

# acc notes

advanced computer controls, inc.

10816 Northridge Square, Cupertino, California 95014

(408) 749-8330

August/September/October  
1985

**Version 3 Status.** The new Version 3 software for the RC-850 repeater controller has been in field test at a dozen sites for a number of weeks, and we're preparing it for general release. The Version 2 software currently in your controller is 24K bytes (3 2764's). The release in field test, which we're calling 3.4, has just about all of Version 3 capabilities except the computer interface and the toolbox. It's over 40K bytes, which is too big to fit in your existing hardware.

Rather than take the time to chop the software down to 32K, and take out features and vocabulary words that you'd miss in order to make it fit in your existing hardware, we've laid out a small board which plugs into the bus connector of your main controller board (that's what it's there for). The board allows your '850 to accommodate up to 56K of program memory. (The Computer Interface board accommodates even more.)

If you have Version 3 family software on order, you'll receive 3.4 with the memory board at no extra charge. We're also upgrading your RAM from 2K bytes to 8K bytes at no extra charge as part of the new software upgrade.

Many thanks to the beta test sites for putting up with the hassles involved. If you're a user of one of those systems, you probably heard some strange sounds while the software was being shaken out. But now all is back to normal - only lots better!

**Version 3 Ideas.** Here are a few ideas for using several of the new features of Version 3 for your RC-850 controller.

**Multiple Autopatch Commands.** There are three independent autopatch access commands, which can serve a variety of purposes in the new software. One application is to have two or three levels of access, where each level can have its own enable/disable, toll restrict, individual user access code requirement, etc.

For example, at night, the regular patch could revert to toll restrict, and either a different access code, or user id can be required to make a long distance call.

Two emergency autodial access commands can be used similarly. During the day, a simple \* or 911 prefix autodialer can be available on an open basis, but at night revert to a backup, more secure access code.

**Individual User Access Codes.** With a controller as sophisticated as the '850, you may find that some of the features can be abused. With Version 3, you can completely cut out the horseplay, by requiring the user to enter his individual user access code before activating functions that you want to protect. There are 800 access codes, and each can be enabled or disabled by you remotely. Around a hundred codes cross directly to stored user call signs, so that when a user enables access, the controller says his call.

Protect the long distance patch, the remote bases... any or all of the 26 classifications of user commands.

**Event Messages.** Now you can schedule one-shot event messages on a daily or weekly basis. Before your net, a message can say "Net in two minutes" followed by paging tones to open user's receivers. Or your repeater can announce the beginning of a new repeater day each morning, and sign off at night before going to sleep.

**Stored high/low meter readings.** The new meter faces and stored high/low readings open up lots of new metering possibilities. The controller stores record highs and lows on each channel, along with the time and date of the record readings. With a temperature sensor on your PA heat sink, you can go back and find out how hot it really gets. And when. Or by monitoring voltage, find out how bad the brownout was. Monitoring the reflected power can tell you when antenna problems develop, and how SWR changes with weather.

These record readings can be included in messages as well, so that the repeater sign-on message each morning can tell how cold it got overnight.

**User Mapped Control Op Commands.** If you're the repeater owner, you've probably wanted to give out a few of the Control Op codes, without giving away the store. Now you can map up to ten Control Op codes to user level commands, with their own prefix. Make these commands available to whom you choose, and your Control Op command structure remains secure.

**Automatic Message Storage On Alarm.** The controller's alarms will go off if the alarm logic inputs are activated, and it will say the programmed announcement for a programmed period. If no one is around to clear the alarm, a mailbox message is left for control operators, tagged with the time and date. So, for example, if someone entered the building, you'll know when (unless they stole the controller!).

**Access and Control Modes.** Various groups like to operate their repeater with PL and/or Touch-Tone access. Eleven modes allow carrier, PL, Touch-Tone, PL and TT, and PL or TT for access, user level commands, and Control Op level commands. The choice from these modes should make everyone happy! And everything can be scheduled.

In addition to the eleven modes, each of the user level commands may be exceptions regarding the need for PL. For example, you may normally operate carrier access, but want PL for the long distance patch, or the remote. Or you may normally require PL for all user commands, but want to leave the Emergency Autodialer as carrier access. You can!

**These are just a few** ideas on how to use some of the vast new features in your '850 controller's new software. More ideas next time.

**ID's of the Month.** "For hamfest directions and information call WB9KFP on the AF9M repeater."

"This is WA6AXX, repeater, repeater, repeater."  
(sorry we don't remember who phoned in that idea)

**Dick Smith Transceiver.** We had hoped to have information this time on the Dick Smith 2 meter and 440 synthesized transceivers. But we haven't heard a word from anyone who has built them and put them into service. You can read about them in the August and September issues of 73 Magazine. They look like they're easy to frequency control, but we don't know how well they'll stand up at a crowded repeater site.

If you've built up either one, let us know so that we can share your experiences.

**Remoting the Phone Line.** Ever get tired of paying a commercial phone line rate at your repeater? Do you have to limit use of the patch because many of your users live outside the repeater's local calling area? Or maybe there's no way you can even get a phone line to the repeater.

One of Version 3's valuable features is support of up to three remote phone lines, linked from the repeater site to remote locations, such as people's homes.

Rulon Passey, W7WQC has a perfect site for his wide coverage area two meter repeater, on a 7000' mountain shared with a broadcast facility... but there are no phone lines. His users are primarily in Salt Lake City and Ogden, Utah. Rulon links down to one phone line in Salt Lake City, and another in Ogden, to provide patch capability for his users in those areas, with his '850 running Version 3 software. Autodial numbers are automatically directed to the right location, while autopatch numbers can be directed to either based on the command used to bring up the patch.

When the patch is initiated, the '850 controller sends signalling tones to the appropriate remote site to take the phone off hook. Rulon selected the HSC signalling supported by the controller, since it's secure, quick, and pleasant sounding. (The controller also provides DTMF, two-tone, five-tone, and other signalling formats.) The controller waits for dial tone, then sends the phone number in DTMF down the link to the remote phone line to dial the number. When the user hangs up the patch, the controller sends signalling on the downlink to place the remote phone back on hook.

Rulon's up and down link are dedicated full-duplex 420 MHz channels, although the controller will let you use your existing remote base transceivers for the up and down links. For example, if your 2 meter repeater has a 220 and 440 remote, the remotes can be used. When the remote phone line link is activated, the remote bases are brought up on their memory frequency 8.

The down link could be the repeater transmitter itself, with PL encode controlled by the '850 to gate the audio into the phone line (to prevent a circular loop back up the link). The uplink could be the control receiver, if you'd like. Since the up and down channels are auxiliary links, they need to be above 220.5 MHz.

Equipment required at the remote sites is a transmitter and receiver, a signalling decoder such as our HSC tone decoder board, and a simple phone patch.

Rulon is able to provide full service autopatch and autodial facilities for his repeater users, despite the fact that he can't get a phone line to his repeater.

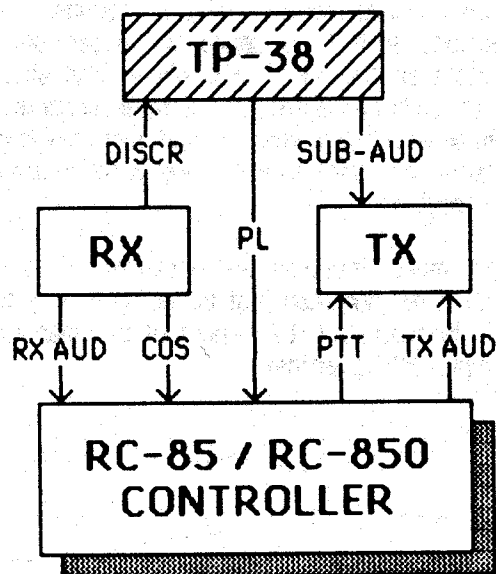
**COMM SPEC Tone Panel.** Communications Specialists, the tone signalling experts, have a new PL tone panel that may be of interest for use on amateur repeaters. The TP-38 Shared Repeater Tone Panel is designed specifically for shared "community repeaters", where several groups of users each use their own PL frequency. In that way, the tow truck driver doesn't have to listen to the chicken farmer.

Unlike the standard PL decoder, which can be set to decode just one tone frequency, the TP-38 can be programmed to detect many different sub-audible tones on the channel (up to 38). And it can be remotely programmed with Touch-Tone commands. It can also "cross-encode", that is, generate one tone in response to receiving a different one.

The TP-38 can be used with your RC-850 or RC-85 controller to provide the ultimate in PL frequency selection flexibility. Program the hang time in the TP-38 to 0, select high true PTT output, and connect it to your controller as shown below.

We know of one RC-85 owner who uses a tone panel to assign "family tones" to ham radio families, so that they can keep in touch with each other without having to listen to everyone else on the repeater.

TP-38 Shared Repeater Tone Panel - \$595. DTMF Module - \$59.95. Communication Specialists, 426 West Taft Avenue, Orange, CA 92665-4296. (800) 854-0547.



**FCC Dockets.** The comment periods have passed for two FCC proposals affecting repeaters and remote bases. The repeater docket primarily addressed frequency coordination and preference in settling interference cases. The auxiliary operation docket proposed removing the 220.5 MHz restriction on auxiliary links.

**Repeater Docket** - The Commission proposed addition of rules defining coordinated repeaters, and placing the responsibility for resolving interference problems on the stations involved. If one station is coordinated and the other is not, then the non-coordinated station would be fully responsible for resolving the problem. Otherwise, both stations would be equally responsible.

We agreed with the Commission's proposals. We also further suggested that they recommend a specific procedure to be followed by amateurs to attempt to resolve interference complaints before approaching the FCC.

**AUX Docket** - The auxiliary operation docket, based on a petition filed by the QCWA, would remove restrictions on the frequencies available for auxiliary operation, except 431-433 and 435-438 MHz (satellite and weak signal areas).

We support the Commission's proposal, based on the benefits to the the amateur community, enhancing its ability to fulfill the basis and purpose. For example, repeater systems would benefit by permitting six meter linking, on-channel repeater-to-repeater linking among two meter repeaters (with "remote base transceivers"), and on-channel remote telephone line linking for two meter repeaters (with our Version 3 software). Where spectrum is available based on local usage, low level remote bases would be permitted on two meters. Other segments of the amateur community would benefit by making two meter packet linking networks and crossband gateways legal, and by permitting HF packet networks and gateways to develop.

Overall, we believe that amateur radio's problems are best solved by self-regulation with some guidance when needed, rather than by arbitrary rules which can only stifle innovation.

For a copy of our comments and reply comments on either docket, send us a self addressed envelope (we'll buy the stamps).

**Telephone Access to Your Home Station.** In the past, the only way that you could operate your home station was to be there, in the shack, sitting in front of the equipment. ShackMaster has changed that, letting you operate from anywhere, linked either over the air, or by calling home on the phone.

Robert Ewing, WA4QWG, in an article in September QST Magazine, describes his RTTY station, remotely controllable from the phone, so that he can use his terminal at his desk to get on the air from work. ShackMaster lets Robert control the frequency of his IC-751, and operate his BSR modules for turning equipment on and off.

ShackMaster really shines for voice modes, since you only need the rig and ShackMaster for remote telephone operation. From any Touch-Tone phone, call home, and when ShackMaster answers, enter simple Touch-Tone commands to select the rig you want to operate, enter the frequency and tune around. When you're ready to transmit, the \* and \* keys are your push-to-talk.

All of ShackMaster's features are available from the phone, including access to up to three rigs, rotor control, remote control logic outputs and BSR control, the mailbox, etc.

Mike Aust, WB6DJI, calls up his station using a Panasonic speaker phone, so it's almost like having his radio equipment right in front of him.

**ShackMaster Article.** If you'd like to know more about the philosophy behind ShackMaster and what it can do, check out the two part article, "Takin' It to the Streets", in the September and October issues of 73 Magazine. If you can't find the issues, please ask us for a reprint of the articles.

**Lightning Statistics.** More deaths are caused each year by lightning than by any other weather phenomenon. Most of the 150 Americans who are killed by lightning each year are struck indirectly, killed by ground currents. At any given moment in the world, there are 1800 storms producing 100 flashes per second, or eight million flashes per day worldwide. (Thanks, San Jose Mercury News.)

**Repeater System Grounding.** Speaking of ground currents ... Getting a good earth ground on top of a mountain can be tough, but that doesn't mean that you need to compromise your grounding system. Mountaintops are far above the water table, and if the soil is sandy or rocky, a good earth ground can be impossible. But if the soil at your repeater site is high resistivity, it's even more important to design the grounding system carefully to prevent damage due to ground currents.

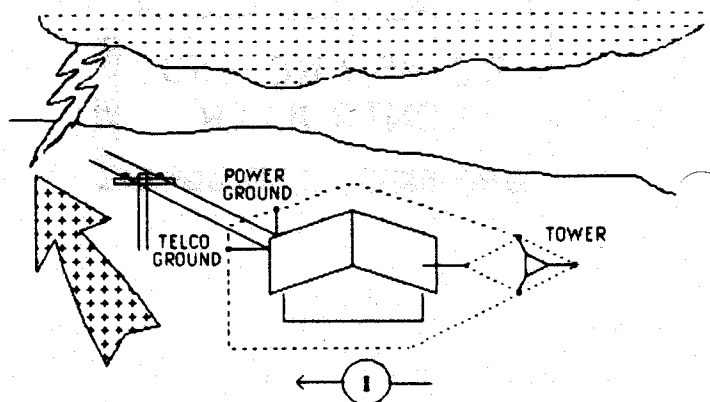
Imagine a lightning strike some distance away, where 100,000 amps is injected into the ground, in order to neutralize the charge induced in the earth by a cloud overhead. As the current flows through your site, huge voltage potentials can exist between different points due to the current flow through the ground resistance.

A second effect is the propagation time of the current impulse through the ground. The step of current flows out from the strike point like waves from a pebble in a pond. Although the current travels fast (nearly the speed of light), as the wave propagates through the site, a huge step voltage appears between the points where the wave has reached and those where it has not yet reached.

The result of these two effects are that the telephone company ground, the power company ground, your ground rod, and your tower will be at vastly different voltages during a nearby strike. Any lightning protector devices would be futile.

The key to real protection here is to tie all the ground points together, either by forming a ring surrounding the site (as shown below), or by forming a "rat-race" grid interconnecting each of the grounds. Make the connections with #10 gauge or larger solid wire. Protectors on the power and phone line should have their grounds connected to the interconnected ground system as well. Now when ground currents arrive, all the equipment rises to a million volts together, then decays together.

There's more involved in protecting a site from equipment damage than just pounding in a ground rod. It isn't difficult, but it's important to understand what you're protecting against.



**Preventive Maintenance.** Unless you're reading this under a blanket of snow, it still isn't too late for a trip to the site to check things out before the dead of winter. An article in August, 1985 Communications Magazine outlines some excellent site checks before winter sets in.

It may be a good idea to measure your antenna's VSWR, especially if you haven't measured it in a while. Check your grounding system for rusted cables or corroded clamps. Look over the tower and guy wires, and the transmission line. Check out the coax for damage to the jacket.

Climb the tower and inspect the antennas themselves. Be sure the connectors are in good shape, and that the taping is still weather-proof. And make sure that the antennas are really vertical!

A casual trip to the site while the weather is still good may save an emergency trip later when you'd rather stay home.

**Welcome New ShackMaster Dealers.** We'd like to announce two new ShackMaster 100 dealers. Of course, ShackMaster is still available factory direct, but you may find it more convenient to buy from one of these outstanding dealers:

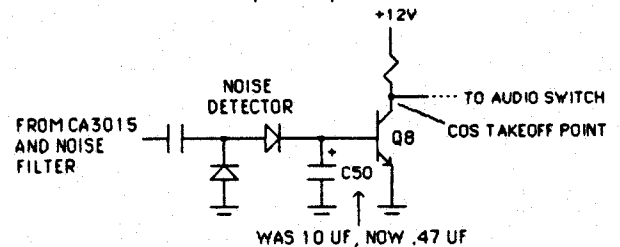
**Ham Radio Outlet** (six stores) / 800-854-6046

**The Ham Station** / 800-523-7731

**DVR Progress.** With the bulk of Version 3 work out of the way, we've been making progress on the Digital Voice Recorder. We'll be in touch shortly with those having it on order.

**Shorten your ShackMaster Control Window.** Carey Fisher, WB4HXE writes "If a user is unable to use a short enough control window period, the control radio can be modified very easily. There is usually a rather large capacitor on the output of the noise detector in the squelch circuit of the radio. By changing this to a smaller value, the squelch circuit responds faster and you can set the control window delay very short. I changed the 10 uF cap (C50) in my Clegg FM-21 220 MHz xcvr to a 0.47 uF. I found that some capacitance is necessary due to noise. Attached is a rough schematic showing the typical location of this capacitor. I am now using a 50 msec control window and have no problems capturing the ShackMaster even when my mobile signal is real weak. The 50 msec period is great! I never miss a syllable when patching or crosslinking!"

Partial Schematic of Clegg FM-21 showing COS takeoff and speedup.



**New Source of HSC Pagers.** We have word that Maxon Electronics has introduced a line of pagers using the HSC signalling format, supported by the RC-850 Version 3 software. Maxon joins Standard as the second supplier of pagers using this format. We'll try to have information on pricing and availability next time.

ShackMaster is a perfect  
Christmas present!

**acc** advanced  
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10816 Northridge Square  
Cupertino, CA 95014  
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**first class**