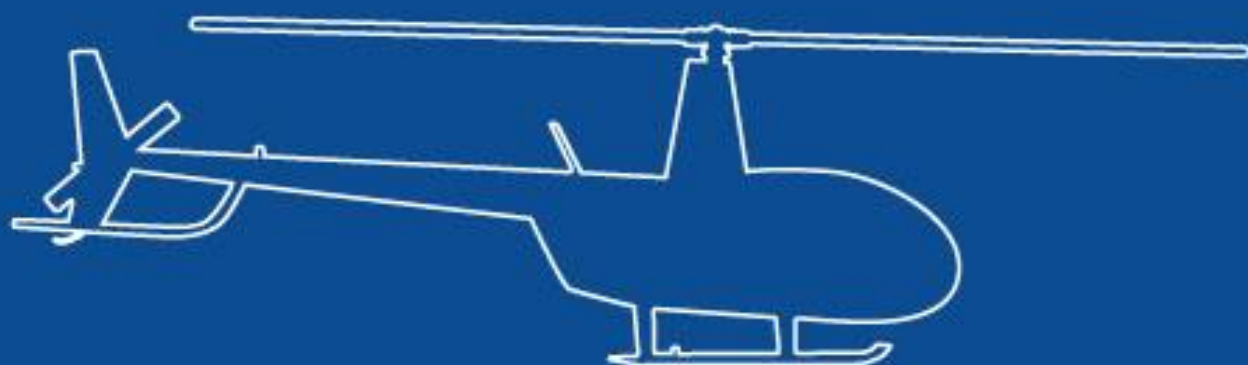


ROBINSON®

R22 & R44 EMU

User Guide



Robinson EMU

iPad Application User Guide

R22 and R44 Engine Monitoring Unit

October 2, 2020

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1. Introduction

This user guide describes the use of an Apple iPad based application (App) designed to allow pilots and personnel to interface with the Engine Monitoring Unit (EMU) in R22 and R44 Helicopters. The App allows the user to view a Summary Table of parameter exceedances.

NOTE

The Robinson EMU App only allows pilots/personnel to view data. Resetting of exceedances recorded by the EMU must be performed by a qualified maintenance technician.

The latest version of the Robinson EMU App is available on the Apple App Store by searching “Robinson EMU” or by following the link provided on the Robinson website: www.robinsonheli.com.

NOTE

Although every effort has been made to make the EMU accurate and reliable, its intended use is as a maintenance aid only. Independent maintenance records kept by qualified personnel continue to serve as the official aircraft records, and it remains the pilot's responsibility to follow all operating limitations and report any observed exceedances.

Once a cause is identified and corrective action is taken, resetting exceedance indications prior to next flight is highly recommended. However, if the pilot determines the aircraft is in condition for safe flight, exceedance reset may be deferred and dispatch allowed. Reset as soon as practical.

There are a few basic iPad features and conventions that will be necessary to navigate the Robinson EMU App that may not be immediately apparent to the novice iPad user. Consult the Apple iPad User Guide for more information on the use of the iPad device.

2. Equipment Description

The EMU is an electronic recording device housed in the same enclosure as the engine governor controller. It is installed behind the pilot's seatback in R22-series helicopters and behind the left, rear seatback in R44-series helicopters.

EMUs are standard equipment in new R22 and R44-series helicopters purchased after January 15, 2020. EMU installations can be identified by the presence of status indication lights as described below.

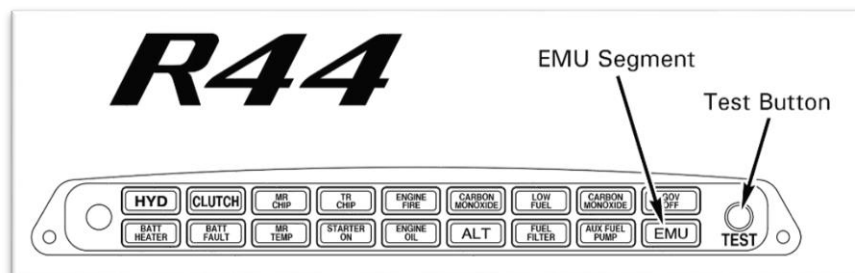
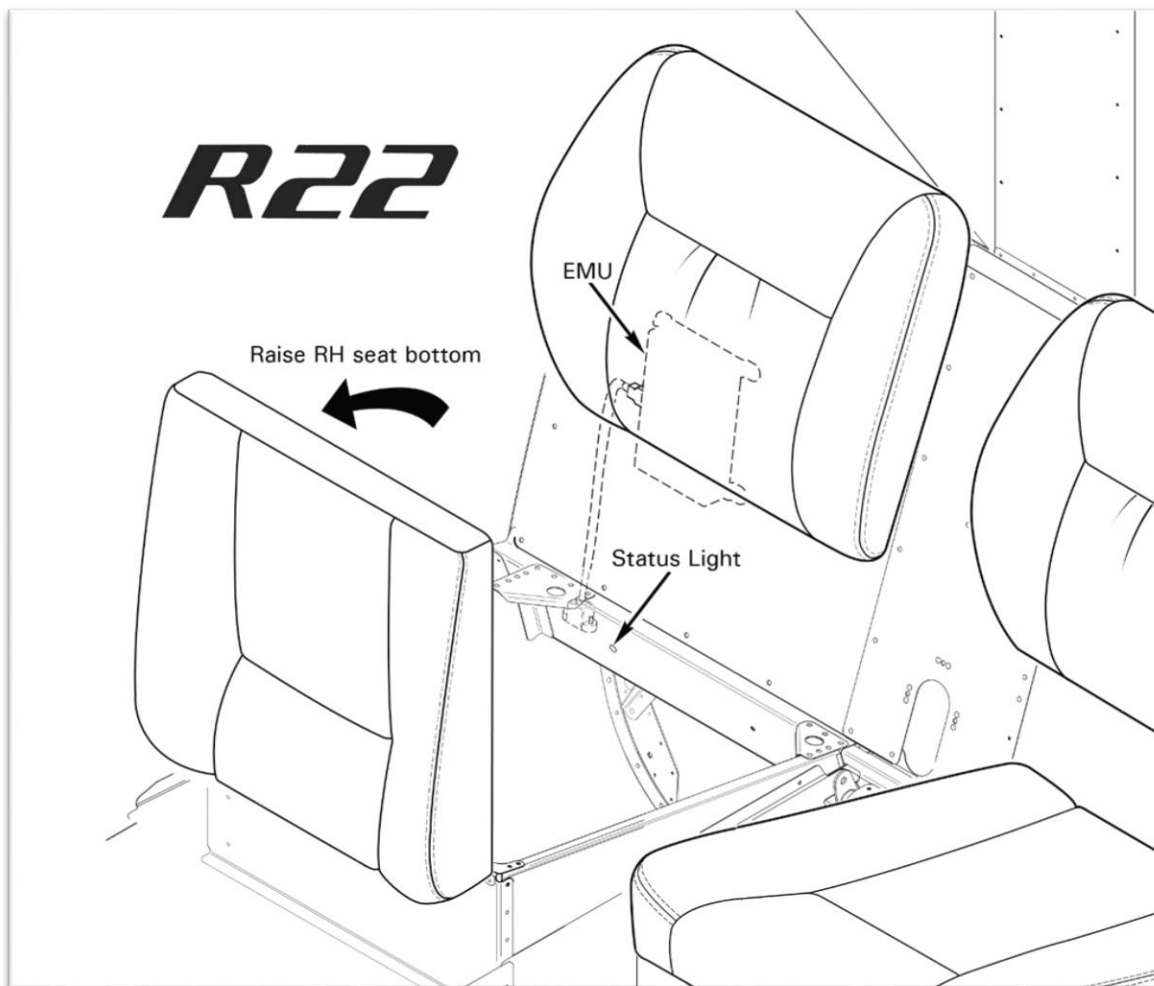
The EMU monitors engine speed, rotor speed, engine oil temperature, cylinder head temperature, manifold pressure, ambient pressure, and outside air temperature. Data is stored once per second. If the EMU detects an engine or rotor parameter outside of operating limits, an exceedance record is created and data is stored at a higher rate of 15 times per second during the exceedance event.

For R22-series helicopters, EMU status is indicated by an amber light on the aft wall of the compartment under the pilot's seat. For R44-series helicopters, status is indicated by the amber EMU segment on the annunciator panel. EMU status is intended to be referenced only for preflight and maintenance activities and not to be a distraction to the pilot in flight. Therefore, on R44-series helicopters, the segment will only illuminate while the annunciator panel test button is depressed.

A steady (non-flashing) status indication is given for normal EMU operation. A fast flashing indication (4 times per second) is given if an exceedance has been recorded. A slowly flashing indication (once every two seconds) is given if a fault is detected with the EMU or one of its sensors.

The EMU receives power when the battery switch is on, so there will be no status indications with the battery switch off.

The EMU unit includes a removeable USB type Bluetooth Low Energy adapter that is used to communicate with the iPad. The Bluetooth adapter automatically receives power and enters Bluetooth pairing mode when the EMU unit is supplied power (master battery switch on).

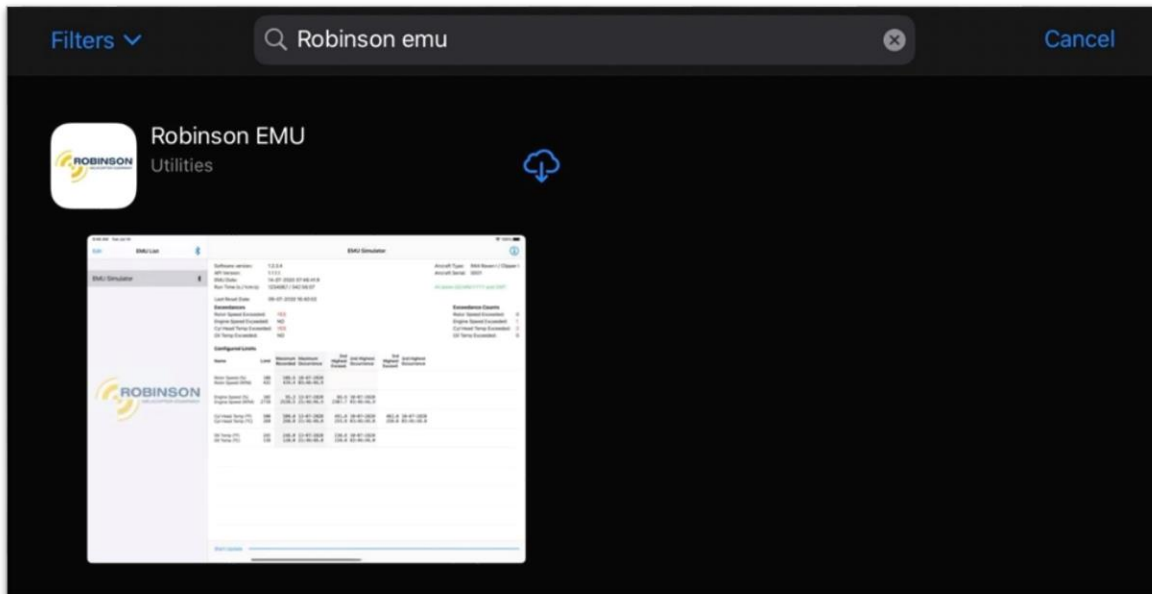


3. App Download & Installation

To download and install the Robinson EMU iPad Application, navigate to the App download page in the Apple App Store by either:

- Using the App Store icon on the iPad home screen and searching for “Robinson EMU”
- Using the link provided on the Robinson website under the *Publications* tab

The App download page should resemble the following:



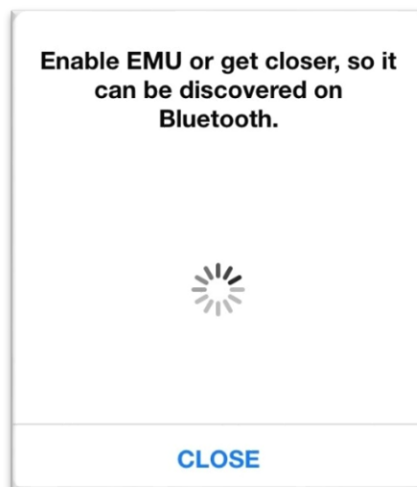
Proceed to download and install the App. When installation is complete, look for the Robinson EMU App icon on the iPad home screen:



Tap the icon to launch the App.

4. Bluetooth Discovery Window

Immediately after launching the App, the user will be prompted by the Bluetooth discovery window:

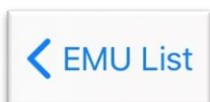


This window will display information for any powered-on EMU within range of the iPad or a spinning wheel indication if there are no EMUs in the vicinity (as pictured above).

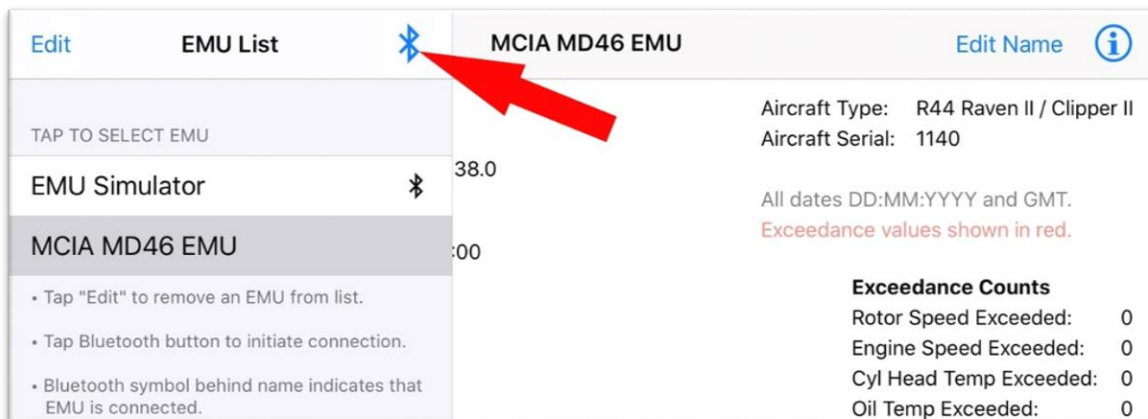
The user can re-enter Bluetooth discovery mode at any time by tapping the Bluetooth icon at the top of the EMU List as outlined in the next section.

5. EMU List

To open the EMU List with the iPad in portrait orientation, select **EMU LIST** at the top left of the screen or swipe with a finger left-to-right from the left edge of the screen. The EMU List is always displayed when the iPad is in landscape orientation.

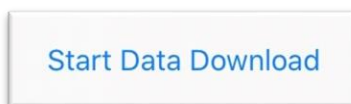


The EMU list displays tabs for the EMU Simulator, all stored Summary Tables, and indicates connection status with an EMU. Tapping the blue Bluetooth icon at the top of the list will relaunch the Bluetooth discovery window.



6. EMU Simulator

The Robinson EMU App includes a Simulator designed to provide an example of App operation and an example Summary Table to familiarize the user with the format and data presented by the App. After selecting the EMU Simulator tab in the EMU List, select **START DATA DOWNLOAD** in the bottom, left-hand corner of the screen to load the sample Summary Table.



The sample Summary Table will load and display on the screen. This table is an example of what information is downloaded and displayed from an aircraft's onboard EMU.

← EMU List
EMU Simulator
Edit Name

Software version: 1.2.3.4

API Version: 1.1.1.1

EMU Date: 17-08-2020 14:02:34.6

Run Time (h:m:s): 342:56:07

Last Reset Date: 28-07-2020 13:42:01

Exceedances Since Last Reset

Rotor Speed Exceeded: NO

Engine Speed Exceeded: YES

Cyl Head Temp Exceeded: YES

Oil Temp Exceeded: NO

Configured Limits

Name	Limit	Maximum Occurrence	2nd Highest Exceedance	3rd Highest Exceedance
Rotor Speed (%)	108	106.6 14-08-2020		
Rotor Speed (RPM)	432	426.4 14:49:38.6		
Engine Speed (%)	102	112.6 12-08-2020		
Engine Speed (RPM)	2718	3000.4 13:29:18.4		
Cyl Head Temp (°F)	500	560.0 07-08-2020	521.0 13-08-2020	
Cyl Head Temp (°C)	260	293.4 18:28:40.7	271.7 21:22:05.2	
Oil Temp (°F)	245	230.0 15-08-2020		
Oil Temp (°C)	118	110.0 20:00:05.4		

Aircraft Type: R44 Raven I / Clipper I

Aircraft Serial: 0001

All dates DD:MM:YYYY and GMT.

Exceedance values shown in red.

Exceedance Counts

Rotor Speed Exceeded: 0

Engine Speed Exceeded: 1

Cyl Head Temp Exceeded: 2

Oil Temp Exceeded: 0

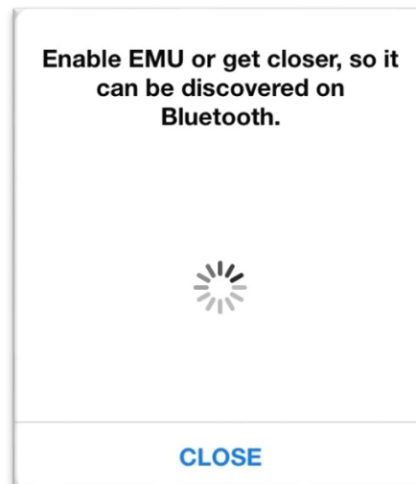
Start Data Download

7. Connect to an EMU

NOTE

Before attempting connection to the aircraft EMU, ensure that Bluetooth is enabled on the iPad being used.

If not already open, launch the Robinson EMU App by tapping the App icon on the iPad home screen. Immediately after launching the App, the user will be prompted by the Bluetooth discovery window. If the App is already open, the Bluetooth discovery window may need to be manually relaunched by tapping the blue Bluetooth icon at the top of the EMU List (reference Section 5).



If the user selects **CLOSE** at any point before a connection is established with the EMU or wishes to reconnect or connect to a different EMU after terminating a connection, they must re-enter Bluetooth discovery mode by tapping the Bluetooth icon at the top of the EMU List.

At this point, switch helicopter power (master battery switch) on. It will take a few moments for the EMU to initialize.

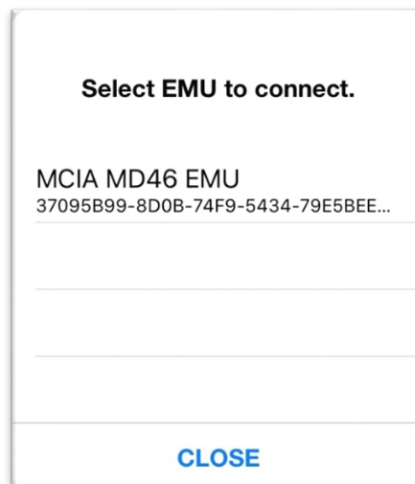
NOTE

A ground power source (e.g. battery charger) is recommended for EMU sessions lasting longer than 10 minutes.

NOTE

Pulling CLUTCH/START and HORN/START circuit breakers is recommended while working near helicopter to ensure starting circuit cannot accidentally be energized. Restore breakers once maintenance task is complete.

After the EMU initializes, the EMU identifier will appear in the Bluetooth discovery window:

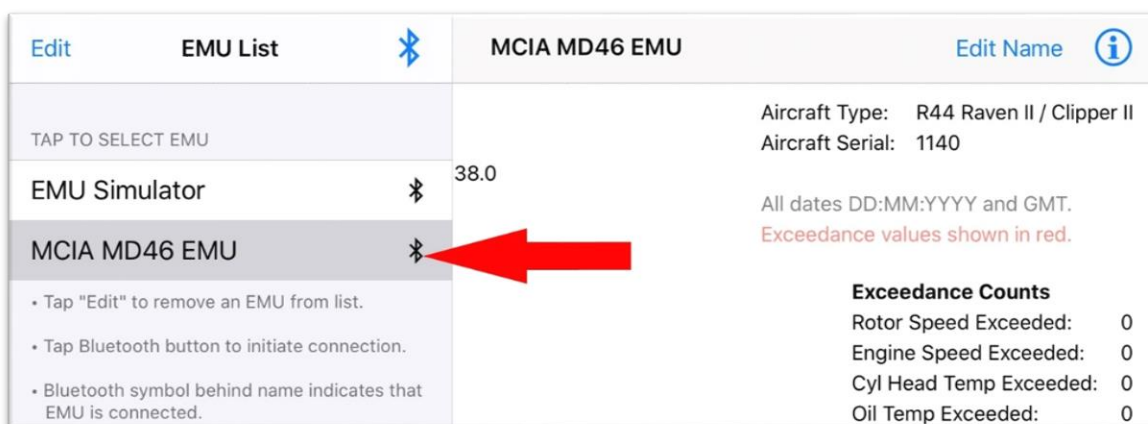


Tap the Bluetooth identifier to select the desired EMU and initiate a connection.

NOTE

If there is more than one EMU-equipped Robinson Helicopter in the vicinity with master power switched on, there will be multiple identical Bluetooth identifiers listed. Until the user edits and stores a new EMU name (ref. following sections), multiple aircraft will appear in the Bluetooth discovery window with identical Bluetooth identifiers. Turn off master power to all other aircraft in the vicinity to ensure that a connection is established to the desired aircraft.

The currently connected EMU will be indicated by a black Bluetooth icon adjacent to the EMU identifier in the EMU List (note that a black Bluetooth icon will always be present next to the EMU Simulator tab).



8. Download a Summary Table

The user can download a Summary Table from the EMU after a Bluetooth connection has been established.

NOTE

No aircraft data will be displayed on the iPad until after downloading the first Summary Table.

Verify that the iPad is still connected to the desired EMU (as indicated by the small, black Bluetooth icon being present next to the EMU identifier in the EMU List) and that the desired EMU is still selected as active in the EMU List (indicated by darker gray shading surrounding EMU identifier in the EMU List). Tap **START DATA DOWNLOAD** at the bottom of the screen to begin downloading the EMU Summary Table.

Start Data Download

Once the download is initiated, the transfer will take approximately 20 seconds to complete. At any time, the user can cancel the download by tapping **CANCEL UPDATE**.

CAUTION

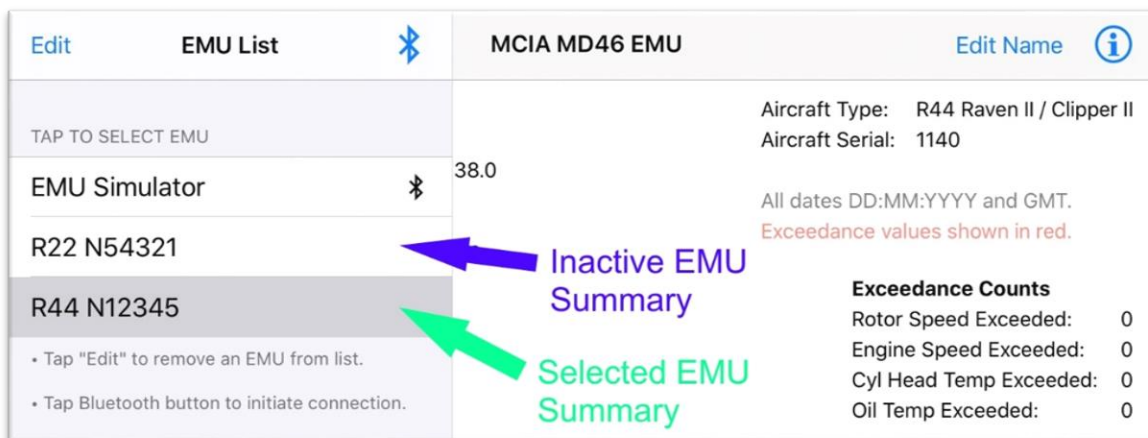
Initiating a new download WILL OVERWRITE the Summary Table stored on the iPad for that particular EMU. If a record of a prior Summary Table is desired, the user must save a screenshot.

The Summary Table will display on-screen once the download is complete.

9. View a Summary Table

Once a Summary Table has been downloaded from an EMU, it will automatically be saved locally on the user's iPad. The iPad will store the latest Summary Table for each individual EMU the user downloads from.

To view a downloaded Summary Table, select the desired EMU from the EMU List by tapping the desired EMU identifier. The currently selected EMU identifier will be indicated by darker gray shading surrounding the EMU identifier in the EMU List.



To view a downloaded Summary Table from a different EMU, simply select another EMU from the EMU List.

9.1. Edit an EMU Name

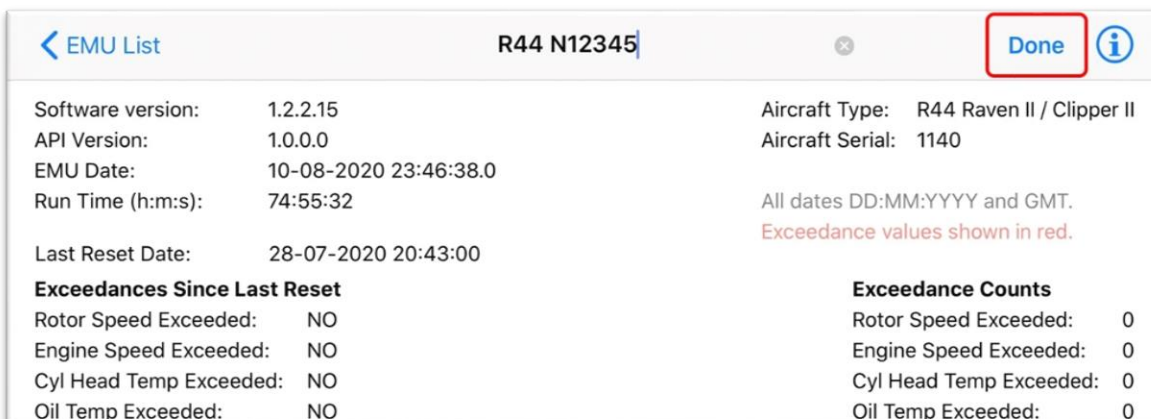
After connecting to an EMU, the associated EMU identifier can be changed by using the **EDIT NAME** button at the top left-hand side of the screen.

A rectangular button with a light gray border and the text "Edit Name" in blue.




Once the **EDIT NAME** button has been toggled, the name field at the top of the screen will be active and a flashing cursor will appear. Press the gray circled "X" to the right of the name field to delete previously typed text or tap anywhere in the name to insert the cursor to edit the existing text.

A screenshot of the EMU screen. At the top, there is a header bar with a back arrow and "EMU List" on the left, "MCIA MD46 EMU" in the center (highlighted with a red box), a gray "X" icon on the right, and "Done" and an info icon further right. Below the header, the screen displays various EMU details in two columns. The left column includes "Software version: 1.2.2.15", "API Version: 1.0.0.0", "EMU Date: 10-08-2020 23:46:38.0", "Run Time (h:m:s): 74:55:32", "Last Reset Date: 28-07-2020 20:43:00", and a section titled "Exceedances Since Last Reset" with four rows of "NO". The right column includes "Aircraft Type: R44 Raven II / Clipper II", "Aircraft Serial: 1140", a note "All dates DD:MM:YYYY and GMT.", "Exceedance values shown in red.", and a section titled "Exceedance Counts" with four rows of "0". A red arrow points to the gray "X" icon in the header.

Enter the desired name into the field and select **DONE** to store the new name.

A screenshot of the EMU screen after the name has been changed. The header bar now shows "R44 N12345" in the center (highlighted with a red box), and the "Done" button is also highlighted with a red box. The rest of the screen content, including the EMU details and exceedance sections, remains the same as in the previous screenshot.

The new EMU name will appear both in the name field at the top of the screen and in the EMU List. The name can be changed again at any time by following the same procedure.

Edit	EMU List		R44 N12345	Edit Name 
TAP TO SELECT EMU			Aircraft Type: R44 Raven II / Clipper II Aircraft Serial: 1140	
EMU Simulator 			38.0	All dates DD:MM:YYYY and GMT. Exceedance values shown in red.
R44 N12345			:00	
<ul style="list-style-type: none"> • Tap "Edit" to remove an EMU from list. • Tap Bluetooth button to initiate connection. • Bluetooth symbol behind name indicates that EMU is connected. 			Exceedance Counts Rotor Speed Exceeded: 0 Engine Speed Exceeded: 0 Cyl Head Temp Exceeded: 0 Oil Temp Exceeded: 0	

NOTE

The user-created name for an EMU will be stored within the App until the App is removed from the user's iPad. When reconnecting to an EMU, the user will be prompted with the user-created name.

9.2. Interpret a Summary Table

Normal values (not exceedances) are displayed in the Summary Table in black text. The Summary Table displays the highest recorded value to-date and a timestamp for Rotor Speed, Engine Speed, Oil Temperature, and Cylinder Head Temperature. An example Summary Table without any recorded exceedances is shown below:

< EMU List
R44 N12345
Edit Name

Software version: 1.2.2.15

API Version: 1.0.0.0

EMU Date: 10-08-2020 23:46:38.0

Run Time (h:m:s): 74:55:32

Last Reset Date: 28-07-2020 20:43:00

Aircraft Type: R44 Raven II / Clipper II

Aircraft Serial: 1140

All dates DD:MM:YYYY and GMT.

Exceedance values shown in red.

Exceedances Since Last Reset

Rotor Speed Exceeded: NO

Engine Speed Exceeded: NO

Cyl Head Temp Exceeded: NO

Oil Temp Exceeded: NO

Exceedance Counts

Rotor Speed Exceeded: 0

Engine Speed Exceeded: 0

Cyl Head Temp Exceeded: 0

Oil Temp Exceeded: 0

Configured Limits

Name	Limit	Maximum Occurrence	2nd Highest Exceedance	3rd Highest Exceedance
Rotor Speed (%)	108	105.6 30-07-2020		
Rotor Speed (RPM)	432	422.2 18:47:01.0		
Engine Speed (%)	102	104.4 04-08-2020		
Engine Speed (RPM)	2718	2780.8 18:55:40.6		
Cyl Head Temp (°F)	500	352.8 05-08-2020		
Cyl Head Temp (°C)	260	178.2 18:47:39.1		
Oil Temp (°F)	245	194.6 07-08-2020		
Oil Temp (°C)	118	90.3 18:42:39.2		

Any exceedances that have not been reset by a technician are displayed on this page. The “Exceedance Flags” and “Exceedance Counts” indicate the type and number of exceedances since the last reset. The “Event Summary” table provides details for the measured value, time, and date of the 3 highest exceedances (if present) displayed in order of severity for each monitored parameter. The “Maximum Occurrence” column always contains the maximum recorded value whether or not it was an exceedance. Values that are counted as exceedances are displayed in red text. The “2nd Highest Exceedance” and “3rd Highest Exceedance” columns will only be populated if there are 2, 3, or more exceedances. An example Summary Table containing an exceedance follows.

NOTE

Values that trigger an exceedance indication are set at levels where maintenance action is required. This is slightly higher than the Operating Limit values and allows for some instrument tolerance to avoid nuisance indications. Therefore, it is possible to see a number in the “Maximum Occurrence” column slightly higher than the “Operating Limit” column but not shown in red text.

< EMU List
R44 N12345
Edit Name i

Software version: 1.2.2.15

API Version: 1.0.0.0

EMU Date: 10-08-2020 23:46:38.0

Run Time (h:m:s): 74:55:32

Last Reset Date: 28-07-2020 20:43:00

Aircraft Type: R44 Raven II / Clipper II

Aircraft Serial: 1140

All dates DD:MM:YYYY and GMT.

Exceedance values shown in red.

Exceedances Since Last Reset

Rotor Speed Exceeded: NO

Engine Speed Exceeded: NO

Cyl Head Temp Exceeded: NO

Oil Temp Exceeded: YES

Exceedance Counts

Rotor Speed Exceeded: 0

Engine Speed Exceeded: 0

Cyl Head Temp Exceeded: 0

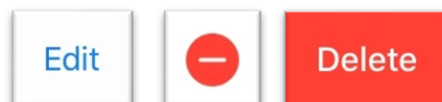
Oil Temp Exceeded: 1

Configured Limits

Name	Limit	Maximum Occurrence	2nd Highest Exceedance	3rd Highest Exceedance
Rotor Speed (%)	108	105.6 30-07-2020		
Rotor Speed (RPM)	432	422.2 18:47:01.0		
Engine Speed (%)	102	104.4 04-08-2020		
Engine Speed (RPM)	2718	2780.8 18:55:40.6		
Cyl Head Temp (°F)	500	352.8 05-08-2020		
Cyl Head Temp (°C)	260	178.2 18:47:39.1		
Oil Temp (°F)	245	248.0 07-08-2020		
Oil Temp (°C)	118	120.0 18:42:39.2		

10. Delete a Summary Table

To delete an EMU Summary Table, select **EDIT** at the top left of the EMU List, select the red-circled **MINUS SIGN**, and select **DELETE**. Alternatively, swipe right-to-left over the undesired EMU name and select **DELETE**.



11. Troubleshooting

If Bluetooth identifier does not appear in the Bluetooth discovery window:

1. Cycle aircraft master battery switch off and back to on and close and reopen the Robinson EMU App.
2. Ensure that aircraft is within 15 feet of the iPad device and that aircraft has a system voltage above 11.5 Volts.
3. Verify that iPad Bluetooth is enabled.

4. Verify that Robinson EMU has permission to use iPad Bluetooth (consult Apple iPad User Guide).
5. If attempts to connect are still unsuccessful, try to establish a connection with the EMU using another iPad, if available.
6. Check EMU status indication. A slowly flashing indication (once every two seconds) is given if a fault is detected with the EMU or one of its sensors. Contact Robinson Technical Support if a fault indication is present.
7. If a separate device also fails to connect, Bluetooth adapter may need to be replaced. Contact Robinson Technical Support for further instruction..