

**Repeater Docket.** A Notice of Proposed Rulemaking regarding repeater coordination included a moratorium prohibiting any amateur from putting into operation a "new" repeater on any band within the largest metropolitan areas. "New" was defined as any repeater not currently on the air, or not currently coordinated in preparation for being put on the air. The League filed a Petition for Partial Reconsideration, requesting that the moratorium be lifted, and the FCC did so. Thank the ARRL for swiftly and successfully petitioning for removal of the moratorium.

The FCC is obviously concerned about problems it perceives to exist relative to repeaters in the amateur service. When staff members of the commission have concerns, they are often expressed informally in talks and interviews. Examples include concern about the suitability of the simplex patch in the amateur service, and more recently about the suitability of the upcoming PACSAT operation (CQ Magazine, April '85 p.108). Their worries about repeaters relate to an apparently growing number of complaints about repeater to repeater interference, submitted to the FCC by hams.

While staff members' opinions are always of interest, they don't generally have the effect of law. But the NPRM lays the groundwork for possible extensive changes in regulations regarding repeaters. It's unfortunate that the amateur repeater community is expending efforts debating 15/20kHz spacing on two meters, when the FCC's NPRM could have substantially greater long term impact.

Given no viable alternatives, the commission will regulate as it sees necessary to minimize its workload - even if it may not be consistent with our views of the best interests of amateur radio. They simply don't have the time to settle disputes.

We think that repeaters should be regulated consistent with the basis and purpose expressed in §97.1. It's worth reading occasionally:

### §97.1 Basis and purpose.

The Rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the

radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international goodwill.

Repeaters relate directly to at least four out of the five principles listed. They help form the "voluntary noncommercial communication service". But that's just one of the purposes - repeaters help hams learn about rf and system design, and other aspects of technology, contributing to b, c, and d.

On the other hand, many amateurs view repeaters as "community property" - if they can receive a repeater on their new handheld, they should be able to use it, and it should always be available to them. After all, a repeater is granted exclusive use of a channel in a given area.

Our greatest concern is that strict regulations governing repeaters might be implemented in a way that ignores the principles listed in the basis and purpose, but rather treats them as "community property". Amateurs should be free to experiment, and as long as they conform to responsible technical guidelines on crowded spectrum, no significant bureaucratic obstacles should be put in the way.

The sole purpose of repeaters in the amateur service is simply not to provide guaranteed, interference free communications to any ham buying a radio. While models from other services may be attractive, approaches to regulation of amateur repeaters should not be based on regulation of police/fire repeaters or "tow-truck" land mobile systems. Amateur repeaters serve different purposes.

We welcome your thoughts on the NPRM. Comments are due at the FCC by July 1.

**Westlink Support Fund.** The Westlink Amateur Radio News, which is carried weekly on many repeaters around the country, is a unique service which offers amateurs up to date news about amateur radio (and some opinions too!). Westlink is supported solely by donations from listeners, and they need your help - now. If everyone that listens regularly considers it like a

magazine, and contributes appropriately, they won't have any financial problems. Send contributions to help keep them on the air to the Westlink Support Fund, c/o Dr. Norm Chalfin, K6PGX, POB 463, Pasadena, CA 91102.

**ID's of the Month.** "Call a ham and QSO. 511 is ready, Bravo! This is K4YPE, repeater."

"This is whiskey alpha six papa echo zulu repeater, and N6FFO controls the switch" (N6FFO is the XYL!).

"Whether you go south, whether you go north, practice safety, be alert, and get home on KA4GXZ repeater."

"This is the smoke'n 31 machine, W3SGJ repeater."

"North, south, east, west, the 220 machine is meeting the test, N4JBF repeater."

**Version 3 - Part 2.** The RC-850 repeater controller introduced the concept of remote programming to repeaters. Its original software allowed the repeater owner to remotely program ID and tail messages, command codes, timers, courtesy tone characteristics, autodial numbers, and lots more. This type of remote programming is done with Touch-Tone commands, and with Version 3.5, a remote computer terminal can be used as well. Version 3 introduces a new level of repeater owner programmability into the repeater system.

Two aspects of the new programmability include logical to physical I/O mapping, and a toolbox. There's lots going inside the controller, and there are lots of pieces of information running around. Unfortunately, although this information could be useful to us as system designers, it isn't available, because it doesn't come to a connector pin. But with logical to physical I/O mapping, you can bring various internal "signals", or logical pieces of information, to hardware output pins.

An example is a signal indicating that the Emergency Autodialer is in use. If such a signal was available, we could use it to start a tape recorder, so that we could build a tape log of all our public service patches. (We wouldn't want the tape to be cluttered with personal calls.) The tape could prove very useful when we're looking for funding, or trying to find a better site for the repeater.

It would be a shame to waste an output pin on such a signal, since only a few people would actually use it.

The logical to physical mapping capability allows you to map the Emergency Autodialer In-Use signal to an output, if you want to use it. If not, there are lots of other internal signals that you might want to bring out.

The mapping capability relates to inputs as well. For example, courtesy tone select inputs are actually logical inputs. We can map physical inputs (hardware pins) to courtesy tone selects, or we can map internal signals, such as patch enabled, phone offhook, remote base enabled, etc.

The full power of the I/O mapping results from the addition of the toolbox, a collection of "circuits" which can be "wired", all in software, remotely. The toolbox includes such elements as gates, flip-flops, one-shots, and analog comparators.

Let's say we have a wattmeter with forward and reflected power connected to the transmitter output. We can read back power on command, or can include the power readings in any of the programmable messages. But with the elements of the toolbox, we can take the reflected power reading to an analog comparator, set a trip limit, and connect an output of the comparator to an alarm input. Now if reflected power exceeds a certain limit, an alarm is triggered and the control operator knows immediately of the problem. We've just connected the wattmeter output to the controller, and designed and implemented the rest of the "circuitry" remotely.

By connecting a receiver s-meter signal to an analog input, we can build a "circuit", using analog comparators, which bins the user signal into one of several signal strength categories, and generates a courtesy tone indicating the user's strength. Again, just a wire from the s-meter output of the receiver is the only hardware involved.

The toolbox requires Version 3.5 and the computer interface option to run. More on Version 3 next time.

Everyone should have received their new manuals, and the software should be in field test when you read this.

**Amateur Radio Instructors - The Lifeblood of the Service.** With the switch to volunteer testing in amateur radio, members of the service have been given a new level of responsibility. The most visible is that of volunteer examiner (VE). The new VE program appears to be taking off nicely thanks to the efforts and hard work of many.

Another volunteer, the unsung hero for many years, is the instructor, who donates his time and energies to injecting enthusiasm into prospective amateurs. These "Elmers" give unselfishly of their time to teach. The best ones know how to get across the excitement of ham radio to people of all ages. They follow up with the new amateurs and provide the support and encouragement needed to get past the difficult early days of being a ham. The dedicated instructor is one of ham radio's most valuable resources.

Remember that without enthusiastic new amateurs entering the service, it simply can't continue to justify its frequency allocations.

All hams should give a pat on the back to VE's and instructors. If you know a VE or a volunteer instructor, thank him or her for their efforts. If you are one, thank you!

**Think Narrow (?).** The large and growing demand for rf spectrum is forcing the land mobile industry to examine new technologies to accommodate more users into a finite amount of space. These technologies include very narrow band FM, ACSB, linear predictive coding, and others. It's ironic that at such a time, amateur repeater coordination groups are actually moving in the opposite direction - that is, changing from 15 kHz to 20 kHz repeater channelization in the 146-148 MHz repeater sub-band - in effect reducing spectrum utilization.

The original two meter repeater band plans were based on 60 kHz spacing, since equipment in use at the time was wideband FM. As loading increased and more modern narrowband equipment became available, these 60 kHz channels were split to provide channels at 30 kHz spacing. In many areas these channels became saturated, and they were split again, creating "split-split", or tertiary 15 kHz channels. This approach has worked very well in many areas of the country for ten years. More recently, in less densely populated areas - specifically the Pacific Northwest - the 30 kHz channels were realigned to 20 kHz spacing to gain more channels without the challenge of making 15 kHz work.

Most of the arguments for 20 kHz channels revolve around its "technical superiority". This simply means that repeaters and users are less prone to interference from adjacent channel systems when the wider 20 kHz spacing is used. Fifteen kHz spacing pushes the technical limits of repeater and user rf gear.

Actually there are two aspects to consider - the practical performance levels of user equipment, and of repeater equipment.

User equipment is largely uncontrollable - many rigs over deviate, some are slightly off frequency, and since there are so many, and most users don't have the equipment required to adjust them properly, it isn't practical to expect to bring them all in line. Thus the inverted 15 kHz splinter channel was born. A user who might be over deviating would not spill over onto another repeater input frequency - only perhaps onto an adjacent output frequency, causing no real harm, since his low power, low elevation operation would at worst on rare occasions spill over into an adjacent channel user's receiver.

The problem that remains with 15 kHz inverted splinter channels is that a repeater receiver input must reject another repeater output 15 kHz away. This means carefully controlled deviation from the repeater transmitter (4.5 kHz peak seems to work well), and a good quality narrow band i.f. strip in the repeater receiver. In addition, careful coordination can keep the splinter repeaters a sufficient geographical distance from their "neighbors", minimizing adjacent channel signal levels to deal with.

The privilege of operating a repeater system - particularly a two meter system - carries with it certain responsibilities. They include use of good quality rf gear designed for use in crowded spectrum. Plus adequate frequency accuracy and stability to ensure that no margin is lost because of being off frequency. The days of using old converted wideband equipment, or \$69 receiver/transmitter kits on two meters are over.

Along with the rf equipment itself, repeater owners have a responsibility to either own or have access to proper test equipment to set up the rf gear so that it's on frequency and stays there, and so deviation and other parameters can be accurately measured.

The greatest current problem with 15 kHz splits is that some systems are now "rightside up", and others are "upside down". Systems opposite each other on the same channel pair, located even great distances from each other, can at times "lock up", each holding up the other system, creating chaos. The ARRL band plan suggests changing inverted systems to rightside up over the next five years.

Amateur band plans, particularly changes to existing band plans, must look years ahead, taking advantage of improving technology, and accomodating the anticipated increased loading in the future. They should also set an example to other spectrum users of what can be done. Newer technologies such as ACSB, and adoption of existing proven technologies such as tone signalling should be explored as well, but in no case should changes be made to raduce amateur spectrum utilization efficiency.

We think that fifteen kHz has been proven over many years to work - It just isn't as easy as 20. And with inverted splinter channels, the burden is placed where it belongs - on the repeater owner and the coordinator. While 20 kHz may fit the needs of the lightly populated Pacific Northwest, Texas, and Mexico, it doesn't meet the needs of densely populated areas such as California and the northeast.

Solving the problem of repeater interference the easy way, by simply spreading out, may seem attractive, but it's really just the expedient solution. There's more to learn, and an example to be set by solving the problem the right way.

Things are tough all over in the world of spectrum management. If the amateur community actually decides to reduce its spectrum utilization in its most crowded frequency band, then the next time the "spectrum thieves" strike, it won't be possible to argue credibly that we really need all the spectrum allocated to amateur radio.

**Member's Manual.** Micheal Salem, N5MS, has sent us a copy of the manual distributed to his group's supporting users. It's very well done, including information about how to use the RC-850 controller based repeater, plus lots of useful hints and recommended operating practices. Micheal is offering copies to interested '850 (and '85) owners for \$4 plus \$1 for shipping. If you're interested, contact him at Salem Law Offices, 101 East Grey, Norman, OK 73069.

**ShackPatch™ - Remotely Controlled Intercom into the Shack.** One of ShackMaster's six major features is ShackPatch.

Almost all hams have used, or at least heard, a repeater autopatch. The autopatch is permitted based on the fact that third parties are permitted to participate in amateur communications provided that a control operator is present at the control point of the station.

(The control point can be local, or remotely located.) The patch allows amateurs, through interconnection of the repeater to the telephone line, to talk with non-amateurs. The autopatch helps fulfill the basis and purpose of amateur radio, specifically as "a voluntary noncommercial communication service, particularly with respect to providing emergency communications".

Now imagine replacing the telephone line at the repeater with a wire to a speaker and microphone. And instead of the repeater, consider instead your home station. Add provisions to allow you, the control operator to remotely control your home station from your remote control point, just like the control op of the repeater. Now you have ShackPatch - an autopatch to home without using the phone!

ShackPatch allows you to talk with your family members over the air, without using a repeater autopatch. Your repeater may be too busy for patch traffic when you'd normally like to use it, such as on the way home from work. Or maybe you just don't want hundreds of ears listening to you and your wife discussing what you're having for dinner. And since many of your autopatches are to home, a simplex autopatch at home wouldn't help.

ShackPatch involves third party participation. Raymond Kowalski of the FCC has described one of the intents of the third party provisions in the rules as "to allow persons who are not licensed Amateur radio operators to experience the benefits of this service and to stimulate their interest in Amateur radio". ShackPatch offers hands on experience to family members in a manner consistent with the letter and stated intent of the rules.

Your family members are the best possible prospects to become new hams - since you're right there as a teacher and they can see the benefits every day. Allowing a youngster to talk with his dad over ShackPatch while to or from work gives him a deeper insight into the benefits of getting a license of his own. Instead of being limited to talking over the radio when his father is in remote control of the station, with his own license he could have a radio of his own and use it anytime to talk with anyone! A spouse can get a better idea of the incredible convenience of being able to communicate from anywhere, and at the same time, lose the inhibitions and fear of talking over the radio.

Who knows - maybe the next group of new hams will be converted ShackPatch users!

**Dynamic RAM Prices Tumble.** Because of the current soft semiconductor market, the cost of 256K bit dynamic RAMs has been dropping much more quickly than anyone expected. That's good news to many repeater owners because it means that it's even cheaper than we expected to upgrade your new Digital Voice Recorder to the full 8 megebit memory capacity. The lowest price we've seen has been \$5.77 for 150 ns chips - Microprocessors Unlimited, 24000 S. Peoria Ave., Beggs, OK 74421 (918)267-4961. The price changes, so check.

Memory price has historically followed a predictable pattern. When a new density memory device is introduced (such as a 16K bit or 64K bit RAM), the price is several times the equivalent cost per bit of smaller memories. Then the prices drop down a historical curve, with "bumps" created by economic and market conditions. But it can be dangerous to predict the future from the past. Only time will tell if we're in a downward bump right now due to a weak overall semiconductor market, or if the capacity coming on line will actually exceed the demand developed during the part's lifetime.

**Ham Ideas.** Amateur radio is a major spectrum user - we're allocated 10.3% of the entire rf spectrum below 450 MHz. (It's 6.6% of the spectrum below 1300 MHz, and this will rise to 8.6% with the allocation of the 900 MHz band.)

Given the magnitude of the allocation to amateur radio, and the relatively small number of people that directly participate, the service needs to work on an ongoing basis to restore the vitality of the service. Spectrum is too valuable to allow to lie dormant. That means we need more hams, and more active hams. And new hams must be encouraged to upgrade past the novice stage.

The ARRL and a new industry association are addressing the problem, and we'll throw in our two cents here.

- As hams, we have the access to the most effective medium for spreading information - radio! And we can use frequencies that can be received by the general public on inexpensive receivers, ranging from weather radios and multiband portables to police/fire scanners. How about a station which continuously transmits information about amateur radio - club activities, classes, information on how to get or upgrade a license, even classes themselves. The rules allow us to transmit one-way communications, addressed to amateur stations, containing information bulletins consisting of subject matter having direct interest to

the amateur radio service. Let's do it! And if non-amateurs listen in to learn and find out about amateur radio - so much the better. Standardize on a two meter frequency, dig up an old reel-to-reel tape recorder, set up a schedule, and spread the word. You can do it now, without all the inertia involved in getting on cable TV or public TV. The ARRL could help by providing standard audio programming material.

- Many community colleges allow anyone to submit proposals for special interest courses to be taught. Teaching amateur radio courses at community colleges, and having them listed in the college brochures, can tap a "new market" of people of all ages interested in self improvement and intellectual stimulation.

- Amateur radio needs to be perceived as part of the "fast track", and the potential exists through tie-in to computers and cellular telephones, as the public becomes more and more aware of technology. Of course, it's difficult to explain why a potential ham needs to learn to communicate the way Samuel Morse did a hundred years ago, but it's worth a try!

- Public spirited people are around all over, and one of the best places to find them is at the Red Cross. An introductory course about Amateur Radio which explains the public service aspects of the hobby may light the fire under some of these people. Just add a short introductory course to the existing courses in CPR, first aid, lifeguarding, etc.

**Change Your Command Codes.** Our repeater controllers offer great versatility in remotely changing the command code structure of your repeater. When you first receive your controller, you should think about how you want your commands organized, and change them from the factory default values when putting it on the air or shortly afterwards.

Command codes on the RC-850 and RC-85 controllers can be changed remotely. Control operator commands, for example, can consist of up to seven programmable digits followed by a two or three digit root code. The root codes are fixed in the controller, but the prefix digits can be anything, allowing hundreds of millions of possible combinations.

User level commands are grouped into a number of classifications, each with its own one to seven digit programmable prefix, again allowing millions of possibilities.

The point is that although there may already be many RC-85 and RC-850 controllers in your area, it's easy to make the command codes on your new controller unique.

**ShackMaster Update.** We have a new release of software for ShackMaster which adds support of the Yaesu FT-757GX, our rotor control board, and other goodies. A second BCD controllable transceiver can be frequency controlled with a second FC-1, and some transceivers with scan up/down microphones, such as the ICOM IC-45, can be frequency controlled as well.

**Rotor Control Board.** Now you can easily and inexpensively remotely control the antenna rotor on your remote base with your RC-850 controller or ShackMaster and the RCB-1 rotor control board. The board is designed to mount inside the Telex/Hygain control box for the CD-45-II or Ham IV, or equivalent. It's priced at \$85 list / \$76.50 amateur discount, and is currently in stock.

**Selective Calling.** HSC (hexadecimal sequential code) is one of the new paging formats supported in Version 3 firmware of the RC-850 controller. It's used in a commercially available pager (Standard PG-50), but it's well suited to a variety of selective call and control applications. For about the cost of a PL decoder, you can build an HSC decoder, which can fit inside some radios, or in a small outboard enclosure.

The HSC signalling format is an extension of five-tone sequential, and is compatible with any repeater. It's pleasant sounding, and is quick - less than 200 ms.

Particular decoder addresses are stored in E<sup>2</sup>PROM pager memories, and can be signalled manually by users, or signalling can be included in any of the programmable messages. The signalling can command a radio squelch to open, and close. Addresses consist of five decimal digits, and any digits can be "wild cards", allowing multiple levels of group call.

Some application ideas...

- Include paging tones in the Emergency Autodialer Activate message to be sure a control op is alerted, even in the middle of the night, so that they can monitor the call.

- Include paging tones in alarm messages to notify the repeater owner of an alarm condition.

- Using Event messages, alert users to an upcoming net. Manually activate the paging tones to notify of an emergency condition.

- Allow your repeater to support a variety of special interest groups, with each user belonging to a sub-group - i.e. DX'ers, public service groups, etc.

- Provide for secure activation of the remote phone lines supported in Version 3 for the patch.

We've designed a pc board for such a decoder using the MX-COM HSC Selective Calling Decoder. The board operates from 12 volts, has a "call" logic output and relay, and alert audio tones. We'll have information on availability next time.

**Price Increase.** As we mentioned last time, we've raised certain of our prices effective April 2 (we aren't fools). We offer an amateur discount for orders placed with 20% deposit included with the order. Company purchase orders requiring credit terms do not qualify for the amateur discount.

**New Employee.** ACC welcomes Teresa Yugo as our Sales Administrator. Teresa has an extensive background in customer service and sales administration. She, Tim, or Catherine can help you with ordering questions.

**Sales Reps.** Mike Young, WB8CX0 is an official Sales Representative for ACC, covering Ohio and much of the east. Mike represents us at many shows and hamfests, and has some items available for immediate delivery. He's also available for technical assistance. (216) 686-1054.

A new rep covering northern Florida for us is Ben Counts, WA4DDF. Ben is happy to do a presentation for your club, or provide a demonstration of our equipment. 1705 Pennsylvania Ave., Palm Harbor, FL 33563. (813)785-1268.

**See You At Dayton.** We'll be at the Dayton Hamvention with all our products on display. See us at booths 348, 349, and 350 (same general location as the past few years). We have meeting room 5 reserved for Sunday afternoon at 1 p.m. for an RC-850 owner's meeting. We'll have a general Version 3 Technical Question and Answer session, so read your manuals and bring your questions. See you there.

**REMINDER: SPRING FORWARD  
FOR DAYLIGHT SAVINGS TIME !**

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