

advanced computer controls, inc.

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July/August '86

## Remote Bases Are Getting Popular.

Judging from articles appearing in the ham magazines, HF remotes are becoming popular. Since our article describing ShackMaster in last year's September and October issues of 73 Magazine, at least three additional articles have appeared describing home brew systems.

In the July issue of QST, an article by Bob Heil, K9EID, describes a VHF to HF remote base setup based on three "decode-a-pad" boards and a Pro-Search antenna rotor system.

In September 73 Magazine, James Millner, WB2REM, describes a remote setup based on a CES 510SA Smartpatch and a homebrew logic board. While it doesn't have provisions for frequency control of the HF rig, it does provide a simple, mostly homebrew, fixed frequency remote.

Finally, the September issue of Ham Radio Magazine describes a very elaborate and sophisticated system based on eight S-100 computer boards. Steve Noll's outstanding project has been in service about 10 years - Steve certainly should be classified as a pioneer!

We certainly didn't invent the remote base concept. But ShackMaster is the first and only product which integrates into a self-contained box, a state-of-the-art HF and VHF remote along with a simplex patch, intercom into the shack, mailbox, rotor control, BSR and general purpose remote control, and other features. Compare what it takes to home brew a system, or build one out of building blocks, and nothing else comes close to ShackMaster.

## Repeater Coordinator's Newsletter.

As part of its role to assist the repeater coordination process, the League publishes a periodic newsletter aimed at the repeater coordination community. Coordinators receive it automatically. Others can receive it on request for a small fee. For information on how to receive the Repeater Coordinator's Newsletter, contact the League.

**Courtesy Tone of the Month.** Doug Kensrue, KA6EEK, describes this simple but winning courtesy tone as pleasant sounding and easy on the ears. You may want to use this as your normal courtesy tone, with more distinctive ones to indicate unusual circumstances.

### Segment 1

Pitch A - 440 Hz

Pitch B - 560 Hz

Duration - 200 to 400 ms

Level - (up to you)

Delay to Segment 1 - (up to you)

### Segments 2 and 3

(zero'd out)

**Turning the Table.** You may have wanted to upgrade your repeater for some time, but haven't been able to figure out how your group could afford to do it. Now your local oil magnate can help out!

Since your repeater exists largely to serve mobile users, the fact that gasoline prices have dropped may be the answer. Figuring that gasoline costs approximately 25¢ a gallon less than a year ago, and assuming 15,000 mile per year travel and 25 mile per gallon efficiency, that means your users are saving \$12.50 per month in gasoline expenses. What better use could there be for a part of that savings than contributing to upgrading your repeater? Just think of it as a gift from your local gas station.

**DVR ID of the Month.** "(Fred) WB6KHP, from WA7AII, are you around, Dave? (Dave) Hi Fred, WB6KHP. (Fred) Do you have 900 MHz with you? (Dave) Yes I do. I'll see you there. (Fred) OK, Dave. WA7AII, QSY. (Dave) WB6KHP, QSY. (Woody) This is WA6AXX, Repeater." As a Special ID, scheduled to come up once in a while, it'll perk up interest for 900 MHz!

**Equal Audio For Your Repeater.** The frequency response of our repeater controllers is flat, but your repeater's receiver and transmitter may not be. Stereo hi-fi audio equalizers offer an inexpensive way to tailor the frequency response of your system to your liking. For less than \$100, you can get a two channel equalizer in stereo stores.

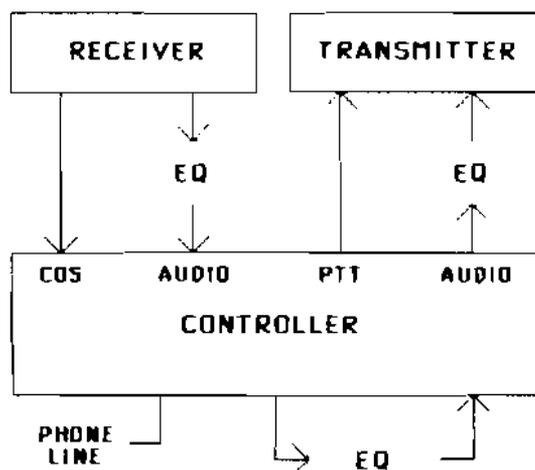
The equalizer breaks up the audio spectrum allowing independent boost or cut of each audio "band", by typically  $\pm 10$  dB or more. If the equalizer breaks up the spectrum into octave sized bands, then it's called a "full octave" equalizer. That means that there are independent controls for 32, 64, 125, 250, 500, 1k, 2k, 4k, 8k, and 16 kHz. Less expensive equalizers have fewer, larger bands - perhaps two full octaves per band.

In equalizing your repeater, you're not particularly interested in the entire audio spectrum, but primarily the range between 200 and 4000 Hz. That means that a two octave equalizer would provide only three bands in the audio range of interest. Depending on your needs, that may be sufficient, or you may want more control by using a more expensive full octave equalizer.

One channel can be placed between the controller and the transmitter, to tailor the overall transmitted audio characteristics. The second channel, if you want to use it, can be placed between the phone patch received audio and the controller's transmitter mixer, to tailor the sound of telephone audio. With the '850, insert it between "audio out" of the telephone board and the controller board. On the '85, insert it between U16 pin 1 and the top of R3.

Or, as Ben Counts, WA4DDF points out, an equalizer channel could go between the receiver and the controller, to allow tailoring received audio response independent of other controller's audio sources.

There's no need to put up with tinny or bassy audio from your receiver or transmitter. And there's no need to monkey with component values and modifications until it sounds the way you want. An equalizer won't remove distortion, but it will let you shape your system's audio to sound great!



**Amplified, Buffered Receiver Audio for the DVR.** The Digital Voice Recorder audio input may connect directly to your receiver's audio output. If your receiver provides very low level, or high impedance audio, you may obtain a buffered audio signal from your RC-850 controller. Pick it from U43 pin 14, and take it to one of the spare RCA jacks on the rear panel for easy access. From there, run it to the DVR's audio input jack. Thanks, Doug Kensrue, KA6EEK.

**Leave a Note For Yourself.** With our Digital Voice Recorder, you can leave voice mail for other repeater users, or for callers on the telephone. But you can also leave a note for yourself. If you're driving, or otherwise aren't able to jot something down that you need to remember, just record a message for yourself using the voice mailbox. Then when you're in a position to write it down, play back your message. Thanks, Bill Strack, WA6ZTJ.

**Digitalker Obsoleted.** Digitalker speech synthesizer chips, which have been used in various repeater controllers through the years (not ours! - they use Texas Instruments speech) are being obsoleted by National Semiconductor. National stopped supporting the chips last year, licensing support to Time Domain Systems, a small company in Rodeo, CA. Now National has announced that they will phase out production of the chips over the next year. National is not recommending them for new designs.

If you've got a repeater controller which uses Digitalker, you may want to buy some spares, while you still can. If you've interfaced our ITC-32 Touch-Tone control board to Digitalker, you may want to get a spare as well. Try Jameco or TDS.

Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002 (415) 592-8097. MMS4104 - \$12.95. DT1050 - \$24.95. Add 5% S&H. Minimum \$20 order.

Time Domain Systems, 840 Sandy Cove, Rodeo, CA 94572. (415) 799-6672. MMS4104 - \$14 + \$5 S&H + CA tax.

**New Manual For ITC-32.** The ITC-32 manual has been "MAC'd" (redone on the Macintosh), and small errors have been corrected. The content hasn't substantially changed, but if you'd like a copy of the sharp new manual, it's available for \$10.

**Repeater PAs.** Mirage/KLM offers a line of rf power amplifiers designed for repeater use. They're rack mountable, and heavily heat sunk for continuous duty cycle operation. One of their nice features is logic controllable in-line or bypass mode. That makes it very easy to remotely control pa in or out, using a remote control output from your repeater controller.

Power levels range up to 120 watts out; drive levels may be as little as 300 mW on some units. Models are available for 146, 220, and 440 MHz. Prices range from \$423 to \$515. Mirage, P.O. Box 1000, Morgan Hill, CA 95037. (408) 779-7363.

**Enhance Your ITC-32 Digitalker.** Mike Young, WB8CX0 has made available a more useful vocabulary for ITC-32 owners who have wired up the Digitalker speech chips. The ITC-32 is a Touch-Tone control board, which also includes the basic repeater control logic functions. As an alternative to Morse code responses, the firmware supports external Digitalker speech chips for voice response. Although Digitalker has been obsoleted by National Semiconductor, and is not recommended for new designs, if you're currently using it with your ITC-32, Mike's work can enhance your system.

Mike can supply a vocabulary EPROM which adds 20 useful words, replacing 18 infrequently used words, and a patched firmware EPROM which includes the new words in command responses. Contact Mike directly if you own an ITC-32 board and are using Digitalker. Mike Young, WB8CX0, P.O. Box 470, Cuyahoga Falls, OH 44222.

**Weather Radio as a Pager.** Weather radios designed to receive National Weather Service transmissions on 162 MHz are available with a tone decoder to detect the NWS emergency alert signal. Since these receivers are inexpensive, they can be modified to serve as the basis for an emergency alerting system for your repeater users. The RC-850 and RC-85 controllers generate two-tone paging, plus the 8 second single tone "group call" which can activate the built-in NWS decoder. Then it's just a matter of recrystalling the receiver to receive your repeater. Just an idea - it may require some experimentation. If you try it, please let us know.

**ICOM AT-500 With Your Kenwood TS-940.** Stephen Smith, WA8LMF has provided us with details on using the ICOM AT-100/500 antenna tuner and/or IC-2KL amplifier with the TS-940. This is a particularly useful combination for a remotely controlled station using ShackMaster. The AT-500 can function as a 4-output automatic antenna switch as well as a tuner. If you're interested, please request Stephen's writeup.

**Extra Control Channels on 440.** Stephen Smith, WA8LMF, points out that due to the happenstance of 5 MHz repeater splits in the 440-450 MHz spectrum, every channel is potentially a repeater input or output - and with just a couple of exceptions, they are! This is unlike two meters, where the 600 kHz splits relative to the repeater subband widths left a handful of simplex channels in the middle.

If your area is full of repeaters between 440 and 450, and you're looking for a UHF control channel for ShackMaster or other applications, consider 438-440 MHz. Not only is that section free of repeaters, but it's also relatively secure, since most radios don't cover it. But there are some that do - and of course your's must, on each end of the control link. Kenwood's TS-811 base rig, and ICOM's IC-04AT (with a modification) go below 440. (There may be others as well, but we don't know about them.)

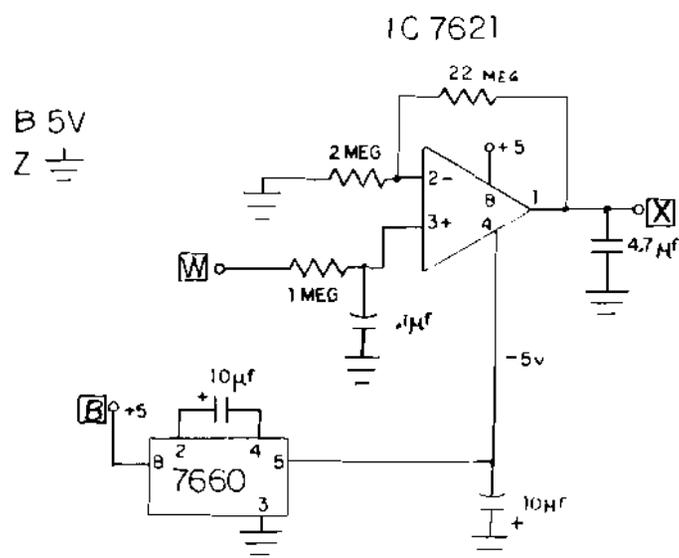
Before planning to operate FM below 440, check with your local frequency coordinator, and also find out if there's a potential for interference to or from amateur television in your area.

**S-Meter Your GE Master II.** Andy Kadvan, KABR, submits this circuit with information for obtaining an s-meter signal from the GE Master II receiver. The signal can drive the s-meter input of your RC-85 or RC-850 repeater controller

Point W is obtained from pin 4 of P904 of the receiver, and swings from zero volts to 500 mV. Andy's op amp circuit saturates (S9+60) at 300 mV.

The ICL7660 is available from Jameco. The IC7621 may be replaced by a high impedance FET input type, such as a TL071CP. Thanks, Andy!

Jameco, 1355 Shoreway Road, Belmont, CA 94002. (415) 592-8097.



### Pick Up an Extra Command Channel.

The RC-850 controller's front panel includes a "highest priority" local microphone input. While intended for a local mic, there's nothing preventing you from using it as an extra command channel. Simply wire up a receiver or other audio source to the mic jack, supplying audio and a contact closure to ground to simulate the mic switch, and you've got another remote command channel input to the controller.

### Two Remote Bases With Your RC-85 Controller.

The RC-850 controller handles four remote bases or links, but the '85 directly controls only one. However, if you'd like to add a second remote base transceiver to your '85, such as a ten meter remote in addition to a two meter remote, it's easy.

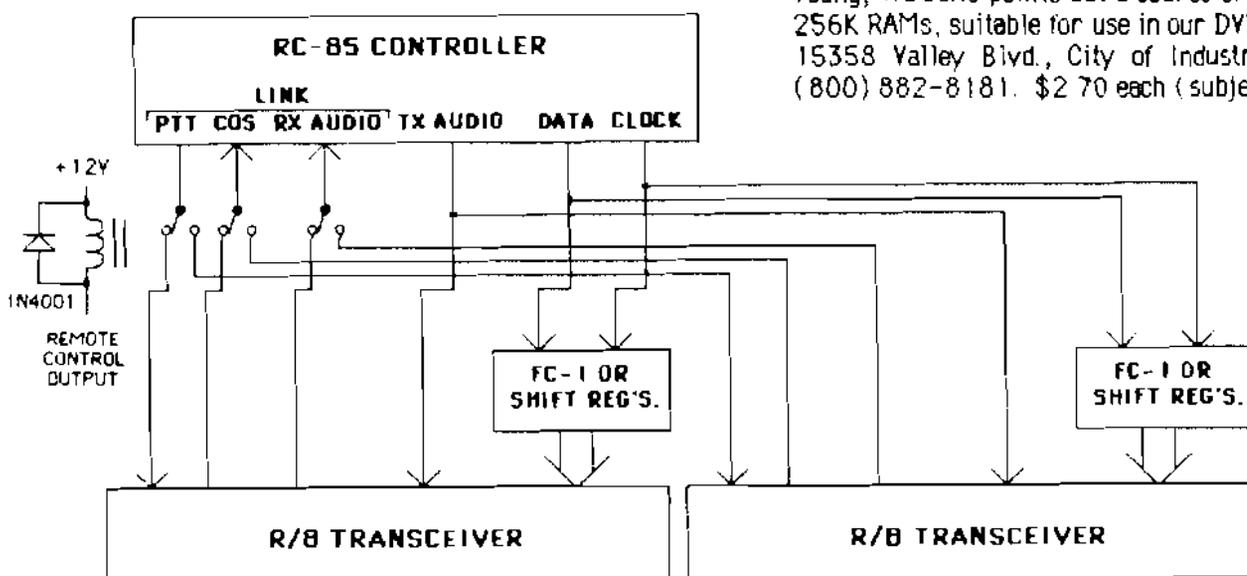
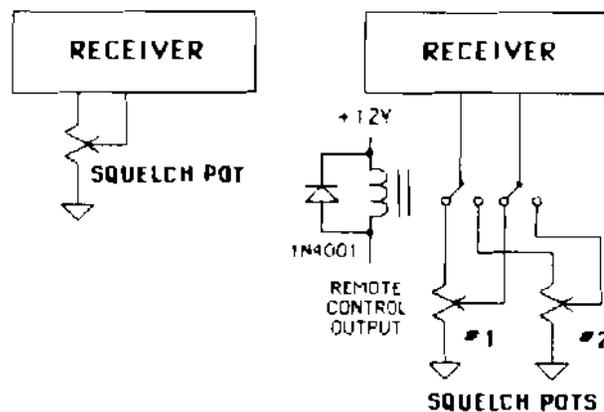
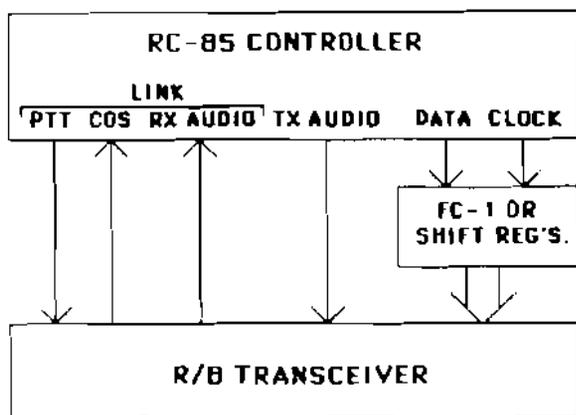
For the ultimate in simplicity, use a reliable three or four pole relay to switch the control signals between the two transceivers. One of the 85's remote control outputs can control the relay, by user Touch-Tone command.

### Remote Squelch Adjust.

You may like to run your repeater receiver squelch right on the edge for maximum sensitivity. But that can leave you vulnerable to spurious squelch openings due to intermod and band openings. A simple circuit, controlled by one of your repeater controller's remote control outputs, can select between two different squelch settings. The setting can be selected by Touch-Tone command, and with the '850, the setting can be scheduled as well to automatically tighten up during periods that there is normally a high level of rf activity at your site.

Simply take a remote control output from your controller to drive a SPDT or DPDT relay. Wire two squelch pots identically to the existing one in your receiver. Depending on the squelch circuit, you'll need to switch one or two lines (therefore use a single or double pole relay).

You can use solid state switching if you'd like, with a 4053B or similar CMOS analog switch. However, selecting a small, reliable relay will be much simpler.



### Source of 256K Dynamic RAMs.

Mike Young, WB8CX0 points out a source of Toshiba 150 ns 256K RAMs, suitable for use in our DVR. I.C. Express, 15358 Valley Blvd., City of Industry, CA 91746. (800) 882-8181. \$2.70 each (subject to change).

**Repeater Manufacturers List.** We at ACC build repeater controllers, since microcomputers are our area of expertise. In general, those that try to build both rf and control products excel in either one or the other, but not both.

Since we don't build repeaters, we want you to know the range of repeater equipment available to select from. And even though our equipment is easy to connect to any repeater, if you'd rather us do it, we'd be happy to. After obtaining our approval, send us your brand new, unmodified repeater, or have it drop shipped to us, and we'll connect it to an '850 or '85 controller for just a labor charge.

The following is a list of commercial repeater manufacturers adapted from RCR's Spec Guide No. 2, August '86. We've included the manufacturers of fixed FM repeaters which include coverage near the amateur 2 meter, 220, or 440 MHz bands. Some "2M" repeaters are spec'd from 150 MHz up; some "440" repeaters are spec'd from 450 MHz up.

Manufacturers who market their repeater products only to amateurs were not included in RCR's list. Note particularly that ICOM offers a pair of nice 10 watt 440 and 1200 MHz repeaters which are not included in this listing. Contact your ICOM dealer for availability.

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Manufacturer	2M	220	440	Pwr
Aerotron, Inc. P.O. Box 27500 Raleigh, NC 27611	x		x	110w
Bowitz Electronic USA Int'l Co., Inc. 3909 S Maryland Las Vegas, NV 89119	x	x	x	250w
Coded Communications 340 Rancheros Dr San Marcos, CA 92069	x		x	120w
Communitronics Ltd. 160 Wilbur Place Bohemia, NY 11716	x	x	x	40w
General Electric Mobile Comm. Div 111 View Rd. Lynchburg, VA 24502	x		x	300w
ICM Communications 701 W Sheridan P.O. Box 26330 Oklahoma City, OK 73126	x			25w
E.F. Johnson 299 Johnson Ave Weseca, MN 56093			x	100w

Manufacturer	2M	220	440	Pwr
Magnus Electronics Inc. 7101 Ridgeway Ave. Lincolnwood, IL 60645	x			25w
Midland Int'l Corp. 1690 N. Topping Kansas City, MO 64120	x		x	35w
Motorola Inc. 1301 E. Algonquin Rd. Shaumburg, IL 60196	x		x	110w
Quintron Corp. One Quintron Way Quincy, IL 62301	x		x	250w
Radio Systems Inc. 3421 S.W. 24th Ave. Ft. Lauderdale, FL 33312	x		x	20w
Regency Land Mobile 1227 S. Patrick Dr. Satellite Beach, FL 32937	x		x	100w
Repro Inc. 2421 N. Orange Blossom Trail Orlando, FL 32804	x		x	35w
Ritron Inc. 505 W. Carmel Dr Carmel, IN 46032	x		x	10w
Spectrum Comm. Corp. 1055 W. Germantown Pk. Norristown, PA 19403	x	x	x	150w
Standard Comm. Corp. P.O. Box 92151 Los Angeles, CA 90009	x		x	150w
TAIT Two-Way Radio Inc. 9434 Old Katy Rd. Suite 110 Houston, TX 77055	x		x	200w
Telemobile Inc. 19840 Hamilton Ave Torrance, CA 90502	x		x	100w
Teletrol, Inc. 9822 N.E. 2nd Ave. Miami Shores, FL 33138			x	80w
Trielectric/Celltronics Inc. 5720 Oberlin Dr. San Diego, CA 92121	x		x	120w
Uniden Corp. Of America 6345 Castleway Ct. Indianapolis, IN 46250	x		x	35w
Yaesu U.S.A. 17210 Edwards Rd. Cerritos, CA 90701	x		x	10w

**Give Us An Alternative.** When calling or writing for support, it's very helpful to provide us with an alternate telephone number. Occasionally, we can't reach you at the number you've given us because of time zone differences or frequent busy signals. Having a second number to try can help us help you.

**Remember, We've Moved.** To avoid delays, please be sure to address all correspondence to our new Santa Clara address - 2356 Walsh Avenue, Santa Clara, CA 95051. Unfortunately, mail or packages sent to our old address may be delayed.



2356 Walsh Avenue  
Santa Clara, California 95051

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**Archive of K6COP  
WR6COP Repeater**