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ACC NOTES MAY/JUNE '83

WIN A DIGITAL VOLTMETER! We're looking for some of the most creative uses of the new Scheduler in the RC-850 Controller. The Scheduler allows automatic changeover at predefined times and days of the week to different control operator setup states (i.e. autopatch enable, ID select, etc.). It also allows activation of the links and the remote control User Function logic outputs. Your repeater can automatically link up to other repeaters for nets, remind users of code practice or meetings, control other equipment at the site on a scheduled basis, and go to sleep at night.

To be eligible to win the voltmeter you must own a controller or have placed the order for your group. Your ideas must be actually implemented and should be submitted by August 15, 1983. Our judgement on the "most creative" is final.

INDIVIDUAL CUSTOM VOCABULARY ORDERED. We've placed our order with Texas Instruments for custom and library speech words requested by RC-850 Controller owners. We've also ordered a number of additional words, some of which we'll include as standard in Version 3 software, near the end of the year. We'll include as many words in Version 3 as we will have room for.

The new words are:

Hamfest	ham	amateur	radio	auto
dial	patch	valley	club	your
please	thank you	police	information	look
mobile	telephone	calling	system	

Also, we will have the suffix "-ing" (WB8CXO says that "-ing" will give us about 41 new words!).

The individual custom words should be back from TI by late July, and we should ship them by early August.

VERSION 2.0 SOFTWARE DISTRIBUTED. Version 2.D software for the RC-850 Controller seems to be bug free, with one exception relating to the Touch-Tone Up command when in PL access. If you delay unkeying your transmitter after entering the command, the receiver audio may be disconnected. For now, just enter any Touch-Tone digit after entering the Touch-Tone Up command to cause it to reconnect.

If you have any problem storing schedule setup states with Link and User Function information included, select any legal antenna direction (0-360) with the Link Antenna Direction command before storing the state. A newly used byte in the E^2prom needs to be initialized and the direction command will do it.

The current release is 2.04. Everyone should currently have 2.03 or 2.D4. Those with 2.03 will be updated shortly.

On our next major release, which will be Version 3 late this year, we'll seek out volunteers with a wide range of system configurations as test sites to minimize inconvenience to everyone else. Later in the year, we'll survey owners to get your feelings about proposed new features and if you want to be an OTS (Official Test Site).

METERING NOTES - POWER. The RC-850 Repeater Controller is available with synthesized speech "Talking Meters". Up to 16 meters can be read remotely, over the air or over the phone, in response to Touch-Tone commands. "Meter Faces" defined in the software for different types of measurements may be assigned to each analog input, so readback is in appropriate measurement units.

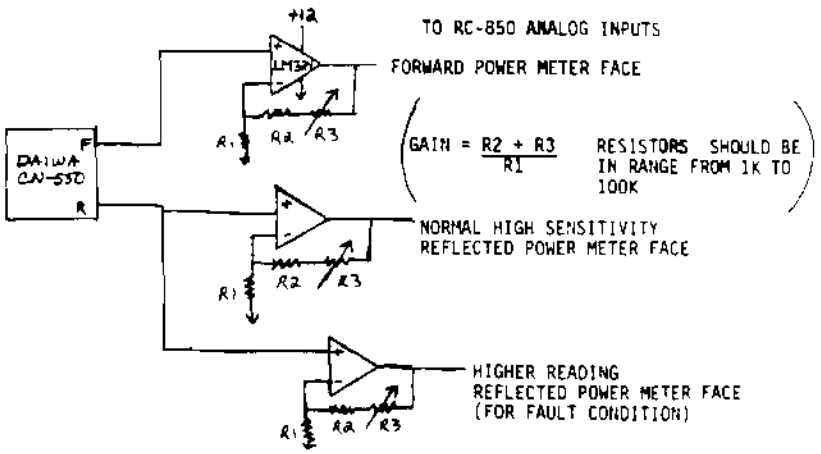
Five meter faces are available for power, with full scale values of 8, 16, 32, 64, and 128 watts. Resolution of readback is one watt. Remote readback of RF power from the repeater site helps diagnose system problems, such as transmitter, power amp, feedline, or antenna difficulties before going to the site, so that you can go prepared. It also permits you to evaluate SWR during different weather conditions, and so on. You can monitor the repeater's transmitter, link transmitters, and other RF equipment at the site.

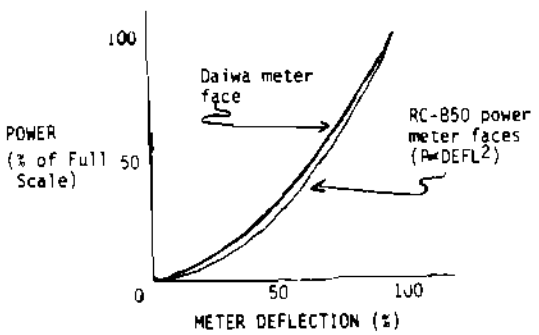
Power is different than other types of measurements in that meter deflection is not linearly proportional to power level. The scale is expanded out at the low end, and crowded in at the high end. This is largely due to the fact that power is proportional to voltage or current squared. There are other non-linearities in the meter's sensing circuits which contribute additional non-linearities in the scale.

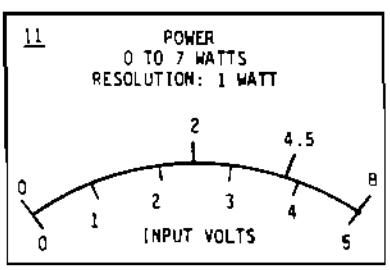
The power meter faces in the RC-850 Controller are based on a power proportional to voltage squared relationship. The figure below shows the curve of power versus meter deflection with the 850's meter face, and a Daiwa CN-550 wattmeter as an example. The match is sufficient to allow valuable power readings, accurate to a few percent, allowing monitoring of system performance. Remember that 1 db error is 26%.

As an actual interface example, we'll show how to interface the CN-550 140-250 MHz dual needle meter to the RC-850 Controller. The CN-550 has its sensor mounted in a shielded enclosure, with rectified dc output for forward and reflected power available at two feedthrough capacitors, which drive the meter movements through adjustable resistors. The dc voltages at the feedthroughs can be tapped to drive op amp circuits to increase the levels to match one or more of the power meter faces.

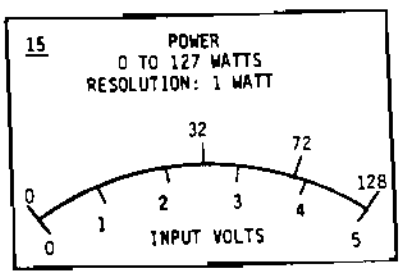
Resistors are selected based on the power level of your system to provide 0-5 volt dc levels to the controller's analog inputs, and should be adjusted for accurate reading at the normal power level. You might want to drive two different meter inputs for reflected power, to allow accurate readback of both normal (small) reflected power, and a higher full scale face in case of antenna problem, without causing the reflected power meter face to "pin".







APPLICATIONS:
REPEATER FORWARD AND REFL. POWER
LINK FORWARD AND REFL. POWER



APPLICATIONS:
REPEATER FORWARD AND REFL. POWER
LINK FORWARD AND REFL. POWER

METERING NOTES: TEMPERATURE SENSORS. The RC-850 controller allows placing temperature sensors at various places at the site to allow remote synthesized speech readback of temperature. Points of interest might be outside temp, temp inside the building, PA heatsink temp, temp inside the cabinet, etc.

Temperature metering is based on the National LM335 Precision Temperature Sensor. The LM335 is electrically like a zener diode, with a precision temperature/voltage characteristic. The simplest hookup is with a resistor to a voltage source, to provide current flow through the sensor. The voltage developed across the sensor represents the temperature, with a change of about 5 mV per degree F.

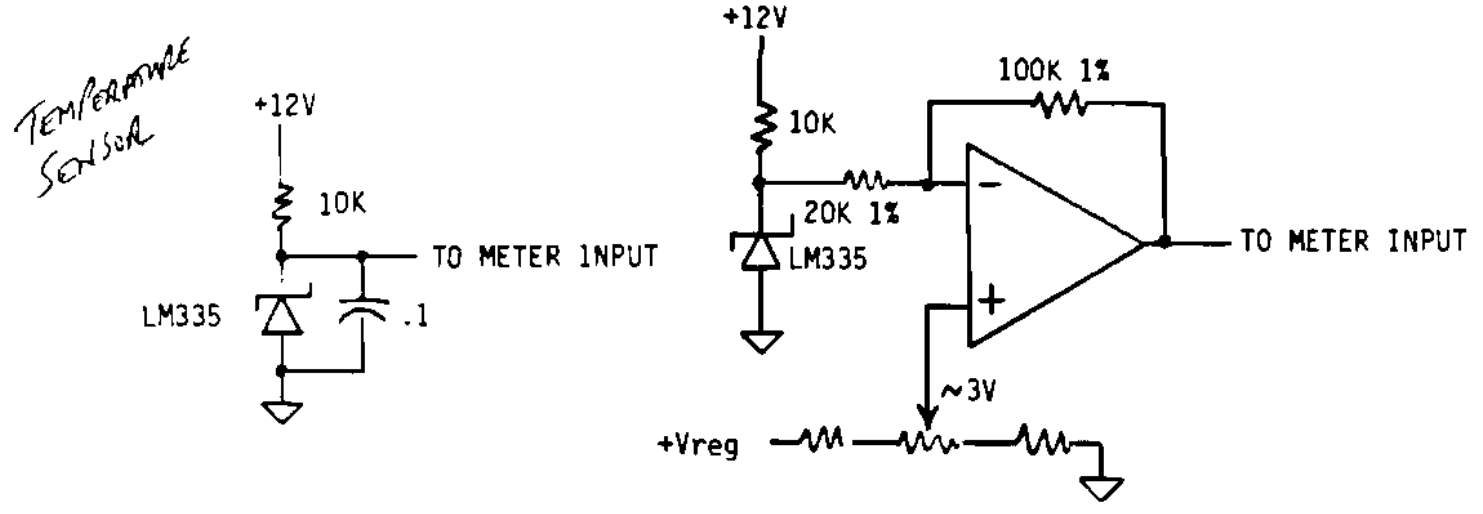
Addition of an op amp circuit can increase the level of signal available, making possible a higher accuracy reading with less resolution required in the measurement circuitry.

The RC-850 controller includes two temperature meter faces, which match the two circuits below. Either of the meter faces can be assigned to any or all of the analog input channels. Assign the Temperature or High Accuracy Temperature meter faces to the appropriate channels using the Meter Face Assignment configuration commands. Temperature can then be read back with user commands (VRT prefix)(channel#). If the VRT prefix is 8, and temperature sensors are on channels 8, 9, and 10, then commands 88, 89, and 810 read back the temperature in degrees F with synthesized speech.

A built-in sensor on the VRT board in the simple circuit configuration allows readback of internal temperature on channel 15.

The LM335 is available in a plastic (LM335Z) and metal (LM335H) transistor package. If sensing the temperature of a heat sink, the metal package is better because it is easier to thermally couple.

The LM335Z is available from Jameco (415)592-8097, and Digikey (800)346-5144 for about $1.50.



HP FOLLOWS ACC'S LEAD. Eight months after ACC introduced its RC-850 repeater controller with speech synthesis capability, Hewlett-Packard has introduced a speech module for its Series 80 computers, using the same TI speech synthesizer chio. It's good to see that HP's evaluation of available speech technology led them to the same conclusion as we reached. It probably also means that the T1 chip will be supported and continuously improved on a long term basis.

POWER MOS FETS GAIN GOOD REPORT. Electronics Magazine, Dec. 29, 1982 reports that power MOS FETs are more reliable than bipolar transistors, based on data from International Rectifier. "The report should be big news to everybody since there's a widespread belief that MOS FETs are fragile and unreliable. This part has arrived."

ACC uses power MOS FETs as "open collector" output buffers in its products because of their reliability, simplicity of interface, and minimal drive current requirements.

RC-850 CONTROLLER ENHANCES USER'S SECURITY. In an article in January, 1983 QST Magazine, KH6IO discusses the potential dangers of divulging personal information over the air. Anyone with a scanner or portable VHF radio could develop a profile of users by listening to repeaters, including over the air conversations and autopatches.

The RC-850 Repeater Controller provides several significant features which may improve the security of phone patch operation. First, user's home phone numbers may be stored in the controller's user loadable autodialer, so that Touch-Tone dialing of the phone number need never be heard on the air. The phone numbers may therefore be secure from anyone listening, even if they have a Touch-Tone decoder. Second, the cover tone may be selected for use, which blocks repeating of the on-the-air side of the conversation. Only the called party is heard through the repeater, enhancing security of the conversation.

The need for security primarily depends on the repeater's frequency band and its geographic location, but if personal security is the goal, the RC-850 controller can help provide it in unique ways.

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PUT SOME GaAsFET IN YOUR REPEATER. A number of people have reported spectacular improvements in repeater receiver performance by adding GaAsFET preamps. The GaAsFET (gallium-arsenide field-effect transistor) is one of the most exciting developments in RF technology since the power transistor. It can dramatically lower the noise figure of receiver front ends. The cost of GaAsFET transistors has dropped over the last year or so, and reasonably priced high performance preamps are now available. A typical preamp will probably give more gain than is needed, but the important thing is the reduction of the noise floor by several db over typical receiver front ends. Remember that to benefit from the lower noise floor, other aspects of the repeater must be optimized as well, such as transmitter white noise, isolation, and receiver de-sense.

GaAsFET preamps are available from Advanced Receiver Research, Lunar, and possibly others.

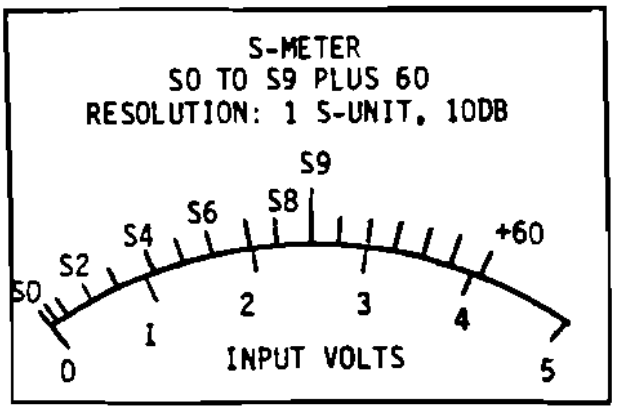
SOMEONE TRYING TO BREAK YOUR CODES? Remember that you can tell the RC-850 controller to ignore Control Operator and configuration commands entered over the air ("Disable Control Over the Air" configuration command). Control it over the command receiver, over the phone, or through the local mike while disabled over the air. You can also place the controller in the "PL Control Op Command" mode, where the repeater is carrier access, but with PL required for Control Op / configuration control. Finally, if someone discovers your codes and abuses them, you can change them at any time remotely!

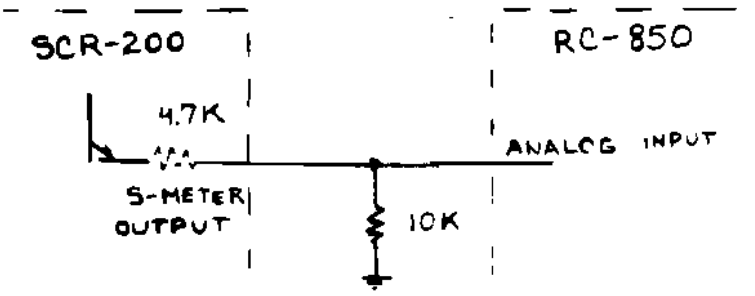
METERING NOTES: S-METER. The RC-850 controller allows users to read back meter readings in synthesized speech. One of the meters which can be read is the receiver's S-meter, allowing users to check their signal strength into the repeater.

An S-meter signal voltage from the receiver can be applied to one of the controller's 16 analog inputs. The S-meter meter face can be assigned to the input selected, so that readback of that channel is in S-units. The S-meter signal is measured by the controller approximately one second into each user transmission. The measured value is stored in memory, and if the user requests an S-meter reading, the stored value is read back in S-units.

The meter voltage should be scaled to match the 0-5 volt input range of the controller. If the voltage is too high, it can be scaled down with two resistors as a voltage divider. If it is too low, it can be amplified with a simple op amp circuit.

The controller's analog inputs should be driven by an impedance of less than about 10K. As an example, the Spectrum SCR200 receiver S-meter output (which has a resistor in series) can connect directly to the controller's input, with a 10K resistor to ground.





ITC-32 ALMOST READY. The ITC-32 Intelligent Touch-Tone Control Board should be ready to ship before the end of March. With RC-850 controller Version 2.0 complete, the ITC-32 is next in line for going into production. For more information on the ITC-32, request our new flier.

HOPE TO SEE YOU AT DAYTON! We'll be there with the RC-850 Repeater Controller, ITC-32 Intelligent Touch-Tone Control Board, and some exciting new products as well. Be sure to look (or listen) for us!

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