

acc notes

AMATEUR RADIO, SCANNING & MONITORING

Advanced Computer Controls, Inc.

October 1993 - February 1994

Repeater Mini-Notes

IDs of the Month

"To be o' not to be. That is the KD6CUC repeater."

"This is the radio police, come out with your hams up, NOEPK."

"Key your mike, what's your call, this repeater is open to all. This is [anonymous]."

Correction from last issue... *"I am watts I am, the N5QJQ repeater."*

More great IDEas and courtesy tones in *ACC Notes Online*.

First-Pizza Award

The first pizza order placed through a ham repeater following the change in the business rule on September 13 of last year was by...

Thomas Reinhart, KD6MQG

N6JXL Repeater, 224.88 MHz

September 13, 1993, 19:48 Local

1 medium pepperoni pizza

Me & Ed's Pizza Parlors

We've sent Thomas a certificate suitable for framing to celebrate the historic occasion. Congratulations!

"Just add a PC with a Sound Blaster and one resistor..."

Expanding Your Repeater's Vocabulary

One of the questions we hear most often is "How can I add more words to my controller's speech vocabulary?" For some people, the built-in nearly 600 words aren't enough. There are hundreds of thousands of words in the English language, so 6,000 words, or even 60,000 words wouldn't be enough to say *exactly* what you want!

Our standard solution to this dilemma is our Digital Voice Recorder product. With it, you can remotely record and re-record any or all of the controller's programmable messages. It gives you access to all the words in the English language, or any other language, in any voice you can "round up" to make your recordings. The DVR is fully solid-state with no moving parts, so it stands up to the harsh environment typical of repeater sites. And it includes a sophisticated voice mailbox.

On the other hand, if a PC can hack it at your site, it can work *with* your controller to greatly expand what your system can say. Keith Triplett, N1HLK, points out just how easily you can do this. First, consider two pieces of background information.

1. You can program any message in your controller to include a DVR track, or digital recording segment. Messages in the '850 can be a mix of DVR tracks, synthesized speech and Morse code. The '85 and '96 allow any message as a whole to be DVR tracks. Check the programming section of your controller's manual for details. When it's time to play a track, the controller sends a serial command to the DVR. The command consists of the ASCII letter P, an eight-bit byte indicating the track number, and a carriage-return line-feed. The DVR responds

(Continued on page 2)

Also in this issue...

Maps for Explorer	3
NOAA Weather Alert	3
'85 & '96 Scheduling	4
RC-850 Controller Retired	6
Technical Support Q&A	7

Explorer is MRT's "Readers' Choice"

Mobile Radio Technology magazine declared ACC's Explorer software for Windows its Readers' Choice in November 1993.

"Of all the new products and services in the April issue, the ones reprinted here generated the most reader requests for additional information." Radio Spectrum Explorer shared the honor with Motorola's *Confidant* pager.

MRT is a magazine for communications professionals. They include dealers, service providers, sophisticated end-users, and consultants.

In addition to hams and scanner enthusiasts, we've aimed Explorer at these professionals. It's also well suited to those involved in government, law enforcement, news gathering, and surveillance.

(Continued from page 1)

by taking its Busy logic output high and playing the track. It returns the Busy line low at the end of the message.

2. The Sound Blaster and similar sound cards for the PC contain a collection of sound generation and recording hardware. They're capable of digital audio waveform record and playback, text-to-speech conversion, and musical instrument synthesis. You can use the text-to-speech capability to have your repeater say anything you want, and the waveform capability to play back audio recordings.

Hardware Setup

Keith uses a PC in place of a DVR to receive the controller's instructions to play tracks. As a minimum, he suggests a 286, a small hard drive, monochrome monitor, a serial and parallel port, and a Sound Blaster family card.

Wire up the COM1 port RD input to the controller's RB-DATA signal. Attach a 10K resistor (as a pull-up) from RD to DSR, strap DSR to DTR, and strap CTS to RTS. Finally, connect pin 2 of the parallel port (data bit 0) to the controller's External Device Busy input.

So just add an inexpensive PC with a Sound Blaster and one resistor to your system and it can say anything you want!

batch file for each message you want the repeater to say, and supply two one-line programs to control a busy signal from the PC to the controller.

1. Modify the **AUTOEXEC.BAT** file on the PC to load the SBTalker program and to switch control of the PC to the COM port connected to your controller. This batch file will execute automatically when the PC boots up. Add the lines shown in figure 1 to the end of the existing **AUTOEXEC.BAT** file.

```
REM Change directory and run SBTALKER
CD\sb??\sbtalk
SBTALKER
REM Setup COM1 for 1200/8/N/1 and switch control
MODE com1 baud=12 data=8 parity=n stop=1
CTTY com1
```

Figure 1. Add these lines to the end of the **AUTOEXEC.BAT** file to start **SBTALKER** and transfer control to the COM port.

2. Batch files are text files that consist of DOS commands that execute as if they were typed directly from the keyboard. The trick here is to name batch files so that they execute when the DVR issues a *play track* command. For example, the batch file named **PA.BAT** will execute when the controller plays track 65. The controller sends **PA <cr-lf>** to the PC. The letter P is the play command, and the letter A is the ASCII character for code 65.

words. Or use the **WPLAY** or **VPLAY** commands followed by the name of **.WAV** or **.VOC** digital audio file that you want to play out the repeater.

The Busy line from the parallel port to the DVR should go high when the message begins, then low after the message ends. You do this with two programs named **LPT-H.EXE** and **LPT-L.EXE**. A typical batch file would look like figure 2.

3. The **LPT-H** and **LPT-L** programs executed from the batch file simply take data bit 0 of the

parallel port high and low. You can write them in QBASIC as **OUT 888,1** and **OUT 888,0** respectively. Or use Debug to program a simple assembler program to do the same.

Where to Go From Here

While this technique will work for playing messages, it's trickier to remotely record digital waveform files. New software that we're developing for the '85 and '96 will enhance this batch file approach for remotely recording announcements.

```
REM Batch file named PA.BAT for track 65 which plays a repeater ID
REM Set parallel port bit 0 high to tell controller the message has started
LPT-H
REM Send text to the Sound Blaster to read (text-to-speech)
READ This is W A 6 A X X Repeater, San Jose, in the heart of Silicon Valley.>NUL
REM The >NUL speeds up the output of messages by inhibiting display
REM Set parallel port bit 0 low to tell controller the message has ended
LPT-L
```

Figure 2. Typical batch file used to play a text message.

PC Software

There are three steps involved in the PC software: modify the **AUTOEXEC.BAT** file, write a simple

The batch file should contain the SBTalker command **READ** followed by the text you want it to read out the repeater. The text is converted by the Sound Blaster to spoken

Then you can have the benefits of a PC at your site, while your repeater is controlled by a reliable industrial-grade controller.

Maps For Explorer

Radio Spectrum Explorer software for Windows "hot-links" your radio to an on-screen map display. The hot-link works in both directions. The map shows you where you're tuned – literally! And you can tune your radio by clicking a location on the map.

The Map window is one of Explorer's new innovative tuning techniques. The question we hear most often is "Do you supply the maps?" or "How do I get a map into Explorer?"

No, we don't supply the maps, but there are lots of choices on how to get one into Explorer. It wants to see a plain old bitmap (.BMP) file containing your map. Two ways of getting maps into Explorer are...

1 Scan in a printed map using a

handheld or flatbed document scanner.

2 Use one or more of the popular mapping software packages available.

On the software side, if you have a CD-ROM, you should own *Street Atlas USA* (DeLorme Mapping, 207-865-1234). Version 2 is improved over the original release, and it's a CD-ROM classic that everyone should have. Zoom to whatever level you want and clip out the portion that covers your reception range.

While *Street Atlas* has a street-level orientation, you may be more interested in a terrain-oriented display. Horizons Technology (800-828-3808) offers *Sure!MAPS* which can be supplemented with full-color

raster USGS map sets of major metropolitan areas.

Another interesting find is *Small Blue Planet* (Now What Software, 415-885-1689). The CD-ROM contains a global relief map, a grayscale US relief map, and numerous satellite images that you may be able to work into your Explorer repertoire.

You won't want to use maps where north is not straight up, like *AutoMap*. Explorer can use latitude/longitude information in your local data base, and can display the current lat/long of the mouse pointer as you move it around. Its interpolation relies on vertical meridians and horizontal parallels.

Link your radio to maps and experience a new way of tuning!

NOAA Weather Alert

Since 97.113 now permits us to retransmit government stations such as NOAA, you can provide a way to notify your users of a pending weather emergency. When there is a threat of bad weather, NOAA transmits a tone that opens up weather monitors. You can transmit these alerts over your repeater.

Gather together the following...

- Midland Weather Max VHF Weather Monitor model 74-102 or equivalent
- VOX circuit, Electronic Rainbow VOX-1 (317-291-7262, \$6.95)
- 2 phono jacks
- 2 phono plugs
- Misc. wire and connectors

The radio has a mode switch on the bottom. In the VOICE mode, it opens the speaker, lets you hear the tone, and then stays open for a couple of minutes. After that, the radio goes quiet. This is the best mode for this project.

Modify the radio to bring out the speaker audio, and the audio before the audio driver (from the volume control). Mount two phono jacks on the side of the radio. One output will vary with the volume control and the other will be constant.

Build the VOX and wire it to the radio's constant output. The VOX board will give a logic high when there is audio. There are no adjustments needed to the board.

You may want to power the radio and VOX circuit with a power supply separate from your repeater's supply. If you use the same supply, you may find that when the repeater unkeys, there may be a spike on the power supply that triggers the VOX that will then key the repeater, causing an endless cycle.

Connect the variable audio output to the link audio input on the controller, and the signal from the VOX board to the link COS input. The alert will only work when

you've got the link turned on. Here's how it works:

- 1 NOAA sends the tone.
- 2 The weather radio speaker opens.
- 3 This audio triggers the VOX.
- 4 The VOX keys the link input.
- 5 The controller puts the audio on the air, secondary to repeater audio.
- 6 After about two minutes, the audio stops, the link courtesy tone plays, and the system goes back to normal.

As configured, there is no way for a ham to bring up NOAA audio over the repeater. This could be added easily, but should be used with caution.

To sum up, this project takes advantage of a new privilege we have. We shouldn't get carried away, but this is a way to be notified of a pending emergency.

Ray J. Vaughan, KD4BBM

An '85 & '96 Scheduling Primer

RC-85 and RC-96 controller owners were introduced to scheduling in Version 5 software. It's been around in our '850 for years, where we first brought the concept to amateur repeaters. While not as elaborate as the '850, your scheduler is a great tool for managing your repeater. If you've been reluctant so far to use it, this primer should help get you going. And it'll get you ready for more powerful features coming in future software.

The scheduler works with your controller's macro sets and time-of-day clock, making it easier to maintain your repeater. It works like an *automatic control operator* by making new selections for you automatically at predetermined times that you specify.

Macro sets are snapshots of your repeater's control operator selections, plus the state of the remote base and the remote control logic outputs. You program the times and days of the week that you want the controller to automatically change macro sets. We call these points in time *setpoints*.

Storing Macro Sets

To store a macro set, you select the various settings that you want. Then you unlock the controller and enter the *store macro set* programming command to store the settings into one of five macro sets.

In general, when you want to store a new macro set similar to one that already exists, simply load the existing macro set, make the changes to distinguish the new one, and then store the new macro set.

Your controller always powers up and resets into macro set 1. Design macro set 1 to describe how you want your repeater to initialize after a power loss. Your control operators can manually load any of the five macro sets, as the scheduler can do automatically.

Storing Setpoints

Setpoints define when the scheduler will change to a different macro set. You can schedule up to ten setpoints that you fill in as needed to arrange your schedule. Each setpoint holds information about the change – the day of the week, time, and the macro set number. The day of the week can be a certain day (like Monday), weekends (Saturday and Sunday), weekdays (Monday-Friday), or every day of the week. You can specify an *nth* day of the month, such as the third Tuesday, which is helpful for monthly events like meetings. Specify the changeover time as hours (*always two-digit* HH) and minutes (MM). You *must* define

setpoints using the same format (12 or 24-hour) that you selected when you set the clock. Include the a.m. or p.m. flag if you set your clock in the 12 hour mode. Finally, specify the macro set to which you want the scheduler to change. See figure 1 for the detailed programming command, and figure 2 for an example.

Example Select macro set 3 every weeknight at 11:00 p.m. Use setpoint 5. The clock is in 12 hour mode. To do this, enter the programming command (with the controller unlocked)

```
*420 5 0 8 1 1100 3
```

Figure 2. Setpoint Programming Example.

Erasing Setpoints

To delete or erase a setpoint, load any invalid time, such as 99 o'clock, and specify any macro set. For example, enter

```
*420S 0 0 0 9900 1  
to clear setpoint S.
```

Define Setpoint Programming Command

12 hr mode *420 S Nth DOW AP HHMM M

24 hr mode *420 S Nth DOW HHMM M

S: Setpoint 0 - 9

Nth: 1st, 2nd, 3rd, 4th, or ANY week of the month

0 = ANY 1 = 1st 2 = 2nd 3 = 3rd 4 = 4th

DOW: Day of Week

0 = Sunday 5 = Friday

1 = Monday 6 = Saturday

2 = Tuesday 7 = everyday

3 = Wednesday 8 = weekdays

4 = Thursday 9 = weekends

AP: a.m. or p.m. (12-hour mode only)

0 = a.m., 1 = p.m.

HHMM: Time in Hours/Minutes

M: Macro set 1 - 5

Figure 1. Define Setpoint Programming Command.

Tricks Using Setpoints

Only one setpoint executes at a particular day, hour, and minute. If several setpoints match at a certain time, the *lowest numbered* setpoint will execute. In some cases, this can help you conserve setpoints. For example, if you want something to happen every day at 10:00 p.m., except Thursday when something else should happen, then place the Thursday setpoint in a lower numbered position than the everyday setpoint. The "Thursday" setpoint will occur on Thursday, while the scheduler will drop down to the lower priority "everyday" setpoint on other days.

Also be aware that if a mobile is transmitting when a scheduler action is ready to occur, the system

(Continued on page 5)

(Continued from page 4)

waits until the end of the mobile transmission. The scheduler can wait on one setpoint at a time. If one is pending and the repeater is waiting for a user to end their transmission, and another setpoint triggers one minute later, the first setpoint is lost and will not execute. Leave several minutes between setpoints if you need to execute more than one at about the same time.

Related Commands

Several control operator commands relate to using the scheduler. In addition to manually loading a macro set, you can ask your repeater which macro set is loaded now. You can turn the scheduler on and off, and interrogate whether it's on or off. See your manual Appendix III for the actual codes.

You need to turn the scheduler *on* in every macro set out of which you want the scheduler to switch. In other words, enable the scheduler in each macro set *unless* you want to inhibit automatic switching out of that macro set. An example of one that you wouldn't want to switch out of might be an emergency macro set that you would only select manually, and want to remain until the end of the emergency. You would store that macro set with the scheduler turned *off*.

Now Schedule Your Repeater

Figure out in advance exactly what you want your repeater to do, then what your repeater's schedule should be. Think in terms of points in time when you want the changes to occur.

Perhaps you'd like to turn off certain things at night, but leave them on until later on weekends. If you have a net on Tuesdays, you'd like to remind users for several hours before it begins. It might be nice to have frequent time announcements as people go to work. Finally, don't forget to wish everyone TGIF on Friday afternoons. This will be a good start.

Decide what macro sets you need. Since your controller always initializes into macro set 1, make that your normal daytime set. You might define macro sets as follows:

- 1: Normal daytime
- 2: Weekday mornings, frequent time message
- 3: Friday afternoon, TGIF message

scheduler will automatically load it when you define a setpoint to do so; and your control operators can manually load this snapshot by loading macro set 1.

Lock the controller back up and select TM1 for weekday mornings. Then store this snapshot as *macro set 2*. It's just like set 1 except that

#	Time	Day	Set	Programming Command
0	01:00 p.m.	Friday	3	*420 0 0 5 1 0100 3
1	07:30 p.m.	Friday	1	*420 1 0 5 1 0730 1
2	04:30 p.m.	Tuesday	4	*420 2 0 2 1 0430 4
3	08:30 p.m.	Tuesday	1	*420 3 0 2 1 0830 1
4	12:01 a.m.	weekdays	5	*420 4 0 8 0 1201 5
5	01:30 a.m.	weekends	5	*420 5 0 9 0 0130 5
6	06:15 a.m.	everyday	1	*420 6 0 7 0 0615 1
7	07:00 a.m.	weekdays	2	*420 7 0 8 0 0700 2
8	09:00 a.m.	weekdays	1	*420 8 0 8 0 0900 1
9	not used			

Figure 3. Setpoints for the sample schedule.

- 4: Tuesday net tail message and special ID
- 5: Normal nighttime

Load the tail messages and IDs that you'll need using programming commands. Unlock the controller and program:

- TM1: (time) (a.m./p.m.) [for weekday mornings]
- TM2: TGIF [for Friday afternoon]
- TM3: Net tonight at 8:30 [for Tuesday afternoon and evening]
- Special ID: Net tonight at 8:30, on WA6AXX, repeater [for Tuesday afternoon and evening]

Start by defining *macro set 1*. Make sure you've set all the control op selections the way you want for normal daytime operation. If you're not sure what the current selections are, then enter the proper control op commands so you are sure. Also set up the remote base and UF remote control outputs, although in this example they're not important. Then unlock your controller and enter *5911. The response will be "MACRO." You've taken a snapshot of the current setup of your controller and stored it in macro set 1. From now on, this is how your controller will behave under three conditions – the controller will power up and reset into this snapshot; the

you've selected a tail message.

Select TM2 for the Friday TGIF message, and store as *macro set 3*.

For Tuesdays, select TM3 and special ID (or rotate pending and special IDs). Store this snapshot as *macro set 4*.

Macro set 5 will be for the normal night operation. Turn off the tail message and special ID. You may want to disable certain functions like the autopatch. Then unlock and enter *5915 to store *macro set 5*.

Now you've defined and stored all the macro sets. You can get back to the daytime macro set using the control operator command to load macro set 1. Now define setpoints.

On Friday afternoons at 1 p.m., select macro set 3 for the TGIF tail message until 7:30. Tuesdays from 4:30 until net time you want the net reminder state. You can switch to the night mode at midnight on weeknights and at 1:30 a.m. on weekends and so on. Define your setpoints with programming commands shown in figure 3.

Now you're done! Sit back and hear your repeater do your work for you. And stay tuned for more about your scheduler's bright future!

RC-850 Controller "Retired"

Yes, it's true. After a nearly unprecedented twelve year product life, we've taken the legendary '850 controller off our price list as a standard product. It's simply become too expensive to keep in production in low volume. Its twelve years were ones of continual change and improvement, with software and hardware upgrades and enhancements that have kept it the industry's standard of comparison in repeater control. If you own an '850, we'll always be here with technical support and repair services. And if you need ten or more new '850s, we can build them for you on special order.

A reminder to '850 owners... If you have the computer interface, download and keep a current copy of the `e2prom.hex` file on your computer. That way, if you're hit by lightning, you can send us the file on disk. Then we can load it into a new EPROM without you needing to do any reprogramming.

Class of '96

We're focusing our repeater controller efforts on enhancing the RC-96 controller (and the software compatible '85) with new software, accessories, and extensions. With the larger memories now available, the '96 will be able to inherit many of the sophisticated features first pioneered in the '850, along with a new level of ease of use through Windows programming software. In addition, the '96 and '85 will be able to work with a PC to extend its capabilities to include features like voice recording and playback. Over time, the '96 will surpass the '850 at a much more attractive price!

Effective immediately, if you purchase a new '96 controller, you will receive the next major software release at no charge. So there's no reason to wait!

ACC Notes Online

Starting with this issue, we're experimenting with an additional

way to distribute this newsletter. We've published a printed version since 1982, mailing it to thousands of you on our mailing list every few months. In an effort to bring you more information in a more timely way, we're posting an expanded edition on America Online and CompuServe. *ACC Notes Online* is a Windows Help-format file that you can download and view like Windows Help.

ACC Notes Online gets around the space limitations inherent in a printed newsletter. It also gives you information in machine readable form that you can cut and paste into other documents.

On CompuServe, GO HAMNET and look in the Vendor Support Library. On America Online, GoTo Ham Radio Club (keyword "ham radio") and look in the Software Exchange, Ham Radio Library for MS-DOS.

Let us know what you think!

New Cordless Phone Frequencies

The FCC responded to a request by the Telecommunication Industry Association (TIA) to allocate additional frequencies in the 46/49 MHz range for cordless telephones. A Notice of Proposed Rulemaking proposes an expansion from ten to twenty-five channel pairs.

The complete text of the NPRM is available in *ACC Notes Online*.

Amateur Radio Encyclopedia

TAB/McGraw-Hill announces "the newest, most complete, best illustrated reference ever published on amateur radio. The encyclopedia is

the only book that covers ham radio and CBs and satellites and packet radio and shortwave listening all from the amateur's point of view." You can examine it free for 30 days and return it if you choose. \$49.95. McGraw-Hill, (800) 822-8158.

Time & Frequency Services

Paper #37-93 describes "Time and Frequency Services Offered by NIST." It covers the National Institute of Standards and Technology radio stations WWV, WWVH, and WWVB, satellite time services and the Automated Computer Time Service. Two additional services are described for those who need the most accurate time or frequency signals. (303) 497-3237.

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Technical Support Q&A

Q *Our repeater has developed an echo that comes and goes. Sometimes when we talk through it we sound like we're in an echo chamber. There must be something wrong with the controller's audio delay.*

A That's a natural conclusion to draw, given what you hear. When you hear hoofbeats you think horses. However, sometimes they're zebras! We've come across this before, and in virtually every case we've seen, it's a case of the transmitted signal, a spur, or a mixing product being heard by the receiver. The repeater closes the feedback loop, and since the controller intentionally introduces a delay, you hear the barrel effect. If your controller doesn't have an audio delay, you might hear a squeal or howl, instead.

You can isolate the problem immediately by listening directly to the audio output of the receiver (*not* the transmit audio coming from the controller). If you hear the echo there, it *must* be an RF issue. If the receiver audio is clean, then call us and we'll help you check the controller.

In one case, the echo went away when the repeater owner retuned the duplexer. In another, a split-site repeater, tightening the coaxial connectors eliminated the echo. The repeater transmitter was getting into the link receiver because of the loose connection.

One owner started to hear an AM radio station along with an echo of repeater users. He tracked it down to Christmas lights put up at the home at the repeater site. It seems that his 220 transmit signal mixed with a 1500 kHz AM radio station in the Christmas lights causing a mixing product to appear 10 kHz off his receive frequency.

Again, isolate the problem by listening directly to receiver audio. If you hear echo there, snoop for loose connections, detuned duplexers, or Christmas lights!

Q *Sometimes our repeater has grunge that keeps the transmitter keyed. After a few minutes, the repeater times out and the transmitter drops, but then it comes right back up again. Why doesn't the repeater stay off when it times-out?*

A The problem may be related to the previous question. If mixing products from the transmitter *cause* the grunge, the grunge will go away when the repeater times out and the transmitter drops. Then, when the transmitter comes back up to say "Repeater time-out cancel," the grunge will return and keep the repeater keyed again.

Q *I hear some systems where messages just run together. Please remind your owners that they can insert pauses in messages (like commas in sentences) using speech vocabulary code 34 or Morse vocabulary code 11.*

Thanks, and consider it done!

A

Q *I want to block "caller ID" on our outgoing phone patches so that no one can read our repeater's phone number. How can I automatically dial *67 before every call to disable caller ID?*

A Use the Patch Dialing Prefix message. (In the 850 there are three dialing prefixes, one each for the primary, secondary, and tertiary patches.) Program it as a *message* to say "S67." The vocabulary codes are 73 06 07. The controller converts the S to *. Then the controller will dial out DTMF *67 before every call. You shouldn't need a pause between the *67 and the phone number.

If you have older software that doesn't convert S to *, the phone company will usually accept DTMF 11 in place of *. In other words, make your Patch Dialing Prefix "1167."

Q *Can I use a 14.4K baud modem at home with the 1200 baud modem connected to my '850? You can't find 1200 baud modems anymore.*

A Sure. Just set your comm program to 1200 baud. That way, your 14.4K modem will originate calls to the controller at 1200 baud using Bell 212A modem tones. Set the baud rate *before* you call. Don't change it during the call, or you may change the baud rate but *not* the tone modulation mode.

Q *My '850 has been in service for nearly 12 years on a southern California mountaintop. The system has developed a significant sideband 15 kHz on each side of the carrier frequency. The amplitude of the sideband seems to be related to the amount of ripple on the internal negative nine volt power supply in the controller.*

A It sounds as if there's too much 15 kHz ripple on the negative supply in your controller. An internal charge pump develops negative nine volts so that the audio circuitry can operate around true ground. The electrolytic filter cap C23 may have aged, and the resulting ripple may be getting into the transmit audio. Replace the cap, perhaps with a larger value (100-220 μ F) electrolytic or tantalum. Also, check that the quad op amps are TL064 low-power versions and were never replaced with a higher current type that would also increase ripple.

By the way, most transmitters would filter out such high audio frequencies before their modulator. Your Spectrum SCT-110 is wide open, but you can modify it to FCC type-accepted performance. See its schematic for the optional capacitors that you should add and change.

And here's to twelve more years of service from your '850 controller!

ACC Notes is now available Online

Now you can access *ACC Notes Online* from the *information superhighway*. Download *ACC Notes Online* to your computer from CompuServe's Hamnet or America Online. *ACC Notes Online* is a Windows Help-format file that you can read, print, and cut and paste. It contains the full text of the printed issue, **plus expanded coverage** with more articles, ideas, and computer files. In addition to what's in this printed issue, the current issue of *ACC Notes Online* contains ...

- More ID messages, courtesy tone ideas, and technical support Qs & As
- Articles about the new FCC commissioner, a local tower conflict, and more
- Details of programs in the article "Expanding Your Repeater's Vocabulary"
- The full text of the Cordless Telephone proposed rule change
- Our ICOM RP-xx20 Interface application note, Lightning app note, and Spare Parts Price List
- Updated RC-85 and RC-96 Controller Programming Sheets referenced in the last issue
- Complete information and pricing on ACC's products



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