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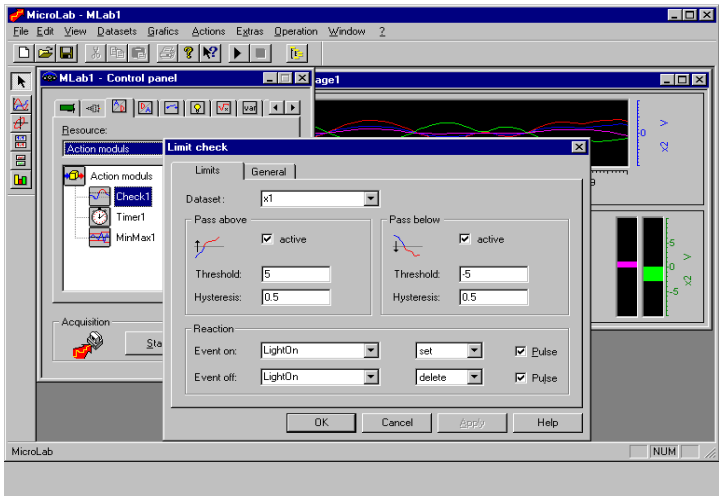
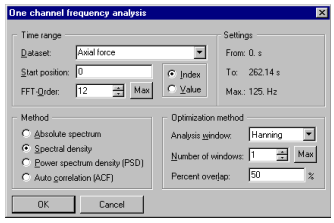
µ-Lab and µ-Graph

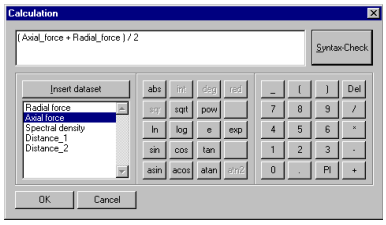
DATA ACQUSITION AND ANALYSIS WITH 32-BIT-POWER

*For the first time is able to present a software packet specially designed for comfortable data acquisition and analysis under Windows 95/98 and Windows NT - **µ-Edition**. The program modules **µ-Lab** and **µ-Graph** make full use of the 32-bit qualities of these operating systems and thus combine a performance previously unknown on a PC extreme ease of use.*

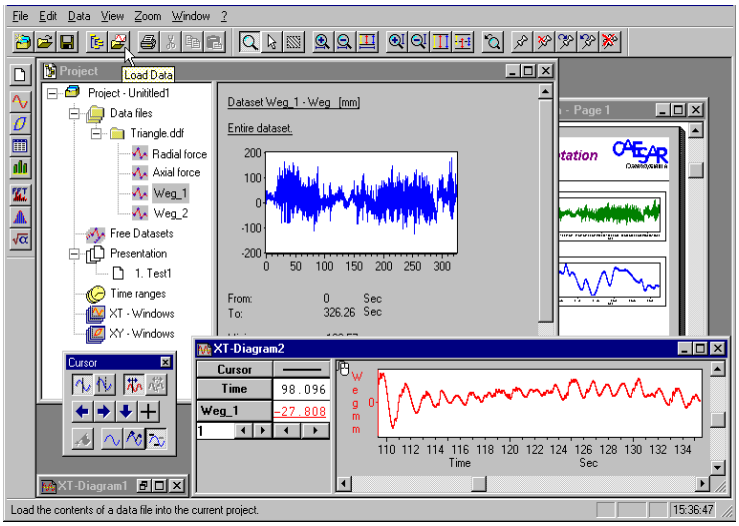
µ-Lab enables data from an unlimited number of digital and analog channels to be acquired, processed online, displayed and output again. As far as the hardware is concerned, data acquisition and output cards from a large range of well known manufacturers and, of course, the MOPS and PCM-Systems are supported. Sample rates from under 1 Hz to more than 100 kHz (continuous) or 500 kHz (Burst) are possible, depending on the hardware used. The acquired data can be distributed among an unlimited number of files. Even the basic µ-Lab version contains a wide range of trigger functions and action modules for limit surveillance, time control, data reduction and various smoothing algorithms. Each channel can be calibrated either linearly or non-linearly. By means of the online-graphic, an unlimited number of graphical objects can be displayed simultaneously: e.g. xt-digram (incl. scroll and scope mode), xy-digram, bar diagram, numerical display or text switch. The properties - e.g. axis scaling, color, text fonts - can be defined separately for each individual object. The functionality of the basic version can be extended, if desired, with the help of additional modules, e.g. for online computation, DIN and Rainflow classification (bin analysis), frequency analysis and signal generation.

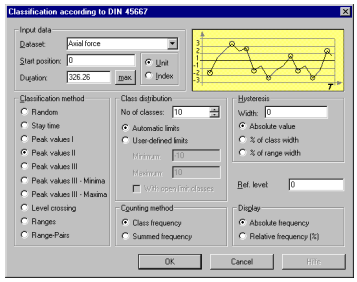


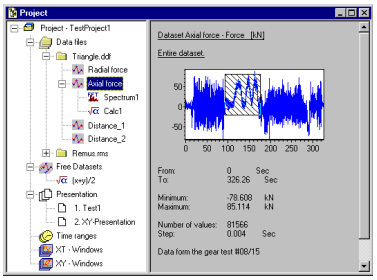


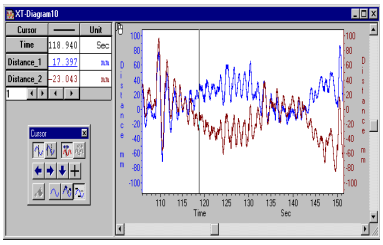


µ-Graph is a flexible, graphical analysis program for all kinds of measured data. It combines the following functions: quick-look, interactive processing, data management, presentation graphic, statistic, formula generator and, optionally, frequency analysis and bin analysis in a user interface which is particularly intuitive and easy to use. The analysis is carried out simply by dragging (Drag & Drop) the marked datasets onto the corresponding button in a toolbar (e.g. print or FFT). µ-Graph is, of course, fully compatible to the REMUS-data format. A special highlight is the incredibly fast quick-look function, which enables the largest datasets to be displayed in a fraction of a second: simply click on the dataset name and even several megabytes of measured data appear at once on the screen without any noticable delay together with the most important statistical parameters. The quick-look has even more to offer: with the help of the mouse, any particular dataset can be marked and either printed or displayed in the interactive cursor mode. Here a wide range of functions are available, e.g. line, crosshair and difference cursor, zooming, scrolling, marking and labelling. While scrolling through long sequences of data, bookmarks can be set so that points of particular interest can easily be found again. Each dataset can be displayed in an xt-diagram, xy-diagram, bar diagram or table with manual or automatic scaling. The flexible presentation graphic in µ-Graph enables records and reports to be freely defined. Together with standard functions for drawing and labelling, the OLE interface makes it possible to include objects from other Windows programs (e.g. Excel or Word).A report that has been designed once can be stored as a template and used again when required simply by clicking a button.









μ-Lab	**Data Acquisition and Online Processing Software**
General Features 	32-bit program optimized for use with Windows NT and Windows'95 * Recording and generation of an umlimited number of analog and digital channels * Sampling rates (dependent on the hardware used) from < 1Hz to: • > 100 kHz for continuous recording to harddisk * Ergonomical handling by: • Drag&drop function • Context-sensitive menus • Tools bars, Tool tips * Language versions -German, English, and French available * Detailed documentation: printed manual and online documentation (PDF) Individual tuning of all default settings
Channel Properties 	Dataset name, label, engineering unit * Linear/non-linear scaling * Curve smoothing: • Sliding average • Weighted sliding average • Linear smoothing * Combination of several digital channels to one analog channel * Limit control for output channels Selective inversion for each digital channel
Data Storage 	Storage of an umlimited number of channels and files * Ring-buffer storage (Post mortem), dependent only on harddisk capacity * Distributed storage on separate harddisks * Single-step recording * Test series * Manual and automatic file name definition * AutoSave function prevents from data loss * Burst recordings to harddisk * Start and stop trigger, pre- and post-trigger
Online Graphics 	Unlimited number of graphic windows * Each window may contain an unlimited number of graphical objects, such as: • Time history (modes: scroll, scope, erase) • XY diagram, Bar graph, Numerics, Switches • Input objects Individually definable text styles, axis scaling and colours
Action Modules 	Limit control * Timer * Data reduction: • Minimum, maximum, average and down-sampling (static and dynamic time range) • Peak/valley recording
Option: Online Arithmetics 	Arithmetical functions with one or more datasets * Comfortable formula definition * Numerical and Boolean operations: • Basic arithmetics (+, -, *, /, power, square root etc.) • Trigonometrical functions • Logarithmic / exponential functions • Absolute value, rounded figures, sign function • Numerical constants (Euler e, π) • Re-calculation: degree-to-rad and vice versa
Action List 	'C'-like programming language for individual data processing * Arithmetic functions: see option ´Online Arithmetics´ * Loop and branch constructs (for, if, else ...) * Special commands for function generation (test-rig control)
Opt: Online Bin Analysis DIN 45667	• Online classification methods: random counting, time-at-level, peak counting I, II, III, level crossing, range, range-pair counting
Option: Online Rainflow Analysis	Online Rainflow analysis
Option: Online FFT	Online-FFT

μ-Graph	**Graphical Analysis Software for Technical Data**
General Features 	32-bit program optimized for use with Windows NT and Windows'95 * Ergonomical handling by: • Drag&drop function • Context-sensitive menus • Tools bars • Tool tips * Language version in German, English and French available * Detailed documentation: printed manual and online documentation (PDF) Individual tuning of all default settings
Data Management 	Evaluation of data files of any size including special configurations, such as: • Ring-buffer files (Post mortem) • Data stored in separate files • Data stored on separate harddisks * Data server for optimized access to network data * Structured data tree display of file contents * Active quick-look display * Individual labelling of datasets, ranges and sample points * Unlimited number of datasets/channels * Selective deletion of datasets * Modification of dataset properties: • Dataset name • Label • Engineering unit • Scaling (linear/non-linear) • Commentary text * Import of other formats: • ASCII-table • RMS, DAT, DIF • dBase * Automatic report generation for all analysis steps * Project management, e.g. combination of data files * Save and load function for project configurations * Clear relation between analysis results and original datasets Parallel processing of datasets with different sample rates
Interactive Display 	Display of any number of datasets as: • Time history • XY diagram • Bar graph • Table * Cursor functions: • Time cursor • Crosshair cursor • Differential cursor • Interpolation of cursor values for datasets having different sample rates * Flexible zoom functions: • Individual up and down zooming • Full-range display • Horizontal and vertical scrolling • Re-activation of up to ten past zoom ranges * Setting, selection and deletion of bookmarks Combination of diagrams Flexible axis scaling: Manual scaling for each dataset Optimized auto-scaling for each dataset Auto-adjust function for all datasets in one diagram * Overlayed display of datasets having different sample rates * Marking and labelling of sample points and data ranges: • Joint storage with appropriate data file • Fast re-display of markers by clicking on them in the data tree structure • Selective display and printout of markers and labels * Individual curve colours and line styles Integrated legend and cursor data display

Presentation 	Report and presentational graphics with individual layout * Easy integration of data, diagrams and tables by use of drag&drop-function * Definition and storage of individual print forms * Drawing functions: • Lines, rectangles • Bitmap graphics for background and logos • All Windows character styles available • Data objects like diagrams and tables * Editing of object properties (colours, patterns, contents) * Comfortable alignment of graphical objects * Import of objects from other programs via OLE (e.g. MS Excel, MS Word) * Definition of page settings * Serial output of all presentation pages to the printer WYSIWYG display of presentation pages
Printout 	Direct printout of single datasets from the project tree structure * Printout of all datasets from one file on one or multiple pages * Printout of single tables and diagrams * Printout of single presentation pages Sorted printout of all presentation pages
Arithmetics 	Arithmetical functions with one or more datasets * Automatic interpolation of datasets having different sample rates * Comfortable formula definition * Clear relation between analysis results and original data in the procect tree structure * Numerical and Boolean operations: • Basic arithmetics (+, -, *, /, power, square root etc.) • Trigonometrical functions • Logarithmic / exponential functions • Absolute value, rounded figures, sign function • Numerical constants (Euler e, π) • Re-calculation: degree-to-rad and vice versa
Statistics	Statistical parameters: • Minimum, maximum, mean, differences (X+Y), standard deviation • Linear regression, slope detection
Option: 1-Channel Frequency Analysis 	Magnitude spectrum, magnitude spectral density, RMS spectrum, power spectral density (PSD). * Correlations: Auto-covariance and normalized auto-correlation * FFT up to 17th order, i.e. over more than 130.000 samples * Window functions: • Rectangle, triangle, Hanning, Hamming, Blackman, exact Blackman • Compensation of magnitude damping Spectral averaging, variable overlapping between 0% and 99%
Option: DIN 45667 Bin Analysis 	Classification methods: random counting, time-at-level, peak counting I, II, III, level crossing, range, range-pair counting * Relative and absolute counting * Computation of bin and cumulative counting * According to the method: • Reference level • Hysteresis definition Revolutional counting
Option: Additional Bin Analysis	Multi-channel counting * Rainflow analysis