Description of the
"Worldwide Soaring Turnpoint Exchange"
Internal Data Format

DRAFT II: 10 March, 1998 at 1945

Caveats

This has been written "in a rush" and has not enjoyed any serious review. Most significantly, it does not represent the tremendous amount of very significant help that was offered by the many individuals who have contributed data and helped/forced the system to develop. All comments and suggestions are most sincerely solicited.

Overview

The "Worldwide Soaring Turnpoint Exchange" internal data storage format was created to accommodate contributions from disparate sources for individual contest sites, as well as regional collections, with quite different content (*e.g.* abbreviated identifiers, turnpoint descriptions, whether there was a pub nearby, *etc* …) and formats (*e.g.* latitude and longitude expressed in degrees, degrees:minutes, degrees:minutes:seconds, or radians). A flexible, self-identifying structure was adopted three years ago and it has served well, without limitations, as the "TX" has grown to approximately 100 "sites" world-wide. It has proven to be simple to maintain, to add new sites, and — most significantly — extensible as new requirements have arisen.

A strong requirement, that was easily satisfied, was respecting the full precision of the contributed latitude and longitude; that is the coordinates are stored as contributed and used "as is" for those output formats using the same format, and the other output formats are derived from it. Thus, d:m:s input is not converted to another, homogeneous format — such as fractional degrees — internally and then converted back to d:m:s when required, which would result in visible differences is the seconds of arc for typical, single-precision arithmetic.

A second requirement was that the format be flexible and extensible, so that storage is allocated only for the data actually contributed for the site, and the system can grow gracefully as new data becomes available for additional different sites.

Each site is maintained as a separate file, for ease of maintenance and updating; thus each will typically contain different categories of information. The UK Ordinance Survey map number appears only in the BGA file, and it has no impact on other sites, but is easily accomodated in the internal storage and the output listings.

The individual files contain three types of records: *i) file definitions*, which contain information about the file as a whole; *e.g.*, site name, contributor, time zone, *ii) column definitions*, which specify the fields in the waypoint definitions that follow; *e.g.* latitude degrees in column 5, and *iii)* the *waypoints* themselves layed out in fields, or columns, as specified by the column definitions.

The column separators are the "tab" character by default, however this can be changed for a file by a "file definition". Tabs were chosen because of their use by many spreadsheet programs' file import capability, and their absence from any of the contributed data. They have the potential disadvantage of being invisible to most editors, but this has not proven to be a difficulty.

Blank lines are permitted anywhere for readability. Long lines are rendered more easily edited by breaking them, and so indicating by a "\" character as the last, non-blank character on the line. Arbitrary comments are allowed at any point.

A potential savings in space, as well as input/output speed, by using a binary — as opposed to ASCII (text) — representation was considered, but dismissed because of the convenience of direct access of the files by a text editor, as well as their relatively small size.

While not a factor for the internal uses of the "TX", a binary format would present unnecessary difficulties for interchange between different computing architectures. The representation of accents and other characters in the extended ASCII character set was addressed by adopting the HTML representations; *e.g.* é ≡ `é` internally. Any translation that renders the extended ASCII character set accessible to any system would work.

Finally, support of non-"TX" WWW–based applications — *e.g.* Marc Ramsey's "Task-Planner" — is provided by a self-identifying, tab-separated file maintained on a WWW-server. Such an interchange file — easily maintained by any spreadsheet program — could well address what I assume to be the *GFAC*'s interest in a general import format specification.

File Definitions

These are designated by lines beginning with `#F(space);` or more completely
```
#F File Definition Name: File Definition Value
```
e.g.
```
#F Timezone name: MET
```
The current File Definitions are presented in Appendix I. In addition to those definitions that comprise the input (*e.g.* contribution date, GNSS datum, *etc…*) there are values associated with specific output formats (*e.g.* Ilec Name, *etc…*). There can be an interaction with some of the column definitions; *e.g.* the hemisphere(s) of the waypoints may be specified for the entire file
```
#F Longitude: West
```
or a column definition (see the next section)
```
#C NS 10
```
which would support an independent longitude hemisphere for each waypoint, as is important for the UK or France.

Column Definitions

These are designated by lines beginning with `#C(space);` or more completely
```
#C Column_Contents Column Number
```
e.g.
```
#C LON_D   10
```
The current Column Definitions are presented in Appendix II. The only required fields ("columns") are the waypoint name, latitude, and longitude. The attributes of the waypoint ("code") — *e.g.* Turnpoint, Start, Finish, Airport, Landing Site, *etc…* — are helpful in the preparation of the various output formats. The code letters currently in use are presented in Appendix III. The different length ID's can be provide by the contributor or generated algo-rithmically and added to the file, allowing editing if desired, or they can be generated "on the fly" when a file requiring them is being generated.

Waypoint Definitions

In addition to the comments addressing the use of the extended ASCII character set, alter-nate names may be provided when different names are used for the same waypoint in different site files to facilitate merging for regional files. They are simply appended to the local name, separated by a "$". A representative file for the WGC '97 at St. Auban is attached as Appendix IV.

Implementation

As a single user system, this was quite simple — no one to ask, no one to blame. Build-ing in internal consistency checks, *e.g.* correct number of columns for each waypoint, as well as external ones, *e.g.* comparison of submitted coordinates with airfield databases, and simple plotting of the waypoints to spot outliers, has proven important. Algorithmic generation of the various length ID's from the name, has proven to be quite useful for the myriad flight recorder and GPS files. Local considerations have certainly colored the development; a Unix platform,

using an ancient "vi" [non-WYSIWYG] editor, and "PERL" for file manipulation.

File Formats Currently Supported

The following GPS and flight computer import file formats are currently supported: Apollo Precedus©, Borgelt Joey©, CAL© (Computerunterstützes Auswerten und Planen von Leistungsflügen), Cambridge Aeronautical Instruments©, Eagle AccuNav WS-1©, Eagle AccuNav WS-2©, EWView II and III©, FlightCheck©, Filser DA4©, Garmin PCX5AVD 2.05©, Garmin PCX5AVD 2.07©, Gardown©, Waypoint+©, Ilec SN10©, Peschges©, Soar-Cont©, Soaring Innovations Glide Navigator©, TaskNav©, Task Finder©, Trimble SMLTU©, XCPAS©, and Zander©. In additions, the "TX" provides *HTML* and Adobe Acrobat "pdf" listings of the waypoints, text and Adobe Acrobat "pdf" files of distance-bearing matrices for sites with fewer than 55 turnpoints, Adobe Acrobat "pdf" maps of the turnpoints, sunset times, and tab-delimited files for importing into user applications.

An import format

Were there interest in a common data import capability by flight recorder/computer software developers, something along the lines of the "TX" tab-delimited format, which is currently available online, would address all of the obvious requirements, I believe: *i*) ASCII text (any editor, any computer), *ii*) tab-delimited fields (any spread sheet program), *iii*) extensible (allow data in addition to the required fields).

File definition lines would consist of rows with two non-blank columns: the parameter name in the first and the parameter value in the second. None are actually required for most of the formats.

Waypoints would be specified, one per row, with the contents of each column defined before the first waypoint row. The column definition row being simply the first row with more than two non-blank columns, or containing some unique text in the right hand most field, such as COLUMN DEFINITIONS. Only three columns are required: NAME, LONGITUDE, and LATITUDE. However, as with the "TX", alternate minutes and seconds fields for latitude and longtitude must be acceptable. While East and North hemispheres have positive values by convention, specifying the hemisphere with N/S and E/W for the file, or for each waypoint should be encouraged for easy understanding. An example is included as Appendix IV.

Appendix I: Waypoint Codes

`A:` Airport [BGA "#"]
`a:` Alpine/Mountain Airport [Altiport]
`B:` Bar/Pub nearby
`C:` Communication available [telephone on field]
`c:` Certified official values
`D:` Glider Airfield
`d:` Difficult to find [BGA "C"]
`E:` Easy to find - but not on map [BGA "B"]
`e:` Heliport
`F:` Finish Point
`f:` Finish Point for Termaat [XCPAS] if different
`G:` Ground verified
`g:` GPS verified values
`H:` Home airport
`h:` Home airport for Termaat [XCPAS] if different
`I:` Inflight GPS verified values
`i:` International Airport
`J:` Jeppesen derived values
`K:` Local Knowledge required [BGA "D"]
`L:` Landing point
`l:` Landmark [Zander "*"]
`M:` Easy to find - on map [BGA "A"]
`m:` Map derived values
`N:` Navigation fix
`P:` Private
`R:` Restricted Area
`S:` Start Point
`T:` Turnpoint
`t:` Turnpoint - not part of contest, *e.g.* for badges *etc*
`U:` Uninhabited - no residence near by
`u:` Unverified values
`V:` AirNav data
`v:` Village, town, city, or other place name
`W:` Warning for listing only
`Y:` Military Airfield
`y:` Civilian-Military Airfield
`Z:` Special Airfield
`z:` Ultralight Strip
`?:` Unclassified

Appendix II: Column Definintions

Turnpoint name *no limit on number of characters, accents are fine but it simplifies life if the contributor can provide the coding used* [NAM]
Turnpoint latitude in degrees *can be decimal or integer* [LAT_D]
Turnpoint longitude in degrees *can be decimal or integer* [LON_D]
Altitude *feet or meters* [ALT]
[Bearing]
Cambridge comment *12 characters* [CAI_COM]
Cambridge name *12 characters* [CAI_NAM]
CAL code [CAL_COD]
CAL Identification number or acronym [CAL_ID]
CAL code [CAL_SOU]
Nearby town, village, or other geographical location [CITY]
Code *specifying attributes, such as airport, restricted area, etc...* [COD]
Comment *any other information* [COM]
Country *ICAO identifier* [COUNTRY]
Date of last modification [DATE]
Long description [DES_L]
Direction *from the contest site. Note, currently overwritten by an internal computation.* [DIRE]
Distance *from the contest site. Note, currently overwritten by an internal computation.* [DIS]
Hemisphere *longitude* [EW]
Communication frequency [FRE]
[FROM]
Heading *to be flown to take the turnpoint photograph* [HDG]
Offical identifier [ICAO]
[ID]
ID *3 character* [ID_3]
ID *4 character* [ID_4]
ID *5 character* [ID_5]
ID *6 character* [ID_6]
ID *9 character* [ID_9]
ID *10 character* [ID_10]
ID *12 character* [ID_12]
ID *20 character* [ID_20]
[ID_SIN]
Turnpoint latitude [minutes] *can be decimal or integer* [LAT_M]
Turnpoint latitude [seconds] *can be decimal or integer* [LAT_S]
Disallowed legs [LEG]
Turnpoint longitude [minutes] *can be decimal or integer* [LON_M]
Turnpoint longitude [seconds] *can be decimal or integer* [LON_S]
Magnetic variation [MAG]
[MAP]
[NAM_6]
Navaid distance [NAV_DIS]
Navaid name [NAV_NAM]
Navaid bearing/radial [NAV_RAD]
Hemisphere *latitude* [NS]
Number [NUM]
Map *Ordinance Survey [UK]* [ORD]
Ordinance Survey Map Number [OS]
Photo target [PHO]
Region [REG]
Runway heading [RW]

Map *Sectional [US]* [SECTIONAL]
Source [SOU]
State [STA]
[TELEPHONE]
[TMS]
[TMS_NAM]
Turnpoint description [TUR]
Turnpoint type [TYP]
[UTM_X]
[UTM_Y]
[UTM_Z]
Zander comment *9 characters* [ZAN_COM]
Hemisphere *latitude* [Latitude]
Hemisphere *longitude* [Longitude]

Appendix III: File Definitions

[This could use a "little" explanation!!
But hopefully, it gives you the idea.]

Altitude unit
Apollo_ID
CAL
CONtest
CONtribution Date
CONtributor
CONtributor E-mail
DATum
Distance
Distance unit
EW_SEPARATOR
FILENAME_4
FILENAME_5
FILENAME_8
Filser_name
FlightCheck
GARMIN_ID
Header
Header_Landing
Home Site
Home Site adjective
ILEC Home
LAT_HOME
LON_HOME
Last updated
Latitude
Longitude
MAGnetic variation
MAP NAME
Map
Modification
NAME_NUMBER
Official
SIGN
STATE_HTML
STATE_NAME
TASKFINDER
TASKPLANNER
TIMezone
TMS
TRAILER
TaskNav
TaskPlanner
Taskfinder
Tasknav_id
Timezone
Timezone Name
Trailer
Trailer_Landing

UPdate
UPdate By
UPdate Date
UPdate E-mail
URL Information
URL Turnpoints
USA
Via
Via e-mail
YEAR
Zander
Zander_name
Zander_start_finish

Appendix IV: A Sample "TX" Internal Data File

```
#F Home Site: Saint Auban, France
#F ILEC Home: Saint Auban
#F Contest: World Glider Competition 1997
#F Contributor: Denis Flament '2D'
#F Contributor e-mail: 2D@mail.dotcom.fr
#F Contribution date: March 28, 1997
#F Update date: April 30, 1997
#F URL Turnpoints: http://wwwperso.hol.fr/~wgc/TP.html
#F URL Information: http://wwwperso.hol.fr/~wgc  the WGC
#F Altitude unit: Meters
#F Distance unit: Km
#F Map: HTML
#F Timezone: +2 [ Summer ]
#F Timezone name: MET
#F Magnetic Variation: -.7
#F Zander_start_finish: original
#F Zander_name: yes
#F Tasknav_id: yes
#F Filser_name: yes
#F Official: yes
#F SIGN: Worldwide
#F CAL: yes
#F Apollo_ID: yes
#F EW_SEPARATOR: ,
#F FILENAME_4: wg97
#F FILENAME_5: wgc97

#F Modifications: 22 Apr 97: Added links to maps for each waypoint
#F Modifications: 30 Apr 97: WGC office submitted changes to turnpoint #51 [ \
Le Muy ] altitude and turnpoint #91 [ Saint Bonnet en Champsaur ] latitude
#F Modifications: 7 May 97: Altiport comment added to Alpe d'Huez and Megeve
#F Modifications: 19 May 97: Latitude for Trigance [ off field landing site ] \
modified.
#F Modifications: 8 June 97: TP #99 SREMY Altitude 113m instead of 140m TP \
#104 VAISON Altitude 220m instead of 330m TP #115 LABRIL Correct spelling is \
LA BRILLANNE instead of LA BRILLANE
#F Header: From the Official List dated 28 March, 1997

#C NUM      1
#C ID       2
#C NAM      3
#C TUR      4
#C COD      5
#C NS       6
#C LAT_D    7
#C LAT_M    8
#C EW       9
#C LON_D   10
#C LON_M   11
#C ALT     12
#C TMS     13
#C TMS_NAM 14
```

```
#C CAL_ID  15
#C FRE     16
#C ID_3    17
#C ID_5    18
#C ID_6    19
#C ID_8    20
#C ID_9    21
#C ID_10   22
#C ID_12   23
#C COM     24
#C ILEC_NAME 25

1    AIGUIN   Aiguines Bridge   T    N    43   48.089   \
E    6   14.969   550           1         AGN  \
AIGNS    AIGUNS   Aiguines Aiguines Aiguines \
Aiguines     1Aiguns
2    ANNECY   Annecy LPNorth threshold   TA   N    \
45   56.077   E   6    6.313    461           2    \
118.2    ANN ANNCY     ANNCYL    AnnecyLP Annecy LP\
Annecy LPAnnecy LP    2AnnecL
3    ALPEDH   Alpe d'Huez   Twr  TL   N    45   5.241    \
E    6    5.040   1860          3    120.6    ALP  \
ALPDH    ALPDHZ   AlpedHuz AlpedHuezAlpe dHuez    \
Alpe dHuez   Altiport 3AlpeD'
4    ANNOT    Annot    Railway station   T    N    43   \
57.833   E   6    40.340   700 #od      4         \
ANO ANNOT    ANNOT    Annot    Annot    Annot    Annot           \
4Annot
```

Appendix V: A Potential Waypoint Import File

Tabs rendered visible as **<T>**

```
Home Site<T>Saint Auban, France
Contest<T>World Glider Competition 1997
Contributor<T>Denis Flament '2D'
Contributor e-mail<T>2D@mail.dotcom.fr
Contribution date<T>March 28, 1997
Modifications<T>22 Apr 97: Added links to maps for each waypoint
Modifications<T>30 Apr 97: WGC office submitted changes to turnpoint #51 [ Le Muy ] altitude and turnpoint #91 [ Saint Bonnet en Champsaur ] latitude

NUM<T>ID<T>NAM<T>TUR<T>COD<T>NS<T>LAT_D<T>LAT_M<T>EW<T>LON_D<T>LON_M<T>ALT<T>TMS<T>TMS_NAM<T>CAL_ID<T>FRE<T>ID_3<T>ID_5<T>ID_6<T>ID_8<T>ID_9<T>ID_10<T>ID_12<T>COM<T>COLUMN DEFINITIONS

1<T>AIGUIN<T>Aiguines<T>Bridge<T>T<T>N<T>43<T>48.089<T>E<T>6<T>14.969<T>550<T>S<T>1<T>AGN<T>AIGNS<T>AIGUNS<T>Aiguines<T>Aiguines<T>Aiguines<T>Aiguines<T><T>1Aiguns
2<T>ANNECY<T>Annecy LP<T>North threshold<T>TA<T>N<T>45<T>56.077<T>E<T>6<T>6.313<T>461<T>S<T>2<T>118.2<T>ANN<T>ANNCY<T>ANNCYL<T>AnnecyLP<T>Annecy LP<T>Annecy LP<T>Annecy LP<T><T>2AnnecL
3<T>ALPEDH<T>Alpe d'Huez<T>Twr<T>TL<T>N<T>45<T>5.241<T>E<T>6<T>5.040<T>1860<T>S<T>3<T>120.6<T>ALP<T>ALPDH<T>ALPDHZ<T>AlpedHuz<T>AlpedHuez<T>Alpe dHuez<T>Alpe dHuez<T>Altiport<T>3AlpeD'
4<T>ANNOT<T>Annot<T>Railway station<T>T<T>N<T>43<T>57.833<T>E<T>6<T>40.340<T>700<T>#od<T>4<T><T>ANO<T>ANNOT<T>ANNOT<T>Annot<T>Annot<T>Annot<T>Annot<T><T>4Annot
```