QST

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May 1977 $1.50

ARRL National Convention
June 3,4,5, 1977

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- Phase lock-loop (PLL) oscillator circuit minimizes unwanted spurious responses.
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- Built-in speaker.
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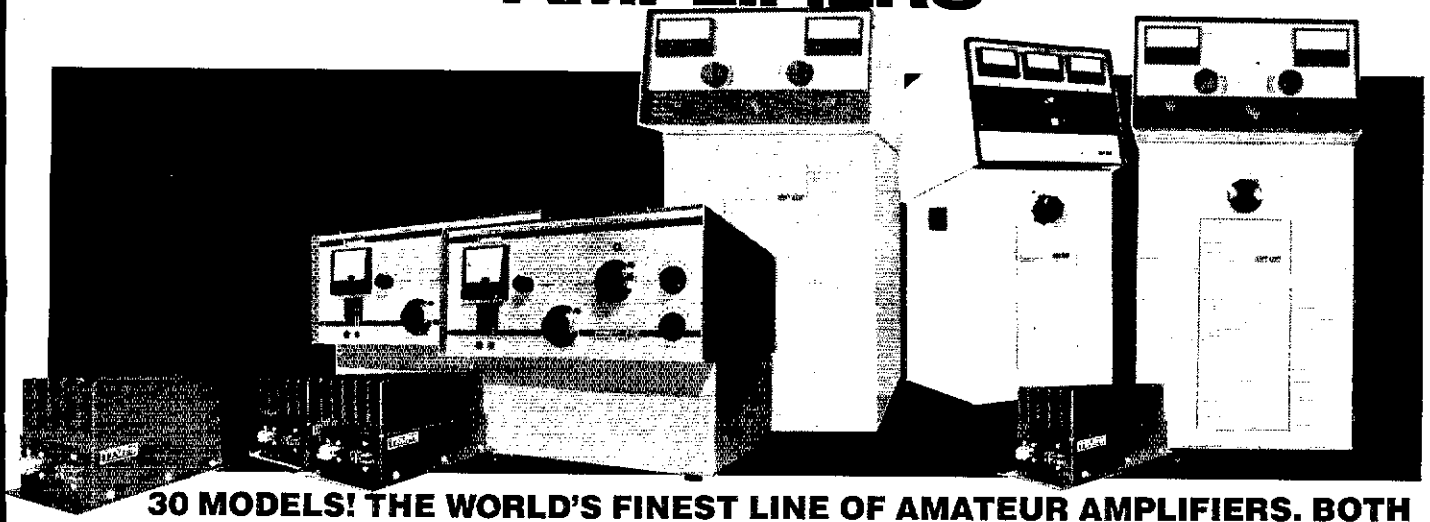

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3K-A COMMERCIAL/MILITARY AMPLIFIER
A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. It provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. 3.5-30 MHz ....$1395.

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TEMPO 6N2
The Tempo 6N2 brings the same high standards to the 6 meter and 2 meter bands. A pair of advanced design Eimac 8874 tubes provide 2,000 watts PEP input on SSB or 1,000 watts on FM or CW. The 6N2 is complete with self-contained solid state power supply, built-in blower and RF relative power indicator. ...$895.00

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The same fine specs and features as the 6N2, but for 2 meter operation only. ...$745.00

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Like the 2002, but for 6 meter operation. ...$795.00

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

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Tempo 100C30	30W	100W	$159.	Tempo 100C10	10W	100W	$149.
Tempo 100C02	2W	100W	$179.				
HIGH BAND VHF AMPLIFIERS (135 to 175 MHz)							
Tempo 130A30	30W	130W	$189.	Tempo 80A02	2W	80W	$159.
Tempo 130A10	10W	130W	$179.	Tempo 50A10	10W	50W	$ 99.
Tempo 130A02	2W	130W	$199.	Tempo 50A02	2W	50W	$119.
Tempo 80A30	30W	80W	$149.	Tempo 30A10	10W	30W	$ 69.
Tempo 80A10	10W	80W	$139.	Tempo 30A02	2W	30W	$ 89.
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Tempo 70D30	30W	70W	$210.	Tempo 40D01	1W	40W	$185.
Tempo 70D10	10W	70W	$240.	Tempo 25D02	2W	25W	$125.
Tempo 70D02	2W	70W	$270.	Tempo 10D02	2W	10W	$ 85.
Tempo 40D10	10W	40W	$145.	Tempo 10D01	1W	10W	$125.
Tempo 40D02	2W	40W	$165.	Linear UHF models also available			

TEMPO 100AL10 VHF LINEAR AMPLIFIER
Completely solid state, 144-148 MHz. Power output of 100 watts (nom.) with only 10 watts (nom.) in. Reliable and compact ...$199.00
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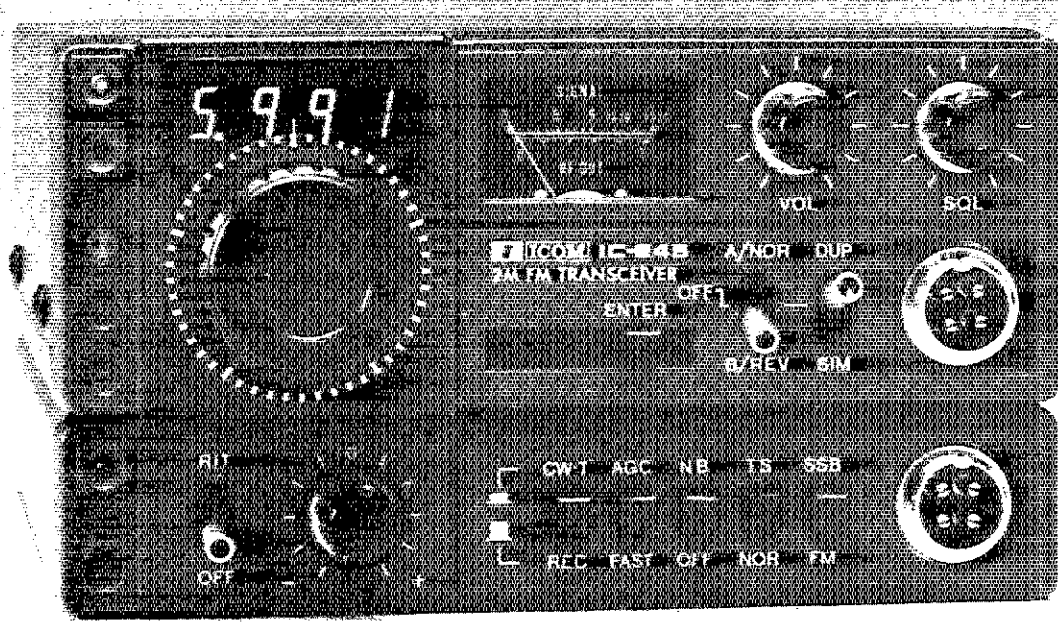

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All Mode Mobile is now yours in a superior ICOM radio that is a generation ahead of all others. The new, fully synthesized **IC-245/SSB** puts you into FM, SSB and CW operation with a very compact dash-mounted transceiver like none you've ever seen.

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- **Remote programing:** The **IC-245/SSB** LSI chip provides for the input of programing digits from a remote key pad which can be combined with Touch Tone* circuitry to provide simultaneous remote program and tone. Computer control from a PIA interface is also possible.

  * a registered trademark of AT&T.
- **FM stability on SSB and CW:** The **IC-245/SSB** synthesis of 100 Hz steps make mobile SSB as stable as FM. This extended range of operation is attracting many FM'ers who have been operating on the direct channels and have discovered SSB.

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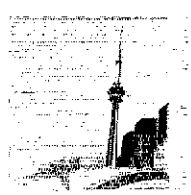
THE COVER



"Communications Between Nations" is the theme of this year's ARRL National Convention. Missed the details? Backtrack to pg. 70, April *QST*.

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Basic Radio

General

Operating

Organizational and Regulatory

Departments

DenTron amateur radio products have always been strikingly individual. This is the result, not of a compulsion to be different, but of a dedication to excellence in American craftsmanship. This dedication now extends to one of the worlds finest high performance Military amateur amplifiers.

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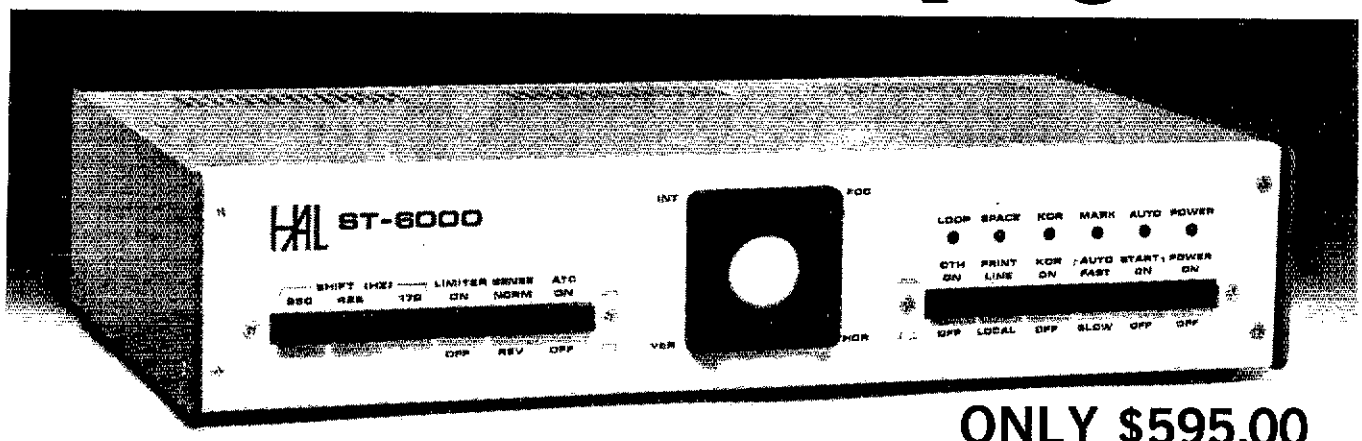
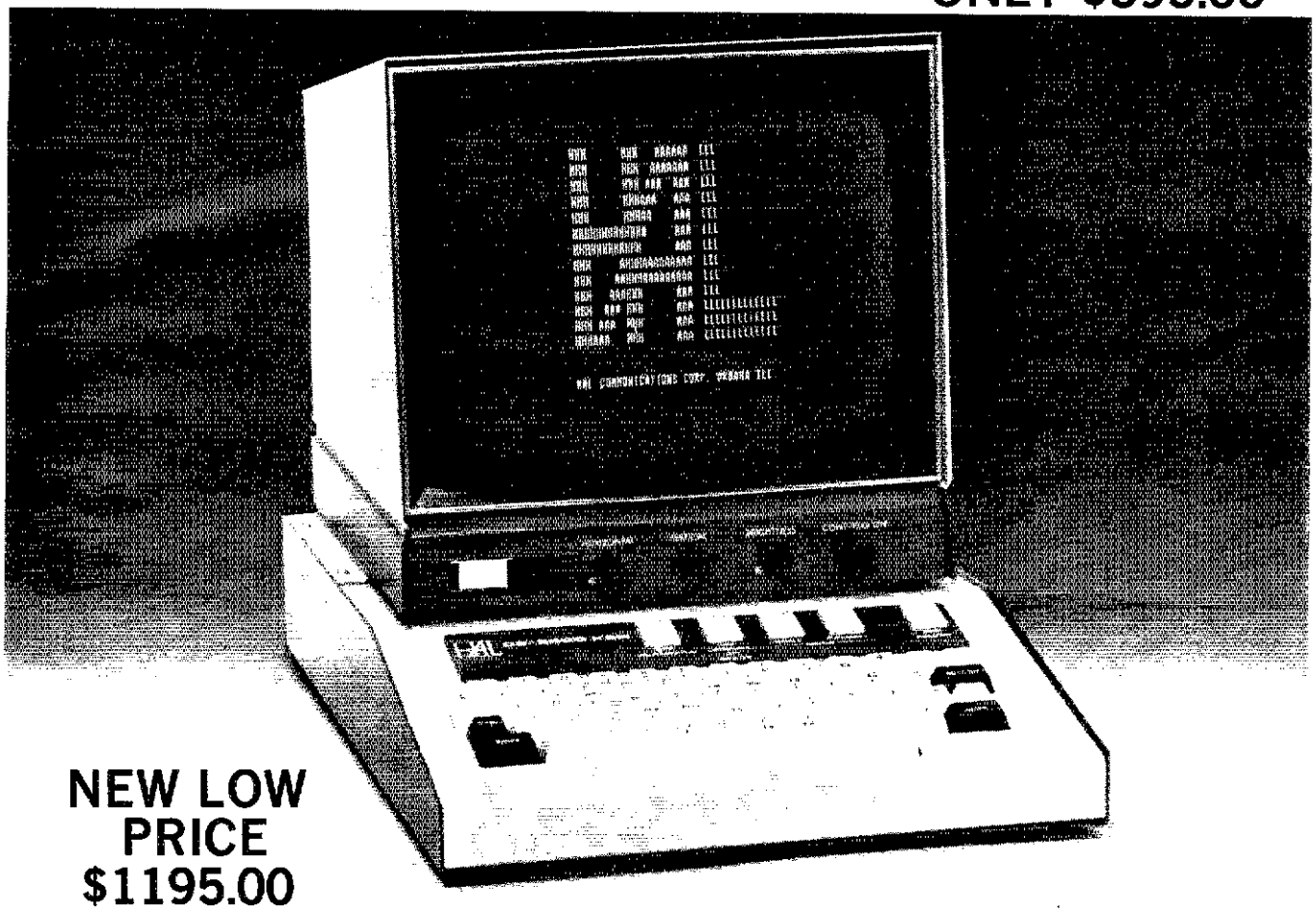


ONLY $595.00



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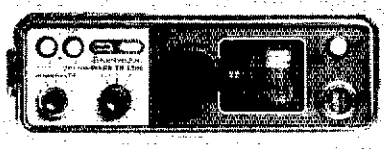

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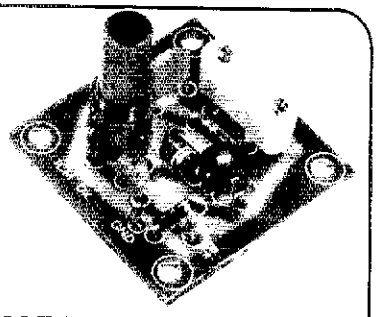
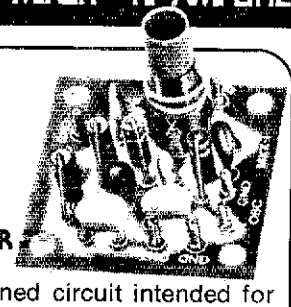


OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$3.95 ea.



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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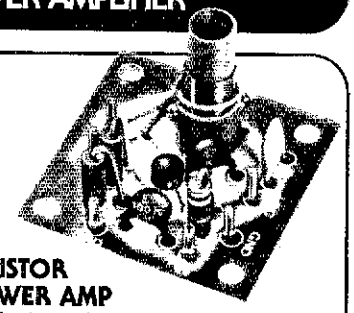
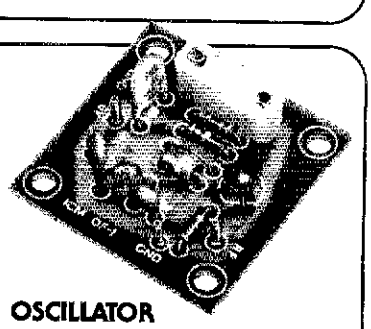
$4.50 ea.



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
Specify when ordering.
$4.75 ea.



OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
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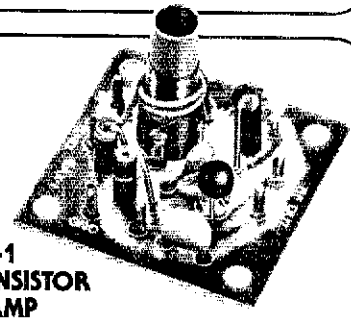
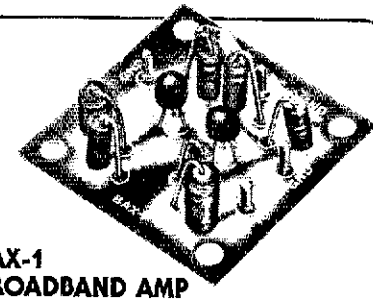
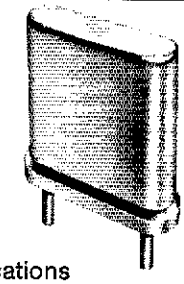


SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.
$4.50 ea.



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
Specify when ordering
$4.75 ea.



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031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.25 ea.

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South Dakota	Ed Gray, WØSD, Rte. 3, Salem 57058

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Mississippi	E. Ed. Robinson, W5YTN, P. O. Box 602, Laurel 39440
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Vermont	Robert L. Scott, W1RNA, 9 Laroe St., Swanton 05488
Western Massachusetts	Percy C. Noble, W1BVR, Bailey Rd., P. O. Box 5, Lanesboro 01237

Northwestern Division

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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..."

900-MHz Class E CB — the Ultimate Answer

The sword of 220-MHz CB continues to hang over our heads, and it may be time for the Commission to resolve the question for once and for all. And we think, once all the facts have been reviewed, there's only one logical answer.

To get at the facts, one has to stand back and look at CB objectively. The real hard question that has to be answered is — what kind of communication does CB need? While there may be some relatively minor exceptions (minor in terms of percentage of total use), our experience is that the overwhelming majority of CB contacts take place over a range of no more than two or three miles. This not because that is the limit of the frequency or the equipment, but because it is the limit of the *need.* Car-to-car communication on the open highway needs only a maximum range of two or three miles to pass the word about traffic conditions. The CBer in search of travel directions invariably can best be helped by another CBer who is nearby and is familiar with the neighborhood. The fisherman along the coast is interested in what is happening nearby, not in long-distance fishing information.

Another aspect of CB operation is that people gather where the action is. On the open highway it's channel 19 for those critical Smokey reports, or channel 9 if the CBer wants to monitor for emergencies. In various cities certain specific channels are used for local traffic reports and commuter chit-chat along specific roads, and when you tune across your CB set, whether it has 23 or 40 channels, only a few are in heavy use, because that's where the action is. So, although there may be 10 million CB licensees in the U.S. right now, there aren't 10 million ÷ 40 on each channel, or even 10 million ÷ 23 on each channel. It's more like 10 million divided by about half a dozen, to get the true channel loading on the popular channels, and by several hundred on the others. The 17 new ones are still graveyard-quiet, even in metropolitan areas.

The CB market is in a state of disarray right now. An overstock of 23-channel sets at year-end, and the introduction of the new 40-channel sets, have resulted in all sorts of price-cutting and instability. To introduce another CB allocation at this point would only add chaos to an already confused market situation. What the CB market needs right now is a period of tranquility, so that the overstocks can be reduced and a cautious reassessment can be made as to what the next step ought to be.

What *should* the next step be? Certainly not 220 MHz. That was a proposal made in haste more than five years ago, proposed by those who hoped to profit quickly from what they very correctly saw as a large market. The dollar sign was the only thing in focus. In opposition were such real considerations as the fact that 220 was already allocated (albeit on a secondary basis) to a viable and responsible service, that there might have to be certain geographical restrictions, that there were serious possibilities of interference to TV sets, and that no real *need* has been clearly demonstrated. Even now, with 10-million licensees, because of the short-range character of the communication that takes place, and because of the tendency of the users to cluster together on those channels where the action is, the *need* for additional channels has yet to be clearly demonstrated.

But, as CB continues to grow, and as hf propagation conditions change with the inevitability of the sunspot cycle, the need for more CB channels will develop.

Where to put them? More channels in the vicinity of 27 MHz? Maybe, by displacing other users there and by accepting the fact that the problems of freak propagation and the unauthorized use of amateur transmitters will continue to bother CBers and the Commission.

More channels at 220? Maybe, if the government is willing to displace two existing services which are using that allocation heavily, if it wants to risk problems in border areas, and if it is willing to accept the chances of TVI. And, of course, the same problem of unauthorized use of higher powered amateur equipment would exist.

But why not a solution which avoids all the previously mentioned pitfalls and which is a sagacious long-term solution and which demonstrates good and responsible frequency management? 900 MHz! No existing service would have to be displaced. Dozens and dozens of channels could be made available for future CB needs as yet undefined. There would not be the temptation for CBers

to use equipment of illegal power. There would unquestionably be fewer interference problems. It would truly be a personal radio service which would not impinge on other services and which could exist in splendid isolation.

Is the state of the art ready? Yes, sir! Last month we personally took part in a demonstration in which two cars, each with 27-MHz and 900-MHz units of comparable effective radiated power, drove around a typical urban-suburban area, switching back and forth between The two channels, comparing signals. Fantastic!

There were some spots where one exceeded the performance of the other, but overall there doesn't have to be one word of apology for the coverage provided by 900. And while a few manufacturers toss around offhand comments about high cost, the fact is that the ones who have done their homework are capable *today* of producing equipment in zillion-lot quantities at very reasonable prices.

For a variety of reasons, there may be no need to announce Class E CB at this time, but when the time does come, 900 MHz is the only logical choice. — *W1RU*

ANDERSON ANSWERED

Just as this issue was going to press, on April 4, a Jack Anderson column appeared in hundreds of newspapers and was quite upsetting to many of our members. The column implied the League's efforts to convince FCC not to reallocate amateur frequencies to CB were somehow improper. It contained a number of factual misstatements in support of its thesis. Nothing was said about potential for television and other interference, nor about the numerous other problems which could be created by a reallocation. The theme was that 300,000 amateurs were thwarting the desires of nine million CBers; not a word was said about the rights of 200 million TV viewers, or about the efforts hams are making to open up amateur radio to CBers and others serious about radio communication.

The response of League members was gratifying, to say the least. We received hundreds of phone calls from concerned members who intended to write their local papers to set the record straight, and we know this is only the tip of the iceberg. Already, the impact has been felt at both the local and the national levels. The League has concentrated on uncovering the source of the misinformation quoted since this, not Jack Anderson, is the real source of our unhappiness. As we go to press, a suitable response at the national level is being drafted by Hq. — *K1ZZ*

League Lines...

Nominations are still open for committee members to be appointe by ARRL President Dannals, W2HD, to the vhf/uhf advisory committee (VUAC), recently authorized by the ARRL Board of Director Nomination forms may be obtained from Hq. Potential nominees and the three signers of the nominating petition must be League members. The purpose of the VUAC is to advise the Board on matters pertaining to the spectrum above 50 MHz. The repeater advisory committee (VRAC) will continue to advise on repeater matters.

DXCC REMINDER. As announced in January QST, a change in DXCC Rule 9 has been approved. But the change has not yet been implemented. Please wait to send in your applications and cards under the new provision until the detailed "go-ahead" is announced in QST "DXCC Notes" in the coming months.

Through efforts Director Ron Hesler, VE1SH, and other hams in the Canadian Division, the special callsign VA3RRL has been obtained for use at the National Convention station in Toronto this June. See YOU there!

HELP WANTED: League Headquarters is looking for personnel with amateur radio backgrounds to fill vacancies in the Membership Services, Communications Club & Training and Technical Departments. We also have an opening for an Assistant Manage of Marketing. Interested? Send your resume, information about your job and amateur radio experiences and salary requirements to ARRL Hq.

Due to the death of VE6TK, the VE QSL Bureau has been taken ov by VE6AGV. The new VE6 QSL Bureau address is G.D. Holston, VE6AGV, 4003 - 1st St., N.W., Calgary, Alberta T2K 0X2, Canada.

Are you a ham working in the newspaper, radio, TV, magazine or other related business? If so, we'd like to list you in our card file of hams in the media. Please send info on yourself or anyone you know who would qualify to Public Information at Hq.

The Jordanian Amateur Radio Society has announced that Jordanian amateurs will be using a special JY25 prefix followed by their individual calls on special occasion of the Silver Jubilee of His Majesty King Hussein of Jordan, JY1. The period of the special call use will run from 2200 UTC May 24th to 2200 UTC June 25th 1977. A special award will be issued. Further details available from ARRL. S.A.S.E. please.

The National Telecommunications Conference (NTC) has extende its call for papers deadline to June 1, 1977. Modern Technology in Amateur Radio is one of the special subject topics being solicited. For more information, contact S.A. Butman at the Jet Propulsion Laboratory, Pasadena, CA.

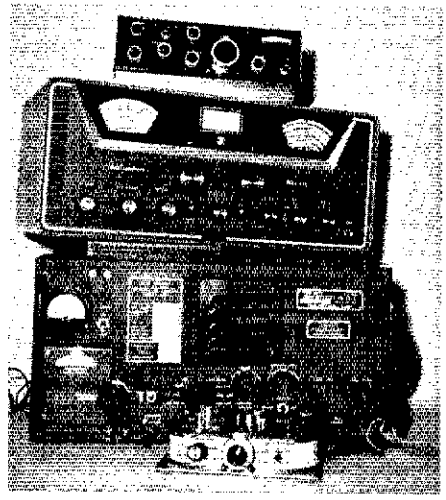
Saudi Arabia has authorized amateur radio station 7Z1AB to conduct third party communications with U.S. amateur stations, effective immediately.

Your First Receiver— How to Choose It

If you're an average newcomer to amateur radio, it's likely that selecting your first receiver has you confused and perplexed. A correct choice can mean the difference between enjoying ham radio and hating it!

By Doug DeMaw,* W1FB

I walked into a large radio wholesale house recently and was intrigued by the shelf upon shelf of new and used amateur equipment displayed by the vendor. But even more interesting was the lineup of prospective buyers that shuffled back and forth among the aisles. The potential customers were scratching their heads and asking questions of one another, pointing to this and that piece of gear and inquiring about the salient features — if any. After doing some eavesdropping among the busy and enthusiastic shoppers, I realized how confused most of the first-time buyers really were, and I recalled my early days as a ham: I was pretty mixed up also when it came to getting the most for my investment. I'd like to offer a few suggestions for those of you who are new to our amateur pastime — pointers for picking a receiver that will do the job of "hearing" the weak signals, separating them in a busy ham band, and staying tuned to the desired frequency once it has been chosen.



This collection of receivers illustrates some choices for a new amateur. Top to bottom, a homemade unit, used commercial receiver, surplus type and another homemade job (foreground).

New or Used Gear?

A lot of beginners feel that it's best to proceed with caution . . . spending the least amount of money possible when purchasing that first receiver or transmitter. Well, we all like to be Scotsmen when it comes to investing dollars in our hobbies, but *cheap* is not necessarily *best* for a fellow or gal who is just getting into amateur radio. Sure, a person can "luck out" now and then and realize a buyer's bonanza in ham gear, but it seldom happens in a *store*. Some good-hearted experienced amateur may offer the newcomer a fine piece of equipment (one that has been sequestered in the cellar since his new apparatus was bought) for a reasonable price, but let's address the matter of buying that receiver from a *dealer*. That's where the action is, and you probably want your equipment *now* . . . not when you stumble upon a Good Samaritan. Shucks, you can always sell what you buy now, should a first-class deal emerge later on.

The question of new or used gear is a tough one to judge. If the buyer is really short of "greenies," the logical outlook is toward a used receiver. Used gear is classified as commercial or war surplus. One should remember that most of the war surplus material on the present market is old — really old — from WWII. The state of the art has advanced tremendously since the 1940s, and the surplus hf-band receiver is pretty much deserving of its popular name, "boat anchor." Surplus receivers are rugged, and for the most part — ugly looking! Not only that, they lack selectivity (ability to separate stations), have a fast tuning rate (no bandspread) and may lack sensitivity from aging (weak tubes and misalignment). Among the more tempting surplus receivers are the BC-348, BC-312 and single-band Command receivers. But, none of those items are really suitable for use in today's crowded amateur bands. If you're a technical person you might be able to modify the old surplus receivers to approach modern-day receiver performance, but the cost of the changes and added components would make the entire project absurd, taking into account the initial cost of the boat anchor. In essence, I can't recommend that a beginner start out with war-surplus receiving gear. As a casual item to experiment with later on — yes, but don't buy one and expect to dig those "weakies" out of the QRM!

What option remains if we reject the surplus? Well, it's logical that we examine used commercial receivers as we

**QST* Technical Editor

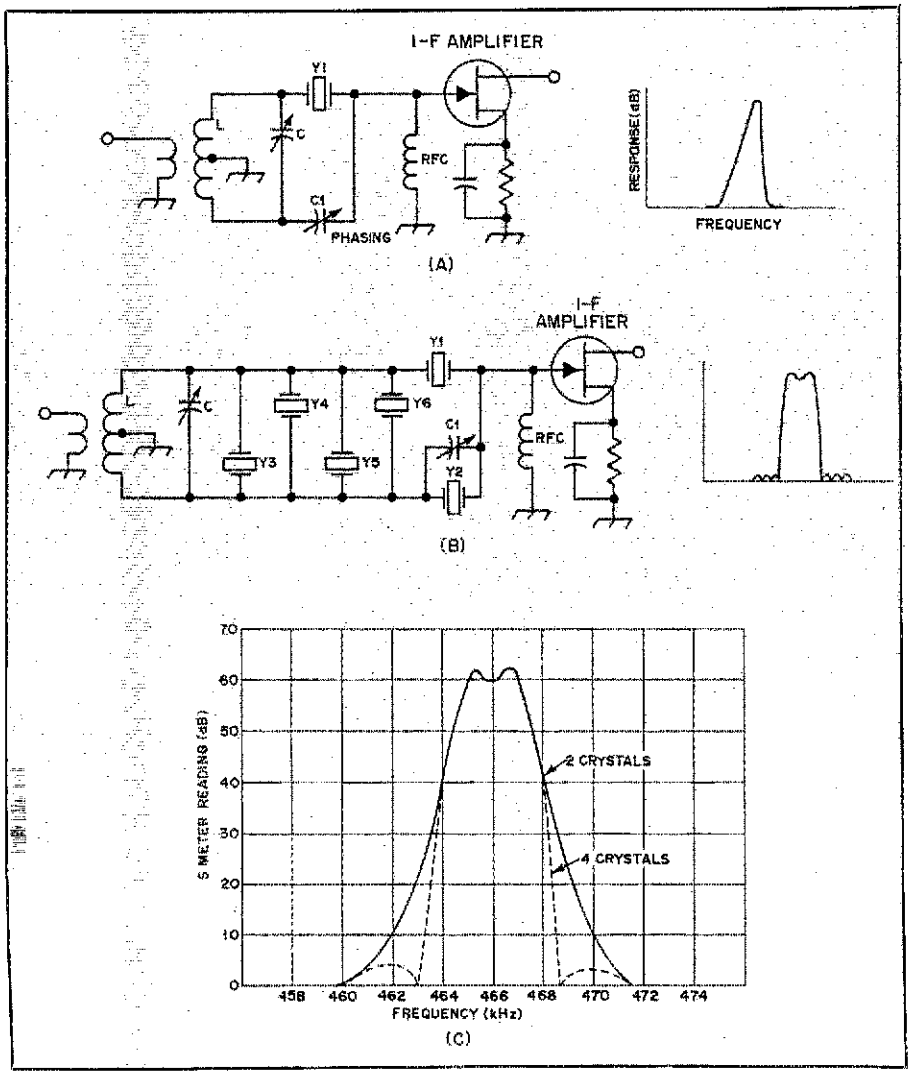


Fig. 1 — Illustration of i-f bandwidth differences versus the number of crystals used in the i-f filter. At A is a one-crystal type of filter with a phasing control (C1). The filter curve is not symmetrical, and its shape will change as C1 is adjusted. At B we see the result of using six crystals. Note the symmetry of the band-pass curve, plus the steep sides of the curve. Greater adjacent-frequency signal rejection is possible because of the sharp slope of the curve. The curves at C show how a two- and four-crystal filter compares in the sharpness of the curve. The response is plotted in kHz versus dB.

continue to squeeze our expenditure to a minimum. How far back in time can we go when evaluating used receivers? Here's where we get into an area of subjectivity, for no two operators regard a given model of gear in the same manner. What you might love as a feature might end up as something I abhor in a receiver. So, in this discussion we must forget our preferences for cabinet sizes, colors and textures. We'd best forget our views on the sizes and styles of knobs, panel-lamp colors, and all manner of superficial trivia. The question is, "How will the darned thing perform on 80-meter cw, or 20-meter ssb?"

Receiver Features

Now that we've decided to investigate used commercial receivers, what shall we seek by way of useful features and performance? What price class are we dealing with? Well, I seriously doubt that anyone with a keen interest in operating our hf amateur bands will be able to squeak by with anything under $100 in price. So let's look at the items that sell for that price or higher. That means we forget about such receivers as NC-57s, S-40s, S-38s, NC-88s and similar squawk boxes.

By way of needed features are selectivity, sensitivity and bandspread. The latter means that the user has the ability to spread the stations over a wide arc of dial calibration. It would be a terrible receiver that allowed the operator, say, 1/2 inch of dial face for the entire 80-meter band. It is much better to be able to spread it over several inches of dial face. Right? So we'll hunt for a receiver that has plenty of bandspread. Generally speaking, we are interested in a ham-band-only receiver. That type has a slow tuning rate and plenty of dial face for each ham band. All modern amateur receivers are made that way, and most tune 500 kHz on each band, even though some of our ham bands don't have 500 kHz of spectrum for our use (160 meters, for example, with a 200-kHz availability).

Most of the early day receivers had two dial faces and tuning mechanisms. One was called *bandset* (fast tuning) and the other was labeled *bandspread* (slow tuning). Receivers of that class covered the ham bands and the commercial frequencies in between, including the standard broadcast band. For amateur work that was a waste of space and components, but if you're a shortwave enthusiast, then a general-coverage receiver may be your "thing." The primary handicap with that style of receiver is the difficulty one has in trying to get the bandspread dial set up for meaningful frequency readout. Each time you change bands it is necessary to adjust the bandset dial to the proper reference mark so that the bandspread dial markings are correct. A built-in 100-kHz calibrator is a must if the task is to be performed quickly and accurately. Unfortunately, not many older general-coverage receivers had a calibrator built in, but you can purchase one and install it if you choose that style of receiver. A contest operator would despise a general-coverage receiver, because in contests it is necessary to switch from band to band numerous times during the event, and all of that calibrating would send most of us off to the "laughing academy" in short order. Don't let me sell those old clunkers short, however: Many of them can provide good service for the patient operator. Some of the units that might be suitable are the NC-183D, SX-71, SX-76, HQ-129X, HQ-140, HQ-180, NC-303, SX-111, RME 50, HQ-110 and others of that age and class. One might also consider the HRO-50-T1 and HRO-60 receivers. With these boxes it is necessary to plug in a coil assembly (front of the receiver) for each band of interest. Each coil module has shorting bars which can be set to provide bandspread or general coverage, and the choice is up to the user. HROs, in their day, were the "Cadillacs" of the receiver world, and they were built very well inside and out.

With respect to *selectivity*, we're speaking mainly of i-f (intermediate frequency) selectivity. In other words, we want a receiver that has sufficient selectivity to separate ssb and cw signals when conditions become crowded in our bands. The early receivers that we have mentioned have *crystal filters*

These circuits consist of a single crystal in series with the i-f signal path. A phasing control is located on the front panel of the equipment to enable the user to manipulate the characteristics of the filter – changing the filter curve to enhance desired signals or reject unwanted ones. In practice, that's just one more chore the operator has to contend with as he tunes in a signal. Some sports-car enthusiasts insist of having a manual 4-speed shift, as it "gives them something to do while they're driving" in addition to aiding performance. An early-day receiver gives the operator "something to do" while he's operating too – band calibration and crystal phasing!

In an ideal receiver one would not need to fiddle with a crystal filter. Rather, the receiver would have separate i-f filters for cw and ssb work. The filters would be prealigned, and they would be far more complex in design than the old single-crystal filters were. Modern receivers use as many as eight crystals in a filter, and that is much better when it comes to rejecting signals that are close in frequency to the desired one. Fig. 1 illustrates how the i-f bandpass characteristics compare between the early filters and present-day ones. It can be seen that the *skirts* of the filter curve are much sharper and uniform with modern multipole filters. Collins mechanical filters compare favorably in this characteristic.

Don't feel that all is lost if you want to buy a good "older" receiver. Those senior-citizen units can be perked up rather well by adding a low-cost *RC* active audio filter to them. The MFJ Enterprises CWF-2, for example, can be installed just after the receiver detector. Its operating voltage can be swiped from the cathode of the audio output tube, as anything from 6 to 15 volts will run the audio filter nicely. Most audio amplifiers have approximately 8 volts available across the cathode-bias resistor (Fig. 2). Alternatively, a 9-volt battery will power the filter for a long time. If you don't like the idea of chopping into the circuitry, an Autek Research audio filter can be used outboard between the phone jack and the speaker or phones. (Both companies advertise in *QST* from time to time.) The *RC* active filters will aid cw reception a great deal, and selectivity comparable to that obtained with a multipole crystal i-f filter can be realized. An audio filter will also help to reduce wide-band noise coming from some of the vintage receivers.

Concerning receiver stability, one can never predict how things will turn out in that regard when buying any piece of used equipment. Nothing can be more troublesome than a receiver which has a drifting local oscillator and/or BFO. Mechanical instability can complicate operations also. Some of the older receivers were somewhat fragile in construction, and the mere act of bumping the receiver or the operating table could make the received signal vanish, or at the least – warble until the vibration ceased. Inspection of the dial mechanism, variable capacitor and chassis strength is worthwhile when picking a used receiver. The more rugged those items are, the better. As far as regular frequency drift goes, that's mainly a matter of heat changes within the receiver cabinet. Tube-type receivers are especially prone to drift, and operating with the lid of the cabinet open should aid the problem. Dirty or worn bearings on the main tuning capacitor will often cause drift or erratic oscillator operation. It's a good idea to give a used receiver a few shots of contact cleaner at the bearing points of the variable capacitors, and a squirt or two into the potentiometers (and on the switch contacts).

It will be meaningless to guess at the receiver sensitivity when making a selection. If the seller is doing the right thing for his customers, he's offering equipment that has been checked and aligned. This means that bad tubes should have been replaced, and all serious equipment maladies resolved. If he has not done this (ask him), he may be willing to get the equipment percolating properly for a slight service charge. As a buyer who has no particular technical aptitude, you might be wise to have that task performed. I can't recommend strongly enough that the buyer take his used receiver home on a *trial basis* for a day or two, then make the final deal if all is as it is advertised to be. Once you get the piece at home where you can play with it, ask an experienced operator to help you determine if it's worth the fee being charged.

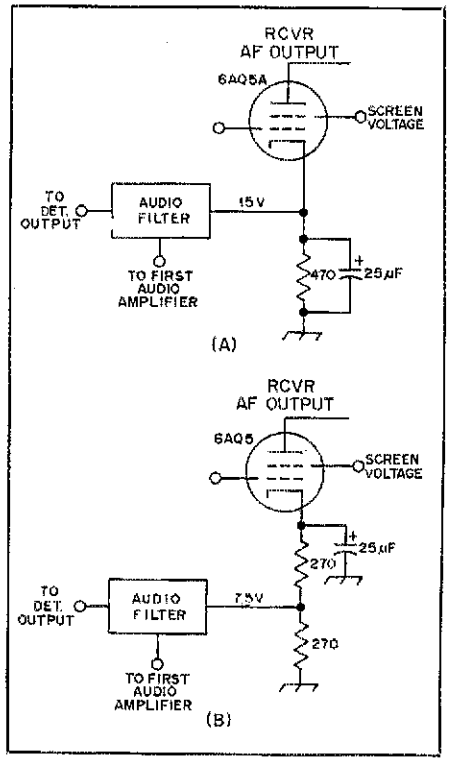


Fig. 2 – Typical audio output stages in older receivers. Operating voltage (dc) can be obtained from the cathode of the audio amplifier tube as shown. The actual amount of voltage developed across the cathode bias resistor will depend on the current drawn by the tube. At A we find 15 volts available for a typical stage. If less voltage is desired, make a resistive divider as is shown at B. The total resistance should be approximately equal to the ohmic value of the single original resistor. The ohmic ratio of the two resistors can be anything the operator chooses, and the ratio will determine the output voltage available.

Among the better (and newer) used receivers are the Drake line, Kenwoods, Collins 75-A4 and 75-S series, and the Heath SB-301 and SB-303 units. The older Collins 75-A units (75-A1, A2 and A3) aren't bad either: Stability, selectivity and sensitivity are likely to be okay in those units, and the frequency readout is very accurate. Mechanical filters can be purchased to obtain the specific degree of i-f selectivity you want, consistent with the bandwidths that Collins Radio makes available.

Of the later-model good war-surplus receivers are the Collins R-390 and 51-J1. They cost quite a bit as used gear ($300 class), but are good substantial items, and should perform well for most amateur work.

Selecting a New Receiver

The "dollars crunch" really hits you hard when you decide to start out with a new receiver! Nothing is inexpensive these days, in relative terms. Perhaps the most economical approach is to buy a Heath receiver in kit form and wire it yourself. Not only will you save some money, but you'll learn something about the layout of your equipment, and that will make servicing less difficult when the need arises.

Good amateur receivers are made by Yaesu, Kenwood, Drake and Collins – as "separates." Don't allow anyone to fool you about tubes versus transistors! A properly designed communications receiver which contains transistors and ICs can do as well or better than a tube type of receiver. It's an old wives' tale that transistors are noisier and more prone to signal overloading than tubes are. Transistorized gear generally requires less service wok, operates cooler (less occasion for drift), and is more efficient in terms of power-supply requirements. The chap who "puts down" transistors is probably a person who knows very little about them, and is out of step with today's technology!

For greatest operating convenience the new receiver should have a built-in frequency calibrator (100-kHz or 100- and 25-kHz markers). It should have a tuning dial that turns easily and smoothly, and without noticeable backlash. If it does not have ssb and cw filters, it will probably have the one for ssb. However, make sure that there are provisions for adding a cw filter when you want one. Most cw filters come in 500- or 600-Hz bandwidths, and that is adequate for all but the most demanding weak-signal work.

If the receiver has a digital readout system you will probably have no difficulty breaking the frequency down to 1 kHz. If the unit does not have a digital display, make sure that the analog readout (mechanical) has 1-kHz increments. This will help you to stay within your authorized frequencies, and will aid in spotting the exact frequency when working nets and schedules with friends.

A noise blanker is a nice "extra" to have in your receiver, but the added cost is not always worth the feature. Most blankers cause some degradation in receiver performance, and don't do much good on run-of-the-mill atmospheric and man-made noise. They come into their own when operating mobile, or when you live in an area where sharp pulse noises prevail. Spark-plug noise is chopped rather effectively by means of noise blankers. If you purchased a receiver just because it had a built-in blanker, chances are that you ended up with a long face and a scowl when you tried to banish atmospheric noise in your receiver. A blanker falls short of the mark in such situations.

It is nice to have receiving provisions for one of the WWV NBS station frequencies included in your receiver. That facility will enable you to keep tabs on the accuracy of your frequency calibrator — and subsequently your dial readout. WWV will also keep your clock accurate if you adjust the timepiece frequently against the NBS station.

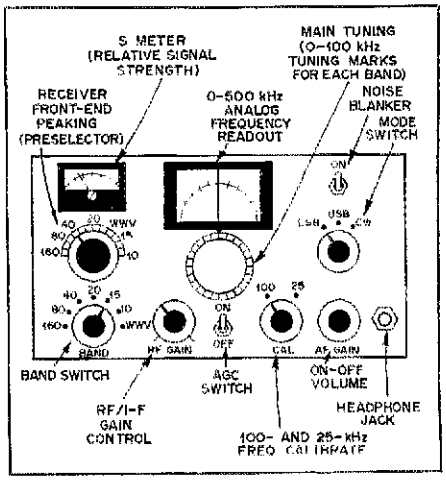


Fig. 3 — Representation of a modern receiver. The labels indicate the control functions for the standard features which most amateurs desire. The analog readout provides 1-kHz increments.

It would be impossible for anyone to state in a positive manner which new receiver is better than the rest. When we buy a new piece of gear we do it on a chance basis, and each brand and model has its good and bad points. For the most part it's a "trade-off" when you buy ham gear. You simply select the features that appeal to you and settle for what you've bought (Fig. 3). It's always smart to visit a ham who has a receiver of the type you are interested in purchasing. Try for a free chance to tune the equipment and evaluate it at the other fellow's or gal's shack; *then* toddle off to the store with your cash.

Homemade Receivers?

An unfortunate fact of life nowadays is that you can't build a receiver for less money than you can buy one — assuming that you are seeking comparable features and performance. Single lot parts purchases are expensive, and parts availability is almost beyond the nightmare stage now. Sure, a cheapie receiver can be tacked together for a few dollars (simple superheterodyne or direct-conversions types), but the performance will probably leave a lot to be wished for when it gets down to digging those signals out of the QRM.

Personally, I'd like to see all amateurs using homemade equipment, but not everyone has the technical know-how to build the stuff and make it "play" correctly. An experienced technician can do a lot with a handful of parts, but the less apt person might have a heart-breaking adventure by tackling a complicated receiver project and may lament about the money involved.

I think it's best to start with a store-bought receiver, then as you learn about technical matters you can bite into a few home-construction projects . . . starting first with some simple receivers and working your way up to the esoteric circuits.

Hey, it's time to get back to tuning the band. I hope you've gotten a few helpful tips from all of this rambling. Maybe I'll see you at the used equipment counter one of these days. Meanwhile, good luck when you go shopping for that first ham receiver!

QST

Strays

THE HAM IS STILL IN THE CLOSET

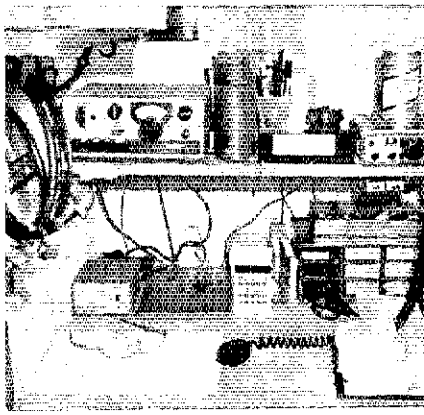
That's right. Back in my junior high school days I didn't have my shack in the closet. At the time I had a small cw setup. It was located right by the window, which, by the way, is 180 feet above the ground and has a view of the entire New York City vicinity. Most hams would say that's not bad for a 12 year old.

When I grew to age 14, I got bigger, my station got bigger, my room seemed smaller, and my money went faster. By that time I had passed my Tech and had gotten a 2-meter rig. I was just entering high school and had piles of homework. A lot of equipment and a lot of school work don't mix, so with permission from the folks, I proceeded to empty out my entire closet. (You're probably wondering where all the clothes went. Well, everyone knows that at that age, you only have one pair of dungarees, and it wasn't hard to find room for them in the hallway closet.)

Now the problem was putting a desk in there. This was the impossible dream. So, without going any further, I built shelves right into the wall.

Now I'm 15 and a sophomore at John Dewey High School. For those of you who read about Jerry Woods' ham-shack closet in August 1976 *QST*, I must say I don't have sparkling new green walls, but I can truly say I have a shack.

One question, though: How do you put up a decent antenna in an 18th floor apartment where it's against the rules to put up an antenna? (It's probably not too important, though, since my shack seems to have broken all the other rules!) — *WA2ALT*



Steve Schwartz, WA2ALT, shows that his bedroom closet holds everything a good ham shack needs!

Keying Wave-Shape Correction Circuit

Keyed-cw wave shaping is a lot like the weather — everybody talks about it, but nobody does anything about it. Perhaps that's because few know what can be done. Suitable shaping circuits can be designed with mathematical equations.

By Robert B. Dome,* W2WAM

This paper discloses means for avoiding keying spikes in transmitters. The correction circuit is passive (no tubes or transistors) and works for any load current; it is independent, therefore, of any changing load conditions presented by the transmitter. The circuit should be of interest to those who use very high-powered transmitters, particularly those with high voltage where tube or transistor regulators would be very expensive and would have to dissipate large amounts of power.

When the key of a transmitter is suddenly closed as in sending a dot or a dash, and the plate voltage is being supplied from a rectifier system having the customary regulation, the wave shape of the dot or dash reflects the presence of regulation. The wave shape is such that initially the dc voltage is highest and then rapidly decreases exponentially to come to rest at a somewhat lower voltage, as shown in the time-voltage wave of Fig. 1. The drop in voltage from the value E_1 at $t = 0$ to E_2 at $t = \infty$ (infinity), when the voltage comes to a rest, divided by the load current in amperes at $t = \infty$ yields the regulation resistance R_1, or

$$R_1 = \frac{E_1 - E_2}{I_2} \text{ ohms} \qquad \text{(A)}$$

The simulated circuit of the system is shown in Fig. 2.

It is the purpose of this paper to show that when the source circuit is that shown in Fig. 2, it is possible to introduce a relatively simple correction circuit to cause the output voltage to be relatively constant with time, as shown by the voltage line E_o in Fig. 1. Such a correction will eliminate the "spikes" of voltage immediately following the closing of the key.

The correction circuit introduced into the system to achieve this desirable result is shown in Fig. 3.

The problem is to specify the values of L, R_3 and R_2 which are required to achieve the flat output voltage shown as E_o in Fig. 1.

The problem may be solved with the aid of operational calculus. In order to obtain the solution, the circuit of Fig. 3 should be redrawn[1] as Fig. 4.

The voltage across the load resistance R_o is thus given by Eq. 1 of Fig. 5.

Since there are two different factors involving p, namely

$$p + \frac{R_2 R_3}{L} \text{ and } p + \frac{1}{R_1 C} \qquad \text{(B)}$$

it is evident that in order to avoid sinusoidal oscillations in e_o on the one hand and unequal time constant (and therefore noncanceling) exponentials on the other hand, it is required that the two factors be identical[2] or that

$$\frac{R_2 + R_3}{L} = \frac{1}{R_1 C} \qquad \text{(C)}$$

Letting these quantities be called β, Eq. 1 reduces to Eq. 2 of Fig. 5. Solving this equation from operational function tables[3] where

$$a = \frac{R_o \beta + \dfrac{R_2 R_3}{L} + \dfrac{1}{C}}{R_o + R_2} \qquad \text{(D)}$$

*645 Terry Road, Syracuse, NY 13219

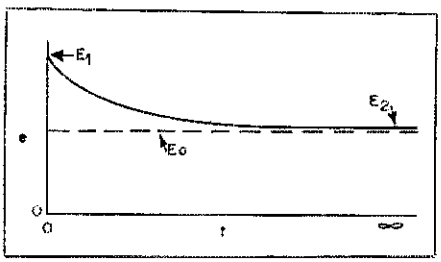


Fig. 1 — Plate-voltage wave shape as a function of time, t.

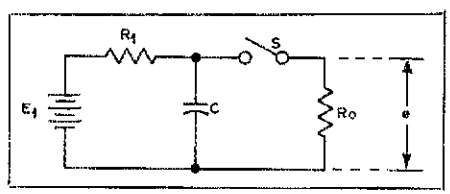


Fig. 2 — Rectifier supply simulated by a constant voltage source E_1 followed by the series resistance R_1, the shunt filter capacitor C, switch S to simulate keying, and load resistance R_o.

[1] Footnotes appear on page 17.

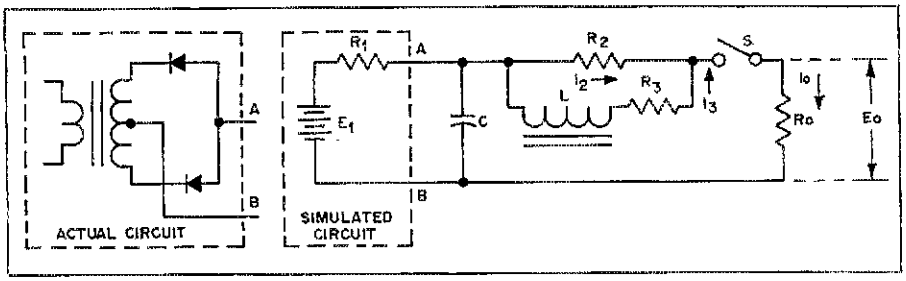


Fig. 3 — Correction circuit consisting of L, R_3, and R_2 added to the circuit of Fig. 2. R_3 is not an added separate resistor but is the actual dc resistance of the inductor.

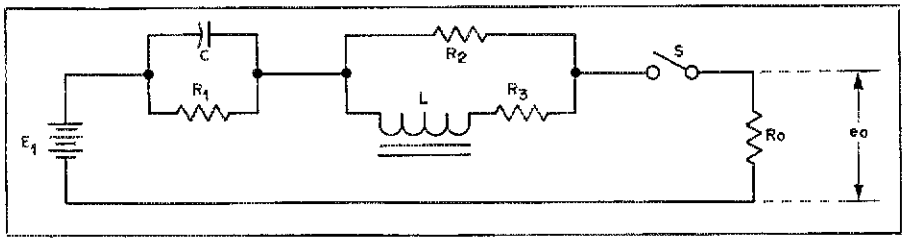


Fig. 4 — Circuit of Fig. 3 redrawn for solution by operational calculus.

$$e_o = \frac{E_1 R_o}{R_o + \dfrac{R_2 R_3}{L\left(p + \dfrac{R_2 R_3}{L}\right)} + \dfrac{pR_2}{p + \dfrac{R_2 + R_3}{L}} + \dfrac{1}{C\left(p + \dfrac{1}{R_1 C}\right)}} \qquad \text{(Eq. 1)}$$

$$e_o = \frac{E_1 R_o (p + \beta)}{(R_o + R_2)\left[p + \dfrac{R_o\beta + \dfrac{R_2 R_3}{L} + \dfrac{1}{C}}{R_o + R_2}\right]} \qquad \text{(Eq. 2)}$$

$$e_o = \frac{E_1 R_o}{R_o + R_2}\left[\epsilon^{-at} + \frac{\beta}{a}(1 - \epsilon^{-at})\right] \qquad \text{(Eq. 3)}$$

$$R_2 = \tfrac{1}{2}\left[R_1 + \sqrt{R_1^2 + 4R_1 R_3}\right] \qquad \text{(Eq. 4)}$$

Fig. 5 — Equations referenced in text.

then Eq. 2 becomes Eq. 3 of Fig. 5. Using Eq. 2, the value of

$$\frac{\beta}{a} = \frac{(R_2 + R_3)(R_o + R_2)}{(R_o + R_1)(R_2 + R_3) + R_2 R_3} \qquad \text{(E)}$$

It is observed that the two exponentials in Eq. 3 can be removed providing β/a can be made equal to 1.0. Therefore, setting the right-hand portion of Eq. E equal to 1.0, it will be found that the condition to be satisfied is

$$R_2^2 - R_1 R_2 - R_1 R_3 = 0 \qquad \text{(F)}$$

Since R_1 is usually known and since R_3 can be approximated, Eq. F should be solved for R_2, whence, Eq. 4 of Fig. 5.

When this condition is met, Eq. 3 reduces to the simple form of

$$e_o = \frac{E_1 R_o}{R_o + R_2} = E_o \qquad \text{(G)}$$

This equation is seen to be independent of time and so E_o is constant from the time the key is closed to infinite time.

There remain the problems of solving for the value of L and the specific value of R_3 to be inserted into Eq. 4. First consider the ratio of L to R_3. The numerical value of this ratio was computed for a large number of filter reactors generally available to the amateur. Let the ratio

$$\frac{L}{R_3} = q \text{ or } R_3 = \frac{L}{q} \qquad \text{(H)}$$

q was found to lie in the range from about 0.013 to 0.167. A q of 0.05 may therefore be assumed for initial calculations.

Solving Eq. C for L and substituting Eq. H for R_3,

$$L = \frac{CR_1^2\left(1 + \dfrac{3R_1 C}{q}\right)}{\left(1 - \dfrac{R_1 C}{q}\right)^2} \text{ henrys} \qquad \text{(I)}$$

where C is in farads and R_1 is in ohms.

In case the proper L with the proper R_3 cannot be found in the list of available inductors, the nearest one may be used and C adjusted so that from Eq. C

$$C = \frac{L}{R_1(R_2 + R_3)} \text{ farads} \qquad \text{(J)}$$

By means of Eqs. 4, H, I and J, the circuit may be designed.

Illustrative Example

Suppose a given transmitter is to be operated at approximately 200 milliamperes and 600 volts dc. The rectifier system may consist of a transformer with a full-wave rectifier with capacitive filter. Let C = 16 μF. The design steps are these:

1) Determine R_1. With L out of the circuit, load the rectifier with the transmitter or a resistance load so that the current flow is 200 mA. Note the open- and closed-circuit voltages E_1 and E_2. Then

$$R_1 = \frac{E_1 - E_2}{I}$$

If E_1 = 720 volts and E_2 = 620 volts then

$$R_1 = \frac{720 - 620}{0.2} = 500 \text{ ohms}$$

2) Determine L. Let q = 0.05. Then substituting in Eq. I,

$$L = \frac{4(1 + 0.48)}{(1 - 0.16)^2} = 8.4 \text{ H}$$

3) Determine R_3. Substituting this value for L into Eq. H,

$$R_3 = \frac{8.4}{0.05} = 168 \text{ ohms}$$

4) Determine R_2. Substituting values for R_1 and R_3 into Eq. 4,

$$R_2 = \tfrac{1}{2}\left[500 + \sqrt{500^2 + 4(500)(168)}\right] = 632 \text{ ohms}$$

5) Determine the actual resultan

E_o. Assuming the load resistance is

$$R_o = \frac{E_o}{I_o} = \frac{620}{0.2} = 3100 \text{ ohms},$$

then from Eq. G,

$$E_o = \frac{720(3100)}{3100 + 632} = 600 \text{ volts}$$

Thus all circuit components and the output voltage have been determined. The main thing to do now is to locate a reactor with 8.4 H of inductance and a 168-ohm dc resistance, and which is rated at

$$I_3 = \frac{I_o R_2}{R_2 + R_3} \text{ amperes}$$

$$= \frac{0.200\,(632)}{632 + 168} = 0.158 \text{ amperes.}$$

From a list of reactors available one was found to have L = 6, R_3 = 150, at I_3 = 0.200. This one should serve quite well since the actual current (I_3) is only 0.158 A. At this reduced current from the 0.2-A rating, where L is measured, it can be expected that L will rise above 6 H, because of lower saturation of the iron core. If desired, recalculations may be made based upon R_3 = 150. These yield R_2 = 620 ohms and E_o = 600 volts (no significant change), and

$$I_3 = \frac{0.200\,(620)}{620 + 500} = 0.161 \text{ A}$$

The current through R_2 after the transient has passed is $I_2 = I_o - I_3 = 0.200 - 0.161 = 0.039$ A. The power dissipated in R_2 is

$$P_{R2} = I_2^{\,2}\,(R_2) = (0.039)^2\,(620)$$
$$= 0.94 \text{ watt}$$

A standard 2-watt, 620-ohm, carbon resistor is suggested.

Tests

The system may be tested by keying the transmitter with square-wave keying pulses and observing the waveform of the rf pulses. If desired, a final adjustment to C may be made to remove any ripples. If the top of the square wave shows a downward dip, the capacitor should be increased, whereas, if the top shows an upward peak, the capacitor should be decreased.

It should be pointed out that the dc voltage will rise for lighter loads, and drop for heavier loads, but no voltage spikes will be present. QST

Footnotes

[1] Berg, "Heaviside Operational Calculus," McGraw-Hill Book Co., First Edition, 1929, pp. 49-51. See Figs. 20 and 21, pp. 50 and 51, for instructions on redrawing the circuit diagram.

[2] See ref. 1 above, equations 13 through 15, pp. 164-165.

[3] See ref. 1 above, equations 1 and 3, p. 164.

Strays

□ When Michael Russ, WA6NGF, a fifth grade teacher at Sierra View Junior Academy, introduced his students to the adventure of ham radio, Bruce Lee of Lindsay, CA, was listening. With help and guidance from Mike and others, Bruce's interest grew and before his Novice call expired, he had worked 49 states on a Ten-Tec Argonaut with only 5 watts power. By the time Bruce reached seventh grade, he could copy code at 20 words per minute and was soon a full-fledged amateur with General class license, WA6KMW. Now in ninth grade, he has just received his Advanced license.

Dr. George Guernsey, WA6GKT, of Lemoore, CA, heard about Bruce and wanted to help the young ham with some better gear. George loaded up all the gear from his personal ham shack and took it as a gift to Bruce! – *WB6QDN*

WA6KMW had a grateful handshake to acknowledge his extraordinary gift from WA6GKT.

TENTH ANNIVERSARY JERUSALEM AWARD

□ The Jerusalem Award Committee announces a new certificate to commemorate the 10th anniversary of the unification of Jerusalem. It will be available to radio amateurs and shortwave listeners. To qualify, submit proof of contact with eight stations in Israel, including at least three in Jerusalem, all made in the year 1977, the 10th anniversary of the city's unification. Have your log entries certified by another amateur and send them with 10 international reply coupons to Jerusalem Award, P.O.B. 4079, Jerusalem 91 040, Israel.

The regular Jerusalem Award will still be available but the number of contacts required has increased to eight. For the regular award, contacts may be dated as far back as 1948.

□ The OH-KY-IN VHF Amateur Radio Society recently held what is believed to be the first ham radio display in a major shopping center in the Cincinnati area. On display were slow-scan television, RTTY, low-band and 2-meter gear and the association autopatch. Club members answered questions about amateur radio and the differences between ham and CB were discussed many times.

Earlier, the group had held its Christmas project at the mall. Each year the club takes its communication van to a local shopping center (usually on the coldest day!) to collect Christmas messages and then send them on their way via the traffic nets.

QST GETS RESULTS

□ In February, 1952, an item in *QST* about an all-ham family in Elgin, IL, caught the eye of Chuck Dutton, WN9QLK, who walked over to their home and introduced himself. On February 10, 1977, the 25th anniversary of the original meeting, Chuck, now W9QLK and married to the family's daughter June, W9BDY (ex-W9OTM), joined the chief operator, the Rev. Everett Battin, W9OWD, his XYL Edith, W9OTO and son, John, K9DX (ex-W9MEM and WB4TLG), to celebrate the occasion. Their cake was decorated to read, "... 25 Years of Solid Copy ..." Shirley Micka, WA9LYJ, a foster daughter, also joined in the ragchewing fun. – *W9BDY*

STOLEN EQUIPMENT

□ Stolen from locked auto in Terre Haute, IN, on February 16, Motorola Modar Triton, model no. D23ABA1820A, modified; serial no. LM049T. Inscribed with driver's license no. KY C-400-877-533-475-6 and owner's name and call sign. William L. Call, WA4ZSJ, Box 2740, University Station, Murray, KY 42071 or Terre Haute Police Dept., case no. 77-2094.

□ Stolen from the WA3RCA club station between 5 and 8 P.M. on Dec. 12, 1976. Collins KWM, serial no. 10272; Drake TR4-C, serial no. 35245 and Heathkit HW 2021, serial unknown (kit incomplete and repackaged for factory completion). Report information to Cheltenham Police, Detective Santel, 215-887-6200. $100 offered for substantial info.

Propagation— Past and Prospects

Cycle 20 is dead — or is it? Long live Cycle 21! After many feints, Cycle 20 finally seems to have had it, and Cycle 21 is beginning to act up. How "good" will it be? Try us again in 1980 or so. Meanwhile, there's always OSCAR.

By Edward P. Tilton,* W1HDQ

There's no time like a solar minimum for studying the sun and its effects on radio propagation. Even then we see things we don't understand, but major events come far enough apart so that a neophyte has some chance of sorting them out. Keeping a detailed record is the first step in explaining what has happened, understanding what is happening, or predicting what will happen next.

This general idea was in back of the author's resumption of sun-watching in the latter half of 1972. We'd projected the sun at intervals for many years, mainly at times of high solar activity. There was plenty to see the first time, in 1946, as we were approaching the peak of Cycle 18. There was still more 11 years later, when Cycle 19 was setting an all-time record for the more than 200 years that man has counted sunspots in any systematic way. All this was exciting — but not very useful to a beginner in the art. There was just too much going on, nearly all the time.

Similar confusion appeared to be developing when we began what we hoped would be a documentation of the Cycle 20 minimum. We hadn't expected that much activity, but we just happened to start at a time when Old Sol was on a near-record rampage. Remember the August auroras? The *QST* vhf column in the October, 1972, issue gives some idea of the extent, intensity and duration of this late-in-the-cycle upsurge. It's worth another reading.

The number of sunspots dropped off markedly following that early August binge, but a recurrence began about three weeks later. With this hint, the author went out on a 27-day limb and predicted an aurora for the 1972 September VHF Party. One came, thereby enhancing our reputation as a seer locally, though in retrospect it must be admitted that this success was mainly a matter of "beginner's luck."

We checked the sun frequently if not regularly thereafter, but made the mistake of trying to *remember* what we saw, instead of keeping a detailed record. Again, there was too much on the sun to make much sense in such a limited and random effort. The project was moved to a back burner again, though we kept it simmering.

Events combined to bring the project up to a full boil in the fall of 1974. Not the least of these was the inauguration of a new and more useful propagation bulletin service on WWV. Here at last was a continuing and near real-time check on our solar and radio observations. From November, 1974, through this writing we have put all WWV solar, geomagnetic and propagation data into detailed chart form. Drawings of the sun for at least one observation on every sunny day are added, along with notes on propagation on the amateur DX bands and other frequencies. The signals of WWV, WWVH and other standard time and frequency stations are checked regularly for this purpose.[1]

About WWV Bulletins

A government economy wave almost cost us the bulletin service last fall, but at this writing propagation bulletins are broadcast hourly at 18 minutes after the hour by WWV on 2.5, 5, 10 and 15 MHz. The preparing agency is the Space Environment Services Center of NOAA. The bulletin content is not quite the same as formerly given at 14 minutes after the hour, but the uses for our purposes are similar. The standard text (which may be modified for special occasions) gives the Boulder K index for the current day, changed four times daily; the 2800-MHz solar flux and the A index, both for the previous day; the state of solar activity and the earth's magnetic field for the previous day; and a prediction of these factors for the current day. The significance of these data is given in *QST* and the *Handbook* so this information will not be repeated in full here.[2]

Note that the K index for *Boulder* is given. This reading of geomagnetic activity is taken at many different observing points, Fredericksburg and Anchorage being two others commonly quoted. The actual figure may vary from one site to another, for a given time, but the Boulder information serves well enough for our purposes. The A index is a 24-hour figure for the same thing, but on a numerical scale more suitable for statistical purposes. Record it and it will help you catch recurring phenomena associated with the sun's four-week rotational period.

Recurrence Fudge Factors

A long-term running record of solar flux and A index can be an invaluable adjunct to the prediction charts now published monthly in *QST* or in making your own day-to-day estimates of radio propagation of almost any kind. Published predictions have to be based on an assumed level of solar activity and on the position of the sun at the season under consideration. The charts cannot take into account short-term fluctua-

*Contributing Editor, Propagation. Correspondence should be sent to ARRL headquarters.

[1] Footnotes appear on page 22.

tions in either solar or geomagnetic activity, both of which *tend* to follow the solar rotational period of about 27-1/2 days. Hence the value of a monthly chart of the WWV indices.

If that were all there were to it, forecasting would be a breeze. But an activity center on the sun may last for months or even years, or its total life can be no more than minutes or perhaps a few hours or days. Why? Hints as to some possible answers were given in the cover story in October, 1976, *QST*.[3] Whatever the causes, the erratic behavior of the sun (and as a consequence wide excursions in geomagnetic activity) holds down the accuracy of long-term predictions for any particular day to a very low level. Your own records can improve this to perhaps 65 to 75 percent. Careful and frequent observations of the sun can get you into really high-accuracy short-term prediction, but by then you may find yourself in the prediction business for other people. A fair alternative is to listen to the W1AW propagation bulletin service, which is updated whenever short-term incidents warrant. See the latest issue of *QST* for W1AW frequencies, modes and schedule.

Two controversial fudge factors were discussed in reference 3: interplanetary effects and eclipses, both solar and lunar. Three examples were shown and another discussed in which a large excursion in solar activity was coincidental with an eclipse. We added another only three weeks after the article was published. It is detailed in Fig. 1. This shows the 2800-MHz solar-flux record for the month of October (red line), and for the related periods four weeks before and after, as was done in the October *QST* story for other events. Here again, we see a marked solar-flux anomaly. After an almost flat run the first three weeks, the flux curve starts up Oct. 22, reaching 86 on the 25th, the highest figure in seven months. In less than a week it is back to 72, the low for October. Note that the related periods a month before and after show nothing like this. There was a total eclipse of the sun, visible in the southern hemisphere on Oct. 23!

How about the bump in the November curve (broken line) centered on the 18th? Well, it "just happened" that Jupiter and the earth were lined up on the same heliocentric longitude during that afternoon.

It is not without interest that major changes in the appearance of the sun accompanied both these events. New England skies were overcast during the eclipse period, but our first view of the sun after the eclipse was worth waiting for. On the 26th there was a large and active-looking sunspot group of the new cycle, just west of the central meridian.

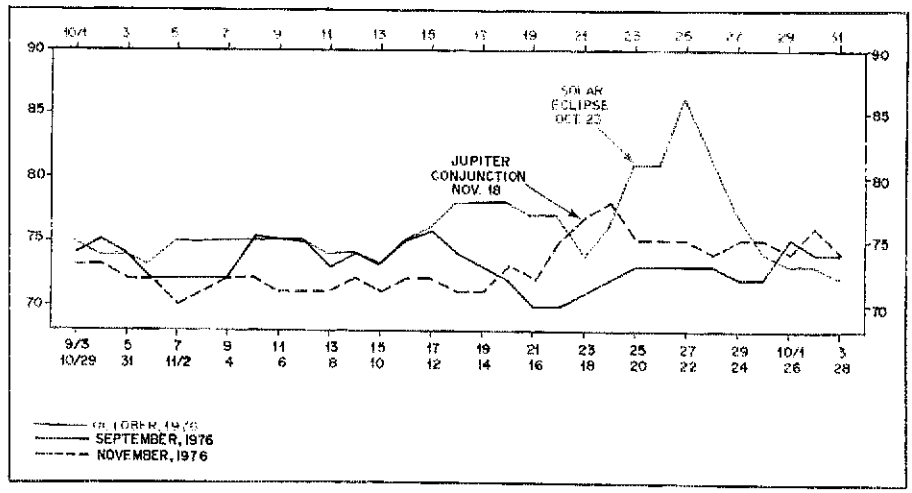


Fig. 1 — The solar-flux data for October, 1976, red line, shows a marked anomaly beginning the 21st. Curves for the comparable periods of September, black line, and November, broken line, show no variations that are related to October by the rotational period of the sun.

If this had been a recurring activity center, we'd have seen it on the 21st, the last sunny day before the eclipse. This group was "born" the day before the eclipse, and Boulder confirms that it quickly grew to become by far the largest active area of the new cycle, to date.

Viewing weather was better for the November period of interest. On the 17th a promising group came around the east limb of the sun. It grew in size and activity through the 19th, and sustained some of this until it went around the west limb on the 30th. Was this triggered by some force associated with the Jupiter-Earth-Sun alignment of the 18th? It was not a recurrence of the October activity. It was days too early for that, and in a much lower position on the sun than the "eclipse group."

Old Cycle – New Cycle

For at least two years the first question raised in any discussion of propagation has been "Where are we in the sunspot cycle?" Soon after would come "When is 10 meters going to be good again?" Until the past few months the only honest answer to both was "I don't know, but . . ." followed by some pretty involved alibis. Though the demise of Cycle 20 was the most studied and best documented solar minimum ever, the best "predictions" about it were made after it was over. Here are ours.

That the sun seemed near the magic turning point several times is obvious from the statistical record of the 2800-MHz solar flux for the past three years, see Fig. 2. Any of several lows could have been the end of Cycle 20, in terms of the time passed since the Cycle 19 minimum in October of 1954. (There have been several cycles shorter than 10 years.) The chart shows highs, lows and averages for each month. Even in 1974, real downtrends seemed to get underway at least twice. The minimum-flux reading got down to 70, or close to it, in five months of that year. But the monthly average went under 80 only once, and the year's average was almost 87. The year 1974 was not a bad one for DX. There were surprising surges, especially one in early October, that pushed conditions to cycle-peak levels. With the solar flux hitting 145, VUs and JAs were worked from the Northeast on 10 meters — no routine thing at any time. A huge sunspot group was in evidence in this period.

Beginning in November, a five-month decline followed by a four-month trough looked as if Cycle 20 was really going out, especially when the bottom came in June, 1975, the "right time" statistically for the end. There was no visible sunspot activity the first 10 days of that month, as the solar flux coasted along at 66, give or take a few tenths. This is the "quiet sun" level, but just as we were getting ready to bury Cycle 20 a new outburst of activity started, and all the numbers shot up again. They held up much of the time through the summer, the solar flux reaching the 1975 high of 125 on Aug. 5. The sun was crawling with spots, but they all crawled along the solar equator, tying them to the "dying" Cycle 20.

High-latitude sunspots, hesitant and faint harbingers of Cycle 21, were seen back in the latter part of 1974. But you had to look quickly and often with a good telescope to see these "here-today, gone-tomorrow" wraiths. One of the virtues of visual observation was that it certified that there was going to *be* a Cycle 21. These spots identified themselves as part of it by their positions, well above or below the solar equator.

After a brief spurt in November, 1975, detailed in reference 3, another downturn began. Would this be *it?* The

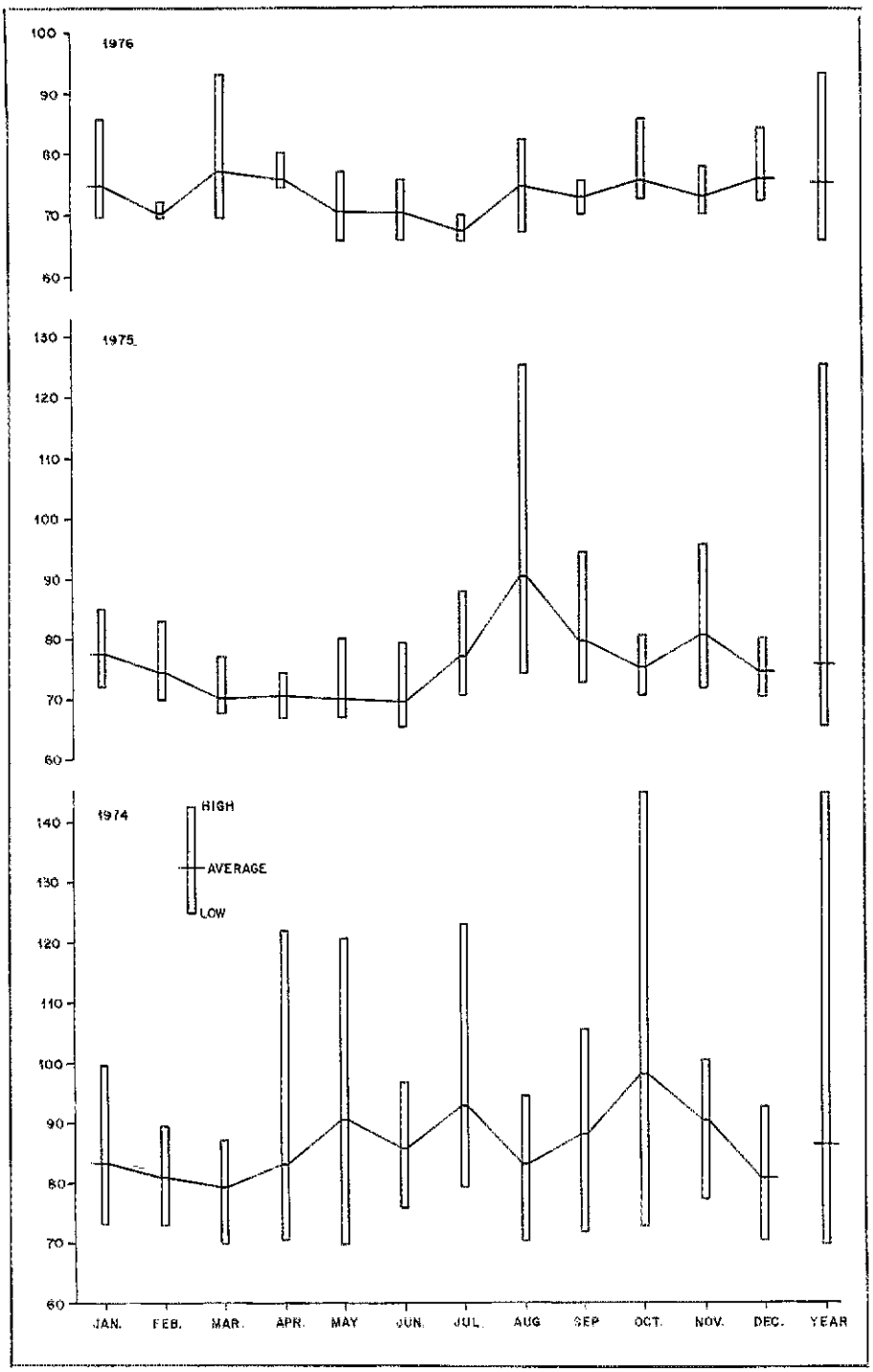


Fig. 2 — 2800-MHz solar-flux record for the past three years, showing monthly and yearly highs, lows and averages. Can you find the bottom of Cycle 20? Figures for January and February, 1977, not available when this chart was made, show impressive gains.

tiny rectangle representing February, 1976, in Fig. 2 certainly looked that way. It had the lowest "high" yet, 72, and most of the month and the first 11 days of March were at 69. When this figure is adjusted for the nearness of the sun to the earth in the early part of the year, 69 is close to quiet-sun conditions. But another surge began March 16, and the flux shot up to the 1976 high of 92, in five days. The sunspot activity associated with this resurgence was all close to the equator, identifying it as another Cycle 20 blowup.

April, 1976, is anything but impressive in Fig. 2, but score points for visual observation here, because on April 18 we saw our largest spots of the new cycle, up to that time. Well south of the equator, they grew in size, instead of fading out as earlier new-cycle ones had. We followed them for four days. In this time they lagged behind an old-cycle group with which they were sharing the solar disk; further proof of their new-cycle identity. (Solar areas above and below the equator rotate more slowly than the region right along the belt line.) Late April and early May brought more Cycle 21 groups. These were small and short-lived, and well north of the equator. Their visit was overshadowed by the more spectacular Cycle 20 activity discussed in reference 3.

It was not easy to discern as we went along, but in retrospect we see the real turning point in mid-1976. The first half of June was dominated by yet another Cycle 20 resurgence, a long-lived recurring area making its fifth run across our field of view. The real news came later in the month: A cycle 21 group that lasted through an entire transit of the solar disk, the first new-cycle activity we saw do this. July was unimpressive from what we could see on the sun or from the appearance of it on our chart. It was the third month in a row with a low of 66. Its high, 70, is a record "low high," and the average, 67.45, the low point in our records.

This is *good* news? Yes, when one more point is made, which does not show in the charts or in anything but visual observation. If you sort out the sources of what little July activity there was and draw curves for the components of both cycles, the old-cycle curve drops almost to zero, while the Cycle 21 curve crosses it on the way up. Though activity has been mostly low, the rise since has been all new-cycle oriented.

Now, about the 10-meter band? There was a substantial increase in F-layer DX on 10 early in 1977, but there's really no point in going out on that limb now. The F-layer muf is always low in summer, and regardless of solar activity all 10-meter propagation beyond local will be via sporadic E from May until September. Such E-layer skip is little affected by any aspect of the solar numbers game. We'll risk one prediction: 15 meters will be open longer and 10 meters more often, this coming fall than in 1976. Don't expect miracles; things move slowly at first. But once it really gets going, the muf will rise fast. Another year should show some real progress.

When will Cycle 21 peak? How high? Get out February *QST*, and turn to page 28. Take your choice from the expert opinions there charted. A somewhat different slant is shown in Fig. 3, which plots the mean of 12 cycles, 8 through 20, Cycle 20 just concluded, and a recent projection for Cycle 21 that has impressive professional backing.

Sunspot Numbers and Cycles — Who Needs 'em?

Everyone should know by now that seeing sunspots is no great accomplish-

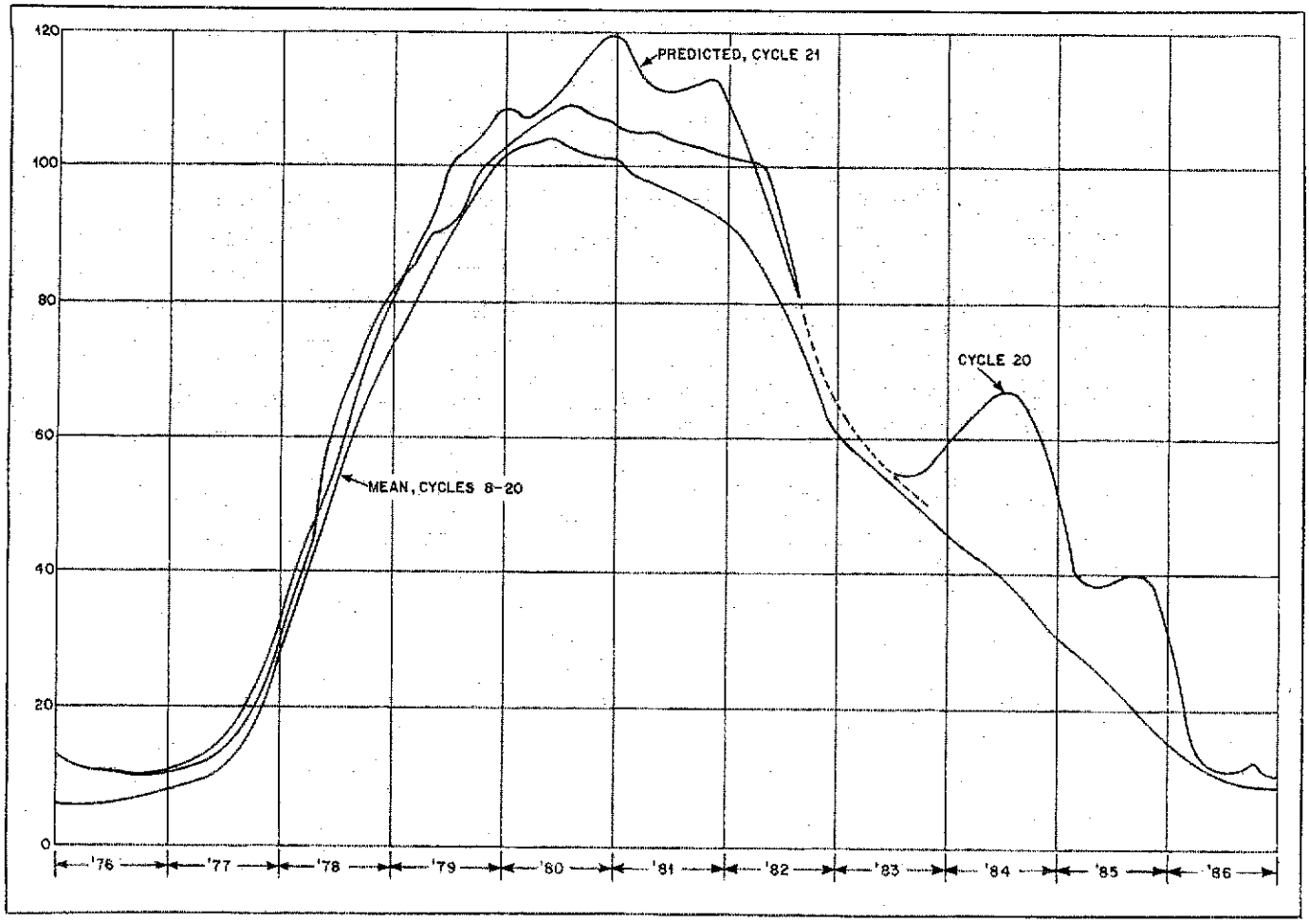


Fig. 3 — How will we fare in Cycle 21? The highest curve here is a recent projection for the new cycle. The peak below it is for Cycle 20, and below that is the mean of 12 cycles ending with 20.

ment. Anything *that* easy has to have technical limitations. Otherwise, Galileo, Hevelius and their thousands of followers in later centuries of sunwatching would have had better answers than we are able to give, at this late date.

What is "sunspot number," anyway? It is *not* the number of sunspots. Rather, it is a vague but time-honored index of solar activity that is still in use mainly because of its statistical link with the past. With it we can compare 1977 with 1777, in at least a rough sort of way, as to relative sunspot activity. The "number" is derived from many observations, and it is not available in any final form until months after the fact. Sometimes called the Wolf Number, after the Swiss astronomer who began using it in 1848, sunspot number is derived from $R = K(10g + f)$, where R is the Wolf Number; K is a rating factor based on the observer's equipment, skill, visual acuity and site quality; g is the number of sunspot *groups* visible; and f is the number of sunspots, regardless of size.

The limitations are obvious, and they have been for many years, but Wolf and others used the principle to work backward in time and establish a rough picture of sunspot numbers almost to the invention of the telescope in the early 1600s. By even rougher approximations and many other indicators, however questionable, sunspot numbers have been assigned back to before the Christian era.[4]

You can find your own rating by projecting the sun on a white card, with a dime-store telescope or binoculars. (Do not look at the sun without a filter certified as safe!) Assign yourself a K value of 1, and plug in the observed numbers. Use the sunspot number you get to find the equivalent 2800-MHz solar flux from Fig. 1, June, 1975, *QST*, or chapter 19 of the *Handbook*, 1976 or 1977 editions. Check this against the figure for the day given by WWV. Do this over a period of time, and adjust your K rating so your results track fairly well with the graph. Then, three months later, when the Zurich smoothed sunspot number is available, you can see how well you match the experts. Or forget the whole sunspot-number business, except as an interesting exercise, particularly if you intend to go into sun-watching seriously.

The longer one observes the sun, especially with advanced methods, and checks the ever-changing nature of radio propagation and other solar-induced terrestrial effects, the more one realizes that sunspots are not too important for our purposes anyway. They don't *do* anything; they're merely one indication of something happening on the sun. Sunspots and radio propagation variables are *by-products* of something else, not cause and effect.

The solar flux (and with it, radio propagation) can change markedly when there are no sunspots visible at all. And the number and size of sunspots, when we do see them, don't necessarily tell us very much about coming good or evil times in the radio realm. It's their day-to-day activity and growth or demise that matter. The 2800-MHz solar flux, as provided by WWV, is a much more useful indicator for today, or anytime in the 30-year record we have of it, than is "sunspot number," or even the size and number of spots seen at any one time.

Narrow-Bandwidth Sun Viewing

A device of great potential for understanding the sun and its effects on communication is the narrow-

bandwidth filter. The sun is mostly hydrogen, so it follows that if we can see the hydrogen wavelength only, we will see things happening that are lost in the white light associated with the sun's tremendous temperatures. Special filters are made for several wavelengths, hydrogen and calcium being the most common.

Since last September the author has been viewing the sun several times daily in both white light (with a proper solar filter) and with a DayStar hygrogen-alpha filter that has a passband of 0.7 angstrom, tunable either side of the 6562.8 angstroms. In this time there have been many days when no sunspots were visible in the white-light view, even with a quality telescope like the Celestron 5. But there has never been a sunny day when we didn't see some H_a activity. Many times there are bright patches, which can portend the coming of sunspots, show areas where spots formerly were, or active areas that may never have spots but which still affect propagation. Beautiful prominences, often looking like windblown forest fires on the solar limbs, identify active areas that may be up to three days around the limb, out of sight to full-light viewing. On the east limb they may warn of a sunspot group on the way. On the west limb they can show activity from a group that has moved around out of sight.

This is truly a "learning experience." We still have much to learn, and may have more on H_a observation at a later date. Meanwhile we warn, "Don't get too caught up in worship of sunspots or sunspot number." They're side effects – interesting and useful, but side effects, even so. We're developing the same feeling about sunspot *cycles*. They've been grabbing cheap headlines too long. The true picture of the sun is by no means that simple! QST

Footnotes

[1] A table showing some of the more useful time and frequency stations of the world is given in chapter 19, *The Radio Amateur's Handbook*. A complete detailed list is given in the *World Radio and TV Handbook*, Gilfer Associates, Inc., Box 239, Park Ridge, NJ 07656.

[2] Tilton, "The DXer's Crystal Ball," *QST*, June, August and September, 1975. Also chapter 19, *The Radio Amateur's Handbook*, 1976 and 1977 editions.

[3] Tilton, "Radio Astrology" *QST*, October, 1976.

[4] Lynch, "The Maunder Minimum," *QST*, July, 1976.

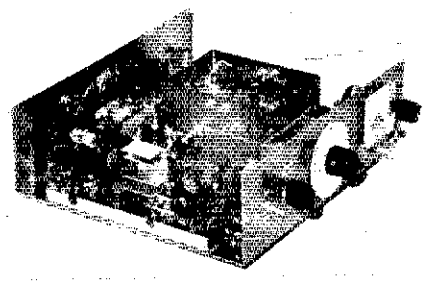
Strays

FROM WORKSHOP TO ANTENNA WITH HOMEMADE EQUIPMENT!

□ Here is additional mute testimony to the game of constructing one's equipment rather than purchasing it! This equipment, built in a truly masterful fashion, should offer incentive to others who have slipped away from our early heritage of assembling our own station equipment. The examples shown here were provided by John Lawson, K5IRK, who duplicated the 10-watt, 40- and 20-meter cw transmitter from the 1975 edition of *The Radio Amateur's Handbook* and built the Mini-Miser's Dream Receiver from *QST* for September of 1976.

In the exterior view of the equipment we find the transmitter on the bottom – looking like a carbon copy of the original, which was built for the *Handbook* by WA1JZC. The *QST* receiver sits atop the transmitter. John did a fine job of making the units similar in appearance.

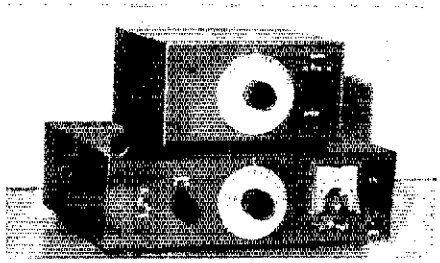
He reports having been a QRO type of operator for some 19 years, and upon switching to QRP he became "simply amazed" at the success he's enjoying at the low-power level. The interior view



Inside, the custom-made transmitter looks as clean as any commercial equipment.

of the transmitter indicates that he's no slouch when it comes to doing neat work! Perhaps the main message one can extract from this type of amateur effort is found in John's words, "It is hard for me to describe the personal satisfaction and pleasure that has been derived from the construction and actual on-the-air operation of these units."

How about you readers? Are your soldering irons hidden by cobwebs? Maybe it's time to join the parade of homemade-equipment enthusiasts! — *W1FB*



The "homebrew" receiver and transmitter shown here make a very neat matched set.

GERMAN RTTY AWARD

□ Those working RTTY will again be eligible for the annual Europaeisches RTTY Diplom (EURD) and Deutsches RTTY Diplom (DRD) of the Deutsche Amateur Fernschreib Gruppe (DAFG). The EURD is based on two-way RTTY contacts with different European countries and prefixes, and the DRD is to promote amateur RTTY activities. For more information, write to DAFG, Award Manager, Post Box 1663, D-4140 Rheinhausen, West Germany.

Results of the Ninth Worked All Europe DX Contest (WAEDC), 1976, RTTY

Single Op

STATION	SCORES	STATION	SCORES
CT1EQ	170317	ZP5WO	9344
I8AA	118065	SM6ASD	9322
I5GZS	79002	SM5EIT	8280
I5KPK	74191	OZ4FF	6850
I1CO8	63896	OZ4DZ	6512
F8XT	56742	WØMT	4920
HB9AVK	44422	DJ9MQ	4824
DJ6JC	39754	VE2QO	4662
DJ4KW/4X	39308	OK2BJT	2640
OK1MP	39304	PAØCWI	1581
DL6BI	29106	F8RZ	1482
SM6AGV	27612	YV5GU	1275
LZ1KAB	23808	OK1KZE	840
I5HZZ	22022	DJ3TI	676
DJ2YE	21080	DL1OY	544
WAØYDJ/4	18232	DL8KQ	360
DJ9IR	16008	DJ1QT	264
IT9VBJ	14637	OH3IH	168
I3FUE	13231	DK4IS	140
DL8QP	12546	EA3AHM	96
K6WZ	12400	SM6CAL	64

Trophy Winners

CT1EQ	Europe Single Op
I1PYS	Europe Multi-Op
WAØYDJ/4	North America Single Op
W1MX	North America Multi-Op
DJ4KW/4X	Asia
13-13018	SWL

Multi-Op

STATION	SCORES	STATION	SCORES
I1PYS	169257	DLØBU	18762
W1MX	57400	UK2BAB	17236
DLØTS	56575	OH1AR	11473
UK3ACR	49644	G3UUP	11125
UK2GAX	49280	TF3IRA	6118
G4ALE	28842	OH1AD	4680
DK1OFF	20701	SK6AW	2160

SWL

13-13018	55945
OK2-5350	41250
I3-14258	17784
I4-14707	17664
I1-56889	11200
HE9KNO	3726
UA3-170305	1092
UA3-117146	440

Check Log: DJ1XT, DJ8BT

Slant-Wire Feed for Grounded Towers

Planning on shunt feeding your tower for operation on 160 meters? Confused about which type of matching method to use? If so, take a look at this simple system!

By Walter Schulz,* K3OQF

There have been a number of fine articles in the amateur literature describing shunt-fed towers using gamma-rod systems and various matching networks. Many of the networks that are commonly used are of high *Q*. This tends to limit the operational bandwidth of the antenna system unless the network is made variable and readjusted each time the frequency of operation is changed a few kilohertz.

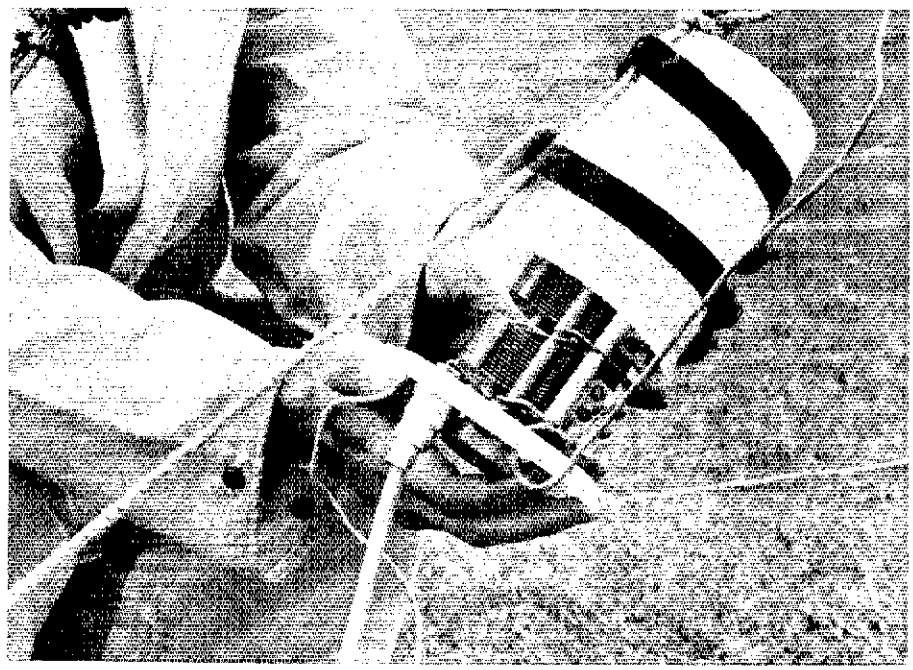
Hoping to find a solution to this problem, I decided to try a slant-wire feed system.[1] This method for feeding grounded towers was worked out by engineers in the 1930s. The system consists of a wire slanting down from the tower at a 45-degree angle (see Fig. 1). Connected in series with the ground end of the slant wire is one side of a variable capacitor. The center conductor of the coaxial-cable feed line is connected to the other side of the capacitor. The braid of the feed line is grounded to the radial system, providing a return path to the base of the antenna. Since the rotor and stator of the capacitor are hot, they must be insulated from ground. The system shown in the photograph not only isolates the capacitor from ground, but also protects the capacitor from the weather.

Finding the Tap Point

According to the material in ref. 2, the proper tap point on the tower (for a 50-Ω impedance) is located approximately one fifth of the distance up the total *electrical height* of the tower. This is quite simple to figure if the tower has no antennas mounted on top. For the higher bands, most amateurs who own towers have an antenna, such as a quad or Yagi, mounted atop. In these cases the electrical height of the tower can be considerably different than the physical height. The antenna on the top of the tower can be considered as a sheet of parrallel conducting wires which acts as a top-loading capacitor. The amount of capacitance that this presents to the system can be calculated using the information contained in refs. 3 and 4.

Once the amount of top loading is known, the electrical height of the tower can be figured using the equations contained in refs. 5 and 6. The overall electrical height of the system is the sum of the electrical height of the tower alone plus the additional electrical height caused by the top loading.

If the reader does not wish to work through the somewhat involved mathematics, he can refer to a chart developed by W4OQ[7] which shows the electrical



Shown here is the method of mounting the capacitor to isolate it from ground and to protect it from the weather.

*3617 Nanton Terrace, Philadelphia, PA 19154

[1] References appear on page 24.

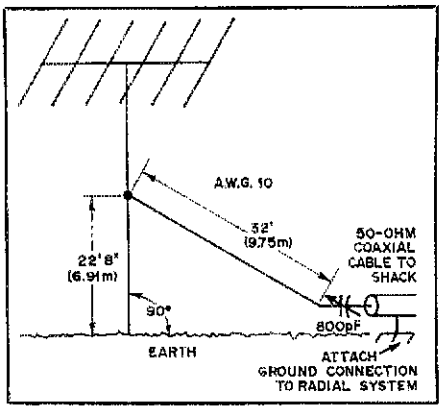


Fig. 1 — Diagram of the slant-wire feed system. The feed wire should form a 45-degree angle with the tower and ground.

height of a tower as a function of physical height and the type of antenna used as top loading. This chart is relatively accurate and is a convenient time-saver. Once the electrical height has been found, the tap point can be calculated as one fifth of this dimension.

Tap Adjustment

Since the chart and equations do not take nearby objects into account, it may be necessary to find the exact tap position experimentally. One way to locate the tap point is to measure the impedance at the bottom of the slant wire with an rf impedance bridge or calibrated rf noise bridge. Move the position of the tap up or down the tower until a 50-ohm resistive component is indicated by the measuring device. Once this has been done the series capacitor should be installed in the slant wire. Adjust the capacitor for zero reactance as indicated by the rf bridge.

Comments

The system used at K3OQF consists of a 55-foot tower topped with a TH6DXX triband beam. The tap point is at the 22.7-foot level and the slant wire is 32 feet in length. The ground system consists of 52 radials, each 35 feet long. Using 50 watts of input power to this antenna system, I have worked stations from Canada to the Gulf of Mexico.

The author would like to thank W4OQ and W2DU for their contributions to the discussions which resulted in this project.

References

[1] "The Shunt-Excited Antenna," Proceedings of *IRE*, June, 1937, pp. 637-696.
[2] Terman, *Radio Engineering Handbook*, McGraw-Hill, 1943, pp. 845-847.
[3] Laport, *Radio Antenna Engineering*, McGraw-Hill, 1952, p. 29.
[4] Hodgman, *Handbook of Chemistry and Physics*, Chemical Rubber Publishing Co., Cleveland, OH, pp. 2332-2334.
[5] Jasik, *Antenna Engineering Handbook*, McGraw-Hill, 1961, p. 3-7.
[6] Jasik, p. 19-3.
[7] "Grounded Vertical Radiators," *Ham Radio*, May, 1975.

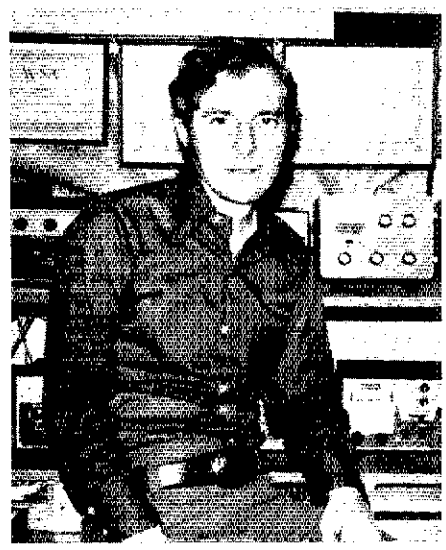
Strays

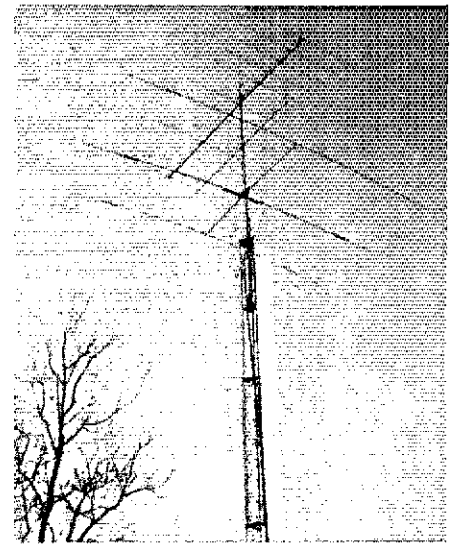
□ Noel Eaton, president of the International Amateur Radio Union, joined 24 other members of the Guelph, ON, Amateur Radio Club on a recent surprise visit to the home of Fred Hammond, VE3HC, to present him with the ARRL Certificate of Merit for his many contributions to amateur radio since the early 1920s. Dr. Maine, Member of Parliament for the area, delivered a letter from Prime Minister Pierre Trudeau. Several short speeches were made and radiograms collected by VE3GOL and VE3CDK from U.S. and Canadian amateurs congratulating Fred were read and displayed. Full press and TV coverage was provided. The TV people were especially impressed by Fred's museum of early ham gear, and the event provided plenty of goodwill toward amateur radio. – *VE3GT*

□ Wade Achord, WB7DNC, is another high-speed ham. He became disenchanted after four years of CB, so he bought a Tempo One, put up 50 feet of wire, and began listening. His Novice license was issued March 5, 1976, but meanwhile, he passed his Technician test in January, 1976, his General in February, and his Advanced in March. He missed a try for Extra Class in June, but on January 28, 1977, he made Extra Class, too, and he remains an enthusiastic amateur!

□ Once again radio amateurs have demonstrated their sincere desire and ability to help their fellowman. Leonard Carroll, W6LXH, of Petaluma, CA, explains.

"While having a nice QSO with KØSTF, Jack Brand, of Rapid City, SD, I mentioned that I was convalescing from a heart attack. During my transmission my rig went dead. I diagnosed the problem as a blown fuse, and began to search for the proper size. After approximately 15 minutes the fuse was replaced and I got back on the air. To my pleasant surprise I found that KØSTF had kept the same frequency, and was frantically trying to contact someone in my area, who could by phone or otherwise check on my physical condition. I have no idea how many hams were involved, but I do particularly wish to thank KØSTF and WA6ALC, Franz Kurth."





Gene Barnes, WA5CBT of San Antonio, is the first applicant for the brand new ARRL 6 Meter "600 Club" Award. Gene met the requirements in just seven weeks and says he had a great time chasing contacts for the award. WA5CBT found that QSL returns were about 78 percent, much better than he ever had on hf. On top of his 50-foot tower is a 6-meter 8-element KLM, below, an 11-element 2-meter beam, and on the bottom a 3-element trap beam for 10-15-20 meters. Gene says that the 10-meter section of his SB-200 is modified for 6 meters and that the TV-6B to the left of the scope is a homebrew 6-meter transverter built to match the Drake line. Gene thanks all those he worked on 6 who made his feat possible, plus SMIRK.

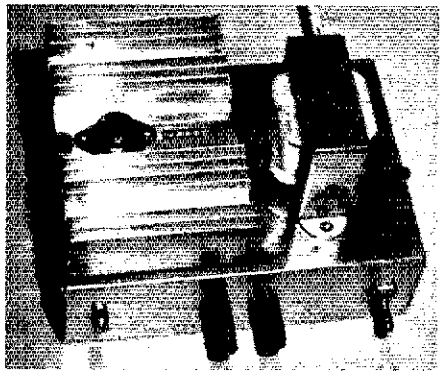
The 5 X 3 Power Supply

If you're looking for a clean-cut, simple-to-build power supply for operating those 5-volt IC projects, here's the ticket. It will get the job done!

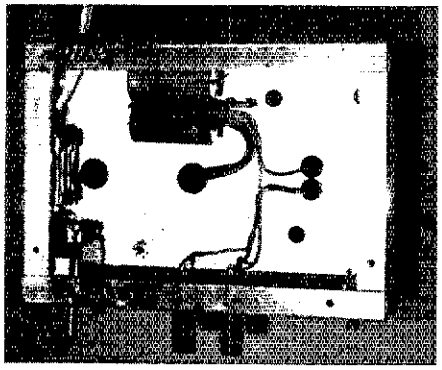
By Ken Powell,* WB6AFT

As most of us recall from the vacuum-tube era, the addition of a voltage regulator to a receiver or VFO made quite an improvement to the circuit stability. It was a very easy addition since it required only a series resistor and a regulator tube. The cost was minimal since the component count was low. This modification was probably made on many thousands of low-cost receivers as a first step in getting more performance for our amateur dollar. One severe limitation to this simple scheme was the current handling capability of the VR tube, usually about 35 milliamperes. Of course more circuitry could be added to increase the current handling capacity but soon the regulator became bigger than the gear to be regulated.

As we ushered in the solid-state era, the Zener diode came along and, like the VR tube, it was easy to use. A series resistor and a Zener diode did the job. However, as with the VR tube, the amount of current that could be handled was a limiting factor. So once again we find that, in order to regulate a larger amount of current, we must increase the circuitry by adding a series-pass transistor and using the Zener diode as a reference. Very similar to the vacuum-tube days! Then along came the integrated circuit, and with it the IC voltage regulator. The IC regulator put it all together in a neat little package. These devices usually referred to as three-terminal regulators combine the simplicity of the Zener diode with much greater current-handling capacity. Put unregulated dc in one terminal and get regulated dc voltage out of the other terminal. Minimal components and minimal cost!



The 5 X 3 power supply in finished fashion. The LM5000 is nested on the large heat sink which occupies most of the top of the chassis.



Interior of the power-supply chassis. The 3/4-A fuse is at the left and the electrolytic capacitors are at the top.

IC Regulators

If you have done much work with ICs, you have probably used these devices, especially the LM309K, which is the most popular of the 5-volt regulators and I am sure you will agree that for the cost, the effective design and simplicity are hard to beat. It is a neat little TO-3 package that provides 5 volts at 1 ampere and is just the thing for TTL power supplies. However, once again I encountered the current limitation. Some of the more ambitious amateur projects I have built, such as electronic TTY or frequency counters, require five volts in excess of one ampere.

After many hours of looking over data sheets, I came up with a suitable regulator for larger loads. This unit, the LM5000, is a two-terminal, TO-3 package rated at 5 V and 3 A. I tried this relatively new unit and found it to function so well in an IC project that I decided to build a small bench supply for TTL work utilizing this regulator.

The supply requires a minimum of parts, no adjustments, and can be assembled in a few hours. Best of all, because of the internal protection designed into the IC regulator, it appears to be indestructible. The internal protection has proven to be a good thing to have on more than one occasion, both in the bench supply and in the IC projects I have used this regulator for.

Circuit Description

The circuit, as depicted in Fig. 1, consists of a 12-V power supply and the three terminal regulator. A 12.6-V filament transformer rated at 3 A feeds a full-wave bridge rectifier. The rectifier is a single unit device rated at 6 A and 200 PIV. This package was used because it is easier to mount and wire than discrete diodes. The rectifier output is filtered by a 2000-μF, 35-V dc capacitor. The filtered dc is applied to the regulator which in turn furnishes 5-volts output, ± 100 millivolts. The 5-V output is filtered further by a 150-μF, 16-V dc capacitor. The power-supply output is monitored by means of a light-emitting diode which also serves as a pilot lamp for the unit. The negative side of the output is left above ground for the bench supply so as to facilitate its use as a negative voltage source, if required.

Construction

The power supply was constructed on a 5 X 7 X 2-inch chassis but could be reduced in size if a more compact package was desired. A meter could be added to read the output current. The power transformer is a Radio Shack unit rated at 12.6 V, 3 A, center tapped. The center tap is not used in this applica-

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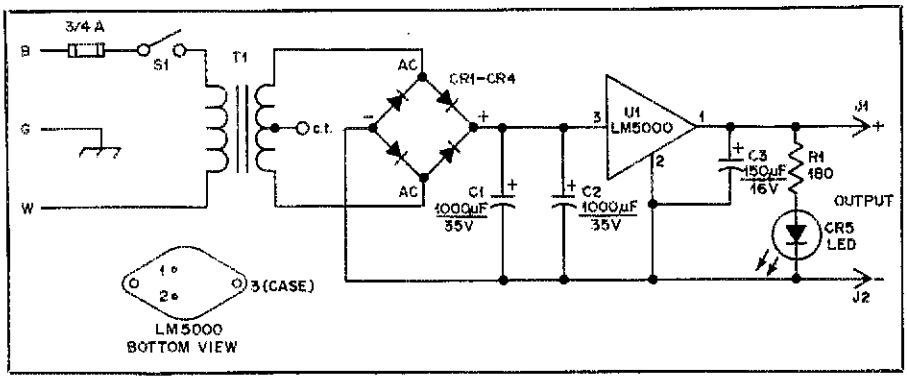


Fig. 1 — Circuit diagram of the power supply.

C1, C2 — 1000-µF, 35-volt electrolytic. Also, it can be a single unit, 2000 µF, 35 volts (Radio Shack 273-1511).
C3 — 150-µF, 16-V electrolytic.
CR1-CR4 — 6 A, 200 PIV (Radio Shack 276-1172).
CR5 — LED (Radio Shack 276-047).
J1, J2 — Terminals (Radio Shack 274-662).
U1 — LM5000 (EEP Inc., 10150 W. Jefferson, Culver City, CA 90230).
Also, one heat sink (Burstein-Applebee no. 12A2227), one chassis (Radio Shack 270-246).

tion. The bridge-rectifier unit is rated at 6 A, 200 PIV. This is a little heavier than required but costs only a few cents more than one that might prove marginal in performance. The input filter capacitor, 2000 µF, 35-V dc, is actually comprised of two 1000-µF units in parallel since these were more readily available. The transformer, rectifier and input filter capacitors are not critical and components of equal or higher value could be used; however, 2000 µF is about the minimum amount. A capacitor of lesser value will cause problems as the supply load approaches the 3-A mark, since the output ripple will increase with the load. The output filter capacitor, C3, should be mounted directly at the terminals of the IC voltage regulator to minimize the possibilities of the circuit oscillating. The output capacitor should be a good quality unit. The value of the output filter does not appear to be critical but should be 100 µF or greater to minimize output ripple.

The heat sink is 3 × 4-1/2 × 2-1/2 inches high. This is about the minimal size sink that can be used in order to keep the case temperature of the IC regulator down under heavy loads. The heat sink is insulated from the chassis with grommets on the mounting hardware as depicted in Fig. 2. The IC regulator is mounted to the heat sink using heat-sinking compound. The insulating procedure should be used as the IC case and heat sink are at a 12-volt potential.

The output indicator, CR5, is a standard 20-mA unit with a 180-ohm, 1/2-watt resistor in series to limit the LED current. Both the positive and negative output terminals are insulated from the chassis so as to allow the use of the supply as a negative source.

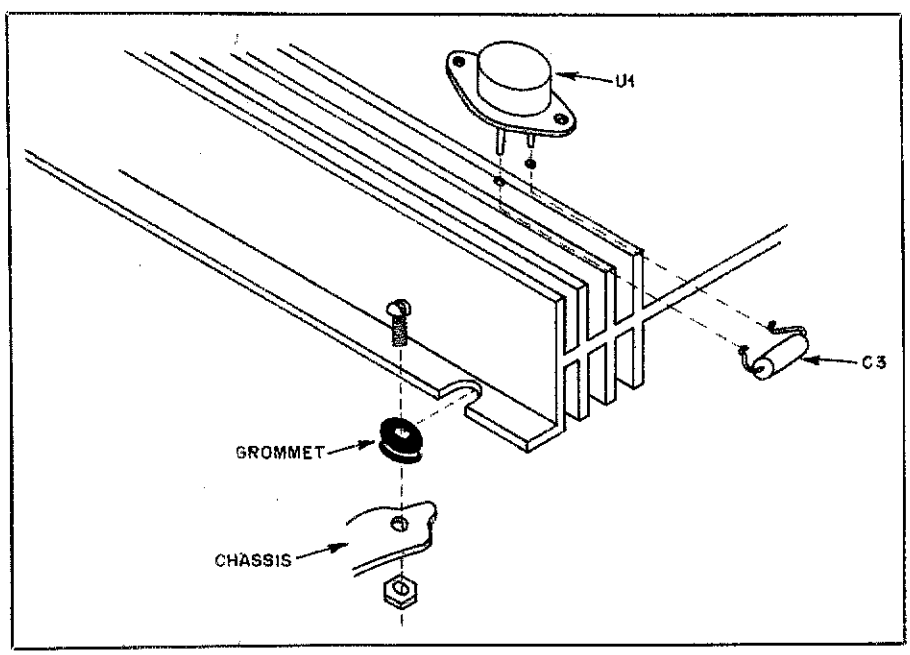


Fig. 2 — Mounting details for U1 and the heat sink.

Testing

Since there are no adjustments in the circuit, I guess we could say it either works or it does not! The LED will indicate if the 5-volt output is available. You can measure the output with a voltmeter, and it should read five volts, plus or minus 100 millivolts. This should provide a good check of your voltmeter as I found these regulators to be very accurate. If an oscilloscope is available, the output of the unit can be checked for oscillation and ripple. If oscillation occurs, check the connections between the output capacitor and the IC regulator terminals. If this does not cure the problem another output capacitor should be tried.[1] If a scope is not available you can check for oscillation with a signal tracer or an audio amplifier coupled to the output of the power supply via a 0.05-µF capacitor. If all is normal, the output of the tracer or amplifier will be nil.

Utilizing my old bench scope, the ripple measured approximately 10 millivolts under full load and fell appreciably as the load was reduced. Increasing the value of the input filter capacitor will further reduce the ripple if your particular application requires it. For normal TTL work it doesn't seem necessary but might be required if you were powering voltage-controlled oscillators, op amps or comparators. Line regulation on the IC regulator is specified as 20 millivolts and load regulation is specified as 50 millivolts. I could not verify these parameters as they exceed the capability of the test equipment I have on hand.

Miscellaneous

Parts placement is not critical with the exception of the output filter capacitor which must be located at the IC regulator terminals. The power transformer was mounted on top of the chassis to prevent heat buildup under the chassis. But after many hours of operation, the transformer did not get very hot and could be placed under the chassis to conserve space. It is a good rule of thumb to keep the input filter capacitors within about four inches of the IC regulator input terminals.

The bench supply described in this article has been in use for about six months and has been a flawless performer. The same circuitry has been in use in other gear in the shack for about a year and I have not had a failure to date, so I know the circuit works. QST

[1] [Editor's Note: National Semiconductor also recommends bypassing the input, pin 3 to pin 2 with a 0.22-µF capacitor.]

Independent Sideband for Your Drake TR-4C

Voice and video now may be transmitted at the same time with this dual-sideband adapter. The capability of expensive equipment can be achieved with this economical unit. It's designed for "independent sideband"!

By Robert W. Gervenack,* W7FEN

Single-sideband lib? Equal rights for the uppers and the lowers? Whatever is involved, you may be stirred to join the isb movement. Fear not about dues, group gatherings or special allegiances. On this and the following pages you may find a way to become an isb (independent sideband) activist!

Isb is authorized for amateur use. So, again fear not. Think first of the times, while working in roundtables or nets, that you wished to withdraw a station to the other sideband in order to exchange information as the group's business continued to roll on. Perhaps, on the other hand, if you operate with slow-scan television, you've desired to transmit or receive video on one sideband and voice on the other. Well, read on!

What is about to unfold before your eyes is the way to make an adapter that will put you on the isb bandwagon. With a small amount of time, some effort and a collection of parts that is easy to acquire, that TR-4C at your operating position can have the isb capability of other more-expensive equipment.

The principle involved is not new. It takes advantage of the fact that all sideband transmitters generate both upper and lower sidebands. This same method may be applied also to other single-sideband transmitters, receivers and transceivers.

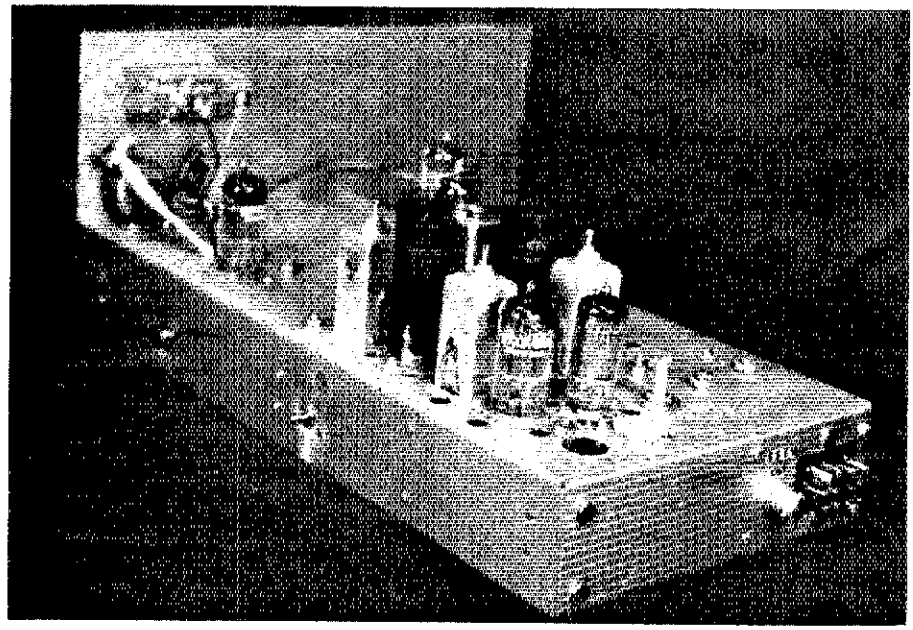
Design of the isb adapter is fashioned after the original TR-4C circuitry with the same type of parts and layout being used. Construction amounts to putting together a kit for which you make up the parts list while this article provides you with the assembly instruction. So, after a little more discussion, let's have at it!

Background

The first project was to build an isb adapter designed for use with a Collins 75A4 receiver and the KWS-1 transmitter.[1] Next to be tried was an isb adapter for a Drake TR-3 for YN3RBD/WA7SFY. The results were very encouraging. So, I started looking for a transceiver with which an isb adapter could be used, but one which would not require the drilling of holes or making physical changes in the cabinet. The Drake TR-4C filled the bill.

Since the Drake TR-3 and TR-4 series of transceivers employ sideband

[1] Footnotes appear on page 32.



The isb adapter for the Drake TR-4C transceiver.

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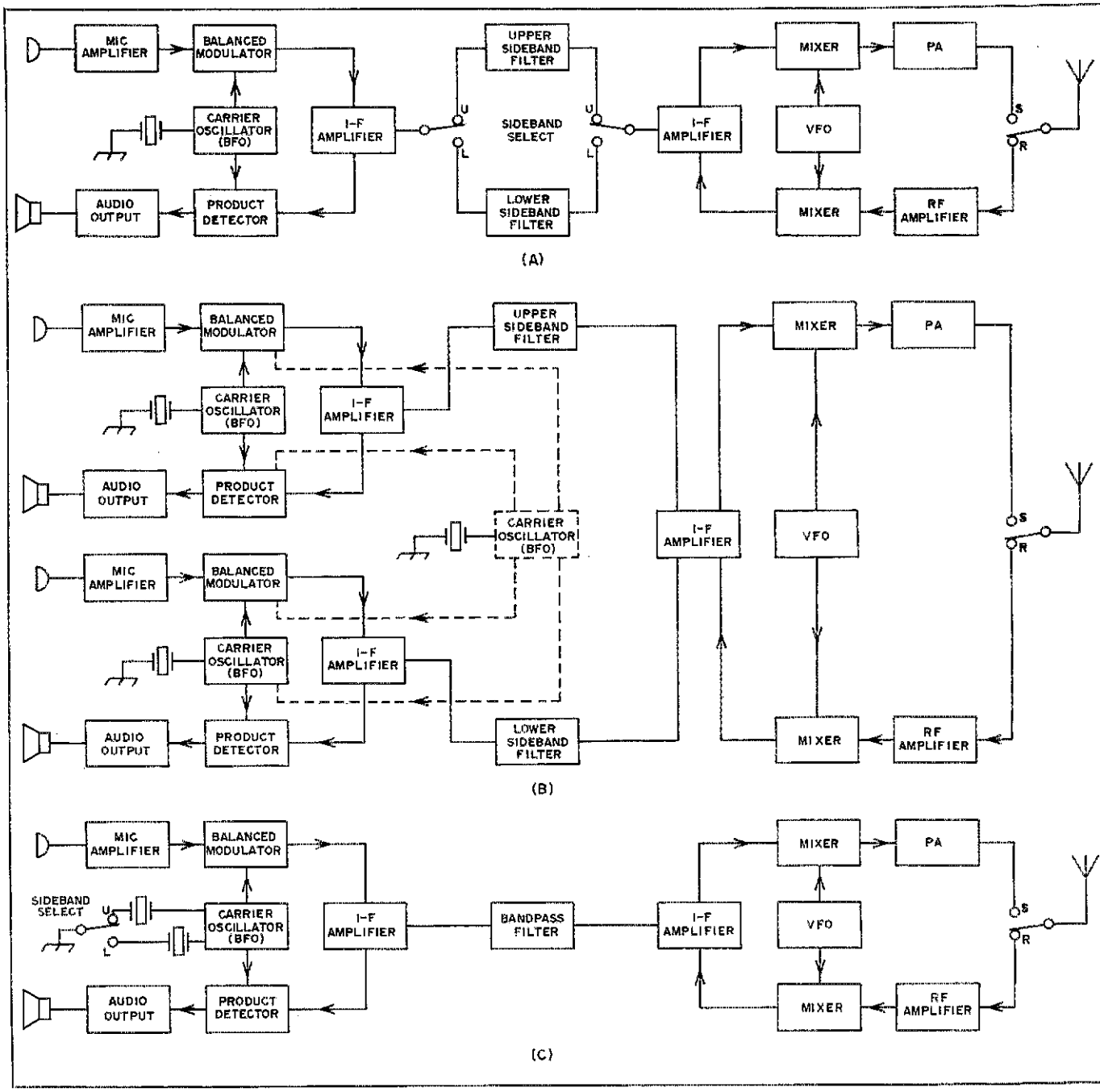


Fig. 1 — Basic block diagrams for filter type sideband transceivers. The arrangement used in the Drake TR-3 and TR-4 series is shown in 1A. A block layout for the TR-4C with isb is shown in 1B, while a basic plan for a transceiver using a band-pass filter is shown in 1C.

filters (integral components for isb operation), it is unnecessary to purchase separate filters for adapting them to isb. This saves about $200. See Fig. 1C. Another good reason for choosing the TR-4C is that it does not require the purchase of a crystal for the carrier (BFO) oscillator as well as other parts to make sideband filters compatible with the circuit.

All TR-3, TR-4 and T4X transceivers and transmitters use separate crystal-lattice sideband filters in the generation of the lower and upper sidebands. The oscillator uses one 9-MHz crystal to generate the carrier (BFO) frequency. The desired sideband is selected by switching in the related filter (Fig. 1A).

Most other single-sideband, filter-exciter cicuits use a band-pass filter and one of two crystals in the carrier (BFO) oscillator to obtain either of the sidebands. The chosen sideband is selected by switching in the proper crystal to generate a frequency above or below the band-pass center frequency, thus providing the selected sideband (Fig. 1C and Fig. 2).

To use a single-crystal carrier (BFO) oscillator, as in Fig. 1B (dotted lines), would require cutting and drilling th chassis of the TR-4C and the design of product detector for the isb adapte The TR-4C uses a 6GX6 as a carrie oscillator and product detector. Th frequency injection for the produc detector is through interelectrode ca pacitance. Thus, it was easier to dupl cate the 6GX6 circuit.

The "Nitty Gritties"

I am not trying to sell Drake bu simply to point out that an adapter t add isb to Drake equipment is les expensive than for equipment usin

band-pass filters. Basic steps are to duplicate the microphone amplifier, balanced modulator, audio output amplifier, product detector, carrier (BFO) and i-f amplifier. Secondly, it is necessary to wire each of the sideband filters to the original and the new circuit. All parts required for the adapter for the TR-4C may be ordered from Drake. Part numbers and values may be taken from the manual, as well as Figs. 3, 4 and 5A. Also refer to the caption for Fig. 1.

The adapter should be wired according to the TR-4C circuit shown here, rather than the manual. In my TR-4C, R57 is connected to the positive 235-V line at the S-meter. Also there is a 1-pF capacitor from the plus terminal on T11 to pin 1 (grid) of V11.

Ideally, it would be desirable to obtain a punched chassis with the oscillator shield plate from Drake. Whatever chassis is used, however, it should allow a parts layout identical to that of the TR-4C. Except for minor changes for components that are bypassed, the wiring should also follow that of the TR-4C.

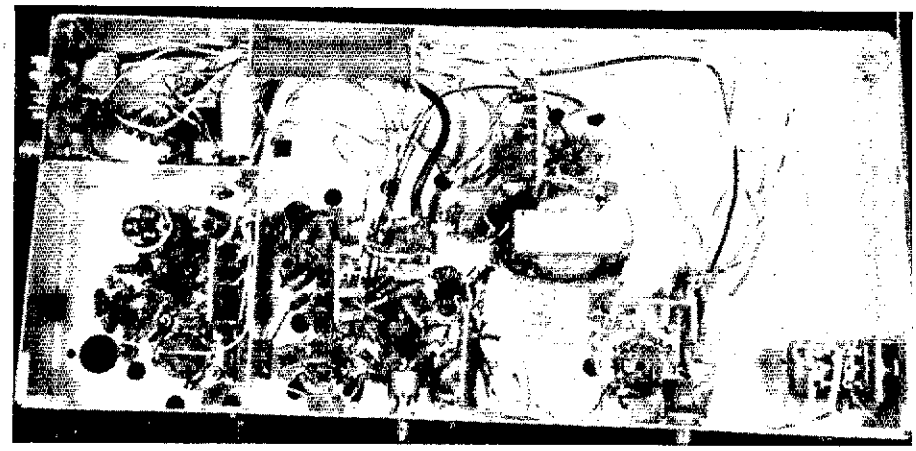
An auxiliary audio-output jack and switch are mounted at a location of the builder's preference to serve as an extra position for TTY, SSTV, FAX, or what have you. The switch is placed in the speaker circuit so that the speaker may be silenced while receiving other than voice signals. Indeed, it makes reception a pleasure to hear as the other station operator's voice comes out of the speaker while one is watching the picture but without the interference of the video impulses.

Other considerations could be the installation of a tuning indicator for TTY and/or SSTV[2] in the cabinet with the isb adapter. A relay may be added to the PTT line which would allow automatic lowering of the room lighting intensity while receiving SSTV. No attempt was made, however, to provide agc, since TTY and video are usually transmitted through the adapter at a reduced level.

TR-4C Wiring

As preparations to modify the TR-4C wiring are about to begin, a recommended step is to give the transceiver an alignment before proceeding further. It probably needs it anyhow. Follow this initial operation with the separation of the two sideband filters, a necessary maneuver so that each may be used in the ssb or isb mode.

Actual isolation of the two sidebands is accomplished in the i-f transformer, T6. Another winding, identical to the one with the 470-ohm resistor across it, is wound over the transformer coil. See Fig. 4. Follow this by wiring the two filters as in Fig. 1B to eliminate



A bottom view of the isb adapter showing the parts layout. Separate capacitors were used for sections A, B and D.

the sideband switch, S7. Since S7 cannot be rewired to suit circuit requirements in Fig. 4, the switch must be replaced. Observe that Fig. 3 and Fig. 4 are drawn according to the format supplied in the TR-4C manual with the same symbols as in the original Fig. 5-5 TR-4C schematic drawing.

Modifying the I-F Transformer

Begin the changes required for the i-f transformer T6 by making a sketch of the position of T6 as it appears on the chassis. Carefully show the wires connected to it. Then you can remove the wires from the terminals on T6, keeping in mind that they will be replaced. Now, remove T6 from the chassis.

Extracting the coil from the can is next in order. First, epoxy the two small terminals between the primary and secondary terminals of T6. Once the cement is firmly set, it is safe to remove the coil and begin by winding 5-1/4 turns of no. 33-cc wire over the lower small coil. Do this in the same winding direction that the lower coil is wound. To secure the new winding, apply some coil dope to the turns and allow it to dry. Once the dope is set, connect the leads of the added coil to the new terminals but do not solder them.

At this point you are ready to reinsert the coil in the can. Install and solder a 470-ohm 5-percent resistor across the new terminals. T6 is placed again on the chassis, and original chassis wiring is reconnected to T6.

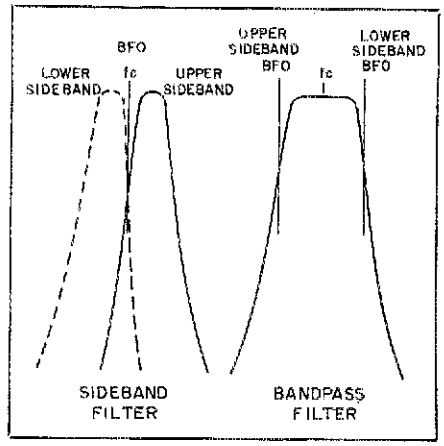


Fig. 2 — Filter-response curves for sideband and band-pass filters.

Replacing the Sideband Switch

To make the substitution for S7, several pieces of hardware need to be removed. Take off the knobs and the front panel, also the screws holding J2, but do not disconnect the wires. Unclamp the two lamp holders.

Remove the three screws holding the sideband filters. Unsolder and remove the wires on S7 (R) that are connected to the filters. Do take note of the wires that go to S1. After moving the filters aside and unsoldering as well as withdrawing the remaining wires on S7, the filter assembly may be lifted from the set, followed by removal of the switch.

With this bit of surgery over, it is time to reassemble the material. Insert the new switch, connecting and soldering the two wires from S1 and the coaxial line from T13. Replace the filter assembly. Remaining steps include wiring a length of RG-174/U between the new terminals of T6 and the lower sideband filter. Mount a coax jack in one of the holes on the rear plate but insulate it from the plate. A length of RG-174/U is wired from this jack to the switch as shown in Fig. 4. Lamp holders and J2 are remounted followed by installation of the front panel and knobs. The TR-4C should now be back

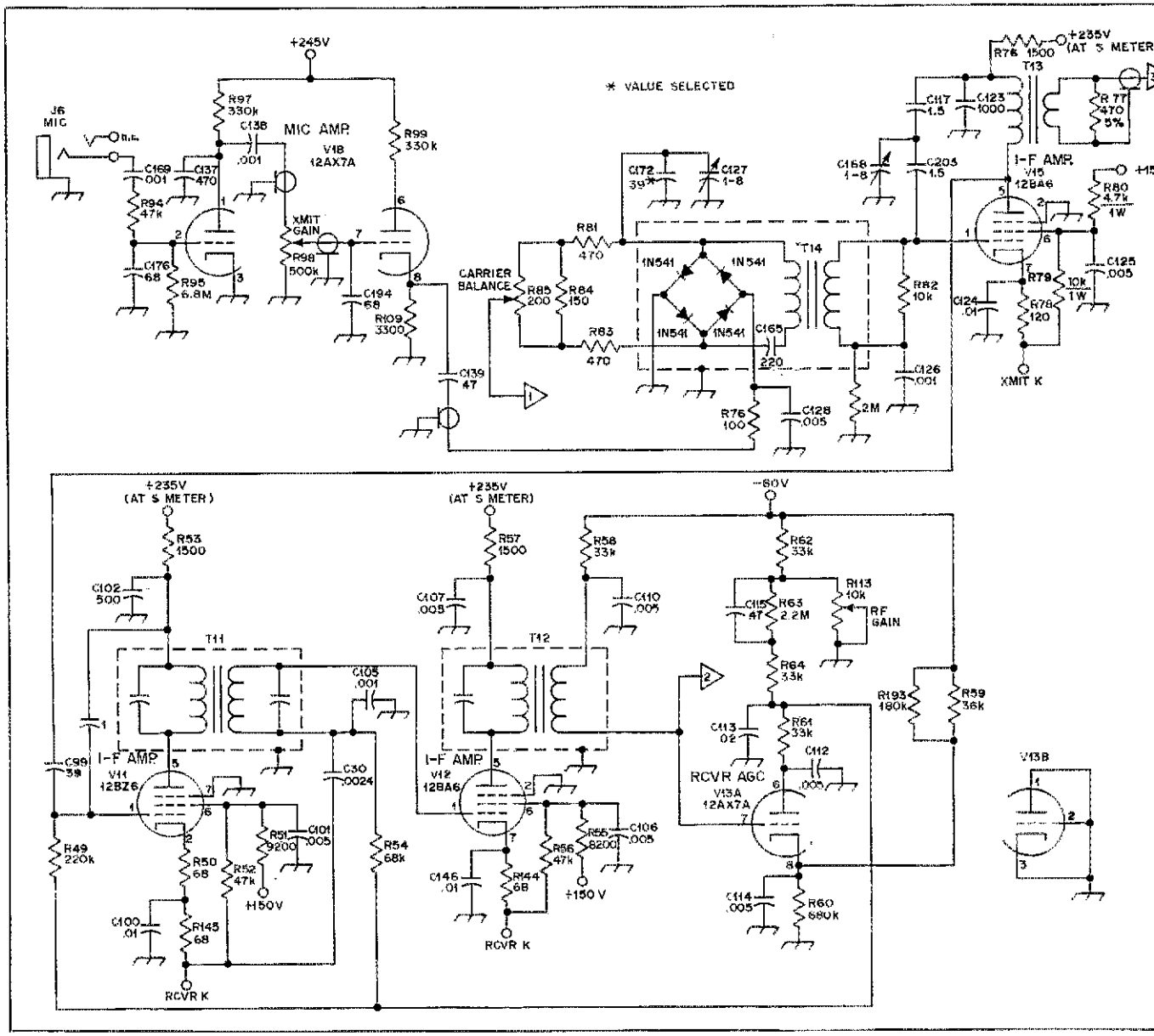


Fig. 3 — Circuit for the isb adapter to be used with the Drake TR-4C transceiver is shown above. It is fashioned after the original TR-4C with the same type of parts and layout.

Note the following: The audio card includes these parts — C135, C136, C142, C211, C212, Q5 (2N3877), R42, R181, R182, R183, R184, R185.

Also observe that a 12BZ6 is used in place of the 6BZ6 to balanc the heater circuit. R110 is changed from 2500 ohms at 7 W, to 6000 ohms at 5 W. R112 is changed from 2500 ohms at 7 W, to 3000 ohm at 5 W. R136 is changed from 1 MΩ to 2 MΩ. R141 and C84 are shunted with a jumper wire which may be opened to inject carrier fo testing purposes.

in its original ssb mode with the upper and lower sideband filters duly isolated.

Power for the Adapter

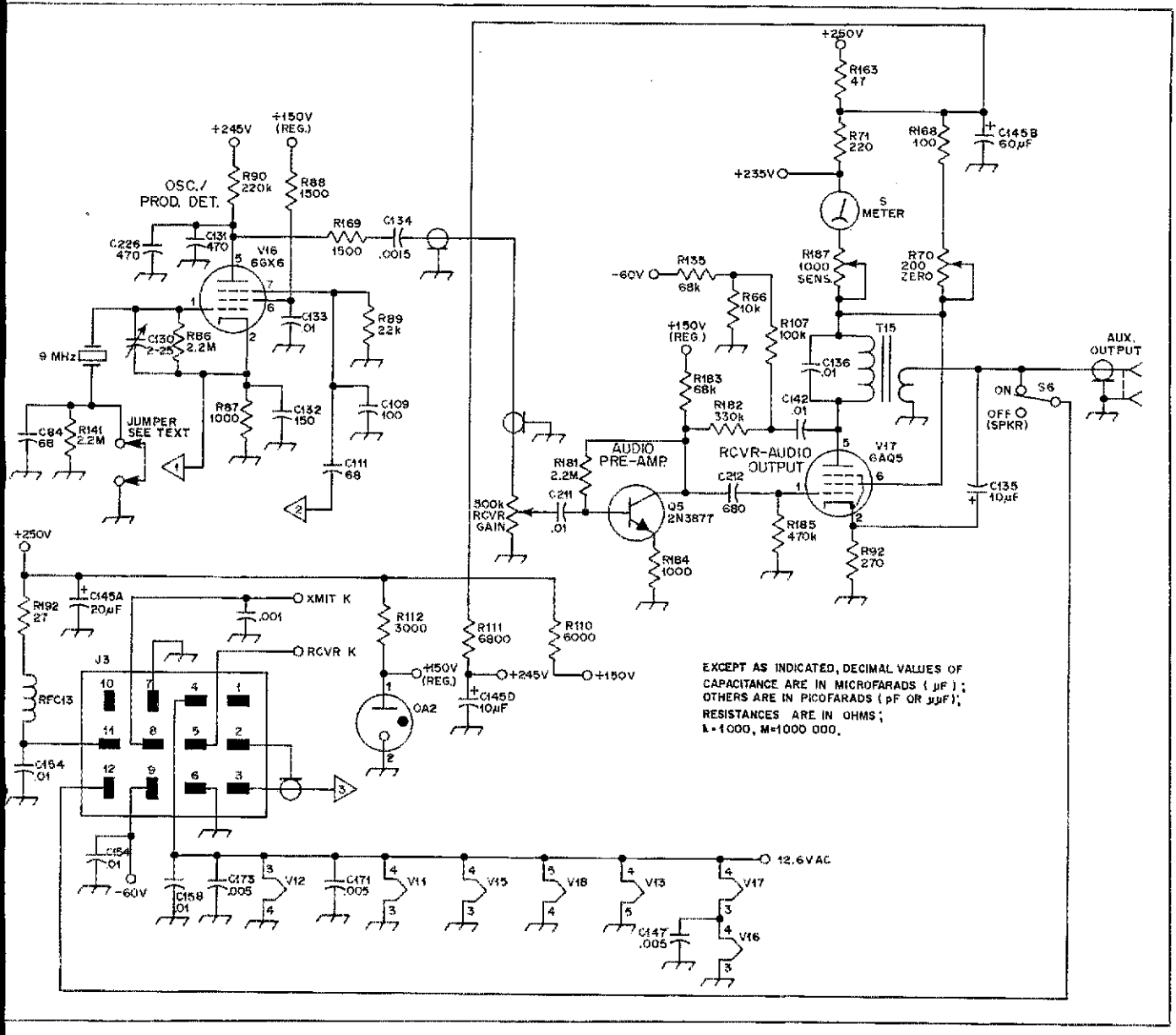
Voltages needed to make the isb adapter percolate are supplied from the TR-4C power supply. The arrangement and circuit for the cables, including plugs and jacks which are required to interconnect the adapter to the TR-4C, is shown in Fig. 5. The cathode transmit-receive lines for the adapter are obtained from J2, located at the bottom of TR-4C. Another suitable connector will have to be made if this receptacle is being used for an accessory. Be sure to use at least no. 18 wire for the 12.6-V ac heater leads. The rf output from the isb adapter is fed through the power plug via RG-174/U or RG-58A/U to a plug or jack on the rear of the TR-4C. See Fig. 5.

Tune-Up and Adjustment

If you and the TR-4C have survived to this point, then the moment of great reward is about to arrive. Align the adapter by following the procedure outlined for the alignment of the TR-4C. The two 9-MHz oscillators must be on the same frequency. If you have not already aligned the TR-4C, as previously suggested, that should be done before going further. The addition of a coil to T6 in the TR-4C probably will detune T6.

Referring to the alignment instru tions in the manual, proceed with th following steps. Disconnect the plat and screen leads of the amplifier tube where they pass through the partitio under the chassis. Plug in the prope cable connectors between the isb adap er and the TR-4C and the AC-4 powe supply. Turn on the power supply an adjust the bias.

Receiving sections of the TR-4C a to be aligned first. Since the two 9-MH crystal oscillators are in the circuit yo will probably hear a heterodyne. Adju C130 in the adapter to zero bea followed by adjustments of T6 and T in the TR-4C adhering to the techniqu carefully outlined in the manual und



Filter Matching Transformer (5-15) *except* step g. Adjust T11 and T12 in the isb adapter as described under Receiver I-F (5-13).

Adjust T13 in the isb adapter as indicated in steps 5-15. Do not, however, adjust T6 in the TR-4C or use step g. Properly set the S-meter for correct indication as explained in steps 4-2 and 5-19. This completes the alignment of the TR-4C and the isb adapter for ssb and isb reception.

Transmit Adjustment

The alignment of the transmit section of the isb adapter remains The carrier-balance controls and T14 need adjustment. They can be set roughly with the use of another receiver tuned to 9 MHz. Then, open the jumper across R141 to insert carrier in the sideband filter band-pass while leaving the TR-4C mode switch in the ssb position. The receiver is tuned for maximum S-meter reading. T14 is adjusted also for maximum S-meter reading. Once those moves have been taken, the carrier-balance control and C127 are adjusted for minimum S-meter reading. It will be necessary to pad or reduce the value of C172 if minimum S-meter indication is reached with C127 at maximum or minimum capacity.

Final adjustment of the isb adapter follows the same procedure as used in steps 5-14 pertaining to the balanced modulator and carrier balance as explained in the TR-4C manual. The exception is step e. The plate and screen leads are reconnected, leaving the jumper across R141 open. With the jumper open, the carrier (BFO) frequency is shifted in the isb adapter just as with the X-CW switch in the TR-4C.

Having accomplished the foregoing, it is time to turn on the power and adjust the bias. Follow the procedure again in steps 5-14 in the manual, except for step e. The TR-4C mode switch must be in the ssb position and the sideband switch should not be in the X position. To conclude the adjustments, disconnect the power and solder the jumper across R141. This completes the alignment.

Microphone Use and SSTV

The microphone-gain potentiometers on the adapter and the transceiver control the audio inputs separately for the two sidebands. I use an external switching arrangement to change one microphone, TTY, SSTV or other outputs to either the isb adapter or the TR-4C. The TR-4C sideband switch is used for quick selection of either the upper or lower sideband.

Because of the flexibility produced as explained here, a new source of pleasure can be derived from operating, especially with SSTV. Try setting the camera[3] in a position to be focused on

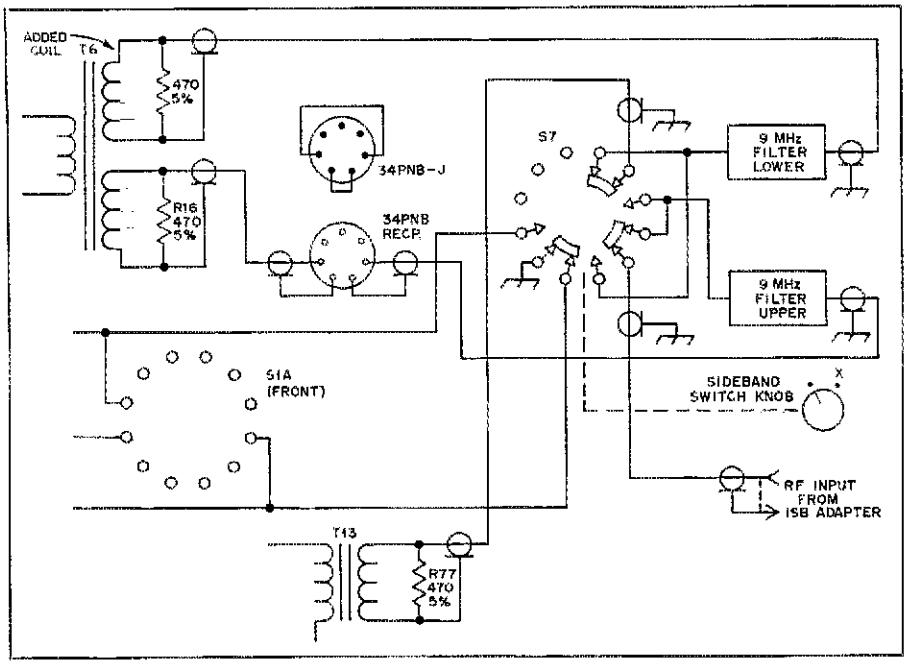


Fig. 4 — Modification of the TR-4C circuit for isb. S7 is a Centralab switch, type PA1007 or equivalent. For the rf input from the isb adapter see details in text.

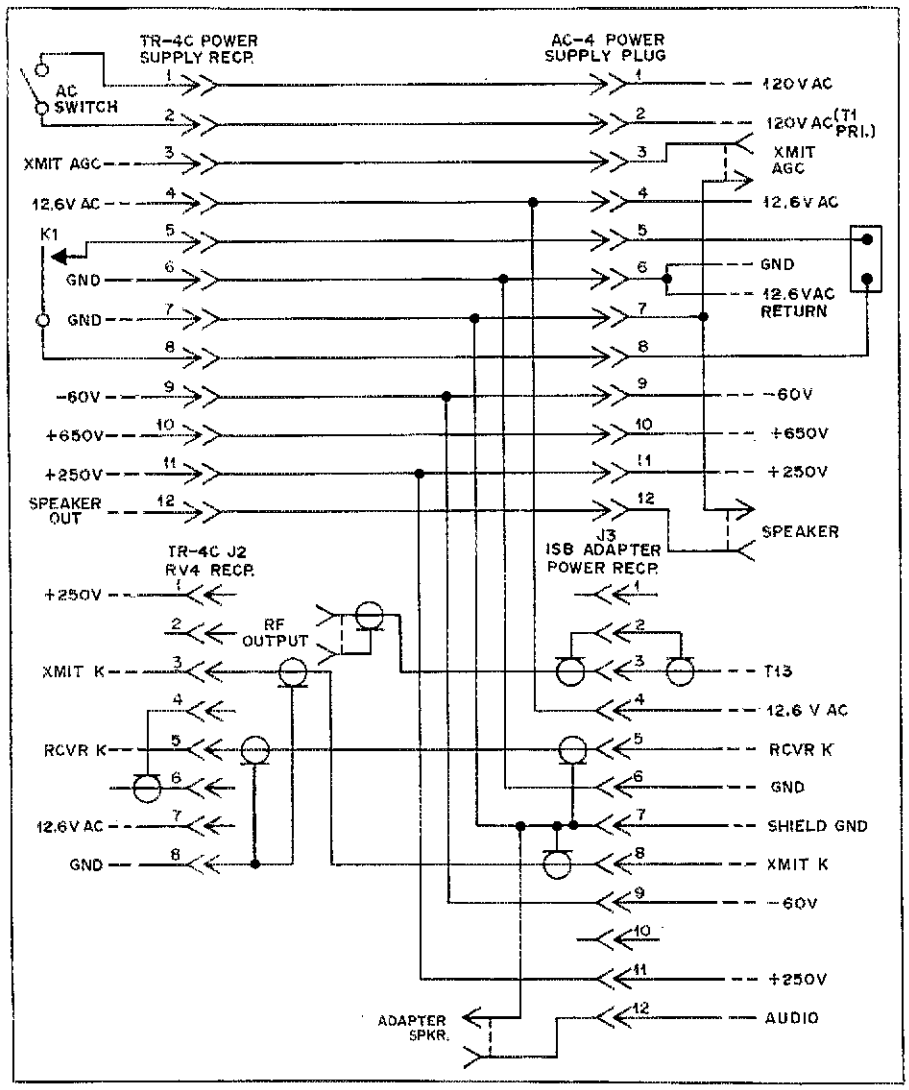


Fig. 5 — Power cable connections between the TR-4C and the isb adapter. TRW Cinch 300 Series Type CCT connectors are used with the cables.

yourself. With the microphone in hand you can be seen and heard.[4] Isb can cu your operating time in half becaus video and audio may be sent at the sam time.

I found when transmitting with slow-scan TV on the TR-4C that th output varied 3 dB from black to white Because of the shape factor of th filters, the output doubled when th video changed from white (2300 Hz) t black (1500 Hz). A simple filter[5] con sisting of a 0.05-μF capacitor in serie with the input and a 10-kΩ resistor t ground smoothed out the changes in th output.

These are the facts and figures. Yo have the fun! QST

Footnotes

[1] *Slow Scan Television Handbook*, 73 Inc chap. 8.

[2] Hall, "A Tuning Aid for SSTV," *QST* fo December, 1975, p. 38.

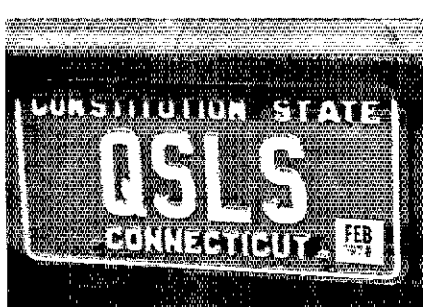
[3] "Hints and Kinks," *QST* for Novembe 1975, p. 42.

[4] Briles and Gervenack, "Slow-Scan T Viewing Adapter for Oscilloscopes," *QS* for June, 1970, p. 47.

[5] Hodgson, "Phase Modulation Principles an Techniques," *Ham Radio* for July, 197 p. 28.

Strays

John C. Yodis, WA2EAH, is QS manager for special-events station KS2RPI, KT2RPI and N2ITU. For QSL send s.a.s.e. to WA2EAH at RD no. 4 Amsterdam, NY 12010.



Not too often does a job change within the same state lead to a change of license plates! In tune with his new post as Manager of the ARRL QSL Bureau, W1CW traded in his "DXCC" plates for "QSLS."

The Stark Key

Are you into keyers? Well, a lot of hams are, and here's a way to save a buck — several in fact!

By Col. Howard J. Stark,* W4OHT

At first I was going to title this piece, "What Comes After the Accu-Keyer?" or "So You Built the Accu-Keyer, but What About a Paddle?" After a little more thought, I decided on the Stark Key or Starkey for short. Oh well, at least the words sound alike. Anyhow the title Stark Key is more appropriate because the key contains some original approaches.

So here is an article about building a key to be used with an electronic keyer. If you have a 1/4-inch electric or hand drill, drill bits, nuts and screws, scraps of plastic and aluminum and a little mechanical ability (usually referred to as "working with the hands"), you can make this very useful key.

Having looked at numerous circuits of keyers (the pc-IC deal) for the past several years, I decided to have a go at Jim Garrett's, WB4VVF, Accu-Keyer (Aug., 1973, *QST*). I gave considerable thought to the aspects of a mechanical device to work the Accu-Keyer. At first, a single lever with some means of bringing the lever back to a neutral position after it made a dot or dash looked easy, but the idea was soon discarded. Two levers, each of which had a fixed rest position initially and each of which returned to it after making dots or dashes, looked much better.

So here is the fruit of my labor; it's about a three- or four-night job with a few extra hours looking at the sketches. Material should not be difficult to come by, and you will have saved yourself about $30. You will get an extra bonus: You'll appreciate why a commercial key costs $30 and is worth all of it!

*9231 Caribbean Blvd., Miami, FL 33189

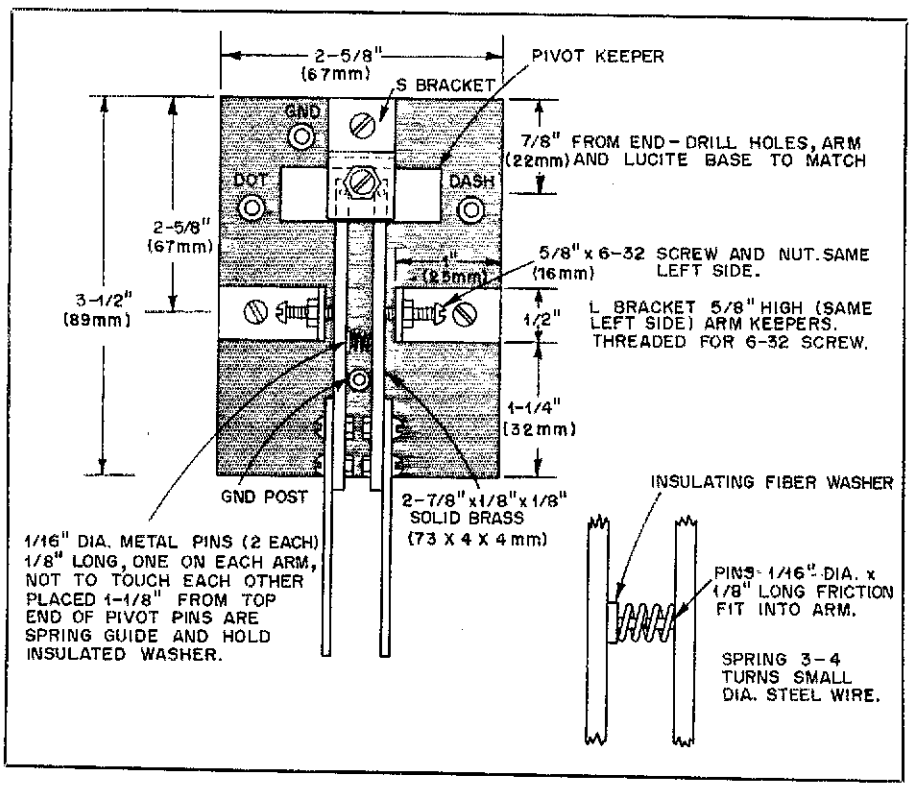


Fig. 1 — View looking down on the keyer.

How-to Details

The key is built on a piece of 1/2-inch thick Lucite or similar plastic. Only one other small piece of 1/2-inch thick Lucite will be needed for a "keeper" on the lever pivots. The key is mounted on four white rubber bumpers, Sears Roebuck item 9-7390. The key is lightweight, so you may want to fasten it to a firm support or provide some weight to the base. Pieces of 1/4-inch Lucite bonded together with adhesive (or held with screws) will suffice in place of solid 1/2-inch Lucite. The paddles are cut from 1/16-inch Lucite and fastened to the 1/8- × 1/8-inch square brass arms with 3-48 machine screws and nuts, two screws to each paddle, placing the nuts on the inside of the brass arms. The brass arms and paddles should be built first. This will help you to orient and align the respective arms to the base. At this point the holes should be drilled inside the lever arms for the 1/16-inch diameter and 1/8-inch long pins. Care must be exercised here as the pins are a friction fit into the brass arms, and the holes are only drilled 1/16-inch deep. The pins must *not* touch each other when arms are in the normal position. The pins serve only as a guide and keeper for the spring. You select the latter to give the desired "feel" of the key. The spring is only a few turns of thin steel spring wire. It keeps the lever arms away from

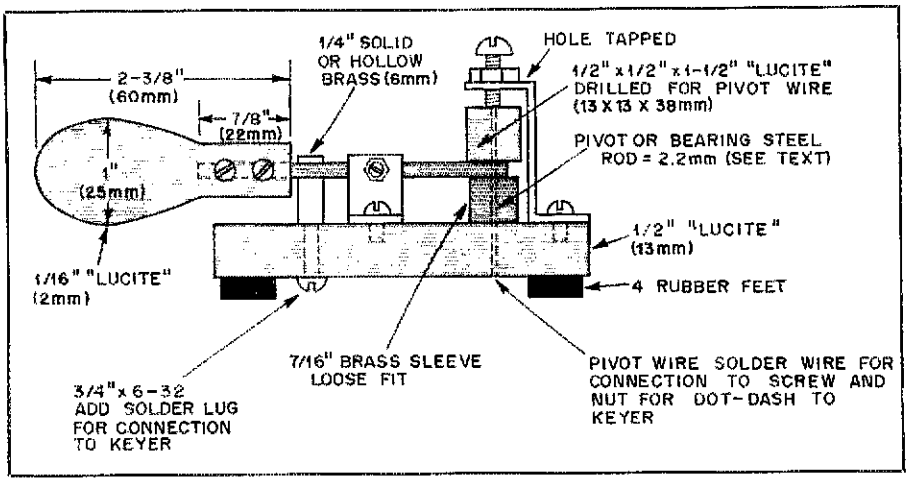


Fig. 2 — Side view of the Stark key.

the grounding post and against the screws in the side brackets.

Installing the two pivots for the key arms is probably the most difficult part of the project. The holes through the 1/2 X 1/2 X 1-1/2-inch Lucite pivot keeper, lever arms and 1/2-inch Lucite base must all be in the same vertical alignment, and yet each hole has to be drilled separately. So, drill the holes in the end of the brass arms, then the holes in the base, and finally the holes in the pivot keeper.

There should be little slack between the hole in the end of the arm and the pivot wire, but there should be considerable freedom for the pivot wire to slide through. I used a 5/16-inch drill for all these holes and steel wire having a 2.2 mm diameter for pivot wire. I found that an ordinary finishing nail can be used here. A 2-inch 6D bright finishing nail with cup head measures 2.3 mm in diameter. Cut this nail 1-13/16-inches long, and it will be just right.

Locate or make the 7/16-inch brass sleeve as part of the bearing assembly and see that the hole through it allows the pivot wire adequate freedom. Make the S-bracket and mount it on the base. Dimensions are not given as the bracket is simply made of 1/2 X 1/16-inch aluminum to provide 1/8-inch clearance above the 1/2 X 1/2-inch pivot keeper. The hole is tapped for a 6-32 by 3/4-inch machine screw and a keeper nut is placed on the screw to lock the tension on the pivot keeper. This unit keeps the brass arms in a horizontal alignment. Without the keeper the arms will droop.

Next, the 1/4-inch diameter solid or hollow brass grounding post is secured to the base. Its position is determined by placing it (see sketch for dimensions) between the arms when arms are exactly parallel and straight out.

Next, the two side brackets (which determine the amount of travel and spring tension on the arm) are installed. In making and installing these as a last or near-last step, care must be taken that the threaded holes in the brackets will allow the end of the 6-32 machine screws to contact the brass arm at the center of the arm (the 1/8-inch dimension) and not off to one side, above or below center.

Install the insulated washer and a spring of your choice. Remember, one side of this spring should not make electrical contact with the side of the arm which has the fiber or insulated washer on it. At this point you can install the binding posts, machine screws and nuts, or whatever you desire to bring electrical contact from each arm and the key grounding post, to the keyer. One inch X 6-32 machine screws were used. They were mounted at appropriate places (see sketch) at the front of the key. You may have to disassemble the key to remove the two pivot wires so that you can solder copper wires to the bottom of them, or to the nail-head end. Then you can run wires to the aforementioned machine screws or binding posts. It's possible you may have to slightly countersink the holes for the two pivot wires after the copper lead wires have been so soldered there to. The wires are run under the Lucite base of the key.

If the key will not control the dots and dashes separately, then the wire tension spring may not be insulated properly from the arm of the key. Recheck this and you should be in business.

At this point you should have gotten the key working. Good luck and good DX! QST

Strays

Last Looks! As the U.S. Air Force bases in Thailand are phased out, MARS (Military Amateur Radio Service) station A18NA will meet its demise.

ALTERNATE SOURCES OF ENERGY NET

□ Interested amateurs are invited to participate in ASE nets with their contribution of knowledge in the field. The ASE cw net meets Sundays on 14,070 MHz at 1900 UTC, and the ASE ssb net meets Sundays on 14,345 MHz at 2030 UTC. W4VPD of Miami, FL, is ASE net-control station.

ENGLAND: A NATIONAL AMATEUR RADIO CONVENTION

□ All amateur radio enthusiasts will be delighted by news of England's "International Radio Communication Exhibition National Convention." A section for hfers and a section for uhf and microwave aficionados will compris what promises to be an outstandin event. Propagation expert Ed Tilto W1HDQ, will represent ARRL at th convention. Planned for 6, 7 and 8 Ma at the Alexandra Palace north London, there will be, in addition manufacturers' exhibits, flea market raffles, dinners and dances, lectures d signed to explain the various facets amateur radio in an entertaining ma ner. Talk-in will be provided on 2, 8 and 160 (that's right — the British kno that to *keep* a band, it must be *use* meters. Plenty of activities are planne as well for family interest. Full detai may be obtained from the Radio So ety of Great Britain, 35 Doughty Stree London WC1N 2AE, England.

A Fully Automatic Morse Code Teaching Machine

How would you teach Morse code to a person? Probably you'd divide the characters into groups and send the same few signals repeatedly until learned — sending "missed" characters more frequently. A microcomputer can provide the same individualized introduction to Morse code.

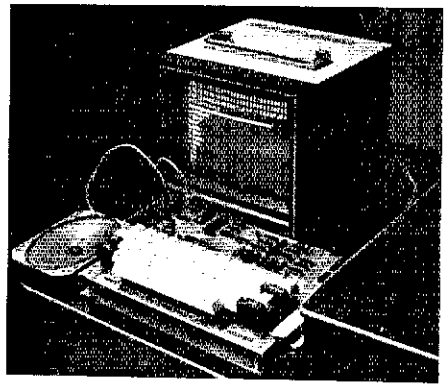
By Howard Cunningham,* WA9VRU

There are many ways to learn the Morse code, most of which will work if given enough time and effort by the student. However, some techniques have been shown to streamline the learning process.[1] These include sound recognition and postponed discrimination. With the aid of both techniques, most students can reach proficiency at 5 wpm after six to eight one-hour sessions.

Sound recognition is perhaps the single most important instruction technique. Since the code is copied by ear, it must be learned by ear. Further, characters should be learned at a speed fast enough (approx. 15 wpm) to hear each character as a single sound rather than a sequence of dots and dashes.

Postponed discrimination requires that longer characters be introduced to a student before shorter characters with the same element sequence. For example, C is introduced before K, which is introduced before A and T. This forces a student to listen to the entire letter before making any decision.

The first problem encountered by the student then becomes finding six to eight hours of good code-practice material. Most code records and tapes are one to two hours long, requiring repetition of material and practice with material both above and below the student's ability. An alternative is attending a good code class where new material is presented at a level in line with the overall ability of the class. In fact, very small groups are ideal, as the instructor can keep track of each student's proficiency and adjust the practice text accordingly.



The HAL Communications Corp. MCEM-8080 microcomputer, all set to go for the continuation of a practice session on learning the code. No knowledge of computer operation or programming is required of the student; all he need do is use the keyboard to type the letter sent via the speaker before the computer displays it on the monitor screen.

I have taught Morse code for many small groups. It was while instructing a make-up session that I realized how mechanical my technique had become. While watching each student carefully, I would look for troublesome letters, concentrate on them until the student gained proficiency, then throw in some old letters for practice. If he could still copy satisfactorily, I would introduce some new letters. Then I realized this technique was a natural application for a microprocessor.

Programming the microcomputer to send code was no problem; Thomas and Belter discuss a code-practice oscillator program in their introduction to microprocessors.[2] The challenge was having the computer adjust to the student's ability.

The student would be required to copy on a computer keyboard. This did not seem too severe a restriction as even hunt-and-peck typing speeds are well above the rate characters would be sent. The computer could time response intervals in addition to testing for correct responses. Furthermore, the computer printing could be controlled to provide immediate positive reinforcement.

I wrote such an instructor program for the Motorola MC6800 microprocessor and tried it out on a few friends. The results were so encouraging that I doubt I will ever teach Morse code by hand again.

Theory of Operation

The microcomputer communicates with the student both aurally and visual-

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[1] References appear on page 37.

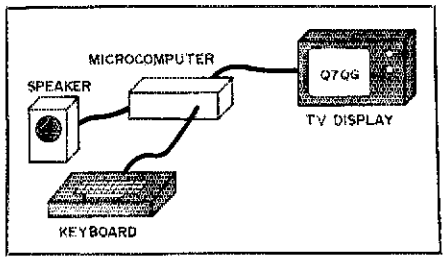

Fig. 1 — Basic components of the Morse code teaching machine. The student listens to the code from the speaker and types the characters on the keyboard. Correct answers are displayed on the TV screen.

ly (see Fig. 1). A speaker connected to the microcomputer is used to send individual Morse characters at 15 wpm. The character being sent can also be displayed visually on a video display screen for simultaneous sight and sound recognition.

Student input is through the computer keyboard. Correct answers for characters sent are acknowledged immediately by displaying the character on the TV screen. Incorrect answers are simply ignored. It is important that the computer uses no negative conditioning for incorrect answers; if the student is unsure, he is encouraged to guess. A correct guess is a very satisfying response.

The teaching algorithm can be summarized in the following manner (see Fig. 2). The program works with a subset of the alphabet starting with the longer letters. One of these is selected at random, with preference given to troublesome letters.

The selected letter is sent as Morse code but not displayed on the screen. The computer then waits for a correct answer. If the correct response is not typed within a few seconds, the letter is repeated, both as Morse code and on the TV screen, and again the computer waits for a response. This step is repeated until the correct letter is entered by the student. The actual duration of each wait is adjusted based on previous responses and is slowly lengthened if no response is made.

When a correct response is entered, the computer will adjust an error probability estimate for that letter. If the student responded correctly, without being told in the previous step, the error probability estimate is reduced; otherwise, it is increased. If the student is still having trouble with any of the letters (i.e., some error probabilities are high), the program returns to select a new letter from the same subset of the alphabet. If, however, the student is doing sufficiently well with all of the letters introduced so far, one of the remaining letters is added to the subset. New letters are selected in a postponed-discrimination order (see Table 1). The initial error-rate estimate for this letter is 100 percent (worst possible) as it is assumed to be new to the student. This will cause a high concentration on the new letter until the student can reliably recognize it without the aid of the visual display.

The estimated error probability for each character is at the heart of the computer program. It represents the computer's immediate evaluation of the student's recent performance. This information itself can be of value to a student; therefore, a special function in the program will print a bar graph on the display terminal representing the amount of additional work needed for each letter.

Table 1
The character introduction order used by the Morse code teaching machine.

NO.	CHAR.	NO.	CHAR.
1	Q	19	X
2	7	20	D
3	Z	21	Y
4	G	22	C
5	Ø	23	K
6	9	24	N
7	8	25	2
8	O	26	3
9	1	27	F
10	J	28	U
11	P	29	4
12	W	30	5
13	L	31	V
14	R	32	H
15	A	33	S
16	M	34	I
17	6	35	T
18	B	36	E

Programming Details

In this section some of the implementation details of the program will be discussed. It will be of interest to those considering writing a similar program; others might skip this section for now.†

The program was initially run on a microcomputer system using the Motorola MC6800 CPU, 1/2 kilobyte of RAM and 1/2 kilobyte of monitor ROM. The program uses 350 bytes of memory for instructions and 90 bytes for data. The program communicates with a video terminal through an ACIA (UART). A mechanical terminal could be substituted if its noise did not interfere with the code reception. Only one bit of programmable output is required for the Morse code. Parallel output ports are well suited for this, although the original implementation used the RTS modem signal of the ACIA. A 1000-Hz square wave is generated on this line so only a single transistor or TTL gate is required to drive the speaker. Interrupts are not used; all program timing is done with a delay loop in a subroutine.

Data structures used by the program include three tables, ERROR, MORSE and ASCII (see Fig. 3), all of which are indexed by a selected character number. The ERROR table contains the estimated probability of error for each character. Each element ranges from zero for zero percent to 255 for 100 percent. The zeroth element of the table contains an average error rate over all characters. The other two tables contain the Morse code and ASCII (teleprinter) code for each letter. Both are required because the tables are sorted into the postponed-discrimination introduction order.

Character selection is based on the ERROR table as follows: a random number ranging from one to 32767 is generated from a pseudo-random sequence. The program then cycles through the ERROR table subtracting each probability from the random number. The character that corresponds to the element which finally counts the number past zero is selected. The larger error probabilities are naturally more likely to push the counter past zero and thus cause the more troublesome letters to be selected.

The dots and dashes of each Morse character are encoded into an eight-bit byte as a string of zeros and ones respectively.[3] An extra one bit is added to mark the end of the character. As the code is being sent, the bit pattern is shifted once for each dot or dash (the bit shifted out indicates which) until only the single extra bit remains. A do

†Space limitations do not permit the publication of complete program listings here in *QST*. However, as a convenience to those wanting the information, such listings are available for the Motorola 6800, the Intel 8080 and the MOS Technology KIM-1 from ARRL, 225 Main St., Newington, CT 06111. With your request for a program listing, please enclose 50 cents to cover handling, a business-size return envelope bearing postage for *two ounces*, and don't forget to specify *which of the three listings* you desire.

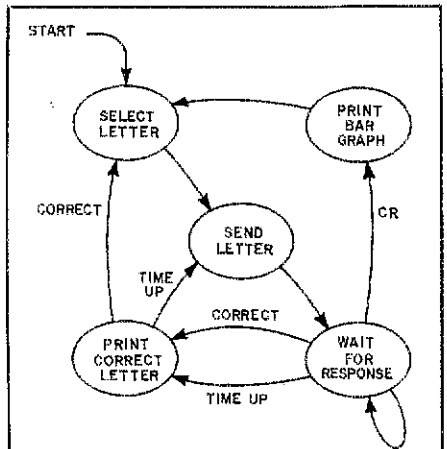

Fig. 2 — State-transition diagram for the Morse teaching program.

is sent for 80 milliseconds, a dash for three times that. A 1000-Hz tone is generated during this time by complementing the single output bit every 1/2 millisecond. Any keyboard entries typed while the character is being sent are discarded.

While waiting for a correct response, the computer counts the response time in 20-millisecond units. Using eight-bit arithmetic, this places an upper limit of about five seconds on delays. The program waits for twice the average response time before giving up on a correct response. The average is computed as 7/8 of the previous average and 1/8 of the most recent response time. This weighted average permits the program to adapt to widely varying typing speeds but prevents sudden changes with a lucky guess on a single character. If no correct response is entered, twice the average is used in the computation, resulting in a delay increase of about 12 percent.

The error probabilities are also adjusted with a weighted average of 7/8 of the old value and 1/8 of the new value. The new value is zero (perfect) if the correct response was entered without help from the microcomputer. A new character is added only when all individual error rates are less than 40 percent (indicating no major problem areas) and the overall error rate is less than 30 percent (indicating a satisfying, but challenging performance level for the student).

The carriage-return key is used to request a bar graph display of the error-rate estimates. A hard-copy printout of this graph at the end of each practice session provides a very positive indication of progress for the student. Sending does not resume after the graph is displayed until a second carriage return is typed, thereby giving the student a chance for a break.

Experience

From early experience with the Morse teaching program, some points have become clear. Regular practice is important, although it makes little difference whether the practice is once a day or once a week. Practice periods of one to one-and-one-half hours are about as long as are useful. Longer sessions cause performance on previously well-known characters to drop. Of course, the program recognizes this drop, and will not introduce any new letters.

The student may feel he has forgotten everything since the last session. But the program will start over at the beginning to review the letters learned previously. Each session turns out to be divided roughly in half between practice of previously introduced letters and introduction of new letters. Note that there is nothing in the program that distinguishes between review and new letters. Its behavior is dictated solely by performance in the current session.

The program introduces new letters to keep the student copying at about 70-percent correct. The number of letters added in a single session is a good indication of progress. In fact, once all letters have been introduced, there is little the program can do other than building up a little speed. Speed itself is limited to 8 to 10 wpm because a response is required before continuing. Above 10 wpm some other form of practice is needed, permitting the student to copy several characters behind. Indeed, above 15 to 20 wpm random text is of questionnable value as syllable and word recognition become important. In other words, the program will take a student from ignorance of the code to a Novice ticket, but a different type of practice will be required for the General, and possibly a third type for the Extra.

One positive consequence of the 10-wpm limit is that no student will become too dependent on a keyboard to copy code. At 8 wpm the transition from "mill" to pencil is not at all difficult.

The success of the Morse code teaching program is dependent on three very important concepts: reinforcement, adaptivity and automation. The student is reinforced for correct answers by character echoing and for total improvement by the bar-graph display. When one still does not know enough code for a complete sentence, it is very reassuring to see new letters being chalked up on the bar-graph display every session.

Adaptivity is even more important as it is the concept upon which the program was built. The program is adaptive in three respects: character selection, character introduction rate and typing speed. Although the student may be unaware of the internal program operation, he will develop confidence in the program to maintain a good pace without pushing too hard. This leads to the third point, automation.

The program must work automatically. It is unreasonable to expect the student to know anything at all about the program or about computers in general. The instructions for use are simply, "Try to type the letters before the computer does." The student can figure out the rest.

Where can one get access to a machine to run the Morse code instructor program? Those who already have a microprocessor system have only to obtain a version of the program for their machine, or convert a copy of one of the existing programs for their system. Those considering building up a machine can add this to their list of possible applications.

Amateur radio clubs, particularly those with training programs or operating stations, could well consider maintaining a microcomputer specifically for Morse code instruction. The Purdue Amateur Radio Club has installed such a system and, although the club intends to use the machine for other applications, code instruction will have a first priority. The club has continued its regular code classes, but has tailored them so students can switch freely from classroom to computerized instruction. The service has been indispensable for those who get behind, or who want to get ahead.

Since beginning this project, I have become convinced that microprocessors can have some real applications in amateur radio. In fact, the teaching machine was an amateur radio project that happened to involve a microprocessor, and not the other way around. We should welcome the entry of the microprocessor into our hobby, particularly when it is solving problems with no previous solution. QST

References

[1] Harris, "Morse Decoded," *QST*, September, 1976.
[2] Thomas and Belter, "Meet the Microprocessor," in three parts, *QST* for August, September and October, 1976.
[3] Krakauer, "Efficient Storage of Morse Character Codes," *Byte*, October, 1976.
[4] Erwood, "A New System for Learning Morse Code," *73*, April, 1969.

LETTER	ERROR PROB.	MORSE CODE	ASCII
Q	60	11011000	121_8
7	68	11000100	67_8
G	41	11010000	107_8
Z	130	11001000	132_8
Ø	255	11111100	60_8
9	255	11110100	71_8
E	255	01000000	105_8

Fig. 3 — Data structures for the teaching program are organized into the three tables illustrated here.

An Ultramodern Linear Amplifier

Been dreaming about that big amplifier while collecting the parts? Well, get with it. This article is for you.

By Carmen F. Moretti,* W2AIH

Reader – you can *never* use vacuum tubes again! If you're an old-timer [or if your name is Bill Orr – Ed.], I may hear your screams of rage. Well, the statement is almost true; vacuum tubes are passe for 99 percent of electronic work. However, if you want a high-power amplifier, then you *almost* have to use tubes. In fact, it is still the most economical way to do the job. Also, no matter what anyone tells you about store-bought amplifiers, there is a "heckuva" satisfaction in building your own. While old-timers are aware of this, neophytes might not be – when you build your own, you get to *know* the piece of equipment, inside and out. There is a lot to be said for doing your own building, and you get what you want, not what someone tries to sell you. In any event, here is an amplifier that I built and I am very proud of it, so proud in fact I had to write an article about it. Maybe it will give you some ideas.

The kW amplifier described here compares favorably with the best that can be built, but at a fraction of the cost of a comparable commercial unit. The component parts are the finest and most reliable that I could find. They were purchased from classified ham ads and flea markets.

The schematic diagram in Fig. 1 represents the essential circuitry for good operational characteristics. Also, the amplifier is capable of handling two kW PEP, has TVI reduction considerations, and imparts a commercial appearance. An Eimac 4CX1500B is used. This tube has exceptionally low intermodulation distortion and low grid interception, which makes it especially suitable for ssb operation. A 4CX1000A could be substituted, with appropriate changes in bias and screen voltages. However, because of distortion characteristics, the 4CX1500B is preferred.

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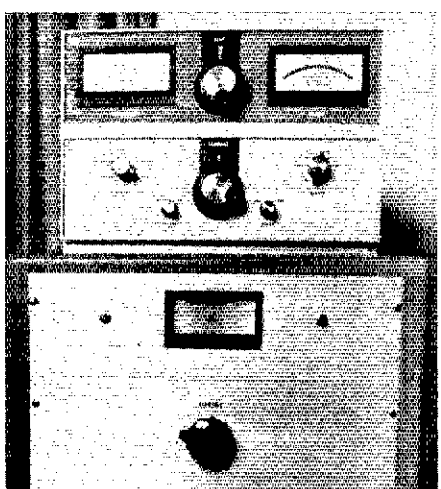
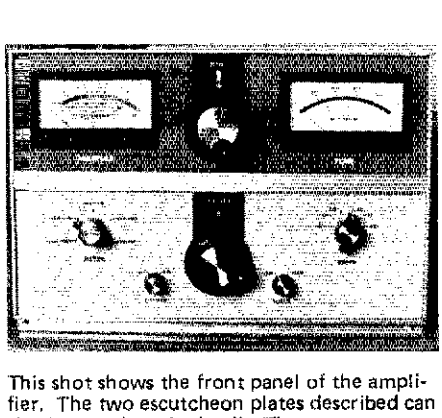


The finished product: The 0- to 5,000-volt meter is also 0- to 1-mA basic movement. I'm still looking for a matching dial for the Variac.



This shot shows the front panel of the amplifier. The two escutcheon plates described can also be seen here in detail. The two meters are surplus 0- to 1-mA, and the new artwork was done by F. W. Krokaugger, 7839 Airlane Ave., Los Angeles, CA.

The front panel is made from a standard relay-rack panel and is cut off at both ends to form a piece 10-1/4 X 16 X 1/8 inches. The finished cabinet measures 10-1/4 inches high and 15 inches deep. A 3-inch section directly behind the front panel forms a shielded enclosure for the meters, switches and the two E. F. Johnson counter mechanisms. Much consideration was given to the layout of the front panel. The meters, pi-network vacuum-variable capacitor dials and all switches were laid out symmetrically to form the finished panel shown in the photograph. Escutcheon plates that came with the E. F. Johnson counter dials were too large and covered most of the front panel. They were scrapped and those shown in the photograph were made up from two pieces of 2 X 2 X 1/8-inch brass plates, painted black and lettered with press-on transfer lettering. In fact, all of the panel lettering can be done the same way. I used universal-gray paint for the upper section and smoke-white paint for the lower half, dividing the two colors with a 3/4-inch wide piece of anodized aluminum stock.

The amplifier enclosure is built of 3/4-inch aluminum angle. Refer to Fig. 3. The top and sides are covered with pieces of perforated aluminum sheet and the back shield is made from two pieces of 0.064-inch aluminum, sheet stock. The lower portion holds the BNC input connector, the eight, 0.001-μF feedthrough capacitors and the high-voltage shielded terminal that carries all input and output wires from the lower cabinet power supplies. It also covers the back of the terminal box that

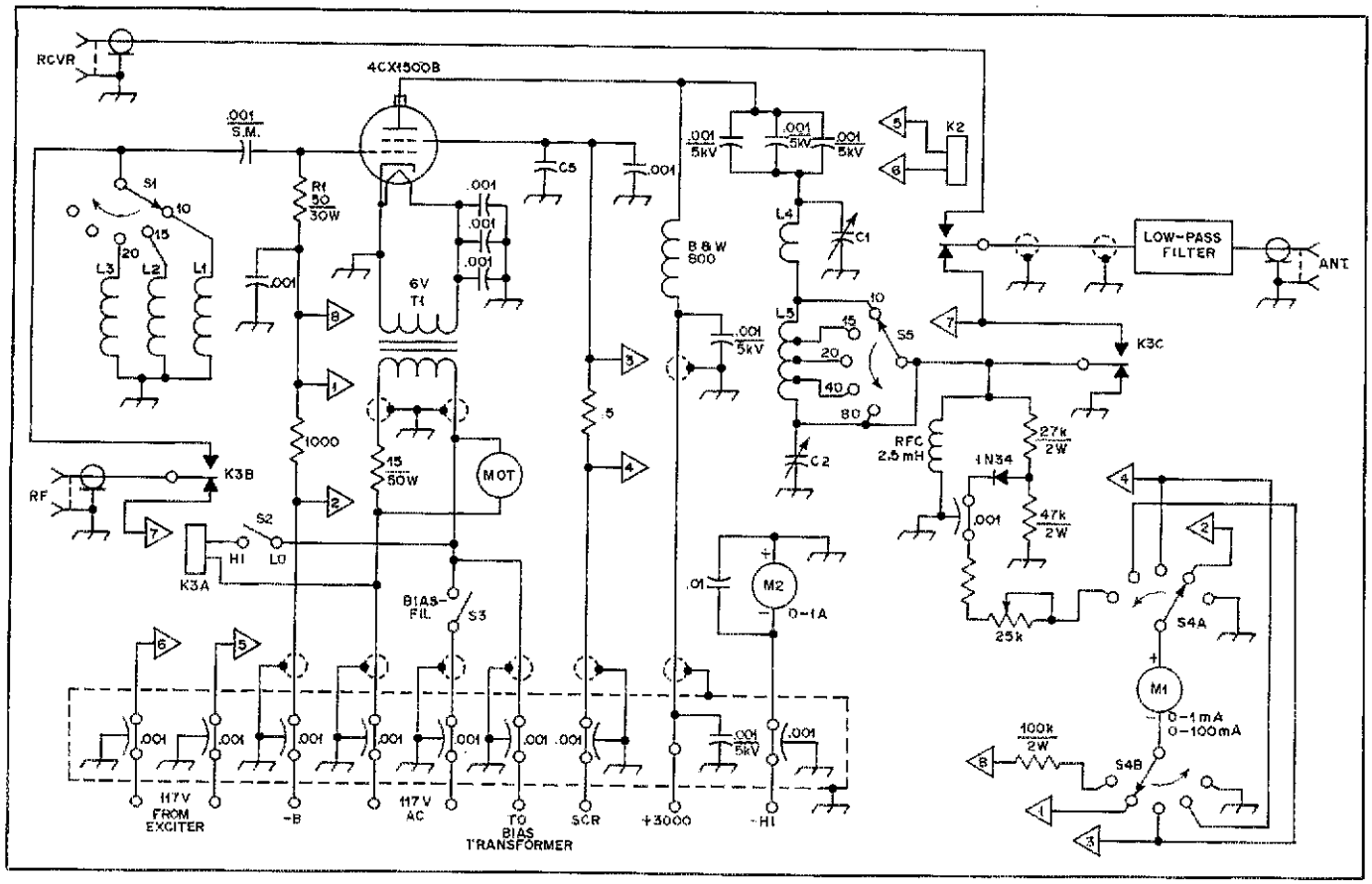
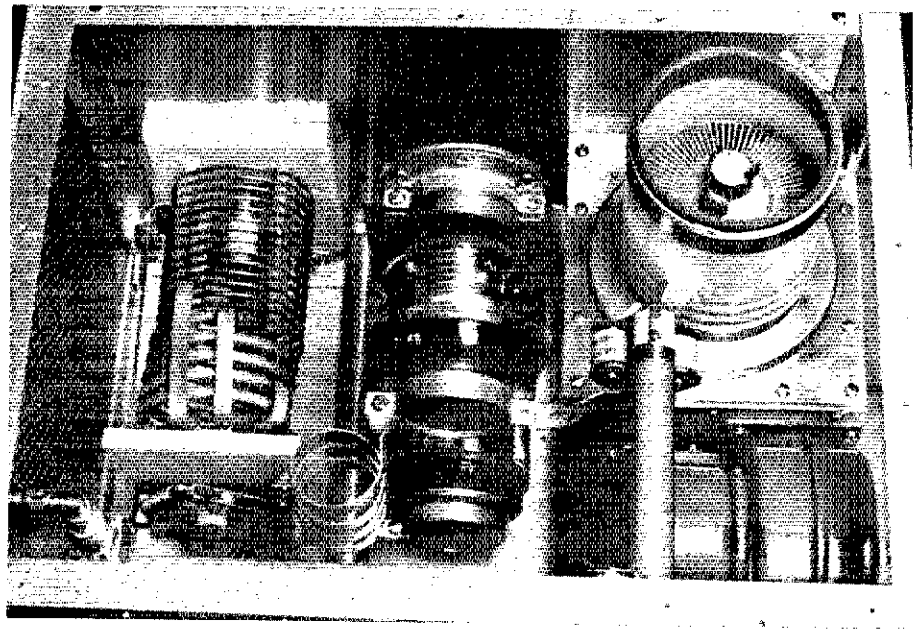


Fig. 1 — Circuit diagram of the amplifier. All 0.001-μF feedthrough capacitors are 500-volt rating, other 0.001-μF capacitors are disk ceramic. Resistances are in ohms, all resistors are 1/2 watt unless specified.

B1 — Blower (Dayton Model 1C39 or equiv.).
C1 — UCSL-500 (Jennings).
C2 — UCSL-2000 (Jennings).
CS — Part of Eimac special socket.
K1 — Coaxial relay, 117-V ac, 1-μW type.
K2 — Dpdt relay (Leach no. 1207-S9, 117-V ac or equiv.).
L1 — 10-meter coil, 5 turns no. 14, 1/2-inch dia, 1-1/4-inch long.
L2 — 15-meter coil, 7 turns, no. 14, 1/2-inch dia, 7/8-inch long.
L3 — 20-meter coil, 12 turns, no. 14, 1/2-inch dia, 1-inch long.
L4, L5 — Turret inductor (B&W 852 recommended).
R1 — 50-ohm, noninductive 30 watts (Corning).
S1 — Single-pole, five-position input grid switch, ceramic type, coupled to S5 with bead chain.
S2 — Spst filament and bias-supply switch.
S3 — Single-pole, five-position meter switch.
T1 — 6.3 V, 10 A.

houses K3 and the rf sampling network. The antenna coaxial relay was also mounted on the rear terminal box, but was fastened to the top cover just over K3. It is positioned so that the antenna input connection protrudes from the enclosure and becomes grounded when the rear upper shield is in place. This arrangement keeps rf lead lengths short. Between the rear terminal box and the section behind the front panel is a 1/2-inch piece of conduit that carries the appropriate wires to the front panel. I edged the three pieces of perforated aluminum shields on three sides with 3/4 × 1/8-inch aluminum strips held in place with small countersunk rivets. The front of the same three pieces was edged with 1 × 1/8-inch aluminum strips and then fastened so as to have a 1/4-inch overlap of the front panel. This provides a more professional appearance. All of the aluminum needed for cabinet, with the exception of the base and interior pieces, was purchased from hardware stores. The 3/4-inch angle for the framework must be unanodized material, while the 3/4-and 1-inch flat stock were



At the upper right is the homemade Teflon chimney as described in text. Also shown is the coaxial antenna relay mounting method used. The low-pass filter mounted to rear-upper shield goes directly to relay. Note how the three 0.001- to 5-kV caps are mounted to the B&W 800 rf choke. Total copper strap length connections between components do not exceed six inches. In fact, there are no other wires in the rf field.

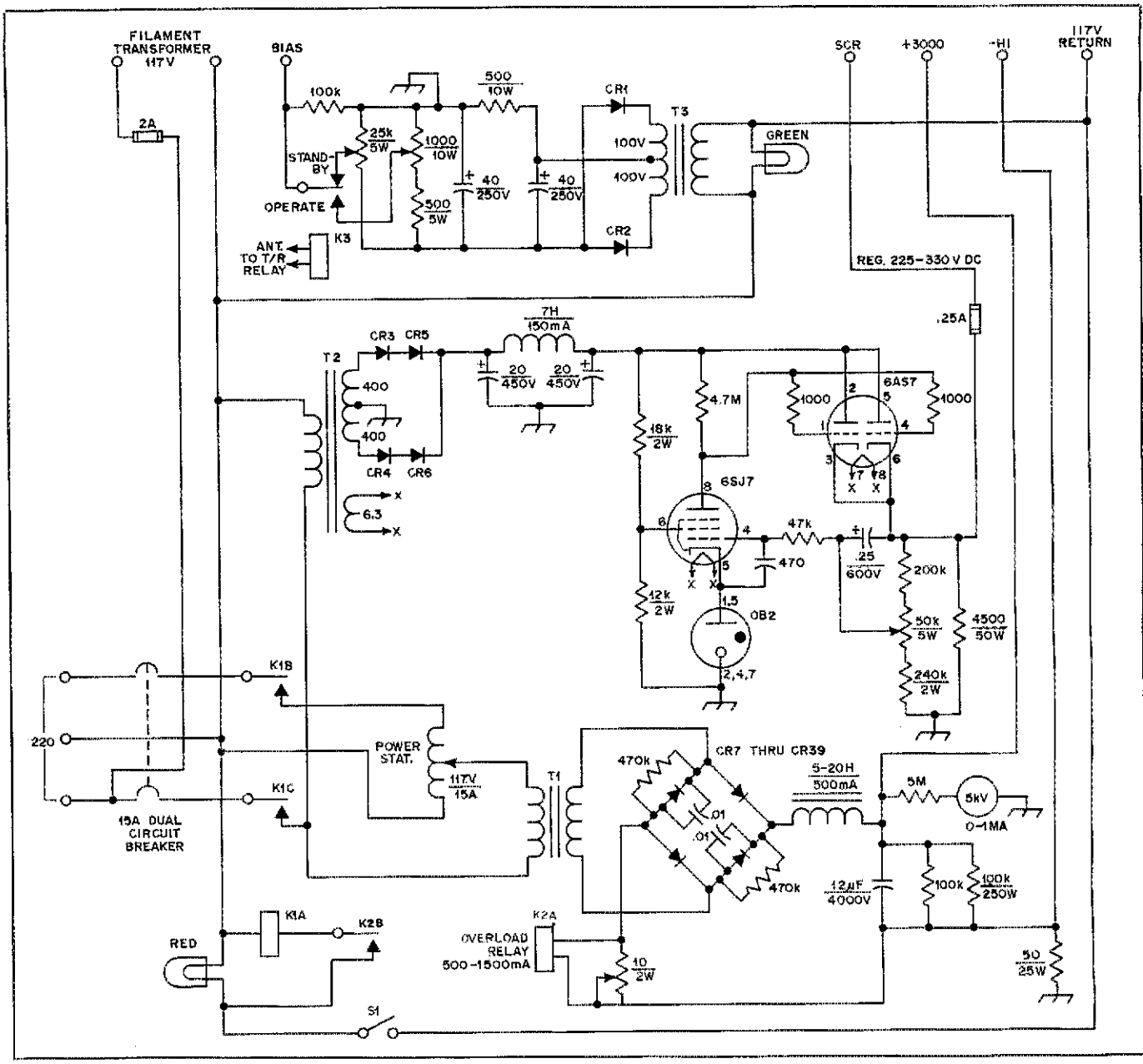


Fig. 2 — Circuit diagram of the power supply. Resistances are in ohms. All resistors are 1/2 watt unless specified. Capacitors with polarity shown are electrolytic. The 0.25-µF/600-volt capacitor is paper.

CB — Dual 220-V ac circuit breaker, 15 A (Wood Electric).
CR1-CR39, incl. — 1,000-V PIV, 2.5 A Motorola HEP170 or equiv.).
K1 — Power relay, 220-V ac, 20 A, with 117-V ac coil.
K2 — Overload relay, 500-1,500 mA (Leach).
S1 — Spst.
T1 — Plate transformer, surplus, dual primary, 117 and 220 V, Sec. 4000 V, 3 kVA.
T2 — 800 V center-tapped, 100 mA or greater, (approximate ratings).
T3 — 200 V center-tapped, 100 mA or greater, (approximate ratings).
Also, Powerstat or Variac, 117 V, 15 A. The red and green indicators are 117-V neon lamps.

anodized to dress up the unit. Make sure that the angle stock used to make up the framework is not anodized, as this would result in poor rf shielding. The anodized edging material does not make contact with the inner frame. It stiffens the shields and helps provide a tighter fit while adding to the appearance of the unit. All exterior shields are fastened to the amplifier frame with 6-32 screws, spaced approximately 2 to 3 inches apart.

A 6 X 6 X 6-inch aluminum chassis with one open side was built to mount the 4CX1500B tube socket and house the grid-circuit components. The filament transformer and blower were attached to the rear section of the chassis as well as a BNC bulkhead receptacle for the rf input. The assembly should be completed before being fastened to the main chassis. It becomes the complete input module and is easily removed if necessary. A piece of aluminum shim stock (6-inches square) was attached to the perforated side shield and serves to seal the grid-compartment opening when in place. This arrangement is convenient for making changes, measurements or adjustments that may become necessary inside the grid module. The drawing and photographs give a good picture of the framework and chassis just described.

Circuit Description

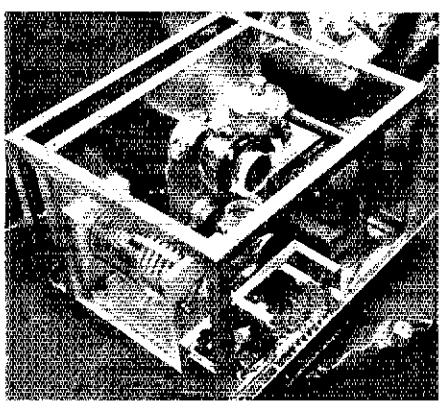
The circuit of the all-band amplifier contains an untuned input circuit. The output employs the familiar pi network. The rf drive signal is terminated in a 50-ohm, 30-watt noninductive resistor through which grid bias is supplied to

the tube. To improve the input impedance match on the 10-, 15- and 20-meter bands, three untuned grid coils are coupled via a chain drive to the output coil assembly and are switched automatically by means of S1 when changing bands.[1] Two meters are used to measure most currents and voltages. M1 has a 0- to 1-mA movement which can be switched (with the proper shunts) to read bias voltage, grid-current, screen pos., screen neg., or sample the rectified rf output. M2, a 0-1A meter, continuously monitors the plate current.

The rf-voltage waveform should be an amplified replica of the applied grid-voltage waveform, so it's obvious that the design of the rf tank circuit greatly determines the efficiency and distortion characteristics of the linear-amplifier stage. A tank circuit Q of 12 was used with this amplifier. The output-coil assembly seen in the photograph was homemade around the familiar Barker and Williamson type inductor. The input and output capacitors of the pi-network were set up to their calculated values[2] and the proper tap on the coil found.[3] The 10-meter band should be set first, followed by the other bands in descending order. Rather than attempt to build your own coil assembly, I recommend using the Barker and Williamson type 852 assembly. It will work equally well if the input capacitor has a tuning range of approximately 5-500 pF.

One of the most important components in this amplifier is the Eimac SK800B socket. *It's a must.* I made the mistake and used another manufacturer's breechblock type of socket without a built-in screen bypass capacitor. When the amplifier was completed and

[1] Footnotes appear on page 43.



This view shows frame construction, parts placement, and rear lower shield including the method used to construct the input shield box. Note the eight 0.001-μF feedthroughs, high-voltage terminal, and BNC rf input terminal. K3 is at the left. Just below K3 are the rf sampling components. You can also see the method in which the blower and filament transformer are fastened to the grid compartment.

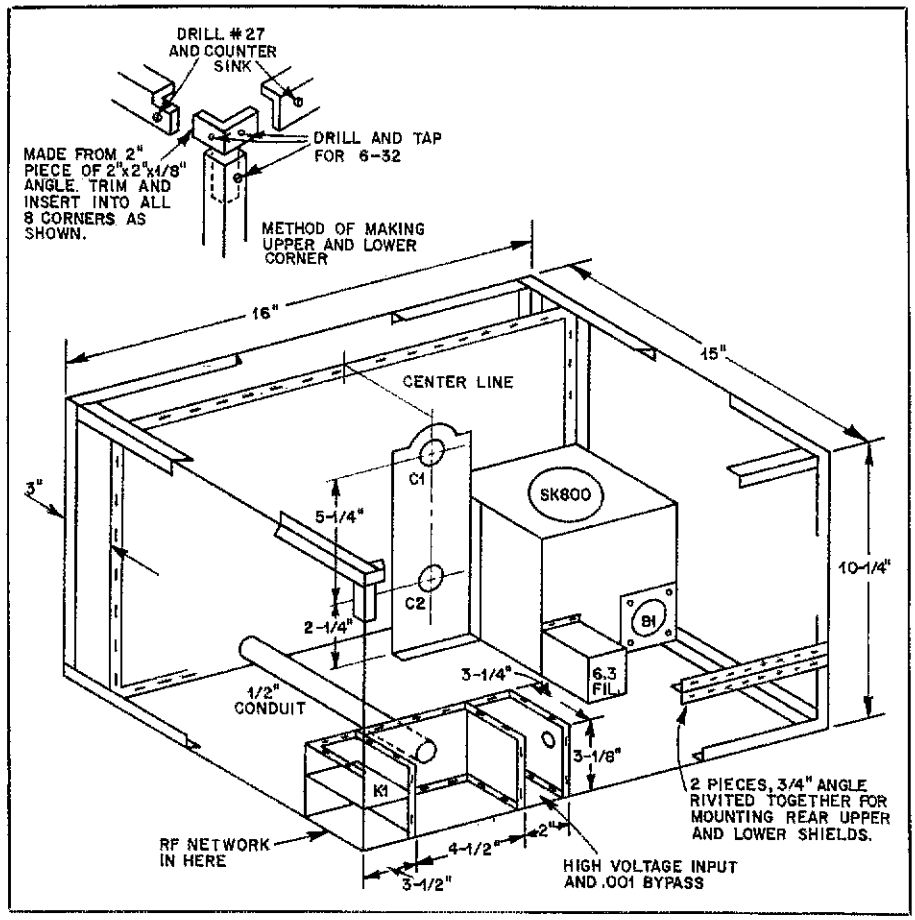


Fig. 3 — This sketch shows the amplifier-enclosure framework construction.

power applied, the 4CX1500B tube self-oscillated. I could write pages and pages on the different types and methods of bypassing that were tried to achieve stability, including all of the ideas that Rinaudo, W6ZO, of Eimac had to offer. All to no avail. After much anguish, while trying to solve the self-oscillation problem, I came to the conclusion that changing the circuit to a dc-grounded screen configuration or replacing the socket was necessary. I decided on the latter, and after replacing the original socket with a SK800B unit, the self-oscillation ceased. Eimac had good reasons for designing special sockets for their tetrodes: The circular housing of the socket into which the screen bypass capacitor is built must have sufficient shielding to reduce intra-stage coupling. At least it proved so in my particular case. This wasn't the end of my problems. However, the other problems were associated with the screen and bias supplies, not with the amplifier circuitry.

Cooling

Radial beam power tubes require adequate cooling to keep the temperature of the anode at the base of the cooling fins and the temperature of the ceramic-to-metal seals to acceptable levels. Instead of using the 4CX1500B chimney, I made a "chimney stack" from a piece of 1/16-inch Teflon sheet stock, formed around two 3-3/8-inch diameter Formica sleeves. The chimney stack ran from the 4CX1500B socket to the top cover in which a 4-inch-round hole was cut. A piece of aluminum screening (the type used for screen doors) was riveted around the cutout of the top shield with an aluminum ring 1/2-inch wide. This method exhausts the flow of hot air directly out of the amplifier enclosure and keeps both the tube and amplifier cabinet cool.

Prior to the method described, a standard chimney was used, and the exhausted hot air was dissipated inside of the perforated enclosure. During talk periods with the tube running 1,000 watts of plate dissipation, the amplifier enclosure became extremely hot, especially the top cover and side shields.

Power Supplies

The method of housing the power supplies is a matter of choice. To keep the commercial appearance, I used an old relay-rack cabinet (30-inches high) that accommodates 19-inch-wide panels. With a little elbow grease, the rust spots were removed. The cabinet was then sprayed with universal-gray paint.

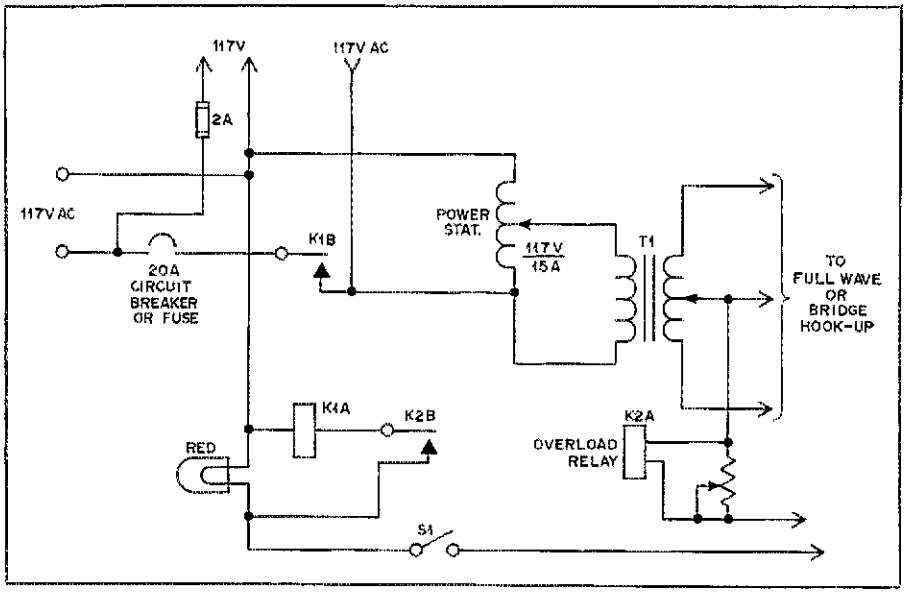


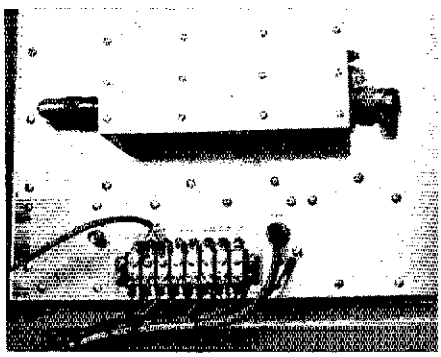
Fig. 4 — Diagram showing alternate connections for 117-V ac.

The 4CX1500B is a low-voltage, high-current tube which is designed specifically for Class AB1 or AB2 operation; therefore, the high-voltage power supply must be capable of maintaining good voltage regulation. During ssb operation the load will continuously vary from standby to full-load conditions. Unless the power-supply regulation is good, the effective linearity of the amplifier will be so poor that the output signal will contain a high percentage of distortion products.

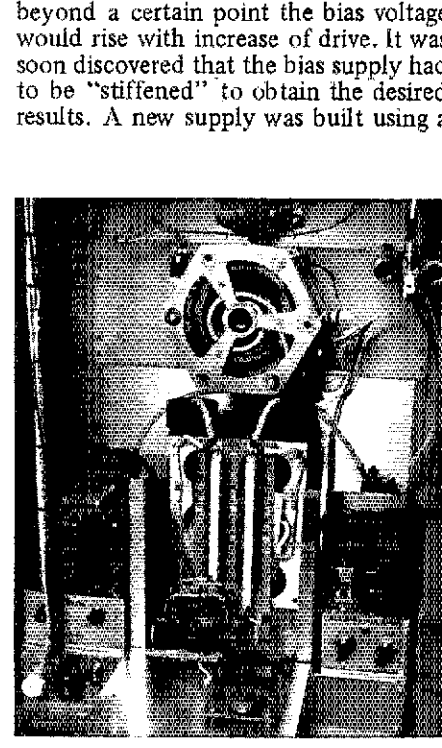
It is possible to obtain good regulation of a high-voltage power supply by a number of methods.[4] The circuit shown utilizes bridge rectification, a swinging choke, and large values of filter capacitance, including two 100-kΩ, 250-watt bleeder resistors in parallel. This configuration allows the high voltage to vary approximately 100 volts between no-load and full-load conditions. If you choose bridge rectification, use a transformer designed for bridge. Transformers with a center-tap connection designed for full-wave rectification lack sufficient insulation to permit the average plate-power transformer to be used in bridge-rectifier circuits. The transformer employed in the supply shown was purchased for ten dollars on the surplus market. It has a dual 120-volt primary 4,000-volt secondary with a rating of 3 kVA. In order to reduce the high-voltage output of the power supply and the high-current inrush when the supply is activated, a 115-volt, 15-ampere Variac was used in the 220-volt line. This arrangement reduces the dc plate voltage to about half of the required 3,000 volts when the Variac is in zero position and allows you to increase the plate-voltage to the required level. The high-voltage power-supply components, as well as the screen and bias supplies which are plug-in modules, were all mounted on a standard 17 X 13 X 3-inch chassis that fastens to the base of the cabinet. The screen and bias supplies were built on standard 7 X 5 X 3-inch chassis. Banana plugs are utilized in the bottom of each chassis. They accept the ac-input and dc-output voltages from corresponding banana jacks in the main subchassis. Both supplies were positioned to allow adjustments and removal from the rear of the cabinet, as shown in the photograph. The remaining area of the base chassis has sufficient space to mount the high-voltage transformer, choke, capacitors, K1 and the high- voltage rectifier board. The rear face of the base chassis was used to mount the 220-volt input receptacle, the dual 15-ampere circuit breaker, filament fuse high-voltage terminal and a 12-position Jones plug. All other wiring was done underneath the main chassis.

Let me offer some thoughts concerning screen and bias supplies for tetrode linear amplifiers, the problems I encountered, and the means used to cure them. An electronic regulated power supply as shown in Fig. 2 must be capable of bleeding at least 75 mA and of maintaining good voltage regulation over wide excursions of plate current.[5] The supply shown more than met the criteria, but would lose regulation causing the screen voltage to change when the 4CX1500B drew current in excess of 400 mA. This voltage change was caused by rf getting back into the screen regulator. I discovered that the rf in the screen regulator was not because of radiation from the amplifier, but caused by direct radiation from the antenna, or possibly by rf flowing back down the outside of the coaxial line. A 47-kΩ resistor in series with the control grid and bypassed to the cathode of the 6SJ7 tube with a 470-pF capacitor corrected the problem.

The grid-bias supply exhibited somewhat the same symptoms as the screen supply, but for an entirely different reason. Originally, the output of the bias supply had two 25-kΩ potentiometers in parallel used as voltage dividers. These potentiometers with the auxiliary relay supply the bias voltages for the "standby" and "operate" modes in single-sideband operation. No problem existed in the standby mode, which was set for approximately 75 mA, but in the operate mode with −34 volts of bias and a plate current of 250 mA beyond a certain point the bias voltage would rise with increase of drive. It was soon discovered that the bias supply had to be "stiffened" to obtain the desired results. A new supply was built using a



Rear view of the amplifier cabinet. Note the TVI filter.



This is the rear of the power-supply cabinet. Both the screen and bias supply modules can also be seen as well as all the other high-voltage components. The Variac has its own mounting panel fastened to the cabinet from the inside so that the front panel can be removed by itself.

huskier transformer and the voltage divider which was originally a 25-kΩ potentiometer was replaced with the 1,000-ohm potentiometer and 500-ohm series resistor shown in the diagram. These changes corrected the problem.

The problems encountered with both the screen and bias supplies exemplify the need for monitoring these voltages during dynamic operation of high-power linear amplifiers, or at least until one is satisfied that the linear is operating properly.

Amplifier Operation

Running the amplifier in Class AB1 and using the manufacturer's ratings of 2,900 volts on the plate, 225 volts on the screen and a grid-bias voltage of approximately −34 volts, I connected the amplifier to a 50-ohm, 1-kW power meter and dummy load. With excitation applied and no grid current, the rf output reached 1 kW with ease. Even though the input circuitry is untuned, it only takes approximately 40 watts of peak power to drive the amplifier to the legal limit. How about TVI? None whatsoever at this location with this unit.

Conclusion

I make no claims of new circuitry or innovations, but rather I've collected and put together all of the best ideas that have appeared in the various amateur journals. Also, I have attempted to go into more detail of the construction aspects and some functional problems that have not previously been highlighted. The linear power amplifier described is suitable for construction by a technically qualified amateur; others proceed with caution!

A note of gratitude goes to Ray Rinaudo, W6ZO, for his many suggestions in helping to resolve some of the functional problems. QST

Footnotes

[1] Wolfe, "High Power Five-Band Linear," *Ham Radio*, April, 1970.
[2] *The Radio Amateur's Handbook*, 1973 edition, chapter 6.
[3] Blakeslee and Smith, "Some Notes on Design and Construction of Grounded-Grid Linear Amplifiers," Dec., 1970, *QST*.
[4] *The Radio Amateur's Handbook*, 1973 edition, page 133.
[5] Data sheet, 4CX1500B, Eimac Div. of Varian, San Carlos, CA 94070.

Strays

□ Don Foster, K5KW, recently fell victim to Guillain-Barre syndrome, the temporary paralysis related to the swine flu vaccine. While he was completely immobile, unable to have visitors or even to talk on the telephone, Don managed to keep his spirits high and pass the time with his bedside HR-2B. Not only did he keep his friends appraised of his daily progress, but he did a great job recruiting potential hams from the ranks of the hospital staff.

Demonstrations from his 12th floor QTH included QSOs up to 75 miles through the local repeaters and nearly 40 miles on 146.52 direct. He attributes his success to his latest antenna creation, an inverted bedpan on the window sill with a quarter-wave magnetic whip affixed to the upper side. He calls it his "12-story bedpan ground plane." For specifications on the invention, you can contact Don through the Tulsa, OK, Repeater Organization. [For a picture and specs on a similar creation, see *QST* for August, 1976, page 60 – Ed.] — *WB5QXI*

□ When "Big Al" Mitchell, WA4HLP, received the 25,902nd Worked All States award recently, it was a noteworthy event – it was the first WAS awarded for using RTTY on a single band. The Jacksonville insurance agent, who had his General ticket only six months before he worked his 50th state on 20-meter RTTY, has set his sights on working 100 countries – via RTTY, naturally.

□ Chicago-area OSCAR buffs can garner late-breaking news about the amateur satellites via the Chicago FM Club's new OSCAR Net on its two-meter 16/76 repeater. Hosted by Ralph Wallio, K9JPR, the net disseminates late information from low-band OSCAR nets meeting earlier in the evening. Ralph also gives orbit times for the Chicago area for the coming week and answers questions on the satellites. All amateurs in greater Chicago are invited to check into the net, which begins at 9 P.M. local time on Tuesdays.

QST Congratulates . . .

□ Bob Piekarski, WB9LJW, who recently received a certificate of commendation from the Wisconsin Air National Guard for his help in relaying medical emergency messages from an Air Guard plane to the base at Mitchell Field.

GROWING PAINS

□ The increased League membership (now exceeding 150,000) and the increased participation in League activities by our members has resulted in an avalanche of mail at Headquarters which we're having a hard time coping with. This was especially true in the month of March; thousands of members accepted our offer to extend their memberships at the old rates or to take out new Life Memberships, resulting in a doubling of the usual work load.

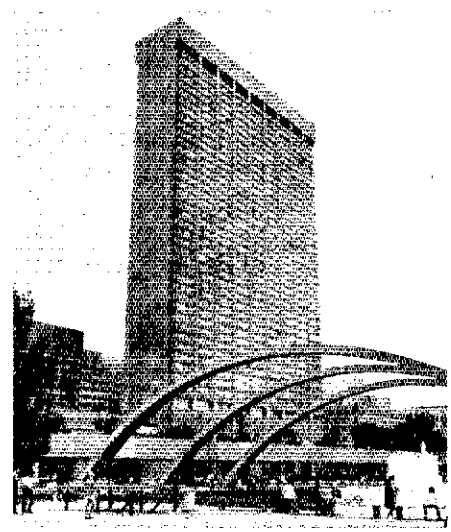
Much to our regret, we have heard several complaints of nonresponse to letters addressed to Hq. We have every intention of continuing to fulfill our obligation to deliver membership services in a timely manner. If you are one of those who has not received a response to a request, please mail the details to my personal attention. If possible, send a copy of the original letter. If not, let me know the date of the correspondence and what specific topic was involved.

No one at Hq. is in the habit of ignoring members' needs, as our postage bill for correspondence will attest! Your assistance and cooperation while we learn to deal with these "growing pains" are most appreciated. — *WIRU*

RI NATIONAL GUARD ON THE AIR MAY 21

□ A special commemorative certificate will be issued to persons working K1FCO, the club station of the 143 Communications Flight (Spt), Rhode Island National Guard, on Armed Forces Day, May 21.

To qualify for the certificate, a QSL card and s.a.s.e. must be sent to K1FCO, 143 Communications Flight, Rhode Island National Guard, T. F. Green Airport, Warwick, RI 02886. The station will operate on the following frequencies between 1400 and 1800 Z: 21.385 MHz, 14.330 MHz, 7.280 MHz and 50.700 MHz.



From City Hall Square you see the Sheraton Center Hotel, site of the 1977 ARRL National Convention "Communications Between Nations."

Product Review

Processor Technology Corp. 8KRA Static-Memory Module

When you finally got that new microcomputer up and running, you found out that the 2 kb (kilobytes) of random-access memory supplied with the system just wasn't enough for you to run that 5-kb BASIC program the manufacturer furnished with the kit. About the only thing you *can* do with your microcomputer is play tic tac toe, and that takes you *30 minutes* to program into the computer! Expand the "mind" of your microcomputer with this 8-kb random-access-memory (RAM) expansion module from Processor Technology Corporation (PTC) of Emeryville, CA.

The 8KRA static read/write memory module has a capacity of 8192 eight-bit bytes and operates in a static mode (as opposed to dynamic memories which require continuous refresh of the data contained in the memory). All address and data lines are buffered, and extensive noise immunity has been designed into the circuit of the memory module. Also featured in the module is switch-selectable addressing, which allows the starting address of the unit to be offset in 1-kb increments from ØØØØ to 65 kb.

How's It Go Together?

Assembly of the review 8KRA module went smoothly with no unusual construction techniques required for the task. Approximately eight hours were spent in building the kit, by proceeding slowly and cautiously to make sure each component was in the proper location before applying solder to the pc board. The largest portion of assembly time was spent soldering the 77 DIP IC sockets to the pc board. These sockets are provided for simplification of installation or removal of ICs should troubleshooting or IC replacement become necessary. All resistors and capacitors are installed in two steps; for ease of assembly we laid out the parts in the order in which they would be installed. This eliminates haphazard searching for components and is a good practice with any kit building. During and after assembly, the builder is instructed to make several tests on the pc board to help assure that a defective component has not been installed or that damage has not occurred to the pc board during the assembly process (this would include such things as solder bridges between or breaks in the circuit runs). Following this procedure will make isolating the cause of a problem easier should trouble be encountered. No problems appeared, however, and the review unit has performed satisfactorily since power was first applied.

Component quality is excellent. The double-sided pc board has plated-through holes and a gold-plated edge connector. A green lacquer solder-resistant mask has been applied to the pc board to help alleviate the chances of solder bridges occurring during assembly of the module. All parts locations are silk-screen outlined on the component side of the pc board, a real aid in the construction process!

Maximum worst-case access time for th 8KRA is 520 ns. Thus, in any 8080 system this memory will operate at the same speed a any other memory with an access time be tween 50 and 520 ns. Both the access tim and nonrefresh features of the 8KRA mea no computer "waiting" time is required.

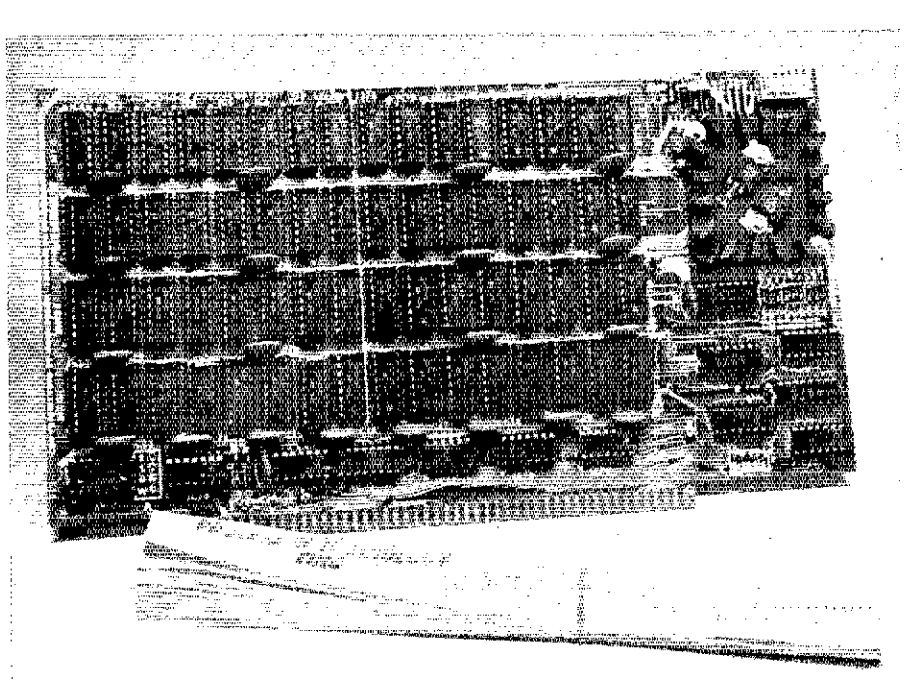
The 8KRA memory module plugs into th back-plane expansion board of the SOL microcomputer and is compatible with othe microcomputers which use the S-100 bus. I requires +7.5- to +10-V dc at 1.9 A (max. operating power. In addition, the low-powe memory ICs used on the module can operat in a low-power standby mode (+1.6- to 2.5-V dc at 0.9 A max.). Data loss from the 8KRA during loss of power or power-interrupt con ditions can consequently be prevented by using two size D batteries for standby power Provisions for adding this standby capability are incorporated in the module design.

One of 64 possible starting addresses fo the 8KRA is selected with the six DI switches positioned in the upper right corne of the module. This corresponds to startin positions at every 1 kb from 0 (to 1023) t 64,512 (to 65,536).

Documentation supplied with the 8KRA i excellent with a 70-page manual containin full assembly instructions, theory of opera tion, Intel 8080 "op-code" listing and systen software.

System software is provided so a user ca rapidly get the system on-line tested an ready to run (provided the would-be user ha an appropriate tape reader; a tape containin a program called ZING is also provided). Wit this information included in the manual, a experienced kit builder should have no prob lems assembling the kit and getting th finished 8KRA module into operation. In th event a problem with the 8KRA does occu Processor Technology provides full suppor for the module and will provide the ki builder with assistance in isolating and curin the problem.

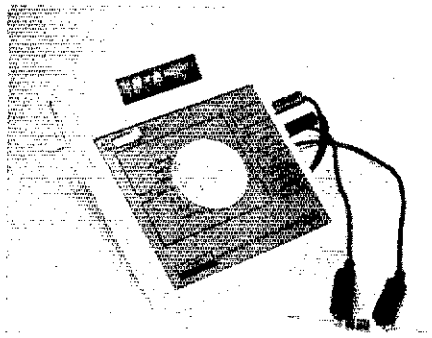
With the memory of our computer ex panded to 10 kb, it is now possible to ru some of the more complex programs that w have developed in recent months. The flex bility of some computers will be greatl increased by the addition of 8 kb of memor (RAM) and the user can apply the system t more functions around the ham shack. Th 8KRA is available from Processor Technolog Corporation, 6200 Hollis Street, Emeryville CA 94608. Price class for the 8KRA at th time of this review is $295 (kit), and $37 factory assembled and tested. — *WA6GVC*



The Processor Technology Corp. 8KRA static-memory module.

WESTON 6000 DIGITAL MULTIMETER

Here's an instrument for the amateur wh needs a VOM for the workshop and the fiel



The Weston 6000 digital multimeter.

No need to depend on ac power to operate this lightweight battery-operated digital VOM; a pair of 9-volt batteries provides a minimum of 200 hours of continuous operation!

The display numerals are 0.5 inch in height for easy viewing. Reflective, field-effect liquid-crystal display elements are used for reading out the measurements taken with the model 6000. Readability is good throughout a wide range of ambient light levels.

There are five ac and dc voltage ranges, five ac and dc current ranges and six resistance ranges. The 26 ranges are provided by means of autorange on volts, milliamperes, amperes, kilohms and megohms. The 200-mV and 200-ohm ranges are selected by separate positions on the function switch. Ac and dc measurements are effected by placing a slide switch in the appropriate position.

An unusual but valuable feature of the model 6000 VOM is the *remote-hold* input jack. It permits storing the result of a measurement as long as the remote-hold input lead is attached to the common bus of the circuit under test. This function is useful when an initial reading is to be compared to a new reading after making circuit changes.

The input impedance of the instrument is 10 megohms in the dc mode, 9 megohms in parallel with 39 pF on the ac range and 10 ohms for the ac and dc current positions. Resolution for ac and dc voltage measurements is 100 μV and is 1 μA for the two current ranges. Maximum readings are 1000 V ac and dc, 10 A for ac and dc current, and 20 megohms on the resistance range. Frequency limits for the ac voltage and current modes are 40 to 400 Hz, respective to the rated accuracy.

Some of the other features offered in this VOM are a low-battery warning (valid reading blinks during last 10 hours of battery life), over-range indication (blinking 1888 in display window) and a high-impact polycarbonate plastic instrument case. A handsome brown leather carrying case is provided with the "6000." The plastic instrument housing is a light beige in color.

A single pair of banana jacks accommodates all input functions other than amperes; a separate jack is provided for the latter. The model 6000 is a 3-1/2 digit instrument, and all of the VOM components are assembled on a single etched-circuit board. The handle of the instrument case serves as a tilt stand while measurements are being taken.

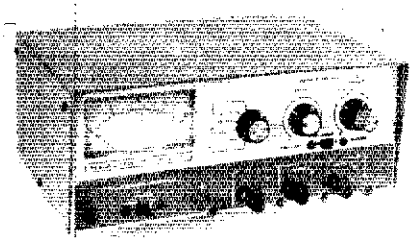
Total package weight (inclusive of batteries) is 22 ounces (625 grams). Dimensions are (WHD) 7 × 5.75 × 2.25 inches (178 × 146 × 58 mm). Price class is $185. Manufacturer is Weston/Schlumberger (made in the USA), 614 Frelinghuysen Ave., Newark, NJ 07114. — *WIFB*

HEATH IP-2718 TRI-POWER SUPPLY

It seems the building and testing of solid-state circuits these days requires a whole collection of power supplies at the work bench. Say you're breadboarding a circuit with TTL integrated circuits – you'd need a 5-volt supply, preferably regulated. Or if it's a solid-state receiver you're perfecting you'd probably need something in the range between 9 and 18 or 20 volts, at least until you finalized the construction and put everything into one package with a self-contained power supply. Or how about that gadget which uses a couple of quad op-amp IC packages, a pair of FETs, and a few TTL ICs to boot? Wow! You'd probably need plus and minus 18 volts dc for that, as well as 5 volts. That would be a difficult bill to fill unless you had three separate power supplies.

Or *would* you need three? Not if you had a Heath IP-2718 tri-power supply, for the '2718 is really three independent supplies rolled into one enclosure. No, it doesn't use three separate power transformers, but it does use three separate secondary windings on the husky transformer it contains. (As if you couldn't recognize it, the transformer is that large object in the upper right corner of the interior-view photo.)

From the tri-power supply you can extract 1.5 amperes at 5 volts (fixed, regulated voltage output), and 0.5 ampere at 0 to 20 volts from each of two supplies (independently and continuously adjustable voltages, also regulated). Or with the flick of a switch on the front panel you can go to the "tracking" mode for the adjustable voltage outputs. In this mode you manipulate a pair of knobs which are coupled with a friction type of clutch. By presetting the knobs you can make the voltages track at the same amplitude, or they can be made to track with a fixed voltage difference between the two outputs. Because the terminals of each output are completely isolated from the other supply outputs, you can apply the voltages to your circuit in any combination of polarities. It's a simple matter, for example, to set up the supply for a continuously adjustable tracking output from 0 to plus and minus 20 volts. Any pair or all three of the supply outputs may be connected in series, or the 20-volt supplies may be operated in parallel by adding half-ohm current-equalizing resistors. Current-limiting protection is provided for each of the three outputs, as is short-circuit protection. All three sections of the supply repeatedly survived the "crowbar" test – a dead short on the output terminals for several seconds.



The Heath IP-2718 tri-power supply.

A peek inside the IP-2718 shows that most of the active devices and other components are mounted on a circuit board, which measures 3-3/4 × 6-3/4 inches. The supply was placed on one end to make this photo, but in operation the circuit board lies in a vertical plane, near the wall formed when the cover is put in place.

All of the current ratings given in the paragraph above, by the way, are Heath's. We found them to be on the conservative side. As an endurance test we set up the power supply on the lab bench and loaded its three outputs full bore into a bank of load resistors. Then we allowed the setup to "cook" for a few hours. During the course of this test the enclosure for the supply did become warm, but that was to be expected – the rear panel is used as a heat sink for the 5-volt regulator and the two 20-volt-supply pass transistors. Meanwhile, the 30-watt bank of resistors, barely adequate for the task it was performing, became much too hot to handle. Cooked fingers, anyone?

Monitoring of the voltage or the current from any one of the three outputs is provided by the front-panel meter, the face of which measures roughly 1-1/2 by 3-1/4 inches. A six-position switch controls the monitoring function of the meter. In some of our applications of the supply, we found it desirable to monitor more than one function at a time, but of course this cannot be done with just a single meter. Attaching external meters into the circuit is the solution.

Construction

This writer constructed the IP-2718 in one weekend, with time out for the usual other weekend activities. I was intrigued with the construction approach Heath used in this supply – almost all of the components are located on a circuit board, which is mounted vertically at one end of the enclosure. Take a look at the photo of the interior and you can see that this approach greatly simplifies construction. The only parts which are not located on the circuit board are the controls binding posts, components which require a heat sink, the power transformer, and (out of the picture at the top) a couple of diodes and a few other parts. A preformed wiring harness takes away the nuisance of measuring, cutting

and stripping a multitude of wires during construction. Even though the two 20-volt supplies use discrete parts altogether (no integrated circuits), the circuit-board technique makes for a surprising amount of open space inside the enclosure. When you first remove the cover you get the impression there's "nobody home," even though there are nearly a hundred components inside.

The enclosure for the tri-power supply measures 7-1/4 × 10-1/2 × 4-1/8 inches. The overall dimensions are slightly greater because of protruding knobs, binding posts, etc. The weight of the completed supply is just a tad under 10 pounds, and of course most of that weight is in the power transformer. The supply has provision for switching to operation from either of two input ac voltage ranges, 105-135 or 200-270. The supply may be operated from either 50- or 60-Hz lines, and requires an input of 100 watts at full load. Price class at the time of this review is $80 in kit form, or $140 if you wish to purchase a factory-assembled version. The IP-2718 is available from Heath Company, Benton Harbor, MI 49022. – *K1TD*

HAL ST-6000 DEMODULATOR

One of the more recent offerings in HAL Communications Corporation's line of radioteleprinter demodulators was evidently designed for "no compromise" operation. The HAL ST-6000 demodulator includes both pre- and post-detection filters, input-age stage and automatic bias-distortion-correcting circuitry to ensure reception in the presence of interference or noise, and the autostart and anti-space features prevent the TTY machine from printing garble when no valid RTTY signal is being received. A keyboard-operated switch (KOS) circuit turns on your transmitter automatically whenever you type on a keyboard or send cw identification, and a crystal-controlled audio frequency-shift keyer (afsk) is built into the ST-6000 circuitry.

State-of-the-art circuitry is used throughout. *R-C* active filters replace the ubiquitous 88-mH toroid coils in the input (pre-detection) filter, discriminator and post-detection filter. The six-pole input filter (equivalent to three tuned circuits) is very effective in reducing the effects of noise and interference. One disadvantage of active filters – susceptibility to overloading by strong signals – is ameliorated by including an automatic gain-control circuit (age) preceding the filter.

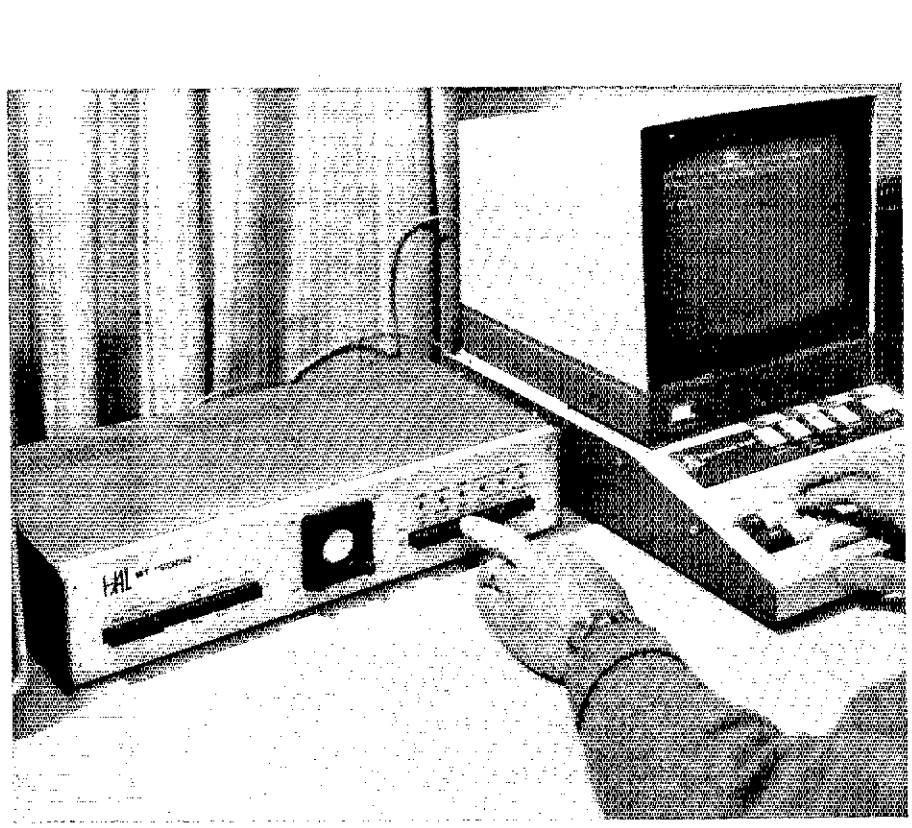
The afsk generator uses high-frequency crystal-controlled oscillators for good stability. The hf signal is run through a digital frequency divider and digital-to-analog converter to produce the audio tones. Frequency shift is selected by the same front-panel push buttons that switch the pre-detection and discriminator filters so that the afsk and demodulator frequencies are always the same. The unit can be supplied with the low-frequency (mark) tone on either 2125 or 1275 Hz. Frequency shifts provided are 170, 425 and 850 Hz. In addition, the cw identification feature produces a tone 100 Hz below the mark frequency.

Some commercial shortwave RTTY stations use 425-Hz shift, so this shift width is useful for those who enjoy shortwave listening. The post-detection filter has a bandwidth wide enough to copy speeds in excess of the 100 wpm that some commercial stations use. Although this bandwidth is wider than optimum for amateur 60-wpm operation, it doesn't seem to cause any serious decrease in copying ability. If desired, the bandwidth could be changed by changing the value of three capacitors in the filter.

The tuning meter uses the "plus-plus" method – that is, both mark and space signal give a positive indication on the meter. Correct tuning is achieved when the meter doesn't flicker while an RTTY signal is being received. An optional oscilloscope tuning indicator gives the standard "plus-sign" readout (vertical line for space, horizontal line for mark).

Most internal signals are available for use through a connector on the rear panel. For example, it is possible to route the CMOS compatible post-detection RTTY signal out to a digital processor (such as a UART signal regenerator IC) and then back into the keyer stage to control a 60-mA loop. The ST-6000 can key a current loop (up to 100 mA) using either the internal 175-volt, 60-mA supply or an external voltage source (or both simultaneously). In addition, outputs are supplied that conform with EIA RS-232C specifications (±12 volts space/mark) or MIL STD-188C specs (±6 volts mark/space). Power requirements are either 110 or 220 volts ac.

Cabinet styling is designed to match that of the companion DS-3000 KSR video terminal. However, the flexible input/output (I/O) options make the ST-6000 compatible with just about any TTY gear on the market today and its advanced features ensure that this unit should satisfy the amateur RTTY operator's demodulator needs for years to come! – *WA3JSU*



The HAL ST-6000 demodulator (left) and the DS-3000 video display terminal (right).

HAL DS-3000 VIDEO DISPLAY TERMINAL

With microprocessors being used in everything from missiles to toasters, it seems only logical to expect to find them in teleprinter circuits. After all, TTY machines are controlled by digital signals readily adaptable to the binary language of computers. The HAL DS-3000 KSR video display terminal is an all-electronic TTY "machine." It comes complete with keyboard and a TV screen to take the place of the ubiquitous roll of yellow paper found on conventional teleprinters.

With a 72-character-per-line capability, the unit is compatible with most surplus TTY machines in use today. The screen can display up to 16 lines of text. When you start to type the 17th line, the top line disappears and all the other lines move up to make room for the new one at the bottom. This process is known as "scrolling."

An Intel 8080A microprocessor IC gives the DS-3000 the ability to perform a bevy of functions never before available in a communications teleprinter. The unit will print (and send) both Baudot (communications) and ASCII (computer) codes at a variety of speeds. (ASCII is available in the "2X" version only.) Available are 60, 66, 75, 100 and 132 words per minute using Baudot code and 100, 150, 300, 600 and 1200 wpm ASCII. Even if you never use anything but 60 wpm on the ham bands, the extra Baudot speeds are fun to have for copying the commercial shortwave stations (most of whom seem to be using 66 and 100 wpm). The ASCII option, of course, makes the device usable as an "intelligent" computer terminal.

Microprocessor control allows you to type a whole page (TV screen) of text, go back and correct your mistakes, then send the corrected copy at the speed of your choice. The

feature makes composing keyboard pictures easy. In addition, you can store up to 255 characters in a special memory which may be recalled at will by pressing a button. For example, you can load in CQ CQ CQ DE W1AW W1AW W1AW and then fill the whole screen with CQs merely by pressing the button a few times. A third 255-character memory acts as a buffer so that if you type faster than the machine is printing out, it will remember what you typed for later transmission. Thus, you can type up to 255 characters ahead. On a conventional teleprinter, if you type even one character ahead, the key will lock until the previous character has been sent.

Other "bells and whistles" include a feature that causes the machine to type out THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG'S BACK 1234567890 whenever you hit the proper keys. If the machine is placed in the "word mode," it won't output a word until you start typing the next one. Thus, if you notice a mistake before the word is finished, you can just backspace and correct it so that the fellow at the other end of the circuit thinks you're a faultless typist!

Even more impressive to the other operator is the "blankfill" switch. This sends blanks whenever the buffer memory is empty. Even a hunt-and-peck typist can send a steady 60 wpm with this feature!

"Unshift-on-space" (machine returns to lower case whenever a space character is *sent* or received) can be switched on or off from the front panel. Automatic carriage return/line feed (machine automatically starts a new line whenever a line runs over 72 characters) is always available. In fact, when the "word wrap-around" mode is selected, the unit will move the *whole word* to the next line so that the word won't be broken in the middle. This means you never have to worry about carriage returns – the machine will automatically start the new line at the proper place as you type!

A keyboard-operated switch (KOS) circuit is available for "break-in" RTTY operation. Whenever data are being sent, a keying transistor is baised ON to ground the push-to-talk line in your transmitter. When the machine stops sending, it will automatically return the station to receive.

Input/output (I/O) standards are quite versatile. Either EIA standard RS-232C or a standard high-voltage TTY current loop may be used.

For the apartment dweller, or for the RTTY enthusiast who simply doesn't like large, noisy TTY machines, the DS-3000 KSR may be the perfect solution. Small, lightweight, attractive and noiseless, it's an alternative that even the most fastidious spouse can approve! – *WA3JSU*

HAMTRONICS P8 VHF PREAMPLIFIER

Older model receivers (and some new ones too) often need a little help receiving weak signals. When feed-line losses have been reduced to a minimum, when antenna operation has been optimized and when the receiver front end has been tweaked, the simplest way to improve sensitivity is to install a preamplifier in front of the receiver. For casual operation, a preamp with an extremely low noise figure is not required. In most cases, the gain of the preamp will mask the poor noise figure of the receiver, and its own noise figure will be low enough. The Hamtronics P8 preamplifier is such a device. Using two JFETs in cascade, the P8 provides a gain of 20 to 23 dB.* The preamp we tested was intended for use on the 2-meter amateur band, but a unit may be selected to provide amplification over various ranges between 83 and 190 MHz. Hamtronics will supply a finished preamp, aligned at the desired frequency (model no. P16) for about $17, or a kit of parts (model no. P8) for about $8. The kit provides all parts including an etched glass-epoxy circuit board. One aspect of the kit may surprise some builders; a short piece of enameled wire is supplied, and the constructor must wind the coils per the instruction sheet for the desired frequency of operation. This should pose no problem for the builder, as the coils are small and require only a few turns of wire. One obvious advantage to this method is that the builder may change the operating frequency in the future by referring to the instruction sheet and rewinding the coils accordingly. The kit went together quickly and worked as soon as power was applied. Alignment took only 15 minutes to optimize. Because most vhf rigs are transceivers, the 1/2 × 2-3/8-inch circuit board should make it easier to install the preamp between the antenna relay and the receiver input, making external connections and switching unnecessary. The preamp should make a significant improvement in reception of vhf cw and ssb, fm repeater, and OSCAR 7 Mode B signals. The P8 preamp is available from Hamtronics, Inc., 182 Belmont Rd., Rochester, NY 14612. – *W1XZ* QST

*Measured in the ARRL lab.

Strays

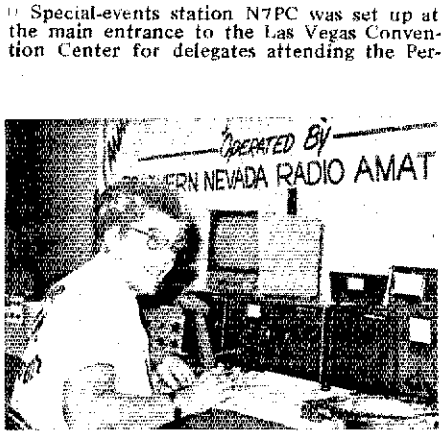
I would like to get in touch with . . .

a pen pal who shares my interest in stamps, swimming, baseball, hiking, television and reading. I am 41 years old and have a wife and two children. Imao Kaneko, no. 654, Yoshida-cho, Totuka-ku, Yokohama, Japan.

anyone who has converted a GE PLL CB set for use on an amateur band. Vic Davis, WA1SLV, Armory Rd., Milford, NH 03055.

N7PC AT PC '77

Special-events station N7PC was set up at the main entrance to the Las Vegas Convention Center for delegates attending the Personal Communications and the Automotive Parts Conventions. Over 200 radio amateurs attended these conventions and visited N7PC from nearly every state and many foreign countries, with the JA amateurs getting the honors. Approximately 300 contacts were made by WA7MRS, W7MWF, W7PBV, K7ZOK and WB7BDX. A special QSL card is available to all who worked N7PC. QSL to N7PC, P. O. Box 945, Boulder City, NV 89005. – *W7PBV*



Kay Davis, WB7BDX, operating in Las Vegas.

NEW BOOKS

The Low and Medium Frequency Radio Scrap Book, by Ken Cornell, W2IMB. Published by *Ham Radio Magazine*, Greenville, NH 03048. Soft-cover version, 8-1/2 × 11 inches, 110 pages. Price: $6.95.

This fascinating and informative publication is probably the most complete collection of notes available to those who are interested in the frequencies between 10 and 1600 kHz and, more particularly, the so-called experimenter's band between 160 and 190 kHz. If you aren't familiar with the latter, it's a band where operation is legal without an FCC license. The restrictions are one watt *maximum* dc input power to the last stage of the transmitter, and an antenna whose total length, including the feed line, does not exceed 50 feet. Scattered groups of experimenters are active in the U.S. They transmit beacon signals for one another to hear, and use their initials, amateur calls, or whatever as call letters. QSOs are mostly carried out by means of cw.

The author is the unofficial patriarch of the experimenters. For many years he has served as a pathfinder for those who wanted to try their luck in low-frequency QRP work. His notebook is a reflection of his efforts and acquired skills over the years, but it contains a lot of technical meat as well.

Ken's book is sure to elicit the praise of those who are smitten with radio nostalgia, as it contains a lot of miscellany about old-time circuits and techniques which were in vogue during the early days of amateur radio. There is even a section on winding old-style coils and loops from yesteryear!

For those who still "dig" vacuum tubes there is material that will make the reader bristle with delight – numerous tube-type circuits for transmitting and receiving between 160 and 190 kHz. Most of the circuits, including a few solid-state ones, are somewhat removed from the state of the art, but they should serve as good starting points and stepping stones to a permanent foothold on the low-frequency band.

Adding spice, the author's philosophies are sprinkled throughout the pages. The narrative is totally casual – the sort of reading that goes well with a glass of your favorite beverage and a few puffs of well-aged pipe tobacco. Once you digest this notebook you'll probably be given to fits of impatience to warm up the soldering iron, raid the ham junk box, and start building your first low-frequency station.

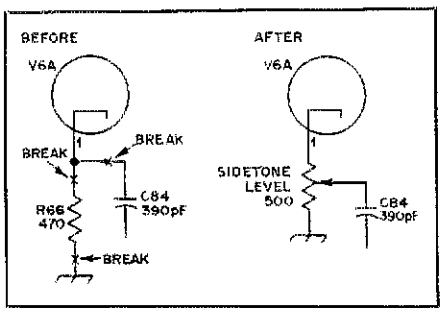
Cornell has included a reprint of the FCC rules and regulations concerning operation in the band. There is a fascinating section on antennas for use in the 160- to 190-kHz range, and none of them are hard to build and adjust.

Even if you don't intend to "fire up" a station for the experimenter's band, you'll want this book for plain old pine-stump reading. It's a refreshing departure from the oft-times stilted and highly technical narrative found in much of the amateur literature of today. – *W1FB*

Hints and Kinks

SIDETONE LEVEL ADJUST FOR THE HEATH HW-16

HW-16 sidetone level may be adjusted by incorporating the modification shown in the schematic diagram. R66, the cathode resistor of V6A, is removed. The lead of C84 connected to the cathode pin of V6A should be disconnected. A 500-ohm potentiometer is connected from the cathode pin of V6A to ground, and the free end of C84 is connected to the wiper of the pot. Sidetone level may now be adjusted to the desired level. – *Jose M. Armengol, WA2BNM*



HW-16 sidetone level modification.

WIDE-RANGE AFSK GENERATOR

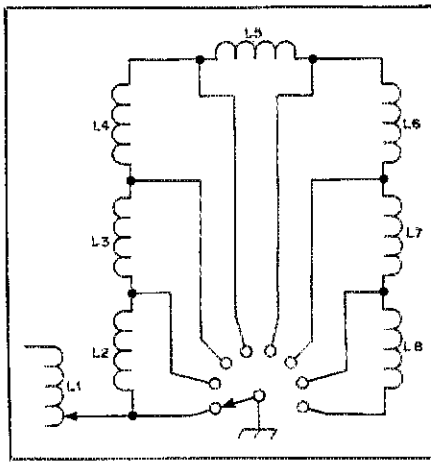
With the component values given, the AFSK generator shown in the schematic diagram will "tune" from 50 Hz to well over 20 kHz. It is capable of shifting between two frequencies over 20 kHz apart. Oscillator U1 is a 555 timer, connected as an astable multivibrator. Potentiometer R2 and Q3 are connected in series with the discharge resistor R1. When Q3 is biased off, the charge/discharge currents for C1 flow primarily through R1 and R2. This series combination determines the lower frequency of oscillation. When Q3 is biased on, R2 is effectively shorted, increasing the frequency of oscillation because of the shorter time constant. Q2 causes the switching of Q3 to be less dependent upon the keying voltage. Q1 adds further isolation and acts as an inverter so that a higher voltage at the input of the generator causes a higher tone to be generated. The Q1 collector load resistor will affect the level of input signal at which keying takes place. The 10-kΩ value shown will result in keying when the input voltage exceeds 1 volt with a 5-volt supply. A value of 1,000 ohms will raise the keying voltage to 3 volts.

The higher frequency should be set first by applying an input voltage to J1 and adjusting R1 for the desired frequency. To set the lower frequency, short out J1 and adjust R2. Since the output of U1 is a square wave, some filtering may be required in certain applications. – *Thomas M. Whittaker, WA9RSB*

POTENTIOMETER TURNED INDUCTOR

It is not news that variable inductors are difficult to find. Many amateurs may not know that there is an inexpensive component, readily available on the surplus market for about $1, which can be modified to yield an excellent 0.3- to 2.5-μH variable inductor. Coupled with a switch and a handful of fixed inductors, this compact unit may be used to build a Transmatch for use with a QRP transmitter or up to medium-power rigs.

The unit to be modified is a 10-turn potentiometer, which is of the type usually found in a black phenolic case measuring 1-3/4 × 3 inches. The resistance value of the unit is unimportant. Upon opening the unit, it will be found that the shaft holds a sliding contact, the wiper of the potentiometer. The inner surface of the phenolic case is spirally ridged, and in the spiral valley lies a coil of heavy, varnished copper wire, consisting of 10 turns. Around that coil is wound a larg number of turns of very fine high-resistanc wire. The wiper normally contacts just th resistance wire. The heavy copper wire serve only as a form.



Potentiometer turned inductor.

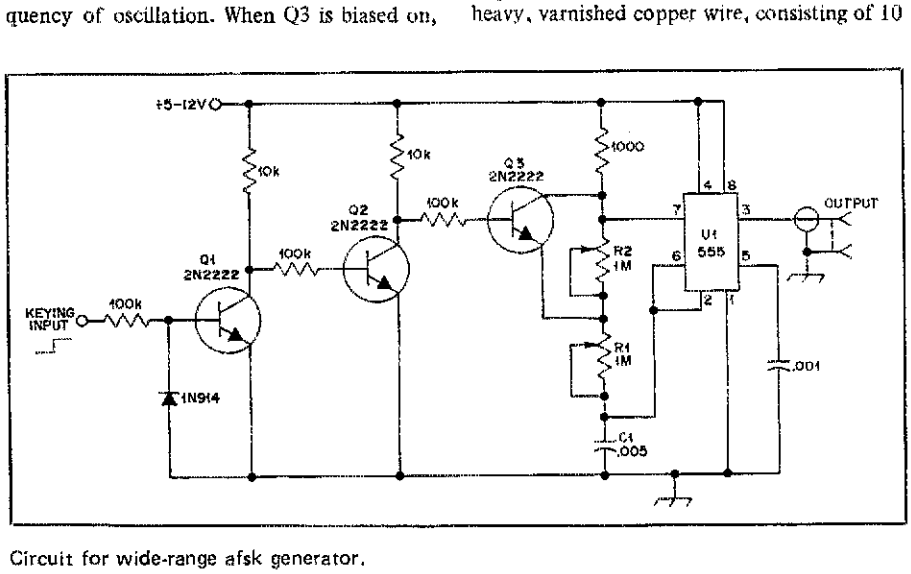
Two approaches to the conversion ar offered. First, one may roll up a tube o sandpaper, insert it into the case, and san the inner surface of the coil until the high resistance wire is sanded away along th length of the entire coil. Care must be take to see that this sanding penetrates not onl the high-resistance wire, but also the varnis insulation between the high-resistance wi and the heavy copper coil. When reassemble the slider will run against the heavy coppe coil, and one now possesses a 10-turn, 0.3- t 2.5-μH variable inductor.

Another approach is to remove the heav wire, along with its wrap of high-resistanc wire, and to replace it with a new coil of ne 14 bare copper wire. This is a bit tedious, bu can be done quite nicely if one winds the ne wire onto a coil form slightly larger than th inside diameter of the phenolic housing. The it is possible to twist the new coil in plac The ridges and valleys molded into th housing greatly aid in this process.

There is a type of 10-turn potentiometer which has the coil wound on the outside of central phenolic cylinder, rather than on th inside of the housing. This style of potent ometer is even easier to convert since it much simpler to wind a coil on the outside o a cylinder than on the inside.

I have just completed the QRP Tran match shown in recent editions of *The Radi Amateur's Handbook*, replacing the switche Amidon cores with fixed inductors and th variable inductor, as shown in the circu diagram.

Inductance L1 is a variable type (0.3 2.5 μH) modified from a 10-turn poten



Circuit for wide-range afsk generator.

ometer. Coil segments L2 through L8 have individual inductances of 2.5 μH. With the switch in the position shown, the total inductance ranges from 0.3 to 2.5 μH. Advancing the switch to the next position changes the value from 2.8 to 5 μH, while the maximum inductance would be 20 μH. Of course this can be easily raised by adding more fixed inductors.

The unit is a beauty! – *Dr. Stan Kaplan, WB9RQR/N*

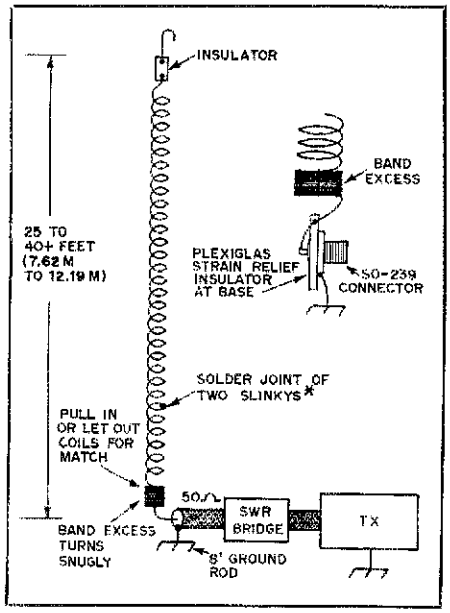
CONTINOUSLY LOADED HELICAL

Living on a postage-stamp-size lot has left me with insufficient room for a typical 75/80-meter antenna. Feeling concerned about the relatively poor efficiency of some shortened verticals on the market, I decided to put up what I call my "Continuously Loaded Helical Vertical." Constructed with the help of WB8JXF, two toy-store spiral coils were soldered together making one long continuous coil. The antenna is supported at the top of my 40-foot tower with an 8-foot side arm and standoff. A strain relief insulator fastened to a ground rod is connected to the lower end of the antenna.

In order to tune the antenna, I applied about 10 watts of rf while watching an SWR bridge at the base of the antenna. Tuning was accomplished by pulling in a number of coil turns until an excellent match was achieved. Excess turns were pulled into a bunch at the base. These can be removed leaving only enough for any future tuning. Since the initial adjustments were for the cw band, it was only a matter of pulling in a few more turns (shortening the antenna) to properly match it for the phone segment. Signal reports have, indeed, been satisfying. It also appears to be relatively immune to man-made noise, giving quieter performance than the vertical and dipole it was compared with. Furthermore, it is good for DX.

Raising and lowering the top of the antenna does cause some change in the inductance. Actually minor tuning can be done this way if a halyard and pulley are used at the top of the tower. Heavy winds will cause swaying of the antenna but the SWR indicator shows an insignificant change.

The system may be mounted close to the side of a wooden building but it is best to keep it three or four feet from a metal structure of any kind. Top feeding the antenna has been found practical and is an approach that may be used by an amateur living on the upper floors of a multistory building. A good ground in either case (whether top or bottom fed) is essential. I used an 8-foot ground rod since radials did not seem to make sufficient difference to bother with digging up the backyard. Total cost of the antenna was about $3. – *Craig V. Iansiti, WD8BDQ*



Continuously loaded helical antenna. *Coils for helical antennas manufactured by Teletron Corp., Box 84, Kings Park, NY 11754. Toy-store variety of coils is used in the antenna illustrated here.

ALC FOR THE SWAN 250-C

Addition of an alc circuit is an improvement for the Swan 250-C 6-meter transceiver to prevent the final amplifier from being overdriven. The modification shown in the schematic diagram has provided results that are indeed effective.

Most of the components used in the modification are installed in a small aluminum box which is mounted on the inside wall of the PA compartment. Dimensions of the box should be suitable for use in this area of the transceiver.

These are the steps to be followed in making the modification.

1) The first i-f amplifier (V9), a 6EW6 sharp-cutoff pentode, should be removed and replaced with a 6GM6, a variable-μ semi-remote-cutoff pentode. This will allow proper gain control of the stage by the derived alc voltage from the final amplifier.

2) Remove the ground connection to pin 7 of relay K1. The alc voltage is connected at this point and is applied to the control grid of the 6GM6 during the transmit mode.

3) The alc circuit is built in a small aluminum box. Note that C2 and C3 are feedthrough capacitors.

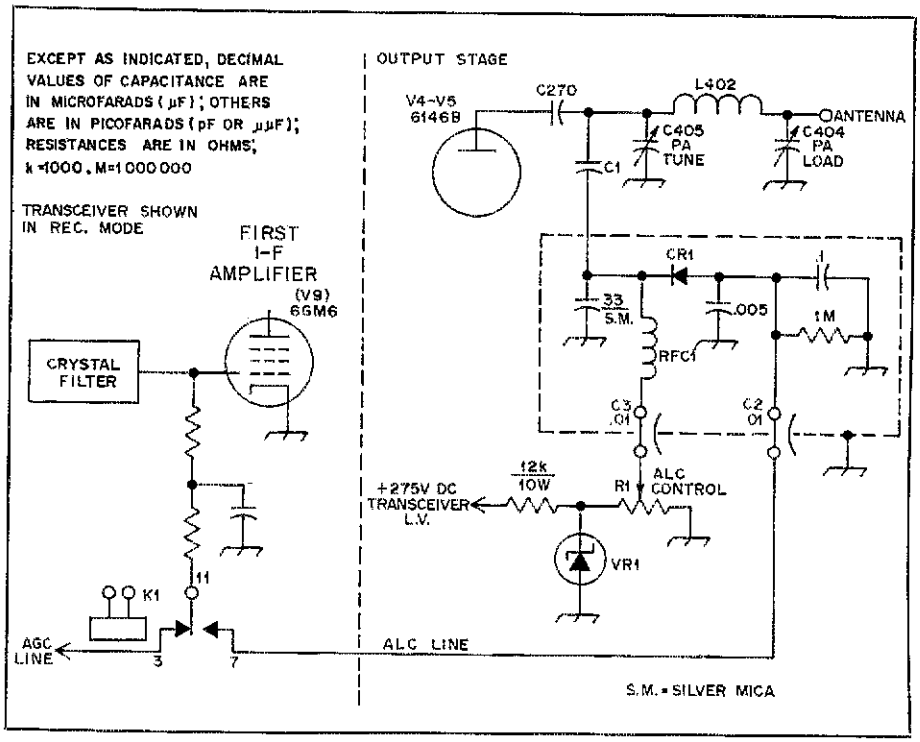
4) There are four 10-W resistors on the inside back plate of the transceiver. Drill two small holes for insulated standoffs, and mount the 12-kΩ, 10-W unit (R3) above the four resistors. All wires may be routed through the closest existing holes in the chassis.

5) Zener diode VR1 may be mounted at any convenient point on the chassis.

6) After modification is complete, check the full range of the bias voltage (0 to +39 V) to be sure that it is available at feedthrough capacitor C3.

7) The alc potentiometer, R1, may be mounted on the front panel of the transceiver in the upper left portion between the S-meter and the window for the tuning-indicator dial. As space is very limited, a miniature potentiometer must be used.

8) Proper adjustment of alc-control potentiometer R2 may be determined by monitoring the ssb signal on an oscilloscope while adjusting the potentiometer to prevent voice peaks from overdriving the final amplifier. – *Hamp Richardson, K5EFW* QST



Schematic diagram of Swan 250-C alc modification.

C1 – 1-pF 2-kV transmitting type capacitor.
C2, C3 – 0.01-μF feedthrough type capacitors.
CR1 – Silicon diode 1N39B or equivalent.
R1 – 20-k linear taper potentiometer.
RFC1 – Ohmite Z-50 rf choke.
VR1 – Zener diode, 39-V, 400-mW Motorola 1N2992B or equiv.

Getting to Know OSCAR – from the Ground Up

Part 5: Whether working DX, filling walls with operating awards, participating in technical experiments or assisting the AMSAT field organization, OSCAR communicators rarely lack for something interesting to get involved in.†

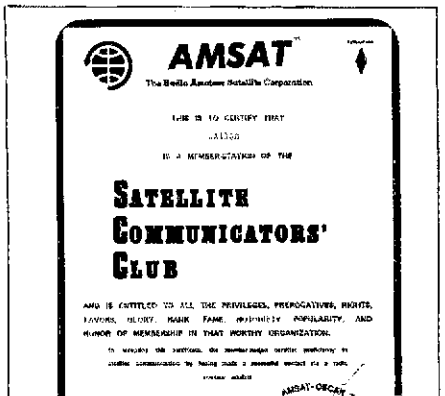
By Charles J. Harris,* WB2CHO

"The OSCAR bug bit hard after hearing OSCAR 7 for the first time," writes Mike Tappan, WB5YCE, of San Antonio, TX. "After reading about the satellites in the first two *QST* articles, I tuned into the downlink of OSCAR 7 Mode A using my low-band rig. The prediction chart was right on, and I had no difficulty copying the satellite. The Doppler shift was particularly intriguing. In my financially crippled condition, I am not shooting for ssb gear right away, but I am scrounging up a 2-meter cw rig, and I'll be on OSCAR soon. Fascinating!"

As Mike — and several thousand other amateurs have been discovering — little can match the thrill of sending your signal through space. The first four parts of this series provided all you need to know to get hooked into OSCAR. This month we look at what you can do with your satellite station, from chasing awards to participating in unique space experiments.

OSCAR = Certificate Hunter's Dream

Your first satellite award will be the Satellite Communicator Club certificate, mentioned in part 2 of this series. To earn this AMSAT-sponsored award, simply report a two-way contact through either satellite to AMSAT, P. O. Box 27, Washington, DC 20044. A special reporting form for this purpose is available from the ARRL. As with any "freebie," a self-addressed, stamped envelope (s.a.s.e.) would be appreciated. You can even earn "endorsements" on


AMSAT
The Radio Amateur Satellite Corporation

THIS IS TO CERTIFY THAT

IS A MEMBER-STATION OF THE

SATELLITE COMMUNICATORS' CLUB

AND IS ENTITLED TO ALL THE PRIVILEGES, PREROGATIVES, RIGHTS, FAVORS, GLORY, FAME, NOTORIETY, POPULARITY, AND HONOR OF MEMBERSHIP IN THAT WORTHY ORGANIZATION.

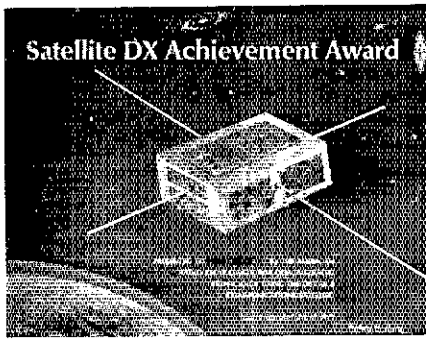
AMSAT-OSCAR 7 PROJECT

AMSAT-OSCAR 7 COMMUNICATOR

this award in the form of stickers for the two satellites now functioning.

With your Satellite Communicator Club certificate hanging in an honored place on your wall, you'll want to set your sights on the OSCAR award and the Satellite DX Achievement certificate. AMSAT sponsors the OSCAR award, issued to stations which submit confirmations of contacts with 20 different states, Canadian call areas, other countries or a combination of these. You should send your cards to AMSAT with sufficient postage for their safe return; you'll need them back for the other awards. The OSCAR certificate is free to AMSAT members, $1 to others.

The rules for the ARRL-sponsored Satellite DX Achievement award are a little more complicated. You have to



Your satellite wallpaper comes in several different styles and colors.

send to the League confirmations o satellite contacts totaling 1,000 poin on the following scale: each new st tion, 10 pts.; each new country, 50 pt and each new continent, 250 pts. You first satellite confirmation nets you 31 pts.: 250 for the continent, 50 for th country and 10 for the station. You ca earn this coveted award with as few four contacts from four different cont nents — but not everyone lives withi satellite range of four continents. Th author did the next best thing: fiv cards from four countries on thre continents (750 pts. for the continent 200 for the countries and 50 for the fiv different stations, total 1,000!). All fiv stations were worked in a single 24-ho period one weekend. Nearly 400 Sate lite DX Achievement Awards have bee issued since number one went to LA1 in January, 1973. Stations in more tha 40 countries have already qualified f this attractive certificate. As with a ARRL awards, the Satellite DX award

*Club and Training Manager, ARRL
†Parts 1 through 4 appeared in *QST* for January through April, 1977.

available only to ARRL members and DX stations. There is no fee for any ARRL award, but sufficient postage for the return of your card is required.

Another certificate well within the reach of any North American satellite communicator is the 10 Districts Award, sponsored by the Lockheed Employees Radio Association, W6LS, 2814 Empire Avenue, Burbank, CA 91504. The award is issued for confirmed contacts with stations in all 10 U.S. call areas. Send the cards, complete with postmark, envelope or bureau stamp, to W6LS along with $1 and ask for the special OSCAR endorsement.


TEN AMERICAN DISTRICTS AWARD

AMATEUR RADIO STATION _____ HAS SUBMITTED SATISFACTORY PROOF OF TWO-WAY COMMUNICATIONS WITH STATIONS IN ALL TEN AMERICAN RADIO DISTRICTS.

TAD AWARD NUMBER _____ ISSUE DATE _____

_____
WLLS AWARD ADMINISTRATOR

The Canadian equivalent of the 10 Districts Award, the WVE Satellite Award, is sponsored by the Northern Alberta Radio Club. W/VE stations must confirm contacts with four Canadian call areas; DX stations (including Alaska and Hawaii) need two different call areas. Send the cards and 25 cents to Ray Nadeau, VE6SF, P. O. Box 52, Barrhead, Alberta T0G 0E0.

Ready for the Tough Ones?

Once you have knocked over the easy awards, it's time to start gunning for the big ones – the ones that separate the casual OSCAR user from the gung-ho satellite communicator. In order of increasing difficulty, there are several awards issued to satellite DXers: OSCAR Sexagesimal Award, Satellite Worked All States, CQ DX Award satellite endorsement and Satellite DXCC.

An extension of AMSAT's basic OSCAR award, the OSCAR Sexagesimal Award is issued to stations confirming contacts with 60 or more states, Canadian call areas, other countries or a combination. Once you have earned the OSCAR award, you can begin shooting for the endorsement stickers. These are issued in multiples of 10 after the basic 20 contacts. At levels of 30, 40 and 50 states, Canadian call areas, countries or mixture thereof, you earn endorsements. When you reach the magic number of 60, you qualify for the OSCAR Sexagesimal Award. Only 18 stations


OSCAR SATELLITE COMMUNICATIONS

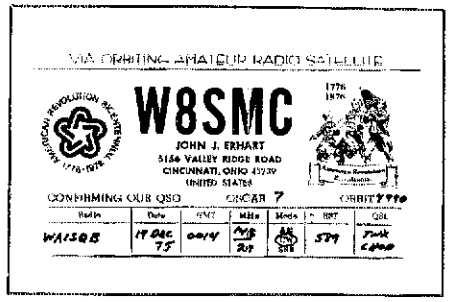
ACHIEVEMENT RECOGNITION

AWARDED TO _____

The Radio Amateur Satellite Corporation

have earned the Sexagesimal award as of March 1, 1977. Yours can be next.

The other ARRL-sponsored satellite award is the special satellite Worked All States (WAS). The rule prohibiting "relayed" contacts in the normal WAS award is replaced by one requiring relay through an amateur satellite. Stations to the west of the Mississippi have a much easier time earning this toughie, because of the difficulty of working Hawaii from the East Coast. But more on this later. As with any satellite award, QSL cards should clearly show that the contact was made through OSCAR, preferably with the satellite and orbit number identified.


VIA ORBITING AMATEUR RADIO SATELLITE

W8SMC

JOHN J. ERHART

5156 VALLEY RIDGE ROAD

CINCINNATI, OHIO 45239

UNITED STATES

CONFIRMING OUR QSO OSCAR 7 ORBIT 7990

Radio	Date	GMT	MHz	Mode	RST	QSL
W4ISQB	19 DEC 75	0014	145 207	AB SSB	579	TNX CARD

A host of regional awards are available to active satellite paper-chasers. These include the Hawaiian Satellite Award, the Washington Satellite Communicators Award and the North Jersey DX Achievement Award. Send an s.a.s.e. to Stephen Carson, KH6IHP, 1624 Kaweleka St., Pearl City, HI 96782, for full details on the Hawaiian award. Tim Blair, WA7FVT, P. O. Box 2262, Tacoma, WA 98401, distributes the rules of the Washington state award. The North Jersey award is available only to DX stations who work five or more NJDXA members via the satellite. Neither cards nor fee is required for this one. Send the log data to Hayden Evans, K2BZT, 11 Holly Tree Lane, Little Silver, NJ 07739.

Finally, the series of awards offered by the JARL can also be earned through satellite contacts. For details, see the *ARRL Ham Radio Operating Guide* or write Awards Manager, Japan Amateur Radio League, Box 377, Tokyo Central, Japan.

Awards for Super Satellite Operators

Looking for a real challenge? Try for a couple of the most difficult satellite DX awards: the satellite endorsement of the CQ DX award and Satellite DXCC. Neither has yet been won! The former requires confirmations from 50 different countries via the satellite, as well as qualifying for the basic, hf DX award. WA6GLD, P. O. Box 1271, Covina, CA 91722, will send complete details on this award for an s.a.s.e. The ARRL DXCC award for satellite contacts has not yet been formally announced. When available, it will be the ultimate in satellite DX awards. Watch the DXCC column in *QST* for further details.

Another toughie yet to be earned is the satellite endorsement of the Worked All Continents award, issued by the International Amateur Radio Union. An s.a.s.e. to the IARU Headquarters Society (ARRL) will bring full details on this sought-after award.

Satellite DXers often pass up the many QSL services available, as they become preoccupied agonizing over their confirmations. Satellite QSLs can be sent through the ARRL Outgoing DX QSL bureau (see *QST* for Oct., 1976, page 51). The AMSAT QSL bureau also handles satellite confirmations. Send your domestic satellite QSLs and several business-size s.a.s.e.s to AMSAT QSL Bureau Manager, Dennis Grindrod, WA1EHF, 564 Stillman Street, Bridgeport, CT 06608. The bureau also forwards DX satellite QSLs for 6 cents each or 20 for $1.

Working DX via OSCAR

To earn any of the more difficult OSCAR awards, you will need to work a considerable amount of DX through the satellites. These stations will be near (or even beyond!) the maximum range of satellite communications, and you'll need some special operating practices to be consistently successful.

Your first requirement for satellite DX is to gear up your existing satellite station for maximum efficiency. Check the accuracy of your antenna pointing system by searching around the predicted direction for maximum signal strength. If your tracking system is more than a few degrees off, it will hamper your DX abilities. Next, check the sensitivity of your 10-meter receiving system by listening to the OSCAR 6 telemetry beacon on 29.45

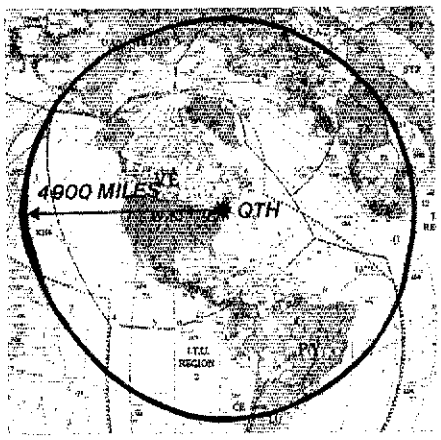


Fig. 4 — The maximum 4,900-mile range of the satellites takes in a lot of territory.

MHz. You should have clear and consistent copy of the beacon right up to the predicted LOS (loss of signal) as the satellite passes beyond the horizon. Many satellite systems benefit from the addition of a suitable preamplifier. See part 2 of this series in February *QST* for more on 10-meter preamps.

When you are confident that the receiving half of your OSCAR station is working well, examine the transmitting portion. Your signal into the satellite should be strong enough for consistent copy, but not so strong that it reduces the sensitivity of the satellite receiver or takes a disproportionate amount of the transponder output. If your downlink signal is significantly stronger than other copyable signals, reduce your erp. Remember that changes in polarization will cause deep fades for short periods of time. Compare your peak signal to the others. An erp of 100 watts should be sufficient.

As you try to access the satellite when it is near your horizon, you will notice your signal is significantly weaker than during overhead passes. The distance to the satellite is greater, increasing path loss, and the greater distance through the lower atmosphere adds additional absorption. Finally, trees and other vegetation which have no effect on overhead passes may introduce considerable attenuation in signal strength on passes close to the horizon. If you can still copy the beacons consistently, but your own signal fades before LOS, you may benefit from a slight increase in erp. Remember to use this additional power (up to about 300 watts erp) only on DX passes and to reduce power to normal levels for overhead passes. Excessive power is probably the greatest single factor in shortening the useful life of the satellites.

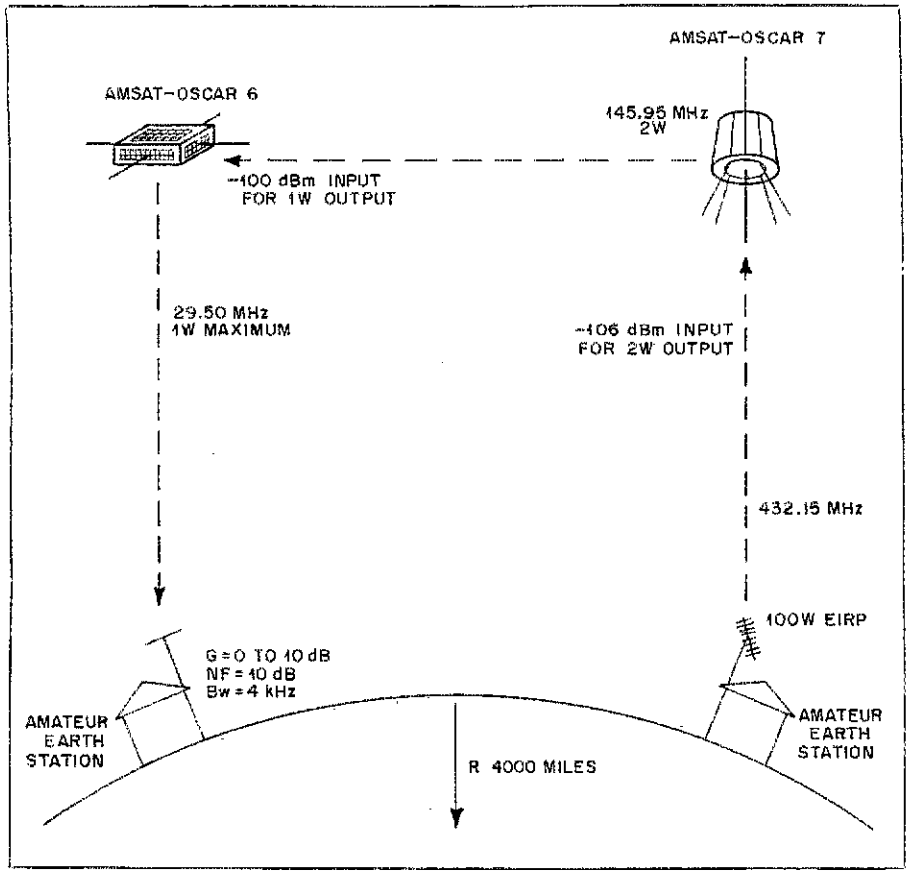


Fig. 5 — Satellite-to-satellite links are possible out to a separation of 5000 km.

Who Can You Work?

Your maximum range in any satellite communications is determined by the height of the satellite. For OSCAR 6 and OSCAR 7, at an altitude of approximately 910 miles (1,500 km), maximum range — with the satellite directly between you and your contact — is about 4,900 miles (7,800 km). You can draw a circle on a map to show what falls within this range, as Fig. 4 shows for Hartford, CT. All states except Hawaii, all of Canada, parts of six continents and well over 100 countries fall within range. Of course, not all these areas have active satellite communicators, and the small section of Asia within satellite range makes Worked All Continents difficult, but at least there are plenty of DX possibilities.

Over-the-Horizon DX

It is even possible, under some circumstances, to work stations beyond the "maximum range." Extended propagation on 10 meters is relatively common, especially in the summer months, and you can often copy the satellite long after predicted LOS. For two-way communication, however, you will need some sort of extension of the 2-meter uplink as well. Tropospheric ducting is the most common form of long distance propagation and helps make Worked All States possible for East Coast stations. Over-the-horizon satellite contacts are handled in a similar manner to meteor scatter skeds. Instead of waiting for the next "shower," satellite DXers pore over orbital crossing data, looking for orbits exactly midway between the two stations. Every 36 days, for example, OSCAR 7 is properly situated for East Coast/Hawaii contacts. Again, as in meteor-scatter and moonbounce communications, the exact time, frequency and calling sequence are predetermined, carefully aligned around the very short "window" when the satellite is in exactly the right location. Patience is more than a virtue in this work; it is a necessity. Persistence pays off, however, as demonstrated by several East Coast WAS award winners and G3IOR's remarkable achievement of contacting W6CG (a distance of more than 5,600 miles).

In actual, over-the-horizon satellite DXing, an erp of greater than 100 watts is acceptable, and even essential, for consistent results. This power should only be used, however, when the satellite is no longer in direct line of sight with your station. Be sure to turn the amplifier off during overhead passes. Again, as in meteor scatter, unscheduled contacts add additional excitement to this form of DXing. You may hear

stations calling, "CQ LOS CQ LOS." They're looking for over-the-horizon DX; give them a clear frequency. You might be in that position soon!

The QRP Challenge

Satellite DXing is not for everyone; some of us prefer a more casual approach. There is one regular feature of satellite operating which has nearly universal appeal: QRP (low-power) days. As of March 1, 1977, UTC Mondays have been reserved for OSCAR QRP. This includes both Mode A and Mode B on OSCAR 7 and the "on" (ascending) orbits of OSCAR 6. On these orbits, AMSAT asks all stations to use 10 watts or less erp. Note that this is *erp, not* output power. Try it – you'll be amazed at the results. So long as higher powered stations are not reducing the sensitivity of the satellite receiver, nor claiming the hog's portion of the output power, even the weakest stations are Q5.

Mode B operators have been enjoying QRP for some time, but even OSCAR 6 has the sensitivity to relay signals of less than 10 watts erp. Imagine a hand-held satellite ground station! It's within the realm of possibility on QRP days. This same low power would be equally effective every day if all stations used the minimum power necessary for all contacts. Perhaps we'll see QRO (high-power) days in the near future; one day a week for those stations running more than 10 watts erp!

Experiments in Space

For the technically inclined, two regular features of satellite operations should be of interest. Every UTC Wednesday, OSCAR 7 is reserved for special experiments, coordinated by AMSAT Vice President of Operations, Rich Zwirko, K1HTV. Past experiments have included sending electrocardiograms from a moving vehicle to a hospital thousands of miles away (see *QST* for October, 1976, page 42). Canadians have used OSCAR for emergency transmitter location, such as in the case of a downed aircraft. Also, OSCAR is the only amateur band where eight-level, computer-style teletype (ASCII) is permitted, under special authorization from the FCC. If you are interested in having a computer linkup via amateur satellite, or have some other special experiment in mind for OSCAR 7, contact K1HTV, 36 Sweet Birch Drive, Meriden, CT 06450.

Another unique aspect of satellite operation that has created quite a bit of interest is the twice-yearly linking experiments. Since OSCAR 6 and OSCAR 7 are in slightly different orbits, OSCAR 7 overtakes and passes its predecessor about twice each year. When the satellites are within a few hundred miles of each other and OSCAR 7 is in Mode B, a double satellite relay is possible. The 432-MHz uplink to OSCAR 7 is translated to 145.9 MHz, which is in turn picked up by OSCAR 6 and relayed to ground stations at 29.45 MHz. (See Fig. 5.) The first OSCAR link tests in 1973 comprised the first free access satellite-to-satellite relay in the history of space flight – another communications first for amateur radio! The W6PAJ AMSAT Orbital Calendar gives the dates of these link experiments. AMSAT will provide further details on these tests.

Those of us who are not experimenters or electrical engineers can still perform a valuable service by carefully monitoring the satellites during these tests. Exact signal strengths, fading characteristics, telemetry data and other information sent to AMSAT help evaluate the projects. This information can then be used to justify further experimentation or modifications to future satellites.

Even the casual OSCAR communicator can make a real contribution by helping to investigate a few of the unexplained anomalies of OSCAR operation. OSCAR 7 Mode A seems to "hear" particularly poorly when it is to the south of the transmitting station. The downlink signal strength increases dramatically as the satellite passes overhead. Frequent monitoring of these signal strengths is necessary to help design this problem out of future OSCARs. OSCAR 7 also experiences unexplained mode changes. AMSAT needs many more telemetry reports before, after and hopefully during the mode shifts to diagnose the problem. Finally, several stations have reported a "reverse Doppler" effect on the 435-MHz beacon of OSCAR 7. The apparent frequency of the beacon increases as it drops below the horizon, the opposite of the predicted effect. Anyone with a well-calibrated receiver can help AMSAT and the rest of the scientific community explore this puzzling phenomenon. Any takers?

As with any amateur activity, satellite operating and coordination requires the volunteer assistance and dedication of large numbers of amateurs throughout the world. A well-coordinated network of hams operates command stations which turn the OSCARs on and off, acts as bulletin stations for both regular satellite bulletins and special educational demonstrations and runs hf satellite nets. Randall Smith, VE3SAT, is the volunteer command station operator for eastern North America. Randy's completely automated station, operated by a microprocessor, provides continuous control over the satellite while it is over this part of the world. Other command stations dot the globe.

There are many nonoperating volunteer jobs in the satellite "field organization." Almost every state and many countries have AMSAT Area Coordinators, who disseminate information about the satellites, arrange for convention and hamfest speakers and demonstrations, and help spread the word about satellite operating problems or schedule changes. These volunteers are always looking for assistance in these projects. Drop a line to your area coordinator offering your services. Contact K1HTV or ARRL for names and addresses of the coordinators.

Table 6
OSCAR DX Leaders Compiled by SP9DH

STATION	POINTS	CONTINENTS	COUNTRIES	STATIONS	BEST DX	DISTANCE
K1HTV	25,000	4	78	2000+	—	4,650
G3IOR	15,250	5	80	960+	W6CG	5,600
G6RH	14,670	5	63	1127	W7SFA	—
DL8DF	12,900	5	53	900	FY7AS	4,900
OK3DDI	11,910	4	72	731	ZE7JX	4,700
SP9DH	10,600	4	59	665	W8DX	4,500
OH2RK	9,700	4	54	500	—	—
YO2IS	9,560	4	51	601	VE3BNO	4,700
W8DX	9,000	5	55	500+	—	—
PAØLQ	8,000	5	35	500+	—	—

(Points based on the ARRL Satellite DX Award scoring system. Distance in miles.)

A-O-8 and Phase III on the Way

As the battery and temperature problems this past February have

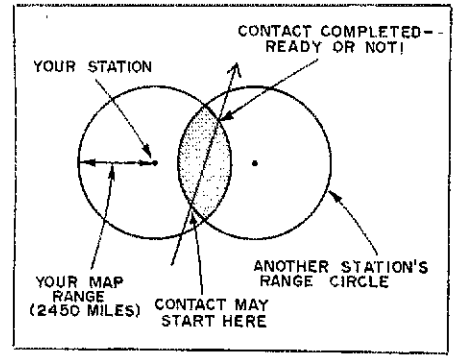


Fig. 6 – The greater the distance between the stations, the shorter the possible contact period.

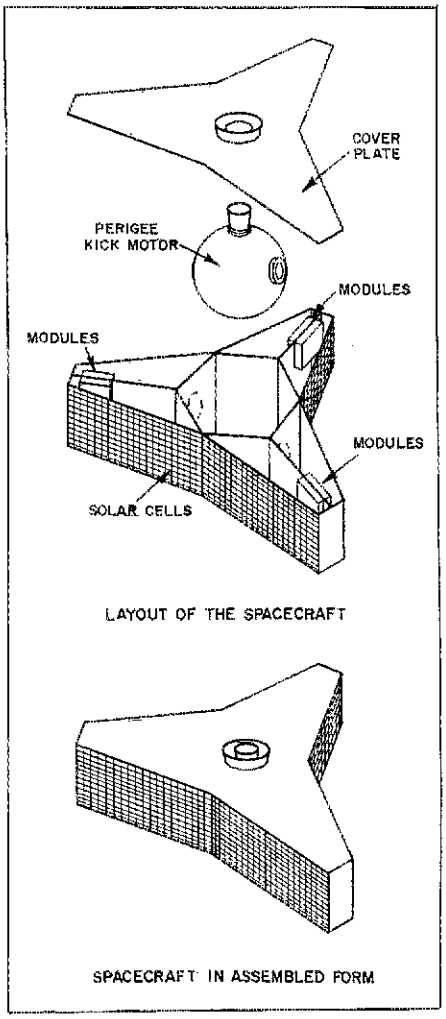


Fig. 7 — Phase III Satellite: The start of worldwide satellite DX.

demonstrated, OSCAR 6 and OSCAR 7 will not last forever. A replacement for OSCAR 6, now called AMSAT-OSCAR-D, is scheduled for launch in late fall. A-O-D (to be called OSCAR 8 when it achieves a successful orbit) has a 2-meter to 10-meter transponder similar to OSCAR 6 and OSCAR 7 Mode A. It also carries a 2-meter to 70-centimeter transponder, designed and built by a team of Japanese amateurs.

Uplink frequencies will be compatible with present satellites. The 2 to 10 transponder will be on exactly the same frequencies as OSCAR 7 Mode A, and the JAMSAT transponder will have an uplink of 145.9-146.0 MHz. The inverted downlink will fall between 435.1 and 435.2 MHz, with a beacon on 435.095 MHz. Watch for further details in *QST*.

The ultimate amateur satellite — AMSAT-OSCAR Phase III — is rapidly becoming a reality. A high-power satellite with an internal solid propellant rocket motor, the Phase III satellite is scheduled for launch in 1979 by the European Space Agency. The internal motor will push the satellite into a highly elliptical orbit peaking high above the Northern Hemisphere. The greater altitude of the orbit will significantly extend its useful range — nearly the entire Northern Hemisphere will be accessible. At the same time, the spacecraft's reduced velocity will extend the time it will be within range of a given station to as much as 20 hours per day. As you may have guessed, the DX possibilities will be tremendous. Satellite DXCC look out! A series of articles on the Phase III satellites will begin in *QST* for June.

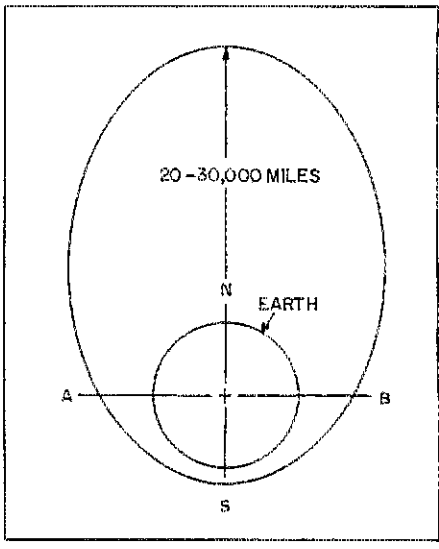


Fig. 8 — The highly elliptical orbit of the Phase III satellites will greatly extend the range and operating time.

Meanwhile, OSCAR 6 continues to set longevity records for limited lifetime satellites and OSCAR 7 provides reliable daily satellite communications for amateur stations throughout the globe. And persistent, but unconfirmed, rumors abound of a Russian amateur satellite in the near future. What is the future of amateur satellites? Whatever we, the amateurs, make it. See you on OSCAR.

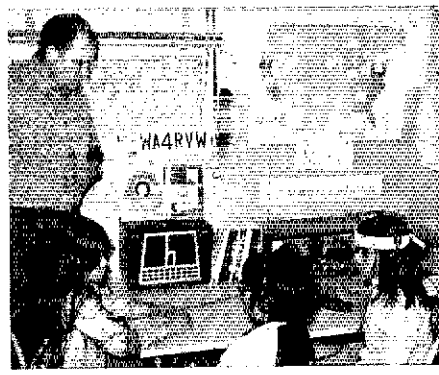
Strays

□ Herb Schoenbohm, KV4FZ, and WVWI News Director Lee Caryle were recently awarded a certificate of honor by Virgin Islands Senate President Elmo Roebuck for their role in the rescue of the pilot and four crew members of a Gruman G-21 seaplane that crashed and sunk near St. Croix. A private pleasure boat, hearing the radio reports sent by KV4FZ and rebroadcast by WVWI, was able to divert its course to the crash site and pick the survivors out of shark-infested waters. None of the survivors had time to put on life preservers, and they were found in the dark clinging to pieces of the wreckage.

Herb is an active DXer and became an amateur celebrity when he acted as the official receiving station for both of Thor Heyerdahl's *Ra* expeditions.

Virgin Island Senate President Elmo Roebuck presents a certificate of honor to Lee Caryle and Herb Schoenbohm, KV4FZ (right).

□ It's a long way from the drums and smoke signals used by the first Americans to today's space-age amateur radio communications. But school children of the Eastern Band of the Cherokee Indian Tribe in Cherokee, NC, are closing the gap. Under the expert tutelage of Bob Lacy, WA4RVW, a science teacher at the Cherokee School, the children are making rapid progress. The program is sponsored by the Blue Ridge Chapter of the Quarter Century Wireless Association, whose members have furnished the school with radio equipment, a training course and complete ARRL library. — *W4YK*



With the help of WA4RVW, these Cherokee children may soon be on the air, broadening their horizons through contacts with distant people and places.

Inferno in Friuli

Within minutes, hf and vhf networks were handling emergency traffic.

By Robert J. Halprin,* WA1WEM

To Associazione Radiotecnica Italiana:

In the recent calamitous earthquake in the Friuli region, Italian radio amateurs rendered a great deal of assistance in our hour of need and we are deeply grateful for their selfless devotion to our people.

The members of your organization have given of their time freely and they have helped immeasurably to solidify relations among our people. They have worked closely with us and we are speechlessly grateful for their efforts. Cordially, Sen. Giulio Orlando, Minister of Posts and Telecommunications

The earthquake struck the Friuli region of Italy on the evening of 6 May 1976. The result: tremendous devastation, a death toll of nearly 1000 and disruption of regular lines of communications.

However, three two-meter fm repeaters were still operative. By means of battery-powered two-fm rigs, 10 amateurs living in the area of the disaster were able to immediately begin the emergency operations.

"The earthquake has destroyed so many homes, there are many casualties . . . send help as soon as possible . . . I3SQJ.[1] I'll be at the police station in a minute, stand by . . . I3COP/mobile."

Within minutes, authorities were alerted. All communications for this first chaotic night and for days afterward were handled by amateurs using the repeaters and 80-meter emergency nets, maintaining communications to and from the ravaged towns and villages.

"The house in front has collapsed . . . I3CQX. Let's try to coordinate . . . I3ILC. Keep the frequency clear for emergency traffic . . . I3BLQ."

Hams provided communications for police, military, Red Cross, hospitals and rescue patrols. In two weeks, the various nets handled over 20,000 messages. Over 500 amateurs participated, most of them members of C.E.R., the A.R.I.-sponsored Corpos Emergenza Radioamatori.

"Tell them lights are needed, strong floodlights, and shovels – houses have collapsed and there are children inside . . . I3SQJ. Tell the hospital to be prepared to receive many people . . . I3SAX."

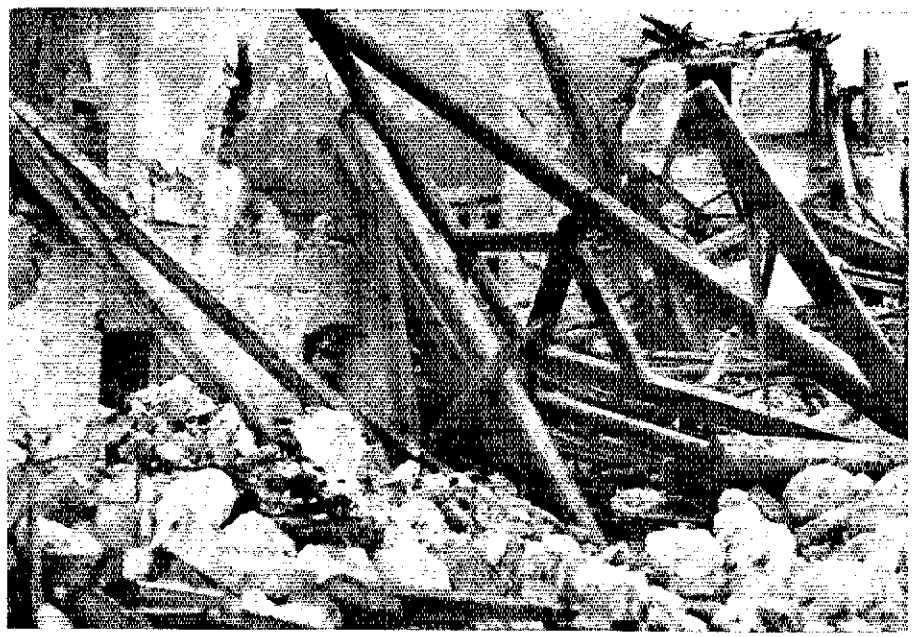
When P.T.T. communications were restored in most of the region, C.E.R. members elected to remain in the more remote locations, making sure these ruined villages had a link with the outside world.

"I'm at Osoppo; my brother's place is completely destroyed. Everything is flat to the ground . . . I3AOS/mobile."

Thanks to an agreement between the P.T.T. and the FCC, third-party traffic was permitted between the U.S. and Italy for the duration of the emergency, for anxious relatives on both sides. I1MOL/W8, in the Detroit area, offered the services of the Oak Park Radio Club to the local Italian Consulate. Member-stations K8IDE and K8HLR handled an enormous amount of disaster reports, phone patches, and health and welfare traffic. Local radio and television stations covered the operation. In Cleveland, WB8OGB had daily schedules with I1OKC, providing status reports for the news media (NBC filmed him in action three times!) and the Red Cross. He also handled a large amount of health and welfare traffic. Many stateside hams were involved in the H & W effort on 20 and 15 meters.

"I am outside of Tarcento . . . I3UBD/mobile. Go directly to the restaurant La di Moret – find out where the people to be vaccinated are – then call me with all possible information . . . the doctor is here . . . I3BLQ. Roger . . . I3UBD."

In this emergency, Italian hams demonstrated discipline, skill and traffic-handling capability. And once more, radio amateurs, with their relatively simple equipment, replaced more sophisticated telecommunications channels which were paralyzed by a natural disaster. QST



Towns and villages in northeast Italy were reduced to rubble by the seismic shock. *(F9FF photo)*

*Assistant Communications Manager, ARRL

[1] From the two-meter log of I3BLQ (*Radio Rivista*).

Pedalera Bike Run Communications

Huff . . . Puff . . . Can you climb the mountain? On a warm California day, almost 800 bicyclists did. Amateurs from Lockheed worked with the company's other employee clubs to cover the remote, rough terrain.

By William G. Imes,* WB6KBS

Over winding roads, behind shadowing mountains and through valleys and hollows, the terrain raised obstacles. For almost 900 bicyclists it was a physical challenge, for the two dozen hams who assisted it was a communications challenge, and for all participants it was a successful run.

The seventh annual Challenge and Mt. Hamilton Ascent drew bicyclists from all around California to attempt a grueling 133-mile (approximately 200 km) ride. Sponsored by the Pedalera Wheelmen of the Lockheed Missile & Space Company Employees' Recreation Association (LERA), it actually consisted of two events on that warm April day: (1) a 70-mile round-trip ride from the LERA building in Sunnyvale, CA, to Lick Observatory at Mt. Hamilton (elevation 4,213 feet) and (2) continue along the back side of the Diablo range, through the cities of Pleasanton and Livermore, and return to the LERA building for the full course.

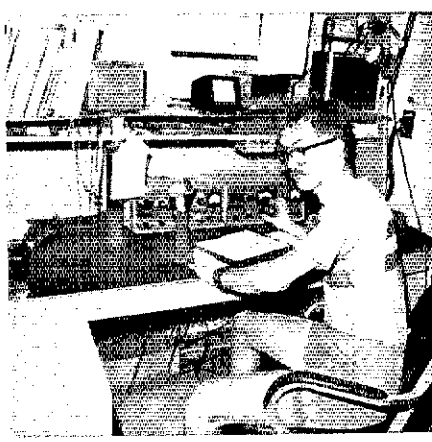
*4418 Belvedere Dr., San Jose, CA 95129

Preparations

Against this backdrop the LERA Amateur Radio Club undertook the difficult communications task. The challenge was to keep track of the cyclists by relaying checkpoint and emergency messages, rider and support vehicle progress, and logistics information. Supporting this effort were members of the Santa Clara Valley VHF Society (WR6ADE) and citizens band members of LERA's Four-Wheel-Drive Club.

Headquarters for the ride was at the LERA building with the club station WA6GFY, acting as a communications center. There, four amateur stations were on the air: a Collins S-Line on 40 meters, two Clegg FM-21s on 220 MHz and an ICOM IC-22A on 2 meters. Other network stations were set up at the observatory atop Mt. Hamilton

At the LERA building, Sunnyvale, CA, riders await check-in to begin the Challenge Run. Visible in the background is a portion of LERA ARC's 70-foot tower.



Bill Pierce, WB6CFU/WA0PJI, listens to 40 meters at the LERA ARC station, WA6GFY.

1976 LERA ARC President Ev Wittig, WA6GYT, chats with Mt. Hamilton via the WR6ABH 220-MHz repeater, while in the background Bill Imes, WB6KBS, operates 2 meters at the LERA building.

Arroyo Mocho on the back side of the Diablo range and at the Youth Center in Pleasanton. These locations served as checkpoints for the ride.

Pedal Away

The communications job was long. It began at 5 A.M. and the last bicyclist wasn't safely back until after dark. Each rider was required to turn in an identifying tag as he reached a checkpoint. It was also a place to get medical or mechanical attention and a welcome rest. He then stated his intention on whether to continue or be taken back by vehicle to LERA. This information was radioed back to the LERA building so each rider could be tracked.

A number was assigned to each rider so that only numbers were transmitted in blocks. Still, there was difficulty in handling the large quantities of traffic efficiently. Operators would attempt to pass too much information too fast or without formalizing it into messages. Such information was lost or had to be repeated. Formalizing is a little slower, but the only way to keep it all under control.

Information more significant than "Gee, it's hot" or "I was just passed by 15 riders" was treated as message traffic. Typical of those were "How's the food holding out at Mt. Hamilton?" "I need a repair truck for a broken bike at San Antonio Junction." "Send a first-aid van to checkpoint two; we have an injury."

On the Road

In addition to the "nonprofessional" emergency services described, arrangements had been made for ambulance service and a California highway patrol helicopter should they have been required. Although a number of medical problems arose, neither was needed.

A nonassigned mobile vehicle just for 40-meter communications was provided by WB6EPG. He spent portions of the day at each checkpoint and assisted in the mop-up operations making sure all stragglers at the end of the line were picked up. Also, he relayed information when the shorter-range CB- or vhf-equipped vehicles could not maintain contact.

Propagation problems were caused by the rugged, winding terrain. While some efforts had been made to strategically locate stations for maintaining continuous communications, more were needed. Significant problems occurred on the back side of Mt. Hamilton on both hf and vhf. Repeater contact could not be maintained because of line-of-sight blockage. Hf had better luck, but also experienced some problems. At one point late in the afternoon, an Alaskan station came in to serve as a relay point. Don't overlook that on these projects. The skip can help to overcome terrain problems and faraway hams are usually eager to help.

Into the Sunset

The whole 133-mile trip was completed by 575 riders while more than 200 bicyclists took the shorter "Ascent-and-Back" route. Some 80 others did not finish for one reason or another, but still enjoyed the day. A total of six injuries requiring hospital treatment occurred. The oldest entrant finishing was 69 years old while the youngest, actually a passenger riding piggyback with her dad, was 14 months old.

The LERA ARC expresses sincere thanks to the LERA Bicycle Club (Pedalera), Four-Wheel-Drive Club, First-Aid Club and their primary coordinators, Larry Lee and Ron Lewis, along with Challenge chairman Vladimir Baicher, for "their help and understanding toward the success of our communications effort, and for allowing us to participate."

Also, thanks to Gene Root, WB6OOO, for coordinating publicity and photographic support with Will Hilbrink, WA6LLZ, of Lockheed public relations. Our thanks and that of all the other organizations go to these dedicated people: WB6EPG, WB6KCJ, WB6KBS, WA6GYT, WN6MQJ, K6HB, K6CN, WB6TOH, WB6CFU, WB6VPI, W6HJP, WB6LDR, K6JVK, W6OLO, W6RUV, WB6MJD, WB6AFJ, K6GZK, W6IRY, WA6AUY, WB6SFC and WB5EMM.

And, of course, our thanks to the Pioneer Radio Club, Baycom and Mt. Vaca Radio Club for the use of their repeater facilities, and to all amateurs on all bands who permitted interference-free operation throughout the day.

Every amateur should participate in an exercise of this type at least once just to gain an appreciation for the level of organization necessary to achieve success in a high-information-rate or emergency situation. QST

Riders take advantage of the Four-Wheel-Drive vehicle to have a drink and a rest at the Smith Creek ranger station, 28 miles from the start.

Riders begin the ascent of Mt. Hamilton. They've gone 35 miles at this point.

Atop Mt. Hamilton at the 220-MHz operating position, Gil Morris, WB6KCJ, is at the mic, with Carl Hartshorn, WA6AUY, taking notes.

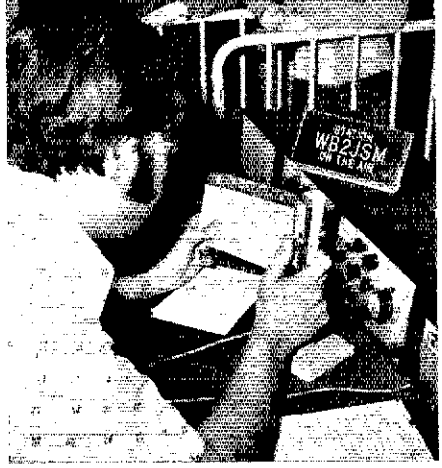
All Special Calls—Doomed?

Drastic relief for a drastic problem seems to be the theme of FCC's latest proposal. Decades of tradition and years of comfortable familiarity could be swept aside by the Notice of Proposed Rulemaking, Docket 21135, which looks toward ". . . simplification of licensing and call-sign assignment."

By Perry F. Williams,* W1UED

No W1AW at Newington? No K2BSA in New Jersey? No K3CR at Penn State, or W8SH at Michigan State or W6YX at Stanford? Under the proposal, these and other club calls would be discontinued at the end of their terms and no new club licenses would be issued. Secondary licenses held by many amateurs, RACES station licenses, military recreation stations including K4NAA and K4WAR, special-event stations like NCØARL (*N*ational *C*onvention Zero *A*merican *R*adio *L*eague) and NJ3BSA (*N*ational *J*amboree three *B*oy *S*couts of *A*merica) would disappear. (The elimination of repeater, auxiliary-link and control station licenses was earlier proposed by FCC in Docket 21033, deregulation of repeaters and remotely controlled stations.)

*Manager, Membership Services, ARRL



Club stations, like WB2JSM in the Hall of Science, New York, provided continuity of call sign and the necessary manpower for emergency traffic with Guatemala following its earthquakes in 1976.

FCC's Dilemma

No question, the Commission *does* have a drastic problem. In the editorial of *QST* last month, we said (in part, some phrases omitted)

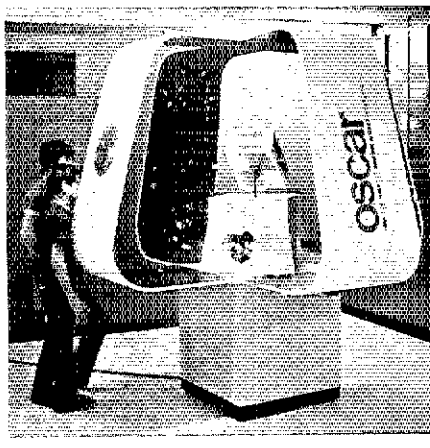
"The Commission has not been able to obtain approval of a budget large enough to cope."

". . . FCC is faced with an ever-increasing flood of work — caused mainly by more license applications and the need for more enforcement of the regulations. There were 980,253 CB applications during the month of January . . . 21,500 pieces of amateur-related mail at Gettysburg — as recently as 1974 the average was 8300. Because amateur applications are more complicated than those for CB, they are, on an individual basis, more work for the Commission.

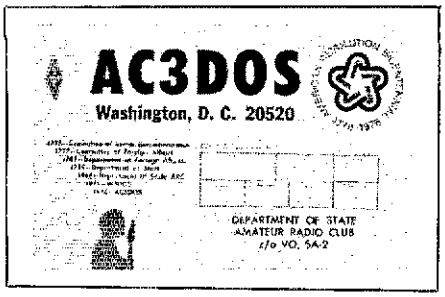
"But the problem is that, despite all of this, the Commission has not been able to obtain approval of a budget large enough to cope. Many actions proposed by the Commission were designed to reduce the cost of regulating the amateur service. New programs even though beneficial to the amateur service can't be considered. There is no money. Because of the long lead time in developing a government agency budget (for instance right now the 1978 budget is being developed), it is difficult to deal with the realities of the present with a budget that was devised a couple of years ago. We think this is a good argument either for radio license fees being channeled back directly to FCC or a more realistic budget. If you believe that FCC needs additional resources to properly accomplish [its tasks], then you may wish to communicate with your Congressional representatives Now."

The FCC's Views

In the introductory passages of Docket 21135, the Commission under



This OSCAR display and the nearby club station, WB4ICJ, introduce a million visitors a year to ham radio and to amateur involvement in space communications at the Kennedy Space Center in Florida.



The Department of State has its own radio club with distinctive call letters, W3DOS (AC3DOS during the Bicentennial) and an equally distinctive Field Day location — the Mall, in full view of the Washington Monument where thousands of visitors to the Capitol can see ham radio in action.

scored its problems in the following passages (from which we have deleted some less-necessary phrases, for brevity's sake):

". . . This surge in interest in personal radio communications has placed a heavy burden on Commission staff engaged in processing licenses. Although the workload at Gettysburg has increased approximately 1000 percent over the past two years, the number of permanent employees has increased by only 50 percent. This has led, in turn, to an increase in the length of time necessary to process and issue Amateur Radio Service and CB Radio Service licenses. We are very much aware that many amateur radio licensees are dissatisfied with the speed with which their regular licenses are processed and issued, and we are investigating methods by which, assuming no new resources to be forthcoming, service to our amateur licensees might be further improved.

The workload at Gettysburg has increased 1000 percent, the number of permanent employees by only 50 percent."

"The Rules governing the Amateur Radio Service contain licensing and call-sign assignment systems of some complexity. At the time these rules were adopted, the size and workload of our Gettysburg staff were such that routine and special amateur application processing could be accomplished without undue delay. As we indicated in the preceding paragraph, however, our resources have not kept pace with the increased demand for personal radio communications. Given these limited resources, we have been forced to assign priorities to our current licensing activities. *We believe our most important task in the Amateur Radio Service to be the processing and issuance of amateur operator and primary station licenses.* We have reached the point at which our lack of resources simply precludes all but the most basic licensing functions. Our regulatory obligations have outstripped our current capabilities. . . .

"Under the existing amateur radio licensing system, a licensee must obtain both an operator license and a station license. A licensee holds only one operator license and is required by Section 97.40 to have, at a minimum, a primary station license, as well. There are several other station licenses available, however, including military recreation, club, special-event, RACES and secondary station licenses, and many amateur operators have obtained one or more (occasionally, many more) such licenses. Additionally, many amateur radio operators are eligible for specific station call signs or 'preferred' formats.

"We do not believe the continuation of the issuance of the various station licenses, other than primary station licenses, or the existence of the current call-sign assignment system to be essential to the Amateur Service. The entire system has become extraordinarily burdensome and difficult to administer properly: A disproportionate percentage of our resources must, because of existing rules, be devoted to the processing of special call-sign requests and nonprimary station license application. Of these, about 95 percent were primary stations. The other 5 percent were secondary, club, military recreation, and RACES stations. Yet processing applications for these nonprimary stations required resources nearly equal to the resources needed to process primary applications. Similarly, Amateur Extra Class licensees comprise only 6 percent of the amateurs, but processing specific call-sign requests requires as much time as issuing call signs to the remaining 94 percent. Clearly, our resources are not allocated in the most effective manner."

KM5BSA at the 5th Annual Explorer Air Show demonstrates the value of special-events stations — here to an audience of Scouts.

Two centuries of history, America as a "melting pot," and the Field Day spirit of amateurs were all demonstrated in the WL2USA operation at the base of the Statue of Liberty during Thanksgiving weekend, 1976.

FCC's Proposed Solution

"In this proceeding we are proposing to simplify the basic licensing structure of the Amateur Service by discontinuing the issuance of all amateur station licenses, other than primary station licenses and space station licenses (under consideration in Docket 19852, October 25, 1973). All amateur radio operators would be limited to one station license. Licensees holding the types of licenses listed above would be permitted to retain them until expiration of the licenses but would not be permitted to renew them. . . .

"We are proposing to simplify the basic structure . . . All amateurs would be limited to one station license."

"We are particularly interested in receiving comments concerning the continued usefulness to the amateur community of separately licensing club stations . . . We solicit comments concerning the continued usefulness, if any, of special-event stations and wish to be provided with specific, concrete examples of special-event stations that have brought favorable public attention to the Amateur Radio Service. . . .

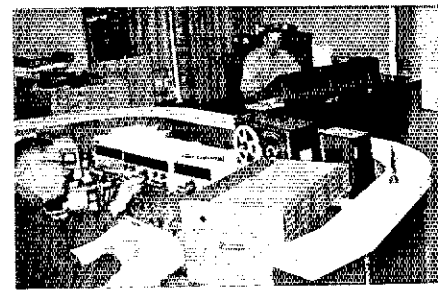
"We are also proposing to simplify drastically the system of amateur radio

And who can forget the hundreds of newspaper columns and the slow-scan TV pictures on prime-time newscasts which resulted from the N6V special-events station at the Jet Propulsion Laboratories during the Viking landings on Mars last summer?

call-sign assignment. Sections 97.51 and 97.53 of the Rules contain rather complex regulations and policies governing amateur radio call-sign assignment. Certain licensees are eligible for 1 X 2 call signs, others are eligible for certain nonspecific 'preferred' call signs, while still others must take the call signs assigned them by the Commission. We are proposing to amend Section 97.51 of the Rules to state simply that amateur radio call signs will be assigned on a systematic basis. Section 97.53 would be deleted entirely. Licensees holding Amateur Extra Class operator licenses would be afforded the opportunity to obtain 1 X 2 and 2 X 2 call signs, but such call signs would be assigned systematically by the Commission. (Amateur Extra Class licensees would not be permitted, as they are now, to obtain specific 1 X 2 call signs of their choice. Licensees moving from one call sign area to another and modifying their licenses to reflect the moves would not continue to be assigned new call signs of the same format as the call signs relinquished. Nor would we continue to issue specific call signs to former holders thereof. We would not issue any more distinctive call signs to stations in repeater or RACES operation. Our proposal, if adopted, would result in a much simpler and fairer call-sign assignment system and would permit us to concentrate our limited resources in areas more productive for the Amateur Radio Service.

". . . We invite interested parties to submit comments concerning our proposals on or before June 2, 1977, and reply comments on or before June 30, 1977. An original and five copies of all comments and reply comments shall be furnished the Commission. Respondents wishing each Commissioner to have a personal copy of the comments may submit an additional six copies. Members of the public wishing to express interest in our proposals but unable to provide the required copies may participate informally by submitting one copy of their comments, without regard to form, provided the correct Docket number is specified. All comments and reply comments filed in this proceeding should be sent to the Secretary, Federal Communications Commission, Washington, DC 20554."

A copy of the Notice of Proposed Rulemaking and the text of the proposed rules in Docket 21135 can be obtained from Hq. A self-addressed envelope with 24-cents postage would



Perhaps the best-known club station of all — W1AW.

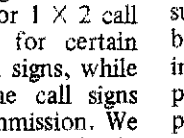
be appreciated. Hq. and your ARRL director (see list on page 8) would each like a copy of your comments. Remarks of simple opposition are of little utility to the Commission. Practical alternatives are sought from those who would like to preserve the status quo.

The "Closed Season"

Separately, but related to the above proposals, the Commission in an Order dated March 2, has established a moratorium on issuance of *new* secondary and special-events licenses. Applications received before March 3 will be processed in due time, but no new ones will be accepted. Secondary, club, RACES, military recreation and other "additional station" license renewals *are* being accepted, pending determination of the outcome of Dockets 21033 and 21135.

And FCC has discontinued its informal practice of issuing a call sign like K3XXX to a person who once held a Novice call of the form KN3XXX according to a release dated March 16, 1977. QST

Strays



□ The Wellesley (MA) Amateur Radio Society will be transmitting code-practice sessions on 21.120 MHz at 1800 UTC Sundays and 0030 UTC Wednesdays. Copy will be taken from issues of *QST* and page numbers for previous code sessions will be given in following sessions. Speeds will be 5, 7-1/2, 10, 15, 18 and 22 wpm. Following the transmission, there will be time for cw QSOs with W1TKZ as net-control station. – *W1ALP*

□ Last June when Eleanor Jefferson, XYL of WA3VYS, went into the hospital for a heart-bypass operation, 14 members of the Pottstown Area Repeater Team gave blood for the elective surgery. In February, WA3VYS himself went to the same hospital to undergo the same operation, and 12 members of PART were still around to volunteer a pint apiece for the second time! When not at the blood bank, the group keeps busy with civic affairs, theory and code classes, and operating the 147.81/21 and 223.42/224.02-MHz repeaters in Pottstown, PA. – *WA3CPK*

□ The Boy Scouts of America are looking for counselors to manage the radio merit badge and amateur radio is looking for dedicated young students for Novice classes. Check the phone book under Boy Scouts and let them know you're holding a class.

□ Some people are luckier than others. The other day we received a package of cards that had been sent to the ARRL Membership Overseas QSL Service which the post office indicated they had received in bad condition. Upon opening the package a note was found signed by the Foreman of Mails, suggesting it might be a good idea to remind the people sending bundles of cards to be sure and wrap the cards securely. Where does the luck part come in? In this particular case the luck part is that the Foreman of Mails is a ham and knew what he was looking at when he saw the scattered cards. Coincidentally, the suffix of his call is BPL. QSL his QTC? Wrap those cards securely you might not be as lucky.

I would like to get in touch with . . .

□ other amateurs who are interested in home construction, for correspondence and exchange of schematics. Richard Sample, WD9AJZ, 430 Pearl St., Richmond, IN 47374.

ARRL Presents the Wide World of Amateur Radio

A series of six professionally produced radio programs for use by broadcast stations is now available from the League. With them a broadcaster can partially meet his requirements for public-service programming while helping to spread the word about ham radio. Where will you use them?

By Peter O'Dell,* WB8NAS

"I'll produce these programs for you if you agree that I do not have to personally meet President Dannals," Steve Mendelsohn, WA2DHF, said when we originally talked to him about the concept of syndicating radio shows about ham radio. "Every time I meet him it either costs me four years of my life or a lot of money. The first time we met, he talked me into joining the Navy. Four years later I was just about to be discharged and I ran into him. He talked me into reenlisting. The last time I saw him, he sold me a life membership." And with that tongue-in-cheek caveat he began the task of producing radio broadcast programs on ham radio. Little did he realize that his efforts would ultimately arouse the curiosity and interest of well-known newscaster Walter Cronkite!

During one of the editing sessions, Walter Cronkite and Steve, WA2DHF, exchange ideas. (Steve, if you are as good a salesman as President Dannals, then you should be able to convince Mr. Cronkite to get a ham license.)

The Shows

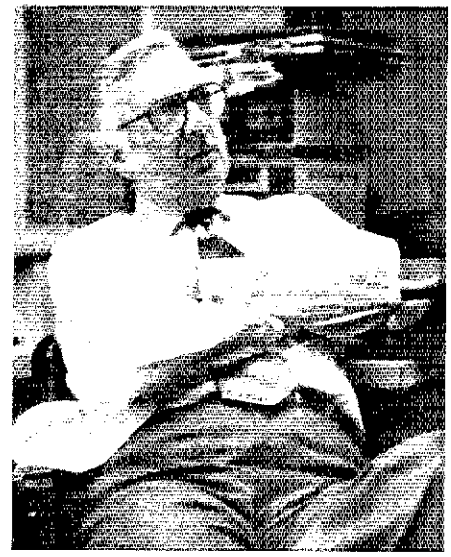
The six 15-minute programs in the package dramatically acquaint audiences with a range of radio-related activities. In subtle parody, the program dealing with theft prevention of mobile radio equipment begins, "Do you know where your radio will be tonight?" Another, with a touch of the women's-lib outlook, describes one YL's introduction to ham radio: "I got tired of doing the dishes every evening while my brother was in the ham shack having all the fun. So I . . . ." Well within the public service category, these professionally prepared, broadcast quality tapes were written, directed and produced by Steve along with Harvey Hurwitz, WA2HYS.

The Producer

Having spent most of last year on the road with the Carter campaign, Steve is now back at CBS Radio Network News where he works as an audio engineer and spends his copious spare time editing amateur radio shows. In addition to utilizing his own professional talents, Steve occasionally received advice from some fairly well-known people at CBS while making the programs. One of the voices heard on the programs is that of a famous CBS reporter. Steve, an active ham for over 18 years, holds an Advanced class license. Besides owning a repeater and serving as the Secretary of the Tri-State Repeater Council, he is an avid DXer with over 150 awards including DXCC. While in the Navy he operated for several years as GM5AHS.

Air Time

If you can get air time for these programs, write to Public Information Radio Shows, ARRL, and we will send you the package. We will provide them to anyone who can get them on the air. If you are making the shows available to more than one station in the same market area, be sure to let both stations know. Since it is likely that additional programs will be available at a later date, we are soliciting comments and suggestions for improvement. If you have ideas for additional program themes, please pass them along. A questionnaire will be included with the package for use by the station in evaluating the programs and providing us with feedback. This is your chance to help your community tune in to THE WIDE WORLD OF AMATEUR RADIO. Don't delay — write today! QST



Walter Cronkite listens attentively to one of the early programs before the editing really began.

*Public Information Officer, ARRL

The ARRL Foundation: We'll Put You in Orbit!

Open doors to the wonderful world of amateur radio. Your contribution to the ARRL Foundation will support AMSAT's Amateur Satellite Phase III program.

By Larry J. Shima,* WØPAN

"At 7:10 I turned my HW-101 on and tuned to 29.502, looking for OSCAR 7's beacon. For 10 minutes I heard nothing so I started tuning down the band. All of a sudden there it was! The 29.4 to 29.5 segment of 10 meters sounded like 15 during a contest! New Mexico, Ottawa, Florida, Texas, New Jersey — they were all there." — *WB2EYB* That's excitement, the excitement of a new Novice discovering one of amateur radio's most exciting accomplishments. The OSCAR satellites have added a whole new dimension to communication for many amateurs around the world and a source of pride for all of us.

From Ravenna, Ohio, physics teacher Eugene Roliff writes, "My students were certainly impressed with the idea of using man-made satellites to measure the mass of the earth. The use of OSCAR has added interest that could not have been achieved with textbook data."

Across the continent — and around the world — OSCARs 6 and 7 are bringing a live, firsthand experience with space communication right into hundreds of classrooms.

For 1977 the ARRL Foundation's major program is directed to support for AMSAT's Amateur Satellite Phase III. This will be the first in a new OSCAR series — designed for long lifetime operation in high altitude, synchronous, circular or elliptical orbits. With these characteristics the Phase III OSCARs will bring revolutionary new capabilities to amateur satellite communication. These will include disaster relief communications . . . classroom educational uses . . . international experimentation . . . new ways to chase DX . . less sophisticated equipment and antennas . . . and expanded use of vhf/uhf frequencies for all. The operational capabilities of the Phase III satellites will surpass all previous OSCARs!

How Can Individual Amateurs Help?

Each of us has our own special reasons to appreciate what amateur radio has added to our lives. The start of a career in electronics — a hobby for relaxed enjoyment at any hour — the opportunity to serve human needs. We acknowledge that debt in various ways: One is to contribute in large ways or small to the support of innovative programs through the ARRL Foundation. A few dollars can help open the door to the wonderful world of amateur radio for the young hams of the future.

How Can Amateur Organizations Help?

A number of successful conventions and hamfests have allocated a portion of their profits to the Foundation. Perhaps your club is planning a convention. Why not consider the Foundation?

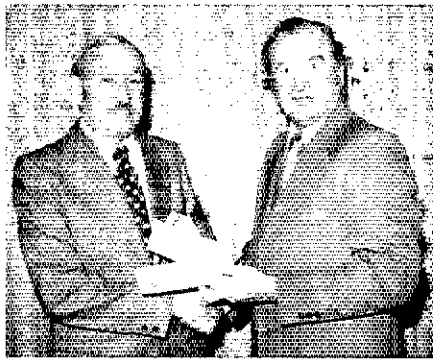
Are Contributions Tax Deductible?

Most assuredly, YES! Donations are fully deductible under IRS regulations. You may designate your gift for a specific purpose or allow it to be allocated by the Foundation Board of Directors.

The ARRL Foundation was created by the League's Board of Directors to develop funding for major projects for the advancement of amateur radio and radio amateurs. The Foundation will be involved in projects above and beyond the normal and traditional functions of the ARRL itself. The objectives the Foundations has set for itself require that such projects have identifiable end results and a clear cost benefit ratio. Contributions may be sent to The ARRL Foundation, Inc., 225 Main Street, Newington, CT 06111. QST

*President, the ARRL Foundation

ARRL Foundation President Larry Shima, WØPAN.



Outgoing President of the Hudson Amateur Radio Council Sy Schlitt, W2SL, presents a check to Division Director Stan Zak, K2SJO. A portion of the profit of HARC's convention, the funds support the ARRL Foundation's program to benefit AMSAT's Amateur Satellite Phase III.

Happenings

Conducted By Perry F. Williams, W1UED

Purity of Emissions: New Rule

Yet another long-standing concept in amateur regulation – as hard to part with as a comfortable old shoe – has succumbed to the passage of time and the realities of the present. For years, the standards of purity and stability of emissions for the Amateur Radio Service have been vague – deliberately so, we believe, to encourage home-built and individually modified equipment. For years, the "purity" regulation, section 97.73, has begun, "Spurious radiation from an amateur station being operated with a carrier frequency below 144 MHz shall be reduced or eliminated in accordance with good engineering practice."

A new rule, effective April 15, reads

97.73 Purity of emissions.

a) The mean power of any spurious emission or radiation from any amateur transmitter or external radio-frequency power amplifier being operated with a carrier frequency below 30 MHz shall be at least 40 dB below the mean power of the fundamental without exceeding the power of 50 mW. For equipment of mean power less than 5 W, the attenuation shall be at least 30 dB.

b) The mean power of any spurious emission or radiation from any amateur transmitter or external radio-frequency power amplifier being operated with a carrier frequency above 30 MHz but below 235 MHz shall be at least 60 dB below the mean power of the fundamental. For transmitters having mean power of 25 W or less, the mean power of any spurious radiation supplied to the antenna transmission line shall be at least 40 dB below the mean power of the fundamental without exceeding the power of 25 μW, but, in any event, need not be reduced below the power of 10 μW.

c) Spurious emission or radiation from an amateur transmitter or external radio-frequency power amplifier being operated with a carrier frequency above 235 MHz shall be reduced or eliminated in accordance with good engineering practice.

d) For the purposes of this section, a spurious emission or radiation is any emission or radiation from a transmitter or any external radio-frequency power amplifier which is outside of the authorized Amateur Radio Service frequency band being used.

e) The above notwithstanding, should any spurious radiation, including chassis or power-line radiation, cause harmful interference to the reception of other radio stations, the licensee may be required to take such further steps as may be necessary to eliminate the interference in accordance with good engineering practices.

The new language was adopted in a First Report and Order, Docket 20777, the FCC proposal to substitute bandwidths in various parts of amateur bands for the current specifications of mode; in other words, where we now have A1 and F2 emissions, allowing only RTTY and cw transmissions, FCC proposed to allow any emission with a bandwidth less than 350 Hz. This Notice attracted quite a lot of comments: 333 persons and eight clubs filed papers, and 23 petitions added 625 names. The Commission has not completed action on the main portion of its proposal, and so Docket 20777 continues to be open.

There was, in addition, a proposal for a new standard to govern purity of emissions: spurious emissions removed from the authorized bandwidth by 250 percent or more of the authorized bandwidth were to be reduced by 40 dB. FCC saw the 40 dB as a first step toward solving the problem of purity of emissions. It represents an attenuation of spurious and harmonic emissions to a level of 1/10,000th that of the fundamental signal. For an amateur station which has a 200-watt output, spurious emissions may be no more than 20 mW, offering a degree of protection. The effects will vary from location to location, from band to band, and for different emission modes.

"It is," the Commission said, "a level of attenuation which the Commission believes can be readily met by most equipment on the market today, and would not require expensive remodeling of equipment by the amateur. It will, however, restrict the use of linear amplifiers which are not meeting what the Commission regards as minimal standards of purity. In a memorandum to the Office of Chief Engineer written November 26, 1976 . . . the Laboratory Division detailed the results of tests of linear amplifiers purportedly sold for use in the Amateur Radio Service which indicate that many such amplifiers achieve harmonic suppression far less than 40 dB, especially in the second and third harmonics.

"The new rule, as adopted, is a modification of the rule proposed in the Notice. . . . Because there has been no decision regarding Docket 20777's proposed bandwidth rules, we are unable to enact the rule as proposed. . . . Therefore, in keeping with the scope of this rulemaking, we are adopting the international standards of emission purity which generally relate to the 40-dB level of attenuation proposed by Docket 20777.

"The International Telecommunications Convention of 1959 requires that all spurious emissions be attenuated by 40 dB when transmitting on frequencies below 30 MHz. When utilizing frequencies between 30 and 235 MHz, transmitters with power output below 25 watts will be required to attenuate their spurious emissions by 40 dB [But there is also a limit of 25 microvolts; see 97.73 (b), above. – Editor]; transmitters with power output of 25 watts or more will be required to attenuate their spurious emissions by 60 dB. Amateurs operating near the edges of amateur bands should give due consideration to these attenuation requirements. We consider these international standards to be a minimal level of purity, but to have required higher levels of attenuation would not have been within the scope of this proceeding. The Commission will be instituting a rulemaking to investigate the need for higher levels of spurious emission attenuation in the Amateur Radio Service. Additionally, upon the disposition of Docket 20777, Section 97.73 will be modified to reflect the Docket's final outcome."

We understand that external filtering to meet the new rules is permissible. Power output, as used in these rules, means the power delivered to the antenna system, including feed line.

The Commission continues to seek suggestions on the subject of spurious emissions and related topics, and there will be additional formal consideration of it.

Copies of the First Report and Order in Docket 20777 are available from Hq.; a self-addressed envelope with 13-cents postage would be appreciated.

FCC CANCELS BULK NOVICE TESTS

The FCC announced in March that it was ending a program of bulk mailing-out of written examinations for the Novice class license because it had proved unsatisfactory and had increased rather than decreased the Commission's workload. Under the experimental program established last November, volunteer examiners could obtain multiple copies of the written exams for students in licensing courses. But the results have not been satisfactory, according to the Commission's Public Notice; many exams are simply not being returned at all and many examiners appear to be requesting multiple tests just to have them on hand in case of future need. Such actions severely impair the integrity of the volunteer examiner program, the Commission said, and for that reason it was terminating the rule waiver. Effective immediately, the FCC said, it was returning to the original method whereby the examiner must file an application prior to administering each Novice class written exam, and Novice examinations will be available only in accordance with the rule.

*Manager, Membership Services, ARRL

ATV REPEATER WAIVER EXTENDED

Back in January, 1974, FCC issued a Special Temporary Authorization (STA) waiving Section 97.61(c) to permit amateur repeater WR4AAG to retransmit television signals of other amateur television stations in the Wash-

Fred Hammond, VE3HC (second from left), here received the ARRL Certificate of Merit during a testimonial to Fred's 50 years in ham radio and his many good turns for others. A highlight was the reading of a letter from Canadian Prime Minister Pierre Trudeau by the Honorable Frank Maine, MP (second from right). ARRL Vice President (and IARU President) Noel Eaton, VE3CJ (left), made the presentation on behalf of Canadian Director Ron Hesler, VE1SH. At far right is Rocco Furfaro, president of the Guelph Amateur Radio Club of which Fred is a founder. *(Mercury photo)*

ington, DC, area. This STA was renewed several times. In response to other requests for similar authority, a one-year blanket waiver of Section 97.61(c) was issued effective February 27, 1976, to allow such operations at any 450-MHz repeater station.

On February 23, the Commission extended the blanket waiver until February 27, 1982, or until the release of a Report and Order in Docket 20777 dealing with television repeaters and bandwidths in the 420- to 450-MHz band, whichever comes first.

WC CALLS IN ERROR

In late February several hundred Amateur Radio Service call signs in the 10th call area were erroneously assigned the prefix "WC." According to the Commission's rules, that prefix is to be assigned only to stations licensed in the Radio Amateur Civil Emergency Service (RACES). The FCC said it would soon correct these call signs to the proper "WB" or "WD" prefix, but amateurs holding WCØ calls may continue to use them until the correction is received.

Joe Tomczyk, WØDBC, of Minneapolis, received double recognition at a meeting of the Upper Midwest Chapter, QCWA; a QCWA certificate attesting to 50 years as a licensed operator and a plaque marking 50 years of ARRL membership. Gar Anderson, KØGA, director from the ARRL Dakota Division (left), makes the award for the League.

MINOR RULES CHANGE

Up to now, an amateur changing his permanent station location has been required to file for modification of his license before going on the air, and in any case, whether on the air or not, within four months. As part of the Commission's program of "deregulation," the second half of this rule has been dropped, effective March 23, 1977. The rule now reads,

"97.95(a) (2) When the authorized fixed-station operation location is changed, an application must be filed prior to any operation in accordance with Section 97.47."

Licensees have a continuing obligation, of course, to keep the Commission informed as to their current mail address; several amateurs have faced revocation proceedings recently because they did not reply to Commission correspondence. This notification does not require a Form 610, but simply a letter stating the new and old name and/or address, call sign and class of operator license.

SCHOLARSHIPS OFFERED

The Foundation for Amateur Radio, Inc., a nonprofit confederation of amateur radio clubs in the Washington, DC, area, has announced the availability of scholarships for the academic year 1977-1978. In addition to the three which have been offered in the past, there is a new scholarship, sponsored by the Radio Club of America, which will be administered by the Foundation. All amateurs, wherever resident in the U.S. who hold an FCC license of at least General class, can compete for one or more of the awards if they plan a full-time course of studies beyond high school.

The John W. Gore Scholarship pays $750. Applicants must intend to pursue a career in electronics or a related science and have completed at least one year in an accredited college or university toward a baccalaureate or higher degree. Preference will be given to residents of the District of Columbia, Maryland and Northern Virginia.

The Richard G. Chichester Scholarship also pays $750. Applicants must be members of the ARRL and be sponsored by an ARRL-affiliated club. There is no restriction on the course of study, but applicants must be enrolled in or have been accepted by an accredited university or college and intend to seek a baccalaureate degree. Preference will be given to residents of Ohio, Kentucky, Indiana, Illinois, the District of Columbia, Maryland and Northern Virginia.

The Edwin S. Van Deusen Scholarship pays $250. Applicants must have been accepted or enrolled in an accredited two-year technical school and intend to seek an associate degree in a science-related area. Area preference is the same as the Gore Scholarship.

The Radio Club of America Scholarship also pays $250. There is no restriction on the course of study, but applicants must be enrolled in or have been accepted by an accredited university, college or technical school and intend to seek at least an associate degree. There is no area of preference.

Application forms can be requested from FAR Scholarships, 8101 Hampden Lane, Bethesda, MD 20014. Requests must be postmarked prior to June 1, 1977.

The Foundation is devoted exclusively to promoting the interest of amateur radio and to scientific, literary and educational pursuit that advance the purposes of amateur radio

RFI BILL INTRODUCED AGAIN

Senator Barry Goldwater, K7UGA, has agai introduced a bill to give FCC authority t ensure that consumer electronics device manufactured or sold in the U.S. have ade quate protection against radio-frequenc interception. We started to write an explana tion of the bill, but then found that th Senator had said it better than we could! Her are excerpts of his remarks from the Con gressional Record of March 2, 1977, followe by the text of the bill:

Reducing Radio-Frequency Interference with Home-Entertainment Products

Mr. Goldwater. Mr. President, it is ob vious that citizens band radio has arrived There are eight million CB stations in opera tion right now and 20 million CB user Almost another million persons seek license every month . . .

One serious problem raised by the growin number of CB sets is possible interferenc with radio, TV and stereo sets and othe home electronic equipment. In fact, the prob lem might be called a giant one. The Federa Communications Commission informs me it i now receiving complaints about radio frequency interference to home entertainment equipment at a rate of abou 200,000 a year. . . .

Now, understand that this is only the ti of an iceberg. The FCC has made studie which prove that there are at least 14 othe people in the same neighborhood as eac person who files a complaint who are an noyed by the same problem. This factor alon would bring the total number of person adversely affected by radio-frequency inter ference up to about 2.5 million. . . .

Thus, the true dimension of the problem i gigantic. There are many, many millions o citizens who are troubled in their daily live by annoying and disruptive interference t the proper operation of electronic equipmen in their homes as a result of the susceptibilit of such equipment to radio-frequency emi sions.

Mr. President, some 80 percent of th problems I am talking about are related to th operation of CB stations. Another seve percent of the problems stem from th operation of stations licensed in the amateu service.

What is not commonly understood is tha the great majority of these complaints resu from defects in home electronic equipmen that pick up signals they should not receiv In fact, the FCC has found in past years tha 90 percent of all television-interference prob lems can be cured only at the televisio receiver. Interference has not been caused b the CB or amateur radio transmitter; it ha resulted from basic design defects in the T set itself.

Further, nearly all problems with audi devices, such as hi-fi equipment, phonograph electronic organs, and intercoms, must b corrected at the set. After all, if a neighbor phonograph starts acting like a shortwav receiver, there is usually nothing the CB o ham radio operator can do about it. Th phonograph simply should not act as a rad receiver.

In short, a major source of the problem is that otherwise well-designed home-entertainment equipment is not adapted to today's urban and suburban environment. The few small components or filters which would block out radio-frequency interference are too often left out by the manufacturers. Later there is a high service call to install them, even though the cost of the protective item itself is minimal.

Some responsible manufacturers already supply filters for reducing television interference when cases are brought to their attention. There is at least one major manufacturer and distributor of television receivers in the United States who now includes the proper filter in his tuner design; and, in my opinion, he has proven that such products can be marketed at competitive prices. Some manufacturers of other home-entertainment equipment recognize a responsibility to the consumer by incorporating the necessary susceptibility-reducing components in their equipment, as well.

A good number, however, still do not. This is where the bill I am introducing today comes in. One means of insuring that the nontechnical public will be offered home-entertainment equipment which is capable of operating properly in the vicinity of nearby CB and amateur radio transmitters is to give the FCC specific authority to require the inclusion of interference-protection components in various types of consumer electronic devices. Thus, I am submitting today legislation which will do just that. . . .

It is my intention that the bill cover television receivers, a-m and fm radio receivers, tape recorders, high-fidelity audio systems, phonographs, intercom systems and electronic organs. Public address systems would also be reached by the bill.

The legislation is not, however, limited to the above products. In a change from the bill which I introduced last year, the new bill drops the restrictive term "audio and visual electronic equipment" and substitutes for it the term "consumer electronic equipment." My purpose in making this drafting change is to reach electronic control devices and warning devices, as well as the above kind of equipment. Home burglar alarm devices are one type of warning system I have in mind. . . .

S. 864

A bill to amend section 302 of the Communications Act of 1934 to authorize the Federal Communications Commission to prescribe regulations with respect to certain electronic equipment that is susceptible to radio frequency energy interference.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That (a) section 302 of the Communications Act of 1934 (82 Stat. 290; 47 U.S.C. 302a) is amended as follows:

1) Subsection (a) of such section is amended –

A) by inserting "(1)" immediately after "governing" in the first sentence;

B) by striking out the period at the end of the first sentence and inserting in lieu thereof " and (2) the use of protective components in consumer electronic equipment which are capable of reducing interference to such equipment from radio frequency energy.";

C) by striking out "shipment, or use of such devices" in the second sentence and inserting in lieu thereof "or shipment of such devices and consumer electronic equipment or the use of such devices.".

2) Subsection (b) of such section is amended by striking out "ship, or use devices" and inserting in lieu thereof "or ship devices and consumer electronic equipment or use devices".

3) Subsection (c) of such section is amended –

A) by inserting "or consumer electronic equipment" immediately after "devices" wherever such term appears in the first sentence;

B) by inserting "and consumer electronic equipment" immediately after "Devices" in the second sentence; and

C) by striking out "the common objective of reducing interference to radio reception," in the second sentence and inserting in lieu thereof "the objectives of reducing interference to radio reception and to consumer electronic equipment,".

b) The heading for section 302 of such Act is amended to read as follows:

"Interference with Radio Communications and Consumer Electronic Equipment."
United States Code: Title 47 Section 302A Telegraphs, Telephones, Etc.

Section 302A. Devices which interfere with radio reception; regulations; restrictions; exceptions

a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations governing the interference potential of devices which in their operation are capable of emitting radio frequency energy by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, shipment, or use of such devices.

b) No person shall manufacture, import, sell, offer for sale, ship, or use devices which fail to comply with regulations promulgated pursuant to this section.

c) The provisions of this section shall not be applicable to carriers transporting such devices without trading in them, to devices manufactured solely for export, to the manufacture, assembly, or installation of devices for its own use by a public utility engaged in providing electric service, or to devices for use by the government of the United States or any agency thereof. Devices for use by the government of the United States or any agency thereof shall be developed, procured, or otherwise acquired, including offshore procurement, under United States government criteria, standards, or specifications designed to achieve the common objective of reducing interference to radio reception, taking into account the unique needs of national defense and security.

NAB PETITION: ARRL COMMENTS

The National Association of Broadcasters has filed a petition RM-2830 asking FCC to change the rules of the Broacasting, CB Radio and Amateur Services so that broadcast and TV stations could routinely retransmit CB and ham reports of emergency information, traffic, road or weather conditions without specific permission from FCC. NAB claimed the change was a relief from a restriction and thus could be put into effect by a simple Order of the Commission.

ARRL has filed comments indicating uneasiness with the proposal and asking that, if the request is to be considered by FCC, normal procedures – issuance of a Notice of Proposed Rulemaking and so on – be followed. "The risk of exceeding reasonable limits for permissible communications by amateur stations would not be justified by the questionable benefit to the broadcaster and to the general public. The present rules have been in effect for many years and have been most satisfactory," the comments said.

"COMMUNICASTING"

Some preliminary work via ham radio with the concept of using repeaters and talk-back stations for educational purposes has led to a petition for rulemaking to establish a new Community Educational Radio Fixed Service, preferably within TV channels 70 through 83. The petition was filed by Dr. Lee Cohen, WA2RPC, of the Center for Advanced Study in Education of the City University of New York and is cosponsored by S. Edwin Piller, W2KPQ, president of a nonprofit group called Communicasting Association of America, Inc. Exact usage of the new service would vary, being tailored to the community each cluster of stations would be established to serve. However, one use would be for televised lectures by TV repeater, with "talk-back" by students on an adjacent channel. This would enable students to "Communicate – Not Commute."

For more information, write Dr. Cohen at 33 West 42nd Street, New York, NY 10036, or Ed Piller, at 80 Birchwood Park Drive, Syosset, NY 11791.

CALL FOR PAPERS: TECHNICAL SYMPOSIUM

The 1977 ARRL Technical Symposium will be held on Friday evening, September 16, 1977, at the Tysons Corner Ramada Inn, Falls Church, VA, in conjunction with the ARRL Virginia Station Convention on the 17th and 18th. This American Radio Relay League technical symposium is managed by the Amateur Radio Research and Development Corporation (AMRAD). Both the convention and the technical symposium are sponsored by the Northern Virginia Amateur Radio Council (NOVARC).

Previously unpublished papers are invited on all technical subjects relating to amateur radio. Areas of interest include propagation, antennas, transmitting and receiving equipment, amateur radio applications of microprocessors, design and construction techniques, station and shop design, hf techniques, vhf/uhf repeaters, amateur television, radioteletype, space communications, microwave experiments, or other topics of technical interest to radio amateurs.

Prospective contributors are asked to forward informal summaries along with a photo of the author and a one-page biographical sketch of the author's amateur/electronic background by July 15. Manuscripts are due by August 15. Please write or call Paul Rinaldo, W4RI, 1524 Springvale Ave., McLean, VA 22101, 703-356-8918 evenings or weekends.

Correspondence

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

NEW HAMS STRIKE BACK

□ K5BA, fellow ham, when you first keyed up, did you know everything about ham radio operation? Maybe the inexperienced ham of whom you spoke of using 10-2 was making his or her first contact – with you! Weren't you excited and a little nervous when you made your first contact? Your unnecessary comment might have discouraged this new ham. Amateurs should give the new hams a little more help and a little less criticism. Why make unnecessary public remarks? – *David Andrews, WB5VIH and Mark Davis, WB5YEY, Little Rock AFB, AR*

□ I am quite sure that if you took a survey about one out of 10 presently licensed hams (maybe more) either is now or was at one time a CBer. I personally know quite a few hams who fall into one of those categories. I hold a CB license as well as an amateur license. When I got on the air as a ham, it was difficult not to say 10-4 and 10-20, but eventually I learned the Q signals and put the 10 codes behind me. I'm sure that when you first got your ham ticket that you made a few mistakes, too. Mr. Maxwell, there are a lot of CBers in my area that are going into ham radio; I hope that you and the people who feel like you do will give us a chance. – *Carlene Healey, WB1BTJ, Pittsfield, MA*

TNX FER THE QSL

□ I would like to thank you for the super QSL service which you are providing. When I received your postcard acknowledgement of the receipt of my cards I was really amazed to learn how rapidly you handled my cards and got them on the road to their overseas destinations. For this kind of service I am very grateful. – *Frank Mitchell, K4KA, Falls Church, VA*

PLEASE REPEAT????

□ Perhaps call-sign proliferation has gone too far. This past weekend I stopped sending when my eye fell on the check-sheet entry of the station I was replying to.

He swiftly sent a question mark, and I as swiftly returned "B4." "B4?" he asked. I replied, "B4 SRI."

Well, you could almost see his helpless shrug . . . and then the station sent "B4SRI 579150." *William Nightman, W4XR, Richmond, VA*

DUES BLUES AND VIEWS

□ I am not a "loyal supporter of the League" – just the opposite. The ARRL has done more to kill amateur radio over the years than any other factor. The only reason I am a "member" is because of gift subscriptions for the past 15 years, and I have tried to discourage these without success. – *G. W. Fyler, W9JT, Lombard, IL*

□ Just a line to let you know that this will be my last year as an ARRL member due to the increase in dues. *Lou DeLuca, WB2AKP, Brooklyn, NY*

□ I wish to commend you on an outstanding job – *QST* has never been better, and the League's activities concerning WARC are truly commendable. I recently got a letter from Headquarters offering membership extensions before the dues rose to $12. As a college student, I can only afford three years' worth, but I consider it an investment in amateur radio, small as it may be. – *Donald Button, WA2IMD, Newark, DE*

□ I feel that your organization is worthwhile. However, at the present time, I stress the viewpoint that you are taking advantage of your situation as a monopoly. Such is evident, in your recent inflation of membership dues. As a result, I must refuse to support such an organization. – *John Christopher Fargas, WB2VVV, Pearl River, NY*

□ Cost-conscious ARRL? How much did it cost to send the January 1977 letter and publicity material to League members patting yourselves on the back and announcing a dues increase to defray expenses of recruiting more amateurs? Unless we get more frequency allocations or hopefully keep from losing more, you are only compounding the problem. Finding a clear frequency is hard enough without your Club and Training Department spending more trying to make it worse. Apply cost consciousness in administration and you might not need to increase membership fees. Besides, *QST* isn't worth more; there is so much technical matter that I'm beginning to get a complex thinking I must be the only Advanced who can't understand it.

How does it feel to have rocks thrown at your glass house? Will the ARRL ever stop throwing bricks at the FCC and learn that more flies can be caught with honey than vinegar? – *Warren Smith, WBØGTL, Colorado Springs, CO*

□ Perhaps you engineer types profit from setting up exclusive classes of licenses so you don't have to share your band space with the low types who can't whip up a junk-box GDO in 12 minutes, but out here in the hinterland, the unwashed multitudes are still plodding along without nine supergrade extra special licenses, and somehow we are all getting along without being able to load up on the snob portion of the band!

So, for all practical purposes, the ARRL may be fine for you, but as far as I am concerned you can hang it where the sun doesn't shine. *Fred Carroll, WA1CSG, Frankfort, ME*

□ I recently received your letter informing me of the price rise in ARRL membership. I seem to remember recently that the ads said that the new size *QST* will help us hold the price line and better serve the amateurs. It seems to me you have done neither so I will not renew my membership. – *Claude Still, WB5SVS, Abilene, TX*

□ I would like to express my appreciation to you for what is happening at Headquarters. The ARRL membership is to be proud of the way things are happening.

There are new publications, materials, training aids and programs for both the newcomer and the old-timer. There is an enthusiastic interest and concern for those seeking ham radio and an equal enthusiasm and concern for those already active. I first received my Novice in 1959 and passed the Technician the same year. In 1966 I made Conditional. Then there followed sporadic interest and activity on my part.

Thanks to you and your staff, I rejoined ARRL two years ago, flew to Anchorage (600 miles) and passed the Advanced. Therefore, I am applying for life membership.

I just wanted you to know that I for one am proud of the way the League is growing and improving. Keep up the good work. – *Paul Arvin, KL7FBU, Sitka, AK*

□ I am very glad to be a member of the ARRL once again. Boy, it sure takes a long time to get a ham license from the FCC, but it is worth the wait. I finally was able to get $9 together for my dues. I am looking forward to getting my first copy of *QST* in a long time, since I am really behind in what is going on. I will have my next year's dues in before this year's runs out. Believe me, I am proud to be a ham and an ARRL member. *Al Carpenter, WA8REC, Spencer, WV*

□ Recently, due to a slight illness, I had the opportunity to read the last few issues of *QST* from cover to cover. Most enthusiastically do I support your management of the League and urge that you continue to follow the same line of reasoning that is now controlling your decisions. With your help I now hold an Advanced license. Please renew my membership. – *Fred Lanyon, WBØOTP, Lemay, MO*

□ I have renewed my membership for one more year at $9. Even at $12 it is a bargain. – *Jim Armstrong, WBØTDX, Mission, KS*

THE JOY OF HAM RADIO

□ I just read that some psychologist says that CB is breaking up marriages. I never heard of a ham busting up his marriage over ham radio – maybe his rig or even his house, but not his marriage. There isn't a woman on earth worth ham radio. Who knows . . . I have to cut this letter short. The war department just came home from Bingo with that broke look on her dial. – *Chuck Waugh, K3NSN, Philadelphia PA*

CRIME AND PUNISHMENT

□ Last night I copied a bulletin which made me a little sad around the edges. It said the FCC was proposing to ban "the sale or manufacture of any amplifier covering the 24 to 35-MHz range."

Now we are to be punished for the lawbreaking of a few CBers? This ruling, if put into effect, will penalize the Amateur Radio Service whose members are entitled to use a kilowatt of power on 10 meters and who, according to the FCC, are "our best behaved service." The FCC has adopted the "whipping boy" concept! Surely, it is beneath these folks to resort to punishing their "best behaved" for the acts of a few upstarts! There has to be better way than this. – *Charles M. Royer, WBØBTD, Des Moines, IA*

YL News and Views

Conducted By Louise Moreau,* W3WRE

YLRC Italiano Elettra Marconi

The YLRC Italiano resulted from an idea to unite the Italian women amateur radio operators. In 1969 I8PLH, Hildegarde Pellicone Goldstein, felt that there would be more feminine interest in amateur radio if the YLs were better acquainted with each other and with women amateur radio operators in other countries. With this idea in mind, 24 of the 36 YLs who then held licenses met in Rome in September of 1969 to organize the YLRC Italiano. Shortly thereafter in September of 1973, the Princess Elettra Marconi permitted the club to adopt her name and became its Honorary President. Membership in this rapidly growing club is now over 100.

These YLs sponsor an intra-club contest to encourage on-the-air activity among members as well as other contests that are open to all amateurs. In 1976 they sponsored a special project to help preserve the Venetian art objects through their "Let's Save Venice" certificate. The beautiful WAIYL certificate appeared in 1971 and is available to all amateurs submitting proof of contact with Italian YLs.

YLRC Italiano members are particularly anxious to work amateurs in this country so to promote such contacts they sponsor tapes in Italian and English for those members not too fluent in English. The tapes illustrate most types of contacts from contest through QSO so that the gals can recognize them.

The YLs work comfortably on cw and RTTY since they can translate as they work. Yet for those who do work phone, the membership has sent us a major request saying, "Please remember to speak very slowly as talking is much easier than understanding a language other than our own, and we want to become well-known to the amateur radio community."

YLRL TAPE TOPICS

The YLRL sponsors a special project for blind YL operators. The club's Tape Topics Chairmen tape the contents of *YL Harmonics*, the official club publication, as well as *QST* "YL News and Views" and other related YL information for sightless YL operators. In Canada a similar program is sponsored by the Ontario Trilliums.

NEW *HARMONICS* COLUMN PLANNED

YLRL Harmonics has added an affiliated-club column for news of club activities to be included in future issues of the magazine. Eila Russell, WA8EBS, has been appointed editor of this new column.

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

Meet Louise Evans, WB6AUK, with her teacher, WB6USB. Louise passed her General class in just 16 weeks and then took only 32 weeks to upgrade to Advanced class.

EI5CG, Miss B. Babe and EI7CW, Mrs. Claire Dixon. This increases the list of countries with women amateur radio operators to 118, so far as we have been able to find them in the *Callbook Magazine*.

1977 YLISSB CONVENTION

The YLISSB has announced that the 1977 Convention will be at the Tri-Arc Travel Lodge in Salt Lake City, June 23-26, 1977.

The convention will include technical sessions, many phases of amateur operation, forums and a business meeting. For those who may be interested, all reservation requests should be sent to V. Mayree Tallman, K4ICA, 428 S.W. 28th Road, Miami, Florida 33129. QST

NYC-YLRL January luncheon meeting. Top row (l-r): Ruth Garretson; Helen Horbstman, WA2LBU; Bea Schwartz, WA2RST; Ruth Kalish, W2IGA; Amy Samuels, W2EUL; Helen Zuparn. Center row: Irene Putzer, WB2LWG; Chris Haycock, WB2YBA; Madeline Greenberg, W2EEO; Ruth Schlitt, WA2RIX. Front Row: Patti Wiener, WA2RRI; Nancy Iscaro, WA2GKT and the two WA2RRI Jr. ops. *(W2EEO photo)*

CLARA 10TH ANNIVERSARY

The Canadian Ladies' Amateur Radio Association is celebrating its 10th anniversary with a miniconvention within the ARRL National Convention in Toronto in June. The CLARA theme is international YL friendship. Plans include a forum, guest speakers and a special birthday luncheon to be held on Saturday, June 4, 1977.

CLARA will sponsor a hospitality room at the Convention for the relaxation of all women who attend the June affair. There will be a separate program and luncheon for the wives of amateurs who attend the ARRL Convention.

For those YLs who wish to attend the CLARA luncheon, a separate reservation from the Convention reservations should be sent to the Chairman VE3HAI.

CLARA plans for all women who attend are excellent. See you there.

IRELAND'S YLS

Ireland has added another country to the rapidly growing YL map with two YLs,

VE3HAI, Ann Nutter, CLARA vice president, is the busy chairwoman of the women's activities as well as of the entire CLARA celebration at the ARRL National Convention in June.

International News

Conducted By Bruce A. Johnson,* WA6IDN/WA1ZQP

Greece: Ancient Ideals and Amateur Radio

While sitting in a park overlooking Athen's famed Acropolis one warm afternoon in January, this writer couldn't help but recall with pleasure the many stories that have come down the centuries about the ancient Greeks. Two qualities which vied for first place among the classical Athenians were *communication* and *self-development*. How fitting, then, to be able to report this month that the Radio Amateur Association of Greece has successfully convinced the Greek government to overhaul the Amateur Radio Service in that country, and to once again conduct examinations for applicants.

Due to political turmoil, and some unpleasant effects on amateur radio, the IARU society (RAAG) asked the government to freeze amateur exams temporarily. This was accomplished on June 6, 1972 – and there hasn't been a new Greek ham since! But in October of that same year, a whole new law was drafted concerning the Amateur Radio Service in Greece. It finally became effective in April, 1976.

The first exams were given in March, 1977, and there were hundreds of anxious Greeks waiting for that magic date. In order to take the exams, the applicant must first show that he holds a certificate from RAAG (see below). This certificate proves that the applicant has successfully completed a course in radio theory, regulations, code and operating procedures. Then, and only then, the applicant takes the test for the Class C license: a basic theory test and a 40 character-per-minute code test. If he succeeds, he may upgrade his license five years later, progressing from 50 watts to 150. When he or she turns 25 years of age, the top class of license (A) is available in exchange for a tough exam and a 60 character-per-minute test. The reward: 300 watts input power (the maximum allowed in Greece) on the standard hf bands, plus 2 and 1-1/4 meters.

The 3.5- to 3.6-MHz band was only recently allocated to Greek amateurs by their government, and the SVs are eagerly showing proof through regular use of the band that the allocation was well deserved.

The bearer of this certificate is entitled to take the exams for a Greek amateur license. He has successfully completed a course in amateur radio theory, regulations, code and procedures from the IARU society of Greece.

Vhf activity? Plenty. Repeaters are being built around Athens, as well as northern Greece, and a new VHF Society was born last year. Affiliated with RAAG, almost every RAAG member has been drawn into the VHF Society by the contagious enthusiasm shown by these vhfers.

A more amiable and hospitable group of hams would be hard to find. RAAG officers are anxious to have foreign amateurs visit Greece, and make marvelous hosts. But, even better, they balance their amiability with effective management.

With WARC-79 drawing so close so fast, the Greeks have made significant progress in re-orienting their national Ministry of Communications toward very favorable support of amateur radio. They even anticipate having an amateur appointed full time to the Greek delegation to WARC in 1979. Their weekly contacts with the Ministry are going far toward making certain that the Amateur Radio Service in Greece can fulfill at least two of its public goals: the advancement of *communication* and international goodwill, and the providing of a skilled corps of self-training, *self-developing* technicians. RAAG, *kallo*!

C'EST BON: 160 METERS AND 2-METER REPEATERS

President Jan Coussi, F9FF, writes from his headquarters of the Reseau des Emetteurs Francais in Paris that the French government has at long last granted the 160-meter band to the radio amateurs of France, along with permission to establish 2-meter repeaters!

Many months of cautious negotiations preceded this announcement: lengthy meetings, painstakingly drafted documents, patient explanations to the government about the needs of the French amateurs.

"We still have much to do," writes the French IARU society, "but we must work slowly with diplomacy in order to reach our desired goals. Looking toward WARC-79, these two authorizations symbolize the optimism which we hold, as we press on in our responsibilities for defending the Amateur Radio Service."

How many amateurs have stopped to consider just how intricate such negotiations can be? Frequently, scores of government employees must be educated about amateur radio and the vital role it plays in a nation's relations with the world. The achievements of the French amateurs will go far toward helping the entire international Amateur Radio Service at WARC-79. *Merci*!

OOPS!

If you're using the Brazil prefix map that appeared in this column in the March issue, you may have noticed that there are two PY6 regions. The southernmost one is the state of Minas Gerais, which should bear the prefix PY4. Our apologies to our Brazilian friends and our thanks to eagle-eyed WA4MDS.

*International Services Assistant, ARRL

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

Summertime – Vacation Time

Vacation time, that time of the year we all look forward to is rapidly approaching. For many of you, it will be your first chance to use your fm rig on some other repeater than your local one. In case you don't know or haven't looked lately, the woods are full of repeaters. In some areas of the country it is now possible to travel many hundreds of miles and always be in range of a repeater. We're now at work on the latest edition of the *ARRL Repeater Directory* (and it promises to be a *big* one). The directory will be free (just postage), so watch W1AW bulletins for the availability date.

Since fm-repeater work is still a new thing to many amateurs, it is worthwhile passing on a few operating hints, particularly if you are traveling. For starters, always keep in mind when using a strange repeater that *you* are the visitor. Guide your operating habits as if it were your own station you were using. It may be a cliche, but the best advice in this case is to do unto others, etc.

The use of autopatch varies greatly from area to area. Generally, the repeater with autopatch reserves the use of autopatch to its own members with the provision that visitors are welcome but the patch must be accessed by a club member. When in doubt, ask!

Most important, while your own repeater group may not mind long-winded transmissions, many repeater groups frown on such operation. If someone calls you to task, don't be upset – it is *their* operation and they have every right to run the system the way they want. In fact, it's a good idea to do some listening before coming on the air. In that way you'll get an idea of how the repeater works, and you'll be less likely to put your foot in your mouth.

SPORADIC-E TIME

We mentioned above that it was vacation time – summertime – which is also sporadic-E time when the ionosphere likes to play tricks on us, particularly with 10, 6 and 2 meters. Don't be alarmed for example, if you are driving around Albuquerque and all of a sudden start hearing a bunch of W6s on the local repeater. They aren't local jokers pulling your leg; they really are California stations whose signals are reaching you via the ionosphere and sporadic-E propagation.

Sporadic E is more common across the southern section of the country but it can take place anywhere. On 6 meters for example, it is so common between the West Coast and Texas that hams have come to expect openings every day. If you run into such an opening on 2 meters, don't forget the simplex (direct) frequencies. You might experience a pleasant surprise by going simplex and calling CQ. (By the way, for any newcomers to amateur radio who have never worked low frequencies, CQ is a general call to all amateurs and *still* a good way to let other amateurs know you are looking for a contact.)

It would be appreciated if you log any sporadic-E contacts and send the information along to Bill Tynan, W3XQ, who conducts our "World Above 50 MHz" column. *And* if you are a 220-MHz operator and run into *any* unusual skip condition by all means let Tynan or ARRL hq. know. Sporadic E on 220 is something we have been trying to pin down for some time and what with all the repeaters now operating there, we should be able to get some good information about the band.

60 dB DOWN?

You'll be reading about it in "Happenings," but the FCC just changed the rules, effective date April 15, concerning purity of emissions. The part that greatly affects all vhf operators is 97.73(b) which states that transmitters, 25 watts or more, operating above 30 MHz and below 235 MHz must have *all* spurious signals attenuated at least 60 dB. In case you ain't looked lately, that means *all* amateur commercial and homemade gear we know of won't meet those specs. Repeater transmitters using duplexers should hit 60 dB or more without problems but us users – no way!

It appears that strip-line filters, and other types of filters are going to become a way of life with us. We'll be going into greater details in later issues of *QST* but we thought *you* would like to *know* that *we know* of *no* rigs that meet those specs now.

HOW TO REPORT AN EMERGENCY

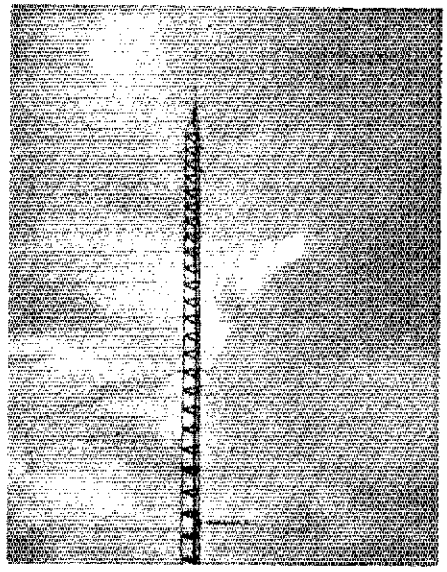
As more and more repeaters install autopatch, more and more amateurs will be using the systems to report emergencies to the police. In our travels around the country we have listened to many repeaters and their autopatch systems. Some do a good job and some – well – some are pretty bad. It is just as easy to do a good job and here are some suggested guidelines. First, state that you are an amateur radio station making the report (we need all the credit we can get).

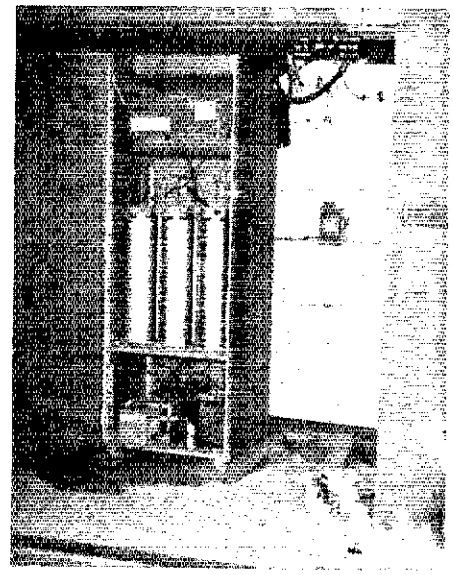
1) "This is amateur radio station . . . . ."
2) "I would like to report a traffic accident" (could be a fire, etc.).
3) "At" (It is important here to take your time and give the location as precisely as possible).
4) It is a good idea to provide as much additional details as you feel are needed. If you think an ambulance is required don't be afraid to say so; let the police make the final judgment.

MORE RFI PROBLEMS

In letters sent by Illinois Bell to their mobile-telephone customers a warning was given to all radio users in or near a 1977 Cadillac. The cruise-control feature of these cars is affected by strong rf fields and can cause a sudden increase or decrease in its speed.

Bell warns to try to avoid using mobile telephones or radio transmitting equipment if you notice you are near a '77 Caddy. Amateur radio operators should take this advice seriously. – *Western Area FM A.R.C. bulletin*





The two photographs show the installation of Caballo Mountain repeater site. Floyd Chowning, K5LA/WR5ASE, is the trustee of this 16/76 machine. Caballo Mountain is located 11 miles southeast of Truth or Consequences, New Mexico.

The tower is 50-ft high and has a Hustler antenna on top. Lower down is a 450-MHz Yagi. The repeater is equipped with emergency power (batteries at bottom of rack).

*VRAC Liaison, ARRL hq.

Coming Conventions

May 14-15
Mississippi State, Jackson, MS

May 21-22
New York State, Rochester, NY

May 21
Wisconsin State, Lake Delton, WI

May 28-29
Tennessee State, Knoxville, TN

June 3-5
ARRL National, Toronto, Ontario

June 18-19
Georgia State, Atlanta, GA

July 2-3
West Virginia State, Jackson's Mill, WV

July 9-10
Roanoke Division, Norfolk, VA

July 30-31
Northwestern Division, Seattle, WA

September 16-18
Virginia State, Falls Church, VA

September 23-25
New England Division, Hartford, CT

September 24-25*
Delta Division, New Orleans, LA

October 7-9
Midwest Division, Wichita, KS

October 7-9
Southwestern Division, Santa Maria, CA

October 8-9*
West Gulf Division, Austin, TX

October 15-16
Pacific Division, San Mateo, CA

November 19-20
South Florida Section, Clearwater, FL

*Date Change

NEW YORK STATE CONVENTION

May 20-22, 1977, Rochester, NY

The New York State ARRL Convention/44th annual Rochester Hamfest will be held the weekend of May 20-22 at the Monroe County Fairgrounds near Rochester, NY.

Activities begin on Friday at the Rochester Marriott Inn (hotel headquarters) where an evening Funfest in the main banquet hall begins at 7 P.M. Famous guitarist, Alvino Rey, W6UK, will entertain. Club groups, manufacturers, distributors and publishers will have open house suites on Friday evening at the hotel.

The huge flea market at the fairgrounds will begin to take shape on Friday afternoon. Flea-market parking spaces will be available continuously from Friday afternoon through Sunday afternoon. The outdoor flea market will operate continuously, weather, light and shoppers dictating hours. The indoor flea market will open at 7 A.M. Saturday and operate until 5:30 P.M., then reopen at 9:30 A.M. on Sunday.

The huge Dome Center (where commercial exhibits and programming are located) at the fairgrounds will open at 9 A.M. on Saturday. FCC tests for Technician and higher classes of exams begin at 9 A.M. Completed FCC form 610 should be sent to FCC, 601 Market Street, Philadelphia, PA 19106 no later than one week prior to the convention. The form must be marked "for examination at Rochester Hamfest." FCC will send confirmations and exam times.

At 7 P.M. activities return to the Marriott where the annual awards banquet will be held, and at midnight, the Royal Order of the Wouff Hong ceremonies take place.

Sunday, at 8:15 A.M., an old-timers buffet breakfast will be served at the Marriott. A program will be presented at the breakfast, after which activities return to the fairgrounds for the day.

Advance registration, $3.50; registration at gate, $4. Advance registration closes May 14. Banquet tickets are $8.50. Unlimited outdoor flea-market space is available at $1 per parking space. Indoor flea-market space is $5 per table, per day. A limited number of camper hookups are available *free* on a first-come, first-served basis.

For the ladies, buses will operate between the fairgrounds and Rochester's famous Midtown Plaza where women may shop and sightsee on Saturday. At 3 P.M., a fashion show and tea will be presented in the Top of the Plaza Restaurant at Midtown. Buses will make a return run to the fairgrounds. Other programs for the ladies are slated.

Ticket orders and information requests should go to Rochester Hamfest, Box 1388, Rochester, NY 14603.

WISCONSIN STATE CONVENTION

May 21, 1977, Lake Delton, WI

A day of fun is in store for Wisconsin and area hams attending the 1977 ARRL Wisconsin State Convention, sponsored by the Yellow Thunder ARC, Inc.

Forums beginning at 10 A.M. include VHF Repeater (featuring "A Repeater Is a Repeater"), club officers, Navy-Marine Corps MARS, ARPSC, DX (hosted by the Madison, WI, DX Club), RTTY and an ARRL Forum, featuring Robert L. White, W1CW, from ARRL headquarters.

It's a good opportunity for Wisconsin area hams to meet and get acquainted with the new Central Division Director Don Miller, W9NTP, of Waldron, Indiana.

There will be a large indoor swap area, with tables priced at $1.50 each. For table reservations, send $1.50 each to Ken Ebneter, K9EN, 822 Wauona Tr., Portage, WI 53901.

There will be another fantastic liars' contest with a select panel of well-qualified judges picking the best liar, to whom goes a large trophy and a badge.

Ladies activities start at 2 P.M. with games and a slide show.

Happy hour is 5:30 to 6 P.M., with the dinner featuring the famous Dell View Resort buffet of chicken and ham plus all the trimmings. After-dinner entertainment will star "Happy the Clown," with eye-defying feats of magic and the traditional Clyde "Coffee" Downing routine, "It's in the Book."

Also, a bearing contest will be held at noon, with the best direction-finder receiving an award, and a hidden transmitter hunt at 2:30 P.M. on 146.94 MHz. Grand award is a Regency HR-2B.

Early bird deadline is May 1, 1977. Registration on convention day, Saturday, May 21 starts at 8 A.M. Registration, $7.25 in advance, $7.75 at door (includes everything); $1.50 in advance, $2 at door (no dinner). All advance registrations to Ken Ebneter, K9EN. For info on hotel accommodations, write Dell View Resort, Lake Delton, WI 53940.

TENNESSEE STATE CONVENTION

May 28-29, 1977, Knoxville, TN

The Tennessee State Convention/Greater Knoxville Hamfest will begin at 9 A.M. on Saturday and Sunday, May 28-29. As last year, activities will take place at the Knoxville National Guard Armory on Sutherland Avenue.

Features this year include an indoor ARRL booth, 10-10 booth, flea market forums, movies on amateur radio, prizes and multiple QSOs. The talk-in will be on 34/94 for 2 meters and 3980 for 80 meters.

A fun banquet, with Peter O'Dell WB8NAS, Public Information Officer, ARRL headquarters staff as speaker, will be held Saturday evening at the Howard Johnson Motel, West Hills exit of I40-I75. Dinner reservations must be paid for in advance to Jo Melton, 749 Elkmont Road, Knoxville, TN 37922.

Hamfest Calendar

California: The 22nd annual West Coast VHF Conference is May 13-15 at the Miramar Hotel on the beach in Santa Barbara. Features include technical and operating-oriented sessions for beginners and advanced vhfers, plus the traditional receiver noise-figure and antenna-gain measurements. Registration is at 6 P.M., Friday. Full day of technical sessions starting at 9 A.M., Saturday. Dinner Saturday night. Registration fee is $2 until April 30; after that $3. Registration forms, hotel information and further details write Dr. Overbeck at the Communication Division, Pepperdine University, Malibu, CA 90265.

***California:** The Lockheed E.R.C. Amateur Radio Club's hamfest is in Burbank at the Lockheed Employee's Recreation Club

*ARRL hamfest

the weekend of May 21-22. Admission is $4

Connecticut: The Candlewood's Amateu Radio Assoc.'s annual auction and flea marke is Saturday, May 14 at St. Mary's school i downtown Ridgefield. Doors open 10 A.M. auction at 1 P.M. Admission $1, indoor tabl space $1; outdoor tailgate space available S.a.s.e. to K1QPP for map and info.

***Illinois:** The Starved Rock Radio Club' annual hamfest is June 5 at the Bureau County Fairgrounds in Princeton. Moder buildings, excellent parking, free coffee an doughnuts from 8:30 till 9 A.M., refreshment available on the grounds. Camping and traile

space assigned with small reservation fee, electrical hook-up on first-come basis. Many motels, plus numerous historical spots nearby. Advance registration until May 20, with s.a.s.e. please; $1.50, at the gate $2. More info write W9MKS/WR9AFG, RFD 1, Box 171, Oglesby, IL 61348. 815-667-4614.

Indiana: The Tri-State Amateur Radio Society's annual hamfest is on Sunday, May 22 at Vanderburgh County, 4-H Center in Evansville. Food available, setup space. Talk-in frequencies are 75/15, 19/79, and 52. For further info write TARS Steven Harris, R-2, Box 81G, Mt. Vernon, IN 47620.

Indiana: The Wabash County Amateur Radio Club's 9th annual hamfest is Sunday, May 22. Rain or shine at the Wabash County 4-H Fairgrounds in Wabash. Large flea market (no table or setup charge). Technical forums, bingo for the XYL, plenty of free parking and lots of good food at reasonable prices. Advance admission $2; $2.50 at gate. Children under 12 free. Write Bob Mitting, 663 Spring St., Wabash, IN 46992.

Kentucky: The Kentucky Ham-O-Rama is Sunday, May 29 (Memorial Day weekend). Located at Boone County Fairgrounds, Burlington (10 miles south of Cincinnati on I-75 Burlington exit). Features: indoor exhibits, flea market, refreshments and more. For info write NKARC, Box 31, Ft. Mitchell, KY 41017.

Maryland: The third annual Easton Amateur Radio Society hamfest is May 22, rain or shine, at 10 A.M. to 4 P.M. (5 miles north of Easton, on U.S. Rte. 50 at the Talbot County Agricultural Center. From the Baltimore or DC areas, go across the Chesapeake Bay Bridge and follow Rte. 50 east for 21 miles from the bridge. Exact location is between mile markers 60 and 61.) Hamfest signs on Rte. 50, north and south. Talk-in on 52 and 146.445/147.045 repeater in Cambridge. Some tables both inside and outside, good-priced refreshments. Lots of room for tables and tailgaters. Donation $2, with an additional $2 for tables or tailgaters. Write K3ONU, Robert L. Roberts, Jr., P. O. Box 781, Easton, MD 21601. Phone 301-822-0943 after 6 P.M.

Michigan: Cadillac, Michigan's 17th annual Swap n' Shop is Saturday, May 21, at the National Guard Armory, Cadillac. Free parking, everyone welcome. Tickets $2. Talk-in on 146.37/97.

Minnesota: Amateur Fair '77 swapfest for amateur radio operators and computer hobbyists is Saturday, June 4, at Minnesota State Fairgrounds. Free overnight parking for self-contained campers. Talk-in on 16/76 and 52/52. Selling from your car or from tables. Some undercover space available. Presented by the Twin City FM Club. Admission $2. For advanced space reservations, tickets or info call Gary at 612-644-4488.

Nebraska: The Pine Ridge Amateur Radio Club's 23rd annual hamfest is June 4-5 at the Pine Ridge Job Corp Center, 11 miles south of Chadron on Hwy. 385. Registration begins at 2 P.M. Saturday; 10 A.M. Sunday. Free camping. Meals served at a nominal cost. Swap table, transmitter hunt, eyeball QSOs and much more. For more info Terry Cogdill, WBØRMJ, 131 Ann St., Chadron, NE 69337.

New Jersey: The Irvington Radio Amateur Club's hamfest is Sunday, May 15, from 9 A.M. to 4 P.M. at the P.A.L. building, 285 Union Ave., Irvington (right alongside the Garden State Pky. at exit 143). Refreshments. Talk-in 34/94 and 52/52. Admission $1; tables $3. For info write K2GQ Radio Club, P.A.L. Bldg., 285 Union Ave., Irvington, NJ 07111 or call Ed, WA2MYZ, at 201-687-3240 evenings.

New York: The Rome Ham Family Day is June 5. Bring the XYL and kids and spend a great day at the Beeches, Rte. 26, Rome. Over 5,000 square ft of indoor display area and a giant flea market. For the family we offer a free tour of Ft. Stanwix. For the ham we offer programs, contests, exhibits and technical presentations. At day's end, relax and treat the family to the famous Beeches buffet. For info write P. O. Box 721, Rome, NY 13440. (Exhibitors are urged to reserve free display areas now.)

North Carolina: The 1977 Durhamfest is May 28-29 at the South Square Shopping Center, Durham. Two-day flea market under covered parking deck. Seminars including Lew McCoy, W1ICP; bingo and shopping for the family. Durham FM Assoc., Box 8651, Durham, NC 27707.

Ohio: The Champaign/Logan Amateur Radio Club's annual flea market is May 15 at the West Liberty Lion's Park, West Liberty. Free admission. Trunk sales and tables $1. Talk-in on 146.52.

Ohio: The Erie Amateur Radio Society's annual Vacationland Hamfest is Sunday, May 22, at the Erie County Fairgrounds on South Columbus Ave., Sandusky. Plenty of flea-market tables, $4 each. 8 acres for trunk sales. Tickets $1.50 advance; $2 at gate; Flea-market vehicles $1. Free transportation to Cedar Point Ferry Boat Docks. Talk-in 52/52. For info or reservations write E.A.R.S., P. O. Box 2037, Sandusky, OH 44870.

Pennsylvania: The Warminster Amateur Radio Club's "Hammart," flea market and auction is Sunday, May 15, from 9 A.M. to 4 P.M. at William Tennent Intermediate High School, Street Rd. (Rte. 132, 2 miles east of York Rd., Rte. 263) Warminster, Bucks County. Registration $1; tailgating $2 additional. Talk-in on 147.69-09; 16/76 and 146.52. For info write Horace Carter, K3ZAC, 38 Hickory La., Doyletown, PA 18901.

Pennsylvania: The 23rd annual Breeze Shooters hamfest is Sunday, May 22, at White Swan Park, Parkway West, near the greater Pittsburgh International Airport. Western Pennsylvania's largest ham event. Amusement park adjacent to site. Free parking. Contact WA3LUM, 311 Evergreen Ave., Pittsburgh, PA 15209.

Pennsylvania: The Annual Penn Central Hamfest is June 5, rain or shine at our new location in Allenwood. Flea market, auction and contests. Registration $3, XYL and children free. Talk-in on 3940 MHz, 37/97, 13/73 and 52 simplex. For info write Clair Yeagle, WA3QXI, R.D. no. 1, P. O. Box 224, Turbotville, PA 17772. Phone 717-437-2595.

Pennsylvania: The Perkiomen Valley Amateur Radio Club's hamfest is June 5, at the Perkiomenville sale and auction ground, Rte. 29, Perkiomenville. Tables available for flea market. Talk-in on 28/88, also on channel 14. Site is located south of Green Lane on Rte. 29 in the scenic hills of Pennsylvania.

South Dakota: A ham picnic is sponsored by Medicine Butte Radio Assoc., Rosebud Amateur Radio Club, and Pierre Amateur Radio Club on June 17-19 at the Armory, Chamberland. ARRL forum, fm forum, slow-scan and RTTY demonstrations. An auction with many XYL and harmonic activities. Food available. Talk-in on 3.955 and also 16/76. Tickets $4.50 in advance; $5 at the door. Info from WBØMZB, Kennebec, SD 57544.

Tennessee: The Humboldt Amateur Radio Club's hamfest is on Sunday, May 22, at Shady Acres City Park in Trenton. Flea market, ladies activities etc. For further info write Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

***Virginia:** The Manassas hamfest is Sunday, June 5, at the Prince William County Fairgrounds, 1/2 mile south of Manassas on Rte. 234. Presented by the Ole Virginia Hams A.R.C., Inc. with refreshments by Woodbridge Wireless, Inc. Admission $3. Gates open at 8 A.M. Tailgating $2, cover available in case of rain. Refreshments, special-activities programs for the entire family; fm clinic – spectrum analysis, deviation and power checks; cw proficiency awards – 5 wpm and up; learn how QSL bureaus work. Space for dealers and manufacturers, write Ole Virginia Hams ARC, Attn: Frank Atkinson, K4CB, P. O. Box 1225, Manassas, VA 22110. Talk-in 37/97 and 147.84/147.24 repeaters. 146.52 simplex and CB channel 1. Camping and hotel accommodations nearby.

Washington: The Fort Vancouver Hamfair is Saturday, and Sunday, May 21-22 at the Clark County fairgrounds, 7 miles north of Vancouver on 15; sponsored by W7AIA, Clark County Amateur Radio Club in cooperation with W7KYC, Portland Amateur Radio Club. Camping, contests, swap & shop, displays, and may other activities. Registration $3; write Dorman Stafford, W7ZDR, registration chairman, Fort Vancouver Hamfair, 3509 E. 21st St., Vancouver, WA 98661. Checks payable to Fort Vancouver Hamfair. Talk-in on 2 & 75 meters.

Wisconsin: The Milwaukee Radio Amateur's Club annual auction of amateur equipment and parts is Thursday, May 26, 7:30 P.M. at Club Meeting Hall, 7500 West State St., Wauwatosa. Open to all hams and proteges. No sales charge or admission fee. No flea-market dealers. Please tag all gear to be sold with seller's name and minimum opening bid.

QST

Strays

"THE ANTENNA HERE IS ———"

Everyone is interested in antennas. Even the typical "formula QSO" nearly always includes an exchange of information on the antennas in use, and antenna discussions rank high on the ragchewer's list of favorite subjects. Antenna forums draw the crowds at conventions and hamfests. But how much do we remember about them all?

Bob Haviland, W4MB, makes a practice of recording details of antennas used in his 21-MHz QSOs. He recently took time out to analyze the log data from more than 500 QSOs between April and December, 1976. Just over half the antennas reported were the Yagi type, multiband or monoband. Nearly 80 percent of these parasitic arrays used three working elements. Only five percent were the two-element variety, and the rest were four elements or more.

It was rather surprising to find that the second most popular antenna was the vertical. Most were multiband trap jobs, though there were a few 21-MHz ground planes. Comments indicated that space (or lack of it) is the principal factor in their 15.7-percent representation.

The quad rated third, with just under 15 percent, nearly all of them two-element jobs. Dipoles were fairly common, their 11.8 percent including some "inverted Vs."

Other antennas encountered were long wires, 1.8 percent; W3DZZ trap jobs, 0.8 percent; 40-meter doublets, also 0.8 percent; the Delta Loop, 0.6 percent; and log periodics, ZL Specials, and G4ZUs, 0.3-percent each.

Heights ran the gamut from 10 feet or less above ground (two percent, mostly verticals) to over 120 feet (also two percent, mostly atop apartment buildings). Only 12 percent were over 80 feet, and two-thirds were less than 60 feet up. The average height was almost exactly 50 feet.

W4MB has tried to see if there is one universally good antenna. He has found interesting variations, but no consistent optimum for all conditions. Even a dipole, and a low one at that, can do a respectable job at times. Evidence: a rotatable dipole less than 20 feet above ground was in use at the part-time Newington location of the undersigned, during the long ragchew that resulted in our receiving this information. And the power output on 21-MHz ssb at the time was under 50 watts. — *W1HDQ*

Washington Mailbox

Conducted by Harold M. Steinman,* K1FHN

GRANDFATHERS

Q. What exactly is the "grandfather clause"? I have been licensed over 50 years, and wonder if I could receive any examination credit toward an Extra Class license.

A. There are many misconceptions about the grandfather clause, and there are not many people today who meet its provisions. It only applies to people who hold a General class or higher license today and who held prior to May, 1917, a valid amateur radio station or operator license issued by any agency of the U.S. government. These people may, upon request, receive credit for the Amateur Extra code test, and the Advanced and Amateur Extra written exams. In effect, those who qualify under this clause may have their General class tickets "grandfathered" into Amateur Extra Class tickets. (97.25c)

Q. Are there any other provisions under which applicants may receive amateur examination credits?

A. Not many. Under certain conditions applicants may receive credit for the 5-, 13- or 20-words per minute code tests. If you held any class of commercial radiotelegraph operator license or permit issued by the FCC within five years prior to applying for an amateur radio license, you can receive credit for the 5- or 13-wpm code test. (97.25)

Under a more stringent condition, you can receive credit for the 20-wpm code test. You must hold a valid First Class commercial radio-telegraph operator license or any commercial radiotelegraph operator license containing an aircraft radiotelegraph endorsement. To receive credit for the 20 wpm test, you must hold this license at the time you apply for the amateur radio license. (97.25b)

Q. Is it possible to receive any credit toward the amateur written exams based on having passed commercial radio operator written exams?

A. No.

Q. Why not? I have a First Class radiotelephone license. The exam was at least as hard as the Amateur Extra exam is supposed to be. Why can't I get credit toward an amateur radio license?

A. Whether the First Class radiotelephone exam is harder than the Amateur Extra, or vice versa, is not clear. Some who have both licenses say the commercial exam is harder; others say the Amateur Extra exam is harder. What *is* clear, however, is that the exams are different; particularly the questions on regulations. The exams are sufficiently different that it is impossible to grant credit toward amateur written exams by virtue of having taken commercial written exams.

COMPREHENSIVE CODE EXAMS

Q. We keep hearing that the FCC is going to give code tests based on comprehension rather than the one-minute solid copy out of five that is now required. My field examination point is still conducting the old-fashioned type test. When will we see the new style tests?

A. The new comprehension style code tests have already been prepared by the FCC in Washington, DC; however, they have not yet been distributed to the FCC's field examination points. Right now the only FCC examination point using the new style tests is the one in Washington, DC.

Q. When will all the field offices be offering the new style code tests?

A. Our best estimate would be July 1, 1977.

Q. How will the new style code test work?

A. Under the "one-minute continuous-copy" code test, the examiner sends code for a period of five minutes. He then checks your copy to see if it contains one solid minute of error-free copy. You cannot pass unless you have copied at least one minute error free.

Under the new comprehension type test, the examiner would send a typical amateur message of roughly five-minutes duration containing such things as a signal report, type of rig, and so forth. During this time you may do what you wish: Copy down what you hear, take brief notes on what you hear, or simply lean back in your chair and take notes in your head. At the end of five minutes you will be given 10 questions to answer based on what you have heard. The questions will be of the multiple-choice type. If you took notes while the code was being sent, you may keep those notes in front of you. You must answer eight of the 10 questions correctly in order to receive a passing grade on the code test.

Q. Is the comprehension type code test harder or easier than the old style code test?

A. We can't say whether one type of test is harder or easier than the other. We feel, however, that the new comprehension test is more in keeping with reality than the "one-minute error-free" test. Few amateurs actually copy the code solid during a QSO; rather, they take notes on the content of the QSO. Also, many proficient cw operators can copy the code solid in their heads, but have a hard time putting the words on paper.

Results of the new type code test are promising, however. In some preliminary experiments that the FCC conducted to compare the old and new style tests, it was found that the failure rate dropped from 50 percent to 20 percent.

Q. Is it legal for a volunteer examiner to conduct the Novice code test using the comprehension technique: i.e., sending a typical QSO for five minutes, then giving the Novice applicant a 10-question multiple-choice test based on the content of the QSO?

A. Yes.

MORE ABOUT EXAMS

Q. How long do I have to complete a written exam at an FCC examination point?

A. There is no set time limit. You may take as long as you need, as long as you finish before the office closes for the day, which is usually around 4:30 P.M. As a practical matter, exams do not take nearly that long to complete. It shouldn't take you longer than an hour or two to complete each written element.

Q. What is an "element"?

A. There are four written examination elements (97.21):

2: Novice
3: General/Technician
4a: Advanced
4b: Amateur Extra

There are three code examination elements:

1a: 5 wpm
1b: 13 wpm
1c: 20 wpm

Q. If I already have a General class license, for example, and try to upgrade to Advanced, do I have to retake any elements I've already taken, or do I simply have to take the Advanced written test?

A. You will receive full credit for those examination elements that are contained in the class of license you already possess. This means that if you have a General class license and seek the Advanced, you need only take element 4a, which is the Advanced written exam. (97.25a)

Q. Do I receive examination credit for exam elements taken by mail?

A. Yes. And this applies to the Novice class, also. This means that, in particular, every Novice has credit toward the 5-wpm code test. If he wishes to upgrade to Technician, he need only take the General/Technician written exam (element 3). He already has credit for the 5-wpm code test. (97.25a)

Since July, 1976, the Technician exam has only been available at an FCC examination point. But if you took the Technician exam by mail before that date, you automatically have credit for the General/Technician written exam, and need only pass the 13-wpm code test to qualify for the General class license. (97.25a)

Q. If I fail a code test, what happens?

A. The exam ends at that point; you cannot go on to take the written element. However you may come back as soon as you want to try again.

Q. If I pass the code test and fail the written element, what happens?

A. Again, the exam ends at that point. In addition, you must wait a minimum of 30 days before you could try again. (97.33)

Q. If I pass the code test and fail the written test, will I receive credit for the code test?

A. No. The FCC has no provisions for granting such credit. You must retake the code test the next time you appear for examination.

*Asst. Manager, Membership Services Dept.

How's DX?

Conducted By Rod Newkirk,* W9BRD

Roasting and Toasting the Earless Wonder

Our pompous guest stood on stage flexing the biggest mouth we ever saw, and nothing at all where his ears should have been. Loda Watts, chairperson for this year's 25th annual DX Hoggery & Poetry Depreciation Society conclave, paused nervously for the tumult to subside in Long Hall. She had reason to be jumpy; a whizzing red-hot Rettysnitch had already removed her coiffure. The obese visitor took command with an a-m roar, discussing the octaphonic possibilities of running eight identical megawatt programs side by side on 7 MHz. Audie O'Mess shouted from the gallery:

An unstable ham from Verona
Went weird over fiery corona.
His sneaky black box
And a hairtrigger VOX
Soon fried him inside his kimono.

The guest loudspeaker next revealed that increasing power from 1,000,000 to 10,000,000 watts gives 10 more dB to the Music for Malpelo Hour. Otto Backitoff retorted from the floor:

We sigh as we file past the bier
Of lynched OM Gadgets von Shmear
Who, taking a snooze,
Kept calling CQs
With a hung-up programmable keyer.

Windbag, swelling indignantly, next discussed computerization involved in automatic QSY to the quietest part of the nearest amateur band. Y. B. Suchalid retaliated from up front:

For instance take Bigmouth McRaver.
You'll do all the locals a favor.
He gives us a pain
With excessive gain
And sounds like an old plug-in shaver.

Blimpy dodged two curare-tipped Wouff Hongs and boasted of a new jammer so powerful it doubles as diathermy for seven health resorts along the Sea of Azov. Osa Bigstack responded from the balcony:

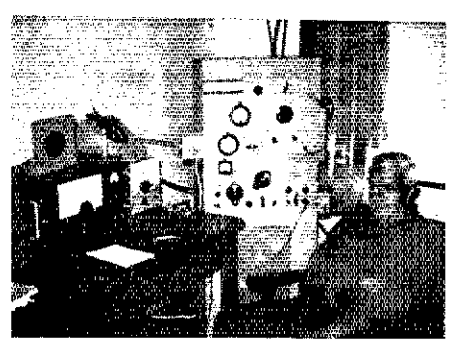
Promising cards to us all,
A rare one with plenty of gall
Demanded some pay.
We flew there next day
And thumbtacked the thief to his wall.

We should have held this DXHPDS meeting last winter. Our gassy guest's ancient-modulation arced over and burst him like a mammoth balloon, releasing enough hot air for an antarctic Field Day in T-shirts.

GETTING 'EM ON THE WALL

Like who needs sunspots? Crummy conditions notwithstanding, those pretty pasteboards keep bouncin' around. "QSLers of the Month" commended in correspondence from WØIYR, WAs 3LVR 4PSL 8FIO 9FFZ, WBs 4JKP 4WHE 5IOQ 7DUV 8ZRL and ØNOU for unusually swift and sure confirmational comebacks include A2CSD, C31JX, CE6EZ, CN8AD, CO7UPC, CT1s DY QN, CXs 1CF 3AL, DJs 2BO 9MH ØLC, DKs 3SN 6KH, EA8s BF CS, EI6CE, F6s BPF EFC, FC9UC, FG0CXV/FS7, FY7AN, G4FMI, Is 1APQ 1PIN 5IRM 7LMR ØAEH ØRRW, IK6POY, ISØBDO, JAs 1DFQ 1MCU 5EZL 5JGY 8ZO ØUH, JE1FFW, JH1WIX, JW2CF, KC4AAC, KL7s HHX IKA, KZ5s FR PDN, OH7YS, OK1MIN, PJ1AA, PY1SJ, SP5RH, TF3AX, TR8BJ, TU2FH, UA6HBC, UB5ZBB, UK2GKW, UV3NA, VE2AQS/TG, VPs 1FOC 1MPW 2LAW 2MOC 5A, VS5MC, W2HWS/VP2, WN5OOT/TG, YS1O, YU2AAY, ZSs 5JY 6ME, 4U1ITU, 7P8BC, 7SL6DO, 9J2BL, 9L1CD, 9V1SH and 9Y4VT, QSL aides W2GHK, K2BPP, WA6AHF, VE2KQ and DJ5DA. Any reliables we overlooked? . . . WA4GKR, WBs 5SBH and ØBAL offer to handle QSLs for overburdened ops at the DX end, the rarer the better. . . . We perceive confusion in differentiating Rhodes, Crete and the Dodecanese. The 18 inhabited Dodecanese isles include Rhodes. (SV1IG, RAAG) . . . I'm always amazed at the number of DXers who never convert their local times and dates to UTC. Their claimed QSOs are often impossible to find in my log. A very sharp postage rate increase here necessitates that QSLs received without sufficient return postage must be answered via bureau. Cards accompanied by one International Reply Coupon receive slow surface mail reply, those with two or more IRCs get airmail response. (PY1RO) . . . A six-month leave and abrupt transfer put 9J2BO far behind in QSLing. Patience, please. (W3CV, WB5NDE) . . . For QSOs on or after May 1, 1977, QSLs are welcomed direct to my St. Thomas QTH. Contacts in Canada and Mexico please include one IRC, those elsewhere one IRC for surface reply, two for air. (KV4CI) . . . Throughout the Bicentennial Year I answered all QSLs on a daily basis including cards from 1656 Russians. Glad to have WA6AHF take on my 1977 QSLing responsibilities. (KV4AA) . . . W2BZL is my QSL manager but I'll be glad to answer cards received direct if sufficient IRCs or appropriate mint postage are supplied. (VP2DD) . . . Sorry for delay in confirming my VP2MNR contacts. The printer lost my original order. (WA6VNR) . . . Not many QSL tenders can surpass W5JLU's 20-year performance as FY7YE's manager. (W8IBX) . . . Contrary to widespread misimpression I do not manage QSLs for VP2GLE. (K4GKD) . . . Note that ZS2MI, call sign for Marion Island's weather station, is not issued to individuals. We manage QSLing only for ZS2MI operator Piet's 1975-'76 QSOs. The next ham assigned duty there will make his own arrangements. (ZS6s BBF CE) . . . I'm inundated with cards arriving direct. Please QSL only via my manager, WA6CEB. (TU2EF) . . . K9CSM still holds logs for activity by MP4s BGR BGW BGY, SVØWM, YBØAAD, 9K2s CA CB CC, 9V1s OI and OX. (WA4JTI) . . . I regret that some of the gang worked a bogus 3D6AX last fall. Vic's been off the air since March, 1976. (WA5IEV) . . . Sorry — no connection here with portable-JW1 activity or other such misuse of my call. (WB8TLX) . . . I still confirm 1970-'75 DXpeditionary QSOs by DJ6QT from CT3 EA8 TY TZ XT ZD3 5T 5U and 5V locations. (DL8PC) . . . WB2MIC now takes over his own KG4EY QSLing. (WA2IRS) . . . Please correct the ZIP on my address in January's "How's" to 18966. (W3KVQ) . . . Kindly call attention to my new QSL-managerial QTH: P. O. Box 73, Edgemont, Pennsylvania 19028. (W3HNK) . . . Despite contrary indications I have no QSLing arrangements with VRs or other DX stations. (CE7BAL) . . . Operated KC4AAC from November 29, 1975, to December 2, 1976, and am quite busy confirming 17,000 contacts. My replacement in Antarctica is K7ODK. Cards for current KC4AAC QSOs by Fred are forwarded to me from his home address. My own KC4 logs didn't follow me north until March. (WB6KIL) . . . With the assistance of Fs 3AT and 8VJ I recently received confirmation of a

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

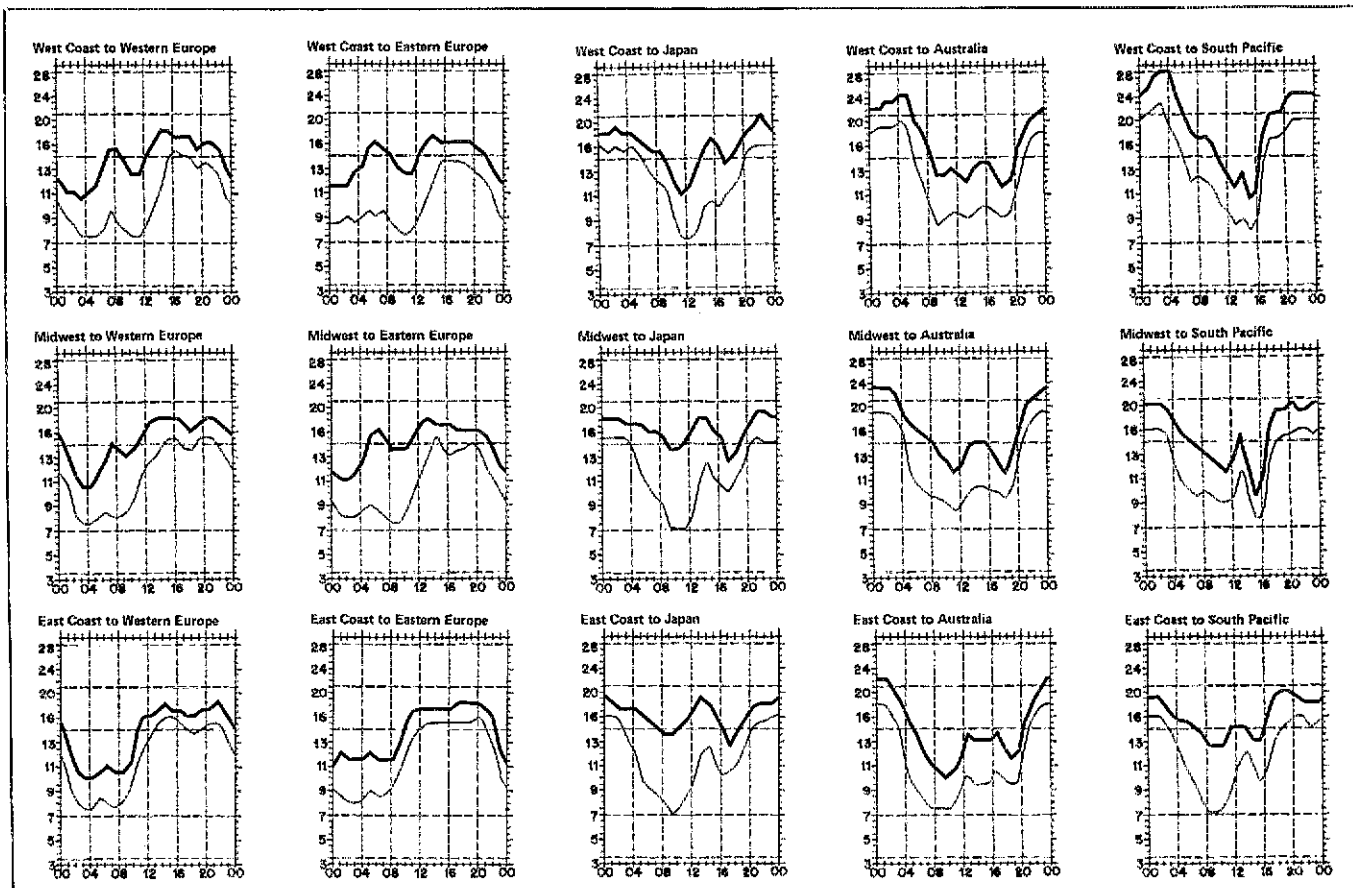


ZL1ABO, left, among New Zealand's foremost DX hunters, radiates potent rf from Wahai Beach. OM-XYL team ZL3s AAA and AAB enjoy DX life in Greymouth. ZL1HY, right, maintains high ranking on ARRL's DXCC Honor Roll. Alan, Ross, Zelda and Dave were among dozens of prominent DXers visited and photographed by VE3AUI on a recent worldwide tour.

1968 TT8AN contact. The latter's present QTH is supplied for your listing. (W4BRB) . . . QSLs for my 9J and 3B springtime action, suffixes unknown at writing, may go via NCDXF, Box 717, Oakland, California, 94604. (K4FOK) . . . WA7HRE will tackle QSLing for ZK1BA's latest Penrhyn-Manihiki strike. (WCDXB) . . . CF-CJ-CK-VC-VF prefixes emanate from Canada, suffixes usually unchanged. (DXNS) . . . C4AFW is said to be sporting a fresh Cyprus label near 3790 kHz at 2230 UTC. (WCDXB) . . . HZ1AB operators Bill and Joe want QSLs via K8PYD and WA4OQO respectively. Other ops may be reached through DJ9ZB. (DXNS) . . . Rig trouble at VR3AK held up log transmissal to KH6AHZ. No regular Fanning mail service. (WCDXB) . . . Note that QSLs for Northern Ireland, Scotland and Wales now may be routed through GI3HXV, GM6MD and GW3ANU respectively. (DXNS) . . . More WCDXB items: PY1CK battled 50 pounds of QSLs after his recent PY0ZAE Trinidad trick. K6AAR is responsible only for VP2LX contacts of 1972, no others. VK0AC's Macquarie contacts probably won't be confirmed until his return to the mainland in December . . . . 'Alp! Parenthesized colleagues hunt handy hints on coaxing cards from targets specified: (W0IYR) DU1POL '74, FR0BCS, PY0BXC, VP8MH, VU2MQF, ZS3XQ all '75; (WA3ERG) HCs 1KP '75, 2BL, TU2s AF '73, BR '72, WB5APF/KC4 '73; (WB4TCH) op Ferrell of old ET3USB; (WB4WHE for his TJ1AD DXCC) HAs 3KMA 9KOL 9KPU 9RT, JY5HCT, KZ5P1, LU8FEU, OD5HF, PA0ATY, PZ1AR, SQs 8AOV 9AWL, TI2KF, WA8UZZ/4X, 4Z4GG, 9J2EP, 9M2EE; (WB0NOU) FO8DF '74 and TF2AA. Any aid? . . . Now to individual recommendations but be mindful that each suggestion is not necessarily accurate, complete or "official" . . . .

OK1DDL needs only Oceania to complete her 160-meter WAC. Running the Czech 10-watt limit on 1.8 MHz, Dagmar has captured 32 countries. This is four less than husband Ludek, OK1HAS. *(W1BB photo)*

AP5HQ, STC, Kohat, Pakistan
CN8AD, P. Doche, 19 Rue Mausole, Casablanca, Morocco
CT2BZ, Lt. L. Bostic, PSC Box 102, APO, New York, New York, 09406
ex-CR7IZ, R. Graca, Rua Gomes Freire No. 7-6° Esq., Lisbon 1, Portugal
DA1UM/LX (via ON5NT)
DJ4LW/5A (via DJ2UU)
DJ7RU/5N2 (to DJ7RU)
DK4TA/OY (to DK4TA)
DK5EC/ET3, K. Schmidt, P. O. Box 5711, Addis Ababa, Ethiopia
DK0GD/ST (via DL9IL)
DL8PC, H. Lemp, An der Kirche 6, D-6364 Florstadt 6, West Germany
EL2s EN ET EU EV (via W3HNK)
EP2NQ, D. Jones (K5MM), 18 Kuche Erfan, Khiabani, Shah Abbas, Tehran, Iran
EP2RL, P. O. Box 496, Shiraz, Iran
F0s DAC/FC DAP/FC (via ON6s KL AP)
F8s ZI ZJ (via F8US)
FK0TX, R. Touzard, Box 320, Noumea, New Caledonia
FL8FF, SP-85018, Djibouti, T.F.A.I.
FM0COO, P. O. Box 619, Fort-de-France, Martinique, F.W.I.
FP8ZZ, P. O. Box 16, St. Pierre, St. Pierre-et-Miquelon Islands
G-GC-GD5AGA (to K4II)
HI8JAM/KP4 (via RCPR)
HP1KJ, P. O. Box 2000, Panama 1, Panama
I2DGG/5V, Box 1170, Lome, Togo
IC8HGZ, P. O. Box 18, Capri, Italy
IK0LYN/IS0 (via WA1VSJ)
JA1PIG/PZ, G. Usui, Box 1237, Paramaribo, Surinam
JE1TWG/S21, c/o Japanese Embassy, Box 458, Dacca, Bangladesh
JH1KSB/JD1, H. Fukushima, Yokokan, DD-102 Yukikaze, Nishi Henmi-cho, Yokosuka, Kanagawa, Japan
JX6LF, A. Munthe, Jan Mayen, c/o Den Kgl Norske Ambassade, Reykjavik, Iceland
K4II/AH3-6 (to K4II)
OE8PRK/YK (to OE8PRK)
OX3EA, E. Arnholtz, P. O. Box 1281, APO, New York, New York, 09023
OX5AB, Box 1282, APO, New York, New York, 09023
OZ3DX/SU (to OZ3DX)

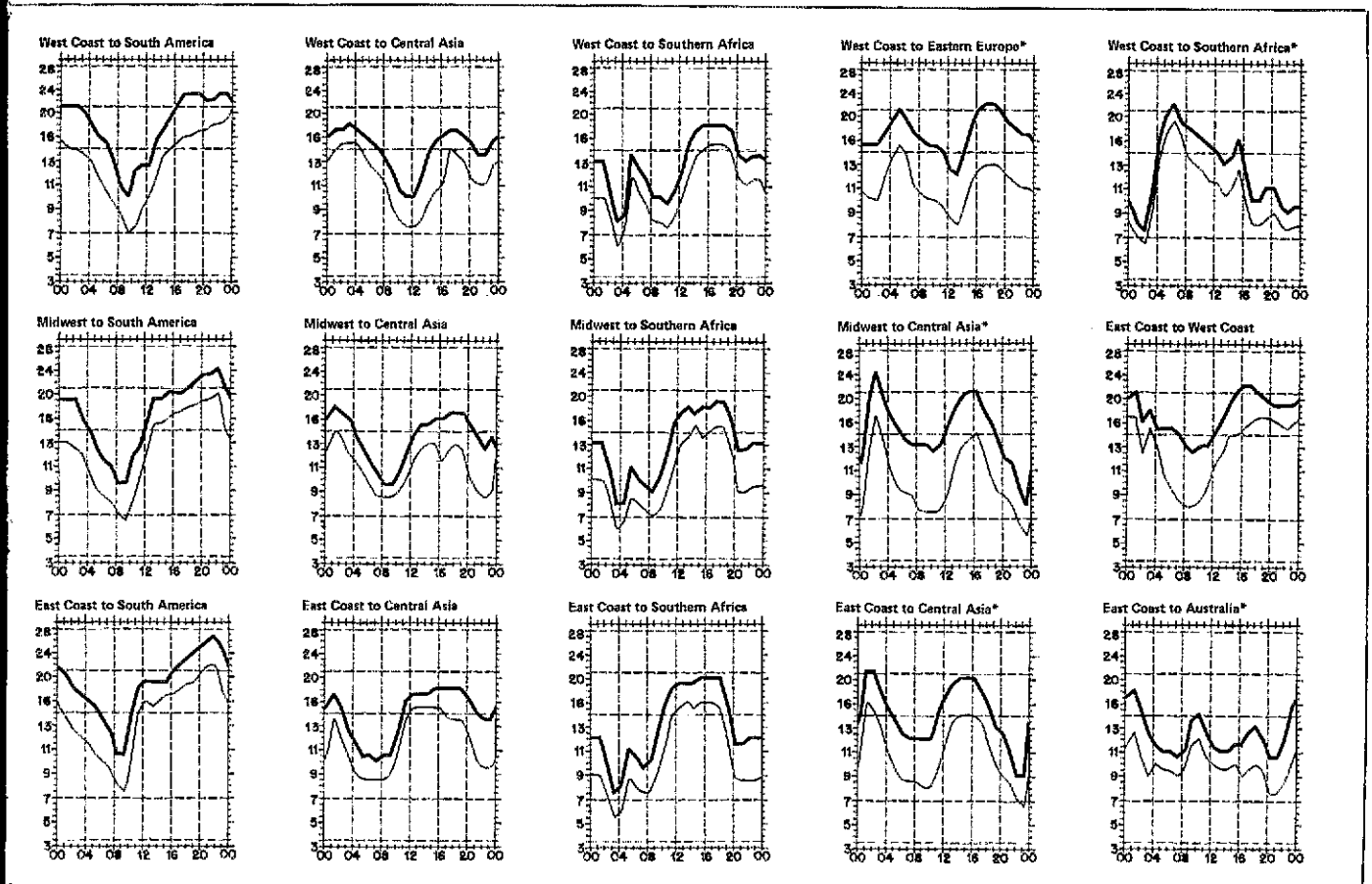


When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. On 50 percent of the days of the month, the highest frequency propagated will be at least as high as the upper curve. On 90 percent of the days of the month, it will be at least as high as the lower curve. See January 1977

PY1RO/5N2 (to PY1RO)
S8AAA, G. Laaks, P. O. Staff, Umtata, Transkei, South Africa
SM5DIC/SU (to SM5DIC)
SU1CR, M. Reda, 33A Sheikh Aly, Yousef st., Cairo, Egypt (or via WBØYFM)
SV1FT, N. Zamenes, P. O. Box 15, Chania, Crete, Greece
ex-TT8AN, G. Marchal, 19 Bis Rue de la Barriere, 54120 Baccarat, France
VE1APU/SU (via VE1NC)
VE2DQC/4X4 (via VE2YM)
VE3FXT/S8 (to VE3FXT)
VKØTB, D. Brain, VK3ADD, 40 Ann St., Dandenong, Victoria, Australia
VP2GCS, Box 447, St. Georges, Grenada, W.I.
VP8PJ, A. Cheshire (G4EEL), British Antarctic Survey, Port Stanley, Falklands
VR4DH, Box 654, Honiara, Solomons
VU2GW, Dr. G. Ranganathan, 3 Raja Krishna Rao rd., Madras 18, India
W7JXE/SU, F. Pector, APO, New York, New York, 09527
W9VNE/C6A (via W8TPS)
WA1TCG/LA (via WA1UZK)
WA6STC/KG6, R. Gustafson, Box 445, Agana, Guam
WA8TOB/C6 (to WA8TOB)
WB2IEC/S2 (via W2GHK)
WB6EWH/VQ9 (via WA4FVT)
WB6UAG/FMØ (via WA6AKK)
XE1OL, Box 60-626, Mexico, D.F., Mexico
XQ3ED, G. Torres, Casilla 13630, Santiago, Chile
YBØACT, N. Duxbury (K4CTY), U.S. Embassy, Box 1, APO, San Francisco, California, 96356
YN6ARC, W. Chow, Nicaragua Adventist Hospital, La Trinidad, Esteli, Nicaragua
YV1BCW, Box 515, Maracaibo, Venezuela
ZS6WW, O. Sweningsen (WA6QGW), P. O. Box 3191, Johannesburg 2000, South Africa
3Ys 1VC 3CC (via LA1C)

KV4AA made the Bicentennial Year memorable by dispensing 35,335 QSOs as AJ3AA. This is Dick's cw shack where a Viking kW is the workhorse; the adjacent ssb room sports another gallon. KV4AA has hammed for half a century after first firing up in the Virgins as K4AAN. Always in the thick of things, Dick performed as *CQ* DX editor for many years and served as president of DX-oriented Yasme Foundation. He's just as fast with QSLs as with QSOs. No other station's cards show up nearly so often in DX Century Club applications to ARRL.

6W8DF/TZ (via 5T5CJ)
9G1KP, P. O. Box 170, Tema, Ghana
9G1MD, Box 7271, Accra, Ghana
9G1MK, P. O. Box 1277, Kumasi, Ghana
9G1PL, P. O. Box 1332, Kumasi, Ghana
9J2s AB JN (via W3HNK)
9J2BO, B. Otter, Box 200, Chinsali, Zambia
9J2LM, P. O. Box 199, Luanshya, Zambia
ex-9K3TC, A. Schmidt, Turgaustr. 6, D-41, Oberhausen, West Germany
9L1CD, G. Persson, SM5CD, G. Tanneforsv. 90, S-58254 Linkoping, Sweden
9Y4OK, P. O. Box 714, Port of Spain, Trinidad
A2CBW (DK3KW)
A35SW (JA1BNW)
A4XGZ (WB4NND)
AD4II/AD4 (K4II)
C31KO/p (DB2PC)
C5AU (G3LQP)
C5AZ (OH2NB)
CK3UOT (VE3UOT)
CT9AT (OH2BAD)
D2ASW (K4UTE)
ELØAP (JA1VE)
EP2DD (K9YPW)
FØALN (K4II)
FØHX (G3ZXK)
FB8WE (F6APG)
FGØCSC (WA6VNR)
FL8KP (W3HNK)
FM7AQ (K4KQB)
FRØDCK (F6EQG)
FRØCYZ (F6ELJ)
FW8CO (F6AXY)
HH2EL (K6KII)
HI8MOG (W3HNK)
HI8SRH (W2KF)
ex-HKØBMO (YN8ARC)
HKØTU (LCR)
HL9TJ (K6VA)
HL9VA (WA2JFK)
HS5AKW (W9NGA)
HW6ADB (F6EEM)
HZ1AB (see text)
1A5AT (I2LPA)
1BØCBM (I2YDX)
IG9PLN (IT9ZGY)
JY9ER (DL8DC)
KC4AAC (see text)
KC4AAE (WØOOW)
KC6KO (WB2WSP)
KC6SP (KG6JFX)
KG4EY (WB2MIC)
KG4JS (WB5HGS)
KG6RI (WA7JCB)
KP4CDL (WA3JEM)
KV4IM (KP4BDL)
OA8AN (WA4ETN)
OE6HZG (W2VMH)
OH3XT/Ø (OH3XT)
ON7VT (ON6CK)
PAØSPD (W4JVU)
PA9AWG (WB9JEN)
PJ8JH (WA6VNR)
PJ8KG (WA6AHF)
PJ9AR (K2QBV)
PJ9CG (WA1JLD)
PYØFOC (PY7PO)
S79DF (ON6FN)
S79FC (ON4CH)
ST2RK (DL7FT)
TA2QR (W5QPX)
TR8CM (FØBYR)
TR8LE (W3HNK)
TR8MC (W2YY)
TU4AK (W6VZA)
VK3ART (W2NHZ)
VK9ZM (VK4ABW)
VKØAC (VK3ZQK)
VKØLD (VK2RS)
VKØRH (VK5WV)
VP1E (DL1JO)
VP1EK (DL1JW)
VP1HE (DL1JW)
VP1KS (DL1KS)
VP1RS (G4BEW)
VP2AZB (RSGB)
VP2DD (W2BZL)
VP2GJI (WA2BJI)
VP2GWM (W8JUY)
VP2LDT (K7VPF)
VP2M (VE7BXG)



QST, page 58, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions for May 1977 assume a sunspot number of 15, which corresponds to a 2800-MHz solar flux of 75.

DX Century Club Awards

Administered by David Newkirk, WA1VCG

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. But there's more — you can endorse your certificate in 20-country increments through 240, in 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from November 19 through December 31, 1976. Think you may be ready to qualify for DXCC? Write Headquarters for details.

New Members

Mixed

KP4DHD/292
I6POY/209
W9LXU/203
K8ETO/179
W9HR/160
IT9TNO/151
W1DLF/141
W4MWT/141
W9OWZ/136
DK5VO/135

JR1URH/131
K2OIX/131
W8JO/130
I7LMR/126
PAØHVZ/121
LU3HAK/121
LX1XL/121
WA4YDR/121
WB2MJJ/119
KS6FG/116

DK5ML/110
DL7UX/110
JR1FYS/110
WA1TAI/110
WA4WCG/110
DK5TI/109
OH5AB/109
WB9QJA/109
I5IRM/108
JR1FCT/108

DK6OZ/107
WA2OHN/107
F6BWA/106
OZ9PP/106
WA1KOC/106
WA3KCY/106
WA5CVQ/106
JA7DLE/105
KJ6DL/105
OK1FAE/105

WB4TEL/105
W6NDS/105
HA8DZ/104
JA2PJJ/104
K1HKF/104
W4TYE/104
W5PPS/104
YO6ADM/104
K1KRY/103
VE2ABX/103

WA2ZRI/103
W3IBL/103
DL9WS/102
K3PCQ/102
PAØFNB/102
VE3GCL/102
W2IAM/102
WB4AVG/102
I5XRP/101

K4BIY/101
W3FAE/101
WA4JJW/101
WB4HOK/101
W5VIW/101
JA3CJO/100
JA5BZL/100
KP4EBQ/100
WA1QNF/100

W2SEC/100
WA3THD/100
WA3TXV/100
WA6QFU/100
WA7LDZ/100
WB8PCN/100
WB8TZF/100
W9HPP/100
WAØEWU/100

Radiotelephone

I3LBW/216
I7RNH/210
KP4DHD/210
W9LXU/199
PAØEHF/197
I6POY/196
K6UD/193

W7BG/163
WA2RPN/147
CP6EL/145
4Z4MQ/140
W4MWT/138
DK5VO/135
WØIUB/131

F6BOR/130
W2EDE/126
I2GGC/124
PAØHVZ/122
W7YEM/116
ZF1MA/113

I3ABI/110
JA3CHO/110
WA4QMQ/110
K8ETO/109
DK5ML/107
I6WOL/107

F6DWE/107
HC1WW/106
K7DXD/106
OE1SBA/106
WA5VUW/106
EL7F/105

K2AHL/105
I2KQ/104
G2DF/103
I2YCF/103
JA6BMR/103
JA7SPJ/103

SM4ACH/103
K9BQL/102
W6MJM/102
CT2BL/101
K2CTJ/101
W4DZZ/101

F2ME/100
G4CVZ/100
KØIET/100
WA5CVQ/100
WA6SGB/100
W9MMZ/100

CW

K4EZL/114
VE3IR/114
AC6PT/111

JR1URH/111
DL1HH/110
W7WN/109

K8ETO/106
W7YTN/106
DJØYD/104

W4TYE/104
W6YKS/104
DJ7CX/102

K8CW/102
K9KWK/102
WØFHE/102

I6POY/101
VE3DCI/101
WA1SSH/101

W2IBZ/101
WB2MJJ/101
VE2EGC/100

WA4DBG/100
W6ISQ/100
W9HFN/100

5BDXCC

JA1ELY JA1EOD W3EPR JA2AN HB9AOO

Endorsements

Mixed

W1SP/324
W1VG/319
WB8HAT/315
W5DRW/312
WB2NYM/307
I7HH/304
WB6APX/304
W5IJW/301
DK3GI/300
W1AM/300
K5FVA/300
K4RA/299
WB2AMO/291
K6DT/291
W4KN/290
DK9FB/282

I2FO/282
WA1SSH/281
OK1ZL/278
DJØYD/273
DK3LP/273
WA8RWU/270
YU1NYP/270
K8CW/268
YU3OV/267
YV4BK/265
W2TXB/260
WB6RIU/259
K8KAE/257
IT9PUG/256
WA5YMW/255
WØIUB/255

W8GIO/254
W1CNU/253
VE7BZC/251
IT9WGI/250
PY5YC/250
WA4BTC/250
HB9AQW/249
K9KWK/247
K5DUT/240
YU3ZV/234
W6VW/233
K9UTN/223
OK1DH/223
PAØEHF/223
I1SBU/221
K9HQM/221

XE1FR/221
OZ4FF/219
W7DV/219
JA4XH/210
JH3DAE/207
W7LR/205
K6QHC/204
K4JPD/203
DK3VV/202
I8RFD/202
VE5RA/201
W1YN/200
K4WVT/200
W4WXZ/200
WB4ZTI/200
K6CBL/200

W8PBO/200
WB8IGU/200
W9NGA/200
EA7CP/199
W9NQW/192
W9ESQ/190
W4AQT/188
WA1CQW/184
WØMHK/181
KH6HC/180
WA4JTI/180
EA3RF/179
K3QIO/179
WBØEZQ/179
KØSVW/175

YU4EGZ/170
JA8SW/164
K2GI/163
YU1GMN/163
JA1MUZ/162
DJ1QX/161
JA1VE/161
K2GAT/160
W2BDE/160
W2HAZ/160
W8CTR/160
W4BV/160
WAØFBQ/160
WØOUE/159
WBØHOG/159

W8BNF/158
F6CLH/150
K1HMO/149
W3GTL/149
K1LMS/148
K1WVX/147
F6DBX/146
WB4ADT/145
WB4YFF/144
JR1TNE/140
VE3HLC/140
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VP2MDV (VE2DDV)
VP2MNK (WAØONK
VP2MXW (WB4PXW)
VP2SAA (W4UG)
VP2SZ (WB8OBA)
VP2VCU (W9QDA)
VP2VDK (KP4BDL)
VP5CNL (W8CNL)
VP5LDH (WB8LDH)
VP5MB (K1ALP)
VP5NG (K1AA)
VP8PL (G3LIK)
VQ9RB(G3LQP)

ex-VR1AA (GW3HCL)
VU2MKP (VU2ARC)
VU7ANI (WA3HUP)
YB4ACJ (K7LAY)
YBØACP (K6MQG)
YV4BK (W2GHK)
ZD8C (KP4EKI)
ZD8W (WA4TLB)
ZE4JH (WA4UPR)
ZF1RD (W4BAA)
ZK2AT (K3RLY)
ZL2BIY (K4II)
ZL5AL (ZL3RK)
ZS2MI (see text)

ZS3KC (WA4MAV)
3D2DK (VK8OM)
3D2IC (JA1BNW)
4S7DR (W2AWJ)
4S7WP (F6CRT)
4W7KM (DB7KM)
5B4DI (WA4APD)
5B4DP (SM4HQO)
5N2WBF (5N2NAS)
5T5JD (W3EVW)
5V7AR (F6ACB)
5W1AT (WB6DXL)
5Z4NI (SMØKV)
5Z4RT (DJ3NG)

6W8A (WA3NCP)
6W8AK (F6AXP)
6W8FOC (DL1RK)
6W8LF (WA4ETN)
7P8AY (K3TUP)
ex-7Q7HR (G4EDZ)
7X4MD (W5DDJ)
7X5SB (F6AXY)
7XØBI (YO8AHL)
805AH (A2CAH)
8P6GN (WB8BTU)
8QØA (I2AXC)
9J2JX (I8JN)

9J2WS (W4RF)
9K2EP (SMØDJZ)
9K2FN (DJ9ZB)

9L1AP (I3SCO)
9L1MD (G3TEJ)
9X5RK (WB4ZTI)

These are yours thanks to contributoria
teamwork by Ws 1CW 3CV 3HNK 4BR
7LLM 7NQ 8IBX, Ks 4PI 5MM 8CSG 8MFO
WAs 1SQB 1STN 1VCG 2RIS 3LVR 4ET
4JTI 5IEV 8FIO 9FFZ, WBs 4TCH 4WH
5IOQ 5NDE 6DXL 6KIL ØNOU, EP2NQ
F8VJ, I2CBM, JA1BNW, SV1IG and DJ
newsletters to be gratefully credited subse
quently.

HONOR ROLL

The call signs of DXCC participants who have come to within 10 countries of having worked all 321 countries currently on the DXCC List comprise the DXCC Honor Roll. The number after each call sign indicates each op's grand total when countries deleted from the list are included. The next HR is scheduled to be published in September, 1977, for submissions received through June.

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WA4WIP/329
K5JEA/339
W6EUF/328
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W9QLD/322
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Correction for the September, 1976 Honor Roll: HB9MX should have been shown at 313 in the Mixed listing with 335 before deletions. Corrections for the DXCC Annual listing of December, 1976: in the Mixed listing, add K5FKD 300, K6IR 285, K9VQK 281, WA7HRE 139. In the Phone listing, add PY2PC 324, WA1NSJ 140, W3KVS 258, WB4NXR 162.

Silent Keys

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

K1DUJ, Theodore J. Yusko, Washington, NH
W1LVR, H. Victor Stenbeck, Scituate, MA
WA1MKU, David B. Barry, Needham, MA
WN1RVA, Donald W. Kilbrith, Orlando, FL
K1URQ, Frederick E. Fields, Essex Jct., VT
W2CDA, Albert Kennyhertz, Roselle, NJ
WA2EEF, Edward V. Kluss, Rochester, NY
WA2ENP, Arthur G. Reichert, Huntington, NY
W2FNK, Harold F. Winter, Westfield, NJ
WA2GSU, Lawrence A. Labelle, Penellville, NY
W2HUW, Elizabeth W. Bumby, New Brunswick, NJ
K2KAN, Park E. Robinson, Paramus, NJ
K2PBE, Edith M. Appell, Hudson Falls, NY
W2WRF, Nunzio N. Iacino, Forest Hills, NY
W3HI, William S. Ridenour, Coraopolis, PA
K3HMJ, Lloyd A. Thomas, Shamokin, PA
K3JM, Van Turner, Milford, DE
W3KLA, Harold W. Wilcox, Baltimore, MD
W3SJB, Richard H. Gridler, Scottdale, PA
WB4AEO, Jesse "Ed" Dodd, Jr., Abbeville, AL
W4DXG, Joseph B. Bullock, Black Mountain, NC
W4EZR, Lester C. Morrell, Arlington, VA
K4JKH, Edmund W. Burroughs, Vero Beach, FL
WA4KMY, Stephen J. Penzick, Miami, FL
W4NF, Kenneth S. Norquest, Doraville, GA
WA4PZB, Ronald E. Seats, Snellville, GA
W4RWT, John M. Morel, Dania, FL
K4SEF, Arnold Garcia, Miami, FL
WB4SWP, James J. Munday, Memphis, TN
WB4VCO, Fred O. Wilson, Memphis, TN
WB4WQM, Dr. Morris Rosenberg, Plantation, FL
W5EQA, Conrad F. Harington, Little Rock, AR
W5FSA, Louis F. Hargus, Jr., Slidell, LA
W5GMM, Thomas E. "Bump" Humphrey, Jr., Huntsville, TX
W5GZU, B. Forest Gammon, Bonham, TX
WB5PHI, Donald E. Page, Roland, OK
W5SIG, Lloyd A. Burrows, El Paso, TX
WB5SSC, Joseph Newchurch, Metairie, LA
W5TOJ, John A. Davis, El Paso, TX
K5TZJ, W. A. "Doc" Curry, Houma, LA
Ex-6BMF, Tom Richardson, Walnut Creek, CA
K6BZQ, Richard P. Partin, Manteca, CA
W6DIT, Dr. J. Sloan Berryman, Santa Monica, CA
WB6ETB, Paul W. Tipton, Torrance, CA
W6EQZ, Harold W. Steinmeier, Ontario, CA
W6HGW, Thomas O. Crow, Sacramento, CA
Ex-6HZ, Harold H. Hoffman, Carmel, CA
Ex-W6KTM, Francis A. Harvey, San Diego, CA
WA6KUD, Lonnie K. Brewton, Merced, CA
W6NGV, Harold S. Ayers, San Francisco, CA
WB6OCT, Jay B. Moore, Carson, CA
W6OTK, Clarence R. Bismack, Yucaipa, CA
W6QKY, Lawrence L. Current, Redlands, CA
W6SCT, Glyn V. Smith, N. Hollywood, CA
K6TRT, John R. Durham, San Diego, CA
W7BPV, B. Nealley Wood, Portland, OR
W7GLL, Louis F. Kruse, Jr., Sierra Vista, AZ
W7HWY, Ralph D. Berkman, Seattle, WA
K7IOI, James P. Reinoehl, Eugene, OR
K7PRE, Max E. Jennings, Spanaway, WA
K7URN, Harry T. Randle III, Layton, UT
WA7WGF, Harold A. Iverson, Buffalo, WY
Ex-W7YPN, Henry N. Bouchee, Livingston, MT
W8BSR, Leonard F. Strobel, Cuyahoga Falls, OH
W8FZJ, Dana M. Bailey, Newton Falls, OH
W8IJV, Warren Bauer, Columbus, OH
W8LMZ, Richard L. Butler, Farmington, MI
WB8RYK, Gilbert E. Borg, Southgate, MI
W9BGF, Delbert B. Stifle, Paxton, IL
W9EVJ, Lloyd E. Hopkins, Elgin, IL
W9FSY, James DeHaan, Chicago, IL
WA9LEA, Herschel C. McKenzie, Indianapoli IN
K9LZN, Joseph L. Plotner, Kokomo, IN
W9MBN, Edward D. English, Chicago, IL
W9NIX, John J. Lehman, Chicago, IL
W9WGY, John H. Catherwood, Springfield, I
Ex-W9WTF, Roy L. Switzer, DeKalb, IL
WØBUI, Robert W. Collier, Colorado Springs, CO
WØCEA, John C. Fisher, Chisago City, MN
WØDMY, Ellis L. Butcher, Hebron, NE
WØHQT, Ralph E. Sargent, Arvada, CO
WØJEA, Herschel E. Satterfield, Greeley, CO
WØLHX, Melvin L. Breeden, Leavenworth, K
KØONT, Leonard W. Caverly, Fargo, ND
WØPBX, Clifford H. Horne, Miltonvale, KS
WØUJS, Charles S. Sterne, Denver, CO
VE1DM, Stanley H. Appleton, Glace Bay, NS
VE4HS, Harold J. Simpson, Miami, Manitoba
VE6TK, Duncan C. Davidson, Calgary, AB
VO1DV, J. H. "Jack" Tarrant, St. John's, NF
VO1GO, Llewellan Samms, Deer Lake, NF
VO1MO, William Lyall, Baie Verte, NF
ZL1ARO, George Currie, Ngatea, New Zealar
G8HX, Frank N. F. Bewley, Notts, England
JY1XYL, Queen Alia, Amman, Jordan
JY3BZ, Bader Zaza, Amman, Jordan

50 Years Ago

May, 1927

□ At its first meeting the new Federal Radio Commission extended the terms of amateur operator and station licenses, but the "Amateur Extra First Grade" has been eliminated. The Editor warns that new regs require us to stay in band, and 1BD shows one way – calibration of harmonics from a b.c. receiver.

□ RCA's new 852 transmitting tube looks like a winner – 75 watts output with grid and plate leads separate from filament socket area to prevent flashover; wonder how much power it will *really* take?

□ Harold Westman designs a compact little rig with a pair of UX-171s – not much power, but its self-rectifying system produces a tone less irritating than r.a.c. and really "pleasing to the ear."

□ Our hero on the cover is poring through *QST*s and other literature pondering the move to crystal control, now that we have all these new "strict" regulations.

□ R. Preece claims minimal distributed capacity and low r.f. resistance for his two-turn loop receiver but makes no mention of directivity.

□ With the trend to cleaner notes continuing, S. E. Hall of Prestolite describes the factors of solutions, heating, leakage and counter-e.m.f. in electrolytic rectifiers.

□ 1AY points up the need, particularly for Official Relay Stations, to be operational at all times and shows some examples of emergency and back-up gear.

□ 1NF, Art Erickson, is a subject of this month's station description – 650 volts of raw a.c., but loose coupling to the antenna to achieve a steady signal.

25 Years Ago

May, 1952

□ Yippee! After a five-year wait, required for the complex task of moving established commercial stations out of the segment, we finally get 21,000-21,450 kc. as a brand-new amateur band. But all is not peaches and cream – TV manufacturers, despite forewarning, have their intermediate frequency smack in that band segment, and things are going to be hectic.

□ W5CSU makes an exhaustive analysis of the 75-meter vertical – concluding that it is a good daytime antenna as well as for DX at night, and if you have the room and the gumption to install the necessary radials, it might be for you.

□ Some of the lab tricks of chassis layout, scribing, drilling and such are described by W1TS.

□ Alignment of a linear amplifier is still a headache for most of us, and W2NJR smooths the path with extensive descriptions of two-tone and trapezoid tests on a scope.

□ Potomac Valley nosed out Frankford in the spirited SS club competition last year, even with W3BFS and W3DGM in second and third place nationally, and W4KFC only in fourth.

□ Copy the Armed Forces Day message perfectly and you'll get a certificate of merit from the Secretary of Defense.

□ W5OME has two extra elements to mount, while stationary, on his car bumper to form a 3-element beam on 10 meters.

□ Staffer W1FTX packages a 50-watt c.w. rig in a cabinet not much larger than his QSL card dimensions.

□ Chairman Coy of the FCC, in testimony before Congress, says hams should get a Congressional Medal of Honor in communications, if there were one. – *W1RW*

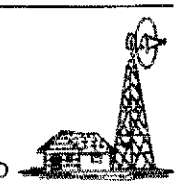
Strays

On a recent weekend of promoting amateur radio with the ARRL exhibit at Trumbull (CT) Shopping Park, members of the Greater Fairfield Amateur Radio Association met the public, answered questions ("No sir, we're no exactly CBers!") and distributed literature on hamming. Caught by W1BVO's camera are, from left, WA1YOF, WA1YMA, W1HEO WA1YFO, WA1RUB and WB1BSF. – *W1HE*

□ The Naval Electronic Systems Comman Amateur/Navy MARS Station W4USN NNNØNMC in Arlington, VA, will be i operation May 21 to commemorate th Armed Forces Day Communications Tes Operations will be conducted from 1400 t 2100 UTC on or near the frequencies 7230, 14300 and 21375 kHz on ssb and 705 and 14090 kHz on RTTY. Visitors in the are will be welcome at the station located i National Center no. 1 Building, 2511 Jeffe son Davis Highway.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO



More Excitement Ahead

In the spring on 1935, 5-meter operators were startled to hear signals from 500 to 1,200 miles away burst in on their local QSOs. Since that time, sporadic-E propagation has fired the imagination of most vhf enthusiasts. It has provided the main source of 6-meter DX and, in the last few years, has become a significant factor in boosting state totals for many 2-meter operators.

Another sporadic-E season is now upon us. Once again, our 6-meter band will resound to signals from stations thousands of miles away. More 6-meter operators will complete contacts with their last few states, swelling the WAS ranks. If the luck of last summer and winter continues, Es excitement will not be limited to our lowest frequency vhf assignment. Inhabitants of 2 meters may also share in the thrill of S9+ signals suddenly appearing from stations a thousand plus miles distant. Even 1-1/4-meter devotees may be in for a treat. But more about that later.

The ultimate range of Es is an open question. Although it is quite well established that the so-called single-hop distance for E-layer propagation is about 1,350 miles, we do not know how many hops are possible. So called double-hop range appears to be limited to around 2,700 miles. WA1OUB pointed this out in a letter last summer in connection with the lack of propagation from KL7HLE, Juneau, AK, into New England at a time when Vince was contacting OH and MI stations. On the other hand, European stations were widely worked on many evenings during last June, July and August on 10 meters. This apparently was sporadic F, normally called short skip by 10-meter operators, of more than two hops. Another case of extreme distance probably caused by multiple-hop Es, occurred on February 11, 1977, when several stations in the San Antonio, TX, area barely missed QSOing KH6IAA, Hilo, HI, a distance of 3,600 miles.

In an effort to collect data on extreme range 6-meter sporadic-E propagation across the North Atlantic, the International Amateur Radio Union is planning an observation program in support of which it is proposed to set up a 50.1-MHz beacon on the French Coast. In addition, a Canadian station, VE1SIX operating on 50.088, will transmit toward Europe. Coordination and collection of reports on the European end are to be handled by F8SH. On this side of the pond, Ed Tilton, W1HDQ, will be in charge of distributing and gathering results. Those interested in participating should contact Ed at League headquarters. Actual start-up of the program will be announced on a W1AW bulletin. This IARU-sponsored activity should provide a fine opportunity for radio amateurs to demonstrate anew their unique ability to contribute to the fund of man's knowledge of the complex subject of radio wave propagation.

Another unanswered question is the upper frequency that can be propagated by intense ionization in the E region. We know that TV Channel 13 has been observed on quite a few occasions, including last February 8 when WA5IYX San Antonio, TX, received signals on that channel emanating from Sioux Falls, SD. The upper end of Channel 13 is 216 MHz, very close to our 1-1/4-meter band. It appears certain that signals on that band can be propagated via sporadic E, but no 1-1/4 meter Es QSOs have ever been reported. A concerted effort to attempt 220-MHz contacts via the E layer certainly appears worthwhile. Not only would success be an exciting and rewarding experience for those involved, but it might also help in defending this and other bands from attacks by commercial interests.

How should one go about looking for 1-1/4-meter "E skip?" First assemble a station which can give a reasonably good account of itself. A transmitter producing 50 to 100 watts or more, along with an antenna system exhibiting 10 to 15 dB gain, should be sufficient. Much activity on the band these days is on fm so that mode should not be ignored. The national simplex frequency is 223.5 MHz, so that channel would appear to be the best place to concentrate fm efforts. Monitoring the outputs of various 220-MHz repeaters for an indication of band openings would also be useful. Consult the *ARRL Repeater Directory* for these frequencies. For cw, ssb and a-m operation, a frequency near the low end of the band would be best. Let's designate 220.050 MHz as the spot to call and listen. To determine when conditions may be favorable, watch 6 and 2 meters as well as the TV channels through 13. Then, get on and make some noise. If everybody is listening, nobody will work anyone.

While on the subject of sporadic E, we must acknowledge the work done on the subject by Mel Wilson, W1DEI/W2BOC. Mel has collected and interpreted literally hundreds of thousands of pieces of data over the past 40 years. His two-part *QST* article, "Midlatitude Intense Sporadic-E Propagation," which appears in December 1970 and March 1971 issues, provides an insight into this very complex subject. We can all help Mel continue his work by sending him detailed reports of Es conditions for all bands. Reports should include such important facts as stations worked or heard and their locations, if known, the exact time, signal characteristics and beam headings for maximum signal strength. Address Mel at 17 Van Cortland Dr., Pittsford, NY 14534.

No discussion of sporadic E would be complete without also noting the tireless data collection job by Pat Dyre, WA5IYX, of San Antonio, TX. Pat's reports appear frequently in this column and are very helpful in putting into perspective the many other accounts received.

As 5- and 6-meter pioneer Vince Dawson, WØZJB, was fond of saying, "CU all of a sudden."

ON THE BANDS

6 Meters — Following the pile of reports for early February, mail listing DX for the latter part of the month is very sparse, indeed. One exception is reported by WB4OSN, Margate, FL. Joe tells of receiving the TI2NA beacon with signals ranging up S9+40 for an hour the evening of March 16. Attempts to attract Eric's attention on 50.150 were in vain. As is usually the case during the "slim pickins" portions of the year, scatter again comes to the fore. One who is taking advantage of the reliable propagation offered by this mode is WA3HGX/2. Vince finds that he can work into the deep South as well as the Midwest any time that stations are on. He states that he is on about 50.108 Friday and Saturday evenings from 2300 eastern time until about 0130 the next morning. Those wishing schedules can write him at 105 N. 26th St., Camden, NJ 08105. Incidentally, Vince recommends that ARRL sponsor a 6-meter contest. He feels that it would help fellows along with their 600 Club Award. The SMIRK contest may fill the bill, Vince. Open to SMIRK members, it will be held from 1300 UTC June 5 until 0500 UTC June 6. An s.a.s.e. to K5ZMS, 7158 Stone Fence Dr., San Antonio, TX 78227 will bring rules and log forms. Two stations looking for scatter skeds are WB9EDP Chicago and WAØMRH Omaha. The latter has just completed his new installation consisting of a kW into a stacked six over six at 60 feet.

WA3ZRE of Philadelphia informs us that he is running an attended beacon on 50.2 from 2100 to 2130 UTC and during most evenings. The above-mentioned VE1SIX beacon, or "propagation study transmitter" as the Canadian DOC apparently prefers to call it, will be aimed toward Europe but should provide enough signal to enable U.S. and Canadian stations to spot band openings to the Maritime Provinces. The frequency will be 50.088. At first, operation will be from the QTH of the station's builder VE1ASJ but later the equipment will be moved to 858-foot Bloomsbury mountain.

In the DX department, K5ZMS informs us that FO8DR is still on 6 and is just waiting for favorable conditions. He has not made any contacts in the last two years but he did hear the KH6EQI beacon and some TV Channel 2 activity last September. He will initiate regu-

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

lar 50.110 cw transmissions beamed toward the U.S. during even days of each month. On odd days, the same transmissions will be beamed in the direction of Japan. Another 6-meter stalwart in the DX realm is HL9WI. Always optimistic, Bill will be looking toward the States during the SMIRK and ARRL contests. He is also continuing his effort of many years to work KL7HAM on Shemya Island in the Aleutians. Speaking of KL7s, KL7IFP in Ketchikan is very active on 6 meters with 120 watts from a homebrew pair of 6146s to a four-element beam. The antenna will soon be expanded to a four over four to help John garner Es and scatter contacts this season. In addition to ssb and cw activity around 50.110, he plans RTTY work at 50.150. John is also on 2 meters and OSCAR with a TS700. On 2 meters, he has worked as far as 250 miles to VE7DRF in Sandpit, BC. He would like to build an amplifier for that band but needs some help with parts. When 6 is good for sporadic E, don't forget the possibility of a 2-meter opening, John. An fm broadcast receiver makes a good monitor for indicating when conditions might be favorable.

For those who haven't already gotten off to a good start on the ARRL 6 Meter 600 Club Award, now as the Es season is beginning should be a fine time to do so. An s.a.s.e. to Headquarters will being complete rules and an entry form.

Many of the gang know of the terrible fire which wiped out everything at WA5YOU and badly burned Charlie's XYL Wanda, WB5NIF. The home and radio equipment are now replaced and Wanda is recovering. They both would like to express thanks to everyone who helped when their need was great. Charlie asks one more favor. Since all their QSL cards were destroyed, they will have to start all over again unless they can get replacements. Therefore, everyone who has worked WA5YOU or WB5NIF is requested to send duplicate cards.

I am sorry to report that one of those who put Newfoundland on the 6-meter map in recent years is a silent key. Bill, VO1MO, has been killed in an automobile accident. We also wish to acknowledge the passing of another well-known 6-meter operator K1HFK.

In the new-call department we find Connie, K5WVX, who now sports K5CM.

2 Meters – Aurora has been rather scarce this year but nevertheless there has been some. The evening of January 30 was apparently the best session according to reports received. Unfortunately, in an attempt to cover the rash of Es activity in early February, accounts of aurora contacts had to be left out of last month's column. K9KQR's log provides a good overview of the January 30 affair. Dick, from his QTH near Chicago, worked W0KRX, W0ONM and WB0SJJ all MN; K0DAS IA; WA0CHK MO; W0EMS and K0PAY MB; K8III OH; VE3FVN Ottawa and WA2PKY NJ. Dick says that he was glad to hear some of the gang above 145 take advantage of the opening. In the same session WA1OUB from Hillsboro, NH, hooked up with W2ROA, WA2BIT and WB2DNN all NY; WA2CJK/4 VA; K8III OH; WA8NLC and K8HWW MI; K9MRI and K9SLQ IN; W9YYF IL as well as VE1RG.

On the EME front, a very nice letter from SM7BAE fills us in on 2-meter moonbounce activity in Sweden. Kjell states that he is using an antenna consisting of 10 16-element Yagis. Other Swedish stations active on 2-meter EME are SM6CKU with four 16-element KLMs, SM5FVH with an 80-element Cushcraft collinear, SM7CRO with four 13-element Yagis and SM3AKW who uses a 48-element collinear. SM7BAE indicates his willingness to schedule any moonbouncer at appropriate times. Those interested may write to him at his *Callbook* address.

In the South, at least, tropo continued throughout the winter months. W5UWB of Kingsville, TX, southwest of Corpus Christi, lists February 17, 21 and 25 as being particularly good. On the last of these days, Jack managed to pick up three new states by contacting WA4CQG AL, WA4KCL GA and WA4CRU TN. Although the GA and TN stations were fairly weak, WA4CQG was S9+ and W4CSS in FL was 20 over. These are only a few of the stations Jack worked on this occasion. Quite a few of them were in FL which is not surprising since, according to WB4JVZ, there are now more than 200 2-meter ssb stations active in the Sunshine State. Of these, about 15 have high power and big beams and five are working toward moonbounce capability. On the February 25 opening, one FL station WA4QHE in Largo worked several TX stations, two in LA and K4GMP Wilmington, NC. WB4JVZ accounts for that opening as the tail end of the high-pressure area that followed the severe winds and dust storms which ripped through the Midwest a few days before. Incidentally Jim's station is one of those nearing EME capability. Being a Technician, he must operate above 145 MHz and hopes that the EME boys will look for him there when the time comes.

One new convert to 2-meter ssb, W5UCY of Pascagoula, MS, says he's having a ball with his Multi 2000 since getting on the band February 15. Between then and March 6, Lowell caught six good openings and worked nearly 40 stations from Sunshine, TX, in the Rio Grande Valley to Miami Springs, FL. Not bad for 10 watts and a small beam.

Quite a bit of mail has come in asking why an award similar to the 6-meter 600 Club cannot be setup for 2 meters or for all of the vhf/uhf bands. One person making such a suggestion is KH6BZF. Another with a similar idea is W5JTA of the SWOT group. The VHF/UHF Advisory Committee (VUAC) was established to tackle just this kind of thing. Once members are chosen, I am certain this will be one of the first pieces of business considered.

Speaking of SWOT, that organization is growing by leaps and bounds. Its members now number over 550. Associate membership is now open to anyone, without need for the requisite two contacts with SWOT members. Also OSCAR contacts now count for full membership. The monthly *SWOT Newsletter* is packed with information on 2-meter activity around the country including listings of many nets and various stations wishing schedules. An s.a.s.e. to Len Hoops, W5JTA, 1704 Glenn Dr., Fort Worth, TX 76131 will bring full details on this worthwhile organization. One recent *SWOT Newsletter* includes an application note from Eimac describing a 500-watt 2-meter amplifier that looks relatively simple to build. I am sure that an s.a.s.e. to W6SAI at Eimac requesting Note AS-24 will produce the information on this nifty-looking design.

If you hear FF, it's NM. Fred swapped W5LO for W5FF a few months ago. Now XYL Lee has turned in WA5MFZ for K5FF. How's that for a his and her call-sign combination? Incidentally, they have improved their Es monitoring capability and will be looking this summer for openings from FL to the New England states.

70 Cm – There's good news for 70-cm EMEers in the form of ZE5JJ. Peter's 32-foot dish is up and working. Even before he had the drive system completed, he got on and worked W1JR. That was at 0230 UTC March 6 and the contact gave Joe EME WAC number 3, the other two holders being K2UYH and G3LTF. Now that ZE5JJ is ready to provide African contacts, the number of WACs on 70 EME should increase markedly. W1JR's contact with ZE5JJ is the culmination of a five-year effort. Joe, then W6FZJ, first heard Peter in 1972. He has been trying to work him ever since. Earlier in the same evening, Joe made the grade with G3LTF for the first time. The two QSOs brought W1JR's EME totals to 24 stations in 13 countries and 10 states as well as WAC. Joe says he runs "a very legal kW" to a 128-element extended/expanded collinear.

The dish at W5FF/K5FF (ex-WA5MFZ) will be back up by the time you read this so Fred and Lee should be ready for EME skeds on 70 cm and 1-1/4 meters. Anyone need NM?

A number of people have written asking where they can get the 1N4885 varactor used in the Tramplifier described in January 1976 *QST* and in the tripler found in the *Handbook*. According to WA1WVK at Headquarters, the diodes can be obtained from Space Power Electronics, RD 1, Glen Gardner, NJ 08826. Apparently the supply is limited, however. I understand that another firm handling hard-to-find semiconductors is Circuit Specialists in Scottsdale, AZ.

ATV activity seems to be picking up over the country. In support of this, W3HM in Mechanicsburg, PA, suggests that a regul subsection of the column be devoted to th facet of our hobby. What do you think? T material in the column is dependent on t reports received so let's hear from you.

23 Cm and Down – In the March column v mentioned the Gunn diode equipment for cm being offered by Microwave Associate Unfortunately in reporting the price, we sa that the diodes are available for $85 eac Actually, the whole assembly consisting the Gunn diode oscillator, a Schottky dio mixer, a varicap afc diode as well as t mounting and coupling structure (what Micr wave Associates calls a Gunnplexer) is wh you get for the amount stated. Also availab is a 17-dBi horn which can be mounted on t unit. All that needs to be added is a pow supply and an fm receiver to make a comple 10-GHz transceiver. For more informati drop a line to Dana W. Atchley, Jr., W1CF, Microwave Associates Inc., Burlington, M 01803. Interest in these units is being e pressed from all over the country. On a rece trip to the West Coast, I had a 2-meter s QSO with WA6ZKY. Gordon told me th quite a few members of the San Bernardi Microwave Society are planning to purcha Gunnplexers with a view to some DX QSOs both the mountaintop line-of-sight type a the over-nonoptical-paths sea ducting. Rec that it was with units very much like the that G4BRS and GM3OXX set the 3-cm D record of 324 miles on an overwater path la summer.

Another application for the Gunnplexer on local line-of-sight paths as are often e countered in controlling and linking repeate W1CF says that the group operati WR1AJY in Carlisle, MA, is using one of t units to remote a receiver from W1ZA's tow to the repeater site about two miles aw There should be no end of uses to whi amateurs can put these devices. The o limitation is ham ingenuity.

Let's hear more about your microwa experiments. QST

50-MHz WAS

1	W0ZJB	52	W6GCG	102	WA6J
2	W0BJV	53	W2RGV	103	WB6W
3	W0CJS	54	W1DEI	104	W7FN
4	W5AJG	55	W1HOY	105	WB6I
5	W9ZHL	56	W6ANN	106	WB6O
6	W9OCA	57	W1SUZ	107	K7ZO
7	W6OB	58	W1AEP	108	WA6O
8	W0IN1	59	W5LFH	109	W6PO
9	W1HDQ	60	W6NLZ	110	K6JU
10	W5MJD	61	W7MAH	111	K9BD
11	W2IDZ	62	W8ESZ	112	WA5F
12	W1LLL	63	W2BYM	113	K6IBY
13	W0DZM	64	W7ACD	114	K6QA
14	W0HVW	65	K6PYH	115	WA6O
15	W0WKB	66	W4HOB	116	WA6H
16	W0SMJ	67	K0JJA	117	K7CIN
17	W0OGW	68	K6RNQ	118	WB6N
18	W7ERA	69	W9QWT	119	WA7G
19	W3OJU	70	W6EDC	120	W7ZB
20	W6TMI	71	K6VLM	121	WA7F
21	K6EDX	72	K6GOX	122	WB6H
22	W5SFW	73	W0EDM	123	WA6A
23	W0ORE	74	W9JCI	124	WB6B
24	W9ALU	75	W0LLU	125	K6QH
25	W8CMS	76	W7RT	126	Not is
26	W0MVG	77	W7RDY	127	WA6B
27	W0CNM	78	W6KIN	128	WB6U
28	W1VNH	79	W6OKR	129	WA6K
29	W0OLY	80	K6GMX	130	K7GW
30	W7HEA	81	W7DYD	131	WA7B
31	K0GDG	82	K6ZEE	132	K7TU
32	W7FFE	83	K6HCP	133	WA6N
33	W0PEP	84	K6YIL	134	WB5C
34	W6BJI	85	K6GMV	135	K5HV
35	W2MEU	86	K7BAG	136	WA7E
36	W1CLS	87	W7ZOW	137	WA7R
37	W6PUZ	88	K7ZPS	138	VE7A
38	W7ILL	89	K6EPT	139	W6SM
39	W0DDX	90	K7KHU	140	K5CM
40	W0DO	91	W5WAX	141	W7IN
41	K9DXT	92	WA7FPO	142	W6DP
42	W6BAZ	93	WA6HXW	143	WA5I
43	W6ABN	94	W6NIT	144	W6KQ
44	VE3AET	95	K7ICW	145	WA6J
45	W9JFP	96	K6EJO	146	WB6V
46	W0QIN	97	W6NLO	147	W7QR
47	W0WWN	98	K7BBO	148	K6DY
48	K9ETD	99	K6ZXS	149	WB6N
49	W0FKY	100	K7MUR	150	K7YA
50	W8LPD	101	K5EFW	151	K7YA
51	W0ZTW	102		152	W8TR

No. 20, 22, 34, 43, 60, 68, 70, 71, 72, 74 a all after 75 are for 50 states.

Public Service

Conducted By Robert J. Halprin,* WA1WEM

Hammus Trafficus

When we saw this phrase in the Wisconsin Nets Operating Manual, we were overcome with a desire to know more about this strange species. So we searched and searched, through ancient and yellowed records and books, but we still weren't satisfied. Nowhere could we find a true definition of the traffic handler. Finally, with eyes burning from strain, we were about to give up, when we stumbled upon the "Traffic Topics" section of *QST* for November, 1957:

"Ever hear of Ben White, W4PL? Of course you have – that is, if you've been handling traffic very long. Ben is the dean of all traffic men, having been in the traffic game since before many of us were born and certainly since most of us were in knee pants; and what's more significant, he's been handling traffic ever since, steadily except for an occasional short layoff to QTA an illness. Add to this fact that he's a real swell guy, and you have a combination that cannot but bring forth a certain amount of veneration for a gent who has been with us a long time and, we hope, will continue to be with us much longer.

"W4IA's Traffic Hounds Morning Watch, a fraternal type traffic net operating in the early morning (always Ben's favorite time for brass pounding), pulled a surprise party for Ben on the occasion of his 73rd [sic!] birthday. And when we say surprise, we do mean surprise. On August 17, with W4PL as NCS, 52 stations reported into the MW, a new record for the net. All of them had traffic for W4PL. After receiving the first few, Ben said 'I begin to smell a conspiracy.' But it was only the beginning. It was three hours and ten minutes later when Ben copied the last message, totaling 63 in all from 22 states, DC, Alaska [sic – Ed.], Quebec and Ontario. Many other stations were on with additional messages of greetings, but couldn't get through the QRM. As one of the ARFers said, 'Sounds like a DX pileup.' VE2DR's message was a 73-word poem which we wish we had room to quote. VE3BUR expressed the sentiments of all with such phrases as '. . . may the ensuing years bring much good health, contentment and peace of mind to a grand old fellow.'

"Ben responded in typical fashion in a letter which was printed in W4IA's FB Morning Watch Bulletin. 'Any verbal felicity that I thought I had seems to have deserted me just when I need it most,' he said. 'I can only say to those who planned this, to those who called in, to those who tried to call, to all who kept the secret, my heartfelt thanks and warm appreciation. Hams are fine people, and the very finest of them are those who handle traffic.' "

After reading this, we realized we had, at long last, reached the end of our quest.

PUBLIC SERVICE DIARY

▫ Waukesha, WI – February 15 (1976). Normal frequencies failed for a military transport returning sick personnel from Germany to Mitchell Field near Milwaukee, WI. When their condition worsened, WA9VVS put the gear on 40 meters, contacting WB9LJW. Located just a few miles from the base, he relayed the request for ambulances and medics to stand by. (K9PAK)

▫ Stewartsville, IN – December 21 (1976). Telephone efforts proved fruitless in trying to report a 4 A.M. fire across the street from WB9YPM, so he contacted WB9LCA on an area repeater. He was able to call his local police, who had neighboring fire departments respond. In the following days, amateurs also conducted a donation drive for the fire victims. (WB9RIU)

▫ Georgia – January 2-3. The GA ARES net was activated for reporting conditions to the Atlanta NWS office as a severe storm moved across it and neighboring states. (K4YRL, SEC GA)

▫ Leitchfield, KY – January 26. A natural gas explosion destroyed one building and set fire to four others, injuring eight persons. Coordination of county emergency equipment, 50 miles away, was handled by amateurs. (W4OYI)

▫ Morrisville, PA – February 2. The Lower Bucks County ARPSC provided communications for both civil defense and the Red Cross during an apartment fire. (WB3BLE, EC Bucks Co.)

▫ Lawrence, KS – February 11. Vandals slashed tires during a dinner of visually handicapped persons, including WB0OZV. Fellow amateurs gathered enough surplus tires to get everybody on their way again. (Kathy Vaughn)

▫ Caribbean Ocean – February 17. Rough waters disoriented a converted PT boat south of Cuba, with WA4KPH aboard. He checked into the Maritime Mobile Service Net and WA4IAI called the Atlanta FCC office, who activated direction-finding stations in Washington and Florida. From their report, VP2VB plotted a new course using the facilities of the larger ship he was on. (WA2LYT)

▫ Caribbean Ocean – February 18. Between Cuba and Jamaica a sailing vessel hit rough seas, losing its bilge pump and LORAN navigation. WA3LBU/R2 broke in on W2LTP, who called Coast Guard hq. in New York. Also, W8EH called the FCC monitoring station at Allegan, MI, and WB5BTD contacted the Galveston, TX, Coast Guard station. A rescue plane located the boat, dropping three bilge pumps. (W8EH)

▫ Dallas, TX – February 20. Mobile units of Dallas County and Garland RACES were at the scene of a train explosion within minutes. Both nets were activated to handle crowd and traffic control, and intracity communication. (W5DWL, SEC NTx)

▫ Tuscaloosa Co., AL – February 23. Exactly two years after a killer tornado hit the area, a late-afternoon watch activated the West Alabama Emergency Net. It changed to a warning status, with the town of Eutaw being hit shortly afterward. Damage messages for c.d. were handled by WA4HIA, but no injuries were reported. (WB4SVH, EC Tuscaloosa Co.)

▫ Yosemite National Park, CA – February 27. On an icy mountain road WB6AFH lost control and was hit by another vehicle, sending it over a cliff. He contacted WB6FZH through a repeater for help. While waiting, two similar accidents happened in the same area, but no injuries resulted from any of the incidents. (WB6AFH)

▫ *Repeater Log.* According to reports received to date, repeaters were used to report 34 automobile accidents and related occurrences, two fires and one medical emergency. Repeaters involved were WR1AAC, WR3ACE, WR4ACO, WR7s ABQ ACA AEL AIM, WR9ABY, WR0ADH.

▫ SEC reports received in February total 28, compared to 32 this time last year. Reported ARES members totaled 10,851 as compared to 11,015 in February 1976. Sections reporting were Ariz, Ark, Colo, Conn, Del, EMass, Ga, Ind, Kans, Me, Mich, Nev, NC, ND, NFla, NTex, Ohio, Okla, Ont, Org, SDgo, Sask, SFla, SNJ, Utah, Va, Wash, WMass, WPA.

NATIONAL TRAFFIC SYSTEM

EAN's ubiquitous W2JJ reports that February was an "excellent month, superb conditions, lots of traffic and vastly improved representation." W7KZ, equally satisfied with his net's performance during the month, pronounced RN7 as *healthy*. New assistant managers: VE3GFN (ECN) and WB9TWT (9RN). First annual 2RN certificates went to W2AIR K2KQC WA2ECO WA2ZGR WA2KFE WA2KOJ WA2YEI WA2SYR WA2YXY WA2YYM WB2ASD WB2RMK WB2THS WB2YKG; second annual – W2JI WA2ELD WB2CST; fifth annual – W2ZEP WB2OYV; ninth annual – W2RUF. 1976 3RN wallpaper went to W3EEB W3IPX W3KUN W3LOS W3NEM W3NNL K3KAJ K3MVO K3OIO WA3AHP WA3OGM WA3PXA WA3QOZ WA3SXU WA3SWF WA3UYF WA3VBM WA3WPY W2KAT/3 W8BZY/3; 4RN certificates to WA4EPJ WA4KKE WA4JPV WA4ZHU; 2RN-D certificates to W2MTA W2UYE K2HNW WA2ECO WA2KOJ WA2PCF; and 9RN certificates to K4QCQ WB4HQW W9CXY (with the net since 1952!) W9DND W9GGW W9LTU W9NXG W9OT W9OYL W9QLW K9KHI K9MZO.

February Reports

(Evening sessions)
(Daytime sessions)

1	2	3	4	5	6	7
EAN	28	2020	72.1	1.609	98.2	
EAN	56	794	14.2	.675	90.8	
CAN	28	1492	53.3	1.303	100.0	
CAN	56	336	6.0	.263	97.2	
PAN	28	1307	46.7	.992	98.2	
PAN	56	164	2.9	.197	85.1	
1RN	54	668	12.3	.467	93.5	100.0
1RN	24	154	6.4	.399	72.4	94.6
2RN	82	657	8.0	.519	94.1	100.0
2RN	51	421	8.2	.621	77.5	92.8
3RN	56	367	6.5	.464	95.2	92.8
3RN	28	101	3.6	.433	98.8	98.2
4RN	54	740	13.7	.535	72.7	100.0
4RN						98.2
RN5	54	1006	18.6	.589	91.9	100.0
RN5	28	379	13.5	.418	90.6	100.0
RN6	56	952	17.0	.540	100.0	100.0

*Assistant Communications Manager, ARRL

RN6	28	176	6.3	.218	88.3	96.4
RN7	56	464	8.2	.543	88.5	96.4
RN7	55	102	1.8	.147	52.0	75.0
8RN	53	404	7.6	.363	83.3	96.4
8RN	28	129	4.6	.386	92.8	100.0
9RN	56	498	8.8	.424	84.8	100.0
9RN	28	153	5.4	.320	91.1	91.0
TEN	56	526	9.3	.414	85.9	100.0
TEN	28	157	5.6	.312	38.5	100.0
ECN	54	422	7.8	.530	98.7	100.0
TWN	56	556	9.9	.426	98.6	98.2
TWN	20	79	3.9	.185	62.8	83.9
CTN	28	584	20.8	.776	100.0	
TCC Eastern	102[1]	854				
TCC Central	76[1]	732				
TCC Pacific	102[1]	919				
Sections[2]		3957	20644	5.2		
Summary		5242	38957	7.4		
Record		5065	34238	24.3		

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (133): BCEN (BC), MTN (MB), WQV/UHF (PQ), SATN SSTN (SK), AENB AEND AENJ AENM AENR AENW SENS (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NCN NEN SDNN SCN (CA), CWN (CO, WY), CN CPN VHF-2 (CT), DEPN DTN (DE), FAST FMTN FPTN GN QFN QFNS SPARC TPTN (FL), CVEN GARES GASSBN (GA), IMN MTN (ID, MT), ILN ISN (IL), TLCN (IA), KSBN KWN QKS QKS-SS (KS), MKPN KNTN KPN KRN KSN KTN KYN (KY), LAN LRN LSN LTN (LA), PTN SGN (ME), MDCTN MDD (MDC), EMRI EM2MN HHTN WMN WMPN (MA), HEN KCAN MACS MI6m MNN QMN WSBN (MI), MAWX MSN MSSPN MSSN PAW (MN), MTN (MS), MON MOSSBN MSN PHD (MO), BARTEN NJN NJPN NJSN (NJ), SWN (NM), NLI NLIPN NLS NYS WDN (NY), NCSSBN PX SCSSBN THEN (NC, SC), ONN OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN STN (OK), WCN (OR, WA), WPTN (Pac), EPAEP&TN PTTN WPA (PA), ETTMN TN TNN TPN (TN), BEN TEX TTN (TX), BUN UCN (UT), VFN VSN VSBN (VA), WSN (WA), WVN (WV), BEN BWN WIN WNN WSBN (WI).

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

Transcontinental Corps

Welcome back to W7DZX, who has returned to TCC-P after a stay in the hospital. Thanks to W7GHT and W7VSE, who handled Jack's skeds in his absence.

George Wood, WA1ZAZ, is a good example of *hammus trafficus*. There's not enough room available to tell you how many nets he's active in, but suffice it to say that he was one of the first to qualify for Novice PSHR. How about you?

	1	2	3	4	5
Eastern		108	94.4	2319	854
Central		84	92.8	1458	732
Pacific		112	91.1	1873	919
Summary		304	92.7	5650	2505

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

TCC Roster

The TCC roster (February): Eastern Area (W2FR, Dir.) — W1s NJM QYY, K1s EIR GN, WA1s FCM MSK WEM, W2s FR GKZ, K2HI/VE2, WA2s ICB PJL, WB2s ASD RKK, WA3s SXU VBM, W4s NPT UQ, K4KNP, W8s LTA PMJ, K8KMQ, WB8ITT, VE1AAO, VE3s GOL SB. Central Area (W5GHP, Dir.) — W4RQS, WB4SKI, W5s GHP MI UGE UJJ, WA5IQU, W9s CXY DND NXG, WA9EED, WB9s NOZ TWT, WØs AM HI QMY, KØs CVD CW, WAØTNM. Pacific Area (K5MAT, Dir.) — W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF OA VZT, K6HW, W7s DZX GB GHT KZ VSE, K7s IWD NHL QFG, WØs ETT IW KLE LQ, KØs DRL TER, NØIA, WBØs DJY QOT, VE7ZK.

Independent Nets (February)

	1	2	3	4
Clearing House		28	552	555
Early Bird		26	111	205
Hit & Bounce		56	1752	414
Hit & Bounce Slow		16	39	106
Mike Farad		24	112	275
North American SSB		22	112	279
North American Traffic and Awards		22	124	929
Washington Region PON		16	48	306
20 Meter ISSB		23	658	491
75 Meter ISSB		28	760	1342
7290 Traffic		41	542	2210

Public Service Honor Roll February 1977

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. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

72
W5KLV
71
WB5NUM
68
W4OGG
67
WA5RKU
64
WA3YJG
WB4OBZ
VE1ZH
63
WBØHOX
62
WA6TVA
61
WA1FCM
WA1VEI
WA2ECO
W2MTA
WB4EKJ
WB5KGP
WB5NKD
WA5YEA
WB6PVH
W7OCX
WB9ICH
59
WA1VGP
WB4ARJ
W7VSE
57
WA2BMI
56
WA1MSK
AB2ASD
W2MLC
WA2SJG
WB4CAK
WA4FBI
WB5PTH
WB6JIK
W6RNL
55
WA1TEH
WA4EPJ
KØCVD
53
WB2CST
WB2RUZ
WB4DBK
52
K4BKX
WA6BFL
W7GHT
K9SAO
VE7DKY
51
WB5NEZ
50
W5VGE
WB8NCD
49
W1RWG
WB2EMU
WB2LZN
K3YHR
WB5FHU
WA5IQU
WB5PVL
WA5ZZA
WB6UZX
WA7MEL
KØEVH
KØMRI
WØRFF
VE1AMR
VE3DPO
VE3DV
48
W4MEE
W9MMP/Ø
47
WA2DIW
WA2ZJP
WA3VBM
WØHXB
46
WA1MJE
WB4SKI
K5ZSI
KG6JES
WA7KQE
WA9QCF
WBØQOT
VE5WM
45
K3ORW
WA5VBM
KØPVI
WØOYH
44
W1BVR
WA2ERT/1
K3KAJ
W3IPX
WB4DJU
K4EV
W9MFG
W9NXG
WB9OEC
WB9PIR
WB9QKH
K9ZTV
VE1AAO
VE1ACU
VE3CDK 42
VE3GOL W2CS
VE5NJ WA2VEN/Ø
WA4PZD
43
W9GGW
W6JXK W9NJP
KØCVD VE4UL
WBØOFQ 41
WØOTF W4LXB
WB4TEK VE5KJ
K9LGU 39
WBØLFY WA1ZAZ/N
VE5XC
VE5XU 22
40 WA1UWF/N
WA5JYH WB4QBB/N
W5UJJ
VE4VV

Brass Pounders League February 1977

BPL Medallions (see December 1973 *QST* p. 59) have been awarded to the following amateurs since last month's listings: WB4SKI W5UGE W7SQT WB8DQX WAØVRE VE7ZK.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions 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 in standard ARRL form.

	1	2	3	4	5	6
W3CUL	319	2153	2316	121	4909
W4DUG	2307	29	2315		4651
K3NSN	1460	240	235	5	1940
WØWYX	42	856	321	535	1754
WAØRWM		554	35	550	1139
W3VR	316	295	411	22	1044
W2EC		518	471	9	998
WA4JDH	1	489	483	1	974
W4MEE	4	453	390	17	864
KØONK	13	712	111	18	854
K9CPM		482	66	274	822
K1NH	73	330	397	20	820
KØZSQ		380		380	760
WØMZI	20	355		301	656
WB6EIG	13	322	312	10	656
WB4OBZ	12	325	308	3	648
W5SHN	103	305	221	4	633
VE3SB		287	301	3	594
WBØHOX	4	291	277	14	586
WAØAUX	11	286	276	8	581
WB4ARJ		256	295	2	553
W4FOE	13	265	228	43	549
W5KLV	3	290	243	9	545
W9MMP/Ø	23	211	172	112	518
K4TH	10	237	164	92	503
K3CR	228	23	228	22	501
WA3YJG	11	181	201	108	501

BPL for 100 or more originations-plus-deliveries

WØFIR	240	W7VSE	146
WA3ATQ	208	W7TZK	132
K7VWA	182	WA1VGP	126
WA3THT	171	WA9GBW	116
WA4TXM	155	W6NL	112
W7SQT	152	WA5VBM	105
		W9IOH	103

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

You'll notice that Gordon Good, WB8YVI, also achieved Novice PSHR. But not for long. He reports that he just passed the General exam. Good work!

Armed Forces Day Communications Tests

Here is a chance to make some contacts outside amateur bands. Army, Navy-Marine Corps and Air Force stations will be looking for your calls on May 21.

This year's observance of Armed Forces Day marks the 28th anniversary of an annual event reflecting the long-standing good relations between the amateur radio fraternity and our military radio stations. As in years past, events scheduled for Saturday, May 21, emphasize the continuing climate of mutual assistance and warm esteem.

A featured highlight of Armed Forces Day 1977 will be the traditional military-to-amateur communications tests. These tests give amateur operators their yearly opportunity to demonstrate their technical skills and receive proper recognition for their expertise. The proceedings include crossband operations in continuous wave (cw), voice (ssb), radioteletypewriter (RTTY) and slow-scan television (SSTV). QSL cards will be awarded to amateurs achieving a verified two-way contact with any of the participating military stations. It will not be necessary to send a QSL card to the military station contacted. Certificates will be sent to those amateurs who receive and accurately copy the Armed Forces Day message from the Secretary of Defense, as transmitted in both cw and RTTY.

Interception by shortwave listeners (SWL) is not acknowledged by QSL cards. However, anyone with the required equipment and ability can qualify for a certificate by copying the Secretary's message.

The 1977 Armed Forces Day slogan is "PEACE THROUGH READINESS," with the emphasis on the vital role our armed forces play in the defense and preservation of our great nation. This responsibility has always been shared by the amateur radio community, ever ready to devote their time, effort and skill toward a beneficial working relationship with the U.S. military communications community.

The military-to-amateur crossband operations will be conducted from 21/1300 UTC to 22/0245 UTC. Military stations NPL, NMH, NAM, NPG, WAR and AIR will transmit on military frequencies, and listen for amateur stations transmitting in those portions of the amateur band indicated below. The operators at the military stations will specify that portion of the amateur subband they are listening.

NPL (Naval Communications Station, San Diego, CA)

MILITARY FREQ. kHz UNLESS OTHERWISE NOTED	*APPROPRIATE AMATEUR BAND IN MHz*
14.389 (1500Z-2100Z)	14.225-14.250 SSTV
7.370 (1500Z-2100Z)	7.16-7.19

NMH (Coast Guard Radio Station, Alexandria, VA)

14.470	14.225-14.250 SSTV
7346.5	7.16-7.19

WAR (Army Radio Washington, DC)

4001.5	3.5-3.75 cw
4020	3.775-4.0 lsb
4030	3.65-3.775 RTTY
6997.5	7.0-7.15 cw
14405	14.0-14.2 cw
20994	21.25-21.45 usb

NAM (Naval Communications Station, Norfolk, VA)

3385	3.5-3.75 cw
4040	3.775-4.0 lsb
6970	7.15-7.3 lsb
7301	7.0-7.05 cw
14385	14.2-14.35 usb
14400	14.0-14.1 cw

NPG (Naval Communications Station, San Francisco, CA)

4001.5	3.775-4.0 lsb
4005	3.5-3.65 cw
4010	3.65-3.75 cw
6989	7.0-7.075 cw
7301.5	7.15-7.3 lsb
7347.5	7.0-7.1 RTTY
7365	7.075-7.150 cw
13922.5	14.0-14.15 RTTY
14356	14.2-14.275 usb
14375	14.0-14.1 cw
14389	14.275-14.35 usb
20983	21.0-21.2 cw
20998.5	21.27-21.4 usb
FREQ. MHz	
49.995*	a-m/usb/cw 50.0-51.0
143.995*	a-m/usb/cw 144.0-146.0
148.40**	fm/RTTY 146-148
148.95**	fm/RTTY 146.0-148.0
222.0*	a-m/usb/cw 221.0-222.5

*To be operated from Mt. Vaca
**To be operated from Mt. Diablo

AIR (Air Force Radio Washington, DC)

4025	3.775-4.0 lsb
7305	7.15-7.3 lsb
7315	7.0-7.3 cw
14397	14.2-14.35 usb

CW Receiving Test

The "cw" receiving test will be conducted at 25 words per minute for any person capable of copying international Morse code. The "cw" broadcast will be a special Armed Forces Day message from the Secretary of Defense to all participants. A ten-minute CQ call for tuning purposes will begin at 22/0300 UTC. The Secretary-of-Defense message will be transmitted precisely at 22/0310 UTC from the following stations on frequencies listed.

TRANSMITTING STATION	FREQ. (kHz)
WAR – Army	4030, 6997.5, 14405
NAM – Navy	3385, 7301, 14400
NPG – Navy	4005, 6989, 14375, 49.995 MHz, 143.995 MHz
AIR – Air Force	7315

RTTY Receiving Test

The radioteletypewriter "RTTY" receiving test will be transmitted at 60 words per minute. A ten-minute CQ call for tuning purposes will begin at 22/0335 UTC. The special Armed Forces Day message from the Secretary of Defense will be transmitted at 22/0345 UTC. This test is to exercise the technical skill in aligning and adjusting of equipment by the operator and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. Transmission will be from the following stations on frequencies listed.

TRANSMITTING STATION	FREQ. (kHz)
WAR – Army	4030, 6697.5, 14405
NPG – Navy	4010, 7347.5, 13922.5, 148.410 MHz
AIR – Air Force	7315

Submission of Test Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address, including zip code of the individual submitting the entry must be indicated on the page containing the test. Each year, a large number of acceptable copies are received with insufficient information or the necessary information is attached to the transcription and was separated, thereby precluding the issuance of a certificate.

Entries should be postmarked no later than May 25, 1977, and submitted to the respective service copied.

Stations copying NAM and NPG should send their entries to Armed Forces Day Test; Chief, Navy-Marine Corps MARS; Building 17; 8th St. & So. Courthouse Rd.; Arlington, VA 22204. Stations copying WAR should send their entries to Armed Forces Day Test; Commander, United States Army; Communications Command; ATTN: CC-OPS-OM; Fort Huachuca, AZ 85613. Stations copying AIR should send their entries to Armed Forces Day Test; Air Force Communications; Service/DOYF; Richard Gebaur Air Force Base; MO 64030. QST

Strays

At age 81, Joseph Ross, W6GYX, has confessed. His amateur radio station, ca. 1911, was decidedly not legal. Until competing interests (girls) took over, Joe had a great time with his newfangled radio equipment. Licensed in 1951, W6GYX remains active in two local radio clubs and keeps up with *QST* at the library. His station's call sign in the century's second decade? JR, of course!

WANT TO HEAR A SATELLITE?

□ You've read about them, wondered about them, seen pictures of them. Why not listen to them?

OSCAR 6 will be coming your way all month on Sunday, Wednesday and Friday evenings, local time. Tune your receiver between 29.45 and 29.55 MHz at about 8:50 P.M. CDST on Friday, May 6, and you'll likely hear the band come to life with all sorts of Morse code and phone signals, as ground stations frantically try to garner QSOs while the satellite speeds northward. Spanish will be evident at first, but contacts will slowly change to English as OSCAR speeds out of range of South and Central America. This OSCAR 6 pass, its 20,842nd, will bring the bird over the heart of North America. This means it will be within range of the entire U.S. and most of Canada.

A good pass for the East Coast and Midwest will occur on Sunday evening, May 16. If you're listening at about 8:30 P.M. EDST, you'll hear Venezuelans contacting Floridians, then stations in the eastern and midwestern U.S. getting together via OSCAR. OSCAR 6 will pass out of range of the northeastern U.S. at about 8:50, while over Northern Canada.

If you're on the West Coast, listen for OSCAR 6 on Wednesday evening, May 25. Begin tuning for the tiny spacecraft at about 8:50 P.M. PDST (a few minutes later if you live in the Pacific Northwest). With any luck, some Hawaiian regulars will be on that evening, and you'll hear some DX between W6s and KH6s for about 20 minutes. OSCAR 6 will be traveling northward about 300 miles off the West Coast, well within range of the islands.

If you Westerners (U.S. and Canada) would like to hear the newest amateur satellite, AMSAT-OSCAR 7, try Wednesday evening, May 4. Start listening between 29.4 and 29.5 MHz at about 7:55 P.M. PDST, and you should hear some Mexican stations, followed by U.S. and Canadian OSCAR users vying for attention. Catch the quick dit-dahs of the telemetry beacon on 29.502 MHz.

When A-O 7 is in Mode B (even days of the year), you'll need a two-meter receiver and antenna to hear it. Its signals are somewhat stronger than OSCAR 7's 10-meter "downlink," so it will be that much easier to catch. A good midwestern pass that should be within range of most of North America will occur on Monday, May 9. Tune in on 145.95 MHz at about 8:45 P.M. CDST for this one.

If you have mornings free, why not try the less crowded conditions you'll find on OSCAR 7's north-to-south orbits? A 10-meter orbit the East Coast will hear loud and clear will occur on Thursday morning, May 19. Try listening between 29.4 and 29.5 MHz at about 10:15 A.M. EDST.

A West Coast morning orbit can be heard on Monday, May 9. Start listening on the same frequencies at about 9:05 A.M. PDST. You should hear OSCAR 7 for about 20 minutes as it comes down from the North Pole on its never-ceasing journey through the sky.

Another good evening orbit for OSCAR 7's 10-meter signals is Saturday, May 28. Tune in to the spacecraft about 8:40 P.M. CDST. This pass should bring OSCAR within range of the eastern two-thirds of the U.S., then the Canadian midwest.

These selected orbits are just a few of the hundreds of times each month one OSCAR or the other is available to us in North America. You need only a 10-meter receiver and just about any kind of antenna – along with the desire to catch a communications satellite from your own QTH. Happy hunting!

Rules, 1977 IARU Radiosport Championship

Do your part for WARC and have fun in the process.

This is it . . . a DX Competition in July, a summertime Sweepstakes, a Worked-All-States weekend, an International QSO Party. As stated in the outline of rules for this Radiosport Championship (March *QST*, page 87), the special occasion which promises to make this an operating event to remember is the 1979 World Administrative Radio Conference, and the international amateur solidarity to be fostered between now and then. If you are an operating radio amateur, then there is something here for *you*.

The rules as outlined in March remain unchanged, except for an expanded awards program; separate categories of competition for single-operator station will include the following: cw only, phone only, and mixed phone and cw. Mixed-mode only for multi-operator entries.

Entries from U.S. and Canadian amateurs will be accepted *only* if made on official log sheets and summary sheets. Those will be available upon request in mid-May in any quantity desired. Send a large, self-addressed stamped envelope to ARRL Headquarters, 225 Main Street, Newington, CT 06111, USA. Log sheets contain space for 100 contacts per sheet of paper; don't forget to also request Operating Aid 6 forms for keeping track (in matrix form) of W/VE contacts and form CD175 for DX contacts. Such forms (filled out) are required with any U.S. or Canadian entrant making a total of more than 200 contacts. The summary sheet contains a worldwide ITU zone list.

Eligibility: All amateurs worldwide, in single-operator and multi-operator, single-transmitter categories. No multi-transmitter allowed. Guidelines for single-operator and multi-single are the same as for the ARRL International DX Competition (page 88, December 1976 *QST*).

Contest Period: July 9 and 10, 1977 (in UTC). Maximum 36 hours for single-operator entries. No time limit for multi-single.

Valid contacts: All amateur bands, 160-2 meters. Each station may be worked once per frequency band, regardless of mode. Crossband contacts not allowed, except contacts via the OSCAR satellites are allowed and count as a separate band. Contacts within one's own DXCC country count one point, outside of one's country but within one's own continent count three points, and outside of one's own continent count five points.

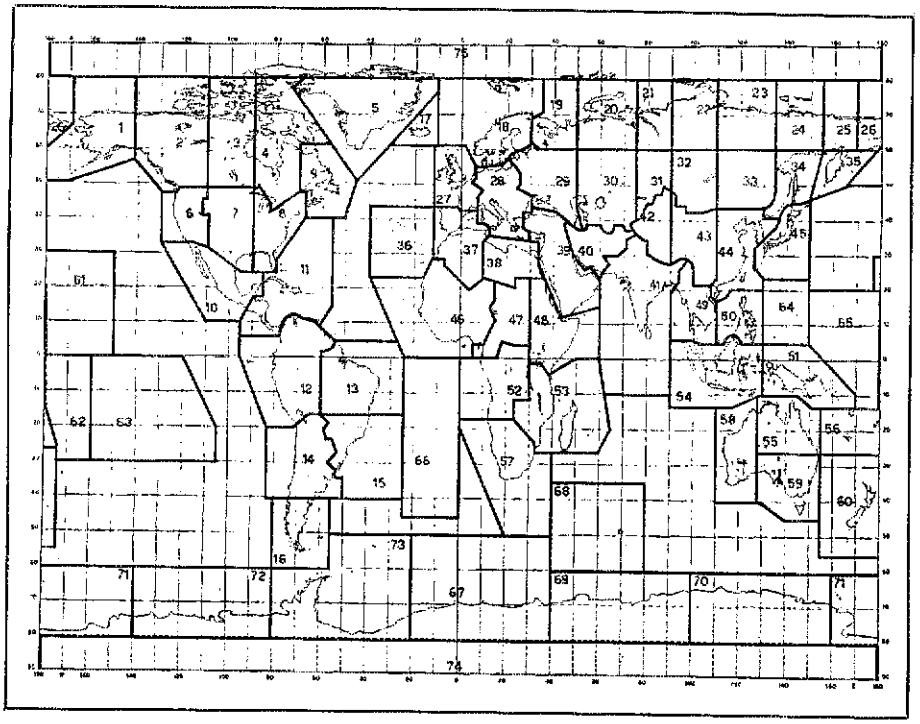
Multipliers: The sum of the number of different ITU zones worked on each band.

Exchanges: Signal report and ITU zone.

Scoring: Final score equals number of QSO points times the zone multiplier.

Reporting: All entries worldwide to be sent to IARU Headquarters, Box AAA, Newington, CT 06111, USA. All U.S. and Canadian entrants *must use* official log sheets and summary sheets, and their entries must be accompanied by dupe sheets if they made 200 or more QSOs. Entries must be postmarked no later than September 1, 1977. All entries become the property of the IARU and none can be returned. In cases of dispute, the decisions of the IARU awards committee are final.

Awards: A certificate will be awarded to the highest scoring cw only, phone only, and mixed-mode entrant in each U.S. state, each Canadian province, each ITU zone and each DXCC country. Additional awards may be made at the discretion of each country's IARU national society. QST



This is a standard ITU zone map. W1, 2, 3, 4, 8 and 9 are in ITU Zone 8; W5 and WØ are in Zone 7; W6 and 7 are in Zone 6; VE1 and 2 in Zone 9; VE3 Zone 4; VE4 and 5 Zone 3; VE6 and 7 Zone 2; VE8 Zones 2, 3, 4 and 75. KH6 is in Zone 61 and KL7 in Zone 1. A complete list, by country prefix, is on the back of the Radiosport Championship summary sheet (form CD236).

Results, 43rd ARRL November Sweepstakes

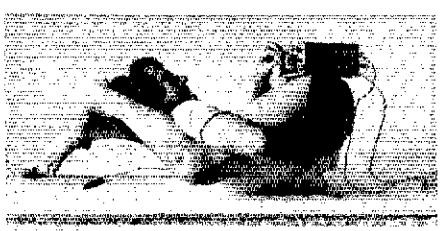
Happiness is being part of an all-time record-breaking event.

By Jim Cain,* WA1STN

We did something right. Despite dire predictions that the 1976 November Sweepstakes contest would be a bust, the 1976 SS was an unqualified success. From every viewpoint, the operating activity which has been touted over the years as the "opening of the contest season" reached new heights last November. The only benchmark which was not raised was the number of complaints from noncontesters, which were almost nonexistent.

For starters, give this some thought. In 1976, every single high-power all-time division record was broken on phone. Every one. We thought about just running the 1976 phone-division-leaders listing and giving it two labels: 1976 and all-time! On cw, a few previous division records remained untouched, but not unchallenged; those remaining to be shattered are Central Division, Midwest, Northwest, Roanoke (c'mon, you guys; W4KFC's record is 11 years old), and Southwest. If this keeps up we will need an electronic scoreboard with instant updating.

Total number of entries in the *1975* Sweepstakes was 2399, down just slightly from 1974, which was the all-time record. In 1976 Headquarters was inundated by 2805 entries, fully 22 percent more than the previous year, and a new record. That's just a handful less than the record for the highest number of entries in any single contest, set in the DX Competition during the last sunspot maximum. If you're thinking that the Contest Branch had 22 percent more work to do this year than last, you're wrong. Thirty-five percent would be more like it, because the average number of contacts per entry was up by at least 10 percent.



Santa Barbara man WB6JXB finds left-footed sending a most relaxing November SS mode of operation.

WB4KTR (r) found his SS operation somewhat limited; he took time out to make some music with famous Bluesman Muddy Waters.

The additional entries seemed to come primarily from those "little guys" we discussed on these pages a year ago, at least some of them as a result of the 200-QSO award offered this year. The Bicentennial Worked All States award probably didn't hinder activity, either. A few of the Canadian sections were moderately scarce (not to mention the U.S. Canal Zone) but all the 50 states were easily found on both modes.

Highlights, Big Gun Category. Everyone knew beforehand that the phone weekend would probably be a battle of two stations: WAØCVS and KV4FZ. WAØCVS received his new call sign hours before the start of the SS and operator WBØDJY had to re-do his CQ tapes with the new call, WØTR. It was only fair, though, that he have a two-letter call sign to compete against the possible advantage gained by his competition's semi-exotic KV4 call sign. K7VPF rolled into the KV4FZ radio station and proceeded to operate while contending with several unknown quantities like band openings and "where's the john?" When it was all over and the dust had cleared there was still some doubt about the outcome, since both contenders had to dupe and re-dupe their logs. The final QSO spread was 21, less than one contact per hour!

Amazingly, two East Coast phone operators managed to break into the Top Ten this year with a couple more lurking very near – WB2OEU with big antennas and WA1LNQ with little ones

*Asst. Communications Mgr., ARRL

Little by big-gun standards, of course, yet it's not only size, but operating technique that counts. All in all, it was four stations south of the Mason-Dixon line, six north, and four stations west of the Rockies and six east. Eight of the 10, however, are at the right distance to work the East Coast on 20 and 15 meters and that's still what counts. Overall, in 22 sections it took over 200k points to win, and only 11 section winners made less than 100k on phone!

WA5LES, last year's cw record-setter, beat his own record but that wasn't quite enough, as Chip at KV4FZ beat it by even more. Add KP4EAJ who operated from KP4AST and W6OAT who keyed WA7NIN and we have a total of three operators who bettered the former record and one who came close. Yes, indeed, there were more "little guys" to work and they did send faster this year. Bravo! Fifty-three of the sections required over 100k for victory on cw, and 18 took over 150k!

Last year there were *no* clean sweeps (all 75 section multipliers worked) on cw, while in 1976 we had 17. VE8 was still the killer and there seems to be no solution to that problem. If you discount the four multi-operator cw stations who swept and the three operators who were "out" for a clean sweep (score not so important) that leaves a lot of serious SS contestants who just plain didn't make the grade, although not for lack of trying.

One hundred and nine clean sweeps on phone is more like it, all right. This writer attempted a minimum-time sweep on phone and finished it by calling a VE1 out of the 75-meter band on cw and luring him up to 3780. That came after coming dangerously close to having to run a phone patch to Balboa in the Canal Zone. Oh well.

What about the low-power competition, you say? The all-time listing elsewhere in this report reveals that many division records remain to be broken, although 11 out of 32 were laid to rest in 1976. It *would* be interesting if some of the well-hardwared stations would shut down their amplifiers for a year and go after some of those 200-watt records. Anyhow, AC8CQN lead the cw QRPers (and, by the way, three of the top four in Michigan were category "A" stations), while Coloradoan WBØMIV turned in the top amplifier-less phone score. That computes, since the overall top phone score also originated in John Denver's Rocky Mountain high country.

And now for something completely different for most casual participants and probably different for most big guns. It's called "disqualifications and how to avoid them." Unfortunately, entrants eliminated from the competition this year include several operators from the Top Ten on both phone and cw. Careful scrutiny of the claimed scores in February's *QST* compared to the final scores in this issue will indicate that *every* Top Ten entry was adjusted in score. When one is adjusted downward greater than two percent, the entry becomes eligible for *possible* action; in practice, the figure used is three-percent score reduction. Entries so adjusted are reviewed by the Headquarters Awards Committee and are weighed against the disqualification criteria specified several years ago by the volunteer Contest Advisory Committee (and printed each year in January *QST*).

So much for the standard speech . . . now for the nitty-gritty. All those disqualified from the top scorers were primarily for "rubber-clocking" (with a few dupes thrown in). If you don't know what rubber-clocking is, it's just as well. If you do, then you also know that with 2,800 logs to cross-check it is not very difficult to spot such time bending.

Backtracking. Last year in the SS report we exhorted entrants to use our forms instead of homemade ones, and to write so we could read what you wrote. This year about 15 percent of the entries used homemade forms, which doesn't seem like much until you

Division Leaders - Phone

HIGH POWER	*LOW POWER*	*DIVISION*	*MULTI-OP*
W3KWB	WA3TBW/3	Atlantic	K3CR
WA9BWY	WB9KMQ	Central	WB9GCS
WAØONL	WAØURW	Dakota	WBØDSJ
W5WMU	W1FCC/4	Delta	WA4EJX
WA8PLZ	W8TR	Great Lakes	WB8JBM/8
WB2OEU	WA2LBT	Hudson	WB2MZU
KØGXR	WBØISW	Midwest	WØQQQ
WA1LNQ	WB2JSJ/1	New England	K1VTM/1
WA7WXY	W7TYN	Northwestern	W7FO
WA7NIN	WA6WRS	Pacific	W6YX
K4YF	W4WSF	Roanoke	W4BVV
WØTR	WBØMIV	Rocky Mtn.	WAØUWF
KV4FZ	AA4BTQ	Southeastern	W4AQL
W6HX	WA7VTM	Southwestern	W6CCP
K5LWL	AB5AAR/5	West Gulf	AA5RXT
VE5DX	VE6ATT	Canadian	VE3DOP

Division Leaders - CW

HIGH POWER	*LOW POWER*	*DIVISION*	*MULTI-OP*
W3LPL	WA3SWF	Atlantic	K3GJD
WA9BWY	AB9CGL	Central	K9RMA
WAØONL	WAØUCU	Dakota	
W5WMU	WA5VDH	Delta	W4EAL
K4GSU	AC8CQN	Great Lakes	WB8JBM/8
WA2UOO	AB2SJG	Hudson	W2SZ
KØGXR	WAØPAO	Midwest	WØZLN
W1FBY	W1DGL/1	New England	W1MX
W7TML	W7YTN	Northwestern	K3MNT/7
WA7NIN	AA6MQS	Pacific	W6YX
K4VX	W4WSF	Roanoke	W4UPJ
WBØDJY	WØETT	Rocky Mtn.	WBØOYX
KV4FZ	K4VFY	Southeastern	W4AQL
K6NA	WB7AEB	Southwestern	WB6JJE
WA5LES	WB5OAF	West Gulf	AA5RXT
VE7CC	VE1MX	Canadian	VE3ART

Top Ten — Low Power

CW		*PHONE*	
CALL	*SCORE*	*CALL*	*SCORE*
AC8CQN	131,254	WBØMIV	176,100
WA5VDH	129,940	WBØIWL	139,160
W1FCC/4	125,504	W4WSF	128,400
WB5AOF	116,928	AB5AAR/5	128,084
WA3SWF	115,632	WA3TBW/3	124,960
W5AC	115,632	W8TR	117,718
WØETT	112,896	WA7VTM	116,340
W5SBX	111,444	WB5AOF	114,402
K4VFY	108,914	WA6ELX	113,040
WAØPAO	108,478	WB2JSJ/1	108,288

Ninth-Area Contest Advisory Committee member Vic, K9UIY, and his famous QRP station.

multiply 2805 times point one five. Be sure to read the rules for the upcoming November Sweepstakes, and for *all* upcoming contests, for that matter. You may be surprised at what you read about requirements for submitting entries in ARRL contests. We're sorry it has to be that way, but with all of our contests experiencing increased activity, with more awards offered all the time, and with the potentially gigantic Radiosport Championship to deal with in July, we simply have to do what we can to streamline our operation. Please ask for and use ARRL contest forms, and we'll reward you with faster service, more timely *QST* reports, and less errors in those reports.

Last but definitely not least, some words about the Affiliated Club Competition aspect of the SS. Number of clubs with valid entries this year: 90, up from 76 in 1975. While some medium-sized clubs were swallowed up by contest conglomerates, many made rather hefty advances in their total point productions over the '75 SS. The Northern California Contest Club wins overall for the second year in a row, their margin of victory over second-place Potomac Valley Radio Club a half-million points this time, versus just 350k in 1975. Both groups produced over a million more points than they did in 1975, NCCC with 136 valid entries and PVRC managing 154.

New to the Top Ten clubs listing in 1976 are the New England Contest Club, the Southern California Contest Club, the Texas Associated Contest Operators, and the Colorado Contest Conspiracy. The first three are new groups, while CCC has been around a few years. Biggest jump upward in the listings is the Central Michigan Amateur Radio Club, from a quarter-million points in 1975 to over a million (and 12th place) in 1976!

Affiliated-Club Competition

CLUB	*SCORE*	*ENTRIES*	*CW WINNER*	*PHONE WINNER*
Northern California Contest Club	10,884,632	136	WA7NIN	WA7NIN
Potomac Valley Radio Club	10,343,214	154	W3LPL	K4YF
Murphy's Marauders	6,520,254	62	W1FBY	WB2OEU
Mad River Radio Club(OH)	3,776,318	42	WA3WIK	WA3WIK
Wireless Institute of NE	3,387,260	49	WA2UOO	WB2RKK
New England Contest Club	2,936,782	45	W1DAL	W1CF
Western Washington DX Club	2,871,650	46	K7RSC	W7RM
Southern California Contest Club	2,863,224	40	W6RTT	WB6YBL
Texas Assoc. Contest Operators	2,350,766	25	AA5LES	WB5OOE
Colorado Contest Conspiracy	2,029,258	17	WBØDJY	WØTR
South Jersey Radio Association	1,356,216	49	K2JOC	WA2VYA
Central Michigan ARC	1,093,428	63	AC8SH	WA8LTX
Texas DX Society	995,022	11	W5SBX	K5LWL
Radio Amateur Technical Society(IL)	849,874	11	WB9KLW	K9HDE
Buffalo Area DX Club	757,194	13	WA2LCC	WA2LCC
Canton Amateur Radio Club(OH)	697,612	20	W8SWB	W8SWB
L'Anse Creuse ARC(MI)	679,674	32	W8GLC	K8BZK
Frankford Radio Club	632,496	8	W2LYL	K3DPQ
Schaumburg Amateur Radio Club(IL)	605,834	10	WA9PBK	WA9PBK
Radio Club of Tacoma	586,908	10	W7BUN	W7BUN
Southern California DX Club	562,544	10	W7CB/6	K6AC
Saginaw Valley Amateur Radio Assoc.(MI)	549,778	27	W8QM	WB8IOT
Indy DXers	482,710	5		WA9BWY
Kankakee Area Radio Society(IL)	470,462	9	AC9NLR	WB9HAD
Prairie Dog Amateur Radio Club(SD)	421,926	3		
Orlando Amateur Radio Club	401,772	3		
Motor City Radio Club(MI)	399,014	13	W8BNF	WA8FRE
South Peninsula Amateur Radio Klub(CA)	377,120	14	W6ICJ	W6KH
Ohio Valley Amateur Radio Assoc.	369,458	7	W8RSW	
North Florida Amateur Radio Society	356,108	4		WA4UFW
Wisconsin Valley Radio Association	344,920	8	W9NA	W9NA
Michigan DX Association	342,348	4		
Twin City DX Association(MN)	342,302	5	WBØANT	
Georgia Tech Amateur Radio Club	322,450	4		
Ozaukee Radio Club(WI)	320,986	5	W9LO	
Gloucester County ARC(NJ)	302,822	10	WB2OSQ	AB2BVV
Winona Radio Club(MN)	294,998	8	WAØURW	WAØURW
Northern Illinois DX Association	271,970	3		
Bluegrass Amateur Radio Club(KY)	266,660	5	AB4FOT	
Alamance Amateur Radio Club(NC)	266,436	10		WA4FFW
Central Virginia Contest Club	266,070	6	K4JM	W4QCW
Pennsylvania Wireless Association	250,728	6	WA3NAF	
Northwest Amateur Radio Club(IL)	248,016	7	W9ZAV	AB9DED
Massillon Amateur Radio Club(OH)	247,698	5	W8LSO	
Overlook Mountain ARC(NY)	239,310	11	W2FPG	AB2BXL
Northrop Radio Club(CA)	230,338	7	W6VPZ	W6HDK
Fresno Amateur Radio Club	228,232	11	WA6JDB	WA6WRS

Another 200k points to the winning NCCC club effort from this gent, WA6MQS.

Those extra points the leading individuals picked up in 1976 and those ballooning club scores are, no doubt, because the "little guys" were out in force. Some of them moved out of that category and into the potential big-gun classification by virtue of their 1976 performances. Our resident philosopher says it's because many of those casual operators started out to make the 200-QSO award level, found out how easy it was, and proceeded to make 300, 400 or more contacts. The certificates will be mailed sometime in May; 200-QSO, section winner, club winner, and that's it. It was a tremendously successful SS, and we thank you.

Oh, yes, the results compiled here would never have been completed without the help of Contest Branch Communications Assistant Bill Jennings, WA1AHI, typist Rita Tilley, WA1WEV, and part-time able helper Dan Street, WA1QNF

Soapbox

My good friend John, K9YBC, was married during the cw weekend. He will be remembered as having been an excellent SS operator. R.I.P.! (K9IWV) The miracle of ham radio — a refugee from Brooklyn goes to Vermont and instantly becomes a celebrity on 20 meters. (WB2JSJ/1) My XYL has made a noteworthy observation: There is a significant reduction in desire to operate the radio after 24 hours of operation. Conclusion . . . there really can be too much of a good thing! (KØJGH) Perhaps

Nicolet High School ARC(WI)	226,350	4		
Five Flags Amateur Radio Assoc.(FL)	211,642	3	WB4SKI	
Lincoln Amateur Radio Club(NE)	204,944	3		
Norwood Amateur Radio Club(MA)	200,274	4		
ARINC Amateur Radio Club(MD)	196,722	8	W3TOS	WA3UUO
IBM Oswego Amateur Radio Club(NY)	185,536	4		
Electronics Museum ARC(CA)	184,968	5	W6ASH	
Burlington Amateur Radio Club(VT)	184,772	4		
PENNARC(PA)	182,390	8		WA3WVT
Schenectady Amateur Radio Assoc.	181,368	4	WB2QDP	
Lake County Amateur Radio Club (IN)	177,702	3		
Connecticut Wireless Association	174,694	5	W1BIH	
University of Manitoba ARS	164,716	4		
Wabash County Amateur Radio Club(IN)	162,708	8	W9JOO	W9JOO
Douglas County Amateur Radio Club(KS)	162,456	4		
Memphis Amateur Radio Association	157,588	8	AB4WHE	K4TTA
Ft. Wayne Radio Club	153,548	3		
Muskegon Area Amateur Radio Club	148,868	8		WB8OQR
Blossomland Amateur Radio Assoc.(MI)	148,588	8	W8IHE	WB8DZR
Johnson County Amateur Radio Club(KS)	139,260	3		
Framingham ARC(MA)	138,548	6		
Atlanta Radio Club	137,134	3		
Richardson Wireless Klub(TX)	135,890	6		WB5SBH
Eastern Iowa DX Association	135,258	3		
Foothills Amateur Radio Society(CA)	110,548	6		AB6GNM
Farout Amateur Radio Club(OH)	100,890	3		
Neenah-Menasha ARC(WI)	98,446	3	AB9PYE	
West Jersey Radio Amateurs	97,304	3		WB2LBT
Hellgate Amateur Radio Club(MT)	95,668	4	K7CTI	
Delaware Amateur Radio Club	95,508	4		
Acadia Naval Radio Amateur Club(ME)	94,920	4		
Murray State University ARC(KY)	91,720	4		
Dayton Amateur Radio Association(OH)	78,938	5		WB8QXN
Reading Radio Club	78,308	6	K3DTD	WB3AAK
807 Club of Kokomo	73,458	3		W9KQD
Spokane Radio Amateurs	70,990	5		K7AWB
Chicago Radio Traffic Association	52,614	5	W9HPG	
Parma Radio Club(OH)	49,560	3		
Wellesley Amateur Radio Society	34,646	3	WA1TAK	
TARCOM(NY)	32,072	6		WA2EXI
Great South Bay ARC(NJ)	30,000	3		
West Park Radiops(OH)	23,828	5	WB8UFO	
Rip Van Winkle Amateur Radio Society	14,090	3		
Mobile Sixers Radio Club(PA)	6808	3		WB4BDD
Iolani School Radio Club(KH6)	6294	3		

Multi-operator, obviously. Proud pop WB8DQP takes time out from WB8JBM/8 SS operation to demonstrate proper keying technique to six-month-old Robby.

them listen during SS when 1000 stations are all on the same frequency at the same time. (WBØMCL) It took seven of us to put up the beam that smashed into the neighbor's fence, and four of us to find all the lost pieces. (WA4GNI) My first chance to enter an hf contest (been on 50 MHz since 1963). Wonder what effect the TV telecast of "Gone with the Wind" had on the last few hours of the contest? (WA5IYX) It occurred to me at the last minute that N6V was available for only two more weeks – Put it on in SS! So I did. Of course the call was the best part. Only one contact was lost as a result of "K6?" QSLs are available for N6V SS contacts from "Mojo," WB6DJP, Caltech 1-55, Pasadena, CA 91126. (N6V/WB6DJP)

we need to go back to the low-power multiplier again. This would encourage energy conservation. (W5QJH) Frustration is having to work the SS from the Novice bands, while awaiting your Advanced ticket in the mail. But was pleased at the invariably courteous attitudes of the other operators for QRS, fills, etc. Didn't find any bummers this trip! (WB6BYH) With the exception of Alaska, Rhode Island, Delaware, Mississippi and Tennessee, I worked every section I heard, and I didn't get a chance to call any of those except the KL7, who was buried in a pile of eager section hunters. Calling him with 100 watts and a wire antenna was like trying to work AC4YN in Tibet with a pair of semaphore flags from Chicago. (W1PWK) I sure wish I knew why the total number of calls on the dupe sheet doesn't add up to the amount of QSOs in the logs, just after I finished duping all my logs! (AA6DYZ) When anybody wonders why amateurs need their frequencies and maybe more, just have

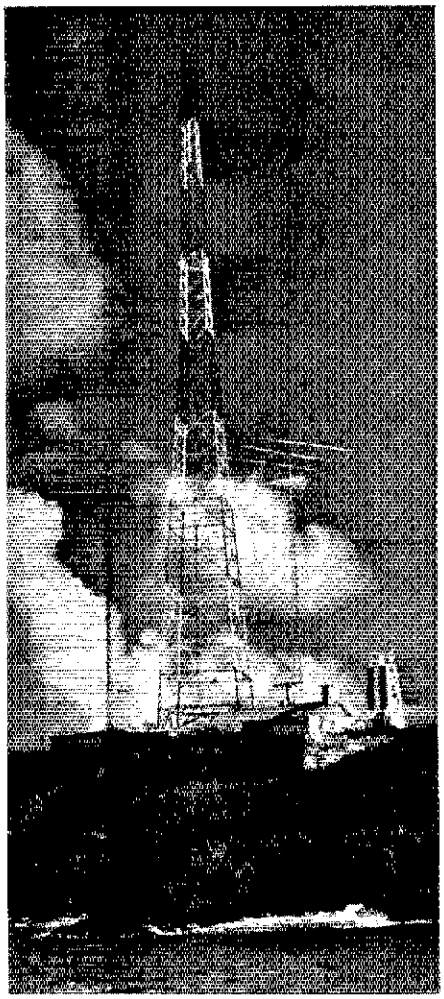
Top Ten

PHONE		*CW*	
WØTR	285,900	KV4FZ	193,500
KV4FZ	282,750	AA5LES	182,780
WA7NIN	262,950	KP4AST	182,304
WA7WXY	261,900	WA7NIN	172,950
WB2OEU	253,050	K4GSU	169,488
K5LWL	244,050	K6NA	167,608
WB5OOE	240,600	W5WMU	166,294
W7RM	239,850	WBØDJY	166,050
W5WMU	227,550	WB4AEX	163,688
WA1LNQ	225,450	W7IR	163,392

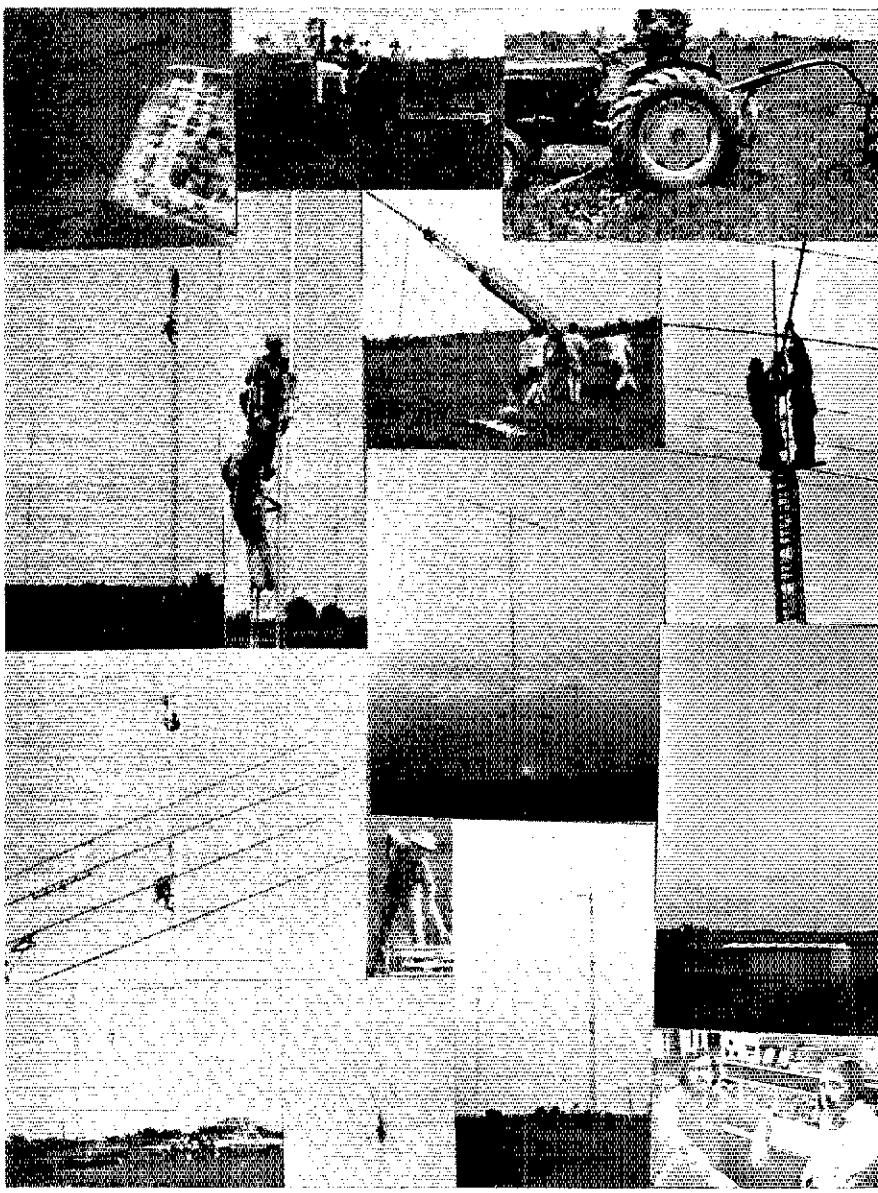
MRRC President and general go-getter K8RMK, in one of his more reflective moods.

All-Time High Power Leaders

CW				*PHONE*		
W3LPL	159,432	76	Atlantic	W3KWB	204,150	7
W9YT	154,800	74	Central	WA9BWY	216,450	7
WAØONL	145,692	76	Dakota	WAØONL	219,150	7
W5WMU	166,294	76	Delta	W5WMU	227,550	7
K4GSU	169,488	76	Great Lakes	WA8PLZ	213,014	7
WA2UOO	161,476	76	Hudson	WB2OEU	253,050	7
KØGXR	134,550	74	Midwest	KØGXR	180,310	7
W1FBY	160,284	76	New England	WA1LNQ	225,450	7
W7RM	168,150	74	Northwestern	WA7WXY	261,900	7
WA7NIN	172,950	76	Pacific	WA7NIN	262,950	7
W4KFC	156,859	65	Roanoke	K4YF	214,950	7
WBØDJY	166,050	76	Rocky Mtn.	WØTR	285,900	7
KV4FZ	193,500	76	Southeastern	KV4FZ	282,750	7
W6RR	172,350	74	Southwestern	W6HX	253,200	7
AA5LES	182,780	76	West Gulf	K5LWL	244,050	7
VE7CC	145,562	76	Canadian	VE5DX	185,100	7



Number one on cw, number two on phone, but who cares about contests? This is your ham radio location of the year, KV4FZ in the U.S. Virgin Islands. K7VPF managed to ignore the blue sky, the sunshine, the natives and the blue Atlantic long enough to operate a couple of November SS weekends from this majestic site.



Building winning antennas for WA5LES and hired-gun K5LWL (l-r, bottom right photo) is no easy task, as the above pictures taken over seven months of labor by some forty helpers, indicate.

For the first time since SS no. 1, I was able to work all sections on both modes in one year. (W6BIP) This was my first time at it . . . was insane . . . no stations sent slower than 40 wpm . . . if I sent slow, I was ignored . . . If I sent fast, I was too sloppy to copy . . . All the high-power sigs buried by 160 watts . . . I sprained my wrist . . . I loved it. (WA4FMA) If ARRL wants to move Hq. to a different spot, I vote for NWT. (W1ERW) Thank goodness for the demise of the Bicentennial calls! (VE3GD) Got so sleepy that I started copying all QSOs as ZZZZZZZZ! (WB5PTE) Worked 74 sections. Haven't watched Walter Cronkite lately. Did we give up the Canal Zone to the Panamanians? (WA1WEM) Suggestion on the dupe sheets. Put a designation on them for WD call signs so you will have one uniform symbol for these calls. (WB9PIR) If my score keeps increasing as it has for the past few years, in 25 years, watch out! (WB2FRH) Now why would a grown man stay up half the night, smoke six packs of cigarettes, develop "brass wrist," a sore back a ruin his nervous system? (WB9VR The Extra portion of the bands are n

Clean Sweep Phone

WA1LNQ	W8FAW/4	W7CB/6	W8SWB	W1DGL/1*
WA1QNF	W4YUU	K6LL/6	K8MFO	K1KDP*
WA1JZC	W1FCC/4	WB6EDM/6	WB8URN	WB2MZU*
WA1STN	K4PJ	WB6AIN	WB9HAD	K3CR*
W1CF	K4YF	W6OKK	WA9PBK	W3KWH*
W1ZA	W3ZKH/4	AA6PGB	K9BGL	W4AQL*
W1RR	W4WSF	WB6LPK	WB9BWU	WA4EJX*
W1UQ	W4QCW	K6NA	WB9DZS	W4BVV*
W5UDK/1	KV4FZ	W6KQG	WA9NVF	K4VT*
K1RQE	W5WMU	K7JVR	W9GT	W4DM*
K1GQ	WB5LZC	WA7WXY	WA9IXF	KØDX/4*
WA1ABW	WB5OOE	WA7NIN	K9HDE	AA5RXT*
WB2OEU	W5TMN	W7TML	WA9BWY	K6AUC*
WB2VFT	K5RHZ	W7RM	K9CDB	K6ZM*
K3DPQ	WA5UCT	W7BUN	K9KGA	WA6GFY*
K3AWZ	K5LWL	K8IDE	WØTR	W6BIP*
K5JZN/3	K6RV	WA8QEF	WBØLLR	KH6GQW*
W3KWB	K6HIH	WA8MOA	WBØMIV	K9HDZ*
W3GRF	W6RGG	WB8BGY	WØQWS	WØQQQ*
AC3USS	W6RJ	W8BNF	WAØONL	*Multi-operator
W3AZD	K6AC	WA8YWX	VE5DX	
K3ZAW	WB6YBL	WB8UKX	VE7WJ	
WA3SXH	W6SVN			

Clean Sweep CW

K1ZND	WA7NIN(W6OAT,opr.)	W4UPJ*
K4PJ	W7TML	K6ZM*
KV4FZ	K7RA	W6YX*
WA5RTG	W8OK	W6BIP*
W6UA	W8DB	*Multi-operator
W6IZU(WA6TLV,opr.)	WBØDJY	
WB6KBK		

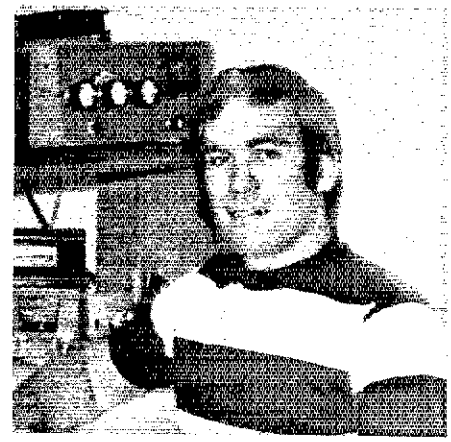
All-Time Low Power Leaders

CW				*PHONE*		
WA3SWF	115,632	76	Atlantic	WA3TBW	124,960	76
WB9GFC	128,772	74	Central	WB9GFC	129,940	74
WAØBWM	100,110	72	Delta	WB		
WB9GFC	128,772	74	Central	WB9GFC	129,940	74
WAØBWM	100,110	72	Dakota	WBØDSP	122,850	72
WA5VDH	129,940	76	Delta	WA5VDH	179,400	75
W8CQN	137,492	74	Great Lakes	W8TR	117,718	76
WB2RJJ	111,024	73	Hudson	WA2LBT	96,652	76
WAØPAO	108,478	76	Midwest	KØCVA	120,000	75
WA1QNF	101,762	74	New England	K1EUF	152,144	71
W7YTN	95,904	76	Northwestern	W7CFL	114,300	71
K6SSJ	106,042	73	Pacific	K7JCA/6	153,825	73
W4WSF	103,222	76	Roanoke	K4PQL	138,380	74
WBØDLE	113,040	72	Rocky Mtn.	WBØMIV	176,100	76
K4VFY	108,914	76	Southeastern	K4WAR	119,550	69
K6LKD	115,344	74	Southwestern	WB6PXP	136,656	75
K5RHZ	117,216	70	West Gulf	K5RHZ	148,000	70
VE2AXW	71,994	74	Canadian	VE6ATT	84,180	76

for us QRP types, as the QRM is light and a few contacts, particularly on 80 can be made there. (WA6UAV) Since I'm working on 5BWAS, I was hoping that 10 meters might open up during the contest (I need most of my remaining states on 10). I did listen on several occasions during the contest, but heard no activity. Also, 15 was open nicely here around 1930Z on Sunday, at which time I worked both coasts as well as old reliable, KH6IJ. (WBØINQ) Very pleased to hear the courtesy shown to ragchewers. There really is room for all of us. (WBØTFM)

Scores

Scores (beginning next page) are grouped by call area, ARRL section, and in order from highest to lowest score; single-operator stations first and multi-operator second. The letter "A" or "B" at the end of each line score indicates the power class of the entry. Example: W1FBY 160,284 – 1083 – 74 – 24 – B means 160,284 total points, 1083 contacts, 74 sections, 24 hours of operation, power over 200 watts. Asterisks denote full-time Headquarters staff members, not eligible for awards when operating their own station or that of another staff member.



Steve, WB4FEC, produced one of *five* 100k cw scores from North Florida in 1976.

College/University Club Station Scores
(multi-operator entries only)

CALL	*SCHOOL*	*TOTAL SCORE*	*CALL*	*SCHOOL*	*TOTAL SCORE*
W6YX	Stanford University	305,864	WA2NPQ	State Univ. of NY - Buffalo	106,582
WØQQQ	Kansas State Univ.	304,392	WA6IMY	Univ. of Cal. at Davis	104,976
W4AQL	Georgia Tech.	257,082	W9YB	Purdue Univ.	104,256
W2SZ	Rensselaer Poly. Inst.	230,718	K2MFF	Newark College of Engineering	88,750
K3CR	Penn. State	229,240	W1MX	Mass. Institute of Tech.	88,622
W4EAL	Univ. of Tennessee	174,020	WBØOKX	Missouri West. State College	74,256
W8LT	Ohio State	164,872	WØYC	Univ. of Minnesota	65,412
AC5AC	Texas A and M Univ.	161,914	W7YH	Washington State Univ.	63,616
WØZLN	Univ. of Missouri	147,168	WB4BNH	Univ. of South Florida	57,728
K2GXT	Rochester Inst. of Tech. (NY)	139,034	W3MGF	Drexel Univ. (PA)	41,168
W1YK	Worcester Poly. Inst. (MA)	125,954	W6BB	Univ. of Calif. at Berkeley	24,378
K1AD	Brown Univ. (RI)	118,432	W9JWC	Bradley Univ. (IL)	23,632
WØEEE	Univ. of Missouri - Rolla	110,260	W5YJ	Oklahoma State Univ.	532
WB5AXC	Univ. of New Mexico	109,872	K4FAU	Florida Atlantic Univ.	180

CW Scores

U.S.A.

1

CONNECTICUT

W1FBY * 160,284-1083-74-24-B
W1ZM(WA2CLQ,opr.) 154,068-1041-74-24-B
K1ZND * 144,600- 964-75-24-B
WA1LNQ * 144,144-1001-72-24-B
W1CW(WA1NNC,opr.) 139,968- 972-72-24-B
W1GNC * 136,604- 923-74-24-B
WA1MAO(WA1NRF,opr.) 135,568- 916-74-24-B
WA1JZC 129,504- 912-71-24-B
WA1QNF 122,202- 837-73-24-B
WA1QZH 112,038- 789-71-23-B
K1TZD(WA1OCU,opr.) 102,408- 753-68-23-B
W1DGL/1 101,664- 706-72-24-A
WA1KOC 96,134- 677-71-24-B
W1GPK 91,664- 674-68-22-B
WA1WVK * 81,472- 608-67-24-A
W1BIH 80,496- 559-72-15-B
WA1UWR 73,834- 551-67-20-B
WA1SSH 66,960- 465-72-16-A
W1GNR 57,820- 413-70-24-A
W1ECH 33,356- 269-62- 8-A
W1TCJ 33,000- 300-55-12-B
K1KRY 30,276- 261-58-15-A
W1VV 29,760- 248-60- 7-B
W1HDF 29,028- 246-59-19-A
AA1UAC 28,800- 240-60-22-B
W1ODY 27,784- 302-46-21-A
WA1AHI * 23,370- 205-57- 9-A
W1VH 22,550- 205-55-14-B
K1THQ/1 22,442- 229-49- 8-A
WA4FIB/1 * 15,960- 140-57- 9-A
WA1NSW 15,300- 153-50- 9-A
WA1VGP 11,552- 152-38- 8-A
WA1DZR 8610- 123-35-12-A
WA1VVA 7722- 117-33-11-A
WA1YDK 6930- 105-33-18-A
W1KAM 6534- 99-33- 7-B
W1FFR 3000- 50-30- 4-A
WA1NKK 1444- 38-19- 2-B
WA1NLD 1302- 31-21- 1-B
WA1FCN 960- 30-16- 6-A
WA9AUM/1 * 408- 17-12- 1-A
WA1OBY(WA1QGC,opr.) 64- 8- 4- 1-A
WA1HRC(WA1s SHX,TUT,VML, VMN,oprs.) 22,680- 210-54-17-A
W1DQJ(+WA1WTB) 18,616- 179-52-13-A
WA1YWS(+WA1YWT) 4144- 74-28-23-A

EASTERN MASSACHUSETTS

WA1JUY(WA2LQZ,opr.) 156,960-1090-72-24-B
W1DAL 135,610- 955-71-24-B
W1AF(WA1UIK,opr.) 125,670- 885-71-23-B
W1ZA(K1LPA,opr.) 118,844- 814-73-24-B
W5UOK/1 87,162- 597-73-16-B
WA1MJD 84,534- 579-73-19-A
WA1VMU(WB2OYV,opr.) 84,096- 584-72-18-B
W1WAI 71,944- 529-68-13-B
WT1AAF 71,568- 504-71-22-B
W1DLF 69,810- 537-65-23-A
W1CMH 66,240- 480-69-13-B
WA1EOT 57,552- 436-66-12-B
W1AX 46,900- 350-67- 8-B
WA1SNR 44,032- 344-64-20-A
W1FMZ 43,036- 371-58-24-A
WA1UGJ 24,940- 215-58-11-A
W1RND 22,680- 210-54-12-A
K1FIR 22,572- 209-54-11-B
W1NJL 20,160- 180-56- 7-A
AC1PL 13,674- 129-53- 7-A
WA1TAK 11,804- 227-26-19-A
WA1UTJ 11,610- 135-43-12-A
WA1PQY 11,232- 156-36- 8-A
W1PLJ 9856- 112-44-12-B
WA1KAJ 9840- 123-40-17-A
WA1UJU 7440- 120-31-16-A
WA1RGW 7200- 100-36- 6-B
WA1RLI 7134- 123-29- 8-A
K1PTE 5120- 80-32-11-A
WA1ZAZ 4756- 82-29-11-A
W1OPJ 2832- 59-24-12-A
WA1NME 2080- 40-26- 7-A
W1DMH 1452- 33-22- 4-B
WA1UWF 840- 28-15- 3-A
W1MX(WA1RJX,WA2DRC,WB2s, FUH,MZE,oprs.) 88,622- 607-73-21-B
K1VVC(+K1AZE,W1OL) 26,432- 236-56-22-B
W1YN(+K1OME) 21,600- 240-45- 6-B
W1FY(W1BU,WA1s,MRJ,VFJ,oprs.) 8500- 125-34-21-A

MAINE

WA1IJV 100,878- 731-69-22-B
K1SWK 70,686- 561-63-24-A
AA1FCM 64,736- 476-68-20-A
WA2HSP/1 53,436- 366-73-21-A
K1RQE 37,522- 257-73- 6-B
W1ERW 33,152- 224-74-18-A
W1SD 30,954- 231-67-14-A
W1FS 3944- 68-29- 4-A
WA1ZAX 192- 12- 8-10-A
K1NAN(WA1YUZ,WN1YZQ,WA2s, ERT,HSP,WB3BOK,WB5CQE, WB8UHU,oprs.) 17,100- 171-50-21-B

NEW HAMPSHIRE

WA1ABV 145,008-1007-72-24-B
K1WJD(K1GQ,opr.) 143,360-1024-70-24-B
WA1RFI 73,840- 520-71-23-A
K1QLZ 46,056- 404-57-24-B
W1HWB 39,312- 351-56-24-A
K1FWE 34,524- 274-63-13-B
W1DXB 30,240- 270-56- 9-B
WA1MZV 28,500- 250-57-17-A
WA1RHA 24,786- 243-51- 5-B
WA1VOG 20,600- 206-50-20-A
K1NH 12,480- 130-48- 7-A
WA1VKM 12,000- 150-40-15-A
W1FMF 1044- 29-18- 3-A

RHODE ISLAND

K1GMW 116,440- 820-71-24-B
WA1IJC 66,000- 500-66-19-A
WA1POJ 23,370- 205-57- 6-A
WA1YKW 4293- 74-29-17-A
K1AD(WB2FCD,WB4TCD,oprs.) 34,928- 296-59- 8-B

VERMONT

W1AYK 85,136- 626-68-20-B
K1IIK 68,474- 511-67-14-B
W1KQ 25,092- 246-51-15-B
K1VTF 19,800- 198-50- 9-B
WB2JSJ/1 7316- 118-31- 7-A

WESTERN MASSACHUSETTS

WA1ABW 141,984- 986-72-24-B
W1DKU 97,554- 687-71-24-A
WA1PZM 53,816- 434-62-20-A
W1DUK 45,110- 347-65-18-A
W1TM 28,952- 329-44-14-B
AA1FBX 20,640- 215-48-15-B
WA1LMZ 19,082- 203-47-21-A
WA1TAI 12,100- 121-50-10-A
W1PWK 11,220- 102-55-13-A
K1KDP 6800- 100-34- 4-B
AA1YXL 2808- 54-26- 9-A
K1KNQ 1776- 37-24- 3-B

2

EASTERN NEW YORK

WB2OEU 127,584- 886-72-24-B
W2AZO 120,158- 823-73-24-B
W2HHC 104,832- 728-72-23-B
W2HVA 76,822- 541-71-23-A
AA2HAI 64,800- 450-72-24-A
WA2UYL 53,298- 423-63-19-A
WB2QDP 45,440- 355-64-24-A
K2TTG 45,024- 336-67-20-A
WB2ALX 44,380- 317-70-22-B
AA2YYM 42,700- 350-61-22-A
WB2DXL 41,328- 328-63-16-B
WB2WQA 37,088- 304-61-17-A
W2FPG 33,152- 259-64-11-B
AB2BXL 30,912- 276-56-12-B
K2HA 21,010- 191-55-11-A
WB2CFP 18,768- 184-51-19-B
WA2WAE 17,296- 184-47- 9-A
AA2MBB 12,420- 135-46-16-A
WA2CJY 10,296- 117-44- 9-A
W2DW 6120- 85-36- 3-B
WA2EHV 5928- 76-39- 8-A
W2NRD 3876- 57-34-10-A
WB2HTV 2688- 56-24- 6-A
WA2ZLQ 2352- 49-24- 6-A
W2FSL 2160- 45-24- 8-A
WA2UXR 1520- 40-19- 6-A
WA2WFH 442- 17-13- 1-A
W2SZ(multi-op) 112,858- 773-73-24-B
WB2ABJ/2(WA2s,EAF,EUQ,GGK, GGM,GXK,YLN,WB2s,EGU,WBO, WN2EYB,oprs.) 7120- 89-40-24-A

N.Y.C.-L.I.

WB2PYM 111,470- 785-71-20-B
W2FVS 107,712- 748-72-23-B
WA2YHK 101,956- 718-71-24-B
AB2SJG 101,616- 696-73-24-A
K2AU 98,404- 674-73-24-B
AB2DZZ 87,500- 625-70-22-A
WB2HZH 83,860- 599-70-24-A
K2HVN 74,592- 518-72-21-B
WB2FKF 67,060- 479-70-19-A
WA2WKH 65,700- 450-73-19-A
W2AIR(WA1MHJ,opr.) 50,440- 388-65-13-B
WB2EHM 40,194- 319-63-19-A
K2KD 39,960- 333-60-18-B
K2YGM 26,096- 233-56-14-A
W2GKZ 23,546- 193-61- 7-B
W2MDM 23,328- 216-54-10-B
WA2ZGR 22,962- 267-43-10-B
WB2LWE 21,730- 205-53-19-A
W2DUS 10,028- 109-46- 5-A
WA4YPT/2 7600- 100-38- 3-B
WA2SRH 7520- 94-40- 9-A
WA2URD 1386- 33-21- 3-A
WB2HRB 50- 5- 5- 3-A
WA2FFQ/2(+WA2CSR) 10,184- 134-38-23-A

NORTHERN NEW JERSEY

WA2UOO 161,476-1106-73-24-B
W2YD(WA2SRQ,opr.) 155,782-1067-73-24-B
WA2NPP(WB2FLF,opr.) 139,104- 966-72-23-B
WB2FIT 120,888- 828-73-24-B
WA2SZQ 96,460- 689-70-24-B
W2SHM 90,144- 626-72-17-B
AB2RJJ 87,454- 599-73-15-B
AC2HTR 64,042- 451-71-22-B
WA2SLF(AB2ASD,opr.) 59,520- 496-60-23-A
AB2FUE 49,010- 377-65-23-B
WB2FRH 41,990- 323-65-21-A
W2BSC(WA2NTI,opr.) 37,230- 365-51-16-B
WB2ARS 37,128- 273-68-22-B
W2ZZ 33,916- 278-61-11-B
WA2IRS 32,818- 269-61-12-A
WB2FGZ 30,114- 239-63-24-A
AB2CST 29,400- 300-49-18-B
WB2POG 27,588- 242-57-11-A
AB2VFT 25,600- 200-64-13-A
WA2LHA 24,426- 207-59-17-A
AB2ZCI 23,968- 214-56-15-B
K2TWK 22,550- 205-55-17-A
AA2AYY 18,810- 209-45-18-A
WA2HSK 17,600- 200-44-18-A
WB2DFO 16,800- 200-42-18-A
WB2SZO 14,288- 152-47- 6-B
F3VN/W2 12,348- 126-49-11-A
W2HN 8910- 99-45- 5-A
WB2GZC 7260- 121-30-21-A
W2HR 5712- 102-28- 7-A
AB2VTT 2880- 48-30- 2-A
K2PTI 2250- 45-25- 4-A
WA2ICK 1716- 39-22-18-A
K2RF 598- 23-13- 2-A
WA2GZN 144- 9- 8- 7-A

SOUTHERN NEW JERSEY

K2JOC 127,750- 875-73-24-B
W2REH 122,688- 852-72-20-B
W2LYL 110,592- 768-72-24-B
WA2VYA 81,360- 565-72-19-B
AB2BYU 56,984- 419-68-23-A
W2PAU 56,810- 436-65-18-B
W2ESX 54,252- 411-66-22-B
K2TD 52,272- 396-66-17-B
WB2OSQ 43,810- 337-65-13-B
W2EA 43,722- 347-63-22-A
WA2LBT 40,656- 308-66-13-B
WA2AEJ 34,692- 294-59-15-B
W1DRN/2 34,160- 280-61-12-B
AB2BVV 31,560- 263-60-16-B
WA2DQM 30,552- 268-57-18-B
W2HVO 26,596- 218-61-11-A
W2FBF 25,500- 250-51- 7-B
W2EPA 25,164- 233-54- 9-B
WA2AZO 23,920- 184-65-10-A
K2HPV 19,890- 221-45-18-A
W2UI 17,238- 169-51- 8-A
WA2HEP 16,728- 204-41-21-A
W2REB 13,072- 172-38-11-A
WA2NEQ 12,060- 134-45-14-A
WA2YEM 10,080- 120-42-13-A
AA2VKG 9324- 126-37-12-A
AD2SBW 7524- 99-38- 6-A
WB2UVB 7480- 110-34-10-A
W2FGY 5624- 76-37-15-B
WA2HXG 4644- 86-27-11-A
K2QXQ 4420- 85-26-19-A
WA2WJL 3016- 58-26- 9-A
W3DUC/2 2310- 55-21- 6-A
WB2VLD 1806- 43-21- 8-B
W2GND 1536- 32-24- 4-A
W2SDB 1054- 31-17- 3-A
W2OGZ 870- 29-15- 7-A
K2AGB 350- 25-27- 9-A
WA2DUE 800- 25-16-12-A
WA7UJW/2 12- 3- 2- 1-A
K2FT(+W2NEA) 42,344- 316-67-10-B

WESTERN NEW YORK

K2KIR 153,154-1049-73-24-B
WA2LCC 116,760- 834-70-24-B
WA2SON 85,120- 608-70-20-B
W2FZK 85,000- 625-68-16-B
WA2QXA 73,296- 509-72-20-B
AB2ABD 72,100- 515-70-19-A
WA2WDE 71,690- 535-67-22-A
WB2THS 66,330- 495-67-12-B
WA2ZRI 60,102- 477-63-24-B
WA2MBM 58,788- 426-69-15-B
WB2ZOW 51,322- 383-67-19-A
K2HYM/2 44,488- 332-67-15-B
WB2SMP 43,296- 328-66-19-B
WB2EXL 42,250- 325-65-20-A
AA2QKF 33,728- 272-62-21-A
AA2DKF 32,294- 241-67-22-A
W2FTY 32,016- 232-69-21-A
AA2AOG 22,770- 207-55- 6-A
WA2EYA 22,154- 209-53-24-A
K2OVF 13,974- 137-51-11-A
WB2DRT 10,570- 151-35-24-A
AA2EAH 5304- 78-34- 2-B
K2UAN 4080- 85-24- 8-A
WB2YQH 1380- 30-23- 3-A
WB2HPC 1178- 31-19-13-A
WA2DBV 1160- 29-20- 4-A
WB2EJO 1116- 31-18-12-A
WA2AFQ 1024- 32-16- 6-A
WA2IMG 950- 25-19- 5-A
WA2BSE 700- 25-14- 4-A
WA2GXV 630- 21-15- 9-A
WA2RIC 300- 15-10- 4-A
K2GXT(WA1RYL,WA2FQE,oprs.) 72,380- 517-70-22-B
WA2SEY/2(+WA2ZKD,WB2KAO) 64,896- 507-64-20-B
WA2NPQ(WA2s,EQW,ICU,WB2s, EYO,HOY,oprs.) 56,950- 425-67-11-B
WA2AVQ(+WB2AUD) 30,240- 270-56-23-A
WA2DHZ(+WA2FEJ) 4736- 74-32-15-A

3

DELAWARE

W4FRO/3 67,824- 471-72-23-A
K3HBP 25,830- 205-63-12-B
AD3YHR 6750- 75-45- 4-A
WA3QFF 4320- 60-36- 4-B
K3KAJ 1716- 39-22- 2-A

EASTERN PENNSYLVANIA

W3ABT(W3IFG,opr.) 128,880- 895-72-24-B
K3DZB 99,260- 709-70-19-B
K3DPQ 88,608- 624-71-21-B
AC3ARK 56,000- 400-70-19-A
WA3JYB 54,808- 403-68-22-A
AB3AJL 53,760- 420-64-16-A
W3GRW 49,400- 380-65-21-B
K3OMP 48,510- 385-63-19-A
K3EGE 35,190- 285-67-15-A
WA3NAF 37,380- 267-70- 9-A
WB3AND 36,594- 321-57-22-A
K3HTZ 29,110- 205-71-12-B
W3ADE 28,990- 223-65-14-B
K3DTD 24,510- 215-57-13-B
WN3DCT 22,896- 216-53-20-A
WA3ABN 22,672- 218-52-17-A
W3CLM 22,000- 200-55-17-B
W3CNS 20,900- 190-55-11-A
W3BGN 18,144- 168-54- 7-A
K3TVT 18,032- 161-56-16-A
WA3ZXI 17,284- 149-58-15-A
WA3MKB 15,402- 151-51-21-A
WB3CBI 12,464- 152-41-19-A
WA3WMF 12,348- 147-42-10-A
WB3AAL 11,750- 125-47-15-A
K3FCM 10,374- 133-39-18-A
WA3WQP 7360- 115-32-10-A
WB3CAC 2700- 50-27-11-A
AB3CTU 2200- 50-22-13-A
WA3ZBR 1054- 31-17- 6-A
WB3BGA 588- 21-14-19-A
W3QS 160- 10- 8- 4-A
WA3OVH 80- 8- 5- 3-A
WA3RCA(WA3s,SZD,WLH,NHO, oprs.) 63,248- 472-67-23-A
W3MGF(AA3s,SXU,YDZ,oprs.) 41,168- 332-62-15-B

MARYLAND-D.C.

W3LPL 159,432-1092-73-24-B
K3ZO 134,784- 936-72-21-B
W3KWB(WB3AJQ,opr.) 133,298- 913-73-24-B
K3BNS(K3OAE,opr.) 131,692- 902-73-24-B
K3WX(W3ADT,opr.) 129,648- 888-73-24-B
AC3IN 117,292- 826-71-23-B
W3CRE(WA3GVP,opr.) 116,070- 795-73-24-B
W3AZD(WA3GUI,opr.) 114,168- 804-71-24-B
K3NPV 108,632- 734-74-17-B
K3ZAW 107,300- 725-74-21-B
W1FLM/3 91,140- 651-70-24-A
W3PZW 89,244- 603-74-18-B
W3GRF 82,320- 588-70-16-B
W3BQV 72,988- 514-71-14-B
W3AZ 69,088- 508-68-20-B
W3TOS 68,608- 512-67-22-A
K3CQ 65,000- 500-65-19-B
K2PLF/3 64,990- 485-67-24-A
AA3KOC 58,380- 417-70-20-A
K3AV 56,140- 401-70-20-B
AA3YMA 55,440- 440-63-17-A
W3FA 51,348- 389-66-15-B
K3HPG 49,248- 342-72-15-A
AA3UHJ 48,132- 382-63-16-A
W3GZQ 46,992- 356-66-17-B
K3JET 45,260- 310-73-16-A
WA3VPI 44,604- 354-63-22-B
K3RS 43,676- 358-61-14-B
AA3AFQ 40,612- 286-71-10-B
W3EAX(WA3TOE,opr.) 39,678- 389-51-19-B
W1NJX/3 39,162- 321-61-17-A
W3IHM 39,000- 325-60-10-B
K3URZ 36,190- 329-55-10-A
WB9AMC/3 32,944- 284-58-17-A
W3FCI 29,640- 247-60-14-B
K3CKT 29,280- 244-60- 7-B
W3IDT 26,104- 251-52-19-A
W3HVM 26,040- 210-62-10-B
W3ERG 24,824- 214-58-16-A
K2SCU/3 24,128- 208-58-22-A
WA3EOQ/3 23,400- 225-52-13-B
WB3AVN 22,700- 227-50- 6-B
WA3QQQ 22,572- 204-54-16-A
WB2JYM/3 20,832- 217-48- 7-B
K3YOF 20,246- 191-53-12-A
K3TLX 20,178- 171-59-14-A
K3PZE 19,698- 201-49-14-B
WA3ZAS 17,958- 219-41- 6-B
AA3THO 16,638- 177-47-15-A
AC5TWT/3 15,700- 157-50- 9-A
W3EE 14,734- 139-53-15-A
W3TN 14,100- 150-47-16-A
W3GZP 10,488- 114-46- 7-B
W3HVQ 8908- 131-34-10-B
WA3SLW 7980- 105-38- 4-A
WB3BUL 5952- 93-32-18-A
WA3DYP/3 5568- 96-29-11-A
WB3CJO 4736- 74-32-22-A
WA3YSW 4080- 68-30-11-A
WB3DHA 3780- 70-27- 8-A
WA3ZAK 3534- 57-31- 9-A
W3KA 2400- 50-24- 5-A
W3ML 2080- 52-20- 2-B
WB3CGI 360- 15-12- 4-B
W3NN 220- 11-10- 4-A
WB3DTQ 216- 12- 9-11-A
W3RIL 2- 1- 1- 1-B
K3GJD(+K3CU) 109,372- 739-74-22-B
WA3TOE(+K3OCN,WA3ECT, oprs.+Net) 66,452- 449-74-22-B
WB3CEE(+WB3CEF) 546- 21-13- 8-A

WESTERN PENNSYLVANIA

WA3WIK(WA3SZX,opr.) 154,468-1058-73-24-B
WA3SWF 115,632- 803-72-24-A
WA3KOS 76,866- 557-69-20-A
WA3JGY 60,984- 462-66-23-A
K3VXV 51,800- 370-70-17-A
K3DMG 42,368- 331-64-13-B
K3BSY 41,088- 321-64-11-B
W3HNH 38,430- 315-61-17-A
W3HDH 37,800- 270-70- 9-B
W3GNR 37,260- 270-69-17-A
WA3MDY 33,000- 300-55-19-A
K3MUB 29,036- 238-61-16-A
WB3AXN 28,000- 250-55-18-A
WA3UNX 16,280- 220-37-18-A
WA3KYC 14,832- 206-36-20-A
WB3AYZ 13,872- 136-51-14-A
WA3WSC 12,544- 128-49- 9-A
WA3HHC 11,336- 109-52-12-B
WA3SXC 8080- 101-40-10-B
WB3CCU 3504- 73-24-21-A
WB3CDD/3 3074- 53-29-15-A
W3KQD 1840- 40-23- 5-A
WB3CLW 1008- 28-18- 9-A
K3CR(WA3s,JFW,NQX,QLG, WN3DCJ,oprs.) 85,540- 611-70-24-B

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ALABAMA

WB4JNL 56,496- 428-66-22-A
K4JED 42,408- 342-62-16-A
WB4NLK 40,832- 319-64-21-A
K4ZGB 23,436- 217-54-14-A
AB4UNM 20,240- 220-46-13-A
W8FAW/4 16,356- 141-58- 4-A
K4JYO 3904- 61-32- 2-B
WA4QBV 1554- 37-21-15-A
WB4OZN 928- 29-16- 9-A

GEORGIA

AD4BAI 124,468- 841-74-24-B
WB4LOK(WB4RWA,opr.) 98,258- 673-73-19-B
W4BTZ 77,616- 539-72-19-B
K4BAM 62,424- 459-68-22-A
WAØDGL/4 28,060- 230-61-12-A
W4LDD 23,544- 218-54-15-A
WB4DPM 22,914- 201-57-15-B
WB4DHC 17,820- 198-45-23-A
W4MGX 16,740- 155-54-13-A
WA3VJA/4 12,700- 127-50- 4-B
AC4GXW/4 12,240- 120-51-14-A
AA4IYB 8858- 103-43- 9-A
AC4LGM 1134- 27-21- 1-A
W4SHL 494- 19-13- 3-A
W4AQL(WB2APO,WA3VJA,WB4s, DNB,EHU,UKU,WA5UGF,WB8PKV oprs.) 98,832- 696-73-23-B
WB4MWC(+WB4UIH) 63,624- 482-66-18-B
W4DOC(K4SIQ,W4s,NJQ,WKP, WA4s,AZL,PZD,WB4s,AJS,HHX, HXE,MHO,oprs.) 9512- 116-41-24-B

KENTUCKY

K4GSU 169,488-1177-72-24-B
K4FU 75,456- 524-72-18-B
AB4FOT 33,972- 298-57-15-A
W4RIW 32,604- 286-57-20-B
WB4KTR 25,536- 224-57- 9-B
WA4EBN 17,808- 168-53-15-A
WA4LSD 10,340- 110-47-23-A
WB4NTB(WB4OEM,opr.) 6080- 80-38- 8-A
WA4UNJ 884- 26-17- 5-A
WB4LSG 352- 16-11-11-A

NORTH CAROLINA

W4NQA 105,000- 750-70-17-B
WA4FFW 95,756- 647-74-20-B
K4FOB 93,344- 679-68-23-A
W4TYE 77,090- 593-65-18-B
K4CAX 52,608- 411-64-12-B
WA4PSL 31,744- 256-62-16-A
W4OMW 23,940- 210-57-18-B
WA4BCN 23,184- 207-56-17-A
K4CBY 18,900- 225-42-12-B
K3OMI/4 14,040- 135-52-1
WA4FKY 4984- 89-28-1
WA4HRD 2300- 50-23-

NORTHERN FLORIDA

W4YUU 148,320-1032-72-2
AA4UFW 110,192- 776-71-2
K4VFY(WA4IMC,opr.) 108,914- 767-71-2
WB4SKI 107,136- 744-72-2
WB4FEC/4 106,120- 758-70-2
K4LAN 72,226- 539-67-1
K4IEX 39,942- 317-63-
AB4GHU 37,812- 274-69-1
WB4JCV 32,280- 269-60-1
K4JEM 28,980- 207-70-2
WA4BTC 22,990- 209-55-
WA4OEM 9374- 109-43-
WA4FMA 9328- 106-44-1
W4OFU(WB4AJL,opr.) 8954- 121-37-
WB4DTS 4536- 63-36-
WB4QBB 1554- 37-21-
WB4YFF(+WB4DRZ) 86,802- 629-69-2

SOUTH CAROLINA

WB4JZT 72,988- 514-71-2
K4OAQ 25,652- 242-53-1
W4NZR 25,536- 224-57-1
W4YJS 2744- 49-28-1

SOUTHERN FLORIDA

WB4AEX 163,688-1106-74-2
WB4OGW 122,988- 831-74-2
AC4QZF 117,096- 861-68-2
K4DAS 101,814- 717-71-2
AA4NFF 87,630- 635-69-2
AB5QDW/4 85,760- 640-67-
K4FMA 62,352- 433-72-2
K4JDC 44,616- 338-66-2
WA4GNI 42,840- 340-63-1
W4OD 36,270- 279-65-1
AA4KKE 23,142- 203-57-
WB4ECR 11,972- 146-41-1
AB4FLW 5688- 79-36-
WA4QQS 96- 8- 6-
AA4LZR(W4LKG,WA4FCT, WAØACF,oprs.) 82,080- 570-72-2
K4FAU(WA4UQA,WB4s,FLW,L oprs.) 180- 10- 9-

TENNESSEE

K4PUZ 163,082-1117-73-
W1FCC/4 125,504- 848-74-
K4AMC 85,680- 595-72-
K4PJ 72,300- 482-75-
W4LUH 51,840- 405-64-
K4HYF 34,036- 254-67-
WA4ELW 33,376- 298-56-
AB4WHE 31,964- 262-61-
WB4MUZ 29,770- 229-65-
WA4ZUI 29,040- 242-60-
AB4WFT 28,426- 233-61-
AA4JVO/4 16,224- 156-52-
WA4CMS 2554- 91-47-
WA4EVB 2162- 47-23-
W4OGG/4 50- 5- 5-
W4EAL(WB4s,LHK,RJF,oprs.) 64,120- 458-70-

VIRGINIA

K4VX(WB4SGV,opr.) 156,658-1073-73-
K4CFB 127,440- 885-72-
K4DTD 119,848- 844-71-
K4IAF 116,928- 812-72-
WA4TLB 116,298- 819-71-
W4KFC 108,864- 756-72-
W4DM 106,260- 759-70-
W4WSF 103,222- 707-73-
WB4BUL 103,222- 707-73-
K4CG(K3WUW,opr.) 100,640- 680-74-
W4YZC 88,914- 609-73-
K4GKD 85,968- 597-72-
W4HBK 78,810- 555-71-
W4UG 70,372- 482-73-
K4FOK 60,568- 452-67-
K4FJW 58,400- 475-62-
W3ZKH/4 56,950- 425-67-
K4JM 55,968- 424-66-
WA4KKP 51,606- 423-61-
K4KA 46,104- 339-68-
W4ZM 45,056- 352-64-
K4TM 40,740- 291-70-
W4NQV 38,528- 301-64-
K4WVT 38,186- 313-61-
K4JWD 30,256- 244-62-
W4FZG 29,768- 244-61-
W4GF 28,476- 226-63-
K4KDN 24,856- 239-52-
K4EJG 24,708- 213-58-
W4KXV 24,200- 220-55-
WB4SWE 23,870- 217-55
W4QCW 22,936- 188-61
W3IYL/4 22,770- 207-55
K4EBY 22,512- 201-56
AA4SHL 21,500- 215-50-
WA4FKK 19,200- 200-48-
WA4MJE 18,000- 200-45-
WA4GSA 16,400- 205-40-
WB4DBK 15,394- 179-43-
WB4YPT 13,900- 139-50-
W4KP 11,440- 130-44
CX1EK/AC4 11,280- 120-47-
WA4MSX 8976- 132-34
WA4UUX 8288- 112-37
WA4NTP 6120- 85-36
W4EZ 5562- 103-27
WB4PCH 4266- 79-27
WB4VEU 4140- 69-30
K4GEL 2464- 56-22
WB4EBV 2322- 43-27
WA4PZO/4 2142- 51-21
W4MYA 1672- 38-22
W4ZRJ 1470- 35-21
WA4PNS 1408- 32-22
K5CII/4 1224- 36-17
K4AW/4 896- 28-16
W4UPJ(+WA3HRV,WB4UKA) 111,450- 743-75
W4RX(+Net) 59,072- 416-71
WA4AXT(+WA4WKY) 16,826- 179-47
WA4OFW/4(multiop) 1360- 34-20

WEST INDIES

KV4FZ(K7VPF,opr.) 193,500-1290-75
KP4AST(KP4EAJ,opr.) 182,304-1266-72
KV4JY 47,628- 378-63

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ARKANSAS

WA5RTG 156,000-1040-75-24-B
WA5VDH 129,940-290-73-24-A

WA5RTG 156,000-1040-75-24-B
WA5VDH 129,940- 890-73-24-A
WA5SDT(WB8DCR,opr.) 116,480- 832-70-24-B
WA5HNN 93,800- 670-70-23-A
WB5NBC 67,620- 490-69-24-A
WB5STD 27,756- 257-54-15-A
W5FIJ 8600- 100-43- 7-B
WB5TGP 6216- 84-37-12-A
W5PGM 2600- 50-26- 7-A

LOUISIANA

W5WMU 166,294-1139-73-24-B
W5RTX 154,216-1042-74-24-B
WB5SNF 55,080- 405-68-22-A
W5OB 45,696- 336-68-18-B
W5WG 27,984- 212-66-18-A
WA5VQE 25,200- 225-56-12-A
WA2UMF/5 950- 25-19- 3-A

MISSISSIPPI

K5LUW 118,944- 826-72-24-B
K3OWN/5 99,400- 710-70-22-B

NEW MEXICO

WA5YTX 128,240- 916-70-21-B
W5QJH 102,200- 730-70-20-A
W5UQB 31,354- 257-61- 8-B
W5JOV 27,594- 219-63-17-A
AB5MVA 8910- 99-45-14-A
WB5PTE 8428- 98-43-14-A
WB5LZC 2550- 51-25- 3-A

NORTHERN TEXAS

W5TMN 135,272- 914-74-24-B
K5RHZ 126,806- 893-71-23-B
W5ZSX 124,468- 841-74-21-B
WB5AOF 116,928- 812-72-24-A
W5LUJ 89,836- 607-74-19-A
AA5QXD 88,704- 616-72-22-A
WA5UCT 84,774- 597-71-17-A
W5ONL 63,648- 468-68-14-B
W5UJI 51,240- 366-70-24-A
AB5RPU 31,752- 252-63-24-A
WB5SBH 28,080- 260-54-13-A
AB5AAR/5 26,040- 217-60- 6-A
W5VGF 25,288- 218-58-18-A
K5BDX 13,000- 125-52- 9-A
W5SOD 11,832- 116-51-15-A
WB5TJP 9102- 111-41-19-A
K5PXV 8652- 103-42-14-A
K5ERJ 8064- 96-42-15-B
W5QGZ 650- 25-13- 1-A
K5WIQ 32- 4- 4- 1-A
AA5RXT(+AB5JJE) 70,596- 477-74-15-B
WB5MWZ(+WB5PIP) 28,380- 258-55-20-B
WB5TYQ(+WB5RQQ) 15,040- 160-47-24-A
WB5TGK(+WA5TGF,WB5s,FLN, XTR,WB9NGA) 7396- 86-43-15-A

OKLAHOMA

AD5LUR 69,814- 521-67-20-B
W5CPI 33,858- 297-57-21-A
WB5QGE 21,660- 190-57-22-A
W5UYH 19,012- 194-49-14-A
W5LFS 17,052- 203-42-12-A
WB5OSM 570- 19-15- 4-A
W5AS 8- 2- 2- 1-A
WB5RLR(+WB5PVL) 45,440- 355-64-17-B
W5YJ(WB5s,CKQ,SKZ,oprs.) 532- 19-14- 2-A

SOUTHERN TEXAS

AA5LES 182,780-1235-74-24-B
W5AC(WB5OOW,opr.) 115,632- 792-73-24-A
W5SBX 111,444- 753-74-18-A
W5OIB 105,696- 734-72-20-B
W5WZQ 102,200- 730-70-13-B
W5BPF 87,188- 614-71-15-B
K5PEL 63,830- 491-65- 8-B
AA5TPO 60,852- 461-66-19-A
W5RPJ 46,410- 357-65-19-A
AA5WCT 41,416- 334-62-11-B
AB5NRH 30,438- 267-57-15-A
WA5HBP 28,060- 230-61-15-B
WA5MCU 26,352- 216-61-14-B
W5NR 25,074- 199-63- 9-B
WB5NDQ 23,112- 214-54-12-B
AA5WQF 21,528- 207-52- 4-B
W5RRR(W5TFC,opr.) 19,992- 204-49- 5-B
AB2UFG/5 17,576- 169-52- 7-A
K5EWJ 8118- 99-41- 6-A
K5YUR 5340- 89-30- 2-B
WA5TNX 5112- 71-36- 7-A
WA5IYX 1750- 35-25-15-B
WB5OKI 630- 21-15- 7-A

CANAL ZONE

KZ5FR 41,528- 358-58-12-A

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EAST BAY

WA6NGG 131,904- 916-72-24-B
WA6DIL 130,232- 892-73-22-B
WA6BMV 89,644- 614-73-24-B
W6RGG 85,104- 591-72-12-B
WB6OQT 79,662- 561-71-23-B
WA6TQK(K6RM,opr.) 75,260- 530-71-21-B
K6HIH 75,168- 522-72-13-B
AA6DYZ/6 65,520- 504-65-24-B
W1ARR/6 43,896- 354-62- 8-B
AA6BFL/6 31,720- 244-65-17-B
K6PJY 30,876- 249-62-15-A
W6MSB 29,264- 236-62-22-A
K6CCY(WB6JIK,opr.) 10,912- 124-44- 4-B
AD6CSL 10,000- 125-40-24-A
WA6UAV 4864- 76-32-10-A
W6RGZ 2350- 47-25- 8-B
WA6QCZ 2208- 46-24-11-A
WB6FXK 1748- 46-19-12-A
WB6HWT 1520- 38-20- 4-A
K6AUC(+K6ILM,WB6ION) 103,460- 739-70-23-B
K6ZM(+WB6s,BBC,HDH) 84,600- 564-75-24-B
WA6JUD(+W6YKM,WB6HDH) 68,160- 480-71-24-B
W6BSL(+WA6JUD,WB6DHH) 11,920- 149-40- -B

LOS ANGELES

W6RTT(WA6OTU,opr.) 134,828- 911-74-23-B
N6V(WB6DJP,opr.) 107,568- 747-72-24-B
K6MP 103,460- 739-70-18-B
W6AM(W6BHY,opr.) 99,680- 712-70-14-B
W6BVN(WB6KJI,opr.) 95,616- 664-72-22-B
W6DGH 74,148- 601-74-11-B
WA6SNK 66,500- 475-70-23-A
AA6EPQ 58,872- 446-66- 8-B
W6OEQ 55,074- 411-67-20-B
W6VPZ(WA6BIL,opr.) 47,450- 365-65-17-B
WB6YHE/6 46,280- 356-65-19-A
WB6KPN 45,126- 327-69-11-A

AA6AWF 44,720- 344-65-18-B
WB6CIA 36,366- 319-57-21-A
W6SVN 34,224- 276-62- 8-B
W6ET 33,792- 256-66-21-A
WA6PPZ 29,280- 240-61-14-A
AB6ZVC/6 28,710- 261-55- 6-B
K6BFK 24,662- 209-59-18-A
WA6FYW/6 22,154- 209-53-12-A
K6YFZ 16,308- 151-54-12-A
WB6ZWP 16,218- 159-51-18-A
AA6OWM 10,080- 105-48- 3-B
AB6KWU 8640- 108-40-21-A
WAØQNT/6 7140- 105-34- 7-A
W6NYB 6336- 88-36- 7-A
AC6RZ 5994- 81-37- 9-A
W6SVO 2650- 53-25-10-A
WB6JJE(+WA6PZL) 53,300- 410-65-19-A

ORANGE

WA6WZN(W6SOR,opr.) 88,768- 608-73-15-B
WA6WZO(W6SOR,opr.) 86,724- 594-73-15-B
KØGJD/6 82,800- 575-72-23-A
W6SOR(WB6JYQ,opr.) 71,264- 524-68-20-B
WA6RUS 26,912- 232-58- 8-B
WA6KHB 7280- 104-35-16-A
AB6AKR 6640- 83-40- 3-A
WB6GCF 5916- 87-34-18-A
AA6JFP 3360- 56-30- 6-A
K6CYX(+WA6JAH) 45,630- 351-65-19-B

SANTA BARBARA

AD6QPH 113,220- 765-74-24-B
W6UA 81,900- 546-75-17-B
W5TES/6 70,704- 491-72-22-B
W7CB/6 60,776- 428-71-16-B
AC6GEB 57,794- 407-71-17-B
W6KPJ 55,896- 411-68-24-A
WA6VBS 39,732- 301-66-15-A
W6PRP 34,100- 275-62- 7-B
AB6CWE 23,370- 205-57- 8-A
W6TU 19,032- 183-52-10-A
AA6LBP 17,784- 171-52- 7-B
W6MUL 17,600- 160-55-13-A
WA6KAC 10,878- 111-49- 8-B
WB6JXB/6 1216- 32-19- 9-A
WA6GVJ 884- 26-17- 5-A

SANTA CLARA VALLEY

W6J7U(WA6TLV,opr.) 139,500- 930-75-24-B
WB6AIN 134,904- 924-73-24-B
K6DC(K6STI,opr.) 126,688- 856-74-24-B
WB6KBK 109,950- 733-75-24-B
AA6DQM 109,728- 762-72-24-B
W6MUR(K6ZX,opr.) 108,484- 733-74-23-B
K6QZ/6 108,040- 730-74-23-B
W6OKK 102,860- 695-74-24-B
AA6MQS(WA6VEF,opr.) 98,208- 682-72-24-A
K6SSJ(WA6DGX,opr.) 97,200- 675-72-24-B
W6ASH 92,880- 645-72-23-B
K6HMO 90,374- 619-73-24-A
WA6CFJ 84,680- 580-73-24-A
K6BR 83,354- 587-71-17-B
WB6DSV 79,920- 555-72-18-B
K6QX 75,260- 530-71-17-B
W6IO 63,758- 449-71-22-A
W6HJP 52,268- 358-73-16-A
W6KZJ 51,888- 376-69-20-B
W6CF 48,824- 359-68- 9-B
WB6KSZ 46,670- 359-65-21-B
AB6HBT 42,478- 317-67-19-A
W6ICJ 40,788- 309-66-15-A
K6RU 36,530- 281-65-12-B
WB6RIU(AA6MQS,opr.) 32,596- 281-58-18-B
WA6FKK 29,388- 237-62-11-A
AD6MU 28,768- 232-62-16-A
WB6PCO 20,570- 187-55-14-A
K6BPB 18,920- 172-55-18-A
W6SUJ 13,200- 150-44-16-A
AB6GNM 12,408- 141-44-11-B
WA6ITV 12,136- 148-41-15-A
K6AYB 10,004- 122-41-22-A
WA6HJV 7992- 111-36-19-A
WB6CXS 7560- 105-36-10-A
W6DWJ 7310- 85-43-13-A
WA6DFM 6800- 100-34-12-A
W6ZRJ 6688- 88-38- 4-B
W6OCP 5824- 91-32- 3-B
K6LWT 3600- 50-36- 6-A
WB6HWQ 3420- 57-30- 4-A
WB6EDQ 2700- 50-27-10-A
WA6SFT 2160- 45-24- 1-B
WA6HAD 2040- 51-20-10-A
WB6RNU 1892- 43-22- 6-A
WB6BYH 1840- 46-20-12-A
WB6SHD/6 1476- 41-18-10-A
WB6MOF 1330- 35-19- 4-A
WB6AAJ 1248- 39-16- 5-B
W6SZN 1008- 28-18- 6-A
WB6EMR 930- 31-15- 1-A
AC6IRA 672- 21-16- 4-A
K5LZT/6 8- 2- 2- 1-A
W6YX(WB4SMA,WA6ITV,WB6s, RAL,ZUO,WA7s,MMK,MQX,oprs.) 118,200- 788-75-24-B
W6MSF(WB6LPK,WAØENP,oprs.) 114,404- 773-74-23-B
WA6UZA(K6EBB,WB6TRR,oprs.) 109,938- 753-73-23-B
K6MA(+WB6ZUI,VE3DXV) 78,526- 553-71-22-B
WB6PYI(+WA6s,CRI,HCI) 76,254- 537-71-21-B
K6EIH(+K6SMH) 49,504- 364-68-18-B
WB6WSL(K6s,OOK,SEM,W6s,FKF, IRA,WA6GSW,WB6s,AAJ,GSZ,JJX, KFO,MDX,POR,POT,UOC,oprs.) 44,088- 334-66-24-B
WA6NKK(K6SMH,WA6s,BZT,MIF, W7EID/7,K8SNX/8,VE7DBV/W6, oprs.) 43,722- 347-63-21-B

SAN DIEGO

K6NA 167,608-1148-73-24-B
WA6CXK 66,368- 488-68-19-B
AB6DPV 62,196- 438-71-15-A
K6PY 24,360- 210-58-20-A
W6IA 17,712- 164-54- 9-B
WA6ORJ/6 11,250- 125-45-14-A
K6KDE 2000- 40-25- 1-B

SAN FRANCISCO

W6KQG 111,398- 763-73-24-B
WB6NHF 61,632- 428-72-22-B
WB6BDL 47,838- 357-67-23-A
WA6NCV 30,256- 244-62-15-A
AB6ITN 7676- 101-38- 8-A
W6BIP(+WA6DJI) 97,050- 647-75-24-B
W6KHI(+W6RNF) 54,944- 404-68-24-B

SAN JOAQUIN VALLEY

K6PU(WB6CEP,opr.) 146,438-1004-73-24-B
AA6TVC(AB6PKA,opr.) 121,764- 834-73-23-B
W6PXG(WA6GSN,opr.) 65,008- 478-68-22-B
WB6YMO 39,996- 303-66-24-A
WA6JDB 36,332- 293-62-11-B
WB6ITM 28,920- 241-60-14-A
K6TG 28,080- 216-65-16-A
W6BVM 23,496- 178-66-11-A
K6YGS/6 17,380- 158-55-16-A
AA6IQZ 8496- 118-36-13-A
WB6KHR 1480- 37-20- 6-A
W6BYH 1000- 50-20- 1-B
WA6YAB 570- 19-15- 3-B
WB6WFQ 8- 2- 2- 1-B
K6AYA(+WA6OEC) 84,980- 607-70-21-B
WB6IUK(+WB6s,ATJ,TQS) 79,804- 562-71-24-B
WB6DYG(+W6PXG) 9200- 100-46- 6-A

SACRAMENTO VALLEY

AA6JVD 91,008- 632-72-24-B
W6ZGM 20,862- 171-61- 9-A
AC6KYA 10,780- 110-49- 5-B
WB6UWM 9292- 101-46- 8-A
WA6BRV 8568- 119-36-14-A
WA6GFX 8208- 108-38-13-B
WA6MSH/6 1178- 31-19-14-A
WA6OWH 126- 9- 7- 2-A
K6SG(+K6RLY) 86,052- 606-71-24-B

PACIFIC

KH6IJ 87,780- 627-70-19-B
KH6IJA 23,780- 205-58-13-A
KH6JFI 2288- 52-22- 5-B
KH6JBX 494- 19-13-10-A
KH6IEJ(+KH6JBX) 5760- 96-30-22-B
KH6IFY(multiop) 40- 5- 4- 5-A

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ARIZONA

W7IR 163,392-1104-74-24-B
W7ZMD 91,612- 619-74-21-B
WB7AEB 88,560- 615-72-23-A
W7YS 60,568- 452-67-22-A
K7JVR 45,264- 328-69-14-B
W7KPL 39,072- 296-66-21-A
K5KVK/7 28,800- 240-60-11-B
WA7WWH 24,360- 210-55-10-A
K7WQO 22,770- 207-55- 8-A
WB7BEY 19,080- 180-53-20-A
AD7NHL 15,288- 156-49- 9-A
WB7COB 14,580- 162-45-17-A
WA7YON 8820- 98-45- 6-A
WB7NQD(W7FCD,opr.) 6400- 80-40- 5-A
WB7DPB 3060- 51-30- 4-A
W7BMC 1488- 31-24- 6-B

IDAHO

K7NHV 108,488- 764-71-13-B
WA7QQD 66,780- 477-70-18-A
W7VSS 36,608- 286-64-17-A

MONTANA

AD7CPC 72,864- 552-66-24-A
W7JYW/7 72,800- 520-70-24-B
K7CTI 70,140- 501-70-16-B
WA7BSZ 28,112- 251-56-15-B
K7CHY 16,300- 163-50-12-A
WB7CFL 12,500- 125-50-16-A
WA7QZD 4950- 75-33-20-B

NEVADA

WA7NIN(W6OAT,opr.) 172,950-1153-75-24-B
W7BKK 53,060- 379-70-18-A
K3ZMI/7 47,888- 328-73-24-A
AA7YHP 44,616- 338-66-20-A
K7EC 29,696- 256-58-20-A
AAØKXJ/7 29,636- 239-62-16-A

OREGON

W7TML 151,200-1008-75-24-B
WA7FAB 78,048- 542-72-24-B
K7WPC 55,080- 405-68-18-A
WB8NUA/7 51,456- 384-67-22-A
W7KMB 49,368- 374-66-23-A
K7BPR 41,216- 322-64-20-A
WB7CCJ 30,114- 239-63- 8-A
WA7DOY 10,500- 125-42-18-A
K7WT 7708- 94-41- 8-B
W7LT 6764- 89-38-14-B
W7TWL 1600- 40-20-13-A

UTAH

WA7VCE 92,448- 642-72-24-A
WA7WIB 44,268- 357-62-21-B
W7LEA 33,604- 271-62-12-A
WA7VVS 374- 17-11- 7-A

WASHINGTON

K7RSC(WA7OTT,opr.) 114,552- 774-74-20-B
W5QQQ/7 107,488- 726-74-22-B
W7DAZ 105,820- 715-74-23-B
K7RA 102,600- 684-75-24-B
W7YTN 95,904- 648-74-23-A
W7WMY 92,448- 642-72-20-B
K7DZ 91,022- 641-71-23-B
AA7OBL 83,860- 599-70-19-B
W7HAD 80,940- 570-71-21-B
K7MOK 74,834- 527-71-22-B
W7JEG 70,140- 501-70-20-B
W7BUN 60,480- 432-70-18-B
W7GB 46,060- 329-70-10-A
K7HBN/7 45,832- 337-68-15-A
WA7RKJ 45,632- 368-62-19-B
AA7JCB 42,432- 312-68-18-B
WA7WET 41,844- 317-66-24-A
WA7VNI 40,576- 317-64-19-A
K7JRE 39,330- 285-69-18-A
K7OEW 39,040- 305-64-20-A
W7NP 33,376- 298-56-15-A
K7EF 30,492- 242-63-19-A
W7LKG 25,200- 210-60-18-B
W7APN 24,780- 210-59- 8-B
AB7ALT 22,990- 209-55-22-A
WA7TIM 22,950- 225-51-10-A
AK7EME 20,706- 203-51-27-A
W7VMF 15,500- 155-50- 4-B
WA7ZTT 7140- 102-35- 9-B
WA7UVJ 6468- 98-33- 9-A
W7UPG 6050- 55-55- 8-A
WA7QGI 4480- 70-32-10-B
K7BFL 4216- 68-31- 8-A
WA7OJI 4080- 60-34- 6-A
K7TAK 3904- 61-32- 8-B
WB7AIH 3552- 74-24-12-A
W7RVQ 1924- 37-26- 5-B
W7BCS 1900- 38-25- 5-A
AB7ALS 8- 2- 2- 2-A
K3MNT/7(+WA1KKM) 142,788- 978-73-24-B
W7YH(multiop) 63,616- 448-71-24-A
WA7VXQ(+WA7VXP) 28,090- 265-53-24-A
W7BYK(+W7KJ) 26,288- 212-62-20-A
WA7FKM(+K7YST,WA7LVN) 24,840- 230-54-22-A

WYOMING

KV4IO/7 99,542- 701-71-22-B
ABØQOT/7 70,000- 500-70-16-A
WA7QKX 48,006- 381-63-18-A
WA7ZTA 25,650- 225-57-18-A

ALASKA

KL7IRN 35,380- 290-61-17-B
KL7GN 30,500- 250-61-14-A

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MICHIGAN

K8HLR 133,200- 925-72-24-B
AC8CQN 131,254- 899-73-24-A
AA8ZAV 102,528- 712-72-24-A
AC8SH(WB8BPY,opr.) 100,944- 701-72-24-A
K8YQW 100,678- 709-71-23-B
WA8CZH 96,596- 711-68-19-B
W8MNL 65,462- 461-71-24-B
AD8MWB 64,400- 460-70-23-A
WA8KME 62,310- 465-67-20-B
W8GLC 61,880- 455-68-20-A
WA8RRR 55,250- 425-65-19-A
WA8MEC 54,656- 427-64-19-A
W8VPC 52,852- 362-73-16-A
WA8MOA 52,836- 357-74-19-B
WB8BNV(WB2TEN,opr.) 46,920- 340-69-14-A
W8QM 42,504- 322-66-21-B
WA8QEF 39,932- 298-67-22-A
W8BNF 39,312- 273-72-21-A
W8PBO 38,528- 301-64-11-B
WB8RVG 38,170- 347-55-21-A
WA8UON/8 38,088- 276-69-19-A
WB8MTD 38,068- 307-62-20-A
WA8REI/8 36,656- 302-64-22-A
W8VWY 34,170- 255-67-18-A
WB8AAX 34,086- 247-69-16-B
WA8OJR 32,880- 274-60-18-A
WB8KFV 31,742- 269-59-13-A
AC8TJQ 29,824- 233-64-17-A
WB8YJY 28,426- 233-61-15-A
K8BZK 27,950- 215-65- 9-B
W8MSK 27,938- 229-61-14-A
WB8UCF 26,314- 223-59-22-A
W8QG 25,856- 202-64-20-A
AB8AYW 25,122- 237-53-16-A
WB8YDR 25,080- 220-57-17-A
K8KQJ 24,662- 209-59-12-A
WB8DTT 24,624- 228-54-12-A
K8SIA 24,360- 210-58-14-B
WB8SVI 24,304- 217-56-12-A
W8TZZ 22,512- 201-56-10-A
W8TWA/8 22,154- 209-53-14-A
W8PVI 22,048- 212-52-18-A
WB8NTX 22,040- 190-58-20-A
W8MPD 21,816- 202-54-11-A
WA8VTK 21,280- 190-56-14-A
WB8VWW 19,712- 176-56-13-A
W8EGI 18,020- 170-53- 8-A
W8IHE 16,830- 165-51- 9-A
AB8TKZ 15,700- 157-50-13-A
WA8VGQ 15,530- 165-41- 8-A
WA8JQV 14,812- 161-46- 4-A
WD8BHE 14,456- 139-52-15-A
WA8LTX 14,204- 134-53-16-B
WB8YRY 12,690- 135-47-20-A
W8JUP 12,604- 137-46-11-A
WA8FMU 12,500- 125-50- 9-A
WB8CKB 10,160- 127-40- 9-A
WB8TZF 10,152- 108-47- 8-A
WA8MHY 10,080- 140-36-20-A
WB8IOT 9976- 116-43-12-A
W8PPY 9440- 118-40-11-A
WA8YPY 9102- 123-37-11-A
W8LCU 8968- 118-38-13-A
WB8YRL 7622- 103-37-13-A
WA8WWS 7488- 104-36- 9-A
WB8YQK 7004- 103-34-14-A
K8RDJ 6840- 95-36-14-A
K8TPT 6314- 77-41-11-A
WB8NSF 5600- 80-35-15-A
WA8QCW 5548- 73-38-11-A
WA8VEB 4800- 75-30- 4-A
WB8YYG 4692- 69-34-20-A
WB8GUD 4488- 66-33- 4-A
W8SS 3456- 54-32- 3-A
WD8AEL 3422- 59-29-23-A
K8AYZ 3180- 53-30- 7-A
W8KAQ 3132- 58-27-13-A
WA8ABN 2900- 50-29-17-A
W8OM 2400- 40-30- 3-A
WA8WBZ 2050- 41-25- 4-A
WB8SLQ 1932- 42-23- 5-A
WD8BSL 1820- 35-26- 5-A
W8SCW 1610- 35-23- 3-A
W8KZM 1482- 39-19- 4-A
W8LOI 1260- 35-18- 4-A
WB8ZPN 1178- 31-19- 9-A
WB8UXD 1140- 38-15- 5-A
WB8KFU 1116- 31-18- 8-A
WB8MJI 1044- 29-18- 3-B
WB8VVY 1026- 27-19- 7-A
WD8ANF 1020- 30-17- 8-A
WB8VBC 952- 28-17- 2-B
WB8THO 864- 27-16- 5-A
K8GHX 816- 24-17- 6-A
W8DYC 660- 22-15- 3-A
W8LUO 616- 22-14- 4-A
W8RTU 504- 18-14- 7-A
WB8YSC 352- 16-11- 5-B
W3GN/8 330- 15-11- 1-A
WB8UHS 320- 16-10- 5-A
WB8FBG 168- 12- 7- 1-A
WB8PLO 154- 11- 7- 3-A
WB8HYD 128- 8- 8- 1-B
WB8IGU 126- 9- 7- 1-A
KD8BLM 50- 5- 5- 3-B
W8SFA 40- 5- 4- 3-A
WB8TVD 8- 2- 2- 4-A
WB8HNB 2- 1- 1- 1-A
WB8LZA(+WB9EGZ) 68,224- 533-64-24-B
WB8IOS(+WB8s,FCZ,OJM,VNZ) 51,408- 378-68-23-B
W8QN(+WB8VAS) 31,356- 234-67-19-B
WA8JFQ(+WA8HTL) 18,900- 189-50-10-B
K8DAC(K8BWC,W8EOS,WA8REI, WB8s,JCD,RYJ,VBC,oprs.) 9660- 115-42-13-A
WB8ZHC(+WB8s,VWE,ZRE) 4590- 85-27-11-A

OHIO

W8EDU(WA3BGE,opr.) 146,730-1005-73-24-B
WA8PLZ(WB8AYC,opr.) 137,030- 965-71-14-B
K8RMK 136,656- 936-73-24-B
W8WPC(K8BPX,opr.) 134,680- 912-74-24-B
K8MFO 134,088- 906-74-24-B
W8QXQ 123,408- 857-72-22-B
W8LT(WA1LKU,opr.) 120,888- 828-73-22-B
AB8UKX 102,200- 700-73-24-B
W8RSW 101,908- 698-73-22-B
W8LSO 98,840- 706-70-23-B
WA8YEE 92,056- 622-74-24-B
K8RMN 88,480- 632-70-24-A
WB8MZZ 83,780- 590-71-24-B
AB8OFR 78,260- 559-70-21-A
W8OK 76,506- 510-75-14-B
K8NEB 72,864- 506-72-21-B
K8EKG 69,814- 521-67-16-A
W8UPH 69,010- 515-67-21-B
W8SWB 68,586- 483-71-22-B
WB8RIJ 67,340- 518-65-20-B
WA8YWX(W8IDM,opr.) 66,314- 467-71-22-B
WB8SVN 65,130- 501-65-23-B
WB8FFM 62,310- 465-67-20-A
W8II 57,084- 426-67-15-B
W8DB 55,350- 369-75-16-A
AD8HBN 54,672- 402-68-12-B
WB8DGO 54,166- 371-73-21-B
WB8NLG 51,060- 370-69-22-A
K8QXB 47,754- 379-63-23-A
K8CVJ 46,900- 350-67-15-A
AC8UMD(WA8TGX,opr.) 45,952- 359-64-12-B
WB8URG 41,752- 307-68-20-A
W8VQI 39,060- 315-62-17-B
AC8GOC 38,860- 290-67-13-A
WB8TXG 38,400- 300-64-18-A
WB8NTY 33,984- 288-59-20-A
AC8CHT 32,996- 226-73-16-A
WB8RTJ 32,004- 254-63-16-A
WA8TKW 26,656- 238-56- 8-B
K8RXD 25,536- 224-57-13-A
WB8TLF 25,308- 222-57-18-A
W8BI(WB8QXN,opr.) 24,396- 214-57-13-B
AC8CSK 22,154- 209-53-15-A
WD8AUB 21,632- 208-52-17-A
W8EX 20,956- 169-62- 5-B
K8MLO 18,800- 200-47- 6-A
AA8TYF 18,666- 183-51- 5-B
K8UQA 15,290- 139-55- 8-A
WA2OCG/8 14,040- 135-52-16-A
AB8ZNG 12,296- 116-53-15-A
WB8YQT 11,750- 125-47-20-A
WB8WIS 11,550- 165-35-14-A
WB8ZAL 11,304- 157-36-17-A
WD8COS 11,248- 148-38-17-A
WD8ACM 10,648- 121-44-19-A
WB8ZRL 10,248- 122-42-14-A
WB8TRW 9600- 120-40-15-A
WB8YVI 8892- 117-38-14-A
W8KHP 7980- 95-42-13-A
WD8AFB 6930- 99-35-16-A
W8MC 6400- 80-40- 6-A
K8NXV 5168- 76-34- 9-B
K8BBH 4380- 73-30-13-A
WB8GVE 3864- 84-23- 8-A
WB8UVZ 3596- 58-31-22-A
WB8NBY 3306- 57-29-13-B
WB8ZBV 3124- 71-22-19-A
WA8MGI 2800- 56-25-12-A
WB8ZXC 2160- 40-27-22-A
WB8TJS 1800- 50-18- 6-A
W8VZE 1600- 32-25- 4-A
WD8BRF 532- 19-14- 4-A
WB8YDP 330- 15-11- 4-A
WB8UFO 180- 10- 9- 3-A
WD8BQV 32- 4- 4- 4-A
WA8NVW 24- 4- 3- 2-A
WB8JBM/8(WB8s,OQP,LSN,oprs.) 130,176- 901-72-24-B

WEST VIRGINIA

AB8IJW 92,960- 664-70-22-B
WA8POS 69,546- 519-67-14-B
K8OQL 22,236- 218-51-12-A
WB8SNO 15,080- 145-52-13-B
WD8BDS 14,996- 163-46-21-A
W8LRL 5400- 100-27- 4-B
W8LZG 5184- 72-36- 9-A
K8QYG 192- 12- 8- 2-A

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ILLINOIS

K9DX 134,352- 933-72-23-B
K9BGL 131,692- 902-73-24-B

WA9TXL 129,024- 896-72-24-B
AD9UKM 117,822- 807-73-21-B
WA6NYV/9 106,848- 742-72-22-B
WA9LOT(WA9IXF,opr.)
104,256- 724-72-23-B
AB9CGL 94,024- 644-73-24-A
K9UIY 87,600- 600-73-24-A
K9DDA 78,472- 577-68-19-A
W9ZAV 78,260- 559-70-22-A
AD9DWK 75,600- 540-70-19-B
W9VBV 73,500- 525-70-19-B
WB9SDE 73,130- 515-71-23-B
W9G1 68,912- 472-73-24-B
WA9OBP 67,620- 490-69-20-A
AC9NLR 66,912- 492-68-18-B
AA9LUD 62,338- 489-71-19-A
AB9DED 61,880- 476-65-16-B
W9FVT 50,784- 368-69-14-A
WB4HYN/9 50,556- 383-66-14-A
WA9YOL 50,028- 379-66-17-A
WA9PBK 45,360- 378-60- 9-B
AD9JUU 42,250- 325-65-15-A
WA9EBT 36,844- 302-61-11-A
W9NU 35,880- 276-65-19-B
AA3KFR/9 30,000- 250-60-14-A
WA9TKK/9 29,760- 248-60-13-A
WB9KLW 29,580- 255-58-16-A
WB9SBD 28,000- 250-56-24-A
K9UQN 27,612- 234-59- 9-A
WB9NST 27,600- 230-60-18-A
WB9JSR 26,912- 232-58-16-A
AA9NFW 23,980- 218-55-16-A
AC9LNQ 23,322- 169-69-11-A
AC9QWM 21,594- 177-61-10-A
WB9SBC 16,600- 166-50-10-A
W9HPG 14,000- 125-56- 8-A
W9IB 13,800- 150-46-11-A
WA9WHB 12,768- 133-48- 8-B
W9REC 11,088- 99-56- 9-B
W9WR 9434- 89-53-12-A
WB9SAD 9270- 103-45-14-A
WB9VGO 9048- 116-39-14-A
K9HDE 7650- 85-45-15-A
WB9SUN 5698- 77-37- 3-A
WB9SNA 4824- 67-36- 4-A
WB9UIF 4284- 63-34- 7-A
WB9VEC 3844- 62-31-18-A
K9NA 3264- 51-32-14-B
W9AGM 2800- 50-28- 3-A
W9ZEN 2352- 49-24- 5-A
AB9UVQ 1408- 32-22- 4-B
WA9AA1 950- 25-19- 1-A
W9MYP 736- 23-16- 2-A
WB9VJN 700- 25-24- -B
W9UDK 616- 22-14- 4-A
WB9DVJ 252- 14- 9- 6-A
WD8AUG/9 154- 11- 7- 2-A
WB9WYC 108- 9- 6- -A
WA9LSD 4- 2- 1- 3-A
K9RMA(+WA8RXM,K9LWR,WB9s,
KCQ,KUP) 100,110- 705-71-24-B
WB9TXO(K8UQN,WA9SIW,oprs.)
27,492- 237-58- 9-B
W9JWC(WB2AIY,WB9s,MQK,PHM,
SGW,UIR,oprs.)
23,632- 211-56-16-A
WB9WCP(K9JKZ,WA9WZZ,WB9s,
SIU,UME,oprs.) 1638- 39-21-23-A
WB9TSB(+WB9UMF)
360- 20- 9-11-A

INDIANA

WA9BWY 139,586- 983-71-24-B
K9UWA 126,836- 857-74-23-B
AA9ITB 123,662- 847-73-23-B
W9OWZ 94,920- 678-70-18-B
W9JOO 71,994- 507-71-23-A
AB9QCP 65,808- 457-72-24-B
W9IIL 58,800- 420-70-16-A
WB9LHJ 53,250- 375-71- 9-B
W9EI 43,648- 352-62-19-A
W9LTU 40,200- 300-67-18-A
KØCVA/9 23,940- 210-57-12-B
WB9PIR 23,712- 208-57-20-B
W9MDW 17,052- 147-58- 7-A
AC9LT 15,360- 160-48- 5-B
WB9SEP 13,568- 128-53-13-A
WA9PKL 9792- 102-48-14-A
K9HUI 5600- 70-40-19-A
K9KRN 5040- 60-42- 7-A
AB9IWO 4900- 50-49- 5-A
WB9TUR 3744- 48-39-23-A
WB9NEU 2750- 55-25- 6-A
WB9WNU 2028- 39-26- 6-A
WB9VYB 644- 23-14-15-A
WB9FNR 552- 23-12-10-A
WB9QEZ 50- 5- 5- 1-A

WISCONSIN

K9KGA 126,806- 893-71-24-B
W9NA 110,304- 766-72-20-B
W9HI 83,368- 613-68- -A
W9LO 76,896- 534-72-23-A
K9CAN 72,816- 492-74-20-B
W9KYZ 72,036- 522-69-23-A
W2WOE/9 70,656- 512-69-22-B
WB9OEC 58,930- 415-71-17-A
AB9PYF 39,284- 322-61-13-A
AC9MSE 37,950- 275-69-18-A
WB9NDO 36,180- 270-67-11-B
AB9NME 33,792- 256-66-11-A
WB9TXE 33,280- 260-64-22-A
AB9SAK 32,376- 284-57-15-A
AB9EJE 31,964- 262-61-15-A
WB9SXX 31,122- 273-57-13-A
WA9USA 27,816- 244-57-13-A
W9MDU 27,348- 258-53-11-A
K9DAF 26,786- 227-59- 7-B
WB9KPX 26,216- 226-58-13-A
WB9ICH 23,408- 209-56-14-B
W9HE 19,140- 174-55- 8-A
K9VER 9804- 114-43- 9-A
W9GKJ 6438- 87-37- 6-A
WB9WFJ 5696- 89-32-24-A
WB9KFF 4092- 66-31-13-A
WB9VJU 3904- 61-32- 4-A
WB9UAI 3400- 68-25-16-A
W9GIL 3392- 53-32- 6-A
AB9PTX 3240- 60-27- 6-A
WB9TSL 3120- 65-24-10-A
WB9YSA 1872- 52-18-12-A

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COLORADO

WBØDJY 166,050-1107-75-24-B
WAØCVS 156,220-1070-73-24-B
WØETI 112,896- 784-72-22-A
WBØIWL(WBØDLE,opr.)
94,500- 675-70-24-A
WØLQ 69,496- 511-68-21-A
WBØLLR 52,780- 406-65-13-A
WBØBAL 41,640- 347-60-20-A
WØIX(WBØIWL,opr.)
29,680- 280-53-17-A
WBØNYY 15,456- 184-42- 6-A
WBØTFM 3306- 57-29-14-A
WBØSYC 936- 26-18- 7-A
WBØMCL 308- 14-11- 5-A
WBØOYX(+WAØNBZ)
40,368- 348-58-21-A

IOWA

KØGXR 133,736- 916-73-24-B
KØZTV 81,366- 573-71-23-A
WAØODK 71,128- 523-68-23-A
WAØUIB 64,284- 487-66-24-A
WØMHK 58,826- 439-67-19-A
AAØWCR 54,536- 401-68-24-A
WAØVKF 48,824- 359-68-13-A
WBØIPH 45,408- 344-66-18-A
WØSS 40,176- 324-62- 8-A
WØPRY 27,540- 270-51- 7-A
WBØJEE 27,144- 261-52-12-A
WBØPYD 25,806- 253-51-12-A
WBØJGS 17,172- 162-53-14-A
WØLR 16,356- 141-58-10-A
WØGA 8514- 99-43- 6-A
WBØNVB 6688- 88-38- 6-B
WBØUCP 6080- 76-40-24-A
WBØRJF 3024- 54-28-18-A

KANSAS

AAØGSG 62,288- 458-68-15-A
KØFPC 59,064- 428-69-19-A
WA4HRG/Ø 58,344- 442-66-21-A
WBØPWF 49,776- 408-61-23-A
K4KWW/Ø 44,856- 366-63-24-A
WBØBIY 40,752- 334-64-14-B
WØFCL 24,752- 221-56-14-B
WØJYJ 23,296- 208-56-15-A
WØLRB 22,550- 205-55-15-A
KØCML 22,048- 208-53-11-A
WØRFF 21,420- 210-51-14-A
WBØISW 16,960- 160-53-14-A
WBØOLA 900- 30-15- 8-A
WØMYM 782- 23-17- 9-A
WØQQQ(WBØSNT,WAØs,MLE,SWC,
oprs.) 117,792- 818-72-24-B
WBØQZB(+WBØQFV)
48,734- 413-59-23-B

MINNESOTA

WBØANT 145,008-1007-72-24-B
WØDXN 126,864- 881-72-24-B
KØSVW(KØIJL,opr.)
112,896- 784-72-24-B
WØHW 103,500- 750-69-23-B
WØOUE 102,528- 712-72-23-B
WAØUCU 99,072- 688-72-24-A
KØMPH 85,118- 583-73-21-A
WØYCR 79,152- 582-68-22-B
KØDHH 78,384- 568-69-22-A
AAØURW 76,680- 540-71-18-A
KØIHG 56,232- 396-71-15-A
WBØOUH 47,120- 380-62-18-A
KØSNG 44,856- 356-63-20-B
KØFZG 44,748- 339-66-23-A
WAØVKP 37,400- 340-55- 9-B
WBØNPB 37,200- 310-60-19-A
KØCNC 35,200- 275-64- 6-B
WØPPJ 33,840- 282-60-14-A
WBØSTL 32,696- 268-61-24-A
WØRHR 24,840- 230-54-12-A
K2VRD/Ø 21,312- 222-48-16-A
WBØEMI 21,200- 200-53-13-A
WBØPWG 19,470- 177-55-16-A
WBØPGZ 16,082- 187-43-14-A
WAØWHT 14,308- 146-49-12-A
KØZXE 9102- 123-37- 4-A
WØJS 7252- 98-37-12-B
ABØNIU 678- 24-14-10-B

MISSOURI

WAØPAO(WAØJNF,opr.)
108,478- 743-73-24-A
AAØNVZ 102,672- 713-72-24-B
KØDEQ 97,980- 690-71-23-B
WØNVP 87,906- 637-69-24-A
ACØQWS 81,558- 571-69-23-A
WAØFBQ 60,590- 415-73-16-B
KØVBU 49,140- 351-70-23-A
KØDPO 45,370- 349-65-16-A
WBØLFY 36,162- 287-63-20-B
KØKYE 29,000- 250-58-18-B
AAØFKD 27,960- 283-60-11-B
KØRWL 24,600- 205-60-11-B
WØBV 11,440- 130-44- 8-A
WØYZZ 8820- 105-42- 9-A
WØEEE(WBØSJP,opr.)
8640- 120-36-23-A
WBØTLM 7350- 105-35-20-A
AAØCGV(WBØGQP,opr.)
4260- 71-30- 4-A
WBØGQP 200- 10-10- 2-A
WBØTCF 2- 1- 1- 1-A
WØZLN(multiop)
147,168-1008-73-24-B

NEBRASKA

WBØINQ 50,508- 366-69-18-A
ABØKDI 31,350- 275-57-18-A
KØSCM 25,500- 255-50-10-B
WØQNP 22,458- 197-57-20-A
WØOPL 21,424- 206-52-20-A
WBØSYY 3132- 58-27- 9-A

NORTH DAKOTA

KØFRP 54,306- 431-63-20-A
WBØBCZ(WAØOVW,opr.)
24,480- 240-51- 5-B

SOUTH DAKOTA

WAØONL 145,692-1026-71-24-B
WAØCPX(WBØDGA,opr.)
145,408-1024-71-24-B
WBØEVQ 76,112- 536-71-20-A
WBØPYL 13,536- 144-47-12-A
WBØRHS 540- 18-15-15-A

VE

MARITIME-NEWFOUNDLAND

VE1MX 71,142- 501-71-20-A
VE1ABR 17,640- 180-49-13-A
VE1BHA 14,994- 147-51-19-A
WA8SPL/VO1(+WB4YIU)
12,212- 142-43-10-A

QUEBEC

VE2AQP 36,036- 273-66-19-B
VE2WA 6216- 84-37- 4-B

ONTARIO

VE3IXE 68,772- 521-66-20-A
VE3EJK 49,542- 359-69-18-A
VE3EIB 36,952- 298-62-21-B
VE3ENM 28,320- 240-59- 8-A
VE3CPU 26,620- 242-55-22-A
VE3DH 24,240- 202-60-12-B
VE3ACB 22,320- 180-62-21-A
VE3DUS 20,790- 231-45-11-B
VE3EEN 16,200- 135-60-14-A
VE3DOP 13,132- 134-49-15-B
VE3GD 2112- 48-22- 6-A
VE3ARTI(VE3s,ATD,DAO,FBI,GAS,
oprs.) 91,080- 690-66-23-B

MANITOBA

VE4UM(VE4VV,opr.)
61,202- 431-71-15-A
VE4OY 21,924- 203-54-10-A
VE4XI 5984- 88-34-15-A

SASKATCHEWAN

VE5DX 129,064- 884-73-24-B
VE5YA 32,130- 255-63-10-A
VE5XC 18,096- 174-52-12-A
VE5KM 850- 25-17-11-A

ALBERTA

VE6AUP 37,800- 300-63-14-A
VE6ATT 30,720- 256-60-16-A

BRITISH COLUMBIA

VE7CC 145,562- 997-73-24-B
VE7IQ 40,430- 311-65-18-B
VE7OTA 1820- 35-26-16-A

Phone Scores

U.S.A.

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CONNECTICUT

WA1LNQ * 225,450-1503-75-24-B
WA1MAO 220,964-1493-74-24-B
W1ZM(WA2CLQ,opr.)
195,064-1318-74-24-B
WA1QZH 159,264-1106-72-24-B
WA1WEM * 149,480-1010-74-20-B
AB1AEL(WB2CHO,opr.) *
142,272- 988-72-21-B
W1GPK 141,504-1056-67-23-B
WA1QNF 120,600- 804-75-22-B
WA1JZC 120,150- 801-75-13-B
WA1NNC(WB1AMS,opr.)
100,050- 725-69-15-B
WA1UWR 94,572- 666-71-21-A
AA1UAD 90,864- 631-72-18-B
WA1GBA 64,464- 474-68-17-B
K1THQ/1 44,890- 335-67-12-A
WA1OBY(WA1QGC,opr.)
44,484- 337-66-20-B
WA1SSH 40,848- 296-69-10-A
W1VV 38,796- 318-61- 8-B
K1RLU 38,688- 312-62-13-B
WA1STN * 29,100- 194-75- 6-B
WA1AHI * 28,500- 250-57- 7-A
WA1VOA 27,336- 268-51-18-A
WA1STO * 24,240- 202-60- 7-B
K1KRY 21,808- 232-47-10-A
W1TCJ 16,600- 166-50- 7-B
WA1VGP 13,332- 202-43- 5-A
W1BIH 11,242- 77-73- 8-B
W1RU * 952- 28-17- 2-A
K1PQA 600- 25-12- 3-A
K1VTM/1(+WA1OCU)
146,584-1004-73-24-B
W1DGL/1(+W1GNC)
144,600- 964-75-24-B
WA1HRC(WA1s,TUT,VMN,VNU,
oprs.) 34,496- 308-56-21-A

EASTERN MASSACHUSETTS

W1CF(K1OME,opr.)
220,500-1470-75-24-B
W1ZA 202,350-1349-75-24-B
W1RR(WA1JYY,opr.)
177,150-1181-75-24-B
W1MX(WB2MZE,opr.)
142,000-1000-71-24-B
WA1VMU(WA2OJK,opr.)
117,530- 805-73-23-B
WA1EOT 116,772- 789-74-18-B
W1UQ(K1LPA,opr.)
110,550- 737-75-24-B
AC1HWM 93,440- 640-73-24-B
WA1RGW 73,808- 659-56-18-B
W5UDK/1 65,850- 439-75-10-B
WA1MJD 59,568- 438-68-16-A
K1GSK 49,680- 360-69-16-B
K5GOE/1 28,426- 233-61-16-A
WA1WGS 23,688- 252-47-24-A
WA1UZH 19,968- 208-48-12-B
WA1RLI 18,816- 224-42-17-A
WA1HFN 17,808- 212-42-20-B
W1AX 14,100- 150-47- 6-B
AC1CRL 9660- 115-42- 9-A
WA1SNR 6048- 84-36- 4-A
W1PLJ 5280- 88-30- 8-B
WA1KUL 5104- 88-29- 6-B
WA1ITZ 2976- 62-24- 9-A
K1PTE 2856- 51-28- 6-A
W1DMH 1700- 50-19- 4-B
W1AF(WA2s,CNE,CPN,WB2BWH,
K1EA,oprs.) 125,580- 897-70-24-B
K1VVC(+WA1s,GDY,UBL,VFJ)
60,792- 447-68-23-B
NX1US(W1YSW,WA1s,GXN,HVS,
JIR,PQY,RGA,RSV,TAK,TAM,TBY,
UMQ,UTJ,UZM,TUN,ZLQ,
WN1WDD,oprs.)
52,824- 426-62-23-B
WA1NUQ(+WA1s,YWK,ZGX)
33,040- 280-59-23-A
WA1CBH(+WA1s,UJX,WNF,WNL,
WNZ,W7F,ZJF)
24,976- 223-56-22-A
WA1PYF(multiop)
4680- 117-20-20-A

MAINE

W1SD 47,180- 337-70-15-B
K1OEY 45,630- 351-65- 9-B
WA1SDQ 37,120- 290-64-16-B
K1RQE 34,500- 230-75-24-B
K1GAX 25,986- 213-61- 7-B
K1NAN(K2NA,opr.)
24,072- 236-51- 4-B
WA1SUR 16,684- 194-43-15-A
WA1FCM 14,994- 153-49- 5-A
K2NA/1 312- 13-12- 1-A

NEW HAMPSHIRE

WA1ABV 220,216-1492-74-23-B
K1GQ(K1PKQ,opr.)
196,950-1313-75-24-B
W1FMF 30,464- 272-56-13-A
WA1FSZ 25,868- 223-58-12-A
W1DXB 18,252- 169-54- 8-B

RHODE ISLAND

AC1GFH 95,472- 663-72-22-A
WA1TFF 71,898- 521-69-20-A
K1HMO 54,670- 385-71-14-B
K1GMW 46,500- 375-62-12-B
K1KYI 24,012- 207-58-13-A
WA1MQO 9600- 100-48- 8-A
AA1UZK 2- 1- 1- 1-A
K1AD(W1GMF,WA1WXB,WB2FCD,
WA3EEC,WB4TCD,oprs.)
83,504- 614-68-14-B

VERMONT

WB2JSJ/1 108,288- 752-72-24-A
W1KQ 52,272- 396-66-14-B
K1VTF 49,368- 363-68-13-B
W1AIM 33,872- 292-58-14-A
WA1YCN 25,088- 224-56-11-B
K1IIK 15,168- 158-48- 5-B

WESTERN MASSACHUSETTS

WA1ABW 214,500-1430-75-24-B
K1RQF 148,000-1000-74-22-B
WA1TAI 57,528- 423-68-24-B
W1GG 51,198- 371-69-16-A
WA1PCJ 30,870- 343-45-16-A
WA1LMZ 26,840- 244-55-13-A
WA1FKF(WA1PZM,opr.)
21,828- 214-51-14-A
WA1OLK 3220- 70-23- 8-B
K1KDP(+K1KNQ)
153,900-1026-75-24-B
W1YK(multiop)
125,954- 887-71-24-B

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EASTERN NEW YORK

WB2OEU 253,050-1687-75-24-B
W2PV(K1ZZ,opr.)
201,334-1379-73-24-B
W2HHC 165,020-1115-74-24-B
W2AZO 118,512- 823-72-20-B
WA2WSX 89,460- 710-63-22-A
AB2BXL 69,552- 504-69-19-A
W2FPG 62,568- 474-66-13-B
WA2ZPT 57,798- 507-57-24-A
WB2YLR 54,944- 404-68-15-B
WB2WBO 52,390- 403-65-13-A
WA2HAI 39,664- 296-67-22-A
W2HVA 37,942- 311-61-13-B
WA2UYL 28,288- 272-52- 9-A
WA2SPL 25,098- 267-47- 3-B
F2YS/W2 24,854- 289-43-12-B
K8BBC/2 24,192- 216-56-14-A
WB2SZV 22,960- 205-56-17-A
WB2FDP 11,250- 125-45-14-A
WA2WFH 10,384- 118-44- 5-A
WA2CJY 4752- 72-33- 5-A
K2RES 3888- 72-27- 8-A
WA2ZLQ 1938- 51-19- 4-A
AA2MBB 900- 25-18- 4-A
K2HA 700- 25-14- 3-A
WA2EHV 60- 6- 5- 1-A
W2SZ(multiop)
117,860- 830-71-13-B
AB2EMU(+WA2PJL,WB2RUZ)
114,452- 806-71-19-B
K2AE(WA2WAF,WB2CFP,oprs.)
72,136- 508-71-20-B
WB2ABJ/2(WA2s,EAF,GXK,WB2s,
EGU,EUQ,WN2EYB,oprs.)
24,072- 204-59-24-A

N.Y.C. - L.I.

W2AIR(WA1MHJ,opr.)
102,240- 720-71-16-B
WB2PYM 102,098- 719-71-16-B
WB2HZH 82,500- 625-66-24-A
WA2WKH 68,000- 500-68-20-A
AB2SJG 51,456- 402-64-10-A
W2FVS 48,496- 433-56-11-B
WA2YHK 39,000- 300-65- 8-B
W2GKZ 25,868- 223-58-10-B
W2SEL 23,210- 211-55- 8-B
AA2ZBW 22,572- 209-54-16-A
W2JGQ 22,176- 198-56-22-B
AB2TSB 21,114- 207-51-12-B
WA2EXI 17,934- 183-49-11-B
K2EL/2 15,276- 201-38-13-B
WA2YJN 15,228- 162-47- 4-B
WA2IYH(WA2MZE,opr.)
14,406- 147-49-11-A
W2MDM 14,308- 146-49- 5-B
WA2ATL 7366- 127-29-12-A
WA2PFZ 7260- 110-33- 6-A
WB2PXA 5056- 79-32-10-B
K2YGM 4756- 58-41- 6-A
WA2SUH/2 4680- 78-30- 4-A
WB2YKL 4088- 73-28- 3-A
K2KD 4032- 63-32- 5-B
AA2ROO 3318- 79-21-10-A
W2VUS 704- 22-16- 2-B
WA2YFI 676- 26-13- 2-A
W2OCZ 308- 14-11- 3-A
WA4YPT/2(WA1MHJ,opr.)
308- 14-11- 1-B
W2JZQ 208- 13- 8- 2-B
WB2MZU(+WA2ZTO,WB2MAN)
159,000-1060-75-24-B
WB2RCJ(+WA2s,GMN,IFQ)
46,750- 425-55-17-B
WB2FKZ/2(WA2s,CSR,FFO,FGB,
WB2KAW,oprs.)
14,760- 180-41-20-A
WB2EHM(+WA2OJR)
5456- 88-31- 6-A

NORTHERN NEW JERSEY

WB2RKK 179,820-1215-74-23-B
AB2RJJ 152,132-1042-73-24-B
WB2SZO 112,420- 770-73-24-B
WA2SZQ 106,560- 740-72-23-B
WA2UOO/2 99,216- 689-72- 9-B
WA2LBT 96,652- 662-73-24-A
AB2VTT 68,820- 465-74-12-B
WB2VFT 61,050- 407-75-17-A
AC2MB 46,428- 318-73-14-B
WB2FRH 41,444- 323-64-20-A
AC2ZZ 37,448- 302-62-11-B
K4VUD/2 34,110- 379-45-21-A
WB2IEC 26,880- 210-64-12-B
WB2HYQ 26,100- 225-58-16-B
AB2JVN 22,000- 220-50- 6-A
WA2MOI 21,924- 203-54-
WB2GFO 19,488- 203-48-
W2SHM 18,144- 189-48-
WB2ASD 15,120- 210-36-
AB2ZCI 14,448- 172-42-
WA2NHC 12,168- 156-39-
WB2UTO 11,480- 140-41-
WB2POG 9744- 116-42-
K2JLT 8806- 119-37-
AB2CST 5750- 115-25-
WB2RMK 4848- 101-24-
WA2UDT 3650- 73-25-
W2GNW 2576- 46-28-
AA4GWG/2 812- 29-14-
W2MUI 750- 25-15-
AC2CC 480- 24-10-
WA2BAW 59- 9- 3-
K2MFF(WA2s,AJN,BYX,VCI,W
DOW,RMK,UVU,oprs.)
88,750- 625-71-
WA2HDG(+W2LVT)
31,212- 289-54-
K2GE(W2JDH,WA2s,NXK,QH
QIO,WB2s,SNN,UYX,oprs.)
15,566- 181-43-

SOUTHERN NEW JERSEY

WB2FLF/2 168,276-1137-74-
WA2VYA 93,832- 634-74-
K2JOC 86,194- 607-71-
WB2LBT 73,272- 516-71-
AB2BVV 69,632- 544-64-
AB2BYU 59,754- 433-69-
K3DVS/2 58,344- 442-66-
WA2OMY 58,320- 486-60-
W2PAU 52,932- 401-66-
W2FGY 47,436- 354-67-
K5VNJ/2 42,480- 295-72-
WB2OSQ 41,990- 323-65-
W2EA 32,160- 240-67-
WA2KOK 29,854- 253-59-
WA2HEP 29,792- 304-49-
W2HVO 27,720- 220-63-
W2ORA 24,948- 231-54-
WB2REI 20,976- 228-46-
WA2AWU 19,712- 224-44-
K2TD 19,044- 207-46-
W2REB 17,686- 239-37-
WA2AEJ 14,700- 147-50-
W2UI 14,602- 149-49-
K2QXQ 13,806- 177-39-
W2PFQ 11,224- 122-46-
WA2AZG 9718- 113-43-
WA2YEM 7272- 101-36-
W2ROW 6278- 73-43-
WB2LCC 4320- 80-27-
AD2SBW 4200- 75-28-
W2OGZ 4012- 59-34-
W2LKB 3432- 66-26-
W2GND 2728- 44-31-
WB2LVD 1936- 44-22-
K2HPV 1548- 43-18-
WB2LNR 1248- 39-16-
W2SDB 700- 25-14-
W2UQB 288- 12-12-
WB2UVB 32- 4- 4-
WA2YOB(+WA2s,NUL,WJL)
52,140- 895-66-
K2FT(+K2KA,W2NEA)
51,322- 383-67-

WESTERN NEW YORK

WA2LCC 173,232-1203-72-
WB2THS 162,060-1110-73-
WA2ZRI 76,664- 518-74-
WA2WDE 71,898- 521-69-
AA2BAO 71,400- 510-70-
WB2LOF 68,160- 480-71-
W3HKK/2 62,064- 431-71-
WA2BYJ 59,616- 432-69-
W2VDX 56,832- 384-74-
AB2ABD 52,578- 381-69-
K2UNY 48,720- 348-70-
W2JJ 43,860- 430-51-
WB2FNS 43,692- 331-66-
W2GHD 40,284- 373-54-
WA2DKF 23,760- 297-40-
WB2UNH 23,426- 221-53-
WB2EHF 21,816- 202-54-
WB2FBP 20,460- 186-55-
WB2YGH 19,992- 204-49-
WB2BXM 19,136- 208-46-
K2SSB 17,800- 178-50-
AA2DBV 16,512- 192-43-
W2FZK 14,628- 159-46-
WB2EXL 13,158- 129-51-
WB2GIN 11,359- 129-44-
WA2AFQ 10,836- 129-42-
WA2ZRD 9750- 125-39-
WA2SON 7200- 100-36-
W2DW 5810- 83-35-
W2JRI 4550- 65-35-
AA2QKF 3968- 62-32-
AC2STM 3618- 67-27-
WA2IMG 1700- 34-25-
K2GXT(WA1RYL,WA2FQE,o
66,654- 483-69-
WB2CUC(+WA2DSA,WB3BDI
66,528- 504-66-
WA2SEY/2(+WA2s,DQH,EWV
WB2KAO) 55,624- 409-68-
WA2NPQ(WA2s,FHA,GRY,MI
WB2s,FFU,IID,oprs.)
46,632- 348-67-
WB2ZOW(+WA2HGS)
27,848- 236-59-
WA2IKO(+K2HYM)
25,344- 264-48-

3

DELAWARE

AA3TAI/3 104,300- 745-70-
WA3LVS 51,584- 403-64-
K3HBP 35,604- 258-69-
K3YHR 27,324- 198-69-
W3WNG 13,020- 217-30-

EASTERN PENNSYLVANIA

K3DPQ 141,600- 944-7
K3AWZ 121,650- 811-7
WA3NAF 101,672- 716-7
K5JZN/3(K3JGI,opr.)
93,750- 625-7
WA3LVR 86,256- 599-7
W3GRW 65,100- 465-7
WA3MKB 58,590- 465-6
AB3AJL 57,822- 419-6
W3TOO/3 54,210- 417-6
WA3ZXY 50,400- 350-7
K3HXS 43,772- 353-6
W3BGN 41,026- 281-7
W3MGF(AA3YDZ,opr.)
32,860- 265-6
WA3WIM 31,800- 265-6
W3ETB 28,438- 241-5
WA3WV1 28,270- 257-5

WA3WQP 25,760- 322-40-17-A
WA3EUG 24,440- 235-52-16-A
WA3ABN 22,472- 212-53-12-A
W3BUR 19,834- 211-47- 9-A
WA3OFD 17,892- 213-42-16-A
WA3VJS 17,100- 171-50-16-A
WB3AAK 15,600- 195-40-22-A
WB3AAL 12,576- 131-48-19-A
WA3SZI 11,616- 264-22-20-A
WB3CAC 11,172- 114-49-11-A
WA3YMV 10,500- 125-42- 9-A
WB3BDD 6794- 79-43- 7-A
K3ECV 4352- 68-32- 7-A
WA3WPA 3410- 55-31- 4-A
K3TVT 3150- 63-25- 5-A
WA3WMF 2448- 51-24- 4-A
W3IIT 1680- 40-21- 6-A
K3AGU 1672- 44-19- 8-A
K3YLL 280- 14-10- 3-A
WA3KFT 12- 3- 2- 2-A
WA3FHN 2- 1- 1- 1-A
WA3OVH(WA3s,NHO,RVT,WUI, WB3ALL,oprs.) 58,616- 431-68-21-B
W3DZI(+WA2s,ASO,DHO,WB2AFM, WA3UOC) 33,630- 285-59-24-B
W3EDU(WB3s,AWJ,BJP,oprs.) 31,944- 242-66-24-B

MARYLAND-D.C.

W3KWB(WB3AJQ,opr.) 204,150-1361-75-24-B
K3ZO 202,356-1386-73-24-B
W3GRF(W3ZZ,opr.) 192,750-1285-75-23-B
W1FLM/3 166,002-1137-73-24-B
AC3USS(WA1FEO,opr.) 158,850-1059-75-24-B
W3AZD 157,050-1047-75-24-B
K3WX(W3ADT,opr.) 153,476-1037-74-24-B
W3FA(WA3ZAS,opr.) 136,364- 934-73-22-B
K3ZAW 131,250- 875-75-24-B
WB3AVN 128,940- 921-70-22-B
AC3IN 125,528- 884-71-24-B
WA3SXH 85,950- 573-75-24-A
K2PLF/3 84,420- 603-70-24-A
WA3RSK 82,552- 607-68-20-A
W3PZW(K3ZNV,opr.) 81,070- 605-67-22-B
K3CQ 77,700- 525-74-15-B
W3EAX(WA3TOE,opr.) 77,532- 546-71-19-B
WA3VUQ 74,692- 526-71-22-B
WA3EPI(WB2UZU,opr.) 70,656- 512-69- 8-B
AC3GZQ 64,260- 459-70-13-B
W3FCI 64,240- 440-73-15-B
WA3VPI 64,172- 526-61-20-B
W3IDT 62,400- 500-60-23-A
W3JPT 58,692- 402-73-19-B
K3IMC 53,600- 400-67-13-B
WA3ZJT 51,612- 374-69-23-B
W3AZ 50,022- 397-63-17-B
W3RRX 49,068- 423-58-18-B
K3NPV 48,642- 363-67- 7-B
AA3YMA 47,740- 385-62-21-A
K3KSS 47,034- 351-67-11-B
WB9AMC/3 45,864- 364-63-15-B
K3RS 44,070- 339-65-11-B
AA3UHJ 42,366- 307-69- 9-B
WA3UPH 40,880- 292-70-12-A
WB2HWH/3 36,722- 301-61- 8-B
WA3UUO 35,230- 271-65-19-A
WB9NZY/3 34,776- 276-63-16-A
W3RWZ 33,552- 233-73- 9-B
W3SW 33,540- 258-65-20-B
W3HVM 31,200- 260-60-11-B
WA3QQQ 31,008- 228-68-14-A
K2SCU/3 28,084- 238-59-22-A
AC3KMV 27,552- 246-56- 5-B
AA3AFQ 26,950- 275-49- 6-B
K3AV 26,760- 223-60-13-A
WA3LVY 24,396- 214-57- 9-A
K3HPG 23,862- 291-41- 8-A
W3ERG 21,726- 213-51-15-A
K3TFU 20,746- 253-41-13-A
WB2JYM/3 18,744- 213-44- 5-B
WB3ADG 17,716- 206-43-16-A
W3GZP 17,270- 157-55- 5-B
AA3KOC 17,020- 185-46-12-A
K3AVT 15,750- 125-63- 7-B
K3CKT 14,734- 139-53- 4-B
W3IHM 13,710- 155-41- 4-A
W3ML 10,804- 146-37- 6-B
WA3ZAK 10,200- 100-51-12-A
K3ZZ 9760- 122-40- 6-B
WB3CGI 9030- 129-35-11-B
LU2DC/W3 8858- 103-43- 7-B
W3ABC 7600- 100-38- 8-A
W3PWO 7296- 76-48- 6-A
WB4SGV/3 5550- 111-25- 2-A
WB3CJO 3320- 83-20- 8-A
K3URZ 2832- 59-24- 2-A
WA3ROY 1806- 43-21- 6-B
K3OAE 1360- 40-17- 2-A
W4RIL 2- 1- 1- 1-B
K3GJD(+K3CU) 132,016- 892-74-19-B
WA3EKL(WA3s,BDF,KCY,oprs.) 82,198- 563-73-23-B
WA3TOE(+K3UCN) 68,160- 480-71-22-B
W3NKF(W3s,EW,MNU,PJM,WA3s, THD,YMO,WA4NYS,oprs.) 40,576- 317-64-24-B

WESTERN PENNSYLVANIA

WA3WIK(WA3SZX,opr.) 192,720-1320-73-24-B
WA3TBW/3 124,960- 880-71-24-A
AB3AGH 47,360- 370-64-14-A
W3GNR 42,228- 306-69-14-A
WA3JGY 40,704- 318-64-15-A
W3SMX 34,584- 262-66-18-A
K3BSY 29,988- 306-49- 7-B
WA3KOS 27,246- 239-57-10-A
W3QII 24,308- 206-59-17-A
WA3MDY 19,106- 233-41-15-A
WA3VAR 16,892- 206-41-11-A
WB3AYZ 16,544- 176-47-13-A
W3HDH 10,440- 90-58- 6-A
AD3HWL 8320- 104-40- 4-B
WA3TPN 3150- 45-35- 5-B
W3KQD 960- 30-16- 3-A
K3CR(WA3s,FET,JFW,NQX,SVK, WN3DCJ,oprs.) 143,700- 958-75-24-B
W3KWH(W3SVJ,WA3FYJ,oprs.) 78,600- 524-75-22-B
WA3TJB/3(+K3MIY,WA3MYI) 50,978- 359-71-24-A

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ALABAMA

WB4QIH 74,520- 540-69-17-B
W8FAW/4 45,000- 300-75- 5-B
AB4UNM 44,110- 401-55-14-A
K4ZGB 33,306- 273-61-12-A
K4JYO 27,776- 248-56- 7-B
WB4JNL 16,016- 154-52-10-A
WA4EDY 12,502- 133-47- 8-A
W4DS 10,496- 80-64-11-B
K4JK 3740- 55-34- 4-A
WB4NLK 1892- 43-22- 2-A

GEORGIA

WB4LOK(WB4TVU,opr.) 146,064-1074-68-15-B
AD4BAI 69,224- 509-68-16-B
W4JM 58,752- 408-72-11-B
WA3VJA/4 52,668- 399-66-15-B
W4BTZ 41,300- 350-59- 9-B
K4KKJ 35,632- 262-68- 9-A
K4EZ 30,208- 236-64- 6-B
K4GCR 29,636- 239-62-10-B
WB4PRM 23,780- 205-58-18-A
AA4OQO 22,578- 213-53- 8-B
WB4KXW 22,400- 200-56-15-A
AC4LGM 11,858- 121-49- 4-A
AC4GXW/4 11,092- 118-47- 9-A
K4BAM 7828- 103-38- 8-A
AC4GKI 2080- 40-26- 5-B
W4AQL(multiop) 158,250-1055-75-24-B
W4DOC(K4RNF,W4s,IO,MRJ,NJQ, WA4s,AXV,AZL,HNL,NAO,PBW, PQO,PZD,QOQ,WB4s,AJS,HXE, VSP,oprs.) 68,870- 485-71-24-B

KENTUCKY

WB4OSS 187,960-1270-74-24-B
WB4KTR 107,894- 739-73-22-B
AA4QMQ 72,224- 488-74-24-B
WA4UNJ 48,576- 368-66-23-A
WA4QQV 44,298- 321-69-18-B
WB4FVP 43,026- 303-71-14-A
WB4NTB(WB4OEM,opr.) 36,180- 270-67-10-B
AB4FOT 34,036- 254-67- 8-A
WA4EBN 33,024- 258-64-16-A
W4RIW 27,258- 231-59-16-B
WB4WBO 2500- 50-25- 4-A

NORTH CAROLINA

WA4FFW 154,906-1061-73-24-B
K4FOB 100,776- 742-68-24-A
WB4PWV 70,104- 508-69-19-B
W4TYE 61,628- 497-62-10-B
K4MOB 60,852- 461-66-19-B
W4NQA 53,760- 420-64- 9-B
WB4VHE 29,648- 218-68- 9-A
WA4PSL 26,400- 240-55-14-A
WA4BCN 19,032- 183-52-10-A
K4VHO 18,644- 158-59-11-B
W4OMW 18,126- 159-57-10-B
WA4HRD 15,500- 155-50-11-B
WB4SGA 6776- 121-28- 6-B
W4IZI 4738- 103-23- 6-A
WB4SGB 3248- 58-28- 5-A
WA4IVR 650- 25-13- 7-A
K4NV 468- 18-13- 2-A
K4YZO 40- 5- 4- 1-A
K4LG(WA4s,HOP,IVR,WB4s,BHQ, SGB,VHE,oprs.) 47,318- 401-59-19-B

NORTHERN FLORIDA

WB4OZT 206,016-1392-74-22-B
W4YUU 166,650-1111-75-20-B
AA4UFW 155,916-1098-71-24-B
WB4JGY 76,300- 545-70-22-B
AC4ZTW 68,160- 480-71-17-B
WA4OEM 27,328- 244-56- 9-A
W4KFA 24,648- 237-52-21-B
WB4CTI 21,840- 210-52-10-B
WB4YGI 4880- 61-40-10-B
WA4BTC 338- 13-13- 1-B

SOUTH CAROLINA

WA4ALC 117,936- 819-72-24-B
W4YJS 14,768- 142-52-18-A
K4ADI 7728- 92-42- 5-A
WA4FCH 180- 10- 9- 1-B

SOUTHERN FLORIDA

AA4BTQ 104,932- 709-74-24-A
AC4OZF 84,184- 619-68-11-B
WB4OGW 78,122- 583-67-13-B
AB5QDW/4 66,500- 475-70-15-A
WB4AFE 43,500- 375-58-22-A
W4PZV 37,740- 255-74-16-B
WA4ZLW 29,056- 227-64-12-A
WA4KMO 29,008- 296-49- 5-B
WB4IBJ 28,404- 263-54-11-A
WA4LOX 28,072- 242-58-12-A
W4FWG 27,720- 231-60- 7-B
WB4AKY 22,440- 220-51-18-A
W4WJ 21,730- 205-53- 5-B
AA4HWH 21,624- 212-51-11-A
WA4FIB 17,702- 167-53-10-A
WB4ECR 16,356- 141-58-13-A
WA4ORX 13,248- 138-48-15-B
WB4BNH(WA4RSA,WB4s,NZO, WYI,WB5QZL,oprs.) 57,728- 451-64-13-B
WB4PRZ(+K4VB,WA4s,KKE,MDM, MIL,MIN,WB4s,ARY,IRG) 51,084- 473-54-14-B

TENNESSEE

K4PUZ 216,150-1441-75-24-B
W1FCC/4 105,900- 706-75-24-A
K4PJ 72,900- 486-75-14-B
K4TTA 58,220- 410-71-12-B
WB4RJF 55,200- 400-69-14-B
W4TGT 45,076- 382-59-13-B
AA4MKU 46,612- 318-67-15-A
WA4CDH 25,296- 204-62-17-A
AB4WHE 23,880- 199-60-12-B
W4OGG/4 8820- 98-45- 6-A
W4LUH 6642- 123-27- 3-B
AA4IVO/4 5940- 90-33- 4-A
WA4JDY 5742- 87-33- 9-B
WA4GZT 4224- 64-33- 9-A
AB4WFT 986- 29-17- 1-B
WA4EJX(multiop) 139,800- 932-75-23-B
W4EAL(multiop) 109,900- 785-70-20-B
WA4ELW(+WB4RZA) 74,304- 516-72-21-B

VIRGINIA

K4YF(WB4UKA,opr.) 214,950-1433-75-24-B
WA4KKP 197,580-1335-74-24-B
W3ZKH/4 154,950-1033-75-24-B
K4CFB 140,976- 979-72-23-B
W4WSF 128,400- 856-75-21-A
W4QCW 106,500- 710-75-19-B
WB4VMB 104,086- 733-71-21-B
K4DID 102,384- 711-72-19-B
K4GKD 102,240- 710-72-16-B
W4KFC 95,140- 670-71-12-B
WA4DUS 84,360- 570-74-17-B
W4MYA 78,130- 601-65-12-B
K5CIT/4 75,442- 563-67-19-B
WA3FUV/4 63,000- 500-63-16-B
AA4SHL 58,500- 450-65-16-B
W4YZC 50,400- 360-70-12-A
WA4JIY 43,884- 318-69-18-B
K4CG(K3WUW,opr.) 43,200- 300-72- 7-B
K4EBY 43,030- 331-65- 8-B
W4EI 42,746- 317-67-13-B
W4JVN 38,080- 272-70-15-B
K4FJW 35,640- 297-60-20-B
K4LEF 33,756- 291-58-17-A
WA4WYN 32,026- 239-67-17-A
WA4ROI 31,578- 277-57-21-A
W4TMN 31,152- 264-59-16-B
W3IYL/4 30,000- 250-60-20-B
WA4SIQ 29,636- 239-62-20-B
W4ZM 28,644- 217-66- 8-B
W4EZ 27,938- 229-61- 7-B
W4GF 24,720- 206-60- 9-B
WA4CGX 24,522- 201-61-16-B
W4NND 23,850- 225-53-11-B
WB4BRC 21,730- 205-53-13-B
WA4NOB 21,500- 215-50-24-B
AB4DBK 21,432- 228-47-13-A
W4JAT 21,000- 175-60- 8-B
LU8AGT/W4 18,616- 179-52- 7-B
W4KMS 16,060- 146-55-11-B
AC4UBE 11,340- 126-45-15-A
WA4MSX 10,152- 141-36-10-A
WA4PNS 9600- 100-48- 7-A
K4JWD 9576- 126-38- 6-B
K4FOK 8184- 124-33- 4-A
W4KP 7396- 86-43-13-B
K4IAI 7128- 99-36- 2-B
WA3MUB/4 6200- 100-31- 3-A
K4KA 5880- 105-28- 5-A
WA4AXT 3596- 62-29- 6-A
AB4EBV 3240- 54-30- 6-A
WA4VBE 2604- 62-21- 6-A
WA4MJE 1600- 50-16- 2-A
K4BKX 864- 27-16- 2-A
W4BVV(+WA3AMH,2MtrNet) 217,950-1453-75-24-B
K4VT(+K4EKJ,WA4HPF) 172,650-1151-75-24-B
W4DM(+Net) 117,000- 780-75-19-B
K4NDH(WA3VPM,W4MXE,WA4s, CFI,NGS,WB4KOO,W8AKS,oprs.) 87,840- 610-72- 9-B
KØDX/4(+Net) 83,400- 556-75-16-B

WEST INDIES

KV4FZ(K7VPF,opr.) 282,750-1885-75-24-B
KV4JY 213,260-1441-74-22-B

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ARKANSAS

WA5RTG 115,778- 793-73-12-B
WB5XIU 104,400- 725-72-21-A
WA5SDT 101,246- 713-71-18-B
WB5SID 73,164- 546-67-21-A
AA5WMC 31,872- 249-64-19-A
WB5PUT 26,796- 231-58-19-A
W5QZL 10,816- 104-52-11-B
AA5HNN 754- 29-13- 2-A

LOUISIANA

W5WMU 227,550-1517-75-24-B
K4CHE/5 53,176- 391-68-24-A
WB5LBV 43,112- 317-68-19-A
W5WG 40,704- 318-64-22-A
WB5VRO 30,848- 241-64-16-A
W5OB 29,264- 236-62- 8-B
WA2UMF/5 19,038- 167-57-16-A

MISSISSIPPI

K3OWN/5 167,536-1132-74-22-B
K5UKH 82,552- 607-68-22-B
K5LUW 51,188- 382-67- 8-B
W5AER 20,188- 206-49-14-A

NEW MEXICO

K5FPO 177,098-1213-73-23-B
WB5LZC 151,800-1010-75-23-B
WA5YCX 132,624- 921-72-20-B
WA5RGI 84,370- 649-65-24-B
W5VIW 72,080- 530-68-20-A
AB5MVA 24,976- 223-56-18-A
WB5WJR 12,834- 207-31- 3-A
AB5HAL 8904- 106-42- 7-B
WB5AXC(WA5s,VAL,WHN,WB5s, AQD,LYJ,TXI,KL7HMT,oprs.) 109,872- 763-72-24-B

NORTHERN TEXAS

WB5OOE(WB5IZN,opr.) 240,600-1604-75-24-B
W5TMN 220,200-1468-75-24-B
K5RHZ 208,950-1393-75-24-B
WA5UCI 158,100-1054-75-18-B
AB5AAR/5 128,084- 902-71-21-A
WB5AOF 114,402- 829-69-24-A
K5VTA 110,112- 744-74-17-B
AB5HIH 85,058- 599-71-17-A
WB5SBH 69,000- 500-69-19-A
W5QXK 53,268- 386-69-20-A
WB5UFB 50,048- 368-68-20-A
K5ERJ 40,052- 323-62-13-B
WB5QLF 23,072- 206-56-13-A
WB5UKI 18,312- 218-42-22-B
K5BDX 14,500- 125-58- 9-A
WA5VOQ 12,480- 120-52- 5-B
WA5UBK 12,200- 122-50-13-A
W5SOD 6888- 82-42- 6-A
W5YR 3960- 60-33- 4-A
WB5OON 3864- 84-33- 4-A
K5WIQ 3672- 51-36- 7-A
W5LA 360- 18-10- 1-A
AA5RXT(+WA4MWH,WB5s,JJE, SFX) 174,900-1166-75-23-B
WB5MWZ(+WB5PIP) 67,938- 507-67-24-B
WB5WJO(+WB5VYL) 65,824- 484-68-24-A
WB5TGK(+WB5s,FLN,XTR, WB9NGA) 51,750- 375-69-24-A
W5ONL(multiop) 39,960- 308-60-10-B

OKLAHOMA

AD5LUR 113,968- 838-68-19-B
WB5RXZ 60,032- 448-67-20-B
W5YH 50,224- 344-73-20-B
K5DEC 41,814- 303-69-18-B
W5YJ(WB5CKQ,opr.) 2760- 60-23- 3-B

SOUTHERN TEXAS

K5LWL 244,050-1627-75-24-B
K5PFL(WB5AWX,opr.) 223,776-1512-74-24-B
K5OOU 74,736- 519-72-24-B
W5SBX 71,426- 503-71-14-A
AB5IFY 65,036- 456-71-15-B
WA5HBP 35,880- 299-60-14-B
K5BZU 32,508- 258-63-14-B
AB5NRH 27,600- 230-60-20-A
WA2PRB/5 27,376- 236-58-12-A
W5RRR(W5LSZ,opr.) 27,328- 224-61- 7-B
K5RF 27,206- 223-61-13-B
WB5TNN 26,314- 223-59-16-A
WA5QPA 25,296- 204-62- 8-B
AA5KLK 24,476- 211-58-12-A
WB5NXH 23,618- 241-49- 9-B
WB5UII 21,510- 239-45-16-A
AA5WCI 17,808- 168-53- 6-A
WA5MCU 456- 19-12- 1-B
AC5AC(WB5s,AZI,BPG,OOW,PBZ, oprs.) 161,914-1109-73-24-B

CANAL ZONE

KZ5UH 5400- 75-36- 2-A

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EAST BAY

K6RV(K6PU,opr.) 192,150-1281-75-24-B
WA6DIL 160,016-1096-73-22-B
K6CCY(WA6VEF,opr.) 158,952-1074-74-24-B
K6HIH 145,800- 972-75-22-B
WA6TQK 134,236- 907-74-24-B
W6RGG 126,900- 846-75-22-B
W6RJ 109,350- 729-75- 9-B
AA6DYZ/6 100,800- 700-72-24-B
WB6OQT 92,400- 660-70-23-B
WA6BMV 82,662- 599-69-24-B
WB6HWT 34,902- 277-63-18-A
K6PJY 32,364- 261-62-16-A
WA6KEQ 22,968- 198-58-23-A
WA6BFL 18,100- 181-50-11-A
WB6KNV 16,920- 188-45-16-A
WA6VYK 14,310- 159-45-19-B
W6LD 12,960- 144-45- 8-B
WA6UAV 1560- 39-20- 8-A
K6AUC(+K6s,ILM,RM) 165,450-1103-75-23-B
K6ZM(+K6STI) 151,350-1009-75-24-B
WA6NGG(+WB6HDH) 143,372- 982-73-24-B
WB6ION(+WB6HWP) 133,200- 900-74-20-B
W5BSL(+WA6JUD) 115,924- 794-73-23-B
WA6JUD(+W6s,BSL,YKM,WA6WRR) 86,430- 645-67-22-B
AC6OT(multiop) 39,040- 320-61-24-B
W6HB(WB6s,EMA,IPC,oprs.) 24,378- 239-51-24-B

LOS ANGELES

K6AC(WB6ZVC,opr.) 223,800-1492-75-24-B
WB6YBL 216,300-1442-75-24-B
W6SVN 136,050- 907-75-18-B
WB6CEI 105,850- 725-73-18-B
AB6FVO 58,862- 499-69-16-B
W7CB/6 61,800- 412-75-12-B
W6VPZ(WA6BIL,opr.) 61,776- 468-66-15-B
W6RR(W6RTT,opr.) 38,500- 350-55- 4-B
WB6KPN 37,632- 294-64-12-A
AC6OEO 36,600- 300-61-17-B
W6CN 30,752- 248-62-19-A
AC6RZ 30,600- 306-50-13-B
WA6GDS 29,382- 249-59-16-A
WB6YHE/6 28,910- 245-59-12-A
W6ORD 28,320- 236-60-11-B
K6MP 26,728- 257-52- 4-B
AA6EPQ 20,776- 212-49- 4-B
AD6BKU 19,936- 178-56-16-B
WB6CIA 19,600- 200-49-12-A
WB6ZWP 13,330- 155-43-15-A
WA6AJR 13,248- 138-48-16-A
AC6OIC 9842- 133-37- 4-B
WB6KJI 7656- 87-44- 5-A
W6RTT 2438- 53-23- 1-B
K6YFZ 2430- 45-27- 4-A
W6PFE 2162- 47-23- 8-A
W5SVO 1836- 54-17-12-A
WB6MXF 1116- 31-18- 2-A
W6AQ(+WB6ZGL) 69,680- 520-67-15-B
WB6JJE(+WA6PZL) 54,264- 399-68-20-A
WB6FFE(+WB6s,DOI,YAS) 52,260- 402-65-21-A

ORANGE

K6LL/6 209,850-1399-75-24-B
WA6WZO 66,456- 468-71-21-A
W6HDK 64,860- 470-69-21-B
WB6KRI 52,302- 379-69-20-A
WA6LFF 46,766- 349-67-23-A
WB6JYQ 28,908- 219-66-15-B
KØGJD/6 22,800- 200-57- 5-A
WA6KHB 20,398- 217-47-24-A
WB6ACY 2000- 40-25- 6-A
W6CCP(+K6YNB,KØGJD) 172,420-1165-74-21-B
W6VLD(W3CEQ,WA6s,DPQ,EUM, oprs.) 117,530- 805-73-20-B
AA6FIT(+WB6IRR) 98- 7- 7- 1-B

SANTA BARBARA

AD6QPH 114,464- 784-73-24-B
W6UA 91,688- 628-73-15-B
AA6GWY 83,212- 586-71-19-B
W6DKQ 74,834- 527-71-22-B
WB6EDM/6 11,250- 75-75-10-B
W6PRP 4950- 75-33- 2-B

SANTA CLARA VALLEY

WB6AIN 180,900-1206-75-24-B
W6UKK(WB6DSV,opr.) 171,750-1145-75-22-B
K6SSJ(WA6DGX,opr.) 168,046-1151-73-24-B
AA6PGB 167,100-1114-75-24-B
W6JZU(WA6TLV,opr.) 155,782-1067-73-24-B
AA6DQM 136,456- 922-74-23-B
WB6LPK 131,100- 874-75-23-B
K6DC(WB6KBK,opr.) 130,670- 895-73-23-B
K6BR(WAØENP,opr.) 119,784- 868-69-15-B
K6FB(WB6JGS,opr.) 105,552- 733-72-24-B
W6CF(WA6GSN,opr.) 99,900- 675-74-24-B
AA6MQS 99,426- 681-73-24-A
W6MSF 97,384- 658-74-22-B
W6MUR(K6ZX,opr.) 92,300- 650-71-18-B
K6QZ/6 89,096- 602-74-20-B
WA6ITV 65,824- 484-68-24-B
K6RU 64,400- 460-70-20-B
K6QX 63,194- 445-71-15-B
WB6PYI 61,488- 427-72-22-B
WB6DSV(W6OKK,opr.) 57,392- 422-68-19-B
WB6RIU 54,470- 419-65-14-B
WA6AVS 53,040- 408-65-24-B
WA6HCI 50,960- 364-70-17-A
W6KH 50,172- 339-74-13-B
W6NLG 45,696- 357-64-10-B
WB6PCO 45,440- 355-64-17-A
K6EIH 39,000- 300-65-14-B
WA6HJV 27,328- 244-56-16-A
AB6GNM 26,448- 232-57-12-B
WB6MDF 22,366- 211-53-18-A
WB6EMR 22,220- 202-55- 7-A
W6MVV 21,576- 174-62- 9-B
WA6BZT 21,300- 213-50-14-A
W6RPK 20,300- 203-50-14-A
W6SUJ 19,872- 207-48-18-A
WB6CXS 19,552- 208-47-10-B
WA6FKK 14,872- 143-52- 5-A
WA6LIJ 12,500- 125-50-12-A
W6LQP 8514- 99-43- 4-B
AB6HBT 6480- 90-36- 4-A
W6LID 4488- 66-34- 6-A
W6WZF 3588- 78-23- 6-A
K6SMH 3024- 63-24- 4-A
AB6SWH 2562- 61-21- 6-A
WA6SFT 1430- 55-13- 1-B
W6IKW 486- 27- 9- 1-B
WB2JYM/6 126- 9- 7- 1-B
K5LZT/6 32- 4- 4- 1-A
W6YX(WB4SMA,WB6s,RAL,ZUO, WA7s,MMK,MQX,WA8YBV,oprs.) 187,664-1268-74-24-B
WA6GFY(W6HJP,WB6s,EXW,MQJ, oprs.) 121,050- 807-75-23-B
WA6UZA(+K6EBB) 79,132- 542-73-19-B
K6MA(+WA6NIL,W8RPA) 48,880- 376-65-24-B
WB6WSL(K6s,ODK,TDT,WA6s, G5W,IXT,WB6s,AAJ,GSZ,JJX,POR, PZT,SJQ,oprs.) 46,080- 360-64-24-B
WA6NKK(K6s,JKV,SMH,W6APZ, WA6s,BZT,FKK,MIF,VE7DBV, oprs.) 30,740- 290-53-12-B
W6ODM(+K6JKV) 7140- 105-34-10-B

SAN DIEGO

W6JOT 160,728-1086-74-24-B
K6NA 151,800-1012-75-13-B
WA6ELX 113,040- 785-72-24-A
AB6DPV 49,558- 349-71-10-A
WA6CXK 42,496- 332-64-11-B
WB6RMG 28,892- 233-62-11-A
WA6MHZ 14,602- 149-49-21-A
AA6UFY 12,880- 140-46-10-B
W6RDF(WA6CXK,opr.) 10,008- 139-32- 4-A
AG6JES/W6 1764- 42-21- 3-A
W6KBD 4- 2- 1- 2-A

SAN FRANCISCO

W6KQG 161,250-1075-75-24-B
AA6HPF 22,736- 203-56-14-B
AA6VPB 14,976- 144-52-16-A
AA6RAV 11,900- 119-50-10-A
AB6ITN 2520- 60-21- 7-A
W6BIP(+WA6DJI) 101,100- 674-75-18-B
W6KHI(+W6RNF) 29,052- 269-54-22-B

SAN JOAQUIN VALLEY

K6PU(WB6CEP,opr.) 165,456-1149-72-24-B
WA6WRS 108,186- 741-73-24-A
WA6LVC 67,804- 506-67-10-B
WB6RKH 59,040- 410-72-19-B
WA6GRA 41,464- 292-71-10-B
WB6ITM 34,580- 266-65-10-A
AA6KMW 23,664- 204-58-15-A
WB6ATJ 20,832- 186-56-13-A
WB6KHR 8200- 100-41- 9-B
AB6PZW 6480- 81-40- 5-B
K6TG 3328- 52-32- 9-A
WA6JDB 2916- 54-27- 2-B
W6RLG 2236- 43-26-11-A
WA6YAB 560- 20-14- 9-A
W6PXG(+K6UZL,WB6s,DYG,IUK, IQS) 142,058- 973-73-24-B
K6AYA(+WA6OEC) 116,620- 833-70-24-B

SACRAMENTO VALLEY

AA6JVO 114,912- 798-72-23-B
K6SG 101,388- 714-71-24-B
AC6KYA 34,706- 259-67-13-B
WB6MMR 26,100- 225-58-11-B
W6YMH 25,056- 216-58-21-B
WA6JRK 24,644- 202-61-19-A
AA6FFI 16,224- 169-48-20-A
W6NKR 16,188- 142-57-11-B
WA6FYP 11,792- 134-44-17-A
WA6BRV 9120- 120-38-11-A
WB6RQE 6396- 82-39- 6-B
K6RLY 3276- 63-26- 4-B
WA6OWH 140- 10- 7- 1-A
WA6IMY(WA6s,BEV,GHH,UZV, WB6s,NGF,RZX,SEQ,YCB,oprs.) 104,976- 729-72-24-B

PACIFIC

KH6IJ 127,584- 886-72-24-B
KH6JFI 35,112- 308-57- 9-B
KH6ILA 6192- 86-36- 6-A
KH6GQW(+KH6GMP 148,950- 993-75-24-B

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ARIZONA

K7JVR 135,600- 904-75-22-B
WB7CYU 140,688- 977-72-24-B
WA7VYM 116,340- 831-70-20-A
W7ZMD 72,660- 519-70-19-B
WB7DPM 68,564- 562-61-16-A
AA7NEV 40,052- 323-62-10-A
WA7QIR 30,090- 255-59-19-B
AA7KLK 25,868- 223-58-10-B
W7FCD 14,706- 129-57- 5-A
W7YS 9000- 100-45- 5-A
AD7NHL 3534- 57-31- 5-A

IDAHO

WA7WXY 261,900-1746-75-24-B
W7VSS 42,840- 306-70-15-A
WA7YXZ(+WA7YIH)
99,428- 742-67-24-A

MONTANA

W7JYW/7 130,900- 935-70-24-B
W7YB(WA7BSZ,opr.)
99,428- 742-67-23-B
W7TYN 96,560- 710-68-22-A
WA7KKN 52,280- 469-60-24-A
WA7IIQ 4278- 69-31- 9-A
W7FO(multiop)
74,244- 538-69-24-B

NEVADA

WA7NIN(W6OAT,opr.)
262,950-1753-75-24-B

OREGON

W7TML 184,800-1232-75-24-B
WB7CCJ 95,472- 663-72-24-A
AA7IHN 88,708- 662-67-21-B
W7JZV 62,300- 445-70-19-B
K7GGY 37,376- 292-64-17-A
WB8NUA/7 32,000- 250-64-13-A
K7WT 27,084- 222-61-13-B
AA7JBE 20,414- 173-59- 5-B
W7IBL/7 19,928- 212-47-16-B
W7TWL 7254- 93-39-11-A
WA7IHO(+WA7s,WEP,WNQ)
31,992- 258-62-20-A

UTAH

W7GXC 39,650- 305-65-14-A
WA7WIB 28,098- 223-63-13-B
WA7VCE 6272- 56-56- 8-A
WA7SHW 5112- 71-36- 6-B

WASHINGTON

W7RM(W5QQQ,opr.)
239,850-1599-75-24-B
W7BUN 177,750-1185-75-24-B
WB4JBS/7 141,036- 966-73-24-B
WA7OBL 127,960- 914-70-23-B
K7DZ 125,136- 869-72-20-B
K7RSC 125,122- 857-73-17-B
WA7UWE 111,444- 753-74-21-B
K7RA 101,388- 714-71-17-B
W7JEG 100,678- 709-71-23-B
W7HAD 85,848- 588-73-23-B
WA7SCN 83,780- 590-71-22-B
W7YTN 68,160- 480-71-18-B
K7AWB 61,774- 461-67-19-B
WB7BNP 55,800- 450-62-23-B
W7WMY 48,952- 422-58- 8-B
WA7PVF 45,440- 355-64-21-B
WA7YCZ 43,400- 362-60-18-B
WA7WET 40,238- 341-59-23-A
W7LKG 40,064- 313-64-24-B
W7DAZ 39,564- 314-63-12-B
WA7QGI 31,696- 283-56- 9-B
WB7AJR 27,690- 213-65-19-B
K7GGD 27,246- 239-57- 7-B
WB7BLQ 26,576- 302-44-14-B
WA7AIM 25,500- 250-51-20-A
WA7ZTT 22,440- 204-55-13-B
AA7JCB 21,420- 210-51-10-B
AB7ALS 20,910- 205-51-16-B
WB7DWU 20,400- 204-50-18-A
K7JCA 20,034- 189-53- 4-B
K7MOK 18,568- 211-44- 9-B
K7DS 16,302- 143-57-12-B
WA7UQG 11,696- 136-43- 4-B
W7RVG 9898- 101-49- 5-A
WA7AGN 7788- 118-33-13-A
WA7ROJ 6800- 85-40-12-B
AB7ALT 5280- 80-33- 7-B
K7TAK 4756- 82-29- 7-A
K7BFL 3248- 56-29- 3-A
WA7OJI 3100- 62-25- 7-A
WA7NSM 2040- 51-20- 6-B
K7EFB 1378- 26-21- 4-A
W7AZI 780- 30-13- 5-B
K7GZO(+K7NZU)
64,944- 492-66-24-B
WA7WMC(+WA7s,TOM,WMB,WMD,
WB7DUX) 60,160- 470-64-22-A

WYOMING

KV4IO/7 99,680- 712-70-17-B
K7GLL 79,288- 583-68-20-A
KØPVI/7 51,322- 383-67-12-A
WA7ZTA 27,392- 214-64-17-A
WA7ZXL 22,968- 198-58-21-A
W7PSO 17,360- 155-56-10-A
WAØLJN/7 4928- 77-32-13-A

ALASKA

KL7GRP 32,818- 269-61-15-B
KL7HSB(+KL7IOG)
49,104- 396-62-10-B

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MICHIGAN

K8YRV 142,058- 973-73-24-B
W8TR(WA8PSD,opr.)
117,718- 829-71-24-A
K8YQW 109,646- 751-73-16-B
WA8WWM 106,642- 751-71-22-A
K8IDE(WB8PIW,opr.)
106,050- 707-75-24-A
K8BZK 105,704- 724-73-21-B
WA8FRE 105,536- 776-68-21-B
K8MJZ 100,080- 695-72-19-B
WA8JFQ 91,000- 650-70-24-B
WA8QEF 84,300- 562-75-22-B
WA8MOA 82,950- 553-75-24-B
K8SIA 63,900- 450-71-20-B
WB8DZR 61,336- 451-68-21-B
WB8BGY 60,000- 400-75-22-B
WB8MNL 56,816- 424-67-22-B
WB8IOT 54,096- 392-69-23-B
WA8FMU 53,196- 403-66-22-A
W8GLC 52,000- 400-65-11-B
K8ZZU 50,954- 349-73-20-B
WA8LTX 50,820- 363-70-23-B
WB8OQR 49,530- 381-65-24-A
WA8QCW 47,880- 342-70-18-A
WA8KME 46,992- 356-66-14-B
WA8MEC 44,488- 332-67-15-B
WB8RRR 43,952- 328-67-15-A
WA8ASV 43,400- 350-62-20-A
WB8JVW 43,392- 339-64-24-A
WB8AAX 42,372- 321-66-20-B
WB8PKU 37,376- 292-64-24-A
AC8QGP 36,790- 282-65-22-B
AC8TJQ 36,046- 269-67-18-A
WB8NBF 36,000- 240-75-16-B
WB8VWY 34,000- 250-68-14-B
K8ZJU 32,982- 239-69-17-B
WA8ZDR 32,896- 257-64-15-A
WB8QQL 31,892- 238-67-16-A
W8IHE 31,144- 229-68-15-B
WB8LDH 30,916- 262-59-10-B
WB8IGW 30,624- 232-66-14-B
WA8MHY 30,276- 261-58-23-A
W8TXM 26,840- 220-61- 9-B
AD8SWW 26,796- 231-58-15-A
AA8ZTQ 25,856- 202-64-19-B
WB8RVG 25,376- 208-61-11-B
AB8NSF 22,326- 183-61-21-A
WB8JUS 25,272- 234-54-16-A
WB8OBF 24,888- 204-61-18-B
K8CVV 24,398- 214-57-14-A
WB8TZF 23,484- 206-57- 9-A
K8RDJ 21,460- 185-58-13-B
WB8QAO 21,376- 167-64-16-A
WB8YSC 20,072- 193-52-20-A
WB8SBI 18,330- 195-47-15-B
W8SS 16,100- 161-50- 9-B
WB8VPC 15,912- 153-52-13-B
WB8MSK 15,552- 162-48-11-A
WB8YDR 15,370- 145-53-15-A
W8ETH 14,872- 143-52-16-A
WB8PFO 14,734- 139-53-15-B
WD8BSL 13,462- 127-53-12-A
W8LOI 12,604- 137-46- 9-A
W8FSZ 12,126- 141-43- 7-B
WB8TVD 11,340- 126-45-16-A
W8PBO 11,232- 144-39- 4-B
WB8QUD 11,232- 117-48-10-A
WB8VBC 10,560- 165-33- 6-B
WB8ARC 10,578- 123-43- 8-B
K8AYZ 9776- 104-47- 7-A
W8JTB 9512- 116-41- 3-A
K8ZKM 9000- 100-45-16-A
WB8FBG 8938- 109-41- 6-A
WB8QXR 8704- 128-34- 7-A
WB8KAQ 8200- 100-41-17-A
WB8JUP 7440- 93-40- 6-A
K8KQJ 7400- 100-37- 6-B
WD8BVI 6696- 93-36- 9-A
WB8BPY 5478- 83-33- 2-B
W8LCU 5250- 75-35- 6-A
WB8THO 4290- 65-33- 9-A
KD8BLM 4144- 56-37-11-B
W8TCY 3224- 52-31- 7-A
AB8TKZ 3200- 50-32- 4-A
WB8LOT 3074- 53-29- 6-B
WB8OJI 4080- 60-34- 5-B
WA8VGQ 2912- 52-28- 3-A
K8YVU 2900- 50-29- 6-A
WB8MOF 2700- 50-27- 5-B
WB8KBF 2700- 50-27- 4-B
WB8HNB 2646- 49-27- 3-A
W8SFA 2100- 50-21- 4-A
WB8TLV 2000- 50-20- 5-B
W8SDH 1960- 49-20- 6-A
W8PVI 1386- 33-21- 2-A
WB8USJ/8 1368- 38-18- 4-A
WB8RNY 1152- 96- 6- 8-B
W8TIC 780- 26-15- 3-A
K8UQP 754- 29-13- 4-A
WB8SLQ 660- 22-15- 4-A
AA8ZAV 570- 19-15- 1-A
W8TZZ 418- 19-11- 2-A
W8MAA(K8HXW,opr.)
408- 17-12- 3-B
WB8WMU 400- 100- 2-16-A
WB8EEQ 260- 13-10- 3-B
WB8HYD 176- 11- 8- 1-B
WA8DPD 168- 42- 2- 8-A
WB8UHS 76- 38- 1- 5-A
W8OM 40- 5- 4- 1-A
K8JCQ 38- 19- 1- 5-A
AB8LWS 28- 14- 1- 1-A
WA8VJB 22- 11- 1- 1-A
WB8NXN 22- 11- 1- 1-A
WB8NUS 14- 7- 1- 2-A
WA8QFR 10- 5- 1- 5-A
WB8LZA(+WB9EGZ)
88,440- 670-66-23-B
W8QN(+WB8VAS)
49,956- 362-69-18-B
WA8SZY/8(+WB8LWS)
33,516- 266-63-21-A
K8DAC(K8s,BWC,CJF,W8s,CTY,
EOS,WB8s,JCD,PLO,ROC,RYJ,
VVY,oprs.) 33,060- 285-58-24-A
WA8LAY(multiop)
21,774- 191-57-11-A
AB8AYW(+WB8TLD)
20,748- 182-57-15-A
K8CJF(multiop)
3312- 69-24- 6-A
WB8WJZ(+WB8TKZ)
1426- 31-23- 3-A

OHIO

WA8PLZ(WB8AYC,opr.)
213,014-1459-73-24-B
WA8YWX 179,550-1197-75-22-B
WB8MMF 139,416- 942-74-24-B
AB8UKX 136,800- 912-75-23-B
WB8MZZ 135,360- 940-72-23-B
WA8SWB 113,850- 759-75-23-B
W8EDU(WA8TKW,opr.)
109,646- 751-73-13-B
W8WPC 102,672- 713-72-16-B
W8KZP 96,214- 659-73-24-B
K8RMK 89,600- 700-64-14-A
WB8DGO 87,162- 597-73-20-B
AD8HBN 75,628- 518-73-12-B
WB8WDO 70,518- 511-69-23-B
K8MFO 68,100- 454-75-11-A
WA3BGE/8 67,452- 511-66- 8-B
WB8WHS 56,364- 427-66-12-B
WB8WMB 55,208- 412-67-18-B
K8CVJ 45,390- 350-65-14-A
W8UPH 45,360- 378-60-17-B
W8IDM 41,580- 297-70-16-B
WB8NBY 40,820- 314-65-22-B
WB8URG 40,320- 315-64-17-A
WB8STU 39,530- 295-67-14-B
WB8RTJ 35,360- 272-65-14-B
K8NXV 33,744- 296-57-14-B
WB8VQI 31,850- 245-65-16-B
WB8RIB 31,500- 250-63- 9-B
WB8QXN 30,256- 248-61-15-B
WB8KPI 27,028- 233-58-17-B
AA8STX 23,856- 213-56- 4-B
W8EX 23,856- 213-56- 8-B
WB8AZN 22,338- 219-51-19-A
WB8EQG 20,764- 179-58-17-A
W8CBA 21,328- 172-62-11-B
W8DB 20,736- 162-64-10-A
W8PCS 20,040- 167-60-10-A
WB8WTS 19,780- 215-46- 8-A
W8CSK 19,152- 171-56-13-A
WB8TJS 17,024- 152-56- 8-B
WB8SDV 16,632- 132-63-16-B
WB8LLY 15,386- 157-49-13-A
AA8TYF 13,824- 144-48- 3-B
WB8SFI 11,322- 111-51-16-A
WB8ETK 9630- 107-45-12-B
WA8DBI 8800- 100-44- 7-B
WB8MXO 7938- 63-63- 9-B
K8MLO 7802- 83-47- 5-A
WB8RQD 7326- 99-37- 9-A
W8VZE 7200- 80-45- 4-A
WA8MGI 7168- 128-28-11-A
W8IMF 6960- 87-40-11-B
WB8BPX 6308- 83-38- 3-B
WA8YHN 6290- 85-37- 6-A
WB8YQT 6270- 95-33-10-B
WB8UPZ 3596- 58-31- 7-A
WB8EKG 3480- 60-29- 2-A
W8LSO 2700- 45-30- 2-B
W8JRN 2500- 50-25- 5-A
WB8NTY 1776- 37-24- 4-A
K8BXU 1332- 37-18- 3-B
WB8NLG 1320- 30-22- 3-A
AC8VVL/8(W8CHT,opr.)
138- 23- 3- 4-A
WB8JBM/8(WB8s,DQP,JOZ,LSN,
oprs.) 178,192-1204-74-24-B
W8LT(WA1LKU,WA8YBT,WB8s,
JXS,TXE,oprs.)
164,872-1114-74-24-B
WB8URN(+WB8SWH)
141,750- 945-75-21-B
AB8OFR(+WB8s,ILW,MRU,NTY,
RDO,SVN) 121,836- 858-71-24-B
W8KRF(+WB8PIY)
67,000- 500-67-21-B
WB8RIJ(+WA8ZDF)
56,994- 483-59- 9-B
K8EIJ(+WB8BZX)
45,012- 341-66-18-A
AC8VND(AC8CHT,W8s,HQK,QID,
AA8COA,WD8s,BMK,BZO,oprs.)
35,910- 285-63-12-B
W8OJW(+K8BXU)
27,888- 249-56-13-B
WA8RUT(+K8MLO,WB8JXS)
23,664- 174-68- 9-A

WEST VIRGINIA

AB8IJW 116,028- 879-66-21-B
WB8WNO 37,440- 288-65-21-A
W8LZG 27,376- 232-59-14-B
WB8TEE 20,210- 215-47-10-A
WB8PHQ 19,350- 215-45-14-A
WD8CBJ 3850- 77-25- 7-A

9

ILLINOIS

WB9HAD 210,600-1404-75-24-B
WA9PBK 192,500-1284-75-23-B
WA9TXL 188,352-1308-72-24-B
K9BGL 168,450-1123-75-24-B
WB9BWU(KØCVA,opr.)
150,000-1000-75-24-B
WB9DZS 148,200- 988-75-17-B
WA9NVF(WB9QNU,opr.)
133,650- 891-75-23-B
WB9CXG 102,396- 742-69-20-B
W9GT 89,850- 599-75-22-B
WA9IXF 84,600- 564-75-14-B
AB9CGL 81,696- 552-74-19-A
WB4HYN/9 80,730- 585-69-24-A
WA6NVY/9 77,248- 544-71-12-B
K9HDE 76,650- 511-75-24-A
K9UIY 64,680- 462-70-18-A
AD9BQL 61,320- 420-73-22-A
WB9KLW 52,992- 384-69-20-A
WB9SDE 50,508- 366-69- 9-B
WB9OCH 50,320- 370-68-23-A
AB9DED 49,982- 373-67-12-B
WB9MKL 48,024- 348-69-13-B
W9FVT 45,500- 325-70-18-A
W9JGV 44,890- 335-67-13-B
WB9BUK 37,570- 289-65-16-B
K9AUZ 31,872- 249-64-11-B
WA9YLB 28,182- 231-61-22-A
WA9YOL 28,158- 247-57-11-A
WB9UKN 27,776- 224-62-16-B
K9PIG 26,760- 223-60-12-A
W9IB 25,740- 198-65-12-B
WB9JSR 25,254- 207-61-10-B
W9DJZ 22,256- 214-52-21-A
WA9TKK/9 21,828- 214-51- 9-A
WB9SEY 19,968- 208-48-13-A
AD9UKM 19,796- 202-49- 4-B
WB9PPL 18,816- 168-56-15-A
WB9NSJ 18,040- 164-55-18-A
WB9VJN 17,346- 177-49- 9-B
WB9TOH 17,286- 201-43- 7-B
K9KHI 17,200- 200-43- 4-B
WB9TFX 16,830- 165-51-14-A
W9ZAY 16,014- 157-51- 6-A
AC9JUI 13,112- 149-44-21-A
W9UDK 12,788- 139-46-10-B
WA9EBT 12,330- 137-45- 6-A
WB9SBC 12,096- 126-48- 7-A
AC9QWM 11,562- 123-47- 5-A
W9REC 9292- 101-46-14-B
W9HPG 8800- 100-44- 9-A
AB9EBJ 8554- 91-47-13-A
WB9JKZ 8502- 109-39- 8-B
W9UVM 7980- 105-38- 6-A
WB9QHW 7696- 104-37- 6-B
AC9LNQ 7252- 74-49- 4-A
K9NA 6880- 86-40-10-A
WB9QKF 5412- 82-33- 3-A
W9CQD 5180- 74-35- 5-A
AB9DVQ 4464- 62-36- 4-B
AA9SVZ 2800- 50-28- 2-A
AB9NBS 2400- 48-25- 3-A
W9NNU 2340- 45-26- 3-B
W9FDY 2100- 50-21- 4-B
WB9DVJ 1444- 38-19- 4-A
AA9AAT 36- 6- 3- 1-A
WB9GCS(multiop)
200,736-1394-72-24-B
K9RMA(+WA8RXM,WA9KUW,
WB9KUP) 111,860- 799-70-24-B
W9NLR(+WB9SIU)
92,158- 649-71-20-B
K9HDZ(+W9GEG,WB9s,QWR,QWS,
RFC,TTN,WQS,WUG)
92,100- 614-75- 8-B
WB9TXO(K9ZMZ,WA9s,SIW,WHB,
WB9s,AGY,PTK,PTO,SBD,UNZ,
YYY,oprs.) 75,828- 534-71-20-B
WB9EEE(+K9s,FXQ,ZW,WA9s,
FPS,ZIK) 52,794- 419-63-21-B
WB9JEI(+WB9s,EEA,JEJ,PVC,UMW
44,416- 347-64-14-B
WA9OBP(+K9ZTV)
11,880- 132-45- 3-A

INDIANA

WA9BWY 216,450-1443-75-24-B
WB9LHI(WA9WUC,opr.)
181,596-1227-74-24-B
AB9CEP 158,112-1098-72-23-B
W9QXO 98,404- 674-73-23-B
K9CDB 83,850- 559-75-17-A
WB9IWN 72,760- 535-68-10-B
K9CLO 53,568- 372-72-17-B
W9KQO 49,968- 347-72-13-B
W9ZRX 49,166- 403-61- 9-B
W9NNC 45,780- 327-70-20-B
WB9JOO 30,618- 243-63-15-A
WB9PIR 30,328- 223-68-20-B
WA9PKL 27,430- 211-64-15-A
WB9QDM 27,246- 239-57-12-A
W9BS 27,000- 225-60-18-A
WB9CEX 23,432- 202-58-19-B
W9CUC 23,408- 209-56- 8-B
WB9LAG 22,800- 190-60-15-B
AC9EHU 22,472- 212-53-14-B
AB9OYD 22,288- 199-56-17-B
WA9ZES 21,836- 206-53-19-A
WB9FNR 19,264- 172-56-11-B
W9MDW 15,340- 130-59- 5-A
AC9LT 11,352- 172-33- 2-B
W9EI 8560- 107-40- 7-A
W9OWZ 4556- 67-34- 1-B
WB9SEP 4350- 75-29- 6-A
WB9CNE/9 690- 23-15- 3-A
WB9QJV 336- 14-12- 3-B
WB9NEU 308- 14-11- 2-A
W9YB(WA3WUL,WB9s,PUM,TEY,
YCH,oprs.) 104,256- 724-72-24-B
WB9YER(K9SPD,WA9YDS,oprs.)
30,628- 247-62-10-B
K9WWT(+WB9s,IWN,PJF)
24,530- 223-55-22-B
K9KRN(+WB9WTH)
13,936- 134-52-13-B

WISCONSIN

K9KGA 172,800-1152-75-24-B
K9CAN 142,058- 973-73-20-B
W9NA 122,100- 825-74-18-B
WB9SHK 118,080- 820-72-24-B
WB9KMQ 91,448- 644-71-23-A
WB9NDO 86,052- 606-71-23-B
W9NSM 72,136- 508-71-20-B
WB9PCQ 47,286- 333-71-12-B
K9HFR 44,850- 325-69-15-B
WA9FXJ 42,458- 299-71-19-B
K9VER 31,720- 260-61-13-A
AB9NME 31,680- 240-66-12-A
K9GTQ 27,720- 231-60-16-B
WB9YDS/9 27,612- 234-59-20-A
W9HR 24,278- 199-61-21-A
K9LWV 23,600- 200-59- 5-B
W9GKJ 22,914- 201-57- 7-A
WB9EJE 21,944- 211-52-14-A
WB9TNZ 20,910- 205-51-19-A
WB9KPX 14,964- 129-58-10-A
W9KI 10,404- 102-51-11-B
WB9OAM 10,168- 124-41-13-B
W9GIL 10,044- 81-62- 7-A
WB9TXE 3782- 61-31- 6-A
WB9PTX 1584- 44-18- 3-B
WB9OHY 1400- 35-20- 5-A

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COLORADO

WØTR(WBØDJY,opr.)
285,900-1906-75-24-B
WBØNYY 206,928-1437-72-24-B
WBØLLR 193,500-1290-75-19-B
WBØMIV(WBØGHV,opr.)
176,100-1174-75-24-A
WBØIWL 139,160- 980-71-24-A
WBØDJY(WØTR,opr.)
126,000- 900-70-14-B
WØETT 102,480- 732-70-20-A
WBØPEA 78,884- 533-74-15-A
WBØDLE 68,832- 478-72-19-A
AAØMYM 48,642- 363-67-14-A
WØTPO 46,540- 358-65-21-B
WBØAAZ 35,100- 270-65-19-A
WØQKY 33,360- 278-60-15-A
WBØWJ 32,776- 241-68-16-A
WBØDGJ(WBØDQJ,opr.)
29,016- 279-52-12-A
WBØBLJ 27,664- 247-56-15-B
KØTTV 25,636- 221-58-12-A
WBØRPW 23,432- 202-58-12-A
WAØZWA 8704- 128-34- 3-A
WØLQ 7626- 93-41- 6-A
WØKFX 6936- 102-34- 5-A
WAØPYY 5510- 95-29- 5-A
WAØUWF(+WBØPTS)
123,408- 857-72-23-B

IOWA

KØGXR 180,310-1235-73-23-B
KØYVU 113,174- 797-71-21-B
KØZTV 76,032- 528-72-21-A
KØJGH/Ø 64,860- 470-69-24-A
WØPRY 55,074- 411-67-12-A
WØSML 48,138- 339-71-23-A
ABØLNF 41,712- 316-66-16-A
WBØRWM 23,954- 203-59-10-B
KØUPV 23,896- 206-58-12-B
ABØBPH 22,880- 176-65-12-A
WBØCHS 16,356- 174-47-15-B
WBØNVB 14,514- 177-41- 7-B
WBØJTH 9588- 102-47-13-A
WAØDCB 5254- 71-37- 6-A
WØGQ(+WBØPYD)
46,632- 348-66-11-B
WBØOKP(multiop)
7128- 99-36-12-A

KANSAS

WBØISW 100,252- 706-71-24-A
WØJYJ 83,804- 576-73-20-A
ACØIUB 59,478- 431-69-16-A
KØEQY 58,156- 434-67-17-A
WAØPBQ 48,138- 339-71-15-A
KØSBV 36,448- 268-68-17-A
AAØSEV 33,936- 303-56-13-B
WBØBIY 27,972- 222-63- 8-B
WAØDOZ 19,796- 202-49-15-A
KØYBV 850- 25-17- 6-A
WA9SYD/Ø 8- 2- 2- 1-A
WØQQQ(WAØs,MLE,SWC,WBØs,
SIV,SNT,oprs.)
186,600-1244-75-24-B

MINNESOTA

WAØVKP 180,560-1220-74-24-B
WAØURW 81,504- 566-72-16-A
WAØUCU 79,094- 557-71-23-A
KØIHG 65,178- 459-71-23-A
KØFZG 62,712- 468-67-21-A
WBØMEB 51,544- 379-68-24-A
KØMPH 48,642- 363-67-13-B
WØYHE 44,022- 319-69-12-A
KØSVW 40,820- 314-65-14-B
WØOXN 37,252- 278-67- 8-B
WBØTXA 28,386- 249-57- 7-B
WØBF 27,216- 252-54-10-A
AAØQIT 24,662- 209-59- 5-B
WBØPWG 24,080- 215-56-12-A
20,384- 182-56- 9-A
WBØNFV 10,004- 122-41-
WAØQWY 4720- 108-45-
WØJS 8362- 113-37-
WBØEMI 6600- 100-33-
ABØPTB 6534- 99-33-
WØHW 5044- 97-26-
WBØDSJ(+WAØMHJ)
116,060- 829-70-
WØYC(WBØs,JBP,LVN,PFK,VG
oprs.) 65,412- 474-69-
WAØYJB(+WBØLTH)
48,444- 367-66-
WBØSTL(+ABØNIU)
40,920- 341-60-
ABØNJV(multiop)
34,680- 289-60-

MISSOURI

KØSGJ(WBØGQP,opr.)
101,530- 715-71-
WØQWS 93,750- 625-75-
KØDEQ 85,000- 625-68-
WAØJNF 77,656- 571-68-
WBØSAA 58,022- 433-67-
WBØFDO 38,556- 306-63-
WBØLFY 20,088- 186-54-
KØVBU 10,340- 110-47-
AAØFKD 10,028- 109-46-
WØEEE(WBØs,GRJ,SDK,SJP,T
oprs.) 110,260- 745-74-
WBØOKX(WØs,HRL,YZE,WBØ
PKH,FKI,PKJ,oprs.)
74,256- 546-68-
KØAZV(WBØs,ODF,OIS,OIY,P
SOL,oprs.) 56,364- 427-66-
WB9LFE/Ø(+WBØs,PXY,TOK)
20,280- 195-52-

NEBRASKA

KØSCM 128,936- 908-71-
WB9OQJ/Ø 77,180- 530-73-
WBØKDI 49,104- 372-66-
WBØMRV 29,008- 259-56-
KØJBL 28,800- 225-64-
WBØPUP 24,476- 211-58-
KØCUB 13,400- 134-50-
WBØIUT(+WØOYW)
38,528- 301-64-
WØFLO(KØs,BDN,ODF,ODH,
WØHQZ,WAØJKN,WBØs,RMJ,
VOR,oprs.) 24,486- 231-53-

NORTH DAKOTA

KØFRP 67,166- 473-71-
WAØCSI 43,932- 339-64-
WBØBCZ 25,760- 230-56-
WB8FPL/Ø 16,416- 171-48-
WAØVQX/Ø(+WAØVEB,WBØY
28,272- 248-57-

SOUTH DAKOTA

WAØONL 219,150-1461-75-
WAØCPX 200,836-1357-74-
AAØARZ 57,084- 426-67-
ABØMWJ 44,744- 329-68-
WBØLOG/Ø 10,028- 109-46-
WBØSTR 7676- 101-38-

VE

MARITIME - NEWFOUNDLA

VE1ABR 55,704- 422-66-
VE1BAK 702- 27-13-

QUEBEC

VE2XL 10,836- 126-43-
VE2OG 9348- 114-41-

ONTARIO

VE3GAS 176,976-1229-72-
VE3DAC 61,880- 455-68-
VE3IXE 43,896- 354-62-
VE3GD 38,808- 294-66-
VE3ECP 26,432- 224-59-
VE3FEA 20,400- 200-51-
VE3FSV 19,176- 188-51-
VE3IKN 7854- 119-33-
VE3DUS 4920- 82-30-
VE3MV 384- 16-12-
VE3DOP(+VE3FLE)
52,992- 384-69-

MANITOBA

VE4SW 65,940- 471-70-
VE4RP 54,064- 436-62-
VE4OP 51,800- 370-70-
VE4VV 46,230- 345-67-
VE4OY 35,360- 272-65-
VE4JK 27,840- 232-60-

SASKATCHEWAN

VE5DX 185,100-1234-75-

ALBERTA

VE6ATT 84,180- 610-69-
VE6AGV 58,616- 441-66-

BRITISH COLUMBIA

VE7WJ(WA1JKJ,opr.)
135,450- 903-75-
VE7HGK 61,134- 443-69-
VE7AJP 36,512- 326-56-

NORTHWEST TERRITORIE

WB6IFD/VE8 4810- 65-37-
VE8CM 1512- 54-14-

Disqualifications

CW

WA1QQK (operator of K1C
K3EST, W6PAA, W6RTT (o
tor of W6RR), K7JCA (ope
of W7FU), W7LR (operato
W7YB), W8OYI, WB9
VE7AON (operator of VE
WB5JJT.

Phone

WA2LQZ (operator of W3
K3CST (operator of K
WA3UYB, W6PAA.

Field Day Rules

Making contacts outdoors is even more fun than making contacts indoors . . . . Try it June 25-26.

ATTENTION. 1977 Field Day entries must be made on standard ARRL summary sheets and Operating Aid 6 forms (dupe sheets). Request these from Headquarters now. You will need one summary sheet plus one Operating Aid 6 for each band/mode you plan to operate on. Substitutes for either of these standard forms cannot be accepted, and entries on nonofficial forms *will* be check logs.

Changes in the rules for Field Day 1977 are as follows:

1) The two-point cw rule is now "permanent."

2) Miscellaneous rule "c" has been reworded to allow Technicians to participate in the setting up and operation of the "free" Novice station for groups in 3A or more transmitters.

3) The natural power *bonus* has been eliminated.

4) The "publicity" bonus may now be obtained by conducting FD operations from a site which is readily accessible to the general public, *as well as* by obtaining media publicity as in the past.

5) Homemade entry forms can no longer be accepted.

If you intend to use the OSCAR satellites on FD, request a special schedule of passes when you request your summary sheet and dupe sheets.

Get the bugs out of your equipment *before* Field Day, *not* during.

Rules

1) *Eligibility:* The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

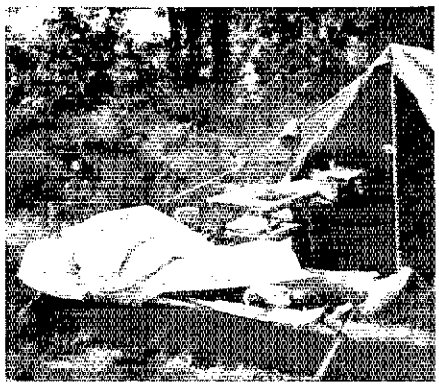
2) *Object:* For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

3) *Conditions of Entry:* Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

4) *Entry Classifications:* Entries will be classified according to the number of transmitted signals, simultaneously on the air at any one time during the FD period, followed by the designation of the nature of the individual or group participation. Once a transmitter makes a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Class A: Club group (or non-club group with three or more licensed amateurs) set up specifically for operation in the FD and using portable identification. Such stations must be located in places which are not regular station locations and must use no equipment or facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call (except when a Novice position is used, as provided by miscellaneous rule c) and under control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter must not exceed 1000 feet. All contacts must be made with transmitter(s) and receiver(s) operating from a power source independent of commercial mains. Entrants who, for any reason, operate a transmitter or receiver from commercial mains for one or more contacts, will be listed at the end of their class. Class B: Non-club stations set up and operated by not more than two licensed amateurs. Other provisions same as for Class A. Class C: Stations located in vehicles capable of operation while in motion and normally operated in this manner, including antenna. Class C stations may operate stationary, but no stationary equipment or facilities may be used. A Class C station may not be used as a station in any other class. The operator of a Class C station may also operate from another station during the FD period but scores for his mobile operations must be submitted separately. Class D: Stations operating from permanent or licensed station locations, not portable or mobile, using commercial power. Class E: As above, but using emergency power for transmitters and receivers.

5) *Field Day Period:* FD operation starts at 1800 UTC the fourth Saturday

Two-operator "Class B" is one of the most popular Field Day categories.



With some 15,000 people participating in Field Day every year, it's "cot" to be good.

of June and lasts until 2100 UTC the following Sunday, a period of 27 hours. Class A and Class B entries who do not begin any setting up operations until 1800 UTC on Saturday may operate the entire duration of the FD period. Others may operate no more than 24 consecutive hours; i.e., once FD operation has started it must cease 24 hours from that point.

6) *Bands:* Each phone and each cw segment is considered as a separate band. All voice contacts are equivalent and RTTY is counted as cw. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice position may operate on any Novice band segment at any time. Contacts made by retransmitting either or both stations do not count for scoring purposes.

7) *Exchanges:* Stations in the U.S., possessions and Canada must exchange ARRL section (see page 8 in any *QST*) and signal report. Valid contacts with stations outside of a section consist of sending a signal report and section and receiving a signal report and country from the foreign station.

8) *Valid Contacts:* A valid contact is defined as a two-way exchange (see above) between stations. Class A, B or C stations may contact any station. Class D or E stations may contact any Class A, B or C station.

9) *Miscellaneous Rules:*

a) Operators participating in the FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated. This is intended to outlaw any kind of manufactured contacts.

b) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station, using different calls. It is not, however, intended to prohibit the use of jointly owned stations which are normally used under different calls by members of the same family.

c) Any Class A group whose entry classification is three or more non-Novice transmitters may also use one Novice operating position (to be set up and operated only by Novice and Technician class licensees) without changing their basic entry classification. The Novice position must keep their own logs and check sheets. The Novice-position, QSO total may be added to the group QSO total before multiplying.

10) *Scoring:* Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and cw contacts count two points each. Power multipliers: If all contacts are made using a dc input power of 10 watts or less AND if a power source other than commercial mains or motor-driven generator is used (e.g., batteries, solar cells, water-driven generators, etc.), multiply by 5. If any or all contacts are made using a dc input power of 200 watts or less, multiply by two. Multiply by one if any or all contacts are made using a dc input power over 200 watts and up to 1000 watts. Dc power on ssb phone is considered to be half the peak-envelope power. Batteries may be charged while in use for Class C entries only. For other classes batteries charged during the FD period must be charged from a power source independent of the commercial mains.

11) *Bonuses:* The following bonus points may be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Do not add bonuses to your final score – all applicable bonuses will be added at Headquarters.

a) 100 points for 100 percent emergency power per transmitter classification. ALL equipment and facilities at the FD site must be operated from a source independent of the commercial mains.

b) 50 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (example: a shopping center). Evidence must be submitted in the form of a clipping, a memo from a BC/TV station stating publicity was given or a copy of material sent to news media for publicity purposes.

c) 50 points for message origination. A message must be originated by the club president or other FD leader, addressed to the SCM or SEC, stating the club name (or non-club group), number of operators, field location and number of AREC members participating. The message must be transmitted during the FD period and a fully serviced copy of it must be included with the FD report. The message must be in standard ARRL message form as explained in *Operating an Amateur Radio Station*. The message must be correct in all respects or no credit will be given.

d) 5 points for each message received and relayed during the FD period, up to a maximum of 50 points. Copies of each message, properly serviced, must be included with the FD report.

e) 50 points can be earned by completing at least one QSO via the OSCAR satellite during the FD period. The repeater provision of rule 6 is waived for OSCAR QSOs as is the 15-minute provision of rule 4. An OSCAR station does not count as an additional transmitter. On the summary sheet show OSCAR as a separate "band."

12) *Club Aggregate Mobile Score:* Entries under Class C may be combined to form an aggregate score for their club, having no connection with the club's portable entry, if any. Individual reports must include the club name. The club secretary or other designated club official must submit the club aggregate mobile score claim. Only bona fide members of a club operating in the club territory (175-mile radius from the club headquarters address) may contribute to this aggregate mobile score.

13) *Reporting:* Entries must be postmarked no later than August 1. The official summary sheet, plus a list of stations worked on each band and appropriate proof(s) for bonuses constitute an entry. *An entry that does not include check sheets will be classified as a check log.* A copy of your FD log is not required unless specifically later requested by ARRL. Send a stamped addressed envelope to ARRL hq. for FD forms which include a summary sheet and check sheets.

14) *Disqualifications:* See January, 1977, *QST*, page 85. QST

Feedback

□ Photo credit for the picture of the Midwest division amateur of the year award, page 71, *QST* for March, 1977 belongs to KØJDC.

□ Spectrum Research Laboratory, Inc of Tucson, AZ, has asked us to notify *QST* readers that they no longer provide pc boards for our projects. We suggest that inquiries about boards be made by writing to WAØUZO and K8WDC.

□ Ex-VP2VV, Yvon J. A. Kerguen, is not a Silent Key as listed in *QST* for April, 1977. His call is now FG7AK

VHF QSO Party

Important new rules for 2-meter work!

Participants in the 1976 June VHF QSO Party will recall fantastic conditions and a number of new section and division records. The June and September Parties are traditionally mini-Field Days with most of the attractions of the all-band FD late in June.

Be sure to note the new rule concerning 2-meter operation (last paragraph of part 3), a rule partially resulting from recommendations of the Contest Advisory Committee with additional input from the Headquarters VHF Repeater Advisory Committee liaison. In addition, note that entries may be returned unless they are made on official ARRL contest forms, in this case form CD68. Make your request NOW for as many copies of that log sheet/summary sheet as you think you will need (38 contacts per sheet). Don't be bashful, since the same forms are used for the September QSO Party. Good luck!

Rules

1) The 1977 June VHF QSO Party begins at 1900 UTC, Saturday, June 11, and ends at 0600 UTC, Monday, June 13. Entrants may operate no more than 28 out of the 35 hours. The seven hours of off-time must be taken in increments of 30 minutes or more. Listening time counts as operating time. All contacts must be made on amateur bands above 50 MHz using authorized modes of emission.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange does not count.

3) Fixed, portable or mobile operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC. Multi-transmitter operations are limited to *only one signal per band* (6, 2, 1-1/4 etc.).

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e. able to communicate over at least a mile).

Use of the segment 146.0 to 148.0 MHz is restricted as follows: Contest contacts *may be made* only on recognized simplex frequencies (per the ARRL official band plan): 146.49, .55, .58; 147.42, .45, .48, .51, .54, .57. Contest contacts may NOT be made on any other frequency in the range 146.0 to 148.0; this restriction *includes all* repeater frequencies (including 146.94) and *also includes* the frequency 146.52.

4) Scoring: 1 point for completed two-way exchanges on 50 or 144 MHz; 2 points for such exchanges on 220 or 420 MHz; 3 points for such exchanges on the higher uhf bands. The sum of these points will be multiplied by the number of different ARRL sections worked per band. Crossband work does not count. Aircraft mobile stations cannot be counted for section multipliers.

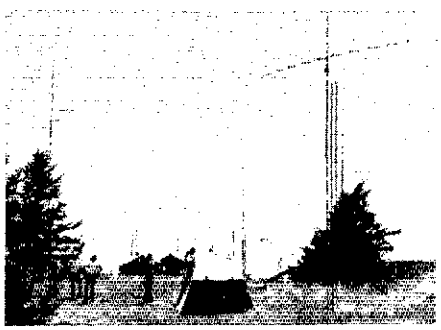
5) Foreign entries: All contacts with foreign countries count for score. All foreign countries are grouped together, and a multiplier of no more than one per band may be claimed for contacts with all foreign stations worked. Foreign stations may only work stations in ARRL sections for contest credit and will give their country name.

6) A contact per band may be counted for each station worked. Example: W2EIF (SNJ) works K1YON (Conn) on 50, 144 and 220 MHz for complete exchanges. This gives W2EIF 4 points (1 — 1 — 2) and also 3 section-multiplier credits. (If W2EIF contacts other Connecticut stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

7) Each section multiplier requires a complete exchange with at least one station. The same section can provide another multiplier point only when contacted on a new vhf band.

8) Awards: Entries must be postmarked no later than July 20, 1977, and must be made on ARRL form CD68. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are recieved or where exceptional effort has been displayed.

9) Disqualifications: See January, 1977, *QST*, page 85. QST



The June VHF QSO Party is your chance to work contest expeditions like this one to Tennessee by members of the Mecklenburg (NC) Amateur Radio Society, W4BFB, last September.

With the new 2-meter rule in effect, this is probably our last chance to print this picture! (K6YNB is Contest Advisory Committee chairman.)

Operating News

Conducted By George Hart,* W1NJM

DXCC Problems

We expect (and devoutly hope) that they will have been resolved by the time you read this, but the interest in DXCC is so great in the operating fraternity that it seems appropriate to devote some space to a discussion of recent (current, as we write) problems.

One thing that has made DXCC a popular and much-sought-after award is the high standards that have always been applied to it. Cards have been meticulously checked and "cheaters" have been dumped from the rolls, whenever they were uncovered. Some of this "uncovering" recalls interesting tales, and some of it has also involved litigation procedures and even threats of physical violence. Nevertheless today, as always, cheating is not tolerated. When your cards are sent to Headquarters, they will be checked thoroughly – by people, not by machines. No doubt in the past some phoney cards have gotten by without being discovered, but a great many have also been disallowed and their perpetrators appropriately dealt with.

What is it about DXCC that makes it such a popular award? Non-DXers don't understand it. It is, after all, just another award based on individual operating effort and achievement, of which we have a great many. What's so special about DXCC that sometimes drives otherwise perfectly normal people to cheating to achieve it? Why should consideration of the ramifications of a single operating award involve the League's Board of Directors to the extent of special meetings and occupy big wads of time of the general manager, the general counsel, even the president? It defies all comprehension. At present the DXCC Branch of the CD has more personnel than the Public Service Branch. The League's insistence on maintaining the highest of standards has caused the Headquarters no end of problems. It has even been suggested that DXCC be set up as a separate Headquarters department!

Well, we don't know all the answers, but there it is. DXCC went from a minor checking function in the CD to a major part of the department's operation, and shortly after WWII reached major proportions, occupying most of one person's time. By the time Bob White (then W6YYN, later W1WPO, right now W1CW) came along, it was a full-time job, then became more than that but no additional person was added to the staff. Bob simply made two people of himself by putting in unsolicited overtime to get the job done. About the time Headquarters moved to its roomy new facility (now outgrown) in Newington, even this was not enough, and a clerk was hired to assist. Fairly recently we have upgraded this clerk to full-fledged communications assistant and added a part-time assistant. DXCC had become a marathon, a whole series of related awards, its rules a matter of heated controversy in DX operating circles which frequently and consistently reached ARRL policy-making levels.

When the League's new QSL Bureau was established, Bob White was tapped as the man best qualified to head it up. (His license plate is now QSLS instead of DXCC!) Naturally, Bob's understudy moved up and the feelers went out for a new communications assistant. Everything was according to plan; or so we thought. We soon discovered, however, that losing Bob White from DXCC was a little more serious than losing one person; it was more like losing *two*, both of them with a veritable wealth of experience, knowledge and wisdom in DXCC lore. No one person could step into those shoes without stumbling a bit, not even someone of Dave Newkirk's obvious talents – not unless, that is, he was able and willing to devote his life to DXCC, as Bob had practically done for 25 years.

So, what happened? Guess it's no secret. By the time we filled Dave's previous position and got a new assistant going (part-time), the DXCC backlog was building up, so was the pressure created by the ire of eager award applicants and Honor Roll seekers, and there was no immediate hope of reducing either. It was decided to have Saturday "card parties" of volunteer employees, some hams and some nonhams, to bite into the backlog and hopefully bring us back up to current status by which time, also hopefully, we would have the personnel situation in the DXCC Branch on its way to being straightened out so that the processing could *stay* current.

Alas, just as we started planning the card parties, another misfortune befell. Dave Newkirk decided that his long-term future did not lie in amateur radio after all, and so announced his departure from the scene as of April 1 (and he wasn't fooling). Thus, the prospect loomed of a DXCC Branch consisting of two comparatively new people, neither of them equipped with enough experience and know-how to run it. Someone new would have to be brought in to bring the Branch up to full quota.

The question was, Who? And in what status? There were plenty of mighty knowledgeable DXers around. Could one of them be obtained and "plugged in" as Branch supervisor? That's what we are working on right now. We don't expect another Bob White, but we feel we need someone with a lot of DX know-how, someone high up in DXCC, someone with the ability to lead, supervise, write, talk, travel, innovate, get along with fellow workers, be diplomatic by correspondence and over the telephone, someone with patience and dedication and vigor. Quite a order, eh? Then supposing we get such a marvel, he (or she) will still have to be trained in our present procedures (not an overnight proposition) before he will be in a position to make changes or even effectively take over supervision of the Branch.

So that's the story of our problems with DXCC. You will note that no mention has been made of the possibility of reducing processing time by paying less attention to the tradition-established integrity and high standards of the award. We don't think the members want this, although studies aimed at streamlining and increasing the efficiency of the various processing procedures are being conducted. If you do want the standards downgraded to increase production, let us know; it will lessen our problems by about 50 percent.

Otherwise, help us out by observing all procedural rules and by being patient. The difficulties will be surmounted as soon as possible. – *W1NJM*

SCM ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* It is advisable to have a few more than five signatures on each petition. No member may sign more than one petition.

*Communications Manager, ARRL

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested.

Communications Manager, ARRL
(Place and date)

225 Main St.
Newington, CT 06111

We, the undersigned full members of the . . . . ARRL section of the . . . . Division, hereby nominate . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . Zip . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must have been received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 10, 1977.

Wherever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, returns counted August 23, and SCMs elected as a result of the above procedures will take office October 1, 1977.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning October 1, 1977.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

W1AW Operating Schedule (April 24-October 30, 1977)

PDST	CDST	EDST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7 A.M.	9 A.M.	10 A.M.	1400	←		Cw Bulletins[3]		→		
8 A.M.	10 A.M.	11 A.M.	1500	←		RTTY Bulletins[4]		→		
1 P.M.	3 P.M.	4 P.M.	2000	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2 P.M.	4 P.M.	5 P.M.	2100	←		Cw Bulletins[3]				→
3 P.M.	5 P.M.	6 P.M.	2200	←		RTTY Bulletins[4]				→
4 P.M.	6 P.M.	7 P.M.	2300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5 P.M.	7 P.M.	8 P.M.	0000	←		Cw Bulletins[3]				→
6 P.M.	8 P.M.	9 P.M.	0100	←		RTTY Bulletins[4]				→
6:30 P.M.	8:30 P.M.	9:30 P.M.	0130	←		Phone Bulletins[5]				→
7 P.M.	9 P.M.	10 P.M.	0200	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8 P.M.	10 P.M.	11 P.M.	0300	←		Cw Bulletins[3]				→
9 P.M.	11 P.M.	12 P.M.	0400	←		RTTY Bulletins[4]				→
9:30 P.M.	11:30 P.M.	12:30 P.M.	0430	←		Phone Bulletins[5]				→

[1] Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2] Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30 25, 20, 15, 13, 10 wpm.
[3] Cw bulletins, 18 wpm, on: 1.835 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz.
[4] RTTY bulletins 60 wpm/170-Hz shift on 3.625 7.095 14.095 21.095 28.095 MHz.
[5] Phone bulletins on 1.835 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz.

Operating-visiting hours are Monday through Friday 7:30 A.M. to 1 A.M. and Saturday and Sunday 3:30 P.M. to 1 A.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 detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work W1AW). The station will be closed May 30, July 4 and Sept. 5. *Staff:* Chief operator/Asst. Communications Mgr. C.R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, WAØOKV.

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.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0200 practice from the issue of *QST* two calendar months past: June 2, It Seems to Us; June 5, Correspondence; June 11, League Lines; June 24, Public Service; June 27, World Above; July 1, YL News.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

George Hart, W1NJM
Communications Manager

5BWAS AWARD

(Updating the master list in December 1976 *QST*, starting with number 270): WB8LBM K7NEQ WA4DRU W1ND WB4NXR WB2FVX W9LT WB5NVH K5EWJ WB4DJO W3JPT.

NEW A-1 OPERATORS

W1FTX W2BXA W2RS K2BK WA2ICU WA3VBM WA4FTJ W5LGY WB4CPO W6RTT WB6KJI W8EWF WB9QYS WØPKD WØCY WØHS WØOP DM2AUJ DM2CYE F2RK G3IOR JR3COZ.

Operating Events

MAY

4/30-5/2: Connecticut QSO Party**
4: West Coast Qualifying Run**
7-8: Russian Contest**
7-9: Georgia QSO Party*
Vermont QSO Party*
14: Frequency Measuring Test*
14-15: Kansas QSO Party*
Massachusetts QSO Party*
14-16: Michigan QSO Party*
15: World Telecommunications Day Contest phone*
17: W1AW Qualifying Run**
21-22: New York State QSO Party*
Armed Forces Day**
22: World Telecommunications Day Contest cw*

JUNE

2: West Coast Qualifying Run
4-5: Minnesota State QSO Party**
11-12: VHF QSO Party*
15: W1AW Qualifying Run (+40 wpm!)
18-19: All-Asian Contest phone**
West Virginia QSO Party**
25-26: Field Day**

JULY

4: Straight Key Night***

*Detailed last month
**Details this issue
***Details next month

6: West Coast Qualifying Run
9-10: IARU Radiosport Championship***
14: W1AW Qualifying Run
16-17: HK, Apollo, 10-10 Contests***

SEPTEMBER

10-11: VHF QSO Party

NOVEMBER

5-6: SS cw
19-20: SS phone

MAY

4/30-5/2: Connecticut QSO Party, full rules p. 91 March. Please note that the call shown as W1QU should read W1QI and that logs go to W1VH in New Milford (not Milford).

4: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC with the Z shown as a time designator). The run will take place on approximately 3590/7090 kHz. Note that this is 2100 PDST, 9 P.M., the night of May 3. Dates are always shown several months in advance and times are always the same local Pacific time of 9 P.M. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call (if any), and complete mailing address. A large stamped addressed envelope will help to expedite your award/endorsements.

7-8: The Russian Contest, CQ-M (CQ-Peace), sponsored by the Radio Sports Federation of the USSR, from 2100Z Sat. to 2100Z Sunday, 80-10 meters; cw and ssb (crossmode contacts not valid). Call CQ-M. Categories: single-op, single band, single-op, multiband, multi-multi. Exchange RS(T) and serial contact no. The Soviet stations will transmit RD(T) plus number region (oblast). The same station may be worked only once on each band during the contest irrespective of the mode. Contacts between stations in the same continent count one point; contacts between stations on different continents count three points. Contacts between Soviet stations count only one point, irrespective of the continent. Contacts between stations in the same country count only for multipliers (not for QS points). Each country counts as a new multiplier per band. Total multiplier is the sum from all bands. Awards plus special notation for those working more than 50 Soviet stations during the CQ-M period. If your log confirms the conditions of the popular USSR awards (R-150-S, R-100-O, W-100-U, R-15-R, R-10-R and R-6-K) certificates will be issued upon request. The committee requests all those participating to mail no later than July 1 to the Krenkel Central Radio Club of the USSR, CQ-M Contest Committee, P. O. Box 88, Moscow, USSR. *CQ-M!*

17: W1AW Qualifying Run, 10-35 wpm at 0130 UTC, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EDST, 9:30 P.M. local Eastern time, the night of May 16. Underline one minute of the highest speed copied, certify that the copy was made without aid and send it to ARRL per instructions above.

JUNE

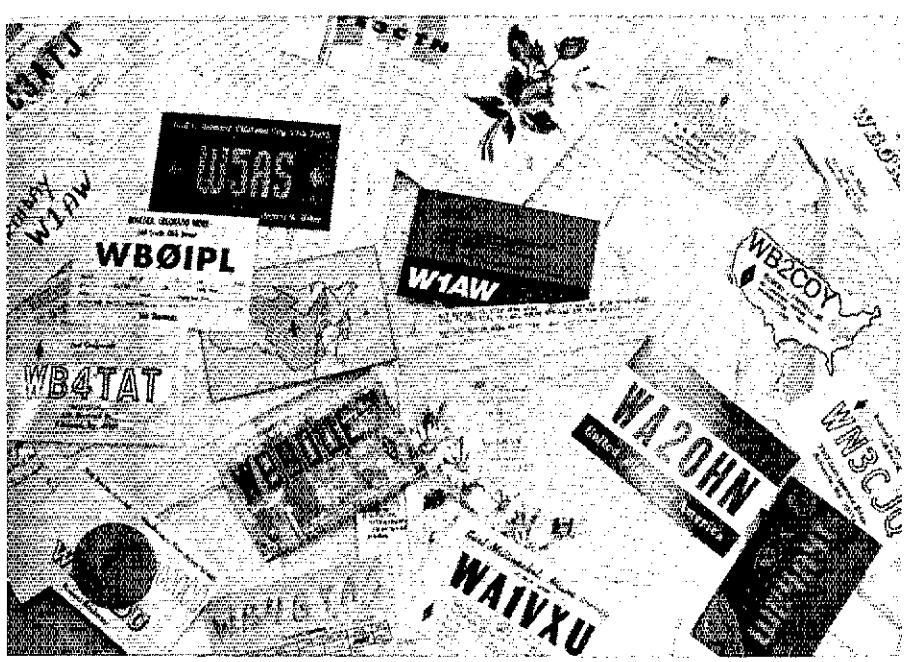
4-5: Minnesota QSO Party from 1800Z June 4 to 2359Z June 5, sponsored by the Heartland Amateur Radio Club. No restrictions as to mode or operating time. Only one transmitter allowed in operation at any one time, no crossband. Novices compete with Novices, Technicians with other Techs. Exchange: MN stations send RS(T) and county. Others send ARRL section and RS(T), DX stations use DXCC country. Score one point per phone QSO, 2 points per cw QSO, Novices/Techs. count 5 points. (Novices/Technicians must identify their license class when sending their call as /N or /T.) MN stations multiply total of points by the number of sections + DX countries (W/VE excluded). Others multiply QSO points by the number of MN counties worked (maximum of 87). Phone and cw are considered the same contest, please score as such. If you make 50 or more contacts your entry must include a check sheet for each band and mode used. Logs must include date/time (Z), bands, modes, exchanges. Note: contacts with WBØTTZ, the HARC station, count 10 QSO points for each QSO on separate bands. Net QSOs are not valid. Certificates for state winners as well as high Novice and Technician scorers as well as to DX stations. MN stations must have 10 QSOs from that county to be eligible for county awards. S.a.s.e. required for return of awards and summary. Usual disqualification criteria. This should be an excellent FD warm-up affording ample time to test emergency equipment and make necessary adjustments prior to June 25-26. Logs must be postmarked by July 2. Send to: HARC, c/o Steven J. Gardner, WBØMAO, Box 261, Staples, MN 56479.

18-19: All-Asian DX Contest phone, sponsored by the Japan Amateur Radio League, the 30-hour period from 1000Z June 18 to 1600Z June 19 (cw will take place August 27-28). All bands below 30 MHz may be used. Entry classifications: Single-op, single band, single-op multiband and multi-multi. Note cw only on 160 meters. W/VEs call CQ AA. Exchange RST plus two figures denoting the age of the operator, YL operators use OO. No crossband contacts permitted. Only one signal per band regardless of category. Scoring: Non-Asians count one point for each complete contact with an Asian station. The multiplier is the number of different Asian *prefixes* worked on each band. Note: Only JD1 stations on Ogasawara (Bonin & Volcano) count for Asia. Contacts with KA stations do not count (they're considered military rather than amateur). Scoring: Multiply the sum of contact points on each band by the sum of multipliers on each band. Log separately for each band and use a complete summary, note the first time a new prefix is worked on each band. Awards. Usual disqualification procedures. The JARL Asian countries list: A4 A51 A6 A7 A9 AP BV BY CR9 EP HL/HM HS HZ/7Z JA/JE/JF/JG/JH/JI/JJ/JR JD1(Ogasawara) JD1 (Okino Torishima) JT JY OD5 S21 TA UA/UK/UV/UW 9-0 UD6/UK6C-D-K UF6/JK6F-O-Q-V UG6/UK6G UH8/UK8H UI8/UK8A-G-I-L-O T-Z UJ8/UK8J-R UL7/UK7 UM8/UK8M-N VS6 VS9M/8Q6 VU VU(Andamans) VU (Laccadives) XU XV XW8 XZ YA YI YK ZC4/5B4 1S(Spratly) 4S7 4W 4X/4Z 7O (Yemen) 70(Kamaran) 8Z4 9K2 9M2 9N1 9V1 and Abu Ail. Contest results may be obtained by enclosing one IRC and an addressed envelope with your entry, which must arrive no later than Sept. 30 (for phone) or Nov. 30 (cw). Send to: JARL, Box 377 Tokyo Central, Japan. **West Virginia QSO Party**, sponsored by the West Virginia State Radio Amateur Council, from 2300Z June 18 to 2300Z June 19; no time limits. Rules: The same station may be worked on different bands for additional points. Only one contact of each station per band may be counted for scoring. Exchange QSO no., report, and county (if in WV), state or country. WV stations may work each other. Out-of-state stations multiply no. of WV QSOs by the number of different WV counties worked. Then use a power multiplier of 1-5 if dc input of 200 watts or less. Awards only to single ops. Suggested operating frequencies are 35 kHz inside each cw band and 10 kHz inside the General class portion of each phone band. Logs must show date/time, QSO no., calls exchanges, county/state/country, mode/band. To be eligible for an award logs must be received no later than July 16. Send to: West Virginia QSO Party, Box 299, Dunbar, WV 25064. QST

Strays

□ Those of you who are thinking of laying in a large supply of QSL cards to last a couple of years might keep in mind that as of April 15, 1978, the post office will not be accepting postcards that measure less than 3-1/2 X 5-1/2 inches.

And did you know that a QSL card mailed at the nine-cent rate will be forwarded without any extra postal charge? However, if the sender wants the card returned if not delivered, the card must state that return postage will be paid by the sender.



February 17 was an anniversary to remember, and over 400 listeners did! That night, W1AW transmitted a special bulletin carrying a message from ARRL President Dannals to all radio amateurs, marking W1AW's 40th birthday. Conditions were good that evening with reports received from 41 states and 4 provinces. A commemorative card was sent to all who responded. Particularly heavy usage was noted of both the cw and teletype bulletins. Thanks to all who participated in the celebration. — *W1YL*

Getting QSL bureau people together to take a picture apparently isn't an easy thing to do. We were fortunate, however, in getting this picture of 10 of the 15 people who are doing the job of "manning" the W4-K4-N4 section of the 4th call-area QSL bureau. Shown in this gathering are (l-r) W3BWZ, WA3NGS, K4WVY, W3AZD, WB3ANE, W4WSF, W4UMF, K4GKD, W4WWG and K4CFB. Those five bureau workers not in the photo are W3NL, K4DXO, K4EBY, W4IDG and W4QAM.

Under the auspices of the National Capital DX Association and managed by W4WSF, the W4-K4-N4 section of the 4th call-area QSL bureau is one of the biggest bureaus in terms of number of cards handled per year — approximately 156,000 during 1976. W4WSF estimates the bureau is currently serving some 2,500 DXers in the W4-K4-N4 group.

As with all the QSL bureau personnel, these folks are dedicated to serving you. Help them to help you by keeping an envelope on file at your QSL bureau for those incoming DX QSLs. The address for the U.S. and Canadian QSL bureaus are shown every other month in *QST*.

STOLEN EQUIPMENT

□ HRO500 receiver, serial no. 751196 Galaxy V transceiver, serial no. 5609V1711 George Simon, WB6ETR, 5401 E. Sussex Way, Fresno, CA 93727. Phone 209-291-9259.

Station Activities

SCM ⊀ AREC ⊀ ORS ⊀ OVS ⊀ SEC ⊀ OBS ⊀ TCC ⊀ OO ⊀ NTS ⊀ WAC ⊀

CP ⊀ A-1 OPR ⊀ EC ⊀ DXCC ⊀ CLUBS ⊀ RM ⊀ OPS ⊀ RCC ⊀ PAM ⊀ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. PAM (Phone): VE6AFO. The Klondike Trail Radio Club held its annual banquet and dance on Feb. 19. The affair this year was a tribute to VE6PP who was the founder of the Club, and who joined Silent Keys last Oct. VE6OJ and VE6BAF have joined the ranks of Official Observers. VE6HO is now OBS and EC in Fort MacLeod. VE6AMM now ORS and handles a lot of traffic. VE6YW was presented with her section net certificate at the Mearns affair. VE6AGV has been recommended for the QSL Manager's Post. Traffic: VE6HO 37, VE6AMM 31, VE6AVV 13, VE6XC 10, VE6AFO 7, VE6VM 6, VE6PZ 5, VE6AKY 4, VE6WN 4, VE6AAT 3, VE6YW 3, VE6AFW 2, VE6BBU 2, VE6MJ 2, VE6AMN 1.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — RM VE7CDF and Net Mgr. VE7GY have proven that if you slow down the CW net to 12-15 wpm you will gain in new members, and we have. But like our highway laws max. speed 55 and not all obey we have the same, on net. Asst. Director, VE7LL still down in the deep south, reports Mexico is pretty nice. VE7CB was at KHG airport to welcome VE7LC and XYL. VE7ZK ORS for most of Pacific Area traffic is moving the station back into Vancouver, less traveling nightly. VE7DAR and Edna just talk to deep Southern CA. Would appreciate hearing from more VE7s and clubs. VE7DFY two year continuous skeds on week ends with friends in Ont. Traffic: VE7FB 139, VE7ZK 131, VE7DKY 75, VE7BLO 45, VE7DFY 23, VE7MW 22, VE7AFY 2.

MANITOBA: SCM, Steve Fink, VE4FQ — Asst. SCM: Peter Guenther, VE4PG. RM: VE4UL. PAM: VE4JP. Several VE4s participated in the Smile-A-thon for the Manitoba Dental Assn. in Feb. VE4UL is now setup on RTTY, while VE4OY and VE4VV had an eyeball QSO with VE5DX and 5RG during a Regina visit. VE4YV is new at Jenpeg. Manitoba's Full ARRL membership rose 14% last year over 1975. VE4IM now heading the ARRL Intruder Watch in this region. Any assistance is welcomed. Don't forget the ARRL National Convention this year in Scarborough, Ont. June 3-4-5. MEPN: 28 sessions, 1169 QNI, 37 QTC. Traffic: VE4UL 168, VE4NM 165, VE4NE 146, VE4RO 134, VE4PG 95, VE4QD 59, VE4UO 39, VE4XN 39, VE4ID 36, VE4QZ 26, VE4LB 24, VE4KM 20, VE4JP 14, VE4OE 12, VE4VV 12, VE4JK 10, VE4YE 10, VE4LU 9, VE4LN 6, VE4HR 4, VE4OD 4, VE4PA 4.

MARITIME & NFLD.: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: Maurice Gladden, VO1FG. SEC: VE1DI. PAM: VO1JN. RM and APN Mgr.: VE1AMR. NTN Mgr.: VO1GW. OBS: VE1GL. Hosp. incl. VE1s AMR ARB BBU. Speedy recovery to VE1AGG, VE1ACU asst. mgr. APN while VE1AMR in hospital. New appointments incl. SEC VE1DI; ECs VE1KL VE1MQ VE1NU. OVS VE1DI. Welcome aboard. White Cane Contest & LOLA were popular activities. Congrats to VE1YE and VE1GA winners W. C. Contest. Salutes to Bulletin Eds. VE1s SH AKT FQ IG AUT UT. VE1ASF now VE1GB, also awarded plaque by Can. Forces/SU. VE1AAU now VE1DX; VE1BIO now VE1GK. Proud owners new equip. incl. VE1s AME AUT BB DO. Brass Pounder's Net (Slow cw) Sun. 1830Z, 3705 kHz. Silent Key VO1MO. VO1BL appt. Asst. Dir. Mewf. & Labrador, ARRL. APN Sessions 25, QNI 117, QTC 131; NTN Sessions 24, QNI 126, QTC 34. Traffic: (Feb.) VE1AAO 397, VE1ZH 254, VE1AMR 110, VE1ACU 92, VE1ST 75, VO1GW 48, VE1HG 31, VE1AMB 16, VE1BOT 11, VE1OC 5, VE1KL 3, VE1AIF 2. (Jan.) VE1AVL 3. (Dec.) VE1AVL 6. (Nov.) VE1AVL 37.

ONTARIO: SCM, Larry Thivierge, VE3GT — At a recent meeting of the Ottawa Valley Mobile RC VE3DV received the ARRL Certificate of Merit in recognition of his long time service as Ont. SCM: In addition, Shep became the newest member of the A1 operator club. Both awards were presented by VE1SH, Canadian Division Dir., who then addressed the club. Congratulations. VE3HGN keeping the Quinte ARC up to date on 75-meter DX. Best wishes to CARF, CLARA and the CARTG, all celebrating their 10th anniversary. Welcome to new CRRL Life Members VE3s EKS FCZ and HPI. VE3FVN will be operating from the UK as G3DFT on 2-meter ssb for 3 weeks with a new IC202, commencing mid May. VA3RRL will be the official call sign of the 77th National. VE3WE active nightly on 3815 kHz at 8 PM with National Convention info. Guelph amateurs will be using prefix VB in lieu of VE during 1977 in commemoration of the city's 150th anniversary and Brantford ARC station using VG3BA honouring that city's centennial year. Members of the Guelph ARC assisted with VE3SJH — nice work fellas. OSN has shifted to 3667 kHz. Nortown ARC code contest winners were: Advanced Class, VE3FXA, tied for second were VE3s EVE and FQJ. Amateur class, VE3HCS with VE3FMI second VE3DPO has joined the ranks of the Old Timers Club. Competition keen between Westside and Skywide ARCs on their two for nine point countdown race on VE3MHZ. Our deepest sympathies to the families of VE3s JP YG BON and DIX who have become Silent Keys. CARTG 16th annual RTTY DX Sweepstakes a success and many looking forward to Oct. for the 17th annual event. Burlington ARC saving Dominion store tapes in order to purchase a wheel-chair for Senior Citizens at the Burlington Mall. Your tapes to BARC, Box 836 L7L 3Y7 would be appreciated. Windsor ARC treated to a tour of Bell facilities courtesy of VE3DIF. Hamilton ARC bursting at the seams with their many projects including an intro to ICs. See you all in Toronto on June 3, 4 and 5 at the National. Traffic: (Feb.) VE3SB 594, VE3GOL 338, VE3DV 268, VE3DPO 219, VE3CDK 151, VE3HTT 134, VE3EWD 117, VE3DZK 114, VE3GFN 112, VE3GT 100, VE3HGJ 97, VE3GNW 75, VE3ATR 62, VE3DVE 58, VE3GJG 31, VE3DH 22, VE3FGV 16, VE3IDL 16, VE3BZR 15, VE3GCC 10, VE3BDM 9. (Jan.) VE3DZK 111, VE3DVE 70, VE3EBC 47, VE3FHQ 8, VE3BDM 4.

QUEBEC: SCM, Larry Dobby, VE2YU — It is with deep regret that we record the passing of VE2DK and VE2KB and VE2APF. Their loss will be felt by all Quebec amateurs. Radio amateurs from Que. and Ont. joined together to participate in the annual Ski Marathon. Repeater VE2RM and other direct frequencies were used for both voice and RTTY communication. Among those heard were VE2APT VE2BFH VE2ARP. MARC continues to perform well with large numbers in attendance at their popular code and theory classes. The VE3TD newsletter has appeared recently and subscriptions are being solicited from amateurs in the Montreal area. VE2 stations are again encouraged to take a more active part in contests sponsored by the many radio societies. Time and time again comments are received stating that very few VE2s are being heard on the bands, all bands, where we are valuable multipliers for U.S. and DX stations. Some stations heard recently during contests were VE2s BPT FU AYU GA WA DDH QO GV. Hope to hear more of you un in the next test. Traffic: VE2APT 89, VE2BP 38.

SASKATCHEWAN: SCM, Percy A. Crosthwaite, VE5RP — Asst. SCM: Ron Nagel, VE5RN. This report written by VE5RN. We are very pleased to see the SSB Traffic Net going so well. The CW Net also handling a healthy portion of traffic. We are saddened by the passing of our fellow ham and friend VE5SM. Plan to attend the Hamfest at Swift Current this year. Remember fellows be kind to our new hams — should be a lot of them this year. Regina Club held a display of ham operations on Mar. 12 at the Public Library. Congrats to all who made the PSHR, Sask. Training Net will close due to lack of interest, will revive again in the fall. Congrats to the Melfort fellows on getting their repeater on the air. Remember, Ron Hesler is our Director; feel free to let him know your views on anything. Traffic: VE5LO 108, VE5XC 65, VE5VO 42, VE5WM 40, VE5RN 39, VE5HP 37, VE5UK 24, VE5BO 20, VE5QS 18, VE5XU 18, VE5AAE 7, VE5AO 4, VE5LQ 3, VE5AN 2, VE5KZ 2, VE5NG 2, VE5UX 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: WA3DUM. RM: W3EEB. PSHR: K3YHR 49, K3KAJ 44. Del. HB no. 116 which would have made Ham Auto Tags "Vanity Plates" at a $25 annual charge was sent back to committee as a result of efforts of WA3IIX K3NYG W3DKX W3YAH WA3WIY WB3DDS and WA3ZFY in Dover on Mar. 8th. Ex-WA3YRP, formerly of Dover, checked in the DTN as WB1BRR from Maine. DARC has 30 licensed amateurs from their classes with 50 more now "in school." Sympathy is extended to W3TRC on the death of his wife, and to W3WD at the loss of his mother-in-law. K3CEW was promoted to Industrial Manager, Enzymes Group, Specialty Div. ICI. New appointment WA3WIY as OPS. DTN: QNI 300, QTC 69. DEPN QNI 70, QTC 7. Traffic: K3KAJ 156, K3YHR 55, WA3WIY 42, W3EEB 29, W3DKX 27, W3WD 22, WA3DUM 15, W3YAH 13, WB3ANC 5.

EASTERN PENNSYLVANIA: SCM, Goerge S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: WA3OGM WA3SXU WA3YJG. PAMs: W3AVJ WA3PZO. Net reports: EPA QNI 334, QTC 202, PTTN QNI 175, QTC 111; PFN QNI 454, QTC 611; EPAEP&TN QNI 233, QTC 79. OVS reports K3IJX WA3BSV WA3ZRE W3CL W3GOA WA3BJQ WA3NDQ. OBS reports W3CL W3AVJ. OO reports W3CL W3KEK W3NC. BPL W3CUL W3VR K3NSN WA3ATQ WA3YJG WA3THT. W3CUL & W3VR seem to be traffic magnets, it keeps coming! WA3YJG finally got an antenna up in the air. WA3ATQ keeping snow so we can have an early spring. WA3NDQ using school vacation to rebuild. WA3NRU active VHF RACES station. New officers R F Hill ARC, WA3ZSZ, pres.; WB3ANF, vice-pres.; WA3RKB, secy.; K3DZB, treas. RF HILL Man of the Year Award went to WB3ANF for his work in conducting Novice classes at N Penn HS. Antracite Repeater Assn. started their 4th Novice class; now have 6 graduates. WA3BSV doing missionary work at CB club meetings! K3IJX setting up new reptr WR3AKL. W3WRE still needs an ant. WA3CKA remodeling. WB3AHV now Extra, WB3BHC big A. WB3DFN and WB3CSW General. WA3VUE sent in a nice resume of the recent SET but also sent in his resignation. Sorry to see him go and hope we can fine a good man to replace him. If you are interested contact the SEC W3FBF. Warm weather is here so get those outside repairs done before vacation comes along. Reports came in better this month so keep up the good work. Traffic: (Feb.) W3CUL 4909, W3VR 1044, K3NSN 1940, WA3YJG 501, WA3THT 459, WA3ATQ 315, W3IPX 150, K3KW 140, WA3PZO 67, WA3WQP 55, WA3ZXI 42, W3ATJ 40, WA3UKZ 35, W3AVJ 30, K3AIZ 28, W3ADE 20, WA3NDQ 20, WA3QFD 17, K3RVC 16, WA3NRU 15, WA3WAC 14, W3BNR 13, W3CL 9, WA3 NO 9, W3BUR 8, WB3AZE 7, WA3BSV 6, WA3TMP 6, W3VA 4, WA3YHR 4, K3IJX 3, WA3BJQ 2, W3HK 2, K3HXS 2, WA3VUE 2, W3CKA 1, W3EU 1, W3GMK 1, W3GOA 1, W3KEK 1, W3WRE 1. (Jan.) K3HXS 4, W3KEK 1.

MARYLAND — DISTRICT OF COLUMBIA: Karl R. Medrow, W3FA — SEC: N3II (W3FCS) needs your EC reports. Congrats to K3ORW Feb. PSHR. How about you others? WA3RSK is closing in on 5BWAS, but congrats to W3JPT who made it, and is now concentrating on 432 MHz. W3QW reports a great many actives from fare Calvert County! W3BHE has been talking up ham radio to the Kiwanians and Lions.

Good PR. Welcome to the So. Md ARC with K3BPW prexy. The Anne Arundel ARC has a nice meeting place in Davidsonville. OO reports from WA3RSK WA3UHJ W3WBY WA3KCY and WA3JSZ who found a CBer on 2 yet! The BARC Modulator shows a lot of work for the 386 members on the mailing list. W3CDQ does the QQTC and QCWA contests. WB2TJR/WB3EPN graduates in May, then a west coast trip and back to grad school. W3ZNW has a new tree for a temporary antenna support. W5TWT/3 says the following for the MDC QSO party: W3FCS (N3II) wins it with WA3RSK W3BHE AA3YMA W3FA AC3BZY/3 and W5TWT/3 following. Visitors: W9PRY AG6JES/6 W3GN/8 AD4BAI AC1TEE W2NCI and JA2HLX in that order. Next one Sep. 17, 18, 1977. Nets: Mgr/Sessions/TFC/QNI avg.: MEPN, WA3PRW/22/111/24.8; MDCTN, K3ORW/16/73/18.0; MDD (Jan.) W3FZV/61/219/7.5; WR PON, W3DFW/16/48/19.1; MDC PON, W3OYY/4/17/22.8; W VA PON, W8QOW/4/8/13.7. Top Brass K3KAJ W8BZY/3 and W3FA. MEPN Toppers W3ADQ WB3AUK WB3BUA and WA3PRW. Others W3CQ W3HWZ W3LDD K3ORW and K3RIJ. WA3YKK is active in MARS and Oscar telemetry. WA3UYF says he has the whole load with that new radio club in Balto. K3OAE can be heard as W4BVV in the big Contests. WB3AOB is using the school's rig. W3WBY reports the Auto-Patch fine, but members tone pads need alignment. W3CDQ WA3ZTW send reports. WA3PRW and K3ORW are busy PAMs. W3FZV is thinking of retiring as RM. MDD needs a bulletin editor. W8BZY/3 WA3EOP WA3UYB WA3SJS and W3IHM keep plugging away. W3IKA ORS, WB3CQT OPS are new ones congrats. Traffic: W8BZY/3 137, W3FA 113, WA3UYB 98, WB3CQT 61, WA3UYF 56, W3IKA 53, WA3PRW 44, WA3YKK 37, K3OAE 30, WB3BUA 28, WB3AOB 27, WA3ZTW 24, W3IHM 19, K3ORW 19, WA2SUS 15, WA3EOP 10, W3CDG 4, W3WBY 4, W3BHE 3.

SOUTHERN NEW JERSEY: SCM, Raymond E. Clancy, WB2GTE — SEC: W2HOB. PAM: WB2LCC. Burlington County ARC WB2JUN, pres.; K2BG, vice-pres.; W2CSV, treas.; WB2YOF, secy. New ORS OPS are W2ZQ K3CPF/2 WB2IYB has HW12. Congrats to Shore Points ARC ARRL Affiliation. WB2HZR sez Princton YMCA ARC is active and meets Fri. eve. has code and theory classes. Congrats new hams WA2s JGR JDG JLL; WB2s IZR JBM JFH. K2HCR a Silent Key. K3MDG now W2IMA. WB2AYA new OO. WB2AEJ is President's Award Recipient of SJRA. 32 SJRA members had 164,500 pts in VHF Contest. Their Novice class of 30 look forward to tickets soon. W2ZQ active in 10 nets. Active ATVers WA2EWO WA2GIW WB2JMA K2MQG W2FST W2LFI W2WLN W2QME want more video QSOs. Eastern Area VHF Soc. sez 6M QSOs to 8-9-Land easy past 10 weeks. Atlantic Div. Repeater Soc. will build 420 MHz repeater sez W2FPY. Tri-City ARC WB2CQJ reports W2HWD appointed asst. Dir. Atlantic Division for SJ. W2KBJ conducts Novice Class at Vineland HS eves. Club has 30 members. WA2AWP is new General. WA2HJF now W2BN. West Jersey RA starts General course. WA3LMY/2 trying to get W2PU active. Del. Valley RA had microcomputer with disks, IMSAI 8080, demonstrated at recent meeting. Club to hold annual Flea Market auction with prizes on door ticket. Traffic: W2ZQ 295, WB2LCC 60, WA2AWU 24, WA3LMY/2 22, K2BG 18, WA2IYI 8, W2LPJ 4.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YA — Asst. SCM: William W. Thompson, W2MTA. SEC: WB2EDT. Asst. SCM W2MTA has prepared the following list of nets of interest to WNY operators:

Net	Freq.	Time/Day
NYSTN	3728	5 PM M-F
NYSCN	3676	10 AM Su
WNYEN	3915	12:30 PM Su
WNYEN	31/91	12:45 PM Su
CHN	3925	11 AM Dy
NYSPTEN	3925	6 PM Dy
ESS	3590	6 PM Dy
NYS	3676	7:10 PM Dy
NYPON	3913	5 PM Dy
2RN	3930	1:4:30/6:30 PM Dy
2RN	3690	7:45/9:30 PM Dy
NYSEATN	3728	5 PM M-F

More two letter calls: WB2NSD now K2RL; W2GUY is W2UY, and yours truly K2YAH is now K2YA. RaRa has been working on providing amateur to amateur contact between Rochester and two of her sister cities. K2OIU and K2JFV have established skeds with Rennes, France and W2SNI and WA2NFY have skeds with Wurzburg, Germany. Local officials are very pleased with the results and I urge other WNY cities active in Sister Cities to do the same. It's fun and it's good PR. The Walton Radio Assn. (W2LZ) recently elected K2EZK, pres.; WB2JOW, vice-pres.; WA2RMI, secy.; W2FMU, treas.;W2TFL, activities chmn. Field Day can't be far away — RAGS has WA2AEW planning their FD. RAGS is also running a club QSL card contest. W2RUF has been awarded a Life Membership in RAWNY for her years of unselfish service. WR2AEJ now has user controlled squelch level. Traffic: W2MTA 486, W2FR 239, W2RUF 220, W2PZL 146, WA2HSB 127, WA2TPC 127, WA2ZJP 71, W2UYE 53, WB2QLX 52, W2FZK 26, WA2AIV 25, WA2LUF 24, WA2ZRI 22, K2OFV 18, W2RQF 17, WA2GXV 16.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP. Asst. SECs: K3SMB WA3LJW. PAMs: K3SMB. RMs: W2KAT/3 W3NEM W3LOS W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
WPA RACES	3990.5	9:00 PM Su

W2ZUH has resigned as SEC for WPA and will be taking on a new job in CA. Over the past three years, W3ZUH has been instrumental in organizing the present WPA ARES into a highly effective emergency communications network. Thanks for a job well done and good luck. The SEC for WPA Section will be WA3VUP, past EC for Blair Co. All county ECs should send their monthly reports to Gerald R. Patton, WA3VUP, 1504 Third Ave., Duncansville, PA 16635. Welcome to the Bedford County ARC, a newly formed club. Get well wishes to W3LYC K3MIY W3LGD. WA3VBM has upgraded to Extra Class and also elected to the A-1 Operators Club. K3ZFP has been appointed to the Personal Communications Foundation. WA3FET is doing graduate work at the Ionospheric Research Center at Arecebo, Puerto Rico. The Steel City ARC is busy conducting Novice classes. The Indiana ARC graduated 14 new Novices. Special thanks to all of the clubs and instructors for spending the time in helping all of the newcomers to Amateur Radio. Although the severe floods expected this Spring did not happen, the many amateurs were prepared to assist with communications. Much

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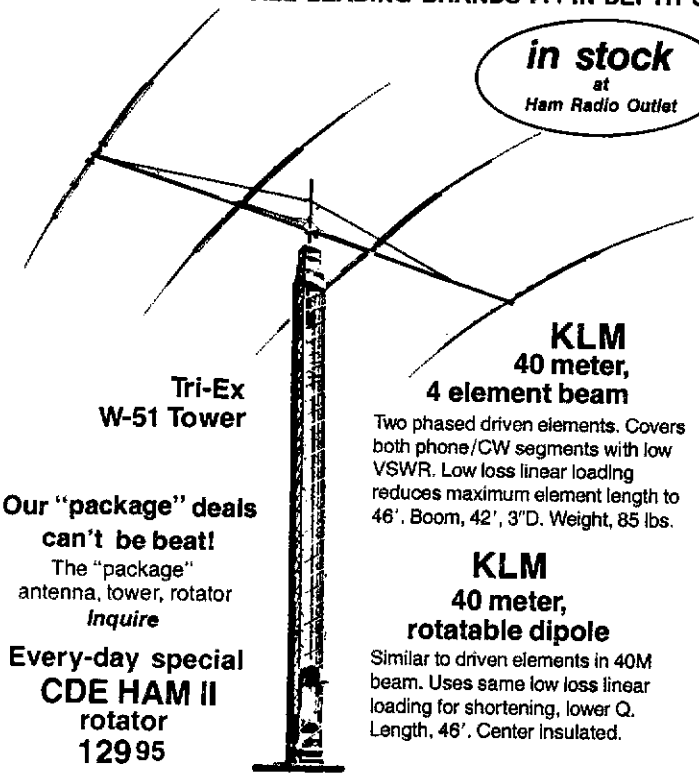

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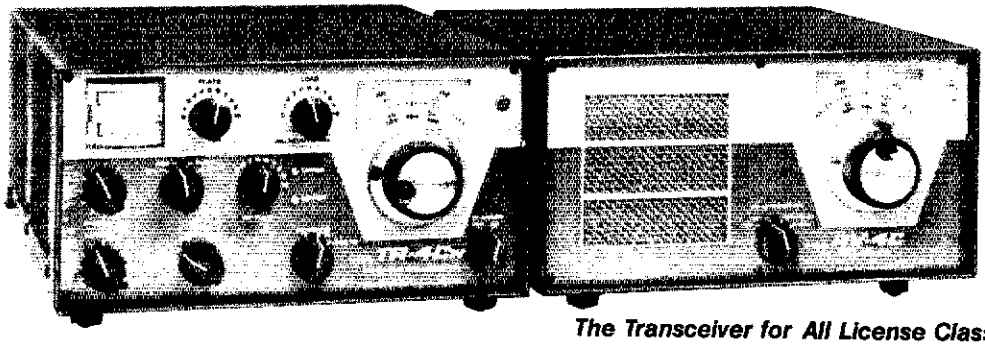

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experience was gained during 1977 SET. I hope to eyeball personally with many of the WPA members at the Northwest PA Hamfest on May 7 and the Breeze Shooters Hamfest on May 22. WB3AAD WB3DPQ WA3ZCA and WA3YYA upgraded to General Class. WB3AKK and WB3AJB upgraded to Advanced Class. The WPA Phone & Traffic Net had 25 sessions in Feb., handled 15 messages with 150 check-ins. The WPA CW Traffic Net had 28 sessions in Feb., 445 check-ins and handled 208 messages. BPL credits K3CR. Traffic: K3CR 501, WA3VBM 417, W2KAT/3 268, WA3AHP 128, WB3AYZ 116, W3EGI 101, K3RXK 89, K3CHD 54, WA3JIH 54, W3KUN 44, W3LOS 43, K3SMB 32, W3SN 26, WA3ZAO 24, K3HCT 23, W3ATQ 17, W3TTN 15, WB3AIQ 9, K8MYU/3 8, W3YD 8, W3UT 6, WB3AGB 5, WA3UDZ 3, W3IDO 2, WA3QNT 2.

CENTRAL DIVISION

ILLINOIS: SCM, E mond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9ALS. PAM: WA9KFK. RM: W9NJP. Cook County EC: W9HPG.

Net	Freq.	Time/Z)/Days	Tfc.	Sess.
ILN	3690	0030/0400 Dy	344	56
Ill Phone	3915	2245 Dy	271	28
NCPN	3915	1200/1700 M-S	363	4
ILN	3940	1400 Su	14	4
Il Sin Speed	3712	0100 Dy	9	16

W9NJP is the newly appointed RM for the IL Section. Jim is an active CW operator on the ILN net. Interested CW enthusiasts can contact him. W9EWH and K9KZN have joined the ranks of Silent Keys. This column's sympathy to their families and many friends. The Galesburg repeater, WR9AKL is on 146.01 in and 146.61 out with The Galesburg repeater, WR9AKL is on 146.01 in and 146.61 out with Univ. ARC of Peoria began handling message service for the students and faculty in Feb. WB9MQK and WB9PHM are the officers of the club. WB9WNN is now a General. WD9AFA WD9AFB WD9AFD WD9AFG WD9AFH WD9AEY WB9WNN is now a General. WD9AFA WD9AFB WD9AFD WD9AFG WD9AFH WD9AEY the Danville Junior College Novice classes. The Egyptian Radio Club of Granite City will hold their annual Hamfest on June 12 at their club grounds. The Circle Amateur Radio Club (U. of I. Chicago) elected WA9YZR WA9UDL KP4DHD WB9MAT and Dan Jacobsen, officers for the coming year. WA9GBW is Trustee and Faculty advisor. The Starved Rock Radio Club Hamfest is June 9th. WD9BEX is a new Novice in Granite City. Brother is WA9GBW, father is WA9GBX and uncle is WB6NJY. K9MWA reports that the Independent Single Sideband Net traffic for Feb. was 658 for 23 sessions and for Jan. the traffic count was 659 during 25 sessions. The Lamoine Emergency Amateur Radio Club at Macomb repeater now in operation with a frequency of 147.06 and 147.66 with a call of WR9ALR. WB9MKL WB9RZW WB9UAE WB9MYN and W9LBQ are the new officers of LAMARS (Libertyville and Mundelein Amateur Radio Society). WA9OYL has a new set of Drake Twins, and has received his WAC certificate. The Wheaton Community Radio Amateurs Hamfest was a great success. Reports from officers were that it had the largest attendance of all previous years. Fritz Franke of Hallicrafters Fame spoke at the Mar. 1st meeting of the Metro Amateur Radio Club. WA9GBW is the only BPL recipient for Feb. Traffic: WA9GBW 308, W9NJP 284, W9NXG 279, W9HOT 218, K9ZTV 163, W9OK 147, WA9KFK 141, W9KR 132, WB9NOZ 116, WA9VGW 110, WA9EBT 101, WB9RSW 84, WB9SNA 61, WA9AQN 58, W9OYL 45, W9JIJ 44, WB9NEH 33, WB9JSR 30, W9PRN 30, WA9GBX 28, W9PE 25, WB9ELP 22, WB9DED 12, W9HPG 9, K9ELV 8, WB9PHM 7, W9LNQ 5, WB9RGZ 4, WB9NIO 4. (Jan.) W9LNQ 22.

INDIANA: SCM, M. P. Hunter, WA9EED — Congrats to W9LTU on his appointment as RM. WR9AHE is implementing auto-patch facilities. Richmond ARA started new code & theory classes on Feb. 14. WR9HCH reports an improved '77 SET by Lake Co. RACES/AREC. WD9ADN reports in one month he has 29 states and 2 countries to his credit and still find time for tfc. nets. FCC seems to want upgrading to be difficult, some tests are showing problems that cannot be answered at all. Congrats to WA9DJP who overcame the upgraded obstacles. Lake Co. ARC is now laying plans for FD. FWRC started new code & theory classes on Mar. 8. FWRC Hamsplatter also has some interesting facts on insurance for your mobile gear. Some very good scores have begun to surface after the first weekend of the ARRL DX test. W9SFI reports DXing is much better after you retire — you don't have to worry about getting up for work after a hard night. WD9AEW reports he was active in NU (another true blue contest type). WB9HCH reports a new 84/24 repeater is being planned in Lake Co. Ne Tfc.: ITN 584, INTN 81, QIN 368, Hoos. VHF 15 QIN (Jan.) 260. Traffic: (Feb.) WB9KTR 37, W9QLW 339, W9YB 328, W9GGW 285, W9IOH 23 W9LTU 196, K9DCX 146, W9HUF 132, WB9PI 122, WB9OZW 121, WB9FOT 96, WB9JHR 8 WB9NAQ 81, W9EI 71, WB9TJS 44, WA9BVS 3 K9YBM 31, WB9DIX 27, WA9OHX 27, K9RPZ 2 K9JQY 25, WB9QEZ 25, WA9QCF 24, K9EQT 2 WA3HKR/9 20, WB9ORM 19, K9FOV 18, W9EN 18, W9DLF 18, W9PMT 15, K9CGS 10, K9TKE K9RGF 7, W9AUB 6, WB9HCH 6, K9WWJ 3, W9BD 2. (Jan.) W9QLW 214, K9TKE 172, WB9HCH 9 WB9THY 48, WB9SOY 23, W9RTH 6.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC K9PKQ. PAMs: W9AYK W9IEM K9UTQ. RM WB9ICH K9KSA W9OT K9LGU. Nets, freq. tim QNI, QTC, Mgr.: BWN, 3985 kHz, 1245Z, M-Sa, 50 428, W9AYK; BEN, 3985 kHz, 1800Z Dy, 580, 13 W9IEM; WSBN, 3985 kHz, 2300Z Dy, 1228, 23 K9UTQ; WNN, 3725 kHz, 2315Z Dy, 98, 1 WB9ICH; WIN-E, 3662 kHz, 0100Z Dy, 225, 15 W9OT; WIN-L, 3662 kHz, 0400Z Dy, 137, 4 K9LGU; WI-ExPO, 3925 kHz, 1801Z M-F, 602, 3 WA9NIX. OO class 4 to WB9NRK. Don't forg YTARC State convention at Lake Delton May 2 K8JMP has 21 students studying Novice class Poynette. ARRL National Convention June 3 4 5 Toronto. WB9BPS has gone back to Alaska. Suppo your WI nets. Hope all your homebrew projects wor New hams from (Kettle Drums) WB9ZHP (WB9ZEG (N) WB9ZEF (T) WB9YZS (N). What your club doing for a project? Do you belong to radio club. You would benefit and so would yo club. Are you ready for FD? Help your club ou W9LNM now W9ZM. WA9ZZZ now W9GC (fro

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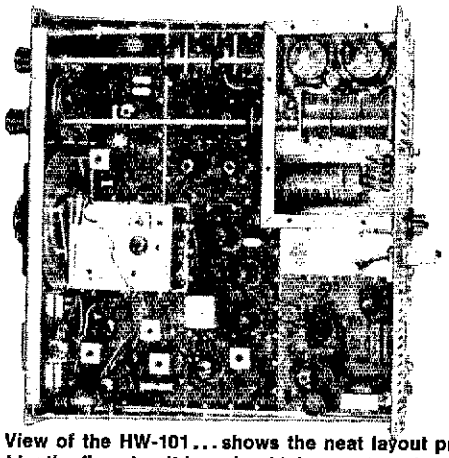
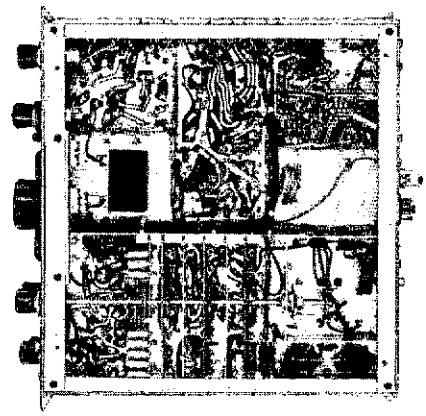


Top View of the HW-101... shows the neat layout provided by the five circuit boards which mount on the top of the chassis. Note the completely enclosed VFO and shielded Final Amplifier which provide excellent TVI protection and operating stability.



Bottom View of the HW-101... shows the four vertical circuit boards with band switch wafers and crystals mounted directly on the boards for easy assembly and tuneup. Final Amplifier bandswitch is located in its own shielded compartment.

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RECEIVER: Sensitivity: <0.35 μV for 10 dB S+N/N for SSB operation. **SSB selectivity:** 2.1 kHz min. @ 6 dB down; 7 kHz max. @ 60 dB down (3.395 MHz filter). **CW selectivity:** (optional SBA-301-2 CW crystal filter); 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 ohm speaker, and high impedance headphone. **Power output:** 2 watts with <10% distortion. **Spurious response:** Image and IF rejection >50 dB. **TRANSMITTER: DC power input:** SSB 180 watt PEP (normal voice, continuous duty cycle). CW 170 watts (50% duty cycle). **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohm to 75 ohm with <2:1 SWR. **Oscillator feed-through or mixer products:** 45 dB below rated output: **Harmonic radiation:** 35 dB below rated output. **Transmit-receive operation: SSB:** PTT or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW sidetone:** Internally switched to speaker or headphone in CW mode. Approx. 1000 Hz tone. **Microphone input:** High impedance with a rating of −45 to −55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB from two-tone output. **RF compression (TALC*):** >10 dB at .1 mA final grid current. **GENERAL: Frequency coverage:** 80-10 M amateur bands. **Frequency stability:** <100 hertz per hour drift after 45 minutes warmup from normal ambient conditions. <100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 700 to 850 volts at 250 mA with 1% maximum ripple; 300 volts at 150 mA with .05% maximum ripple; −115 volts at 10 mA with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 6⅝" H x 14⅞" W x 13⅜" D.

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YTARC) WA9GJU is editor of Intercom. W9SZR is now K3ZO is this right Fred? Oshkosh RC held a banquet at Nino's in Oshkosh Feb. 15, a very fine turnout too, their radio classes are going good. YTARC reports good turnaround in their classes. K9JMP has Novice classes going in Poynette. New Novices in Winnebago area WD9AQX WD9AQY WB9YSC WB9YWK WB9YWM and WB9YWO. New officers for MARA W9HSY, pres.; WA9ACI, vice-pres.; WA9FTH, treas., WA9JDR, secy. (from FLARAC). K9CPM made BPL. Traffic: (Feb.) K9CPM 822, W9DND 366, W9CXY 231, W9SFL 176, K9MZO 163, W9OT 116, W9NUI 99, K9FHI 97, WB9ICH 97, W9IEM 70, K9LGU 61, K9UTQ 48, W9AYK 47, WB9OEC 42, W9MFG 38, K9SAO 34, WB9JSW 32, WB9HLS 29, WB9QKH 29, W9YFW 29, K9JPS 28, WB9SHK 20, WA9NDV 18, K9ANV 9, WA9QVT 9, WA9RRU 8, WB9LKC 4, WB9QXU 4, K9ASC 2, WB9PYG 2.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K@ZXE — Active MN traffic nets are: 1205 PM daily, 3945 MSPN, 9 AM-5 PM M-F 9 AM-noon Sat. Piconet AW 3925, 5:30 PM daily MSSN 3710, 5:45 PM daily MSPN 3925, 6:15 PM MAWX daily 3925, 8:30 PM MSN 3685, 10:15 PM MSN2 3685. You are all invited to represent your city on these nets. WB@OFQ, RM MSSN, is providing relay stations between MSSN and MSN to improve traffic coverage. K@RMX has received OPS. W9MMP/@ helping with the Intruder Watch program. FCC field exams will be given in Fargo, ND, June 7. File FCC form 610 with St. Paul now. State MARS director, W@KUI, is recuperating after a stay in the hospital. WB@PGZ has formed the 3950 Club which meets Sun. at 1 PM on (you guessed it) 3950 kHz. All are welcome to check in, especially the teen group. Austin ARC elected WB@LTH pres.; WA@RKV, secy-treas. Good luck. An impressive demonstration of 2M emergency communication was presented to the Blandin Co. and the DNR by the Northern Lakes ARC Grand Rapids. NLARC picnic will be July 17. See you there. The Mankato ARC has produced new Novices WB@YVU WB@ZQN and WB@ZQH. Good going fellows. Their new officers are WB@FMR, pres.; WB@HYE, vice-pres.; WB2GCT/@ secy-treas. The St Paul RC has four instructors; W@FCO W@QKJ K@MG and WA@ODW; who teach all levels of licensees. That's quite a service. Traffic: WB@HOX 586, W9MMP/@ 518, W@QMY 242, WB@LDW 222, K@CVD 185, K@ZXE 155, WB@EKC 88, WA@YYT 74, WA@QIT 70, WB@OUH 70, WB@UCU 69, WB@PKG 67, W@DUW 64, K@RMX 62, W@PET 59, W@HKF 58, K@CSE 58, K@ZBI 50, WB@NZB 49, WB@OFQ 49, WA@GLI 43, K@PIZ 42, WB@VNC 40, WA@TFC 38, W@OSJ 36, W@RIQ 35, W@HZU 26, W@ORB 19, WA@RKV 15, WB@NCP 14, W@OPX 13, K@BDD 12, WA@JPR 12, WA@URW 12, WA@WOV 12, WB@MAO 11, WB@LSI 11, WB@JYT 10, WB@PGZ 9, K@FLT 8, K@GNI 6, WA@IAW 2, K@SXQ 1, WB@PBN 1.

NORTH DAKOTA: SCM, Mark J. Worcester WA@WLP — Minot has code classes going with about 23 attending. W@JWL can be found on CW looking for DX for WAC. WA@OVT giving code classes with about 10 attending. Dakota Feedback ARC at Grafton planning Novice Classes in about 2 weeks. WB@SHD at Hettinger went from Novice to Advanced and received instant upgrade. Appointments to date: SEC WB@PDP ORSs, W@DM W@CAQ; OPSs W@DM WA@SUF; OBS W@DM; OO WA@OVW; ECs W@RIB WB@NZJ, K7QJW/@ W@HNV WB@BMH W@BHT K@PVC WA@CRH W@SRH WB@OAJ WA@QBN WA@LRE and WA@UNA. There will be an EC Net at 1600Z on 3996.5 on the first Sun. of each month. All ECs are requested to participate. The YL Weather Net and DATa weather gathering portion will discontinue Apr 15 until Nov. 1.

Nets — kHz	CDT/Days	Sess.	QNI	QTC
Manager				
DATa — 3996.5	1700 S-S	47	476	27
WA@SUF	1800 M-F			
Goose River — 1990	0900 Su	4	52	
W@CDO				
YL WTH — 3996.5	0700 S-S	28	694	72
WA@RWM				

Traffic: WA@RWN 1139, WA@SUF 170, WA@CRI 151, WB@BMG 95, W@CDO 89, W@FNZ 84, W@DD 48, WB@PDP 20.

SOUTH DAKOTA: SCM, Ed Gray, WA@CPX — The SD Hamfest will be held June 17, 18 and 19 at Chanberlain, SD armory. The main activities kick off at 3:00 PM on Sat. The sponsor is the Medicine Butte ARC. W@DB of Milbank is a Silent Key. WB@ZYC Kennebec is a new Novice. Two meter ssb/cw activity in the state has been growing rapidly at 145.100 MHz with 10:00 PM being a good time to check for activity. Net election was held with WA@VRE, chosen as NJQ mgr., K@TVJ, summer session Evening net mgr., and WA@YAK, Winter Session Evening Net mgr. A special thanks to the past net managers and net control stations. The appointment for SEC is open. Anyone interested is asked to contact your SCM as soon as possible. Net report totals: QNI 2067, and QTC 93. Traffic: W@MZI 656, WA@VRE 238, W@HO 110, W@IG 47, WB@EVQ 26.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SE WA5VNV. PAMs: W5POH WA5ZWZ. RM: W5MY. Nets, kHz, Times/Day, QNI, QTC, Mgr.: ARN, 399 0030/Dy, 804, 49, K5MEA; OZK, 3760, 0100/D 193, 46, W5MYZ; APN, 3937, 1200/M-S, 805, 3 W5POH; M-Bird, 3928, 2230/M-F, 559, 18, WA5ZW. New EC for Cleburne Co. W5UVP and Washington C WB5EPD. OBS for K5MEA. Endorsed EC W5SH OPS WB5GQH, PAM WA5ZWZ. New hams in A W8SS XRC XRD XRO XQU XSE XSL XSN XT XRV XTW XTX YAS ZCW YZD ZBC ZII ZHC ZG ZBI YYM ZHJ ZHY ZCS YYY YYW ZPH ZP W5UAU visited the AR River Valley AR Foundati of Russellville, AR Feb. 15th. K5GKN now K5D PSHR: W5POH 39, WA5VNV 11. Traffic: WA5HN 198, WA5VNV 54, K5MEA 32, W5SHY 24, WB5GW 21, W5POH 20, W5UAU 17, K5KL 12, K5DW 7, W5RIT 3.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NYY. SEC: WB5CI RM: WA5ZZA. VHF PAM: W5VBX. Regret to announce the resignation of WB5KFY as PAM and L Net Mgr. Congratulations to the Lafayette ARC on excellent Hamfest. The C-A Award went to WB5IY

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MT-1 Matching xtmr 19
AUTEK
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B & W
340A Q-mult/notch $ 29
331 Little dipper 79
BRIMSTONE
144 2m FM Xcvr $399
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10A Exciter w/80, 40m $ 49
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22'er 2m AM Xcvr $ 99
66'er 6m AM Xcvr 99
Thor 6 6m linear (RF) 69
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418 DC supply/mod 35
Zeus VHF Xmtr 249
Interceptor VHF Rcvr 179
Interceptor B VHF Rcvr 239
Allbander HF tuner 69
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136B-2 Blanker 100
516F-2 AC supply 149
516E-1 KWM-1 DC PS 75
MP-1 DC supply 119
PM-2 Portable AC ps 95
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160-XV 160m Xvtr $139
DRAKE
2AC Calibrator $ 9
2NB Noise blanker 19
2LF Low freq conv 19
FL-6000 6 KHz filter 39
SW-4A SWL Rcvr 225
SSR-1 SW Rcvr 249
SPR-4 SW Rcvr 349
TA-4 Xcv adapt 15
SCC-4 Calibrator 19
SC-6 6m conv 59
CPS-1 Conv ps 12
TR-4 Xcvr 389
34PNB Noise blanker 75
TR-6/NB 6m Xcvr 599
DC-3 DC supply 75
DC-4 DC supply 95
L-4B Linear 599
MN-4 Matcher 69
ML-2 2m FM Xcvr 149
TR-22 2m FM Xcvr 149
TR-22C 2m FM Xcvr 169
DYCOMM
101-500 2m FM amp $ 39
500D 2m FM amp 49
GLB
400B Synthesizer $139
GALAXY/GLOBE/WRL
VX-1 VOX $ 9
Galaxy V Xcvr 189
Galaxy V Mk II Xcvr 229
GT-550 Xcvr 279
AC-35 AC supply 69
AC-400 AC supply 75
RV-1 Remote VFO 59
RV-550 Remote VFO 69
VX-35 VOX 12
CAL-35 Calibrator 12
SC-35 Speaker 12
G-1000 DC supply 89
CAL-25 Calibrator 19
F-3 CW filter 24
Economy AC supply 29
R-1530 Rcvr/3 filt 1295
AC-210 AC supply 19
GENAVE
Ham-Pak $ 19
GONSET
Comm IIB 6m Xcvr $ 49
Comm III 2m Xcvr 79
Comm IV 2m Xcvr 99
Comm IV 6m Xcvr 99
GC-105 2m Xcvr 99
G-50 6m Xcvr 139
910A 6m SSB Xcvr 189
911A AC supply 39
HALLICRAFTERS
SX-100 SW Rcvr $139
SX-122 SW Rcvr 225
HT-44 Transmitter 159
SR-150 Xcvr 249
PS-150-120 AC supply 75
PS-150-12 DC supply 49
MR-150 Rack mt 15
FPM-300 Xcvr 349
FPM-300 Mk II Xcvr 399
P-26 AC supply 45
HAMMARLUND
HQ-160 SW Rcvr $159
HQ-180 SW Rcvr 259
HQ-180A SW Rcvr 359
HC-10 SSB conv 59
HEATHKIT
SB-300 Ham Rcvr $199
SB-301 Ham Rcvr 229
HRA-10-1 Cal 9
SBA-300-3 6m conv 29
SBA-300-4 2m conv 29
QF-1 Q-mult 9
SB-10 SSB adaptor 69
HX-30 6m Xmtr 149
SB-400 Transmitter 225
SB-401 Transmitter 249
HA-14 Linear 99
HW-10 6m Xcvr 99
HW-22 20m Xcvr 75
HW-32 20m Xcvr 75
HW-32A 20m Xcvr 85
HW-101 Xcvr 259
SB-100 Xcvr 299
SB-100-1 Mount 9
SB-104 Xcvr 599
SB-104-1 Blanker 24
SB-104-2 Mob mount 34
HP-1144 AC supply 79
HPD-121 Microphone 34
SB-230 Linear 349
SB-604 Speaker 29
SB-614 Station monitor 139
SB-6345 Station console 159
HW-30 Two'er Xcvr 29
HP-13 DC supply 45
HP-13B DC supply 54
HP-23 AC supply 45
HP-23A AC supply 49
HO-13 Hamscan 69
HW-8 QRP CW Xcvr 119
HM-2102 VHF wattmtr 24
HW-202 2m FM Xcvr 159
HWA-202-1 AC supply 29
ITC
Multi-2000 2m Xcvr $399
ICOM
IC-21 2m FM Xcvr $199
IC-21A 2m FM Xcvr 249
DV-21 Digital VFO 189
IC-22A 2m FM Xcvr 189
IC-230 2m synth Xcvr 299
IC-3PA AC supply 59
IC-502 6m SSB Xcvr 199
IC-3PS AC supply 79
JOHNSON
275w Matchbox w/SWR $109
6N2 VHF transmitter 79
KLM
Echo II 2m SSB Xcvr $269
KENWOOD
R-599 Ham Rcvr $249
T-599 Transmitter 289
TS-700A 2m Xcvr 499
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Century 400 DC PS 59
MILLEN
90651 Grid dip osc $ 39
MOTOROLA
Metrum II 10w 2m FM $199
NATIONAL
XCU-27 Calibrator $ 29
NCXD DC supply 75
AC-200 AC supply 69
P & H
2-150 SSB conv $149
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Frequency modulator $ 15
PEARCE SIMPSON
Gladding 25 2m FM. ps $139
RADIO INDUSTRIES
Loudenboomer Mk II $199
REGENCY
HR-2 2m FM Xcvr $139
HR-2A 2m FM Xcvr 149
HR-2B 2m FM Xcvr 159
HR-212 2m FM Xcvr 169
HR-2S 2m FM Xcvr 199
HR-2MS 2m FM Xcvr 179
AR-2 2m FM amp 89
HR-6 6m FM Xcvr 129
P-110 AC supply 34
HRT-2 2m FM HT 99
ROBOT
61 Viewfinder $299
SBE
SB-33 Xcvr $159
SB-34 80-15m Xcvr 239
SB-144 2m FM Xcvr 149
SB-450 TRC 450 Xvtr 149
SINGER
PR-1 Panadaptor $ 79
STANDARD
826M 2m FM Xcvr $169
CSA Charger 25
14U 2m FM Xcvr 249
SWAN
SW-117 AC supply $ 65
SW-240 80-20m Xcvr 159
TCU Control unit 59
SW-12 DC supply 59
400 Xcvr/410 VFO 229
SS-200 Xcvr 469
260 Cygnet Xcvr 289
270 Cygnet Xcvr 329
300B/SS16B Xcvr 419
1200W Linear 199
350C Xcvr 299
512 DC supply 69
117XC AC supply/spkr 95
14X DC module 39
14C DC module 49
117X AC supply 65
14-117 DC supply 95
510X Xtal oscillator 39
508 Remote VFO 159
600T Transmitter 359
600R Ham Rcvr 289
600R Custom Rcvr 399
600S Speaker 19
600SP Spkr/patch 59
250 6m Xcvr 229
250C 6m Xcvr 329
FM-2X 2m FM Xcvr 149
FM-1210A 2m FM. ps 199
VX-2 VOX 29
FP-1 Phone patch 44
TPL
502B 2m amplifier $ 99
802B 2m amplifier 149
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Tempo One Xcvr $299
AC/One AC supply 75
VHF-1 2m FM Xcvr 329
SS-200 Xcvr 469
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270 Cygnet Xcvr 329
ACH Charger 19
TEN TEC
PM-2B QRP Xcvr $ 39
210 AC supply 19
Triton II Xcvr 429
Triton IV Xcvr 549
251 AC supply 49
262B AC PS, VOX 99
TRIO
TR-2200 2m FM Xcvr $149
VARITRONICS
IC-2F 2m FM Xcvr $119
IC-3P AC supply 39
FDFM-2A 2m FM Xcvr 79
VHF ENGINEERING
PA-110/30 2m amp $ 99
PS-24C AC supply 89
YAESU
FTDX-560 Xcvr $449
FT-401B Xcvr 549
FT-101B Xcvr 549
FR-101S Ham Rcvr 389
FL-101 Transmitter 425
FTV-250 2m Xvtr 129
FTV-650B 6m Xvtr 129
SP-101PB Spkr/patch 49
200R 2m synth Xcvr 249

3-25-77

The following items are NEW Close-outs, Overstock merchandise, etc. Most are factory-sealed, all carry New warranties. Limited quantity. Close-outs available at Milwaukee only. Terms of sale: Payment in full with order or Mastercharge, no trades.

	reg.	NOW
ATLAS		
210X 80-10m Xcvr	$679	577
210X/NB With blanker	719	611
215X 160-15m Xcvr	679	577
215X/NB With blanker	719	611
BRIMSTONE	reg.	NOW
144 2m FM Xcvr	$650	449
CLEGG	reg.	NOW
22'er FM ser 25 2m Xcvr	$384	234
027 Charger DEMO	64	25
COLLINS	reg.	NOW
30L-1 80-10m linear	1536	681
COMCRAFT	reg.	NOW
CST-50 2m/220 FM Xcvr	$869	599
CPS-6 AC supply	139	99
DRAKE	reg.	NOW
L-4B 80-10m linear	$895	749
TR-4C 80-10m Xcvr	999	499
SCC-1 VHF calibrator	26	19
CA-1 Stack adaptor	16	5
BBLT-144D 2m tnk mt ant	27	14
SSR-1 Shortwave Rcvr	350	279
EBC	reg.	NOW
144 JR 2m FM Xcvr	$599	399
ETO	reg.	NOW
274 80-10m linear	$995	675
77D 160-10m linear	2995	2375
EICO	reg.	NOW
752W DC supply wired	$109	49
GALAXY	reg.	NOW
GT-550A 80-10m Xcvr DEMO	$595	395
G-1000 DC supply	129	99
RV-550A Remote VFO	95	89
XO-550 Xtal oscillator	49	39
ZZM Mobile floor mount	6	3
R-1530 General cov Rcvr	1550	1295
FL-5305 500 Hz filter	70	60
FL-5306 6 KHz filter	80	70
RPA-1530 Rack adaptor	170	99
GAM	reg.	NOW
TG-2 2m mobile ant, 3 db	$ 17	9
TG-2R 2m roof ant, 3 db	19	10
MP-34 2m mobile ant, 6 db	27	14
TG-3 2m base ant, 3 db	29	15
TG-3S 2m base ant, 6 db	54	27
TG-5S 2m base ant, 8 db	81	41
HALLICRAFTERS	reg.	NOW
MR-400A Mobile mt - SR-400	$ 89	19
R 49 Speaker	17	15
HA-19 Calibrator	39	19
HENRY	reg.	NOW
2K Ultra 2kw PEP linear	$895	775
HICKOK	reg.	NOW
239 Color bar generator	$125	75
246 Deluxe bar generator	215	149
215 Semiconductor analyzer	138	88
HI-PAR	reg.	NOW
S-2 Saturn 6 ant only	$ 15	10
HT2M 2m 8 element beam	24	12
HY-GAIN	reg.	NOW
SI2S4/362 2m FM J-Pole	$110	99
ITC	reg.	NOW
Multi-2000 2m Xcvr DEMO	$695	450
ICOM	reg.	NOW
IC-60 6m FM Xcvr	$299	239
IC-230 Synthesized 2m FM	489	349
IC-21 VFO Receive VFO	119	99
KLM	reg.	NOW
Multi-2000A 2m FM/SSB Xcvr	$679	499
KENWOOD	reg.	NOW
R-599A 80-10m Rcvr	$459	359
QR-666 SWL receiver	289	199
TS-700A 2m SSB/FM Xcvr	599	539

	reg.	NOW
MOTOROLA		
T-1670A AC supply	$150	99
NEWTRONICS	reg.	NOW
G3-144 2m FM base ant, 3 db	$21	15
G5-144 2m FM base ant, 5 db	41	29
BBLT-220 220 MHz tnk lip ant	26	15
BBLT-450 450 MHz tnk lip ant	25	15
NYE	reg.	NOW
250-23-4 275w matchbox	$202	139
REGENCY	reg.	NOW
HR-212 2m FM Xcvr DEMO	$259	199
HR-2S 2m FM ac xcvr/scan	349	239
HR-220 220 MHz FM Xcvr	239	189
HR-440 450 MHz FM Xcvr	349	249
ACT-W-10 Whamo scanner	329	199
DFS-5K Dig freq selector	199	149
SBE	reg.	NOW
SB-ICTV SSTV camera only	$469	199
SIGNAL ONE	reg.	NOW
Standard CW filter - CX-7	$ 69	59
Deluxe CW filter for CX-7	160	149
SONAR	reg.	NOW
FM-1803 10w marine FM Xcvr	$299	149
PS-2923 AC supply DEMO	39	19
D-1024 Depth recorder/flasher	259	159
D-1060 Depth sounder	145	95
STANDARD	reg.	NOW
146A 2w 2m FM HT	$298	229
826M 2m FM Xcvr	359	169
851L 25w 2m FM Xcvr	565	249
801SA 10w marine FM Xcvr	329	179
811S 2.5w marine FM Xcvr	199	149
SWAN	reg.	NOW
300B/SS16 16-pole filter	$639	499
1200X 1200w PEP linear	349	299
117XC AC supply/spkr	159	129
117X Basic AC supply	114	89
230X Basic 220v supply	127	89
14XP DC module, pos gnd	70	49
SS-100 80-10m Xcvr	699	399
PS-10 AC supply	99	79
SS-200 80-10m Xcvr DEMO	779	499
PS-20 AC supply	179	149
610X Xtal oscillator	67	49
P-1215A AC supply	75	59
600R 80-10m Rcvr DEMO	439	299
600T 80-10m Xmtr	649	399
600T USED*	649	349
FM-1210A 2m FM Xcvr, ps	319	199
1040V 40-10m vert ant	111	79
75m kit for 1040V vert	36	9
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TEABERRY	reg.	NOW
T-Scan UHF pocket scanner		49
TEMPO	reg.	NOW
FMP 2m FM Xcvr DEMO	$225	125
FMA 25w 2m FM Xcvr	349	149
ACA AC supply	49	29
TEN-TEC	reg.	NOW
315 80-10m Rcvr DEMO	$249	179
TX-100 CW transmitter	109	69
Triton I 80-10m Xcvr	579	399
Triton II 80-10m Xcvr DEMO	669	499
261 AC supply	109	89
VARITRONICS	reg.	NOW
FDFM-2A 2m FM port Xcvr	$250	79
FM-20M Mobile 10w 2m amp	150	19
FM-208M As above, but AC	235	39
PA-50 Mk I 50w 2m amp	129	39
YAESU	reg.	NOW
FT-2FB 2m FM Xcvr DEMO	$239	189
FT-2 Auto 2m FM Xcvr	379	199
FT-224 2m FM Xcvr DEMO	249	199
200R Synthesized 2m FM Xcvr	449	279

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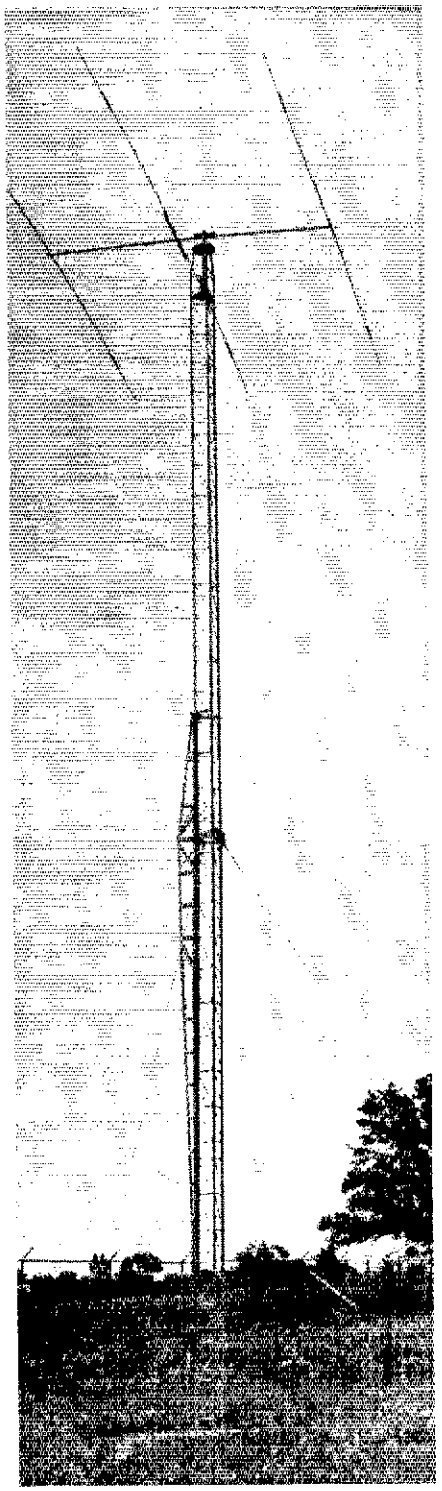

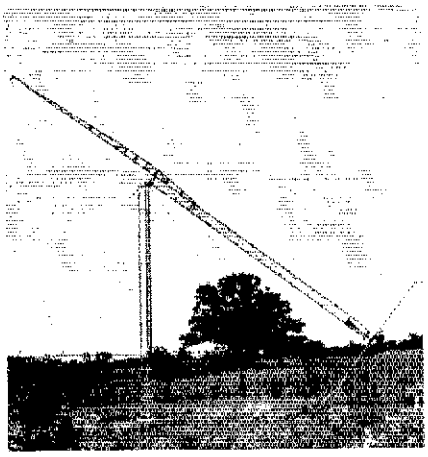

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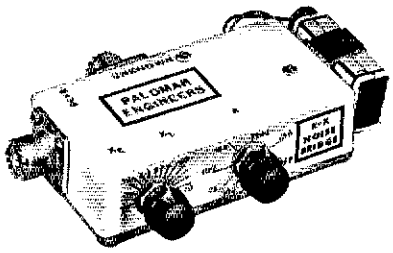

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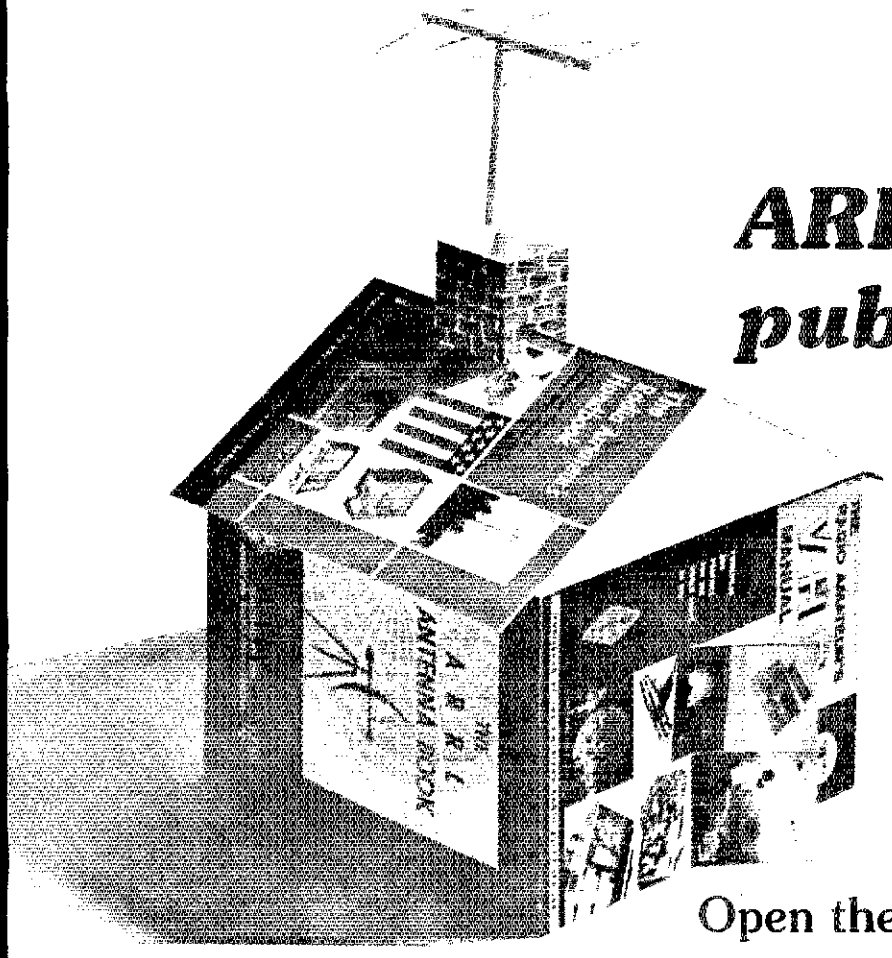

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THE AMERICAN RADIO RELAY LEAGUE, 225 MAIN STREET, NEWINGTON, CT 06111

Louisiana state RO. New officers of LARC ar K5EGW, pres.; K5NFQ, vice-pres.; K5DPG, secy. K5ARH, treas. WB5UTY has his new 2-mtr amp working. WB5MXE active on the Hammond repeater Officers of the MTA ARC are WA5WQN, pres. WD5BJL, vice-pres.; WB5IOE, secy.; WB5OCY, treas The MTA club graduated 14 Techs, 3 Generals and one Advanced from their last class that finished in Feb. Regret to report the passing of K5TZJ of New Iberia formally of Houma. WA5ZZA reports activity in LAN increasing. WA5ANV LSN net mgr, has been off the air due to rig and antenna troubles. In the meantime WA5ZZA is helping with the net.

Net — Freq.	Time/Days	QNI	QTC	Mg
LAN — 3615	7:00 & 10:00 Dy	439	211	WA5ZZ
LTN — 3910	6:15 Dy	355	82	WB5KF
LSN — 3703	8:30 PM M-F	79	27	WA5ANV
LRN — 3587.5	7:00 PM Su	18	12	WB5FHU

Traffic: WA5IQU 247, W5GHP 206, WB5PTH 160 WA5ZZA 139, W5MI 108, WB5CDX 96, WA5VQB 89, WB5NVB 67, WB5LBR 47, WB4VGY 37 WB5FHU 35, WB5NEZ 19, WB5RTW 7. (Jan. WB5NVB 54.

MISSISSIPPI: SCM, E. Ed Robinson, W5YTN — SEC WB5FXA. Enjoyed FB visit with the ECHO Repeate Assn. and their club doing good job with 28/8 repeater. K5IKB EC for District E reports all h counties now have local ECs. New 2-meter repeater i Meridian now on the air 10/70. Congrats to K5RR on 30 wpm code proficiency certificate. Welcome ne MS amateurs: WB5s ZGD ZGZ ZFI ZEQ ZES ZGE ZIJ ZEM ZEQ ZET ZDX ZFR ZEN ZER ZLU ZC YCR YZI X5K XUP XU5 YBK YAE YAW AGW YB YAL YYL YCN YCW YZO YYQ ZAG ZLH ZN ZHR ZHV ZHT ZKR ZHE ZHU ZHW ZHN ZNB ZH ZHX ZH5 ZIR. WD5s BEV BET BEX BDM BFC BE BCO BCU AGB BFZ BDZ BEJ BER AGN AFH AH DRN5 sessions 28, QTC 379, MS rep. 92.9%. CGCH QNI 3011, QTC 110. M5BN QNI 1183, QTC 85, N MS FM Net QNI 414, QTC 4. MTN QNI 220. QTC 6 Miss Lou Weather Net QNI 105, QTC 4. Traffic WB5VDY 144, WB5LXX 143, W5EDT 136, WB5FH 130, K5OAF 41, N5XA 25, WB5SNB 25, W5LSG 2 W5YTN 17, W5RUB 15, W5VKR 14, WB5QCA 1 W5BW 8, WB5HVY 7, W5OXA 5, K5VXV WB5HAS 2, WB5NGF 2.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC WB4DYJ. PAM: WB4PRF. RM: WB4DJU.

Net — Freq.	Time(Z)/Days	Sess.	QNI	QT
Manager				
TPN — 3.980	1140 M-F	83	4637	37
WA4EWV				
W4PFP	1245 M-F			
WB4YPO	0130 M-Su			
	1400 SSuH			
TCN — 3.980	0130 M			
WB4WHE				
TN — 3.635	0130 Dy	30	276	10
K4YFC				
TNN — 3.710	2300 MTh	9	73	2
WA4CNY				
ETVHFN — 50.4	0200 MWF	13	141	
WA4WZJ				
ETVHFN — 145.2	0200 TTh	8	44	
WB4DZG				
MTFMN — 28.8	0200 TF	9	75	
W4EAY				
WTVHFN — 146.37	2330 Dy	40	1080	
WA4VVX — 146.97				
TCDARC — 146.16	0200 W	4	94	
W4CYL — 146.76				

Everyone remember to attend, the Humboldt Hamfes on the 24th and the Knoxville Hamfest on the 28th & 29th, both are always very interesting. The MARA enrolled 250 students in their Spring, '71 radio training class. Current OPSs are as follows: WB4YP WA4EWW WB4MPJ K4JSF WB4ANX WB4DY W4TYV WA4TWL WA4WVW W4VJW W4SGI W4PF K4UMW W4PSN WA4BCS W4OGG K4QK WA4CGK WA4JNW WB4ZSZ. Current ORSs ar K4SXD N4ZZ K4YFC WB4DJU K4AMC W4OG W4QD K4VM WB4CRT WB4ZSZ WB4NIR WA4UA WB4FGT WA4IDN and ORS 11 are WA4YS WA4CNY. Traffic: K4CNY 365, WA4CNY 145 WA4WHQ 128, W4OGG 108, K4VM 101, WB4ZS 101, K4JSF 99, W4QD 97, WB4DJU 81, WA4DK 56, K4YFC 56, K4FSK 42, WB4PRF 42, W4VS 38 WB4BKF 29, WA4GLS 28, W4RUW 27, WA4VVX 27 WB4MPJ 21, W4TYV 19, WB4YPO 17, W4CYL 16 WB4GBI 12, N4ZZ 12, WB4WHE 11, WA4OSH 8 W4SGI 7, W4VJW 7, K4UMW 6, WA5WVW 6, W4PS 5, WA4ATI 4, WA4TYN 4, K4MZE 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID. SEC WB4ZML.

Net	QNI	QTC	Net	QNI	QT
KRN	308	47	KYN	117	9
KTN	1054	97	KSN	7	
KPON	84	8	KNTN	207	8
			SEKEN	38	

Many tnx to WB4KLC who now has his General an has been helping your SCM out by taking incomin traffic. Our CW nets are in dire need of QNI. Th winter band condx took their toll on the late session K4FUM, RM, needs your support, WB4BDF an WB4KLC both have new rigs. Traffic: K4TXJ 257 K4HRF 136, W4BAZ 128, WB4KLC 71, WB4QVS 5 WA4IGS 52, WA4FOB 38, W4CDA 34, WB4EOR 2 WB4AUN 27, K4HOE 27, WA4AVV 26, K4FUM 1 W4CID 18, K4AVX 17, WA4NAR 11, K4LDL WA4FAF 7, WA4UBE 5, WB4AFH 2, WA4WNH 1.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC W8MPD. RMs: W8JYA WB8NCD. PAMs: K8LN WB8JIX. VHF PAM: WA8WVV.

Net — Freq.	Time/Day	QNI	QTC	Ses
MACS — 3953	1600 Dy	940	594	3
QMN — 3663	2300/0200 Dy	961	365	9
WSSBN — 3935	0001 Dy	899	299	3
MiARES — 3932	2300 Su	109	86	
BRMEN — 3930	2230 Dy	624	81	2
UPEN — 3922	2230 Dy	782	80	3
GLETN — 3932	0230 Dy	360	36	2
MNN — 3720	2230 Dy	112	34	2
Mi6M — 50.7	0001 Dy	227	28	2
VHF PAM		416	8	1

Election results: Central Mich Repeater Ass WB8RCR, pres.; WB8SDJ, vice-pres.; WB8UOO, secy W8JDW, treas. Monroe County, WB8GWB, pres WB8KBZ, vice-pres.; WB8TKL, secy-treas. Shiawass ARA, WB8ECZ, pres.; WA8ABM, vice-pres.; WB8VE secy.; WA8AAP, treas. MACS Amateur of the year

W8PDP. KH6ILJ now back in Owosso as WB8GHU. New licenses: Novice, WD8s DNU IBC IBB DZP DNU. Technicians, WD8DDV & WB8UVQ. Generals, WD8ANC WB8SEZ WB8ULT WB8ZIY. Advanced, WB8MEG WA8TMP. Congratulations. New appointees: WB8FEY WB8CFV WB8VCD W8LSS W8UPV are ECs. W8RC is ORS & WB8SDL OBS. Club papers report increasing numbers of Technicians operating hf cw. New year: WB8TQZ reports completion of HW 2036. WD8DQR has a TS 520. WA8WWM TS 820 & IC 22S. WB8KQS HW 101. K8MUJ SR 150. WB8VOM TR4. Traffic: (Feb.) WB8YDZ 245, W8VPU 234, K8WRJ 232, W8MO 195, W7KQU/8 176, W8CUP 159, WA8OIE 158, WB8POL 153, WB8JIX 134, K8DY1 102, W8GLC 100, W8NOH 100, WB8YIQ 98, WA8DHB 96, K8LNE 95, W8OW 91, WB8NCD 89, W8TZZ 77, WD8CIQ 63, K8ZJU 52, WB8ITT 50, WA8WZF 49, WA8WWS 48, W8EOI 47, WB8OJS 41, WB8DKQ 41, WA8SV1 39, W8IHX 38, W8JUP 38, WB8JNJ 34, WD8CSA 32, W8UFS 32, K8DTG 31, W8DCN 30, K8EZL 28, W8CSO 27, K8GXV 27, W8LDS 24, WB8SNI 24, W8EU 22, W8IUC 20, W8VIZ 17, W8SDB 16, WA8WVY 16, WB8EYM 14, K8JED 13, WB8APN 12, W8HKL 12, W8RNQ 12, K8JHA 11, W8JLD 11, K8PYN 11, W8TBP 11, K8CIP 10, WD8CIU 7, WA8FJF 5, WB8TQZ 5, WA8YPY 5, W8JAX 4, W8WVL 4, WD8BAA 3, W8QBE 3. (Jan.) WB8RVG 91, WB8YDZ 60, WB8MTD 34, WA8WWM 33, WB8GKB 19, WB8KBZ 15, W8DC 1, WB8TQZ 1.

OHIO: SCM, H. Rudolph Greeb, W8CHT/N8XX/WR8AJO/WR8AJP — Ohio Section Nets Picnic, July 31, High Bank Metro Park, north of Worthington on Highway 23. Short Business meeting starts about 1:30 P.M. For details and map contact WB8JGW. Net Reports (Feb.)

Net — Freq.	Time(Z)	Sess.	QNI	QTC
OSSBN — 3.9725	1430/2000/2245	85	2744	1118
ONN — 3.710	2234	20	89	47
06MN — 50.16	0100	28	189	32
BRTN — 146.46	0130	28	93	28
BN — 3.577	2245/0200	48	330	181
OSN — 3.577	2210	28	190	88
BNR — 3.605	2200	28	102	514

Currently the entire section appointees structure is being reviewed, W8LTA, RM without portfolio, has been appointed to assist the other RMs in reviewing ORS criteria and appointment procedures. I'm currently looking for people to assist in parallel capacity for the other appointments. WA8SVX reports successful completion of Novice code and theory class, with 36 new licenses either in hand or expected shortly. WD8ILA & WD8ILB are new hams in University Heights. Queen City Emergency Net and Hamilton County ARES cooperated in special SET with American National Red Cross, Ottawa County, Central OH, and other ARES groups re-scheduled their SET activities during Feb. since the real snow and weather emergency cancelled many exercises. Hams in all counties along the Ohio River and major tributaries participated in standby alert during the extreme freeze and subsequent thawing. While no major flooding or other disaster occurred, had conditions been only slightly different a major emergency could have existed. Traffic: WB8KWD 783, WA8MCR 535, W8ALS 250, W8LTA 248, WB8VLR 221, K8LGA 188, K8BYR 177, WB8KKI 170, WB8YVI 170, K8MLO 149, W8TH 146, WB8JGW 130, WA8KPN 130, WA8JPX 105, WB8CJU 101, W8LZE 94, N8XX 90, WA8VWH 80, WB8OMQ 78, W8CXM 73, WB8OFR 72, W8JD 60, K8LXA 59, WB8MRL 52, W8OE 49, WA8RQQ 48, WD8ACM 46, WB8TRK 41, WA8SED 40, W8QZK 39, WD8AVY/N 32, WD8COS/N 26, WB8PIY 25, WA8SSI 25, W8OUU 23, WR8HHH 19, W8WEG 19, W8DCX 16, WB8AYC 12, W8DHL 12, WB8WEK 12, K8QYR 11, WB8GGR 10, W8GRG 10, W8IMI 10, WA8MAZ 10, K8IOW 7, W8PNP 7, WB8UIN 7, K8ONA 7, N8AA 5, W8TZ 2.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, W2CS — SEC: WB2VUK. Asst. SEC: K2AYQ. PAMs: WB2QEI WB2EMU. RMs: K2OYG WB2IXW. WB2VUK and K2AYQ have swapped jobs so that K2AYQ can have more time to devote to his local ARES group. New SEC is WB2VUK, asst. SEC is K2AYQ. Thanks Wayne for all your hard work. Columbia-Greene has a new EC, WB2DUW. He will find W2KHQ a hard act to follow. Good luck. OO report received from W2DW. OBS report from WA2PAU. The Communications Club of New Rochelle has 71 students enrolled in the Novice class. Training chairman WB2GMN is going to have his hands full! Albany ARA celebrates passing the 200 mark in membership by graduating four new Novices: WA2KHI WA2KNO WB2KNN WA2KQG. WA2PAU spent a week in FL operating from W4ZL. W2YJR reports working England on 5 watts cw. WA2CJY says his oatmeal box antenna tuner really does work. WB2FVX has been busy lately. In addition to completing 5 band WAS (No. 275) and getting his own Extra Class license, he recently graduated the following new Novices: WA2BTT WA2CMY WA2EDQ WA2ZKJ WB2DWQ WB2JHS WB2ZRE. In case you've been wondering who belongs to those new call signs, W2HNX is now N2SF, WA2KUL is W2UU, WA2EAH is K2VV, WB2FMK is W2NC and WA2PJL is now W2CS. New graduates of Poughkeepsie Club Novice course: WA2KQF WA2KZN WB2KMT WB2LDT WB2KMZ. PSHR this month to WB2RUZ WB2EMU W2CS. Traffic: (Feb.) W2YJR 338, W2CS 196, W2BIW 166, WB2EMU 154, WB2TGL 125, WB2RUZ 88, WA2UYL 72, W2IT 55, WA2YYM 44, WB2EKM 40, K2OUA 37, K2HNW 22, WA2CJY 18, WB2AJD 17, WA2EHV 10, WA2PAU 9, W2DW 4, WB2GOJ 4, WA2CNE 3. (Jan.) W2IT 104, WB2QOH 57.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, Wb2WFJ. SEC: K2HTX. RM: WB2LZN. PAM: WA2ECO. The following are major AREC/RACES Nets. Join one, please.

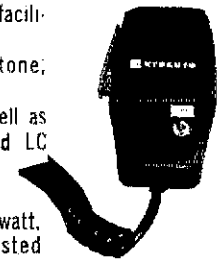
Bronx	28.64 MHz	50.35 MHz	146.88 fm
Kings	28.64 MHz	50.35	146.88 fm
Richmond			146.88 fm
New York	29.5		146.88 fm
Queens	29.5 MHz	50.52 MHz	145.62 am/fm
Nassau	28.72 MHz		145.68 am
W. Suffolk	28.73 MHz (Hunt.)		145.59 am
	28.65 MHz (Smith)		147.21 fm
	28.61 MHz (Babylon)		146.94 fm

NEW!
FM144-10SXRII

All Solid State-PLL digital synthesized — No Crystals to buy! 5KHz steps — 144–149 MHz-LED digital readout PLUS MARS-CAP.*

• 5MHz Band Coverage — 1000 Channels (instead of the usual 2MHz to 4MHz — 400 to 800 Channels) • Priority Channel • Audio Output 4 Watts • 15 Watts Output • Unequaled Receiver Sensitivity and Selectivity — 15 POLE FILTER, MONOLITHIC CRYSTAL FILTER AND AUTOMATIC TUNED RECEIVER FRONT END — COMPARE!! • Superb Engineering and Superior Commercial Avionics Grade Quality and Construction Second to None at ANY PRICE.

- **FREQUENCY RANGE:** Receive: 144.00 to 148.995 MHz, 5KHz steps (1000 channels). Transmit 144.00 to 148.995 MHz, 5KHz steps (1000 channels) + MARS-CAP.*
- **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. **15 pole filter** as well as monolithic crystal filter and **automatic tuned** LC circuits provide superior skirt selectivity.
- **AUDIO OUTPUT: 4 WATTS.** Built in speaker.
- **HIGH/LOW POWER OUTPUT:** 15 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 watt and 15 watts, fully protected — short or open SWR.
- **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: 2¼ x 6½ x 7½. All cords, plugs, fuses, mobile mount, microphone hanger, etc., included. Weight: 5 lbs.



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Same specifications as above except transmit/receive: 51.00-53.995 MHz, 600 channels
Introductory Price $389.00

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VALUE $599.00
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NEW!
TONE ENCODER/ DECODER
SC-12A ... 12 CHANNELS ... DUAL TONE
Introductory Price $119.00

Touch-Tone Pad
MODEL FMTP-1
... $59.00

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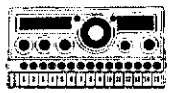
NEW!
FMSC-2 SCANNER
FOR KDK FM-144



14 CHANNEL PROGRAMABLE
INTRODUCTORY PRICE **$99**

NEW! 7400 SCANNER

FOR KENWOOD TR-7400A

14 CHANNEL PROGRAMABLE
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***NEW**

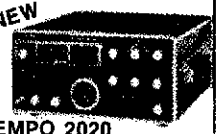
$39.95

NEW!! ADD 5 CHANS (TOTAL 10) TO SRC-146A

- Simple 10 min. installation
- Same color and quality as SRC-146A
- Completely WIRED & TESTED
- ALSO usable with most other hand holds **$39.95**

ATLAS, COLLINS, REGENCY, DENTRON, BRIMSTONE, CUSH-CRAFT, BIRD, STANDARD, KLM, HYGAIN, KENWOOD, TEMPO, MINI-PRODUCTS, MIDLAND, VHF MARINE, EIMAC, ICOM, AMMCOM, CIR, ETC. — PLEASE WRITE FOR QUOTE.

***NEW**



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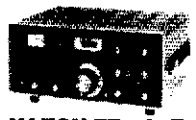
NEW!! TOUCH-TONE PAD COMPLETELY WIRED & READY TO PLUG IN $69.00
COMPLETE BACK ASSEMBLY



YAESU FT-101E TRANSCEIVER'S

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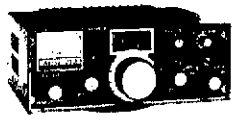

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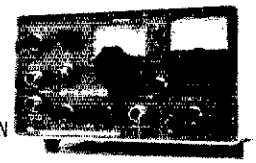
NEW AM/FM ANALYZER

SIGMA AF-250L



- INTRODUCTORY PRICE **$199**
- DEVIATION/MODULATION METER - FM: 0-20 KHz, AM: 0-100%.
- SIZE: 5½"(h) x 10¼"(w) x 7¼"(d). WEIGHT: 7 lbs.
- FREQUENCY: 1.8MHz-520MHz

ALSO MODEL AF-250LW WITH BUILT IN 125 WATT CALIBRATED WATT METER AND DUMMY LOAD. PRICE **$259**
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FOR KDK FM 144

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- FULL SCAN 146 and 147 MHz CONSECUTIVELY OR 1 MHz, OR ANY MHz RANGE. SCAN RATE 1 MHz/2 SECONDS (ADJUSTABLE)
- CONTROLS: SCAN/HOLD, LATCH/DELAY, 600 KHz OFFSET (OFF, UP, DOWN), PROGRAM/1 MHz - SIMPLE INSTALLATION

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NEW 2 METER FM TRANSCEIVERS
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SPECIAL SALE!

• SRC-146A	$298.00
• 4 XTALS: 34/94 AND 94/94	N/C
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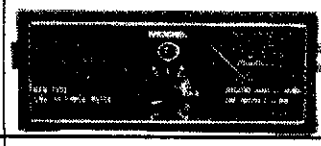
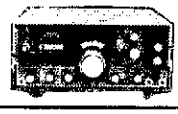
CAL. PWR SCALES 200W/2000W

- FREQ RANGE 3.5 - 150 MHz
- PLEASE DO NOT CONFUSE THE RF-2000 WITH SIMILAR APPEARING LOWER PRICED UNITS — RF-2000 IS AN INDIVIDUALLY CALIBRATED PROFESSIONAL QUALITY INSTRUMENT — UNEQUALED AT MANY TIMES THE PRICE.

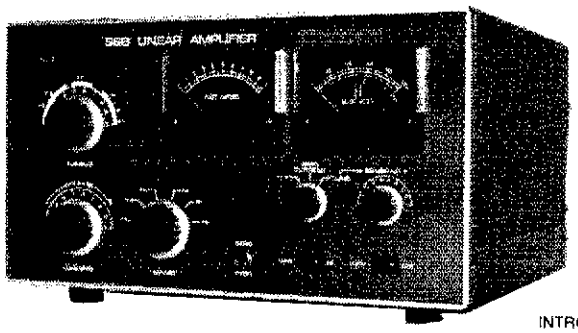


SIZE: 2"(w) x 2½"(h) x 2½"(d).

ATLAS
210X-215X AND 350-XL



NEW!



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2 DAY AIR SHIPMENT ANYWHERE IN U.S. $35. ALASKA AND HAWAII SLIGHTLY HIGHER

- FULL BAND COVERAGE 160-10 METERS INCLUDING MARS.
- 2000+ WATTS P.E.P. SSB INPUT. 1000 WATTS INPUT CONTINUOUS DUTY, CW, RTTY AND SSTV.
- TWO EIMAC 3-500Z CONSERVATIVELY RATED FINALS.
- ALL MAJOR HV AND OTHER CIRCUIT COMPONENTS MOUNTED ON SINGLE G-10 GLASS PLUG IN BOARD. HAVE A SERVICE PROBLEM? (VERY UNLIKELY) JUST UNPLUG BOARD AND SEND TO US.
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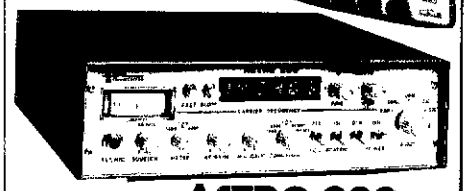

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SC-12A	Audible Tone Encoder Decoder	$119
FMSC-1	Scanner — Random, Any Range	$169
FMSC-2	Scanner — Programable, 14 Channels	$99
MARS-CAP*	Option Kit — Any Frequency, Any Split	$12
FMOF-1	Offset Option Kit — 2 Extra Positions, Crystals Required	$19
FMOF-2	±1 MHz Offset Option Kit (No Crystals To Buy)	$19
FMTE-1	Sub Audible Tone (100 Hz — Adjustable 67-203 Hz)	$29
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Service Manual		$2.00
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BANKAMERICARD — master charge

	28.65 MHz (Islip)	
E. Suffolk		146.82 fm
	Brookhaven	16/76 fm
	Riverhead	3730 kHz (c

Note: Net times between 2000 and 2100 local, Mon
Officers for Middle County ARC (Brookhaven Twp
are WB2FEB, pres.; WB2ADF, vice-pres.; WA2TRH
treas.; K2KD, secy.; WA2KKJ, act. mgr. WA2ECO i
now with a TS520. W2EC made BPL with ar
outstanding traffic total. WA2YEI now has ar
HA800B rcvr and HW7 for his shack. W2GKZ finishec
his HW2036 with good results. Congratulations to
WA2BMI who passed the Advanced. Welcome to new
clubs in the area, Quisqueya RC and St. Johns Univ
RC, for info on Quisqueya RC, contact Julio R. Brea
HI8JRB/2, 540 W. 163 St., Apt. 21, NY, NY 10032
Wantagh RC had FB turnout for their Novice classes
Officers for the Kings County RC are WA2UMY, pres.
WA2BJJ, vice-pres.; WA2NDA, treas.; WB2CDQ, secy
Hall of Science ARC is getting up construction o
equipt., classes again. WB2FHN reports that severa
clubs in Eastern Suffolk are offering Novice Courses
he also reports The Shelter Is. ARC now boasts 3
members, Bob also needs AK for WAS. New ham i
the College Point Area is WA2IVW. Officers fo
Citibank ARC are WA2ROD, pres.; WB2PHT, vice
pres.; WA2GXQ, secy-treas. W1ICP addressed the L.I
Chapter of QCWA at its Dec. meeting, also present wa
W2HD. Chapt. officers are W2JGR, chmn.; W2UAL
vice-chmn.; W2NKC, secy.; W2HVU, treas. The L
QCWA Net meets every Sun. at 11:00 AM on 391
kHz. TU-BORO officers are W2YSM, pres.; WA2MXB
vice-pres.; WB2UDD, secy.; W2VZQ, treas. Traffic
(Feb.) W2EC 998, WB2LZN 315, WA2ECO 274
W2HXT 222, W2GLE 137, WA2BMI 134, W2LYH
106, W2MLC 97, W2GKZ 40, W2DBQ 36, WB2SJC
28, K2GCE 24, WA2YEI 21, K2JFE 6. (Jan.
WA2WKH 545, WA2BRF 209, WB2SJG 37.

NORTHERN NEW JERSEY: SCM, Louis J
Amoroso, W2ZZ —

Net — Freq. Manager	Time(PM)/Days	Sess.	QNI	QSP
NJN — 3695 WB2CST	7:00 Dy	28	386	202
NJN — 3695 WB2CST	10:00 Dy	28	155	37
NJSN — 3730 WA2WIW	8:15 Dy	25	103	63
NJPN — 3950 WA2SLF	6:00 Dy	28	484	261
NJPN — 3950 WA2SLF	8:00 A Su	4	18	20
PVTN — 145.7 WA2OPY	8:00 Dy			

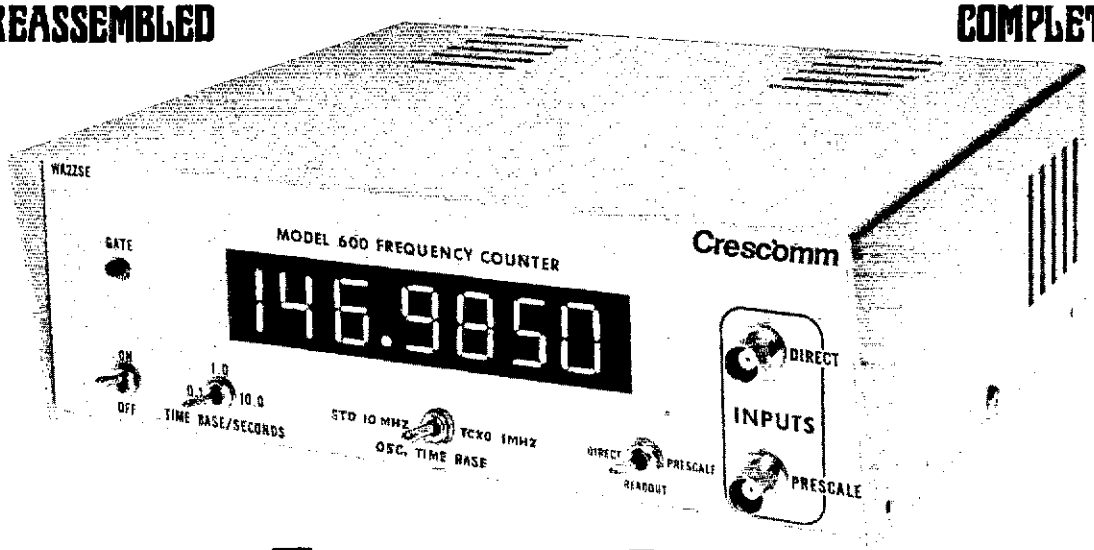
SEC: WB2PBO. PAMs: WA2SLF and WA2OPY (VHF). RMs: WA2WJW and WB2CST. New hams i
our sections include WA2KJP of Little Falls, WB2KEH
Prospect Park and WB2KQE Tenafly. Welcome to al
and hope to hear from you soon. WA2DIW reporte
his fall class resulted in 8 new licensed hams. Th
Sussex County Novice class recently graduated 1
students. WB2VTT reports that they have 4 student
and two teaches at the Redshore School Novice clas
in New Brunswick. Congratulations to the above
groups for the fine work they are doing. WA2KFE i
running a net that meets daily on 21.4 MHz at 0000Z
WA2RYD is again back in NJ. We regret to note th
passing of two Tri-County Radio Assn. members
W2FNK and W2CDA. They will be missed by thei
many friends. WB2RJJ has a new 70-ft. crankup
tower. WA2ZQH won his Tower Court Case in Gle
Rock. Oscar DXCC totals are Nr. 62 for W2RS and Nr
76 for W2LV. WA2GMO new Advanced. WA2UQC
continues to build his antenna farm with a bobtai
curtain on 40 and a shunt fed tower on 80. K2CYX
has a new inverted Vee up for 75 mtrs for traffi
work. WB2YJQ back on the air with a TS-820. Ou
Director K2SJO, Vice-Director W2IHA and your SCM
all spoke at a recent meeting of the Old Barney Radi
Club. This group is available to all clubs in the NN
section. See page 8 for the list of QTHs. The Mayor o
Englewood has proclaimed the week of June 19 t
June 25 as Englewood Amateur Radio Assn. Week
Traffic: (Feb.) WB2ASD 372, WA2BAW 330
WB2CST 93, W2SWE 93, W2CU 91, WA2AYY 67
WB2RMK 62, W2ZEP 59, WA2NPP 58, W2CC 52
WB2DFO 48, WB2VTT 44, WA2DIW 40, WA2KFI
40, WA2RYD 40, WA2CAK 37, WA2FIB 3
WA2SLF 37, WA2WXM 29, K2CYX 28, WB2HSQ 22
K2ZFI 22, W2ZZ 21, WA2UOO 15, WB2PBO 10
W2WOJ 10, W2CVW 8, K2AM 6. (Jan.) W2ODV 45
WA2FUI 16, K2AM 9, WB2RJJ 9.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — Iowa's younges
known Novices are WBØZRS age 7, and WBØZRL, ag
10. They are brothers, and their proud Pop is KØPN
KØGFU scheduled four showings of "Moving Up" fil
plus a TV spot. WØPEX is veep of KTIV-T
WAØDAG and WØGN enrolled at I.S.U. KØEGA ass
EC for Linn County and will have ST-6 assemble
soon. WBØUJE and WØMOQ moving to W6-Lan
Cedar Valley new officers: WØHUP, pres.; WØNMU
veep.; WBØFNM, treas.; WØGGO, secy. KØQV
WØPZK WAØFYG KØCKX KØYHO WØCQC KØEG
WBØHBP and WBØBPH active Army MARS in
Central IA. Prairie Dog ARC new officers: WBØEV
pres.; WAØARZ, veep.; WBØMVX, secy-treas. Slou
City welcomes WBØWJF WBØWPG WBØWW
WBØYHO WBØYNQ WBØYNX WBØYNY an
WBØYOA. New in Mapleton is WBØYNV an
WBØYNZ. WBØWZN is new in Vermillion, WBØYO
in Blencoe, WBØYRQ in Hawarden, WBØZFC
Akron, and WBØURW in West Liberty. WAØVBX ha
new antenna farm for storm watch. KØUJJ is no
KØCF. KØGXR is KØMM and has 23 prospecti
Novices in Clinton. Mt. Ayr welcomes WBØZR
WBØZRN WBØZRO WBØZRP WBØZRQ an
WBØZRR. Happy May Day, Ia. 75M 3970 kHz 1730
QNI 1565, QTC 128, WAØVZH Mgr. 2300Z QN
1156, QTC 75, WAØQNB Mgr. Tall Corn 3560 kH
2330/0300Z Dy QNI 337, QTC 127, sess. 55, KØEV
mgr. Traffic: (Feb.) WAØAUX 581, KØEVH 20
WØYLS 134, WØSS 96, WØUPX 56, WØOMV 3
WØJPJ 28, WBØAVW 27, WBØPYD 23, WØLFF 1
WØLJW 18, WØBQJ 12, WØBX 4, WBØENL 4, WØIK
4. (Jan.) WBØPYD 36.

KANSAS: SCM, Robert M. Summers, KØBXF — SE
WØKL. RM: KØMRI. PAMs: WAØSEV WBØBCL. N
Mgr. WØRFF for the QKS-SS net (Slow speed CW
would like to encourage a few more experienced han

PREASSEMBLED **COMPLETE KIT**



Crescomm Frequency Counters Features:

1 High Sensitivity VHF pre-scaler (built-in). 100mv RMS @ 50Ω @ 300MHZ. Frequency range DC through 600MHZ Model 600.

2 Excellent temperature compensation crystal controlled time base, yielding ±1 part/ 10^6 stability per hour after 10 min warm-up, ± 10PPM worst case, from 0^o to + 55^oC!, at 100Hz @ 450MHZ is attainable, typically if calibrated to WWVL. This is approximately 2 parts in 10^7!

3 7 digit display, resolution 100Hz with 10m Sec. gate interval, pre-scaled! 10Hz resolution with 1 Sec. pre-scaled, 1Hz resolution with 10 Sec. gate interval pre-scaled!

4 Built-in 5VDC regulator; input to 3-terminal regulator is accessible for use with 12VDC out-board PS. You can use this counter mobile.

5 Easy 6 hour assembly; all circuit broad tracks are pre-tinned, have drilled holes and are plated through! All I.C. sockets included - Makes trouble shooting a breeze.

6 Cabinet, plexy window and all necessary components included for easy, trouble-free assembly.

7 90-Day full coverage warranty.

Optional accessories TCXO time base yielding ½ PPM stability. $79.95

Optional 10 Sec. time gate resolution to 1Hz. $15.00. (Free with purchase of above TCXO)

Optional 12VDC power recepticle and cord assembly $15.00 (on preassembled counter only)

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Complete kit or preassembled, burned in, and environmental chamber tested unit available for the commercial shop or modern ham shack.

KIT Model 600K 179.00 ea. PREASSEMBLED & TESTED Model 600 AT 249.00

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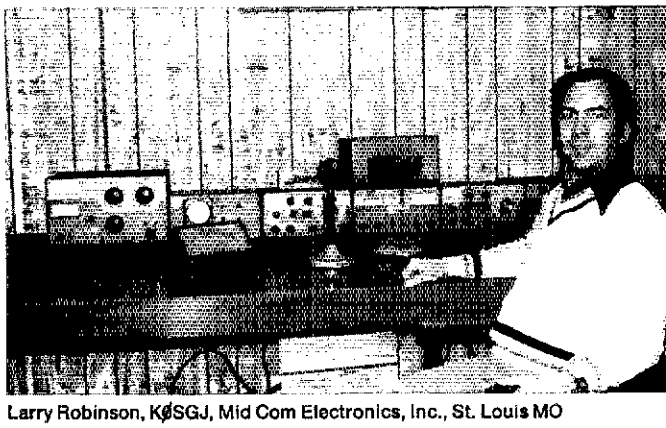
Mark Franklin, WBØANT, Electronic Center, Minneapolis MN

George Dominick, W4UWC, Bondurant Bros. Co., Knoxville TN



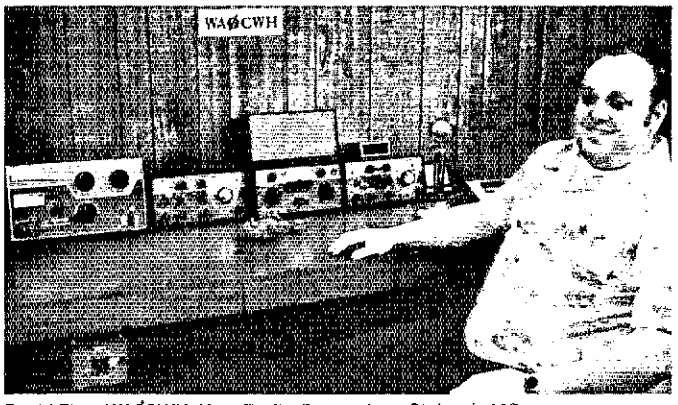
Larry Robinson, KØSGJ, Mid Com Electronics, Inc., St. Louis MO

These photographs are worth 13,000 words...

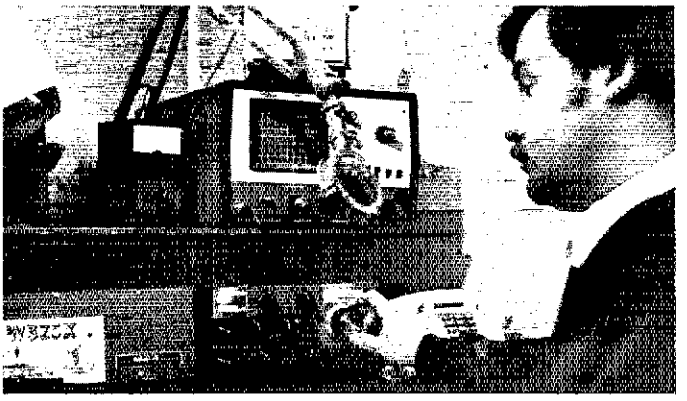
DRAKE

equipment available today, have you ever wondered

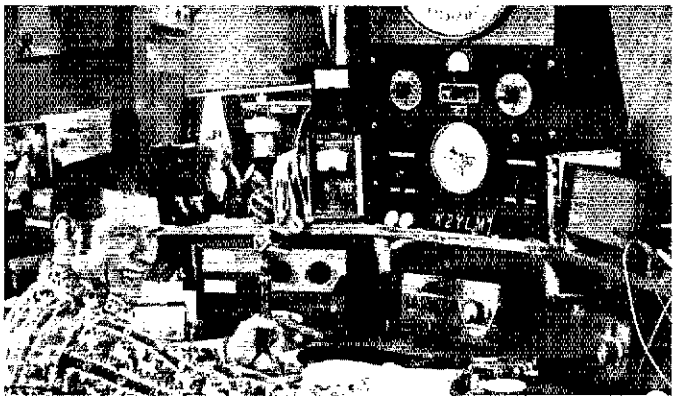
Dealer uses at home—



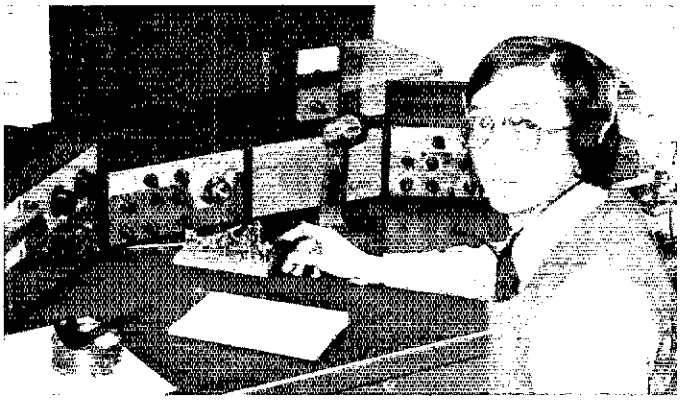
David Fine, WAØCWH, Ham Radio Center, Inc., St. Louis MO



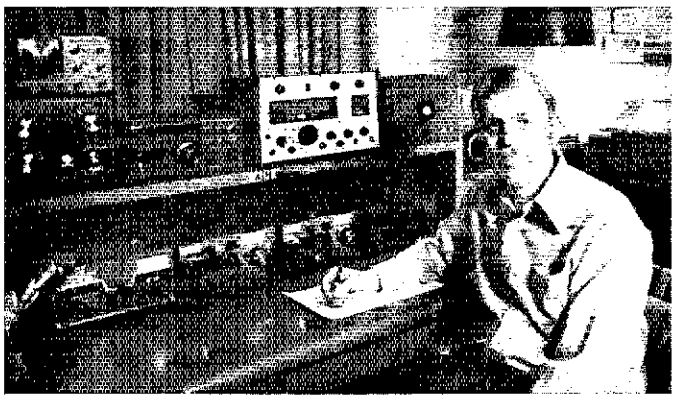
Tom Softley, W3ZSX, The Comm Center, Inc., Laurel MD



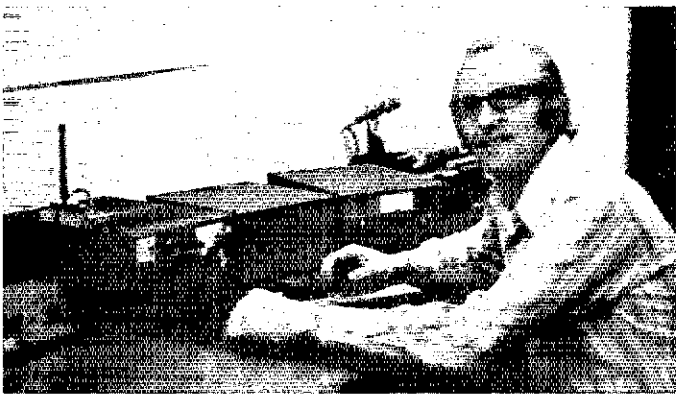
Earl Smith, K2YLM, Atkinson & Smith, Inc., Eatontown NJ



Ed Cobb, K4YFR, Priest Electronics, Inc., Norfolk VA



Gordon Kittel, W3GK, Electronic Exchange, Souderton PA



Ross Hansen, WB7BYZ, Ross Distributing Co., Preston ID

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NOW FROM Wilson:

AMATEUR: ANTENNAS • ROTORS • TOWERS

3 CRANK-UP TOWER MODELS AVAILABLE

TT-45 FREESTANDING CRANK-UP TOWER, 45 Ft.
The TT-45 will support 9 sq. ft. at a height of 39 ft. freestanding when properly bracketed to a house or wall at the 8 ft. level. The loads decrease as the tower extension Mast is lengthened. (Loads are based at 78 mph and load permitted on the tower decreases with increases in wind speed over 78 mph). The tower can be completely freestanding with our new concrete or tower rotating bases, which allow the use of our raising fixture. Using these accessories, the towers can be installed by one man easily.

List . . . **$345.00**

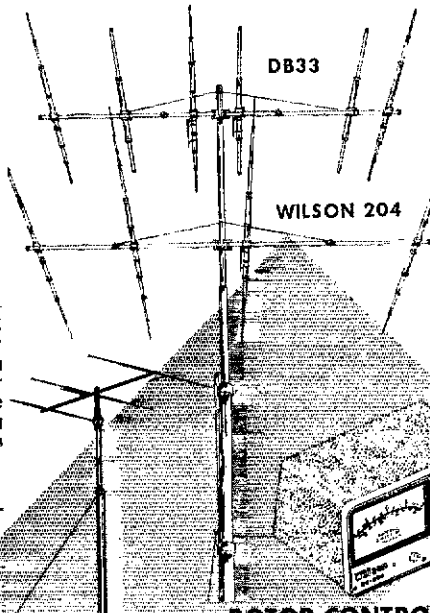
FOR THE TOWERING SIGNAL - WILSON'S SST-64 GUYED CRANK-UP TOWER, 64 Ft.
All steel tubing is galvanized, plated and conforms to ASTM specifications for years of maintenance free service. The SST-64 is made of 4 sections, being 4.5", 3.5", 2.5" and 2". These large diameters give unexcelled strength and virtually makes the thin push-up poles a thing of the past. The large loads of today's antennas make the Wilson SST-64 the best value on the market today.

List . . . **$421.00**

THE WILSON GT-46 GUYED CRANK-UP TOWER, 46 Ft.
The GT-46 features quality construction and materials, with the stability of the Guyed System.

FEATURES OF THE GT-46:
• Low cost • High capacity • all steel, conforms to ASTM (American Standard of Testing Materials) • Fully galvanized • 800 lb. winch standard • Guy kits available for factory recommended installations • 2000 lb. raising cable standard (Aircraft Quality) • Can be roof mounted for extra height • Great looking, slim flag pole design, for the ecology minded.

List . . . **$249.00**



ROTOR CONTROL BOX

SST-64 CRANK-UP TOWER

WR 500 ROTOR

WR 1000 ROTOR

AMATEUR ANTENNAS

The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom plus a Gamma Match (no balun required) make for high performance on CW & phone across the entire 20 meter band. The 204 Monobander is built rugged at the high stress points. Using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading.

The DB33 is the newest addition to the Wilson line of antennas. Designed for the amateur who wants a lightweight economical antenna package, the DB33 compliments the M204 for an excellent DXers combination.

All Wilson Monoband and Duoband beams have the following common features:
- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- 2" or 3" Aluminum Booms
- Adjustable 52 Ω Gamma Match
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

WR 1000 ROTOR

The Rotor everyone has been waiting years for — capable of the largest arrays up to 40 sq. ft.—Superior to prop pitches — Full 4,000 inch lbs. of turning torque. Braking system requires 12,000 inch lbs. before over-riding — accepts 2" - 3" masts — Weighs 60 lbs. — Size: 11" diameter, 19" high.

The Finest Rotor in the Market Today
WR 1000 . . . . . $459.00 List

WR 500 ROTOR

The Wilson WR500 Rotor has 860 inch lbs. of turning torque before stalling.

In addition, a Special Braking System requires 1300 inch lbs. of torque before windmilling—This is more than twice the braking ability of the other comparable rotor being marketed.

Full 96 Steel Ball Bearing raceway assures elimination of side torque jamming when Rotor is mounted in line with the mast.

Recommended for antennas of 6.5 sq. ft. or less . . . weighs 20 lbs.

The WR500 Rotor . . $139.95 List

Coming Soon: The New Wilson WR750 Rotor!!!

WILSON AMATEUR ANTENNA SPECIFICATIONS

Model No.	Frequency	Boom Length (ft.)	Number Elements	Longest Element (ft.)	Turning Radius (ft.)	Element Area (sq. ft.)	Wind Loading at 80 MPH (lbs.)	Assembled Weight (lbs.)	Shipping Weight (lbs.)	Price
M340	40	46	3	70'0"	39'0"	15	300	180	220	$745.00
M520	20	52	5	35'6"	32'0"	10.5	210	98	123	420.00
M520	20	40	5	35'4"	27'0"	8.75	175	74	98	295.00
M204	20	26	4	36'4"	22'6"	6.5	135	52	68	189.00
M203	20	18	3	36'0"	20'5"	5.25	105	35	40	129.00
M156	15	26	6	24'3"	18'0"	8.0	160	41	44	159.00
M154	15	17	4	24'2"	15'8"	6.0	80	30	33	109.00
M153	15	17	3	24'2"	14'0"	3.0	60	21	24	89.00
M108	10	40	6	18'0"	22'0"	5.5	110	49	77	219.00
M106	10	31	6	18'2"	18'1"	4.0	80	34	38	119.00
M105	10	26	5	18'0"	15'3"	3.0	60	29	32	109.00
M103	10	11.5	3	18'0"	10'0"	2.0	40	10	12	39.00
DB54	20	40	5	38'4"	27'0"	12.75	255	94	119	349.00
	15		4	24'3"						
DB43	15	19	4	24'3"	15'8"	6.0	120	36	43	149.00
	10		3	18'0"						
DB33	15	17	4	24'2"	12'2"	4.5	90	30	33	109.00
	10		3	18'0"						

AVAILABLE THRU YOUR LOCAL DEALER

FOR THE NAME OF YOUR NEAREST AMATEUR DEALER — *OR FOR A FREE CATALOG OF THE ABOVE PRODUCTS, CONTACT:*

Wilson Electronics Corp.

Prices Effective May 1, 1977

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ABOUT A Wilson RADIO . . .

WE-800
2 METER PORTABLE SYNTHESIZED RADIO
$399.00 LIST

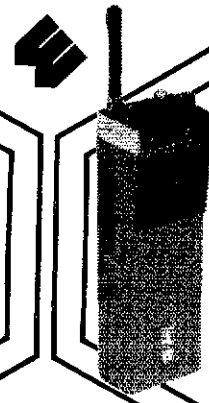
. . . we're known by the thousands who use us!!!

SPECS. 1405SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 25 MA TX 400 MA (lw) 900 MA (5W)
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency 52/52 installed.

ACCESSORIES:

- Battery Chargers
- Touch Pads
- Tone Options
- Speaker Mics
- Leather Cases
- Mobile Amplifier and Battery Charger



1402SM
HAND HELD
2.5 WATT
TRANSCEIVER
144-148 MHz
$192.95 LIST

SPECS. 2202SM

FREQUENCY RANGE 220-225 MHz
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 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
- Current Drain: RX 25 MA, TX 400 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency 223.50 MHz installed
- Uses the same accessories as 1405.

$259.95 2202SM

1405SM
5 WATT
TRANSCEIVER
144-148 MHz
$259.95

Wilson 2 meter Hand-Held radios . . . The dependable ones . . . proven performance for the discriminating Ham who insists on quality and value.

Two models are available: the 2.5 watt model 1402SM, and the switchable 1 watt or 5 watt model 1405SM . . . options include Touch-Tone Pad, Battery Charger, Battery Packs Speaker Mike, Leather Case, and Tone Options.

Join the thousands of amateurs now using Wilson . . . the radio that goes where you do.

1402 SPECS

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- S-Meter/Battery Indicator
- Size: 8 7/8 x 1 7/8 x 2 7/8
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain RX 25 MA TX 500 MA
- Microswitch Speaker Mic
- High Impact Plastic Case

4502SM SPECS.

FREQUENCY RANGE 420-450 MHz
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 21.4 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 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 25 MA, TX 500 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency installed, 446.00 MHz
- Uses same accessories as 1405.

$324.95

WILSON ALSO HAS DYNAMITE LINES OF ANTENNAS, CRANK-UP TOWERS, AND ROTORS . . .

MORE ABOUT THE WE-800:

Wilson's New Portable 800 Channel 2 Meter Synthesized Radio that can go anywhere with you • Switchable 1 and 12 watt output • 1 watt output with internal Ni-cad battery pack (takes regular 10 "AA" Ni-cads) • Low current drain CMOS synthesizer: Rx45 MA, TX 350 MA at 1 watt • 12 watt output mobile • Covers frequency range 144-148 MHz in 5 kHz steps, 600 kHz off-set up or down • Two positions available for other than 600 kHz off-set • Five pre-set channels • On-off switch control for meter light in rear for power saving use • Size 8-1/4" x 6-3/4" x 1-7/8" • Weight 1 lb. 5 oz.

Prices effective May 1, 1977 and are subject to change without notice.

ALL WILSON HAND-HELD RADIOS FEATURE:

- Performance
- Dependability
- Rugged Construction
- Versatility

FOR ADDITIONAL LITERATURE, CONTACT YOUR NEAREST AMATEUR DEALER OR:

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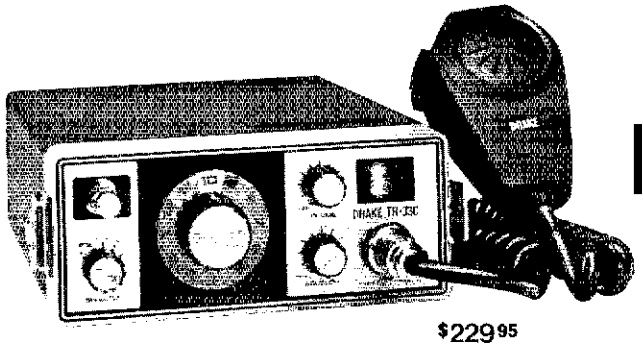
The DRAKE TR-33C



Amateur VHF FM Transceiver

$229.95

- **Hand Held Convenience, 12 Channel Capability**
- **SCPC** *(Single Crystal Per Channel)* **Frequency Control**
- **Lower Receiver Battery Drain**
- **Expanded Portable Antenna Choice**

• 12 Channels—only one crystal per channel provides simplex OR repeater operation on ANY channel. 2 channels supplied. 5 transmit offset positions, 3 supplied. • All FET front-end crystal filter for superb receiver intermod rejection. • Small convenient microphone included. • New lower power drain circuit on squelched receive. • Nicad rechargeable batteries supplied. • Built-in battery charger. • Ac and dc power cords supplied. • Telescoping screw-on antenna supplied, rubber helix optional. • Channel indicator light when using external dc supply. • Carry strap supplied. • Meter Indicates receive strength, xmit output, or battery voltage. • External speaker jack on rear panel. • Auxiliary jack on rear panel—may be used for tone-pad connections, etc. • Traditional R.L. Drake service backup.

DRAKE TR-33C SPECIFICATIONS

GENERAL: • **Frequency Coverage:** 146-148 MHz, 12 channels (2 supplied: 146.52 and 146.94). Crystal determines receive frequency. • Transmit frequency offset for repeater operation determined by 5-position switch: Simplex, +600 kHz, and −600 kHz supplied; any two additional offsets available with accessory crystals. • **Power requirements:** 13.0 volts dc ± 15% external supply OR internal battery supply. • **Current Drain (Batteries):** Squelched receive: 30 mA; transmit: 400 mA. External supply: above plus 45 mA for channel switch indicator lamp. • **Antenna:** 50 ohm external antenna through SO-239 connector OR screw-on telescoping whip antenna supplied, may be replaced with rubber helix antenna. • **Dimensions:** 5.5" x 2.8" x 8.5" (13.8 x 5.8 x 21.6 cm). • **Weight:** 4.4 lbs (2 kg).

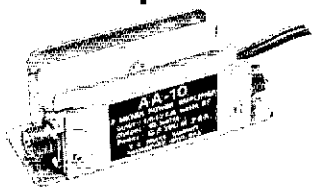
RECEIVER: • **Sensitivity:** less than .5 μV for 20 dB noise quieting. • **Selectivity:** + 30 kHz adjacent channel rejection greater than 75 dB. • **Modulation acceptance:** at least ± 7 kHz. • **Inter modulation Rejection:** 70 dB referenced to sensitity level. • **First i-f:** 10.7 MHz with monolithic crystal filter. • **Second i-f:** 455 kHz with ceramic filter. • **Audio Output:** nominal 1 watt at less than 10% distortion into 8 ohm built-in speaker or external speaker.

TRANSMITTER: • **Rf Output Power:** 1.5 watts minimum with 13.0 volts dc supply. • **Frequency Deviation:** Direct frequency modulation adjustable to at least ± 7 kHz deviation, factory set at ± 5 kHz • Separate microphone gain and deviation adjustments • Drake 1525EM Push Button Encoding Mike can be used direct with no modification.

DRAKE TR-33C ACCESSORIES

Drake AA-10 Power Amplifier

10 dB power increase greatly adds to the transmitting distance covered by any 2-meter fm transceiver running up to 1.8 watts output



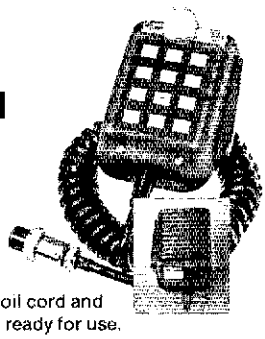
Small size: 2"H x 2.1"W x 5.5"D (51 x 52 x 140 mm)

Drake AC-10 Power Supply

Powers the AA-10, TR-22C, TR-33C and TR-72. Simultaneously can charge the TR-22C/33C nicads. Supplies 13.8 volts up to 3 amps from 120 V-ac 60 Hz input. • **Accessory Crystals.** • **Model No. 1333 Drake MMK-33 Mobile Mount.**

- **Model AA-10 Power Amplifier ..... $49.95 ea.**
- **Model AC-10 Power Supply ..... 49.95 ea.**
- **Accessory Crystals ..... 6.30 ea.**
- **Model MMK-33 Mobile Mount ..... 12.95 ea.**
- **Model 7079 Vinyl Carrying Case ..... 9.95 ea.**

Drake 1525EM Push Button Encoding Mike



- Microphone and auto-patch encoder in single convenient package with coil cord and connector. Fully wired and ready for use.
- High accuracy IC tone generator, no frequency adjustments.
- High reliability Digitran® keyboard.
- Power for tone encoder obtained from transceiver through microphone cable. No battery required. Low current drain.
- Low output impedance allows use with almost all transceivers.
- Four pin microphone plug; directly connects to Drake TR-33C without any modification in transceiver. Compatible with all previous Drake and other 2 meter units with minor modifications.

Drake 1525EM, microphone with tone encoder — **$49.95**
Drake 7073DM without tone encoder — **$19.00**

All prices (suggested amateur net) and specifications subject to change without notice.

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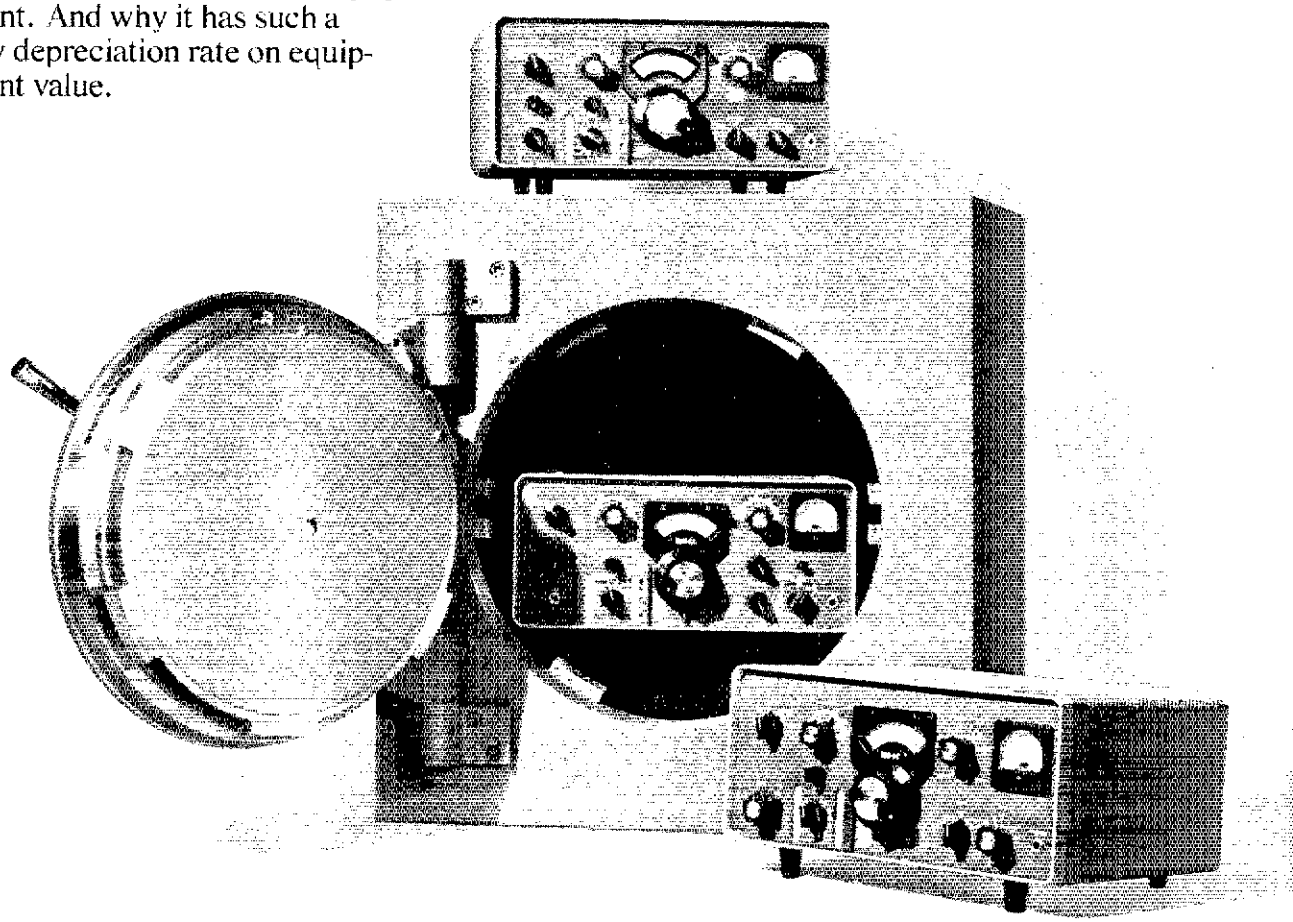
And here it is.

Rockwell International

...where science gets down to business



to drop by the 3735 kHz freq. at 6:30 PM daily and give a helping hand to the group trying to learn what traffic is all about. Liaison from the net back to QKS is most important so that the proper channel of traffic is adhered to as far as the NTS is concerned. KS does send a Rep. each night to the Tenth Region Net. SET 1977 is over and should be all discussed by the time you read this. If you did not participate due to an unknown factor of some sort — like who is my EC? Then perhaps now is the time to start finding out before a real emergency does arise and the situation demanding proficient operating is upon us. Perhaps you can be the key person to spur the activity needed in your AREC Zone. Net reports for Feb. KSBN 28 sessions, QNI 1002, QTC 198. KPN 8 sessions, QNI 213, QTC 14. KWN Net 28 sessions, QNI 754, QTC 256. QKS-SS 22 sessions, QNI 75, QTC 31. QKS 56 sessions, QNI 565, QTC 222. W@KL still needs to hear from ECs each month. WA@HRG moving to OR. Lots of new 2 letter calls appearing. As soon as, and if you get one, be sure and do drop a line to the SCM so we can put an update on Who is Who one month real soon. Any one interested in co-ordination of the VHF activity especially as it pertains to traffic handling? Traffic: (Feb.) WA2VEN/@ 272, W@FIR 246, W@OYH 100, W@AM 98, W@HI 92, W@RFF 92, WB@LKA 82, W@CHJ 81, WA@LBB 66, K@MRI 65, K@BXF 59, N@IN 58, K@BWI 43, WB@LUN 38, WA@SEV 34, WB@PWF 29, WB@VEZ 24, WA4HRG/@ 17, WB@BIY 15, W@FCL 15, WB@KDE 13, W@FDJ 12, WA@KVP 12, W@KL 11, W@RBO 11, WA@OWH 7, WA@TRO 7, W@PB 6, K@FPC 4, WB@OQX 2. (Jan.) K@FPC 64. (Dec.) K@FPC 16.

MISSOURI: SCM, L. G. Wilson, K@RWL — Asst. SCM, Joe Flowers, W@OTF. SEC: WB@DBW. Congratulations to WB@ZLL through WB@ZLQ, WB@ZNW through WB@ZNZ and WB@ZOA on passing Novice and to WB@TIL and WB@UZJ on passing General. Congratulations to WB@MEO on obtaining a 25-wpm sticker and congratulations to WB@NXX and WA@QEY on passing Extra. Finally, congratulations to WB@TIL who earned his '76 WAS award as a Novice. Currently there are 55 attending Novice class at the PHD Club. The new Lebanon ARC officers are WB@RHC, pres.; K@DZD, vice-pres.; WB@KEI, secy-treas.

Net	QNI	QTC	Net	QNI	QTC
MSN	198	247	MON 2	72	28
HBN	286	36	MON	153	114
SCEN	81	5	MOSSBN	985	188
PHD	39	8			

I am happy to report that W@SIV and WA@FCR are both home from the hospital and doing fine and hope that W@BV, who has been under the weather will soon be feeling fit. WB@MSY and WB@NIE have moved from Springfield to their new home in Jefferson City, while W@PM has been promoted from Jefferson City to Springfield as District Engineer with the MOSHP. Traffic: K@ONK 854, WB@SND 257, WB@LFY 129, W@OTF 100, WB@MEO 88, WB@NXX 86, WB@END 73, WA@FKD 56, W@OUD 59, K@CW 47, K@RWL 47, WA@FMD 39, WA@CIU 35, W@BVL 34, WB@FKY 27, WB@LMW 22, W@OQD 18, W@EPI 15, WA@LCV 10, K@AHL 8, WB@NPC 7, WA@MOF 6, WA@EMX 3, W@QAU 2.

NEBRASKA: SCM, Claire Richard Dyas, W@JCP — Asst. SCMs: WB@GWR & WA@GHZ. SEC: WA@ASM. Plans are in progress for the July Victoria Springs HAMFEST, plan to attend. W@DMY is a Silent Key.

Net — Freq.	GMT/Dy	QNI	QTC	Manager
NSN — 3982	0030Z Dy	993	32	WA@LOY
NMN — 3982	1330Z Dy	1069	26	WB@GWR
WNN Wx — 3950	1400Z M-S	499	55	W@NIK
AREC — 3980	1430Z Su	166	1	W@IRZ
CHN — 3980	1830Z Dy	1275	203	WA@GHZ
Sandhills WX — 3950	1930Z M-S	386	18	WB@JWQ
PM — 3978	2100Z M-F	286	33	WA@AUX
QCWA — 3980	1500Z-S	63		W@FQB
160 M — 1995 & Neb. 2 Mtr — 16/76	0130Z Dy	293	155	WA@CBJ
	0300Z M-F	480	15	K@GND

Traffic: W@VEA 112, WA@CBJ 58, WB@YSG 39, K@BRS 36, W@VYX 34, WB@EVS 26, W@GEQ 24, W@HOP 21, WB@JWQ 19, W@YFR 17, W@CSW 16, WB@GMQ 16, W@MW 14, WA@GEX 14, W@JCP 12, W@FQB 10, WA@LOY 9, W@ZNI 6, WA@GHZ 5, WA@PCC 4, W@RJA 4, W@ATU 3, WA@EEI 3, W@HNT 2, W@NIK 2, W@IXB 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W2GVT — SEC: W1DGL. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

Net — Freq.	Time/Days	Sess.	QNI	QTC
CN — 3640	1900/2200 Dy			
CPN — 3965	1800 M-S	28	433	210
	1000 Su			
VHF-2 — 28/88	2130 Dy	28	332	148

High QNI: CPN — W1NQO and K1DFS. VHF-2 High QTC W1EFW & WA1URA. SEC W1DGL expects communications from all ECs, be sure reports on your area have been sent in. Director W1HHR sends thanks for Club Bulletins. Club Rosters are helpful also. Feb. QO Bulletin from ARRL should be re-read by all OOs. Your efforts are needed and appreciated. Manchester RC Bulletin "Short Skip" has excellent format and content. Tri-City ARC "Feedback" includes W1QV suggestion of member station pictures for use in Club History Scrapbook. Other Clubs may be interested. Stamford ARA "Squelch Burst" outlines problems encountered in replacing their Repeater Antenna. Shoreline ARC Bulletin indicates SARC Repeater will be operational if all help continues. Southington ARA enjoyed program on Oscar and Satellite Communications presented by K1HTV who is an authority on VHF QSOs. Meriden ARC "Key Klix" notes Club Program on Traffic Handling via WA1VGP & WA1UHN. New officers Manchester RC: WA1DOI, pres.; W1CDC, vice-pres.; K1AAF, secy.; WA1YVG, treas. Congratulations to: WA1VGP Feb. BPL; WA1NGL Extra Class; WB1CDK WB1CDL & WB1CDM Novice Class! Final Field Day plans underway in most clubs — be sure to take part and provide plenty of support for all our wonderful new Novice Class Amateurs! Traffic: W1EFW 355, WA1VGP 326, WA1GFH 210, WA1URA 116, WA1WEM 115, WA1KVI 85, W1GVT 63, K1DFS 59, W1BDN 35, WA1UOU 34, WA1UQT 24, W1KV 23, K1AQE 18, W1BDI 12, W1QV 9, W1CUH 5.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — SEC W1AOG is still in FL. Endorsements:

LATEST LISTING MAY 1977

Vhf engineering

36 NEW PRODUCT

THE WORLD'S MOST COMPLETE LINE OF VHF-FM KITS AND EQUIPMENT

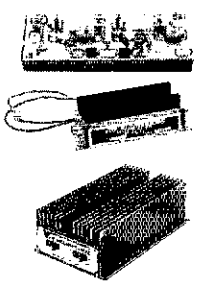
RECEIVERS

RX28C	28-35 MHz FM receiver with 2 pole 10.7 MHz crystal filter	$ 59.95
RX28C W/T	same as above—wired & tested	104.95
RX50C Kit	30-60 MHz rcvr w/2 pole 10.7 MHz crystal filter	59.95
RX50C W/T	same as above—wired & tested	104.95
RX144C Kit	140-170 MHz rcvr w/2 pole 10.7 MHz crystal filter	69.95
RX144C W/T	same as above—wired & tested	114.95
RX220C Kit	210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter	69.95
RX220C W/T	same as above—wired & tested	114.95
RX432C Kit	432 MHz rcvr w/2 pole 10.7 MHz crystal filter	79.95
RX432C W/T	same as above—wired & tested	124.95
RXCF	accessory filter for above receiver kits gives 70 dB adjacent channel rejection	8.50
RF28 Kit	10 mtr RF front end 10.7 MHz out	12.50
RF50 Kit	6 mtr RF front end 10.7 MHz out	12.50
RF144D Kit	2 mtr RF front end 10.7 MHz out	17.50
RF220D Kit	220 MHz RF front end 10.7 MHz out	17.50
RF432 Kit	432 MHz RF front end 10.7 MHz out	27.50
IF 10.7F Kit	10.7 MHz IF module includes 2 pole crystal filter	27.50
FM455 Kit	455 KHz IF stage plus FM detector	17.50
AS2 Kit	audio and squelch board	15.00

TRANSMITTERS

TX50	transmitter exciter, 1 watt, 6 mtr	39.95
TX50 W/T	same as above—wired & tested	59.95
TX144B Kit	transmitter exciter—1 watt—2 mtrs	29.95
TX144B W/T	same as above—wired & tested	49.95
TX220B Kit	transmitter exciter—1watt—220 MHz	29.95
TX220B W/T	same as above—wired & tested	49.95
TX432B Kit	transmitter exciter 432 MHz	39.95
TX432B W/T	same as above—wired & tested	59.95
TX150 Kit	300 milliwatt, 2 mtr transmitter	19.95
TX150 W/T	same as above—wired & tested	29.95

POWER AMPLIFIERS

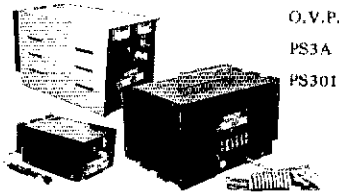


PA2501H Kit	2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors	59.95
PA2501H W/T	same as above—wired & tested	74.95
PA4010H Kit	2 mtr power amp—10w in—40w out—relay switching	59.95
PA4010H W/T	same as above—wired & tested	74.95
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	49.95
PA50/25 W/T	same as above, wired & tested	69.95
PA144/15 Kit	2 mtr power amp—1w in—15w out—less case, connectors and switching	39.95
PA144/25 Kit	same as PA144/15 kit but 25w	49.95
PA220/15 Kit	similar to PA144/15 for 220 MHz	39.95
PA432/10 Kit	power amp—similar to PA144/15 except 10w and 432 MHz	49.95
PA140/10 W/T	10w in—140w out—2 mtr amp	179.95
PA140/30 W/T	30w in—140w out—2 mtr amp	159.95

Blue Line — RF power amp, wired & tested, emission—CW-FM-SSB/AM

Model	Frequency	Power Input	Power Output	
BLB 3/150	45- 55MHz	3W	150W	TBA
BLC 10/70	140-160MHz	10W	70W	139.95
BLC 2/70	140-160MHz	2W	70W	159.95
BLC 10/150	140-160MHz	10W	150W	259.95
BLC 30/150	140-160MHz	30W	150W	239.95
BLD 2/60	220-230MHz	2W	60W	159.95
BLD 10/60	220-230MHz	10W	60W	139.95
BLD 10/120	220-230MHz	10W	120W	259.95
BLE 10/40	420-470MHz	10W	40W	139.95
BLE 2/40	420-470MHz	2W	40W	159.95
BLE 30/80	420-470MHz	30W	80W	259.95
BLE 10/80	420-470MHz	10W	80W	289.95

POWER SUPPLIES



PS15C Kit	15 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	79.95
PS15C W/T	same as above—wired & tested	94.95
PS25C Kit	25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and ovp	129.95
PS25C W/T	same as above—wired & tested	149.95
PS25M Kit	same as PS25C with meters	149.95
PS25M W/T	same as above—wired & tested	169.95
O.V.P.	adds over voltage protection to your power supplies, 15 VDC max.	9.95
PS3A Kit	12 volt—power supply regulator card with fold-back current limiting	8.95
PS3012 W/T	new commercial duty 30 amp 12 VDC regulated power supply w/case, w/fold-back current limiting and overvoltage protection	239.95

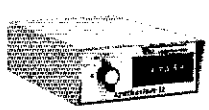
REPEATERS

RPT50 Kit	repeater—6 meter	465.95
RPT50	repeater—6 meter, wired & tested	695.95
RPT144 Kit	repeater—2 mtr—15w—complete (less crystals)	465.95
RPT220 Kit	repeater—220 MHz—15w—complete (less crystals)	465.95
RPT432 Kit	repeater—10 watt—432 MHz (less crystals)	515.95
RPT144 W/T	repeater—15 watt—2 mtr	698.95
RPT220 W/T	repeater—15 watt—220 MHz.	695.95
RPT432 W/T	repeater—10 watt—432 MHz.	749.95
DPLA50	6 mtr close spaced duplexer	575.00
DPLA144	2 mtr, 600 KHz spaced duplexer, wired and tuned to frequency	379.95
DPLA220	220 MHz duplexer, wired and tuned to frequency	379.95
DPLA432	rack mount duplexer	319.95
DSC-U	double shielded duplexer cables with PL259 connectors (pr.)	25.00
DSC-N	same as above with type N connectors (pr.)	25.00

TRANSCEIVERS

TRX50 Kit	Complete 6 mtr FM transceiver kit, 20w out, 10 channel scan with case (less mike and crystals)	249.95
TRX144 Kit	same as above, but 2 mtr & 15w out	219.95
TRX220 Kit	same as above except for 220 MHz	219.95
TRX432 Kit	same as above except 10 watt and 432MHz	254.95
TRC-1	transceiver case only	19.95
TRC-2	transceiver case and accessories	39.95

SYNTHESIZERS



SYN II Kit	2 mtr synthesizer, transmitt offsets programmable from 100 KHz—10 MHz, (Mars offsets with optional adapters)	169.95
SYN II W/T	same as above—wired & tested	239.95
MO-1 Kit	Mars/cap offset optional	2.50
TO-1 Kit	18 MHz optional tripler	2.50

WALKIE-TALKIES

HT 144B Kit	2 mtr, 2w, 4 channel, hand held receiver with crystals for 146.52 simplex	129.95
NICAD	battery pack, 12 VDC, ½ amp.	29.95
BC12	battery charger for above	5.95
Rubber Duck	2 mtr, with male BNC connector	8.95

OTHER PRODUCTS BY VHF ENGINEERING

CD1 Kit	10 channel receive xtal deck w/diode switching.	$ 6.95
CD2 Kit	10 channel xmit deck w/switch and trimmers	14.95
CD3 Kit	UHF version of CD1 deck, needed for 432 multi-channel operation.	12.95
COR2 Kit	carrier operated relay	19.95
SC3 Kit	10 channel auto-scan adapter for RX with priority	19.95
Crystals	we stock most repeater and simplex pairs from 146.0-147.0 (each).	5.00
CWID Kit	159 bit, field programmable, code identifier with built-in squelch tail and ID timers	39.95
CWID	wired and tested, not programmed	54.95
CWID	wired and tested, programmed	59.95
MIC 1	2,000 ohm dynamic mike with P.T.T. and coil cord	12.95
TS1 W/T	tone squelch decoder	59.95
TS1 W/T	installed in repeater, including interface accessories	89.95
TD3 Kit	2 tone decoder	29.95
TD3 W/T	same as above—wired & tested	39.95
HL144 W/T	4 pole helical resonator, wired & tested, swept tuned to 144 MHz ban	24.95
HL220 W/T	same as above tuned to 220 MHz ban	24.95
HL432 W/T	same as above tuned to 432 MHz ban	24.95

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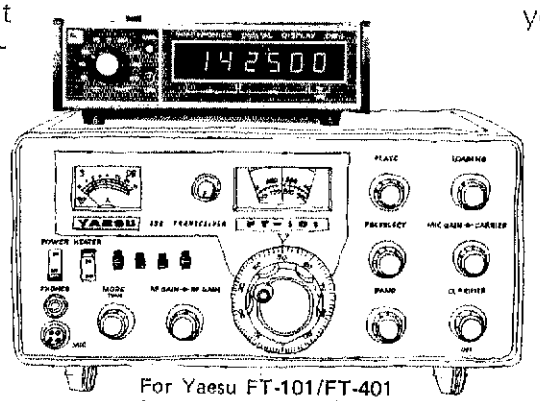
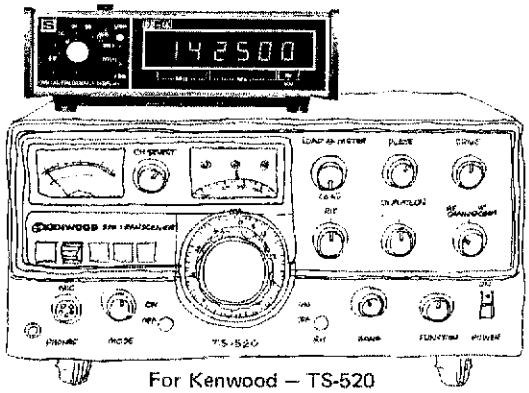
From turn-on , Spectronics crystal controlled readouts give you better than 100 Hz accuracy. From a cold start, they let you check a rig's VFO warm-up irregularity, as well as drift and linearity. The bright easily read display can be seen even from across a room. Just plug the unit into 117 VAC and connect the cable (supplied) to the VFO receptacle on your transceiver or receiver. It's a totally hassle-free hook-up.

In addition to these great displays, Spectronics offers a high-quality frequency counter for your test bench. Model SC-30 covers 5 Hz to 30 MHz; the SC-250 from 5 Hz to 250 MHz.

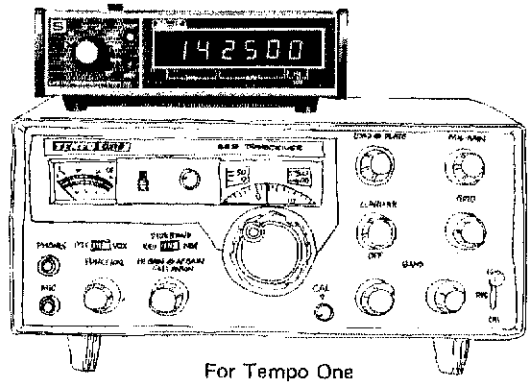
Until now, direct digital frequency read-out was incredibly expensive. But no more. So order the Spectronics unit that's right for your rig now. The Prices? Incredibly right. No matter how you count 'em.



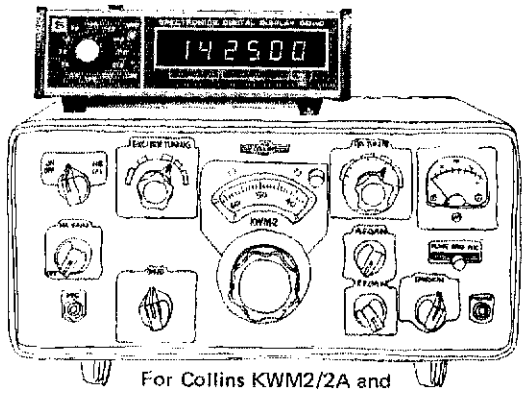
For Yaesu FT-101/FT-401
–Order Model DD-1–$169.95



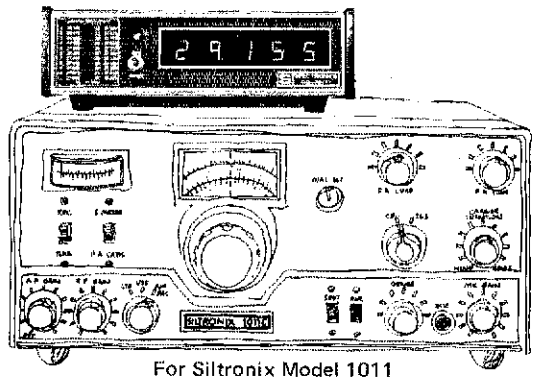
For Kenwood – TS-520
–Order Model DD-1-K–$169.95



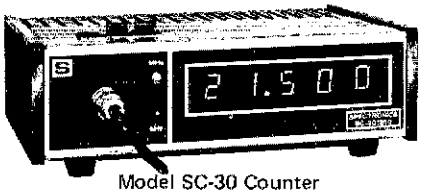
For Tempo One
– Order Model DD-IT–$169.95



For Collins KWM2/2A and
75S series–Order Model DD-1C–$169.95



For Siltronix Model 1011
–Order Model DD-10/11–$149.95



Model SC-30 Counter
5 Hz–30 MHz–$169.95
Model SC-250, 5 Hz–250 MHz–$219.95

SPECTRONICS INC.
1491 East 28th Street, Signal Hill, CA 90806

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☐ Model DD-1 ☐ Model DD-1-K ☐ Model DD-1T ☐ Model DD-1C
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☐ Detailed data sheet on Model _____

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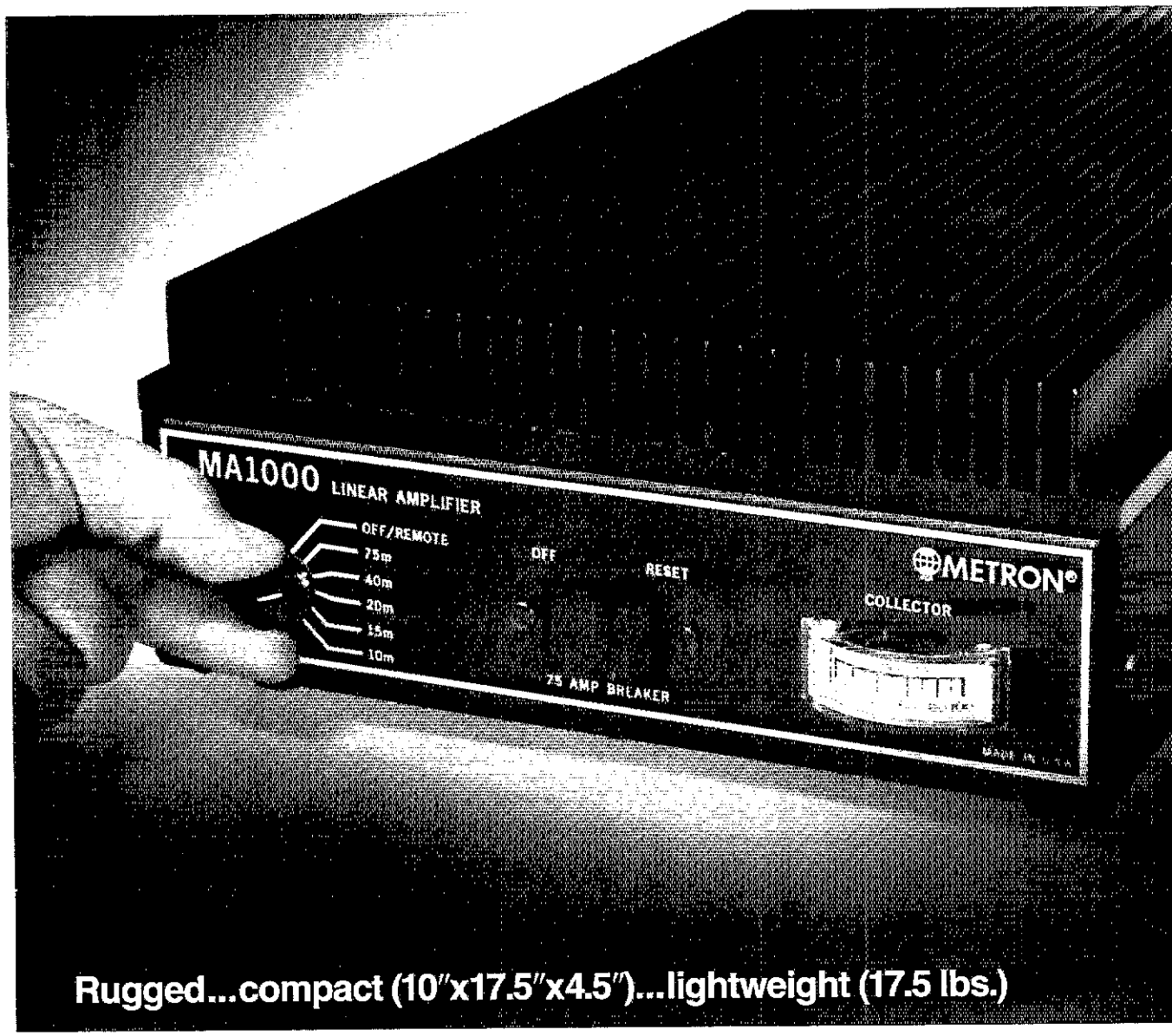
BankAmericard and Master Charge accepted.

California residents add 6% sales tax. Add $2.00 for shipping and handling within Cont. U.S.



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No tuning or adjustment whatever over 80, 40, 20, 15 and 10 meters

- Mobile 12V... no separate power supply required
- Base station with optional 13.6V power supply
- Fully remote controlled
- Suitable for use with any transceiver in the 100W class
- Heatsink convector-cooled and thermostatically controlled
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For further details, send for free informative brochure and name of your nearest dealer.

Dealer inquiries invited.

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Power output	13.6V DC 600W PEP typical
Frequency range	2-30MHz continuous coverage, no tuning
Filter selection	Front panel rotary switch or by remote control
Intermodulation distortion	-24dB 1kw input 3rd order -32dB 500W PEP output 2-18MHz
Harmonics	-50dB all amateur bands
Drive level	60W PEP 50 ohms
Power source	11-13.6V DC 70A peak; avg. voice 40A
Size	10″ wide; 17.5″ deep; 4.5″ high
Weight	17.5 lbs

30-day money back (less shipping) guarantee.
Send check or money order. Illinois residents add 5% sales tax.

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PS75 $39
(Plug-in power supply)

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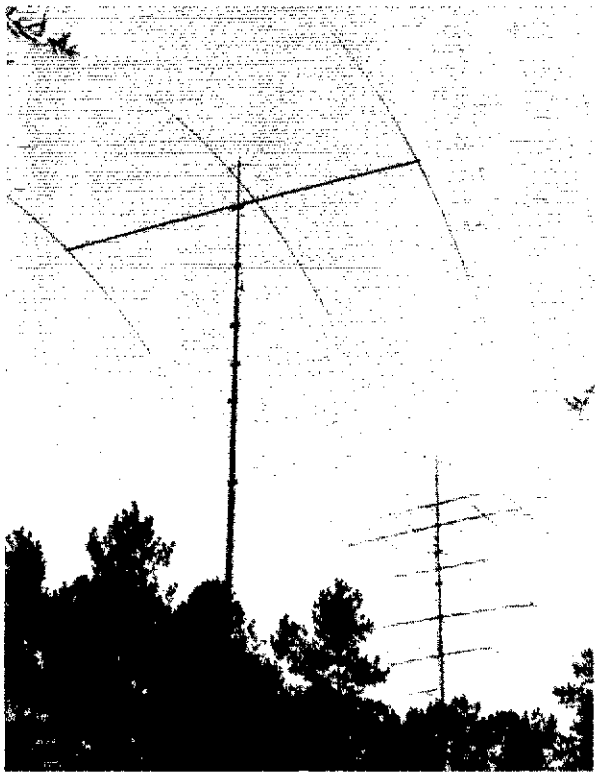

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- Antennas for OSCAR and moonbounce: crossed yagi, dish, helical antennas and an "Az-El mount".
- Tower and Rotator selection and installation.
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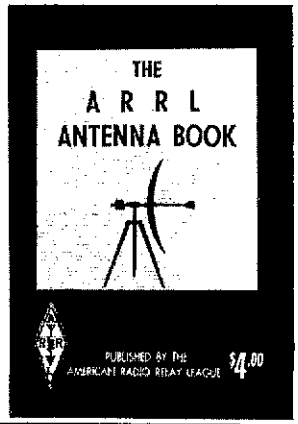

The AMERICAN RADIO RELAY LEAGUE, INC.

NEWINGTON, CONN. 06111

W1XA, WA1QKD as ECs; WA1QJU OBS; K9AQ OVS. Appointments: WA1YWK as ORS-11; K1RA WA1NAE OOs. W1LVR K1GVF WA1MKP ex-W1QC K1QOK are Silent Keys. WB1APJ XYL of K1KE K1EPL has a Triton 4. N.E. Director W1HHR visit Massasoit, Gloucester & Medway Clubs. WB5ZOD Taunton. WB1AUF, Don Bosco Tech. HS RC Boston, a new Club. W1HZV in Harwich. W1UOH Smyrna Beach, FL. W7LME is ex-K1DXY formerly Peabody. W1MD feeling better after heart attack. Club met at W1MNK's. NEEPN had 60 QNIs, 18 QT WA1WDS spoke at the Chemisford ARC on "Modul tion Theory." W1DBY on 2M FM. W1LZW on trip FL. W1GBE, Raytheon EDL. RC class for Tech Dorchester ARC on the 80 Novice band on scho days from 2:30 to 4 PM, officers are: WA1TEH, pre WB1AVB, secy.; WB2SOR, moderator. WA1VMG h his Advanced. HHTN had 224 QNI, 124 QT WA1YMC is Asst. EC for W2HGY who has SMR No. 1680. K1MRC has 2M FM. W1IPZ went to t Orlando Convention. EMRIPN for Jan. had QTC 25 QNI 410. W1NF has been a ham for 75 years in Ma congrats. WA1UWF had 16,740 points in Nov Roundup. W1IYD on 80 cw. K9AQP building a 4 MHz EME array. W1IAE spoke at the Middlesex AR on "Electrical Safety," new officers: WA1VBS, pre WA1GXN, vice-pres.; WA1RVZ, secy.; W1LJO, trea WA1JWQ, editor QRZ. Officers of Norwood AR WA1VOH, pres.; K1HRV, vice-pres.; WA1RLI, sec WA1EOT, treas. Framingham RC held their annu dinner at Marconi's in Ahsland. K1LWI a new O WA1WEX has his General. W1EIO has an HW-2036 order. W1AN home from FL also K1HJQ. W1TF retires soon. K1KYB has call but no equipmer W1ALP on 2M FM WA1MHJ in Coast Guard and an Island in the Pacific. W1FMK spoke on WARC- at the Lexington ARC. EMRI had 457 QTI, 269 QT HHTN had 231 QNI, 142 QTC for Feb. WB1BZO WB1BZP are W1XA's sons. WB1AGF got 6 ne countries for DXCC. W1KL has HW-2036 on 2 FM WA1DEK & W1SGU retired from RCA-WC WA1MKT now at WCC. K1LJS worked over 20 points in all Mass contest. W1GYL has his Gener Quannapowitt RA had a "Show-N-Tell" progra Please note that these Counties make up this Sectio all others are Western MA, Barnstable, Bristol, Duk Essex, Middlesex, Nantucket, Norfolk, Plymout Suffolk. After 46 yrs. W1DMH worked a VK. W1J said he worked PA0SSB on 432 EME for his 11 country on 432. K1PNB had 61 PSHR in Jan. W1G is ex-WA1GAE. NENN had QTC 95, QNI 11 EM2MN had 96 QNIs, 44 QTC. WB1CIH new Weymouth. WA1KAJ has his Extra. W1VTP on 2 FM. EC reports from: W1PEX, K1FMM W1F WA1RCY. Traffic: (Feb.) WA1MSK 374, WA1V 363, WA1TEH 314, WA1EYY 209, W1UX 20 WA1ZAZ 154, W1HL 118, W1EMG 83, WA1RVZ 7 WA1UWF 61, K1EA 60, W1DMS 54, WA1OWQ 4 W1FJI 42, WA1RAJ 37, W1DMH 36, W1PEX 3 W1PNB 22, W1TKZ 17, W1ATX 10, WA1IFE 1 WA1VMG 5, WA1PQY 3. (Jan.) K1PAD 188, K1PN 131, WA1VMG 39.

MAINE: SCM, Ed Bristow, WA1MUX — W8SWN reports Portland-Gorham ARC active with HW-2 constructed by the students WA1YRR and WB1AI new hams WB1ALQ WB1BWN and WB1BWO. Novi class commenced Feb. 14. Fourth annual Hoss-Trad Net Swapfest will be held at Fairgrounds, Deerfie NH May 7. Contact K1RQG or WA1IVB for in Special session of Hoss-Traders now on Sugarloaf M rptr. Mon. at 8 P.M. MSSN certs. to K1JCX WA1V WA1FCM. Pine Tree Net real active. Join the fun 3596 kHz 7 P.M. daily. K1RQG and WA1IVB co sidering 75 mtr. repeater (11). Sea Gull Net (Fe average per session check-ins 42, tfc. 6.2, time 64 mi Barnyard Net (Feb.) sess. 24, ck-in 810, tfc. 28. L PWD YUZ and others lost antennas during recent storm. Pine Tree Net (Feb.) sess. 28, tfc. 261, ck 265, WA1MUX will do report next month. Traff (Feb.) WA1FCM 465, W1RWG 175, WA1YUZ 1 WA2ERT/1 150, W1ERW 119, WA1JHT 63, K1T 47, K1JCX 35, K1GUP 32, W1ISQ 15. (Jan.) W1RW 144, K1GUP 85.

NEW HAMPSHIRE: SCM, Robert C. Mitche W1NH/W1SWX — SEC: K1RSC. RM: WA1GC PAM: Open. The NH QSO Party from all reports wa great success. Welcome to WB1ADF WB1A WB1AEA WB1ADE WB1AFS WB1AFU WB1A WB1AHC WB1AHM WB1AGG WB1AJV WB1A WB1AMU WB1ANG WB1ANW WB1ANV WB1A WB1AMX WB1AMJ WB1AOA WB1AMI WB1AOU WB1AHV. K1QLZ/W1JY rearranging his sha K1TMD instructing CBers to become hams in Fra lin. K1BCS disaster chmn. for the Red Cross help two families left homeless by fire during the SE WA1JSD operates from XE1BD with an FT101 a inverted Vee. W1IJ of Woodsville now a Silent K Endorsements: K1RSC SEC; WA1GCE R W1JB/W1APK, WA1CFT as ECs; W1JB/W1A W1NH/W1SWX & WA1LNH as OOs; W1JB/W1A W1AIJ W1BYS & K1SHR as OPSs; WA1GCE W1A & K2SIL/1 as ORSs; W1ALE W1QKA & K1SHR WA1FSZ as OVSs plus W1JB/W1APK as our or OBS. The first NH station to make 160-meter work all states is W1FZ. Jim received KL7GKY QSL, t last holdout. W1MK was the only active OO in t recent FMT. The GSPN had 335 check-ins & traffic. Another Silent Key is W1NKI of Manchest K1MFQ building a 220 rig. Traffic: K1BCS 22 K1NH 119, W1BYS 14, W1NH 12.

VERMONT: SCM, R. L. Scott, W1RNA — Static qualifying for appointments to ORS, ORS II, O OVS, OO, contact W1RNA. See "Operating an Am teur Radio Station" booklet for appointment requi ments. Welcome to new amateurs WB1AUM(N) WB1AVN(N). VT RFD 4/79/12; VT Fone 4/111/ GMN 24/596/76; VT SSB 26/472/94; Carr 24/562/57. Traffic: K1BQB 102, W1RNA 18.

WESTERN MASSACHUSETTS: Percy C. Nob W1BVR — Club classes going very well. WA1S reports a class being held at the YMCA in Westfi started with 77 students! K1IQA new EC for Har den Co. WA1EBE now W1BN. WMN welco W1AMI back into the fold. W1DVW has a new Dr T-4XC transmitter. WA1OPN, with all her physi disabilities, doing an outstanding job on WMN. W come to W1ETH (formerly of East. MA). He is s physician at Mt. Holyoke College. WA1MJE WMPN: 20 sessions, QNI 274, tfc. 64. W1DVW WMN: 28 sessions, QNI 182, tfc. 151. WA1DNB WMEN: 4 sessions, QNI 190 (including 124 t liaison with 2-meter repeaters). NOBARC Hamfes flea market July 9-10. Commington, MA. Traf WA1MJE 364, W1BVR 141, W1UD 137, W1TM 1 WA1OUZ 81, W1DVW 67, WA1TYY 38, W1KK W1ZPB 29, K1RGQ 11, WA1OPN 9, W1ETH WA1PLS 5.

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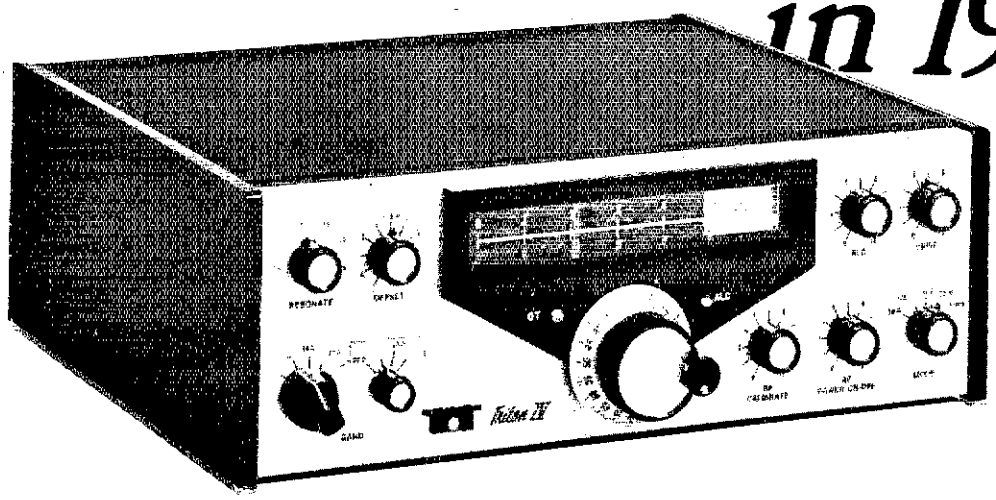

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NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — We regret to report that KL7FMR and his wife were killed in an air craft accident. Eddie was very active on the various nets. He and his wife will be missed very much. KL7FLU now out of the hospital and residing in the Pioneers Home in Fairbanks. Suggest we all send her a card. Fay was a very active station on the traffic nets. The Anchorage Club reports they will have 20 new Novices receiving licenses within a few weeks. The Anchorage Flea market will be held again this year the first part of May. ARRL will again have a booth with many publications etc. Many stations participated in the annual Fur Rendezvous providing communications for the dog sled race. KL7HOV reports that the ASN had 760 ck-ins this month. KL7HIX reports Kodiak will have 10 to graduate from their Novice class. KL7HDX is handling traffic on the various nets in and out of AK. KL7AF is not on the air but expects to be soon. Traffic: KL7HDX 9.

IDAHO: SCM, Dale A. Brock, WA7EWV — SEC: W7JMH. PAM: WA7HOS. RM: WA@KKR/7.

Net — Freq.	Time	QNI	QTC	Manage
FARM — 3.935	0200 Dy	1072	39	W7TGL
IMN — 3.635	0230 M-F	196	95	W7GHT
RACES — 3.99	1415 M-F	572	10	W7KDE

W7EYR W7YAD and W7IYG all sporting new two meter rigs. K7MIY and Harmonic, WB7PHB, are proud owners of an Atlas 215. W7IWU and W7JE instructing a Novice class in Boise. W7CJC vacationing in CA. W7FOF just returned from there. W7QC of Bonner Ferry received a Golden Anniversary Award (licensed 50 years ago) and a Fifty Years Continuously Licensed Award by the Quarter Century Wireless Assn. Congrats! WA7QQD, radio instructor northwest Nazarene College, bought a new Kenwood TS-520 and promptly scored better than 100,000 in the Jan. CW CD Party. W7LDG has received his old call back; he is now W7HZL. He also completed WAS on 160 Mtrs. WB7OUO, a Novice of two months, now an Advanced licensee, FB! Traffic: W7GHT 453, W7GBO 84.

MONTANA: SCM, Robert Leo, W7LR — Bridger Club helped Carbon Co. Sheriff search for two, lost in the Pryor Mtns. Two meters provided contact where other radios failed. New appts: SEC W7TYN; EC K7LDZ; OBS K7SIK. ECs apptd. several asst. ECs. WA7PZO W7IXO W7LR mailed 460 traffic handling memos to MT ARRL, RACES, MTN & IMN members. W7TYN & K7CTI in Jan. CD test. New Anaconda ARC: K7SIK, pres.; W7TUO, vice-pres.; K7YNZ, treas. K7CTI & K7CPC in NR. K7CPC DXCC with DX60. W7FG K7CTI W7LR in DX test. 25 Novices from K7CTI class. K7CTI DXCC total 156. WA7JHC new 2-meter gear. K7CHY has new SB400. W7DB put ARRL bulletins on MTN. Sorry to report W7OHT a Silent Key. W7LR visited Bridger & Anaconda clubs. K7SIK checks into DRN7. Traffic: W7TGU 56, K7CHY 38, K7CTI 24, K7SIK 24, W7NEG 23, WA7PZO 22, WA7KMP 14, W7LR 11, W7TYN 10, W7DB 9, WA7PDC 2.

OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: Leland McIntosh, WA7UJU. SEC: W7LBH. PAM: K7RQ2. RM: K7OUF.

Net — Freq.	QNI	QTC	Sess.	Manag
OSN — 3585	166	212	35	K7IW
AREC(st) — 3993.5	298	8	28	WA7NE
BSN — 3908				WA7SS
AREC — 146.64/	685/	33	35	K7WWF
(PDX) — 146.33	(Jan.)			
WCN — 3702	363	110	26	WA7UJ
AREC JC — 147.06	66	6	8	WA7UJ

Activity on 223.50 MHz coming alive in PDX area. K7TJR WB7DSK W7VOK W7FVF W7ALG K7WWF W7KJZ K7DVK, two repeaters are planned. Coos Bay RC: K7WPC, pres.; W7TZO, vice-pres. Band conditions getting better also traffic. Sports car buffs had field day in PDX area WB7ADU WB7DES WB7ERV WA7NTU WA7ZJN K7VDN WA7ZAJ took part in the "Rally." The Goat Mt rptr on 37-97 used for all communications. Mr Murphy present! W7KIC helping to start Novice class in his area. EARS Club: WA7SZR, pres.; WA7SDI, vice-pres.; WA7YZT, secy. Register your picnics, campouts, etc. right away with your SCM so the OBS can let it be known. K7RQ2 reports Novice class to start in Bend, OR. WA7SSU getting new equipment. EC W7TZO has a new fourteen-element KLM up. W7WHY working on 20-meter beam. WA7KIU again on the move. BSN picnic July 10, see WA7GFE. WA7MHP introduced resolution declaring Ham Week (OR House of Representatives) to be a permanent thing. Traffic: (Feb.) W7VSE 421, K7VDN 208, K7QFG 140, K7IWD 134, K7OUF 130, WA7UJO 89, WA7TXV 73, W7DAN 63, WB7ADU 52, W7HLF 23, WB7DES 21, WB7ERV 17, WA7ZJN 12, W7LT 11, WB7DSK 10, WB7NTU 5, WB7CBA 3. (Jan.) W7DAN 96, WA7UJO 55, K7WWI 42.

WASHINGTON: SCM, Mary E. Lewis, W7QGP —

Net — Freq.	Time	QNI	QTC.	Ses
Manager				
NTN — 3970	11:30	2062	134	2
W7PFD				
WARTS — 3970	18:00	2168	42	2
W7QGP				
NWSSB 3945	18:30	564	58	2
WA7RCR				
WSN — 3590	1030	193	355	2
K7QZA				
ESN — 3720-CW	0100	282	37	2
WA7MIF — 3920				
Phone				
ARES — 3920 Su	0900	41		
K7VAS				

Old Timer's Night was very well attended at Radi Amateurs of Skagit County club meeting held at th Skagit Community College and the officers a W7IXR, pres.; WA7WZQ, vice-pres.; WA7GMX, secy treas. Lower Columbia ARC's new club house has th walls up and things are looking up. Clark County AR Hamfest is May 21 & 22 a good time for everyone pl excellent program is planned. Yakima Hamfest is Ma 15 contact any club member for tickets. WA7DK received an IC 22S for his birthday. WA7KGT repor ARES net every Tue. 19:30 local on 146.01-6 K7GGD moving from an Apt. to a condo. WB7OB busy with personal and accident reports on 2 M. It nice to know someone will take the time to make land line call to help you when you have a flat tire run out of gas. K7DCG reports he is radioman-i charge of comms on Icebreaker Glacier and from Ju to Sept. will be /R2 from Arctic circle and Nov Apr. '78 as KCH4USG on Deeptreeze '78 fro Antarctica on 20 Meters. Traffic: (Feb.) K7GXZ 16

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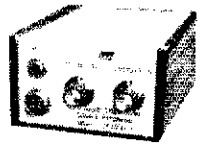

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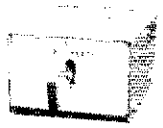

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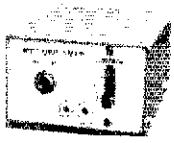

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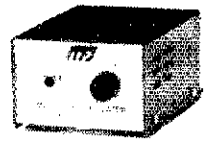

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K7KWT 91, K7OZA 82, W7LG 77, W7APS 64, WA7BDD 59, W7IEU 37, WA7LQV 34, WA7DKA 28, W7PWP 24, W7BUN 16, WA7KGT 8, W7AIB 6, K7VAS 4, K7GGD 2. (Jan.) K7VNI 301, K7VAS 106.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — WA6AHF is now within 2 states of 5BWAS. WB6DXR is net control for the Napa Valley Emergency Net. W6EPR now on from Fairfield. K6MIS reports NBARS took part in the Vallejo Walkathon. W6DNY now home and doing well after a time in the hospital. WB6CSD teaching code and theory for the SRARS. W6PBU and XYL are home after a fine trip to KH6-Land. K6VXM back in Vallejo after several years in Mexico. Those of you on 2 meters can now get traffic to NCN on WR6ADC 147.84/24 at 7:30 PM daily. WB6WBG is active on Mission Trail Net. Poor band conditions gave W6CBF problems on the last Freq. Measuring Test. K6UWR and KH6GQW are running skeds on Sun. at 5:30 PM local on 14240. All are welcome to join in. Thanks to W6ZF for a fine report on the North Bay activity. CCRC reports the following new calls in the section. WN6OAH WA6NXV WN6NIZ WN6NWN WN6NXK WN6ODC WN6OCC WN6OIR WN6OCB WN6OFG WA6OBK WN6OJN WA6ODX WN6OEQ WN6OFH WN6OCZ WN6OHY WN6OFI WN6OER WN6OCO WN6OCX WN6MYV WN6MUO WB6MYQ and WN6MAC. W6WAH has moved to Auburn. W6RGG has a second call, N6KB. The following stations made NCN Honor Roll: WA6BFL WB6JIK W6JXK K6PMG WB6UZX WB6VEW and W6OA. Traffic: (Feb.) K6HW 385, K6OE 362, W6OA 255, W6JXK 217, WB6JIK 210, WB5UZX 61, WA6BFL 44, WB5VEF 23, WB6WBG 15. (Jan.) WB6JIK 237.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. W7QO instructor for Tahoe ARA has graduated twelve Novices plus one General and two Technicians. Special events station N7PC was activated by WA7MRS W7MWF W7PBV K7BDX and K7ZOK with high honors going to K7BDX. Las Vegas RAC has club emblem patches. W7JUO W7MWF and W7OK each working a lot of DX. W7ZT and WA7BEU have been heard mobiling in the Southwest. The National Consumer Electronics Show is scheduled for Jan. 1978, with an estimated 25,000 delegates which should help to make an interesting SAROC convention. WB6RER, ex-W7, is a Silent Key. Traffic: W7ILX 128, K7ZAU 45.

PACIFIC: SCM, Pat Corrigan, KH6GQW — New call of TheRepeater is KH6JHV (37/97). KH6CKJ had a gecko probelm in his rig and had a month's repair job. KH6JFN left for NY. BIARC and EARC sent lengthy comments to FCC on Docket 20271 regarding WARC freq. allocation proposals. West Pac Tfc Net still on 14110 at 0700. Name will change soon to Pac. Tfc Net. I suggest many KH6s and others in Pac. will want to comment on FCC Docket 21135 in which they propose to eliminate secondary (additional) station licenses. Comment due date is June 2. VE2ACP visited in Mar. Your SCM presented the Kauai ARC with its charter of affiliation with ARRL. New officers are: KH6ZT, pres.; KH6AJ, vice-pres.; KH6GFN, secy. KH6JBH, treas.; KH6EBQ act. chmn. KH6s CKJ & JCB spearheaded joint CB/Ham display at Kahala Mall. KH6CKJ had trip to ZL. Be alert to help if bad weather strikes anywhere. Remember, it was just a year ago for Supertyphoon Pamela. Traffic: KH6CKJ 22.

SACRAMENTO VALLEY: SCM, Norman Wilson — WA6JVD — SEC: W6SMU. The recently completed radio class of the Tahoe Amateur Radio Assn. produced 12 Novices, 2 Techs, and one General Class. Their last meeting featured the ARRL film "Moving Up to Ham Radio." ARRL films are available through the Division Director. In Roseville, K6SRH joined Silent Keys. WB6GFJ reports that the Leagues RF packet proved useful in the TVI ridden Marysville, Yuba City area. WB6FAA is trying to figure out how to get his Classic 33 tribander on top of his tower. New calls in Paradise are WB6s TBX and TQB. WB6RQE is now an OO Class I. WA6JVD is digging holes for guy points for a new 100 foot Rohn 25 tower. W6PU didn't like the smell of that call so he is now W6FB. K6SG has added a 30S1 amp to his contest station. Traffic: W6RSP 179, K6RPN 85, W6DEF 30.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT — Kudos to W6BYS whose handling of emergency traffic between the USNS Sealift Caribbean and the Marine Hospital may have saved the life of an injured seaman. Alan Abrams of TLH's Adult Education Amateur Radio Class passed both the General and Advanced exams before he even received his Novice call sign. With "instant upgrade" licensing now in effect, the SF FCC office issued him the interim call sign "ALAN ABRAMS." Prefix hunters alert!; W6NL achieved BPL again in February; Congratulations to W6MWH who passed his Advanced, to WB6TKD and WB6VBJ who received their Novice licenses, to K6TP upon appointment as SF section RM, to K6PB upon appointment as ORS, and to W6EYS upon appointment as SFRC's emergency coordinator. My term as SCM expires Oct. 1. Anyone interested in taking on this job should submit a nomination petition to ARRL now; K6LRN operated the DX test running 55 watts to indoor dipoles — masochist! WA6RJL uses an interesting biographical card to supplement his regular QSL. Traffic: W6NL 246, W6RNL 212, K6TP 196, W6IPL 143, K6PB 10, WB6JEO 2.

SAN JOAQUIN VALLEY: SCM, Charles P. McConnell, W6DPD — SEC: WA6HNO. WB6UJD EC for Stanislaus Co. Give him your support. Renewals: EC WB6RZI and WB6MGG. W6HKV now N6AM and has ordered an Atlas 350XL. W6RTZ and WA6ZLN are Silent Keys. WB6PSW has a 700CX. W6LLF and WA6NGF have TS700A. W6ZNX and WB6CXX have IC211. WA6JIH K6LKJ and W6DPD have TR7400A. WA6CPP on RTTY. WB6PCT and WA6RXI made NCN Honor Roll for Feb. WA6JRZ now W6XK. WB6OSH is W6XC. WA6WXP is W6XP. WB6WFE active on the Teen Net on 3925 MHz at 1700 PST. WB6ITM has a four-element 20m beam, a 28ASR, and is building TUs. WB6OWI has a T5520. W6UZ has his 3-500Z amplifier working. The Kern Co. RC now meets at First Federal savings at 4401 Ming Ave., in Bakersfield on the first Fri. at 7:30 PM. WB6KLL secy. WA6JDB active on NCN. K6PSJ and K6MGX are Life Members. WB6KLL now home and has an Atlas 215X and HW202. Amateurs from Fresno, Merced

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KENWOOD

and Bakersfield helped with the UCP telethon. Your SCM has visited the Delta ARC, Turlock ARC, Madera ARC, Fresno ARC, Tulare Co. ARC and Kern Co. ARC since Sept. 1976. Traffic: (Feb.) WA6JDB 14, N6AM 8, WA6CPP 4, W6DPD 3, WA6KMW 1, WA6GJV 1, WB6WFQ 1. (Jan.) K6PSJ 4.

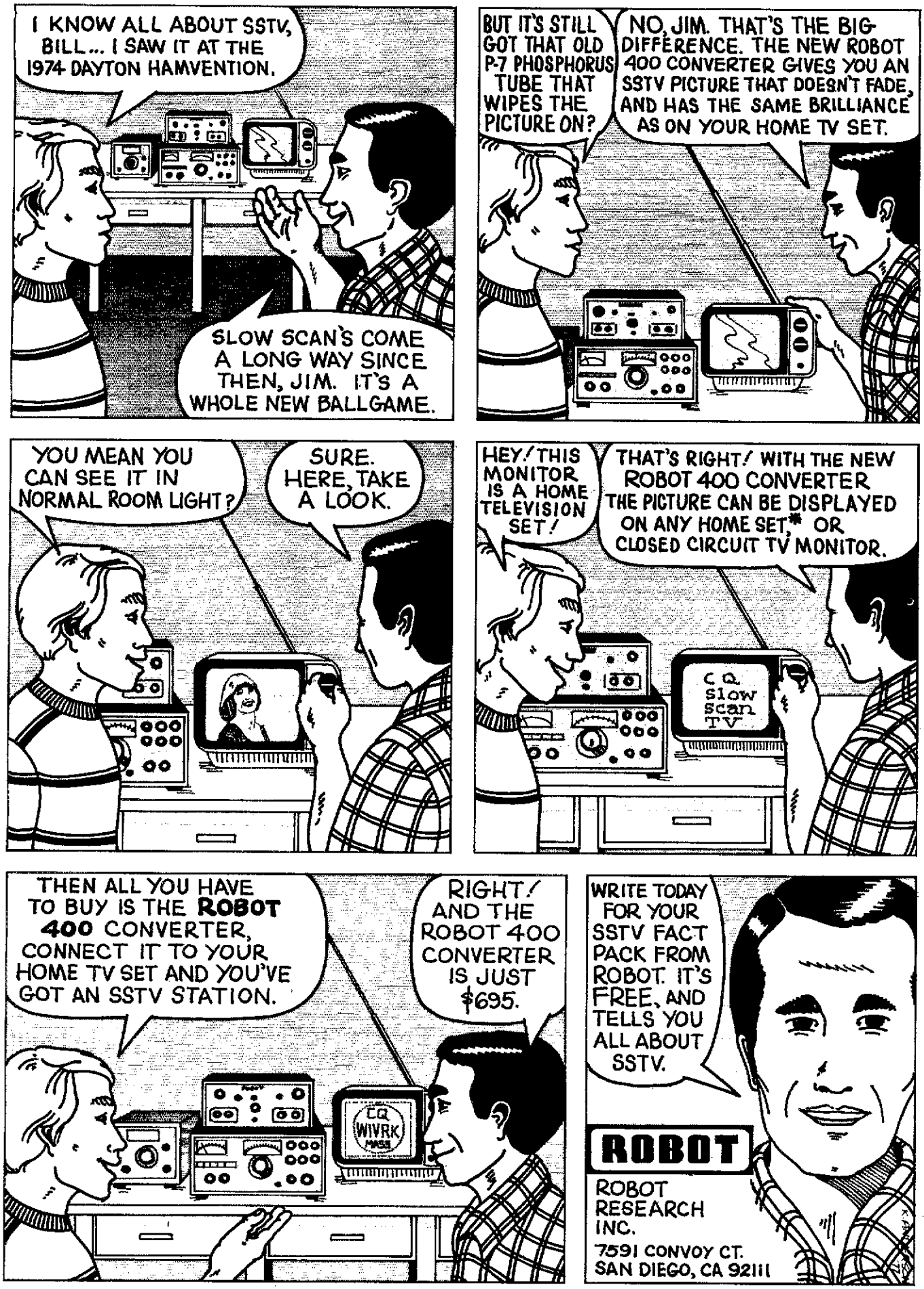
SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — NCN Mgr. W6RFF reports the new VHF session of NCN is thriving. It meets daily at 1930 local on WR6ADC (84/24). Bay Area clubs take note: the Central California Radio Council (CCRC) meets at 8 PM local on the first Wed. of each month at W6QIE's QTH in South SFO. Club reps are cordially invited. W6AUC offered a welcome helping hand to two local CBers. Result: two cases of TVI cured! Congrats to W6ZM and K6TXR for being first and second, respectively, in winning the SCCARA Bicentennial Award. The annual SCCARA flea market has been scheduled for June 12, again in the parking lot of Quement Electronics. Orchids to the WR6ADE group, who helped Santa Claus talk to a group of Children at Alexian Bros. and Good Samaritan Hospitals during Dec. ADE provided the link to the North Pole, while the happy kids provided the smiles. The PAARA folks are running three weekly nets, which indicates their going ho attitude. 145.24 AM at 815 PM and 147.45 FM at 830 PM local Mon. are their 2M freqs., while they run SSB on 21.393 or 14.245 at 9 AM to pick up their out of state members. The Santa Cruz County ARC is still running their popular license classes. Contact K6QJZ or W6KHS for more info. Traffic: W6YBV 143, W6RFF 89, W6AUC 51, W6KZJ 23, WB6HBT 15, WA6HAD 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFO. VHF PAM: K4GHR. RM: K4MC. EC of the Month is W4VOX presiding over Jackson County so get in touch. Initial SET reports indicate 19 exercises sn watch QST for details of our performance. What used to be known as the Roanoke Div. "League Officials Meeting" for annual occurence is now the League Forum Meeting and will be at Burlington May 14-15 and each club is urged to send a rep and individual attendance is welcome. Contact Alamance ARC re Forum. WB4OXT says new QSL Bureau is great. WA4PSL is handling much traffic, has WAS, CP-25 and 60 toward DXCC, congrats. W4IPP has worked over 1200 different 2-mtr stations since early 1971, can anyone top that? Speaking of records, W4AIT seems first 2-Mtr WAS via satellite, any other claims? WB4UBA passed Advanced. The Tar Heel Emergency Net (THEN) elected WB4MXG as Net Mgr. and WB4MMK, WA4RIP as new Net Directors and W4OFO was reelected Net Secy. congrats to all. Central NC Tfc Net (CNCTN—13/73 Salisbury) had 28 sessions, 1078 QNI and 16 QTC, tnx WB4VIM. The '76 NC QSO Party results were: K4GHR/M first place, NC county winners were: WA4PSL, WB4PWV, W4EAI, K4YFH, AA4MWI, WA4LWO, WA4QJL, K4UHJ & WB4CCK and WB2VWW as out-of-state winner, congrats to all. Traffic: (Feb.) W4EAT 245, WA4PSL 169, W4OFO 96, K4MC 70, WB4MXG 68, W4PCN 60, K4FTB 58, K4EZH 54, WA4TCR 40, W4WXZ 36, WB4OXT 30, WA4QJL 30, WA4KSO 20, WB4WOR 20, WA4SRD 15, W4WWR 14, W4EHF 10, WB4CES 4, K4AIH 2. (Jan.) WB4EZR 172, WA4KFY 60, WB4UBA 18, K4AIH 10.

SOUTH CAROLINA: SCM, Tom Lutkin, WA4DAX — Asst. SCM: Garry Barnette, WA4MDP. SEC: WB4NTS. PAM: W4MTK. RM: WB4CAK. The XYL and I attended meeting of Side Band net in Columbia and enjoyed meeting some old friends as well as new friends. WB4OBZ now writing monthly column for "World Radio" in addition to his duties as 4RN(D). Net. Mgr. W4FVV reports 11 new Novices in Anderson with a new class starting soon, also new autopatch on 37/97. N4EE was seen on Channel 5 in Charleston with his antique telegraph key collection and WA4ICE had spot on front page of newspaper, very good PR efforts. Hope to see you at Greenville. Net reports: SCSSBN QNI 1152, QTC 132; PX QNI 222, QTC 11; ARC 2MTR QNI 580, QTC 12; Blueridge 2 MTR QNI 956, QTC 38. Traffic: WB4OBZ 648, WB4ARJ 553, W4NTO 135, WA4KXZ 104, W4ANK 82, WB4CAR 80, WA4DAX 56, W4MTK 55, K4FRX 32, W4FMZ 22, W4FVV 20, W4OCX 18, N4EE 15, WB4JNE 15, W4DRF 11, WA4LTZ 4.

VIRGINIA: SCM, Robert L. Follmar, N4RF — SEC: WB4DTG. PAM: K4VWK. Asst. PAM: WA4YIU. RMs: VN K4BKX; VSN WA4EPJ; 4RN W4SHJ. Must again ask that all stations report their monthly activity no later than the 5th of each month so that I may get my rpts to Hq. in time. Lately I have been receiving reports up to the 15th of the month! Our new VN Mgr. is now K4BKX and we all wish Rich well. Many tnks to outgoing Mgr. K4AIF as he has done a fine job. K4GR expects his workload to drop since WB4DKB is back on the air. Bob also rpts the microcomptr is finally making sense, hi. W4LXB rec'd WAS/75 & WAS/BIC. WB4ZKG back home at Fort Story. WB4FJK & WB4MMW rpt antennas down. MMW's ant was mounted on a metal storage shed which blew over! WA4RDI new ORS rpts slo mont with tfc of 62. VSBN mgr. K4VWK had gud SET with 1,844 points. WB4DBK & WA4ZAJ sporting new TS-520s. W4SHJ K4BKX & W4HU rptd attending SE Div. Conv. in Orlando. Williamsburg ARC formed with W4TMN as pres.; VP W4NTG; secy/treas. W5CLE. Adtivities Mgr. WB4WL — welcome! W4YZC says VA State Conv. plans ang. 4-6 for Sept. 16, 17. E. WB4DQZ is encouraged by replies to AREC solicitation letter. W4OOL says local ARC still turning out new hams. W4NHI has new harmonic, congrats Bill. W4MK enjoyed the VA Sect news ltr, tnx OM. WB4EKY solved his TVI problems and handling tfc. W4KK & XYL had a nice trip to Rio. WB4OXT among those planning attending Dayton Hamfest. He also installed 1/8 wave 160 vertical. WB4WLJ wrkin for General. OO WA4SDC having fun with Oscar satellites on Mode A & B. The SCM has recd many congrats on N4RF call. Tnx to all. K4DHB gave Novice tests & all passed! W4TZC says the cold wx helps his activity. WA4WJG delivered msg (SET) from the Gov. of Louisiana to Gov. Godwin of Virginia. Club papers fm NOVARC, AMRAD, LARC, Roanoke. OVS WB4MMW also reported. FB net rpts fm VSN, VSBN, VN and VFN. Traffic: (Feb.) K4BKX 449, K4KNP 339, WA4EPJ 253, K4GR 243, W4LXB 206, K4MLC 161, W4UQ 161, N4RF 143, WB4ZKG 110, K4JM 103, WB4ZNB 90, WB4FJK 86, WB4KV 84, WA4RDI 62, WA4YIU 60, WB4DBK 58, K4VW



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June 5, 1977
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Bureau County Fairgounds
Princeton, Illinois

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Usual Starved Rock Radio Club incentives.

Centrally located and easily reached via routes 80 - 6 - 34 - 89 - 26, watch for large yellow "Hamfest" signs.

Nominal fee for campers, vans and trailers

Free coffee and doughnuts — 8:30 to 9:00 a.m.

A.R.R.L. public relations booth manned by knowledgeable league representatives

No Inflation!!! $1.50 before May 20, $2.00 at Gate.

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58, W4SHJ 49, W4TMN 48, WA4YVG 46, WB4DTG 45, W4SUS 43, WA4UUX 41, WA4QQI 40, WA4EAZ 39, K4KA 33, WA4AJF 26, W4YZC 25, WB4DQZ 23, W4NWM 23, W4OOL 22, WA4HDV 20, WA4RBF 20, W4TZC 20, W4NHI 14, K4ITV 14, WA4CLK 12, WB4PNY 10, N4DR 10, WA4ZAJ 10, WA4NOB 9, W4ZM 8, WB8MKO/4 7, W4MK 7, WV5KKP 7, WB4KEY 6, WB4UHC 5, WA4RBF 5, WA4WQG 5, W4KX 4, WA4ANN 4, W4ZDN 3. (Jan.) WA4EPJ 339, WA4ZAJ 202, K4IAF 197, K4GR 143, WB4DBK 84, K4VWK 81, W4UQ 79, W4SUS 68, WB4FJK 57, W4HFH 26, WA4CLK 25, K4DHB 17, W4TZC 17, WB4UHC 14, W4THV 12, WA4ANN 12, K4KA 10, WA4AJF 8, W4MK 6, W4DM 1. (Dec.) WB4FJK 34, WB4UHC 3. (Nov.) WA4YIU 51.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — WB8DQX, WVN Phone Net Mgr. is now Phone Activity Mgr — (PAM). Officers East River ARC, Bluefield, WB4BBF, pres.; W8KBU, vice-pres.; W8DYA, secy.; K8ZDY, treas. Ham classes for Preston Co. conducted by W8IXG and WA8YCG. Ham classes Greenbrier Co. by WB8DMS and W8FFC. All classes getting good newspaper coverage. New ECs K8AXW WB8TDA.

Net — Freq.	Time(Z)/Days	Tfc.	Sess.
CW — 3568	0000 Dy	58	28
Novice — 3730	2215 Dy	156	28
Phone — 3990	1700 Dy	118	28
Phone — 3990	2300 Dy	280	28
Hillbilly — 142901700 Su		47	4

Huntington Hamfest, Camden Park on June 5th. West Va State Radio Convention, Jackson's Mill July 2nd and 3rd with LEw McCoy and Chod Harris. New stations WD8s DRE DLX TZY WOY WZJ TKY BDA; WD8s IGH Harris. New stations WD8s DRE CLX TZY WOY WZJ TKY BDA; WD8s IGH IBP IGY IGS. Traffic: WB8DZX 121, WB8SAW 70, W8HZA 39, WB8III 31, W8JM 30, WB8TJN 30, W8CYL 26, WB8TDA 26, W8CKX 22, WB8YMJ 22, K8MZM 12, WA8NDY 11, WA8POS 11, W8ETF 8, W8FZP 8, WB8TEE 8, WB8VAZ 8, WA8NJB 7, WB8ZMX 7, K8BCF 6, WB8YEX 6, WB8YXJ 6, WA8LFW 6, WB8IJW 6, W8EUE 6, WB8CNN 6.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA0HLQ — SEC: K0FLQ. RM: WB0HCK. PAMs: K0CNV WA0YGQ. Major Traffic Nets in the CO Section are as follows: CRRG, 146.07/.67, Sun., 1900 local; CEPN, 3945, Sun., 0800 local; Hi-Noon, 3940/7240, Daily, 1200 local; PON, 3965, Sun., 0815 local; Weather Net, 3945, Daily, 0700 local; Columbine, 3989, Mon — Sat., 2000 local; Denver AREC, 146.34/.94, Sun., 0900 local; No. Metro AREC, 146.07/.67, Sun., 0930 local; RMRL, 146.34/.94, Sun., 1930 local; So. Metro AREC, 146.04/.64, Sun., 2045 local; TWN, 3570 Daily, 1930 & 2230 local; CWN, 3715, Daily 0130 UTC; PHC, 146.34/.94, 0100 UTC; Net Tfc. for Feb.: Hi-Noon QNI 1249, QTC 69, informals 257, QNF 1380, 28 sessions. (Jan.) Columbine QNI 1230, QTC 82, informals 235, QNF 1485. Traffic: (Feb.) W0WYX 1754, K0ZSQ 760, WB0QOT 302, W0HXB 161, WA0YNP 151, W0KLE 132, WB0PVT 128, W0LC 120, WB0BAL 114, W0RE 110, W0IW 105, K0PV 51, WB0NHA 48, W0LAE 31, WB0QPQ 12, WA0YED 8, W0GW 4, W0NFW 2, WB0GEX 1. (Jan.) K0YFK 738, WB0IBS 324, W0NZL 144, W0LQ 126, K0FLQ 112, WA0CNA 107, K0RTO 70, W0MYB 60, K0WZN 60, WB0NOH 58, K0IIY 57, WB0UQV 52, K0TIV 48, WA0REX 39, WB0MCL 34, W0PGX 32, W0YCD 32, K0UYF 30, WB0QPQ 28, W0ONF 24, WA0LSB 19, WB0ELD 10, K0CNV 9, W0NFW 8, W0SIN 6. (Dec.) K0YFK 838, WB0IBS 248, WA0CNA 80, W0RE 76, K0RTO 75, K0WZN 67, WB0NOH 60, W0NZL 49, WB0UQV 48, K0MDT 46, W0PGX 38, K0UYF 33, W0YCD 31, WA0REX 26, W0QOT 25, K0DND 18, K0CNV 14, W0MYB 14, WB0ELD 9, WB0ITG 7, K0FLQ 4, WA0DGJ 2, W0OII 2, W0OKH 2.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE — Asst SCM: Joe T. Knight, W5PDY. SEC: W5ALR. PAMs K5IKL, W5PNY. RM: K5KPS. New Mexico Road Runner Net, meets daily on 3940 at 1800 local time has a new net mgr., K5IKL, who reports for this month a total of 1036 QNI, 46 QTC. K5IKL also new PAM. Southwest net (SWN) had 279 QNI and 245 QTC, meets daily on 3585 at 1915 local time. The Breakfast Club net meets daily on 3940 at 0700 local time, had 522 QNI and handled 26 msgs. WR5ABV and WR5AJS are both off temporarily. WB5KSS now has RTTY. W5VDH reports the N.M. novice net is kaput, lack of activitity. W5VTL surprised that msg reporting has been changed since 20 years ago. K0KDT lost a tower and WA5RGA lost a cinder block wall in the last windstorm. WA5LTP out of the hospital and doing well. Pecos Valley ARS is having success qualifying Novices for license. Traffic: W5JOV 432, W5UH 295, W5DAD 254, W5ENI 174, K5KPS 150, WB5KSS 108, WB5LZF 74, W5MYM 48, W5RR 55, W5VDH 34, W5TWZ 27, W5VTL 27, WB5ROS 20, WA5MIY 13, WA5OHI 12, W5QNQ 7.

UTAH: SCM, Ervin Greene, W7EU — SEC: WA7ZBC RM: W7OCX. BUN Mgr.: W7OCX. UCN Mgr. WA7MEL. BUN meets at 1930 UCT on 7272 kHz daily. UCN meets on 3710 kHz daily at 0215 UCT. VHF Society officers for 1977: W7KCC, pres.; WB7BJV, vice-pres.; K7PQB, secy.; K7CQM, treas.; W7GPN, freq-coor. WA7ARK repeater tech. for WR7ADU. W7OCX received a Public Service award for Teton Dam Disaster Communications. W7RQT about to re-activate on EME from new location. K7SA reports excellent new location especially for WR7AAA communications. WA7ZBO on 432 through Oscar 7 mode with new Echo 70 CM. WA7HCQ has new call K7UT. W7BE enjoying a new facet of radio after 40 years since joining the 2-meter gang with his KDK FM 144X rig. Utah Amateur Teletype Society has new solid state repeater on .10-.70 and new location for better coverage without so much desense and inter mod. Traffic: WA7MEL 60, WA7TEH 48, WA7JR 33, W7OCX 33, WA7KHE 27, W7EU 18, W7DKB 17, W7BE 9.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — SEC: WA7NHP. RM: K8K5A. Welcome new Novices in the Cheyenne area WB7PJA WB8PJB WB7PJC and WB7PJE. WA7TCQ working in Cody for a while. The Sheridan amateurs will soon have a 2-meter repeater operating on 146.22/146.82 MHz. At least two more amatuers have joined the 2-meter fm gang, W7GM and WA7USI. As promised last month I have more on the location of the 1977 WY Hamfest. Dates July 16 and 17, at the Casper Community College. WA7NH

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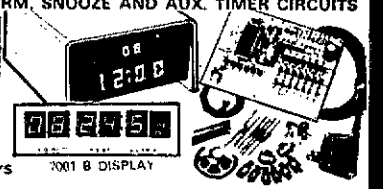
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3-Switches
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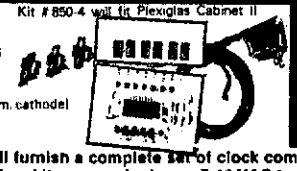
9-Resistors
24 Molex pins

Kit #850-4 will fit Plexiglas Cabinet II



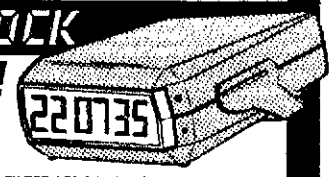
$11.95 ea. QTY. 1-5
$10.95 ea. QTY. 6-11
$9.95 ea. QTY. 12 OR MORE

"Kit #850-4 will furnish a complete set of clock components as listed. The only additional items required are a 7-12 VAC transformer, a circuit board and a cabinet, if desired."

PRINTED CIRCUIT BOARD FOR KIT #850-4, SCREEN PRINTED DRILLED AND SOLDER PLATED FIBERGLASS $2.95
MINI-BRITE RED LED'S (FOR COLON IN CLOCK DISPLAY) ... Pkg. of 5-$1.00
MOLDED PLUG TRANSFORMER 115/10 VAC (WITH CORD) $2.50
NOTE: Entire Clock may be assembled on one PC Board or Board may be cut to remote display.

MOBILE LED CLOCK

12/24 HR .4" DIGITS!



MODEL #2001 — 12 VOLT AC or DC POWERED

- 6 JUMBO .4" RED LED'S BEHIND RED FILTER LENS WITH CHROME RIM
- SET TIME FROM FRONT VIA HIDDEN SWITCHES • 12/24-Hr. TIME FORMAT
- STYLISH CHARCOAL GRAY CASE OF MOLDED HIGH TEMP. PLASTIC
- BRIDGE POWER INPUT CIRCUITRY — TWO WIRE NO POLARITY HOOK-UP
- OPTIONAL CONNECTION TO BLANK DISPLAY (Use When Key Off In Car, Etc.)
- TOP QUALITY PC BOARDS & COMPONENTS - EXCELLENT INSTRUCTIONS
- MOUNTING BRACKET INCLUDED

KIT #2001 COMPLETE KIT (Less 9V. Battery) **29.95 EA.** 2 OR MORE **$27.95 EA.**
115 VAC Power Pack #AC-1 **$2.80 EA.**

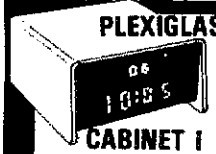
ASSEMBLED UNITS WIRED & TESTED ORDER #2001 WT (LESS 9V. BATTERY) **$39.95 EA.** 3 OR MORE **$37.95 EA.**
WIRED FOR 12 HR. OP. IF NOT SPECIFIED OTHERWISE

60 HZ. XTAL TIME BASE

Will enable Digital Clock Kits or Clock-Calendar Kits to operate from 12V DC. 1"x2" PC Board Power Req.: 5-15V (2.5 MA. TYP.) Easy 3 wire hookup Accuracy: ± 2PPM

#TB-1 (Adjustable) Complete Kit **$4.95 ea.**
Wir & Cal $9.95

PLEXIGLAS CABINETS



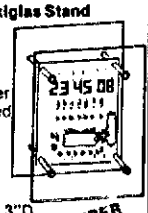
Great for Clocks or any LED Digital project. Clear-Red Chassis serves as Bezel to increase contrast of digital displays.

CABINET I 3"H, 6¼"W, 5½"D
CABINET II 2½"H, 5"W, 4"D
Black, White or Clear Cover
$6.50 ea.

RED OR GREY PLEXIGLAS FOR DIGITAL BEZELS 3"x6"x1/8" **95¢ ea. 4/$3**

SEE THE WORKS Clock Kit Clear Plexiglas Stand

- 6 Big .4" digits
- 12 or 24 hr. time
- 3 set switches
- Plug transformer
- all parts included



Plexiglas is Pre-cut & drilled
Kit #850-4 CP
Size: 6"H, 4½"W, 3"D
$23.50 ea. 2/$45. A SUPER CLOCK!

JUMBO DIGIT CLOCK

A complete Kit (less Cabinet) featuring: six .5" digits, MM5314 IC, 12/24 Hr. time, 50/60 HZ., Plug-Transformer, Line Cord, Switches, and all Parts. (Ideal Fit in Cabinet II) Kit # 5314-5 . **$19.95 2/$38.**
WITH PC Board's

JUMBO DIGIT CONVERSION KIT $9.95 ea.
Convert small digit LED clock to large .5" displays. Kit includes 6 - LED's, Multiplex PC Board & easy hook up info.
Kit # JD-1CC For common Cathode
Kit # JD-1CA for common Anode

TELEPHONE FORMAT KEYBOARD
BY Chomerics
EF-21360
2-1/4"x3"

5/32" thick
$4.95 6/$28.

25 AMP BRIDGE

$1.95 ea. 3/$5.00

NEW LSI TECHNOLOGY

FREQUENCY COUNTER KIT

8 LARGE .4" RED LED DIGITS

• ONLY 8 IC's! • XTAL TIME BASE

A truly "State of the Art" counter using quality components throughout.

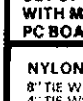
KIT INCLUDES: DETAILED INSTRUCTIONS, XTAL, TOP QUALITY FIBERGLASS DOUBLE SIDED PC BOARD, IC'S WITH SOCKETS AND ALL PARTS LESS POWER SUPPLY AND CABINET.

50 MHZ COUNTER KIT	#FC-50	$69.95
5 VOLT REGULATED 1 AMP POWER SUPPLY KIT	#PS-02	$9.95
350 MHZ PRESCALER KIT	#PSL-350	23.95
850 MHZ PRESCALER KIT	#PSL-650	$29.95
CABINET [& MTG HARDWARE]	#CAB III	$19.95

[CABINET WILL HOUSE #FC-50, #PS-02, AND A PRESCALER]

DELIVERIES TO START IN MAY, 1977

Fairchild Super Digit FND-359



.4" Char. Ht. 7 segment LED RED Com. Cath. Direct pin replacement for popular FND-70.
95¢ ea, 10/$8.50 100/$79.00

SET OF 6 FND-359 WITH MULTIPLEX PC BOARD $6.95

NYLON WIRE TIES

8" TIE WRAP 100/$1.95
4" TIE WRAP 100/$1.75

PLUG TRANSFORMERS

12 VAC at 150 MA	$ 2.50
12 VAC at 500 MA	3.50
7VAC at 1.75 VA	$3.50

SCHOTTKY TTL

74S00	$ .35
74S01	.40
74S04	.55
74S05	.60
74S09	.55
74S10	.40
74S20	.50
74S22	.45
74S40	.45
74S50	.45
74S51	.55
74S60	.85
74S64	.55
74S74	.85
74S75	1.75
74S78	1.50
74S86	.95
74S107	.55
74S112	.95
74S113	1.40
74S114	.95
74S133	.75
74S134	.75
74S138	1.75
74S139	1.50
74S151	1.95
74S153	1.95
74S155	1.95
74S156	1.95
74S157	1.80
74S158	2.50
74S174	2.50
74S175	2.50
74S181	2.95
74S182	1.95
74S251	2.75

DIGITAL CLOCK IC's

MM5312	$ 4.95
MM5314	3.95
MM5375 AB	3.95
CT-7001	7.95
CT-7002	13.95
MM5369	2.50

LED DRIVERS

7447	$ .95
7448	.95
75491	.65
75492	.65

PRESCALE

11C90DC	$15.95
95H90	9.95

VOLTAGE REGULATORS

LM 309 H	TO-5	$ .95
LM 309 K	TO-3	1.25
7805	TAB	.95
7812	TAB	1.25
7812	TO-3	1.50
7815	TO-3	1.25
7815	TAB	1.25
78L 15	TO-5	.75
7824	TO-3	1.25
723	DIP	.75
723	TO-5	.75

PROM

1702 E Prom $8.95
5203 E Prom $8.95

SWITCHES

ROCKER SPDT	6/$1
MINI-SLIDE SPDT	5/$1
REG. SLIDE DPDT	6/$1
PUSH BUTTON N.O.	3/$1
MINI SPDT	$1.30
TOGGLE DPDT	1.50

IC SOCKETS

PINS	1-24	25	100
8	$ .25	$ .22	$ .20
14	.25	.22	.20
16	.28	.25	.23
18	.31	.28	.26
24	.50	.45	.40
28	.60	.55	.50
40	.75	.70	.65

XTAL

3.579545 MHZ. $1.95

21L02

PRIME - 450 NS LOW POWER FAIRCHILD OR SIGNETICS

1-24	$1.95
25-99	1.75
100-199	1.60
200-499	1.45
Over 500	1.40

TRANSISTORS

2N2222 A	TO-18	3/$1.00
2N2712	TO-98	5/$1.00
2N3415	TO-9	5/$1.00
2N3704	TO-92	5/$1.00
2N4400	TO-92	5/$1.00
2N4125	TO-92	5/$1.00
2N4249	TO-92	5/$1.00
2N4937	TO-92	5/$1.00
2N6027	PUT	2/$1.00
2N5457	N J-Fet	2/$1.00

DIODES

IN 4002	1A, 100 PIV	12/$1.00
IN 4005	1A, 600 PIV	11/$1.00
IN 4007	1A, 1000 PIV	10/$1.00
RECTIFIER	2.5A, 1000 PIV	4/$1.00
IN 914	SIL. SIGNAL	20/$1.00
IN 4148	SIL. SIGNAL	20/$1.00
DYAC	28V.	4/$1.00

LINEAR

555	TIMER	2/$1.00
556	DUAL TIMER	.95
565	PLL	.95
566	FUNCTION GEN.	1.75
567	TONE DECODER	1.75

TRANSISTOR SOCKET TO-5/18 GOLD PINS

5/$1.00

7-SEG LED

COMMON CATHODE

	COLOR	HT	DEC PT	PR EA
FND-359	RED	.4"	RHDP	$ .95
FND-503	RED	.5"	RHDP	$1.35
DL-750	RED	.6"	LHDP	$2.95
XAN 654	GREEN	.6"	NDP	$1.95
XAN 664	RED	.6"	NDP	$1.95

COMMON ANODE

DL 747	RED	.6"	LHDP	$1.95
XAN-72	RED	.3"	LHDP	$1.25
MAN 72	RED	.3"	LHDP	$1.25
XAN 81	YELLOW	.3"	RHDP	$1.75
XAN-351	GREEN	.3"	RHDP	$1.50
XAN-361	RED	.3"	RHDP	$1.50
XAN-362	RED	.3"	LHDP	$1.50
XAN 662	RED	.6"	NDP	$1.95
XAN-692	RED	.6"	NDP	$1.95

OP AMPS

3/$1.00
301 TO-5
709 DIP
709 TO 5
741 DIP
741 MDIP
741 TO-5
747 TO 5

DISCRETE LED's

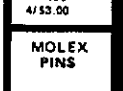
JUMBO RED

10 FOR $1.00
100 FOR $9.50

PC TRIM POTS

25K 6/$1.00
4.7K 6/$1.00
SPECTROL 10K 10 TURN 95¢
4/$3.00

MOLEX PINS



Foran Inexpensive Sockets

100 for $1.25
Reel of 1000 $8.50

AUTO BURGLAR ALARM KIT

AN EASY TO ASSEMBLE AND EASY TO INSTALL ALARM PROVIDING MANY FEATURES NOT NORMALLY FOUND. KEYLESS ALARM HAS PROVISION FOR POS. & GROUNDING SWITCHES OR SENSORS. WILL PULSE HORN RELAY AT 1HZ RATE OR DRIVE SIREN. KIT PROVIDES PROGRAMMABLE TIME DELAYS FOR EXIT, ENTRY & ALARM PERIOD. UNIT MOUNTS UNDER DASH - REMOTE SWITCH CAN BE MOUNTED WHERE DESIRED. CMOS RELIABILITY RESISTS FALSE ALARMS & PROVIDES FOR ULTRA DEPENDABLE ALARM. DO NOT BE FOOLED BY LOW PRICES! THIS IS A TOP QUALITY COMPLETE KIT WITH ALL PARTS INCLUDING DETAILED DRAWINGS AND INSTRUCTIONS OR AVAILABLE WIRED AND TESTED

KIT #ALR-1 **$9.95**
#ALR-1WT WIRED & TESTED **$19.95**

VARIABLE REGULATED 1 AMP POWER SUPPLY KIT

- VARIABLE FROM 4 to 14V
- SHORT CIRCUIT PROOF
- 723 IC REGULATOR
- 2N3055 PASS TRANSISTOR
- CURRENT LIMITING AT 1 Amp

KIT IS COMPLETE INCLUDING DRILLED & SOLDER PLATED FIBERGLASS PC BOARD AND ALL PARTS (Less TRANSFORMER) KIT #PS-01 $8.95

TRANSFORMER 24V CT will provide 300MA at 12V and 1 Amp at 5V with #PS-01. $3.50

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WE PAY ALL SHIPPING IN CONTINENTAL USA — OTHERS ADD 5% (10% FOR AIRMAIL)
SEE OUR BOOTHS AT THE ATLANTA HAMFESTIVAL - JUNE 18-19, 1977

just returned from a trip to Hawaii. W7VB planning trip to AZ. K7SLM reports WY Cowboy net held 20 sessions with 637 QNI, 17 QTC. Traffic: W7SQT 454, K7VWA 432, W7TZK 315, WA7WXQ 17, K7SLM 6.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Birmingham, Mobile, Twin Base and Huntsville ARCs have code/theory classes going again. Birmingham ARC had another "standing room only" crowd show up for their initial class; don't forget the B'hamfest May 7 & 8. The Twin Base club paper reports a YL. Net has been started on 3i/91, 1000 hours each Wed; all check-ins welcome and WA4UAW is NCS. The Huntsville Area Young Ladies ARC (HAYLARC) has been organized with about 42 licensed-lady Ham members. Officers of the Muscle Shoals ARC are: WA4EEC, pres.; WA4HUJ, vice-pres.; WA4ZDW, secy-treas.; WB4FIR, repeater trustee; K4ODU, EC; K4LGF Director. K4IKR was MC for the Old Timers night at the Huntsville ARC. Speakers were K4YUP K4RSB W4YFN K4DAB and WB4PRF. Good to have WB4PRF visit us; he is the PAM; TN Section. W4HHU was presented a certificate in recognition of his NTS activities. K4IKR and WA4GQD were elected Honorary members of the club. New NM of SENS is K4VZN, replacing WB4BFQ who had served since Sept. 1975. K4HJM and W4MHO report AENW alerted 3 times for WX watch in Feb. Also the Golden Gabbers celebrated their first anniversary on Feb. 18. WB4BAP now W4XI. Appointed WB4KSL as ORS. Endorsed K4HJM K4LYY and K4WSS as ECs. Traffic: (Feb.) WA4JDH 974, W4RQS 381, WB4EKJ 354, WA4RND 76, K4AOZ 72, K4LYY 36, WB4RCH 26, WB4AYO 23, WA4RMP 17, WB4TVY 14, K4UMD 10, W4MHO 6, K4HJM 2. (Jan.) WA4TMG 87, WB4AYO 21, WB4IYW 21, WA4FHY 2.

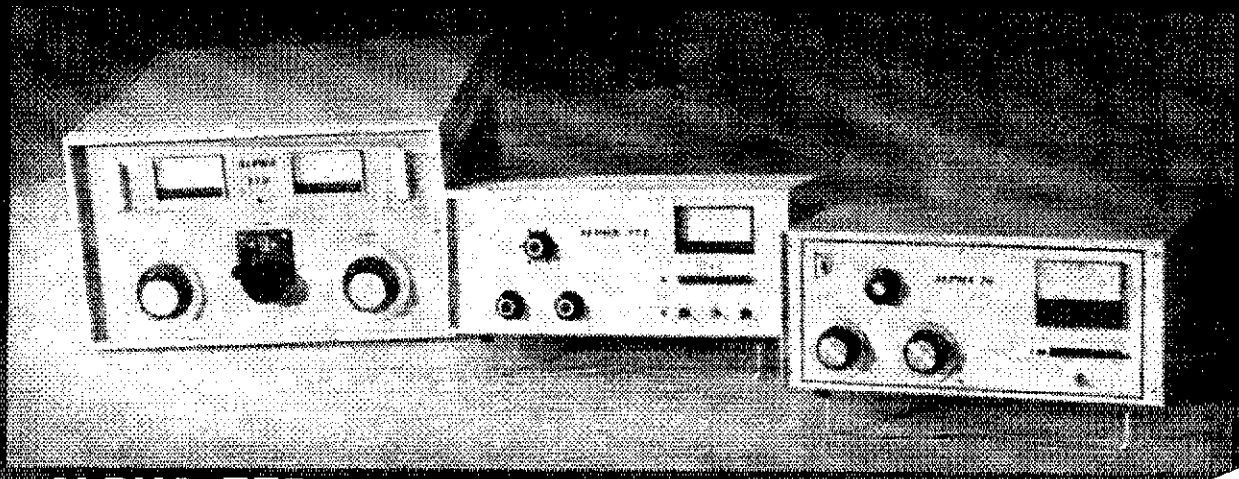
GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. RM: K4FLR. PAM: K4JNL. Congrats to W4FOE on making BPL and to K4EV, WA4PZD and WB4TEK on making PSHR. GA is well represented in traffic activities and has excellent nets. If you are not a part of them please get active and send in your report to the SCM not later than the 5th. WB4ACV made DXCC. WB4LOK active in fone and cw contests. WR4AAE handled at least 11 emergency calls. Central GA VHF net QNI 142, QTC 6. GARES QNI 123, QTC 14. CVEN No. 1 QNI 40, QTC 8. CVEN No. 2 QNI 644, QTC 38. Congrats to W4RS on his 78th birthday. WA4PZD now liaison with National Weather Service, Atlanta, for emergency planning and work. With sadness we note that W4NF and W4DKK are Silent Keys. K4SO K4FEZ and WA4JPP helped K4PIK get his six-element triband up on a 50-foot tower. W4SHL participated in Feb. FMT. WA4OKJ now General and WB4IGS is an Advanced. WR4AKF now in Savannah on 37/97. ND4JC report shows WA4BDE WA0DGL WA4KCL WA4KCJ WA4HGS WA4BDD K4GCR K4GBL K4KZO WA4LHH WA4RDO W4UFD K4ZHT and WA4RWS were responsible for making over 1700 contacts with 50 states and 23 DX locations. A great job well done. GSBN reports 4021 points for the SET with W4DOC K4JSR WB4BEO WA4ZYT WB4IUK WA4EPK K4CRO W4VTA WB4HIQ K4FRM W4HON WA4OZT WA4JTC WA4SSU K4VHC K4JNL WA4AKU WA4OQO W4BKK WB4MZO WA4AJY as NCS and W4FOE W4GH WA4EPK WA4OZT K4EV WA4HHW K4BAI WA4AJY WB4TEK WA4OQO and WA4BZY as liaison. Traffic: (Feb.) W4FOE 549, WB4WQL 136, W4PIM 77, W4CZN 72, K4NM 52, K4YRL 34, WB4DHC 31, K4EV 29, W4HON 29, K4NWB 28, WB4TEK 27, W4SHL 14, K4WC 14, WA4PZD 9, W4JM 4, W4LGM 4, WA4RWS 4. (Jan.) WA4AKU 87, WB4WQL 72, W4FVT 64, WB4ACV 6, WB4LOK 2.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: WA4FBI. PAM: W4WNY/75; WB4BSZ/VHF. New/renewed appts.: WB4NAY as EC of Leon Co. WB4NMU and WA4TXM OPSs; W4IA ORS; WB4UQH OVS. SNCs earned by W4DTS K4EJW WB4EXN WA4EYU WB4FHT WB4FJY W4GUJ WA4HHC WA4IWW WA4LHX and WB4NMU on FPTN; WB4ADL K4ELH WB4FHT W4MVG WB4NMU WB4TVG and WB4TZR on NFPN; WA4OEM on TPTN; WB4QBB/N on QFNS. New NM of NFPN is WA4TNC. WB4OMG elected pres. of FL Repeater Council; W4SME vice-pres.; W4FZX, treas. New Pensacola Club officers: PFMRA WB4MUS, WA4MYF and WB4PKR; FFARA K4QZO K4HYV and WA4RQH. New calls: K4BSS now N4SS; WA4LBM now K4XK; WB4TVB now N4NS; WA4KII now W4KXZ. QST cartoonist K4PP now living in Pensacola. WB4SKI earned BPL. On recent 2m band opening, W4CSS worked 8 states; W4RH worked NM and CO. WA4LGK is new Editor of Tallahassee ARC newsletter. WB4LNO WA4RUR WA4WCG and WB4YKV upgraded. New Orange Park ARC officers: K4BSN, pres.; WB4CGD, vice-pres.; WA4HOL, secy.; WA4UBN, treas. WA4WPQ is chmn. of NOFARS Emerg. Power committee. Gateway Chapter QCWA holds net at 1600Z Sat. on 3930 kHz. WA4EYU won an IC-22S at Miami Hamboree. EC W4UJL prepared FB report on his SET drill. WB4YTX on VP of Orlando ARC and Asst. EC for Seminole Co. W4MGO apptd. ARRL Asst. Dir. W4MB and WA4CRI sporting new 2m rigs. WB4NGJ teaching DBARA Novice class. NPR 07/67 repeater now on the air. Traffic: (Feb.) WA4TXM 349, WA4FBI 337, WB4SKI 261, WB4NMU 226, W4ILE 183, W4WNY 152, WA4EYW 120, W4KIX 97, WB4FHT 96, W4JL 91, WB4TZR 86, WB4DTS 80, WA4QQG 78, N4SS 75, WB4NJI 71, W4LDM 66, WB4QBB/N 63, WB4VAP 60, WA4OEM 54, WA4EYU 48, WB4HRG 48, W4RH 36, WA4CRI 35, W4FJY 28, WB4TVG 26, W4MGO 25, K4DDY 24, WA4FKE 23, WB4YKV 20, WB4ADL 19, K4QER 19, WB4VDL 16, WA4IWW 12, WA4TNC 12, K4FLV 10, K4RNS 10, WB4DXN 6, WA4HCS 6, WA4ZVP 6, WB4YTX 5, WB4IJR 2, W4IA 1. (Jan.) WB4TVQ 15, W4IA 6.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH. Asst. SEC: W4WYR. RM: W4MEE. PAMs: WB4AID WA4NBE. New appointments this month: W4NOK OBS, KP4CM/N4 OO. Congrats to W4MEE who received his BPL Medaillon. Net certificates issued: Gator Net WB4SNX; FPTN W4DDW K4DLC WA4EIC WA4HHW W4IAD K4KIC W4KDN W4NBE WB4RVW K4SJA W4SWW K4TH WB4WYG; NFPN W4VZ W4YOG; QFN WA4JPV W4MEE; SPARC WA4QGV. W4BK recovering nicely from recent operation. Running for national QCWA offices are K4NE for dir. and W4BK for treas. — two good men from the Gator Chapter. On Feb. 18-20, St Petersburg amateurs under leadership of WA4FEN provided communications for Ladies Professional Gol

ALPHA POWER

. . . FOR THAT BIG SIGNAL



ALPHA 77D
'THE ULTIMATE'

- Runs cold and whisper-quiet in all modes at maximum legal power.
- Full 10-160 meter coverage.
- Built-in QSK system
- Vacuum tuning citor & T/R
- Re

ALPHA 374
'NO TUNE UP'

- Smallest & lightest true locked-key kilowatt.
- 10-80 met
tion with
all

ALPHA 76
'RUGGED

- R

An **Alpha** linear is an investment in performance and pleasure. **FCC's PROPOSED NEW RULES MAKE PURCHASE OF A NEW ALPHA RIGHT NOW AN EVEN BETTER INVESTMENT!** A CB-control rule likely to be adopted soon would *ban 10 meter coverage* in all new commercial linears, while permitting continued use and resale of existing linears. Cost-increasing type acceptance is also expected. With excitement growing on 10 as sunspots climb, shouldn't you invest in a new *full-coverage* **Alpha** *now*? ETO has doubled production to make it possible if you act quickly.

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Quality shows, in features such
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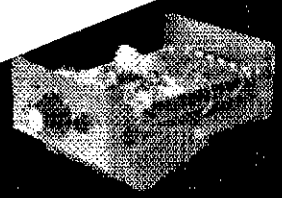
m Eimac ceramic triodes, ducted-air
ooling, husky rf components, and the full-year warranty shared by all **ALPHA** linear amplifiers. Write or call ETO direct for detailed literature and prompt delivery.



ALPHA/VOMAX
'TOPS IN TALK POWER'

- New split-band speech processor is actually more effective than rf clippers!
- Extremely low distortion.
- Easy to use with any rig.
- Money-back guarantee!

$179.00 (12 VDC); AC supply $15.

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Tournament, proceeds going to charity. We understand about 8 hand-held 2-meter units were used with excellent results. On Feb. 5 and 6, Pinellas County amateurs headed up by K4CNB and K4NAN provided safety communications for the Southland Reggatta (hydroplane races) on Lake Maggiore in St. Petersburg. The 18 operators involved received compliments for their "professionalism" and discipline. Osceola ARES handled radio for Celebral Palsy telethon, displaying excellent emergency capability. Tampa ARC had excellent results with booth at Florida State Fair telling the Amateur Radio story to the public and handling 4651 messages. 220 MHz operations in Pinellas County is really blossoming, with another group purchase order for 17 Midland 13-509 units. There are at least 34 different stations active on 220, one station having 4 of the Midland units. W4APV has ordered a new antenna and hard-line to place his 220 MHz repeater in service in St. Petersburg. Traffic: (Feb.) W4DUG 4651, W4MEE 864, K4TH 503, W4SJH 476, WA4SCK 434, K4SCL 429, W4DVO 358, WB4WYG 303, WA4JPV 190, WA4NBE 169, W4QM 157, WB4AID 140, W4EH 137, WA4ZHU 111, WA4EIC 103, WA4GYR 90, W4WYR 85, W4NTE 82, WB4ALH 71, W4GPL 65, W4IRA 65, WA4QGV 60, K4BLM 48, N4ET 48, W4GDK 48, WA4WDM 46, WA4UQQ 34, WB4KSJ 29, WB4RVW 29, K4EUK 21, K4CFV 21, WB4IZS 21, WA4PFK 20, WA4HDH 16, K8PXM 10, W4SMK 7, WA4GNI 6, WB4IKX 6, W2PF/4 6, W4BK 5, WB4FLW 5, W4KGJ 4, W4MML 2, K4FAU 1. (Jan.) WB4ALH 222, W4DVO 135, WA4SCK 87, WA4CTM 58, WB4FLW 6, W4ZR 1. (Dec.) WA4CTM 32, WB4FLW 25.

WEST INDIES: SCM, David Novoa, KP4BDL — KP4ZC very active as OO. KP4EOT passed his General, KP4DDP made Bicentennial WAS on 75 meters. He's also active on 15 m. KP4IS now retired and working DX on 20 ssb. W8DSX/KP4 doing FB job as Eng. in Charge of the San Juan office of the FCC. We heard a lot of activity from the KP4s and KV4s in the DX Competition. OBS KV4FZ passes ARRL bulletins daily in the Antilles Emergency & Weather Net. KP4s EMP BL and DJ recovering. KP4BJM has a new QTH. KP4EHF very active as NCS for La Santa repeater net. KP4AYA does same thing for El Gallito. KG4-Land members should remember that this is their section and send activities reports to your SCM.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — RM K7NHL. PAMs: WA7KQE & W7UQQ. Scottsdale ARC is conducting a series of technical presentations at club meetings on servicing ham gear and using test equipment. The club now has a shack at 2009 N. Scottsdale Road. W7JKD now N7AR, and WA7TZO now N7US. Officers of the new Metropolitan ARC at Tucson are W7KMV, pres.; W8KRH, vice-pres.; K7CC, secy. and chief op. WA4ART, treas.; WB7DRD, board member. Members of the AZ Repeater Assn. provided public service communications for the Wickenburg Gold Rush Days parade, with WA7GLP and WB7DKJ assisting on two ambulance emergencies. K6QPV/7 is sponsoring an ARC at Marcos DiNiza HS in Tempe. WB7OWW is the newly-issued call for the Flagstaff Jr. HS ARC. Nets. (Feb.) Cactus Net 757, ATEN 46, SWN 245. (Jan.) Cactus 610, Cactus slow speed 8. Traffic: (Feb.) K7NHL 305, WB6WQH/7 266, WA7KQE 42, W7UQQ 42, K7ZUY 42, WB7CAG 38, W7EH 27, W7HFR 27, W7DQS 25, WA7WEB 23, K7MTZ 6, W7RQ 5, K7NMQ 4, K7GH 3, K7GLA 2. (Jan.) WB6WQH/7 229.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — RMs: WB6PKA. Attention: let's not forget the Lockheed RC 12th annual Los Angeles Radio Convention. The happy event will be May 21 and 22 at the Lockheed recreation center on Empire Street in Burbank. The Los Angeles Mayor has proclaimed May 22 and 23 Amateur Radio Weekend. The Proclamation is on display at the Lockheed W6LS station. WA6HUI is this year's co-chairman of the W6LS Ham Convention. The JPL RC is selling its Slow Scan TV MARS picture cassettes, those interested send $3.75 each to Dick Piety, Mail Stop 158-205. The TRW RC is still desperately looking for a new editor for the Club Bull; they would appreciate hearing from some of the members. The San Gabriel Valley RC will present Ham Radio to the public at the annual Arcadia Park in Jun display. All users are invited to display their clu projects, whatever they may be. For more info contac WA6CBJ. This is to inform you that yours truly W6INH has joined the world famous club of retiree and professional loafers, to take it easy and keep looking for my replacement. Must have at least General class license and preferably a CW operator t make the thing work properly. WB6PKA has bee experimenting with phased verticals on 3.5 MHz, ha been having good luck chasing those rare ones there. I the recent San Fernando RC bulletin I noticed tha they are already getting organized for Field Day. Among those getting ready are WB6OYD an WB6EPS, with the help of many others. The JPL R now has their two-meter repeater operationa WA6PEA just finished getting the rig on the air an sent a few squelch tails and had two answers, that really getting on in a hurry. Traffic: W6INH 242 W6OEC 132, WB6OUD 129, W6SGZ 102, W6HUJ 94 W6QAE 60, WB6PKA 36, W6BRO 22, K6EA 20 W6USY 16, WA6EWY 10, K6CL 7, W6NKE 7.

ORANGE: SCM, Wm. Heitritter, WB6AKR — Ass SCM: Dick Birbeck, K6CID. SEC: W6AQB. PAM W6BPB. RMs: WA6TVA, WB6AKR. ECs: WB6ARH K6GGS W6LKN WB6NSU WA6VMI WA6YWS. Ana heim Amateur Radio Assn. P. O. Box 2242, Anaheim CA 92804 sponsoring Worked Orange County Award Contact: Award Manager for requirements of thi award. The Morongo Basic ARC and Palm Spring ARC provided communications for the USO 100 Mil Palm Springs Marathon Run which was conducted t raise funds and stimulate interest and goodwill of th Armed Services. W6AUW has a new TS-520. K7BHI/ a new TS-820. WA6HUB has 34 students in amateu radio class. WB6AYA on RTTY with HAL DS-300 KSR Video Display Terminal. St Jude Hospital AR needs help in building an operating position for whee chair operators. Contact K6CRX for details. WR6AA is off the air awaiting FCC application for change i trustee to be processed and approved. The Orang County Council of Radio Clubs has been reactivate with WA6HKW, chmn. and W6HHC secy-trea WA6MPI Novice class has over 30 students. RM an Mgr. of Southern Calif. Net (3,598 daily at 6:30 P.M WA6TVA seeking participation interest for additiona sessions of Novice Emergency Net on 3.730 at 5:3 P.M. This effort is coordinated with EC and Mgr.

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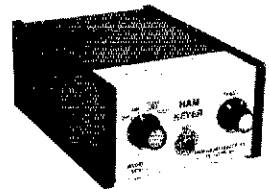

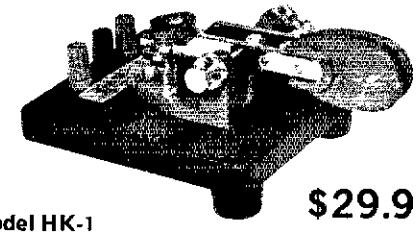

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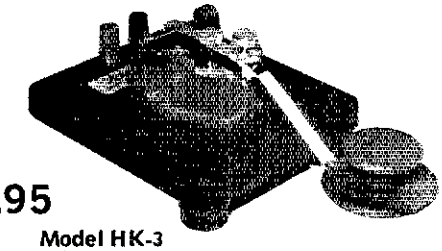

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NEN WA6YWS. WA6PTX and WA8WDZ/6 are now active on SCN. WB6AKR has assumed the Responsibility of preparation and issuance of SCN award certificates and endorsements. In order to devote more time to SCN and duties of SCM; WB6AKR has resigned as NCS and Asst. Mgr. of the Pacific Area Net. New equipment at WB6AKR include Icom IC-22S mobile and Icom IC-245/IC-3PA with KLM eight-element beam for base station. W6AQB reports WB6EOW now a Silent Key. Traffic: (Feb.) WB6EIC 656, WA6TVA 94, W6RE 51, WA8WDZ/6 48, W6CPE 40, W6QBD 14, WA6YWS 9, WB6SKL 4. (Jan.) WB6NEX 32.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — Only 16 months until the ARRL National Convention in San Diego, Sept. 22-24, 1978. Attention clubs: If you have special events planned, notify SCM W6INI (three months in advance) so that it can be carried in this column. San Diego Repeater Assn. is well over the 500-member mark. What are you doing for public service? Try handling traffic with the National Traffic System (NTS). Evening nets are CW while daytime ones are phone. Contact me for details or check in on Southern Calif. Net (SCN), any day, at 1830 PT, 3595 kHz. Daytime Region Six Net is daily at 1400 PT on 7267 kHz. Try it, you'll like it! W6INI and WB6GYE demonstrated the merits of amateur radio to students at the Oakcrest Junior High School in Encinitas. Thanks to WA6RDN for the use of his Atlas 210. Upgraded: WA6EJL to Advanced, WA6ODE to General. New ARES members: WB6FTW K6GP WA6KJT WA6MMH WA6PKX WB5QIQ WB6RJE WA6RVB WA7YHX. North Shores ARC club members and XYLs visited Ensenada, B.C., Radio Club. North Shores pres. WA6LZA/XE2QB made the arrangements. Traffic: (Feb.) WB5PVH 342, W6BGF 212, KG6JES 106, W5PZU 42, W6DEY 28, W6SIF 20, K6LKD 2, WA6UFY 2. (Jan.) WA6EJL 14.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DE — The Santa Barbara Club has 91 students in their license classes. Contact WB6HOZ and WA6BLS for info. K6QPH and K6WI were active in the ARRL DX contest. WB5KPL issa regular NCS on RN6. W6PNM transmits bulletins on WR6AOX in Ventura. WB6RIX handled 73 patches and 10 msgs on MARS. The Section ARES Net has moved to 1930 Wed. and the VHF net to 1900 on WR6AFI. SBARC had presentation on microprocessors and the Poinsetti Club in Ventura has W6HHG reminisce on WW II radio days. WA6KYW has a new beam up above Ventura thanks to WA6TMQ. WA6GHB has won two Poinsettia Club awards. The appointee review has been completed. If you didn't get a letter and you think you should have, contact WA6DEI. PSHR: WA6VBS 35, WB5KPL 34, K6WI 31, WA6DEI 30. W6RIC is doing a great job as EC in Ventura county. He needs help from the Simi area. W1UUQ is now WA6TUQ and also the new Disaster Communications Chairman for the Santa Barbara Red Cross. Traffic: WA6VBS 184, WB5KPL 111, K6WI 111, WA6MBZ 100, WA6DEI 33, W6PNM 4.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, W5EJ - Asst. SCM: Ruth Chance, WA5VJW. SEC: W5DWL. RM: W5LA. Much activity in classes by all clubs in the North Texas region with hundreds of Novices and much upgrading. KC club of Ft. Worth using the new ARRL Novice package. Hear much good comment on "instant" upgrading. Understand TX H. B. 383 was left to quietly die by its sponsor following a briefing on its possible impact by Dallas Amateurs. Congrats to WA5ZNZ, finally topped out on that 13 wpm and now headed for Advanced. W5LUB with new W5NT call. Heard from WA5KZA, on activities in Red River Valley ARC in connection with repeaters for Sulphur Springs and Paris ARC WR5ALX working together. Garland ARC new prez W5TGA who bemoans the fact that he can never raise WB5PRD on 88. Dallas County RACES SKYWARN program kicked off Feb. 31-19 on tornado awareness with Allen Moller conducting classes. WB5KSM is conducting slow-speed code practice on 28.605, on Wed. at 9 PM. SWO I growing by leaps, membership up to over 400. Contact W5JTA for info on this first rate VHF DX and what have you activity. West Gulf Division is 8th in rank for membership in ARRL. Slow speed traffic net still very much needed, if interested write W5LA who will get things going. W5DWL arranged terrific SET program for North TX region, response and activity was good on all counts. Heard rumors proposed ARRL meet scheduled for Austin in July has been changed to Oct. Amarillo Repeater Society readying new 07-67 repeater. It's not too late to send a few bucks to help out. Send to WB5GII. West TX boys report 2-meter openings beginning, with 1200 mile contacts reported on 52 simplex. The SW Dallas boys 06-66 repeater working out fine from Duncanville area, and Denton 31-91 really socking into the Metro area. K5LZA reports Dallas County RACES stands at 341 members with net alert by tone over WR5ABY on 28-88. W5T putting up antenna for a whack at 160 meters. W5SHN's traffic total is sumpin' to look at. We need ECs for Denton and Ellis County, contact W5DWL. Already we're hearing planning for Field Day, looks like a big one this year. Keep reports coming in, we want to hear from you and what's happening at your QTH. Traffic totals reported are getting higher each month, how about yours? Traffic: W5SHN 633, W5T 303, K5QKM 57, K5SOR 57, WB5LWB 22, K5LZA 20, W5YK 16, W5EJ 14, W5DWL 4.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN - Asst. SCM: Raymond L. Miller, W5REC. PAMs: WB5AZS WB5KGP and WA5OUV. RMs: W5RB and WB5NKD. Feb. traffic totals above a year ago but below Jan. Still a fine report. More than 300 attended the OK City Auto-Patch Weather Watch Meeting. A fine program and a well-organized Storm Watch Net. I am pleased to hear of the Local Nets being operated via the repeaters. Ardmore, Elk City, Muskogee and Woodward are the ones that I have heard from. The League Bulletins are being read on several of these and we can use more OBS. These local Nets can and do help in many ways. Operator Training, Traffic outlet to and from NTS, Exchange of Information and Weather Watch when needed. With the coverage we have now, nearly 2/3 of OK can be reached via 2-meter FM. Ponca City should have a new receiver up on a taller tower by now. The OK Panhandle Machine should be operational soon. I do not have space to list all the new calls that have been reported. I wish to welcome each of you and encourage your particip

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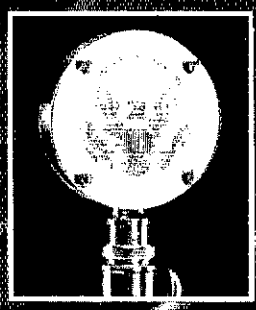

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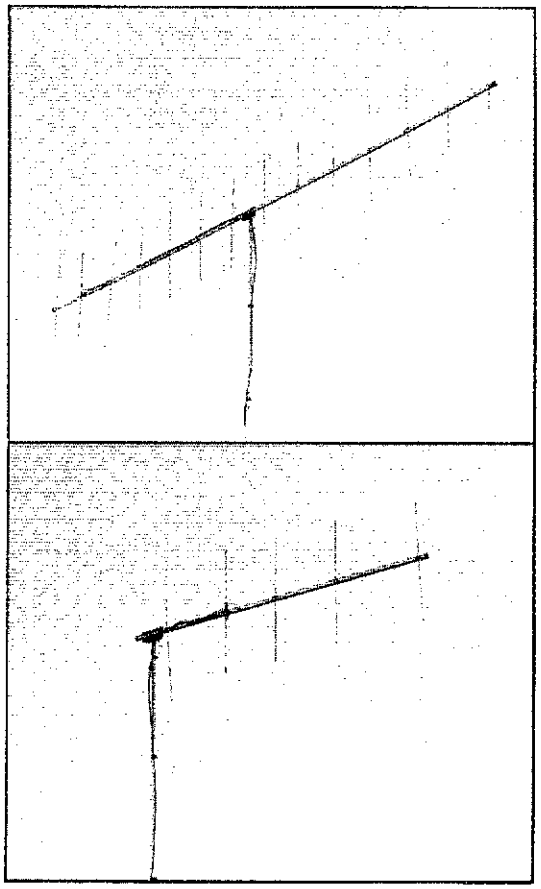

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Boom length	186″	148 ¾″	75″	43½″
Longest element	39½″	40¼″	39 ⅝″	40¼″
Turning radius	95″	75 ⅛″	73″	43½″
Wind survival	80 mph	80 mph	80 mph	80 mph
Mast diameter	1¼-1⅝″ O.D.	1¼-1⅝″ O.D.	1¼-1⅝″ O.D.	1¼-1⅝″ O.D.
Boom diameter	1¼″ O.D.	1¼″ O.D.	1¼″ O.D.	1¼″ O.D.
Wind load area	1.65 ft² max.	1.26 ft² max.	.740 ft² max.	.496 ft² max.
Net weight	5.5 lbs	4.1 lbs	2.9 lbs	2.2 lbs
Electrical				
Maximum SWR	2:1	2:1	2:1	2:1
Band width	2 MHz	2 MHz	4 MHz	4 MHz
Maximum power	250/500 PEP	250/500 PEP	250/500 PEP	250/500 PEP
Impedance w/balun	52 ohms	52 ohms	52 ohms	52 ohms
½ power beam width	35° vertical 35° horizontal	43° vertical 36° horizontal	60° vertical 45° horizontal	95° vertical 60° horizontal
Stacking distance	82″ min.	82″ min.	82″ min.	82″ min.

tion in our state Nets. WA5YQR is operating a net o
3725 kHz on Mon. and Fri. at 8:00 P.M., local che
in and practice up. Traffic: (Feb.) WB5NKD 46
WB5NKC 232, W5RB 226, W5REC 162, K5OWK 8
W5FKL 65, WB5KGP 42, WB5ELG 36, WB5AZS 3
WB5PVL 25, W5SUG 25, WA5FSN 24, WB5OCZ 1
W5PML 12, K5ZDB 10, K5CXP 9, WA5OUV
WBØWIU/5 8, WB5OYU 2, WB5UCM 2. (Jan
WB5PVL 61.

SOUTHERN TEXAS: SCM, Arthur B. Ross, W5KR
SEC: W5TQP, RM: W5UGE. PAM: WB5NUM. O
reporting this month: WB5BMB N5ZZ (former
WA5LTQ) W5VAH. OVS reporting this mont
K5LZJ. Strange, too, just after a month of fabulo
band openings. WB5KPL/6, late of Houston, st
active on nets in CA; he does NCS job for RN6, pl
other assignments. Former PAM WB5AMN back o
the nets from Cajun-Land. WA5QKE ramrodding a
effort to put a 2-meter repeater in Conro
WB5FTG/WB5FTH of San Antonio and WB5TE
WB5TEK are husband/wife teams active on the traff
nets. OPS W5BGE joined the ranks of seven-da
weekenders; he is just now learning the real meani
of "busy." New ORS/OPS WB4KSG/5 is heard o
nearly all of the traffic nets in TX every da
Immediate past West Gulf Director W5EYB has a ne
call: N5RA. OPS WA5VBM has all of her antenn
back in good repair after a hard winter. ORS/E
W5UJJ handled 146 messages during SET, just 114 f
rest of Jan. N5AB and N5ZZ both in El Paso — almo
Alpha and Omega. W5KLV and WA5VBM made BP
this month. One letter from WA5RKU wrote 75%
this effort. It was almost a very short month. Traffi
(Feb.) W5KLV 545, K5HZR 375, WA5RKU 37
WA5VBM 345, WB4KSG/5 333, WB5NUM 30
WA5YEA 296, W5UJJ 231, K5ZSI 168, W5UGE 13
WB5GVO 63, W5BGE 41, W5KR 39, W5QAL 2
W5BHO 20, WA5JYH 13, WB5LTW 10, K5RVF
(Jan.) W5UJJ 260.

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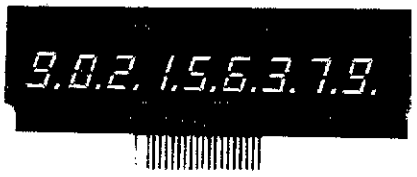

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2N3906	6/1.00
2N4400	6/1.00
2N4443 SCR	3/1.00
1N4004	15/1.00
1N4007	10/1.00
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7403	.17	7476	.35
74H04	.25	7480	.45
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7406	.25	7485	.89
7408	.17	7486	.35
7409	.17	7490	.71
7410	.17	7491	.71
7411	.25	7492	.71
7413	.45	7493	.67
7420	.17	7494	.90
7421	.17	7495	.71
7423	.35	7496	.85
7425	.27	74100	.96
7426	.25	74121	.31
7427	.17	74123	.81
7430	.25	74125	.44
7432	.30	74141	.71
7437	.35	74145	.97
7438	.35	74151	.71
7440	.17	74153	.81
7442	.60	74154	.97
7443	.60	74161	.91
7444	.65	74163	1.05
7446	.85	74164	1.05
7447	.81	74174	.91
7448	.81	74175	1.40
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7451	.17	74181	2.25
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7454	.17	74192	1.20
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74LS00	.25
74LS02	.25
74LS04	.30
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74LS10	.25
74LS11	.32
74LS20	.31
74LS21	.33
74LS22	.33
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74LS30	.31
74LS32	.33
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74LS38	.35
74LS74	.49
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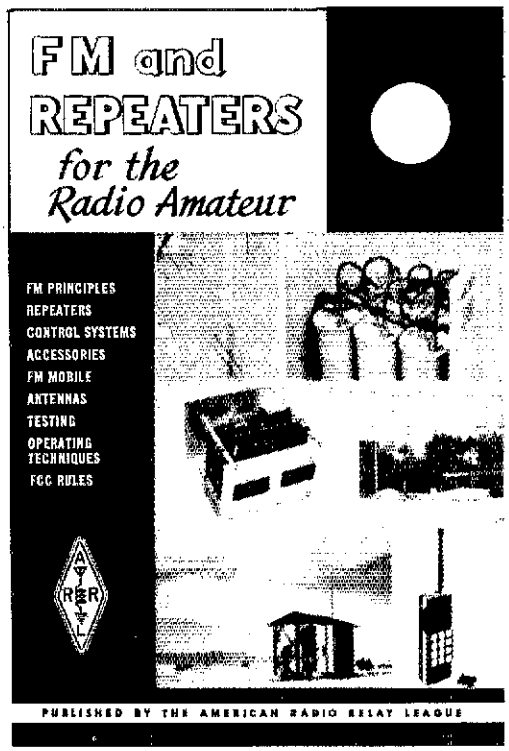

This book is a *must* for the fm buff as well as the operator just breaking into fm and repeaters. Everything is covered! Fourteen chapters include: mobile installation, transmitters, receivers and antennas for mobile and base, and fm test equipment. Special sections treat alignment and troubleshooting 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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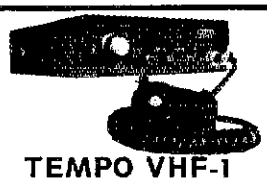

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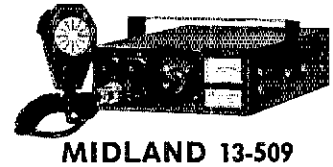

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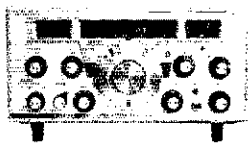

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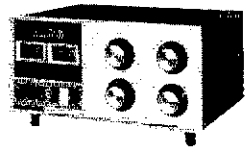

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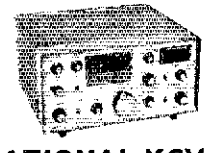

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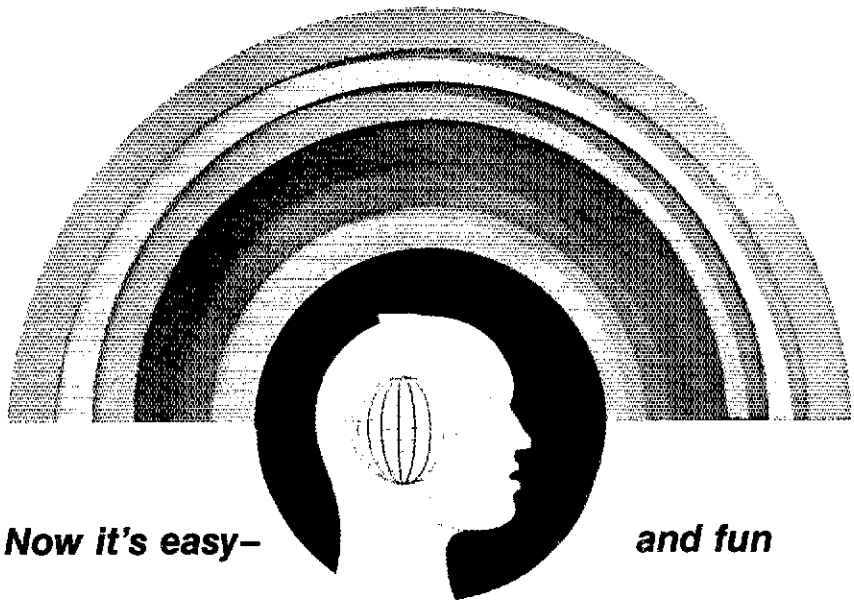

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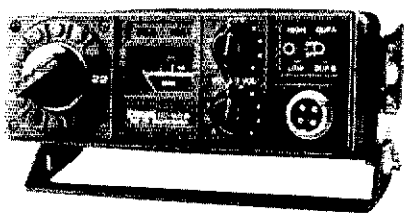

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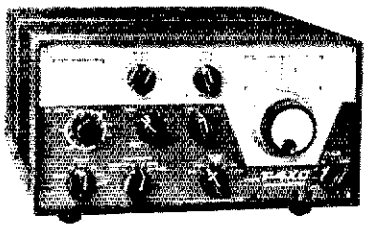

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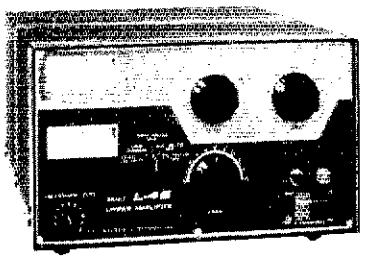

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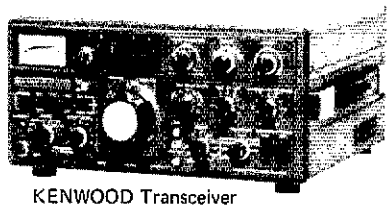

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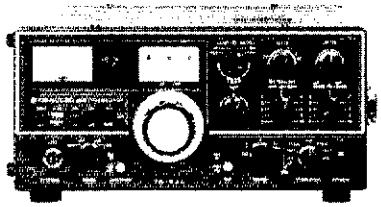

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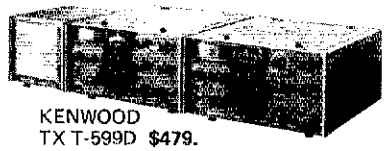

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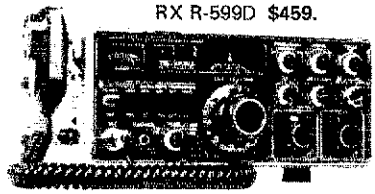

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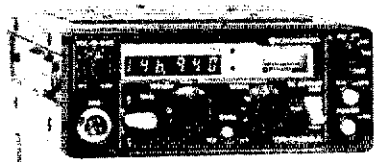

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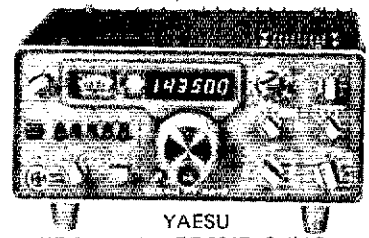
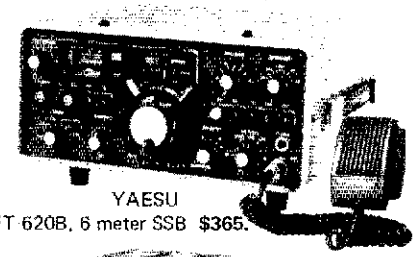
FT-101E, 160 thru 10M $729.

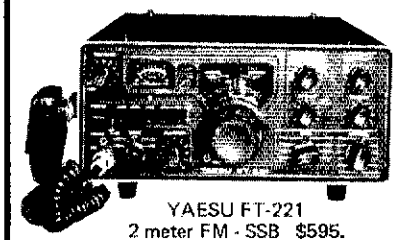


YAESU
HF Transceiver FT-301D, Solid State
160 thru 10M $935.



YAESU
FT 620B, 6 meter SSB $365.

YAESU Receiver
FRG-7 Broadcast to 30 Mhz $299.



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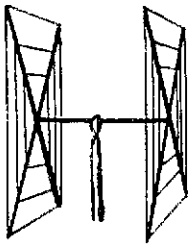

10/15/20 quad, absolutely complete, all machined ready for simple assembly, the choice of the champs for maximum performance!... $45.

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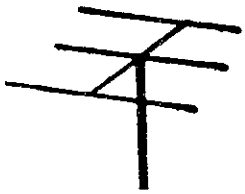

Every beam is absolutely complete in every respect, fully machined and with hardware, ready for easy assembly.

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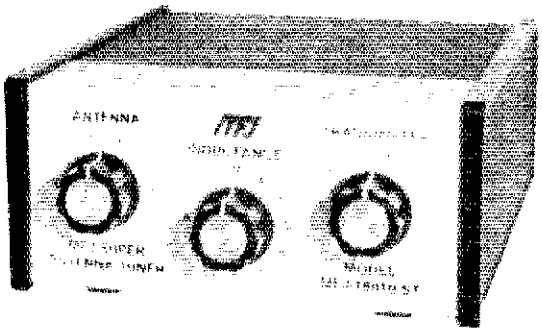
This NEW MFJ Super Antenna Tuner . . .

matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF OUTPUT. Built-in balun, too!



$69.95

With the NEW MFJ Super Antenna Tuner you can run your full transceiver power output — up to 200 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 5x2x6 inches fits easily in a small corner of your suitcase.

The secret of this tiny, powerful tuner is a wide range 12 position variable inductor made from two stacked toroid cores and high quality capacitors manufactured especially for MFJ. For balanced lines a 1:4 (unbalanced to balanced) balun is built-in. Made in U.S.A. by MFJ Enterprises.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).

Try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This tuner is unconditionally guaranteed for one year.

To order, simply call us **toll-free 800-647-8660** and charge it on your BankAmericard or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-16010ST Super Antenna Tuner.

Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order today.

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FT-101E YAESU

The FT-101E YAESU Transceiver with new RF Speech Processor. Solid state 160 thru 10 meters.
*FT-101EE (less processor)
*FT-101EX (less accessories)

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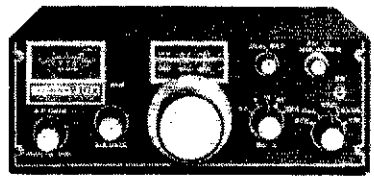
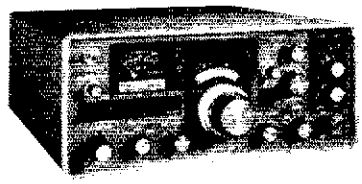


ATLAS 210x/215x



ATLAS 350-XL

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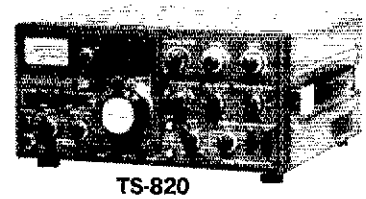
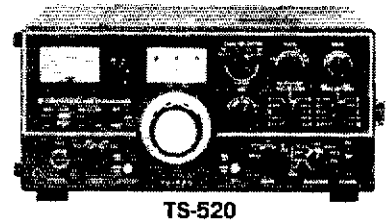
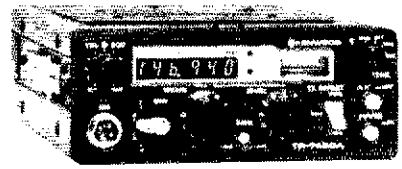


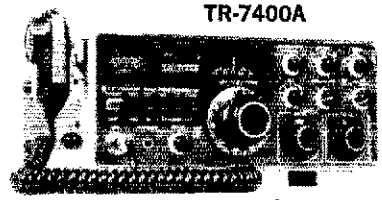
TS-820



TS-520

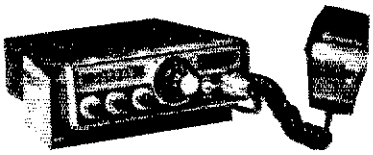


TR-7400A



TS-700A

THE TS-700A KENWOOD TRANSCEIVER. SOLID STATE 2 METERS SSB/FM/CW/AM.



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NEW! FMSC-1 SCANNER

FOR KDK FM 144
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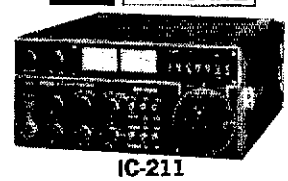
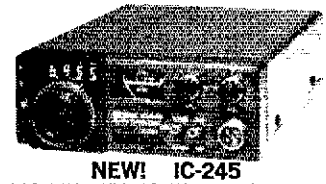


IC-211

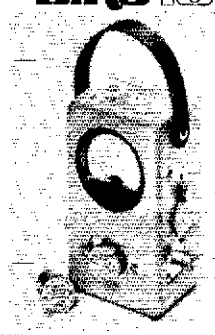
4 MEG. MULTI-MODE 2 METER TRANSCEIVER



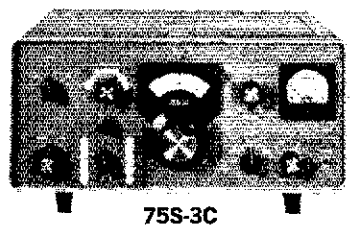
NEW! IC-245

146 MHz FM 10 W TRANSCEIVER

BIRD 43

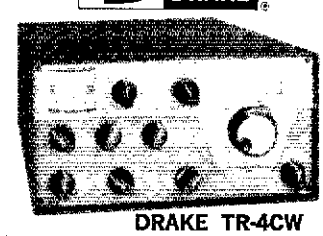


COLLINS



75S-3C

DRAKE



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MODEL PLF employs a dual gate FET providing noise figures of 1.5 to 3.4 db., depending upon the band. The weak signal performance of most receivers as well as image and spurious rejection are greatly improved. Overall gain is in excess of 20 db. Panel contains switching that transfers the antenna directly to the receiver or to the Preamp.
Model PLF 117V AC, 60 Hz. Wired & Tested $44.00

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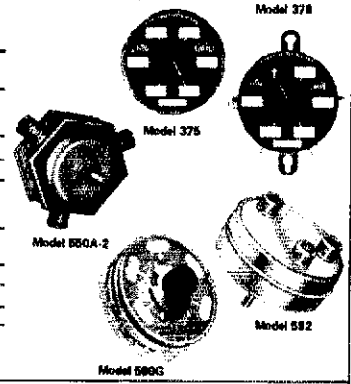
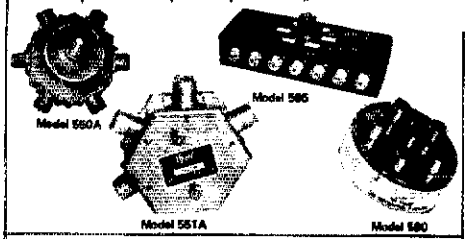
COAXIAL SWITCH SELECTOR CHART — BARKER & WILLIAMSON, INC.

Model	PRICE	Outputs	Connector Placement	Remarks
378	18.95	6	Axial	PROTAX switch. Grounds all except selected output circuit.
376	18.95	5	Radial	PROTAX switch. Grounds all except selected output circuit. Sixth switch position grounds all outputs.
550A	14.00	5	Radial	
550A-2	12.50	2	Radial	
551A	17.50	2	Radial	Special 7-pole 2 position switch used to switch any RF device in or out of series connection in a coaxial line. See figure lower!
556	.95	—	—	Bracket only for wall mounting of radial connector switches
590	17.95	5	Axial	
590G	17.95	5	Axial	Grounds all except selected output circuit.
592	16.50	2	Axial	
596	18.50	6	In-line	Grounds all except selected output circuit.





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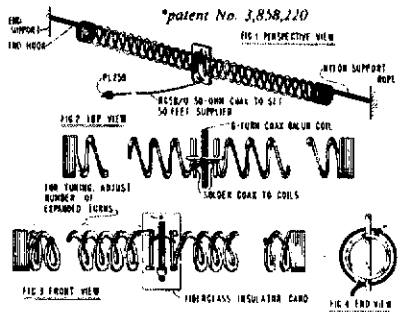
New Slinky® dipole* with helical loading radiates a good signal at 1/10 wavelength long!



- This electrically small 80/75, 40, & 20 meter antenna operates at any length from 24 to 70 feet • no extra balun or transmatch needed • portable—erects & stores in minutes • small enough to fit in attic or apartment • full legal power • low SWR over complete 80/75, 40, & 20 meter bands • much lower atmospheric noise pickup than a vertical and needs no radials • kit includes a pair of **specially-made 4-inch dia. by 4-inch long coils**, containing 335 feet of radiating conductor, balun, 50 ft RG58/U coax, PL259 connector, nylon rope & instruction manual • now in use by US Dept. of State, US Army, radio schools, plus thousands of hams the world over

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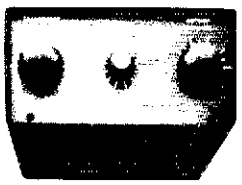

160-10AT SUPERTUNERTM
Want an antenna tuner to match everything between 160 and 10 through balanced line, coax line and random line. SupertunerTM is the one for you at just $129.50

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Converts 115 volts AC to 13.6 volts DC ±200 millivolts. Handles 4 amps continuous and 6 amps max. Ideally suited for applications where excellent DC stability is important, such as CB transmission, small Ham radio transmitter, and high quality eight-track car stereos. Can be used to trickle-charge 12 volt car batteries.

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Line/Load Regulation	20 mV	50 mV
Ripple/Noise	2 mV RMS	5 mV RMS
Transient Response	20 uSec	
Current Continuous	4 Amp	
Current Limit	6 Amp	
Current Foldback	2 Amp	

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Case: 3¼" (H) x 5⅜" (W) x 6¼" (D). Shipping Weight: 6 lbs

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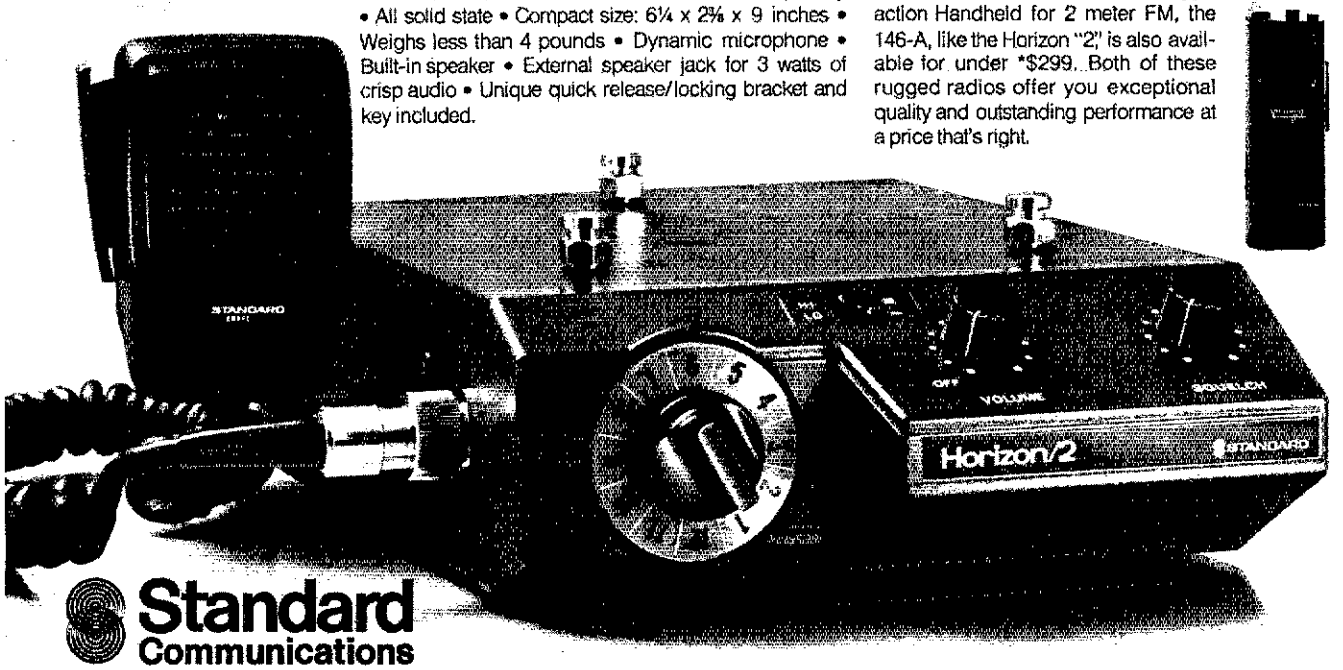
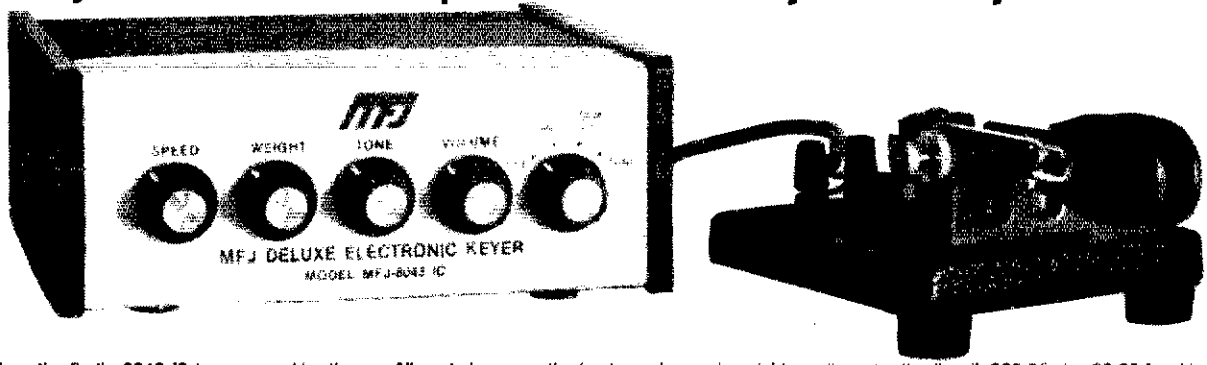


Standard Communications

Standard Communications Corp. P.O. Box 92151 • Los Angeles • Ca • 90009

This NEW MFJ Deluxe Keyer at $69.95 . . .

gives you more features per dollar than any other keyer available.



Based on the Curtis 8043 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

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Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, −300V max., 10 ma, max.; cathode and solid state transmitters + 300V max., 200 ma, max.

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Beautiful Ten Tec enclosure. Eggshell white, walnut sides. Compact 6x6x2 inches.

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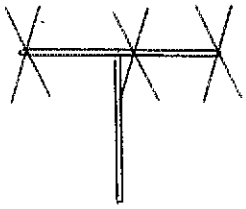

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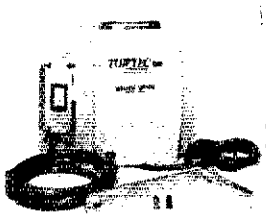

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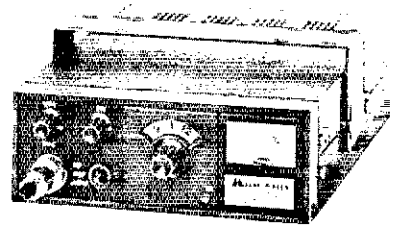

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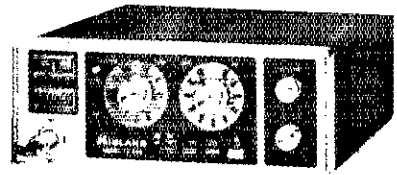

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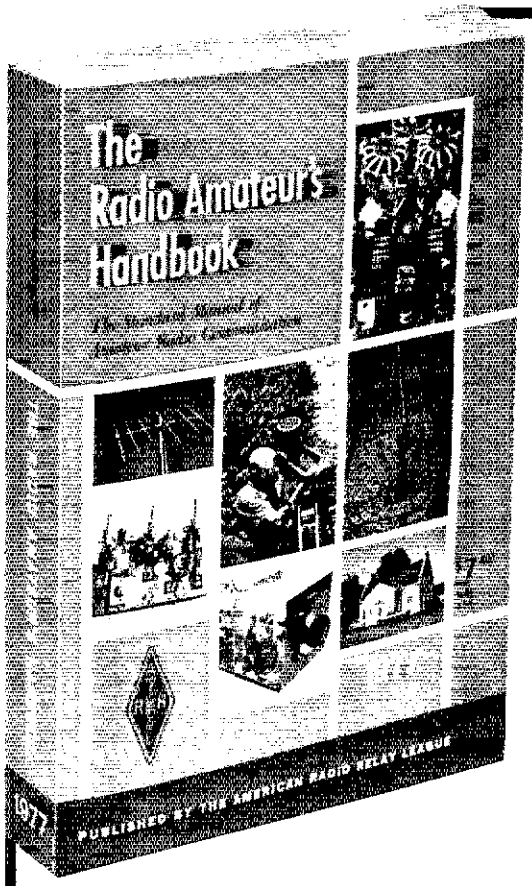

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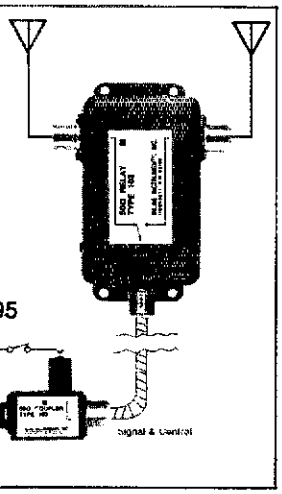

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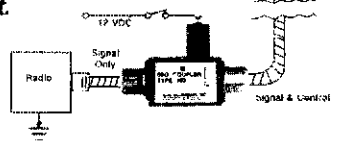

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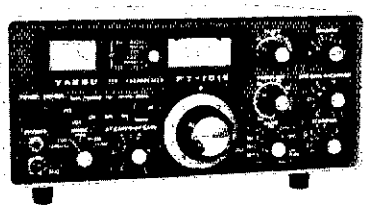

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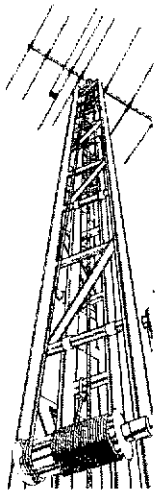

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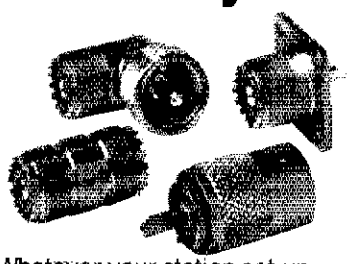

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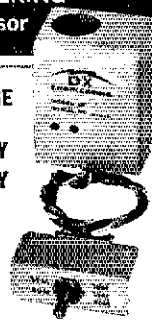

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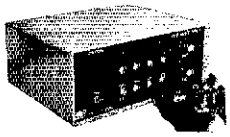

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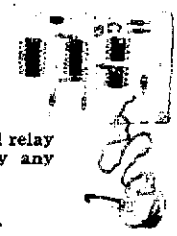

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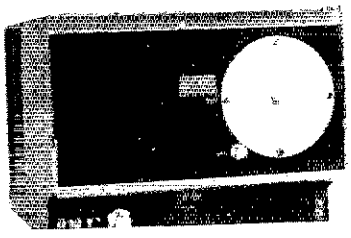

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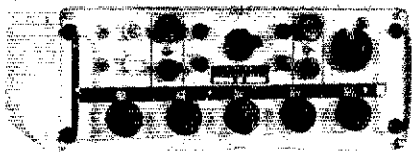

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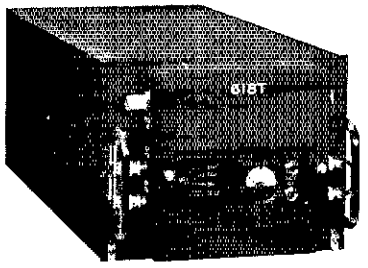

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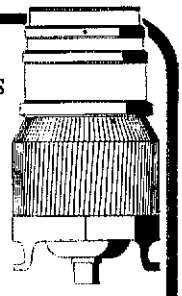

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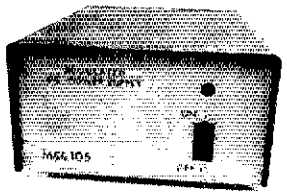

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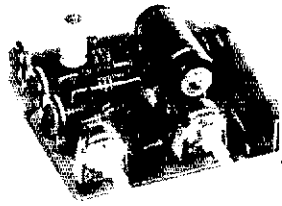

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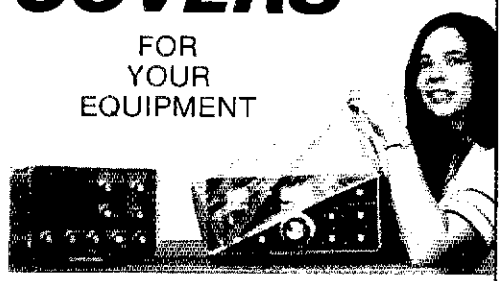

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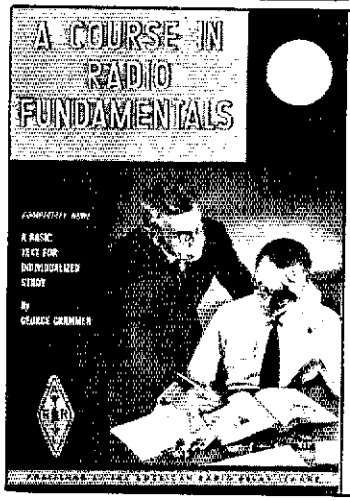

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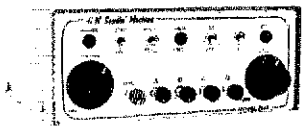

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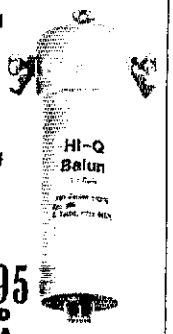

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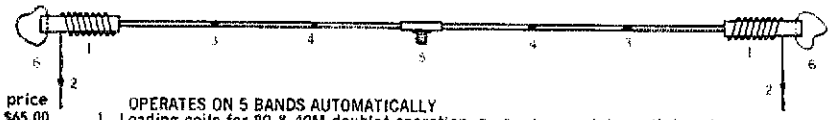

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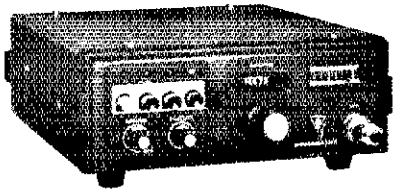

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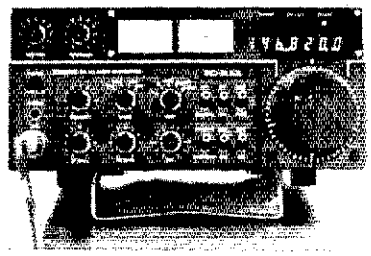

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DESK console equipment cabinet. Build from design drawings, photographs; $4.75. Bill Morris, WA5RSC, P. O. Box 411, Lubbock TX 79408.

STAINLESS and galvanized steel antenna guy wire our specialty. Wilcox Electronics, Box 1331, S.L.C., UT 84110.

USED gear hotline: Buyers & Sellers 617-536-8777.

WANTED: Pre-1925 QST magazines. W6RVB, 529 Kevin Way, Placentia CA 92670.

160M CONVERTER Kit details from W9NZB, 3132 North Lowell Avenue, Chicago IL 60641.

MOBILE Bonding Straps under .50 each. Literature. Estes Engineering, 930 Marine Drive, Port Angeles WA 98362.

PERSONALIZED Name-call sign badges — $1.50 postpaid. Mac's Shack; Box 1171-D; Garland TX 75041.

TRANSMITTING Tubes, HV and filament xfmrs, rotary inductors, transmitting capacitors. Send stamp for flyer. T.S. Marinich Electronics, 102 Bell St., Weirton WVA 26062.

GET into broadcasting. Become a DJ, technician, or start own station! Get free tapes-records-equipment. Pass commercial license exams. Free booklet tells how! "Broadcasting" Box 5516-Q5, Walnut Creek CA 94596.

LINEAR Amplifier, 2-30 MHz, 150 watt mobile. Construction plans, $3. IGOR, Box 5516-Q5, Walnut Creek CA 94595.

WANTED: Hallicratter receivers & parts — any condition. For private collection. Also have some duplicates for sale or trade. Write C. Dachis 4500 Russell, Austin, TX 78745.

SWAN 600T transmitter — 600R Custom Receiver — speaker, $700. for pair. Swan 2KW Linear, $475. Mint. W6NSD, 17830 Sherman Way Apt. 303, Reseda CA 91335.

ATLAS Motorola FM and SSB Marine Radio. Motorola Pagers bought and sold. W5BCO, Ralph Hicks, P. O. Box 15633 Tulsa OK 74112. 918-266-2525.

WANTED: Mosley TA-33Jr. or similar. WA3NMW 717-544-3191.

HEAVY duty high-voltage power supply parts: plate transformers, filter chokes, bleeders, solid-state full-wave bridge rectifiers, oil-filled filter condensers, also 0-220V 20A Variac. WA6DUG, 785 Radcliffe Ave., Pacific Palisades, Calif. 90272. 213-459-2440. If no answer, please leave name and number on recording.

ENJOY the best DXing at Paradise Hotel, Ambergris Cay 35 miles off coast of Belize, Central America. Bring your own gear and operate. Guaranteed low noise level and perfect operating conditions. While off the air, enjoy best of fishing, diving and swimming in the clear Carribean. 20-meter antenna on premises. USA office 9225 Katy Freeway, Houston TX 77024, 713-461-2027.

WANTED to buy: 450th, 1000T tubes. K8CCV, 5471 Norquest Blvd., Youngstown, Ohio 44515.

WANTED: IO-105 Heath Scope, pay $250. K0MNA. 316-838-5385.

FOR SALE: Yaesu FTDX560 Transceiver and matching speaker in good condition $400. Swan 350 transceiver with AC and DC power supplies $350. Both my personal equipment. You pick-up or pay transportation and packing. Want Drake T4XB and linear amp. W1HGH 20 Eider St., Yarmouthport, MA 02675.

IF You're looking here for used ham gear, there's at least one other place you should be looking: Buyers & Sellers weekly equipment list. Each list (updated every week) contains hundreds of pieces of gear, currently available all over the United States, organized into SSB transmitters, 5-band transceivers, linears, etc. all having our mail purchase guarantee. A sample copy is Free by sending an s.a.s.e. to Buyers & Sellers — Dept. QC, P. O. Box 73, Kenmore Station, Boston, MA 02215.

TRITON IV with deluxe ps and cw filter $750 KR50 $95. all new — you ship WB3BSI.

PREPARE For the new FCC ham exams. Use POSI-CHECK. Original, expertly devised, multiple exams, covering all areas tested over by FCC. IBM sheets for self-testing, keyed answers with explanations. All classifications newly rewritten and updated. Novice class, Element 2, now required with all other classes, $4.45; General Class, $5.75; Advanced Class, $5.75; Extra Class $5.95. Also Radiotelephone Third Class, Elements 1, 2 and 9, $9.95. First Class postage prepaid USA. Send check or money order to POSI-CHECK, Box 3564, Urbandale Station, Des Moines IA 50322.

YAEHOO! I've got Yaesu. Also VHF Eng., ICOM, KLM, Swan, Dentron, CushCraft and Larsen. Use your bank credit card. Call or write W0EZ for new or used gear. Bob Smith Electronics, 12 South 21st St., Fort Dodge, IA. 50501. 515-576-3886.

WANTED: SB-301, SB-401, for salvage. K0MNA, Bill Downs, 4805 Sullivan, Wichita KS 67204, 316-838-5385.

QST, Ham Radio, 73, and CQ issues at 20c each, including USA shipping. Lockheed ARC, 2814 Empire, Burbank CA 91504.

MOBILE OPS. Tired of Ignition Noise? Please send s.a.se. for info on shielded ignition systems. Summit Enterprises, 20 Elder Street, Yarmouthport MA 02675.

OPERATE Collins kilowatt station. Vacation in beautiful Belgrade Lakes, Maine on Private 1000-foot peninsula. Housekeeping cottage on lake sleeps five. Excellent fishing, boating swimming. Indescribable setting. Pictures available $300/week. W9NQF 312-641-2320.

HEATH SB-104 new Nov. 76 $595, works great sounds great. Sachnoff, 17103 Magnolia Hazelcrest, IL 60429 312-335-4231.

LINEAR Raytrack Horizon Six Meter, mint, $225. Arrange meeting at Dayton Hamvention, call 614-335-9425. WA8BOB.

NCX3-NCXA w power, manual, mint condition $195. Tempo One with Tempo a.c. supply, fan, swr-wattmeter, desk mike all one hour new. Want used Yaesu FT101 series. K3IBQ.

SB-303/401 Excellent condition. $450 firm includes shipping. K5RRG, 601-762-8499.

WANTED: 2-Collins 351R Rack adaptors. 1 Collins 351R2 Rack adaptors. W7MJE 1201 S. 11st. Coos Bay, OR 97420.

HEATH Pawnee (HW20) 2m xcvr, 8/10 watt AM & CW; operating condition w/manual. Best offer — W2DQG, 56 Circle Blvd., Newfoundland, NJ 07435.

TELETYPES: Model 15 — $70, Model 28 — $600, TR-22C — $180 with 4 channels. Rob Bienstock 19 Cedar Drive East, Old Bethpage NY 11804.

NEEDED: Inexpensive radio equipment for University of Georgia Amateur Radio Club. Contact Dr. Uzes UGA, Dept. of Physics, Athens GA 30601. 404-542-2487.

SELL: Lafayette police receiver PF-300 vhf hi/lo & uhf mint condition. $70. Hallicrafter S-118 General covg. rec, 19kz — 30MHz like new $40. R. J. Colarusso P. O. Box 581 Alpena Mich. 49707.

FOR SALE: Atlas 210X with noise blanker, 220-CS with VX-5, DD-8 digital dial, (all six months old); DMK, MT-1 and Swan 742 (all new). Complete package: $995. K2JZT, 20 Harts Hill Parkway, Whitesboro, NY 13492. 315-736-7448.

HAMMARLUND clock for receiver wanted, Art WA2ECI 11 Ft. George Hill, NYC 10040.

AMECO TX62 (55.00) W6RQZ, 1330 Curtis Berkeley, CA 94702 415-526-7345.

WANTED: Small DPDT 3-1/4" X 2" porcelain base 110vAC Antenna changeover relay. W1BB.

GENAVE GTX-IT 2M hand held, 6 months old, new condition, no scratches. Factory installed touchtone pad, nicads, charger, and holster case. Factory installed xtals: 01/61, 31/91, 34/94, 40/00, 46/06, 52/52. Extra 22/82 xtals go with it. Cost $449., sell $325. I'm going synthesized. Louis DeMania 518-372-5108.

ATLAS 210X, Echo II, Echo 70, Janel 2-10 converter W8OY Box 320 Mentor, OH 44060.

FOR SALE: HT-220 6-channel with T.T. pad. Charger with extra battery included. $450. WA9YCC, 806 Matthles Dr. Papillon NE 68046 402-331-3136.

NEW Stripline amplifier — 144 to 148 MHz 5 watts drive — 600 watts output. ARCOS — 35 Highland Drive, East Greenbush, NY 12061 (W2GN) 518-477-4990.

GLB 400B Synthesizer, $125. HR-212, $140. W8QX, Box 452, Birmingham, MI 48012.

FOR SALE: Sears 1250W power plant like new $150. ATV character-generator from QST July 1974 $125. Cash- Pick-up only. W2GVC Tom Nolan, RD 2, Box 209 Wrightstown, NJ 08562. 609-758-2616.

SELL AX-190 $150. HQ-160 $120. HRO-60 $110. HQ-150 $110. HP-35 $50 and SR-56 $60. Are calculators K9UKX 51625 Chestnut Road, Granger IN 46530.

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 Demo Atlas 210X transceiver, $519.00; New Drake TR-4C, $509.00; New Display Swan 700CX, $509.00; Demo T-4XC; $469.00. New Rohn 50' Foldover Tower Prepaid $398.00. Demo Ham-II Rotor $119.00; Used Atlas 210X, $489.00. Display Mosley TA-33 Beam $159.00. Hoss-Trader, Specials: New Dentron 2000 Watt linears on sale, $475.00. New Display L-4B linear, $729.00. On sale, "New Collins at 2% above cost, or make offer." Moory Electronics Company, P. O. Box 506, DeWitt, Arkansas 72042. Tel.: 501-946-2820.

TRITON 4, VOX supply, cw filter and 10 mtr xtals. $750. K8CVV, 313-549-2353.

YOUR call sign and handle on a 1-1/2" X 2-1/2" plastic name tag in a choice of colors with locking pin on back. Red, black, blue background with white letters. Other colors available. Price: $3.00, Home QTH added, $0.50 additional. Barbara Simmons, Tag-it Co., Box 2062, Indianapolis IN 46206.

HEATHKIT SB-401 transmitter and SB-300 receiver with cw & a-m filters, SB-600 speaker. All mint, $410. SB-610 monitor scope $90. WA4PAB, Lexington, KY 606-278-0646.

SELL — Drake 2-NT, exceptionally clean, no mods., $85, will ship. W.F. Koepp, K5CD, 9750 Parkford Dr., Dallas TX 75238.

WANTED: 4CX250B/4CX250k (W6RGZ) 1330 Curtis Berkeley, CA 94702.

WANTED — Gud working order Drake AA10/AC10 combo. Chesler L. Pattee — W1VMO 20 Marie Ave., Sharon, MA 02067.

STANDARD 826MA 2-meter fm transceiver. Good condition $175 Philip Schwebler, W9GCG. 4536 N50 St., Milwaukee, WI 53218.

QSTs — 1/64 thru 12/75 (exc. 5/69) best offer, W2DGG, 56 Circle Blvd., Newfoundland, NJ 07435.

FOR SALE: Atlas 180 transceiver. Just returned from factory for check up, updated with latest modes, microphone and battery cables $400. Walter Naef RT 5 Box 125 Madison WI 53704, 608-222-6915.

FOR SALE: Clean NCX5 Mark II with ps, speaker xtal calibrator. With manuals in factory cartons. Never used mobile $400. W4MMR evenings 919-726-1725.

DRAKE Station — R4C 500 cycle, 160M, T4XC, MS4, AC-4, mint, in original cartons, Johnson 275 Matchbox, TenTec KR-20 keyer, $900., Roger Cooper W4LGM, 9-5 912-744-2143.

COLLINS KWS-1 late model serial 1017-4-250B's, in storage a long time. No scratches. No signs of wear on dials, letters or numerals. Its near new — inside and out $895. Drake R-4B with filters and all s.w. crystals, absolutely mint $320. AJ Allison RT2 Box 1012 Bonita Springs FL 33923. 813-992-0058.

WANTED — Used Atlas 210 or 215 with console etc. also unique antenna tuner. Must be reasonable L. Daniels WA3LKV 22 Ridge Lansford PA 18232.

SWAN 350 (late) with fsk, break-in cw, and opposite sideband, Swan 117XC and 14X supplies, VOX, $385. Regency HR-2 $149. Stephen Budensiek, 805 East Second, Mitchell SD 57301. 605-996-5733.

SELL: FR6-7; 14-AVQ; Laffeyette Mic. Russ; WBØMOR; 228 Gray Ave., Ames, IA 50010.

HEATHKIT HW-12 w/ac supply & book $100 or offer; Swan SW-140 w/ac supply & manual $100 or offer. Both units in good shape. W6SH Marin Amateur Radio Club, 712-5th St., San Rafael CA 94901.

TRISTAO super mini-mast telescoping 40' model with building mount, 1 yr. old $260 plus shipping. Dave WA1TQO, 298 Hart St., Southington, CT 06489 203-621-5771.

SELL — Gonset GBS 100- $95. plus UPS manual W2AWM — 404 Glaridge Court Point Pleasant NJ 08742.

HT44 Hallicrafters XMTR, PS150120 pwr supply, speaker and extra set tubes $250. Milten 90651 gridipper $75. W9RZZ 312-681-3813.

30L-1 (mint) $475 pp. new: TS700A, VOX-3, 61/76/82/91/94/97, $525 pp. WA5OXK, 504-394-8851.

WANTED: Heathkit SB-650 freq. display, Dayco DR-30 receiver, receiver can be working or not. W2UZ Jim Geras, 38-05 220 St., Bayside, NY 11361.

R390A receiver, good condition — Bob Czajkowski, WA1TAI 617-754-6640.

YOUNG amateur club needs equipment. Anything greatly appreciated. WA4OFW President Jarov 8907 Mapleview Ave., Richmond VA 23229.

A-K30; RCA17, receivers. Extensive list antiques; moderns; QSTs; tubes etc. s.a.s.e Joe Harms, B158, Edgewater FL 32032.

COLLINS — 32S — 75S-3 — 312 B4 — 516-F2 — SM-2 mint cond. $1,400. Tony Oliger 1009 West 27th St., Cheyenne, WY 82001. 634-5098, WA7EHK.

SELL: Wilson 224 2 mtr — xcvr 24 channel with 06/64 16/76 — 34/94 — 28/88 — 37/97 — 52/52 orig. carton $200. Sencore FET 14 VOM $50. all mint. W3KBR — D.A. Klingler 801 S. 60 St., Harrisburg PA 17111.

WANTED — Gonset sidewinder 2-meter transceiver, model 900A K5EFW — 2727 Norment Rd., SW Albuquerque NM 87105.

FOR SALE: In Long Beach CA 2-family house. Has 3-element rotary beam and Slinky dipole on roof. Could turn over complete KWM-2 station, good condition in good operating location near beach. Write Sam WB6FJZ P. O. Box 3852 Long Beach CA 90803.

HT220 Slim line excellent condition now on 163.46 MHz. With carrying case, less battery. $300. incl. shipping. WØOZG RD5 Box 113, St. Charles, MO 63301.

SELL: TR-3 w/ac ps, sprk. Nice condx. $300. You ship. Larry Kellough, WB9AZQ, Box 144, Robinson, IL 62454.

WANTED Gonset 6 meter amplifier model 913A vht state price and condition. Henry J. Vander Waarden WA2SIX, 66 Meridian Rd., Levittown NY 11756. 516-735-5804.

STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. We are factory-authorized dealers for Kenwood, Drake, Collins, ICOM, Ten-Tec, Tempo, Atlas, Regency, Swan, Midland, Alpha, Standard, Dentron, Hy-Gain, Mosley, CushCraft, and CDE, plus accessories. For the best deal around on hf or vhf gear, write or call us today for our low quote and become one of our many happy and satisfied customers of Hoosier Electronics, P. O. Box 2001, Terre Haute In 47802. 812-238-1456.

WANTED: Kenwood R and T-599 with speaker. Schweikart 753 Yeadon Ave., Yeadon, PA 19050.

SELL: HW202 $160 write WA3VRT.

SELLING: Heath HW-32, HP-23, Mike, cantenna — mint — $100 firm. U ship. cert. check only. WA2EXD 38 Rhinesmith — Wanaque, NJ 07465.

JOHNSON Matchbox 275W w/o swr $60. Instructions included WA1CGX Boston area 617-843-3987.

HEATH HW100 transceiver, with HP-23 AC power supply, excellent condition, $275 or best offer. Ameco TX-62 6 and 2 meter am/cw transmitter with Knight VFO, excellent condition, $140 or best offer. Lafayette HA-230 SWL receiver, with Ameco 6 meter converter, good condition, $60 or best offer. Steve Goldband, WA2BUF, 160 Auburn, Buffalo, NY 14213, 716-886-1020.

COILS Wanted: Need complete set of B & W kilowatt HDVL plug-in coils with jack bar and link assembly. Same sytle in E.F. Johnson would be acceptable. All replys answered. Wayne N8MS Rt. 2 Box 305 Fairmont, WV 26554.

SELL: Hallicrafter 400 watt transceiver SR400, pwr supply, HA20 outboard VFO $560 — W9AR 312-272-2443.

WANTED: 220 mc strip for National 300 converter call 215-277-2124. C. G. Bacon, W3VOI.

TECH Manuals for Govt. surplus gear — $6.50 each: SP-600JX, URM-25D, OS-8A/U. Thousands more available. Send 50c (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington DC 20021.

WANTED: Antenna AS-410/URD-2, also manuals for RCA ET-4336-H and Waterman S 14 A scope. State price first letter. W1KCR, Box 25, Claremont, NH 03743.

SALE: Swan 270 — $275. will ship. Viking II with HAID VFO $75. K2IGW 341 Tracey Lane, Grand Island NY 14072.

HAMMARLUND HQ 170, Hammarlund HX 50 with manuals, good working & looking cond., new tubes. $300 WB4FSN, 708 Holston, Elizabethton, TN, 37643 615-543-2830.

WANTED — Old microphones, pre 1940. Also microphone catalogs. Write Bob Paquette 443 N. 31 St., Milw. WI 53208.

TOROIDS: 88mh or 44mh, dozen, postpaid in U.S. $6.95; also RTTY gear. Telecommunications Services Co., Box 4117, Alexandria, VA 22303.

JOHNSON 275 watt Matchbox with meter. $75. postpaid. WB6RWE 707-539-1007.

SELL: Latayette HA 800, am/cw/ssb. Mint condition. Solid state, 80 thru 6 meters. $65. Ray Hecht, 596 Halyard Lane, Sarasota, FL 33577.

CAN U help? Need manual for Star SR700-A rcvr. WB4VSO 314 Spring Valley Rd. Montgomery, AL 36116.

ATTENTION: Physicians & medical laboratory directors: I have a large amount of used medical equipment in good condition and will either sell at low prices or trade for good quality (Collins, Yaesu, etc.) ham gear. Write Frank Dahm, P. O. Box 642, Cocoa Beach, FL 32931.

SELL: IC-22A and DV-21 Digital VFO $450, IC-202 $190, SB-230 $325. All excellent. K0CKX 319-354-4478.

ICOM, KLM, Hy-Gain, CushCraft, CDE, Regency, Bowmar and others. Look no further! At C & I Communications you'll find terrific buys on the equipment you're looking for. Most items in stock. Daily UPS shipping. Write or call, but remember before you buy see C & I. C & I Communications, P. O. Box 52 Cambridge City IN. 47327 Phone 317-478-3749 after 1800 UTC.

FOR SALE: Collins 75S3 recv. 32S3 Trans. 516F2 pwr supply winged emblem $1100. Jack H. Garretson, W2AOM, 67 Juniper Street, Dumont, NJ 07628 201-384-1264.

FOR SALE: Adobe ham shack with 3 bedrooms, walled-in patio and 80-meter doublet poles. W7JVK 5809 E. Baker, Tucson, AZ 85711.

TWO Swan TV2B two meter transverters. $200 each. KLM 140 watt two meter linear $175. Hallicrafters PS-500, 500w power supply $35. K3RYL 2750 Belaire Road, Bethlehem, PA 18017.

ROBOT SSTV, 70D monitor, 80A camera, mint condx. $550, plus UPS, WB8PJR, 13529 Harold Ave., Cleveland, OH 44135.

B&K Test equipment. Free catalog. Free shipping. Dinosaur discounts. Spacetron-A, 948 Prospect, Elmhurst, IL 60126.

MODEL 15 printer with table and ESSCO TV-7 demodulator $125 W0KTT 314-374-5336.

FOR SALE: Make offer — Early Motorola transistorized TV — Model 19P-1 Sams 520-2 Needs work — Pix tube like new. Heath TV alignment generator TS-4A. Dumont Scope Type 208-B. Heath VF-1 good condition. C. H. Daykin W2AFE, 19 Oxford Place, Geneva, NY 14456.

SWAN 14-117 deps complete with cables $115, Hustler Mo-2 mast, 75, 40, 15 resonators and spring, 19 ft. RG8U and Hy-Gain bumper mount $35. Whole desk $130, all excellent condition. Besh E. Damkroger K0JPP Box 1, Dewitt, NE 68341.

WANTED: SB-401, SB-220, SB-610, SB-620, SB-650; Drake C-line. W3BRG, 1634 Cherry Hill Road North, State College, PA 16801.

SB-104 W/N.B. supply, mint. Factory mod. ald align. First $600 WB3DPP 717-284-4897.

DRAKE AC-3, $65; RV-3, $65. Mint, F.O.B. Lynch 405-262-6303.

FOR SALE — Collins 30S-1 in excellent condition, 2 spare 4CX1000A's $900. W6USG Box-302, Earp, CA 92242 — 714-665-2859.

YAESU FTDX400 transceiver/speaker, $310, RCA WO505A Oscilioscipe, $100. FOB. WB6VYU, 716 12th, Manhattan Beach, CA 90266.

BUY-Sell-Trade. Write for free mailer. Give name address and call letters. Complete stock of major brands new and reconditioned equipment. Call for best deals. We buy Collins, Drake, Swan etc. SSB & FM. Associated Radio 8012 Conser, Overland Park, KS 66204 913-381-5901.

CQ HRO-60. Want 15 meter coil and slide dial for HRO-60. WB7CUC, 4235 Hazelcrest Dr., Las Vegas NV 89121.

DRAKE TR6 with noise blanker and am filter with MS4 and AC4 power supply. $575, WA8KVY. 19927 Prest. Ave. Det. MICH. 48235 313-342-3159.

SELL — Florida Ham Paradise. HI power station! Four antenna systems on tilt tower! 60 foot Windale Expando coach, radio room, etc., on large landscaped lot in exclusive adult Imperial Terrace, Tavares, Florida. Completely furnished! Twenty nine nine! Call K4CC 904-343-3787.

TELETYPE 32 ASR. Automatic C.R., L.R. Immaculate. 60 wpm gear, 100 wpm gear, 5 manuals adjustment and parts. $225. WB2MSL 518-891-3324, Saranac Lake, NY.

HW32A — HW12A — HP23B expert. wired. U operate $250. Galovchenko. 212-543-8349.

SELL: QST 1947 thru 1976 most years complete. Best offer. Many odd CQ & 73 free. G. Roberts 2020 Himrod St., Bronklyn NY 11237 Tel. 212-366-4845.

RETIRING from radio field. Selling components from tube days. Tubes, I.F.s, conds., chokes, xtmrs. Homebrew sig. gen. amps., part built rcvrs. No offer refused. G. Roberts 2020 Himrod St., Brooklyn, N.Y. 11237. Tel. 212-366-4845. Call or write for inspection appointment before May 25.

SALE: Collins 51J-4. 5-30.5Mc $450, NCX-3 NCXA p/s $150. W5UOS 505-437-1356.

HW-16 c/w Novice transceiver, 90 watts with 15 crystals, $100 Russell Couch -- Lynn, MA 617-592-7770.

WANTED: D-104 Astatic grip/talk UG8 mike stand. W1BB.

SELL: Swan 508 VFO $150. Glen Rothwell Rt. 4 Box 308 Poulsbo, WA 98370.

W@CVU for sale. Collins KWS-1 and 75A-4 receiver and transmitter in excellent condition. All modifications on equipment made at Collins Radio. Price $875. F.O.B. Charles Boegel, 1500 Center Point Road NE Cedar Rapids, IA 52402.

FOR SALE: Alpha-70A linear amplifier W4BYT Monticello FL 32344 Phone 904-977-3050.

SELL: Heathkit scope IO-4540 DC-5MHz assembled calibrated by certified technician $225. 2 months old will ship WA2DGU.

SELL SB-102 with cw filter HP23B P.S. and SB-600 spkr $345. Hy-Gain TH3 JR Tri-Band beam with balun $45. Hy-Gain model 270 2 mtr ant. $20. Hustler mobile whip with 15 mtr., 40 mtr and 80 mtr resonators $20. W. H. Wiley W6OWD 415-728-7136.

CALL Letter Badges: Wear your call proudly at next hamfest! 1" X 3" badge of flexible plastic. White, black, red, green, brushed gold, brushed silver. $1.75 State name and call. WA2DKC, Box 118, Elbridge, NY 13060 Same day service.

SELL: CMC Model 738AN, 100 MHz frequency counter, $275.; Telonic SN-3 uhf signal generator $90.; model 80 signal generator $150.; B & K Model 970 Transistor Equipment Analyst, $90.; B & K Model 375 VTVM, $30.; Tektronix 570 Curve Tracer, $150. W9AQK — 312-625-4333.

ICOM, Drake, Ten-Tec, Swan, Hygain, Cushcraft & More. Write or call for our weekly specials. Trades accepted. The Stereo Repair Shop 3206 Erie Blvd East. Syracuse, NY 315-446-2266. Lee WA2ACF and Art W82YPP.

CALL Letter license plates wanted for collection. Will pay postage. Art Phillips WA7NXL, Route 4 Box 720 Flagstaff AZ 86001.

WANTED: Heathkit HG10-B or Hallicrafters HA-5 WA2FHH 105 Creston Avenue, Audubon, NJ 08106 609-546-2771.

DON and Bob's big station specials. Call for quote on FT101E, TS520, TS820, Atlas 350XL, ETO, TS700A, TR7400A (sealed cartons); CDE Ham-2 120.00; CD44 104.00; Belden 8wire rotor cable 14c/ft; Belden 8237 RG8 19c/ft; 8214 RG8foam 23c/ft; 8210 72 ohm KW twinlead 19.00/100ft; 22ga phosbronze antenna wire 3.50/1000ft; CDE .001/10KV doorknob cap. 1.95 Mallory 2.5A/1000PIV Epoxy diode 19cea; Raytheon 572B/T160L 21.95ea; GE rec. tubes 50% off list Amphenol PL259 59c. All items guaranteed. Price fob Houston, quotes good 30 days. Send letterhead for dealer listing. Madison Electronics Supply, Inc. 1508 Mckinney, Houston, TX 77002. 713-658-0268 Evenings: 713-497-5683.

WANTED: Drake C-4 console. Bill Junius K3PSU 2571 Saddle Drive Lancaster, PA 17601 717-569-3081.

WANTED: Drake T-4XC/AC-4, SPR 4, Magnum-6 D-104, SB-220, L8AVT, Autek QF-1; Call Ray 212-697-0646 daylight.

WANTED: Drake-line R-4C, T-4XC, AC-4 filters swl-crystals. Only New York area for pick-up, evening Ray 212-532-5845.

WANTED: 40-60ft self supporting tower, legal limi linear, transmatch, W6QY 913 Westmont Dr Alhambra CA 91803 213-281-7298.

WANTED Ten-Tec PM-2B or PM-3A, state condition and price Craig Taylor 504 S. Chestnut, Marshfield, WI 54449.

MCELROY looking for family keepsake wanted MacKey bug on chrome flat iron base. State price and condition. McElroy WB4PPV, Amembassy, APO San Fran, CA 96503.

COMPLETE Drake station used one year, excellent condition. R4C, All cw filters, MS4, T4XC, AC4, L4B amplifier. Plus KW Matchbox, D-104. $1650 Package deal only. Mike WA8CVE Cleveland, OH 216-835-1309.

SELL: Heath TX-1 transmitter including accessories $85. WA2PVN, 642 Selfmaster Parkway, Union, NJ 07083.

LRL-66 Multi-band antenna dipole 10 thru 80 with low SWR, $40. WB2AKM, 41 Marino Avenue, Port Washington, NY 11050.

WANTED: Crystal impedance meters. TS-330, TS-68 or TSM-15 Glenn R. Kurzenknabe, K3SWZ 40 Centerview Av. New Cumberland, PA 17070.

GENAVE GTX-200 30w 2m fm with 04/64 10/70 16/76 19/79 22/82 25/85 28/88 31/91 34/94 37/97 94/94 52/52, $175. Johnson Ranger I, $75. Drake 2-B needs work, $100. Gonset GSB-6 6m SSB/AM/CW xcvr 20w PEP, AC PS, $75. Model 15 Teletype, $50. Mike, W4YQR, 4901 Trousdale Drive, Nashville, TN 37220 615-834-1705.

FOR SALE: Drake R-4 receiver in very good condition — $260 WB5NGB Doug Loughmiller R.R. 6 Box 515 Paris TX 75460.

WANTED: Drake R-4B in very good shape — state price — WB5NGB Doug Loughmiller R.R. 6 Box 515 Paris TX 75460.

ALPHA 374 — Mint used very little — $775 plus UPS. Roddick K7BDG, 5105 East Sunset Drive, Yakima, WA 98901.

LEATHER Belts. Handmade. 1-1/2 inch wide. Your call letters stamped on back. Specify brown or black. Send waist size, call letters, and $12. to: Branding Iron, Box 104, Paris, OH 44669.

WANTED: Any info. to modify Heathkit monobanders HW-12, 22, 32. WA9GPH Doug Limbaugh 7637 Adams Forest Park, IL 60130.

TRADE: SB-104, HP-1144, and SB-604 for SB-303 and SB-401. Also for sale 18AVT 80-10 vertical $35., Hallicrafters SX-101 MkIII 160-10M receiver. You ship $125. WB4MIH Doug Robson 1403 NE 25t., Pompano Beach FL 33060.

SELL — Chicago area — Hallicrafters SX115, HT32 HT33B, SR42. W9MZP 312-967-7525.

WANTED: 1296 MHz. Transmitting and receiving gear especially low noise pre-amp and converter. WA9RAT/7 509-582-7256.

SELL: Collins 7553C, 32S3A, 312B-3, 516F-2, 500 Hz. filter, Round Emblem, 19 months old, mint condition, $3995, Firm, WA4IRE 813-985-7080.

HAM TV? Go first class! GBC top quality 600 line camera with 16mm lens. 10,000:1 automatic light compensation. Target, beam, and focus externally adjustable! Tilt-head camera mount for wall or table. Monitor, 22" transformer-powered, with sound amplifier. Complete system, brand new, w/warranty $485. Ed Howell W4SOD, Folly Beach SC 29439. 803-588-2344.

WANTED — Drake 2NT, smtr. w/manual. Good condx. state price, write WA2FCV, Theo. A. Gretch, 111 Madaline LA Depew, NY 14043.

KLM-40-Meters, 4 elements, new selaed box $335. New Henry 3KA $1195. KWM-2, 516F-2, Round $895. Signal/one CX7B, immaculate $1595. Payne Radio, K4ID, 615-384-2224.

FOR SALE: Drake CC-1 vhf converter console W/SC-2, SC-6 converters, CPS-1, SCC-1. Excellent. $150, Contact G. Hawrysko, K2AWA, P. O. Box 568, Jamaica NY 11424. 212-224-2448.

MINT R4C with four filters, noise blanker, 160 meters; and T4XC with 160 meters — both extra nice — W4XS 615-794-5380 evenings.

EXTRA mint T4XC w/160 meters — little use — K4KJC — 615-794-5380 evenings.

WANTED: HW22A and HW32A without power supply and in working condition WA5HJD, 1010 Ave. B, Del Rio, TX 78840.

BARLOW-WARDLEY xcr-30 receiver. Used less than 50 hrs. Mint condition. See QST Jan 1977 page 37 for description. Cost 275 plus tax. Sacrifice $220 or will trade for Kenwood TV-502 or Yaesu FTV-250 transverter. Grontkowski, WA2JBZ 2855 University Ave., Bronx, NY 10468.

HEATH HW-202, Mint condition, rcvr modified with Piezo 8-pole crystal filter for 14kHz bandwidth — $200. WA2MIU, Ralph Frick 1 Holly Drive RD 3 Randolph, NJ 07801.

K7 Mickey Mouse is alive and well, and living in Pullman, WA. K7MM was WA7KWY. Any inquiries may be addressed to Dan Ransom, K7MM, P. O. Box 2165 CS, Pullman, WA 99163. 509-332-6325.

FOR SALE — Heath HW-16 with HG-10B VFO and Lafayette swr F.S. meter retubed recently $155. Ron, WB5REO 510 Evertt Conroe, Texas 77301 713-756-0335.

SELL/SWAP Meissner signal shifter 1930 vintage with catalog W9AYL 2003 Newton, Park Ridge, IL 60068.

HELP Celebrate Vermont's bicentennial (1777-1977), work 10 Vermont stations on the hf bands, get beautiful VTCC award. For info write VTCC Award, Burlington Amateur Radio Club, P. O. Box 312, Burlington, VT 05402.

SELL 20A, 13.8VDC power supply; 115VAC input, 50% duty cycle; excellent electronic regulation; electronic overcurrent and short circuit protection; crowbar over-voltage protection; perfect for 200W — class transistorized transceivers; $99 postpaid. WA9NSY, Box 728, Huron, SD 57350.

OSCAR Gear: Swan 250C xcvr with TV2B 2m transverter and 117XC ps. SI model MMV432H varactor tripler for 432 MHz. Make offer. WB9CQJ, 6048 S. Lakeview, Littleton CO 80120.

SPECIAL — new, factory boxed, 6GH8-A $1.50, 6LQ6/6JE6-C $4.50. Add shipping. Tube, Capacitor, Resistor list 25c. write Tommy, WB9CUL/4, Comm-Tech, 104 N. Third Street Richmond, KY 40475.

6 MTR xcvr SR46, VFO HA26, manuals, PTT mike. Want good cw receiver. W9SMY 5019 Burt St., Omaha, NE 68132.

SSTV — Robot 70-B Monitor and 80-A Camera, Sony CD302-A Cassette Deck w/mono amplifier, Macro lens, close-up lenses, etc. All mint condx. Complete outfit: $595. w/o cassette $500. WB5IOQ 918-396-3328.

GONSET G-50, 6 meter transceiver with Ameco preamp. Very good cond. $125. Looking for and will consider trade on Heath RX-1, HW-10, VHF-1, GSX-30, and matching convertors and convertor cabinet for HC-300. Write WA2PJP 60 Sunset Ave., Selden LI NY 11784.

COLLINS S-Line wanted. Condition somewhat unimportant. R. Myers, 221 Long Swamp Road, Wolcott CT 06716.

FLEA Market. The Eastern Conn. Amateur Radio Assoc. — K1MUJ — will hold their 4th Annual Flea Market on May 22, 1977 at Point Breeze Rest., Webster Mass. Time will be from 10:00 AM to whenever. Dealer fee will be $5.00. Admission for buyers will be $.50 per person. Free parking. Take Rt. 52 to Exit 1 in Webster then south on Rt. 193 one mile, look for signs. Talk in on 52 direct, 16-76, 10-70, 825-225, Ch. 14. Need more info? Call Dick K1SYI, 617-943-4420 after 7 or Mike WA1RLV 203-774-8254 anytime. Food & refreshments available.

"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 demo Atlas 210X transceiver, $499.00; new Drake TR-4C, $509.00; new Display Swan 700CX, $509.00; demo T-4XC, $469.00; new Rohn 50' foldover tower prepaid $439.00. Demo Ham-II rotor $125.00; used Atlas 210X $449.00. Display Mosley TA-33 beam $159.00. Hoss-Trader, SPECIALS: New Dentron 2000 watt linears on sale, $475.00. New Display L-4B linear, $729.00. ON SALE: "New Collins at 22% discount, OR MAKE OFFER. Moory Electronics Company, P. O. Box 506, DeWitt, Arkansas 72042. Tel.: 501-946-2820.

ROME Ham Family Day, June 5, 1977. Bring the XYL and kids and spend a great day at the Beeches, Rt. 26, Rome NY. We have over 5,000 square feet of indoor display area and a giant flea market. For the family we offer a free tour of Ft. Stanwix. For the ham we have interesting programs, contests, equipment displays, exhibits, and technical presentations. At the end of the day relax and treat the family to the famous Beeches buffet. For info write PO Box 721, Rome NY 13440. (Exhibitors are urged to reserve free display area now).

CASH for your ham gear. Beacon Comm. 617-267-1975.

REDUCING for apartment move. Atwater-Kent 60 special inside "Kiel Golden Voice Table." Gertsch FM-3 Frequency Meter with DM-1 FM Modulator Meter. Also rack mounted modulation meter. Five inch Dumont scope. 52/146/450 MHz repeater station, duplexer, band pass cavity, ac generator, antique moustache cups, Tandberg tape recorders, monaural/stereo, Pentron monaural. QST's since 1948, CQ's 1948-1949, National Geographics since 1948. 52 volumes Encyclopaedia Britannica. ARC-5 receivers/transmitters, TC-349G excellent, dc motor-generator for TBX-5, miscellaneous tubes/parts, Collins F250A20 mechanical filters. Everything must go. Make best offer. Call for information. 804-272-7254, W4NJE, 9810 Channing Lane, Richmond VA 23235.

40 Mtr Beam 402 BA used 1 month $175. You ship. K7ABV. Eric Martin — K7ABV, 3608 5th Ave. South, Great Falls Montana 59401.

Jobs for Hams

LINCOLN Farm seeks an instructor to teach electronics and code to our summer campers. Salary is open. We are an equal-opportunity employer and will consider a male, female or married couple (if both work on staff). We are an interracial, international and cross-cultural group. Lincoln Farm, 140 Heatherdell Road, Ardsley, NY 10502.

HELP Wanted: Cw operator. FCC 1st or 2nd class telegraph license and excellent typing ability required. Write to: Mobile Marine Radio, Inc. (Station WLO) Route 12 Box 218, Mobile AL 36609.

COUNSELOR: Operator with general license to teach ham radio at Pennsylvania co-ed camp. Have completely equipped ham station. Write Trail's End Camp, 215 Adams Street, Brooklyn, NY 11201.

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NEWS BULLETIN

DECISIONS - - - DECISIONS!!!

Who Can Decide???

DEAR OM: If you're in the market for a NEW RIG — whether it be a new all-band SSB Transceiver, a VHF unit, or whatever — you've no doubt "DECIDED" (at the least) by now that it's no cut & dry affair!! In fact, when you start comparing all the specs & features available on the wide variety of makes & models today, and take into account such important factors as price, performance, quality, resale value and SERVICE-ABILITY — chances are, more often than not, you'll wind up right back where you started — either scratchin' your head or ready to flip a coin!!

Now, we at BURGHARDT AMATEUR CENTER in Watertown, South Dakota — of all places!! — don't claim to have "all the answers" — but we DO HAVE most of these new models IN STOCK for IMMEDIATE DELIVERY, and we'll be more than happy to assist you in whatever way possible to help take some of the guesswork out of buying your new station. We're ALWAYS willing to furnish you (at NO CHARGE) up-to-date specs on any or all of the new models, and offer you whatever FIRST-HAND information we have that will "EASE YOUR MIND" and insure that your ultimate "DECISION" will indeed be the RIGHT ONE for YOU!!

In addition, when you've finally narrowed the field down a bit, we'll be ready with our TOP-DOLLAR trade allowance for your used gear — YES!! WE DO TAKE TRADE-INS!! — and give you a SQUARE DEAL that will include FAST DELIVERY, DEPENDABLE SERVICE and GUARANTEED SATISFACTION — all at NO EXTRA CHARGE!! We'll even give your new gear a COMPLETE CHECK-OUT prior to shipment and install any optional accessories you may have chosen — thus insuring that it will meet factory specs in all modes of operation when you're ready to put it on the air!! And, in most cases, we'll have it rolling along to you the SAME DAY your order reaches our desk.

That's just the way we handle things here at BURGHARDT AMATEUR CENTER — when you deal with us, you ALWAYS receive our prompt PERSONAL ATTENTION and INDIVIDUAL CONCERN, and you will always find us ready to COOPERATE with you to the limit!! We don't 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, it's the reputation of the dealer standing behind their purchase that's worth as much or more than the quality of the product itself.

We KNOW that Watertown "ain't exactly the cornerstone of civilization" — but we are ON THE MAP, and we'll go a LONG-LONG way to take VERY GOOD CARE of YOU!! Remember, OM, we're STRICTLY engaged in the "HAM" radio business, and our only aim is to give YOU the kind of SERVICE you deserve—AND YOU GET!!—as a member of the amateur fraternity investing your hard-earned dollars on sophisticated radio equipment with "AMERICA'S MOST RELIABLE AMATEUR DEALER"!! We ARE FOR REAL, and we look forward to SERVING YOU soon.

73's STAN BURGHARDT WØIT BILL BURGHARDT WNØNBO JIM SMITH WBØMJY

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THE MPC-1000R REGENERATIVE RTTY TERMINAL UNIT

The MPC-1000R REGENERATIVE Terminal Unit features automatic MULTIPATH CORRECTION, IN-BAND DIVERSITY operation, SIGNAL REGENERATION, up-down SPEED CONVERSION, automatic BLANK or LTRS CHARACTER generation and variable CHARACTER RATE.

An 80 character **FIFO buffer MEMORY** provides a full line of storage and may be PRELOADED and RECIRCULATED. Preloading of the memory may be accomplished from either the local keyboard or the incoming signal.

A unique Character Rate over-ride and TD INHIBIT circuit prevents character over-runs during down-speed conversion.

The crystal-controlled **UART REGENERATOR** may be programmed for 5, 6, 7 or 8 level codes, PARITY and the various stop-bit options. The UART's tri-state mode may be utilized to generate a PHASING pulse for crypto peripherals.

The phase-continuous AFSK Tone Keyer may be preset with three different combinations of Mark and Space tones, which are operator-selectable from the front panel.

The optional Station Identifier (TID-100) may be programmed in Morse, Baudot or ASCII codes and used in either a narrow or full shift configuration.

The internal high level loop supply is strappable for 60 or 20 mils operation. EIA, MIL and TTL FSK outputs are available simultaneously.

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CMOS digital circuits in the Multipath Corrector and Regenerator section guarantee high immunity to noise pulses associated with local teleprinters.

Designed for 50 to 400 Hz operation, the MPC-1000R carries a one-year warranty on land, sea or in the air.

An inquiry on your letterhead or QSL will bring all the other features and complete specifications, or call 213-682-3705.

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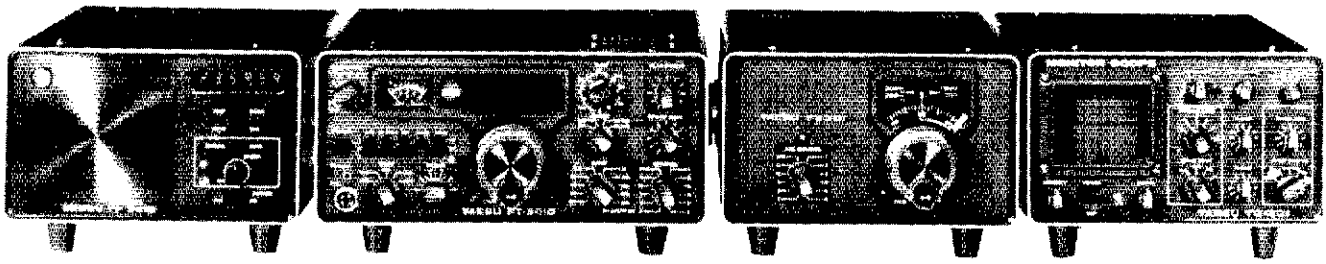

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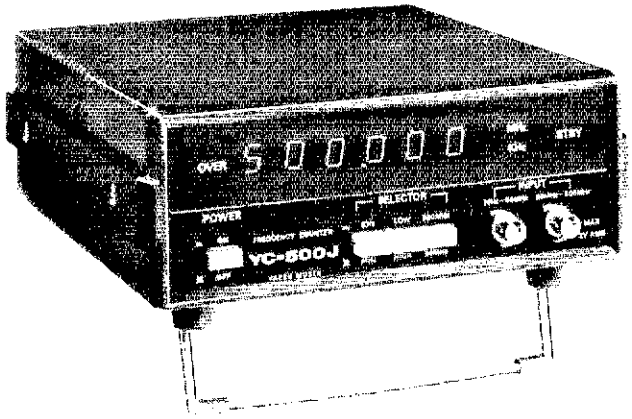

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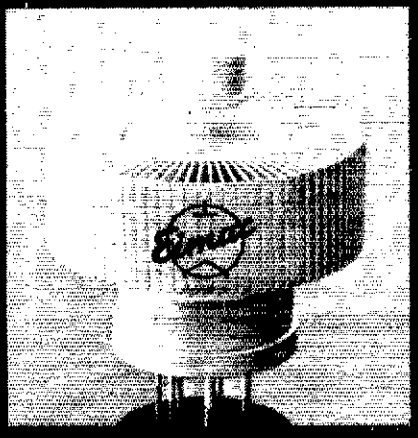

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