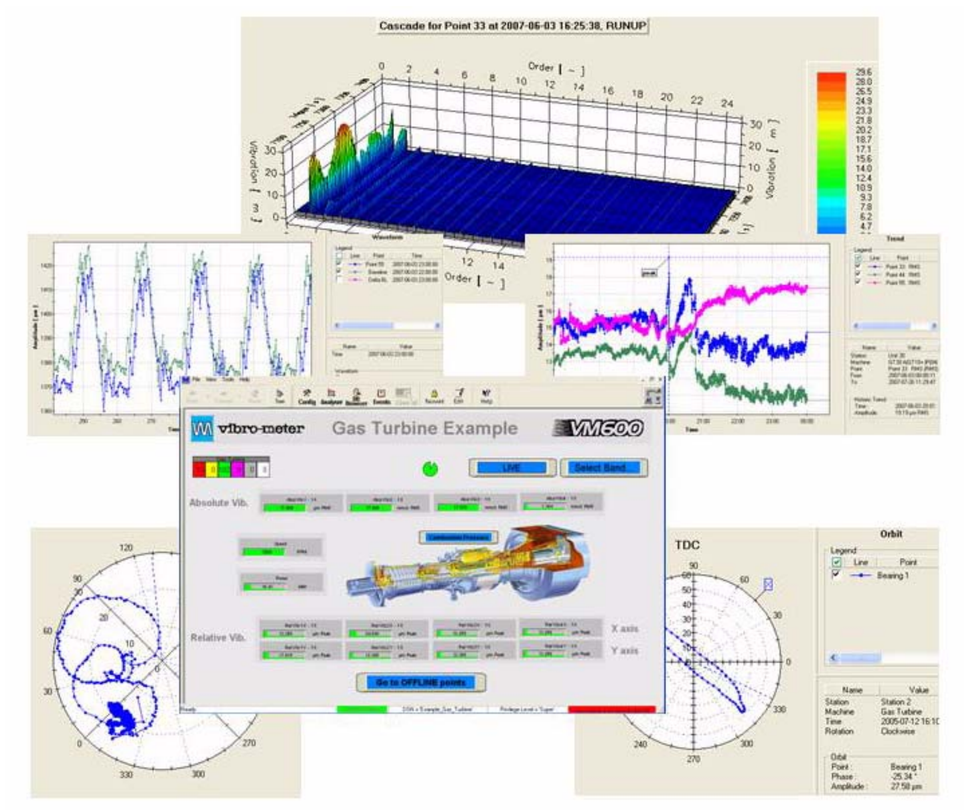
Vibro-Meter

Software Manual

VM600
Condition Monitoring System (CMS)

Volume 1 - The Core System



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Part II : Installing and Configuring the System

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PREFACE

About This Manual

This manual relates to the Vibro-Meter VM600 Condition Monitoring System (CMS) Software.

This is Volume 1 of the CMS Software manual. It provides a general system description, as well as instructions on installing, configuring and operating the CMS system.

Volume 2 of this manual describes optional modules of the CMS Software that can be purchased separately.

Who Should Use This Manual

This manual is written for integrators and operators of condition monitoring systems using the VM600 CMS Software.

Integrators and operators are assumed to have the necessary technical training to install, configure and use the CMS Software system.

Applicability of This Manual

This manual applies to Version 2.2 of the CMS Software package. It reflects the features available with Version 2.2, and may not be applicable to earlier or later versions of the software.

Please note that this manual describes use of the CMS Software with a standard Windows configuration in English. If using a different locale, you may need to modify certain parameters, for example, use a comma (“,”) as the decimal point in numbers.

Licensing

The purchase of the CMS Software includes licenses for the CMS Software, as well as the embedded database package.

The installation and use of the database package is strictly limited to the number of licenses purchased through Vibro-Meter. Additional licenses must be purchased directly or indirectly from Sybase. Also, the use of the database product embedded into the delivery is strictly limited to exclusive use with the VM600 CMS Software. Other uses must be explicitly authorised by Sybase.

Related Publications and Documentation

Related documents are:

- *VM600 Condition Monitoring System (CMS) Software Manual, Volume 2 - Optional Modules*
  Vibro-Meter Document No. MACMS-SW/E
- *VM600 Condition Monitoring System (CMS) Quick Start Manual*
  Vibro-Meter Document No. MACMS-QS/E
- *VM600 Condition Monitoring System (CMS) Hardware Manual*
  Vibro-Meter Document No. MACMS-HW/E

- *VM600 Networking Instruction Manual*
  Vibro-Meter Document No. MAVM600-NET/E

Release Notes

Before continuing, please read the *Release Notes* provided with the CMS Software Installation Kit. The *Release Notes* contain important information about:

- New product features
- Resolved problems and bug fixes
- Known issues
- Compatibility with earlier software versions.

SAFETY

Symbols and Styles Used in This Manual

The following symbols are used in this manual where appropriate :

The WARNING safety symbol

THIS INTRODUCES DIRECTIVES, PROCEDURES OR PRECAUTIONARY MEASURES WHICH MUST BE EXECUTED OR FOLLOWED. FAILURE TO OBEY A WARNING CAN RESULT IN INJURY TO THE OPERATOR OR THIRD PARTIES.

The CAUTION safety symbol

This draws the operator's attention to information, directives or procedures which must be executed or followed. Failure to obey a caution can result in damage to equipment.

NOTE : This is an example of the NOTE paragraph style. This draws the operator’s attention to complementary information or advice relating to the subject being treated.

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Part I : Overview

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1 INTRODUCTION

1.1 The VM600 Condition Monitoring System

This chapter describes the main features of the VM600 Condition Monitoring System (CMS) software. For hardware details, refer to the *VM600 Condition Monitoring System (CMS) Hardware Manual*.

The VM600 CMS system integrates machinery protection and condition monitoring functions in a single, modular system. As shown in Figure 1-1, the system is made up of:

- Vibro-Meter machinery protection systems (MPS) and condition monitoring systems installed in one or more VM600 racks. VM600 racks can contain CMS-only cards (CMC 16, IOC 16T, etc.), or a mixture of CMS and MPS cards (for example, with additional MPC 4, IOC 4T or RLC 16 cards).
- A relational database, in which the system's configuration details, acquired measurement data, and offline data are stored.
- CMS Software, a collection of software programs, including modules to manage the transfer of data from the VM600 racks, store and retrieve data in the database and process, and display the resulting data.

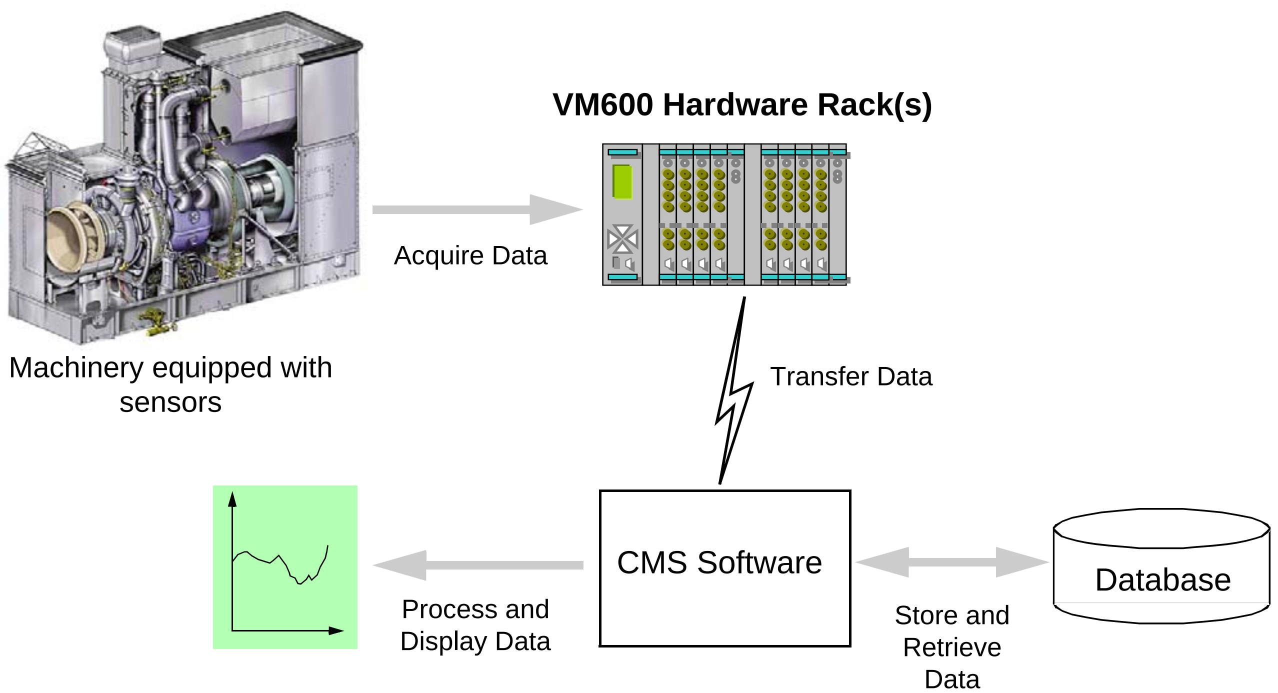


Figure 1-1 : The VM600 CMS System

1.2 Data Acquisition

The VM600 CMS system provides:

- Automatic acquisition and storage of all relevant data for the machinery being monitored
- Long-term trending and continuous checking for limit exceedences
- Event logging (hardware events, limit-related events, user-events)
- Complementary high-resolution data acquisition (for example, scheduled, "on alarm")
- Automatic run-up and run-down data acquisition
- Fast Fourier Transform (FFT) based processing

1.2.1 Data Acquisition Modes

The data acquisition modes represent the building blocks from which a condition monitoring system is assembled. The focus necessarily varies a lot between applications, so it is important to introduce the data acquisition capabilities–and thus to clearly define each in physical terms.

In order to introduce the terms and definitions used in this chapter, Figure 1-2 shows the basic parameters underlying every available measurement mode.

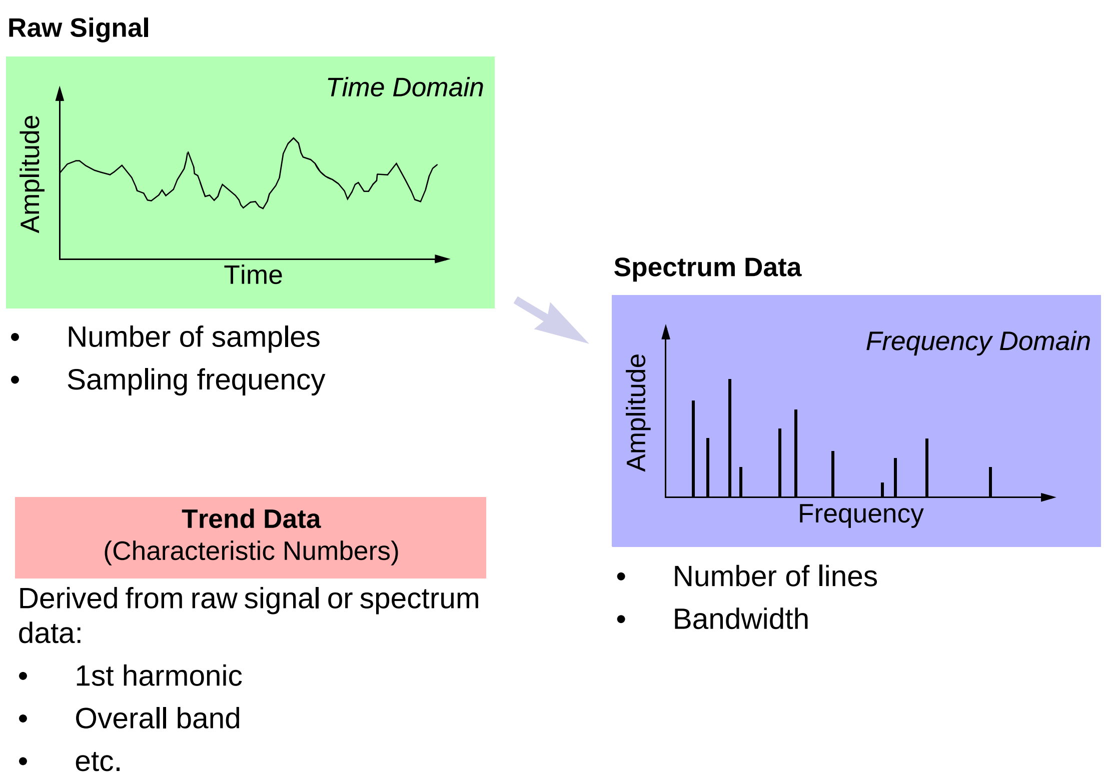


Figure 1-2 : Basic Data Acquisition Parameters

Where:

- **Raw Signal**. The start of the data acquisition chain is the acquisition of a raw signal from a sensor representing a physical parameter. This time-domain data, or time series, is made up of a specific number of samples, and a sampling frequency.
- **Spectrum Data**. Based on the time-domain based data series, a spectrum is calculated using Fast Fourier Transform (FFT) algorithms. The resulting representation of the data in the frequency domain is characterized by the frequency resolution, or the number of lines in the spectrum, together with the bandwidth.
- **Trend Data**. The last step is the extraction of parameters that may be characteristic of a certain machine condition, and which may be derived from either the time-domain or spectrum data. For this, different types of *rectifier functions* (see 1.2.3 - Rectifiers: Time-Domain Based Outputs vs FFT-Based Outputs) are available. Many features of the CMS system are based on these derived parameters, which is the most condensed form of data, and often the most efficient format to use to monitor the condition of machinery. Trending these outputs over longer periods of time is most suitable for the detection of future trends, which would be difficult to detect using raw signal data alone. The CMS system is therefore equipped with advanced features for the processing of such trend data and the automatic logging of relevant trend data.

1.2.2 FFT-Based Processing

The VM600 CMC 16 card is an FFT-based card. This means that it is capable of acquiring data in the time domain (e.g. vibration “waveforms”) and converting the data into the frequency domain to obtain a spectrum. This is done using sophisticated mathematical algorithms implemented in software embedded on the CMC 16 card itself.

Both the time- and frequency-domain information can be analysed to obtain a set of *characteristic numbers* that may be meaningful for a particular machine condition. These numbers can differ greatly between applications, and are very specific to the type of machinery being monitored. As an example, for a vibration monitoring application, the following parameters may be of interest:

- First harmonic (amplitude and phase)
- Intensity within a frequency band (for example, shown as an RMS value)

Acquisition of the raw signal data is performed on all 16 channels of the CMC 16 card in parallel. The signal processing, by contrast, is performed by a single Digital Signal Processor (DSP) chip on the card. The architecture is dedicated to the measurement of dynamic, constantly changing, data such as vibrations and pressures. However, the system can also process slowly evolving data, also called “quasi-static” data, such as analog measurements, temperatures, process values, and so on. This is possible because signal processing requires only a subset of the functionality required for processing dynamic data.

1.2.3 Rectifiers: Time-Domain Based Outputs vs FFT-Based Outputs

Various rectifier functions are applicable for time-domain based, or FFT-based outputs, as shown in Figure 1-3:

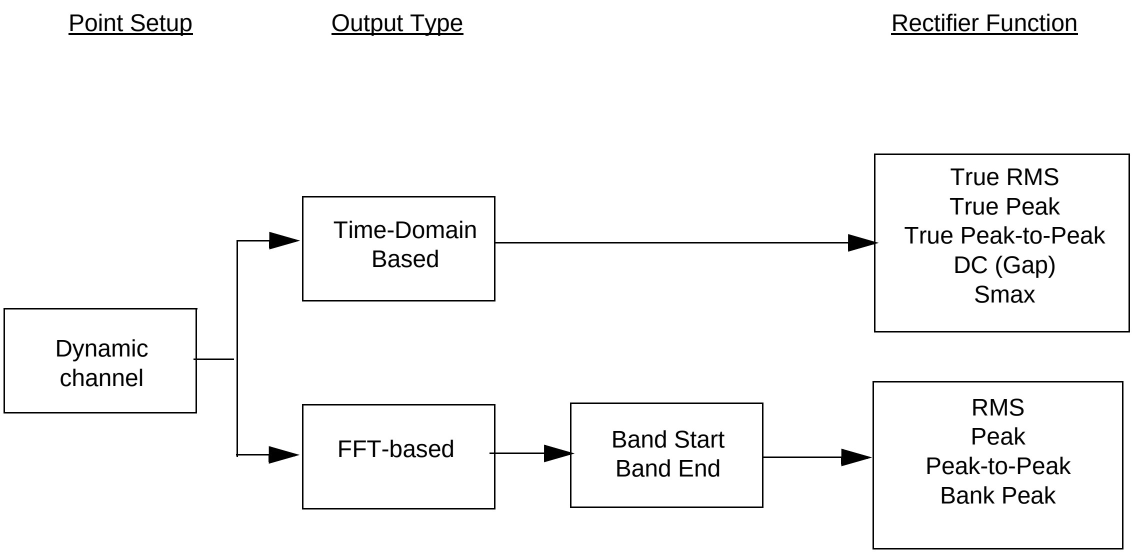


Figure 1-3 : Time-Domain Based and FFT-Based Rectifiers

For time-domain based outputs, the following rectifier functions are available:

- True RMS
- True Peak
- True Peak-to-Peak
- DC (Gap) component of the signal
- S_{max}. This is a special case of combined dual-channel processing, but is also based on time-series data.

For FFT-based outputs, the following rectifier functions are available:

- RMS
- Peak (scaled from RMS)
- Peak-to-peak (scaled from RMS)
- Band peak. This function selects the highest amplitude within a certain frequency band of a spectrum at any given moment.

The FFT-based outputs are also referred to as frequency bands.

1.2.4 Frequency Band Extraction

The CMS Software allows the extraction of frequency bands (spectral components) for machinery diagnostics, that is, the definition of frequency ranges to which a particular rectifier function is applied. These outputs can be monitored and trended. Figure 1-4 below shows a spectrum with several bands selected. In this example, “1X” refers to the 1st order, also known as the first harmonic or fundamental frequency.

The CMS Software allows individual orders to be extracted, for example, the 3rd order (3X). Additionally, the spectral energy in a band can be monitored by defining a range such as (0.2 to 0.6) X. It is thus possible to address individual lines in the spectrum, seamlessly stack frequency bands to cover the entire measured range, and to analyse overlapping bands.

Alarm and alert thresholds can be set individually for each output band.

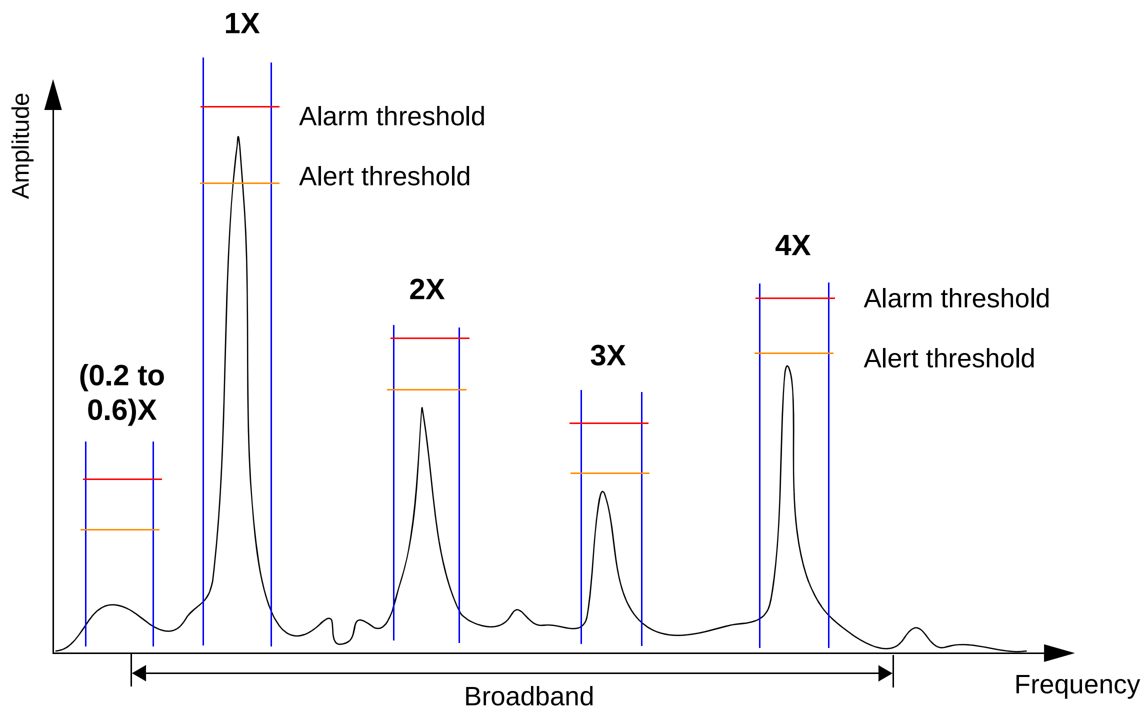


Figure 1-4 : Principle of Band Extraction

1.2.5 Limits and Alarm Priorities

Each configured output (time-domain or FFT-based) has its own limits, against which it is compared at the end of each processing cycle. The graph shown in Figure 1-5 shows the six limits that can be configured, and which therefore define in which “range” the output is considered to be by the system. Depending on the range, specific action can be taken.

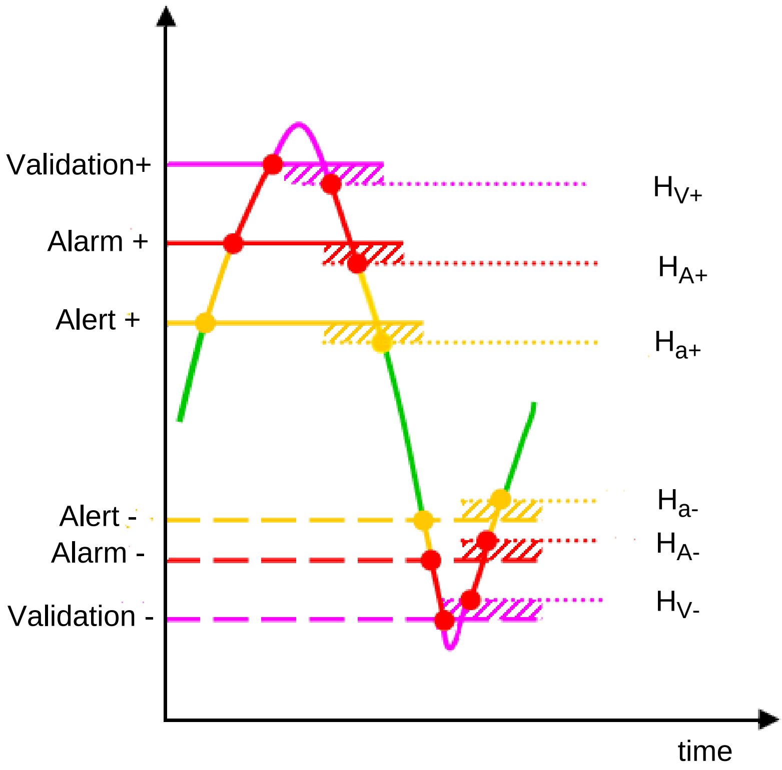


Figure 1-5 : Alarm, Alert and Validation Levels

Every change from one alert or alarm range to another automatically generates an entry in the event log. A parameter called the “alarm priority” determines the action to be taken when a high or low alarm exceedance occurs, as listed in Table 1-1.

Table 1-1 : Alarm Priorities and Actions

Alarm priority	Action
None	*No action taken.*
Low	*The alarm is detected, an event is logged in the database, and the data acquisition rate is increased.*
High	*The alarm is detected, an event is logged in the database, the data acquisition rate is increased, waveform and spectra are acquired.*

1.2.6 Averaging Waveform and Spectrum in scheduled mode

The CMC16 Card filters the vibration signal and then samples it before the waveform is (Figure 1-6):

1- released

2- submitted to the Fast Fourier Transformation to extract a Spectrum.

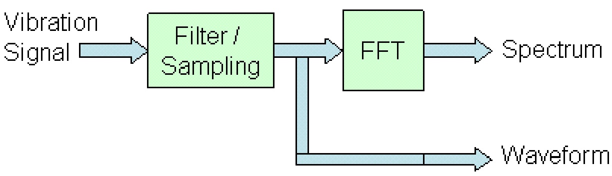


Figure 1-6 : Filtering and Sampling Vibration Signals

For scheduled data acquisition CMS offers an averaging feature for a) Fixed Frequency Sampling: only Frequency domain averaging is available and b) orders sampling mode: Averaging in the Time Domain (for waveform) and then in the Frequency Domain (for spectrum) are available. Only one of averaging can be used and the value for the other averaging must be one.

a) b)

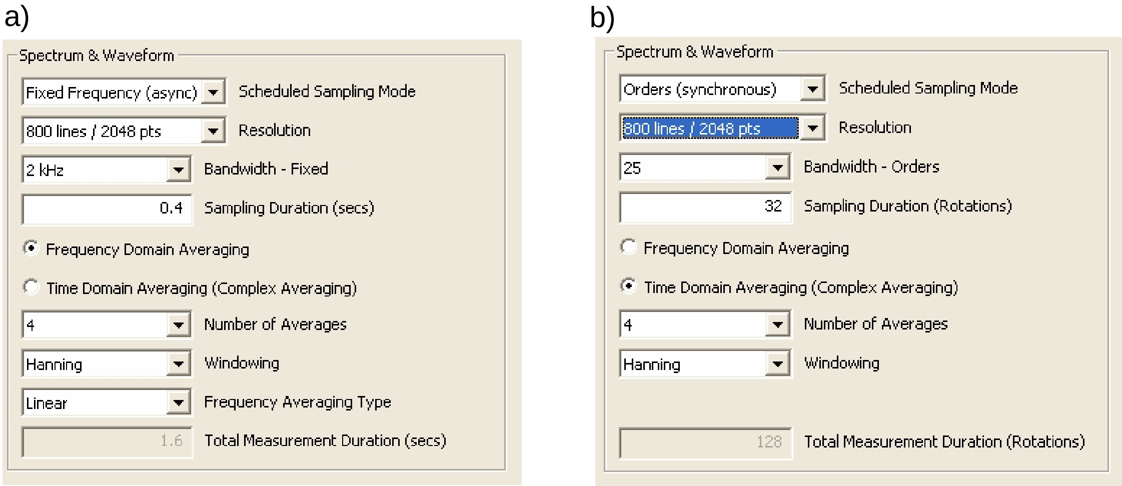


Figure 1-7 : Averaging in the Frequency and Time Domains

1.2.6.1 Time domain averaging

An average of n-waveforms is calculated. The resulting averaged waveform is then FFT-processed. The resulting spectra are derived by complex averaging using amplitude and phase (Figure 1-8).

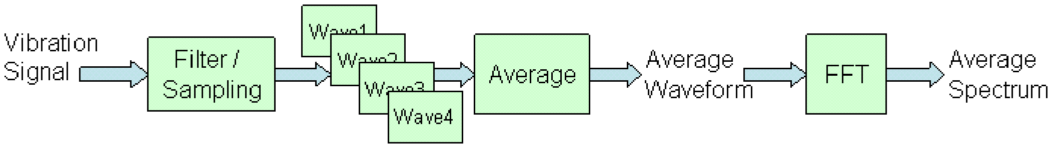


Figure 1-8 : Process of Time Domain Averaging

1.2.6.2 Frequency domain averaging

n-waveforms are FFT-processed. The resulting n spectra are submitted to an amplitude averaging function of mean value per line (Figure 1-9). The averaged spectrum can be with linear, RMS or peak rectifying function. The phase from the last measurement (no average) is provided. If time domain average is 1, then there is averaged waveform.

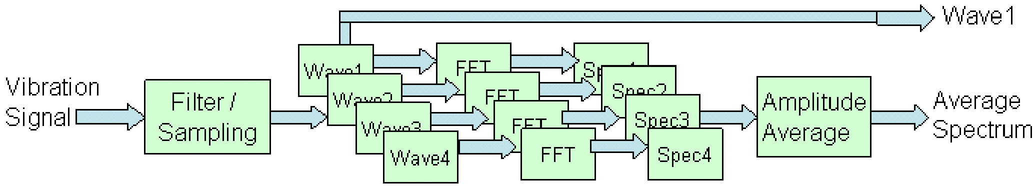


Figure 1-9 : Process of Time Domain Averaging

1.3 Operating Modes

The CMS Software can operate in the following modes:

- Background
- Transient
- Alternative
- Manual

The operating mode is chosen either automatically by the system, or manually by the user. The modes are shown in Figure 1-10.

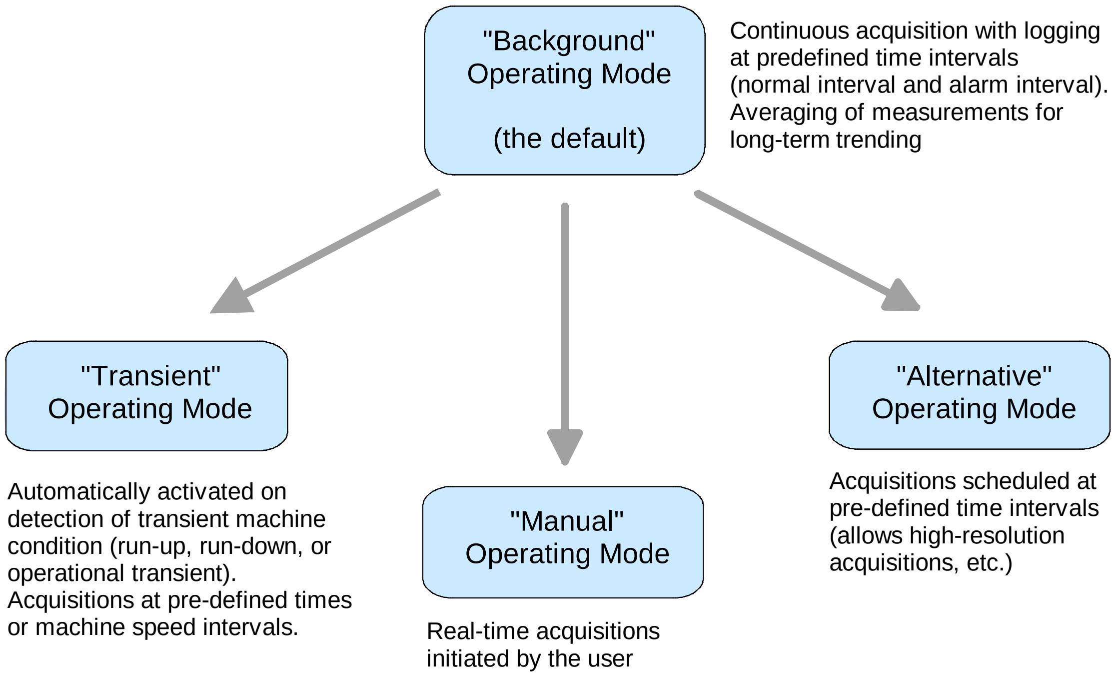


Figure 1-10 : VM600 Operating Modes

1.3.1 Background Operating Mode

This is the system's default operating mode. It is active for all possible machine states (see 1.4 - Machine States).

In background operating mode, the CMC 16 card assures the following:

- Continuous acquisition of 400-line spectra and extraction of predefined outputs
- Limit exceedance detection—the output status (normal/alert/alarm/validation) is monitored
- Event logging—events are logged for channels and outputs to create a status history
- Logging of processed outputs according to predefined storage rates (see also 1.6 - Trending)
- System event detection and logging—hardware status, communication status, and so on—are monitored
- Transient detection—tacho and channel status are checked as a basis for initiating transient operating mode (see 1.3.2 - Transient Operating Mode below).
- Manual acquisition of real-time data—waveforms, spectra and orbits are transmitted to the host and corresponding displays can be activated by the user

Data acquisition types available are:

- Trend data—time-domain based outputs, FFT-based outputs, or dual-channel based S_{max} output.

1.3.2 Transient Operating Mode

This mode is activated when the system detects that the machine is in one of the transient machine states (run-up, run-down, or operational transient).

Acquisition occurs at configurable time or speed intervals.

Data acquisition types available are:

- Transient cascade
- Transient trend data

1.3.3 Alternative Operating Mode

This mode is an alternative to the standard background operating mode. It is activated in the following ways:

- On schedule: according to a pre-defined schedule (time interval)
- On alarm: on alarm exceedance, for example, when a vibration point exceeds the High Alarm threshold.

Data acquisition in alternative mode occurs in parallel to background logging, that is, background logging does not stop when alternative mode is activated.

Alternative mode can only be used when the machine state is “on load” (see 1.4 - Machine States). The user can choose to acquire one of the following data types:

- Waveform only
- Spectrum only
- Waveform and spectrum
- Long waveform (also known as “oscilloscope mode”)

An Orbit acquisition may also be scheduled.

1.3.4 Manual Operating Mode

This mode allows the user to initiate real-time acquisition of the following: waveform, spectrum, long waveform (“oscilloscope”), orbit and trend data (any configured output).

Manually requested data acquisition is only possible when the machine state (see 1.4 - Machine States) is “stopped” or “on load”. User requests for real-time data are processed by the system with a lower priority than the other automatic data acquisition types.

1.4 Machine States

The machine state describes the current condition of the rotating machinery being monitored. Typically, the machine state is related to the rotational speed of the machinery.

Machine states are closely related to data acquisition types (see 1.5 - Data Acquisition Types), which describe data acquisition in physical terms, such as the number of samples, sampling frequency, bandwidth, and so on.

The following machine states can be identified during a typical engine cycle:

- **Stopped**

  The machine speed is below a pre-defined threshold known as the Lowspeed Cutoff.
- **Run-up**

  The machine has started up and its speed is between the Lowspeed Cutoff and the Lowspeed Trigger values.
- **Running “on load”**

This is the normal operating condition, with the machine running at or close to its nominal speed. The condition is defined by the Overspeed Trigger and the Lowspeed Trigger values.

- **Operational transient**

  The machine speed has increased and has crossed the Overspeed Trigger value.

- **Run-down**

  The machine speed has decreased and now lies between the Lowspeed Trigger and Lowspeed Cutoff values.

The machine states are shown in Figure 1-11.

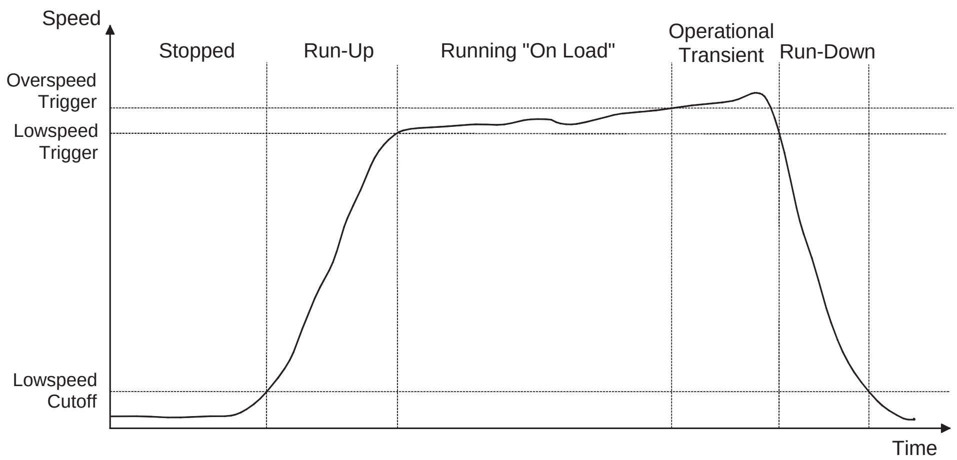


Figure 1-11 : Machine States for a Typical Operating Cycle

The Overspeed Trigger, Lowspeed Trigger and Lowspeed Cutoff values are separately set at CMS Software configuration time for each machine being monitored: refer to 9.9.3 - Configuring Machines.

All parameters refer to the same reference speed channel defined for each machine. In applications without a speed measurement, or where the notion of speed is not applicable, the system can be run in fixed frequency mode, which allows the same types of data acquisition that are normally available while the machine is running “on load”. For this purpose, a “Fixed speed” parameter can be selected when creating a rack configuration (see Chapter 9 - Creating a Rack Configuration).

Figure 1-12 below shows the correspondence between the operating modes introduced in 1.3 - Operating Modes and machine states. The column on the left of the table shows the VM600 system operating modes and, under each of the headings, the measurement types available (e.g. Spectrum, Waveform).

Operating mode:	Machine Operating State: Stopped	Run-Up	Running “On Load”	Operational Transient	Run-Down	
Background						Automatic, pre-programmed, autonomous acquisition
Trend Data	✓	✓	✓	✓	✓	
S_{max}[1]	(✓)	(✓)	(✓)	(✓)	(✓)	
Transient						
Transient Cascade	- - -	✓	- - -	✓	✓	
Transient Trend Data	- - -	✓	- - -	✓	✓	
Alternative						
Waveform	- - -	- - -	✓[2]	- - -	- - -	
Spectrum	- - -	- - -	✓[2]	- - -	- - -	
Long Waveform	✓	- - -	✓[2]	- - -	- - -	
Orbit	- - -	- - -	✓	- - -	- - -	
Manual						User-initiated acquisition
Real-time Waveform	✓	✓	✓	✓	✓	
Real-time Spectrum	✓	✓	✓	✓	✓	
Real-time Long Waveform	✓	- - -	✓	- - -	- - -	
Real-time Orbit	✓	✓	✓	✓	✓	
Real-time Trend	✓	✓	✓	✓	✓	

Key: *✓ Data type available - - - Data type not available*

1. *S_{max} is a special case obtained from Trend data*
2. *In this situation, one of the following choices must be defined: (a) Waveform, (b) Spectrum only, (c) Waveform and Spectrum, (d) Long Waveform (“oscilloscope mode”)*

Figure 1-12 : Operating Modes for Various Machine States

1.5 Data Acquisition Types

The CMS Software allows the following data types to be acquired:

- Trend (including time-domain, FFT-based outputs, or S_{max})
- Transient Trend and Transient Cascade
- Waveform and Spectrum
- Orbit
- Long Waveform

1.5.1 Trend Data Acquisition

This type of data acquisition is performed in background mode. Acquisition is based on a time series of 1024 samples, which are processed to obtain 400-line spectra for band extraction (frequency analysis). The sampling frequency is configurable and determines the bandwidth. This is shown in Figure 1-13.

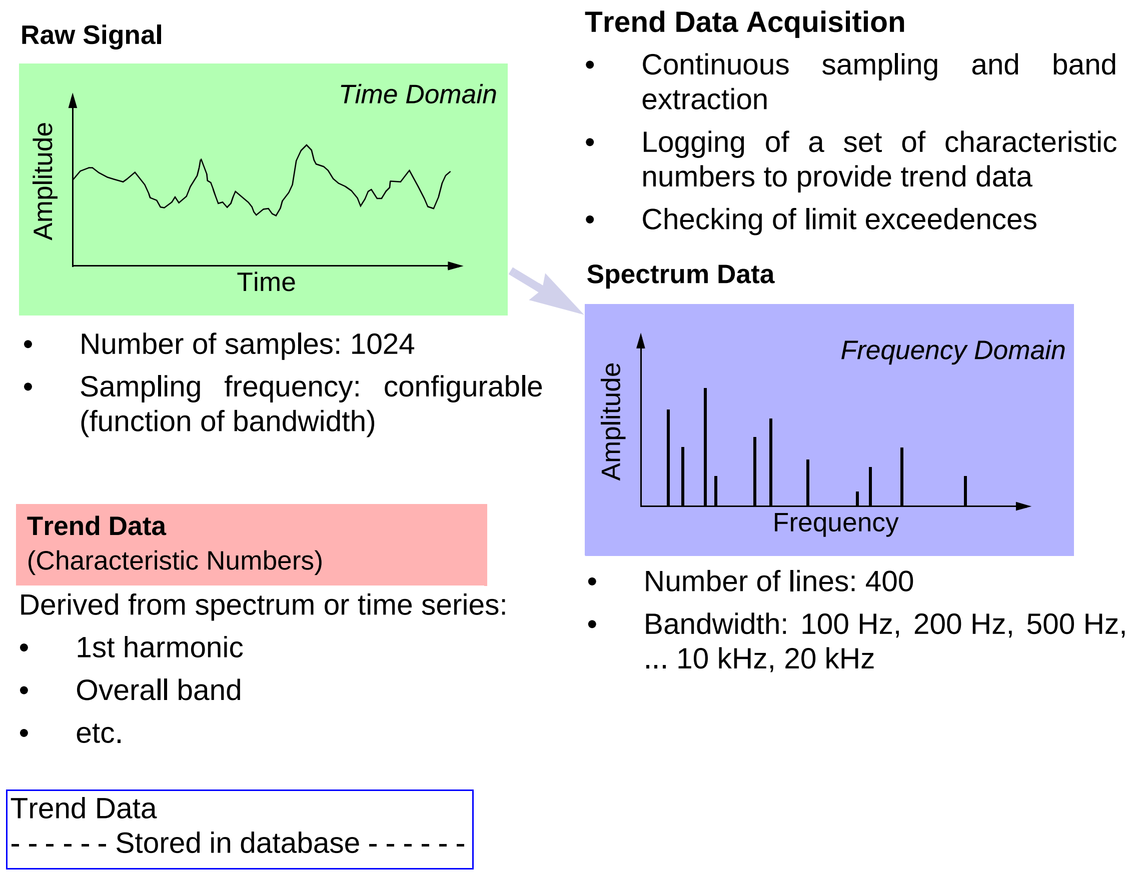


Figure 1-13 : Trend Data Acquisition

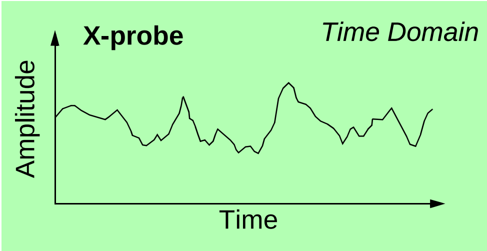
Note that only the predefined trend data (characteristic numbers) are stored in the database. The raw (time-based) signal and the spectral components are not stored in the database.

Acquisition takes place at the following intervals:

- Normal—used when no alarm condition is present
- Alarm—data is acquired more rapidly when an alarm has been raised

A special case of trend data acquisition is the S_{max} acquisition, which is a frequently used dual-channel processing data type used to compare vibration data from two sources. It is based on the synchronously acquired time-series data of two associated channels, and is performed in background mode. More specifically, in this mode, 512 samples are taken for each of the two probes over four complete shaft revolutions (that is, 128 samples per revolution). This is shown in Figure 1-14.

Raw Signal

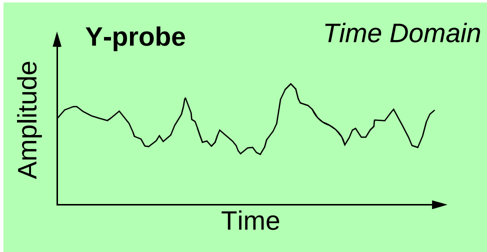


- Number of samples: 512 spread over 4 revolutions (128 samples/rev)
- Sampling frequency: bandwidth = 50 orders

S_{max} Acquisition

- Data acquired together with Trend Data (in Background operating mode)

Raw Signal



Characteristic Numbers

Derived from time series:

- S_{max}

- - - - - - Stored in database - - - - - -

Figure 1-14 : Smax Data Acquisition

The S_{max} value is derived from the time series and stored in the database in the same way as the other “trend” data points that make up long-term trend curves.

1.5.2 Transient Trend Data and Transient Cascade Acquisition

These two acquisition types (see below) are performed in Transient operating mode. They are based on similar acquisition parameters to the trend data measured in background mode, that is, data is taken in blocks of 1024 samples, allowing 400-line spectra to be generated. In contrast to background mode, however, the spectral data are also retained for further analysis.

Up to 100 spectra can be acquired to produce a *transient cascade plot*, also known as a "waterfall" plot. In this mode, both spectral data and transient trend data (characteristic numbers) are stored in the database. The transient trend curves are different from the historic trend curves in that the spacing of data points is based on delta-time or delta-RPM criteria, and that for each data point the current speed value is stored as well. This is shown in Figure 1-15.

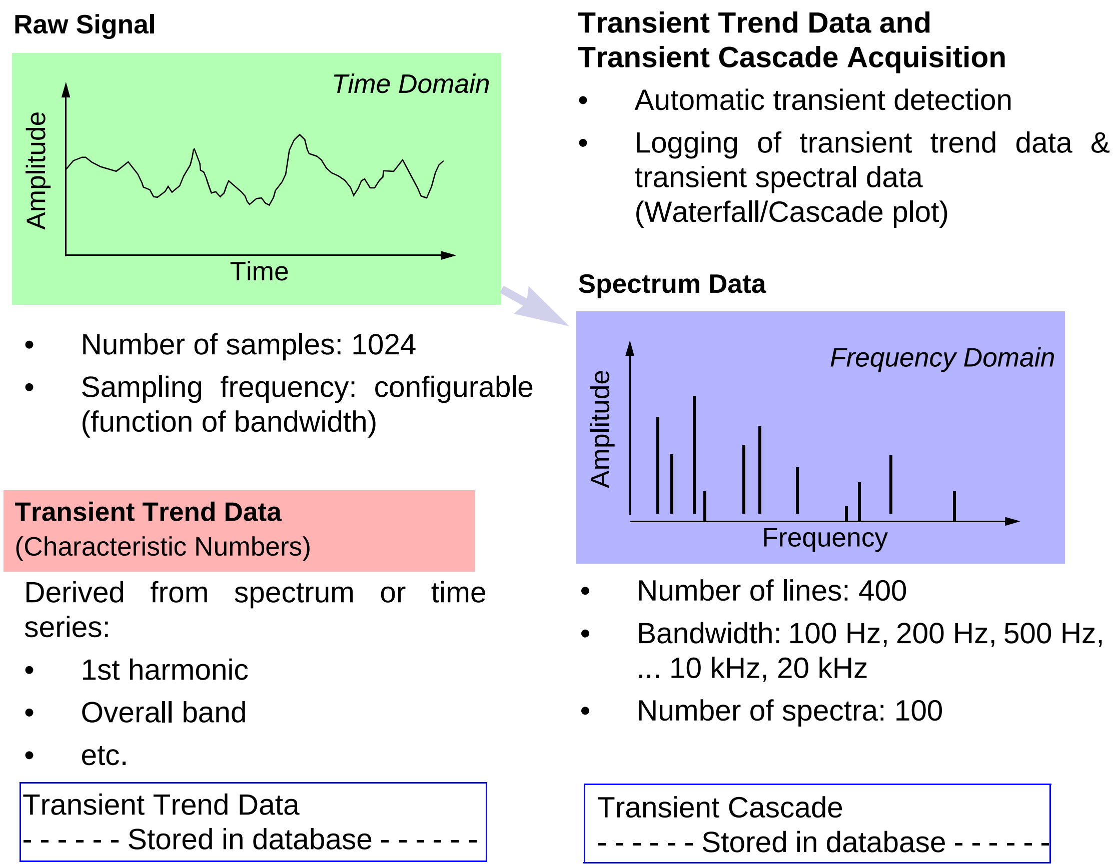


Figure 1-15 : Transient Trend and Transient Cascade Data Acquisition

1.5.3 Alternative Mode Acquisition

Waveform and spectrum data can be produced when operating in Alternative operating mode.

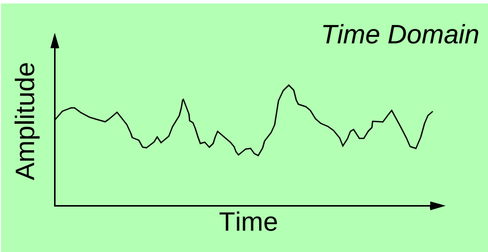
The number of samples can be configured according to individual needs. Often, a large number of samples (8192) is selected to provide high-resolution acquisition of data.

Data acquisition is initiated in the following ways:

- **On schedule**, that is, according to a pre-defined schedule (time interval)
- **On alarm** exceedance, that is, when a vibration point exceeds the High Alarm threshold (see 1.2.5 - Limits and Alarm Priorities).

This is shown in Figure 1-16.

Raw Signal



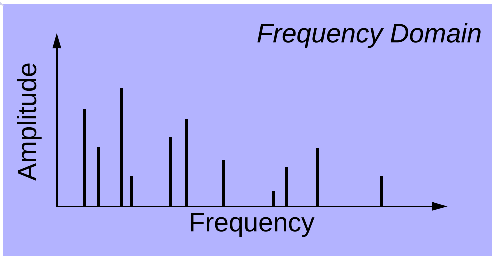
- Number of samples: 256, 512, 1024, 2048, 4096 or 8192
- Sampling frequency: configurable (function of bandwidth)

Waveform
- - - - - - - Stored in database - - - - - - -

Waveform and Spectrum Acquisition

- Acquired in Alternative operating mode
- Activated “on schedule” or “on alarm event”
- Logging of high-resolution data into database

Spectrum Data



- Number of lines: 100, 200, 400, 800, 1600 or 3200
- Bandwidth: 100 Hz, 200 Hz, 500 Hz, ... 10 kHz, 20 kHz

Spectrum
- - - - - - - Stored in database - - - - - - -

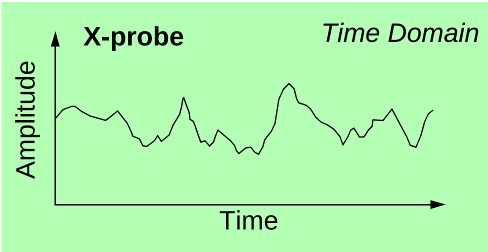
Figure 1-16 : Waveform and Spectrum Data Acquisition

1.5.4 Orbit Acquisition

This type of data acquisition is performed in Alternative operating mode. It can also be started manually.

Synchronous time-domain data is obtained from an X- and Y-probe. Both sets of data are stored in the database, allowing an orbit display to be generated subsequently. This is shown in Figure 1-17.

Raw Signal

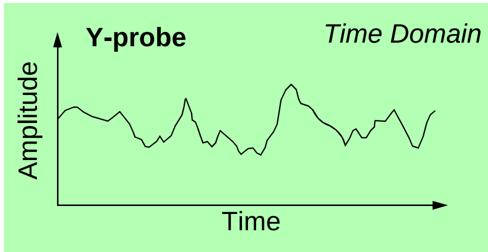


- Number of samples: 256 spread over 4 revolutions (64 samples/rev)
- Sampling frequency: bandwidth = 25 orders

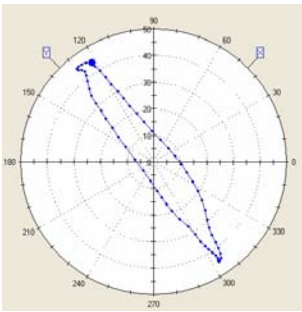
- - - - - - - Stored in Database - - - - - - -

Orbit Acquisition

- Activated manually, “on schedule” or “on alarm event”
- Fully synchronous acquisition of both associated channels



- - - - - - - Stored in Database - - - - - - -



Orbit Display

Available for Display

Figure 1-17 : Orbit Data Acquisition

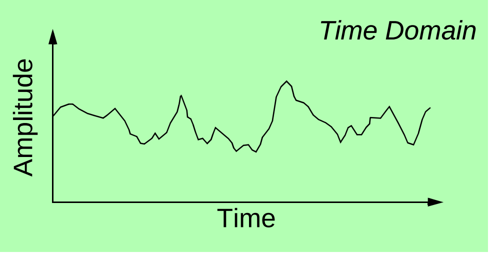
1.5.5 Long Waveform

A long waveform is obtained by taking 42 799 samples in the time domain.

This type of data acquisition (see Figure 1-18 below) is one of the options (along with waveform and spectrum) that can be chosen in Alternative operating mode.

A long waveform can also be acquired manually.

Raw Signal



- Number of samples: 42 799
- Sampling frequency: configurable (function of bandwidth)

Long Waveform
- - - - - - - Stored in database - - - - - - -

Long Waveform Acquisition

- Acquired in Alternative operating mode
- Activated manually, “on schedule” or “on alarm event”

Figure 1-18 : Long Waveform Data Acquisition

1.5.6 Long waveform when some channels are in transient mode

In a configuration with a mixed configuration showing some channels from the same logic machine on Waveform + Spectra and others with long waveform as scheduled acquisition, when the Machine switches into transient only the Waveform/spectra channels will switch to acquire transient trend and cascade (Figure 1-19).

The current setup is such that:

1- Users configure the long waveform to be scheduled in the Configuration Editor. This choice excludes the configuration of other scheduled modes (WF, SP) for the background acquisition.

2- The VMCom effectively simulates a user request every scheduled-interval.

For the CMC card this looks like a user-requested long-waveform which is a low-priority task and only gets processed whenever the card has enough resources to do so.

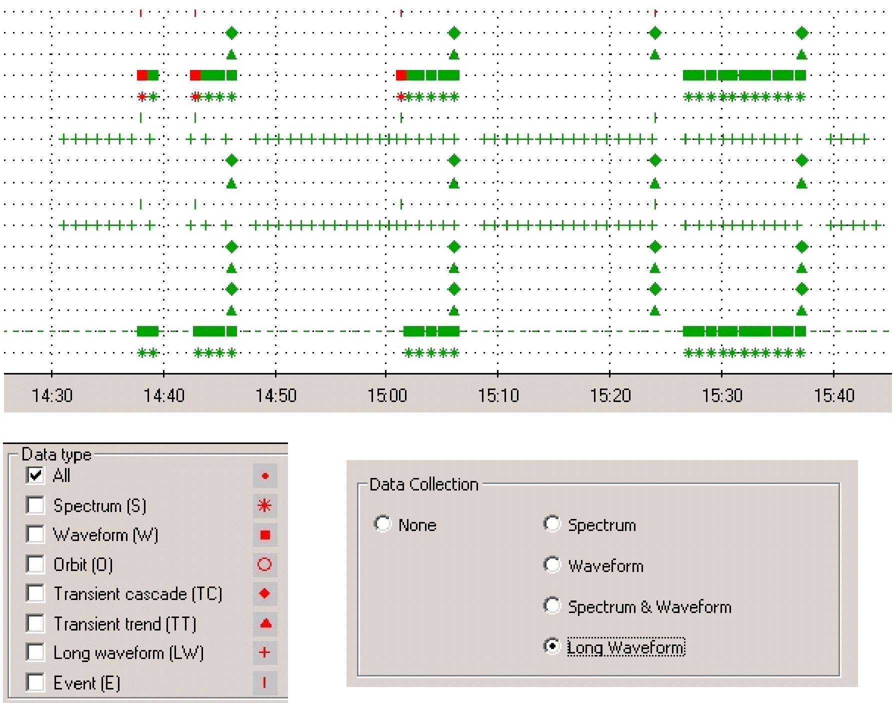


Figure 1-19 : Transient Mode - Waveforms and Spectra

1.6 Trending

The spacing of data points on the trend curve is determined by two primary parameters (see Figure 1-20) :

- The normal storage rate
- The alarm storage rate.

Once the output exceeds its high alarm threshold, the system switches automatically to alarm storage rate. This is typically set to shorter values than the normal storage interval. The minimum selectable interval is 1 second. Normal and Alarm storage intervals allow you to tune the density of trend points “by time”.

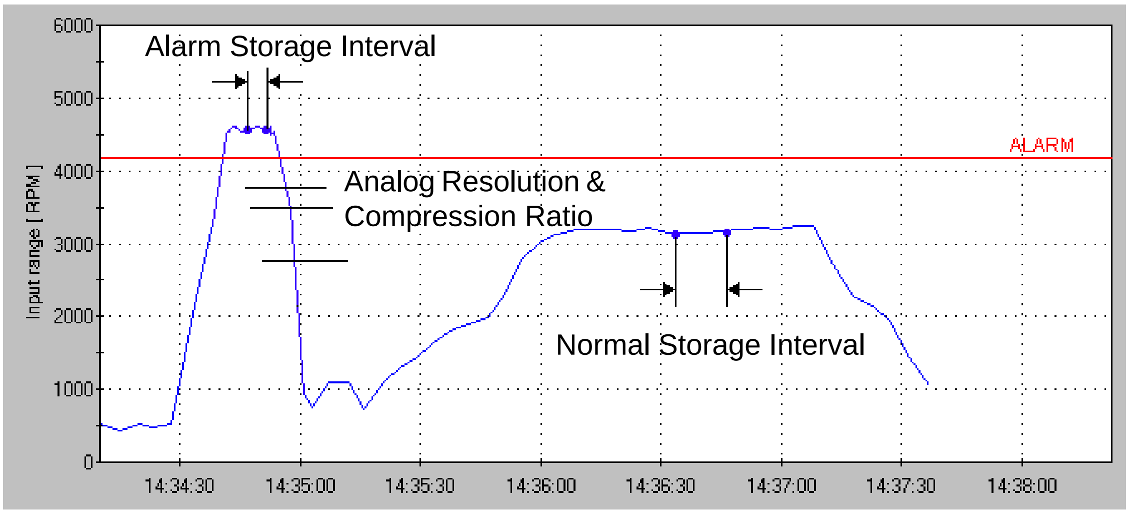


Figure 1-20 : Normal and Alarm Storage Intervals

In addition, the two parameters Analog Resolution and Compression Ratio allow you to capture data in a particular change of amplitude (Analog Resolution), that is, data points are added to the trend curve when big changes occur in a short space of time. The Compression Ratio allows you to further tune the width of this amplitude interval, and to reduce it when approaching the alarm limit.

1.7 Event Logging

The CMS Software performs limit checks for each configured output, at every processing cycle. Any exceedances, or amplitude changes across a user-defined limit, are logged into the database, as shown in Figure 1-21. Additional hysteresis can be defined.

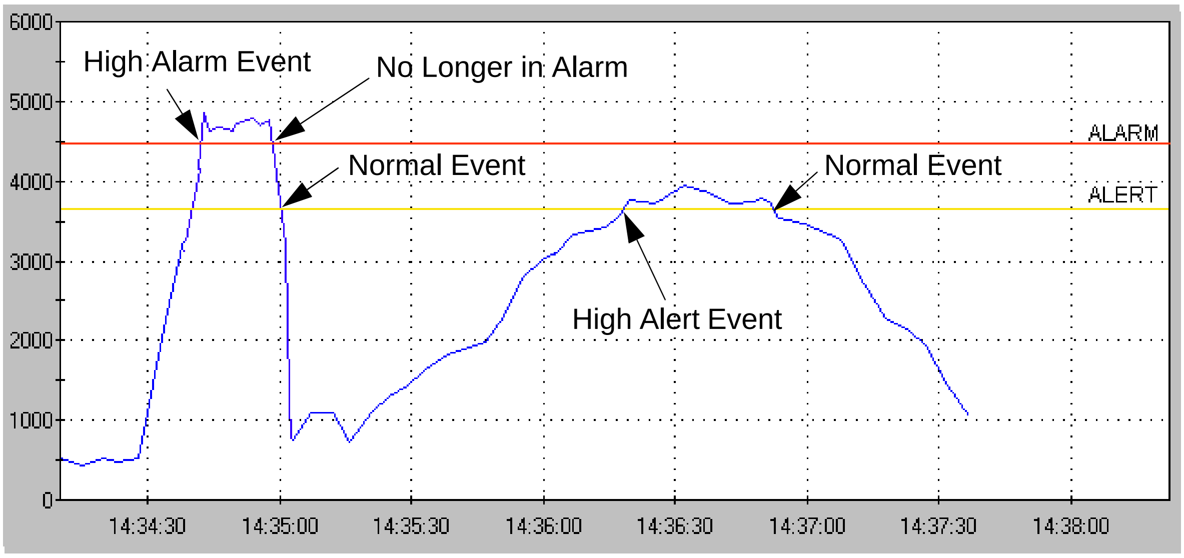


Figure 1-21 : Event Logging

The events available to the user are listed in Table 1-2:

Table 1-2 : Event Types and Corresponding Events

Event Type	Events	
Speed-Related	*Speed (Tacho) Pulse Lost*	
	Speed (Tacho) Pulse Found	
Hardware-Related	*CMC 16 card offline*	
	CMC 16 card online	
	Rack offline	
	Rack online	
Level-Related	**If Event Generation Selected by User:**	**If Event Generation Inhibited by User:**
	Normal	*FFT Window event (Inhibited) Band Normal*
	High Alarm	*FFT Window event (Inhibited) Band High Alarm*
	High Alert	*FFT Window event (Inhibited) Band High Alert*
	Low Alert	*FFT Window event (Inhibited) Band Low Alert*
	Low Alarm	*FFT Window event (Inhibited) Band Low Alarm*
	Validity Fault	*FFT Window event (Inhibited) Band Validity Fault*
User	*User Note*	

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2 CMS SYSTEM ARCHITECTURE

2.1 Introduction

Figure 2-1 shows a general overview of the VM600 CMS Software system architecture. For an introduction to VM600 networking concepts and an introduction to network addressing, refer to the *VM600 Networking Instruction Manual*.

The *host PC* is the computer on which the CMS Software is installed. The database may also be installed on this PC. All configuration activities are done here (or they can also be done from another PC via a LAN, an Intranet, or any other available network connection).

A *hub* allows users of a local intranet to configure the VM600 hardware, access the database and perform all other activities possible on the host PC.

A *modem* may be installed to allow remote access through the phone line – which enables the system for fully remote operation, including configuration, data analysis and machine diagnostics, as well as maintenance of the data acquisition system. The presence of a modem connection also facilitates remote technical support, by Vibro-Meter or other authorized personnel.

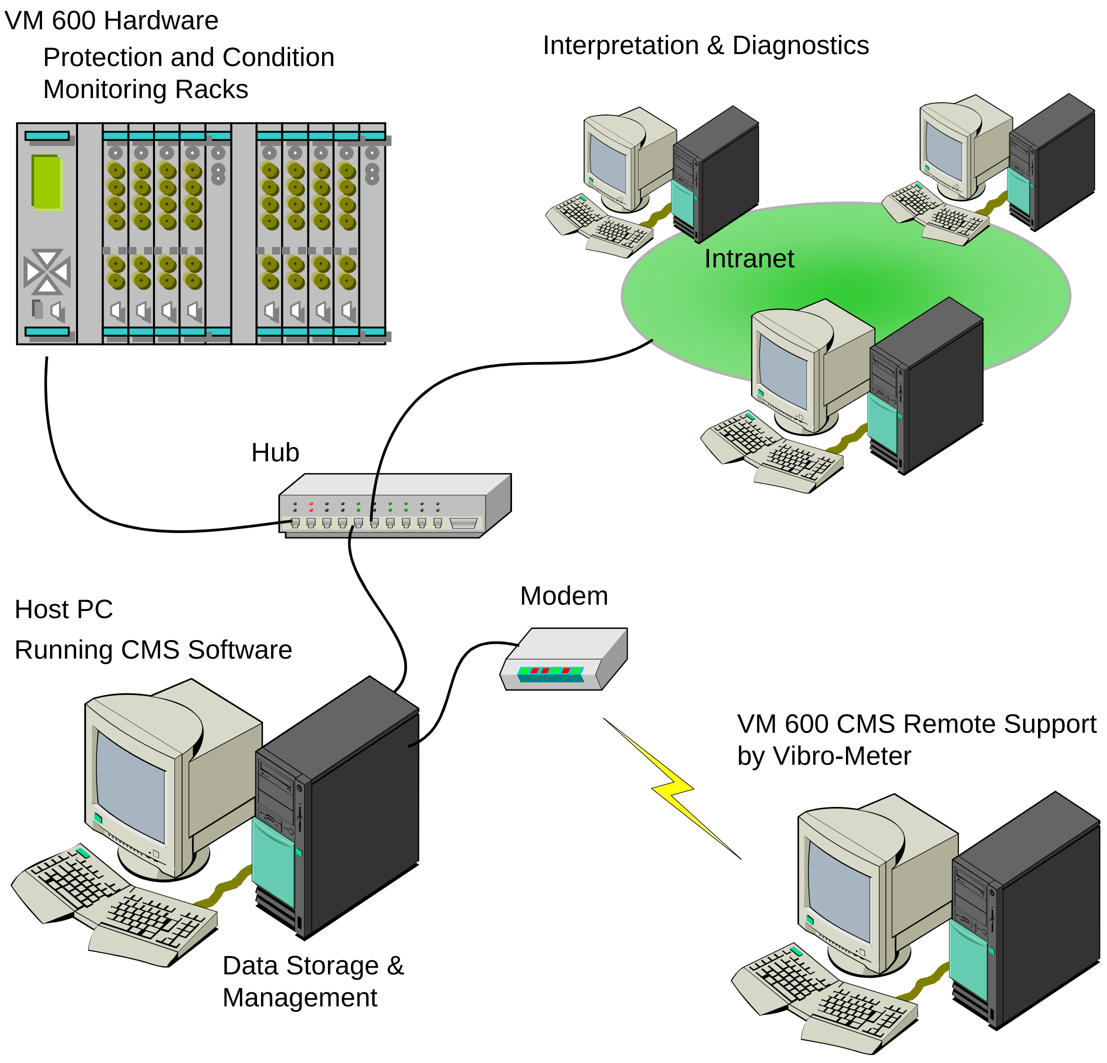

Figure 2-1 : CMS Software System Architecture

2.2 Configurations

Depending on the size and complexity of your installation, you can either install the CMS Software on a single PC or on several interconnected PCs (referred to as a distributed configuration).

2.2.1 Single-PC Configuration

In this configuration (see Figure 2-2 below) the VM600 hardware is connected to a single PC over an Ethernet link. The link between the PC and the VM600 hardware can be established either via a direct crossed-Ethernet cable, or using a Hub and suitable network cabling.

The host PC (or Data Acquisition Server) fulfils the following tasks:

- Stores and runs the database (Adaptive Server Anywhere)
- Communicates with the VM600 hardware
- Runs automatic data acquisition
- Allows access to individual CMS Software modules
- Optionally, the database can be made accessible to the outside world.

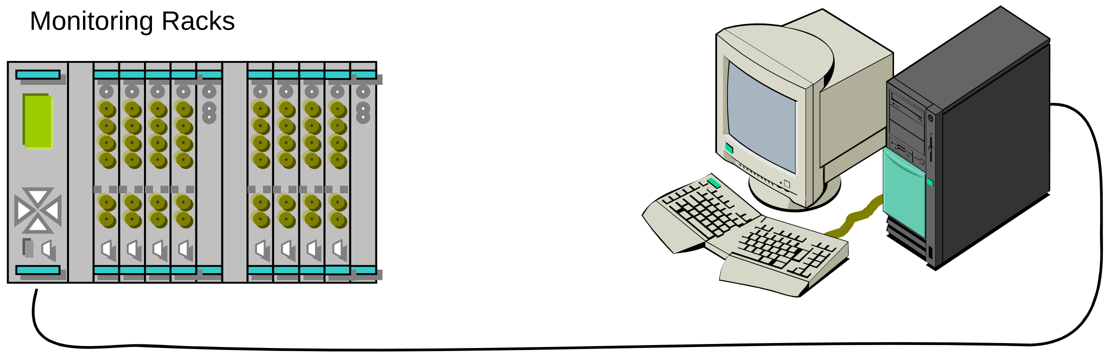

Figure 2-2 : Single Host Configuration

2.2.2 Distributed Configuration

In a distributed configuration (see Figure 2-3 below), tasks are distributed across several PCs.

A dedicated PC (the Data Acquisition Host) can be used solely for acquiring data from the VM600 rack.

Another dedicated PC can be used as the Database Server. Although the CMS Software is delivered with a Windows-based database package, any other ODBC-compatible package can be used and this PC could even run under a non-Windows operating system such as Linux or UNIX.

Several operator PCs can be connected to the LAN, with one or more of the CMS Software modules installed on each PC.

The obvious advantages of the distributed configuration are that system operation becomes very flexible, and allows a more efficient division of tasks when several people work together on it (site operators, maintenance engineers, machine diagnostics experts, and so on). Also, the operation of the system is no longer dependent on the physical location.

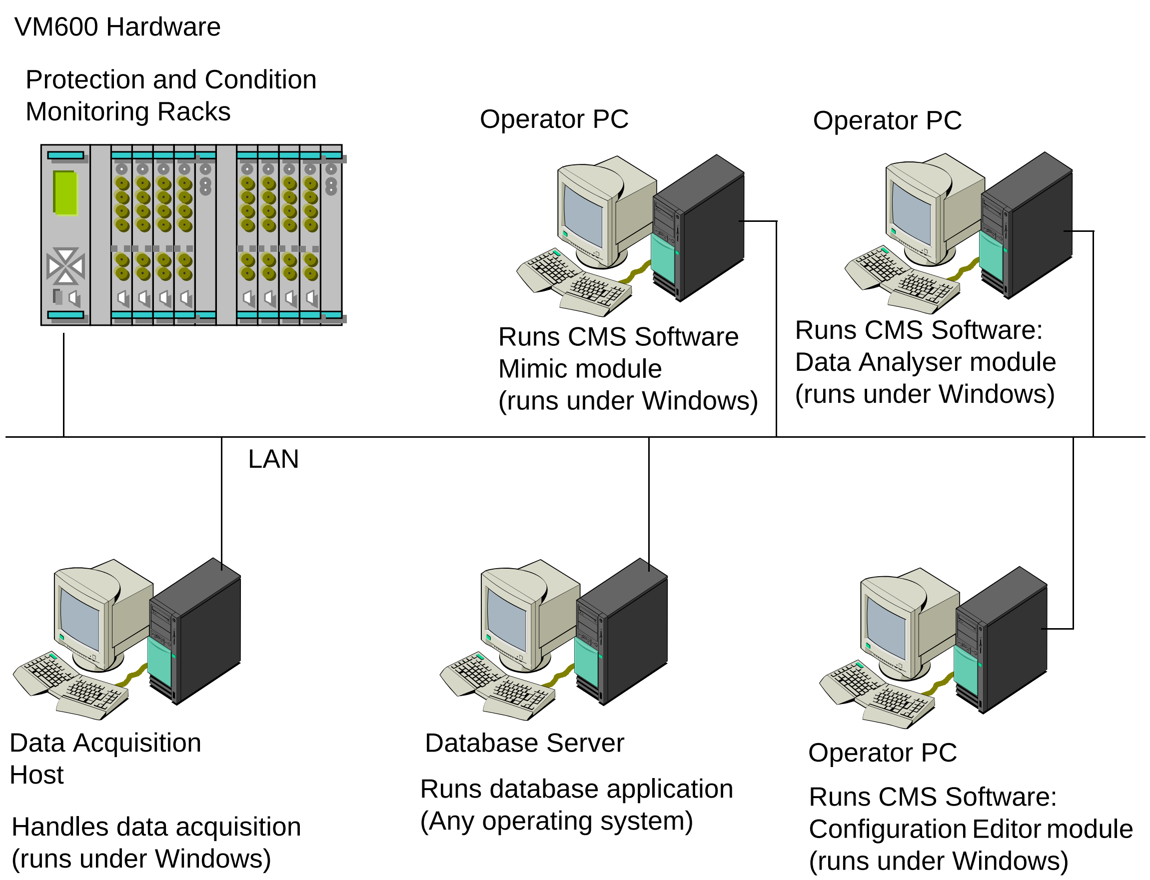

Figure 2-3 : Distributed Configuration

2.3 The CMS Software - Overview

2.3.1 Introduction

The CMS Software is delivered as part of a standard installation media kit consisting of the following:

- One CD-ROM containing the Sybase SQL Anywhere Studio© (P/N 957.01.1000.0001) database software
- One CD-ROM containing the VM600 CMS Software (P/N 209-500-600-SSS)

2.3.2 The Database Software

The CMS Software is designed around the core of an SQL-compliant database. The standard version of the CMS Software is delivered with Sybase's **Adaptive Server Anywhere** database management software suite. However, the CMS Software can be made to run with any other commercial off-the-shelf database management product that conforms to the ANSI SQL 92 standard.

Please ask your Vibro-Meter system vendor about compatibility with other database management packages. The procedures described in this chapter describe the use of Adaptive Server Anywhere only.

2.3.3 The VM600 CMS Software

The CMS Software is intended for use with Vibro-Meter's VM600 series Condition Monitoring System (CMS) hardware. The software packages allow:

- Configuration and operation of the CMS hardware
- Automatic acquisition and storage of machine data (allowing long-term logging and trending)
- Limit exceedence check and event logging
- Real-time analysis of machine parameters
- Advanced data analysis (online and offline)
- Data management
- Data export to and import from third-party systems

The packages run on various Microsoft Windows platforms. Refer to 2.4 Software and Hardware Prerequisites below for details.

2.4 Software and Hardware Prerequisites

2.4.1 Supported Operating Systems

The CMS Software runs on the following operating systems:

- Microsoft® Windows NT® (Version 4 or later)
- Microsoft Windows® 2000
- Microsoft Windows XP
- Microsoft Server 2003

The software runs on both Workstation and Server versions of the operating systems. For optimum system reliability, data security, and remote access capabilities, it is recommended to use Server versions of the operating systems.

2.4.2 Hardware Requirements

The minimum hardware configuration recommended for the use of the CMS Software is shown in Table 2-1. The actual requirements are strongly dependent on the type of use of the system and the purpose (demonstrations or training, offline data analysis, acquisitions server, database server, etc.). Typically, data acquisition servers and data servers have to comply to increased requirements in terms of reliability, and availability. For these machines, higher technical specifications are recommended. For other applications, such as troubleshooting, commissioning, and training, less stringent requirements apply, and practically any modern computer hardware can be used.

Table 2-1 : Minimum and Recommended PC Configurations

Item, Parameter	Minimum Configuration	Recommended Configuration
Computer type	*Any (laptop, desktop, workstation, Industrial PC etc.)*	*Industrial Server with capabilities for redundant power supply, redundant hard disks (mirroring or RAID)*
Processor type	*Intel® Pentium®*	*Pentium III (or better)*
Processor speed	*233 MHz*	*1.2 GHz (or more)*
Memory	*128 MB RAM*	*512 MB RAM (or more)*
Hard disk	*1 GB*	*10 GB (or more)*
CD-ROM	*CD-ROM drive*	*CD-ROM drive*
Ethernet Card	*Any standard Ethernet hardware supported by the operating system*	*High-speed Ethernet hardware*
Display	*Any colour display supported by the operating system*	*17" SVGA compatible or better (19" is preferable)*
Backup (optional)	-	*20/40GB DAT tape drive (or larger)*
Mouse	*Any pointer device supported by the operating system*	*3-button mouse*

2.4.3 VM600 Hardware Requirements

The following Vibro-Meter hardware is required for use with the CMS Software system: one or more VM600 racks with CMC 16 cards and their associated IOC 16T cards, as well as the CPUM and IOCN cards set up for network communication over an Ethernet (TCP/IP) network. The CMS Software is compatible with the following versions of cards:

Table 2-2 : Minimum VM600 Hardware Requirements

VM600 Hardware component	Description	Version / Part Number
CMC 16 card	*Condition Monitoring Card*	*200-530-012-012 or 200-530-012-013 or 200-530-021-013 or 200-530-022-014*
IOC 16T card	*Input/Output Card for CMC 16*	*200-565-000-012 or 200-565-000-013*
CPUM card	*Modular CPU Card (containing Disk-on-Chip)*	*200-595-034-111 (209-595-200-134) or 200-595-044-111*
IOCN card	*Input/Output Card for CPUM*	*200-566-000-012 or 200-566-000-112*

3 THE CMS SOFTWARE MODULES

This chapter introduces the CMS Software modules and describes general *aspects* of the software's operation. For more details on the individual program modules, refer to the individual chapters of this manual or the online help of individual modules.

3.1 Introduction

The CMS Software consists of a number of modules, each fulfilling a specific task. Most modules are fully operational, stand-alone applications. In addition, many of the modules provide useful menu shortcuts to allow you to switch quickly to a related module.

The CMS Software modules are logically divided into groups as follows:

Table 3-1 : CMS Software Groups

Group	Modules
Configuration & Setup	*Configuration Editor* *VM600 Administrator* *Diagnostics Rule Box*
Communications & Data Storage	*VMCom Communications Handler* *Database Management System (DBMS) providing database servers and database*
Display & Analysis	*Mimic* *Database Browser* *Data Analyser* *CMS Event Viewer*
Data Import/Export	*Modbus Client/Server* *DDE Client/Server* *ODBC Server* *Keyboard Interface* *OPC Client Server*
Air Gap Monitoring	*Air Gap monitoring (integrated into Configuration Editor)*

The CMS Software architecture allows various external systems to connect to the database. Examples include:

Table 3-2 : CMS Software External Groups

Group	System
External Systems	*Turbine Control System* *Performance Monitoring* *Lube Oil Analysis System* *Special analysis tools* *etc.*

The figure below provides an overview of the CMS Software architecture.

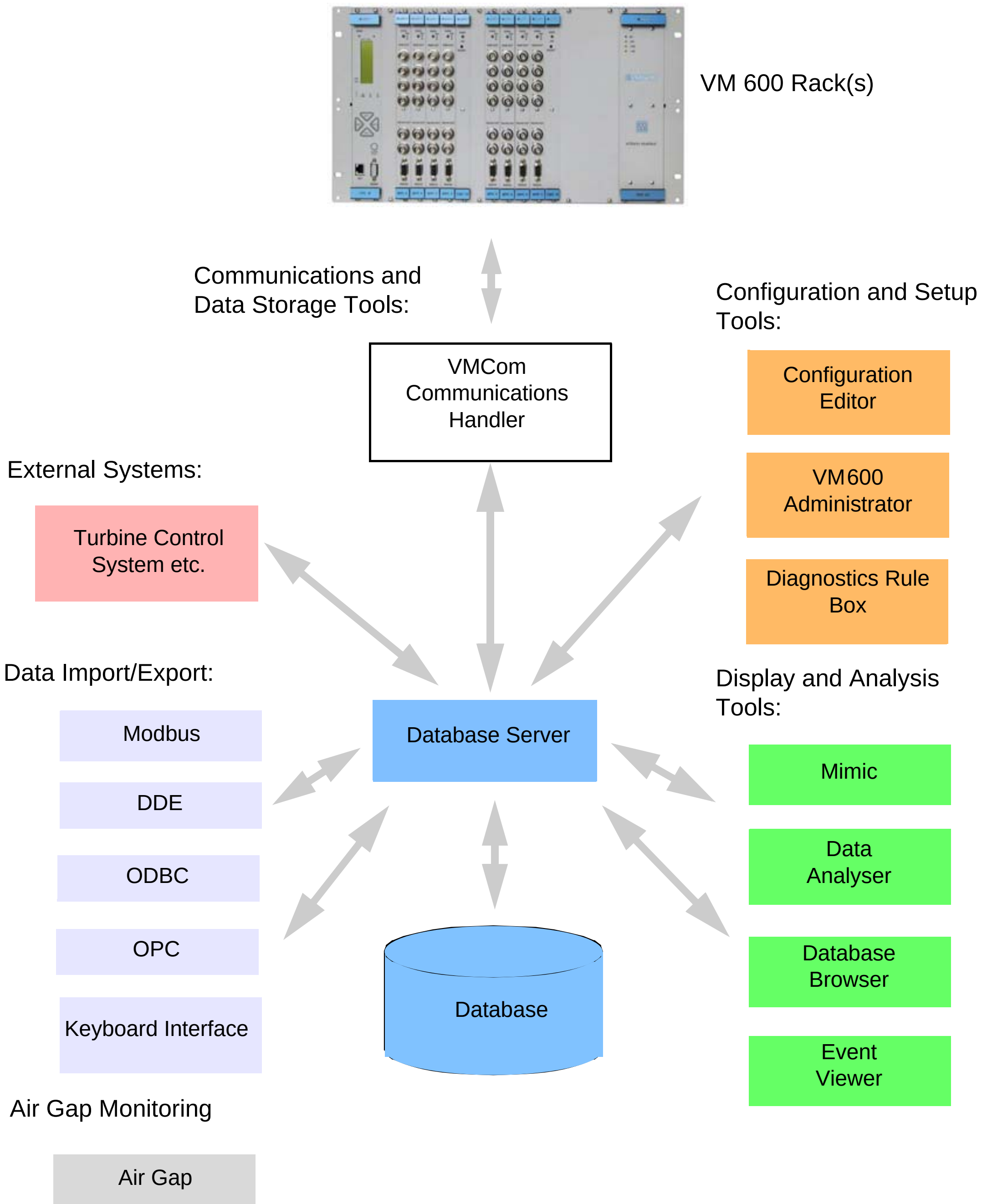

Figure 3-1 : VM600 Software Architecture

The configuration is written to the database using a standard ODBC connection, from where it is transferred upon user request to the VM600 rack(s) by the VMCom communications handler module.

3.2 The Modules

3.2.1 Database Management and Storage

All CMS Software modules connect to a central database. The database contains:

- Information relating to the VM600 system's configuration
- Measurement data acquired from one or more VM600 racks.
- Optionally, "offline" data acquired from external systems via DDE or Modbus protocols.

Some CMS Software modules store data in the database, while others extract measurement data from the database and present it in a meaningful form to the users.

A database management system is responsible for controlling access to the database and other related tasks. Once correctly installed and configured, the database software runs in the background and does not interact directly with the user.

The CMS Software is delivered with a reliable and powerful third-party product, Sybase Adaptive Server Anywhere, which provides the database functionality on behalf of the other CMS Software modules. However, you can configure your system to use a different database management software, such as Oracle, if you wish, provided that it is ODBC and SQL 92 compliant.

See Chapter 7 - Administering Databases for details on the database utilities available.

3.2.2 The VMCom Communications Handler

The VMCom communications handler is responsible for setting up and controlling the flow of data between the VM600 rack(s) and the database.

The VMCom communications handler can either be set up as an automatically started Windows service, or it can be launched manually. When first started, it downloads rack configuration data to the VM600 rack(s) that will supply measurement data, prompting a reset of the cards. Upon restarting, the cards are able to establish communications with the database via the network and begin sending data directly to the database.

This module is described in detail in Chapter 8 - Setting Up the VMCom Communications Handler.

3.2.3 The VM600 Administrator

This application is a "portal", providing easy access to the other CMS Software modules, tools for database management and commonly used operating system components.

The VM600 Administrator is described in Chapter 6 - Using the VM600 Administrator.

3.2.4 The Configuration Editor

The Configuration Editor is used to define and update the system configuration. The system configuration can include the configuration details of an individual processed output value, a complete rack, machine-specific parameters for data logging or transients, or the entire system hierarchy.

The Configuration Editor is a stand-alone program, but can also be launched from within other CMS Software modules, for example, the Mimic application.

Using the Configuration Editor, the system configuration can be viewed or—provided the correct password level is entered—changed and saved into the database. The Configuration Editor commits configuration changes to the database and uses the VMCom communications handler to send them to the VM600 hardware rack(s).

This module is described in detail in Chapter 9 - Creating a Rack Configuration.

3.2.5 Mimic

Mimic is a graphical tool that uses an easily customisable palette of predefined objects to provide a hierarchical view of the monitored machinery, display real-time data from the rack(s), and many other functions. Several of the other CMS Software modules can also be launched directly from within Mimic when specialist tasks are required. Once the CMS Software has been fully configured and has gone “live”, Mimic is therefore the only module usually needed by operators.

Also from the operator screen, a number of “real-time” data acquisition features are available which allow the operator to manually request data from the hardware. These user requests are handled by the VM600 hardware in addition to the automatic and pre-programmed data acquisition. The operator can choose whether or not to write the data obtained in this way to the database. This live data can sometimes facilitate the analysis of the current machine condition. The real-time features are mostly useful for testing and commissioning purposes, verifying the integrity of the CMS system, as well as for troubleshooting purposes.

Real-time plots can be requested from various locations in the Mimic application, notably the value or status indicators, or the tree items of the logical view. The Data Analyser module is called directly to display the measurement data (see 3.2.7 - The Data Analyser).

Mimic is described in detail in Chapter 10 - Using the Mimic Module.

3.2.6 The Database Browser

The Database Browser is a tool for viewing the contents of the database. It visualises the contents of stored datasets in an intuitive time-line representation, and allows you to quickly navigate to the dataset of interest. A selection of several independent criteria (point, type of data set, time) helps you to easily isolate the dataset of interest. From this application, a direct link to the Data Analysis module is provided, as well as to the event log via the CMS Event Viewer module.

The Database Browser is described in Chapter 11 - Using the Database Browser.

3.2.7 The Data Analyser

The Data Analyser module is a graphical presentation tool used to display measurement data from the database.

The tool takes selected data from the data measurement points defined in the database, applies user- or system-defined filters to the data, and displays the data in a variety of forms. Typical filters that can be applied to the data are time, alarm status, machine status, or a freely configurable filter that can be constructed based on any speed, analog, or digital data.

The Data Analyser module provides a detailed view of the contents of the measurement database. It provides complete access to all existing datasets, and helps to quickly scan through large quantities of data. The modules offer various independent criteria for effective filtering and sorting.

The following real-time graphs are available:

Table 3-3 : Real-Time Graph Types

		Measurement Point Type			
		Speed	Dynamic	Analog	Digital
Real-time Graph	*Bar graph* [1]	✓	✓	✓	✓
	Trend	✓	✓	✓	✓
	Waveform	-	✓	-	-
	Spectrum	-	✓	-	-
	Long Waveform [2]	✓	✓	✓	✓
	Orbit [3]	-	✓	-	-

1. *For dynamic points, showing individual outputs, rather than the complete point.*
2. *Also referred to as “Oscilloscope Waveform”.*
3. *Available only for relative vibration points for which Orbits are defined.*

NOTE : The VM600 CMS system being an automatic online data acquisition system, Mimic and the other modules with graphical user interfaces are not necessary in order to populate a database with measurement data. This aspect is handled automatically in the background by the database and the VMCom communications handler.

NOTE : The Data Analyser module includes the same real-time data acquisition features as Mimic. See 3.2.5 - Mimic for details.

The Data Analyser is described in detail in Chapter 12 - Using the Data Analyser to Create Graphs.

3.2.8 The CMS Event Viewer

The CMS Event Viewer can be launched from within various other CMS Software modules—including Mimic, the Data Analyser and Database Browser modules—or as a separate program.

The CMS Event Viewer is used to view events in the database that have either been created automatically by the system, or manually by users. It shows, in list form, the events that apply to certain filtering criteria that can be set by the user. Invoking the tool from other modules is context-sensitive, that is, the contents of the CMS Event Viewer windows always relate directly to the module from which it was launched. For example, invoking it from the “Unacknowledged Events” Indicator in the Mimic module shows only unacknowledged events, whereas invoking it from a machine selected in the Mimic logical view shows only events related to the selected machine.

This tool is primarily used by the operator in conjunction with the Mimic screens, providing immediate notification of any new occurrences in the system. New events are initially flagged as “unacknowledged” until the operator manually acknowledges having read their contents. However, the CMS Event Viewer is also useful for performing detailed data analysis, and comparing the event log with measurement data. More specifically, the alarm event log is a good starting point for searching for more detailed data that were triggered by limit exceedence of specific outputs.

For all limit-related events, a direct link to the relevant part of the historic trend curve is available with a single click of the mouse.

The CMS Event Viewer is described in Chapter 13 - Using the CMS Event Viewer.

3.3 Offline Systems

The term “offline” refers to any activity that occurs outside the basic VM600 CMS Software system, for example, extracting data originating from non-VM600 systems, or gathering measurement data from VM600 racks and further processing it in other non-VM600 systems (by contrast, “online” activity refers to internal VM600 rack, CMS Software and database-related activity).

Offline-generated data values become “current values” for the system, and can be displayed from within Mimic, or any real-time plot type. From these “current values”, the VMCom communications process automatically generates historic trends and limit exceedence events, based on the current configuration. The existence of a common CMS Software database enables you to correlate online data with offline values using standard plotting tools.

The VM600 CMS Software currently supports the following offline systems:

Table 3-4 : Offline Point Types and Related Modules

Offline Point Type	Related Module
DDE points	*DDE Interface*
ODBC points	*ODBC Interface*
OPC points	*OPC Interface*
Keyboard-entered points	*Keyboard Interface*
Modbus points	*Modbus Interface*
Calculated points	*Diagnostics Rule Box*

Any of these offline data collection modules can be set up to run fully automatically as Window system services running under a local system account.

3.3.0.1 The DDE Interface

Dynamic Data Exchange (DDE) is a communications protocol supported by Windows operating systems which enables applications to communicate with each other. DDE automates the process of manually copying and pasting data from one application to another via the clipboard.

The DDE Client/Server utility allows you to exchange data between VM600 CMS Software databases and external Windows applications, such as Microsoft Excel.

The tool also supports the exporting of data from the database.

This tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.3.0.2 The ODBC Interface

ODBC (Open DataBase Connectivity) is a communications protocol built in to many Windows operating systems. ODBC provides a standard method of connecting client applications to database servers. ODBC makes it possible to access any data in any database, regardless of which database management system (DBMS) is handling the data.

In the same way as other types of “offline” data in CMS software, ODBC uses a client/server architecture, in which the application requesting the data is called a “client” and the application providing the data is called a “server”. The CMS Software can act as both client and server, that is, it can:

- Import data from any ODBC-compatible application into a CMS Software database.
- Allow any ODBC-compatible application to request data from a CMS Software database.

The ODBC tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.3.0.3 The OPC Interface

OLE for Process Control (OPC) is an open connectivity mechanism enabling the exchange of data between OPC-compatible data sources. These data sources can include “intelligent” devices on the factory floor, databases in a control room, and software applications such as third-party applications.

OPC has a client/server architecture. CMS Software can function as both OPC server and OPC client. The CMS Software includes an OPC configuration utility to allow you to define and configure instances of OPC servers and OPC clients.

The ODBC tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.3.0.4 The Keyboard Interface

This tool allows you to manually set the values of slowly-varying offline data points by entering their values with the keyboard.

From a configuration point of view, keyboard-entered points are a form of offline system, and as such can also be created from within the Configuration Editor. Keyboard-entered points are treated similarly to other offline points, such as calculated points, DDE points, Modbus points, and so on.

While this tool is primarily intended for the keyboard entry of selected, slowly varying parameters, it can also be used to temporarily replace data imported from other (automatic) external interfaces in situations where these are currently unavailable. For this purpose, it is possible from within the Configuration Editor to “move” configured points from another offline point group to the keyboard-entered area of the database.

This tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.3.0.5 The Modbus Interface

Modbus is a widely used database communications protocol originally developed by Modicon (now a part of Schneider Automation). The Modbus Client/Server tool can be used to collect data for offline points from external sources via the Modbus protocol and store the data in the VM600 database.

The tool also supports the exporting of data from the database.

This tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.3.0.6 The Diagnostics Rule Box

This tool is a powerful, fully automated, decision support system for operators and machinery experts. Any information in a CMS Software database, including measurement data and imported “offline” data, can be used to generate complex diagnostics rules. You can also develop templates for standard diagnostics procedures and activate them for any item of machinery.

Calculated points output by the Diagnostics Rule Box tool can be directly stored as “offline” data in the CMS Software database.

This tool is based on the concept of fully customizable scripts and rules:

Scripts are assemblies of rules that are ready to be executed according to user-defined parameters. Scripts can contain sequences, loops and branches, and allow you to customize their execution according to the particular needs of the diagnostics rules.

Rules are composed of three elements:

- **Input Level**: Any number of customizable input criteria, such as exceedance checks, points' status, counters, and so on, which are associated with either individual measurement points or groups of measurement points.
- **Logical Level**: A freely-configurable assembly of logical combinations of the results from Input Level elements.
- **Actions Level**: Any number of user-defined actions that are executed based upon results from the Logical Level.

These three elements are interconnected using a user-friendly and intuitive graphical editor. Simulation tools are provided to allow easy visual verification and testing of the rules, using simple colour-coding techniques.

Diagnostics rules are easy to adapt and enhance without affecting normal system operation.

The Diagnostics Server subsequently runs independently and performs the tasks defined in the Diagnostics Rule Box, working in parallel with the normal data acquisition tasks of the system.

This tool is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.4 Air Gap Monitoring System

The Air Gap module CMS Software is key component in Vibro-Meter’s air gap diagnostics solution, designed to provide continual monitoring the distance between the rotor and stator of turbines. Large hydroelectric turbines are subjected to constantly varying centrifugal, thermal, and magnetic forces that are capable of distorting the stator and rotor of the turbine, thereby causing this air gap to vary. Monitoring the air gap is an essential part of condition monitoring as it can provide early warning of impending problems and facilitates timely maintenance procedures.

The Air Gap Monitoring system allows the following types of measurement:

- Rotor profile measurement in one or more planes
- Stator profile measurement (roundness, eccentricity) in one or more layers (“planes”)
- The ability to generate alarms for each sensor
- Minimum, maximum, and average air gap over one complete rotation
- Identification of the pole numbers producing the minimum and maximum air gap
- Magnetic flux measurement,

The air gap monitoring solution is described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2.*

3.5 External Systems

The architecture allows various external systems to be connected to the database. Examples include:

- Turbine Control System
- Distributed Control System (DCS)
- Lube Oil Analysis System

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Part II : Installing and Configuring the System

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4 INSTALLING CMS SOFTWARE

4.1 Installing CMS Software

To install the CMS Software:

1- First, install the database software, as described in 4.1.1 Installing Adaptive Server Anywhere Database Software below.

2- Then, install the CMS Software itself, as described in 4.1.2 Installing the CMS Software Programs.

NOTE : It is not mandatory to install the database software before the CMS Software. However, the CMS Software's setup program attempts to install a sample database on your system and can only do so if the database software has already been installed. If you reverse the order of installation, you must manually configure the sample database before using it.

4.1.1 Installing Adaptive Server Anywhere Database Software

To install the database software on the Database Server PC:

1- Insert the CD-ROM labelled **Sybase SQL Anywhere Studio** in the CD-ROM drive.

If the setup procedure does not start automatically, use Windows Explorer to navigate to the CD-ROM drive and double-click the **setup.exe** file.

2- The setup procedure starts automatically. Follow the installation instructions.

3- You are prompted to select the components of Adaptive Server Anywhere to install. Refer to Table 4-1.

Table 4-1 : Adaptive Server Anywhere Installable Components

Component	Choice	Comments
Adaptive Server Anywhere	*MANDATORY*	*The main database component.*
Synchronization tools	*OPTIONAL*	*Select this option only if you need to synchronize the contents of databases with other databases or remote users.*
Sybase Central	*MANDATORY*	*Database management utility.*
jConnect	*NOT NEEDED*	*Select this option only if you intend using Java-based tools to access your databases.*
Online Books	*RECOMMENDED*	*Online reference manuals.*
InstallShield Objects and Templates	*NOT NEEDED*	*Select this option only if you intend developing your own database applications.*

4- If you have purchased a Server license, the following window appears:

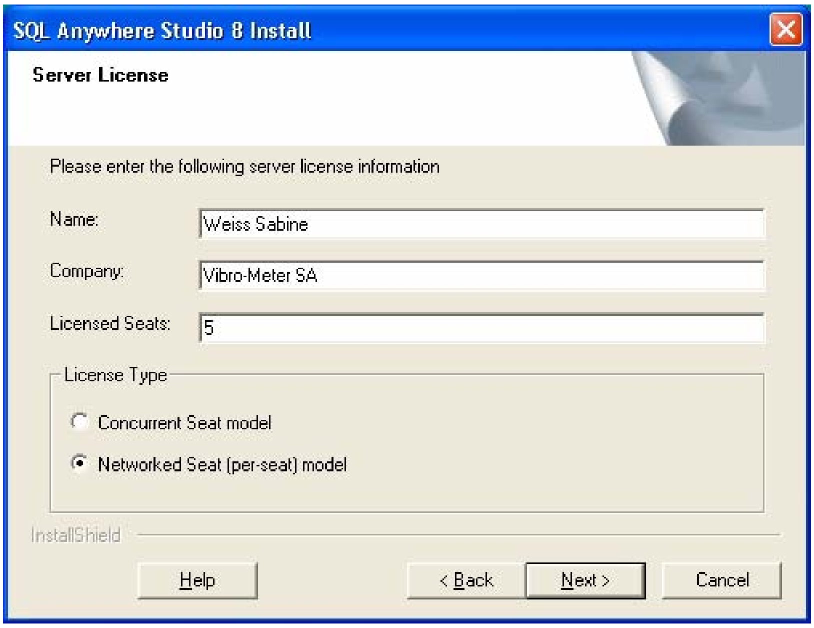


Figure 4-1 : The Server License Window

Specify the number of **Licensed Seats** you have purchased—according to the number of remote access stations that will be used to access the server—and click **Next** to continue the installation.

5- Remove the CD-ROM from the drive and reboot your computer when prompted.

4.1.2 Installing the CMS Software Programs

To install the CMS Software programs:

1- Insert the CD-ROM containing the CMS Software in the CD-ROM drive.

2- Use Windows Explorer to navigate to the CD-ROM drive and double-click the **setup.exe** file.

3- If you are upgrading or reinstalling the CMS Software, the setup program detects that a version of the CMS Software has already been installed on this computer. You must uninstall an existing version of the CMS Software whenever you upgrade to a more recent version, change installation options, or activate optional program modules that you have purchased.

Although the data integrity of your system is fully preserved throughout the upgrade or reinstallation process, you are strongly recommended to make a backup of your database before upgrading or reinstalling.

To automatically remove the CMS Software system, proceed as follows:

a. Click **Remove**.

b. Click **OK** on the first install window to confirm removal.

c. The setup program proceeds to automatically uninstall the existing version. When finished, click Finish.

d. Double-click the **setup.exe** file to restart the setup program.

4- Click **Yes** to accept the terms of the license agreement.

5- When prompted, enter a **User Name**, **Company Name**, and the **License Key** provided to you by Vibro-Meter. This license key automatically selects the installation language and any optional components you ordered with the product.

If you have not received a license key from Vibro-Meter, you can still install the CMS Software in “demonstration” mode by entering “DEMO” in the **License Key** field. In this case, the product is installed in a special demonstration mode: all product components are installed, but the Mimic module and any programs launched from within Mimic will shut down after 20 minutes of activity.

NOTE : If you install the CMS Software using the DEMO license key and subsequently receive a full license key from Vibro-Meter, you will be prompted to uninstall the DEMO version, as described in Step 2 above. Then proceed to install the CMS Software, entering the valid license key when prompted.

6- When prompted to select the destination folder for the installation, enter the desired location, or accept the proposed default. Special requirements (such as the use of a separate disk partition for the CMS Software installation) may be considered here.

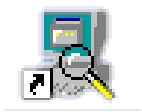
7- Select the type of installation: **Typical**, **Compact**, or **Custom**. **Typical** is the default and is recommended—it contains all relevant components as well as some useful optional components, example files etc.

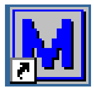
The result of the installation is a new directory with the following structure:

Table 4-2 : Default Installation Directories

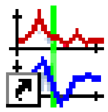
Directory	Subdirectory	Contents
VM600_CMS		*Root installation directory of all CMS components*
	Admin	*Files and executables relating to the Administrative tools.*
	Bin	*Collection of executables, libraries, and necessary files*
	DB	*Use this directory to store databases. For increased data safety, customer databases may be located on a separate disk, disk partition, or a dedicated server on the network.* *SQL script files for database creation are also stored here.*
	Examples	*Sample databases, Mimic documents, and other objects*
	Firmware	*CMC 16 card firmware updates*
	Help	*The CMS Software and CMS Hardware manuals, in Acrobat PDF format.*
	Image	*Bitmaps used by various applications*
	Projects	*Contains project-specific information. A separate sub-folder is created for each CMS Software database you create, containing all configuration files and Mimic documents relating to the database.*

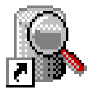
If you used the proposed default settings, the following items are added to **Start > Programs > VM600 CMS Software** and as shortcut icons on your desktop:


VM600 Administrator


VM600 Mimic


VM600 Configuration Editor


VM600 Data Analyzer


VM600 DB Browser

Refer to Chapter 3 - The CMS Software Modules for details on the CMS Software programs.

4.2 Upgrading the Adaptive Server Anywhere Database Software

Upgrading to a more recent version of the CMS Software does not normally require reinstallation of the Adaptive Server Anywhere database software referred to in 4.1.1 - Installing Adaptive Server Anywhere Database Software. This situation is illustrated in Figure 4-2:

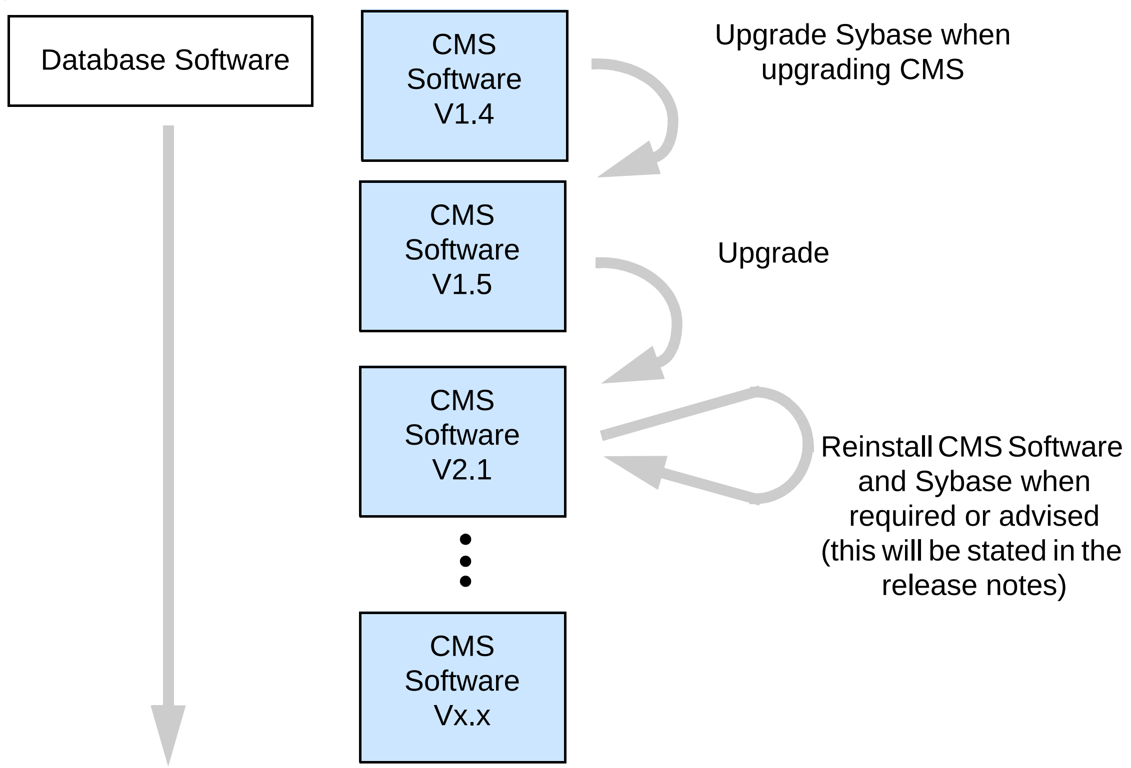


Figure 4-2 : Upgrading and Reinstalling the Adaptive Server Anywhere Database Software

4.3 Uninstalling the CMS Software Manually

NOTE : When upgrading to a more recent version of the CMS Software or reinstalling the software, you are automatically prompted to uninstall the CMS Software by the setup program. It is not necessary to uninstall the Database Software before upgrading or reinstalling the software.

To uninstall the CMS Software manually:

1- Close any documents open in any of the CMS Software applications and close any running CMS Software programs, which may create conflicts or inconsistencies during the upgrade.

2- Stop any running processes related to the CMS Software. In particular, you must stop the VMCom communications handler if it is running in the background. To do this:

a. Choose **Start Menu > Settings > Control Panel > Administrative Tools > Services**

b. If the **VM600 VMCom** process is present in the list, highlight it as shown below:

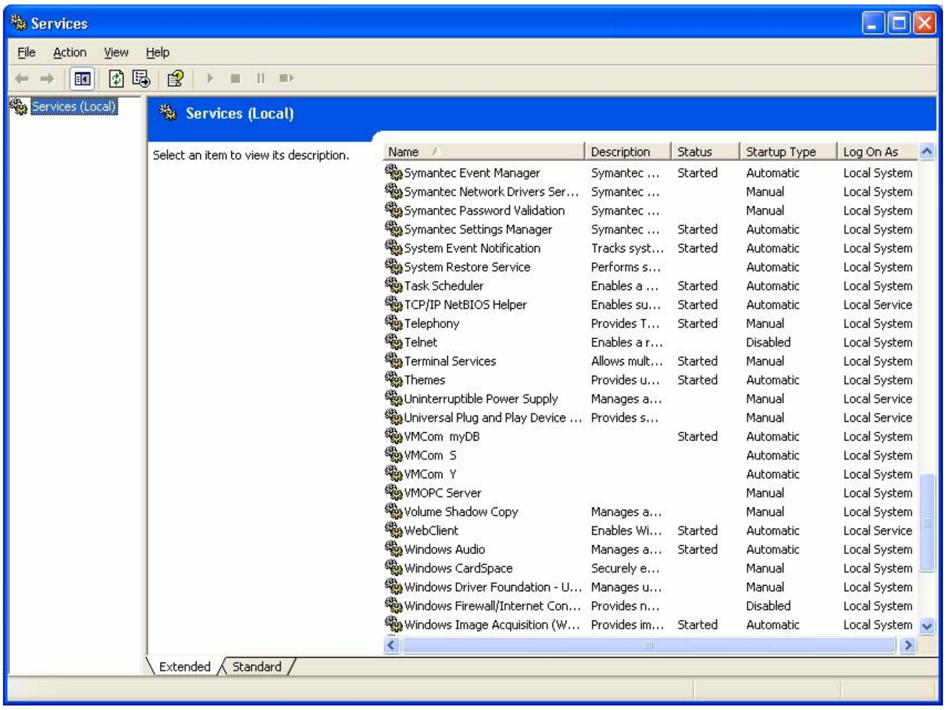


Figure 4-3 : The Windows Services Window

c. Right-click and choose **Stop**. The **Status** column displays **Stopped**.

To verify that the service is no longer running:

a. Press Ctrl-Alt-Del and click **Task List**.

b. Select the **Processes** property sheet.

3- If the **VMCom.exe** process still appears in the list, as shown below, the service could not be shut down automatically. If this is this case, select the **VMCom.exe** process and click **End Process**.

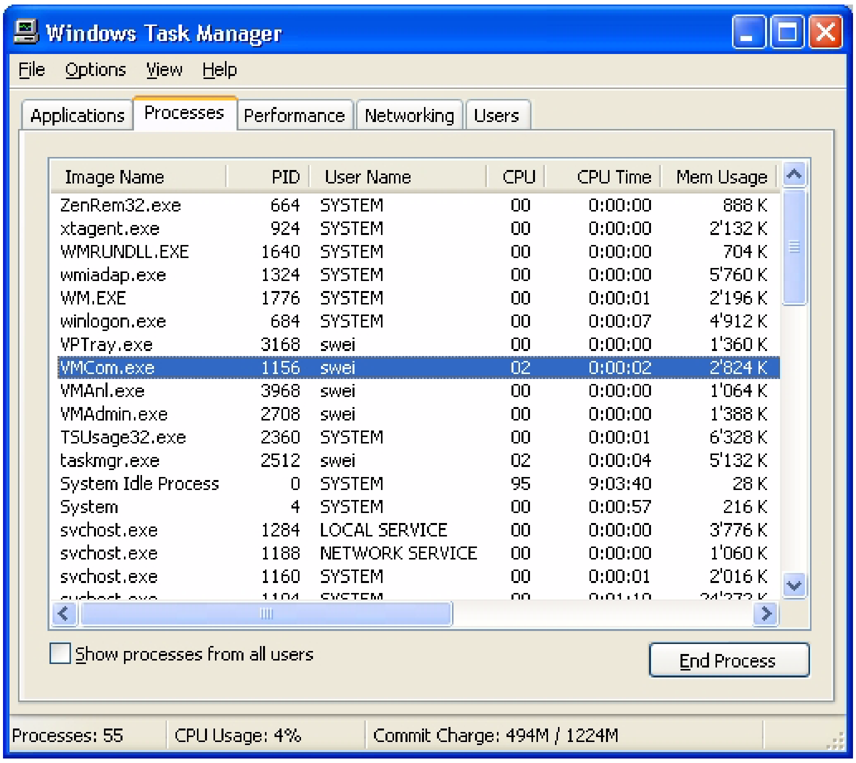


Figure 4-4 : The Windows Task Manager

Before stopping, the VMCom.exe process must itself stop a number of other background processes, which takes approximately 10 to 20 seconds to complete. You must wait until the VMCom.exe entry disappears from the task list before proceeding, otherwise a second VMCom.exe process may be launched. This can lead to VM600 hardware problems as only one process can be associated with an ODBC system DSN at any one time.

4- Choose **Start Menu > Settings > Control Panel > Add/Remove Programs.**

5- Select **VM600 CMS Software** from the list of currently installed programs:

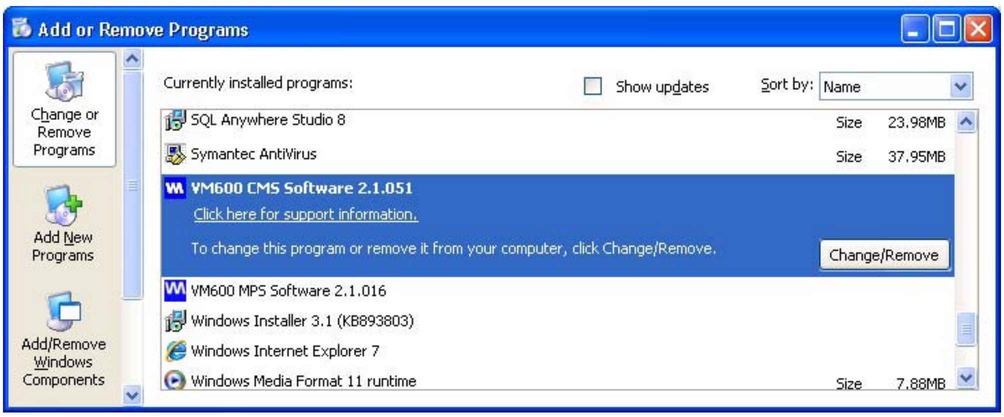


Figure 4-5 : Uninstalling CMS Software

6- Click **Change/Remove**.

7- When the uninstall wizard starts, choose **Remove.**

8- Click **Next** and follow the on-screen instructions.

This uninstalls all programs and libraries required by the CMS Software, but leaves all existing databases and related project information in place.

4.4 Uninstalling the Adaptive Server Anywhere Database Software

To uninstall the Adaptive Server Anywhere database software:

1- Choose **Start Menu > Settings > Control Panel > Add/Remove Programs**

2- Select **SQL Anywhere Studio** from the list of currently installed programs:

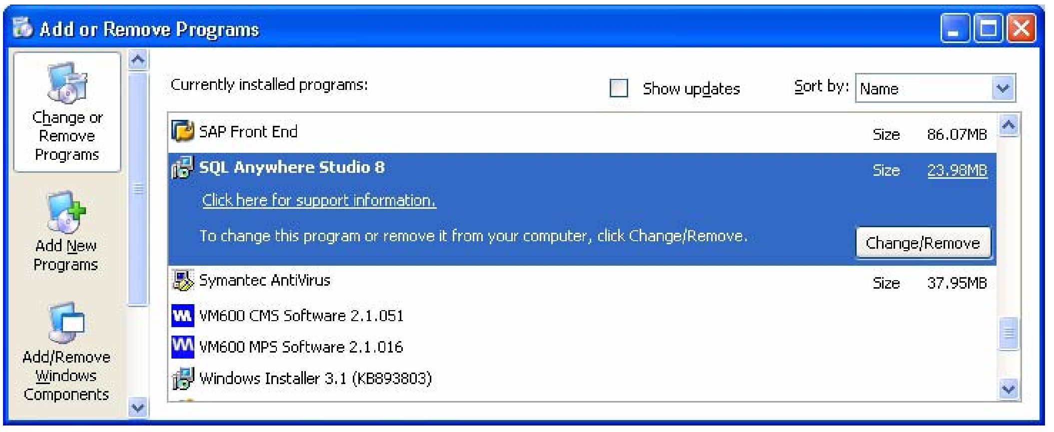


Figure 4-6 : Uninstalling SQL Anywhere Studio

3- Click **Change/Remove**.

4- When the uninstall wizard starts, choose **Remove.**

5- Click **Next** and follow the on-screen instructions.

This uninstalls the Adaptive Server Anywhere components, but leaves all existing databases and the CMS Software in place.

4.5 Avoiding Up- and Downgrading the Software

To facilitate both your and Vibro-Meter's work, it is recommended not to upgrade or downgrade the CMS Software and CMC 16 firmware frequently. Some modifications to the database made when upgrading cannot be undone, so downgrading software versions can cause problems.

It always helps to analyse the problem first, then upgrade to a new software version only when necessary. Proceed as follows:

1- Describe the problem to Vibro-Meter's Customer Support department.

2- You will receive a response describing how to fix the problem and possibly recommending a change of CMS Software version, firmware, or both).

3- Learn about the other features included in the recommended software version.

4- Make a decision whether to upgrade or not.

5- Perform the upgrade.

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5 CMC 16 CARD FIRMWARE MANAGEMENT

The CMS Software requires that all connected CMC 16 cards run the same firmware version. In addition, individual releases of the VM600 CMS Software require specific versions of firmware. The following table lists the CMS Software versions, part numbers of available CMC 16 cards, and the corresponding firmware versions supported:

Table 5-1 : Supported Firmware Versions for CMS Software

VM600 CMS Software		CMC 16 Card Part Number	Firmware Version Number
Version	**Part Number**		
1.3.x	*209-500-600-013*	*200-530-012-012*	*5.04*
		200-530-012-013	*5.04*
		200-530-013-012	*5.05*
		200-530-013-013	*5.05*
1.4.x	*209-500-600-014*	*200-530-012-012*	*5.04*
		200-530-012-013	*5.04*
		200-530-013-012	*5.05*
		200-530-013-013	*5.05*
1.5.0	*209-500-600-015*	*200-530-020-012*	*6.00*
		200-530-020-013	*6.00*
1.5.1	*209-500-600-015*	*200-530-021-012*	*6.01*
		200-530-021-013	*6.01*
1.5.2	*209-500-600-015*	*200-530-021-013*	*6.01*
		200-530-022-014	*6.02*
1.5.3	*209-500-600-015*	*200-530-021-013*	*6.01*
		200-530-022-014	*6.02*
1.5.4	*209-500-600-015*	*200-530-021-013*	*6.01*
		200-530-022-014	*6.02*
2.0	*209-500-600-020*	*200-530-023-013*	*6.03*
		200-530-023-014	*6.03*
2.1	*209-500-600-020*	*200-530-025-013*	*6.05*
		200-530-025-014	*6.05*
2.2	*209-500-600-022*	*200-530-025-012*	*6.05*
		200-530-025-013	*6.05*
		200-530-025-014	*6.05*

Each new release of the CMS Software systematically upgrades the firmware versions of all cards to the latest supported firmware version. The CMS Software also provides a utility to allow you to update the firmware version installed in a CMC 16 card from anywhere on the network.

Managing firmware upgrades is a specialist task that can, if used unintentionally or incorrectly, lead to malfunctioning of the CMC 16 card and affect proper function of data acquisition. It is therefore strongly recommended to use the utility for the purposes described in the following description only.

5.1 Firmware Versions

When upgrading firmware versions, you must respect the following rules:

- Same version of firmware on all cards

  The system does not support a mixture of several versions of CMC 16 cards (firmware) in the same rack or system. If you add or exchange a new card, you must ensure that all cards have the same firmware version loaded. If necessary, upgrade to the firmware version matching your CMS Software version. Also, check whether you need to upgrade to a higher firmware version for the new CMC card 200-530-025-014, which requires firmware version 6.05.

- Firmware version must match the CMC 16 card

  For the new CMC 16 card P/N 200-530-025-014, you must upgrade to firmware Version 6.05 or higher. Remember that you must upgrade all other CMC 16 cards in all racks/systems connected to the host PC to the same firmware version.

- Firmware version must match the CMS Software version

  If you upgrade your CMS Software version, check Table 5-1 carefully to ensure that it still works with your current firmware version.

  A Constraining factor with real time measurements is a general change in the protocol made between CMS versions 1.4 and 1.5. If running CMS 1.4 then Firmware 5.05 must be used. With CMS 1.5 rev x and all the builds of CMS 2.0, 2.1 and 2.2 Firmware 6.0x is required. It is recommended that at least version 6.02 is used (6.01 does not run on cards -014), and ideally version 6.05.

5.1.1 The Download CMC Firmware Utility

To download a firmware update:

1- Make sure the computer where the CMS Software is installed is connected to the VM600 rack containing the CMC 16 card to be upgraded.

For this special task, it may be worth considering connecting the computer directly to the VM600 rack using a crossed Ethernet cable to avoid any risk of upgrading other CMC 16 racks by mistake.

2- Start the VM600 Administrator program

3- Expand the System Tools icon in the structure view on the left,

4- Double-click **CMC Firmware Update.** The following window is displayed:

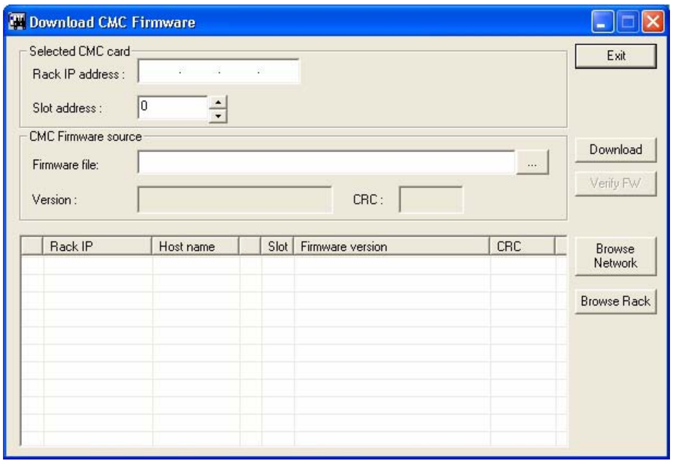

Figure 5-1 : The CMC Firmware Update Window

5- Click **Browse Network** (only when searching for a populated IP Address)

6- Enter IP Address and click **Browse Rack**. A list of CMC 16 cards “visible” across the network from this computer is displayed:

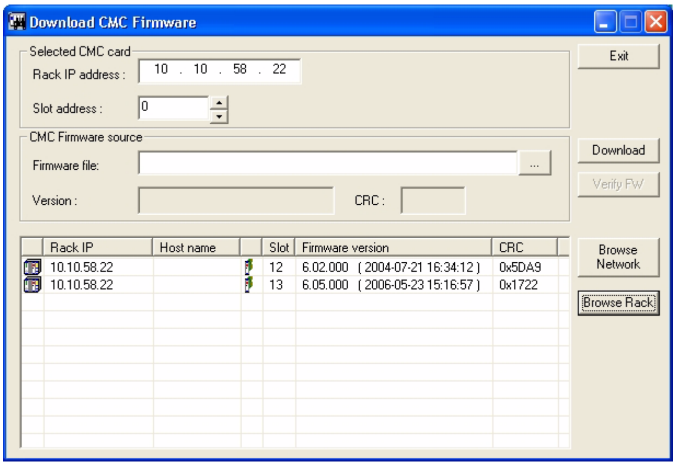

Figure 5-2 : Current Firmware Versions in Detected CMC 16 Cards

7- Click the browse button [...] and navigate to the folder containing the firmware upgrade, by default *C:\Program Files\VM600_CMS\Firmware:*

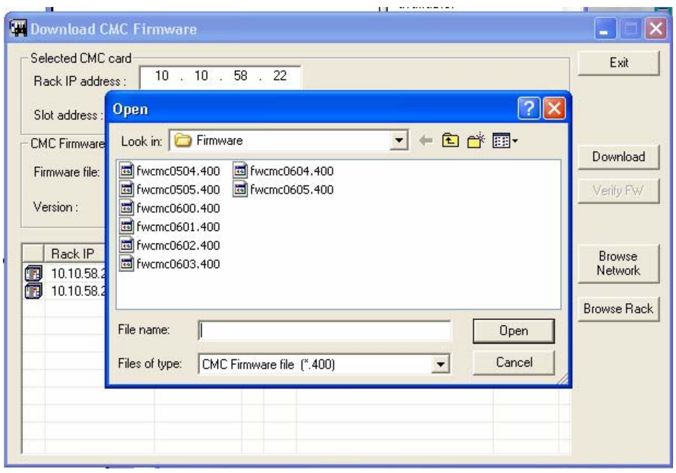

Figure 5-3 : Available CMC Firmware Upgrades

8- Consult Table 5-1 and select the firmware version that corresponds with the correct CMC 16 card number and CMS Software version. Select the latest firmware file for use with the current version of CMS Software, for example **fwcmc604.400** and click **Open**. Other firmware upgrade files are contained in the same folder.

9- Select the CMC 16 card to be upgraded.

10- Click **Download**. The firmware is downloaded to the selected card.

11- One the download is complete, this can be repeated on the additional CMC 16 cards.

NOTE : Using this tool, it is possible to download any available firmware version to any version of CMC 16 card. It is therefore possible to downgrade a card to a previous firmware version as well as upgrading a card. This feature may be useful for exchanging spare cards between several racks that are being used by different versions of the CMS Software.

6 USING THE VM600 ADMINISTRATOR

6.1 Introduction

The VM600 Administrator module is a “portal” providing quick and convenient access to all other CMS Software modules, as well as to a number of useful Windows system tools and database utilities.

NOTE : Certain programs can also be started from the CMS Software’s Windows menu:

Start > Programs > VM600 CMS Software > *modulename*

To start the VM600 Administrator:

Start > Programs > VM600 CMS Software > Administrator

or double-click the  shortcut on the desktop. The VM600 Administrator window shown in Figure 6-1 appears:

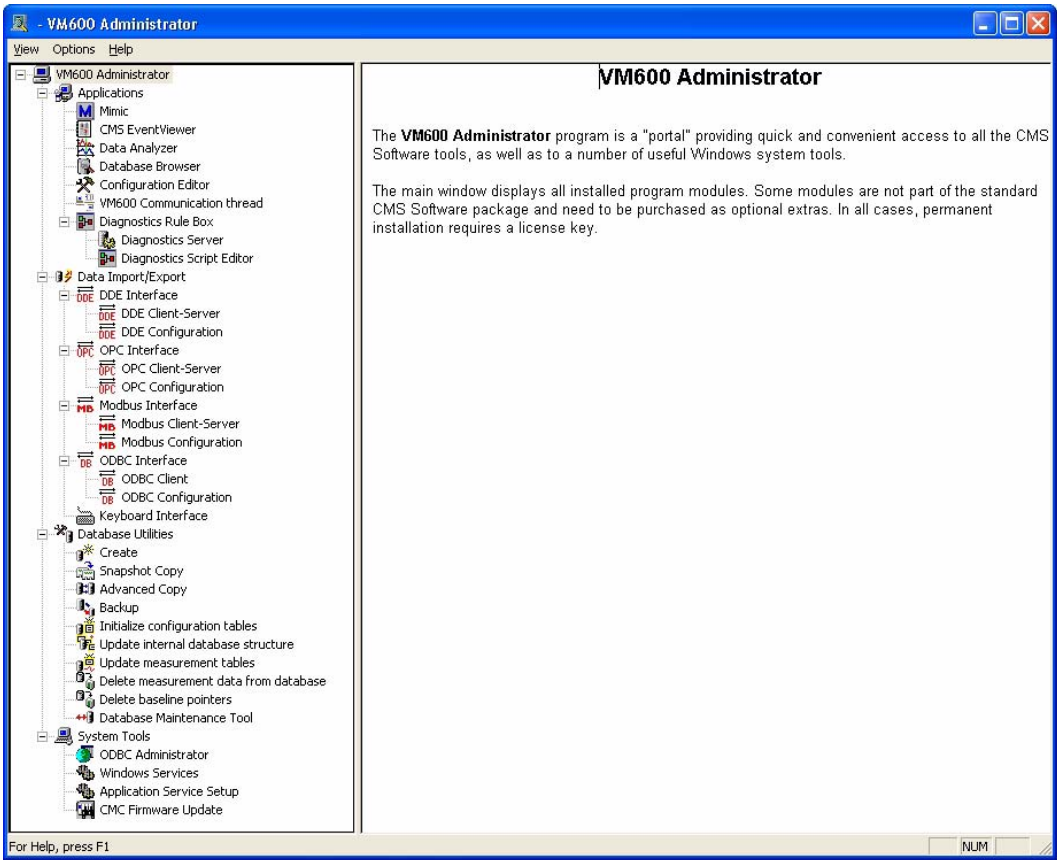

Figure 6-1 : The VM600 Administrator Tool

The left-hand side of the window contains a list of the programs that can be launched directly from within the VM600 Administrator. They are divided into the following groups:

- VM600 Applications
- Data Import/Export tools
- Database Utilities
- System Tools

6.2 Applications

This section links directly to the following VM600 applications:

- Mimic
- CMS Event Viewer
- Data Analyser
- Database Browser
- Configuration Editor
- VM600 Communication Thread
- Diagnostics Rule Box*

Refer to the individual chapters of Part III - Using the System for more details on the programs.

* Optional component described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2*.

6.3 Data Import/Export Tools

This section contains links to optional tools that are only present if purchased with your VM600 CMS Software system/

- DDE Interface
- Modbus Interface
- ODBC Interface
- OPC Interface
- Keyboard Interface

These utilities are described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2*.

6.4 Database Utilities

This section contains links to directly launch the following database tools:

- Create
- Snapshot Copy
- Advanced Copy
- Backup
- Initialize Configuration Tables
- Update Internal Database Structure
- Update Measurement Tables
- Delete Baseline Data from database
- Delete Measurement Data from Database
- Database Maintenance Tool

These tools are described in Chapter 7 - Administering Databases.

6.5 System Tools

This section contains links to Windows system tools and a tool to update the firmware in the CMC 16 card:

- ODBC Administrator
- Windows Services
- Application Service Setup
- CMC Firmware Update.

The ODBC Administrator and Windows Services tools are described in the Windows online help. The Application Service Setup tool is described in Chapter 8 - Setting Up the VMCom Communications Handler, while the CMC Firmware Update tool is described in Chapter 5 - CMC 16 Card Firmware Management.

6.6 Administrator Options

Figure 6-2 shows the options available on the administrator.

Figure 6-2 : Administrator Options

6.6.1 Changing the Language

The language can be changed between English (default) and French. To change to the French version of CMS (if purchased and installed)

1- Open the Language… dialog

2- Select the required language from the choicebox

3- Close the VM600 Administrator

All CMS Applications opened will then run in the language chosen.

6.6.2 Changing the ODBC Selection

In all CMS Applications, users are requested to connect to their database. De-selecting the option “show ODBC selection dialog...” causes the software to open the datasource which was last used. This is useful for users who always connect to the same database.

6.6.2.1 The ODBC Selection Dialog

Figure 6-3 shows the default ODBC selection dialog.

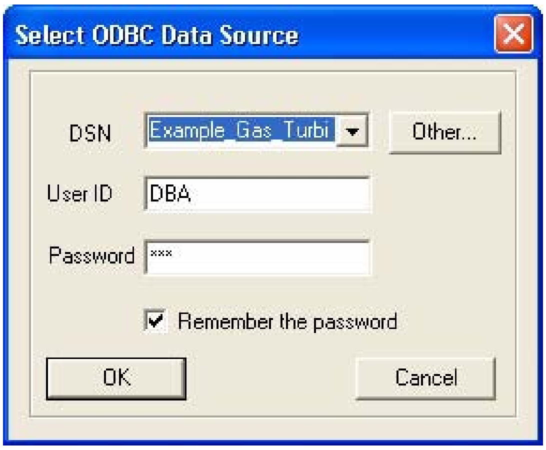

Figure 6-3 : The Select ODBC Data Source Window

To change the database being used:

1- Choose the ODBC system **DSN** of the required database. The five most recently used system DSNs are listed. To use a different system DSN, click Other and select a DSN from the **Machine Data Source**.

2- Type in a valid ODBC **User ID** (e.g. "DBA") and **Password** (e.g. "SQL") for the database and click **OK**.

3- Optionally, select the **Remember the password** option. When this is selected, the password is stored in the Windows Registry and displayed automatically when logging into the database. Furthermore, the User ID and Password are passed to any applications launched from within the application (e.g. opening the Event Viewer from Mimic). When not selected the User ID and password are required to access applications each time.

Passwords and system DSNs appear in "clear" in the Windows Registry, i.e. they are not encrypted. Take appropriate security precautions to protect your Windows system.

If the application is unable to establish a connection to the selected database (e.g. because the database server is not running, or because the database could not be opened), the utility exits. Use the Database Maintenance tool (see 7.6.2- Using the Database Maintenance Tool) to determine the reason for the failure, then correct the fault and restart the application.

6.6.2.2 Access without ODBC Selection Dialog

If the show **ODBC selection dialog...** is not selected, the application directly opens using the last used DSN, with the last used User ID (e.g. "DBA") and Password (e.g. "SQL").

6.7 Running a Version Check

Some CMS Software modules are optional and must be purchased from Vibro-Meter separately.

To check which components of CMS Software are installed, choose **Version Check** from the **Help** menu:

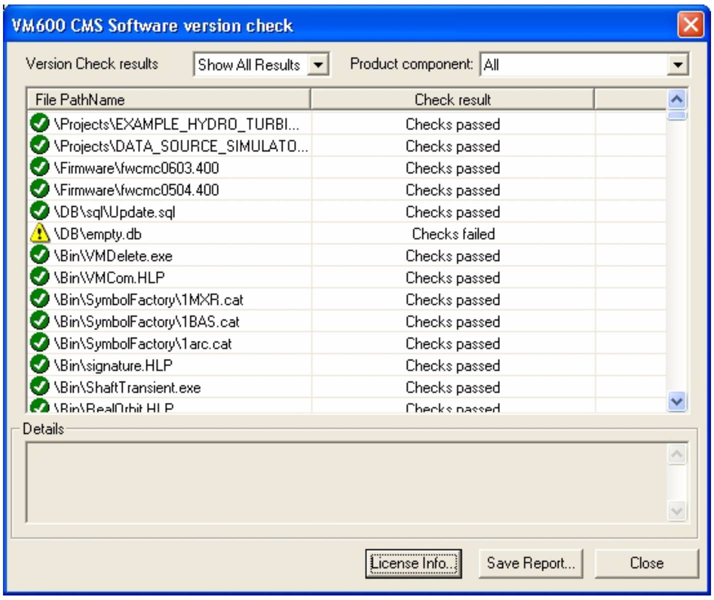

Figure 6-4 : The Version Check Window

Optional modules for which you have no license (for example, because you installed the demonstration version of CMS Software) are shown with a warning symbol. More serious problems, for example missing files, are indicated by an error symbol.

Only installed programs for which licenses have been purchased are listed in the VM600 Administrator tool window. If items do not appear in the list, check the installation options and verify your license key.

Click **Save Report** to export details to a text file, which you can send to Vibro-Meter customer support in case of problems.

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7 ADMINISTERING DATABASES

This chapter describes how to set up and manage the relational databases in which CMS Software stores measurement and configuration data.

7.1 Terminology

The following terms are used in this manual to describe basic database concepts.

7.1.1 Database

A *database* is a system for storing and retrieving data in which data is organized in tables. Each table contains data stored in rows and columns. A *relational database* consists of a collection of tables that store interrelated data.

7.1.2 Database Management System (DBMS)

A *database management system (DBMS)* is a collection of programs that allow you to create, use and manage databases.

The DBMS delivered with the VM600 CMS Software is Sybase's Adaptive Server Anywhere.

You can use any other SQL 92 compatible DBMS with the VM600 CMS Software—see 7.7.4 - Creating a Backup Before Changing Configurations. See 7.1.6 - SQL for an introduction to SQL.

7.1.3 Database Server

A *database server* is a software program set up by and run under the control of the DBMS The database server regulates all access to the information stored in a database. Thereafter, applications do not access the database directly, but communicate only with the database server. A *network database server* regulates access for both local and network-wide applications.

In the VM600 system, Adaptive Server Anywhere sets up database servers as Windows system services, which allows them to continue running when no users are logged on to a PC and to start and stop the database servers automatically.

NOTE : The Sybase documentation also uses the term "database engine".

7.1.4 Transaction Log Files

A transaction log file is a cumulative record of all the changes made to a database since it was first created, or since the log file was last deleted.

Using a transaction log makes it possible to:

- Schedule regular backups. Backups based on transaction logs are faster and easier than full database backups that do not use transaction logging.
- Recover from a media failure. If you have a media failure, you can restore the most recent full backup, then use the transaction log to add the data that was not written to disk.
- Recover from a system crash. When the server restarts, it runs through the end of the transaction logs and recovers any writes that were not made to disk at the time of the crash. Logged databases do not require a consistency check.

The disadvantage of using a transaction log file is that it can grow quickly, often much faster than the physical database file itself:

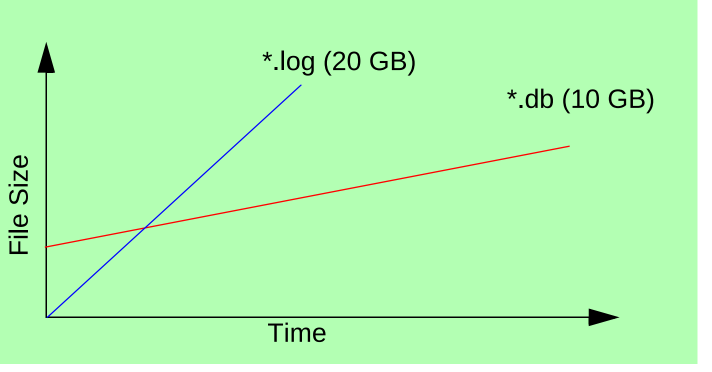


Figure 7-1 : A Transaction Log File Can Grow Quickly

You can use a utility, **VMDelete**, provided with the CMS Software, to regularly delete the contents of the transaction log file, for example, each day, and so ensure that it doesn't grow too large, for example:

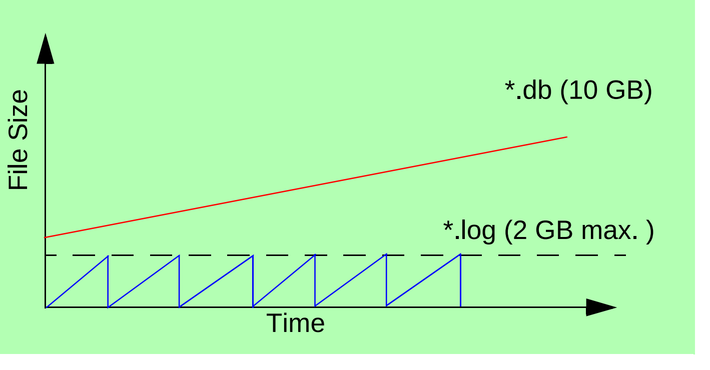


Figure 7-2 : Using VMDelete To Limit Transaction Log File Size

In this case, you may need to do daily backups to capture database changes before they are overwritten.

If you choose not to use a transaction log file, be aware that the physical database file will be larger than it would otherwise be:

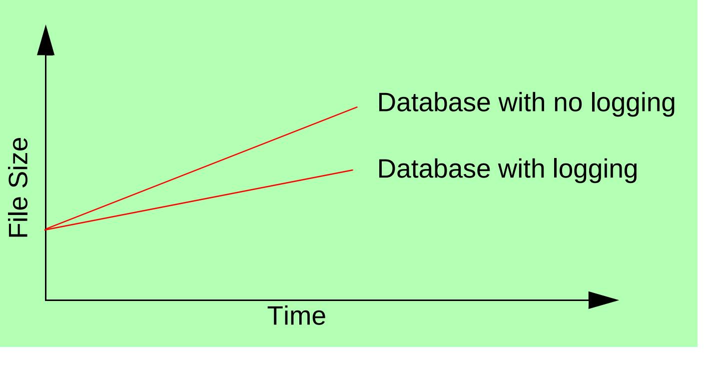


Figure 7-3 : The Effect of Logging on Database File Size

Refer to 7.6.9 - Changing Transaction Log File Settings for details on modifying the default transaction log file settings.

7.1.5 Client/Server Architecture

A *client application* is a program that is a requester of services. A *server* is a program that is the provider of services to client applications. Although the server and client applications are often installed on two physically remote PCs within the same network, both can be installed and run on the same PC in simple configurations.

The VM600 CMS Software system has a client/server architecture; the database server runs on a server PC, while the CMS Software modules, whether running on the same PC or on remote PCs in the network, are client applications.

7.1.6 SQL

When a client application needs to carry out a database-related task, such as retrieving information or inserting new data into a table, it describes the task using *Structured Query Language (SQL)* statements. SQL is a programming language specially developed for databases and which has been standardized by the ANSI and ISO standards bodies. The most recent version, to which the CMS Software complies, is SQL 92.

In the CMS Software environment, most SQL requests are hidden from the user: they are sent directly from the CMS Software modules to the database server. For example, the VMCom communications handler continuously and transparently stores acquired measurement data in the database using SQL statements. Similarly, various CMS Software modules extract data from the database and display it on the screen, for example, in the form of a bar chart.

Most DBMS systems provide a simple graphical tool for building, generating, and running SQL statements. Adaptive Server Anywhere provides the Interactive SQL tool. Refer to Sybase Central's online help for further details (**Start > Programs > Sybase SQL Anywhere 8 > Online Books**).

7.1.7 ODBC

ODBC (Open DataBase Connectivity) is a communications protocol built in to the Windows NT, Windows 2000 and Windows XP operating systems.

ODBC provides a standard method of connecting client applications to database servers. The advantage of using ODBC is that it can be used by any application that includes support for ODBC, and to communicate with any database server that supports ODBC. Furthermore, since ODBC is network compatible, the application and database server can be located on different PCs anywhere on the network.

As shown in Figure 7-4 below, ODBC works by inserting a middle layer, called an ODBC driver, between the application and the database server. The ODBC driver translates the application's requests into commands that are understood by any ODBC-compliant database server.

In ODBC terminology, the database being used is called a *data source*. Think of a data source as a combination of:

- The physical database file being accessed
- The information required to access that data (for example, security parameters)
- The physical location of the database

Each ODBC data source is identified by a unique Data Source Name (DSN). ODBC defines a number of different types of DSN:

- User DSNs are visible only to the currently logged in user

- System DSNs are visible to all network users and to Windows services
- File DSNs are visible by several users sharing the same database file.
- Machine DSN is a term used to describe DSNs that are present on the local PC, that is, user DSNs or system DSNs.

System DSNs are used by the VM600 CMS Software to ensure that databases are continuously available to all users and can be accessed across a network.

Figure 7-4 shows the basic ODBC components within the CMS Software architecture.

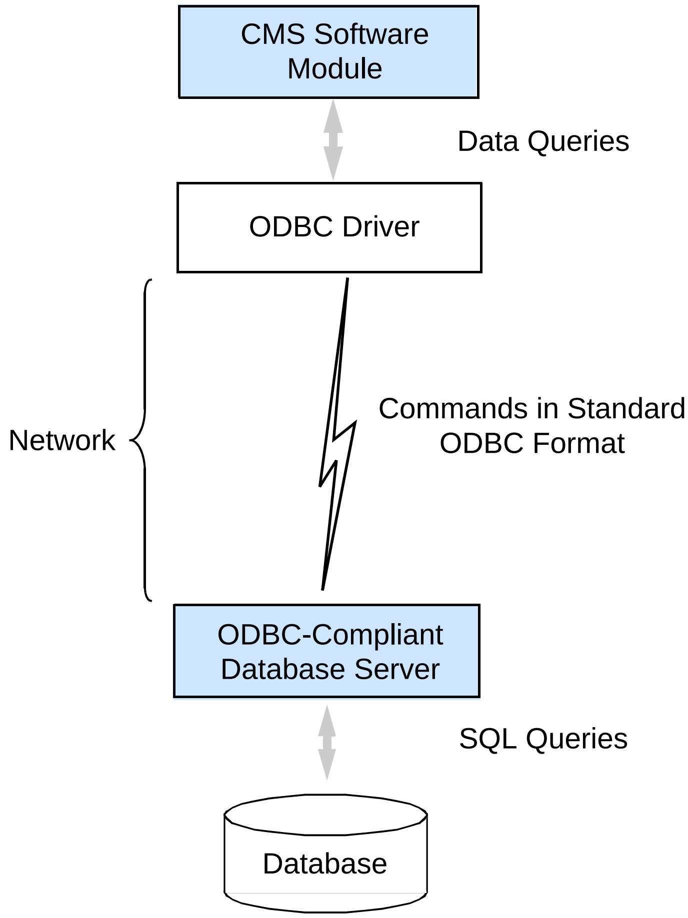


Figure 7-4 : ODBC Database Components

7.2 Structure of CMS Software Databases

Each CMS Software database is logically divided into a number of segments:

- **Configuration Data**. The online portion of the database contains all data relating to the configuration of the VM600 rack or racks, as well as internal CMS Software configuration details such as Mimic documents and security settings. Online configuration data is stored in the database by using the Configuration Editor module.
- **Mimic Documents**. The graphical documents you create with the Mimic application to display the contents of the database are stored within the database itself. These documents can display both online and offline data.

- **Measurement Data**. This part of the database contains both online data, that is, the actual data that has been collected from VM600 rack outputs, and historic data, that is, the data used to construct spectra, trends, waveforms, and orbits.

The “offline” portion of the database contains details of all offline points. These are special database tables in which data collected by external control or monitoring systems, such as turbine control systems, or via specialist communications protocols, such as Modbus or Dynamic Data Exchange (DDE).

The database structure is shown in Figure 7-5:

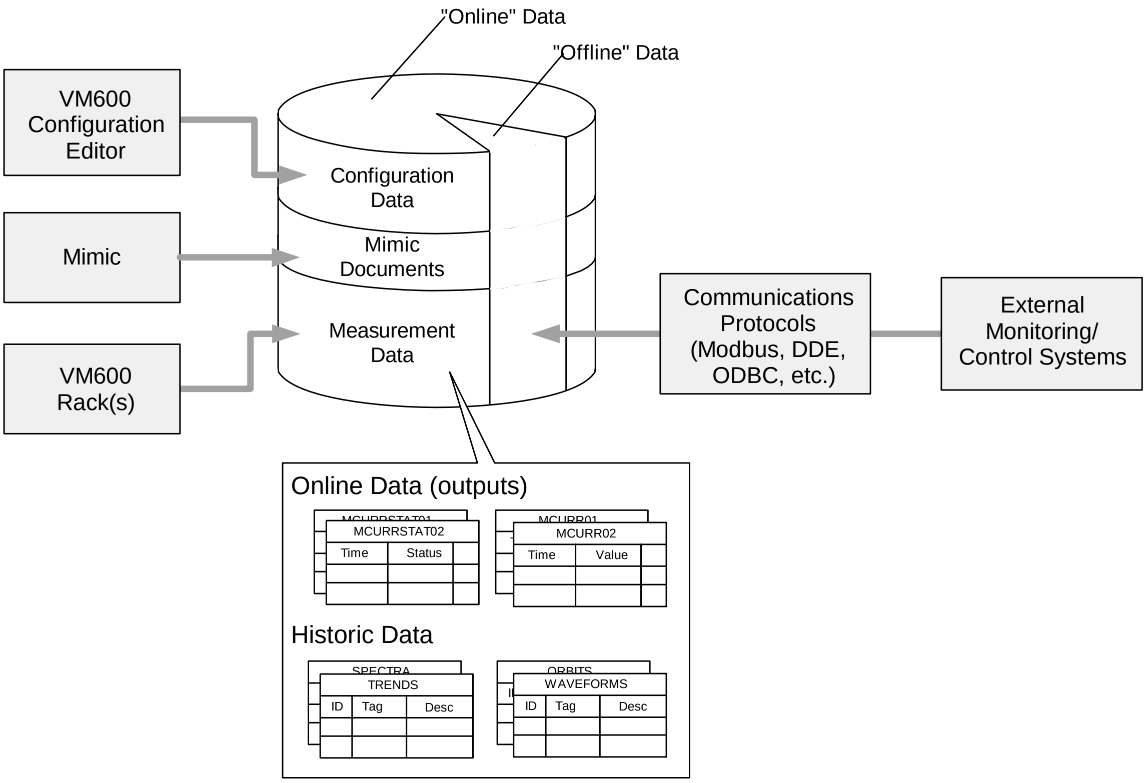


Figure 7-5 : Structure of a VM600 CMS Software Database

7.3 Essential Database Tasks

Creating a database that is ready to begin storing measurement and configuration data involves:

1- Creating a new physical database file. This is the file (typically stored on the database server PC, but it can be located on any PC in the network) in which the data is stored.

A utility is provided with the CMS Software to help you create new database files: refer to 7.3.1 - Creating a Physical Database File.

2- Preparing the internal structure of the database.

The Create database utility also divides a newly-created database file into separate areas to hold configuration data and measurement data, and prepares the internal database structure for use.

3- Setting up the database to accept measurement data. The necessary tasks are described in 7.4.3 - Establishing a Remote Connection from a Client PC without Sybase.

7.3.1 Creating a Physical Database File

Use the **Create** utility to create a new database for use with the VM600 CMS Software. The utility creates the database in three stages:

- Creates the physical database file
- Defines the ODBC data source name of the database server that is to manage the database file (refer to 7.4.3 - Establishing a Remote Connection from a Client PC without Sybase)
- Generates the internal database structure needed to hold VM600 configuration and measurement data for offline points, online points or both.

DATABASE FILES ARE TYPICALLY 1 TO 2 MB IN SIZE WHEN FIRST CREATED. HOWEVER, WHEN LIVE MEASUREMENT DATA IS BEING STORED, THE FILE SIZE CAN GROW QUICKLY AND LARGE DATABASES CAN REACH 5 GB OR MORE IN SIZE.

BEFORE CREATING A DATABASE, BE SURE TO RESERVE SUFFICIENT FREE DISK SPACE FOR IT.

To create a new database:

1- Stop any existing database servers that are currently running on the local PC. Refer to 7.5.4 - Stopping Database Servers for details on how to do this.

2- Start the VM600 Administrator program (**Start > Programs > VM600 CMS Software > Administrator**).

3- Expand the **Database Utilities** icon and double-click **Create**. The Create New VM600 Database window is displayed:

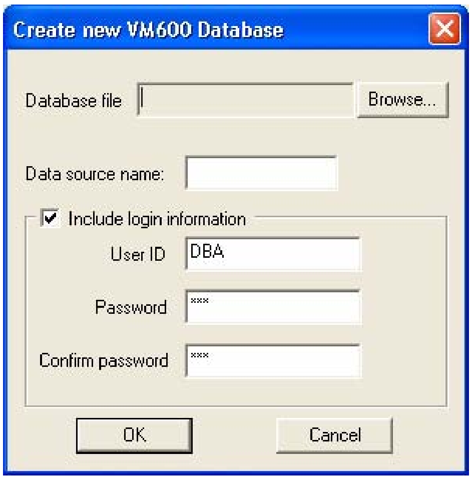


Figure 7-6 : The Create New VM600 Database Window

4- Click **Browse**.

5- Navigate to the folder in which to store the database file and type the name of the file, with a ".db" extension (for example, "cms_sw.db"), and click **Save**.

NOTE : The C:\Program Files\VM600_CMS\DB folder is provided as a default location for databases.

6- Type the ODBC **Data source name** to assign to the database. To simplify name management, it is recommended to use the upper case equivalent of the database file name, minus the extension. For example, if the database file is “cms_sw.db”, type “CMS_SW”, as shown in Figure 7-7:

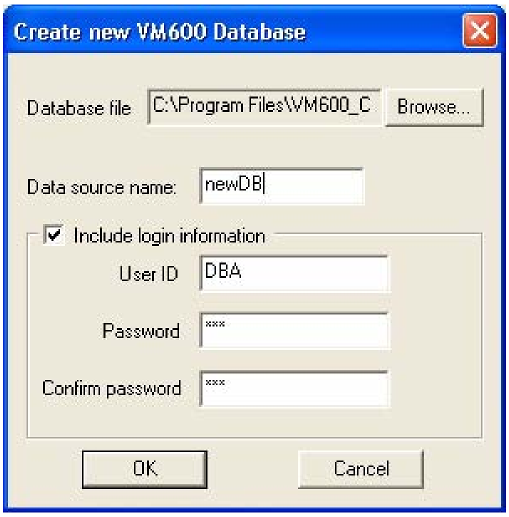


Figure 7-7 : Specifying the DSN

The data source name subsequently appears in the list of available databases in, for example, the VM600 Configuration Editor module.

Refer to 7.4.3 - Establishing a Remote Connection from a Client PC without Sybase below for further information on ODBC data source names.

7- The **Include login information** is selected by default, which means that the user ID and password you specify (see below) will be automatically used on behalf of users whenever they access the database using ODBC. If you deselect this option, users must enter a user ID and password before using any of the CMS Software modules with this database.

8- Specify a **User ID** and **Password** for access to the database. Retype the password as confirmation.

NOTE : The default values proposed are “DBA” for the user ID and “SQL” for the password. You can change the default user ID and password to provide additional security. Refer to 7.5.1 - Controlling Access to the Database Server for details.

9- Click **OK**. The utility creates the physical database file, sets initial security settings and creates default database configuration data.

10- When the “Task finished successfully!” message is displayed, click **OK** to close the Create Database tool.

The new database can now be used to store configuration and measurement data.

7.3.2 Creating a Database Server

For each database you create (see 7.3.1 - Creating a Physical Database File), you must also create a database server to manage communications with the database.

In the following example, a database server named VM600_DB_SERVER is created to manage the physical database file C:\Program Files\VM600_CMS\DB\test.db and allow TCP/IP network connections to the database.

To create a database server:

1- Launch Sybase Central (**Start > Programs > Sybase SQL Anywhere 8 > Sybase Central**)

2- Select **Services**, then double-click **Add Service.**

3- Type a name for the database server (for example “VM600_DB_SERVER”) and click **Next**.

4- Select **Network Database Server** and click **Next**. A network database server is required to support client/server communications across a network.

5- Select the executable program for the database server:

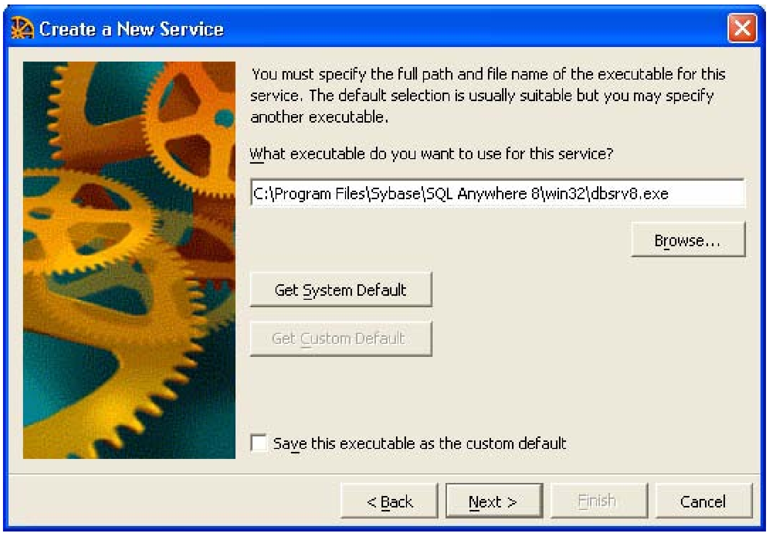


Figure 7-8 : Selecting the Executable for a Database Server

NOTE : Depending on the type of Sybase license used on the computer, either dbeng8.exe or dbsrv8.exe (as shown in Figure 7-8 above) may appear as the name of the executable. You must use dbsrv8.exe. If dbeng8.exe appears, click **Browse** and select the dbsrv8.exe program manually.

6- Specify command-line parameters for the database server and click **Next**. The following parameters are usually sufficient:

-x tcpip	*Add TCP/IP network support for the database server*
***-ch** 32M*	*Use a cache size of 32 MB. See 7.5.3 - Database Server Cache Memory Size Optimization for information on specifying cache sizes*
***-n** VM600_DB_SERVER*	*Name the database server “VM600_DB_SERVER”. This is the name that appears in the list of available database servers in Sybase Central, and as the name of the system service in Windows*
databasename	*The path and file name of the physical database file that is to be managed by the database server, for example, “C:\Program Files\VM600_CMS\DB\server1.db”*

NOTE : If the path or file name of the database contains spaces, you must type quotation marks (“) around the parameter.

For example:

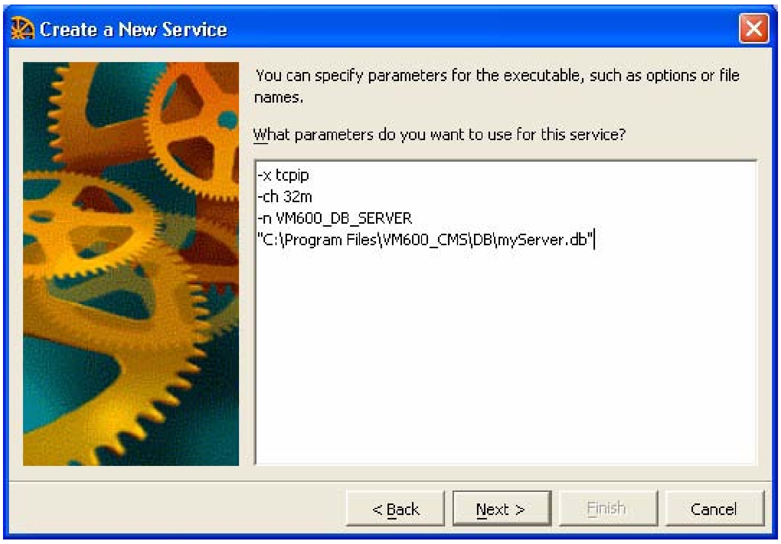


Figure 7-9 : Database Server Command Line Parameters

For a complete list of command-line parameters, refer to the Adaptive Server Anywhere online help (search for “database servers, command line”, for example)

7- Leave the default value **Local System Account** selected and click **Next**.

8- Specify whether the database server is to be started automatically or manually. In most cases, you can leave the default value **Automatic** selected and click **Next**. This means that the database server is started automatically when you next restart Windows.

9- To start the database server immediately, select the **Start the service now** check box. Otherwise, deselect the check box. You must then start the database server manually or automatically during the next system restart. Refer to 7.3.3 - Starting a Database Server.

10- Click **Finish** to create the service.

There are several ways to check that the database server has been created correctly and that it is running:

- Verify that a database server icon  has appeared in the Windows system tray to indicate that the server is running. Double-click the database server icon to display a console window showing information about the service:

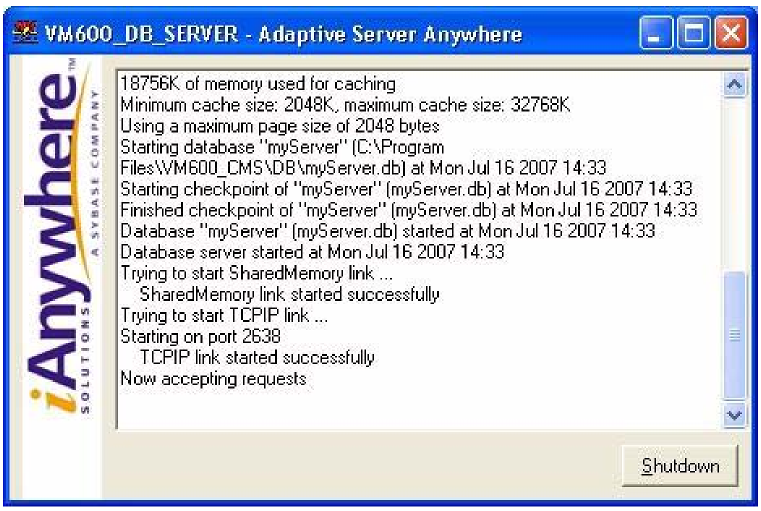


Figure 7-10 : The Database Server Console

- Display the Sybase Central window and click **Services**. The new database server appears in the list on the right, as shown in Figure 7-11:

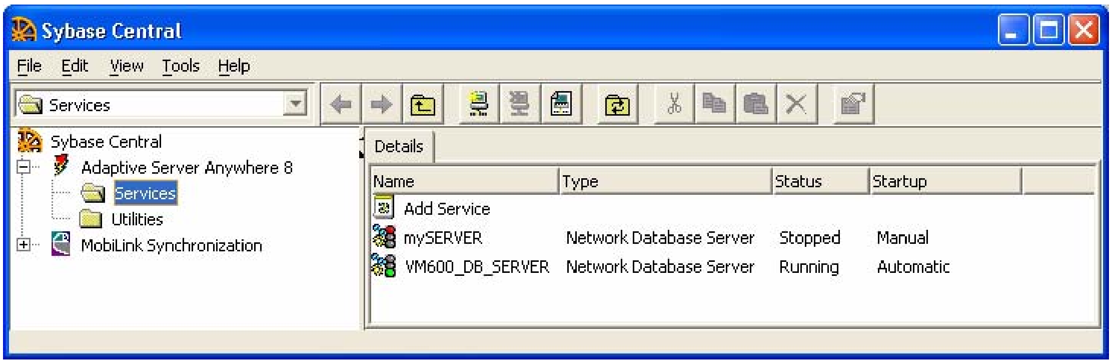


Figure 7-11 : The New Database Server in Sybase Central

- Display the list of Windows system services (**Start > Settings > Control Panel > Administrative Tools > Services**). The text “Adaptive Server Anywhere” appears in front of the database server name, for example:

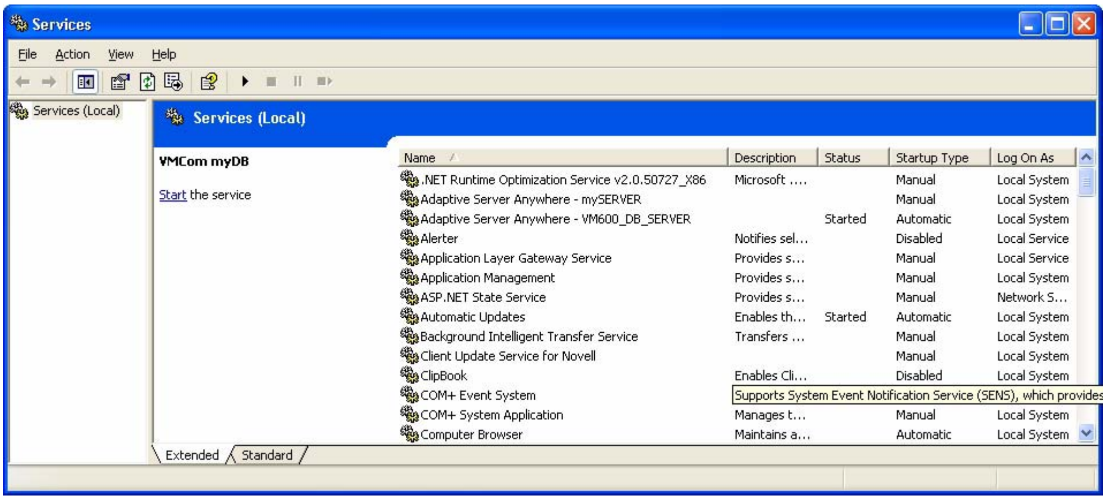


Figure 7-12 : A Database Service in the Services Window

7.3.3 Starting a Database Server

If you did not choose the **Start the service now** option when creating the database server, you can subsequently start the database server either automatically or manually.

7.3.3.1 Automatic Start

If you selected the default **Automatic** setting selected when creating the database server, the database server is configured to run as an automatic Windows service and starts automatically when you next restart Windows.

7.3.3.2 Manual Start

If you selected the **Manual** option, you must force the service to start manually using either Sybase Studio, or directly from the Services window as follows:

1- Display the Services window (**Start > Settings > Control Panel > Administrative Tools > Services**).

2- Right-click on the service name in the list of available services and select **Start**.

Or, in Sybase Central:

1- Start **Sybase Central**.

2- Click **Services**

3- Right-click on the service in the list on the right and select **Start**.

7.4 Next Steps

If the database server and CMS Software are installed on the same PC, you can now proceed to Chapter 8 - Setting Up the VMCom Communications Handler.

If they are installed on different PCs, however, you must now prepare the database server to accept remote connections, and establish a connection to the PC on which the database server is running from the remote operator PC or PCs on which the CMS Software is running, as shown in Figure 7-13:

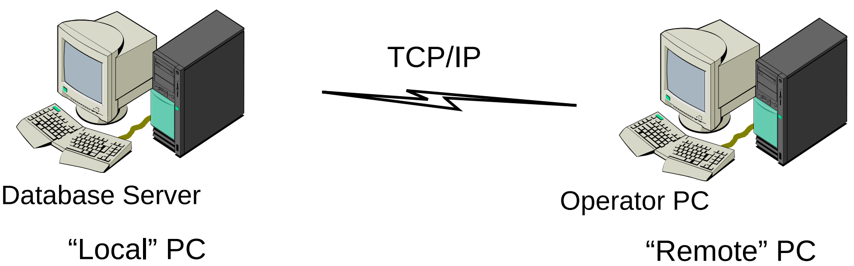


Figure 7-13 : Setting Up a Remote TCP/IP Connection to the Database Server

7.4.1 Preparing the Database Server to Accept Remote Connections

---

NOTE : The following task is only required if your database and the CMS Software modules are installed on different PCs.

To configure a database server to accept remote connections:

1- Verify that a database has been created, the internal structure prepared and a database server exists for the database. Refer to 7.3.1 - Creating a Physical Database File and 7.3.2 - Creating a Database Server, respectively.

2- Determine the TCP/IP address of the local PC. For example, open a Command Prompt window and type **ipconfig**:

```
C:\>ipconfig
Windows 2000 IP Configuration
Ethernet adapter Local Area Connection:
            Connection-specific DNS Suffix  . : vm.lan
            IP Address. . . . . . . . . . . . : 10.10.10.12
            Subnet Mask . . . . . . . . . . . : 255.255.0.0
            Default Gateway . . . . . . . . . : 10.10.1.254
```

In the above example, the TCP/IP address of the local PC is "10.10.10.12". Note down this address.

NOTE : If your network uses DHCP to allocate TCP/IP addresses dynamically, this address is likely to change from one Windows login to the next. In this case, use the host name of the local PC instead. Contact your network administrator if you are unsure of the value to use.

3- Start the ODBC Administrator (for example, with **VM600 Administrator > System Tools > ODBC Administrator**).

4- Select the **System DSN** property sheet.

5- Select the data source to which remote access is to be enabled and click **Configure**.

6- Click the **Database** property sheet and check that the database **Server name** is correct (for example, “VM600_DB_SERVER”) and corresponds to the **Database file** name.

7- Click the **Network** property sheet.

8- Select the **TCP/IP** check box and enter the network protocol options, which must include the host name or address of the local PC that you noted previously. For example:

```
HOST=10.10.10.12;UDP=NO;
```

9- Click the **ODBC** property sheet and click **Test Connection.** A “Connection successful” message is displayed. If the test fails, check that the database server name and TCP/IP address of the local PC are correct.

10- Click **OK**.

The database server is now ready to accept remote connections.

7.4.2 Establishing Remote Connections to the Database Server

NOTE : The following task is only required if your database and the CMS Software modules are installed on different PCs.

Perform the following procedure on the remote PC, that is, the PC on which the CMS Software is installed and from where you wish to connect to a database server on a different PC (see Figure 7-13).

1- First, test the network connection to the remote PC:

a. Open a Command Prompt window on the remote PC.

b. Type **ping** *ipaddress*, where *ipaddress* is the TCP/IP address or host name of the PC running the database server. For example:

```
C:\>ping 10.10.10.12
        Pinging 10.10.10.12 with 32 bytes of data:

        Reply from 10.10.10.12: bytes=32 time<10ms TTL=128
        Reply from 10.10.10.12: bytes=32 time<10ms TTL=128
        Reply from 10.10.10.12: bytes=32 time<10ms TTL=128
        Reply from 10.10.10.12: bytes=32 time<10ms TTL=128

        Ping statistics for 10.10.10.12:
          Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
        Approximate round trip times in milli-seconds:
          Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

If the remote PC cannot be reached using the **ping** command, contact your network administrator.

2- Start the ODBC Administrator (for example, with **VM600 Administrator > System > Administration Tools > ODBC Administrator**).

3- Select the **System DSN** property sheet.

4- Click **Add.**

5- Select the **Adaptive Server Anywhere 8.0** ODBC driver, and click **Finish**:

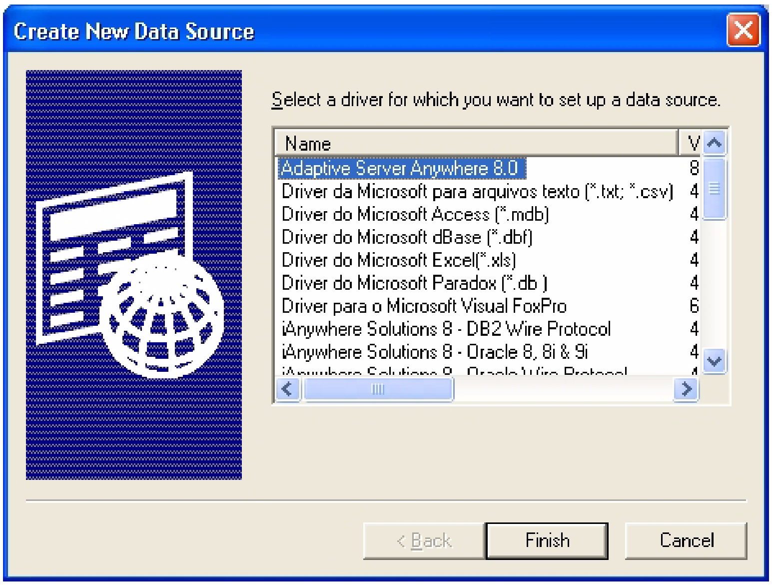


Figure 7-14 : Creating a New Data Source Name

6- On the ODBC Configuration window that appears, type a **Data source name**. This is a system DSN that will be created on the local PC to identify the database server on the remote PC, for example, “REMOTE_VM600_DB”.

7- Optionally, type a **Description**, for example “System DSN for remote CMS database”.

8- Select the **Login** property sheet and enter a valid **User ID** and **Password** to connect to the database (the default values are “DBA” for the user ID and “SQL” for the password).

9- Select the **Database** property sheet.

10- Type the **Server Name** of the remote database server, for example VM600_DB_SERVER.

11- Type the **Database Name** of the database you wish to access using the database server (this is important if the database server is managing several databases):

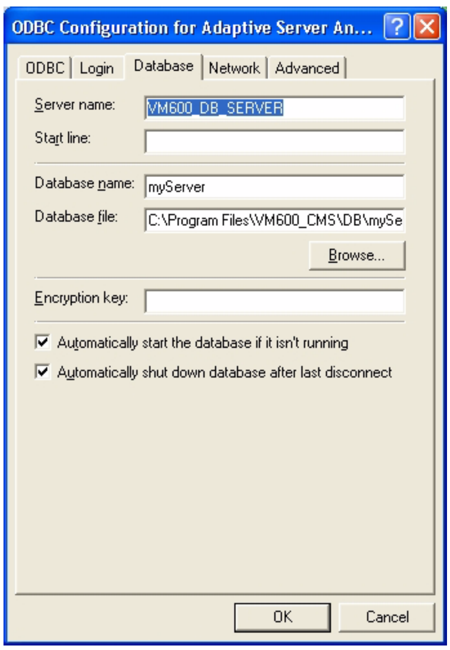


Figure 7-15 : Configuring ODBC Database Settings

12- Click the **Network** property sheet.

13- Select the **TCP/IP** check box and enter the TCP/IP address of the remote PC. For example:

HOST=ipaddress;	*Where ipaddress is the TCP/IP address of the PC on which the database server is running, for example "10.10.10.12".*
UDP=NO;	*Connections to the PC do not use the User Datagram Protocol (UDP). Use of UDP is optional: it can improve data transfer times between Windows PCs.*

NOTE : If your network uses DHCP to allocate TCP/IP addresses dynamically, this address is likely to change from login to login. In this case, use the host name of the local PC instead. Contact your network administrator if you are unsure of the value to use.

14- Click the **ODBC** property sheet.

15- Click **Test Connection.** A "Connection successful" message is displayed:

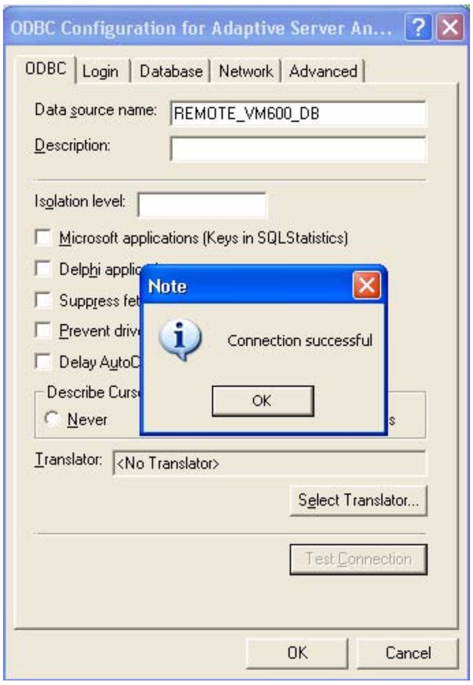


Figure 7-16 : Testing the ODBC Connection

16- Click **OK** to complete creating the remote ODBC link.

If the test fails, check that the database server name and TCP/IP address of the remote PC are correct.

To test the connection from a CMS Software module, launch the module and attempt to access the database server identified by the DSN name you assigned in Step 6 above, for example "REMOTE_VM600_DB". The following figure shows a list of available databases in the VM600 Configuration Editor module:

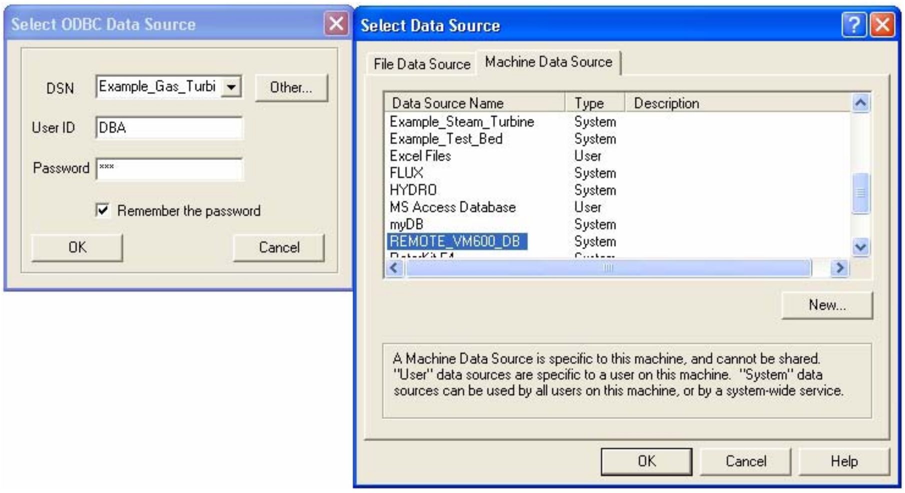


Figure 7-17 : A Remote Database in the List of ODBC Sources

7.4.3 Establishing a Remote Connection from a Client PC without Sybase

You can remotely access a database server from a client PC that does not have the Adaptive Server Anywhere software installed on it.

To prepare the server:

1- Test the network connection between the server and the client PC using the **ping** command.

2- Start the network database server program on the server, and load the correct database.

3- Be sure to allocate an adequate number of client licenses when installing the Adaptive Server Anywhere software (see 4.1.1 - Installing Adaptive Server Anywhere Database Software)

To install and configure the client PC:

1- Install the CMS Software programs on the client PC, as described in Chapter 4 - Installing CMS Software, but do not install the Adaptive Server Anywhere database software.

2- Locate the following ODBC driver files on the server (by default, C:\Program Files\Sybase\SQL Anywhere 8\win32):

- **dbodbc8.dll**
- **dblgen8.dll**
- **dbcon8.dll**

Copy the files to the **C:\Windows\System32** directory on the client PC.

3- Register the ODBC driver as follows:

- Open a Windows command prompt.
- Change directory to **C\Windows\System32**
- Type **regsvr32 dbodbc32.dll**

4- Run the ODBC Administrator program (**odbcad32.exe**).

5- Select the data source in the list and click **Configure**.

6- Select the **Network** property sheet.

7- Select the TCP/IP check box and type HOST=*ip_address*, where *ip_address* is the TCP/IP address of the server.

8- Click **OK**.

9- Connect directly to a database file (single access) or to a Sybase database server (for multiple TCP/IP access).

7.5 Managing Database Servers

7.5.1 Controlling Access to the Database Server

The information needed to establish a connection between an ODBC-compliant client application (that is, a CMS Software module) and an ODBC data source (that is, a database server) is managed by a Windows program called the **ODBC Administrator**. Use ODBC Administrator to identify the data source to use, manage the available ODBC drivers, and configure security parameters for ODBC connections.

7.5.1.1 Starting ODBC Administrator

To start the ODBC Administrator:

1- Start **VM600 Administrator**.

2- Expand the **System Tools** icon and double-click **ODBC Administrator**.

3- The ODBC Data Source Administrator window is displayed:

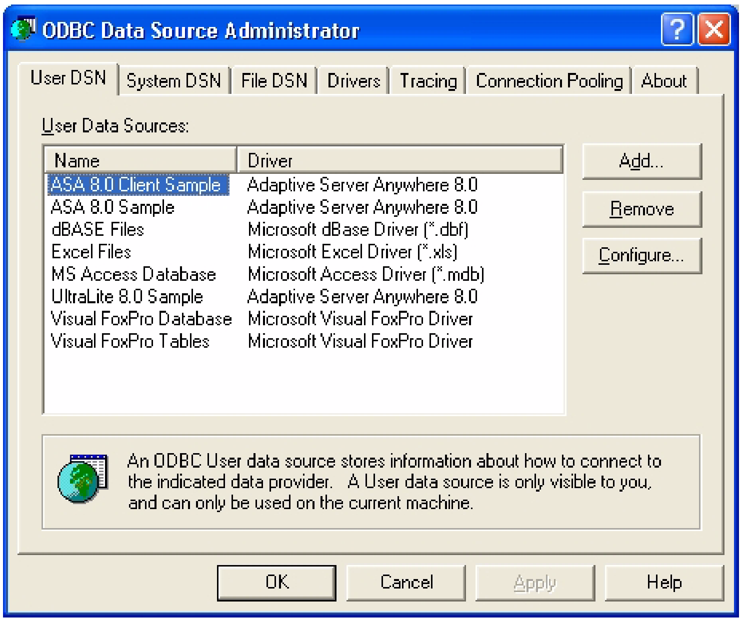


Figure 7-18 : The ODBC Administrator Window

NOTE : You can also access the ODBC Administrator window via the VM600 Administrator module. See Chapter 6 - Using the VM600 Administrator.

7.5.1.2 Entering the User ID and Password to Access a Database Server

When you start any of the CMS Software modules, the module's ODBC driver must be able to connect to the chosen data source. To do this, it must provide the following parameters:

- The ODBC data source name (DSN)
- The User ID (UID) of the ODBC connection
- The Password (PWD) associated with the user ID.

If, when creating the database, you chose to allow CMS Software modules to automatically reuse the ODBC user ID and password (refer to 7.3.1 - Creating a Physical Database File), starting any of the CMS Software modules does not require a user ID and password to be entered.

Otherwise, if you do not select automatic reuse, the following window is displayed whenever you start any of the CMS Software modules:

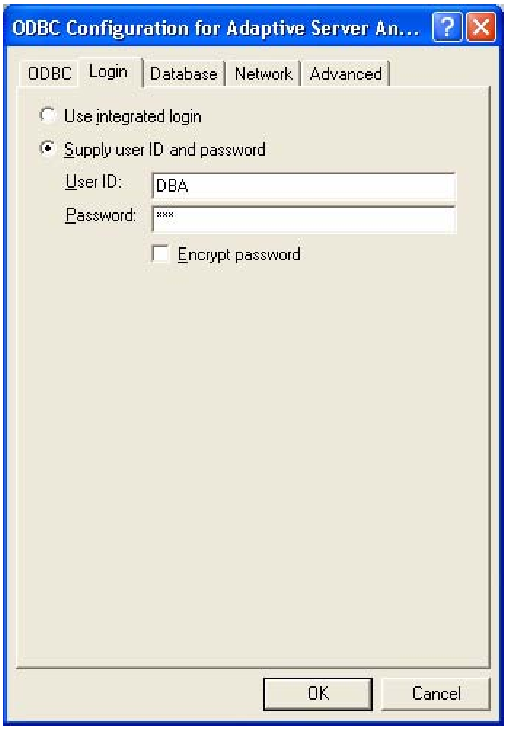


Figure 7-19 : Connecting to a CMS Software Module

You must type a valid user ID and password to access the data source. Adaptive Server Anywhere uses the following default values:

- User ID: **DBA**
- Password: **SQL**

NOTE : Both the user ID and password are case-sensitive.

Additional user IDs can be created using Sybase Central. See Logging On With a Different User ID and Password below for details.

7.5.1.3 Logging On with a Password Only

Using the ODBC Administrator program, you can force users to enter only a password when accessing a database:

1- Start the ODBC Administrator program.

2- Click the **System DSN** property sheet.

3- Select the DSN of the database from the list and click **Configure**.

4- Click the **Login** property sheet.

5- Delete the **Password**.

6- Click **OK** twice.

At the next login, the **User ID** field contains the default user ID “DBA”, but the password field is empty and must be typed by the user before access to the data source is granted:

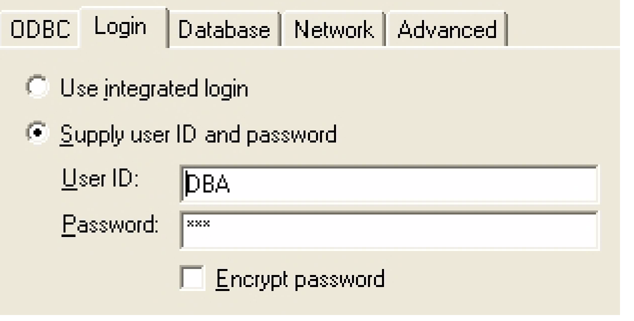


Figure 7-20 : Prompting for a Password Only

7.5.1.4 Logging On With a Different User ID and Password

To modify both the default user ID and password to use for the ODBC connection to a database:

1- Start Sybase Central.

2- Connect to the database and create a new user. Specify the user ID and password and configure the user account’s permissions and properties as required.

Refer to Sybase Central’s online help for details.

At the next login, the user must enter both the user ID and password to access the database.

7.5.2 Modifying Database Server Command Line Parameters

To subsequently modify any of the command line parameters or startup options of a database server, use Sybase Central. For example, you may later wish to add another database to the service so that the database server manages several databases, or to change the name of the current working database.

To modify the parameters of a database server:

1- Stop the database server, from either the Services window or Sybase Central. See 7.6.5 - Updating Databases from Previous Releases of the CMS Software.

2- In Sybase Central, click **Services**.

3- Right-click on the database server and choose **Properties**.

4- Select the **Configuration** property sheet.

5- Change the parameters as required, then click **OK**.

6- Restart the database server.

7.5.3 Database Server Cache Memory Size Optimization

You can configure a database server to use cache memory in which to store frequently accessed database data. Since accessing cache memory is much faster than accessing a hard disk, the use of cache memory can improve database performance significantly. The larger the cache, the more pages are accessible in the cache, the fewer times the database server needs to read data from disk, and so the bigger the performance improvement.

In Adaptive Server Anywhere, the following database server parameters are used to determine the cache memory size:

-c	*Sets the initial memory reserved for caching database pages and other server information. The default value is 2M (2MB).*
-ch	*Sets a maximum cache size, as a limit to automatic cache growth.*

Use the information in Table 7-1 to determine the initial recommended cache memory size:

Table 7-1 : Recommended Initial Cache Memory Settings

Number of VM600 Racks	-c	-ch
1	32M	64M
2	32M	64M
3	64M	128M
4	64M	128M

An additional constraint is that the cache memory size should occupy no more than 25% of the total amount of random access memory (RAM) installed on the PC, and never more than 50%.

For example, if the PC has 512MB of RAM, the cache memory setting should be 128MB. For a 4-rack system, therefore, use:

-c 64M -ch 128M

7.5.4 Stopping Database Servers

You can stop a database server from Windows, Sybase Central or the database server console window.

To stop a database server from the Windows Services window:

1- Display the Services window (directly from the VM600 Administration utility, or choose **Start > Settings > Control Panel > Administrative Tools > Services).**

2- Right-click on the service and select **Stop**.

To stop a database server from Sybase Central:

1- Start **Sybase Central**.

2- Click **Services.**

3- Right-click on the service in the list on the right and select **Stop**.

To stop a database server from the database server console:

1- Double-click the database server icon  in the Windows system tray to display the console window (as shown in Figure 7-10).

2- Click **Shutdown**.

7.5.5 Deleting Database Servers

NOTE : You cannot delete a database server directly from the Windows Services window.

To delete a service:

1- Open Sybase Central > Adaptive Server Anywhere 8 > Services

2- Check that the service is not running - if it is stop it. Open the pop-up menu with a right mouse click on the service and click the left button to stop the service

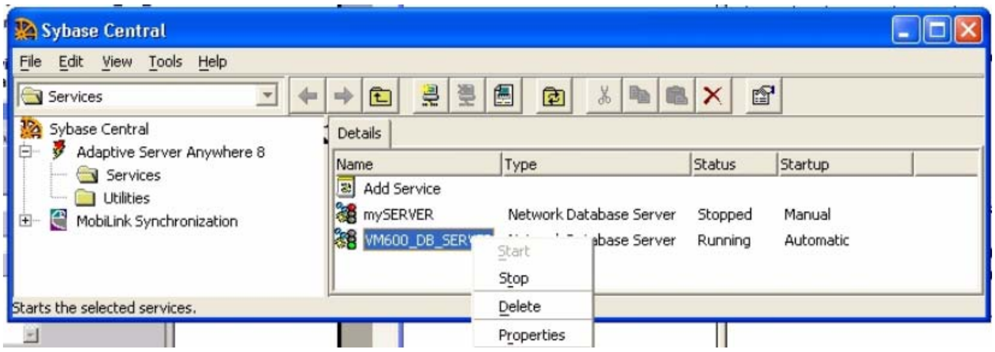


Figure 7-21 : Deleting a Service

3- Right click on the service and select delete from the pop-up menu

4- Close Sybase

5- Click **Exit**.

6- Shut down and restart Windows.

The service is removed from the list of available services. This can be checked in the Services window (**Start > Settings > Control Panel > Administrative Tools > Services**).

7.6 Managing Databases

7.6.1 Database Monitoring

VMCom automatically monitors the size of the database and the log file.

VMCom maintains log files in the C:\Program Files\VM600_CMS\Projects directory. This log file contains:

- A timestamped entry whenever a predetermined increase in database size occurs.
- An entry to report an automatic purge of a database or log file after it has reached a predetermined size.

You can use this log file to predict database growth and determine a sensible backup strategy using:

- The VMCom DELETE parameter.
- Performing a database copy into a backup directory.

Figure 7-22 shows an extract from a log file:

myDB_2007-07-16.log - Notepad

File Edit Format View Help

```
*** START UP VMCom Database Size Management Info ******************************************************
Start time                :     2007-07-16 14:57:20
DB Server's computer name :     PCXP05102-01443
DB file name              :     C:\Program Files\VM600_CMS\DB\my.db
DB log file name          :     ?
DB grow size              :     10 MB
DB log file size limit    :     100 MB
Disk minimum space        :     150 MB
Disk minimum percent      :     3 %
*******************************************************************************************************

        2007-07-16 14:57:28     DB file size :    150    MB      DB Log file size :        78    MB

        2007-07-16 15:12:35     DB file size :    150    MB      DB Log file size :        88    MB

        2007-07-16 15:38:13     DB file size :    160    MB      DB Log file size :        88    MB

        2007-07-16 15:53:21     DB file size :    160    MB      DB Log file size :        98    MB

        2007-07-16 16:00:43     DB file size :    160    MB      DB Log file size :       100    MB

*** DB log file Truncate Info *************************************************************************
        2007-07-16 16:01:16     DB log file was truncated successfully
*******************************************************************************************************

        2007-07-16 16:14:12     DB file size :    170    MB      DB Log file size :         0    MB

        2007-07-16 16:42:12     DB file size :    170    MB      DB Log file size :        10    MB

*** STOP VMCom Database Size Management Info *********************************************************
Stop time                 :     2007-02-02 16:52:25
*******************************************************************************************************
```

Figure 7-22 : A Database Log File

7.6.2 Using the Database Maintenance Tool

The Database Maintenance Tool checks the presence and integrity of CMS Software databases on your system. It allows you to access all relevant information concerning an ODBC data source, including its name, the presence and type of the database files (*.db and *.log), and the presence and name of the respective database engine. This information provides a quick overview of where the database files are physically stored, by which database engine they are being deployed as data sources, and with which name.

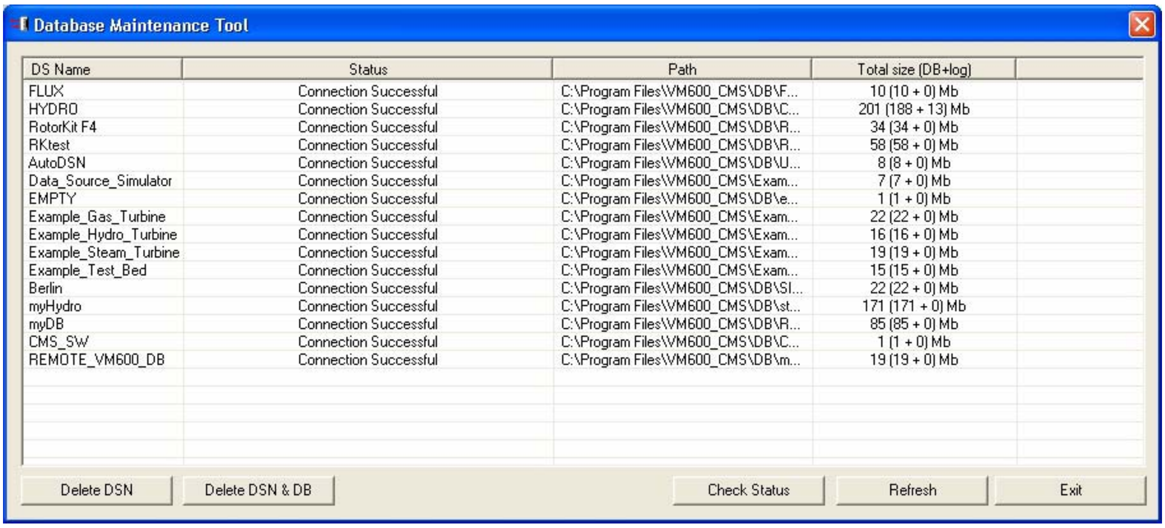
To begin database maintenance:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Database Maintenance Tool**. The Database Maintenance Tool window is displayed:

When the utility starts up, it lists all system DSNs existing on the local machine, with the **Status** column showing “???”.

Click **Check Status** to force the utility to attempt to connect to all the listed databases and display the result of the connection attempt:



DS Name	Status	Path	Total size (DB+log)
FLUX	Connection Successful	C:\Program Files\VM600_CMS\DB\F...	10 (10 + 0) Mb
HYDRO	Connection Successful	C:\Program Files\VM600_CMS\DB\C...	201 (188 + 13) Mb
RotorKit F4	Connection Successful	C:\Program Files\VM600_CMS\DB\R...	34 (34 + 0) Mb
RKtest	Connection Successful	C:\Program Files\VM600_CMS\DB\R...	58 (58 + 0) Mb
AutoDSN	Connection Successful	C:\Program Files\VM600_CMS\DB\U...	8 (8 + 0) Mb
Data_Source_Simulator	Connection Successful	C:\Program Files\VM600_CMS\Exam...	7 (7 + 0) Mb
EMPTY	Connection Successful	C:\Program Files\VM600_CMS\DB\e...	1 (1 + 0) Mb
Example_Gas_Turbine	Connection Successful	C:\Program Files\VM600_CMS\Exam...	22 (22 + 0) Mb
Example_Hydro_Turbine	Connection Successful	C:\Program Files\VM600_CMS\Exam...	16 (16 + 0) Mb
Example_Steam_Turbine	Connection Successful	C:\Program Files\VM600_CMS\Exam...	19 (19 + 0) Mb
Example_Test_Bed	Connection Successful	C:\Program Files\VM600_CMS\Exam...	15 (15 + 0) Mb
Berlin	Connection Successful	C:\Program Files\VM600_CMS\DB\SI...	22 (22 + 0) Mb
myHydro	Connection Successful	C:\Program Files\VM600_CMS\DB\st...	171 (171 + 0) Mb
myDB	Connection Successful	C:\Program Files\VM600_CMS\DB\R...	85 (85 + 0) Mb
CMS_SW	Connection Successful	C:\Program Files\VM600_CMS\DB\C...	1 (1 + 0) Mb
REMOTE_VM600_DB	Connection Successful	C:\Program Files\VM600_CMS\DB\m...	19 (19 + 0) Mb

Figure 7-23 : The Database Maintenance Utility

A “Connection successful” message indicates that a connection is possible. Other messages may indicate that the utility is unable to connect to the database. Refer to Appendix A - Troubleshooting and Frequently Asked Questions for more information.

The **Path** column gives the location of physical database files.

The **Total Size** column gives the total size of databases, in megabytes (MB). The size is shown as:

Total Size (**Database Size** + **Transaction Log File Size**) **MB**

For example:

```
14(14+0) MB
```

You can perform the following database maintenance tasks:

- To delete a database’s system DSN (but leave the corresponding physical database file untouched):
  a. Select a database from the list
  b. Click **Delete DSN**.
- To delete both the database’s system DSN and the corresponding physical database file:
  a. Select a database
  b. Click **Delete DSN & DB**.
  c. A window appears warning you that the entire contents of the database will be deleted and cannot be recovered. Click **OK** to continue, or **Cancel** to abandon the operation.

Click **Refresh** to update the display.

Click **Exit** to quit the tool.

7.6.3 Creating a “Snapshot” Copy of a Database

A database utility is provided to copy measurement data from one (source) database to a second (target) database. This creates an instant “snapshot” of the data contained in a database. You can select the time frame for which you want to collect the data into your snapshot. For example, you can create snapshot databases of all measurement data collected on certain days, merge the snapshot databases into a single composite database, then delete the last “x” days’ data from the main data collection database, as shown in the figure below. Baseline Data will not be copied into the Snapshot (neither the BL table nor the associated datasets).

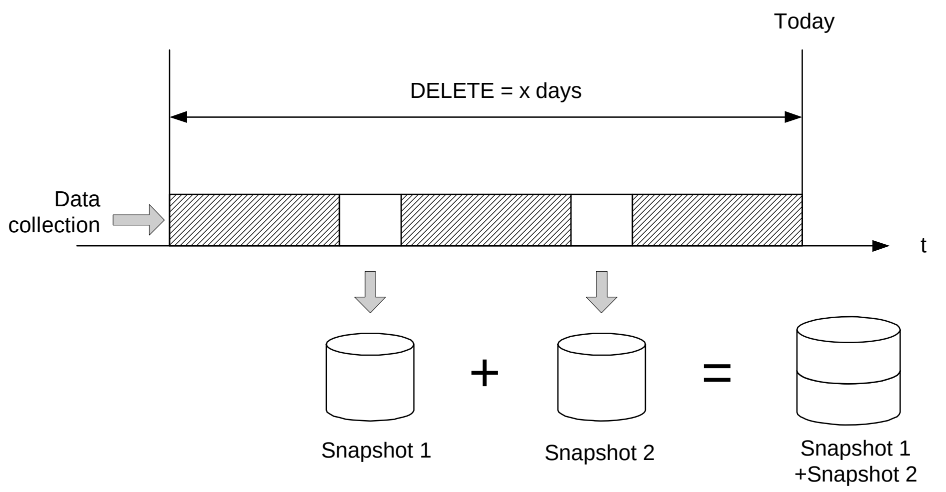


Figure 7-24 : Creating Snapshot Copies of a Database

Refer to 7.2 - Structure of CMS Software Databases for an overview of the database structure.

NOTE : To copy configuration data from one database to another, use the **Advanced Copy** database utility instead. See 7.6.4 - Advanced Database Copying below.

To create a “snapshot” database:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Snapshot Copy**. The Snapshot Copy window is displayed:

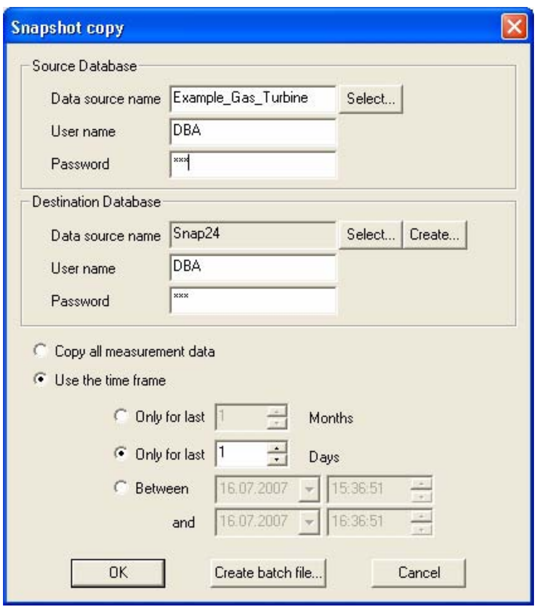


Figure 7-25 : The Snapshot Copy Window

3- Type the system DSN or click **Select** and choose the database to copy the measurement data from.

4- Enter a valid **User name** and **Password** for the database.

5- Click **Select** to choose the destination database. Click **Create** to create a new database in which to store the data.

6- Enter a valid **User name** and **Password** for the target database.

7- Choose whether to copy all measurement data, or only data collected over a specified period of time, such as the past 1 month or 3 days.

8- Click **OK** to begin the copy immediately.

9- Alternatively, click **Create batch file** to generate a Windows command file (*.bat) containing the instructions required to carry out the snapshot copy. Examples of batch file use are given in the next section.

The Consistency check is also affected when copying databases using:

1- Snapshot Copy: check runs on source database (before copy process) and destination database (after copy)

2- Advanced Copy: check additionally runs on source database and destination database (before copy process) and again on the destination database (after copy process).

If these checks are passed without exceptions, these procedures run silently in the background. A one-line summary is added to the copy.log (Figure 7-26).

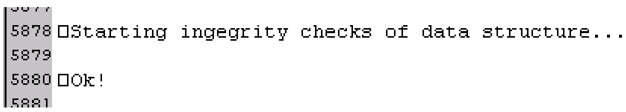


Figure 7-26 : Copy.log After Copying a Database

7.6.3.1 Creating Snapshot Batch Files

The **Create batch file** button on the Snapshot copy window generates a batch file containing the instructions necessary to create a snapshot copy of a database.

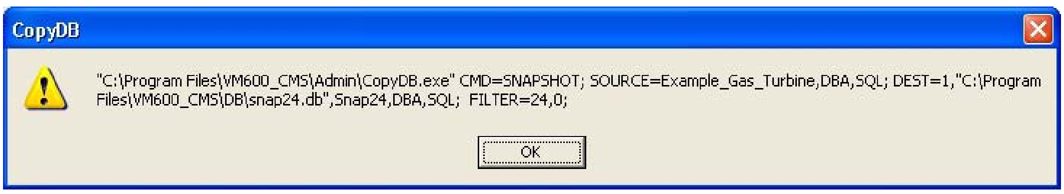


Figure 7-27 : CopyDB.bat After Creating a Snapshot

The following is an example of a generated batch file:

```
# SNAPSHOT COPY BATCH FILE
# MODIFY DIRECTLY AT YOUR OWN RISK!
"C:\Program Files\VM600_CMS\Admin\CopyDB.exe" CMD=SNAPSHOT;
  SOURCE=SAMPLE,DBA,SQL; DEST=0,ANOTHER,DBA,SQL;  FILTER=743,0;
```

You can use the batch files, for example, to create snapshot databases containing all data generated today, or during the past 24 hours. You can set up Windows to run the batch files automatically, for example, at specific times of the day.

7.6.3.2 Merging Snapshot Files

When you have created several snapshot databases, you can use the Snapshot Copy utility to copy the measurement data from one snapshot database to another. To do this:

1- Run the Snapshot Copy utility.

2- On the Snapshot Copy window, select the most recent snapshot database you created as the **Source Database** and the earlier-created database as the **Destination Database**.

3- Choose **Copy All Measurement Data**.

4- Click **OK**.

The measurement data from the older snapshot database is copied to the newer database. Progress, warning and error messages are written to a status window. An example is shown in Figure 7-28:

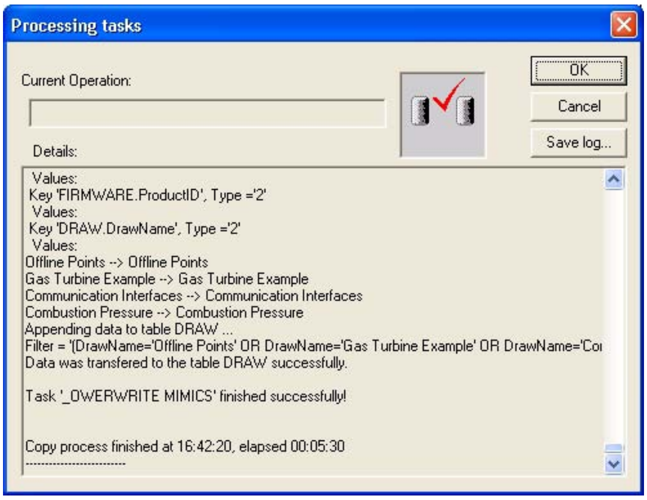


Figure 7-28 : Copying Snapshot Databases

7.6.3.3 Scheduled Task Snapshot Merge

This merge program copies all measurement data from the source database into the destination database. After running a daily 24 hour Snapshot copy as a backup, the following command can be used to automatically amend the data slice to another database (i.e. large backup) of the same configuration. Data already existing in the destination database will not be re-copied. Due to a configuration check, the process is interrupted before copying the data if configuration changes have been made.

To amend the merge to an existing backup procedure:

1- Open the existing snapshot.bat file created in 7.6.3.1- Creating Snapshot Batch Files

2- Add the new command line replacing the following with your settings (see Figure 7-29)

"C:\Program Files\VM600_CMS\Admin\copydb.exe" CMD=DATA_MERGE;

Source=<dsn>,<uid>,<pwd>;DEST=<dsn>,<uid>,<pwd>;

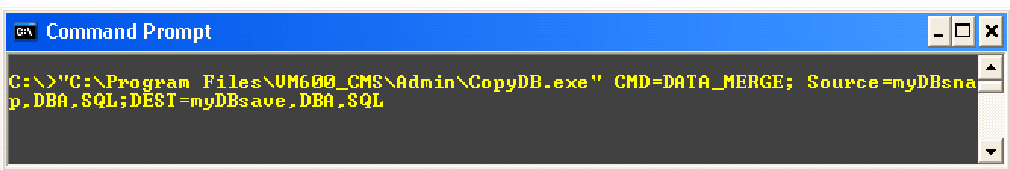


Figure 7-29 : Adding a New Command Line to the snapshot.bat File

To create a new scheduled task

1- Choose **Start > Settings > Control Panel** and double-click **Scheduled Task**.

2- Double-click **Add scheduled task**.

3- Click **Next**.

4- Click **Browse**.

5- Select the executable program **copyDB.exe**

(e.g. C:\Program Files\VM600_CMS\Admin\copydb.exe) and click **Open**.

6- Select the frequency at which the backup is to be performed, e.g. "Daily".

7- Click **Next**.

8- Select the time, frequency and start date for the backup and click **Next**. Before starting the data merge ensure that the copy of the backup slice from the running database has finished.

9- Enter the name and password of the Windows user account that is to run the scheduled task.

10- Select **Open advanced properties for this task** and click **Finish**. The advanced properties window for the **CopyDB** program will be displayed (Figure 7-30).

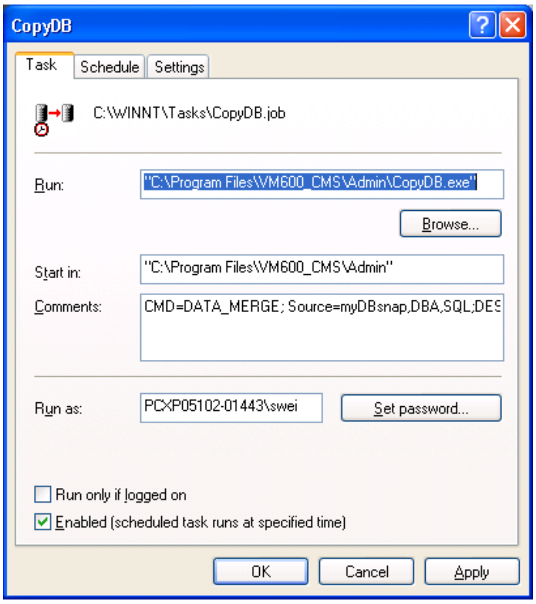


Figure 7-30 : Advanced Properties for Database Merge

7.6.4 Advanced Database Copying

A utility is provided to copy the complete or partial contents of one (source) database to another (target) database. You can choose to copy measurement data, configuration data, or both. Refer to 7.2 - Structure of CMS Software Databases for an overview of the database structure.

NOTE : To copy measurement data from one database to another, consider using the Snapshot Copy utility instead. See 7.6 - Managing Databases.

To copy a database:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Advanced Copy**. The Select Source DSN window is displayed:

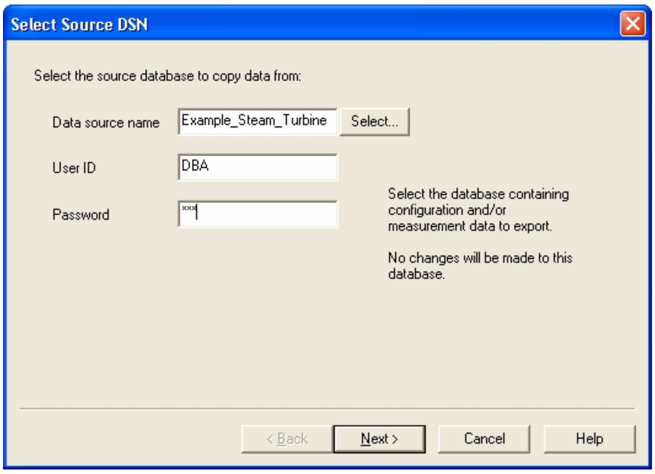


Figure 7-31 : The Select Source DSN Window

3- Click **Select**.

4- On the Select Data Source window, select the **Machine Data Source** property sheet, choose the data source name of the source database (that is, the database that is to be copied) and click **OK**.

NOTE : The database to be copied must not currently be in use by the CMS Software.

5- Type the ODBC **User ID** and **Password** for the ODBC connection to the source database. By default, the user name is “DBA” and the password “SQL”.

6- Click **Next**. The Select Target DSN window is displayed:

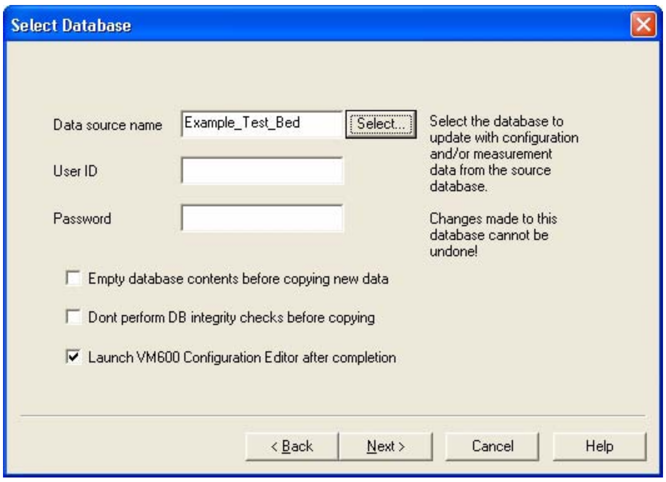


Figure 7-32 : The Select Target DSN Window

7- Repeat steps 3 to 6 to select and log in to the target database.

8- Optionally, select any of the following options:

- Delete the contents of the target database first, then copy the source database contents.
- Do not carry out a check that all database tables and columns that exist in the source database also exist in the target database before starting the copy. It is not recommended to skip this check.

- Automatically launch the VM600 Configuration Editor module when copying is complete.

9- Click **Next**. You are prompted to provide a Super user password for the destination database:

Figure 7-33 : The Privilege Level Window

Type a valid password and click **OK** to continue.

10- The Copying Options window is displayed:

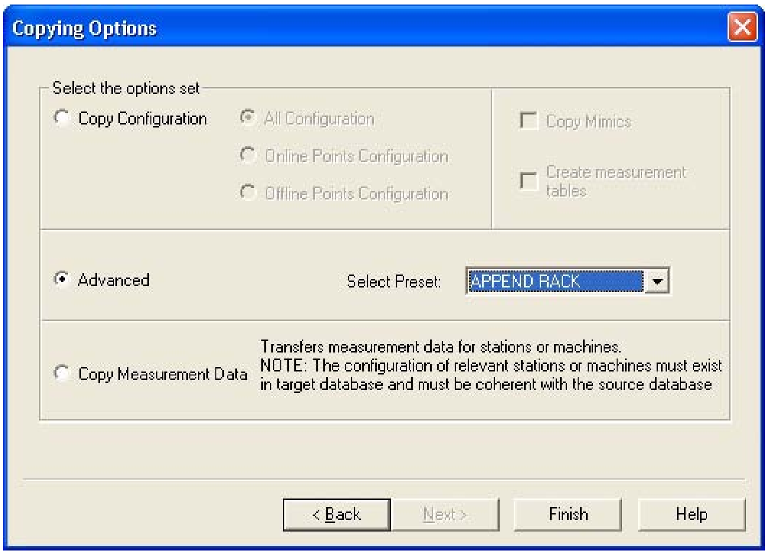


Figure 7-34 : The Copying Options Window

11- Select one of the following options:

- **Copy Configuration**. Copy configuration data only from the source database to the target database. You can choose to copy configuration data for online points only, offline points only, or both. In addition, you can choose to copy all Mimic documents stored in the database, and to automatically create any measurement tables that exist in the source database but are missing from the target database.
- **Advanced.** Select one of the options listed in Table 7-2 below.

Table 7-2 : Advanced Database Functions

Advanced Functions	Description
APPEND RACK	*Adds a complete VM600 rack, including all cards, points and associated outputs to the target database.*
APPEND STATION	*Adds a complete Station, including all attached machines, racks, points, and outputs to the target database.*
APPEND MIMICS	*Adds selected Mimic documents to the target database.*
EMPTY DB	*Clear the target database of its entire contents.*
UPDATE DB	*Update the target database to match the structure and contents of the source database.*
APPEND ALL	*Append the entire contents of the source database to the target database.*
ONLINE CONFIGURATION	*Copy all configuration data from online data points to the target database.*

- **Copy Measurement Data.** Copy configuration data only from the source database to the target database.

12- Click **Finish** to begin copying.

Depending on the type of operation performed, wizards are provided to guide you through various questions that are important for the consistency of the new system architecture, such as station, machine and point name associations. For example, the following window might appear to allow you to select points in the source database from which to copy measurement data:

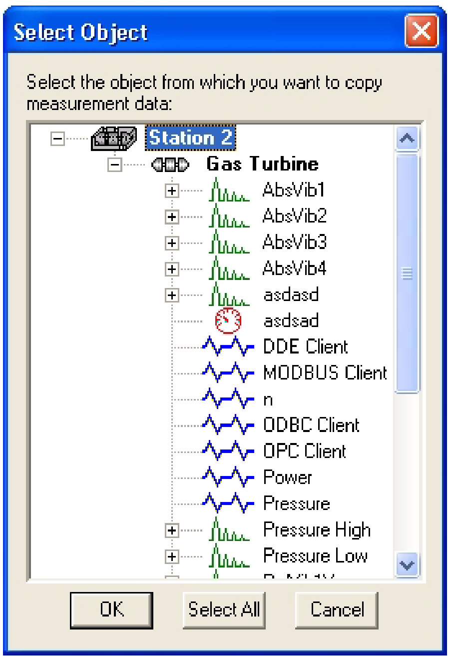


Figure 7-35 : Selecting Points to Copy in the Source Database

Source and target database table and column names at the same hierarchical level must be unique. More explicitly, the following constraints apply:

- All Station names within the same database must be unique.
- All Machine names within the same station must be unique.
- All Point tag names associated with the same machine must be unique
- All output Tag names associated with the same point must be unique.

NOTE : Measurement data can only be copied from one machine to another if their configurations are identical, that is, the same number and type of points, outputs, cards, channels used, tags).

Using this utility, it is possible to use the same database as both source and target DSN, which allows you to very efficiently build up large systems that consist of many identical machines or stations. The advanced options then allow you to rapidly duplicate portions of a configuration (racks, machines, stations) with minimum effort. This functionality also allows you to prepare "template configurations" for particular machines, or parts of machinery, from which real system configurations can then be assembled.

7.6.5 Updating Databases from Previous Releases of the CMS Software

The internal structure of CMS Software databases can differ from one release to the next. A utility is therefore provided to automatically update the internal structure of a database created with an earlier release of the CMS Software to the structure required by the currently installed release.

To upgrade a database to the latest release:

1- If it is not already running, start the VM600 Administrator program.

2- Expand the **Database Utilities** icon and double-click **Update Internal Database Structure**. The window shown in Figure 7-36 is displayed:

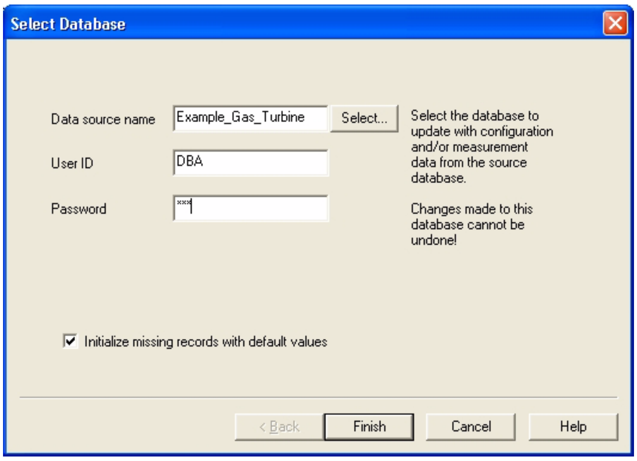


Figure 7-36 : The Create Database Tables Utility

3- Enter the ODBC data source name of the database in which to create the tables.

4- Type a valid user ID and password for the ODBC connection to the specified data source. If you accepted the default values when creating the database, type "DBA" for the **User ID** and "SQL" for the **Password**.

5- Click **Finish**.

6- Enter a valid super user password when prompted and click **OK**.

7.6.6 Updating Measurement Tables

NOTE : You must have Super user privileges to use this utility.

The CMS Software stores measurement data in database tables. These tables are managed dynamically by the system, that is, they are continuously updated to be fully consistent with the system configuration.

The VMCom communications handler module verifies the consistency of the existing measurement tables against the current configuration whenever it is started and—if needed—automatically adapts the database table structure accordingly.

Consequently, this utility is not normally required. Nevertheless the presence of the measurement tables is required by some CMS Software modules in order to be fully functional. In particular, the Mimic module requires the existence of measurement tables in order to be able to correctly assign indicators to values. The preparation of functional Mimic documents that include values and/or status indicator objects is therefore only possible if these tables already exist.

This utility manually completes the internal database structure, including the measurement tables, without requiring you to launch the VMCom communications handler. This may be relevant when preparing databases offline, that is, without hardware, or for integration work where third-party systems need to refer to measurement tables.

NOTE : The database file, ODBC data source name and configuration must already exist.

To create missing measurement tables:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Update measurement tables**. The Select Database window is displayed (Figure 7-36).

3- Click **Select**.

4- On the Select Data Source window, select the **Machine Data Source** property sheet, choose the system DSN name of the database to be updated and click **OK**.

5- Type the ODBC **User Name** and **Password** for the ODBC connection to the source database. By default, the user name is “DBA” and the password “SQL”.

6- Optionally, select the **Initialize missing records with default values** check box to write default values into the newly created database records.

7- Click **Finish**.

8- When prompted, enter a valid super user password for the selected database:

Figure 7-37 : The Privilege Level Window

9- Click **OK**.

10- The utility runs and status messages are displayed. In the example shown in Figure 7-38, two new database tables are added and initialized with default values:

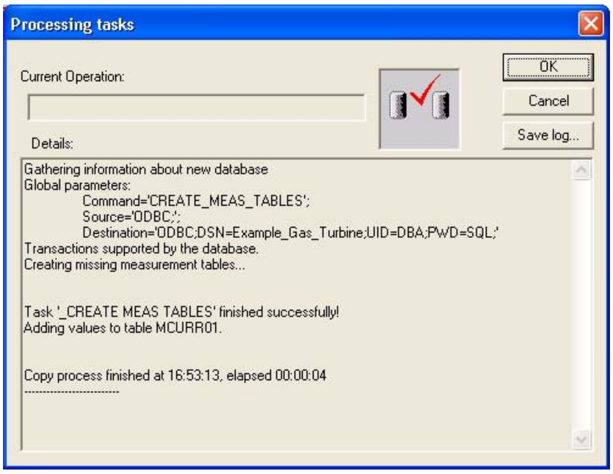


Figure 7-38 : Output from Create Missing Measurement Tables

11- Optionally, click **Save log** to write the contents of the window to a file.

12- Click **OK** to shut the window.

7.6.7 Deleting Measurement Data from a Database

This utility should be used with extreme care, and only by experienced users. Under normal circumstances its operation should be strictly limited to cleaning up measurement data that has already been backed up, or to eliminate unwanted data produced, for example during testing, commissioning, or training.

This utility deletes all measurement data from a specified database. Configuration data and Mimic documents stored in the database are unaffected.

To delete measurement data from a database:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Delete measurement data from database.**

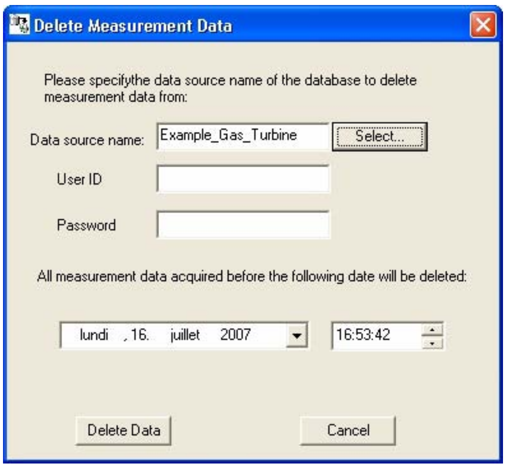


Figure 7-39 : The Delete Measurement Data Utility

3- Enter the ODBC **Data source name** of the database to delete measurement data from.

4- Type the **User ID** and **Password** of the ODBC connection to the specified data source.

5- Specify the “last valid” date and time. To modify the date, you can either:

- Click on any of the data or tile fields and type a new value.
- Click the down arrow on the data field to display a monthly calendar and select the click to select a date:

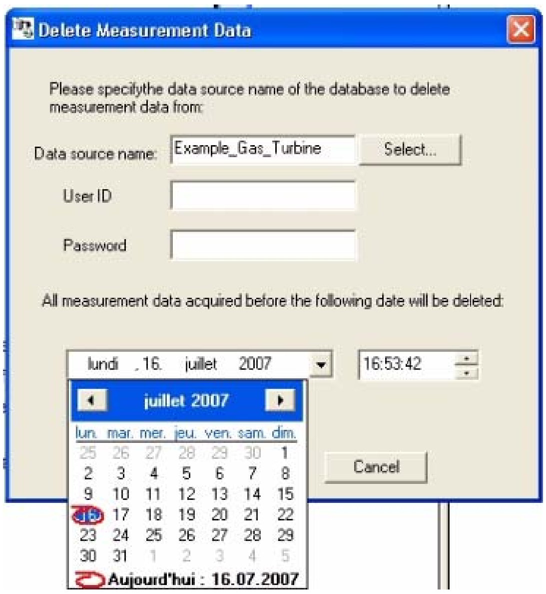


Figure 7-40 : The Calendar

6- Click **Delete Data**. All measurement data acquired before the selected valid date and time is permanently deleted from the database. Record sets defined as Baseline data will not be deleted.

7.6.8 Deleting Baseline Pointers

This tool deletes all entries in the Baseline table. The VM Delete program will then eliminate the linked datasets from the database once they are outside the selected time window.

7.6.9 Changing Transaction Log File Settings

Transaction logging is activated by default on all new databases created using the Create utility (see 7.3.1 - Creating a Physical Database File). However, you can activate it for existing databases, or disable it if it is not required.

To configure a database to use a transaction log file:

1- Choose **Start > Programs > Sybase SQL Anywhere > Sybase Central**.

2- Double-click on **Utilities**.

3- Double-click **Change Log File Settings**.

4- Click **Next**.

5- Click **Browse** and select the database file to change log file settings for.

6- Click **Next** to view the current log file settings of the database. Figure 7-41 shows a database that does not currently use a transaction log file:

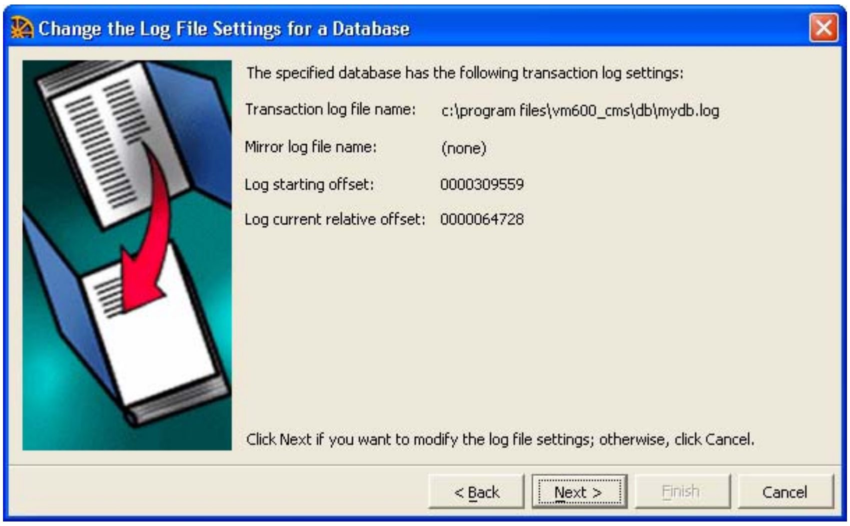


Figure 7-41 : The Current Log File Settings

7- Click **Next**.

8- Select **Maintain the following transaction log file**. The transaction log file name suggested is the same as the physical database file name but with a ".log" extension, as shown in Figure 7-42. It is recommended to respect this naming convention. If you do not specify a path, the log file is stored in the same directory as the database file.

9- Click **Next** to display mirror file settings for the database. The use of a mirror file improves data security but reduces system performance considerably, and is not required for the CMS Software system. Leave this option unchecked.

10- Click **Finish** and close Sybase Central. The database continues to run normally, but with a log file.

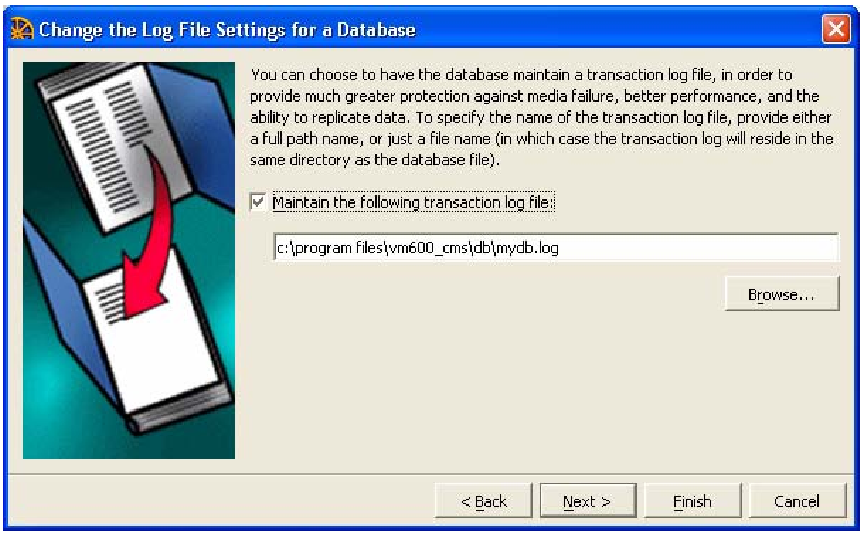


Figure 7-42 : Specifying the Transaction Log File Name

7.6.10 Viewing the Contents of a Transaction Log File

Transaction log files are stored in a binary format. Viewing the contents of the log file therefore requires that you translate it to a text file. Sybase Central includes a utility to do this:

1- Launch Sybase Central.

2- Double-click on **Utilities**.

3- Double-click on **Translate Log File**. The Translate a Log File wizard starts.

4- Click **Next**.

5- Click **Browse** and choose the transaction log file.

6- Choose the name of the text file in which to store the translated log file contents and click **Next**.

7- Select any of the options you require:

- **Generate ANSI SQL only**. Adaptive Server Anywhere uses Embedded SQL, an implementation of the ANSI standard. You are recommended NOT to select this option as it does not include any data in the log file.
- **Include uncommitted transactions**. Since uncommitted transactions represent data that has not yet been saved, you are recommended to select this option.
- **Include trigger-generated transactions**. Triggers (automatically executed procedures stored in the database) are an important part of the database, and it is recommended to select this option. Do not select **Include as comments only**, so that they can be used again.

8- Click **Next**.

9- Optionally, choose **Translate from the following checkpoint only** and choose to translate either from the last checkpoint or the last checkpoint prior to a specific date

10- Click **Finish**.

A typical translated log file might contain:

```
--CONNECT-1001-0000281085-DBA-2004/apr/11 11:05
--BEGIN TRANSACTION-1001-0000281096
BEGIN TRANSACTION
go
--SQL-1001-0000281097
create server TEST class 'ODBC' using 'TEST'
go
--COMMIT-1001-0000281151
COMMIT WORK
go
--ROLLBACK-1001-0000281152
ROLLBACK WORK
go
--CHECKPOINT-0000-0000281159-2004/apr/11 11:05
--CONNECT-1001-0000281185-DBA-2004/apr/11 11:05
--BEGIN TRANSACTION-1001-0000281196
BEGIN TRANSACTION
go
--SQL-1001-0000281197
create domain
  ALARM_PRIORITY integer not null default 1 check(ALARM_PRIORITY between 0
and 2)
go
```

7.7 Backing Up Databases

Measurement data stored in VM600 CMS Software databases should be backed up and archived on a regular basis. Standard Windows backup procedures cannot back up the contents of a database while it is actually running because the database server locks files for its exclusive use when running. There are, however, several ways of backing up databases while the database server is still running:

- Using the CMS Software’s Backup Database utility
- Using a utility provided with Adaptive Server Anywhere
- Automatically, using an Adaptive Server Anywhere utility and the Windows task scheduling facility.

You are advised to store the backed up database on a physically different device, for example a different PC or physical hard disk drive. Using the Delete Measurement Data utility described in 7.6.7 - Deleting Measurement Data from a Database, you can then reduce the contents of the running database to improve performance.

7.7.1 Using the CMS Software’s Backup Database Utility

This tool creates an archive version of a running database. The resulting file can be stored on the local system or on a network drive. The archived backup contains all information inside the source database, including configuration data, Mimic documents and measurement data. No changes are made to the source database itself. If the specified source database is not running when you start the utility, its database server is temporarily started for the duration of the backup process. The creation of an archive copy allows you to restore a database at any time using utilities provided by Adaptive Server Anywhere.

When using this utility, it is strongly recommended to specify A DIFFERENT location than the drive or folder containing the source database. This avoids potential complications due to file names or file size/available disk space conflicts.

To create a backup copy of a database:

1- Start **VM600 Administrator**.

2- Expand the **Database Utilities** icon and double-click **Backup database**.

3- Enter the ODBC data source name of the database to back up.

4- Type the user ID and password of the ODBC connection to the specified data source.

5- Click **Browse** and select the folder in which to store the archive copy of the database.

6- Optionally, select **Create backup log file** and select the name and location of a log file.

7- Click **Start**.

7.7.2 Using the Adaptive Server Anywhere Backup Utility

Sybase SQL Anywhere provides a database backup facility that can be used to back up a database while it is running.

To back up a database while it is running:

1- Select **Start** > **Programs** > **Sybase SQL Anywhere 8** > **Sybase Central**.

2- Choose **Tools > Connect**.

3- On the New Connection window, choose **Adaptive Server Anywhere 8** and click **OK**.

4- Select **ODBC Data Source Name** and select the database to be backed up, as shown in Figure 7-43:

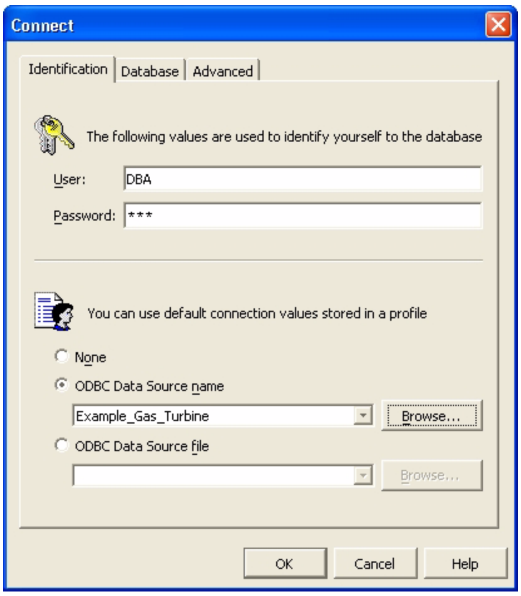


Figure 7-43 : Connecting to an ODBC Data Source in Sybase Central

5- Enter a valid **User** name (for example “DBA”) and **Password** (for example, “SQL”) to access the database. You are now connected to the database and can perform maintenance tasks on it.

6- In Sybase Central, select **Utilities** then double-click **Backup Database**.

7- Click **Next** to display a list of databases. Select the database to back up and click **Next**.

8- Specify the location on disk or the tape drive on which to store the backup copy and click **Next**.

9- Add an optional comment and click **Finish** to start the backup operation.

7.7.3 Performing Automatic Database Backups

Database backups can be scheduled to run automatically at predetermined dates and times.

To set up scheduled database backups:

1- Choose **Start > Settings > Control Panel** and double-click **Scheduled Task**.

2- Double-click **Add scheduled task**.

3- Click **Next**.

4- Click **Browse**.

5- Select the executable program **dbbackup.exe** (for example, C:\Program Files\Sybase\SQL Anywhere 8\win32) and click **Open**.

6- Select the frequency at which the backup is to be performed, for example “Daily”.

7- Click **Next**.

8- Select the time, frequency and start date for the backup and click **Next**.

9- Enter the name and password of the Windows user account that is to run the scheduled task.

10- Select **Open advanced properties for this task** and click **Finish**. The advanced properties window for the **dbbackup** program appears, as shown in Figure 7-44:

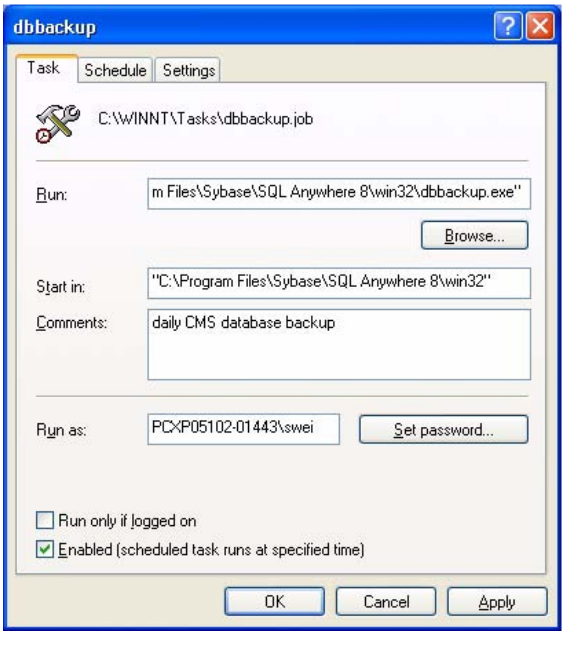


Figure 7-44 : Advanced Properties for DBBackup

11- In the **Run** field, add the command-line parameters for the **dbbackup** program. For example:

```
"C:\Program Files\Sybase\SQL Anywhere 8\win32\dbbackup.exe" -c DSN=SAMPLE;
-d -o backup_log.txt D:\VM600_BACKUPS
```

12- Click **OK** when finished. The backup task is added to the list of scheduled tasks.

NOTE : You are STRONGLY recommended to first run the scheduled task manually to test that it runs correctly. To do this, right-click on the task in the Scheduled Tasks window and select **Run**.

The command-line options for the database backup utility are listed in Table 7-3 below:

Table 7-3 : Command-Line Parameters for the Database Backup Utility

Switch	Description
-c "keyword=value; ..."	*Supply database connection parameters*
-d[1]	*Backup main database file*
-l filename	*Live backup of transaction log to filename*
-n	*Rename local backup of transaction log to match server*
-o filename	*Write output messages to filename*
-q	*Quiet: do not print messages*
-r	*Rename and restart the transaction log*
-t[1]	*Back up the transaction log file*
-w[1]	*Back up write file*
-x	*Delete and restart the transaction log file*
-xo	*Delete and restart the transaction log without backup*
-y	*Create directory or replace files without confirmation*

1. *If none of the -d, -t or -w options are specified, all files in the database are backed up*

7.7.4 Creating a Backup Before Changing Configurations

Always create a backup copy of a database (both the database and the transaction log file) before modifying your system's configuration.

If you only do a simple file copy, detach the log file from the copied database file (**Sybase Central > Adaptive Server Anywhere > Utilities > Change log file settings**).

If you normally retain the same configuration, but simply need to add a few data points and need to save space, make an advanced copy (**VM600 Administrator > Database Utilities > Advanced Copy**) of the existing configuration data.

To be sure, use the Snapshot Copy utility (**VM600 Administrator > Database Utilities > Snapshot Copy**) to make a complete copy of the database.

You can also save your existing configuration by performing a dump-to-file extraction of all defined parameters to Excel spreadsheet format. This allows you to archive all settings: It is not, however, a substitute for making a full (snapshot) copy of the database.

7.8 Permanently Deleting Data from a Database

You can permanently delete data from a database:

- Automatically, using the daily delete feature in the VMCom communications handler. Refer to Chapter 8 - Setting Up the VMCom Communications Handler.
- Manually, by entering the **VMDelete** command at a Windows command prompt:

```
VMDelete DSN="myDB"; UID=DBA; PWD=SQL;LASTTIME=100;
```

The **LASTTIME** parameter specifies the number of days' data you wish to retain in the database. In this example, all data older than 100 days is deleted.

Alternatively, you can specify a date with the **LASTTIME** parameter, for example:

```
VMDelete DSN="myDB"; UID=DBA; PWD=SQL;LASTTIME=2005-01-01;
```

In this case, all data stored in the database before the specified date is deleted.

The loss of data from these tasks is permanent and cannot be recovered. You must ensure you have backed up all data before using the **VMDelete** command.

7.9 Using a Different DBMS

It is recommended that you use the supplied Adaptive Server Anywhere package to create and manage databases in which to store your VM600 data. However, you can instead store your data in any other ODBC-compliant DBMS, for example:

- Oracle
- Microsoft Access
- Microsoft Excel
- Microsoft SQL Server
- IBM DBASE
- Paradox

Contact your nearest Vibro-Meter sales office for details.

8 SETTING UP THE VMCOM COMMUNICATIONS HANDLER

8.1 Introduction

The VMCom communications handler is responsible for managing the flow of data between the VM600 rack(s) and the database server. Only one VMCom communications handler can exist on one PC at any one time.

You can either run the VMCom communications handler manually, or set it up to run as an automatically started Windows service:

- It is recommended to set up the VMCom communications handler as a Windows system service. This allows it to benefit from operating system features such as automatic start on power-up of the PC, autoboot in case of repeated failure, or automatic restart in case of the problems with other processes. This option also provides the greatest security and reliability, as once running it is invisible to the normal user. This is described in 8.3.2 - Running VMCom from the VM600 Administrator.
- For testing and commissioning purposes, it is possible to start the VMCom communications handler manually from the Windows desktop or run the VMDiag.exe program directly from the Windows Explorer or command prompt. This is described in 8.3 - Running the VMCom Communications Handler Manually.

When started, the database server sends the VMCom communications handler the configuration data of all configured VM600 racks. This data is then downloaded to the CMC 16 card(s) in the VM600 rack(s), prompting an automatic reset of the cards. When the CMC 16 card(s) have restarted with the required configuration, they can immediately start sending data to the database server, which stores it in the database as measurement data.

Once the measurement data has been stored in the database, it can be extracted by other CMS Software modules to be, for example, displayed as a chart. This is shown in Figure 8-1:

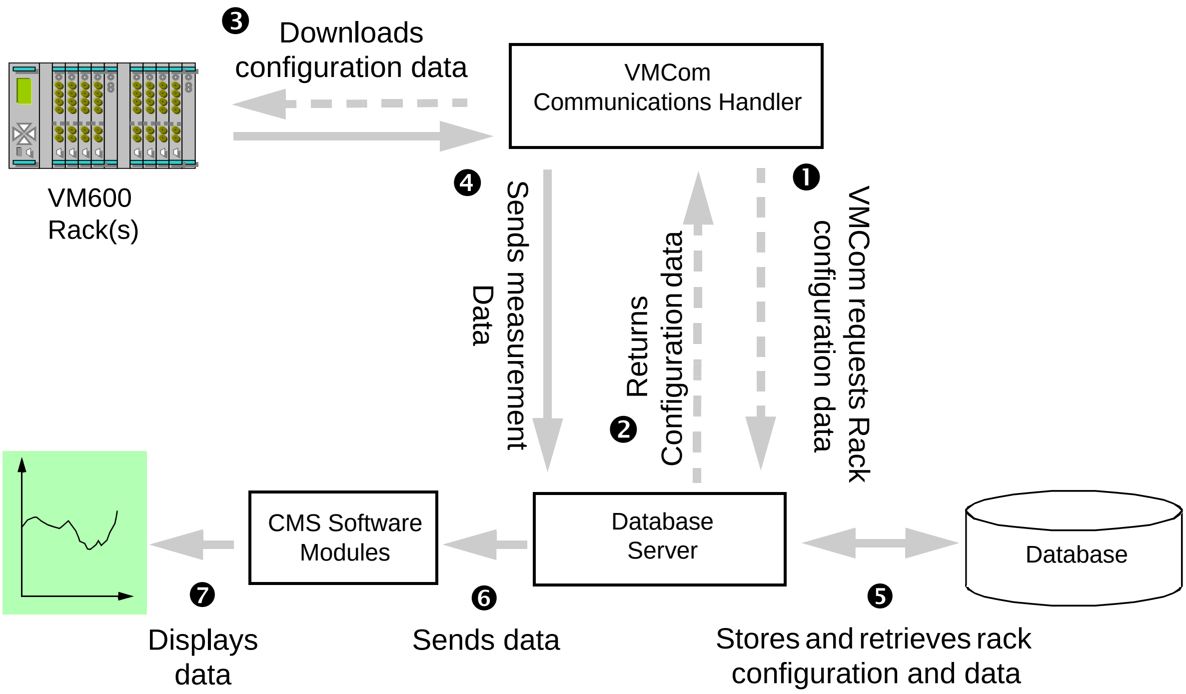


Figure 8-1 : The VMCom Communications Handler Environment

Correctly configured, starting the VMCom communications handler automatically establishes communications between the VM600 rack(s) and the database server and data collection begins. No further manual user intervention is required. Subsequent use of other CMS Software modules such as Mimic to exploit the measurement data is optional.

8.2 Checking the VM600 Rack Status

Before starting the VMCom communications handler, use the following procedures to check the status of CMC 16 cards in the VM600 rack.

8.2.1 Checking the TCP/IP Address of the VM600 Rack

The *VM600 Networking Instruction Manual* describes how to check that the rack's TCP/IP address is valid and accessible across the network.

If the rack cannot be reached using the **ping** command, contact your network administrator.

Refer to the *VM600 CMS Hardware Manual* for details on how to set and subsequently modify the TCP/IP address.

NOTE : It is a good idea to attach a label to the front of the rack indicating the card's TCP/IP address.

8.2.2 Checking the Communications Status

If the DIAG LED on the front panel of a CMC 16 card is flashing green, the card has received no communications for more than 200 seconds.

Within 30 seconds of the VMCom communications handler starting correctly, the DIAG LED should change to continual green, indicating normal operation.

8.3 Running the VMCom Communications Handler Manually

For testing and commissioning purposes, it is possible to start the VMCom communications handler manually. This is possible in several ways:

1- From the desktop using a shortcut.

2- By running the VMDiag.exe program directly from a command prompt or the Windows Explorer.

8.3.1 Running VMCom from a Shortcut

To create a desktop shortcut to start the VMCom communications handler:

1- Right-click on the Windows desktop and select **New > Shortcut**.

2- Click **Browse** and select the VMCom.exe program, for example "C:\Program Files\VM600_CMS\Bin\VMCom.exe".

3- Type a name for the shortcut and click **Finish**.

4- Right-click on the shortcut that appears on the desktop and choose **Properties**. The following Properties window appears:

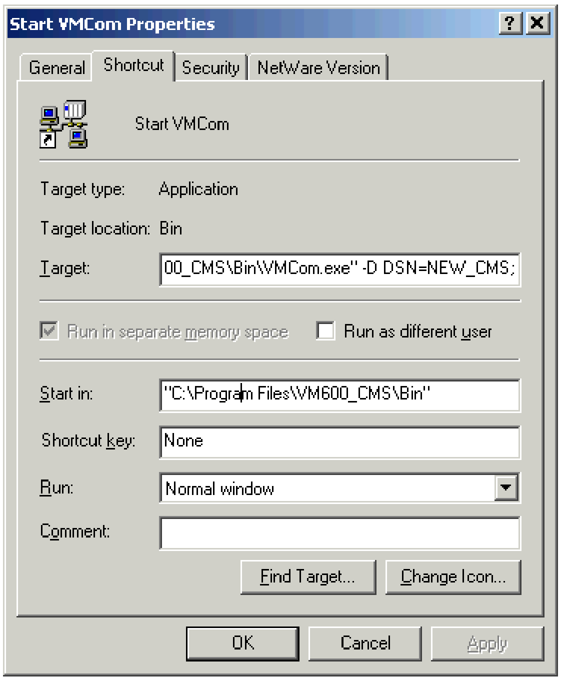


Figure 8-2 : Specifying VMCom Properties

5- On the **Target** line, leave a space and type the command line parameters (refer to Table 8-1).

6- In the **Start in** field, type the name of the folder in which the VMCom.exe program is to start up, for example “C:\Program Files\VM600_CMS\Bin”.

7- Click **OK** to create the desktop shortcut.

8- Double-click the shortcut to start the VMCom process.

To verify the status of the system, or to check for the presence of the services, the Windows Task List can be used—both the database server process (dbsrv8.exe), and the VMCom communications handler (VMCom.exe) are listed when they are running.

8.3.2 Running VMCom from the VM600 Administrator

To run VMCom.exe directly from the VM600 Administrator:

1- Start the VM600 Administrator program.

2- Expand the **VM600 Administrator** and **Applications** icons on the left.

3- Double-click the **VM600 Communication Thread** item. The Command Line Parameters window appears:

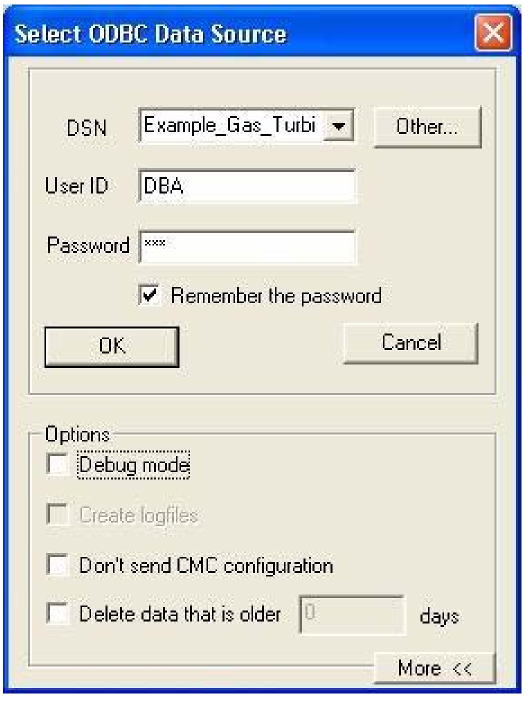


Figure 8-3 : VMCom Command Line Parameters

4- Specify mandatory and optional startup parameters. Refer to Table 8-1 for details on the meaning of the command line parameters.

5- Click **OK** to start the VMCom communications handler.

8.3.3 VMCom Debug options

To use the Debug mode:

1- Tick the Debug mode check box

2- Tick the **Create logfiles** tick box

Other options available are:

- not send the configuration when VMCom is started
- automatically run the Delete Data from Database utility 10 minutes after the start of VMCom and every 24 hours after that.

The latter option keeps the size and content of the database reduced to the number of days specified.

8.4 Running the VMCom Communications Handler as a Service

To set up the VMCom communications handler to run as a Windows system service:

1- Start the VM600 Administrator program.

2- Expand the **VM600 Administrator** and **System Tools** icons on the left.

3- Double-click the **Application Service Setup** item. The Setup Service window appears:

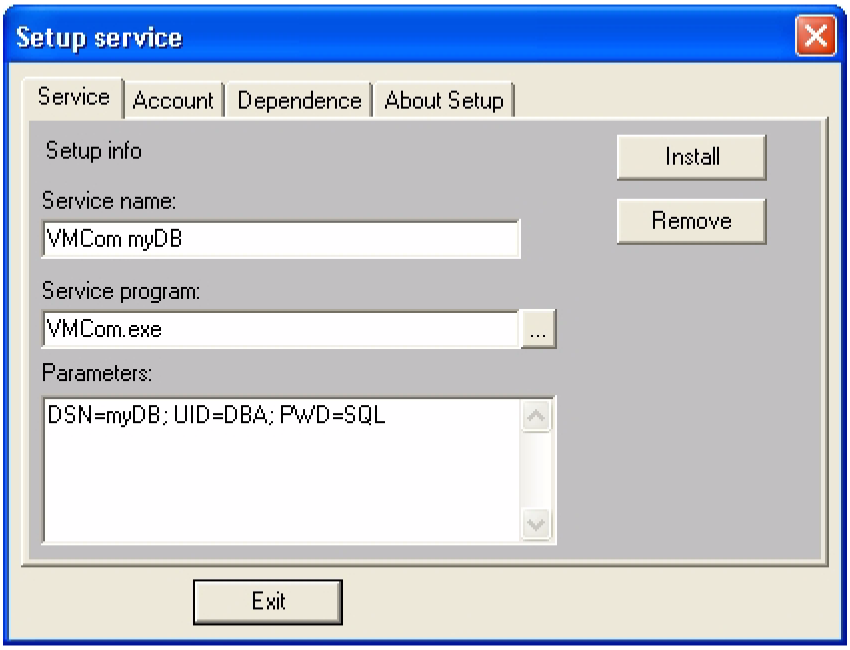


Figure 8-4 : The Service Setup Window

4- On the Setup Service window:

a. Enter a name for the **Service name**, for example "VMCom - Gas Turbine".

NOTE : The name you specify appears in the list of Windows services. Choose a name that will be easily identifiable as the VMCom service.

---

b. Leave the AGCom.exe program selected. This program manages the VMCom communications handler process.

c. In the **Parameters** field, enter the startup parameters for the VMCom communications handler. The VMCom communications handler accepts a number of command-line options and parameters, with the following syntax:

`VMCom.exe -O1 -O2 -O3 ... parameter1; parameter2; parameter3; ...`

where *O1*, *O2* and *O3* are options and *parameter1*, *parameter2* and *parameter3* are parameters. All options must be prefixed by a dash ("-"), while each parameter must end with a semi-colon (";"). Each option and parameter must be separated by at least one space.

Table 8-1 lists the possible command line options and parameters:

Table 8-1 : VMCom Communications Handler Startup Parameters (Part 1 of 2)

Option/Parameter	Explanation	Comment
Options		
-D	*Debug mode. Additional troubleshooting information is displayed and recorded when the VMCom communications handler starts up.* *Activating debug mode causes the Windows Application Log File to grow rapidly. See 8.8 - Managing the Application Log File for details on how to set a maximum log file size (overwriting events as required), or specify a period of time that information is to be kept. This purging activity is launched by VMCom every 24 hours, starting 10 minutes after VMCom is launched.* **NOTE :** It is not recommended to implement Debug mode during "live" operations—only for test purposes.	*Optional*
-N	*No download. Configuration data is not downloaded to the VM600 rack(s) when the VMCom communications handler starts. The VMCom communications handler assumes that the CMC 16 cards are already configured and begins collecting data immediately.* *This option is useful when you want to preserve a configuration that is already in the rack's cards. It avoids the approximate 30 second delay that is normally required for a normal reset and reconfiguration.* *If you add this option, you can still download configuration data manually at a later time (see 9.14 - Downloading the Configuration to the Rack), even while the VMCom communications handler is still running.*	*Optional*
Parameters		
DSN="*myDB*";	*The system DSN of the database server with which the VMCom communications handler is to exchange configuration data.*	*Mandatory*

Table 8-1 : VMCom Communications Handler Startup Parameters (Part 2 of 2)

Option/Parameter	Explanation	Comment
UID=userID; *PWD=password;*	*The ODBC user ID and password needed to connect to the database server.* *If specified, these values override any manually entered user ID and password values. If these values are not supplied, VMCom uses the appropriate entries established elsewhere for the ODBC link.*	*Optional*
DELETE=numdays;	*This option indirectly limits the size of the database by requesting the deletion of all data older than numdays. When active, a dedicated program starts up automatically 10 minutes after the VMCom communications handler, and thereafter once daily. This program deletes all database data that is older than the specified number of days, and truncates the log file.* *When used in conjunction with scheduled backups defined at the operating system level, this parameter allows you to secure data and manage database size. However, it must be used with care as it can effectively inhibit the collection and analysis of valid data.* *The default value is zero, meaning that the parameter is not active: the database is free to grow in size up to the limits established elsewhere (for example, storage intervals).* **NOTE :** The emptied database is not compressed, so you might not see a reduction in file size. However, the database's growth rate will slow as the freed space is reused for new data. **NOTE :** Establish a regular backup procedure to avoid the loss of any potentially valuable data.	*Optional*
PORT=portno	*This option is used only for a few specific installations. Unless requested differently when setting up your system, leave the default value unchanged.*	

NOTE : The DSN="*myDB*"; parameter is mandatory. During system pre-commissioning and testing, it is recommended to also use the –D debugging option to force display of the console window. However, to avoid accidental interaction of users with the services, this option should not be used with live installations.

5- Click the **Account** property sheet. Leave the default value **Automatic** selected to automatically start the VMCom communications handler at Windows startup time.

6- Click the **Dependence** property sheet. To automatically start the VMCom communications handler whenever the corresponding database server service is started, select an Adaptive Server Anywhere database server name from the list of services, for example:

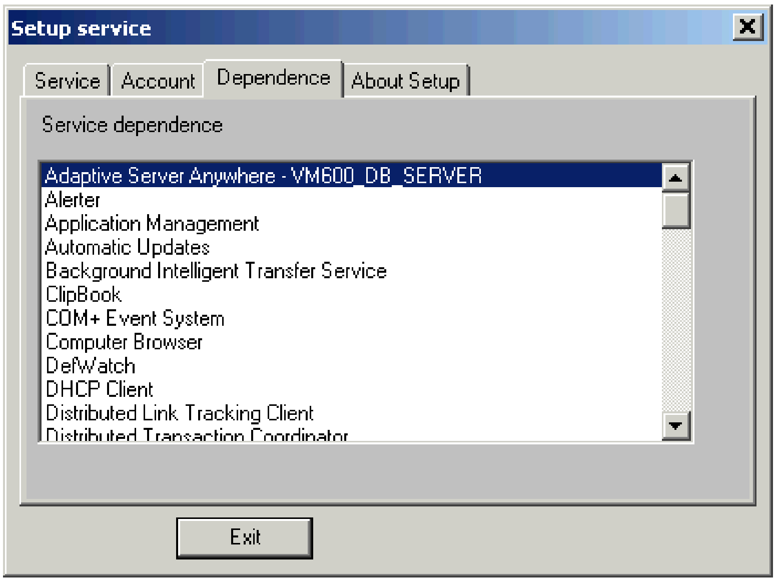


Figure 8-5 : Setting Up Dependencies

7- Click the **Service** property sheet.

8- Click **Install**. The following window is displayed:

Figure 8-6 : Successful Service Creation Message

If an error message appears, refer to Chapter A - Troubleshooting and Frequently Asked Questions.

9- The VMCom communications handler starts. If the -D debug command-line option was specified, the console window shows detailed messages, as shown in Figure 8-7:

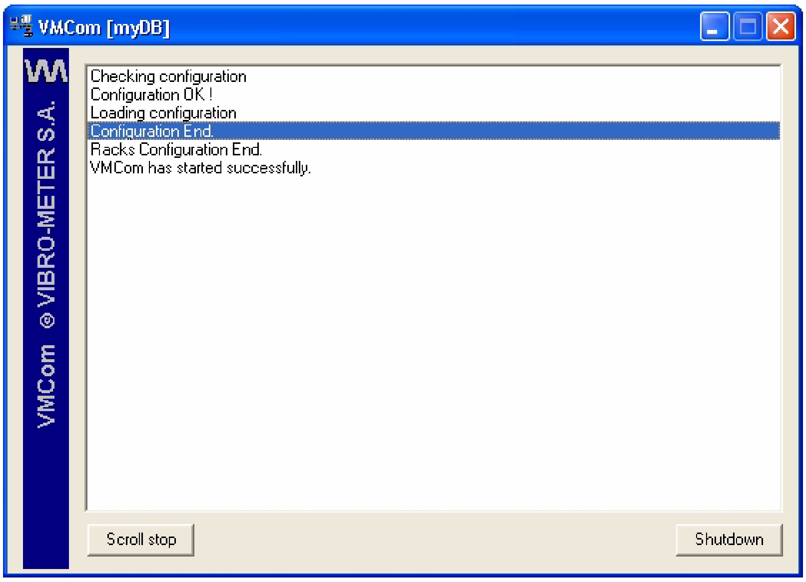


Figure 8-7 : The VMCom Console Window

From this console window, you can:

- Click **Scroll stop** and **Scroll** to respectively stop and restart the scrolling of text within the console window.
- Click **Shutdown** to stop the VMCom communications handler.
- Minimise the console window to leave the VMCom communications handler service running.

A small icon appears in the Windows system tray to indicate that the service is running. You can double-click this icon at any time to restore the console window.

8.5 Manually Restarting the VMCom Communications Handler

To manually restart the VMCom Communications Handler:

1- Open the Windows Services window. The VM600 Administrator program provides a shortcut:

a. Start the VM600 Administrator program.

b. Expand the **VM600 Administrator** and **System Tools** icons on the left.

c. Double-click the **Windows Services** item.

2- Scroll down the **Name** column until you find the VMCom Communications Handler name you assigned in the **Service name** field of the Service Setup window (see Figure 8-4).

3- Double-click on the service name to display its properties:

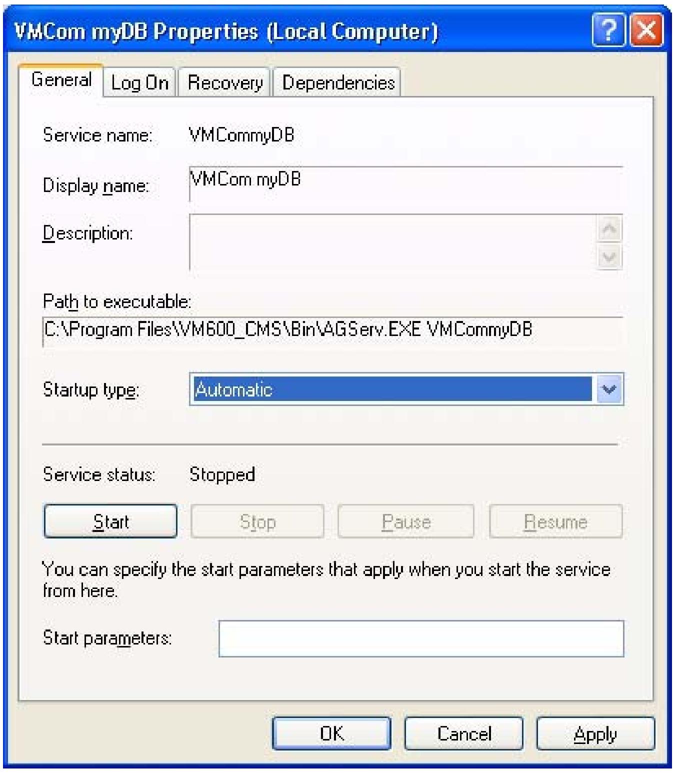


Figure 8-8 : Windows Service Properties

To manually start the service, click **Start**.

The VMCom communications handler icon appears in the Windows system tray and the console window appears (see Figure 8-7).

Click **OK** to return to the services list.

8.6 Stopping the VMCom Communications Handler

The VMCom communications handler can be stopped:

1- From the Windows Services window:

a. Display the Windows Services window

b. Double-click the name of the VMCom communications handler from the list of services (this was specified when creating the service—refer to 8.3.2 - Running VMCom from the VM600 Administrator)

c. Click the **Stop** button

2- From the Windows task list:

a. Press Ctrl+Alt+Del

b. Click **Task List**

c. Select the **Processes** property sheet

d. Select the VMCom.exe task entry

e. Click **End Process**

3- If it was launched manually, using the **Shutdown** button on the VMCom communications handler window.

Before stopping, the VMCom.exe process must itself stop a number of other background processes, which takes approximately 10 to 20 seconds to complete. You must wait until the VMCom.exe entry disappears from the task list before restarting the process, otherwise a second VMCom.exe process may be launched. This can in turn lead to VM600 hardware problems as only one process can be associated with an ODBC system DSN at any one time.

8.7 Deleting the VMCom Service

Proceed as follows to delete the VMCom communications handler from the list of Windows services:

1- Stop the VMCom communications handler as described in 8.6 - Stopping the VMCom Communications Handler above.

2- Start the VM600 Administrator program.

3- Expand the **VM600** and **System** icons on the left.

4- Double-click the **VMCom service setup** item.

5- On the Setup Service window:

  a. Type the name of the service to be deleted in the **Service name**, for example “VM600 VMCom process”. Be sure to enter the name exactly as it appears in the list of Windows Services (the **Name** column).

6- Click **Remove**. If successful, a “DeleteService SUCCESS” message is displayed.

NOTE : The Error Message “failure: OpenService (0x424)” indicates that the service could not be deleted. Check the name of the service in the Windows Services window and try again.

7- On the Windows Services window, click the **Refresh** button to update the list of remaining services.

8.8 Managing the Application Log File

In common with other Windows applications, the VMCom communications handler writes messages to the Windows application log file whenever an event occurs. For example, an entry is written to the application log file whenever another CMS software application connects to or disconnects from the VMCom communications handler. When running the VMCom communications handler in debug mode, the large number of events can cause the application log file to grow very large.

To manage the size of the application log file:

1- Select **Start > Control Panel > Administrative Tools > Event Viewer** and click on **Application Log** to display the Windows application log, as shown in Figure 8-9.

“VMCom” in the **Source** column identifies the VMCom communications handler as the source of the event:

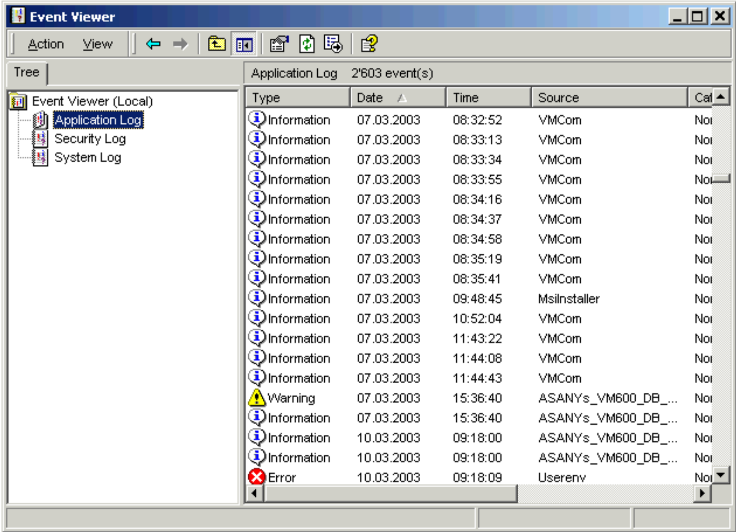


Figure 8-9 : Windows Application Log File

2- Right-click on **Application** in the list of log types on the left and select **Properties**. The Application Log Properties window is displayed as shown in Figure 8-10:

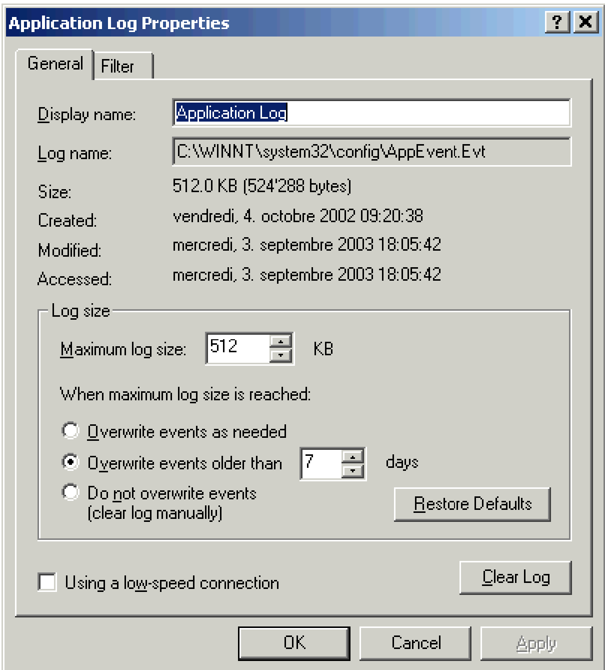


Figure 8-10 : The Application Log Properties Window

3- Change the default option **Overwrite events older than** to **Overwrite events as needed**. This means that when the log file exceeds the **Maximum log size** value, each new entry automatically causes the older entry to be deleted so that the file cannot exceed the maximum size. You can also increase the maximum log size value, or decrease the number of days that events stay in the log file.

4- Click **Apply**.

5- Click **OK** to return to the Event Viewer window.

9 CREATING A RACK CONFIGURATION

9.1 Before Starting the Configuration Editor

9.1.1 Gathering Information about Your System's Configuration

The Configuration Editor is a graphical tool used to set up the desired configuration of CMC 16 and IOC 16T cards in VM600 racks.

NOTE : At this stage, it can be helpful to use a configuration sheet (for example, a spreadsheet) to map out the required channels, signal types and card inputs.

Once the configuration is complete, the Configuration Editor allows you to print out a computer-generated schematic diagram of the corresponding switch settings required on the IOC 16T card, which you can use to manually configure the IOC 16T card accordingly.

The Configuration Editor stores interim configuration updates in the database. When the configuration is ready, you "commit" the complete configuration, which prompts the VMCom communications handler module to retrieve configuration data from the database and download it to the VM600 rack. This process is illustrated in Figure 9-1.

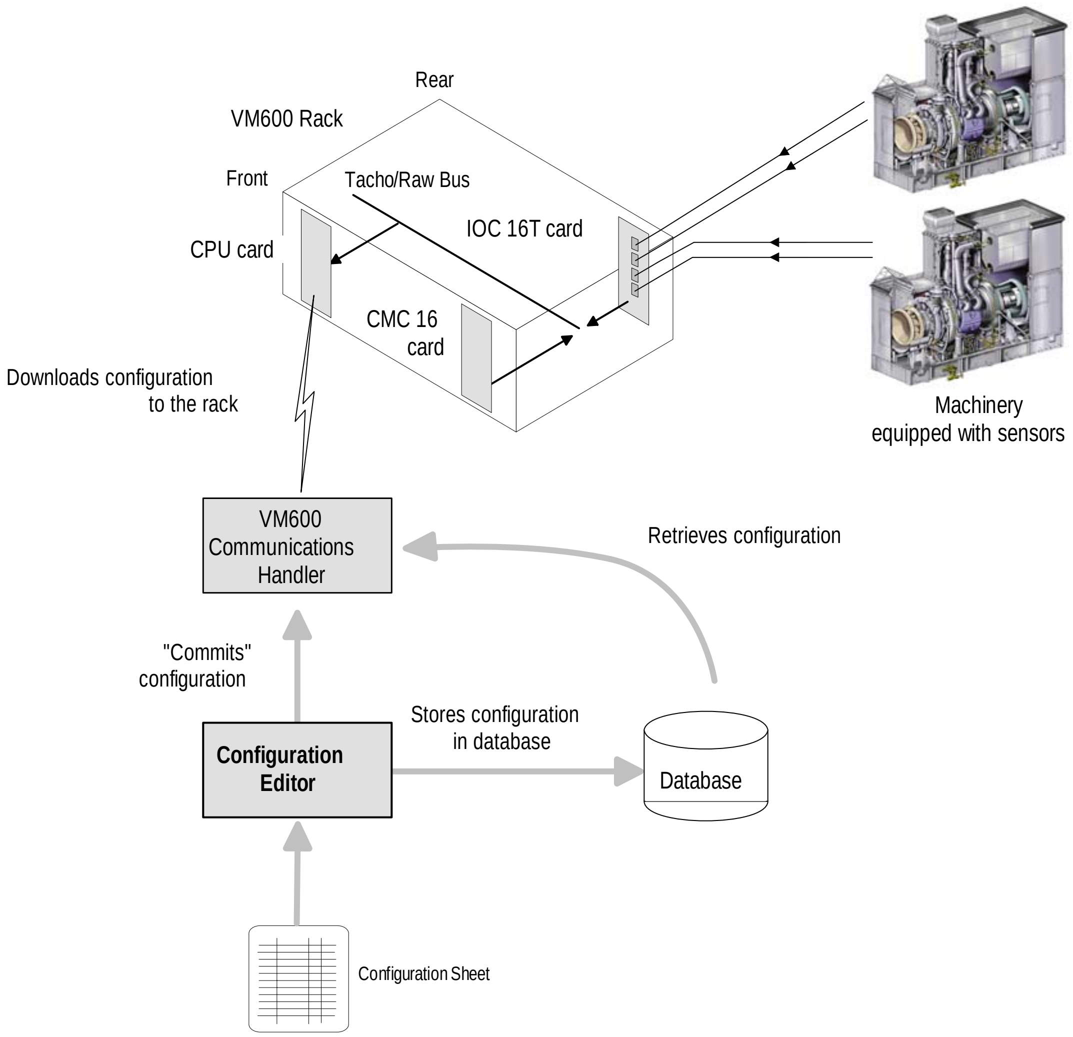


Figure 9-1 : The Configuration Editor

9.1.2 Ensuring VMCom is Running

The Configuration Editor requires that the VMCom communications handler is running to manage the connection between the CMS Software, the database, and the VM600 rack or racks. Before starting the Configuration Editor, check that the VMCom communications handler is running as follows:

1- Verify that a VMCom communications handler icon  appears in the Windows system tray (bottom right corner of the Windows desktop).

If there is no icon, VMCom may not be running—refer to 8.3 - Running the VMCom Communications Handler Manually for details on how to start the VMCom communications handler.

2- If the icon is displayed, click it once. The VMCom console window appears:

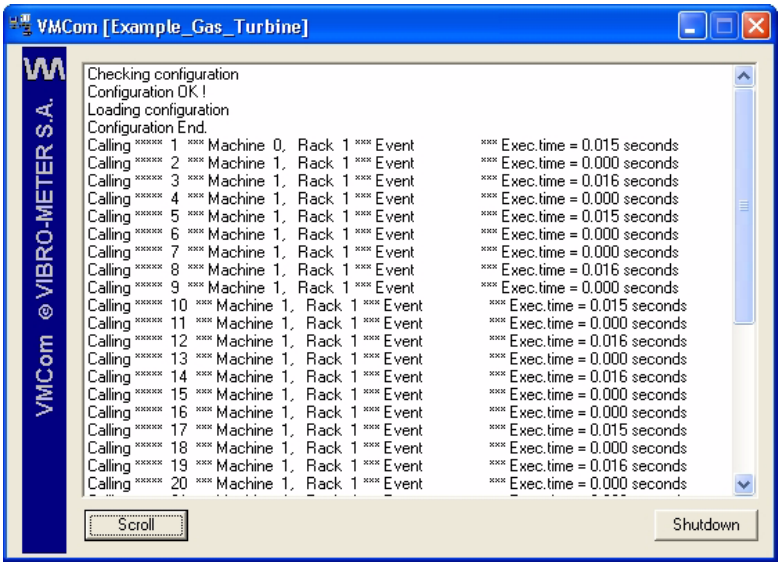


Figure 9-2 : The VMCom Console Window

3- If an error message appears instead, VMCom may be running but incorrectly configured. Refer to Appendix A - Troubleshooting and Frequently Asked Questions for further information.

4- Optionally, minimise the console window.

9.2 Starting the Configuration Editor

NOTE : The Configuration Editor can also be launched from within other CMS Software modules, for example, Mimic. Refer to the respective chapters of this manual for further details.

To start the configuration editor:

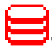
1- Choose **Start > Programs > VM600 CMS Software > Configuration Editor**

2- Start the VM600 Administrator program, choosing **Applications** in the structure view on the left, then double-clicking the Configuration Editor.

Alternatively, double-click the  shortcut on the desktop. The Select ODBC Data Source window shown in Figure 9-3 appears:

Figure 9-3 : Select ODBC Data Source Window

9.3 Selecting a Database

When first started, the Configuration Editor displays a list of available databases. Each ODBC system DSN existing on the local PC is listed next to a database icon .

To select the database to work with:

1- In the **DSN** list, choose the ODBC system DSN of the database to work with. The five most recently used system DSNs are listed. To use a different system DSN, click **Other**.

2- Type in a valid ODBC **User ID** (e.g. "DBA") and **Password** (e.g. "SQL") for the database and click **OK**. Optionally, select the **Remember the password** option. When selected, the password is stored in the Windows Registry and is displayed automatically when you next log in to the database.

3- The Configuration Editor reads the current configuration from the selected database and displays a structured view of the configuration, as shown in Figure 9-4.

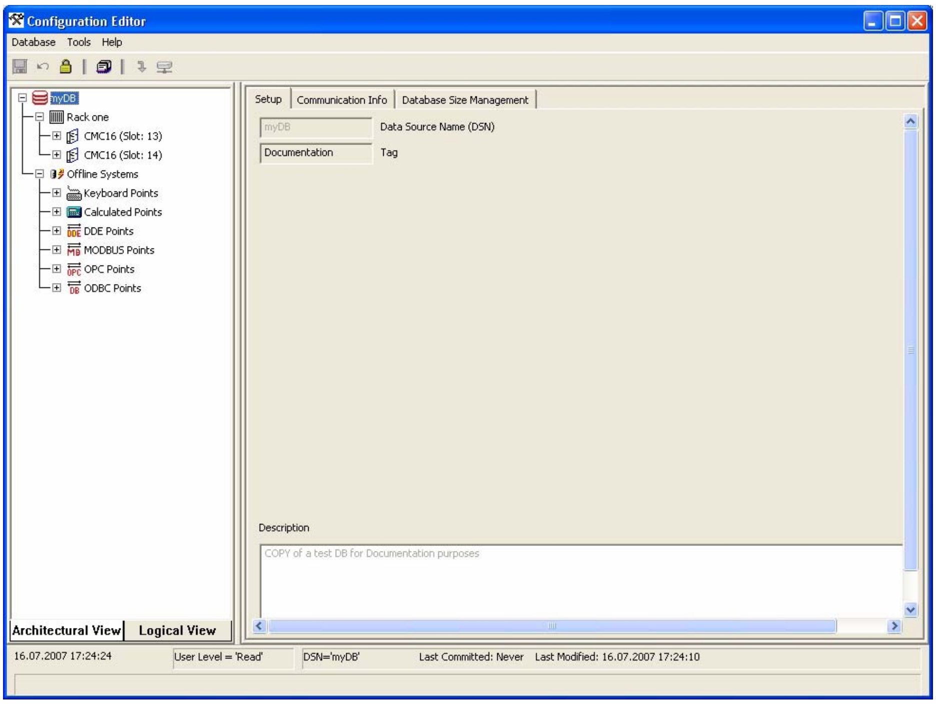


Figure 9-4 : Structured View of the Configuration

The initial view of a database allows you to:

- Browse the current configuration
- Switch between architectural and logical views of the configuration
- Switch to a higher level of privileges
- Display information about the selected database.

NOTE : You cannot create or delete complete databases from within the Configuration Editor. Utilities are provided to do this; refer to Chapter 7 - Administering Databases for details.

9.4 System Security

9.4.1 Setting Privilege Levels

The CMS Software supports four different privilege levels to control access to security aspects of the configuration:

- **Read**. This is the privilege level with the lowest security level: no password is required for access. With read privileges, you can only view the current configuration. This is the default level granted when you first start the Configuration Editor.
- **User**. User level currently provides the same privileges as Read level, that is, you can view the current configuration only.
- **Master**. Master level users can enable and disable parts of the current configuration and save database changes.
- **Super**. Super level users can modify the current configuration and save any changes.

User, Master and Super levels can be protected with passwords. You can change the password for your own privilege level and that for any lower privilege level, but not that for a higher level. For example, an operator with Master level privilege may change the User and Master level passwords, but not the Super level password.

Table 9-1 lists, for each privilege level, which functions are authorized for users having the appropriate privilege level:

Table 9-1 : Privilege Levels

Function	**Privilege Level**			
	Read	**User**	**Master**	**Super**
View the current configuration	✓	✓	✓	✓
Enable/disable parts of the configuration			✓	✓
Modify the configuration				✓
Write changes to a database			(✓)	✓
Download the configuration to VM600 racks			(✓)	✓

NOTE : Super user privileges automatically revert to Read privileges after a number of minutes of inactivity. The number of minutes can be set in the Mimic program options (see 10.9 - Setting Mimic Options).

The current privilege level is displayed in the bottom left corner of the Configuration Editor window, as shown in Figure 9-5.

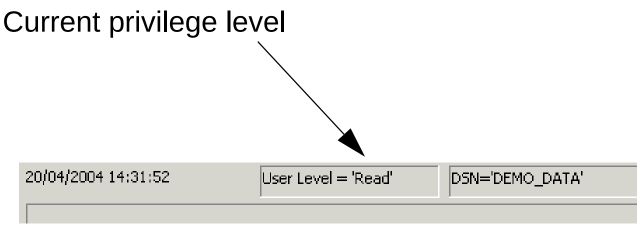


Figure 9-5 : The Current Privilege Level

9.4.2 Entering Passwords

To enter a password:

1- Click the Password icon  on the toolbar, or choose **Security** from the **Tools** menu. The Change Privilege Level window is displayed:

Figure 9-6 : The Change Password Level Window

2- Choose the required level of **Privileges**: **Read**, **User**, **Master** or **Super**. Type the appropriate password and click **OK**. The default passwords are:

- User level: “user”
- Master level: “master”
- Super level: “super”

NOTE : Passwords are case sensitive, that is, “user”, “User” and “USER” are three different passwords.

To change the default passwords, see 9.4.3 - Changing Passwords below.

All features that are supported by the privilege level are displayed or activated in the structured view window. For example, for a super user, **COMMIT** and **CONNECTION** buttons are displayed.

9.4.3 Changing Passwords

NOTE : Changing passwords in the Configuration Editor changes the password in all other CMS Software modules.

To change a password:

1- Choose **Tools > Modify Passwords**.

2- Type a valid Super user level password.

3- The Modify Passwords window appears:

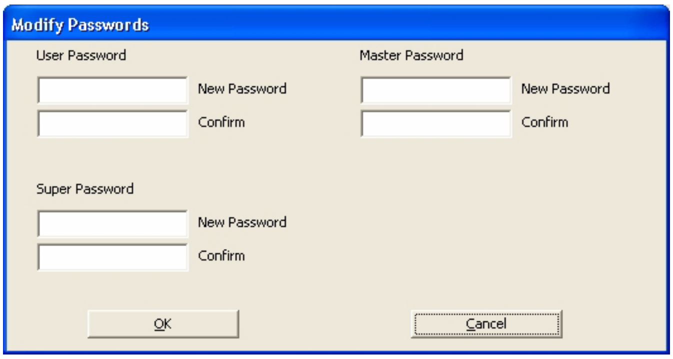


Figure 9-7 : The Modify Passwords Window

4- Type the new **User Password**, **Master Password**, or **Super Password**.

5- Type the new password again in the corresponding **Confirm** field.

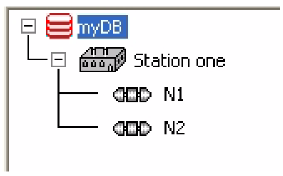
6- Click **OK**.

9.5 Viewing the Current Configuration

You can view the current configuration in two ways; a logical view and an architectural view.

9.5.1 The Logical View

The Logical view shows the system hierarchy from the operator’s perspective, i.e. the structure in terms of:

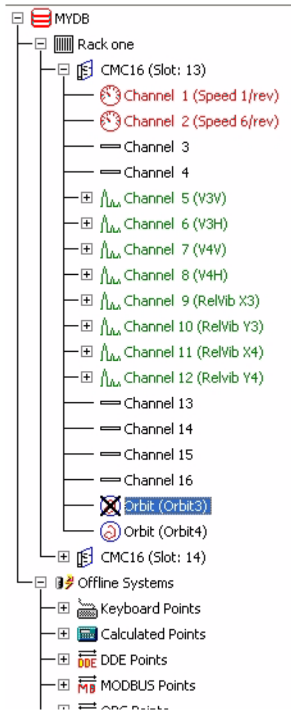


- Databases
- Stations
- Machines

9.5.2 The Architectural View

The architectural view represents the system from a hardware perspective. It shows the system hierarchy in terms of:

- Database
- Racks
- Cards (e.g. CMC 16)
- Channels
- Outputs (e.g. frequency bands)
- Offline points



9.5.3 Switching Views

To switch from the logical view to the architectural view or vice versa:

1- Click **Logical View** or **Architectural View** at the bottom of the tree view.

9.6 Creating a New Configuration

9.6.1 Overview

To begin a new configuration:

1- Ensure you have Super user privileges.

2- Switch to the architectural view if it is not already displayed and:

a. Define and configure the VM600 racks, as described in 9.7.1 - Defining a New Rack.

b. Define and configure the cards in each rack, as described in 9.7.4 - Configuring Cards.

NOTE : The current version of the VM600 CMS Software only supports CMC 16 cards.

c. Define and configure the channels and outputs for each card, as described in 9.7.6 - Configuring Channels.

3- Switch to the logical view (refer to 9.5.3 - Switching Views) and:

a. Define and configure the stations, as described in 9.9.1 - Attributing a Station to a Database.

b. Attribute each machine to a station, as described in 9.9.2 - Attributing Machines to a Station.

c. Configure individual machines, as described in 9.9.3 - Configuring Machines.

4- When the configuration is complete, save the changes to the database and force the new configuration to be downloaded to the VM600 rack by clicking the Commit button, as described in 9.14 - Downloading the Configuration to the Rack.

9.6.2 Grouping Similar Outputs Together

For performance reasons relating to the way that the IOC 16 card collects data, it is recommended to implement the following guidelines

- Only the first four channels on the card can be configured as Speed (tacho) points.
- Group signals of the same type (processing parameters) on adjacent channels (relative vibrations, absolute vibrations, air gap, and so on). For example:

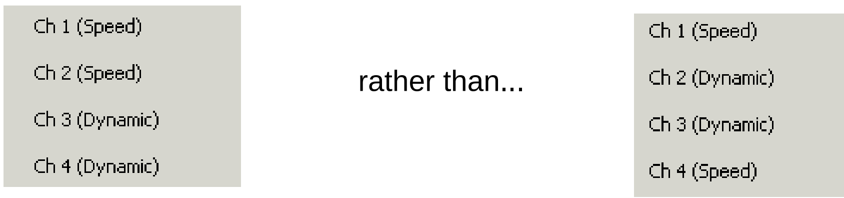


Figure 9-8 : Configuring Speed Channels

- Place all speed channels before any other measuring points (dynamic and analog points).
- Configure channels from the top downwards (that is, configure the point that appears first in the list of available points, then configure the second point, and so on).
- Group together channels related in terms of speed, rather than of the same type. Figure 9-9 shows a typical IOC 16T card configuration:

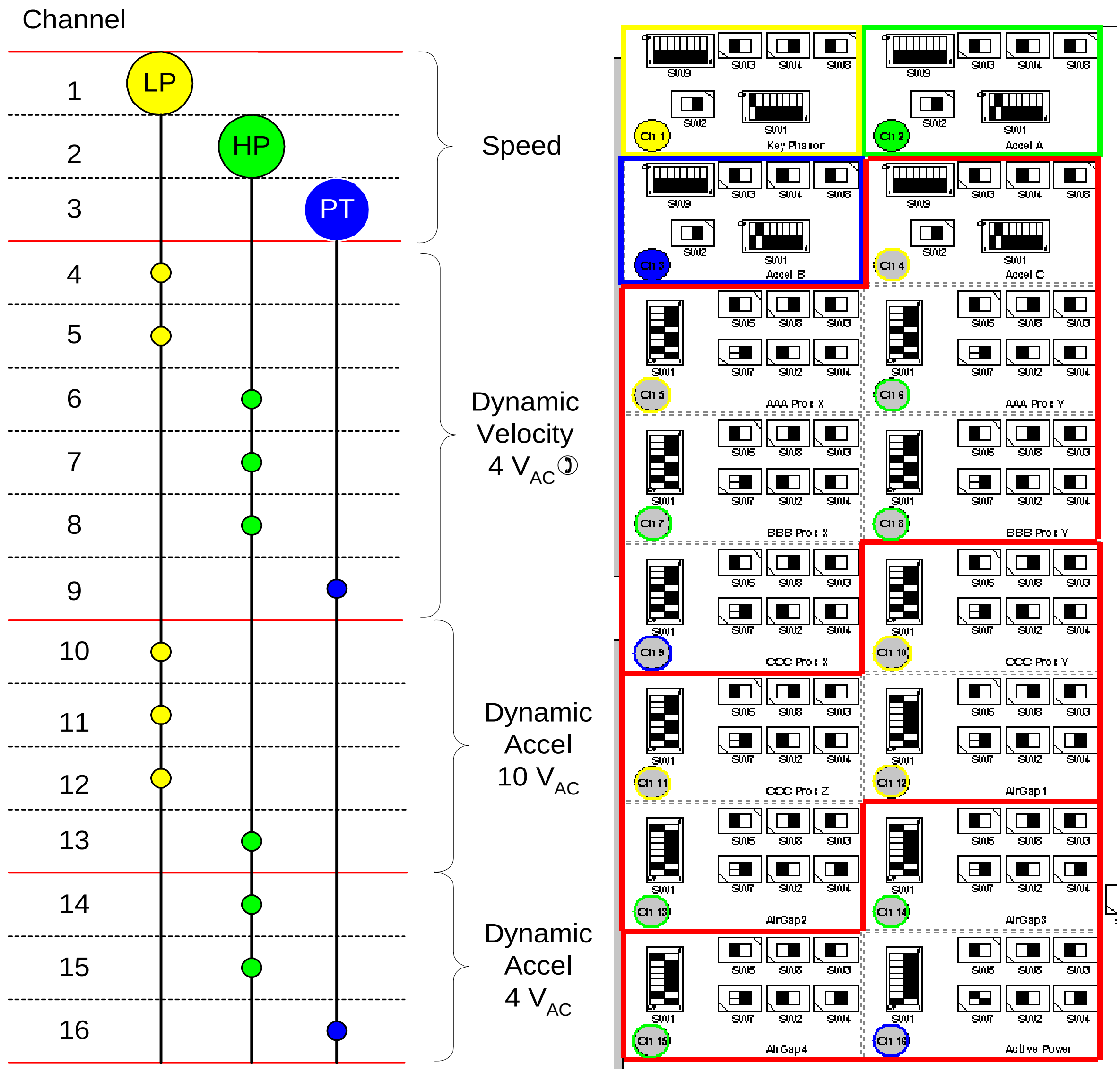


Figure 9-9 : Grouping Inputs

How to display this graphical image of the IOC 16T card is described in 9.15 - Configuring the IOC 16T Card.

Check that you are working with the correct IOC 16T card: refer to Table 2-2 for details.

9.7 Working with the Architectural View

The architectural view allows you to define the VM600 racks used in the VM600 CMS Software and attribute them to the databases that are to store their measurement data. The cards used in each rack are then defined, along with the slot position they occupy. Finally, the inputs and outputs of the individual cards are configured.

9.7.1 Defining a New Rack

You must define one rack object in the Configuration Editor for each physical rack in your VM600 system.

To define a new rack:

1- Open the database in which the rack's configuration data is to be stored (see 9.3 - Selecting a Database).

2- Ensure you have **Super** user privileges.

3- In architectural view, right-click on the top-level database icon and select **New Rack**, or select the database and choose **New Rack** from the **Database** menu.

4- Type a unique **Tag** identifier for the rack (up to 16 alphanumeric characters).

5- Optionally, type a description of the rack.

6- Click **OK**.

7- Click the Save button on the toolbar.

9.7.2 Configuring a Rack

To configure a rack:

1- Display the **Architectural** view.

2- Ensure you have **Super** user privileges.

3- Click on the rack to configure. The current or default properties of the rack are displayed on the right:

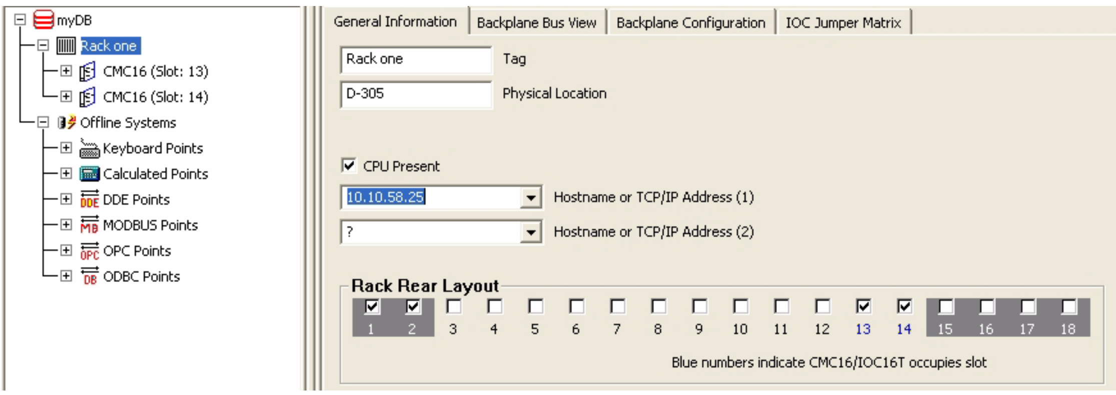


Figure 9-10 : General Properties of a VM600 Rack

4- Optionally, modify the **Tag** for the rack that you entered when creating the rack.

5- Optionally, enter a description of the rack's **Physical Location**.

6- Select **CPU Present** and enter the **Hostname or TCP/IP Address** of the rack's CPUM card. The TCP/IP address must match that assigned to the CPUM card when it was first installed. Refer to the *VM600 CMS Hardware Manual* for details on how to set and if necessary modify the TCP/IP address. It may be useful to attach a label to the front of the rack indicating the card's TCP/IP address.

7- If the CPUM card is equipped with a second Ethernet card, you can enter the host name or TCP/IP address of the second card in the second **Hostname or TCP/IP Address** field.

The **Rack Rear Layout** box displays the rack slots containing cards. For example, selecting **CPU Present** to indicate the presence of a CPUM card automatically shows slots 1 and 2 as being used. Slots containing CMC 16/IOC 16T cards (see 9.7.3 - Adding Cards to the Rack) are automatically selected and the slot number occupied appears in blue.

8- Optionally, modify the **Description** of the rack that you entered when creating the rack.

9- Click the Save button on the toolbar to store the changes in the database.

NOTE : You are also prompted to save changes whenever you click on another rack.

9.7.3 Adding Cards to the Rack

The next step is to specify the configuration of all CMC 16 cards that are present in the VM600 rack.

To add a card to a rack:

1- Ensure you have **Super** user privileges.

2- In the architectural view, right-click on a rack and choose **Add Card to Rack** (or select the rack and choose **Add Card to Rack** from the **File** menu).

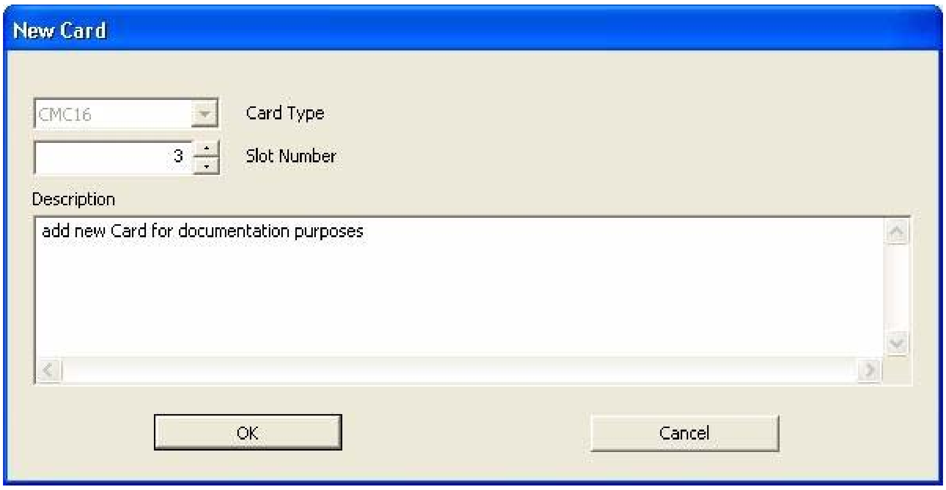


Figure 9-11 : The New Card Window

3- Select the **Slot Number** physically occupied by the CMC 16/IOC 16T card pair in the rack. Enter a number between 3 and 14 inclusive (slots 1 and 2 are reserved for CPUM cards, while slots 15 and 16 are reserved for RPS 6U rack power supply cards).

4- Optionally, type a **Description** of the card.

5- Click **OK**.

The card is added to the architectural view, together with a minimum default definition of channels and outputs.

9.7.4 Configuring Cards

To configure a card:

1- Ensure you have **Super** user privileges.

2- In the architectural view, select the card to configure. The current or default properties of the card are displayed on the right:

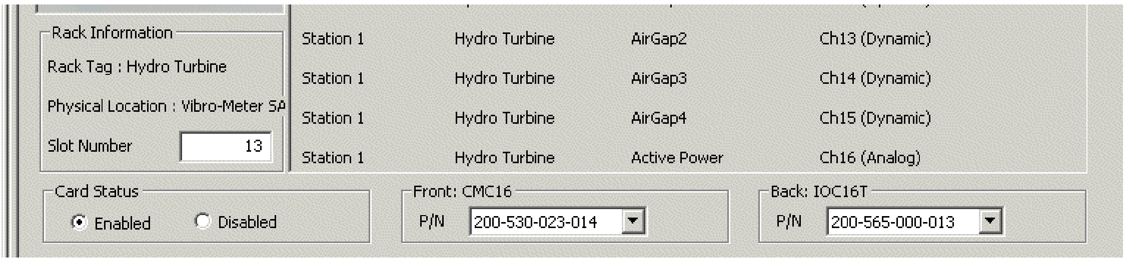


Figure 9-12 : Configuring a Card

3- Optionally, modify the **Slot Number** and **Description** that you entered when creating the card.

4- Specify whether the card is to be **Enabled** or **Disabled**. The configuration data of disabled cards are stored in the database, but only measurement data from enabled cards is stored in the database. This can be useful to temporarily inhibit data collection from slots where the card has been removed.

5- Specify the part numbers (**P/N**) of the CMC 16 card located in the front of the rack and the corresponding IOC 16T card located at the rear of the rack.

6- Expand the card's icon in the architectural view and configure each of the channels in the card that are to be used for data collection, as described in 9.7.6 - Configuring Channels.

7- Optionally, add an orbit display output as described in 9.7.14 - Configuring Orbit Displays.

8- When you have finished, click the Save button to store the changes in the database.

NOTE : You are automatically prompted to save changes whenever you click on another card or rack.

9.7.5 Cloning Cards with Drag and Drop

To quickly copy a card's configuration when adding a card with an identical or similar configuration to a new or different VM600 rack:

1- Ensure you have **Super** user privileges.

2- If necessary, add the new VM600 rack as described in 9.7.1 - Defining a New Rack.

3- In the architectural view, click on the card to copy, hold down the mouse button, drag the card's icon over the new rack's icon, and release the mouse button.

4- On the New Card window, add an optional description of the card and click **OK**.

5- Click **Yes** to confirm adding the card.

6- A message is displayed warning you to check the card's configuration. Click **OK** to continue.

The card's configuration is copied to the new rack. However, you must complete certain configuration details specific to the card. For example, copied measurement points must always be manually attached to a machine.

9.7.6 Configuring Channels

To configure a channel:

1- Ensure you have **Super** user privileges.

2- Switch to the **Architectural** view.

3- If the channel's configuration is similar to that of another channel that you have already configured, consider cloning the channel's configuration as described in 9.7.13 - Cloning Configurations.

NOTE : If copying card configurations to a different rack, take particular care to check all settings in order to receive an error-free configuration. Correctly configured inputs cannot always be simply copied to another rack—you may have to modify the configuration manually.

4- Expand the card's icon in the structure view and click on the channel to configure. The current or default properties of the channel are displayed on the right:

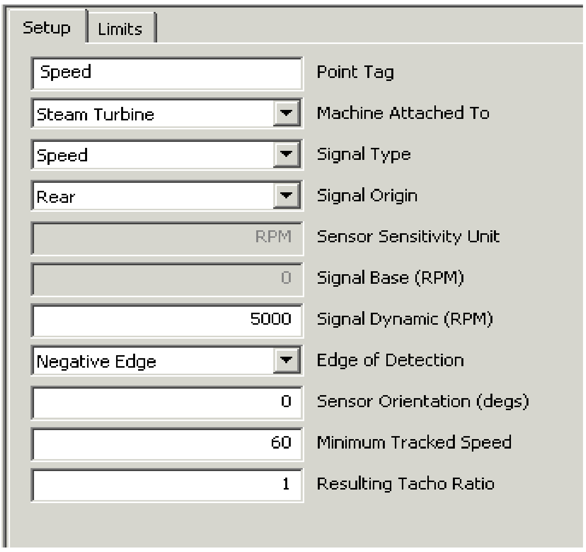


Figure 9-13 : Configuring a Channel

5- Type a **Point Tag** to uniquely identify the channel, for example "Speed/Tacho 1".

6- In the **Machine Attached To** list, select the machine from which the channel is to collect measurement data. If no machines are available for selection, switch to the Logical view and define at least one station and one machine, as described in 9.9.2 - Attributing Machines to a Station.

7- Select the type of input signal from the **Signal Type** list on the property sheet on the right:

- **Dynamic**: A waveform formed by a combination of signals at different frequencies with different amplitudes. Refer to Configuring Dynamic Channels below.
- **Analog**: A DC level giving a single value at any one time, for example temperature, pressure, or flow. Also known as a "process" signal. Refer to Configuring Analog Channels.
- **Digital**: A signal that has only two possible states, "on" or "off". Used to monitor on/off switches or open/close relays. Refer to Configuring Digital Channels below.
- **Speed**: An analog signal measuring the velocity of a point, usually in RPM. Also known as a tacho input. Only channels 1 to 4 of a CMC 16 card can be configured as speed inputs. Refer to Configuring Speed (Tacho) Channels below.

Signals can be acquired either internally from adjacent Machinery Protection Cards (MPC 4) via the VM600 rack's raw bus or tacho bus, or externally via the screw terminal connectors on the matching IOC 16T card at the rear of the rack. For details on configuring the IOC 16T card, refer to 9.15 - Configuring the IOC 16T Card.

8- Configure the parameters associated with the channel as described in the sections that follow.

9- Click the Save button to store the configuration in the database.

9.7.7 Configuring Dynamic Channels

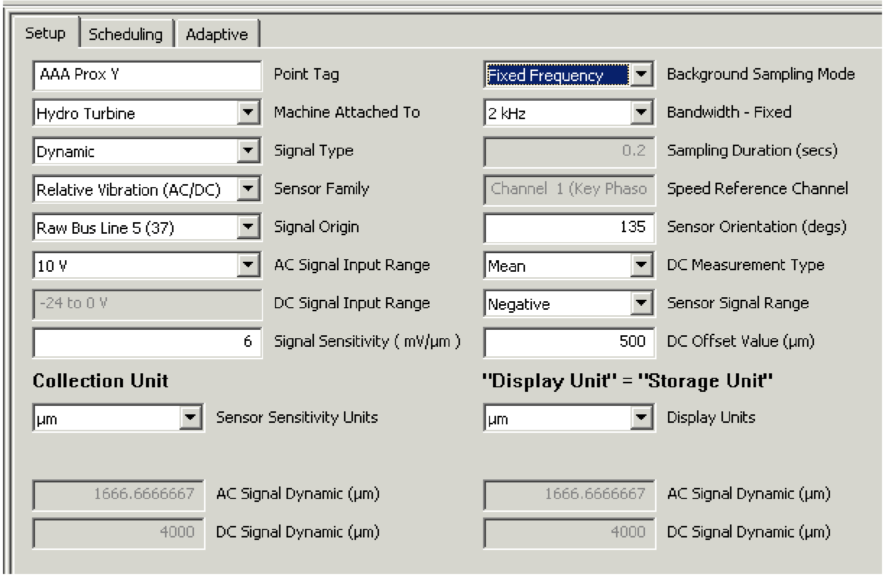


Figure 9-14 : Configuring a Dynamic Channel

1- Type a unique **Point Tag** to assign to the channel.

2- In the **Machine Attached To** list, select the machine from which the channel is to collect measurement data. If no machines are available for selection, switch to the Logical view and define at least one station and one machine, as described in 9.9.2 - Attributing Machines to a Station.

3- In the **Sensor Family** list, indicate the type of dynamic signal being acquired:

- **General (AC)**. For measurements of “general” signal types with AC components.
- **General (AC/DC)**. For measurements of “general” signal types with a mixture of AC and DC components. It is possible to dedicate one of the outputs to DC, which can be used for Line checks or plausibility checks in cases where a DC signal component is expected.
- **General (AC/DC) Air Gap**. Similar to the General (AC/DC) type, but with predefined values that have been set up for correct measurement. It can be considered as a template for air gap sensors.
- **Absolute Vibration (AC)**. For absolute bearing vibration measurements. This sensor family provides integration.
- **Relative Vibration (AC/DC)**. For measurements of relative vibration, typically for proximity probes. AC represents the dynamic relative vibration and the DC component represents the gap.

4- Select the **Signal Origin**. Indicate whether the signal originates from the screw terminal connectors on the IOC 16T card at the rear of the rack, or from one of the lines of the VM600 rack's raw or tacho bus.

5- Set the **AC Signal Input Range**. Select the conditioning range of the incoming signal. A range of pre-selected values are available between 100 mV and 20 V. Depending on the type of Sensor Family selected, the corresponding DC Signal Input Range is displayed.

6- The **Signal Sensitivity** is the ratio of the change induced in the output to a change in the input signal. Specify a non-zero value. Refer to the datasheet or calibration sheet of the sensor.

7- Choose the collection units for the data in the **Sensor Sensitivity Units** field below. A typical signal sensitivity value for a proximity probe transducer, for example, is 7.87 mV per micron (200 mV per mil).

8- In the **Background Sampling Mode** field, specify whether order tracking or fixed frequency is to be used to trigger the time-series data acquisition. Order tracking should be chosen when accurate phase information is required, and whenever speed-related frequency components are of interest.

9- Depending on the selected sampling mode, choose the order or fixed frequency **Bandwidth** to be logged:

- For **Orders** (machine speed multiplication factor), choose one of the pre-selected values between 1.56 orders (range 0 to 1.56 times the running speed of the machine) and 400 orders.
- For **Fixed frequency** (maximum frequency in Hertz), choose one of the pre-selected values between 100 Hz (range 0 to 100 Hz) and 20 kHz.

10- The **Speed Reference Channel ID** is the speed (tacho) channel from which the machine's speed data is derived. If more than one channel is configured, select the speed channel to use.

NOTE : Only speed channels on the same CMC 16 card and associated with the same machine can be selected as the reference speed channel.

11- **Sensor Orientation** specifies the physical mounting orientation of the input sensor in degrees. The default value, 90, corresponds to 12 o'clock (TDC, top dead centre), while 270 corresponds to 6 o'clock. The value must be in the range 0 to 360.

12- The **DC Measurement Type** is used to determine the DC (Gap) value from the vibration signal. In the case of relative vibration channels, the DC component represents the gap between the probe tip and the target material (e.g. the shaft). Select:

- **Minimum**. The minimum value of the vibration signal is used.
- **Maximum**. The maximum value of the vibration signal is used.
- **Mean** (the default). The mean average value of the vibration signal is used.

This is only applicable to the Relative Vibration sensor family.

13- The **Sensor Signal Range** is used to specify the polarity of the input signal. This can be used to invert the time waveform data. A positive voltage implies that the minimum DC gap corresponds to the minimum display value. A negative voltage implies that the minimum DC (Gap) value corresponds to a maximum display value.

This is only applicable to the Relative Vibration sensor family.

14- The **DC Offset Display Base** is the minimum value of DC (Gap) that it is possible to display. It is determined by the thickness of the sensors.

This is only applicable to the Relative Vibration sensor family.

NOTE : For information on which direction for the offset definition of relative vibration points, refer to Q. Which direction for the offset definition of relative vibration points? in Chapter A - Troubleshooting and Frequently Asked Questions.

15- In the **"Display Unit = Storage Unit"** field, choose the units in which to display the DC (Gap): microns or mils. Any engineering units with the same unit family as the collection unit (sensor calibration unit) can be selected. In the case of integration, the appropriate choice is offered for absolute vibration signals. All data is stored and displayed in the chosen units.

On the **Scheduling** property sheet:

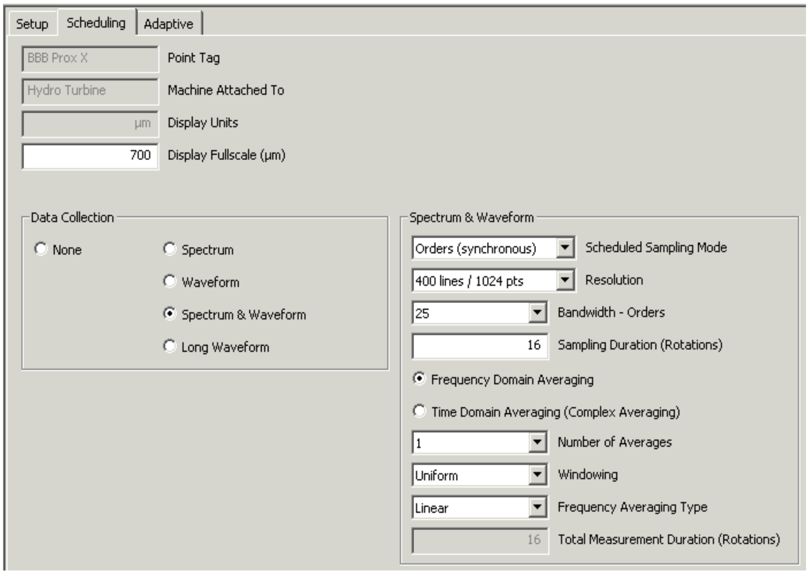


Figure 9-15 : The Scheduling Property Sheet

1- Specify the **Display Fullscale** to be used. This is the maximum value to be displayed for scheduled datasets. The value is in the currently selected display units.

2- Select and configure the type of data to be collected when operating in Alternative mode (see 1.3.3 - Alternative Operating Mode). The choices are:

a. **None**. No waveform data is collected.

b. **Spectrum**. Store scheduled frequency spectra only.

c. **Waveform**. Store scheduled time waveforms only.

d. **Spectrum and waveform**. Store both scheduled time waveforms and frequency spectra.

e. **Long Waveform**. Store long waveform (also known as oscilloscope) data only. This is useful for the extended capture of time-based data (for example, over several minutes).

For Spectrum, Waveform, or Spectrum and Waveform data, specify:

- **Resolution**. Select the number of spectral lines or waveform points to include in the spectrum.
- **Scheduled Sampling Mode**. Select "Orders" or "Fixed Frequency" and the corresponding bandwidth.

- **Number of Revs** (when Orders sampling mode is selected). The value is displayed for information only, and depends on the values of resolution and the bandwidth.
- **Sampling Duration** (when Fixed Frequency sampling mode is selected). The calculated sampling duration. The value is displayed for information only, and depends on the values of resolution and the bandwidth.
- **Time Domain Averages**. The number of synchronous time-domain samples to be used to calculate the average time waveform (used to eliminate random data).

The following values apply only to Spectrum data:

- **Windowing**. The type of windowing function to be applied to the time-domain data. For Order tracking, a Uniform window is recommended, while for fixed frequency acquisition, a Hanning window should be applied.
- **Frequency Domain Averages**. The number of synchronous frequency-domain samples used to calculate the average frequency spectrum in order to eliminate random data.
- **Frequency Averaging Type**. The method used to calculate the frequency spectrum using the number of frequency domain averages selected above. The methods available are **Linear** (the resultant frequency spectrum is the mean of the value selected in Frequency Domain Averages), **RMS** (the resultant frequency spectrum is the square root of the mean of the value selected in Frequency Domain Averages), and **Peak Hold** (the resultant frequency spectrum is the maximum amplitude at each line from the value selected in the **Frequency Domain Averages** field).

On the **Adaptive** property sheet:

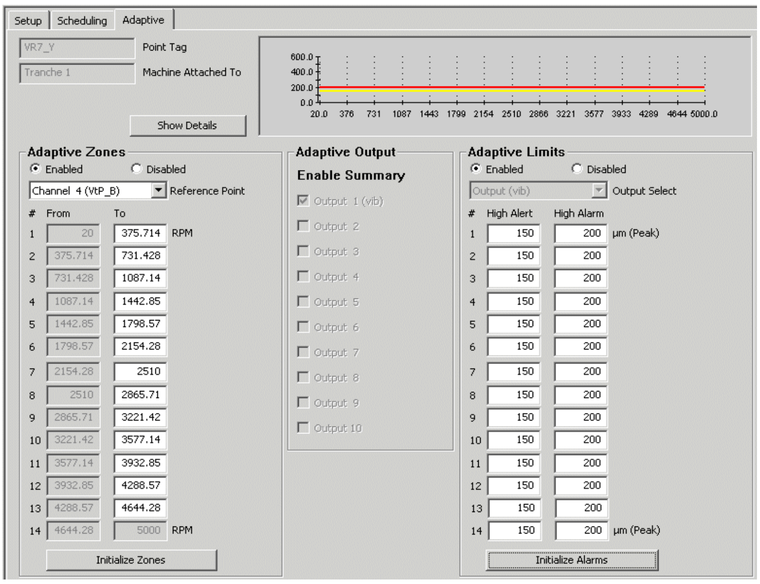


Figure 9-16 : The Adaptive Monitoring Property Sheet

Adaptive Monitoring allows you to set alerts and alarms dynamically, depending on the value of a chosen speed signal.

NOTE : Adaptive monitoring requires an accurate and reliable speed measurement.
To set adaptive monitoring parameters accurately, you should consider creating a trend plot showing the output vibration level against speed, obtained during run-ups and run-downs. This will help you to define the alarm and alert limits you want to configure.

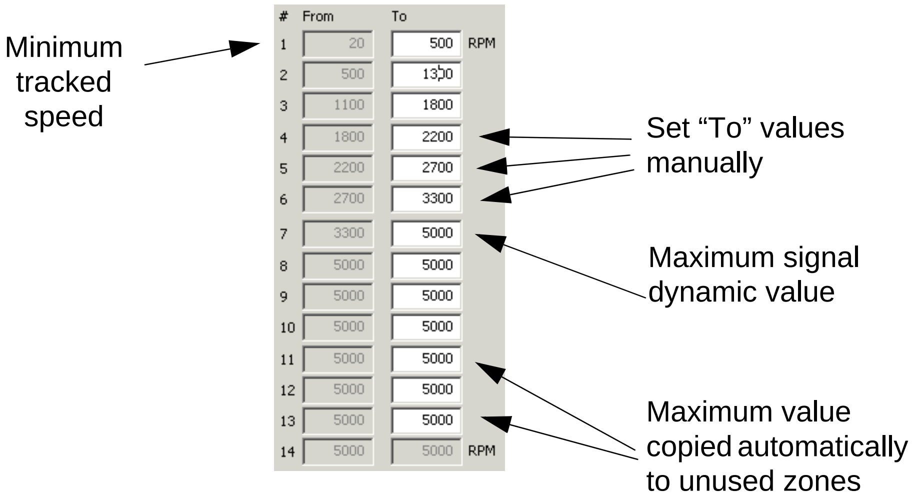
Configure adaptive monitoring as follows:

1- Select a reference point in the **Reference Point** list.

2- In the **Adaptive Zones** area of the window, choose **Enabled** and select the speed channel that is to serve as the reference point.

3- The first “From” value is always the **Minimum Tracked Speed** value for the selected speed channel. The last “To” value is always the **Signal Dynamic** value for the selected channel. Between these two values, you can define up to 14 different tracking zones. The default values are calculated to create 14 zones of equal size. You can overtype these defaults with custom “To” values to define customized tracking zones. The “From” values are automatically re-calculated accordingly.

To define fewer than the maximum 14 zones, type the Signal Dynamic value in any of the “To” boxes, then click in any other “To” zone. For example, to define 7 zones:



To re-display the default values for all zones, click **Initialize Zones**.

4- In the **Output Select** list, choose the output band to be used for adaptive monitoring.

5- In the **Adaptive Limits** area of the window, choose **Enabled** to activate dynamic High Alert and High Alarm limits.

6- The default High Alert and High Alarm values are the **High Alert Amplitude** and **High Alarm Amplitude** values for the selected output band. Enter any custom values you wish for any particular zone. The graphic at the top of the window is continuously updated to display the values of alarms and alerts that you set:

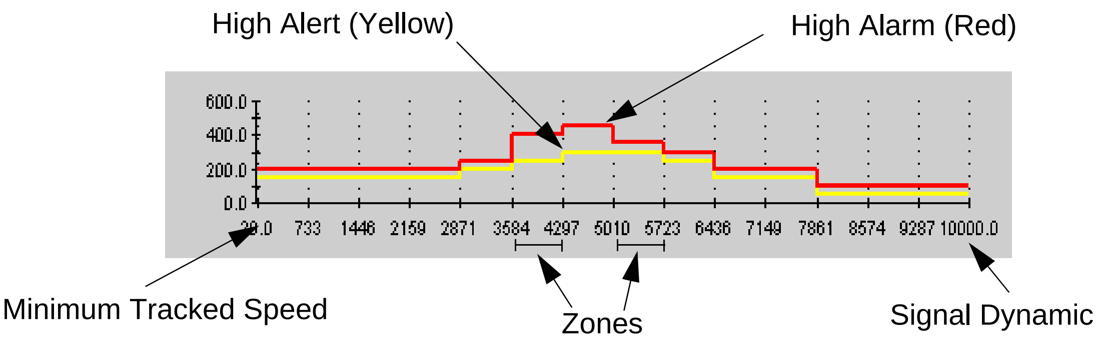


Figure 9-17 : Alert and Alarm Levels

To re-display the default values for all zones, click **Initialize Alarms.**

Click on the **Show Details** button to display a graphic curve of the current Adaptive Monitoring configuration, for example:

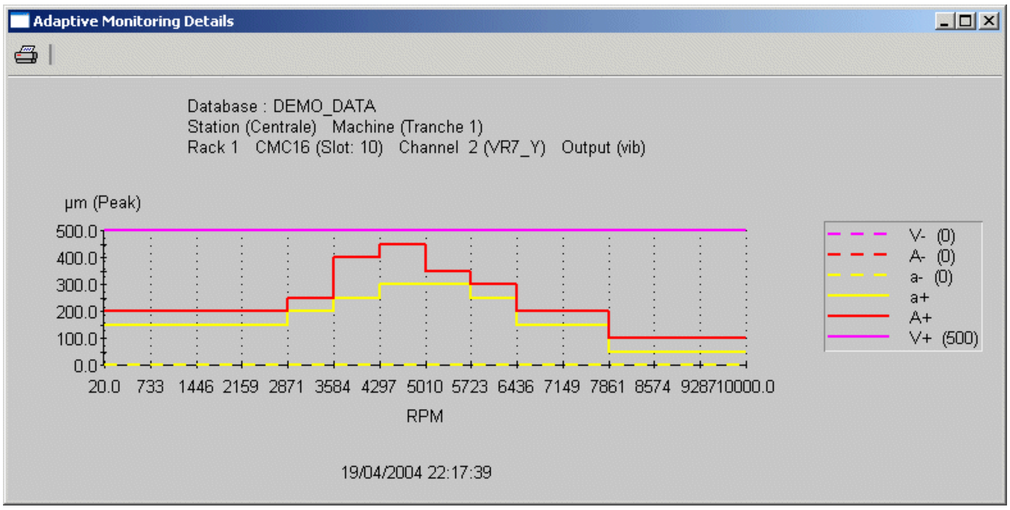


Figure 9-18 : A Typical Adaptive Monitoring Graph

When configuring dynamic channels:

- All dynamic points on the same machine must obtain their speed reference from a speed channel *on the same machine*. If you have more than 15 dynamic points configured, you must pass the speed signal to the other card or cards, for example, using the tacho bus. This speed reference is required even if you set the machine to “fixed speed” in the logical view.
- At least one dynamic point is *required* on each card, in order to trigger and synchronize data acquisition for offline points or analog points. This dynamic point provides offline points or analog points with a time reference (timestamp). If you do not have a dynamic point to measure, this requirement can be met by simply defining a “dummy” point that is not associated with any dynamic signal coming from the card:

9.7.8 Configuring Analog Channels

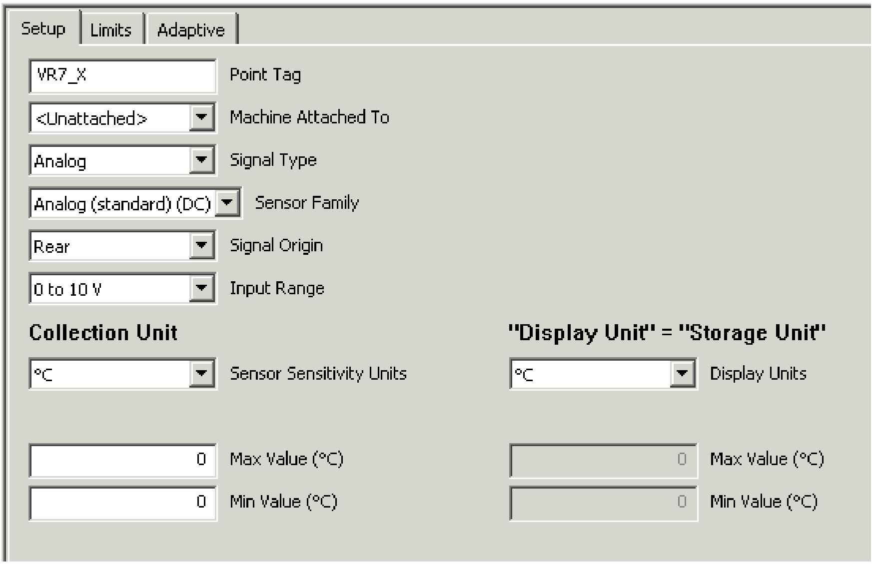


Figure 9-19 : Configuring an Analog Channel

To configure an analog channel:

1- Specify the analog **Sensor Family**, for example “Thermocouple (E-Type)”.

2- In the **Signal Origin** field, specify whether the signal originates from the screw terminal connectors on the IOC 16T card at the rear of the rack, or from one of the lines of the VM600 rack’s raw or tacho bus.

3- For standard analog inputs, specify collection units as the **Sensor Sensitivity Units** from the list of available unit types, and specify the maximum and minimum values that are to be captured.

4- For thermocouple inputs, choose whether the thermocouple is **Compensated** or **Uncompensated**.

5- For **Display Units**, choose either degrees Fahrenheit or degrees Celsius. The equivalent **Maximum Value** and **Minimum Value** in the chosen display/storage units are automatically displayed and updated.

On the **Limits** property sheet, configure the alarm types and events, as described in Configuring Alarms below.

NOTE : Since µm is not included in the drop down list, it can be entered manually as a user-defined unit. Press and hold the 'Alt'-key on your keyboard followed by the number 230. Once the ‘Alt’-key is released, a symbol µ appears in the string field. If the using the numbers on the keyboard does not create this symbol, then use the numbers on the keypad.

9.7.9 Configuring Digital Channels

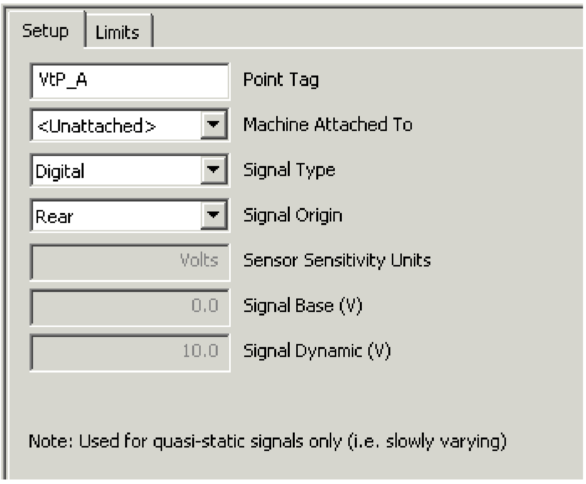


Figure 9-20 : Configuring a Digital Channel

To configure a digital channel:

1- In the **Signal Origin** field, specify whether the signal originates from the screw terminal connectors on the IOC 16T card at the rear of the rack, or from one of the bus lines of the VM600 rack’s raw or tacho bus.

2- For thermocouple inputs, the **Sensor Sensitivity Units**, **Signal Base** and **Signal Dynamic** values are preset and cannot be modified.

On the **Limits** property sheet, configure the alarm types and events, as described in Configuring Alarms below.

9.7.10 Configuring Speed (Tacho) Channels

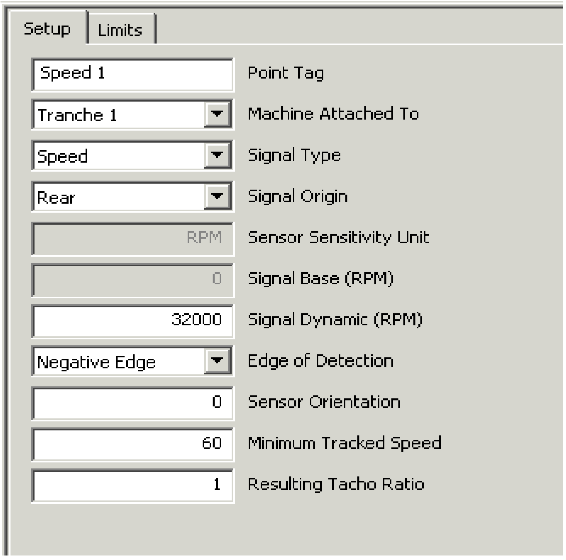


Figure 9-21 : Configuring a Speed (Tacho) Channel

To configure a speed channel, proceed as follows:

1- Type a unique **Point Tag** for the channel, for example “Speed 1”.

2- In the **Machine Attached To** list, select the machine to which the channel is connected.

3- In the **Signal Origin** field, choose whether the signal originates from the screw terminal connectors on the IOC 16T card at the rear of the rack, or one of the rack’s eight tacho bus lines.

4- In the **Signal Dynamic** field, enter the maximum speed (in RPM) to be tracked. The maximum value is limited to 32000 by the hardware.

5- In the **Edge of Detection** field, choose either **Negative Edge** (falling edge) or **Positive Edge** (rising edge).

6- Specify the physical **Sensor Orientation** of the speed sensor, in degrees. The default is zero.

7- Specify the minimum tracked speed, in RPM. The minimum value possible is 15.

NOTE : It is recommended to not set this value lower than necessary, otherwise data acquisition may become relatively slow due to the longer time period required for tacho detection. 60 or 120 should be a suitable value for power generation machinery running at 3000 RPM or higher.

8- In **Tacho Ratio**, enter the tacho ratio. If the input source has a gearbox and the tacho frequency is to be measured on the input shaft, enter the calculated gear ratio between the input and output shafts. Otherwise, leave the default value of 1. The maximum value is 128.

9- Optionally, enter a description of the sensor.

On the **Limits** property sheet, configure the alarm types and events, as described in Configuring Alarms below.

9.7.11 Configuring Alarms

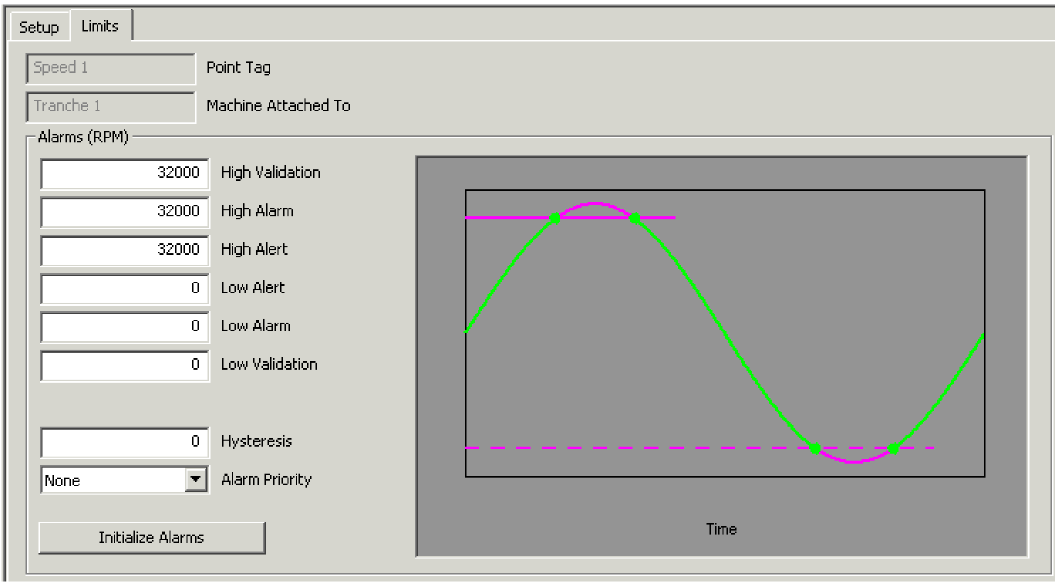


Figure 9-22 : Configuring Alarm Limits

On the **Limits** property sheet of most channel types, you can configure the values necessary to trigger events. These events can in turn be used to display alarms on Mimic displays or in graphs and plots:

1- Optionally, click **Initialize Alarms**. This sets the three "high" values to the maximum allowed value of the channel specified on the **Setup** property sheet, and the three "low" values to the minimum allowed value of the channel. The graphical representation of the alarm values on the right of the window is updated accordingly.

2- Specify **High Validation**, **High Alert** and **High Alarm** values for the channel. The values must be between zero and the **Signal Dynamic** value set on the **Setup** property sheet. The units used are those specified on the **Setup** property sheet for the respective channel type, for example, Volts or Degrees Celsius.

3- Specify **Low Validation**, **Low Alert** and **Low Alarm** values for the channel. The values must be between zero and the **Signal Dynamic** value set on the **Setup** property sheet.

4- Optionally, specify a **Hysteresis** value. Also called "deadband", hysteresis is that portion of a signal where a change in input does not produce a corresponding change in output. Hysteresis can be used to eliminate spurious events caused by the current value dropping frequently below then rising above the alarm level, generating multiple events. Enter a value in the currently selected engineering units.

5- Specify the **Alarm Priority**. Alarm priority can be None, Low or High. Refer to Table 1-1 in Chapter 1 - Introduction for details.

The schematic plot shows the event generation behaviour will react based on the currently selected parameters.

Refer to 1.2.5 - Limits and Alarm Priorities for details on these values.

9.7.12 Configuring Frequency Bands

The VM600 CMS Software allows you to specify up to 10 frequency bands for each dynamic channel to enable the collection, analysis and display of dynamic data.

Each frequency band (also often referred to as spectral bands or frequency components) can be set up to look at one line or a range of lines on the frequency spectrum. The start and end frequencies of the band can be defined either in terms of multiples of the machine speed (RPM), or as an absolute frequency value (Hertz).

Each band can indicate RMS, true RMS, peak, peak-to-peak, true peak, true peak-to-peak, DC (Gap), S_{max}, or band peak. Acceleration (g), velocity (in/sec, mm/sec) and displacement (mil, micron) signals are also available and can be converted for display to any standard.

You can set up events for frequency bands so that measurement data is stored in the database only if the change of value exceeds a pre-defined threshold. Values can also be averaged for smoothing or noise reduction while another process is used to calculate long-term averages.

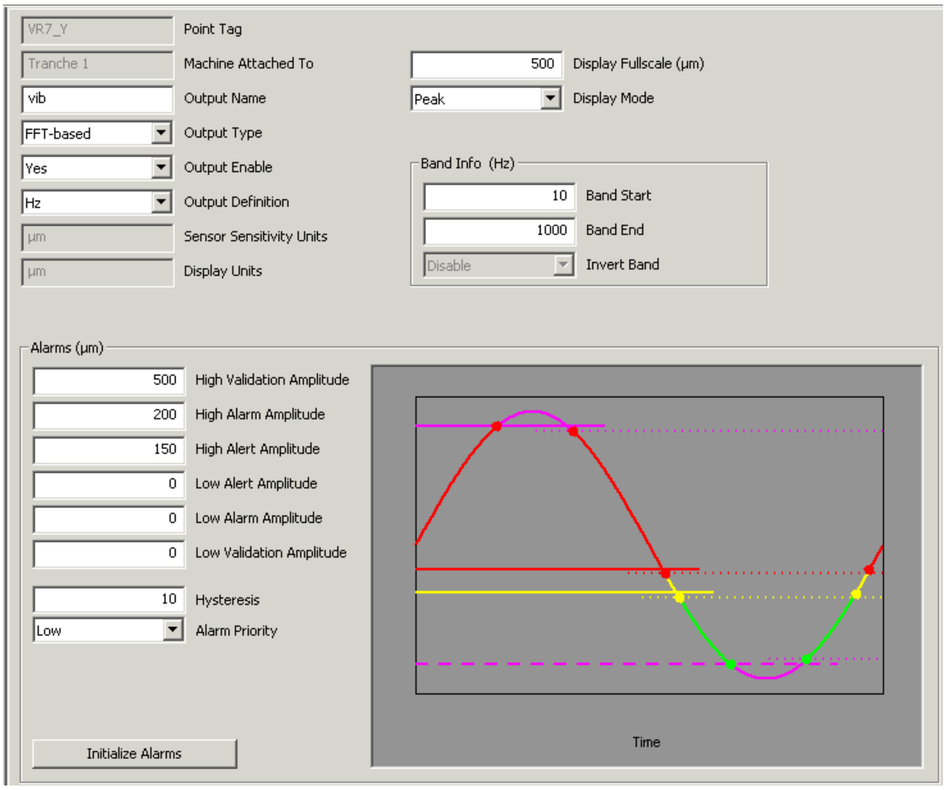


Figure 9-23 : Configuring Frequency Bands for Dynamic Channels

To configure a frequency band for a channel:

1- Switch to the **Architectural** view.

2- Expand the channel icon in the structure view and click on the output to configure. The current or default properties of the output are displayed on the right.

3- If the output's configuration is similar to that of another output that you have already configured, consider cloning the configuration, as described in 9.7.13 - Cloning Configurations.

4- **Output Name**. Enter a name for the output (1 to 8 alphanumeric characters). For example, "1X", or "OVR". Names must be unique on the channel to which they belong, but the same names can be used for other channels of the same card.

5- **Output Type**. Choose whether the output is time domain-based (that is, shows a frequency amplitude vs. time graph) or FFT-based (when discrete frequency components are calculated from sampled time data).

6- **Output Enable**. Select **Yes** to enable this output, or **No** to disable the output.

7- **Output Definition** (FFT-based outputs only). Whether the output is to be defined in terms of **Orders** (the frequency band start and end positions are specified in terms of machine speed multiplication factors), or **Hz** (the band start and end positions are specified in Hertz).

8- **Sensor Sensitivity Units**, **Display Units** are the units chosen for the vibration channel, and cannot be modified here.

9- **Speed Reference Channel ID** (FFT-based outputs only) is the speed channel selected for use with the vibration channel, and cannot be modified here.

10- **Display Fullscale**. The maximum value which is to be displayed for the output.

11- **Display Mode**. The type of data to be displayed for the band. If the **Output Type** is FFT-based, the following options are available:

- **Peak**. Uses the band energy value as the band peak signal value, where the band energy is:

  Band_energy = $\sqrt{\Sigma y^2}$

  where y is the peak amplitude at each frequency line in the band.

- **Peak-Peak**. Uses (2 x Band_energy) as the band peak-to-peak signal value (see above for band energy definition).
- **RMS**. Uses (Band_energy ÷ $\sqrt{2}$) as the band peak-to-peak signal value (see above for band energy definition)
- **Band Peak**. Uses the peak amplitude value within the frequency band.

If the selected **Output Type** is Time-Domain based, the following options are available:

- **True RMS**. The arithmetic RMS of the amplitude:

  Arithmetic_RMS = $\sqrt{y^2 / n}$

  where y is the value of each sample of the time domain.

- **True Peak-Peak**. The peak-to-peak amplitude value of the time waveform data.
- **True Peak**. The peak-to-peak amplitude value of the time waveform data divided by two.
- **DC (Gap)**. The negative DC output signal of a proximity probe, which indicates the physical gap distance.
- **S_{max}**. This value can only be derived from a speed-driven machine. The value is based on the synchronously acquired time-series data of two associated channels. Choose the second channel to be used to derive the S_{max} value from the **Associated Channel** list. It is sufficient to define the Smax output on just one of the two participating time domain based vibration channels. Defining it twice loads the system with unnecessary processing and stores redundant information.

12- **Band Start** (FFT-based outputs only). The lower limit of the spectral band in Orders or Hertz, depending on the value selected in the **Output Definition** field.

13- **Band End** (FFT-based outputs only). The upper limit of the spectral band in Orders or Hertz, depending on the value selected in the **Output Definition** field. Set the value to exactly the same value as the **Band Start** field to select a single frequency or harmonic.

14- **Invert Band** (FFT-based outputs only).

15- Specify **High Validation Amplitude**, **High Alert Amplitude** and **High Alarm Amplitude** values for the channel. The values must be between zero and the **Display Fullscale** value. The units used are those specified for the channel, for example, Volts or Degrees Celsius.

16- Specify **Low Validation Amplitude**, **Low Alert Amplitude** and **Low Alarm Amplitude** values for the channel. The values must be between zero and the **Display Fullscale** value. The units used are those specified for the channel, for example, Volts or Degrees Celsius.

17- Optionally, specify a **Hysteresis** value. Also called “deadband”, hysteresis is that portion of a signal where a change in input does not produce a corresponding change in output. It can be used to eliminate spurious events caused by the current value dropping frequently below then rising above the alarm level, generating multiple events.

18- Specify the **Alarm Priority**. Alarm priority can be None, Low or High. See 1.2.5 - Limits and Alarm Priorities.

To automatically initialise default alarm values, click **Initialize Alarms**. This sets the three High event values equal to the Signal Dynamic value, and the three Low event values to zero.

9.7.13 Cloning Configurations

NOTE : You must have Super user privileges to clone configurations.

If you have a number of similar configurations, you can often save a lot of time by “cloning”, that is, using one object’s configuration as a template which is then copied to other similar objects. You can then change the values of any parameters that are different between the two configurations.

Cloning can be used to copy machines, channels and outputs.

NOTE : You can also copy card configurations using a slightly different drag and drop technique. See 9.7.5 - Cloning Cards with Drag and Drop.

Cloning an object uses the same concept as the Windows clipboard. For example, to create a clone of a machine configuration:

1- Create and configure the machine that is to serve as the template configuration for other machines attributed to the same station.

2- Right-click the machine name and choose **Copy**.

3- Create a second machine.

4- Right-click on the second machine and choose **Paste**. The value of all configuration fields are copied from the source machine definition to this target machine.

5- Change any fields to represent the differences between the two machines. One field that must be changed, for example, is the **Tag**, or unique machine identifier. It is also recommended to change the **Description** tag. Modify the value of these and any other fields to reflect differences between the machines, then click the Save button .

You can also copy and paste channels and card configurations. While most configuration settings are copied, you must specify certain items of required information manually. For example, a newly created point is not automatically attached to a machine, so it cannot retain the speed reference from the original point. Also, dynamic points that are copied lose their Adaptive Monitoring information, since the adaptive reference must be attached to the same machine as the dynamic point. You must also specify a new name for the copied point.

Therefore, check the configuration of a copied point carefully, especially if you have copied to a different card or even a different rack.

9.7.14 Configuring Orbit Displays

An orbit display is a special type of synchronous time-domain data obtained from an X- and Y-probe and therefore measured on two different input channels. Both sets of data are stored in the database, allowing an orbit display to be generated.

To set up an orbit display:

1- Ensure you have **Super** user privileges.

2- In the architectural view, select the CMC 16 card to which the two inputs are attached.

3- Right-click on the card and choose **Add Orbit**, or choose **Add Orbit** from the **Edit** menu. The Orbit setup window is displayed:

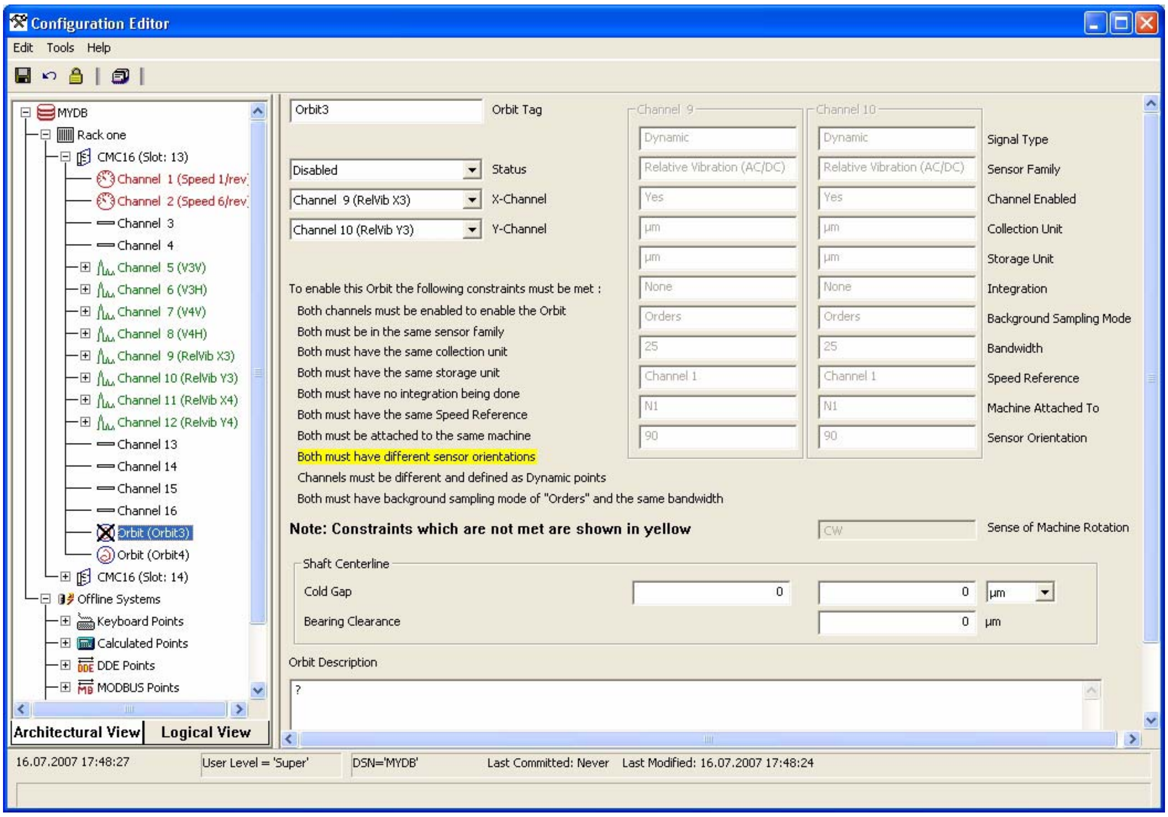


Figure 9-24 : Setting Up an Orbit Display

4- Type a unique **Tag Name** for the orbit display.

5- Specify whether the orbit display is to be **Enabled** or **Disabled**. The configurations of disabled orbit are stored in the database, but measurement data is only collected from enabled orbits.

6- Specify the channels to the used as the **X-Channel** and the **Y-Channel**. The relevant parameters of the channels chosen appear in the two areas on the right.

7- In order for a meaningful orbit display to be obtained, the two selected channels must have the following constraints in common:

- The same channel cannot be selected as both X-Channel and Y-Channel.
- Both channels must be defined as Dynamic channels
- Both channels must have the same Sensor Family
- Both channels must have the same Collection Units
- Both channels must have the same Storage Units

- Both channels must not have integration defined
- Both channels must have the same Speed Reference
- Both channels must be attached to the same machine
- The two channels must have different Sensor Orientations. The difference in probe angles is not, however, restricted to 90 degrees.
- Both channels must have the background sampling mode “Orders” and the same bandwidth.

Any constraints which do not match are shown in yellow. Modify the configuration of one of the selected channels until no constraints are shown in yellow.

8- The **Sense of Machine Rotation** shows whether the machine being measured is rotating in a clockwise or counter clockwise (anti-clockwise) direction.

9- For the Historic and Transient Shaft Centerline graphs, the sensor's cold gap and the bearing's clearance diameter need to be defined. The "cold gap" represents a y-offset from the zero position, typically acquired when the machine is offline or on turning-gear. The Bearing Clearance Diameter should be entered, so the outside circle can be drawn (centred on the x-axis, with the origin y value being half the bearing clearance diameter).

10- Optionally, enter a **Description** of the orbit.

9.7.15 Channel with Signal Integration Has No Time Domain Output

If you configure an input channel with integration (single or double) in the Configuration Editor, the CMC 16 card prepares a single integrated spectrum from which the post-processing outputs are extracted. Time-domain based band extraction can only be used when the channel is not integrated:

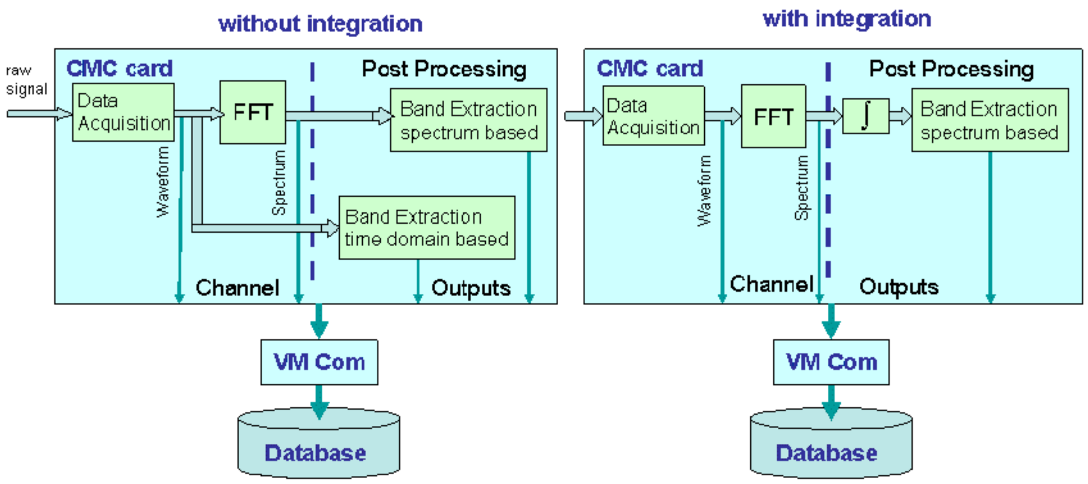


Figure 9-25 : Signal Integration and Time Domain Extraction

9.8 Working with Offline Data

Offline data is data stored in the CMS Software database that does not originate from VM600 racks, but from devices or third-party systems connected to the CMS Software.

Currently, several types of offline data, including Dynamic Data Exchange (DDE), OLE for Process Control (OPC), Modbus programmable controllers, keyboard-originated and ODBC-managed data can be imported in this way.

The number of points per machine is limited to 250. Once more than 250 offline points are attached to a machine, they will not be stored in the database. However, this is unlikely to be restrictive in existing installations since this limitation is per machine.

9.8.1 Adding and Configuring Offline Points

You must use the Configuration Editor to configure the database to be used to store data originating from keyboard offline points.

To define and configure an offline point:

1- Start the Configuration Editor and open the target database.

2- Click the access privileges icon and enter a valid **Super** user password.

3- In the architectural view, select the **Offline Systems** icon .

4- Right-click and choose the offline point type to add:

- Keyboard-entered points
- Calculated points
- DDE points
- Modbus points
- ODBC points

These points are created using optional modules of CMS Software, which are described in the *VM600 Condition Monitoring System (CMS) User Manual, Volume 2*.

5- Right-click on the offline points group icon that appears in the architectural view and choose either **Add Offline Digital Point** or **Add Offline Analog Point**. Offline data can be of two types:

- "Digital" or binary data. This type of data can only have two possible values: "0" (zero) or "1" (one).
- "Analog" data. This type of data can have any integer or floating point value, for example "3.14159".

6- Click on the analog Point 1 or digital Point 1 point icon that appears in the architectural view.

7- In the properties area of the window, type a unique **Point Tag** for the offline point.

8- Select the machine to which the sensor is attached.

9- Optionally, enter a **Point Description** of the offline point.

10- For analog points, select the collection unit for the offline point and configure limits on the **Limits** property sheet.

NOTE : When setting up any type of Offline Points do not forget to add the validation limits.

11- Repeat steps 4 through 10 to add other offline points.

12- Click the **Save** icon to save the changes.

To review the status of all offline points of a particular type, click the offline server type's icon in the explorer view. For example:

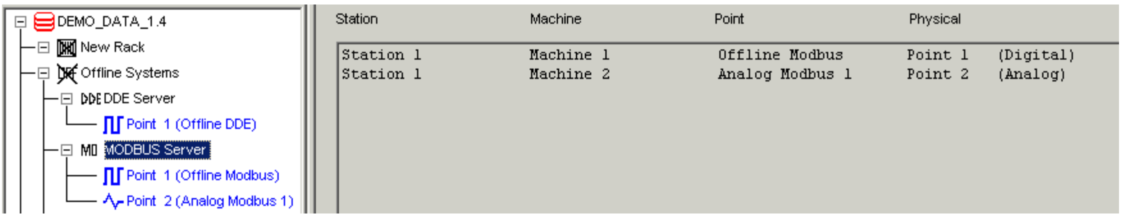


Figure 9-26 : Modbus Offline Points

9.8.2 Duplicating Offline Points

There are two methods of quickly duplicating the configurations of offline points:

- Use the copy and paste procedure described in 9.7.13 - Cloning Configurations to clone an existing offline point.
- Right-click on the **Offline server** icon to which the point to be duplicate is attached and choose **Duplicate Offline Digital Point** or **Duplicate Offline Analog Point**. A new point is created of the same type and with the same configuration as an existing point of the same type. The **Machine attached to** field in the copied point is empty. In order to make the point fully operational, you must attach this point to a machine.

9.8.3 Next Steps

The above description prepares the database for receiving and processing data from offline points, and displays these points in the configuration tree. It also creates the appropriate data structures in which the offline data is stored. The processes to "fill" these data structures with data, however, are separate programs, which are listed in the Data Import/Export section of the VM600 Administrator program.

NOTE : Whenever you add offline points to the configuration, the database must be updated ready to receive the offline data. This update is performed either:

- Automatically, the next time that the VMCom communications handler is launched to establish communications with the VM600 rack.

- Manually, by running the Create Missing Measurement Tables utility described in 7.6.6 - Updating Measurement Tables.

The next step is to set up and configure the link between the source of the offline data and the database. This is achieved using separate configuration utilities, described in *VM600 Condition Monitoring System (CMS) User Manual, Volume 2*.

9.9 Configuring the Logical View

The Logical view is a representation of the machines from which measurement data is collected. Individual machines can be grouped together into stations, which are in turn attached to individual databases. The connection between logical and architectural views is made by defining which channels or points on the VM600 racks are physically connected to which machines.

9.9.1 Attributing a Station to a Database

NOTE : You must have Super user privileges to modify the configuration of a machine.

To attribute a station (that is, a group of machines) to a database, select the database name in the logical configuration tree, then either:

- Select **New Station** from the **Database** menu.
- Right-click and choose **New Station** from the pop-up menu that appears.

When the New Station window appears, type a name for the station in the **Tag** field. This name must be unique, that is, two or more stations cannot have the same name within the same database.

Optionally, type some descriptive text into the **Description** field, for example “Monitoring station in main machine room”.

9.9.2 Attributing Machines to a Station

One or more machines can be logically associated with each station.

To attribute a machine to a station:

1- Right-click the **Station** icon and choose **Add Machine to Station**.

2- On the New Machine window that appears, type the **Tag** to assign to the machine. This name, which must be unique within the station, is used to identify the machine on other configuration windows.

3- Optionally, type a **Description** of the station, for example “Gas Turbine Number 1”.

4- Click **OK**.

5- Configure the new machine, as described in 9.9.3 - Configuring Machines.

Repeat for all other machines to be defined.

9.9.3 Configuring Machines

NOTE : You must have Super user privileges to modify the configuration of a machine.

To configure a machine:

1- Switch to the **Logical** view.

2- Click on the machine to configure. The current or default properties of the machine are displayed on the right:

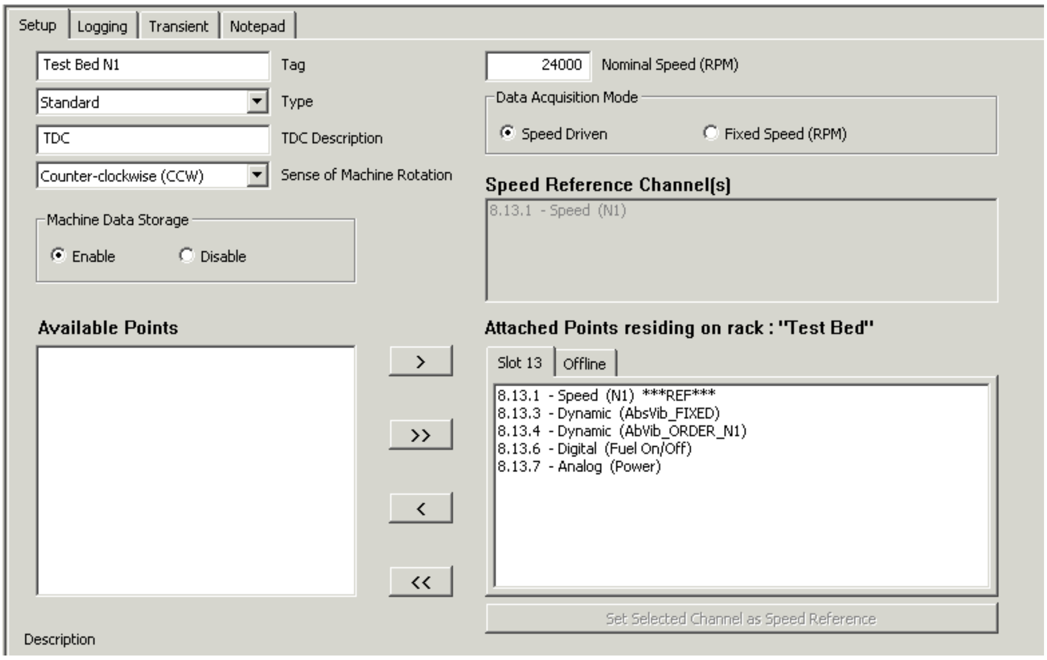


Figure 9-27 : Configuring a Machine

NOTE : If the machine's configuration is similar to that of another machine that you have already configured, consider cloning the machine's configuration as described in 9.7.13 - Cloning Configurations.

3- Configure the following parameters on the **Setup** property sheet for this machine:

a. Modify the unique **Tag** as required.

b. Specify whether the machine is **Speed Driven** or **Fixed Speed**. In either case, enter the **Nominal Speed** in RPM, which corresponds to the "running normally on load" state of the machine.

c. Enter the text label that will be printed at the top of plots to denote the Top Dead Centre (TDC) for this machine's bearing. For example, "TDC".

d. Specify whether the machine rotates in a clockwise only, anti-clockwise (counter clockwise) only, or both directions.

e. From the list of available points, select those that are attached to this machine. Speed points become available for selection as the reference speed point for transient data collected from this machine (see item 4 below).

f. Select a speed channel from the list of attached points and click **Set Selected Channel as Speed Reference**.

Configure the following parameters on the **Logging** property sheet for this machine. Logging settings may vary greatly, depending on the type and purpose of the machine, its nominal speed, the number of measured points in the system, the rate of growth of the database and the amount of disk space allowed for the database. The values shown in Figure 9-28 are typical for a test bed machine with a nominal speed of 24000 RPM.

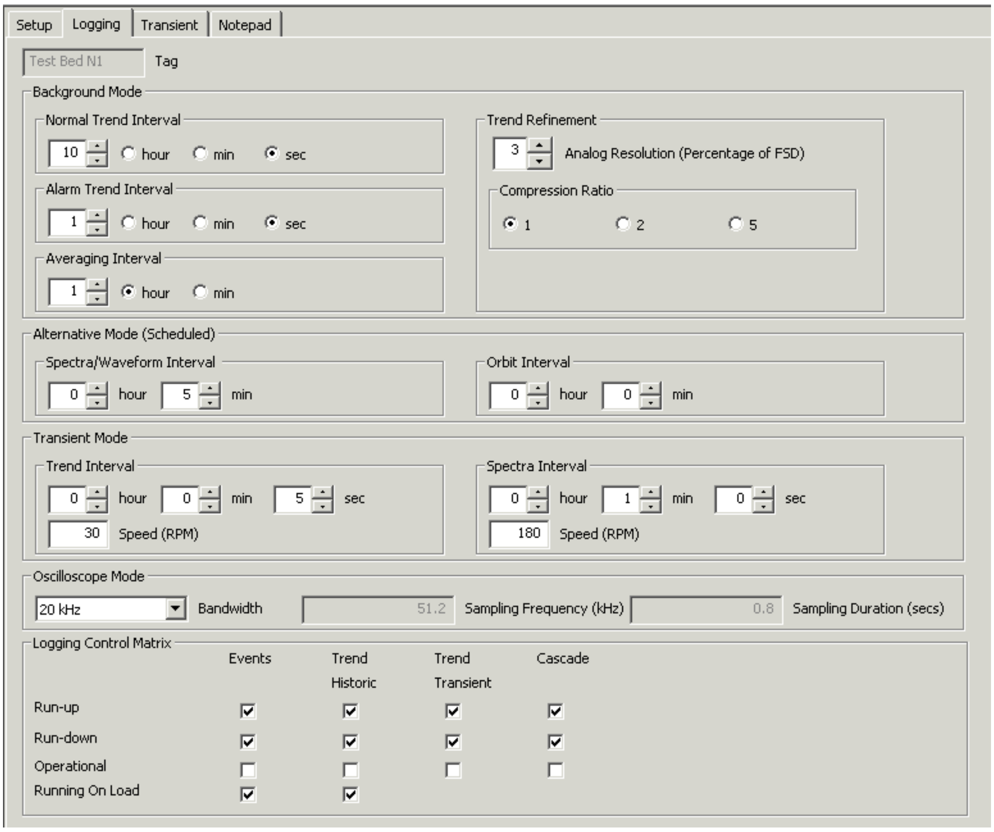


Figure 9-28 : Logging Properties

In the **Background Mode** area of the window, specify parameters to determine the spacing of data points on trend curves generated with data from this machine. Specify the normal and alarm storage intervals (in hours, minutes and seconds), analog resolution (as a percentage), and compression ratio to be used. Refer to 1.6 - Trending for details.

You can also specify the **Averaging Interval**. By default, the CMS Software generates average values for data. These values can be displayed within the Data Analyser module, for example, as the average trend. This parameter sets the time frame for generation of those values. It cannot be switched off—you can ignore this value if you do not need to display averaged data.

In the **Alternative Mode (Scheduled)** area of the window, specify the time interval at which to gather data sets when running . You can specify different time intervals for spectrum/waveform and orbit data acquisitions. Refer to 1.3.3 - Alternative Operating Mode for details.

Specify the time and/or speed interval at which to gather data when the CMS Software is running in transient operating mode. Refer to 1.3.2 - Transient Operating Mode for details.

The **Transient Mode** portion of the window is used to set the transient trend data collection rate:

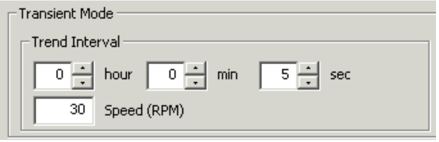


Figure 9-29 : Configuring Transient Mode

Although the CMC 16 card is rated with a minimum storage interval of 200 ms (configuration of a single speed signal for all similarly configured channels on the card at a sampling bandwidth greater than 2.5 kHz), you cannot display this data against time with the CMS Software. Within the database, timestamp intervals are limited to a full second, so you would have to store up to 5 points with the same timestamp. You can, however, plot the transient trend against the speed (also stored in every measured point) to obtain a full picture of your curve.

A collection rate of less than 1 second can only be achieved using a relatively tight speed setting.

In the **Trend Interval** box, specify a minimum storage interval for transient mode. When the CMS Software detects the machine entering transient mode, it takes a trend setting when the specified storage interval is passed. Data is also stored in the database if the change in speed exceeds the specified value before the time interval is passed.

In the example shown above, this means that a sample will be taken every 5 seconds. If the speed increases by 30 RPM before the 5 seconds have expired, data acquisition is effected at that moment (plus the time until the card is ready to accept the data: the minimum storage interval).

Both mechanisms can be disabled. Set a **Speed (RPM)** value of 0 to regularly acquire data every x seconds, minutes or hours regardless of changes in machine speed (once transient mode is detected). Set a **Trend Interval** value of 0 hours, 0 minutes and 0 seconds to acquire data in transient mode whenever the change in speed exceeds the configured value.

For slow-adjusting machines, set a longer trend interval (for example, 30 to 60 minutes).

See also Appendix A - Troubleshooting and Frequently Asked Questions for further tips on how to set the **Trend Interval** value.

4- Configure the following parameters on the **Transient** property sheet for this machine:

a. Select the speed channel to be used as the reference speed channel to be used for this machine. The speed channels available for selection are those attached to this machine on the **Setup** property sheet (see item 3 above). Refer to 1.4 - Machine States for more information.

b. Specify values for the transient duration (in minutes, the default is 0), and the RPM at which overspeed, lowspeed, and lowspeed cutoff triggers are activated. Refer to 1.4 - Machine States for more information.

The transient duration is defined on a machines logical view transient page. This feature determines the time period in which the systems after having detected a transient stays in transient mode (i.e. the sampling rate specified on the machines logical view logging page). However, once returned to nominal speed, the transient is not detected. shows an example of historical trends

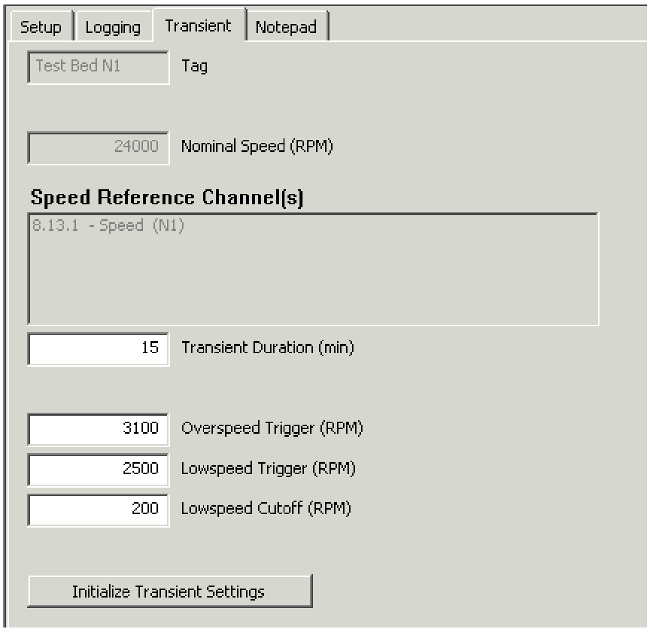


Figure 9-30 : Preview of Transient Page

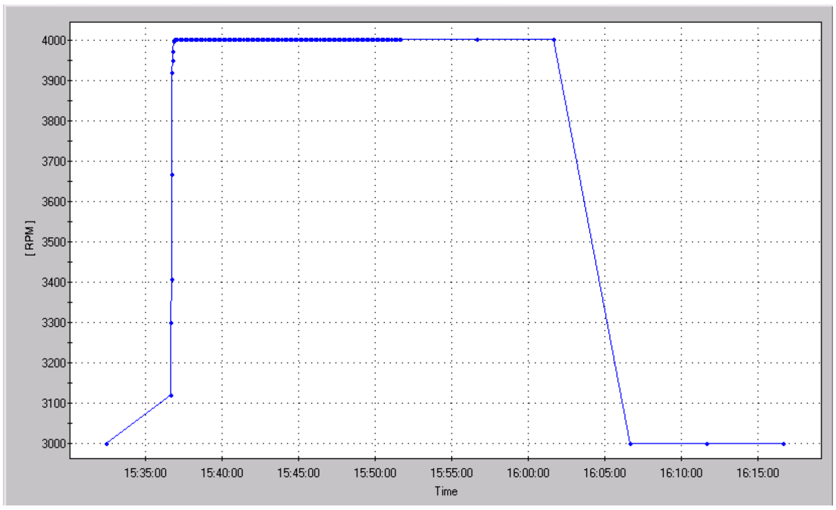


Figure 9-31 : Example of Historical Transients

5- Use the **Notepad** facility to add any optional comments about this machine.

6- When you have finished, click the Save button to write any changes to the database.

NOTE : You are automatically prompted to save changes whenever you click on another machine.

7- Download the configuration to the VM600 racks, as described in 9.14 - Downloading the Configuration to the Rack.

9.9.4 Disabling and Enabling Machines

Machine configurations can be temporarily disabled then re-enabled when necessary.

To disable or enable a machine:

1- Right-click on the machine in the logical view.

2- Select Enable/Disable Selected Machine.

Disabled machines appear crossed out in the logical view. Re-enabling a configuration returns the machine’s icon to its normal state.

9.10 Minimum Rack Configuration

A newly-created configuration must contain a minimum number of items before it can be downloaded to a rack:

- In the architectural view:
  - One VM600 rack
  - One CMC 16 card
  - One point configured on one channel
- In the logical view:
  - One station
  - One machine
  - One attached point.

9.11 Performing Consistency Checks

The Configuration Editor performs a series of consistency checks both automatically (whenever you open a database or change privilege levels), or manually.

You can save and print the results of the consistency checks.

The consistency checks check the complex settings and dependencies for measuring points and their relations in architectural and logical view evolution of requirements and relationships in the database may lead to inconsistent data

The consistency checks test for three types of errors:

- Integrity Checks. These are automatically corrected by CMS Software.
- Manual Update Required Checks. You must correct these errors.
- Field Checks, which require corrective measures.

To manually perform consistency checks:

1- Select the top-level database in either Logical or Architectural view.

2- Choose **Consistency Checks** from the **Database** menu.

3- Choose either **Performs Checks** to launch the checks manually, or **View Previous Results** to display the results of the previous tests (whether performed automatically or manually).

Figure 9-32 shows the results of consistency checks:

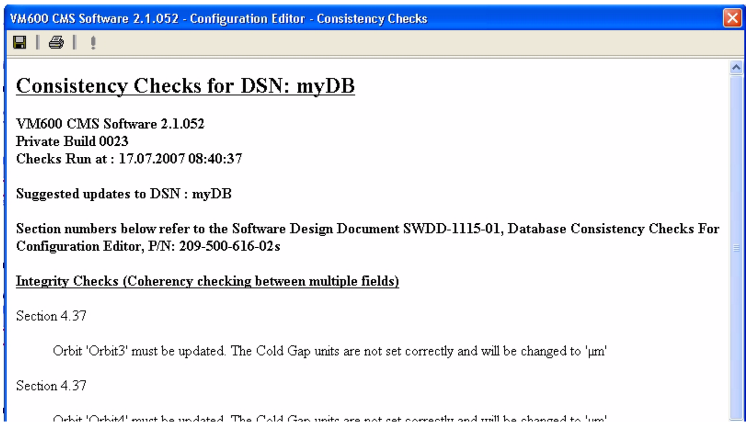


Figure 9-32 : Consistency Checks

You can print the results, or save the results to a file into HTML format.

If the consistency checks include recommended changes, the  icon on the toolbar is activated. Click this icon to automatically apply the recommended changes.

For example:

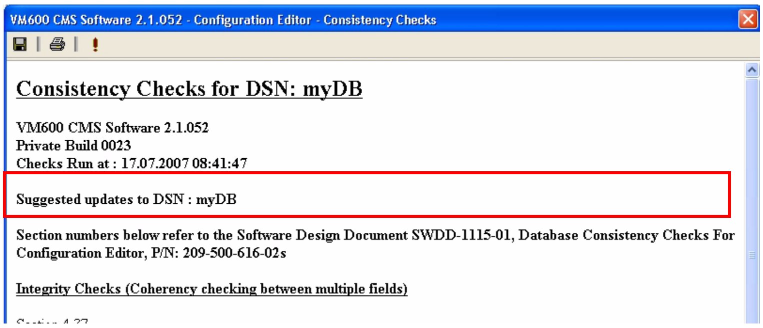


Figure 9-33 : Updates Recommended by Consistency Checks

After clicking the update button , the window changes to:

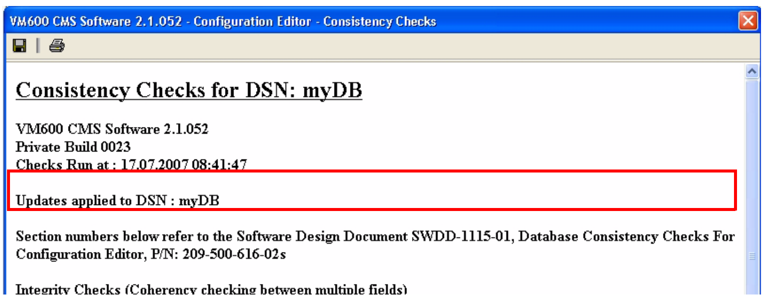


Figure 9-34 : Updates Recommended by Consistency Checks

9.12 Dumping Database Data to File

You can request the Configuration Editor to save an image of the database's current configuration into a comma-separated value (CSV) format file.

This database image helps Vibro-Meter support personnel to view the current configuration of a system. In addition, a printout of the database image can service as official documentation of a VM600 system's configuration, for example, for internal audit purposes.

This database image is smaller in size and easier to produce than a snapshot copy of the database.

To create a database image:

1- Choose **Dump to File** from the **Database** menu.

2- Specify the name and location of the image file (.csv) to be generated.

3- Click **Save**.

Figure 9-35 shows a portion of a database image file, opened as an Excel spreadsheet:

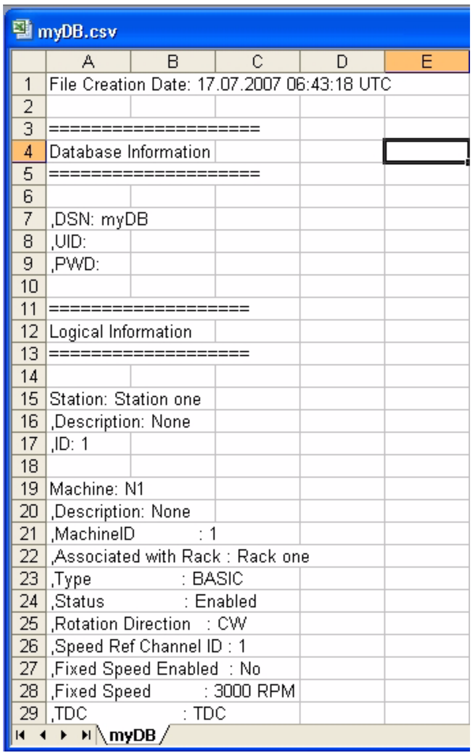


Figure 9-35 : A Database Image File

9.13 Displaying a Database Summary

You can also request the Configuration Editor to save an image of the database's current configuration in an HTML format file.

This image helps Vibro-Meter support personnel to view the current configuration of a system. In addition, a printout of the database image can service as official documentation of a VM600 system's configuration, for example, for internal audit purposes.

This database image is smaller in size and easier to produce than a snapshot copy of the database.

To create a database summary:

1- Click the  icon on the Configuration Editor's toolbar.

2- Specify the name and location of the image file (.html) to be generated.

3- Click **Save**.

Figure 9-36 shows an example:

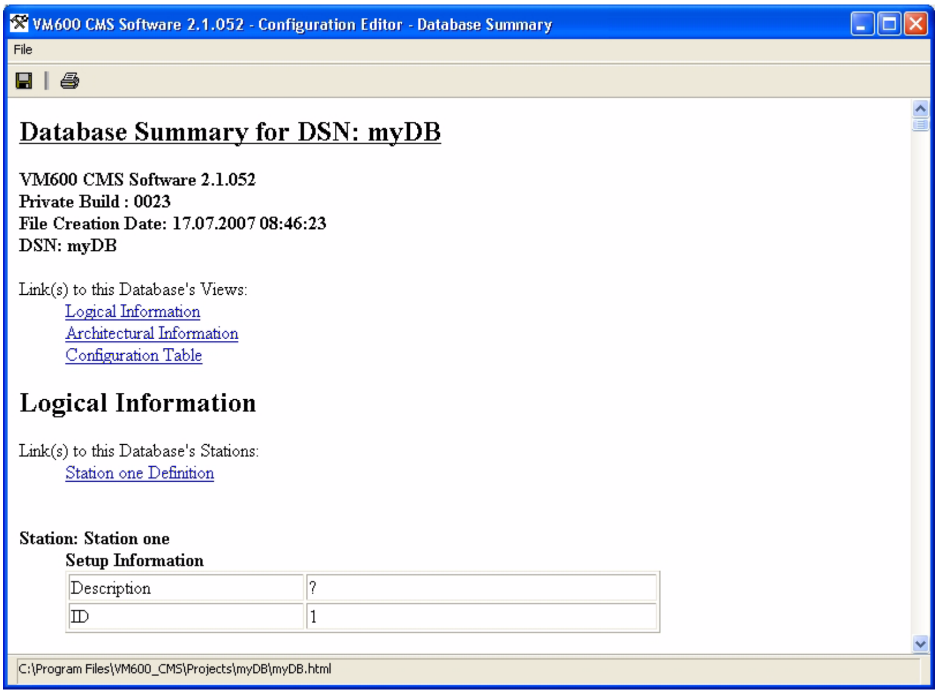


Figure 9-36 : A Database Summary File

9.14 Downloading the Configuration to the Rack

When you have configured all stations, machines, racks, cards, and channels, you can initiate downloading of the configuration to the appropriate racks and cards.

By default, the configuration is automatically downloaded to all racks and all cards whenever the VMCom communications module is started. Refer to Chapter 8 - Setting Up the VMCom Communications Handler for details. If the VMCom communications module is already running (for example, as a Windows system service), you can manually initiate the downloading process from within the Configuration Editor module.

To download the configuration:

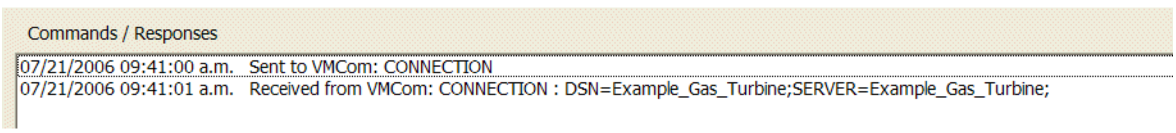
1- Select the top-level database icon in the Logical or Architectural view.

2- Obtain Super user privileges.

3- Test that a connection exists to the VMCom communications module:

a. Select the **Communication Info** property sheet.

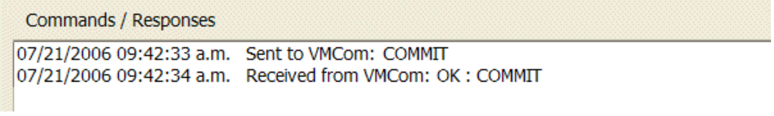
b. Click the Connection icon on the toolbar. If a valid connection exists, the following message is displayed in the console area:



where Example_Gas_Turbine is the system DSN of the database and Example_Gas_Turbine is also the system DSN of the database server.

c. If any other message appears, refer to Appendix A - Troubleshooting and Frequently Asked Questions.

d. Click the Commit icon on the toolbar to begin downloading the rack configuration. If the configuration is successfully downloaded, the following message is displayed in the console area:



If any other message appears, refer to Appendix A - Troubleshooting and Frequently Asked Questions.

9.15 Configuring the IOC 16T Card

In a VM600 rack, CMC 16 and IOC 16T cards must always be installed together, as a pair. The IOC 16T card must be installed in the slot directly behind the CMC 16 card in the VM600 rack.

In order for data signals from measuring equipment to be displayed correctly in the CMS Software, the IOC 16T card configuration must match exactly the CMC 16 card configuration as defined with the Configuration Editor module. Once the configuration of the CMC 16 has been downloaded to the card, you must therefore ensure that the IOC 16T card's hardware configuration matches the software configuration.

The IOC 16T card contains a number of user-configurable switches, each corresponding to a signal coming either from one of the card's rear connectors, or the VM600 rack's raw or tacho bus. When a switch is set to the ON position, the signal coming from the rear connector is blocked. When a switch is set to the OFF position, the signal coming from the rear connector is enabled and passed to the CMC 16 card.

Refer to the *VM600 Condition Monitoring System (CMS) Hardware Manual* for full details.

9.15.1 Printing the Schematic Diagram

To help you set the switches on the IOC 16T card correctly, the Configuration Editor provides a computer-generated schematic diagram of a IOC 16T card showing the switch positions needed to match the current software configuration. You can use this schematic diagram to help you configure the IOC 16T card.

To view and print the schematic diagram:

1- Switch to the architectural view.

2- Select the rack containing the CMC 16 card.

3- Select the **IOC Jumper Matrix** property sheet.

4- Right-click on the image and choose **Print**.

Figure 9-37 below shows an example of a schematic diagram.

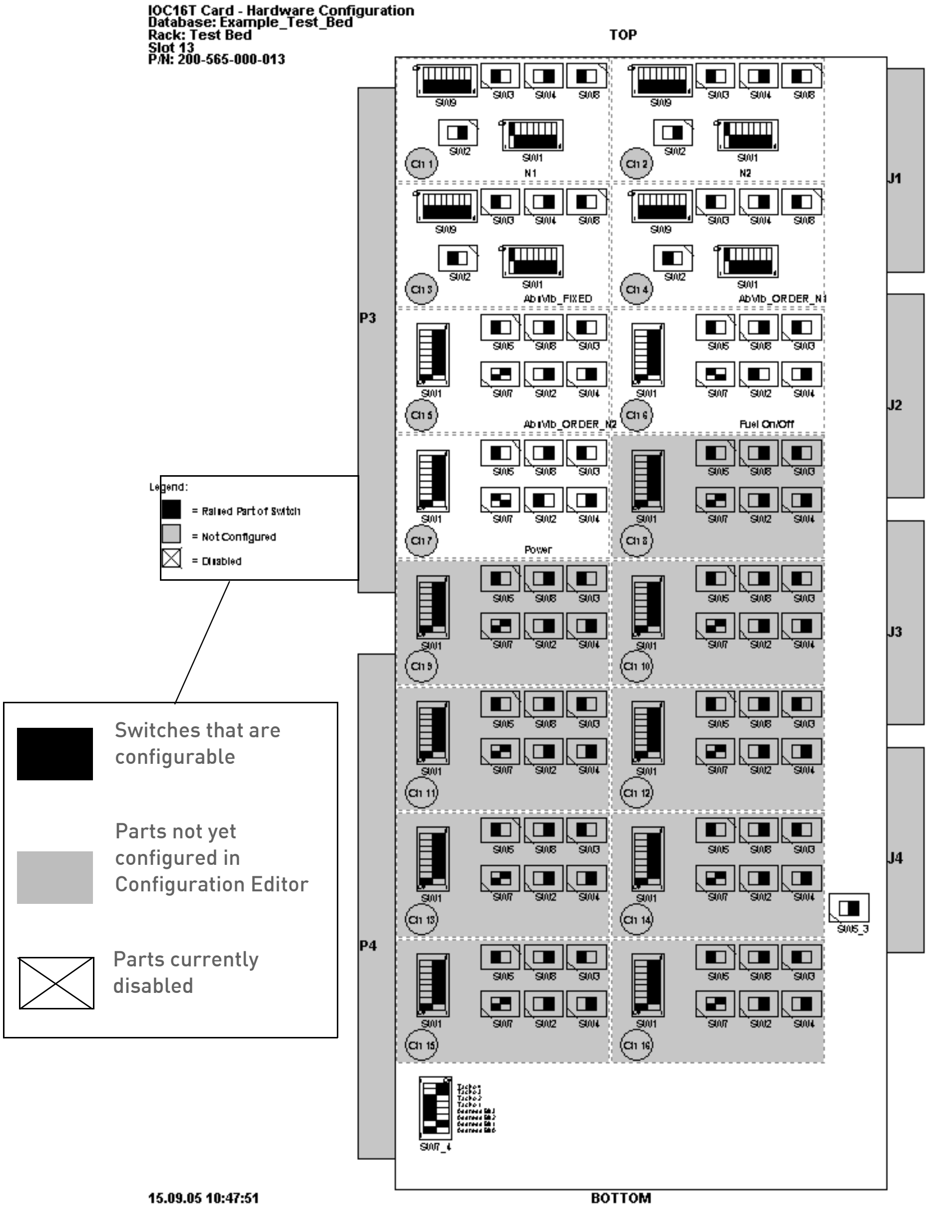


Figure 9-37 : Schematic Diagram of an IOC 16T Card

9.15.2 Configuring the IOC 16T Card

Refer to the *VM 600 Condition Monitoring System (CMS) Hardware Manual* for the procedures to use to safely remove cards from and install cards into a VM600 rack.

To configure the jumper switches on the IOC 16T card:

1- Remove the IOC 16T card from the VM600 rack.

2- Using the printout of the schematic diagram, identify each jumper switch block on the card in turn and check that the jumpers and rotary switches are in the same position as on the printed schematic diagram. For example:

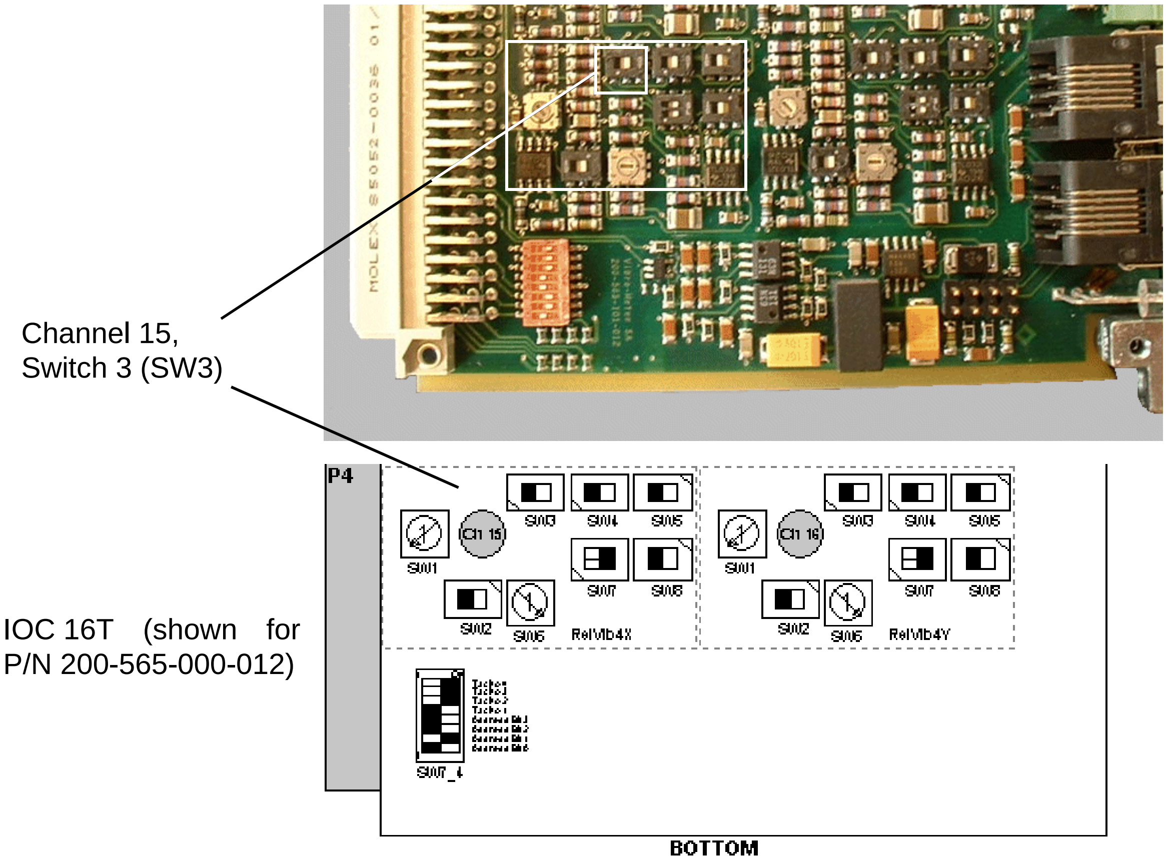


Figure 9-38 : Checking Switch Settings on a Real Card and the Schematic Diagram

NOTE : On a real card, rotary switches resemble either (10 positions) or (5 positions)

The jumpers and switches on an IOC 16T card are very sensitive. Always used a small screwdriver or suitable configuration tool to change jumper or rotary switch positions. Incorrect switch settings or imprecise rotary switch settings can cause missing or incorrect measurement data to be stored in the database.

3- Whenever necessary, change the jumper or rotary switch setting on the card to match the setting shown in the schematic diagram. In the above example, the switches in switch block 15 would need to be changed as follows:

a. Rotate the rotary switch 1 (SW1) to the fully vertical position.

b. Move the raised part of switch 2 (SW2) to the right (ON position)

c. Move the raised part of switch 3 (SW3) to the right (ON position)

d. Move the bottom part of switch 7 (SW7) to the left (OFF position)

For the meaning of the switch positions, refer to the *VM600 Condition Monitoring System (CMS) Hardware Manual*.

4- To perform an additional check that the jumpers are set correctly, you can display a list of the required switch settings. On the **IOC Jumper Matrix** property sheet, right-click on the image to display a contextual menu and choose **Jumper Information**. The following window is displayed:

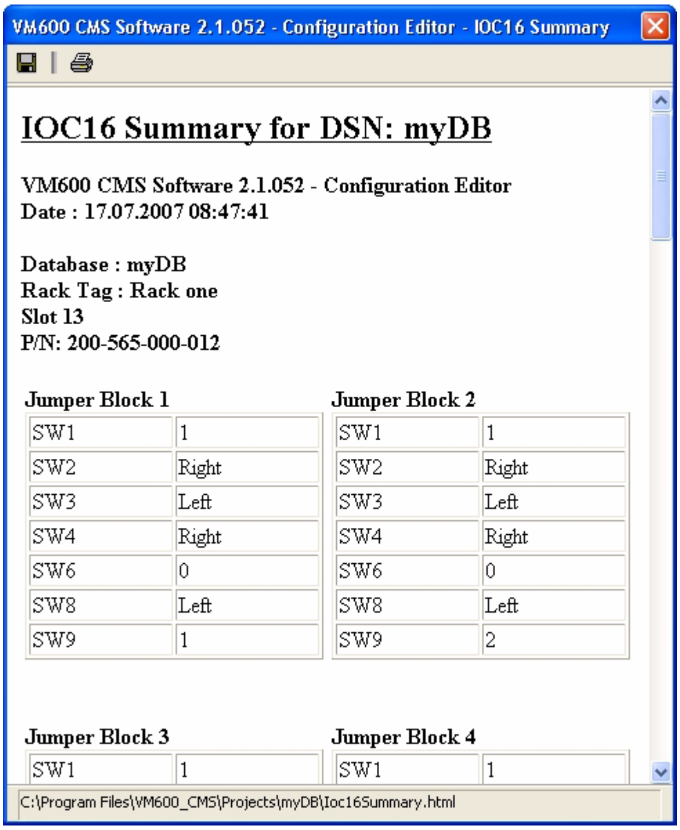


Figure 9-39 : Jumper Summary

5- Reinstall the IOC 16T in the rack when all switch settings have been set correctly.

NOTE : There is no need to remove the CMC 16 card from the rack as part of the reconfiguration procedure.

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Part III : Using the System

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10 USING THE MIMIC MODULE

10.1 Introduction

Mimic is a graphical application that provides the operator with a customized view of the machinery being monitored by the VM600 CMS Software system.

The types of data you can view in Mimic include historic and transient data, “live” data coming directly from one or more VM600 racks, and data from “offline” systems.

To view the data, you create one or more Mimic documents. Mimic documents can contain a variety of predefined objects, such as a Value Indicator or an embedded Excel spreadsheet, which display data in a graphical format.

Mimic is also a “portal” providing one-click access to other CMS Software modules, as shown in Figure 10-1 below:

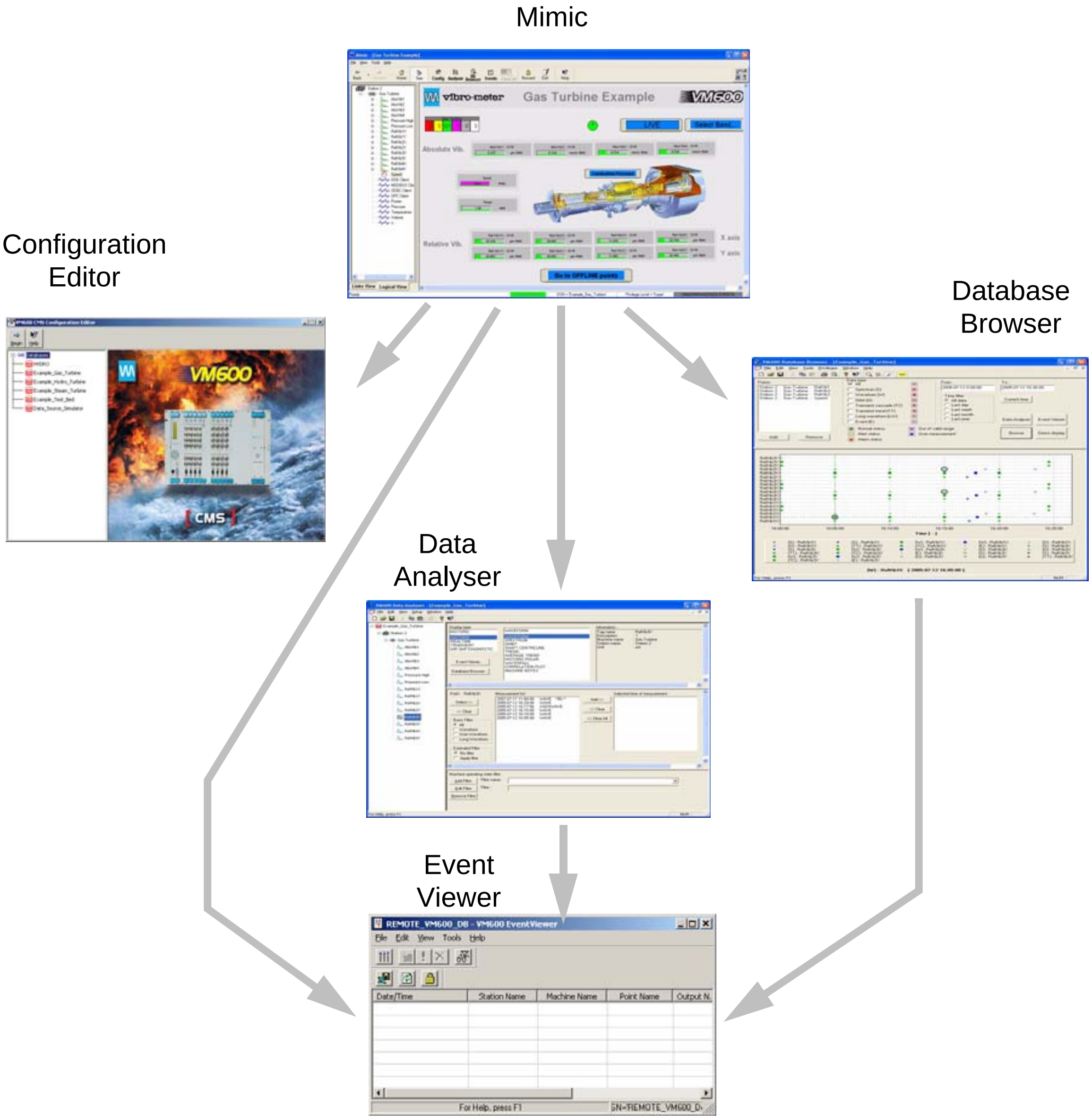


Figure 10-1 : Interrelating CMS Software Modules

10.2 Before Using Mimic

Before using Mimic, you must:

1- Set up and configure a database. This involves:

- Creating at least one database.
- Configuring an ODBC system DSN and user account to access the database.
- Creating and setting up a database server for the database and setting it up to run automatically.

See Chapter 7 - Administering Databases for details.

NOTE : If Mimic is unable to establish a connection to a database when starting up, you will not be able to view any measurement data from the database. However, you can still edit previously created Mimic documents.

2- Optionally, start the VMCom communications handler. If VMCom is running, you will be able to display “live” measurement data in your Mimic documents. Otherwise, you can only display measurement data that has previously been stored in the database.

3- See Chapter 8 - Setting Up the VMCom Communications Handler for details.

4- Use the Configuration Editor to define the initial machine, rack and card configuration and store this configuration in the database.

See Chapter 9 - Creating a Rack Configuration for details.

10.3 Starting Mimic

You can start Mimic by either:

- Choosing **Start > Programs > VM600 CMS Software > Mimic**
- Starting the VM600 Administrator program, choosing **Applications** in the structure view on the left, then double-clicking Mimic.

10.4 Selecting a Database (Mimic)

When you start Mimic, depending on the options chosen in the VM600 Administrator, Mimic starts directly on the previously used database or the Select ODBC Data Source window opens. Refer to Chapter 6.6 - Administrator Options for further details.

If you have previously created a default Mimic document for the database, the Mimic main window is displayed. Otherwise, you are prompted to either browse for a Mimic document to open, or to open Mimic with no loaded document (refer to 10.9.1 - Specifying a Default Mimic Document for further information):

Figure 10-2 : No Default Document

Choose **Yes** to display a list of Mimic documents stored in the selected database. You can then select a Mimic document to be displayed initially.

Choose **No** to open Mimic with no documents.

10.5 The Mimic Main Window

When started, the Mimic main window and default document are displayed. An example is shown in Figure 10-3:

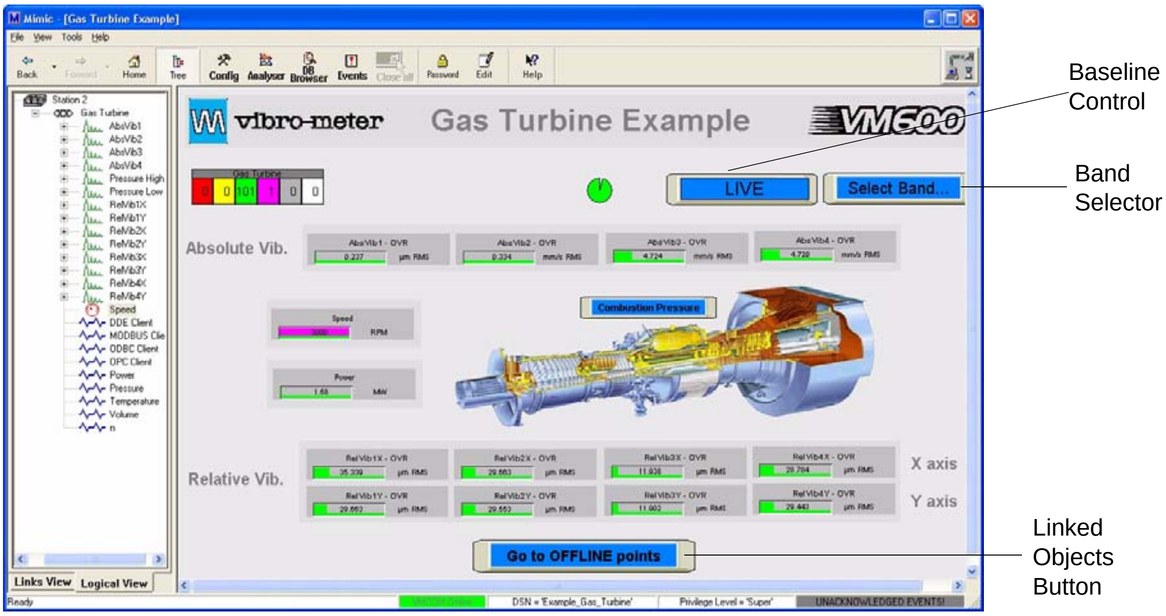


Figure 10-3 : The Mimic Main Window with Default Document

The Mimic main window is made up of:

- At the top, the icon bar.
- To the left, logical and links views of the current configuration stored in the database. See Logical and Links Views on page 10-4 below for details.
- In the middle, the mimic document.
- To the right, the currently loaded Mimic document.
- At the bottom, the status bar.

10.5.0.1 The Icon Bar

The icon bar contains icons providing one-click access to other VM600 modules as well as security settings and online help:

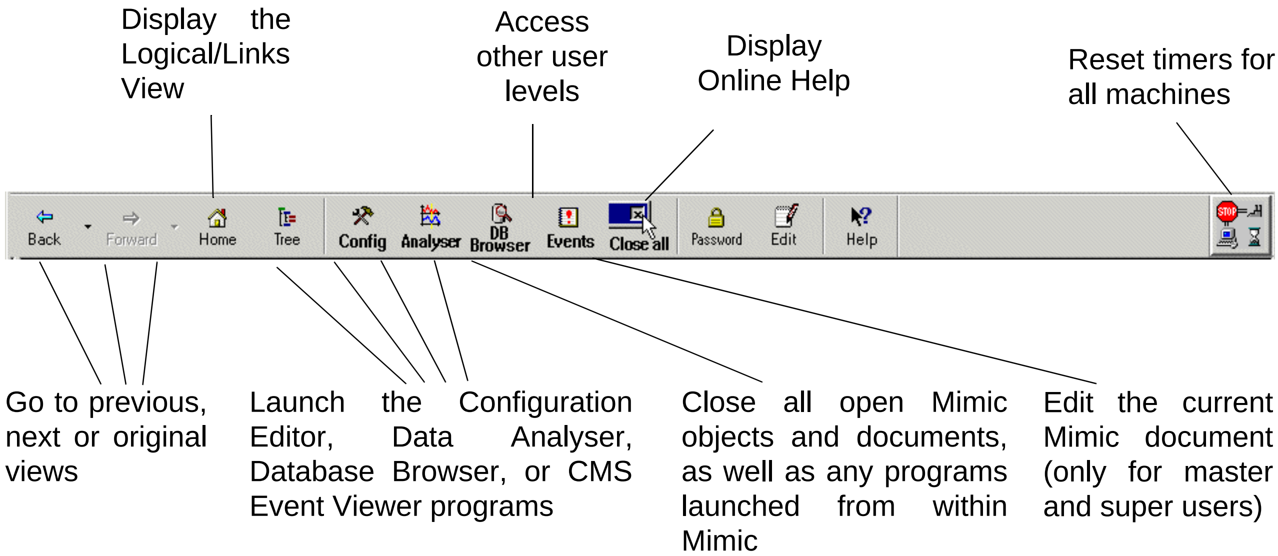


Figure 10-4 : The Icon Bar

10.5.0.2 Logical and Links Views

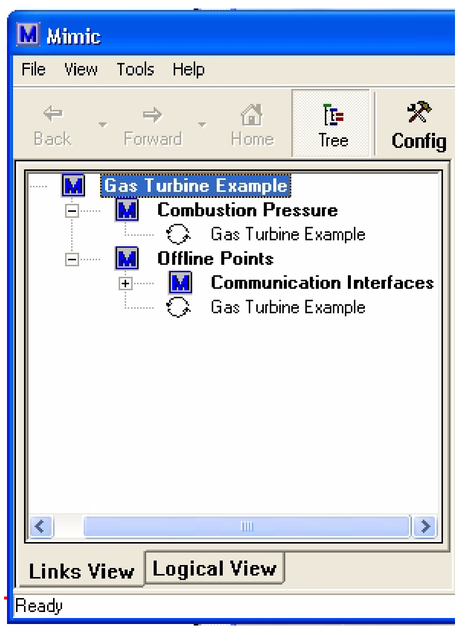
During the configuration process, a mapping between the Logical and the Links Views is performed, by simply attaching measurement channels of the hardware (the “Links View”) to machines (the “Logical View”). All data processing, data storage, and data management for viewing and analysis is based on the logical view.

10.5.0.2.1 The Links View

The Links view shows graphically how the Mimic documents associated with a database are interrelated, and allows you to easily navigate through them.

The Links view is created automatically during system configuration, or by linking graphical objects in one Mimic document to another document.

You can create any number of Mimic documents and structure them as you wish. One document is defined as “default” document, displayed at the top of the Links view structure and which appears by default whenever Mimic is started. Below the default document, the Links view can contain any number of sub-documents, accessible by clicking on links defined in higher-level Mimic documents.

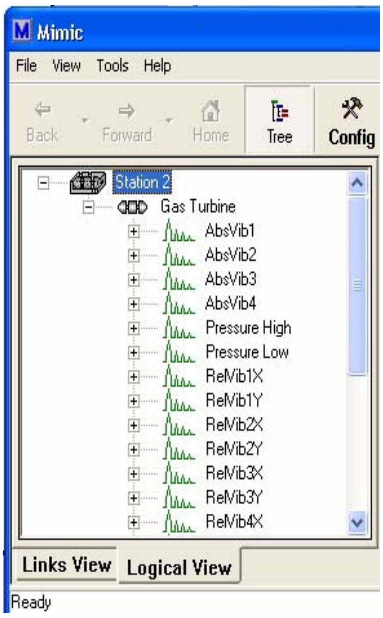


10.5.0.3 The Logical View

The Logical view shows the VM600 system hierarchy from an operator's perspective, that is, the structure in terms of:

- Stations
- Machines
- Points
- Outputs

By double-clicking on an item in the Logical view, or right-clicking and choosing a menu entry, you can display real-time graphs of the data originating from any part of the structure (see 10.6 - Displaying Graphs), or launch the Configuration Editor to modify the system configuration.



10.5.0.4 The Document Window

The right-hand side of the main window displays the current Mimic document. When first started, Mimic loads a default Mimic document if one has been defined. Provided the VMCom communications handler is running, the value and status indicators contained in the Mimic document show "live" measurement data values coming from the VM600 rack. Otherwise, the most recently stored values in the database are displayed.

From CMS version 2.2 upwards, the Baseline Feature (Figure 10-3) enables users to switch between current values, those stored in the database and the difference between them (delta). The baseline switch button indicates which is currently displayed. The Band Selector (Figure 10-3) allows users to switch the display between the different configured bands of the value indicators. The Linked Objects Button allows users to navigate between different Mimic screens (for example, go to offline points).

To change the appearance of the Mimic document, or load a different document, you must enter a special Edit mode. This is described in 10.8 - The Mimic Document Editor.

10.5.0.5 The Status Bar

The status bar, along the bottom edge of the Mimic main window, contains up-to-date indications of the Mimic module's status:

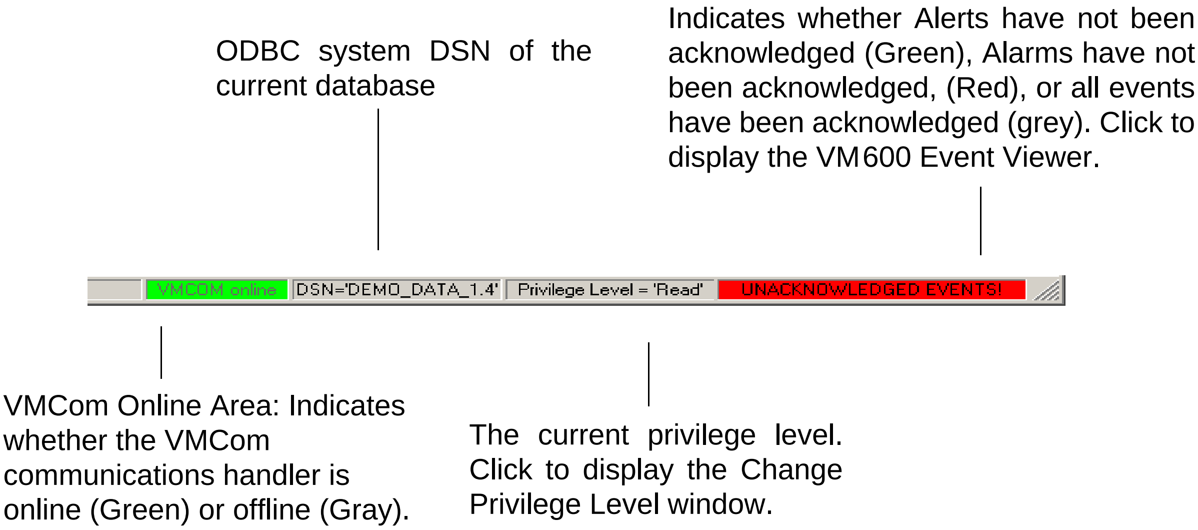


Figure 10-5 : The Status Bar

If a user presses and holds 'Ctrl' and 'Shift' whilst over the VMCom Online Area, and then clicks the left mouse button, the connection can be verified (Figure 10-6)

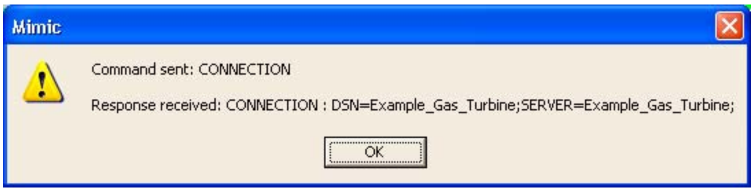


Figure 10-6 : Verification of the Connection

10.6 Displaying Graphs

From the logical view of the Mimic window, you can display measurement data graphically and list events associated with any selected output.

You can also use a favorites window to display the data from several outputs on the same graph.

10.6.0.1 Single Point or Output Graphs

To display a graph for a single point or output:

1- In the logical view, select the point or output for which to display data.

2- Right-click and select the type of graph to display. The list of available graphs is contextual, for example, for a Speed (tacho) point, **Realtime Trend** and **Bar Graph** are available.

Alternatively, double-click to display the Favorites window. See Figure 10-8.

To display a list of events associated with the selected output, choose **Events**. The Event Viewer is launched (see Chapter 13 - Using the CMS Event Viewer).

The Graph Viewer is launched to display the appropriate graph type, for example:

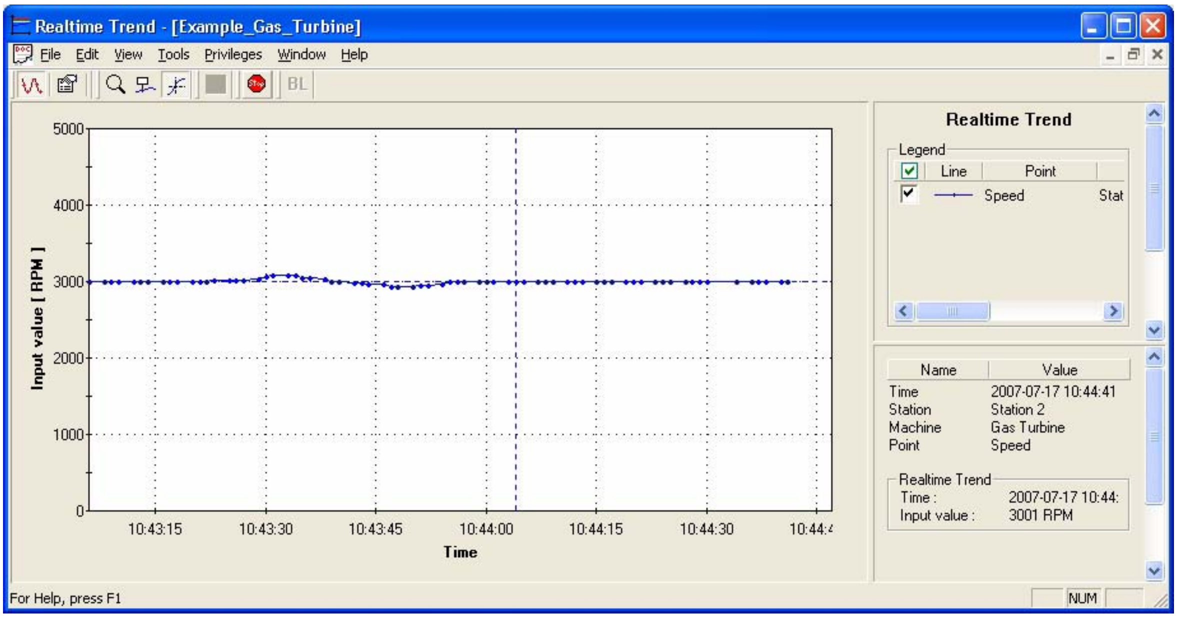


Figure 10-7 : A Realtime Trend Graph for a Speed Point

10.6.0.2 Several Points or Outputs Graphs

To display the output from several points or outputs on the same graph:

1- In the logical view, double-click the machine or station to which the points or outputs are attached.

2- The Favorites window is displayed:

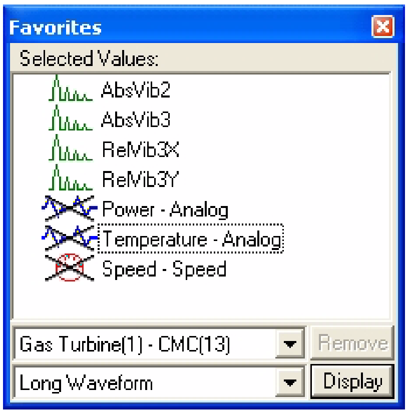
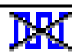


Figure 10-8 : The Favorites Window

3- Select the values to display.

4- Choose the form of data to display from the list of **Available Graphs.**

5- Click **Display**.

NOTE : If a value is crossed out in the Favorites window (for example ), the point or output cannot be represented in the selected graph type. For example, the values from a digital output cannot be displayed in oscilloscope (Long Waveform) form.

10.7 Security

In common with other VM600 modules, Mimic defines four different security levels to control access to potentially sensitive features of the application.

When you first start Mimic, for example, you are granted read-only access. This means that you can view live measurement data in Mimic documents, but you cannot make any changes to the documents. By contrast, Super user level allows you to modify any aspects of a Mimic document and save the changes you make to the database.

NOTE : Passwords are case sensitive, that is, “user”, “User”, and “USER” are three different passwords.

The current user level is displayed in the status bar of Mimic (see Figure 10-5).

10.7.1 Default Passwords

10.7.1.1 Read Access

There is no Read password: this is the default access level and no password is required.

The default User password is “user”.

The default Master user password is “master”.

The default Super user password is “super”.

10.7.2 Privilege Levels

Table 10-1 lists, for each privilege level, which Mimic functions are authorized for users having the appropriate privilege level:

Table 10-1 : Privilege Levels

Function	Privilege Level			
	Read	User	Master	Super
View current configuration	✓	✓	✓	✓
Edit and save Mimic documents			✓	✓
Delete Mimic documents				✓
Access Mimic subdocuments	[1]	1	1	1

1. *Access to Mimic subdocuments can also be configured using macros. Refer to Using Macros in the General Properties Window on page 10-20.*

NOTE : When launching other CMS Software modules from within Mimic, the current Mimic privilege level is “inherited” by the other module. For example, if you have Super level privileges in Mimic and launch the Data Analyser (see Figure 10-4), Super level privileges are available while using the Data Analyser. The Configuration Editor is a special case: since only one user can modify configurations at any one time, Super level privileges may be refused if they have already been granted to another user. In this case, User level privileges are granted instead.

10.7.3 Entering Passwords

To enter a password:

1- Click the password button 

on the Mimic icon bar, or choose **Tools > Security**.

2- The Change Privilege Level window is displayed:

Figure 10-9 : The Change Privilege Level Window

3- Choose the required level of **Privileges**: Read, User, Master or Super.

4- Type the corresponding **Password** and click **OK**.

All features that are supported by the privilege level are displayed or activated.

10.7.4 Modifying Passwords

Passwords are stored in the database. You can use the Configuration Editor to modify the passwords for any of the privilege levels. Refer to Chapter 9 - Creating a Rack Configuration.

10.8 The Mimic Document Editor

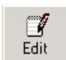
To create, edit or save Mimic documents or to modify Mimic options, you must enter Edit mode. When you have finished modifying the Mimic document, you switch back to Run mode to view the document as it appears to end users, for example, operators in the machine room.

10.8.1 Switching between Run and Edit Modes

When you first start Mimic, Mimic documents are displayed in Run mode, that is, they display measurement data but the format of the Mimic documents themselves cannot be modified. To create new Mimic documents or modify existing ones, you must enter a special Edit mode.

To exit Run mode and enter Edit mode:

1- Ensure you have Super user privileges (refer to 10.7 - Security).

2- Click the Switch Edit/Run mode icon 

on the Mimic icon bar to enter Edit mode.

When in Edit mode, the following icon bars appear at the top of the Mimic window:

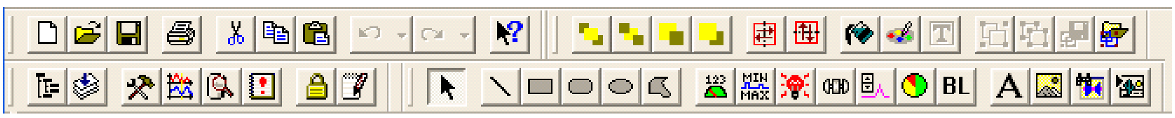
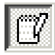


Figure 10-10 : The Edit Mode Icon Bar

To learn about the function of icons on the icon mode, use the bubble help that appears when you place the mouse over an icon.

You can drag and drop an icon bar to a new position, for example, to change the order in which the icon bars appear or to rearrange the icons on 3 or 4 rows.

To exit Edit mode and enter Run mode:

1- Click the Switch Edit/Run mode icon  on the Mimic icon bar to return to Run mode.

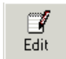
When in Run mode, the icon bar returns to that shown in Figure 10-4.

10.9 Setting Mimic Options

You can set a number of options in Mimic. For example, you can choose whether to start Mimic in fullscreen mode or not.

To set Mimic options:

1- Ensure you have super user privileges (refer to 10.7 - Security).

2- Click the Switch Edit/Run mode icon 

on the Mimic icon bar to enter Edit mode.

3- Choose **Tools** > **Options**. The Program Options window is displayed:

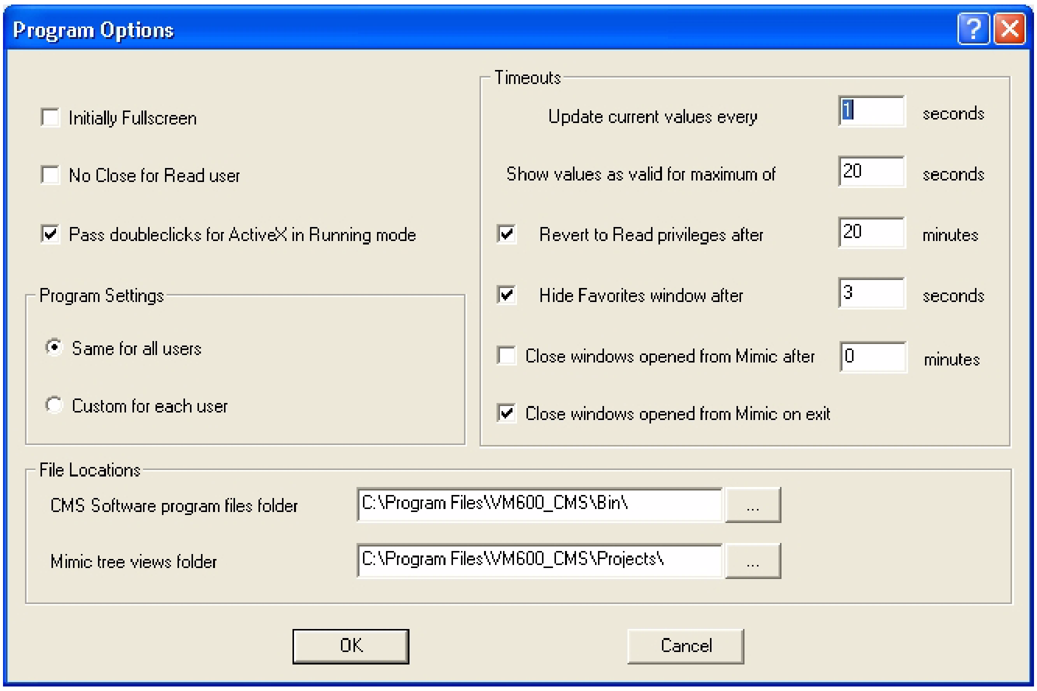


Figure 10-11 : The Program Options Window

4- Set the following options as required:

- **Initially Fullscreen**. Select this checkbox to maximise the main window when starting Mimic.
- **No Close for Read user**. Select this checkbox to prevent users with Read privileges from closing Mimic.
- **Pass double-clicks for ActiveX in Running Mode.** When selected, double-clicking on an ActiveX object in Run mode launches the application linked to the object. Otherwise, when not selected, double-clicks are ignored. For example, if this option is selected and you insert a Microsoft Word document in a Mimic document as an ActiveX object (see ActiveX Objects on page 10-17), double-clicking the icon in Run mode launches Microsoft Word and displays the document.

- **Program Settings**. Select **Same for all users** to apply all options to all users. Select **Custom for each user** to restore the program options selected by individual users, based on their Windows user ID and password.
- **File Locations**. Specify the folders in which to store CMS Software executable programs and tree views.
- **Update current values every.** Specify the frequency in seconds with which current values are updated.
- **Show values as valid for maximum of**. Specify the number of seconds for which values are shown as being valid. This is used with timer objects to set the number of seconds that timers are active for.
- **Revert to Read Privileges after**. Specify the number of minutes of inactivity before Super user privileges are automatically reset to Read level privileges.
- **Hide Favorites window after**. Specify the number of seconds that the Favorites window (see Figure 10-8) remains open before being closed automatically.
- **Close Windows opened from Mimic after**. Specify the number of minutes after which any window opened from within Mimic, for example, the CMS Event viewer or Data Analyser windows, are closed automatically.
- **Close windows opened Mimic on exit**. Select this option to specify that all windows opened from within Mimic are automatically closed when you close the Mimic window. This includes all Mimic documents and other CMS programs.

5- Click **OK** to set the options and return to the main Mimic window.

Any changed options are applied the next time you start Mimic.

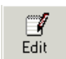
10.9.1 Specifying a Default Mimic Document

You can create any number of Mimic documents. Mimic documents are stored in the part of the database that is reserved for configuration data.

One Mimic document can be designated as the “default” Mimic document. This is the document that is loaded automatically whenever Mimic is started. If you do not designate a default document, Mimic prompts you for the Mimic document to load when started.

To specify the default Mimic document:

1- Obtain super user privileges. See 10.7.2 - Privilege Levels.

2- Click the Switch Edit/Run mode icon 

on the Mimic icon bar to enter Edit mode.

3- Load the Mimic document you want to set as the default document.

4- Choose **File > Set as default**.

10.9.2 Working with Objects

Mimic documents are composed of one or more objects, for example, images, value, multi-value and status indicators, bar charts, geometrical shapes, or text boxes.

When you create a new Mimic document, it is empty. You build up the contents of the document by adding objects to it. For value indicators, you associate outputs with the object by dragging nodes from the Logical View window of Mimic onto the object. This automatically creates an association between the database and the object.

10.9.2.1 Creating New Objects

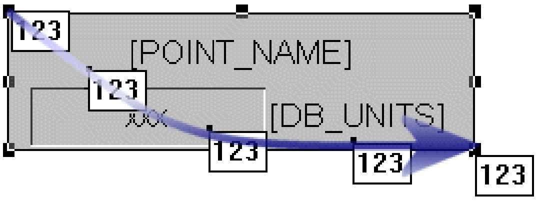
To add a new object to the document:

1- Click in the Mimic document to activate the icon bars.

2- Click an icon on the object icon bar (or use the menus) to select the type of object to create, for example:

3- Move the mouse into the document area. The mouse cursor changes shape, depending on the type of object selected.

4- “Draw” the object on the document window by clicking and holding down the left mouse button, dragging until the object is the required size, then releasing the mouse button:



5- For value and status indicators, associate a measurement point displayed in the logical view window (see 10.5 - The Mimic Main Window) with the object by dragging the measurement point from the logical view and dropping it on the object.

6- Finally, set the properties of the object, for example, the style of bar graph to be displayed or the border width of a box, by double-clicking on the object, or right-clicking and selecting **Properties**. See 10.9.6 - Setting Object Properties for more details.

10.9.2.2 Cloning Objects

You can also create a new object by “cloning” an existing one. To do this, either:

- Copy and paste the object
- Hold down the ‘Ctrl’ key, click the object to be cloned, drag the mouse to a new location, then release the ‘Ctrl’ key and mouse button.

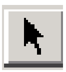
NOTE : The cloned object appears exactly on top of the original object. Move it immediately to its new destination to avoid confusion.

Once cloned, you can modify the object’s properties as required.

10.9.3 The Objects Palette

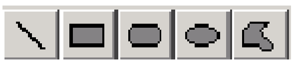
Objects are grouped together on the Objects palette available in Edit mode:

10.9.3.1 The Selection Pointer



To select any of the objects in a Mimic document, click the Selection pointer icon first, then click on the object. You can then resize the object, modify its properties, or apply one of the tools on the Tools palette (see below).

10.9.3.2 Geometrical Objects



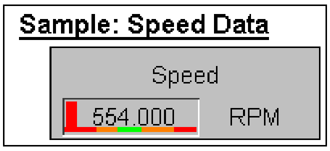
Geometrical objects allow you to draw static objects in a Mimic document, for example to draw borders around a value indicator, or to visually group together several objects.

You can draw (from left to right):

- Straight lines. Click and hold down the left mouse button to select the start point of the line, move the mouse and release the mouse button to select the end point. Double-click the line (or select the line, right-click and choose **Properties**) to set the line's properties. For example, you can display the line as a solid or dashed line, or with an arrow at one end.
- Rectangles. Click and hold down the left mouse button, move the mouse to the diagonally opposite corner of the rectangle, and click again.
- Rectangles with rounded corners. As above, but draws a rectangle with rounded corners. To adjust the shape of the rectangle:
  a. Move the mouse over the handle half-way down the right-hand side of the rectangle until the mouse pointer changes to a 4-headed arrow .
  b. Click and hold down the left mouse button.
  c. Move the button towards the centre of the rectangle.
  d. Release the mouse button when the shape is as required.
- Ellipses. Click and hold down the left mouse button, move the mouse to the diagonally opposite point on the ellipse, and release the mouse button.
- Polygons. Click the left mouse button to select the start point, move the mouse and click again to select the next vertex of the polygon. Repeat to draw more vertices, then double-click to complete the polygon.

10.9.3.3 Value Indicators 

Value indicators show the realtime value of dynamic measurement data associated with a predefined point or output on a VM600 rack. For example:



A value indicator can be associated with any speed (tacho), analog, digital, and thermocouple input channel by dragging the channel's icon from the database's logical view onto the value indicator.

By modifying the properties of a value indicator, you can choose to display a simple numerical value indicator, a combined bar graph and numerical value indicator (as in the above example), or other formats. Users can also switch between displaying the phase and the amplitude and displaying live, baseline or delta values.

Value indicators can also display information about the alarm levels defined for any given channel. You can display alarm levels either as a color-coded axis of a bar graph or by color-coding the numerical value itself.

When in Run mode, the frequency with which the value indicator is refreshed depends on the overall load on the system, for example, the number of channels that have been defined and are receiving live data.

For more detailed examples on the use of Value indicators as two-state indicators, see 10.12 - Configuring Two-State Indicators

10.9.3.4 Minimum/Maximum Value Indicators 

Minimum/Maximum Value indicators allow you to select multiple input channels and display the maximum, minimum, or average of the values.

For more details on Minimum/Maximum Value indicators, refer to 10.10 - Configuring Min/Max Indicators.

10.9.3.5 Status Indicators 

Status indicators provide a realtime indication of the number and type of alarm raised by any of the machines or stations being monitored by the system.

A status indicator provides a quick overview of the number of outputs in alarm, alert, and validation status (Figure 10-12).

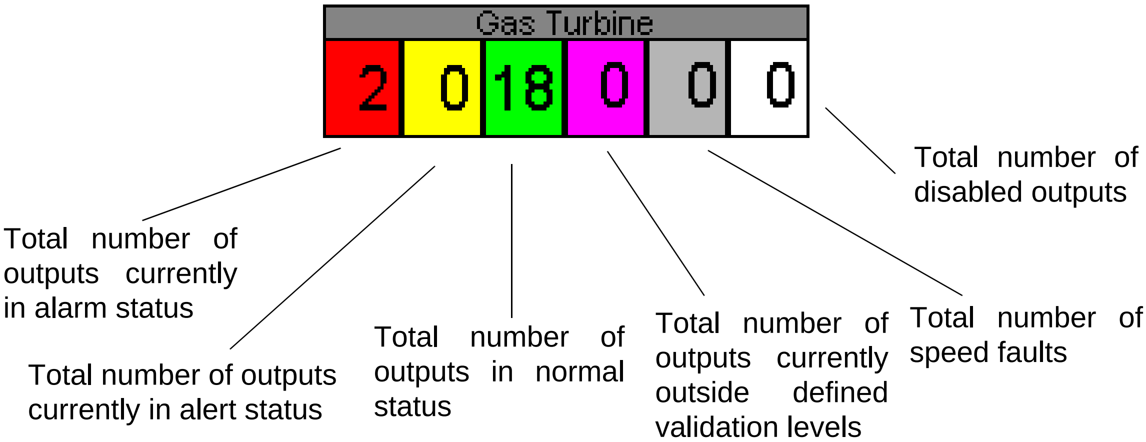
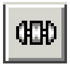


Figure 10-12 : Status Indicator

NOTE : As alarm events are acknowledged, they are no longer counted in the Status Indicator's total. However, the output itself remains in alarm status.

10.9.3.6 Machine Status 

A Machine Status indicator allows you to display the current status of a machine, for example:

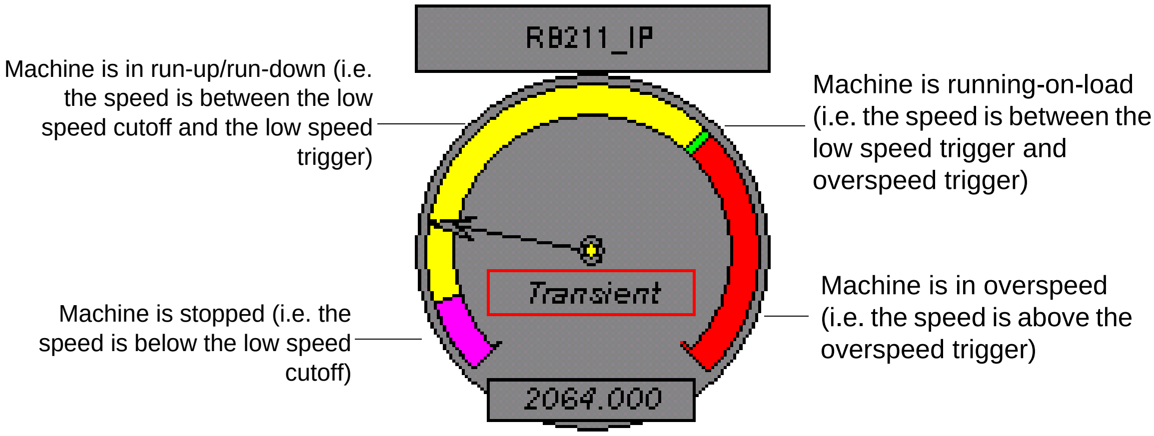
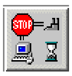


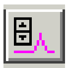
Figure 10-13 : Machine Status Indicator

The indicator displays the current speed value for a selected machine.

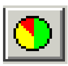
The following buttons on the Mimic toolbar relate to timers:

 Click the Reset Timers button to restart all timers that have not yet expired.

 Click the Start Timers button to restart all expired timers.

10.9.3.7 Band Control 

Band control objects display a menu from which you can choose a selected output to display. See 10.11 - Using Band Control Indicators.

10.9.3.8 Update Timer 

Timer objects allow you to associate a timer with a machine. Timers are used to visually indicate the amount of time elapsed since measurement data was last updated: when the timer expires, the timer object changes color. You can choose to display timers as digital values, pie charts, or bar charts.

A timer object displays the amount of time that has elapsed since the selected measurement data was last updated. The maximum value of a counter is given by the **Show values as valid for maximum of** Mimic option (see 10.9 - Setting Mimic Options). For example, if this value is set to 60 seconds, the timer starts at 60 seconds and expires when it reaches zero.

10.9.3.9 Baseline Control 

The Baseline feature allows users to take a snapshot of data when the machine is in good condition (e.g. after commissioning). These data can then be used as a global reference. Degradation and sudden changes in vibration pattern observed at a later time can then be compared to this baseline. There is one baseline timestamp per logical machine. The Trend Baseline is applicable to trend data. Once a trend baseline timestamp has been saved, the baseline control switch allows users to switch between: i) live data, ii) the latest values saved on or just before the timestamp and iii) the difference between i and ii (delta).

Figure 10-14 is an example where no baseline has ever been set for a machine. This display can be accessed using a right mouse click. Using this menu, the baseline can be set (new or update) and the display can be switched between Live Data, Baseline or Delta.

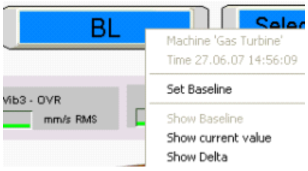
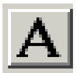


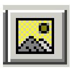
Figure 10-14 : Baseline Control

Further information on baseline control, refer to 10.13- Configuring Baseline Controls.

10.9.3.10 Text Objects 

Text objects display a static string of text in a font and with font size that you define.

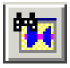
Text objects can also contain links to other Mimic documents, so that when the operator clicks on the text object, the other Mimic document is displayed in its place.

10.9.3.11 Pictures 

Insert a picture object to place an image in a Mimic document.

When you insert the object, Mimic prompts you to choose the image file to insert. You can choose images in BMP, JPEG, GIF, or ICO format.

NOTE : You can also define an image as the background image of a Mimic document. See 10.9.8 - Setting a Background Image for details.

10.9.3.12 Symbol Factory 

Displays the Symbol Factory window:

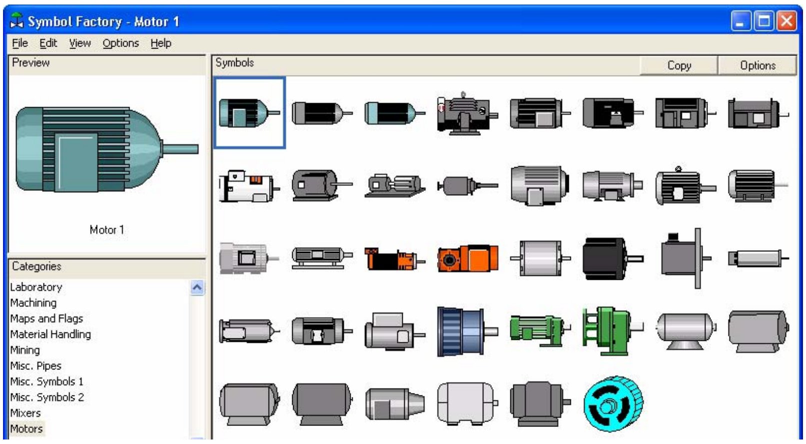


Figure 10-15 : The Symbol Factory Window

The Symbol Factory is a library of over 4,000 graphics relating to industrial automation, including pumps, pipes, valves, tanks, mixers, motors, ducts, electrical symbols, flow meters, material handling, sensors, PLCs, transmitters, and ISA symbols.

If you installed CMS Software using the “DEMO” license number, only a demonstration version of the Symbol Factory is available. This version has the following limitations:

- Only the first symbol in each category can be included in Mimic documents or exported to other formats.
- You cannot create your own categories of symbols
- You cannot import symbols from other sources.

When you install the CMS Software using a full license, none of these restrictions apply.

To insert a symbol in a Mimic document:

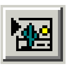
1- Select the category of symbol to include in your Mimic document.

2- Select the symbol to use and click **Copy**.

3- Select your Mimic document and paste the symbol (**Edit > Paste**)

4- Select the symbol and resize it as necessary.

NOTE : The Symbol Factory is not available on CMS installations in DEMO-mode

10.9.3.13 ActiveX Objects 

Inserts an ActiveX object into your Mimic document. You can then open and edit the linked document in Run mode by double-clicking on the object. Examples of ActiveX objects include word processing documents, spreadsheets and slide presentations, but the list of available ActiveX object types depends on which ActiveX-compatible applications are installed on the local PC.

You can choose to insert either an icon or a part of the document itself.

If the “Pass double-clicks for ActiveX in Running Mode” program option is selected (see 10.9 - Setting Mimic Options), switching to Run mode and double-clicking the ActiveX object launches the linked program.

When you double-click the object, in either Edit or Run mode, Mimic's menus may be replaced by those of the program linked to the object. For example, Microsoft Word menus may appear on the Mimic toolbar. This behaviour, however, varies from program to program.

10.9.4 The Tools Palette

The Tools palette is a separate icon bar available in Edit mode:

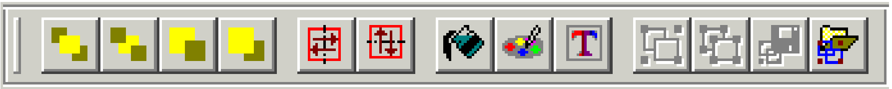
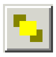
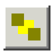
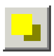
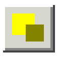
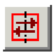
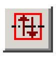
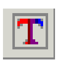
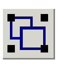
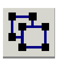
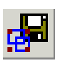


Figure 10-16 : The Tools Palette

The Tools palette contains icons to transform selected objects in a number of ways, as summarized in Table 10-2.

Table 10-2 : Tools Palette Description

Icon	Title	Description
	*Bring to Front*	*For objects that overlap, move the selected object to the front*
	*Move to Back*	*For objects that overlap, move the selected object to the back*
	*Move Forwards*	*For objects that overlap, move the selected object forward one layer*
	*Move Backwards*	*For objects that overlap, move the selected object backwards one layer*
	*Flip Horizontally*	*Flip the object horizontally*
	*Flip Vertically*	*Flip the object vertically*
	*Fill Color*	*Fill the selected object with a selected color*
	*Line Color*	*Set the border of the selected object to a selected color*
	*Change Font*	*Modify the text properties (font and font size) of a selected text object*
	*Group*	*Group several selected objects together*
	*Ungroup*	*Separate previously grouped objects*
	*Save Group to File*	*Save a group of objects to file*
	*Load Group from File*	*Load a previously saved group of objects from file*

10.9.5 Keyboard Shortcuts

You can use the following keyboard shortcuts in Mimic documents.

Table 10-3 : Keyboard Shortcuts

Key	Description
Alt+Enter	*Edit selected object's properties*
-	*Move object backward one level*
= or +	*Move object forward one level*
_ (underscore) or Ctrl+-	*Send object to back*
+ or Ctrl-+	*Bring object to front*
E or e	*Draw an ellipse*
L or l	*Draw a line*
N or n	*Draw a rounded rectangle*
R or r	*Draw a rectangle*
S or s	*Select*
Ctrl+S	*Save file*
Ctrl+O	*Open a file*
Ctrl+P	*Print*
Ctrl+A	*Select All*
Ctrl+C or Ctrl+Ins	*Copy*
Ctrl+V or Shift+Ins	*Paste*
Ctrl+X or Shift+Del	*Cut*
Ctrl+Z or Alt+BkSp	*Undo*
Del	*Clear*
Esc	*Cancel edit*
F5	*Refresh*
F6	*Next active pane*
Shift+F6	*Previous active pane*
Ctrl+←	*Align with left edge*
Ctrl+↓	*Align with bottom*
Ctrl+→	*Align with right edge*
Ctrl+↑	*Align with top edge*

10.9.6 Setting Object Properties

An object's properties determine its physical appearance when in Run mode, and for dynamic objects, the source of the data that it displays.

To set an object's properties, double-click the object, right-click on the object and choose **Properties**, or select the object and press Alt+Enter.

10.9.6.1 Setting General Properties

Each object type has a different Properties window, for example, for a Value Indicator:

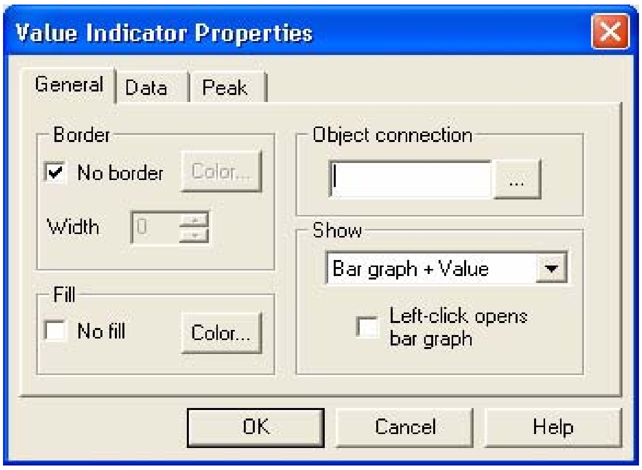


Figure 10-17 : A Properties Window

The format of the **General** property sheet is different for each object type. In general, however, the left-hand side of the window contains settings that determine the appearance of the object when you switch to Run mode, while the right-hand side of the window allows you to define links to other Mimic documents and specify the format of the data.

10.9.6.2 Using Macros in the General Properties Window

You can type the following macro names in the **Object connection** field of the General property sheet to display the corresponding value automatically when in Run mode. This is described in 10.14.2 - Creating Links to Other Mimic Documents:

[CMD]commandline	*Treat the command line text following the macro name as a Windows command.*
[SUPER]mimic_doc_name	*Only display the specified Mimic document if the user currently has Super user privileges.*
[MASTER]mimic_doc_name	*Only display the specified Mimic document if the user currently has Master or Super user privileges.*
[USER]mimic_doc_name	*Only display the specified Mimic document if the user currently has User, Master or Super user privileges.*

NOTE : There must be no space between the macro name and the command-line options. File paths that contain spaces must be enclosed in quotes (“ ”).

For example, to launch a realtime waveform plot on a point with Point=26, using the DSN “myDB”, enter the following string into the Object Connection field”:

```
[CMD]"C:\Program Files\VM600_CMS\Bin\RealWave.exe" DSN="myDB"; POINT=26;
```

If the user does not have the required privileges, the link is not activated and no visual indication that the object is linked to a Mimic sub-document is given.

To display several points on the same plot, use the following syntax:

```
... POINT=26 29 50 62
```

Notice that there must be a single space between the point numbers.

To display the data as a bar graph instead:

1- Replace “RealWave.exe” by “Bargraph.exe”

2- Specify both the point identifier and output band identifier, separated by a period (“.”) for each point on the bar graph. For example:

```
[CMD]"C:\Program Files\VM600_CMS\Bin\Bargraph.exe" DSN="myDB";
       POINT=26.0 26.1 29.1;
```

10.9.6.3 Setting Data Properties

For all objects capable of displaying data (e.g. value indicators), a **Data** property page contains properties that determine the source and format of the data to be displayed by the object (Figure 10-18).

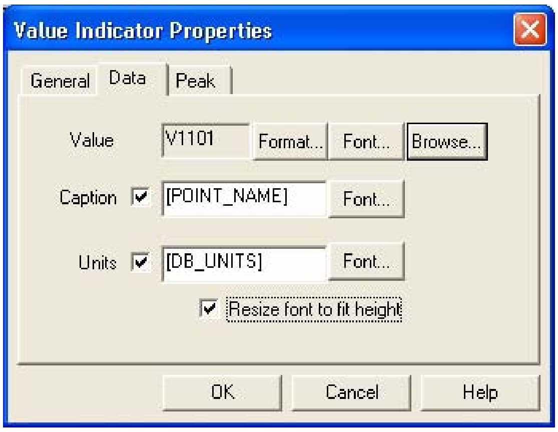


Figure 10-18 : The Data Property Sheet for a Value Indicator

As the Configuration Editor attributes a Unit to each online point, the Digital Points are also given the Unit Volt. Displaying this point in the Mimic as a Value indicator then also shows V as unit unless you untick the Units box on the Data thumb tab of the Value indicator's Properties.

The Value Output Format dialog box (Figure 10-19) is opened by clicking “Format” in the Value Indicator Properties dialog box. This allows users to change the settings of a value or min/max indicator. The output can be preset to be switchable (from the band control) or to always display Amplitude or Phase values. The Value type can be chosen between Float (most common) exponential or Integer display. In the case of integer display, the decimal places button becomes disabled. Ticking the Evaluate Expression Box allows users to display results calculated from configured data value (Figure 10-20).

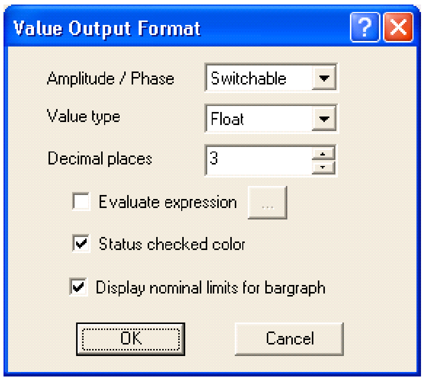


Figure 10-19 : Value Output Format

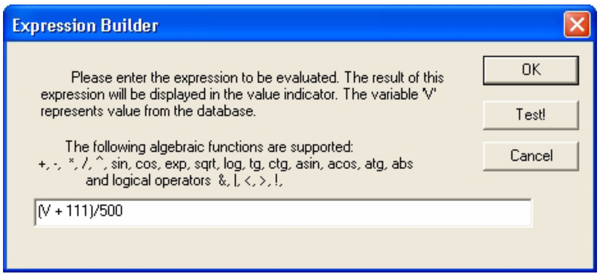


Figure 10-20 : Expression Builder

On clicking “Font” in the Value Indicator Properties dialog box (Figure 10-18), the Font dialog box appears (Figure 10-21). This can be used to change the font of the displayed text. Figure 10-22 shows an example of changing the display font from lime to fuchsia.

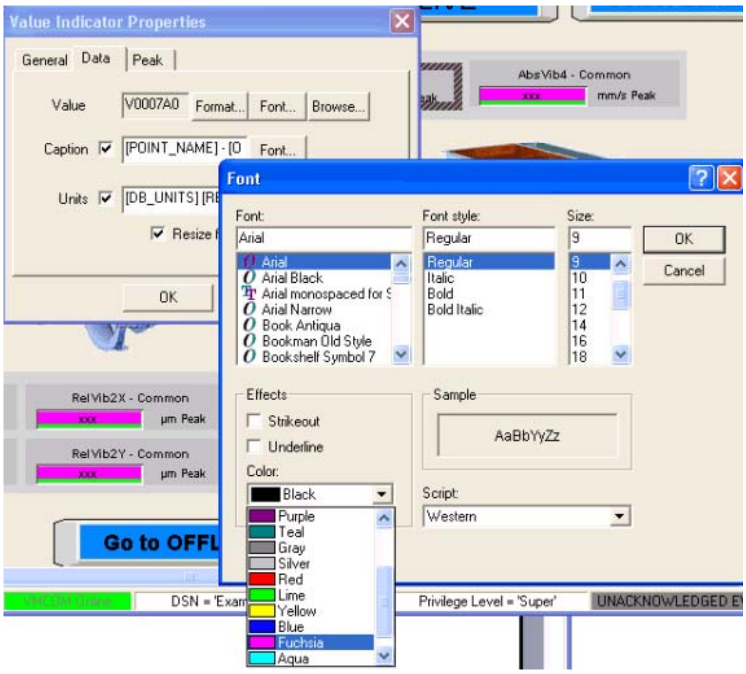


Figure 10-21 : Changing the Font

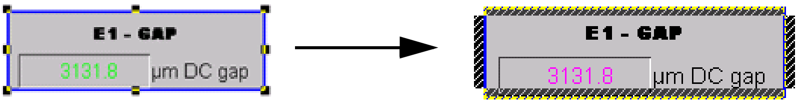


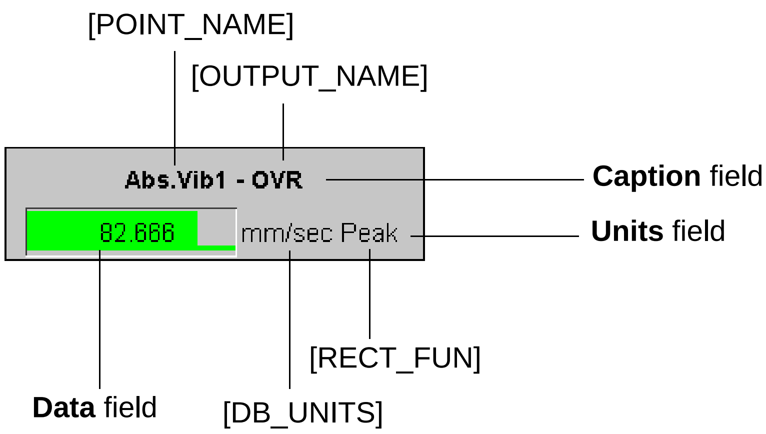
Figure 10-22 : Example of Changing the Display Font from Lime to Fuchsia

10.9.6.4 Using Macros on the Data Property Sheet

You can type the following macro names in the **Caption** or **Units** fields of the Data property sheets of Value and MultiValue indicators to display the corresponding value automatically when in Run mode:

[POINT_NAME]	*Display the name of the point associated with the object. For example, if you drag a point named “Speed” and drop it onto a Value Indicator, “Speed” is displayed as the caption.*
[OUTPUT_NAME]	*Display the name of the output channel associated with the object. For example, if you drag a point named “Channel 1” and drop it onto a Value Indicator, “Channel 1” is displayed as the caption.*
[DB_UNITS]	*Display the measurement units used by the associated point or output. The value is extracted from the database. For example, if you drag an absolute vibration point and drop it onto a Value Indicator, “mm/sec” may be displayed as the caption (assuming this is the value of the* ***Display Unit*** *field for this output in the Configuration Editor).*
[RECT_FUN]	*For dynamic points, display the name of the rectifier function assigned to the point or output in the Configuration Editor, that is, one of the following:* • *Peak* • *Peak-to-Peak* • *RMS* • *True Peak* • *True Peak-Peak* • *True RMS* • *DC (Gap)* • S_{max} *Refer to the Configuration Editor online help for details.* *Rectifier functions are explained in 1.2.3 - Rectifiers: Time-Domain Based Outputs vs FFT-Based Outputs.*
[AMPL_PH]	Displays either “Amplitude” or “Phase”, depending on the displayed value type (switch in band control). This continues displaying in degrees or value when the indicator is configured accordingly.

The following window shows an output in Run mode and the corresponding macros:



Click **Help** for detailed information on setting the properties.

10.9.7 Creating and Managing Groups of Objects

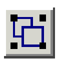
You can group objects together so that they become a single logical unit. This has a number of advantages:

1- You can move, copy, and delete the group as if it were a single object.

2- You can save the object group to disk. Object groups can then be inserted into other Mimic documents.

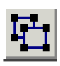
To create an object group:

1- Select the objects to group together. If the objects are positioned close to each other, the easiest way to do this is to drag the mouse over the objects. Otherwise, you can select individual objects by holding down the Shift key and clicking on each object in turn.

2- Click the **Group** icon  on the tools palette, or choose **Format > Group**.

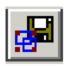
To ungroup objects:

1- Select an object that belongs to a group.

2- Click the **Ungroup** icon  on the tools palette, or choose **Format > Ungroup**.

To save an object group to disk:

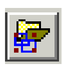
1- Select the object group by selecting an object that belongs to the group.

2- Click the **Save to Group** icon  on the tools palette, or choose **Format > Save Group**.

3- Browse to a folder and select a file name for the object group. Object groups are saved with a *.gr extension.

To insert a previously saved object group into a Mimic document:

1- Ensure no objects are selected in the Mimic document.

2- Click the Insert Group icon  on the tools palette, or choose **Format > Save Group**.

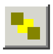
3- Browse and choose the Group file (*.gr) that contains the object group and click **Open**.

10.9.8 Setting a Background Image

To set a background image for a Mimic document:

1- Insert a picture object  in a Mimic document.

2- Resize the image to cover the entire area of the Mimic document.

3- Click the **Move to Back** icon  on the Tools palette to move the image to the background.

10.10 Configuring Min/Max Indicators

To configure a Min/Max indicator to display the minimum, maximum, or average value of a number of outputs:

1- Create a Min/Max Indicator object (as described in 10.9.2 - Working with Objects) and display its **Properties** window.

2- Select the **Data** property page.

3- Click **Browse** to display the MultiValue Indicator Properties window:

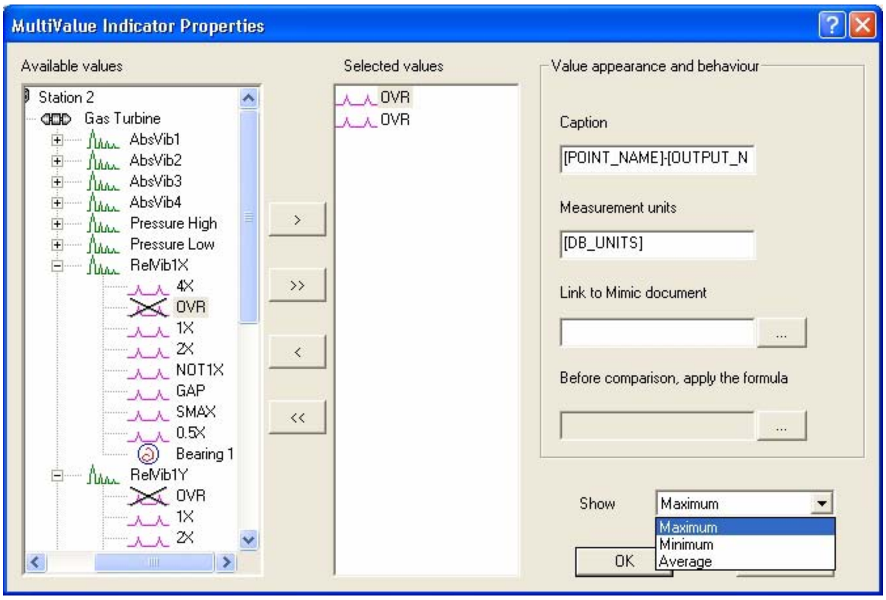


Figure 10-23 : The MultiValue Indicator Properties Window

4- In the **Available Values** list, double-click on the outputs to be used. The outputs are added to the **Selected Values** list.

5- Optionally, configure the **Caption** and **Measurement Units** to use for the display. You can use any of the macros described in Using Macros in the General Properties Window on page 10-20.

6- Optionally, choose a Mimic document to use to display the result.

7- Optionally, create an expression to be applied to the result.

8- In the **Show** list, choose whether to display the **Maximum**, **Minimum**, or **Average** value.

9- Click **OK** twice.

10- Switch to **Run** mode. The control displays the appropriate value. By default, the control's caption displays the name of the output that is generating the displayed value. No caption is displayed if the average value is being displayed.

10.11 Using Band Control Indicators

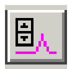
To configure a band control indicator:

1- Insert value indicators (see 10.9.2 - Working with Objects) to be selected by the band control object into the current Mimic document. To do this, you can either:

- Create a value indicator for each frequency band configured for a dynamic channel, then drag and drop a single frequency band output from the Logical view on to the respective value indicator,
- Insert a single value indicator, then drag and drop the dynamic channel in which the frequency bands are defined onto the object. In this case, the value indicator's title shows the name of the channel followed by "**-Common**", for example:

Figure 10-24 : Value Indicator

NOTE : The same principle applies when choosing between always displaying amplitude or phase in 2 separate value indicators, or keeping the display switchable.

2- Insert a Band Control object  into the document.

3- Switch to **Run** mode. Click **OK** to save the changes you have made.

4- Click on the Band Control object. A menu appears, showing the labels of all frequency bands configured in the current database, for example:

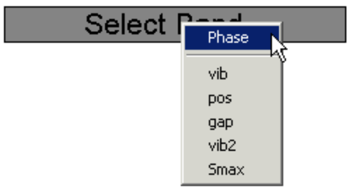


Figure 10-25 : Frequency Bands Available for a Band Control Object

5- From this menu, you can choose to:

- Switch between displaying Phase and Amplitude for all value indicators in the current document configured as 'switchable'. Those configured as Phase-Indicators always display Degrees and the Amplitude-Indicators always displays Amplitude.
- Choose a frequency band label from the list. In this case, the selected frequency band is displayed in all value indicator objects configured as "common" dynamic channel outputs.

For example:

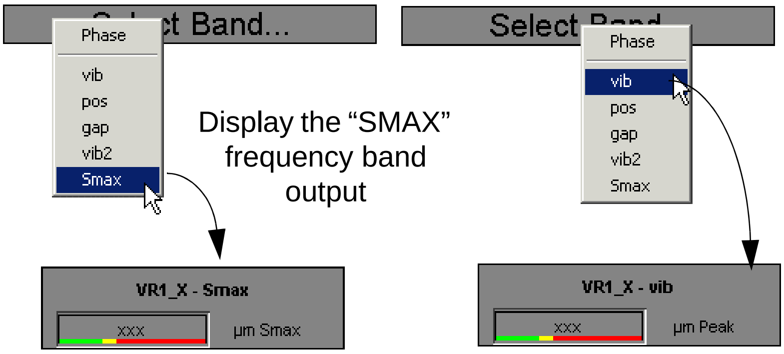


Figure 10-26 : Band Control Selection

To modify the default frequency band and mode displayed by the band control object:

1- Switch to Edit mode

2- Right-click on the Band Control object and choose **Properties**.

3- In the **Defaults** area of the Properties window, select the default **Output** to be displayed and whether to display the **Amplitude** or **Phase** of frequency bands by default.

10.12 Configuring Two-State Indicators

To configure a Value Indicator as a two-state "on-off" switch:

1- Create a Value Indicator object (as described in 10.9.2 - Working with Objects) and display its **Properties** window.

2- In the **Show** list, select **Two-State Indicator**.

3- Select the **Data** property sheet.

4- Click **Format**. The Value Switch Behaviour - Condition Builder window is displayed, as shown in Figure 10-27:

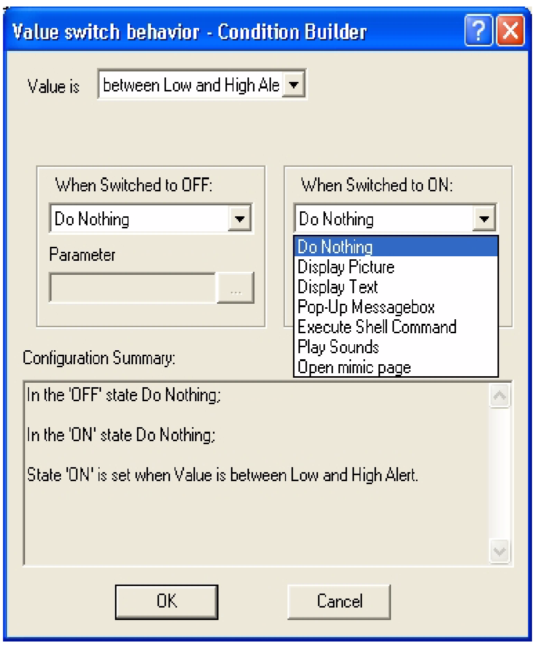


Figure 10-27 : The Value Switch Behaviour - Condition Builder Window

This window allows you to specify the conditions under which the two-state indicator is either “off” or “on”:

5- Specify the condition. First, select the data range to check in the **Value is** list. You can choose between the following types:

- **In the Interval**. Use the **Value 1 and Value 2** buttons that appear to set the appropriate values for the upper and lower bounds of the data range. When the value is within this range, the indicator is switched to the “on” position.
- **More than**. Click the **Value** button that appears to specify the value. When the data is greater than the specified value, the indicator is switched to the “on” position.

NOTE : To specify a “less than” condition, specify a greater than condition for the “off” state.

- **Equal to**. Click the **Value** button that appears and specify the value. When the data exactly matches the specified value, the indicator is switched to the “on” position. Otherwise, the indicator displays the “off” position.
- **between Low and High Alert**. Similar to the “In the interval” mode, with predefined bounds. Use to perform a specific action when an Alert goes outside a valid range.
- **between Low and High Alarm**. Similar to the “In the interval” mode, with predefined bounds. Use to perform a specific action when an Alarm goes outside a valid range.
- **in the Valid Range**. Similar to the “In the interval” mode, with predefined bounds. Use to perform a specific action when the displayed value goes outside a valid range.

6- Select the type of action for the “on” and “off” states of the two-state indicator. You can choose various types of actions to perform:

- **Do Nothing**. This is useful if the indicator is to perform an action only when in one state. See 10.12.1 - Configuring Two-State Indicators to Display Multiple Images for an example.
- **Display Picture**. Click the browse button and select the image file to display. 10.12.1 - Configuring Two-State Indicators to Display Multiple Images for an example.
- **Display Text**. Type the text to display in the text box that appears.
- **Pop-Up Message box.** This displays a pop-up message box when the condition changes state. Note that the message box is only displayed once, when the switch first changes state.
- **Execute Shell Command**. This is an advanced feature that launches a user-defined program whenever the condition changes state.
- **Play Sounds**. Click the browse button and select a Sound file to play when in a given state. See 10.12.2 - Configuring a Two-State Indicator to Play an Audible Alarm for an example.
- **Open Mimic page**. Click the browse button and select a Mimic document to open when a given condition is met.

7- Check the summary information. Use the **Configuration summary** field at the bottom of the window to check the conditions and actions assigned to this indicator.

8- Click **OK**.

10.12.1 Configuring Two-State Indicators to Display Multiple Images

You can position several Value Indicator objects exactly on top of each other and configure each to display a different image. The first (topmost) indicator does nothing, the second one (logically underneath the first one) becomes visible. If both the first and second indicators are false and set to “no action”, the third indicator (logically beneath both the first and second objects) might display some information. This feature can be used, for example, to display a dynamic “traffic light” indication: green when a value is within a “normal” range, yellow when outside this range of values, and red if the value exceeds a third, “danger” range. This situation is illustrated in Figure 10-28:

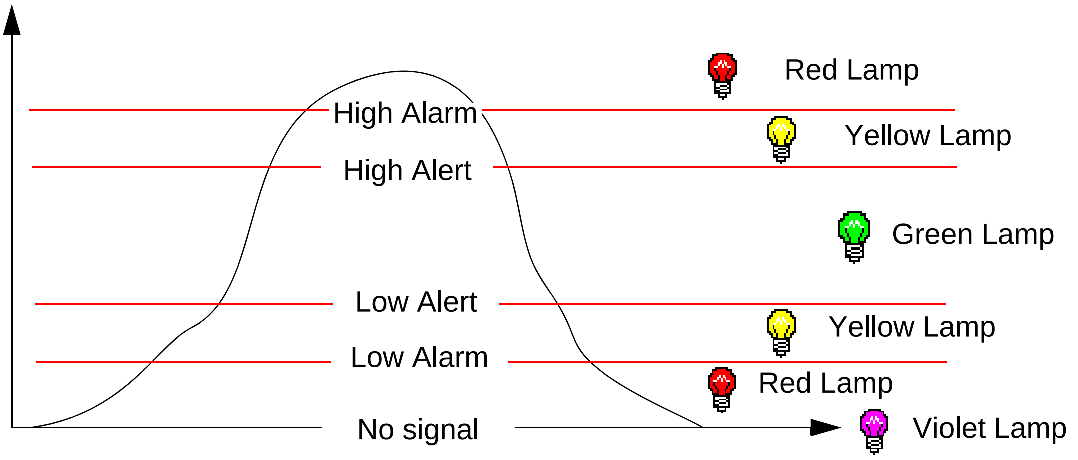


Figure 10-28 : Using Lamps to Indicate Alarm and Alert Levels

To do this using multiple two-state indicators:

1- Create a Value Indicator object (as described in 10.9.2 - Working with Objects) and display its **Properties** window.

2- Select **No Border** and **No Fill**.

3- In the **Show** list, select **Two-State Indicator**.

4- Select the **Data** property sheet.

5- Deselect the **Caption** and **Units** options.

6- Click **Format** and select **between High and Low Alarms** in the **Value is** field.

7- Select **Do Nothing** for **When Switched to OFF** and **Display Picture** for **When Switched to ON**, as shown in Figure 10-29. In this configuration, whenever the **Do Nothing** setting is true, the Value Indicator is ignored, and the object immediately below it in the Mimic document is tested. If, however, the value is false, an image, in this case a yellow lamp, is displayed.

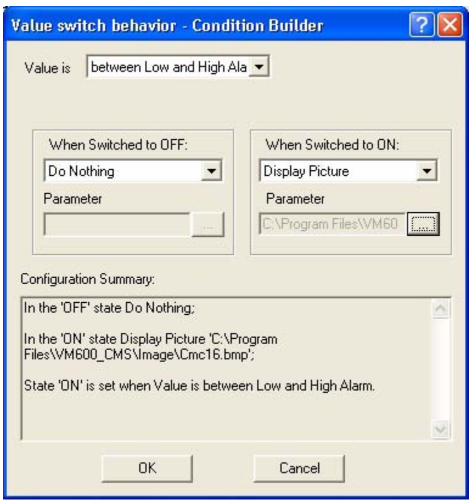


Figure 10-29 : Setting Up a Transparent Value Indicator

8- Create a second Value Indicator object and configure it like the first object but with the following differences:
   - Select **between Low and High Alerts** in the **Value Is** field.
   - Select a green lamp image in the **Parameter** field.

9- Create a third Value Indicator object and configure it like the other objects but with the following differences:
   - Select **in the Value Range** in the **Value Is** field.
   - Select **Display a Picture** in the **When Switched to OFF** field and select a purple lamp image in the **Parameter** field
   - Select **Display a Picture** in the **When Switched to ON** field and select a red lamp image in the **Parameter** field.

10- Select the first Value Indicator created and choose **Move to Front** from the **Format** menu.

11- Select the second Value Indicator created and choose **Move Backward** from the **Format** menu.

12- Select the third Value Indicator created and choose **Move to Back** from the **Format** menu.

13- Move all three objects into exactly the same position on the Mimic document.

14- Save the changes you have made to the Mimic document.

15- Switch to Run mode and test the indicator.

NOTE : For an example of such an indicator, open the group object “Lamp_Indicator.gr” (**Format > Insert Group from File**), provided with the VM600 CMS Software in the **Examples** folder, ungroup the object and examine the individual objects’ properties.

10.12.2 Configuring a Two-State Indicator to Play an Audible Alarm

To configure a two-state indicator to play an audible alarm whenever a given value or range of values is exceeded:

1- Create a Value Indicator object and display its **Properties** window.

2- In the **Show** list, select **Two-State Indicator**.

3- Select the **Data** property sheet.

4- Click **Format**.

5- Select a condition from the **Value is** box.

6- In the list of available options for either **When Switched to OFF** or **When Switched to ON**, select **Play Sounds**.

7- In the **Parameter** field, either type the path and file name of a Wave Sound file (*.wav). Alternatively, click the browse button, browse to a folder containing the Wave Sound file (*.wav) to use, select a file and click **Open**.

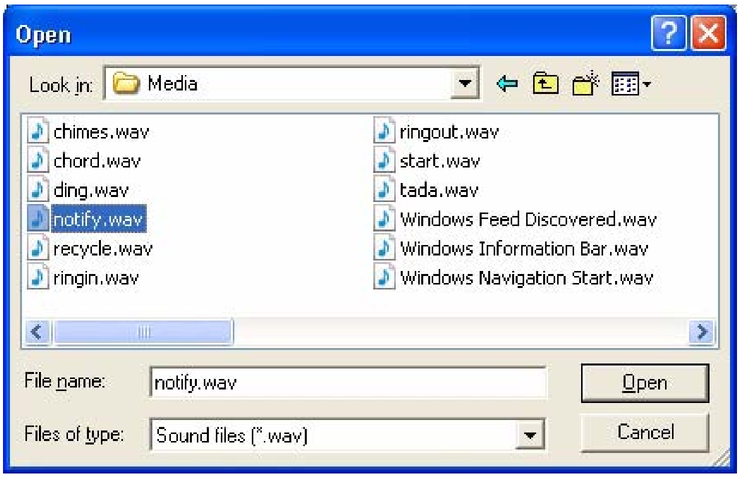


Figure 10-30 : Selecting a Sound File

NOTE : A number of useful sound files are delivered with Windows. For example, in Windows XP, browse to the folder C:\WINNT\Media.

8- Click **OK** to save the object's properties.

9- Save the changes you have made to the Mimic document.

10- Switch to Run mode.

10.13 Configuring Baseline Controls

The Baseline Control allows users to switch the display between the current values and those stored at the time-base or the delta between the two. The baseline switch button shows what is currently displayed (LIVE = current data, BL = baseline data stored at the time-base for the machine, DELTA = the difference between the two).

10.13.1 Setting Baseline Control Properties

To configure a Baseline Control:

1- Create a Baseline Control object (as described in 10.9.2- Working with Objects) and

display its Properties window (Figure 10-31).

2- On the right hand side of the Baseline Control Properties, select the Caption required (See 10.13.2- Using Macros in the Baseline Control Window).

3- Change the font of the caption using the font button if required.

4- Change the border and fill colors if required.

5- Attach the Baseline Control to the Machine to be monitored. Verify that this is the same machine displayed on the Mimic being created.

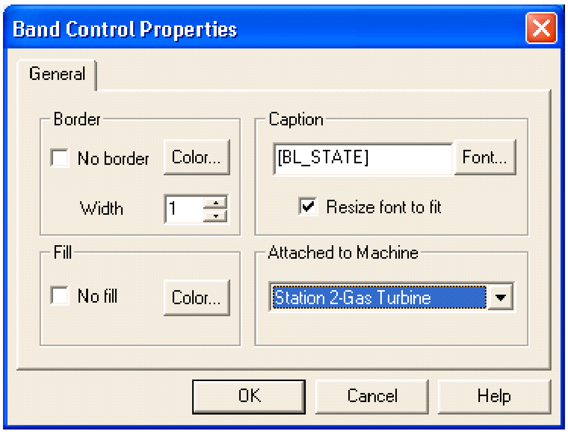


Figure 10-31 : Band Control Properties

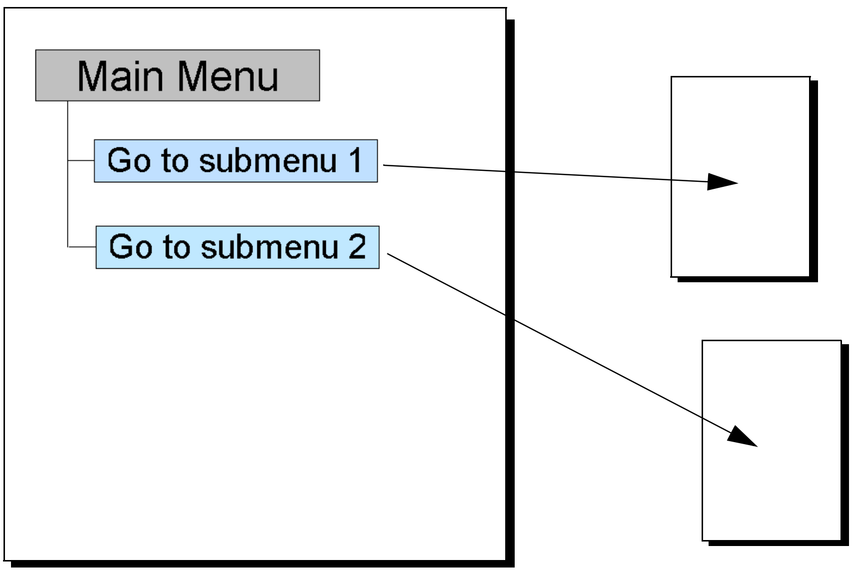
10.13.2 Using Macros in the Baseline Control Window

The meaning of the baseline control macros are as outlined below:

[BL_STATE]	Displays either “LIVE”, “BL” or “DELTA”, depending on the displayed data (switch on Baseline control).
[MACHINE_NAME]	Displays the name of the machine associated with the Baseline control.
[BL_TIME]	Displays the timestamp of the set Baseline for the machine associated with the Baseline control.

10.14 Creating Mimic Subdocuments

Mimic allows you to define a hierarchy of interconnected Mimic documents and to navigate between documents by clicking on text objects that have been configured as links to other documents:



Default Mimic Document1

Figure 10-32 : A Hierarchy of Linked Mimic Documents

10.14.1 Creating Subdocuments

To create a new Mimic document:

1- Ensure you have Super user access rights (refer to 10.7 - Security).

2- Enter Edit mode by clicking the **Edit** icon on the icon bar. See 10.8 - The Mimic Document Editor.

3- Choose **File > New**.

4- Create the objects and define the appearance of the new document, as described in 10.8 - The Mimic Document Editor.

5- Choose **File > Save as**.

6- In the Save As window, type a name for the new document, for example:

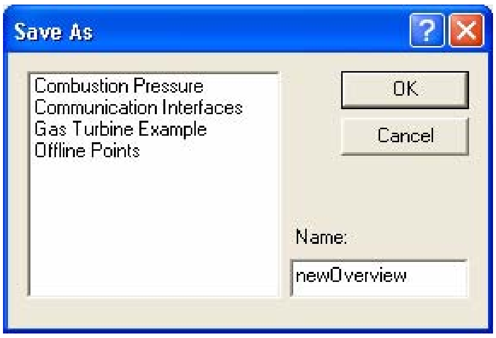


Figure 10-33 : The Save As Window

7- Click **OK**.

10.14.2 Creating Links to Other Mimic Documents

Once you have finished creating a new Mimic document, you can either set the new document as the default Mimic document (see 10.9.1 - Specifying a Default Mimic Document), or create links to the document from another Mimic document.

To create a link to a Mimic document:

1- In Mimic's Link View, double-click on the document that is contain the link to the new document. Typically, for example, a link would be created from the top-level default document to one or more subdocuments.

2- Insert a text object in the document to contain the document.

3- Double-click on the text object to display the object's property sheet.

4- Click the browse button to the right of the **Object Connection** field. A list of existing Mimic documents appears:

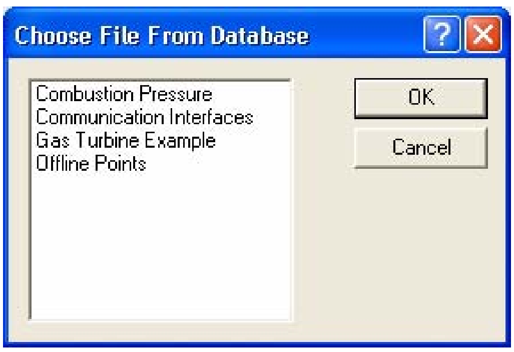


Figure 10-34 : List of Existing Mimic Documents

NOTE : If Mimic documents are being saved to disk (see 10.9 - Setting Mimic Options), a standard Windows browse window appears for you to select a Mimic document (*.m).

5- Select the Mimic document to be opened when the link is activated and click **OK**.

6- Optionally, prefix the Mimic document name that appears in the **Object connection** field with a macro to control user privileges to activate the link, for example "[SUPER]". Refer to Using Macros in the General Properties Window on page 10-20 for details.

7- Set any other properties of the text object, for example, the background color and font.

NOTE : It is a good idea to choose a distinctive style for links and apply it consistently to all text that contains links to other documents. For example, define all links as blue, underlined text. This way, it is easier for the operator to distinguish links from normal text objects.

8- Click **OK** to close the Text Properties window.

10.14.3 Updating the Links View

Once a new document has been created and linked to by other documents, you should update the Links view to take account of the new document structure.

To update the Links view:

1- In Edit mode, click the Rebuild Links icon  on the tool bar, or choose **View > Rebuild Tree**.

2- The Links View is updated to include the new document.

10.14.4 Testing Links

To test a link from one Mimic document to a sub-document:

1- Switch to Run mode.

2- Click on the text object that contains the link. The linked to sub-document appears automatically.

If the target Mimic document does not appear, access to the document may be limited to users with a specific privilege level. Refer to 10.9.6 - Setting Object Properties for details.

10.14.5 Managing Mimic Documents

You can rename or delete existing Mimic documents, write individual Mimic documents to disk and load documents from disk using the Mimic Document manager.

To display the Document Manager, enter Edit mode and choose **Tools > DB Documents Manager**. The Database Record Manager window is displayed:

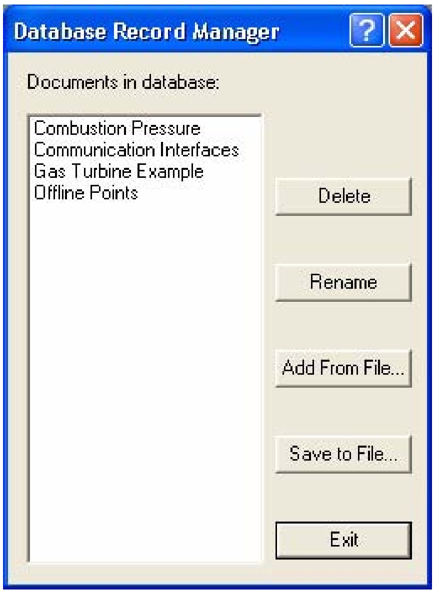


Figure 10-35 : The Database Record Manager Window

From this window, you can:

- Select a Mimic document and click **Delete** to remove the document permanently from the database.
- Select a Mimic document and click **Rename** to rename the document.
- Click **Add from File** to load a previously saved Mimic document (*.m) from disk and store it in the database.
- Select a Mimic document and click **Save to File** to write a Mimic file to disk. Browse to the folder in which to store the document, modify the default name if required, and click **OK**. Mimic documents are stored with a .m extension.
- Click **Exit** to return to Mimic.

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11 USING THE DATABASE BROWSER

11.1 Introduction

The Database Browser module is a graphical tool used to display data from the database.

The Database Browser allows you to view the complete contents of the database. It graphically shows all stored data sets in an intuitive time-line representation, and allows you to quickly navigate to the data set of interest. The Database Browser provides direct links to the Data Analysis and Event Viewer modules.

11.2 Before Using the Database Browser

Before using the Database Browser, you must:

1- Set up and configure a database. This involves:
- Creating at least one database.
- Configuring an ODBC system DSN and user account to access the database.
- Creating and setting up a database server for the database and setting it up to run automatically.

See Chapter 7 - Administering Databases for details.

2- Use the Configuration Editor to define the VM600 racks, cards, and outputs used to gather data, and store this configuration in the database.

See Chapter 9 - Creating a Rack Configuration for details.

11.3 Starting the Database Browser

Start the Database Browser manually by:

1- Choosing **Start > Programs > VM600 CMS Software > DB Browser**

2- Starting the VM600 Administrator program, choosing **Applications** in the structure view on the left, then double-clicking Database Browser.

You can also start the Database Browser from within Mimic. Refer to Chapter 10 - Using the Mimic Module.

11.4 Selecting a Database (Database Browser)

If the Database Browser is started from within Mimic, the current database is used as the source of measurement data. However, if the Database Browser is started manually, the database used depends on the options chosen in the VM600 Administrator. The Database Browser starts directly on the previously used database or the Select ODBC Data Source window opens. Refer to Chapter 6.6 - Administrator Options for further details.

11.5 The Main Window

The Database Browser main window, shown in Figure 11-1, is divided into two main parts:

1- The top half of the window allows you to select the outputs and types of data to analyse.

2- The bottom half of the window displays a graph of the selected data.

3- Circled elements have been defined as Baseline values.

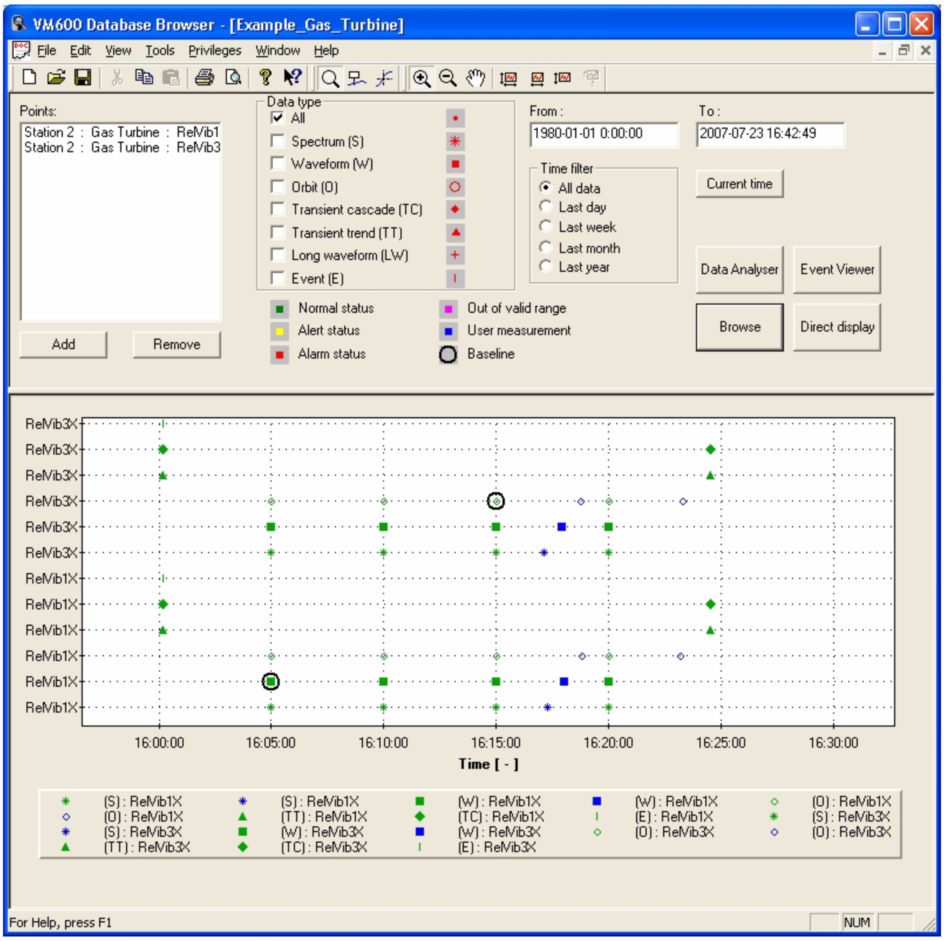


Figure 11-1 : The Database Browser Main Window

11.6 Selecting the Data to Use

To select the data to use:

1- To select the output or outputs to use, click **Add**. The following window is displayed:

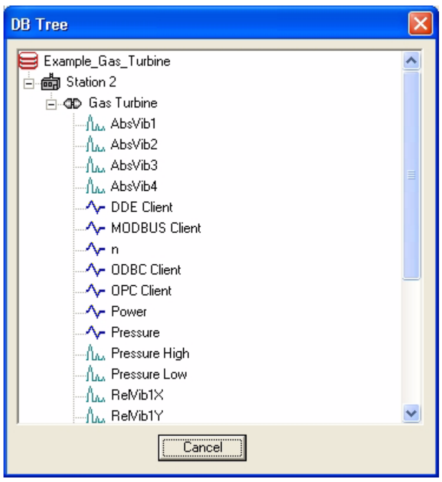


Figure 11-2 : Adding Points

2- Click one or more output points. The points are added to the **Points** list on the main window.

3- On the main window, select the type of data to use:

- Choose **All** to use all the data from the selected output(s).
- Choose one or more of the other data types to use:

Spectrum	•
Waveform	□
Orbit	○
Transient cascade	◇
Transient trend	△
Long Waveform	+
Events	|

4- Select or directly edit the start (**From**) and end (**To**) ranges for the data to be used. You can apply a filter to the **From** range. Click **Current time** to insert the local PC's current system time into the **To** field.

5- Click one of the following buttons:

- **Analyse**. Launches the Data Analyser module.
- **Event List**. Displays the Event List window.
- **Browse**. Display a plot of the selected output data in the bottom half of the window.
- **Direct Display**. Display a plot of the data in a separate window, using the Data Analyser module to display the data.

11.6.1 Browsing Data

When you click **Browse** to work with the data directly within the Database Browser, you can access the functions on the toolbar, which is similar to that of the Data Analyser module:

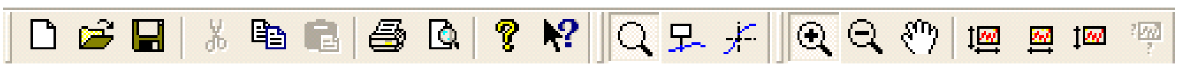


Figure 11-3 : Database Browser Toolbar

Refer to Chapter 12 - Using the Data Analyser to Create Graphs for details on each of the icons. Use the Marker icon , for example, to mark a data point. The value of the data point then appears underneath the graph, as shown in Figure 11-4.

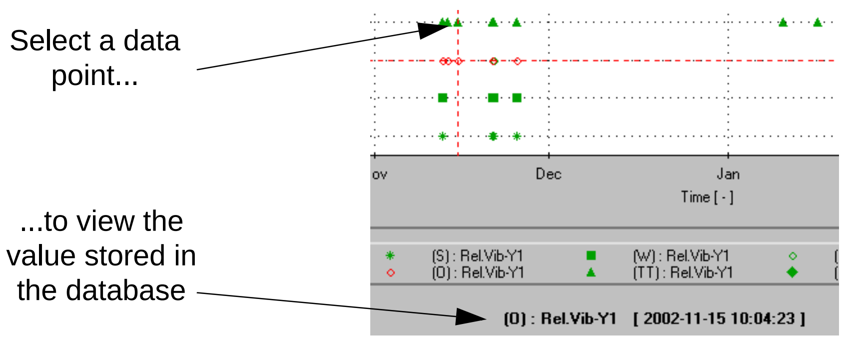


Figure 11-4 : Marking a Point

11.6.2 Displaying Data in the Data Analyser Module

By clicking **Direct Display** on the main window and working on the graph within the Data Analyser module. An example graph is shown in Figure 11-5. Refer to Chapter 12 - Using the Data Analyser to Create Graphs for further details.

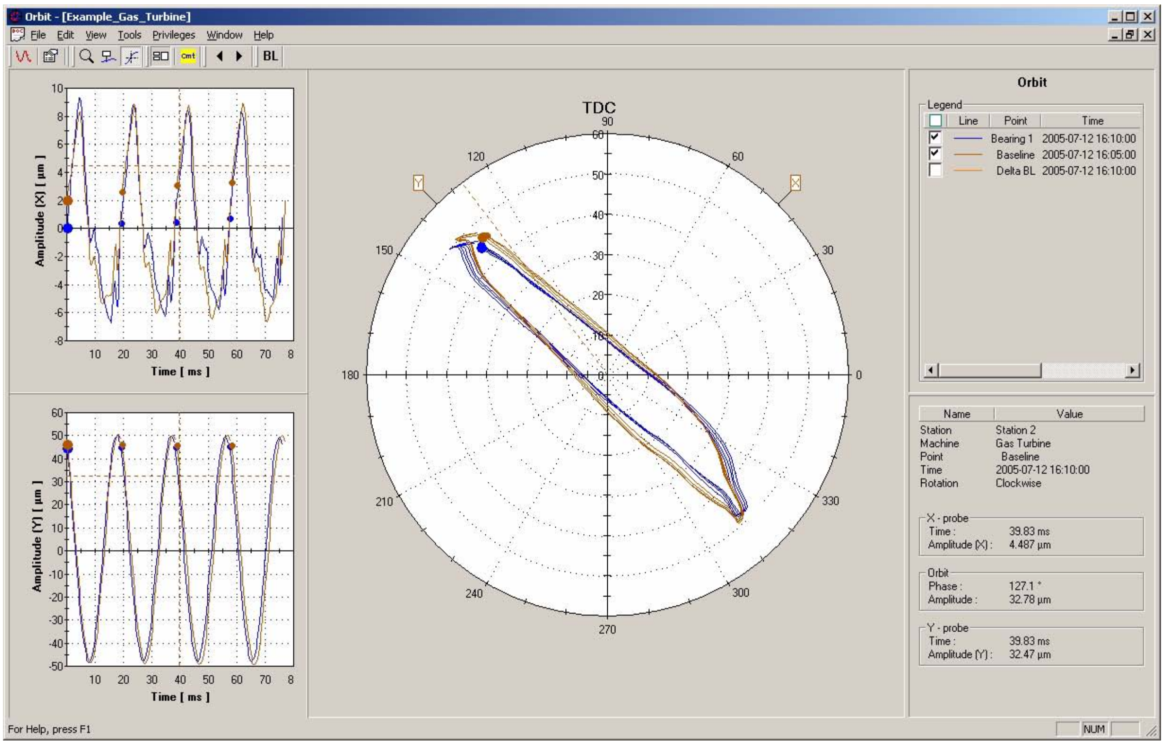
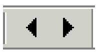


Figure 11-5 : An Example of a Graph in Direct Display Mode

11.6.3 Next/Previous Functions

All plot types for displaying discrete data sets, such as waveforms, spectra, or orbits, allow you to directly scan through the data sets for the selected points using the **Next** and **Previous** buttons:



11.6.4 Data Management of User-Requested Data

You can save data sets into the database by first freezing the plot then saving it. This effectively add the data set into the automatically acquired data sets, acquired on schedule or alarm. This is represented on the Database Browser as well as the Analyser.

11.6.4.1 To freeze a plot:

Click the **Stop** symbol

11.6.4.2 Saving the data:

Click the **Save** symbol

12 USING THE DATA ANALYSER TO CREATE GRAPHS

12.1 Introduction

The Data Analyser module is a graphical tool used to display measurement data.

The tool takes selected data from the data measurement points defined in the database, applies user- or system-defined filters to the data, and displays the data in a variety of graphs, plots or charts.

Typical filters that can be applied to the data are time, alarm status, machine status, or a freely configurable filter that can be constructed based on any speed, analog, or digital data.

12.2 Before Using the Data Analyser

Before using the Data Analyser, you must:

1- Set up and configure a database. This involves:

- Creating at least one database
- Configuring an ODBC system DSN and user account to access the database.
- Creating and setting up a database server for the database and setting it up to run automatically.

See Chapter 7 - Administering Databases for details.

2- Optionally, start the VMCom communications handler. If VMCom is running, you will be able to display “live” measurement data in the Data Analyser. Otherwise, you can only display historic data that has previously been stored in the database.

See Chapter 8 - Setting Up the VMCom Communications Handler for details.

3- Use the Configuration Editor to define the VM600 racks, cards, and outputs used to gather data, and store this configuration in the database.

See Chapter 9 - Creating a Rack Configuration for details.

12.3 Configuring System Time

CMS Software includes modules that graphically plot collected data. It is important that all the data that is plotted is timestamped in a single continuous flow. If the PC on which the CMS software is installed is configured to automatically adjust the system time for daylight saving hours, this can cause data to be incorrectly plotted. For this reason, it is advisable to switch off automatic daylight savings hour adjustment.

To deactivate automatic daylight savings hour adjustment:

1- Click **Start** > **Settings** > **Control Panel**.

2- Open the **Date and Time** applet.

3- Click the **Time Zone** property sheet:

Figure 12-1 : The Day/Time Properties Window

4- Deselect the **Automatically adjust clock for daylight savings changes** check box

5- Click **OK**.

12.4 Starting the Data Analyser

The Data Analyser can be started either manually or from within other CMS Software modules.

Start the Data Analyser manually by:

1- Choosing **Start > Programs > VM600 Software > Analyser**

2- Starting the VM600 Administrator program, choosing **Applications** in the structure view on the left, then double-clicking **Data Analyser**.

You can also start the Data Analyser from within:

- Mimic
- The Database Browser.

12.5 Selecting a Database

If the Data Analyser is started from within Mimic or the Database Browser, the current database is used as the source of measurement data. However, if the Data Analyser is started manually, the database used depends on the options chosen in the VM600 Administrator. The Database Browser starts directly on the previously used database or the Select ODBC Data Source window opens. Refer to Chapter 6.6 - Administrator Options for further details.

12.6 The Main Window

The Data Analyser main window, shown in Figure 12-2, is divided into two main parts:

1- The left hand side of the window shows a logical view of the stations, machines, racks and outputs defined in the selected database.

2- The right hand side of the window lists selection criteria for the type of data to be used, the type of graph, plot or chart to be created, and any user or system filters that are to be applied to the data.

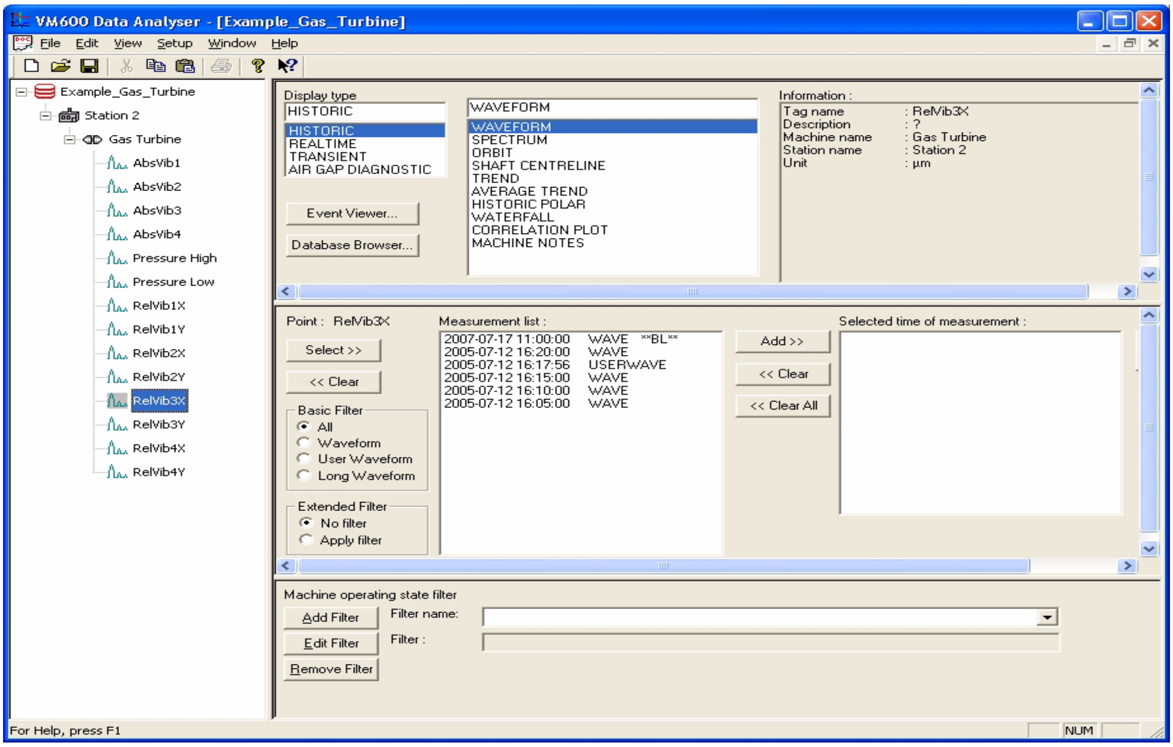


Figure 12-2 : The Data Analyser Main Window

12.7 Creating Graphs

There are several steps to creating a graph:

1- Choose the type of data to use for the graph

2- Choose the type of graph, plot or chart to create

3- Choose the source of the data

4- Apply optional user- or system-defined filters

5- Display the data

12.7.1 Selecting the Data Type

Graphs of three types of data can be generated:

- Historic data—previously captured data extracted from the database.
- Realtime data—live data coming from the machine or machines being monitored.
- Transient data—data of a limited duration, characteristic of the run-up and run-down phases of a machine.

To select the data type:

1- Select **HISTORIC**, **REALTIME** or **TRANSIENT** from the **Data Type** list.

2- If you are using the air gap monitoring module, optionally select **AIR GAP DIAGNOSTICS** from the **Data Type** list.

12.7.2 Selecting the Graph Type

Not all graph types are suitable for all data types. The Data Analyser presents a contextual list of available graph types when you select the data type.

Table 12-1 shows the types of graph available for each of the data types:

Refer to Chapter 1 - Introduction for a more detailed description of each of the graph types.

Table 12-1 : Available Graph Types

Data Type	Available Graphs
HISTORIC	*WAVEFORM* *SPECTRUM* *ORBIT* *SHAFT CENTRELINE* *TREND* *HISTORIC POLAR* *WATERFALL* *CORRELATION PLOT* *MACHINE NOTES*
REALTIME	*BARGRAPH* *REALTIME TREND* *WAVEFORM* *SPECTRUM* *ORBIT* *REALTIME POLAR* *MACHINE NOTES*
TRANSIENT	*CASCADE* *TRANSIENT TREND* *BODE* *SHAFT CENTRELINE* *POLAR GRAPH* *MULTIPLE POLAR GRAPH* *MACHINE NOTES*
AIR GAP DIAGNOSTICS	*ROTOR SHAPE* *SIGNATURE* *ROTOR POLAR* *POLE TREND* *MACHINE NOTES*

To select a graph type:

1- Select the **Display Type** as described in Chapter 12.7.1 - Selecting the Data Type.

2- Select an available **Graph Type**.

Depending on your selection, the Data Analyser updates the Logical View to show all relevant stations, machines and channels for which the selected graph type is available, and displays measurement data and filter information in the lower part of the window.

12.7.3 Selecting the Data to Display

The next step is to select the data to be displayed. The data selection procedure differs according to the graph type. For example:

- For a machine notes graph, select a machine in the Logical View and click **Select**. Any machine notes that have been added appear in the **Note List** field. See the online help to learn how to add machine notes.
- For all other types of realtime graph:
  a. Select the point in the Logical View
  b. Click **Add**
- For trend data:
  a. Select the point in the Logical View,
  b. Click **Select**.
  c. Select points in the list of Measurement Data and click **Add**.
  d. Select a **From** and **To** time and date.

12.7.4 Applying a System or Extended Filter

Once a selection is made for a display type, a point list and a time filter, click **Display** to show the appropriate plot. In addition to predefined filter criteria ("System" filters), additional filter criteria can be applied using user-defined conditions ("Extended" filters):

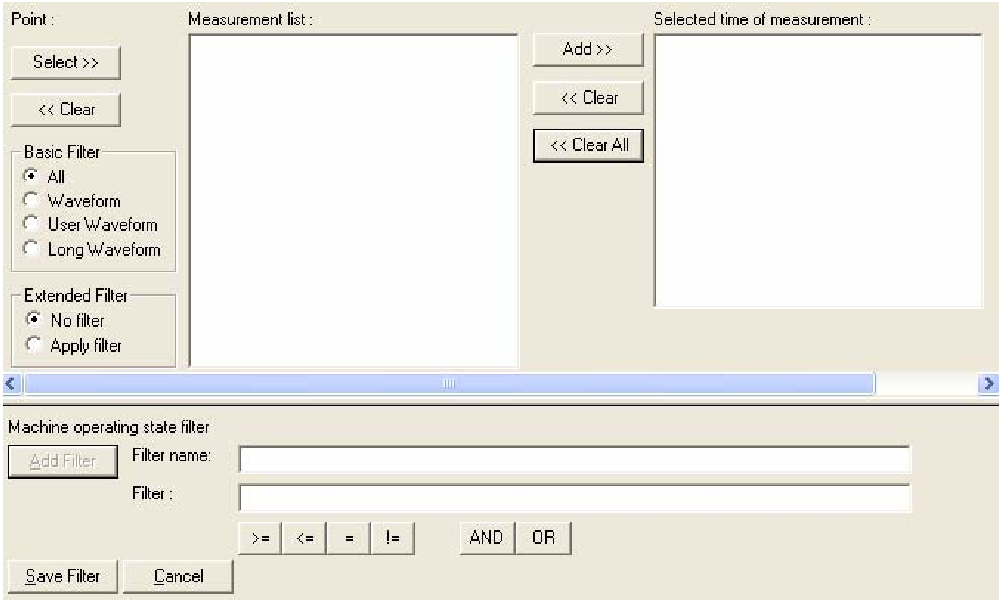


Figure 12-3 : Creating a Filter

Extended filters allow you to define certain conditions of the machinery based on variables, such as analog, speed, or digital points. Extended filters are applied in addition to any system filters that may already be in place. They allow you to look for specific operating conditions, instead of showing all the historic data that is available in the database.

For example, instead of showing a trend curve for a certain vibration value over the entire period of data capture, it is possible to only show a subset of this data, and to display a trend curve over a certain period while the machine was running at a speed within a certain range.

You can construct your own filters, based on any analog, digital, or speed point, and save them for future reuse.

The following shows an example:

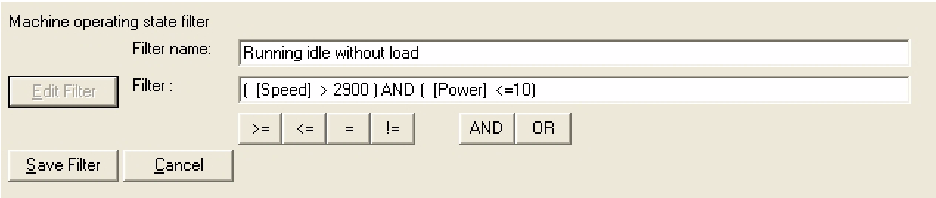


Figure 12-4 : Example of an Extended Filter

This window allows you to:

1- Create filters and save them for use in the current session

2- Edit existing filters

3- Save filters for use in future sessions

4- Delete existing filters

12.7.5 Displaying the Graph

To display the graph, click **Display**.

The following figure shows an example:

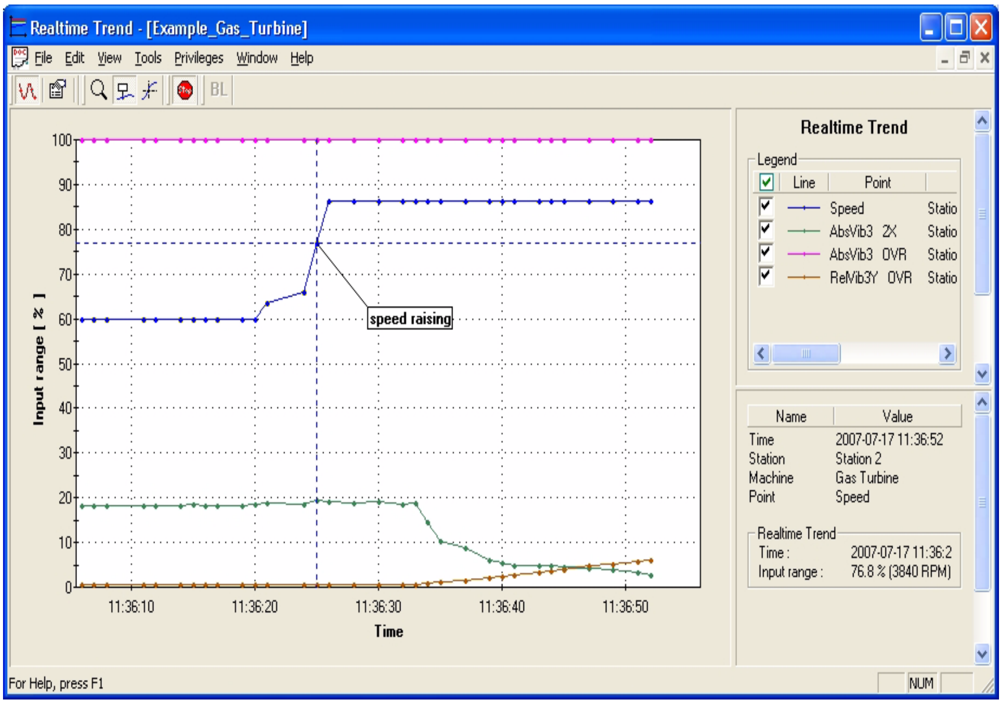


Figure 12-5 : A Realtime Trend Graph

To view the measured points, choose **Display Symbols** from the **View** menu, or click  on the toolbar.

12.8 Working with Graphs

Whilst a graph is displayed, its appearance can be changed using various buttons on the tool bar. Depending on the chosen mode (scaling, comments, point select), different commands / bars are available as described below.

12.8.1 Display points and limits

 The display Symbols tool, gives a graph with a point for each measurement

 The show limits tool is only available on trends

Toggles the position of amplitude and phase (amplitude above phase - European convention; phase above amplitude - US convention)

12.8.2 Scaling / Zoom

The scaling mode allows users to zoom in and out (or) after clicking a tool followed by a graph. Alternatively, the mouse wheel can be used. It is also possible to zoom by dragging a rectangle over the area of interest whilst holding down the left mouse button. Once a zoom has been chosen, users can switch from one zoom to another by pressing and holding the ‘Alt’ key.

The panning tool ( ) allows users to move around a graph. Pressing and holding the left mouse button allows users to ‘grip’ the graph and move it. This tool can also be activated whilst zooming by pressing and holding the Ctrl key. The rescaling buttons allow users to rescale graphs (x and y rescaling, just x rescaling or just y rescaling).

12.8.3 Pick a point / Marker

Pick a point functions allow users to click onto any point on a graph. In graphs with several plots, the following options are available:

 Common marker: The selection in one plot automatically positions the cursor to the same point on other plots.

 Single marker: Changing the selected point is only carried out in the graph selected.

Once a point has been chosen, its details are shown in the legend (Figure 12-6, a). A comment can then be added by clicking the comment icon to attach a text box to the marked point. The Marker Info button (Figure 12-6, b) allows users to add the point's details into the comment.

a) b)

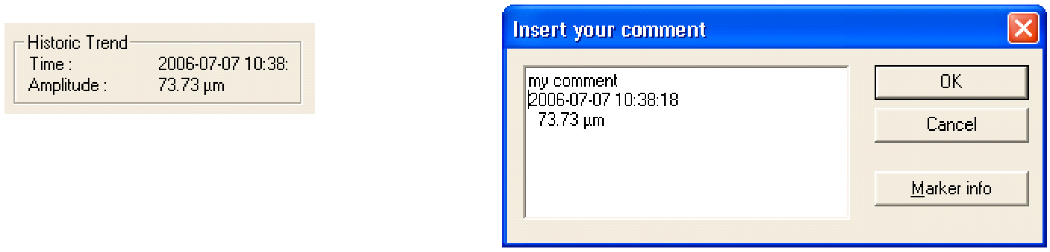
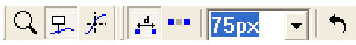


Figure 12-6 : Adding a Comment to a Point on a Graph

12.8.4 Labels and their density



1- Editing Comments

Click on the Labels icon to pick up the comment and replace it with using the left mouse button. A single left click selects the comment (Figure 12-7, a), then clicking the left button in the text region allows users to edit the comment. (Figure 12-7, b). The comment is then validated using another left click (Figure 12-7, c).

NOTE : Take care when selecting comments. A double-click on the left mouse button hides the comment.

a) b) c)

Figure 12-7 : Editing Comments

2- Define comments to display

Depending on the graph displayed there are various options available to choose which comments to display.

In the Transient Polar for example, using the tool the minimal distance between two labels (10, 25, 50, 75, 100 pixels) can be defined. Any label(s) between these pixels are hidden.

Using the tool a number from 2 to 10 can be selected, which causes only one out of 2, 3, 4,… labels to be displayed.

3- Using the Settings tool, the appearance of comments (e.g. bounding rectangle, transparent background) and function labels can be defined (refer to 12.8.5- Settings)

12.8.5 Settings

Layout preferences for the Data Analyser plots can be selected and saved using the settings tool. The default settings Set as default comprise of:

1- **General settings (**Figure 12-8, a) such as i) display data in Speed (RPM) or Frequency (Hertz), ii) to show phase above amplitude in a Bode plot (US convention), iii) to show or hide the symbols and show or hide speed labels.

2- **Labels** (Figure 12-8, b) to define appearance (e.g. bounding rectangle, transparent background) and function. The later may vary between graphs (e.g. display only speed, only time or both, with or without units on the Transient Polar plot).

3- **Tools (**Figure 12-8, c) to allow users to save preferences, such as i) which tools should be selected when a graph is opened, ii) whether the common zoom is switched on or off, iii) how to display labels and iv) whether the common marker is switched on or off.

a) b) c)

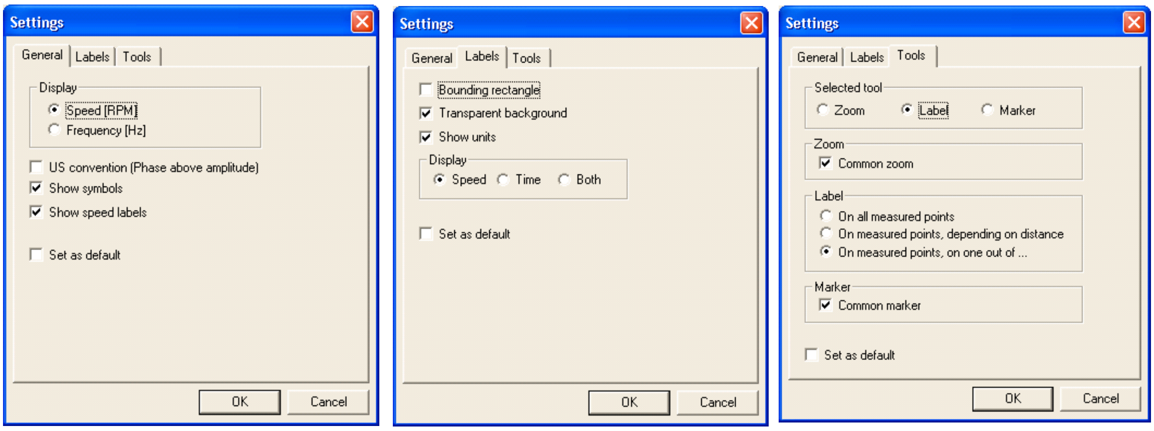


Figure 12-8 : Settings Showing a) General, b) Labels and c) Tools

For each of the graphs a separate entry is made in the registry, so you can choose different settings depending on the type of graph to be displayed.

12.8.6 Data Baseline

The Baseline feature BL captures snapshots any time (e.g. when the machine is running in good condition such as after commissioning). These data can then be used as a global reference. Degradation and sudden changes in vibration pattern later on can then be compared to this baseline.

For the Data Baseline, an individual measurement can be chosen locally on each vibration-channel data (Historic Waveform, Spectrum, Orbit or Transient) as baseline for this specific Channel and Type.

NOTE : The Trend Baseline for the entire Machine is not changed when the baseline feature is used.

To set a Data Baseline, firstly change to Super privilege level. The currently displayed graph can then be defined to be the Baseline value for the selected channel and type. Graph from other measurements now have checkboxes in the legend to allow users to decide whether to display not only the selected graph but also the previously defined Baseline or the difference between the baseline and the current graph.

The baseline can be updated as required. There is one Baseline available for each channel band for each of the following historic graphs: Waveform, Long Waveform, Spectrum, Orbit and Transient.

Figure 12-9 : Graph Showing Historic Data and the Difference Between these Data and the Baseline (Delta)

12.8.7 Menu bar functions

Figure 12-10 shows a range of the menu bar functions available.

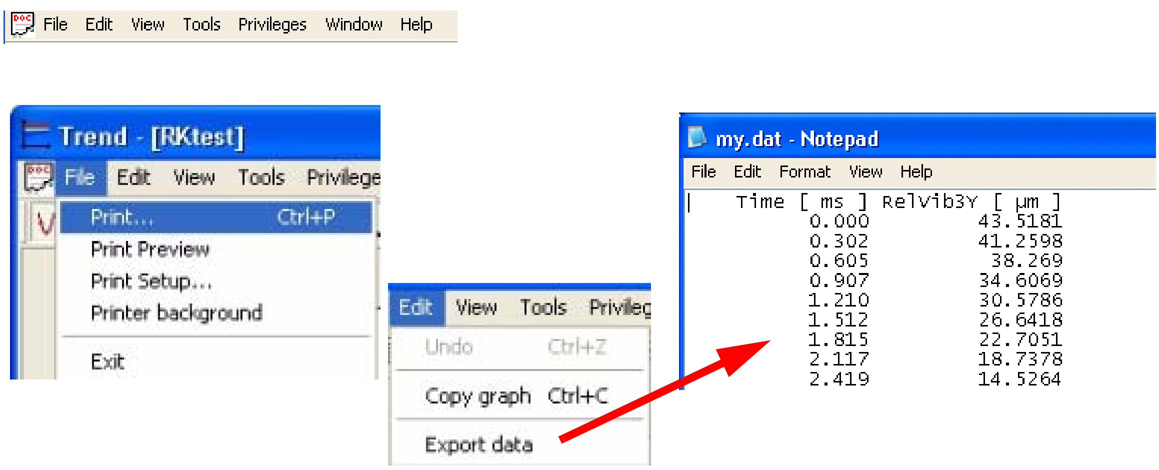


Figure 12-10 : Menu Bar Functions

The menu bar comprises of a list of functions, the most important of which are described in subsequent sections.

12.8.7.1 File

1- **Print Preview** allows users to preview how the graph will print before actually printing.

2- **Print Setup** opens the standard Windows Print dialog box, so that print settings can be selected.

3- **Printer Background** allows users to replace the grayscale background with a white background.

12.8.7.2 Edit

1- **Copy Graph** allows users to make a copy of the graph currently on display. It is similar to using the print screen key on a keyboard, except only the graph is copied.

2- **Export Data** exports all points from this graph into a text file. It is suggested that an appropriate format is *.dat).

12.8.7.3 View

Figure 12-11 shows the View functions available on the menu bar. The view functions allow users to change the appearance of graphs. The options are the same as those on the toolbar (Section 12.8.2).

The contents of the drop-down menu change according to the type of data being displayed. For example, the view menu allows users to:

- Advance to the next or previous dataset in Historic data.
- Toggle between amplitude and phase display in a Bode diagram.
- Amend the labels of Polar Plots.
- Delete graph headers and footers (in settings).
- A new window can be opened to display plotted data.
- Single lines or the entire content of the plot can be copied onto the clipboard.

a) b) c)

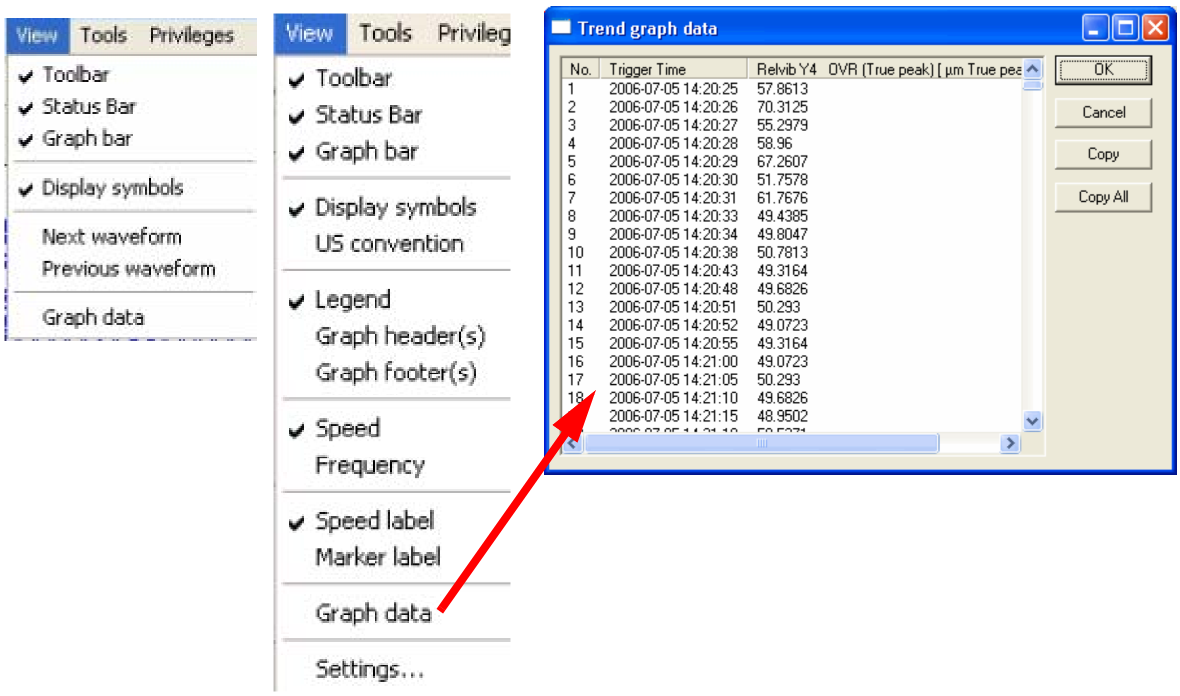


Figure 12-11 : View Functions on the Menu Bar Showing a) Historic Waveform Menu, b) Transient Polar Plot Menu and c) Trend Graph Data

12.8.7.4 Tools, privileges, window and help

Figure 12-12 shows the Tools, Privileges, window and help menu bars.

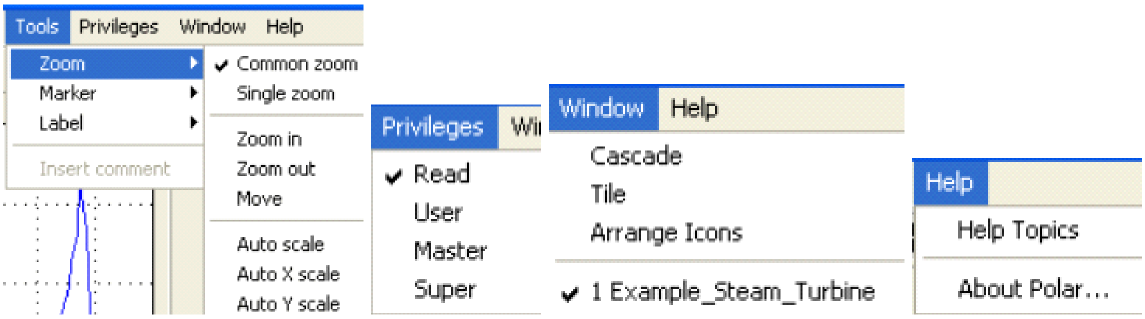


Figure 12-12 : Other Drop-down Menus of the Menu Bar

1- The **Tools** drop-down menu offers the same functions as described for the toolbar in 12.8.2, page 12.7 to 12.8.4, page 12.8.

2- The **Privileges** drop-down menu allows users to change to Super-mode if this change was not made when opening the Data Analyser.

3- The **Window** drop-down menu allows users to control the appearance of windows on the screen and change the active window

4- The **Help drop-down menu** allows users to enter the online help, where information about the topic of interest may be provided. In the Help-information is contained information regarding the version of CMS installed.

13 USING THE CMS EVENT VIEWER

13.1 Introduction

The CMS Software system performs limit checks for each configured output, at every processing cycle. Any exceedances, or amplitude changes across a user-defined limit, are logged into the database.

The CMS Event Viewer is used to display events in the database that have either been generated automatically by the system, or manually by users. You can filter the displayed events according to a variety of criteria.

The CMS Event Viewer can be launched either directly from the VM600 Administrator, or from within various other CMS Software modules, including Mimic, the Data Analyser and the Database Browser.

Invoking the CMS Event Viewer within another module is context-sensitive, that is, the contents of the CMS Event Viewer window relate directly to the module from where it was launched. For example, invoking it from the “Unacknowledged Events” indicator in the Mimic module shows only unacknowledged events, whereas invoking it from a machine in the Mimic logical view shows only events related to the selected machine.

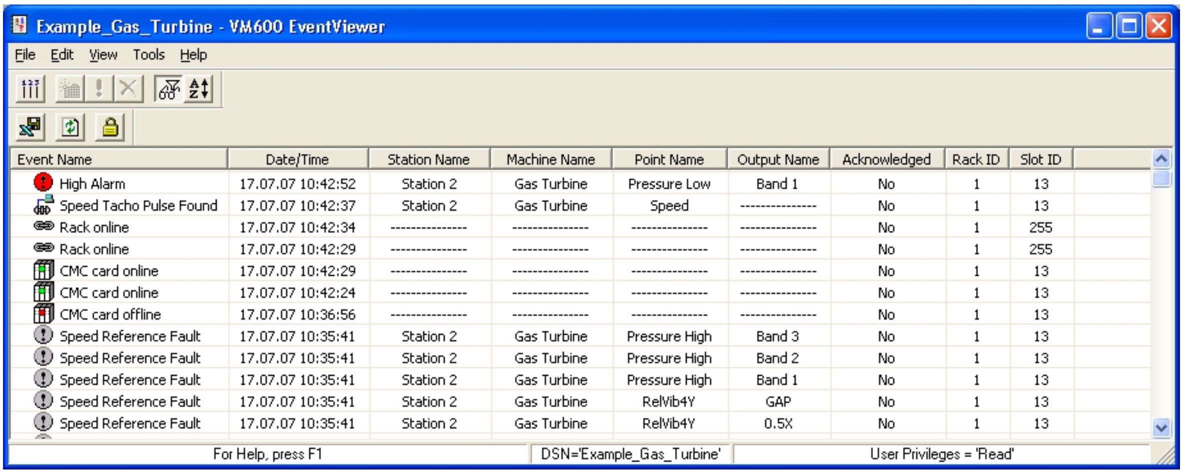


Figure 13-1 : The CMS Event Viewer Window

The CMS Event Viewer shows, in list form, the events that apply, according to particular filters and sort criteria that you can set.

You can update the list at any time by clicking the Refresh button .

The CMS Event Viewer is primarily used by the operator in conjunction with Mimic, providing immediate notification of any new occurrences in the system. New events are initially flagged as “unacknowledged” until the operator manually acknowledges having read their contents. However, the CMS Event Viewer is also useful for performing detailed data analysis, and comparing the event log with measurement data. More specifically, the alarm event log is a good starting point for searching for more detailed data that were triggered by limit exceedance of specific outputs.

13.2 Selecting a Database (Event Viewer)

If the Event Viewer is started from within Mimic or the Database Browser, the current database is used as the source of measurement data. However, if the Data Analyser is started manually, the database used depends on the options chosen in the VM600

Administrator. The Database Browser starts directly on the previously used database or the Select ODBC Data Source window opens. Refer to Chapter 6.6 - Administrator Options for further details.

13.3 Privilege Levels

All users can view the list of events in the CMS Event Viewer.

Before being able to acknowledge events, however, you must have Super or Master user privileges.

To gain Super or Master user privileges:

1- Click the **Password** button , or choose **Tools > Privileges**.

2- Choose **Super** or **Master**. The Change Privilege Level window is displayed:

Figure 13-2 : The Change Privilege Level Window

3- Type the Super or Master password and click **OK**.

See Chapter 9 - Creating a Rack Configuration for more information on system security, including the default passwords to use and how to modify passwords.

13.4 Acknowledging Events

To acknowledge an event:

1- Obtain Super or Master user privileges, as described above.

2- Double-click on the event in the event list, or select the event and click the Acknowledge button .

3- On the Event Detail window, type an optional note describing the reason for acknowledging the event. Click **Add Note** to automatically add to the note the current time or the time that the event occurred.

4- Select **Acknowledged**.

5- Click **Close**. Alternatively, click **Previous** or **Next** to acknowledge the event immediately above or below this event in the list, respectively.

Depending on the filter that is being applied, the acknowledged event may be removed from the event list.

13.5 Sorting the Event Log

To modify the order in which events are listed:

1- Click the **Sort** icon . The Sort window is displayed:

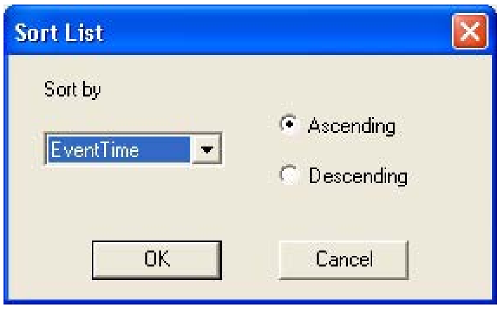


Figure 13-3 : The Sort List Window

2- In the **Sort by** list, choose the column to be used as the primary sort key.

3- Choose **Ascending** to sort the entries in ascending alphabetical order, or **Descending** to sort in descending order.

4- Click **OK**.

13.6 Filtering the Event Log

You can choose to display only those types of event that interest you.

To filter events:

1- Click the Filter icon , or choose **Tools > Filter Messages**.

2- On the Filter Events window, choose the type of events to display. For example, to display only events that have occurred with the past 7 days:

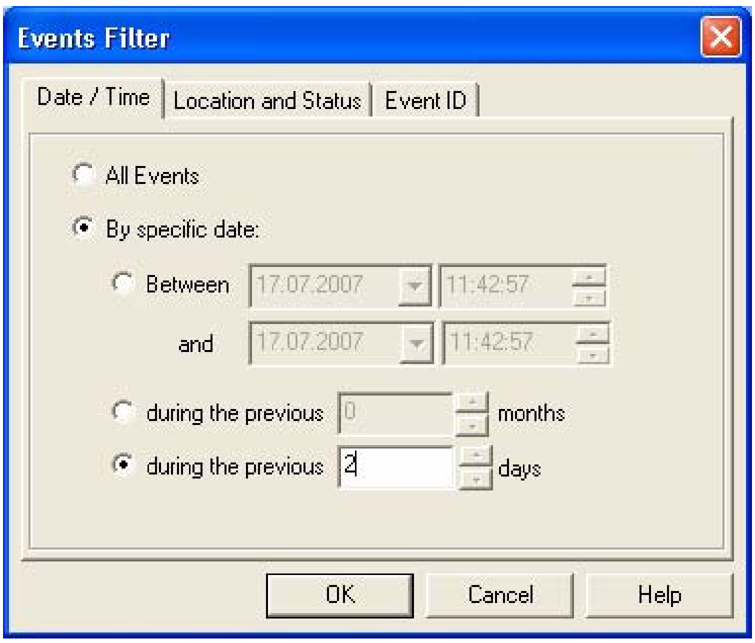


Figure 13-4 : Filtering Events

3- Click **OK**.

The Event Browser can be invoked from various places throughout the CMS Software. Depending on the context, it is invoked as if a filter, such as “only unacknowledged alarms”, had been preset manually.

13.6.1 Removing Filter Settings

To remove an active filter, click the **Filter** icon on the toolbar. The display reverts to normal.

13.6.2 Changing Filter Settings

Preset filter settings remain unchanged, regardless of whether they are actually applied. It is therefore possible to re-activate the same filter settings by clicking the **Filter** icon again. The data is highlighted, and the previously set filter settings re-applied.

This is useful in order to trace events that have been acknowledged, and therefore disappeared from the list of unacknowledged events.

13.7 Customizing the Event Log

You can customize the event log to display just the information of interest to you.

To add or remove columns:

1- Click the **Customize** icon , or choose **View > Select Columns**.

2- On the Select Columns to Display window, use the arrows between the columns to add or remove columns as required, or **Move Up** and **Move Down** to change the order in which the selected columns appear in the list:

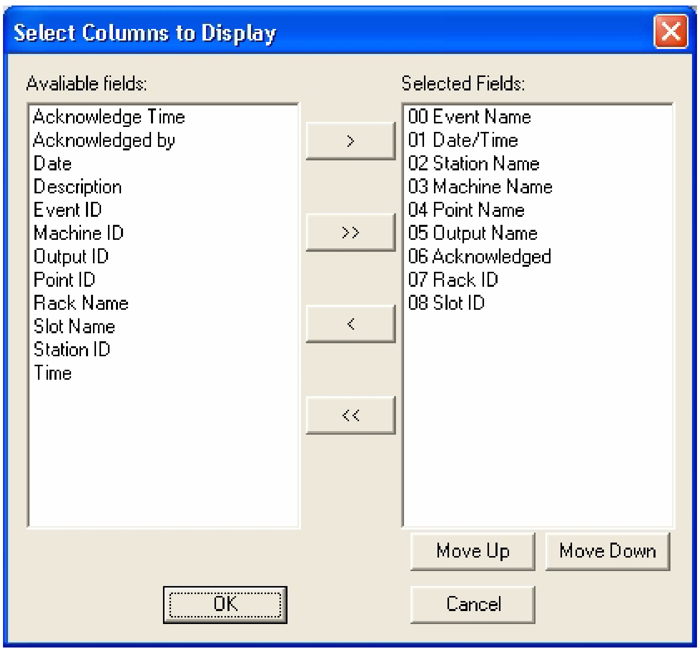


Figure 13-5 : Select CMS Event Viewer Columns

3- Click **OK** when finished.

13.7.1 Display descriptions

To keep track of the history of a machine text can be added to each entry in the Events List. New events can be created to add a text description at a certain time. Thus, explanations can be left about events that have occurred. To view these comments, click the 'column'-button in the event viewer and add the Description column to the selected Fields list. This can then be positioned as appropriate (Figure 13-6).

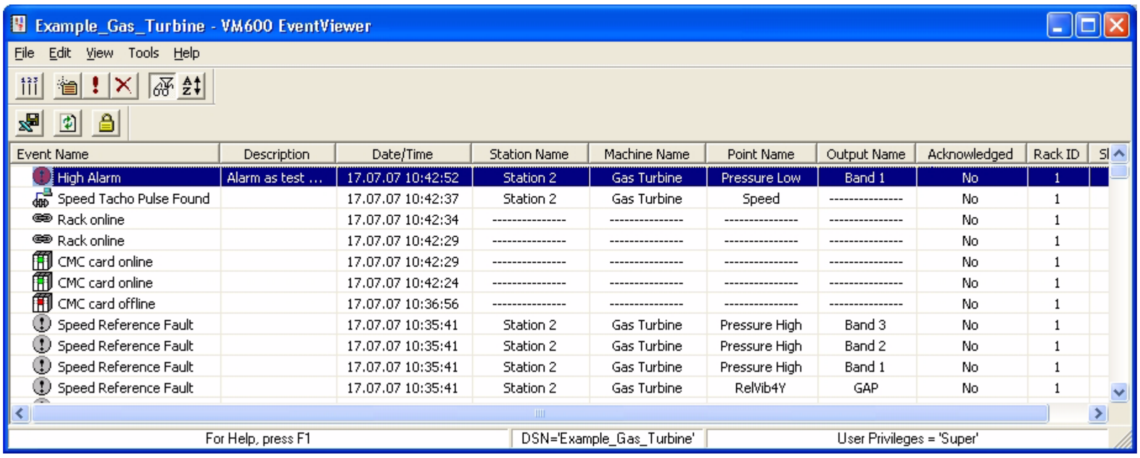


Figure 13-6 : Display of Event Viewer with Descriptions

13.8 Exporting the Event Log

You can export the contents of the event log to a file for further processing by other applications.

To export the event log:

1- Click the Export icon , or choose **File > Save List.**

2- Specify the name of the file to export and click **Save**. The event log is exported to a comma-separated text file (.csv) on the disk. You can then, for example, archive the data or subsequently import the contents of the file into another application, such as a spreadsheet, for further analysis.

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Part IV : Appendices

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A TROUBLESHOOTING AND FREQUENTLY ASKED QUESTIONS

Q. Why does nothing happen when I double-click the VMCom shortcut on my desktop?

A. Verify the following:

1- Right-click on the shortcut and choose **Properties**. For VMCom to start, the value of the DSN=*"myDB"* parameter must match that of a database that is currently running as a Database Server. Refer to 8.3.2 - Running VMCom from the VM600 Administrator for details.

2- Check that the physical database file associated with the DSN is the same as that being managed by the database server. To check which physical database file is associated with a system DSN:

a. Start the ODBC Administrator program, for example, from the VM600 Administrator program.

b. Click the **System DSN** property sheet.

c. Select the system DSN that is specified in the VMCom shortcut properties.

d. Click **Configure**.

e. Click the **Database** property sheet.

f. The name of the database appears in the **Database file** field.

To check which physical database file is being managed by a database server:

a. Start the Sybase Central program

b. Select the **Services** node on the left-hand side of the window.

c. Right-click on the Database Server and choose **Properties**.

d. Click the **Configuration** property sheet. The database being used appears in the **Parameters** box, for example “sample.db”.

Q. What do “VMCom is disconnected by user...” messages in the application log file mean?

A. Messages of the form “VMCom is disconnected by user : npar : 2003-03-07 07:35:19” are generated by the Mimic application when the VMCom communications handler is running in debug mode (using the -D command-line option). Periodically (every 15 seconds), Mimic checks that the VMCom communications handler is still running by disconnecting then reconnecting. In debug mode, these messages are written to the Windows application log file.

These messages are harmless and have no negative impact on system performance. However, due to the large number of entries generated in the application log file, you should consider either removing the debug option (see 7.5.2 - Modifying Database Server Command Line Parameters), or taking steps to limit the size of the application log file (see 8.8 - Managing the Application Log File).

Q. What do the error messages returned by the VMCom Service Setup Program mean?

A. Only one VMCom service can exist at any one time. If the following error message is displayed in a popup window:

```
failure: CreateService (0x431)
```

a VMCom service already exists and the program is unable to create another one. Open the Windows Services window and identify the existing service's name.

Q. I start VMCom first, then Mimic, but "VMCom offline" still appears in red on the status line. Why?

A. The most likely cause is that the database server required by the VMCom communications handler is not running. Proceed as follows:

1- Exit Mimic.

2- Stop VMCom by clicking on the VMCom icon in the system tray and clicking **Shutdown**.

3- Check that the database server and VMCom are accessing the same database, as described previously.

4- In Sybase Central, start the database server.

5- Start VMCom.

6- Start Mimic.

Q. Why does "Unacknowledged messages" appear in red at the bottom of the Mimic window, and what should I do about it?

A. This message indicates that alert or alarm indications, or a variety of other possible error conditions, have been detected by the CMS Software system but no operator or administrator has yet acknowledged having read all such messages. To acknowledge a message:

1- Double-click on the "Unacknowledged messages" area of the Mimic window. The Event Viewer module is launched.

2- Make sure you have Super user privileges in Event Viewer.

3- Double-click on any listed event that shows "No" in the "Acknowledged" column.

4- Optionally, type a brief comment explaining the reason for the fault, or the solution to the fault.

5- Select **Acknowledged**.

6- Type your name and click **OK**.

7- Use the **Next** and **Previous** buttons to navigate other unacknowledged events in the list, then click **OK**.

8- Close the Event Viewer when all events have been acknowledged. The status bar area is now green.

Q. When I return from lunch, all my open Mimic documents have been closed. Why?

A. A timeout is set in the Mimic options. To remove or increase the timeout:

1- Make sure you have Super user privileges in Mimic.

2- Enter Edit mode.

3- Choose **Tools > Options**.

4- Either deselect the **Close windows opened from Mimic after** option, or enter a larger timeout value.

5- Click **OK**.

6- Return to Run mode.

Q. Why is no value being displayed in Mimic for my Analog input?

A. Verify the following points:

1- Check that the IOC 16T channel to which the input is physically connected matches a channel number configured as an Analog input in the Configuration Editor.

2- Remove the IOC 16T card from the VM600 rack and check that the jumper settings match those shown on the schematic diagram printed from the Configuration Editor. Refer to 9.15 - Configuring the IOC 16T Card on page 9-39 for a description of the procedure to follow.

3- Open the Mimic document and check that the object that should be displaying the value is correctly configured. Drag and drop the correct output or output from the architectural view onto the object and watch for any error messages that Mimic displays.

Q. Why does Windows display error/warning messages saying “Application Log Full”?

A. The VMCom communications handler writes messages to the Windows application log file whenever an event occurs. For example, an entry is written to the application log file whenever a CMS Software application connects to or disconnects from the VMCom communications handler. When running the VMCom communications handler in debug mode, the large number of events can cause the application log file to overflow, causing “Application Log Full” error messages to be displayed.

Limit the size of the application log file as described in 8.8 - Managing the Application Log File.

Q. My Database Has Overflowed the Partition!

A. The cause of this problem is usually that the application log file has grown rapidly. Although databases on other partitions should continue to function normally, it may be impossible to start the database server for the affected database.

When this happens, it may also become impossible to delete the application log file for the database, stop the database server, or change the database parameters to use no log file.

To recover from this situation, you can attempt to launch **dbsrv8.exe** manually using the "**-f**" parameter. Refer to the Sybase Central online help for more information.

Refer to 7.1.4 - Transaction Log Files for more information on estimating and controlling the size of transaction log files.

Q. Why do I get a "Column not found: Column 'FW2' Not Found" error when I open a database in the Configuration Editor?

A. The most likely cause of this message is that you are running the CMS Software with a database that was created with an earlier version of the software and has not yet been updated to the current version. In this case, try running the **Update Internal Database Structure** utility from within the VM600 Administrator program.

Q. How do I know which version of Adaptive Server Anywhere is installed?

A. To find out which version is installed:

1- Launch Sybase Central by choosing **Start** > **Programs** > **Sybase SQL Anywhere 8** > **Sybase Central**

2- Choose **Help** > **About Sybase Central**. The Sybase Central window is displayed (Figure A-1).

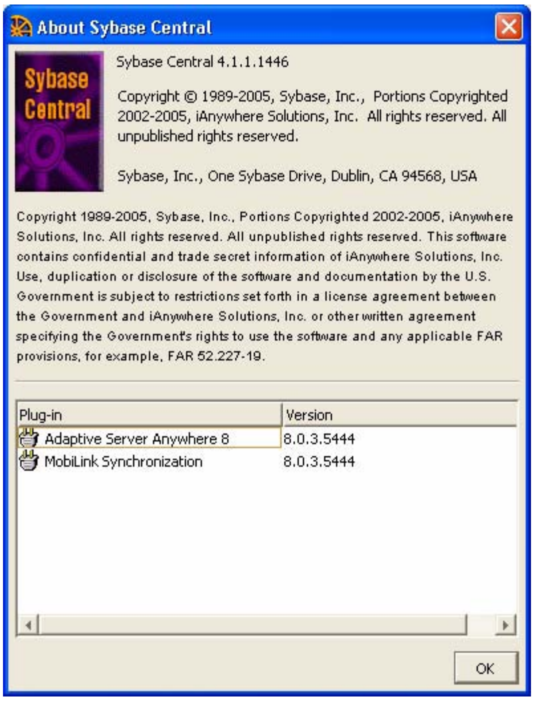


Figure A-1 : Sybase Central Window

In this case, the version is "8.0.3.5444".

Q. How can I improve the performance of my database?

A. The processing load and storage demands of a database are likely to increase significantly over time. As a consequence, database performance can degrade. To improve performance:

1- Verify that the database is using a transaction log file and is not using a mirror file. Changing these settings is described in 7.6.9 - Changing Transaction Log File Settings.

2- Check that the database server's cache memory allocation is the optimum size (see 7.5.3 - Database Server Cache Memory Size Optimization).

3- Consider upgrading the PC that is running the database, for example by installing larger and faster disk drives, more RAM, faster processors, faster network communications, and so on.

Q. How do I fix problems connecting to the VMCom communications handler?

A. This problem exhibits various symptoms, depending on the context of usage of the CMS Software, the system administration of the host PC and client PC's and the current type of activity. The following symptoms are indicative of this issue:

COMMIT doesn't work from Configuration Editor:

- When attempting to perform a COMMIT, the Configuration Editor window shows "VMCom appears to be offline"
- VMCom does not react to the request and continues to run normally.

CONNECTION doesn't work from the Configuration Editor

- When attempting a connection, Configuration Editor Window shows "VMCom appears to be offline"
- VMCom does not react to the request and continue to run normally.

Real-Time Plots

- When attempting to launch real-time plots (waveforms, spectra, orbits, and so on), the connection fails and the Real-Time Plot window shows "VMCOM offline" in the title bar.

Incorrect VMCom status in Mimic

- Mimic window shows "VMCom offline" although the VMCom process is actually running

Q. Background Information about the CMS internal communication mechanism

The VMCom communications handler is responsible for exchanging data with CMC 16 cards through the network. It downloads configuration data to the hardware, and uploads measurement data and status information from the VM600 racks and stores it in the database.

While most of these tasks are carried out independently by the process, some activities require user interaction with the VMCom process, such as manually triggering the download of configuration data to the card (COMMIT), or the acquisition of specific user-requested datasets, such as real-time spectra, real-time waveforms, or real-time orbits.

At a lower lever, the mechanism used for those actions uses a “pipe” connection, which requires that the currently logged in Windows user has access to the directory where the program VMCom.exe is running. In a distributed architecture (when the system is operated from several machines over a network), this has certain consequences on the administration of those machines. The next section highlights conditions that need to be met in order to guarantee the functioning of the pipe connection mechanism.

A. Use the following checklist to help solve the problem:

1- Host identification

When running, the VMCom communications handler process “signs” its presence within the database by writing the host name of the PC on which it is running into a field inside the CONFIGURATION table of the database. Other programs that need to connect to VMCom, or check that it is running, rely on this signature to detect whether the VMCom process is running. Whenever a connection to VMCom is needed, these programs attempt to connect to the pipe of the VMCom process on the PC identified by this host name.

The host name of the PC where VMCom is running must be known, and visible from all client machines. In a client/server environment, the server and clients must be located on the same network, belong to the same subnet or use appropriate gateways, and must be able to recognize the host name (for example, by looking up the name in the “hosts” file on the local PC, or using a domain name server).

2- Windows Networking Components

Two components of Windows operating systems are required for connecting to the VMCom process over the network:

- **Client for Microsoft Networks**, to be able to “see” the host over a network
- **File and Printer Sharing for Microsoft Networks**, to be able to share files over the network, thus allowing components to connect to a pipe.

While both these components are part of the standard Windows operating system, they must be installed on the PC where VMCom is running. Otherwise, it is not possible to establish the pipe connection.

Check that both components are installed on the computer. If one or other is not:

- **Install** > **Client** > select **Client for Microsoft Networks** > **OK**
- **Install** > **Service** > **File and Printer Sharing** > **OK**

3- Windows Users/System Administration

Users logged on to a CMS host or client computer must have access to the directory where the currently running VMCom.exe program is located. This implies that the current Windows user must have appropriate privileges to the installation directory of the CMS Software on the host computer.

When accessing the system from a client machine, the user name and password on the local Windows system (client machine), must also be recognized as authorized users on the server machine.

Typically it is recommended to configure dedicated Windows users on the host as well as on all client machines, with unique user names and passwords.

Q. Why don't I get the expected results?

A. Check the following in the Configuration Editor:

- For transient data, check that the sampling duration is not set to zero.
- If no output signal is available, check the band mapping for the output.
- If the signal shape for a dynamic signal is  and you expected , check that the **Integration** setting is **None**.
- If unexpected orders are received, check the reference **Fixed Speed** value for the machine to which the channel is connected (in the Architectural view.
- Always configure at least one speed channel for each card, even if it is not used directly for the channel's processing.
- If S_{max} trend data is being acquired, check that order tracking and fixed frequency features are both switched off.

Q. Should I Use Daylight Savings Time?

CMS Software always shows you a continuous sequence of data on plots. This data is always stored in Universal Coordinated Time (UTC), without any reference to summer or winter time, that is, independent of the system clock setting on your computer.

However, if the "Automatically adjust clock for daylight saving changes" setting is set on your computer, the displayed times are calculated from the actual time adjusted for daylight saving time. So, during summer you will see points displayed correctly, but winter points will be one hour out. In winter, the opposite happens and the summer points will be one hour out.

A. Deselect the "Automatically adjust clock for daylight saving changes" checkbox (accessible from **Start > Control Panel > Date and Time**):, as shown in Figure A-2.

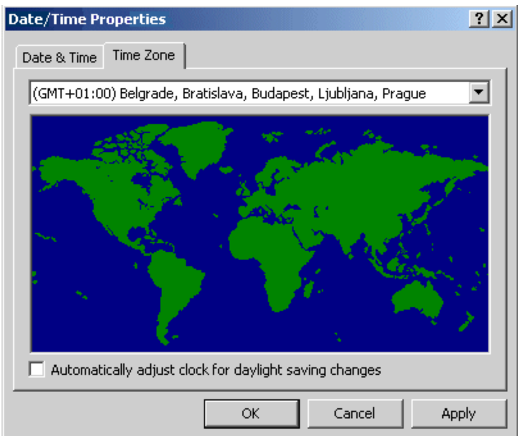


Figure A-2 : Date and Time Properties

Q. How do I perform trend refinement in background mode?

A. To capture quick changes in amplitude in background mode when the machine is running on load, use the **Trend Refinement** setting on the machine's **Logging** page in the Logical View of the Configuration Editor (Figure A-3).

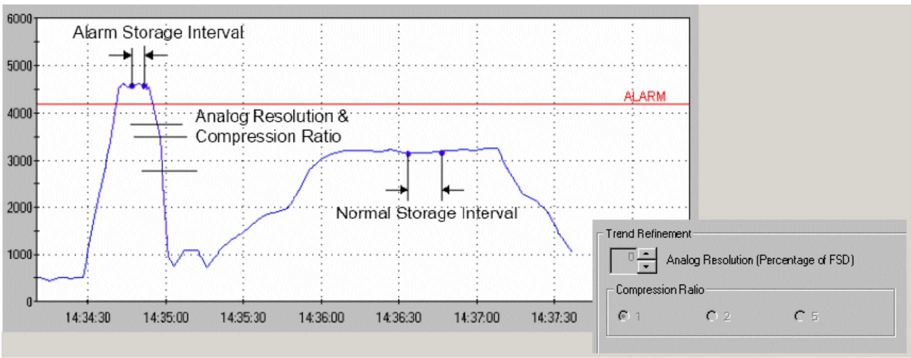


Figure A-3 : Logging Page of Logical View

If, when running on-load, the system detects that the measured values between two realtime trend points are further apart than x% of FSD (full scale deflection, configured as the **Analog Resolution**), it writes every acquired trend point into the database.

With the **Compression Ratio** setting, you can further adapt the **Analog Resolution** to be smaller when it approaches the alarm levels.

Example A: **Analog Resolution** 20% of FSD and **Compression Ratio** equals 1: the **Analog Resolution** effectively used always stays at 20% of FSD (see the black line in Figure A-4).

Example B: **Analog Resolution** 20% of FSD and **Compression Ratio** equals 2: the **Analog Resolution** effectively used is 20% of FSD only when the values are between the alarm values (LowAlarm + ½ (HighAlarm - LowAlarm). As the value gets closer to the alarm values, the analog resolution is reduced to its percentage divided by the compression ration (that is, 20% / 2 = 10%) (see blue line in Figure A-4).

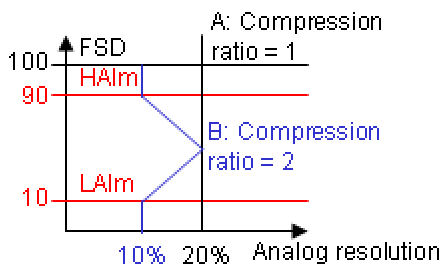


Figure A-4 : Sample Trends

NOTE : A small **Analog Resolution** value can cause the trend buffer to rollover (that is, to overwrite the oldest data before it has been sent to the database).

NOTE : You can only choose one percentage value for the machine, even though signals may be configured differently (peak and peak-to-peak).

NOTE : Analog Resolution is only active when the machine status is running "on load" (see 1.4 - Machine States on page 1-9).

Q. Which direction for the offset definition of relative vibration points?

A. Positive and negative directions can be defined as follows:

- Positive direction - further away from the probe - more negative
- Negative direction - closer to the probe - less negative

In CMS, the same mathematical approach is used for the positive and negative DC Signal range (Figure A-5).

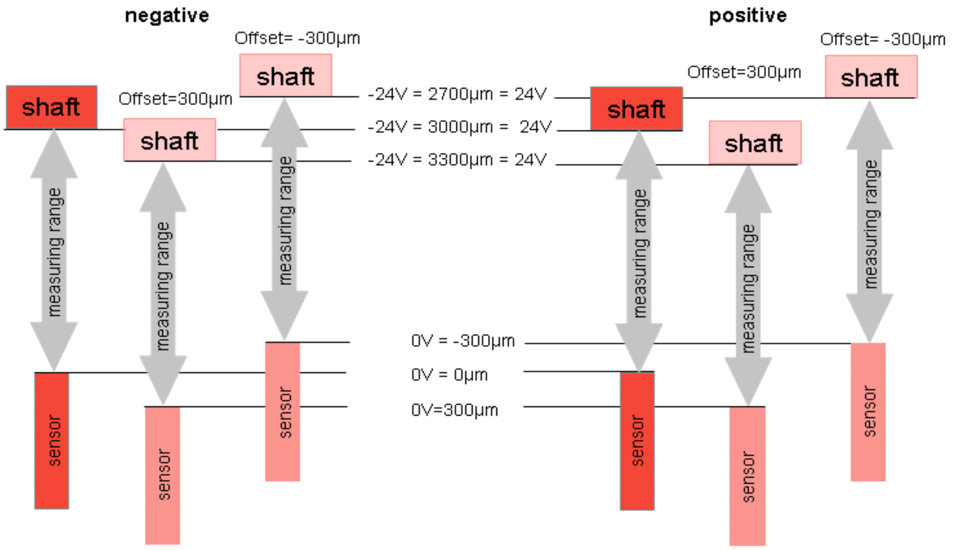


Figure A-5 : Positive and negative signal ranges

As a result, in CMS:

- A positive offset value means that the measuring range is virtually shifted away from the target.
- A negative offset value means that the measuring range is virtually shifted towards the target.

NOTE : Only DC Gap outputs take into account the DC offset.

Q. What if remote access to the system fails?

A. If you need to access your database from more than one other computer you need to uninstall Sybase and choose a higher number of licensed seats in the setup. The Help/About Sybase only states the version of Sybase running. No other setup information is provided.

Q. How is it possible to log and trend the behaviour of non-dynamic Points

A. Dynamic points drive logging of trend data, which leads to restraints when integrating non-dynamic points (e.g. offline points, tacho or analog points) into the CMS Database. Offline points must be attached to a machine in the logical view. Figure A-6 shows the output from a vibration point with one output enabled.

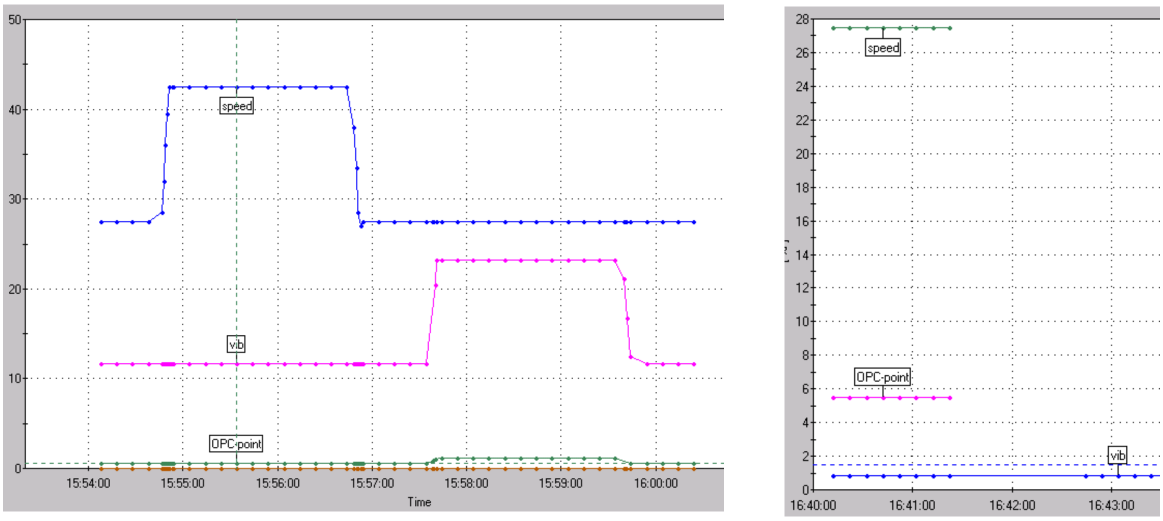


Figure A-6 : Historic Trend Change in the OPC Points with Changing Speed and Vibration Levels

When all vibration channels from a machine are detached, no further data from that machine is stored into the database. Where several machines are equipped with VM600_CMS monitoring and others are not, it may be useful to integrate process variables (from Modbus or OPC) from all machines into the CMS database. To facilitate this, a workaround in the configuration is required:

1- The offline points are attached to an existing CMS-machine

2- The virtual speed and dynamic points is defined for an extra logical machine where all other offline points are attached. A spare speed channel can then be fed from the tachobus in that rack (providing the MPC card feeds onto both tacho buses). For the vibration channel, the easiest method is to feed one rear signal onto two channels. Otherwise, an MPS signal can be used (not included in the CMS configuration) and fed it onto a free raw bus.

On machines without speed and vibration points realtime values can still be received, but the historical data from the machine will not be stored into the database.

Q. How can I run CMS 2.0 and upwards with Sybase 8.02

A. It is recommended that CMS 2.0 is used with Sybase 8.03. If absolutely necessary, CMS 2.0 can be used with Sybase 8.02, but it is necessary to solve database issues (Figure A-7).

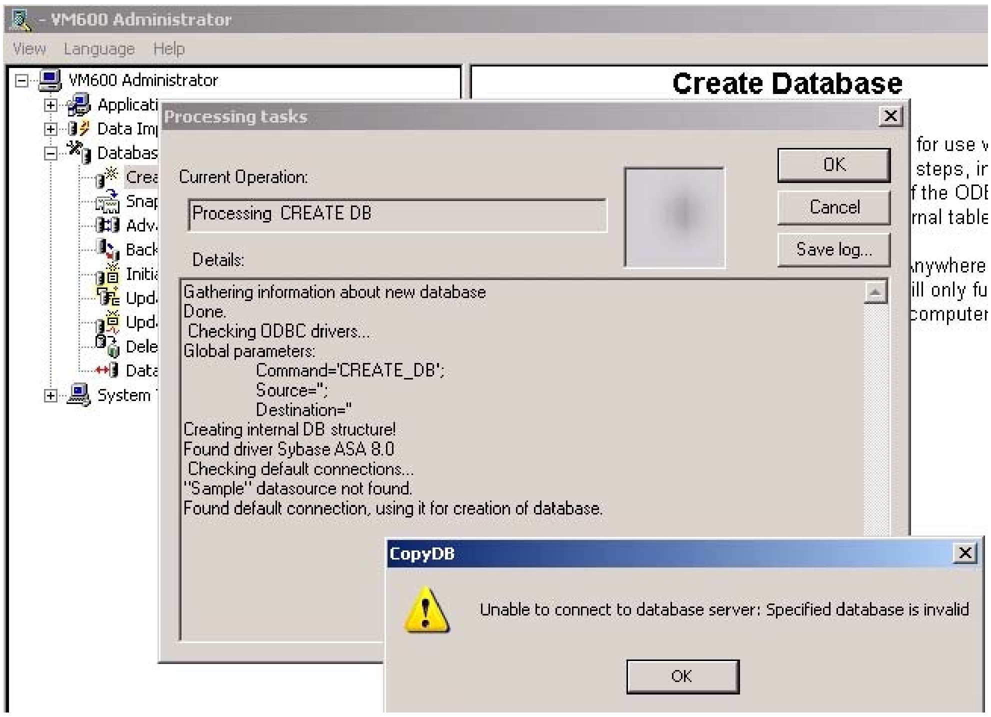


Figure A-7 : Error Creating a New Database using CMS 2.0 and Sybase 8.02.

New databases are created using the file C:\Program Files\VM600_CMS\DB\empty.db in the VM Administrator (Figure A-8). The error when installing CMS 2.0 / 2.1 / 2.2 is caused by the empty.db file being generated in Sybase 8.03 , but Sybase 8.02 is running.

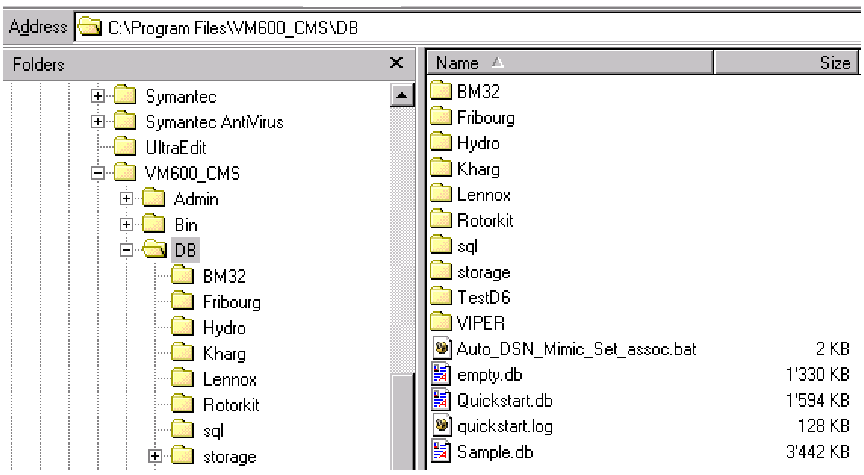


Figure A-8 : Location of empty.db File

To resolve this issue one of the following procedures can be used once CMS 2.x has been installed:

1- Rename the file empty.db to empty803.db (1 330 KB)

2- Download the file empty802.db from Vibro-Meter's FTP-server at: ftp://vmchftp.vibro-meter.com. A username and password can be obtained by e-mailing: techsupport.ch@vibro-meter.com.

3- Make a copy of the file empty802.db and rename it empty.db (1 064 KB)

OR

1- Rename the file empty.db to empty803.db (1 330 KB)

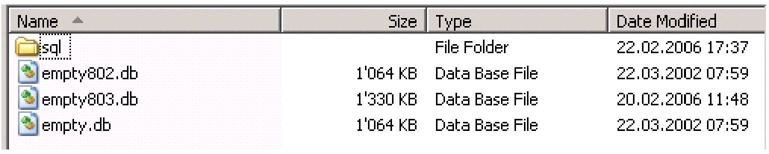
2- Uninstall CMS 2.x

3- Install CMS 1.5.4

4- Make a copy of the file empty802.db and rename it empty.db (1 064 KB)

5- Install CMS 2.x

Once complete, make sure the empty.db you are using is not the 1 064 KB file. The file system should now be as in Figure A-9.



Name	Size	Type	Date Modified
sql		File Folder	22.02.2006 17:37
empty802.db	1'064 KB	Data Base File	22.03.2002 07:59
empty803.db	1'330 KB	Data Base File	20.02.2006 11:48
empty.db	1'064 KB	Data Base File	22.03.2002 07:59

Figure A-9 : File System After Changing empty.db

Q. Why do I need to open the configuration editor when deleting a database?

A. When using the Delete Data from Database function on a freshly copied database in the VM600 Admin's Database Utilities the user is requested to open the database in the Configuration Editor.

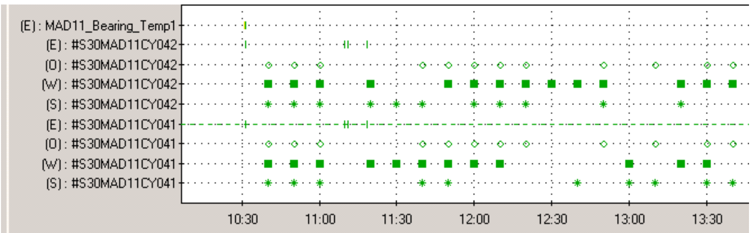
During the copy process the Configuration table is left empty as it contains information specific to the PC it runs on. Opening the Configuration Editor on a new database initializes the configuration table with data (i.e. passwords, the host it has been running on and the time when the database was last modified). This task has to be completed on a new database once and it must be affected manually.

Alternatively, the advanced copy (choose Configuration + Mimic) can be used. A new database from VM600 Admin's Database Utilities needs to be created. This completes the Configuration Table with all required information so that the advanced copy can proceed without the extra step of opening the Configuration editor.

Q. Can I run 2 VMComs on the same rack?

A. It is important when setting up several units/machines of the same type (and therefore copy the same database and setup onto several PCs) to remember to change the IP-address in the database. If this is not done, holes appear in your acquired data missing data appear on the second system (Figure A-10). In this case, check whether a second VMCom is running on the same CPU-M/on the same rack (Figure A-11).

a) DB A



b) DB B

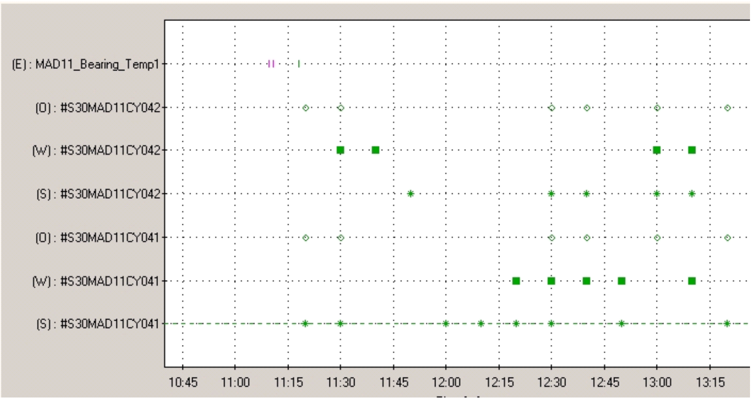


Figure A-10 : Results from Incorrect Setup of DB A and DB B

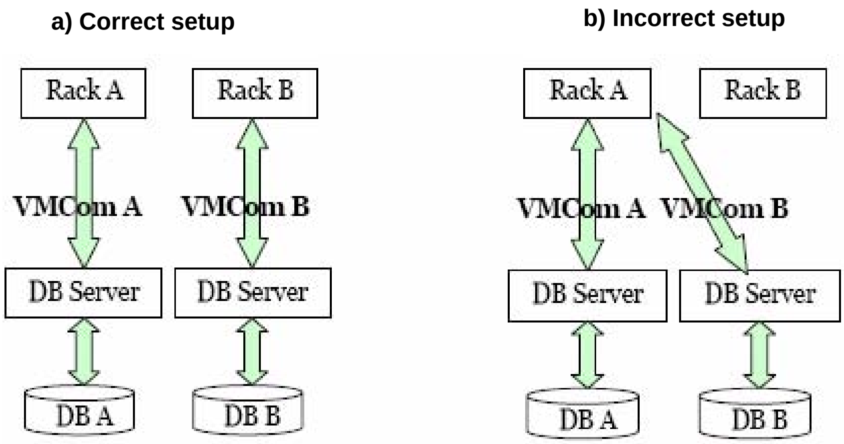


Figure A-11 : a) Correct and b) Incorrect Setup of 2 VMComs

In Figure A-10, VMCom A was started at 10:30. All data were correctly stored until VMCom B was started at 11:09. As the configuration of DB B had to be adapted to the 10 minute logging rate, a Commit was made at about 11:10. Since this takes several minutes is may be why no values were stored for the 11:10 measurement (i.e. due to the reset of the card).

Q. Why do I not get real-time graphs via remote access?

A. If you receive a blank screen when opening (for example) the Realtime Waveform from Mimic on the Remote Computer (VMCom is running on a different PC - where the DB and the DBServer also run), then this may be caused by i) access permission and the configuration of File and Printer Sharing Service and ii) lack of permission to access the realtime data pipe on CMS server machine running VMCom.

Other possible symptoms of this problem include:

1- When trying the Connect or sending a Commit from the Configuration Editor it shows a "VMCom appears to be offline" message.

2- The Mimic shows a grey VMCom indicator in the Status Bar.

If any of the above issues are experienced, then check whether it is possible to:

1- Ping the server?

2- See the server in network neighbourhood using standard browse network window of Windows explorer.

3- See the contents of the server in Windows explorer - shared folders list, shared printers, scheduled tasks. You may not have permission to browse the shared folders themselves, but you must have the permission to connect to the server on the remote computer.

On both computers, you MUST verify in the LAN connection properties that "File and Printer sharing" and "Client for Microsoft Networks" are installed and enabled (Figure A-12).

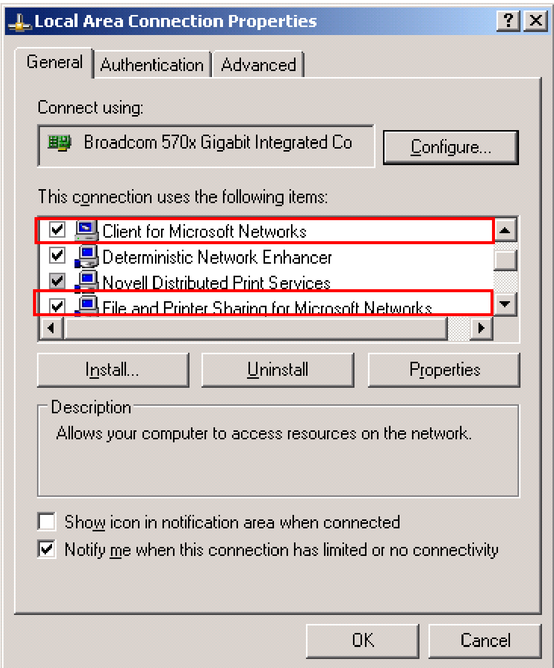


Figure A-12 : Local Area Connection Properties

Once the above has been carried out (or checked) enable the Server PC (where VMCom is running) for File Sharing. In the Windows Explorer click on the right mouse button on any Folder or even the disk itself. Open the 'Sharing and Security…' tool (Figure A-13).

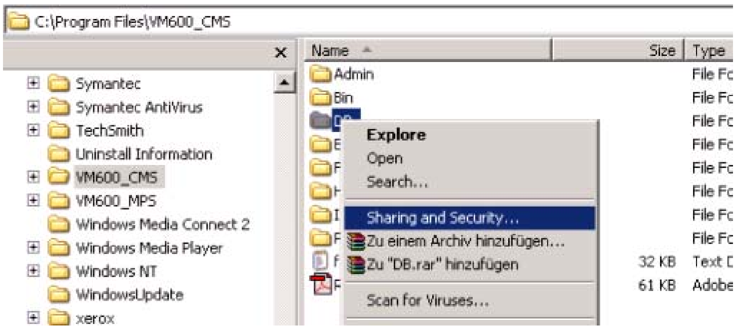


Figure A-13 : Windows Sharing and Security Tool

Next, click to confirm that you understand the security risks, but want to share files without running the wizard, then OK .

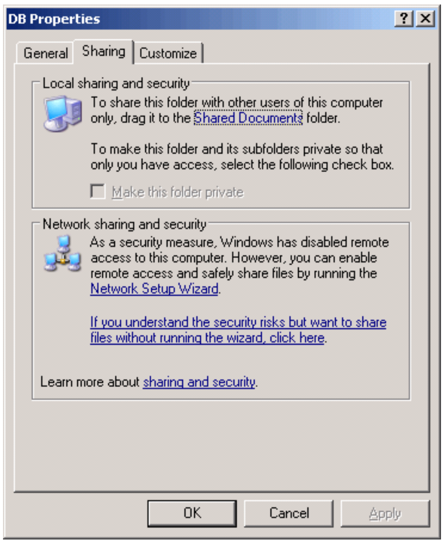


Figure A-14 : Windows DB Properties

Then select “Just enable the file sharing” and click OK.

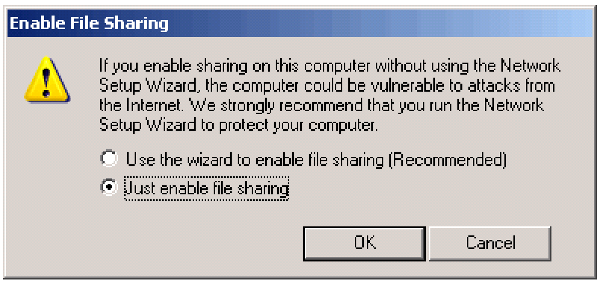


Figure A-15 : Just Enable File Sharing Option

Once this is complete, the file sharing in windows can be again disabled if required. The remote computer now starts displaying the requested Waveform.

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B ABBREVIATIONS

The table below defines the abbreviations found in this manual and associated Vibro-Meter documentation.

Abbreviation	Definition
AC	*Alternating Current*
Amp	*Ampere*
ANSI	*American National Standards Institute*
ASCII	*American Standard Code for Information Interchange*
BMP	*Bitmap*
BW	*Bandwidth*
CCW	*Counter-clockwise (anti-clockwise)*
CD-ROM	*Compact Disk - Read Only Memory*
cpm	*Cycles Per Minute*
CMC	*Condition Monitoring Card*
CMS	*Condition Monitoring System*
CPU	*Central Processing Unit*
CRC	*Cyclic Redundancy Check*
CSV	*Comma Separated Values*
CU	*Collection Unit*
CW	*Clockwise*
DAT	*Digital Audio Tape*
DB	*Database*
DBMS	*Database Management System*
DC	*Direct Current*
DCS	*Distributed Control System*
DDE	*Dynamic Data Exchange*
DHCP	*Dynamic Host Configuration Protocol*
DSN	*Data Source Name*
DSP	*Digital Signal Processor*
FFT	*Fast Fourier Transform*
FTP	*File Transfer Protocol*
g	*gravity (Unit of Acceleration)*

Abbreviation	Definition
GB	*Gigabyte*
GIF	*Graphic Interchange Format*
GUI	*Graphical User Interface*
HP	*High Pressure (Turbine)*
HW	*Hardware*
Hz	*Hertz*
ID	*Identifier*
IOC	*Input / Output Card*
IP	*Internet Protocol*
ISO	*International Standards Organisation*
JPEG	*Joint Photographics Experts Group*
kHz	*Kilohertz (10^3 Hertz)*
kV	*Kilovolt (10^3 Volts)*
LAN	*Local Area Network*
LED	*Light Emitting Diode*
LP	*Low Pressure (Turbine)*
mA	*Milliamp (10^{-3} Ampere)*
max.	*Maximum*
MHz	*Megahertz*
min.	*Minimum*
mins	*Minutes*
MPC	*Machinery Protection Card*
MPS	*Machinery Protection System*
MTS	*Minimum Tracked Speed*
N/A	*Not Applicable*
NT	*New Technology*
OC	*Open Collector*
ODBC	*Open Database Connectivity*
OLE	*Object Linking and Embedding*
OPC	*Open Connectivity*
Pa	*Pascal (SI Unit of Pressure)*
PC	*Personal Computer*

Abbreviation	Definition
PLC	*Programmable Logic Controller*
pF	*Pico Farad (10^{-12} Farad)*
P/N	*Part Number*
ppm	*Parts Per Million*
psi	*Pounds per Square Inch*
PWD	*Password*
RAID	*Redundant Array of Inexpensive Disks*
RAM	*Random Access Memory*
RLC	*Relay Card*
RMS	*Root Mean Square*
ROM	*Read Only Memory*
RPC	*Remote Procedure Call*
RPM	*Revolutions Per Minute*
RTU	*Remote Terminal Unit*
SQL	*Structured Query Language*
SVGA	*Super Video Graphics Array*
TCP/IP	*Transmission Control Protocol/Internet Protocol*
TCS	*Turbine Control System*
TDC	*Top Dead Centre*
Ts	*Sampling Duration*
UDP	*User Datagram Protocol*
UID	*User ID*
V	*Volts*
V_{AC}	*Voltage, Alternating Current*
V_{DC}	*Voltage, Direct Current*
VM600	*Vibro-Meter's VM600 Series (Machinery Protection Systems and Condition and Performance Monitoring Systems)*
VMCom	*VM600 Communications Handler*

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C INDEX

Symbols

A

B

C

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

D

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PRODUCT DEFECT REPORT

Should you have any problem with your Vibro-Meter product, please contact your Vibro-Meter **agent**. You may need to return a defective unit to Vibro-Meter. If you do, please **photocopy then fill in this form (in English) and attach it to the defective unit.** Your completed Product Defect Report is important because it can help us rapidly solve the problem.

NOTE : Always provide a filled-in photocopy of the Product Defect Report for each defective unit. The report must accompany the unit at all times.

Contact Details: You or the designated Contact Person for your company.

Name ______________________ Job Title ______________

Company ______________________ Email ______________

Address ______________________________________

Country ______________________ Post Code ______________

Telephone ______________________ Fax ______________

Signature ______________________ Date ______________

Product Details: Plug-in modules display Product Detail information on a sticker pasted on the unit.

Module type: ______________________________________

Serial number (S/N): ______________ Part number (P/N): ______________

Vibro-Meter order number: ______________________________

Date of purchase: ______________ Site where used: ______________

Problems Observed:

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(Please continue on back of sheet if necessary)

Is the problem (put an ☒ where appropriate) :

☐ Always evident ? ☐ Intermittent ? ☐ Temperature dependent?

Please use this space for any additional information:

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Reference : ***MACMS-SW/E*** *Edition :* *Edition 10* *Date of Issue :* *Jul 26/07*

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