Lowrance .USR File Format

Version 2 and 3

Byte	Description	Example (hex)
0 – 3	Version number. 32-bit integer, little-endian. Version 2 does not save depth. Version 3 does not display comments.	02 00 00 00 (version 2) or 03 00 00 00 (version 3)
4 - 7	Number of way-points. 32-bit integer, little-endian.	02 00 00 00 (2 waypoints)
8 – 11	Latitude in Mercator meters WGS84 (truncated whole meters). Signed 32-bit int, little-endian.	6A 2D 51 00 (~44.17N)
12 - 15	Longitude in Mercator meters WGS84 (truncated whole meters). Signed 32-bit int, little-endian.	DA C7 7A FF (~78.69W)
16 – 19	Altitude in feet. 32-bit integer, little-endian.	14 00 00 00 (20 feet)
20 – 23	Way-point name string length. 32-bit integer, little-endian.	03 00 00 00 (3 characters)
24 – end of string	Way-point name string. Terminated with ‘00 00 00 00’. Optionally, instead of ‘00 00 00 00’ termination, comments may be appended to this string. Start comment string with comment length, 32-bit integer, little-endian. There is no termination after the comment string.	30 30 31 (001) 04 00 00 00 (4 characters) 54 65 73 74 (Test)
Next 4 bytes	Date and time of way-point modification. Signed(?) 32-bit int, little-endian. Seconds since 1 January 2000, 00:00 Local time.	A0 A9 28 00 (31 Jan 2000, 20:14:24)
Next 4 bytes	Icon ID number. See GPX Icon Table. 32-bit integer, little-endian.	37 27 00 00 (10039) ‘dam’
Next 8 bytes	Version 3 only. Depth in feet. IEEE 754 32-bit floating point format. Bytes are stored in this order: 00, 00, LSB, LSB-1, MSB+1, MSB, 01 00.	00 00 CD CC 38 41 01 00 IEEE 745: 41 38 CC CD (11.55 feet)
Next 4 bytes	Version 2 only. Waypoint number x 2^16, 32-bit integer, little-endian.	00 00 01 00 (End of waypoint 1)
Next 4 bytes	Repeat sequence for next way-point starting with Latitude and end with waypoint number x 2^16. Continue for all way-points.	
	...	
Last 4 bytes	End of file. Terminate file with zero, 32-bit integer, little-endian. In version 2 this is instead of the waypoint number x 2^16 of the last waypoint. Not in addition to.	00 00 00 00 (End of file)

GPX Icon Table

Number	GPX Tag
10000	diamond 1
10001	diamond 2
10002	diamond 3
10003	x 1
10004	x 2
10005	x 3
10006	cross
10007	house
10008	car
10009	store
10010	gas station
10011	fork and spoon
10012	telephone
10013	airplane
10014	exit sign
10015	stop sign
10016	exclamation
10017	traffic light
10018	american flag
10019	person
10020	restrooms
10021	tree
10022	mountains
10023	campsite
10024	picnic table
10025	deer
10026	deer tracks
10027	turkey tracks
10028	tree stand
10029	bridge
10030	skull and crossbones
10031	fish
10032	two fish
10033	dive flag
10034	wreck
10035	anchor
10036	boat
10037	boat ramp
10038	flag buoy
10039	dam
10040	swimmer
10041	pier

Note: GlobalMap 3600 c iGPS has 21 more icons beyond 10041 pier.

Conversion from LAT, LON to Mercator meters.

LONmm = LONdeg x SEMIMINOR x DEGREESTORADIANS

where
LONmm = Longitude in Mercator meters
LONdeg = Longitude in degrees
DEGREESTORADIANS = 0.017453292
SEMIMINOR = 6356752.3142

Java code:
```
int meters = (int)(lon * SEMIMINOR * DEGREESTORADIANS);
```

LATmm = SEMIMINOR x log(tan((LATdeg x DEGREESTORADIANS + (2 x pi)) / 2))

where
LATmm = Latitude in Mercator meters
LATdeg = Latitude in degrees
DEGREESTORADIANS = 0.017453292
SEMIMINOR = 6356752.3142

Java code:
```
int meters = (int)(SEMIMINOR * Math.log(Math.tan((lat * DEGREESTORADIANS +
Math.PI / 2.0) / 2.0)));
```