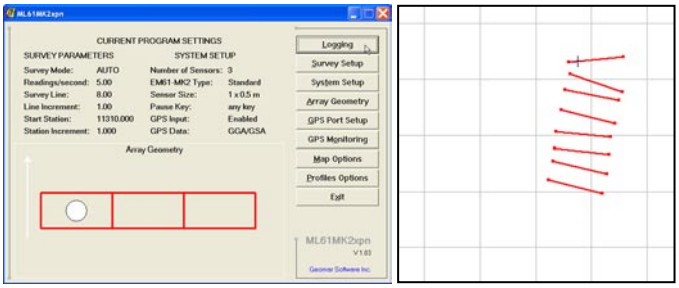
ML61MK2*xpn* data logging system

The **ML61MK2xpn** system for Geonics EM61-MK2 array (one or two row configurations) consists of two programs: the field data acquisition component ML61MK2xpn and the data processing software Multi61MK2.

ML61MK2xpn will increase productivity significantly in areas where multiple EM61-MK2 systems can be configured as a single array. The ML61MK2xpn data acquisition software can collect readings from up to 9 EM61-MK2 systems and one GPS receiver into one file simultaneously. The software will also significantly speed up the time it takes to complete a survey by providing uniformly spaced lines with real time navigation and array swath. Thereby preventing skipped areas and overlapping coverage.

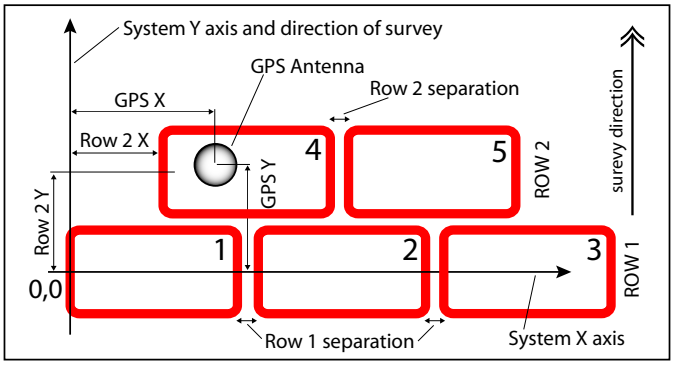


Actual GPS antenna position along array is reflected on a map swath bar (scale 15 m)

ML61MK2xpn software works with virtually any GPS receiver by supporting NMEA messages: GGA, POS, GLL, LLQ, LLK, GGK, and Leica Robotics Total Station TPS, and features real time navigation by displaying current and logged positions as dots or scaled array swath, while providing a graphical and numerical view of the collected EM61-MK2 data, and GPS parameters and coordinates.

Two units array (photo courtesy of USA Environmental, Inc.)

The accompanying Windows based data processing program Multi61MK2 is designed to process data collected under control of the ML61MK2xpn. The program positions each EM61-MK2 sensor based on the user specified array geometry (see Figure below), GPS recorded positions, instant heading of the array, and the user specified filters.



Specifying two row array geometry for five EM61-MK2 units and GPS antenna

Main features of the ML61MK2xpn:

- easy to read map with user specified colour and size for current position indicator and the array swath
- adjustable map scale, grid interval, and cursor band
- easy to read EM61-MK2 4 channel equalizer bar, profile and numeric display for all EM units
- update at a rate of over 100 readings/seconds
- continuous monitoring and warnings for each instrument and GPS cable connections
- monitoring each EM61-MK2 battery level
- extensive survey parameters info
- number of GPS satellites, PDOP, and position quality indicator monitoring
- user specified GPS warning mask
- latitude and longitude coordinate display
- actual speed of the system
- one key toggle for extended length profile mode

GEOMAR SOFTWARE INC.
Tel: 905.306.9215
Fax: 905.276.8158
E-mail: geomar@geomar.com

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ML61MK2xpn Features (data acquisition program)

Main display functions:

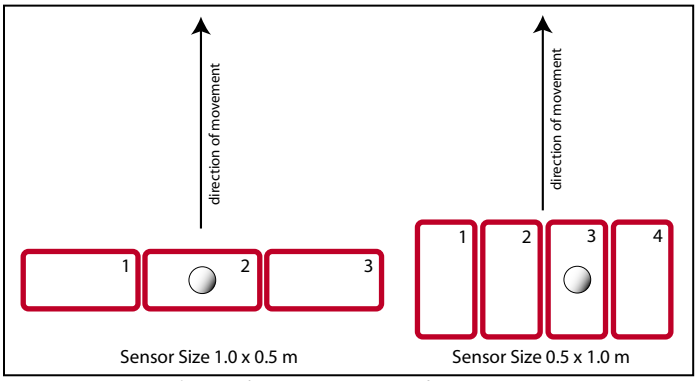
- Real time navigation, current location indicator shown as cursor, logged positions displayed as dots or array swath (span of the array)
- User specified map scale, grid line intervals, and cursor band; screen scrolls once the cursor band limit is reached
- EM61-MK2 Channels 1, 2, 3, and 4 or T are displayed as moving graphic bars, profiles, and in numeric form for each instrument in the array; option for extended profiles
- EM61-MK2 mode, instrument battery level, and proper serial connection for each instrument and GPS monitored
- Support for High Power and N.C.C. type of EM61-MK2
- Real time graphical array configuration display
- Current GPS antenna position in Latitude/Longitude, type of differential corrections (DGPS, various RTK), PDOP or other equivalent parameter (depends on NMEA used), and number of satellites
- Various survey parameters and settings, number of logged stations
- Monitoring of GPS signal and enabling warning for GPS mask
- Continuous display of the actual speed of the system

Survey parameters:

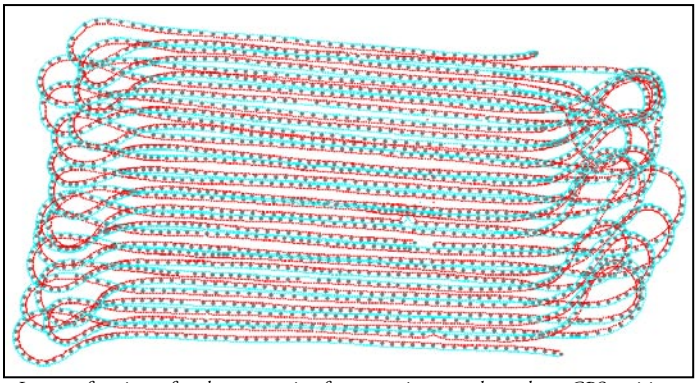
- Rate of data acquisition: over 100 Hz (at 1 Hz GPS output) for total number of units in array (depends on computer)
- Quick Line, New Line, New Station, Comment entry
- Change of map and EM61-MK2 data scales at any time
- Array geometry: number of units, rows, sensors size, and separations

GPS functions:

- Configuration of logger serial port to accommodate any GPS settings
- GPS output monitoring, GPS warning mask, connection alarm
- Support for NMEA messages: GGA, GGA/GSA, GLL, POS, LLQ, LLK, GGK, and Leica Robotics Total Station TPS1100/1200 stream
- Offsets for GPS antenna in any direction



Selection of 1 x 0.5 sensor size and GPS antenna

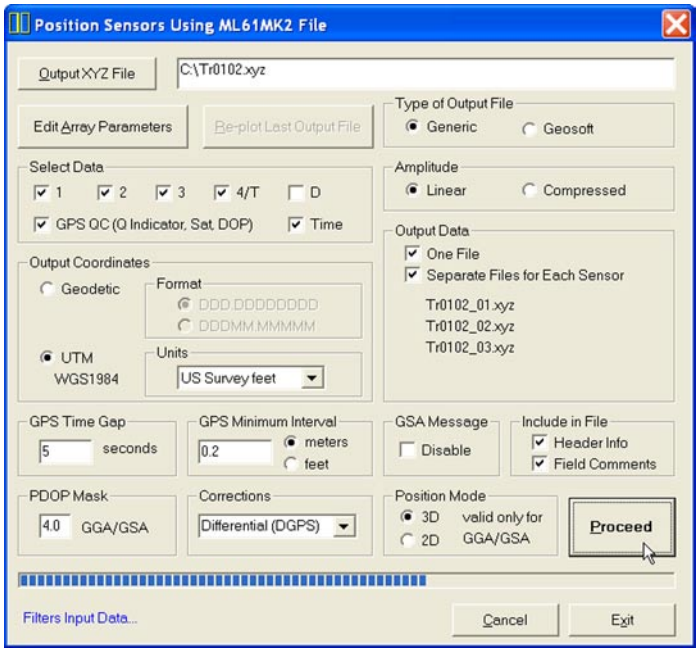


Layout of stations after data processing for two units array; large dots - GPS positions, red dots - EM61-MK2 #1, blue dots - EM61-MK2 #2

Multi61MK2 Features (data processing program)

Position sensors based on standalone ML61MK2xpn file:

- Apply GPS antenna offset at any direction (as entered in the field with an option of correcting these parameters during data processing)
- Output to one and/or separate XYZ files for each instrument
- Filters the quality of positioned data based on GPS parameters as PDOP (or equivalent) and the degree of differential corrections
- Further enhancement of the EM61-MK2 readings position is obtained by specifying the GPS Time Gap and GPS Minimum Interval.
- Choice of coordinates in generated XYZ file: Geodetic coordinates (Latitude/Longitude in degrees) or in UTM coordinates (meters, feet or US Survey Feet, WGS1984 datum)



Position all EM61-MK2 readings and create XYZ file based on external GPS file *(This function is used when real time GPS differential corrections are not available, or when further post processing of GPS data may improve positioning accuracy)*

- Apply GPS antenna offset in any direction (as entered in the field with option of correcting this parameter during data processing)
- Further enhancement of the EM61-MK2 readings position is obtained by specifying the GPS Time Gap and GPS Minimum Interval

Position EM61-MK2 by merging standalone GPS file *(This function can be used only as an emergency when direct interface of GPS was not possible during field work)*

Miscellaneous:

- Full transparent compatibility with older ML61MK2 data files
- Edit dialog for several survey parameters and instrument settings with real time array configuration graphical update
- Field QC parameters (Quality Indicator, number of Satellites and PDOP) are written into the generated XYZ file
- Convert ML61MK2xpn files to Geonics DAT61MK2 format
- Convert ML61MK2xpn files to general format ASCII file
- Convert GXY file to ASCII file containing positions
- Retrieve and position field comments from ML61MK2 file
- Apply System Time Constant delay (lag) in generated XYZ file
- Transfer data file from DOS based field computer to PC
- View, edit, and save modified data files

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