

WAITERS FLIGHT DATA RECORDER

Flight Data Recorder

Walters Flight Data Recorder

TERMS OF USE

You are free to use and distribute this program. You can give it away, but please don't sell it.

THE PROGRAM

One of the major problems I have when test flying new hardware or airframe changes, is documenting the flight parameters. I get caught up in "flying the plane" and forget to note key parameters.

With this software program, attached to a GPS, an EFIS, and an Engine Monitoring system (EMS), I can now focus my full attention on the test card and not have to worry about documenting flight parameters.

Just start the program before engine start, and go fly the plane.

Walters Flight Data Recorder is designed to run on a laptop, or other IBM compatible computer that may be installed in the aircraft.

The Recorder accepts serial inputs from any, or all;

- 1) GPS receiver that transmits NEMA 0183 Serial Data at 4,800 bps,
- 2) Dynon EFIS D10, D10A, or D100 transmitting serial data at 115,200 bps.
- 3) Dynon EMS 10 Engine Monitor, transmitting serial data at 115,200 bps.
- 4) Grand Rapids 4000/6000, transmitting serial data at 9,600 bps.

The Recorder separates the data and displays it on the user screen.

The displayed data is then recorded at a user selectable interval from 63 times per second (if EFIS is installed), or as slow as once every 30 seconds.

Typically, the recorder is operated at once per second.



THE NEED FOR SPEED

Slower Machine:

When operating in the “Real Time” mode, and attempting to record all three items (EFIS, EMS and GPS), my older Toshiba Satellite 1555, 350mhz AMD-K6 processor (shown above) running Windows ME could not keep up, and would crash after a few seconds.

When I turned off the EMS, it would record the EFIS and GPS in the REAL TIME mode.

It would keep up at the “1/4 Second” interval.

Faster Machine:

A no name computer running WinXP with an AMD Duron processor at 1.3 Ghz. Using one serial port, and two SER-to-USB adapters was able to record all three items (EFIS, EMS and GPS) in the “Real Time” mode. This is a LOT of data being stored, so make sure theres plenty of room on the hard drive.

NOTE: if your computer is crashing, remove the EFIS or EMS serial plug, then reboot, run Waiters Flight Data Recorder, and select a slower speed or disable one of the high speed unit. Save the configuration before attempting to reconnect the serial cable.

SETUP AND RUN

Run the SETUP file to install the Waiters Flight Data Recorder. This will install three files in the application folder, WAITERS FLIGHT DATA RECORDER.EXE and WAITERS FLIGHT DATA RECORDER.INI, and WAITERS FLIGHT DATA RECORDER.PDF. Windows normally places these in the C:\Program Files\ folder

The final resting place for these files will most likely be in the following folder:

C:\Program Files\WAITERS FLIGHT DATA RECORDER.exe

Once installed, run Waiters Flight Data Recorder like any other Windows program. To run Waiters Flight Data Recorder, click on the “WAITERS FLIGHT DATA RECORDER” icon on the desktop, or in the START- PROGRAMS – Waiters Flight Data Recorder

RECORDER DATA FILES

The default folder for the recorded data files is “C:\FLIGHT RECORDER”.

You can change this on the COM SETUP screen.

Whenever the Recorder is started, it looks to see if a data file already exists for today's date. If it doesn't, a new file is created. The file name will be in the form of WFDRmmddyy.TXT.

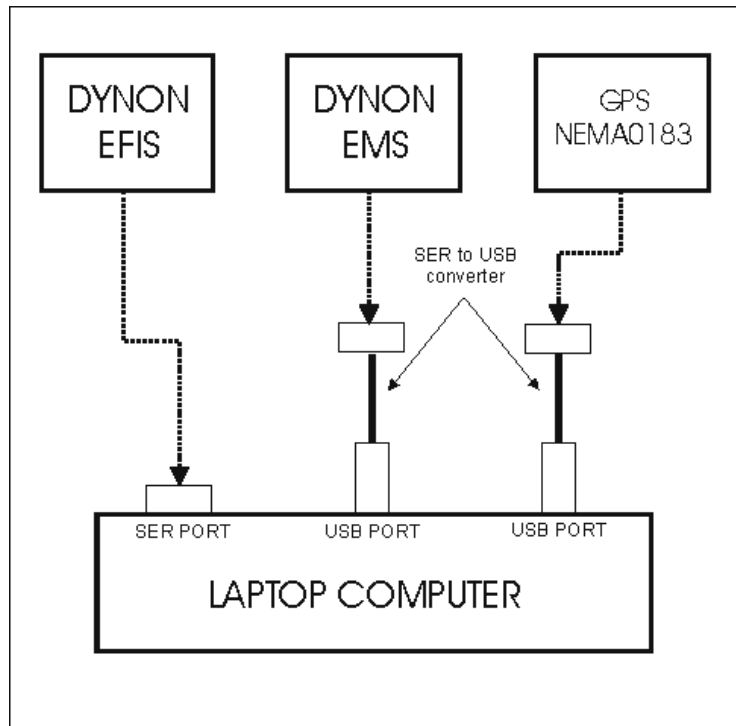
Example: WFDR072505.TXT

Regardless if the file exists or not, the Recorder will always write a header line to the file. The header line is tab delimited that provides the names for the data fields. Look below under Header Fields. For a brief description of the headers.

If the recorder is stopped and started several times during a day, you'll see a new header line in the file every time the recorder was restarted.

SERIAL INPUTS

The Dynon EFIS D10, D10A, and D100 output a serial stream of data over 60 times a second. This rapid stream is excellent for detailed resolution, but may be “to much” data for viewing on an Excel spreadsheet.



HOW IT WORKS

The EFIS data stream is decoded and displayed in real time. The displayed data is then "captured" at the interval selected, from "real time" to once every 30 seconds and stored in a tab delimited text file.

In the "Real Time" mode, display data is updated in real time. The display is updated four times per second for the other recording speeds.

An input is also available for GPS data. Most modern GPS units transmit a NEMA 0183 serial output. Waiters Flight Data Recorder looks for three particular "Sentences" from the NEMA 0183 data. It then parses the data, places it on the display, and records it along with the EFIS data.

By utilizing both EFIS and GPS data, a complete three-dimensional data set, along with exact location, can be saved to the recorder's data files.

PLUS, a Serial input from the EMS records engine parameters in conjunction with the positioning data. This makes performance evaluations a snap, as all the data is correlated in time, and recorded in one file. i.e. CHT and Oil Temperature rise during climb. Fuel burn for climb, cruise, or descent. ALL THIS IS recorded and documented.

When recording a DYNON EFIS, Due to the high speed of the EFIS serial stream, connect it to the computer's serial port, rather than through a SER-to-USB converter.

Waiters Flight Data Recorder will record EFIS, GPS, and ENGINE data at the interval selected. If you don't have a GPS but would like to take advantage of this recorder, you may want to look at

www.deluoelectronics.com

They offer some very inexpensive standalone USB and Serial port GPS receivers.



The left photo shows a Deluo Stand Alone GPS receiver (Price \$69.00). This receiver measures about 1 inch square. It receives its power from the USB or Mouse connector on the computer. It outputs standard NEMA0183 serial data at 4800 baud.

Most Laptops only have one Serial port connection. I've used both "Blue Tooth", and a "USB to Serial" converters, to give me another serial port, both with excellent results.

The photo on the right shows two SER-to-USB converters that I use. My old Toshiba laptop has only one mode 1.0 USB port (slow), so I also use a USB powered USB HUB (shown with the converters). With the drivers provided, the computer treats these USB converter ports like standard serial ports.

Remember, Waiters Flight Data Recorder will record EFIS OR GPS OR ENGINE, OR any combination. If you record only with EFIS, the GPS fields will be blank. If you record only with GPS, the EFIS fields will be blank. For easy viewing, the ENGINE data is displayed on its own separate page.

Walters Flight Data Recorder Main Page

FLIGHT DATA

Walters GPS / EFIS / EMS Flight Recorder

FLIGHT DATA

TIME

COMPUTER: 10:16:07 SET

GPS: 15:16:08

EFIS: 11:17:33 53

SPEED ALTITUDE COURSE

GPS: 0.0 379 0 T

GPS: 0.0 833 244 M

PITCH: -07.1 ROLL: +000.0

LATERAL Gs: -0.1 VERTICAL Gs: +1.0

TURN RATE: -00.2 AOA: 99

FIX MODE: SPS MODE SATs USED: 06

LATITUDE: N 4134.1317 LONGITUDE: W 08328.4379

DYNON EMS10 MONITOR

UNITS

☐ MSec, Meters ☐ kM/hour, Meters

☒ kNOTS, FEET ☐ MPH, FEET

COMM PORTS

GPS: COM1 4800,n,8,1

EFIS: COM8 115200,n,8,1

ENGINE: COM9 115200,n,8,1

CONFIGURATION

RECORDER

PRESS (F1) TO STOP

Folder/File: C:\EFIS\EFIS110505.TXT

☐ Real Time ☒ 1 Sec ☐ 10 Sec

☐ 1/4 Sec ☐ 5 Sec ☐ 30 Sec

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Version 2.4.1b 4 Nov 2005

SAVE CONFIG

Flight data can be captured from two sources, an EFIS and/or a GPS

The EFIS data source can be either a Dynon EFIS D10, D10A, or D100. This source transmits EFIS data out its serial port at 115,200. Note that the EFIS data fields have blue colored text.

The GPS data source can be any GPS that transmits a NEMA 0183 "\$GPGGA", "\$GPRMC", and "\$GPVTG" sentence. Note that the GPS data fields have brown colored text.

TIME

The Display shows three times, The Computer time, GPS Time, and the EFIS time. All three times are recorded.

When the GPS receiver is tracking a valid position, the "FIX MODE" indicator will change to a bright green color. Note also that the "SET" button becomes active with a valid GPS fix. Pressing the SET button will update the computers date and time to match the GPS date and time. The time set feature will take into account the "Time Zone" that is set in the computer.

NOTE: If you are experiencing problems with the GPS TIME fields in the recorded data, Try selecting the other TIME FORMAT on the configuration menu. Some variants of GPS Sentences are using a time format that is unpredictable, and difficult to convert to different formats. If you are able to capture these sentences, send them to me and I'll see if I can change the recorder program to correctly convert these sentences.
Thanks, Waiter

COURSE

There are three data blocks under the course heading, these are;

GPS True course. Aircraft is tracking this course across the ground.

GPS Magnetic Course**. Aircraft is tracking this course across the ground.

EFIS Heading. Aircraft is pointing in this direction (magnetic)

** Some GPS receivers don't transmit the "\$GPVTG" sentence, Waiters Flight Data Recorder uses this sentence ONLY for the magnetic heading. True heading is derived from the more popular "\$GPRMC" sentence.

ENGINE MONITOR

Clicking this button will select the engine monitor screen. There are currently two (2) Engine Monitors supported; (Grand Rapids, and Dynon)

UNIT CONVERSION

The GPS and EFIS outputs data in the Metric and/or English system. The Waiters Flight Data Recorder will convert, display, and record the data in the units selected by the operator. To avoid confusion, a field in the recorded data indicates what units are being used., KPH, MPS, KNOTS, or MILES.

KPH :	Speed > Kilometers per Hour,	Altitude > Meters
MPS :	Speed > Meters per Second,	Altitude > Meters
KNOTS :	Speed > Nautical Miles per Hour,	Altitude > Feet
MILES :	Speed > Statute Miles per Hour,	Altitude > Feet

Unit conversion can be selected real time., and takes effect immediately.

If you wish to save the changes made to the UNITS or the RECORDER time, simply press the "SAVE CONFIG" button. The settings are now saved in the INI file.

COMM PORTS

The Com ports show what ports are being used, and their settings. The configuration of the serial ports can be changed by clicking the “CONFIG SERIAL” button near the bottom of the screen. This will call up the “EFIS GPS COM PORT SETTINGS” screen.

Real time serial data can be displayed at any time by clicking on any of the data display windows for the GPS or the EFIS.

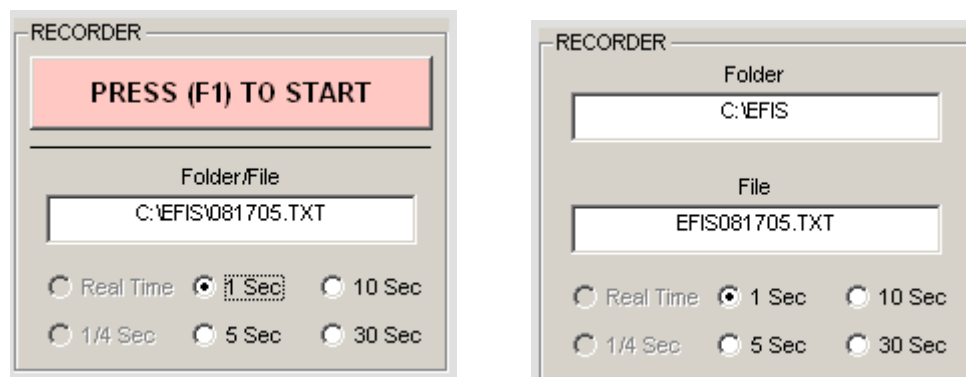
NOTE: If the EFIS or GPS Comm ports are set to “NONE”, their corresponding data displays are darkened and disabled.

The small green indicators beside each Port Number text box will turn bright green when recognizable data is being received and decoded on the port.

CONFIGURATION BUTTON – Calls up the Serial Port / Recorder configuration screen

RECORDER

There are Two possible sub windows available, depending on the configuration setting.



The Window on the left is displayed on the main screen if the “Show RECORDER START-STOP Button” is selected on the **EFIS GPS Com Port Settings** screen. The recorder can be started and stopped by either clicking on the PRESS (F1) TO START, or by using the F1 hot key. When the recorder is ON, the button will blink colors, alternating between dark green and gray.

The window on the right is displayed if the “Show RECORDER START-STOP Button” is NOT selected. In this case, the recorder runs whenever the program is running.

NOTE: Whenever the recorder is started, OR, whenever any of the setup parameters are changed, a new header line is inserted into the data file.

The Folder where the recorded file is stored has a default setting of “C:\EFIS”. This can be changed in the Setup Page by clicking the CONFIGURATION button.

DATA FILE NAME

The record data File name is created automatically, based on the computers date. The file name will be EFISmddyy.TXT. The Record file is a tab delimited file and can read by any text editor or spreadsheet program. Keep in mind that Microsoft Excel is limited to 65,000 lines.

Whenever Waiters Flight Data Recorder is started, it will always write a new line that contains the field headers. The headers are tab delimited, just like the data, and make it easy to identify the fields when loaded into a spreadsheet program.

Header fields are only included for the item being recorder, EFIS, GPS, or ENGINE. The selection is enabled by selecting the COM port. If a COM port is anything other than "NONE", then fields are created, and the corresponding data is recorded. If the COM port is "NONE" than the fields are NOT created, and the data is NOT recorded.

These two fields will Always be created, and are always the first two fields in each record.

COMPUTER TIME
UNITS

The following fields are also created if their corresponding COMM PORT is selected to record data.

GPS COMM PORT

Review your GPS manual for description of NEMA 0183 sentence descriptions. Although the NEMA 0183 is a standard, there may be minor variations in the sentence structure. I've tested the software with numerous vendors of GPS receivers and the code works OK .

Goggle NEMA 0183

These fields are created and recorded if the GPS COM port is set to anything except "NONE";

GPS COMM
GPS TIME
GPS MAG
GPS TRUE
GPS GND SPEED
GPS ALTITUDE
GPS LATITUDE
GPS LONGITUDE
GPS MODE
GPS SATS USED

EFIS COMM PORT

These fields are created and recorded if the EFIS COM port is set to anything except "NONE"; Currently the Dynon D10, D10A, and D100 are the only three EFIS systems supported.

DYNON EFIS D10, D10A, and D100 data

Review the Dynon EFIS manual for detailed description of EFIS data:

<http://www.dynondevelopment.com/>

EFIS COMM
EFIS TIME
EFIS PITCH
EFIS ROLL
EFIS YAW
EFIS AIRSPEED
EFIS ALTITUDE
EFIS TURN RATE
EFIS LAT G's
EFIS VERT G's
EFIS AOA

EMS COMM PORT

These fields are created and recorded if the ENGINE COM port is set to anything except "NONE"; Either the DYNON EMS or the GRAND RAPIDS will be recorded, depending on the setup.

DYNON EMS 10 DATA

Review the Dynon EMS manual for detailed description of EMS engine data:

<http://www.dynondevelopment.com/>

RPM
MANIFOLD PRES
OIL TEMP
OIL PRES
VOLTS
AMPS
EGT 1
EGT 2
EGT 3
EGT 4
EGT 5
EGT 6
CHT 1
CHT 2
CHT 3
CHT 4
CHT 5
CHT 6
FUEL PRES
FUEL FLOW
QUANTITY 1
QUANTITY 2
FUEL REMAINING
GP 1
GP 2
GP 3
THERMOCOUPLE

GRAND RAPIDS 4000 / 6000

Depending on the software version of the Grand Rapids 4000/6000, it may output one of two different styles of information (headers). Waiters Flight Data Recorder will automatically detect which header style is being transmitted, and parse the serial stream data correctly.

NOTE: Waiters Recorder doesn't perform any unit conversion with the Grand Rapids 4000/6000, because there is no way for the recorder to know what units are being output by the GR4000/6000, i.e. knots vs. mph, or Deg C vs. Deg F. The units recorded are the units displayed on the GR4000/6000.

EMS COMM
HEADER
FLIGHT TIMER
HOUR METER
OIL TEMP
OIL PRES
CARB TEMP
COOLANT TEMP
RPM1
RPM2
VOLTS
EGT1
EGT2
EGT3
EGT4
EGT5
EGT6
CHT1
CHT2
CHT3
CHT4
CHT5
CHT6
FUEL
FLOW
TIME REMAIN
AIRSPEED
ALTITUDE
ROC
BARO
OAT
INT TEMP
AUX1
AUX2
AUX3
AUX4
AUX5
AUX6

RECORDER TIMES

This is the time interval between recorded entries. Keep in mind that some slower computers may not be able to keep up with the fast speeds of the serial port, or the fast write times that will be required if the recorder is operated in the "Real Time" mode.

Real Time – makes a recording entry every time the EFIS sends a complete field. This recording is done up to 63 entries per second. If for some reason the EFIS serial port becomes disconnected, data will be recorded at a default rate of once per second.

Although Excel will be able to handle about 18 hours of data at this speed, the file will become very large and cumbersome. Try it.

$\frac{1}{4}$ - 30 seconds – These intervals make a recording entry as indicated. The $\frac{1}{4}$ will make 4 entries per second, the 30 will make one entry every thirty seconds.

If you change the times, you can save the new setting by clicking on the "SAVE CONFIG" in the UNITS window.

NOTE: If the EFIS is not used or not selected, the "REAL TIME" and "1/4 Second" record times are disabled. Normally GPS updates at once per second, so recording any faster than this is a waste of disk space.

DYNON EMS 10 ENGINE DATA SCREEN

Engine Monitoring System							
ENGINE							
TIME	0134:54.31		RPM	0000		MAN PRES	02.50
OIL TEMP	346		VOLTS	12.6			
OIL PRES	000		AMPS	001			
EGT	1	2	3	4	5	6	
	-099	0168	0286	0094	0546	0048	
CHT	-17	182	163	080	208	212	
FUEL							
PRESSURE		FLOW					
99.9		00.0					
QTY 1	QTY 2	REMAIN					
00.0	00.0	00.0					
MISC							
GP1	OAT = -0046						
GP2	N/A = XXXXX						
GP3	N/A = XXXXX						
Temp	-099						
RETURN							

Review the Dynon EMS 10 manual for the meaning/applicability of the data.

Click on any of the fields to view the raw serial stream.

GRAND RAPIDS 4000/6000 ENGINE DATA SCREEN

GRAND RAPIDS 4000 / 6000							
ENGINE							
FLIGHT TIME	1113.40		HOUR	0.0		VOLTS	12.0
OIL TEMP	81	CARB	77	RPM 1	00		
OIL PRES	19	COOLANT	59	RPM 2	00		
	1	2	3	4	5	6	
EGT	67	67	67	67	73	72	
CHT	69	69	69	69	72	72	
FUEL							
FUEL REMAIN	38.0	FLOW	0.0	TIME REMAIN	0:00		
FLIGHT							
AIRSPEED	0	ALTITUDE	0				
ROC	0	BARO	00.00				
OAT TEMP	77	INT TEMP	83				
MISC							
AUX 1	4						
AUX 2	12						
AUX 3	0						
AUX 4	302						
AUX 5	65,535						
AUX 6	0						
HEADER	\$FE \$FE \$FE						
RETURN							

NOTE

No Unit conversion is performed. The units recorded in the data file, and the units displayed on this screen are the same as the units displayed on the Grand Rapids screen.

The HEADER box (MISC) displays the header version being received by the recorder. Currently, only two headers are supported, \$FE-\$FF-\$FE and , \$FE-\$FE-\$FE .

The small green box to the right of the HEADER will turn bright green when one of these two headers has been received and decoded.

EFIS / GPS / EMS COM PORT SETTINGS

The screenshot shows the 'EFIS GPS Com Port Settings' dialog box. It is organized into four panels: EFIS, ENGINE, GPS, and RECORDER OPTIONS. Each panel contains settings for a specific device's serial communication. The EFIS panel is configured for COM8 at 115200 baud with 8 data bits, no parity, 1 stop bit, and no flow control. The ENGINE panel is set to COM9 at 115200 baud with 8 data bits, no parity, 1 stop bit, and no flow control. The GPS panel is set to COM1 at 4800 baud with 8 data bits, no parity, 1 stop bit, and no flow control. The RECORDER OPTIONS panel shows the data folder location as 'C:\EFIS', the time format as 'hh:mm:ss', and the 'Show RECORDER START-STOP Button' checkbox is checked. Each of the three device panels has an 'ACCEPT' button (which is red) and a 'DISPLAY COMM' button. At the bottom of the dialog are 'CANCEL' and 'RETURN' buttons.

The Com port settings screen allows you to change com port settings, and reassign the folder where the recorded data will be written.

EFIS, GPS, and EMS Port Settings

Clicking on any of the parameters will cause the corresponding "ACCEPT" button to turn red. This serves as a reminder that you may have made changes to the port settings. You MUST click the ACCEPT button to activate any changes.

The ACCEPT button causes some rudimentary error checking to occur. If the port settings are legal, the ACCEPT button will turn back to a gray color, the settings will be saved as the default settings, and the port will become active with the new settings.

COM1 thru COM12 are supported. Most standard rates up to 115,200 are supported.

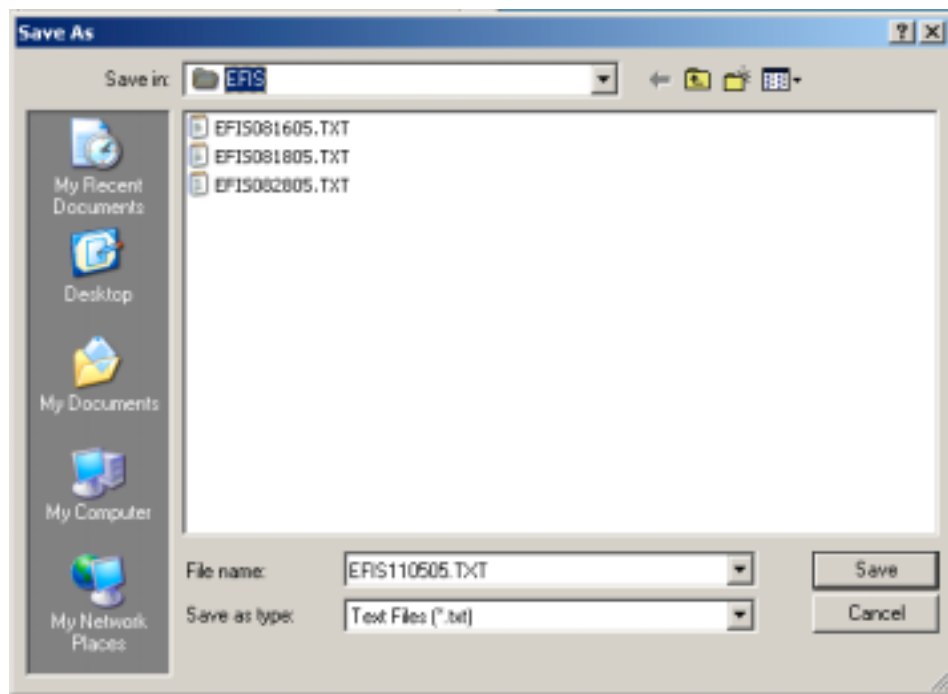
The DISPLAY COMM button calls up the Raw Serial data screen to display any received data from the selected port.

The small green indicators to the right of the COMM PORT windows are used to display the current status of the Comm ports. These will turn bright green when data is being received and decoded on the corresponding port.

RECORDER FOLDER

This is the drive and directory where the Waiters Flight Data Recorder data files will be stored. This **MUST** be a legal drive letter.

Click in the box to call up the Save As menu. Here you can select or create the drive and folder where the data files will be stored.



TIME FORMAT

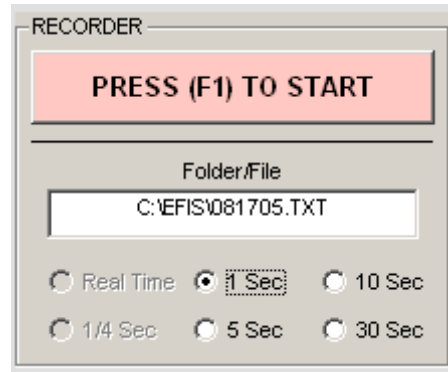
Selects which format will be saved on the recorded file.

NOTE: If you are experiencing problems with the GPS TIME fields in the recorded data, Try selecting the other TIME FORMAT on the configuration menu. Some variants of GPS Sentences are using a time format that is unpredictable, and difficult to convert to different formats. If you are able to capture these sentences, send them to me and I'll see if I can change the recorder program to correctly convert these sentences.
Thanks, Waiter

SHOW RECORDER START / STOP BUTTON

Normally, the recorder is running anytime the software is running. However, If this option is selected, then the recorder can be started and stopped with either of two methods; either clicking on the button (see below) , or pressing the F1 key;

In the RECORDER section of the main screen, clicking the PRESS (F1) TO START will start the recorder, and the button will alternate colors between GREEN and GRAY. Clicking the button again will stop the recorder, and the button will change to RED color. Anytime the recorder is started, it writes a header line into the recorded data



RECORDER SECTION, MAIN SCREEN

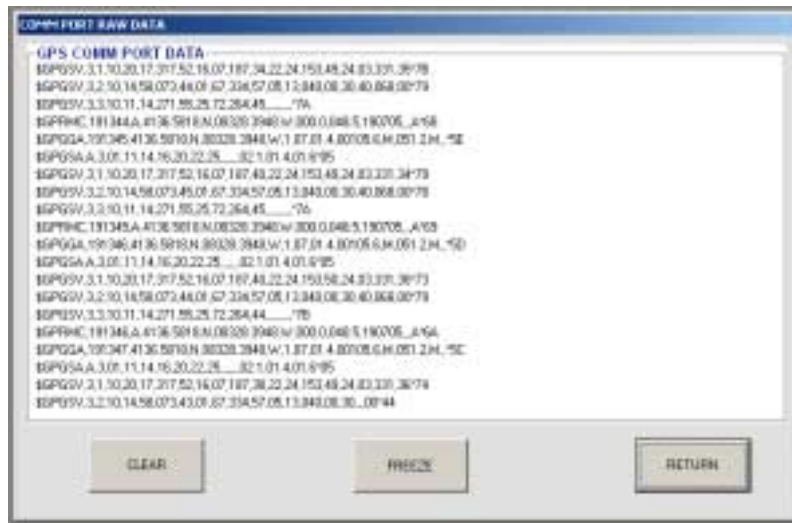
CANCEL

The CANCEL button will cause any UNACCEPTED changes to flip back to the original settings. Once the ACCEPT button has been pressed, the CANCEL has no effect.

RETURN

The RETURN button will return to the MAIN screen, and also cancel any changes that were not accepted.

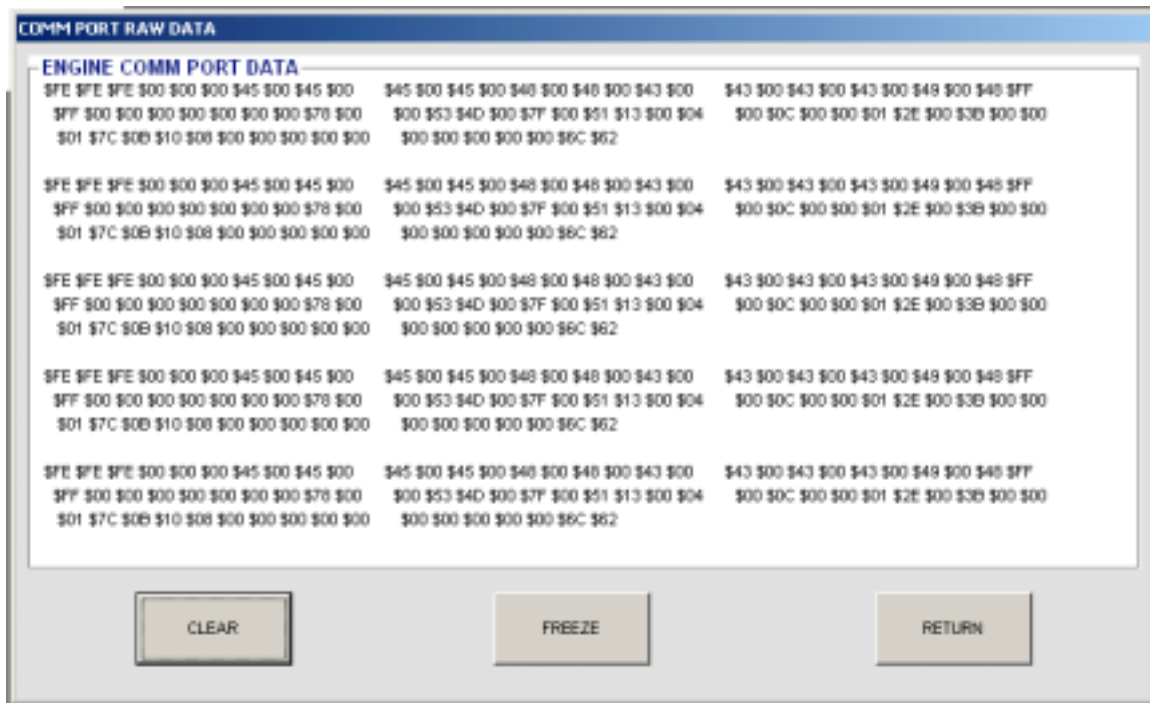
COM PORT RAW DATA



SAMPLE – GPS DATA



SAMPLE – DYNON EMS ENGINE DATA



SAMPLE – ENGINE GRAND RAPIDS DATA

Shown above are three samples , GPS data and the Dynon and Grand Rapids Engine data.

This screen shows the last 20 lines of data received from either the EFIS, GPS, or EMS com ports. The newest line comes in at the bottom, and scrolls up. Displays 20 lines only, cannot be scrolled.

NOTE: Due to the type of encoding used by the Grand Rapids EMS, The Serial data stream is converted to a HEX for display purposes. The fields are then placed in groups of 10, 3 groups per line. In the example above, there are 77 data fields display over the three lines of GR data.

CLEAR

Clears the 20 lines of scrolling text.

FREEZE

Toggles ON / OFF - Freezes the display. When the display is frozen, the button turns red. Freezing does NOT effect the received data coming into the com port, or the recorder itself.

Freezing the screen keeps it from being updated by received data. This is useful for examining data that is scrolling by fast.

RETURN

Return to the previous display

KNOWN ISSUES

Setting Computer Time / Date - There are some minor variations in the GPS sentence that provides date/time. Although the software has been tested on many computers and GPS devices, I've seen one instance where the correct time was set, but the wrong date. This may have been corrected in the later versions, but keep an eye on this if you SET your date/time.

Out of Stack space – you will most likely encounter this if you are running an older / slower computer, AND you are attempting to record EFIS, EMS, and GPS, in the “REAL TIME” mode. If you must record real time, then turn off the EMS and GPS serial ports (select NONE.). Slow down to at least 1 second if you are recording all three items.

Use the computers built in Comm ports for all high speed data (Dynon), if possible.

Grand Rapids Data – There seems to be an issue with how GR sends out the data for AUX1 through AUX6. AUX1 through AUX6 are reported as having a high and low bytes, but seems to be sent as 2's complement.

DYNON EFIS seconds don't start at ZERO – Dynon EFIS seconds are broken into 64 parts, 00 – 63. A “00” doesn't start a new second, there seems to be a slight delay, and new second start at about 05 or 06.. Look at the EFSI clock that was recorded in “Real Time”;

15:04:29.62
15:04:29.63
15:04:29.00
15:04:29.01
15:04:29.02
15:04:29.03
15:04:29.04
15:04:29.05
15:04:30.06
15:04:30.07
15:04:30.08
15:04:30.09

To correct for this, the recorder software ignores the Dynon milliseconds, and assigns its own milliseconds. When the recorder sees that the seconds value has changed, it resets an internal counter to zero. This will be the first data point for a new second. As each data point is received, the counter is incremented, and the value is assigned as the New Dynon millisecond. With this correction, the recorded datapoints are now in correct chronological order, and may be sorted correctly by EFIS time.

Note that the Dynon EFSI normally sends a maximum of 64 serial data streams per second (0 – 63), BUT, NOT ALWAYS. Occasionally, the Dynon data stream will dip to as low as 59 streams per second. This is normal, as per conversation with Dynon.

COMMENTS, SUGGESTIONS, BUGS, ETC

Please contact me via e-mail:

waiter@iflyez.com

APPENDIX A

VERSION INFORMATION

3.2.2	15 Nov	Correct GR OAT decoding scheme
3.2.1	12 Nov	Add Millisecond correction to Dynon EFIS time. Millisecond is now Correct the TACH2 data from GR4000/6000 (two header styles) Upgrade COM ActiveX to increase performance Upgrade COMM DISPLAY for GR to display ALL data fields
3.0.0	8 Nov	Rename to update usage from original program Optimize switch for CPU speed
2.4.2	5 Nov	Verify Dynon D100 compatibility
2.4.1	4 Nov	Fix GR 4000/6000 OAT decoding Fix Data Folder Selection bug
2.4.0	3 Sep	Clean up serial ports. Verify OPS with WinXP Convert GR data to HEX for display purposes
2.3.1 ' ,	28 Aug	Add GR Header info display Added COMM Status to GR screen Added COMM status lights on main and Comm screens Added Comm Status to recorded Serial data
2.3.0	27 Aug	Release for GR data
2.2.4	22 Aug	Rework GR EMS data detection
2.2.3	17 Aug	Use the F1 key to toggle the recorder ON/OFF
2.2.2 '	16 Aug	Recorder can start/stop different time format
2.2.1 '	15 Aug	Data file now saved in binary instead of text Fixed some misspells
2.2.0	13 Aug	Add support for Grand Rapids 4000/6000
'2.1.2	6 AUG	Fix EMS serial port doesn't initialize properly
'2.1.1 '	31 JUL	Fix stack overflow problem in Receive events Add EMS to recorder
'2.0.3	28 Jul	Add Magnetic heading from VTG sentence
'2.0.2 '	27 Jul	Add Kilometers per hour to scales Fix minor display errors
'2.0.1	25 Jul	NEW RELEASE

'1.0.7 ' '	25 Jul	Enable/Disable buttons according to com ports selected parse and record GPS data Set computer time to GPS time
'1.0.6 ' ' '	23 Jul	Fix com port startup error lockup Clean up time displays , more user friendly shut down ports when closing close open files when closing
'1.0.5	22 Jul	Fix Freeze button color problem when using CLEAR
'1.0.4	19 Jul	Display and record Three time clocks, Computer, GPS, EFIS
'1.0.3 ' '	19 Jul	Fix ACCEPT button colors They now go back to gray if everything oK Added a CANCEL button on Serial Setup Screen Add Serial ports display screen
'1.0.2	18 Jul	Add Serial port page
'1.0.1	18 Jul	Add 1/4 second time record
'1.0.0	15 Jul	Orig Release

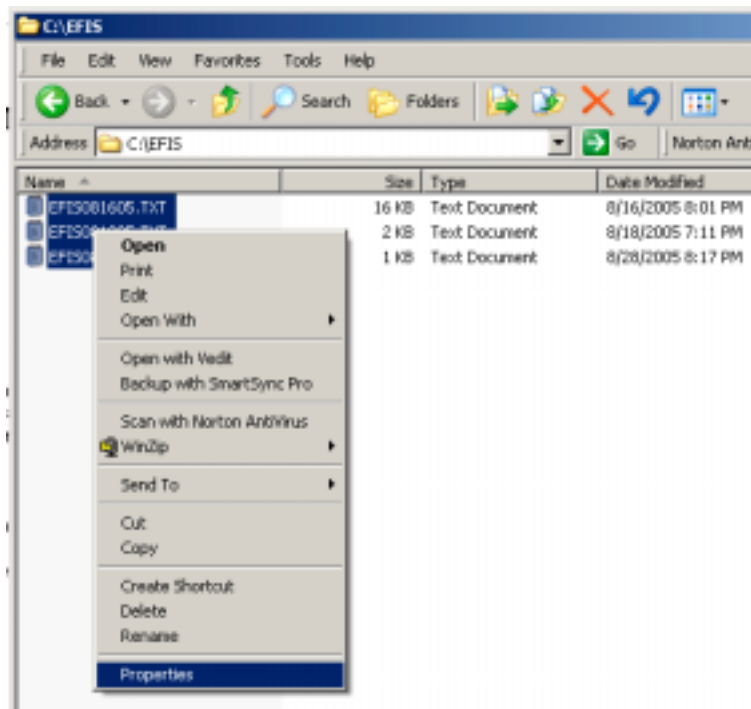
APPENDIX B

SAFEGUARDING your data

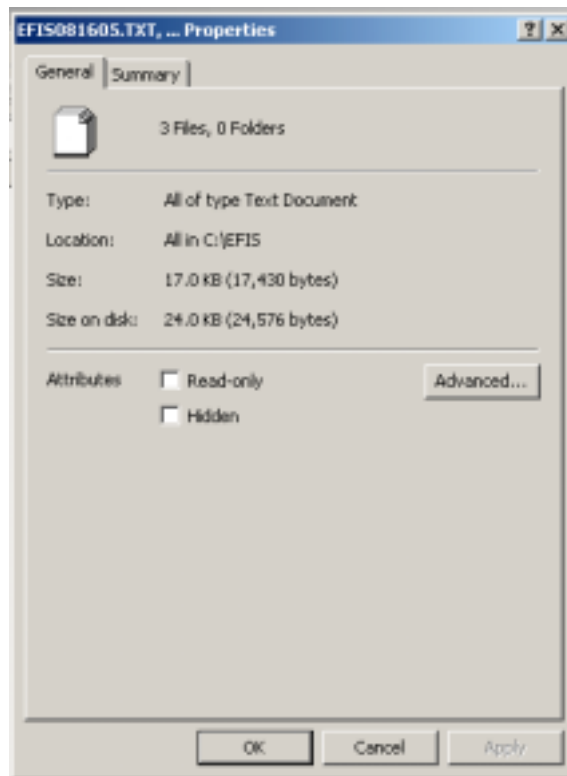
Now that you have the data file, you need to take great care to ensure that the file isn't altered or worst, accidentally deleted. I normally give my files a "READ ONLY" attribute to prevent accidental damage.

To change a files attribute to "READ ONLY", do the following;

- 1) Using Windows explorer, browse to the drive and folder that contains your data files.
- 2) Select "Edit / Select All" from the top tool bar.
- 3) Move your mouse onto any of the highlight files, and do a right click.



- 5) Scroll down to the “Properties” item, and click it, The following Screen will be displayed;



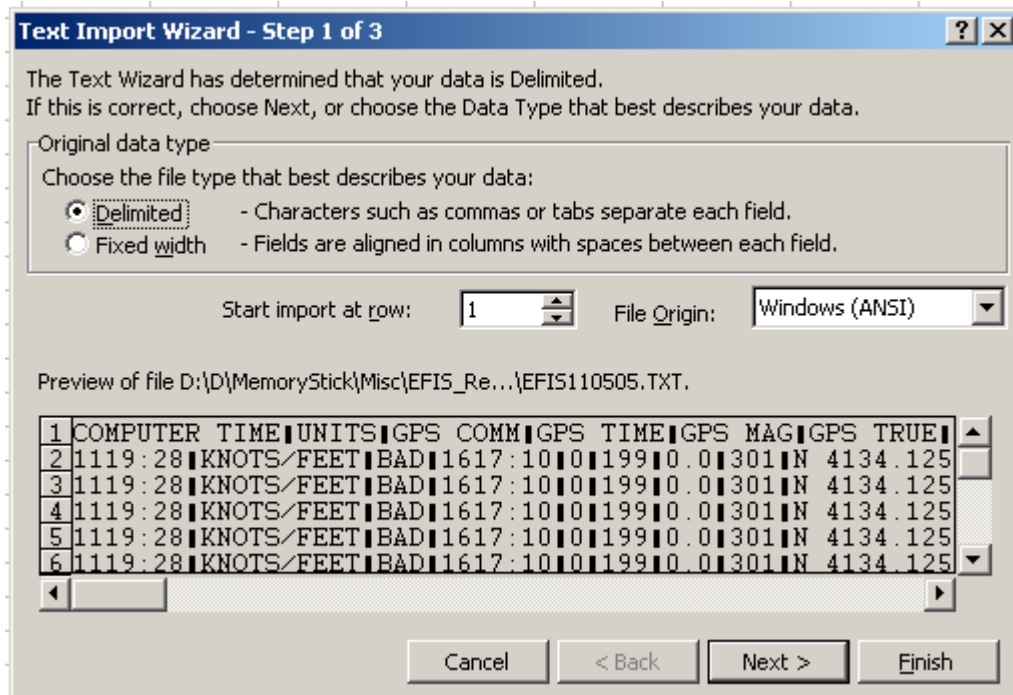
- 6) put a checkmark in the “Read-only” box, then hit OK. When a file is Read Only, you will be prompted with a warning before the file is deleted or overwritten.

Make ALL your data file READ ONLY,. ALSO, Make copies of the files and place them in a safe place.

APPENDIX C

Reading Data file into Microsoft Excel

- 1) Start Excel from the START / PROGRAMS button.
- 2) After Excel start, select FILE / OPEN.
- 3) In the OPEN dialog box near the bottom, "Files of Type" select "ALL *.*"
- 4) Still in the OPEN Dialog box, browse to the drive/folder of your particular data file.
- 5) When you find the file, click on it and the following Excel screen will open.



- 6) Make sure "Delimited" is checked, then hit "Next". The following screen will open.

Text Import Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview below.

Delimiters:

☒ Tab ☐ Semicolon ☐ Comma
☐ Space ☐ Other:

☐ Treat consecutive delimiters as one

Text Qualifier: {none}

Data preview:

COMPUTER TIME	UNITS	GPS COMM	GPS TIME	GPS MAG	GPS TR
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199

Cancel < Back Next > Finish

- 7) Make sure the “Tab” is selected for Delimiters, and “Text Qualifier”, needs to be changed to “None”. Click Next and the following screen will open.

Text Import Wizard - Step 3 of 3

This screen lets you select each column and set the Data Format.

'General' converts numeric values to numbers, date values to dates, and all remaining values to text.

Column data format:

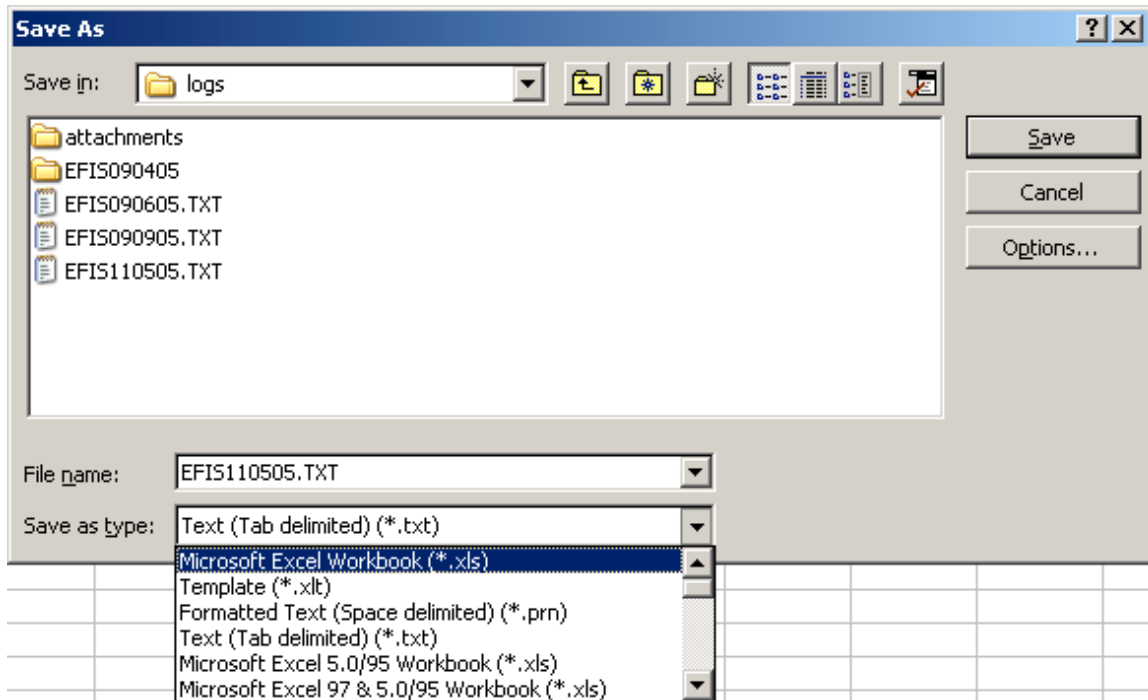
☐ General
☒ Text
☐ Date: MDY
☐ Do not import column (Skip)

Data preview:

Text	General	General	General	General	General
COMPUTER TIME	UNITS	GPS COMM	GPS TIME	GPS MAG	GPS TR
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199
1119:28	KNOTS/FEET	BAD	1617:10	0	199

Cancel < Back Next > Finish

- 8) Change the “Column Data Format” to “Text”. When you click “Finish”, all your data will be placed in their proper column.
- 9) Before starting any analysis, you may want to “Save As” the data, so you won’t have to go through this loading process again for this particular file.
- 10) Select “Files / Save As” from the main Excel screen, this will display the following screen;



- 11) In the Save as Type, select the “Microsoft Excel Workbook” as the type. When you click the Save button, your file will be saved under the same file name, but as an Excel file.

IMPORTANT – Doing an immediate Save As will keep you from accidentally altering or deleting your flight data. You did make them READ ONLY, Didn’t you?