QST

evoted entirely to Amateur Radio

January 1976 $1.00

New from Cover to Cover for Better Service to You!

Page 9

this is the "ONE" you've been waiting for

An advanced design synthesized 2-meter transceiver...the

Tempo VHF/ONE

No need to wait any longer — this is it! Whether you are already on 2-meter and want something better or you're just thinking of getting into it, the VHF/ONE is the way to go.

The brand new Tempo VHF/ONE is fully synthesized so no crystals are required. It features all of the advantages of a 5-digit LED receive frequency display and offers the full 2-meter band coverage (144 to 148 MHz) for transmit and receive.

Here are some more of the features that makes the VHF/ONE the most compact and versatile 2-meter amateur transceiver available.

- Full 2-meter band coverage (144 to 148 MHz) for transmit and receive.
- Full phase lock synthesized (PLL) so no channel crystals are required.
- Compact and lightweight — 9.5" long x 7" wide x 2.25" high. Weight — About 4.5 lbs.
- Provisions for an accessory SSB adaptor.
- 5-digit LED receive frequency display.
- 5 KHz frequency selection for FM operation.
- Automatic repeater split — selectable up or down for normal or reverse operation.
- Compare its construction with any other amateur transceiver on the market.
- Microphone, power cord and mounting bracket included with each transceiver.
- Two built-in programmable channels.
- All solid state.
- 10 watts output.
- Super selectivity with a crystal filter at the first IF and an E type ceramic filter at the second IF.
- 800 Selectable receive frequencies.
- Accessory 9-pin socket.
- $495.00

TEMPO SSB/ONE

SSB adapter for the Tempo VHF/One

- Selectable upper or lower sideband.
- Plugs directly into the VHF/One with no modificatio
- Noise blanker built-in.
- RIT and VXO for full frequency coverage.
- $225.00

Prices subject to change without notice.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
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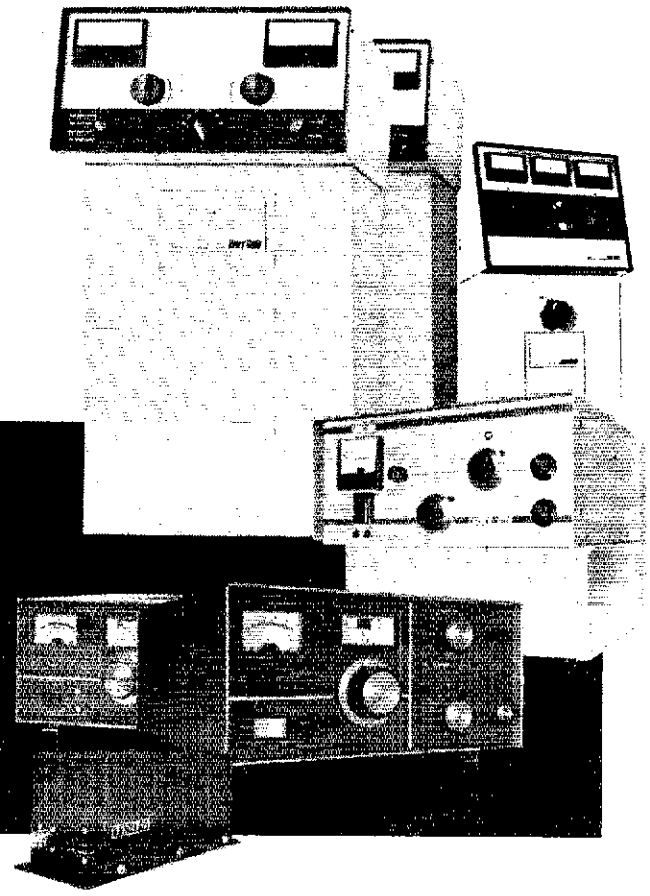
Available at select dealers throughout the U.S

Henry Radio has the amplifier you want



Never before has one company manufactured such a broad line of amateur amplifiers, both vacuum tube and solid state, for HF, VHF and UHF; fixed station and mobile; low power and high power. Take your pick from 20 models...the world's finest line of amateur amplifiers.

2K-4. . .
THE "WORKHORSE"
The 2K-4 linear amplifier offers engineering, construction and features second to none, and at a price that makes it the best amplifier value ever offered to the amateur. Constructed with a ruggedness guaranteed to provide a long life of reliable service, its heavy duty components allow it to loaf along even at full legal power. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console or desk model ..$995.00

3K-A COMMERCIAL/MILITARY AMPLIFIER
A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. In addition, the 3K-A provides a heavy duty power supply capable of furnishing 2000 watts of continous duty input for either RTTY or CW with 1200 watts output. Price...$1250.00

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The 4K-ULTRA is specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. The amplifier features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input. This amplifier can be supplied modified for operation on frequencies up to about 100MHz. Price...$2950.00

TEMPO 6N2
The Tempo 6N2 brings the same high standards of performance and reliability to the 6 meter and 2 meter bands. Using a pair of advanced design Eimac 8874 tubes, it provides 2,000 watts PEP input on SSB or 1,000 watts input on FM or CW. The 6N2 is complete in one compact cabinet with a self-contained solid state power supply, built-in blower and RF relative power indicator. Price...$795

TEMPO 2002
The same fine specs and festures as the 6N2, but for 2 meter operation only. ...$695.00

TEMPO 2006
Like the 2002, but for 6 meter operation. ..$695.00

TEMPO T-2000
LINEAR AMPLIFIER
The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. $795.00

K-2000
LINEAR AMPLIFIER
The new K-2000 is the perfect companion for Kenwood's TS-520...matched for style and circuitry. The same specifications as the T-2000...$795.00

TEMPO VHF/UHF AMPLIFIERS
Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communicatios. FCC type accepted also.

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Congratulations, somebody. You just bought the 27,000th Collins KWM-2A transceiver.

That's right.
In the last 15 years some 27,000 Collins KWM-2A units have been sold. Sold to amateur operators worldwide, governmental agencies, public and private emergency services, exploration parties. And used in such diverse climates as those of the polar ice-caps and the jungles of Southeast Asia.

Behind this popularity is Collins' basic philosophy: "A conservative design makes a high-reliability design." And KWM-2A reliability is legend. So is its high stability and its high resistance to electrical and physical punishment. And, as a result, it enjoys high resale value.

KWM-2A utilizes only U.S. standardized tubes and components. Because of its conservative, high-reliability design, maintenance is comparatively simple. In fact, many maintenance operations can be performed by most any operator. And good parts availability means air time, not downtime.

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Amateur Radio Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406. Phone 319/395-4507.

Rockwell International

January 1976
Volume LX Number 1

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THE COVER

Hq. staffer Donna assists in making measurements on new 432 MHz amplifier. See page 11.

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Basic Radio

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Departments

American Ham Spirit, you either have it; or you don't.

The hams at Dentron have it. That's why we pack so much excitement into the products we build.

If you're an excited ham who loves to operate all bands, why not complete your station with the 160 meter Top Bander™? 160 meters is only a step away from 80 with this remarkable 160 meter transverter. Designed to bring simple, low cost 160 meter capability to any amateur station equipped for 80 meter CW, SSB, or AM operation. Just "plug in and play" and you're on 160 meters with 100 watts transmit power and a super sensitive receiver.

And coupled with the 160AT Skymaster™, tuning your present antenna or long wire is a snap.

There is only one Super Tuner™ and only one Super Super Tuner™. Excited Dentron customers around the world have discovered why the Super Tuner™ and Super Super Tuner™ are the only antenna tuners on the market that will match **EVERYTHING** between 160 and 10 meters, whether it be balanced line, coax cable, random or long wire.

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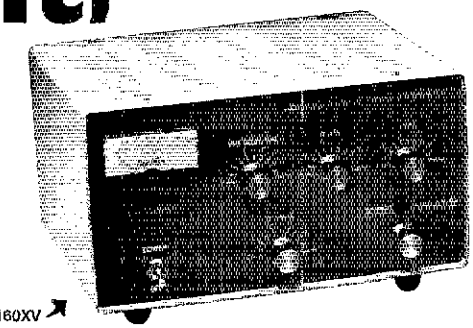

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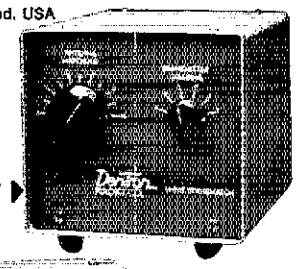
Top Bander $199.50 ppd. USA

2 MHz MARS unit
$229.50 ppd. USA



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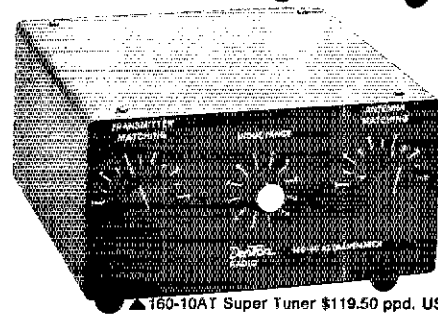

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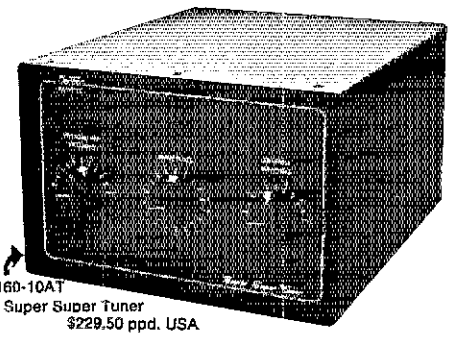

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Super Super Tuner
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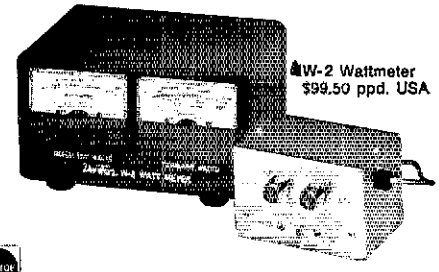

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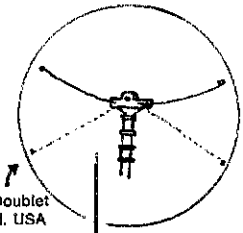

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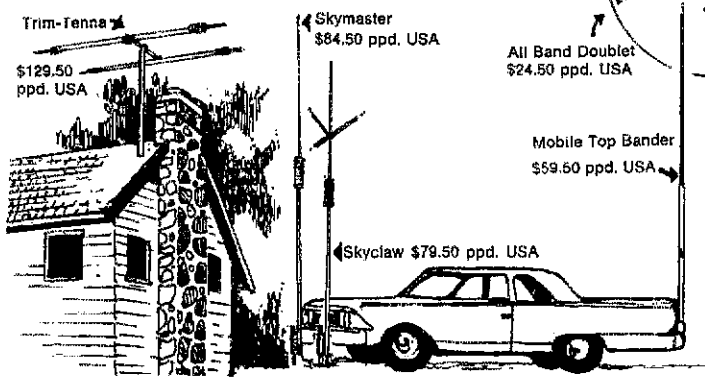

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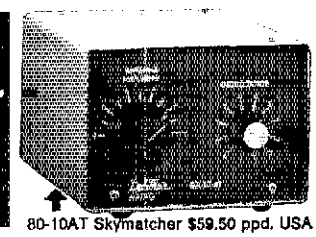
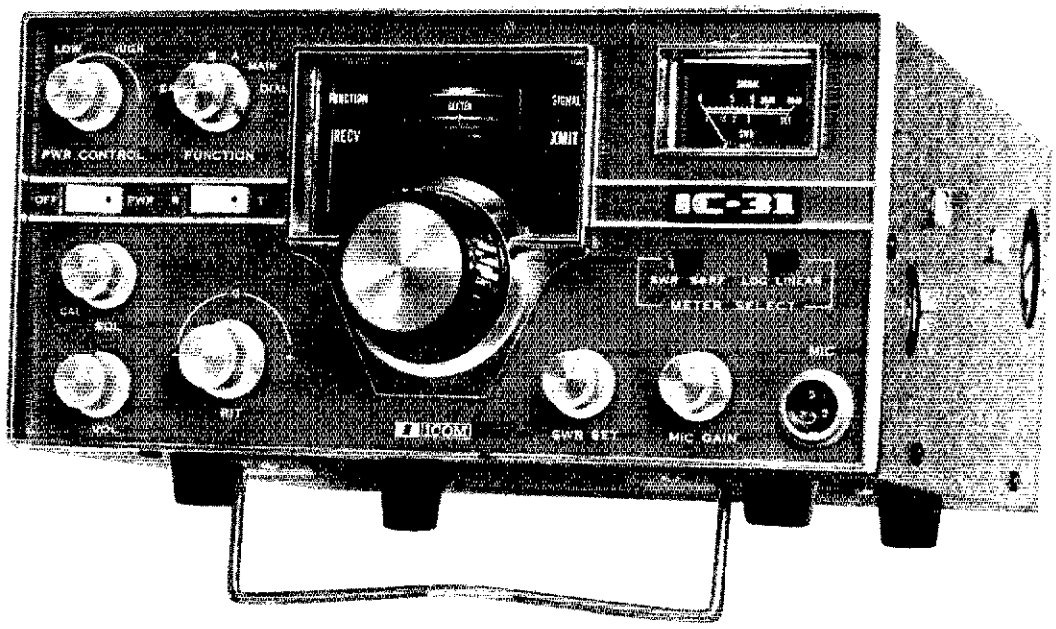
(216) 425-3173

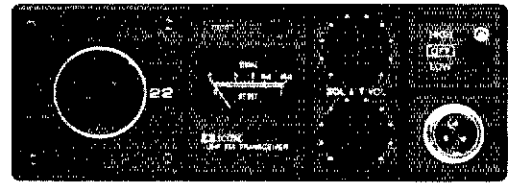


80-10AT Skymatcher $59.50 ppd. USA



The First Base Hit!

The 450MHz-FM game now has one on base! ICOM is on with the first 440-450 radio built specifically for base operation, the **IC-31.** You're going to be hearing a lot from this promising young newcomer following in the footsteps of that popular veteran, the **IC-30A** mobile unit.



Impressively built for 26 channels and 10 watts output, this unit is the perfect teammate of the **IC-30A,** which has proven itself to be the biggest 450 winner on the road. With the S.W.R. bridge built right into the front panel and a forward mounted 9-pin socket, the new **IC-31** base unit provides the flexibility necessary to good UHF operation, and its compact size and styling match the other ICOM base radios.

If you want the number one team, bring it on home with the **IC-31.** Tryouts are being held at your ICOM dealer now.

Frequency Range	440-450MHz
Channels	26
Power Output	Hi 10 Watts, variable to 1 Watt
Sensitivity	.4 microvolts for 20DB quieting .3 microvolts for 12DB SINAD
Bandwidth (Transmitted)	15KHz with 5KHz deviation
Size	111x230x260 (dim. in MM)
Weight	7.2 kilos

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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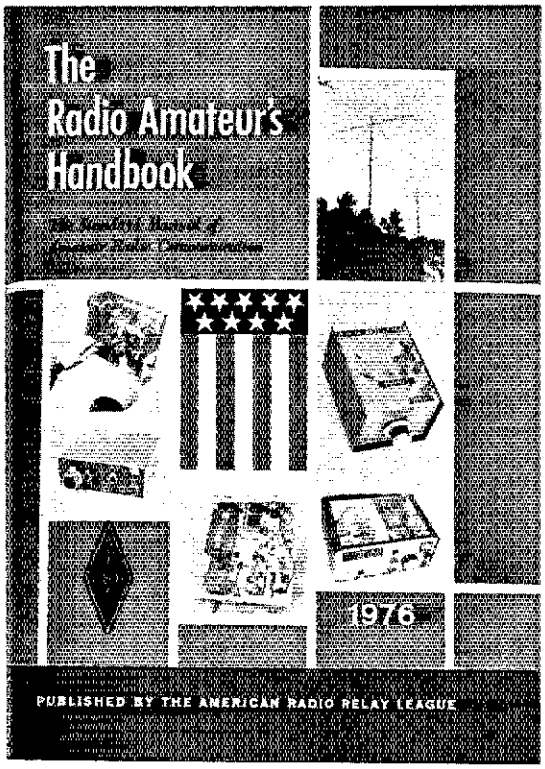

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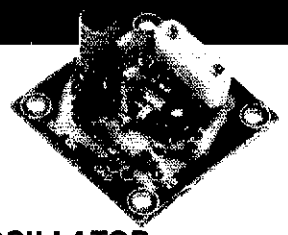
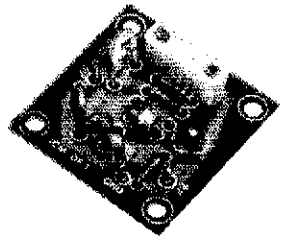


OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
Price $3.95 ea.



OF-1 OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OF-1, Lo, Cat. No. 035108. 20 to 60 MHz, OF-1, Hi, Cat. No. 035109
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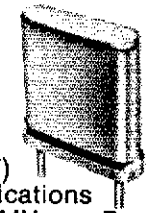
Price $3.25 ea.



EX CRYSTALS
(HC 6/U HOLDER)

Cat. No.	Specifications
031080	3 to 20 MHz — For use in OX OSC Lo Specify when ordering $4.95 ea.
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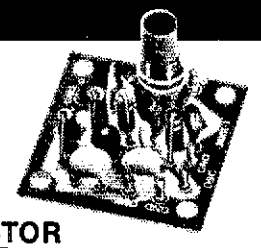

MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
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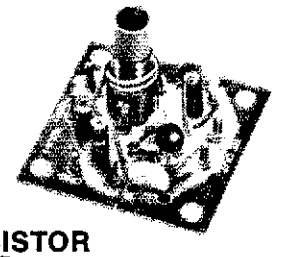
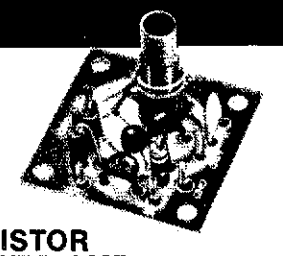


SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Signal tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103
Specify when ordering.
Price $4.50 ea.



PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
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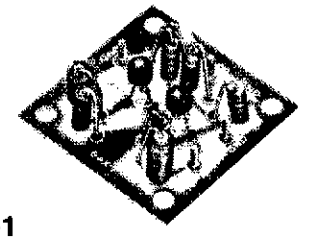
Price $4.75 ea.



BAX-1
BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107
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*Members Executive Committee

Section Communications Managers of the ARRL

Reports Invited: All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

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Ontario	Holland H. Shepherd, VE3DV, 3016 Cowan Cres., Ottawa, K1V 8L1
Quebec	Lawrence P. Dobby, VE2YU, 157 Sedgefield Ave., Point Claire, P.Q. H9R 1N8
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Maryland-D.C.	Karl R. Medrow, W3FA, 718 W. Central Avenue, Davidsonville 21035
Southern New Jersey	Charles E. Travers, W2YPZ, State Police Drive, Trenton 08628
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Delta Division

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Louisiana	Robert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans 70126
Mississippi	William L. Appleby, WB5DCY, 28 Linda Lane, Long Beach 39560
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Great Lakes Division

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Michigan	Allen L. Baker, W8TZZ, 4145 Eighth Street, Newport 48166
Ohio	Henry R. Greeb, W8CHT, 6580 Dry Ridge Road, Cincinnati 45247

Hudson Division

Eastern New York	Gary J. Ferdinand, WA2PJL, Sunset Trail, Clinton Corners, 12514
N.Y.C. & Long Island	John H. Smale, WB2CHY, 530 South 15th St., Lindenhurst 11757
Northern New Jersey	William S. Keller, III, WB2RKK, 27 Albright Circle, Madison 07940

Midwest Division

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Northwestern Division

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Pacific	J. P. Corrigan, KH6GQW, P. O. Box 698, Kaneohe 96744
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San Francisco	Charles K. Epps, W6OAT, 35 Belcher St., San Francisco 94114
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Roanoke Division

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Wyoming	Joseph P. Ernst, W7VB, 502 Ryan St., Thermopolis 82443

Southeastern Division

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Southwestern Division

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Orange	William L. Weise, W6CPB, 1753 Iowa St., Costa Mesa 92626
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Santa Barbara	D. Paul Gagnon, WA6DEI, 1791 Hedon Cir., Camarillo 93010

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*Official appointed to act temporarily in the absence of a regular official.

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

A New Look

For some twenty years we had, from time to time, considered the pros and cons of changing the page size of *QST*. On a couple of occasions we had gone so far as to prepare sample copies of *QST* in the new size, to test the opinions of our staff, Hq. visitors, and directors. While there were always some advantages evident, we were deterred from making the change largely because of tradition and because the disadvantages didn't seem to be sufficiently outweighed by the advantages.

But events of the past couple of years finally swung the scales in favor of a change.

First, let's go back to the beginning, when *QST* first came upon the scene. At that time the page size was chosen to be approximately 6-1/2 by 9-1/2 inches in size. Why? For the very simple reason that was the size press the local printer had. Even in subsequent years, as *QST* outgrew (in circulation) one printer and then another, the 6-1/2 by 9-1/2-size press was commonly available, and there was no compelling reason to change the page size.

In 1929 the printing of *QST* was moved to the Rumford Press in Concord, N H. Rumford was (and is) a fine printer, and they produced every issue of *QST* up through the December, 1975, issue. Let the writer, speaking not only for himself but for the several editors prior, again voice his sincere thanks to the Rumford Press for the fine work they did for all of those nearly fifty years.

But standards in the publishing field changed, and older printing equipment was replaced by new equipment which was designed for different page sizes. The printer could make adjustments in the width of the paper purchased, but with the newer presses it was necessary to throw away over an inch of trim waste on each copy of *QST*. This amounted to hundreds of pounds of waste paper per issue, but we could live with it – until the price of paper went out of sight a couple of years ago. Over a two-year span, the cost of producing an issue of *QST* increased nearly 75%, almost all of that increase caused by the higher price of paper. These increased costs helped to create a loss in ARRL operations of over $130,000 in 1974. With all of the other inflationary pressures that were also upon us, it was obvious that it was time for a change and so, this new size of *QST*.

We recognize full well that the change in size will bring inconvenience to some.

Bookshelves, carefully designed to fit the traditional size of *QST*, must now be redesigned. Our advertisers must make some adjustment. The new size will not slide so easily into a coat pocket for reading while on a bus. The magazines will not stand unsupported on a shelf so easily. And students who want to hide *QST* behind a textbook in study periods will have a little more difficulty.

On the other hand, the changes we have put into effect with this issue of *QST* are going to save a considerable amount of money – over $100,000 a year. By having gone to a "standard" size, we have been able to seek out more competitive quotes for the printing. The printer that has now been selected to print *QST* is the R. R. Donnelley Co., who for more than ten years has been printing the ARRL *Handbook* and some of our other manuals. The printing of *QST* is now being done in Glasgow, Kentucky, and so the distribution will take place from a somewhat more central point and thus, hopefully, will get to you members more expeditiously.

There are other advantages which you may find more tangible. A larger type font will make the reading much easier for all, and perhaps will even appear to make some of the more technical articles easier to comprehend. The three-column design will permit more varied and attractive layouts, thus increasing your interest in the content. We'll be able to bring you larger, clearer photographs and diagrams, which ought to make everyone happier.

Finally, we have used the occasion of this change to reappraise some of our editorial approaches, and you will find a number of new slants in this and subsequent issues. Our ultimate goal is to make every page of each issue of interest to every reader.

The original decision to change the page size of *QST* was based largely on economics. The implementation of that decision has hopefully been accomplished in a way to bring you a journal of which you can continue to be proud and which will indeed serve you better than ever.

Getting ready for this change in *QST* has been an exciting and rewarding experience for your Hq. staff – we hope you'll find the result equally rewarding.

– *W1RU*

League Lines...

The Nov. 23 EME tests on 432 from WA6LET using the 150-foot SRI dish resulted in 83 QSOs with 61 different stations, according to WB6KAP. Stations were worked in all ten U.S. call areas and 13 countries, including all continents except South America. Sometime during 1976 there'll be a repeat operation, but on 1296 MHz.

Help FCC help us, by following a couple of basic rules when writing to Gettysburg. First, use the new amateur postoffice box number, 1020. This speeds up the sorting. Secondly, use a standard No. 10 business envelope, so that your application can be folded twice the long way. Finally, when you fold that 610, be sure that you do so into three equal portions, so that the application occupies a minimum of space in the envelope and isn't so likely to be cut up by the mechanical letter openers.

When you take the test for a General Class license at an FCC examining point, if you miss the code test by only a small amount, and if you'll ask, you'll be given credit for the Technician code element, and can go on to take the written part of the exam. Upon passing that, you'll receive a Technician (G) license, and when you get your code speed up, you'll have to take only the code portion of the exam. But you have to ask.

A special events station on January 1, 1976, will sign AB6TR, and will operate from the annual Pasadena Tournament of Roses Parade, exclusively on 3985 kHz, ssb. January 1 is, of course, the first day the new "A" call signs can be used. Confused about which prefixes are what under this bicentennial arrangement? Okay, see page 135 of this issue for a special tear-out which you can keep at the operating position for the rest of 1976.

The state of Washington bicentennial sailing ship "Explorer" is in need of an amateur to operate the ship's amateur station as she sails from Washington down through the Panama Canal and up the east coast. Interested? (Oh, to be young again! -- W1RU) Contact John H. Brown, W7CKZ, Rt. 31, Box 318-A15, Olympia, WA 98502.

The Canadian mail strike fouled up both Canadian Division vice-director balloting and Canadian member renewals. The balloting problem has been solved by extending ballot-counting date for Canadians from November 20 to January 8. As for membership renewals, no Canadian member whose renewal was held up by the mail strike will have a lapse in the continuity of his membership.

Overloading in Mode B of Oscar 7 is becoming a serious problem, threatening the lifetime of the batteries, and causing cross modulation, desensing, and mode switching. If a signal is particularly loud on the 2 meter downlink, he is probably using more than the recommended 100 watts erp on the 70cm uplink. A tactful reminder to reduce power is appropriate.

We can't help noticing from correspondence and conversations with amateurs all over the country that 220 MHz repeater activity is booming. Here in the Hartford area, for example, there are five 220 MHz machines in full-time operation with two more under construction, where there was but one a year ago. The move to 220 was inevitable, given the saturation of 146 MHz in many areas, but it has been slowed by the recurring spectre of Class E CB. It may not be long before frequency coordinators encounter the same problems on 220 that they now have on two meters, but at the moment frequencies are available nearly everywhere.

President Dannals has announced the makeup of the Advisory Committees for 1976. New on the repeater committee are K4DSN, W6GO and WA7WMC. Others continuing to serve are W5NSQ (newly named as chairman), KØTVO, VE3WT, WA2GCX, K3GEG, W1GXT, W8GRG and K9LSB. The Contest Advisory Committee's newcomers are WA1KID, W2FVS, W5MYA and K6YNB who join K7NHV (chairman), W3BQV, K4BAI, K8HLR, W9LT, WAØCVS and VE7CC. W1DAL, K2BZT, W9KNI and VE3QA have been named to the DX Advisory Committee, and its new chairman is K5FVA. Others in the group are W3BWZ, K4IKR, W6NJU, W7YTN, WA8ZDF and KØHUD. No new personnel were added to the Emergency Communications Advisory Committee; its members are WB2EDT, W3PST, WA4PBG, W4IYT, K5SVD, W6INI, W7IEU, W9QBH, WØPB, VE3DV and W8ERD, the new chairman.

A Tramplifier for 432 MHz

Table-top aid to access of Oscar 7, Mode B — a quiet gray box.

By Thomas McMullen,* W1SL and Clarke Greene,** WA1JLD

Let's roll the ball on 432 MHz! If you've been putting off building a medium-power amplifier for lack of an easy design to follow, this article is for you. You don't have to be an Oscar-7 enthusiast to appreciate this design, but if you are using Oscar in Mode B (432.15-MHz input/145.95-MHz output), you may need a bit more power to do the job effectively. The Tramplifier is probably just what you've been waiting to build.

Perhaps you're interested in conventional communications modes on 432, and don't have enough power available to compete with the chaps and gals who are running up big scores in contests and states-worked totals. If this description fits you, read on! Finally, you may be a person who finds new ideas interesting, but building homemade equipment isn't your preferred pastime. Should this be your outlook in amateur radio, keep reading. There are some novel ideas presented here.

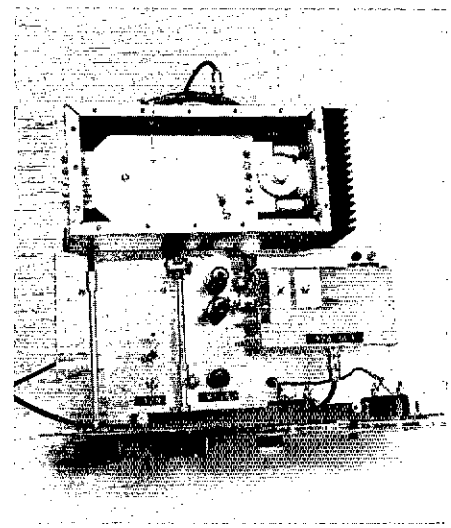
Equipment for 432 MHz varies in style, size, complexity, and ancestry. Some stations use converted uhf-fm transmitters that once saw duty in taxicabs or the like. Others have been able to build up-converters using tubes such as the 6939.[1] Others have pressed their 144-MHz equipment into service by employing an active frequency tripler.[2,3]

With most of these systems, there seems to be a plateau with an almost vertical wall between the two power levels. The simple or low-power systems needed too much antenna to reach the required radiated power for good use of the satellite, while the next step-up in power employed the 4X150/4CX250 family of tubes with the required noisy blower for cooling the anode.

A Quiet Alternative

The design criteria for a desirable amplifier were simple — a table-top conduction-cooled (quiet) unit that would deliver 100-watts output at a drive level of less than 10 watts. The table-top configuration would be more attractive to many station owners than would the old reliable rack-and-panel system of days gone by. The conduction-cooling requirement was to get away from the blower/air-hose/insulated-box problems that follow the usual external-anode design. At the 100-watt output level, some transmission-line loss could be tolerated and still allow the use of a modest antenna for satellite access.

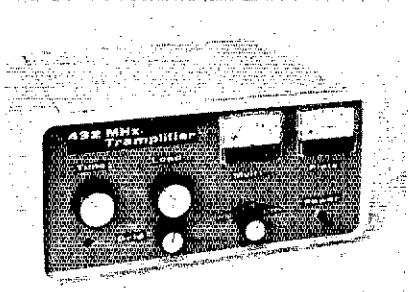
Some of the new conduction-cooled triodes seemed attractive, but drive requirements were a bit above the capabilities of many present exciters. Transistors provide an interesting approach, but linear devices at the 100-watt level are difficult to obtain; the inclusion of linear mode for ssb operation was a must. A little-known member of the 4X150 family — the 8560A, seemed ideal. In appearance it resembles a 4CX250 that didn't get the cooling fins



The amplifier chassis is mounted parallel to the front panel. A varactor-diode tripler is mounted on the subchassis, at the right. This view of the amplifier shows the ceramic insulators that provide pressure to hold the tube anode against the thermal link and the heat-sink assembly. A half-wavelength plate line occupies most of the length of the chassis, with a flapper type of tuning capacitor mounted on the left wall. The two VR tubes, center, are regulators for the screen voltage. Insulated shafts extend into the plate compartment, under the plate line, where they rotate eccentric disks to provide tuning control. Two tip jacks at the extreme right allow a cooling fan to be connected, if needed for higher power operation.

*Assistant Technical Editor, *QST*.
**ARRL Laboratory Assistant.

[1] This and all subsequent footnotes can be found at the end of the article.



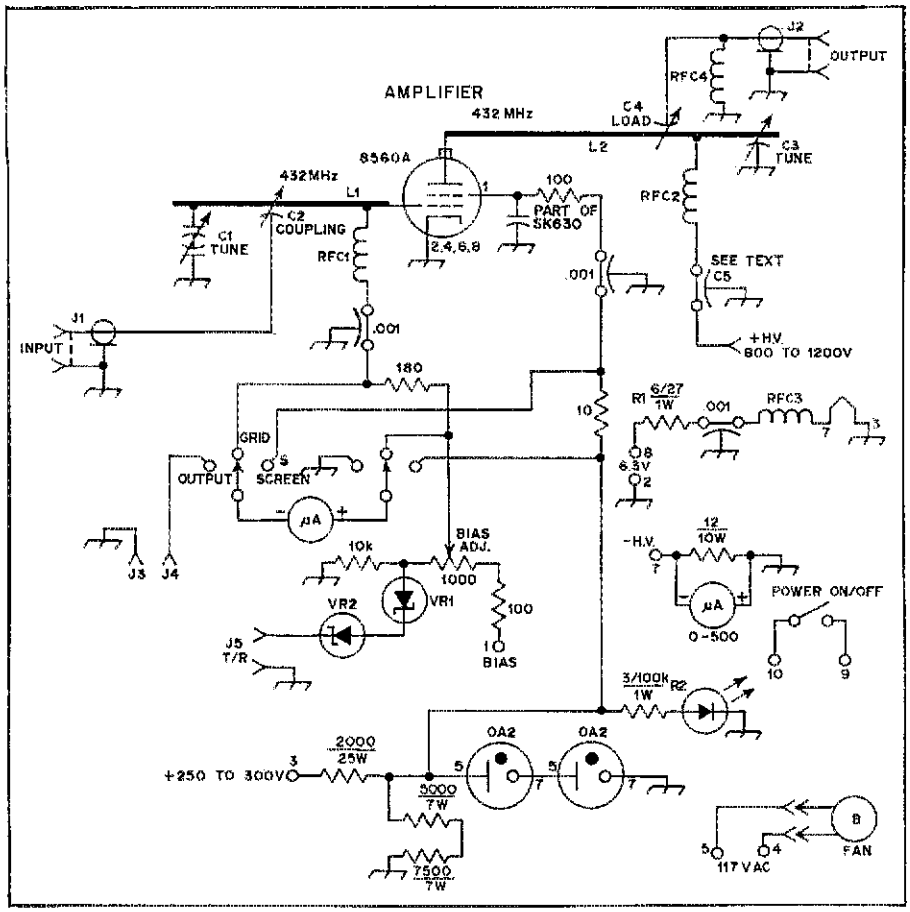


Fig. 1 — Schematic diagram of the 432-MHz amplifier.

C1 — 1.8- to 5.1-pF air variable, E. F. Johnson 160-0205-001. Mount on phenolic bracket.

C2 — 1/2-inch dia disk on center conductor of coaxial extension. See text and photograph.

C3,C4 — Spring-brass flapper type tuning capacitors. See text and Fig. 2.

C5 — 2-1/2 X 4-inch pc board, single-sided, with .01-inch thick Teflon sheet for insulation to chassis. Copper-foil side mounted toward the chassis wall.

CR1 — 1/4-inch dia LED.

J1 — BNC chassis-mount connector with threads filed to fit inside brass sleeve.

J2 — Type "N" coaxial connector.

J3,J4 — Tip jacks or binding posts.

J5 — Phono type connector. External relay contacts should be wired to short J5 for "carrier-on" condition.

J6 — High-voltage connector, James Millen 37001.

L1 — 1-3/4 X 4-inch double-sided pc board, spaced 7/8-inch from chassis.

L2 — 3-1/2 X 6-1/4-inch double-sided pc board or aluminum strip. Length from tip of line to tube center is 7-1/8 inches. See Fig. 2.

Heat Sink — Astrodyne No. 3216-0500-A0000, 5 X 5 inches. Can be painted flat black or anodized for better dissipation.

R1 — 27 ohm, 1-W resistor, 6 in parallel.

R2 — 100-kΩ 1-W resistor 3 in parallel.

attached to the anode, but rather has a solid block in place. Other than that, the characteristics of the two are almost identical. Drive requirements are low, and the tube can be cooled by clamping the anode to a heat sink through a thermal link.

Amplifier Circuitry

The amplifier draws heavily upon previous designs that utilized the air-cooled, external-anode tubes,[4,5] as shown in Fig. 1 and in the photographs. A half-wave grid line is fabricated from double-sided pc-board material. The input-coupling method departs slightly from previous examples, but only in the mechanics of adjustment. The plate line is similar to published information, with slight variations in the method of tuning.

Input coupling to the amplifier is by means of a capacitive probe to the grid line. A small tab of copper is soldered to the grid line and forms one side of the capacitor. A disk on the center conductor of a coaxial section is the movable portion of the coupling. This coaxial section is fabricated from pieces of brass tubing that will slide together, telescope fashion. A BNC chassis-mount fitting with the threads filed down is soldered into the inner, movable, piece of tubing to allow ease of connection from the exciter. A piece of copper wire and a couple of Teflon disks extend the center conductor for attachment of the capacitor plate inside the grid compartment. Once adjusted, the sliding portion is held in place by means of a small compression clamp.

The plate line is the familiar half-wavelength variety, with capacitive tuning provided by movable vanes or "flappers." In earlier versions using this tuning scheme, the flappers were moved by means of string that was allowed to wind or unwind around a shaft, providing front-panel control. After a few instances of loss of control, caused by the nylon fishing line melting or becoming untied, the writers decided that there had to be a better way. Accordingly, the cam-on-a-rod method was tried and found satisfactory. Both plate-tuning and output-coupling flappers are adjusted in this manner (Fig. 2).

Cooling It

Several tests were performed to check the effectiveness of the thermal-link/heat-sink cooling system. With the aid of Temprobes,[6] it was determined that the tube would stay within maximum temperature ratings while dissipating 100 to 200 watts of dc. A liberal coating of thermal-conducting grease was used to aid heat transfer. More on this subject later.

Early tests with only dc applied, and later ones with the full dc and rf voltages present, confirmed that at the 100-watt output level no forced-air cooling was required. At higher output levels of 175 to 200 watts, the temperatures on the anode and heat sink were still below the maximum allowed by the manufacturer, but high enough that it was felt prudent to add a quiet "whisper" fan for safety. Operational tests proved that the added background noise was not distracting to the operator.

Construction

There are several configurations possible for the package, and the constructor should feel free to mold them to fit his idea of how things should be assembled. An LMB cabinet (CO-1) was selected for an enclosure because it matches many of the "gray boxes" found in a lot of shacks. Rather than mount the heat

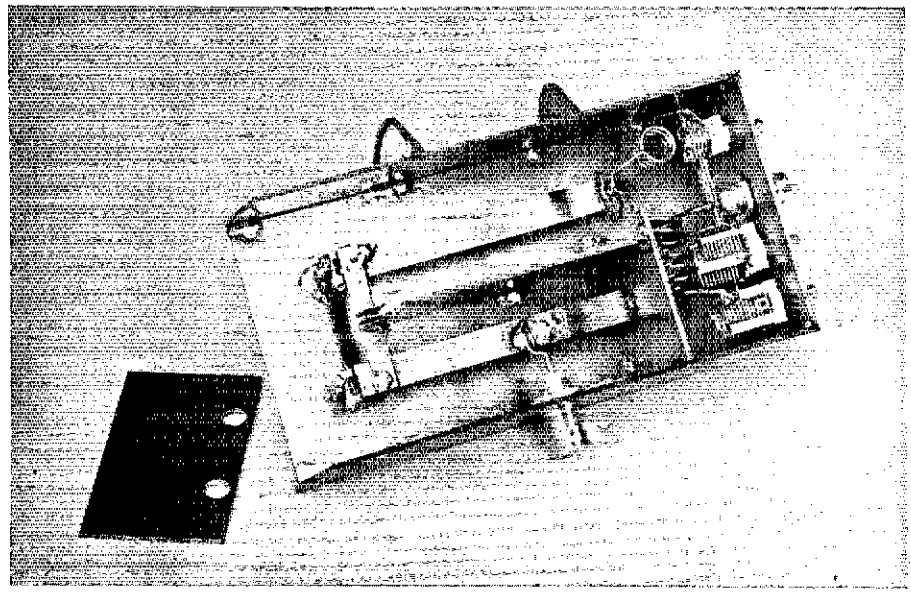
Table I
Operating Conditions

144-MHz drive power watts	*432-MHz drive power watts*	*432-MHz output power watts*
4	2	30
8	4	50
10	5	80
15	7	100
18	9	140

Ep — 1000 V.
Ip — 60 mA, zero signal.
Ip 300 mA, single tone (cw), 140 W output.

sink through an unsightly hole in the rear panel of the cabinet, it was decided to mount the amplifier parallel to the front panel. This places the heat sink inside, but there is adequate ventilation through the box to allow proper cooling. This mounting scheme also permits a fan to be mounted inside, so that there are no awkward protuberances to worry about behind the cabinet. A standard size chassis is used to fill the gap between the panel and the amplifier proper, and incidentally to provide a mounting space for peripheral electronics. As long as the parts placement within the amplifier grid and plate compartments is not changed from the design given here, it will not matter what is done externally.

The grid compartment is a 5 X 7 X 2-inch aluminum chassis with captive nuts in the bottom lip to permit securing the bottom plate. For the plate compartment a 5 X 10 X 3-inch aluminum chassis was modified to provide better mounting surfaces for the heat sink and to allow the plate-tuning flapper to be mounted on the end wall of the compartment. One end of the chassis was removed and pieces of aluminum angle stock were fastened around the open end. These pieces were drilled to accept No. 8-32 screws that thread into tapped holes in the heat sink. Tapped holes in the top surface of the heat sink and captive nuts in the top lips of the chassis permit a perforated top plate to be fastened securely for minimum rf leakage. Total dimensions are given in Fig. 2.



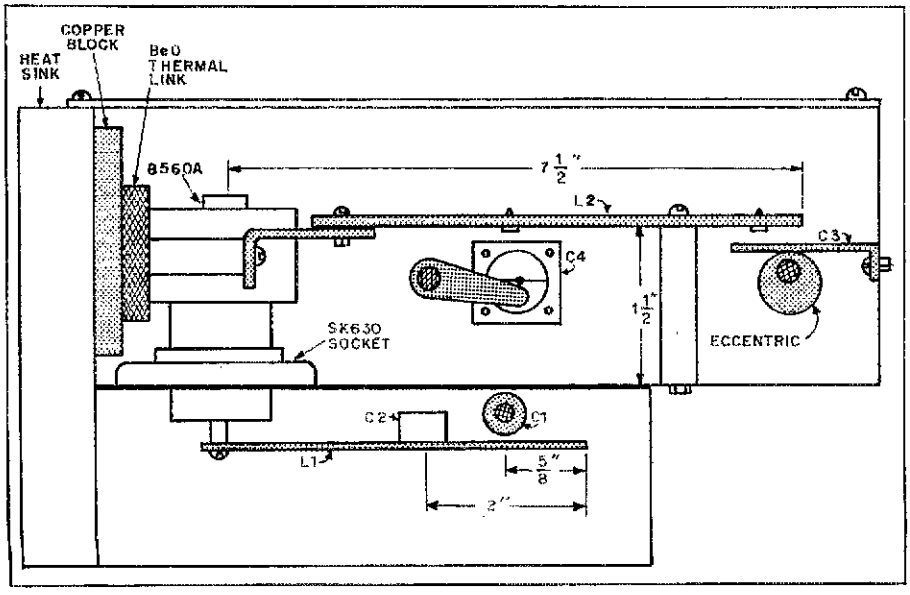
The varactor tripler is assembled in a box made from double-sided pc board. Construction of the tripler is described in Chapter 7 of the *Handbook*.

Tube Placement

An Eimac SK-630 socket and SK-1920 thermal link are used in mounting the tube and conducting the heat away from the anode. The thermal link is made of toxic beryllium oxide (BeO). The manufacturer's caution against abrasion, fractures, or disposal should be heeded. Parts placement in the anode-block area is critical if efficient heat transfer and minimum strain on the tube are to be obtained. The tube socket must have sufficient clearance in its mounting hole that some lateral movement toward or away from the heat sink is allowed. The socket is secured to the chassis with the usual toe clamps supplied. Because of the rim formed on the socket by the integral screen-bypass capacitor, a spacer is needed between the thermal link and the heat sink. A piece of copper, 1/4-inch thick and 2-3/4 X 4-1/2-inches square, serves as the spacer, as well as providing excellent heat transfer to the inner face of the heat sink. This copper spacer and the BeO thermal link are both held in place between the tube anode and the heat sink by the pressure applied by the ceramic pillars. The anode end of the plate line is bent up to form a surface that will permit screws to thread into the insulators. In the early version of the amplifier this shaped and bent piece of aluminum was only long enough to provide some mounting surface to which the plate line (double-sided pc board in this instance) was fastened by means of five No. 6-32 screws and nuts with lock washers. The photograph shows this particular scheme in the top view. A later version had the pc board replaced with an aluminum strip of the same size. A still later test was made with the anode-clamp/plate line all constructed from one piece of aluminum. No difference in plate-circuit performance could be noticed, which was the reason for the tests of different materials.

A moderate coating of thermal-conducting grease should be applied between the copper plate, the heat sink, the thermal link, and the anode block. Don't overdo it, however. In one test a glob of the material found its way down to the screen ring, and the combination of rf and dc voltages between the screen and plate caused the material to break down

Fig. 2 — Cutaway drawing from the side of the grid and plate compartments. The plate line may be made of two pieces, as shown here, or of one single piece of aluminum strip. C4 is shown from the end-on view. The arm that moves C4 and the eccentric that moves C3 are fastened to their insulated shafts by epoxy cement. Small Teflon buttons prevent accidental shorts between the capacitors and the plate line.



The Tripler

In case you haven't guessed, the tripler is responsible for the "Tr" part of the name, an appendage that was ap-

plied to the combination while W1SL had his back turned. It seemed appropriate, so no great effort was expended to remove it.

The frequency tripler, using a varactor diode, is essentially a duplicate of the one described in other ARRL publications.[7] A slight change was made to permit easier adjustment; a 1000-ohm resistor was added in series with the normal bias resistor across the diode. This permits the diode current to be monitored during the tune-up procedure. A rough approximation of correct adjustment can be obtained by tuning the input circuitry for maximum voltage across the 1000-ohm resistor, and then adjusting the idler circuit and the output circuits for a dip in this reading. These adjustments should be made with the varactor output connected to a suitable 50-ohm load; reactive loads will cause the readings to be erratic and confusing. Final adjustments should be made with the aid of SWR meters and a sensitive wavemeter or other spectral-output indicating system. Once the tripler is adjusted for proper operation into a dummy load, *dont touch it.* Further adjustments should be done at the tube grid-input circuit.

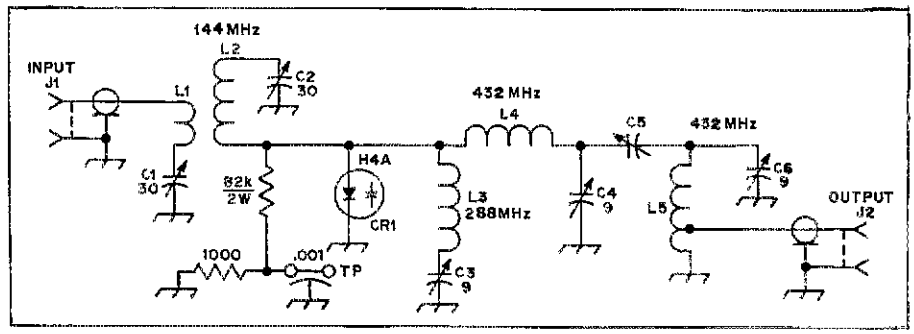
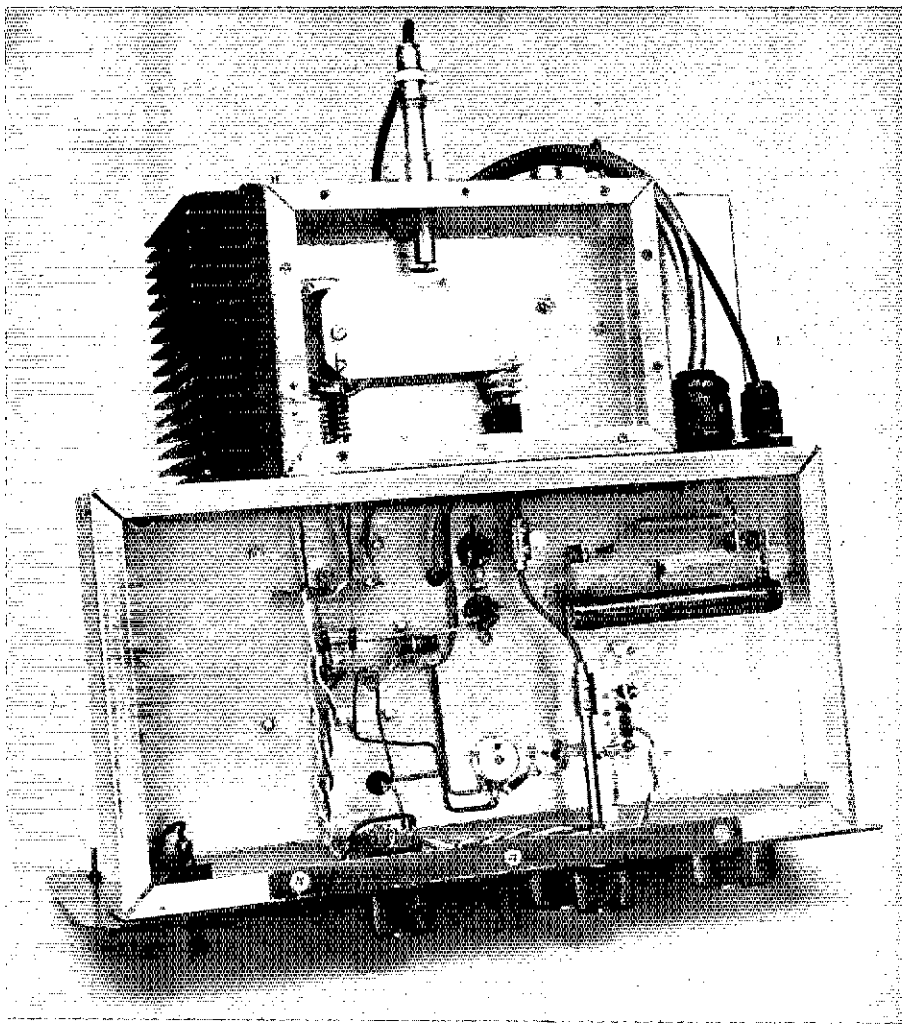


Fig. 3 — Schematic diagram of the varactor tripler. See footnote 2 and 3.

Because the tripler construction and the peripheral-electronics chassis layout were not carefully coordinated, there is a distressing lack of space to adjust the tripler input circuits while in place (as can be seen in the photograph). However, if the builder will move the location of the voltage regulator tubes an inch or two to the left, there should be no problem. The tripler is fastened to the chassis by means of spade lugs extending from the vertical members of the tripler box.

A look at the bottom of the amplifier reveals the grid compartment, top center, and the ac and dc connection cables from the power supply. A grid line is tuned by means of a butterfly type of capacitor, mounted on phenolic so that the total capacitance is reduced. A small disk on the end of a coaxial section provides capacitive input coupling to the grid circuit. The flexible coupling shown here has since been replaced by two universal-joint type of connectors, to remove some annoying backlash in the tuning control. A high-wattage dropping resistor, part of the screen supply circuitry, is shown at the right.



Power Supply

Most of the earlier testing of this unit was performed while using the Heath HP-23A to supply all voltages. The amplifier can be operated at the 80- to 100-watt output level without unduly taxing the capability of this supply. Accordingly, the wiring and plug connections were made up with this feature in mind. When a larger supply was constructed for tests at the 200-watt level, connections were made compatible with those on the Heath supply as far as practicable. When using the HP-23A, provision must be made to drop the filament potential to the nominal 6.0 V required by the 8560A heater. A voltage-dropping resistor for this purpose is located under the support chassis. Heater voltage should be measured *at the tube socket*, not at the power supply. The newer power supply, HP-23B, can be used if the series resistance added is sufficient to drop the potential from 12 to 6 V as needed by the tube.

Adjustment and Operation

Initial testing should be performed while operating the amplifier at reduced plate and screen voltages, if possible. Output coupling should be at maximum, and the input-coupling probe should be near maximum. Again, do not adjust the tripler circuits to make up for misadjustment of the amplifier. Drive power should be adjusted by increasing or decreasing the 144-MHz excitation to the tripler. An output power indicator should be used as an aid to adjustment of the amplifier. Provisions were made in the wiring to the multimeter switch to display a sample of rf energy, such as might be obtained from a directional

coupler.[8] The input-probe spacing and the grid-line tuning should be adjusted for maximum drive to the tube; this should be concurrent with minimum SWR as seen by the tripler. Move the coupling probe in small increments – the proper position will tend to be somewhat difficult to find. Output coupling and plate tuning should be adjusted for maximum output. The reason for starting with maximum coupling is that with minimum coupling and reactive loads, the amplifier could be unstable. Loading should be decreased until there is a smooth, but not sharp, dip in plate current. A reading in the vicinity of 250 to 300 mA at resonance is about right, at a plate potential of 800 V. As with most tubes in this family, maximum output is seldom achieved at minimum plate current. Use the output power as an indication of proper operation, but be sure that the screen is not abused – *small* amounts of *negative* screen current are no cause for alarm. In all cases, do not exceed the power dissipation rating of the tube element concerned.

It is not practical to operate this tube in this configuration at more than 1200-V plate potential. Tests were made at 1500 V, with disastrous results. At that dc level, with the added rf voltage, the stress across the BeO thermal link caused it to become very "unhappy." This caused it to produce frying sounds, which made the authors unhappy. The condition also caused a reduction of plate-circuit efficiency and much unwanted heating of nearby metal parts. Investigation of the phenomena showed that the high *Q* of the circuit caused the fault. Rather than do a complete redesign of the plate circuit, and because the initial goal was a 100-watt unit, the decision was made to leave well enough alone and recommend a 1200-volt limit.

Variations

It should be obvious that there are other possibilities for providing drive to the amplifier. A transmitting mixer that will provide 432-MHz output can be used in any desired mode – the bias of the amplifier can be adjusted for either Class C or linear operation. An existing exciter or low-powered transmitter at 432 MHz will also work well. See Table I for suitable drive levels.

And for those readers that have a "bargain" surplus blower that they absolutely must get some use of, the 8560-A can be exchanged with a 4X150 or 4CX250; simply replace the heat sink with a metal plate and an air fitting for the blower. Since there will be no thermal link to contend with, these tubes may be operated at higher plate voltage and higher output power. However, some slight lengthening of the plate line may be necessary to compensate for the reduced capacitance at the tube end.

Panel Lettering

One of the simpler details of a large construction project is the application of lettering to the front panel. There are many products on the market to fill this need. Hand lettering with a pen on masking tape is probably the easiest way to accomplish the task but, needless to say, lends the least professional finish. At the opposite end of the scale, one can fabricate black anodized aluminum name plates for each control, as shown in the photographs. Supplies for this process are available from Kepro, 3630 Scarlet Oak Boulevard, St. Louis, MO 63122. The materials used here cost less than $20 and there is plenty of aluminum, etching powder, and developer left over for several more projects. The process is similar to the production of pc boards. Complete step-by-step instructions are provided by Kepro and need not be repeated here. *A word of caution:* one of the materials, sodium hydroxide, should be handled with care. Prolonged contact with the skin could cause burns and, accordingly, rubber gloves are recommended.

Acknowledgements

The authors would like to thank Bill Orr, W6SAI, for aid in parts procurement, and Bob Sutherland, W6PO, for help in analyzing the "unhappiness" of the BeO thermal link.

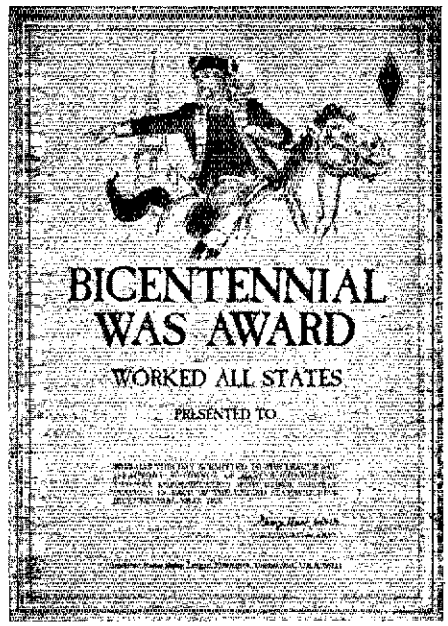
Footnotes

1. Moretti, "A Heterodyne Exciter for 432 MHz," *QST*, November, 1973, (also see Feedback, *QST*, March, 1974, page 83).
2. *Radio Amateur's Handbook*, ARRL, 52nd Edition, Chapter 7.
3. *Radio Amateur's VHF Manual* ARRL 3rd Edition, Chapter 13.
4. Knadle, "High Efficiency Parallel Kilowatt for 432 MHz," *QST*, April, 1972.
5. Knadle, "Dual-Band Stripline Amplifier-Tripler for 144 and 432 MHz," *Ham Radio*, February, 1970.
6. Temprobes® Test Kit, by Tempil®, Hamilton Blvd., South Plainfield, NJ 07080.
7. See footnote 2.
8. McMullen, "The Line Sampler," *QST*, April, 1972. Also in *FM and Repeaters for the Radio Amateur*, Chapter 10, and *The Radio Amateur's VHF Manual*, Chapter 14.

Strays

I would like to get in touch with . . .

- amateurs who are employees of Ontario Provincial Police. VE3CGU
- employees of the Fisher Scientific Co. and subsidiaries who are ham operators. K3VMS
- those interested in starting an on-the-air detective book club. WN6HND
- amateur radio operators who were former members of the Lone Scouts of America. WB2WOQ
- others wishing to join an amateur radio astronomy group recently organized. Contact Todd Ferson, East Hillcrest Dr., DesMoines, IA 50317.
- anyone interested in forming an astronomy and amateur radio net and/or club. Write Tom Frauenhofer, 170 Hilltop Rd., Rochester, NY 14616.



THE ARRL BICENTENNIAL WAS AWARD

At its January 1975 meeting, the ARRL Board of Directors authorized a special U.S. Bicentennial WAS Award for contacts made January 1-December 31, 1976.

The design is evident, with a vertical format. The actual certificate is 10 X 14 inches, with red, white and blue printing on a heavyweight tan parchment-like stock. Even if you've earned WAS previously, you're eligible for and will want to try for this one. Forms should be ready about the time this notice appears. (An s.a.s.e. will expedite yours!)

The Board included a schedule of handling charges of $2 for League members, $4 for non-members, and no charge for stations outside of Canada and the U.S. In general, standard WAS rules apply although this particular award will not be endorsed for band or mode. *CQ USA!*

A 15-Meter Goober Whistle

Huh? What's a Goober Whistle? Well, let us just say it's similar to an Arachis Hypogaea whistle. Still baffled? Read on.

By Jay Rusgrove,* WA1LNQ

Many low-power solid-state transmitter construction projects have been featured in *QST* and other amateur radio publications. Most of them are designed to operate in the lower portion of the hf spectrum and too often 10- and 15-meter enthusiasts are left to fend for themselves. This is unfortunate because 15 meters is an ideal band for low-power work because of the low atmospheric noise level. Even in periods of low solar activity the band is almost always "open" in the north/south directions and quite often in the east/west directions with transcontinental contacts commonplace. Also, it is not unusual to hear low-power stations working lots of DX. To help fill the void in information on homemade equipment that covers this band, this 15-meter transmitter was designed and built.

Design Criteria

The following design criteria are listed numerically, but are not necessarily in the order of their importance.

1) The transmitter must be VFO controlled and cover the frequency range 21.000 to 21.250 MHz. The VFO should have excellent frequency stability and sufficient buffering to assure a chirp-free signal.

2) Power input should be approximately 10 watts and the output waveform must be very clean with low harmonic content. There should be no instability anywhere in the spectrum.

3) Some means must be included to prevent the transmitter from being keyed when in the receive mode.

4) The transmitter tuning should be sufficiently broad so that retuning of the transmitter is not necessary with moderate changes in operating frequency.

5) If good frequency stability is to be achieved the VFO must run continuously during transmit and receive. Therefore, the VFO frequency must be shifted away from the operating frequency during receive periods.

6) A means of spotting the transmitter frequency should be included.

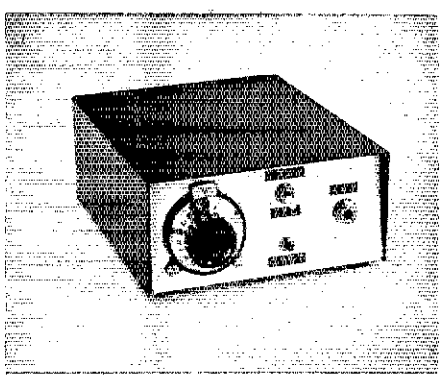
7) For simplicity's sake a break-in delay type of transmit-receive changeover system will not be used. Rather, a single switch will be used to transfer from transmit to receive.

8) Printed-circuit-board construction technique is highly desirable.

9) The package must be small in size for portability.

10) Emphasis should be placed on using easy-to-obtain parts.

* Beginner & Novice Editor, *QST*



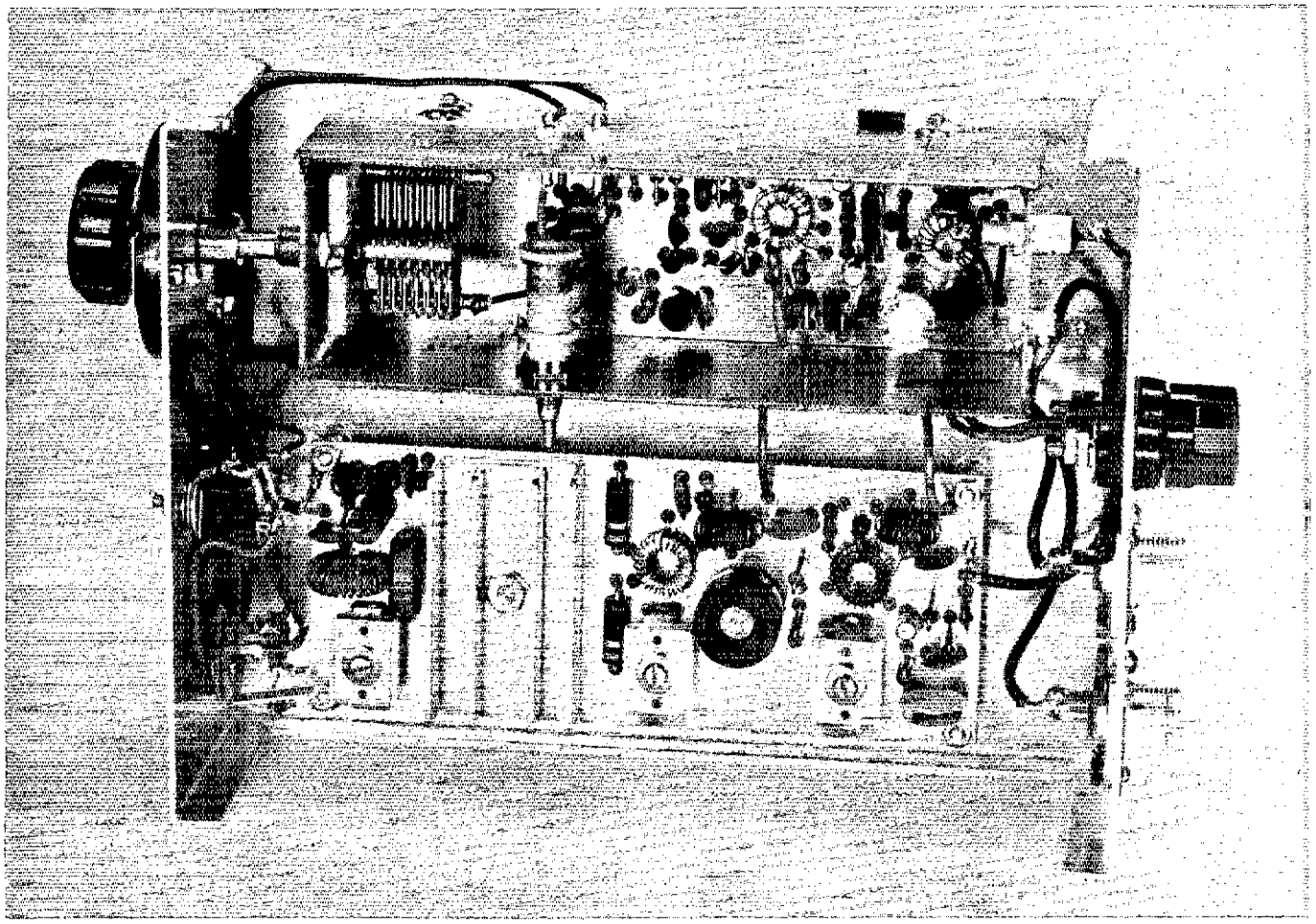
Circuit Details

With these requirements in mind, the circuit shown in Fig. 1 was developed. The VFO circuit used in this transmitter is almost identical to the one used in Part VI of "Learning to Work with Semi-conductors," *QST* for October, 1975. Several VFOs of this type have been built in the ARRL lab, and each of them exhibited excellent frequency stability. A 7-MHz model, constructed by W1CER, drifted less than 2 Hz after a short warm-up period! This circuit seemed as though it would be a good choice since our oscillator will be operating at approximately 10.5 MHz and stability can often be a problem at that high a frequency. If you are interested in a detailed description of the VFO, see the article mentioned above.

Q1 and associated components comprise a Colpitts oscillator which tunes from 10.5 to 10.625 MHz. C6 is the main tuning capacitor, and L1, an adjustable coil, is used to set the VFO on frequency at the low end of the range. C4 and C5 form an rf voltage divider which is placed across the series-tuned tank (L1 and C3). The divider-circuit component values are calculated so as to provide ample feedback to the source of Q1 to sustain oscillation. Output from Q1 is taken from the source and coupled to the gate of Q2 through a small value coupling capacitor, C8.

Q2, a JFET buffer, has a very high input impedance, making it an ideal buffer. High input impedance is desirable because oscillator loading is minimized and therefore the frequency stability of the oscillator will not be affected. C10 and L2 form the tuned primary portion of T1, which is resonant approximately in the center of the oscillator tuning range. R7 provides source bias for the buffer and C11 ensures that the bottom of L2 is at ac ground.

Q3 and Q4 form a push-push frequency doubler. The center tap of L3 is at ac ground and the remaining leads feed the bases of Q3 and Q4 with 10.5-MHz signals that are 180° out of phase with each other. In order to obtain a pure sine wave at the output of the doubler, the characteristics of Q3 and Q4 must be closely matched. Since transistor characteristics vary quite a bit, even with transistors of the same type,



Here is an inside view of the transmitter. The VFO is at the top of the picture and the transmitter strip is directly below it. The homemade heat sink for the output transistor can be seen at the left center of the transmitter board.

R10 is included in the circuit to balance the two transistors. When R10 is rotated, the bias on one transistor is decreased while at the same time the bias on the other is being increased. This adjustment serves to equalize the gains of the two transistors. C16 and L4 make up the collector tuned circuit, and L5 couples VFO energy to the remainder of the transmitter.

C2, CR1, RFC1, R1 and R2 comprise the VFO-offset circuit. During transmit, no voltage is applied to the top of R1. No current flows through CR1 and so its resistance is very high. Under this set of conditions, C2 will have virtually no effect on the oscillator frequency. During receive, +12 volts is applied to the top of R1 and current flows through CR1, lowering its resistance to some small value. The negative side of C2 is essentially at ground potential. C2 is now in parallel with C3 and a shift in oscillator frequency of approximately 100 kHz occurs. This circuit allows the VFO to run continuously and not interfere with incoming signals. S2, the spotting switch, is a normally-open push-button switch. When S2 is depressed, current no longer flows through CR1 and the oscillator is allowed to oscillate on the frequency that it will during transmit.

Q5, the pre-driver stage, operates as a Class A amplifier. R15 is a 500-ohm circuit-board potentiometer and is used to vary the bias on Q5. By varying the bias, the gain of the stage can be controlled, and thus the amount of drive applied to the succeeding stages. L6 and C22 form the tuned primary of T3. The low-impedance collector is tapped down on L6 several turns from the ground end (C23 end) of the coil. This affects an impedance match and preserves the *Q* of the tank circuit. If the collector had been connected to the junction of L6 and C22, the *Q* of the circuit would have been severely degraded.

The driver stage uses an RCA 40082 transistor which operates Class B. This stage was originally designed to operate Class C, but the drive available from Q5 was somewhat marginal. It was decided to bias the driver up to Class B operation as this would reduce the overall drive requirements and affect the efficiency only a small amount.

The output stage uses a stud-mounted npn power transistor intended primarily for vhf Class C transmitters. This device is rather rugged and has more than enough gain at hf. Class C operation is used and the efficiency is on the order of 60%. L10, L11 and C31 make up a *T* network which is used to step up the low collector impedance (approximately 13 ohms) to 50 ohms. C31 is made adjustable to compensate for small variations in load or input impedances. Dc-blocking capacitor, C32, is placed at the high-impedance (50-ohm) side of the network. Ordinary disk capacitors do not perform well in low-impedance, high-current applications. Placing the capacitor at the high-impedance end of the network helps get around this problem.

Construction

The transmitter is constructed on two double-sided circuit boards, one for the VFO and one for the transmitter strip. To help protect the VFO from stray rf currents, it is enclosed in a shielded box made from double-sided circuit board material. The box mea-

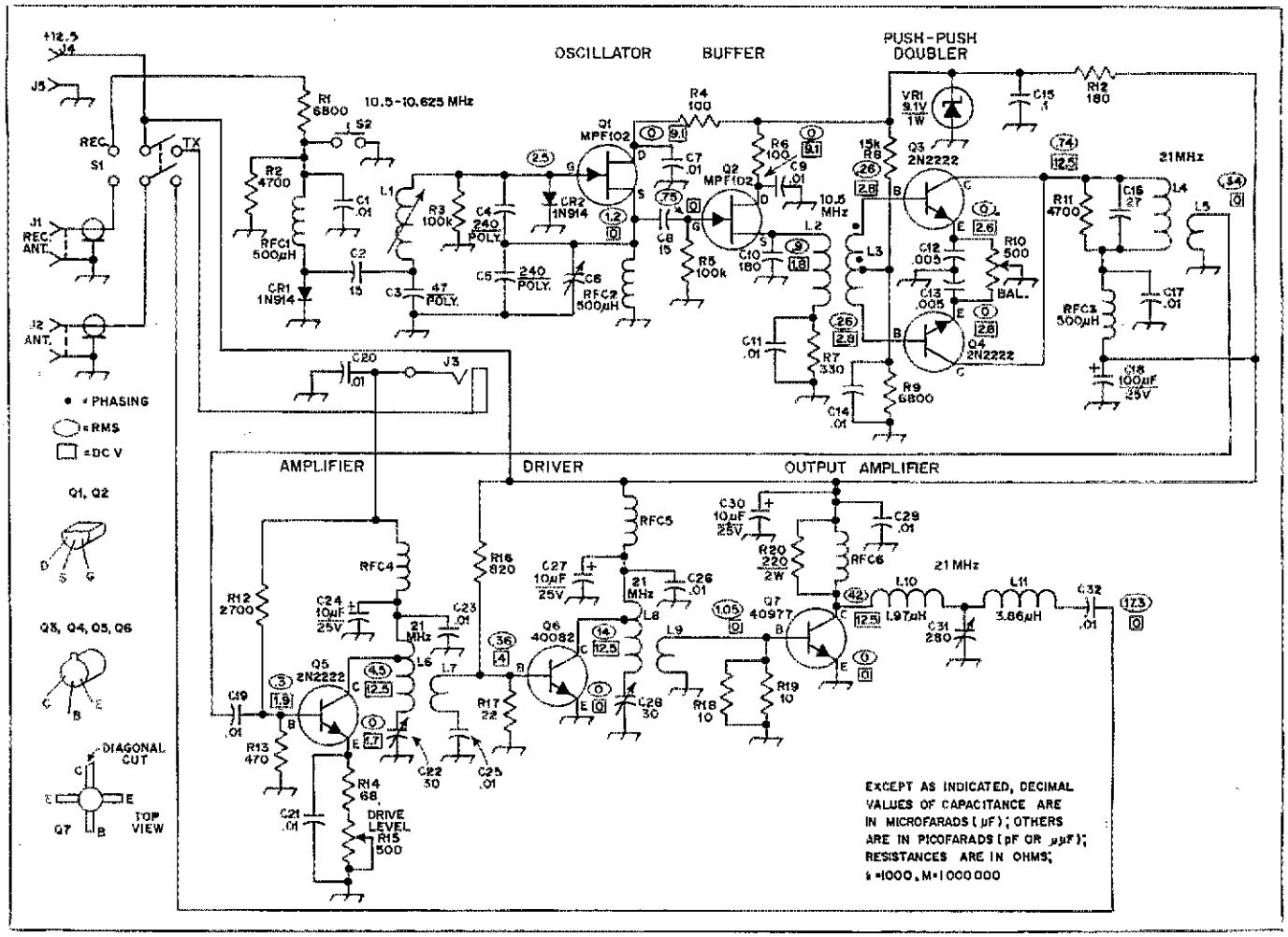


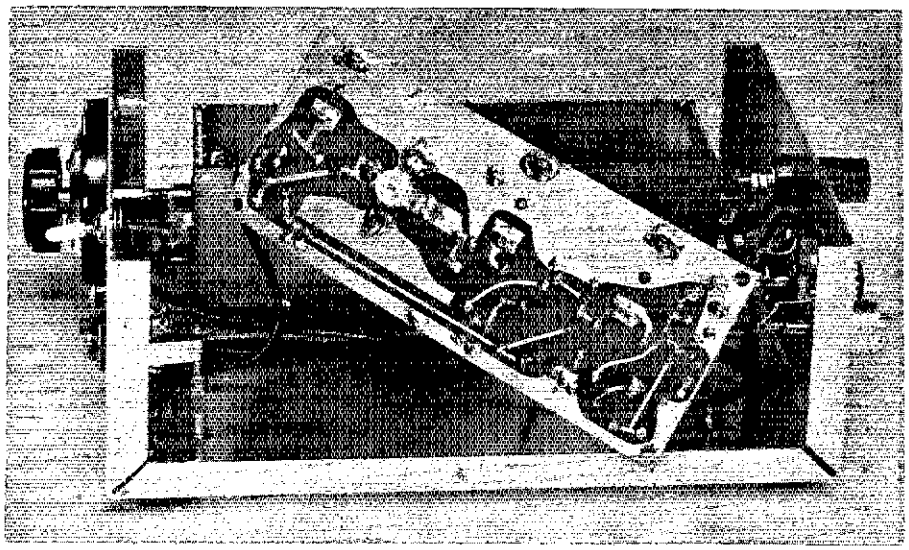
Fig. 1 — Shown here is the schematic diagram of the 15-meter transmitter. Fixed-value capacitors are disk ceramic unless specified otherwise. Fixed value resistors are 1/2-W composition unless noted otherwise. Numbered components not appearing in the parts list are identified for pc-board layout purposes only.

C3 — 47-pF polystyrene.
C4,C5 — 240-pF polystyrene.
C6 — 4- to 53.5-pF variable (Millen 22050 or equiv.).
C18 — 100-μF electrolytic, 25 volts.
C24,C27,C30 — 10-μF tantalum or electrolytic, 25 volts.
C22,C28 — 2.7- to 30-pF variable (Elmenco 461 or equiv.).
C31 — 25- to 280-pF variable (Elmenco 464 or equiv.).
CR1,CR2 — 1N914 or equiv.
J1,J2 — Coaxial connector, type SO-239.
J3 — Phone jack (Radio Shack 274-280 or equiv.).
J4,J5 — Binding post.
L1 — 6.05- to 12.5-μH adjustable coil (Miller 42A105CBI or equiv.).
L2 — 17 turns No. 28 enam. wire on Amidon T-50-6 core.
L3 — 10 turns No. 28 enam. wire, center tapped, wound over L2.
L4 — 17 turns No. 28 enam. wire on an Amidon T-50-6 core.
L5 — 5 turns No. 28 enam. wire wound over L4.
L6 — 30 turns No. 28 enam. wire on an Amidon T-50-6 core. Tap 10 turns above C23 end.
L7 — 4 turns No. 28 enam. wire wound over L6.
L8 — 30 turns No. 28 enam. wire on an Amidon T-50-6 core. Tap 7 turns above C26 end.
L9 — 3 turns No. 28 enam. wire wound over L8.
L10 — 20 turns No. 22 enam. wire on an Amidon T-68-6 core.
L11 — 29 turns No. 22 enam. wire on an Amidon T-68-6 core.
Q1,Q2 — Motorola MPF102 JFET or equiv.
Q3,Q4,Q5 — 2N2222 transistor.
Q6 — RCA 40082 transistor.
Q7 — RCA 40977 transistor.
RFC1,RFC2,RFC3 — 500-μH rf choke (Millen J-302-500 or equiv.).
RFC4 — 16 turns No. 28 enam. wire on an Amidon FT-50-61 core.
RFC5 — 11 turns No. 22 enam. wire on an Amidon FT-50-61 core.
RFC6 — 6 turns No. 22 enam. wire on an Amidon FT-50-61 core.
S1 — Dpdt miniature toggle switch.
S2 — Spst momentary-contact push-button switch.
VR1 — Zener diode, 9.1 volt, 1 watt.

sures 2 X 6 X 2 inches, and wherever two of the panels meet, they are soldered together along the entire length of the seam. The VFO circuit board is soldered into the box near the bottom. C6, the main tuning capacitor, is attached to the front of the box and L1 is attached to the side. At the rear, the dc lead is brought out through a .001-μF feedthrough capacitor and the VFO output through a Teflon feedthrough terminal. See the photograph. The two feedthrough terminals directly below L1 are for the spot switch and VFO offset function.

The transmitter board is shown above the VFO in the photograph. Both the driver and output stage require heat sinks. A Thermalloy 2215B heat sink is used for the 40082 driver although any heat sink that will fit the TO-39 case may be used. The 40977 output transistor is mounted with the leads on the foil side of the board, thereby simplifying connection to the circuit-board foil. The stud protrudes through the circuit board, and a homemade heat sink is attached to it on the component side of the board. A suitable heat sink consists of two U-shaped pieces of 1/16-inch aluminum sheet.

The entire transmitter, excluding power supply, is housed in an aluminum homemade enclosure that measures 6 X 8 X 2-1/2 inches. Mounted on the rear panel are the antenna and receiver antenna output receptacles, along with two binding posts for connection to the power supply. The front panel supports



This photograph shows how the output transistor is mounted to the circuit board. The three holes along the top of the circuit board are clearance holes for the variable capacitor adjusting screws.

the vernier dial mechanism, key jack, transmit-receive switch and spot switch. Since +12 volts is present on both the tip and ring connections of the key jack, it must be isolated from ground. This can be accomplished by drilling the hole for the jack slightly oversize and using fiber washers on each side of the panel.

Tune-Up

Connect a 12-volt power supply capable of delivering 1.3 amperes to the power supply terminals on the rear apron. Attach a 50-ohm dummy load to the antenna receptacle and insert a key into J3. The VFO must be adjusted first. Set the main tuning capacitor so that its plates are fully meshed and set the drive control, R5, to the minimum drive position (tab on control toward the edge of the circuit board). Place the transmit-receive switch in the transmit position. While listening to the station receiver, set to approximately 20.998 MHz, adjust L1 to bring the VFO on frequency.

For the following adjustment, a general-coverage receiver, dip meter, or oscilloscope may be used. Set the VFO on the transmitter to 21.000 MHz. Insert one end of a wire into the receiver antenna jack and place the other end near L4 in the VFO. Tune the receiver to 10.5 MHz and adjust the balancing resistor, R10, for minimum signal strength. If a receiver that covers this frequency is not available, a dip meter may be used in its place. With the dip meter in the detector mode and its coil coupled to L4, tune the dip meter to 10.5 MHz. Adjust R10 for a minimum reading. If an oscilloscope is available, it may be connected across the output of the VFO. R10 should then be adjusted for the purest sine-wave curve. This completes the VFO alignment.

A VTVM or FET voltmeter with rf probe can be used for the alignment of the transmitter strip. Connect the rf probe across the dummy load. Key the transmitter and advance the drive control to the 3/4 full-drive position. Adjust C22, C28 and C31 for maximum output. As an alternative to the VTVM or FET voltmeter, an SWR indicator or wattmeter may be used. The device should be placed in the line between the transmitter and the dummy load. C22, C28 and C31 are adjusted to provide maximum output, and R15 is adjusted for a 6-watt reading.

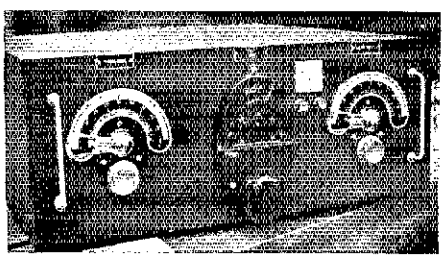
Additional Comments

Circuit board templates and part layout diagrams are available from ARRL for $1.25. Included with the templates is a list of suppliers for all parts in this project other than fixed value capacitors and resistors. Spectral analysis of the transmitted signal shows the second harmonic to be 45 dB down from the main signal and the third harmonic down by 55 dB. On-the-air contacts and measurements made in the ARRL lab indicate that the transmitter is clean and chirp free. Build a Goober Whistle and have a ball! QST

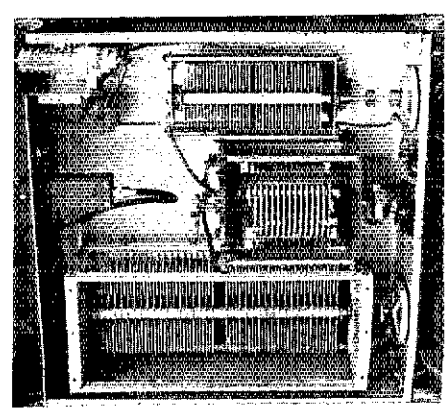
Strays

ULTIMATE ULTIMATE TRANSMATCH?

□ Look out W1ICP, you're being upstaged in Transmatch construction! The photographs show a slick version of the Ultimate Transmatch, built to high-power, battleship specifications by Barry Boothe, W9UCW – former *QST* Cover Plaque winner for his "Minooka Special" 160-meter antenna article. His unit operates from 160 through 10 meters, and in his words is "capable of high power transfer." The assembly measures 25 X 25 X 9-1/2 inches, and is enclosed in a case made from 1/8-inch heat-treated aluminum. Black crackle paint was used as a finish material.



The split-stator capacitor is 800-pF per section, and the output series-leg capacitor is a 500-pF unit. His roller inductor is 9 inches in diameter and has 1/8 X 3/16-inch copper for the conductor stock. Barry claims he can match his 50-ohm rig to a coat hanger, but laments because the Transmatch "just ain't portable enuff." Say, does anyone know what power level is used out there in the Great Lakes region on 160? Looks like Barry's matcher can handle all that the law allows! – *W1CER*



Simple Broadband Matching Networks

This article gives complete details on constructing broadband matching transformers for ratios of 4:1, 6:1, 9:1 and 16:1.

By Jerry Sevick,* W2FMI

Jerry Sevick, W2FMI, is director of Technical Relations at Bell Labs. A long-time ham, he joined Bell Labs in 1956 and until recently was engaged in the development of high-frequency transistors and integrated circuits. Prior to that, he taught physics at Wayne State University in Detroit. W2FMI received his Ph.D. in Applied Physics from Harvard University in 1952. His doctorate thesis was "The Backscattering Cross-Section of Coupled Antennas." Any of you that have had the opportunity of hearing Sevick speak on short verticals also knows that he is a dynamic speaker. We once asked him how he learned to charm an audience and discovered that he was a weather man on TV while working his way through school. That's not all -- Jerry's charming wife was our cover gal on March 1973 QST. Look it up!

Are you looking for a physically small DX antenna? To obtain low-angle radiation on 80 and 160 meters, many amateurs use vertical antennas. Horizontal antennas would have to be at elevations of a half-wavelength or greater to be comparable. Suitable supporting structures are beyond the reach of most amateurs at these lower-frequency bands. Quarter-wavelength verticals require some 60 feet on 80 meters and 120 feet on 160 meters -- still very tall structures! However, short verticals over a good image plane have been shown theoretically[1] and experimentally[2] to perform practically as well a their full-size quarter-wavelength counterparts. The only problems are very low input impedances and narrower bandwidths.

This paper describes broadband matching networks which can efficiently match 50-ohm coaxial cable to verticals as short as 1/25 wavelength. Also included is information on short vertical antenna designs incorporating large top hats in order to improve bandwidth, such as a very short 40-meter vertical and a dual-band 80- and 160-meter short vertical with remote switching. In addition, loading coils using powdered-iron toroidal cores are discussed.

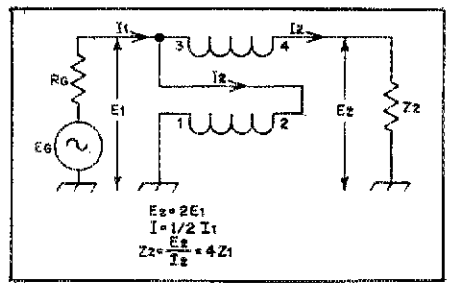


Fig. 1 — Four-to-one broadband bifilar transformer. Upper winding can be tapped at appropriate points to obtain other ratios such as 1.5:1, 2:1, and 3:1.

Connie, W2FMI's better half, is making use of the shade under Jerry's 40-meter umbrella antenna. It is hoped that Jerry warns her about touching the antenna when he is running high power!

* Bell Laboratories, 600 Mountain Ave., Murray Hill, NJ 07974.

[1] This and all subsequent footnotes can be found at the end of the article.

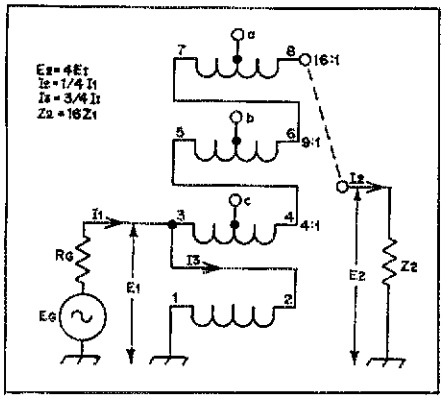


Fig. 2 — Four-winding, broadband, variable impedance transformer. Connections a, b, and c can be placed at appropriate points to yield various ratios from 1.5:1 to 16:1.

Broadband Matching Transformers

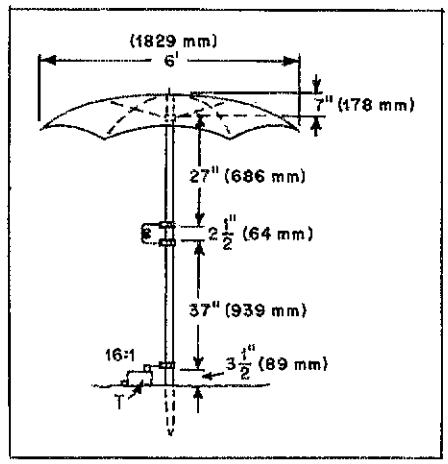
Broadband transformers have been widely used because of their inherent bandwidth ratios (as high as 20,000:1) from a few tens of kilohertz to over a thousand megahertz. This is possible because of the transmission-line nature of the windings. The interwinding capacitance is a component of the characteristic impedance and therefore, unlike the conventional transformer, forms no resonances which seriously limit the bandwidth.[3] At low frequencies, where interwinding capacitances can be neglected, these transformers are similar in operation to the conventional transformer. The main difference (and a very important one from a power standpoint) is that the windings tend to cancel out the induced flux in the core. Thus, high-permeability ferrite cores, which are not only highly nonlinear but also suffer serious damage even at flux levels as low as 200 to 500 gauss, can be used. This greatly extends the low-frequency range of performance. Since higher permeability also permits fewer turns at the lower frequencies, high-frequency performance is also improved since the upper cutoff is determined mainly from transmission-line considerations. At the high-frequency cutoff, the effect of the core is negligible.

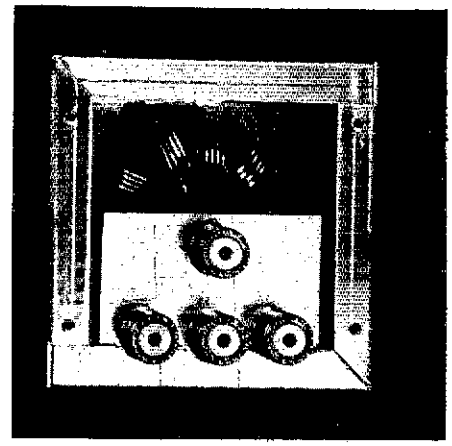
The applications of broadband transformers to antennas and broadband circuits have been covered by a number of authors.[4,5] This paper extends the application of these transformers to include the operation of short ground-mounted vertical antennas with impedances as low as 3 to 4 ohms. Further design considerations illustrate variable matches to vertical antennas having impedances even greater than 35 ohms.

Bifilar matching transformers for ground-mounted verticals lend themselves to unbalanced operation. That is, both input and output terminals can have a common ground connection. This eliminates the third magnetizing winding required in balanced-to-unbalanced (balun) operation. By adding third and fourth windings, as well as tapping windings at appropriate points, various combinations of broadband matching can be obtained. Fig. 1 shows a 4:1 unbalanced-to-unbalanced configuration. This transformer can be used with verticals of 12.5 or 200 ohms when using 50-ohm cable. No. 14 wire can be used and it will easily handle 1000 watts of power. By tapping at points 1/4, 1/2 and 3/4 of the way along the top winding, ratios of approximately 1.5:1, 2:1, and 3:1 can also be obtained. It should be noted that one of the wires was covered with vinyl electrical tape in order to prevent voltage breakdown between the windings. This was necessary when a step-up ratio was used at high power to match antennas with impedances greater than 50 ohms.

Fig. 2 shows a transformer with four windings, permitting wide-band matching ratios as high as 16:1. A picture shows a four-winding transformer with taps at 4:1, 6:1, 9:1, and 16:1. In tracing the current flow in the windings when using the 16:1 tap, one sees that the top three windings carry the same current. The bottom winding, in order to maintain the proper potentials, sustains a current three times greater. The bottom current cancels out the core flux due to the other three windings. If this transformer is used to match into low impedances, like 3 to 4 ohms, the current in the bottom winding can be as high as 15 amperes if the high side of the transformer is fed with 50-ohm cable handling a kilowatt of power. If one needs a 16:1 match like this at high power, then cascading two 4:1 transformers is recommended. In this case, the transformer at the lowest impedance side only requires each winding to handle 7.5 A. Thus even No. 14 wire would suffice in this application.

Fig. 3 — Final design and bandwidth characteristic of a short 40-meter vertical having an input impedance of 3.5 ohms and utilizing a commercial beach umbrella. This antenna established its worth as a prototype for the lower frequencies.





A 4-winding, wideband transformer (with front cover removed) with connections made for matching ratios of 4:1, 6:1, 9:1, and 16:1. The 6:1 ratio is the top coaxial connector and, from left to right, 16:1, 9:1, and 4:1 are the others. There are 10 (quadfilar) turns of No. 14 enameled wire on a *Q1*, 2.5 inch OD ferrite core.

The popular cores used in these applications are 2.5 inch OD ferrites[6] of *Q1* and *Q2* material and powdered iron cores,[7] of 2-inch OD. The permeabilities of these cores, μ, are nominally 125, 40 and 10, respectively. Powdered iron cores of permeabilities 8 and 25 are also available.

In all cases these cores can be made to operate over the 10- to 160-meter bands with full power capability and very low loss. The main difference in their design is that lower permeability cores require more turns at the lower frequencies. For example, *Q1* material required 10 turns to cover the 160-meter band, *Q2* required 12 turns, and powdered iron (μ = 10) required 14 turns. Since the more common powdered-iron core is generally smaller in diameter and requires more turns because of lower permeability, higher ratios are sometimes difficult to obtain because of physical limitations. Although most of the author's experimentation on these transformers was done on the 40-, 80- and 160-meter bands, the results indicated that they should operate on the higher bands equally well. When working with low impedance levels, unwanted parasitic inductances come into play, particularly on 14 MHz and above. In this case lead lengths should be kept to a minimum.

All the results obtained by the author have shown that the transformers can be used to match a variety of loads and impedance ratios, they can be used over many bands, and that they exhibit

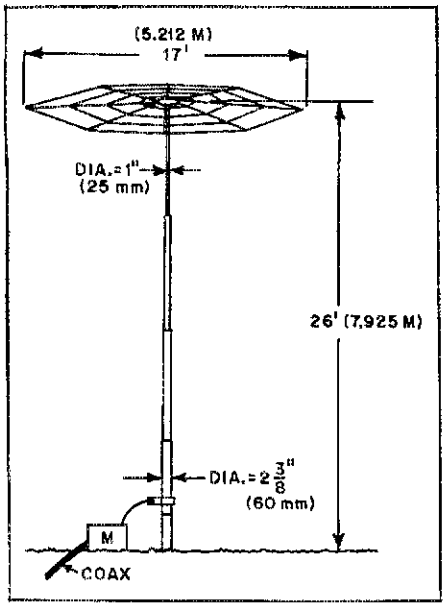


Fig 4 — The 80- and 160-meter dual-band vertical system. The remotely switched matching network is described in the text. Not shown are three sets of polypropylene guy ropes at heights of about 9, 18 and 26 feet.

negligible loss in operation. More importantly, the core materials are readily available and low in cost.

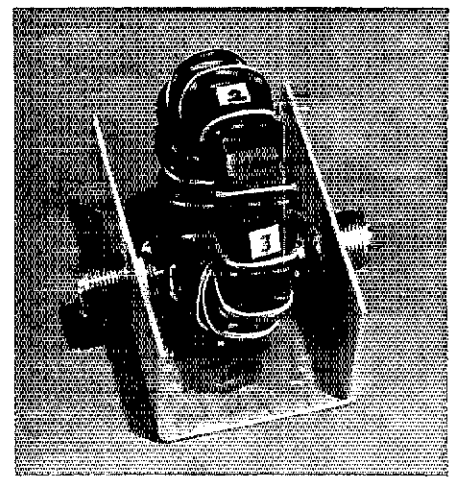
A Short Vertical Antenna Design

These transformers permit efficient matching to impedances as low as 3 to 4 ohms. This means, with some top-hat loading, antennas could be 4 to 5 feet tall on 40, 8 to 10 feet on 80, and 16 to 20 feet on 160 meters. With the capability of tapping off any portion of the transformer windings, thus providing variable matching, the heights of these antennas can be increased at will depending upon the bandwidth desired.

The first short vertical designed by the author was brought about by a trip to a local shopping center. The author saw a beach umbrella that had about the right proportions one would use in designing a short 40-meter vertical. The "antenna" was purchased (at a nominal price) and a 14-turn coil, connected across an insulated section about three feet from the ground, was used to tune the vertical to resonance. The measured input impedance was 3-1/2 ohms and was matched easily to 50-Ω line with a 16:1 transformer. Fig. 3 shows the final design and the bandwidth characteristic. Several months of operation on 40 meters verified the outstanding capability of this short vertical antenna (with an extensive radial system) and established its worth as a prototype for the lower frequencies. A further study showed that the 6-foot diameter top-section was about the equivalent of a 4-1/2-foot-diameter solid disk.

A Dual-Band 160- and 80-Meter System

The antenna shown in Fig. 4 is a dual-band design using a remotely switched matching network (see photograph) which not only changed a tap on a broadband transformer from 4:1 to 9:1, but also introduced a powdered-iron base-loading coil for 160-meter operation.



The broadband bifilar transformer shown has 12 bifilar turns, No. 14 wire, on a ferrite (*Q1* material, 2.5 inch OD) core. Taps are also placed at 3, 6, and 9 turns, thus yielding ratios of 1.5:1, 2:1, 3:1 and 4:1. This transformer has a connection at the 1.5:1 ratio tap. Extra insulation was provided for the enameled wire in order to prevent voltage breakdown when matching into loads greater than 50 ohms.

The circuit diagram for the remote matching network is shown in Fig. 5. The loading coil was made with four powdered-iron (μ = 10, 2-inch OD) cores. They were first wrapped individually with several layers of vinyl electrical tape before being combined and wrapped again. The necessary inductance was obtained with 22-1/2 turns. A slight adjustment of the loading coil and the height of the antenna was found necessary in order to put the minimum SWR at 1812 kHz. In general, a 1-foot change in height of the antenna changes the 80-meter resonance by 60 kHz and the 160-meter resonance by 15 kHz. A change of 1/2 turn on the powdered-iron core coil changes the 160-meter resonance by about 50 kHz. It should be noted that the windings had extra insu-

Bottom view of the matching network for the dual-band 80- and 160-meter vertical. The loading coil is on the right and the trifilar 4:1 and 9:1 matching transformer on the left. The dpdt 24-volt antenna relay switches in or out the loading coil and changes the taps on the transformer to the appropriate ratio. The enclosure is the conventional 4 X 5 X 6-inch aluminum Minibox.

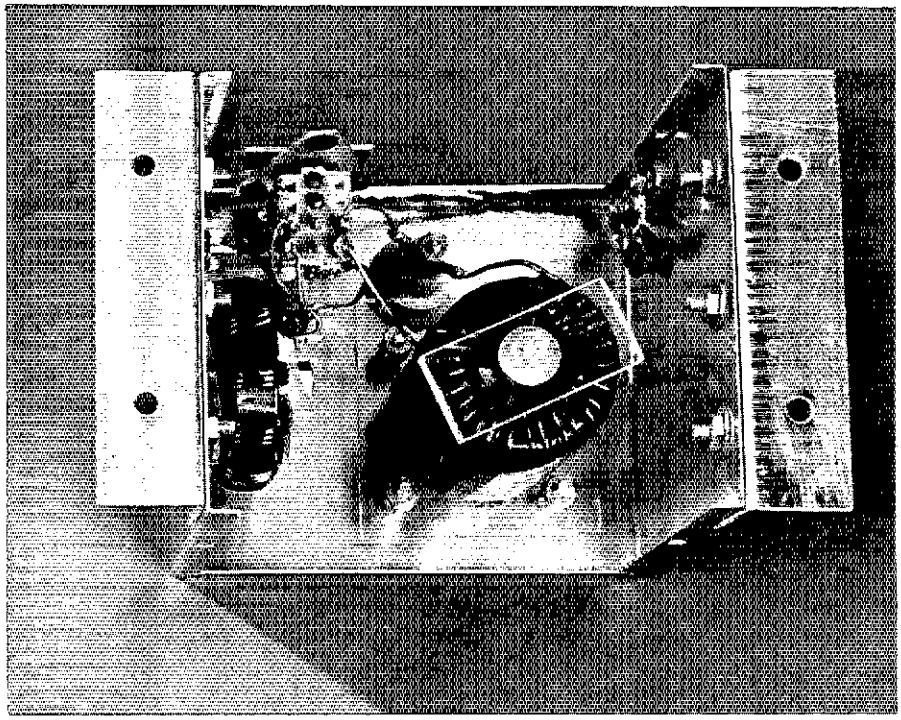
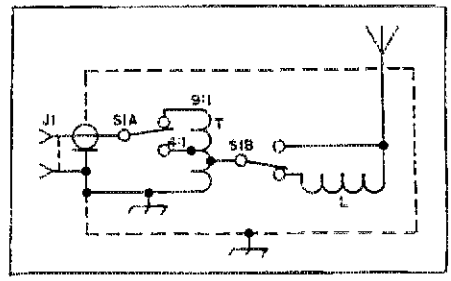


Fig. 5 — The remotely switched matching network for the 80- and 160-meter dual-band vertical antenna. The indicated switch positions are for 160-meter operation.

S1 — Dpdt antenna relay.
J1 — Coaxial connector, chassis type.
L — Load coil for 160 meters, 22-1/2 turns, No. 14 wire on 4 cores of 2-inch OD powdered-iron, permeability of 10 (Amidon T-200-2).
T — Broadband transformer (see text).



lation (about one layer of vinyl tape) added on the inside part of the windings in order to prevent breakdown between them.

Low-permeability ferrite material *Q2* (μ = 40, but still 4 times larger than the powdered-iron material) was also investigated for use as a core for a 160-meter loading inductance. It was hoped that with several stacked cores of this material, the flux density would be reduced to a level where nonlinearities and permanent damage could be avoided. Two cores and about 10 turns of wire were used. The result was negative. Large changes in inductance were noted on voice peaks by the sudden large changes in the SWR. Also, small but permanent changes in the SWR were observed, indicating permanent damage. In contrast to ferrite, powdered iron maintains its linearity at high flux densities and suffers no permanent damage. As noted above, four cores of permeability 10, and 22-1/2 turns, provided the proper inductance (approx. 30 μH). The loss in this coil was about equal to the air-wound coil (33 turns, 6 tpi, No. 12 wire, 2-1/2-inch OD). Two stacked powdered-iron cores of permeability 25 were also investigated. This arrangement required about 17 turns, but was rejected because the loss, which was mainly in the two cores, went up to 3 ohms. This is certainly intolerable since it is of the order of magnitude of the radiation resistance of the very short vertical.

Concluding Remarks

The predominant characteristic of the short antenna is probably its very low value of radiation resistance. One must be careful of excessive ground and ohmic losses in coils and matching networks. A good image plane can eliminate the ground-loss factor. The application of a top hat eases the problem somewhat because it increases the effective length and thus the radiation resistance. The radiation resistance can be increased five-fold[8] by resorting to complete top-hat loading of a vertical. Combinations of top-hat and inductive loading can be used depending upon the radiator height and the bandwidth desired. One can also resort to a short folded unipole. With these combinations at his disposal, the designer is left with the problem of efficiently matching his transmission line to various impedance levels. The wide-band transmission-line transformer can provide the answer. It is capable of operating very efficiently over a wide range of impedances and impedance ratios.

I would like to acknowledge the generosity of the following companies who supplied cores and information for my experiments: Indiana General Corp., Amidon Associates, and the Arnold Engineering Co.

Finally, I want to thank my colleague, Mort Fagen, WA2EIT, for his encouragement and discussions of the antenna papers the author has written.

Footnotes

1 King *The Theory of Linear Antennas*, p. 184, Harvard Univ. Press, Cambridge, MA, 1956.
2 Sevick, "The W2FMI Ground-Mounted Short Vertical," *QST* March, 1973.
3 Ruthroff, "Some Broad-Band Transformers," *Proc. IRE*, Vol. 47, p. 137, Aug. 1959.
4 Turrin, "Application of Broadband Balun Transformers," *QST* April, 1969.
5 Krauss and Allen, "Designing Toroidal Transformers to Optimize Wideband Performance," *Electronics*, Aug. 16, 1973.
6 Indiana General Corp., Electronics Div., Keasby, NJ 08832.
7 Amidon Associates, 12033 Otsego Street, No. Hollywood, CA 91607; The Arnold Engineering Co., Marengo, IL.
8 See reference 2.

50 Years Ago

January, 1926

□ Another Hoover conference, informally setting national radio regulations, has rejected pressure from domestic broadcasters and retained the 160-meter band for amateurs. Maxim, Stewart and Warner represented the League.

□ ARRL Traffic Manager Fred Schnell reports in detail on his several months' tour demonstrating short-waves to the Navy. The Chief of Naval Operations says, "largely through his efforts, high-frequency radio is now definitely in the Navy, both ashore and afloat."

□ Crystal control is the system of the future, and two practical rigs are described, along with warning against overload. The crystals are an inch or so square, and get warm in operation — using a 210 oscillator to drive a 204-A, what else?

□ Lou Hatry says the reflex circuit doesn't merit the recent brickbats it has received; improved audio transformers and capacitor by-passing of the secondary seem to take off the curses.

□ The editor announces a campaign to interest more people in amateur radio, and among other things the Hq. is "preparing an A.R.R.L. Handbook . . ."

□ 6CNC and other west coasters are experimenting below 1 meter, with 201A tubes and half-turn inductances, and achieving some success.

□ The first all-Canadian convention in Montreal was a big affair, featuring a report by Schnell on the NRRL expedition.

□ The national table of frequency allocations, in 1976 a volume in itself, is a simple listing of six column inches.

25 Years Ago

January, 1951

□ Bandpass coupling allows W1FTX to have but one control on a four-band 40-watt rig. It's TVI-treated, of course.

□ Every manufactured receiver is a compromise in some way, says W1DX, mostly because a broad variety of customers can't agree on what *they* want. Custom-building your own is the only answer, and descriptions of three homemade beauties are offered as proof — by W8DX, W3FYS and W6MX.

□ W1LOP describes a wide-range test oscillator, 50 cycles to 500 kc., in one compact unit. The circuit is based on work done by W3HFW at BuStans.

□ Another useful measurement device is a field-strength meter by W1DX, with an r.f. stage so you can use it a half-mile or more from the antenna.

□ Big-time contests are on the schedule for early 1951 — V.h.f. sweepstakes in January, and the DX competition in February-March.

□ "Why-How-When" are questions W1HDQ answers for the ham interested in trying v.h.f. for the first time; it's part of the continuing operating series.

□ W6KW is among those elected to the ARRL Board of Directors in the division balloting, actually for his second term.

□ Sideband should get impetus from a new s.s.b. suppressed-carrier transmitter just brought on the market by Eldico.

□ The editor says the FCC license total should hit 100,000 soon. — *W1RW*

An Accu-Keyer for QRP$_p$ Operation

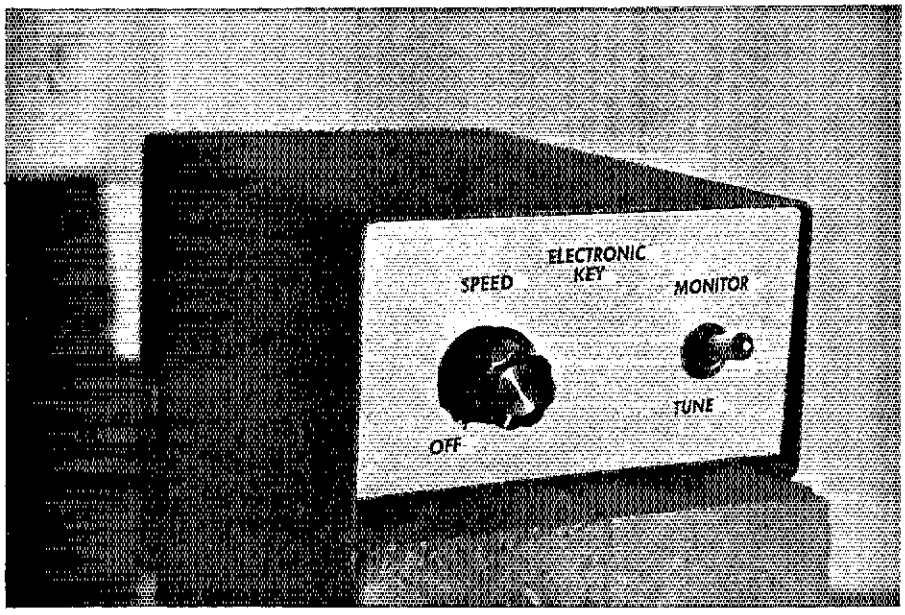
CMOS integrated circuits offer the QRPp operator a means for having such conveniences as this adaptation of the WB4VVF Accu-Keyer.

By Gene Hinkle,* WA5KPG

When WB4VVF first described his Accu-Keyer in August, 1973, it seemed that this was the ultimate in keyer design.[1] The Accu-Keyer is an electronic keyer incorporating dot and dash memories and, available at the flick of a switch, automatic word spacing. What possible improvement could be made to a keyer that has been constructed by literally thousands of builders? Probably the only drawback of the design is the use of power-consuming TTL digital integrated circuits which are not compatible with QRPp operation. However with the proper part substitutions, a keyer can be built which only consumes 25 microwatts during standby! The secret to the new design is to use CMOS integrated circuits in place of the TTL circuits. CMOS circuits are inherently low power-drain devices and are now appearing on the surplus market at a price within the reach of most amateurs. CMOS ICs which have direct pin-for-pin compatibility with the TTL circuits allow the use of the printed circuit board offered.[2] The clock generator circuit is redesigned so that it has a very low standby current consumption. Fig. 1 shows the new values used in the clock circuit. Note that the number of parts and their placement are the same as those used in the original design. Thus, the original printed circuit board does not have to be modified to incorporate this design. The clock generator is the major power consumer during standby. This circuit only requires a few microamperes. The exact power consumption will vary as a function of the setting of the speed adjustment potentiometer R7.

*1109 Rutland, No. 270, Austin, TX 78758.

[1] Garrett, "The WB4VVF Accu-Keyer," *QST*, August, 1973.



The original Accu-Keyer circuit board left several pins floating (open circuited) on several chips. Pin 4 of U4 should be connected to pin 14, U4. Likewise, pin 4 of U5 should be connected to pin 14, U5. This is because CMOS *must* have all input pins terminated with either a *1* or *0* logic level. Otherwise, the CMOS's open inputs will cause the device to behave in a linear mode, causing high power consumption and erratic operation. The following pins should be terminated with a 10-kΩ resistor to pin 14 of any IC: (1) the dot input, (2) the dash input, (3) the automatic-space input, and (4) the tune input. These four resistors should be placed on the back of the printed circuit board and soldered directly to the pin tabs.

[2] Predrilled printed circuit boards are available for $3.50 from Jim Garrett, 126 W. Buchanon Ave., Orlando, FL 32809.

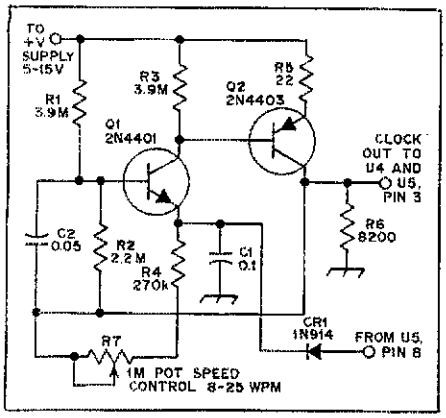
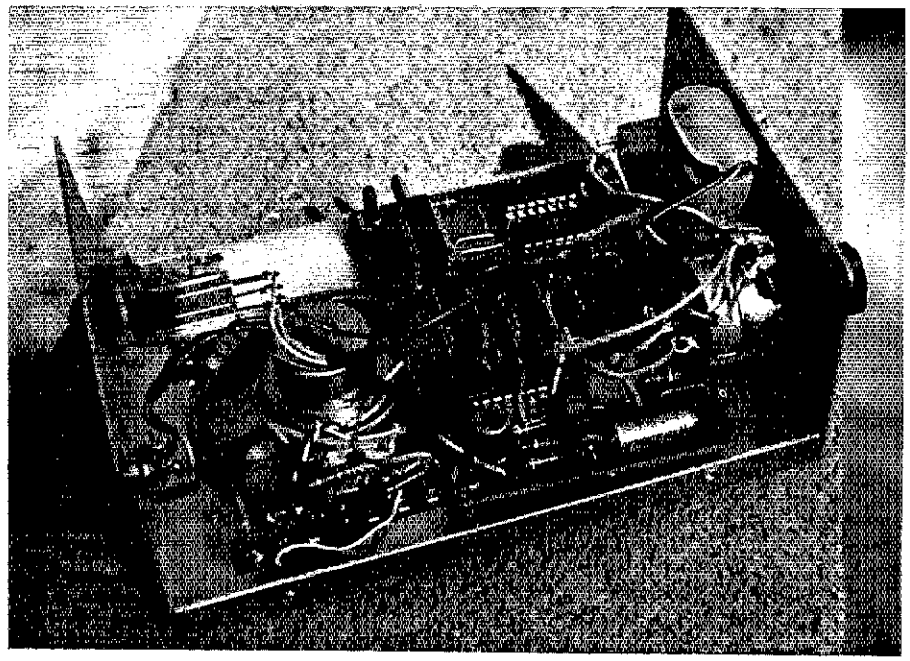


Fig. 1 — Schematic diagram of the Accu-Keyer (QRPp style) clock circuit. This design features low power consumption, necessary when used with battery-powered QRP rigs. Components fit into original pc-board holes. Changing the value of C1 will also vary the speed of the clock.



For QRPp rigs, a switch closure to ground is sometimes required to key the transmitter. The same type of closure is used with cathode-keyed transmitters. To accommodate this requirement, a simple Darlington transistor circuit is used as the output driver. If grid-block keying is used, then the original circuit may be used with a slight change of values. The current requirement during key-down is determined by the 1,000-Ω resistor on the output transistor. This resistor value also determines the maximum current which may be switched by the output stage. With the value shown, the key-down current was 4 mA with a 5-volt supply. The maximum current the stage could switch was about 300 mA. For lower current requirements the 1000-Ω resistor may be increased in value to decrease the key-down current. The 2N4401 transistor shown can handle up to 40 volts during keyup. For higher key-up voltages, a substitute transistor with appropriate higher Vceo should be used. Most QRPp rigs are operated with under 40 volts and the output transistor is well within limits. All of the transistors shown are noncritical as long as they have reasonable gain and their safe operating voltages and currents are observed.

The CMOS substitutes for the 7400 series of TTL digital circuits are identified by the letter "C" after the 74. Thus, the digital integrated circuits needed are three 74C00s, three 74C74s, and one 74C10. The average price of the 74C00 and 74C10 is under $1 while the 74C74s are under $1.50.[3] Several of the 74C circuits I originally purchased from surplus outlets proved to be defective over part of their operating voltage range. It is wise to test the devices for correct operation.

In addition to the low power requirement of the 74C series of CMOS is the wide range of supply voltage permissible. The CMOS Accu-Keyer may be operated from a voltage source between 5 and 15 volts. Supply regulation is also noncritical, so large power supply filters are not necessary. As a precautionary action, a 15-V Zener diode should be installed on the board. This will protect the CMOS devices from any transients which might occur. A 9-V transistor radio battery may be used or the voltage may be derived from the QRPp rig. Since the keyer draws such minute current when not being used, the battery should last for months. Power consumption versus battery voltage is shown in Fig. 2.

A sidetone oscillator circuit is shown

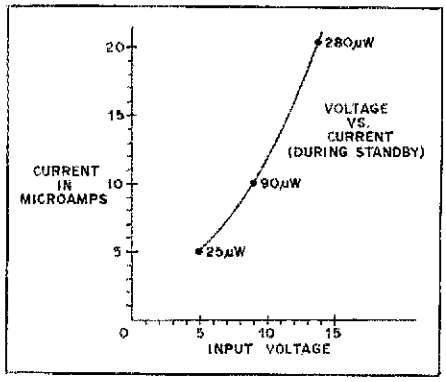


Fig. 2 — Power consumption chart for the Accu-Keyer using CMOS integrated circuits. The standby power is a function of the speed-control setting.

[3] Poly Paks Inc., P. O. Box 942H Lynnfield, MA 01940. Also International Electronics, P. O. Box 1708R, Monterey, CA 93940.

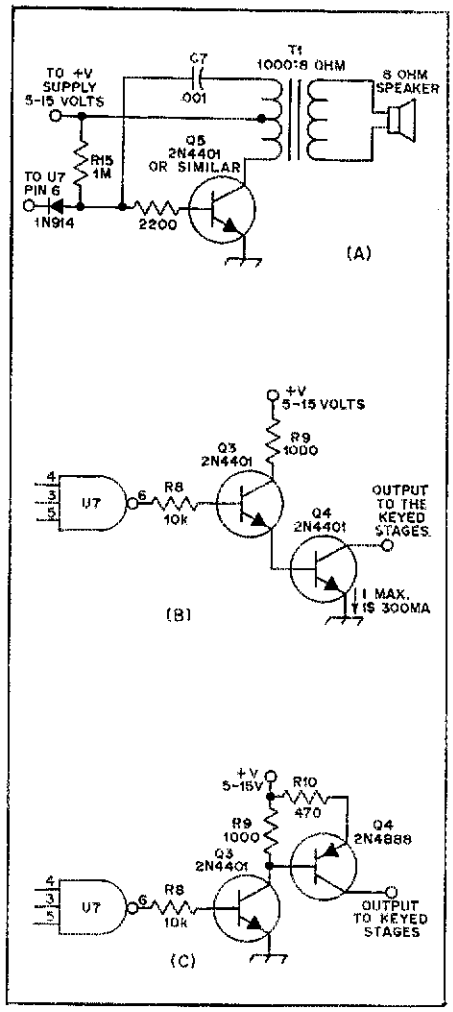


Fig. 3 — At A, schematic diagram of a typical sidetone oscillator. At B and C are two different types of output circuits. Circuit B should be used if the key-up voltage on the keyed terminals of the transmitter are normally positive and require a switch closure to ground. Circuit C is used with transmitters which use a negative voltage to ground for keying, as in grid-block keying.

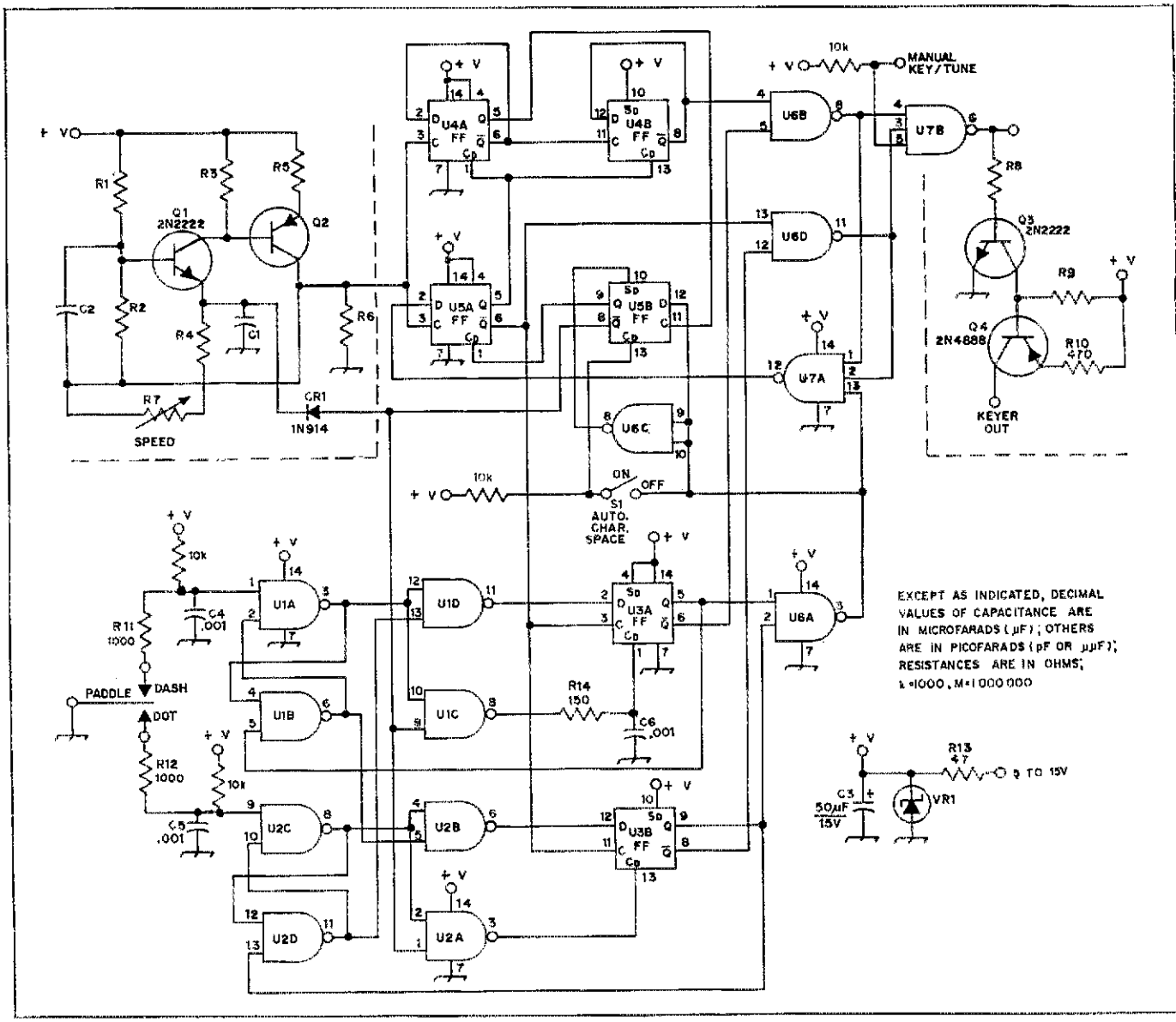
in Fig. 3A.[4] The oscillator, if needed, will require an additional 1 mA to operate during keying. Since many rigs have their own sidetone oscillator built-in, this circuit may not be needed.

When working with the 74C series of CMOS, it is recommended that a grounded-tip soldering iron be used. This is to protect the insulated-gate inputs on the CMOS from being punctured due to high electrostatic fields. It is highly recommended that Molex pins or IC sockets be used. The Molex pins are very inexpensive and will permit the CMOS to be plugged into the circuit board instead of soldered.

I hope this information will be of interest and help to other amateurs interested in QRPp keyer designs. The Accu-Keyer printed circuit board makes the assembly of this keyer extremely simple and quick. The addition of CMOS to the Accu-Keyer permits it to be competitive with the most expensive Morse senders, and yet the cost is still reasonable. QST

[4] Pollock, "COS MOS IC ElectronicKeyer," *Ham Radio*, June, 1974.

Fig. 4 — Schematic diagram of the Accu-Keyer using 74C00 series CMOS integrated circuits. Four additional 10-kΩ resistors are added to the original printed circuit board for logic pull-ups. Supply voltage may vary from 5 to 15 volts.



Strays

□ Do you have four months of free time, an extra $500 and a horse? Then the Dominquez-Escadante Bicentennial Expedition is the place for you. The 1700-mile trip, which will follow the route taken by two Franciscan missionaries in 1776, needs a radio operator to relay progress reports and requests for supplies and to handle emergency messages. (Is there a Q-signal for "I've just been bitten by a rattlesnake?")

This is a unique opportunity for the hoof-loose and fancy free QRP fan. The trip will transverse some of the most beautiful unspoiled land in the West, and promises to be an unforgettable experience. With any luck, the radio operator can obtain special-events call signs for the three different call areas in Colorado, Utah and New Mexico.

For further information and application forms, contact the League or Bill Daley, ARBA, Suite 222, 1515 Cleveland Place, Denver, CO 80202, as soon as possible.

An AC Line Monitor

By Neil Johnson,* W2OLU

Remember the time you needed a quick check on line voltage and that *old* expensive multimeter happened to be on the ohms scale and you forgot to change it? Well, there's no need to endanger the *new* one since the method presented here provides a simple means for accomplishing the task of monitoring ac line voltage inexpensively and accurately.

Since multimeters are also notoriously inaccurate when used in such service, I developed a simple ac line-monitor circuit. This utilized a surplus aircraft type of voltmeter, one having a suppressed zero.[1] Lately, such meters are no longer available at surplus prices. Several inquiries from hams prodded me into the development of a substitute ac line monitor, described here. I tried to center the design around low-cost and widely available components. In this way, almost any amateur, anywhere, should be able to duplicate the instrument.

Why You Shouldn't Trust Your Multimeter

Many amateurs have tried to utilize their VOM to measure the ac line voltage, but this method is undependable. The better grade of multimeters are usually accurate to ±3% on ac, but such accuracy is related to the full-scale reading of the meter. This means that your maximum error might be as high as 4.5 volts on a meter having a scale of 0 to 150 volts ac. If you try to measure the same voltage on a meter with a 250-volt scale, your inaccuracy could be as much as 7.5 volts. This works out such that a ham trying to measure an input of 117.5 volts ac might read this quantity as low as 110 volts, or as high as 125 volts. Further, if your multimeter has been in service for some time, it is doubtful that it will remain within the original manufacturer's specifications of ±3%. Moral: Don't rely on your multimeter for an accurate ac line-voltage reading.

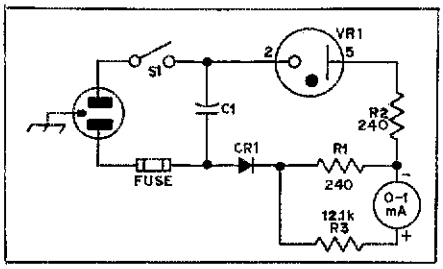


Fig. 1 — Schematic diagram of the line monitor. Unless otherwise specified, resistors are 1/4-watt, 1-percent tolerance and capacitors are disk ceramic.
CR1 — Silicon diode, 1 A, 500 PRV.
R3 — Can be a 300-Ω and 8200-Ω 1-percent resistor in series.
S1 — Spst toggle switch.
VR1 — Voltage regulator tube, OC3 or VR-105.

*74 Pine Tree Lane, Tappan, NY 10983.

[1] "Ac Power-Line Monitor," *Ham Radio Magazine*, August, 1971.

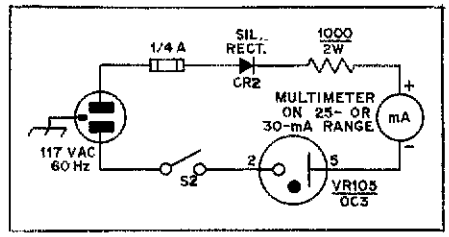


Fig. 2 — Schematic diagram of test circuit for testing VR tubes.
CR2 — Silicon diode, 1 A, 500 PRV.
S1 — Spst toggle switch.

A Different Approach

The circuit shown in Fig. 1 illustrates an alternative method to using a multimeter for line monitoring. A voltage-regulator tube is used to provide a voltage "offset" that permits greater sensitivity in the range of interest. That is, a meter that reads from 0 to 20 volts rather than from 0 to 130 volts may be used.

The heart of the meter circuitry is an ordinary 0- to 1-mA instrument for the indicating movement. When hooked up properly, the accuracy of this circuit is quite good. Although some of the expanded-scale ac line monitors have used a solid-state device such as a Zener diode for a reference voltage, I found it more convenient to use an ordinary OC3 (VR-105) regulator tube for the comparison voltage. Of all the VR tubes commonly available, this one seems to have the "flattest" regulation curve. After running careful checks on this factor, the experimentally derived data seem to verify the curves given in the tube manuals. While in the design stage, I had access to a commercially made tube tester, and to a dozen VR-105 tubes. However, the simple test circuit shown in Fig. 2 sniffed out a defective VR tube that had passed as okay on the tube checker. Of all makes of VR tubes under test, it was found that those of Mullard manufacture were of greatest dependability.

Two Minor Disadvantages

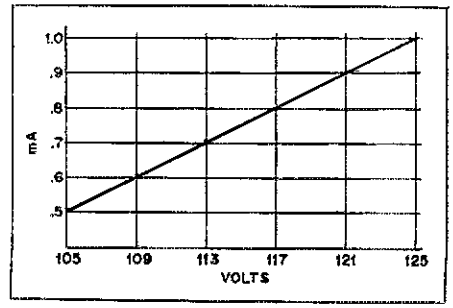
The VR tube, being of gaseous nature, will generate rf "hash" similar to that emanating from a fluorescent lamp, but of far lower intensity. In my case, the disturbance peaked at approximately 7 MHz and the simple bypass capacitor added to the circuit seemed to conquer this trouble.

The second minor objection lies in the fact that a VR tube is subject to the effects of radiation, either in the form of luminous radiation (light) or rf radiation. To minimize these effects, a simple aluminum enclosure was chosen. This does a good job of protecting the meter, and it also dresses up the entire assembly.

Added Touches

Those with time to spare can carefully disassemble the 1-mA meter and add India ink markings to delineate the new voltage scale. Or more simply, a conversion chart similar to that shown in Fig. 3 could be used. If this is done, the meter can be wired to an ordinary dpst switch, thus enabling the basic 0-to 1-mA movement to be used for other useful purposes in the shack. QST

Fig. 3 — Calibration chart for the voltmeter.



Learning to Work with Integrated Circuits

Part 1: Follow this series, build the circuits described, and you'll end up knowing perhaps a bit more about working with ICs. But you'll also possess an instrument which doubles as a digital voltmeter and a frequency counter.

By Jerry Hall,* K1PLP, and Charles Watts,** WA6GVC/1

For many amateurs the transition from vacuum-tube to transistor technology is still in process. Others have simply turned away from solid-state theory and application to remain secure in the comfortable environment of the vacuum-tube world. Now that integrated circuits are replacing discrete devices at an increasing rate, some amateurs are even less enthusiastic about learning to work with solid-state components. The job isn't as tough as it may seem, provided the amateur is willing to learn a few basic rules and philosophies concerning the use of transistors. Once this has been done the same rules can be applied to integrated circuits, for an IC is merely a collection of transistors, diodes, and resistors on a common structure. Here we shall offer a plain-talk approach to working with integrated circuits, in the hope that the heretofore reluctant experimenter/builder will become involved in this interesting and satisfying facet of amateur radio.

Integrated circuits come in a variety of packages with many sizes and shapes — large, small, high-power or low-power capability, plastic, metal, and so on. The number of pins on the package can run from as few as two (plus a common connection to the case) to as many as 48 or more, depending on the function of the IC and on how many connections are required to internal points of the circuit. But despite the seemingly endless number of IC types, all ICs can be classified broadly as either linear or digital.

Linear ICs, sometimes called analog ICs, operate directly on a continuous

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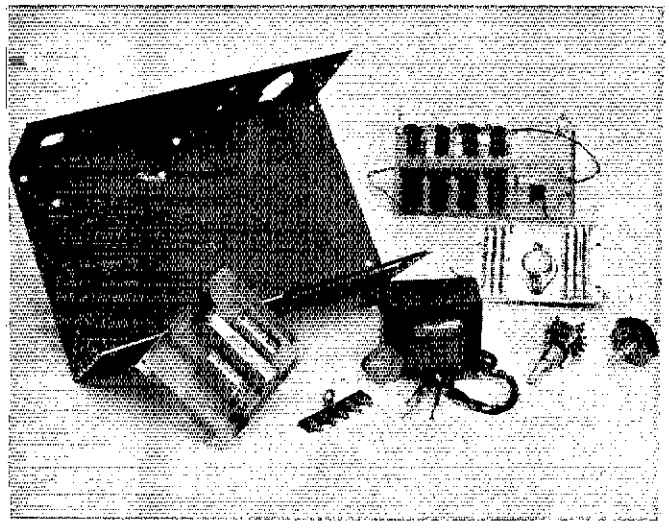
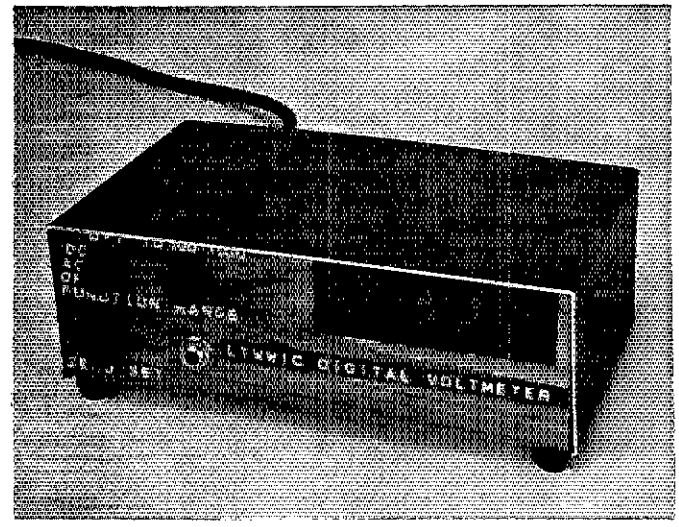
[1] NOTE: footnotes can be found at the end of the article.

The digital voltmeter in the process of assembly, left, and completed, right.





electrical signal to change the shape of the signal, increase its strength, or otherwise modify it for a specific function. Typical linear circuits are operational amplifiers (op amps), differential amplifiers, sense amplifiers, and regulators, to name a few. Normally the output is some continuous (analog) function of the input, and the device is not operated in the saturation or full-conduction region.

A digital circuit operates like a switch, in either of two conditions — saturated or on, and cutoff. Typical circuits include gates, inverters, counters, latches, flip-flops, and decoders, among many others. Digital circuits can make logical decisions and are used in computers or similar decision-making equipment. Digital ICs are used by amateurs in such devices as electronic keyers, frequency counters, frequency synthesizers, and tone decoders, to name a few. But that does not mean that such instruments use digital ICs exclusively. Indeed, most items on this list will include both linear and digital ICs in their parts lists. Such is the case for the construction project we'll be getting into in this series of articles.

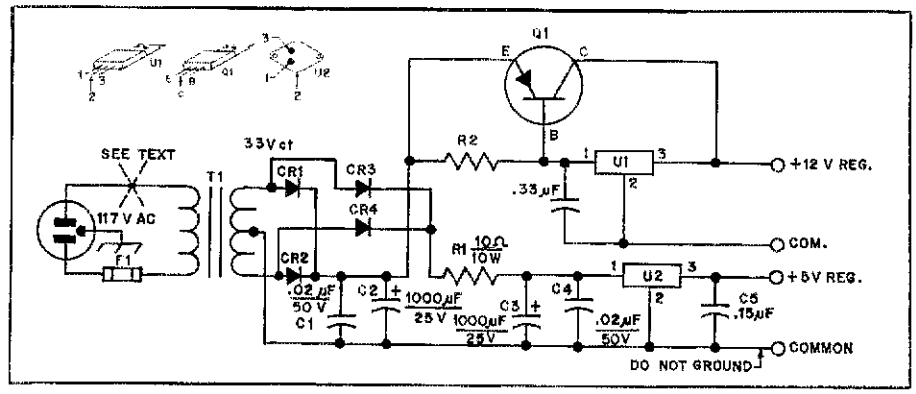


Fig. 1 — Schematic diagram of the power supply for the digital voltmeter. Connections marked "common" should be tied together but should remain isolated from chassis ground. This enables the test prods of the DVM to be connected in the proper polarity to the circuit under test without disrupting operation of either the circuit or the DVM. The X shown in the primary circuit of T1 indicates where switch contacts will be wired during later assembly.

C1, C4, C5, C6 — Disk or rectangular ceramic, 50-V minimum rating. C4 must be mounted directly at pin 1 of U2, with "common" end attached to a solder lug secured with mounting screw to case of U2.
C2, C3 — Electrolytic; ratings shown are minimum values. Archer (Radio Shack) 272-1047 suitable.
CR1-CR4, incl. — Silicon rectifier diode, 1-A 100-V minimum rating. Motorola HEP170 suitable.
F1 — 1 A, with pigtail leads.
Q1 — Pnp silicon audio power transistor, 40 watts, 2N5193, RCA SK3083, or equiv.
R1 — Archer 271-132 or equiv.
R2 — 1.75 ohms; see text.
T1 — Low-voltage rectifier transformer, 117-V primary, 33-V 1-A secondary, Hammond 166J33 or equiv. (Hammond Mfg. Co., 385 Nabel St., Buffalo, NY 14225; Canadian address, 394 Edinburgh Rd. North, Guelph, Ont.)
U1 — 12-V 3-terminal 1-A regulator IC; Fairchild 7812, Motorola MC7812, National Semiconductor LM340T-12, or equiv.
U2 — 5-V 3-terminal 1-A regulator IC; LM309K, Archer 276-1770, or equiv. Mount on 2 X 3-3/8-inch heat sink (Archer 276-1358 or equiv.) with silicone thermal-conducting grease and insulating washers (Archer 276-1371 transistor-mounting hardware kit suitable).

It's What's Inside That Counts

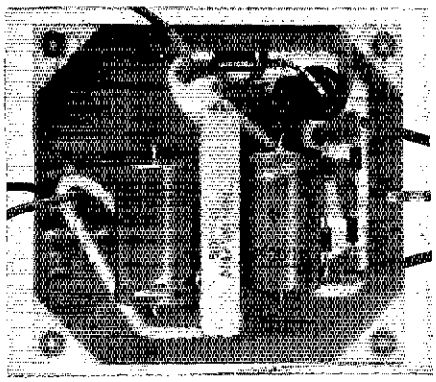
In a way, integrated circuits are like people. Different people wear different kinds of clothing. In the same manner, different integrated circuits are "dressed up" in various kinds of packages. Just as you can tell a bit about a person by the type of clothing he usually wears, you can also tell a bit about an IC from the package it comes in. For example, a high-current voltage regulator would certainly not be encased in a tiny plastic IC package. Instead it would probably be packaged in a husky metal case, designed for maximum conduction of heat away from the "working parts" of the IC and for mounting on a heat sink. On the other hand, a simple gate circuit that dissipates no more than a few milliwatts of power at maximum operating capability would not be packaged in an expensive metal case. Expensive? Yes, speaking in relative terms, especially when you consider that manufacturers produce hundreds of thousands, perhaps millions of ICs in a production run. And if you consider the cost of materials only, the case is much more costly than the "chip" or structure of working parts which go inside.

Now don't get us wrong. We're not saying the package makes the IC. This is not true, just as in the old saying about the suit not making the man. What we *are* saying is that you can get an idea of the power-handling capability of the IC from its package, and maybe an overall idea of its intended use. But for specific applications of any IC, it's what's inside that counts. Many different kinds of IC chips with totally dissimilar applications can be encased in identical packages.

What is an IC chip? How is an IC manufactured? Basically the principle is simple. An IC chip or die is first manufactured, and then it is mounted inside its case by attaching connecting leads. Finally the chip is embedded or otherwise sealed in its case. The chip is a tiny piece of semiconductor material on which electronic components have been formed by a series of photochemical reactions. Actually the dice or chips are not manufactured individually, for this would be most uneconomical. Instead, hundreds of chips (which are laid out like the linoleum tiles on a kitchen floor), are formed simultaneously on a thin slice or wafer of semiconductor material. They vary in size, depending on the complexity of the IC, but range approximately from 15 mils square to 100 mils square, a mil being a thousandth of an inch.

Silicon is the material ordinarily used for the supporting material on which the electronic components are formed. This is called the substrate. The silicon material is "grown" as a crystal, in ingot form. The ingot is then sliced into round wafers, typically 10 mils thick. The diameter of the wafers is that of the ingot, usually 1-1/2 to 2 inches. The wafers are then polished to a mirror finish before they undergo the photochemical processes. These processes are many and varied in nature, depending on the complexity of the IC, but involve essentially the same few procedures followed repeatedly. A silicon-dioxide layer is first formed on the surface of the wafer. Windows are then formed in the oxide layer by applying a photoresist material and etching. After the remaining photoresist material is removed, "doping" is performed by means of chemical diffusion. This doping takes place through the windows of the protective silicon-dioxide layer, in a thermal reaction chamber containing an atmosphere of atoms of the doping material. The dopant is a compound which, upon diffusion, changes the conductive properties of the silicon.

In this way, a thin layer of n- or p-type material is formed in designated areas on the surface of the wafer, depending on the type of dopant used. The thickness of the layer can be controlled to a degree by the amount of time the wafer remains in the reaction chamber. Thus, through subsequent re-oxidation and formation of new windows, a thin n-type layer can be formed on the surface of a thicker, broader, p-type layer, or vice versa. In this way



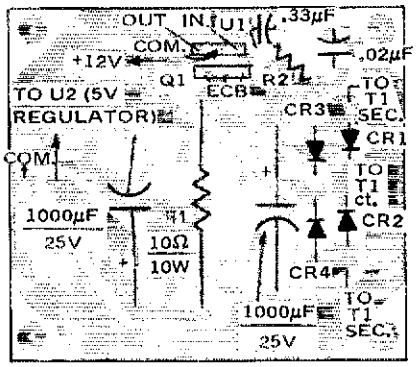


Fig. 2 – Parts placement guide for the power supply circuit board, not shown at actual size. These views show the component side of the board. R2 is mounted vertically. R1 and the four diodes, CR1 through CR4, are spaced approximately 1/4 inch above the board surface to aid in their cooling.

pn or np junctions are formed. With further masking and doping, triple-layer junctions can be formed, pnp or npn. Resistors are formed in this same manner, with a volume of p-type resistive material floating in a "boat" of n-type material. As long as the p-type region is maintained at a more negative potential than the n-type boat, there is effective electrical isolation of the boat. The resistance value is controlled by the length of the section between connections, in addition to other variables, assuming a uniform cross section. It is for this reason that high resistance values are not incorporated inside ICs; they would occupy too much area.

In the final steps of the photolithographic process, a layer of aluminum is blanketed over the entire wafer. A protective (and insulating) layer of silicon dioxide masks the wafer except for windows where contact is to be made to elements of the chips. Photoetching of the aluminum blanket leaves a pattern of internal interconnections and pads for external connections. Before the wafer is diced, most manufacturers perform testing of chip sections on the wafer. This is done by computer, with needle-tipped wafer probes. After all, there's no sense in going to the time and expense to package a chip which is no good. Depending on various factors, the manufacturer may probe every chip on the wafer, or probing may be done merely on a sampling basis. Following this testing, the wafers are diced and wire leads are ultrasonically bonded to interconnect the chip pads with package pins. The case is then sealed, and more testing will likely be performed before the IC is declared ready for shipment.

The manufacturing technique described above yields what is termed a monolithic IC – one in which the active electronic elements are fabricated on a single substrate. Most ICs used by amateurs are of this type. The other major category of ICs is termed hybrid. In a hybrid IC, multichip circuits are arrayed on a suitable passive or nonconductive substrate, such as ceramic. These are interconnected by metalization patterns or by very fine wires. Tiny discrete components may also become a part of a hybrid IC.

The Digital Voltmeter

So much for the internal workings of an IC. Now let's turn to how they can be used in some simple but worthwhile applications. The satisfaction of building one's own equipment is something that is difficult to express in words. The desire for most experimenter/builders to increase their knowledge is great. But along with the "smarts" most would like to have a usable piece of gear when they have completed this particular phase of their learning. The unit described in this series is, therefore, in keeping with this philosophy. The digital voltmeter and frequency counter, which is the end product of this series, will require five printed circuit boards, lots of integrated circuits (linear and digital) and several hours at the work bench to complete. It can be built at a cost of approximately $50 to $70.

The DVM has an 11-megohm input impedance for high isolation between DVM input circuits and the circuit under test. A three-position, front-panel-mounted rotary switch selects the desired range, and another rotary switch selects the functional operation of the DVM. Both ac and dc voltage (up to 1000) and dc current up to 1 ampere can be measured with the DVM. Two LEDs on the left-hand side of the numerical display give the user an indication of when the voltage is overrange or if the test probes are not connected in the proper polarity to the circuit under test. The full-scale indication of the three ranges is 10, 100, and 1000 volts. In the 10-V position the indication is to the nearest hundredth of a volt, and is switched to the nearest tenth volt for the 100-V range and the nearest volt for the 1000-V range. The dc current is measured with the range switch in the 10-volt position. Four large (3/8-inch) numerical LEDs give an easy-to-read display of measured values, even in well-lighted rooms. The fourth digit is seldom if ever used for the DVM function but is a necessary part of the frequency counter feature of the unit.

The 60-Hz power-line frequency may be used as the timing reference in a low-cost simple frequency counter, but will be satisfactory only at audio frequencies. The use of a stable crystal-controlled oscillator in place of the 60-Hz line frequency and the addition of an hf prescaler will be described in final parts of this series. These will allow for use of the basic counter and display circuits as a high-accuracy rf frequency counter, usable to 50 MHz.

Some Design Philosophy

The modular construction used in two earlier series of articles that appeared in *QST* will continue to be used in this series.[1,2] The "island" squares of copper-clad pc-board will, however, be replaced by etched circuit boards. A set of five boards will be required to duplicate the project presented here. The selection of a digital-voltmeter/frequency counter as the project for this series was based on the availability of components and on what the authors felt would be quite useful to the prospective builder. The assembly of the power supply pc board will be treated in this part of the series.

The power supply for the DVM must provide +12 and +5 volts. See Fig. 1. These voltages are obtained by using four 2-ampere, 1000-PRV, silicon diodes as two full-wave rectifiers. Voltage regulation for both the twelve- and five-volt sources is provided by two separate three-terminal voltage-regulator ICs. The three-terminal regulator is almost indestructible because of such features as internal current limiting and thermal shutdown (protection from overheating such as would be caused by excessive power dissipation). The terminals are used for making connections to the positive unregulated input, the positive regulated output, and the power supply common (ground). ICs of this type function essentially as a voltage-sensitive series resistor. They require a minimum voltage to regulate properly. Too low an input voltage will cause the output to "follow" the input and will result in poor to nonexistent power supply regulation.

There are several types of regulator ICs which could have been used for this purpose, such as the popular 723, but that IC regulator requires several exter-

nal components to "set" the proper voltage level and to sense and thereby limit the current of the regulator circuit. In addition to the reasons given above, IC regulators such as the 723 have low current-handling capability (300 mA is typical) while the three-terminal regulators have a typical current limit of 1 ampere (this value is for ICs attached to the recommended heat sink). To increase the current capability of these low-current-handling devices, an external transistor called a pass element or current-boost element can be employed. Since the current requirement of the 12-volt power supply used in the DVM is slightly greater than the maximum current rating of the IC used without heat sink, this pass-regulator scheme is used in the 12-volt regulator circuit. The current-limit threshold or level is determined by the value of the sensing element, R2. Its value was chosen to establish the limit at 450 mA. This is approximately 50 mA above the total current requirement of the 12-volt power supply load.

The five-volt leg of the power supply uses a three-terminal type IC regulator packaged in the standard TO-3 case, a package commonly used for high-power transistors. This regulator IC has a 1-ampere current-limit threshold and the current requirements on this supply should not exceed 800 mA (0.8 A) under fully loaded conditions. The input voltage for proper regulation with this IC is a minimum of 8 volts. The maximum input voltage for both the 12- and 5-volt regulators is 35. Since the potential present at the output of the rectifier is 23 volts, that means the 5-V regulator would be required to drop the voltage internally by 18 volts. That large voltage drop would result in a device heat dissipation of approximately 14.4 watts ($P = EI = 18 \times 0.8$ A). Information contained on the data sheet, available from several manufacturers of the IC used, tells us that the maximum average power dissipation of this particular IC, with the proper heat sink, is only 8.2 watts. To enable us to use the heat-sink/IC combination selected for the DVM project, a 10-Ω, 10-watt resistor is placed in series with the dc line from the rectifier/filter circuit to the input of the IC regulator. This resistor drops the input voltage so that under varying load conditions the maximum dissipation the IC will be required to handle is 6.5 watts. The remainder of the power is dissipated in the 10-ohm resistor. This scheme was chosen over others which could have been used, such as a separate power transformer for the 5-volt supply.

The final components selected for the power supply were the power transformer and the filter capacitors, C2 and C3. These parts were selected to give an adequate safe operating margin and an acceptable ac ripple level, prior to regulation. Total power requirements from T1 are 33 volt-amperes in a worst-case condition (all 8s in the display, reverse polarity and overrange indicator lighted and a high line voltage), but under most operating conditions the requirement will be less than 30 volt-amperes. The transformer specified is conservatively rated and should not become excessively warm when the DVM is in use. The value and operating voltage for C2 and C3 are the minimum that would be used. They were chosen to provide good dc filtering while holding their maximum physical size to an acceptable dimension.

Fig. 1 shows the schematic diagram of the power supply, and Fig. 2 is a parts placement guide. For the construction of this project the authors used printed-circuit-board techniques.[3] Detailed discussion on the design and fabrication of pc boards has been covered in past *QST* construction articles and will not be delved into in this writing. The pc-board method was chosen because duplication of the circuit boards or purchase of ready-made boards would be within reach of most builders. Another method would be to use Vectorbord and solder the wires onto the pins of the various sockets and leads of other parts. This method is termed point-to-point wiring.

Putting It All Together

Assembling the power supply board can best be accomplished by following the parts placement guide, Fig. 2. Some precautions should be observed when soldering the pass transistor and the 7812 IC regulator onto the pc board. There are two primary reasons for solid-state device failures, high voltage and heat. Exceeding the maximum heat an IC can dissipate for more than a short period of time is "certain death." Excessive heat applied to the leads of an IC with a soldering iron while installing the device into a circuit can also damage an IC beyond recoverable limits. Most ICs cannot withstand temperatures greater than 300°C on their leads for more than ten seconds. The average temperature of a 42-watt soldering iron is 413°C (775°F). The smaller 27-watt iron recommended for use on pc boards can reach a temperature of 400°C depending on the type of tip used with the iron (the average temperature is approximately 370°C). This should be an indication of what can be expected if the unwary builder were to use a 100-watt soldering gun with temperatures nearing or surpassing 500°C.

If a small-wattage soldering iron is not available, form a smaller tip by wrapping a short piece of No. 12 or 14 copper wire around the existing tip of the iron. This reduces the temperature and should make the iron usable on this and similar construction projects.

Static-electricity discharge can be a problem, although this is a more common source of damage when using CMOS devices which do not have diode protection on their input circuits. It is still good practice to ground the tip of the soldering iron if you are soldering the ICs into the circuit. (Except for the power supply, we suggest you use IC sockets for this project.)

The value of the current-sensing resistor, R2, is calculated to give 1.75 ohms resistance. The resistor is made by winding 16.5 feet of No. 30 enamel-coated copper wire around the body of a 1000-Ω or higher value 2-watt composition resistor. This value sets the current limit of the regulator at 450 mA. Mount the 5-volt regulator, U2, on the heat sink using the hardware specified in the parts list. Make sure the IC is insulated from the heat sink since the power supply common is above the chassis ground. Mount bypass capacitor C4 as close to the IC as possible with minimum lead length. If the LM309 is not bypassed properly, you might wind up with an unwanted oscillator in the DVM circuit. A bypass capacitor was originally placed directly across the output of the 12-volt regulator, U1, but this caused the IC to break into oscillation under heavy load conditions. Since there will be two different voltages used in the DVM/frequency counter, it would be a good idea to color code the various lines that will be used in the project. Voltage and signal lines should not be run together if possible and the shortest possible length of wire should be used for each connection.

Part II of this series will describe the testing of the power supply and the construction of the display circuit.

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Hoover, "The ABC's of Monolithic Integrated Circuits," *ST-3935*, RCA Electronic Components, Somerville, NJ, 1969.

Glossary of Integrated Circuit and Related Terminology Motorola Semiconductor Products, Inc., Phoenix, AZ, 1970.

The Linear Integrated Circuits Data Catalog, Fairchild Semiconductor, Mountain View, CA, 1973.

The Radio Amateur's Handbook, ARRL, Newington, CT, 1976 (chapters on ac power supplies and construction practices).

Footnotes

[1] DeMaw and McCoy, "Learning to Work with Semiconductors," Parts I through VI, *QST*, April through September, 1974.

[2] DeMaw and Rusgrove, "Learning to Work with Semiconductors," Parts I through VI, *QST*, April, May, and July through October, 1975.

[3] A list of suppliers of ready-made circuit boards for this project will appear in Part II of this series. QST

Impedance of Short Horizontal Dipoles

By Robert B. Dome,* W2WAM

"I'd love to get on eighty meters or even 160 but I just don't have the room for antennas." This lament is often heard nowadays when visions of tall towers and long runs of wire must be reconciled with the reality of the average size building lot. However, antennas for these bands need not be significantly larger than those for the higher ones if used with a properly designed matching network. Unfortunately, one needs to know what impedance range has to be covered by such a network first, before an intelligent design approach can be undertaken.

If the proposed antenna is an ordinary half-wavelength dipole up at a sufficient height, the problem is solved easily and the solution has been presented in a number of texts including *The Radio Amateur's Handbook*. But because of space limitations it is sometimes impossible for the amateur to construct a horizontal dipole to be a full half-wavelength long, particularly at 80 meters and sometimes at 40 meters. The effectiveness of a short dipole as a radiator is almost as good as a half-wavelength radiator if copper losses can be kept low. It is the purpose of this paper to show how to determine the impedance at the open center of such antennas.

Radiation Resistance of Short Dipole

The impedance of a dipole is made up of two components: (1) the radiation resistance component, and (2) the reactive component. These will be dealt with separately. The resistive component will be dealt with first. The resistive component is affected both by the dipole length and by the height above the earth. These two parameters will be dealt with separately and then in combination.

The effect of dipole length will first be considered. Assume first that the antenna is so far above the earth that the mutual impedance of the antenna image below the earth's surface is negligible. This condition is also known as the "free space" case. The radiation resistance of the dipole then is equal to twice the radiation resistance of a grounded vertical antenna having a height equal to one-half the overall length of the dipole. A multiplying factor *F1* will be found which when multiplied by the resistance of a half-wave antenna in free space (73.3 ohms) will yield the radiation resistance of the short dipole.

The radiation resistance of a short vertical antenna may be found from several sources, but the one used here is from Pierce.[1] The data are presented in tabular form using the first two columns of Pierce's Table III. Pierce gives the resistance in terms of $\lambda/\lambda o$ the ratio of the wavelength corresponding to the operating radio frequency to the natural or self-resonant wavelength of the antenna which is four times the height of the antenna; however, it is more convenient to think of the antenna length in terms of fractions of a wavelength. This is obtained by dividing 0.25 by the figures shown in the first column of Pierce. The results are presented in Table I.

The factor *F1* is obtained by dividing the figures in the Dipole Radiation Resistance column by 73.14, the value of the resistance for a 0.500-λ dipole. The factor *F1* is plotted in Fig. 1 as a function of dipole length *S*. The curve is smoothed to eliminate minor errors in Pierce's data; furthermore, the value of 73.3 ohms is now more generally accepted so that the radiation resistance R_C (the *c* refers to resistance at the center) of the short dipole in free space is given by:

$R_C = 73.3\ F1$ ohms (1)

where *F1* is read from Fig. 1 as a function of *S*.

Radiation Resistance Vs. Height above Ground

In free space a half-wavelength horizontal antenna has a radiation resistance of 73.3 ohms at its center. As the height above ground is reduced, the resistance changes. The value of the radiation resistance as a function of the height above ground may be found from existing data[2,3] for the radiation resistance of a half-wavelength dipole parallel to a flat sheet reflector (i.e., 180° for the corner angle is a corner reflector system). These data cover the range in distances above the plane from 0.5 λ to 0.1λ. When the distance is less than 0.1 λ, the present author has found that the radiation resistance is given very accurately by the asymptotic equation:

$R_C = 31.8\ (1-\cos 2h)$ ohms $(h \leq 36^\circ)$ (2)

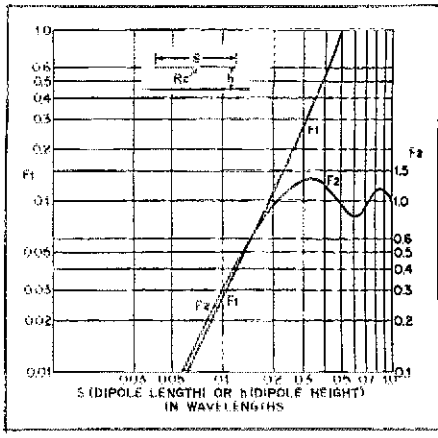
where h = height above ground in degrees. (Example: at 0.1 λ above ground, $h = 0.1(360^\circ) = 36^\circ$.) Some representative values of R_C for various heights are given in Table II.

The factor *F2* in the last rows of Table II is obtained by dividing the resistance immediately above the *F2* factor by 73.3, the radiation resistance of a half-wave antenna in free space. The factor *F2* is also plotted in Fig. 1 as a function of the antenna height h in decimal fractions of a wavelength.

Use of Factors *F1* and *F2* to Determine Radiation Resistance.

The radiation resistance of any horizontal dipole of length *S* in wavelengths

Fig. 1 — Antenna factors to be used for calculating the input resistance of a dipole of length *S* over a perfectly conducting ground at an antenna height *h*.



*645 Terry Road., Syracuse, NY 13219.

[1] This and all subsequent footnotes can be found at the end of the article.

Table I

Pierce λ/λ_O	Length of Vertical in Wavelength	Radiation Resistance at Base of Vertical	Length of Dipole in Wavelengths	Radiation Resistance of Dipole	F1
1.00	0.250	36.57	0.500	73.14	1.000
1.12	0.223	26.40	0.446	52.80	0.720
1.21	0.206	21.70	0.412	43.40	0.591
1.31	0.191	17.65	0.382	35.30	0.481
1.43	0.175	14.28	0.350	28.56	0.389
1.57	0.159	11.62		23.24	0.318
1.74	0.1437	9.10		18.20	0.248
1.97	0.127	6.92		13.84	0.189
2.24	0.1116	5.19		10.38	0.142
2.62	0.0955	3.78		7.56	0.103
3.14	0.0795	2.58		5.16	0.0705
3.93	0.0635	1.65		3.30	0.045
5.26	0.0475	0.90		1.80	0.0246

suspended at any height h in wavelengths, provided S is 0.5 λ or less and h is 1.0 λ or less, may now be determined for any operating frequency f_O. Employing the law of superposition, the radiation resistance at the center of the dipole is:

$$R_C = 73.3\ F1\ F2 \quad (3)$$

The use of this equation will be illustrated by a specific example. Suppose the length of a certain dipole is 75 feet and the height h is 30 feet, and that the operating frequency is 3850 kHz. First determine the *electrical* length S in wavelengths. In free space the electrical wavelength is related to the frequency by:

$$\lambda = 984/f_O \text{ feet} \quad (4)$$

where f_O is the frequency in megahertz. Since 3850 kHz = 3.85 MHz, then:

$$\lambda = \frac{984}{3.85} = 256 \text{ feet} \quad (5)$$

Now because of end effects, the electrical length of a typical wire antenna, the length of which is in the order of a half-wavelength, is about 1.05 times the physical length. Hence the electrical length of the 75-foot wire, in wavelengths, at 3.85 MHz, is:

$$S = \frac{75 \times 1.05}{256} = 0.308\lambda \quad (6)$$

No correction is needed for the height calculations, so h in wavelengths becomes:

$$h = \frac{\text{actual height}}{\text{wavelength}} = \frac{30}{256} = 0.117\lambda \quad (7)$$

In Fig. 1, for S = 0.308, using the left-hand scale and the *F1* curve, *F1* is read off as *F1* = 0.29; for h = 0.117, using the right-hand scale and the *F2* curve, *F2* is read off as 0.4. The radiation resistance of the antenna thus becomes, from eq. (3):

$$R_C = 73.3\ F1F2 = 73.3(0.29)(0.4) = 8.5 \text{ ohms} \quad (8)$$

Reactance at Center of Short Dipole

In order to tune the short dipole to resonance, an inductive element of some kind should be inserted at the center of the dipole between the two halves. This element may take the form of a lumped inductor or perhaps a short stub of a transmission line having the required inductive reactance. In either event, a knowledge of the reactance of the dipole would be most helpful in order to select a suitable tuning element.

The reactance at the center of the short horizontal dipole may be computed from the surge impedance of the antenna and from its electrical length in a manner similar to the case of a transmission line open at its far end, or:

$$jX_C = jZ_O \cot(S/2) \text{ ohms} \quad (9)$$

where Z_O = antenna surge impedance
S = electrical length of the antenna in degrees

The surge impedance may be closely approximated by an equation[4] adapted to the dipole dimensions from:

$$Z_O = 276 \log_{10} \frac{S}{d\sqrt{1 + (S/4h)^2}} \quad (10)$$

where S = electrical length of dipole tip-to-tip, d = antenna conductor diameter, and h = height of antenna above ground. All units should be the same for S, d and h.)

The surge impedance for the same antenna as was used in the example in the previous section, assuming the conductor is a No. 8 B&S gauge wire, may now be computed from eq. (10), where S = electrical length = (75) × (1.05) × (12) = 945 in., h = height above ground = (30) × (12) = 360 in., and d = 0.128 in. (from wire tables).

Substituting these values into eq. (10) gives:

$$Z_O = 1045 \text{ ohms} \quad (11)$$

From eq. (9) the reactance at the antenna center is:

$$jXc = -j1045 \cot \frac{(0.308)(360^\circ)}{Z}$$

$$-j1045 \cot 55.5^\circ = -j719 \text{ ohms} \quad (12)$$

where 0.308 in the above equation is from eq. (6).

Impedance at Dipole Center

The complete expression for the impedance at the antenna center is:

$$Z = R_C + jX_C \text{ ohms} \quad (13)$$

In the example given, using eq. (8) and eq. (12):

$$Z = 8.5 - j719 \text{ ohms} \quad (14)$$

The inductance required to tune out the antenna reactance at the operating frequency f is:

$$L = X_C/2\pi f \ H \quad (15)$$

In the example used, this inductance is:

$$L = 719/2\pi 3.85 \times 10^6 = 29.7 \times 10^{-6} H = 29.7\ \mu H \quad (16)$$

In practice, L may take the form of an inductor connected across the central insulator of the dipole, or it may take the form of a short transmission-line stub short circuited at its lower end.[5]

Footnotes

1. Pierce, *Electric Oscillations and Electric Waves*, McGraw-Hill Book Co., New York, NY, 1st edition (1920), p. 481.
2. *The ARRL Antenna Book*, ARRL, Newington, Conn., 12th edition (1970), p. 238, Fig. 10-43; from John D. Kraus "The Corner Reflector Antenna," *Proc. I.R.E., Vol. 28, p. 513, Nov. 1940.*
3. Terman, *Radio Engineers' Handbook*, McGraw-Hill Book Co., 1st edition (1943), Fig. 24, p. 791.
4. *Reference Data for Radio Engineers*, Federal Telephone and Radio Corp., 3rd edition (1949), p. 324, Type F.
5. [It should be mentioned that tuning out the reactance with a parallel stub will also affect the antenna resistance. The resistance will be transformed by the relation: $R = X^2/r$ where R is the new resistance seen in the antenna terminals, X is the reactance, and r is the original series resistance. For the example given, R will be in the order of 60-kΩ. Consequently, an alternate system might be employed if such a high resistance was impractical.]–Ed.

Table II

h in wavelengths	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
h in degrees	0°	18°	36°	54°	72°	90°	108°	126°	144°	162°	180°
R_C *in ohms*	0	6	22	45	68	86	96	98	90	81	70
F2	0.000	0.082	0.300	0.614	0.930	1.170	1.310	1.340	1.230	1.105	0.455
h in wavelengths	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	
h in degrees	198°	216°	234°	252°	270°	288°	306°	324°	342°	360°	
R_C *in ohms*	63	60	61	67	76	82	85	84	80	76	
F2	0.86	0.82	0.83	0.91	1.04	1.12	1.16	1.15	1.09	1.04	

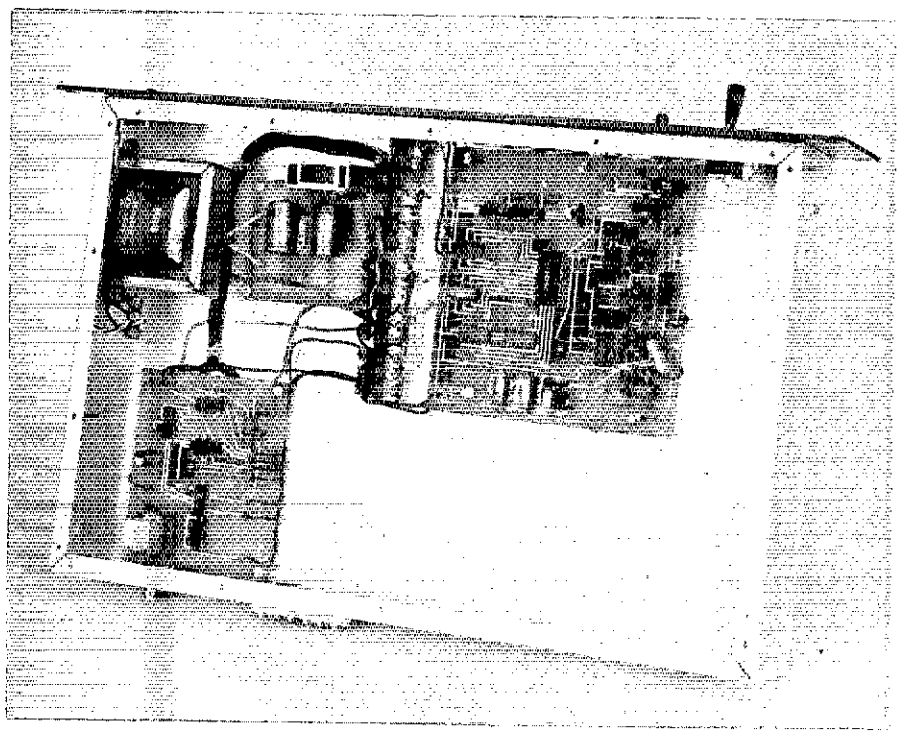
A Scanning Touch-Tone Digit and Word Decoder

Stereo demodulator ICs provide a unique method for tone-decoding and subsequent word sequencing for remote-control of amateur equipment.

By Carl F. Buhrer,* W1GNP

Making a telephone call from the car, changing the azimuth and elevation of a parabolic antenna at a distant mountaintop installation while sitting in the comfort of one's shack forty miles away, turning off a "runaway" repeater . . . these and many other remotely controlled functions are becoming commonplace occurrences to today's radio amateur. The Touch-Tone encoding system, used extensively in auto-patch operations on fm repeaters across the country, offers a ready-made source for dual-tone codes, and advances in microcircuitry design have produced a single device that can be used to decode these dual-tone codes for a variety of remotely controlled functions. However, one device is required to decode each tone. In this article the writer shows how a scanning decoder evolved as an attempt to avoid using seven of these decoder ICs, and how a simple counter circuit can recognize specific four-digit-word sequences to provide a unique approach to a remote-control decoder.

*6 Murphy Circle, Framingham, MA 01701.



There are sixteen tone pairs possible — selecting one from the low group, 697, 770, 852 and 941 Hz, and one from the high group, 1209, 1336, 1477 and 1633 Hz. Two phase-locked-loop types of tone decoders should therefore be sufficient if each one sequentially scans the four tones of one group. In this way two decoders with some added scanning circuits take the place of eight. Parts of the scanning circuit such as the clock oscillator and digit decoder would be required in any case for word decoding, and the parts' cost of the present system using primarily low cost TTL logic is reasonable. One disadvantage of the scanning decoder is the slow response time resulting from the need to wait for each decoder to find the received tone. Also, a delay is built-in which requires both decoders to halt for at least one full clock period before a digit is registered. The operation is thus relatively immune to spurious responses from voice signals yet takes 1/2 second or less to respond properly to any digit.

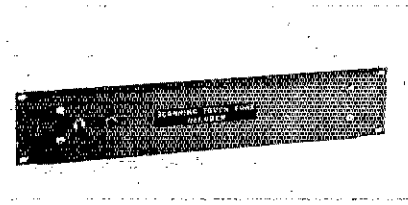
The type 567 tone decoder is not satisfactory for use in this circuit because neither side of the frequency determining R-C network is grounded. A Motorola MC1310P was tried because one had been used previously for tone decoding and was found to work well in this frequency range. Its intended use is as a phase-locked-loop fm stereo decoder. In this application it locks onto

the 19-kHz pilot tone which is present, along with the audio signal, and turns on an open-collector output to light a stereo indicator lamp.[1] Its internal oscillator runs at 76 kHz, and an internal frequency divider gives the 19 kHz for the pilot tone detection. A 19-kHz monitor output is provided. In the present circuit the oscillator is run at four times the Touch-Tone frequencies, and the stereo decoder function (except for the indicator lamp output) is ignored. Since the frequency determining resistor runs to ground, it is programmed easily for scanning operation by using four resistance values and four, open-collector, 15-volt NAND gates (7426).

[1] Gay, *Electronics 44* (24), p. 62, November 22, 1971.

Digit Decoding

The digit decoder is shown in Fig. 1. A 12-volt power supply is required for the MC1310P circuits, and the voltage on the programming resistance network is somewhat high for the usual open-collector NAND gates, so a 7426 is used.



The .01- and .015-μF capacitors should be mylar or silver mica for temperature stability, and some experimentation with the resistance values to achieve the correct frequencies may be necessary. A

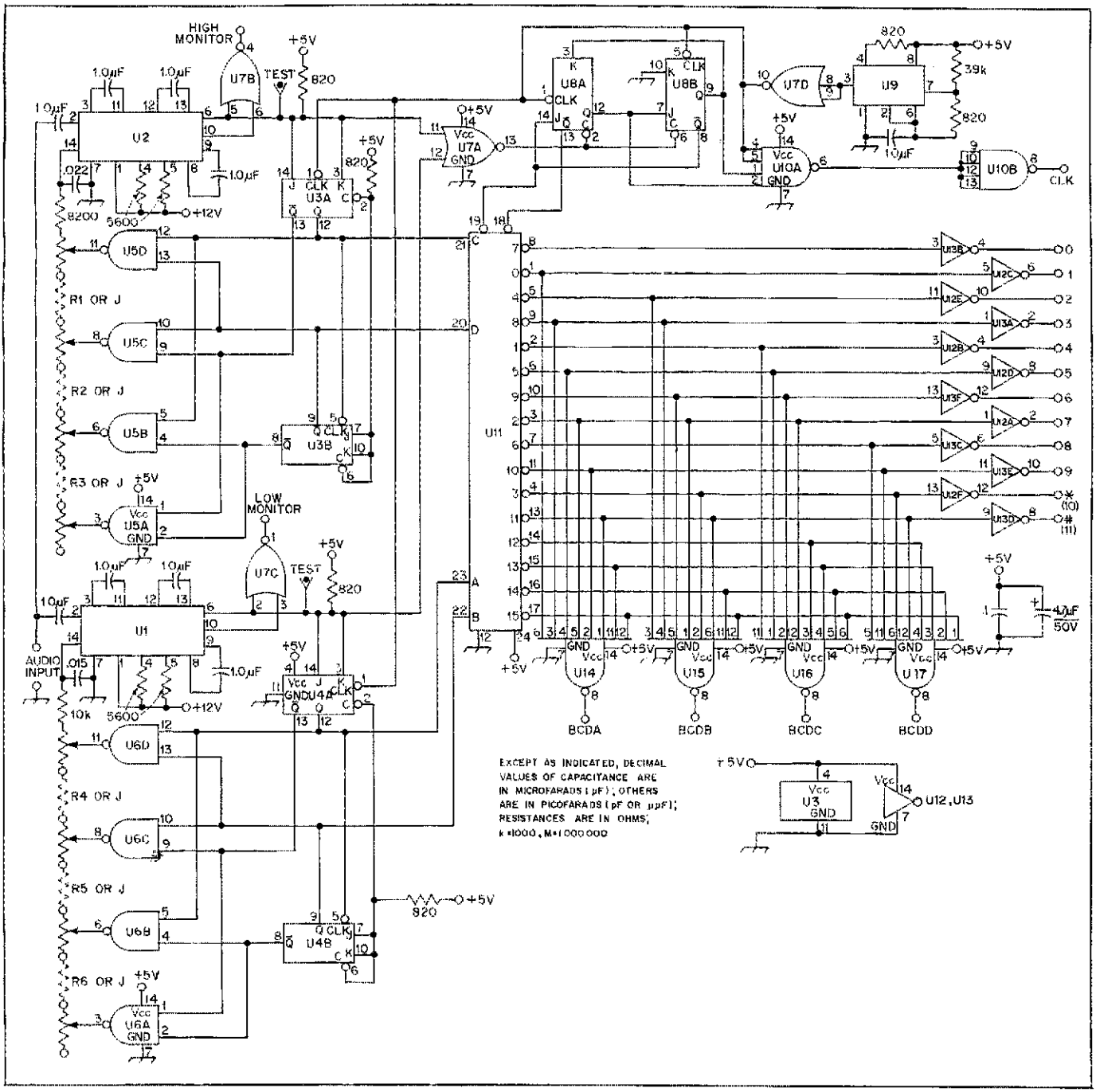


Fig. 1 — Schematic diagram of the tone and digit decoder. Parts placement is not critical, but standard construction practice should be followed when fabricating these circuits.

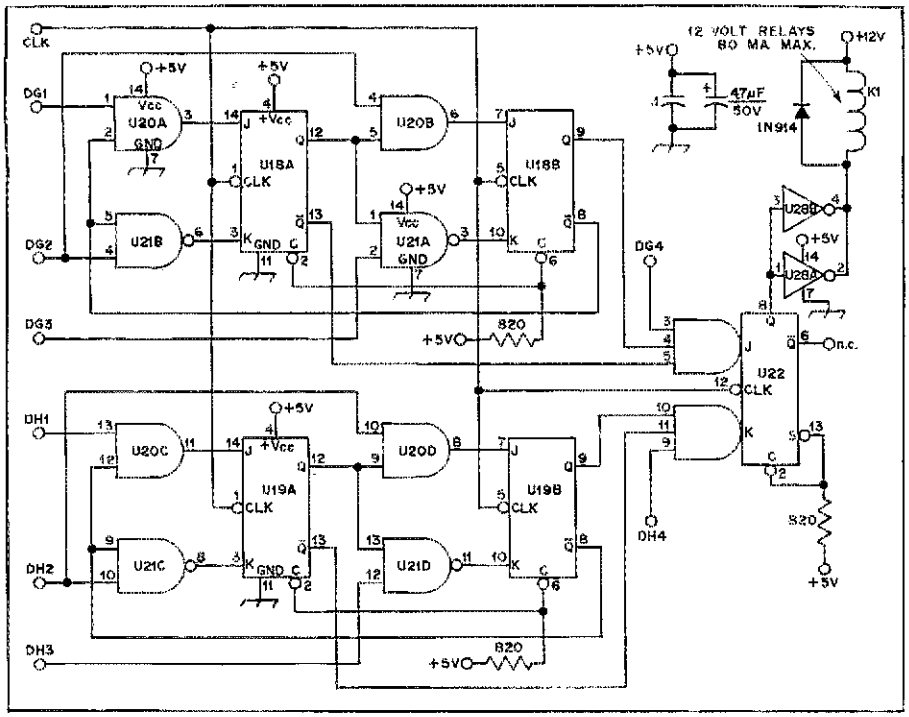


Fig. 2 — Schematic diagram of the relay-control pc board. Be sure to select relays that have contact current capability for use in the desired application.

fixed resistance of 10k-Ω or 12k-Ω was used and a jumper-wire or selected value of fixed resistance was inserted between all of the 1k-Ω potentiometers. The circuit time constants resulting from the use of 1.0-µF ceramic capacitators appear to be the correct value for the present system. The 820-Ω pull-up resistor from the +5-volt supply makes the output TTL compatible; the monitor output is correct for driving TTL devices.

The 555 timer U9 and inverting gate U7D provide a positive clock pulse for all the 7473 flip-flops which toggle on the trailing edge of the pulse. When no tone inputs are received, U3 and U4 count through four states each and cause the open collector gates U5 and U6 to conduct in sequence A through D, thereby sweeping the frequencies of U1 and U2 upward through the low and high tone groups respectively. When either tunes to an incoming tone, it becomes phase locked to it, its output at the test point goes low, the counter is stopped because its *J* and *K* inputs are low and the detector remains locked on the incoming frequency. Also, the monitor output can pass through gate U7B or U7C and can be used for exact measurement of incoming tone frequencies. When both tones are so detected, a logic one condition appears at the output of NOR gate U7A and counter U8 is permitted to advance from its cleared condition.

The *J-K* flip-flops in U8 are wired to advance in count through states *0, 1, 3, 2, 2* and become stopped in state *2* (U8A off, U8B on) until reset when one or the other tone detector drops out. Its purpose is to provide a two clock period double check on the decoder operation and yield a single clock pulse (CLK) just before the end of state *3* if the tone signal is so validated. Also, during state *3* (U8A and U8B on) the decoder U11 is enabled, and one of the digit outputs from U12 or U13 comes on.

The decoder makes use of the counter states of U3 and U4 when they are stopped by an incoming two-tone signal. Since the tones are scanned from low to high and the low group (top to bottom rows on a standard pad) is wired to the two least significant digit inputs on U11, the output states of U11 would correspond to the tone button assignments of a standard Touch-Tone pad. In order that the digit outputs are correct for the actual assignment on the tone pad, the U11 outputs are reordered and the twelve corresponding to the commonly used twelve button pad are inverted to the positive logic form by U12 and U13. The four gates U14, U15, U16 and U17 are optional and are used to obtain the binary equivalent of the standard digit assignment of the Touch-Tone pad.

Word Decoding

The word-decoding circuitry shown in Fig. 2 consists of two, three-digit prefix decoders and an output flip-flop U22. Each prefix decoder consists of a dual *J-K* flip-flop (U18), two AND gates (U20A and B) and two NAND gates (U21A and B). The prefix or first three digits of the four letter word being decoded are selected by connecting inputs digit 1 (DG1), digit 2 (DG2), digit 3 (DG3) and digit 4 (DG4) to the desired outputs from U12 and U13. Likewise, the other word-decoder inputs DH1, DH2, DH3 and DH4 are connected to four outputs from U12 and U13. The first four-letter word such as the sequence 4639 would turn U22 on, and the second such as 1 * 8 # would turn it off.

This sequence detection is achieved by the gating used on the *J-K* inputs of U18 and U19. Each is a two-stage counter which will advance in the state sequence 0 – 1 – 3 – 2 – 0 only if the correct digit input is on in proper sequence. That is, in order to advance from 0 – 1 DG1 must be on, to advance from 1 – 3 DG2 must be on, and to advance from 3 – 2 DG3 must be on. If any are off when they should be on, the state goes directly to zero. When state 2 is reached, U18A is off and U18B is on, and two of the three AND *J* inputs of U22 are on. At this point the three-digit prefix has been received successfully. If the fourth digit received corresponds to DG4, the clock pulse (CLK) will also turn on U22 since all its *J* inputs will then be on. Similarly, the second four-digit-word sequence will turn off U22. Further interfacing between the TTL output of U22 and a controlled system will depend upon its nature. A simple relay driver using two parallel-connected 15-volt open-collector buffer inverters (1/3 of a 7416) and a 12-volt, 150-ohm relay is shown. A small silicon diode connected as shown helps to avoid transient problems.

The on-off function of Fig. 2 can be simplified by using the same prefix decoder for both turn on and turn off: only the fourth digit need be different. One must be sure the word decoder is reset before it will respond properly to a four-digit word. This is just a matter of being sure that any code such as 4639 is not preceeded by a 4, a 46, or a 463. If in doubt about what the last digit may have been in the system, an extra random digit other than 4 is generally sufficient. Alternatively, the reset inputs of U18 and U19 can be wired to some completely independent source of a reset such as the carrier-input detector.

A few words about the choice of codes. For most amateur radio applications the four-digit word provides adequate security. If a great deal of phone patch activity is present on the channel, the characters * or # should be used in the code as these do not appear in phone numbers. The four additional characters generated only by a sixteen-button pad can be used if four addition-

al inverters are added to the group in U12 and U13. When a number of four-digit codes are used to operate a remote system of some sort, it becomes difficult to remember them all, and ease of use becomes an important factor in choosing codes. Often a single digit is better to turn something off because it's quicker and less likely to be forgotten. In any case all system codes must be mutually compatible.

Construction

The word decoder of Fig. 2 was originally part of a larger control system using a different digit decoder. This required, initially, that the circuitry of Fig. 1, U1 through U9 portion, be constructed on a 3 × 4-1/2 inch piece of Vectorbord, and Wire-Wrap construction was used in building the unit. But, the unit shown in the title photograph was constructed on double-side, copper-clad pc board. The layout and fabrication of the boards was done by Chuck Carroll, W1GQO, in the ARRL laboratory.

The tone and digit decoder circuit of Fig. 1 was constructed on a 6 × 6 inch pc board. All of the components are mounted on the top side of the board and are soldered on both sides of the pc board. The value for R1 through R8 in each tone-selection line should be selected so that the potentiometer will tune the circuit to the proper tone in the middle of its range. The values shown in the circuit diagram of Fig. 1 are typical and can be used as a starting point for selecting the final value. The word decoders are also constructed on pc board with a double-sided layout. The decoder board is 4 × 4 inches with all of the components installed on the top side. Several of these decoder boards can be stacked and will make the addition of control functions a simple task.

Alignment

Alignment is a matter of setting the scanned frequencies to the correct values using a frequency counter connected to a monitor point. The associated test point is grounded, and with no input to the decoder one of the frequencies can be adjusted depending on which of the four tones in any group happened to be on when it was stopped manually. It is best to stop the highest tone first and adjust the first potentiometer, along with R9 if necessary, to get 941 Hz. Then select the second potentiometer and value of R1 until 852 Hz can be tuned. In a like manner, adjust all eight frequencies to the correct values. After several months of operation the response became sluggish and finally the unit stopped working, but original performance was restored by retuning R1 through R8. Satisfactory operation is obtained with input levels between 0.1 and 1 volt ac. QST

Trash Can Art

By Irving Smith,* WB2BCY

Have you ever seen something beautiful in a trash can? Bear in mind that beauty is in the eyes of the beholder. One connoisseur of beautiful trash cans is Bob Buus, WA2HVA.[1] In the electronics plant where he is employed, these objects of beauty are frequently on display on the loading platform. One of the secrets is that you must arrive early, before the garbage men come to cart off the treasures. Some days these receptacles are loaded with items that are obsolete in industry but manna from heaven to a ham.

After you have gleaned a collection of discarded electronic components, what next? You can, of course, just sit there and admire your junk box but that is not Bob's cup of tea. As impresario of the Garden State Amateur Radio Club, sometimes known as program director, Bob is well known for his outstanding programs.

An idea for a construction project for the club hit Bob. Having completed the OAKEY (*QST*/Oct. 72), he thought that this might make a good club program. He was amazed when 24 members elected to engage in building this keyer. With a quick inventory of his junk box, Bob proceeded to order non-junk-box items needed for his program. Bob Gunderson, W2JIO, had some components in his junk box which Buus obtained by barter – a completed keyer in exchange for some of W2JIO's surplus.

One of the goals for a club project is to keep the price to a minimum. Bob sure did. The final ante came to $8.00 per keyer. A few changes were made to coincide with the junk box contents, too. A true afficionado fits his project to what is available rather than what is designated in the schematic.

Bases and cabinets presented an obstacle. Commercial boxes add to the cost. After some searching, Bob fell heir to some aluminum gutter scrap which could be formed into cases. Bases were not so easy to come by. For a good keyer a heavy base was essential. With scrap metal at an all time high, 24 bases were a problem.

Buus came up with the idea of forming his scrap aluminum into flat boxes or trays which could be filled with plaster of paris. This filled the bill, but it takes a lot of speed and skill to work plaster of paris before it hardens. WB2BCY suggested the addition of vinegar to extend the working time. By the time 24 bases were fashioned Bob was quite an expert.

Circuit boards had to be laid out and drilled. Panels, keys, pivots, etc, etc, had to be sawed out, tapped, drilled, and fitted. Nuts had been embedded into the plaster so they became part of the base. This took care of the cover for the keyer as well as rubber feet to add stability.

Then came the drawing of schematic and circuit board lay-outs together with instruction sheets. Bob also designed a module to test the circuit boards as they were completed so errors could be remedied prior to the assembly stage.

It was truly a remarkable undertaking, and Bob was mighty generous with his time and labor. His junkbox also took quite a beating but as Bob says, "That's ham radio." All that was needed by the club members was a soldering iron plus a diagonal cutter and a screw driver. There will be a lot of good fists on the GSARA cw Net thanks to this club program.

Bob Buus has only one problem. What can he do for an encore? QST

WN2IYZ watches as WA2HVA checks his board.

*10 Williamsburg North, Colts Neck, NJ 07722

[1] Two-Tone Burst Generator, *QST*, Aug. 1971.

Product Review

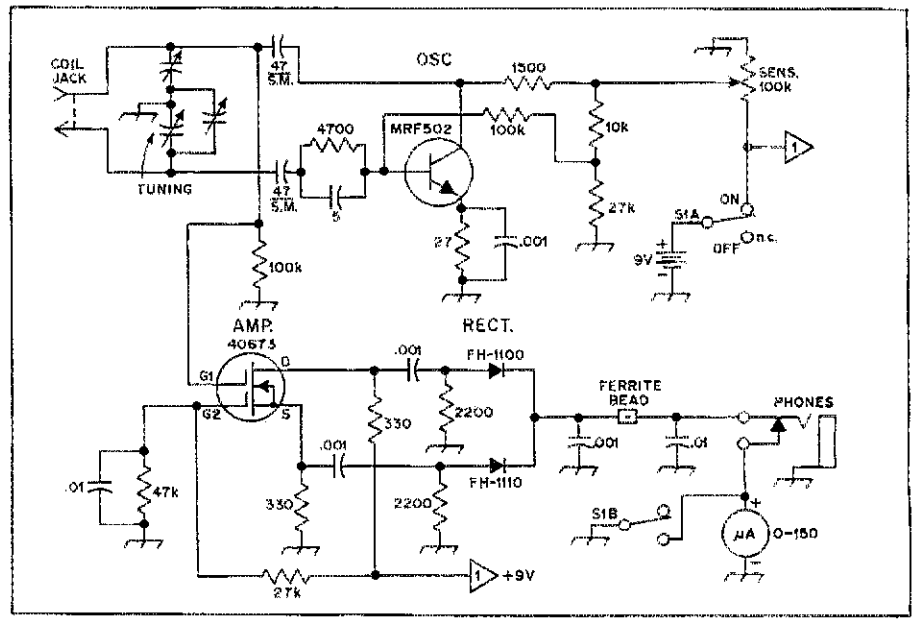
The Heath HD-1250 Dip Meter

Amateurs have been wondering for a long time when and if the Heath Company would produce a new solid-state dip meter in kit form. The long-awaited announcement came recently, and the HD-1250 brings within reach of most amateurs, regardless of their financial means, a compact, smooth-operating solid-state dip meter. It is a monument to miniaturization when compared to their tube and tunnel-diode models of years back, and is probably the smallest unit of its kind on today's market. The point of diminishing returns arrives when a piece of test equipment is too small to be handled comfortably. Heath's design engineer apparently recognized that axiom, for the dipper is not awkward in the least to adjust when tests are being made.

The HD-1250 kit took this writer exactly four hours to assemble and test. In keeping with the usual Heath practice, all information given in the construction booklet is concise and accurate. Upon completion of the assembly, the dipper was turned on and it functioned as stated in the manual. Calibration took exactly one minute!

The oscillator employs an npn bipolar transistor. There is wisdom in that choice of device, despite the "neatness coefficient" of field-effect transistors. A bipolar transistor is somewhat less subject to damage from strong rf fields – those which are sometimes present when the unit is called upon to serve as a wavemeter. The 1.6 to 250-MHz operating range of the 1250 makes it a handy piece of test gear for most ham shacks.

A dual-gate MOSFET is employed as an rf amplifier which samples energy from the oscillator stage. Output from the rf amplifier is supplied to a full-wave hot-carrier diode rectifier. Dc voltage from the rectifier is used to deflect a 150-μA meter which registers a dip when the resonance of the tuned circuit under test is reached. The meter deflects upward when the dipper is used as a wavemeter, the rise in meter deflection occurring when the dipper is tuned to the output frequency of the tuned circuit under test.



Schematic diagram of the HD-1250 dipper. The value of the split stator variable capacitor is unknown.

A 9-volt transistor radio battery is used to power the dipper. It mounts inside the instrument case. An earphone jack is located on the end panel, providing a plug-in point for monitoring the quality of a-m signals.

Two circuit boards are used in the unit. One contains the oscillator circuit and is mounted directly adjacent to the coil socket and variable capacitor. Short leads from the board to the coil jack and variable capacitor assure minimum unwanted inductive and capacitive reactances, either of which can cause false dips in the oscillator tuning range. The remaining pc board hosts the meter amplifier and rectifier circuitry.

Copious amounts of sponge-plastic material are used in the assembly to keep the innards snug and to prevent the battery from migrating about in the cabinet. No evidence of microphonics was noted, owing perhaps to the pc-board construction format and the use of foam padding.

Unique among the features of the HD-1250 is the use of a phono plug on each prewound plug-in coil. A mating phono jack is located on the end of the dipper box. Apparently the mediocre dielectric properties of the phenolic insulation of the plug and jack do not impair performance at that high-impedance point in the circuit: performance is entirely suitable for the application. High-quality components are used throughout the instrument, and most of the components are American in origin.

Something needs to be said about the instruction manual: it contains a delightful short course on how to use a dip meter. The beginner in electronics should not find himself agonizing over what the many practical uses are for a dipper – that is, if he takes a few moments to read the booklet and study the numerous illustrations. The course even tells how to measure the relative Q of a tuned circuit!

It should be realized that the dip meter is not a precision instrument with regard to reading frequency. However, the HD-1250 is capable of sufficient accuracy to serve the needs of most amateurs. One can keep close tabs on the actual operating frequency of the instrument by listening to the oscillator output on a calibrated receiver. Table I shows how the dial calibration reads out in terms of accuracy after the unit is calibrated for a proper dial indication at 7 MHz.

Tuning across each coil range shows little variation in meter deflection, and there are very few "blips" (false dips) – no more than seen on the most expensive of dip meters. That is a refreshing improvement over the tube-type dipper sold some years ago by Heath. Although the dip in meter reading at resonance of the circuit under test is not magnificent, it is entirely adequate. Even with tight coupling to the load, there is no evidence that the oscillator is about to quit - a trait that has not been common to some solid-state dippers sold in the past.

Noteworthy about this particular Heath kit is the fact that a durable plastic instrument case is provided with the package of parts. Once completed, the dipper is protected from dirt, moisture, and general abuse by the carrying case. The box has a tray

Table 1

Freq. (meters)	Dipper Freq. (MHz)	Dial Setting (MHz)
160	1.765	1.80
80	3.450	3.50
40	7.000	7.00
20	14.10	14.00
15	21.00	21.00
10	28.120	28.00
6	52.20	50.00
2	145.00	145.00
1-1/4	240.00	240.00

Table of frequencies versus dial readings after dipper was calibrated for accuracy of readout at 7.0 MHz.

which holds the coils.

The HD-1250 seems to be a piece of gear which should find frequent application in any ham shack, laboratory, or antenna test site. Certainly, it is small enough to carry aloft for antenna work, and because it needs no external power supply, it should be ideal for campers, Field Day enthusiasts, and the like.

The instruction book states that calibration can be carried out with good accuracy by coupling the dipper to a frequency counter. The method was tried while using a Heath 80-MHz counter (model SM-105), but it was not possible to obtain enough output from the dipper to trigger the counter. Perhaps the method would be satisfactory when employed with a counter of exceptional sensitivity. Three counters were tried in the ARRL lab. None could be actuated with the HD-1250 dipper. — *WICER*

Heathkit HD-1250 Dip Meter

Dimensions (HWD) and Weight: 2 X 2-5/16 X 5-7/8 inches, 2 pounds with case and coils.
Power Requirements: 9-volt NEDA type 1604 battery.
Tuning range: 1.6 to 250 MHz, oscillator and wavemeter.
Price class: $60.
Manufacturer: Heath Company, Benton Harbor, MI 49022.

BROADBAND TRANSFORMERS

Communications Power, Inc. is manufacturing a line of wide-band rf transformers which are designed especially for solid-state amplifier applications. The operating range of the components is 1.8 to 30 MHz. Transformers are available in power ratings up to 150 watts.

The RF400 is rated at 25 W, RF600 is a 50-W unit, RF800 handles 100 W, and the RF1000 is capable of passing 150 W. The turns ratio for each is 1:3, 4, 5, or 6.

All of the transformers are of the "conventional" design variety. That is, they are not transmission-line transformers. The primary (low-impedance winding) consists of a U-shaped brass tube which passes through two rows of ferrite toroids to comprise a 1-turn winding. The secondary winding is looped through the brass tubing, thereby taking advantage of the high permeability of the core material. The transformers are designed for push-pull amplifier circuits. Additional information can be obtained from Bob Artigo, Communications Power, Inc., 2407 Charleston Rd., Mountain View, CA 94043.

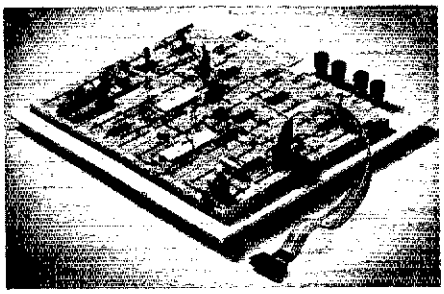
HIGH-FREQUENCY NPN TRANSISTOR-ARRAY IC

RCA has released a new transistor-array IC which shows considerable promise in amateur radio circuits. The new IC, designated CA3127E, contains five individual npn bipolar transistors and features a separate substrate connection. The latter, of course, greatly simplifies biasing of the individual transistors.

Of special interest is the f_T rating of 1000 MHz. Power gain at 100 MHz is 30 dB, and noise figure at 100 MHz is 3.5 dB. The device is useful at frequencies up to 500 MHz as a mixer, rf amplifier, i-f amplifier, product detector, af amplifier, oscillator, combination mixer/oscillator/amplifier, and a host of other everyday applications.

The CA3127E is supplied in a 16-lead, dual-in-line package. Power dissipation for any one transistor is 85 mW, and total package dissipation is 425 mW. Each transistor can handle up to 15 V collector to emitter, and a collector current up to 20 mA.

Further data can be obtained by writing for *File No. 662*, RCA Solid-State Division, Box 3200, Somerville, NJ 08876. — *WICER*



SOLDERLESS BREADBOARD

AP Products, Inc. is offering a neat solderless, plug-in breadboard for experimenters who work with solid-state circuits. The unit is called the ACE and is available in several sizes. The socket holes will accommodate LSI-size DIP packages as well as standard DIPs. Discrete components with lead diameters up to .032 inch can be used with the board.

Two models of the ACE are in kit form ($18.95 and $24.95). The five assembled ACEs range from $28.95 to $79.95. Five-way binding posts provide access to ground, external power, and signals in and out.

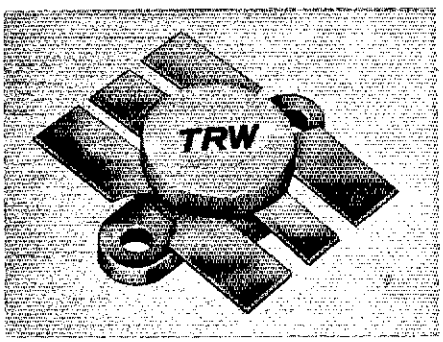
Further information and a catalog can be obtained from AP Products, Inc., Box 110, Painesville, OH 44077.

HIGH–POWER UHF/VHF TRANSISTORS

TRW is producing a new high-power line of transistors for vhf and uhf, and the components are rated from 25 to 100 watts cw power. Operating voltage is 28 dc, and all of the transistors in the line use diffused-silicon emitter ballasting and passivated gold metalization. The ballasting makes the devices practically immune to damage from high SWR, and the gold metalization process helps to assure reliability and long life. In more direct terms, the gold process reduces migration of the internal metals from one part of the transistor to another. The latter is a common cause of failure in rf power transistors.

The new transistors can be operated Class A, AB, or C, and are intended primarily for broadband-amplifier service. All of the transistors are packaged in the strip-line ceramic format to assure minimal unwanted inductive reactance.

Part numbers and price for the series are: PT731 (vhf, 25 W) $13; JØ-1006 (vhf, 100 W) $56; PT9704 (uhf, 30 W) $17.50; JØ-2106 (uhf, 100 W) $93.50. The foregoing prices are for 100-lot purchases. Further data and price breaks can be obtained from: Sales Mgr., TRW RF Semiconductors, 14520 Aviation Blvd., Lawndale, CA 90260.



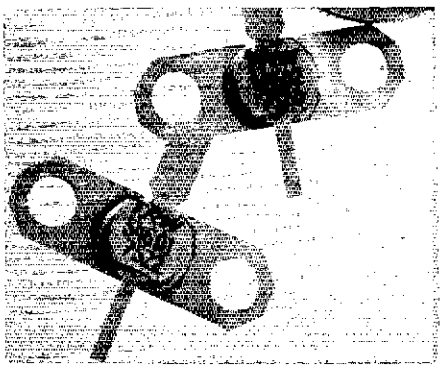
ULTRALINEAR MICROWAVE TRANSISTOR

TRW has announced a new line of ultralinear transistors for use in the microwave spectrum. Power output is available to 6 watts.

The transistors employ emitter ballasting (SWR protection) and provide a linear gain up to 6 dB at the rated frequency. The components are designated as the 52000, 53000, and 54000 series. Typical applications are in amplifiers for transmitting analog signals and for oscillator service. Six hermetic package styles are available as options.

Gold metalization is used in the fabrication process to help prevent unwanted metal migration and to ensure long life and reliability. No special precautions are required to protect the transistors from high ratios of SWR.

Further information and prices for the 2- and 4-GHz transistors can be obtained from TRW RF Semiconductors, 14520 Aviation Blvd., Lawndale, CA 90260. QST



Strays

□ When Wallaceburg, Ontario, Canada, celebrated its 100th birthday with a parade, area hams set up base station CJ3DTR in the town police station along with 7 mobiles along the parade route. The mobiles were used by St. John's ambulance attendants as their base of operations. Favorable comments were made on the operations by Police Chief Ross Cushman. Standing (l-r) VE3BWT, CJ3BSM, W8SOE, W8OHS, VE3FVT, VE3HAY. Kneeling are: CJ3EQY, VE3BIG, VE3FAM, and mobile in car, VE3CMC.

□ To honor the 1976 Summer Olympics, a certificate will be awarded to licensed amateurs who comply with the following requirements:

1. Canadian amateurs must work 10 Montreal *Island* stations. (Montreal *Island* amateurs must work 20 Montreal *Island* stations - vhf/uhf repeater contacts disallowed).

2. Foreign amateurs must work 5 Montreal *Island* stations.

3. Contacts must be made between August 1, 1975, and July 31, 1976. Any Mode.

4. Send $1.00 or 5 IRCs and a copy of your log containing: date, time, station worked and operator, mode, frequency, received signal report, sent signal report. No QSLs required.

5. Send applications to: Secretary, Westminster Amateur Radio School, Box 323, Montreal Int'l Airport A.M.F., P.Q. Canada.

□ Contacting 10 different members of the NCDXA who will be using special call signs during the 1976 bicentennial year will make any licensed radio amateur in the world eligible for the National Capitol DX Association U.S.A. Bicentennial Award. Award information and conditions:

1. Two way QSO with ten different NCDXA members using special call signs during 1976.

2. Any band or any mode from 1.8 MHz to 29.7 MHz may be used.

3. No endorsements for band or mode or for more than ten.

4. Send log information. No QSLs required.

5. Award fees: U.S. stations 50c, DX free.

6. Send all applications to NCDXA Awards Manager, W4QAW, Raymond E. Spence, 10013 Coach Road, Vienna, VA 22180 U.S.A.

7. NCDXA Members: AC3AFM, AC3AFQ, AC3AZD, AC3BQV, AC3BWZ, AD3CHP, AC3COR, AC3CRE, AC3DBT, AC3EZT, AA3HRV, AC3KA, AA3KSQ, AA3MBQ, AA3NHG, AA3NGS, AC3NL, AC3QW, AC3RX, AC3SW, AD3EH, AC3ZNH, AD3ZAW, AC3ZSR, AD4CFB, AD4CTY, AD4DXO, AD4EBY, AD4EKJ, AD4GKD, AC4IDG, AC4KFC, AD4KQB, AD4OMR, AC4QAW, AC4UMF, AC4WSF, AD4WVT, AC4WWG, AC4DPS, AA4HPF, AB2EXK, AC2GHK, AC9SZR.

Left photo: Connecticut Governor Ella Grasso presents Amateur Radio Weekend proclamation to ARRL director W1HHR while Pioneer Valley Repeater Association president K1KTB looks on. The November 1 and 2 dates coincided with the ARRL New England Division Convention in Hartford. Right photo: Governor Grasso, at the main operating position at W1AW, sends greetings to amateurs via Oscar 6. Thereafter, Governor Grasso took time to make a number of contacts with other stations via Oscar.

Feedback

□ Credit for the information contained in the K9ASL/8 Hint and Kink in *QST* for September, 1975, should be given to Marvin Vandor Kooi, "Current-Sharing Design Boosts Regulator Output," *Electronics*, March 29, 1973, page 83.

□ The Chisholm Trail Amateur Radio Club, Inc., Duncan, OK, is again an ARRL affiliated club.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

WA1CNQ, Robert E. Morrissey, Dedham, MA
WA1GIA, Hervey B. Varney, E. Rochester, NH
W1OTZ, Samuel D. Shon, Braintree, MA
K1WSP, Charles Capone, Northfield Falls, VT
W2BUH, John Kaminsky, Binghamton, NY
WA2CRW, Londa B. Shultz, Scotia, NY
W2DJU, Albert H. Stiles, Browns Mills, NJ
W2FEE, Herschel B. Martin, Medford, NJ
W2GFZ, M. Kenneth Kruger, Hasbrouck Heights, NJ
K2JF, Arthur A. Johnson, Glens Falls, NY
K2KKH, Robert W. Derr, Mt. Vision, NY
W2LNI, Barry Gensler, New York, NY
K3BUG/W1AFU, Russell E. Bassett, Waynesboro, PA
W3DCY, Ferdinand, Lambour, Nicktown, PA
WA3ETM, Jean M. Sturgis, Sinking Spring, PA
W3FP, Frank E. Whittam, Silver Spring, MD
W3IEV, John J. Dwyer, Eddington, PA
W3MBB, R. George Hayes, Altoona, PA
K3ODA, John A. McGinty, Drexel Hill, PA
K3SIQ, Samuel Snowiss, Hollidaysburg, PA
WN3YNS, William B. Marshman, Hallstead, PA
K4HS, Charles R. Drescher, Sarasota, FL
W4KAM, Leslie K. Adams, Lexington, KY
W4KCL, Clifford L. Lougee, Boca Raton, FL
WA4KQS, Harold L. Finch, Treasure Island, FL
W4MWM, Knud J. Knudsen, Daytona Beach, FL
K4NSU, H. E. Alsbrooks, Jr., Russellville, AL
W4OKD, Vernon F. Lowndes, Riverdale, GA
K4PI, Franklin Atlee, St. Petersburg Beach, FL
W4WFW, Billy R. Sams, Knoxville, TN
W4ZIY, Joe A. Terry, Athens, AL
W5BTV, Robert J. Candler, Coleman, TX
W5EEL, Woods D. Johnson, Midwest City, OK
K5HQE, Fred J. Woolard, Jr., Sayre, OK
W5IXT, Chester E. Ballard, Conroe, TX
K5KXY, Carl C. Wartes, Southland, TX
K5LMF, Arthur D. Holmes, Tulsa, OK
WA5MZL, Herbert W. Lennie, Wimberley, TX
W5QAY, John F. Ormiston, Jr., Oklahoma City, OK
W6BLC, Carleton W. Campbell, Crescent City, CA
K6DX, Corwin R. Henry, Alamo, CA
W6FKG, Weldon G. Drew, Santa Cruz, CA
W6KJT, Carl H. Herrin, Pasadena, CA
W6KOB, William S. Cobb, San Maria, CA
W6KYG/W7BZS, Charles H. "Herb" Richards, Anacortes, WA
WB6LGM, Mike O. Severe, Borrego Springs, CA
W6NZP, Evelyn E. Scott, Long Beach, CA
W6RUC, Elston L. Price, Long Beach, CA
W6TSN, Raymond Worsham, Culver City, CA
W6ZCN, Lawrence J. Wren, Inglewood, CA
W7AEJ, Jack V. Nicholas, Portland, OR
W7SKP, Dimitri Roulias, Reno, NV
K8CGO, Leland W. Tupper, Montrose, MI
K8DAT, William Alberts, Northville, MI
W8FCC, Harold G. Nixon, Columbus, OH
W8FGU, Carl L. Worrick, Trenton, MI
W8HLX, Cecil K. Barnes, West Salem, OH
WB8JHS, Lloyd H. Leach, Moundsville, WV
K8KRK, Robert A. Fisher, Tiffin, OH
W8LEG, Stanley R. Rice, Springfield, OH
K8LSG, Dr. Roger W. DeBusk, Grosse Pointe Farms, MI
WA8NUH, William S. Beam, Mansfield, OH
W8VTY, Raymond C. Reiser, Cleveland, OH
W9CRG, Bernard E. Philippsen, Milwaukee, WI
W9DZB, Francis K. Mansfield, Bellwood, IL
W9GBA, Carl J. Wampole, Anderson, IN
W9HIQ, Lewis W. "Mickey" Dixon, Indianapolis, IN
W9HNL, Howard R. Gibson, Centralia, IL
K9LZG, Robert G. Mitchell, Fountain City, IN
W9MVJ, Alfred G. Geis, Niles, IL
W9RGY, Thomas G. Conner, Lafayette, IN
W9VCF, Jack E. Riley, Alexandria, IN
KØFOW, Clarence W. Elwell, Duluth, MN
WØMBE, Hugo R. Klug, Fenton, MO
WØUUA, Cecil F. Hays, Kansas City, MO
WØWOB, Vernon E. Snider, Colby, KS
WØYPG, Arthur F. Myers, Omaha, NE
VE1PL, Roger T. Erskine, Bathurst, NB
VE3EWT, Art E. Thomas, Peterborough, ON
Ex-VE6CN, Gerald O. Kincaid, Calgary, AB
ZL3NK, M. C. Robinson, Christchurch, NZ

Propagation... Past and Prospects

Believing, with philosophers, that to plan for the future we must first know the past, we look at solar and propagation data for the last two years before trying to assess our prospects for 1976. Whatever we think of the last days of Cycle 20, we know the current period to be the best-documented solar minimum ever. Enough has been learned about making use of the low-activity years so that some of us — in the midst of communications blackouts that can accompany the DX goodies of peak years — may someday look back on the quiet middle '70s as the "good old days."

Have we hit bottom? When will things get better? The answers depend on whose data you're looking at. Solar radiation is a complex phenomenon with ramifications far beyond any number that can be correlated with propagation conditions. For some reasons why this is so, see interesting new ideas in the "Solar System Issue" of *Scientific American*.[1] Amateur viewpoints vary widely, too. What is good or bad? On what frequency, in what season, at what time of day? Over what distance? In what latitudes? In what directions? These factors were discussed in some detail in a recent *QST* series.[2]

Solar Flux Record, 1974-75

The 2800-MHz solar flux index provided hourly by WWV ties in well with *F*-layer muf in the north-temperate zone. (See reference 2.) A statistical view of the solar flux for the past two years is given in Fig. 1, which shows monthly high, low, and average figures. Yearly summaries are at the right. Early 1975 shows a steady decline in all categories, in marked contrast to 1974. April, 1975, looks like the bottom, in this context. But June's minimum of 66 and average under 70 may be significant. Not shown is a unique June feature: a 10-day period when the flux ran very close to the quiet-sun level. Will there be more such before the Cycle 21 rise? One is tempted to say no, but experience dictates a wait-and-see stance.

Activity from two cycles may complicate the picture. Cycle 20 sunspot numbers are predicted to decline further, but flux levels for July through November were generally higher than in the first half of 1975. With several large spot groups appearing a few days apart, the solar flux rose from a fall low of 71, Oct. 31, to the high 90s, Nov. 17-19. This brought the 10-meter band to life in spectacular fashion Nov. 8-9 and 14-19. Almost the whole world came through simultaneously on 14 MHz Nov. 16. High-latitude propagation was excellent on 21 several days. Europe and Africa were worked on 28 from almost everywhere in the country on the 17th. Other exceptionally good periods were observed the first week of September (surprise 10-meter opening to Africa the 6th), Sept. 14-28, Oct. 1-5 and 13-27. Below-average conditions prevailed Oct. 6-10, Nov. 2-7, and were expected for the end of November, as this summary was being prepared.

Early 1976?

The latter halves of September and October were periods of exceptional ionospheric calm, with generally good propagation below about 25 MHz daily. Such stretches of good times are unlikely to be duplicated often in the future. Otherwise the periods above, good and bad, should turn up at roughly 27-day intervals. The past provides no complete map for the future, so frequent monitoring, as described in reference 2, is recommended for scheduling operating time for maximum DX advantage. Close examination of the sun by the projection method will also be helpful.

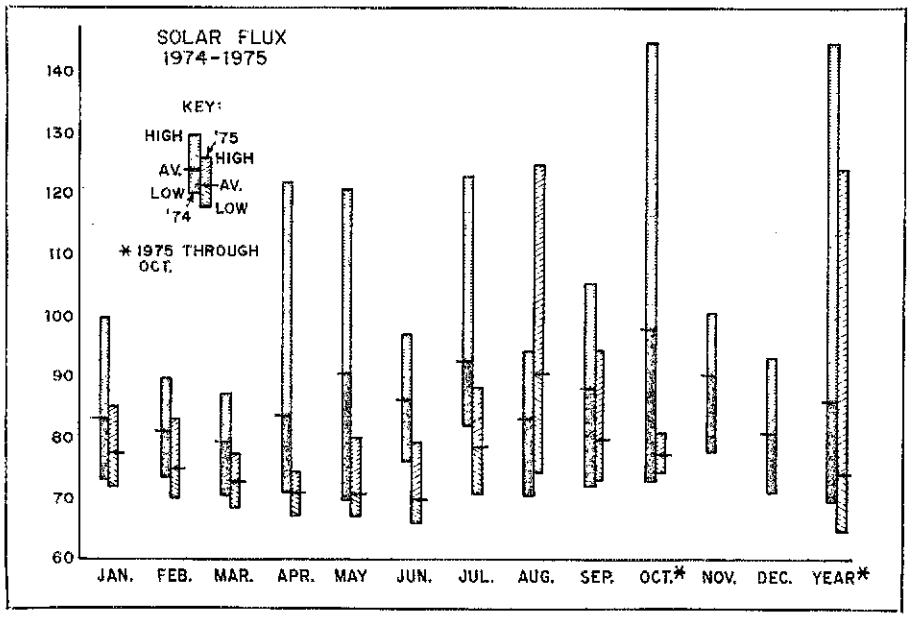
Except for a slight dip around the winter solstice, no marked change in overall propagation conditions is expected in the first quarter of 1976. It should be kept in mind that good conditions (and bad!) can occur at any point in the solar cycle. It just may turn out that "bad" on 160, 80, or 40 may be "good" on 10 and/or 6. But good breaks will do little good on the latter two bands if too few people are in there *trying*. Don't sell ham radio, and especially the higher frequencies, short in 1976!

This is the first of what will probably be a quarterly series of *QST* propagation summaries. Comments and suggestions welcome. — *W1HDQ* QST

[1] Parker, "The Sun," *Scientific American*, September, 1975.

[2] Tilton, "The DXer's Crystal Ball," *QST* June, August and September, 1975. Issues still available, $1 per copy. Condensation in Chapter 19, *The Radio Amateur's Handbook*, 1976 edition.

Fig. 1 — Solar flux data for 1974 and 1975.



Hints and Kinks

BUG TO KEYER PADDLE, AND BACK TO BUG

Here is an idea for modifying your bug for use as an electronic keyer paddle. This modification will allow you to change the bug back and forth between bug and paddle quickly without much effort.

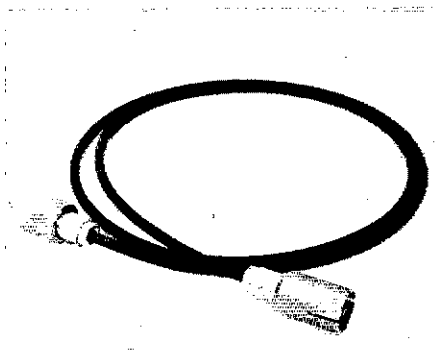
Remove the weights from the vibrator arm. Glue a small fiber block from behind the dot contact to the vibrator arm. This prevents the dot contact spring from operating. Underneath the base-plate, remove the bus bar connecting the dash and dot terminals. Adjust the key arm so that as the dot contact is made the vibrator arm touches the damper assembly. Wiring is straightforward. Reverse the above procedure to restore the unit to its original configuration. – *Robert Anderson, WB9FTA*

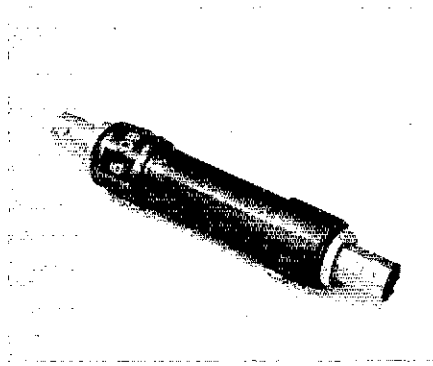
TEST AIDS

Here are a couple of test aids for use around the shop. Both are constructed of standard 1/2-inch copper plumbing fittings. The modified coaxial plug, which slips on or off the popular SO-239 uhf chassis connector, is just a standard PL-259 cable plug with the threaded shell removed. The shell is replaced with a 1/2-inch copper pipe coupling.

Construction requires minor modification of the pipe coupling. As the inside diameter is slightly larger than the threaded portion of the PL-259, the end of the coupling should be "rolled" in by lightly tapping the edge of the fitting with a hammer while rotating the coupling until a proper fit is achieved. Then the coupling should be slotted as shown in the photograph. After cleaning, assemble the plug and position it, with the cable extending vertically at the top. It is soldered easily with the aid of a propane torch and rosin-core solder. Finally, fit the working end of the quick connector to an SO-239 connector by slightly squeezing the copper adjacent to the slots with a pair of pliers.

The cable attachment is conventional, with the only difference being that the cable is soldered to the reducing bushing only; then, the bushing is screwed into the plug and snugged down tightly.





The 6-dB hf-band attenuator pad, shown in the photograph, is constructed from a short length of 1/2-inch copper pipe and two end caps. BNC connectors are used for convenience; however, any coaxial type of connector of small size would work. Construction requires the appropriate resistor values be used. In this case a T pad was used. First, the resistors are soldered together and then to the end of one of the BNC connectors. Then the assembly is slid into the pipe and soldered to the other BNC connector. It is important to allow just enough lead length at the second end to facilitate soldering, because a necessary amount of slack is introduced when telescoping the unit together. This slack should be as small as possible. Secure the caps to the body by drilling a small hole and installing small sheet-metal screws. – *John Bipes, K0YQX*

FILM-CONTAINER BATTERY HOLDER

An excellent C cell battery holder, which offers the advantages of being inexpensive as well as easily attachable and separable, can be fabricated from 35-mm plastic film containers. Heavy-duty snap fasteners attached to both ends of the plastic container provide the terminals for a C cell, when placed in the battery holder.

Construction is simple, the fasteners consist of three parts: a ring, socket, and stud. The ring, after removing any paint, is centered and the prongs of the ring are forced through the plastic container and also through the plastic cap from the inside. A socket or stud is then centered on the protruding prongs of the ring. The entire assembly is then set against a hard surface and the ring is driven home with a hammer and a short section of 1/2-inch dowel rod. The choice of whether to use a socket- or stud-fastener configuration is left to the individual. Small pieces of aluminum foil folded several times and placed in the cap and container, flush with the end rings, provide excellent battery contact and also serve as spacers.

Several of the battery holders may be used in combination when needed, and the required voltage can be obtained by snapping the appropriate number of holders together. In addition, the recycled battery holders are inexpensive, eight of the holders cost a total of fifty-five cents to construct. – *Allan Hale, WA9IRS/WB8UZG*

SOLDER PLATING – CHEAP!

Many experimenters have told me that they are tired of looking at their work sitting on ugly old oxidized copper circuit boards. The general comment is, "Sure would be nice to either tin or silver plate our circuit boards but who can afford silver powder or a solder-flow pot?" The solution to this problem is simple. One need not look any further than his soldering iron.

Hand tinning is really nothing new; it just seems to be one of those things that is not often passed on to others. Previously, I sent out all my board work to be tin dipped and did so at great expense. As the bills mounted up, I decided it was time to find a less expensive solution. The one I finally came up with was hand tinning.

Hand tinning requires only some good rosin-core solder, a flat-tipped 60-watt soldering iron, and for best results – some liquid solder flux. Superior No. 30 or equivalent will do nicely. The liquid flux aids the flow of solder onto the copper.

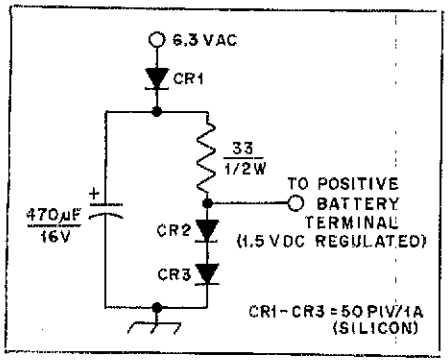
In the case of double- or single-sided boards, apply a generous amount of solder onto the board. Next, hold the circuit board upright with some pliers and slowly run the excess solder off the board with the soldering-iron tip. Once the excess solder has been removed, the board may be cleaned. Freon TMC or isopropyl alcohol and a small brush will do the job.

Small wattage soldering irons should be used and care should be taken so as not to lift the copper off the board. The excess solder may be removed by the same method as before, or it can be done more safely by using a solder-wick. Remember that on small surface areas it is easy to destroy the bond between epoxy and copper with too much heat.

After you have practiced this a few times you will not only get more proficient (and less destructive), but will probably find ways of improving on this technique to suit your own needs. – *Rick Olsen, WA7CNP*

BATTERY REPLACEMENT CIRCUIT FOR VTVM

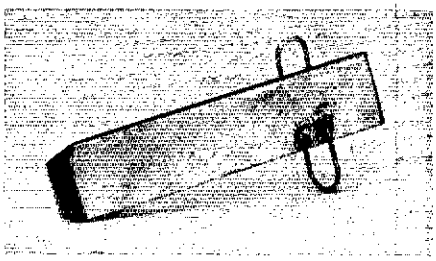
Here is a circuit I used to replace the battery in my VTVM. I found enough room in my particular VTVM for the five additional components by mounting them in holes drilled in a large, no-foil section of the printed-circuit board. The 6.3 volts ac obtained directly from the power supply line to the pilot lamp. Although the VTVM may have to be recalibrated, this circuit provides good regulation and eliminates the requirement of replacing batteries. Do not try to use the battery in the VTVM when the



circuit has been installed. – *Paul Alexander, K5LZT/9*

BATTERY TEST AID

Here is a simple device for use in measuring a battery current drain. It is a piece of double-sided pc board tapered at one end, allowing the board to slide in between two batteries (or a battery and its terminal) easily, for measuring current being drawn by the equipment in which the battery is employed. Insert the probe between the battery or the batteries, connect a milliameter to the terminals on the pc board, turn the device on and measure the current being drawn. Plug a battery charger into the equipment and if current indication reverses, read the net charge. – *Ralph H. Janowsky, W2RPO*



EXTRACTION OF HARD-TO-REACH TUBES

In my Collins 75A3 receiver, one of the tubes, a 6BA6 (V-5), defies extraction. It is located where only the tips of the fingers can touch the top of the tube, and unless one risks damage to the tube by using a pad type of instrument reaching to the bottom, removal for testing or replacement of the tube is virtually impossible.

The problem was solved with the use of air conditioning "duct" tape. The tape is made of heavy cloth and has an adhesive that grips well to most anything it touches. Cut two strips of duct tape 1/4 × 3-inches. Have a coffee stirrer (wood or plastic) or any stiff sliver of wood handy. Lower the tape strip alongside the tube, leaving enough of the tape above the top of the tube to allow the ends to be pressed together. Do this to both sides of the tube, using the stirrer to gently press the tape to the sides of the tube. An easy pull on the strips will release the tube from its socket. Leave the tape in place on the tube until after the tube has been replaced in the receiver. Using the same coffee stirrer, pry the adhesive away from the tube. Although this technique was used on my receiver, it could be applied to any piece of equipment which uses tubes. – *Mack O. Santer, W2ZPW*

REPLACE WITH CARE OR SPURIOUS YOU MIGHT AIR

With many transmitters or transceivers it is possible to transmit on spurious frequencies because of improper adjustment of the final-amplifier tuning or preselector controls. This past weekend the PA tuning knob fell off my FPM-300 transmitter. I replaced it while the rig was properly tuned for operation on the 40-meter band. However, the capacitor rotates a full 360 degrees, and I just happened to replace the knob 180 degrees from its proper position! Therefore, although giving a correct indication for 40 meters, the reference numbers on the panel were reversed for the other bands. Setting the control to the "10" position actually resulted in its being set correctly for 80 meters, and vice-versa. After much frustration from being unable to obtain a match to my 80-meter antenna and two attempts to raise W1AW on 3580 kHz, it dawned on me – I wasn't transmitting anywhere near 3580 kHz. The signal was probably outside the amateur bands entirely.

If a plate-tuning capacitor rotates 360 degrees it is very easy to replace a knob the wrong way. Also, one should make sure that the dip in plate current occurs when this control is set for the correct band. The results of little mistakes like these could be disastrous. – *Stan Gibilisco, WA0OKV*

TONE PAD CONNECTION FOR THE HW-202

A quick glance at the inside of the Heath HW-202 might give the impression that there just isn't enough room to connect the rig up for Touch Tone use, particularly if a tone-burst encoder has already been installed. It is not as hard as it might appear; just follow these steps. On the transmitter board, locate connector pins AB, U and AD. These are the same pins used to connect the HWA-202-2 encoder. Take a length of RG-174/U cable, solder the inner conductor to pin AB and the shield to pin U. Take a length of stranded insulated wire and solder to pin AD. Run these wires along the edge of the power amplifier board and pass them through the slot provided for the dc voltage line. Secure them with a cable clamp fastened to one of the rear-apron machine screws.

You will find the 11 volts dc provided by pin AD superior to a 9-volt battery and always "fresh." Should the tone pad load the microphone input circuit, you should provide a means for switching the tone pad out of the circuit when not in use. - *J. P. Taylor, W4CWB*

SOME FORMULAE FOR CALCULATOR CALCULATIONS

The day may not be too distant when electronic calculator manufacturers offer highly specialized models. For instance, a hand-held scientific model for the electronics field that has a built-in DVM and frequency counter, as well as preprogrammed functions. Until that day arrives existing functions and formulas pertinent to electronics can sometimes be simplified so that most formulas, carried on a 3-by-5-inch card in the present day scientific calculator case, can replace many of the standard charts and graphs. In many cases the answers can be found in less time.

Most engineers and technicians are familiar with the standard dBm-versus-voltage graph with curves for the various impedances. These curves can be reduced to the following formula:

$$V = \sqrt{\left[\log^{-1}\left(\frac{\text{dBm}}{10}\right)\right] \times *} \qquad (1)$$

*0.050 (for 50-ohm systems)
0.075 (for 75-ohm systems)
0.600 (for 600-ohm systems)

On a scientific calculator dBm can be converted to voltage in 10 to 12 steps, depending on the model. This can usually be accomplished faster than interpolating the value from a chart.

The formula for voltage to dBm conversion is even simpler than formula 1:

$$\text{dBm} = 10 \log \left[1000\left(\frac{E^2}{R}\right)\right] \qquad (2)$$

Again, about the same number of steps are required.

Formula 1 can be modified slightly to convert dBm to amperes:

$$I = \sqrt{\left[\log^{-1}\left(\frac{\text{dBm}}{10}\right)\right] \times \#} \qquad (3)$$

#2.0^{-5} (50-ohm systems)
1.33^{-5} (75-ohm systems)
1.66^{-6} (600-ohm systems)

Many times it is desirable to express two power levels in percent rather than dB, as in the case of carrier-to-sideband level. Most spectrum analyzers have both dB and linear scales so this may be determined readily. However, certain instruments such as a frequency selective voltmeter may not.

If it is desired to have a signal that is 80% of another signal (80% modulated a-m for example) the following formula can be used:

$$\Delta\text{dB} = 20 \log \frac{200}{\%}$$

$$\Delta\text{dB} = 7.9588 \text{ or } 8 \text{ dB} \qquad (4)$$

Adjusting for a sideband level 8 dB down from the carrier level will yield 80% modulation. Conversely ΔdB can be converted to percent:

$$\% = \frac{200}{\log^{-1}\left(\frac{\Delta\text{dB}}{20}\right)} \qquad (5)$$

Either formula 4 or 5 can be solved in less time than it takes to change a spectrum analyzer from one scale to another.

A standard model calculator can be used to do logs and antilogs if the machine has X^2 and $\sqrt{X}$ functions:

$$\text{Log } X \approx \sqrt{X}\left[\begin{matrix}\text{repeat}\\ \text{function}\\ 11 \text{ times}\end{matrix}\right] - 1 \times 889 \qquad (6)$$

conversely:

$$\text{Log}^{-1}\ X \approx \left[\frac{X}{889} + 1\right]^{2} \text{ (11 times)} \qquad (7)$$

This method is surprisingly accurate. Granted, repeating the function is time consuming but is usually faster than log tables.

These formulas barely scratch the surface of what these little machines can do. As they become more sophisticated one may have to consult a textbook to see what the formula looks like! – *W. P. Dart, W6KGU/4* QST

Some Capacitor Basics

Some plain horse sense is all a beginner needs when choosing capacitors for his project. The guidelines here should make the task easier.

By Doug DeMaw,* W1CER

Are you new to amateur radio? If the answer is "yes," it's reasonable to assume that you're doing some private nail biting and fidgeting each time you try to select the proper capacitor for a given application. Certainly there are myriad types of "condensers," as they were once called, from which to make a choice. Each type has its private characteristics and personality, and even though many kinds can be used to accomplish one job, others are suitable for only a specific assignment. A person who is new to our electronics pastime may find himself tottering at the threshold of despondency when he tries to purchase the correct capacitors for his first home-construction project, or for use when he attempts to repair a piece of manufactured equipment.

Unfortunately, a book-length narrative would be required to cover completely the subject of capacitor design, electrical traits, and practical applications. A short primer is given here, and the information provided should help untangle the threads of doubt a new ham may have about choosing and using the best capacitor for the job at hand.

Understanding the Units

The fundamental unit of capacitance is the *farad*. However, the unit is far too great in magnitude to work with in electronics, so we have adopted smaller and more practical units for designating values of capacitance. We deal primarily in μF, or microfarads (one-millionth of a farad) and pF, or picofarads (one-millionth of a microfarad). The latter was once specified as $\mu\mu$f, or micro-microfarads, for the benefit of those who may have older textbooks on file. A present trend in Europe is beginning to take hold in the USA — one where the term nF or *nanofarad*, is being used. A nanofarad is one-billionth (10^{-9}) of a farad.

*Technical Editor, *QST*.

Voltage Ratings

All fixed-value capacitors are rated for some maximum value of ac or dc operating voltage. As a general rule an ac type of capacitor should not be used in dc applications. It will be noted that most ac capacitors are nonpolarized. That is, there are no positive and negative terminals indicated on the component. The maximum operating voltage of an ac capacitor is expressed in pk-pk (peak to peak) terms.

Most of the capacitors we use in amateur work are rated for some maximum amount of dc voltage. This does not mean we cannot use them in circuits where ac and dc voltage are *both* present. Furthermore, we are able to use them where only *ac* or *rf* voltage is present. Rf voltage is, of course, ac voltage at a high-frequency rate of alternation.

When a dc-rated capacitor is used in a circuit where ac voltage is also present, the rule is that the pk-pk ac voltage *must not* exceed the rated dc amount. For example, if a 10-μF filter capacitor is rated at 250 V dc, and if it immediately follows the rectifier in a power supply, the dc output from the rectifier will have *some* ripple (ac) on it. The pk-pk value of this 120-Hz energy must not swing beyond 250 V. This is a rather obtuse example of the situation, and is used only to illustrate the principle. Similarly, a dc-rated capacitor may be used as a bypass in an audio or rf type of circuit, and the pk-pk sine-wave value must not exceed the dc rating. Pk-pk voltage amounts present in a circuit can be measured with a scope or peak-reading ac voltmeter.

Some beginners are fooled by the fact that no dc voltage is present in a given circuit — just ac or rf voltage. Therefore, they tend to assume that the voltage rating of the capacitor is of minor significance. Not true! If, for example, a 250-pF disk ceramic capacitor was connected between the input of a transmitter pi network and ground (after the dc blocking capacitor), and the disk ceramic unit was rated at 1000 V dc the capacitor could go up in smoke almost immediately when the transmitter was keyed. Why? Because the pk-pk rf voltage present might be *several thousand* volts, the amount depending upon the plate impedance and power-output level of the tube in the PA. Of course the same situation could exist at the output of a pi network, even though the impedance level would be much lower there . . . generally on the order of 50 or 75 ohms.

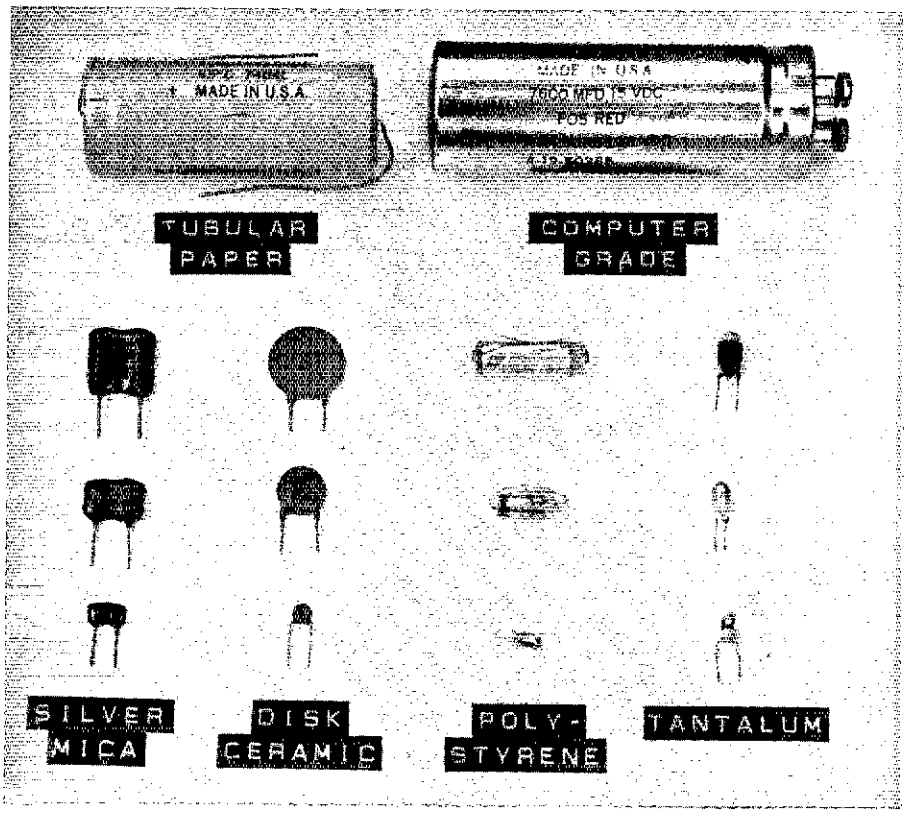
AC-Current Problems

Few modern capacitors carry ac or dc current ratings on their bodies. De current is a matter of concern mainly when feedthrough capacitors are employed. The cross-sectional area of the "through" conductor must be adequate for the amount of current flowing through the capacitor to prevent unwanted heating and voltage drops caused by I^2R losses.

Respective to ac current, the internal structure of the capacitor used must be adequate for the amount of current flowing if heating and subsequent damage or capacitance-value change are to be avoided. Knowledge of how a capacitor is built is helpful in choosing the proper type for a job. To illustrate the foregoing, a disk-ceramic capacitor contains a ceramic disk upon which two plates are formed by coating each side with silver. Thus, the total conducting area consists of two small, thin plates. The ceramic functions as the dielectric

material between the plates, just as air does between the plates of a variable capacitor. The amount of current which can flow through the plates before excessive heating takes place is limited by the size of the plates. Disk ceramic capacitors are poor choices for use in ac or rf power circuits. In some applications several disk ceramic capacitors can be connected in parallel to obtain a particular value of capacitance (five .001-μF units to obtain .005-μF, for example) when more current than a single capacitor can handle must be accommodated.

Mica capacitors are more suitable for circuits in which high values of rf current must flow. Although they may be similar in physical dimensions to a disk ceramic unit, they contain *several* plates (alternate thin metal plates and sheet mica). Therefore, the overall plate area is considerably greater than that of a like-value disk ceramic capacitor. For this reason the current is not concentrated in a small region, and heating is greatly reduced or eliminated. The higher the impedance of the circuit, the less will be the heating problem. This is because the voltage will be high and the current low (plate blocking capacitor in a pi network of a transmitter, for example). For this reason we often use high-voltage disk-ceramic capacitors between the tube plate and input to the pi network, as the impedance on *each* side of the capacitor is high. Conversely, in a high-power transistor amplifier designed for rf work we experience the opposite effect. This is because the collector impedance of a power transistor is very low, as is the collector tuned circuit. A single disk ceramic capacitor will not be acceptable in this application, but several in parallel might be entirely satisfactory.



Capacitor *Q*

The *Q* of a coil or capacitor is its quality factor. With respect to capacitors, the *Q* is related to the resistance of the insulating material (dielectric) used between the plates. The greater the inherent resistance, the higher the *Q* and the lower the energy loss. The higher the operating frequency of a circuit, the more significant the matter of *Q* becomes. A poor quality capacitor could easily destroy the *Q* of a tuned circuit, even if the coil *Q* was high. The *Q* of a capacitor at a given frequency is determined by many complex structural considerations, and is well beyond the scope of this article. Generally speaking, air-dielectric capacitors, silver-mica capacitors, and some glass capacitors are high-*Q* types.

Capacitor Stability

It was stated earlier that excessive internal heating of solid-dielectric capacitors, such as disk ceramics, is sometimes caused by a superabundance of ac or rf current flow. Heating – internally caused or brought on by the external environment – will bring changes in capacitance. The amount of change is determined mainly by the kind of capacitor in use. Ceramic capacitors are particularly prone to this unwanted malady. Stability is of the utmost importance in oscillators, tank circuits, and filters. Choosing the right capacitor for the application is mandatory when the desired performance must be realized, if we may use a truism.

Ceramic capacitors aren't recommended to obtain stable circuits except where their drift-versus-heat characteristics can be used to advantage (drift compensation). Magnesium titanate (positive temperature coefficient) and calcium titanate (negative temperature coefficient) are the principal materials used in ceramic capacitors. A combination of the two materials is sometimes used to provide controlled temperature coefficients. Disk and tubular ceramics are most often used in compensating circuits, notably in VFOs.

Since we have learned that rf current causes heating, even though the heat may be miniscule in amount, the capacitors in an rf circuit will change value by some percentage. Therefore, in critical circuits it is wise to use several capacitors in parallel to obtain a desired capacitance value. This will cause the current to flow through several capacitors, which in turn will greatly minimize the heating in each unit, leading to vastly improved stability. Silver micas, because of the larger plate area, are better for use in stable circuits. Most silver micas are rated for a capacitance change no greater than ±5 percent over a temperature range of -55 to +125 degrees *C*. Ordinary ceramic capacitors can change value as much as ±20 percent over a similar temperature excursion.

An excellent capacitor for use in stable af and rf circuits is the polystyrene type. The capacitance change is less than 1.3 percent over a temperature range of -10 to +70 degrees *C*. The coefficient is negative. Furthermore, this high-quality capacitor is quite inexpensive and it is suitable for applications from dc to at least 30 MHz, based on ARRL laboratory findings. Another advantage in using polystyrene capacitors is the immunity they exhibit to humidity effects. They are sealed tightly, and contain aluminum foil plates to which polystyrene dielectric material is fused, bolstering the humidity-barrier effect.

Inductance Problems

A serious problem can arise at high frequency and above when using capacitors that present unwanted inductance. This condition can result from the pigtail lengths and the internal structure of the component being used. Ideally, a vhf or uhf capacitor should exhibit no inductance when placed in the circuit; therefore, it would have no pigtails, and

the terminals and capacitor plates would be wide conducting strips. Inductive reactances are introduced by long leads, which in turn make impedance matching and effective bypassing and coupling extremely difficult.

Some builders try to preserve the capacitors and resistors for use in a succeeding project. They do this by not snipping off the capacitor pigtails. In many instances the long leads will prevent an rf circuit from working properly, if at all. Furthermore, the long leads in combination with the capacitance of the component will establish a resonant circuit (parallel inductance and capacitance), usually in the vhf or uhf region. These unwanted resonances can act as traps in an rf lead, thereby preventing proper performance. Proof of this condition can be found by shorting together the leads of a ceramic capacitor and finding the self-resonant frequency with a dip meter. It follows then, that the component leads should be kept as short as possible in rf circuits – coupling or bypassing applications. Unwanted inductance effects can sometimes be reduced by placing two or more capacitors in parallel to obtain a desired capacitance value, for as the unwanted inductances are placed in parallel the *overall* inductance becomes less, as is the case when one connects resistors in parallel to reduce the overall resistance amount.

The foregoing problem is especially troublesome in low-impedance circuits (transistor rf power stages), for the tuned circuits of such amplifiers or oscillators generally employ coils of very low inductance, say, of 0.1 μH at 50 MHz. The addition of unwanted capacitor inductance can add to the inductance of the coil and spoil the impedance match or tuned-circuit Q. Moreover, in push-pull stages where electrical balance is important, symmetry must be preserved to assure the desired balance. Unwanted inductances and capacitances can be presented by the components used, and this might make balancing impossible.

In circuits where unwanted capacitor inductances can not be tolerated, the builder may choose to employ leadless chip or mica capacitors. The soldering is done directly to the capacitor plates. Leadless capacitors are most applicable in printed-circuit assemblies where the pc-board pattern can be designed to accommodate the leadless capacitor without a need to add pigtails.

Tubular paper and similar capacitors should not be used in rf circuits. They have low Q and are usually quite inductive.

High-Capacitance Units

Electrolytic capacitors are available in a capacitance range from 1 to 100,000 μF or greater. They contain aluminum-foil plates and utilize a paste type of conducting material as the electrolyte. The paste is often contained in a special paper which is placed between the capacitor plates. The dielectric appears as a thin insulating layer caused by electro-chemical action when polarizing dc voltage is applied to the capacitor. This style of capacitor permits some leakage current between its plates, and that condition limits the maximum voltage rating to approximately 600. Most amateurs use "computer-grade electrolytics" today because of their compactness and reliability. They are frequently used in series with one another to filter high-voltage power supplies of up to 3000 volts dc output. When electrolytic capacitors are series connected, equalizing resistors of high wattage and like value should be placed in parallel with each capacitor in the string to prevent damage to any one capacitor.

Another popular high-capacitance unit is the tantalum type. One style uses foil plates made from tantalum, and the electrolyte is liquid. A more common type today is the tantalum one with solid electrolyte. The latter is a semiconductor material. Tantalum capacitors are available in a range of 0.1 to 330 μF and at voltage ratings from 6 to 50. The main feature of interest to amateurs is the small size of these components. They are well suited to low-voltage solid-state circuits of the miniature variety.

Final Comments

A substantial number of other capacitor types is available on the present market. They differ mainly from those we have just described in their composition and physical form. Many of them follow the classic tubular paper design but use modern plastics as dielectric and insulating materials. Most of these capacitors are intended for use from dc through the audio-frequency range, but are not suitable for rf applications. As a rule of thumb, an amateur can use high-quality rf types of capacitors at ac and dc, but low-frequency capacitors should not be used in rf circuits.

A good moral to this story might be: *Keep the connecting leads as short as possible, avoid capacitor heating, and choose the right capacitor for the job.* Finally, watch those voltage ratings! QST

Strays

CAN IT BE? CLUB CLAIMS SENIORITY

□ The Radio Club of Tacoma (Washington) was formally organized on October 16, 1916. Are there any challengers to this group's claim to be the oldest U.S. amateur radio club which has been continuously operating under its original charter and with the same name? Its ARRL affiliation dates from August of 1920. All claims, they say, can be authenticated from their record archives housed in their club library.

In addition to a well-equipped radio room, the wholly owned club house at 1249 South Washington Street boasts an antique wireless radio museum, a meeting room, kitchen and a library stocked with the memorabilia of the club. Here amidst its many historical treasures, a browser can flip through Volume 1, No. 1 of *QST* issued in 1915, or peruse a copy of the *Pacific Radio News* published in San Francisco, heralding the club's first officers and meeting place.

Via its own printing press, the Tacoma Radio Club publishes a monthly newsletter *The Loggers Bark*. Among its other activities is sponsorship of the annual Tacoma Hamfair. At the 1975 affair, the first vice president of ARRL Vic Clark, W4KFC, made an official visit. One of the ingredients of the Tacoma club's success is the ladies' Auxiliary to which wives or mothers of the members automatically belong. Through their efforts, much of the behind- the-scene work is accomplished.

Engrossed in conversation at the 1975 Tacoma Hamfair are at left, Dr. F. Clifford Spike, W7OS; center front, Roy J. Devish, W7AZI; right, Vic Clark, W4KFC; and center rear, Bill Deatherage, WA7SCN.

Amateur Radio

By Major General Robert E. Sadler*

What does a high-ranking military communicator think about the problems which confront our hobby? In his address to the ARRL National Convention, Reston, VA, General Sadler touched upon some of the core issues facing amateur radio today. The following are excerpts from his address.

Just the other day I met another kind of "amateur operator" who really left an impression on me. I was going down Route 81 taking my son to college when this orange streak went by. About 10 minutes later I stopped at a gas station and there was the orange streak — a hopped up Torino. I said to the young driver, "I don't know where you are going, young man, but you sure seem to be in a hurry." He responded, "I was only going 85, but if I had my CB I'd be going 95 and not worrying about it." Now, not everybody has this attitude. In fact, CBers have a pretty good image with the general public because a great number of them are also interested in public service. But I thought that was interesting because it reminded me of the message from the President, Mr. Dannals, on the Class E issue in the March *QST*.

I'm sure I don't have to remind anyone here that the issue is how some part of the spectrum between 220 and 225 MHz is going to be used. This has been of great interest to you and is of interest to us, too. We have some systems operating within this band that are very important to all of us here. You know, we don't have many weapon systems today that are vital to this country that don't rely heavily on frequency support. But we all need to keep in mind that the effective use of the spectrum is vital to all of us. No one should bank frequencies and not make good use of them. None of us draw interest on that.

Restructuring

There is a tremendous pressure in our country for personal use of the radio spectrum. Such a force is certainly evidenced by the millions of citizen band radio enthusiasts. The pressure of numbers alone is hard to ignore. Today, there are over 6 million CBers and *The Wall Street Journal, Barrons*, and *Electronics News* all report that manufacturers of CB equipment can't keep up with the demand. In fact, business is reported to be so good, it's bad. With this interest, and pressure to grow, there may be well over 10 million in the citizens band by 1980; and this represents a voice that *will* be heard.

Therefore, restructuring, in whatever form, should make room within the amateur service for a broad spectrum of individual citizens interested in radio as a hobby.

It seems to me that you have a golden opportunity to expand your excellence and professionalism in a more broadly based Amateur Radio Service. I know the position of some is that they would rather have a small, strong professional group than a larger group of less professional members. But, I don't think there is anything wrong with a *strong* large professional group — it is certainly good for the country.

There are great opportunities here! While you need the pressure of CB numbers, the Citizens Radio Service needs your operational and technical expertise to solve current CB problems of overcrowding, spurious radiations, procedure violations, and others. Moreover, they could benefit from *your* leadership, *your* tradition of responsible actions, and *your* history of integrity in following the rules of radio operation.

We all want the citizen to be able to share spectrum privileges in our democratic society. We want responsible citizens and a responsible radio service. So the goal, as I see it, is to foster increased participation in your hobby without losing any of the necessary quality aspects of amateur radio. For example, the concept of providing a basic class of amateur license with endorsements for demonstrated proficiency in more advanced skills is an ideal way of channeling some of the pressure for spectrum use.

Ham Training

I am, of course, partial to our professional amateur. I would be ungrateful if I weren't, because you have made tremendous contributions to the Military. I think one of the most significant ones you make is through the young people you train who eventually join our ranks. I have personally noted that many of our sharpest communicators are amateurs. They are strongly motivated people who have communications as both their vocation and avocation, and they are enthusiastic and inquisitive about both of them. So they don't just work at their profession on the basis of a duty day — they go home and continue communicating and experimenting and getting sharper in their profession.

I think you can see why I appreciate your programs. And one of the best programs that I know anywhere is your use of Oscar in the classroom with demonstrations by local amateurs. This program can't help but attract all of those who have an aptitude for amateur radio.

It is a great tribute to amateur radio that you have the calibre of volunteers who can design and build satellites that have the record of success that your Oscar series has had. It is absolutely amazing to me that you can build one as complex as Oscar 7 for $60,000. We could use a little of your budget stretching techniques in the Military because we are having a hard time making our limited budget stretch to do the things we need to do.

The key to maintaining the strength and vitality of any organization is its youth. Young people today aren't as interested in tradition as they are in progress; and there are whole new fields of interest available today that weren't readily available or practical to us. So there is going to be a lot of competition for the interest of our youth, but all organizations have the same problems; and you have a lot going for you.

You demand discipline, and youth wants it today.

You ask them to be professionals and they want to take pride in what they do. You have an effective program in making contact with them through your Oscar program; and while you have tough standards, you are willing to work with them and show them the way, and they appreciate that. QST

* Director for Communications-Electronics, The Joint Chiefs of Staff, Department of Defense.

1975 · A Year of Waiting

A personal overview of what happened, and did not happen, in Amateur Radio and the American Radio Relay League in 1975

By Charles Harris,* WB2CHO

Waiting for another sunspot, even a little one . . . Waiting for a license renewal to be processed . . . Waiting for Congressional action on RFI problems . . . Waiting for official word on the Extra Class call sign docket . . . Waiting for the band to open . . . Waiting for FCC action on amateur restructuring and Class E CB . . . Waiting for the chance to finally work an AC3- in Pennsylvania . . . Waiting for the local repeater to receive its WR call . . . Waiting . . .

A lot of good ideas, plenty of fruitful discussion, extensive research and preparation on the part of amateurs, contrasted with little action in government circles – that was the theme of the year 1975 in amateur radio.

Much of the ideas, discussion and preparation concerned the FCC: what they did and did not do. On the positive side, 1975 saw amateur licensing fees substantially reduced, under pressure from the Supreme Court, and the citizenship requirement for ham licenses eliminated. Both moves were welcomed by the amateur community, but neither led to a significant increase in the number of amateur licensees.

The FCC announced new amateur bands in the gigahertz range, including all frequencies above 300 GHz. The number of copies the FCC requests in comments was reduced, and John Johnston, K3BNS, replaced the retiring A. Prose Walker, W4BW, as head of the Amateur and Citizens Division of the FCC.

Only a couple of FCC actions in 1975 affected more than a minute fraction of amateurs, however. Bicentennial call signs were announced, and for once WAs and WBs got the better deal, dropping a mere "dah" in the new year. Their previously-licensed compatriots are faced with a more radical change, from K to AD, W to AC. The operation will be a great boon for prefix hunters, and a big headache for QSL bureau workers.

Also of interest to the amateur community in general, the FCC has begun

the deregulation of the restrictive repeater licensing rules, by allowing linked repeaters, crossbanding and automatic control. Further moves in this direction are promised by John Johnston.

Of more interest to many amateurs was what the FCC did not do in 1975. The long-awaited Extra Class call sign docket continues to languish on a Washington desk. The more recent ARRL proposals to permit ASCII on amateur bands and to administer amateur examinations in Spanish prompted no official action, nor has the Mt. Diablo club proposal to formalize the procedure for amateur exams for the deaf been considered. There was, of course, little time in 1975 for positive action on these issues. 1976? We wait . . .

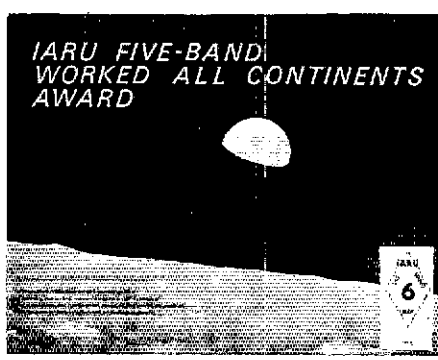
The FCC problem which affected the most amateurs in 1975 was licensing delays. An unanticipated explosion in Citizens Band licenses overwhelmed the Gettysburg licensing headquarters, creating the greatest backlog in FCC history. Hams waited more than four months for simple renewals and upgrades, and untold numbers of Novices lost interest in amateur radio while waiting for their WN call. The new post office box for amateur licenses, Box 1020, reduced the turnover time to about 7 weeks by the year's end, but hundreds of repeater applications still await action after six months. It is well past time for "instant licensing!"

Amateur restructuring and Class E CB continued to be the major topics of discussion in 1975, as the amateur community had an unprecedented opportunity to express its opinion of the entire licensing system. Manufacturers and CB groups showed sign of considerable restlessness over FCC inaction on Class E, but amateurs sighed in relief as the FCC announced it would postpone decisions on Class E while it considered a code-free amateur ticket. CBers and amateurs alike continue to wait.

But the League did more than wait during 1975. As soon as the word on Docket 20282 broke late in 1974, the January issue of *QST* was changed to include highlights of the FCC's dual ladder concept. (Ever wonder why our Managing Editor is losing his hair?) The full text of the controversial docket was featured in February, followed by extensive coverage of the membership survey and the Board of Directors deliberations in the March, May, July and September issues.

And speaking of the survey: it was indeed a mammoth undertaking, ultimately involving more than two dozen of the headquarters personnel. Assistant Secretaries Dave Sumner, K1ZND, and Hal Steinman, K1FHN, and Managing Editor Bill Dunkerley, WA2INB, carried much of the headquarters workload, but the real heroes of the operation were the more than 56,000 members who took the time and effort to complete and return the survey form, many with extensive written comments.

Professional survey-takers were amazed at the phenomenal response rate, but the League felt it was indicative of the keen membership interest in this all-important subject. The survey results were tabulated and analyzed and presented, along with the thousands of individually written comments, to the



*Assistant Secretary, ARRL

Board for consideration at its special May meeting. The decisions made at that May meeting are a matter of record, in both the minutes of the meeting and in the 125-page counter-proposal filed with the FCC. Now we can only wait . . .

Consideration of Docket 20282 was not the only League activity in 1975. Indeed, the ARRL moved ahead on a variety of fronts, to better serve its ever-growing membership. A new director-appointed post was established: Public Relations Assistant, to disseminate to the non-amateur public the many positive aspects of amateur radio, particularly in the area of public service. The program has met with a great deal of success, thanks to the leadership of ARRL's Public Relations Counsel, Don Waters. Among the latest products in the PR line are taped public service spots for broadcast stations, now available from headquarters.

Under the leadership of newly appointed General Manager Dick Baldwin, W1RU, *QST* has announced some changes for the new year. Although technically part of the 1976 review, many of the changes should be welcomed by our members, as the larger size allows us to use larger print and diagrams. The reason for this radical departure from 60 years of a smaller size? Simple economics, as the over $100,000 saved by changing the size will allow the League to avoid an increase in dues in these days of ever-increasing inflationary pressures.

Other League activities in the past year involved Oscar, RFI, WARC and

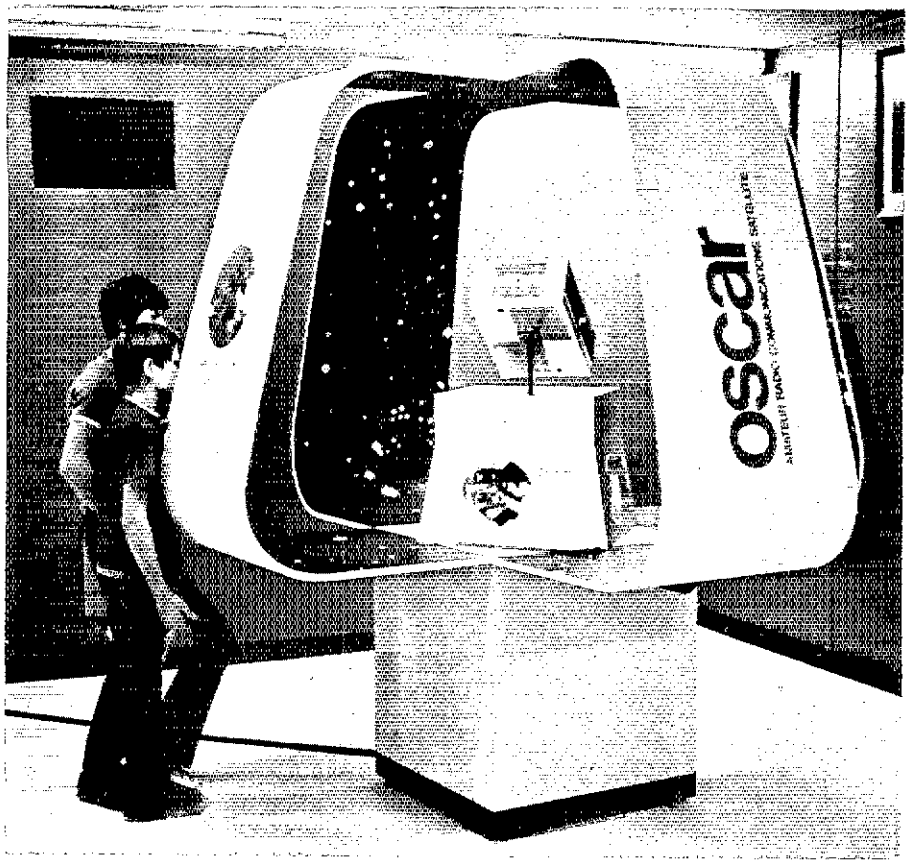
DXCC. Oscar 6 celebrated its third birthday in fine shape, and early in the fourth year of operation of this supposedly short-lived satellite, Connecticut Governor Ella Grasso worked two countries and a handful of states through the space-borne repeater, from the ARRL headquarters' station, W1AW. Oscar 7 entered its second year of operation, with the 70cm-2m mode B attracting much of the attention. The non-profit ARRL Foundation continued its support of these operational satellites, as well as the proposed Phase III series, planned for future years.

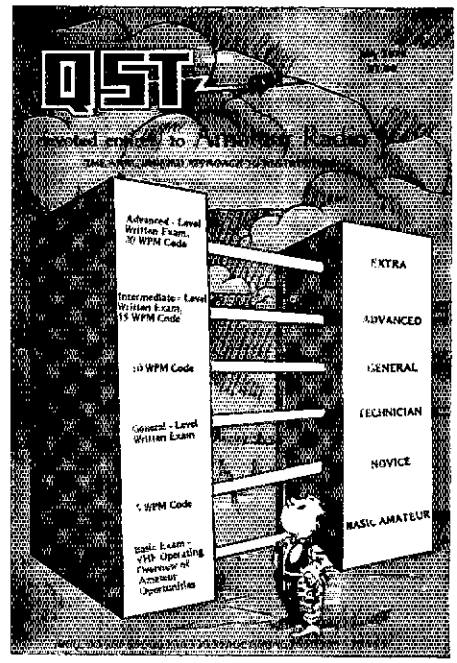
By the year's end, more than $62,000 had been raised to assist this work and the important Oscar Education Program. Have you included this worthy beneficiary in your will? In conjunction with the ARRL-NASA sponsored Oscar Education Program, the League produced a 29-minute color videotape on the satellites and their use in the classroom. This tape, *Oscar and the Ham*, is available through headquarters. Also in the Oscar field in 1975, Richard L. Daniels, WA4DGU, received the coveted Space-Ship Earth award from NASA, for his work in the Oscar Education Program.

Getting back down to earth, RFI continued to plague many amateurs, and the League continued its efforts to alleviate this troublesome problem. The ARRL RFI Task Group met in March, under the direction of Task Group Chairman and ARRL Vice President Vic Clark, W4KFC. Through the efforts of this committee, the ARRL completely updated its RFI package and, more important, a bill has been introduced in Congress to eliminate many of the easily avoidable interference problems. Congressman Vanik of Ohio introduced the bill, now known as HR 7052, in May, and hearings are scheduled soon. Write your congressman now, urging his support of this measure.

On the international scene, the forthcoming World Administrative Radio Conference in 1979 was the topic of major interest. IARU Regions I and III both held conferences in the spring of 1975, in Hong Kong and Warsaw. IARU President Noel Eaton, VE3CJ, attended the two conferences, where plans for WARC preparation were discussed. ITU Secretary-General M. Mili highlighted the Warsaw conference, with an address on the 50th anniversary of the founding of the IARU. A Region II conference has been scheduled for this spring in Miami, as the U.S. Amateur Working Group for WARC, headed by A. Prose Walker, continues its extensive preparation.

The amateur position at the WARC will be a unified one, with amateurs from all parts of the world supporting requests for the full, unshared use of the 160, 80 and 40 meter bands, a worldwide band at 220 MHz and new amateur





frequencies around 10, 18 and 24 MHz. What will we get? We can only wait, and continue our groundwork and preparation.

Also in the international field, the League's Executive Committee and the Board of Directors of the Sister Cities International have approved a cooperative understanding between the two groups, in an effort to further international good will via amateur radio. We look forward to a long and fruitful relationship with Sister Cities International in future years.

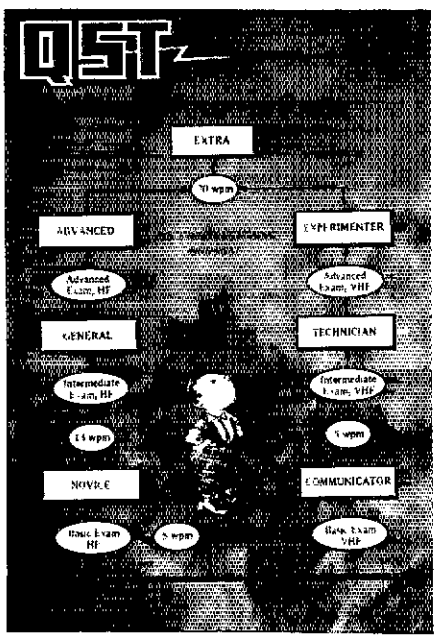
Also in public service, vhf fm and repeaters once again demonstrated their value in emergency communications, as tornadoes ripped through Alabama, Mississippi and Oklahoma early in the year. The hf bands carried their share of public service communications in 1975, as the daytime part of NTS continued its progress toward official recognition. A prime example was the assistance given the Vietnamese refugee camps earlier in the year.

In the miscellaneous department, MARS joined IARU in celebrating its silver anniversary, and the sunspot cycle bottomed out (hopefully!). DXCC saw a couple of countries come and go, and the addition of a new award: CW DXCC, with ARRL Atlantic Division Vice Director and W3QSL Bureau Manager Jesse Bieberman, W3KT, earning the coveted Number 1. A couple of contest changes proved popular, as the double point bonus for cw FD QSOs and low band/high band categories in the DX Test gave more stations a crack at official wallpaper.

6BWAC Number 1 went to JA7AO, a sign of things to come. The code-free amateur license in Japan has pushed that country ahead of the U.S. in number of licensed hams. Digital gear became the in thing this past year, forcing those of us who finally conquered transistors back to the drawing board. ARRL's Instructor Corps gained over 150 Elmers, but more are needed. The 1975 *Handbook* sold out, as interest in amateur radio continued to climb.

Two-meter fm has become so popular that many areas are seriously overcrowded with repeaters. We still have a lot of available spectrum at 220 and 432 MHz, and these bands may be the only hope for beleaguered frequency coordinators.

As we look back over the year 1975, we see mainly preparation: preparation for the WARC, for the hearings on HR 7052, for the comments on 20282, preparation for the future of amateur radio. 1975 will not be remembered as a turning point in ham radio, but it may very well have been, as the work done by the ARRL, its members, and amateurs throughout the world during this past year will have profound effects on the structure of amateur radio in the future. But for now we must wait, and wait . . . QST



Correspondence

The publishers of QST assume no responsibility for statements made herein by correspondents.

QUE?

□ In keeping with the "in thing" these days, which is changing long descriptive names for scientific terms into short, non-descriptive ones, I offer the following:

If cycles-per-second is now Hertz and centigrade is now Celsius, what about a couple other well understood words, such as frequency and wavelength? The latter particularly makes too much sense, and there are plenty of worthy radio pioneers whose families would be honored by making their name a household word.

Maxwell for frequency seems a good choice, as does Marconi for wavelength. Then we can have phrases like: "The Marconi for a Maxwell of 20 MegaHertz is 15 meters." Or: "The speed of light is equal to Marconi times Maxwell." The possibilities are endless. — *Charles J. Harris, WB2CHO, Watertown, CT*

QRZ?

□ The article on Interstellar Communication by W3MR in the August 1975 issue of *QST* suggests a new field for radio amateurs to explore. Since amateurs have led in the developing science of electronic communication from the days of the spark transmitters to the Oscar space satellites, this may be the time for amateurs to seriously consider making a contribution to the growing field of CETI (Communications with Extraterrestrial Intelligence). Major national and international programs to search for signals from alien civilizations are already in progress or in the planning stage.

An organized amateur effort similar to that for Oscar and using equipment of the type required for moonbounce would make it possible not only to listen for, but also to transmit an "Interstellar CQ" to nearby star systems. By utilizing transmitters operating at maximum authorized amateur power, high gain dish antennas with guided equatorial mounts, and by connecting a number of different stations together with common transmitter keying and using common target stars, it should be possible to radiate a sizable signal detectable by any advanced civilization around a nearby star.

While such a program would require many years before a reply might be expected, the chance of success could be quite good if many advanced technical civilizations exist in the universe. The type of message, the proper frequencies, and other technical data can be found by study of the numerous reports now available on the subject of Interstellar Communications, and by monitoring any current transmissions from major radio observatories via high frequency backscatter.

It would be quite an honor when contact is established someday if amateur radio first bridged the gap between civilizations among the stars. The universe is listening; let's transmit a "CQ." — *James D. Hillman, W3VGF, Pittsburgh, PA*

QTR?

□ Who started the UTC "improvement," which seems to have usurped our good old GMT? Having introduced it into *QST* you appear to have confused yourselves, as the latest issue I have uses both UTC and "Z", which are one and the same.

I feel it is relevant that here in Britain, the "home" of GMT, there has been no mention of UTC. And perhaps someone can explain how Universal Coordinated Time comes to be UTC. Surely it should be UCT? — *Allan Herridge, G3IDG, Basingstoke, Hampshire, England.*

QST!

□ May I offer a small criticism to your fine publication, *QST*. As one of amateur radio's finest public relation tools, *QST* could be discouraging some prospective members from entering our ranks by the use of too many undefined acronyms.

I have always made it a practice of making my copy of *QST* available to any and all around our laboratory in the hopes that someone will get interested in amateur radio. The other day I spent at least 20 minutes deciphering way too many acronyms used in your last issue to a few interested parties. I have been licensed for over 25 years and had to stop and really think to decipher some of the ones we hams have taken for granted over the years. To the new-comer, ham jargon is not that easy to grasp even without the added acronym puzzle. I am sure this does a lot to discourage many in further perusing.

I would like to suggest that the use of acronyms remain, but they should be defined the first time, then the acronym bracketed in each and every article, every month. For example; if an article is written about Earth-Moon-Earth (EME), it should be written in this form and from that point on until the end of the article, EME should suffice. By the way, it could have saved me a little embarrassment. — *H. Lee Hancock, Jr., W4NXC, Springfield, VA*

□ I just wanted to say that I agree 100% with Larry Scheck (WN2WNA) of Brooklyn, NY and Don Allison (WB4Z1U) of Florence, AL, both of whom had letters in the November issue of *QST* complaining that the magazine is too technical.

I have been receiving *QST* for about a year now and don't understand or like so many complicated articles and diagrams about advanced equipment and programs. Of course, some of your readers may understand and enjoy such articles, but how about more balance in selection. A few more articles for Novices and beginners, please. Thank you. — *George T. Van Hoomissen, WN7BDF, Portland, OR*

□ I heartily concur with the statements published in "Correspondence from Members" that the articles are too technical in nature for the average ham operator to even know what some of the words mean, yet put the articles to good use. I am an Extra class operator, have a B.S. in Administration & minored in Mathematics & can't begin to comprehend some of your articles. Perhaps a survey similar to the one you sent out on FCC restructuring is in order to see just what your members want and can read. — *W.A. Clepper, Jr., K3ESV, Sharon, PA.*

□ I have just read the letter from Mr. Larry Scheck, WN2WNA, in the November *QST*. Why did this man become an amateur? He is not interested in either the technical aspect or the operating aspect of the "hobby" of amateur radio.

I can think of many articles that have run in *QST* in the past year that have been excellent theory articles but still very easily understood by the average amateur who got his license by studying theory and code. Your "Beginner and Novice" articles have been very easily understood. Even the more technical articles like the ones from W2FMI have been easily understood if you only read the construction part. At times the theory has been a little deep for the beginner but the construction part was child's play. W1CER's and WA1LNQ's series on transmitter and receiver design was excellent. It taught the person who knew very little except Ohm's Law how to design. The math in those articles was simple arithmetic.

To answer Mr. Allison's letter on contests, try them, you might like contests. While it is true that some contesters have been lost from reality, for the most part they are a great group. — *Charles J. Collingwood, WB9BUV, Zionsville, IN*

ENTHUSIASM CONTAGIUM

□ Enthusiasm is contagious! I know, because I have seen it spread through our Mammoth Cave Amateur Radio Club like wildfire! This infectious hobby we call amateur radio often lies dormant in the minds and hearts of small, "elite" groups of hams who are content with checking into a MARS net once a week. But not OUR club! Our club is dynamic! It is growing! We are on the move! And all because a couple of hams took the time to share their enthusiasm.

In March of 1974 my son and I and three others cautiously appealed to the local ham club president asking for help to get a Novice license. We were not certain what was required to get a license, but we were warmly received by the 14 or 15 club members who were active at that time. They took us under their wing and taught us code, theory, operating procedures, and pride. They gave us all the help we needed and tempered it with encouragement and friendship. But most of all they gave us enthusiasm.

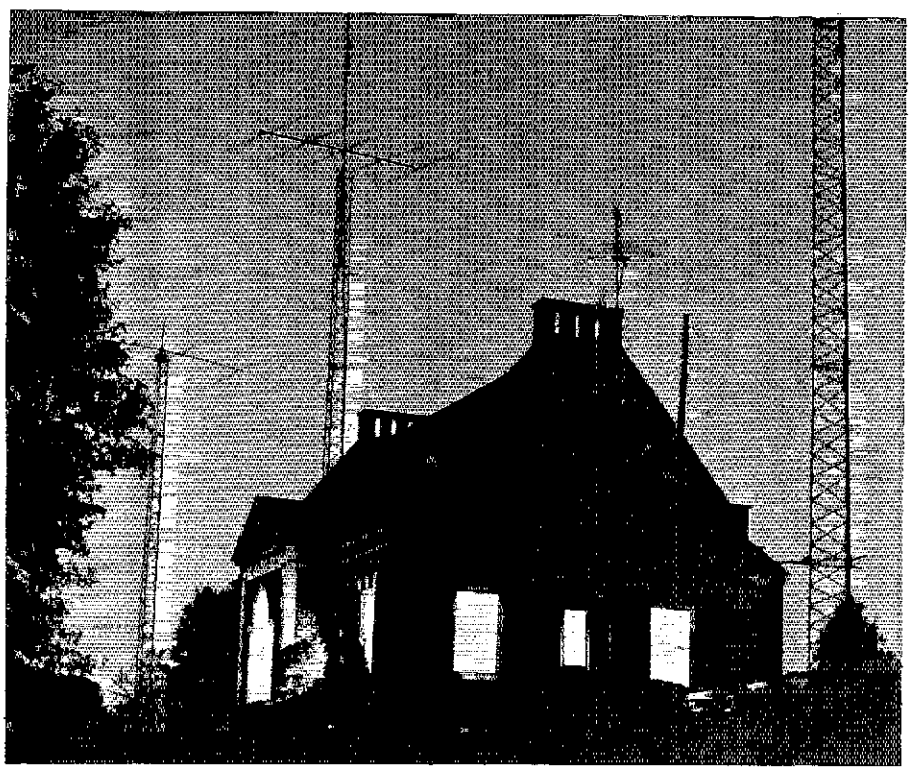
And now, 19 months later, my son Mike (WN4JZP) is a Novice, Norma (WA4KFL) and Anson (WB4KPJ) are Generals, and Bob (WA4KFM) and I have our Advanced tickets. "Fine Business" you say! You bet it is! But the story doesn't end here. We have had three successful Novice classes since March of '74, and another is under way at the present time. We are expecting 35 members at our next club meeting. We had to find a larger meeting place because we outgrew the old one. We have doubled our active club membership, and our teenage Novices have organized a ham radio club at the high school. We have a public relations chairman who keeps our community up-to-date on our public service activities. Our club meetings include advisories and training sessions, and we are scheduling code practice broadcasts via our repeater station.

I am saddened by frequent testimonials from people that have not been able to find the same help and encouragement that I have had. To these people I offer my apologies for the indifferent attitude of some amateurs. Such hams are a minority. For all across our country ham clubs like ours are alive and vibrant. And wherever apathy gives way to enthusiasm, amateur radio is alive! — *Bernie Schwitzgebel, WA4JZO, Glasgow, KY* QST

Hams at Headquarters

Some cured, some not. Here are a few of the 70-plus faces and calls you'll meet at 225 Main St., Newington, CT 06111 See you in '76?

By Ellen White, W1YL



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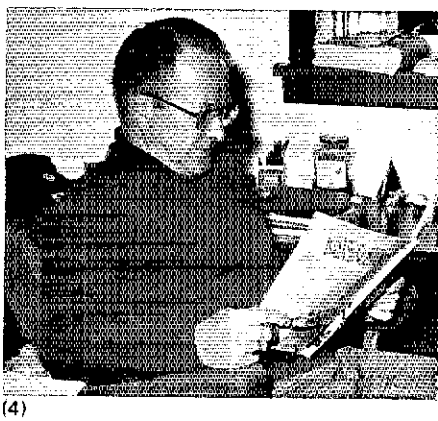

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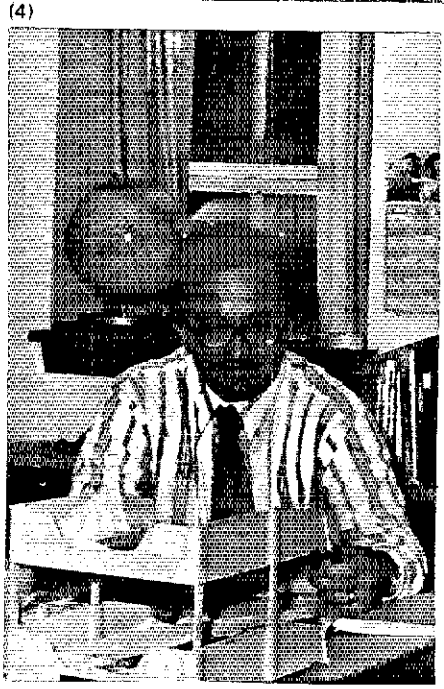

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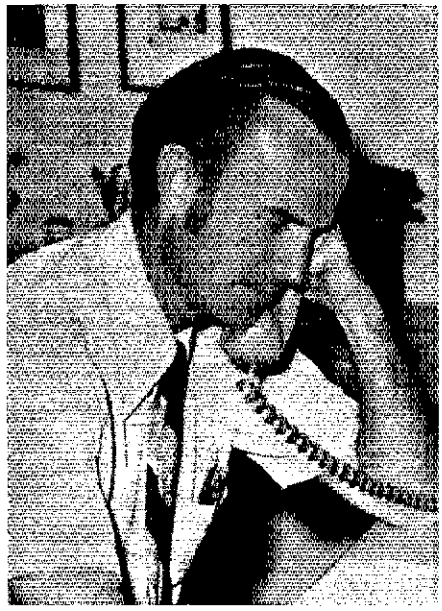

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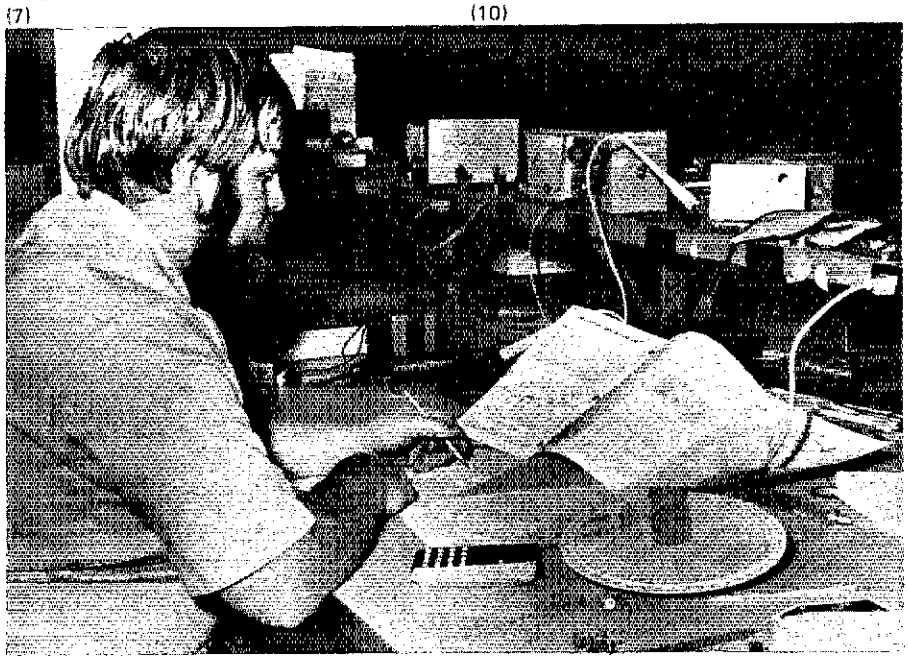

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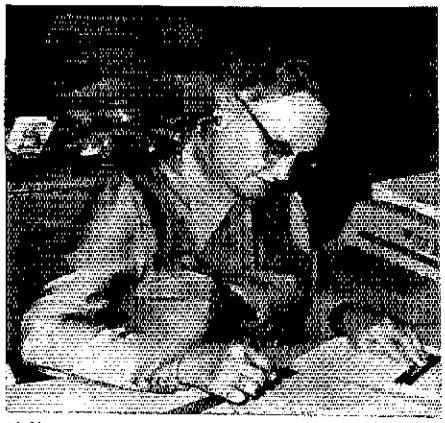
(1) The Maxim Memorial Station in an unusual night shot by visitor W2ABE. (2) Assistant Secretary WB2CHO, left, welcomes Washington visitor W7GVC. (3) Receptionist, Karen, arranges for your tour guide while you log in. (4) First stop on the tour is General Manager/*QST* Editor W1RU, ex-W1IKE. (5) W1UED is in charge of the Secretarial Department, covering the multitude of membership services. (6) Technical Editor W1CER, ex-W8HHS. (7) Popular Assistant Technical Editor W1ICP, ex-WØICP discussing repeater frequency coordination with W1NJM. (8) W1GQO, ex-K3UQU, designing vhf amplifier matching networks for the *Handbook*. (9) Beginner and Novice Editor WA1LNQ. (10) A typical position for Advertising Manager W1CUT, ex-W5TQD. (11) *QST* Managing Editor WA2INB, ex-KL7ELA. (12) Assistant Communications Manager WA1STO, ex-WB9FJT. (13) Communications Manager W1NJM, ex-W3AMR.



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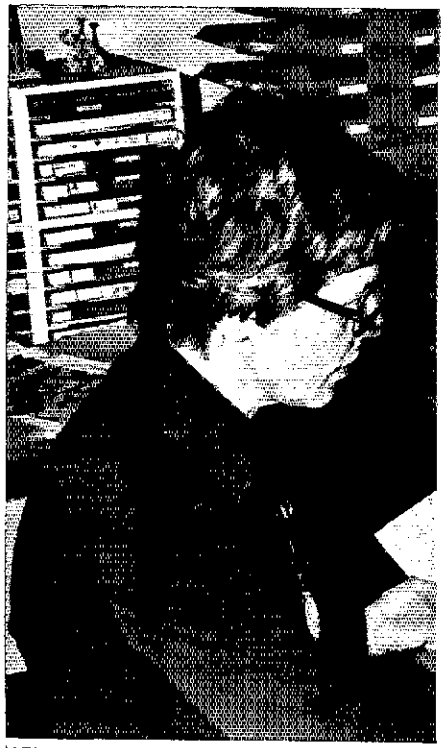

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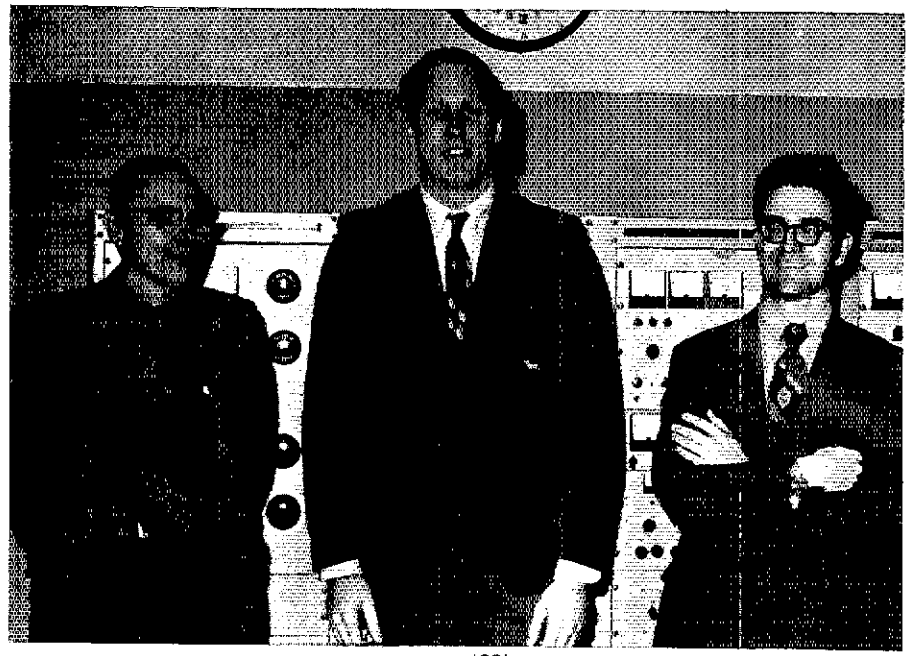

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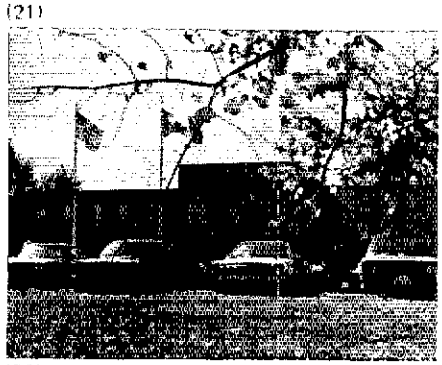

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(14) Rita WN1WEV edits station activities. (15) Deputy Communications Manager W1YL, ex-W1YYM, W6YYM, KH6QI, W2RBU, working on the contest calendar for the year. (16) Senior Hq. staffer Marion E. Bayrer. (17) Chief Billing Clerk Leitha Phillips. (18) Doreen Cromarty is in charge of those 100-K plus membership records. She's shown checking a member's master records on microfiche. (19) Circulation Manager W1JMY runs the largest Hq. dept. with responsibility encompassing almost all business aspects of the League. Joe's assistant is W1GNC, ex-WØDRE. (20) The model crew of the model station, the W1AW "team": left to right, Assistant Communications Manager and Station Supervisor W1WPR, ex-W3ODU, WA3JSU (yes, Alan is 6'6"), and Chris, WB2SEZ. (21) W1WPR punching tape for both the cw and RTTY W1AW bulletins. (22) It's time for a brief adieu for this trip. We hope you plan a more extended visit to see your home of amateur radio during this bicentennial year. 73.

QST

Hamfest Calendar

Indiana: The Fort Wayne Hamfest is January 18 at Shiloh Hall (1/2 mile west of I-3 on the Carroll Rd). More tables and space than last year. Flea market, food, drinks. Tickets $1.50 at door; XYLs, children under 12 free. Tables available $1 for 4 feet. Talk-ins on 28/88 and 16/76. For details write: ACARTS, Inc., P. O. Box 342, Fort Wayne, IN 46801.

Michigan: Southfield Amateur Radio Club's Swap n' Shop is January 18, Southfield High School. Ten Mile and Lahser Rd., Southfield. Tickets $1.50. For info write: Mr. Robert Younkers, 24675 Lahser Rd., Southfield, MI 48075.

Ohio: New day and location Mansfield Mid-Winter Hamfest/Auction, Sunday, February 1 at the Richland County Fairgrounds. Forums, large indoor flea market areas, displays and auction with easy access from I-71 and US-30. Registration $1.50 in advance; $2 at the door. Tables for flea market $1 each. Doors open at 9 A.M., auction begins at 2. No commission. Talk-ins 3,972.5 kHz, 146.52 and 34/94. Additional info and advance tickets write: K8JPF, Harry Frietchen, Jr., 120 Homewood Rd., Mansfield, OH 44906 (419) 529-2801 home, (419) 524-1441 work.

Wisconsin: The 4th annual Midwinter Swapfest of the West Allis Radio Amateur Club will be Saturday, January 24, starting at 8 A.M. at the Waukesha County Expo Center. Directions: I-94 to Waukesha Co. F, south to FT, west to Expo. Talk-in on 146.52 MHz. Tickets $1.50 advanced, $2.00 at door. (Dealers – advanced registration only.) Write: WARAC, Box 1072, Milwaukee, WI. 53201.

Coming Conventions

ARRL TROPICAL HAMBOREE

January 24-25, 1976, Miami, Florida

The really international hamfest in a genuinely international city. On January 24-25, meet your island and Latin American DX friends at the Miami Bayfront Auditorium, Miami, Florida, in the only part of the USA – including most of Florida – with a 99 percent promise of January tropical sunshine.

Hamboree traditional goodies plus – it's traditional! – always something new. The latest from the manufacturers – the not so late in the giant indoor flea market! At the ARRL forum, January Board meeting results will be delivered by President Harry J. Dannals, W2TUK. "Integrated Circuits" will be the topic covered by Technical Assistant Chuck Watts, WA6GVC, of the ARRL headquarters staff. There will be a Bicentennial QSO/QSL Contest, sponsored by the City of Miami, with announcement and kick-off by Miami officials. Keep up with the state of the art at "Skip" Tenney's renowned microprocessor seminar (details from Skip at *Ham Radio* magazine). For the lucky, an Atlas 210X, Heath HW104, Heath 2026, and an ICOM 230 plus more. The YL's list includes a beautiful diamond ring!

Registration is $2.00. Hotel data on request by writing to the Dade Radio Club, P. O. Box 520073, Miami, FL 33152.

January 23-25
ARRL Tropical Hamboree, Miami, Florida

February 13-15
Florida State, Orlando, Florida

March 20
Michigan State, Muskegon, Michigan

April 9-11
Southwestern Division, Tucson, Arizona

April 10-11,
North Florida Section, Jacksonville, Florida
April 25
Delta Division, Jackson, Mississippi

June 5-6,
ARRL Hamfest, Salina, Kansas

June 11-13
Southeastern Division, Atlanta, Georgia

July 2-4
West Virginia State, Jackson's Mill, West Virginia

July 9-10
Central Division, Milwaukee, Wisconsin

July 16-18
ARRL National, Denver, Colorado

July 24-25
Atlantic Division, Philadelphia, Pennsylvania

August 7-8
ARRL Hamfest, Concordia, Kansas

September 3-5
Canadian Division, Halifax, Nova Scotia

September 3-5
Pacific Division, San Jose, California

September 10-12
New England Division, Boston, Massachusetts

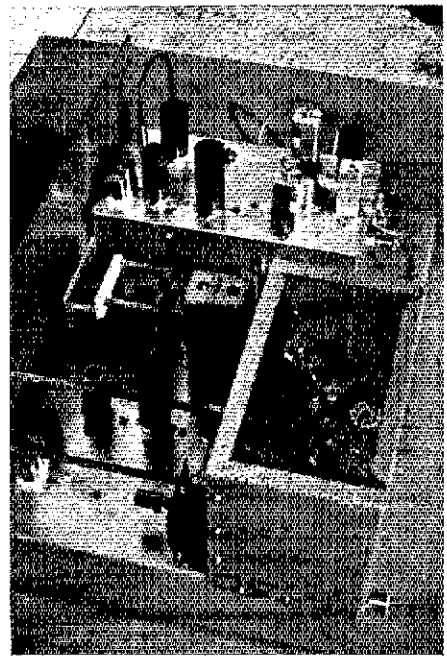
October 8-10
Midwest Division, Omaha, Nebraska

November 6-7
South Florida Section, Clearwater, Florida

November 13-14
Hudson Division, McAfee, New Jersey

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

Strays



□ Not all amateurs have given in to the parts procurement nightmare! The photograph shows one man's effort to produce an 80 through 10 meter band-switching ssb transmitter, and a neat job it is at that. The tubes and components are of surplus origin except for the McCoy ssb filter and some Miller i-f cans which the builder, W6SPC, won at a hamfest. Hand-wound coils are used in the rig, and judicious swapping with other amateurs provided additional components used in the transmitter. Dan reports that he garnered the 6293s in the PA for 25 cents each, and his heterodyne-oscillator crystals were also 25 cents apiece from a surplus dealer.

There must be some kind of moral to this short story – that those who really want to construct equipment should exercise patience and initiative when gathering parts. It beats sitting with folded hands and bewailing the lack of ready access to brand new components. Incidentally, W6SPC is not an engineer: his circuit is based on ideas presented in the *Handbook*. – *WICER*

STOLEN EQUIPMENT

□ Theft from truck on Nov. 13 in Fresno, CA. Clegg FM-27B, Serial No. 27043-1628. Edward Brehn, WA6UIO, 58609 Rd. 601, Ahwahnee, CA 93601.

□ Standard 826MA, Serial No. 208185, was stolen from parked car in Pasadena, CA. Gary Jaegers, WB6WDV, 870 E. Alameda St. Altadena, CA.

□ Drake ML-11 two-meter, Serial No. 20445, taken from car on Oct. 20 in Miramar, FL. Contact Miramar Police Dept., case No. 75-10-819.

□ Simpson "Model A," Serial No. 44475. L. Fred Towers, II, WB4KXS, 2253 Poates Drive, Richmond, VA 23228.

□ Clegg FM-27B, Serial No. 27092-473 was stolen from pick-up truck. Wallace Blake, W10EV, 75 Great Hill Rd., East Hartford, CT 06108.

□ Regency Model HR2MS Transcan, Serial No. 11-01590 was stolen evening of Sept. 25 from auto. Jerry Haberer, WA0WSY, 7165 Tilden Ave., Colorado Springs, CO 80911.

□ Beltek Model WS570, Serial No. 010124, Stolen on Aug. 5 from car. Ronald Ridenour, W0CNK, 8700 Richard Road, Denver, CO 80229.

□ Swan 240, Serial No. 297226, was stolen Sept. 20 from auto. Elwood H. Robinson, WB5CUT, 124 North Broadway, El Dorado, AR 71730.

I Wish I Had Known

Are nerves a hurdle you wrestle with before an exam? Here's how to soothe them.

By Edward J. Durnall,* K1BYE

With all due credit to the *ARRL License Manual, ARRL Handbook, Understanding Amateur Radio, A Course in Radio Fundamentals* and a host of other publications which I found to be of great value in my efforts to move from a Conditional to an Advanced license, there still remained a considerable number of unexpected problems which I encountered when I entered the FCC examination room on the second floor of the Portland, Maine, Post Office one snowy day in early April. The following comments are offered in the spirit of helpful suggestions which may or may not apply to other individuals or other testing situations.

Plan to arrive early. Several applicants arrived late due to road conditions, getting lost, parking problems, or plain misjudgment of travel time requirements. Consequently they entered the examination room with at least one strike against them. They were emotionally and physically upset.

Bring several sharpened pencils (but not too sharp) with fairly soft lead (approximately No.2 hardness) which will take well on the standard IBM answer sheets and will be easy for the examiner to read. If the pencils do not have erasers, bring one or more separate erasers with you. Bring one or two pens with blue or black ink — not green, red, or some exotic color.

If you have been practicing cw with headphones or with the speaker within a few feet of your ears, you may be in for a shock. The code machine for this particular examination was as much as 30 feet distant from some of the applicants and had a most unpleasant tone. Considering this situation, a prospective examinee might well wish to practice copying cw from a speaker located across the room with the BFO set at what you consider to be an unpleasant tone. The code test itself consisted of five minutes of straight copy liberally interspersed with commas, periods, slant/bars, numerals and — the one thing I did not remember hearing on W1AW — question marks. Furthermore, the numerals did not follow the W1AW code-practice pattern; that is, lists of amateur calls followed by a series of digits. You must attain perfect copy for any one minute period within the five-minute test. Don't give up and don't go back to make a correction or fill in while at the same time attempting to keep up with the sending. However, as you will probably not have any time at the completion of the code test to make corrections or fill-ins, you might want to consider using the last half-minute of the five for this purpose. If you intend to follow this procedure be sure to bring a watch with a second hand or a stop watch (preferred) so you can time yourself as you take the test.

You may find that the Extra Class code test (20 wpm) will be given first, as our examiner explained that this procedure had been adopted to help both the applicant for the Extra Class and others. If the slower test (13 wpm) were given first, the 20 wpm would seem extremely fast to the Extra Class group and would not particularly help the General or Advanced applicants. By administering the faster test first, the 13 wpm would seem slow by comparison to those of us taking the General or Advanced and would not hurt the Extra Class applicants. The examiner collected our code test papers immediately and scored them while we sat, chewing our finger nails. The first element of the written test was then given to those who passed this hurdle. As a holder of a Conditional license, this meant that I first had to take the written examination for the General before I could proceed to the Advanced. Of course, if you already hold the General or Advanced, you would skip this step and move directly to the appropriate examination. The examiner supplied scratch paper which had to be turned in with the answer sheet at the end of the examination. Several of my fellow applicants brought hand-held calculators (battery operated) with them which they were permitted to use, but I found the computations such that only arithmetic and very elementary algebra were required.

The written examination for the General license consisted of 50 multiple-choice questions in a test booklet with answers to be recorded on a separate IBM answer sheet. The questions themselves were remarkably similar to those in the ARRL *License Manual* although frequently paraphrased or put in the negative rather than the positive. The biggest surprise to me was the number of questions dealing with FCC regulations. A thorough study of these regulations dealing with amateur radio is a "must."

As a psychologist with a professional interest in testing, I was aware of the fact that I should answer all questions even if I had to resort to guessing, as the FCC scoring procedure counts the total number of correct answers and does not adjust the total score for incorrect answers (as is the case in College Board Examinations and others). Evidently, my fellow applicants were not aware of this and several commented after the examination was over that they had left one or more questions blank as they had not been sure of the correct answer.

The examiner collected the test booklets, answer sheets and scratch paper on an individual basis as each of the examinees completed his particular examination. The answer sheets were then graded on an individual basis, and each applicant was told whether he had passed or failed. Those who had passed and were not scheduled for further examinations were then free to leave. Those of us who passed and were attempting to obtain a higher class license, either Advanced and/or Extra Class, were given new test booklets, answer sheets and scratch paper covering the next examination element. In my case I was given the Advanced test and proceeded to answer at least ten of the fifty items before I realized that the

*Univ. of N. Hampshire, Div. of Cont. Education, 6 Garrison Ave., Durham, NH 03824.

questions on this examination were numbered from 51 to 100, while I was filling in the answer sheet from 1 to 50. Profit from my mistake; make certain that the answers to the test items appear opposite the corresponding numbers on the answer sheet.

My experience with the Advanced Class examination followed that of the General Class examination. The questions were very similar to those in the ARRL *License Manual* but again there were many more specific questions on regulations than I had expected. The testing procedures described above were followed for the Advanced and for those taking the Extra Class.

After what seemed to be an eternity, although actually only a few minutes, the examiner indicated that I had passed the examination and that in due course (8 to 9 weeks), I would receive a new license as an Advanced class licensee from the FCC in Gettysburg, Pennsylvania.

While the weather was still wet and cold, as I walked to my car to my eyes the sun was shining. I was floating on balmy spring breezes, and I felt like a kid again. I had passed! QST

Cancelled due to Lack of Interest

You say you were going to hold a licensing class but no one showed up on the first night? You had an ad in the local paper and got some materials from ARRL Hq. but no one was interested in learning the code? What you need is some bigger and better PR and one prime mover. What better person to consult than Bill Welsh, W6DDB?

Bill is a very active member of the LERC Amateur Radio Club, a part of the Lockheed Employees' Recreation Club in Burbank, California. He has been in charge of the club's many licensing classes, sometimes running two groups at the same time. The Recreation Club, with its various member-organizations, holds open house every few years and this year about 700 people visited the LERC ARC's club room. The visitors listened to QSOs, tried their hand at the code with a hand key and electronic keyer, asked questions and took home free literature. Voila! A licensing class – enough people with a desire to learn to make it all worth while. (The club station is also open every weekday evening, resulting in around 2000 curious non-hams plus 1000 interested amateurs which includes some juicy DX.) Pamphlets and books are part of the display. LERC ARC's bulletin is one of these; it relates information on when and where the club meets and in what activities members can get involved. Check out the bulletin boards and equipment. They look as if they're in just their usual spots, but what youngster (or anyone) wouldn't like to get his hands on that equipment or the tools from the board, for closer examination.

Introductory pamphlets available from Hq. the club bulletin, QSLs and certificates make a nice display.

Now what? An instructor or two or three, materials, and enthusiasm are needed. Instructors – volunteers from the club roster – can be rounded up to take turns teaching one or two class nights, with one person acting as the overall coordinator. This coordinator plans how much material to include per lesson. He can ask the volunteer club member to read over a specific section of *How to Become a Radio Amateur* and a chapter from *A Course in Radio Fundamentals* to brush up on background information, before discussing capacitors, for instance. Or put to use a member's specialty area, such as the guy who experiments every weekend with wire antennas.

Materials are easy. The Gateway Series for the students' textbooks, films and quizzes, introductory pamphlets for the first night, teaching aids, graduation certificates, and the booklet "Instructor's Guide to Licensing Classes" are available from Hq. (The guide, "Licensing Classes" contains all kinds of ideas and practical knowledge of use to the instructor and Bill Welsh was literally the inspiration for this manual. He was the 1961 recipient of the Edison Award for his work in training amateurs.)

The card says, "Try these telegraph keys if you wish—whether or not you know code."

That leaves enthusiasm. Spirited discussions, not dry, boring lectures, mean active minds. Active minds are learning minds. Portray to your club-member volunteer-instructors how great it is to hear, "Now I get it!" or, "Yeah, I see!"

"Conducting a licensing course can be a very pleasant experience and it certainly leaves you with a good feeling when you hear ex-students engaged in the hobby," says Bill. "Simply prepare the material, get an interested group together, and get things rolling. Feel free to contact W6DDB [or ARRL Hq.] if you have specific questions regarding your particular licensing course program. Good luck!" – *WA1STO* QST

Happenings

Conducted By Perry F. Williams,* W1UED

Lively Elections for ARRL

Spirited elections for director and vice director in seven of the League's 16 divisions were concluded with ballot counting on November 20. The closest race was in the Delta Division where *Malcolm Keown, W5RUB,* edged out Vice Director John H. Sanders, WB4ANX, 897 votes to 886.

Though the results weren't as close, much interest was generated in the Pacific Division where Gary Stilwell, W6NJU, and William W. Eitel, W6UF/WA7LRU, running as a team for director and vice director respectively, challenged incumbents J. A. Doc Gmelin, W6ZRJ, and Albert F. Gaetano, W6VZT. Each team achieved 50% success – *W6ZRJ* beat W6NJU 1574 votes to 1394, to retain his directorship, while *Bill Eitel* garnered 1875 votes against 1090 for Al Gaetano!

Another contest with lots of pre-balloting action was that for director in the Southeastern Division, where the incumbent Vice Director Ted Wayne, WB4CBP, ran against the present Director *Larry E. Price, W4DQD.* The tally turned out to be anything but close: Larry got 2996 votes, Ted 1113. Larry's informal running-mate, *Bev B. Cavender, K4VW,* got 2322 votes to 1763 for James A. Gundry, W4JM, in the vice director contest.

In the Atlantic Division, *Harry A. McConaghy, W3SW,* won reelection as director with 3404 votes to 1938 for Richard J. Karl, W3ZUH. In the vice director race, *Jesse Bieberman, W3KT,* was also reelected, earning 2631 votes against 1427 for David L. Heller, K3HNP, and 1296 for Harold C. Smith, WA2KND.

The Dakota Division picked *Garfield A. Anderson, WØKE,* as its director by 790 votes to 332 for Benjamin J. Layton, WØUTT. *Tod Olson, WØIYP,* won the vice director contest, scoring 437 votes to 351 for Edward C. Gray, WAØCPX and 347 for Ernest G. Anderson, WØRRW. Great Lakes Vice Director *William Clausen, W8IMI,* rang up 2186 votes to 1624 for Leonard M. Nathanson, W8RC. Finally, in the Midwest Division, *Claire Richard Dyas, WØJCP,* edged out incumbent Vice Director Richard W. Pitner, WØFZO, by 1142 to 1095 votes.

To introduce the new people we'll follow the "rank has its privileges" route and talk first about the new director, Garfield A. Anderson, WØKE, who will represent the Dakota Division for the next two years. Gar is assistant secretary and assistant treasurer of the Northwest Bell Telephone Company. In 1975 he was appointed by Director Shima as an assistant director and then, when WØPAN resigned and Tom Kulas, WAØIAW, moved up to director, Gar was appointed by President Dannals to the vice director post. Other credits: past president, Radio Amateur Teletypists Society; past State Civil Defense Radio Officer; member, 3900 Club, Handi-Ham System, Minnesota CW Net, Ten-Ten Net, QCWA and the A-1 Operator Club. Gar has been licensed since 1926, and earlier held WØDOP. He is 63 years old and makes his home in Edina, Minnesota.

The vice director working with Gar is Tod Olson, WØIYP, age 42, of Long Lake, Minnesota. Tod is vice president for operations of ARES, Inc., a producer of specialized training programs. Among the amateur radio posts he's held are: assistant director, ARRL Dakota Division, 1969-1971 and 1974-1975; section communications manager for Minnesota, 1974-1975; past president, Minnesota Wireless Association and trustee of WØAA; publisher and editor, National Contest Journal; past vice president, Minneapolis Radio Club; ORS, OO, OPS, and A-1 Operator Club. Tod is a Life Member of ARRL, and has been licensed since 1952.

Malcolm P. Keown, W5RUB, age 32, of Vicksburg, Mississippi, was chosen as vice director for the Delta Division, of which he's been serving as an assistant director for 1974-1975. He's president of the Vicksburg Amateur Radio Club and teaches its Novice class, and also currently serves on the ARRL Contest Advisory Committee. Other activities and honors: past president, Red Bank High Amateur Radio Club, 1971 Distinguished Service Award, Mississippi Civil Defense Council; chairman, Delta Division QSO Party, 1970-1975; amateur radio instructor for the high schools of Madison Parish; and official observer. Malc operated as K4RIN from 1957 through 1968, and is a Life Member of ARRL.

The Midwest Division picked Claire Richard Dyas, WØJCP for vice director. The 54-year-old resident of Lincoln, Nebraska, is a retired Lieutenant Colonel in the Army. His ham radio offices include assistant director for the Midwest Division, 1973-1975; section communications manager for Nebraska, 1974-1976; director, secretary, past president, Lincoln Amateur Radio Club; and Army MARS membership. First licensed as K5JJD in 1957, Claire is a Charter Life Member of ARRL.

William W. Eitel, W6UF/WA7LRU, age 67, of Dayton, Nevada, is the Pacific Division's choice for vice director. A cofounder and longtime officer of the Eimac Division, Varian, Bill is fully retired from its management now. He served as assistant director of the ARRL Pacific Division from 1971 through 1974. Currently, Bill is chairman of the Amateur Satellite Service Council, chairman of the Oscar Association and a member of the FCC's World Administrative Radio Conference Preparatory Advisory Committee for amateur radio. Past honors include the Distinguished Service Award, USN, and the rank of fellow in the Institute of Electrical and Electronic Engineers and in the Radio Club of America. A Life Member of the League, Bill has been licensed since 1924.

The Southeastern Division's new vice director is Bev B. Cavender, K4VW, of Lake Placid, Florida. OM Cavender, 41, is president of both the Cavender Corporation, Realtors, and of Cavender Groves, Inc. He is a member of the Sociedad International de Radioaficionados, Radio Club de Costa Rica, the Florida DX Club, the Ten Ten Net, Amsat, QCWA, FOC, the A-1 Operator Club, and Life Member, ARRL. Bev's a past editor of the Florida DX Report and has held the calls W8CKB, W4CKB, T12BEV and ZF1VW since his first license in 1948. He shares the hobby with wife Carole, WB4NOI/ZF1YL.

One race is still undecided: ballots for Canada will be counted six weeks after the end of the postal strike. The contest there for vice director involves William W. Loucks, VE3AR, William L. Skidmore, VE3AUI and Henry W. Thel, VE7WJ. The directors and vice directors already elected begin their terms at noon January 1, 1976 for two years.

FCC LOOSENS CONTROLS SOME MORE

You're licensee/trustee of a new repeater on 220 MHz. You've got a dozen amateurs to join you up there, but sometimes the repeater stays quiet for hours. How can you build up activity?

One of your control-link operators suddenly gets transferred across the country by his employer. How do you go about replacing him, on paper as well as in reality?

As of December, there are new answers to these questions, as a result of some additional deregulation of amateur radio by the Federal Communications Commission. First was the Report and Order in Docket 20013, permitting repeaters to have outputs in bands other than the one the input is on. Thus, it becomes possible to set up repeaters so that, for instance, an amateur can transmit on 220 and listen on 146, while another amateur does the reverse. This additional flexibility, requested by the League in RM-2327, should make it easier to establish and populate new repeaters in less-active bands. The same order offers a new definition of automatic retransmission and limits its use to remotely controlled stations, auxiliary links and repeaters. The new texts, which became effective December 15, follow:

97.3 Definitions. (y) Automatic retransmission. Retransmission of signals by an amateur radio station whereby the retransmitting station is actuated solely by the presence of a received signal through electrical or electromechanical means, i.e., without any

* Assistant Secretary, ARRL.

Hope Cliver, WA6AWV, qualified for General Class at the age of ten! She came along to a radio class at Palm Desert, CA, in which her parents were enrolled, because sitters were hard to find. (Mom and dad have their licenses, too – issued after Hope's – WA6BLB and WA6BJD!) With Hope at a picnic is Southwestern Director John Griggs, W6KW.

direct, positive action by the control operator.

97.111 Operation of a repeater station. (c) A repeater station may concurrently receive and retransmit amateur radio signals on one or more frequency bands authorized for repeater stations, but may not concurrently retransmit on more than one frequency within the same band except when specifically approved by the Commission. A repeater station authorized to operate in conjunction with one or more auxiliary link stations for relaying radio signals, received at another location(s), to the repeater station may utilize input (receiving) frequencies not available for repeater stations, provided the input frequencies to the auxiliary link station(s) are in frequency bands authorized to repeater stations.

97.126 Retransmitting radio signals. No amateur radio station, except a properly licensed repeater station, auxiliary link station, or a remotely controlled station may automatically retransmit the radio signals of other amateur radio stations. A remotely controlled station, other than a remotely controlled repeater station or auxiliary link station, may retransmit only the radio signals of auxiliary link stations shown on the station system network diagram.

Right on its footsteps came another action, effective December 1, transferring information required of licensees for remotely controlled stations, including some repeaters, from filing regulations under Section 97.41 to logging rules in Section 97.103. This will allow a licensee to replace a control station with another, simply by a log entry and without notification to the Commission.

Remotely controlled stations will be able to "migrate" too. The prohibition on portable operation of a remotely controlled station also has been lifted. The texts of these rules changes were not available at press time, so we'll present them here next month. If you need them sooner, send a stamped self-addressed envelope with 13 cents postage to "Remote Control," ARRL Hq. *One important note to licensees/trustees:* Your current system network diagram and associated information, already furnished to FCC when you applied for remote control privileges, should now be added to the station log; the rules apply to existing stations as well as to applicants.

MT. DIABLO, WE'RE WITH YOU

In July 1975, the Mt. Diablo Amateur Radio Club of California asked FCC to change the rules so that deaf persons could prove code reception ability with non-aural methods. (Up to the present, the deaf have had to seek waiver of the rule requiring them ". . . to receive by ear . . . messages in the International Morse Code. . . ." The petition was designated as RM-2567.

The League now has joined the fight with "Comments and Supplemental Proposal," supporting the original request and adding another: that alternatives also be supplied for the language, " . . . to send by hand-key . . ." for those who may lack sufficient use of their hands, but can demonstrate sending ability in other ways.

Our proposal envisions adding to Section 97.29 (c) these words:

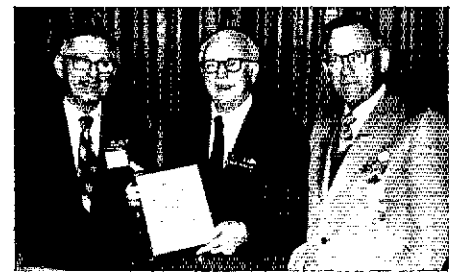
In lieu of demonstrating ability to transmit by key and/or receive by ear, a handicapped or disabled applicant may utilize such other devices and/or methods to demonstrate a working knowledge of the International Morse Code as may be appropriate under the circumstances.

The League contends that the suggested language would not contravene the obvious intent of Article 41 of the Radio Regulations adopted by the International Telecommunication Union, and also that this change is merely procedural, so FCC does not need to go through normal rulemaking procedures in order to adopt it. Anyone needing a full copy of the ARRL filing may send a self-addressed envelope marked "Deaf" to ARRL Hq., with 13 cents postage.

ENVIRONMENTAL ADDENDUM

To the average amateur a "major action" in equipping the ham shack is probably anything the ham has to tell the spouse about, before laying out the money. But to FCC, considering its obligations under the National Environmental Policy Act, the only "major action" likely to involve an amateur is the construction of an antenna support in excess of 300 feet high. Thirteen months ago FCC released a Report and Order in Docket 19555 placing microwave towers over 100 feet and antenna supports over 300 feet in the "major action" category. A number of organizations petitioned for reconsideration, including

Popular *QST* author Jerry Sevick, W2FMI here accepts the April Cover Plaque award for the article, "Instruments and Methods for Use in Vertical Antennas," from Stan Zak, K2SJO (left) Hudson Division Director, while Vice Director George Diehl, W2IHA, looks on.



Amateur of the Year in the Midwest is Lee Bergen, WØAR, center. Last year's titleholder, Jim McKim, WØCY, is at left; Midwest Director Paul Grauer, WØFIR at right. *(Photo by WØCHJ)*

ARRL which sought to have amateurs eliminated from the environmental rules in toto. (We were not successful; the Commission agreed that it was unlikely amateurs would erect structures that large, but said if we did, we should meet the same rules as others.)

Majority sentiment did prevail, however, in that all classes of communications towers have one common height at which the environmental rules apply – 300 feet – after December 19. All other antenna structures (except directional arrays for standard a-m broadcast stations), microwave or not, are not "major actions in accordance with Section 1.1305" of FCC's rules, and will not require an environmental impact filing.

Ham radio was prominently displayed at the Harvest Festival Fair at the Meriden Square Mall in Connecticut. Here K1EPX tickles the keyer for W1NRG, the station of the Meriden Amateur Radio Club, while WN1VGR, left, WN1VTO and WN1VGP (standing) follow the proceedings. Attractive backboards displayed League publications and certificates to a thousand spectators.

NEVADA IS FIRST

The first major hamfest of 1976 is the occasion for the first Amateur Radio Week of the year as well. The traditional "SAROC" affair happens January 8-11 in Las Vegas. The "Week," January 4-11, involves the rest of Nevada as well. In his proclamation, Governor Mike O'Callaghan mentions amateur contributions to the advancement of the radio art, to disaster relief, to defense preparedness and morale of the armed forces and to international good will.

The big effort toward amateur radio week, perhaps involving half the states, is traditionally the week in June which ends with ARRL Field Day – for 1976, this is June 20-26.

International News

Conducted By David Sumner,* K1ZND

Focus on Australia: Novice License Adopted "Down Under"

More than four years of study by the Wireless Institute of Australia and the Postmaster-General has resulted in the introduction of a Novice Class amateur radio license in that country. The new license, which has the support of the WIA, is being introduced to enable persons to engage in radio communication as a hobby on a restricted basis and to gain the knowledge and experience necessary to qualify for a normal license. An Amateur Operator's Novice Certificate of Proficiency will be issued to any person, regardless of age, who passes a relatively simple examination in radio theory and regulations and a Morse code test at five words per minute. The fee for a Novice station license is $6.00 Australian per year, half the normal rate. The examination fee is $2.00.

Australian Novices are permitted to operate crystal-controlled transmitters in the bands 3.525-3.575, 21.125-21.200, and 26.960-27.230 MHz with power up to 10 watts input for CW and double sideband and 30 watts for single-sideband emission. (The 26.960-27.230 MHz band is still allocated to the Amateur Radio Service in Australia.)

There are two other classes of amateur license in Australia which are available only to applicants at least 16 years old. Holders of the Amateur Operator's Certificate of Proficiency have full privileges in all amateur bands. Holders of the Limited Certificate of Proficiency, which has an identical written test but no code test, have full amateur privileges except cw above 52 MHz and are assigned station call signs with three-letter suffixes beginning with the letters Y and Z.

At the present time there are approximately 7,000 licensed amateurs in Australia, about one-third of whom hold the Limited Certificate of Proficiency. These figures do not include Novices.

HOW WOULD YOU DO ON THE AUSTRALIAN AMATEUR EXAM?

The examination for the Amateur Operator's Certificate of Proficiency in Australia consists of a Morse code sending and receiving test at 10 words per minute and essay exams on radio theory and regulations. Here's a sample theory test. Two and one-half hours is the time allowed for completion; a separate test on regulations takes 30 minutes. Seven of the nine questions that follow must be attempted. How do you think American amateurs would fare?

1) a) Explain the fundamental difference between frequency modulation and amplitude modulation.

b) With the aid of a circuit diagram, explain the theory of operation of the discriminator stage of a receiver suitable for reception of frequency modulated signals.

2) a) Explain the theory of operation of a junction type transistor.

b) Draw a circuit diagram of a single stage audio amplifier in which use is made of a junction type transistor.

3) a) Explain briefly the theory of radio transmission via the ionosphere.

b) Discuss the effects on high frequency transmission of the daily variations of the ionosphere, the seasonal changes and the eleven year sunspot cycle.

c) What is an "ionospheric prediction chart"?

4) a) Using appropriate curves, indicate the current and voltage distribution on a half-wave transmitting aerial (dipole).

b) Show whether even or odd quarter-wave sections of resonant feeders are necessary to provide parallel tuning at the transmitter end when the aerial is to be: (i) current fed; (ii) voltage fed.

5) a) What is the essential difference between a "Tuned Radio Frequency" type of receiver and one of the "Superheterodyne" type?

b) Explain why an "image" signal can sometimes be received on a Superheterodyne type. Discuss means of reducing "image" effect.

6) a) With the aid of a sketch, describe the construction and theory of operation of a crystal microphone.

b) Listing component values, show by means of a circuit diagram how this type of microphone is connected to an amplifier.

7) Explain the theory of operation of a "grid-dip" meter. Use diagrams to illustrate your answer. Give a practical example of the use of such an instrument.

8) a) Show a circuit diagram of the final rf stage of a transmitter using a triode vacuum tube, and state step by step how you would neutralize it.

b) What effects could result from operating such an amplifier which was not neutralized? Explain.

9) Two resistors, R1 and R2, of 20,000 and 10,000 ohms respectively, are connected in series across a 20 volt dc supply of negligible impedance. Calculate: (a) the potential difference across each resistor; (b) the power dissipated by R2; and (c) the voltage reading which will be obtained if a voltmeter having an internal resistance of 10,000 ohms is connected across R1.

* Assistant Secretary, ARRL.

Amateur radio's active program to combat interference from non-amateur stations in our bands is called the Intruder Watch. Alf Chandler, VK3LC (l), Australian Coordinator of the IW, recently visited ARRL/IARU Headquarters and took the opportunity to confer with Hq. staffers W1RU and W1UED. Art, W2LH (r), made the visit possible. (Thanks to Art's wife Madeline, W2EEO, for the photo.)

"IARU NEWS" BECOMES "INTERNATIONAL NEWS" WITH *QST'S* NEW LOOK

Ever since the founding of the International Amateur Radio Union as amateur radio's worldwide representative in 1925, *QST* has been the official journal of the Union as well as of the ARRL. For most of those fifty-plus years, "IARU News" has been a regular feature, carrying information on the activities of the Union and its member-societies (which now number 88).

The Union's activities have never been greater, or more important, than they are right now. We are rapidly approaching the year 1979 and a World Administrative Radio Conference which will compare our needs for spectrum space to those of dozens of commercial services. Radio amateurs who are interested in the future of their service will find more than ever to interest them in this column. It is hoped that the new banner will attract new readers who can thereby become aware of the great challenges and opportunities which await us at the end of this decade.

YL News and Views

Conducted By Louise Moreau,* W3WRE

70 Years

Among the many anniversary celebrations planned this year observing our national bicentennial will be one highlighting the 70th anniversary of women in radio. In 1906, Anna Nevins became the first woman to enter this field of communications. Three years later YLs in the United States opened the door to the Amateur Radio Service for all who followed.

In the past 70 years the focus of the YL picture has shifted from a national to an international scope, until today 50,000 YL operators represent 130 countries, worldwide. Sprouting YL clubs in many countries encourage women to become interested in radio and to find that they are not only welcome but also are wanted as contacts on the air.

Through individual and club sponsored public services, YLs have built a record of service that parallels the entire amateur picture, and through the personal YL to YL association are helping to further international friendship.

Women have been busy these past 70 years building a tradition that has become a part of YLRL, YLISSB, JLRL, CLARA, YLRC Italiano, and the many local YL clubs. It is a tradition of commitment – both personal and public. But most of all by their worldwide association, women amateur radio operators are contradicting Rabelais's statement that "half the world does not know how the other half lives."

YL News and Views congratulates all women amateur radio operators on their special anniversary year.

Peggy Wiseman, WB5HFD, active Handicapped Net Control Station.

PLAN AHEAD – 1976 YL MEETINGS

The major meetings of women in amateur radio have been announced for the year 1976. Hosted by the GAYLARCS, the Seventh International YLRL Convention will be held in Houston, Texas, at the Holiday Inn West, on June 10-12.

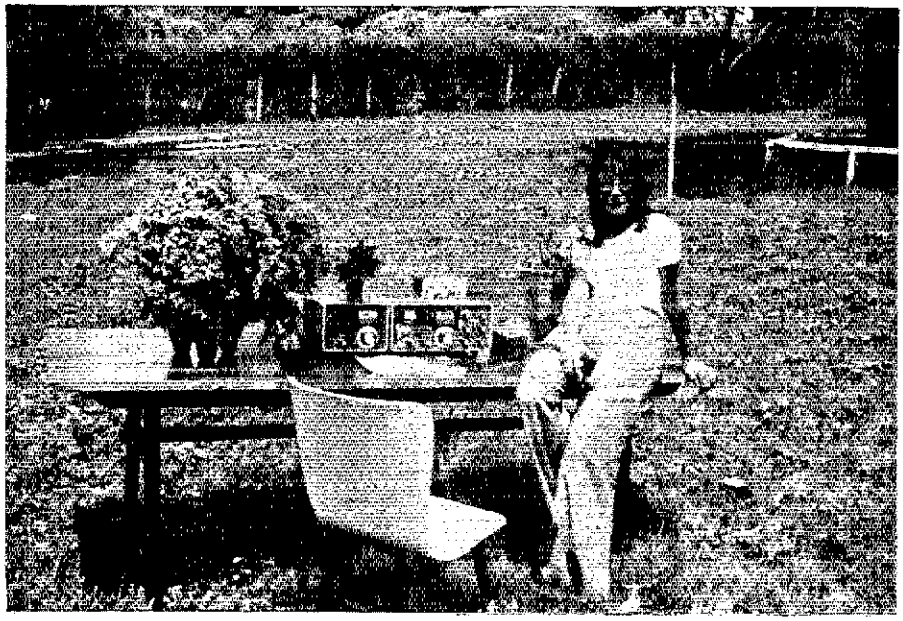
There will be a YL Forum and Women's program at the National ARRL Convention in Denver in July. Almost every ARRL Division Convention will schedule a YL program.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

TIMOR YL

Teresa Gominho, CR8AL, is at present, Timor's first and only YL operator. She is the daughter of CR8AG, Aielu, Portuguese Timor. YL News and Views thanks PY7YS for this information.

PY4AKL, active DXer, added another country to the YL picture when she operated as PVØAKL in the DXpedition at San Fernando de Noronha last summer. *(Photo PY7YS)*



WB5HFD, PEGGY WISEMAN

Peggy got interested in amateur radio about three years ago, and in a true do-it-yourself system, learned code and theory without attending classes. The results were Novice in 1972, General in 1973, Advanced and Extra in 1974.

A member of ARRL, TYLRUN, and Lakeland A.R.C., she is active in both traffic handling and Civil Defense operation. Although she is not handicapped, she is a member of the Handicapped Net acting as NCS one day a week, and assists blind and handicapped amateurs.

Peggy and the OM, Don, K5CA, conduct amateur radio classes in their home and their efforts have resulted in a number of new calls in their area.

1975 "HOWDY DAYS" RESULTS

YLRL Members: ØK5TT, 72; DJ7UAC, 68; DJ1TE, 59; DK1HH, 56; WB4PXN, 52; XJ1AMB, 40; K5JKV/5, 34; WA8AHU, 32; DJØEK, 30; WA8EBS, 29; F5RC, 21; WA2NFY, 14; JA1AEQ, 13, PAØHIL, 11; G8LY, 10.

Non-members: DF2SL, 30; WA6BAY/4, 27; JE1WR, 17

1976 YLRL CONTEST CUSTODIAN

Contest logs for DX YL to North American YL Contest in January, and for the annual YL-OM Contest in February and March, should be sent to the 1976 Contest Custodian, Beth Newlin, WA7FFG, 826 W. Prince Road - 06, Tucson, AZ 85705.

NEW FRENCH YLs

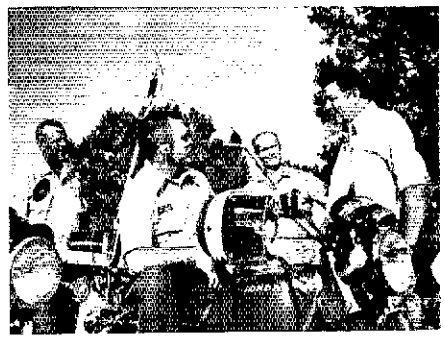
The French publication *Ondes Contes Informations* lists two new YL calls: F6DEU, Marie-Anne Delile, and F6DTJ, Mme. Chantal Prost. QST

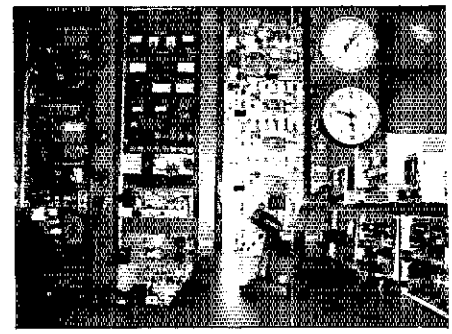
FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

FM and Repeater News Goes Monthly

Starting with this issue of *QST*, FM and Repeater News will become a monthly feature. In the past, the main purpose of the column was to keep the repeater owners and operators up to date on FCC actions and rule interpretations. While we still plan to feature such news, the primary purpose of the column will be aimed at the repeater users. We are going to need your help if the idea is going to work. If you have any news that is of interest to other fm-ers or repeater users, even technical tidbits, pass the information along to us and we'll try to use the material -- and that includes photographs. Does your repeater club have any novel features that others might want to hear about? Let us hear from you! Now that we've covered the good news, let's preach a little.





Left photo: K7HEH, K5FPO, K7DLN and W1ICP are shown (from left) at a meet in Silver City, NM last fall. Motorcycle mobile, 2-meter style was the subject of this conversation. Right photo: This neat layout is WA6ICB and repeater, WR6AGT. The location is Eureka and operation is on 34/94.

AUTOPATCH ABUSES, OR, WHY DOES IT HAPPEN ONLY IN WASHINGTON?

Recently, two FCC officials (hams) were demonstrating the use of repeaters to some of their fellow employees (not hams). While the FCC people were listening, an amateur came on the repeater, dialed up the autopatch and got his office and secretary. He proceeded to check with his secretary as to what messages he had received and then left instructions for some of his other appointments! Needless to say, the FCC personnel who were listening had some embarassing questions to ask their two ham fellow workers.

It cannot be emphasized too strongly that the use of autopatch for business communications is strictly against the FCC rules. What is worse, such violations jeopardize the use of autopatch for all of us. If you have any questions at all about the legality of a particular call you are going to make on an autopatch -- don't make it!

BROADCASTING AND 97.113

One more item while we are preaching and then we'll quit -- violations of 97.113. We note in some bulletins from repeater councils that certain repeaters have various methods for rebroadcasting weather stations. Our regulations, 97.113 in part, state that "an amateur station shall not be used to engage in any form of broadcasting, that is, the dissemination of radio communications intended to be received by the public directly or by the intermediary of relay stations, nor for the retransmission by automatic means of programs or signals emanating from any class of stations other than amateur."

This rule is perfectly clear-cut. It means that we cannot pick up any non-amateur radio station and rebroadcast it. Some repeaters with autopatch can be used to dial up a telephone message type of weather announcement, and this is permissible. FCC interprets its rules to mean that the amateur must request the phone message but this act is implied when the amateur dials up the autopatch or asks some other ham on the repeater to do so.

In our conversations with FCC people, they stated that as long as the rule on rebroadcasting other radio services exists, it must be observed. However, it was pointed out by FCC that if good reasons existed, the rule could be changed. Frankly, we see no harm in rebroadcasting a government weather service station. In fact, in tornado areas it would be in the public interest to do so. What are your thoughts? Should the rule be changed?

CROSSBANDING RESTRICTIONS REMOVED

On July 17, 1974, a notice of proposed rule making was adopted by FCC in response to an ARRL petition, RM 2327. This was a petition to permit crossband operation of repeaters in repeater bands. The FCC has acted, with an effective date of Dec. 15, 1975, to delete the restrictions of crossbanding of repeaters in repeater bands as per ARRL's request. So now we can crossband as many repeaters in as many repeater bands as we wish.

At the same time, FCC defined automatic retransmissions of amateur signals in 97.3 of the regulations. Briefly, automatic retransmission is defined as one that is actuated *solely* by the presence of a received signal through electrical or electromechanical means and without any direct or positive action by the control operator.

However, when retransmitting, the band or frequencies used must correspond to the operating privileges of all amateurs concerned. For example, one could not retransmit a Novice to a General Class band.

Also, in the section of rules under prohibited practices FCC has added 97.126. This states that only certain types of stations may *automatically* retransmit signals. These are remotely controlled stations, repeaters, and auxiliary links. Additionally, remotely controlled stations (remote bases) may only retransmit signals of their associated stations. Keep in mind that in all this discussion the key words are *automatic retransmission.* This serves to eliminate the problem whereby a ham may hold the mike up to a speaker to retransmit a message for example, to a ham on another band.

ARRL NATIONAL FREQUENCY COORDINATOR PLAN

Probably many repeater users are not aware that the frequencies of the repeaters they use are assigned by frequency coordinators. The amateurs who serve as frequency coordinators do so on a voluntary basis without pay or expenses. There is no "official" status for these amateurs. Usually, they are appointed by repeater councils, or groups of clubs and in a few cases, "appointed" by ARRL headquarters simply because no one else came forward to take the job.

Up to this point in time, there has been no serious need for an official program. However, in some of the more populated areas of the country, we are encountering amateurs putting repeaters on the air, and ignoring the advice of frequency coordinators. This can cause chaos, even to the point of disaster for repeater operation. Therefore, the ARRL will sponsor a National Frequency Coordination Plan.

The ARRL plan would consist of frequency coordinators, each to be designated as an official ARRL coordinator for his area, with the *full support and backing* of the plan by FCC. With both ARRL and FCC support, the coordinator would have the required authority that is necessary to effect workable assignments. Because of the responsibility the coordinator assumes, it would be desirable that any such appointments have the full support of state or area councils, and SCMs. In all likelihood, the majority of the present coordinators would become official ones.

The primary duty of a frequency coordinator would encompass the issuance of frequencies. Additionally, the coordinator would also have the authority to determine power levels that repeaters could run to minimize cochannel interference, for example. By the same token, in *extremely* crowded areas, where necessary, the coordinator could determine time sharing of repeater groups. Naturally, the performance and actions of a coordinator would be subject to periodic review to avoid abuses of the system.

A mailing explaining the proposals has been made to interested parties. These include all frequency coordinators presently listed in ARRL Repeater Directory, plus whatever councils and groups we have addresses for. If you didn't receive the mailing, we would appreciate hearing from coordinators and councils as to what areas you administer. Also, your thoughts and ideas about the plan would be welcomed. QST

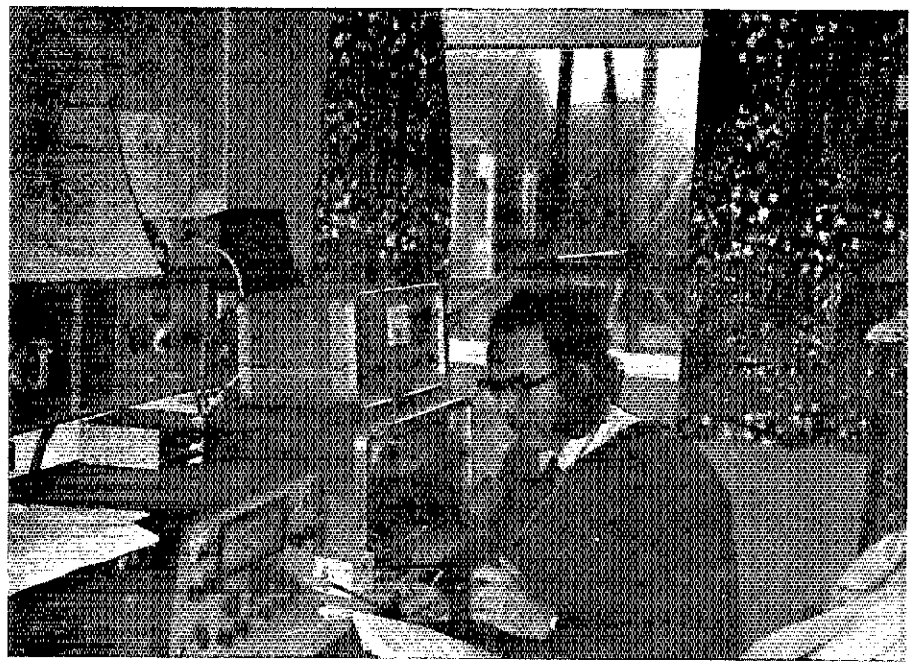
*VRAC Liaison, ARRL Hq.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV

Activity!

A frequent complaint of those who regularly inhabit the vhf/uhf bands is that activity is far too low to sustain interest. Except for 2-meter fm, occupancy of our higher frequency bands certainly is lower than that on hf bands. Couple that with normal propagation conditions, and we have a situation in which it's easy to get the idea that no one else is on. Obviously, this is not true. Frequently one station will call CQ, hear no response, and go away. Five minutes later, another station may come on and do the same thing. There they were, like ships that pass in the night, not knowing of each other's presence. Various schemes have been proposed from time to time to counter this problem. One helpful technique is the use of calling frequencies. Thus when puttering around the shack, many fellows monitor the calling frequency for any signs of life. On 6-meters, 50.110 is well recognized as the calling frequency for ssb or cw. On a-m it's 50.4; on fm, 52.525. In a large part of the country, the 2-meter ssb and cw gang use 144.110 with 145.025 as alternate. Popular with many a-mers is 145.2, while on fm 146.52 has pretty much supplanted 146.94 as the national simplex calling channel. One item to keep in mind about the use of calling frequencies is that to be of much use they should be kept clear of QSOs. Once contact has been established, QSY to another frequency. Unfortunately, this rule is broken more often than it is observed.



G3IOR of Norwich, England, is a well-known Oscar user. Pat has worked 66 countries on 5 continents and 25 U.S. states, including all 10 call areas.

Another technique for helping vhf stations get together is the designation of "activity nights." In New England, Monday night at 2100 has been designated as the time for concentrating on 2-meter operation. Although quite effective, the activity night has a few flaws. For one thing, it is very possible to miss some good propagation conditions by being on only one night per week. Another is that it doesn't help the operator who wants more frequent activity. An alternative approach which might ease some of these shortcomings would be to agree on a particular time each night for each band. This is already being done informally in some parts of the country. Along the East Coast, 2100 is generally considered the time for 2-meter operation while 70-cm work seems to peak at 2200. We would be interested in getting the opinions of the readers of this column on this subject and will be glad to summarize the results.

NEWSLETTER IDEAS

Many of the club newsletters often contain some worthwhile ideas and construction articles. For example *Zero BEAT*, the organ of the Hampden County MA Radio Association has had two vhf oriented articles in recent issues. The June, 1975, issue carries an article on construction of a high power 2-meter amplifier using 8874s. The September issue contains a piece on improvements that can be made to the TR-6. For copies, send an s.a.s.e. (2 stamps) to WA1HHN, 71 Endecott St., Springfield, MA. The *Tidewater Ssbn Report* also has some good tips from time to time. One is a piece entitled "Align Your Venus." Another deals with neutralization of Swan 250s. An s.a.s.e. to Bill Shaw, WA4MMP, 2216 Dunbarton Dr., Chesapeake, VA 23325 will bring you these. Issue No. 15 of the *Rocky Mountain 220-MHz News* includes information on converting old 2-meter commercial fm equipment to 220. The s.a.s.e. in this case goes to Box 842, Denver, CO 80201.

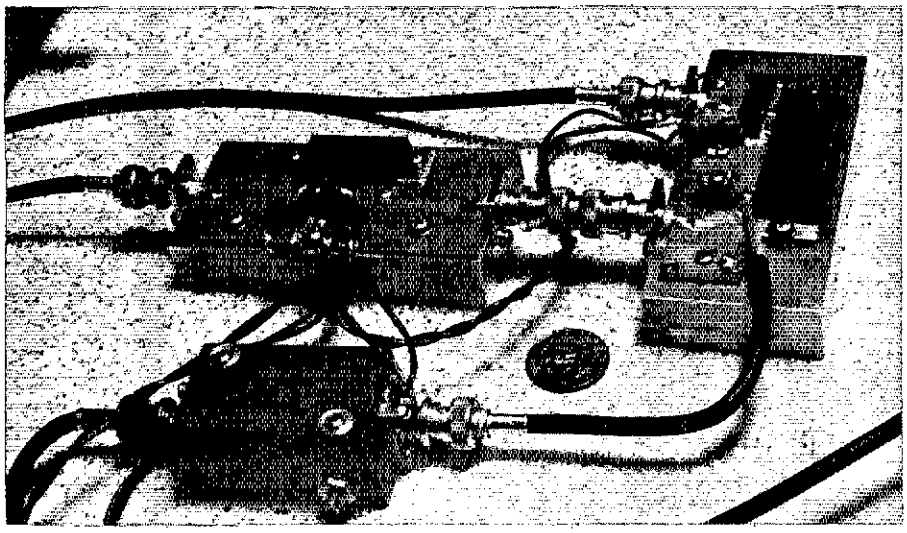
*Send material to Bill Tynan, W3KMV, Box 117, Burtonsville, MD 20730 or call (301) 384-6736 and record your message.

ON THE BANDS

6 Meters. Apropos to the subject of activity, WA4CPM, writing in *Tidewater Sideband Net Report* for October, makes the point that 6 is suffering from lack of activity when the band isn't open for DX. Buzz laments the fact that in previous years he could get on and work a number of fellows within a range of a few hundred miles whereas this year CQ after CQ goes unanswered. One answer is nets. The *Tidewater Sideband Net Report* lists their net as meeting at 2000 local time, Tuesday, on 50.150. The North Carolina net is at 2100, Thursday, on 50.120, and the East Coast Sideband Net gathers Sunday morning at 1100 on 50.150. WA2TPS of Liverpool, NY, has similar remarks to make with regard to 6-meter occupancy. Possibly Carroll can do some organizing and get a net or two going in his area.

We complain of activity down here in the "lower 48." Vince, known to most of us as K8REG, writes from his KL7HLE QTH in Anchorage that since July 26 he has worked just one station. That contact was with KL7IBG and required m.s. during the Perseids. Vince is in there trying in any case. He calls and listens every day at lunchtime which is between 2100 and 2200Z. On weekends he is on most of the day. In other parts of the 6-meter world, we learn from K5ZMS, the Number 1 SMIRK, that VE3EVW will be active this winter from the island of Montserrat as VP2MJ. Monty has a 150-watt rig and a 5-element beam. Normal frequency will be just above 50.1.

On the evening of Sunday, Nov. 9, (0200 to 0400Z, Nov. 10) we were treated to a very good E_S session, for the time of year. Stations in the Midwest were quite strong here on the East Coast. There was even one report of double hop contact from K2ZRJ, New Jersey, into Utah. The opening partially made up for October, which almost everyone classifies as one of the poorest Octobers within memory for most types of 6-meter propagation. WA5IYX lists only one E_S opening during the month. That was to Florida on the 31st and lasted an hour and 15 minutes. Pat's F_2 muf summary isn't too encouraging either with just 2 days over 40 MHz. A possible harbinger of better things to come in the F_2 and TE departments comes in the form of a copy of the U.S. Department of Commerce News, passed along by WØNRW. The release notes that the first significant spot activity of the new solar cycle was observed *late in August.* We are all in hopes that Cycle No. 21 will be kinder to 6-meter operators than was No. 20.



The 439.25-MHz solid-state ATV transmitter used by W2TRP. At right is the PA driven by the low-level driver at the upper left. The video modulator is at the bottom. Output power is 15 watts average, 30 watts peak.

2 Meters. The extended Indian Summer which much of the country enjoyed last Fall produced some excellent tropo conditions. WB5LUA reports from Richardson, TX, near Dallas, that Oct. 9 was a big night. Al worked W4WDH, Oxford, GA, and WA4CQG, Auburn, AL. W5SID, nearby, worked these stations plus WA4NPL, Scottsboro, AL and W4ISS, Augusta, GA. K4MSG, Petersburg, VA, found the night of Oct. 23 particularly good. Paul had 19 QSOs in 7 states. He made a particular effort to work the a-m fellows and suggests that others do the same, particularly during good openings. Using fm, WB9NME had a ball on the night of Nov. 4 working western New York stations, which were getting into the Milwaukee repeater as well as closer-in stations through other repeaters. Douglas was told that, despite his low power (10 watts) and indoor antenna, he was "triggering" the Buffalo, NY, 31/91 repeater.

All of the tropo was not confined to our continent. A letter from G3COJ tells of an extended range session that took place in Europe between the evening of Oct. 25 and the morning of the 29th. Brian's best DX on 2 meters was SP5JC in Poland about 900 miles. The higher bands were active too. On 70 cm G3COJ lists SM5CCY in Sweden; DM2BYE, Germany and OK1KIR/P in Czechoslovakia. Even 23 cm produced DX contacts with DC7CWA in Germany (600 miles) and HB9AMH in Switzerland (450 miles) being among the most notable.

Aurora provided some fun this fall but certainly not up to other years. WA1OUB caught an opening Oct. 9 in which he worked K8LZF near Detroit, MI and W2PTI, Watertown, NY.

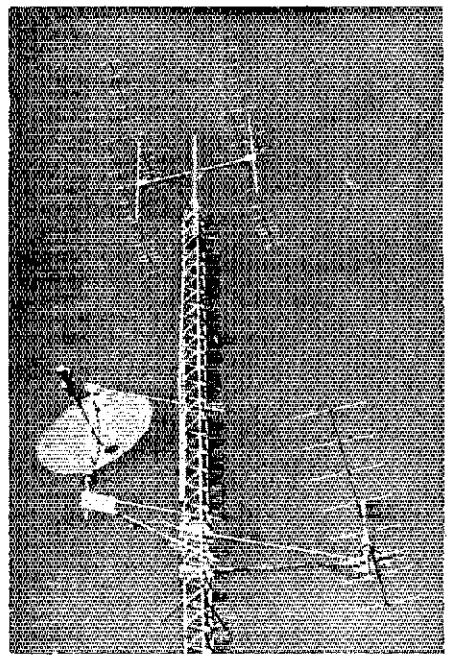
One form of vhf DX that's almost always with us, if we take the trouble to partake of it, is m.s. K0DAS writes that he completed a contact with W4ISS during the Orionids on Oct. 22. It was a two-minute burst that finally did the trick.

One of the facets of the world above 50 MHz which is particularly fascinating to a wide variety of hams is moonbounce. To capitalize on this, W7CNK has been giving talks on EME operation to radio clubs in his area. This is a fine way to publicize vhf/uhf activities to fellows whose only contact with the spectrum above 50 MHz may be working through repeaters. Sounds like a good idea for some of the rest of the active EME fraternity.

70 CM. As this is being written in mid-Nov., we hear that the warm-up tests for the WA6LET EME operation went very well. Signals from the Stanford, 150-foot dish were excellent and certainly much improved over last time. A number of stations participating in the Oct. 31 rehearsal reported signal levels of 15 dB over noise. Some fellows, using only single and dual Yagis, were able to copy the WA6LET transmissions. We'll have details on the October 31 test, as well as the actual operation, scheduled for Nov. 23, in next month's column.

A new 70-cm station here in the Washington, DC, area is W4FS. W4FJ, veteran 432 operator of Richmond, VA, reports that Vic has a fine signal on both cw and ssb.

If you look up high enough at K2RIW, you see 52 elements for 432 at 100 feet, 8 elements for 144 at 75 feet, and a 5-foot dish on 2304 at 80 feet. These are the "old" antennas. We understand that bigger things in both towers and antennas will be heard from before long.



Microwave. K5TLG, Miami, OK, passes along a tantalizing peek into some microwave experiments that he and WA5ICW are contemplating and, at the same time, pleads for more information in *QST* concerning our microwave bands. He makes the point that many people who should, do not even know our frequency assignments in the microwave region. Let's have some more details on your work, Tom. We'll be happy to provide exposure in these pages.

COMMERCIAL EQUIPMENT

Various sources have asked us to put out a plea to the vhf/uhf fraternity to mount a letter writing campaign to manufacturers of ham equipment urging them to resume marketing gear, other than fm, for the bands above 50 MHz. One correspondent making such a pitch is Ray Clark, K5ZMS. He cites a recent letter received from J. B. Shafer, K8DCE, Communications Products Manager for Heath. The letter states that the company's best aid in planning new products and reviving old is correspondence expressing definite interest in making a purchase. To indicate the magnitude of interest needed to resurrect a recently out-of-production product, Ray understands, as few as 50 orders for SB 110As might cause the line to be reopened to satisfy the demand. The same may be true of the SB 500. If we all express interest in purchasing vhf/uhf products of Heath as well as Drake, Collins, Swan, Yaesu, Kenwood and others, we may reawaken the interest of manufacturers for producing products for our corner of the amateur market. It has been demonstrated many times before that the availability of a wide variety of commercial gear promotes activity.

Any company producing microwave products for amateurs is certainly worthy of mention. Microcomm, 14908 Sandy Lane, San Jose, CA 95124 is such a company. Paul Shuch says that his company's first product is a preamp for 1296 MHz, boasting a noise figure in the neighborhood of 3 dB and a gain of about 13 dB. For such good performance the price is quite low. A spec sheet is available for an s.a.s.e.

VHF SWEEPSTAKES JANUARY 3-4, 1976

We are continuing, on a trial basis, the practice of presenting abbreviated rules and referring the reader to a previous issue of *QST*. This method met with generally favorable reaction when used with the September VHF QSO Party. Rules for the VHF Sweepstakes remain unchanged from those of the past several years. Complete rules and contest report forms are always available from ARRL Headquarters.

The contest period is 2 P.M. your local time Saturday, Jan. 3, 1976, to midnight Sunday, Jan. 4. Stations may be worked once per band, at 2 points per two-way QSO; multipliers are the ARRL sections worked on *all* bands (*not* once per band). Foreign stations give their country as part of the exchange, and count as *one* multiplier, regardless of how many are worked. Final score is total contact points times the total multiplier worked plus 10. Thus, five complete QSOs worked in three ARRL sections and two foreign countries equals a score of 70 points.

The contest exchange is as follows: consecutive serial number (beginning with No. 1); the letter "A" if your d.c. input power is 50 watts or less, "B" if greater than 50 watts; your station call; the last two digits of the year in which you were first licensed as an amateur; and your ARRL section. If you are able to exchange and confirm the information only one way with another station, you may count *one* point for the partial contact.

Complete rules appeared in *QST* for December, 1974, page 55. Postmark deadline for entries is February 15, 1976. QST

Public Service

Conducted By Robert J. Halprin,* WB2NOM

DNTS Becomes Permanent

When a daytime segment of the National Traffic System was started in 1973, the plan was to operate it on a trial basis for one year, then reassess and decide whether or not it should be a permanent fixture in the system. This was the same plan used in 1949 when NTS originally started – itself then something new and revolutionary in that it departed from the usual procedure of making something out of what we have. The original NTS was a paper plan, and the procedure was to fit the operators and nets into it, to find the people to fit the system rather than tailor the system to suit the convenience of the people.

It worked, too – but it sure wasn't easy. On top of growing pains, NTS had some of the worst hf operating conditions in history to contend with. There was no foregone conclusion that it would succeed. At times, quite the contrary! But the system survived its growing plans (and lousy condx) and became a model of organizational tightness.

So, 24 years later, we started talking about expansion of the system to utilize the increasing number of daytime operators, so that the system would operate two cycles per day, instead of one. Most of the daytime operators used phone instead of cw, so original DNTS nets were set up on phone frequencies. Although 355 operators promised to participate, not more than a tenth of that number showed up to man the first nets. Problems galore developed – propagation problems, QRM problems, personnel problems and yes, let's face it, personality problems. A small group of leaders undertook to solve them, but the months went by and progress was slow. The year trial period passed, but no decision was made whether to continue or discontinue – so DNTS kept right on struggling. Conditions weren't so good. Net managers weren't easy to come by and often not easy to keep when they discovered they had a system to adhere to beyond the running of their own net. Section liaison was difficult. Despite the 355 who had promised to participate, not enough participants (Indians) were available to provide a steady turnover from day to day. As usual, the dedicated few carried the ball. DNTS leaders were welcomed with open arms by the Pacific and Central Area Staffs, something short of that by the EAS. The communications manager remained skeptical and reticent about permanence, tried to set target goals for DNTS to meet as a condition – goals declared impractical of achievement by some DNTS leaders. Feeling began to run high. DNTS leaders started to lean on the communications manager to announce DNTS permanence.

All concerned may consider this the official announcement of such, although it comes about without any more sharpness of line distinction than did the beginning and ending of the trial period. DNTS has been, in effect, a permanent part of NTS for quite some time. All the official announcement adds is status and a focusing of goals. It is now a full-fledged equal partner with "evening" NTS in a unified National Traffic System. It is not, repeat *not* being recognized as a separate system, nor as a subordinate part. The daytime and evening cycles will not be known (not at this level, anyway), as they have been heretofore, as DNTS and NTS, but simply as the daytime and evening cycles of NTS. True, there will be separate managers, at least for the time being, but *one of the goals* will be to arrive at a managerial setup which will permit administrative management from a single level. Some proposals to this end are being made in the current CD Bulletin and will come to the attention of the area staffs for discussion and recommendation.

Other goals? Okay, how about this one: to achieve a full cycle of NTS operation during the daytime operation, from section through area and back to section. This is already nearing accomplishment, with area-level nets already in operation in the Eastern Area and getting established in the Central Area. Here's another one: setting up a sequence of net meetings that will accomplish a west-to-east traffic flow to compliment the east-to-west flow of the evening cycle. This is possible during the daytime segment because it has twelve hours to operate instead of the four or five of the evening cycle – but it will necessitate finding people to operate the nets instead of operating the nets to fit the convenience of the people.

And here is still another goal, which some feel is hardest of all: operating the NTS daytime segment as a tight system, as the evening segment has operated for many years, in which standard NTS routing is followed whenever available in preference to cross-channel or cross-level or non-NTS routing that might be, or seem to be, faster. This means dispensing with some of the "come one, come all, everybody welcome" aspects of phone net operation and hewing more closely to the NTS line. There was considerable discussion of this topic at the recent EAS meeting in Toronto, indicating that this concept needs to be more strictly defined, but it's all in the *Public Service Communications Manual*, if only you will read it.

Then there are the lesser goals of appointed managers for all daytime nets, more turnover of NCS and liaison stations as more daytime operators get into the act, a continuing source of originated traffic, better and systematic liaison with and among nets in the two segments to foster the "one-ness" concept, continued evaluation of the Continental Net concept as against a TCC arrangement.

Official recognition of DNTS as a part of the overall NTS does not end the battle or the problems. It just makes them continuing problems instead of trial-related problems. Informally, some sentiment has been expressed on both sides that they want nothing, or as little as possible, to do with the other side; some have even threatened to "defect" if they are forced to take the other side into consideration in their operation. The official attitude toward such sentiment is to reject it out of hand as unprogressive. There will be some who will participate only in the daytime system because it is 99% phone, and some who will participate only in the evening because it is 100% cw at region level and above. So be it, and no discrimination against such personal preferences. Also, no partiality for one preference over another. The object is to handle traffic systematically. The mode used is a means to that end, and personal preferences we will always have. What else is new? – *WINJM*

Public Service Diary

□ Cincinnati, OH – October 14. During a World Series game at Riverfront Stadium, WB8PSU spotted a crime in progress. He notified police with his hand-held transceiver via WR8ACB. – (WA8CQA, SEC OH)

□ Inyo Co., CA – October 15. WA6KZV and WB6KWE handled on-the-scene communications during a search for a lost hunter. Several other stations assisted on 80 and 40 meters. – (WA6KZV, EC Kern Co.)

□ North Central, OK – October 21. WB5AUF was piloting an aircraft when most of his electrical systems failed, disabling all of his navigational equipment. He contacted WB5NMB with his hand-held unit. The FAA was notified and WB5AUF was able to land at a nearby airport. – (WA5FSN, SEC OK)

□ Caracas, Venezuela – October 26. YV5AXU broke into a QSO between K4SJA and W2KBI to request that someone contact K4RFA, who could arrange for some emergency medical equipment to be sent. WA4NBT contacted K4RFA but he wasn't sure whether he could locate the equipment. W2JUP, who was listening on frequency, called a hospital in New York City. This hospital had the necessary equipment, so W2JUP arranged for it to be flown to Caracas. At the same time, K4GYF and WB4UPJ/4 arranged for a similar shipment. – (K4GYF)

□ Milwaukee, WI – October 30. On behalf of the Sheriff's Department, the Milwaukee Co. AREC simultaneously provided communications for Halloween night activities and for a visit to the area by President Ford. – (WB9NNJ, EC Milwaukee Co.)

□ Santa Monica, CA – October 30. WB6DGH/mobile 6 saw a car go up in flames on Santa Monica Blvd. He called WA6DGG on 146.52 simplex, who notified the fire department. – (WB6DGH)

□ Atlantic Ocean – November 2. A sloop was in distress off the coast of South Carolina and amateur radio was their only means of communication (VE0MCM). The FCC declared 3933 kHz as an emergency frequency. Over 60 amateurs participated, relaying messages to and from VE0MCM with the Coast Guard and other rescue services. By sunset, the crew of the vessel had been rescued. – (WA2AML, K8AXL)

□ Lawton, OK – November 2. WB0NYJ/5,

*Communications Assistant, ARRL.

stationed at Fort Sill, OK, picked up a distress call from a ship 300 miles off the Virginia coast. He used the worldwide military telephone system (AUTOVON) to call the Coast Guard communications center. — (WB5LOZ)

□ Repeater Log. According to reports received by deadline (which is much earlier than normal concurrent to the size change of *QST*) repeaters were used to report 12 traffic accidents and related occurrences, six fires and twice provided individuals with emergency medical aid. The following repeaters were involved: WR1AEY, WR2ACD, WR3ACI, WR4s ADJ ADO, WR6ADE and WRØABF.

Coming At You. The 1976 Simulated Emergency Test, that is. Check with your local EC or SEC (December *QST*, page 54) for the SET schedule in your area. — *WB2NOM*

For October, 40 Section Emergency Coordinators reported a total AREC membership of 14,908. At this time last year, 46 SEC reports were received, with a membership totaling 15,296. Sections reporting were: Ala, Alaska, Ariz, Colo, Conn, Del, EBay, EMass, EPa, Ill, Ind; Kans, Ky, Mich, Miss, Mont, NLI, NC, NFla, NNJ, NTex, Ohio, Okla, Ont, ORG, SV, SDgo, SJV, SBar, SCV, SFla, SNJ, STex, Utah, Va, Wash, WMass, WNY, WPa.

NATIONAL TRAFFIC SYSTEM

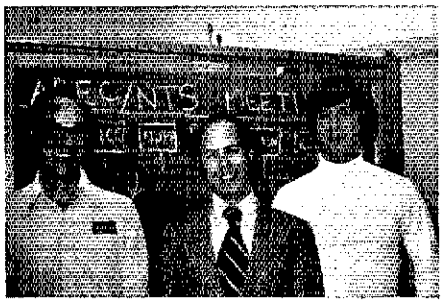
DCAN is scheduled to commence December 15 on 7250 kHz, spearheaded by WA5ZZA. WB8III is doing a yeoman's job of representing West Virginia on D8RN, reports WA8MCR. 2RN is now holding an early-early session at 2330 UTC on 3930 kHz. D2RN also has an early session going, at 1800 UTC. W5PNY is looking for stations who can meet DTWN skeds. Long skip is taking its toll on all nets. The following earned net certificates: WB2EDW (2RN), WB4FLT (4RN), WB4BYV WB4HQW W9PVH WB9KTR WB9NME WB9NVN (9RN).

October Reports

1	2	3	4	5	6
EAN	31	1459	47.1	1.154	97.3
CAN	31	987	31.8	.858	100.0
PAN	—	—	—	—	—
DEAN	62	425	6.8	.391	84.4
1RN	62	495	8.0	.392	92.3
D1RN	28	105	3.7	.303	80.6
2RN	61	443	7.2	.649	100.0
D2RN	31	162	5.2	.395	100.0
3RN	62	310	5.0	.381	90.8
D3RN	31	222	7.1	.400	97.7
4RN	61	576	9.4	.367	94.9
5RN	62	684	11.0	.370	61.6
DRN5	31	59	1.9	.107	71.4
RN6	62	432	6.9	.334	95.7
DRN6	31	160	5.1	.170	78.6
RN7	59	280	4.7	.363	71.1
DRN7	—	60	1.3	.142	39.5
8RN	56	275	4.9	.287	86.0
D8RN	31	125	4.0	.386	93.5
9RN	58	452	7.7	.360	87.0
D9RN	31	82	2.6	.209	91.1
TEN	—	—	—	—	—
DTRN	—	—	—	—	—
ECN	62	321	5.1	.460	87.6
TWN	57	394	6.9	.280	88.4
DTWN	21	44	2.1	.091	55.4
CTN	31	224	7.2	.214	94.0
TCC Eastern	116[1]	643			
TCC Central	84[1]	469			
TCC Pacific	112[1]	726			
Sections[2]	4082	14789	3.6		
Summary	5134	25403	4.9		
Record	5476	31117	16.4		

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — %REP.

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (119): AENB AEND AENJ AENR AENW SENS (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NCN NEN NTN SCN (CA), SSN (CO), CN CPN (CT), DEPN DTN (DE), FAST FMTN FPTN GN NFPN QFN TPTN VEN (FL), GSN GSSN (GA), IMN (ID,MT), ILN (IL), INM (IN), I75MN TLCN (IA), KSBN KWN QKS QKS-SS (KS), KNTN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), PTN (ME), MDD MDCTN (MDC), EMRI EMRI2MN WMN WMPN (MA), MACS MNN QMN (MI), PAW (MN), MSBN MSN MTN (MS), MON MOSSBN MOSSN PHD (MO), WNN (NE), NHVTN (NH,VT), NJN NJPN NJSN (NJ), NLI NLIPN NYS (NY), NCSSBN (NC), NDRACES (ND), BN BRTN



On October 4, a meeting was held for Northern New Jersey ARRL leadership appointees to discuss ways to involve more amateurs in AREC/NTS and to improve reliability of both services in times of emergency. Some of those attending were (l. to r.) SEC WB2PBO, SCM WB2RKK and PAM WB2VTT.

OSN OSSBN O6MTRN (OH), OAN OLZ OPEN OTWN STN (OK), BSN (OR), WPTN ((Pac.), EPAEP&TN PFN PTTN WPA (PA), CN SCNN (SC), TN TNN TPN TWN (TN), TEX TEX-SS TTN (TX), BUN UCN (UT), VSBN BSN (VA), WVN WVPN (WV), BWN WIN WNN WSBN WSSN (WI), MTN (MB), GBN ODN OPN OQN (ON), WQV/UHF (PQ).

Transcontinental Corps

KØAEM has resigned as TCC-Central Director after three years of excellent leadership. W5GHP has been appointed to replace him.

1	2	3	4	5
Eastern	124	93.6	1686	643
Central	93	90.3	1000	469
Pacific	124	90.3	1486	726
Summary	341	91.4	4172	1836

1 — AREA
2 — FUNCTIONS
3 — %SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

The TCC roster (October): Eastern Area (W2FR, Dir.) — W1s NJM QYY, K1s EIR GMW, WA1s MSK POJ STN, W2s FR GKZ KAT/3, K2KIR, WA2s DSA ICB PJL UWA, WB2s NOM/1 PYM RKK, W3EML, K3s CB MVO, W4UQ, K4KNP, WA4VFW, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s GOL SB. Central Area (KØAEM, Dir.) — W4OGG, WB4DXN, W5s GHP MI QU UGE UJJ, WA5IQU, W9s CXY DND NXG, WA9EED, WB9NOZ, WØs HI INH LCX QMY ZHN, WAØs MLE TNM, KØCVD. Pacific Area (K5MAT, Dir.) — W5RE, K5MAT WB5KSS, W6s BGF BVB EOT MLE TYM VZT YBV, K6HW, WA6DEI, WB6DJP, W7s BQ DZX GHT KZ, K7s CTW IWD NHL QFG. WØs LQ LRN, KØDRL, WBØs HCK QOT, VE7ZK.

Independent Net Reports (October)

1	2	3	4
Central Gulf Coast Hurricane	31	63	1773
Clearing House	27	244	501
Hit & Bounce	31	1051	442
Hit & Bounce Slow	17	101	176
IMRA	33	412	1536
Mike Farad	27	63	243
North American SSB	27	235	542
Washington Region PON	13	20	187
20 Meter ISSB	21	1032	262
75 Meter ISSB	31	354	1196
7290 Traffic	44	455	1939

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll October 1975

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

76 WB5AMN	55 WA2PJL	49 KØMRI	44 WA4HUB
75 WB5LII	53 W2MLC	49 WØOTF	44 W4WXZ
64 WBØHOX	53 WB4IYW	49 VE3FRG	44 WB5FMA
63 K1PAD	52 WB2SHL	49 VE3GFN	44 WB5KGP
63 WB2VTT	52 W4OGG	48 WB5KQJ	44 WB5QDW
62 WB4YKM	52 WB6PVH	48 WB5MFQ	44 W5VZO/4
62 WB6BDL	52 WA6TVA	47 WA3WPY	44 WA6DEI
61 WA1MSK	52 WAØGLI	47 K3YHR	44 WA6DMB
61 WA2DSA	51 W9MFG	47 WB4OXT	44 KL7JDO
61 WA3PHQ	50 W6RNL	47 WA4UAZ	44 WBØQOT
61 WA4FBI	50 WBØKTH	47 WB5NUM	44 VE3FQZ
61 W5GHP	49 W2FR	47 K9TKE	44 VE3GT
61 WA5IQU	49 WB2LZN	46 WA3DUM	44 VE3SB
61 WA5PRI	49 W2MTA	46 W6RFF	42 WB2RUZ
61 K5TTC	49 W2OE	46 WØOYH	42 WA2WDT
61 W7OCX	49 WB2RMK	45 WA1MJE	42 WA5VBM
61 WBØCZR	49 WA3WRN	45 WB4DXN	42 WB9KTR
61 WBØHBM	49 WB4EKJ	45 K4TH	42 WBØLOR
58 WA4EPJ	49 WA4LGT	44 WA9QVT	41 WA2UYK
57 W5KLV	49 K5MAT	45 WAØFMD	41 WA3NDQ
56 WA1QKD	49 WB5MTQ	44 W1BVR	41 WØQMY
56 WB2RKK	49 W5MYZ	44 WA1POJ	40 WA1SQB
56 WA2VPA	49 W7GHT	44 WA2PCF	40 W6AUQ
56 WB2WBH	49 WA7MEL	44 WB2UJD	40 KL7HDX
56 K4VHC	49 K9LGU	44 K3KAJ	40 WB9ICH
56 W4WNY	49 K9ZTV	44 K3OIO	40 WB9NME
56 WA5ZZA	49 KØCVD	44 K4FTB	40 WBØLJH
56 KØZXE			

Brass Pounders League October 1975

BPL Medallions (see December, 1973 *QST*, p. 59) have been awarded to the following amateurs since last month's listings: W3AVJ WA3PHQ.

The BPL is open to all amateurs in the United States, Canada and U.S. posessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt of standard ARRL form.

Winners of BPL Certificates for Oct. Traffic

1	2	3	4	5	6
W3CUL	459	1085	1362	52	2958
WØWYX	45	690	244	446	1425
K3NSN	14	605	605	0	1224
W3VR	239	217	433	12	901
K9CPM	2	386	156	278	822
KØZSQ	0	395	0	395	790
W6RSY	2	381	361	8	752
WB2SHL	72	312	245	67	696
WB4SKI	15	251	318	12	596
WA4SCK	17	284	291	3	595
KØYFK	1	276	2	275	554
WBØQOT	16	192	292	12	506
WB6EIG	36	229	229	10	504

BPL for 100 or more originations-plus deliveries

W7TZK	206
WØFIR	163
K7VWA	145
WA3ATQ	122
WB6PKA	111

More-Than-One-Operator Station

VE2UN	230
K4KDJ	197
K3IQG	134

1 — CALL
2 — ORIG.
3 — RECD.
4 — SENT
5 — DEL.
6 — TOTAL

How's DX?

Conducted By Rod Newkirk,* W9BRD

Big New Year's Day Rip-off at Sea

This could very well be a happy new year of budding short-wave renaissance, the bottoming-out of a sunspot cycle decline that has worn out its welcome, if any. Gee, how long has it been since old 20 stayed in regularly around the clock? And since 10 banged away all day long with easy QRP-and-dipole DXCC?

On the other hand, Old Sol being as tricky as ever, we might be running that same opening paragraph again a year from now. Yet the good times do come along. Did you catch those few good fall weekends on 21 and 28 MHz? Just *jammed* with S9 signals. Youngsters, that's a lot like 15 and 10 always sounded in the good old days. You could scarcely decide where to point your beam.

For right now, though, it's dig, dig. And when we've DXhausted even the 160-meter substrata, caught up on all our QSLing, and whipped the last annoying bugs in our layouts, a lot of us read, read, read. About DX if possible, or at least something on radio and electronics generally.

We had the recent good fortune to get hold of *Ida Was a Tramp*, a 272-pager by Cdr. E. J. Quinby, USN (Ret.) published by Exposition Press of Hicksville, New York. Made us forget to fret about the latest fadeout on 40. Being the first-person adventures of a precocious wireless operator on the high seas and in distant lands from the days of Jack Binns and the coherer through WW-II and beyond, we could hardly put it down. Plenty of rare photography, too.

Old salt Quinby includes mention of the unusual 1899-1900 Pacific cruise of steamship *Nemo*. By crossing the equator and international date line precisely at midnight New Year's Eve she momentarily existed in two centuries, two days, two months, two years, two oceans and four hemispheres simultaneously. For her crew and passengers January 1, 1900, disappeared without a trace. Fortunately the *Nemo* didn't.

Jay's entertaining flair for expressing the dramatic while extracting rich humor rates him status as a front-rank historian of the art. Such a work is bound to whet the jaded DX appetite and cause one to grab for mike or key. Have you read any other books lately that do the same? We'll be glad to QSP your recommendations.

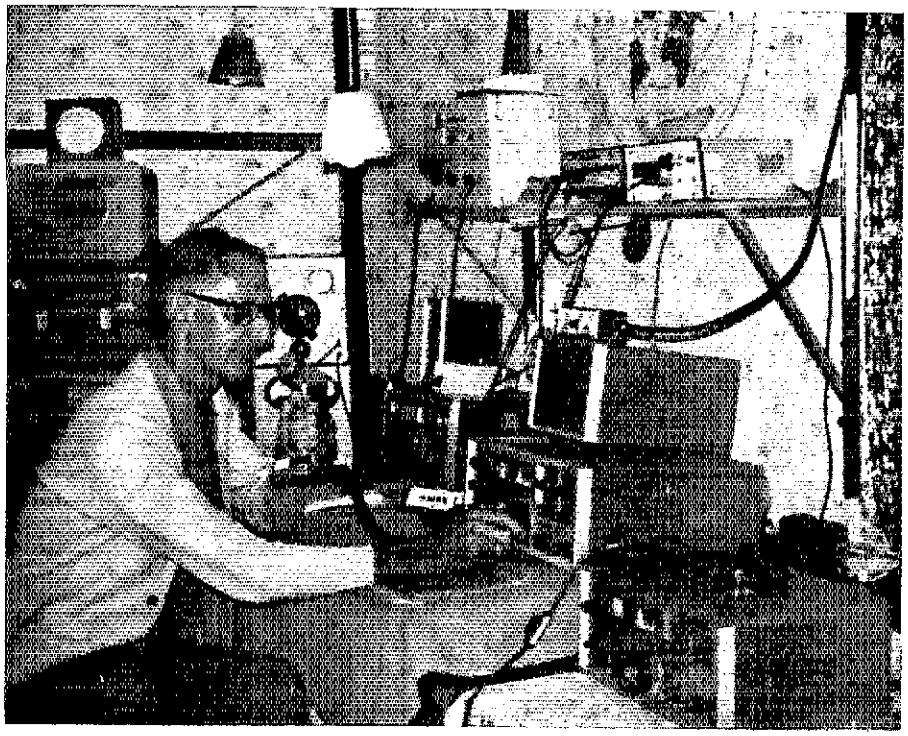
ZF1JH (WA6VNR) offers your QTH of the Month, a chunk of beautiful Seven Mile Beach. Especially enviable this time of the year, eh? Joe first tried his vertical mounted in waters off shore but maintenance problems soon forced a beachward QSY.

WHERE

No, the bands haven't begun sprouting Asians and Africans at high noon all the way down through 3.5 MHz. We'll just have to watch our "A" prefixes more closely from now on. Remember that AP is still Pakistan, AX is used by Australians once in a while, and A2-3-4-5-6-7-8-9 stations remain genuine DX. Note particularly that AC3-4-5 no longer represent Sikkim, Tibet and Bhutan – hi! . . . W1FLS is ex-AC3PT's QSL manager only for 1969-'70 Sikkim QSOs. (DXNS) . . . I'm claiming the first "IRC DXCC" with a collection of International Reply Coupons from 105 countries, some dating back to the '40s. My Swan Island DXpedition got me started five years ago. Much assistance came from the DX gang and Geoff Watts of *DX News-Sheet*. I'll be displaying them at future DX gatherings. (K5QHS) . . . All requests for my Liechtenstein QSLs will be answered 100 percent direct or via bureaus. (HB9-ØNL) . . . GC8HT, now traveling in the New Zealand region, expects to be back home dispensing more Channels QSOs and QSLs in March. (DXNS) . . . Anyone still due my Panamarican Games commemorative card should contact me via the address in last month's *QST* (6D1SA) . . . QSLs for voice contacts with KV4IJ on October 25-26, 1975, can go to my address. (K6SDR) . . . October '75 contest contacts by HV3SJ courtesy visiting DF2GX, DJ3HJ and JA4CBP can be QSLd to DJ3HJ's QTH. (DXNS) . . . I'd like to serve as QSL manager for some needful op at the DX end. (WN3ANE) . . . Nothing in the way of logs from EA6BG for months now, so I can no longer manage Mateo's QSLing. (W1RLV) . . . Ex-CT2BP will tackle his huge Azores QSL backlog as soon as he gets reorganized in Florida as WA6GKJ/4. (W1WQC) . . . LX1s are Luxembourg citizens, LX2s authorized visitors, LX9s and Øs are club deals, and self-styled LX3s are spurious. (DXNS) . . . Review of my log and records for the past eighteen months shows a 95-percent QSL return from DX in response to IRCs and self-addressed envelopes. This is much higher than s.a.s.e. results from Statesiders for my Five-Band WAS project. I tip my hat to W4WSF and ARRL's Fourland Bureau branch for excellent service. (K4DAS) . . . Recent receipts from the Bulgarian bureau indicate a leisurely 18-month round trip. I wish the ratio of UA QSLs to Russian SWL reports would improve. By the way, SV1OM/mm is unknown at the Greece bureau. (K4DAS) . . . Those still in need of 9M2DP confirmations for QSOs from February, 1973, to May '75 should consult me via my new Georgia QTH. (W4DXF) . . . Clarifying those Brazilian prefix notes in October's "How's": PY Novices (Class C) have suffixes with the letters W, X or Y after the numeral; e.g., PY2WAA. Non-Novices (Classes A and B) if Brazilian or Portuguese citizens will have two- or three-letter suffixes with any letters other than W, X, Y and Z immediately following the numeral. Authorized foreign amateurs under reciprocal operating agreements will use suffixes with Z after the numeral. (PY2BKO) . . . K4GKD's management of VP2DX confirmations goes only for QSOs in November, 1975. (WA3HRV) . . . K4CDZ still awaits A2CCY's '75 ARRL Test log with a thousand or more petitioners to answer. (LIDXA) . . . W4KA can help confirm October '75 contest contacts accumulated by K4IIF at 4UITU. (WCDXB) . . . Adding "via Madrid, Spain" to EA9 addresses may get surer delivery. This worked fine for EA9EO, a ten-day response. (K4WVT) . . . Tips from "How's" contributors KØCVD and WA3SWF helped me zero in on QSLs from FR7AI/t and FM7WH. (KH6CF) . . . CR6s become D2As courtesy International Telecommunications Union and may sign D3A in special Angolan activities. Suffixes are status quo, CR6SW being D2ASW, etc. We also hear that numerical call areas are being shuffled in Poland where former SP1AGE becomes SP3AGE at the same location. (DXNS) . . . VE1AL/3, 11-311 Bunting Rd., St. Catharines, Ontario, needs the present whereabouts of former VE3AII/SU and VE6CBJ/SU. Alan manages their QSLs and desires to terminate the task. (CDXA) . . . QSOs with FO8BO in early August can be confirmed via my QTH. (K6ILM) . . . I QSL every station worked and sure wish more 21-MHz types would do the same. (WH6IOZ) . . . QSL aide JAØCUV/1 still has trouble obtaining the logs of 3B6CF for contacts after June 23, 1974. Cyclone damage in 3B-land may be a factor. (WB4TDH) . . . K4KQB, formerly KG6SX, says he has no connection with September's KGSX activity. So far as he knows the call has not been reissued. (K4WVT) . . . FG7AR/FS7 logs are overdue at QSL manager F6BBJ who is eager to get on with the job. (LIDXA) . . . 9J11 stations are 9J2s with

CT2BP resettles in Florida after making a host of wireless friends from the Azores. Phil should be signing WA6GKJ/4 until his Fourland call comes through. *(Photo via W1WQC)*

*c/o ARRL, 225 Main St., Newington, CT 06111.



GC2RS comes back home to DX after a twelve-year absence with an TDdx401 and TA33jr., mostly on 20 phone. If your *QST* file goes back to January, 1958, you'll find an interesting view of Frank and the old GC2RS that accomplished a-m WAS and DXCC from Guernsey with a mere 25-watt 807.

unchanged suffixes operating commemoratively. (DXNS) . . . Licensing and call sign procedures in Guatemala have been modified. Old TG4SR now is WA1HCK/TG4 at the same QTH. (W5QPX) . . . Club station SV1SV, extensively operated at Wednesday meetings, QSLs all contacts. This was not always true and some old logs have been lost. I have accepted responsibility to confirm every SV1SV contact made since January, 1973. (SV1IG) . . . Canada's postal strike brought VE/VO QSLing to a near standstill late in the old year. (DXNS) . . . HC1CW returned to Michigan and will clear up QSL management from his K8UDJ address. (LIDXA) . . . 6O1KM QSOs by operator McCamy in September, 1969, may still be confirmed through Max McCamy, 7515 Vernwood, Houston, Texas 77040. (DXNS) . . . OC4 is a fresh Peruvian prefix for certain occasions. The OAN label as in OAN4ASG denotes novice status in Peru. (DXNS) . . . 7X5AB complains of unauthorized use of his call on 40 cw. Ali sticks to 20 sideband. (WAØEWU) . . . Ex-OA3X, now signing YB9ABX, still awaits overdue QSLs from stations worked during the aftermath of the great Peruvian earthquake. (K3RDT) . . . I've been handling the B-suffix portion of the ARRL QSL Bureau's Nineland branch for almost three years. A typical month produces a stack of cards from five to eight inches high. Takes me about two and a half hours to get them sorted and ready for mailing. (K9WEH) . . . 'Alp! W7YF pleads for a push toward FW8DA's QSL, WB6HVY will settle for scoop on VU2OO's pasteboard possibilities, and K8IQB seeks the secret of securing overdue affidavits from CE6EZ, FWØIC, OA6DM, PJ2JR, SMs 3COL 5RY, UKs 2BBB 3ABB and 5Z4KM. Any aid? . . . The new year's first "QSLers of the Month," all commended in "How's" mail from W7YF, K4s DAS WVT, WAs 2JZX 3SWF 3YVI 3YVJ ØEWU, WBs 2NOM and 5HVY for confirmational comebacks quicker than customary, include A6XR, COS 5CP 8BO, CR4BC, DK5WL/HBØ, DU1EN, F5GV, FB8XL, FPØYY, GI3JEX, K3SWZ/VP9, KH6s FX GKD/KB6, KS6FF, OHØs AM PA, OJØMA, ON4LJ, PY2ELZ, SV1GA, VP2LAW, VQ9Z, VR1PE, W9s MR/CEØ NTP/CEØ, XE3TL, YBØABV, YN1s FWN WB, YO7DL, YV5CKR, ZD8TM, ZF8JW, ZF1GE, ZK1AK, 9Ms 2DQ and 8VLC, together with QSL tenders Ws 3HNK 6KLI, WAs 3HUP 4NRE 7PEZ, WB2FVO, F2MO, G4CHP and OH2BH. Any swift suppliers we missed? Now our monthly QTH directory, mindful of the fact that each specification is not necessarily accurate, complete or "official". . .

A9XBD, Box 14, Manama, Bahrein

ex-CT2BP, P. Wilson, WA6KJ/4, 1200 NW 15th St., Holmstead, Florida 33030
DA2DX/HBØ (via W3HNK or to WA5VKJ)
DK5EC/ET3, K. Schmidt, Box 5711, Addis Ababa, Ethiopia
EA9FF, Serrano dr. No. 1, Ceuta, Spanish North Africa
EA9FG, A. de Salazar, c/o Aridal 5, El Aaiun, Spanish Sahara
ET3PG, Box 21321, Addis Ababa, Ethiopia
FPØMD (via G3LMD or VO1FB)
GB2BP, c/o Telecomms, B.P., Dyce, Aberdeen, Scotland
HC8RG, G. Ruebsam, (DK6EB), Isla Santa Cruz, Galapagos, Ecuador
JY5MB, P.O. Box 299, Amman, Jordan
KC6CV, D. Evans, Box 68, Yap, Western Carolines 96943
KS6s ET FF, via B. Giunta, W6KLI, P.O. Box 182, La Puente, California, 91747
OAN4ASG, Box 3929, Lima, Peru
OX4AN, P.O. Box 369, APO, New York, New York 09121
OX4AS, Box 369, APO New York, New York 09121
P29MJ, P.O. Box 204, Port Moresby, Papua-New Guinea
P29PN, P. Nantes, Box 219, Madang, Papua-New Guinea
SV1GZ, J. Kondylakis, 33 Louca Petraki, Iraklion, Crete, Greece
SV1IG, T. Panos, 4-6 Voltairou st., Neoskosmos, Athens 411, Greece
ex-TG4SR (to WA1HCK/TG4)
VE1s VE/SU XU/SU (via VE1APY)
VEØNWK, HMCS *Yukon* ARC, c/o FMO, Victoria, British Columbia, Canada
VP2GMB, via M. Badolato, W5MYA, 2 Country pl., Bedford Texas, 76021
VP5TI, P.O. Box 78, Grand Turk, Turks & Caicos, W.I. (or via G3RWU)
VRs 1Z 8B, c/o Yasme Foundation, P.O. Box 2025, Castro Valley, California 94546
VU2CK, via J. Alline, K3GL, 99 Pinecrest dr., Indiana, Pennsylvania 15701
WA1HCK/TG4, E. Read, Apto. 20, Chimaltenango, Guatemala
WA3HRV/VP2D (via K4GKD)
WB4CMW/KC6, USCGC *Basswood*, FPO, San Francisco California, 96601
WB9AJF/6Y, L. Skoczek, Box 38, Kingston 4, Jamaica
YB3s AP AR, P.O. Box 59, Surabaja, Indonesia
YN4BB, Barbara Bach, Clinica de Salud, Corn Island Via Bluefields, Nicaragua
YS1O, O. Orellana, P. Once 73, San Benito, San Salvador
ZD8EW, c/o BBC, Ascension Island
ZK2AO, Box 36, Niue Island
ZS3JAM, P.O. Box 926, Otjiwarongo 9210, South West Africa
5R8CU, B.P. 1398, Tananarive, Malagasy
7P8AR, R. Williams, Box 1303, Maseru, Lesotho
7X5AB (via F6BFH or W2KF)
9G1JC, P.O. Box 6017, Accra, Ghana
ex-9M2DP, D. Poole, Jr., W4DXF, P.O. Box 275, Rincon, Georgia 31326

WA2KGY/4X is steadily workable from Jerusalem where he and his family now live after emigrating from the U.S.A. This photo results from a visit to Dave's hamshack by WB4FDT who recently scored some 500 contacts as a portable-4X.

CE6EI studies agronomy in Osorno when not pursuing geography on 21-MHz code and voice with his FT101 and vertical. Gerhard also has studied in Connecticut on foreign exchange. *(Photo via K9ARZ)*

A4XGD (to G3MOT)
AC3PT (see text)
C31LR (via REF)
CE9AT (via CE2MZ)
DA2TV (via REF)
EA6BG (see text)
EI9ONE (via EI7CC)
EP2NC (via I2YDX)
FGØMM (via WA1JKJ)
FO8BO (see text)
FOØILM (to K6ILM)
FR7AI/J (to FR7AI)
FY7AK (via F2QQ)
GC8HT (see text)
H31KC (to HP1KC)
HBØAIC (to HB9AIC)
HR6SWA (via K3LLL)
HS5AKW (via W9NGA)
HV3SJ (see text)
KA6YL (via WB6KGB)
KV4IJ (see text)
ex-OA3X (via SM6CVE)
OC4A (via RCP)
OE2BZL (via DK5AD)
ONØITU (via ON5TO)
P29WG (to VK4ABG)
PJ8FBC (to WØFBC)
PJ8YFQ (via WA4BTC)
PJØUSA (to K2FJ)
VP2A (via K2IGW)
VP2DX (see text)
VP2KJ (via WB2TSL)
VP2M (via W4QL)
VP5WW (via WB4EYX)
VS6GG (via HKARTS)
VS9MPH (via G4CUR)
VX9A (via VE3GMT)
VYØA (via VE3GMT)
YB9ABX (via SM6CVE)
ZD8JAM (via ZD8AR)
ZF1NH (to WB4ZNH)
ZK2AP (via WØJRN)
ZX1ITU (via PY1BMB)
4U1ITU (see text)
4U2ITU (via WB2CKS)
601KM (see text)
7X2AA (via WA2NMS)
7XØBI (via YO8AHL)
9G1GE (via G3USE)
9L1BH (via SM3CXS)
9M8HB (via HB9XJ)
9Q5DM (via ZS1LK)

Thanks for the preceding glossary go to Ws 1CW 1WQC 5QPX 7YF, Ks 1ZND 4DAS 4WVT, WAs 1SQB 2JZX 3HRV ØEWU, WB5HVY and other literature of DX clubs, groups and individuals which we'll probably be crediting on a quarterly basis henceforth because of increased space limitation. Come again!

DX Century Club Awards

Conducted By Bob White, W1CW

New Members

Radio telephone listings follow the general-type "New Member" and "Endorsement" listings — October 1 — October 31, 1975

300	YV4AGP	128	CT1UM	108	104	WA7VDY	SM7DYZ
G3XYP	199	WA3NAF	117	LZ2KSB	WBØKHI	102	100
291	K1TZQ	120	9G1FE	107	103	I2KLP	JA6GPR
IT9AUA	167	ZB2CJ	113	JA8DWR	DK8SR	OZ4LS	WAØZOL
259	YU1ELM	119	WA1JUY	OZ2E	K6CKA	W1JWA	
PY2ELV	129	WAØJYJ	111	106	KG4FU	101	
245	WAØABU	118	DK7AA	WA5TPO	WA5PQX	WB4YFF	
Radiotelephone							
300	ZP5RS	114	WB8PTP	103	VP2MA	WB5CKH	WA7COQ
G3XYP	119	WA7UFS	104	ISØMVE	W2NBJ	101	100
144	G4DJC	106	VK2EW	KA6SR	102	G3WYN	GW5YI
							K3UMV
CW							
107		106		102		100	
K4II		W8ZCQ		W9OHH		W9MR	

Endorsements

In the endorsement listings shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340	300	K2GBC	K3ZOL	200	KØCML	W1JAA	EA6CE
W5HDS	JA8MS	WA2FCA	W4MIA	DK5AD	W2DPL	W2FYS	F6CLH
335	PY2RW	260	W8QFR	W7VSE	WB4LDT	W9UDK	W1VH
W9TKD	ZS6RM	W6TC	220	WB8FOS	W9TQA	140	WB4DEL
325	290	WA9TXL	K7AY	YU2LA	160	WA4CWU	W6FL
SMØKV	W5KKZ	WAØOMA	W2GRR	180	K4QG	WB8MCR	W8CTR
W6EUF	280	250	W1WQC/4	JH3DAE	K6QHC	WA9TAA	
W9WNB	VE4SK	WA9TVM	WBØHAI	JA4FM	K8LUU	YU1NPG	
310	WA5ZWC	WØGKE	5W1AU	K1WJB	K9HQM	YU3TFB	
W1MDO	270	240	9L1JT	K9UTN	VE2AFU	120	
Radiotelephone							
315	W6ARJ	W5KKZ	250	DL7PH	180	160	WA5TYX
W3RX	290	270	KZ5JM	W1WQC/4	HB9QC	JH3DAE	W8DOG
310	CR4BS	JA1AAT	240	5W1AU	I5AFC	WB4OXD	WB8MCR
W2GBC	W9CPD	260	K8TRA	200	JA3FD	140	WBØGXU
305	ZS6RM	I5FCK	YV4AGP	SM5VS	W7BCT	K8LUU	120
K9LKA	280	WA2FCA	220	WAØPVW	W9DFS	K9HQM	DK5AD
						WA4CWU	YU1NPG
CW							
140		W1DAL		OE1ZGA		K4YFQ	
K6GA		120		OZ1VY		K6VY	
						K9UTN	

In June, 1975, Honor Roll listing, the call and total for W4DQS should have been shown as W4DQS . . . 320/336 CW/F.

Strays

□ To many of the newcomers to amateur radio components such as these in this equipment setup are merely relics behind glass in the ARRL lobby or in other similar collections of radio memorabilia. But to the original owner of call W9CRC Russ Rennaker and other senior citizen hams, such stations represent their introduction into amateur radio. Here the transmitter used a Ford spark coil; the receiver, a 201 tube and an amplifier for the Magnavox speaker which required a 6 volt field source.

I would like to get in touch with . . .

□ any school radio club interested in establishing a school radio club net on 20 meters. WA7ZWC

□ University of Missouri graduates interested in forming an MU net. WØZXY

□ chefs whose hobby is amateur radio. G2DRTT

□ ham operators world-wide who are employees of Fisher. Send name, call sign, branch and home address to Fred C. Shelter, 977 Oak Street, Indiana, PA 15701.

□ amateurs who are alumni of Brandeis University. Brandeis Amateur Radio Society, WA1JHQ/1

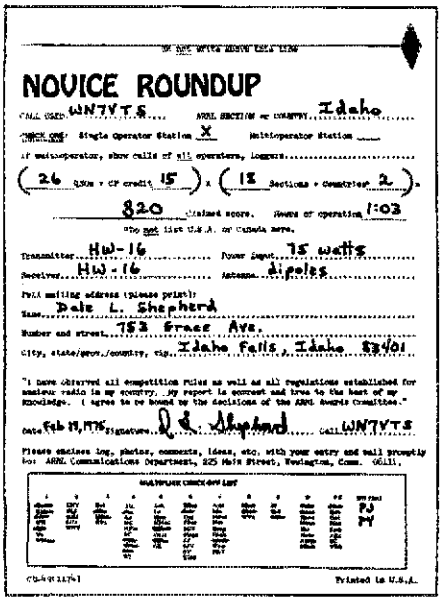
□ amateur operators who are police officers in the state of New York. WA2NJR

□ others interested in the reception of weather satellite pictures. WB8QYM

□ amateur operators who are deaf. Jerry Lane, 922 Suburban Apts., DeKalb, IL 60115.

□ anyone interested in a Russian language net. WA6SQG

□ other members of the Big Brothers association interested in getting together for a big brother-little brother field day in 1976. WB2MZU/1



1976 Novice Roundup

Novices, here's the chance to work *your* own contest . . . it's Novice Roundup time again. The last two years have both seen new records set by Novices, but whether you find yourself fighting for top spot, working for that WAS certificate or increasing your code speed, you'll discover the NR is loads of fun. Thirty hours operating time allowed out of nine days will go by like thirty minutes.

The 1976 Novice Roundup period is 0001 UTC Saturday, February 7 to 2359 UTC Sunday, February 15. Don't forget, this means it actually *starts* on Friday evening, local time, in all parts of the U.S.

A few operating hints: after calling CQ, listen on both sides of your frequency; not everyone will have a VFO. Check 15 and 10 meters periodically, since short band openings there will bring in some hard-to-get states (and DX). Write to headquarters for a supply of special log forms and "dupe sheets." Send a self-addressed, stamped envelope and ask for the Novice Roundup "package."

After the NR is over, send your logs with comments and photos of you and your station to headquarters; be sure they are postmarked no later than March 15, 1976. Since logs become the property of ARRL and cannot be returned, remember to keep a copy for your own files. Good luck!

How To Participate

Contest QSOs are much briefer than ordinary ragchews. You should not repeat your transmission (call, RST and section) at all unless you're requested to do so. Here's the way a typical exchange might go:

CQ NR CQ NR DE WN4VMC WN4VMC WM4VMC NR K

WN4VMC DE WN9AXP WN9AXP AR

WN9AXP DE WN4VMC 579 TENN BK

WN4VMC DE WN9AXP R 569 ILL K

WN9AXP R TNX 73 SK DE WN4VMC NR K

In most cases your state is your section. However, new hams in PA NJ NY MA CA FL & TX should check page 6 of any issue of *QST* to learn their exact section (within the 16 ARRL divisions). If you still don't know your ARRL section after referring to page 6 of *QST*, drop us a card and we'll help you out.

Generals: *don't* call CQ NR; *answer* Novice CQ NRs.

Note that time is expressed in Coordinated Universal Time (UTC). If you're unfamiliar with UTC, remember that it's 5 hours ahead of EST, 6 ahead of CST, 7 ahead of MST and 8 ahead of PST. Better yet, send for our handy Operating Aid # 14, which contains, among other goodies, a time conversion chart and explanation of the RST system.

Sample Summary Sheet

DO NOT WRITE ABOVE THIS LINE

NOVICE ROUNDUP

CALL USED WN7YTS ARRL SECTION or COUNTRY Idaho

CHECK ONE: Single Operator Station X Multioperator Station ____

If multioperator, show calls of all operators, loggers

(26 QSOs + CP credit 15) x (18 Sections + Countries 2) = 820 Claimed score. Hours of operation 1:03

Do not list U.S.A. or Canada here.

Transmitter HW-16 Power input 75 watts

Receiver HW-16 Antenna dipoles

Full mailing address (please print):

Name Dale L. Shepherd

Number and street 753 Grace Ave.

City, state/prov./country, zip Idaho Falls, Idaho 83401

"I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date Feb 11, 1976 Signature D. L. Shepherd Call WN7YTS

Please enclose log, photos, comments, ideas, etc. with your entry and mail promptly to: ARRL Communications Department, 225 Main Street, Newington, Conn. 06111.

MULTIPLIER CHECK-OFF LIST

Printed in U.S.A.

Scoring

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6 KL7 KP4/KV4 KZ5 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31+3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see OP-News of this issue. You may work DX stations for contest credit; a multiplier of 1 is earned for each separate foreign country worked.

Read the rules carefully. Keep a check-sheet of stations worked (we have Operating Aid †6 available free) so that you don't have duplicate QSOs. Log sheets, Op Aid 6 and a map of the United States are now available from your ARRL Headquarters. *Unless first-class postage is included with your request, log sheets will be sent by third-class mail.* To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 10 cents postage attached. This will assure your receiving 3 log-sheets (enough for 300 QSOs), 1 Op Aid 6 and a WAS map (if desired). Using this as a guideline, you can adjust the postage according to the number of logs you anticipate needing.

B C N U in the NR!

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of *QST*

2) *Time:* All contacts must be made during the contest period starting at 0001 (12:01 A.M.) Coordinated Universal Time on the first Saturday of February and continuing until 2359 (11:59 P.M.) Coordinated Universal Time the second Sunday of February. Time may be divided as desired but *must not* exceed 30 hours total. Off periods *may not* be *less than* 15 minutes at a time. Times on and off *must* be entered in your log.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs may take place on the 80-, 40-, 15-, and 10-meter bands. Crossband contacts are not permitted. Novices work any amateur stations; non-Novices work Novices only. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your RST and section and receipt of a RST and section/country. A station may be worked only once, regardless of band.

A Novice may operate in the Novice portion of the competition until he receives his General Class license; then he must participate as a non-Novice only.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The number of ARRL sections (see page 6 of any *QST*) + foreign countries worked during the contest is the "total multiplier." Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold the ARRL Code Proficiency certificates. FCC code credit *cannot* be used in lieu of the above. If an entrant does not hold a ARRL Cp Award, he can apply for credit by attaching to his Novice Roundup report a copy of the qualifying run from W1AW or W6OWP for January or February. Cp credit equals the wpm speed indicated on the latest ARRL certificate or sticker held by the entrant. The final score equals the "total points" plus "ARRL Code Proficiency credit" multiplied by the "total multiplier."

5) *Reporting:* Contest work must be reported on forms from the ARRL. Reporting forms and a map of the United States will be sent free upon request. Indicate starting and ending times for each period on the air. All NR reports become the property of ARRL and none can be returned. Entries must be mailed to ARRL Hq., 225 Main St., Newington, CT 06111, no later than March 15, 1976.

6) *Awards:* A certificate will be given to the highest scoring Novice in each ARRL section. Multioperator or General Class licensees and above are not eligible for awards. However, a box containing the TOP TEN W/VE higher-class licensees will be incorporated in the results. And should participation warrant, a similar box will show TOP TEN DX entrants.

Operating News

Conducted By George Hart, W1NJM

The Syndromes of High Power

High power is fine, as far as it goes, but it is sure no substitute for effective radiators. The way to get results is first to make sure your antenna system is operating at maximum efficiency. *Then* consider your power input, and also a means of quickly controlling it so that you aren't using more power than necessary to effect the communication at hand. This is illegal by Section 324 of the Communications Act, and it does apply to amateurs.

Trouble is, too many of us don't use our heads – or rather, many of us get carried away with affluence, or with greed, or maybe just plain old enthusiasm to get the job done, or maybe a slight case of sickness of the cranial cavitation. So we go out and buy a lot of heavy gear, capable of running up to, say, ten kilowatts input, and have a lot of fun installing it and watching the fantastic meter readings and the corona and the powerful, deep hum of heavy transformers and chokes and hearing the guy at the other end say, "Wow, what a signal!" We know of one ham who, while working for a commercial organization building a 50-kW hf rig, fired it up on 75 meters one night, just for fun, and tried to tell all and sundry he was running a "cool kW."

Well, fun is fun, but basic insecurity causing frequent pushing of the 10-kW switch is a different matter. You've gotta have that country, so push that switch. You've gotta bust through that QRM, so push the switch. Your mother hated you, so push that switch and show 'em! The white coat squad will be here any minute, so push it and watch the 4CX5000s blush!

Often, a perpetrator of such illegalities will try to justify it, either to himself or to his close circle of friends – most of whom disapprove but won't "squeal." "It operates cool and conservative," he rationalizes, "and I never push it unless I hafta." "It gets me in and out of the pileups fast," he tells his friends. "That way I'm out of your hair quicker." But the innate satisfaction is such that he'll usually jump into every pileup he finds, even if he already has that country, just to assert his mastery. Not all who do this are running illegal power input, of course. Some are demonstrating the mastery of their sophisticated antenna systems.

Then there is the guy who just likes to chew the rag, but insists on being the center of attention, and the only way he can do this is by putting out a signal nobody can compete with – or hardly anybody. You'll hear him on there, expounding away on his favorite subject – himself and his problems and his achievements – day after day, night after night, as long as anybody will listen, and sometimes even if nobody will.

Occasionally one of these birds will come out with the real reason why he uses multi-kW. "I just can't compete without it," he'll say. This is meant to imply that everybody else does it, so he has to also. But what it really signifies is a confession of basic insecurity with a threat of failure. I can't succeed unless I cheat; therefore, you must agree that I should cheat, because failure is unthinkable.

Well, we've always said that a psychologist would have a field day if he started to analyze amateurs. The above is inspired by comments from the field received here in recent months. Its purpose is not specific, but in general if you recognize any of your own habits and don't want to be "pegged," look at your operating as others do – or might.

MEET YOUR SCM

Newly elected Maritime SCM Ron Solomon, VE1OC, was born in Darmouth, Nova Scotia, in late 1919. Ron holds a BS from Dalhousie University as well as a later BA

(major in mathematics). During WWII he served as an officer in the RAF and RCAF (radar). VE1OC acquired his call in September of 1938 and is currently an Advanced Amateur licensee. This active ham holds OPS and PAM appointments and served as Assistant SCM for four years. Among the awards he has earned are BPL, RCC, PSA, WAC, WACAN, WAVE, WAS, DXCC as well as Section Net Certificates. Ron is a past president of the Darmouth Amateur Radio League, Life Member of ARRL, QCWA and the Society of Wireless Pioneers, member of the Halifax Amateur Radio Club, Nova Scotia Amateur Radio Association, the Antique Wireless Association, the Antique Radio Club of America, the Canadian Vintage Wireless Association, and the Nova Scotia VHF Association. VE1OC operates principally on 10 through 75 meters. Outside radiators include dipoles for 75 and 40 plus a 3-element triband beam

5-BAND AWARDS

Updating the December, 1975, listing, *5BDXCC:* (starting with number 463), 9L1JT W1WQC/4; *5BWAS:* (starting with number 229), WB5HVY K2GBC W7WT WB4QWM.

W1AW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.M. (all local Eastern time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you. The station will be closed Jan. 1, Feb. 16 and Apr. 16. *Staff:* Chief Operator/ARRL Asst. Communications Mgr., C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

Code Practice

Approximate frequencies: 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references. Details on Qualifying Runs appear monthly in *QST* Operating Events. The 0230Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	*EST*	*UTC*
5-7½-10-13-9	A.M. MWF	1400Z MWF
20-25	9:30 P.M. TThSSu	0230Z MWFS
10-13-15	4 P.M. M-F	2100Z M-F
	7:30 P.M. Dy	0030Z Dy
35-30-25-20-15	9:30 P.M. MWF	0230Z TThS
	9 A.M. TTh	1400Z TTh

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* text to be sent in the 0230Z practice from the October issue of *QST*.

1/9	It Seems to Us	1/22	Pub. Sv.
1/13	Correspondence	1/26	World Above
1/21	League Lines	1/30	YL News

Bulletins

Columns indicate times in EST-PST-UTC.

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0200Z Dy
2330 M-S	2030 M-S	0430Z T-Su

CW Bulletins at 18 wpm (1.805 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2130 M-F
2000 Dy	1700 Dy	0100Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 M-S	2100 M-S	0500Z T-Su

RTTY Bulletins at 170 Hz shift are repeated at 850 Hz shift when time permits (3.625 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2230Z M-F
2300 M-S	2000 M-S	0400Z T-Su

Oscar Bulletins (18 wpm on cw frequencies):

0840 M-F	0540 M-F	1340Z M-F
1400 M-F	1100 M-F	1900Z M-F
1600 Su	1300 Su	2100Z Su

Oscar RTTY:

1700 Su	1400 Su	2200Z Su

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC):

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

DXCC NOTES

Announcement is hereby made of two additions to the ARRL Countries List: Sable Island, VX9, and St. Paul Island, VY0. The addition of Sable Island is based on Point 1 of the criteria used for Countries List additions (". . . a distinctively separate administration.") and St. Paul Island by reason of Point 3 ("separation by foreign land"). Contacts made after November 15, 1945, with either Sable Island or St. Paul Island, may be submitted for DXCC credits starting February 1, 1976.

No DXCC credits will be given for any operations from Sable Island, or St. Paul Island until it has been established that landing and operation from those islands was done under specific permission from the proper authority.

NOVEMBER 8, 1975, FMT

The new production schedule for *QST* makes it impossible to present the full FMT results this issue. Stand by for the November report in February, please.

HIGH SCORES – OCTOBER CD PARTIES

The CD Parties are held four times a year, in January, April, July, and October; they are not really "contests" in the true sense of the word because no certificates are given. The CD parties are merely get togethers for League members holding leadership and operating appointments, primarily through the Communications Department. Your local Emergency Coordinator is eligible to participate, along with the guy down the street who operates on traffic nets and holds an Official Relay Station appointment and the amateur up on the hill active on VHF and appointed as an Official VHF Station. The CD Parties are "closed" in the sense that only appointees and officials are eligible to participate but are "open in that just about every active amateur can qualify for one appointment or another. Your Section Communications Manager (listed on page 8 of *QST*) can supply information on appointments of all kinds.

For the last several years the July CD Parties have been open to all League members, and a special announcement of that event is in *QST* each June. This year, however, the open CD Parties will be in April, since the July Parties have been dropped to make room for the special Bicentennial Celebration. The other three parties are traditionally for appointees and officials only, and they have provided a low-key, enjoyable activity for thousands of operators over the years. There *is* some competition in them, however, and the October, 1975, CW CD Party was a good example. An examination of the high scorers listed below will illustrate the point. . . the top score of 955 contacts in 69 ARRL sections represents a new scoring record for the October CW Party and a QSO rate of just about 48 per hour for 20 hours. WA2UOO is a seasoned operator, with years of experience in many contests as well as CD Parties. Others in the top ten scores are similarly experienced and several have found themselves at the top in CD Parties and Sweepstakes contests over the years. Although just a fun activity for most, the October CW CD Party had competition at its best for the "Number One" spot.

CD Parties sponsored by your Communications Department are just one of many activities and services available to ARRL members. Your SCM can supply information on most of these, and get you started in active, "official" participation in your ARRL section. We'd like to hear you on your section traffic net, or in AREC drills, or as an Official Observer, and, of course, in future CD Parties! – *WA1STN*

QST

CW

WA1STN(WA2UOO,op)	331,890-	955-69-20	
WA7WXY	315,350-	894-70-20	
WA1KID(K1ZND,op)	302,565-	869-69-20	
W6PAA	299,460-	861-69-20	
K4PUZ	299,200-	873-68-20	
W5BEVC	297,850-	844-70-20	
W8FAW/4	296,080-	770-66-20	
K@GXR	252,280-	742-68-20	
W9YT(WA3VJZ,op)	241,870-	717-67-20	
K4DAS	240,240-	722-66-20	
K1JYN/6	234,945-	676-69-19	
WA1UIK	233,350-	718-65-18	
K9BGL	233,350-	718-65-20	
K2KIR	223,720-	650-68-10	
W9PJT	204,425-	624-65-17	
WA3VWJ/5	184,140-	553-66-17	
WB2RKK/1	180,495-	565-63-13	
WB5HOD	177,975-	561-63-15	
WA8BTZ	149,825-	454-65-16	
W@GTF	143,140-	415-68-12	
WA3VBM	142,065-	446-63-10	
WA6VEF	141,900-	430-66-19	
VO1KE	140,430-	447-62-	
WB5IZN	132,160-	408-64- 8	
W6IKW	129,600-	399-64-17	
K4JM	124,480-	384-64- 9	
W@ETT/7	123,380-	394-62-19	
*W1GNC	122,915-	398-61- 7	
W6DGH	122,960-	376-64- 8	
WA6BMV	116,865-	366-63-20	
K9EYA	115,900-	380-61-11	
K1LPA	114,975-	361-63-15	
W5TXA	114,180-	338-66-10	
WA@URW	113,750-	344-65- 8	
W2FR	113,050-	315-70- 9	
WB@QOT	109,120-	334-64-12	
W6DQX	108,885-	351-61- 5	
WA4UAZ	108,160-	328-64-12	
WB@NOM/1	107,360-	344-61-	
K3HXS	106,200-	350-60-11	
K@RPH	106,140-	360-58- 9	
W5VZO/4	104,615-	338-61-17	
WB@JYK	104,135-	352-58-18	
W4OZF	104,110-	354-58- 8	
K@AZJ	103,545-	347-58- 8	
WB1BX	103,320-	321-63- 9	
WB@KKI	101,500-	345-58-15	
WA1QKD	100,300-	336-59-14	
WB@WKQ	100,120-	313-63-19	

PHONE

WB2NOM/1	157,440-	484-64-15	
K6CQF	129,600-	405-64- 9	
WA4KKP	125,660-	407-61-17	
K@PVI/5	72,105-	253-57-14	
K@GXR	119,255-	391-61-20	
K3MNT/7	117,800-	374-62-15	
W5HGT	114,000-	377-60-12	
WB4FZQ	111,435-	391-57-15	
WA3VWJ/5	102,900-	338-60-15	
K3HXS	102,030-	354-57-13	
W4BTZ	93,980-	317-58-15	
K1LPA	85,400-	276-61-15	
K4LAN	84,075-	291-57- 8	
W4MYA	83,220-	286-57- 9	
K3DZB	78,840-	267-54- 9	
W8LT	78,660-	273-57- 6	
K9BGL	75,880-	271-56- 6	
WA1RYL	75,000-	295-50- 8	
WA4UAZ	72,540-	270-52-17	
WA1RWU	69,019-	414-55-14	
K9EYA	67,820-	253-53- 7	
W1FJI	67,815-	258-53-16	
WA7WXY	66,120-	249-54- 3	
WB4ZSO	65,580-	250-54-11	
WB6HJW	57,545-	237-57-13	
WA1QNE	55,455-	243-52- 4	
WA4UAZ	55,265-	224-57- 7	
WB2RKK	53,960-	238-52- 4	
WA3RWO/8	53,525-	226-55-13	
WA1UIK	52,000-	248-50- 8	
WB8UKX	51,655-	209-59- 7	
WB9NME	50,020-	222-51-11	
W4OZF	47,885-	220-51- 6	
W5VZO/4	46,640-	209-52-17	
WB@JYK	46,500-	219-50-	
W@OTF	44,270-	195-54- 7	
WB9HOD	43,900-	191-55- 7	
W4KFC	42,110-	186-54- 3	
WA2YPO	41,000-	200-52-17	
K4FU	40,680-	206-48- 5	
WA1STN	40,700-	184-46- 3	
W1AW	40,890-	174-47- 6	

Operating Events

JANUARY

1: Straight-Key Night (starts 0100Z which is Dec. 31 local time), p. 96 Dec.

3: International Pacific DX Net 8th Birthday Party, p. 96 Dec.

3-4: VHF Sweepstakes, p. 56 Dec. **Nostalgia Radio Exchange**, p. 96 Dec.

7: West Coast Qualifying Run, (W6OWP, prime, W6ZRJ, alternate). 10-35 wpm at 0500Z on 3590/7090 kHz. This is 2100 PST the night of January 6. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," e.g. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A legal size addressed stamped envelope would be helpful.

10-11: CD Party cw, open to all ARRL appointees and officials, notified separately by bulletin. (Note it starts 2300Z Jan. 10 and ends 0500Z Jan. 12.) **Hunting Lions in the Air Contest, YU 80-Meter DX Contest**, p. 96 Dec.

13: W1AW Qualifying Run, 10-35 wpm at 0230 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EST (9:30 P.M. local Eastern time) the night of January 12. Underline one minute of top speed copied, certify copy made without aid, and send to ARRL for grading. Please include your name, call (if any) and complete mailing address. A legal size addressed stamped envelope would be helpful.

14-15: DX-YL to North American YL Contest, cw, p. 96 Dec.

17-18: CD Party phone.

24-25: SIMULATED EMERGENCY TEST, p. 54 Dec. **Under 20 QSO Party**, sponsored by the Under 20 Club, open to all under the age of 20. Full 48-hour period UTC, cw and phone. Exchange RS(T), state, country, or province, and name. Continental U.S. QSOs worth 1 point; Alaska and Hawaii (or a country on the same continent), 2 points, DX or other countries, 3 points. Cw QSOs worth double points, with triple points on your 20th QSO. Multiplier is the sum of states, provinces and DX countries worked. Score equals multiplier times QSO points added to your age. Awards. Membership to all who participate. For results and/or awards, send an s.a.s.e. with an additional stamp to defray costs to Jim Berets, WA1UOU, 33 Arrow Head Dr., Stamford, CT 06903 or Gregg Levethan, WA1UOT, 17 Boulder Brook Dr., Stamford, CT 06903. Mail by Feb. 1.

28-29: DX YL to North American YL Contest, phone, p. 96 Dec.

31-Feb. 1: French Contest, cw, p. 99 Dec.

FEBRUARY

5: West Coast Qualifying Run.

7-8: DX Competition phone, p. 61 Dec.

7-15: Novice Roundup, p. 70 this issue.

11: W1AW Qualifying Run.

14-15: Ten-Ten Net Winter QSO Party, full UTC period. Open to all, but only 10-10 members eligible for awards. Exchange name, location, 10-10 number. Score 1 point for each contact, 1 point if with a 10-10 member, 1 point if outside your own state, province, or country. (Max. possible 3 points for any one contact.) All contacts must be made on 10 meters, any mode, but a station may be contacted only once. Logs must include date and time of each contact. Awards. Send logs by April 1 to Grace Dunlap, K5MRU, Box 445, La Feria, TX 78559. Complete results will appear in the 10-10 Net Summer Bulletin.

15: Frequency Measuring Test, open to all, begins with a callup at 0230 and 0520 UTC February 15. (Remember, this is the evening before, local time!) The periods for measurement start at 0237 (20 meters), 0245 (40 meters) and 0253 (80 meters); for the late run, 0537, 0545, and 0553 respectively. Note the reverse order and measure 20 first. Each measuring period lasts five minutes. Submit your averages for each 5-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,071, 7085, and 3560 kHz. Late-run frequencies are 14,089, 7091, and 3564 kHz. Your entry must be received by Feb. 26 to qualify for the May *QST* report of the competition. W1AW will start transmitting the official results in a special bulletin February 27.

21-22: DX Competition cw, p. 61 Dec. **YL/OM Contest**, phone, sponsored by the Young Ladies' Radio League, starts 1800Z Feb. 21, ends 1800Z Feb. 22 (cw Mar. 6-7). Open to all; all bands, no crossband, net contacts not permitted. Call CQ YL (YLs call CQ OM). Exchange QSO no., RS(T), section/country (see p. 8 for section list). Entries must indicate band, times, date, transmitter power. Note phone and cw are separate contests. One point per QSO. Contact a station once only, multiply by no. of different sections and/or countries. Contestants

running 150-watts input or less on cw and 300 watts ssb pep or less on phone multiply by 1.25. Signed logs with claimed scores must be postmarked no later than March 24 and received by April 18 or they will be disqualified. Log copies go to Beth Newlin, WA7FFG, 826 W. Prince Rd. - 06, Tucson, AZ 85705. Certificates, trophies.
28-29: French Contest, phone, p. 99 Dec.

MARCH

3: West Coast Qualifying Run.
6-7: DX Competition, phone, YL/OM Contest, cw.
11: W1AW Qualifying Run.
13-14: BERU.
14-15: South Dakota State QSO Party, sponsored by the Prairie Dog Amateur Radio Club, 1400Z March 14 to 0200Z March 15. Cw 70 kHz up from the bottom, phone 1975-3955-7230-14280-21370-28510. Novice in the middle of their bands. SD exchange RS(T) and county (no SD-SD contacts permitted), all others report plus state, province, or country. The same station can be worked on different bands, modes, and counties for multipliers. Score: SD contacts times states, province, country. All other contacts times counties. Signed declaration and claimed score required Certificates. Logs by April 30 to WB0EVQ, Box 493, Springfield, SD 57062.
20-21: DX Competition, cw.
22: W1AW Morning Qualifying Run.
27-28: BARTG Spring RTTY Contest.
April 3-5: "Open" CD Party, cw.
April 10-12: "Open" CD Party, phone.
June 12-13: VHF QSO Party.
June 26-27: Field Day.
July 4: Straight Key Night.
July 24-25: ARRL Bicentennial Celebration.
Sept. 4-5: VHF QSO Party.
Nov. 6-8: SS, cw.
Nov. 20-22: SS, phone. QST

Contest Disqualification Criteria and Club Competition Rules

Contesting with your club is fun. Being disqualified is not. Here are the details on both these important aspects of ARRL contests.

Various ARRL operating contests held each year are built around rules by which participants must abide. Through the years, means of enforcing those rules in a manner fair to all participants have evolved into a set of guidelines based primarily on recommendations of the ARRL Contest Advisory Committee. Those guidelines are called the Disqualification Criteria, and are used as the basis for examination of possible rules infractions. The Headquarters Awards Committee, composed of seven active staff members, provides a recommendation in each case to the Communications Manager, with whom responsibility for the final decision lies.

What follows are those Disqualification Criteria, along with rules for Club Competition in ARRL contests. The Disqualification Criteria apply to all ARRL operating activities, and the Club Competition applies to the VHF Sweepstakes, the DX Competition, and the November Sweepstakes. Rules for all contests throughout the coming year will refer the reader to this page concerning rules enforcement and club competition.

Club Competition

Only ARRL Affiliated Clubs may participate in the club competition. A member must be listed in the regular score listings before he can be counted for a club.

In order for a club to be listed, two points must be met:

a) At least 3 entries from members of the club must be submitted.

b) All members wishing to be included in the club scores must indicate the club name on their summary sheet *and* the club letter (if one is sent in accordance with the previous paragraph) must indicate that said member is eligible to compete for the club.

Members eligible to compete:

a) Bona-fide club members living up to 50 miles from the club affiliation address need not attend any minimum number of club meetings. However, to be considered bona-fide, a member must be active in club affairs.

b) Members residing between 50 and 175 miles from the club affiliation address must attend at least 50% of the in-person club meetings during the year immediately prior to the date of the contest. If, however, he has not been a member for a year's time, he must have attended at least 50% of the meetings since he became a member.

c) Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition.

Scores of members meeting the requirements of section 11A may be submitted for club credit. Single and multi-operator station scores may be counted. At a guest-operated single-operator station, both the guest-operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations at least 66% of the operators must be members of the same club in order for the score to count for that club.

In order for a member to attend at least 50% of the in-person club meetings it is necessary that the club hold *at least* 4 in-person meetings a year so the member can attend at least 50%.

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later in order that he can meet the 50% attendance rule.

The highest affiliated club entry will be awarded a gavel.

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a club certificate where at least three single-operator cw and/or three single-operator phone scores are submitted.

Disqualifications

If the claimed score of a participant is reduced by 2 percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or other scoring discrepancies.

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1975 phone SS prohibits submission of an entry for the 1976 phone SS, but 1976 cw SS participation is OK.

The calls of all disqualified participants will be listed in the *QST* report of the contest.

Any participant on the borderline of disqualification but not actually disqualified may receive a warning letter from the Communications Manager.

For each duplicate contact that is removed from the log by Hq., a penalty of 3 additional contacts will be exacted. The penalty will not, however, be considered as part of the 2% disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

Station Activities

SCM ≠ AREC ≠ ORS ≠ OVS ≠ SEC ≠ OBS ≠ TCC ≠ OO ≠ NTS ≠ WAC ≠ CP ≠ A-1 OPR ≠ EC ≠ DXCC ≠ CLUBS ≠ RM ≠ OPS ≠ RCC ≠ PAM ≠ WAS

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: WA3DUM. RM: W3EEB. PSHR: K3YHR 47, WA3WPY 47, WA3DUM 46, K3KAJ 44. W3PM, a regular on the DEPN for many years and Sussex County RO became a Silent Key. His good fellowship, knowledge, and willingness to serve will be missed by all. WA3ANC is a new DE ham. K3YHR will become DEPN mgr. effective Jan. 1st. WA3PCC heard a request for assistance when the Supt. of an Accra, Ghana Mission became ill. Fred, through contact with a Wilmington sponsor, arranged for the mission to be closed temporarily, a substitute sent, arrival and assistance scheduled at the Philadelphia airport and medical attention. His contacts were with 9G1 JC and XYL 9G1JL. DTN QNI 388, QTC 66; DEPN QNI 69, QTC 7. Traffic: (Oct.) K3KAJ 159, W3EEB 119, WA3WPY 97, WA3DUM 54, W3DKX 33, K3YHR 19, WA3UUN 11, W3YAH 10, K3JXR 2. (Sept.) WA3WPY 94.

EASTERN PENNSYLAVNIA: SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF. PAMs: WA3PZO W3AVJ. RMs: K3DZB W3EML K3MVO WA3PHQ WA3WOE WB2FWW/3. Two net reports received this month: PFN QNI 600, QTC 498; EPAEP&TN QNI 331, QTC 99. Still no word from the cw nets. Lets take a minute and get those reports in. OVS reports from W3CL and WA3BSV. OBS reports from K3BHU WA3PHQ W3AVJ W3ID. OO reports from K3NSN K3OIO W3CL W3KCM W3KEK K3DRT W3BFF. Four BPLs this month: W3CUL W3VR K3NSN WA3ATQ. Halloween gave the Hazelton Hams a chance for some public service by assisting the police in night street patrols; assisting were W3FCU K3RHI K3IJX WA3GNG WA3BSV WB3ADT K3UKZ K3TRM. WA3UDS/3 took first place nationally in 1975 FD using ONE watt! The Pack Rats did it again, the biggest Hamarama ever! WA3MNT can attest to it too, he is now borrowing money for lunch. K3UCT got his big "A" ticket. W3HYT now using HW101 says it is better that QRP! The big guns W3CUL and W3VR still piling up the traffic totals. K3NSN back in the missionary nets. Our lady Marine WA3ATQ still keeping her many skeds. WA3THT now has a new antenna, now for a rig to connect to it. Sorry to hear W3EML still having problems with his eyes, speedy recovery from the gang in EPA Bill. Apology No. 1 — I missed PTTN report above it is QNI 189, QTC 72. The TASBAR gang were active duting the recent hurricane or flood. Those active were W3CMA W3VA W3ZRQ K3NYX. Happy 62nd and retirement to W3BUR, boy will you be busy now, I know! W3BNR still on the move he would like a job guaranteed to keep him home at least 50% of the time. W3EU getting ready for a hard winter he says! With the help of HQ, I believe I have all appointments and their expiration dates on hand. I will jog your memory as they become due. Remember appointments are for two years now. A little late I guess but I hope Santa brought you all the goodies you requested. The Bicentennial year is on us so lets make it a good one for Ham Radio. If you can't get to the National Convention then by all means make plans to attend the Atlantic Division Convention in Philadelphia. Traffic: (Oct.) W3CUL 2958, K3NSN 1224, W3VR 901, WA3ATQ 304, WA3THT 215, W3EML 142, WA3PHQ 141, WB2RBA/3 140, W3IPX 116, WA3UKZ 98, WA3PZU 75, K3MVO 64, WA3VUE 57, W3AVJ 46, W3WRE 36, WA3NDQ 32, K3OIO 27, W3ID 24, K3BHU 22, W3HK 20, W3LC 19, W3ZRQ 15, WA3PGT 14, WA3CFU 14, W4BUR 14, WA3REY 13, W3ADE 12, W3CL 11, W3AXA 8, W3BNR 6, W3VA 5, WA3VDQ 4, K3HXS 2, WA3BJQ 1, WA3BSV 1, W3EU 1, W3KCM 1, W3KEK 1, W3GY 1, WA3QLG 1, WA3TMP 1. (Sept.) WA3PZU 51, K3DCB 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — The K3IQG team at Loyola college made BPL for Oct. WA3WRN has the top traffic score. W3CVE an independent is back and slinging cw to all his old buddies. WA3ZAS has worked 97 countries from his diggings. WA3EOP is busy both at W3CWC and at home. MEPN has WA3PRW K3ORW and WA3IHW as directors. WA3IHW and K3LFN are FAR trustees, MDCTN top Honor Rollers are WA3WRN WA3PRW W3LDD and W3ADQ. This net had 17 sessions, QNI average of 14.7 with traffic at 63. The WR PON had 13 sessions, QNI avg 14.4 and traffic of 20. W3FCS managed 35 PSHR points along with DX chasing and winterizing the shack. A busy school schedule has WA3UYB WA3UUM WA3UPH and WA3VJQ burning the midnight oil. WB8ZVY/3 WA3JSZ and W3EBK file 00 reports. While W3FZV visited Japan for 3 weeks, DE boys K3KAJ W3EEB WA3WPY K3YHR kept MDD humming. W3MSN is back in action 1.6 thru 450 MHz and wants no more of those twisting winds. W3EOV trips to the west coast by air and rentals. W3ZNW finds 2-mtr fm a pleasure tripping to AL. WA3SJY tried for a Hong Kong sked with no joy. W3MWD keeps no week end skeds. WA3UYF itching to get back from the new QTH. W3BHE had the thrill of a life time participating in an on-the-air sea rescue involving VE@MCM, the Coast Guard and the 4th District hams on the east coast. WA3UVM RACES RO and the Montgomery Co. hams provided "Flood Watch" communications on Sept. 25 and 26. Participants WA3YOO, WA3ZLB (NCS) W3HEM WA3ZNW W3VG W3BFV WA3PAD WA3PAE and WR3ABM. QNI stations W3CYQ WA3OIB W3UCT WA3TRS W3SOG WA3PBC WA3ZOR W3GXM WA3WHL WA3UQF WA3ZQA W3PIH WA3SLJ and W3HHB. On Sept. 26 the call was answered by: WA3SEE W3TNQ WA3WYA W3HSC W3CYQ W3HHB and the Air Force MARS. Good show with a good try out of the new fm system. Nets: WR PON (W3DFW) 3905 kHz at 5:15 PM week days. MD Fone Nets (WA3EOP and W3LDD) 3920 kHz at 6 PM daily, and MDD (W3FZV) on 3643 kHz, daily at 7 and 10 PM. Traffic: (Oct.) WA3WRN 168, K3IQG 151, WA3EOP 138, W3CVE 128, W3FA 128, WA3SJY 88, W8BZY/3 83, W3MWD 77, W3FCS 35, WA3PRW 26, W3FZV 20, W3EOV 19, WA3UYB 19, W3BHE 4. (Sept.) WA3UPH 24.

SOUTHERN NEW JERSEY: SCM, Charles E. Travers, W2YPZ — At the annual NJN meeting WB2LCV was elected mgr. for 1976. W2FQY K2BDA K2DQR report Laurenceville NJ Repeater making excellent progress. A new 140-ft. tower with channel master was recently installed replacing tower damaged in recent storm. EC WA2AML held a very successful meeting at Somers Pt. Great interest was shown and SEC W2JI with ECs WB2KGT WA2WPZ WA2SEA and WA2TRK present. WA2SGA gave a very interesting picture of his organization and how it functions. The GCARC reports a code class of 19 students. Assisting in the training are WA2AXJ WA2VEE and WN2AHQ. Pres. K3MDG of SHARK reports recent ARRL affiliation and construction under way for a repeater on 146.01/.61. The Harmonics, SJRA Publication enjoyed a very interesting program by K3JH of Bryn Mawr, PA describing his huge HF rotaty beam antenna array. An RCA team headed by W2KF has been formed to design the system and provide on-site project direction and training of Iranian personnel who will operate the equipment of a large telecommunications system on Kish Island in the Persian Gulf. Traffic: WB2LCU 115, WB2ICE 38, W2JI 36, WB2LCC 18, WN2AZU 15, WB2SFX 12, WB2OSQ 8, W2REH 3, W2IU 1.

WESTERN NEW YORK: SCM, Richard M. Pitzeruse, K2KTK — SEC: W2CFP. Please note that effective immediately, my mailing address is 4043 Howlett Hill Road, Syracuse, N.Y. 13215. WA2EAJ participated with BARRA in providing communications for the second annual Buffalo to Niagara Falls marathon. About this time, WA2EAJ is on a DXpedition to Disney World in FL. WB2KUN looking forward to the two weeks after Christmas when he will be back from Navy basic training to fire up the ham rig. WA2CDV active in the last CD Party and is gearing up his OO work. W2RQF ordered the digital readout for the FT-101E. WA2UYK doing an FB job as a new traffic handler on NYS. W2RUF has a Novice Net running on 3728 kHz at 1700 local time. On Mon., Wed., and Fri. it runs at 5 wpm, and on Tue. and Thurs. they vary the speed. WB2TGL is the asst. mgr. of NYSCN. W2RUF readying an HW-101 and SB-220. Traffic: (Oct.) W2MTA 228, W2FR 220, WA2ICB 162, W2OE 145, WA2UYK 139, WB2UBW 131, W2RUF 121, WB2KUN 53, WA2TPC 49, WB2VND 48, WA2HSB 45, W2RUT 39, WB2QIX 28, W2RQF 23, K2OFV 18, K2KTK 14, W2EAF 12, WA2EAJ 9, K2IMI 7. (Sept.) W2FR 302, W2RUF 108. (Aug.) W2RUF 81.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: W3ZUH. Asst. SEC: K3SMB. PAM: K3ZNP. RMs: W2KAT/3 W3NEM W3LOS W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 local time. PA Traffic Training Net meets daily on 3610 kHz at 6:30 PM local time. PA Phone Net meets M - F on 3960 kHz at 5:30 PM local time. Central and Western PA RACES Net meets every Sun. on 3990 kHz at 8:00 AM and 9:00 AM respectively. It is with deep regret to announce the Silent Key of K3SIQ. New appointments: W1FCC/3 OO; W3GQJ OBS. Welcome to following new Novices WN3AGZ WN3AAC WN3ACC WN3AGD WN3AGE and WN3ZBA. W3FYV has upgraded to Extra Class. The Cumberland Valley ARC repeater now operational on 147.72/.12 MHz. WA3WJA has been busy lately experimenting with fast scan TV. Thanks to K3QAM K3JOT WA3YDP W3YCD and WA3SSU for assisting W3TTN with the repair of his antennas for the winter. WA3WIK and WA3SOZ are proud owners of new towers. Good luck fellows in getting them in the air before the snow flies. The South Hills Brass Pounders & Modulators took first place during Field Day for the W3 call area in the 8 transmitter class. K3CA and WA3KQA are conducting Amateur Radio classes for the continuing education program in State College. Simulated Emergency Test on Jan. 24 & 25. Let's make this a whole WPA effort with every county participating. All nets in the Section should be on the air during this SET. Contact your county EC or W3ZUH for details. Special thanks to the Fort Venango Mike & Key Club of Oil City and the Conemaugh Valley ARC of Johnstown for their FB hospitality during recent visits to their club meetings. I encourage all WPA members to take a few minutes and read The Amateur's Code in the front of the ARRL Handbook. The WPA CW Traffic Net had 31 sessions in Oct., 344 stations check in and handled 154 messages. Traffic: W2KAT/3 327, WA3VBM 130, W3EGJ 95, WA3SWF 50, K3CHD 38, W3OW 25, W3KUN 20, K3OYB 19, K3SMB 18, W3SN 16, W3LOS 15, K3ASI 14, K3SJN 14, W3TIN 14, WA3PMT 10, W3ATQ 7, W3UT 7, W3IDO 6, W3EGK 2, W3LOD 2, WA3UDZ 1.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. RM: K9ZTV. PAM: WA9KFK. Cook County EC: W9HPG

Net — Freq.	Time(Z)/Days	Sess.	QNI	QTC
ILN — 3690	0030 Dy			253
ILL Phone — 3915	2145 Dy			330
NCPN — 3915	1200 M — S			
	1700 M — S			82
IEN — 3940	1400 Su			79

This column's sympathy to the family and friends of W9JLL who recently passed away. He was a true old timer of this section and was very active on the traffic bands. WA9DOS WB9OHN and WB9FRX are the newly elected officers of Lakeview Amateur Radio Assn. WA9JJE received his Advanced ticket. Members of the Arlington Heights Amateur Radio Assn. were again active on their annual patrol of the area's parks on Halloween nite. W9GSB is enjoying his 43rd year of Ham Radio with a new Yaesu FT101B and 200 foot long wire antenna. New officers of the Six Meter Club of Chicago are W9WIC K9ENZ Blanche Thuma K9TMW WA9RER and W9RVG. W9PRN attended the Starved Rock Radio Club's annual appreciation dinner. Their new repeater frequency will be 147.12 and 147.72, with the call WR9AFG. Plan now to attend the 1976 ARRL Central Division Convention which will be held in Milwaukee, WI on July 9 and 10. It will be hosted by the West Allis Radio Amateur Club, and will be at the Red Carpet Inn and Exposition Center. K9TRG gave a travelog of his recent trip to Europe at the Wheaton Community Amateurs club meeting. ARRL has announced a special Bicentennial WAS for all states in '76, any mode and bands. WB9KLW has upgraded to the Advanced Class. WA9KRL K9HDZ K9FNB and W9RZC are the new officers of the Sangamon Valley Radio Club. IL was represented in 30 of 31 9RN sessions. Traffic: WB9NVN 424, WA9VGW 322, W9NXG 234, WB9NOZ 204, W9NJP 183, K9ZTV 114, W9JXV 64, W9LNQ 62, WA9KFK 53, W9OYL 45, WA9ULP 42, WB9DED 39, K9KHI 34, W9KR 34, WA9JJE 28, W9HOT 24, W9PRN 20, WB9PHM 16, W9RYU 12, W9ZAV 8, WB9NIO 6, K9DDA 1.

INDIANA: SCM, M.P. Hunter, WA9EED — SEC: W9UMH. Congrats are in order for the IN section members who made 100% representation on D9RN possible. WB9OMX points out an increase in QNI on QIN. Both nets welcome your support. The Indy Radio Club continues to have some very exceptional programs. Congrats to the new officers of IRCC, — they are very capable indeed. The WVARA bandspread reports that 9Hz has been used for radio propagation. W9UMH continues his good work with the EC program. IN is now near the top in EC representation. With regret I note the following Silent Keys: W9HIQ W9RGY K9LZG W9GBA. Some scores were generated locally during the CQWW contest. Two new countries stirred up interest during the contest and just after. Due to the qualifying criteria for these two you can expect some additional new ones. Net Traffic: IPON 4, INN 12, QIN 168, Hoos, VHF 1, ITN 526. Traffic: WB9KTR 256, K9FZX 227, WB9OMX 168, W9HUF 102, W9QLW 111, K9DCX 97, W9UEM 78, WB9IHR 77, W9UMH 70, W9ENU 69, W9EI 68, WB9FOT 51, W9LTU 42, WA9OHX 42, WA9OKK 41, W9OKP 39, WB9DIX 38, K9CBY 32, WB9MDS 31, K9RWQ 30, K9RPZ 28, WA9OLM 27, W9PMT 26, K9EQT 25, K9TKE 25, K9YBM 25, K9DZC 22, WA9OAD 21, W9MCJ 19, W9KWR 14, WA9TJS 11, WB9OZW 10, K9JQY 9, K9LZN 9, K9HMC 7, WA9CYG/9 5, W9IDH 5, WA9CDP 4, WA9WJA 2.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9PKQ. PAMs: W9AYK WA9LRW K9UTQ. RMs: WB9ICH W9MFG K9LGU K9KSA.

Net — Freq.	Time(Z)/Days	Sess.	QNI	QTC
BWN — 3985	1245 M-S		436	352
W9AYK				
BEN — 3985	1800 Dy		679	184
WA9LRW				
WNN — 3725	2315 Dy		97	21
WB9ICH				
WSBN — 3985	2330 Dy		1703	337
K9UTQ				
WSSN — 3662	0030 MWF		57	3
K9KSA				
WIN — E —3662	0100 Dy		342	216
W9MFG				
WIN — L — 3662	0300 Dy		245	133
K9LGU				
Wis. Expo — 3925	1801 M-F		678	64
WA9NIX				

K9OXY worked WA9INC W@CCE (IA) WB@EIC K@TLM WA@CHK(MO). Two new hams in Portage WN9SEI WN9SEJ. W9MY OO Class 4. WIN-E WIN-L certificates to WB9IDU. Groundhog party was a big success with over 90 present for the dinner including friends from IA and MI. Two older hams who were in on the ground work of the original ground hog party could not be present were W9FMI and W9FVX. WSBN BEN certificates to W9IEM. WB9ANR has new 15-meter beam. K9DAF has new SB220. K9CPM made BPL. WSBN certificate to WB9QKO. Wisconsin Nets Assn. is now incorporated known as WNA Ltd. WNA manual will soon be coming out, has a lot of good things in it. Does your county have an EC? If you think you can qualify let your SCM know, we would like to have an EC for all counties. Traffic: (Oct.) K9CPM 822, W9DND 275, W9PVH 257, WB9NME 196, WA9GJU 161, WB8IDU 154, WA9QVT 150, K9FHI 130, WB9ICH 118, WB9KPX 102, K9LGU 89, W9MFG 65, W9AYK 63, WB9HLS 48, K9UTQ 48, WN9PTX 47, WB9LKC 44, WA9LRW 43, W9SFL 39, WA9PKM 37, K9KSA 36, W9IHW 34, K9JPS 32, WB9NHT/9 32, WN9NRK 29, WB9JSW 28, W9IEM 18, W9ESJ 14, W9BKD 13, W9KHH 12, WB9PYG 11, W9ZBD 10, W9CFS 8, W9YFW 8, WN9OEC 5, WB9NKC 4, WB9LIW 3. (Sept.) WB9KPX 304.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K@ZXE — SEC: WA@OFZ. PAMs: K@FLT WA@GLI WB@OCT. RMs: K@CVD K@RYU WA@YAH. Chief OBS: WB@KOR; Chief OO: WA@PRS. The SCM moved and is getting settled at 2021 Swan Lake Raod Duluth MN 55811. Please send all reports and letters to this address. Congrats to WN@QNX new Novice; WB@QDM General; K@KLY WA@VUP WB@FMI WB@HOX Advanced; WB@MBY Extra. WB@LOR recently obtained the WAS and WAM awards. WB@MAO is busy with Novices in Staples; WA@QIT K@RYU and others are working with Novices in Duluth; and novice classes are being held at the Dunwoody Institute in Mpls. Grand Rapids is organizing for RACES reports WB@NQJ. The Marshall Club becoming active in AREC see WB@DHS. Does your county have an EC? Can your club provide one? WB@OCT is retiring as MSPN evening PAM because of increased job responsibilities. Many thanks to Jim for his great enthusiasm and positive action. Section net certificates are being issued to active net members. WB@HOX now approved Life Member, presented WB9NVN a copy of the new operating book for sightless amateurs. The Duluth area 2M fm group is organizing fox hunts and repeater activities. Silent Key W@AIY will be missed my many. Piconet 3925 kHz 9 AM-5 PM M-F, 9 AM to noon Sat.; MSPN 3945 kHz 12:05 PM daily; MSSN 3710 kHz 5:30 PM M-F; MSPN 3925 kHz 5:45 PM daily; MSN1 3685 kHz 6:30 PM daily, MSN2 3685 kHz 10:15 PM daily. MAWX 3925 kHz follows MSPN evening session. Traffic: WB@HOX 466, W@QMY 239, K@CVD 222, WA@GLI 192,

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NORTH DAKOTA: SCM, Harold L. Sheets, W@DM — OBS: K@PVG. OO: W@BF. WB@BPS started a radio code and theory class for 6 weeks. W@BF working on an SB104 and doing OK. W@GZD has new linear going to match his new SB104. W7CEB/@ ex-W@FCA retired and came back to Valley City to live. WB@GJY moved to the farm in ND and ex-KL7 WB@RHT is now on. Both are serving as net control stations. WA4FPU/@ on in Grand Forks with high freq. beam. WA@RWM received the Presidential Sports Award for her efforts in the soft ball field this summer. Congrats. Code practice still continues by some old timers on the air in mornings. Sounding better all the time!

Net — kHz	GST/Days	Sess.	QNI	QTC
Manager				
Goose River — 1990 W@CDO	0900 Su	4	44	9
RACES — 3996.5 WB@ATJ-WA@SUF	1750-1830 S-S	34	561	56

Traffic: WA@SUF 55, W@CDO 22, W@DM 16, W@MXF 12, WB@HMG 7, WA@JPT 3.

SOUTH DAKOTA: SCM, Ed Gray, WA@CPX — SD State QSO Party open to all SD hams. Sponsored by the Praire Dog ARC of Vermillion/Yankton invites you to participate at 1400Z Mar. 15 to 0200Z Mar. 16. (From 8-8 on Sun.) cw 70 up from bottom, phone 1,975, 3,955, 7,230, 14,280, 21,370, 28,510. Novice in middle of their bands. Exchange RS(T) & County. Same station can be worked different bands and modes. No SD to SD contacts permitted. Plaque to highest single and multi-op scores in state. Please send logs to WB@EVQ, Box 493, Springfield, SD 57062. Please send logs even if you only work a few by Apr. 15, 1976. WB@PTM is a new General at Brookings. Net reports: Morning Net 430 check-ins and 52 formals; NJQ 962 check-ins and 52 formals; Evening Net 1330 check-ins and 24 formals; SDN CW remains active. Traffic: W@HOJ 95, WA@NZA 88, WA@VRE 36, WB@LJM 1.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: W5RXU, PAM: W5POH, RM: W5MYZ, Net, kHz, Time/Day, QNI, QTC, Mgr. OZK 3765, 0100/Dy, 187, 26, W5MYZ; APN, 3937, 1200/M-S, 777, 27, W5POH; M-Bird, 3925, 2230/M-F, 539, 22, WA5ZWZ; ARN, 3995, 0030/Dy, 473, 29, W5UAU. Welcome new hams WB5s PLK, PLL PLM PLN PLO PLP PLY, WN5s PKP PKQ PLC PLZ PMH PMI. WB5IGF renewed OBS & ORS, W5RXU renewed SEC appointment. W5KL working 160. PSHR: W5MYZ 49, W5POH 39, W5BED 28, WB5OHD 22, W5UAU 18. Traffic: W5MYZ 58, W5UAU 35, W5POH 26, W5BED 21, WB5GWU 10, WB5OHD 6, W5KL 5, W5TXA 1.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NYY. SEC: W5TRI. RM: WA5PRI. PAM: WB5EKU. VHF PAM: WA5KND. New officers Southeast LA Club are K5CAV, pres.; WA5PCE, vice-pres.; WB5MXE, secy-treas. Congrats to the M.T.A. of New Orleans, and the Northwest Radio Amateur Assn. on becoming ARRL affiliates. WB5JZQ inactive awaiting new KWM-2. Lafayette Club novice class started with 28 applications. The Lake Charles Club again assisted the YMBC with communications at their 1975 Air Show. Active stations were W5HSM WA5QBX K5DXY K5TFZ WA5EWL K5BQT and K5ESN. Baton Rouge Club Novice class started with over 50 students. B. R. Club Public Service Net moved to their 22-82 repeater WR5AFJ. LAN Net Certs awarded to WB5EKU WA5CAV WB5KQJ and WB5IKT. LSN Net Certs to WB5NXO and WN5OYU. New Club is being formed at McNeese College, details contact WB5KQJ. Congrats to all traffic handlers for their past work. Remember Jan. is SET. Please check with your EC for additional info. The RTTY Net LRN doing very well, we need more members on RTTY.

Net — Freq.	Time/Days	Sess.	QNI	QTC
Manager				
LAN — 3615 WA5PRI	7:00/10:00 Dy	319	142	
LTN — 3910 WB5EKU	6:45 PM Dy	250	60	
LSN — 3703 K5TTC	8:30 PM M-F	128	31	
LRN — 3587.5 W5GHP	7:00 PM Su	22	12	

Traffic: WA5IQU 314, W5GHP 265, K5TTC 260, WA5ZZA 150, WA5PRI 57, WB5JZQ 56, WB5EKU 34, WB5KQJ 30, WB5LBR 25, WB5IKT 15, WA5ANV 6, WN5QCT 6, WB5N5R 3.

MISSISSIPPI: SCM, W.L. Appleby, WB5DCY — Enjoyed a fine visit with the Vicksburg Area Amateurs at a meeting of that up and coming club. Fine repeater also in that area. MCARA high scorer in Section for FD. Looks like Hamfest on the Coast (Biloxi - Gulfport) in late May. WB5NQS on FM-VHF. W5BW now known as the little old clock maker. WB5HVY has 5BWAS. WB5NQS WB5LAI now Advanced Class. WA5JXV finished HW-202. Welcome to new amateurs WB5s OOV OOG OOU OPT OPA and WN5OOA. 450 activity starting in Hattiesburg. WB5OVF has Novice class in session. Echo working on Code Practice schedule. WB5IRR new pres. of Pearl River ARC. W5SYA now K4KKG in Mobile AL. Novice classes started this month in Vicksburg. WB5PKS regular on MSBN. WA5VDR & K5BWW are responsible. Vicksburg ARC to incorporate. WN5NJZ hot after DXCC. WB5MDR operated KM5BSA from Jackson City Air Show, and was NCS MSN using special call. CGCHN mgr. now WB5LTW, asst. WA5LZB. More new amateurs WN5s PNR POP POM PNQ PNB. Welcome. WB5PEO heard Mtn. WB5FHA was congratulated by RN5 mgr. WA5IQU for MTN activity on RN5. FB. MCARA fishfry was success. W5PQG has Novice class in Gulfport. WB5NQS and WA5WRE has General. Advance class in session also in Gulfport. Still need applications for OOs. Traffic: W5EDT 126, WB5MTQ 103, WB5FHA 86, W5WZ 61, WB5DCY 52, WA5YZW 36, W5SBM 32, W5NCB 25, WB5HVY 11, W5LL 4, WN5NJZ 3.

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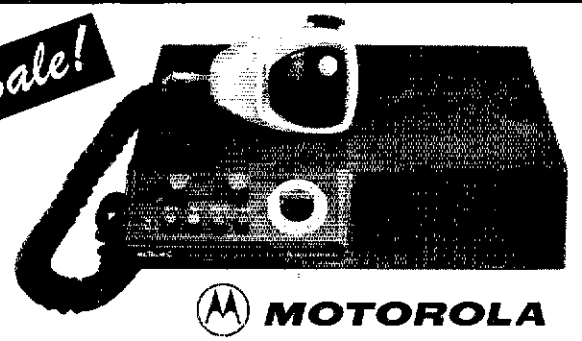

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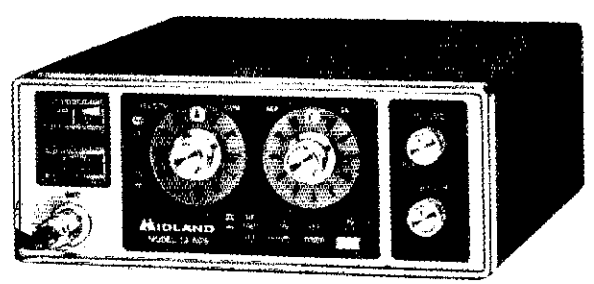

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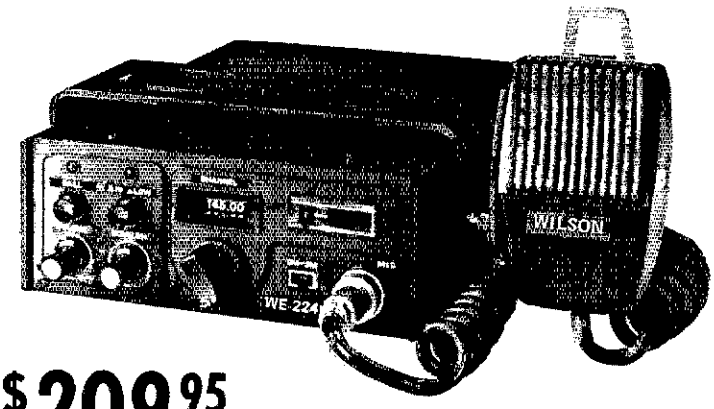

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14. Reverse Polarity Protection Circuit
15. NBFM - 15 KHz Channel Separation
16. External Speaker Jack
17. Built-in Speaker
18. Dynamic Microphone Included
19. Mobile Mounting Bracket Included
20. Frequency Range 144-148
21. 6½"W x 2½"H x 9½"D
22. Weight: 5½ lbs.
23. Power Requirements:
    Source: 13.5 VDC ± 10%
    Receive: .45A
    Transmit: 2.6A (10W), .7A (1W)

1402SM HAND HELD 2.5 WATT TRANSCEIVER

144-148 MHz

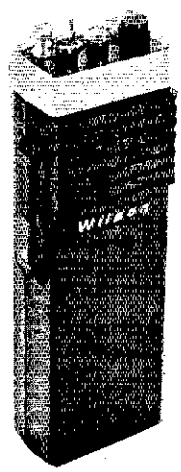
$199.95

FEATURES

1402 SM	1405 SM
• 6 Channel Operation	• 6 Channel Operation
• Individual Trimmers on all TX/RX Crystals	• Individual Trimmers on all TX/RX Crystals
• All Crystals Plug In.	• All Crystals Plug In
• 12 KHz Ceramic Filter	• 12 KHz Ceramic Filter
• 10.7 IF and 455 KC IF	• 10.7 and 455 KC IF
• .3 Microvolt	• .3 Microvolt
• Sensitivity for 20 dB Quieting	• Sensitivity for 20 dB Quieting
• Weight: 1 lb. 14 oz. less Battery	• Weight: 1 lb. 14 oz. less Battery
• S-Meter/Battery Indicator	• Battery Indicator
• Size: 8 7/8 x 1 7/8 x 2 7/8	• Size: 8 7/8 x 1 3/4 x 2 7/8
• 2.5 Watts Minimum Output @ 12 VDC	• Switchable 1 & 5 Watts Minimum Output @ 12 VDC
• Current Drain RX 14 MA TX 500 MA	• Current Drain: RX 14 MA TX 400 MA (1w) 900 MA (5W)
• Microswitch Mike Button	• Microswitch Mike Button
	• Unbreakable Lexan® Case

1405SM HAND HELD 5 WATT TRANSCEIVER

144-148 MHz



$279.95

SPECIAL ON EACH RADIO INCLUDES:

1. Antenna
2. Case
3. Batteries
4. 52/52 Xtal
5. Your Choice of 2 TX/RX Crystals (Common Frequency Only)

OPTIONAL TOUCH-TONE PAD SHOWN

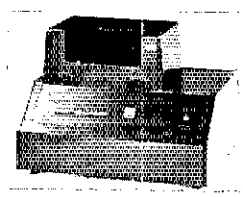
Can be Modified for MARS or CAP

10 Day Money Back Guarantee

90 Day Warranty

HAND HELD ACCESSORY SPECIALS

DESCRIPTION	SPECIAL PRICE
BC1 - BATTERY CHARGER	$36.95
BP - NI-CAD BATTERY PACK	15.00
LC1 - 1402 LEATHER CASE	14.00
LC2 - LEATHER CASE FOR 1405, 2202, 4502	14.00
SM2 - SPEAKER MIKE FOR 1402 AND 1405	29.95
TE1 - SUB-AUDIBLE TONE ENCODER INSTALLED	39.95
TTP - TOUCH TONE PAD INSTALLED	$59.95
XF1 - 10.7 MONOLITHIC IF XTAL FILTER INST.	$10.00
CRYSTALS: TX OR RX (Common Freq. Only)	4.50



BC-1 NI-CAD BATTERY CHARGER WITH REGULAR AND TRICKLE CHARGE FEATURE

Wilson Electronics Corp.

announces the addition of

220 AND 450

2202 SM

FREQUENCY RANGE 222 - 225 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 2.5 Watts Output @ 12 VDC
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

USES SAME ACCESSORIES AS 1405

INTRODUCTION SPECIAL

$279.95

INCLUDES

1. 2202 SM
2. Antenna
3. Battery Pack
4. Leather Case
5. 223.00 Simplex Installed

4502 SM

FREQUENCY RANGE 442 - 450 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 1.8 Watts Output @ 12 VDC
- Current Drain: RX 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

USES SAME ACCESSORIES AS 1405

INTRODUCTION SPECIAL

$299.95

INCLUDES

1. 4502SM
2. Antenna
3. Battery Pack
4. Leather Case
5. 446.00 Simplex Installed

TO: WILSON ELECTRONICS CORP., 4288 S. POLARIS AVE., LAS VEGAS, NEVADA 89103
(702) 739-1931

JANUARY FACTORY DIRECT SALE ORDER BLANK

_____ 2202 SM @ $279.95. _____ 4502 SM @ $299.95. _____ WE-224 @ $209.95.

_____ 1402 SM @ $199.95. _____ 1405 SM @ $279.95. _____

_____ BC1 @ $36.95. _____ BP @ $15.00. _____ LC1 @ $14.00. _____ LC2 @ $14.00.

_____ SM2 @ $29.95. _____ TE1 @ $39.95. (SPECIFY FREQUENCY _____)

_____ TTP @ $59.95. _____ XF1 @ $10.00. _____ TX XTALS @ $4.50 ea. _____ RX XTALS @ $4.50 ea.

EQUIP TRANSCEIVER AS FOLLOWS: XTALS A. _____ B. _____

C. _____ D. _____ E. _____ F. _____

ENCLOSED IS _____ ☐ CHECK ☐ MONEY ORDER ☐ MC ☐ BAC

CARD # _____ EXPIRATION DATE _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

SIGNATURE _____

Add $5.00 per Radio for Shipping, Handling; and Crystal Netting.

SALE VALID JANUARY 1 THRU 31, 1976 QST NEVADA RESIDENTS ADD SALES TAX

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. PAMs: WB4PRF K4LSP. RM: WB4DJU.

Net — Freq. Manager	Time(Z)/Days	Sess.	QNI	QTC
TPN — 3980 WA4EWW W4PFP WB4YPO	1040 M-F 1145 M-F 2330 M-S 1300 SSu,Hol.	77	3469	181
TWN — 3980 WB4DYJ	2100 S	4	74	0
TN-3635 K4YFC	0000 Dy	23	121	116
TNN — 3707.5	2300 Dy	14	31	2
ETVHFN — 50.4 WA4YKN	0000 TThS	13	98	0
ETVHFN — 145.2 WB4DZG	0000 WF	9	32	1
ETTMN — 28.7 W8YNFI	0100 WF	9	123	2
MTTMN — 28.8 W4EAY	0100 TF	9	52	0
ACARECN — 28/.88 WA4DEP	0100 T	5	64	0
TCN — 3980 WB4MPJ	0030 S	4	84	5

WA4DPF had 114 phone patches; WA4UAZ had 25 overseas phone patches. The following Novices resulted from last class of the Smoky Mountain ARC: WN4s AHB AHE AHD BYD BJI CAD CIA BIL CNY CNW COF COI CJT CPV COG COM; 12 have become ARRL members and 8 have joined AREC. The East TN Ten Meter Net now has one session meeting at 0000Z on 15 meters on 21150 to accommodate these new amateurs. The Reeltoot ARC has 17 participants in the present Novice class; this club just about doubled the amateur population in their area this year. Following were the winners at the Memfest '75: first, WB5INW; second, W4DNM; third, W5HDN; fourth, WB5WJA. The Memfest '75 wound up the TN hamfests for 1975 so every one get ready to get a fresh start in 1976. Traffic: K4CNY 237, K4YFC 86, WA4UAZ 66, W4OGG 54, W4RUW 51, K4KCK 45, K4JSF 32, WB4ZSZ 27, WB4YPO 23, WB4DJU 21, WA4GLS 18, WB4ANX 16, WB4MPJ 9, W4SGI 8, W4CYL 6, WB4GBI 6, WB4DDV 4, K4MZE 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	391	32	KNTN	47	8
MKPN	988	96	6DAREC	82	9
KTN	1213	163	8DAREC	101	11
KYN	275	196	8DAREC (Sept)	82	8

WB4BYV has been awarded his 9RN certificate. Lexington hams W4PKR W4TPB WA4HRA WA4HTM WB4GGO WB4OFK and WB4YQY provided communications for an environmental Bike-A-Thon via WR4ACR. New officers of the Owensboro ARC are W4OYI, pres.; WA4DZJ, vice-pres.; WB4IHO/9, secy-treas. The Owensboro ARC Code/Theory classes are about to graduate 15 new novices. K4LSB is now a Silent Key. Congrats to No. KY ARC on new club affiliation. W4RHZ had an FB article on violent WX in their bulletin. Write Joe for a copy if you're interested. Traffic: (Oct.) WB4BYV 103, W4CID 98, W4BAZ 81, WB4ZML 81, WB4QVS 71, WB4AUN 60, WA4IGS 52, WB4EOR 51, WA4GHQ 48, WB4EXQ 44, K4TXJ 41, WA4FAF 19, K4HOE 18, WA4AGH 17, WA4NNG 17, W4CDA 15, WA4RCD 13, W4VWQ 13, K4AVX 7, W4IQZ 4. (Sept.) W4BAZ 64, K4TXJ 43.

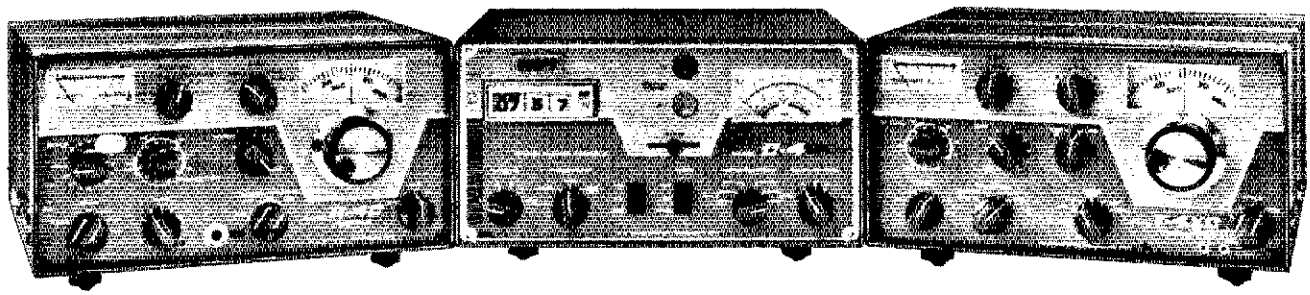
MICHIGAN: SCM, A.L. Baker, W8TZZ — SEC: W8MPD. RMs: W8JYA W8RTN W8YIQ K8AMU K8KMQ. PAMs: K8LNE WB8JIX. VHF PAM: WA8WVV.

Net — Freq. Manager	Time/Days	Sess.	QNI	QTC
QMN — 3663 W8JYA	2300/0300 Dy	93	1234	308
MACS — 3953 K8LNE	1600 Dy	35	848	323
WSBN — 3935 WB8JIX	0001/Dy	31	854	122
MNN — 3720 WB8NCD	2230 Dy	31	235	101
UPEN — 3922 K8VOA	2230 Dy	35	695	44
GLETN — 3932 WB8OBR	0230 Dy	31	661	122
BR/MEN — 3930 WB8BYB	2130 Dy	31	759	186

W8CVQ reports SW MI 2M Net QNI 46 in 4 sessions. 2M Catfish Net had QNI 60 in 4 sessions. WB8MTD reports 2M Action Net QNI 120 in 5 sessions. K8LOY wins Bearcat Scanner at Lansing Swap-N-Shop. Kent County Repeater Assn. elects new officers: WB8CCV, pres.; WB8BJY, vice-pres.; WB8ESK, secy.-treas. New officers at Cherryland ARC are K8YZW, pres.; WA8WWM, vice-pres.; WB8EYL, secy.; W8YVT, treas. Motor City election results: W8ARH, pres.; WB8PFB, vice-pres.; WA8YPY, secy.; WB8FMO, treas. MACS net selects Amateurs of the Month: July WA8PDN, Aug. W8IUC, Sept. W8QOM. To eliminate confusion KZ5WA now WA8WWM, K3SJL now W8LUE, WA3RWO now WB8WKQ. W8FSZ now 25 year member of ARRL per W8TXM. WB8PFB reports operation with new rig SB104. WB8WKQ has completed installation of new two-element quad. New Novices are: WN8s WGP WGR WEO VYB WGY WGS WGQ. Congratulations. New members are reported at: DARA, Stu Rockafellow, Motor City, and SARA. Regretfully I report W8CGO K8LSG W8WGU K8DAI and W8FGU as Silent Keys. QUA MI AREC Net on 3932 kHz at 0100 UTC Sun. Traffic: (Oct.) WB8ITT 344, K8LNE 319, K8DYI 300, K8KMQ 213, W8MO 152, WB8DKQ 119, W8TZZ 94, WA8WZF 85, W8NOH 84, WB8NCD 72, WA8RXI 72, WB8WKQ 72, WB8JIX 71, WB8POL 67, W8RTN 57, W8VIZ 55, W8YIQ 52, WB8FBG 51, W8UFS 50, K8JED 48, K8AMU 42, WB8OBR 40, W8EU 38, K8VOA 37, WB8RYB 34, W8JYA 29, W8LOU 29, WB8NII 22, WB8DJS 19, W8DCN 18, K8TAK 18, K8WRJ 18, WB8RVG 17, W8JUP 16, W8IXJ 14, W8TXM 14, W8RNQ 13, WB8LWW 12, WB8MTD 12, WB8QQQ 12, K8ZJU 12, W8IUC 11, K8JHA 11, W8ZFL 10, WB8GKB 10, K8GXV 10, WA8FXR 9, W8HKL 9, W8QBE 8, W8TBP 8, W8JAX 7, K8KCF 7, W8PBO 7, W8SDB 7, W8LUE 6, WA8MTI 6, W8CUP 5, W8GLC 5, WA8WVV 5, W8ACW 4, W8SCW 4, W8BEZ 3, W8WVL 3, WA8FJF 2, WB8PFB 2, WA8YPY 2, W7KQU/8 2, (Sept.) WB8RXS 20, WA8AXF 5.

Still the best way to get from 160 to 10 meters:

Wide Frequency Range and Selectivity Flexibility



Drake C-Line

Both the R-4C and T-4XC cover extra 500 kHz ranges throughout the HF spectrum. Additional crystals, which are front panel selectable, provide new bands as they are needed such as those discussed for 10, 18, and 24 MHz.

The excellent performance of the system makes weak signal DXing on 160 meters a pleasure.

Both units employ the famous Drake PTO for super stability and 1 kHz direct dial readout. Calibration remains the same when switching between modes.

With the proper use of the passband tuning, notch filter, and eight-pole crystal lattice filter (SSB supplied, five others for AM, CW, and RTTY available as accessories), the R-4C gives outstanding results in severe QRM as compared to fixed selectivity systems.

Complete transceive capability using either PTO is provided, with spot signal for zero beating.

The C-4 integrates a myriad of functions together, including phone patch, rotor control, remote motor controlled antenna switch, master station control, wattmeter, and many others.

C-LINE ACCESSORIES

• Standard Crystals for T-4XC or R-4C • Accessory I.F. Filters • AC Power Supply
• Matching Speaker • Antenna Matching Networks • RF Wattmeters
• Station Console • Desk Top or Hand Held Ceramic Microphones • Noise Blanker

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» See us at SAROC in Las Vegas «

OHIO: SCM, Hank Greeb, K8CHT — Asst. SCM: William K. Shaeffer, WA8MCR. SEC: WA8KPN. PAMs W8MOK WA8SSI. RMs: K8IKD WB8JGW WA8WAK.

Net — Freq. Manager	Time/Days	Sess.	QNI	QTC
06MN — 50,160 WA8SSI	0200	29	285	94
ONN — 3708 K8IKD	2330	8	33	16
OSSBN — 3972.5 W8MOK	1530/2100/2345	85	2420	729
BNR — 3605 K8NCV	2300	31	110	143
OSN — 3577 WB8JGW	2310	28	126	46
BN — 3577 WA8WAK		62	445	241
MASER — WB8GGR		5	99	14
BRTN — 146.46 WB8PSO	0230	31	103	85

Ohio Novice Net, 3710 kHz, 2330Z, Sun., Tue. & Thur. K8IKD invites your participation, regardless of your class of license. Novice participants so far include WN8TRK WN8UPO WN8VLR. Adams-Brown Co. AREC provided communication for a Bike-A-Thon on Oct. 11. Apricot Net aided Cleveland's Columbus Day Parade, Oct. 11. DARA (Dayton) holding a monthly net, Sat. (1st or 2nd), 0900 EST on 3968 kHz, after their meeting. Central Ohio AREC now has 3 two-meter repeaters and 1 220 MHz repeater, all portable. WB8INY reports 220 MHz activity on the increase in Columbus. K8ONA spoke at Daughter's of American Revolution, Oct. 6. Ohio Six Meter Net certificates were issued to 34 members. K8LGA reports AREC net on Newcomerstown Repeater 146.13/73. Contact her for details. Milford ARC will have code and theory classes starting Jan. 15, 7 P.M. every Thur. Contact WA8CXO for further info. The Triple States ARC will have code & theory classes starting Jan. 8, every Thur. at 7:30 P.M. Contact WA8KPN for details. Traffic: WB8MZZ 397, WA8HGH 275, WA8MCR 183, W8ENI 159, W8IBX 146, WB8KWD 126, W8PTT 106, WB8OMQ 105, WB8KKJ 85, W8MOK 82, WA8VWH 75, W8JD 73, W8DIL/8 64, WB8OZA 56, W8QE 52, K8LXA 49, W8LZL 47, W8MGA 46, WB8JGW 45, W8ALS 43, WB8SGF 41, W8QZK 39, WB8MRL 35, K8LGA 32, WB8VKS 30, WB8CJU 27, WA8VTD 24, WB8LQU 21, K8MLO 21, WB8TEM 21, Wn8TRK 21, W8OUU 20, W8CHT 19, WB8GGR 18, W8TH 18, WA8DWL 15, WN8VLR 13, WA8GPO 12, K8BYR 11, K8JPF 10, WB8PIY 9, W8GOE 8, K8BNL 7, K8QYR 7, WA8BOV 6, K8CKY 6, WA8JSW 6, W8UQY 6, WB8HHP 5, WB8KQJ 5, WB8QXN 5, W8DYF 4, K8ONA 3, WB8ORR 3, W8BHL 2, WB8IBZ 2, W8WE 2.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, WA2PJL — SEC: W2KGC. Asst. SEC: K2AYQ. RMs: WA2FBI WB2IXW K2ON. PAM: WB2QEL. Traffic nets: ESS(3590, 6 PM); NYS(3675, 7 & 10 PM); NYSPTEN(3925, 6 PM); CHN (3925, 11 PM); PON(3913, 5 PM). If by now your appointment is not renewed, it is because I have not received monthly reports. Those wishing reissuance must reapply to me. Jan. is the time for the Simulated Emergency Test. Get with your AREC team or traffic net to help out. Send SET reports to me or out SEC, W2KGC. Congrats to: WN2CUU, new Generals: WB2CNS, WB2WRR and new Advanced WA2YSM. Albany Club video taped "Hams Wide World" for local TV showing. New Club, the Rip Van Winkle ARS meets in Columbia-Greene College, 3rd Mon. at 7 PM. Officers are W2DW WB2DUW and WB2RZZ. New hams at Maple Hill High: WN2CPD WN2CPE WN2CQL WN2CQM thanks to classes run by trustee WA2UON. WB2VYS, trustee of WB2ELA reports holiday radiogram service at V.A. Hospital. New Life Members: K2RRZ, WA2CNE. New Region net mgr. WB2EMU is looking for an ssb NTS section to be formed in upstate NY. Public Service Honor Roll to WB2RUZ and WA2PJL. Net totals: NYS(QNI 929, QSP 292), NYSPTEN (QNI 1248, QSP 156). Traffic: (Oct.) WA2PJL 310, WA2YPO 277, WB2EMU 169, WB2RUZ 58, WB2TDX/2 49, WB2TGL 49, W2BIW 38, K2TTG 32, K2OUA 19, WB2ELA 18, WB2IXW 10, W2WSS 9, WA2CJY 7, K2HNW 5, WB2GOJ 5, WA2PAU 5, WB2EKM 2. (Sept.) WB2GMN 13.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM/PAM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: WB2LZN. The following are major AREC/RACES Nets: Join one.

Bronx	28.64	50.35 146.88 fm
Kings	28.64	50.35 146.88 fm
Richmond		146.88 fm
New York	29.5	146.88 fm
Queens	29.5	50.52 146.20 fm
Nassau	28.72	145.68 fm
W. Suffolk	28.73 (Hunt.)	145.59 am
	28.65 (Smith.)	147.21 fm
	28.610 (Babylon)	146.94 fm
E. Suffolk		146.82 fm

Note: Net times between 2000 and 21000 local on Mon. Happy New Year to All. Don't forget the SET at the end of this month, all the frequencies are listed above. (The six meter freqs are usually for standby). We still need ECs for several towns, mostly in Suffolk Co., Islip and Southampton, to name a few, if interested, contact K2HTX for further info. Huntington and Smithtown had successful Goblin Patrols during Halloween. Great South Bay ARC has contacted Babylon Town CD and plans are being made to set up a comm. center with the town. WN2BSR has just received his license and he's looking for hams in the Coney Island area. WA2YEI has been appointed to the Intruder Watch. The Oct. issue of *QST* included an FB picture of W2PF on page 51. Dave reports that he does look different now and his station has changed considerably. It is with deep regret that we list K2UPA as a Silent Key. W2EW has received a Certificate of Recognition from Air Force MARS in connection with his work with the MARS youth training program and performance within the MARS program. Radio Club of America held it's 66th annual banquet and meeting the end of Nov. at the NY Sheraton. Welcome to new Tech WB2CMA. WA2TLM received his Advanced and is now /2 at Suny Buffalo. WA2YEI now getting active on section nets and thanks WB2LZN for net info. I hope that all and anybody anticipating to put up a new repeater will coordinate their efforts through the Freq Coordinator who is K2QPF, and also the fact that the FCC has deleted their restrictions on cross-band operation, this per ARRL OB No. 559. K2RYE now living in Encino, CA. Looks like the site for the 1976 Hudson Div. Convention will be at Great Gorge, NJ with the dates being Nov. 12, 13 and 14. More details will be released as the info comes, plan now to

NEW!
FM144-10SXR-II

All Solid State-PLL digital synthesized — No Crystals to buy! 5KHz steps — 144-148 MHz-LED digital readout.

Introducing the standard of comparison for years to come. No other unit begins to compare with the superb engineering and superior commercial avionics grade quality construction of the FM144-10SXR-II

FM144-10SXR-II (BUILT IN DCPS)
INTRODUCTORY PRICE
$389.00 VALUE $599.00
Regulated AC/PS
MODEL FMPS-4R...$49.00

- **FREQUENCY RANGE:** Receive: 148.00 to 147.995 MHz, 5KHz steps (1000 channels). Transmit: 146.00 to 147.995 MHz, 5KHz steps (400 channels).
- **FULL DIGITAL READOUT:** Six easy to read LED digits provide direct frequency readout assuring accurate and simple selection of operating frequency.
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED'S while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END:** DC output of PLL fed to varactor diodes in all front end R-F tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. **No other amateur unit at any price** has this feature which is found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation – for superb emphasized hi-fi audio quality second to none.
- **FULLY REGULATED INTEGRAL POWER SUPPLIES:** Operating voltage for all circuits, i.e., 12v, 9v and 5v have independently regulated supplies. 12v regulator effective in keeping engine alternator noises out and protects final transistor from overload.
- **MONITOR LAMPS:** 2 LED'S on front panel indicate (1) incoming signal-channel busy, and (2) un-lock condition of phase locked loop.
- **DUPLEX FREQUENCY OFFSET:** 600KHz **plus** or **minus**. 5KHz steps. Plus simplex, any frequency.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch-tone, phone patch, and other accessories.
- **RECEIVE:** .25 uv sensitivity. **9 pole filter** as well as monolithic crystal filter and **automatic tuned** LC circuits provide superior skirt selectivity.
- **AUDIO OUTPUT: 4 WATTS**
- **HIGH/LOW POWER OUTPUT:** 10 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 watt and 10 watts.
- **PRIORITY CHANNEL:** Instant selection by front panel switch. Diode matrix may be owner re-programmed to any frequency (146.52 provided).
- **DUAL METER:** Provides "S" reading on receive and power out on transmit.
- **OTHER FEATURES:** Dynamic microphone, mobile mount, external speaker jack, and much, much, more. Size: 2⅛ x 6½ x 7½. All cords, plugs, fuses, mobile mount, microphone hanger, etc., included.

Manufactured by one of the world's most distinguished Avionics manufacturers, Kyokuto Denshi Kaisha, Ltd.

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8817 S.W. 129th Terrace, Miami, Florida 33176
Telephone (305) 233-3631

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attend. Traffic: (Oct.) WB2SHL 696, WB2LZN 178, W2EC 149, WA2VPA 86, WB2WBH 56, WA2UJH 48, WA2YAY 38, WA2ROK 46, WB2YKG 44, WA2ZGR 35, WA2WKH 32, W2MLC 31, W2HXT 11, W2PF 6, WA2PLI 4, WA2TLM/2 2, WA2YEI 2. (Sept.) WA2ZGR 40.

NORTHERN NEW JERSEY: SCM, William S. Keller III, WB2RKK —

Net — Freq. Manager	Time (PM)/Days	Sess.	QNI	QTC
NJN — 3695	7:00 Dy	31	459	165
WA2DSA	10:00 Dy	31	210	50
NJPN — 3950	6:00 Dy	31	626	236
WB2VTT	9:00 AM Su	4	80	5
NJSN — 3730	8:15 Dy	31	293	66
WB2RMK				
PVTEN — 145.71	8:00 Dy	31		
WA2OPY				

SEC: WB2PBO. PAMs: WA2OPY (VHF) WB2VTT. RM: WA2DSA. OO reports received from WB2CST K2EK WB2IEC WB2TFH. New appointments: WA2QHN ORS; WB2VTT PAM. Congrats to WB2VTT who was recently elected as NJ Phone Net mgr. for the coming year, and to WB2LCV who won the NJN election. Our thanks to WA2DSA who has done a tremendous job as NJN mgr. over the past year. It is with sorrow that we note the recent passing of W2DXX, a member of the NJDXA and had achieved the top DX honor roll position. WB2HSD teaches a novice course at the Thomas Edison ARA while the Fairlawn ARC reports regular code classes every Fri. at 8 PM. We welcome new amateurs WN2CAI WN2DVE WN2BYN WN2BZN WN2CGX and WN2CGY to the bands. Congrats to new Advanced licensee WA2YGT. WA2KFE is trustee for W2GTF, St Peters College ARS. WB2VTT now has a TA-36-40 on top of a 60-ft. tower. K2JFJ completed his two meter VFO, WA2QHN still working on a power supply for his two meter fm rig, and WB2RKK is finally on two FM! WA2RMZ reports having completed his first Oscar QSO, while K2QBW reports working an FG7 and OH via that satellite. K2QBW also reports working many new DX prefixes on 75-meter ssb. WA2GEZ has brought his DX total to 154 with 9Q5, 9V1, V56, ZD8, and HM QSOs. Meanwhile, K2KF has brought his DX total to 40 using QRPP. Did everyone get the VX9 and VY9 stations that were active in late Oct. Congrats to K2JFJ who won top honors for the second call area in the AZ QSO party and also won honors for top NJ score in the WA QSO party. WB2RKK operated /1 from VT in both Oct. CD parties and will gladly answer any QST requests. The Wireless Institute of the Northeast recently elected its new officers for the coming year: WB2RKK, pres.; W2REH, vice-pres.; WA2DSA, secy.; W2SHM, treas.; W2FVS, W2AZO W1BGD K2MME WB2RJJ dir. Don't forget to participate in the annual SET to be held this month. QNI/Traffic: (Oct.) WA2DSA 335, WB2VTT 204, WB2RKK 165, K2BHH 127, WB2RMK 105, WA2NPP 93, WA2PCF 66, W2CU 62, W2SWE 56, WA2NHZ 50, WA2RMZ 40, WB2HSD 37, WA2DIW 31, K2ZFI 31, WA2WDT 22, W2ZEP 22, WA2RZP 17, WN2ASD 15, WA2CAK 14, WB2UJD 11, WB2VFT 11, WB2TDI 8, W2WHB 8, WA2QJU 6, WA2SRQ 5, WA2CCF 4, W2CVW 4, W2ODV 3, WB2PBO 3, WB2RJJ 3, WA2SLF 3, WA2UOO 3, WA2FUI 2, W2WOJ 2. (Sept.) WA2WDT 97, WA2KFE 26, WB2JVN 8, WB2HSD 5, W2WHB 4, W2WOJ 1.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — Congrats to W0FGC, WB0NGT and K0TDO on Advanced tickets. Mt. Pleasant High School received the call WB0PWR, and with the help of WA0CZT WN0OTQ WN0PAG WN0PMX and WN0PCW will soon be Generals. WA0DGZ moved to Yankton, SD. WB0EGI is new pres. of Scooland Repeater Assn. K0AAR working on auto patch for WR0AGZ. K0BGG gave report on new repeater which will run 125 watts. WA0RHZ W0MAN WA0VDT K0TFT and W0SDV attending Western Iowa Tech. for transistor course. WA0CLN working his son in KP4-land on 75m. WB0QMU and WB0ODA new hams in NW IA. W0BQJ has worked 22 countries including a JA0 while he is portable/3. He will be in 4- and 5-land before he comes home in Apr. K0TDO having good luck on 2m since his twenty-element beam is back up. Eastern Iowa DX Assn. has been formed with WA0VDX, pres.; W0PCO, veep; W0FHE, secy.-treas. They have 14 members and had 93% participation in their first contest. Davenport ARC had 12 mobiles and 20 hams on the Goblin Patrol. The Davenport Hamfest will be Feb. 22. New appointments WB0JGS OO—IV, WB0JYK OO-III, WA0ZJK EC and W0UPX OPS. W0IO has new sixteen-elements on 2m. WR0ABD has much improved signal. WR0AJV 04/64 at Ames has auto patch. W0YI busy on 2M ssb and Oscar. Ames ARC has 10 Novice students. The Lincoln ARC can be proud of their Midwest Convention. (Net, Freq., Time(Z)/Days, QNI, QTC, Sess., Mgr.: Iowa 75 Meter, 3970, 1830 M-S, 1590, 64, 27, WA0VZH; Iowa 75 Meter, 3970, 0030 M-S, 1011, 47, 27, WA0ACX; Tall Corn 3560, 0030/0400 Dy, 251, 82, 60, K0AZJ. Traffic: WA0AUX 228, K0AZJ 131, W0YLS 54, WA0LKM 52, W0OMV 35, WA0KHF 15, W0LFF 8, WB0AVW 6, K0GHH 5.

KANSAS: SCM, Robert M. Summers, K0BXF — SEC: K0JMF. PAMs: WA0SEV WB0BCL. RM: K0MRI. VHF PAM: WA0EDA. My apologies for being off the air the last of the month; almost lost my XYL from a ruptured ulcer. WB0CUY again operating from Hesston College this year working mostly 15 meters. W0KL is now affiliated with OOTC No. 1873. Several members of the Hiawatha ARC had the goblins where they wanted them on Halloween and provided communications for the annual parade. WB0HGG reports the WR0ABK repeater raised the antenna to the 380-ft. level, increasing receiving range about 10 miles. Net mgr. WB0BCL reports Midstates Mobil Monitor Svc serving 48 mobiles, 928 QNI, 54 QTC during Oct. QKS-55 final report QNI 53, QTC 7. Anyone interested in taking on the job as mgr. of the Slow Speed net on 3735 kHz please contact K0BXF or K0MRI. Many thanks to WN0PWF for trying to keep it alive for a couple of months. KSBN for Oct. QNI 990, QTC 101. PKN QNI 156, QTC 10. The KS WX Net reported 599 QNI, 129 QTC, no special watches. QKS 477 QNI, 202 QTC. CW is still alive in KS on 3610 kHz daily at 7 or 10 PM. Traffic: (Oct.) W0INH 171, W0FIR 166, C0CHJ 113 K0MRI 111, WB0HBM 100, WA0LBB 71, W0OYH 68, K0BXF 58, W0PB 53,WA0SEV 51, WB0CZR 47, WB0LKA 34, WA0MLE 31, WB0OCK 31, WN0PWF 29, WA0KVP 26, W0RBO 24, W0MCH 20, W0GCJ 14, W0FDJ 8, WA0DRQ 6, W0NYG 6, WA0OWH 5, W0KL 4, WN0OLA 4, W0FCL 3, WB0KWI 3, WB0HGG 2, WB0KWJ 2, WB0CUY 1. (Sept.) WB0GVR 33, W0FCL 12.

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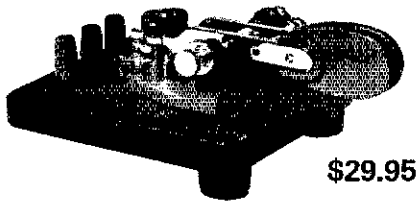

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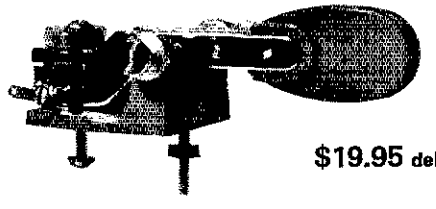

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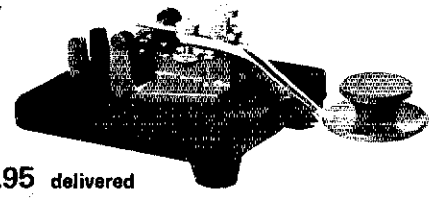

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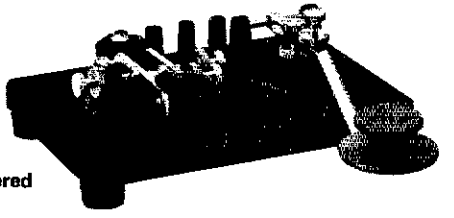

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MISSOURI: SCM, B. H. Moschenross, WA@FMD — Asst. SCM/SEC: Cliff Chamney, K@BIX. K@AEM renewed ORS appointment.

Net	QNI	QTC	Net	QNI	QTC
MOSSB	1167	55	MON2	114	56
MEN	517	38	STLAREC	60	1
HBN	400	46	SCEN	41	4
MSN	235	49	PHD	39	7
MON	155	78	PHD(Sept.)	91	9

Congratulations to new Novices WN@QMJ WN@QMP WN@QLV WN@QMQ WN@QWI and WN@QWU. PHD Amateur of the Month for Sept. was WA@RJM and for Oct., WB@PZP. K@FUZ is a new Extra Class licensee. I regret to report W@HTI as a Silent Key. Our sympathy to his family. I would appreciate an update from all net managers as to the time, freq. and days their nets meet. WB@PFU and WN@PRP have moved to Tulsa. WB@JWM has moved to Washington, D.C. MON will miss him. WA@CFQ won an Atlas 210 at the Midwest Convention in Lincoln. Two new repeaters on the air: WR@AIH (04/64) in Platte City and WR@AJL (147.66/06) in Bolivar. W@AIG has a new Brimstone and WA@YBW is sporting the new Kenwood Line Traffic: W@NUB 135, W@OTF 102, W@BV 98, WB@HSP 95, WA@FMD 89, W@OUD 53 WB@MEO 28, WA@QOA 28, WB@LMW 19, W@EPI 17, K@ENH 7, WA@KUH 6, K@RWL 5, WA@MOF 4, W@EEE 3, WB@FQM 3, WN@PLW 1.

NEBRASKA: SCM, Dick Dyas, W@JCP — The midwest Division convention well attended, all had a good time. Our appreciation to the FCC personnel for their fine conduct of the exams and for bringing several fine programs. The LOs also presented several fine programs. The Lincoln ARC wishes to express appreciation to all who attended as well as to those who had a part in the program. WB@QQC is a new ham in Minden. On Halloween, the Keith Co. ARC acted as the vigilante watch. The AK-SAR-BEN ARC took part in the pumpkin patrol. 160 M WX net again operating on 1995 kHz at 0130Z. Net reports: NE Morning Phone Net, QNI 1164, QTC 21; Sandhills WX, QNI 96, QTC 2; Western NE, QNI 508, QTC 1; Afternoon QNI 463, QTC 6; AREC, QNI 176, QTC 1; QCWA, QNI 56, NE Storm I, 1131, QTC 42; NSN II, QNI 794, QTC 14; 160 M WX, QNI 60, QTC 10; Cornhusker, QNI 1585, QTC 125; Eastern NE 2-mtr, QNI 400, QTC 42. Traffic: W@GKK 46, WA@CBJ 33, W@JDJ 24, W@HOP 21, W@JCP 21, W@VEA 21, W@FQB 18, K@SFA 15, W@HTA 14, W@MW 12, WB@GMQ 7, WA@QEX 7, W@VYX 7, WB@JWQ 6, W@GEQ 5, WA@GHZ 5, WA@PCC 5, K@FJT 4, W@WKP 4, WB@CLP 3, WA@LOY 3, W@NIK 3, WA@EEI 2, WA@HQQ 2, W@YFR 2, WB@GAK 1, W@UFZ 1, WA@VIT 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1DGL. RM: K1EIR. PAM: K1YGS. VHF PAM: WA1ELA.

Net-Freq.	Time/Days	Sess.	QNI	QTC
CN — 3640	1900 & 2200 Dy	62	378	335
CPN — 3965	1800 M-S 1000 Su	31	424	222
VHF-2 — 28/88	2130 Dy	31	337	66
CSN — 3725	1830 Dy	31	117	63

High QNI: CN — W1CTI and WA1RUR. CPN: W1NQO K1PAD WA1RUR and WA1RXA. VHF-2 High QNI: WA1ELA, High QTC: W1EFW. SEC W1DGL very busy during Convention. Contact him for info, on '76 SET. EC reports: WA1NGL WA1JYP WA1LRO WA1LMV and WA1RXA. Director W1HHR extends thanks to all who attended the Convention, sorry not more time for eye-ball QSOs. He would appreciate your comments. Hamden HARASCOPE is a 6 pager & pushing Public Service. Tri-City Novice Class going well. 1CRC WR1ABM new officers: W1NTS, pres.; K1ELT, vice-pres.-admin.; WA1LMV, vice-pres.-tech.; K1THP, secy.; K1YGS, treas. With sincere regret we add the call of W1CTX to the list of Silent Keys. W1ICP/ARRL requests comments on National Freq. Coordination Plan for VHF repeater operation. Congratulations to: WA1LRO Extra Class; WA1PRJ & WA1SDX Advanced Class; WN1TSP WN1TYP & WN1UNK General Class; WA1RUR Oct. High QNI CN/CPN; W1EFW Oct. High traffic total; and Pioneer Valley Repeater Assn. Sponsors of the '75 ARRL Convention! The Convention was enjoyed by many and pointed out the necessity for us to be Able, Active, and Operate on ALL Bands! Suggested New Year's Resolution: Be Active on all Bands, Support ARRL, get others to join! To keep our frequencies we must Use ALL of our frequencies. The Best to All for 1976! HAPPY NEW YEAR! Traffic: (Oct.) W1EFW 290, WA1RUR 245, WA1GFH 182, W1CTI 138, WA1UAX 132, W1AW 76, WB2NOM/1 75, WA1STN 75, WA1SQB 51, W1DGL 49, WA1RZA 35, WA1HLP 31, K1YGS 28, W1GVT 25, W1KV 25, W1BDI 12, W1BDN 12, W1CUH 12, WA1RUS 9, WA1OPB 7, WA1JYP 5, WA1TXM 4, WA1UNE 4, WA1RRZ 3, WN1UHN 3, WA1VPE 1. (Sept.) WA1RZA 12.

EASTERN MASSACHUSETTS: SCM, Frank Baker W1ALP — SEC: W1AOG received reports from ECs WA1RTR W1BAQ K1NFW K1CCW WA1SXU W1EQH WA1QKD K1PAD W1FJI. W1SE WA1CNQ W1OTZ WA1GRI are Silent Keys. We hear K1WKS is back in the East and on 2. WA1RGA has additional call WA1VVO. WA1s UQE VAM instructing Novice course at Medway H. S. Cape & Island Assn. took part in Cape Hospital Disaster drill, 31 QNIs, W1ALT was NC. WN1VUM a relative of K1DRN. After 52 years off the air 1BNP 1921-23 now on as WA1UWS. Advance license, retired from M.I.T. WA1IDA is Asst. Dir. for New England Division and C.D. Deputy RO for Newton. W1UVE is C.D., RO. WA1s SLH CRI VFY VCR now Advanced. WR1ADR a new hard line coaxial cable. W1AEC had auction, WA1FNM chmn., W1LAZ K1IBR auctioneers'. WA1s UZB PFA BZJ W1FJI assisted with communications for the Int'l Motorcycle trials in RI. T9 Club met at W1IB's QTH. WA1MES, pres.; WA1HMW, vice-pres.; Joseph Brown, secy. of the Sudbury Raytheon ARC; the call W1GBE was held by the late Percy L. Spencer. K1CLM has his Advance; WA1SPI General. W1ARU does nice job in the AM as NC for Barnyard Net. W1ALP RO for Halifax. WN1UGJ mgr. for Eastern Area Slow Net. W1EIH new IC 250C. W1UX had good trip out West. Wellesley ARS helped in Veterans Day Parade. WA1PQY asst. EC for WA1HVS. WA1PAZ/1 back on 2, member of W1MX & W1HEB. W1LE has HW101 on all bands. WA1FNM made a Heathkit for code class. W1NF visited old WCC, Wellfleet escorted by W1ALT. W1WSN new EC & RO for Stoughton. Univ. of Lowell members "The Ogres" went to Pack Monadnock for VHF on 6 & 2; WA1LQZ on 15 & 20. NEEPN had 73 QNIs, 17 QTC. W1BVP in Detroit for Coast Guard; in 5 years will retire to Seattle with call W7KQU; now on 160 thru 10 looking for old gang from South Shore.

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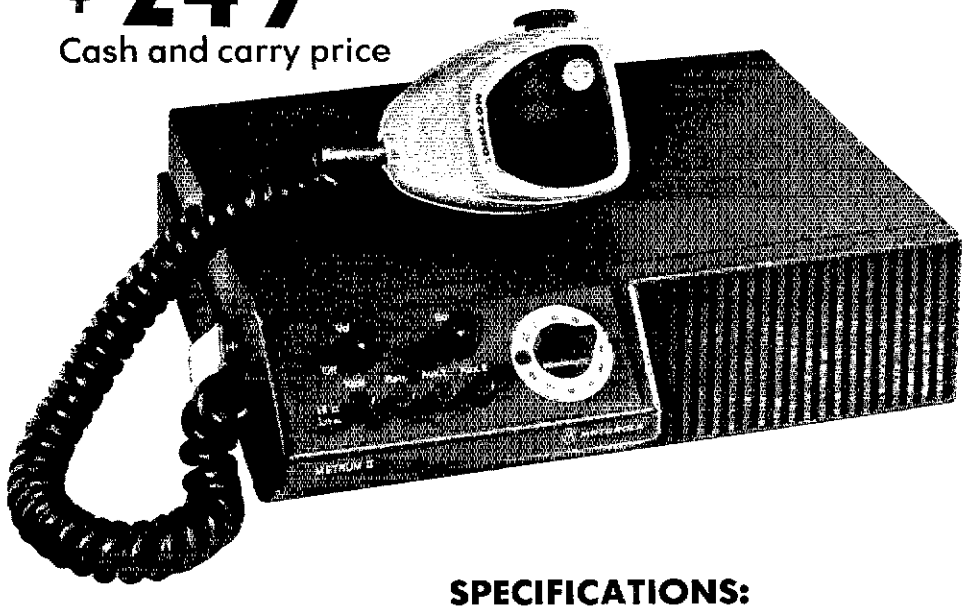

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EM2MN had 54 QNIs, 8 QTC. WA1ORP is ex-W1DGA. WA1JWQ pres.; WA1QLK, vice-pres.; WA1GXN, secy.; W1LJO, treas.; of Middlesex ARC. W1UX has three XYLs as NCs on Clearing House Net WB2EMU WA2VYT WA2UYK. W1WSN says they are conducting classes to convert scouts & C-Bers into radio amateurs, wife is WA1MZO, son 12 WN1TJJ. WA1MSK sent out a nice "Zero Beat" bulletin of the EMRIN. A bulletin of the EMRiPN sponsored by the Middlesex ARC, WA1RFT editor. W1LMU attended Northeast 160-meter convention in W. Ghent W1ER on from winter home at Sullivan Island in W4-Land had QSOs with Newton gang. W1MP back to FL. W1CHU on 160. W1AYA on 6. Eastern MA well represented at Hartford Convention. Congrats to W1GAG and XYL on 50th anniversary. K1AFF/VE1 visited W1ALP. WA1QAA/QAB had a baby boy. EMRI 250 QTC, 306 QNI. Traffic: (Oct.) WA1MSK 291, W1PEX 251, WA1QKD 174, W1DMS 13, K1PAD 109, W1CE 87, W1EIH 70, W1UX 62, W1OJM 54, W1EMG 46, W1DMH 14, WA1PQY 14, W1ACG 11, WA1IFE 7, WA1PAZ/1 3, WA1FNM 2, W1LE 2, W1NF 1. (Sept.) WA1JUY 90, WA1PQY 18.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX — SEC: K1RSC. PAM: K1YSD. RM: WA1GCE. Happy New Year to all. Endorsements: W1UBG K1YMH K1PQV WA1MXT WA1MZV W1MHX WA1GCE, K1AC and W1AIJ as ORSs; W1BXM W1EUJ and W1JY/K1QLZ as OVSs; W1DXB W1JB and W6MZW/1 as OOs; WA1GCE as RM; K1YSD and W1AIJ as OPSs plus W1EHT as EC. Welcome to WN1s VOG VOZ VOV VUQ VTY VUK VTS and VSW. Oscar 6 and 7 are being worked by W1JSM with 38 countries and 48 states. K1PQV's 2-meter mobile accompanies Sid on the mail route. WN1UWI on with a new HW16, SB600, HM102, VFI VFO and 2BDQ dipole on 80 and 40. W1JSM QSOed AL and IL on 144, one meteor scatter. WA1PSI has a new Robot 300 for SSTV. WA1JSD W1SWX and WA1ABV/1 active in the last CD Party. K1PSC, K1RSD WA1KTM new Advanced Class licensees. K1LMS all homebrew concept now being followed by 2 home built towers. K1PQV says W1ALE's repeater WR1ABU is super. The NHVTN report shows 141 check-ins, 75 traffic in 22 sessions. W1DXB has a new sawhorse antenna for the DX season. W1JY a new Ten Tech Argonaut/Linear Amplifier combo for mobile. WN1VWI reports the Port City ARC ham classes FB. Traffic: (Oct.) K1LMS 51, W1SWX 4. (Sept.) WA1MXT 98, WA1GCE 35.

RHODE ISLAND: — SCM, Ron Simonton, K1GMW — This is my first report as your SCM. If I have not attended one of your club meetings, please send me your meeting information. WR1ACW group had an excellent meeting at the Steam and Wireless Museum in E. Greenwich in Oct. Their Jan. meeting will include election of officers for 1976, and all members should plan to attend. Fidelity ARC now meeting at the Cranston General Hospital, 1930, every Wed. Newport County ARC making plans for the Tall Ships visit to Newport during 1976. NCRC is conducting code and theory classes, and club members, including K5FPW/1 and W1GO have been working hard on their new 147.96/36 repeater WR1AFY. Newport meetings are at 1930 every Mon. at the Seamen's Institute. Visitors are welcome at both clubs. RM WA1POJ and PAM WA1RFT are active on Oscar. Wanted: RI stations for both EMRI nets. Phone: 3,898 kHz 2230 UTC. CW: 3,660 kHz 0000 and 0300 UTC. Both nets meet daily. RI emergency plan primary frequencies will be on two meters. Open repeaters on 146.10/70, 16/76, 235/835 and 34/94 plus the NCRC repeater. Traffic: K1GMW 137, WA1POJ 91, WA1RFT 35.

VERMONT: SCM, J. H. Viele, W1BRG — SEC: W1VSA.

Net-Freq. Manager	Time(Z)/Days	Sess.	QNI	QTC
VTSB — 3909 WA1PSK	2300 M-S 1230 Su		517	62
Carrier — 3935 W2DSK	1300 M-S		442	25
Green Mt. — 3932 W1JLZ	2130 M-S		447	27
Vt. Phone — 3909 W1KKM	2130 Su		91	5

Welcome new amateurs WN1VSP WN1VTV and WA1VUV. New officers of WR1ACA are W1VLL, pres.; W1CMV, vice-pres.; W1ELJ, secy-treas.; W1RFP, trustee. WA1DHK has her own mobile home in Ludlow. W1UWS conducts code and theory classes every Tue. at CAP Bldg., No. Springfield airport. Congrats to WA1PSK who placed first in VT section in low band class of 41st DX competition. Many hams from section attended N.E. Convention in Hartford. Traffic: WA3FFR/1 12, W1LMO 7.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BVR — SEC: WA1DNB. CW RM: W1DVW. PAM: WA1MJE. VHF PAMs: W1KZS WA1PLS. Our deepest sympathy to W1UD and XYL in the loss of their teen-age daughter. WA1DNB new Swan MB-80A solid-state ssb-cw rig. W1TM's FD group scored highest on the East Coast A-1 group (beaten only by the battery-powered group). WA1LUX and W1DWA put on fine program on local BC station. W5RBB/1 now ORS W1HNJ. WA1TFT passed Extra Class exam., WA1SXE the Advanced. Western MA. had fine attendance at Hartford convention. OO K1RQF submits list of 10 stations notified. Reports of emergency operation reported by WA1PLS and W1KZS. WMPN 23 sessions total QNI 262, QTC 33, different stations 72. WMN 31 sessions, QNI 149, traffic 92. WMEN 3 sessions, QNI 52 (plus 31 from repeaters). WMAREC 23 sessions, QNI 189, traffic 11. Appointments: ORS W1DOY; OO W1HNJ; OBS WA1PLS; OVSs WA1RWU and WA1HHN. Individual reports above much appreciated, and believe that type of info of much more interest than just summaries of organized activities!! Excerpts from club bulletins can be cut to make room for such (as club bulletins are mainly info for the individual clubs). Merry Christmas and best wishes for a very Happy New Year. Traffic: WA1MJE 196, W1DVW 89, W1BVR 80, W1TM 76, W1KK 45, WA1TFT 15, K1RGQ 13, WA1PLS 10, W1DOY 7, W1HNJ 7, WA1DNB 5, WA1OLK 1, W1STR 1.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — SEC KL7JDO and myself visited Anchorage, Juneau and Ketchikan clubs this month, many thanks for the hospitality. KL7CFX reports new officers for Fairbanks Club. KL7JDO reports Kodiak Club supported the marathon walk on Kodiak with communications. KL7HKM reports starting a drive for AREC members. KL7HLC very busy at school. KL7HNQ trying a VHF shot directly into Fairbanks from QTH at Delta Junction. KL7HOV reports the Snipers Net had 687 check-ins, 32 P.P. and other QTC during 31 sessions with liaison to AKW/AKN to RN7. KL7HMH and KL7HMJ had 12 public service calls this month. They also have a new 2-meter rig. I need more reports of

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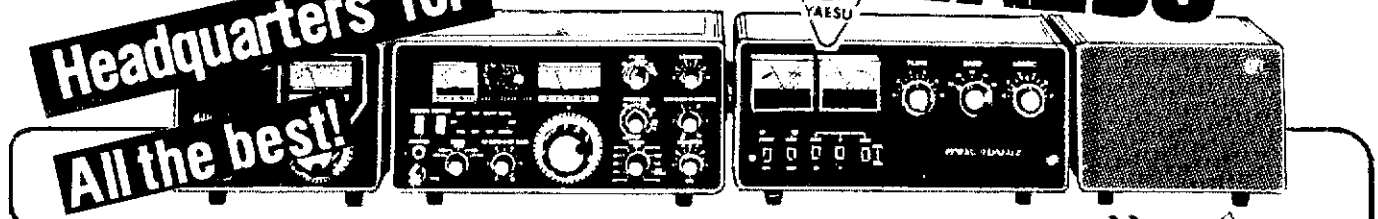

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what is going on around AK these days in all areas. The Southwestern clubs are very active and trying to set up RTTY nets and meeting other nets when conditions permit. Good work gang and again thanks. Traffic: (Oct.) KL7HDX 24, KL7GCH 15, KL7JDO 15, KL7HMH 3, KL7HMK 2, KL7HNQ 2. (Sept.) KL7JDO 4.

IDAHO: SCM, Dale A. Brock, WA7EWV — SEC: W7JMB. PAM: WA7HOS.

Net — Freq.	Time/Days	Sess.	QNI	QTC
Manager				
FARM — 3935	0200 Dy	31		
W7TWZ				
IMN — 3635	0230 M-F	23	202	60
W7GHT				
RACES — 3990	1415 M-F	23		
K7UBC				
ID Silver — 3930	0115 MWF			
W7IY				

Lewiston-Clarkston Amateur Radio Club is furnishing the instructors for the Amateur Radio License class at Walla Walla Community College, Clarkston Branch. WA7TRO says they will soon graduate nearly a dozen novices. The Whiskey Butte Repeater, Orofino, 146.16/.76, is now in operation with excellent coverage. Traffic: W7GHT 109, W7GBO 15, WAØKKR/7 12, W7FIS 2.

MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7PZO. New call WN7CFL. WA7OBH has a new addition to the family. W7OIO is chasing Oscar 6 & 7. Montana Traffic net is meeting at 0030Z, WA7PZO and WA7VXM built new quads. INM had 23 sessions, 60 QTC and 202 QNI. Traffic: K7BMT 4, WA7PZO 4, WA7OBH 1.

OREGON: SCM, Ray Perkins, WA7KIU — SEC: W7HLF. RM: K7OUF. PAM: K7RQZ.

Net — Freq.	Time	QNI	QTC
Manager			
BSN — 3908	0130Z	635	50
WA7MHP			
OSN — 3585	0245Z	191	140
WA7TXV			
AREC — 3993	0300Z	372	7
WA7NEQ			
NSN — 3702	0300Z	431	178
WA7OCV			
NUCLEAR — 50.250 MHz,	9:30 AM Su	20	
W7FFE			

Congrats to W7CKZ who has accepted the position of Public Relations Asst. to the Director, Northwestern Division. John's home QTH is Rt. 1, Box 318-A15, Olympia, WA, 98502. Please contact John for assistance in whatever you or your club may be doing where Public Relations is needed or has been accomplished. Congrats to K7DUE on being one of the top ten OOs. Now is the time to stir up some activity for this year's Simulated Emergency Test. If you are waiting for the real thing, you will probably be caught with your pants down. Take a good look at yourself in the mirror. You are someone's impression of HAMS. (Borrowed from K7RQZ) The grapevine tells me one Tech in Hood River has been called in for re-examination. I understand there were no violations, just routine. Should you look in the mirror too? Traffic: (Oct.) WA7TXV 139, K7IWD 127, K7OUF 125, K7IFG 123, K7QFG 99, W7DAN 88, K7NTS 72, W7MLM 65, WA7MHP 34, WA7YEU 20, WA7QDC 19, W7LT 14. (Sept.) K7QFG 132.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — WA7BDD going to night school. W7BCS reworked power supply and increased power twice all of 80 watts input. W7KHN still flying, at present trip to Spain. New officers for NWSSC Net W7VDR, mgr.; WA7LQV, secy-treas.; W7PWP W7SYS WA7RCR W7SAP and W7FIM, dir. New chapter "Evergreen" of QCWA was formed in Spokane July 1. Officers are W7BMK, pres.; W7GRE, vice-pres.; W7IDZ, secy.-treas.; W7JRV, dir. Covers NE OR and Southeast WA. W7FL, North ID. W7NC eastern WA and W7DB western MT. QCWA Net meets Sun. 0830 local time on 3985 kHz. NCS is W7FL. A 2-meter fm net is also planned 34/94. The new PR assistant for NW Division (ARRL) is John Brown, W7CKZ, Route 1, Box 318-A15 Olympia, WA 98502. Please have your club PR person contact W7CKZ to either improve clubs PR program or get a program started. Spokane Dial Twisters ARC finally succeeded getting "Sister City Amateur Radio" program in operation, frequency approximately 14.280 MHz 0000 UWT. Very good PR. What is your club doing? Boeing Bears WA State QSO Party had excellent response and BEARS wish to thank everyone who took part. Both NSN "flow speed" and WSN-cw nets, nets active membership needed. How about it fellows and gals. Traffic: W7DZX 292, K7OZA 129, K7CTW 92, W7APS 76, WA7BDD 58, W7LG 43, W7KEI 39, WA7RCR 17, W7BUN 14, W7IEU 13, W7PWP 12, W7AIB 8, K7VNI 5, WA7GVB 4, K3MNT/7 4, W7AXT 2.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCM: Ronald Martin, W6ZF. SEC: WB6RPK. Asst. SEC: WB6DSI. At a meeting of SCMs held Oct. 18, K6ITL was unofficially appointed Regional Emergency Coordinator for the CA Sections of the Pacific Division. K6ITL will coordinate and organize the inter-section emergency communications activities. All members of this Section are encouraged to cooperate with K6ITL in his efforts. Our thanks to WB6RPK, SEC of this section whose hard work for over two years has led to this appointment. At the Oct. meeting of the Northern Calif. Contest Club, 29 became new members. Also present at the meeting was WIRU, Gen. Mgr. of the ARRL. Congratulations to W6CBF on making the Honor Roll in the July Freq. Measuring Test. WA6BMV has a new TR-4 and all set for SS. WA6CAZ now has his Extra. From all indications the Calif. QSO Party was a smashing success, thanks to the many members of NCCC for much hard work. Just wait until next year. From CCRC the following were listed as new calls in the section. WN6BFL, WB6BIV, WN6BFH, WN6BEL, WN6AZR, WN6AZZ, WN6BEQ, WN6BFE, and WN6BAC. Good luck to all. WB6ION is now an OPS. Remember a card to your SCM, QTH on page 6 will start the ball rolling on your ARRL appointment. Traffic: K6HW 317, W6JKK 130, WA6IPI 115, WB6VEW 24, K6PMG 19, WA6VEF 14, WB6WBG 13, WA6BMV 9, WA6CAZ 3.

NEVADA: SCM, John D. Weaver, W7AAF — NARA provided communications for the NV Day parade in Carson City on Oct. 31 and LVRAC provided the same for the March of Dimes Walkathon in Las Vegas

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on Oct. 18. Both were large scale efforts involving too many hams to mention individually, and both made extensive use of 2-meter fm. Congrats to all involved! K6MQX/7 will soon be moving from Las Vegas to Reno, says he is fast closing in on DXCC. He also took top honors overall in Class 1A-Battery and Class 1A for the sixth call area in the last FD. W7ILX hoping for a 28ASR in Nov. WB7WXH has new TH6DXX. WA7LZL/MM sporting a new Atlas transceiver. Special kudos to K7OHX and WA7ZIW on earning First Phone tickets. RTTY fans in Las Vegas should check out the new RTTY repeater on 147.96/147.36. Contact me for details. Traffic: W7ILX 132, K6MQX/7 14, K7OHX 6.

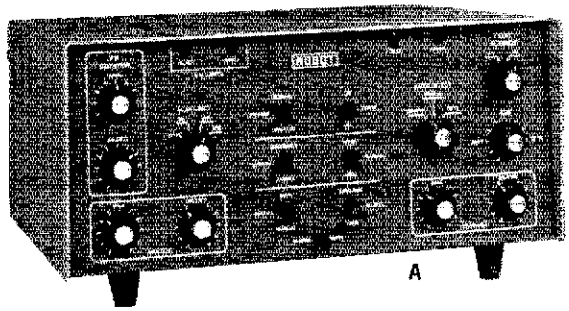
PACIFIC: SCM, Pat Corrigan, KH6GQW — Our thanks to KH6IAC who did so well as RM and to his successor KH6IQU. Woody sez W6FGD & wife WB8FSX here for visit. WT2PB active in traffic from Kamuela and is ORS. Pacific Novice Tfc Net meets Wed., Fri., Sun., at 0830Z on 21120; 2100Z on Fri, Sat. KG6JES net control. KH6HBZ now 75 in OK, his brother GQI now in DU-land. Had the grandest letter from ex-6BDL who was SCM here in 1926! He started as 1CNM in 1920, got the 1st WAC from Hawaii & he recalled the old club 6BUC at fairgrounds. He sent a 6BDL QSL on a 1-cent postcard (how long ago is that?). WH6INE her OM, WH6IOP & daughter WH6IQK all active and check into PNTN. Jim Neiger of ZD8Z fame here recently and operated from KX6. WestPacTfcNet still going strong, still looking for KH6s to check in. Check with RM, KH6IQU for details. EARC, Inc coordinating with National Weather Service on critical WX observation net. Traffic: (Oct.) KH6IAC 306, KG6JAQ 184, KH6IQU 181, KG6JES 37, KC6DK 25, W1ZPB/KH6 8, KH6GQW 8, KH6IEC 2. (Sept.) KG6JAQ 106.

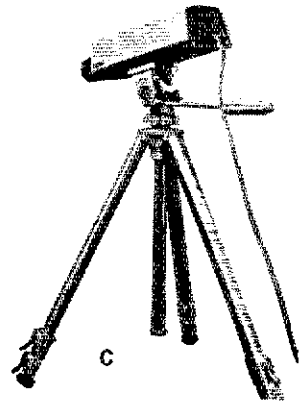
SACRAMENTO VALLEY: SCM, Norman Wilson, WA6JVD — SEC: W6SMU. The Radio Amateur Mobile Society and the Mt. Vaca RC organized communications for the Heart Association's Cycleton '75 in Sacramento, Yolo, El Dorado and Placer counties. W6DEF moved to Auburn from the Bay area where he was very active in AREC and traffic activities. Hal now our newest ORS. W6PBC working nightly into the Bay area from Folsom with 5 watts ssb on 432 MHz. WA6BKS has repaired his quad and W6KKN has a new HW-202. WA6ORW becoming active in traffic nets on 75 meters. WA6OWH is tutoring some of his students in amateur radio. WA6HAF operated the CA QSO Party parked under a rhombic at DQ Univ. near Davis. K6ITL is the unofficial Regional Emergency Coordinator for the CA Sections of the Pac. Div. W6KYA received 200 logs submitted for CA QSO Party operations. WA6JVD got a 40-meter quad loop erected 15 mins. before the start of sweepstakes. Traffic: WA6ORW 13, W6DEF/6 12, W6PBC 4, WA6OWH 3.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT — W6CXY WB6ENJ WA6QXV WB6FFX and WB6EUG did a superlative job providing communications for the Oct. 18 March of Dimes Walk-a-Thon in Ukiah. WB6UPV appt'd OBS. WB6NHF and W6GGR have volunteered to conduct Novice exams in the Eureka area. Using only a barefoot rig, WB6ZUC was able to grab certificate No. 14 of the new cw only DXCC — FB OG! WB6AGP has up a new 40-meter beam. WB6BDL and W6RNL again made PSHR in Oct; W6RQ made Honor Roll in the July FMT. WR6ABM (.22/.32) now on 24 hours per day. Congrats to WA6CAL on receiving his General, and to W6JAF his Extra; also to CSN members WN6DXG WN6JER and WN6CRT all awaiting their Generals. Terra Linda High Electronics club (WB6JEO) has started a radiogram service from school. Geo Ladd PRC now has club stn WB6FDT on the air. W6EAJ keeps 160m alive with his old AM rig. WB6DBL serving as Thur. NCS on DRN6. W6GGR rebuilt his DX-100 for work on RTTY. Mendocino City hams interested in forming a club contact WB6EUG. WB6NHF and W6QAT both made WAS during CA QSO Party. Traffic: (Oct.) W6IPL 139, W6RNL 126, W6NL 32, WB6JEO 25, WB6BDL 23, WB6UPV 20, WB6ITN 9, W6GGR 7, W6QNB/6 2, W6OAT 1. (Sept.) K6TP 139.

SAN JOAQUIN VALLEY: SCM, Ralph Sarovan, W6JPU — It is with deep regret that I report the passing of WA6JZP. He will be missed by many. WB6WFQ is pres. of the Wildcat ARS. W6DPD the trustee. WB6JDB on 2 meters fm. WA6ZMW on 1296. WN6AYB passed his Technician license. The Tulare County ARC has reactivated the 2-meter fm net over WR6AIM, 28-88 is the freq. W6UF and W6NJU were recent visitors to the FARC. W6YKM W6YKS WA6WRR are active with Oscar. The Turlock ARC repeater now on the air on 147.63-03. It is located on Mt. Bullion. The Turlock ARC meets on the 2nd and 4th Tue. at the Turlock High School, Room 14. New Novices in Stockton are WN6RDM WN6BDD WN6BXG WN6BXL WN6BXA WN6BDE WN6BXI WN6BXN WN6BXK and WN6NDP. The Dehorning Society held their 2nd annual hamfest with 110 in attendance. W6EWX was chmn. W6GRV teaching code and theory and has produced 5 Novices. W6ICG won the main door prize at the Dehorning Society Hamfest. W6DPD has worked 50 states on 6 meters. WA6CTR has an IC22A. WB6EEH has an Atlas 180. WA6GOI has the Drake Line. WA6TVC is heard on 75 ssb. Traffic: WA6RXI 42, WB6FPV 8, WA6CPP 3.

SANTA CLARA VALLEY: SCM, Jim Maxwell, K6AQ/W6CUF — SEC: WA6RXB. RMs: W6BVB W6RFF W6QNB. W6RSY made BPL. W6RFF W6AUC made PSHR. WB6LMR new OPS. W6RFF reports NCN traffic building up after the summer doldrums. The Palo Alto ARA net meets every Mon. at 8 PM local on two frequencies: 145.24 for AMers, 147.45 for FMers. W6AUC having good luck with an invisible antenna on his new condominium. Congrats to WN6BQY and WN6HLF and WN6HBL on passing their General Class exams! WA6UOM busy learning to interpret Oscar 7 telemetry. W6BWB having fantastic results from a new 3W PEP hand held 2M unit from Japan. He has been heard over the hills into San Jose from Santa Cruz using the whip only, and has even worked into LA using the station beam. Quite a feat for a 3W rig. The Santa Cruz County 19/79 machine WR6AJB has been moved to La Corona Hts., with vastly improved coverage reported. WA6WEI has taken time off from DX chasing to go on RTTY. Welcome to 4X4NY, currently visiting in the Bay Area. SCCARA's new novice class is underway with 14 members, ably tutored by WA6GBQ and WB6CXS. W6QIE still running his popular code practice Tue. thru Sun. every week, 8 PM local on 3590. All hands stand by for the SET, scheduled this coming Jan. 24-25. A new club station has been started at Oak Grove High School, reports WB6ESF. The Big Noise out of Mendocino County during the CA QSO Party was due to the joint efforts of W6QNB and WA6TAH. WB6JNN and WB6MLY are checking out gear on 434 ATV.





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Model 70D SSTV Monitor
Receives and displays amateur standard 128-line or 256-line SSTV pictures on six-inch (diagonal) P-7 (radar) screen. Also displays Model 80A SSTV Camera's fast-scan video picture for easy set-up and focus (Viewfinder mode), and demodulated SSTV waveform (oscilloscope display) for aid in receiver tuning or SSTV camera adjustment (Video-Graph mode). All station interconnections: receiver (speaker output), microphone, transmitter (mic input), tape recorder, phone line. With tape player and SSTV tape recording, the Model 70D alone provides for complete two-way SSTV station operation. All solid state except CRT. $445.

Model 70C Basic SSTV Monitor
Identical to Model 70D, but without Viewfinder or Video-Graph modes. Add these features at any time with Viewfinder/Video-Graph Kit (below). With tape player and SSTV tape recording, the Model 70C alone provides for complete two-way SSTV station operation. All solid state except CRT. $345.

Model 80A SSTV Camera
Generates amateur standard SSTV pictures and fast scan video for Viewfinder mode. High resolution 1" separate mesh-vidicon. Controls for contrast, brightness, SSTV signal level, black/white video reversal, partial frame operation. Provision for adding automatic light level control (ALC) with ALC Kit (below). All solid state except vidicon. For use with Model 70C or 70D. Requires suitable C-mount lens. $345.

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F	50	1.9	42	$ 85
H	18–108	2.5	48	$230.

All lenses fit either Model 80A or any CCTV C-Mount Camera.

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W6BWB. Just back from a trip to Japan, reports heavy activity there on 2M ssb, both mobile and fixed. Traffic: W6RSY 752, W6YBV 298, W6RFI 223, W6NW 114, W6AUC 78, W6BVB 76, WB6ESF 11, W6QNB 8, W6KZJ 5, WB6JNN 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF, PAM: W4OFO, VHF PAM: K4GHR, RMs: K4MC WB4ETF, EC of the month WA4JCS, covering Granville Co. Our new SEC visited the Scotland Co. ARS and new EC for that area is WB4SXX. Congrats to WB4MJH elected new dir. for JFK Net. Western Carolina FM Soc. has been organized to serve WNC, ETN, SC and GA with WB4DRN, pres.; WB4LDO secy-treas.; W4AFM, vice-pres. Meetings at Grace Rest, Asheville, 7:00 PM, 2nd Mon. each month. About 450 attended the annual Rockhill Hamfest at Joslin Park on Lake Wylie with several net meetings and many eyeball QSOs. W4YIU retired from GE to full-time hamming. WB4OXT now Advanced and reports the 3938 bunch having their semi-annual "ham-in" at Oxford with WB4JAV hosting about 120. WB4AVG installing 50-ft. windmill tower. Raleigh ARS ran comm. for the NC Sport Car Rally on Oct. 19. W4CZU made 58WAS. W4TYE/OBS placing bulletins on 13/73 Salisbury repeater and sporting a new TS520 on low bands. New officers Cary ARC are WB4DAR, pres.; WA4LRG, vice-pres.; K4FBG, secy-treas. New Novices from Cary "spring class" are WN4BME and WN4BQR. Thanks to the following groups for sending their club newsletters: Raleigh ARS News, Carteret-Craven ARC "The Short Circuit", Cape Fear ARS News, Onslow ARC News, Brightleaf ARC "Ham Chatter" and the Forsyth ARC "5-9 Plus". Also, for our cw ops, a very fine newsletter is The CN News, written by CN net mgr. WB4OBZ. Check in on 3573, 7 and 10 PM daily, for the combined NC/SC net, CN. SC has a new net, the Palmetto Traffic Exchange, meeting 3900 at 6:45 PM, for the purpose of providing liaison to SC and other NTS section and regional networks. Your SCM wishes all a very Merry Christmas and Happy 1976. Traffic: (Oct.) K4MC 122, WB4PZU 112, K4FTB 105, W4OFO 104, W4RWL 74, WA9NEW/4 49, WB4MXG 47, W4WXZ 45, W4FMN 44, WB4OXT 41, W4WWR 35, WB4KHZ 27, WA4KSO 21, K4AIH 11, WB4CES 5, WB4DNP 5, K4DJ 4, WA4MUW 4. (Sept.) W4FMN 46, W4TYE 11, K4FBG 10, W4JG 2.

SOUTH CAROLINA: SCM, R. H. Miller, WA4ECJ — SEC: W4ZMZ. RM: WB4OBZ. The SC Distribution System continues to grow. Liaison with other nets is the key. The Palmetto Traffic Exchange (PTE) as the focal point of the System, is a common meeting-ground for all nets and repeater groups in SC. Your net, too, can have a piece of the action. All it takes is one of your number to check in to PTE on a regular basis. Most groups find it convenient to assign a different station for each day, thus spreading liaison duty among several. Schedule is 3900 at 6:40 PM EST. Palmetto Chapter of QCWA is also rapidly growing. Forty members so far. WN4UKU is SC's first ORS II. To learn how you may qualify, check in to the Novice Net on 3718 kHz at 5:30 PM EST. Write or send a message to RM WB4OBZ in Moncks Corner. Bouquets to OBS W4EGH for never failing to report.

Nets:	CNE	CNL	SCNN	PTE
Sessions:	28	27	26	29
Stations:	225	110	67	168
Traffic:	111	31	21	44

Traffic: WB4OBZ 181, W4NTO 99, WA4ECJ 30, K4JLM 15, WN4UKU 10, WB4NBK 1.

VIRGINIA: SCM, Robert L. Follmar, W4QDY — Asst. SCM: A. E. Martin, W4THV. SEC: WA4YIU. Asst. SEC: WA4PBG. PAM: WB4KYM. RMs: W4SHJ K4IAF WB2VYK/4 WA4AVN WA4DHY. This is my first report as the incoming SCM and I look forward to working with and for the VA radio amateurs in all aspects of our common interests in organized activity. Your full cooperation with this office will be appreciated as we continue to work together for the betterment of the VA Section ARRL. Tnx for the many congrats recd on the election. Thanks to K4GR (former SCM) for his hospitality and help in effecting the smooth transfer of SCM office material and info. W4KFC reports attending Shelby NC Hamfest and Nat'l Conv. and that K4LHB instrumental in arranging for proclamation of Amateur Radio Week by Fairfax Co. Brd. of Supervisors. Vic also attended Gaithersburg Hamfest & New England Division Convention. WA4JVO is proud owner of Extra Class ticket! K4VWK passed his Advanced. Kudos to both. WA4EPJ & K4MLC both report the largest traffic total since participation in NTS (FB). WB4DRB sez "my dad WA4NEH now active on 2 meters." WA4HUB reports a new four-element half wave colinear for 20M with open wire feed using soda straw insulators! See that ole' friend W4YZC has his beam up again and having fun on the HF bands. He also reports that W4PAY-NVARC has disaster assessment team. WB4GMC got in a little operating while home from college. Old reliable K4KX welcomes me back to the "Salt Mine" and gave me dope on how to find him in the boondocks. Your SCM, together with about 25 radio amateurs worked the City of Chesapeake election returns using repeater WR4ACN. WA4VFW returned from visiting Europe and glad to be back. He now is TCC station KILO so will be kept busy. Hi. W4DM having trouble with cw rig. W4JUJ still county hunting, 3035 to date! WA4HHG sweating out DXCC with 60 countries. K4GR has 80 hrs into new SB-104 with no end in sight. WA4CGX reports 121 fone patches. Report VSBN (Aug.) Sessions 62 check-ins 1026 messages handled 1026, Liaison 4RN (via VSN, VN) D4RN and 2 mtrs. VSN QNI 372, QTC 195, QTR 833. Traffic: (Oct.) K4KDJ 418, WA4EPJ 384, WB4YKM 342, W4QDY 205, K4MLC 204, W4UQ 175, W5VZO/4 130, WB4PFJ 128, W4YZC 121, W4SUS 120, WA4AJF 90, WA4YIU 80, WB4KIT 69, K4KNP 63, K4JM 57, W4SHJ 48, WA4JVO 40, K4GP 39, WB2VYK/4 39, K3DSQ/4 33, WA4HUB 30, W4ZDN 23, W4TZC 23, WB4DTG 17, WB8MKL/4 14, WB4AFA 13, WB4DRB/4 12, K4VWK 9, WB4YXN 8, W4KFC 7, WB4GMC 3, WA4KKP 3, WB4ZNB 3, W4KX 2. (Sept.) K3DSQ/4 15, W4KFC 5.

WEST VIRGINIA: SCM, Kay Anderson, W8DUV — PAM: WB8DQX. RM: W8HZA. Oct. activity lively with Mid-day Net leading in traffic handled. WVN (CW) had best percentage however, with 178 stations handling 95 messages. WV Mid-day net had 565 stations handling 126 messages. WB8III is new ORS in Fairmont. SCM now in process of renewing appointments for ORS, OPS EC and OO. Regret to report the passing of WA8OLA in Sept. New officers of Monongalia Wireless Assn.: WB8RAE, pres.; W8GUL, vice-pres.; W8JOF, secy-treas. Their first ham-picnic was

WB4TVY 8. (Sept.) W4ZUP 22, WB4CQA 11, W4DGH 4.

CANAL ZONE: SCM, Roderick J. Isler, KZ5PI — Chagres River Amateur Radio Club is planning for its Annual Crossroads of the World Hamfest. This year the club is making plans to combine all CZ clubs and the Panama R.P. Club and have a Central America Hamfest. If all goes well this will be the largest Hamfest in South America. CZ ARA club secy, KZ5TC is being transferred and last meeting KZ5JI will assume the new duties. All CZ hams greatly appreciate the contributions made by KZ5TC and best wishes on your new assignment. Volunteers were solicited at the recent CZARA club meeting to assist new CZ hams or interested citizens in getting established in amateur radio. Congratulations to new CZ novices, KZ5YPN KZ5NPN and new Generals KZ5TS and KZ5SG. On Nov. 22, 1975 over 22 future hams will be tested for their Novice ticket. Classes in ham radio continue year round in the CZ for novice and general tickets.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4KZP. PAM: K4JNL. Resignation of K4FLR as RM is reluctantly accepted. Thanks for a job well done. Congrats to K4JNL for a well deserved Amateur of the Year award. Ga. 55 Assn. officers WA4AKU, pres.; K4ZYK, veep; W4HON, secy.; W4PFF, dir. Excellent EC bulletin by WA4AJY. GSN bulletin by K4FLR well done. W4BTZ very active as OO. K4YRL makes PSHR for Sept., K4VHC does same for Oct. Kennehochee hamfest Feb. 21 and 22. Look for Kennesaw repeater by WA4DDH and WB4VXP on 53.44 in 52.44 out. 75 DX progressing nicely for W4JM. GSN QNI 293, QTC 175. GSSN QNI 1228, QTC 69. Sept. CVEN 1 QNI 56, QTC 9, and CVEN 2 QNI 586, QTC 47. Traffic: WB4IGX 140, W4AAY 65, K4VHC 57, WA4AEL 23, WA4LLI 21, K4BAI 10, W4HON 8, K4PIK 7, K4WC 7, W4JM 4. (Sept.) W4PIM 61, K4YRL 53, W4BTZ 1. (June) WA4LLI 76.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr. W4RKH — SEC: WA4WBM. RM: WA4FBI. PAMs: WB4VDM/75, W4SDR/40, WB4BSZ/VHF.

Net — Freq. Manager	Time(Z)/Days	Sess.	QNI	QTC
NFPN — 3950 WB4VDM	2330 Dy			
QFN — 3651 WA4FBI	0000/0300 Dy			

The LO meeting in Tallahassee called by WA4WBM was well attended, with reps. from Pensacola, Jacksonville, Daytona Beach and New Port Richey! Committees are working on new Section AREC plan, a sample County Plan, and the concept of Emergency Response Teams. W4MLE was there to interpret the ARRL Operating Manual. WB4ZPC appointed as OBS/OVS. FAST Net certs earned by WB4AOL WA4EYY and W4SIZ. WB4ATY doing FB job as editor of the Playground ARC's newsletter, *Relay Chatter*. New officers Panama City ARC are: WB4IXK, pres.; WA4VIY, vice-pres.; WA1USQ/4, secy.; WA4DEN, treas. EC K4RZM has begun a weekly emergency net for W. F.L. on 3990.5 kHz Thur. at 2015 CST, following the 146.52 Net. Sorry to report W4MXN a Silent Key. WA4FBI's XYL now WA4FAL. Gainesville & Ocala clubs combined for a big picnic last month; WA4JMN won the raffle prize. WA4LCT upgraded from Tech. to General. NOFARS has 120 members; they had exhibits at 2 shopping centers. WA4LJO new on QFN from Jax. Officers of DBARA are WB4ESH, pres.; WB4OWX, vice-pres.; K4FLV, secy.; W4LRV, treas.; WA4MQA, act. WA4NMU has Advanced ticket. WB4HKP attended the Section ARPSC meeting. W4LDY WB4GHU WA4QQQ and W4MB operated KT4MB on Dry Torgugas. WB4YFF is Bicentennial chmn. for Orlando ARC and CFRA. Traffic: (Oct.) WB4SKI 596, WA4FBI 430, WB4GHU 214, WB4HKP 158, WB4DXN 150, W4SDR 129, W4LDM 102, WA4CRI 100, W4KIX 82, WB4PHT 82, W4WNY 78, WB0HHC/4 73, K4DDY 57, WB4FJY 44, WN4NID 41, WB4OMG 37, WB4NJI 35, W4RKH 32, WB4VDM 31, K4CVO 21, WA4MYF 20, K4OER 20, K4RNS 20, WB4DAD 17, WA4EYU 16, K4RZM 9, K4FLV 5, WB4TPR/4 5, WB4VAP 5, WA4BAX 4, WB4VMP 3. (Sept.) WB4DVM 60.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: W4IYT. Asst. SEC: W4SMK. RM: K4EBE. PAMs: WA4NBE W4OGX. New appointment: W2VDT/4 ORS. OOs reporting: K4DAS K4JPF W4MML WA4UVG. OVS reporting: WA4ZLW. K4OAS received A1 Operator award. WA4GNI reports Disney World ARC now has a 120-ft. tower. They expect to have repeaters on all VHF/UHF bands soon. WA4ZLW is active with fast scan ATV simplex on 439.25 while awaiting his ATV repeater license. WA4CTM has the UT-4 RTTY circuit operational. 6M AM RTTY at 50.7 MHz is going great around St. Petersburg with WB4DJN W4QAJ WB4DJO WA4ROX WB4BZO WA4CTM and possibly others active. W4EGM WB4ARN WB4IKK WB4IRY and WA4ZRX have RTTY equipment and expect to be on soon. K4KIK reports delay in plans for 2M RTTY repeater — now possibly mid 1976. K4QG has been plagued with equipment failures, but looks for better times ahead. WA4UVG received 25 wpm code sticker and QXCC-120 endorsement. K4URX reports on annual "Spook Patrol" for Halloween in Key West running 2 evenings with 11 mobiles participating. On Oct. 11, Tampa Bay Repeater Assn. hosted a meeting of FL Repeater Council in Tampa. TBRA has ordered a new commercial duplexer and expects to single-site their 16/76 machine soon. The St. Petersburg 2-meter bunch is active with transmitter hunts every Sun. as well as with the Sat. morning breakfasts where about 50 people turn out each week. Prominent on transmitter hunts are WA4KDL K4NAN WA4FEN K4ISS WA4FNY WA4CHL W4EGM K5FZG/4 K5IHH/4 WA4ROX WA4FYR WA6CMJ/4 WB4FYS WA4FPS WB4KSJ W4BNM and WA4ZQZ. Traffic: (Oct.) WA4SCK 595,K4SJH 493, K4SCL 379, W4WYR 245, W4GOG 195, K4TH 180, W4EH 164, K3PIE/4 147, WB4KSG/4 129, WB4AID 104, W4DVO 101, WA4LGT 88, K4GYF 83, WA4CTM 68, WB4ZSO 59, WA4GYR 56, WA4IJH 52, WA4NBE 51, W2VDT/4 51, W4IYT 36, WA4GNI 35, WB4ALH 34, W4DQS 34, K4BLM 31, W4GDK 28, W4ILE/4 26, W4IRA 22, W4SMK 22, K4CFV 20, WA4EIC 18, WA4HDH 18, WB4HJW 17, W4TJM 12, K4QG 11, W4OGK 7, K4DRH 6, WA4UQQ 6, W4KGJ 5, WA4KNX 5, W4LK 4, W4MML 4, W4NTE 4, WA4UVG 4, K4EBE 2. (Sept.) WA4IJH 76, W4ILE/4 46, WA4GNI 43, WA4UQQ 12, W4NTE 6, W4MML 4, K4GFW 2.

WEST INDIES: SCM, David Novoa, KP4BDL — New appointments: KP4AOC OBS; KP4BSQ OVS. Need ECs and asst. ECs in every district plus Aguadilla and Caguas areas. Other posts also available. Those interested please contact me. KP4DRT very active on 40 cw. KP4ZC wants to share UFO info. KP4DKZ passed

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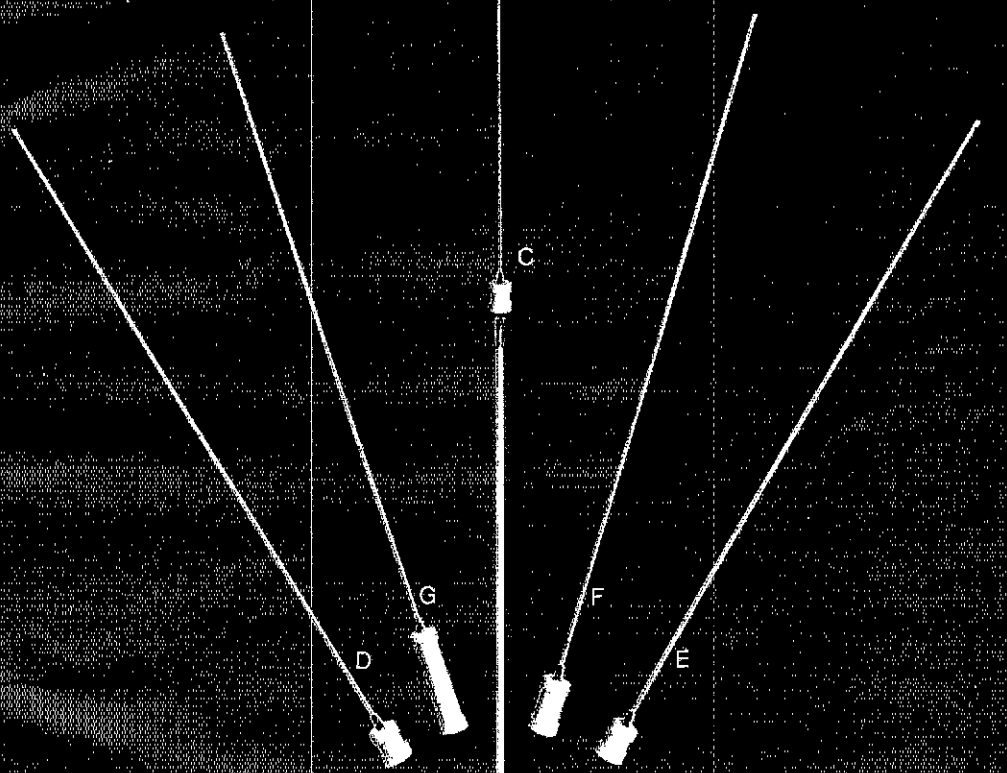

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(B) 36" cowl or deck mount mast **Model 277**
(C) 10 meter coil/antenna **Model 280**
(D) 15 meter coil/antenna **Model 281**
(E) 20 meter coil/antenna **Model 282**
(F) 40 meter coil/antenna **Model 283**
(G) 75/80 meter coil/antenna **Model 284**

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held Sept. 21, about 95 attended. MWA's net Wed. 8 PM on WR8ABM. TARA's new officers are WA8CGR, pres.; W8BPRL, vice-pres.; WB8VXD, secy.-treas. KARC ordering "T" shirts for members will have club name and logo in two colors. Will be worn on Field Day, Walk-a-thons, State Convention, etc. New officers of WV State Radio Council: W8JM, pres.; WA8KXI, vice-pres.; WB8LAI secy.; and K8LOU, treas. Traffic: (Oct.) WB8III 104, WB8HZA 91, WB8DQX 52, W8CKX 41, W8FZP 30, WB8UV 16, W8SQO 7, K8ZDY 7, WB8CPU 6, WA8RUZ 5, W8AFB 4, W8JM 4, WA8NDY 4, K8QEW 4, WB8WLC 4, WA8CRW 3, W8GWR 2, WB8CNN 2, WB8QYN 2. (Sept.) WB8IJW 133.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA0HLQ — SEC: K0FLQ. RM: WB0HCK. PAMs: K0CNV WA0YGQ. WB0MTA enjoying her new duties as NCS on the Weather Net on Wed. WA0YNQ reports the CO Ten-Ten chapter of 10-X has now grown to 45 members in CO & 8 members out-of-state. The net meets on Tue. at 6 and 8 PM local time, and on Thur. & Sat. at 6 PM local time. All check-ins are welcome. K0HPE reports 54 contacts on Oct. CD QSO Party. CO amateurs extend a warm welcome back to W0DQN who recently returned home following successful open heart surgery at a Denver hospital. W5SHJ moving his QTH to Coaldale, CO where he expects to be operating portable pending receipt of his "0" call. Newly elected officers of the Mile Hi DX Assn for 1975-76 are WB0NHG, pres.; WB0IWL, vice-pres.; WB0CGJ, secy-treas. Officers of the Denver Radio Club for 1975-76 are K0HRZ, pres.; WB0HWQ, vice-pres.; WB0IWL, secy.; WB0HWP, treas. Officers for the Empire Radio Club for 1975-76 are K0SUH, pres.; WA0DQJ, vice-pres.; WB0DUV, secy-treas. Officers for the Arapahoe Radio Club for 1975-76 are WA0YGQ, pres.; WA0TRB, vice-pres.; WAB0HUC, secy.; WB0BMD, treas. Net tfc. for Oct.: HI Noon Net QNI 1102, QTC 37, informals 214, 31 sessions, 1483 minutes. SSN QNI 217, QTC 23, 28 sessions, 492 minutes. Late Net Tfc.: SSN (Aug.) QNI 30, QTC 11, 14 sessions, 162 minutes. SSN (Sept.) QNI 113, QTC 49, 25 sessions, 379 minutes. Traffic: (Oct.) W0WYX 1425, K0ZSQ 790, K0YFK 584, WB0QOT 506, WB0MTA 475, W0ETT 202, W0HXB 109, W0IW 78, W0QIX 67, W0LAE 58, WB0BAL 35, WA0YNP 28, WA0TMA 22, WB0IZO 19, K0SPR 19, W0MYB 18, W0PGX 14, WA0VED 13, WA0YNQ 7. (Sept.) W0LQ 74, W0MYB 33, W0BAL 12, W0PT 7. (Aug.) W0LQ 143, WB0NME/0 2.

NEW MEXICO: SCM, Edward Hart Jr., W5RE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. PAMs: W5PNY W5DMG. RMs: W5UH K5KPS. Southwest Net (SWN) meets at 1915 on 3585 kHz. This month had 200 stations check in and handled 197 msgs. Activity good, but the net needs more stations from AZ. New Mexico Road Runner Net (NMRRN) meets at 1800 on 3940 kHz. with 757 stations reporting in and handled 47 msgs. WB5KSS W5NMI and WA5RPC provided communications while members of Los Alamos Explorer Post No. 20 with search and rescue rafts assisted State Police in the recovery of a body of a drowned Albuquerque man. K5KPS having fun with a Triton on 10 thru 80. W5SHJ moving to Coaldale, CO in Dec. WB5MSW is a new OPS. Traffic: W5ENI 290, WB5KSS 231, K5KPS 204, K5MAT 106, W5RE 63, W5DMG 40, W5SHJ 13, WA5OHI 8, WA5MIY 4, WB5MSW 4.

UTAH: SCM, Ervin Greene, W7EU — SEC: WA7ZBO. RM: W7OCX. Welcome to the new RTTY group forming with name abbreviated UARTS appropriately. We should have some autostart activity on .70 by the time the .10-.70 repeater is ready. W7BE reports lots of company but still working DX. W7RO reports DX very good to Europe. Just about like the old times. K7WYT has returned to Yuma for the winter making his signals somewhat warmer to receive. WA7VNQ is enjoying handling more traffic. W7OCX reports lots of overseas Army MARS traffic is being refiled into amateur nets particularly BUN. WA7WKQ passed his Extra Class exam and W7GXC his Advanced. Congrats guys, well done. W7GXC planning his new QTH in WY. Will look forward to hearing him from that location. UARC 16.76 on the air with auto patch logic. UARC also making 16mm TV commercial on ham to be aired this winter. Two new ECs are W7MUG K7BTB. Best wishes to all for a great new year. Let's make '76 the greatest. Traffic: WA7OAU 80, WA7MEL 59, W7OCX 36, WA7VNQ 24, W7DKB 10, W7RO 10, WA7JRC 7.

WYOMING: SCM, Joe Ernst, W7VB — The Great Plains Repeater Assn. made it up Laramie Peak Fri. Nov. 7th to get their 28-88 repeater operational. The 34-94 repeater six or seven miles S.E. of Rock Springs also on the air, with particularly good coverage to the west of Highway 30. Rawlins repeater should be on shortly. K7VWA with trailer and mobile unit took off for fishing on the Oregon coast Nov. 10. There seems to be a lot of Novices coming along with new licenses and equipment. Winter storms in Casper, disabled several antennas the last of Oct. The WY swap shop is heard Sun. mornings after the Net callup at 8 AM MDT on 3920. Remember the WY Hamfest, tentatively set for July 10 and 11 at Meadowlark Lake. Then the National ARRL Convention at the Denver Hilton July 16, 17, and 18. Traffic: W7TZK 424, K7VWA 327.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Hope ECs have their SET plans made. All AREC members should also "pitch in" some time during SET uther operators, too. If you do not know the EC for your area, contact SEC W4DGH or myself. The Mobile, Gadsden, Univ. of AL and Calhoun Co. ARCs had amateur radio exhibits in their communities. The Mobile and UA clubs signed up new members. The UA club originated about 70 messages. Conditions real bad on AENM. Appreciate the assistance of W5UMM W8ICO K0DQV and WB2YGA in serving as NCS and/or relaying traffic between AL stations. The Sand Mountain Repeater Assn. now operating. K4WSS pres. of the Assn. after WA4SNU resigned. EC K4CUU of Colbert and Lauderdale Co. report Halloween Safety Patrol a success. AREC members of each Co. used WR4ADJ (AENJ) to handle communications, received high praise from Muscle Shoals Police Dept. K4JK says WA4UNM putting up a 60 ft fold-over tower. WA4MFF active on AENM and AENX, has new Yaesu FT-101. W4MVM new R4C. K4GUU helping relay to MARS nets; has been ham 43 years. Endorsed K4AOZ as OBS and WB4FZQ as ORS. Traffic: (Oct.) WB4EKJ 186, WB4LDG 102, K4AOZ 84, WN4JDH 84, WA4AJA 42, K4GUU 32, WB4RCF 23, WN4TMG 23, K4CUU 20, K4LYY 19, WB4IYW 18, K4VF 12,

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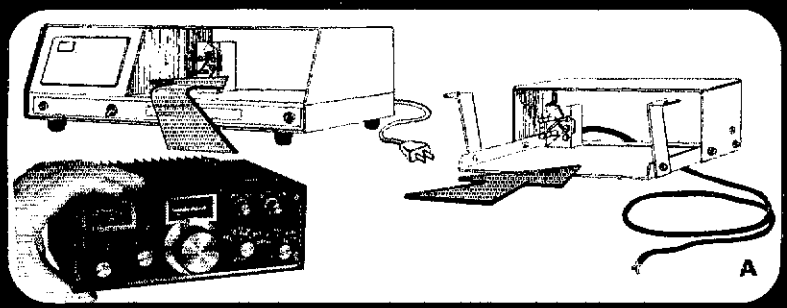

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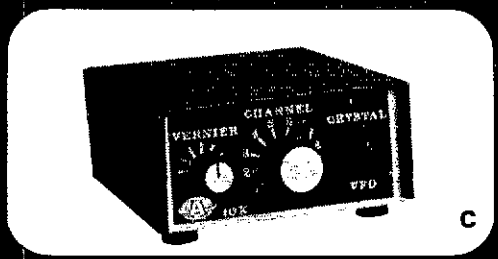

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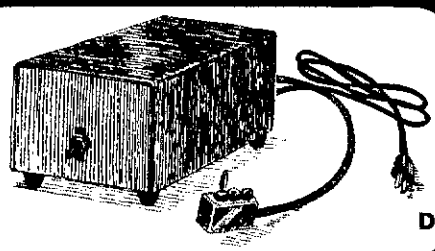

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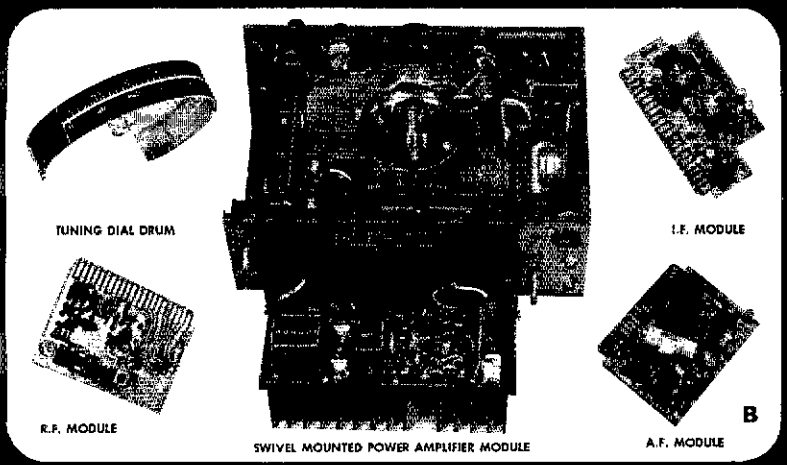

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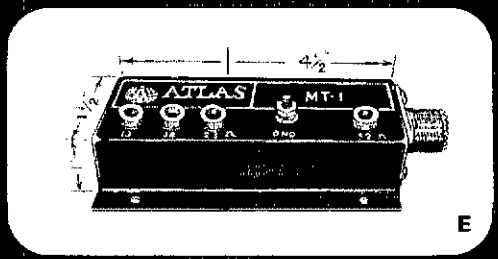

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the Bar Exam. Congrats! Radio Club de PR is giving classes for Novice and General Class license. KP4DLX and KP4AHQ transmit code practice daily at 0030Z over 34/94 repeater. KP4EBQ passed his General. New Novices in Ponce are WP4s EHO, EHB and EIG. Sorry to report that KP4BMZ became a Silent Key. KP4s ACQ, DPN and TIN have new Kenwood TS-520s. Repeaters are being planned for El Yunque, Marquesa, Maravilla and Estado Mts. Glad to hear KP4CL and CK again chasing DX. Please report activities to your SCM.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — RM: K7NHL. PAMs: WA7KQE & W7UQQ. K7NHL has obtained his First Class radiophone and Second Class radiotelegraph licenses, and his son, K7NHK, has passed his general and Advanced Class exams. A number of Tucson's Old Pueblo Radio Club members attended the Southwestern Division ARRL Convention in Ventura, CA. Tucson will be the site of the Division Convention Apr. 9-11. Tucson and Phoenix amateurs provided communications for a "bike-a-thon" from the U of A in Tucson to ASU in Tempe. W7KSO is the new editor of the W7IO newsletter, published by the AZ ARC, and WA7GEQ is the new editor of The Squelch Tail, published by the AZ Repeater Assn. New officers of the Brophy ARC are WN7CAC, pres.; WN7CAA, vice-pres.; and WN7BZZ, secy-treas. New officers of the Amateur Radio Council of AZ are WA7GEQ, chmn.; WA7JCK, vice-chmn; W7HFR, secy.; WA7NIY, treas. Nets: AIEN QNI 554, QTC 47, certificates to K7NTG K7EMM K7GLA; Cactus Net QNI 1238, QTC 125. Traffic: K7NHL 172, WA7VTM 44, WA7KQE 29, W7DQS 22, K7NTG 11, WA7EXI 8, WB2WPY/7 6, WA7WEB 5, K7NMQ 3, K7EMM 1, K7GLA 1, WA7UWG 1.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Berasley, WB6OYN. RMs: K6UYK WB6ZVC. New appointments: WB6EPS WA6TCH new ORSs: WB6OYN Asst. SCM and WB6ZVC RM; WA6EEJ OBS. It's certainly good to see this interest in league activities again. WA6AKQ reports that it took eleven and a half weeks to receive his Advanced license and reports daughter has the new call WN6YPH. K6CYP has registered with the AREC, but for the time being there is no SEC in the section as yet, however, I am looking. The San Gabriel Valley RC is preparing for the 1976 Rose Parade, they plan using the call AB6PTR, their transmitter will be atop Radio Station KPPC, the Star News building in Pasadena. The recent Southwestern Div. Convention at Ventura was attended by over 1200 hams. Again the San Pedro RC did a wonderful job giving printed boards away, these guys are still tops, with the help of instructor W6SZH the printed board expert. Thanks to this untiring group of wonderful guys. W6PHE and W6CL handled the QCWA booth, while W6MAB was overseer of the area displays. Thanks to WB6PKA for the help on SCN and RNs. Congratulations to WB6NSJ who won The Ham of the Year award for the SW division. Ray is a very hard worker and helpful to everyone who is interested in Amateur Radio. WA6IDN lost his antenna in recent wind, when a tree fell on it, expects to be back on the air soon. W6BRO having receiver trouble. K6UYK been missing SCN because of business trips back east. K6CL has installed new TH6DXX and the new world of DX is opening up, says he didn't realize what he had been missing. K6EA the local sea-going op reports his ship is tied up for a few months and is spending his time back east. New recent members on SCN are WB6AIT WA6JHV and WA6ARP. Congrats fellows, we seem to lose some and gain some that is what keeps the wheels going. I have been advised that W6UE will soon be back on the air, this is the Cal-Tech Amateur radio station. Traffic: WB6PKA 333, W6INH 186, WB6DJP 143, W6HUJ 136, WB6ETB 88, W6OEO 73, W6QAL 50, K6UYK 25, WB6EPS 24, WB6JFD 20, W6USY 20, W6NKE 17, WB6OYN 12, WA6TCH 10, WB6AIT 8, WB6OYD 5, WB6VZI 5.

ORANGE: SCM, William L. Weise, W6CPB — Asst. SCM: Dick Birbeck, K6CID. SEC: WA6TVA. RM/PAM: WB6AKR. WA6HKW, pres. of Anaheim RC is hard at work setting up procedures and training other Hams in emergency communications for the American Red Cross. If you can help please contact Jim. Field Day report in Nov. QST show all clubs made a very respectable score. Congrats to all participants. Enjoyed having eye-ball with so many at the Ventura Convention. Hope all had a good time. Don't forget you can, if you choose without prior approval of FCC, use the centennial call beginning Jan. 1. Details in Dec. QST. Bike-a-thons, tennis matches, mountain rescue and other activities has kept many AREC and other hams busy in the Orange Section during Oct. Our thanks to all who participated. Next time how about getting a little publicity in the local papers to let the other folks know that we are doing something beside causing TVI. Hi. K6UZ is busy participating in many of the local AREC nets and helping out during a mountain rescue on Oct. 16. WB6VTK says traffic very light during Oct. Maybe just a lull before the Holiday rush. Congrats to W6RUU who obtained his Advanced ticket. Anaheim RC net meets every Wed. 7:30 PM on 3915 kHz. Call K6SYU/WB6SAE. Join in sometime and get acquainted. WB6LGM is a Silent Key. Our condolences to the family. WB6EIG is very active on ten traffic nets. If you need to get traffic out contact John at his QTH in Running Springs. Traffic: WB6EIG 504, WB6VTK 77, W6CPB 55, WA6TVA 45, WA6YWS 38, K6LJA 18, K6GGS 16, W6WRJ 10, W6QBD 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — SEC: W6GBF. Annual SET will take place latter part of Jan. All amateurs invited to participate. Contact me (273-1120 or W6GBF 422-7696) for info. Emerg equip not necessary. AREC nets (all MHz): 3.905 Sun. 0900, Mon. 1900; 1.818 Sun. 1100; 29.375 Sun. 1000; 28.585 Mon. 2000; 50.25 (AM) Sun. 0930; 145.5 (AM) Sun. 0900, Tue. 1900; 146.13/73 Sun. 0830; 146.52 Sun. 1900; 147.60/00 Tue. 1930; Novice 3.725 Sun. 0830; cw 3.770 Sun. 0930. San Diego well represented at SW Div. Convention in Ventura. A highlight was music by W6UK. W6KJB won a Tempo One. New amateurs: WN6EEM. Upgraded: WA6ENR WB6MME. W6SRS has tape/slide program on RTTY for clubs. K6BTO getting ready for 2.3 gHz operation. W6NYH is now W6HC. North Shores ARC had program on UFOs. WB6PLZ teaching licensing class, Tue. & Thur. mornings, Normal Heights United Methodist Church. WB6CUQ on 2 meters with IC-230. Congrats to newly-apptd Asst. Dir. WB6RMG. El Cajon Club has Novice class 7 PM Mon. at Civil Defense EOC. New officers of Imperial Valley ARA: WA6FND, pres. W6JHG, vice-pres.; K6AXU, treas.; WB6RMG, secy. PSHR: WA6DMB, WB6PVH. Traffic: WA6DMB 269, WB6PVH 180, W6BGF 122, W6DEY 42, W6PZU 36, WA6BDW 11, WA6IIK 2, WA6UFY 1.

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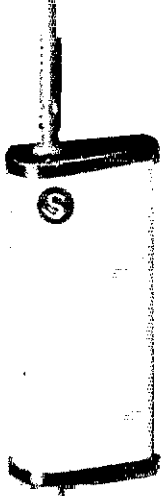
SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI — The SET is in Jan. Everyone Should Help! Contact our SEC WB6HJW for info. Santa Barbara is busy making new hams. New Novices are WN6AHI WN6ASY WN6AHN WN6ATB WN6ATE WN6CBV; Generals WB6BAV WA6BRW WB6IBO; Advanced WA6BAT WB6GPO WB6PGX; Extra WA6MWH WA6YPG WA6PAD and WA6BIJ. The code and theory classes are being taught by WN6AHN WA6BRW WA6BLS W6PIE and WN6HOZ. Congratulations on a great job fellows. Is your club sponsoring code classes? W6MSG W6MSW WB6VGC and WA6FHH provided comms for the Baja 1000 road race in Mexico. WB6TLS sporting a new TS-520 on the Fiesta City Net (0300Z 21150 Mon.). The convention in Ventura now history. Thanks for a great time go to the committees headed by W6UEI W6PNM WA6WWF WA6DEI WA6TPL WB6COQ WA6GKR K6LHA WA6TMQ and WA6QKC. WA6BVS hosted a traffic breakfast at the convention. . WB6QDS won the Golden Yagi Award for winning the T Hunt for Sept. WN6CVI a new Novice in Santa Maria. WN6KTA passed his Advanced at the convention. WB6DBD now active on vhf. K6QPH W6AB WA6DEI and WB6HJW were among the most active in the CA QSO Party. New officers of the Ventura County ARC are W6FYP, pres.; WB6JKM, vice-pres.; WB6NNP, secy., WA6WYD, treas., WB6COQ, Custodian. W6LOR busy working 40-meter cw from Santa Barbara. Bruce Gordon spoke at SBARC on vhf direction finding based on his work with the CAP. Public Relations should be the new goal of every club. PSHR: WA6DEI 44, WA6VBS 25. Traffic: WA6VBS 115, WA6MBZ 111, WA6DEI 91, W6POU 14, K6QPH 2.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L.E. Harrison, W5LR — Asst. SCM: Frank E. Sewell, W5IZU. SEC: W5SHN. RM: W5QU. PAM: W5GSN. Volunteer needed for job of SEC and RM. Call or write W5LR 265-3296 Arlington Metro line. WB5AZL attending Univ-Penn in Philly appointed Student Activity Council rep per WB2BTA/3. Kilocycle ARC FT Worth reports auction with 10% sales to club. WA5MWS auctioneer, W5RIY former SoTX OO located Mesquite. WA5KZA, pres. Red River Valley ARC conducting code/theory classes 2320 Jackson St; Paris, TX, Tel 785-6694. W5III sends QSL card from Holy Land. W5QPX NTX Sr OO reports 18 observations in Oct. TX Southmost ARC rpts snowbirds arriving early. Yours truly leaving Sn. QTH Rt. 3 Box 319 Harlingen Stuart Place. Dallas ARC reports tower problems continued. An order issued 9/6 by U.S. Judge J. Gordon to *"Jam CB Radio Channels in Louisville & Y"*. 1 KW Transmitter used to block "CB" radio within an area, by Engineer R. Moore County Education Board at Judges Direction. FCC investigating, spokesman says many eyebrows were raised. (Per WB5OYL). Dallas Co. RACES active on 28/88 call K5LZA 231-9820. K5BDC active on VHF & attending advanced classes Braniff TC. W5TGA reports 8 citations as OO. Please send copy your CD-13, to SCM. W5YK our regular reporter. He has yet to fail sending report. Thanks for copy your EC publicity. Hq. will be advised. Texoma now history, attendance firm 600 plus registered in attendance despite "Mail Foul Up" worse than the Navy's Hogans Goat. TT's bad. Grand prize won by W5PML, OK SCM. K5WIQ Booker TX showed up at Texoma with full VHF report. Our SEC W5SHN has large list of gear left by the late Dr. Gilpin, W5FUY. Call Duane 214-586/9097 or 589-3275 Jacksonville. SEC reports 351 AREC members divided as follows 187 full, 164 limited. EC WB5HGI Van Zant Co. K3BNS, John Johnston recently relieved Prose Walker indicates he may lean toward "de-regulation", so fellow amateurs let us express ourselves again by writing the FCC and the League. Grayson Co. K5OUK VHF Sec. of Howe, TX is newly appointed club in No TX. Greetings folks. Your reports welcome at anytime. OVS WA5IKU reports 50 MHz propagation, low Sporadic "E" activity nil. Some activity on 6 meters late evenings ssb 50.110 and cw practice on 50.150. Two meters very active of DX plus fm and ssb. Irving ARC reports meeting Sept. 25 and Oct. 9. Spook Patrol reactivated as an assist to Irving Police. WA8SWM/5 in Dallas and working for TI. Your SCM has correspondence from G4JZ regarding W5's QRMing European stations. SEC reporting 13 stations for Oct. Traffic: (Oct.) W5TI 184, WB5MFQ 116, W5SHN 31, W5YK 6, W5LR 4. (Sept.) WB5DXB 70, W5SHN 29, W5GSN 10.

OKLAHOMA: SCM, Cecil C. Cash, W5PML — Another bigger and better Texoma Hamarama now history, with 675 registered this year. WN5NEF is proud owner of a new HW-101. WN5NKD has 10- 15- and 20-meter inverted V hooked up to her Galaxy 5 MK-3, just awaiting the arrival of her General ticket. New EC of Jackson Co. is WB5KRH. The Tulsa Repeater Organization Inc. was asked, and furnished communications umbrella for 10 bus loads of children from the Hissom Center, while they attended the Tulsa State Fair. Nine operators worked all through the day keeping watch over the children, all went off without a hitch. The biggest event was the Roy Clark Golf Tournament in Tulsa which the TRO covered with 35 operators for the three day affair. Congrats to new Advanced WB5GMK WB5KGP K5KXL WB5MWD and WA5YGY; General WB5LUX and Tech. WB5NKC who also passed the General exam. Ex-W2FIR now W5UVX. Our cw nets are OAN 3705 kHz at 0030Z mgr. WN5NKD and OLZ 3682 kHz at 0100Z mgr. W5RB. Traffic: W5RB 208, WN5NKD 94, WB5AZS 44, WB5OYU 43, WB5KGP 40, WB5HQX 30, W5FW 25, WN5NKC 24, W5FKL 23, WB5ELG 21, W5SUG 20, W5PML 17, WA5QQP 9, WA5OUV 8, W5REC 7, WB5MWD 5, WA5WWG 1.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — SEC: WB5CUR. RM: W5UGE. PAM: WB5AMN. OOs reporting: W5NGW WA5KLX K5HGB. OVS reporting: WB5CIT WB5HRI. ORS WA3VWJ/5 has his new call WB5QDW. OPS/OO W8UX has high praise for new W1AW 10 wpm bulletins; he recommends more publicity for phone and Novice ops. OVS WB5HRI upgraded to Advance! OO/OVS WB5CIT celebrated first birthday of his 449.0/444.0 repeater, WR5AGT Oct. 25. OPS K5RVD mobiled around Central and West TX for 3 weeks. OO WA5KLX has new 40-meter "slope" antenna; got in ten hours in Oct. CD party for lots of fun. EC W5ICL reports Orange ARC has new officers: W5ICL, pres.; WA5DIK, vice-pres.; K5WAH, secy-treas. OO K5HGB was one of the bunch who worked with Houston CD in "Mainstreet 75" celebration. Our old friend, W5RBB, now W1HNJ. OPS WA5CBT having fun with 6-mtr ssb and 2-mtr mobile; will operate with prefix AA for bicentennial. WB5EPL (OM) and WN5MTF are new husband and wife team in Corpus Christi. WB5EVL lost his entire station to a lightning strike! Please Take Precautions! WN5OKR transmits code practice nightly at 8:30 PM on 21, 171



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kHz. Sun City ARC (El Paso) has new officers: W5ANU, pres.; WB5KNU, vice-pres.; Theresa Lindsey, secy.; WB5LCN, treas. Received 32 reports by Nov. 7, including 4 which were late for the Oct. 7 report. With 97 appointees, that ain't a good percentage. Traffic: (Oct.) K5HZR 424, W5TQP 244, WA5VBM 150, W5KLV 109, WB5QDW 83, WB5LII 79, WA5YEA 67, WB5FMA 54, WB5OOW 36, WB5LTW 31, WB5NUM 30, WB5AMN 24, WA5RKU 27, K5ROZ 17, WB5IJR 15, WB5HRI 13, W5TFW 13, W8UX/5 13, WA5TKC 11, K5ZMS 4, WB5CIT 3, WB5GQH 3, K5RVF 1. (Sept.) W5UJJ 166, WB5FMA 51, WA5KLX 5.

CANADIAN DIVISION

ALBERTA: SCM, Don Sutherland, VE6FK — Asst. SCM: John Wilkinson, VE6ALR. SEC: VE6XC. Thanks for the cooperation of 1975 and looking forward to 1976. Conditions on 75 very poor. However, VHF Net at 0330 on link repeaters VE6RPT/VE6VHF filled many of the gaps. Traffic: VE6FS 65, VE6FK 58, VE6AMM 21, VE6QN 12, VE6VM 10, VE6WN 6.

BRITISH COLUMBIA: SCM, H.E. Savage, VE7FB — The British Columbia Slow Speed Net, 3650 kHz which follows the B.C.E.N. session is the open door to learn cw traffic handling. Time 0330Z. Vancouver Island Senior Citizens Radio Repeater Assn. held their annual meeting in the Island Hall, in Parksville. Cold smorgasbord dinner and buisness followed. Returning present officers, VE7WA, pres.; VE7VZ, vice pres.; VE7ALY, treas.; VE7AWC, secy. B.C.E.N. RM VE7DCF. Nanaimo's paper Static recent issues have some very interesting circuits and reading material. We are still looking for volunteers for ORS and ECs also club news. Traffic: VE7CDF 191, VE7ZK 174, VE7DKY 97, VE7BLO 75, VE7DFY 27.

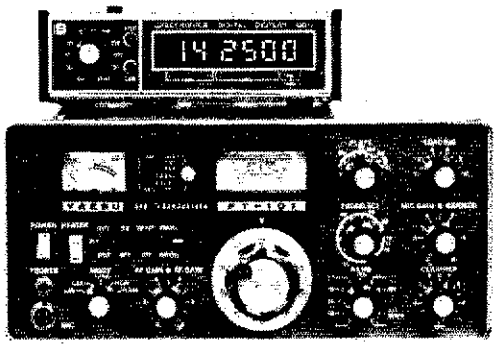
MANITOBA: SCM, Steve Fink, VE4FQ — RM: VE4PG. PAM: VE4JP. ECs: VE4NE VE4NW. ORSs: VE4TY VE4LG VE4EA VE4RO. OPS: VE4LU. OO: VE4SW. OBSs: VE4MG VE4HE. OVS: VE4AS. Our traffic nets continue in high gear this winter season. MTN has added a second session at 0400Z to clear late traffic, and check-ins are welcomed. The VE4UM club has 15 operators this season and is active on all bands and all modes, and frequently handles phone patches for the university students. WARC held a successful auction Nov. 9. VE4HU and VE3CU/4 are new calls in Winnipeg. Let's all get ready for the DX Test next month, and please support your nets during SET. MTN: 31 sessions, 161 QNI, 92 QTC. MEPN: 31 sessions 1158 QNI, 15 QTC. Traffic: VE4XP 69, VE4OW 39, VE4FQ 18, VE4CA 14, VE4IX 12, VE4JP 11, VE4LU 7, VE4UM 7, VE4FK 4, VE4HA 4, VE4XN 4, VE4HR 3, VE4DE 2.

MARITIME: SCM, Aaron D. Solomon, VE1OC — SEC: VE1ACA. Greetings to all from new SCM. I welcome your comments queries and news items both on the air and by mail. VEIs — remember the annual VE1 Contest takes place with the cw week end Jan. 11, and phone Jan. 18. It is with deep regret that we report the passing of VE1PL, VE1TH and VE1TS. Sympathy is extended to their families. A DXpedition to Sable Island using the call VX9A, also to St. Paul's Island using the call VY9A made over 20,000 contacts. QSL via VE3GMT. Many amateurs took part in the Boy Scout Jamboree and the CQ WW Contest. Maritime Section ARRL Convention will take place at St. Mary's Univ., Halifax, NS Aug. 20, to the 22nd, 1976. Details to follow. New officers NS VHF Assn. VE1AYE, pres.; VE1AAC, vice-pres.; VE1AJQ, secy-treas.; VE1AJZ, tech chmn. The Blomidon Repeater now all solid state. Officers Truro ARC are CH1ALP, pres.; CH1AHV, vice-pres.; CH1TK, secy.-treas. The club reports membership of 29, meets 2nd Mon. each month. New White Cane operators are VE1BFD and VE1AZN. VE1APV and VE1LT operating from Dartmouth area. VE1NF moved to Pictou, VE1FQ has new tower, VE1NP new mast and TA-33. VE1QU worked 15 countries on 10 meters during Oct. VE1AMZ running code and theory classes at Nova Scotia Inst. of Tech. VE1WG and VE1PX hope to start new class soon. VE1PX new Yaseau FT401. Recent visitors include VO1CC, ex-VP9, HH and VE7CAM. VE1AMR extends thanks to all VEIs for their cooperation during his term. Traffic: VE1AMR 81, VE1AAO 86, VE1ZH 51, VE1ARB 30, VE1ABN 16, VE1AMB 3.

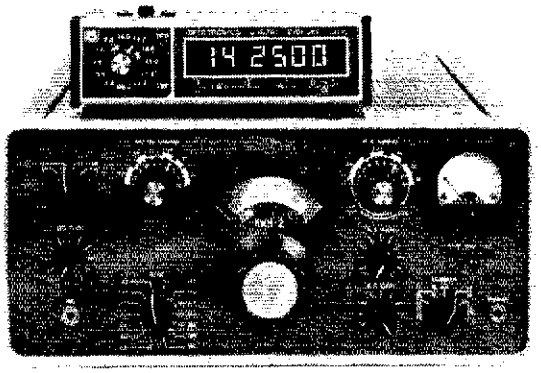
ONTARIO: SCM, Holland H. Shepard, VE3DV — Asst. SCM: Mrs Noreen L. Nimmons, VE3GOL. VE3GOL is a comparative newcomer to amateur radio taking on an ORS appointment in Sept. 1974. She has become one of two Canadian amateurs presently in the elite of traffic handlers, The Transcontinental Corps of the NTS. Noreen will provide the major point of contact for League members in the West end of Lake Ontario and I hope you will take advantage of this appointment to assist Noreen in giving Ont. the best in ARRL sponsored on-the-air activities. I haven't confirmed this but I am certain the Oct. 25-26 meeting of the Eastern Area Staff was a first for Canada. The EAS meeting was hosted by VE3AWE of Kleinburg, the Eastern Canada Net mgr. of the 11th Region. All sections of the area were represented including W1NJM, the Communications Mgr. VE3SB Ottawa and VE3GOL. Thornhill attended certain portions as TCC representatives. I Won't try to give you the full range of their deliberations but I can say that it will result in certain changes in the Section Net cw system here in Ont. The ARRL Ont. QSL Bureau now being operated by the members of the Ont. Trillium, P O Box 157, Downsview, Ont. M3M 3A3 and you can best help this great public spirited group by sending TOT enough s.a.s.e. to serve you and them too. VE3FOH, pres. of the Burlington ARC thinks we hide our head under a bushel basket when it comes to publicizing our public service actions. Ray suggests each club make up attractive cards which will tell the recipient that he has been assisted by a member of the . . . ARC and give his/her name. I think it is a good idea don't you? Traffic: (Oct.) VE3SB 302, VE3GOL 274, VE3FQZ 154, VE3DPO 125, VE3DV 120, VE3EKC 114, VE3AWE 95, VE3HJA 91, VE3GFN 85, VE3FRG 83, VE3EHF 81, VE3GT 74, VE3DVE 68, VE3CDK 62, VE3EWD 41, VE3ATR 27, VE3BZB 24, VE3GCE 17, VE3FGV 14, VE3DH 7, VE3GEQ 4. (Sept.) VE3AWE 40, VE3GEQ 4.

QUEBEC: SCM, Larry Dobby, VE2YU — BPL: VE2UN. Because of mail strike column is short this month. Traffic: VE2UN 250, VE2DR 233, VE2DRC 45, VE2APT 21, VE2UY 16.

DIGITAL DISPLAY



FOR YAESU TRANSCEIVERS



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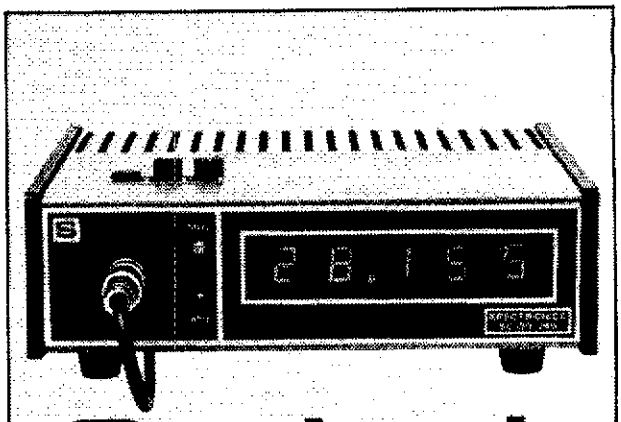

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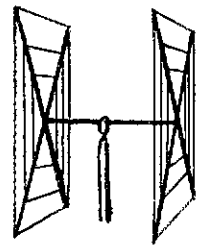

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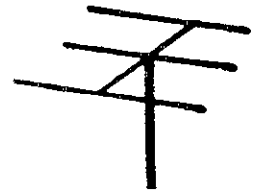

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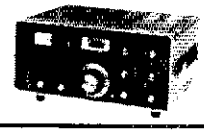

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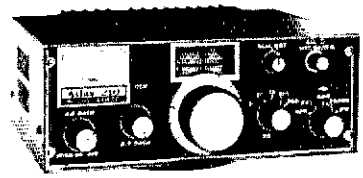

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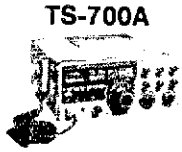

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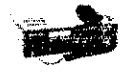

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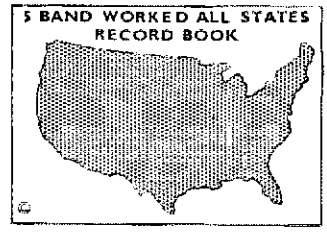

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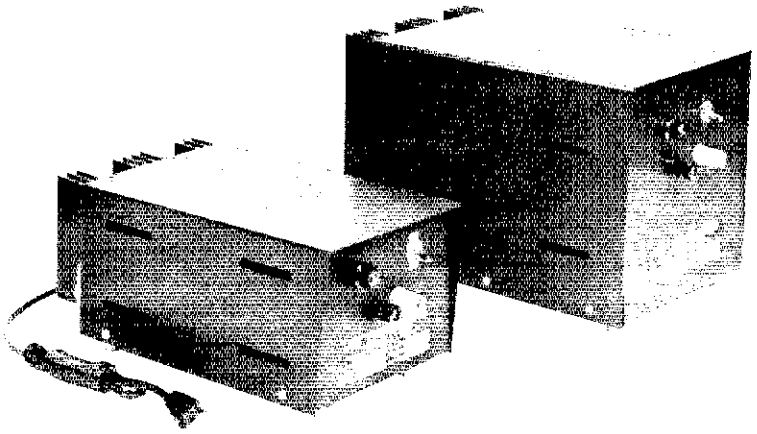

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Load Regulation:
2% from no load to 10 amps.
Current Output:
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10 amps continuous
Ripple:
50 mV at 10 amps
Weight:
11-1/2 pounds
Size:
11-1/4" x 5-1/2" x 4-3/4"

Kit $79.95
Wired and tested 94.95

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Load Regulation:
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Current Output:
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20 amps continuous
Ripple:
50 mV at 20 amps
Weight:
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Size:
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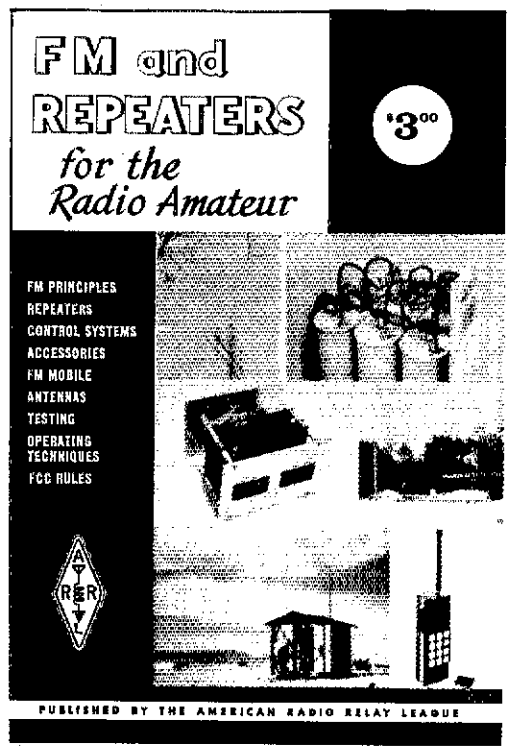

This book is a *must* for the fm buff as well as the operator just breaking into fm and repeaters. Everything is covered! Fourteen chapters include: mobile installation, transmitters, receivers and antennas for mobile and base, and fm test equipment. Special sections treat alignment and troubleshooting gear as well as repeater technical problems and cures. Club organization, repeater location planning, and operating under the new regulations are all covered. If you operate fm or are just becoming interested, you cannot afford to be without this book.

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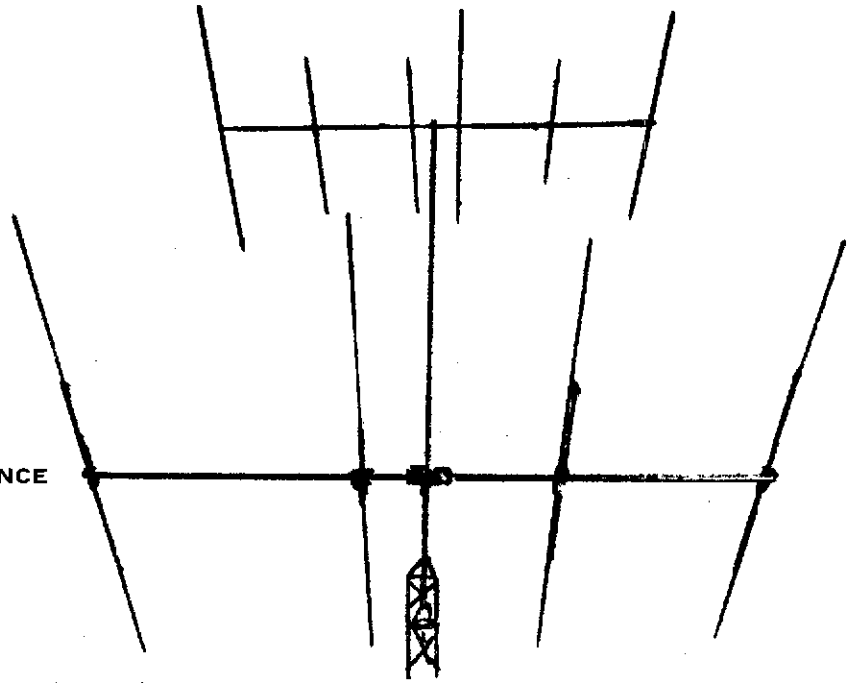
Wilson Electronics Corp.

WILSON 204 MONOBANDER PLUS DB33



REAL MONO PERFORMANCE ON 10-15-20

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- Adjustable 52 Ω Gamma Match
- Quality Aluminum
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WILSON AMATEUR ANTENNA SPECIFICATIONS

	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M240	30	2	73'0"	39'6"	10.0	250	60	63	$299.00
M520	40	5	36'4"	27'0"	5.0	125	90	96	269.00
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M155	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	40	5	36'4"	27'0"	7.9	198	105	119	299.00
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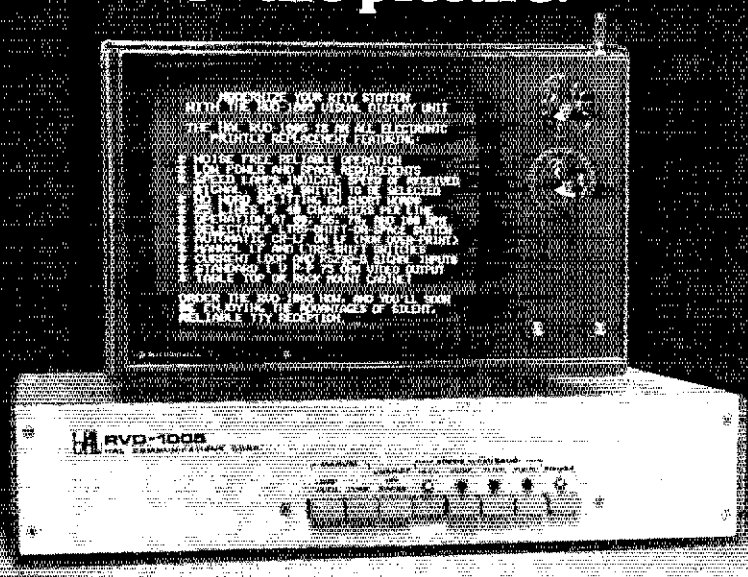

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The RVD-1005 converts the output of any TU into a clear, easy-to-read TTY video readout. The output signal can be fed to a TV monitor—like the RVD-2110 monitor shown—or, with slight modification, any standard TV receiver. The features speak for themselves. We've included everything the serious amateur requires for TTY receiving at its best.

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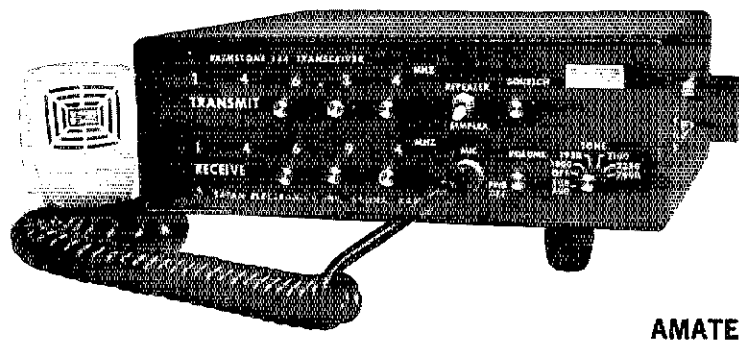

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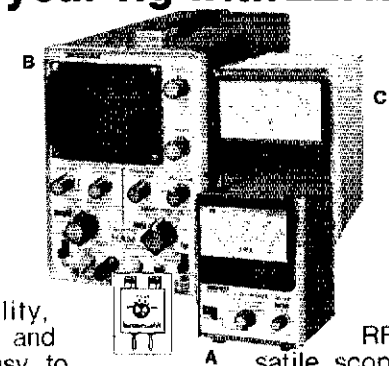

(A) LPM-885 SWR Wattmeter

A sensitive, in-line type power meter which measures SWR of x'mission lines and power output from 1.8 to 54MHz. Facilitates adjustment of x'mitter and antenna systems for highest efficiency. May be left in circuit for continuous power output monitoring in the 1-1000W range. SWR Power Detector circuit assembly separates for remote measurements. Forward-to-Reverse power ratio is used for accurate SWR readings. **$99.95**

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LBO-310Ham 3" Scope $269.95

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(C) LPM-880 RF Wattmeter

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☐ LPM-880 RF Power Meter	@$149.95	
☐ LAC-895 Antenna Coupler	@$159.95	
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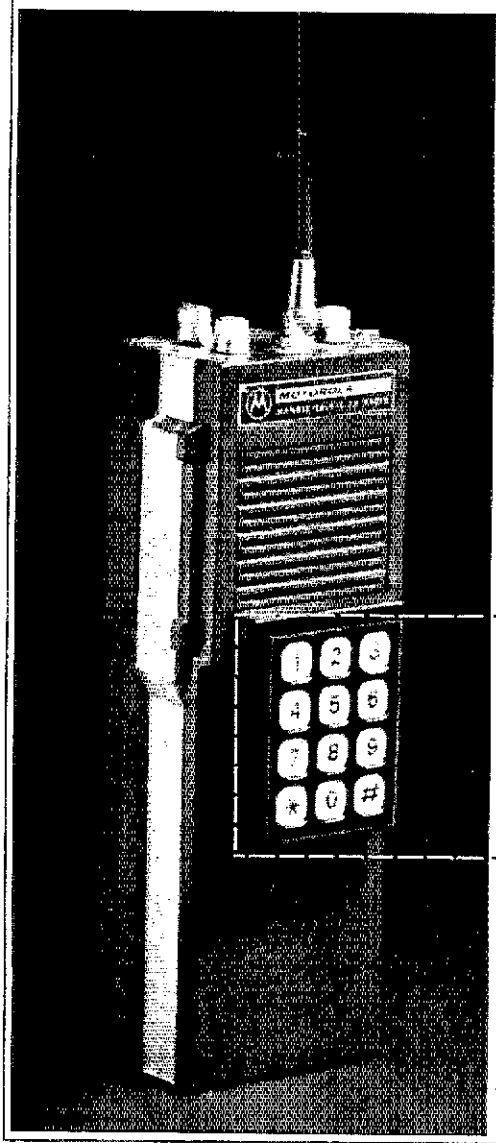

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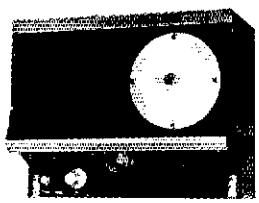

490-T Ant. Tuning Unit
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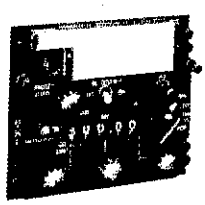
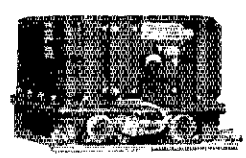
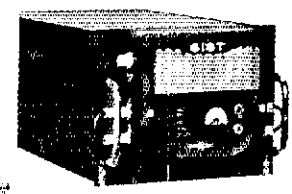


ARC-51 Control Box

R1051 or T827



ARC-51 Transceiver



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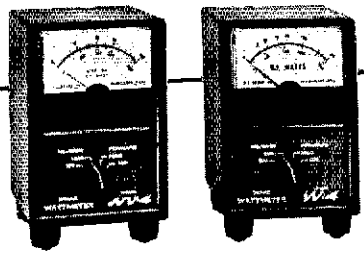
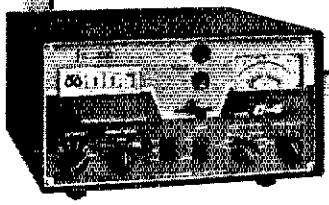


Memo from Drake

One of our observers wrote the other day that we do some rather curious things from time to time here at Drake. For example, he said, we seem to have a penchant for putting wattmeters in almost everything.

On thinking that over, it is true that the W-4 is a fine device for up to 2 kW from 1.8 thru 54 MHz. The WV-4 covers 20 to 200 MHz and we do have W-4 type units in the MN-4 and MN-2000 antenna matching units. We also have one in the C-4 Station Console, and a 3 kW meter in the L-4B Amplifier.

Our friend went on to say since we have put so many wattmeters in various things, we had probably even put one in the coffee pot here at the plant. Now obviously that carried the whole thing a bit too far -- after all, we had enough trouble getting one into the water cooler!



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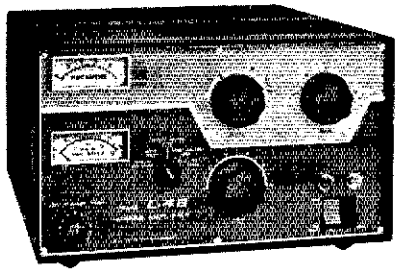

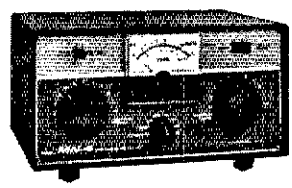

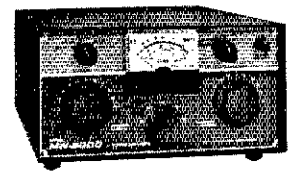

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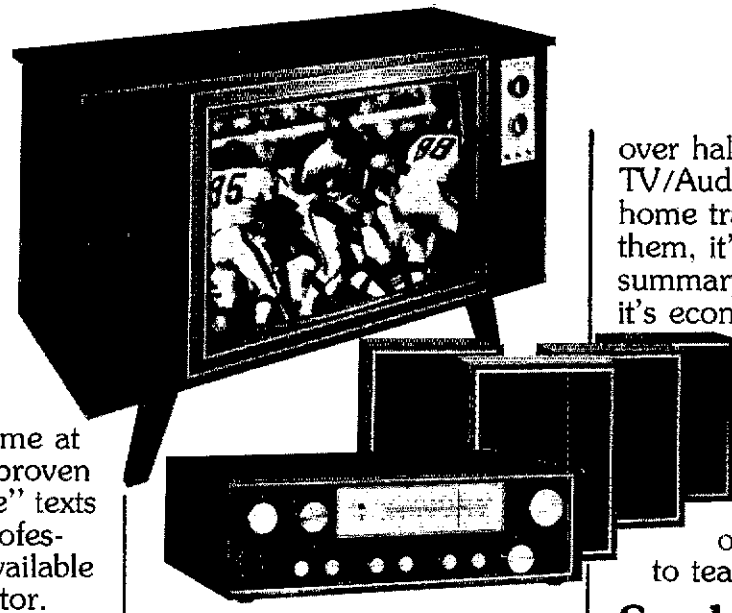

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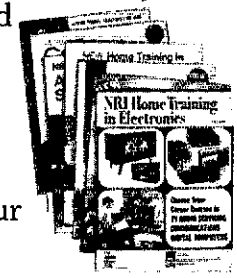

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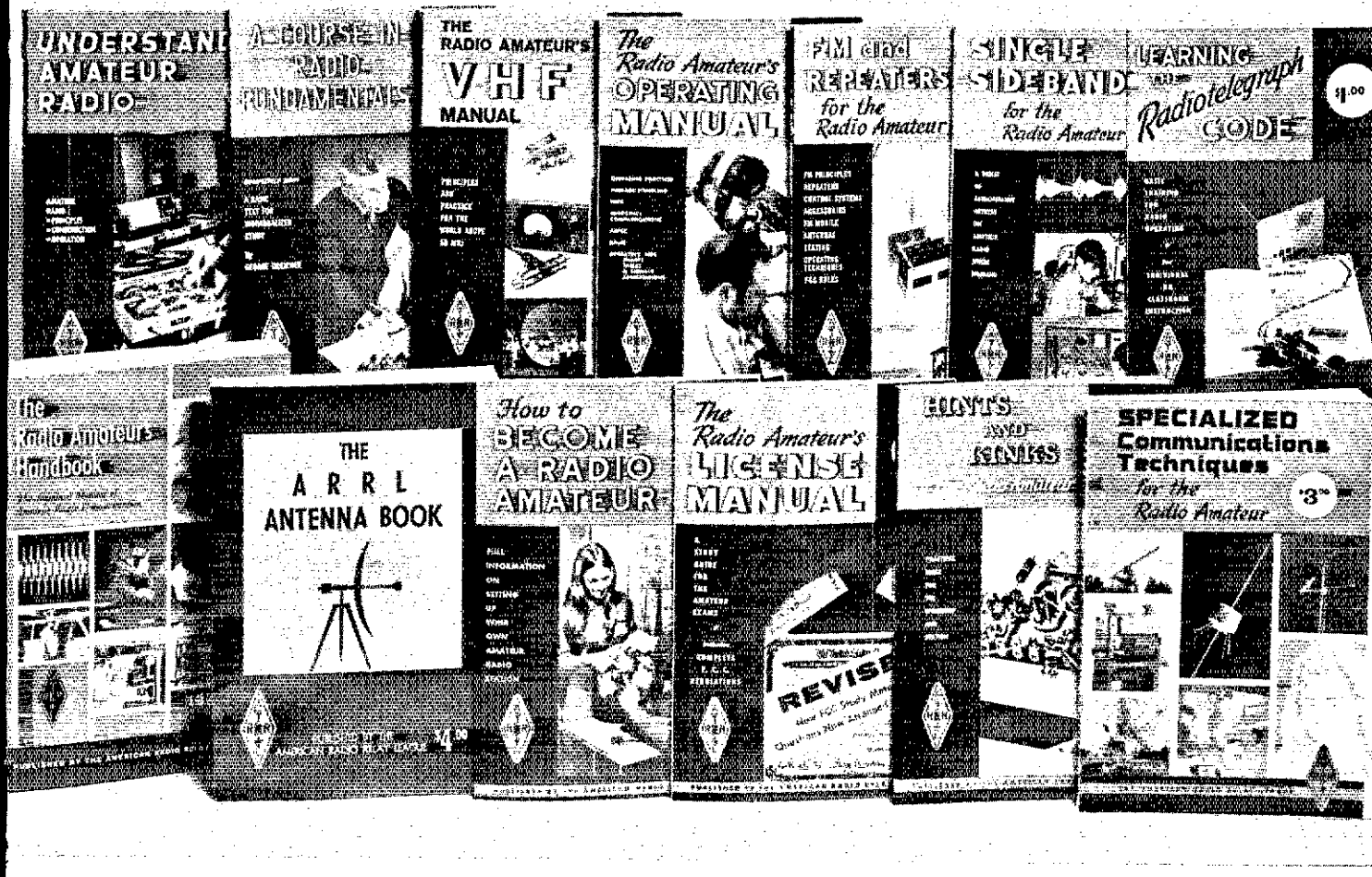

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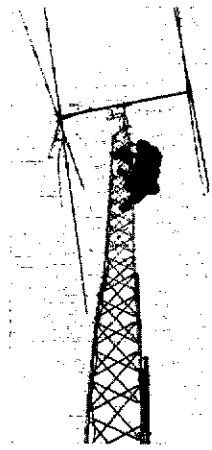

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2N4360 TYPE Gen. Purpose Amp & Sw (TO-106)	3/$1.00
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2N2907 PNP TRANSISTOR GP Amp & Switch	6/$1.00
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MPF102 N-CHANNEL FET RF Amp 200 MHz	3/$1.00
556 DUAL 555 TIMER 1 μsec to 1 hour (DIP)	$1.00
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741 Op Amp, Freq. Comp., LM 741, μA741, etc. (MINI-DIP)	4/$1.00
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1N4154 DIODE 30 V/10mA-1N914 except 30 V	25/$1.00
BR1 BRIDGE RECTIFIER 50 V PIV, 500 mA (DIP)	3/$1.00
MM5314 DIGITAL CLOCK CHIP With Specs/Schematics	$4.95

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308 Micro-Power Op Amp (TO-5/MINI-DIP)	$1.00
309K Voltage Regulator 5 V @ 1 A (TO-3)	$1.25
324 Quad 741 Op Amp, Compensated (DIP)	$1.50
340T Volt. Reg.-1 Amp-Specify 5, 6, 12, 15 or 24 V-w/ckts	$1.75
380 2-5 Watt Audio Amplifier 34 dB (DIP)	$1.29
555 Timer 1 μs to 1 hr. NE555, LM555, etc. (MINI DIP)	$ .65
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739 Dual Low-Noise Audio Preamp/Op Amp (DIP)	$1.00
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SALE: Comcratt CTR-144 2 meter Am/Fm transceiver-$225 or trade for Robot SSTV 70A monitor. WB6ZTN Don Barnes 8092 Salter Ave., Huntington Beach CA 92647. (714) 847-3875.

75A1 Receiver. Mint $125. 2 new Eimac 3-400Z tubes $45. Pr. Trade one new 3-400Z tube for cw filter for 75A4. 5 position switches for linears. Handle kw plus. $6. P.P. 48. Good used 4-1000 tube $25. P.O. 48. Bill Collier Route 4, Box 119-A1, Jonesville VA 24263.

DRAKE R-4C T-4XC MS-4 AC-4. Six months old. $875. Bill Williams, WB5OLN Box 365, Iowa Park TX 76367. (817) 592-5316.

MANUALS needed for TT321A/UX facsimilie transceiver, Inoue FDFM-2 transceiver, Link 1905-2b receiver, RME DB-20 (military CME-50063) preselector to copy or purchase. R. Dillman, 435 Utah Street, No. 4 San Francisco CA 94110.

COLLINS KWM2 Ser. 13565 with pwr supply es spkr $700 Like new, used little. No marks or scratches. Never mobile. J. Bright, 131 Nugent Street, New Hyde Park LI NY 11040.

MURCH UT 2000 Ultimate transmatch/SWR meter 100. (W6RQZ) 1330 Curtis Berkeley CA 94702. (415) 526-7345.

ICOM — 22A Ser. 3452 used 5 hrs; 18 xtals, mobile ant. $225. K1BXU.

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FOR SALE — HR05TAL, power supply, speaker, a,b,c,d,e,f,g coils — positively mint, newly aligned, working perfectly. Also HR05RA1, speaker,a,b,c,d coils, no power supply also mint and operating. Two extra HR05 coils. Make realistic offer for either or all. No separate coil sales. W8GI Wells Chapin Box 176, Kingsley MI 49649.

SELL new AM1178-GRC Multiplier & Amp. 400-600MHz. $50. FOB. Wanted: Johnson rotary inductor, 28uH (229-203) Turns counter. Reasonable! WA3PHL, 7 Circle Rd. Millersville PA 17551. (717) 872-4745.

FOR SALE — Four 833A's $20. each. Factory matched pair 6LB6's brand new, $10. As new Quasi-Logarithmic Speech Processor by New England Engineering, installs in mike line, any rig $40. Shipped prepaid, send M.O. W2DAP, 4 Brookfield LN., Centereach NY 11720.

SALE: Heathkit IM25 Solid State VOM $65. IG18 Solid State Sine Square Wave Generator $75. IP27 Regulated Power Supply 0-50 Volts 0-1.5 Amps $60. IO102 Oscilloscope $130. IB1100 Frequency Counter 30 MHZ $100. GR88 VHF Police Monitor $45. HN31 Cantenna $10. All above in as new condition with manuals. Also, brand new Eico Grid Dip Meter $40. W4VMM P O Box 352, Ormond Beach FL 32074.

NATIONAL NCX-3 modified for 6146 finals, ALC documented, recently aligned. $120. Also Model 14 Typing Reperf, $50. Model 14 Tee Dee, $50. WA1QZE 755 Washington St, Annisquam MA 01930. (617) 283-7507.

WANTED: Lowband plug-in coil from WWII BC-610 transmitter. W8CVU 7222 W Bayshore, Traverse City MI 49684.

SELL: Heath SB301, cw filter, speaker $225. Homebrew QRP Xmtr, Ten Tec 200 VFO $75. WB0NSS, Dave Pearson, Manson, IO 50563. (712) 469-2366.

LIKE New, hardly used. SB104 with xtal filter. Speaker with AC power supply. SB644 remote VFO $935. New, used one hour HW202 with tone burst and AC power supply. HA202 pwr. amp. $250. K4TM, 3000 Sedgewick Dr Lynchburg VA 24503.

WANTED: HA-5 VFO, mint condition only! — W5EGS.

FOR Quick Sale — KWM-2 Collins transceiver with Heathkit SB-200, 1200-watt linear (wired by a professional). KWM-2 equipped with expensive factory installed Collins noise blanker. Combination purchased new, used less than 100 hours. Both in mint condition — perfect, if any questions write. Combined price $799. W0BOH — Box 82209, Lincoln NE 68501.

SELL: Swan SS-200 $475 New Cond. D.M. Johnson 10515 Penn Ave., Bloomington MN 55431.

SELL New HW16 HG10B HM102 needs alignment $150 Ranger 1 $50. Dean Cowden, RI, Macon MO 63552.

SELL: Knight Tr-108 2m transceiver $70 — Knight V-107, 2m and 6m VFO $15. — Poly-comm 6, 6m Transceiver $50. Paul Gruettner 2743 South 52 Place, Milwaukee WI 53219.

SELL: Swan 500; 117XC; 410VFO; No. 22 transceive switch — like new; new finals, Lab checked $450. K2ZSY (212) 249-5142.

WANTED: RME 4350 rcvr, working condition also Ta-34A keyer with tapes. W0NPC, C.D. Ehinger, Box 57, Stanley KS 66223. (913) 681-2443.

DRAKE TR6 for sale, six meters, all crystals, SSB, CW, AM, AC4, noise blanker, built in speaker, plus Lunnenberg six el. Long John beam, all mint, prefer pick up my QTH. Buttner, P.O. Box 405, Guilderland, NY 12084. (518) 456-2959.

HW-202 with GLB, 13kc filter and pre-amp. Five crystal frequencies. $410. I ship. WA2BDP.

ARGONAUT, $200., old radio tubes, schemtaics. Wetzel, Box 331, Gun Club Rd., Coopersburg PA 18036.

SELL: Mosley 2-el 3-band quad, $140, no shipping. Paul, WB6BDN (213) 475-3780 (nites only).

SELL: Heath 40-meter monoband transceiver: Model HW22A-factory wired- tested and calibrated (demonstration unit) purchased from Heath 10/01/75. Hustler 40 meter mobile resonator included: firm price $120. Aaron Reitman (WA2AKB) 1349 E. 85th. Street, Brooklyn NY 11236.

WANTED: Rohn 25/45 tower will take down. W1 or W2 call areas. C. Carroll (203) 224-4603.

STEAL — Mint SB-303 rcvr with CW filter, manual for $295. First certified check. Dave French WB8QVX, 175 Friendship Dr., New Concord OH 43762. (614)826-7130 after 5.

LAFAYETTE HA 800B 6-80 meters AM/CW/SSB Receiver Warranty, original carton, $150 list, sell for $80. Wayne DeForge, Box 9, HydePark VT 05655.

WANTED — Millen Transmatch No. 92200 Model or Drake MN2000 antenna match network. I. Rosen 2114 Biscayne Dr., Winter Pk, FL 32789.

WANTED: Scott communication receiver. Also any McMyrtle silver receivers. Private collector. Charles Schwartz 3015 W. 40th, Davenport IA 52806.

FOR SALE: General coverage NC-183D, V.G., $200. Clegg 99er, $40, Wm. Wentzel, W3GWA, Box 262, Perkiomenville PA 18074.

WANTED: HW32 good condition, local if possible. W3GFB 85 Keeley Ave., New Britain, PA 18901.

TEN TEC PM3-A with cmplt accs $125, SBE-33 $150, Raytrack Autolevel $75, 2mtr RCALD $120, Misc. W8GYS. 434 Blenheim Rd., Columbus OH 43214.

COLLINS 136B2 Noise Blanker and NTN Noise blanker antenna. Make offer. W1HEZ 7 Kirk, Springvale ME 04083.

SELL: DeVry home study course in electronics, 100 complete lessons. $40; DeVry 5 inch oscilloscope $35; Eico 324 signal generator 150 KHz to 11 MHz $25; Revere Hi-Fi tape recorder model T1100, cost $150, sell for $50; professional lineman's safety belt $7.50. No reasonable offer refused. Robinson. 6S309 Somerset, Naperville, IL 60540. Tel (312) 357-0151.

WANTED: Hammarlund HC-10- advise price and condition. Mel Dilbeck, 1523 — 18th Avenue, San Francisco CA 94122.

WANTED: to purchase locally in Southern California. HR0-60 in top condition. E. F. Coune, 122 Bob St., Monrovia CA 91016. Tel. (213) 359-7255.

FORCED Sale for new equipment. National N.C. 183 with Lakeshore signal- splitter. Lysco xmitter model 600, 50 watt, 10 thru 160, built in VFO, or crystal, $80 for rec, $45 for xmitter, or best offer. WN8UQX Sault Ste. Marie MI 49783.

WANTED: Collins CV591-A Single side band converter to use on Collins 51J-4 or R390-A. W. Pierce R.D. 1, Elverson PA 19520.

RTTY — Model 19 set up; including Page Printer, TD, re perforator, table, paper, power supply — works good $150. Mike Alfred WN6CIK P.O. Box 15363 San Diego CA 92115. Eves. phone (714) 287-9684.

SELL: RCA CMCT-30 2 meter FM XCVR w/specs. Homebrew TV w/afsk, relay racks, magnecord tape playback deck 15" reels No. 816CK rack mount. WA2DGU, 322 Broughton Ave, Bloomfield NJ 07003.

FOR SALE: Collins 312-B-5 station control-speaker-phone patch-VFO. New, never used. Cost $635. Make an offer. K8JGS. 3020 Duke St., Kalamazoo, MI 49008. Phone (616) 345-0801.

SSB/CW/RTTY station: Heath HX-10, RX-1 and TR switch, in good condition, $320. Rick Bourgeois, WA5EVH, Box 2746, Lafayette LA 70501.

HW-7 transceiver with earphones - $55. HD-1410 electronic keyer, mint, — $65. All cables & books. You ship. WA5JUL, 1524 N. Craycroft, Tucson AZ 85712. (602) 296-2755.

NEW Hustler mobile foldover mast, KW coils 15, 20 meters, fender mount — $30; Sea 866A — $15.; 2ea 811A — $10.; Heath GD1A grid dipper — $15.; Waters compreamp 359 — $15.; Bi Balun — $5.; Heath HM102 — $30.; HyGain 203B (Houston pickup) — $50; K5MWZ Box 16099, Ft Worth TX 76133.

"DON and Bob" new guaranteed buys, CDE HAM-2 117.00; Belden 8448 rotor cable 13c/ft; CD44 89.95; Hygain TH6DXX 192.00; Mosley classic 33 179.00; 18HT Hytower, 208.00; KLM 20M, 40M big sticks, write prices, Belden 8214 RG8FOAM coax 23c/ft; 8237 RG8 19c/ft; RG62B/U 10c/ft; coming; Telstar 1500 watt digital wattmeter 99.95; CDE .001/10KV doorknob cap 1.95; 22GA/7STD Phosbronze 2.50/1000ft; quote TS520, Atlas 210X. Midland 13505 2MFM-30W 250.00; write needs on items not listed, Collins. Prices FOB Houston. Good until FEB 1. Madison Electronics, 1508 McKinney, Houston TX 77002. (713)224-2668. Nite (713) 497-5683.

WANT pre-1925 Marconi, DeForest, Grebe or similar radio gear or parts, Spark gear, loose couplers, crystal sets. Also Atwater Kent breadboards and breadboard parts. Advise condition and price. Mike White, 118 Countryview Drive, Naperville IL 60540.

COLLINS CP-1 crystal package for complete frequency coverage with 75S-3C or KWM-2A, $200. Collins F455FA-40 4.0 kHz AM filter for 75S-3B/C, $50. Jim Jorgensen, 5319 Blodgett Ave., Downers Grove IL 60515. (312) 852-4704.

WANTED: Used HRO 500 and L.F. 10. H. Mills WA3ECE/5. 5667-1 Large St. FT Hood TX 76544. (817) 532-5249.

OLD Radio magazines, Radio Broadcast, Popular Radio, Electronics Engr., Electrical Communication, Bell Lab Record, QST, "73" write. Jacques Kurtz, 642 East 23 St., Brooklyn NY 11210.

WANTED: HA-14 and HP-14; WB5FXI.

SELL or trade Motorola HT 200 Motorola page boy and chargers. ST-6 terminal unit. Heath SB-614 Monitor scope Heath Labratory scope model 10-12 Hickok color bar dot generator, Heath 8 channel R/C two receivers 8 servos two frequencies. K9MWA. 609 Henrietta, Gillespie IL 62033. (217) 839-3481.

HAMMARLUND SP-600 W/cabinet $225. Lampkin *105B frequency meter with UHF adapter* $175. Regency DR-200 Hi-Lo Monitoradio $75. Hallicrafters SX-122A $250. All in excellent condition. P. Darby, WA5EIV, 608 Nursery Ave., Metairie LA 70005.

WANTED:SP 600-JX, SG-3/U, AN/URM-25, TS-588A/U TS-173/U, TS-174B/U TS-723/U. Please give your lowest price. John Waskowitz 35-30 73rd St. Flushing NY 11372.

SELL: Hallicrafters SSB/CW Transceiver model FPM 300 MKII w/microphone $400. Brand new - never been used - lost interest in ham Donna Davis, 312 Cataract, Waterloo IA 50702. (319) 232-6679.

WANTED: Swan mobile antenna model 55. Must be in excellent condition. Quote price to L. K. Barnett; WB4RFZ; P.O. Box 364; Decatur AL 35601.

WANTED: Hy-Gain Model 400 Roto-Brake Antenna Rotators. Tower-mounted rotating units only or with control boxes. State condition, price, and shipping terms. M. Koss, WB9BPG, 4606 Thornleigh Drive, Indianapolis, IN 46226..

FOR SALE: Swan 250 $175., Collins mobile power supply $40., Dycom 40 watts out 10 watts in two-meter mobile amplifier $40., HW 12 and 32 with AC power supplies $100. each. W3VDA, P. O. Box 1333, Harrisburg PA 17105.

BC-221 Frequency meter, extra crystal, earphones and manual, 25 lb. shp. wt. $75. Johnson low pass filter $10. Monarch MT 200 VOM, $7.50. TV-2 tube tester, very versatile, all ranges, 45 lb. shp. wt. $75.00. Junk box $5.00. All plus shipping. Write for details. H. J. Boyd 14 Live Oak Road, Hilton Head Island SC 29928. WB4GRL.

SALE: New Ten Tec KR-50 keyer $75. Unique wire tuner $40., Drake MN4 ant. tuner $40. No phone calls, shipping extra. Douglas Frick, 6 W. 9th Street, Pottstown, PA 19464.

SELL: HR-10; $55. + UPS, Wayne Scott, Minden NE 68959.

FREQUENCY meter, AN/URM-32, 125 kHz to 100 MHz in three ranges, With original calibration book and 60-cycle, 117 V. power. $125. W6BKY, Box 1633, Palo Alto CA 94302.

FOR SALE: SB-102 with 400 Hz filter, HP-23B power supply and SB-600 speaker. 9 months old, Heath aligned, excellent condx, free shipping; $435. Larry WB2NEL, 4259 Bedford Ave. Brooklyn NY 11229.

SELL: Drake ML-2, 2M FM. Absolute mint condition! Xtals for 9 channels. Complete — $219. WA3CUQ, 337 E. Main St., Kutztown PA 19530.

WANTED: Heath HO-10 monitor scope and HO13 scanalyzer. Send cost state condition. Conrad Herold. 2211 E. Ridge Rd., Beloit, WI 53511.

GROUNDED grid filament chokes 30 amp — $5; plate chokes 800 mA $4; 2 amp — $6; PPUSA48, William Deane, 8831 Soverign Rd., San Diego CA 92123.

HEATHKIT HW-16 transceiver, HG-10B VFO. Excellent, clean. $120. Saltzberg, 9318 Edmonston Road, Greenbelt MD 20770.

BUY-Sell-Trade. Write for free mailer. Give name address and call letters. Complete stock of major brands. New and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, Etc. SSB & FM. Associated Radio 8012 Conser, Overland Park KS 66204. (913) 381-5901.

SELL Heath SB100 $275., AC supply $35. SB220 $325. SB600 $15. SB650 $100. SB630 and SB 640 $35. each as is. Waters SWR $80. Roger Paulson, Box 4, Needham MA 02192.

YAESU FT 101B for sale. Less than 40 hours air time. Mint condition, $575. Fred Johnson, Box 220, Thomasville NC 27360. (919) 475-6157.

QST's wanted: 1915 to 1928 included, all. 1937 November. QST's available: 1937 September, October. 1938 March. 1940 February. 1946 all but September. 1947 all; 1948 all but February, September. 1949 all. 1950 all but April. 1951 all but March. 1952 all. 1963 January, October. 1964 October, December. 1965 February, March, September, October, November, December. 1966 all but September. 1967 all but June, July, September, December. 1968 January, May. 1974 January, February. CQ's: 1955 February. 1960 February. 1966 April. 73's: 1962 November, December. 1963 all but December. 1936 to 1961: Radio Television, Radio News, Radio Electronics, Radio Craft. sase. odd issues $1. ea. VE2OU, 2785 Valcourt, Ste Foy, Quebec G1W1W2 Canada.

EZ-WAY RBX50G — Wonder post, crankup tiltover, heavy duty, mint $495. A Zani 131 Scottsdale Dr., Coraopolis PA 15108.

MANSON Labs frequency Synthesizer. Covers 2-34MHz in 100Hz to 12.5Hz steps. Cost new $18,000. Will sell for $2,800. Info: W5TKW, 203 West Haddock, Norman OK 73069.

FOR SALE: SB100 with HP-23A $275; SB220 $350; 18AVT/WB $40; DX-60B with VF-1 VFO $40; HR-10B $40. Wanted used tower, tri-band beam, ham-m rotator. John Merrill WA1LZV, 8 Spruce Drive, Dover NH 03820.

MINT Bargains: GLB 400B Synthesizer and Unimetrics Ultracomm 25 combo — $229. Drake R4A, T4X, MS4, AC4, Shure 444 mike, Johnson Matchbox — $599. Local only. Norm Dick, WB2EHB (212) 884-9694. 3119 Bailey Ave., Bronx NY 10463.

HALLICRAFTERS SR-2000 xcvr, P-2000 AC P.S., HA-20 remote VFO, best offer over $900. Galaxy FM-210 w/AC/DC P.S. $100. WB4OSS Terry Wells, 540 Dover Rd., Lexington, KY 40505. (606) 299-6402.

SELL: Line voltage monitor with Beckman meter, 110 to 120 VAC scale $20. Electro Voice 607 mike $25. Shure 404C mike $8. Shure 404C with low impedance carbon element $8. Hustler vertical with ten meter coil $20. Rotron miniature fan $8. Filament Transformer 6.3V 20A $10. You pay shipping on above items. WB4JXZ/6, 2200 Olive Ave No. 21, Atwater CA 95301. (209) 358-8934.

THE Ultimate QRP station. Argonaut with latest factory mods, newly aligned and perfect with Model 250 AC supply, KR-20 keyer, Turner mike and speech processor, calibrator and three-step CW filter custom-built into Ten-Tec cabinets. I've worked 87 countries and WAS with 5 watts PEP. Now you can, too. For just $335 shipped anywhere in continental U.S. Craig Roberts, WB5HKO, 411 Burgandy St., Apt. 9, New Orleans LA 70112. (504) 581-3227.

SELL: HQ170, good condition, with matching speaker and manual — $140. You pay shipping charges. J.R. Bradley, K4UUC, 3364 Dartmouth Circle, Montgomery AL 36111.

SWAN 500C — 117AX — VX2 — 508VFO Excellent condition $500. W6IDF 606 N. Hathaway Ave., Monterey Park CA 91754.

HALLICRAFTERS SR42A, stabilized HA26 VFO, MR40 mobile kit. Excellent. $75. Horace Brokaw W2ACC, RR2, Neshanic Station NJ 08853.

WANTED: Rotary inverter, input 32 volts D.C.; output 115 volts 60 Hz 200 watts or larger. K. Sorensen Box 182 Tingley IA 50863.

SELL — RTTY Cross-Type Tuning Indicator described in RTTY Handbook by Kretzman. Enclosed in cabinet. Best offer. F. Thiede W2EC & Nathan Hale Drive, Setauket NY 11733. Tel (516) 751-0473.

FOR SALE: Late 7553B, 3253, 516F2, 3128A, $1800. 51S1, $1650. 8251, $895. 75S3C, $895. 30L1, $695. 200V, $395. R390A, $595. R388, $325. 51J4 (new), $695. Kenwood (new): R599A, T599A, $825; VF0900, $150; T5520, $599. Rotators: HAM-II, $129; CD-44, $89. Mosley: TA36/CL36, $450. CX7A, 2 filters, spare tube, $1395. 2K4, $795. HT41, new tubes, $200. HA-6, P.S., $125. Q-50, $125. FPM-300, $275. NCX-3, ACDC, $195. TR6, AC4, MS4, $600. ML2, $200. Swan-140, $65. Collins: 516E1, $95; MP1, $75; 351D2 (new), $75. Craig Radio, P. O. Box 815, Portsmouth NH 03801. (207) 439-0474. (603) 436-2884 (nites).

CREI Electronics course — with hard cover binders. W5MSK, 454 Olive Drive, Slidell LA 70458.

FOR SALE: Leader LBO-505 scope with manual and probes. Mint condition. $500. Wanted: Allied AX-190. Must be working. R. Matassa, 941 Army Trail Rd., Addison IL 60101. (312) 543-2186.

WANTED: (2) Eimac chimney SK-406 for 4-250-4-400; ARRL Handbook editions 1, 2, 3, & 4; QST 1921 and earlier; sell/trade QST 1923 and later; radio 40s-50s. Sase list. WA7OVP, 85041 Sarvis Berry Ln., Eugene OR 97405.

EICO 753 xcvr. with EICO 751 AC supply $125. Eico 720 xmtr. $50. Eico 730 modulator $25. Stephen Snyder, WB8WGB, 160 Wake Robin Trail, Rolling Hills Estates, Lewisburg WV 24901. (304) 645-6664.

SELL: Drake R4 $245.00 FOB, two Amperex unused 8163/3-400Z $50, or swap for one new Eimac 8874. W6GMC, 328 Harsin Lane, Santa Maria CA 93454.

FOR SALE: HQ-170A-VHF $195, TX-62 $65, will ship. WA1PJY, Ironwood Drive, Danbury CT 06810.

GALAXY rejector cw filter. Nulls adjacent cw interference. Instructions included $20. W3DJD, 205 Elliger Ave., Fort Washington PA 19034.

COLLINS 516E1 dc mobile transceiver power supply. Excellent condition $80. QSTs pre-1924 wanted. W2HLP, Box 77, Mt. Freedom NJ 07970.

WANTED: Manuals for Hallicrafters S108, Hammarlund HQ110A. Buy or pay for copying privilege. E. L. Smith, 1715 Central, Wilmette IL 60091.

AUDIO filter, antenna coupler, 40M crystals. K4JCX, 121 Maple, Oak Ridge TN 37830.

WANTED: SB610; SB630; HM-2103; FV-400; details. Thurber, 372 Crabapple, Wright-Patterson AFB OH 45433.

MARINE FMH 299, Yaesu FT2 Auto $289. FTDX400 $395. FTDX570 $469. Herb (213) 478-3577 days.

NEED $50. Wide-band scope. W7KIZ, 1402 Craig, Moses Lake WA 98837.

SELL plate xfmr 3600-0-3600 at 1 A. with 110/220 pri. $40 fob. W0AIH, 304 W. 17th St., Grand Island NE 68801, h

WANTED: Full Collins station. Will pay $1500 cash. Bill Armstrong, W7UDR, Seattle University, Seattle WA 98122.

SELL — Rf speech processor for T4XB, T4X, or T4. Dx engineering plug-in type. Mint condition still under warranty, $100. David Schwartz, 1183 Southeast St., Amherst MA 01002.

FOR SALE: Swan 250 w/117XC power supply. Needs alignment. Best offer over $225. Hornet Tribander 500 10-15-20 w/AR22 rotor $75. C. Hollins, WB2FOE, Box 113, Bayport NY 11705.

SB104, HP1144, filter, SB634. Mint. $695. WB5FQV, (504) 866-3406.

MOVING to Montreal? 3 bedroom bungalow with elaborate antenna farm 12 miles from downtown, $40,000. Mel Martin, VE2AHI (514) 691-6656.

KENWOOD R-599 receiver with internal VHF converters, T-599 200w transmitter, S-599 speaker, all for $500. Heath HW-202 2 meter transceiver with tone burst $200, HA-202 40 watt 2 meter FM amplifier $60. Clegg 011 12v 6.5 amp supply $50. All mint and with manuals. Martin Barrack, WB4JUK, 200 S. Lincoln Avenue, Sterling VA 22170.

SELL: Heath SB401 $225; Eimac 68A w/1070 AC & DC PS $125. All excellent w/manuals. Jim Locke, W6VRG, 2544 Pleasant Hill Road, Sebastopol CA 95472. (707) 823-2565.

FOR SALE: HW 202 with 94, 22/82 25/85 28/88 perfect $150; Drake 2B excellent just realigned $150; Hallicrafters HT 37 perfect $150 you ship. WA9WGT (715) 748-4006 evenings.

TEMPO FMH handi talkie, tone pad, 5 sets local *crystals, ac/charger, rubber whip, nicads, case,* excellent condition $275. Call (203) 529-8665. Kellersman, MDS, 433 Silas Deane Highway, Wethersfield CT 06109.

PROP pitch motor — 9576.1 ratio, $45, local pick-up. WA2BSX (518) 783-7492.

CRYSTALS-Air-1st-cl: Novice, active FT-243, all frequencies, minimum five 40M, 14M, 10M 99c each, 80M $1.85. Less than five $1.50, 80M $1.95. Novice band — Edge Marker — QSO combination package, 80M, 40M, 15M, 10M — four bands, eight crystals — EBM-QSO-8 — $9.95. Same less 10M pair — EBM-QSO-6 — $7.95. Both Novice packages for QSO just inside Hi-Lo band edges and calibration of receiver or VFO. Novice — 7030, 3500, 3750 — $4.95. 160M FT-243 pins $2.95, four for $9.80. Sockets 25c. 1st-cl-Air 20c/crystal. Bob Woods, W@LPS. "Crystals Since 1933." Free listings 160M-2M. C-W Crystals, Marshfield MO 65706.

WANTED: Hallicrafter HA-1 T-O-Keyer, also Vibroplex for keyer. Mint condition. Priced reasonable. Elwood Brewster, Grafton NH 03240. Phone (603) 523-4558.

WANTED: T-4XC with AC4. Harvey Johnson, Milton WI 53563.

(2) Johnson 220-225 MHz. FM transceivers, 6 channels w/xtals for 223.500 $135 each. WB@MPE, 1440 Lakeview Ave., Minneapolis MN 55416.

METERS, tubes, QSTs, test etc. gear. New & antique items, must sell. Lists for sase. Joe Harms, W4BLQ, Box 158, Edgewater FL 32032.

WANTED: KWM-2; 30L1 also SB102; SB200. Give S.N., condx, price 1st letter. C. A. Harrow, 2081 SE 19 Ave, Pompano Bch FL 33062. (305) 941-5231.

4CX250K tubes new in sealed containers for sale $25. each or will trade. Wanted 8874 tubes and used Bird 43 wattmeter. Ron Allen, WA1NGR (203) 345-4382.

NOVICES: Excellent Heathkit DX60B, HG10B, HR10B w/cal, SB-600, manuals, accessories. All for $180. Contact WA1VIU, Barry Jacobson. (516) 538-0268 or 472 Susan Court, West Hempstead NY 11552.

ITC 2000 w/LSB & PL, TS520 (new), HAM II, 2-DX120 antennas, HP (type) 410B, Polarad SA84 10 MHz-40 GHz spectrum analyzer, R390A, S.S. 2m repeater plus much more. Retiring fm ham radio. No trades. Sase for list — WA9JWN, (312) 747-5725.

HOSS-Trader, Ed says "We refuse to be undersold: If you didn't buy it from the HOSS you paid too much. Shop around for the best price then telephone the Hoss last." New Atlas 210 transceiver, $519.00 Demo TR4-C, $490. New Display SWAN 700-CX, $539. Demo T4XC, $469; Demo HR-2B, $179; New ICOM demonstrator, $419. Model 230; New Rohn 50 Ft. Foldover Tower Prepaid $359. Demo HAM-2 rotator, $116.95; New Display Atlas 210-X, $539.95; HOSS-Trader, Specials — TR-4, $395; R4-C, $429; New Heathkit SB-303 receiver, $295; New Collins at OLD prices, factory sealed: make offer. Moory Electronics Company, P. O. Box 506, DeWitt Arkansas 72042. Tel: (501) 946-2820.

ABSOLUTELY mint Heath SB-220 linear amplifier for sale. Thirty minutes air time. Priced to sell — $350. George Reid, WA8UZI, 3011 Darlington Rd., Toledo OH 43606. (419) 536-5209.

WANTED for personal collection telephone, telegraph, audio, and radio sets, components, books, magazines artifacts pre 1930. Will Nangle, 761 No. 29th St., Milwaukee WI 53208.

QST from 1927. Will sell by volume or by year. Set broken. HW101, power supply, and mike. $300.00, excellent. WN4JQY, 601T. Pecan Dr., Martinez GA 30907.

SELL: Heath HW-16, HG10-B0VFO, ex. new cond. $125. WN2UAK, 6 Lenape Trail, Chatham NJ 07928.

RAK/RAL shipboard receivers WWII 15-600 kHz. Also 500-2100 kHz. Also large assortment 30 year old electron tubes. W3AW, 9406 Evans, Philadelphia PA 19115.

ANTENNAS: Dipole, multiple band arrays. 15 thru 75 meters from $59.50. Mobile antennas — CB, 20M, 40M and 2 M from $19.50. Baluns: 1:1 and 4:1 — $12.95 ea. Data available. Savoy Electronics, Inc., P. O. Box 5727, Ft. Lauderdale FL 33310.

COMPUTER hobbyists! Bargain hunt or sell via On-Line. 18 issues/year — $3.75. Free sample issue from: On-Line, 24695 Santa Cruz Hwy., Los Gatos CA 95030.

THE North End Radio Club of St. Paul, Minnesota, would appreciate any donations of equipment, as the club has just been started. Please call (612) 488-4872.

AFSK-1 "simple AFSK keyer" kit from Ham Radio August 1975 by Bill King. W2LTJ G-10 board and components $16.95 postpaid. Varco Devices, Drawer 8, Stirling NJ 07980.

BAUDOT to ASCII converter kits for $59. Perfect for the SWTP video display. At last video RTTY for minimum cost! Walters Ind., Box 563, Oak Harbor WA 98217.

CLOSEOUT — Original Petit MT-5 Morse to RTTY translator now available at huge savings. Semi-kit $95, several available A&T for $380. SASE for details. Walters Ind., Box 563, Oak Harbor WA 98277.

MICROWAVE, RF, audio text equipment. Bargain prices. Free catalog. ALR Electronics, P' O' Box 706, Flushing NY 11352.

SURPLUS telephones — standard commercial modern dial desk phones. Excellent condition. Cost $30.00 — extension for ham shack or bedroom. Special to hams $5.95 prepaid U.S.A. only. Surplus Center, Box 82209, Lincoln NE 68501.

WORRY-warts, beginners: 24 pages of tips covering General theory, code, taking the exam. $1.25. If I did you can. WB@PTM, 516 9th Ave., Brookings SD 57006.

YOUR call sign custom routed into natural 5/8"X 5-3/4" X 20" redwood. Choice black or white lettering. One side $7.50. Both $12.50 ppd. Tony Vitolo, 1967 Tanglewood Drive, Snellville GA 30278. Other sizes on request.

IMMEDIATELY available several Collins 75S3c receivers in factory cartons. Regularly $1,200.00, now $995.00 each. Hammarlund HQ215 solid state Hamband: general coverage receiver mint at $325.00. Send self addressed stamped envelope for large list of used gear go: HCJ Electronics, 8214 E. Sprague, Spokane WA 99208. Phone (509) 924-2343.

SELLING complete Heath station, SB-303 with optional am-cw filters, $350, SB-401 with optional crystal pack, $325; SB-600, $15; SB-610, $85; SB-620, $120; SB-630, $100; SB-650, $150. All units rarely used, flawless condition. Arnold Chase, WA1RYZ, 96 High Ridge Rd., West Hartford CT 06117. (203) 523-0281.

EAST Cars net membership is only $3.00 yearly. Join us. K3FEC, 10103 Ashwood Dr., Kensington MD 20795.

LICENSING Classes for all Amateur FCC grades beginning January 17 at Hall of Science including special solid state electronics course. Write Box 1032, Flushing NY 11352 or Call (212) 699-9400 for information.

R390 Receiver in excellent shape with manual, $375. Ron W6GXK 129 Club Drive San Carlos CA 94070.

CHEAP, but complete — SB-100, HP-23, HP13A all fine condition. $350. John WB9GWO/6, 385 Auburn Wy, San Jose CA 95129. (408) 244-2367.

RF CONNECTORS, PL259 or SO239, five for $3.50 postpaid. Free catalog Coakit Box 101-B Dumont NJ 07628.

DRAKE 2C, 2CQ, xtal calibrator, manual, for sale. $160 FOB. All perfect; college expenses. Al Vazquez, Caltech 1-62, Pasadena CA 91126.

SELL: Archer 6 position antenna switch, HW-16, Brass pounder key, CW-crystals. Tony Masi WN2UNK RD No. 1 Box 398 Bainbridge, NY 13733. $140. takes all. Will pay shipping.

KENWOOD — T-599A, R-599A $800. Perfect. Clegg 27-B $250. Neves (415) 325-1873.

VTVM. B & K Dynascan Model 177 worth $109.95 new. Goes to highest bidder. Mint condition. Cables and manual included. I ship insured. Steve Crowley, 2900 Forest Avenue, Des Moines, IA 50311.

COLLINS CP-1 crystal pack new $450. 516E-1 12V power supply, used, $100. 351D-2 mobile mount, new, $200. Bill Jay, RFD 3, Box 261A, Douglasville GA 30134. Phone (404) 942-3192 evenings.

WANTED: Johnson KW matchbox with bridge. Preston Smith K6RGO, 1317 Tularosa Dr No. 1, Los Angeles, CA 90026 (213) 660-3668.

WANTED: Heath AT-1. Must be in mint condition with original manual. K4GBL (912) 883-7373.

WANTED Radio Telegraphers to join original Morse Telegraph Club. Enjoy quarterly news Dots and Dashes. Help preserve both radio and Morse telegraphy. C D Combs 712 South 49th St, Lincoln Nebr 68510.

SELL: Johnson KW matchbox w/swr $175; DX-100 $60; and HW 101 and HP 23 w/manuals $290, you pay shipping. WA9DLB, 925 - 2nd Ave. N.W., Jamestown ND 58401.

HEATHKITS professionally assembled, s.a.s.e. for quote. Parrish, 306 W. Amherst, Melbourne FL 32901.

LASERS — spectra-physics model 112 gas laser, with spare plasma tube, needs new mirrors, $400 F.O.B.; also 2 ruby rods; Dumont TC-100 CCTV camera without lens, $80. all for sale. J.M. Carr, Box 16291, Baton Rouge LA 70803. (504) 387-1717.

SWAN 250 - mint 6-meter free P.S. $245. HW-29A Sixer with mobile supply. 2 meter Galaxy 210 $130. with crystals. Wood 120 Noble Ave, Roanoke VA 24012.

FACTORY — Aligned GLB channelizer, HW202. WA9QDZ.

BC610 HV power supply. Good condition. Best offer K31PQ (215) 357-6548.

SELL: Hallicrafters Xmtr HT-44 with PS-150 — $175. Hallicrafters receiver SX-117 with speaker $165, SB-200 linear $195.00. All good condx. K2TSB 39 Vivian Court, Howell, NJ 07731. (201) 458-3855.

YAESU FT-101B for sale. Purchased in February 1975 in Tokyo. No English manual. Mint Condx. CW filter. AC-DC operation. Unused finals. $480. WB2ZRQ/JA1ANE M. Tsukamoto 42-55 Colden St., 12M, Flushing NY 11355.

SR-400 Cyclone II with Swan 117 P.S. both excellent condition — $500. Joel Levine WB2BMH (212) 683-0628.

FOR SALE: 51J-4, $1100, with 3 MFs not surplus, used little, like-new. No shipping. See to believe, R. A. Kumada P.O. Box 6794, Burbank CA 91510.

WANTED: Heath SB-102 w/p.s. and spkr, SB-200, SB-610, HN-31 Cantenna. Simmie Walker, WB5KYQ, 1410 Richmond Road, Apt. 213, Texarkana TX 75501.

FOR SALE: SX-140 good condition, Knight t-60 Line New. Perfect Novice station. $40. each, both for $75. I will ship U.P.S. Cornwell, WB2PSK, RD No. 2 Box 16A Blairstown NJ 07825.

Jobs For Hams

CAMP Counsellor Wanted to help in cabin and teach electronics. Must really enjoy working with kids. Write Killooleet, Hancock VT 05748.

COUNSELORS - Ham radio, electronics, rocketry, auto mechanics childrens camp, NE Penna. Write Corpuel, 633 Barnard Ave, Woodmere NY 11598. (516) 295-5544.

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☐ SN7438	.34	☐ SN74105	.44	☐ SN74191	1.40
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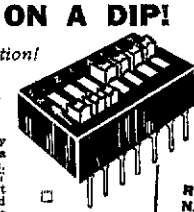

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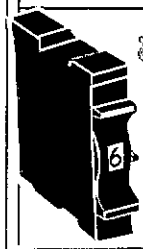

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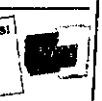

Type 219M . . . you've seen 'em at local distributors for $9. EECO Series 200 thumbwheel switch is a standard in the industry. Used by any electronic designer or experimenter. Features single pole binary coded code description: BCD 1-2-4-8, truth table E02, Black "matte" finish. Indicates 0-9. Life 1-meg of detents. Electrical ratings non-switching 3 amps. Connections goldplated on G-10 board, with markings 1, 2, 4, 8 and C. Back of panel mtg. 2 x 1.8 x 0.6".

IT'S NEW! "TO-5" MICRO MINI 0-8 ROTARY SWITCH

- TO-5 Transistor Case!
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IMAGINE! 8 DIFFERENT ROTARY CIRCUITS IN 1/4 x 5/16" Space

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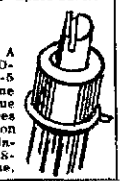
We introduced our customers to "7 Switches On A DIP", and now . . . for the 1st time anywhere A MICRO-MINIATURE ROTARY SWITCH shaped like a TO-5 transistor case. That's right! . . . TO-5 case! Imagine 8 different rotary circuits in 1/4 x 5/16" space (a true space saver). 8 pins gold plated! Use for P.C. Features 0-to-8, 45° angle, 0.05" screwdriver adjust shaft on top of case, breakdown voltage 500, 1/2-Meg. insulation resistance. By CHICAGO SWITCH, Type 30-8-08-005. It's the most unusual switch for micro-circuit use.



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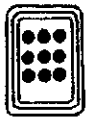

This unit is not advertised anywhere! Made for Motorola Communications at the original cost of $4.50 each (for insertion in their Walkie Talkie Program). It's a 60-ohm imp MIKE. It's an excellent speaker too, covering broad range in sound. Extremely well-made.

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- Positive Voltage

$1.75 Each

Buy 3 — Take 10%

Type	Volts
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☐ LM-340-08T	8 v.
☐ LM-340-12T	12 v.
☐ LM-340-15T	15 v.
☐ LM-340-18T	18 v.
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Micro (Axial) MV-50 style
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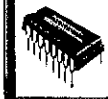
PROGRAMMABLE TIMER DELAYS UP TO 5 DAYS



XR-2240 14-pin DIP Consists of a self-contained 8-bit programmable binary counter, oscillator, and controlled flip-flop. 4V to 15V supply. Temp. and power supply stability outperforms all others. Power only 12 mW. @ 4V. Programmable capability 255 steps, 8 separate outputs, one for each counter.

☐ **$4.95**

MICROPROCESSORS! ROMS! RAMS! MEMORIES!

☐	8008 Microprocessor	$29.95
☐	8080 Super 8008	150.00
☐	2102 1024 Static RAM	3.95
☐	1101 256 bit RAM	1.50
☐	1103 1024 bit RAM	2.95
☐	MM5260 1024 RAM	2.95
☐	MM5262 2048 bit RAM	6.50
☐	2513 Character generator	12.50
☐	MM5203Q Erasable PROM	14.95
☐	MM5202Q Erasable PROM	14.95
☐	1702A Erasable PROM	19.95
☐	8223 Programmable ROM	2.95

"BEEPER" AND "DATER" CLOCK ON THE CHIPS

☐ MK50250 BEEPER

$8.50

Imagine a chip (MK50250) "Beepin" and audible alarm! All others are external. It also features internal brightness control. The CT7001 requires external triggering of alarm, date of the month and direct drive to LED readouts. Both require minimum current drain and voltages, for either 4 to 6 LED readouts, 12 or 24 hours, AM and PM.

☐ CT7001 Alarm and Date. . . . $6.95

TELE TYPE CHIPS

☐	COM2502	UART, 40 pin	$12.50
☐	COM2601	USRT, 40 pin	24.00
☐	KR-2376ST	Keyboard encoder ROM	12.50
☐	NMX-5010	10 channel multiplex	9.95

7-SEGMENT READOUT SALE!

- Up to 20 mils per seg. at 5V.
- All fit into 14-pin IC socket.

	Type	Size	Color	Sale	2 for
☐	MAN-1	.27	Red	$2.50	$4.00
☐	MAN-3MA	.12	Red	.69	2.00
☐	MAN-4AB	.27	Red	1.95	3.00
☐	MAN-5	.27	Green	1.50	4.00
☐	MAN-7	.27	Red	1.00	2.50
☐	MAN-8	.27	Yellow	1.50	4.00

ALL ABOVE BY MONSANTO

SPECTROL TYPE 43 RECTANGULAR CERMET POTS

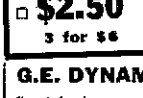
Ohms	Ohms	Ohms
☐ 10	☐ 1K	☐ 100K
☐ 20	☐ 2K	☐ 200K
☐ 50	☐ 5K	☐ 250K
☐ 100	☐ 10K	☐ 500K
☐ 200	☐ 20K	☐ 1 Meg
☐ 500	☐ 50K	☐ 2 Meg

2 for $1.00 ☐

Cermet sealed. Screw driver adjust with idling and stops. Resistance ±10 percent. ¾ watt. Size .760 x .25 x .19.

RELAY IN A DIP

IT'S NEW! GRIBSBY-BARTON REED RELAY IN A DIP PACKAGE



Type GB 521B-2

☐ **$2.50** 3 for $6

One of the special outstanding new buys of 1976 for you hobbyists looking for something different in relays. Designed so that you can insert in standard 14-pin IC socket. Rated at 5 volts @ 150 ohm coil, SPST NC contacts. Designed to work with integrated circuits. Max. IC rating 100 mils, breakdown voltage 100 VDC. Needs 1 volt to break circuit. With built-in coil suppression diode.

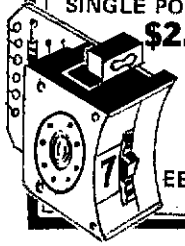
LITRONIX "JUMBO'S"

- Singles size: 1 x 3/4 x 5/16
- Duals size: .8 x .9 x .29
- 7-Segment, 25-mils per segment

	Type	Size	Color	Sale	3 for
☐	721D	.5	Red	$5.95	$15.00
☐	727E	.5	Red	5.95	15.00
☐	746F	.6	Red	3.95	11.00
☐	747	.6	Red	3.95	11.00

D—Plus or Minus 1 plus a digit (1½ digits)
E—Dualdigits
F—Plus or Minus 1

SINGLE POLE BINARY THUMBWHEEL SWITCHES



$2.50 3 for $6. * With diode compliment * Code BCO 1-2-4 * 8 Position

Economy purchase of these most-popular maker of thumbwheel switches . . . EECO! Now enables unique switch seekers to obtain this rare item at tremendous savings. Greater than 1 meg detents. 3 amp non-switch contact rating. Hi-impact black matte case. G-10 glass epoxy circuit board in rear. Easy-to-read large white numerals against black background. Switch size 1.36 x 0.8". Removed from new equipment. Looks like new. Distributor unit price $9

EECO
☐ Type 808M—3 diodes, Truth Table BO1
☐ Type 809M—6 diodes, Truth Table CO1
☐ Type 879M—no diode Truth Table C11

KEYBOARD KIT ☐ $4.95

Touch Tone

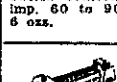
Kit includes 4 x 2½" G-10 glass etched pc board, with 10 OAK "smooth touch" white keys with black numerals, plus diagram on "touch tone encoder". Large many "keyboard systems" readily available. *0-to-9*

G.E. DYNAMIC MIKE

Crystal clear response for all types of ham, audio eqpt. Size only 2¼ x 1½ x ⅞". Gray impact case. ON-OFF switch. With multi position stand, 6-ft. of cable for plug and external switch control. 50K ohms imp. 60 to 9000 hz. Wt. 6 ozs.

☐ **$2.50** 3 for $6.00

MINI REED RELAY



Only $1

For PC board and micro circuitry 24VDC SPST normally opened cont. at 5.5 mils, 2500 coil. Relay closes at 14VDC. 1 x ⅜ x ¾".

Terms: add postage **Rated:** net 30
Phone Orders: Wakefield, Mass. (617) 245-3829
Retail: 16-18 Del Carmine St., Wakefield, Mass. (off Water Street) C.O.D.'S MAY BE PHONED

☐ 20c CATALOG Fiber Optics, "ICs", Semi's, Parts

MINIMUM ORDER — $4.00

POLY PAKS

P.O. BOX 942M LYNNFIELD, MASS. 01940

NEWS BULLETIN

In the Spirit of '76

HAPPY NEW YEAR & HAPPY NEW GEAR

DEAR OM: HAPPY BIRTHDAY!! We finally made it!! Nearly two-hundred years have now come and gone since this great nation of ours was founded upon the lofty principles of "LIFE, LIBERTY, and THE PURSUIT OF HAPPINESS!"

Now, granted, ol' George and Benjamin, along with the rest of their compatriots, may not exactly have had HAM RADIO in mind when they drafted their "DECLARATION OF INDEPENDENCE" — but who (at this late date) can question their interpretation of the "BILL OF RIGHTS" which, among other things, guarantees the right of "FREE SPEECH!"

It may well have been that, in their unfailing wisdom, they foresaw the advent of HAM RADIO and the need of thousands of AMERICANS from all walks of life to "Get-on-the-Air" and work a little DX, chase a satellite, or "Rag-Chew" with the boys! Without a doubt, General George would have had a much easier time of it — crossing the Delaware — had he been equipped with 2-Meter FM!!

Whatever their intent, the fact remains that today we are a "FREE" people — free to make our own choices, our own decisions. And, when it comes to making decisions about buying new (or used) ham radio equipment, we feel that it is worth-your-while to hear the GOOD NEWS about BURGHARDT AMATEUR CENTER in Watertown, South Dakota — of all places!!

"We, the people . . ." at BURGHARDT AMATEUR CENTER believe there are TWO IMPORTANT FACTORS in any purchase of ham radio equipment — the PRODUCT and the DEALER — or, in otherwords, what you buy & where or from whom you buy it. We stock & sell and guarantee & SERVICE virtually every major quality product in the ham radio field today, but it's not so much WHAT we sell — rather HOW we sell it that's worth your consideration when you're in the market for a new or used piece of ham gear.

When you deal with us, you ALWAYS receive our PROMPT, PERSONAL ATTENTION and INDIVIDUAL CONCERN — every letter or phone call puts you in INSTANT TOUCH with someone who can give your order or inquiry his undivided attention. We approach each & every transaction with a fresh frame of mind, and you'll always find us ready to COOPERATE with you to the limit!!

When it comes to FAST DELIVERY, HONEST DEALING and DEPENDABLE SERVICE, we don't just advertise it — we GIVE IT!! We do not pretend to be "Big Operators" or "Wheeler-Dealers" — but choose instead to offer FRIENDSHIP, PERSONAL SERVICE and RELIABILITY to those who realize that there is more to a GOOD DEAL than just the "lowest price" — that in the final analysis, the reputation of the dealer standing behind their purchase is worth as much or more than the quality of the product itself.

In future issues of QST, we'll no doubt be advertising at times SPECIFIC products, which we feel will be of interest to you. But, we want you to BE AWARE of our MOST PRECIOUS COMMODITY — which is, ourselves, our policies, our terms, our guarantees and our services. These, along with your CONFIDENCE, are our MOST important assets, and in terms of dollars & cents will NEVER be discounted!!

In closing, we'd like to take this opportunity to extend you our best wishes for a truly "HAPPY & HEALTHY NEW YEAR" in 1976. To those who have patronized us over the past 38 plus years, our sincerest "THANKS" for giving us the chance to serve you. We hope our efforts have made your hobby both an enjoyable & satisfying one, and we look forward to hearing from you again soon, along with those who have yet to "TRY US!"

Finally, while we all take a few moments from our busy work schedules & daily routines during the course of this proud BICENTENNIAL YEAR we now celebrate in commemoration of the heroic deeds & unselfish valor of our forefathers, let us be ever-mindful & thankful that their "SPIRIT OF '76" which led them through innumerable hardships and costly sacrifices is still AMERICA today!!

WE'RE FOR REAL!!
There's No Doubt About It!

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WRITE TODAY FOR OUR LATEST BULLETIN/USED EQUIPMENT LIST!!

1976 Bicentennial Calls

BICENTENNIAL CALL SIGN PREFIX EXCHANGE

In celebration of the U.S. Bicentennial, the Federal Communications Commission is permitting the use of special prefixes on a voluntary basis by its amateur licensees from 0500 UTC January 1, 1976, to 0500 UTC January 1, 1977. No special approval is required. The following tables are designed to make it easy to determine what prefix you should use (left columns) and what prefix a Bicentennial station you hear usually uses (right columns). Those "K" prefixes not listed, such as KG4 and KZ5, are not under FCC jurisdiction. Plans for special prefixes for those locations were unknown at press time.

Call Sign Prefixes Within Contiguous U.S.

Existing	Bicentennial	Bicentennial	Existing
W	AC	AA	WA
K	AD	AB	WB
WA	AA	AC	W
WB	AB	AD	K
WD	AE	AE	WD
WN	AK	AF	WR
WR	AF	AK	WN

Call Sign Prefixes Outside Contiguous U.S.

Existing	Bicentennial	Bicentennial	Existing
KB6	AG2	AG1	WW6
KC4[1]	AL4	AG2	KB6
KG6[2]	AG6	AG3	WB6[3]
KH6	AH6	AG5	WG6
KJ6	AJ7	AG6	KG6[2]
KL7	AL7	AG7	KW6
KM6	AH7	AH1	WH6
KP4	AJ4	AH2	WM6
KP6	AIø	AH3	KS6
KS4	AH4	AH4	KS4
KS6	AH3	AH5	WS6
KV4	AJ3	AH6	KH6
KW6	AG7	AH7	KM6
WB6	AG3	AIø	KP6
WG6	AG5	AJ1	WJ6
WH6	AH1	AJ2	WV4
WJ6	AJ1	AJ3	KV4
WL7	AL1	AJ4	KP4
WM6	AH2	AJ7	KJ6
WP4	AJ8	AJ8	WP4
WS6	AH5	AL1	WL7
WV4	AJ2	AL4	KC4[1]
WW6	AG1	AL7	KL7

[1] Navassa Is., NOT Antarctica.
[2] Guam only, NOT the other Mariana Is.
[3] Novices on Baker, Canton, Enderbury, Howland Is., NOT California (other "W" prefixes in this table are also Novice stations.)

U.S. Amateur Frequency and Mode Allocations (Revised as of Nov. 14,1975)

TEAR OUT

BANDWIDTH LIMITATIONS

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz and between 50.1 and 52.5 MHz the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

RTTY: When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

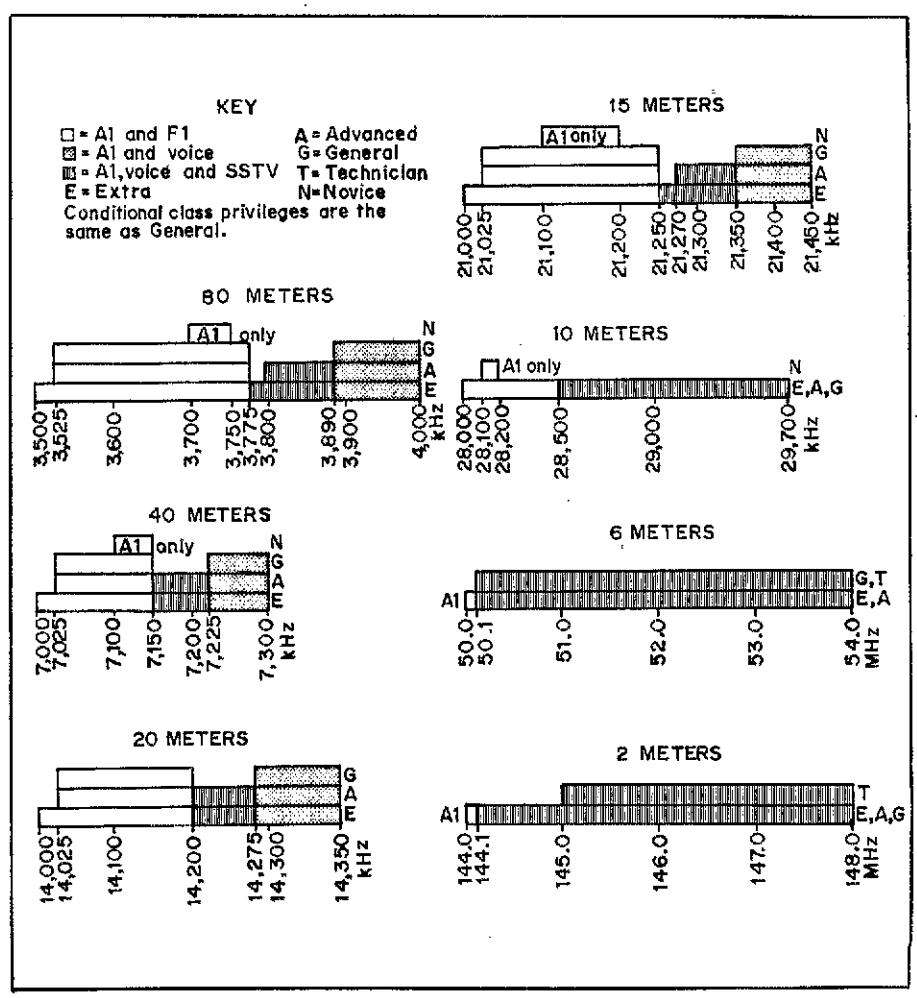
ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate sub-bands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 220 and 420 MHz bands. For details, and for information on specialized modes, see ARRL License Manual. For information on repeaters, see License Manual and Repeater Directory.

160 METERS: Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see License Manual or request form S15A from ARRL Hq.

Other — All modes except as noted
Extra, Advanced, General, Technician.

MHz	GHz(1GHz=1000MHz)
220 — 225*	10.0 — 10.5*
420 — 450*	24.0 — 24.25
1215 — 1300*	48.0 — 50.0
2300 — 2450	71.0 — 76.0
3300 — 3500	165.0 — 170.0
5650 — 5925	240.0 — 250.0
* Pulse not permitted	All above 300



MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1976

(Check QST monthly for updates.)

JANUARY

1 Straight Key Night
3-4 VHF SS
6 West Coast Qualifying Run
8-11 *SAROC (Las Vegas, NV)*
10-12 CD Party, cw
12 W1AW Qualifying Run
17-19 CD Party, phone
24-25 Simulated Emergency Test
ARRL "Tropical Hamboree" (Miami, FL)

FEBRUARY

4 West Coast Qualifying Run
7-8 DX Competition, phone
7-15 Novice Roundup
10 W1AW Qualifying Run
13-15 *Florida State Conv. (Orlando)*
14 Frequency Measuring Test
21-22 DX Competition, cw

MARCH

2 West Coast Qualifying Run
6-7 DX Competition, phone
10 W1AW Qualifying Run
20 *Michigan State Conv. (Muskegon)*
20-21 DX Competition, cw
Vero Beach Hamfest (FL)
22 W1AW Morning Qualifying Run
31 West Coast Qualifying Run

APRIL

3-5 "Open" CD Party, cw
9-11 *Southwestern Div. Conv. (Tucson, AZ)*
10-11 No. Florida Section Conv. (Jacksonville)
10-12 "Open" CD Party, phone
15 W1AW Qualifying Run
23-25 *Dayton Hamvention*
25 *Delta Div. Conv. (Jackson, MS)*
25 W1AW Special Qualifying Run

MAY

4 West Coast Qualifying Run
7 Frequency Measuring Test
10 W1AW Qualifying Run
22-23 *WNY Hamfest (Rochester)*

JUNE

2 West Coast Qualifying Run
5-6 ARRL Hamfest (Salina, KS)
11-13 *SE Div. Conv. (Atlanta)*
12-13 VHF QSO Party
15 W1AW Qualifying Run (+40 wpm)
23 W1AW Morning Qualifying Run
26-27 Field Day

JULY

2-4 *West Virginia State Conv. (Jackson's Mill)*
3 Straight Key Night
6 West Coast Qualifying Run
9-10 *Central Div. Conv. (Milwaukee, WI)*
14 W1AW Qualifying Run
16-18 *National Conv. (Denver, CO)*
24-25 ARRL Bicentennial Celebration
Atlantic Div. Conv. (Philadelphia)

AUGUST

4 West Coast Qualifying Run
7-8 *ARRL Hamfest (Concordia, KS)*
12 W1AW Qualifying Run

SEPTEMBER

3-5 *Pacific Div. Conv. (San Jose)*
Canadian Div. Conv. (Halifax)
4 Frequency Measuring Test
4-5 VHF QSO Party
7 West Coast Qualifying Run
10-12 *New England Div. Conv. (Boston)*
11-12 Melbourne, FL Hamfest
13 W1AW Qualifying Run
21 W1AW Morning Qualifying Run

OCTOBER

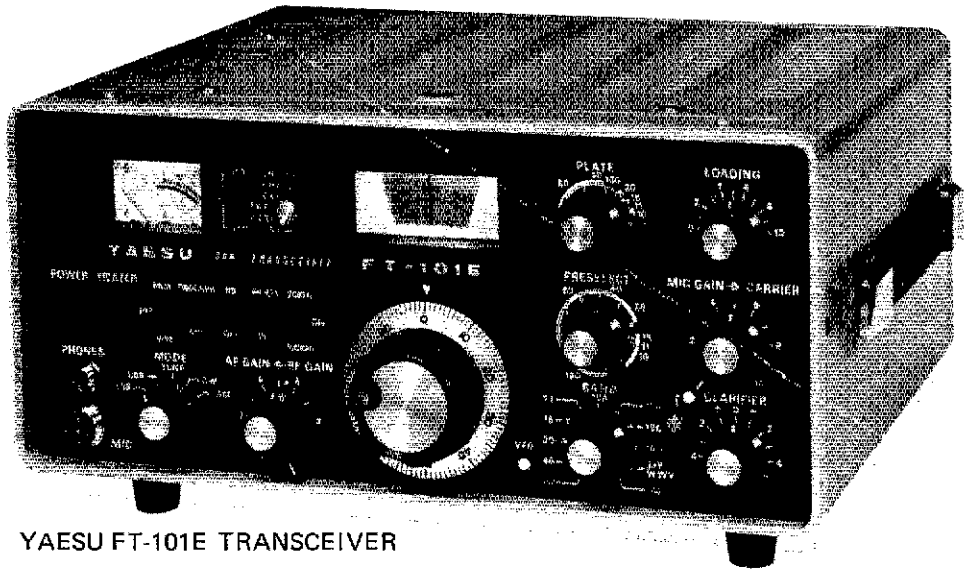
6 West Coast Qualifying Run
8-10 CD Party, phone
Midwest Div. Conv. (Omaha, NE)
12 W1AW Qualifying Run
16-18 CD Party, cw
24 W1AW Special Qualifying Run

NOVEMBER

2 West Coast Qualifying Run
5 Frequency Measuring Test
6-7 *So. Fla. Section Conv. (Clearwater)*
6-8 Sweepstakes, cw
10 W1AW Qualifying Run
13-14 *Hudson Div. Conv. (McAfee, NJ)*
20-22 Sweepstakes, phone

DECEMBER

1 West Coast Qualifying Run
4-5 160-Meter Contest
11-12 10-Meter Contest
16 W1AW Qualifying Run (+40 wpm)
29 W1AW Morning Qualifying Run
31 Straight Key Night



YAESU FT-101E TRANSCEIVER

Now, more radio

from the radio company.

Are Yaesu's FT-101's the finest all-around transceivers in the world? Yes – and now the best is even better. The new FT-101E includes a potent R. F. speech processor. Plus improved, easy-to-use lever switches. A more refined clarifier control for push-button, independent clarifier operation. There's also a 160 meter crystal included without extra charge.

And all the other features that have made the FT-101 series of transceivers among the world's most popular are still here: 260 watts SSB PEP. Globe-circling power on CW and AM. 160 to 10 meters range. 0.3uV receiving sensitivity. And one very important feature you never want to forget is the famous Yaesu warranty, strong dealer network and convenient serviceability.

If you're a serious amateur, you're always looking for more radio. And the FT-101E is just that. $749* buys you a million bucks worth of enjoyment. See your Yaesu dealer or write for our catalog. Yaesu Musen USA, Inc. 7625 E. Rosecrans, No. 29, Paramount, Calif. 90723.

YAESU

The radio.

*FT-101EE $659.
FT-101EX $599.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