DCS1100-UIM

USER INFORMATION MANUAL

FOR THE

DCS1000 CONFIGURATION & PYTHON GRAPHING

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FORM NAME:	AKV DCS1100-UIM

TABLE OF CONTENTS

CHANGE LOG

v1.0 – v1.6	Initial Release
v2.0	- Improved App layout and added pinch zoom. Added new background recording of loads and GEO position of pickup and drop-offs with formatted report via email.
v2.1	Added Flight Duration and added column headers to the Totals Report Fig. 2

1.0 INTRODUCTION

The **DCS1100 User Manual** describes the procedures for configuring a company PC to communicate with and modify certain settings on the **DCS1100** via the **PuTTY Terminal Program**, as well as use the supplied **AKV Python Graphing Software**.

PuTTY Terminal is the communication tool used to allow communication between the PC and the DCS000 to change factory default settings The Python based graphing software is used to display the recorded usage information and trend data over a period of time.

IMPORTANT: The end-user is expected to have a functional knowledge of PC computer use running Windows 10 or greater operating systems. The User must also familiarize themselves with this manual.

It is highly recommended that the User read this manual thoroughly, at least once, before proceeding, and be aware of the following:

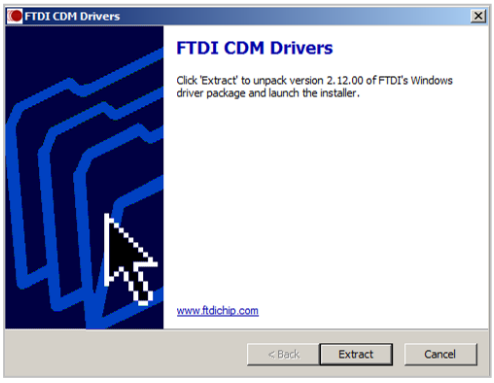
Considerations:

- General knowledge of PC operation is required
- The **DCS1100** and graphing software is not designed to support Apple MAC computers
- If you decide to print this document, make sure it's in color, so colored references will stand out
- In order to communicate with the **DCS1100** , the User must set up **PuTTY Terminal** and configure it as outlined
- Use of **Windows 10** or greater and a 64 Bit Operating System is recommended
- Instructions contained herein refer to using **Windows 10** only
- If your computer supports a 9-pin Serial port (most Laptops today do not have a 9 pin serial port unless custom built), then you do not need to use the supplied USB adaptor. If a 9-pin serial port is not available, you will need to set up the USB-To-Serial adaptor cable driver as mentioned in **SECTION 2.0 – USB TO SERIAL CABLE DRIVER INSTALLATION**
- **WARNING:** make sure to configure the **DCS1100** to the specific AS350B3 i.e. 2B/2B1 or H125 (2D) See **Sect. 5.3 Y (SET AIRCRAFT TYPE)**

2.0 USB TO SERIAL CABLE DRIVER INSTALLATION

All of the instructions outlined below will enable the end-user to install and run the **PuTTY** terminal emulator communication tool. The **AKV**-supplied **USB** adapter software is required if your PC does not have a 9-pin serial port available. If your PC supports a 9-pin serial port, you may skip to **SECTION 3.0 – STARTUP OF PUTTY TERMINAL**.

a. Boot up the computer to be used (**SECTION 6.0**)
b. Locate the **USB to 9-Pin Serial Cable** and set aside for now
c. Insert the supplied **CD** and locate the ***USB FTDI Adaptor*** folder
d. Open the folder and double-click on the file ***CDM21228_Setup***
e. Click on **Extract**
f. When the **Welcome to the Installation Wizard** is displayed, Click **NEXT**
g. Select **Accept** terms
h. When complete, select **FINISH**
i. **Reboot** the computer
j. When reboot is complete, plug in the USB adaptor
k. The **Installing Device Driver** will pop up and then displays **Ready to Use** when it's complete
   - Installation errors will be displayed, and may require un-installing and then re-installation of the software to resolve



Alternate Method: You may obtain the driver from the **FTDI Support** page, using the link below:

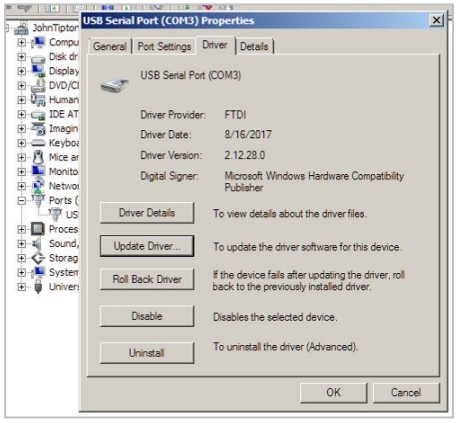
1. Go to http://www.ftdichip.com/Drivers/VCP.htm
2. On the Drivers window, scroll down until you see the Processor Architecture table as shown below.
3. Select the latest Windows driver as "*Setup Executable"*, as shown in screenshot
4. Under **COMMENTS** double-click **CDM vXX.X WHQL Certified.exe** to install it, and continue

		Processor Architecture							
Operating System	Release Date	X86 (32-bit)	X64 (64-bit)	PPC	ARM	MIPSII	MIPSIV	SH4	Comments
Windows (Desktop)*	2021-07-15	2.12.36.4	2.12.36.4	–	–	–	–	–	WHQL Certified. Includes VCP and D2XX. Available as a setup executable Please read the Release Notes and Installation Guides.

5. Click on **Setup Executable**, and select **Run**

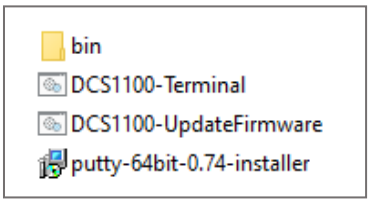
   NOTE: You may also select **Save** to copy the raw file to your **PC**. Follow default directions for installation and continue

6. Note the location of the downloaded **Zip** folder
7. Open **Device Manager**
   a. Expand **Ports (COM & LPT)** option
   b. Locate **Input devices** – **USB Serial Port** (COM***xx***)
   c. Locate the **COM** port the **USB Cable** is plugged into
   d. Double-click on it to open **Properties**
8. Click on the **Driver** tab
9. Select **Update Drivers** and **Browse** to the downloaded **Zip** folder location
10. Select the **Folder**
11. Click **NEXT** and follow prompts
12. **Run PuTTY** to test



3.0 STARTUP OF PuTTY TERMINAL

The following files will need to be copied from the CD to your PC and located in a folder (name it **DCS1100**) in order for the **DCS1100-Terminal Program** to run correctly. Save this folder preferably on your desktop screen for easy access. Ensure that the **bin** folder is located within the **DCS1100** folder.



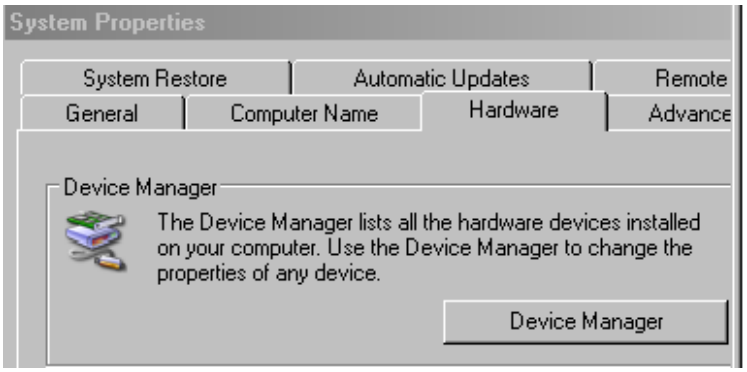
3.1 DISCOVERING THE ASSIGNED COM PORT ON DEVICE MANAGER

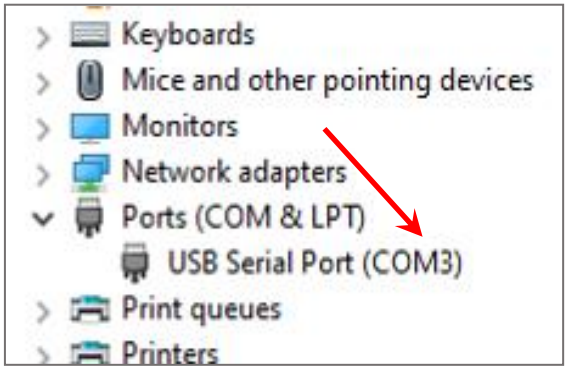
To begin the **PuTTY Terminal** setup with a **USB** connection, you must know what **COM** port has been assigned to the **USB** port you're plugged into. To accomplish this, perform the following:

a. Plug the **USB Adaptor cable** only into a convenient USB port on your computer

b. Right-click on **START**, then click on **DEVICE MANAGER**

- **ALTERNATE**: Type **DEVICE MANAGER** in the bottom left "Type here to search" window and enter





c. **Expand** the **Ports (COM & LPT)** listing

d. Locate the *USB Serial Port (COMxx)* (Your COM number may be different)

e. Write down the **COM** number

f. Keep this window open

3.2 MODIFY THE COM PORT

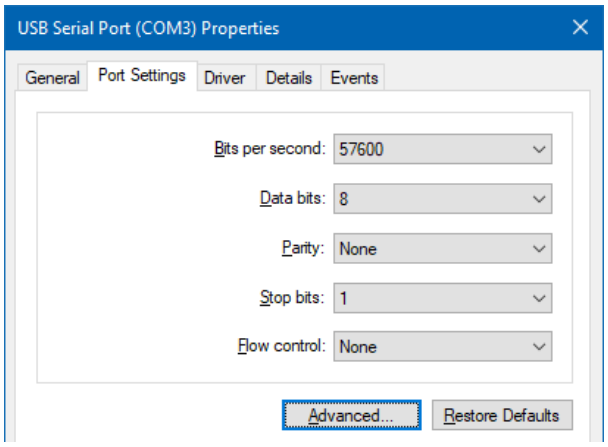
IMPORTANT: You must modify the ADVANCED PROPERTIES of the **COM Port** in order for **PuTTY** to run correctly when connecting to the **DCS1100**.

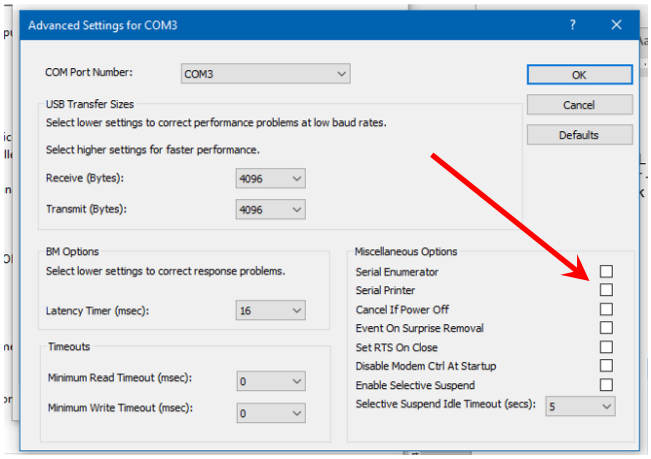
a. **Right Click** on the **USB Serial Port COMxx** currently plugged into, and select **Properties**

b. In the **USB Serial Port** window, select the **Port Settings Tab**

c. In this tab, select the **Advanced** button

d. Uncheck the **Serial Enumerator**

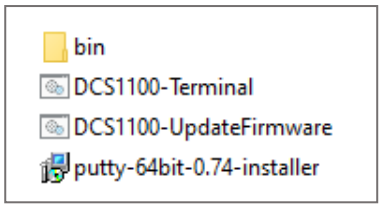




e. Click **OK** and **OK** again, to **SAVE** and exit

f. Close **Device Manager**

3.3 PUTTY TERMINAL INSTALLATION



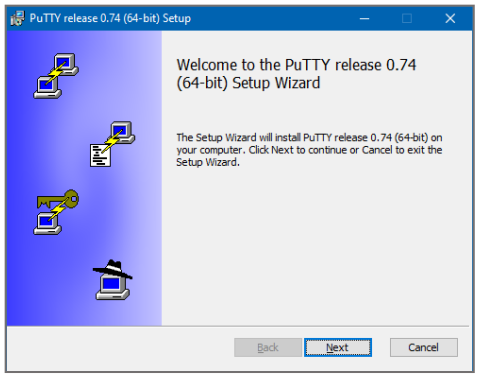
a. Double-Click on the **putty-64bit-0.74-installer.msi** file

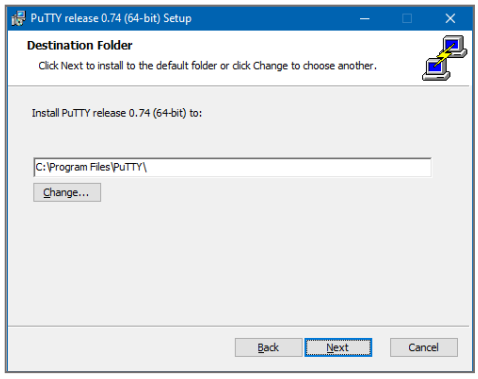
b. The **PuTTY Setup** window opens

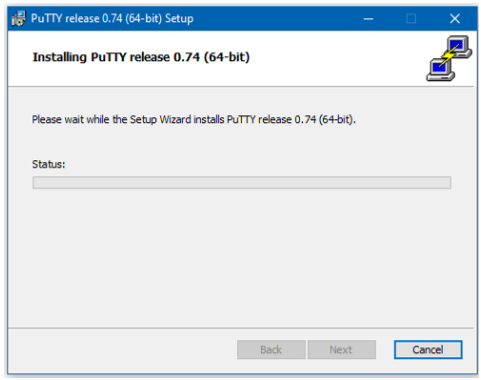
c. Install the program using the defaults presented

d. Click on **NEXT** when displayed, and then **INSTALL**

e. Plug in the USB Adaptor cable into the identified COM port





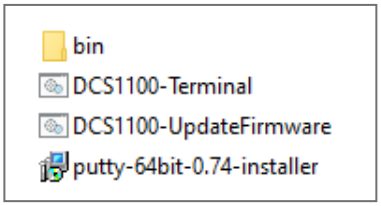


3.4 RUN THE PUTTY TERMINAL EMULATOR PROGRAM

a. Plug the serial cable into the **DCS1100 S1**, **COM Port**

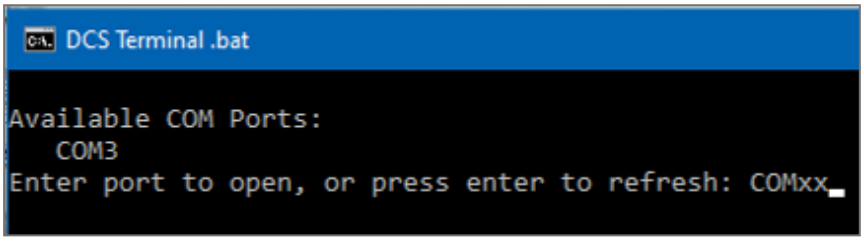
b. Power on the aircraft

c. Run the **DCS1100-Terminal.bat** file



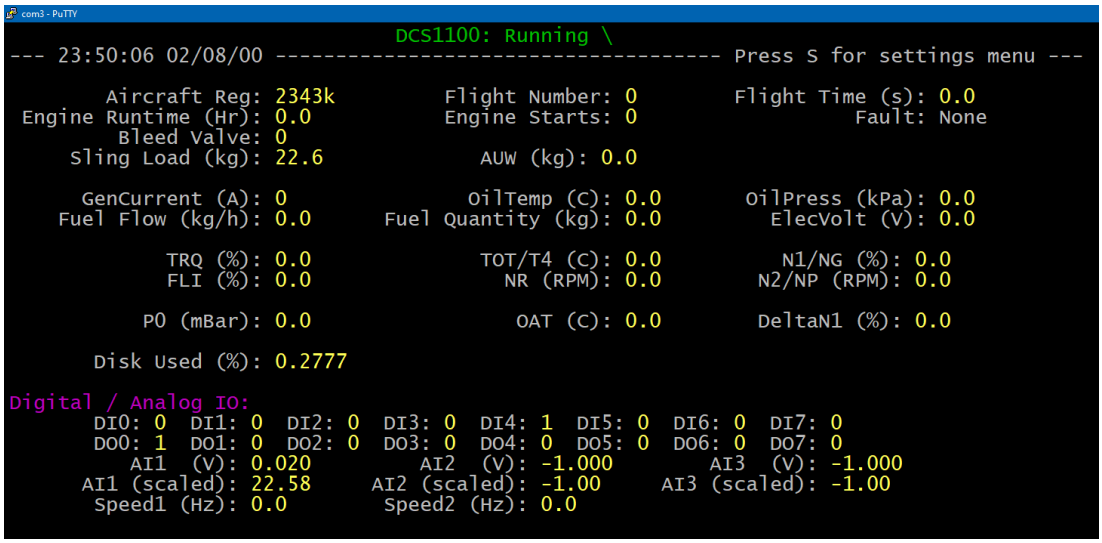
d. A **DCS Terminal.bat** windows opens

e. Type in your **COM*xx*** number and hit **ENTER**



f. The Window changes to **COMxx – PuTTY**, and shows current data being read from the **DCS1100** in real time, refreshing every 1 second

g. Verify that at the center-top of the screen, it reads ***DCS1100: Running***, with a green **SPINNING MARKER** \. This **MARKER** verifies the program is communicating with the **DCS1100**.



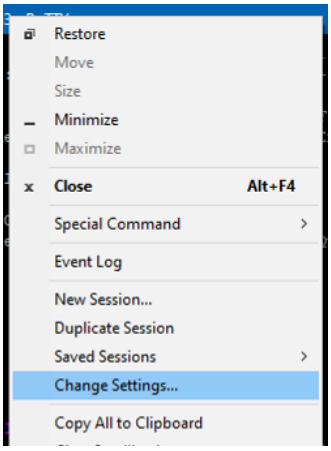
PuTTY initial installation view
(*see next sect. 3.5*)

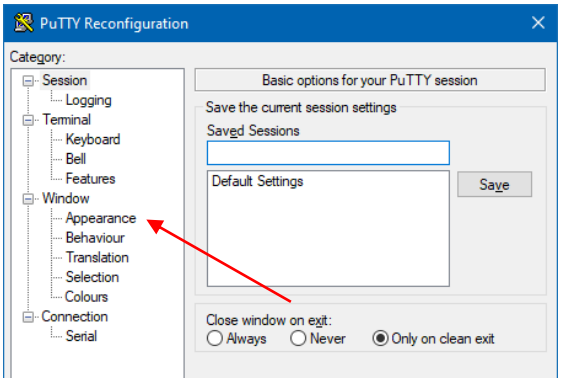
3.5 CHANGE THE PUTTY TERMINAL FONTS

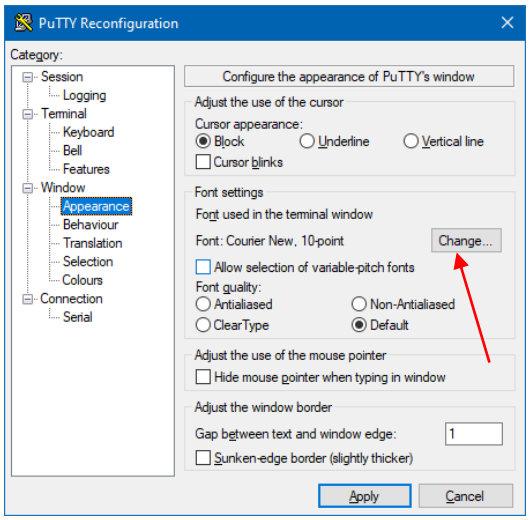
The following suggested change is to improve the **PuTTY Terminal** display from the default view above for easier reading.

a. **Right Click** on the **PuTTY** white title bar and select **Change Settings**

b. The ***PuTTY Reconfiguration*** window opens



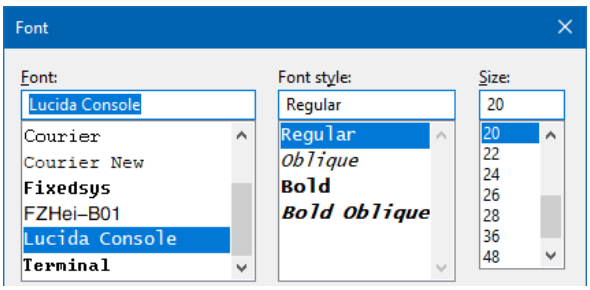




c. Go to **APPEARANCE** and click on the **CHANGE** button

d. The **Font** window opens

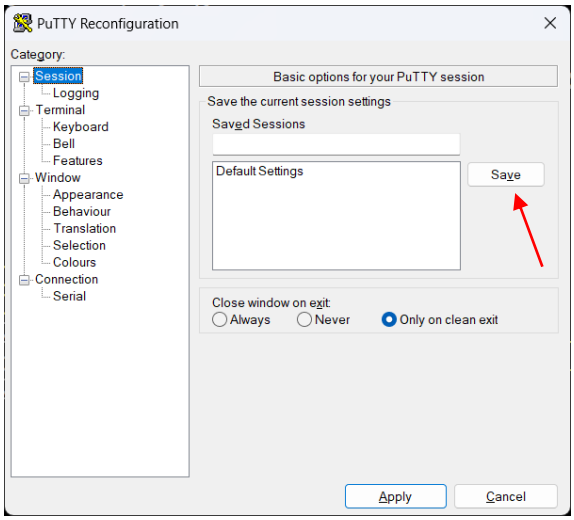
e. **Select** the following **Settings** to fill the desktop screen
- FONT = **Lucinda Console** (example)
- FONT STYLE = **Regular**
- SIZE = **18-20** (select as needed)
- SCRIPT = **Default**



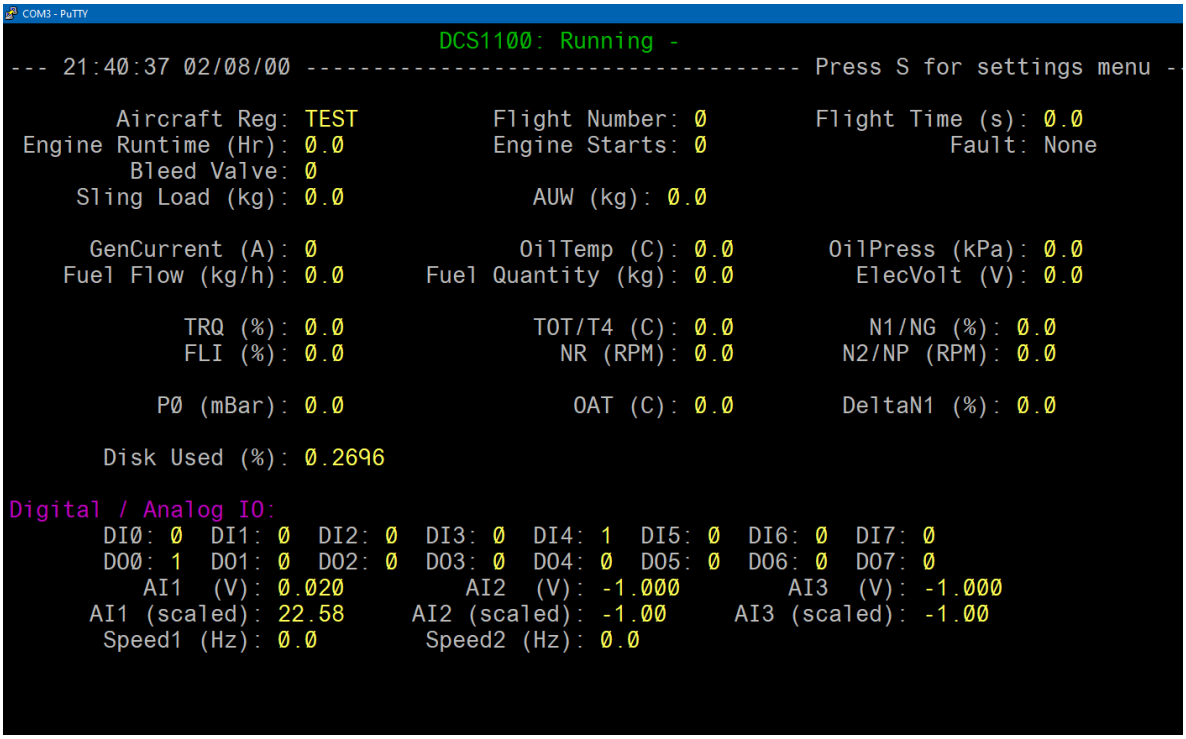
f. **Click OK**

g. Now select **Session** then **Save**

h. **Click Apply** and the **Font** window closes



i. View the main screen and check results. Alter as needed with above steps



PuTTY screen after settings changed

(***yep, it's nicer..!***)

4.0 CONNECTING PuTTY TO THE DCS1100

This section steps you through the **DCS1100** connection settings using the **PuTTY Terminal** and provides a definitions list for the displayed data stream information, which is refreshed every second.

4.1 CONNECTING

a. Ensure **PuTTY Terminal** is running. Refer to **STEP 3.4 – RUN THE PUTTY TERMINAL EMULATOR PROGRAM**

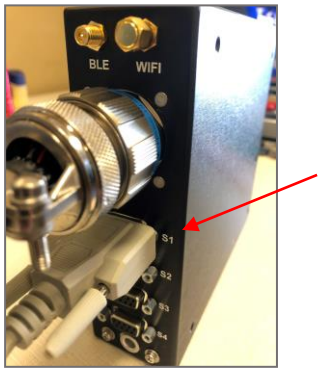
b. Locate the **AKV**-supplied **9-pin Serial Cable** and connect one end to the **USB** adaptor, or directly to the 9-pin port on the **PC**

c. Connect the other end of the **9-pin Serial Cable** to the **S1 COM Port** of the installed **DCS1100**

d. Turn on the aircraft battery switch

e. Live data should be displayed with green **SPINNING MARKER** \ (Refreshes values every second)

- If no data is displayed, try these tests:
  - Disconnect and reconnect the **USB** and **Serial** cables,
  - Power off and Restart **the DCS1100** and then your computer
  - Review **Sections 2.0 and 3.0**



4.2 HOW TO INTERPRET PUTTY DISPLAY DATA

This section provides a row-by-row explanation of the **PuTTY Terminal** window you will see while using it. The below sample screenshot shows how the screen data appears in **PuTTY Terminal** . The row line-reference numbers are shown on the left side.

```
1)  COM3 - PuTTY
2)                              DCS1100: Running -
3)  --- 21:40:37 02/08/00 ---------------------------------- Press S for settings menu

4)          Aircraft Reg: TEST          Flight Number: 0        Flight Time (s): 0.0
5)    Engine Runtime (Hr): 0.0          Engine Starts: 0                 Fault: None
6)           Bleed Valve: 0
7)       Sling Load (kg): 0.0              AUW (kg): 0.0

8)        GenCurrent (A): 0               OilTemp (C): 0.0       OilPress (kPa): 0.0
9)      Fuel Flow (kg/h): 0.0       Fuel Quantity (kg): 0.0         ElecVolt (V): 0.0

10)             TRQ (%): 0.0              TOT/T4 (C): 0.0          N1/NG (%): 0.0
11)             FLI (%): 0.0                NR (RPM): 0.0        N2/NP (RPM): 0.0

12)            P0 (mBar): 0.0                OAT (C): 0.0        DeltaN1 (%): 0.0

13)         Disk Used (%): 0.2696

14) Digital / Analog IO:
15)         DI0: 0  DI1: 0  DI2: 0  DI3: 0  DI4: 1  DI5: 0  DI6: 0  DI7: 0
16)         DO0: 1  DO1: 0  DO2: 0  DO3: 0  DO4: 0  DO5: 0  DO6: 0  DO7: 0
17)            AI1  (V): 0.020          AI2  (V): -1.000          AI3  (V): -1.000
18)        AI1 (scaled): 22.58       AI2 (scaled): -1.00       AI3 (scaled): -1.00
19)         Speed1 (Hz): 0.0          Speed2 (Hz): 0.0
```

The following describes the meaning of each **PuTTY** display row number and the data source.

(1) COMxx PuTTY

Indicates the **Screen ID**. When Right-Clicked, it displays the PuTTY sub-menu (See ***Section 3.5* for details**)

(2) DCS1100: Running /

Screen Heading	Displays DCS1100
Condition	Will always display "Running"
Icon	Check spinning marker **/** which confirms connection

(3) 21:40:37 02/08/00 Press S for settings menu

21:40:37 02/08/00	This is the DCS1100 Date and Time
Press S for settings	Allows you to enter the DCS1100 settings menu and change values

(4) Aircraft Reg: xxxxx Flight Number: 0 Flight Time (s): 0.0

Aircraft Reg:	Aircraft registration number. Default is AKV-NOT_SET **"**AKV-" will proceed any number entered
Flight Number:	Computed from the VEMD ARINC and is incremental
Flight Time (s):	The flight time is displayed in seconds. **NOTE:** This is converted to 1/10th hour (0.1) increments when viewing flight time in the supplied graph

(5) Engine Run Time (Hr): 0.0 Engine Starts: 0 Fault: None

Engine Run Time (Hr):	Indicates the engine running time of the helicopter in 1/10th hour (0.1) increments
Engine Start Count:	This is an incremental count of each engine start
Fault:	A value will be displayed related to the fault condition. For AKV diagnostic purposes

(6) Bleed Valve: 0

Bleed Valve:	1 = Closed and 0 = Open

(7) Sling Load: (kg): 0.0 AUW (kg): 0.0

Sling Load: (kg):	This is the scaled weight in **Kg only** from either the user selected VEMD ARINC or analog input. The analog input is from either the MSI or OnBoard load indicators. This is selected in the settings menu "**L**"
AUW (kg):	Computed from the VEMD ARINC

(8) GenCurrent (A): 0 OilTemp (C): 0.0 OilPress (kPa): 0.0

Gen Current (A):
Oil Temp (C):
Oil Press (kPa):

} Computed from the VEMD ARINC

(9) Fuel Flow (kg/h): 0.0 Fuel Quantity (kg): 0.0 ElecVolt (V): 0.0

Fuel Flow (kg/h):
Fuel Quantity (kg):
Elec Volt (V):

} Computed from the VEMD ARINC

(10) TRQ (%): 0.0 TOT/T4 (C): 0.0 N1 / NG (%): 0.0

TRQ (%):
TOT / T4 (C):
N1 / NG (%):

} Computed from the VEMD ARINC

(11) FLI (%): 0.0 NR (RPM): 0.0 N2 / NP (RPM): 0.0

FLI (%):
NR (RPM):
N2 / NP (RPM):

} Computed from the VEMD ARINC

(12) P0 (mBar): 0.0 OAT (C): 0.0 DeltaN1 (%): 0.0

P0 (mBar):
OAT (C):
DeltaN1 (%):

} Computed from the VEMD ARINC

(13) Disk Used (%): 0.2696

Disk Used (%): Indicates how much of the 8GB DCS onboard memory has been used

(14) Digital / Analog IO:

This is the Header for the **IO Status** section of the lower screen

(15) DI0: 0 DI1: 0 DI2: 0 DI3: 0 DI4: 0 DI5: 0 DI6: 0 DI7: 0

DI0 through DI7 These are Digital Input Indicators 0 through 7 - ON=1, OFF=0
DI1 and DI2 are for optional expansion. DI3 – DI7 are for future expansion

(16) DO0: 1 DO1: 0 DO2: 0 DO3: 0 DO4: 0 DO5: 0 DO6: 0 DO7: 0

DO0 through DO7 These are Digital Output Indicators 0 through 7 - ON=1, OFF=0
DO3 and DO4 are for optional expansion. DO5 – DO7 are for future expansion

(17) AI1 (V): 0.020 AI2 (V): –1.000 AI3 (V): –1.000

AI1 (V):
AI2 (V):
AI3 (V):

The raw analog voltage reading
AI1 is indicates disabled, but may be enabled in the SETTINGS menu

(18) AI1 (Scaled): 22.58 AI2 (Scaled): –1.000 AI3 (Scaled): –1.000

AI1 (Scaled):
AI2 (Scaled):
AI3 (Scaled):

AI1 is permanently assigned to the Load Hook
AI2 and AI3 are for optional expansion
It is the reading of the scaled value (i.e. AI1 (V) + *any* applied scale and offset)
Scaling is configured in the settings menu “A”

(19) Speed1 (Hz): 0.0 Speed2 (Hz): 0.0

Speed 1 (Hz):
Speed 2 (Hz):

Frequency in Hertz (Hz) for future expansion

5.0 SETTING DCS1100 USER VALUES VIA PUTTY TERMINAL

These are the steps and commands required to access the **DCS1100 PUTTY User Interface**. Within this interface, you will be able to change several of the factory defaults.

PUTTY must be running, the **DCS1100** must be connected to the computer, and streaming data must be viewable before continuing.

5.1 DCS1100 USER INTERFACE

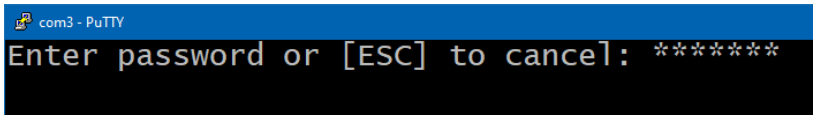
READ THIS SECTION THOROUGHLY.

The following describes the **Menu Setting** in **PuTTY**. As you begin making changes to the program, you may notice that the *Disk Used (%)* will increase which is normal. You will want to make notes on what changes are needed, such as the *password*, *date/times*, and *registration number*. Record these values for later reference.

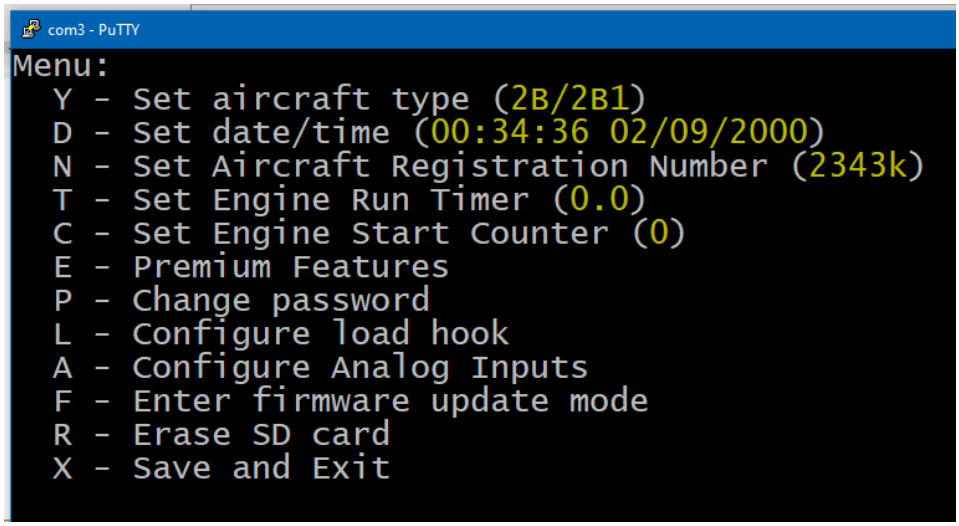
Mistakes with Entries

Most errors may be cleared by hitting **BACKSPACE** and re-entering it. Data the system does not recognize is ignored, and in most cases, you are returned to the menu position you were last in. You may also press **ENTER**, type **N**, and click **ENTER** to retry an entry. In most instances, pressing **ENTER** with bad data allows you to re-enter the information you attempted.

a. Start up **PUTTY Terminal** and turn on the aircraft battery switch
b. The aircraft data begins streaming
c. Type "**S"** and the **PASSWORD** screen appears
d. Enter your **PASSWORD** (The **default password is "*DCS1100*"**, but it is recommended this be changed)



e. The **DCS1100 PUTTY MENU Screen** appears



f. The following primary letter menu is shown. Some of these contain sub-menus, as shown in the **PuTTY Menu Layers Table**, further below:

S – To access the System Menu for configuration options — See **SECTION 5.2**

Note: *The factory-default password is* ***DCS1100*** *until changed by the user*

Y – To select the Aircraft Model Type — See **SECTION 5.3**

D – To set the Date and Time — See **SECTION 5.4**

N – To set the Aircraft Registration Number — See **SECTION 5.5**

T – To set the Engine Run Timer — See **SECTION 5.6**

C – To set the Engine Start Counter — See **SECTION 5.7**

E – To access Premium Features — See **SECTION 5.8**

P – To change the Password — See **SECTION 5.9**

L – To Configure the Load Hook — See **SECTION 5.10**

A – To Configure the Analog Inputs — See **SECTION 5.11**

F – To enter a Firmware Update — See **SECTION 5.12**

R – To Erase Internal DCS1100 SD Card Memory — See **SECTION 5.13**

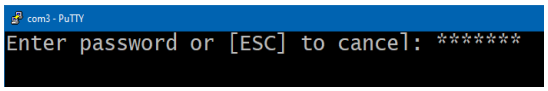
X – To Save and Exit the Menu back to MAIN SCREEN — See **SECTION 5.14**

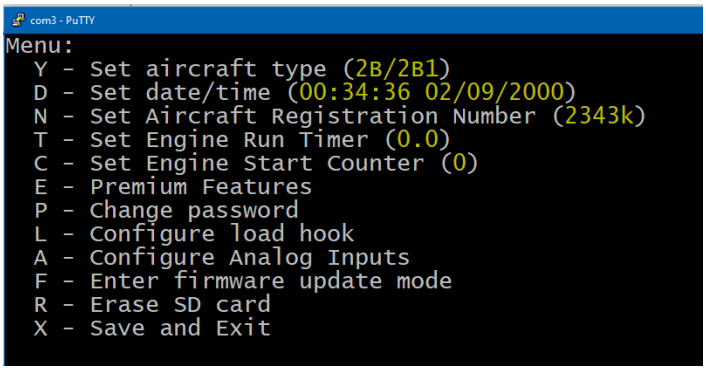
DCS PUTTY Terminal Menu Layers Table

DATA SCREEN	*SYSTEM ACCESS*	*SYSTEM MENU*	*SYSTEM SUB-MENUS*
DATA SCREEN	**S** (ACCESS)	**Y** (Set Aircraft Type)	**0 –** 2B/2B1
			1 – H125
		D (Set Date & Time)	
		N (Set Registration Number)	
		T (Set Engine Run Timer)	
		C (Set Engine Start Counter)	
		E (Premium Features)	**B** (Bluetooth)
			E (ETM1000)
			G (Guardian G4)
		P (Change Password)	
		L (Configure Load Hook)	**C** (Configuration – Enable/Disable)
			R (Input Range)
			S (Scale Factor)
			O (Offset)
		A (Configure Analog Inputs)	**Input 2**
			1 (AIN2 Enable/Disable)
			2 (AIN2 Range)
			3 (AIN2 Scale)
			4 (AIN2 Offset)
			Input 3
			5 (AIN3 Enable/Disable)
			6 (AIN3 Range)
			7 (AIN3 Scale)
			8 (AIN3 Offset)
		F (Firmware Update Mode)	
		R (Erase DCS Memory)	
		X (Save & Exit)	**X** (ALL ABOVE - Exit To SYSTEM MENU)

5.2 S (SYSTEM ACCESS)

a. From the DATA SCREEN, type **S** to access the **System Menu**
b. The system prompts you for the password:
   - This screen remains until you hit **ESC** to exit back to the **Main Screen**
   - Use the **factory default password** of "*DCS1100*" (uppercase)
   - See **STEP 5.9 – CHANGE PASSWORD** to change password options
c. Type in the password and press **ENTER**
d. You are taken to the **System Menu Options** screen
e. These listed commands are used to change various information on the **DCS1100**, as needed
   - Pressing **ESC** from the **Main Screen** returns you to the **Running Data Screen**
   - Pressing **ESC** from within **each menu option** will return you to the **Main Screen**



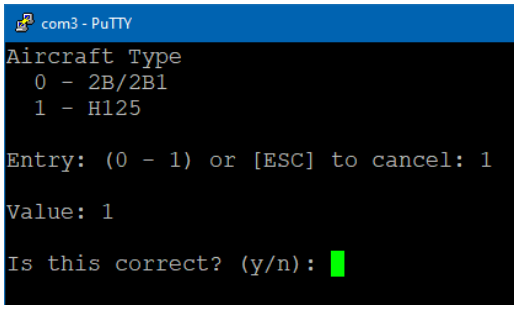


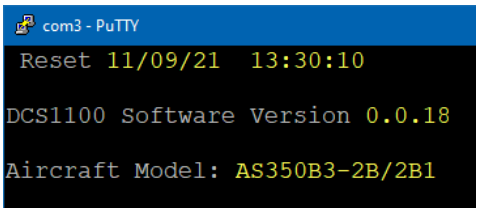
5.3 Y (SET AIRCRAFT TYPE)

WARNING- SET THIS ITEM CORRECTLY. From this menu, you will choose the engine type either 2B/2B1 of H125 (2D engine)

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in the password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **Y** and press **ENTER** and the **Aircraft Type** screen opens
e. Enter the current aircraft/**engine model** (**0** or **1**) and press **ENTER**

NOTE: This is an **IMPORTANT** configuration requirement





f. The System queries "Is this correct **Y** or **N** ?"
g. Type **Y** and press **ENTER**
h. A **Reboot** occurs that briefly shows the change displayed
i. The **Running Data Screen** is displayed in running mode

5.4 D (SET DATE/TIME)

The **DCS** system does not compensate for *DAYLIGHT SAVING TIME*, but does for *LEAP YEAR*.

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **D** press **ENTER**
e. The **Date/Time** menu screen opens and displays:
   Enter Date/Time with the following format or [ESC] to cancel:
   HH:MM:SS MM/DD/YYYY
f. Type in **BOTH TIME** and **DATE** as shown above, and press **ENTER**
g. The System queries “Is this correct **Y** or **N** ?”
h. Verify the entry information
i. Type **Y** and press **ENTER**
j. You are returned to the **Main Menu**
k. Verify the display information is correct

5.5 N (AIRCRAFT REGISTRATION NUMBER)

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **N** and press **ENTER**
e. The **AC Registration** menu screen opens and displays:
   Aircraft Reg: (12 chars max) or [ESC] to cancel:
f. Enter the **Aircraft Registration Number** and press **ENTER**
   - While this accepts lower-case letters, it is not recommended
g. The System queries “Is this correct **Y** or **N** ?”
h. Type **Y** and press **ENTER**
i. After a brief pause you are returned to the **Main Menu**

5.6 T (ENGINE RUN TIMER)

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **T** and press **ENTER**
e. The **Run Timer** menu screen opens and displays:
   Engine Run Timer: (0.0 - 99999.0) or [ESC] to cancel:
f. Enter the current **Run Time** and press **ENTER**
g. The System queries “Is this correct **Y** or **N** ?”
h. Type **Y** and press **ENTER**
i. You are returned to the **Main Menu**

NOTE: The flight time is obtained from the VEMD ARINC only, and is not configurable

5.7 C (ENGINE START COUNTER)

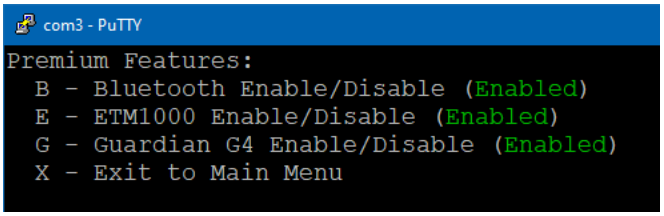
a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **C** and press **ENTER**
e. The **Start Counter** menu screen opens and displays:
   Engine Start Counter: (0 - 99999) or [ESC] to cancel:
f. Enter the current **Starts** and press **ENTER**
g. The System queries "Is this correct **Y** or **N** ?"
h. Type **Y** and press **ENTER**
i. You are returned to the **Main Menu**

5.8 E (PREMIUM FEATURES)

There is nothing that needs to be done in this section. **NOTE**: You cannot use the **ETM1000** or **Guardian G4** interface features unless these systems have been purchased separately, installed, and connected. **AKV Inc.** has set these features as ENABLED by default.

NOTES: Do Not disable these settings or you will have to contact AKV for a password

Current Features:
B - Bluetooth Enable/Disable (*Enabled*)
E - ETM1000 Enable/Disable (*Enabled*)
G - Guardian G4 Enable/Disable (*Enabled*)
X - Exit to Main Menu



Entering either **B**, **E**, or **G** will take you to a sub-menu (e.g. *Enter Bluetooth password or [ESC] to cancel:*), DO NOT DISABLE.

B (Bluetooth) is dedicated to the **AKV IOS App** also referred to as the *FLI Repeater App*. Reference document "***AKV IOS App User Manual***" for instructions on connecting to the App via Bluetooth and the use of the App

5.9 P (CHANGE PASSWORD)

It is recommended that the User change the default password to something more robust.

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in the current password (Default is *DCS1100*) and press **ENTER**
c. The **Password** menu screen opens
d. The **System** asks for new password:
   - Passwords are case-sensitive
   - These characters may be any combination of letters, numbers, or special characters
   - Passwords should be highly unique so only authorized personnel may perform any changes
e. Make note of your new password and keep it safe!
   - If you lose your password, contact **AKV, Inc.** for a one-use password to gain access

f. Type in your new password and press **ENTER**
   - Errors allow you to continue trying

g. You are returned to the **Main Menu**
h. Type in **X** to SAVE AND EXIT and return to the **Running Data Screen**
i. Immediately test your new password

5.10 L (CONFIGURE LOAD HOOK)

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **L** and press **ENTER**
e. **Load Hook** screens by selection:

➢ The **Load Hook** is DISABLED screen

```
Load Hook:
  C - Configuration (Disabled)
  X - Exit to Main Menu
```

➢ The **Load Hook** is enabled as ARINC (data source)
There is nothing else to configure

```
Load Hook:
  C - Configuration (Enabled: ARINC)
  X - Exit to Main Menu
```

➢ The **Load Hook** is enabled as ANALOG (data source)
See **Step f** for sub-menu selection options

com3 - PuTTY

```
Load Hook:
  C - Configuration (Enabled: Analog)
  R - Input Range (0-5V)
  S - Scale Factor (1156.000)
  O - Offset (0.000)
      Note: scale and offset must yield load value in kilograms
  X - Exit to Main Menu
```

Load Hook Configuration Features:

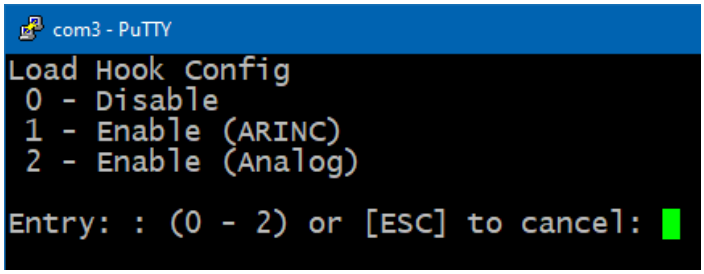
C - Configuration	*(Enabled: Analog)*
R - Input Range	(0-5V) (Indicators from MSI are 0-5v and OnBoard are mostly 0-5 or 0-7v)
S - Scale Factor	(1156.000) is a default value and can be changed Scale value **must yield load value in kilograms**
O - Offset	(0.000) is a default value and can be changed Offset **must yield load value in kilograms**
X - Exit to Main Menu	Exits

f. You are prompted to select the **Sub-Menu** corresponding to a **Load Hook Feature**:

C – Hook Configuration:	Go to **STEP 5.10.1**
R – Hook Input Range:	Skip to **STEP 5.10.2**
S – Hook Scale Factor:	Skip to **STEP 5.10.3**

5.10.1 HOOK CONFIG

a. Type in **C** and press **ENTER**
b. The **Hook Config** menu screen opens and displays:



c. Enter the desired **Configuration** number type and press **ENTER**. You must select either **ARINC** or **Analog** as the Load Hook data source
d. The System queries "Is this correct **Y** or **N** ?"
e. Type **Y** and press **ENTER**
f. You are returned to the **Load Hook Menu**

5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED

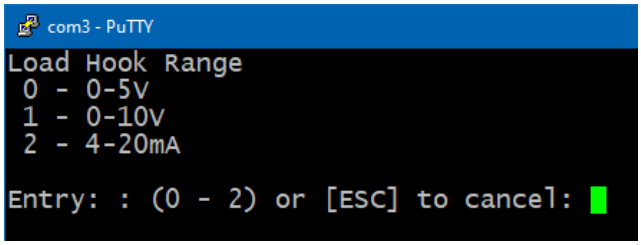
a. Type in **R** and press **ENTER**

Note: **MSI-150** are 0-5v

Onboard C-39 are mostly 0-5v but some are 0-7v. Check specific indicator for actual analog voltage output. If your system is 0-7v, use the **selection 1** - 0-10v

Onboard C-40 is 0.5-10, Use selection 1 - 0-10v

b. The **Hook Range** menu screen opens and displays:



c. Enter the current **Range** and press **ENTER**
d. The System queries "Is this correct **Y** or **N** ?"
e. Type **Y** and press **ENTER**
f. You are returned to the **Load Hook Menu**

5.10.3 HOOK SCALE FACTOR

For this option, the HOOK SCALE is the value that calibrates the **DCS1100** to the respective load indicator.

Within each of the following **Appendix** sections at the back of this document, there is both an **on-ground calibration** procedure using a load cell calibration tool available from **AKV**, and an **in-flight** calibration procedure. The choice of which procedure to utilize is left to the installer.

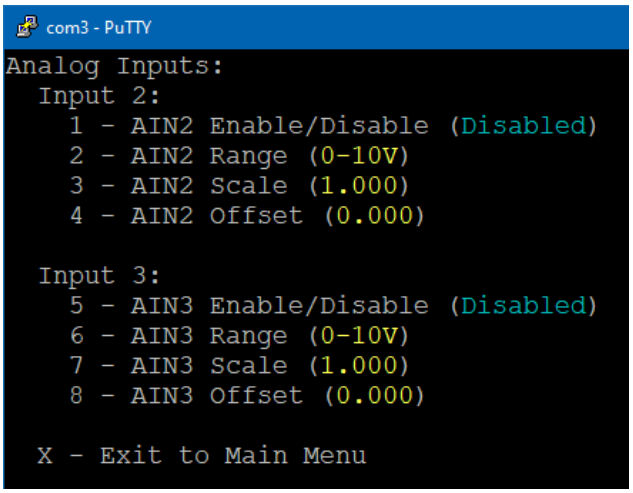
For the Onboard C-39 Indicator
Refer to **Appendix A – On Ground Procedure**
Refer to **Appendix B – In Flight Procedure**

For the Onboard C-40 Indicator
Refer to **Appendix C – On Ground Procedure**
Refer to **Appendix D – In Flight Procedure**

For the MSI-150 Indicator
Refer to **Appendix E - On Ground Procedure**
Refer to **Appendix F – In Flight Procedure**

5.11 A (CONFIGURE OPTIONAL ANALOG INPUTS)

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **A** and press **ENTER**
e. **THE ANALOG INPUTS MENU SCREEN OPENS AND DISPLAYS :**



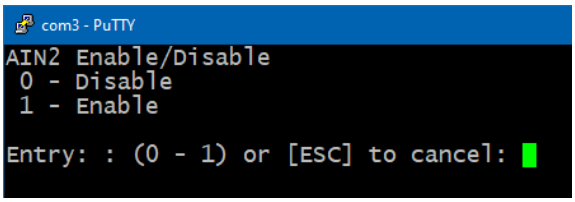
f. You are prompted to select the **Sub-Menu** corresponding to a **Analog Input Feature**:

1 – AIN2 & **3 Enable/Disable:**	Go to **STEP 5.11.1**
2 – AIN2 & **3 Range:**	Skip to **STEP 5.11.2**
3 – AIN2 & **3 Scale:**	Skip to **STEP 5.11.3**

4 – AIN2 & **3 Offset:** Skip to **STEP 5.11.4**

5.11.1 AIN2 & 3 ENABLE/DISABLE

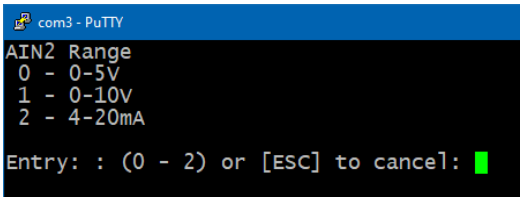
a. Type in **1** and press **ENTER**
b. The **AIN2 Enable/Disable** menu screen opens and displays:



c. Enter either **0** or **1** and press **ENTER**
d. The System queries “Is this correct **Y** or **N** ?”
e. Type **Y** and press **ENTER**
f. You are returned to the **Analog Inputs Menu**

5.11.2 AIN2 & 3 RANGE - Optional

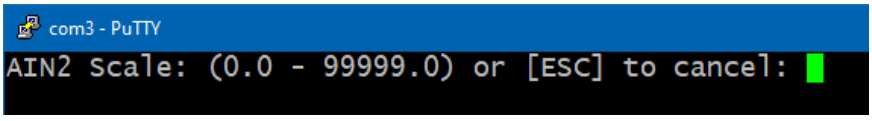
a. Type in **2** and press **ENTER**
b. The **AIN2 Range** menu screen opens and displays:



c. Enter the current **Range** and press **ENTER**
d. The System queries “Is this correct **Y** or **N** ?”
e. Type **Y** and press **ENTER**
f. You are returned to the **Analog Inputs Menu**

5.11.3 AIN2 & 3 SCALE - Optional

a. Type in **3** and press **ENTER**
b. The **AIN2 Scale** menu screen opens and displays:

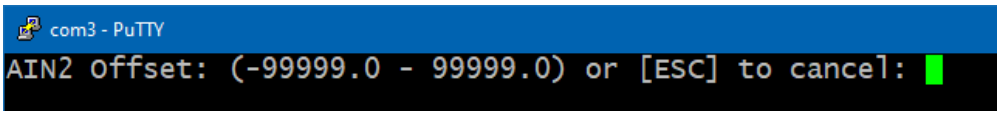


c. Enter the current **Scale** and press **ENTER**
d. The System queries “Is this correct **Y** or **N** ?”
e. Type **Y** and press **ENTER**

f. You are returned to the **Analog Inputs Menu**

5.11.4 AIN2 & 3 OFFSET - Optional

a. Type in **4** and press **ENTER**
b. The **AIN2 Offset** menu screen opens and displays:



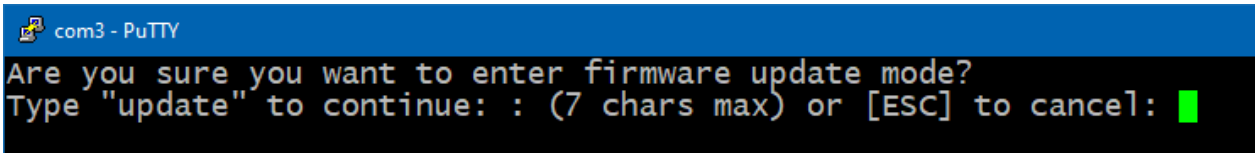
c. Enter the current **Offset** and press **ENTER**
d. The System queries “Is this correct **Y** or **N** ?”
e. Type **Y** and press **ENTER**
f. You are returned to the **Analog Inputs Menu**

5.12 F (ENTER FIRMWARE UPDATE MODE)

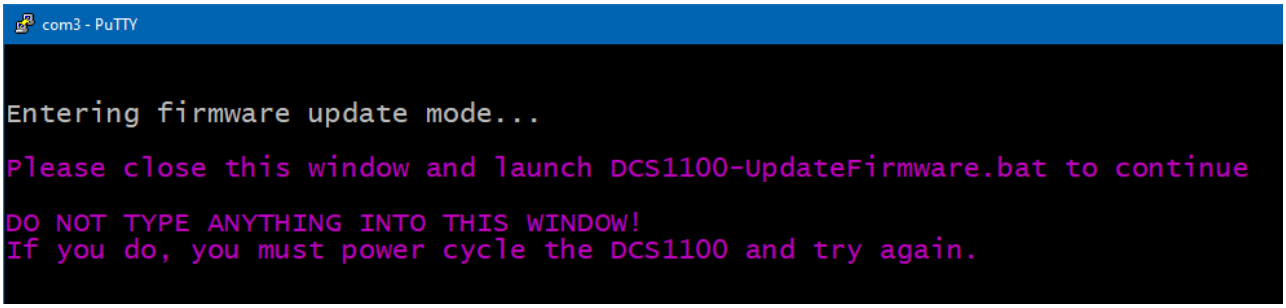
This procedure is used when AKV have released a firmware revision update. It can then be uploaded to the DCS1100 by the user via this procedure.

IMPORTANT: It will first be necessary to note all of your current configuration settings, otherwise they will be lost!

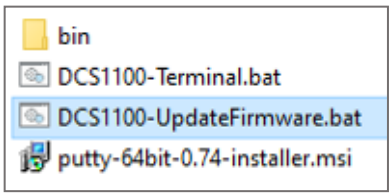
a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **F** and press **ENTER**
e. The **Firmware Update Mode** menu screen opens and displays:

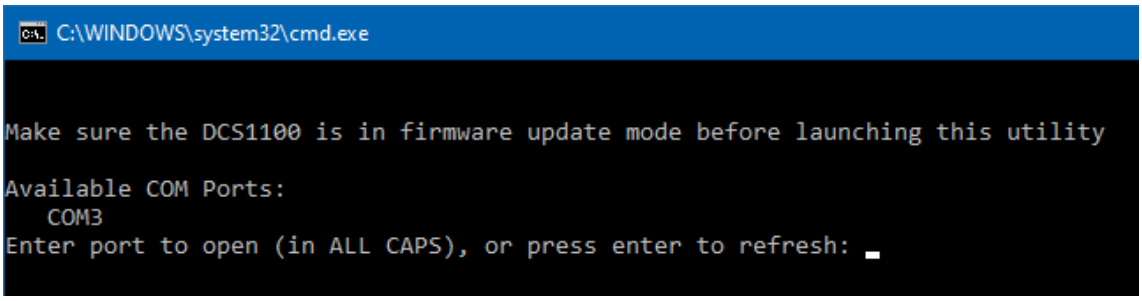


f. Type in *update* and press **ENTER**
g. The System queries “Is this correct **Y** or **N** ?”
h. Type **Y** and press **ENTER**
i. The screen displays:

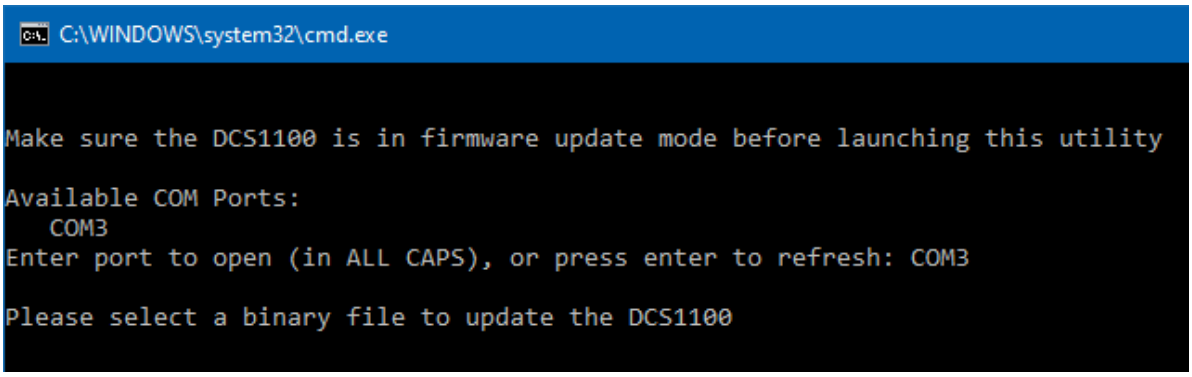


j. Close the window by clicking on the **X** at the upper right
k. The System queries "*Are you sure you want to close this session*?"
l. Click on **OK** and both windows close
m. Locate the ***DCS1100-UpdateFirmware.bat*** file and double-click it
n. The new command window displays the following:

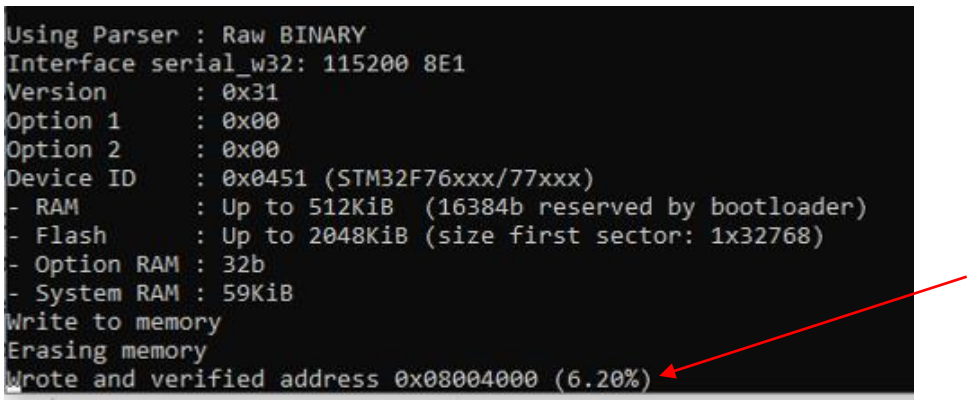




o. Type in the current **COM port** and press **ENTER**
p. The **Firmware window** refreshes and opens an **Explorer window**:



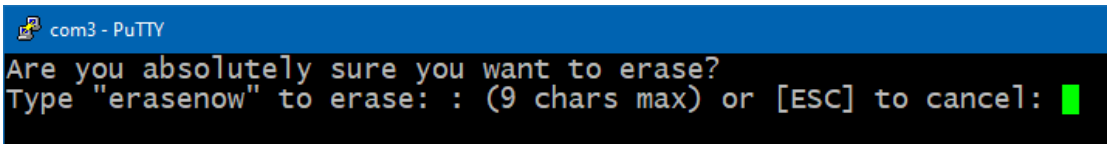
q. Use the "Browse" button to locate the new firmware, for example *S4890-DCS1100-x.x.x.bin*
r. Select the firmware file and click **OPEN** and the firmware will load automatically
s. If the firmware upload is successful, the bottom of the screen will show the following (x.xx %) of data increasing until complete and "*done*" is displayed with "*Press any key to continue*"
t. Press a key and this window will close



5.13 R (Erase Internal DCS1100 SD Card Memory)

Warning: Performing this will delete all recorded internal usage information, but not the settings. Data should first be off-loaded via a USB Thumb drive, and transferred to a PC, before erasing the DCS1100 internal memory.
See alternate pushbutton method Sect 6.2.2 (g) Method 2

a. From the **Running Data Screen**, type **S** to access the **System Menu**
b. Type in your password and press **ENTER**
c. You are taken to the **System Menu Options** screen
d. Type in **R** press **ENTER**
e. The **Erase DCS Memory** menu screen opens and displays:



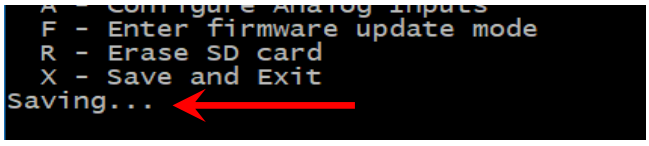
f. Type in ***erasenow*** press **ENTER**
g. The System queries “Is this correct **Y** or **N** ?”
h. Type **Y** and press **ENTER**
i. The screen displays:

j. Type **Y** and press **ENTER**
k. You are returned to the **Main Menu**
l. Select **X** for **Save & Exit** (See *5.14*)
m. You are returned to the **Running Data Screen**

5.14 X (SAVE & EXIT)

This is used when you have completed whatever task was needed.

a. Type in **X** and press **ENTER**
b. The program automatically saves the current changes and displays: ***Saving…***



c. You are returned to the **Running Data Screen**
d. Verify changes made and that the system is running with the spinning **MARKER** (see **4.2**, Item **2**)

GRAPHING SOFTWARE

6.0 GRAPHING

The supplied **"AKV GRAPHING"** is a **Python** based program that is utilized in order to view the DCS1100 data. Python is a graphic-rich platform that provides additional functionality like Pinch Zoom, improved long term trending, and a better overall user experience.

The AKV Python graphing software is used for both the **AKV ETM1000** and **DCS1100** systems. It auto-detects which system data is being loaded and viewed.

Run Log data is recorded in one-second resolution or 1Hz

6.1 SUGGESTED METHODS TO BACKUP & STORE RECORDED DATA

a. With reference to the *Fig. 1* below, create a dedicated top level folder named ***DCS1100 Data*** on your **Windows Desktop** screen by performing the following:
   1) **Right-click** in an open area of the screen and select ***New***
   2) Click on the ***Folder*** option
   3) Name the new folder ***DCS1100 Data***

b. Inside the ***DCS1100 Data*** folder, create a new ***Aircraft Registration Folder*** for each aircraft that uses the DCS1100, with the aircraft's registration number as the folder name

c. Inside of the ***Aircraft Registration Folder*** create a ***Date Folder*** into which the **SD Card** data is downloaded. AKV recommends naming this folder as the ***DATE*** in which the data was transferred from the DCS1100 to this folder

   (e.g. **100121** for **November 1, 2021**, or whichever variation suits your business)

d. Within each ***Date Folder***, you will copy **all data** from the **DCS1100** via the USB thumb drive.

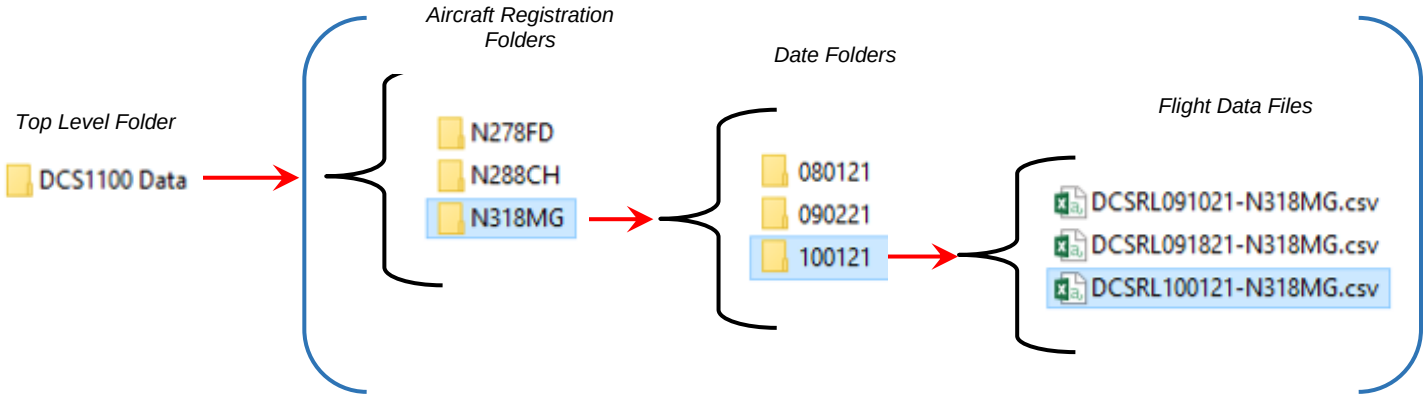


Fig. 1 *- Backup File Structure Example*

6.2 How To Back Up Recorded Data

Once you have familiarized yourself with this manual and the steps below, perform the following to back up usage data.

6.2.1 Copy Data From The DCS1100

a. Gather a **USB Drive** capable of at least **1GB** of storage
b. Power on the aircraft
c. On the **DCS1100 unit**, unscrew the **USB Cover**
d. Insert the **USB Drive** into the **DCS USB Receptacle**
e. Verify the amber "**Status**" **LED** has lighted
f. Push and release the **Black** "***Load***" **Pushbutton**
g. The amber **"Status" LED** will flash occasionally during the transfer of data. If your thumb drive has a built-in **LED**, it will also flash during the data transfer process

   NOTE: This process can take some time if data is not off loaded on a regular basis. AKV recommend every 100 hrs. Consider connecting a battery cart to the aircraft during this process
h. When complete, the amber **"Status" LED** will turn off and the **Green** "**PWR**" **LED** will flash
i. Remove the **USB Drive** and replace the **USB Cover**

6.2.2 Copy Data To A Computer

Before continuing, be sure you have reviewed **Section 6.1 – Suggested Methods To Backup & Store Recorded Data.**

a. Open the **DCS1100 Data** folder on the desktop screen
b. Open the correct aircraft folder (e.g. N318MG)
c. Create a new date flight folder:
   1) **Right-click** inside the folder in a clear area, and select ***New***, then ***Folder***
   2) **Name** the folder with the date convention; MONTHDAYYEAR (e.g. 100121)
   3) **Double-click** the new date folder to enter it

d. Insert the thumb-drive in to the PC, and copy **all data** from the **USB Drive** to the newly made date folder
e. When done, double-check and verify that files copied correctly before continuing

   Important: Be absolutely sure you have copied the files correctly. If you see "***shortcut***" in the file name, you have **NOT** copied the **Data**, and are in danger of losing your data if the **DCS1100 Memory** is erased.

f. After confirming files have copied correctly, delete them from the **USB Drive**
g. Erase the data from the **DCS1100 unit** memory. You do not want old data in the DCS1100 that has already been off-loaded to a PC date file

   ➢ Use one of the following two methods:

METHOD ONE – ERASE DCS1100 DATA

Erase the data directly from the DCS1100, via a PC connected to PuTTY. To do this, refer to **Section 5.13 R (Erase Internal DCS1100 SD Card Memory)**.

METHOD TWO – ERASE DCS1100 DATA

Erase the data via the DCS1100 front panel (without a PC).

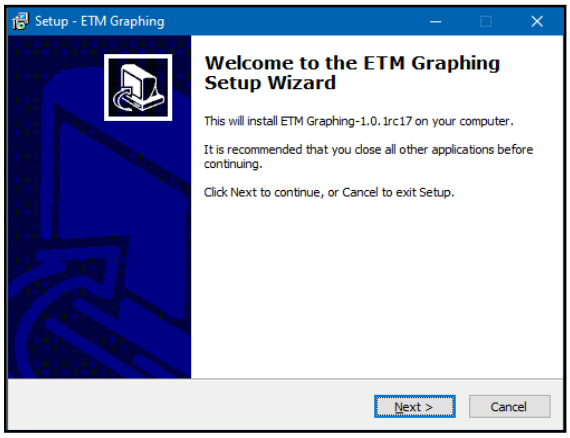
1. **PRESS AND HOLD** the Black "**Load**" pushbutton
2. Wait for the "**Amber** "**ERR**" LED to blink
3. When the green "**PWR**" LED illuminates, Release the pushbutton
   (The **Green** and **Amber** LEDs will flash during the erase process)
4. When the "**Amber** "**ERR**" stops blinking and green "**PWR**" LED is illuminated
   Erase is complete. Old data is unrecoverable

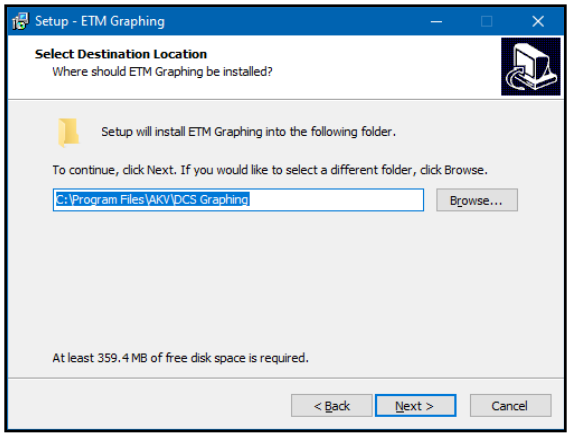
7.0 INSTALLING THE PYTHON GRAPHING PROGRAM

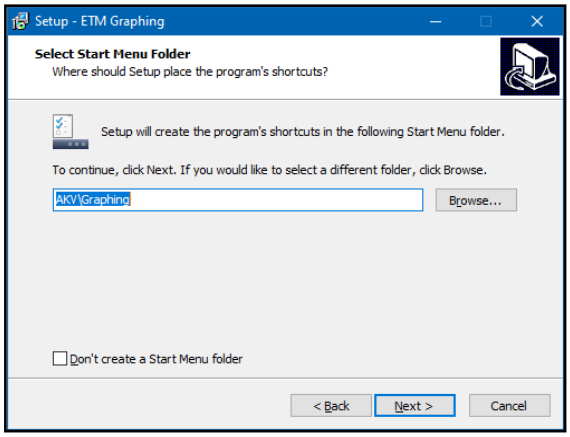
This section explains how to install and run the graphing software and view your data.

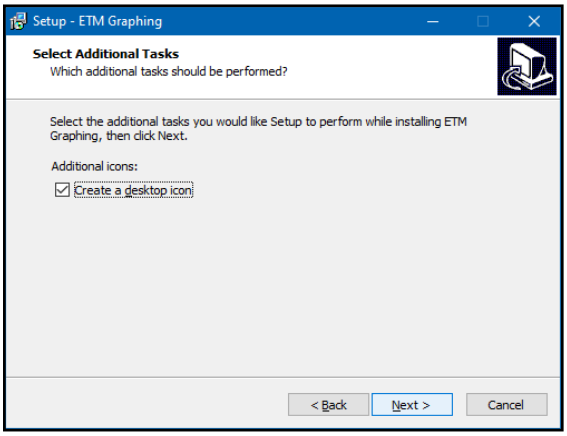
The installation file "*setup_AKV-Graphing-1.0.1rc20.149.exe*" or later version is located on the supplied **CD**.

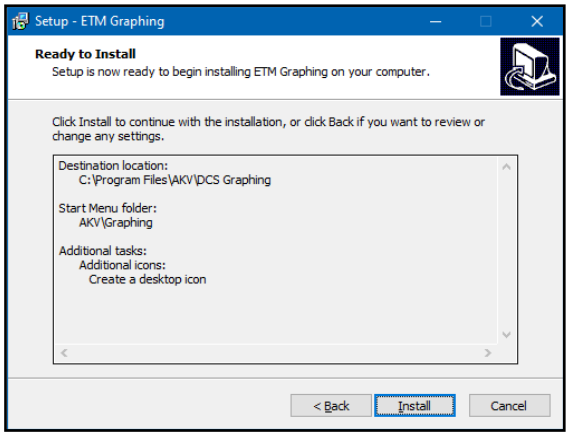
a. **Locate** and double-click the ***setup_AKV-Graphing-1.0.1rc20.149.exe*** (or latest version)
b. **Install** the program using the defaults presented
c. Click on **NEXT** when displayed and then **INSTALL**
d. Click **FINISH** when installation complete

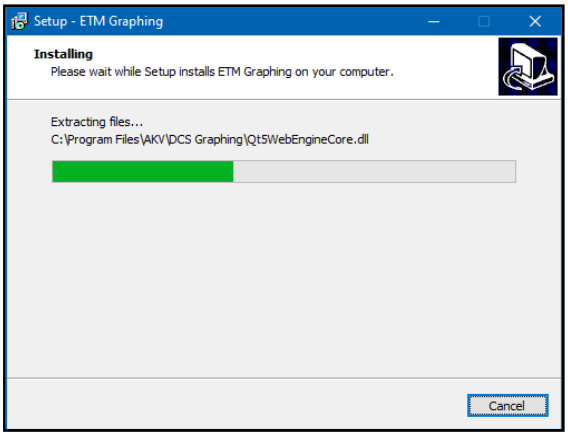






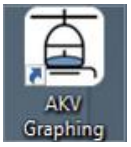




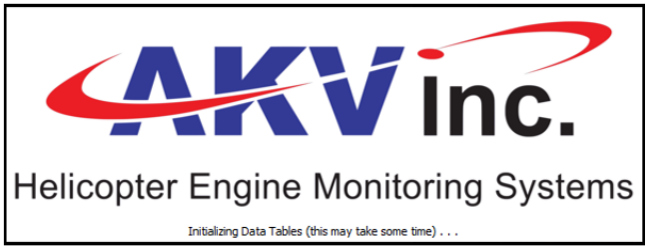


7.1 RUN THE GRAPHING PROGRAM

a. **Double-Click** on the **AKV Graphing Icon** from the desktop

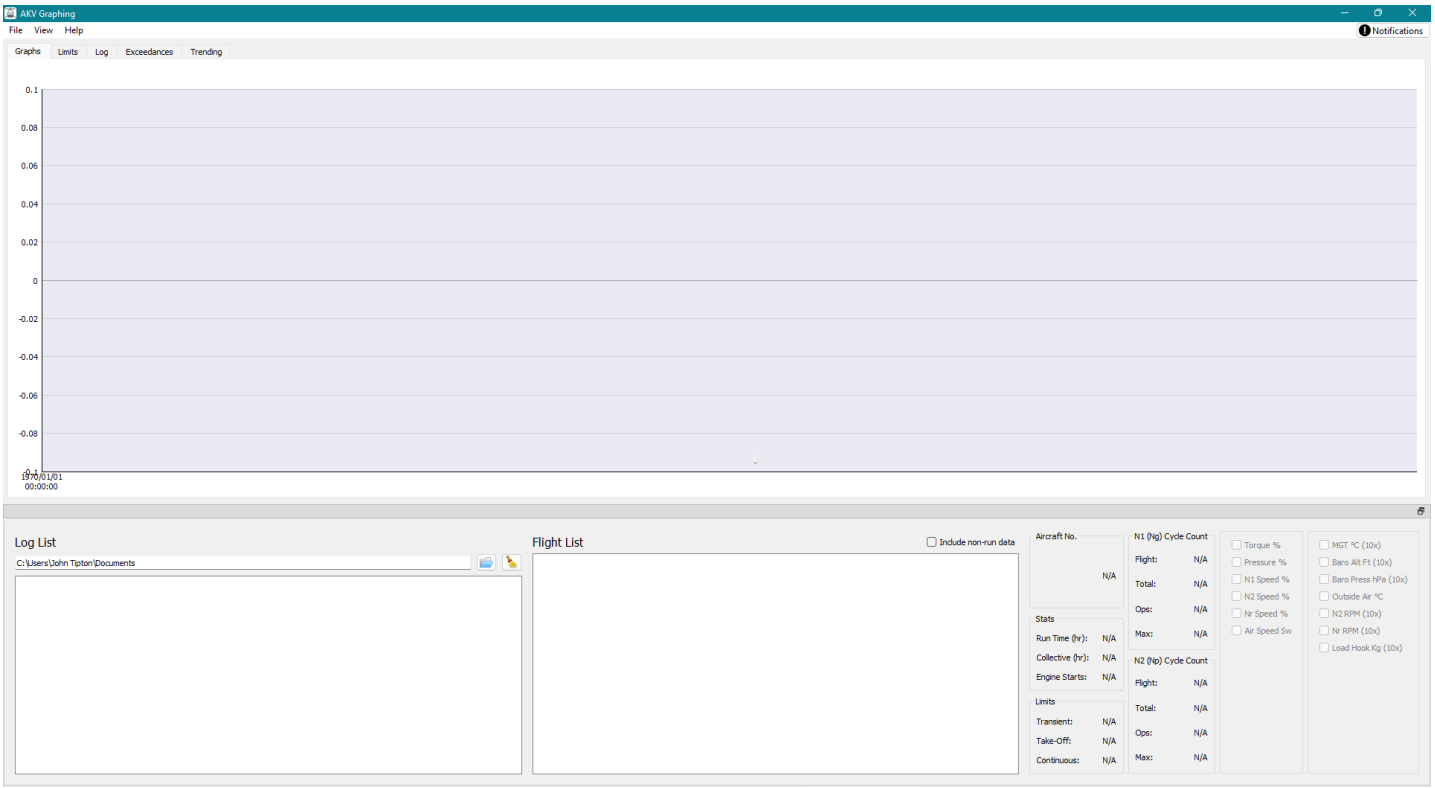


b. The **AKV Inc. Splash Screen** appears for a few moments



c. The Main **DCS1100** window appears

d. To view your data, refer to **Sections 8.0** and **9.0**



8.0 LOADING DATA

This section breaks down the various features of the **Python Graphing Program**.

NOTE: For each instance the aircraft battery switch is turned on, the **DCS1100** creates a **Run Log** file **DCSRLmmddyy - (registration)** for the day, even if there is no other activity.

8.1 IMPORT AND ACCESS FLIGHT DATA

There are two options for loading **DCS1100** log files:

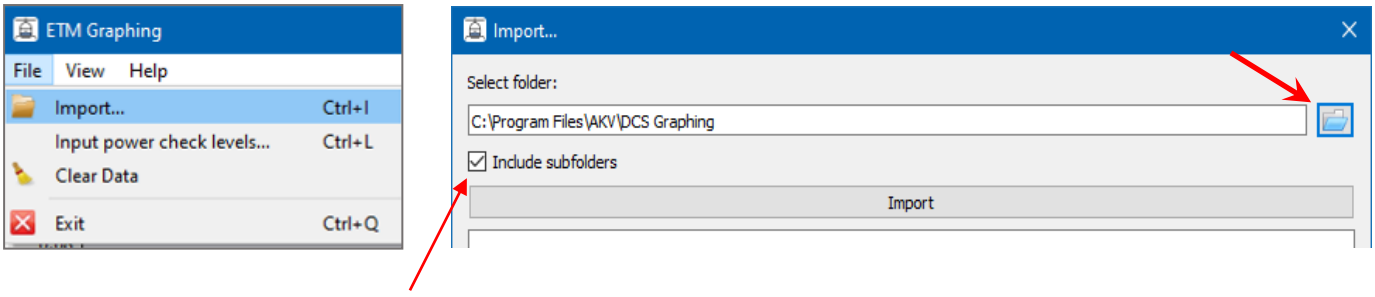
- **METHOD ONE** is used to load large batches of multiple stored data files. This provides a quicker way to view and navigate between large files as it loads all data into the graphing memory and provides for a better experience.
- **METHOD TWO** is used to load smaller file folders one-at-a-time

METHOD ONE – Import Batch Files

This method is used when large batches of multiple subfolders need to be loaded. It provides for faster loading of data when switching between date folders in the **Log List** as the data is already loaded. It also loads the same files into the trending section.

a. Click on **Tool Bar**, **File**, and then **Import**

b. The **Import Screen** opens



c. Select the **Include Subfolders** Checkbox

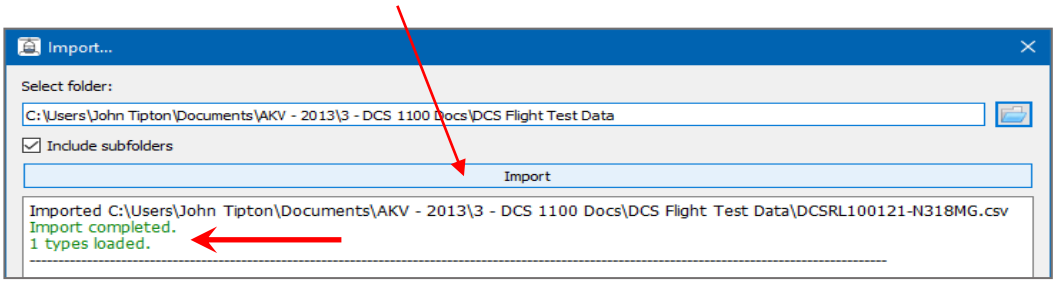
d. Click on the directory folder icon at far right

e. Select the specific “Aircraft Registration” folder you created where the data is stored (no files will be visible)

f. Click on **Select Folder** at bottom-right

g. The **Import…** Windows opens

h. Click on **Import** button in center



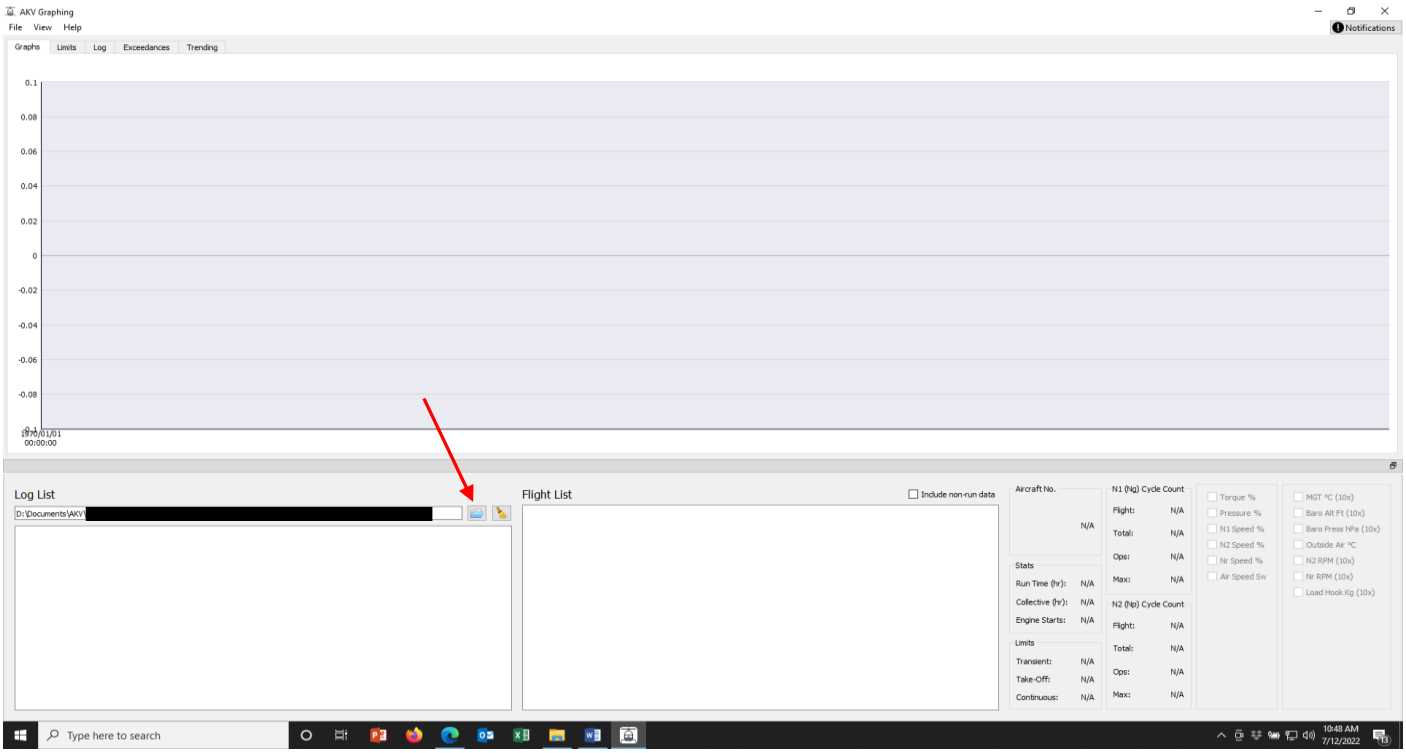
i. The area beneath the import button shown above displays what data is loaded, and will highlight any errors

j. Close this window by clicking the **X** in the top right.

k. The graphing screen will appear, similar to the image below

l. Continue to the next **Section 8.2** to select desired files

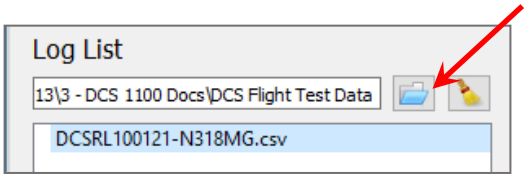
NOTE: If there are multiple sub folders that are loaded then you will need to select the particular sub folder by clicking the **Log List** directory folder icon (red arrow) and selecting which of the folders you want loaded in the **Log List** window



METHOD TWO – Load Individual Files

This method is best used when just one subfolder needs to be loaded.

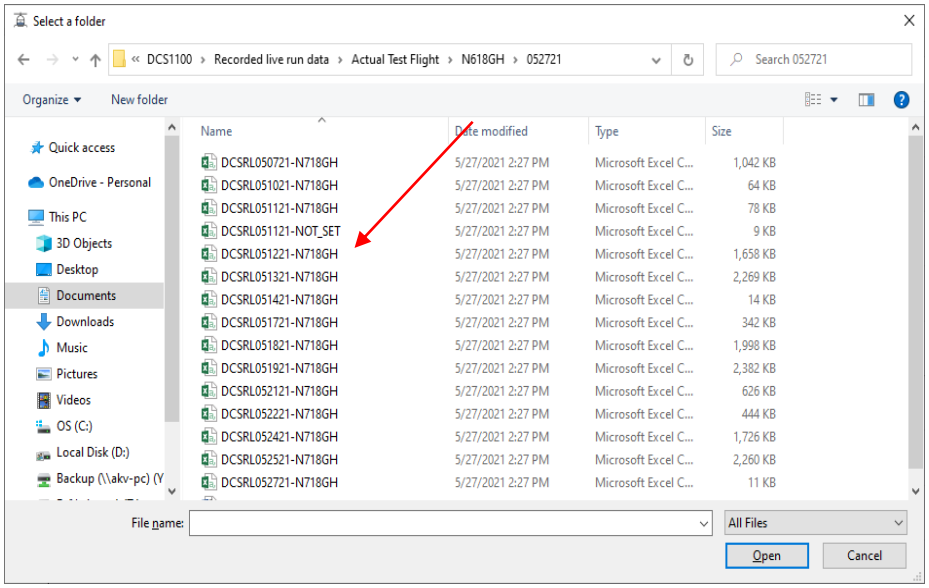
a. Load folders one-at-a-time by using the **Log List** folder directory selection (red arrow)



b. Double-click on any one of the files shown from within a particular folder

c. All files within the selected folder are loaded into the **Log List**

NOTE: Clicking on any file within a folder will automatically load all files in that folder



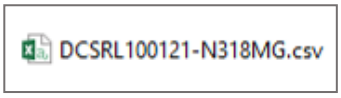
8.2 ACCESS RUN LOGS AND FLIGHT LISTS

Run Log Format

Run Log (**DCSRLmmddyy-xxxxx**) files are displayed in the bottom left-hand **Log List** box. For each day the aircraft battery switch was turned on, a new **Run Log** is created for that day.

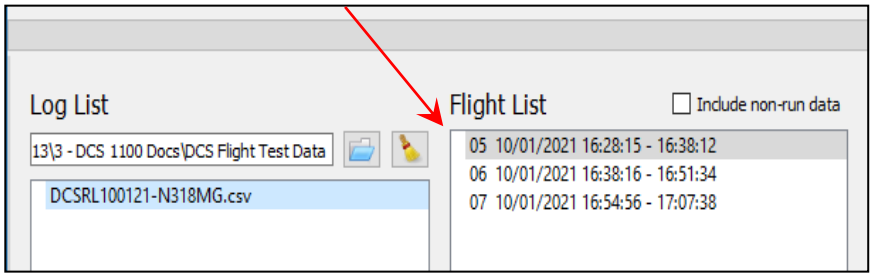
The **Run Log** file name is displayed as the date the file was generated from the **DCS1100**

i.e. ***DCSRL100121-N318MG.csv*** *(Run Log, Dated 10-01-2021 - Registration Number)*



When you click on a **Run Log** file, all flights associated with that **Run Log** appear in the right-hand box under **Flight List**. They are represented with a sequential numeric file number with the date displayed in standard format, with beginning and ending times.

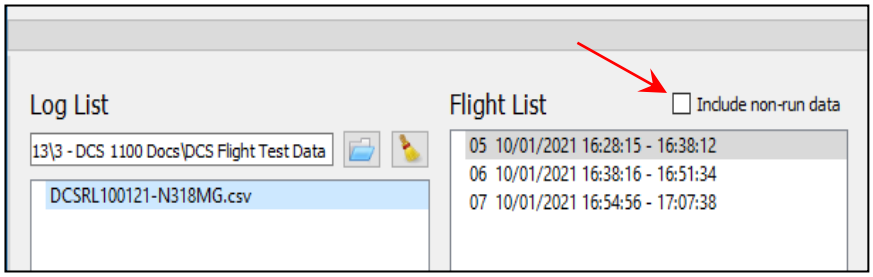
i.e. **05 10/01/2021 16:28:15 AM – 16:38:12 PM**



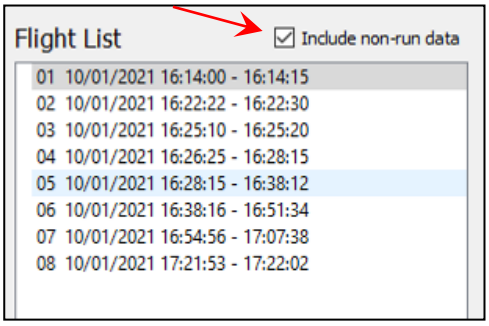
NOTE: By default, the Flight List shows only files with an engine start.

Non-Run Data

The **Include Non-Run Data** CHECKBOX must be selected to view hidden files that do not contain an engine start, as shown below.



By default, only run files are shown



With the Include Non-Run box checked, both run and non-run files are displayed

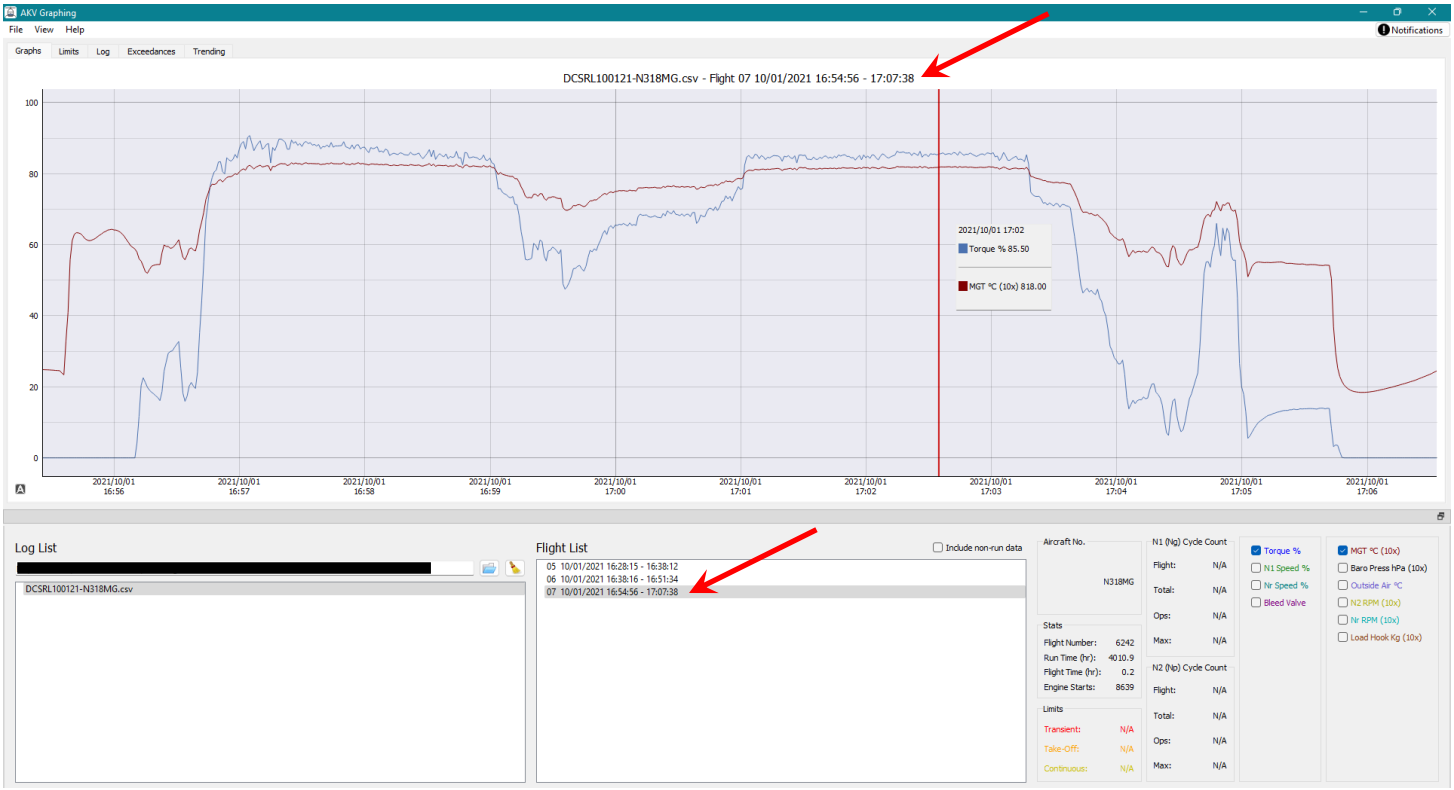
9.0 GRAPHING DATA

This section describes how to view your data.

9.1 SELECT A RUN LOG

a. In the **Log List** box, click on the desired **Run Log (RL)** date file

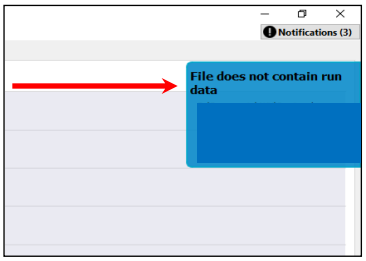
b. The **Flight List** box displays all files that have engine run data . The file you highlight displays across the top of the graph window



c. The **Flight List** files are represented with a sequential flight number and the date in standard format, with beginning and ending times

- Flight File example: **10/01/2021 16:54:56 – 17:07:38**

NOTE: If no data exists for that file, a blue flag in the top-right will be displayed: “File does not contain run data” for a few seconds

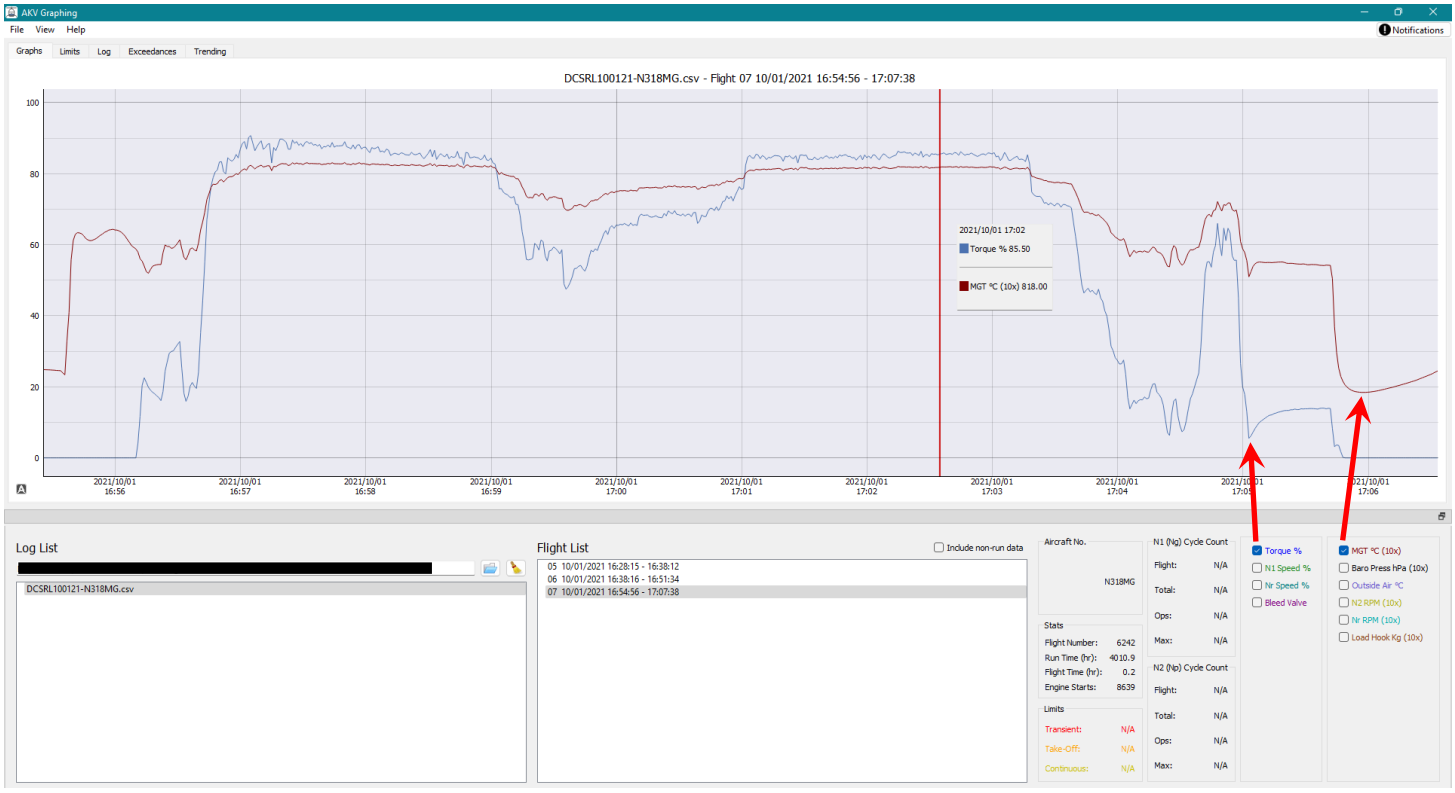


9.2 GRAPHING A RUN LOG (DCSRLMMDDYY.CSV)

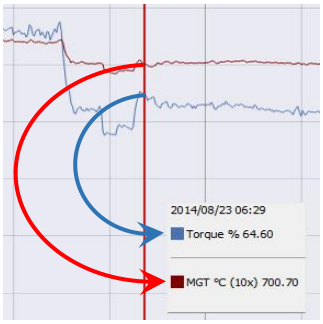
a. Select any parameter **Check Box**(s) you wish to view in the graph

b. The **Y-Axis Vertical Slider**:

- When the mouse is placed in the graphing area, the vertical red line slides left and right. A **Pop-Up Box** shows all selected values where the vertical slider intercepts the parameter. It displays the parameter name and designated color along with the value at the intercept point.



NOTE: A parameter that displays a **10x** multiplier is shown in the **Pop-Up Box** with its true value. For example the **MGT** intercept at **Y-Axis 70.70** indicates the true value of **700.70** shown above.



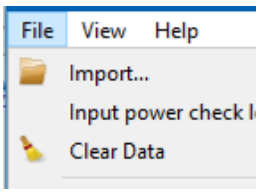
c. Changing Selection:

- Each time you view a different **Flight Log**, all data from the graph and the **Parameters** will be cleared
- To clear all selections and remove the current **Log Lists** manually, click on the **Reset** button (brush icon).

10.0 GRAPH CONTROL OPTIONS

10.1 TOOLBAR

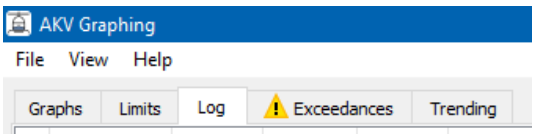
The Toolbar provides access to other features that are available



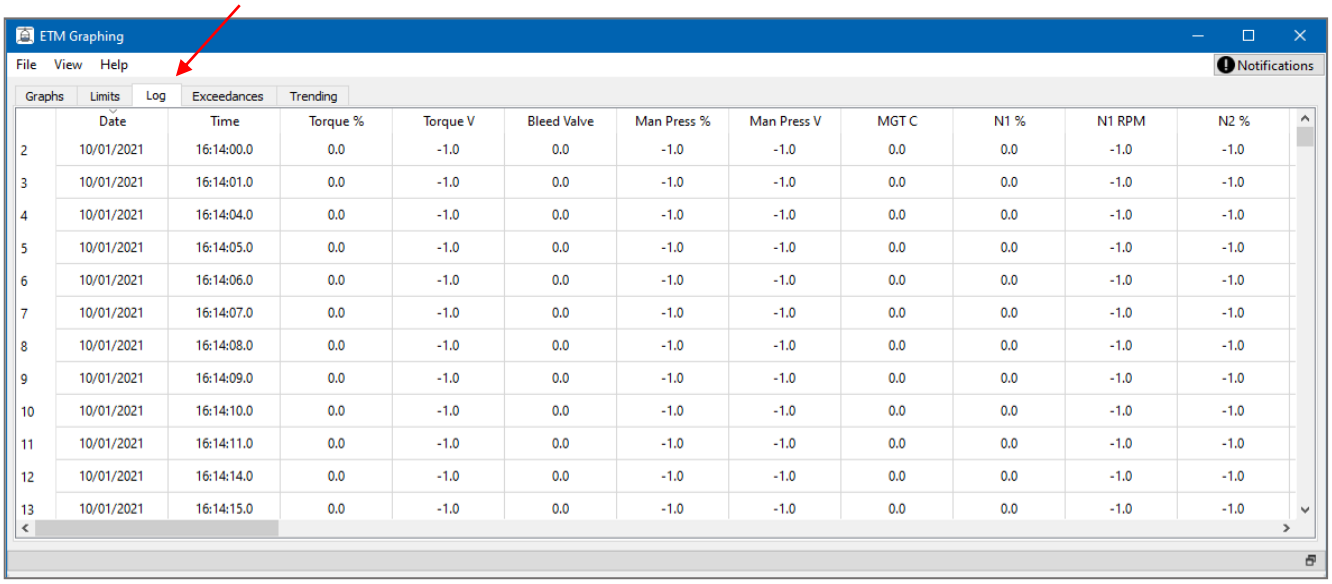
- **IMPORT DATA** – Described in **Sect. 8.1**
- **INPUT POWER CHECK LEVELS** – Refer to **SECTION 11– TRENDING DATA**
- **CLEAR DATA** – This resets the graph by clearing **Python** of all information, and displaying blank **Log List** and **Flight List** boxes. Data can then be re-loaded

10.2 TABS

The Tabs allow for navigation between the screens.



- **GRAPHS TAB** – To view the graphing screen for the recorded data
  See **Section 9.0 – Graphing Data**
- **Limits Tab** – **DCS** does not use this
- **LOG TAB** – Displays the raw recorded data for the selected **Run Log** file for which-ever file is highlighted in the **Log List**



	Date	Time	Torque %	Torque V	Bleed Valve	Man Press %	Man Press V	MGT C	N1 %	N1 RPM	N2 %
2	10/01/2021	16:14:00.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
3	10/01/2021	16:14:01.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
4	10/01/2021	16:14:04.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
5	10/01/2021	16:14:05.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
6	10/01/2021	16:14:06.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
7	10/01/2021	16:14:07.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
8	10/01/2021	16:14:08.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
9	10/01/2021	16:14:09.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
10	10/01/2021	16:14:10.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
11	10/01/2021	16:14:11.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
12	10/01/2021	16:14:14.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0
13	10/01/2021	16:14:15.0	0.0	-1.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0

- **Exceedances Tab** – **DCS** does not use this
- **TRENDING TAB** – Displays the Trending screen, which allows the trending of all recorded data. See **SECTION 11 – TRENDING DATA**

10.3 GRAPH VIEWING CONTROLS

At the screen bottom-right are viewable data and selectable parameters for a specific flight highlighted in the **Flight List**. For description, it has been divided into sections, **A** thru **G.**

A	**– Aircraft No.**	The current file's aircraft registration number
B	**– Stats**	Flight, Engine run times and engine starts
C	**– Limits**	ETM1000 Only
D	**– N1 (Ng) Cycle Count**	ETM1000 Only
E	**– N2 (Np) Cycle Count**	ETM1000 Only
F	**– Parameters**	Displayed chart values when selected
G	**– Parameters**	Displayed chart values when selected

NOTE: Sections **F** and **G** contain both **Nr**. In some B3's this is displayed in **%** and in others as RPM.

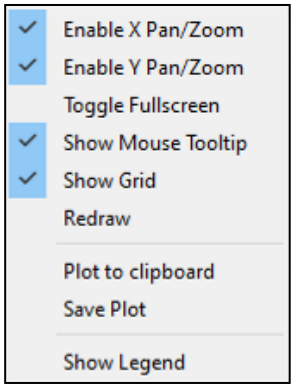
10.4 MOUSE CONTROLS

With graphed data showing, place the mouse cursor over the graph area and:

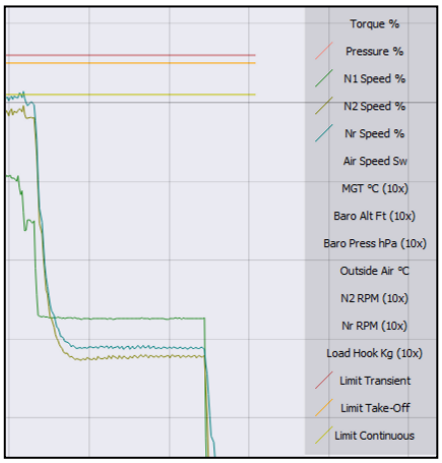
- **Roll up and down** with a scroll wheel type mouse to expand/contract the **Y-Axis** viewing
- **Click and hold left mouse** allows the screen data to be dragged around for viewing
- **Click and hold right mouse** and move the mouse to expand/contract both **X-** & **Y-Axis** viewing resolution, which will automatically re-scale the X-axis time stamp accordingly

Other options are available by right-clicking directly on the graphing chart. You may select or de-select them as needed.

- **Default Selections:** The four selections (Enable Pan/Zoom and Show Mouse Tooltip and Grid) are checked by default
- **To reset the view**, select **Redraw**. This re-scales the graph back to its original layout



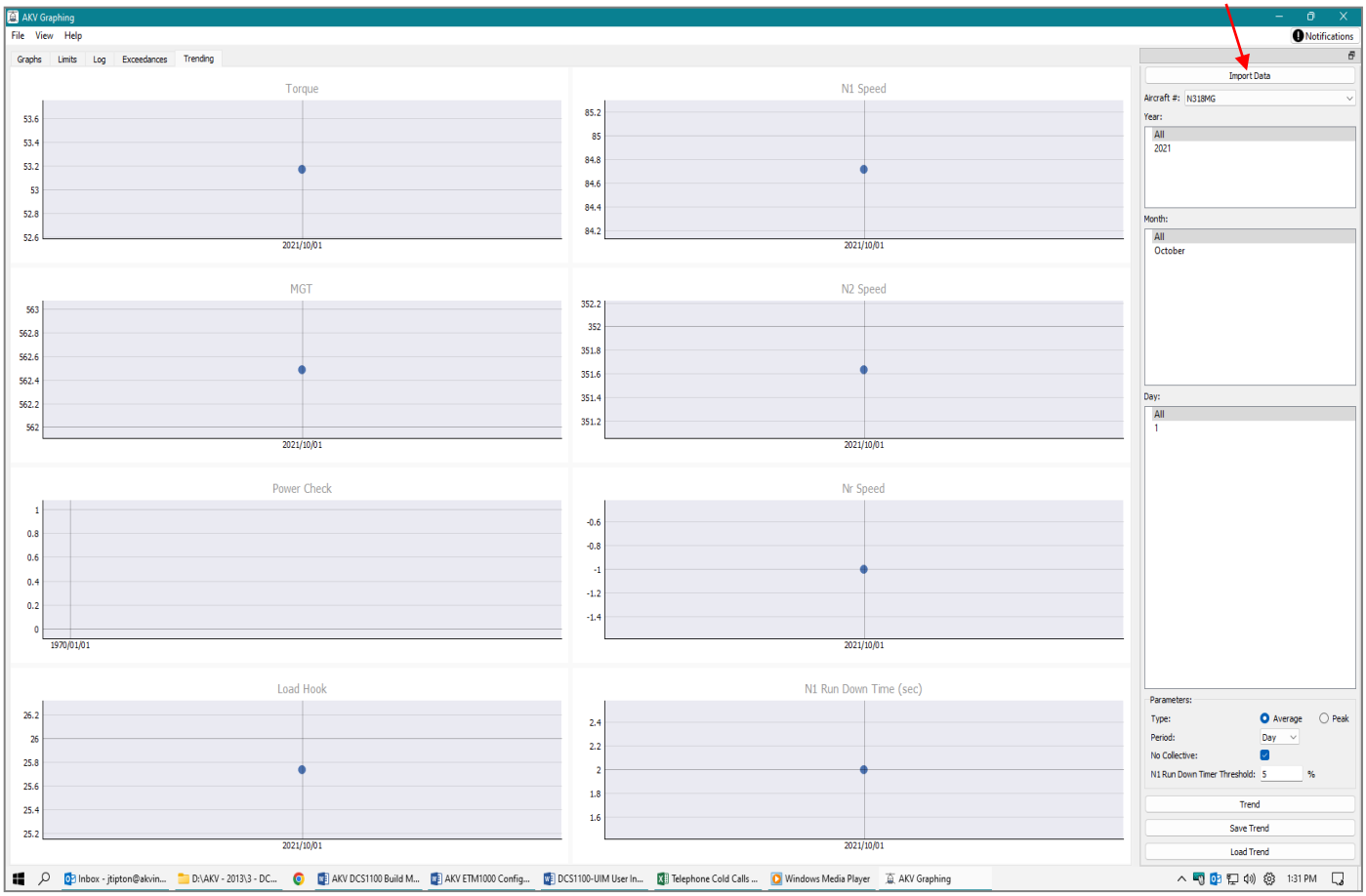
- Select **Toggle *FULLSCREEN*** for full-screen viewing of the graph. Select **Toggle Fullscreen** again to return or click on the **X** upper-right
- **Plot To Clipboard:** This allows you to **Print** the current image by **right-clicking** and selecting **Plot to Clipboard**, then use **CNTL+V** to paste it into a document to print, save, or email
- **Save Plot:** This saves the current image as a **.png** file in a save location you choose
- **Show Legend:** This displays the parameter boxes with their color schemes



11.0 TRENDING DATA

The trending capability of **Python** provides long-term trending of recorded data for each **Aircraft Folder** (helicopter registration number). If you have loaded data in the graphing screen using only the **Log List** directory folder then selected a **Log List** date, it will show only that set of data with the year, month and day in addition to any other selected **Log List** dates from the **Graph** in the right pane window.

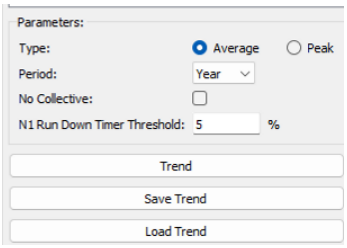
If you want to trend additional data, the best method is to import the complete **Aircraft Folder** (helicopter registration number) either from the graphing screen tool bar **File tab** then "**import**" or by importing directly from within the trending screen and selecting "**Import Data**" (red arrow)



11.1 How To Trend Data

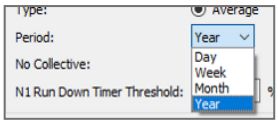
a. Which ever method you use to load data into the trending screen, The Year, Month, and Days will be highlighted as ***ALL*** by default. From here you can also select specific ranged data as needed (date, month, year)

b. In the bottom right **Parameters** section you can Select:



- **Average** processes a day's worth of data into a single value
- **Peak** processes a days worth of data into a single value
- The **No Collective** check box needs to be checked if your aircraft does not use the collective switch interface for flight time. Some aircraft do not have the collective micro switch installed and is the reason this check box may need to be selected. As a default, it is un-checked.

  NOTE: Without a collective signal to provide actual flight data, your trended data will be diluted with ground run data. This will affect the averaging of the trended data.



- The **Period** drop-down option at the bottom changes the default range from year to Month, Week, or Day. All parameters will be refreshed after the **Trend** button is selected again
- The **N1 Run Down Timer Threshold %** is the time it takes from the entered threshold value until zero is reached on shutdown. Detecting a negative trend (short time to zero), may indicate the presence of coaking issues.

c. You may use **All** for Year, Month, or Day detail or change as needed

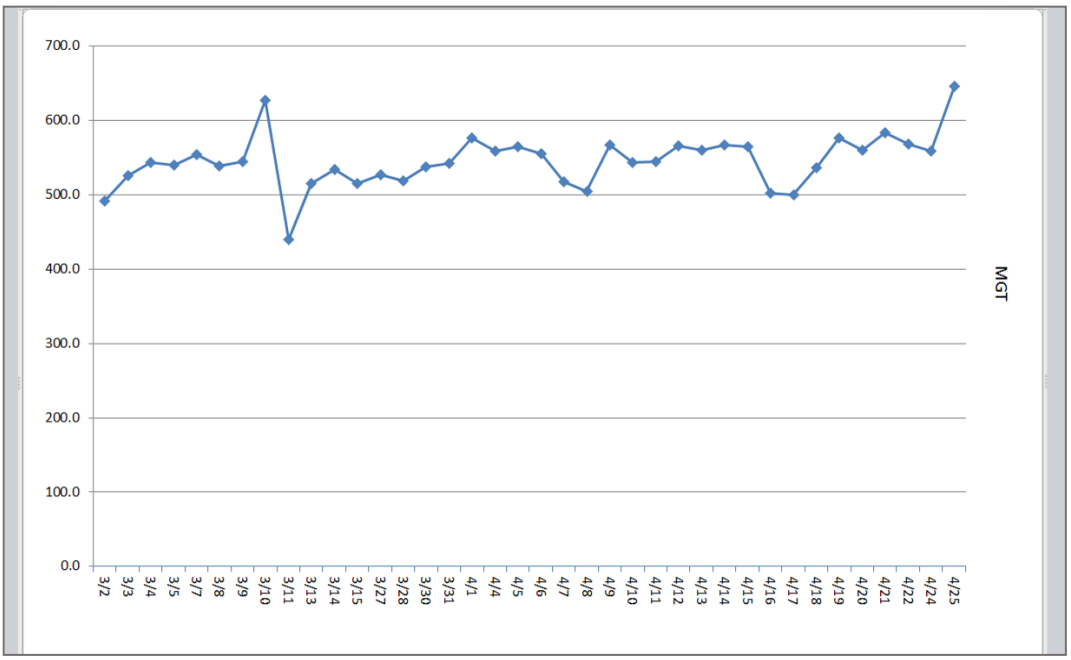
d. Click the **TREND** button at bottom-right. It may take some time if there is a lot of data to be processed, but once data is trended, it is displayed in each parameter window

e. Click the **SAVE TREND** to save the current Trend information. This file will be saved to the **Data Folder** you are currently viewing

Note: Saving will only keep one instance within the Data Folder you are currently viewing. Anytime you save, it overwrites the previous file. After saving a Trend, you can continue trending additional data as needed.

f. Click the **LOAD TREND** to load the saved Trend information This file automatically opens the file saved from the Data Folder you are currently viewing. It will also load any parameters that were used to trend the saved file.

g. Each parameter window utilizes the same mouse pop-up control as with the graph. For example, place the mouse pointer over any of the trended parameters, right click then select toggle full screen. The selected graph will be displayed by itself, full screen and will have the same zoom functions as the graphing screen, along with plotting to the clip board for saving and redraw, etc.



h. To return to the trending screen, do one of the following:

- **Toggle** the **Fullscreen** again
- **Click** on the **X** at upper-right

11.2 ENTER POWER CHECKS FOR TRENDING

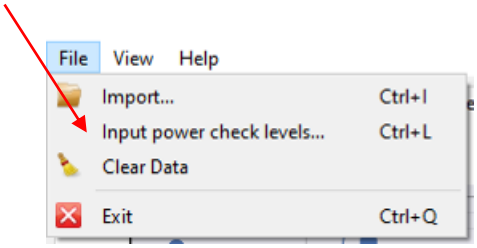
This section describes how to enter your power checks.

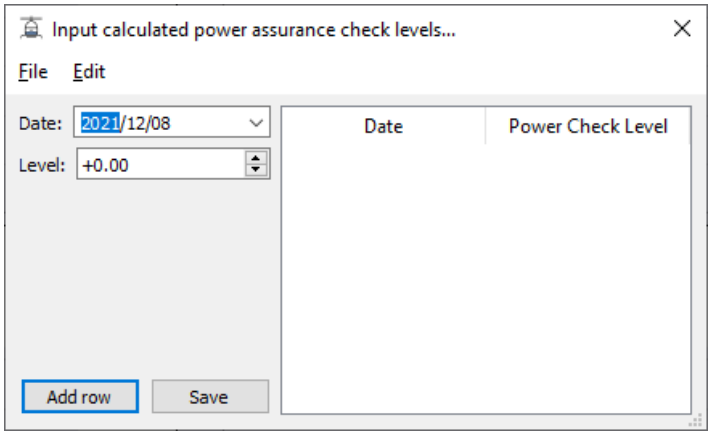
a. **IMPORTANT:** Import data into **Trend** that has the same data range as the power check(s) to be entered

b. Manually enter power checks by clicking on **Tool Bar**, and then **File**

c. Click on the **Input Power Check Levels** option

NOTE: **Power Checks** must have the same date as the imported files.





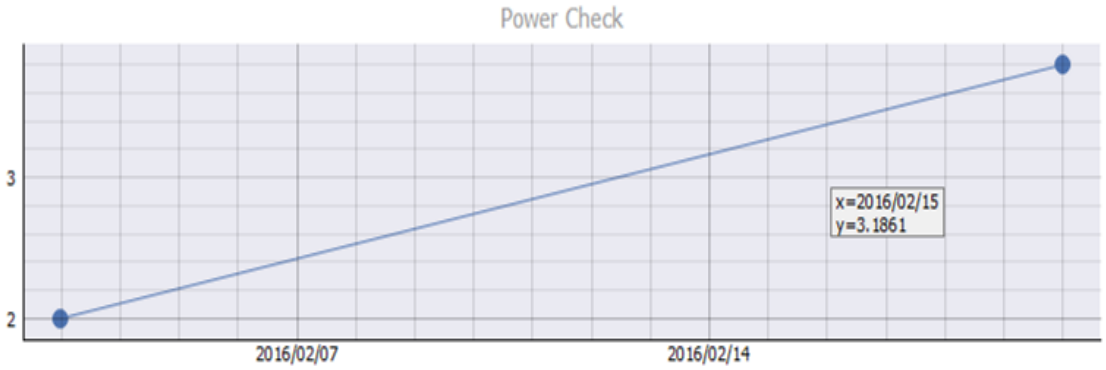
d. Enter the selected date, power check "level", then click on **ADD ROW**. Multiple entries can be made be clicking **ADD ROW** again

e. When done click **SAVE**

f. After you see the notice the file was successfully saved, close this window

g. Click the **TREND** button to display the **Power Check** entries in the graphing window, and it will update automatically

NOTE: Power checks are saved as **CPWRCHK.csv** in the same file as the imported data.

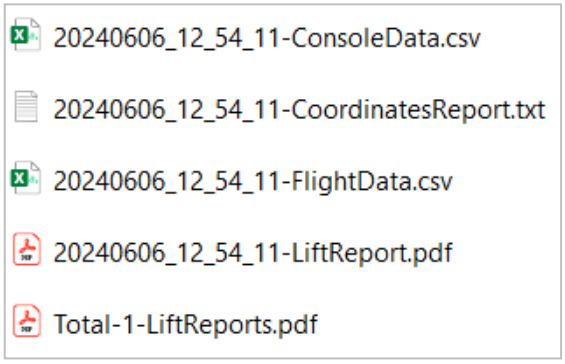


Two Power Check points plotted

12.0 FLI REPEATER APP DATA

To email recorded data from the App, refer to ***AKV DCS AND ETM IOS APP USER MANUAL – v2.0*** or greater.

Data emailed from the App using the "SEND REPORTS" button consists of five files. These files are detailed below, under their file headings.



CONSOLE DATA ---------- See **SECTION 12.1**

COORDINATES REPORT ------- See **SECTION 12.2**

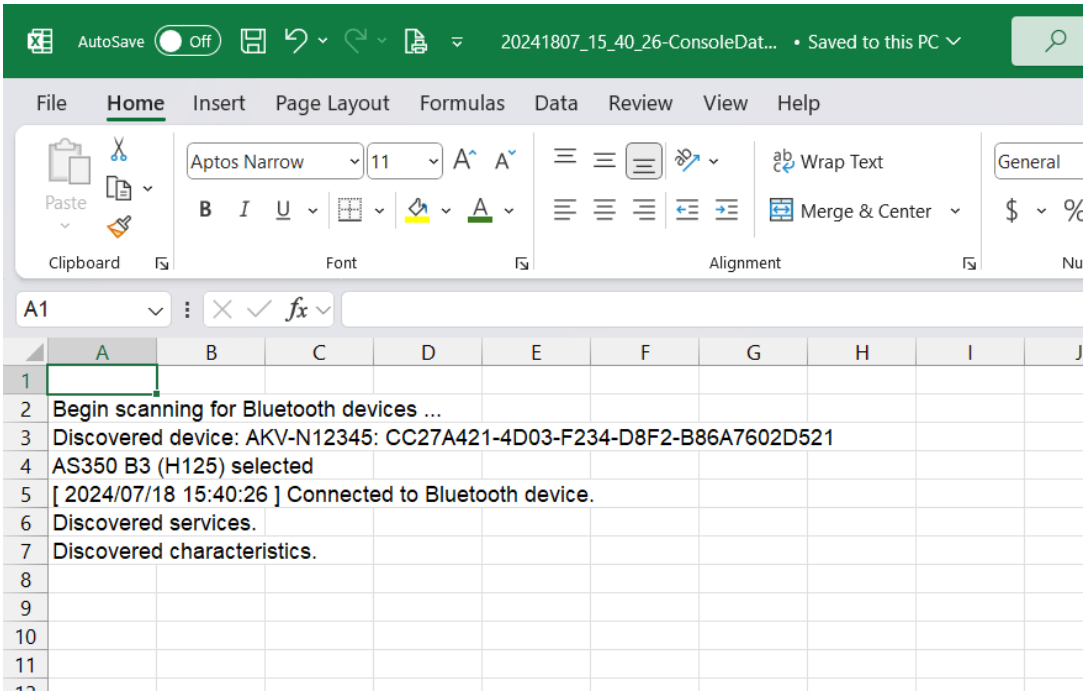
FLIGHT DATA ---------- See **SECTION 12.3**

LIFT REPORT ---------- See **SECTION 12.4**

TOTAL LIFT REPORT ---------- See **SECTION 12.5**

12.1 CONSOLE DATA

The **ConsoleData.csv** file indicates when the App was connected, or disconnected, from the **DCS1100** for informational purposes only

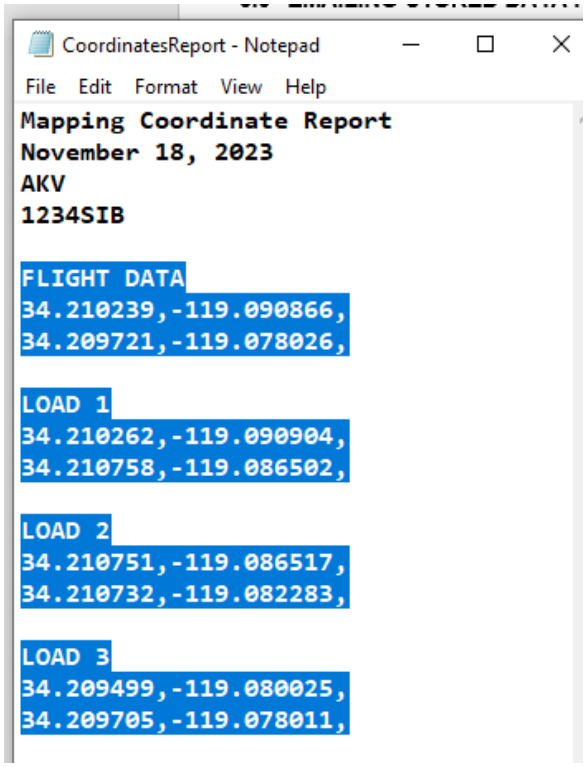


12.2 COORDINATES REPORT

The **CoordinatesReport.txt** is an abbreviated text file that allows for simple copy-and-paste of the GPS coordinates into a geo-mapping program. Ref **Lift Report** Fig. 1

- AKV recommend using the online GEO mapping software at https://maps.co/

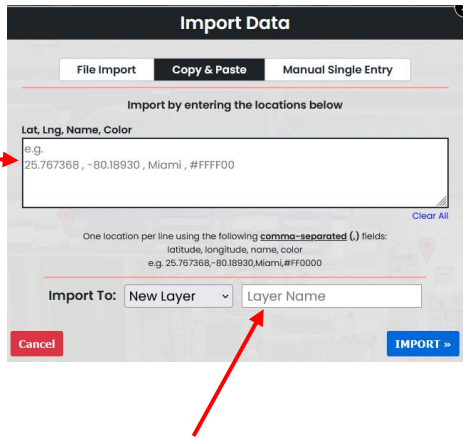
This mapping software has a free feature of up to (5) stored plotted coordinates files and a monthly service fee for more advance features.



(a) Copy-and-paste the **Flight Data** and Load (x). You can copy all coordinates or a selection of your choice.

(b) Open the web link https://maps.co/, and perform the following:

1. Start Map Maker
2. Import Data
3. Select Copy & Paste
4. Paste the data in the window
5. Name the file
6. Click on Import



(c) Change colors and other features by selecting the named file (red arrow, below)

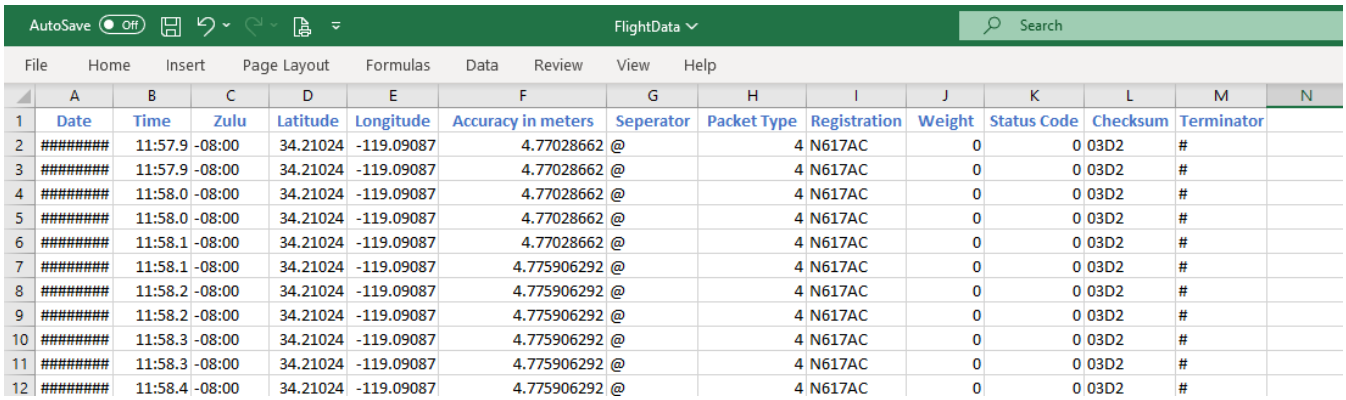
Note: After a couple uses, you will have to register and pay separately for advanced features. However, this is useful, web-based Geo-plotting software

- Organize your data files however you like, but as an AKV suggestion, save all the data files from the email into a dedicated aircraft folder, and then into a sub-folder for each day the job was performed

12.3 FLIGHT DATA

The **FlightData.csv** file is a high-resolution file of the recorded data at 20/sec. This file is the basis of the data that generates the LiftReport.pdf. The blue column headers describe each column.

If #### are shown for a column, right click the column's alphabetic header and increase the column width so that it is readable.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	Time	Zulu	Latitude	Longitude	Accuracy in meters	Seperator	Packet Type	Registration	Weight	Status Code	Checksum	Terminator	
2	########	11:57.9	-08:00	34.21024	-119.09087	4.77028662	@	4	N617AC	0	0	03D2	#	
3	########	11:57.9	-08:00	34.21024	-119.09087	4.77028662	@	4	N617AC	0	0	03D2	#	
4	########	11:58.0	-08:00	34.21024	-119.09087	4.77028662	@	4	N617AC	0	0	03D2	#	
5	########	11:58.0	-08:00	34.21024	-119.09087	4.77028662	@	4	N617AC	0	0	03D2	#	
6	########	11:58.1	-08:00	34.21024	-119.09087	4.77028662	@	4	N617AC	0	0	03D2	#	
7	########	11:58.1	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	
8	########	11:58.2	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	
9	########	11:58.2	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	
10	########	11:58.3	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	
11	########	11:58.3	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	
12	########	11:58.4	-08:00	34.21024	-119.09087	4.775906292	@	4	N617AC	0	0	03D2	#	

12.4 LIFT REPORT

The **LiftReport.pdf** is a formatted and easy to read report containing the operator and customer information, individual load weights and GPS coordinates for pickup and drop-off locations along with load totals which include the total time on hook.

NOTE: The DCS1100 and ETM1000 does not currently support a bucket release function. All weights are automatically recorded when the hook weight is <10% of the carried weight.

- See Fig. 1, next page

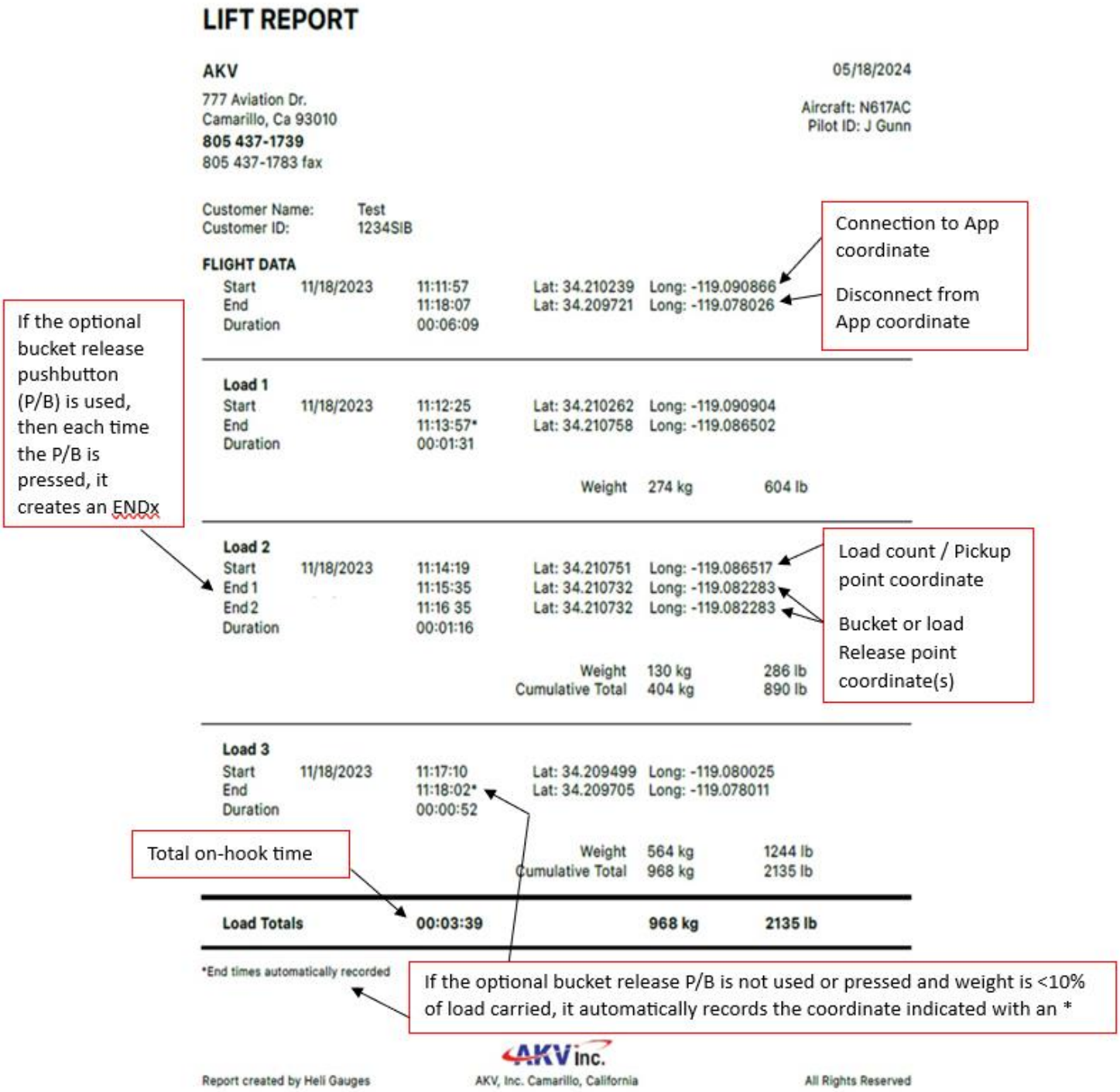

LIFT REPORT
AKV
777 Aviation Dr.
Camarillo, Ca 93010
805 437-1739
805 437-1783 fax
05/18/2024
Aircraft: N617AC
Pilot ID: J Gunn
Customer Name: Test
Customer ID: 1234SIB
FLIGHT DATA
Start 11/18/2023 11:11:57 Lat: 34.210239 Long: -119.090866
End 11:18:07 Lat: 34.209721 Long: -119.078026
Duration 00:06:09
Connection to App coordinate
Disconnect from App coordinate
If the optional bucket release pushbutton (P/B) is used, then each time the P/B is pressed, it creates an ENDx
Load 1
Start 11/18/2023 11:12:25 Lat: 34.210262 Long: -119.090904
End 11:13:57* Lat: 34.210758 Long: -119.086502
Duration 00:01:31
Weight 274 kg 604 lb
Load 2
Start 11/18/2023 11:14:19 Lat: 34.210751 Long: -119.086517
End 1 11:15:35 Lat: 34.210732 Long: -119.082283
End 2 11:16 35 Lat: 34.210732 Long: -119.082283
Duration 00:01:16
Load count / Pickup point coordinate
Bucket or load Release point coordinate(s)
Weight 130 kg 286 lb
Cumulative Total 404 kg 890 lb
Load 3
Start 11/18/2023 11:17:10 Lat: 34.209499 Long: -119.080025
End 11:18:02* Lat: 34.209705 Long: -119.078011
Duration 00:00:52
Total on-hook time
Weight 564 kg 1244 lb
Cumulative Total 968 kg 2135 lb
Load Totals 00:03:39 968 kg 2135 lb
*End times automatically recorded
If the optional bucket release P/B is not used or pressed and weight is <10% of load carried, it automatically records the coordinate indicated with an *
Report created by Heli Gauges
AKV, Inc. Camarillo, California
All Rights Reserved

Fig. 1

12.5 TOTAL LIFT REPORT

The **Total-X-LiftReports.pdf** is a simplified totals only report that takes the totals from each flight report and displays a total-of-totals at the bottom of the report. Fig. 2

NOTE: This report is always sent with the flight reports when using the “Send Reports” button. It can also be sent by itself, as shown in Fig. 3

LIFT REPORT TOTAL

AKV
777 Aviation Dr.
Camarillo, Ca 93010
805 437-1739
805 437-1783 fax

10/15/2024

Aircraft: 13:26:42
Pilot ID: J Gunn

Customer Name: v1.6.2(0)
Customer ID: AKV

	Load Totals	FLT DURATION	HOOK TIME	TOTAL KG	TOTAL LB
Report 2024/10/15 13:17	3	00:02:16	00:00:40	1034.5 kg	2280.8 lb
Report 2024/10/15 13:20	2	00:02:14	00:00:29	1635.5 kg	3605.5 lb
Report 2024/10/15 13:27	0	00:00:47	00:00:00	0.0 kg	0.0 lb
Return Totals 3	5	00:05:18	00:01:09	2670.0 kg	5886.3 lb

Fig. 2

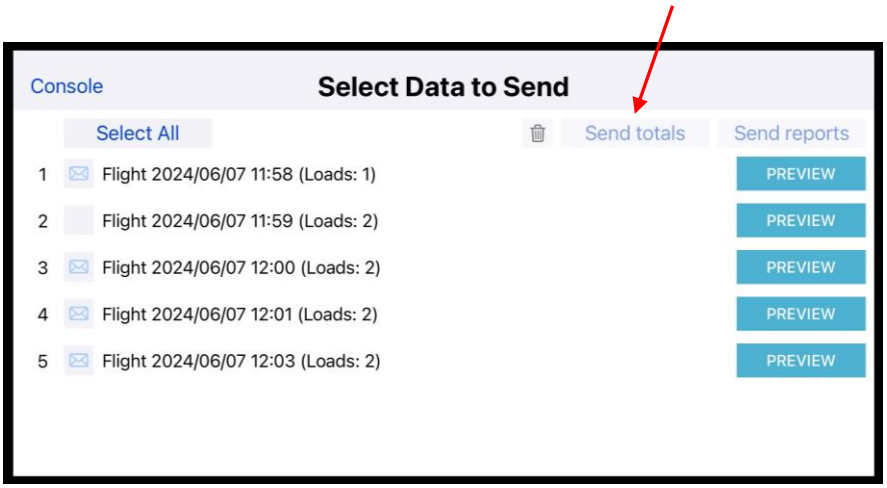


Fig. 3

13.0 CONTACT INFORMATION

777 Aviation Drive
Camarillo, CA 93010 USA
Phone (805) 437-1739
FAX (805) 437-1783
Email: sales@akvinc.com
Web: www.akvinc.com

APPENDICES

APPENDIX A

ONBOARD C-39 AND DCS1100 CALIBRATION – ON GROUND PROCEDURE

The following procedure allows for on-ground calibration of the DCS1100 sling load indication with the Onboard C-39 load indicator. By following this procedure, there is no need to fly the helicopter to calibrate with a known weight (except for a test flight). With this method of calibration, it provides more time to configure the system and is possible to obtain an accuracy of +/- 5Kg or +/-10Lb or better between the DCS1100 and the Onboard indicator. An alternate “in-flight” only calibration procedure follows this procedure.

NOTE: For this procedure however, it is required that the RICE LAKE RANGER 5 load cell simulator kit is purchased from AKV, sold separately.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the “zero” button on the indicator will NOT zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The “Installation Zero” routine will enable the indicators analogue 0-5v output (0-7v on some models) to be at 0v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately

NOTE: **During** calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed “HOOK” weight to match the Onboard indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the Onboard indicator equal to the weight of the longline and hook. It will however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- RICE LAKE RANGER 5 load cell simulator kit (purchased separately from AKV). **Supplied with interface connector.**
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100
- Reference to the Onboard **C-39 owner’s manual 120-039-00**
- Battery cart for the A/C external power
- Your typical longline and remote hook (will also be used for the test flight)

IMPORTANT: It is assumed the Onboard indicator routines have previously been configured correctly and the system is already calibrated. Check the following items for your installation before proceeding. Refer to the Onboard C-39 indicator owner’s manual 120-039-00

- CODE = the load cell labeled “CAL CODE” number (typically a four digit code) is entered
- SCAL = the rated load cell capacity value which directly affects the analogue output. For example, a SCAL value of 2000Lb/Kg is entered as 0200 (x10). This means that at 0Lb/Kg the analogue output from the indicator is 0v and at 2000, it is 5v (7v for some models)

1. Confirm A/C power is OFF.
2. Weigh the longline and remote hook together on a scale, record the weight on paper

3. Disconnect the belly hook load cell connector and connect the “RICE LAKE RANGER 5” load cell simulator to the load cell female cable connector that is routed to the load indicator in the cockpit

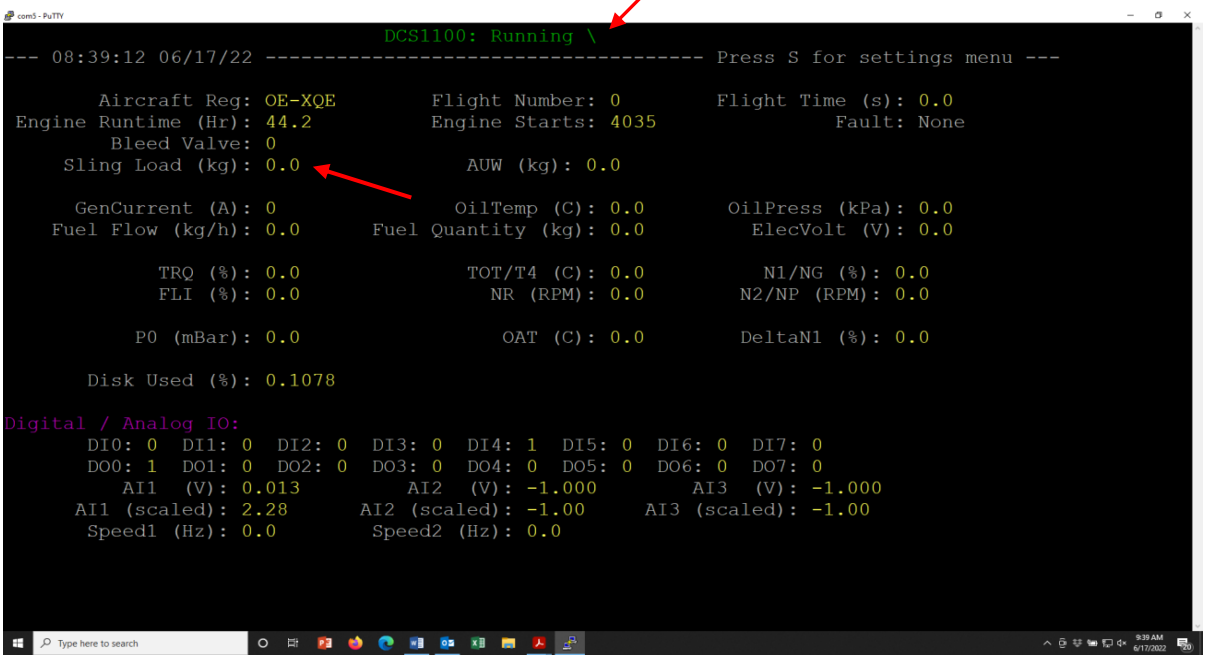
4. Set the “RICE LAKE RANGER 5” as follows:
   a. Set the course/fine to “fine” and the multi-turn adjustment pot on the right at zero
   b. Set the mV/V scale knob to zero

5. Connect the external battery cart to the A/C
6. Turn the A/C power ON

For the following calibration example, the Onboard indicator is set to display Kg and the weighed line and hook are 40 Kg (88Lb). However, **<u>you will enter the weight of your longline and hook as weighed above during this procedure</u>**.

7. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
8. Run the PuTTy interface.

Rotating line indicates communication is OK

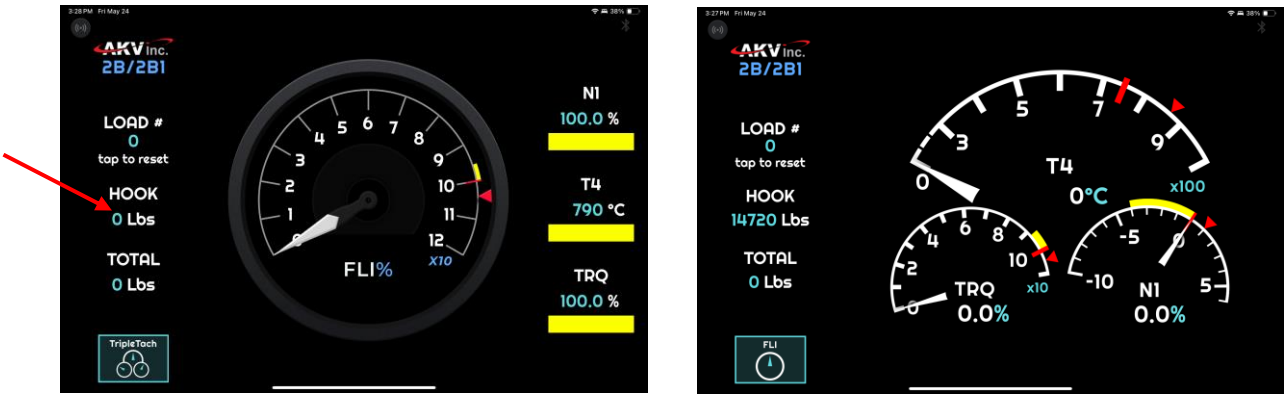


9. Confirm the DCS1100 analog setting voltage range is correct for the C-39
Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue
10. Zero the Onboard indicator display using the zero button.
11. Adjust the multi-turn Vernier pot until the Onboard indicator displays a 4 (x10) = 40Kg (88Lb). <u>Use your measured weight here</u>
12. Go to the Onboard configuration routine by pressing both buttons simultaneously
    a. With the left button, press twice to display “0 in”
    b. Press the right button, then with the 4 (x10) = 40Kg)) weight value flashing, press any button to exit. This will set the Analogue output to 0v with the 40Kg weight of the longline and hook.
    c. Confirm the symbol “Ø” (top middle) is displayed by pressing “un-zero”.

13. Turn the Vernier multi-turn pot back to zero and the Onboard indicator will display a (negative value) – 4 (x10) = -40Kg. This is now your “un-zero” Ø weight value on the indicator which is the weight of the line and hook now removed from the load cell.

    NOTE: Pressing the zero button will zero the Onboard indicator but not the analogue output. Press the “un-zero” button again to show the un-zero Ø value. Leave it here and do not zero the indicator.

14. In the top left corner of the PC display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**
15. You can also use the optional FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.



16. Turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 0 weight value on the Onboard indicator. This is now your 0 weight with the weighed longline and hook weight attached but with the analogue output at zero as well.
17. Continue to turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 45 (x10) =450Kg which is a mid-weight value (992Lb) on the Onboard indicator.
18. Observe the DCS1100 weight versus the Onboard indicator weight

    REMINDER: The Onboard indicator weight is x10 whereas the DCS1100 PC interface display and App weight is the real weight. An Onboard indicator weight of 45Kg = 450Kg.

19. If the DCS1100 sling load weight is indicating higher than the Onboard indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
20. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value.
21. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the Onboard indicator. The **basic formula** to know the approx. scale value to enter is based on the load cell capacity divided by the typical measured excitation 10v, for example, 2000/10 = 200Lb/Kg per volt. A value of 200 is then a good starting scale number to enter in the DCS1100.
22. Exit settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App it will display “No Data” and you will have to re-connect the App each time.

23. When the DCS1100 and Onboard indicator match within +/- 5Kg or +/-10Lb, adjust the Vernier multi-turn pot to different displayed weights, including max weight to verify they continue to match. There maybe a need to enter an offset value. If so, then a change to the scale factor might be needed to fine tune.
24. When satisfied, record the DCS1100 scale value and offset as backup.

25. Turn the “RICE LAKE RANGER 5” Vernier multi-turn pot to zero.
26. Turn off the A/C power, disconnect the “RICE LAKE RANGER 5” and re-connect the cable to the Onboard load cell.

Complete a test flight with the long line and remote hook that was weighed previously.

If using the PC interface for this test flight, a mechanic will need to ride along OR if using the FLI Repeater App, you can observe that the App displayed “HOOK” weight corresponds with the Onboard indicator weight.

REMINDER: The Onboard indicator weight is x10 whereas the DCS1100 PC interface display and App weight is the real weight. An Onboard indicator weight of 52Kg = 520Kg

27. Start the A/C.
28. Make sure the Onboard indicator is set to display “un-zero” Ø (top middle). This will display the –XX value equal to the weight of the longline and hook used above.

    NOTE: If you press the zero button, the displayed indicator weight will not match the analogue output weight so you will want to always leave it as “un-zero”. Pressing either the zero or un-zero will not change your settings.

29. Lift to a hover and with the longline clear of the ground. The Onboard indicator should show zero.
30. Lift a known weight to confirm the Onboard indicator, DCS1100 PC interface and / or FLI Repeater App “HOOK’ weight match +/- 5Kg or +/-10Lb.
31. The calibration procedure can be repeated if the results are not as expected or you can contact AKV for assistance.

    NOTE: If changing to a longer or shorter longline, it may be necessary to **reset** the Onboard indicator “0 in” configuration routine for the weight of the new line and hook. If you neglect to do this, you may notice the DCS1100 PC interface and / or FLI Repeater App “HOOK” weight will not match the Onboard indicator weight. Re-calibration is not required, only resetting the “0 in” is required. This is best done in cruise flight if flying without assistance of a copilot or mechanic. **Remember to always leave the display as “un-zero” Ø**.

END

ONBOARD C-39 AND DCS1100 CALIBRATION – ON GROUND PROCEDURE

APPENDIX B

ONBOARD C-39 AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE

The following procedure allows for in-flight calibration of the DCS1100 sling load indication with the Onboard C-39 load indicator. This procedure requires you to fly the helicopter to calibrate the DCS1100 with a known weight. When using this method to calibrate, it is possible to obtain an accuracy of +/- 5Kg or +/-10Lb between the DCS1100 and the Onboard indicator.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the “zero” button on the indicator will **NOT** zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The “Installation Zero” routine will enable the indicators analogue 0-5v output (0-7v on some models) to be at 0v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately

NOTE: During calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed “HOOK” weight to match the Onboard indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the Onboard indicator equal to the weight of the longline and hook. It will however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100
- Reference to the Onboard **C-39 owner’s manual 120-039-00**
- Your typical longline and remote hook
- A Mechanic / copilot to assist calibration in-flight.

To accomplish the in-flight calibration of the DCS1100 and Onboard load indicator, do the following:

1. A/C battery switch ON

   IMPORTANT: It is assumed the Onboard indicator routines have previously been configured correctly. Check the following items for your installation before proceeding. Refer to Onboard **C-39 indicator owner’s manual 120-039-00**

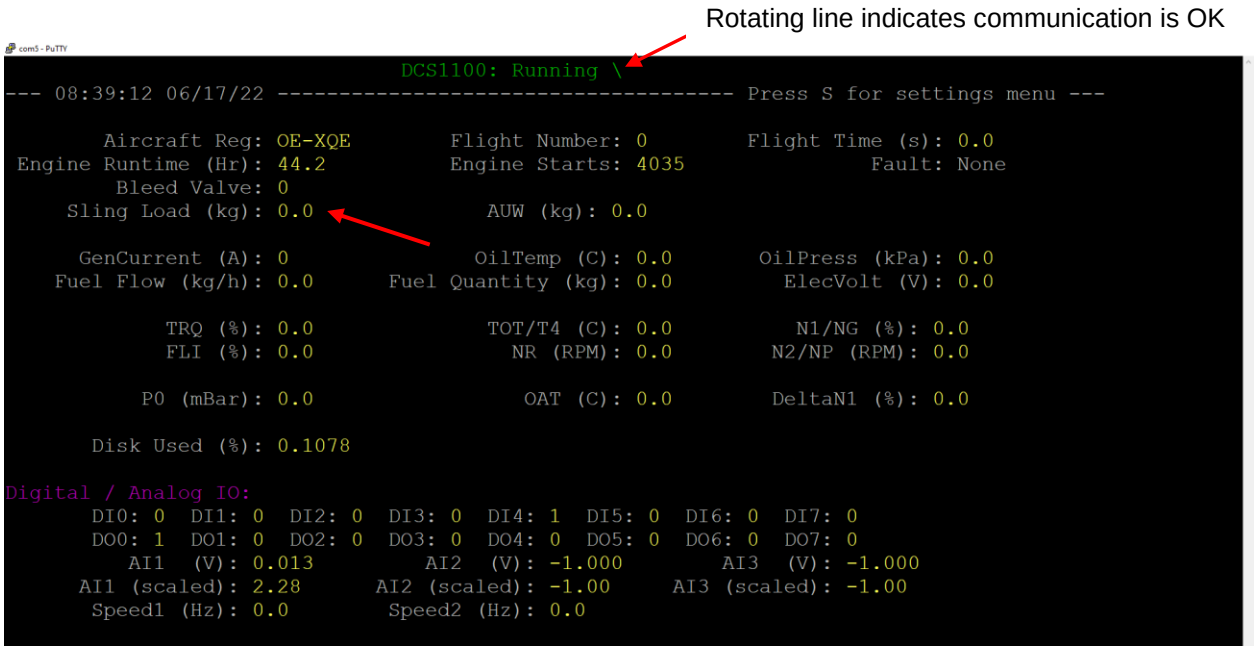
- CODE = the load cell labeled “CAL CODE” number (typically a four digit code) is entered.
- SCAL = the rated load cell capacity value which directly affects the analogue output. For example, a SCAL value of 2000 Lb/Kg is entered as 0200 (x10). This means that at 0Lb/Kg the analogue output from the indicator is 0v and at 2000, it is 5v (7v for some models).

For the following calibration example, the On Board indicator is set to display Kg

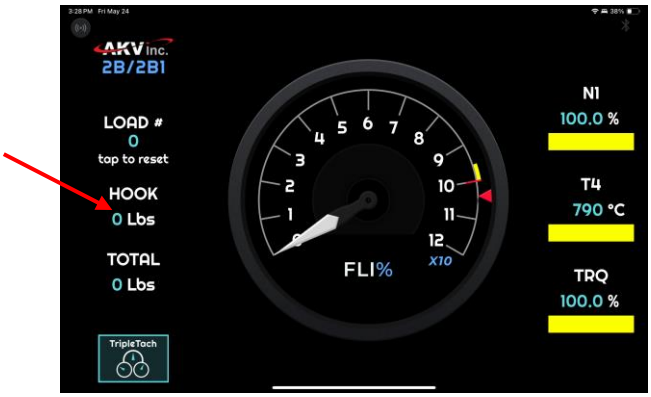
2. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
3. Run the PuTTy interface.

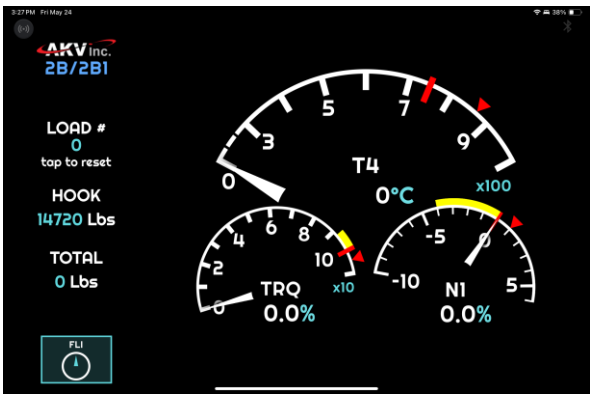
4. Confirm the DCS1100 analog setting voltage range is correct for the C-39
   Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue

5. In the top left corner of the PC display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**



6. You can also use the FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.





7. Zero the Onboard indicator display using the zero button.
8. Start the helicopter and establish a HOGE with the longline and hook clear of the ground.
9. The Onboard indicator will display the weight of the longline and hook.
10. Go to the Onboard configuration routine by pressing both buttons simultaneously
11. With the left button, press twice to display “0 in”
12. Press the right button, then with the displayed weight value flashing, press any button to exit. This will set the Analogue output to 0v with the weight of the longline and hook attached.
13. Confirm the symbol “Ø” (top middle) is displayed by pressing “un-zero”.

14. Land the helicopter and the Onboard indicator will display a (negative value). This is now your “un-zero” Ø value on the indicator which is the weight of the line and hook now removed from the load cell.

    NOTE: Pressing the zero button will zero the Onboard indicator but not the analogue output. Press the “un-zero” button again to show the un-zero Ø value and leave it there.

15. Establish a HOGE.
16. The Onboard indicator will display a 0 weight value. This is now your 0 weight with the longline and hook weight attached but importantly, with the analogue output at zero as well.
17. Lift a known weight equal to at least 25% of the rated max capacity of the load cell. A larger weight equal of 50% will provide better accuracy.
18. Observe the DCS1100 weight versus the Onboard indicator weight

    REMINDER: The Onboard indicator weight is x10 whereas the DCS1100 PC interface display and App weight is the real weight. An Onboard indicator weight of 45Kg = 450Kg

19. If the DCS1100 sling load weight is indicating higher than the Onboard indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
    The **basic formula** to know the approx. scale value to enter is based on the load cell capacity divided by the measured excitation voltage, for example 2000/10 = 200Lb/Kg per volt. A value of 200 is then a good starting scale number to enter in the DCS1100.
27. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value. There maybe a need to enter an offset value. If so, then a change to the scale factor might be needed to fine tune.
20. Exit the settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App, it will display “No Data” and you will have to re-connect the App each time.

21. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the Onboard indicator.
22. When the DCS1100 and Onboard indicator match within +/- 5Kg or +/-10Lb, different known weights can be lifted to verify accuracy.
23. When satisfied, record the DCS1100 scale value and offset as backup.
24. Land and shutdown.
25. The calibration procedure can be repeated if the results are not as expected or you can contact AKV for assistance.

    NOTE: If changing to a longer or shorter longline, it will be necessary to **reset** the Onboard indicator “0 in” configuration routine for the weight of the new line and hook. If you neglect to do this, you will notice the DCS1100 PC interface and / or FLI Repeater App “HOOK” weight will not match the Onboard indicator weight. Re-calibration is not required, only resetting the “0 in” is required. This is best done in cruise flight if flying without assistance of a copilot or mechanic. **Remember to always leave the display as “un-zero” Ø**.

END

ONBOARD C-39 AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE

APPENDIX C

ONBOARD C-40 AND DCS1100 CALIBRATION – ON GROUND PROCEDURE

The following procedure allows for on-ground calibration of the DCS1100 sling load indication with the Onboard C-40 load indicator. By following this procedure, there is no need to fly the helicopter to calibrate with a known weight (except for a test flight). With this method of calibration, it provides more time to configure the system and is possible to obtain an accuracy of +/- 5Kg or +/-10Lb or better between the DCS1100 and the Onboard indicator. An alternate “in-flight” only calibration procedure follows this procedure.

NOTE: For this procedure however, it is required that the RICE LAKE RANGER 5 load cell simulator kit is purchased from AKV, sold separately.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the “zero” button on the indicator will NOT zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The “Installation Zero” routine will enable the indicators analogue 0.5-10v output be at 0.5v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately

NOTE: **During** calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed “HOOK” weight to match the Onboard indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the Onboard indicator equal to the weight of the longline and hook. It will however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- RICE LAKE RANGER 5 load cell simulator kit (purchased separately from AKV). **Supplied with interface connector.**
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100
- Reference to the Onboard **C-40 owner’s manual 120-152-00**
- Battery cart for the A/C external power
- Your typical longline and remote hook (will also be used for the test flight)

IMPORTANT: It is assumed the Onboard indicator routines have previously been configured correctly and the system is calibrated already. Check the following items for your installation before proceeding. Refer to the Onboard C-40 indicator owner’s manual 120-152-00

- CODE = the load cell labeled “CAL CODE” number (typically a four digit code) is entered
- SCAL = the rated load cell capacity value which directly affects the analogue output. For example, a SCAL value of 2000 Lb/Kg it means that at 0Lb/Kg the analogue output from the indicator is 0.5v and at 2000 it is 10v

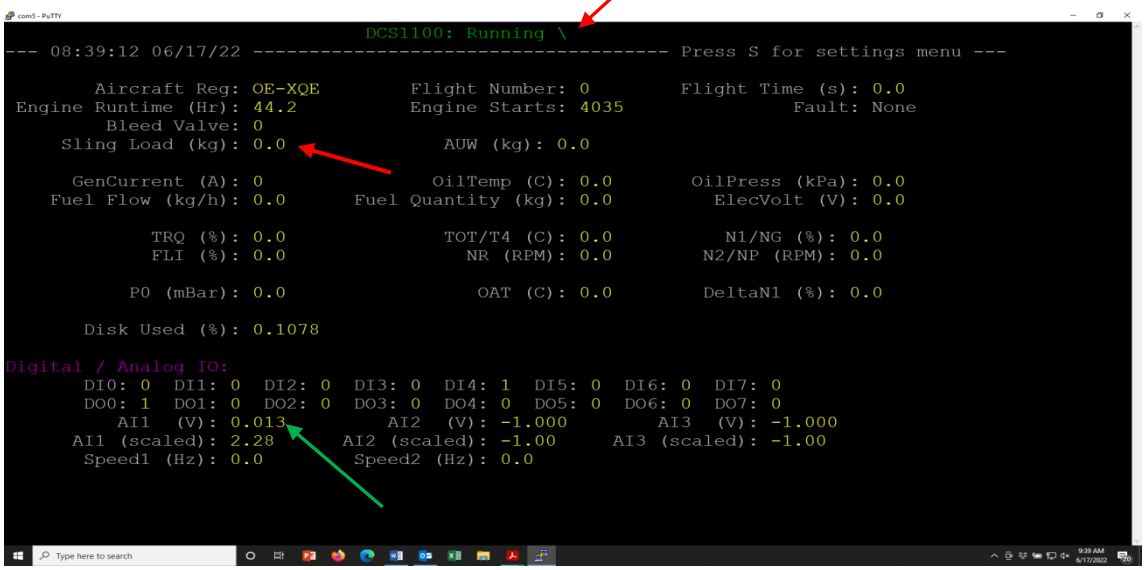
1. Confirm A/C power is OFF.
2. Weigh the longline and remote hook together on a scale, record the weight on paper
3. Disconnect the belly hook load cell connector and connect the “RICE LAKE RANGER 5” load cell simulator to the load cell female cable connector that is routed to the load indicator in the cockpit
4. Set the “RICE LAKE RANGER 5” as follows:
   a. Set the course/fine to **OFF**
   b. Set multi-turn adjustment pot on the right at zero
   c. Set the mV/V scale knob to zero

5. Connect the external battery cart to the A/C
6. Turn the A/C power ON

For the following calibration example, the Onboard indicator is set to display Kg and the weighed line and hook are 40 Kg (88Lb). However, **you will enter the weight of your longline and hook as weighed above during this procedure**.

7. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
8. Run the PuTTy interface.

Rotating line indicates communication is OK



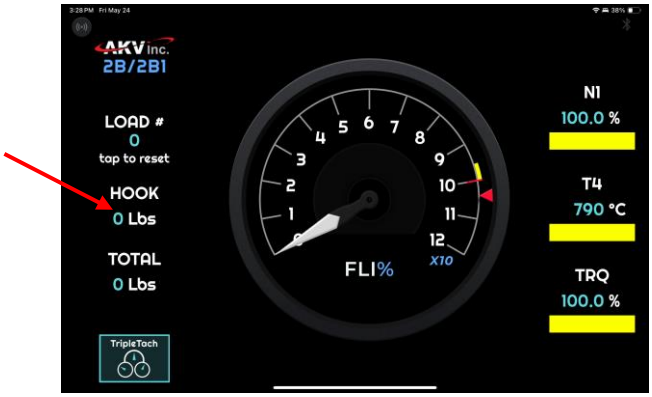
9. Confirm the DCS1100 analog setting voltage range is correct for C-40 (0-10v)
   Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue
10. On the C-40, run “Installation Zero”
11. Go to the Onboard configuration routine by rotating the knob left or right
    a. Push the knob one time
    b. Rotate the knob to highlight “Installation Zero”
    c. Push the knob one time
    d. Rotate the knob to display <YES>
    e. Push the knob to enter and again to select <OK>
    f. Push the knob and hold to exit

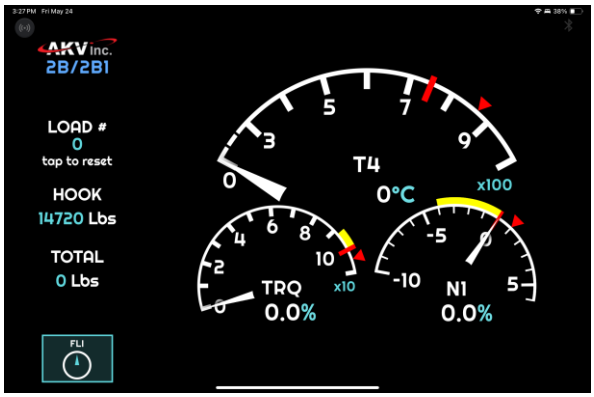
12. Verify analog input voltage AI1 is approx. 0.500v (green arrow above)
13. On the RICE LAKE RANGER 5, turn the course/fine to FINE

14. Adjust the multi-turn Vernier pot until the Onboard indicator displays a 40Kg (88Lb). Use your measured weight here
15. Run “Installation Zero” again as above
16. On the RICE LAKE RANGER 5, turn the course/fine to FINE or MEDIUM (your preference)

    NOTE: Pressing the zero button (displays Ø) will zero the Onboard indicator but not the analogue output. Double press to show the un-zero value. Leave it here and do not zero the indicator.

17. In the top left corner of the PC display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**
18. You can also use the optional FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.





19. Turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 0 weight value on the Onboard indicator. This is now your 0 weight with the weighed longline and hook weight attached but with the analogue output at zero as well.
20. Continue to turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 450Kg which is a mid-weight value (992Lb) on the Onboard indicator.
21. Observe the DCS1100 weight versus the Onboard indicator weight
22. If the DCS1100 sling load weight is indicating higher than the Onboard indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
23. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value.
24. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the Onboard indicator. The **basic formula** to know the approx. scale value to enter is based on the load cell capacity divided by the typical measured excitation 10v, for example, 2000/10 = 200Lb/Kg per volt. A value of 200 is then a good starting scale number to enter in the DCS1100.
25. Exit settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App it will display “No Data” and you will have to re-connect the App each time.

26. When the DCS1100 and Onboard indicator match within +/- 5Kg or +/-10Lb, adjust the Vernier multi-turn pot to different displayed weights, including max weight to verify they continue to match. There maybe a need to enter an offset value. If so, then a change to the scale factor might be needed to fine tune.
27. When satisfied, record the DCS1100 scale value and offset as backup.
28. Turn the “RICE LAKE RANGER 5” Vernier multi-turn pot to zero.
29. Turn off the A/C power, disconnect the “RICE LAKE RANGER 5” and re-connect the cable to the Onboard load cell.

Complete a test flight with the long line and remote hook that was weighed previously.

If using the PC interface for this test flight, a mechanic will need to ride along OR if using the FLI Repeater App, you can observe that the App displayed “HOOK” weight corresponds with the Onboard indicator weight.

30. Start the A/C.
31. Make sure the Onboard indicator is set to display “un-zero”. This will display the –XX value equal to the weight of the longline and hook used above.

    NOTE: If you press the zero button (indicates Ø), the displayed indicator weight will not match the analogue output weight so you will want to always leave it as “un-zero”. Pressing either the zero or un-zero will not change your settings.

32. Lift to a hover and with the longline clear of the ground. The Onboard indicator should show zero.
33. Lift a known weight to confirm the Onboard indicator, DCS1100 PC interface and / or FLI Repeater App “HOOK’ weight match +/- 5Kg or +/-10Lb.
34. The calibration procedure can be repeated if the results are not as expected or you can contact AKV for assistance.

    NOTE: If changing to a longer or shorter longline, it may be necessary to **reset** the Onboard “Zero Installation” configuration routine for the weight of the new line and hook. If you neglect to do this, you may notice the DCS1100 PC interface and / or FLI Repeater App “HOOK” weight will not match the Onboard indicator weight. Re-calibration is not required, only resetting the “0 in” is required. This is best done in cruise flight if flying without assistance of a copilot or mechanic. **Remember to always leave the display as “un-zero”**.

END

ONBOARD C-40 AND DCS1100 CALIBRATION – ON GROUND PROCEDURE

APPENDIX D

ONBOARD C-40 AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE

The following procedure allows for in-flight calibration of the DCS1100 sling load indication with the Onboard C-40 load indicator. This procedure requires you to fly the helicopter to calibrate the DCS1100 with a known weight. When using this method to calibrate, it is possible to obtain an accuracy of +/- 5Kg or +/-10Lb between the DCS1100 and the Onboard indicator.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the “zero” button on the indicator will **NOT** zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The “Installation Zero” routine will enable the indicators analogue 0.5-10v output to be at 0.5v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately

NOTE: During calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed “HOOK” weight to match the Onboard indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the Onboard indicator equal to the weight of the longline and hook. It will, however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100
- Reference to the Onboard **C-40 owner’s manual 120-152-00**
- Your typical longline and remote hook
- A Mechanic / copilot to assist calibration in-flight.

1. Before flight, A/C battery switch ON

IMPORTANT: It is assumed the Onboard indicator routines have previously been configured correctly and the system is already calibrated. Check the following items for your installation before proceeding. Refer to the Onboard C-40 indicator owner’s manual 120-152-00

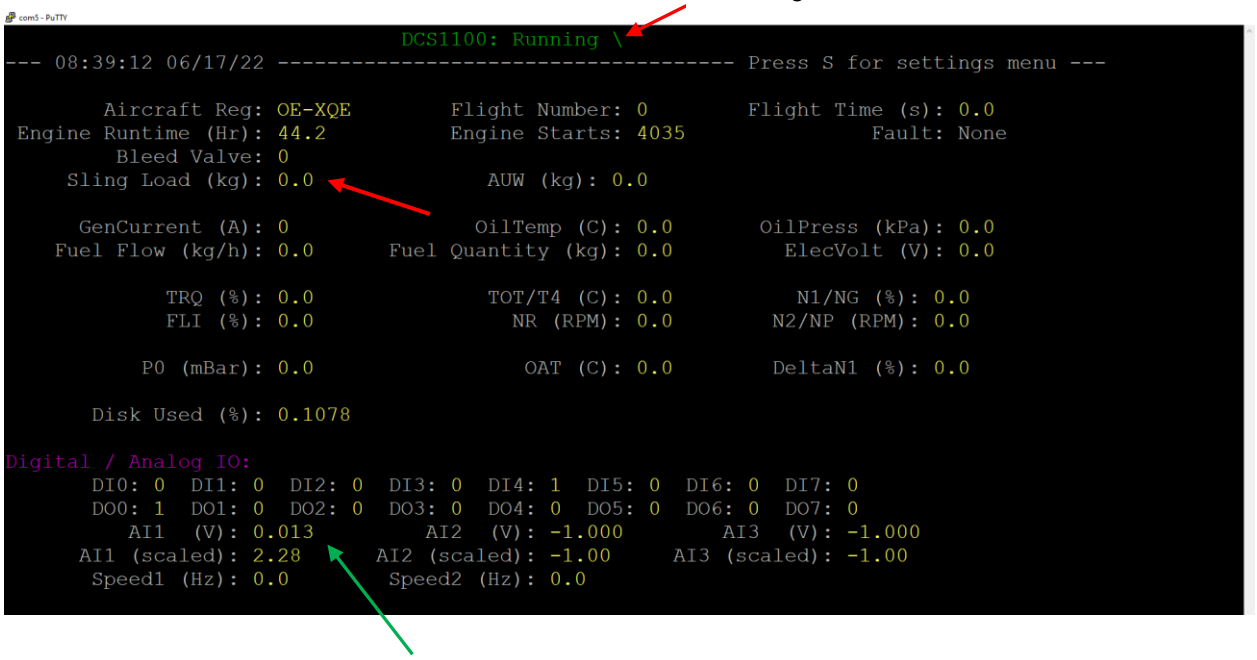
- CODE = the load cell labeled “CAL CODE” number (typically a four digit code) is entered
- SCAL = the rated load cell capacity value which directly affects the analogue output. For example, a SCAL value of 2000 Lb/Kg means that at 0Lb/Kg the analogue output from the indicator is 0.5v and at 2000, it is 10v

For the following calibration example, the Onboard indicator is set to display Kg

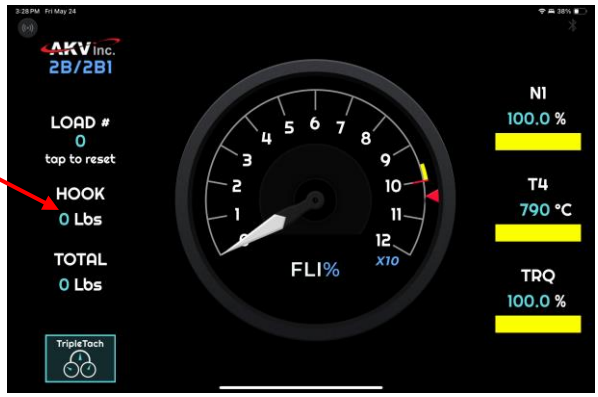
2. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
3. Run the PuTTy interface.

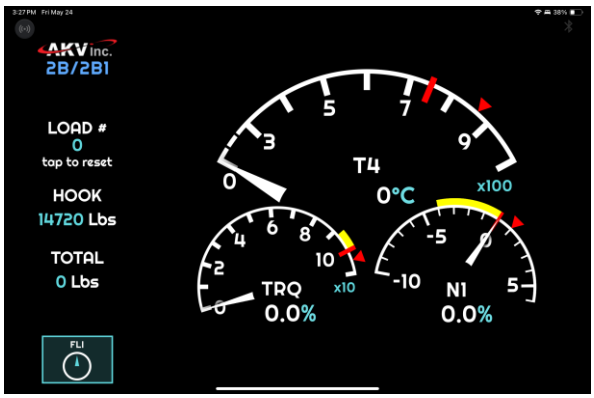
4. Confirm the DCS1100 analog setting voltage range is correct for C-40 (0-10v)
   Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue
5. In the top left corner of the PC display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**

Rotating line indicates communication is OK



6. You can also use the FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.





7. Start the helicopter and establish a HOGE with the longline and hook clear of the ground
8. On the C-40, run “Installation Zero”
9. Go to the Onboard configuration routine by rotating the knob left or right
   g. Push the knob one time
   h. Rotate the knob to highlight “Installation Zero”
   i. Push the knob one time
   j. Rotate the knob to display <YES>
   k. Push the knob to enter and again to select <OK>
   l. Push the knob and hold to exit

10. Verify analog input voltage AI1 is approx. 0.500v (green arrow above)

11. The Onboard indicator will display the weight of the longline and hook.

    NOTE: Pressing the zero button (displays Ø) will zero the Onboard indicator but not the analogue output. Double press to show the un-zero value. Leave it here and do not zero the indicator.

12. Lift a known weight equal to at least 25% of the rated max capacity of the load cell. A larger weight equal of 50% will provide better accuracy.
13. Observe the DCS1100 weight versus the Onboard indicator weight
14. If the DCS1100 sling load weight is indicating higher than the Onboard indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
    The **basic formula** to know the approx. scale value to enter is based on the load cell capacity divided by the measured excitation voltage, for example 2000/10 = 200Lb/Kg per volt. A value of 200 is then a good starting scale number to enter in the DCS1100.
15. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value. There maybe a need to enter an offset value. If so, then a change to the scale factor might be needed to fine tune.
16. Exit the settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App, it will display “No Data” and you will have to re-connect the App each time.

17. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the Onboard indicator.
18. When the DCS1100 and Onboard indicator match within +/- 5Kg or +/-10Lb, different known weights can be lifted to verify accuracy.
19. When satisfied, record the DCS1100 scale value and offset as backup
20. Land and shutdown.
21. The calibration procedure can be repeated if the results are not as expected or you can contact AKV for assistance.

    NOTE: If changing to a longer or shorter longline, it will be necessary to **reset** the Onboard indicator “Installation Zero” routine for the weight of the new line and hook. If you neglect to do this, you will notice the DCS1100 PC interface and / or FLI Repeater App “HOOK” weight will not match the Onboard indicator weight. Re-calibration is not required, only resetting “installation Zero” is required. This is best done in cruise flight if flying without assistance of a copilot or mechanic. **Remember to always leave the display as “un-zero”**.

END

ONBOARD C-40 AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE

APPENDIX E

MSI-150X AND DCS1100 CALIBRATION – ON GROUND PROCEDURE

The following procedure allows for on-ground calibration of the DCS1100 sling load indication with the MSI-150X load indicator. By following this procedure, there is no need to fly the helicopter to calibrate with a known weight (except for a test flight). With this method of calibration, it provides more time to configure the system and is possible to obtain an accuracy of +/- 5Kg or +/-10Lb or better between the DCS1100 and the MSI indicator. An alternate "in-flight" only calibration procedure follows this procedure.

NOTE: For this procedure however, it is required that the RICE LAKE RANGER 5 load cell simulator kit is purchased from AKV, sold separately.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the "zero" button on the indicator will NOT zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The "un-zero" method will enable the indicators analogue 0-5v output to be at 0v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately.

NOTE: During calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed "HOOK" weight to match the MSI indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the MSI indicator equal to the weight of the longline and hook. It will however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- RICE LAKE RANGER 5 load cell simulator kit (purchased separately from AKV). **Supplied with interface connector.**
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100.
- Reference to the **MSI-150X Sky-Weigh User Guide.**
- Battery cart for the A/C external power.
- Your typical longline and remote hook (will also be used for the test flight)

IMPORTANT: It is assumed the MSI indicator is already calibrated as indicated by the MSI "Calibration" method on Pg. 7 of the **MSI-150X Sky-Weigh User Guide.**

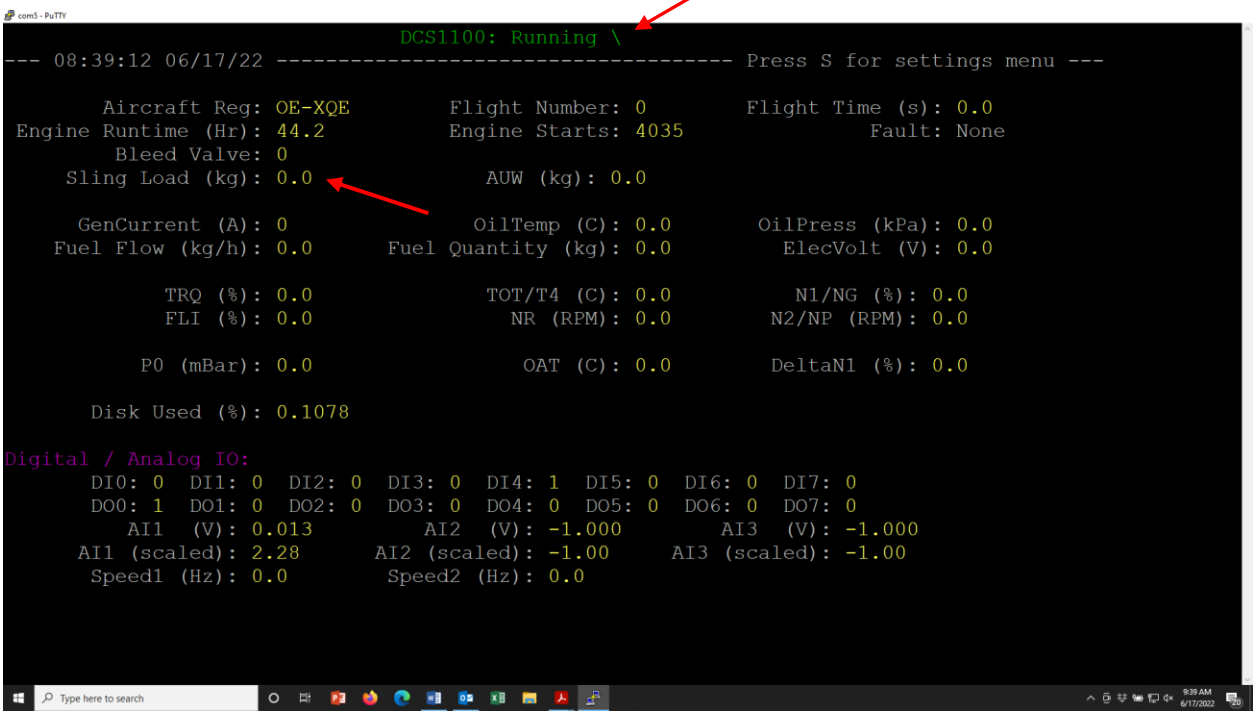
1. Confirm A/C power is OFF.
2. Weigh the longline and remote hook together on a scale and record the weight on paper
3. Disconnect the belly hook load cell connector and connect the "RICE LAKE RANGER 5" load cell simulator to the load cell female cable connector that is routed to the load indicator in the cockpit.

4. Set the “RICE LAKE RANGER 5” as follows:
   a. Vernier to “fine” and the multi-turn adjustment pot on the right at zero
   b. Set the mV/V scale knob to zero
5. Connect the external battery cart to the A/C.
6. Turn the A/C power ON.

For the following calibration example, the MSI indicator is set to display Kg and the weighed line and hook are 40 Kg (88Lb). However, **<u>you will enter the weight of your longline and hook as weighed above during this procedure</u>**.

7. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
8. Run the PuTTy interface.

Rotating line indicates communication is OK

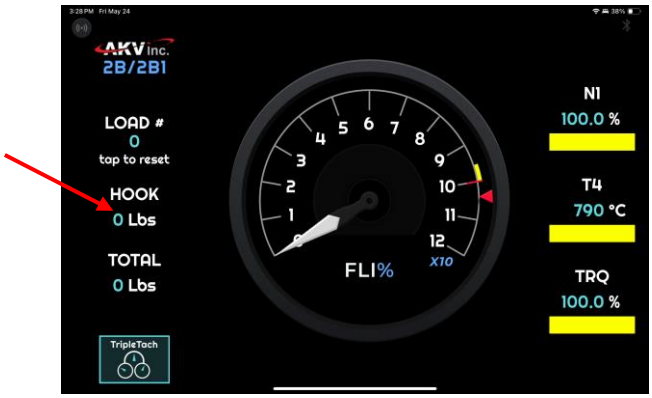


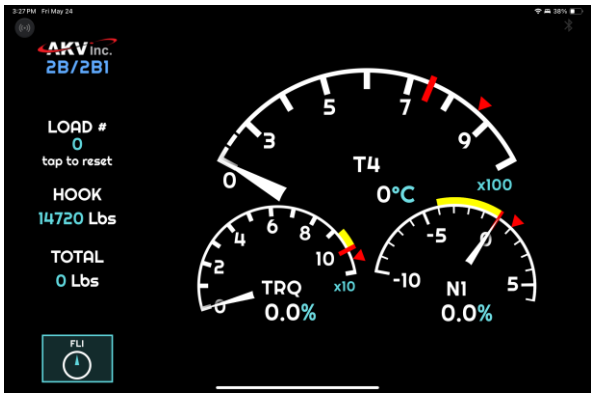
9. Confirm the DCS1100 analog setting voltage range is correct for MXI-150
   Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue
10. The MSI indicator display, if previously adjusted for zero and span correctly, should display zero. If not refer to MSI “Calibration” method on Pg. 7 of the **MSI-150X Sky-Weigh User Guide**.
11. Adjust the multi-turn Vernier pot until the MSI indicator displays 40Kg (88Lb). <u>Use your measured weight here</u>
12. Wait 30 sec to allow for the dampening settings of the indicator to stabilize the display.
13. On the rear of the MSI indicator, now adjust the “zero” pot to indicate 0 on the display.

14. Turn the Vernier multi-turn pot back to zero and the MSI indicator will display a (negative value) – 40Kg. This is the unconnected or “un-zero” weight value on the indicator which is the weight of the line and hook now removed from the load cell.

    NOTE: Pressing the zero button will zero the MSI indicator but not the analogue output. Recycle the power to show the unconnected weight of your longline and hook. **Leave it here and do not zero the indicator.**

15. In the top left corner of the PC PuTTy display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**
16. You can also use the optional FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.





17. Turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 0 weight value on the MSI indicator. This is now your 0 weight with the weighed longline and hook weight attached but with the analogue output at zero as well.
18. Continue to turn up the “RICE LAKE RANGER 5” Vernier multi-turn pot to display a 450Kg which is a typical mid-weight value (992Lb) for the H125 load cell.
19. Observe the DCS1100 weight versus the MSI indicator weight.
20. If the DCS1100 sling load weight is indicating higher than the MSI indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
21. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value.
22. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the MSI indicator. As a starting scale value, enter the actual A/C labeled load cell CAL *xxxx*.

23. Exit settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App, it will display “No Data” and you will have to re-connect the App each time.

24. When the DCS1100 and MSI indicator match within +/- 5Kg or +/-10Lb, adjust the Vernier multi-turn pot to different displayed weights, including max weight to verify they continue to match.

    NOTE: At the lower weight indications, there may be a need to add an offset value + or -. If this needed, **re-check the higher weight indications** to adjust the scale factor to compensate for the added offset.

25. When satisfied, record the DCS1100 scale and offset values as backup.
26. Turn the “RICE LAKE RANGER 5” Vernier multi-turn pot to zero.
27. Turn off the A/C power, disconnect the “RICE LAKE RANGER 5” and re-connect the cable to the A/C load cell

Complete a test flight with the long line and remote hook that was weighed previously.

If using the PC interface for this test flight, a mechanic will need to ride along OR if using the FLI Repeater App, you can observe that the App displayed “HOOK” weight corresponds with the MSI indicator weight.

28. Power ON
29. The MSI indicator should still display the –XX value equal to the weight of the longline used above. If not, adjust the rear zero pot to show the negative (-xx) “un-zero” value of the weighed longline and hook.

    NOTE: If you press the zero button, the displayed indicator weight will not match the analogue output weight so you will want to always leave it as “un-zero”. You will need to cycle the power to see the “un-zero” value again.

30. Start the A/C and lift to a HOGE with the longline and hook clear of the ground. The MSI indicator should show zero.
31. Lift a known weight to confirm the MSI indicator, DCS1100 PC interface and / or FLI Repeater App “HOOK’ weight match +/- 5Kg or +/-10Lb.
32. The calibration procedure can be repeated if the results are not as expected or you can contact AKV for assistance.

    NOTE: If changing to a longer or shorter longline, it may be necessary to **reset** the MSI indicator “un-zero” for the weight of the new line and hook. If you neglect to do this, you may notice the DCS1100 PC interface and / or FLI Repeater App “HOOK” weight will not match the MSI indicator weight. Re-calibration is not required, only resetting the “un-zero” is required using the rear indicator zero pot. This is best done with the assistance of a copilot or mechanic. **Remember to always leave the display as “un-zero”.**

END

MSI-150X AND DCS1100 CALIBRATION – ON GROUD PROCEDURE

APPENDIX F

MSI-150X AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE

The following procedure allows for in-flight calibration of the DCS1100 sling load indication with the MSI-150X load indicator. This procedure requires you to fly the helicopter to calibrate the DCS1100 with a known weight. When using this method to calibrate, it is possible to obtain an accuracy of +/- 5Kg or +/-10Lb between the DCS1100 and the MSI indicator.

Typical operation is to simply tare or zero the indicator when the longline and remote hook are attached. This allows for the pilot to view only the weight carried on the hook. However, pressing the “zero” button on the indicator will **NOT** zero the analogue output which is needed for the DCS1100 to record weights correctly based on actual weights carried.

The “un-zero” method will enable the indicators analogue 0-5v output to be at 0v when the weight of a longline and remote hook are connected in flight. This is important for the DCS1100 sling load weight to record accurately.

NOTE: During calibration of the DCS1100, it is important for the DCS1100 and optional FLI Repeater App displayed “HOOK” weight to match the MSI indicator. Once calibration is complete and if pressing the zero button to tare the longline and hook in flight, **there will be a difference** between the FLI Repeater App hook weight from the DCS1100 and the MSI indicator equal to the weight of the longline and hook. It will however not affect the analogue signal to the DCS1100 after calibration.

Items needed for calibration are:

- Laptop PC installed with PuTTy for interface with the DCS1100 using the supplied RS232 cable
- Optional iPad installed with the FLI Repeater App and previously configured to communicate with the DCS1100
- Reference to the **MSI-150X Sky-Weigh User Guide.**
- Your typical longline and remote hook
- A Mechanic / copilot to assist calibration in-flight.
- Access to the zero pot on the rear of the indicator
- Copy down the CAL value from the load cell label

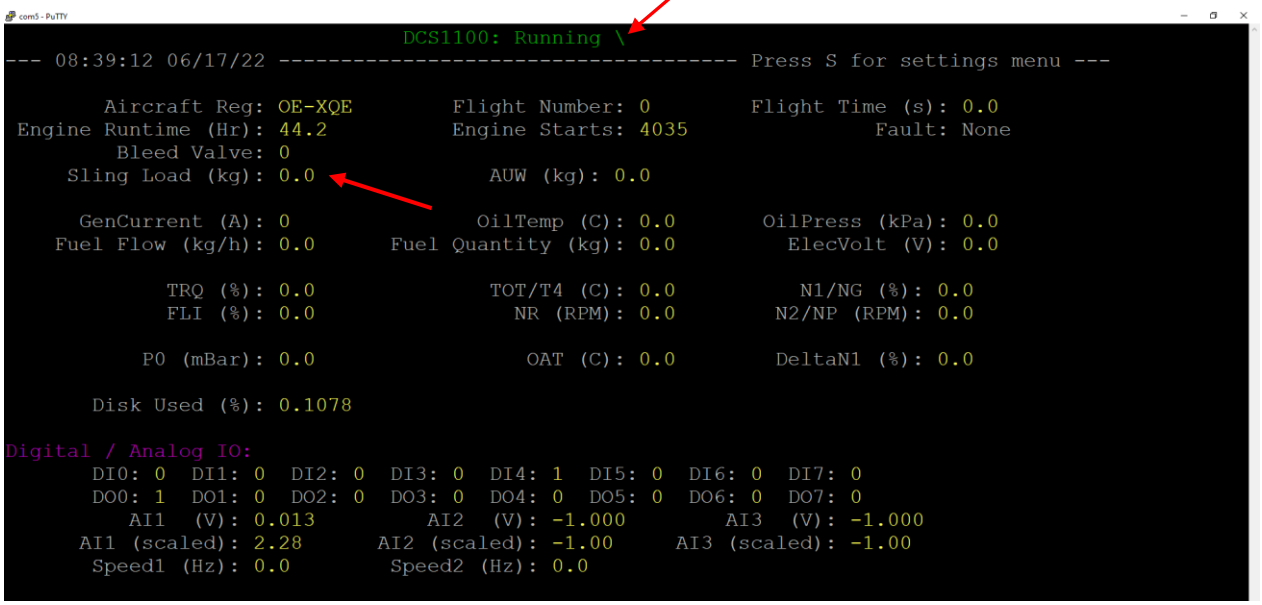
1. A/C battery switch ON

IMPORTANT: It is assumed the MSI indicator is known to be calibrated as indicated by the MSI “Calibration” method on Pg. 7 of the **MSI-150X Sky-Weigh User Guide**

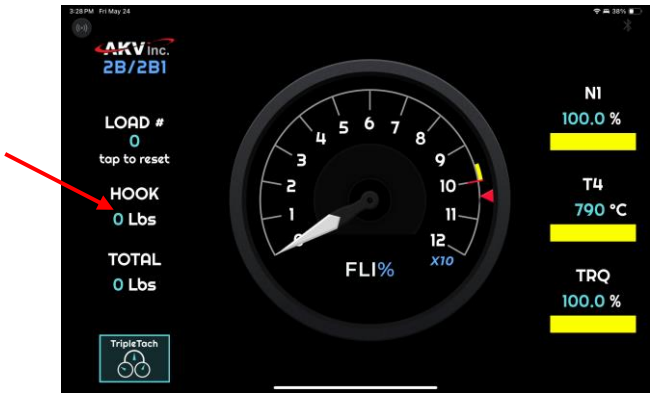
For the following calibration example, the MSI indicator is set to display Kg

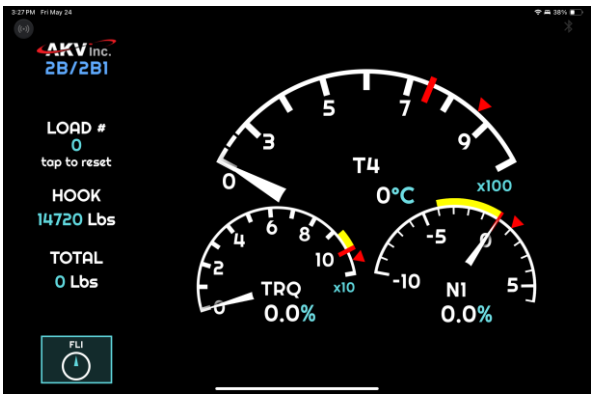
1. Connect your PC running the PuTTy interface to the DCS1100 “S1” (Com 1) port.
2. Run the PuTTy interface.
3. Confirm the DCS1100 analog setting voltage range is correct for MXI-150
   Ref. 5.10.2 HOOK INPUT RANGE WHEN ANALOG IS SELECTED then continue
4. In the top left corner of the PC display under “Bleed Valve” is the Sling Load or Hook weight for the DCS1100. **This value is always in Kg and cannot be changed.**

Rotating line indicates communication is OK



5. You can also use the FLI Repeater App at the same time to observe the App displayed “HOOK” weight which will be the same as displayed on the PC. The weight can be changed from Kg to Lb and back by pressing the displayed weight.





6. Zero the MSI indicator display using the zero button.
7. Start the A/C and lift to a HOGE with the longline and hook clear of the ground.
8. The MSI indicator will display the weight of the longline and hook.
9. Adjust the rear zero pot to show 0 on the indicator
10. Land the helicopter and the MSI indicator will display a –XX (negative value). This is now your "un-zero" value on the indicator which is the weight of the line and hook now removed from the load cell.

    NOTE: Pressing the zero button will zero the MSI indicator but not the analogue output. Cycle the power on the indicator to show the "un-zero" value and leave it there.

11. Establish a HOGE again.
12. The MSI indicator will display a 0 weight value. This is now your 0 weight with the longline and hook weight attached but importantly, with the analogue output at zero as well.
13. Now, lift a known weight equal to at least 25% of the rated max capacity of the load cell. A larger weight equal of 50% will provide better accuracy.
14. Observe the DCS1100 weight versus the MSI indicator weight
15. If the DCS1100 sling load weight is indicating higher than the MSI indicator, then the DCS1100 scale value will need to be lowered and vice-versa.
16. On the DCS1100 interface, enter S for settings / password (DCS1100) / L- Configure hook / S – Scale Factor to enter a different scale value.
17. Adjust the DCS1100 scale factor until you have found the correct scale value that allows the DCS1100 to match the MSI indicator. As a starting scale value, enter the actual A/C labeled load cell CAL *xxxx*.
18. Exit settings back to the main screen after every entry.

    NOTE: When exiting the settings and if using the App, it will display "No Data" and you will have to re-connect the App each time.

19. The DCS1100 and MSI indicator need to match within +/- 5Kg or +/-10Lb,
20. For additional calibration confirmation try lifting a lower weight.

    NOTE: At the lower weight indications, there may be a need to add an offset value + or -. If this needed, **re-check the higher weight indications** to adjust the scale factor to compensate for the added offset.

21. When satisfied, record the DCS1100 scale and offset values as backup.
22. Land and shutdown

    NOTE: If changing to a longer or shorter longline, it will be necessary to **reset** the MSI indicator "un-zero" configuration routine for the weight of the new line and hook. If you neglect to do this, you will notice the DCS1100 PC interface and / or FLI Repeater App "HOOK" weight will not match the MSI indicator weight. Re-calibration is not required, only resetting the "un-zero" is required. This is best done in cruise flight if flying without assistance of a copilot or mechanic.
    Remember to always leave the display as "un-zero".

END

MSI-150X AND DCS1100 CALIBRATION – IN FLIGHT PROCEDURE