RT-21 Version 4   rev 4

Overview:

Beginning with serial number 4000, the RT-21 version 4 is being supplied for all RT-21, RT-21r, RT-21dc, RT-21D and RT-21pp units. This new version contains a few functional differences and new features. Included is a new, larger main CPU that has twice the program memory space so that we may add more features in the future. Released along with RT-21 v4, is a new SETUP Utility version that adds support for the new features. Please download and install SETUP Utility 4."latest" should you desire to take advantage of them.

USB Driver:

Version 4 RT-21 (and version 3) have used the FTDI Chip for USB connectivity. Due to parts shortages, beginning in November 2022, we are shipping with a Silicon Labs CP210x chip instead. If your unit is not recognized as a valid Serial COM port (USB to UART Bridge) when connected to an RT-21, please install the driver available from the website under SUPPORT\Rotor Controllers\Software.

1. Unplug the RT-21 USB cable.
2. Unzip this to a location you can find on your computer (desktop is fine).
3. Browse to the unzipped directory (not the zip file) and **right click** "silabser.inf" file.
4. Select: SHOW MORE OPTIONS
5. Select: INSTALL.
6. Plug in the RT-21 USB cable.

NOTE: The new Silicon Labs device will show as a COM port as soon as it's connected to the computer, it does NOT require the RT-21 to be switched on. This behavior is different than the previous FTDI chip used in all v3 RT-21, and v4 RT-21 up until now.

For other platforms, or additional information, you may download/view the Silicon Labs CP210x information and drivers here [CP210x USB to UART Bridge VCP Drivers - Silicon Labs (silabs.com)](https://www.silabs.com)

Supports Internal Ethernet (LAN) or WiFi with embedded webserver or direct TCP Support. (Option)

This optional feature consists of an add-in card, ribbon cable and external antenna (WiFi) that implement an internal Network LAN interface for the RT-21 that includes an embedded webserver for graphic rotator control, or any TCP enabled remote access control application. Once installed and configured, this allows you to connect your RT-21 to any in-range WiFi network or direct network LAN connection. For external (to your network) use, you will need to configure your home router to allow remote access using Port Forwarding.
LAN/WiFi Versions"

- WiFi w/embedded Web Server only – Initial Release 4.0 or higher
- Ethernet LAN Module – 4.13 (requires SETUP Utility 4.10 or higher for WebServer and TCP functionality
- WiFi TCP – 4.13

Version 4.12 was an interim/limited- version that added initial LAN and TCP support, but was not widely distributed. Update to 4.13 is recommended for controllers running 4.12.

RT-21 DEBUG Mode – new in v4.13

This enhanced Debug Mode changes the format of the RT-21 display to simplify the troubleshooting of the RT-21, and attached rotator and cabling without requiring the need for a computer connection in most cases. Point and Shoot capabilities are disabled in this mode. Access DEBUG Mode through the front panel or the RT-21 SETUP Utility.

For Pot (analog) style feedback rotators (Yaesu, Hy-Gain, etc.) the display shows not only the actual current A/D converter value, but also the as calibrated CAL values that are stored in the RT-21.

For Counter style feedback rotators (Orion, SPID etc.) the display watches the actual internal pulse counter without disabling it when the RT-21 is idle. This is useful for diagnosing intermittent connections and other counting problems.

Firmware update process

Firmware updates no longer require an additional program. SETUP Utility 4.0 now provides a direct firmware update for v4 units over RS232 or USB. The process is simple:
- Connect SETUP Utility to your RT-21, the on-screen LED should be green to indicate communications is working on the selected COM port.
- Click on the orange "Update Firmware" button at the lower left.
- Browse for the new firmware file on your computer (RT-21 4.xx.hex) and select it.
- Click on the "Load Firmware" button to load the new firmware. The RT-21 will momentarily flash "BOOT" on the display, and then go blank. The SETUP Utility will show the load process. The RT-21 will restart itself automatically at the end of the firmware load.

New rotators added to the OPTIONS menu

Two new OPTIONS are available in the SETUP->Options menu (and SETUP Utility) to preconfigure the RT-21 for other Yaesu models.
- YAESU AC450 – for G450/G650 and other of the smaller AC motor units that allow 450 degrees of rotation
- YAESU AC360 – for the older Yaesu and Kenpro (G400/G600) units that use AC motors, but allow only 360 degrees of rotation

Support for future OLED optional displays [4.13]

Planned optional OLED display support is included in 4.13.

Display Screen Saver operation [4.13]

Included with version 4.13 (requires display version 1.3 shown at bottom left at boot time) adds a new menu item that allows Screen Saver of up to 1 hour. Off is default. When paired with the 1.3 display module, will blank the display until a button is pressed, or remote command is initiated. This feature is added primarily for the OLED display options that are planned. The OLED do not have brightness settings like the LCD and VFD do, so the Screen Saver will prolong the life of these OLED displays. LCD and VFD displays can also utilize the screen saver if they are equipped with 1.3 FW. The display FW is not currently field upgradable without replacing the display module.

Other changes and improvements first introduced in v4

- Factory Resets, and Rotator OPTION changes now automatically re calibrate counter type rotators to the center of their rotation for a North Center setup.
- Factory Reset (RESET EE) resets ALL settings to the defaults for the specific rotator that is already selected with OPTION. (note: The OPTION setting is the only setting that does not get changed upon a RESET EE.)
- The wording on the RT-21 display in SETUP mode is changed. Instead of "New Value = " to indicate what the setting will be changed to, the display reads "Change To:".
- Recovery from severe power glitches/brownouts is improved. Along with a change to the firmware in the display module, instances of blank displays, or "Counter Range Errors" when the RT-21 is subjected to such instances, should be reduced.
- SETUP Utility will now display various status messages from the RT-21 including "In-Motion" and various Error Status, including Pot out-of-range, and Error, No-Motions as they occur. Communications will no longer be disabled with these errors. (CAUTION: For remote operations, it is now possible to see what is happening to your rotator system and these errors may indicate that there is a problem with your rotator that should be addressed on-site. Attempts to calibrate or use DEBUG remotely can allow you to over-rotate your system and cause cable/rotator damage on those rotators that do NOT contain protective limit switches.   This includes Pro.Sis.Tel, Alfa Spid, and TIC ring systems.)
- The vanity boot message will now be reset to factory defaults when a front Panel EE RESET occurs. (Requires new 1.2 display for this)

New Protocol commands.

R2n; - New Poll command that returns current heading along with a status byte. Returns "SOH,'0',Status,'>',nnn.n,;" nnn.n is the current heading.
    Status: 0 = idle, 1 = In Motion, 2 = Error, no Motion, 4 = Pot out-of-range, 5 = Counter Range
ATn; - all following serial commands are sent to and processed by the add-in wireless module. <esc>

escapes from ATn; and returns communications to RT-21 main CPU.

R3n; - forces CPU and Display Resets. This is the same as a power restart.

R4m; - Reads (and then clears) the last abnormal controller CPU RESET.

B2n; - Places RT-21 into bootloader mode using RS-232

BUn; - Places RT-21 into bootloader mode using USB

T0n; - Sets TCP mode for LAN/WiFi option modules (disables pass through AT commands needed by SETUP Utility

T1n; - Resets TCP mode to allow pass though AT commands

AT; - Connects serial to LAN/WiFi module to AT command for configuration (30 sec activity timeout)

<esc> - Diconnects serial to LAN/WiFi module back to RT-21 command mode

Upgrades and Compatibility.

- The v4 CPU can only be installed in a main board rev 4.0 or higher. Any earlier RT-21 may be upgraded with v4 by replacing the main board, and upgrading the display. We can re-program displays at the factory for this purpose.
- V4 utilizes display version 1.2 or later.
- Display 1.3 FW supports the Screen Saver mode that is introduced in RT-21 v4.13

WiFi/LAN Operation:

The internal Wifi or LANoptions implement a standard network interface that can connect to any 2.4 GHz wifi router or access point. You configure the Web-Server from the RT-21 SETUP Utility software connected to RS232 or USB port on the RT-21. Once connected (Green LED) click on "Web-Server Configure" to display the IP Configuration window. You will set:

Rotator Name ID

> This is the name you wish assign to this RT-21 for display when your browser connects.

DHCP or Static IP

> If you want to use a Static IP in the RT-21, select this and provide the required IP, Subnet and Gateway

WiFi Security (WiFi Only)

> Select the security type and the SSID of the network you want to join. If using security, also provide the network key phrase. The security Type MUST match the wifi network security exactly.

Ports (Advanced and Optional)

> Selects ports used for access other than the defaults. HTTP port is the port that your browser needs to connect. If you use 80, then no port need be specified in your browser.

UDP (Factory Use)

Serial – TCP Operation, sets the TCP port for Serial/TCP applications e.g. GH Everyware Client, or PST Rotator (YO3DMU) etc. [4.13 and later only]

[The Web Login is not implemented]

Close and restart your RT-21. The first time your WiFi RT-21 connects to your network, it may take up to 30 seconds depending on your security type. After that, it will connect in less than 5 seconds. There are two LEDs on the Wifi Board, the large green one next to the DIP switch is power, then smaller one on the radio module will blink when it connects. Once it connects, you can restart SETUP Utility and open the Web Server Window again to see what IP address was assigned (if you did not set a static IP)

The Ethernet/LAN module has the typical activity and connect led embedded in the rear Ethernet connector.

Now, enter the IP address into your browser URL window to bring your control web-page.

In order to access remotely, you must use a port that can be forwarded by your router to the IP of the RT-21 you have selected. See your router's documentation for specific info for your router. We recommend that Static IP in the RT-21 be used whenever you access remotely.

If your ISP does not supply you with a static IP for your network, then a Dynamic DNS provider would make things simple. Setup for remote access is straightforward if you have any experience with your router. If not, we would be happy to assist, or point you in the right direction.

Using the WiFi Browser interface: - EXAMPLE.

Your IP is 192.169.1.4, your HTTP port is 8080

Connect to your RT-21 entering http://192.168.1.4:8080 in your URL field. (inside your network)

Use the Setup tab to set Presets and beamwidth for your rotator display. You may also create and utilize your own images (www.dxatlas.com works well) for your location and specific needs. We will set you up with an account on our image server so that you can upload and manage your images.

From the MAP tab, you can drag the beam display, enter a heading, "press the CW or CCW buttons", or click on the presets.

From Console tab you may enter "R21;<cr>" to see the response to the poll command.

Green Heron Engineering maintains a test unit that is normally available at http://webster.no-ip.net:8080

The default image is a compass rose. The RT-21 defaults to a B/W banner and image only if the cloud server cannot be reached.