

MLgrad601 Data File



A.1 Description of MLgrad601 Data File Format (MGR)

Each record created by the MLgrad601 program for Windows 7/XP contains 27 characters, including line feed at the end of each record.

Header of the file contains 6 records starting with characters M, H, and four records starting with G.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
M	L	G	6	0	1			W	1	0	6	Survey Type			UT		IM		IS	AU						10
H			File Name									C1	C2	C3	C4	C5	C6		TG			C7	C8	C9		10
G	GPS X Offset (F7.3)							GPS Y Offset (F7.3)							NC	MN	GP			CONG						10
G	not used							not used																		10
G	not used							not used																		10
G	Unit Separation (F7.3)							Separation (F7.3)																		10

- | | | |
|--------------|---|---|
| ML601 | - | identification of program file (rL601 if append part) |
| W106 | - | version number (V1.06) |
| Survey Type | - | GPS (if GPS Input Enabled) or GRD (grid) |
| UT | - | unit type (0 = meters, 1 = ft, 2 = US Survey ft) |
| IM | - | survey mode (fixed 0 = Auto) |
| IS | - | not used (fixed =2) |
| AU | - | array units (0=m, 1=cm, 2=feet, 3=inch) |
| File Name | - | file name, maximum 8 characters |
| C1 to C9 | - | type of Grad601 for each console (=1 Grad601-1, =2 Grad601-2) |
| TG | - | File tag (space=original, 1=Saved As / edited) |
| GPS X Offset | - | Offset of GPS antenna in X direction |
| GPS Y Offset | - | Offset of GPS antenna in Y direction |
| NC | - | total number of consoles in the array (1 to 9) |
| MN | - | leading unit (1 to 9 sensor, 0 for center) |

- GP - type of GPS NMEA message
(0 = GGA/GSA, 1= GGA, 2 = POS, 3 = LLK, 4=LLQ, 5=GLL, 6 = GGK, 7 = Leica TPS, 8 = pseudo GGA)
- CO - coordinates (not used in this version)
- NG - number of GPS receivers (not used in this version)
- Unit Separation - separation between sensors of the same console
- Separation - separation between sensors of neighbouring consoles
- 10 - Line Feed character

Header at the start of survey line (contains four records starting with L, B, A, and Z)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
L	Line Name - 8 characters																									10
B	Start Station (Format F11.2)																									10
A	Dir								Increment (Format F11.3)																	10
Z	D	D	M	M	Y	Y	Y	Y		H	H	:	M	M	:	S	S	.	h	h						10

- Line Name - Line Name, maximum 8 characters
- Start Station - Start Station for the Line, format F11.2
- Time - Time when Line was created in milliseconds
- Dir - Direction of the Line (E, W, N, or S)
- Station Inc. - Station Increment, format F11.3
- Date - Date when Line was created, format DD-MM-YYYY
- Time - Time when Line was created, format HH:MM:SS.hh
- 10 - Line Feed character

Timer Reset

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
*	Computer Time (Format HH:MM:SS.hh)															Time Stamp in ms (10 digits)										10

Indicates reset time of the program timer. This record links timer in milliseconds and computer time (local time) in format HH:MM:SS.hh. This record is written to the file each time after the program switches from the Stand By to Log mode. In case when data are taken continuously the timer is automatically reset every hour.

Reading

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
I	\$	P	B	A	R	,	Left Sensor				,	Right Sensor				Time Stamp in ms (10 digits)										10

I - indicator of reading start, one ASCII character. Number of the ASCII character represents the Grad601 console number in array.
Console #1 is indicated by character T (ASCII number 84). Following constants are added to each of this number (84) to indicate other instruments in the array:

Grad601 Console #1	0
Grad601 Console #2	+32
Grad601 Console #3	+128
Grad601 Console #4	+160
Grad601 Console #5	-64
Grad601 Console #6	+67
Grad601 Console #7	+84
Grad601 Console #8	+101
Grad601 Console #9	-24

\$PBAR - original indicator of Grad601 string (not used)

, - comma separator

Left Sensor - 4 digits, reading of the Left Sensor connected to console

Right Sensor - 4 digits, reading of the Right Sensor connected to console
(spaces if Grad601-1 with one sensor is used)

Time - time stamp of the reading in milliseconds, this is time elapsed from the start (creation) of the current data. The time in milliseconds can be linked with the computer local time by using Times in lines B and Z of Line Header.

10 - Line Feed character

Comment

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
C	Comment (maximum 11 characters)															Time Stamp in ms (10 digits)										10

New Station

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
S	New Station (Format 11.2)															Time Stamp in ms (10 digits)										10

Records starting with X

Several informative records, for example X\$STARTED indicates start of Logging mode, X\$PAUSED indicates Pause (activated by Pause key stroke), etc.

Line starting with r

The tag **rL601** indicates location where file was appended. File header is repeated (see the first page of this chapter). The only difference is that instead of tag **ML601** the line starts with **rL601**.

GPS Data Message Records

Each GPS record (GGA Message) is broken in to several 25 characters strings and placed in the MLgrad601 data file which contains 27 characters records, including one character indicator and line feed at the end of each record. The GPS sequence starts at the line which contains the character @ as the first character, then records that contain a continuation of the same message start with the character #. The GPS sequence ends with a line starting with the character !. The last line contains sequential number of GPS recorded position and a logger time stamp for the given GPS reading. A sample of the GPS message written in MLgrad601 format is given below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
@	\$	G	P	G	G	A	,	h	h	m	m	s	s	.	s	s	,	d	d	m	m	.	m	m	m	10
#	m	m	,	s	,	d	d	d	m	m	.	m	m	m	m	m	,	s	,	n	,	q	q	,	p	10
#	p	.	p	,	s	a	a	a	a	a	.	a	a	,	u	,	±	x	x	x	x	.	x	,	M	10
#	,	s	s	s	,	a	a	a	*	c	c	CR	LF													10
!	0	0	4	3	5											Time Stamp in ms (10 digits)										10

The GPS sequence may contain 4 to 7 records. The components of the GGA message may differ in length, however they are placed in the same number of columns. Refer to Appendix B (section B.2) for the definition of each component of the GGA data message. Other available GPS messages in NMEA format, GSA, POS, LLK, LLQ, GLL, and GGK, are recorded similarly. The structure of these NMEA sentences is given in section B.2 of Appendix B.

If the Checksum in NMEA message is invalid then starting character @ is replaced by ?, and # is replaced by " (ASCII character code 34). The starting character of Time Stamp record ! remains the same.

A.2 Example of MLgrad601 Data File

The MLgrad601 data file records are written in binary format, therefore characters may have a different shape when displayed or printed, depending on particular video or printer settings.

```
MLG601 W106GPS0 0 20
H 082212A 222200 000
G 1.610 0.500410 01
G
G
G 0.460 0.460
L3.00
B -137.00
AS 1.000
Z22082014 12:17:03
*12:17:03.078 4576351
t$PBAR, 44, 66 4579580
ô$PBAR, 74, 28 4579580
T$PBAR, 89, 58 4579580
O$PBAR, 57, 80 4579596
t$PBAR, 44, 78 4579674
ô$PBAR, 74, 49 4579674
T$PBAR, 89, 79 4579674
O$PBAR, 57, 62 4579705
t$PBAR, 45, 66 4579768
ô$PBAR, 75, 29 4579768
T$PBAR, 90, 59 4579768
O$PBAR, 65, 68 4579799
t$PBAR, 50, 70 4579861
ô$PBAR, 78, 36 4579861
T$PBAR, 101, 66 4579877
O$PBAR, 62, 62 4579892
ô$PBAR, 77, 29 4579955
t$PBAR, 48, 66 4579955
T$PBAR, 96, 59 4579970
O$PBAR, 35, 76 4579986
ô$PBAR, 65, 45 4580064
t$PBAR, 30, 76 4580064
T$PBAR, 60, 75 4580064
O$PBAR, 39, 73 4580080
@GPGGA,162406,4336.8685,N
#,07937.7241,W,8,12,2.0,20
#1.2,M,-35.4,M,*7C
! 0 4579986
ô$PBAR, 67, 41 4580158
t$PBAR, 33, 73 4580158
T$PBAR, 66, 71 4580158
O$PBAR, 73, 67 4580173
ô$PBAR, 82, 34 4580251
t$PBAR, 55, 69 4580251
T$PBAR, 111, 64 4580251
O$PBAR, 68, 67 4580267
ô$PBAR, 79, 34 4580345
t$PBAR, 52, 69 4580345
T$PBAR, 104, 64 4580345
O$PBAR, 52, 80 4580376
ô$PBAR, 72, 49 4580438
t$PBAR, 41, 78 4580438
T$PBAR, 82, 79 4580454
O$PBAR, 59, 61 4580470
t$PBAR, 46, 65 4580532
ô$PBAR, 76, 27 4580532
T$PBAR, 93, 57 4580548
O$PBAR, 78, 73 4580563
t$PBAR, 58, 73 4580641
.....
```