acc notes

ShackMaster Review

Lew McCoy, W1ICP, has written a review of ShackMaster, our multi-function station controller. The review appeared in the November, 1986 issue of CQ Magazine. Lew is the Technical Representative at CQ, after having spent many years in the Technical Department at the League.

If you can't find the November issue of CQ, call or write us for a reprint!

Product Demonstration Cassette

We've put the finishing touches on our repeater product demo cassette, and it's available on request at no charge. It lets you hear, first hand, the inside story on our repeater control products, including the RC-850 and RC-85 controllers, the Digital Voice Recorder, and the ITC-32 Intelligent Touch-Tone Control Board. It's suitable for individual listening or for club meeting presentations. If you've been working on convincing your group to upgrade your repeater, our tape may be a valuable tool in your presentation.

Wayne Green Visits ACC

In early October we had the pleasure to be visited by Wayne, W2NSD, during a layover in the Bay Area on his way to Tokyo. We had the opportunity to talk about 73 Magazine, amateur radio in general, CD's, and lots more. If you haven't seen 73 Magazine lately,

be sure to take a look. With Wayne back, and a great crew, it's more interesting than ever.

We also twisted Wayne's arm and had him record some ID announcements for our repeaters. If you run into him at a hamfest, take a tape recorder, and if you twist his arm hard enough, he might be willing to record an ID which you can upload to your DVR!

Dayton Speakers

Once again we're planning to have a forum at the Dayton Hamvention. Last year we were fortunate to have three speakers present interesting talks. Like last year, we'd like several equipment owners to talk about projects they've undertaken relating to their repeater systems. Talks can relate to technical topics, site management, organizational and financing ideas, or anything else relating to repeaters.

Our forum is scheduled for Sunday, April 26, 10:00-11:30 a.m., at the Hara Arena. You can plan to attend Sunday morning even if you want to get an early start home.

Please contact us as soon as possible if you'd like to give an informal talk. Share the wealth of information!

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Archie Comic Book

You may have heard about or seen the new comic book about amateur radio aimed at interesting young people in the hobby. While it was a joint effort of the amateur industry and the League, one of the real heros behind the effort was Dick Ross, the publisher of CQ Magazine. Dick did much of the work in bringing the project to reality. Projects of this type usually have one or two people who are really responsible for pulling them off - in this case it was Dick! Thanks!

By the way, we have a number of copies of the comic book. If you know any youngsters who you might be able to light a fire under, and you'd enjoy following up by leading them through the process of becoming a ham, ask us for a copy. Quantities are available from the League.

ID of the Month

"Hundreds of hams will switch over, turn on, and dial up radio eighty-eight - N2JC Repeater".

Courtesy Tones of the Month

Bob Bash, KE3K, reports an interesting "special effect" courtesy tone design idea for the RC-850 controller. It's based on creating "beat note" effects by using dual frequency tones with slightly different pitches.

A soft decay tone can be set up by programming frequencies 1 or 2 Hz apart. Tones 1 Hz apart will create a 1 Hz beat note - that is, the tone will start out at full amplitude, decay to zero in a half second, and reach full amplitude again in 1 second. For example, if Segment 1A = 400 Hz, and Segment 2A = 401 Hz, and the duration is 500 ms, the effect will be a decaying tone like a bell. Thanks Bob!

Brad Watson, WA6AEO, who can decode Touch-Tones by ear, identifies his currently selected macro set by assigning the corresponding Touch-Tone courtesy tone to each. Just program one tone segment with the two frequencies that make up the desired Touch-Tone digit. For your reference, the tone frequencies are shown below:

A Day in the Life of ShackMaster...

"On October 18, 1986, Lee (KH6BZF) called me on my repeater (147.84/24) and wanted to show some Boy Scouts that were camping at Aiea State Park communications on VHF. After he told me, I turned on my ShackMaster 100 and its link onto HF.

"This way, we could show them more than just a VHF mobile/handheld type of communications. Now the Boy Scouts were able to work George (CE3HFI) in Chile, 10 meters, Bill (AH6H) on 15 meters, and Karl (KK1A/6) also on 15 meters. All signals were 59. The time was between 2148Z and 2216Z.

"The Boy Scouts were from Troop 113, St. Anna's. While in contact with Chile, Lee found out that two of the boys spoke Spanish, and he let them talk to George and try out their Spanish. This showed the Boy Scouts a small part of Amateur Radio, and some of its up-to-date type of communications. The contacts were enjoyed by one and all." (Tony, KH6JEO)

My Audio is Tinny/Bassy

Occasionally we'll run across a complaint that audio through a new repeater sounds tinny or bassy. This almost always results from picking off receive audio or injecting transmit audio improperly.

FM communications systems transmit audio with a pre-emphasis characteristic - that is, higher frequency audio signals are louder than lower frequency signals. The transmitted audio is actually frequency shaped. This is done for a very good reason. By boosting the highs before transmitting the signal, they can be knocked down in the receiver to restore a flat frequency response. In the process of knocking down the highs in the receiver, we're also knocking down noise inherent in the FM detection process. This improves the signal-to-noise ratio of the communication system. We can get away with doing this because most voice energy is contained in the lower frequency range. Boosting the highs just brings them up to a comparable level as the unboosted lows and evens the energy distribution across the audio spectrum.

Boost the highs at the transmitter, and knock them back down at the receiver.

How is this actually done in the transmitter and receiver? There are two types of "FM" transmitters - direct frequency modulation and phase modulation.

A direct FM modulator is inherently "flat". The carrier deviation depends only on the amplitude of the modulating signal. A simple "pre-emphasis network" is inserted before the modulator. This network provides a 6 dB per octave boost; a 1kHz tone will deviate the transmitter twice as wide as a 500 Hz tone of the same level.
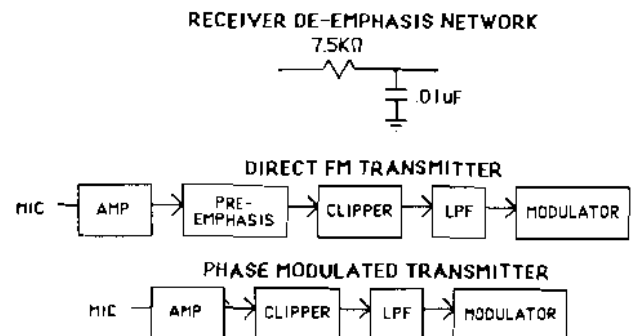
On the other hand, the deviation of a carrier modulated by a *phase* modulator depends not only on the amplitude of the modulating signal, but is also proportional to the modulating *frequency* as well. In other words, a phase modulator inherently pre-emphasizes transmitted audio. Audio from a pre-emphasized FM transmitter is identical to audio from a phase modulated transmitter with no pre-emphasis network.

Our controllers are designed to work with flat frequency response audio. That means receiver audio supplied to the controller should be taken after the receiver's de-emphasis network. Since de-emphasis normally takes place early following the detector, it's usually very easy to find a good pickoff point. If de-emphasis is done later in the receiver, such as part of the audio power amp, a simple RC network will provide the necessary de-emphasis for audio taken from an earlier stage. If receive audio is pulled before the de-emphasis network, it will sound *tinny*. It may also be difficult for the controller to decode Touch-Tone because of unequal levels of the tone pairs.

Transmit audio should be applied to a direct FM transmitter *before* its pre-emphasis network. Applying audio directly to the FM modulator, for example, would result in *bassy* sounding audio in users' receivers.

Since a phase modulated transmitter doesn't need a pre-emphasis network, it's not important where audio is injected, except that it's generally best to inject before the clipper so that maximum deviation is controlled.

RECEIVER DE-EMPHASIS NETWORK
7.5KΩ

.01uF

DIRECT FM TRANSMITTER

MIC — AMP → PRE-EMPHASIS → CLIPPER → LPF → MODULATOR

PHASE MODULATED TRANSMITTER

MIC — AMP → CLIPPER → LPF → MODULATOR

Remotely Set Your Talking Clock

Andy Kadvan points out an interesting technique for specialized remote control applications. His need was to remotely set the talking clock connected to his RC-85 controller. He's found it particularly useful for avoiding a trip to the site for daylight savings time and standard time changes. Andy uses a clock built from an article in May and July 1983 Popular Electronics magazine. His approach should work with any talking clock which reads out the hours and minutes as you advance them while setting the clock.
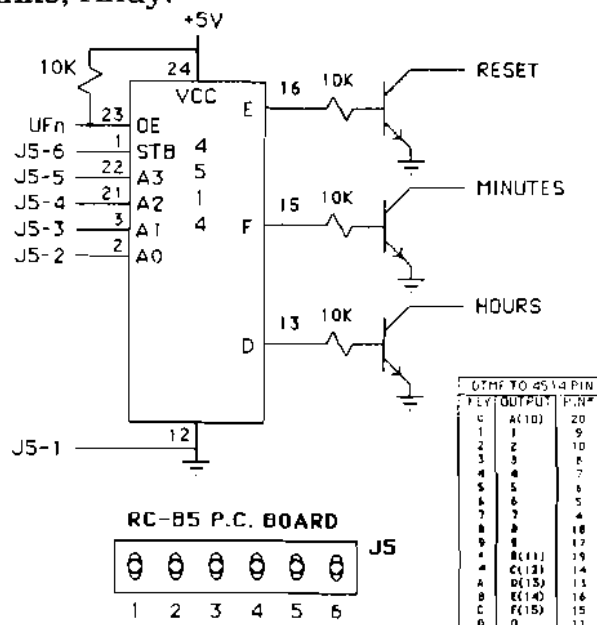
Andy uses a 4 line to 16 line decoder to provide a logic output corresponding to each Touch-Tone key. He selected the A key for hours, B key for minutes, and C key for clock reset. With his clock, the buffered outputs can connect directly to the clock's setting switches.

To set the clock,

① Bring up the Spare Audio function to keep the repeater transmitter on.

② Turn on UF4, or the UF output you've selected to control the output enable of the 4 line to 16 line decoder. The decoder is otherwise kept disabled by the UF output for security.

③ Reset the clock by sending the C key, then, about a second later, another key (1-9). The C output of the CD4514 latches when you send the Touch-Tone C, then unlatches when you send a different key.

④ Now send the A tone and unkey. The A output latches, advancing hours, and the clock reads out the hours while advancing. When it's advanced to the proper hour, send Touch-Tone 1 (or any key such as 1-9) to unlatch the output.

⑤ Do the same with minutes using the B key.

⑥ Now that the clock is set, turn off UF 4 to disable the CD4514, and turn off Spare Audio to let the transmitter drop.

Andy's technique combines hardware simplicity and command simplicity with the security offered by the UF remote control outputs. His technique should be useful for other special control needs as well. Thanks, Andy!

DTMF TO 4514 PIN		
KEY	OUTPUT	PIN#
*	A(10)	20
1	1	9
2	2	10
3	3	8
4	4	7
5	5	6
6	6	5
7	7	4
8	8	18
9	9	17
*	B(11)	19
A	C(12)	14
B	D(13)	13
C	E(14)	16
D	F(15)	15
	0	11

ShackMaster BSR Hookup

If you've hooked up your ShackMaster to the Heathkit GD-1530 and found that it doesn't always control your BSR modules correctly, this note may help.

The "RS-232" input to the GD-1530 is actually an LED in a high speed optocoupler with a minimum current transfer ratio of about 20%. With the photo-transistor collector resistor of 2200Ω pulled up to 5 volts, a minimum of 10 mA is required through the LED to produce a logic low at the output. RS-232 drivers aren't designed to normally drive loads as heavy as the GD-1530's input. Norman Hendrickson, KØBT, recommends *changing the photo-transistor collector resistor R10 in the GD-1530 from 2200Ω to 10K* to add plenty of transfer margin. Remember, do it with the power unplugged - the chassis is hot!

Thanks, Norman.

Equalize Your ShackMaster

Last time, we talked about using a stereo equalizer to shape your repeater's audio to your liking. An equalizer can be useful in your ShackMaster HF remote base, as well.

When operating crossband through your VHF or UHF control channel into the HF rig, the audio characteristics of the transmitted HF signal are dependent on several things - your voice, your HT's microphone, and the audio circuitry in the HT's transmitter, the control transceiver's receiver, and the HF transmitter. ShackMaster's frequency response is flat, so it doesn't contribute any additional frequency shaping.

Differing characteristics among voices alone can justify equalizing audio to your SSB transmitter. When operating through a remote, there are so many additional variables that, for optimum audio, a graphic equalizer ahead of your HF transmitter may be able to improve your signal. The equalizer gives you the flexibility to compensate for all the variables and end up with optimum audio.

Ideal Equalizer

Pat Kudo, N6GTU, brings to our attention what is perhaps the best equalizer value available for these applications - the Radio Shack "Line Level Equalizer for High-Power Equipment" (12-1867). It's inexpensive ($39.95), has 7 bands, operates on 12 volts dc at low current (12 mA), and accomodates line or high level audio. Thanks, Pat.

Two Remote Bases With One FC-1

Last time, we showed how to control two remote bases from one link port using two FC-1 boards. Here are details for connecting one FC-1 Frequency Control Board to two ICOM transceivers to provide remote bases on two bands using one link port. The circuit can apply to any of our products which are compatible with the FC-1, including the RC-850 and RC-85 controllers, the ITC-32 Intelligent Touch-Tone Control Board, and ShackMaster.

Both transceivers should be powered up together - either they're both on or they're both off. The frequency and offset outputs of the FC-1 drive both rigs in parallel. The transmit audio from the controller also drives both rigs in parallel. For simplicity, a relay controlled by a general purpose remote control output of the controller can switch PTT, receive audio, and COS between the two rigs.

As a variation, an idea suggested by a clever RC-85 owner (sorry we don't remember who suggested it) is particularly useful when driving a 2 meter and 220 remote. Let the MHz digit automatically select the 2 meter or 220 rig! If the MHz digit is 0-4, it must be 220; if it's 5, 6 or 7, it must be two meters. By automatically selecting the rig based on the MHz digit, the user doesn't need to manually select it.
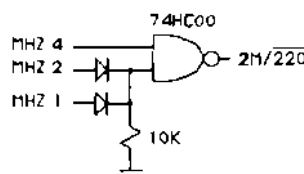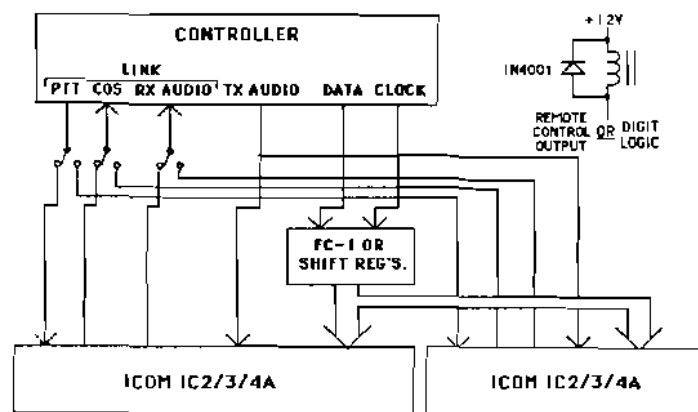
AUTOSELECT 2M/220					
MHZ	8	4	2	1	BAND
0	0	0	0	0	220
1	0	0	0	1	220
2	0	0	1	0	220
3	0	0	1	1	220
4	0	1	0	0	220
5	0	1	0	1	2M
6	0	1	1	0	2M
7	0	1	1	1	2M
8	1	0	0	0	--
9	1	0	0	1	--

What Business Are We In?

When the airline industry began to develop, railroad companies viewed it as a threat. That's because they viewed themselves as being in the *railroad* business, and the new airline industry was an unwanted transportation competitor. That view turned out to be a terrible mistake. The railroads should have understood that they were really in the *transportation* business. If they had, they would have adopted new transportation technology, would have continued to grow, and would have become stronger instead of being left behind in the transportation business by the new upstart airlines.

Today, oil companies with a future understand that they're really in the *energy* business, so that they'll still be around when the world runs out of oil. A good example is ARCO, an oil company who is also the leader in solar energy technology.

How does this relate to ham radio? As hams, we need to think about and understand what "business" we're in as hams, in a world of changing technology and needs.

Are we in the business of providing a fun, stimulating, and educational activity for young people? Of providing service to the public in exchange for access to spectrum? Of increasing people's understanding and appreciation for technology? Of safeguarding a portion of the spectrum for public access, like national parks? Of providing personal communications? Of basking in the accomplishments of those that preceeded us? Or some of each? In what proportions?

Ham radio has always faced threats. It isn't likely that it will die, *but it will change!* Technology is making our prime UHF allocations such as 900 and 1200 MHz cost effective for other applications. With no growth in the amateur service, and with those prime allocations virtually unused by hams, it's unrealistic to expect to keep them without fundamental changes. These changes can result from our own rethinking of "what business we're in", or they can be forced on us by others with needs that must and will be met.

If amateur radio were really fulfilling its potential, it would be booming, and there wouldn't be a continuing threat by others wanting spectrum for various forms of personal, non-commercial voice and digital communications. We need to listen to what they're saying.

A report by the FCC's Office of Plans and Policy entitled "Alternatives for Improved Personal Communications" recommends changes in the GMRS (General Mobile Radio Service). Among others, the report recommends considering the following two ideas: allocating the 900 or 1200 MHz amateur bands to a new personal radio service or sharing them between amateur and a new service; or restructuring the amateur service to allow non-amateurs extensive access to 146 and 440 MHz amateur bands for personal communications. These are just internal FCC ideas right now, but they *could happen*, and they should make us realize that we shouldn't take for granted what we have. Our allocations won't remain ours just because they are now.

If we, as amateurs, and those that represent us aren't sure what amateur radio should be, or our view isn't consistent with today's and tomorrow's world, we're in trouble. What business are we in?

Recent Conventions

We exhibited at the ARRL National Convention in San Diego and the Pacific Division Convention in San Jose. The San Diego folks put on a fantastic "National" for southern California.

We visited, but didn't exhibit at the Hamwest convention in Las Vegas in early November. This year there will be no large southern California show - we expect Hamwest in Las Vegas to be the place to be in '87. The date hasn't been set yet, but keep your eyes open. Plan to attend!

RCB-2 Available

We've upgraded the Rotor Control Board to handle heavier duty rotor boxes including the Tailtwister. It's supported by ShackMaster and will be supported by RC-850 controller V3.5 software. ($76 discount price)

TM-411A Details

Norman Hendrickson, KØBT, has provided us with a nice article about "KBØT Remote Base". He describes his ShackMaster hookup to the Kenwood TM-411A as a frequency agile control transceiver, including the use of DCS for control channel security. We'll send you a copy on request.

Drake UV-3 Details

Also available is a writeup on frequency agile control of the Drake UV3 tri-band transceiver. The writeup is based on information submitted by Tom Workman, KØTW, and Jerry Clark, K7KZ. Thanks, Tom and Jerry!

Computer Interface Progress

We haven't forgotten about the computer interface for the RC-850 controller, although it may seem that way. We're actively working on the software, and we think that '850 owners will be very happy with the package that we'll have to offer.

Want to Continue Receiving "ACC Notes"?

It's been a couple of years since we updated our ACC Notes mailing list. We're happy to continue sending ACC Notes to you at no charge, but we do want to know that you're still enjoying it. If you'd like to keep receiving it, *please return the form below.* If we don't hear from you, we'll regretfully remove you from our subscription list. ***Please fill out the form and send it back now, even if you own ACC equipment. Thanks!***

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