*COMET*USB
Shaker Control System

System Guide
Rev. 2.00

System Installation
Maintenance
Calibration
Troubleshooting

LDS-Dactron

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Table of Contents

1 Introduction

This manual provides instructions on installing, maintaining, and calibrating a *COMET*_{USB} Shaker Control System. It also provides information on power and environmental requirements and safety considerations. Any person responsible for installing, maintaining or calibrating the system should be fully familiar with the contents of this manual. For instructions on using the system refer to the following User's Guides:

"Shaker Control Vibration Test and Analysis Series"

"RT Pro Dynamic Signal Analysis Series"

*COMET*_{USB} *Shaker Control System*

Other sections of this manual cover:

- Power and environmental requirements
- Safety
- Installation
- Maintenance
- Calibration
- Troubleshooting

System Description

Product Overview

The *COMET*_{USB} Shaker Control System consists of two primary components: (1) the *COMET*_{USB} hardware and (2) Windows-based application software. The *COMET*_{USB} performs data measurement and drive signal generation. It also performs digital signal processing tasks such as anti-alias filtering and tracking-filter processing. Control-loop operations, communication between the user interface and *COMET*_{USB}, and data transfer to the host PC are handled via USB.

The *COMET*_{USB} is classified as a USB 2.0 device. It is backwards compatible with USB 1.0 and 1.1 communications, however, throughput to the PC will be significantly reduced when used with USB 1.0 and 1.1 hosts. It is recommended that the PC be equipped with USB 2.0 or a USB 2.0 bridge card, which converts a PCI or PCMCIA port into a USB 2.0 port.

The Windows application software manages operator commands, display of data, and data storage on the host PC. Shaker Vibration Control applications along with Signal Analysis applications are currently available for a range of noise and vibration testing.

The *COMET*_{USB} Shaker Control System comes standard with two analog inputs having ICP® sensor power, one drive output signal source, 6' (1.83 m) USB 2.0 Type A to Type B cable, power cord, system guide, Installation CD, calibration data and License Key disk, and a one year warranty.

Options

There are both hardware and software options available for the *COMET*_{USB}. These options are listed in the table below.

Hardware Option	Description
Rack mount kit	19" rack mountable brackets. Note: This option is not available when used in-conjunction with the fastener panel kit.

Software Option	Description
Value Random	Random vibration control
Value Sine	Swept sine vibration control
Value Classical Shock	Shock transient control for classical waveforms such as half-sine pulses
RT Pro	Signal analysis and waveform source functions; modal data acquisition (record FRF for modal analysis); transient capture and SRS analysis
Re-Calibration	In-house System Re-calibration

System Hookups and Status Indicators

An on/off power switch, abort button, and three LED status indicators are present on the front panel.

The rear panel has 3 BNC connectors. The Analog Inputs for connection to sensor voltage signals. The Output supplies an analog output signal to drive devices such as electrodynamic shakers.

> **Warning**
>
> *Do not connect analog voltage signals exceeding ±36 Volts to the input channel or the system electronics may be damaged.*

A USB, three-conductor AC power receptacle, and grounding stud, completes the list of connections to the rear.

Alert

It is good wiring practice to ensure that the system chassis is grounded. Use a suitably insulated ground conductor to connect the ground post on the rear of the chassis to earth ground. This will help prevent problems due to ground loops.

Front view of the COMET_{USB}

Rear view of the COMETUSB

Specifications

Inputs

Analog Channels	Two standard. Both are differential inputs with 220k Ω impedance. Each input channel has overload detection before both the analog and digital anti-alias filters. Setup allows per channel selection of input voltage range (0.1V, 1V, 10V), transducer sensitivity, sensor type (e.g., acceleration, force, pressure, etc.), and coupling selections for DC, AC (high pass cutoff at 3 Hz defined as -0.1dB amplitude attenuation), ICP (cutoff at 0.7Hz, 4.7mA, and 23V), and TEDS.
Electronics	Differential amplifier, programmable gain amplifier, anti-aliasing filters, and 24 bit Analog to Digital Converter (ADC).
Filtering	An analog filter plus a 160 dB/octave linear-phase digital filter prevent aliasing and phase distortion.
Frequency range	Up to 21 kHz analysis frequency (48k samples per second). Extended frequency option available for 42 kHz (96k samples per second).
Voltage range	±10 Vpeak
Signal conditioning	Voltage, ICP sensor power (4.7 mA, 23 Vpeak open circuit).
Maximum input	±36 Vpeak without damage
Resolution	24-bit
Dynamic range	120 dBfs, 110 dB minimum in FFT mode
Accuracy	±0.08 dB (1 kHz sine at full-scale)

Channel Match
    Amplitude
    Phase
	
	 Within ±0.04 dB
	 Within ±0.50 degree (from DC to 21kHz, frequency response measurement, both inputs on the same input range, linear average)

Alias protection	>117 dB stopband rejection
Signal-to-noise	> 100 dB (from DC to 1000 Hz measured with half-full-scale sine wave)
Cross-talk	<-110 dB
Total Harmonic Distortion + noise	<-105 dBfs
Frequency accuracy	Within 0.01 %

All Specifications subject to change without notice.

Outputs

Analog channels	Waveform Source with 1 Drive channel standard
Electronics	24-bit Digital to Analog Converter (DAC) with analog and digital anti-imaging filters.
Filtering	A 160 dB/octave digital filter plus an analog filter prevent imaging and phase distortion.
Frequency range	Up to 42 kHz output frequency (96k samples per second) with extended frequency option.
Voltage range	±10 Vpeak with programmable attenuation
Resolution	24-bit
Dynamic range	120 dBfs
Total Harmonic Distortion	< -95 dBfs
Output impedance	50 Ω
Maximum current	24 mA peak

Hardware

Enclosure	Metal case encloses low-noise inputs/outputs with multiple 50 MHz 32-bit floating-point DSP processors. Front Panel – status LEDs, power switch, and abort button. Rear Panel – BNC connections for inputs and source, USB, AC power, and grounding stud.
Input expansion	Two standard
PC configuration	PC with USB connector, Windows 98SE/2000/ME/XP Operating System, and Microsoft Word are the only requirements.
PC expansion	PC upgrades and peripheral additions do not delay or interrupt the control loop process or data acquisition and realtime processing.

General

Mains Power	100 - 240 VAC 47-63Hz 0.5A	
Power Consumption	25 Watts	
Dimensions (*Exclude bumpers and BNC connectors*)		
Height	8.1 in. (20.6 cm)	
Width	3.5 in. (8.9 cm)	
Depth	13.4 in. (34.0 cm)	
Weight	6.8 lbs. (3.1 kg)	
Temperature	41 to 113 ºF (5 to 45 ºC)	
Humidity	10% to 90% RH non-condensing	

All Specifications subject to change without notice.

Regulatory Compliance

Compliance	CE[1] Marking
Safety	EN[2] 61010-1, IEC[3] 1010-1
EMC	FCC[4] Part 15 (CFR 47) Class A, EN 61326 Class A, CISPR22[5] Class A

[1]CE = European Compliance.
[2]EN = European Norm.
[3]IEC = International Electrotechnical Commission.
[4]FCC = Federal Communications Commission.
[5]CISPR = International Special Committee On Radio Interference.

European Community Statement

This equipment complies with the following European directives:

EMC Directive 89/336/EEC and amending Directives 92/31/EEC and 93/68/EEC Low Voltage Directive 73/23/EEC.

FCC Class A Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at his own expense.

Any changes or modifications to this equipment not expressly approved by LDS-Dactron could void the user's authority to operate this equipment.

All Specifications subject to change without notice.

2 Safety and Equipment Protection

Safety Summary

The following general safety precautions must be observed during all phases of operation, maintenance, and calibration of this system. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards and/or design, manufacture, and intended use of this system. LDS-Dactron assumes no liability for the customer's failure to comply with these requirements.

Connect the Chassis to Ground

To minimize shock hazard, the system must be connected to an electrical ground. The system is equipped with a three-conductor AC power cord. The power cord must be plugged into an approved three-contact electrical outlet to insure safe operation. An additional grounding stud on the chassis is provided if additional grounding is necessary.

Do Not Operate In an Explosive Atmosphere

Do not operate the system in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits

Operating personnel must not remove the system cover. Qualified service personnel must make component replacement and internal adjustments. Do not replace components with power cord connected. Under certain conditions, dangerous voltages may exist even with the power cord removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Do Not Substitute Parts or Modify the System

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the system. Return the system to LDS-Dactron for service and repair to ensure that safety features are maintained.

Danger Warnings

The warning messages below, and throughout this guide, are important notices regarding safe system operation and system protection. Instructions given by these warnings must be followed to ensure safety for both personnel and equipment.

Warning

Dangerous voltages may be present in the system. Use the same care as you would for any electronic equipment when handling, calibrating, or maintaining this system.

Warning

Under no circumstances should an operator remove any covers, screws, or in any way enter the COMET$_{USB}$. There are no operator settable controls or adjustments inside the COMET$_{USB}$.

Warning

To prevent potential fire or shock hazard, do not expose the system to rain or moisture.

Warning

Do not connect analog voltage signals exceeding ±36 Volts to the input or tachometer channels or the system electronics may be damaged.

Warning

Do not connect an analog voltage source to the output channel or the system electronics may be damaged.

Warning

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

3 Power and Environmental Requirements

Power Requirements

The *COMET*$_{USB}$'s power supply is auto sensing and can be powered from any single phase AC power source supplying from 100 to 240 Volts. The line frequency can vary from 47 to 63 Hz.

The *COMET*$_{USB}$ consumes less than 40 Watts depending on the number of channels and sources activated.

USB Cable Requirements

It is recommended that a USB 2.0 cable be used with the *COMET*$_{USB}$. USB 2.0 cables are typically of higher quality than USB 1.0 or 1.1 cables.

The maximum USB cable length is 16 feet. Additional USB cables can be added to increase the length provided that either a powered USB hub is added between cables to boost the power or a USB Repeater Cable is used.

Environmental Requirements

Operation

When powered, the allowable ambient temperature for operation of the *COMET*$_{USB}$ is from 32 to 122 ºF (0 to 50 ºC). The relative humidity range for operation is from 10 to 90% under non-condensing conditions.

Care must be taken to ensure unobstructed airflow to the fan on the bottom side of the chassis. Vent holes on the top side of the chassis must also be free of obstruction. If the *COMET*$_{USB}$ is mounted in an enclosure, such as an equipment rack, care must be taken to prevent

blocking the fan or air vents and an allowance made for adequate fresh air circulation.

In accordance with International Standards IEC 1010-1 (EN61010-1) the following conditions are also applicable:

1. Maximum relative humidity is 80% for temperatures up to 87.8 ºF (31 ºC) and 50% for temperatures up to 104 ºF (40 ºC).

2. Maximum operating altitude up to 6000 ft. (2000 m.).

3. For use in an indoor environment only.

4. For use with mains supply of Installation Category II.

5. For use in Pollution Degree 1 or 2 environments.

Warning

*To prevent potential fire or shock hazard, do not
expose the system to rain or moisture.*

Storage and Shipment

Store the *COMET*$_{USB}$ in a clean, dry environment. The following environmental limitations apply to both storage and shipment:

Temperature: -20 to 60 ºC (-4 to 140 ºF)

Humidity: Up to 95%

The system should also be protected against temperature extremes that would cause condensation within the system.

Packaging for Shipment

Original Packaging

Use the original factory packaging containers to return ship the system to LDS-Dactron for Re-calibration or service. If the system is being returned to LDS-Dactron for service, attach a tag indicating the return merchandise authorization (RMA) number provided by LDS-Dactron technical support, type of service required, return address, system model name, and serial number.

The following general instructions should be used for repackaging with commercially available materials:

1. Wrap the system with heavy paper or plastic.

2. Use a strong shipping container. A double wall carton made of 350-pound test material is adequate.

3. Use a layer of shock absorbing material 70 to 100 mm (3 to 4 inches) thick around all sides of the system to provide firm cushioning and prevent movement inside of the container. Protect the control panel with cardboard.

> ## Caution
>
> *Styrene pellets in any shape should never be used as packing material. The pellets do not adequately cushion or prevent the system from shifting in the carton. The pellets also create static electricity that can damage electronic components.*

4. Seal the shipping container securely.

5. Mark the shipping container FRAGILE to ensure careful handling. In any correspondence, refer to the system by model name and serial number.

4 System Installation

Installation and Setup Procedure

Basic System Hardware Setup

The configuration of a LDS-Dactron *COMET*_{USB} System consists of the hardware, and the associated connecting cables.

To install the System verify that you have the following components:

- *COMET*_{USB}
- 6' (1.83 m) USB 2.0 Type A to Type B cable
- Power cord
- Installation CD
- Calibration data and License Key disk

Connecting the *COMET*_{USB} unit

1) Set the *COMET*_{USB} unit in position. Be sure that this unit is within six feet of the host PC (the length of the USB cable).

2) On the rear of the *COMET*_{USB}, insert the USB cable into the USB port. Verify that the cable is securely seated in the port.

Step 1: *COMET*_{USB} Driver Installation Instructions

The *COMET*_{USB} communicates with the PC through a USB connection. This requires Windows driver software to enable the USB connection. The USB is a "plug and play" device, which means that after the driver is initially installed, the configuration of the driver is automatically launched every time the device is plugged into the USB port. To install the *COMET*_{USB} driver you will need the *COMET*_{USB} hardware, a USB cable, and the Installation CD.

The driver installation process first locates the INF file named
VCSUSB.INF on the CDROM. Using the information provided by
VCSUSB.INF, the device driver file *VCSUSB.SYS* is copied into the
WINDOWS\ SYSTEM32 \DRIVERS folder. The operating system
registers the *COMET*$_{USB}$ device in its registry so the next time the
COMET$_{USB}$ is plugged in it can be identified. Finally, the *VCSUSB.INF*
file is copied into the *WINDOWS\OTHER\INF* or its subfolder for
future use.

Follow the instructions below to install the *COMET*$_{USB}$ driver software.

1. Turn on the PC and launch Windows. Your PC must use one of the
   following operating systems: Windows 98 Second Edition, 2000,
   ME, or XP. If you are using Windows 2000 or XP you must be
   logged on with administrator privileges to install a new driver.

2. Place the Installation CD into the CD drive.

3. Turn on the *COMET*$_{USB}$.

4. Plug the USB cable into the *COMET*$_{USB}$ and the PC.

   The PC will auto detect the presence of the new hardware and launch
   the "New Hardware Wizard." Note the dialog boxes shown below
   are from Windows XP. The dialog for Windows 98SE, ME, and
   2000 will vary slightly.

5. Select, "Install from a list or specific location (Advanced)" and click on the Next button.

   The driver files are named **VCSUSB.SYS** and **VCSUSB.INF** and are located on the root directory of the Installation CD.

6. Select, "Search for the best driver in these locations." Specify a location, and enter the path to the driver files on the CD drive. For example if the CD drive is the E:\ drive, you would type E:\ as the path. Click on the Next button. Windows remembers the path to the previous USB device installation so you may need to delete the old path and re-type the path to the CD drive.

System Installation
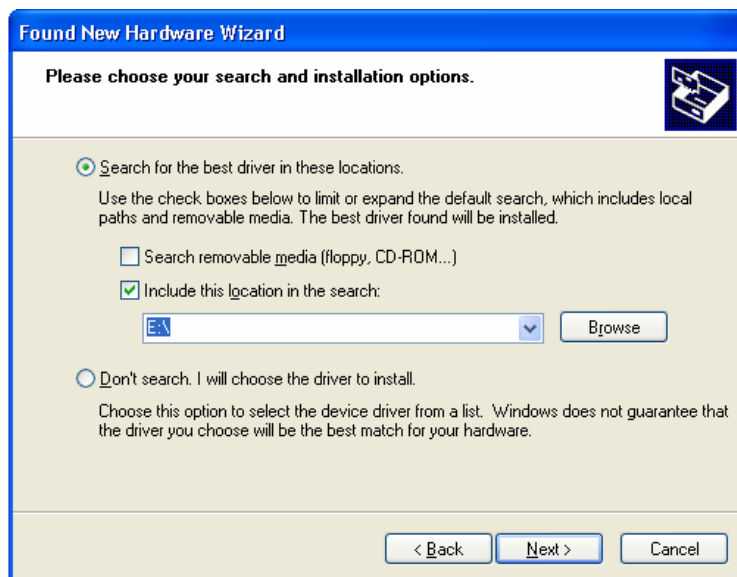
7. When Windows finds the driver file ***VCSUSB.INF***, it may display the following dialog. Select, "LDS-Dactron Comet-USB (USB 2.0 device)" and click on the Next button to complete the installation. Otherwise, Windows will automatically install the driver.
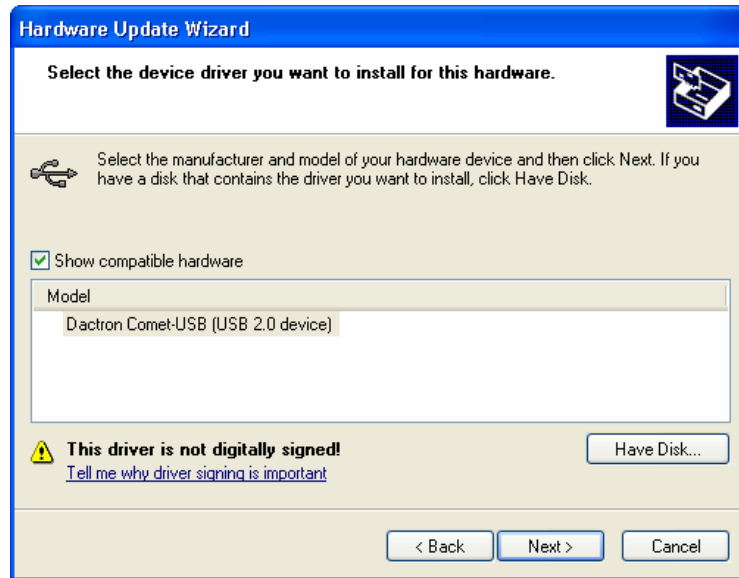
For Windows XP, after the driver installation starts the following dialog may open. Click on "Continue Anyway" to complete the installation. This dialog indicates that LDS-Dactron has not registered the driver with Microsoft Corporation.
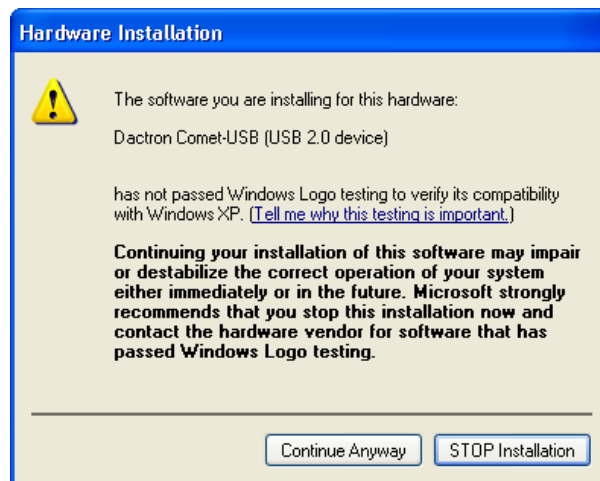
8. The driver installation should now be complete. Click on the Finish button to close the New Hardware Wizard.
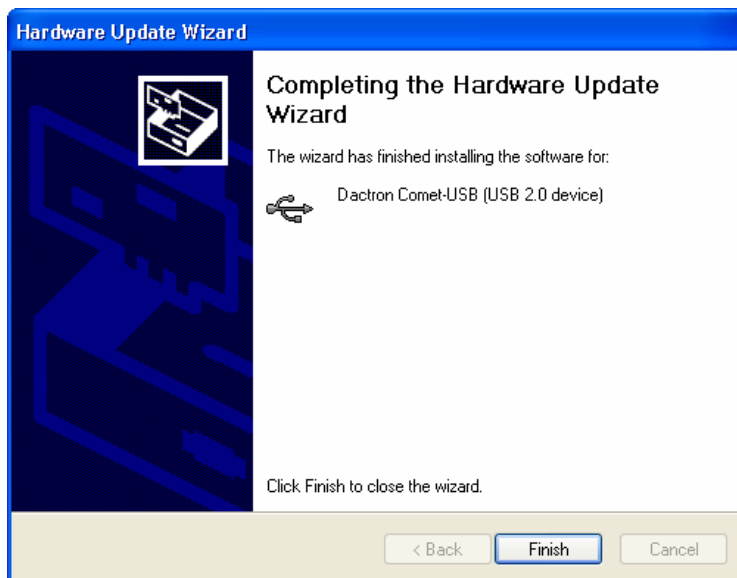
The driver is now installed and the **COMET**_{USB} should be auto-detected every time it is plugged into the specific USB port on the host PC.

Step 2: Installing Application Software on the PC

Application software, such as the Shaker Control Vibration Test and Analysis Series or the RT Pro Dynamic Signal Analysis Series, is installed on the host PC. Refer to the "Shaker Control Vibration Test and Analysis Series" or the "RT Pro Dynamic Signal Analysis Series" User Guide, "Installation and Setup Procedure", for complete details on installation of application software.

The **COMET**_{USB} is now ready to run. Start the LDS-Dactron application software from the host PC and you will be ready to use the application software.

Step 3: Running the Application Software

The LDS-Dactron software running on the *COMET*_{USB} system consists of the following three modules:

Windows application software running on the host PC or a remote PC.

Server software running on the host PC.

DSP software running on the DSP chip in the *COMET*_{USB}.

Step 3: Running the Application Software

The LDS-Dactron software running on the *COMET*$_{USB}$ system consists of the following three modules:

Windows application software running on the host PC or a remote PC.

Server software running on the host PC.

DSP software running on the DSP chip in the *COMET*$_{USB}$.

Updating the Device Driver

The device driver must be updated when you install a new version of the LDS-Dactron application software that uses a new driver. The application software will detect the driver version before it launches and indicate whether an update is necessary. If you get an error message indicating that a newer version of the device driver is required, then you must update the *COMET*$_{USB}$ device driver.

To update the LDS-Dactron *COMET*$_{USB}$ device driver follow these instructions. The figures following are for Windows XP and may vary with other operating systems.

1. Go to the Windows Start button and select Control Panel, and then double click System from the list of control panels. Click on the Hardware tab and then the Device Manager button.
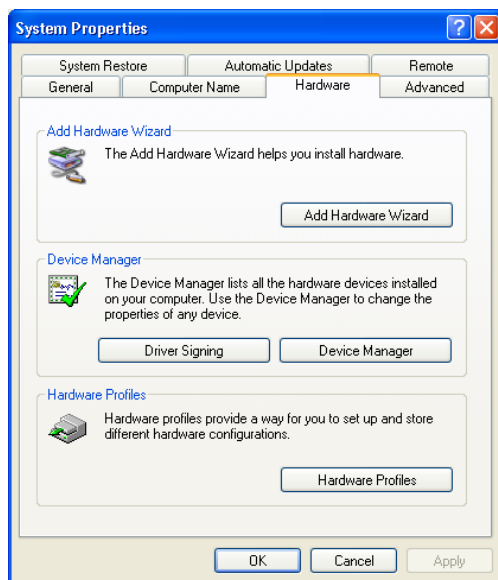
2. Scroll down to "Universal Serial Bus controllers", click the "+" icon to expand the selection and right click on LDS-Dactron Comet-USB (USB 2.0 device). Select "Update Driver…" from the pop up menu.
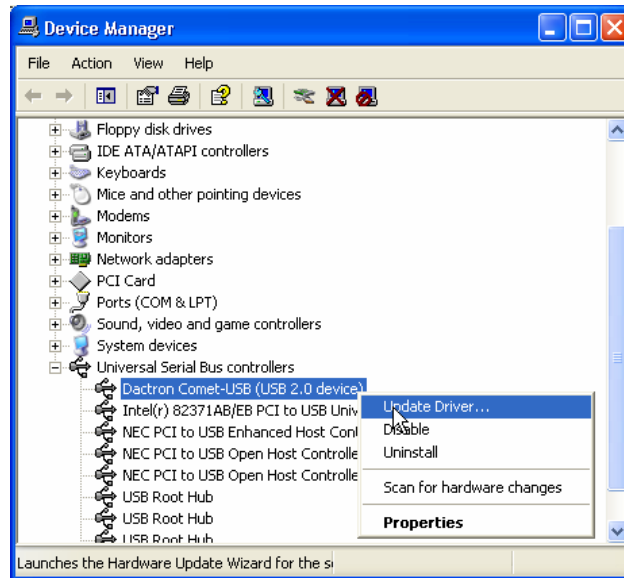
Select, "Install from a list or specific location (Advanced)". And click on the Next button.

The updated driver files are named **VCSUSB.SYS** and **VCSUSB.INF** and are located on the root directory of the Installation CD.

3. Select, "Search for the best driver in these locations". Specify a location and enter the path to the CD drive. For example, if the CD drive is the E:\ drive, you would type E:\ as the path. Click on the Next button. Windows remembers the path to the previous USB device so you may need to delete the old path and re-type the path to the CD drive.
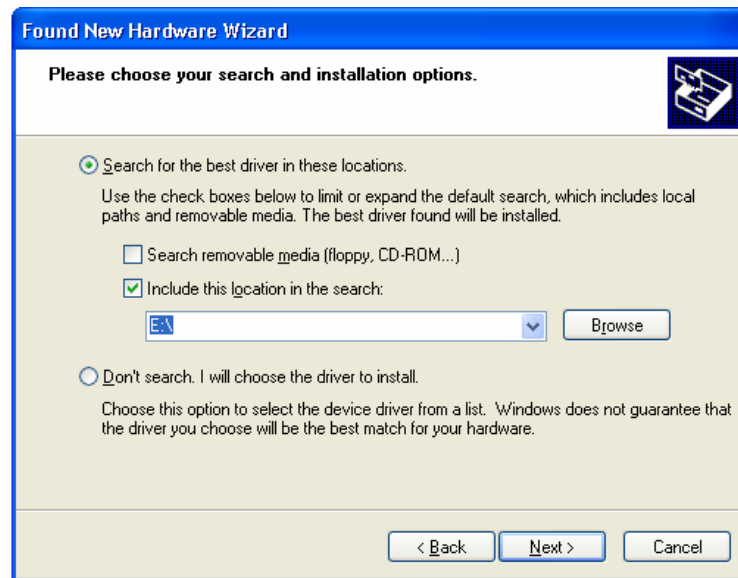
4. Note that the Hardware Update Wizard shows the existing *COMET*$_{USB}$ driver information as well as the new *COMET*$_{USB}$ driver information found on your Installation CD. Select the new *COMET*$_{USB}$ driver found on your Installation CD. Click Next.
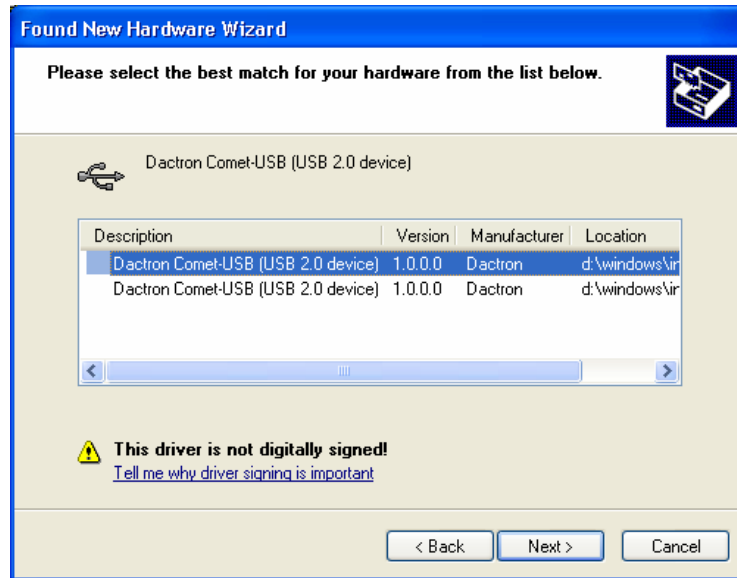
For Windows XP, after the driver installation starts the following dialog may open. Click on "Continue Anyway" to complete the installation. This dialog indicates that LDS-Dactron has not registered the driver with Microsoft Corporation.
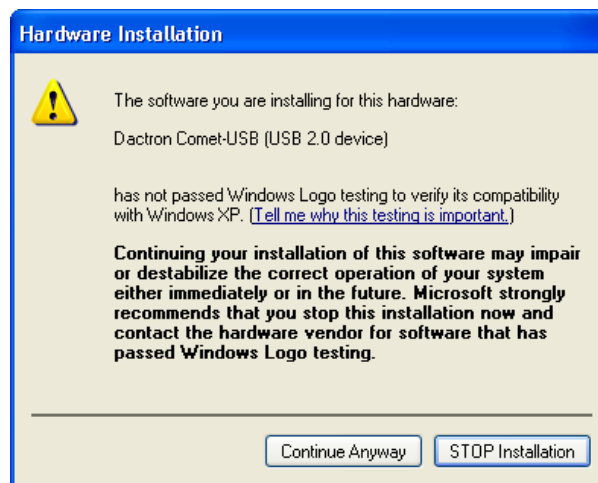
5. Click on the Finish button to close the Hardware Update Wizard.
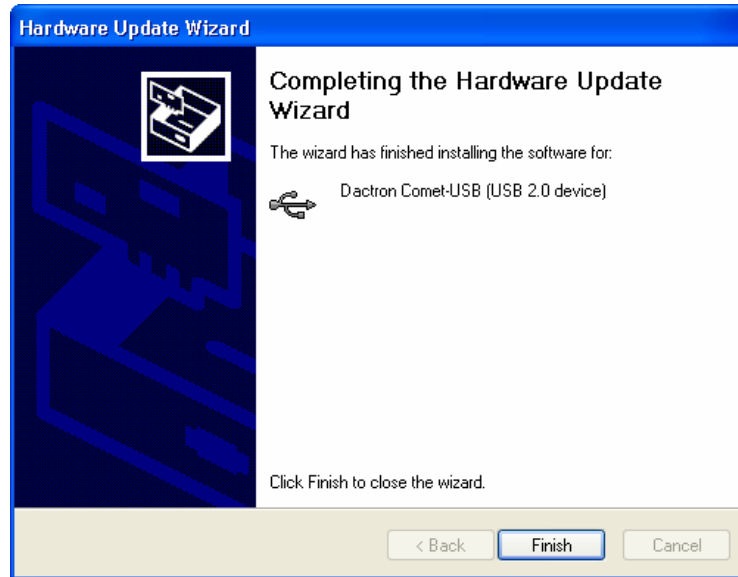
6. Windows 2000, ME, and XP do not require restart after updating drivers. For Windows 98SE, you will need to restart your computer to let the system update the new changes.
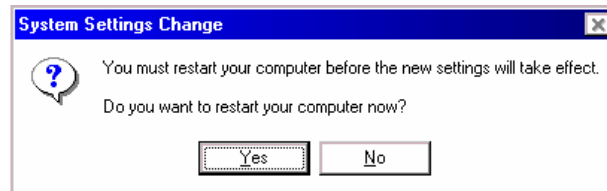
Uninstall the Device Driver

Under rare circumstances you may need to uninstall the device driver for the LDS-Dactron *COMET*_{USB}. Follow these steps carefully. Failure to follow the instructions can result in damage to the operating system or other software. It is recommended that a network administrator or other computer expert perform this operation.

The process of uninstalling the device driver is vastly different for each operating system. Refer to the instructions below for your specific operating system.

Windows 98SE

To uninstall the *COMET*_{USB} device driver in Windows 98SE, follow these instructions.

1. Delete the following 3 files:

   C:\WINDOWS\INF\OTHER\VCSUSB.INF

   C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.SYS

   C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.HEX

2. From the Start Menu, choose Run, type "**regedit**" to run the registry editor program. Be extremely careful when using the registry editor program as you can damage the operating system and other software by inadvertently deleting the wrong items.

   Expand the HKEY_LOCAL_MACHINE by clicking on the + button to the left.

   Continue to expand to the following path:
   HKEY_LOCAL_MACHINE \ENUM\USB

   Delete the folder named **VID_0B90&PID_3000** by right clicking in it and selecting Delete from the pop-up menu.

   Expand to the following path:
   **HKEY_LOCAL_MACHINE
   \SYSTEM\CURRENTCONTROLSET\
   SERVICES\CLASS\USB**

This folder may contain many entries. Click on each one and read the Driver Description. Delete any driver that has a description of "LDS-Dactron COMET-USB (USB 2.0 device)"

Exit the Registry Editor program.

The driver should now be completely uninstalled.

Please be very careful when you delete files from your PC's Windows system folder. If other files are accidentally deleted, your PC or software programs may not function correctly.

Windows 2000

To uninstall the *COMET*_{USB} device driver in Windows 2000 follow these instructions.

1. Go to the Windows Start button and select Control Panel, and then double click Add/Remove Hardware. Click Next.

2. Select "Uninstall/Unplug a device". Click Next.
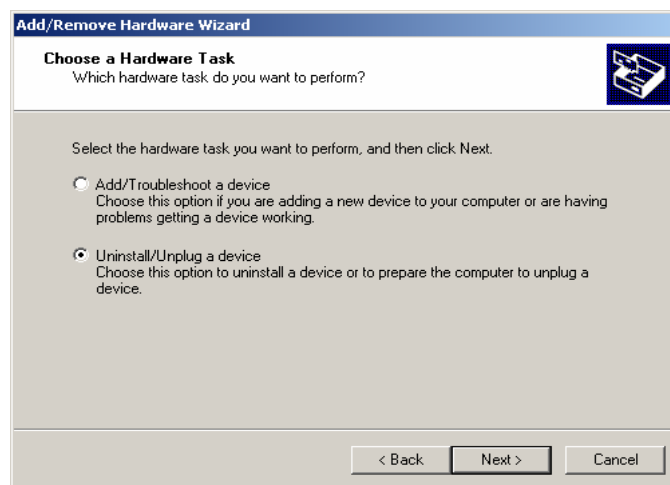
3. Select "Uninstall a device". Click Next.
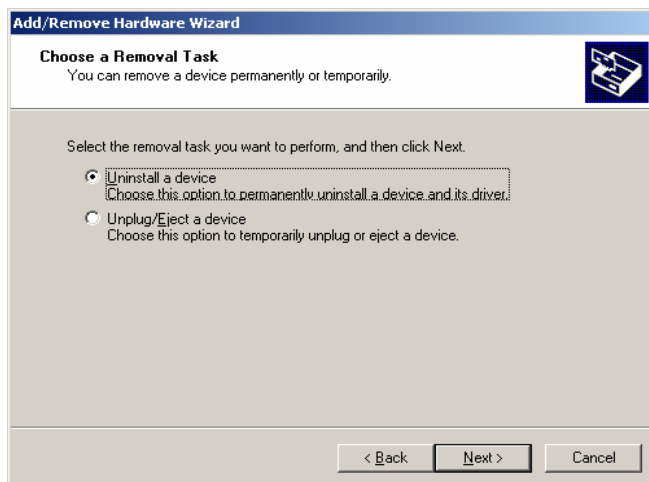
4. Select the LDS-Dactron COMET-USB (USB 2.0 device) device. It will be hidden if the **COMET**$_{USB}$ is not connected and power is not applied to the unit. If this is the case, then place a check next to "show hidden devices" to display it. Click Next.
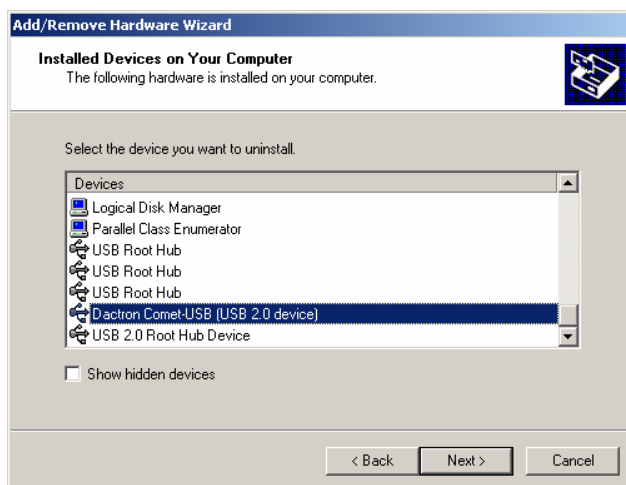
5. Select "Yes, I want to uninstall this device". Click Next.
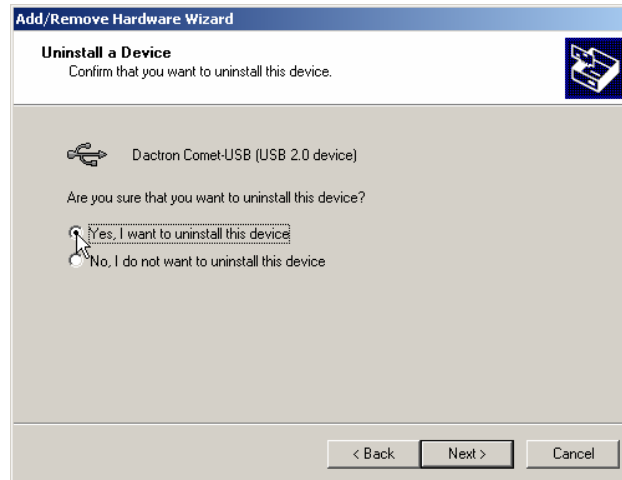
6. Click on the Finish button to close the Add/Remove Hardware Wizard.

7. Optional:

   After you remove the device, manually delete the following 5 files:

   C:\WINNT\INF\OTHER\VCSUSB.INF

   C:\WINNT\SYSTEM32\DRIVERS\VCSUSB.SYS

   C:\WINNT\SYSTEM32\DRIVERS\VCSUSB.HEX

   C:\WINNT\INF\OEM#.INF - There may be several #s, e.g., OEM0.INF, OEM1.INF, OEM2.INF, etc… You can open each OEM#.INF file and find the one that lists "VCSUSB" at the top of the file. There may be more than one. Note the # of the OEM#.INF file/s, close the file and then delete it.

   C:\WINNT\INF\OEM#.PNF - Delete the file with the number associated with the OEM#.INF file/s from the previous step.

   The driver should now be completely uninstalled.

   Please be very careful when you delete files from your PC's Windows system folder. If other files are accidentally deleted, your PC or software programs may not function correctly.

System Installation

Windows ME

To uninstall the *COMET*_{USB} device driver in Windows ME follow these instructions.

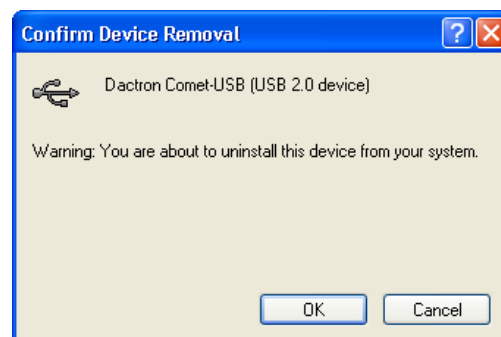1. Go to the Windows Start button and select Control Panel, and then double click System from the list of control panels. Click on the Device Manager tab. Scroll down to Universal Serial Bus controllers and click the "+" icon to expand the selection. Highlight the LDS-Dactron COMETUSB (USB 2.0 device). The *COMET*_{USB} will only be listed if it is connected via the USB cable and power is applied to the unit. If the *COMET*_{USB} is not connected and power is not applied, then it will not be listed in the Device Manager list. Click on the Remove button.

2. Click OK to confirm the device removal.

3. Optional:

   After you remove the device, manually delete the following 4 files:

   C:\WINDOWS\INF\OTHER\LDS-DACTRON INC. VCSUSB.INF

   C:\WINDOWS\INF\OTHER\LDS-DACTRON VCSUSB.INF

   C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.SYS

   C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.HEX

   The driver should now be completely uninstalled.

   Please be very careful when you delete files from your PC's Windows system folder. If other files are accidentally deleted, your PC or software programs may not function correctly.

Windows XP

To uninstall the *COMET*_{USB} device driver in Windows XP follow these instructions.

4. Go to the Windows Start button and select Control Panel, and then double click System from the list of control panels. Click on the Hardware tab and then the Device Manager button.
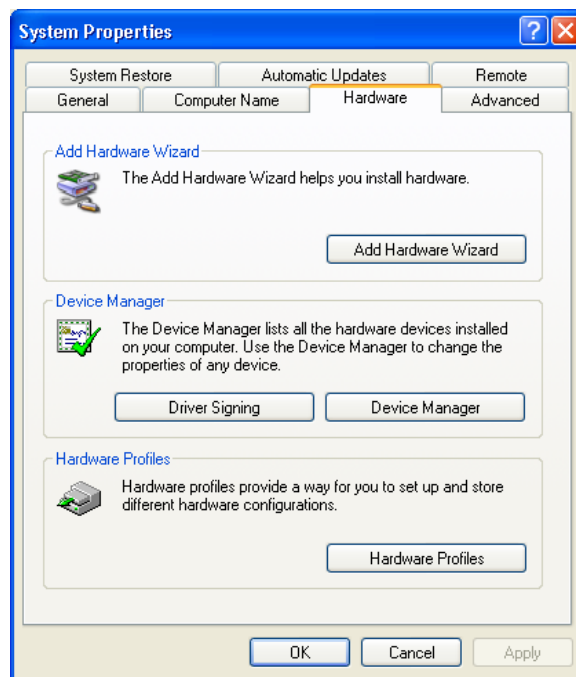
5. Scroll down to "Universal Serial Bus controllers," click the "+" icon to expand the selection and right click on LDS-Dactron Comet-USB (USB 2.0 device). Select Uninstall from the pop up menu.

The **COMET**_{USB} will only be listed if it is connected via the USB cable and power is applied to the unit. If the **COMET**_{USB} is not connected and power is not applied, then it will not be listed in the Device Manager list.
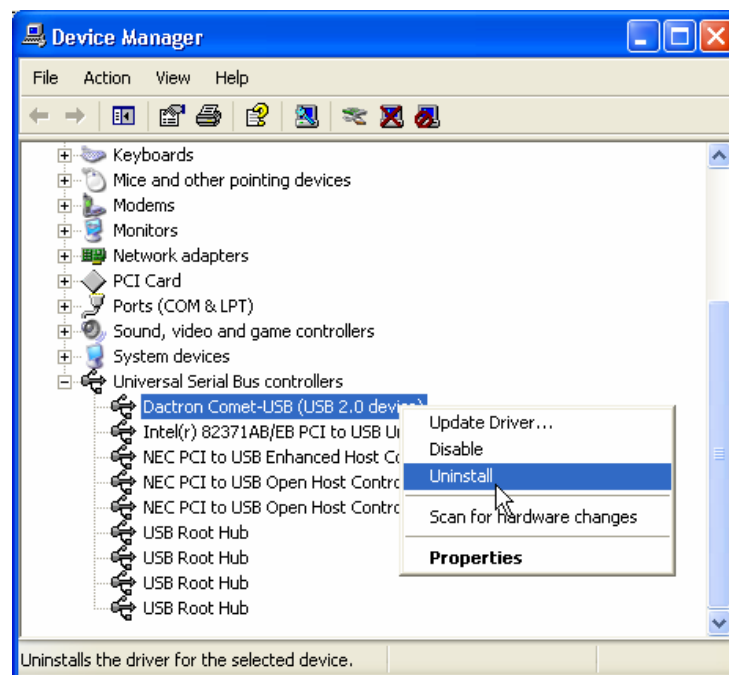
6. Click OK to confirm the device removal.

7. Optional:

    After you remove the device, manually delete the following 5 files:

    C:\WINDOWS\INF\OTHER\VCSUSB.INF

    C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.SYS

    C:\WINDOWS\SYSTEM32\DRIVERS\VCSUSB.HEX

    C:\WINDOWS\INF\OEM#.INF - There may be several #s, e.g., OEM0.INF, OEM1.INF, OEM2.INF, etc... You can open each OEM#.INF file and find the one that lists "VCSUSB" at the top of the file. There may be more than one. Note the # of the OEM#.INF file/s, close the file and then delete it.

    C:\WINDOWS\INF\OEM#.PNF - Delete the file with the number associated with the OEM#.INF file/s from the previous step.

    The driver should now be completely uninstalled.

    Please be very careful when you delete files from your PC's Windows system folder. If other files are accidentally deleted, your PC or software programs may not function correct

4 Maintenance

Maintenance should be performed periodically to ensure proper system operation and product life. Cleaning of the fan filter is the only routine maintenance required. The fan filter (located on the right side of the chassis) should be inspected routinely and cleaned when there is a visible buildup of dust. For clean laboratory environments an annual filter cleaning may be sufficient. For environments that are dusty or have other air borne contaminants, more frequent inspection and cleaning intervals are required.

Procedure to Remove and Clean the Fan Filter:

1. Power off the system.

2. Disconnect the power cord from the receptacle in the rear of the system.

3. Use a flathead screwdriver to remove the plastic fan guard. To do this, insert the head of the screwdriver under the centerpiece of the plastic fan guard, and then gentle pry the centerpiece up until the guard snaps out of the chassis side.

4. Remove the filter and wash in a water solution using a mild soap.

5. Insert the dry filter back into position on the side of the chassis.

6. Snap the plastic filter guard back into position.   Check that the filter is secured and properly positioned. Remove the guard and re-position the filter if necessary.

<div style="border:1px solid">

Warning

</div>

Under no circumstances should an operator remove any covers, screws, or in any way enter the COMET$_{USB}$ System other than noted. There are no other operator settable controls or adjustments inside the COMET$_{USB}$. Any hardware expansion must be performed by an authorized LDS-Dactron representative.

5 Calibration

What Do We Calibrate?

This section documents the procedure for offset and gain error calibration of the input channels. The offset is a constant DC offset, and the gain error is an error of the amplification factor in the input and signal source paths.

Both offset and gain errors are gain-dependent. The gain settings will influence the offset estimate and the gain error itself. Therefore, it is necessary to calibrate all the voltage ranges.

The purpose of calibration is to ensure accuracy by estimating the offset value and the gain error in all possible ranges (gain-settings). Once this calibration data is stored, the input measurement and the signal source can be adjusted back to the most accurate value.

The LDS-Dactron system uses sigma-delta A/D and D/A converters and an anti-aliasing filter with a very high cutoff frequency. As a result, the amplitude characteristics of the input and signal source are not frequency dependent. Satisfactory flatness is guaranteed over the entire useful frequency range. Therefore, we do not recommend calibration of the amplitude vs. frequency characteristics.

The Drive output channel of the *COMET*$_{USB}$ can be used to calibrate the input channels. The key is a good signal reference measurement, such as that provided by a high-precision voltmeter. If the voltmeter meets accuracy specifications, the actual signal source is inconsequential.

Signal Source Used for Calibration

A single sine tone generated by the Source channel is used for both input and signal source calibration. Multiple frames are captured, windowed, and averaged to reduce the variance of the sine tone amplitude estimation.

The amplitude flatness (ripple) within the analysis frequency range is about ±0.01dB. This very low number is due to digital implementation of the anti-aliasing filter (for the inputs) and the reconstruction filter (for the signal sources). The gain characteristics are frequency-independent within the analysis frequency range.

Two panes display the time capture trace and the power spectrum for each channel. This display allows you to simultaneously view the time domain and frequency domain signals captured by the input channels. This provides a visual comparison of channel levels and is helpful in diagnosing problems if the calibration fails.
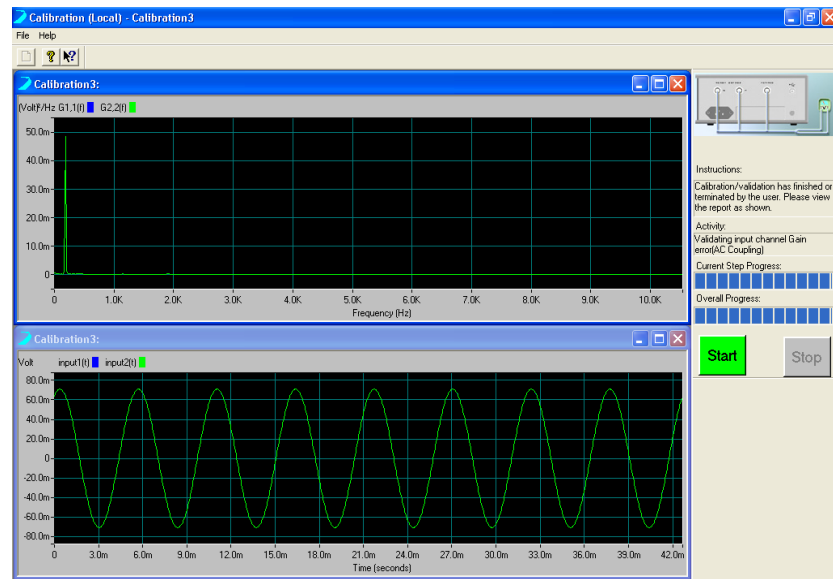
Calibration Two Pane Display Screen

Install the Calibration Software

Insert the Installation CD into the CD drive. The CD will then automatically launch the setup routine. If it does not, on the CD drive, locate the file "Setup.exe" and double-click on it.

From the installation main menu for Shaker Control, select "Shaker Control Series" then select "Calibration". If you have the RT Pro Installation CD, then from the installation main menu, select "Signal Analysis Series" then select "Calibration".

This will invoke the dialog box shown below:
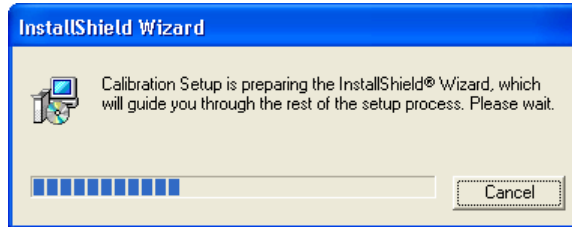
Installation Dialog Box

Follow the step-by-step instructions to install the software. A License Key will be needed to complete the process. Either "import" the License Key or copy-and-paste it directly from the License Key file.
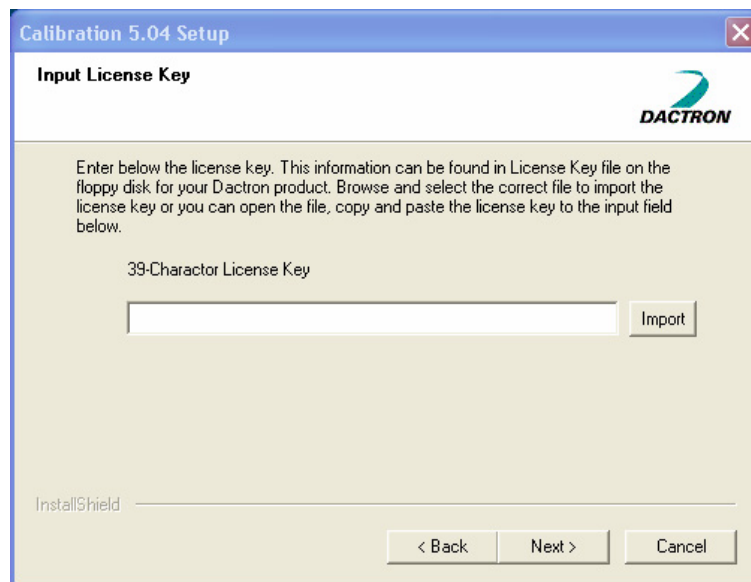
Calibration Tools

To calibrate the *COMET*$_{USB}$ with LDS-Dactron's calibration software, you will need the following:

(1) 3 BNC cables.

(2) Voltmeter BNC adapter cable.

(3) BNC T Connectors or connecting adapters linking each of the individual BNC cables together at one end.

(4) Voltmeter with a valid calibration certificate. The voltmeter should be able to measure DC and True RMS to an accuracy of 0.25%. The AC bandwidth for the voltmeter should be higher than 10 kHz.

The voltmeter accuracy should be 0.25% in order to ensure that the LDS-Dactron system is calibrated to an accuracy of $\pm1\%$ ($\sim \pm0.1$dB). Generally, the accuracy of the calibration meter should be four times higher than the system being calibrated.

Calibration Procedure

Calibration involves the following major steps:

(1) Connect cables to the *COMET*$_{USB}$.

(2) Start the calibration software.

(3) Measure the Output channel offset with no input signal.

(4) Perform Output channel calibration.

(5) Perform Input channel calibration.

(6) Validate the calibration results.

Cable Connection
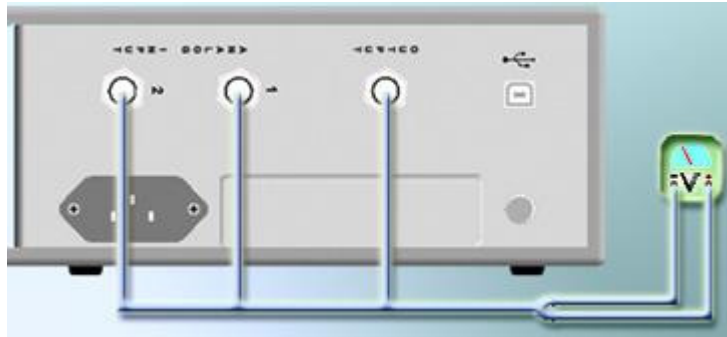
Cable Connection for Calibration

Connect one end of the BNC cables to Analog Input Channels 1-2 and Output channel. Connect all the other ends together with BNC T Connectors. Connect this cable harness to a voltmeter that is certified to the accuracy standard noted in the calibration tool requirements section (0.25%).

Note that during the calibration process, you will be prompted to disconnect and relocate BNC cables, as necessary.

Power up the **COMET**$_{USB}$ and wait at least 10 minutes. If required, record environmental parameters such as pressure, humidity etc…
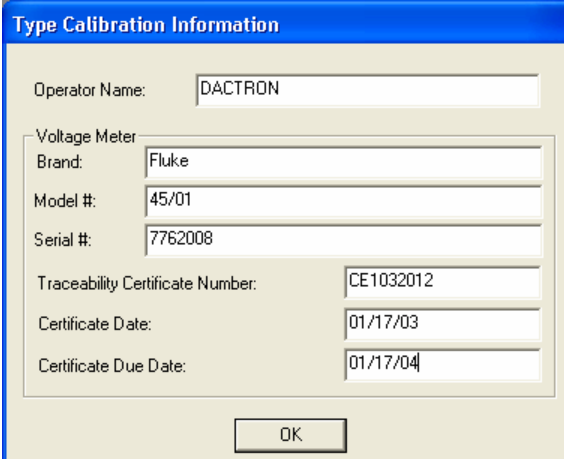
Start the Calibration Software

Start the calibration software by clicking the Calibration icon.

Select New under the File menu:
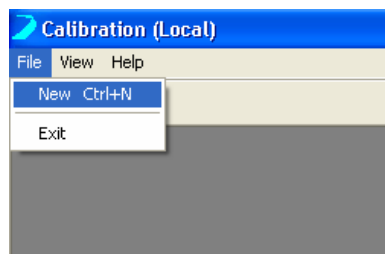
You are then prompted to enter the following information:

Select OK after the appropriate information has been entered. This will open the normal LDS-Dactron Control System screen and a warning message reminding you to allow the hardware to warm up sufficiently prior to system calibration.
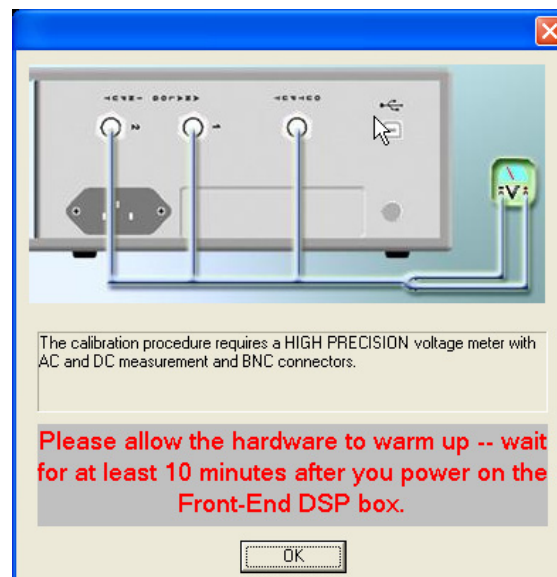
Click OK to acknowledge the warning. The normal LDS-Dactron Control System screen is now fully visible. Before pressing the Start button, measure the DC voltage offset on the Drive channel. A typical

reading for the Drive offset is under 5 millivolts. Select Start on the Control Panel. Then follow the step-by-step instructions.
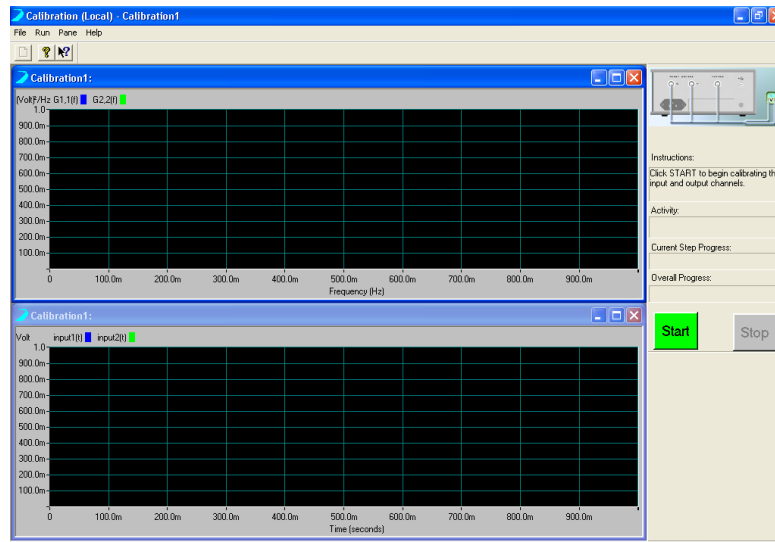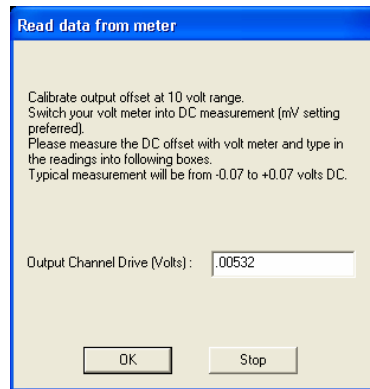
LDS-Dactron Calibration Control System Screen

Output Channel Calibration

The first step is to measure the DC offset of the drive channel. A dialog box will appear repeatedly until all output ranges are measured. Each time, you should read the DC measurement from the voltmeter and type the value in the edit box.

Please allow enough time for voltmeter readings to stabilize. Stability can be assumed if the readings vary less than 2% of the total measurement reading on all ranges.
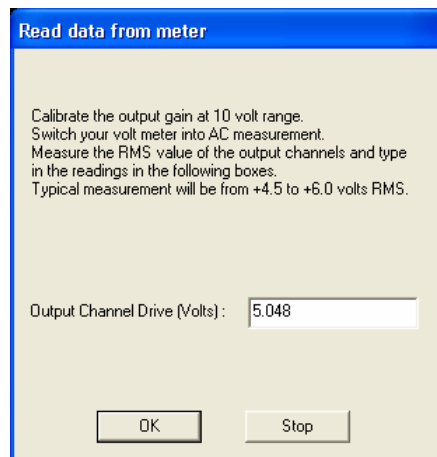
The DC output measurement will be repeated three times; one measurement is made at the 10, 1 and 0.1 Volt full-scale ranges.

DC Measurement for Offset Calibration

You will also be requested to measure the RMS value of the output at three levels and type it into the dialog box. **Please make sure that the voltmeter is switched to AC measurement.** This concludes the calibration of the Drive output.

AC Measurement for Gain Calibration

Input Channel Calibration

The input channels are calibrated automatically. The system will now use the **calibrated Drive** as the signal source. The gain error and offset estimation are calculated automatically for all the input range settings.

The input calibration process depends on an accurately calibrated Drive channel. If the Drive is not accurately calibrated, the validation report will document less than satisfactory results for both input and output channels.

Calibration Result Validation

After the input calibration, the software validates the calibration results. During this validation, it requires remeasurement of the DC offset and RMS values. Both DC offset and RMS measurement will be made at all three voltage ranges as before.

A dialog box asks for a measurement and entry of the DC reading from the meter. The software will check the deviation of its expected value and the measured value.
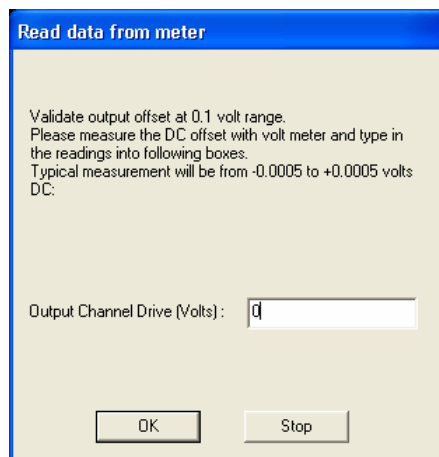
DC Measurement for the Offset Validation

After validation, both the offset and gain error should be within tolerance.

The pass/no-pass tolerance used during the validation is:

10 volt range: 1% of the Full Scale

1.0 volt range: 2% of the Full Scale

0.1 volt range: 5% of the Full Scale

Calibration Data File and Report

At the end of the calibration process, a dialog box showing the calibration report will be opened for review. The calibration data file and a text report are saved in the "LDS-DactronCalib" directory. You can view the calibration report in text mode at any time. This Calibration Report is the basis for any calibration certification requirement.
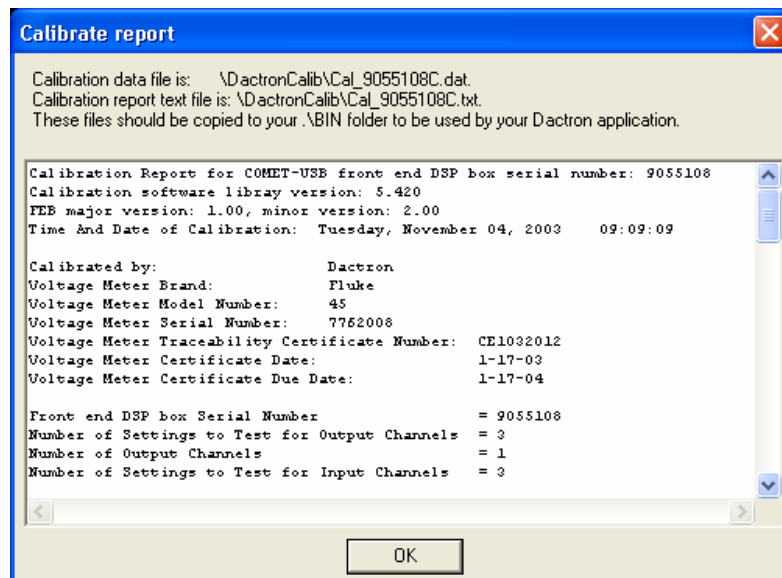

Preview of the Calibration Report

To use the calibration data file, copy it into the \BIN folder where the main software application resides.

Important

The calibration software does not copy the calibration files to the \BIN folder. This must be done manually by the user.

6 System Troubleshooting

The diagram below shows the structured layers of the LDS-Dactron *COMET*_{USB} System. Each layer generates and sends a message to the system user interface in the event of an error condition. These messages aid in diagnosing and resolving problems.
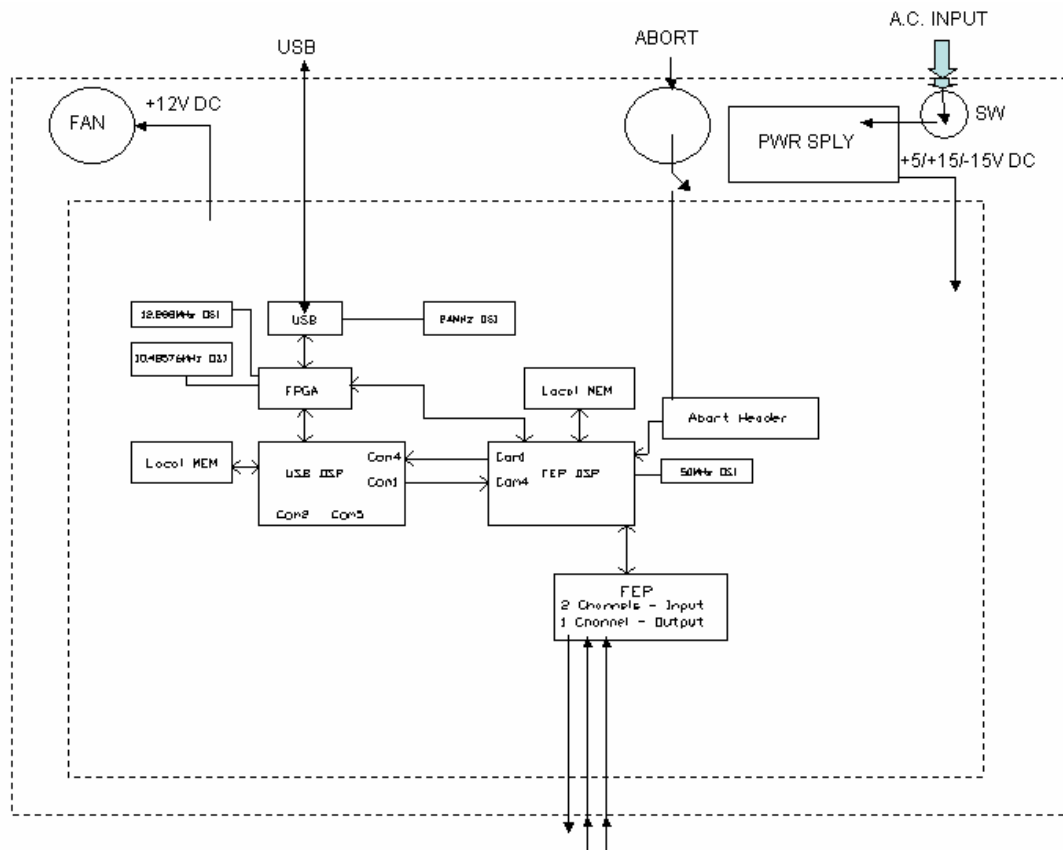
Check if USB driver is installed correctly

To determine if the driver software has been installed and if the PC recognizes the **COMET**_{USB}, first connect the **COMET**_{USB} to the PC with a USB cable and apply power to the system. Go to the Windows Start button and select Control Panel. Double click System from the list of control panels. Click on the Hardware tab and then the Device Manager button.
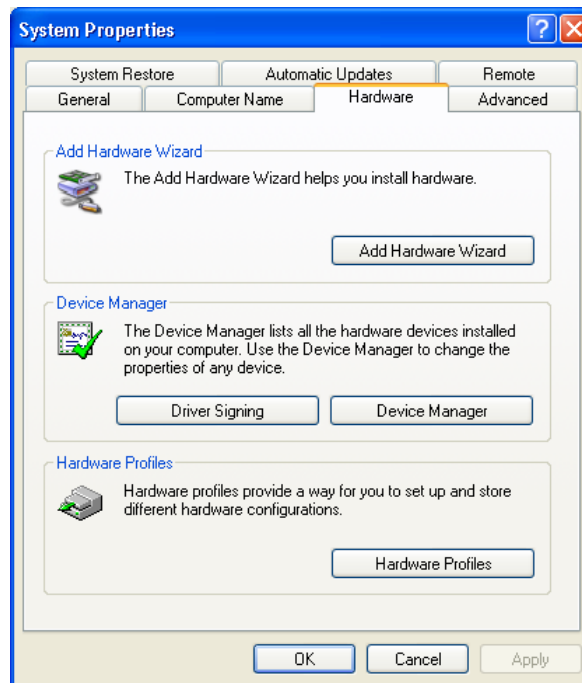
Scroll down to "Universal Serial Bus controllers", click the "+" icon to expand the selection and see all installed USB devices. If the device and driver have been installed correctly, then you should see "LDS-Dactron Comet-USB (USB 2.0 device)" in the list as shown below.
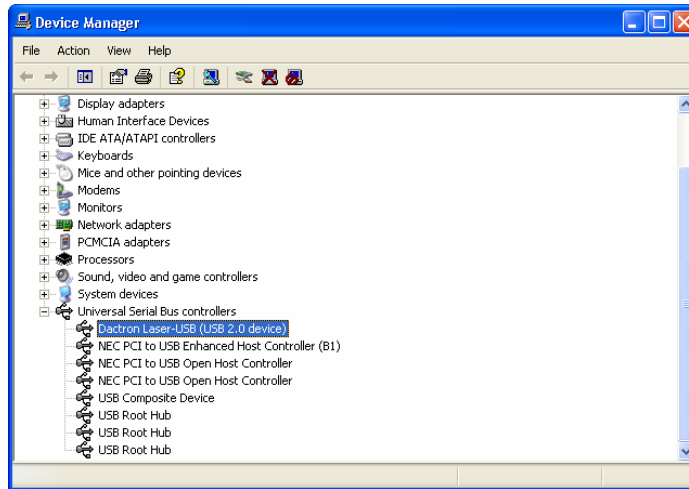
The **COMET**_{USB} will only be listed if it is connected via the USB cable and power is applied to the unit. If the **COMET**_{USB} is not connected and no power is applied, then it will not be listed in the Device Manager list. Try reinstalling or updating the device driver, if the device driver is not listed even when the **COMET**_{USB} is connected and power is applied. In this case, the driver may not have been installed correctly.

USB not connected at application startup

The **COMET**_{USB} must be connected to the PC via the USB cable and powered before the application software is started.

If you start the application software before powering on the unit or prior to plugging in the USB cable into the unit, you will receive the following error message.
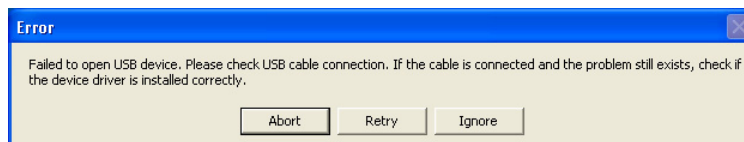
Click Abort, apply power to the *COMET*~USB~, unplug and plug the USB cable into the *COMET*~USB~ and the PC, and restart the application software.
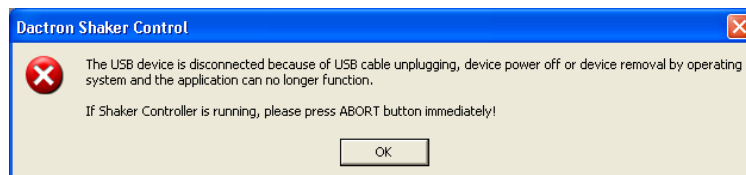
If you start the application software before the PC initializes the USB connection, you will receive the following error message.
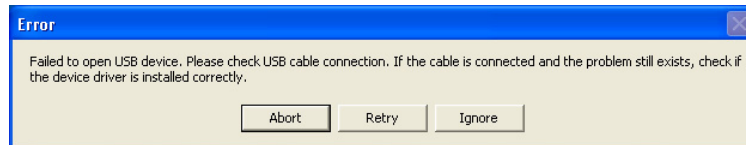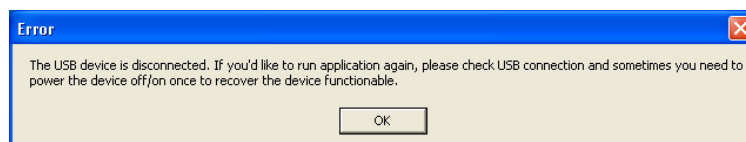

Click Abort, apply power to the *COMET*~USB~, unplug and plug the USB cable into the *COMET*~USB~ and the PC, and restart the application software.

Failure to initialize the *COMET*~USB~

If power is lost or reduced below the minimum requirements or the USB cable is inadvertently disconnected between the *COMET*~USB~ and the PC while the application software is running, you will receive the following error message.


You may also receive the following error message.

Click OK, close the application software, apply power to the **COMET**_{USB}, unplug and plug the USB cable into the **COMET**_{USB} and the PC, and restart the application software.

Windows Application Software Failure

If any Windows application or DSP software module is missing the following type of error message is displayed.
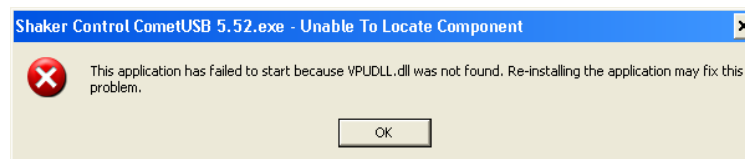
7 Limited Warranty Statement

LDS warrants to you, the Buyer, that LDS hardware, accessories and supplies will be free from defects in material and workmanship, for a period of one year from date of shipment. If LDS receives notice of such defects during the warranty period, LDS will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or equivalent in performance to new.

LDS warrants to you that LDS software will not fail to execute its programming instructions, for a period of one year from date of shipment, due to defects in material and workmanship when properly installed. If LDS receives notice of such defects during the warranty period, LDS will, at its option, either repair or replace software media which does not execute its programming instructions due to such defects

LDS does not warrant that the operation of LDS products will be uninterrupted or error free.

LDS products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by LDS, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED AND LDS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.

THE REMEDIES IN THIS WARRANTY STATEMENT ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL LDS OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHER LEGAL THEORY.

ASSISTANCE

If you are unable to solve a problem with your LDS-Dactron product, contact your LDS Representative. To locate the LDS Representative in your area refer to LDS web site www.lds-group.com. You can also contact LDS-Dactron directly at using the contact information on the cover page.

TO RECEIVE WARRANTY REPAIR SERVICE

To obtain warranty service or repair, LDS-Dactron products must be returned to a service facility designated by LDS. Buyer shall prepay shipping charges to LDS and LDS shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to LDS from countries and locations outside of the United States.

8 Manual Revision History

Date	Manual Version	Contents added into the Manual in this version
12 JAN 2004	2.00, 55 pages	Initial manual version for System Guide

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