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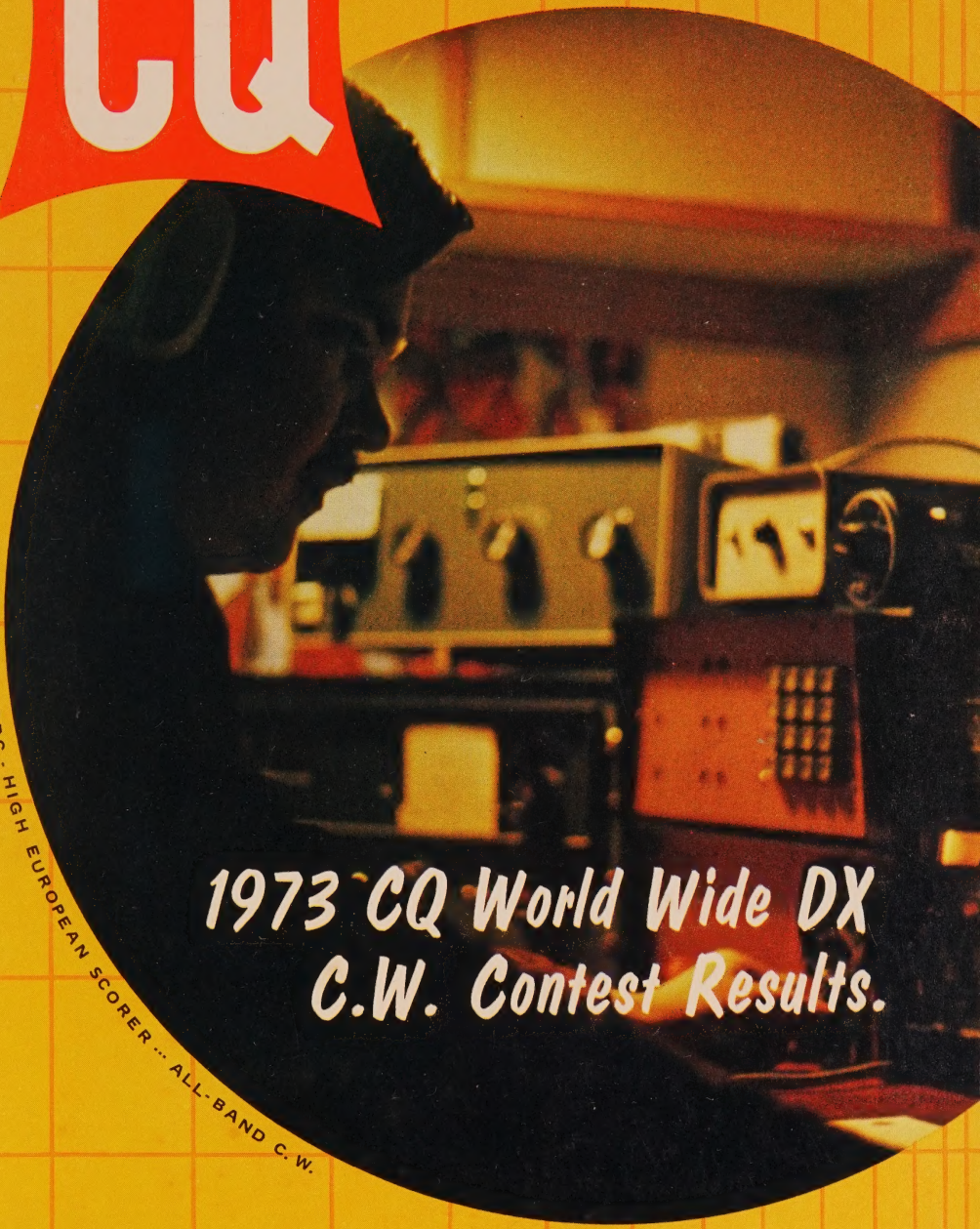
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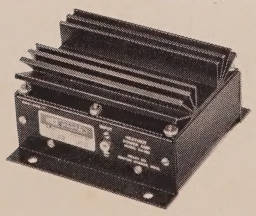
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The Heathkit HA-202 2-Meter Amplifier works with any 2-meter exciter delivering 5-15 watts, while pulling a meager 7 amps from any 12 VDC system. No additional power supplies are required. All solid-state components mount on a single circuit board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



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

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Kit HM-2102,
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HM-2102 SPECIFICATIONS — **Frequency range:** 50 MHz to 160 MHz. **Wattmeter accuracy:** ±10% of full-scale reading.* **Power capability:** To 250 W. **SWR sensitivity:** Less than 10 W. **Impedance:** 50 ohms nominal. **SWR bridge:** Continuous to 250 W. **Connectors:** UHF type SO 239. **Dimensions:** 5¼″ W, 5⅛″ H and 6½″ D, assembled as one unit.

*Using a 50 Ω noninductive load.

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

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

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

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

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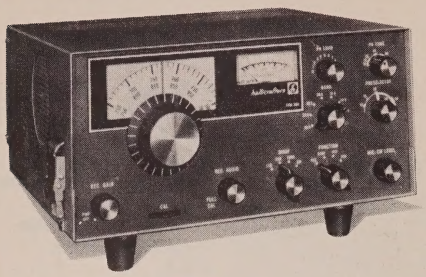
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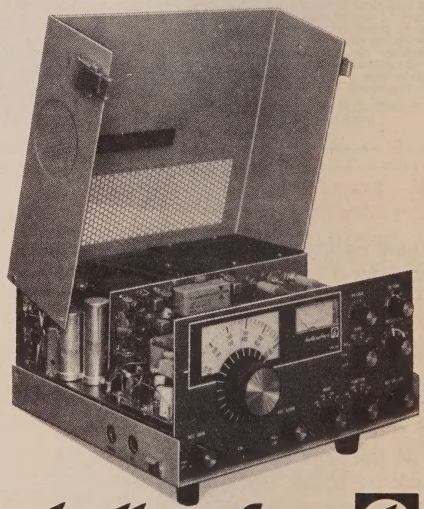
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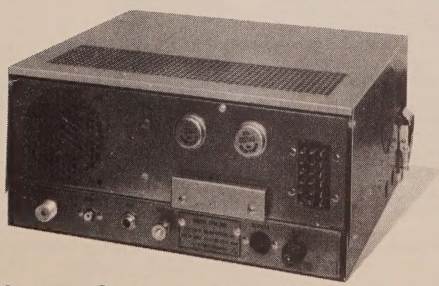


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- Type of service: continuous operation with 2-tone S SB-CW-RTTY (50% duty cycle)
- Power Output: 125 Watts P.E.P. (Nominal) into 50 ohms
- Receiver Sensitivity: Less than 1 uV for 15 db SN Ratio
- Selectivity: 2.0 kHz
- Receiver IM: 60 db below 2 equal 10MV signals
- Receiver Image and IF Rejection: Greater than 60 db.
- Internal Receiver Spurious: Less than equivalent 1 Microvolt Signal
- Transmitter IM: 30 db below P.E.P. (26db below one of two equal tones)
- Adjacent Channel Desensitizing: 3 db with greater than 10,000 MV
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- AF Power Output: 2 watts
- Stability: 100 Hz after warmup. Max. 100 with 10% line voltage change
- Frequency Readout: Within 1 kHz ± 100 kHz of Cal. Point not more than 3 kHz across entire 500 KC Band
- Break-In CW: Semi-Automatic
- CW Sidetone
- Audio Frequency Response: 500-2500 Hz Nominal
- AALC: 12 db Compression
- AGC Figure of Merit: 60 db minimum
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AUGUST, 1974 VOL. 30, NO. 8

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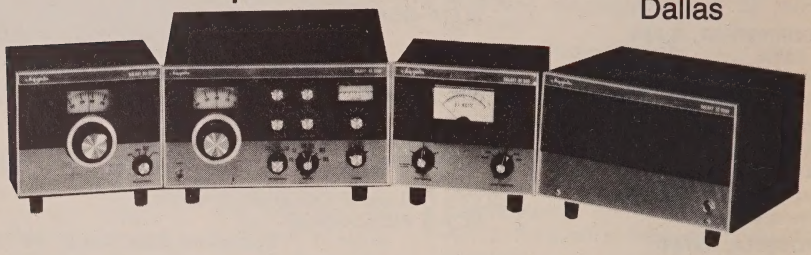
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Noise Level—In excess of 40 db below single tone carrier.

Audio Frequency Response—Minus 6 db approximately 300/2400 Hz determined by side band filter.

RF Compression Characteristics—Up to 10 db RF compression without distortion.

Receiver Sensitivity—Better than .5 uv for 10 db S+N/n ratio.

Receiver Selectivity—2.1 KHz with 1.8 shape factor for SSB or 300 Hz sharp selectivity with optional CW filter.

Receiver Spurious Response—Image rejection better than 40 db down. Internal spurious below 1 uv equivalent input.

Frequency Calibration—Interpolation to 1 KHz in 5 KHz increments.

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Effective Sept. I, 1974, CQ's domestic subscription rates will be:

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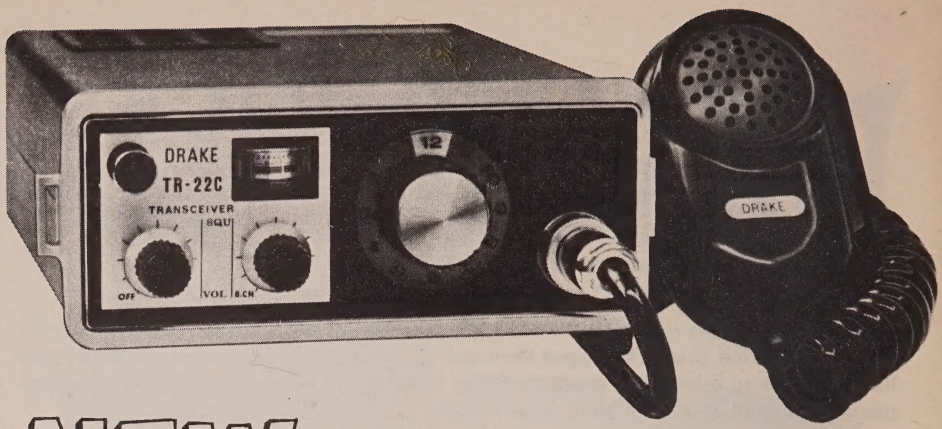
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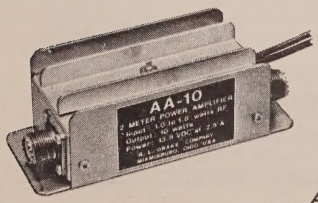
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RECEIVER: • **Sensitivity:** Typically .5 microvolt for 20 dB quieting • **IF Selectivity:** 20 kHz at 6 dB down; ±30 kHz channel rejection greater than 75 dB down. • **First IF:** 10.7 MHz with 2-pole monolithic crystal filter. • **Second IF:** 455 kHz with ceramic filter. • **Intermodulation Response:** At least 60 dB down. • **Modulation Acceptance:** ±7kHz. • **Audio Output:** At least 1 Watt at less than 10% distortion. • **Audio Output Impedance:** 8 Ohms

TRANSMITTER: • **RF Output Power:** 1 Watt minimum • **Frequency Deviation:** Adjustable to ±10 kHz maximum, factory set to 6.0 kHz. • **Multiplication:** 12 Times



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OUR READERS SAY

TVI Suits

Editor, *CQ*:

The issues raised in the recent discussions and letters concerning RFI problems and liabilities are certainly deservant of careful study by all of us.

It is difficult to argue against the idea of insurance which offers protection against loss of one's life, property, savings, etc. The great dilemma here is the possibility that once widespread insurance becomes a fact, complainants will "sue the insurance company" as the expression goes in other damage suits where the complainant feels he is suing an impersonal corporation.

We should take heed and control of the situation - our relationships with our neighbors; the design, installation, filtering, and operation of our equipment; and support of legislation such as HR-3516 which would require home entertainment devices to contain r.f. rejection filters.

Let us hope that the situation will not degenerate into one of paying damages to neighbors in order to continue operation and enjoyment of our beloved amateur radio hobby/service.

Edward F. Erickson, W2CVW
South Amboy, NJ

Editor, *CQ*:

In response to T.V.I. Lawsuits, how about a counter-suit? For example if the next door neighbor's car has engine noise which causes interference to your receiver on 15 or 10 meters, he is not in compliance with part 15 of FCC rules and regulations. He also is just as "guilty" as the ham for an invasion of privacy: Keeping the ham from enjoying his hobby as much as the ham who might disturb some TV watchers. After all, isn't watching TV a hobby? Another example: While the neighbor is watching TV, if he is using a color set, tune down to 3.580 mHz and I'll betcha you will receive his color burst oscillator loud and clear.

I think these are just as justified grounds for suit (countersuit) as the guy with a TV has. Anyhow, its food for thought.

John F. Tilch Jr., K5EIE
El Paso, TX

QSLing

Editor, *CQ*:

As a non-US station primarily in the c.w. bands, I have grown accustomed to including as part of my regular exchange of information with other stations, the following phrase: QSL VIA BUREAU. I do this to suppress pleas for my QSL card, or queries for my QSL address. I'm sure the phrase is nothing new to c.w. operators.

I much prefer to have a nice chat with anyone, regardless of his QTH, whose signal is S-9 than chase DX to get their QSL card. In fact, I'm sometimes annoyed at some stations who are quite insistent on having a QSO with me, for the same reason. Rather than copy thru their QRM, I either QRT, look for a clear frequency, or look for someone else with a nice strong signal.

And now to the point of my letter. I propose that those amateurs among us, who are not interested in sending or receiving QSL cards, have some simple means of communicating this initial intent to everyone who is listening. One possibility is to transmit DEN instead of DE, when identifying yourself at the end of each transmission. I suppose one could even say "DEN" on phone, to indicate the same intent. I confess it sounds awkward, but perhaps with wide usage we would grow accustomed to it. After all, don't we say HI-HI when we mean HA-HA?

In any event, I'm tired of QSLing. It takes up a lot of my time, I can't afford a QSL service, and the postage is no longer insignificant. Each year I send out about 1000 cards for the 1000 that I receive. The ones I receive are filed alphabetically and like-as-not, never seen again.

I do wish to point out that I'm aware of the great number of amateurs who do look for DX and who are interested in exchanging cards. Fine. The certificates that can be earned are certainly worthwhile achievements. Their recipients have every reason to be proud of themselves for the skill and patience required to get them. These operators would not be wasting their time, QSL card, and postage by declining a contact with a station using DEN.

Also, even if two amateurs had a contact using DEN throughout, there is nothing to prevent them from agreeing to exchange QSLs. In this case, continuing to use DEN merely broadcasts to other listeners their initial feelings about QSLing.

Theodore J. Herman, KZ5VV
Gamboa, Canal Zone

Editor, *CQ*:

On May 25, 1974 at 0145GMT, I heard a DX station in the Galapagos Island off the coast of Ecuador. This was a new DX country for me. I made contact, exchanged reports and he passed along his QSL information. While giving me this information, he said IRC's were no good there, and to send him a SASE with $1.00 enclosed. I asked him if a stamp from his country (I can usually get these through a DX stamp service in New York) would be OK. He snapped back, saying not to blame him if I did not get a card from him, that he did not care to QSL for the fun of it and that he had a big stack of unanswered QSL cards from stations that did not send him a dollar.

I feel that if I have to pay somebody off to get a QSL, I'd just as soon not have one from him. The Callbook lists 11 stations there. I'll wait to hear from the other 10, hoping that they are not in ham radio for the money.

Ben Thomas, WB5EOV
Waco, TX

'Judge' Rates High

Editor, *CQ*:

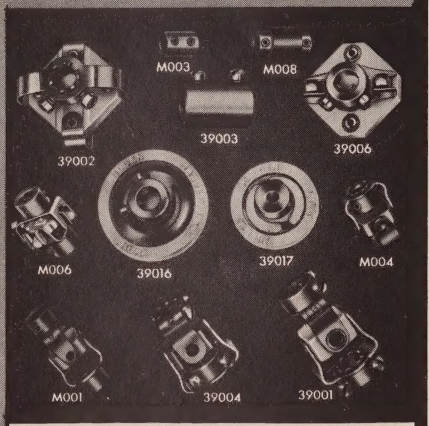
I'm sure you get letters about something someone doesn't like.

I'd like to write one to compliment you upon publishing the very interesting article written by Ken Glanzer entitled, " Determining Resonant Lengths of Transmission Lines. "

I found this article most interesting and helpful. It is the sort of information that the ham can put into practice in order to make his con-

Designed for

Application



COUPLINGS

Illustrated are a few of the stock miniature and standard Millen couplings. Flexible or solid—insulated or non-insulated — normal or high torque. Also available with inverted hubs to reduce length.

JAMES MILLEN MFG. CO., INC.
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tribution to Amateur Radio more worthwhile.

Sounds like I have a high regard for the "Judge" as I also own and value his Antenna Handbook.

Jules P. Miller, W4BJM
Hillsboro Beach, FL

Phantom Copying

Editor, *CQ*:

Just a brief note to tell you how much I enjoyed the article "Phantom Copying: A Transitional Step" by Mr. Al D'Onofrio in the June '74 issue which arrived this afternoon. It was a delightful article written in a light, pleasant, altruistic vein. I hope we can see more of Mr. D'Onofrio's writing in the future.

I only wish someone like "Harv" had been around when I was trying to learn to copy WCS Press Wireless in USS *Herndon* (DD-198) back in 1939 on Neutrality Patrol down in the Caribbean. It would have made c.w. a heckuva lot easier.

Harry R. Mead, W4MRY, (ATC, USN, Ret.)
Orlando, FL

Editor, *CQ*:

599X on W2PRO's "Phantom Copying" article (*CQ*, June, '74). I would like to hear more from Al on c.w. and other related subjects, too. Your Novice Shack is VFB, but the focal point of all Novices and others is c.w., day in and day out. There are a thousand and one problems, and the day of the clean QSO is gone for most of us. We need c.w. help every month. Is "Old Salt" Harv a possible candidate?

Ken F. Hilt, WN3WLM
Pittsburg, PA

We've approached "Old Salt" Al D'Onofrio (creator of Old Salt Harv) to come up with sequels to Ernie's encounter with the old pro. In the meantime we'll just have to be patient or perhaps feed a few story ideas to W2PRO. - K2MGA

Announcements

St. Cloud, Minnesota

The Central Minnesota Hamfest will be held on Sunday, August 18th, 1974, near St. Cloud Minnesota. There will be a swap-market and transmitter hunt. For more information contact: Gary Loomis, WNØGSC, Rt. 2, Rice, MN 56367.

Marshalltown, Iowa

The Iowa 75 Meter Net will hold its annual picnic on Sunday, August 25, at Riverview Park in Marshalltown, Iowa. Prizes will be awarded and drinks are free. Contact Jerry Smith, WØDUN, P.O. Box 14, Akron, Iowa 51001.

Rockford, Illinois

The Big Thunder Amateur Radio Club and Rockford Amateur Radio Association announce the annual Bel-Rock Hamfest at the Boone County Fairgrounds, Belvidere, Illinois on August 25, 1974, Rockford, Illinois, 61110.

Shelby, North Carolina

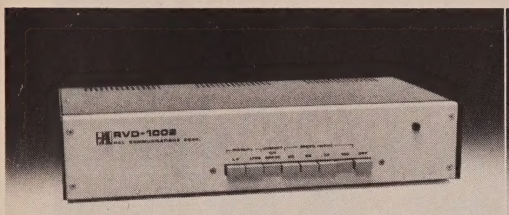
The Shelby Radio Club Annual Hamfest will be held August 31rst to September 1rst, 1974, at Cedar Park, North of Shelby on Highway 10. Write or call Bill Bridges, K4WHQ, 904 E. Main St., Shelby, NC 28150. (704)482-1239.

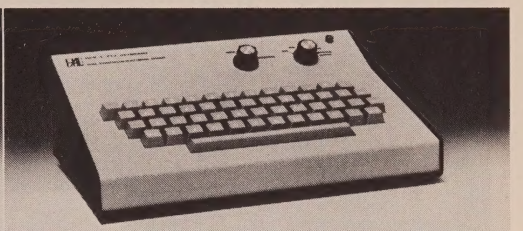
Louisville, Kentucky

The Fourth Annual Greater Louisville Hamfest will be held on Sunday August 25th, 1974 at the

[*continued on page 70*]

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The RVD-1002. The silent, reliable RTTY video display unit from HAL.

The revolutionary HAL RVD-1002 RTTY video display unit "prints" an RTTY signal from any TU at the four standard data rates (60, 66, 75 and 100 WPM), using a TV receiver with slight modification. Or it will directly feed a TV monitor. Power consumption is low, thanks to the RVD-1002's solid-state construction. So turn on to silent, trouble-free RTTY—with the RVD-1002.

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All solid-state. Transmit at data rates of 60, 66, 75 or 100 WPM at the flick of a switch. Complete alpha-numeric keys, 15 punctuation marks, 3 carriage control keys, 2 shift keys, break key, 2 character function keys, a "DE-call sign" key, even a "Quick brown fox..." test key.

The DKB-2010 is equally versatile in the CW mode, with complete alphanumeric and punctuation keys, speeds from 8-60 WPM, and a "DE-call sign" key. The DKB-2010 includes a three-character buffer operational in either the RTTY or CW mode. Optional 64 or 128 key buffer also available.

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Every amateur who knows his RTTY respects the ST-6 terminal as being the best. Autostart operation, an antispace feature and switch selection of 850 and 170 Hz shifts are standard. Circuitry is state-of-the-art, including DIP IC's on plug-in PC cards. Filters and discriminators are designed for standard RTTY tones. A 425 Hz shift discriminator is an option which allows superior reception when copying commercial press transmissions. Another option is the AK-1 audio frequency shift keyer for input to an SSB transmitter. The ST-6 and its options are available in assembled or kit form. Cabinet not included in kit.

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HAL Communications Corp.
Box 365, Urbana, Illinois 61801
Telephone: (217) 359-7373

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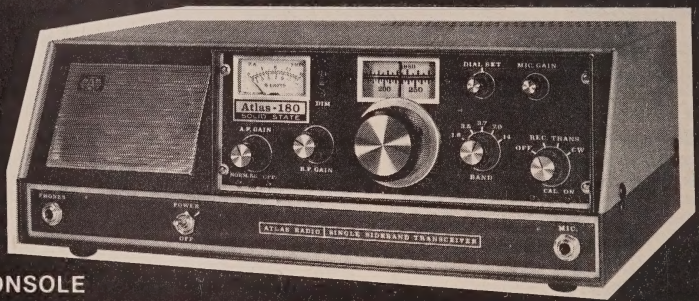
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180 WATTS P.E.A. INPUT . . . 20, 40, 80 and 160 METER



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THE IDEAL MOBILE RIG.
Only 3½ in. high, 9½ in. wide, 9½ in. deep . . . Operates directly from 12-14 volts DC . . . All Solid State Modular Construction, No transmitter tuning, Built-in speaker. All the necessary features, power, and performance for only.....**$479**



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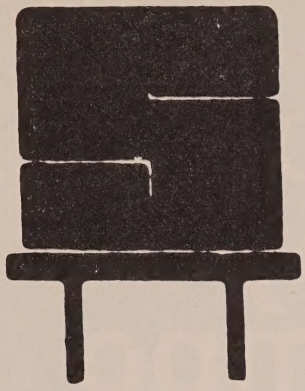
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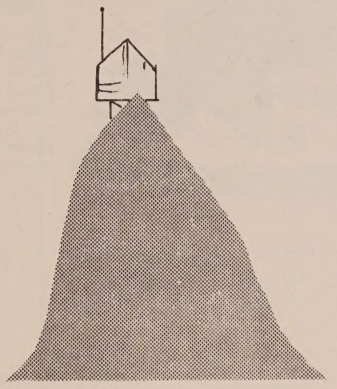
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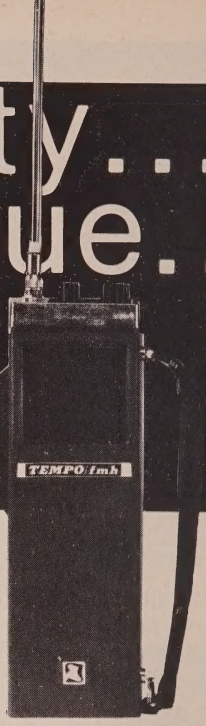
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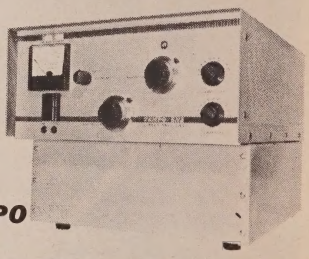
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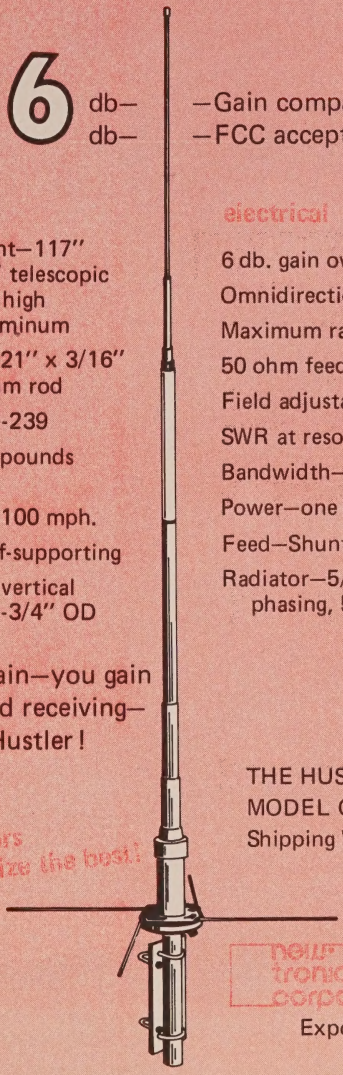
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...or any TWO-METER FIXED STATION OPERATION

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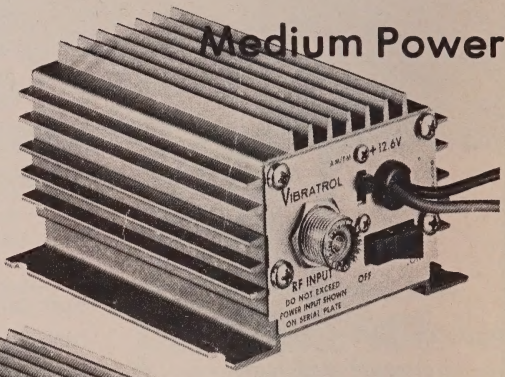
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SOLID STATE AM-CW-SSB

FM-AM-CW-SSB MOBILE/BASE

2 METER AMPLIFIERS

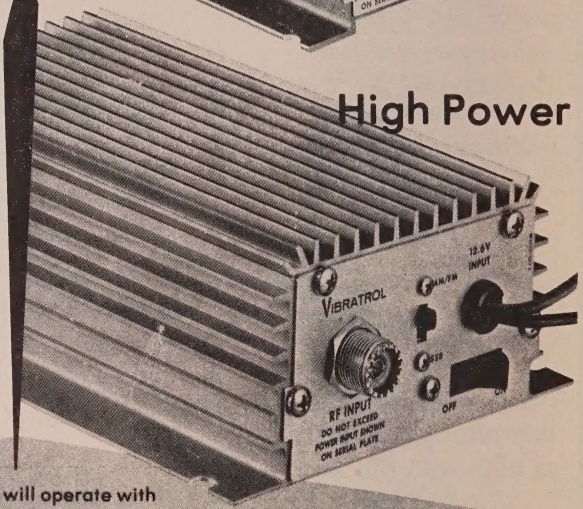
Medium Power



Model	Drive	Output	Price
RFL-301	3W	40W	$ 99.95
RFL-401	3W	60W	149.95
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All cases 2½" H x 4" W x 4" D, anodized.

High Power



Model	Drive	Output	Price
RFL-501	3W	110W	$199.95
RFL-801	10W	100W	149.95
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All cases 2½" H x 4" W x 8" D, anodized.

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All models will operate with reduced output from as little as one watt drive.
Amplifiers are supplied pre-tuned for band portion in which they are to be used.
For SSB and CW use, delayed dropout is available — add "SSB" to model number and $5.00 to price.
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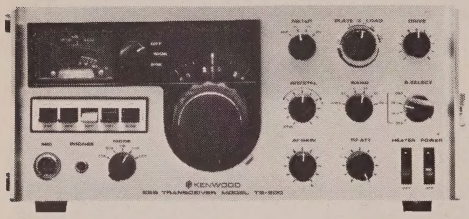
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Hy-Gain Electronics Corporation; 8601 Northeast Highway Six; Lincoln, NE 68507; 402/464-9151; Telex 48-6424. Branch Office and Warehouse; 6100 Sepulveda Blvd., #322; Van Nuys, CA 91401; 213/785-4532; Telex 65-1359. Distributed in Canada by Lectron Radio Sales, Ltd.; 211 Hunter Street West; Peterborough, Ontario.

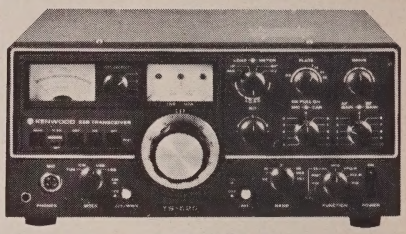
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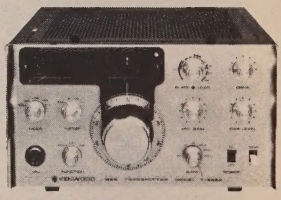
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The Transistor in 1926?

BY R. M. KEILS*

"A SIMPLE, substantial and inexpensive . . . amplifier not involving the use of excessive voltages, and in which no filament or equivalent element is present."

In 1926 such a device was but an engineering fantasy. After all, the state of the art had not yet embraced the indirectly heated cathode. Semiconductor development was barely postnatal, and twenty-one years would pass before Walter Brattain and John Bardeen of Bell Telephone Laboratories would write their famous letter to an editor announcing the invention of a working crystal amplifier.

But a few prophetic minds were, even in the twenties, playing around with what was to be known as solid-state electron physics. The idea of a solid-state valve was not new; logic suggested that, as the introduction of the control grid into the vacuum tube diode had produced the triode, a similar development might turn the semiconductor rectifier into an amplifying device.

A physicist in Leipzig, Germany, Julius E. Lilienfeld, sought to corner the credit for the invention before ayone else could turn theory into fact—before he could, for that matter. His three U.S. patents read like successive versions of a chapter from Jules Verne or Hugo Gernsback. Lilienfeld earned his credentials for his work in electron field emission by which he contributed to the development of the X-ray tube and the various sub-atomic emission microscopes. Though his attempts at advancing solid-state are more curious than revolutionary, they afford a unique look at the scientific imagination.

Lilienfeld filed in October 1926 for a patent on a "method and apparatus for controlling electric currents."[1] The illustration which accompanies the patent (fig. 1) shows a rectangular device with a frame of glass (10) divided in half by a piece of aluminum foil .0001 inch thick, (13) or (14). Two conductors (11) and (12) of copper, silver or gold lie on one surface of the glass, their edges near and parallel to the transverse break which holds the foil flush with the surface. (For reasons unknown Lilienfeld apparently envisioned a fracture rather than a smooth cut in which to sandwich the foil —perhaps he was afraid it would otherwise fall out.)

Over this arrangement is deposited a coating of unspecified "minute thickness" of "a compound of copper and sulphur," (15). This film bridges the two conductors, which serve as contacts, and joins the foil to form an electrical 'T.' It is applied, says Lilien-

*138 Stockbridge, Apt. 2, Kalamazoo, MI 49001.

[1] Patent No. 1,745,175. Filed Oct. 8, 1926, dated Jan. 28, 1930. Figures 1 and 2 are reproduced from this patent.

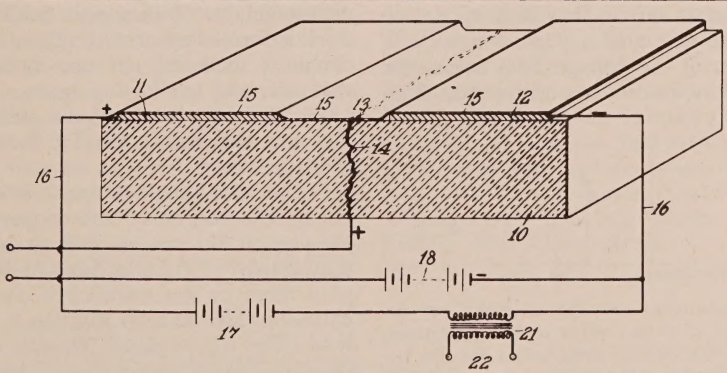


Fig. 1—Diagram from the first American patent of a solid-state amplifier. Call-outs are described in the article.

feld, by heating a copper wire in a vacuum so as to spatter copper onto the device, or by depositing the copper from a colloidal suspension. The deposit is then sulfurized by exposure to a sulfur vapor or a sulfur-bearing gas or liquid.

Junction Field-Effect Transistor?

The copper-sulfur compound is chosen because it forms a rectifying junction with aluminum; the aluminum is the cathode. Various rectifying junctions were available at the time and their success as r.f. detectors was stimulus enough to conjure these prefigurations of the technology we have today.

Though it was not in Lilienfeld's vocabulary, we can apply the modern terminology of the field-effect transistor to describe this device handily, for their principles are largely the same regardless of the immaturity of the inventor's concept of semiconductor physics. The positive terminal (11), or drain, is connected to the positive pole of battery (17), and the source (12) is connected to the negative. As with the FET, drain and source are interchangeable. The channel is the portion of the film between (11) and (12) (prophetically, it even *looks* like a channel, though the patent gives it no particular name). The foil forms a junction with the channel and is reverse biased, causing the depletion region. Amplification is the result of the variation in the conductivity of the film adjacent to the junction in response to the signal voltage on the foil gate. Since electrons were the only carriers known to Lilienfeld, his would have to be considered an n-channel FET.

Figure 2 shows the inventor's supposition of the relative voltage levels at all points in the direction of current flow with the device in operation, no signal applied. Portion *c* is the gradient of the voltage drop across the channel; *d* represents a positive bias high

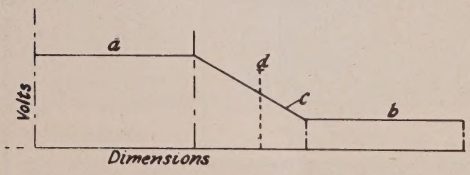


Fig. 2—"Dimensional volt characteristics" of device of fig. 1. *d* is bias value on the *volts* scale. *a* minus *b* is the voltage drop across the film between contacts (11) and (12), shown as a gradient by portion c. The base line of the graph is obviously some arbitrary negative voltage.

enough to prevent clipping the negative peaks of a signal applied to the two terminals at the left of fig. 1. If the signal causes the voltage on the foil to go negative with respect to the potential at that point of the film, the foil will draw what we would call gate current since reverse bias would be lost. Battery (18) provides the bias.

The depletion region common to today's FET theory does not occur in Lilienfeld's interpretation of the dynamic physics of his amplifier. He explains the transistor function thus:

> The basis of the invention resides apparently in the fact that the conducting layer at the particular point selected introduces a resistance varying with the electric field at this point . . . it may be assumed that the atoms (or molecules) of a conductor are of the nature of bipoles. In order for an electron, therefore, to travel in the electric field, the bipoles are obliged to become organized in this field substantially with their axes parallel or lying in the field [direction] of flow. Any disturbance in this organization, as by heat movement, magnetic field, electrostatic cross-field, etc., will serve to increase the resistance of the conductor . . . [and with this design] the conductivity of the layer is influenced by the electric field.

Which is to say, the apparatus is a voltage amplifier. Note that the film is thin enough that the field acts across its full thickness.

The New Improved Models

Though he never improved on his semiconductor theory Lilienfeld went on inventing. In his second patent application seventeen months later he describes various design improvements for the amplifier and gives greater detail of materials and fabrication.[2] This time the frame is a substrate of aluminum instead of glass. See fig. 3. A dielectric layer of aluminum oxide 10^{-4} mm. thick is formed electrolytically or "by purely chemical methods" on one surface. Over that are two conducting layers, (30) and (31). One may be aluminum and the other "copper disulfide (Cu_2S), lead dioxide (PbO_2), etc. . . .

"Other combinations may consist of copper for the portion 30 and copper oxide for the portion 31, etc.; or, both of the portions may consist of metal or both of compounds of a more or less conductive nature." The extra-thin area of their junction is where the field effect takes place. Though it appears

[2] Patent No. 1,900,018. Filed March 28, 1928, dated March 7, 1933; from which figure 3 is reproduced.

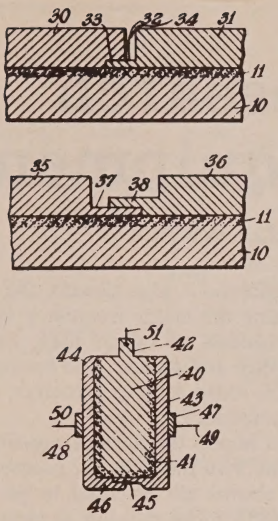


Fig. 3—Cross-sections of improved amplifier designs. (10) and (11) correspond to (40) and (41); (31) and (30) to (43) and (44).

that he is specifically intending a rectifying junction between (30) and (31) when using a metal and an oxide or sulfide, Lilienfeld makes no mention of the obvious. Indeed he negates the argument by suggesting some of his "other combinations." Amazingly, he later in the same patent describes a diode detector of copper sulfide and aluminum, though it is a different animal from his amplifier. It would seem that the physicist missed seeing an important characteristic of his own invention.

Lilienfeld's third patent application[3] describes a final model of the device (fig. 4): an amplifier consisting of a thin ("200 $\mu\mu$") layer (12) of magnesium "or aluminum, tungsten, tantalum, etc." sandwiched between two heavier layers (10) and (11) of copper sulfide "or copper bisulfide, silver sulfide, lead peroxide, magnesium sulfide, etc." The thinness of (12) assures that pores are left, (12'), so that the material from (10) and (11) will fill them, bridging (12) with the metallic compound to "offer passageways between the said outer layers for the flow of electric current therebetween." These passageways are equivalent, electrically, to the thin portions of semiconductor provided on the surface of earlier designs.

Though Lilienfeld describes this setup aas two back-to-back diodes with one common element, (12), suggesting to modern readers the configuration of the bipolar junction transistor (12 would be the base), those microscopic short circuits of (12') show that this design is merely a mechanical variant of principles applied to earlier efforts. (10) and (11) are electrically one, as are (11), (12) and (15) in fig. 1.

Noble, If Not Nobel

"Invention" is a word of glass. It can be stretched to extremes and bent into any shape desired; its usefulness can be as easily shattered. Did Lilienfeld "invent" the solid-state amplifier?

Any reader of patents knows that the only thing that must be demonstrated workable for the granting of Letters Patent is the author's imagination, since originality of scheme rather than practicality is the needed factor. Perhaps as much fiction, especially science fiction, is covered by patent as is covered by copyright.

But even Lilienfeld's imagination fails the readers' test at points. It's not his fault that current semiconductor theory was lacking in the twenties, but it is certainly not to his credit that he mistakes Cu_2S for "copper disulfide" when it has always been copper or cuprous sulfide. It does not speak well of his scientific method that the graph of fig. 2, based on no empirical data, is beneath the scientific standards of the high school science fair projects of today. The graph suggests that he never built and tested the device he claims to have invented.

Moreover, he contradicts himself in his claims and he makes ridiculous errors. For example, he suggests that a junction of a pure metal with a pure metal, even aluminum with aluminum, can form a rectifier—a patent absurdity. Such illogic makes following his patent claims as difficult as

[*Continued on page 72*]

[3] Patent No. 1,877,140. Filed Dec. 8, 1928, dated Sept. 13, 1932. Figure 4 is from this patent.

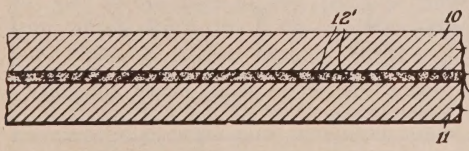


Fig. 4—Final design employs the same principles as fig. 1 in a third arrangement.

CQ Reviews: The Robot Research Slow-Scan TV Equipment

BY COPTHORNE MacDONALD,* WØORX

THE Robot Model 70A SSTV Monitor, and the Model 80A SSTV Camera, are the latest versions of the Model 70 and Model 80 which have done so much to launch slow-scan TV as a widespread amateur activity. Robot has also introduced an electronic "viewfinder" monitor, the Model 61, which works as an accessory to the camera, permitting more rapid camera setup and adjustment.

The Model 70A SSTV Monitor

In amateur slow-scan TV the camera converts an image into a frequency shifted audio tone. This tone is then transmitted by the station's regular r.f. transmitter. At the receiving end, the audio output of the ham receiver is converted back to an image in the slow-scan monitor. The Model 70 slow-scan TV monitor is the basic unit in the Robot system. In addition to displaying the received picture it also powers the camera and contains the audio frequency switching circuitry needed to switch back and forth between voice and picture, and between various possible video sources (receiver, camera, and tape recorder).

Figure 1 shows the various possible interconnections with the 70A. Of course, not all the units shown are essential to get on the air with SSTV. The monitor is essential for receiving. For transmitting you need a camera or even just a tape recorder with pictures recorded for you by a friendly slow-scanner. The Model 61 viewfinder and a scope are not necessities but do make setup and adjustment easier. Note that the station microphone plugs into the 70A and no longer into the transmitter. A patch cord connects the monitor to the transmitter mike jack. This arrangement permits the front panel VIDEO/VOICE switch to control whether the mike, or one of the video sources, is fed to the transmitter. (The microphone PTT

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

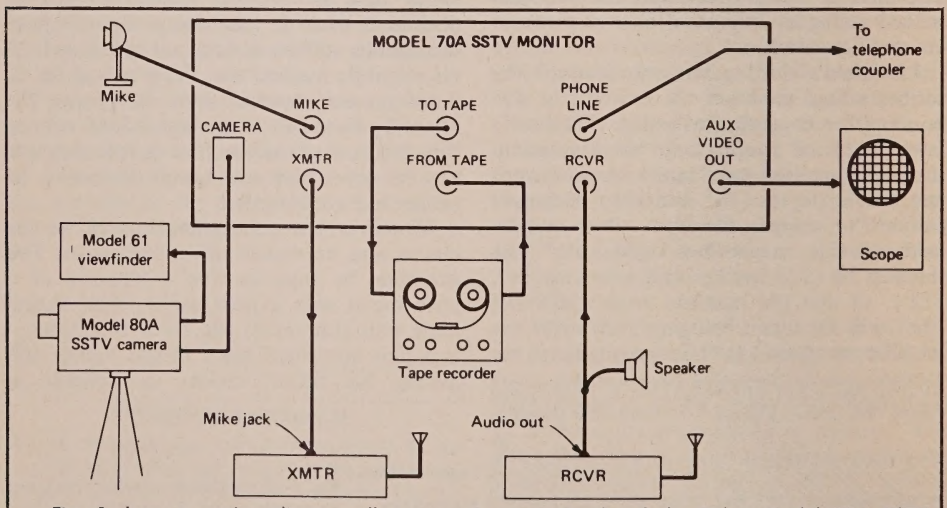


Fig. 1—Interconnection diagram illustrating the central role of the Robot Model 70A SSTV monitor in the Robot system.

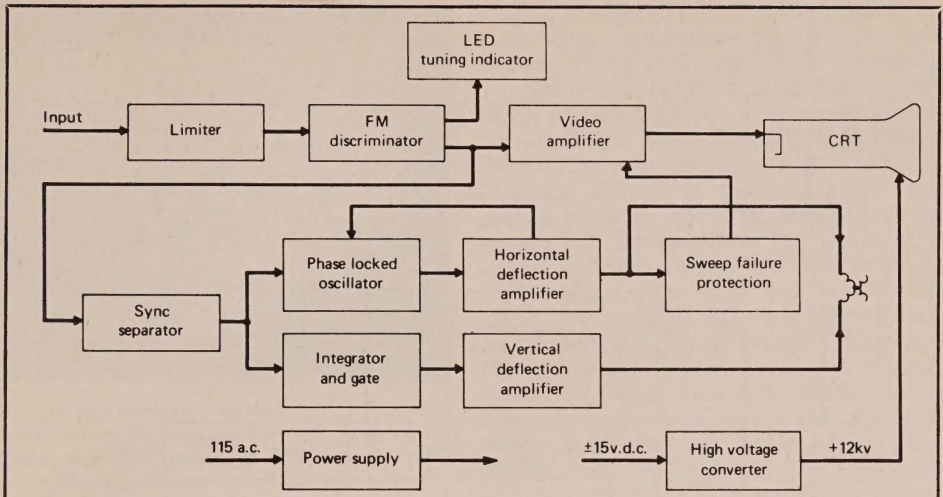


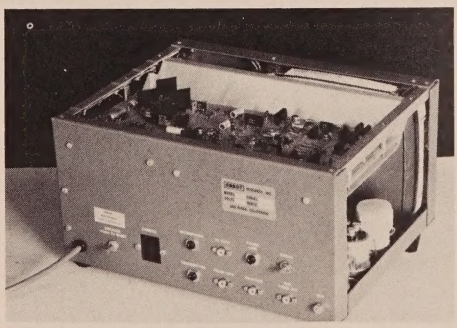
Fig. 2—Block diagram of the Robot Model 70A SSTV Monitor.

switch will work as usual.) The front panel VIDEO SELECT SWITCH has three positions: CAMERA, RECEIVE, and TAPE. In the CAMERA position the output of the 80A camera is viewed on the 70A monitor screen, is fed to the tape recorder input, and is sent to the transmitter if the VIDEO/VOICE switch is in the VIDEO position. In the RECEIVE position the receiver output feeds the monitor and tape recorder inputs. In the TAPE position the tape recorder output feeds the monitor and the transmitter input.

The system can also be used for sending and receiving pictures over telephone lines. In this case the PHONE LINE output of the 70A goes to the phone company installed "voice coupler." (Due to the fact that the ham receiver and speaker would load down the incoming phone line signal if everything is connected at once, it's either radio *or* telephone use unless some external switching is used.)

Some of the 70A's features can better be understood by referring to the block diagram of fig. 2. The SSTV signal shifts between 2300 Hz which represents "white," to 1500 Hz for "black," and 1200 Hz for "sync." The 70A uses an op-amp limiter which drives an s-shaped active filter discriminator. The d.c. out of the discriminator feeds a video amp which drives the CRT cathode. The sync separator in this monitor strips sync off the demodulated composite video signal as is done in a conventional TV set. It is a.c. coupled to allow sync separation under conditions of slight mistuning or low signal input. The horizontal oscillator is phase-locked to the incoming sync rather than being directly triggered by each pulse. The vertical oscillator is triggered directly by each integrated vertical pulse. Each deflection amplifier uses a pair of power transistors and an op-amp in a feedback arrangement to drive the CRT deflection yoke, insuring linear sweep.

One of the features which the 70A has, that the 70 did not have, is an LED tuning indicator which helps the operator to tune the s.s.b. receiver when coming upon an SSTV transmission in process. Another new feature is the AUX VIDEO OUT jack which allows a d.c.-coupled scope to be used to monitor the demodulated video waveform.



The 70A SSTV monitor with cover removed showing plug-in epoxy-glass PC board on top, and rear panel connectors.

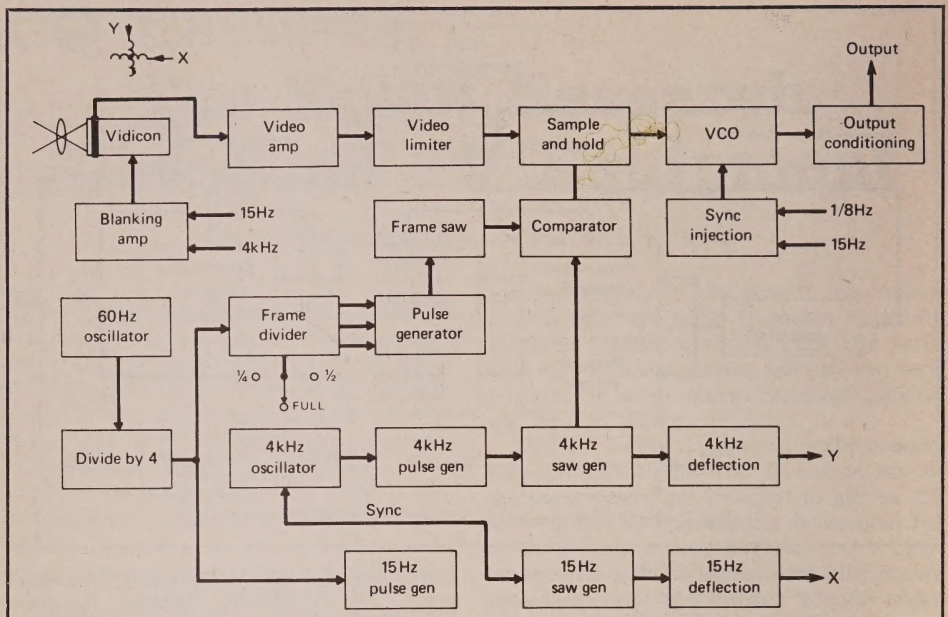


Fig. 3—Block diagram of the Robot Model 80A sampling type SSTV camera.

For many reasons stable voltages are a necessity in slow-scan equipment, and Robot went to considerable lengths to insure stability in the 70A. The basic supply voltages of +15 and −15 volts are regulated to a rated 0.1%, line and load. The +12 kv for the CRT is supplied by an r.f. shielded d.c.-to-d.c. converter powered from this regulated low voltage. The monitor power supply is designed to have sufficient reserve capacity to power the 80A camera as well as its own circuitry, and a zener regulated −120 volts and an unregulated +350 volts are also produced and made available at the camera accessory jack on the rear panel of the monitor.

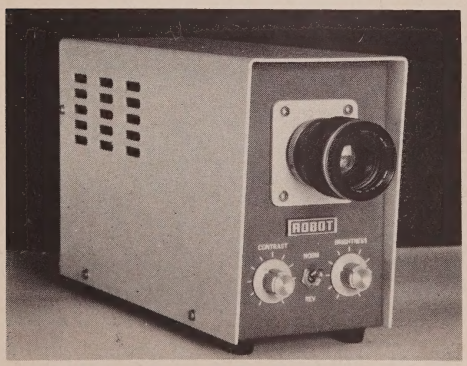


Fig. 4—The Robot Model 80A SSTV camera showing the front panel controls.

The CRT is a 9 inch rectangular, magnetically deflected, and electrostatically focused tube with a type P7 long persistence phosphor. The square bezel on the front of the monitor masks the tube face to a 4.75 inch by 4.75 inch active screen area. A yellow plastic filter attenuates the blue flash from the P7. With +12 kv accelerating potential, a phosphor screen can be damaged in short order if the horizontal sweep fails. To prevent this, the monitor employs a sweep failure protection circuit which biases off the CRT if there is no horizontal sweep.

Additional features common to all the Robot units are r.f. bypassing of all leads into and out of the units to reduce the chance of r.f. pickup problems in the shack, heavy gauge aluminum cabinets finished in two-tone grey, and plug-in epoxy-glass P.C. boards. Units are 100% solid state except for CRTs and vidicon, and use quite a few I.C.s—particularly op-amps. Internal strapping of power transformer connections can be changed to permit operation on 230 volts 50/60 Hz as well as 115 volts 50/60 Hz.

The Model 80A SSTV Camera

The 80A was designed solely for amateur rate SSTV. Its scan rates are tailored to the

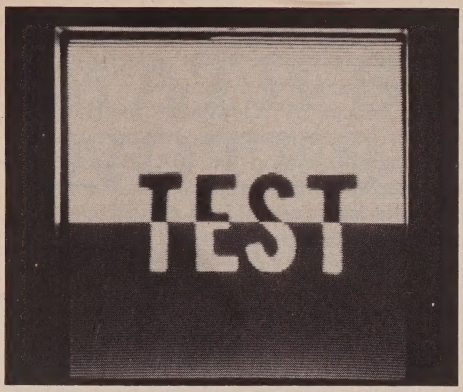


Fig. 5—The camera's NORM/REV switch was thrown when this scan reached the center of the screen, thereby reversing the video polarity. (One frame time exposure of 70A screen.)

amateur standards, and differ considerably from the rates employed in ordinary closed circuit vidicon cameras. Its output is the amateur standard, frequency shifted audio tone, carrying with it video information at a 15 Hz line rate and 8.5 second frame time. The vidicon is not scanned at these rates, however. The camera uses a sampling scheme in which the vidicon camera tube is scanned with a 4000 Hz vertical rate and a 15 Hz horizontal rate. This permits the use of a standard, low cost, one inch diameter vidicon rather than a special slow-scan type. By the use of a timing and sampling scheme too complex to go into here, individual picture elements are picked out of this relatively fast-scan picture. They are then stretched in time to form a baseband slow-scan signal which modulates the audio subcarrier to produce the camera output. The block diagram of fig. 3 shows the flow of signals and pulses within the camera.

The slow-scan sync pulses are generated by a digital countdown sync generator for long term stability. In 60 Hz power areas the power frequency is divided by 4 to obtain the SSTV horizontal frequency of 15 Hz. In 50 Hz areas (Europe for example) the standards call for a horizontal rate of 16⅔ Hz (50 ÷ 3) and this change requires only the shift of a jumper on the P.S. board.

The front panel controls can be seen in fig. 4. The CONTRAST control adjusts the vidicon target voltage and is really a camera tube "sensitivity" control. The further clockwise the control is turned, the more sensitive the camera becomes, but the more prone to shading and grey scale problems. The optimum setting will depend upon the characteristics of the particular vidicon supplied. The BRIGHTNESS control is a d.c. bias control which centers the video waveform between the black and white clipping limits. This control, the lens iris adjustment, and possibly the lighting of the subject are the controls normally used to optimize any given picture for transmission. The NORM/REV switch is used to reverse the video polarity in the Model 80A. Thus it is possible to transmit white letters on a black background even when using black-on-white artwork. Figure 5 shows a picture where this reversal switch was thrown right in the middle of the scan. Another new feature of the 80A is a switch on the rear panel of the camera permitting transmission of ¼ and ½ frames as well as the normal full frame. The ¼ frame mode is particularly useful for identification, CQs, and the like, because the quarter frame is repeated every two seconds. (See fig. 6.)

Since a sampling camera does not "freeze" the scene that it's looking at, some hams have been apprehensive about its use for viewing people. Is it possible to sit still enough for 8 seconds? Most definitely yes. Unlike a photographic time exposure where slight movement blurs the picture, movement in front of a sampling camera shows up as a distorted but "in-focus" image. Faces look fine even if you don't sit perfectly still, and occasionally some wag will get a laugh by doing the top half of his face "straight on" and the lower half "in profile." (Kids love to experiment with this. It has the same sort of fascination as the distorting mirrors in the fun house.)

Robot has a wide assortment of lenses available for the 80A. Possibly the most appealing for all around use is their *f*/1.4,



Fig. 6—Front view of the 70A SSTV monitor while receiving a ¼ frame transmission from the 80A camera. (2 second time exposure.)

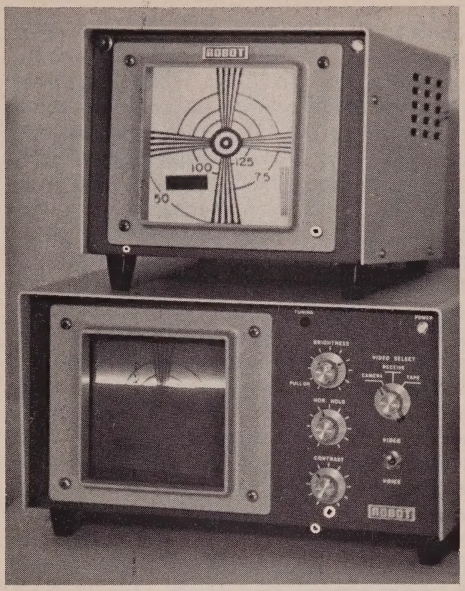


Fig. 7—The Robot Model 61 viewfinder sits atop the 70A monitor and both units display the output of the 80A camera which was viewing a test pattern. (Normal room lighting, 0.125 second snapshot.)

25 mm focal length "Macro" lens which will focus at distances from infinity to as close as 6 inches. This close focusing feature allows small objects to be "blown-up" enough to fill the screen.

The camera has 4 small feet permitting it to sit on a table or shelf. It also has a mounting plate on the bottom threaded for the standard ¼"-20 photographic tripod mounting screw.

The Model 61 SSTV Viewfinder

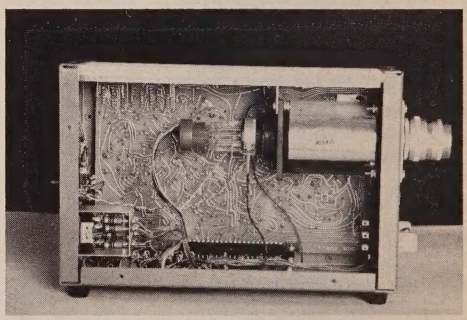
Since the slow-scan frame time is 8 seconds, adjusting the camera for an optimum picture can be a fairly slow process if all that you have to guide you is the image on the slow-scan monitor screen. It takes a few seconds to assess the effect of each new adjustment. Most slow-scanners minimize the problem by recording their frequently used pictures on tape. Others put their cameras on photographic copy stands, pointed down, and put photos and other visual material on standard sized cards that can be slipped conveniently into a fixed position under the camera. The electronic viewfinder adds even more convenience. Essentially it is a TV monitor operating at the camera's *fast-scan* rate of 15 frames per second. With 15 frames coming along every second the picture on the viewfinder screen responds immediately to any changes made at the camera/picture source/lighting end of things.

The Model 61 Viewfinder matches the monitor in screen size, and would normally sit alongside or atop the 70A. Because the 1/15 second frame time exceeds the flicker threshold of the eye, a long persistence CRT is used to minimize the effect. This unit has its own internal regulated power supply, and connects to the FAST SCAN jack at the rear of the 80A camera with a 10 foot cable which is supplied with the viewfinder. There are no external controls on the viewfinder because it is used as a *standard* for setting camera brightness, contrast and lens iris setting, as well as camera focus and positioning adjustments.

70A Monitor Performance

There are still some hams who have never seen a slow-scan monitor in action so I'll try to describe the effect—though there is no real substitute for seeing it. Slow-scan monitors, including the 70A, use the same P7 phosphor used in many radar displays. The yellow part of the phosphor is "glow-in-the-dark" stuff. What happens when a slow-scan picture is being received is that a bright horizontal "writing line" moves from the top of the picture to the bottom over an 8 second period. Above that bright line is left the residual "afterglow" image. Figure 7 gives the rough idea. The lower unit is the Model 70A monitor with writing line just starting to scan down. Of course, the normal room lighting used to take this photo tends

[*Continued on page 71*]



View of the 80A SSTV camera with cover removed. Inside the U-shaped bracket at the lower left are the r.f.i. filter components. The handle of the ¼ frame/½ frame/full frame toggle switch can be seen extending out the rear panel.

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

To begin this month's column, we would like to describe an antenna that we have come across that is quite unique in construction and should be of interest to 2 meter f.m. enthusiasts. The antenna is manufactured by the Phelps Dodge Communications Company, Route 79, Marlboro, New Jersey 07748 and is a commercial 5/8 wave base loaded unit that will operate from 144-174 mHz. What is unique is that the base loading coil is made out of the actual whip rod itself. There is absolutely no plastic, epoxy, etc., but simply a spring steel rod with a loading coil wound right out of one end of the antenna rod. Also on this end is a fitting that must be slightly modified to fit a standard mobile body mount with a 3/8" thread.

The modification consists of simply drilling out the fitting to 3/8" (use care when drilling out the hole as a 3/8" drill has a tendency to catch. Also, do not drill too deeply. *Just past the* set-screw hole is adequate) and sliding it over the existing stud on the body mount. Do not use the body mount spring since that will upset the base loading. Then cut the antenna to the proper length (54" for 146.3 mHz although this is not at all critical) and you are in business. The antenna may be locked in place by a short 10-32 set screw installed in the hole provided. If you use a wing nut soldered to the set screw, you will have a quickly removable installation which will enable you to remove the antenna in a matter of seconds.

Since the cost for this antenna is only $10.50, and it is almost indestructible and foolproof we really don't see how you can go wrong. Incidently, s.w.r. when cut to 54" was 1.3:1 at 146.34 mHz.

The part number is 551-509 and when ordering, request that the nylon threaded locking piece be omitted from the antenna. This will save you the work of removing it when adding the 10-32 locking set screw.

We have not compared the antenna with a commercial 5/8 wave at present, but it gives a gain of about 2 over a 19" 1/4 wave whip (measured by noting increase in signal strength in an area of poor reception).

*5 Melville Lane, Great Neck, N.Y. 11023.

Synthesizers

The letters keep coming in on the column we did for the experimental synthesizer last March with a follow-up in July and we would

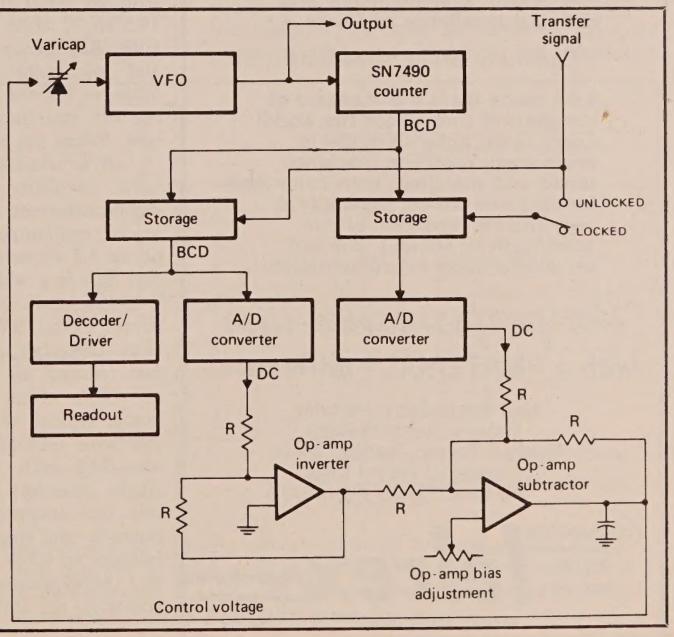


Fig. 1 — Revised synthesizer scheme. All resistors "R" may be the same value.

with **TELREX**

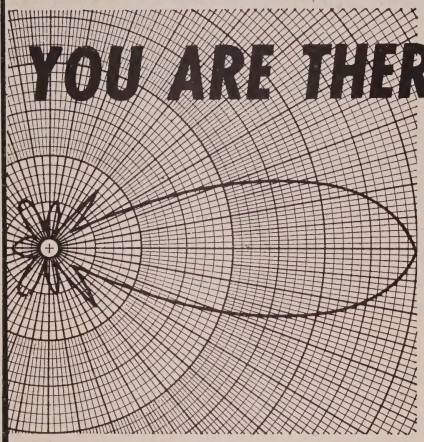
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like to suggest another variation at this time.

Since by now most regular readers will be familiar with the basic scheme and idea, we can jump right to fig. 1. Here we have completely dispensed with all of the digital subtraction methods and converted the output of both storage chips directly to d.c. A simple op-amp now effectively subtracts one d.c. signal from another producing the required control voltage. This new variation should now make this unit much easier to build.

New Products

In the new product area, Beckman Instruments, Helipot Division, Fullerton, California 92634 has just introduced a line of active telephone-tone filters which should be of interest to new repeater builders or owners wishing to add a tone activated feature to their existing setups. Their 882 series filters are available in standard frequencies of 697, 770, 852, 941, 1209, 1336, 1477 and 1633 Hz all $\pm$ 0.5%. Each unit has an input impedance of about 30K and will supply $\pm$ 2 milliamperes to a suitable load. Best of all, these units are available in 1-9 quantity at only $12 complete.

From SGS-ATES Semiconductor, 435 Newtonville Avenue, Newtonville, Mass. 02160 comes several new items. They have introduced three, TO-125 plastic 3 terminal integrated circuit regulators of the type made famous by the Fairchild μA 7800 series. Their L129, L130 and L131 give output voltages of 5, 12 and 15 volts respectively. The L129 will work with an input of 7.5 to 20v., the L130 with 14.5 to 27 volts and the L131 with 17.5 to 27 volts. Regulation for all units is better than 1% and maximum output current is 850 milliamperes for the 5v. unit, 720 milliamperes for the 12v. unit and 600 milliamperes for the 15v. unit. Prices are $1.40 each in 100 quantity.

Also available from SGS-ATES is a new u.h.f. amplifier transistor, the BF479. This device offers an 800 mHz noise figure of 4 db at 10 milliamperes of collector current and about 3.5 db at a current of 1-3 ma. Price for this unit is a welcome $2.25 in unit quantities.

Good news for u.h.f./v.h.f. experimenters comes from TRW Semiconductor, 14520 Aviation, Lawndale, California 90260. They have just reduced all prices on their complete line of v.h.f., u.h.f. and microwave transistors. Some typical reductions are: the JO2005, a *200 watt* unit at 200 mHz through 400 mHz was $38 each and is now only $27.50 in single quantity; the 2N5596 200 watt 1 gHz unit has dropped from $95 to $64 in single quantity and most others have dropped by an average of 25%. If you do any power amplifier experimentations I would suggest that you write for TRW's catalog and new price list.

73, Irv, WA2NDM

antennas

BY WILLIAM I. ORR,* W6SAI

LAST month's column discussed antenna problems some amateurs encounter in the form of restrictions and regulations written into leases and deeds. Some homes, condominium apartments and townhouses frown on the erection of any antenna, and may even have restrictive clauses incorporated into lease or deed. In addition, the widespread use of cable TV, plus the installation of underground utilities, makes the ham antenna an all-too-conspicuous eyesore to the unsympathetic neighbor or landlord.

Provided there are no legal obstacles, which are outside the scope of this column, it is possible for the enterprising amateur to get on the air by using an "invisible antenna," which is either hidden from view, visible but disguised, or which disappears from view when not in use. The indoor antenna was discussed last month, and this column will cover some other antenna projects for "tough" locations. An "oldie but goodie" is the so-called "Pole Lamp antenna."

*48 Campbell Lane, Menlo Park, CA 94025.

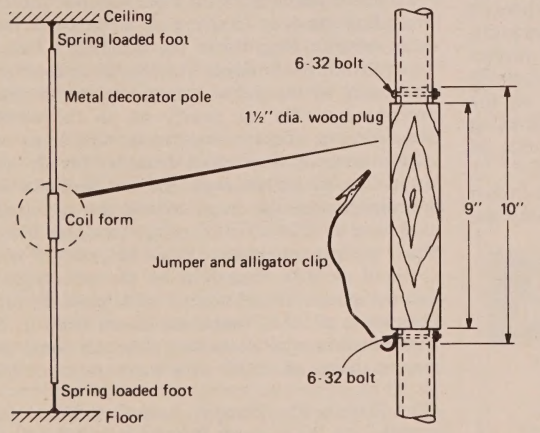
The Pole Lamp Antenna

Sometimes the situation is desperate. An amateur rig can be squeezed into a closet or bookcase, but what about the antenna? If limited to indoors, can the antenna be blended in with the decor of the room and not be an eyesore? The answer to these questions is "yes" when a pole lamp antenna is used.

The pole lamp antenna, fig. 1 is a decor-matching accessory to the home if carefully built. This unique antenna is made from a spring-loaded pole lamp structure, which is placed in position between floor and ceiling of the radio room. Many home furnishing stores carry a variety of pole lamps and decorator poles which can be used to support shelves, radios, books and other objects. Plain, unadorned poles and the various pieces which go together to make up the poles can be purchased. The most popular and least expensive decorator pole is a three-section assembly about seven feet long having spring-loaded "feet" in the ends which are wedged against ceiling and floor.

If you are fortunate, a pole may be purchased with a wood center section, which is required for this antenna assembly. If only an all-metal pole is obtainable, the center section must be cut in half and trimmed for insertion of a wooden plug to serve as an insulator and support for the center tuning coil.

The spring-loaded pole antenna is operated in a vertical position, with a high-Q, tapped tuning coil placed at the center. The coil resonates the compact antenna (which is a first cousin of the popular mobile whip antenna) to the band in use and the antenna, plus the length of wire connecting it to the transmitter,



Band	Center coil
80	90 turns no. 16 tinned wire, 2½" dia., 9" long
40	Tap for approx. 28 turns in circuit
20	Tap for approx. 15 turns in circuit
15	Tap for approx. 8 turns in circuit
10	Short out coil

NOTE:

1. Connect loading coil between 6-32 bolts.
2. Turn down ends of plug to fit within pole. Epoxy joint.

Fig. 1—Decorator pole antenna serves as a good, indoor multiband antenna system. Pole is cut in half and insulating plug inserted to provide mounting area for resonating coil which connects the antenna halves. Pole antenna is used with radial ground wire for best results. (Drawing courtesy of Radio Publications, Inc.)

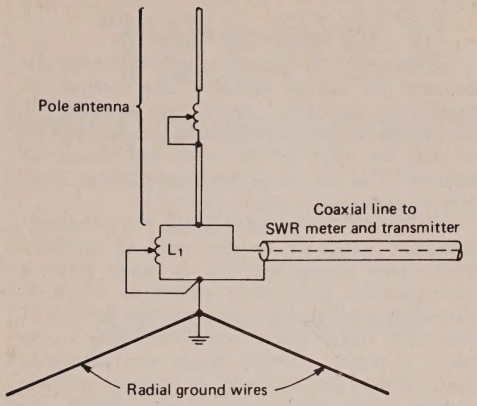


Fig. 2—Pole antenna is fed with coaxial line from SWR meter and transmitter. Coil L, is a matching device for 40 and 80 meters, as whip has very low radiation resistance on those bands. The coil is 6 turns #12 wire on a 2" form, wound to a length of 2 ".

are operated in conjunction with a tuned radial ground wire, if convenient, or with a cold water plumbing system ground.

Tuning the Pole Antenna

The approximate number of turns on the center coil for each h.f. amateur band is given in the illustration. An s.w.r. meter is used to tune up the system. With the transmitter working on very low power, the number of turns in the loading coil are adjusted for the lowest value of s.w.r. on the transmission line. Turns are adjusted one at a time.

The antenna, being short, is quite frequency sensitive and any major shift in frequency (especially on the 80 meter band) requires a readjustment of the coil tap for best performance. Antenna loading on 80 and 40 meters may be facilitated by placing a small adjustable coil (L^1) across the coaxial line, right at the base of the antenna. This coil, plus the loading coil, are adjusted together for lowest value of s.w.r. on the feedline, as shown in fig. 2.

A tuned radial wire, such as described in last month's column is used with the pole lamp antenna. This is an artificial ground system that is very effective. Quite simply, it is an insulated wire, one-quarter wavelength long at the operating frequency, connected to the ground post of the transmitter at one end and run away from the equipment, either indoors or outdoors. The far end of the wire is left free and taped to prevent accidental contact. Radial placement is not critical and it may be run along the floor of the radio room, tacked to the baseboard, or simply tossed out the window and supported a few inches above the ground. Two or more radials may be used for multi-band operation, each cut to one of the bands in use (fig. 2).

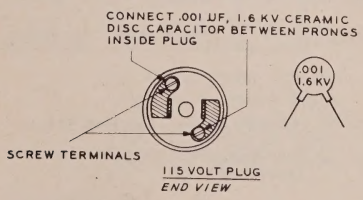


Fig. 3—Disc capacitor placed in spare line plug can be used to "de-TVI" the electrical wiring of your building. (Drawing courtesy of Radio Publications, Inc.)

De-TVI-ing the Apartment or Home

Once your "invisible" antenna is operating properly with a reasonable value of s.w.r., it is a prudent idea to check the electrical wiring of the building for r.f. power that may be leaking into it from the nearby antenna. If the wiring is enclosed in metal conduit, this coupling is unlikely. Open wiring (knob-and-tube or *Romex*) can act as an unwanted pickup antenna, coupling a large amount of your precious output power into the neighbor's TV set or stereo! Sometimes r.f. pickup in the power line can be noticed when a lamp (supposedly turned off) glows when you are on the air. A fast and simple way to cure this problem is with a handful of .001 mf, 1.6 kv ceramic disc capacitors connected across the screw terminals of an empty line plug (fig. 3). The plugs are inserted in wall sockets at random until a position is found that "detunes" the electrical wiring in the building. Sometimes two or three plugs are needed to do the job properly.

"Invisible" Outdoor Antennas

If space permits, it may be feasible for the struggling amateur to string up an invisible outdoor antenna away from the building.[1] This is imperative if the building has a metal framework. The name of the game is to make the outdoor antenna invisible, or nearly so, to the casual observer. An effective way to do this is to use copper wire of very small diameter for the antenna. The writer has experimented with end-fed and dipole antennas made of soft drawn, enameled wire of #20 to #28 gauge (magnet wire). Other experimenters have made antennas of wire as small as #34 (removed by the mile from a defunct power transformer) with good results. Operation of "thin" antennas seems little to do with antenna wire diameter, although some antennas made of #34 wire have mysteriously

[1]The Handbook, "Simple, Low-Cost Wire Antennas," by W2LX and W6SAI is chock-full of "invisible" antenna ideas. Published by Radio Publications, Inc., Wilton. Conn., 06897 for $3.95 plus 25c postage and handling.
[2]Another Radio Publications book. $5.95 plus 25c postage and handling.



Mako's boy friend gets a new linear.

come down during the night. The only reason for this, it is guessed, is that birds can't see the wire either, and fly into it! Antennas made of #28 gauge wire don't seem to have this problem.

No problem with wire heating has been observed when running a few hundred watts input and the antennas seem to function as well as equivalent antennas made of "fatter" wire. In any event, regardless of power loss, antennas made with small diameter copper wire work, and in some instances are the *only* answer to a "tough" antenna problem.

Erecting the Invisible Antenna

Very small, hard-to-see insulators for the invisible antenna can be made out of ¼-inch diameter lucite or plastic rod. Make the insulator about 2 inches long and drill fine holes in it to accept the antenna and tie-off wire. Smooth the edges of the holes so that they do not chafe the wires.

The ends of the antenna should be tied off to points that will not impose a strain on the wire when the wind blows. Trees are poor tie-off points as they sway in the wind. Don't use a power or utility pole, tempting as it may seem. It is illegal to attach anything to a power pole. And in addition, it is dangerous and foolhardy!

In order to see the invisible antenna when you put it up, tie a long thread to a small piece of paper. Fold the paper and drop it over the center of the antenna wire. Once the antenna is up, you can remove the paper with a gentle tug on the thread.

As a starter, an invisible dipole made of #22 to #28 wire is recommended. You can use small-diameter RG-174/U coaxial line. The jacket of this line, unfortunately, is black and tends to stand out against the sky. The mini-coax is quite unobtrusive, however, against a darker background, such as a building, or a tree.

W6SAI would be pleased to hear from users of "invisible" antennas and to hear about their experiments with unusual antennas. Not everything is known about this interesting antenna technique and many questions remain to be answered. For each antenna idea published, the writer will be pleased to send an autographed copy of his new *VHE Handbook for Radio Amateurs*, written in conjunction with Herb Brier, W9EGO (of the *CQ* Novice Column), and just hot off the press! ■

what is an antenna noise bridge?



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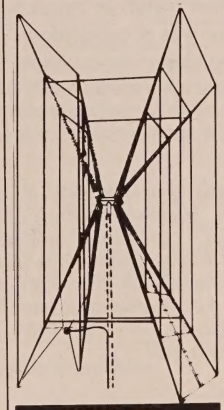
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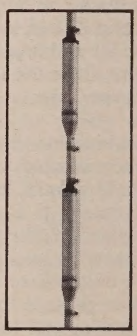
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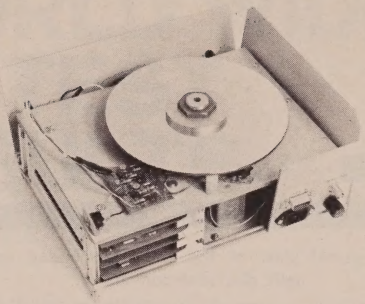
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COP'S COLUMN

BY COPTHORNE MACDONALD,*
W∅ORX



This magnetic disc mechanism is the heart of the Colorado Video slow-scan to fast-scan converter.

HAMS aren't the only people using slow-scan TV these days, and I thought it might be interesting to peek this month at a couple of the non-amateur systems being produced and used. These commercial systems use expensive scan-conversion techniques to get a bright slow-scan TV display on a conventional TV monitor. This seemingly simple shift from P7 phosphor to TV display unfortunately raises the price into the several kilobuck range; but let's dream a little . . .

Colorado Video

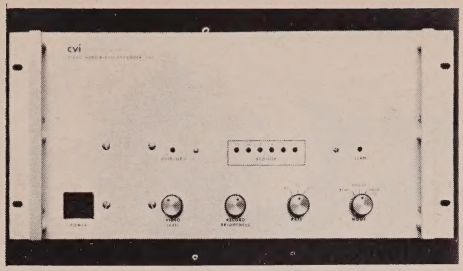
Glen Southworth is President of Colorado Video, Inc. and one of the pioneers in commercial slow scan TV. Back in 1966 he came out with a sampling type fast-to-slow converter that converted the output of a standard scan vidicon camera to SSTV. He started working real magic the next year, however, when he used the sampling idea in reverse, using a rotating magnetic disc to perform a *slow-scan to fast-scan* conversion! The basic idea is to rotate the disc at 30 or 60 revolutions per second and then record one picture element at a time onto the disc from the incoming SSTV. Then, when the slow-scan frame is finished, the disc is full of picture elements. As the disc continues to rotate, a playback head picks up that full frame during each rotation and provides a standard rate signal for the TV monitor. The tricky part is putting those picture samples in exactly the right place on the disc, and this requires exceptionally good control over the motor rotation. There are two versions of the scan-converter. The Model 261 handles a 1 kHz bandwidth input signal with a line rate of 6.6 Hz and a frame time of 30 or 60 seconds. Resolution is about 220 TV lines. The Model 220A is used with a wider bandwidth SSTV signal of about 8 kHz, and a frame time of 4 to 8 seconds. Resolution is about the same.

This second unit was used in a very interesting educational application. Charles Ruffing of the Michigan Department of Education had a project where the 8 kHz slow-scan TV signal was transmitted over one of the SCA channels of an f.m. broadcast station. (The SCA channels are normally used to transmit background music to paid subscribers. They aren't reproduced by ordinary home receivers.) The Michigan group found slow-scan to be just as effective an instructional medium as conventional TV.

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

New Directions Radio Schedule

Activity	Area Covered	Day	Time	Approximate Frequency
New Directions Roundtable	U.S. & Canada	Sunday	3:00 P.M. EDT	14253 kHz
New Directions Roundtable	Eastern U.S.	Sunday	5:30 P.M. EDT	7163 kHz
New Directions Roundtable	West Coast	Tue, Thu, Sun	8:00 P.M. PDT	7233 kHz
			9:00 P.M. PDT	3898 kHz
Alternative Sources of Energy Roundtable	Eastern U.S.	Saturday	8:30 A.M. EDT	7233 kHz
Slow-speed CW Gathering Place	Regional	Daily	6:30 A.M. local time	7133 kHz (3733 in winter)

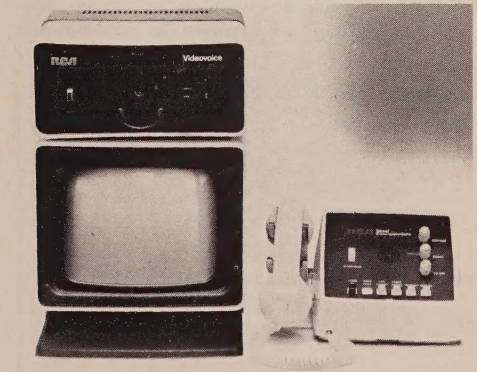


Front panel view of the Colorado Video magnetic disc scan-converter.

RCA's Videovoice

While research continues at Bell Labs, the phone company's Picturephone units demonstrated in recent years require a 1 mHz wide channel for the picture, and thus cannot work over voice grade telephone circuits. There is obviously a voice bandwidth/slow-scan approach to doing the same job, and suitable scan-converters were developed and operational back in the mid 60's. To actually come out with a product of this type involves investment and marketing risk, though, and RCA is the first company to bite the bullet and do it.

The RCA Videovoice system does work over the regular telephone network. Just as with amateur SSTV, however, the picture and voice cannot be sent simultaneously over a single phone line or other voice channel. The desk top unit shown in the photo contains a fast-scan camera and a monitor. The camera swivels, is detachable, and has a built-in 45 degree mirror to permit viewing objects on the desk top. A separate "electronics package" contains the scan-converter, "frame-freeze" unit, and power supplies. It would normally be installed in a closet or other out of the way place. The frame-freeze feature can be used during transmit to freeze a single frame of camera output and transmit that one frame. In this mode a person being viewed would not need to sit still for the full frame time of 30 or 55 seconds. The 55 second frame gives somewhat higher resolution but is not used with frame-freeze, presumably because there is some resolution loss in the frame-freeze unit itself. The exact resolution is not specified, but the frame rate indicates 200 to 300 TV lines—approaching what you get on a home TV set. A vidicon-sized silicon target storage tube performs the scan-conversion on both send and receive. Synchronization is accomplished, for some reason, by crystal oscillators at both ends rather than by transmitting sync pulses.



This is the desk top portion of the RCA Videovoice phone-line SSTV system.

With a rental cost of $250/month, the gear is not apt to find its way into too many homes! RCA says the system is presently being used by several large corporations for executive and technical conferencing. Medical usage also seems to be popular. Video voice equipment was installed on the SS *Hope* and used for the exchange of medical information with people back in the U.S. An oil company also uses the system in ship-to-shore mode to get seismic and oceanographic data back from tankers at sea.

"New Directions" Activities

Included in this month's column is a table showing current operating times and frequencies for the various New Directions activities.

The Alternative Sources of Energy Net, mentioned in the May column, now meets on Saturday mornings. Frank Thompson, WØOD, is rewinding a car alternator for 110 volts to use in his wind generator system. Ray Martin, WA5CCZ, is using a one-lunger methane-fuelled engine to put his station on the air, and has experience with vertical axis wind generators. Allan Owen, WA3OWT, is helping a friend of his design a waterwheel. (Calculations indicate that it should deliver a steady 200 watts from a stream flowing through the friend's property.) Albert, WB4BWR, reports on energy and village technology activities at "The Farm" in Tennessee. If you are thinking of getting into some sort of energy project yourself, or just have a general interest in the subject, please join us: Saturday morning at 8:30 A.M. EDT on 7233, plus or minus the QRM.

Several Novices and ex-Novices have just started a daily slow-speed c.w. get-together aimed at breaking out of the stereotyped Novice QSO and discussing *something*. George Conley, WNØKYC, calls it a "street corner on 40 meters" and it is closer to that than to a formal net. If you'd like to dig a little deeper than name, QTH, and RST, then listen for, or call "CQ NEWS" at 6:30 A.M. local time on 7133. (Obviously, calling an hour earlier or an hour later is also possible in many areas since signals cross time zones.)

Vy 73, Cop, WØORX

1973 CQ WORLD WIDE DX CONTEST C.W. RESULTS

BY FRANK ANZALONE,* W1WY

WHAT a let-down. After the excellent conditions we experienced the previous month in the Phone Contest, it was a great disappointment to find 10 almost completely closed and 15 and 20 only fairly productive. The c.w. fraternity had cause to complain.

W3ASK had predicted fair to normal conditions for the two contest dates, but George warned of possible disturbances in his updated Dial-A-Prop forecast. Even the lower frequencies suffered. There also seemed to be a marked decrease in activity.

However, I wonder if this lack of contest activity could be totally blamed on poor propagation conditions. I get the feeling that c.w. is slowly but surely giving way to s.s.b. For the first time in our contest history the phone returns exceeded the c.w. total, 1746 to 1704. That figure indicates a 4% drop for c.w. over last year. Overall, however, we are only 2% below last year's record total, thanks to the increase in this year's Phone Contest.

The biggest drop on c.w. was from our own state-side stations, the over-seas boys are more than holding up their percentage.

One thing that can be said about c.w. however is that it is a more accurate mode of transmission, and we found little evidence of questionable call signs.

Reluctantly, the Committee found it necessary to make two disqualifications: the multi-multi score of station K6SEN, and the 14 mHz score of VK2APK.

Due to the nature of the K6SEN violation and in view of the fact that this is the second consecutive year this station has been disqualified, we feel more drastic action is necessary and therefore must prohibit station K6SEN from participating in future *CQ* sponsored contests for a period of one year.

In the case of VK2APK, this is the 4th consecutive disqualification for taking credit of an excessive number of duplicate contacts. Due to the repetition of the same violation he is also being prohibited from participating in *CQ* contests for one year. We wonder if he has bothered to read the letters we sent him concerning last year's decisions.

As in the phone contest we found it necessary to reclassify a few of the multi-operator, single transmitter entries. As the rule clearly states, the only situation that warrants working more than one band during the same ten minute time period is to pick up a new multiplier. If the contact is not a new multiplier the operation is considered multi-transmitter.

Several logs lost credit in certain areas because we could not read the photo copies that were submitted. We always prefer original



Fred Laun III, contester par-excellence and his ill-fated LU5HFI layout which promoted the terrifying series of events last April. Much has been written of Fred's dramatic experience in Argentina so it needs no repeating here. He will probably miss operating LU5HFI as much as we will miss working the potent signal which placed him in the Top Ten, both phone and c.w. But we are surely happy to have him safely back as a plain old W/K.

*Chairman, *CQ* Contest Committee

PLAQUE AND TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association. Earl Lucas, W2JT Memorial. Won by Jorge Camboni, CV8B (14 mHz)

EUROPE — Friends of Tom Martin, G2LB Memorial. Won by Al Slater, G3FXB (14 mHz)

Single Operator, All Band

WORLD — Larry LeKashman, W8AB Trophy. Won by Martin Laine, ZD3X (OH2BH)

U.S.A.—Frankford Radio Club Trophy. Won by Francis Donovan, W3LPL.

EUROPE — W3AU Operators' Trophy. Won by Erkki Korhonen, OH8RC.

CARIB./C.A. — Harold Fox, W3AA Plaque. Won by Miguel Encisco, KP4DPN.

AFRICA — Gordon Marshall, W6RR Plaque. Won by Jerry Trousdale, 9L1JT.

ASIA—Japan CQ Magazine Trophy. Won by Travis Pederson, HS4AGN.

OCEANIA — Maui Amateur Radio Club Trophy. Won by Lyell Woolnough. VK2GW.

Multi-Operator, Single Transmitter

WORLD—Dr. Anthony Susen, W3AOH Trophy. Won by Station PJ1AA (Oprs. PJ2ARI, PJ2CJ, PJ2CW, PJ2JW, PJ2MI, PJ2VD)

Multi-Operator, Multi Transmitter

WORLD — Hazard Reeves, K2GL Trophy. Won by Station W3AU. (Oprs. W3AU, K3EST, WA1LKX, WA3HRV, WA3LVX, W3IN, W3ZKH, WN3UTA)

Contest Expedition

WORLD—Dr. Donald Miller, W9WNV Trophy. Dr. Harold Megibow, K2HLB Memorial. Won by Martin Laine, ZD3X.

CQ Club Award

Potomac Valley Radio Club

logs, original or photocopy, showing dupes that have been crossed out, etc., but make sure the copy is perfectly clear and readable. If you recopy your log make it an exact copy of the original showing dupes, etc. (Seems no one uses carbon paper anymore.)

All our score corrections did not result in a reduction. Many will find their scores substantially increased because we have given them credit for multipliers they neglected to take, or errors in their scoring.

The number of expedition stations was much lower than the number that participated in the phone contest, but picking the winner of the Dr. Harold Megibow, K2HLB Memorial was no problem. Matching the performance of his close friend and countryman (OH2MM) in the phone contest, from the same location in Gambia, Marty, OH2BH broke the existing single operator all band c.w. record. We had no alternative but to select ZD3X as the winner of Don Miller's Award. Don held this record himself some years ago.

If you are wondering about the selection of some of the Trophy winners the highest score is not always the winner. There are many factors that must be considered. For instance in the Carib./C.A. and Africa areas only permanent residents are eligible. The Oceania award excludes Hawaiian entries, and there is a three year non-eligible period for stations that have won a major award. All very complicated but should provide more incentive for others to try for one of these awards.

This was XE1IIJ's swan song from Mexico. Scotty could always be counted on to come up with an exciting new call for each contest, the last one being 4C5AA. Scotty always felt that W/K QSO's should have been worth 3 points for him. Now that he is in the Virginia area their value is zero. There's no justice.

We are grateful to Michel, F2MO, QSL



Now I ask you, is that the way to work a contest? Actually that's Marty, OH2BH and his XYL Leena at their home QTH in Finland. The contest operating was done from ZD3X in Gambia. Marty said that all credit for his breaking the world record should go to Leena who would not let him give up when a fever had him down. With such inspiration how could he fail.

Single Operator — All Band

Station	QSO's						Zones						Countries					
	1.8	3.5	7	14	21	28	1.8	3.5	7	14	21	28	1.8	3.5	7	14	21	28
ZD3X		176	391	1057	1170	610		13	20	24	21	18		32	44	70	60	45
KH6RS	21	236	850	694	898	431	5	17	27	30	30	15	4	22	36	44	41	21
4C5AA		307	720	815	921	389		17	26	29	22	18		41	54	63	55	26
9Z4AA	7	218	408	822	1066	311	4	9	17	23	19	16	4	25	46	52	49	21
LU5HFI	1	42	177	648	806	425	1	9	16	32	25	22	1	8	34	64	65	48
ZS6IW		28	170	471	477	85		11	27	27	24	13		22	50	64	66	44
KH6IJ	12	120	328	629	716	207	3	11	12	29	20	11	4	12	13	43	26	10
9Y4VU	2	131	255	478	520	250	1	9	13	22	17	14	2	15	32	44	44	22
ET3USE		22	171	280	431	275		6	13	28	25	23		11	32	57	57	56
W3LPL		73	226	405	205	36		16	29	30	24	18		35	71	84	58	30

Multi-Operator — Single Transmitter

PJ1AA	10	222	623	842	496	443	3	13	20	28	18	18	4	25	45	71	44	30
4M5ANT	2	160	535	751	785	235	2	14	21	29	24	12	2	35	58	71	57	12
ZF1TW	27	237	739	603	591	394	4	10	22	22	20	17	5	16	49	49	48	24
YU1BCD		274	270	565	327	42		14	22	29	32	17		46	69	74	88	36
LU8DQ		69	191	587	463	261		10	21	27	22	20		11	42	51	57	37
DLØWU		203	337	682	371	37		12	23	28	24	11		39	57	52	55	25
K6EBB	8	36	678	311	201	25	4	17	30	29	23	16	3	24	54	58	36	19

Multi-Operator — Multi-Transmitter

W3AU	20	170	403	945	581	71	7	21	31	38	29	19	11	55	87	119	89	33
W2PV	53	103	288	739	440	61	8	18	29	36	28	17	17	41	79	115	89	34
W4BVV	16	162	339	734	372	51	7	22	32	34	27	17	11	56	77	101	78	29
W3WJD		133	210	753	372	59		19	30	38	29	19		46	73	116	84	38
OH1AA	88	840	630	670	385	50	2	20	30	32	30	12	11	54	74	77	85	29
UK9ABA		388	464	519	450	70		19	26	29	26	15		50	57	73	68	41

Band-by-band breakdown of top scores.

manager for FB8XA and FB8XC for forwarding these two rare logs. Due to the fact that mail leaves the islands only once a year they were sent to him via RTTY.

W4BRB followed his successful expedition on 160 to VP7 in the Phone Contest with another one for the c.w. week-end. This time going all the way down to 9Z4 to get the 3 point QSO advantage. Nice score Gene, too bad that Herb also decided to give the Top Band a whirl this year. KV4FZ's antenna system on that band is pretty difficult to duplicate.

And speaking of 160, that GW3UCB/p multi-operator score may seem ridiculously low but that's because it was made on 160 only. The boys over there have this thing about the Top Band.

K8HLR had planned a major effort on 40 but had to settle for a mediocre score. After a most frustrating week-end which included a blown balun, second harmonic problem, bad h.v. power supply and a few other minor obstacles. After correcting all these problems, a plus 10 line noise from a local manufacturing plant almost drove Bob to the local "pizza and beer" parlor. However he stuck it out and at least takes home the bacon for the 8th district.

Some of the overseas boys also had problems. Following is a verbatim note from Ted, UP2OX. "It was not too much joy to work with dipoles in the DX contest. My neighbors, the owners of TV sets could agree with me watching their dancing screens. Anyway their patience wasn't unlimited like mine. I found my wires cut right in the middle of the contest."

We have received many messages from UK6APA on the Asian side of the Black Sea, claiming that he is in Zone 17 and therefore a 3 point contact for Europeans. We will not argue the point but try to get a ruling from Box 88. (We did not receive a log from him anyway.)

Compiling the club scores again proved to be quite a chore. The scores as submitted by most of the Club Secretaries were only a partial list, making it necessary for us to do a lot of digging and getting the scores from the individual logs. If your call did not appear on the Club list, or you also neglected to indicate your affilation on your log, how are we to know how to credit it? And when you have a close one for top honors like the PVRC and FRC every point counts.

This year the FRC lead in the multi-oper-

[*Continued on page 72*]

TOP SCORES

SINGLE OPERATOR
ALL BAND

ZD3X	**3,524,826**	ZS6IW	1,259,760
KH6RS	2,712,388	KH6IJ	1,156,240
4C5AA	2,422,251	9Y4VU	1,135,755
9Z4AA	2,397,990	ET3USE	1,073,072
LU5HFI	2,017,925	**W3LPL**	**1,069,265**

SINGLE BAND

28 mHz

CX9BT	283,098
ZE8JN	187,834
CR6OZ	140,696
G5BAU	19,092
YU3ER	19,040
G3RUX	16,571

21 mHz

CV1B	370,461
G3HCT	191,664
YU2CDS	180,240
W4KFC	136,731
DL1EE	120,432
DL1KD	103,008

7 mHz

KP4AST	447,421
CV7B	196,480
GI3OQR	182,400
YU3EY	161,528
VA7WJ	154,284
W5WZQ	134,151

3.5 mHz

UB5CI	81,445
UA1DZ	76,176
YV5AW	74,144
UA9CM	68,742
G3KWK	49,312
OH1XX	44,362

14 mHz

CV8B	**715,260**
CR6LK	686,936
VK2BKM	247,244
G3FXB	**238,128**
W4AAV	206,010
K9TZH	180,000

1.8 mHz

KV4FZ	21,320
9Z4GS	5,252
DJ8WL	3,519
KH6CHC	2,845
OK1ATP	2,576
WB8APH	2,444

MULTI-OPERATOR
SINGLE TRANSMITTER

PJ1AA	**2,493,304**	YU1BCD	1,389,885
4M5ANT	2,473,917	LU8DQ	1,291,826
ZF1TW	1,629,056	DLØWU	1,213,046

MULTI-OPERATOR
MULTI TRANSMITTER

W3AU	**3,394,016**	W3WJD	2,149,056
W2PV	2,384,837	OH1AA	2,070,240
W4BVV	2,340,106	UK9ABA	2,051,512

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

C.W. RESULTS
SINGLE OPERATOR
NORTH AMERICA
United States

W1BPW	**A**	**1,039,422**	**952**	**116**	**266**	
K1NOL	**A**	**912,380**	**854**	**113**	**267**	
WA1RCP	"	807,690	848	104	223	
W1ARR	"	752,754	817	106	221	
W1PL	"	359,488	477	90	184	
W1EZD	"	184,508	332	63	130	
W1BIH	"	121,765	188	78	167	
W1WY	"	108,446	212	67	127	
W1IHN	"	103,700	236	61	109	
W1CNU	"	68,880	194	40	83	
WA9AUM/1		18,614	85	29	53	
W1RML	"	17,520	86	29	51	
W1AX	"	16,543	79	26	45	
W1PLJ	"	7,990	60	16	31	
W1AWE	"	7,344	47	22	32	
WA1QBH	"	3,690	35	18	27	
W1OPJ	"	2,523	30	8	19	
W1SK	"	840	13	11	13	
K1LWI	**28**	**7,579**	**71**	**17**	**36**	
W1MDO	**21**	**53,934**	**210**	**22**	**67**	
W1PIV	"	34,262	161	22	52	
WA1FCN	"	987	19	10	11	
K1HVV	**14**	**102,960**	**399**	**28**	**71**	
WA1SKV	"	34,800	199	17	43	
K1DIR	**3.5**	**22,984**	**125**	**21**	**47**	
W1BB	**1.8**	**1,344**	**23**	**7**	**14**	
W2GXD	**A**	**797,940**	**760**	**118**	**254**	
W2FVS	**A**	**310,994**	**427**	**87**	**175**	
K2BK	"	252,879	383	81	156	
W2GGE	"	164,325	330	60	115	
K2AHQ	"	145,200	332	54	96	
W2DT	"	104,320	211	52	111	
W2CVW	"	69,069	172	46	97	
W2HUG	"	62,646	155	62	97	
K2DW	"	60,324	172	48	84	
WA2DLV	"	51,120	161	41	79	
WB2ZWJ	"	50,673	131	23	88	
K2MFY	"	48,314	178	33	65	
K2QIL	"	31,700	118	32	68	
WB2SXD	"	29,410	125	32	53	
WA2RQH	"	18,361	107	20	41	
PA0LOU/W2		15,288	66	35	56	
W2HL	"	12,874	61	37	45	
WA2RJZ	"	9,577	61	22	39	
W2CKR	"	9,486	53	19	43	
W2EUO	"	8,642	54	23	35	
WB2CST	"	1,829	26	15	16	
K2QBW	**28**	**6,750**	**58**	**17**	**33**	
W2NIN	**21**	**89,000**	**311**	**34**	**76**	
K8WWU/2		48,384	201	25	59	
W2AZO	"	40,350	189	22	53	
K2FE	"	14,168	90	19	37	
WA2HZR	"	13,275	80	19	40	
K2TQC	**14**	**103,844**	**335**	**29**	**81**	
WA2AJN	"	44,233	220	20	51	
WA2ZWH	"	22,932	127	19	44	
WA2AUB	"	9,396	61	18	40	
WB2EOO	"	5,418	47	14	29	
K2LWR	**7**	**53,460**	**198**	**30**	**69**	
		(Opr. WA2BCK)				
W2LWI	**1.8**	**1,040**	**24**	**8**	**12**	
W3LPL	**A**	**1,069,265**	**945**	**117**	**278**	
W3GRF	**A**	**640,760**	**686**	**107**	**225**	
W3BGN	**A**	**507,060**	**651**	**86**	**184**	
W3VT	"	499,656	546	104	223	
W3NZ	"	404,078	514	101	180	
K3BW	"	402,426	515	93	190	
K3CY	"	393,040	494	91	198	
W3QOR	"	301,217	423	86	173	
W3YIK	"	290,820	398	91	171	
W3GN	"	274,250	389	77	173	
W3AXW	"	265,856	398	83	165	
W3KFQ	"	198,540	376	61	119	
K3AV	"	195,502	298	78	161	
W3OV	"	189,860	313	79	141	
W3ALB	"	171,302	311	64	130	
W3FA	"	132,600	248	71	129	
K3ZOL	"	114,080	226	62	122	
W3KT	"	102,830	213	64	118	
W3ARK	"	99,120	212	64	113	
W3BB	"	80,375	226	41	84	
WA3NNA	"	74,074	158	72	110	
WA3AFQ	"	70,742	166	64	99	
W3ZJ	"	68,640	181	60	96	
K3CR	"	50,895	141	50	85	
WA3NAF	"	42,746	127	53	81	
W3HVM	"	29,492	105	38	63	
WA3SWF	"	28,476	100	47	66	
W3EVW	"	23,125	66	36	89	
K3AU	"	15,300	74	36	49	
W3CGS	"	13,728	75	22	44	
K3CBF	"	5,043	42	14	27	
W3FCI	"	368	9	7	9	
WA3IWX	**28**	**3,219**	**35**	**14**	**23**	
W3MFJ	**21**	**70,035**	**283**	**23**	**64**	
WA3LJP	**14**	**104,832**	**427**	**21**	**63**	
		(Opr. WA3QIA)				
W3AFM	"	88,708	235	34	100	
K3JGJ	"	84,448	312	28	63	
WA3LRN	"	40,128	181	22	54	
W3ZSR	**7**	**12,558**	**77**	**24**	**45**	
K3AIG	"	9,912	64	20	39	
W3MFW	**3.5**	**32,475**	**154**	**22**	**53**	
W4YHD	**A**	**776,968**	**700**	**126**	**268**	
WB4YLG	**A**	**662,080**	**741**	**105**	**215**	
K4PQL	**A**	**642,963**	**736**	**101**	**220**	
W4YWX	"	616,896	653	105	231	
K4VX	"	597,556	668	102	214	
		(Opr. WA3IAQ)				
W4FDA	"	522,262	617	97	207	
		(Opr. WB4IAE)				
WB4BGY	"	471,065	544	92	221	
K4EZ	"	275,870	405	80	165	
K4CL	"	272,506	426	79	144	
WB4HQE	"	247,648	402	68	150	
K4TBN	"	243,925	333	91	184	
W4MCM	"	212,976	295	89	183	
K4BAI	"	201,500	311	90	160	
W4KXV	"	194,060	367	105	185	
K4KQ	"	158,928	255	80	151	
W4BJ	"	149,370	266	62	133	
K4HWW	"	138,673	262	68	129	
K4NE	"	133,133	240	79	130	
W4JHK	"	112,530	241	60	105	
W4OZF	"	101,384	252	73	111	
K4JM	"	94,050	206	60	105	
W4GF	"	88,608	209	57	99	
W4HOS	"	88,247	180	66	113	
WB4RUA	"	83,779	163	76	123	
W4DM	"	74,444	182	57	91	
W4TMR	"	70,200	175	60	96	
K0CMF/4		67,156	157	63	100	
W4ZM	"	62,160	163	51	89	
K4EBY	"	44,505	140	43	72	
K4KA	"	44,384	128	58	88	
W4DMB	"	33,087	101	50	73	
WB4TBO	"	25,200	112	31	53	
W4EZ	"	19,624	82	32	56	
WB4EMF	"	17,584	97	48	64	
W4KNW	"	14,204	75	25	42	
W4IML	"	13,858	67	36	46	
K4JYM	"	12,483	66	30	43	
W4LDF	"	8,768	53	25	39	
K4EJG	"	7,040	42	27	37	
WB4RDV	"	5,980	43	22	30	
WB4YPT	"	4,508	36	21	28	
WB4NRI	"	4,466	32	29	29	
W4ZRJ	"	12	2	2	1	
W4WSF	**28**	**4,796**	**50**	**16**	**28**	
K4KNJ	"	2,178	29	14	19	
W4EEO	"	1,316	18	12	16	
W4KFC	**21**	**136,731**	**400**	**30**	**89**	
K4IRQ	"	86,880	321	22	74	
W4AAV	**14**	**206,010**	**561**	**35**	**91**	
W4QCW	**7**	**91,152**	**304**	**31**	**77**	
W4BAA	"	5,895	53	16	29	
WA4APG	"	3,838	39	15	23	
WA5ZNY	**A**	**337,662**	**564**	**78**	**144**	
W5RTQ	"	190,575	316	85	146	
W4SYL/5	"	169,252	250	98	146	
VE6BU/W5		38,734	137	39	68	
W5HIC	"	19,250	72	46	64	
K5EWJ	"	12,084	60	35	41	
K5BLV	"	11,970	62	30	40	
K5FVA	"	6,579	62	22	29	
W5HCJ	"	2,736	29	14	22	
WB5KMY	"	2,268	26	21	21	
WB5FMA	"	525	11	10	11	
WA5STI	**28**	**4,797**	**49**	**16**	**25**	
W5MYA	**21**	**47,520**	**213**	**25**	**55**	
W5OSJ	"	9,633	63	20	37	
W5BJA	**14**	**71,706**	**249**	**30**	**72**	
W5WZQ	**7**	**134,151**	**482**	**30**	**67**	
W5WZN	"	15,904	118	24	32	
WB5DIZ	"	10,971	73	21	32	
K5PFL	**3.5**	**20,237**	**134**	**21**	**38**	

W5LUJ	"	13,872	114	19	29
K5JVF	"	432	12	7	9
K6AHV	**A**				
	1,008,040	**1094**	**125**	**194**
W6MAR	**A**	**988,524**	**1084**	**118**	**206**
W6DGH	**A**	**983,016**	**1070**	**127**	**201**
W6ANN	"	929,556	951	127	215
		(Opr. W6DQX)			
W6PAA		873,012	1047	116	178
W6RR	"	782,501	940	107	184
W9LVT/6		605,616	867	95	153
W6PLH	"	442,958	644	97	144
WA6JVD	"	244,512	409	91	125
K6CQF	"	201,880	356	88	118
K6DR	"	192,150	374	81	102
K6NA	"	156,770	238	117	188
W6NUT	"	87,690	205	70	88
W6EYY	"	86,388	237	56	82
G3DPX/W6		49,250	146	61	64
W6PRP	"	48,384	133	63	81
WA6MWG		44,998	116	64	87
W6BZE	"	30,987	118	40	59
K6HIH	"	29,742	130	39	47
W6HJ	"	22,270	97	37	48
W6GBY	"	20,294	97	34	39
W6CLM	"	17,925	93	37	38
W6KYA	"	14,536	68	38	41
WB6EXW	"	13,640	87	31	31
W6EJ	"	11,152	53	31	51
W6MTJ	"	10,670	69	26	29
W6JKR	"	9,825	55	32	43
WB6DSV	"	8,750	55	33	37
W6APW	"	8,250	47	34	41
W6RQZ	"	4,980	57	12	18
K6QM	"	3,648	30	22	26
W6BIL	"	627	11	9	10
WA6ORJ	"	108	6	5	4
K6SDR	**21**	**107,950**	**449**	**26**	**59**
K6AA/6	"	67,784	316	26	48
		(Opr. WB6HHQ)			
W6KFV	"	44,427	277	22	37
K6ELX	"	12,950	133	18	19
VE7AUA/W6					
	14	**116,620**	**423**	**35**	**63**
K6QZ	"	113,464	381	35	69
K6ZM	"	91,336	336	33	65
K6QW	"	56,240	254	27	49
W6RW	"	20,160	116	24	39
		(Opr. W2IWC)			
WA6JKK	"	8,288	81	18	19
WA6NGG	**7**	**97,820**	**504**	**29**	**38**
W6ITY	"	92,988	393	30	52
K6VI	**3.5**	**16,148**	**145**	**20**	**24**
W6GGV	"	13,992	116	18	26
		(Opr. WB6PKA)			
W7IR	**A**	**560,070**	**634**	**111**	**204**
K7RSC	"	157,140	435	65	70
		(Opr. WA7TLK)			
W7AYY	"	128,757	287	70	97
W7NP	"	121,836	299	61	82
WA7JCB	"	103,920	315	57	63
W7YBX	"	89,913	260	61	68
WA7NUH	"	67,734	175	58	84
W7OF	"	67,350	170	68	82
W7WMY	"	63,845	212	53	60
W7HXG	"	55,296	214	38	58
W7LAV	"	41,380	174	42	50
W7LZF	"	38,318	126	52	67
W7IUO	"	19,760	82	42	53
W7MCU	"	14,355	66	40	47
W7VRO	**21**	**14,740**	**123**	**18**	**26**
K7MKS	"	6,880	79	15	17
K7CVL	"	756	21	6	6
W7APN	**14**	**50,298**	**217**	**33**	**50**
K7CHT	"	6,688	64	19	19
W7ETZ	"	3,744	37	16	20
W7SCQ	"	1,932	25	12	16
K7HTZ	**7**	**68,248**	**331**	**28**	**48**
WA7FAB	"	7,676	76	15	23
W7JLU	**3.5**	**14,240**	**132**	**17**	**23**
W7KW	"	10,840	99	16	24
W7YTN	"	7,990	95	14	20
K7IDX	**1.8**	**675**	**20**	**8**	**7**
W8DSO	**A**	**63,525**	**184**	**40**	**81**
W8GOC	"	29,184	106	47	67
W8WZ	"	22,339	92	29	60
W8WVU	"	20,700	88	45	55
W8KZO	"	20,088	82	39	54
WB8EUN	"	17,892	78	33	51
WA8YEE	28	726	13	9	13
K8IDE	**14**	**122,115**	**406**	**32**	**73**
WA8MSR	"	113,904	355	31	82
		(Opr. W9AQW)			
K8CXM	"	72,114	252	30	71
W8JGU	"	56,352	207	28	68
WA8QIY	"	52,546	214	29	65
W8UMR	"	22,218	122	23	46
K8HLR	**7**	**46,835**	**188**	**28**	**67**
WB8APH					
	1.8	**2,444**	**46**	**9**	**17**
WB9BPG	**A**	**638,672**	**633**	**111**	**247**
W9LKJ	"	412,902	567	92	169
W9RER	"	389,340	529	96	174
W9BZW	"	258,462	379	91	158
W9LF	"	214,896	351	77	145
W9SFR	"	175,110	329	68	127
W9WYB	"	117,394	263	59	99
W9PJT	"	110,960	272	61	91
W9DWQ	"	93,444	223	61	95
WA9LZA	"	65,727	223	37	72
K9DAF	"	58,344	165	55	77
K9UWA	"	35,793	134	35	62
W9HE	"	30,900	110	42	61
W9QWM	"	29,750	103	51	68
WA9EED	"	18,792	69	47	61
W9LKI	**21**	**21,357**	**121**	**22**	**41**
W9IMQ	"	16,185	96	22	43
		(Opr. WA9MCC)			



Close-up of the VS6AW operating position. That's Paul, VS6DO using the ole' "straight key." Other members of the multi crew were Maurice, VS5MC; Bob, VS6BL; Jack, VS6GM; and Doug, VS6AW. Doug is now stateside and will be signing K4EVL. The rest of the crew is still back in Hong Kong and hopefully will be on for the next one.

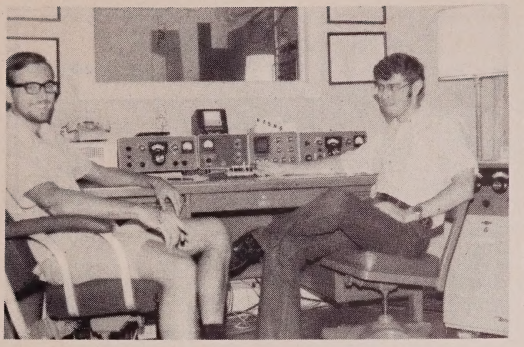
TOP U.S.A. SCORES

All Band	**W3LPL**	**1,069,265**
28 mHz	K1LWI	7,579
21 mHz	W4KFC	136,731
14 mHz	W4AAV	206,010
7 mHz	W5WZQ	134,151
3.5 mHz	W3MFW	32,475
1.8 mHz	WB8APH	2,444

Multi-Operator

Single Xmtr	K6EBB	1,139,007
Multi Xmtr	W3AU	3,394,016

K9TZH	**14**	**180,000**	**523**	**31**	**89**
W9MYD	"	178,800	517	34	85
W9OHH	"	123,057	378	34	78
K9CLO	"	45,408	188	27	61
K9HDP	"	43,610	176	29	60
WB9HAD	"	14,504	95	19	37
W9JK	**7**	**24,168**	**116**	**25**	**51**
W9RX	"	22,620	113	24	54
WA9EJD	"	1,197	27	8	13
W2EQS/9					
	1.8	64	45	4	4
WØHP	**A**	**242,208**	**379**	**98**	**163**
WØIUB	"	90,585	206	68	97
WØGYH	"	44,712	130	55	83
WAØTKJ	"	31,552	122	55	61
WAØTAS	"	19,584	82	41	55
WAØYEF	"	15,498	77	35	47
KØJPL	"	13,833	68	39	48
KØGSV	"	10,488	55	32	44
WBØGOB	"	5,885	44	24	31
WAØVBW					
	28	280	20	7	7
KØARS	**21**	**13,248**	**72**	**21**	**48**
WØJCT	"	9,045	60	21	38
WA1NKK/WØ					
	14	**36,960**	**163**	**25**	**55**
WØHBH	"	3,400	35	13	21
WØLBP	**7**	**19,703**	**119**	**23**	**38**
W5EQT/Ø		18,525	107	25	50
Alaska					
KL7HIK	**A**	**106,134**	**441**	**43**	**55**
KL7FAF	"	69,600	426	36	39
KL7HLM	"	24,240	263	19	21
KL7HER	**14**	**3,744**	**105**	**10**	**6**
KL7HRP	**7**	**10,509**	**138**	**13**	**18**
Bahamas					
VP7NY	1.8	104	13	2	2
Canada					
VO1KE	**A**	**316,786**	**840**	**56**	**115**
VO1AW	"	41,184	172	38	58
VE2BQL	**14**	**7,884**	**84**	**12**	**24**
VE3EDC	**A**	**435,232**	**890**	**85**	**147**
		(Opr. VE3EDG)			
VE3DMC	"	36,333	146	35	64
VE3BZ	"	19,328	113	25	39
VE3BFK	"	7,285	74	24	23
VE3BBH	**21**	**30,914**	**225**	**19**	**39**
VE3ABN	**14**	**177,934**	**659**	**34**	**73**
VE3GCO	"	47,068	227	22	60
VE3BMV	**7**	**92,625**	**438**	**28**	**67**
VE3GFW	"	4	1	1	1
VE5RA	**14**	**17,596**	**150**	**22**	**31**
VE5XU	**1.8**	**1,023**	**47**	**6**	**5**
VE6APJ	**7**	**6,104**	**102**	**13**	**15**
VE7HQ	**A**	**56,508**	**264**	**50**	**52**
VE7AZG	"	9,080	103	22	18
VA7WJ	**7**	**154,284**	**850**	**29**	**49**
		(Opr. VE7CC)			
VE7IQ	3.5	1,265	57	6	5
VE8OO	**14**	**107,184**	**609**	**26**	**51**
Costa Rica					
TI2WD	**A**	**281,904**	**773**	**64**	**104**
TI2WX	**14**	**29,995**	**415**	**17**	**18**
Cuba					
UP2CG/CO2					
	14	**10,225**	**200**	**11**	**14**
CO2KP	**7**	**1,740**	**145**	**4**	**2**
Dominican Rep.					
HI8LC	**7**	**3,146**	**120**	**6**	**7**
Greenland					
OX3YY	**A**	**109,545**	**461**	**38**	**71**
OX3JW	"	54,270	428	28	53
Guatemala					
TG9YN	**A**	**191,800**	**655**	**57**	**80**
Honduras					
HR1AT	**A**	**103,176**	**477**	**40**	**63**
Mexico					
4C5AA	**A**				
		2,422,251	**3152**	**112**	**239**
Panama					
HP1AC	**A**	**13,272**	**137**	**19**	**23**
Puerto Rico					
KP4DPN	**A**	**760,864**	**1403**	**71**	**165**
KP4AST	**7**	**447,421**	**1479**	**32**	**95**
		(Opr. WA4PXP)			
Saint Kitts					
VP2KX	**A**	**9,366**	**222**	**10**	**11**
Saint Pierre					
FPØBG	**A**	**163,920**	**595**	**37**	**83**
Virgin Island					
KV4IC	**A**	**573,860**	**1932**	**50**	**90**
		(Opr. WA3BGE)			
KV4AM	**7**	**8,600**	**89**	**16**	**27**
KV4FZ	**1.8**	**21,320**	**220**	**11**	**29**
AFRICA					
Angola					
CR6AI	**A**	**925,860**	**1273**	**75**	**185**
CR6OZ	**28**	**140,696**	**551**	**24**	**62**
CR6IK	**14**	**686,936**	**1695**	**34**	**102**
Ethiopia					
ET3USE					
	A	**1,073,072**	**1179**	**95**	**213**
Gambia					
ZD3X	**A**	**3,524,826**	**3404**	**96**	**251**
		(Opr. OH2BH)			
Kerguelen Is.					
FB8XA	**A**	**186,160**	**489**	**56**	**74**
FB8XC	"	70,850	229	42	67
Mauritania					
5T5CJ	**A**	**372,243**	**753**	**54**	**113**
Morocco					
CN8BO	**A**	**347,438**	**647**	**51**	**131**
Mozambique					
CR7IZ	**A**	**292,864**	**630**	**54**	**122**
CR7FI	"	39,710	146	33	62
Rhodesia					
ZE8JN	**28**	**187,834**	**655**	**26**	**72**
Sao Thome					
CR5AJ	**7**	**9,120**	**104**	**10**	**20**
Sierra Leone					
9L1JT	**A**	**971,945**	**1333**	**77**	**170**
South Africa					
ZS6IW	**A**				
		1,259,760	**1231**	**102**	**246**
ZS6ZE	"	515,100	851	66	138
ZS5EW	"	1,860	22	16	15
ZS2CW	**14**	**27,877**	**161**	**22**	**39**
ASIA					
Andaman Islands					
VU7GV	**A**	**11,993**	**105**	**28**	**39**
Bhutan					
A51PN	**A**	**36,966**	**221**	**52**	**70**



KZ5NG—Contest operating seems to be a fun thing, (as it should be), for Hans and Steve, WA1LWA and WA4UAZ (ex-GM5AXO) respectively. Glad you liked it fellows, hope you find the next one as enjoyable.

India

VU2DX	**A**	**393,018**	**860**	**54**	**132**
VU2FC	**A**	**272,130**	**555**	**65**	**128**
VU2NSC	**21**	**24,108**	**185**	**14**	**35**

Iran

EP2MW	**A**	**69,218**	**268**	**38**	**68**
EP2BQ	**1.8**	**1,560**	**41**	**3**	**10**

Japan

JA3MIO	**A**	**154,662**	**352**	**69**	**104**
JA1SJV	**A**	**138,316**	**340**	**66**	**85**
JA2TH	**A**	**122,952**	**337**	**60**	**81**
JA8FBM	"	119,805	338	63	84
JA6CLO	"	114,345	263	72	93
JA1CMD	"	101,232	283	66	78
JA2HUN	"	97,920	315	52	68
JA1JKG	"	93,444	268	69	87
JA5TX	"	84,980	258	61	69
JH1OGT	"	84,110	266	58	72
JA1IST	"	83,204	228	58	66
JG1CDM	"	82,042	273	55	72
JA8DIM	"	73,088	239	60	68
JA7YOJ	"	70,375	240	58	67
		(Opr. JA7GQB)			
JA1SR	"	59,085	200	55	62
JA5CEK/3		55,833	218	50	61
JA3VOV	"	55,414	230	49	54
JH3LXN	"	48,015	194	46	51
JA1BTH	"	46,917	218	48	69
JA3BEA	"	36,504	139	47	61
JA0IND/1		33,781	182	39	44
JF1RPZ/4		26,754	134	41	50
JA2BJW	"	21,528	111	41	37
JA7IKH	"	20,837	124	31	36
JA8MSJ	"	13,662	95	33	36
JA3ERG	"	13,454	86	30	32
JA1BZM	"	12,760	118	24	20
JA4DZ	"	12,469	56	31	28
JA6YAD	"	12,282	90	30	39
JA4AQR/3		8,850	77	25	25
JA1BSU	"	8,772	66	26	25
JA7SL	"	7,048	72	25	21
JR2BPV	"	5,960	59	21	19
JR2BDF	"	5,500	58	22	22
JA0GZ	"	5,060	50	25	21
JA3OLI	"	4,982	41	28	25
JA2DGD	"	4,025	55	17	18
JR3EPI	"	3,526	51	21	20
JA2BNN	"	3,060	40	17	19
JA9BOH	"	2,937	36	17	16
JA1BC	"	1,624	24	14	15
JA1AAT	"	1,210	31	14	12
JH3KAI	"	885	21	7	8
JA2YKZ	"	741	17	9	10
JA2OZI	"	472	39	10	11
JA1XZF	**28**	**2,628**	**32**	**16**	**20**
JA3HZT	"	462	13	9	12
JH1BBT	**21**	**64,758**	**278**	**29**	**57**
JA3JRI	**21**	**53,750**	**234**	**32**	**54**
JE1CAY	"	40,122	189	31	48
JH1GMP	"	30,800	158	26	54
JA7EUK	"	28,556	183	23	36
JH1NSS	"	13,872	101	22	29
JA8GQ	"	13,311	103	21	30
JR1FVW	"	10,098	79	20	34
JA9CWJ	"	9,416	83	19	25
JH2EVL	"	8,505	117	19	26
JA1RUJ	"	8,170	71	19	24
JA7IAU	"	6,696	68	17	19
JR2BDG	"	5,700	63	17	21
JR3PYW	"	5,586	56	18	24
JH2BLV	"	5,220	56	16	20
JA2VSS	"	3,150	40	15	15
JA5BLF	"	2,976	50	13	11
JA2GXD	"	1,518	26	11	12
JA2KZ	"	1,496	30	8	9
JR3FXN	"	16	2	2	2
JA2PJC	**14**	**143,400**	**527**	**32**	**68**
JA2INS	**14**	**92,616**	**333**	**32**	**70**
JA2HGA	"	81,081	389	30	51
JH1APZ	"	50,518	281	23	44
JA1KSJ	"	44,928	214	29	49
JA8AIP	"	40,575	206	28	47
JA2EG	"	26,466	161	26	40
JA2IU	"	26,100	172	23	37
JA0SC	"	20,433	176	19	30
JA6ARW	"	19,965	140	21	34
JA7JW	"	17,004	122	25	27
JA1AS	"	15,496	120	22	30
JA2BGH	"	12,330	114	26	19
JA1PTI	"	10,500	128	17	23
JH1FSF	"	8,300	67	21	29
JA1HOM	"	7,480	98	18	22
JA2OJ	"	6,321	57	22	21
JA1BFN	"	3,510	61	16	14
JA4CLL	"	3,312	47	19	17
JA1VP	"	2,695	33	15	20
JE1GFS	"	1,920	36	12	12
JA1KQX	"	1,494	31	10	8
JH3BJN	"	897	26	11	12
JA1BUI	"	816	25	8	9
JA8ABR	"	756	18	8	6
JA3BCT	"	323	17	10	9
JH1HTK	"	54	8	3	3
JA1CWZ	**7**	**78,056**	**330**	**29**	**59**
JA1DUH	"	18,468	124	20	34
JA1PPW	"	17,920	124	22	34
JA2AIR	"	12,220	103	21	26
JA2WIQ/1		11,350	96	22	28
JA1ZHK	"	8,080	75	18	22
JA1PLQ	"	2,950	50	13	12
JH2VAX	"	2,852	54	12	11
JH1QXP	"	1,620	32	10	8
JA2WXU	"	1,404	45	8	6
JE1KZN	"	1,162	36	8	6
JA0HVB	"	91	5	4	3
JA2GQT	"	48	4	2	2
JA2IYJ	**3.5**	**17,954**	**162**	**20**	**27**
JA1MCU	"	12,348	107	21	28
JA1NEC	"	10,040	115	18	22
JF1XID	"	6,364	71	18	25
JA3IW	"	4,224	59	14	19
JH1KLA	"	2,015	36	13	18
JA9DOF	"	1,120	34	8	8
JA7NI	**1.8**	**204**	**8**	**6**	**6**
JA3AA	"	60	6	3	3
KA6SS	**14**	**24,768**	**169**	**24**	**40**

Khmer Republic

XU1AA	**A**	**44,505**	**237**	**49**	**66**
		(Opr. W6ISQ)			

Lebanon

OD5LX	**28**	**11,692**	**106**	**9**	**28**

Malaysia

9M2CX	**A**	**427,350**	**795**	**98**	**177**
9M2DP	"	11,343	162	29	28

Syria

YK1OK	**A**	**240,000**	**668**	**35**	**90**

Taiwan

BV2A	**14**	**1,620**	**83**	**14**	**18**

Thailand

HS4AGN	**A**	**923,803**	**1324**	**116**	**233**
HS3AIG	"	283,736	742	78	154

Vietnam

XV5AC	**A**	**446,598**	**914**	**92**	**166**
			(Opr. K7CBZ)		

U.S.S.R.

Asiatic

UA9DN	**A**	**883,680**	**1383**	**65**	**159**
UW9WL	"	458,098	819	48	151
UA9JH	"	380,100	665	59	151
UA9CBM		97,308	247	43	110
UA9UF	"	94,185	489	33	72
UV9CQ	"	54,824	237	26	63
UA9NX	"	32,657	117	38	75
UA9MQ	"	23,736	135	37	49
UA9HAI	"	12,688	131	24	37
UA9LAQ	"	8,127	71	16	27
UA9LAS	"	2,415	47	10	13
UA9CDU	28	12	2	2	2
UV9CU	**21**	**90,501**	**431**	**29**	**68**
UA9JL	"	34,000	264	21	47
UA9QD	"	20,072	145	13	39
UA9ND	**14**	**85,780**	**403**	**25**	**55**
UA9CAL	"	60,760	343	18	44
UA9QAO	"	46,872	290	17	39
UV9OC	"	39,455	282	19	46
UW9AT	"	31,760	161	25	55
UA9XAH	"	16,280	148	15	29
UA9OBJ	"	15,120	119	15	41
UA9IF	"	12,576	160	18	30
UA9FYL	"	9,450	133	11	31
UA9QDX	**7**	**58,058**	**422**	**19**	**39**
UA9HAV	"	34,472	264	20	42
UV9CO	"	32,750	241	14	36
UA9ADD		2,772	57	6	15
UA9CM	**3.5**	**68,742**	**451**	**11**	**43**
UA9BC	"	42,768	311	11	37
UA9NN	"	16,154	156	10	32
JAØMI	**A**	**173,595**	**712**	**65**	**98**
UAØDV	"	110,212	451	48	76
UAØAG	"	84,757	272	47	84
UAØYT	"	60,960	226	44	76
UAØBBC	"	33,936	162	29	55
UAØLJ	"	29,336	325	35	41
UAØLS	"	20,732	208	35	38
UAØCBW		11,935	162	26	29
UAØYAE					
	14	**112,706**	**535**	**28**	**66**
UAØFBZ	"	100,016	533	30	64
UWØLT	"	46,425	364	25	50
UAØTD	"	21,114	268	19	32
UAØSAU	"	20,416	207	12	46
UAØJAD					
	3.5	**15,480**	**214**	**17**	**28**
UWØFB	"	4,199	170	8	11

Armenia

UG6GAG	**21**	**81,344**	**466**	**17**	**45**
UG6JJ	**14**	**99,450**	**417**	**28**	**62**

Azerbaijan

UD6BQ	**A**	**390,208**	**686**	**62**	**146**
UD6AM	"	179,908	451	55	109
UD6CM	"	53,206	249	21	53
UD6DFK		18,468	132	18	36
UD6BW	14	5,472	73	9	23
UD6DJT	**7**	**19,775**	**214**	**9**	**26**
UD6DHU					
	3.5	**35,518**	**302**	**10**	**33**

Georgia

UF6FBX	**A**	**267,463**	**734**	**38**	**95**
UF6QAC	"	53,016	222	28	66
UF6HK					
	3.5	**19,188**	**180**	**6**	**33**

Kazakh

UL7LAW	**A**	**268,800**	**511**	**59**	**141**
UL7BF	"	203,322	574	41	100
UL7EAH	"	85,760	307	45	83
UL7TA	**28**	**8,112**	**91**	**19**	**29**
UL7OF	"	2,220	37	7	13
UL7EAJ	**14**	**46,398**	**288**	**21**	**45**
UL7NAR	"	1,995	49	9	13
UL7HD	"	154	9	6	8
UL7NAF	**7**	**24,950**	**237**	**16**	**34**
UL7TAM	"	15,141	147	16	33

Tadjik

UJ8AG	**A**	**369,492**	**875**	**49**	**115**
UJ8AB	**21**	**27,083**	**205**	**18**	**35**
UJ8JAS	**7**	**28,566**	**223**	**18**	**36**

Turkoman

UH8BO	**14**	**30,914**	**188**	**26**	**56**

EUROPE

Belgium

ON50/4XG					
	A	**94,392**	**359**	**44**	**108**
ON50/5AZ					
	21	**63,225**	**361**	**23**	**52**
ON4CE	14	760	45	6	20

Bulgaria

LZ1AG	**A**	**189,202**	**480**	**65**	**182**
LZ1NJ	"	26,390	233	28	63
LZ1BY	"	1,890	47	11	24
LZ1CW	**21**	**47,806**	**264**	**27**	**79**
LZ1FI	"	31,616	243	21	55
LZ1AD	"	26,532	149	26	41
LZ2RB	"	9,296	82	18	38
LZ2UG	**14**	**29,580**	**351**	**15**	**45**
LZ1KV	"	24,800	216	18	44
LZ1KDZ	"	22,440	282	17	38
LZ2KST	**7**	**103,960**	**782**	**29**	**63**
		(Operated by LZ2ZZ)			
LZ2KR	"	6,520	170	7	28
LZ1XL	**3.5**	**27,596**	**536**	**8**	**35**
LZ1YE	"	7,807	200	7	30

Czechoslovakia

OK2QX	**A**	**337,386**	**790**	**76**	**201**
OK1ALW	**A**	**157,331**	**688**	**40**	**91**
OK1MPP/P					
	"	103,376	265	60	122
OK2BPE	"	76,738	504	31	91
OK2BEC	"	73,575	442	36	99
OK2LN	"	59,706	396	27	80
OK2PBM		59,385	368	30	81
OK1AHV	"	50,120	261	35	80
OK2PAW		43,197	264	31	90
OK3TBG	"	41,225	305	24	73
OK3CGG		39,592	330	23	78
OK2PDL	"	35,584	273	34	94
OK2PEQ		25,896	218	22	61
OK1FJS	"	20,280	215	17	61
OK3TZD	"	18,392	150	23	65
OK1KZ	"	18,018	200	16	61
OK2KFP	"	12,213	144	17	42
OK2BEF	"	12,012	180	12	54
OK1MAA	"	11,220	187	13	47
OK3YCV	"	10,764	131	19	50
OK1MIN	"	9,487	63	24	29
OK1FAM	"	9,048	102	20	38
OK1US	"	8,127	83	18	25
OK1IAH	"	7,560	119	15	41
OK1MAW		6,930	52	23	40
OK1YI	"	5,700	40	23	27
OK2SGW		5,694	100	12	27
OK2KPS	"	5,252	96	16	36
OK2PAE	"	5,100	39	25	35
OK2BBS	"	3,864	76	12	30
OK3KFO	"	2,924	55	14	29
OK2BJJ		2,610	57	8	22
OK3KGJ	"	2,470	66	10	28
OK1DVK	"	627	21	12	13
OK2BCI	"	140	6	5	5
OK2ABU	"	140	6	5	5
OK3OM	**28**	**5,400**	**51**	**19**	**35**
OK1ARZ					
	21	**24,900**	**122**	**23**	**52**
OK3SIH	**21**	**23,490**	**126**	**24**	**57**
OK1ABP	"	14,626	79	25	46
OK3UN	"	13,696	90	24	40
OK1FON	"	6,300	64	16	29
OK3CGP	"	2,590	44	11	24
OK1AQO	"	1,651	49	5	8
OK1ASJ	**14**	**79,990**	**400**	**24**	**71**
OK3ZAA	**14**	**77,420**	**473**	**27**	**68**
OK1DWA		55,836	279	25	69
OK2BON	"	35,697	259	21	50
OK1ATZ	"	29,744	152	29	59
OK2BGR	"	15,565	167	17	38
OK3TBC	"	14,198	112	18	44
OK3IAG	"	13,950	138	20	42

The Ultimate F.M. Transceiver

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

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- Operates on FM, AM or Modulated CW
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- Autoscan in 5 KHz steps across entire band, with adjustable speed and frequency limits.
- Synthesizer flexibility that offers choice of 600 KHz up or down, 1 Meg up or down, simplex, frequency split, or any nonstandard split (programmable) all from a single function switch.
- Receiver Sensitivity of 0.35 Mv for 12 db SINAD on FM
- Dual power output of 20 watts or 5 watts across entire band
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- Image spurious and intermodulation (EIA) 80 db minimum
- 10 pole, 13 KHz crystal filter
- Receiver Superhet, single conversion
- Frequency stability of 0.0005%
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- Full LED Digital readout
- Built-in S Meter also serves as VSWR bridge, power output meter, battery indicator, deviation indicator and discriminator meter.
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The EBC-144 "DREAM MACHINE"



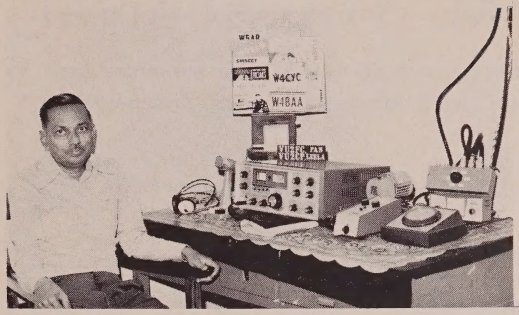
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Looks like Pau, VU2FC could use a little more wall decoration, so we will send him a certificate to help cover some of the bare spots. A few more QSL cards would help too.

OK1AOJ	"	12,987	219	10	29
OK3ZMT	"	7,680	95	13	27
OK3CAU	"	7,216	118	10	31
OK1XM	"	4,983	86	7	26
OK1EV	"	4,964	75	12	22
OK2BEI	"	4,620	114	9	13
OK1AWF	"	845	25	7	6
OK2SMO	"	143	7	5	6
OK2BYW	**7**	**76,923**	**560**	**28**	**71**
OK1DIM	**7**	**43,928**	**467**	**18**	**58**
OK2BEH	"	10,304	171	9	37
OK1FSM	"	5,247	145	7	26
OK1AES	"	4,256	133	5	27
OK3CFS	"	3,944	135	5	24
OK3EQ	"	3,024	71	6	30
OK2BLA	"	2,565	91	5	22
OK2BFX	"	2,460	83	5	25
OK2BOB					
	3.5	**37,485**	**486**	**14**	**49**
OK3CFZ					
	3.5	**27,542**	**530**	**9**	**38**
OK1JCW	"	15,980	318	9	38
OK2BEM	"	14,976	324	7	41
OK2HI	"	14,406	262	8	41
OK3ZBU	"	11,480	274	6	34
OK3RJB	"	10,440	261	7	33
OK1XJ	"	6,816	204	6	26
OK1FCA	"	5,775	175	5	28
OK3ZMD	"	5,539	203	6	23
OK1HBW		4,930	170	6	23
OK1MZO		4,290	148	4	26
OK3YCM/P		3,689	117	5	26
OK3CEK	"	3,120	102	5	25
OK1MKU		2,187	83	5	22
OK2PFX	"	1,408	58	4	22
OK1KRQ	"	931	50	4	15
OK1AVN	"	825	33	5	20
OK3RJS	"	774	44	4	14
OK1PG/P		322	25	3	11
OK2SWD/P		110	11	3	7
OK3ZAB	"	44	12	1	3
OK1ATP					
	1.8	**2,576**	**97**	**6**	**17**
OK1DOK					
	1.8	**1,932**	**86**	**5**	**16**
OK1KPU	"	1,640	83	5	15
OK1MMW		1,452	62	5	17
OK2PDN	"	1,197	69	4	15
OK2BKT	"	1,134	65	4	14
OL1API	"	969	56	4	13
OL6AQH	"	930	62	3	12
OK1MIW		923	72	2	11
OK1AXD	"	602	42	3	11
OL6AQJ	"	540	41	3	12
OK1FRF	"	450	19	6	12
OK1IDK	"	432	24	4	12
OL5AQC	"	408	38	2	10
OL6AQP	"	374	34	2	9
OL8CCS	"	312	29	2	10
OK2SPJ	"	260	26	2	8
OL9CBM	"	240	25	2	8
OL6AQV	"	135	18	2	7
OL6ARH	"	120	18	2	6
OL6ARK	"	81	28	2	7
OK2PFV	"	63	9	2	5
OK1AIJ	"	56	10	2	5
OL9CDP	"	56	11	2	5
OL8CCH	"	54	17	2	4
OL0CBH	"	15	3	2	3
Denmark					
OZ1LO	**A**	**547,104**	**1033**	**93**	**235**
OZ2NU	"	54,740	407	22	93
OZ5QU	"	38,190	198	39	95
OZ5ME	"	33,580	233	29	86
OZ3PO	"	24,265	140	34	81
OZ6XR	"	14,656	223	15	49
OZ2UA	"	8,892	88	28	50
OZ3ZR	"	6,325	114	15	40
OZ9OI	"	5,780	61	24	44
OZ6HS	"	4,067	67	14	35
OZ1W	"	3,600	45	18	27
OZ5DX	**21**	**89,640**	**381**	**31**	**89**
OZ3Y	"	10,064	70	22	46
OZ7HT	**14**	**83,266**	**568**	**23**	**56**
OZ9QM	"	8,720	127	11	29
OZ6XT	3.5	1,980	23	4	9
England					
G3MXJ	**A**	**696,102**	**963**	**92**	**226**
G3LNS	**A**	**688,584**	**1011**	**85**	**227**
G2AJB	"	59,286	300	33	90
G3CWL	"	880	21	10	10
G5BAU	**28**	**19,092**	**117**	**24**	**50**
G3RUX	**28**	**16,571**	**148**	**18**	**55**
G3HCT	**21**	**191,664**	**655**	**31**	**90**
G3FXB	**14**	**238,128**	**873**	**33**	**88**
G3RZI/A		179,144	870	28	70
G3JKY	"	22,700	292	9	41
G8DI	"	8,991	182	9	28
G3UJG	"	6,090	141	5	24
G3KDB	**7**	**46,371**	**387**	**23**	**64**
G4ALG	"	11,395	252	9	34
G3KWK	**3.5**	**49,312**	**447**	**14**	**53**
G4BEG	**1.8**	**1,848**	**91**	**4**	**17**
Faeroe Islands					
OY2O	**A**	**12,291**	**234**	**12**	**39**
Federal Republic of Germany					
DJ2HH	**A**	**702,110**	**929**	**90**	**215**
DK3GI	**A**	**627,760**	**1108**	**85**	**195**
DK5WL	"	483,450	932	85	190
DK4PH	"	428,500	856	77	173
DJ9MH	"	376,062	666	85	184
DJ2TI	"	173,448	517	60	138
DL7QU	"	152,658	428	59	139
DJ6BW		152,412	498	50	106

[*cont. on p. 74*]

CLUB SCORES

United States

Potomac Valley Radio Club **33,564,204**
Frankford Radio Club **32,553,413**
Murphy's Marauders 25,576,049
Southern California DX Club 20,066,803
Western Washington DX Club 16,713,517
South Eastern DX Club (Ga.) 13,453,625
Northern California Contest Club 11,179,767
Richardson Wireless Klub (Tex.) 8,951,498
INDY DX'ers Club. (Ind.) 6,220,458
Texas DX Society 5,998,239
San Diego DX Club (Calif.) 3,793,969
Delta DX Association (La.) 3,581,067
Northern Illinois DX Assoc. 3,562,640
Oak Park Radio Club (Mich.) 3,018,034
Golden Triangle DX Club (Fla.) 1,576,805
Colorado Contest Conspiracy 1,194,141
Florida DX Club 1,029,040
Wireless Institute of Northeast 719,924
Central Virginia Contest Club 664,570
Nights of the Round Table (Md.) 607,594
Twin City DX Association (Minn.) 556,207
North Jersey DX Association 540,930
Michigan DX Association 258,480
St. Louis Amateur Radio Club 231,193
Sterling Park A.R.C. (Va.) 91,118
L.E.R.A. Amateur R.C. (Lockheed) 76,321

Canada

Toronto DX Club 2,915,508
Calgary Amateur Radio Assoc. 759,669

Foreign Clubs

Rhine-Ruhr DX Assoc. (Germ.) 21,795,000
South German DX Group 6,921,263
Chelyabinsk Radio Club (USSR) 5,463,712
Kaunas Polytechnik R.C. (Lith.) 5,088,925
Lamperthem DX Group (Germ.) 5,046,678
Honolulu DX Club 4,612,921
Saar-Pfalz DX Club (Germ.) 4,292,294
Moscow Radio Club (USSR) 4,129,332
Radio Club Venezolano 2,548,051
Uruguay DX Club 2,511,321
Humabo DX Group (Angola) 1,801,108
Rayzans Radio Club (USSR) 1,760,675
Rio DX Stars (Brazil) 1,622,593
SP DX Club (Poland) 1,281,985
Lvov DX Club (Ukraine) 1,119,886
Kiel Canal Radio Club (Germ.) 1,048,580
Kharkov Radio Club (Ukraine) 969,142
Riga Radio Club (Latvia) 891,924
Danish DX Group (Denmark) 866,096
Leningrad Radio Club (USSR) 487,345
SK5AJ DX Club (Sweden) 471,697
Radio Club Tallinn (Estonia) 378,369
Radio Club Tirnovo (Bulgaria) 344,514
YU DX Club (Yugoslavia) 253,463
Voronezh Radio Club (USSR) 212,202
Vasteras Radio Klub (Sweden) 170,454
Swiss DX Club (Switz.) 58,915

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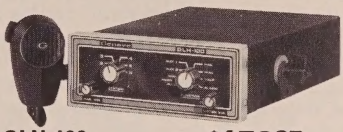
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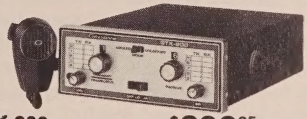
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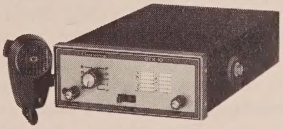
GTX-100 1¼-Meter FM — $309.95 *(Incl. 223.5 MHz)*



GLH-100 P.A./Siren — $159.95 *(horn optional)*



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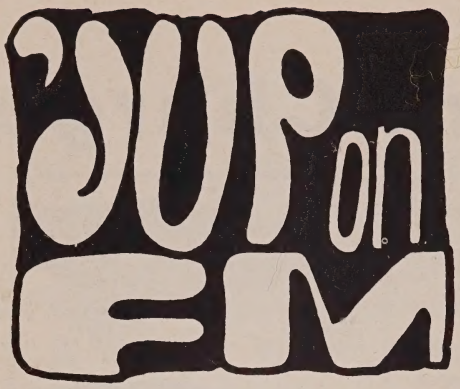
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BY NORM STERNBERG,* W2JUP

At this writing, the proposal to change the allocation of a portion of the 220 mega-Hertz amateur band and re-assign it to another service looks like it has bogged down in the Washington papermill. Stories are circulating to the effect that our government is receiving strong protests from our frontiering neighbors to the north and south of us, and that certain pressures are being brought to bear on the FCC to drop the whole subject rather than get into a hassle with several other signatory nations and the possibility of borderline feuds over allocations. Personally, I hope the docket in question stays bogged down forever. And I—as one small voice, am trying to make my feelings known to my legislators in Washington in a firm and resolute manner.

For the past months I have been monitoring various channels of the Citizen's Radio Service, especially on Friday and Saturday nights, and here on Long Island, the number and quality of the unlawful and illegal operations on that part of the radio spectrum is nothing short of mind-boggling! I have been making cassette tape recordings of what transpires on CB, and little by little getting the stuff transcribed onto paper. I hope to have several dozen pages typed by next month and with the help of the local library copying machine, I intend to send one copy of this dossier to each of my senators and all of my congressmen. The letter accompanying the transcripts will ask simply that they read and try to understand the importance of the information. I ask only that they evaluate with an open mind the question of whether or not the massive infractions of the existing rules of part 95 be authorized to proliferate to yet another portion of the radio spectrum.

By the way, I also hold a CB ticket, and on occasion do attempt to use CB in the manner in which it was intended to be used. Very rarely have I been successful.

If you feel as I do, get in touch with your local elected representative and let him know how you feel. There may be hope yet if they get enough strong inputs. It *is* an election year.

*2 Regal Lane, Levittown, N.Y. 11756.

The Human Mode

In every major metropolitan area there is a FM repeater of one sort or another. Just as in every major metropolitan area there seems to be a ghetto, or a Harlem, or a Watts. Some of the repeaters to which I listen are beginning to be kind of a social problem. There are elitist groups of control stations who glare down from their lofty perches on the touch-tone pads and the control lines, defying all mortal men and women to make a mistake or talk too long, or perhaps use language just a wee bit too strong for eighty-year-old Aunt Martha who might be riding along in someone's car and has never been more than five miles west of the county line. These potentates of the push-buttons frequently wave their magic control circuits and in a flash, the repeater is gone from the air!! All the users sit there and suck their thumbs, never quite certain whose horrendous boo-boo was the critical factor that caused the chain to be pulled and the repeater to flush itself down the drain. These great controllers of our destinies sometimes forget that they, too, were once mere mortal hams.

Of course, being a control station is not the easiest task that I have ever encountered. Frankly, I have done control duty on a couple of machines wherein after three hours of constant listening I felt like my next stop would be either the bathroom in which I would deliver up my lunch, or even a weekend sojourn at the rubber-room over to the county hospital . . . for rest and recuperation, like a combat-weary war veteran. Try it sometime for your own amusement.

I get concerned at times over the stuff that I hear on the repeater when the nonsense rises up above my knees. It radiates out for many miles in all directions and I wonder if some of the repeater users might not belong in some other hobby, like perhaps advanced basket-weaving, or maybe "do-it-yourself" gastroenterology. Some of them just don't belong on the radio.

The prime reason for my seemingly excessive concern with what we sound like on the repeaters is the following: f.m. as it is being used today is a limited range communication mode. In most cases the repeaters can be heard for maybe up to 100 miles, sometimes a bit further. Unlike the h.f. bands, using c.w. and s.s.b., RTTY and slow scan TV, we are generally in a position to have personal face-to-face contact with a large number of the

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people we talk to...the so-called "eyeball QSO," and judging from what I see here in the Northeast, sooner or later we will run into the other guys at a club meeting, or a hidden transmitter hunt, or the local radio parts emporium, or at work, or on the annual field day...we do get to see the guys we talk to rather frequently. In contrast, we can chat with the same group of guys on twenty meter c.w. for ten years, and never get to see what they look like or learn anything in the way of "in-depth" personality of the person at the other end of the contact.

It is very easy to draw conclusions about another human being when you hear him on the radio every day of the week, and in many cases several times in the same day. Sometimes the impressions gained over the air are favorable, sometimes you get to thinking that the other guy belongs in an institution for the mentally retarded, and even wonder where the person bought the license that gives him the privilege of cluttering up the public airwaves.

The point here is that f.m. is by nature a much more humanistic form of amateur radio. The personal interplay of emotion and reaction extends far beyond that found in any other facet of the hobby. And if I am correct in my analysis, any such deeply humanistic pursuit is definitely deserving of more attention to the human perspective factors than we commonly afford it.

When I talk to a good buddy from the local club or repeater group over the telephone, we don't use "Q" signals in our conversation. We don't "Roger, fine business, old man" each other to death! We talk like ordinary folk . . . we are hams. We both know we are hams. We don't have the need to prove that we are hams by larding our speech patterns with giant portions of pseudo-cryptic abbreviations and worn-out acronyms that should have gone out of the lingo with the demise of the Alexanderson alternator.

And to add insult to injury, so much of the "radio jargon" that I hear on the repeater is used inappropriately, incorrectly and unnecessarily.

This has given rise to a new game which I call "mouthmanship". This sport is defined as the practice of hearing someone else use a word with which one is unfamiliar, and immediately proceeding to use that same word on any and all occasions, whenever the spirit moves one, to demonstrate that one does a lot of listening and that the words are really so easy to pronounce. One also can give the erroneous impression of huge gobs of technical expertise by careful choice of the appropriate "un-understood" words. Let me give you some examples . . .

"I'm getting a lot of intermod . . ."

Now this phrase can be heard at least forty times a day on any major repeater in a metropolitan area. Frequently the user has never heard a real case of intermodulation and on at least two occasions that I can recall, some poor nitwit didn't realize that he was witnessing a band opening and was hearing mobiles from 300 miles away coming into his local repeater. For reasons yet unknown to me, most of the poorly understood happenings on the repeater resulting in crummy noises on the output are all lumped together under the glamorous heading of "intermod." Let me try to shed some light on what intermod can be . . .

Several years ago, we had a pair of exceptionally strong repeaters here on Long Island. One of them, running about a quarter kilowatt output was located a mere 1.9 miles from my house. The other one was about ten or so miles away. It also ran power of the same magnitude and an interesting thing would happen when both repeaters went on the air at the same time. I would hear both repeaters on 146.94 which was my favorite spot in those bygone days. I went through at least seven completely different receivers, pre-amps, attenuator pads, antennas, cables . . . I changed everything I could think of changing. Finally, in desperation, I borrowed a commercial cavity, tuned it to 146.94, made a complete engineering study of the cavity and when I measure the "Q" at something over 4000, I stuck the garbage-can-size device in the line to my commercial base station (a well known brand that had been retired from the New York City Fire Department, and whose receiver had five pipes in the front end area). Guess what???? The junk was still there, right on 146.94, whenever the two repeaters were on the air at the same time. Just about that time, I had taken possession of an advanced pocket-type electronic slide rule, and I spent one weekend pumping numbers into the HP35, and looking for answers that could explain what I was getting. Here is what I found:

Repeater "A"—146.85 × 2	= 293.70 mHz
Repeater "B"—146.76	— 146.76 mHz
Intermodulation Product	= 146.94 mHz

This is a classic example of intermodulation following the formula 2A—B equals C. On occasion, this situation arises due to the existence of some external non-linear device, mixing the two signals, and generating an intermodulation product external to the receiver, which comes right down the pipe, through the cavities and into the front end of the receiver. There is not a single thing you can do except find the non-linear element and eliminate it. I guess I was luckier than most . . . the "B" repeater changed to another frequency and the problem disappeared! This is a true intermodulation situation and is not entirely uncommon. Non-

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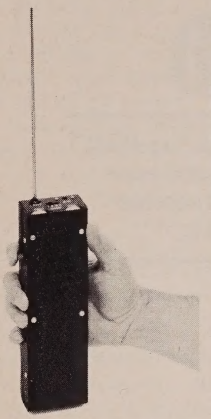
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GENERAL INFORMATION:

- Anodized aluminum case 1½ x 2½ x 9¼
- All tunable coils are prewound
- Transceiver is on one G 10 predrilled board
- Parts layout silk-screened on boards for easy construction
- Crystal deck is separate predrilled board
- Weight less batteries – approximately 15 oz.
- Battery case is AA size – accepts alkaline or nicad
- External battery charging/power supply jack furnished
- 1 dual gate mosfet 1 I.C. 18 transistors 7 diodes
- Antenna – collapsible 17" whip
- Can be tuned to any 2 MHz segment between 140 and 170 MHz
- Plenty of room in case for add ons (PL and tone)

HT–144 TRANSMITTER SPECIFICATIONS: OUTPUT 2 watts minimum. 3 dB BANDWIDTH 2 MHz typical. STABILITY .002 typical (depends on crystal). SPURIOUS outputs down 30 dB or better. MODULATION true FM with varactor in crystal circuit. NETTING separate trimmers for each channel. DEVIATION adjustable to 5 kHz. AUDIO limiter and active low pass filter. MICROPHONE speaker type. CRYSTAL 18 MHz parallel at 20 pF. MULTIPLICATION FACTOR frequency times 8. CURRENT DRAIN 500 mA typical.

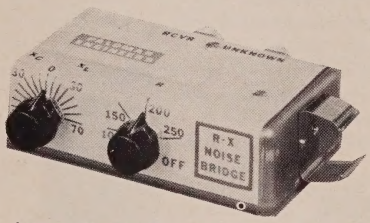
HT–144 RECEIVER SPECIFICATIONS: SENSITIVITY better than .5μV for 20 dB quieting. SQUELCH THRESHOLD better than .3μV. STABILITY .002 typical (depends on crystal). ADJACENT CHANNEL REJECTION 60 dB. SPURIOUS RESPONSES down 70 dB. FIRST IF 10.7 MHz. SECOND IF 455 kHz. BANDWIDTH 15 kHz at 3 dB points. CRYSTAL 45 MHz parallel at 20 pF. CRYSTAL FORMULA receive frequency minus 10.7 divided by 3. HC25U crystal holders, wire leads. AUDIO OUTPUT .5w typical. CURRENT DRAIN 15 mA squelched, 100 mA on voice peaks.

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linear devices can exist nearby the shack in the form of rusty metallic clothesline poles, corroded television antennas, and other dissimilar metallic junctions, forming diode junctions. Corrosion in tower structures is another potential source of this kind of mayhem. Sometimes poorly designed receiver front ends can be responsible for intermodulation products being generated in the receiver itself. The solution here is careful design and construction, the use of input devices such as FETs and Nuvistors rather than the more commonly found bi-polar kind. Sometimes a six db r.f. attenuator will remedy the problem and still permit sufficient receiver sensitivity to get the job done. But let's not call every single anomalous noise that gets into the repeater "intermod" . . . there are other problems in the air such as industrial heating and diathermy equipment, and almost any other form of higher-powered radiating machinery that can cause the repeater to belch forth with unintelligible junk from time to time.

"That's a Roger." Where did the word "Roger" get the connotation of "yes"? The last time I looked, "Roger" meant something like, "I have heard and understood your message." Now it appears to be used for everything from "yes, I agree with you" to "I can't think of anything else to start my transmission with."

We seem to have a parallel with the younger generation's frenetic usage of the "you know" and "like" stuff, which they insert several times into each sentence that they utter. Can we have exhausted all the useful words in the English language so early in our cultural heritage? A shrink friend of mine explains it as part of a "lack-of-self-confidence" syndrome. I wonder . . .

"WB2ZWR is QSYing to nine four." This one breaks me up! Why not just say, "WB2ZWR is changing over to nine four"? Let's look at this for a minute . . . the "Q" signals were originally set up for telegraphy in an attempt to pass the greatest amount of information in the shortest length with the least number of dots and dashes. It still has its place . . . on c.w. and RTTY. Not only do we *not* need it on phone, the case cited is improper use of the signal. If you check, you should find that "QSY" is an order or instruction given in the imperative sense, usually by a coastal station to a mobile station. Remember how the book reads?

"QSY?" "Shall I change to transmission on another frequency?"

"QSY" "Change to transmission on another frequency."

The first signal is a request for direction or instruction. The second signal is that direction or instruction. Is there any valid reason for us to use this stuff on a two meter repeater, or any other f.m. operation, for that matter? Why can't we just sound like people? If we are truly justified in using the above mentioned "Q" signal on a repeater, why not say, "interrogatory QRK" instead of "how am I making the machine, old man?" If someone asks a question requiring a "yes" or "no" answer, why do we have to say "that's an affirmative" or "that's a negative"? Why can't we just say "yes" or "no"? If we want to know where Joe Smith is, why not ask him "where are you?" instead of "what's your QTH?" Another one that gets me is the "home QTH" line. Makes me think that guy is chief OP on the old S.S. *Bucketboat!* The last time someone asked me what my QTH was, I really told him . . . I said, "Well, Joe, I am just leaving 43 degrees 41 minutes 6 seconds north, 73 degrees 36 minutes 38 seconds west!" (If you think I am kidding, check page 143 in the latest edition of the ARRL operating manual). I say firmly, let's get it together! If "Q" signals are to be used, then let's use them as they were meant to be used and let's use them to the hilt!

Next month, I promise to publish what I call "The Cliché Code." This code is designed to help the lazy amateur say all the usual trite junk that infests so many repeaters, and minimize on-channel time while doing so. Have a happy. 73, Norm, W2JUP

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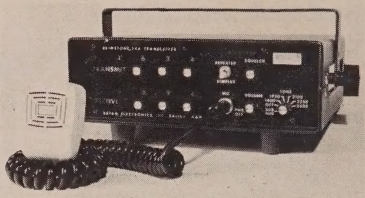
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CQ The Radio Amateur's Journal

QRP

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG/ϕ

QRP—The Mouse That Roars

I'VE been blasting away in this column for half-a-year, and fellows probably are getting tired of my verbiage by now. So let's try something a little different—QRPp'rs writing the column for other QRPp'rs. Let's have Stan Hill, VE3DQ, Editor of *The Groundwave* (Ottawa Amateur Radio Club Bulletin) tell his story and give some operating tips that will interest all QRPp'rs, novice and veteran alike.

"A number of months ago, when I was listening on 40 meters, I heard a weak W2 calling CQ 'way down under a rock-crusher. I moved my v.f.o. a few kHz below the flak and gave the weak fellow a call. He moved to my frequency in the clear and I was thrilled to have a half-hour QSO with a QRPp'r located in his hunting camp near Saranac Lake, N.Y. He was running 100mw output and told me that he had just previously worked a station in Denver. The band was wide open, so I began listening in the spaces between the QRO stations for weak signals. I picked up a very weak signal and snagged him. He was in Lincoln, Nebraska, and also running 100mw. To put the thing in perspective, consider that this is equivalent to one-sixhundreth of the power required to light a 60W light bulb! We worked for about ten minutes until a QRO station began blasting away, ending this QSO. This whetted my appetite for more of the same, and a few days later I stumbled onto a prearranged frequency where a QRP contest was aking place. I worked a half-dozen HW-7's and Ten-Tecs and homebrew mini-rigs on that frequency, and that got into the fun by reducing the loading and drive of my DX-40 to QRPp level. Man! I had not experienced such exhilaration since I got my ticket and had my first stumbling QSO using a borrowed 201A TNT rig and a two-tube regenerative receiver!

Beating The Odds

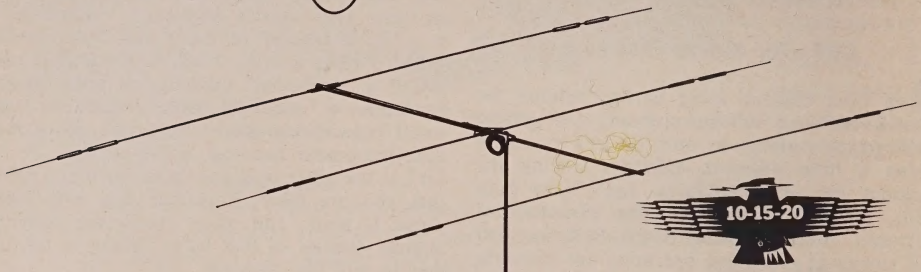
"The QRPp'r competes against massive odds in the crowded bands, so he uses his skill as an operator to even things a little. Here are some of the dodges that seem to work **(1)** Reduce losses in your transmitting system to a minimum. A QRO station can afford the loss of a few db through poor matching, a lossy transmission line and a poor antenna. A QRPp station cannot afford to lose even one db unnecessarily. Also remember that a haywire setup will bomb out on you during an important contact—Murphy's Law makes it so! **(2)** Use a v.f.o. You gotta work'em where they *ARE*, not where they ain't! Most stations listen on or near their transmit frequency and you will wait a long time for a CQ'r to appear on or near your crystal frequency. Additionally, a v.f.o. is needed to move out from under QRM. Failing a v.f.o., it will help a little if you install a "rubbering" capacitor in your crystal oscillator—a relatively large inductance and small capacitance should help you get a few kHz movement from an active crystal. **(3)** Let the other operator know early in a QSO that you are QRP. This tells him why your signal is weak, and often excites the fellow's interest enough so that he is willing to do his best to pull you through. **(4)** QRS—slow sending of a mini-signal is much easier to copy than the virtuosity of a speed merchant. 10 w.p.m. is about right. If you 'mail it to him' at a lesser speed though, your contact becomes bored and impatient. **(5)** Work the contests. During contests, r.f. gains are cranked wide open and contesters are willing to endure massive QRM to rack up one more lousy point which may be a juicy multiplier for their score. **(6)** Patiently wait for a station you want to contact to finish a QSO, and then drop in with a tail-gating call to him. **(7)** Answer CQ's rather than call CQ yourself. You can call CQ till the cows come home and none will notice your feeble signal unless you have a really outstanding antenna setup. I have found that answering CQ's brought QSO's so long as a QRO station didn't beat me out. **(8)** Do not answer a CQ call zero-beat—move off frequency a 100 Hz or so. This avoids the pile-ups, and there is a good chance that your weak signal will be the only one in the clear. **(9)** Call a CQ'r no more than twice—if your quarry doesn't answer by then, he either has his gain too low, conditions are against you, or he is unwilling to expend the effort to copy a weak signal. **(10)** Send QRZ? at the end of each QSO. Other fellows often 'read the mail' and interest in QRPp has developed to the point that most fellows are pleased to work a QRPp station and discuss details of your rig and operations. **(11)** Use the QRP ARC I Club calling frequencies: 3540, 7040, 14065, 21040 kHz. The boys are listening for you! **(12)** Answer CQ DX calls from US stations—DX'rs are often willing to spend some time with you when they discover you are QRPp.

[*Continued on page 80*]

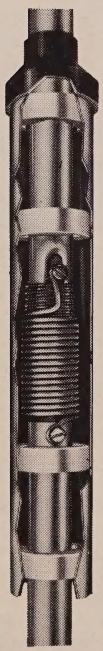
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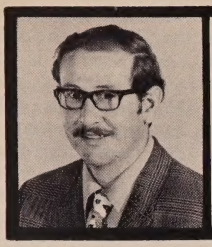
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DX

BY JERRY HAGEN,* WA6GLD

SPRING and early Summer DX conditions have been far from outstanding, however, the doldrums have been somewhat modified by Special Prefix activity for ITU week which should have fattened up WPX scores as a multitude of W/K prefixes were authorized by the FCC. The Fresno DX Convention featured VK3JW, however the Dayton Hamvention DX Meeting was livened up by "female streakers." All this just proves that DXers are *not* a dull bunch.

DXTRA

It appears that the ARRL DX Advisory Committee has begun to issue reports containing information on items passed and recommended to the ARRL HQ, as well as recaping items defeated by the committee and those requiring further study. According to the West Coast DX Bulletin, a report was compiled by the ARRL DXAC in December of 73 and presented to the ARRL Board Meeting in January 1974. A follow-on report was planned for the July ARRL Board Meeting. The "West Coast DX Bulletin" also reports that the ARRL DXAC is planning to issue monthly progress reports which will be sent to major DX bulletins and have set a four month limit for an issue to be put to a committee vote. Matters considered during the Spring of this year were the elimination of DXCC Phone, relaxation of rule 9 regarding the mileage one may move and retain DXCC credit, and the status of several countries. It is quite possible that the countries of Tibet and Zanzibar will be deleted countries by the time this issue is published.

DXTRA wishes to commend the ARRL DXAC, and especially their energetic young Chairman Ted Marks, WA2FQG for the effort they are providing to communicate the actions of the committee. We feel that this is the proper method to keep the committee and DXers informed and interested in DX activity. As the committee are volunteers who spend a great deal of time handling the polling of DXers it is only fitting that their efforts be communicated and result changes to DXCC administration which are desired by active DXers. No matter what your stand on DXCC is, all should agree that this type of action is the *real* purpose for the existence of the ARRL DXAC.

*P.O. Box 1271, Covina, California 91722.

The CQ DX Award Program

C.W. DX	2XSSB DX
153—ZL4DU	345—ZL3AFA
154—OK1ATK	346—WB6PNB
155—IØBAM	347—W4NJF
	348—W2QK
	349—W2GLE

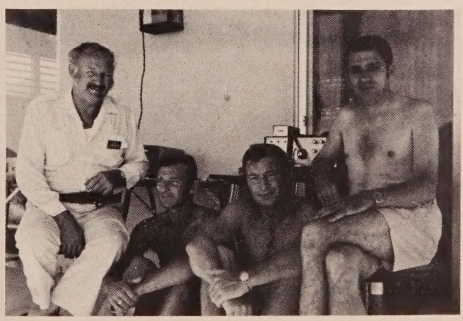
Endorsements

C.W.: ZL4DU, OK1ATK—150 Countries
S.S.B.: W2QK, W4NJF—310 Countries, WB6PNB—275 Countries, W4NJF—28 mHz, W4NJF—3.5/7 mHz

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

Dayton Hamvention Report

The DX Program at the Dayton Hamvention was hosted by Stu Meyer, W2GHK/4 and featured speakers including Darleen Magen, HC2YL, Scott Redd, XE1IIJ, Van Fair, PJ9GIW and DXAC session by "Doc" Sheller, WA8ZDF. However, not to be outdone by the 1973 Fresno DX Convention, the real excitement is described by the "Long Island DX Bulletin"—"What happened on the un-official part of the program was probably the best part for DXers. As usual, the North Jersey DX Hospitality room ran full tilt Friday and Saturday night with overflow lining the halls for some distance. Until about 11:00 on Saturday night it was business as usual with elbow bending, DX conversation spewing forth about the greatest adventures of all times. Rumors have spread that the North Jersey DX room was STREAKED - - - TRUE TRUE TRUE. There



The group in this photo operated from St. Maarten in 1973 using PJ7ARI on s.s.b. and PJ7VD on c.w. L. to r. are Yvon, VP2VV, Bob—PJ2CB, Arie—PJ2ARI and Joeke—PJ2VD.

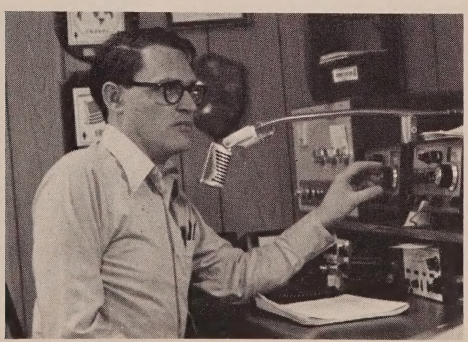


Wow! WB5DTX called in air support for the installation of his 7 Element Wilson 20 Meter Yagi. The tower is 140 feet high!

they were, two female streakers trying to make it down a hall full of DXers that would have taken the L.A. Rams front four to clear. The streak turned into a slow walk that left many a DXer with lock jaw. Not once but twice by one and a finale by another one after a collection was taken in a pillow case. Most of the action was provided by a WØ who roamed the streets of Dayton before a suitable streaker was located. A wild night with a W2 entering the dressing room and acting as the agent to count out the funds to the streakers (each count took about five minutes, there wasn't any change and he came out with a grin). Meanwhile a W4 turned into Flip Wilson with an extraordinary imitation of Geraldine while this was all going on. Well Fresno had a girl in a cake last year (who knows what happened this year?) but Dayton was streaked. Where do we go from here?"

New CQ DX Advisory Committee Member

We are pleased to announce the addition of Murphy's Marauders to those DX oriented clubs represented on the *CQ* DX Advisory Committee. The first representative of this relatively new and very active Contest and DX Club is Ted Melindoski, K1GUD. Ted is an active member of Murphy's Marauders and participates in all major DX contests as well as being a top DXer. He has been Secretary/Treasurer and VP of the club in the past few years. We are sure that Ted will provide active opinion and guidance for the DX Department and are looking forward to working with Ted.



The CQ DXer for August is John, W4WSF who operates from Boyce, Virginia and is active in many facets of Amateur Radio.

CQ DXer For August

This month's featured *CQ* DXer represents the Potomac Valley Radio Club which is one of the Top Clubs in the World as far as DX and Contest Activity is concerned. The Club recently celebrated their 25th Anniversary and issued a special booklet containing a history of the club. One section contained a Contest record for the club for the past 13 years which showed very few second or third place finishes. Another section presented a brief resume of each member listing his awards, amateur radio accomplishments and other hobbies. At present there are approximately 100 members of which 74 hold DXCC and almost 20 hold 5 Band DXCC. The officers for 1974 are "Bud" Smith, W4YZC—President; Frank Donovan, W3LPL—Vice President; Mike Sullivan, WB4BGY—Secretary; and John Kanode, W4WSF—Treasurer and *CQ* DX Committee Member. When asked to nominate a feature DXer, the PVRC President stated that John Kanode, W4WSF was easily the outstanding DXer of the PVRC and stated the following in his nomination letter, "I recently edited the PVRC 25th An-

The WAZ Program

Single Band WAZ

20 Meter Phone

2.....W4WSF

S.S.B. WAZ

1196.....W7ZJB
1197.....K6SVL
1198.....K8PYD
1199.....PAØGMM
1200.....JA1WVK

C.W.—Phone WAZ

3707.....WB4RUA
3708.....K4RA
3709.....WAØOOU
3710.....VE3DMC
3711.....JA1KRU
3712.....K1WJB

Phone WAZ

496.....K6SVL

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

niversary Booklet which included a resume of each club member. When it came to W4WSF it was impossible to list all of his DX accomplishments and awards (over 125). He is a serious DXer and Contest Operator who is always willing to give his best to help the PVRC effort in *CQ* and ARRL Contests."

John is a member of the WPX Honor Roll and has four WPX Awards (C.W., 2×S.S.B., Phone, and Mixed) as well as the *CQ* SSB DX and *CQ* CW DX Awards, WAZ, DXCC, 5BDXCC, 5BWAS, DUF-4 and many contest certificates. John is a Lifetime member of the ARRL and has held the calls K5UYF, WA3LYH, KZ5II, and HP1XWS. In 1969 John even operated HP1XWS/HP5 to the delight of WPXers.

The W4WSF station is located in Boyce, Virginia and includes a Drake C Line, Henry 2K linear and dipoles for 160, 80 and 40 meters. On 14 mHz the antenna is a 6 element Wilson Yagi and a TH-6DXX is used for 21 and 28 mHz.

Our DXer for August is a bachelor and is employed as an engineer with IBM. He enjoys model trains, coin collecting, and stamp collecting when not on the amateur bands. John signed KK4ITU during ITU week and has become the W4/K4 QSL Bureau Manager which is almost a full time job in itself. Congratulations to an avid DXer—W4WSF.

The WPX Program

Mixed

439—WB6PNB
440—WØSFU
441—JR1NRP

C.W.

1313—SP2BFK
1314—JA1VE
1315—G3FVC
1316—IT9RAN
1317—WB9EBP
1318—W1EWD

WPNX

71—WN6OSS

VPX

70—DL-8913

Endorsements

Mixed: ON4QX, DJ7CX—1000, WØSFU—650, K3SXQ—600, WB6PNB—450
C.W.: ON4QX—900, DJ7CX—800, VO1AW—750, W8JAQ—500, G3FVC—350
S.S.B.: IØBGJ—900, I8AA—800, W7CUJ—400, WB4TPU—350
VPX: DL-8913—600, WØ-6437—400
40 Meters: IØBGJ, DJ7CX
North America: IØBGJ, DJ7CX
Oceania: IØBGJ
South America: WB2FMK, G2GM

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



Doug, SVØWXX (WB5HMY) operated from the island of Levkas on the West Coast of Greece with this nice setup. *(TKs WB4KZI)*

International Telecommunication Union Week

The 1974 International Telecommunication Week of May 11 to 19 turned out to be a period of high operating activity largely due to the issuance of many special prefix calls by the FCC. The purpose was to celebrate the anniversary of the ITU which was founded on May 17. The ITU is a World group with representatives from most countries utilizing the radio spectrum. Its primary purpose is to coordinate the use of frequencies for all radio services, including those of amateurs. To represent amateur radio the International Amateur Radio Union consisting of 86 national amateur radio societies is invited to participate in many ITU activities. During the past several months the IARU News Column of *QST* has presented informative information on the ITU and IARU which should be of interest to all DXers.

Approximately 89 special W/K prefix calls with "ITU" suffix were active during mid-May



This photo by W1AM includes all but one of the XT2 amateurs active in 1973. L. to r. are XT2AA, XT2AK, XT2AJ, XT2AG, XT2AM (W1AM), and XT2AE.

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.

Mixed

W4LRN 1300	W6TCQ 954	I6SF 862	K6SDR 804	WA6EPQ 713
F9RM 1100	PAØSNG 943	W9FD 860	IØJX 803	W3YHR 710
VE3GCO 1073	DL1MD 940	W4BYU 859	JA1AG 765	PAØVB 706
W2NUT 1025	WB2FMK 920	W0AUB 856	SM7TV 752	W6NJU 706
WA6MWG 1015	W3GJY 918	YU2DX 855	K2ZRO 751	W9ZTD 700
W8LY 1013	W4BQY 916	WB4KZG 850	WA2EAH 750	WAØCPX 693
W3PVZ 1011	YU1AG 916	G3DO 849	K8UDJ 750	WA6JVD 691
DJ7CX 1004	W4IC 900	W6ISQ 847	CT1LN 749	W8GMK 683
W8ROC 980	K1SHN 893	K2AAC 843	WA5LOB 749	WA5VDH 669
ON4QX 975	W4WSF 877	WAØKDI 824	PY4AP 735	WB4SIJ 654
W4CRW 972	DL1CF 872	W9WHM 811	KØBLT 733	

C.W.

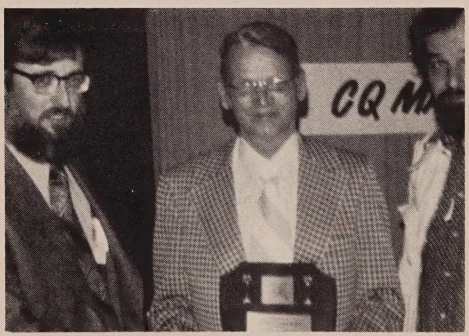
W8LY 1001	VK3AHQ 809	YU1AG 735	WA6JVD 679	W6TCQ 604
W8KPL 955	W9FD 802	K2AAC 726	I6SF 676	VE4OX 600
DL1QT 900	DJ7CX 782	WA6MWG 719	W3ARK 659	OK2QX 600
W2HO 885	G2GM 769	K1SHN 715	SM5BNX 652	
ON4QX 851	W4BYU 768	W4IC 700	K2ZRO 635	
W2AIW 813	K7ABV 767	OK2DB 693	K1LWI 629	
WB2FMK 810	VO1AW 742	W6ISQ 685	W8GMK 628	

2XSSB

W4NJF 1100	DL1MD 858	I8YRK 766	OE2EGL 730	CX2CN 679
F9RM 1047	HP1JC 851	G3DO 765	W6RKP 725	WB6DXU 656
IØAMU 957	WØYDB 831	IT9JT 762	W6YMV 720	WA6TAX 615
CT1PK 930	I0ZV 827	W3DJZ 761	OK1MP 715	CR7IK 613
W9DWQ 917	PAØSNG 824	W6TCQ 759	WB2NYM 702	WB4KZG 610
DL9OH 911	WA6MWG 805	W4IC 750	YU1AG 699	I4LCK 608
K2POA 883	F2MO 780	WA5LOB 747	W3YHR 685	
I8KDB 873	I4ZSQ 780	K1SHN 737	ZL3NS 685	

which made the DX bands a bee-hive of activity. This editor was highly impressed with the enthusiasm, operating skill, and courtesy of the operators. Virtually all stations were active on both c.w. and 2×s.s.b. and on all bands. Several stations provided simultaneous operation on c.w. and 2×s.s.b. and many made over 3,000 QSO's during the 9 day period. The FCC handled the special call requests in an efficient manner despite a helping hand from "Murphy" in several occasions. Rubin, WA6-AHF said he was shocked to hear another station signing WX6ITU which was assigned to him, but a call to the FCC corrected the situation as KU6ITU was authorized. Two special calls were received by W9AES so KZ9ITU was used on the first week-end and WD9ITU on the second week-end of the authorization period.

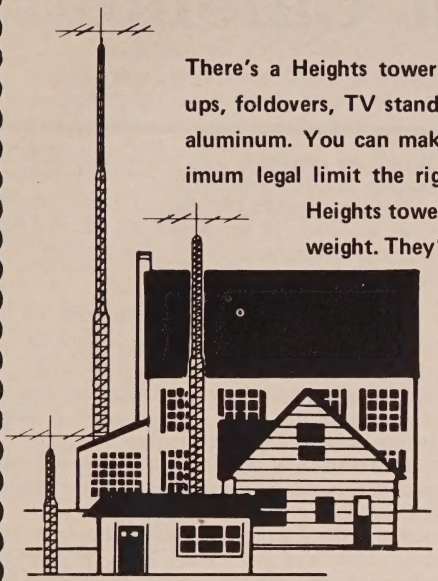
Below is a list of QSL information for the special ITU week stations. As many of these stations made thousands of QSO's it is highly recommended that you include a self-addressed *stamped* envelope with your request. Also be sure to have the proper GMT time and date for your QSO.



Doc Stricker, W8WZ, first winner in CQ's Single Band WAZ award series is shown holding the award he received at Dayton this year. Flanking Doc on the left is Dick Ross, K2MGA, Editor of CQ, and on the right Al Dorhoffer, K2EEK, Managing Editor.

KD1ITU—via WA1RND
KE1ITU—via W1DAL
KF1ITU—via W1DMD
KJ1ITU—via WA1STN
KK1ITU—via WA1UWC
KL1ITU—via W1RSS
KO1ITU—via WA1PID
KQ1ITU—via W1NXZ
KY1ITU—via W1DGJ
WO1ITU—via WA2UWA
WS1ITU—via WA1PGY
KC2ITU—via WB2EQE
KD2ITU—via B.A.R.C.
KE2ITU—via WA2DHG
KF2ITU—via WB2EOU
KH2ITU—via WA2UWA
KK2ITU—via WA2UWA
KO2ITU—via WA2BCK
KP2ITU—via WA2UWA
KQ2ITU—via L1DXA
KR2ITU—via WA2UWA
KS2ITU—via WA2UWA
KW2ITU—via WA2UWA
KX2ITU—via WA2UWA
KY2ITU—via WB2FVO
WD2ITU—via W2TUK
WP2ITU—via WA2CCF
WQ2ITU—via WB2GGM
KB3ITU—via W3CRE
KY5ITU—via K5RWK
KD6ITU—via W6LS
KE6ITU—via YASME
KF6ITU—via W6ANN
KK6ITU—via W6PAA
KO6ITU—via K6SDR
KT6ITU—via W6NJU
KU6ITU—via WA6AHF
KX6ITU—via WB6AGP
KZ6ITU—via W6GBY
WD6ITU—via WA6FIT
WF6ITU—via W6CUF
WI6ITU—via W6ISQ
WT6ITU—via W6NUT
WW6ITU—via YASME
WX6ITU—via WA6AUD
WZ6ITU—via W6SC
KD7ITU—via W7ZC
KF7ITU—via K7LTV
KT7ITU—via W7NHV
KC8ITU—via K8DYZ
KD8ITU—via K8MFO
KI8ITU—via WB8EUN
KJ8ITU—via K8CJQ
KQ8ITU—via W8II
KY8ITU—via W8SHM
WC8ITU—via WA8TDY
WI8ITU—via W8RSW
WJ8ITU—via WA8GPX

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Almont Heights Industrial Park "AT"
Almont, Michigan 48003

KD3ITU—via WA3PZO
KE3ITU—via K3CR
KJ3ITU—via W3GJY
KQ3ITU—via W3AZD
KU3ITU—via K3CHP
KW3ITU—via WA2UWA
KX3ITU—via W3AU
WX3ITU—via ?
KD4ITU—via W2GHK
KE4ITU—via K4ZA
KK4ITU—via W4WSF
KR4ITU—via K4ZCP
KX4ITU—via W4REZ
KY4ITU—via K4OD
KZ4ITU—via WB4SGV
WS4ITU—via W4DC
WV4ITU—via W4IML
KH5ITU—via W5RTQ
KQ5ITU—via WB5IZN
KR5ITU—via K5PFL
KT5ITU—via WA5LES
KX5ITU—via W5SBX

KD9ITU—via W9MTT
KS9ITU—via WA9LZA
KW9ITU—via K9WEH
KY9ITU—via W9JUV
KZ9ITU—via W9AES
WD9ITU—via W9AES
KD0ITU—via K0SGJ
KU0ITU—via WA0TKJ
KX0ITU—via W0PGA

QTH's

WA2UWA—P.O. Box 1158 East Hampton N.Y. 11937
BARC—P.O. Box 1143 Buffalo, N.Y. 14240
LIDXA—P.O. Box 73 Coram, N.Y. 11727
YASME—P.O. Box 2025 Castro Valley, Calif. 94546

QSL Information

A4XFD—via G3XEC
A4XFF—via G8CUO
AX90—via K9KXA
C29NC—via K6ZDL
CF2UN—via VE2UN
CQ6LF—via W3HNK
CR3WB—via CT1BH
CR6OR—via W0GX
CV2T—via CX2CS
ET3USB—via K4DD
F5WQ/FY7—via R.E.F.
FG0BAR—via F6CXG
FM0ASI—via F5GN
FP8CT—via VE5NW
HL9UA—via WA3NOP
IZ1VVZ—via I1VVZ
JD1ACH—via JA3GZN
JD1AHQ—via JH1DTC
JD1AJD—via JA1KSO
JD1YAH—via JH1EXV

PJ8DX—via K2FJ
P29GG—via K7UWT
SV0WGG—via K4EKJ
TI2CF—via WA4LDM
VP1MPW—via WB8LJY
VP1FOC—via W4MZQ
VP2EEC—via K2FJ
VP5WW—via WB4IAE
VS6GM—via W2JTY
WQ0KSU — W0QQQ
XU1DX—via W1YRC
XW8GP—via WA3NVQ
ZB2CA—via G3HAB
ZB2CS—via W9JVF
ZB2CV—via G3SXE
ZB2CW—via G3LIK
ZB2CX—via VE3GCO
ZB2CY—via G4BLV
ZF1AH—via WA1QBH
ZF1CQ—via W0OXN

KC4AAC—via K0YKJ
KC4AAD—via W6MAB
KX6MV—via WA6HRS
M1C—via I4EAJ
OE1ZZB—via WA1JKJ
OG7AA—via OH7AA
OY1M—via W6TCQ
PZ1CQ—via S. Toreson, Estlandsgatan 5C Malmo, SWEDEN

3A0GX—via I1ALZ
3B8DQ—via G4AJJ
3D2CC—via VE6AKV
4W1GM—via W3HNK
5X5NK—via DL1YW
5Z4OG—via VE2GS
7XZAH—recent operation is a pirate—DL7AH is not QSL Manager

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Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Aug.	3-4	Illinois QSO Party
*Aug	3-4	Romanian Contest
*Aug.	3-5	Kentucky QSO Party
*Aug.	10-11	European C.W. Contest
*Aug.	10-11	Argentina Phone Contest
*Aug.	10-11	WE RTTY/VHF QSO Party
*Aug.	17-18	SARTG RTTY Contest
Aug.	17-18	New Jersey QSO Party
Aug.	24-25	Oregon QSO Party
Aug.	24-25	All Asian C.W. Contest
Aug.	31	Ohio QSO Party
Sept.	7-8	ARRL VHF QSO Party
Sept.	7-9	Four Land QSO Party
Sept.	14-15	European Phone Contest
Sept.	14-15	Scandinavian C.W. Contest
Sept.	14-15	Annual Clara Day Party
Sept.	14-16	Maryland/D.C. QSO Party
Sept.	14-16	Wash. State QSO Party
Sept.	18-20	YLRL "Howdy Days"
Sept.	21-22	Scandinavian Phone Contest
Sept.	21-22	VE/W Contest
Sept.	28-29	Delta QSO Party
Oct.	5-6	VK/ZL/Oceania Phone Contest
Oct.	5-6	California QSO Party
Oct.	5-7	WE Phone & C.W. QSO Party
Oct.	12-13	VK/ZL/ Oceania C.W. Contest
Oct.	12-13	RSGB 21/28 mHz Phone
Oct.	16-17	YLRL Anniv. C.W. Party
Oct.	19-20	RSGB 7 mHz C.W. Contest
Oct.	19-20	WADM C.W. Contest
Oct.	19-20	Boy Scouts Jamboree
Oct.	19-21	Manitoba QSO Party
Oct.	**26-27**	**CQ WW DX Phone Contest**
Nov.	2-3	ARRL C.W. Sweepstakes
Nov.	16-17	ARRL Phone Sweepstakes
Nov.	**23-24**	**CQ WW DX C.W. Contest**

*Covered in last month's Calendar

European DX Contest

C.W.—Aug. 10-12 Phone—Sept. 14-15
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 20th annual European contest sponsored by the DARC and was covered in details last month's CALENDAR. Rules same as last year with one minor change. Now only 10 QTCs can be sent to the same station on all bands.

Log and summary sheets are available from W1WY by sending a large s.a.s.e. with sufficient postage to cover your request.

Mailing deadline for logs is Sept. 15th for C.W. and Oct. 15 for phone. To the WAEDC Contest Committee, D-895 Kaufbeuren, P.O. Box 262, West Germany.

All Asian C.W. DX Contest

Starts: 1000 GMT Saturday, August 24
Ends: 1600 GMT Sunday, August 25

This is the 15th year the JARL has run this contest and this year they included a Phone section which took place in June.

Rules same as in previous years and were given in detail in the June CALENDAR, including a Country List for Asia.

Phone logs must be *received* no later than Sept. 30th. You have until Nov. 30th for the c.w. and they go to: J.A.R.L. Contest Committee, Central Post Office, Box 377, Tokyo, Japan.

Illinois QSO Party

Starts: 2000 GMT Saturday, August 3
Ends: 2400 GMT Sunday, August 4

This is the 12th annual party sponsored by the Radio Amateur Megacycle Society. The same stations may be worked on each band and mode for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for Ill.; state, province or country for others. (Ill. may work in state stations)

Scoring: One point per QSO. Ill. multiply total by sum of states, provinces and DXCC countries worked. Others use Ill. counties for their multiplier. (max. of 102).

There is a bonus multiplier of 1 for each group of 8 contacts with the same county.

In addition stations using a power input of 5 watts or less can multiply score by 5.

Count US, Canada, Hawaii and Alaska as countries, and Hawaii and Alaska again as states. (Ill. may be used by all).

Frequencies: 3560, 3735, 3900, 7060, 7175, 7260, 14060, 14275, 21060, 21100, 21360, 28060, 28160, 28660. Phone on hour, c.w. on half hour.

Awards: Certificates to top stations in each state, VE call area, DX country and last three places in Illinois. Single, multi-operator and Novice stations compete separately.

A summary sheet showing the scoring and

*14 Sherwood Road, Stamford, Conn. 06905.

other pertinent information is requested. Include a large s.a.s.e. if results are desired.

Mailing deadline is Sept. 15 to: Radio Amateur Megacycle Society, K9CJU, 3620 N. Oleander Ave., Chicago, Ill. 60634.

New Jersey QSO Party

1900-0600 GMT Sat./Sun. Aug. 17/18
1200-2300 GMT Sunday, August 18

This is the 15th party sponsored by the Englewood ARA. Phone and c.w. are considered separate bands. The same station may be worked on each band and mode and N.J. may work other N.J. stations for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for N.J., ARRL section or country for others.

Scoring: Out-of-state multiply N.J. QSO's by N.J. counties worked. (max. of 21).

N.J. stations score 1 point for W/K, VE/VO contacts, 3 points for DX. Multiply total by ARRL sections. (max. of 74) KP4, KH6, KL7, KZ5 are 3 points and section multiplier.

Frequencies: 1810, 3535, 3735, 3905, 7035, 7135, 7265, 14035, 14280, 21100, 21355, 28100, 28600, 50-50.5, 144-146. Phone on even hours.

Awards: Certificates to the top scorers in each N.J. county, ARRL section and DX country. Also to Novices and Technicians.

Indicate each multiplier the first time it is worked. A summary sheet and QSO check sheet is also requested.

Stations planning activity in N.J. are requested to advise EARA by Aug. 3rd so that coverage of all counties may be planned.

Logs must be received no later than Sept. 14th by the Englewood ARA, 303 Tenafly Road, Englewood, N.J. 07631. Include a large s.a.s.e. if results are desired.

Oregon QSO Party

Starts: 0000 GMT Saturday, August 24
Ends: 2400 GMT Sunday, August 25

This is the 2nd annual party by the Emerald A.R.S. The same station may be worked once per band regardless of mode, and Ore. in-state contacts may be made for QSO and multiplier credit.

Exchange: Signal report and QTH. County for Oregon; state, province or country for all others.

Scoring: *For Oregon:* One point for W/K, VE, KH6 and KL7 QSO's; 3 points for DX. Multiplier for each state, province and DX country worked. (Including KH6 & KL7).

For W/K & VE: 5 points for each Ore. QSO, 7 points if its a Novice. Multiplier of 1 for each Ore. county worked per band.

DX Stations: 10 points for each Ore. QSO, 15 points if its a Novice. Multiplier of 1 for each Ore. county worked per band.

Final Score: Total QSO points times the multiplier. (max. of 36 counties).

Frequencies: C.W.—1810, 3550, 7050, 14050, 21050, 28050. Phone—1820, 3900, 7250, 14280, 21375, 28600 and 2 and 6 meters. Novices—3710, 7110, 21110, 28110.

Awards: Certificates to top scorers, single and multi-op., in each state, province, DX country, and Novice in each state. Also overall high score in the U.S. Canada and DX country. Oregon stations and Novices will compete for top 3 places in each county. A special award for the overall high scorer.

Mailing deadline Sept. 14th to Station WA7-TDZ, 2188 East Irwin Way, Eugene, Oregon 97402. Include s.a.s.e. for results.

Ohio Interstate QSO Party

Two Periods (GMT)
1900 Sat. Aug. 31 to 0300 Sun. Sept. 1
1500 to 2300 Sunday Sept. 1

This party is sponsored by the Ohio Council of Amateur Radio Clubs. There are no restrictions as to operating time, power, number of operators or transmitters. The same station may be worked once on each band and mode.

Exchange: QSO no., RS(T) and QTH. County for Ohio, ARRL section for others.

Scoring: One point per completed QSO on 80 thru 10, 2 points on 160 and above 50 mHz. A contact with WO8HIO, special events station for the State Fair, is worth 5 points.

Final Score: QSO points × ARRL sections worked for Ohio; and QSO points × Ohio counties (max. of 88) for all others. (DX contacts have QSO value but not as a multiplier).

Portable stations operating from rare Ohio counties may multiply their final score by 1.5. All counties **except** Butler, Cuyahoga, Franklin, Hamilton, Lorain, Lucas, Mahoning, Montgomery, Stark, Summit and Trumbull are considered as rare.

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

Awards: Awards to 1st, 2nd and 3rd place stations in and outside Ohio. And to winners in each ARRL section and Ohio county. (Min. of 10 different QSO's). Separate awards for those using above 50 mHz exclusively.

Entries must be received by Nov. 1st by: Ohio QSO Party, 6470 Penick Drive, Reynoldsburg, Ohio 43068. A s.a.s.e. to above will get you a contest package with log, summary sheets and all necessary material.

Four Land QSO Party

Starts: 1800 GMT Saturday, September 7
Ends: 0200 GMT Monday, September 9

This is the 5th annual party sponsored by the 5th Call District A.R.A. of the I.A.R.S., to make the many counties in the eight 4th call area states available for county hunters.

The same station may be worked on each

band and mode fixed, and again if operating portable or mobile, and from each different county. 4th call area stations may work each other for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County and state for 4th district; state, province or country for others.

Scoring: *4th Call Area:* One point for W/VE contacts, 3 points for DX. (inc. KH6 & KL7). Final score, QSO points × states and provinces worked. (counted once only).

All Others: Two points for each QSO. Final score, QSO points × 4th district states + 4th district counties. (counted only once).

Frequencies: C.W.—3575, 7060, 14070, 21090, 28090. Phone—3940, 7260, 14343, 21360, 28600. Novice: 3710, 7110, 21110, 28110.

Awards: Certificates to top scorers in each state, province and country, 2nd and 3rd place when warranted. Also county awards to 4th call area states and special awards to Novices, s.w.l.'s and B/H. (Blind and Handicapped). There are also High Honor Awards to the top scorers in Four Land, high outside W/K, VE and DX country.

Mail logs within 30 days of end of party to: Fourth Call District A.R.A., Att: Bob Knapp, W4OMW, R.#7, Box 187, Greenville, N.C. 27834. Include s.a.s.e. for results.

Scandinavian Activity Contest

C.W.—Sept. 14-15 Phone—Sept. 21-22
Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

It's the world working the Scandinavians on all bands, 3.5 thru 28 mHz, in the 16th S.A.C. activity. Country prefixes are: LA/LJ/LG, JW, JX, OH, OHØ, OJØ OX, OY, OZ, SM/SK/SL.

Classes: Single operator and multi-operator, single and multi transmitter Multi transmitter stations must use separate series of serial numbers for each band. Club stations are classed as multi-operator.

Exchange: Five and six figures, RS(T) plus a progressive QSO no. starting with 001.

Scoring: One point for each completed QSO. The multiplier is the sum total of SAC countries worked on each band, as listed above. Maximum of 10 per band. Scoring all band only.

Awards: Certificates for all operating classes, to the two top scorers, both phone and c.w., in each country and each USA call area.

Phone and c.w. are separate contests. A summary sheet showing the scoring and other information, your name and address in BLOCK LETTERS, and a signed declaration that all rules and regulations have been observed is requested.

Mailing deadline is October 15th and this year logs go to: EDR Contest Committee, P.O. Box 335, 9100 Aalborg, Denmark.

Maryland/D.C. QSO Party

Starts: 2300 GMT Saturday, September 14
Ends: 0100 GMT Monday, September 16

This is the 8th QSO Party sponsored by the Maydale A.R.S. The same station may be worked on each band and mode for QSO points as well as band multiplier.

Exchange: QSO no., RS(T) and QTH. County for MD/DC, ARRL section or country for others. (Baltimore City and Washington separate).

Scoring: Two points for each completed QSO. MD/DC use ARRL sections and countries for their multiplier. All others use Maryland counties and Independent cities. (max. 24 on each band).

Frequencies: On h.f. bands 75 kHz from low end of each c.w. band on even hours. On Phone 25 kHz from top of each band on odd hours. Try 10 and 15 on half hour. On 6, 2 and 220, stations may be worked thru repeaters.

Awards: Certificates to top scorers in each ARRL section, country and MD county and D.C., both phone and c.w. A Plaque to the Top Scorer combining total score for all bands and modes.

Use a separate log for each band and mode as well as a check sheet for each band and mode with over 100 contacts.

Also a summary sheet showing the scoring, name and address, and a signed declaration that all rules and regulations have been observed.

Mailing deadline Oct. 4 to: Maydale A.R.S., c/o C. E. Andersen, W5TWT/3, 14601 Claude Lane, Silver Spring, MD 20904

Washington State QSO Party

Starts: 2000 GMT Saturday, September 14
Ends: 0200 GMT Monday, September 16

This is the 9th annual QSO party sponsored by the Boeing Employees A.R.S. The same station may be worked on each band and mode for QSO points, and again if portable and is a new multiplier. Wash. stations may work other in-state stations for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Wash., state, province or country for all others.

Scoring: Wash. stations score 1 point for each QSO, others 2 points for each Wash. QSO. Multiplier for Wash. is states, provinces and countries worked. Others use Wash. counties worked. (max. of 39).

Frequencies: C.W.—3560, 7060, 14060, 21060, 28160. Phone—3935, 7260, 14280, 21380, 28660. Novice—3735, 7125, 21150, 28160.

Awards: Certificates to top scorers, single and multi-operator, in each state, VE province, DX country and Wash. county. The Worked Five Bears Award is available to anyone working 5 club members before, during or after the party.

[*Continued on page 80*]



Propagation

BY GEORGE JACOBS,* W3ASK

A FEW 10 meter DX openings may still be possible to southern and tropical areas during the late afternoon. Frequent short-skip openings between distances of about 500 and 1400 miles can be expected.

An occasional 15 meter DX opening towards Europe and the east may be possible before noon, but check for much better conditions during the afternoon hours, especially towards Africa, South America, the South Pacific, and Oceania. Frequent short-skip openings are also expected between distances of about 400 and 1400 miles.

Twenty meters should continue as the best DX band during the month. Openings are forecast to most areas of the world between sunrise and midnight. Peak conditions should occur for several hours after local sunrise, and again during the late afternoon and early evening. Twenty meters will often remain open through much of the period of darkness, especially towards southern and tropical areas. Very frequent short-skip openings are expected on 20, from several hundred miles out to beyond a one-hop limit of 2300 miles, from shortly after sunrise to almost midnight.

Some fairly good 40 meter DX openings are forecast for the early evening hours, towards the east and south. Conditions should improve towards the west and south after midnight, with the band remaining open for DX until sunrise. Look for excellent short-skip openings between about 250 and 750 miles during the daylight hours, and between 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should also be possible on 80 meters during the hours of darkness. Conditions should peak just as the sun begins to rise on the "light" side of the path. Try 80 meters for short-skip openings up to about 250 miles during the daylight hours, and between 250 and 2300 miles at night.

It's still too early for 160 meter DX openings, but an occasional one may be possible during the hours of darkness and the sunrise period. Short-skip on 160 looks good during the hours of darkness for distances up to at least 1300 miles.

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

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For August, 1974

		Rating & Forecast Quality		
Propagation Index .....(4)	(3)	(2)	(1)
Date *August*			
Above Normal: 1, 3, 14, 20-21, 29, 31	A	A	B	C
Normal: 2, 4-5, 7-8, 12-13, 15, 17-19, 22-23, 26-28, 30	A	B	D	E
Below Normal: 6, 9, 11, 16, 24-25	B	C	E	E
Disturbed: 10	C	D	E	E

Where *expected signal quality* is:

A—Excellent opening, exceptionally strong, steady signals.
B—Good opening, moderately strong signals with little fading and noise.
C—Fair opening, signals between moderately strong and weak, with some fading and noise.
D—Poor opening, signals weak with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

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

2. With the *propagation index*, use the above table to find the expected signal quality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (3) will have a forecast signal quality of A on Aug. 1, C on Aug. 2, A on Aug. 3, C on Aug. 4-5 etc.

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

Since the summer propagation season is expected to end by mid-September, this month's *DX Propagation Charts* cover only a *one month* period, rather than the usual two month span. *Short-skip* Charts for August appear in last month's column.

V.h.f. Ionospheric Openings

Some fairly frequent 6 meter short-skip openings should be possible during August, as a result of sporadic-E ionization. These openings normally extend over a range of approximately 750 to 1300 miles, but during periods of especially intense sporadic-E ionization, 6 meter "two-hop" openings may take place up to distances of 2500 miles. Occasional 2 meter short-skip openings may also be possible over a range of about 1200 to 1400 miles.

One of the year's most prolonged and intensive meteor showers, the *Perseids*, should take place between August 10 and 14. Maximum intensity is expected at about noontime on the 12th, with an average of fifty meteors an hour. Ionization produceed as these meteors enter the earth's atmosphere should be sufficient to make possible numerous meteor-scatter type openings on the 6 and 2 meter bands. The range of these openings could be up to several hundred miles.

There's a possibility for some auroral-scatter propagation on the v.h.f. bands during a radio storm expected on August 9-11. Openings may also occur on other days that are expected to

How To Use The DX Propagation Charts

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

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

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

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

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

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight saving* time is used, *not* GMT. To convert to GMT, *add* to the times shown in the appropriate Chart 7 hours in the PDT Zone, 6 in the MDT Zone, 5 in the CDT Zone and 4 in EST Zone. For example, 14 in Washington, D.C. is 18 GMT and 20 in Los Angeles is 03 GMT, etc.

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

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

be "below normal." Check the "Last Minute Forecast" appearing at the beginning of this column. Auroral-scatter type openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading, and Doppler shift on s.s.b. signals.

Sunspot Cycle

The Swiss Solar Observatory reports a monthly mean sunspot number of 42 for May, 1974. Highest activity was observed between May 4 and 8, when the count varied between 103 and 113. There were six days during the month when no spots at all appeared on the sun's surface. May's mean number results in a *smoothed* sunspot number of 33 centered on November, 1973. The sunspot cycle is measured by the value of smoothed sunspot number. A smoothed sunspot number of 24 is forecast for August, 1974. The present cycle continues to decrease very slowly, and a minimum is not expected before October, 1975.

73, George, W3ASK

August 15—September 15, 1974

Time Zone: EDT (24-Hour Time)

EASTERN USA TO:

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

*Predicted times for 80 meter openings. Openings on 160 meters are also possible during those times when 80 meter openings are shown with a forecast rating of (2), or better.

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

Time Zones: CDT & MDT (24-Hour Time)

CENTRAL USA TO:

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

CALL 516-883-6223
FOR DIAL-A-PROP

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

Time Zone: PDT (24-Hour Time)

WESTERN USA TO:

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

[*Continued on page 70*]



THE awards PROGRAM



BY ED HOPPER,* W2GT

USA-CA Honor Roll

3000		1000	
W8CXS	139	VE1AHG	329
2000		**500**	
W2RPZ	202	K9UQN	997
1500			
WA4VAP	244		
VE1AHG	245		

THE "Story of the Month" for August, as told by Lee, is:

Lee W. Cook, WA8WNK, DL5LC

"I have been trying to come up with some way to thank all my friends I have made during the past four years while stationed here with the USAF in Germany. In addition, I am trying to find a way to inform these fine people and many others I have contacted, about a special certificate I have made up for my many contacts.

"I obtained my amateur radio license in 1968 while stationed at Keesler AFB and shortly thereafter became President of the Keesler AFB Amateur Radio Club, K5TYP. While operating as WA8WNK/5 from Biloxi, I obtained my WAS and joined the CH groups. Leaving Keesler in Dec. 1969, I operated as WA8WNK/4 from Craig AFB for the next 18 months. While there I again earned WAS and became active in the County Hunter Nets due to my frequent mobiling between Selma, Alabama and my home in Columbus, Ohio. I further became a member of AREA and the YL- Net. Of course in addition to my amateur activities, I have always been an active member of the USAF MARS program.

"Upon being transferred to Wiesbaden, Germany, in May 1970, I obtained a German call, DL5LC, and then over the last four years have added other foreign calls as I was on leave or TDY to many countries. It is with respect to my various foreign calls, and requests by amateur friends, that I came up with the idea of a special QSL or award for any amateur stations who have contacted me using my various calls. I have sent out almost all of the 5000 QSLs I had made for me as DL5LC, and about 1500 of these since Dec. '73 when the two Germany rule went into effect. I ask that anyone who can determine they have contacted me using two or more of my later listed call signs, I will be glad to send them a special 8½ × 10 certificate. These calls are as follows: WA8WNK, Westerville, Ohio; WA8WNK/5, Keesler AFB, Miss.; WA8WNK/4, Craig, AFB, Ala.; WA8WNK/3, Bolling AFB, D.C.; DL5LC, Wiesbaden AB, Germany; ON8VV, Brussels, Belgium; FØATS, various locations in France; G5AVK, various locations in Great Britain; I1FCP, Aviano AB, Italy; PA9QD, various locations in Holland; WA8WNK/OE, Saltsburg and Innsbruk, Austria; WA8WNK/HB, various locations in Switzerland.

"My primary activity has been using my Heathkit, HW-100 and SB-220 with a 3 element tri-band beam on 20 meters. Of course due to some bad propagation over the last few years, some contacts have been on 15 and 10, maybe I should have said good propagation, but I only go on those bands when 20 is out.

"As this is being written, I am in my final month trying to complete WAS as a DL5, and lack only Hawaii and Wyoming. DXCC should be completed as soon as some of the rarer QSL cards are received.

"My enjoyment in amateur radio has even increased during the past year as the XYL,

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



Capt. Lee W. Cook, DL5LC, WA8WNK, etc.

Gayle, obtained her license WB8CTW and obtained her German call DA1GC. We are both now active running MARS traffic from Germany back to the US for the many military personnel stationed in the Wiesbaden area. Further, my Father has now passed his Novice test, WN8ORE, so when we return to the US in June of this year, the hobby will be a full family hobby.

"For anyone who can give me the dates and times of contacts with me from any two or more of the mentioned calls, I will be glad to send one of my certificates. Please address the request to: Lee Cook, P.O. Box 4201, Norton AFB, California 92409. *(Ed. note—May I suggest you send along a s.a.s.e or s.a.e. & IRC).*

"Shortly some of you will contact me as WA8WNK/6 and thus add another call to the listing. In addition to this, I will be active hopefully as much as possible, on both 2 meters and the County Hunter Nets., as my XYL and I drive across country from Ohio to California the last two weeks of May 1974. We look forward to contacting as many of our friends as possible, and also many new ones.

"I do confirm all contacts via DARC (German QSL Bureau), so sometimes QSL cards are a little slow in arriving. If anyone needs a DL contact for an award, I will QSL direct."

Awards Issued

Paul Kollar, W8CXS, who has helped so many during his trips, especially during QSO parties, finally found time to apply for USA-CA-3000.

Edgar Newman, W2RPZ keeps keying away and made USA-CA-2000, All A-1 (2×CW).

Mr. Lynn Craig Benjamin, WA4VAP was issued USA-CA-1500.

William "Bugs" Grundy, VE1AHG qualified fro USA-CA-1000 and 1500, All A-1.

Don Backys, K9UQN made USA-CA-500.

Awards

C.W. County Hunters Net Award Program: Plans are being made to come out with a number of awards and suggestions are most welcome and for more data send s.a.s.e. to Jim Hoffman, K1ZFQ, 42 Gresham Street, Milford, Conn. 06460 (Jim publishes a monthly C.W. County Hunters Newsletter). Or send suggestions or s.a.s.e. for data to CHN Awards Manager, George Levensalor, W1DPJ, 399 Buck Street, Bangor, Maine 04401. They have ideas on County Awards, Mobile Awards, US-Canada Border Award, Atlantic Coast Line Award, US-Pacific Coast Line Award, CHN Work All Union County Award, CHN Independent Cities Award, US-Mexico Border Award, US-Gulf of Mexico Coast Line Award, Mississippi River Award, CHN Work All Zip Code Award. So write!



Lee William Cook Certificate.

Delete: QRP Chapter #1 Award/Certificate. This club has changed name to: Inter County Amateur Radio Club and they hope to have a new Award/Certificate out soon. Details when I get them. This came via Salvatore T. Console, K2QMF, Secretary, 163-27 91st Street, Howard Beach, N.Y. 11414.

WCVB-TV Award: WCVB-TV of Boston, Mass. is pleased to offer this certificate to all amateur radio operators in recognition of the contributions that amateurs have made to the arts of communications and technical developments. The Award will be issued for having established two way communication with three (3) employees of WCVB-TV. DX stations need to work two (2). Former employees may be counted. There are no date or time limitations on the contacts. QSL cards are not required, and *contacts through repeaters are acceptable.* There is no charge for the Award. Awards will be endorsed for band and mode, if requested and additional certificates may be earned if new contacts are submitted.

Send log data, showing call of station worked, date, band and mode to: Robert W. Jennings, W1DKD, 15 Cliff Ave., Scituate, Mass. 02066.



WCVB-TV AWARD.



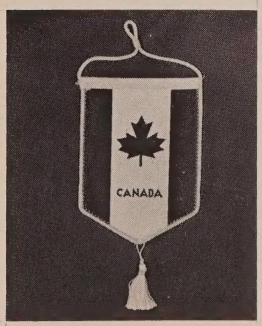
Space Net Award.

Look For:

W1CHA	W1JRQ	K1RZN
W1DKD	W1KBO	K1UHH
W1DIL	K1KJC	W1UOP
W1EDI	W1LHZ	KN1UWD
W1GVV	W1MRQ	KN1UXV
W1IGP	WA1OAE	K1ZGH
KN1IRP	W1OMR	W2VAC
W1JFK	W1ORV	W3ZKU
W1JN	W1RSS	K8RLG

The Maple Leaf Award: VE3LSS, The Amateur Radio Club of the Listowel District Secondary School is pleased to announce a new Canadian Award, which is available to all radio amateurs and s.w.ls. The Award is an attractive flag pennant suitable for display in anyone's radio shack. The Maple Leaf Award is for working or hearing and confirming Canadian amateur radio prefixes. QSLs for QSOs must be in your possession. A GCR (certified list signed by two amateurs) must accompany your application.

Class III—15 different Canadian prefixes
Class II —25 different Canadian prefixes
Class I —30 or more different Canadian prefixes.



The Maple Leaf Award.

All contacts must be made after January 1, 1965, the year in which the Maple Leaf became Canada's official flag. Prefixes can come from the CF, CI, VA, VB, VE, VO, VX, 3B, 3C series and from later special call allocations. Endorsements for bands and modes are available. A beautiful Maple Leaf flag pin (for your lapel) is sent along with the Award and it looks like it is worth more than half the cost of the Award and Pin. Send application, GCR, and 14 IRCs or $2.00 to the Award Custodian, VE3GCO, Mr. Garry Hammond, Geography Department, L.D.S.S., 155 Maitland Ave., S., Listowel, Ontario, Canada. All Awards will be sent airmail.

Holy Year Award: This new Award issued for QSOs during the Holy Year, December 2, 1973 to the end of 1975. Requirements—QSO with HV1CN or HV3SJ. Europeans also required to QSO 10 Rome stations, all others required to QSO 7 Rome stations. You must have the QSLs. Send GCR List—all log data (checked by 2 other amateurs—carefully check QSLs as many pirate HV stations). Cost is 10 IRCs, Countries without IRCs (Communist Countries), Award is free. Send certified data, fee to: Associazione Radiotecnia Italiana (ARI), Box 361, 00100 Rome, Italy. Many thanks to Father Ed., HV3SJ; Bernie, W8IMZ and Frank, W1WY for this data.

Notes

Sorry no room left for me to sound off, much mail but applications slow, thus I was able to squeeze in a lot of data on Awards. How was your month? 73, Ed., W2GT.



The Radio Amateur Satellite Corporation (AMSAT) is a non-profit, tax-exempt organization founded in the greater Washington, D.C. area five years ago. It is a membership organization open to all radio amateurs and interested non-amateurs. AMSAT's satellite programs are supported entirely from donations, membership dues, and grants.

Join AMSAT. Learn more about how you can participate with the exciting AMSAT OSCAR 6 communications satellite, and with the exciting AMSAT-OSCAR 6 communications satellite, and with OSCAR 7 which promises to be even better! Receive the quarterly AMSAT News letter with the latest information on this new ham radio frontier. For membership information, write the Membership Committee, AMSAT, P.O. Box 27, Washington, D.C. 20044.

SURPLUS sidelights

BY GORDON ELIOT WHITE*

THIS is the third of a series of articles in this space, dealing with the operation of the Teletype Model 28 stunt box, the mechanical computer which fits in the back of the Model 28 typing unit, and can perform mechanical and electrical tricks.

One of the most desirable RTTY "stunts" is automatic carriage-return and line-feed. It is common to suffer a poor quality signal and occasionally lose a character, particularly on a high-frequency channel. English is a redundant language—you can lose quite a few letters and still get the sense of the message, however if you lose carriage return, you will get a line typed illegibly on top of the previous line. If you lose carriage-return too, you will get a little black square, very heavily typed at the end of the line. Very hard to read.

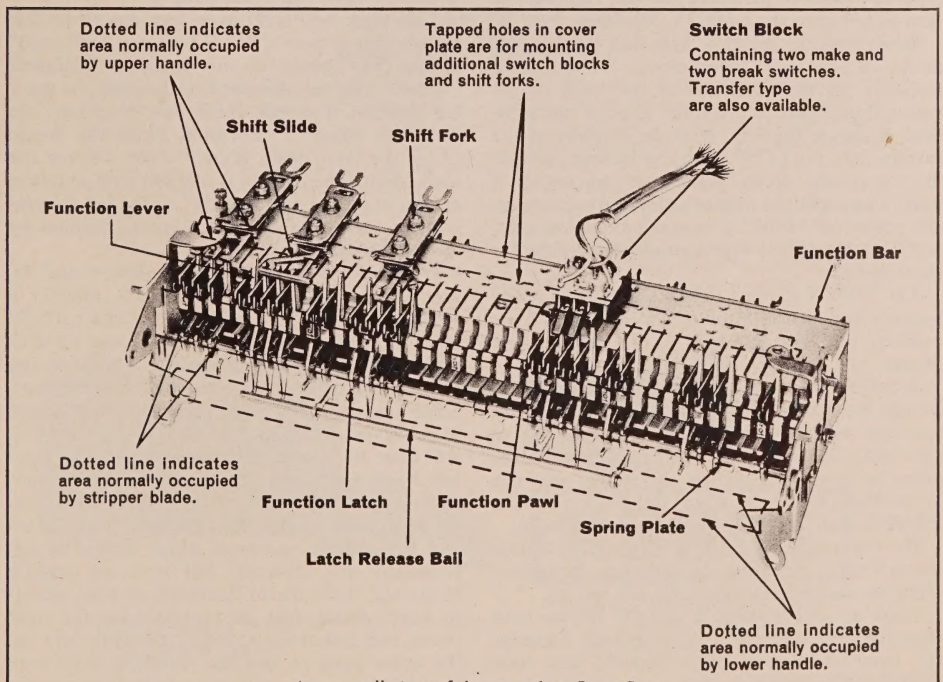
*1502 Stonewall Rd., Alexandria, Va. 22302

It is not only propagation that leads to loss of carriage-return and line feed. Many amateurs are still using Model 14 (or model 28) tape printers aas the station RTTY set. If they become careless, or their little red light burns out, they may merrily type away line after line without remembering that the other end may be on a page printer, not a tape machine.

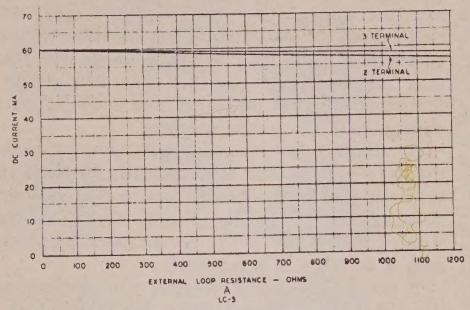
By adding a few strategic parts, you can make the #28 page printer automatically carriage return and line feed when it gets to the end of a standard line. If the CR/LF signal comes in, you won't (as with the #15) get an extra line feed, only if no CR/LF is received.

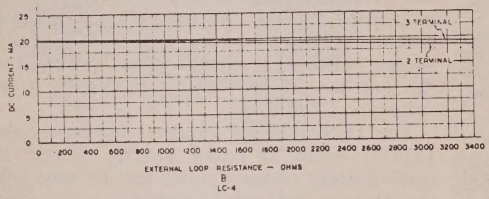
If you have the #28 manual, you can look up the CR/LF kit, Specification 5783S. This is a puzzler, for it shows only one part, a toggle (part number 157973) and a screw (110434) and washer (110743) to attach it. This is misleading, for you have to have some more parts to get automatic CR/LF.

The 157973 toggle attaches to part number 157972, which is found directly behind the spacing drum (takeup pulley for the wire draw rope) on the right side of the front of the model 28 page printer. The 157972 is a flat, bent inverted "L" shaped part, about an inch long, pivoted at the lower end. The upper end extends behind the front plate and engages the "zero" code bar via a "U" shaped protrusion on the code bar. The purpose of the 157973 toggle is to make

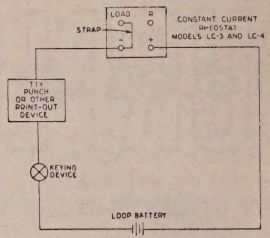


An overall view of the complete Stunt Box.

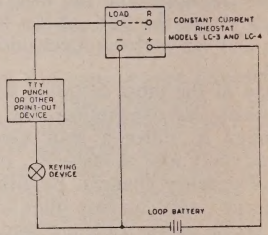




REGULATION CHARACTERISTICS
MODELS LC-3 & LC-4



INSTALLATION DIAGRAM
TWO TERMINAL CONNECTION



INSTALLATION DIAGRAM
THREE TERMINAL CONNECTION

the spacing drum contact the assembly when the type box reaches the right margin, moving the zero code bar to the right.

When looking for this, first find the spacing drum, an aluminum wheel about 3½ inches in diameter, on the right side of the front of the typing unit. There is a similar, though not identical, drum on the left. With the typebox at the extreme left, the 157972 part can be seen through the top of the drum. What you can see of it looks like a pair of fingers pointing to the right. Off-center on 157972 is a small threaded hole, and pointing to the left a projection holding a short spring.

The 157973 is lined up so the 110434 screw passes through it into the threaded hole and the twisted right end of 157973 fits between the fingers.

A projection on the rear of the spacing drum should hit the 157973 when the type box is at the right margin, forcing the zero code bar to the right. The projection may be rotated on the drum by loosening slightly the screws you can see on the front of the drum. **DO NOT** move the **FRONT** ring, which controls the left margin.

Having installed the 157973 if your #28 does not have one, let's go to the stunt box. Remove it from the machine as explained last month.

Look at slots number 4 and 39. If you have stunt bars in those slots, you are in luck. Examine the front of each of those bars. If they have **ONLY ONE TINE** on each, you probably have the right parts for automatic CR/LF already. If not, replace the bars in slots 4 and 39 with #152671 universal stunt bars,

The swap of stunt bars was described last month. The proper CR/LF bars are "universal" in that they operate on *any* character whenever the zero code bar is moved to the right, or spacing position. You can check this by poking the zero bar where it protrudes from the frame under the left ribbon holder while rotating the main shaft. The casting is marked with numbers on the front and **"M"** and **"S"** on the top. Normally the zero bar is kept in marking position by the 157972 and its spring.

If you don't find *anything* in slots 4 and 39, you will have to add several parts, notably a 152653 pawl, with a 157240 spring and a 72522 felt wick, plus a 152641 stunt lever, and a 90517 spring and a 152660 spring plate. A 4703 spring should be attached to the front of the stunt bar. Since you will have other parts in adjacent slots to guide you, I will not explain how these fit. You will have to remove the end plates on the stunt box itself and carefully slide the retaining rods aside to install the new parts. With care this can be done without upsetting the other slots. This is a five-handed operation which should be approached with delicacy, but it is not unduly tricky and there are no clearances or adjustments to worry about. Just get everything in the right place, and install the 152671 bars when you get the other parts in and the stuntbox itself back together, then reinstall the whole thing in the printer and you have now got automatic carriage



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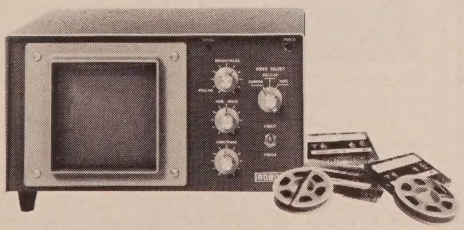
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return and line feed. Some adjustment of the ring behind the right spacing drum may be required.

On very early printers, there is a one-piece part number 150438 in place of 157973 and 157972.

Note that when operating at full speed the typing unit will trip both carriage return and line feed at the same time, that is during one character time period. Since the unit is still receiving copy, the typebox will usually not have time to get all the way back to the right margin before another letter comes up, and you may get a character printed "on the fly" as the typebox is approaching the right end of its travel. This is less trouble at 60 words per minute than at 100 w.p.m., and is generally not noticed on moderate speed keyboard sending. Nothing can be done about that character unless the sending station will send CR and LF, which does away with the need for the automatic feature.

This column winds up the easily-accomplished stunt box modifications. There are many more, such as vertical and horizontal tabulation, print-non-print, back-space, reverse line feed, two-color ribbon, selective calling, and all manner of switch operations. To do a serious job with the stunt box requires careful study of the parts book and the maintenance manual. I may go into selective calling at a later time, but it is probably too specialized a subject to continue with at this time.

Constant Current Rheostat

I have noted on the surplus market a very useful item for the RTTY enthusiast, the Stelma constant current rheostat. This is a solid-state device about the size of a pack of cigarettes which can be connected into the station loop to keep the current steady at a nominal 60 milliamperes (model LC-3) or 20 ma (LC-4) despite variations in load or supply. I find it very useful when plugging different printers, demodulators and reperfs in and out of the loop. Particularly when using the DXD (TS-383) stroboscope, it prevents burning out printer magnets.
amperes (model LC-3) or 20 ma (LC-4) despite and reperfs in and out of the loop. Particularly

The DXD requires full loop voltage to fire its neon indicator lamp, so yid have to tdrn the loop pot to zero resistance. If you then forget to crank up the pot to 2,500 ohms when you pull the plug on the DXD you will burn up or at least scorch the printer magnet coils by running 100 or more ma through them.

The LC-3 will prevent this by returning the current to 60 ma automatically.

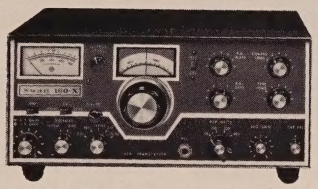
The unit is a transistorized current regulator, self-powered from the loop itself. Fig. 1 shows the hookup of the regulator. Three-terminal hookup provides the best regulation, and allows operation from loops with as little as 10 volts. Two-terminal operation is used only with high-voltage loops of 65 volts or more.

These little units are showing up as surplus now in the $4 price range. ■

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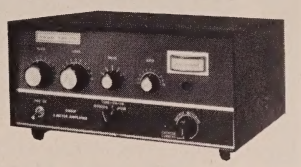
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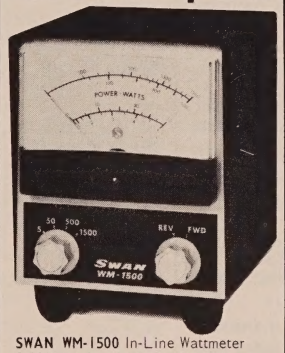
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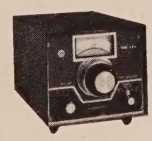


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Announcements [*from page 8*]

Oldham County Fairgrounds in LaGrange, KY, 4 miles north of I-71 on State Route 146. For more information, contact: Denny, K4GOU, 1022 Sylvia St., Louisville, KY 40217.

Fort Wayne, Indiana

All Boy, Girl and Adult Scouters that are interested in International Radio Scouting, and hold Amateur Radio Licences, please contact Mr. Don Wibel, K9ECE/WI9BSA, 5115 Delaware Ave., Fort Wayne, Indiana 46805.

Danville, Illinois

On September 1, 1974, the Danville Hamfest will take place at Douglas Park in Danville, Illinois. Prizes and a huge flea market will be available. For more information contact: Dave, WA9PDS, Dolan Road, Catlin, Illinois 61817.

Melbourne, Florida

The 9th annual Melbourne Hamfest is September 7th and 8th, 1974. All air conditioned. For more information contact the Platinium Coast Amateur Radio Society, P.O. Box 1004, Melbourne Florida 32901.

Malaga, New Jersey

The 26th annual South Jersey Radio Association Hamfest will take place on Sunday, September 8, 1974, at Molia Farms picnic grounds, Malaga NJ, (near intersection of routes 42 and 47). Free parking and picnic tables are available. For information and advance registration, write to Bill Brandberg, W2BBN, 322, Lakeview Ave., Haddonfield, NJ 08033.

Washington, Missouri

The Zero Beaters Amateur Radio Club issponsoring its annual Hamfest on August 4th, 1974 in Washington Missouri, 10 miles north of US-50 on State Route 47. For more information, contact: J.K. Sattgast, WA0FYA, Box 24, Dutzow, MO 63342.

Oklahoma City, Oklahoma

The Oklahoma Ham Holiday, the largest hamfest in central Oklahoma, will be held in the Holiday Inn East in Oklahoma City on Saturday and Sunday, August 3rd and 4th, 1974. For information, contact: Gene A. Nailon, K5DLE, Box 15013, Oklahoma City, OK 73115.

Winchester, Virginia

The Shenandoan Valley Amateur Radio Club will have its 24th annual hamfest on Saturday and Sunday, August 3rd and 4th, 1974. It will take place in the Winchester Armory. Contact L. Neill Woods, W4LOG, P.O. Box 139, Winchester, VA 22601.

Irving, Texas

The North Texas Repeater Association invites all amateurs to attend the Texas VHF-FM Society Summer '74 Convention Friday evening, Saturday and Sunday, August 2nd, 3rd, and 4th at the Dallas West Ramada Inn in Irving Texas. For more invormation write to Texas VHF-FM Society, P.O. Box 3823, Irving Texas, 75061.

Philadelphia, Pennsylvania

The Mt. Airy VHF Radio Club, (The Pack Rats), will hold their 19th annual Family Day & Picnic on Sunday, August 11, 1974 (rain date August 18th 1974) at the Fort Washington State Park, Flourtown, PA. Free prizes to the kiddies. Contact Richard Boyle, K3IGX, 7915 Bayard St. Philadelphia, PA 19150.

Hillard, Ohio

The Central Ohio Radio Club, Inc., will present its Flea Market Auction Hamfest Sunday, August 11th, 1974, at the Franklin County Fair Grounds, Hillard, Ohio. Write CORC Inc. Box 23, Delaware, Ohio, 43015, for information.

Tacoma, Washington

The Radio Club of Tacoma, INC. presents "Hamfair - 74" Saturday and Sunday, August 17th & 18th 1974 at Pierce County Fairgrounds in Graham, Washington. For more information, contact: Bill Morgan, W7GPR, 3421 E. 138th St., Tacoma, WA 98446.

Reno, Nevada

The Sierra Nevada Hamfest will be held in Idlewilde Park, Reno, Nevada, Saturday, August 10, 1974. Free beer and soft drinks. For information, contact: Nevada Amateur Radio Association, P.O. Box 2534, Reno, Nevada, 89502.

Propagation [*from page 61*]

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

to wash out the afterglow image. Because the afterglow is rather dim, subdued lighting is advisable when viewing the monitor image. This can be accomplished by dimming the shack lighting, or by using a viewing hood of some sort. (Robot sells one to fit the 70A bezel.)

Regarding some of the finer points, the image stays in sharp focus even with the monitor brightness turned up quite high, and there is little tendency for the image to 'bloom" or expand. (I might mention that high brightness settings can be counterproductive since the "writing line" brightness goes up faster than the afterglow brightness. There is an optimum setting of monitor contrast and brighness which the viewer soon finds.) The video output low-pass filter eliminates the subcarrier "ripple" or "dot effect" almost completely. There is also very little 60 Hz spurious magnetic deflection from the power transformer. The image size is quite adequate for viewing by a small group of people.

The LED tuning indicator is a real help when trying to tune in an SSTV transmission already in progress. The LED glows at full brightness whenever the incoming subcarrier is within ±50 Hz of 1200 Hz. It does not glow at all when the subcarrier is more than 100 Hz away from 1200 Hz. Naturally, the LED will flash not only on sync, but also on video if the receiver is mistuned. Its real help comes as a fine tuning aid to the ear. The slow-scanner soon becomes able to roughly tune in a signal just by listening to the sound of it. At this point he glances at the LED and fine tunes for the distinctive flashing appearances that an accurately tuned signal produces.

The automatic sync threshold circuit works well under a wide variety of conditions. The horizontal sync circuit will lock-in on stations from both 60 Hz and 50 Hz power areas without readjustment. Sync recovery after a QRM burst normally takes only a few lines if the HOR HOLD control is optimaly set. This reviewer's only real complaint about sync performance is the line-to-line jitter which starts to appear when the signal to noise ratio of received signals drops to the point where "snow" is visible in the picture.

An input signal of 25 millivolts r.m.s. (70 peak-to-peak) or greater will produce constant amplitude, symmetrical limiting.

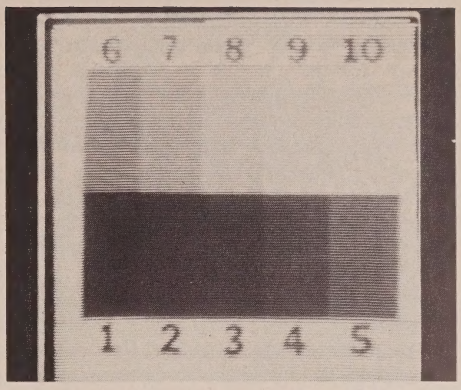


Fig. 8—70A SSTV monitor display of standard EIA logarithmic grey scale strips being viewed by the 80A SSTV camera. See text. (One frame time exposure.)

Camera and Overall System Performance

The Robot instruction book recommends a light level on the object or scene to be viewed equivalent to a 75 watt bulb at a distance of 4 feet. This gives some feel for the sensitivity of the camera. If more light is available, then the target voltage can be reduced (camera CONTRAST turned CCW) and the grey scale performance will improve. (The response of the vidicon becomes less linear and more nearly logarithmic at low target voltage—a desirable condition.) A second advantage of extra light is that the lens can be stopped down, increasing the optical depth-of-field and making optical focus less critical.

Figure 8 shows the very good overall grey scale capability of the 80A/70A system. The optical test pattern was made using EIA standard logarithmic grey scale strips. (These are the same strips used to evaluate the grey scale performance of broadcast and CCTV cameras.) The photo shows the slight tendency for grey scale compression at the extreme black and white ends of the range. (Caused by the monitor at the white end, camera at black.) In spite of this, and with careful setup, the full 10 shades can be observed by eye on the monitor screen and appear in the original photo from which fig. 8 was made. A solid 7 or 8 shades is probably a more realistic estimate under typical ham shack conditions.

When viewing a high contrast test pattern with the camera, a limiting resolution in excess of 125 lines was observed on the 70A

monitor. Figure 9 is a one frame time exposure which gives a good subjective "feel" for the amount of detail that can be transmitted by the system.

Reliability is one of the important factors we hams consider when making an equipment purchase. Robot claims that, "Of the thousands of Robot SSTV cameras and monitors now on the air (many for over three years), not one has developed any major problem, and less than 2% have experienced any difficulty at all." Even if we consider all problems to be "major," 2% is a very respectable number! No problems developed in any of the three units reviewed by *CQ* during several months of operation.

The mechanical construction techniques and workmanship are excellent. The instruction manuals are good, though basically written for the original models 70 and 80 and updated via insert sheets with the new model changes. The shipping cartons are oversized, with cut blocks of resilient foam to protect the units even if the cartons are mishandled in shipment.

One of the most appealing things about the Robot equipment is its price, which is considerably lower than equipment of similar quality and complexity sold in the commercial television market. This is one reason why Robot has continued to dominate the amateur SSTV market—Robot equipment offers a very high level of performance and quality for the money. In slow-scan gear (as in almost everything else) there is room for improvement, but would-be competitors have been faced with the considerable challenge of matching or improving on the performance of the Robot gear while at the same time making a profit. Some have fallen by the wayside attempting it. Others have decided not even to try.

The Robot SSTV equipment is available on a "factory-direct" basis only and cannot be purchased through distributors. For prices and information on lenses and accessories, contact Robot Research Inc., 7591 Convoy Court, San Diego, California 92111.

—WØORX



Fig. 9—Representative of the picture quality obtainable with the system is this SSTV rendition of former FCC Commissioner Nicholas Johnson. (One frame time exposure of 70A screen.)

C.W. Results [*from page 35*]

ator category, which is unusual for them, but fell behind in the single operator department. So for the umpteenth time it's the PVRC that wins the *CQ* Club Plaque.

We have again listed the Novice scores separately hoping that this will create more interest and participation.

Same hard working bunch as in the past. To make it look more dignified I will refer to them as the Committee: Fred Capossela, W2IWC/6; Bob Cox, K3EST; Dave Donnelly, WB2SQN; Bob Entwistle, W1MDO; Andy Malashuk, W1GYE; Ralph Nichols, W1CNU; Dick Norton, W6DGH; Gene Walsh, K2KUR; Bernie Welch, W8IMZ, and somehow I got involved in the action. If you should hear or get to see any of the above group, a word of appreciation would be in order. And let's not forget Marguerite Fagella at the office. She takes care of your requests for log forms, etc.

73 for this one, Frank, W1WY

Transistors In 1926? [*from page 19*]

making their apparatus work, a feat as yet undone.

Yet to rule him a failure would be to impugn the validity of a motive, more of hope than of reason, that has given the history of sciences the ponderous romance of alchemy. Such enrichment we must not deny ourselves. If Lilienfeld accomplished nothing else by enshrining his ideas in government approval, he inspired others to research in the right direction if only to capture for themselves the credit for having invented the real thing. History has shown that it seldom remembers the names or faces of those who merely tried. ■

years in the making



RTTY FROM AtoZ

DURWARD J. TUCKER, W5VU

Drawn partly from the pages of **CQ**, and partly from previously unpublished material, this new RTTY classic has been produced to fill the void in RTTY knowledge among amateurs and professionals alike.

Written to round out the amateurs' RTTY bookshelf which up to now has relied solely on another **CQ** classic: "The New RTTY Handbook," the combination of the two is unbeatable. To properly describe the scope of this volume would demand a volume in itself, but the chapter headings below tell the story:

Chapter 1—**RTTY Basics.** Chapter 2—**The Teletypewriter.** Chapter 3—**Teletype and Radio Reception.** Chapter 4—**Converter (Terminal Unit) Basics.** Chapter 5—**Polar Relays and Distortion.** Chapter 6—**Special RTTY Circuits.** Chapter 7—**Test Sets.** Chapter 8—**Machine Adjustments.** Chapter 9—**Tape Printers.** Chapter 10—**Kleinschmidt Machines, Tape Readers, Teletype Models 28 and 32.** Chapter 11—**Codes, Data Processing & Advanced Machines.** Chapter 12—**Distortion Producing Test Sets.** Chapter 13—**Regenerative Repeaters and Frequency Shift Monitors.** Chapter 14—**Terminal Units.** Chapter 15—**The RTTY Station.** Chapter 16—**FCC Rules, Operating Procedures.**

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C.W. Results *[from page 40]*

DL1GN	"	88,060	309	51	119
DJ1KV	"	77,056	291	35	77
DL1YA	"	73,766	258	45	109
DL6PE	"	65,526	205	50	84
DJ4LK	"	65,526	213	49	85
DK8KD	"	39,952	306	25	63
DJ1YHA	"	37,500	121	42	83
DL2HQ	"	36,636	153	40	89
DL6WE	"	30,788	219	24	62
DL8IG	"	25,312	141	30	58
DL8HA	"	13,065	89	25	40
DL6BP	"	12,980	125	19	36
DJ5QK	"	3,053	42	18	25
DJ9QD	"	1,875	36	11	14
DL7AA	**28**	**9,916**	**73**	**19**	**48**
DL1EE	**21**	**120,432**	**426**	**31**	**73**
DL1KD	**21**	**103,008**	**368**	**31**	**80**
DL1RB	"	41,385	191	28	61
DL1TH	"	11,565	107	14	31
DL9RP	"	2,130	47	11	19
DJ7RJ	**14**	**51,828**	**251**	**26**	**58**
DJ4TR	"	45,400	416	16	34
DK1VN	"	31,119	232	22	47
DL8FR	**7**	**97,873**	**537**	**24**	**73**
DJ5PA	"	88,298	505	30	76
DL8FD	"	25,830	329	15	48
DJ8FF	"	12,100	205	10	45
DJ9EG	"	11,883	207	11	40
DL1KS	**3.5**	**11,660**	**220**	**8**	**36**
DL2JO	"	9,953	259	6	31
DJ8WL	**1.8**	**3,519**	**157**	**5**	**18**
DL6EN	"	1,518	70	4	18

Finland

OH8RC	**A**	**966,602**	**1232**	**103**	**226**
OH2MM	**A**	**578,124**	**880**	**89**	**229**
OH2BJH	"	66,125	258	38	77
OH5RZ	"	61,740	343	37	104
OH2BHG	"	31,164	151	35	71
OH7NW	"	24,465	162	29	76
OH7RF	"	21,730	81	45	61
OH9PH	"	21,440	164	21	46
OH2YL	"	15,096	140	24	44
OH7NJ	"	15,048	150	21	55
OH2LU	"	14,350	144	21	61
OH7UE	"	13,689	124	27	54
OH6XY	"	11,972	114	22	51
OH7SC	"	4,726	64	12	22
OH9TD	"	4,453	54	18	43
OH6JW	"	1,856	72	10	22
OH2VZ	"	1,680	34	12	18
OH5RP	"	1,512	24	13	23
OH4TC	"	638	23	7	15
OH6ZJ	"	567	19	9	12
OH2BAD	**28**	**12,818**	**99**	**16**	**42**
OH4SL	**21**	**67,008**	**305**	**30**	**66**
OH2BFJ	"	51,408	230	29	73
OH3NR	"	1,998	24	16	21
OH5ZK	"	1,652	30	8	16
OH2FS	**14**	**61,952**	**349**	**27**	**59**
OH1KA	"	53,483	436	24	55
OH7QU	"	27,880	205	27	55
OH6MM	"	23,691	259	15	38
OH2BOQ	"	9,548	171	11	33
OH2BCD	"	4,824	102	10	26
OH2QV/5	**7**	**113,934**	**581**	**31**	**71**
OH1PS	"	31,575	325	20	51
OH7SQ	"	2,436	88	5	23
OH1XX	**3.5**	**44,362**	**367**	**22**	**55**
OH5PZ	"	7,455	207	6	28
OH5VX	"	3,131	94	5	26
OH6LB	"	2,720	70	6	26
OH6ZH	"	1,260	32	6	22
OH6RC	"	888	35	6	19
OH2BO	**1.8**	**810**	**53**	**4**	**11**
OH1UR	"	484	46	2	9

France

HW5IN	**A**	**348,840**	**1069**	**50**	**120**
HW8TM	"	99,085	378	47	102
HW8TQ	"	85,894	434	40	94
HW6BEE	"	84,189	298	45	88
HW2XW	"	55,968	335	33	63
HW8FE	"	38,350	172	48	70
HW6ACV	"	30,734	141	42	85
F5YG	"	20,631	203	18	51
HW6BPL	"	16,016	109	34	43
F3IJ	"	6,623	75	14	23
HWØZZ	14	28	7	1	3
HW3CY	**3.5**	**25,860**	**395**	**13**	**47**
HWØACS	"	25,000	477	8	42

German Democratic Republic

DM3YBF	**A**	**154,324**	**582**	**46**	**118**
DT5SDL	"	27,816	151	38	76
DT5UUL	"	24,846	156	31	70
DM4YEL	"	20,732	104	31	40
DM2CRJ	"	15,246	192	14	52
DT2AJH	"	9,381	79	23	30
DM3LOG	"	8,950	93	18	32
DT3OML	"	8,344	122	15	44
DM2CCM	"	7,344	68	17	51
DT3IMO	"	6,118	125	11	35
DT3BE	"	5,035	81	14	39
DT2CRM	"	4,640	64	14	15
DT3XUE	"	4,292	40	23	35
DT2AOL	"	4,028	40	19	19
DM2CTL	"	888	27	8	16
DT2CHM	**21**	**23,478**	**103**	**26**	**60**
DT3UE	"	7,728	60	21	35
DM2FJL	"	3,840	49	12	20
DM2FBL/P					
	14	**32,620**	**280**	**22**	**48**
DM2CED	"	16,330	200	12	34
DM2BUN	"	9,072	76	16	40
DT2ATL	"	2,244	40	11	23
DM2CPE	"	1,512	22	12	16
DM2FDO	"	357	15	6	11
DT2AQI	**7**	**17,004**	**287**	**10**	**42**
DT4WL	"	5,425	142	7	28
DM4WFF	"	2,673	63	9	24
DM5PBN					
	3.5	**5,676**	**171**	**5**	**28**
DM3VXI	"	2,185	96	4	19
DT2DRO	"	2,160	64	6	24
DM3ROO	"	1,848	65	5	23
DT5RUL	"	720	36	4	16
DT2ACL	"	360	24	4	11

Greece

SVØWXX	**A**	**24,360**	**355**	**14**	**44**

Iceland

TF3AW	**A**	**41,808**	**246**	**28**	**50**
WA3GHC/TF		**41,704**	**288**	**28**	**75**

Ireland

EI5F	A	3,366	34	11	22

Italy

I1MOL	**A**	**698,775**	**1633**	**66**	**165**
I6BQI	**A**	**674,700**	**1078**	**94**	**231**
I5ARS	"	367,696	996	52	144
I6MAT	"	126,687	420	42	79
I1MDQ	28	1,152	20	9	15
I3EAD	21	9,114	91	15	27
I1MFS	**14**	**16,276**	**134**	**15**	**37**
I6PSY	"	420	16	6	9
I3SLB	**7**	**72,900**	**584**	**23**	**58**

Malta

9H1CH	**21**	**101,640**	**603**	**22**	**66**

The Netherlands

PAØVB	**A**	**57,459**	**306**	**31**	**76**
PAØPLM	14	252	16	4	10
PAØTA	3.5	3,939	89	9	30
PAØHIP	**1.8**	**4,100**	**194**	**5**	**15**

Northern Ireland

GI3OQR	**7**	**182,400**	**911**	**34**	**86**

Norway

LA2Q	**A**	**33,215**	**284**	**24**	**67**
LA1P	"	8,228	113	18	50
LA2IE	"	7,353	127	17	26
LA6MP	"	2,304	54	13	23
LA9HC	21	2,214	28	15	26
LA7FD	"	1,140	39	4	16
LA7DS	**14**	**18,288**	**238**	**10**	**38**
LA2XI	"	9,408	160	12	30
LA4CQ	"	266	20	3	11
LA6U	7	4,371	76	9	38
LA8WG	"	4,347	143	8	19
LA8XM	"	1,748	38	16	22
LA5HE	3.5	896	26	6	22

Poland

SP9BPF	**A**	**158,178**	**509**	**54**	**152**
SP6DMJ	**A**	**113,050**	**399**	**44**	**131**
SP9ABE	"	89,650	293	45	113
SP2AOB	"	82,585	236	61	133
SP5AFL	"	66,066	319	41	112
SP4ACG	"	65,212	383	35	84
SP9CDA	"	62,540	410	33	85
SP9AGS	"	40,330	293	30	80
SP9BDQ	"	35,258	218	35	86
SP8GEY	"	25,210	144	29	58
SP8AWP	"	11,760	105	23	48
SP8AIS	"	10,500	201	10	38
SP9BRP	"	9,660	167	15	45
SP7CKF	"	7,215	95	18	47
SP1PTT	"	6,811	114	13	36
SP8EMO	"	6,148	64	23	37
SP2BBD	"	4,797	70	13	41
SP1AFU	"	4,636	69	14	47
SP3FAR	"	4,428	119	8	26
SP2FBC	"	3,965	40	21	40
SP6PAZ	"	2,688	91	8	24
SP2BIK	"	2,557	25	14	17
SP3BYZ	"	1,150	36	11	20
SP2PZH	"	864	28	9	17
SP5BB	"	814	19	6	14
SP9CSU	"	420	22	7	14
SP6BFK	28	1,372	21	11	17
SP3DOI	"	432	11	6	10
SP5PWK	**21**	**72,616**	**263**	**32**	**84**
SP9CTW	"	48,791	210	29	69
SP9UH	"	13,629	105	21	38
SP8AWH	"	6,604	58	18	34
SP2AVE	**14**	**50,132**	**341**	**25**	**58**
SP9ABU	**14**	**29,452**	**213**	**22**	**52**
SP5BCT	"	25,848	191	21	51
SP9DTI	"	25,764	275	16	41
SP7ASZ	"	18,135	143	21	44
SP9AI	"	15,447	145	16	41
SP9EVP	"	14,190	170	17	38
SP7DTP	"	11,836	156	13	31
SP7ATA	"	9,600	96	16	32
SP8AG	"	9,345	113	11	29
SP9ZD	"	4,950	99	9	21
SP5DIR	"	4,851	99	8	25
SP7BFC	"	3,354	38	15	24
SP8GQU	"	3,332	63	8	24
SP5AD	"	1,258	24	11	23
SP6DMI	"	966	23	8	14
SP5ATO	"	612	12	8	9
SP2AHD	"	527	15	8	9
SP6HFC	"	308	20	5	9
SP5ARN	**7**	**50,778**	**374**	**24**	**67**
SP6TQ	**7**	**36,261**	**322**	**18**	**61**
SP5AUY	"	34,974	383	18	49
SP8FIX	"	28,320	416	11	48
SP7HMC	"	11,662	201	13	36
SP1ETC	"	9,520	225	7	33
SP3CDQ	"	6,396	140	8	33
SP3FYX	"	2,500	111	5	20
SP3GBJ	"	2,088	59	7	22
SP6UK	"	1,710	49	7	23
SP7CVW	"	820	40	4	16
SP3FAH	"	620	27	5	15
SP9DH	**3.5**	**25,925**	**380**	**13**	**48**
SP2AJO	**3.5**	**23,972**	**429**	**9**	**43**
SP8AQN	"	14,749	308	8	35
SP5GIQ	"	9,962	288	6	28
SP5GH	"	9,184	82	10	46
SP9CAV	"	7,683	182	5	34
SP2FAX	"	7,104	226	5	27
SP9AAB	"	4,998	138	5	29
SP5ELA	"	3,150	125	5	20
SP4FXA	"	2,736	106	11	20
SP3AUZ	"	1,943	69	5	24
SP5GLP	"	1,700	68	5	19
SP8DHJ	"	1,344	53	6	18
SP9FBS	"	1,273	67	4	15
SP3FQP	"	912	40	4	20
SP3EUZ	"	666	37	4	18
SP2FIL	"	357	31	4	13
SP4GAP	"	255	18	4	11
SP9HAX	"	66	7	4	7
SP6PAX	"	65	13	1	4
SP9AVZ	"	52	17	1	3

Portugal

CTIQN	**7**	**7,968**	**167**	**7**	**25**

Romania

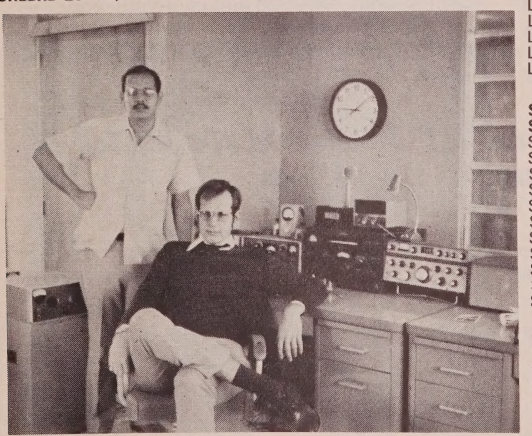
YO3AC	**A**	**60,200**	**209**	**51**	**121**
YO7DL	"	32,250	182	29	57
YO2ARV	"	28,466	272	19	67
YO6AW	"	14,700	171	19	51
YO4BBZ	"	7,550	147	12	38
YO2RA	"	6,215	111	12	43
YO6AFP	"	4,214	81	14	35
YO6EZ	"	3,285	68	13	32
YO6MK	"	1,426	42	9	22
YO2AVP	"	560	24	6	14
YO6AKN	28	63	5	3	4
YO3JW	**21**	**5,950**	**60**	**15**	**35**
YO7VO	"	2,816	51	13	19
YO5BQ	**14**	**31,356**	**311**	**18**	**49**
YO5NY	"	4,515	98	10	35
YO2AHJ	**7**	**16,006**	**256**	**11**	**41**
YO7ARZ	"	10,682	153	12	37
YO9AWV	"	10,080	150	12	36
YO7AHD	"	7,654	138	13	30
YO7VS	"	3,468	77	10	24
YO5ALH	"	980	33	6	14
YO2IQ	"	525	19	6	15
YO2AVA	"	121	11	4	7
YO5AT	**3.5**	**13,224**	**352**	**5**	**33**
YO6AJK	"	4,500	145	6	24
YO6LV	"	1,817	76	5	18

Scotland

GM3CFS	**A**	**134,429**	**512**	**50**	**129**
GM4ASY					
	1.8	**2,224**	**135**	**4**	**13**

Sicily

IT9JT	**A**	**737,394**	**1433**	**78**	**213**
			(opr. IT9PLT)		



Pedro, KP4AST, and Jim, WA4PXP, and the gear that puts out that potent 40 meter signal. Of course a 3 el. full sized beam at 160 feet makes it a lot easier. Jim was the man behind the key and responsible for a new world's record on 40 meters c.w.

CQ ANNOUNCES NEW SUBSCRIPTION RATES

The recent increases in the prices of paper, postage and printing are forcing us to raise CQ's subscription prices. We regret the need to follow all other amateur magazine publishers in raising prices, but we must do so if we are to continue to provide the high quality reading CQ readers have come to expect.

Effective Sept. 1, 1974, CQ's domestic subscription rates will be:

$7.50 for one year
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As a courtesy to present subscribers, we will honor long term reduced rate subscriptions during the next six weeks only, as follows:

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IT9LMK	21	75,240	440	26	73

Spain

EA5BS	**A**	**447,984**	**1276**	**55**	**161**
EA2CR	"	5,358	72	12	35

Sweden

SM7EAN	**A**	**305,908**	**867**	**68**	**158**
SM4CMG	"	131,989	360	52	117
SM7ID	"	121,278	498	47	127
SMØDJZ	"	57,876	286	42	114
SM5DNI	"	37,177	168	38	75
SM5BKI	"	24,687	129	40	77
SM6CMU	"	23,643	108	35	76
SM6BZE	"	20,383	113	35	74
SM5BRW	"	17,630	99	32	54
SM6CRA	"	17,372	138	26	60
SM5BNX	"	11,857	131	21	50
SM4AZD	"	8,892	97	22	56
SM5BAX	"	6,394	61	21	25
SMØCGO	"	5,508	59	20	34
SMØIX	"	2,655	27	21	24
SM5RE	"	1,972	34	15	19
SM3AJL	"	814	27	8	14
SMØFY	"	110	5	5	5
SM5BHW	**28**	**4,848**	**52**	**13**	**35**
SM6FYJ	**21**	**50,544**	**215**	**29**	**75**
SM2COR	"	43,500	220	27	60
SM6DSW	"	10,428	87	21	45
SM5ACQ	**14**	**84,530**	**526**	**25**	**54**
SM5DSF	"	56,316	438	22	54
SM5BRS	"	36,068	307	23	48
SM2CEW	"	31,093	385	17	42
SMØCCM	"	28,492	226	22	46
SM5FUG	"	7,130	78	12	34
SMØBVQ	"	6,270	125	11	27
SM5UQ	"	5,920	122	12	25
SM6JY	"	5,040	105	9	26
SMØTW	**7**	**33,530**	**395**	**20**	**50**
SM6FEK	"	4,130	108	5	30
SM5DLR	"	414	22	4	14

Switzerland

HB9UD	A	9,537	87	20	31
HB9DX	**21**	**21,675**	**108**	**25**	**50**
HB9QA	**3.5**	**7,800**	**186**	**7**	**33**
HB9NL	1.8	330	19	3	3

Wales

GW3SYL	**A**	**108,330**	**401**	**47**	**110**
GW4COP	**A**	**104,920**	**510**	**45**	**127**

Yugoslavia

YU1NPG	**A**	**277,632**	**576**	**76**	**165**
YU2BTU	A	4,278	55	19	27
YU1SF	"	2,178	48	12	21
YU3ER	**28**	**19,040**	**122**	**23**	**57**
YU2CDS	**21**	**180,240**	**620**	**33**	**87**
			(opr. YU2RNE)		
YU5XDX	"	23,226	162	23	56
YU3TCQ	**14**	**12,098**	**165**	**13**	**33**
YU1DGH	"	2,380	43	8	20
YU3EY	**7**	**161,528**	**861**	**34**	**88**
YU4VXW	"	57,960	445	24	62
YU3TBG	"	34,200	404	14	46
YU1OCV	**3.5**	**20,482**	**379**	**10**	**39**
YU3NP	"	14,455	259	8	41

U.S.S.R.

European

UV3WT	**A**	**114,264**	**357**	**57**	**126**
UA6WF	"	64,192	291	40	96
UA3ST	"	48,720	256	29	83
UA1RV	"	39,996	244	31	70
UA3ESS	"	37,142	266	26	72
UA4BI	"	36,036	171	42	75
UZ3RV	"	34,232	305	21	67
UA3DDF	"	18,270	302	11	34
UA3AAU	"	7,526	82	19	34
UA3TA	"	7,208	76	20	48
UA3WAK	"	7,162	130	15	38
UA3IAK	"	6,439	109	11	36
UA6YAK	"	5,805	110	12	31
UA3WAK	"	4,700	77	14	36
UA3WAO	"	3,600	89	11	29
UA6HYL	"	3,542	47	18	28
UA6HBU	"	2,337	35	10	13
UW4NO	"	1,680	36	12	23
UA6JAD	**28**	**7,200**	**155**	**11**	**29**
RA3ALN	"	1,440	26	11	19
UA3LBF	"	1,316	21	11	17
RA3AIF	"	252	7	6	6
UA3QBG	"	207	13	4	5
UA3LM	**21**	**59,500**	**301**	**27**	**73**
UW6CV	"	46,722	448	24	54
UA1BX	"	43,775	239	26	77
UA3ET	"	16,401	116	23	54
UA3NP	"	14,539	153	19	48
UA3JD	"	9,576	120	16	40
UK6YAA	"	7,029	114	8	25
UW6BB	"	3,600	87	9	21
UA3GM	**14**	**76,154**	**376**	**28**	**73**
UK3XMC	"	62,780	390	27	59
UA1RJ	"	45,815	342	22	55
UA3DFK	"	41,276	353	19	49
UA4WAR	"	35,910	291	21	49
UA4PAO	"	29,616	300	17	50
UA3TAM	"	26,202	225	17	49
UW6NP	"	21,772	282	14	34
UA1QAV	"	21,504	222	19	45
UA3NAQ	"	19,360	240	13	42
UA1QAU	"	18,176	174	17	44
UA3DEA	"	17,386	219	11	31
UW6LC	"	17,066	239	15	38
UA4YAW	"	11,718	134	15	39
UA4IW	"	1,820	37	8	20
UA3FK	"	110	10	3	8
UK3XAA	**7**	**36,540**	**512**	**14**	**49**
UW6MP	"	10,304	160	11	35
UA6LAH	"	9,150	133	15	35
UW6CY	"	8,473	162	10	27
UA1DZ	**3.5**	**76,176**	**611**	**25**	**67**
UA4FAZ	"	21,805	343	11	38
UA3NB	"	19,412	341	10	36
UV3QZ	"	18,767	296	9	40
UA3QAQ	"	15,180	298	8	34
UV3GW	"	11,045	186	7	40
UW6AJ	"	8,640	223	9	27
UA6AJG	"	4,352	99	7	27
UA1UJ	"	2,600	90	5	20

Estonia

UR2MY	**A**	**255,335**	**746**	**62**	**167**
UR2GT	"	47,268	347	32	85
UR2QD	**21**	**68,020**	**318**	**30**	**65**
UR2RYB	**14**	**29,232**	**339**	**19**	**39**
UR2NP	"	24,380	298	15	38
UR2LL	"	540	18	6	12
UR2JW	**7**	**22,150**	**375**	**13**	**37**
UR2IO	"	3,861	135	6	21
UR2FU	**3.5**	**20,592**	**422**	**9**	**35**
UR2RJ	"	11,298	241	7	35
UR2CR	"	6,372	159	6	30
UR2RC	"	5,678	151	6	28
UR2RL	"	5,184	152	5	27

Kaliningrad

UA2DP	**21**	**11,972**	**78**	**21**	**52**
UA2FAT	**14**	**64,768**	**384**	**24**	**68**
UA2EC	**3.5**	**12,773**	**175**	**11**	**42**
UA2FBI	"	315	19	5	10

Latvia

UQ2PJ	**A**	**79,616**	**420**	**34**	**94**
UQ2GCN	"	50,172	342	26	85
UQ2NN	"	44,448	406	22	74
UQ2DZ	"	6,771	149	8	29
UQ2CR	**14**	**18,468**	**168**	**14**	**40**
UQ2HO	"	17,080	209	19	37
UQ2GCB	**7**	**8,288**	**201**	**8**	**29**
UQ2OF	3.5	608	32	4	15

Lithuania

UP2NK	**A**	**780,045**	**1168**	**100**	**257**
UP2OX	"	226,188	749	57	149
UP2BAS	"	149,328	576	49	134
UP2ARV	"	76,850	377	39	106
UP2BBF	"	9,455	117	18	43
UP2BAV	"	6,160	65	14	42
UK2PAP	"	4,095	73	14	31
UK2PAR	**14**	**96,069**	**502**	**26**	**67**
UP2DV	"	27,832	250	18	53
UP2PAP	"	24,192	287	17	37
UP2SA	"	3,861	90	9	18
UP2OM	"	3,366	99	11	23
UP2BB	"	1,080	44	20	54
UP2BAT	**7**	**19,938**	**257**	**16**	**43**
UP2BAZ	"	3,799	127	6	23
UP2CT	**3.5**	**23,422**	**428**	**8**	**41**
UP2MB	"	22,344	415	8	41

Moldavia

UO5AP	**A**	**106,603**	**507**	**38**	**119**
UO5OBE	"	42,588	398	22	69
UO5GR	**14**	**16,896**	**120**	**18**	**46**
UO5OWG	**7**	**4,200**	**121**	**7**	**23**
UO5OAL					
	3.5	**15,444**	**369**	**6**	**33**

Ukraine

UB5WF	**A**	**588,302**	**1047**	**75**	**211**
UY5TE	"	90,522	413	40	101
UY5DV	"	61,674	350	33	81
UY5UW	"	42,864	214	29	65
UB5IU	"	41,921	271	27	76
UT5LE	"	38,376	235	27	55
UT5SI	"	27,636	221	35	59
UT5XJ	"	22,327	269	22	61
UB5CAY	"	20,482	164	24	53
UB5EF	"	12,744	118	22	54
UY5GG	"	6,437	114	14	27
UB5ZBB	"	3,220	46	15	31
UY5TH	"	3,036	55	13	31
UB5VY	**21**	**59,895**	**321**	**19**	**80**
UB5MCD	**14**	**112,671**	**637**	**31**	**76**
UY5LO	"	81,000	526	28	62
UT5BW	"	27,370	216	19	51
UB5OE	"	20,513	135	20	53
UB5VAA	"	15,147	175	14	37
UB5OD	"	6,808	104	14	30
UT5BP	**7**	**47,124**	**406**	**24**	**60**
UT5DS	"	28,644	341	15	47
UB5TO	"	18,180	187	16	44
UB5RS	"	10,480	214	8	32
UY5ZP	"	8,016	114	11	37
UB5CI	**3.5**	**81,445**	**616**	**23**	**68**
UT5SY	"	29,176	408	13	43
UT5MD	"	25,806	372	9	42
UB5HAC	"	3,038	76	7	24

White Russia

UC2SKC	**A**	**63,648**	**463**	**27**	**75**
UC2AAD	"	41,625	254	28	83
UC2WG	"	4,462	63	15	31
UC2OAA	21	4,255	45	14	23
UC2LAL	**14**	**2,266**	**85**	**6**	**16**
UC2DO	"	1,980	43	8	14
UC2AAM	**7**	**42,254**	**465**	**18**	**56**
UC2OR	**3.5**	**13,366**	**286**	**7**	**34**
UC2XX	"	11,328	211	9	39

OCEANIA

Australia

VK2GW	**A**	**302,874**	**729**	**61**	**82**
AX2BQQ	"	19,136	103	23	41
VK2BKM	**14**	**247,244**	**755**	**30**	**83**
VK3BRC	A	1,924	21	14	18
AX3KX	**21**	**84,168**	**456**	**22**	**41**
VK3APN	**7**	**62,814**	**360**	**23**	**35**
AX3XB	**3.5**	**5,080**	**88**	**11**	**9**
VK4ZV	**A**	**294,765**	**779**	**53**	**76**
VK4XW	"	1,920	26	16	16
VK6RU	**A**	**26,082**	**144**	**28**	**35**

Guam

KG6JAR	**A**	**235,480**	**697**	**53**	**63**

Hawaii

KH6RS	**A**	**2,712,388**	**3130**	**124**	**168**
			(Opr. K2SIL)		
KH6IJ	**A**	**1,156,240**	**2012**	**86**	**108**
KH6HIZ	"	99,760	432	41	39
KH6IGA	**14**	**152,283**	**749**	**26**	**43**
KH6IGC	"	21,056	226	16	16
KH6HSW	**7**	**31,728**	**231**	**22**	**26**
KH6CHC	**1.8**	**2,845**	**62**	**8**	**7**
KH6GMP	"	264	13	4	4

Marshall Islands

KX6BB	**A**	**166,963**	**559**	**55**	**48**
KX6KI	"	69,336	302	41	40

New Zealand

ZM1AMM	**21**	**61,555**	**323**	**23**	**42**
ZL1ARV	**14**	**83,776**	**436**	**29**	**64**

Philippine Islands

DU1AFS	**A**	**11,501**	**79**	**24**	**29**

SOUTH AMERICA

Argentina

LU5HFI					
	A	**2,017,925**	**2096**	**105**	**220**
LU9FAN	**14**	**164,008**	**538**	**34**	**70**
LU3FG	"	128,845	596	24	49

Bolivia

CP1EU	**3.5**	**2,226**	**56**	**7**	**7**

Brazil

PT2JB	A	5,278	136	8	5
PY1JN	21	3,850	93	8	6
PY2FRW	**14**	**33,467**	**229**	**17**	**32**

Ecuador

HC1CW	**A**	**104,312**	**349**	**40**	**64**

Peru

OA4AHA	**A**	**846,422**	**1481**	**76**	**118**

Surinam

PZ1CQ	**A**	**214,326**	**492**	**57**	**90**

Trinidad

9Z4AA	**A**	**2,397,990**	**2832**	**88**	**197**
			(Opr. W6BHY)		
9Y4VU	**A**	**1,135,755**	**1636**	**76**	**159**
9Z4GS	**1.8**	**5,252**	**70**	**10**	**16**

Uruguay

CX9BT	**28**	**283,098**	**1094**	**24**	**63**
CV1B	**21**	**370,461**	**1370**	**27**	**64**
CV8B	**14**	**715,260**	**1852**	**36**	**94**
CV7B	**7**	**196,480**	**834**	**25**	**55**
CX3BH	**3.5**	**2,397**	**56**	**9**	**8**

Venezuela

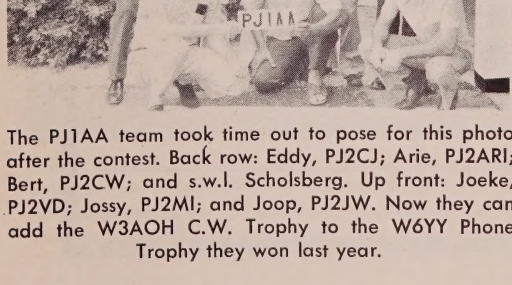
YV1JA	21	4,248	59	6	18
YV5AW	**3.5**	**74,144**	**445**	**17**	**39**

Multi-Operator Single Transmitter

NORTH AMERICA

U.S.A.

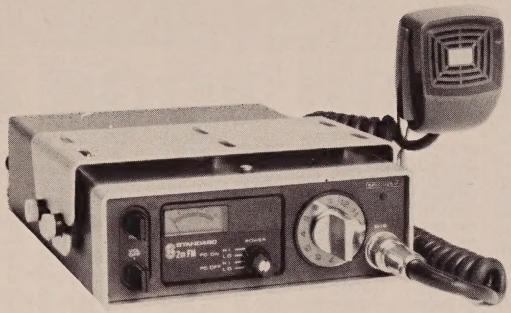
WA1NRV		**885,150**	**910**	**108**	**242**
WA1KID		570,304	724	82	186
W2YD		**427,791**	**562**	**117**	**184**
K2FL		241,920	369	80	160
WA2OYR		137,112	275	70	127
W3EZT		**744,464**	**718**	**111**	**257**
K3GJD		565,470	651	101	205
W3CRE		463,938	558	101	200
K3MBF		307,989	575	60	123
W3NX		287,412	403	88	170
W3BYX		221,872	416	60	136
W3GRS		90,640	189	64	112



The PJ1AA team took time out to pose for this photo after the contest. Back row: Eddy, PJ2CJ; Arie, PJ2ARI; Bert, PJ2CW; and s.w.l. Scholsberg. Up front: Joeke, PJ2VD; Jossy, PJ2MI; and Joop, PJ2JW. Now they can add the W3AOH C.W. Trophy to the W6YY Phone Trophy they won last year.

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The Best Buy ever...



SRC-826 MA

OUR DEAL:

826 MA list	$398.00
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Package list price	$502.00
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YOU'VE SAVED	$143.00

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Handheld Special

SRC–146A with:

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- "Stubby" antenna
- Leather case
- Ni-cads
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List Price	$396.00
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MINEOLA, N.Y. 11501, 525 Jericho Turnpike, One Half Block East of Herricks Road
TOTOWA, N.J. 07511, 225 Route 46, 201-256-8555
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SEND MAIL ORDERS TO DEPT. SQ-1
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K4GSU	**962,964**	**825**	**124**	**290**
W4LCP	883,002	833	112	255
K4DBZ	642,802	684	105	226
W4ZSH	208,865	323	79	156
WA5LES	**870,204**	**846**	**122**	**259**
WB5IZN	336,954	484	91	176
K5QNM	1,968	29	22	19
K6EBB	**1,139,007**	**1259**	**119**	**194**
W6KG	436,392	663	100	132
W6BIP	345,721	553	87	140
W5QQQ/7	**299,662**	**434**	**100**	**157**
W7FR	164,162	376	70	88
WA7TTC	16,185	83	40	43
WA7RUY	3,425	56	13	12
WB8BTI	3,588	37	21	25
W9ZTD	**611,382**	**636**	**115**	**231**
W9LT	488,898	584	101	213
W9YT	470,542	593	102	196
K9IU	193,500	379	76	149
WA9NPM	160,425	291	78	129

Canada

VE1FO	**463,670**	**917**	**82**	**151**
VE3HUM	**517,144**	**866**	**84**	**170**

Canal Zone

KZ5NG	**457,806**	**1173**	**70**	**113**

Cayman Islands

ZF1TW	**1,629,056**	**2591**	**95**	**191**

Jamaica

6Y5BF	**1,199,063**	**2368**	**85**	**154**

ASIA

Hong Kong

VS6AW	**862,389**	**1840**	**98**	**181**

Japan

JA3YKC	**298,151**	**557**	**81**	**132**
JA2YAB	**271,025**	**540**	**76**	**109**
JH1ZLA	136,347	378	59	82
JA3ZBI	100,098	304	59	75
JA2ZAP	58,566	207	60	69
JA3YJP/3	10,150	151	31	44

U.S.S.R.
Club Stations

Asiatic

UK9SAY	**582,975**	**1030**	**62**	**163**
UK9CAN	337,212	713	46	128
UK9HAC	216,144	558	51	120
UK9UAO	184,539	574	43	94
UK9FER	181,720	480	42	112
UK9CCJ	180,630	499	40	95
UK9AAG	94,581	383	30	63
UK9YAM	89,380	407	36	73
UK9XAN	48,984	256	23	55
UK9XAC	29,873	158	27	52
UK9AAC	22,032	120	25	47
UK9CDI	9,108	99	12	14
UKØFAA	**575.246**	**1275**	**92**	**146**
UKØSAL	144,261	630	38	79
UKØCAQ	88,911	535	52	59
UKØCAA	40,488	636	27	29
UKØCAE	8,036	220	12	16
UKØIAC	4,048	115	12	10

Azerbaijan

UK6DAU	**471,872**	**862**	**59**	**143**

Kazakh

UK7NAA	25,593	183	21	36

Georgia

UK6QAA	**44,665**	**244**	**20**	**45**
UK6QAD	13,095	109	14	31

Kirghiz

UK8MAA	**427,045**	**879**	**73**	**150**

Turkoman

4L8A	**1,072,020**	**1265**	**100**	**240**
UK8YAA	12,800	215	21	43

Uzbekh

UK8AAI	**719,495**	**995**	**92**	**213**

EUROPE

Aland Island

OHØNI	**469,718**	**1219**	**71**	**192**

Bulgaria
Club Stations

LZ1KSV	**821,431**	**1213**	**94**	**259**
LZ2KAD	337,264	887	59	155
LZ1KDP	312,968	921	74	158
LZ1KRD	215,360	891	46	114
LZ1KBG	158,072	786	42	116
LZ2KSU	126,150	445	48	126
LZ2KUL	56,127	537	45	107
LZ1KAU	53,280	429	30	60
LZ1KAA	15,184	156	19	54
LZ2KPD	9,520	157	12	28
LZ2KAJ	1,320	58	8	14

Czechoslovakia
Club Stations

OK1KTL	**382,571**	**959**	**70**	**147**
OK1KSO/P	312,818	689	72	169
OK1KCI	239,274	708	65	146
OK5RAR	103,555	465	45	104
OK1KPZ	69,741	418	31	92
OK1KRS	25,251	416	9	48
OK3KTY	16,506	226	18	45
OK3KGQ	15,246	186	15	47
OK1KIR	14,784	84	28	49
OK2KWL	10,316	111	14	48
OK1KOK	7,680	122	11	37
OK1KED	1,550	48	8	23

England

G3RRS	**313,940**	**729**	**63**	**157**
G3RCV	63,630	388	27	78

Finland

OH2AC	**52,910**	**292**	**55**	**88**

Faroe Islands

OY6FRA	**346,252**	**1149**	**56**	**158**

East Germany

DM2ATD	**1,029,616**	**1458**	**91**	**226**
DT3QO	596,440	1125	80	230

West Germany

DLØWU	**1,213,046**	**1630**	**98**	**228**
DLØWW	873,288	1246	100	211
DJ9JF	523,770	1080	78	177
DLØKL	504,504	1013	74	178
DK5GBA	357,417	806	83	180
DK5VW	85,412	265	51	112

Hungary

HA5KBM	**217,554**	**744**	**58**	**144**

Ireland

EI1AA	**94,306**	**576**	**31**	**91**

Netherlands

PI1PT	**79,350**	**316**	**46**	**104**
PA9ABV	17,360	186	21	59

Poland
Club Stations

SP7PBC	**164,328**	**577**	**47**	**120**
SP8KAF	91,980	538	27	99
SP6PZP	70,434	394	45	86
SP2KFQ	55,247	387	25	76
SP1PEA	45,486	324	30	84
SP9KMQ	39,403	322	26	65
SP9ZAS	35,245	195	28	67
SP9KDD	30,600	221	31	69
SP9PBN	7,514	252	6	28
SP9ZHQ	4,598	86	13	25
SP9PBZ	48	7	3	5

Roumania

YO3KAA	**573,792**	**1203**	**78**	**200**
YO6KAL	326,988	740	74	205
YO8KGC	280,395	952	45	156
YO8KAN	102,382	487	43	99

Sweden

SK5AL	**799,704**	**1220**	**109**	**274**
SM5AOE	598,086	1045	89	209
SM6AEK	487,916	883	89	197
SM5CEU	327,684	657	85	197
SK6AB	286,944	848	62	134
SK5EU	188,940	679	50	151
SLØFV	68,040	393	42	98
SK5GV	63,980	364	42	98
SK6AW	12,825	108	24	51

Switzerland

HB9AHP	13,020	118	27	43

Wales

GW3UCB/P	**5,221**	**187**	**5**	**18**

Yugoslavia

YU1BCD	**1,389,885**	**1478**	**114**	**313**
YU1JRS	778,540	1387	93	242
YU2HDE	246,954	486	81	156
YU2CBM	144,288	465	59	108
YU1ELM	89,964	398	41	112

U.S.S.R.
Club Stations

European

UK6LEZ	**1,094,577**	**1153**	**127**	**324**
UK3UAA	**519,750**	**875**	**66**	**284**
UK3ABB	459,763	1094	70	185
UK4WAC	416,264	1132	65	179
UK3SAB	360,003	904	70	167
UK4AAB	240,786	854	49	140
UK3AAC	239,056	723	58	165
UK3MAA	195,216	633	51	145
UK4AAI	164,340	697	41	125
UK4WAB	152,255	595	40	129
UK3XAI	136,455	614	42	123
UK3QAE	122,388	594	36	105
UK6AAJ	86,944	410	42	101
UK1AAG	62,964	381	37	71
UK1TAL	59,280	295	30	74
UK4FAE	51,409	320	26	75
UK3NAB	50,324	362	29	63
UK3WAC	30,940	247	21	70
UK1ABA	30,544	278	21	62
UK3XAM	16,698	172	19	47
UK3TAR	9,715	254	12	17
UK3XAD	3,344	59	13	25
UK3XAB	2,280	30	13	17

Estonia

UK2RAN	**156,768**	**764**	**31**	**107**

Kaliningrad

UK2FAS	**8,120**	**227**	**7**	**28**

Karelia

UK1NAB	**115,444**	**697**	**37**	**87**

Latvia

UK2GKW	**281,502**	**814**	**61**	**173**
UK2GBY	274,736	897	61	162
UK2GAY	247,572	872	62	145
UK2GAN	228,345.935		42	153
UK2GBJ	140,320	635	42	118

Lithuania

UK2PAF	**669,060**	**1147**	**84**	**231**
UK2PAA	178,500	753	45	125
UK2PAD	81,862	580	23	99
UK2BAO	58,104	403	28	80
UK2BBE	41,860	413	17	75
UK2PAT	24,236	186	28	55

Ukraine

UK5JAC	**554,368**	**1150**	**82**	**202**
UK5IAZ	**529,179**	**941**	**97**	**242**
UK5WBG	439,482	1014	73	194
UK5IBM	381,682	910	88	196
UK5VAA	334,304	846	70	178
UK5KAA	199,548	589	65	142
UK5TAA	186,611	664	47	134
UK5IAI	173,386	521	58	159
UK5EAO	149,900	616	35	97
UK5LBJ	129,024	640	32	94
UK5PAA	126,555	681	35	108
UK5GAV	103,620	443	45	112
UK5QBE	70,955	407	29	86
UK5ZAA	48,034	346	30	64
UK5QAC	44,400	310	27	84
UK5WAA	20,538	198	22	41
UK5LAE	3,672	60	10	26

White Russia

UK2WAF	**252,006**	**885**	**53**	**141**
UK2LAA	170,982	778	49	128
UK2CAQ	33,575	288	19	66
UK2AAP	30,870	227	31	74
UK2AAB	17,760	195	20	50
UK2OAA	16,555	152	28	49

SOUTH AMERICA

Argentina

LU8DQ	**1,291,826**	**1571**	**100**	**198**

Bolivia

CP3BY/1	**275,724**	**797**	**57**	**81**

Netherlands Antilles

PJ1AA	**2,493,304**	**2636**	**100**	**219**

Venezuela

4M5ANT	**2,473,917**	**2468**	**102**	**235**

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North America

W3AU	**3,394,016**	**2179**	**145**	**399**
W2PV	**2,384,837**	**1684**	**136**	**375**
W4BVV	**2,340,106**	**1674**	**139**	**352**
W3WJD	**2,149,056**	**1527**	**135**	**357**
W1ZM	**1,709,290**	**1473**	**116**	**294**
W3GPE	1,564,530	1282	126	305
W3FRY	1,266,912	1061	130	294
K4CG	1,200,861	1106	115	272
W7SFA	**1,149,649**	**1337**	**117**	**196**
W3GM	1,067,772	928	118	286
K1VTM	1,003,926	1102	96	222
WA3ATX	747,000	804	108	224
W3TV	575,360	655	104	206
WA2BLV	415,492	555	83	183
W3SS	218,530	381	70	135
W3GL	148,932	283	67	130

Asia

UK9ABA	**2,051,512**	**1891**	**115**	**289**
JA2YEF	**743,470**	**981**	**114**	**187**
JR1YFU	354,620	601	91	147
JA3YBF	266,208	598	75	102

Europe

OH1AA	**2,070,240**	**2663**	**126**	**330**
DLØPG	**1,962,576**	**2491**	**119**	**313**
OK5KWA	**1,354,833**	**1953**	**109**	**310**
DLØKF	1,048,580	1744	107	263
SK5AJ	**1,012,299**	**1572**	**107**	**284**
DJ4UF	838,068	1661	90	218
DLØII	307,547	768	75	154
DLØRZ	268,755	942	55	150

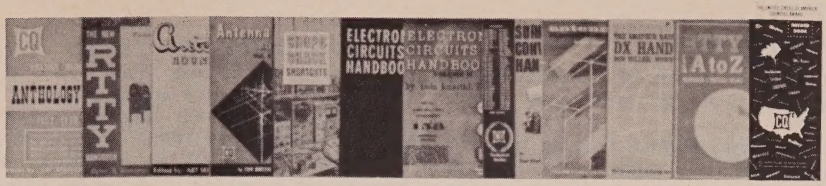
Oceania

KS6ER	**1,415,650**	**2136**	**102**	**128**
KH6IGE	**1,001,835**	**1664**	**91**	**114**

Novice

WN8MMF A	**1,242**	**62**	**12**	**15**
WN6OYV "	336	19	7	7
WN2FUN 21	**4,872**	**57**	**8**	**21**
WN6SWM "	4,368	56	14	14
WN8OTF "	2,720	33	15	19
WNØGTJ "	90	8	5	4
WN1RWX M	18	25	5	4

Our thanks to the following stations who sent in check logs and logs solicited for checking purposes. Also a few unscored logs that were beyond salvaging. DJ3YU, DJ0XT, DK5OS, DL1YB, DM2AOM, DM2BEO, DM2BFM, DM2BML, DM2BNJ, DM2BUB, DM2CBB, DM2CGH, DM2CJJ, DM2CKD, DM2EPH, DM2FQN, DM3KF, DM3WYF, DM4XKL, DM6TAH, DT2ADC, DT2AND, DT-2BYE, DT2COJ, DT2CYO, DT2-DZH, DT3CF, DT3OC, DT4FG, DT4WL, DT4XXH, DT4ZXH, DT5-KN, FM7WG, FP8AP, G4BXN, G6NK, GM3UM, I5RDT, JA1BF, JA1LB, JA1RSX, JA1SYY, JA1SGU, JE1GWO, JE1PNC, JH1PAE, JH1-VIY, JR1BVU, K7EFB, KV4AA, KV4CI/mm3, LA4KQ, LA8O, LA9-GG, LA9HC, LA9JD, LX1ML, LZ1-KID, LZ1KSP, LZ1QR, OH1UR, OH2BCD, OH2BFJ, OH5AB, OH5-XO, OH5YB, OH8OR, OK1AII, OK1AR, OK1DKR, OK1FBH, OK1-JDJ, OK1KDO, OK1KWV, OK1NW, OK1TA, OK2BFX, OK2BJU, OK2-BOV, OK2SDJ, OK2-18916, OK3-BH, OK3CGP, OK3TBC, OK3ZMT, PAØTA, SM2COR, SM5BFJ, SM5-CVC, SM5FNB, SM7ACN, SM7-FYM, SM7TQ, SM7TV, SP1AGE, SP1BHX, SP2GLS, SP2UU, SP3-BLP, SP4AVG, SP5EXA, SP5GKN, SP5GRY, SP5YY, SP6AEW, SP6-FER, SP6KKE, SP8KAR, SP8KJY, SP9EIJ, SP9EM, SP9FTK, SP9-GAN, SV1DB/a, UA1DX, UA1OAE, UA1WAP, UA1WAR, UA3DAO, UA3DL, UA3FT, UA3RDM, UA4-DK, UA4OP, UA4PAX, UA4QK, UA6BV, UA6DL, UA9MY, UA9OS, UA9UAB, UA9UGA, UAØABB, UAØ-BAC, UAØLH, UAØLL, UAØOS, UB5AAF, UB5LDJ, UB5MDD, UB-5PS, UB5QT, UB5VK, UB5WAB, UC2ANN, UC2WAL, UC2-009290, UF6-01274, UI8AAH, UK1AAF, UK1ABC, UK3DAC, UK3NAF, UK-3TAA, UK4PBB, UK5EAP, UK5-MAG, UK5RAB, UK9CCE, UK9-OBK, UK9UAI, UKØAAS, UL7JAE, UP2AW, UP2BL, UT5HP, UV3CQ, UV3DN, UV3GE, UV9DX, UW6-OQ, VK3AJG, W1PWK, W2CJX, W2LKH, W3CTE, W4JUK, WB9-FFR, YO7VS, YO8AVB, YO8GF, ZE8JN, 3D6AX.



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QRP [*from page 49*]

You gain the advantage of his sophisticated receiving equipment and weak-signal experience.

(13) Try to marshall your time so that you are listening when the bands are likely to be open. Like fishing, you have to be there when 'the fish are biting.'

So there you have it my friends. Why not whomp up a lil' rig and give it a go? Those of us who have been bewitched by the 'song of the flea' will never be the same! You will find it harder to make a contact than with QRO, but *patience* is the watchword here. Do not be discouraged if Proliferation Pete over in the next county feigns deafness when your paltry signal corrupts the innards of his shiny new 1200 bux transceiver. Chances are, a pro in Munich or Valparaiso, or even Tokyo or Canberra will dig your faint whisper out of the mud and get back to you with a report. When QRM/QRN is fierce, your signal will have about as much chance as a mosquito in a wind-tunnel. At such times, best take the day off and go streaking on the Mall! After all, "The Amateur is Balanced!"

QRO has a thousand watts;
a lot of clout has he.
QRP has a mere half-watt;
but he makes it work, by gee!"

Tip For S.S.B.'rs

There are a growing number of QRPp s.s.b. enthusiasts due to the tremendous popularity of the Argonaut. I stumbled quite by chance across an excellent place for QRPp s.s.b. operators to pick up those needed states and countries. It is the YL ISSB Communications System which meets daily on 14,333 kHz, from 1600Z until the band goes dead. What caught my attention was one of the frequent check-in calls for emergency stations, mobiles, and QRP stations. I checked in and have racked up about 6 new "hard ones" (they're all hard after about the first sixty countries!), including a KJ6 who pulled down his antenna fifteen minutes after I worked him—he headed back to the states. A very receptive attitude toward QRPp stations pervades all of the friendly amateurs participating in the System. Check-ins from all over the world are frequent.

One further note. There is a movement afoot to organize an "Argonaut Club." Program would probably include QSO parties, awards, club bulletin etc. If any of you are interested in getting in on such a club, drop me a card. We'll post future developments in this column if the club gets underway.

That ties it up for another month. Our next column will get back to our discussion of achieving receiver efficiency. Till then, hope to see some of you on the air.

73, Ade, K8EEG

Contest Calendar [*from page 58*]

The Worked Three Bear Cubs Award is also available for working 3 novice members.

Mailing deadline Oct. 14th to: Boeing Employees A.R.S., Att: Willis Propst, K7RSB, 18415 38th Ave., South, Seattle, Wash. 98188. (Results will be mailed to all entries, no s.a.s.e. required).

Annual CLARA Day Contest

Starts: 1800 GMT Saturday, September 14
Ends: 1800 GMT Sunday, September 15

Details for this one were rather brief, but here they are for what they are worth.

Exchange: RS(T), QTH and Name.

Scoring: 1 point for each CLARA member worked, 3 points for each bonus station. (What is a bonus station?). Multiply QSO points by number of Canadian call areas worked. Each station may be worked on c.w. and phone, or 2 different bands, c.w. and phone.

Frequencies: Phone—3775, 3900, 7200, 14160, 14280, 21300. C.W.—3690, 7035, 14035, 21035.

Awards: Member winner, CLARA pin and certificate, non-members, Trophy and 2nd and 3rd place certificate.

Logs go to: May Jones, VE1AMB, 79 Waverley Ave., Moncton, N.B. Canada E1C 7T8. No later than November 15th.

YLRL "Howdy Days"

Starts: 1800 GMT Wednesday, September 18
Ends: 1800 GMT Friday, September 20

This activity is for YL's only. Scores will be based on contacts between YL operators only. All bands and modes may be used, but cross-band and net contacts do not count.

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

The top scoring YLRL member will receive her choice of a YLRL pin, charm or stationery. The highest scoring non-member receives a one year membership in the YLRL.

Logs must be received before Oct. 17th and go to: Christine E. Haycock, WB2YBA, 361 Roseville Ave., Newark, N.J. 07107.

Editor's Notes

Getting the *CQ* World Wide Contest results out a month earlier than last year leaves little time for any comments.

However want to call your attention to the ARRL Sweepstakes dates change, and the fact that the c.w. and phone week-ends have been swapped around. It makes for a better arrangement as far as the *CQ* Contest is concerned but some other organizations are not too happy with the change. C'est la vie.

73 for now, Frank, W1WY

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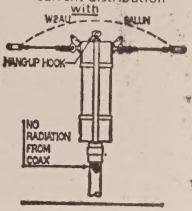
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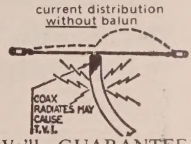
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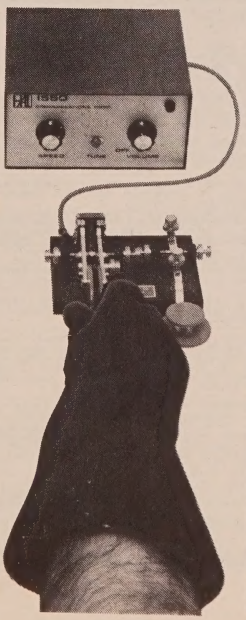
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MIX pleasure with pleasure at the Hamburg International Hamfest, Niagara Falls on September 21. For information contact Lin Browneli, WB2HCL, 210 Buffalo, Hamburg, NY 14075.

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HIGH GLOSS QSL CARDS: From $8.95/1000. Full color catalogue, $1.00. Lijon Graphics, Box 48, East Longmeadow, Mass. 01028.

Did you know that supplements to the book, "CQ YL," are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher, W5RZJ, Louisa Sando, 4417-11th St., NW, Albuquerque, NM 87107. Please enclose two 8 cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL," contains 21 chapters, over 600 photographs. Order your personal copy, or a gift copy, from W5RZJ, $3.00 postpaid.

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Rubber address stamps. Free catalog. 45 type styles Jackson's, Box 443 F, Franklin Park, IL 60131.

SALE: Heathkit HX10 AM/SSB Transmitter mic, $200. Don Derian, 205 W Champlost Ave., Philadelphia, PA 19120.

DRAKE R-4B and T-4XB with speaker, power supply and 11 extra crystals, $725. L-4B Linear with power and LP Filter, $575. All three, $1,250. Original Cartons, Shipping prepaid is UPS. Under 4 years seasonal use only, superb condition. Inquiries invited. Cashier's check or M.O. Harry Clingenpeel, RR2, Lake Tippecanoe, Leesburg, IN 46538. (219)453-3381, after 8 pm.

MINATURIZED TELETYPEWRITER: Mite Corp. model TT-299B/UG 115 V, 60 Hz; newly overhauled and fully guaranteed. In excellent condition. Cost over $3900.00 new, will sell for $495.00. (804) 599-6966, 12533 Warwick Blvd., Newport News, VA 23606.

COLLINS 75A4 Serial 3840 Three filters 1.5 2.1 3.1, $350. C.W. Rogers, Box 338 Manasquan, 08736 NJ.

$500 REWARD Jesse James; $10,000 Reward Sam Belle Starr. Antiqued replica posters both $2.00. Free gift. Ideal for ham shack. Chalet; 16 Charles Auburn, NY 13021.

YAESU FT2 Auto Scanner 2M 25W Transceiver, Mint New Condx, $299, fob W6BL, 550 Homewood Road, Los Angeles, CA 90049; Herb, (213)-653-2250, nites (213)472-2413.

CLEGG FM-27Bs at prices I dare not publish. W0NGS, Bob Smith Electronics, 1226 9th Ave., North, Fort Dodge, IA 50501. (515)576-3886.

QSLs. Second to none. Same day service. Samples airmailed, 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah, 84015.

Swan 1200x, less than 10 hours use. Extra set P.A. tubes. $180.00 plus UPS or will trade for Pentax Auto Cons's. J.P. Begy, 28 Loma Vuelta Rd., Kerrville, TX 78028. Phone-1-512-896-2842.

JOHNSON RIG OWNERS' WANTED: Viking II with VFO, Thunderbolt Linear and late model Viking 500. All must be mine, factory wired and original, no modifications. State price and history. W1CDC, 43 Dover Rd., Manchester, CT 06040.

CANADIANS: For all your electronic parts requirments at low prices send for free flyer; DARTEK ELECTRONICS Dept C., Box 2460, Dartmouth, Nova Scotia.

FOR SALE: 2 KW P.E.P. Homebrew Linear, uses 4 6LQ6's, $65. Call Bristol, TN, (615)-764-6654 after 6 PM.

FOR SALE: GLB 2 mtr synthesizer; factory built, new, never used; $167.45. Don Rose, 11 Ivanhoe Circle, Greenville, SC 29607.

FOR SALE: Drake T4XB/R4B, $635. Very good condition; homebuilt power supply included. W2BP, 101 Collins Ave., Pleasantville, NJ 08232. (609)-646-1266.

COLLINS 75A4 Serial 2703 Three filters .6 1.5 3.1, $350, C.W. Rogers Box 338 Manasquan, 08736, NJ.

Want to buy two Collins stations either KWM-2, outfit, or S-Line, Watts 312B-4 or 312B-5 console and 30L-1 or 30S-1 linear. Must be clean and priced right. Richard Schark, 417 North Ferry, Ottumwa, IA 52501.

WANTED: for NORTHERN RADIO 174/3 FS converter, discrim. modules SA-174203A switchable and SA-174203A-2 (170shift). W6ZRG,-11007 Explorer Rd., La Mesa, CA 92041.

Trust your oscilloscope readings? If not, our accurate calibrator for $9.95 is for you. Guaranteed. Bailey, 174 North Coleman Road, Centereach, NY 11720.

FOR SALE: Sierra 164 Thruline Wattmeter like Bird no. 43, W/Plug-ins for 1, 5, 10 & 50w full scale; plug all bands 144, 220 & 440MHz. $95. Cleanup list SASE. W4API, Box 4085, Arlington, VA 22204.

BUY-SELL-TRADE: Write for monthly mailer. Give name address xall letters. Complete stock of major brands, new and reconditioned equipment. Call us for best deals. Ivan Doty Collins, Drake, Swan, Overland Park, KS 66204.

"QST" for sale. Send SASE for list. S.G. Simonson 991 Park Lane North, Franklin Square, NY 11010.

HEATH SB-610 monitor/scope, $60. HG-10B w/ built-in power, $30. Allied RF signal generator, $20. Heath Cantenna with chassis and cage, $15. Micronta 200 watt 12 DC to 110 V AC inverter, new, $35. Ameco adapted preamp, 10 thru 20, with 3 selectable audio filters in same shielded and paneled unit, no cabinet, 6.3 v. and B power required, $25. Mosley and Toroid Preselector, per QST, 10 thru 20, with 3 selectable audio filters in unit shielding and panel, Datak labeled, power but no cabinet, $50. Postage or UPS prepaid. Harry Clingenpeel, RR2, Leesburg, IN 46538.

COLLINS S line 75S-3, 32S-1 and 516F-2, $800. Collins R-390 and TMC CV-1750 USB/LSB Converter, $495. Loudenboomer 275 W Matchbox with SWR Bridge, $75. Hammarlund 2 mtr FM-10A, $75. Mosley TA-33 Senior Beam, $100. Ron MacKinnon, WA2JRY, 77-22 64th Lane Glendale NY 11227, (212)456-1576.

HY-GAIN 10m beam excellent, $40.00. S-40B, $15.00 AN-GRR-5 Rcvr- mobile, 1.5-18 mHz, $50. With Manual. All $110.00. You ship. D. Head, P.O. Box 817 Tahoe City, CA 95730, (916)546-3600.

"FOR SALE: Globe Chief 90 Transmitter, fair condition, 160-10 meters; $30.00, WN2TRS, 31 Shepherd Place, Kearny, NJ 07032."

WANTED: Heath SB-401 SSB transmitter. John Bracey, WB5JXH, 7602 Springwood, El Paso, TX 79925.

NEW JERSEY QSO party will be held on August 17 and 18. Englewood ARA, 303 Tenafly Rd., Englewood, NJ 07631.

Your non-commercial swap-n-sell ads published free in RADIO. Send ads to Wichita Amateur Radio Society, Box 4391, Wichita Falls, TX 76308.

STEREO' Garrard turntable fair $25. Lenco Turntable minus stylus, new, $30. Sansui Stereo receiver, $60. C. Smith, Box 543, Conyers, GA 30207.

VAC VARIABLE-375 mmfd 1400V. $40.00. FOB. BL221T with AC. $40 FOB. Basham, Cave Junction, OR 97523.

MODEL 28 LESU's. Bell type, Lesu-8. Complete wiring for Mod. 28KSR, contains loop supply, Casting with 4 "Horns," Polar relay socket less relay, etc., $15.00 each, plus shipping. L. Pfleger, 10615 W. Ridge Rd., Apt. 54, Hales Corners, WI 53130.

JOHNSON VALIANT XMITTER Heath HR10 rcvr. Heath HV10 VFO with homebrew Power Supply. All mint with manuals. $100.00 plus shipping charges. Heath OL-1 Scope, $25.00. Mint, no manual. Cornell Dubilier VTVOM with manual, mint. $25.00. R. Silence, WN4GRU, Rt. 8, Box 544, Lutz, FL 33549.

NEED: Rcvr tuning cap. for Knight TR-108 part No. 286-104, any price. C. Milazzo, WB2OZA, 716 Calhoun Ave., Bronx, NY 10465. 824-2630.

FOR SALE: KW-1, $1000. 62S-1 (needs work), $395. Viking kilowatt (no desk!), $425. Kenny 2K, $400; 3K-A, $895. KWS-1/75A4, 3 filters, spkr; $1150. SP-600 JX-17, cabinet, $275. James Craig, 29 Shervurne Ave., Portsmouth, NH 03801.

FOR SALE: 4-CD 4 mf at 3k.v.d.c. 3000, type TC 30040 paper cap. One Hammarlund TC225A, 48 plate, 3/16 space Var. Cap. Best offer. M.J. Douglas, w6CUG, 2254 Pepper Dr., Concord CA 94520.

SELL: 1 ea MD7 modulator 7.5Ω (new, boxed); Xfmr's, 105 NPR; sec6.0V 12.5A $6; T Bolt 6N2 manual, $2, TC 2 manual ½2. K5ULB, 11847 E. 16, Tulsa, OK 74128.

SALE: C.P. Clare RP9809G3 12 VDC. Relay & socket $11 ea. IC RTL, MC904G, MC926G, $7.5. SN52711 $.90 ea. H. Gorden, 11011 Brandywine St., Kens., MD 20795.

JACKSON TUBE TESTER, Jackson Pixtube tester and booster, electrotech color clot generator, meters, etc. Basham, Cave Junction, OR 97523.

COLLEGE HAM CLUB seeks donation of gear. Campus Amateur Radio Club, 4304 University Dr., Wichita Falls, TX 76308.

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40 METER BEAM Full size Monobander with 40 ft. boom (3" dia.) All aluminum & rugged reinforced elements. $300.00. MACE, 8600 Skyline Dr., Hollywood, CA 90046.

WANTED: Early vacuum tubes with brass bases need UV-213, UV-216, Kellogg 401, UV-200 and others. W9LGH, 610 Monroe Ave., River Forest, IL 60305.

SELL: 8 mm, 16 mm and 8 mm Super cameras and projectors. 35 mm Stereo camera and stereo projector. Heath Mitchell colorval darkroom exposure computer. Will trade for old ham receiver and test equip. SASE for list. J.R. Doak, W2GHF, CPO Box 603, Kingston, NY 12401.

BARGAIN: 50 unused transistors $1.00 post paid. SASE for my listing. G. Samkofsky, K4HRU, 4803 Brenda Dr., Orlando, FL 32806.

WANTED: Battery radios and crystal radio sets of the early 1920's. Need not be in working condition. Also want old radio catalogs. State model, price, condition. D. McKenzie, 1200 W. Euclid, Indianola, IA 50125.

SALE: C.P. Clare RP9809G3 12 VDC. Relay & socket $11 ea. IC RTL, MC904G, MC926G, $7.5. SN52711 $.90 ea. H. Gorden, 11011 Brandywine St., Kens., MD 20795.

JACDSON TUBE TESTER, Jackson pixtube tester and booster, electrotech color clot generator, meters, etc. Basham, Cave Junction, OR 97523.

FOR SALE OR TRADE: HT-9 transmitter, for gear in good working condition. Also a near-new Lafayette VFO from 80 mtrs thru 10 mtrs for $35. 889-4441. Arthur R. Rossello, WB2YBR, Box 255, Norris Hts., Sloatsburg, NY 12580.

SELL: 814 tubes new 4.00 ea. PPD. Instructograph all tapes and 5 extra new ones. $37 postpaid. Good condition. K5ULB, 11847 E. 16th, Tulsa, OK 74128.

BC/79, rcvr, orig. P/S, H.B. converter for 2 mtrs., 60W preamp and spkr, $75. FOB. SCR522, unmod Fyed $20 FOB. K5ULB, 11847 E. 16, Tulsa, OK 74128.

WANTED: TH6DX beam or 4 element monobander for 20 m. Ham m rotor. Juatin E. Spinler K0GNH, R2 Owatonna MN 55060.

Would like information on W8CJR who operated portable XU China in 1946 out of Shanghai. Name Fred. - W6PSQ, P.O. Box 701, Madera, CA 93637.

FOR SALE: 2 m. AM station complete, SR-42A, HA-22 VFO, Mike, Vibrator, P.S. Will Trade for Drake 2NT, Offers. Jerry, 922 Suburban Apts., Dekalb, IL 60115.

SELL: 1937 RCA Ham RCVR & XMTR, $90; Mint 32 V1, $100. WANT: Johnson SSB Adaptor, 75A3, KW Desk. K8CCV, 5471 Norquest Blvd., Youngstown, OH 44515.

RETIRED PHOTOG selling Nikon, Rolleflex and 4 X5 cameras. Write your needs, W6RW, 8600 Skyline Dr., Hollywood, CA 90046.

CONFIDENTIAL FREQUENCY LIST! Now in book form. Thousands of classified frequencies; spies, CIA, aeronautical, government, tactical, teletype, emergency, many more. $4.00 postpaid. Bob Grove, WA6PYQ, 846 Rutherford Lane, W. Palm Beach, FL 33406.

SALE: Lafayette all Transistor HA6506 mtr xcvr, $75. Knight2 mtr TR108 and VFO, $89. Box 3344, K6THQ, Industry, CA 91744.

SELL: SX-110 gen. cov. rcvr-excellent condition, $85. Progress Line MT-36N Hi-band rig w/acc-good condition, $99. Norm, WB2EHB, 212-884-9694.

WANT: Book "Wireless Direction Finding" by R. Keen. Please state condition and price. Worcester, R.D. 1, Frankfort, NY 13340.

FOR SALE: 2 used Motorola, Mobile transceivers Model numbers: T51G, Transceiver number: TA104, (HM). Best offer takes. H.M. Sims, 208 North Greenwood Avenue, Fort Smith, Arkansas, 72901, (501)783-4303.

HELP! Need the 3 1/2" meter and cable that fits Bird Model 611 Termaline Wattmeter, Can anyone help? W7ZFB, 605 Cherry, Vandenberg CA, 93437.

SALE: Hallicrafter SR-400 with matching power supply, all manuals, less than 2yrs old, $495.00. Swan TV-2B beam antenna, up 4 months, $55.00. Jerry Reimer, (WB9GIG), 1321 Ruger Ave., Janesville, WI 53545, (608)752-9651.

SELL: DRAKE MN-4 Matchbox, Little used, mint condition, $70, postpaid. Peter Feely, 15 Locust Hill, Yonkers, NY 10701.

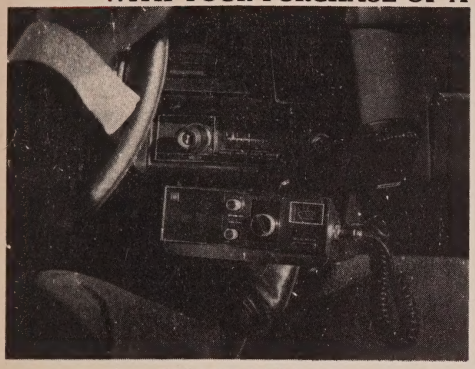
FOR SALE: Johnson 6N2, 7854 Final-115 WTS. out VFO, P/S-MOD. Perfect condition, $125. Vanguard 2 Mtr. FET-CONV. $35. WB2OTK, (914)-462-0785.

FOR SALE: ship's Compass, 4" plath. German, with Azimuth Circle, brand new, never used; in wooden case. Mounting gimbals of course. $49.00. Postpaid. H. Marhoff, P.O. 569, Largo, FL 33540.

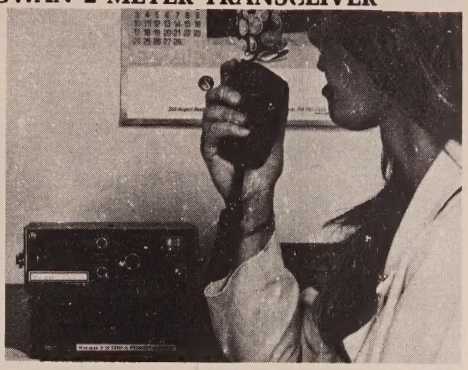
FOR SALE: 220 MH Station. WA2EUS, 110 Lafayette St., Copiague, NY 11726.

FREE ANTENNA

WITH YOUR PURCHASE OF A SWAN 2-METER TRANSCEIVER



FM-2XA Mobile



FM-1210A Base

Order A Complete FM-2XA Or FM-1210A Transceiver And Swan Will Include a 2-Meter FM Antenna

At No Extra Charge!

Here is a great opportunity to join the fun on 144 through 148 MHz. Whether you choose the FM-2XA or FM-1210A for a mobile or fixed-station installation, you will get an excellent 10-Watt FM unit with a built-in speaker, dynamic microphone, mounting bracket and hardware plus, absolutely free, a matched 2-Meter antenna.

Both transceivers work directly off 12V DC for mobile use and are equipped with matching 110V AC power supply for home use. The FM-2XA has a 12 channel capacity with 3 channels installed. An independent switching feature gives the FM-1210A up to 144 channel combinations and comes with 4 transmit and 4 receive crystals installed.

The following packages are available during this special limited offer:

#1—FM-2XA Mobile Station. Includes Snap-Pack AC Power Supply PLUS a FREE Swan MD-4 mobile 2-Meter whip antenna. Please specify your choice of roof or deck type mounting. **$299.95**

#2—FM-1210A Mobile Station. Includes Pedestal AC Power Supply PLUS a FREE Swan MD-4 mobile 2-Meter whip antenna. Please specify your choice of roof or deck type mounting. **$359.95**

#3—FM-2XA Fixed-Station. Includes 110V AC Snap-Pack Power Supply PLUS a FREE 3 dB gain, 2-Meter vertical antenna for your home installation. **$299.95**

#4—FM-1210A Fixed-Station. Includes 110V AC Pedestal Power Supply PLUS a FREE 3 dB gain, 2-Meter vertical antenna for your home installation. **$359.95**

We strongly suggest that you place your order now with a participating Swan dealer, or you may order direct from the factory with the coupon below, as this offer may be withdrawn without notice.

Gentlemen:

Please ship me, collect, the 2-Meter package I've checked. ☐ Full payment Enclosed. ☐ 20% down payment enclosed, ship C.O.D. ☐ 10% down payment enclosed, charge to my Swan Credit Account #_____. (California residents please add sales tax.)

☐ #1—FM-2XA Mobile — $299.95
☐ Roof ☐ Deck

☐ #2—FM-1210A Mobile — $359.95
☐ Roof ☐ Deck

☐ #3—FM-2XA Fixed-Station — $299.95

☐ #4—FM-1210A Fixed-Station — $359.95

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A subsidiary of Cubic Corporation
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You may reserve your package by calling Area Code (714) 757-7525.

SELL: Polaroid Automatic no. 100 camera and flash gun plus beautiful fitted black leather case, only $65.00. Bob, (215)884-6010.

COLLINS: Going "S" Line. Late model, clean 75A4/500 cy with manual goes for best offer. All letters with reasonable offer answered. W6AT, 367 Northwest, Vacaville, CA 95688.

SELL OR TRADE: Leeds-Northrop W-S Bridge model KS3011. WANT: Millen G.D.O. model 90651. K5RME, P.O. Box 74, Ingram, TX 78025.

FOR SALE: National Radio model NC108 in good condition. $50.00 plus UPS shipping. James Fred, RR1, Box 41, Cutler, IN 46920.

SELL: New Dycom VHF RF probe, $4; New commercial 0.1 watt 2m FM xmitter with .34 xtal and mike, used Heath 2er, $25. W5QNQ, 2025, O'Donnell, Las Cruces, NM 88001.

WANTED: Robot Fast Scan Monitor. Mike Ludkiewicz, 143 Richmond Road, Ludlow, MA 01056.

FOR SALE: Xmtr Ranger 160-11M, $60. Heath HW-12 80M SSB & HP10 DC supply, $100. S. Hughes 5232 Old Colony Rd., Kalamazoo, MI 49008.

WANTED: 32S-3 needing repair or rebuilding. George Kearse 636 Pine Norco, LA 70079.

METER RELAYS: Weston 705, Choice of 10 microamp or 1 Ma. movements. $5.95. Add P.P., W4JGO, 643 Deamond Rd., Salem, VA 24153.

SELL OR TRADE: Looking for GDO, Dual Trace Scope, 2m Walkie Talkie. SASE for my list. WA3VUC, Box 4, Warminster, PA 18974.

FOR SALE: Mint Johnson Thunderbolt, $250. HX-50 and Polycomm 62 B, both need work. Make offer. Richard Schweizer, WB2PCF, 240-27 145th Ave., Rosedale, NY 11422. (212)528-5124.

SELL OR SWAP: 30W. Hi Band FM units as is no accessories. Bendix I R-54 with schematic $25. K8HWW, 33727 Brownlea, Sterling HGTS, MI 48077.

WANTED: Winter 1946 Call Book. Reasonable price. W. Carr, W3LDD, RD 2 Box 193, Havre De Grace, MD 21071.

SSTV NEWSTAPE: Send SASE for information and application to: K1GRT, Leo Cavanaugh, 113 Court St., Dover, NH 03802.

QSL CARDS printed on glossy card stock. Sample 25 cents, The Print Shop, P.O. Box 353 Lockport, IL 60441.

SELL: ARRL Handbooks, various years; $2.25, postpaid. Samkofsky, 4803 Brenda Drive, Orlando, FL 32806.

WANTED: Manual G.E. Sweep Generator, model 4ST 4A1. Buy or Rent. A. Bielenda, W2IDA, 43 Chestnut Ridge, Rd., Saddle River, NJ 07458.

FOR SALE: Drake, TR-4C, 34PNB, AC-4, MS-4, New Factory Warranty, $625. Russell, 19680 Mountville Dr. Maple Hts; OH 44137. (216)662-2175.

WANTED: Drake TR-3 wAC--3 or TR-4 w/AC-4. Must in good working condition. Doug Shinn, 113 Henry St., Ravenswood, WV 26164.

W8RC, New Call of W8DQL. Still operating eighty through two meters. Lenoard M. Nathason, Southfield Mich, 48075.

FOR SALE: IC-230 (new), $450. HT-32, & 135 HT-33, $175. SP-600-JX17, $200. SR-C826M, mike, 18 xtals, P.S., $300. Johnson, Fleetcom 557 (450-470MHz, 10w), ACPS, Mike, $350.00. James W. Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

WHISPER-TYPE FANS: ultra low noise, 43 CFM, 115V, 3X3X1 1/2. List at over $16; will sell brand new for $9.50, postpaid, B. Klinger, 2253 W 73rd St., Cleveland, OH 44102.

WANTED: AN/ALR-5 receiver with tuning units and book. Jerry Molaver, 1008 Split Rock Rd., Cheshire CT 06410. KITEX.

WANTED: 4-400 tube & socket. Advise price. Jim K4VBH, Box 268 Americus, GA 31709.

WANTED: H-P, Tektronix items cheap Also quantities of High-power SCR's, Triacs, etc... State condition and price. Littell, W8KTL, RR2, Arcanum OH 45304.

SWAP: for 2 mtr FM Mobile gear. Beautiful new oceanographer w/watch, by Bulova. Value, $125. or sell, make offer. WB9HXZ, 8864 Hillside, Hickory Hills, IL 60457.

SELL: 75S-3B and 325-3 and P.S., $1200.00 like new. Pickup only, Will not ship. 30L1 also available $400.00. Package, $1500.00. (914)354-5762.

NUMBERED HAM SENTENCES in 54 languages for you to copy! K3CHP's DX QSL Guide. $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

WILL PAY, $3.00 just for information as to distributor, dealer or person I can buy 25 ft. of no. 14 Teflon covered wire. WANT: Drake W-4 wattmeter, Tappehorn, 2536 Kings Hwy, Louisville, KY 40205.

WANTED: Manual for Central Electronics, 600L Linear. W7JI, 235 E. 15 St., Tempe, AZ 85281.

SELL: Novice Rig, Viking Ranger and Knight R-100A $150. Will sell separate. WB0HSZ, 6865 S. Steele St., Littleton, CO 80122.

WANT TO BUY: Working CB sets, Surplus communications equipment. State name, accurate condition etc. Meltron, Box 9054, San Diego, CA 92109.

SELL OR TRADE: 18AVT w/80M, DX-60B w/VFO, Keyer w/paddle, 50ft pole. WB6VFC, Box 91434, Los Angeles CA 90009.

WANTED: Heath Digital clock and thermometer plus instructograph. Tom Dornback, K9MKX, 2515 College Rd., Downers Grove, IL 60515.

CIRCA: 1925 Grebe Syncrophase, filaments light, Can anyone tell me anything about this radio? WBHSL, S.M. Yost, Rt. 3, Gaylord, MI 49735.

WANTED: May 1971 issue of "Ham Radio" State price and condition. Foss, 1560 Campus Dr., Berkeley, CA 94708.

WANTED: Technical manual w/schematic for alignment procedures for Hammarlund HQ-120, Fred Turk, 20731 Elaine Ave., Lakewood, CA 90715, (213)8658107.

WANTED: Any equipment, books, or manuals on cryptography. L. Kruh, WN2TSD, 17 Alfred Rd., W. Merrick, New York 11566 or call collect, (516)-378-0263.

WANT: Heathkit, SB110A and HP23A. C. Reil, 11639, 26 S.W. Seattle, WA 98146.

FOR SALE: RTTY, A-Z book, $3. VOM20K/V, $8. Realistic CB100MW xceivers TRC-25A, $30/pr. Postage paid, W9DI, 22 S. Clay St., Hinsdale, IL 60521.

SALE: Tecraft TR 20/50 Six meter transmitter with home made AC supply, JT30 mike change over relay and xtals complete, in good shape; $35.00 W8YLJ, Del Carlin RR no.1 Bryan, OH 43506.

COLLECTORS: Nathanial Baldwin Earphones, $25, Tube UV-201, Brass base, $5, 6AG7's 25 cents ea., Dow CO AX Relay AC coil aux contacts, $10, plus postage, W6BLZ, 528 Colima St., La Jolla, CA 92037.

FOR SALE: Avcom tone burst module, TN-421 $15.00. Drake TR-22 crystals 16/76, 46/88, 88/88, 147.45/75, $6 pr. Auslander, 1499 No. Merrick, NY 11566.

FOR SALE: Tubes, 115 pulls, 12AT7, 12AU7 & AK5, etc., plus 100 new P.C. Coil forms. All for $10.00 postpaid. D. Penrod, WA9PTW, R2, Rochester, IL 62563.

DRAKE: R-4C, 9 extra xtals, MS-4 and manual. All mint. Will ship in original cartons; $450. W8VAS, 3390 Higley Rd., Rocky River, OH 44116.

FOR SALE: New SB-220 plate xmfr, $25. Used Thordarson plate xmfr 117V primary two secondary 3120VCT 2530VCT rated at 500 ma DC, $25. Turner 454C(SSB) mike used three hours, $20. New two 4X150A's, $25/pair, New two 4CX250B's $30/pair. WANTED: 6V6's with metal envelopes, new. G.L. Myers, 44641, 21st St., West, Lancaster CA 93534.

SELL-OUT: Johnson Pacemaker, $75, Challenger, $35; Heath, VF-1 VFO, $15. Twoer (new), $35. GR-91 RCVR, $15, V-7A VTVM, $15, BC-348 w/AC, $40; AF-67 xmtr, $35; Lafayette HA-350 rcvr (mint) $70. WA5NQE, 701 Carolyn Ave., Austin, TX 78705.

FOR SALE: 30L1, like new, $300, 75A2, needs work, $75, NC300 working condition, $75. Art, K2QHT, (516)265-6479.

WANTED: Drake RV6, Mint. Richard Spahl, Lake Parkway, Webster, MA 01570, K1SYI, (617)943-4420.

FOR SALE: Midland 220-225 MHz 10w. Transceiver, new, $240.00. Autopatch System. Box 291, Western Springs, IL 60558.

SELL: Research Microscope, B&L with many accessories. Also Bolens Denier balance (electronic) Console trade for ham or test gear. Trammel, 1507 White Oak CT., Martinsville, VA 24122.

WANTED: TR-106 6 Meter Transceiver manual for Xeroxing. Will pay postage plus. Bill Wentzel, W3GWA, Box 262, Perkiomenville, PA 18074.

WANTED: RTTY JOURNAL for 1969, 1970, plus January - April 1971; CE600L; CE20A modulation transformers. W6CRG, 11007 Explorer Rd., La Mesa, CA 92041.

FOR SALE: 2 meter super twoer transeiver, $25. WA9AXA, 201 E. 59th St., Westmont, IL 60559.

SELL: Swan 350, AC PS spkr, mobile MTG BRKT Hustler, KW Resonators, Mint condition. $425, Postage paid insurance, W2ASI/4, 7010 S.W. 16th St., Plantation, FL 33317. (305)792-4600.

CINCINNATI HAMFEST: 37th annual - Sunday, September 15, 1974 at the New Stricker's Grove on State Rt. 128, one mile west of Ross (Venice), Ohio. Flea market, contests, model aircraft flying, food and beverages all day. $2.00 covers everything. For further information: Ray Clark, WB8BUF Box 1521, Cincinnati, Ohio, 45201.

SIGNAL/ONE trouble guide containing problems, solutions, general information, $1.75. Bob, P.O. Box 6216, W0YVA/4, Arlington, VA 22206. Write me your experience & I'll send you a free copy.

"Mini Quad HQI-$40.00, TR44-Rotator, $45.00, Millen 300 watt Transmatch w/S.W.R., $50.00. W2AAS, 200 Moyer St., Canajoharie, NY 13317. (518)673-5873.

WANTED: Radio News, Radio Broadcast, Popular Radio, Electrical Experimenter, Modern Electrics Wireless Age, Popular Electricity, Radio Books & Catalogs, Hand books etc. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City, CA 94062.

WANTED: Collins Mechanical Filter, 6Khz, no. F455J-60, for 75A4. WN2PSP, Box 172, R no. 5, Blue Anchor, NJ 08037. (609)567-0338.

WANT TO BUY: Old Radio & Communication parts components etc. TG Soukup, WA1AWX, 161 Bob Hill Rd., Ridgefield CT 06877.

WANTED: Data & Adaptor Kit MX-949/U for Sig. Corps. 1-177-B Triplett tube tester. WB9AZQ, Larry, 404 E. Emmons, Robinson, IL 62454.

NEED: Information on Versastore cope memory and PC boards by Decision Control, Newport Beach, CA Schwartz, 719 W. Patterson, Long Beach, CA 90806.

FOR SALE: Vac. Tubes in wireless comm. Bucher 1919 (rare). Wireless experimenter manual, Bucher 1920. Radio-instruments & measurements, both standard, no. 74, Hard Cover 1920, $8, each. FOB Douglas, W6CUG, 2254 Pepper Dr., Concord, CA 94520.

WANTED: Edwards Electronics Digital Multimeter Kit with frequency capability. State condition. Chinn, 238 Blue Rock Road, South Yarmouth, MA 02664.

FOR SALE: Heath SB650, Digital Frequency display. Tested-never used; $179. FOB. D. Sachnoff 9429 Ohio, Omaha NE 68134.

FOR SALE: Six-Meter 4 element Telrex Beam, $10. WA2PCL, 101-23 Lefferts Blvd, Richmond Hill, NY 11419. (212849-8458.

SELL: Matched by National Radio, New 8122 tubes P.P. $115/pair. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

SELL: QST/73/CQ/HAM RADIO, Send S.A.S.E. for list. Guimares, RFD 2, Box 480, Middleboro, MA 02346.

FOR SALE: G.E. 2 meter FM transceiver needs repair, $15. VHF 5 channel xmtr, $5. G.E. remote console 4EC28, $50. K6KZT, 2255 Alexander Ave, Los Osos, CA 93401.

SELL: Alltronics, Howard model "K" RTTY converter, $65; condition excellent. Comaire FLM-6 Ant. tuner, new, $15. A.E. Johnson, K1IIK, Box 77 West Dover, VT 05356.

CALL LETTER license plates wanted for collection. Will pay postage. Art Phillips, WA7NXL, 3401 N. Columbus Blvd., Tucson, AZ 85712.

WANTED: Schematic for Harvey-Wells deluxe bandmaster xmtr with BFO and power supply. Will be used to put blind novice on air. Will copy & return. Any help appreciated. Joe Roberts, W7DRR, 9251 N. 37th Ave., Phoenix, AZ 85021, (602)973-5035.

$200.00 CASH for URA-17/CV-483 comparator-converter group. W4AIS, 306 Thornwood Dr., Taylors, SC 29687.

WANTED: RTTY equipment and manuals for 15 and 14 teletype and teletype tools. W5JTA, 1704 Glenn Dr., FT Worth, TX 76131.

FOR SALE: DX-100 xmtr, $75. Ameco TX-62 xmtr, $75, both good condition, no shipping. F. Kurz, P.O. Box 347, Zion, IL 60099.

WANTED: One or two tube's type 7271. W8KVG 502 Burns St., Ranson, W. VA 25438.

WANTED: Marine vhf transceiver 25w to 50 ohms at least 3 frequs 156mc one watt sw fcc type accepted. Box 8352 Savannah, GA 31402.

FOR SALE: Sears slide projector; cost - $95, sell for $40.00. Good condition. Charles Smith, Box 543, Conyers, GA 30207.

FOR SALE: About 70 CQ's & QST's from 1958 to 1974. Also some 73's, Radio Electronics, etc. $5.00, plus postage. Frentz, Deerwood, Minnesota 56444.

WANTED: For Amateur Museum, Carbon filament triode vacuum tube with candelabra screw base made for DeForest by H.W. McCamdles Co./1906. W9LGH, 610 Monroe Ave., River Forest, IL 60305.

HAVE EXTRA RIDERS MANUALS: Need Vol 23 and all indexes. W7KSG, 1876 E. 2990 So. Salt Lake City, Utah 84106.

WANTED: Police Radars and Klystrons; solid state lab equipment, instruments. Price in first letter. Littell, RR2 Arcanum, OH 45304.

FOR SALE Swan 600T & R with speaker, & built in phone patch, $800.00 One year old. P.O. Box 26037, Jacksonville, FL 32218.

FOR SALE: EICO 625 Tube tester, w/carrying lid cover, CRT adapter, $60.00; Gonset super 6 converter, $30.00; EICO 495 Volt Calibrator scope, $17.50; EIC) 584 Battery Checker, $9.50, All FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy, Jamaica, LI, NY 11432.

SELL: Clegg 99, $65. National NC183D with spkr, $100. Heath O-7 scope, $30. Manuals included Ted Tsucalas, 162-23 96 St., Howard Beach, NY, 11414.

WANTED: For Boys Club - Technical books, magazines, and courses. E. Ezekiel 43/2 Shaviv, Herzila 46-221 Israel.

SELL: Heath DX-60B, Excellent, mint condition 1 1/2 years old, has C.W. & A.M. Can be xtal control or used with VFO, $75.00 without xtals & $85.00 with. Howard Corbiner, WN6SOZ, 5938 Wrightcrest Dr., Culver City, CA 90230.

FOR SALE: Swan 350, very good condition, no modifications, $200, or best offer. P.A. Scheiter, K5VDO, 1007 Jan Lee, Burkburnett, TX 76354.

SELL: HCX-500, AC-500, perfect condition, $250, Drake R4B, $325. H. Taubin, W2GCW, Box 55C Mountain View Drive, Elizaville, NY 12523.

SWLL: Heath AM-2 SWR, $8.00. WANTED: KW transmatch, Magnum six for Drake TR4. Hal Cushing, W6LXZ, 5224 Bobbie Ave., San Jose CA 95130.

SELL: Model 15 page telttype printer with Bias supply, $75, plus any crating cost if to be shipped. Needs few keytops. W7CRP, 55 E. 8th, Sheridan WY 82801.

FOR SALE: VIBROPLEX original, best offer or preferably trade for a keyer paddle. WB2JWM, Box 257 Gilbertsville NY 13776.

MODERNIZE your shack with a ham 24 hour wall clock. Battery or electric, write for information. Steve, WB5BNM, 1524 N. Oklahoma Ave., Shawnee OKLA 74801.

FOR SALE: Heath counter-scaler, Motorola, T43-GGV, others, WA5CMC, 2309 Bullington St., Wichita Falls, TX 76301.

WANTED: Triband beam setup for club station. Will pick up if between Chicago and Madison Wisc. Dave, WB9BVX, 408 1/2 S. Mills, Madison, WI, 53715.

ROYAL SIGNALS AMATEUR RADIO SOCIETY: If ex-U.S. Signal Corps and you have worked with R. Signals write G4RS (QTHR) for membership. J. Cooper Captain (TOT) G3DPS, School of signals, Bladford, Dorset, England.

FOR SALE: RTTY Electrocom FSC-250 terminal unit with tuning scope, $150 or best offer. (201)-429-8880.



300 Watts and Fully Solid-State

"How Sweet It Is!"

Yes, with enough DX power out of a completely solid-state transceiver to work the world, another plateau in amateur radio development has been achieved. Swan's new SS-200A has a nominal power input rating of 300 watts P.E.P. into a 50 Ohm output load on suppressed carrier single-sideband transmissions. It has this, plus all the excellent solid-state features Swan introduced more than a year ago:

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A home station, like the one demonstrated by Emerson Kasmer (WA6TNV) above, can be easily equipped with SS-200A accessories. Illustrated at the right is a PS-20 matching 110V AC power supply. In the center, a 610X crystal controlled oscillator sits atop an SS-208 VFO. Kas holds a Swan 444 desk mike with a locking PTT bar. For more information on this excellent American-made transceiver, and other Swan products, visit any authorized Swan dealer or write to Swan for our latest "World of Amateur Radio" catalog.

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TELETYPE EQUIPMENT FOR SALE: Models 14 15, 19, 28. TD's, Reperfs, KSR's, ASR's. Parts or complete machines. Write needs or send SASE for complete listing and prices. Larry Pfleger, 10615 W. Ridge Rd., Apt. 54, Hales Corners, WI, 53130.

SELL: Used, guaranteed, 4-1000A's-$20; Chimneys $10; 4-400A chimney; $4; Guaranteed PL 172's $40.00. Trammell, 1507 White Oak Court, Martinsville VA 24112.

FOR SALE: Used Radio parts, Transformers, Chokes, Oil filled condensers etc... all good condition. Some units built up. W5COC, Rt. 5 Box 1236 Waco, TX 78203.

WANT: Omega T Noise Bridge, FT101 Speaker, 220V10 to 15A variac. Jack, K2OUA, 173 - Wooddale, Ballston Lake, NY 12019.

FOR SALE: SBE SB2-LA Linear AMP., $150.00; 12V.D.C. inverter for linear, perfect for 1KW mobile, $50.00. WANT: 30LI AMP. K6AEZ, 150 Geneive St., Camarillo, CA 93010.

FOR SALE: Military R-392 Rcvr., S-32MHz, digital readout, good condition, $175, plus shipping, K2ZSZ, c/o Gleigher, 96-04 57th Ave., Rego Park, NY 11368.

FOR SALE: Calculator, MITS no. 908M. Has squares, roots, reciprocal, % and memory, $85.00. With case and postpaid. H. Marhoff, P.O. 569, Largo, FL 33540.

SALE: Knight TR 108 & VFO for 2 mtr. Al condition, $75.00. K6THQ, P.O. Box 3344, Industry CA 91744.

WANT: Spectrum Analyzer, Fluke 8000A, vacuum relays, vacuum capacitors. A. Emerald, 8956, Swallow Ave., Fountain Valley, CA 92708.

FOR SALE: Heath Twoer and 7el. Two Mtr. Beam like new, $25. W2EGQ, 169 Stony Brook Rd., Somerville, NJ 08876.

FOR SALE: AC Adapters, 6 VDC 150 MA, Standard plug, brand new, $3.00. Postpaid. K2MFY, 2 Nutley Court, Plainview, NY 11803.

FOR SALE: CX7A Maint. Man. 7/73 New, or Trade for 11/70 version CX7 Maint. Man. Price-$22, plus postage. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

SELL: Round emblem S-Line and Henry 3K. Send sase for details. Jim Fleming, K9FRZ, 6N705 Harvey Road, Medinah, IL 60157.

GALVANOMETERS: Weston 9912, 4" x 4.5", Center zero., Movement 2.5-0-2.5 microamps, $8.95 plus postage. W4JGO, 643 Diamond Rd., Salem, VA 24153.

WANTED: Swan 508 VFO. Donal Girard, RT.5, Box 71, Chippewa Falls, WI 54792.

FOR SALE: Clegg 22er, $125., Challenger, $50., DX60B-$50. You ship. H. Suydam, RD2 Box 5 Warwick, NY 10990.

WANTED: 2 meter FM RTTY Keyer. State price and condition in first letter. K7GHZ, 501 So. Ash St., Centralia, WA 98531.

WANTED: Matching spk, 2.1KC filter P/N F-455-J21 for Collins 75A4 RCVR. K2LZJ, Romagiino, 2 Plowboy Path, Commack, NY 11725.

SELL: Humidity sensing elements. Res. varies with hum. change. 3%acc., $8, ea., Six for $3.95 ppd. W4JGO, 643 Diamond Rd., Salem, VA 24153.

TEST QUESTIONS & ANSWERS: FCC 1rst and 2nd Class Exams, $5.00. Autopatch Systems, Ltd., Box 291, Western Springs, IL 60558.

WANTED: Used James Millen solid state dipper or Eico Model 710 grid dip meter. Give condition and price. Dean Brooks, 5141 Lincoln Ave. Los Angeles CA 90042.

QSLs: Second to none. Same day service. Samples airmailed 25 cents. Ray, K7HLR, Box 331 Clearfield, Utah 84015.

FOR SALE: Heath HW-16, HG-10B, & extras. 6 months old, $125.00 plus shipping. WN5KOQ, 1646 Steele, Baton Rouge, LA 78015.

FOR SALE: NCX-5MKII with NCXA, manual, $375.00. Jim, W1VYB, (617)922-3850.

TRANSFORMERS REWOUND: Jess Price, W4CLJ 507 Raehn St., Orlando, FL 32806. (305)427-7251.

WANTED: Good/Clean HQ-180/A. Fred Galla, W2LSN, 147-37 Roosevelt Ave., Flushing, NY, 11354.

FOR SALE: Heath HR-10B, 7 Months old, Professionally assembled. Will Ship C.O.D. Postpaid, $70. WB6DSK, 2000 Vista Drive, Modesto CA 95355. (209)526-9573.

SELL: Swan 250; $195; NS-1, noise blanker, $22; 117XC power supply, $75. H.C. Richardson, 1109 Dakota S.E., Albuquerque, NM 87108.

WANTED: Ameco TX-62 with BFO and Dow Relay. Albert Lawrence, WB2KWZ, 157 Fayette St. Palmyra, NY 14522.

WANTED: PAC Acoustic coupler for Pacific Plantronics Headset, HMS50/T30-3. M.J. Moss, W4UXJ, Box 28601, Atlanta, GA 30328.

WANTED: 1D8/VT-148 and 5 x 4 tubes. Must test O.K. State price and quantity available. Bill, Vokac, K9WQY, P.O. Box 216, Mansfield, IL 61854.

VHF CONTEST: Sept. 7th - 8th. Contacts wanted on 50-432MHz. AM CW FM & SSB. Write K8HWW or WA8ZCO, 16245 Beechwood, Birmingham, MI 48009.

WANTED: Drake TC2, SC2. State price and condition. WB9ESM, John Gleaser, 1225 S. 12th St. Manitowoc, WI 54220.

FOR SALE: HW-32A, 3 mos old, Mint, $100. I'll ship; Communicator III 6 mtr, $45; WANT Matchbox, MN4, Argonaut. WB5DOQ, 9215 Rowan, Houston, TX 77036. (713)772-6739.

FOR SALE: Dow-Key Relays, DPDT Coax plus DPDT external electrical contacts, never used $12. ea. 4CX1000A with ceramic socket and chimney, in original wrap, $75.00. WA8VFK, 314 So. Western Springfield, OH 45506.

WANTED: 2 KW G-G amplifier ($200 to $300 price range). Write stating price and condition. Richard Schweizer, WB2PCF, 240-27 145 Ave., Rosedale, NY 11422.

WANT: Drake TC-2-SC-Z, etc. FOR SALE: Gonset 2 meter SSB sidewinder, Like new, $250.00 with AC/PS. K4BPY, (205) 881-3908.

BUY OR TRADE: For Millen KW Transmatch 92200. Jack Simpson, W7HZD, 1106 N. 15th St., Coeur D'Alene, ID 83814.

TRADE: S-85 and DB-23 for Books on fish or Lionel Trains or best offer. WA1NYV, Brown Terrace, Box 363, Uxbridge, MA 01569.

SELL OR TRADE: Complete texts and answers, N.T.S. master color TV course, $50.00. A.E. Johnson, K1IIK, Box 77, West Dover, Vermont, 05356.

WANT: VFO with built in power supply. Art Prutzman, K3DTL, 302 Wyoming Ave., Kingston, PA 18704.

WANTED: One - three Collins exciters model 32-KI in good condition. Bob Wagner, P.O. Box 582 Fairview, New Mexico 87532.

BUY: Heathkit SB 640 VFO working condition; write, KP4JM, Saldana, Box 7388 Cidra, P.R. 00639.

FOR SALE: Biggest DX & Awards Hunters' Club in world -CHC publishes book, Directory of Certificates & Awards, $5.00. Box 385, Bonita CA 92002.

FOR SALE: Lafayette model, HA-250 Linear amplifier. New condition, $50.00 postpaid. James Fred, RR 1, Box 41, Cutler, IN 46920.

AVIATION PILOTS: Communicators, past/present elegible join Flying Hams' Club. 1682 members Write, Box 385, Bonita, CA 92002 for FHC info.

FOR SALE: Knight C-555 CB Trcr kit, $15.00 EICO 221 VM w/HV Probe, $30.00; Heath To-I Test osc., $20.00 EICO 495 Scope Volt. Cal, $15.00 All FOB. R. Wendel, 160-20 Grand Central Parkway, Jamaica, NY 11432.

FOR SALE: Link 50 watt FM 150 mc Base station $75.00. J. Wasiewicz, 229 Sarles Lane, Pleasantville NY 10570.

NEED: Manual and/or schematic for Harvey-Wells Bandmaster Deluxe with VFO Xmtr. Will be used to put blind novice on air. Joe Roberts, W7DRR, 9251 N. 37th Ave., Phoenix, AZ 85021.

SELL: HR-10B with calibrator, $60.00/or trade. WA6WWU, 337 W. Raymond St., Compton, CA 90220.

FOR SALE: 2 meter transceivers: Hallicrafters SR42A with VFO and Knight TR-108. Xtal-transmit; tuneable rcvrs. Some xtals included with .94. Excellent condition. Dr. Jack Robinson, W0RJZ, Box 466, Creston, Iowa 50801.

FOR SALE: 12 Button wrap around TT pad covers with pads, $18.00 Autopatch Systems, Box 291 Western Springs, IL 60558.

WANTED: Davco DR-30 Solid State Receiver State price and condition. Kaisel, P.O. Box 4153, Woodside, CA 94062.

FOR SALE: Panadaptor: SP-44. (Panoramic & Hallicrafter's Manuals). Spare 2 API Display tube & 10 other spare tubes. Excellent Condition. $40.00 FOB. W.L. Babcock, W2RXW, 405 Sayles St., Oneida, NY 13421.

ROBOT SSTV MONITOR: Camera Viewfinder, accessories, little used, list shack cleanup SASE W4API, Box 4095, Arlington, VA 22204.

FOR SALE: HT32A, Mint, $185.00, Navy Long wave RCVR, $150.00. You pick up, W9MIK, 281-2057; Chicago, IL.

WANTED: Used Curtis Keyer w/programmable memory. Jim Rafferty, 333 1rst St., Seal Beach, CA 90740.

FOR SALE: Commercial Tower, 155 Ft. high, best offer. Write for information, SASE. R. Zurawski, Rt. 2 Box 646, Memominee, MICH 49858.

FOR SALE: Old Mackay Radio Headphones, $25, postpaid. H. Anderson, 639 NO Wahsatch, Colorado Springs CO 80903.

FOR SALE OR TRADE: 18AVT, RV-4, Cubel 4el 15m Quad, Candle5'' TV, RCA reel-to-reel recorder, Shure 565 Unisphere mic, EIMAC ps2v power supply, WA3VUC, Box 4, Warminster, PA 18974.

SELL: Midland 4 channel VHF pocket scanner, unused, $75. C. Milazzo, WB2OZA, 716 Calhoun Ave., Bronx, NY 10465.

GET A TABLE FOR YOUR TELEPRINTER: Designed for Kleinschmidt ASR with 40 x 23 x 27 dimensions. Great for either a single printer or printer and reperf. $17.50 FOB. WB5HGQ, 2117 Westlake Dr., Piano, TX 75074.

HAM MOVIE: Travelogue of South America in color featuring LUJAA, CE2AA and other S.A. hams in action available for showing at radio club meetings in Southern California. Call Dr. Hess, W6CK, (213)281-4663 at noon or write Box 19 M, Pasadena, CA 91102.

WANTED: 1973 issue of USA and Foreign Amateur call book. Norris McKamey, RR1, Box 185 Bettendorf, Iowa, 52722.

ANTIQUE HRO: Serial no. F82-July 23, 1935, with original power supply, complete set of coils and instruction manual. (2.5 V tubes). $275.00, or trade toward Collins or good receiver. Edward L. Gzehoviak, 2025 Ryons, Lincoln, Nebraska 68502 or (412)435-0789.

FOR SALE Round meters, Jewell RF Thermocouple type, 0-1 1/2 Amps, $12. Triplet 321, 0-200 mil and 0-250 mil, $10, each, Weston 301, 0-1 mil, $10. Plus postage., Ruiffs, RFD, Sebage Lake, Maine 04075.

WANTED: Manual for AN/USM-29 Frequency meter. State price, ppd. K6BCT, Box 393, Ridgecrest, CA 93555.

WANT: Hallicrafters SX122 General Coverage Rcvr or equivalent rcvr. W4MEL, 1586 Moravia Ave., Holly Hill, FL 32017.

WANTED: D104 Microphone, with or without stand. WA6AHF, 17494 VIA Alamitos, San Lorenzo, CA 94580.

WANTED: Model Radio Control System. Trade: Photography or electronic equipment, K3QPB, 137 Hoffman Dr., Johnston, PA 15904.

FOR SALE: Hammarlund RCVR 110, 160-6 meters, clock, carrier meter, mint condition, $100. WB4MTE, Paul D. Skidmore, 6212 Stone Ave., Crossville, TN 38555.

FOR SALE: Swan 350C with 117XC power supply $350.00. Heath Warrior Linear, $175; postal no. only, you pay shipping or pick up. Willie N. Love, K5MFA, Box 411, Atlanta, TX.

SELL: Mint T-4xB, R-4B, AC-3, MS4. Factory realigned, Feb. '73. Ship in original cartons, UPS, prepaid; $825. K9JDC, Rt., 2 Box 56, Lockport, IL 60441.

SELL: Hammarlund HQ-180AX, $275. HA-800B 160m-6m, $95. Both with original packing and manuals. S. Powers, 41 Elsie Rd., Brockton, MA 02402.

NEED FUNDS FOR COLLEGE: You pick up Hy-Gain 10-15, beam, $10; 24' boom 2-meter Hygain beam, $5; 1250 watt power plant, used only few hours, $100 firm. Gene, WA5ETK, 817 W. 11th St., Littlefield, TX 79339.

WANT: Swan FPI Phone Patch, good condition and price. W2ASI/4, 7010 S.W. 16th St. Plantation, FL 33317.

WANT: HA650 or HA750, good condition and reasonable price. W. Adams, P.O. Box 324, Fishkill, NY 12524.

WANTED: Heathkit SB-640 remote VFO. Cash or trade, Have 14 AVQ, SB-610, scope, etc. WB2RXF Box 235, Hunter, NY 12442.

FOR SALE: New P&H AFC2 audio compressor $5.00; Eico 730 modulator, $5.00; Low pass filters B&W, 5.00; RME DB23 preselector, 25.00; Ameco PCL-P preselector, 25.00; Regency HR6, new, $200. Vibro Keyer $12.00 all FOB. Bill Lawson, K4IOP, 1325 Highland Road, Chattanooga, TN 37415.

FISHERMAN: Attract fish to your line with our transistorized electronic fish callers. Small, lightweight and battery operated, $4.00 postpaid. Will swap one or more for any ham gear. James Shank, 21 Terrace Lane, Elizabethtown, PA 17022.

FOR SALE: 30 AMP Filament chokes for GG Linears. Perfect for pair, 3-500z's, 4-400A's, 813's, or single 4-1000A, 3-1000z, etc. New satisfaction guaranteed. $5.50 each, 2 for $10.00 ppd. V. Murrell, K4HHA, Rt. 6 Newport, TN 37821.

SELL OR TRADE: Heathkit 2 meter transceiver, model HW-20. WA6AHF, 17494 Via Alamitos, San Lorenzo, CA 94580.

WANTED: Test answers to "Cleveland Institute of Electronics" Electronics Engineering course. State Price. Donald E. Chapman, 1621 W. Division St., Chicago, IL 60622.

FOR SALE: Link 50 watt FM 150MC base station $75.00. J. Wasiewicz, W2DQC, 229 Sarles Lane Pleasantville NY 10570.

WANT: Round Emblem KWM2W 2A, Call Marty, (215)884-6010, WA3IFQ.

FOR SALE: Pair of bright chrome bumper guards with fittings (no rust) for '70 Ford, $25.00 Clark, 123 Davis Ave., Hackensack NJ 07601.

FOR SALE: SB303 with SSB and cw filters. $275. V. Schorn, RT5 Box 323-B Florence AL 35630.

FOR SALE: HP-415 VSWR Indicator, $25, Tektronix 101 pads, term units, Attenuators, Standardizers, $3, ea. LM Freq Meters, parts, $4. K6KZT, 2255 Alexander Ave., Los Osos, CA 93401.

FOR SALE: Meters, Milammeter, D.C. Center Reading, 0-150, $3.50 ppd. Goodman, 5826 S. Western. Chicago IL 60636.

SELL/EXCHANGE: Japanese Radio mags-one dollar each. English equivelant, Playboy-twelve dollars for years set. Lots penpals etc. Brian Smith, P.O. Box 4, Uckfield, Sussex, England.

FOR SALE: Swan 510 Crystal oscillator unit; mint condition, and manual. C.L. Meistroff, 7410 Chamberlayne Ave., Richmond VA 23227.

WILL BE QSL MANAGER: Send for details, write WB2UVB, 15 E. Camden Ave., Moorestown, NJ 08057.

WANTED: Wireless gear, old receivers, Misc. parts, catalogs, etc., regardless of condition. Hovarth, 522 Third St., San Rafael, CA 94901.

SELL: Round emblem S-Line, and Hanry 3K. SASE for details. Jim Fleming, 6N705 Harvey Rd., Medinah, IL 60157.

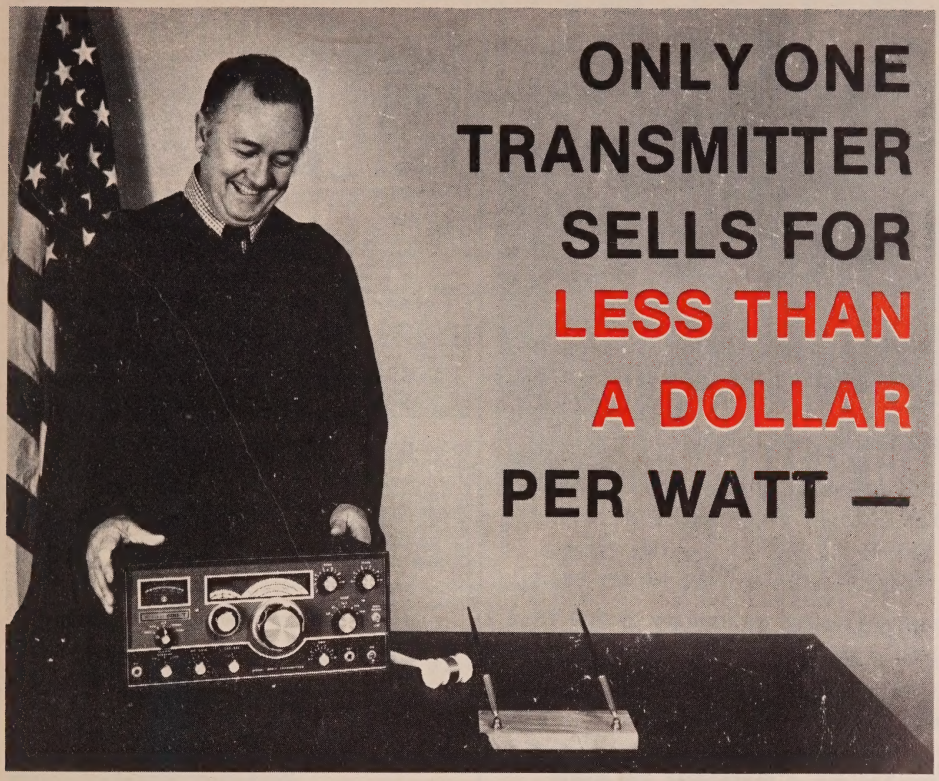
WANT: Collins SLine, for cash or will trade 5LSL or KWM2, Call: J.P. Ashcraft, WB5DTX, (214)361-6611.

FOR SALE: 6 Element 6 meter Beam. New in Box $35. WA8MLV, 1008 Englewood, Parma, OH 44134.

SELL: Hallicrafters HQ170 Receiver, excellent condition, $120. K2SHZ, J. McCann, 18 So. Hollow Dr., Ballston Lake, NY 12019.

WANTED: Hallicrafters model T-54, television in metal cabinet, (1948 or 1949) 7'' screen, need not be working but complete. Wayne Letourneau, WBOCTE, 2338 E. South Ave., N. ST Paul MN 55109.

WANTED: Large Oil filled filter caps. Please state capacity, voltage, size, and price. John Williams, P.O. Box 186, Greenville, SC 29602.



THE SWAN 600T!

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

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

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

The brand YOU should buy is obvious. Visit your authorized SWAN dealer and order your 600T.

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

600T	Transmitter	**$589.95**
600R	Custom Receiver with SS-16B filter	**$615.95**
600S	Speaker	**$ 24.95**
600SP	Deluxe Speaker with FP-1 phone patch	**$ 69.96**
510X	Crystal Oscillator	**$ 54.95**
VX-2	Automatic Voice Control	**$ 44.95**
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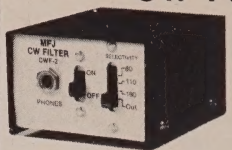
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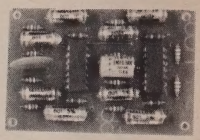
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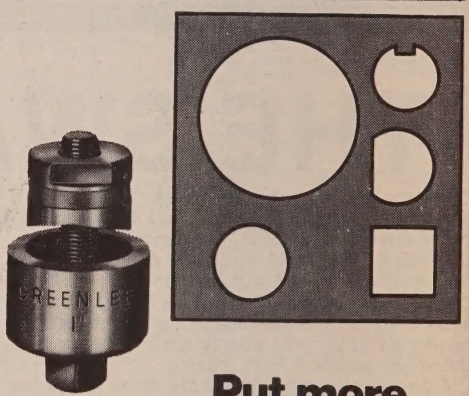
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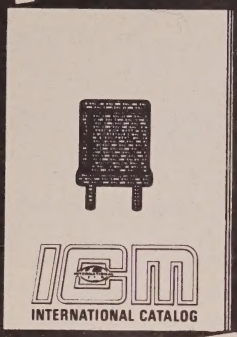
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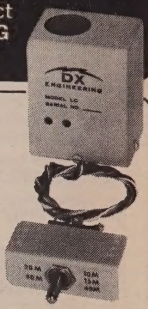
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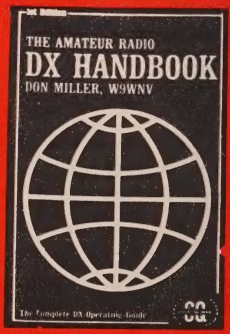


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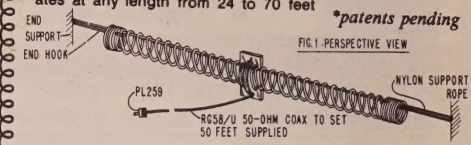
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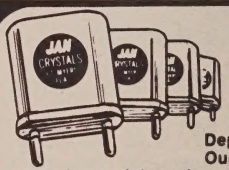
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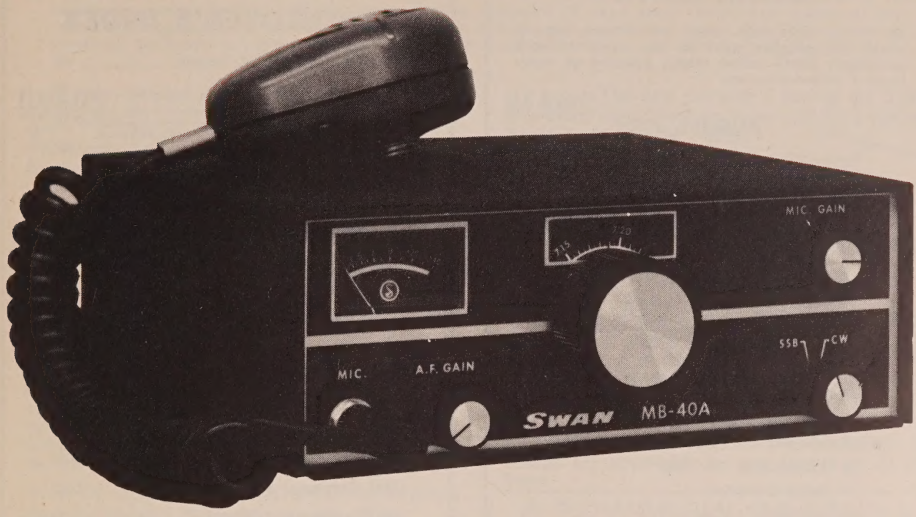
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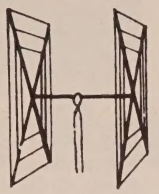
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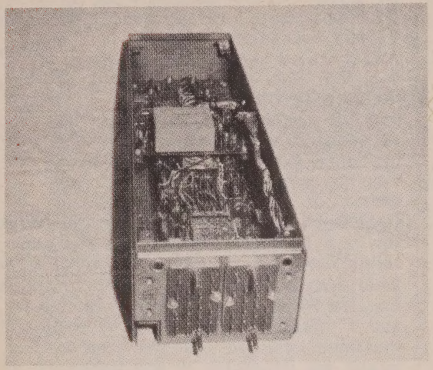
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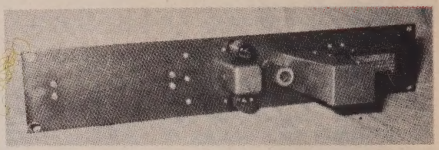
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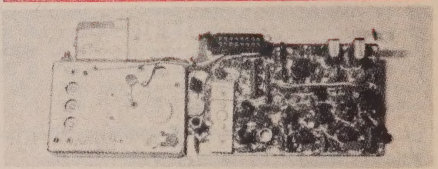
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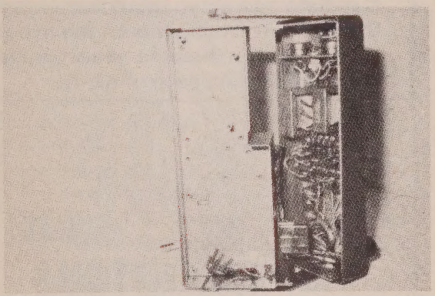




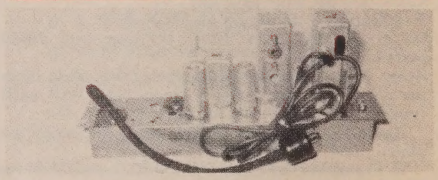
GE antenna matching and distribution amplifiers used to provide the gain necessary to match up to 3 receivers to a single antenna, 40-50 MHz.
GE Part #.....4KY8A3 ..... $15.



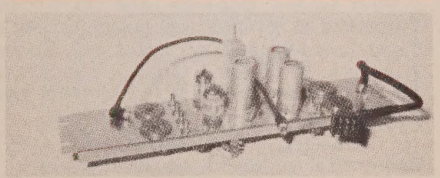
GE 4ET62A, 132-150 MHz, 8 watt, all solid state Porta-mobil, complete transmitter strip $88.



GE Porta-mobil extended control housing with 10 watt audio amplifier ..... $38.



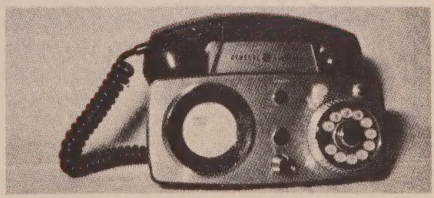
GE Progress Line low band dual front end strip. Can be used for simultaneous monitoring ..... $15.



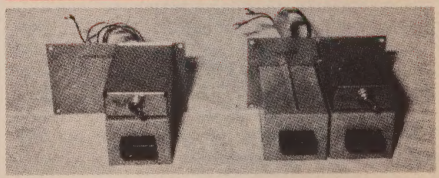
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