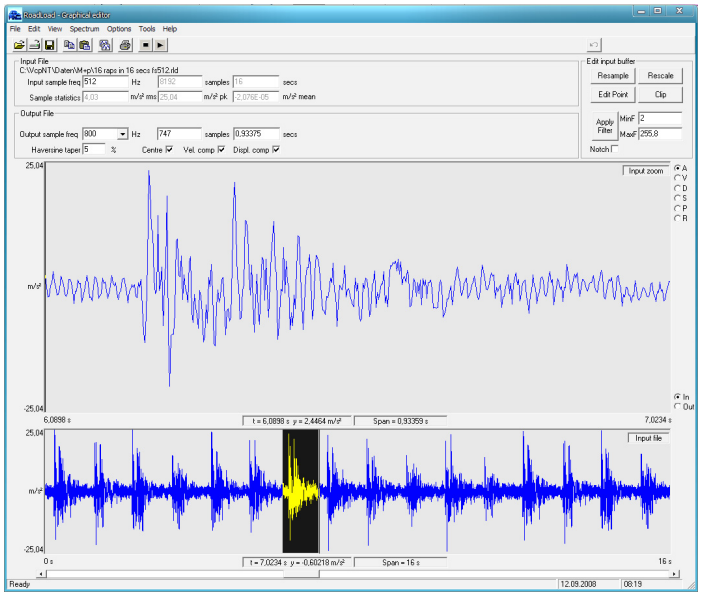
# m+p VibControl

## Time Domain Replication/Road Load Simulation

The m+p VibControl Time Domain Replication suite of programs provides the complete solution for the transfer of data from the true environment to the vibration test laboratory. As part of the overall m+p VibControl family of products, the Time Domain Replication software is fully compatible with other vibration test modes, such as random, sine, shock, SRS and mixed mode.

The powerful graphical editor makes it easy to review and compile your field sample data for use in the test lab. The point editor, filters, velocity and displacement compensation ensure the test feasibility is evaluated at an early stage. The continuous closed-loop controller then replicates the test files with very high levels of precision. The control algorithms use a continuous coherence averaging technique to ensure a stable proactive control loop that will not only provide accurate replication but will also respond to changes in test item dynamics.

Upon test completion the measured data can be reviewed using an unmatched range of reporting tools that will automatically filter data types, embed company logos, use predetermined report layouts and, if required, you can send the data to your customer in an active form within your electronic report copy.



Graphical editor

## Key Features

- Unlimited time data replication
- Continuous closed-loop control
- Advanced field sample data compilation
- Multiple road surface test sequencer for automated, long-term durability testing including email and SMS messages
- Active control loop
- Full signal editing suite
- Throughput time data recording
- Powerful report generator
- Automatic end-to-end report repeats

## Applications

- Road load signal replication of test tracks, race circuit or road conditions
- Automotive accelerated product durability testing
- Replication of flight recorded vibration
- Long-time transient signal replication, e.g. earthquake simulation
- Replication of package transportation vibration data
- Engine vibration replication, e.g. marine or automotive
- Gunfire simulation from recorded or SRS synthesized data
- Strain measurements using m+p hardware (m+p VibRunner, m+p VibMobile), available bridges: full bridge, half bridge, quarter bridge, measuring either bending or Poisson's ratio

## Sample Data Compilation

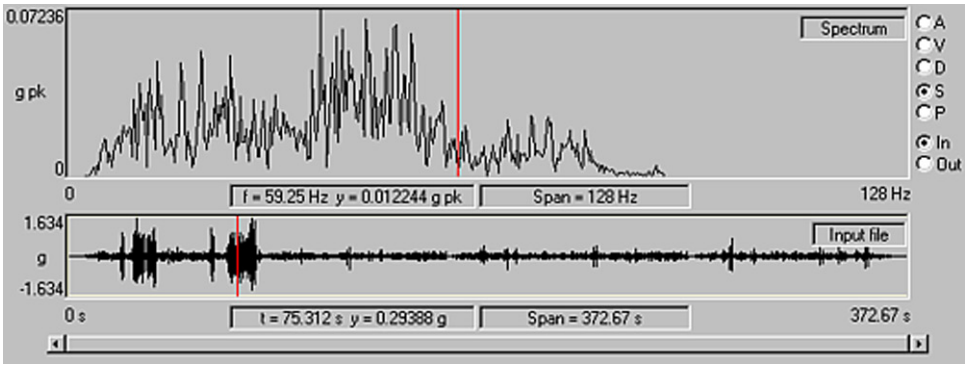
The real power of Time Domain Replication testing on hydraulic or electromagnetic shakers is in the pre-test data handling. At all times the test engineer is faced with a need to provide a balance between test requirement and physical equipment limitations.

The sample data compilation allows the engineer to tailor the raw test data not only to meet his equipment limitations but also to develop a time history that includes all the sections of signal that are of interest. Our copy-save-append function allows relevant sections to be put together and areas of low vibration output, which are of no interest, to be removed from the final time history hence minimizing valuable test time requirements.

The raw data can be read directly from several different formats including RPC3, WAV and ASCII. It can then be viewed as a standard acceleration trace or re-calculated into velocity or displacement traces, it can even be displayed as an FFT trace for evaluation of frequency content prior to testing.

The high-speed graphics display allows cursor click-and-drag zoom selection, plus panning for efficient compilation of relevant data sections. The length of the time history file is only limited by the size of the hard disk on the host PC; the Time Domain Replication suite can handle files of any size.

Data clipping, individual point editing in addition to user-selectable band pass filtering ensure the test data does not exceed the shaker or UUT restrictions. Automatic resampling, scaling, selectable end-tapers, velocity and displacement compensations are then applied to create the required time history. Once the raw data has been compiled into the required time history, additional test parameters including several advanced features such as user-selectable real-time band pass filtering are added ready for the m+p VibControl Time Domain Replication controller.




Spectrum display in zoom window

- ASCII, WAV and RPC3 raw sample data files, import of any sample frequency and length
- Sampling from 128 Hz to a minimum peak sampling rate of 12.8 kHz (hardware dependent)
- Usable ranges from 0-51 Hz to 0-5 kHz (hardware dependent)
- Control resolution from 1/128 to 1/8,192 of the sample frequency
- Time history file size limited only by host PC local disk capacity
- Unlimited repeats of a single time history file
- User-selectable real-time band pass filtering
- User-selectable resampling of control signals
- Test control functions: Frequency resolution of the control filter, test schedule and duration, a sample record can be repeated any number of times, alarm and abort limits for safe testing and detection of mechanical failures, measurement channel set-up
- Data clip and edit functions
- 2 to 128 measurement and control channels
- ICP transducer support
- m+p VibUtil package (optional) providing test sequencing for automated road surface programs and digital channel control e.g. for climatic chambers; can be set to send email messages upon test completion or test abort

## Time Domain Replication

The development of real-time continuously updating control represents a significant improvement in test repeatability and quality. The ability to control in real time a signal that is constantly changing and can last for hours requires a very stable control algorithm at its core.

The coherence averaging technique used in the m+p VibControl software is inherent stable; this provides reliable long-term control. Utilising this stability ensures the accuracy of the replicated signal is at its peak throughout the test, whilst also ensuring fast reaction to dynamic changes on the shaker or UUT. As with all other m+p VibControl test modes, a comprehensive system selfcheck is performed prior to running the test to ensure that sensors and drive signals are in place avoiding potentially dangerous and damaging situations. The test signals are specially tailored to provide a fast test with good estimates of system transfer function for accurate start-up.

- System selfcheck
- Continuous update control algorithm using coherence averaging
- Stable control with time variant frequency content
- Highly tolerant of non-linear system response such as in hydraulic shaker systems

## Test Sequencing

Where many road surfaces are combined in complex sequences for long-term durability testing, the m+p VibUtil option can easily combine individual tests in any complexity of nested loops. The sequencer can be paused and resumed at any time during the test to ensure a long test can be completed in sequence even if interrupted mid-stream. m+p VibUtil allows Time Domain Replication files to be tested in a sequence along with random, sine, shock, SRS or mixed mode data. Whilst the operator is present, comments can be added in addition to the freedom to view signals online as the test progresses.

When the test is left unattended for an overnight or weekend run, you can still be in control. The m+p VibUtil program can be set to send an email to the user defined addressees upon test completion or abort. A protocol file documenting key test events is attached to the email.

Within test sequencing digital input and output provides links to external equipment such as environmental chambers for combined testing.

- Flexible test sequence set-up
- Loop function for automatically repeating sequences of commands
- Status email can be sent upon test abort or completion to an unlimited number of recipients with protocol file attached
- Support of 8 digital input channels and 4 digital output channels

## Test Report

The advanced data review and report program included with the Time Domain Replication suite allows reports to be printed directly from the control window, alternatively the displayed data can be copied to standard Windows applications such as Word or Excel. Plots can be created with single or overlaid traces. User comments, company logos and graph markers can all be added to create a complete report ready display. Data filtering is available to select quickly the most relevant data from all that was stored during the test.

The reports can be generated online while running a test or upon test completion. The ultimate step in electronic report generation is using the m+p Analyzer eReporter software package to which the m+p VibControl data can be directly exported.

- Interface to m+p Analyzer eReporter software for comprehensive analysis and reporting
- Double cursor with zoom-in function
- Horizontal cursor
- One-click printing to a Word document of all or a selection of result data
- Copy and paste of all or a selection of result data to Excel for matrix analysis
- Export of all or a selection of result data in Universal File Format
- Export of complete binary result file into ASCII file
- Multiplot:
  - Minimum and maximum labels for all traces
  - Peak search over all traces

## Operating System

- Microsoft Windows 7 Pro and Windows 10 Pro 32 or 64 bit



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