SAFLY
Tracking and Emergency System
by
DSX

User's Manual

Version 1.0

Technical and operation description

In this manual there is the description of the functioning of the SAFLY system and the data that it records, transmits and accepts.
There is today one version of the SAFLY.

The SAFLY is also a flight data recorder complying with the specification of the FAI/IGC in terms of data format, security signature of the data and download procedure, but it's not approved by the FAI/IGC.

The system has an extremely precise internal pressure sensor that supplies pressure information.

The recorded data are in the format specified by the FAI/IGC.

The SAFLY records in its own internal memory, the data regarding position, altitude, time and other parameters useful for the verification of the same data, with a frequency selectable by the user, up to a maximum of one fix per second.
All data are recorded in a non-volatile memory, hence they can be retrieved even after a power failure.
The data can be easily downloaded, through a direct serial or USB connection to the PC, to be visualized on a PC through free and commercial software programs.

The transmission of the data to a base station is performed through two channels: GSM network and satellite network.

The user can select how often the buffered data can be transmitted to the base station: with the GSM network it can take place from continuous transmission to any number of minutes. The satellite transmissions are limited by the local regulations.

If the customer requires it, a software option can be turned on that generates short files with a summary of the flight activity, with the aim of easing the operation of billing and recording of the use of the aircraft.

Main components

The SAFLY is composed of the following main components, all internal to the system, unless clearly stated:

- Last generation GPS chipset
  (horizontal error <2m 50%, <4m 90%, vertical <3m 50%, <5m 90%,
  cold start 41 seconds, reacquisition 2 seconds)
- High sensitivity barometric sensor
- Memory of 16 Mb (>400 h of data recording with 1 fix every 3 seconds)
- Leds and switch for controlling the operations
- Direct cable connection with the external through a serial port and a USB slave port
- GSM modem
- Satellite modem
- Accelerometers and emergency activation button in a separate box
- GPS external antenna
- Satellite external antenna
- GSM antenna mounted on the unit (can be installed remotely ir required)

Installation instructions

The SAFLY is composed of only few functional elements: the main box, the GPS antenna, the satellite antenna and the emergency activation box, that can be easily installed on board any vehicle.
The GPS and satellite antennas could be coupled together in the future, reducing one element.
Despite from the easiness of the installation, it is recommended to let a specialist install your SAFLY system onboard a vehicle, especially if there are components made of carbon fibre, metal and other electronic instruments.

GPS antenna

The correct operation of the SAFLY can be hindered by the wrong positioning of the receiver antenna of the integrated GPS.
In case of doubt about the antenna positioning, please contact DSX for assistance.

The positioning of the GPS antenna has to be performed installing it in an area that is not electromagnetically shielded.
The GPS systems are sensitive to electromagnetic radiations originating from other on board systems, therefore it's recommended to install the antenna in a place far enough from instruments that generate strong electromagnetic fields. In particular, avoid the proximity to transceivers and electric gyros.

Description of the connectors

To the power switch activates the SAFLY.
Please DO NOT TURN ON and then immediately OFF the unit.

The GPS antenna plug has to be used only for the GPS antenna provided with the SAFLY. DSX guarantees an optimal performance of the GPS when the antenna supplied with the system is used.

The RJ45 is the one to be used to connect the system to a PC for using the DSX software or any other software approved by DSX (please see the www.d-s-x.net page for the list). This socket can also be used to take the data output from the SAFLY (GPS navigation and other proprietary sentences) and to send to the SAFLY data for configuration and transmission.
The RJ45 socket can be used to power the system and recharge the internal battery, with a standard IGC wiring. At present, it's preferable to recharge the units with a 5V current through the USB socket (i.e. connecting it to a computer).

The USB-B socket allows the connection of the SAFLY to a computer, powering and charging the unit directly from the computer. Every time the SAFLY is connected to a power source through the USB, it is powered on, but no transmission will take place.

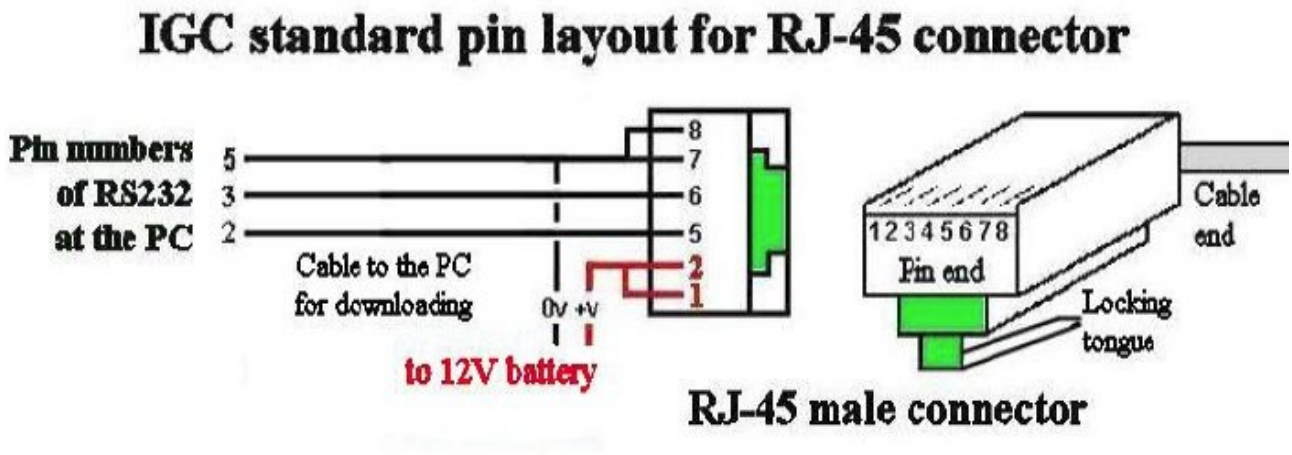
The GPS antenna plug: the GPS antenna must be connected here. DSX guarantees an optimal functioning of the GPS when the antenna supplied with the system is used. Take care of screwing the connector properly.

The satellite antenna plug: the satellite antenna must be connected here.
Be careful of not exchanging the satellite and the GPS antennas connecting them to the SAFLY.

Pin out of the RJ45 connectors

The schematics of the IGC RJ45 connectors is described in the following image (source: FAI/IGC)

Pins	Function
1&2	Volts +
3&4	Spare, for future application with GFAC approval
5	Data out (AL7)
6	Data in (AL7)
7&8	Earth (Volts -ve)



The pins 3 & 4 are not used.

Please read the recommendations for avoiding electromagnetic interferences before wiring a cable.

The power supply data, specified in the technical specifications, must be fulfilled at all times, to avoid damages to the system.

It is present a protection against the polarity inversion on all connectors (the RJ45 and the USB).
The power supply is filtered to avoid interference with other on board systems.

The power supply characteristics, specified in the technical specifications, must be fulfilled at all times, to avoid damages to the system.

Positioning of the GPS antenna

The operation of the system might be compromised by the wrong positioning of the GPS antenna. The antenna shall look at the sky all time. The angle aperture of the supplied antenna is 180°.
In case of doubt about its positioning, please contact DSX for assistance.

Positioning of the GSM antenna

The GSM antenna is devoted to keep the connection with the cellular network ground stations therefore it should have a clear view toward ground.
The best position of the antenna is vertical, pointing to the ground.

Positioning of the satellite antenna

The satellite antenna is devoted to transmit data to the satellites therefore it shall be positioned facing the sky at all times. The transmission power is low and the satellites are about 1'000 km away.

Operation of the system

There are different options for starting the data recording:

- start after 20 GPS fixes have been performed
- automatic start when a speed (horizontal or vertical) is sensed to be above a threshold, for a certain period of time

As well there are different options for stopping the data recording:

- automatic stop after a certain time with no movement
- no stopping of the data recording, until the system is powered off

The functioning of the system is fully automatic, once it's powered and installed on board the plane.
On the SAFLY there are three leds, with which all functions can be indicated.
The three leds, red, yellow and green, indicate the conditions described below.

Normal operation

- Red led **steady**: GPS not locked and GSM modem OFF. When the GSM modem is turned ON, the red led goes off;
- Red led **flashing** at short intervals: data recording active;
- green led **flashing** at short intervals: system ready for operation with GPS locked;
- yellow led **blinking** slowly: GSM modem switched ON but not connected to network;
- yellow led **flashing** at short intervals: GSM modem ON but not connected to the network (normal operation);
- yellow led **steady** on: GPRS data transmission from GSM modem (the success of the transmission cannot be guaranteed).

During normal operation, the three leds will quickly flash with the sequence = green – yellow – red.

Maintenance operations

- The total erase of the internal memory of the system can be done only when the unit is connected to a PC, and then the leds yellow and green will flash alternatively during the erase of the memory, until the operation is completed;

Summary of the information provided by the leds

	Green	Yellow	Red
GSM and GPS OFF			Steady
System ready for operations	Flashing		
GSM modem ON not in network		Slow blinking	
GSM modem ON and logged on network		Flashing	
GPRS data transmission		Steady	
Memory erase	Blinking	Blinking	
Data recording / Normal operation	Flashing	Flashing	Flashing

Recorded data

The data are recorded in the non-volatile memory of the system and can be downloaded to the PC:

1) A file in standard IGC format, where there are present all the data relative to all instants of the flight, recorded with the rate defined by the user, useful for verifying the flight, for documenting the flight in competitions and for the badges;

Optionally it can be activated the function of recording a second type of file:

2) a DSX file, with the extension .DUV, containing the information relative to the operation of the vehicle: this file presents in few lines e concise summary of the data regarding take off or movement start, landing or stop, total run time.

Both types of files have the name that follows the FAI/IGC standard, if downloaded with a computer.

Here follow the data recorded in the internal memory of the system, that are available for the downloading:

- Aircraft call sign and type (data present in both types of files, IGC and DUV)

- Pilot name (data present in both files)

- Time of start / take off and geo coordinates of the place where it took place (data present in file 2)

- Landing / stop time and geo coordinates of the event (data present in file 2 and, in details, also in file 1)

- Position (coordinates and altitude) of the vehicle during the movement, with a data recording frequency that can be set by the user (for everyday aeroclub activity and tracking, a fix every 4 seconds is usually enough); when the memory was full, the system will start deleting the older data and recording there the new ones.

The file 1), beside being used for the sporting activity, is usually used for checking the flight performed by the plane during instruction (debriefing with students) or to check the route followed, the altitude and the speed held at every moment.
The file 2) is thought for the use by the Administration, the operator of the aircraft, to easily have the data relative to the usage of the plane by the members of the club, for example, to simplify the control of the flight activity and the corresponding administrative and accounting issues.

Setting of the pilot data

The setting of the data for the pilot that is going to start the flight is quickly done through the computer with the DSX software, with his data. Otherwise it's possible to set these data with an SMS to the system.

Criteria to start / finish the data recording

When the option for generating thr DUV files has been selected, the recording starts automatically, before take off, when the engine start is detected.

Here are presented the start/finish recording criteria.

Recording of the take off:
a) ground speed calculated by the GPS > 15 km/h for at least 10 fixes continuous;
b) barometric pressure variation corresponding to an altitude increase with a vertical speed of at least 2 m/s for 10 seconds.
At the moment of detecting the take off, the recording starts and in the file are saved the 20 fixes preceding the take off. For this reason it’s better to let the GPS lock on few minutes before the take off. Remember also that the best performance of the GPS can be attained once it has downloaded all the ephemeris from the satellites, an operation that requires about 12 minutes.

Recording of the landing:
ground speed calculated by the GPS < 10 km/h for at least 20 seconds continuously.
In case the GPS is not locked, the landing won’t be detected and therefore, it is not listed in the file of the flight activity log.

UPDATE: the FAI/IGC requires now that the end of the data recording doesn't take place automatically, rather it keeps for an indefinite time until the power is removed from the system. Until recording of data is ongoing, the use of the USB is inhibited: switch the system off and on again to use the USB.

In the case the GPS is not yet locked on (in 3D, with coordinates and altitude), the 2D coordinates will be used to record the data in the files, while the GPS altitude is set to 00000, while the pressure altitude is displayed, obviously calculated referring to the 1013.25 mb QNH. If also the 2D position wasn't available, the coordinate values would be left at 0. The time of the engine start, take off and engine shut down will be taken from the internal clock, independently from the GPS.
In this way it's not possible to false the recording done by the system, shielding the GPS antenna, and it will always be known the time of engine start, take off and engine shut down.

Download and validation of data

Through a connection of the system to a PC running the program DSX-Win or the program supplied by FAI/IGC, it's possible to download the files with the data recorded in flight. For connecting the system, use a serial cable with the pins prepared according to the IGC pin out or with a USB cable.

For information regarding the data downloading with the DSX program, please refer to the dedicated section of this manual.

Downloading the data with the FAI/IGC program

The program from the FAI/IGC, "IGCshell.exe", with the library "IGC-DSX.dll", can be downloaded from the FAI/IGC site: (http://www.fai.org/gliding/gnss/freeware.asp). With it you can also perform the validation of the files recorded and downloaded, which means to verify that they have been recorded by a DSX flight recorded and that they haven't been modified. Even the change of one character in the file will make the validation fail.

Use of the DSX program

When the system is set up to record the flight data, it records the flights in IGC format in its internal memory, automatically, starting the moment when the GPS detects, for a certain time, a ground speed higher than a threshold predefined. The automatic stop of the recording is not active anymore, according to the latest requirements of the FAI/IGC, that imposes the recording until the system is powered.
The internal memory of the system has a capacity of 16 Mb, which allows for a recording of about 480'000 fixes.
In the case of a recording time interval (seconds between each fix) equal to 3 seconds, the estimated recording time available is > 400 hours. The longest recording time is estimated to be about 1'600 hours with an interval fix of 12 seconds.
It is recommended to limit the time between fixes to less than 10 seconds.
The transfer of the files from the system to a computer may take place through a serial or USB connection with the appropriate cable and the DSX program supplied by DSX. Moreover the library (*igc-dsx.dll*) allows to use the IGC shell program to download and validate the flight data recorded by the system.

The DSX software allows to set up the main parameters of the system, as showed below:

- data relative to the pilot and the plane, for the declaration included in the IGC files and for the data transmitted in case of activation of the SOS signal;
- list of the flights recorded in the memory with the chance of selecting those to download to the computer or to erase the memory;
- rate of recording of the fixes both in normal operation and after a pilot's event marking;
- NMEA and DSX proprietary sentences to output through the serial port, to supply them to other instrumentation connected (i.e. a PDA);

- preparing of the task to be declared in the system;
- set up of the SOS operation through the GSM/GPRS module.

The DSX program allows also to perform the firmware updates: the firmware files available in the folder set up to keep them (see below) are reported in the window “Updates” and the button “Confirm fw Update” starts the process.

Main window of the program DSX-Win

Installation

The program doesn't need any special installation procedure: it's enough to expand the files:

- DSX-Win.exe
- Aiuto.hlg — help file
- Confge.ini — configuration file for DSX-Win
- Loader6.ss — file used for the update of the firmware
- Dsx000CF.txt — example file of configuration for the USB stick

in a folder and start the program (double click on the file *DSX-Win.exe*).
The configuration file *confge.ini* supplied is ready for running the program from the folder C:\DSX , that is recommended to create, to copying the files in it.
For ease of use, it is suggested to make a link to the file *DSX-Win.exe* and place it on the desktop.

Once the DSX-Win is launched, pressing the button “?” the online help is launched.

[screenshot of the DSX program main window]

Before starting the program it's necessary to select the communication port of the computer to be used.

Selection of the communication port

Edit the file *confge.ini* (double click on the file name or right button of the mouse / “Open with ..” and select Notepad).
Depending on the communication type to the PC, serial or USB port (possibility only available to the DSX8001), two different configurations must be done.
In the following table it's reported what value to write in the first and sixth parameter of the *confge.ini* file, function of the connection type used (serial or USB).

	First parameter: number of COM port	*Sixth parameter:*
Serial connection	‘number of the COM port’	(nil)
USB connection (DSX8001)	‘number of the COM port’	U

Below the line “first parameter: COM port number to be used”, write the number of the COM port that is being used to connect the cable coming from the system.

In case there is a PC with an integrated 9 pins serial COM port, the COM used will very likely be the number 1. If a PC without a 9 pins serial port, to connect the DSX8000 it's necessary to use a USB-serial converter.

In the case of the DSX8001, it's possible to connect the system to a USB port of the PC: before doing this for the first time, install the USB driver downloadable from the DSX website.

The DSX program is capable of searching automatically for the COM port to which the system is connected to. If the search doesn't work, try again restarting the DSX program. If it doesn't work, then it's needed to select the COM port and define it in the *confge.ini* file.

In Windows XP® and similarly other operating systems, the information can be found selecting:: “Start / Control Panel / System / Hardware / Device Manager / Ports (COM & LPT)”.

ATTENTION

Close any other program that uses the selected COM port (i.e., ActiveSync used to connect PDA and PC): close the program pressing CTRL-ALT-DELETE and then selecting “Processes”, highlight the program and press the button “End Task”.
In case of presence of programs that use the COM port assigned for connecting to the DSX system, it will not be possible connecting the systems.

In the case of ActiveSync it's necessary terminating the WCESCOMM.EXE pressing the button “End Task”

At the start of DSX program there will be an icon indicating that the PC is automatically searching for the communication port

Every time that in the DSX program is visible a red flag with yellow cross, it means that the serial port COM port is not free and hence DSX-Win can't use it.
It's recommended to exit the DSX program, free the COM port and restart it.

If the serial port is free to be used by the DSX program, there will be the yellow icon on the right:

After establishing a connection with the system, there will be an icon with two arrows and a green layout:
In the case all the info in the boxes of the instrument are not appearing correctly, press the button “Connection Refresh” and wait few seconds.

Setting the folders

The settings in the file *confge.ini* allow defining different folders for each type of file (logs, updates, turnpoints, etc.). From version A.11 of the DSX program, if the file *confge.ini* is not present, the DSX program will assume that all files are in the program directory and will also put all new files in that same directory.
In the file *confge.ini*, below the writing “Second parameter: directory for IGC files”, define the complete path of the directory where to download the flight data recorded.
After the writing “Third parameter: directory for help and firmware files”, type the complete path of the directory where there will be the files for the firmware updates: the DSX program will search for valid files in this directory.
Example of configuration file *confge.ini* (recommended):

```
* This is the DSX configuration file
* asterisk in first column = comments
*   ----------------------------------------------------
* 1st parameter : COM port number to be used
1
* 2nd parameter : directory where IGC files will be created
C:\DSX\
* 3rd parameter : directory where update and help files must be
C:\DSX\
* 4th  parameter : directory of turnpoint file
C:\DSX\
```

Indicate the directory where the info want to be recorded

* 5th parameter : turnpoints file name (GPS-LOG format)
Turnpoints.dta
* 6th parameter : 'U' if the com port is an USB port, otherwise “0”
U

Connection

For the serial connection with the system, the cable has to be plugged in the RJ45 socket that is on the left in the picture of the connections, and in the 8 pins socket of the PC.
For the USB connection, the socket to be used is the one close to the GPS antenna socket.
Launch the DSX program and then connect the system to the PC.

Communication system / PC

The communication between the DSX system and the PC, might be not fast, especially if it takes place with a serial connection through a USB-serial adapter. It's therefore necessary to wait a bit to see the effect of the commands.
With the button “Read data from device” it's possible to read the parameters that are saved in the system, while with the button “Write”, the data are transferred to the system. The operation of writing needs few seconds: wait for this time to elapse, before doing other operations.
As a general rule it's always better waiting for the appearing in the communication window at the bottom, for the message “End device data read” before proceeding with any other operation.
In the case of USB connection, when the system is disconnected from the PC, the DSX program must be closed and restarted when the system is reconnected.

In the case the power to the system is cut when it's connected to the PC, push the button “Connection Refresh”. This is recommended also when strange characters appear in any of the fields on the screen.

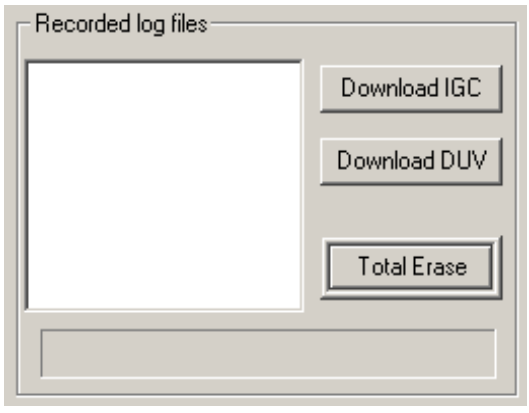
System setup

Pilot and aircraft data

When the button “Write” is pressed, to write the data of the pilot and aircraft, it's necessary to wait that the fields are read again in the system and what was written appears again; this is a sign that indicates that the data were correctly written in the system.

Flighta data recorded in memory

In the DSX program there is the following frame:



Here are presented all flights currently recorded in memory.
Download IGC : download the data recorded in the selected file, in IGC format
Download DUV : download the summary data relative to the selected file (see below for the description of the DUV file)
Total erase : complete deletion of the data in memory; this will not allow to download data files later on.

In the case of Windows communicating that there is an error during the download of the file and that the application (DSX program) will be terminated, check that all the directories specified in the *confge.ini* are correct and existing.

NOTE

The erasing of the system's memory doesn't affect the data relative to the pilot, aircraft and system settings.

Parameters of the flight recorder

Logger activated	:	select if the recording function is required to be active
N.Log present	:	number of log files present in the memory
Fix rate	:	time step, in seconds, between the recorded fixes
PEV Fix rate	:	time step, in seconds, between the recorded fixes after a pilot event marker
Task	:	opens the window for the task declaration

Firmware update

List of firmware files present in the directory specified in the file *confge.ini* or in the directory of the DSX program, if the *confge.ini* file is not present.
The firmware update takes place in two phases: first the file is transferred to the internal memory (this operation takes about 10 minutes) and then the reprogramming takes place, programming the microprocessor (it takes about 10 minutes time).
It's possible to stop the firmware update at the end of the first phase but, once the second phase has started, it's not possible to stop the process anymore, without causing a damage to the system that shall then be sent back to DSX.

NOTE

After the reprogramming of the system, it will restart and it takes about 50 seconds to erase completely the memory and be ready to operate again.
After each reprogramming there won't be any data of previously recorded flights.

ATTENTION

During the firmware update never unplug the power. In case of power failure during the re-programming of the system, it can be that the unit has to be sent to DSX for recovery.

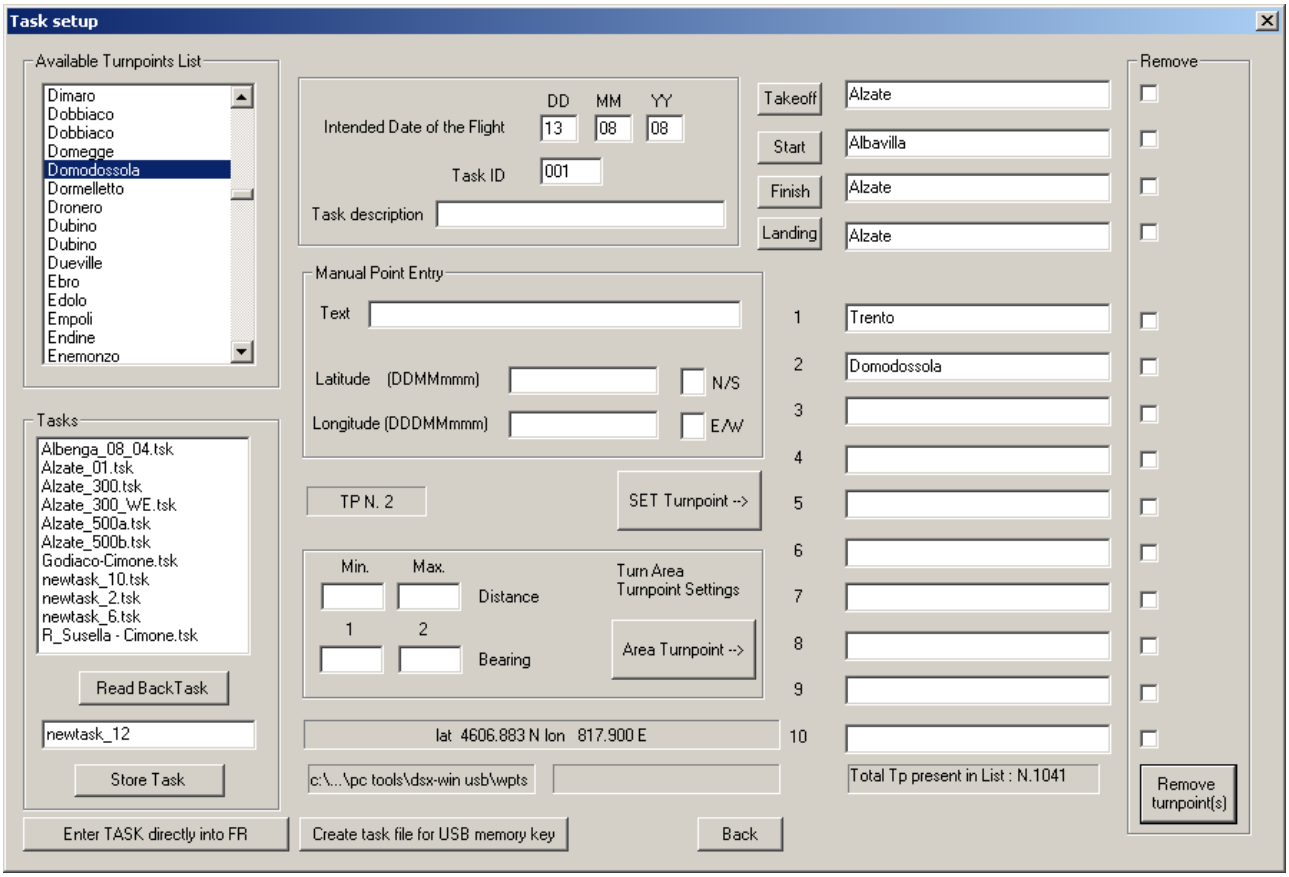
Settings for communication with flight computer (or PDA)

Port speed	:	set the communication speed desired. It is recommended to use a speed of at least 9'600 bps

RMC, GGA, VTG, RMZ: select the NMEA sentences that are required to be output (for navigation GGA and VTG are usually enough)

Task declaration

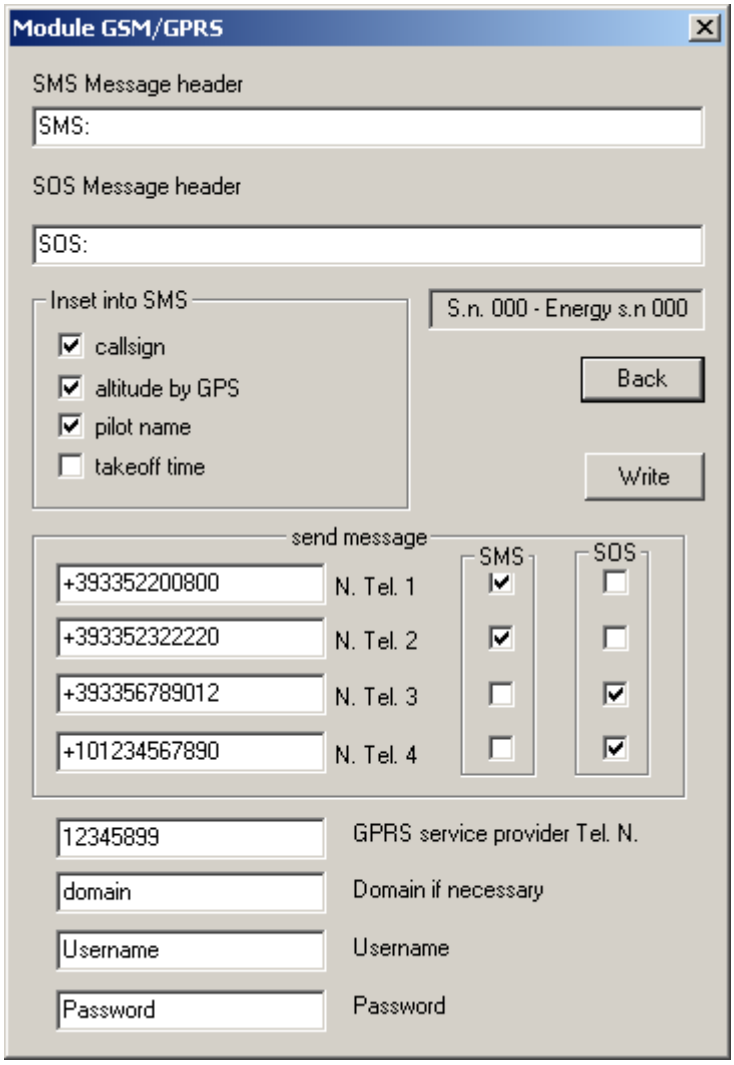
Window for declaring the tasks to upload to the system.
Select a turnpoint from the list on the left and press the buttons “Take off”, “Start”, “Finish” or “Landing” to assign it.
With a double click on the name of the turnpoint in the list on the left, it's inserted in the task, in the first free position.
To remove turnpoints, select the checkbox on the right and then press the button “Remove turnpoint(s)”
It is also possible to insert turnpoints that are not in the list, typing their coordinates.
Store task : to record the task created: assign a name in the typing box and save.
Read Back Task : to read a task that has been previously saved.
Enter task directly into FR: immediate declaration of the task in the system, if its connected to the PC



The window for the task definition

GSM messaging set-up

SMS Message headers : fixed header of all messages that will be sent for notification, transmitted after manual activation from the pilot
SOS Message header : fixed header for all SOS messages sent automatically or manually
Insert into SMS : data to be inserted in the messages
Send message : numbers of cellular phones to which to send the messages



Window for setting the GSM/GPRS functions (it's recommended to insert some characters in the fields, even if the GSM/GPRS module is not present)

Help

The DSX-Win program has a Help file, that can be viewed pressing the button “?” and it presents information about each window of the program.

Data protection

All data recorded by the system are protected with a validation key for security.
The data files downloaded from the system can be validated, verifying the authenticity, with a program supplied by the FAI/IGC, as already described, with the library “IGC-DSX.dll”, to be placed in the same directory of the IGC program. With this tool it's possible to detect the change to even one only character in the IGC file. Therefore it is possible to verify at anytime that the downloaded data, even if archived in a PC in the past, haven't been modified.

The system has a seal to detect the opening of the box, even if small, by non authorized personnel.
The opening of the box will invalidate immediately the warranty.

The system with flight recording capability, shows the following icon in the DSX program, when connected to the DSX-Win,

When in the DSX program an icon like the following would appear, with a red flag,

it would mean that the unit cannot be used as a flight recorder, likely because it's been opened.
All files in IGC format coming from this unit cannot be validated by the IGC program with the DSX library.

Use of the recorded data

The system is conceived for:

- Downloading the flight data detailed for all instants of flight, in IGC format
- Downloading the flight data and the summary files with the reports of the aircraft activity (files 1 and 2 described in this manual)
- Identifying the downloaded data as coming from a certain plane, whose call sign are recorded in the file. The date and the time of the files downloaded are those of the moment of the take off
- Setting up the options of the system like pilot's name, time step of the data recording, GPS navigation data to be output on the serial port, etc.)
- Setting up of the protected options of the system, like the full erase of the memory

Files description

File with the aircraft activity summary (.DUV)

The file presented below, with the flight data, has been downloaded to a USB stick and to a PC.

Example of complete DUV file:

Flight of 01-03-08
Pilot: John Smith
Aircraft type: single engine
Call sign: X-XXXX
Take off : 09:49:54 Lat: 4424241N Lon: 00857746E Gps.St. A Alt.GPS:00065
Landing : 09:50:54 Lat: 4424242N Lon: 00857746E Gps.St. A Alt.GPS:00063
Operation time: 00:01:00

Other parameters can be recorded in the file according to the needs and requests.

Standard FAI/IGC file with flight data (.IGC)

The files containing the flight data follow the rules defined by the FAI/IGC standard.
It's not necessary to edit the data file, since the data can be visualized, after downloading, with software programs commonly used.

As a reference it is reported below a part of a file recorded by the system.

AXDMAC042 DSX
HFDTE010807
HFFXA010
HFPLTPILOT:John Smith
HFGTYACFTTYPE:Cessna 150
HFGIDACFTID:X-XXXX
HFCIDCOMPETITIONID:55
HFCCLCOMPETITIONCLASS:Motorplane
HFDTM100GPSDATUM:WGS84
HFRFWFIRMWARE VERSION: DSX 1.00
HFRHWHARDWARE VERSION: DSX AC 3
HFFTYFRTYPE: DSX, SAFLY 3000

HFGPS: Trimble Navigation,Copernicus,12,20000
HFPRSPRESSALTSENSOR: Intersema,MS5534,20000
I023638FXA3940SIU
B0737074344642N00722755EA003770041901908
B0737114344658N00722782EA003780042001908
……
B0737154344676N00722813EA003800042101908
B0737314344760N00722979EA003910043202607
……

Below the data in the file are described.

H records - File header

HFDTE290307
Date DDMMYY (in the example, 29 March 2007)

HFFXA010
Horizontal precision [m] (in the example, 10m)

HFPLTPILOT:Mario Rossi
Pilot's name

HFGTYACFTTYPE:Cessna 150
Aircraft type

HFGIDACFTID:X-XXXX
Aircraft call sign

HFCIDCOMPETITIONID:55
Competition sign (if present)

HFCCLCOMPETITIONCLASS:Motorplane
Class of aircraft

HFDTM100GPSDATUM:WGS84
GPS datum: 100 = WGS84

HFRFWFIRMWARE VERSION: DSX 1.00
Firmware version

HFRHWHARDWARE VERSION: DSX AC 3
Hardware version

HFFTYFRTYPE: SAFLY 3000,DSX
Manufacturer's name, model number of the flight recorder

HFGPS: Trimble Navigation,Copernicus,12,20000
GPS manufacturer name, Model, Channels, Max altitude

HFPRSPRESSALTSENSOR: Intersema,MS5534,20000
Manufacturer name of the pressure sensor, Model, Max altitude

B records

Here follows the description of the data included in the B records, with the flight data recorded at the sample sate as set up.

B1035304546170N00909733EA003520037900908

B	=	type of record (in the IGC standard, B is the record with the flight data)
103530	=	time [UTC] 10:35:30 (HHMMSS)
4546170N	=	latitude (DDMMmmmN/S)
00909733E	=	longitude (DDDMMmmmE/W)
A	=	A o V (A = 3D fix, V = 2D fix)
00352	=	pressure altitude [m], on the 1013.25 mb at sea level (PPPPP)
00379	=	altitude [m] above the WGS84 ellipsoid (GGGGG)
009	=	spatial accuracy [m] (AAA)
08	=	satellites in use (SS)

Troubleshooting

1) The system doesn't turn on:
    a. Check the power source and the switch

2) …....

Recommendations for EM interference reduction

Due to the nature of the system, electromagnetic interferences (EMI) may occur, especially when the unit is installed in gliders with not so modern electric systems. Here are presented some hints that have shown to be beneficial in EMI reduction/suppression.

- Do not install the power cable of the units in contact with the antenna cable of a transceiver.
- When preparing a cable for the PDA, do not connect to the socket the wires that are not needed.
- Check for free wires that are connected to the main power but not connected to any utility: they shouldn't be present.
- In case of persistence of interference, a ferrite ring can be used.

Warranty

The system is given to the user with the assurance that all design and manufacturing procedures have been conducted in a professional manner, according to the current standards for the realization of electronic equipment.
The warranty of the product is according to the regulation in force at the moment of the sale.

NOTE

It is guaranteed that the system has no need for a pre-programmed firmware update to allow its operation in the future.
It is possible that the periodic calibration of the pressure sensor is required, according to the EAI&ICC rules.

DSX will replace every unit that is demonstrated to be defective because of reasons not depending on the installation and operation by the user and that does not show any damage to the seals (mechanical and electronic).

In case of opening the box without the authorization from DSX, this reserves itself the right of not being responsible of possible malfunctions or problems of any nature in the system or in any other DSX component installed.

Every DSX module has a unique and unchangeable identification code, digitally set in the system. For the warranty and official identification, the digital code is the reference one.

Technical Specifications

Power supply	:	8 – 30 V
Power consumption (typical)	:	30 mA @ 12 V
GPS engine	:	Trimble Copernicus
Pressure sensor	:	Intersema MS5534
Internal memory	:	16 Mb
Recording time	:	>400 h @ 1fix every 3 s
Dimensions	:	110 x 67 x 26 mm
Weight	:	~180 gr + GPS antenna
Interfaces	:	USB slave, serial
Data output	:	NMEA 0183 standard RMC, GGA, VTG, RMZ navigation data

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