Garmin Integrated Flight Deck
Engine Data Analyzer Instructions

GARMIN®

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INTRODUCTION

The Garmin Integrated Flight Deck Engine Data Analyzer is a Visual Basic macro written for Microsoft Excel and designed to enable owner/operators of turbine-powered aircraft to log and analyze engine data.

SYSTEM REQUIREMENTS

Before installing the Garmin Integrated Flight Deck Engine Data Analyzer make sure your computer meets the System Requirements.

SOFTWARE

- Windows XP, Vista, 7
- MS Excel 2003 or later

RECOMMENDED HARDWARE

- SD Card Reader
- 1 GB RAM
- 10 MB hard drive space

INSTALLATION

The installation process consists of clicking the link on the website to download and run the self-extracting .zip application. Once the installation has finished you should be able to locate and open the Garmin Integrated Flight Deck Engine Data Analyzer spreadsheet on your local hard drive.

1) Visit https://fly.garmin.com/fly-garmin/support/engine-data-analyzer/
2) Click on the download link for the Garmin Integrated Flight Deck Engine Data Analyzer (EDA). Depending on your connection speed, the download may take up to a few minutes.
3) Specify a local directory for the WinZip Self-Extractor to place the necessary files. The default location for the install is "C:\Garmin\G1000", to use another directory, type it in the text box, or click the **Browse…** button to choose a different install location.

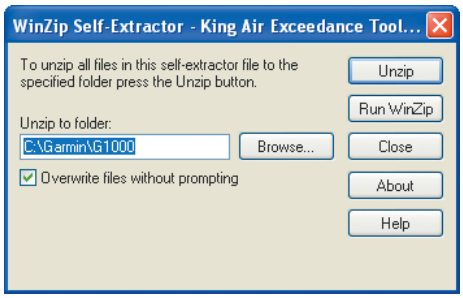


Figure 1 WinZip Self-Extractor

5) Click **Unzip**

6) Once the WinZip Self-Extractor has finished, a window will appear to show that the installation was successful, Click **OK** to continue

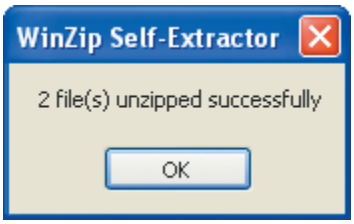


Figure 2 Installation Successful

7) Close the WinZip Self-Extractor

CONFIGURATION

In order for the EDA to evaluate any engine data, the necessary engine parameters will need to be entered into the spreadsheet. Before you proceed with this step, ensure that you have a current AFM for your aircraft.

User Defined Color Codes

	OPERATING CONDITION	SHP	TORQUE	MAXIMUM OBSERVED ITT	GAS GENERATOR RPM N1			PROP RPM N2		OIL PRESS		OIL TEMP	
		HP	FT-LBS	deg C	RPM	%		RPM	RPM	PSI	PSI	deg C	deg C
		Max	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	Max
	STARTING			1000						0		-40	
	LOW IDLE			750	22875	61		1150		60		-40	110
	HIGH IDLE											-40	110
	TAKEOFF	850	2230	820	39000		104		2000	90	135	0	110
	MAX CONT	850	2230	820	39000		104		2000	90	135	0	110
	CRUISE CLIMB	850	2230	775	39000		104		2000	90	135	0	110
	NORMAL CRUISE	850	2230	775	39000		104		2000	90	135	0	110
	MAX CRUISE	850	2230	820	39000		104		2000	90	135	0	110
	MAX REVERSE	850		760			88		1900	90	135	0	110
	TRANSIENT		2750	850	39000		104		2200	40	200	0	104
☑	TRANSIENT TIME LIMIT (sec)		5	20					20				600
	START TRANSIENT TIME LIMIT (sec)			5									

Check box to activate footnote limit.		Minimum	Maximum
☑	Torque limits apply within the following RPM range:	1600	2000
	Below this range, torque is limited to the following value (FT-LBS):		1100

Check box to activate footnote limit.		Feathered RPM Limit
☑	Operation at or below the following propeller RPM is permissible only with the propeller feathered:	400

Check boxes to activate footnote limits.								
			Min N1%	Min Oil Temp (deg C)		Max Oil Temp (deg C)		
☑	When the following conditions are met:		72	60		71		
	Normal oil pressures are:	Min (psi)	90	Max(psi)	135	Below Altitude (ft):		21,000
		Min (psi)	85	Max(psi)	135	At or Above (ft):		21,000
☑	Oil pressures in the following range should be tolerated only for the duration of the flight:	Min (psi)	60	Max(psi)	85	Engine torque is limited to:		1100
☑	Oil pressure below this value requires engine shut down or landing at the nearest airport with minimal power (psi):			60				

Summary | Exceedances | Limitations | About

Figure 3 Engine Limitations

1) Locate and open the EDA spreadsheet. Note that the default install location is C:\Garmin\G1000.
2) Enable macros (if not already enabled).
3) Click on the Limitations worksheet. Enter the required engine limitations into the spreadsheet. See the appropriate sections in your aircraft's AFM for detailed engine performance information.
4) Check or uncheck the engine parameter limits that you want to be evaluated.
5) Set the desired color code for each parameter limit as shown in Figure 3. These color codes will appear on the Exceedance worksheet when a parameter corresponding to the color code has been exceeded.
6) Once all engine limitations are configured, click 'Save' to complete the configuration.

OPERATION

Engine log files from the aircraft system SD card can be downloaded and then analyzed by the EDA. The resulting analysis will show instances of operation which are outside the established limits.

NOTE: *Any new engine data, or new analysis will require that the data be reanalyzed before the results are shown on the appropriate worksheets.*

1) Click on the Summary worksheet.
2) Ensure that the network path in the Data Directory field is complete and accurate. Note that the default path is "C:\Garmin\G1000\data".

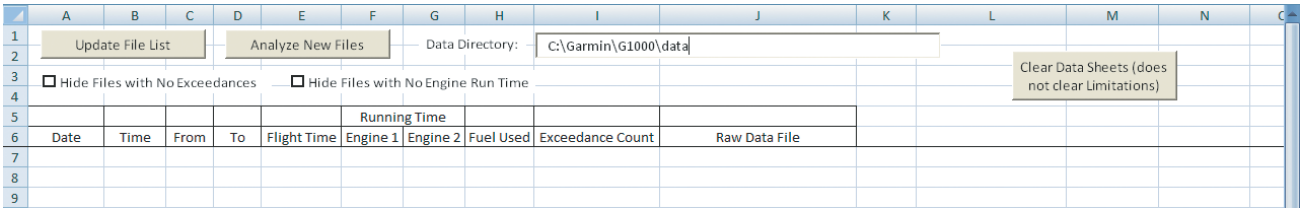


Figure 4 Empty Summary Worksheet

3) Remove the SD card from the aircraft and place it into an SD card reader connected to your PC.
4) Copy the desired log files from the SD card to the folder that corresponds to the data path entered into the Data Directory cell in the spreadsheet.

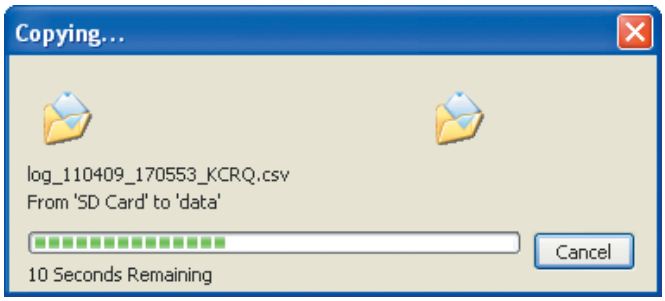
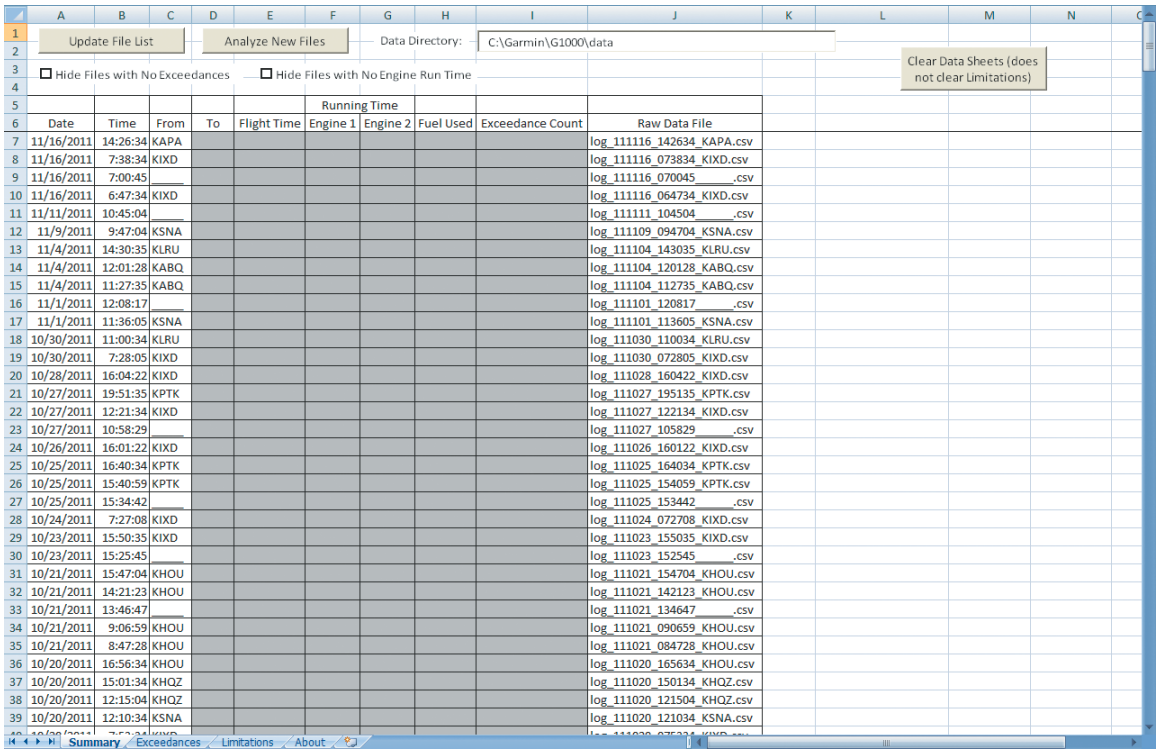


Figure 5 Copying Log Files

5) Click the **Update File List** button. Any files that were added to the directory will be imported, and will appear with grey data cells. The grey cells indicate log files that have not yet been analyzed.



Date	Time	From	To	Flight Time	Running Time Engine 1	Running Time Engine 2	Fuel Used	Exceedance Count	Raw Data File
11/16/2011	14:26:34	KAPA							log_111116_142634_KAPA.csv
11/16/2011	7:38:34	KIXD							log_111116_073834_KIXD.csv
11/16/2011	7:00:45	____							log_111116_070045_____.csv
11/16/2011	6:47:34	KIXD							log_111116_064734_KIXD.csv
11/11/2011	10:45:04	____							log_111111_104504_____.csv
11/9/2011	9:47:04	KSNA							log_111109_094704_KSNA.csv
11/4/2011	14:30:35	KLRU							log_111104_143035_KLRU.csv
11/4/2011	12:01:28	KABQ							log_111104_120128_KABQ.csv
11/4/2011	11:27:35	KABQ							log_111104_112735_KABQ.csv
11/1/2011	12:08:17	____							log_111101_120817_____.csv
11/1/2011	11:36:05	KSNA							log_111101_113605_KSNA.csv
10/30/2011	11:00:34	KLRU							log_111030_110034_KLRU.csv
10/30/2011	7:28:05	KIXD							log_111030_072805_KIXD.csv
10/28/2011	16:04:22	KIXD							log_111028_160422_KIXD.csv
10/27/2011	19:51:35	KPTK							log_111027_195135_KPTK.csv
10/27/2011	12:21:34	KIXD							log_111027_122134_KIXD.csv
10/27/2011	10:58:29	____							log_111027_105829_____.csv
10/26/2011	16:01:22	KIXD							log_111026_160122_KIXD.csv
10/25/2011	16:40:34	KPTK							log_111025_164034_KPTK.csv
10/25/2011	15:40:59	KPTK							log_111025_154059_KPTK.csv
10/25/2011	15:34:42	____							log_111025_153442_____.csv
10/24/2011	7:27:08	KIXD							log_111024_072708_KIXD.csv
10/23/2011	15:50:35	KIXD							log_111023_155035_KIXD.csv
10/23/2011	15:25:45	____							log_111023_152545_____.csv
10/21/2011	15:47:04	KHOU							log_111021_154704_KHOU.csv
10/21/2011	14:21:23	KHOU							log_111021_142123_KHOU.csv
10/21/2011	13:46:47	____							log_111021_134647_____.csv
10/21/2011	9:06:59	KHOU							log_111021_090659_KHOU.csv
10/21/2011	8:47:28	KHOU							log_111021_084728_KHOU.csv
10/20/2011	16:56:34	KHOU							log_111020_165634_KHOU.csv
10/20/2011	15:01:34	KHQZ							log_111020_150134_KHQZ.csv
10/20/2011	12:15:04	KHQZ							log_111020_121504_KHQZ.csv
10/20/2011	12:10:34	KSNA							log_111020_121034_KSNA.csv

Figure 6 New Engine Log Files

6) Click the **Analyze New Files** button. Once pressed, the spreadsheet will perform the necessary computations and insert the results into the Summary and Exceedances worksheets. Depending on the number of log files imported, the process could take several minutes, please do not navigate to other worksheets until this process has finished. During this process the **Analyze New Files** button will display the current progress of the analysis and data results will gradually replace the empty grey cells..

Figure 7 Progress Indicator

NOTE: *If the Hide Flights with Zero Exceedances and/or Hide Files with No Engine Run Time box is checked, and no flights contain exceedances, or engine run time, the Summary and Exceedances worksheets will have no visible data.*

7) Once the data has been downloaded from the SD card, remove it from the PC and place it back into the SD Card slot in the aircraft.

8) As more data is collected from the aircraft, repeat steps 1-6 to import and analyze new data.

9) If you wish to clear existing engine data from the EDA spreadsheet, click the **Clear Data Sheets** button. This will clear any logs and analyzed data, but it will not clear the Limitations, or remove the log files from the Data folder.

VIEWING EXCEEDANCES

Engine log data that has been analyzed, will show in the Summary and Exceedances worksheets. The Summary worksheet gives an overview of the flight, as well as the exceedance count. The Exceedances worksheet gives a detailed list of each exceedance, when it occurred, for how long, and which parameter was exceeded.

1) Click on the Summary worksheet to view a line-by-line summary of each engine log. Each line shows: Date, Time, From, To, Flight Time, Engine Run Time, Fuel Used, Exceedance Count, and Raw Data File.

					Running Time				
Date	Time	From	To	Flight Time	Engine 1	Engine 2	Fuel Used	Exceedance Count	Raw Data File
10/25/2011	15:40:59	KPTK		0.00	0.00	0.00	0	0	log_111025_154059_KPTK.csv
10/25/2011	15:34:42	_____		0.00	0.00	0.00	0	0	log_111025_153442_____.csv
10/24/2011	7:27:08	KIXD	FAVLI	2.05	2.33	2.34	225	25	log_111024_072708_KIXD.csv

Figure 8 Engine Log Summary

2) To view detailed exceedance information about a particular flight, click on the Exceedances worksheet.

3) Scroll through the list of exceedances until you reach the desired flight. The beginning of each flight will include a single line summary of the flight, followed by a list of exceedances.

4) Exceedance limits are shown in order of occurrence. Each exceedance includes the following information: Start and End Time, Parameter Exceeded, Min/Max Value, Phase of Flight, Duration, and an Exceedance Note which provides additional information on how the parameter was exceeded. If a color code was assigned to an engine parameter limitation, the corresponding color will appear when the parameter is exceeded, as shown in Figure 9.

1					Running Time (Hrs)						
2	Time	From	To	Flight Time (Hrs)	Engine 1	Engine 2	Fuel Used (Gals)	Exceedance Count	Raw Data File		
1266	20:14:11	KMCI	KIXD	1.81	2.05	2.06	193	67	log_110909_201411.csv		
1267											
1268		Start	End	Parameter	Min/Max Value	Phase	Duration	Exceedance Note			
1269		20:15:00	20:15:01	Maximum ITT, Engine 2	1005	Starting	2	During engine start ITT must not exceed 1000.			
1270		20:15:32	20:15:33	Minimum Oil Temperature, Engine 1	-42.78	Starting	3	In this operating condition, oil temperature must not be less than -40.			
1271		20:15:37	20:15:37	Maximum Oil Pressure, Engine 1	210	Starting	1	In this operating condition, oil pressure must not exceed 200.			
1272		20:15:43	20:15:49	Maximum ITT, Engine 1	860	Starting	6	During engine start ITT may exceed 850 for no more than 5 seconds.			
1273		20:15:51	20:15:53	Minimum Oil Temperature, Engine 1	-42.78	Starting	2	In this operating condition, oil temperature must not be less than -40.			
1274		20:16:05	20:16:07	Minimum Oil Pressure, Engine 1	59	On Ground	2	In this operating condition oil prssure must not be less than 60.			
1275		20:16:13	20:18:14	Minimum Propeller RPM, Engine 1	1131	On Ground	120	Stabilized ground operation below 1150 RPM is prohibited.			
1276		20:16:19	20:16:40	Maximum ITT, Engine 1	800	On Ground	22	In this operating condition ITT may exceed 750 for no more than 20 seconds.			
1277		20:18:17	20:18:35	Minimum Propeller RPM, Engine 1	1141	On Ground	19	Stabilized ground operation below 1150 RPM is prohibited.			
1278		20:20:04	20:20:59	Minimum N1, Engine 2	59.62	On Ground	52	N1 is limited to a minimum of 61 at Low Idle.			
1279		20:20:06	20:20:56	Minimum N1, Engine 1	58.36	On Ground	47	N1 is limited to a minimum of 61 at Low Idle.			
1280		20:20:57	20:20:57	Minimum Propeller RPM, Engine 1	1139	On Ground	1	Stabilized ground operation below 1150 RPM is prohibited.			
1281		20:21:01	20:21:04	Minimum Propeller RPM, Engine 1	1131	On Ground	3	Stabilized ground operation below 1150 RPM is prohibited.			
1282		20:23:50	20:23:53	Minimum Propeller RPM, Engine 1	1149	On Ground	5	Stabilized ground operation below 1150 RPM is prohibited.			
1283		20:25:29	20:25:29	Maximum Oil Pressure, Engine 2	140	Takeoff	2	In this operating condition, oil pressure is limited to 135.			
1284		20:25:29	20:25:41	Maximum N1, Engine 2	104.50	Takeoff	11	In this operating condition N1 must not exceed 104.			
1285		20:25:32	20:25:32	Minimum Oil Temperature, Engine 2	-1.11	Takeoff	2	In this operating condition, oil temperature must not be less than 0.			
1286		20:25:34	20:25:36	Maximum Oil Temperature, Engine 1	111.11	Takeoff	2	In this operating condition oil temperature must not exceed 104.			
1287		20:25:36	20:25:36	Maximum Torque, Engine 1	2760	Takeoff	1	In this operating condition torque must not exceed 2750.			
1288		20:25:36	20:25:38	Minimum Oil Temperature, Engine 2	51.67	Takeoff	2	A minimum oil temperature of 55 is recommended for fuel heater operation at t			
1289		20:25:36	20:25:41	Maximum Torque, Engine 1	2760	Takeoff	6	In this operating condition torque must not exceed 2750.			
1290		20:25:43	20:25:43	Minimum Oil Pressure, Engine 2	88	Takeoff	2	In this operating condition oil prssure must not be less than 90.			
1291		20:25:48	20:25:50	Minimum Oil Temperature, Engine 2	-3.89	Cruise Climb	2	In this operating condition, oil temperature must not be less than 0.			
1292		20:26:23	20:26:28	Maximum Torque, Engine 1	2250	Cruise Climb	6	In this operating condition torque may exceed 2230 for no more than 5 seconds.			
1293		20:34:43	20:34:54	Maximum N1, Engine 1	104.50	Cruise Climb	12	In this operating condition N1 must not exceed 104.			
1294		20:36:25	20:36:27	Maximum Oil Pressure, Engine 1	140	Cruise Climb	2	When N1 is greater than 72 and oil temperature is between 60 and 71, normal oil			
1295		20:36:44	20:36:44	Minimum Oil Pressure, Engine 2	88	Cruise Climb	2	In this operating condition oil prssure must not be less than 90.			
1296		20:37:01	20:37:01	Maximum Oil Pressure, Engine 2	140	Cruise Climb	2	In this operating condition, oil pressure is limited to 135.			
1297		20:37:55	20:37:57	Minimum Oil Pressure, Engine 1	88	Max Continuous	2	In this operating condition oil prssure must not be less than 90.			
1298		20:38:02	20:38:08	Maximum Torque, Engine 2	2250	Max Continuous	6	In this operating condition torque may exceed 2230 for no more than 5 seconds.			
1299		20:38:17	20:38:18	Minimum Oil Temperature, Engine 1	-3.89	Max Continuous	2	In this operating condition, oil temperature must not be less than 0.			
1300		20:38:22	20:38:32	Maximum N1, Engine 2	104.50	Max Continuous	11	In this operating condition N1 must not exceed 104.			
1301		20:38:51	20:38:53	Maximum Oil Pressure, Engine 1	140	Max Continuous	2	When N1 is greater than 72 and oil temperature is between 60 and 71, normal oil			
1302		20:39:43	20:39:45	Maximum ITT, Engine 1	860	Max Continuous	2	In this operating condition, ITT must not exceed 850.			

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Figure 9 Exceedances

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