# Emerald 18 QC Data Organizer Setup & Troubleshooting Guide

This script was written to combine the low, normal, and high QC and assay value files into one excel spreadsheet. It is written in the programming language R and requires installation of a few R programs to run. You will need your QC data from your instrument (**eQC**) and the assay value files from the Abbott Diagnostics US Tech Library (On the Abbott Sharepoint via Organization -> Diagnostics -> U.S. Technical Library -> Value Assignments).

https://www.corelaboratory.abbott/tl/us/technical-library.html#ValueAssignments

## First time setup:

1. **Place the E18 QC Data Organizer folder into your C:\ drive.**

To avoid any Windows access rights restrictions please copy this folder into your C:\ root drive. For faster copying times exclude the "E18 Data" folder and then separately copy only the data you want sorted. It is recommended that you remove any datalog runs as these take a very long time to copy.

2. **Install R-3.4.4-win** (64-bit)

In the installer folder, "R-3.4.4-win" or find it online at https://cran.r-project.org/. This is the version of R that the code was written in, some libraries do not work with different versions of R. If you are on a Mac, it may work on the mac version of R 3.3.3 but I have not tested it.

3. **Install Rtools**

In the installer folder, "Rtools35.exe". Install it into C:\Rtools if it is not the default location. It can also be found online at https://cran.r-project.org/bin/windows/Rtools/ some packages require this to run properly.

4. **Install RStudio**

In the installer folder, "RStudio-1.1.453". This is the text editor program that the script will run in using R. Always open the Data Organizer file first before opening RStudio, do **not** use the RStudio shortcut!

5. **Run the First Time Installer E18 QC Data Organizer.R file.**

After installing R, Rtools, and RStudio, this should automatically open in RStudio. Click anywhere in the textbox with the code and then go to Code -> Run Region -> Run All, or press **ctrl + alt + R**.. This will install the R libraries (groups of functions) I used to write this script. Do **not** save after running.

6. **Copy your AB18 folder with raw qc data into the "E18 QC Data Organize with R" folder.**

Raw QC data and the lot assay value files can be put in subfolders within the E18 QC Data Organizer folder. If combining multiple AB18 folders, change the name of the AB18 folder. I recommend adding the date that it was saved to the folder name. The R script will only use the last modified file for that instrument, lot, and level.

**IMPORTANT:** Keep the raw QC data files in the same folder structure that was created by the Emerald 18, the script uses this to pair the instrument serial number with the QC lot.

7. **Download the assay value files for each lot and level from the US Tech library**.

Then place these files into the E18 QC Data Organizer folder or a subfolder of this folder. The files must be accessible and **NOT** in a zip folder.

**DISCLAIMER: All data created by this script is For Information Only (FIO), R is not a validated system! It is up to you to check the created spreadsheet with the raw data to make sure there are no errors!**

**How do I run the script in RStudio?**

Open the script in RStudio by double clicking the "E18 QC Data Organizer V1_1.R file. If Windows doesn't know what program to open it with, find RStudio in the list of programs. You can browse for the rstudio.exe file, it should be under C:\Users\[USERNAME]\Documents\RStudio\bin by default. After RStudio opens through the script file click anywhere in the source code or console textboxes and press **ctrl + alt + R** or go to Code -> Run Region -> Run All. Do not save after running. The script will continue to run until it finishes. If you see a little stop sign above the console window, the code is still running. You can stop it by pressing Esc or clicking the stop sign button. 

**What will the excel output look like?**

This script will create excel spreadsheets in two formats. First by lot, with each instrument given its own page in the spreadsheet. Second by instrument, with all QC data on one spreadsheet. It will make graphs of the data if you enable graph creation in the top portion of the code on line 19 but this is very slow.

**How to choose specific parameters for the created spreadsheet:**

To select your desired output parameters, change how the object **finalcols** is defined in the code near line 68. You must choose your parameters by inserting them into the c( ) list with quotes around each parameter.

This example makes a spreadsheet with the following columns in order: Date, RBC Low, RBC Normal, RBC High, Comments, ShortDate, and datetime Low, datetime Normal, and datetime High:

(line 68 in code)

```
finalcols <- c("Date", "RBC_LL", "RBC_NL", "RBC_HL", "Comments", "ShortDate", "datetime_LL", "datetime_NL", "datetime_HL")
```

NOTE: "Date" is the sorted date without the time. "ShortDate" is the sorted date with a number (#2, #3, etc.) for subsequent runs on the same date for easy excel graphing. "datetime" is the combined date and time in one cell for either low, normal, or high levels.

You can use the following presets which are listed in the code to quickly change the spreadsheet output. These do not use quotes around them when defining finalcols because they are character vector objects in R.

| Presets for finalcols | Values |
|---|---|
| ALL | All E18 parameters. |
| CBC | Standard CBC, no differential parameters |
| DIFF | All WBC, GRAN, LYM, and MID values. |
| DATES | All low, normal, and high date and time. |
| There are additional presets for each parameter e.g. (RBC for low, normal, and high RBC values). | |

**Example with presets and individual columns:**

(line 68 in code)

```
finalcols <- c("Date", RBC, MCV, PLT, "Comments", "ShortDate", DATES)
```

This creates a spreadsheet with the Date column, all low, normal, and high values for RBC, MCV, PLT, and the Comments column, ShortDate column, and low, normal, and high date and time columns.

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## Troubleshooting Guide for E18 QC Data Organizer

Here you can find troubleshooting tips for if you get an error while running the R script. Check the console in RStudio for error messages and check the table on the next page for fixes.

**QC File Rules:**

- Must be the **eQC** file from the Emerald 18, do NOT choose the backup option when saving to usb.
- Must be somewhere in the "E18 Data Organizer with R V1_1" folder.
- All QC data files must be named L####, H#####, N####.
- Use a letter after the lot number for instruments with multiple files.
- Do **not** put any characters before the L, N, or H in the file or folder name. These files will be ignored or may cause an error during running.
- The folder names must adhere to these rules, they are used for naming.
- Must have low, normal, and high **eQC** files for each lot or else the lot will be skipped.
- No other files with “QCL”, “QCN”, or “QCH”, or “.DAT” in their file name in the folder. Other files besides the E18 **eQC** files may cause an error.

**Assay Value File Rules:**

- The file must be unzipped somewhere in the "E18 Data Organizer with R V1_1" folder.
- Must use the same text format as downloaded from the US Tech Library.
- If you cannot get an old lot file from the US Tech Library copy another assay value file and change the file name and numbers. Make sure to change the lot name and all values in the file.
- Make sure you have low, normal, and high for each lot even if you do not want one in the output.

US Tech Library: https://www.corelaboratory.abbott/tl/us/technical-library.html#ValueAssignments

| Error | Solution |
|---|---|
| `Error in FUN(X[[i]], ...) : object 'QCLNH####' not found` | Assay value file #### is missing, download it from the US Tech Library, unzip it, and place it in the folder. |
| `[#] "If \"no lines avaliable in input error\" please check or delete the last file name printed here.\n File may be empty and unreadable, please check and delete file E18 Data/AB test/######/#######/EQC/N####/NORMQC.DAT"`<br>`Error in read.table(file = ufiles[i, #], header = FALSE, sep = "\t", skip = 3, :`<br>`no lines available in input` | An empty (0 run) QC file was saved to the USB. Read the first message directly above it and find and delete the empty file. |
| `Error in saveWorkbook(get(finalwb)…", :`<br>`File already exists!` | The script will continue to run and it will only create spreadsheets that haven’t already been made. To add more data to a spreadsheet rename, delete, or move the old file and run the script again. |

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If none of the above solutions fix your error, delete any .Rhistory and .RData, or .Rprofile files, they are not needed. Close RStudio and reopen it by double-clicking on the “E18 QC Data Organizer V1_1.R script. Next, check that the R script is using the same folder that it’s placed in as its working directory. Open the script in RStudio and type the following into the terminal and press enter.

```
getwd()
```

This returns the folder path that the R script is working in. If it does not return the same folder that the E18 QC Data Organizer V1_1.R file is in close RStudio and reopen RStudio by double-clicking on the R script. Check getwd() in the console again, if the problem persists you can change the directory before running the script manually. Following this example, change the path to the same path you have the script in:

(Copy the correct folder location from the address bar in Windows):
(line 16 of code, delete the # to turn the code on)

```
setwd("C:/E18 QC Data Organizer with R V1_1")
```

NOTE: Change the backslashes "\" to forward slashes "/" and surround the path name with quotes.