acc notes

Advanced Computer Controls, Inc. AMATEUR RADIO March-April-May 1990

Repeater Mini-Notes

Repeater Telephone Rates

If you're still paying commercial phone line rates for your repeater's patch, some effort could lead to a significant cost reduction. Hams in several states have persuaded their local telephone companies to grant amateur repeaters residential rates. Connecticut appears to be the latest (Southern New England Telephone), following Pacific Bell (CA), all GTE operating companies, and U.S. West (Mountain Bell). Tnx, ARRL.

New 6 Meter Band Plans

After a ruling by the FCC expanding the 6 meter repeater subband from 52-54 to 51-54 MHz, some new band planning is underway. SCRBBA (So. Calif.) has designed a plan which can be implemented on a per-MHz basis, with 500 kHz splits (in low). This brings to four the number of different splits on 6 meters. The ARRL plan provides for splits of 1 MHz.

Also in this issue ...

Lower Cost RC-96 Repeater Controller

The **RC-96 Repeater Controller**, our rugged mid-range controller, is now available in a lower cost "plain front-panel" configuration. By eliminating the front panel keypad and display on this popular unit, we're able to pass along the savings, making it the controller of choice in cost sensitive mid-range applications.

Of course, the front-panel keypad and display version is still available. The keypad makes it easy to start programming the unit before hooking it up to a repeater. A speaker plugged into the rear speaker jack lets you hear the synthesized speech responses to your commands. The display lets you view input and output signal status to verify the controller is connected to your repeater properly.

The **Digital Voice Recorder** is a favorite system accessory of our controller owners, and it's compatible with the '96. The DVR provides Voice Mail for your repeater system, and allows remote recording of all the controller's programmable announcements. And its audio quality is outstanding, thanks to the 64K bit-per-second PCM digital recording.

The **FC-900 Interface** makes it easy to interface ICOM's IC-900/901 FM mobile band units as remote base and link transceivers. Through your '96 based repeater, you can operate other bands and link to other repeaters to extend the range of your system, join in nets and drills on other repeaters, and work ten meter DX!

The **RC-85 Controller** board, one of our most popular products, is still available as an even lower cost alternative to the '96.

RC-96 w/FP Display, $1365. Plain F/P, $1215 (discount prices).

RC-850 Controller Warranty Expansion

ACC is proud to announce an expansion of the RC-850 Repeater Controller two-year warranty to include coverage for damage caused by lightning. The '850 joins ACC's RC-96 controller with this coverage, unique in the industry.

Since repeaters are typically installed at high elevations, they are susceptible to damage from lightning striking the phone line, power line or antenna. Extensive internal protection helps prevent damage from these strikes.

The '850 continues to grow in capability through software and hardware upgrades. Not as visible, however, are other improvements, including the extensive lightning protection built into each new '850. Our experience with the product in the field gives us the confidence to provide this major new warranty benefit to our customers.

"PatchMaster was selected as one of the ten most innovative new products for 1990.'

Introducing PatchMaster 200

PatchMaster 200 is the first of a new line of commercial and amateur two-way interconnect products from ACC. International Mobile Communications Expo (the land mobile equivalent of the Dayton HamVention) recently selected PatchMaster as one of the ten most innovative new land mobile products for 1990. We think that every ham will be able to benefit from PatchMaster as well!

PatchMaster is a radio-telephone interconnect (phone patch) which supports simplex sampling, VOX, full and half-duplex operation. It's intended for use with VHF and UHF FM two-way radio systems. PatchMaster is fully programmable using DTMF or a terminal via the built-in serial port. The full-featured patch offers Autodial, toll-restrict, synthesized and recordable voice prompts, and supports two phone lines.

PatchMaster integrates voice mail, a base station remote, selective call and remote control capabilities into a high performance phone patch.

Mobiles, telephone callers and the dispatcher (or person at home) can leave voice messages if the other person isn't there, getting the message through when the radio system would otherwise be useless. PatchMaster addresses the problem of missed radio calls by applying voice mail technology to two-way radio.

The base radio can be operated anywhere at the base location (or home) through a twisted pair connection to one or more telephone sets. The dispatcher isn't tied down to the radio – the radio can be accessed from any multi-line telephone in the home or office.

PatchMaster 200 raises the level of expectation of what a "patch" can offer two-way users by integrating other valuable functions. These capabilities are rounded out by ease of installation, programming and use, and the most extensive lightning protection offered in a patch.

PatchMaster will be in production in the fall of this year.

Antenna Feedline Loss

Loss in your antenna feedline lowers your effective transmitted power and reduces the effective sensitivity of your receiver.

A useful rule of thumb is to select a main feeder with no more than 1.5 dB total attenuation. This is equivalent to 71% efficiency. Lowering the loss further is beyond the point of diminishing returns; a greater loss will impact the performance of your system.

To achieve 1.5 dB loss on long runs or at 450 or 1300 MHz, it may be necessary to use other than the popular RG-8 foam or 9913 cables. The table below shows maximum runs of cables of different types of cable which will have less than 1.5 dB loss. The numbers are computed by interpolating and extrapolating from available data to apply to the amateur bands. If your run is significantly longer than shown for your repeater band and cable type, you might consider stepping up to a lower loss feedline.

For information on Andrew cable, ask for the brochure, "HELIAX Coaxial Cable for Land Mobile Radio Systems". Andrew Corporation, 10500 W. 153rd St., Orland Park, IL 60462. (312) 349-3300.

		MAX. RUN (IN FEET) FOR 1.5 DB LOSS AT ...			
CABLE TYPE	**DESCRIPTION**	**150 MHZ**	**225 MHZ**	**450 MHZ**	**1300 MHZ**
RG-8	-	48	38	25	14
RG-8 FOAM	-	75	60	40	25
BELDEN 9913	-	100	79	55	31
ANDREW FSJ1-50	Superflexible 1/4"	65	54	38	21
ANDREW FSJ4-50B	Superflexible 1/2"	115	94	65	39
ANDREW LDF2-50	LDF Foam 3/8"	115	94	65	39
ANDREW LDF4-50A	LDF Foam 1/2"	176	150	100	58
ANDREW LDF5-50A	LDF Foam 7/8"	333	263	176	100
ANDREW LDF6-50A	LDF Foam 1-1/4"	429	357	242	136
ANDREW LDF7-50A	LDF Foam 1-5/8"	536	429	288	167
ANDREW HJ12-50	Air 2-1/4"	750	600	395	234

Dayton 1990

We were once again at the Dayton HamVention in late April to show and tell our products, and to have the opportunity to meet our customers, old friends, and to make some new ones.

At our annual Sunday morning forum, Linda Rae Sande and Michael Young delivered a slide presentation and hosted refreshments for the hamfest weary. The topics included a few "ACC Notes"-like items, a description of our Digital Voice Recorder, and a presentation on ham applications of PatchMaster, our new intereonnect product (see page 2).

Other than PatchMaster, the most exciting new product we saw was AEA's IsoLoop HF antenna. In the field of repeaters, Doug Hall Electronics demonstrated an interface between ACC repeater controllers and Kenwood radios for remote base applications. Doug's interface reads the BCD frequency data supplied by the controllers and sends it to the Kenwood radios in a format that they understand. [Doug Hall Electronics, (614) 261-8871].

We're looking forward to returning next year to do it again.

1200 MHz Repeater System Ideas

Building a high-performance repeater system at 1200 MHz is a challenge. In our January-April '89 issue we detailed some of the equipment popular in Southern California, where a number of successful 1200 MHz repeaters are on the air. Some more ideas, this time from Brad Rulien, WB6IRC. Brad owns several interlinked repeaters in Northern California, including a system on Mount Diablo, which is one of the best repeater sites in the world.

Brad is impressed with a duplexer available from Telewave. The model TPRD-12044, with 1 dB insertion loss, is available for $648.80.

A potential problem with available high gain antennas for 1200 is their vertical radiation pattern. It seems that some have an up-tilt, meaning that the radiation is directed slightly above the horizon, which isn't where your users are. One local group has had better success mounting their antenna upside down, so the tilt would work for them, rather than against them.

Rumor has it that Telewave has under development a 3 dB gain antenna for 1200 MHz, which Brad has been able to try out. According to his tests, it outperforms the more popular gain antennas, probably because of the gain antennas' undesirable up-tilt.

Another trick up Brad's sleeve is the Comet CFX-4310 "tri-band duplexer" ($78.85). This inexpensive filter is intended to accept three radios and connect them to a multi-band antenna, or conversely, connect a multi-band radio to three separate antennas. On one side is the combined input/output at a type N connector. On the other side is an N connector for 840-1400 MHz, an N connector for 350-500 MHz, and a UHF connector for 1.3-150 MHz. The filter is very high quality, and measured only .3dB loss at 1200 MHz. It can fit into a 1200 MHz repeater system between the duplexer and the antenna, to protect the receiver (or preamp) from strong UHF RF levels that may be present at the site. These out of band signals aren't effectively attenuated by a duplexer, and can squash a sensitive preamp.

Comet/N.C.G., (714) 630-4541.

Telewave, Inc. 1155 Terra Bella Ave., Mountain View, CA 94043. (415) 968-4400.

More 440 Band Units Arriving

ICOM has confirmed that more UX-49A 440 MHz hand units for their IC-900 mobile radio will be delivered to dealers, possibly in June. All dealer back orders will be filled, and additional band units will be available for future dealer orders.

The UX-49A band unit is one of six that can connect to ACC's FC-900 Interface, making it easy to attach a six-band remote base to your ACC controlled repeater. The 440 band units had been in short supply and were becoming difficult to find, but more will be arriving.

Several owners have reported successfully retuning the 440 band unit down to the 420-430 range, where it can be used for conventional repeater linking. The software in all our controllers can command the unit to the 420-430 and the 430-440 MHz ranges for special applications, such as linking.

By the way, the rumor we heard about the 10 meter band unit being discontinued is <u>not</u> true.

Turn a - To a +

ACC controllers provide users with a voice readback of their signal strength at the repeater. They convert a 0-5V S-meter signal to a voice response. If your receiver generates a negative voltage metering signal, you can change the polarity by merely reversing the rectifier diode in the i.f. amplifier meter circuit. The metering signal can then be fed directly into the controller. On the Motorola Mocom 70, the diode to reverse is CR301.

Thanks, Mike Naruta, AA8K.

Other Notes of Interest

In Brief

Transceiver Modules

Motorola Radius Division has introduced a line of commercial grade, simple, low power transceiver boards and modules. They have fast switching times which might make them suitable for high speed packet links, as well as other two-way radio projects. They're available at VHF high band (136-174 MHz) and UHF (403-470 MHz). Some models exclude the ham bands in their specs but they are probably tunable.

Contact Motorola at (800) 624-8999 ext. 5992 or a local Motorola Radius dealer and ask about the RNet Series Telemetry Radio and RF Transceiver Boards.

'85 by Computer

Andy Kadvan is offering a PC program that works with 100% Hayes compatible modems, allowing programming of the '85 and '96 controllers from your computer using modem generated DTMF.

The cost is $29.95+$3 shipping. Andy Kadvan, KA8R, 1835 Lynn Mar Ave., Poland, OH 44514.

Our Own Almanac

Amateur radio operators should drop their licenses and grab their mikes today because it was on this date in 1909 that Einar Dessau got on the air from his home in Denmark and traded pleasantries with a government radio post six miles away. This is believed to be history's first broadcast by a ham. (San Jose Mercury News, 3/18/90)

"We can appreciate the value of carrying handheld radios with us"

Personal Communications Networks

Numerous developmental programs are underway in North America and Europe that promise to deliver personal communications capability to the general public. As hams, we can appreciate the value of carrying a tiny handheld radio with us that lets us talk with friends, and in some cases, family members, whenever we'd like. Not to mention the ability to make a quick phone call through the autopatch.

The new Personal Communications Networks (PCNs) are based on digital cellular-like technologies, involving the merger of advanced cordless telephone technologies and micro-cellular techniques.

One approach is based on the existing cellular infrastrucutre. As cellular systems are converted to digital over the next several years, and as cell sizes are reduced to allow more reuse of frequencies, the system capacities will expand to support far more than simply cellular mobile telephone service. There will be capacity for radio communication service unrelated to the telephone, such as unit-to-unit voice, data and fax.

Other approaches to PCNs may involve other than cellular spectrum for implementing new systems. New local area cordless telephone technologies, also involving digital transmission and frequency reuse, may evolve into broader application PCNs.

A system under development by Millicom will use spread-spectrum techniques near 2 GHz. Millicom has been licensed to share this spectrum in Orlando and Houston for experimental service.

It is expected that PCN telephone handsets, however the systems develop, will be wallet-sized, low power and inexpensive.

A fly in the ointment may be a lack of worldwide standardization, which will slow development. But, the future of personal communications will be exciting, indeed!

ACC Technical Support Improvements

We've made some procedural changes that have improved our free telephone Technical Support Service. We think you'll find it far easier to get through without getting a busy signal (we've measured a 300% improvement!). We may, however, ask you to leave your name and phone number so that we can return your call if we're helping a customer on another line. And we'll return your call within a few minutes if at all possible.

We're the only manufacturer of repeater controllers with a dedicated Applications Engineer available to assist you. Hours are Monday through Friday, 9-12 and 12:30-3 west coast time, at (408) 727-3414.

Date: _____

Name: _____ Call Sign: _____

Repeater Organization: _____ Repeater Call: _____

Frequency: _____

Mailing Address:

_____

_____

_____

Shipping Address (not a P.O. Box):

_____

_____

_____

Day phone #:
☎ _____

Alternate #:
☎ _____

Comments: _____

To speed processing of your order, please . . .

✓ Provide both a mailing and shipping address
✓ Provide both day and evening phone numbers where you can be reached
✓ Shipping address cannot be a P.O. Box (UPS does not deliver to P.O. Boxes)

- -

① Subtotal $ _____

② Credit for previously purchased manual – $ _____

③ New subtotal $ _____

④ CA and FL residents add sales tax (line 3 times 6.0, 6.25, 6.75, or 7.25%) $ _____

⑤ Shipping and insurance (UPS second day air):
RC-850 - $24.00 DVR - $20.00
RC-96 - 15.00 RC-85B - 10.00
FC-900/CIB - 8.00 Accessories - 5.00
Manuals - no charge
International - call for quote $ _____

⑥ C.O.D. fee ($4 if applicable) $ _____

⑦ TOTAL DUE $ _____

⑧ Deposit enclosed – $ _____

⑨ BALANCE DUE $ _____

METHOD OF PAYMENT
(Please indicate one)

❑ Check enclosed for total amount due
❑ Deposit encl. w/ balance due prior to shipment
❑ Deposit encl. w/balance due COD Cert. Funds
❑ Charge to a VISA / Mastercard
❑ Company p. o. – subject to credit approval

P.O. # _____
(Hard copy required prior to shipment)

Credit card #: _____

Expiration date: _____

Name on card: _____

address: _____

_____

Signature: _____

Thank you for your order!

advanced computer controls, inc.

2356 Walsh Avenue, Santa Clara, California 95051
(408) 727-3330

Price List and Order Form

June 1990

RC-850 REPEATER CONTROLLER with Version 3 Firmware

		List Price	Discount Price*
❑ RC-850	Repeater Controller in 19" rack mount cabinet (includes Telephone Interface and Voice Response Telemetry)		
	❑ with Plain Front Panel	$2800.00	$2400.00
	❑ with Front Panel Display	2900.00	2700.00
❑ CIB/VEO	Computer Interface Option (V3.5) with Vocabulary Expansion Option	525.00	450.00*
❑ PS	Nspector™ Programming Sheet Software Custom Sheet Heading _____	115.00	95.00**
❑ FC-900	Interface for IC-900 Super Multi-Bander System units	260.00	225.00**
❑ ENC	FC-900 CTCSS Encoder Option	35.00	25.00
❑ CTCSS	Subaudible Tone Decoder		
	❑ Installed	120.00	100.00
	❑ Not installed	70.00	60.00
❑ MC48	Local Microphone	100.00	85.00
❑ FC-1	Frequency Control Board	60.00	55.00
❑ M850	Manual Only (included in purchase)	45.00	35.00

* CIB/VEO discount price is $350.00 when ordered with either rack mount RC-850 Controller.
** Requires CIB/VEO Option.

RC-850, TP-3 Telephone Interface, and VR-2 Voice Response Telemetry are also available in board-only configurations. Please call the factory for pricing.

RC-96 REPEATER CONTROLLER with Version 4 Firmware

		List Price	Discount Price*
❑ RC-96	Repeater Controller with one DIN cable	$1550.00	$1365.00
❑ RC-96	Repeater Controller w/plain front panel & one DIN cable	1380.00	1215.00
❑ TNP	CTCSS Tone Panel Option with one tone installed	200.00	175.00
❑❑❑❑❑❑❑	EAT Each additional Tone (up to 7 additional)	45.00	35.00
❑ AD-2	Audio Delay Line Board Kit	185.00	160.00
❑ FC-900	Interface for IC-900 Super Multi-Bander System units	260.00	225.00
❑ ENC	FC-900 CTCSS Encoder Option	35.00	25.00
❑ FC-1	Frequency Control Board	65.00	55.00
❑❑❑❑C B	Additional DIN Cable (one supplied with controller)	35.00	25.00
❑❑❑❑ CN	Additional DIN Connector only	15.00	10.00
❑ M96	Manual Only (included in purchase)	25.00	15.00

RC-85 REPEATER CONTROLLER with Version 4 Firmware

		List Price	Discount Price*
❑ RC-85B	Repeater Controller Board	$ 1050.00	$ 895.00
❑ CTCSS	Subaudible Tone Decoder		
	❑ Not installed	70.00	60.00
❑ AD-2	Audio Delay Line Board Kit	185.00	160.00
❑ FC-900	Interface for IC-900 Super Multi-Bander System units	260.00	225.00
❑ ENC	FC-900 CTCSS Encoder Option	35.00	25.00
❑ FC-1	Frequency Control Board	65.00	55.00
❑ M85	Manual Only (included in purchase)	25.00	15.00
❑ V4U	Version 4 Software Upgrade from V3 RC-85	150.00	125.00*

*V4 Software Upgrade available for $100.00 when purchased with the FC-900 Interface.

DIGITAL VOICE RECORDER

		List Price	Discount Price*
❑ Digital Voice Recorder	(one channel, one block 256K byte memories)		
	❑ Assembled and tested board only	$ 1150.00	$ 950.00
	❑ In 19" rack mount cabinet	1350.00	1150.00
❑❑❑ MX-3	Add'l 256K byte memory (up to four blocks total)†	125.00	100.00
❑ CH-2	Second record/playback channel††	250.00	200.00
❑ CH-3	Third record/playback channel††	250.00	200.00
❑ MDVR	Manual Only (included in purchase)	15.00	10.00

† Memory may be expanded by the user in the field. Dynamic RAM required for operation. Either 4164 (64K bit) or 41256 (256K bit), 200 ns or faster (150 ns, 120 ns, etc.). Up to four blocks of 8 devices (32 total). Check current product flier for details.

†† Factory upgradeable only.

The cost of a previously purchased manual is applicable as a credit toward your new equipment. Owner's supplements are shipped when controllers are ordered.

---

* To qualify for **Discount Price**, order may be accompanied by a minimum 20% deposit, with balance due prior to shipment, or payable via COD certified funds or VISA or Mastercard charge. Orders placed on company purchase orders requiring credit terms do not qualify for Discount Price.

Warranty periods are:
RC-850 Repeater Controller - 2 years
RC-96 Repeater Controller - 2 years
RC-85 Repeater Controller - 2 years
Digital Voice Recorder - 1 year

Limited Warranty - Advanced Computer Controls, Inc. warrants that the products manufactured by ACC will be free from defects in material and workmanship for the warranty period from the date of shipment. The liability of ACC is limited to replacing or repairing, at ACC's option, any defective products which are returned to ACC, Santa Clara, California. In no case are products to be returned without first obtaining permission from ACC. The foregoing warranty shall not be valid: (i) if the products or parts have been subjected to misuse, accident, alteration, neglect, unauthorized repair or installation; (ii) for expendable items with the products, including custom equipment or products produced to Buyer's specifications. ACC shall make the final determination as to the existence of any alleged defect.

EXCEPT AS HEREINABOVE PROVIDED, ACC MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. All implied warranties are limited in duration to the above stated warranty period. Some states do not allow the exclusion or limitation of incidental or consequential damages or on how long an implied warranty lasts.

PRICES - All prices are subject to change without notice. Prices do not include any taxes. Prices include packing suitable for domestic shipping. Export packing and freight are extra.

CANCELLATION AND DEFERRAL - Cancellation of or changes to acknowledged orders are accepted only on terms that protect ACC against loss.

TITLE AND SHIPMENT - All shipments are F.O.B. ACC, Santa Clara, California. Title to the products and risk of loss shall pass to Buyer upon ACC's delivery to the carrier, regardless of any provisions for payment of freight or insurance or form of shipping documents. The method of shipping and packaging shall be in accordance with ACC's then current standards. Shipping dates provided by ACC are approximate only. ACC shall not be liable for any loss, damage, or expense (consequential or otherwise) incurred by Buyer if ACC fails to meet specified delivery dates.

LIMITATION OF LIABILITY - ACC'S LIABILITY UNDER OR FOR BREACH OF THIS AGREEMENT SHALL BE LIMITED TO REFUND OF THE PURCHASE PRICE. IN NO EVENT SHALL ACC BE LIABLE FOR COSTS OF PROCUREMENT OF SUBSTITUTE GOODS, LOSS OF PROFITS, OR FOR ANY SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, HOWEVER, CAUSED, WHETHER FOR BREACH OF WARRANTY, BREACH OF CONTRACT, REPUDIATION OF CONTRACT, NEGLIGENCE, OR OTHERWISE.

SOFTWARE PRODUCTS RESTRICTIONS - No title to or ownership of any Software or any parts thereof is transferred to Buyer by any delivery of Software to the Buyer hereunder. All Software provided by ACC is subject to a separate license agreement between Buyer and ACC.

01-30001-13

Interfacing ACC's Repeater Controllers to the ICOM IC-RPxx20 Repeaters

ICOM's IC-RPxx20 repeaters offer, in one impressive package, a high performance receiver and transmitter and a heavy duty power supply. They also include a "bare-bones" internal control system. Operation and enjoyment of the repeater can be enhanced by adding an ACC controller external to the repeater to add full remote control and remote programming, autopatch/autodial, synthesized speech, remote base and linking support, scheduling, and lots more that has made ACC the amateur radio standard for repeater control.

Hooking up the controller is easy because the back of the repeater has an "ACC" connector ("Advanced Computer Controls" or "accessory" connector?).

ICOM also made it easy to disable the internal controller so that your ACC controller will have complete control of the transmitter. It isn't necessary to cut any traces, remove any components or unplug any connectors. Just follow the steps below:

1. Turn down pot R33 in the repeater Logic Unit to eliminate the internal audio path.

2. Set DIP switch S4-2 off in the Logic-A Unit to disable the internal IDer.

3. If you intend to use the repeater's internal CTCSS decoder, install a wire from the "DET" signal at IC9, pin 17 (P23) of the Logic Unit to the ACC connector, pin 8.

4. Wire a cable from the ACC connector to your ACC controller as shown in the table below. Set DIP switches on the controller as shown.

5. Power up the equipment. Press the LOCAL INHIBIT switch on the repeater front panel to eliminate the internal keying path. This effectively makes the unit a full-duplex transceiver, not a repeater. But there's a trick! If the repeater loses power, when power is restored, the repeater will come back up in repeat mode. To cause it to always power up in local, keep the button pushed in all the time by stuffing a tie wrap in the cutout for the button, or use another trick to keep the button depressed.

6. Adjust audio levels as required by the controller. Logic Unit pot R45 adjusts the receiver audio level available to the controller at pin 5 of the ACC connector.

ICOM IC-RPxx20 ACC Connector			REPEATER CONTROLLER		
PIN #	NAME	DESCRIPTION	RC-850	RC-96	RC-85
1	NC	No connection.	-	-	-
2	GND	Connect to ground.	Phono jack shield	REPEATER-2 (brown), shield	J4-1, J3-14, J1-1
3	SEND	PTT. When grounded, transmits.	DIGITAL I/O-7	REPEATER-4 (orange)	J3-10
4	MOD	External modulator input.	TX phono jack	REPEATER-6 (green)	J4-8
5	AF	Fixed AF output.	RX phono jack	REPEATER-7 (blue)	J4-7
6	SQLS	Squelch output (low true, o. c., see Note 1)	DIGITAL I/O-17	REPEATER-1 (black)	J3-1
7	13.8V	13.8V output.	POWER Jones-2	+12V or center pin of POWER	J1-2
8	NC	Optional CTCSS (see Note 2).	[DIGITAL I/O-15]	[REPEATER-5 (yellow)]	[J3-4]

Notes:
1. Wire a 2.2K pullup resistor from SQLS to 13.8V.
2. Connect the "DET" signal from IC9 pin 23 on the Logic Board to ACC connector pin 8 to use the internal CTCSS decoder. Connect this pin to the controller as shown.
3. RC-850 DIP switches (main board) – SW1 off, SW2 on, SW3 on
4. RC-96, RC-85 DIP switches – SW1 off, SW2 off, SW3 on

advanced computer controls, inc.
2356 Walsh Avenue, Santa Clara, California 95051
(408) 727-3330

Controller / ICOM RP-xx20 Interface

To stay on our mailing list ...

The mailing list for ACC Notes has grown so large that, in order to control our costs, we need to know that you still want to receive our newsletter. If you'd like to continue receiving ACC Notes every few months, please return the bottom portion of this page with your mailing label attached and any changes noted. We need your label (or a copy) for efficient processing. Please – no phone requests. If we don't hear from you, we'll reluctantly **drop your name from our list**. Thanks for cooperating!

Return the bottom portion of this page with your address label attached.

acc advanced computer controls, inc.

2356 Walsh Avenue
Santa Clara, California 95051