acc notes

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Last time we said that we'd provide details on our RC-850 repeater controller Version 3 software, and our new Digital Voice Recorder. At this writing, the completely re-written RC-850 manual set is being final edited prior to distribution, and the software is being readied for beta test. We've demonstrated the DVR at the Miami Tropical Hamboree, and are gearing up for production. So here we go!

Our Goal. We know we're late with our Version 3 software. Version 2 for the RC-850 controller has been bugfree, and offers far more overall capability than any other repeater controller available anywhere, at any price. Our goal in new software for the '850 is not to provide a handful of new features and fluff, which would be easy to do, but to advance the state of the art in repeater control.

Version 3. The capabilities of the new software are extensive, so we'll just try to hit on a sampling of the highlights here. This time we'll describe some of the new capabilities relating to the message editor, telemetry, paging, access and control modes, and the patch. Next time we'll describe the "toolbox", scheduler enhancements, the computer interface, remote bases, and more.

Messages - Your Repeater Talks to You. The controller talks to its users to provide information. Some of the things it says are predefined, and others are messages that you program. The IDs, for example, can include useful information for frequent users, and newcomers as well. Additional synthesized speech vocabulary, accessible from the interactive message editor allows the controller to say more informative things in ID's, tail messages, the bulletin board, etc. Some of the new words include

amateur	ham	patch	valley
auto	hamfest	please	your
club	-ing	police	zed
dial	late	radio	
emergency	look	star	
	mobile	thank you	

Even with our new Digital Voice Recorder which allows remote recording of the various response messages, many are best provided using the built-in speech synthesizer. The male and female voices provide a consistent "personality" for your repeater. There is simply no substitute for a large, custom tailored synthesized speech vocabulary in a repeater controller.

In Version 2, messages could be either synthesized speech or Morse code. In Version 3, messages may consist of mixtures of speech, Morse, DVR tracks, paging tones, external devices, and more. An example would be an ID composed of a DVR track saying "Be sure to attend tonight's meeting on VHF propagation" followed by synthesized speech announcement of the call sign. Another might be an alarm message consisting of paging tones to activate your pager followed by a speech announcement of the alarm type.

Some other enhancements include adding two character positions to most programmable messages, and message "macros" that allow call signs and other frequently used strings to be stored just once.

Telemetry - Keeping Score. The '850 controller offers sixteen analog input channels for analog measurement and voice readback of meter readings. "Meter faces" for different types of measurements can be assigned to each channel, depending on what you're measuring. New analog meter faces include several additional voltage, current and power faces to cover a broad range of applications, and direction in degrees. Users can interrogate meter readings with Touch-Tone commands.

In Version 3, meter readings can be included automatically in messages as well. When the repeater says "At eighteen watts, this is WA6AXX, repeater", it means it! Or an over-temperature alarm message can say "Power amp's over temperature, one hundred forty degrees".

Immediate readings are of interest, but sometimes even more interesting are highs and lows on a particular channel. The controller periodically measures each analog channel, and stores a running high and low value for each channel, tagged with the time of the high/low measurement. The high/low memories can be cleared manually or as scheduler events. A scheduled morning ID message might say "Good morning, today's low temperature, forty seven degrees, at WA6AXX, Repeater".

The "toolbox", which we'll describe in detail next time, often eliminates the need for external circuitry in connecting a variety of signal sources to the controller for measurement. It also allows courtesy tone selection and alarm generation based on the analog signals applied. The new capabilities make it easier to use the metering, and let you get many more benefits from it.

Paging - Selective Call. In our Version 2 software, we introduced two-tone sequential paging to amateur repeaters. Paging capabilities allow users to be available without having to listen to all the chatter normally on the repeater. It is also ideal for public service oriented repeater groups. There's been so much interest in paging with the '850 that we've added a variety of new formats. To simplify activation of paging tones, the format, address, and frequency of each pager are stored in memories, and accessed by users (or the system in programmable messages) as two digit addresses.

The new formats include alternate two-tone timings, five/six tone sequential, DTMF, CTCSS, HSC numeric display, and GSC digital display paging. The new paging formats are useful both in selective call applications, and as secure forms of signalling for remote control. The display page formats are the state of the art in paging technology. Pages may be specified as tone only, tone and voice, or tone and data, depending on the format.

Paging tones can be directed to the repeater transmitter, or to the remote base transmitters on memory frequencies, for users who have pagers on frequencies other than the repeater output. For example, 220 users can't generally find pagers for 220 MHz, but if the repeater has a 440 remote, the paging tones can be sent on a 440 MHz frequency to modified UHF pagers.

All the new formats except the binary digital GSC format are generated using the RC-850's built-in tone generator and are compatible with virtually any transmitter. Binary GSC paging requires a digital modulator added to the direct FM repeater transmitter.

Access and Command Modes. Version 2 software offers four PL access and control modes, and a Touch-Tone access mode with programmable timer. Version 3 extends this to eleven access and control modes, supporting all the logical combinations of carrier, PL, Touch-Tone, PL and Touch-Tone, and PL or Touch-Tone for access, user command, and control op command. These modes allow the repeater owner to operate his system exactly the way he wants.

Each class of user command can have a set of "attributes" associated with it. These attributes further affect whether PL is or is not required for particular commands, and can require individual user code access to certain features. We'll describe the result of some of these capabilities with a couple of examples.

You may want your repeater to be carrier access, but require PL for most user commands. But you may want the Emergency Autodialer and bulletin board to be available to anyone without PL as a public service. That's easy!

Maybe your repeater operates carrier access and command, but there are a few features that you'd like to limit to PL control. For example, an un-toll restricted Autopatch (see below) could require PL while the protected Autopatch may be carrier accessed.

Certain user commands may require the user to identify himself with his individual user access code before activating the function. For example, the un-toll restricted Autopatch, and the remote bases might be individual user code accessible. The user identifies himself with his own three digit code. If his code is enabled by the repeater owner, the repeater announces his call and allows him several seconds to activate the function. Individual user access codes both limit access to sensitive features and facilitate logging (as we'll see next time!).

The Patch. If one Autopatch is good, three must be better! But why have three Autopatches? Actually, the Autopatch can be accessed with three different user command codes. Each can be enabled or disabled, and toll restricted independently. Each can each also have its own set of attributes. One Autopatch might be carrier accessed and toll restricted, and scheduled to be available during the day. Another might be available for general use as well, but require individual user ID to call long distance numbers. At night, a third with a different command code might be available only to control operators.

Two Emergency Autodialer access codes provide similar benefits - it's easy to provide an open autodialer as a public service during the day while keeping a closed autodialer available at night.

Perhaps the most significant upgrade is direct support of multiple phone lines, including remote phone lines linked through the remote base transceivers. Autopatch isn't practical on many repeaters, because of the cost of running lines to the site, or because the repeater site is far away from its coverage area and all calls are toll calls. By sharing the same auxiliary transceivers used as remote base transceivers (and paging transmitters) with the patch, all that's needed at remote phone line sites are a pair of transceivers, a decoder, and a coupler.

Three available lines may include any combination of one or two local lines (with a signal provided for relay selection), and up to three remote lines. Autopatch calls may be directed to one of the three lines based on the command used, and autodialer calls are directed automatically to the proper line based on a prefix stored with each number.

Little features added include selectable male, female, or Morse code phone number readback, a simple toll restrict mode as an alternative to the telephone exchange tables, permitted area codes, and more autodial numbers with more flexibility in defining them.

Digital Voice Recorder. ACC's new DVR is a multichannel solid-state digital audio recorder, which can remotely record and play back audio in communications systems. Audio is digitized and stored in semiconductor memory. Since it's fully solid-state and there are no moving parts, it's ideal for use in remote locations and harsh environments. No degradation of audio results from a large number of record and playback operations.

The DVR allows remote recording, and playback of up to 128 variable length audio "tracks". A built-in Touch-Tone command decoder instructs the recording operation. Serial commands from external equipment (such as ACC's repeater controllers) cause playback of audio tracks. Several strobe logic inputs allow playback of certain tracks for operation with simpler control equipment in stand-alone applications.

Independent of the DVR's standard record/playback operation, a Touch-Tone activated voice mailbox allows users to load and retreive voice mail.

The DVR is available with up to three fully independent record/playback channels, allowing one unit to simultaneously service several systems, greatly reducing the per-channel cost. In addition, voice mail can be directed to any or all of the three channels.

Recording Technology - The DVR is based on direct digital recording - 64K bit per second PCM (pulse code modulation). The technique is similar to compact audio disk technology, but uses a smaller digital word and lower sample frequency since a repeater isn't capable of the same high fidelity as a stereo system. But unlike digital recording techniques which directly compress the data, such as CVSD and ADPCM, PCM preserves full repeater fidelity - a 3 db bandwidth of about 150-3800 Hz, approximately 1.5% distortion, and a high signal-to-noise ratio.

The DVR optionally compresses data in software for selectable recording quality levels, allowing you to trade off audio quality vs. memory usage for different types of recordings. Mailbox messages may be recorded with somewhat lower audio quality to conserve memory, while your favorite female voice can sound like she's right there at the repeater IDing it for you! Given the predictable steep drop in cost of memory, we chose to give you the option of no-compromise audio quality.

Three Channel - The DVR is available as a one, two, or three channel recorder, and may be upgraded at any time. Independent multi-channel capability allows several repeaters to share one unit, allowing several groups or systems to share the cost. Voice mail can be directed between systems! One channel may be dedicated to the phone line so that audio can be recorded from the phone, and mail may be left and retreived from the phone, all conducted off the air.

Standard Memory Chips - The DVR accomodates up to 32 RAM chips for voice storage - four rows of eight chips per row. Each row may contain either 64K bit (4164) or 256K bit (41256) chips - up to 8 megabits of memory! These chips are standard "jellybean" dynamic RAMs used in the IBM PC and most other home computers, and are available from ACC or may be obtained from any home computer supplier for easy upgrade at any time. Compatibility with 256K chips, which are just now becoming available in quantity, lets you take full advantage of advances in semiconductor technology, and the predictable decline in the price of memory. When fully loaded with memory, the DVR is capable of up to six minutes of recording time.

Direct Interface to RC-850 and RC-85 - The architecture of the RC-850 and RC-85 message generation allows any programmable message to access the DVR for playback. Even more importantly, several DVR tracks can be joined together to form IDs, Emergency Autodialer reaponaea, etc. The ability to use a treck in several different repeater messages makes the most of the recording time available. In effect, the playback time is several times the recording time, since tracks can be accessed from several messages (i.e. your call sign needs to be recorded only once). With the RC-850 even courtesy tones can consist of remotaly recorded audio!

Remotely Recordable Messages	RC-85	RC-850
ID's	7	16*
Tail messages	3	13*
Emergency Autodial Reaponaes	10	10
Bulletin Board	2	2
Alarm	1	2
Phone Answer	Y	Y
Phone Hangup	Y	Y
Courteay Tones	N	8
User-to-user mailbox messages	64	64

*These may be scheduled.

The DVR may be used standalone on any repeater as well, providing remotely recordable IDs, and the voice mailbox.

Available in e Veriety of Configurations - The DVR is available as an assembled and tested board, or in a 19" rack mount enclosure. It can be supplied with one, two, or three record/playbeck channels, and in your choice of memory size.

Pricing is from $750, and we're gearing up to begin shipping early March.

Clock For Your RC-85. Doug Porter tells us how he connected a Radio Shack talking clock to his RC-85 repeater controller. The message editor in the RC-85 allows you to define any of the programmable messages as "external device". When the controller is to generate an external device message, it provides e strobe, and waits for a busy signal to indicate completion of the external message. In the RC-85, the time of day external message could be used for a aelectable tail message, as the phone hangup message, and in a bulletin board alot so that uaers could interrogate it whenever they want.

Radio Shack has a $39.95 time-only battery operated clock, and a $49.95 time/date clock which operates from ac power with an auxiliary backup battery. Write to us for a copy of Doug's hookup.

Pagers Available. We know of a aource for about ten used Motorola Pageboy II pagers, adaptable to two meter use (aaking $75). They need to be re-crystalled (around $13) and repeaked for the new frequency. They're compatible with the two-tone signalling from the RC-850 and RC-85 controllers. If you're interested, write to us and we'll psss the word to our cuatomer (who doesn't want to be deluged!).

ID's Of The Month. "Inch for inch, meter for meter, KA4SEJ is the complete repeater". "On the move, all the time, WA4ZBE, rapeater". "Fire up the radio, open the gate, and enter the K4ICN repeater".

A National Repeater Coordinator? At this writing, it appears that the FCC will issue a Notice of Propoeed Rulemaking proposing to appoint a national organization for coordinating amateur repeaters, similar to the way commercial repeater coordination is handled. (It appears that the ARRL isn't interested in the job.) Our first reaction is that the problem of repeater coordination seems much worse than it is. Of the thousands of amateur repeaters in operation, only a handful come to the attention of the FCC or the amateur press as "problems".

We think that it's unfortunate that hams don't appear to be able to manage the coordination process locally. But the FCC's response to the problem should teach us an important lesson.

Imagine that you're a member of the staff at the FCC. The commission's budget has been slashed, it's responsible for overseeing the mess resulting from the breakup of the phone company, and every possible special interest is looking for more or new spectrum for their special service. But the phone rings off the hook with hams calling from around the country - not to promote the value of the amateur service, or to help offload the commission of routine amateur related activities, but to complain about their fellow ham! That can't make a very favorable impression.

In the big scheme of things, amateur radio isn't really one of the commission's most crucial regulatory tasks. If it appears that hams can't solve their own problems, then the commission will find a way for them to be solved. But the solution probably won't be in the best interest of amateur radio.

The point? Try to solve problems without involving the FCC. Approach the league for assistance instead. Be consciously willing to compromise. Don't "tell" on your fellow ham to the FCC unless he's a threat to the service. Don't call the FCC to ask about rules unless you've spent a lot of time reading and studying them first yourself. Better yet, ask the league if in doubt. If you're thinking about approaching the FCC about a problem, put yourself in their shoes and think about how it reflects on amateur radio.

Control Below 220? Radio remote control of other amateur radio stations is currently limited to frequencies above 220.5 MHz by §97.61(d), which says "All amateur frequency bands above 220.5 MHz ... are available for auxiliary operation". The QCWA has petitioned the FCC to delete 97.61(d), which would in effect allow such remote control on any frequency. The current 220.5 MHz boundary could be considered arbitrary (like many rules), and is largely unnecessary given modern control technology. Any repeater or remote base owner should be very interested in commenting if the petition results in a Notice of Proposed Rulemaking.

REPCO Repeater Interface. Dave Melnick, WA6POR has provided us with an application note describing the interface of the RC-850 controller to the REPCO Dimension Repeater. Only four connections are required, and no modifications are necessary. Dave also outlines the adjustment procedure and switch settings. REPCO offers reasonably priced commercial grade repeaters suitable for two meter and 440 MHz amateur use. REPCO, POB 7065, Orlando, FL 32854. Write to us for a copy of the application note.

General Repeater Guidelines. The Tri-State Amateur Repeater Council offers a set of general guidelines and technical system considerations regarding amateur repeaters, and is looking for comments. Write to TSARC Technical Committee, Gary Kantor WA2BAU, 58 Rutgers Lane, Parsippany, NJ 07054. We'd suggest an SASE and a few pennies for copying costs.

Looking For A Controller? Before you buy, we suggest that you consider the features and the benefits to you. Our **RC-850** is the industry's top of the line controller and its foremost benefit is that it's **upgradeable** in both software and hardware. The software upgrede potential has been demonstrated in Version 2 software, and now soon with Version 3. Our upgrades don't just expand previously existing capabilities or add a new feature or two (it would be easier on us if we did only that) - but they break new ground in repeater control system architecture. Our original owners know that upgrading from Version 1 to Veraion 2 aoftware was like getting a whole new controller!

The hardware upgrade potential on the **RC-850** has been demonstrated with our memory expansion boerd, and our new computer interface board. A computer bus connector permits every RC-850 owner, even the very first one, to follow our hardware upgrsde path. Hardware upgrades were *planned* even before the very first RC-850 rolled off the production floor a couple of years ago. This kind of engineering means that you won't have to buy a whole new system just to get the latest in technology - your RC-850 will never become obsolete!

The **RC-85**'s foremost benefit is that many of the most important repeater controller features are conveniently contained on one board - for one low price. We can aupply the **RC-85** in a rack mount enclosure, or ss just a board so that you can mount it inside your existing repeater enclosure. Both the RC-850 and the RC-85 run off your existing 12 volt power supply - no need to buy a duplicate power supply, because our controllers are designed for low power drain (around 175 mA). Hook-up is easy to any repeater - connect transmitter PTT and audio, receiver COS and eudio, phone line, and twelve volts.

Both the RC-85 and RC-850 controller are designed to make the most of our new Digital Voice Recorder. All the programmable measeges (multiple ID's, tail'e, end other response messages) in the controllers may access the DVR for playback. And since messages can consist of multiple DVR tracks joined together, you make the most of the memory storage in the DVR. The DVR's voice mailbox supplements the RC-850's built-in mailbox.

More Touch-Tone Trivia. Gordon Pugh, W1JTB wrote to us to tell us that low number area codes for "city folks" (example 212 New York vs. 918 Oklahoma) was not really as a courtesy to the city dwellers. The shorter rotary dialing time for the majority of calls to big cities reduced holding time while dialing the area code, reducing the totsl amount of central office equipment required, and saving money for the phone company!

On the other hand, Harry Hahn, WA3AWB talls us that the Touch-Tone pad arrangement was chosen as it was (four row, three column) to slow down the caller because the early DTMF electronics were alow in response time. The arrangement fastest for the user is placing the buttons in a circle, aimilar to the old telephone dial, but the early DTMF decoders couldn't handle the potential dialing speed.

Digitalker For Your ITC-32. The ITC-32 Intelligent Touch-Tone Control Board firmware is designed to interface to Digitalker speech chips to provide voice IDs and other command responaes. (Otherwise thesa responses are in Morse code.) Larry Brooks, WB0ECV has laid out a pc board for the Digitalker chips, which makes it easy to get the most out of your ITC-32. Larry is offering the bare board for $22 post paid. You'll also need the Digitalker chips, a voltage regulator, op amp, crystal, resistors and capacitors as described in the ITC-32 manual, which are available from Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002 (415) 592-8097. For the pc board, write to Larry S. Brooks, 3185 Bunting Ave., Grand Junction, CO 81504. Thanks Larry!

Half-Price Sale. Our RC-85 controller, at under $1000, is the "second best repeater controller in the world" ... second only to our RC-850 controller. We invite you to request the manual on the RC-85 at half price ($10) with the slip below, and welcome you to compare with anything else available.

When you receive your manual you'll notice that the command codes are "censored". When you decide to purchase your controller we send you replacement sections which provide the actual command code structure. Although the commands are fully remotely programmable and can be changed at any time to any of literally millions of codes, we protect our equipment owners by not releasing any more details than necessary, unless you actually have purchased a controller.

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Yes! I'd like the chance to read about the RC-85 Repeater Controller at half price. Please send me the manual for $10.

☐ My check is enclosed.
☐ Please charge to my VISA/MC.

Card Number ______________________________ Exp. __________

Name ________________________________ Call ________________

Address ______________________________ (no P.O. boxes please)

____

Phone Number ________________________

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Price Increases. We lowered the price of the RC-850 controller last summer, but it will be going back up with the introduction of Version 3. ShackMaster will also be going up from its introductory price of $625 to $695. The price increases will be effective in March.

Silent Key. One of our first RC-850 owners, Larry King, WA6OBT, passed away recently due to an accident at his home. We had the pleasure to meet him in person and talked with him many times. Amateur radio will miss him.

When in doubt – Let us know! You may have something that you've wondered about for a while but never asked us, or you may have a suggestion, comment or idea – when you do, please write us and let us know! Of course when you have an immediate problem you should call us. A survey of our people who answer the phone indicates that the best times to call are:

All day Monday – from 8 a.m. to 4 p.m.
Tuesday through Friday – from 2 p.m. to 4 p.m.

We'll make a point to be especially available during these times.

Ten Meter Remote Base. All our repeater control products support at least one synthesized remote base transceiver attached to the repeater. Mike Young, WB8CXO has provided us with information on using the FC-1 Frequency Control Board to interface the controllers to the Azden PCS-2800 ten meter transceiver. The FC-1 board interfaces to the connector on the rf deck of the transceiver. The interface provides complete control of frequency and offset, so you can work ten meter FM simplex and repeaters. Write to us for a copy. Thanks, Mike.

Source For Parts. To supplement last time's list, another good supplier of high tech parts for your technical projects is Advanced Computer Products (no relation), P.O. Box 17329, Irvine, CA 92713-7329. (800) 854-8230.

ABCD Phone. Jim Fortney, K6IYK tells us that the DAK "control operator" phone we mentioned last time is more than just a phone - it has memories which can store telephone numbers, or repeater control codes! But the * and # keys are used for programming the memories, so to pass * or # into the phone line, simply hit the key twice.

Jim dug up some cheaper 16 key phones, Toyo Model 1000, for $8 each. These phones don't have memory features, but do have the ABCD keys, and can help provide overall repeater telephone control security.

ShackMaster. We wanted to talk about another of ShackMaster's features in depth, but we're out of room this time. In the mean time, we welcome you to order the manual, which describes all its capabilities in detail. It's only $7.50 postpaid.

Signup For ACC Notes. We're doing housecleaning on our mailing list for this newsletter. If you'd like to continue receiving ACC Notes <u>and didn't send in the slip from the last issue</u>, please send in the coupon below. If we haven't heard from you, we'll reluctantly drop you from our mailing list. Of course, if you've purchased <u>equipment</u> under your name, we'll keep you on our mailing list unless you specifically request us to remove it.

Many thanks to those who sent in the slip from the last issue - it's good to know that you're out there.

YES! Please continue sending me ACC Notes ☐ 2

Please take me off your mailing list ☐

Name _____ Call _____

Telephone(day) _____ (evening) _____

[If any changes only]

Address _____

City _____ State _____ Zip _____

I'd like to read more about (?) in ACC Notes _____

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Westlink On Your Repeater. Leonard Goodnow, WA1UNN describes how he records Westlink, and keeps it available to users on Touch-Tone command from his RC-850 based repeater all weak. He has a continuous loop recorder at the repeater whose audio output drives the '850 Spare Audio 1 input. Record audio comes from the transmitter audio output from the controller. The recorder is controlled by the user function remote control outputs – UF1 controls record/playback, and UF2 is an emergency recorder off function in case of malfunction. The SEL3 signal from inside the controller is used to activate the recorder.

A spare scheduler setup state is used to record Westlink. Both links are disabled, the patch timer is disabled, long distance is enabled, a "West ready" tail message is selected, and UF1 is turned on. Westlink is dialed on the patch, and the Spare Audio 1 command is entered, starting the recording. At the end, the # terminates the patch and Spare 1 function at the same time, and the recorder runs until it recues. The controller is then manually set back to the proper setup state.

The Spare Audio 1 timer is set to 11 minutes, and Leonard uses a 12 minute tape. Westlink can be played on any scheduler state that Spare Audio 1 has been enabled (it's kept disabled from midnight to 6). The Spare Audio 1 timer automatically turns it off if someone forgets or drives out of range, and users can talk over it if necessary.