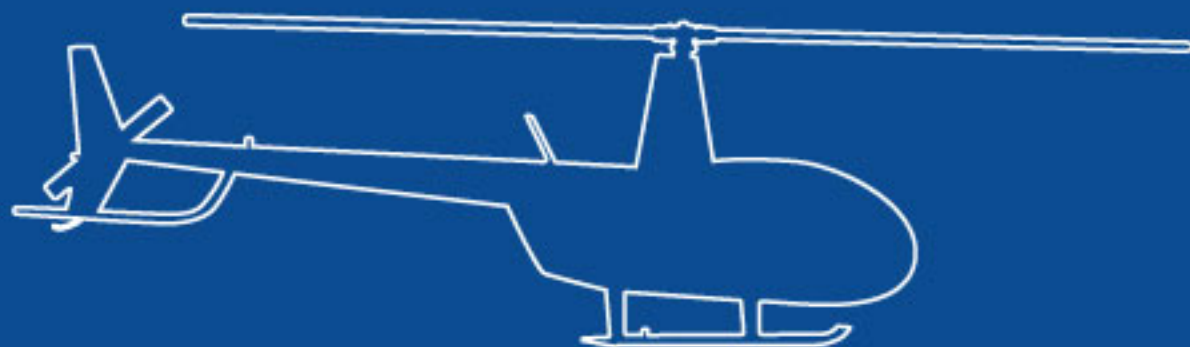


ROBINSON®

R22 & R44 EMU

Technician's Guide



R22 and R44 Engine Monitoring Unit**Technician's PC Software Guide****Oct 2, 2020 Revision**TABLE OF CONTENTS

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1. Introduction

This user guide describes personal computer (PC) based software designed for technicians to interface with the Engine Monitoring Unit (EMU) in R22 and R44 Helicopters. The software allows technicians to perform initial configuration of new units, view and download recorded data, and reset exceedance indications.

The latest version of the software and of this user guide are available 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.

In addition to the PC software described in this manual, an application intended for pilot use is available for Apple iPad devices through the Apple App Store. To get the application from an iPad, access the Apple App Store and search "Robinson EMU". A link is also provided on the Robinson website.

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 (Figure 1) and behind the left, rear seatback in R44-series helicopters (Figure 2).

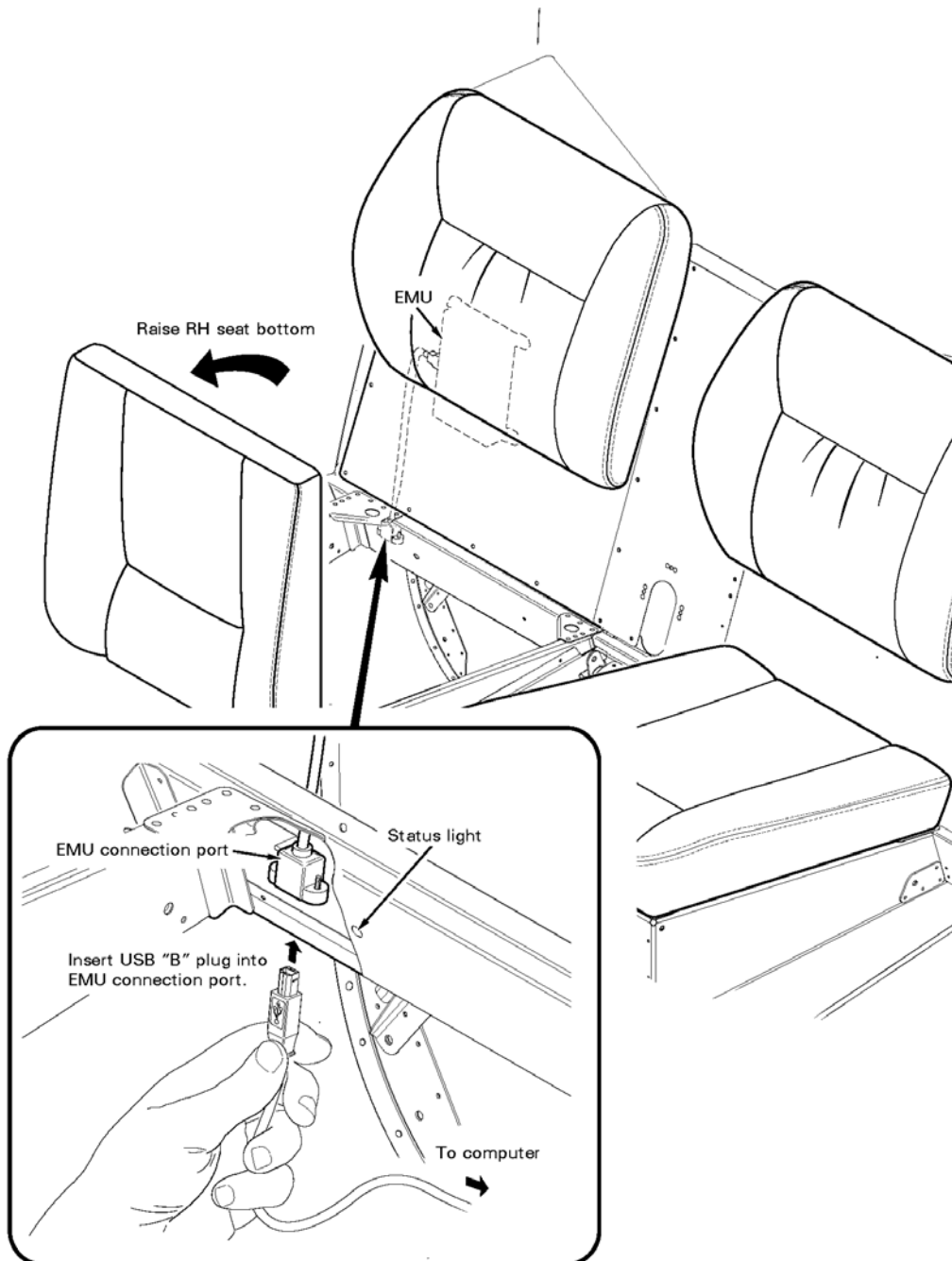


Figure 1: R22 EMU Connection and Status Light

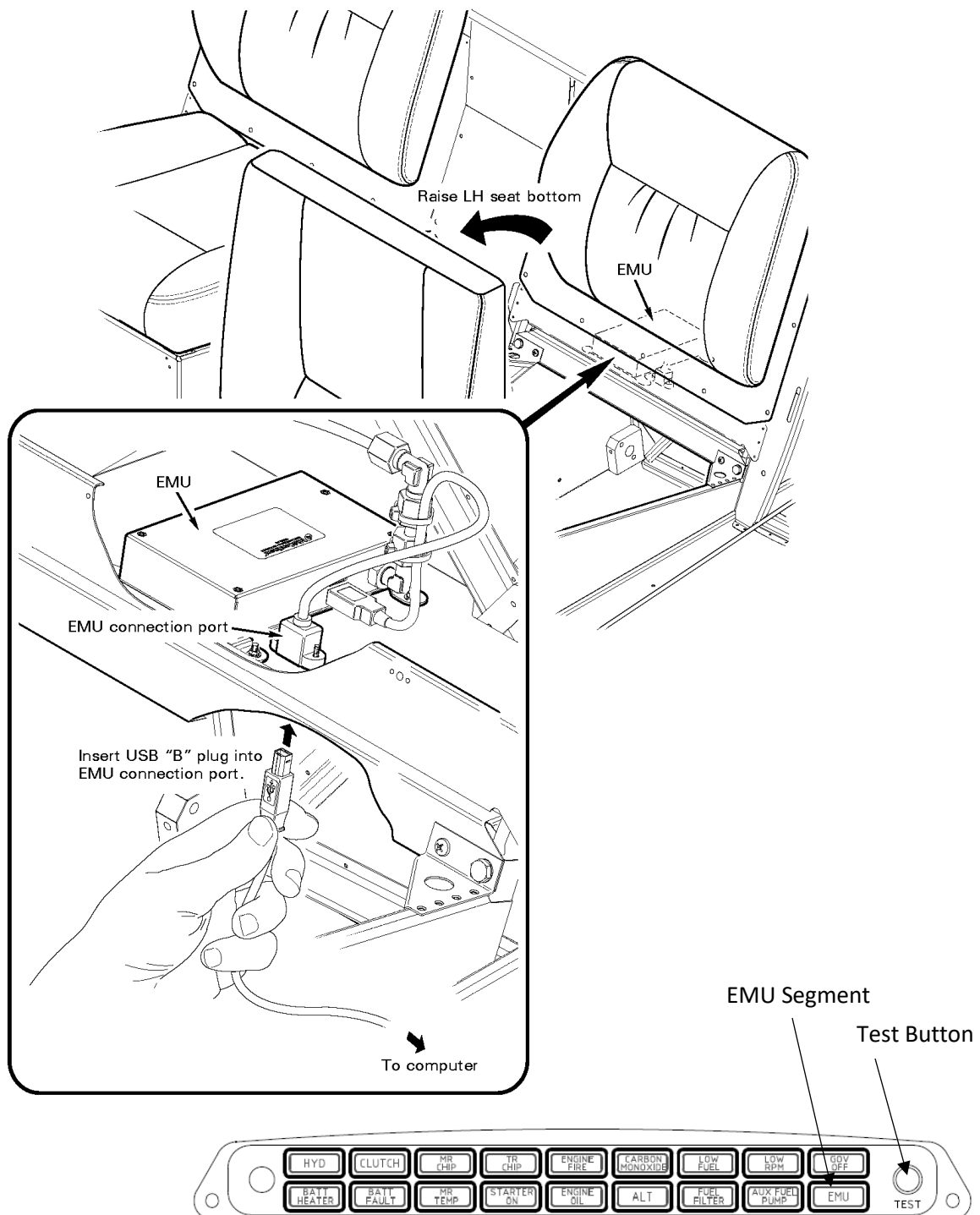


Figure 2: R44 EMU Connection and Annunciator Panel with EMU Segment

EMUs are standard equipment in new R22 and R44-series helicopters purchased after January 15, 2020. Helicopters with EMUs installed can be identified by the presence of their 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 (Figure 1). For R44-series helicopters, status is indicated by the amber EMU segment on the annunciator panel (Figure 2). 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 EMU 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.

A commercially available USB-A to USB-B cable (standard printer cable, Figure 3) is required to connect the PC to the EMU.



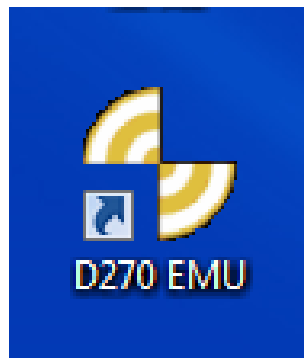
Figure 3: Connection Cable

The connection port is on the underside of the horizontal panel just aft of the seat opening for the pilot's seat on R22-series helicopters and the left rear seat on R44-series helicopters (Figure 1 and Figure 2). The small end of the USB cable plugs in vertically upward. A light and mirror may be helpful to find the port the first time.

3. Software Installation

Using the PC that is intended to interface with the EMU (a laptop or tablet PC with USB port and Windows 10 or later operating system is required), go to www.robinsonheli.com. The *Customer Support* menu has information related to the EMU including instructions for downloading PC software.

A compressed folder in .zip format will be downloaded. Extract the contents of the compressed folder, and locate the `_install.bat` file. Right click on the file, and select "run as administrator". A successful installation will place the following icon on the desktop:



4. Connecting to EMU

With helicopter battery switch off and PC power on, connect the USB cable between the PC and EMU. The EMU port is on the underside of the horizontal panel just aft of the seat opening for the pilot's seat on R22-series helicopters and the left rear seat on R44-series helicopters as indicated in Figure 1 and Figure 2.

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.

Turn helicopter battery switch on. In approximately 10 seconds the EMU will initialize. After initialization, EMU's status indicator may exhibit a fast flash. (For R44-series helicopters, it is necessary to push and hold the annunciator panel test button to illuminate the EMU status indicator).

NOTE

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

Launch the EMU software by double clicking EMU icon. The Connection screen shown below will appear. This indicates a successful connection and shows some basic information about the helicopter and EMU.

The fast flash rate, if present, will be replaced by the steady status indication after the software is launched, unless there is an actual recorded exceedance.



Figure 4: Connection Screen

5. Reading Data

Either a specific date and time range of data, or all recorded data, can be read from the EMU. The USB connection is limited to a data transfer rate of approximately 500 records per second, or about 7 seconds to download one hour's worth of EMU data. 2200 hours of data requires about 4.5 hours to read. Therefore, it is recommended to periodically download recent data. Once downloaded, the recently downloaded data can be combined with existing data into a master file on the PC much faster than the download process.

From the connection page, click *File* and either *Read Recent Data from EMU* or *Read All Data from EMU*. If recent data is selected, a window will appear to enter the desired date and time range:

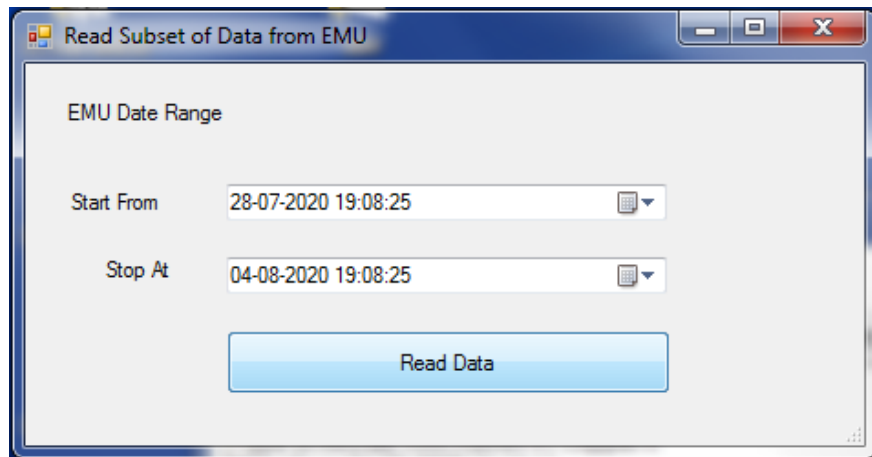


Figure 5: Data Range Screen

The default range is one week leading up to and including the most recent recorded data. The date format is DD-MM-YYYY and the time is Coordinated Universal Time (UTC). A desired range can be typed into the boxes or selected using the dropdown arrows on the right. Be sure to apply the timezone correction for the local time zone. For example, if it is intended to look at data from a flight that began on 5 August 2020 at 9 AM in the Pacific Time Zone (UTC -7), the Start From entry would be:

05-08-2020 16:00:00

Click read data, and a green progress bar at the bottom of the EMU software window will show download progress. Once complete, the screen will switch to the Flight History screen (see Section 6).

NOTE

Reading the data DOES NOT save it to the PC. Saving a file to the PC requires a separate action. See Section 6.

When complete, including saving a file if desired, switch off helicopter battery power and disconnect USB cable.

6. Data Viewing

6.1. Files

Once data has been retrieved, it may be saved as a file on the PC. Click *File, Save Data to File*. A default “Logs” directory is selected by the software. Any directory may be used with standard Windows navigation. A default filename associated with the helicopter model and serial number and date the file is created will be assigned. For example:

R44_1140_20200926.emu would be the default filename for a EMU data from R44 S/N 1140 saved on September 26, 2020.

As with the directory, the user may choose to type a different filename.

The created file has the extension .emu and can only be read by the EMU software.

Once a file has been saved to the PC, it can be accessed and read by the software without being connected to an EMU. Thus, data from various dates and times as well as various helicopters can be collected on the PC and reviewed at the technician's convenience.

As noted in Section 5, retrieval of multiple, short files is preferable to a long data download. To combine files, open one file, then select *File, Merge File Data*, and open the next data file. The software will merge each data set as it is loaded sorting all of the records by time. Once all desired files are loaded, save the result as a combined master file.

6.2. Summary Report Screen

The Summary Report screen is shown below.

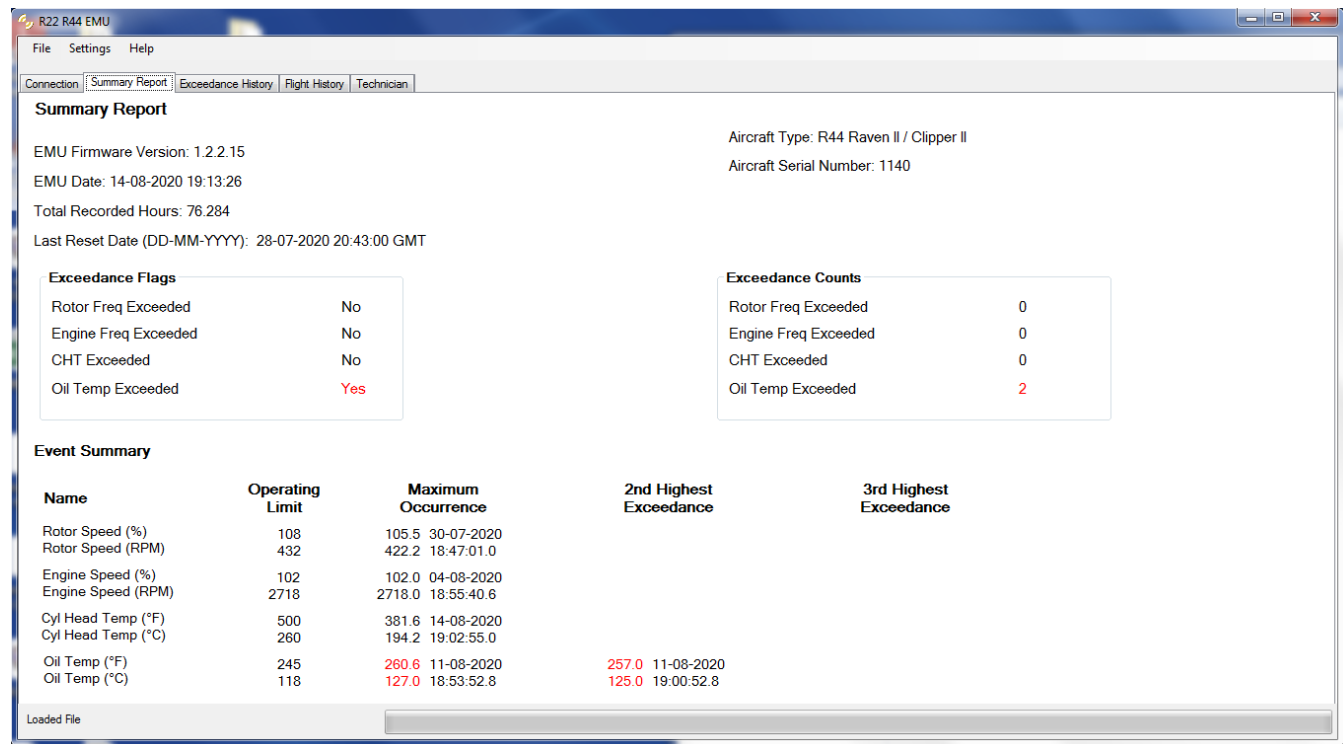


Figure 6: Summary Report Screen

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.

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.

NOTE

The Summary Report screen displays information equivalent to the iPad "App" for pilots (see Section 1).

6.3. Exceedance History Screen

The Exceedance History screen is shown below. It shows all exceedance events for the data range loaded into the software. The Exceedance History screen is not cleared by technician resets. It maintains a historical record.

Navigation of the Exceedance History screen is similar to navigation of the Flight History screen (see Section 6.4).

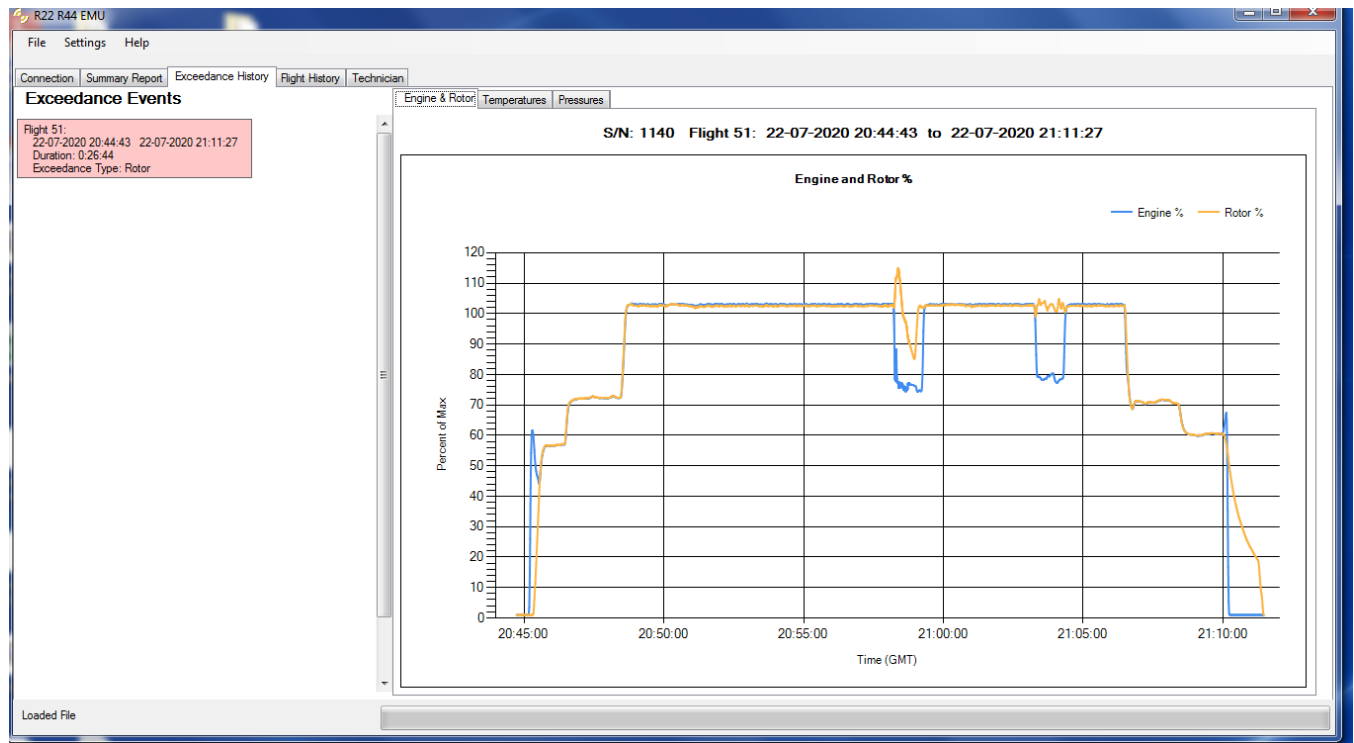


Figure 7: Exceedance History Screen

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.

6.4. Flight History Screen

The Flight History screen is shown below. Select an individual flight by clicking on it in the list on the left side of the page. Graphical data for that flight will appear on the right side of the page. Select the appropriate tab on top of the graph for each parameter of interest.

Data can be displayed in either Metric or English units by using the Settings menu in the main menu bar.

Narrowing in on a specific time range can be accomplished by holding a left click and dragging the mouse or touch pad to highlight the desired range. Vertical scaling is fixed and cannot be adjusted. To reset a time range, re-click on the flight in the list on the left side of the screen.

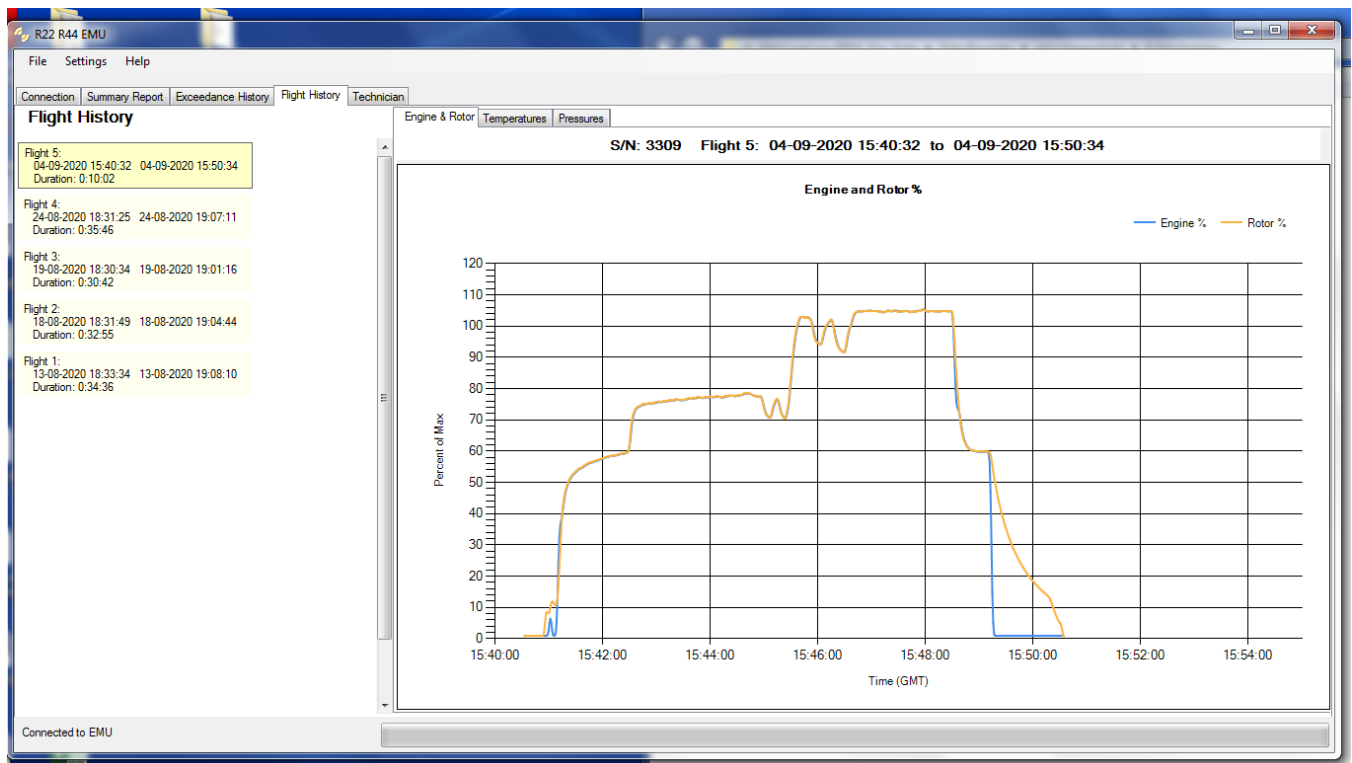


Figure 8: Flight History Screen

7. Technician Screen

The Technician screen is shown below. It can be used to reset exceedances or adjust the internal clock per Sections 7.1 and 7.2. The technician screen is only available when the PC is connected to an EMU.

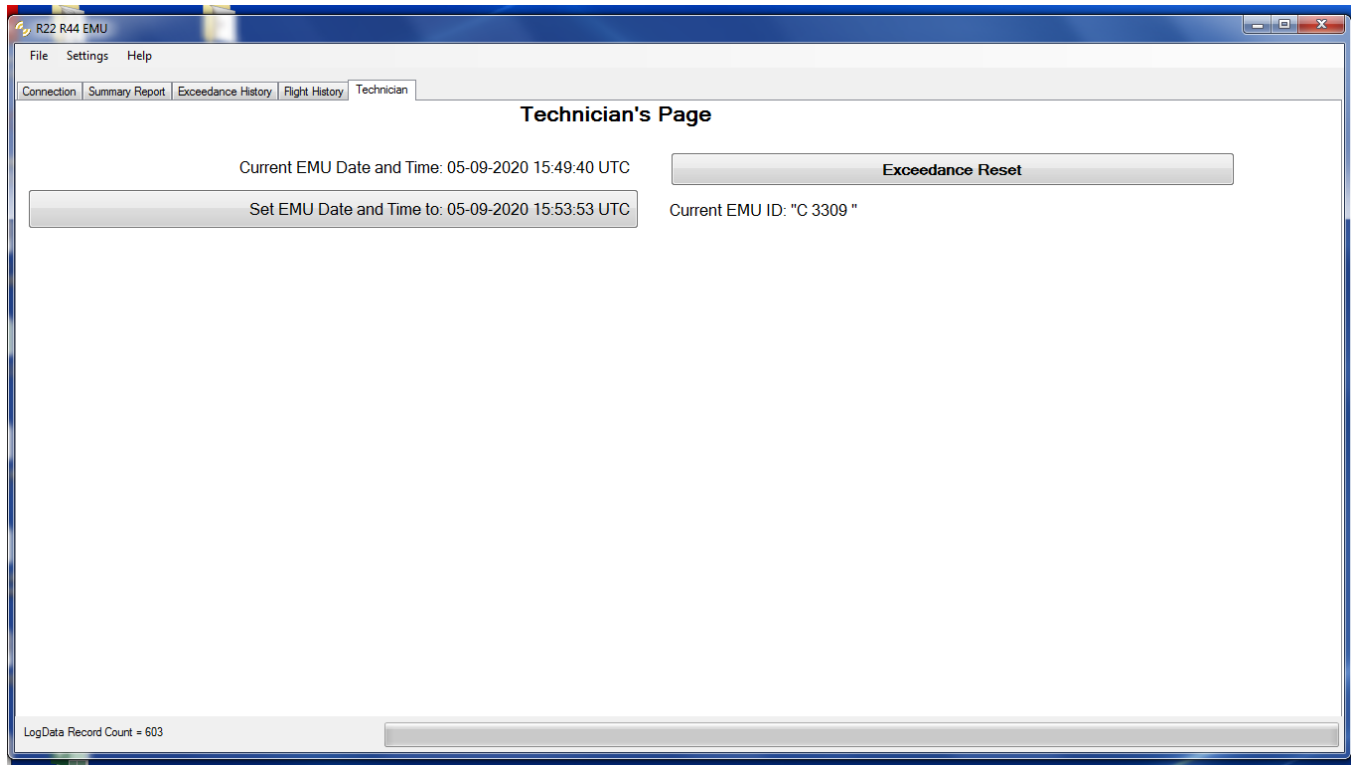


Figure 9: Technician Screen

7.1. Exceedance Reset

Pressing the Exceedance Reset button will clear all exceedances from the Summary Report page and reset the flashing status indicator. Pilots refer to the status indicator during their preflight inspection and are instructed to seek technician assistance for a flashing indicator. Therefore, a reset should only be done once the technician determines the cause of the exceedance and takes appropriate corrective action. The Exceedance History screen (Section 6.3) retains a historical record of all exceedances regardless of whether they are reset.

7.2. Internal Clock

The EMU uses an internal clock for time and date. The clock may be inaccurate by as much as a few seconds per day. The EMU clock time and date are displayed along with the PC clock time and date on the left side of the screen. If the technician notices a significant error in the time and date, the internal clock may be synchronized to the PC clock by clicking the “Set EMU Date and Time...” button.

When helicopter electrical power is off, the internal clock runs on a small battery inside the EMU. The battery is designed to last approximately 8 years. After the battery dies, each flight will be logged as starting 10 minutes after the end of the previous flight. This way, data is still recorded, and the order of events is maintained, even though the date and time recorded are no longer correct.

7.3. Program New EMU ID

A new EMU must be programmed with the helicopter model and serial number. For new EMUs, the technician screen will include the appropriate fields as shown in Figure 10. THIS CAN ONLY BE DONE ONCE. Once the EMU ID is programmed, the associated fields on the Technician screen disappear.

The screenshot shows the 'R22 R44 EMU' software window. The title bar includes 'File', 'Settings', and 'Help' menus. Below the title bar is a navigation bar with tabs: 'Connection', 'Summary Report', 'Exceedance History', 'Flight History', and 'Technician'. The 'Technician' tab is active, displaying the 'Technician's Page'. The page contains the following elements:

- Current EMU Date and Time: 14-09-2020 20:25:49 UTC
- Set EMU Date and Time to: 14-09-2020 20:25:03 UTC
- Exceedance Reset button
- Current EMU ID: ""
- Aircraft Type: (label)
- Set New EMU ID section containing:
 - Aircraft Type dropdown menu (currently showing '<Select Aircraft>')
 - Aircraft Serial Number input field (currently empty)
 - Set EMU ID button

At the bottom left, a status bar indicates 'Connected to EMU'.

Figure 10: Technician Screen for New EMU with Fields for Helicopter Information

8. Factory Communication

Robinson technical support personnel have software to view EMU data in more detail and assist in troubleshooting if required. For assistance, attach relevant .emu file to email correspondence (to minimize downtime, provide special file-handling instructions as required).