acc
advanced computer controls, inc.

RC-850 Repeater Controller

Description

The RC-850 Repeater Controller brings a new dimension to repeater control and operation. It offers state-of-the-art technology that's *designed for the future* and has an established record of reliability and customer satisfaction.

SPEECH —
THE NATURAL WAY TO COMMUNICATE
Your repeater, built around the RC-850 controller, communicates with you and your users in its own voice. Highly natural sounding male and female voices give your repeater *personality*. And they know "ham talk" with their own huge custom ham radio repeater vocabulary. What can your repeater say? It can automatically remind you of nets and meetings, tell your signal strength, and describe conditions at the site (with external sensors). It can warn you of intrusions, read you your mail, and confirm your commands. With all it knows, the RC-850 controller has a lot to say. The *voice* is the controller's way of communicating with you.

Your repeater also communicates using its courtesy tones that act like "color codes" for your *ears*. Is the repeater on battery power? Are you weak into the system? The courtesy tone can *tell* you. And the tones that you design make your controller unique.

REMOTE PROGRAMMING
Back before the RC-850 controller, repeaters were "programmed" with diodes, DIP switches, and custom wiring. Then came the micro-computer, and the repeater was programmed in PROM. That was okay, but changes meant a trip to the hill or to the factory.

Then along came ACC with the RC-850 controller which introduced *remote programming* with its simple Touch-Tone command language. Reprogrammable, non-volatile Electrically Erasable PROM ("E-squared PROM") means convenient, reliable changes and no down time. Your commands are even confirmed in voice. You can reprogram practically everything such as ID's, autodial numbers, command codes and much more from anywhere with a Touch-Tone radio or telephone. Informative ID and tail messages, enhanced security, and customized operation become standard features. No more trips to the hill for that "one little change" because you *remotely* program your repeater.

Version 3 Firmware and the Computer Interface support remote programming from your home computer. They let you travel to the hill via packet or telephone modem.

AUTOPATCH — UNLIKE ANY OTHER
The Autopatch is an important part of most repeaters. The RC-850 controller maximizes the convenience provided to your users, and the public service benefits to your community. Features include 240 user programmable autodial numbers, 10 Emergency numbers with message readback ("County Fire" for example), as well as conventional "enter the phone number" autopatch. Phone number readback and regenerated DTMF or rotary signalling eliminate wrong numbers.

The '850 controller supports the conventional phone line at the site (or two), and is also engineered to support multiple, remotely located phone lines. Remote phone lines can provide autopatch coverage to match your repeater's rf coverage, residential rather than business line charges, and in many cases make autopatch possible for the first time if there's no phone line available at your site. The remote lines may be linked over the air, with reliable, secure signalling to activate them.

The "Antidialer" locks out phone numbers or blocks of numbers you don't want dialed. And telephone exchange tables for multiple area codes allow you to define your own "toll-free" dialing area.

Then there are extras like full duplex capability, cover tone for semi-private patches, and extensive programmable timers. Even storage of credit card numbers and MCI/Sprint access codes is made easy for toll calling.

The reverse patch screens incoming calls by requiring an access code. Your repeater actually calls you by your call sign, or with your pager code in case you aren't listening.

THE SCHEDULER —
PUTS YOUR REPEATER ON AUTOPILOT
The RC-850 controller's built-in clock/calendar combined with highly sophisticated software lets you schedule your repeater's operation. Acting as an "Automatic Control Operator", the Scheduler selects operational modes based on time and day of week. The extensive scheduling capability can remind users of nets and meetings, bring up and take down links, and secure your system at night. *Automatically*.

Scheduler "Events" can wake you up, generate on-the-hour announcements, and even kick off your net! Hands free operation means that the drudgery of being a control operator no longer exists.

Description

TELEMETRY —
REMOTE METER READING

The RC-850 controller provides you with sophisticated remote metering functions not found in the most expensive dedicated systems.

Analog measurement capability combined with unique "Meter Faces" in the controller's firmware allow readback of a variety of meter readings. Users can interrogate signal strength, quieting, deviation, and more with Touch-Tone commands. Check the repeater's output power, battery voltage, and other equipment at the site. The controller even uses the correct *unit name* for you, such as "degrees", "volts", and "amps".

The ability to interrogate current readings is just the beginning. The controller actually continuously measures the reading on each channel, and it stores the maximum and minimum reading for each channel, *tagged with the time and date* of the high/low. This makes it easy to find out how high the reflected power runs or how cold it gets, and when.

Meter readings and stored high/lows can be included in programmable messages. An ID can say, "75 degrees, at WA6AXX, Repeater".

REMOTE BASE — LINK UP

Your repeater becomes a communications *system*, rather than an isolated relay station. The RC-850 controller will control several synthesized transceivers connected to your repeater in response to user commands and scheduled changeovers. Work other frequencies *through* your repeater. The cross-linking capability allows linking two or more frequencies *through* your repeater. The controller accepts commands entered from the links, allowing the link to be brought up *from* the link, for the ultimate in flexibility.

Link your repeater to others for nets and special events, and to simplex frequencies to extend coverage range. Carry around one radio to work more than one band and benefit from the elevation of your repeater site. Even work DX from your handheld!

PAGING AND MAILBOX —
PERSONAL SERVICES TO YOUR USERS

The RC-850 controller introduced the benefits of paging to amateur repeaters. With large numbers of surplus pagers available, you don't have to be listening to be available — your friend can activate your pocket pager with Touch-Tone commands. Paging is also perfect for public service oriented groups.

Many paging formats are supported, and format and address for each pager are stored in memories for easy activation. The page can be tone only, tone and voice, or numeric display data. Someday these capabilities will be included in ordinary ham transceivers, but you can benefit from them today with a pager or paging decoder and your RC-850 controller!

A Touch-Tone activated mailbox lets a caller leave a message for you when you're simply not around. When you return, the controller will tell you if there are any messages and you can read your mail. Even leave phone numbers as part of messages. Call in from over the air or the phone for great versatility. And because the controller can store 100 user call signs and ten speech messages, individualized service becomes available to your whole club (or a selected part of it!).

For the ultimate in message versatility, ACC's Digital Voice Recorder provides true voice mailbox capability for your repeater.

COMPUTER INTERFACE —
NEW WINDOWS INTO YOUR REPEATER

With the Computer Interface Option, the RC-850 controller can talk with computers through serial ports. Connect one port to a modem, and another to a packet TNC. Use your home computer to remotely program the controller over the phone or via packet. The computer interface capability opens new windows into *management* of your repeater!

STATE-OF-THE-ART
INNOVATIVE HARDWARE

What you first notice about the RC-850 controller is how pleasant listening to it is. After all, "how it sounds" is the bottom line in a repeater system. Innovations in hardware design eliminate squelch tails and fully mute your Touch-Tone.

Low power operation is a standard feature through use of high speed CMOS instead of TTL or LSTTL. Even the CPU is CMOS! Low power 12 volt operation lets you get power from your existing power supply and backup battery.

We planned for the future by leaving room for new hardware technology as well, so your controller will never become obsolete. As your group grows, and your needs grow, the controller's capabilities grow with you. And our record proves it!

The '850 is modular, so you can buy what you need and can afford now, knowing you can easily add-on later.

Description/Specifications

EASY TO HOOK UP

RC-850 controllers are in operation with just about every type of repeater equipment imaginable. From the latest commercial repeaters to homebrew equipment. Our universal interface means it takes just minutes to connect. Transmitter PTT and audio, and receiver COS and audio are all that are required. Connect twelve volts and the phone line and you're done! If you're building a completely new system we'll even hook it up to your new repeater.

PROVEN RELIABILITY

The overriding concern of most repeater system designers is reliability. The RC-850 controller has achieved its *enviable* reliability record through excellence in engineering, outstanding workmanship, extensive burn-in, and use of the best quality components. ACC pioneered the use of watchdog timers, supply voltage monitoring circuitry, and other hardware and software techniques in repeater control systems to enhance their reliability. All ICs are socketed in the most reliable machine contact sockets available. With field proven reliability like this, we back it with a two-year warranty!

ACC will keep the RC-850 "The Standard" in high performance repeater control. Pick the *proven winner*. The RC-850 Repeater Controller — nothing else comes close!

Specifications

Microprocessor 80C85
Memory
    Total expandable beyond 384K bytes
    EPROM – 136K
    E^{2}PROM – 8K
    RAM – 8K, expandable to 16K
Logic Inputs
    Low <.8 volts
    High 2.4-15 volts
    Impedance 10K
    Programmable active high/low
Logic Outputs VMOS power transistors (open drain)
    60V/100mA drive capacity
    Programmable active high/low
Audio Inputs 100K impedance, adjustable levels
Audio Outputs
    5V p-p transmitter audio
    .5V p-p link audio
Operating Temperature -15 to +55° C
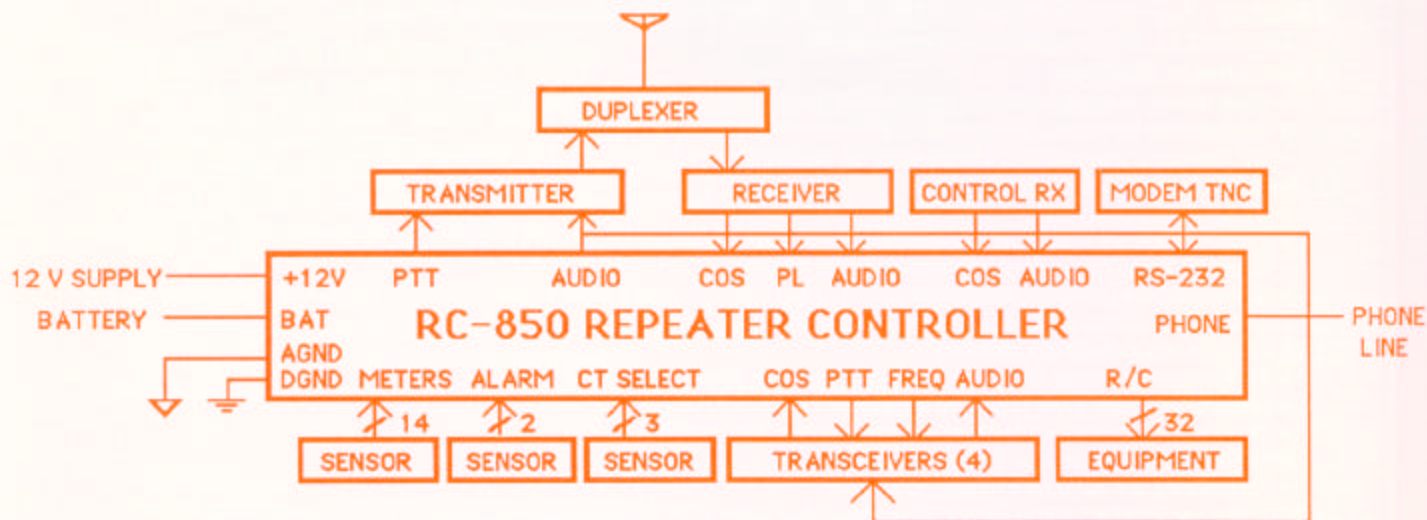**Power** 11.5 to 15V dc @ 175 mA
Cabinet size 17" W x 14.5" D x 2.5" H
    19" rack mountable
Weight Approximately 4 lbs.

Specifications subject to change without notice

REPEATER BLOCK DIAGRAM

Features

Standard Features

❑ **Complete standalone repeater control**

❑ **Remotely programmable with Touch-Tone commands:**
- Messages – over 200 (ID's, tails, mailbox, etc.).
  May include CW, paging tones, DTMF tones, external devices, synthesized speech (w/VRT option), and Digital Voice Recorder tracks (w/DVR)
- Morse code parameters: Speed – 5-35 WPM, Pitch – dc-3000 Hz, Level – 4 steps
- Control Op and user command codes (30 prefix groups, up to 7 digits each)
- Courtesy tone parameters (13 sets – pitch, durations, spacings fully programmable)
- Timers – 27 sets, 0-30 minute with 1 second resolution
- Autodialer numbers (250)
- Telephone exchange tables
- Pager memories
- Remote base frequency memories
- Non-volatile E^{2}PROM storage (no batteries)

❑ **Natural sounding speech synthesizer** for effective user/repeater interface
- Custom ham/repeater oriented vocabulary of over 300 words, expandable to over 600 words
- Letters, numbers, phoenetic alphabet
- Amateur radio terms – club net, meeting, hamfest, amateur, etc.
- Male and female voices, sound effects
- Easy to use interactive message editor

❑ **Autopatch / Autodial**
- Supports up to two local phone lines, three remote phone lines (3 total)
- Store/forward, DTMF or rotary (2 speeds each)
- Optional phone number readback
- User Loadable Autodial – 240 numbers (50 numbers hold up to 35 digits)
- Emergency Autodial (10 numbers) with message readback
- Antidialer – traps 10 numbers, permits wildcards and globals for blocks
- Toll restrict – leading 1/0 and digit count; or exchange tables for 800 telephone exchanges in 2 area codes, 3 permitted area codes
- Full or half duplex patch, electronic hybrid, audio AGC
- Cover tone for semi-private patches
- Activity timer with warning warble
- Autodial storage of credit card / MCI / Sprint access codes
- Three-terminal gas discharge tube for effective lightning protection

❑ **Reverse patch** – general or directed to 100 stored user call signs

❑ **Clock/calendar**
- Scheduler
  - 10 "Setup States" storing over 200 parameters each
  - 30 Time/day of week changeovers and events
- Commandable readback of time
- Time, date, and morning/afternoon/evening available as run time variables in messages

❑ **Paging** – two-tone, 5/6 tone, DTMF, CTCSS, HSC display, commandable or may be included in any programmable messages

❑ **Electronic Mailbox**
- User-to-user mail; system generated mail – unanswered reverse patches and alarms
- Addressed by user callsign slot, 100 user callsign storage
- 10 "canned" messages; digits may be appended to messages, i.e., phone numbers

❑ **Remote bases and links**
- Up to 4 transceivers
- Commandable frequency and offset of 2 transceivers
- Remote base frequency memories with names
- Cross-linking of the transceivers
- Command entry from the remotes and links

❑ **11 access and control modes**
- PL for access, user level, or Control Operator level command
- Main and "user level only" PL inputs
- Touch-Tone access mode with programmable timeout
- Individual user access codes for 800 users
- Attributes for further custom tailoring

❑ **10 "Macro Sets"** for easy Control Operator selection of predefined repeater setup parameters

Features/Options

Standard Features (continued)

❑ **Analog metering**
- 16 channel analog measurement
- Readback on command and inclusion in any programmable messages
- Immediate readings, and ongoing min/max readings for each channel
- Firmware defined talking meter faces for voltage, current, S-meter, deviation, temperature, quieting, power, weather conditions, etc.
- Built-in sensors for temperature and voltage
- Internal telemetry logging

❑ **General purpose remote control**
- Logic outputs – 6 expandable to 64

❑ **Alarm inputs** with programmable messages; leaves mailbox message if alarm is not cleared

❑ **Audio delay line** (75 ms) to mute squelch tails and fully mute Touch-Tone

❑ **Courtesy tone**
- 13 sets to convey information
- Selectable by Control Op or logic inputs
- Programmable pitch, delay, and spacing of 3 segments per tone set

❑ **Low distortion computer synthesized tone generation,** single and dual frequency, programmable to 1 Hz resolution, 4 levels

❑ **Noise and kerchunker filtering**

❑ **Control receiver provisions**

❑ **Fully integrated CMOS 16 digit DTMF decoder**

❑ **Intelligent ID algorithm** – automatically selects from up to 14 programmable ID's

❑ **Tail messages** – 13, selectable occurance rate

❑ **Command acknowledgement** with unique messages

❑ **Built-in E²PROM programmer**/eraser for remotely programmed parameters

❑ **Low power, single supply operation** with built-in battery switchover circuitry

❑ **Fully socketed** with top quality machine contact IC sockets for reliability and easy service

❑ **Proven reliability** designed in, with watchdog timer, voltage monitoring circuitry, transient protection, conservative design

❑ **Compatible with ACC's Digital Voice Recorder**

❑ **Manual, free telephone technical support**

Front Panel Display Option

❑ **Internal and I/O status**
❑ **55 LED indicators, one digit**
❑ **Off, on, blink, wink** indicator states
❑ **Display on/off switch** to minimize power consumption
❑ **Local microphone jack** (for MC-48, MC-80, or compatible)
❑ **Local speaker jack, volume control**

Computer Interface Option

❑ **Two hardware RS-232-C serial I/O ports**
- Firmware supports packet radio "bulletin board" like user interface
- Selectable baud rates

❑ **Two auxiliary dedicated Touch-Tone receivers**
❑ **Three memory sockets for expansion to 384K bytes and beyond**
❑ **Personal computer software** for printout of programming information

Vocabulary Expansion Option (requires Computer Interface Option)

❑ **Over 600 synthesized speech words and phrases**
❑ **Days of the week, months of the year**
❑ **Additional weather, emergency, and public service words**

Specifications subject to change without notice