



# **LVP Programming System User Guide**

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This guide provides information on the intended use of the DSI LVP-1000 Telemetry Transmitter and the LVP Programming System. It also contains information relating to the requirements of 1999/5/EC (R&TTE Directive), FCC compliance and transmitter disposal. Please read this guide carefully and retain for future reference.

**Intended Use:**

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The DSI LVP-1000 Telemetry Transmitter is intended for measuring physiologic parameters in laboratory animals. This device measures left ventricular pressure and temperature and should be placed subcutaneously, no more than 1.5 inches from the surface of the skin. The LVP Programming System is used to set the transmission parameters of LVP-1000 devices.

**Declaration of Conformity:**

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LVP-1000-433 Transmitters and the XC-1000 (Remote Transceiver) conform to the requirements of 1999/5/EC (R&TTE Directive). The declaration of conformity may be viewed on the Internet at [www.datasci.com](http://www.datasci.com).

Use of these devices may be subject to licensing in the following countries. For licensing options please contact the national spectrum management authorities

Austria	Belgium	Denmark
France	Greece	Iceland
Ireland	Italy	Liechtenstein
Luxembourg	The Netherlands	Norway
Portugal	Spain	Switzerland

**FCC Statement:**

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**LVP-1000-916** TX FCC ID MHALVP916

**XC-1000** TX FCC ID MHAXC1000

IC: IC:5681A-XC1000

These devices comply with part 15 of the FCC rules and RSS210 of the Canadian rules.. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference that may cause undesired operation.

**Caution:**

Changes or modifications not expressly approved by the party responsible for compliance could void the users authority to operate the equipment.

**Transmitter Disposal:**

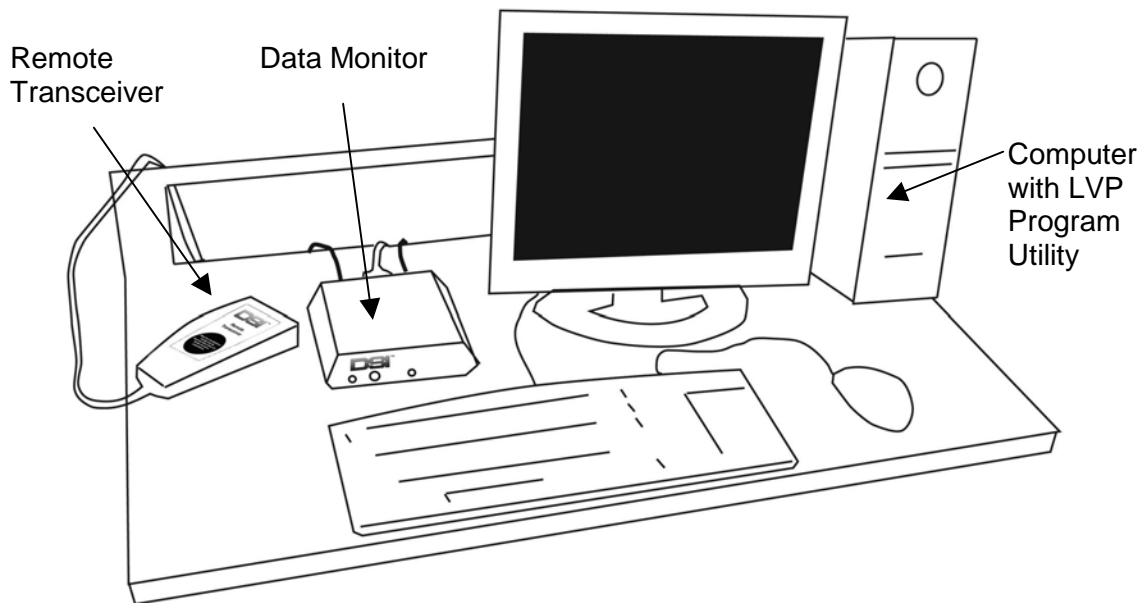
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Transmitters contain a primary battery cell. The battery cell may be removed by destructively dismantling the transmitter. Recycle the battery cell and remaining electronics in accordance with applicable federal, state, and local regulations.

# The LVP Programming System

## About the LVP Programming System

The LVP Programming System encompasses the software and hardware components needed to program the LVP-1000 transmitter. The hardware components are connected to a computer that has the LVP Program Utility installed.



**The LVP Programming System consists of the following components:**

### **LVP Program Utility**

The LVP Program Utility is a simple software program installed on a computer. The LVP Program Utility allows you to read and change the data transmission schedule for your LVP-1000 transmitters. It also keeps a log of all of the LVP-1000s and the configurations you have programmed.

### **Remote Transceiver - Model XC-1000**

The Remote Transceiver sends and receives programming signals to and from the implanted transmitter.

### **Data Monitor - Model DM-1000**

The Data Monitor converts the programming signals received from the Remote Transceiver into a digital format and provides feedback about system operation via the front panel display. The Data Monitor is connected to a serial port on the computer.

### Data Monitor Power Supply

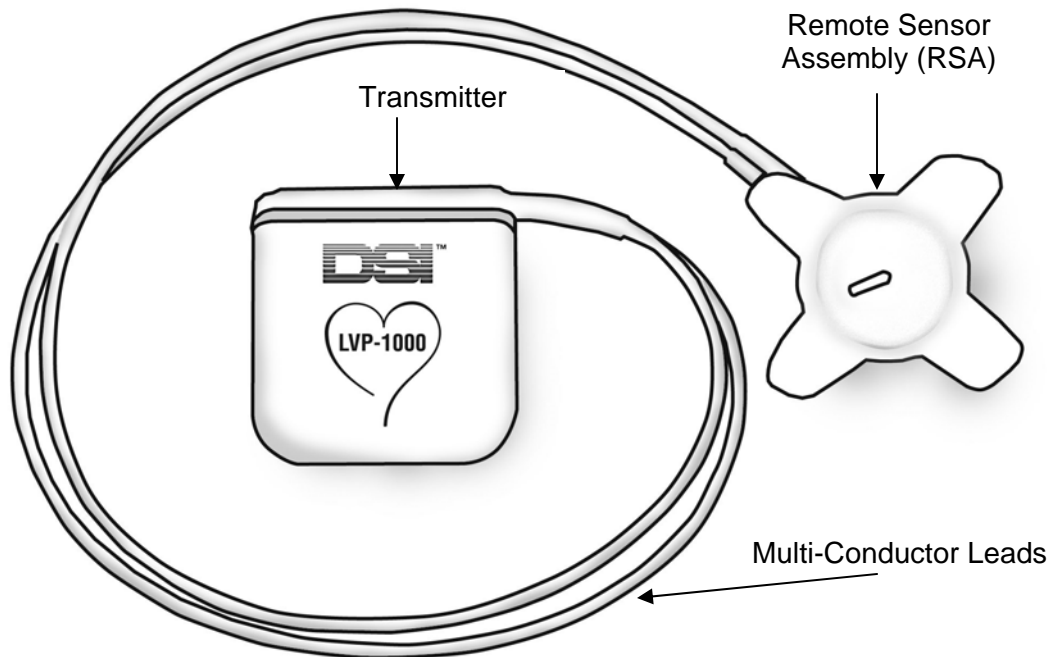
The Data Monitor power supply provides power to the Data Monitor and Remote Transceiver.

### Magnet

The magnet manually activates the LVP-1000 transmitter during programming. It also can be used to manually initiate a data transmission to the Dataquest A.R.T. System. Keep the magnet in a convenient storage location so it is readily accessible and to prevent inadvertent activation of the LVP-1000.

### About the LVP-1000

The LVP-1000 measures left ventricular (LV) pressure and temperature from laboratory animals. The LVP-1000 was originally developed for human clinical use, and provides high fidelity left ventricular pressure measurements. It is ideal for cardiac-specific applications such as congestive heart failure models where highly accurate parameters of heart function are required.



There are 2 models of this transmitter, the LVP-1000-433, which is sold for use in Europe; and the LVP-1000-916, which is sold for use in the United States and Canada. Both models are used and function in the same manner, except for the radio transmission frequency. In DSI manuals and product literature, the shortened model name, LVP-1000, refers to both models.

The LVP-1000 is the first in a series of future generation transmitters providing automated configuration, confirmation of transmitter ID, and programmed Duty-Cycling

to extend battery life. The LVP-1000 uses an extremely stable pressure sensor located in the Remote Sensor Assembly (RSA) to minimize pressure drift over extended implant durations. The RSA is located separate from the Transmitter to minimize the effects of fluid head pressure. The RSA and Transmitter are permanently connected via two Multi-Conductor Leads.

## Features

- Hermetic packaging for extended implant life
- Very low pressure drift
- "Smart" transmitter identification
  - Automated configuration
  - Positive unique identification during sampling
- High fidelity pressure waveforms
- Separate transmission frequency allows simultaneous use with a PhysioTel transmitter model in a single animal
- Compatible with Dataquest A.R.T.™ 3.0 and later versions
- Measures LV pressure and body temperature

## Specifications

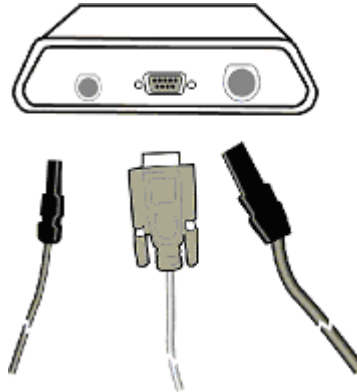
Frequency Response	100Hz
Initial Accuracy	+/- 3 mmHg
Maximum Pressure Drift	1 mmHg/month
Temperature Accuracy	+/- 0.5 °C
Temperature Drift	0.1 °C/month
Duty-cycle battery life	> 2 years - depends on usage
Continuous Battery Life	6 weeks

## About the Data Monitor

The Data Monitor, DM-1000, is a component of the LVP Programming System's hardware. The Data Monitor is connected to a serial port on the computer. It must also be connected to the power supply provided, which must be plugged into an electrical outlet. The Remote Transceiver, XC-1000, is connected to the Data Monitor.



Front of the Data Monitor



Back of the Data Monitor

### Status Lights

The front of the Data Monitor has several status lights and a Transfer button. In general, these lights are not used with the LVP Programming system. Here is a brief explanation of these status lights.

- The 'Ready' light will be solidly illuminated when the LVP Program Utility is in use.
- At all other times, the 'Ready' light will flash when the Data Monitor is receiving power.
- All other lights may be illuminated or flash temporarily when the Data Monitor is first powered up and when the LVP Program Utility is opened. These flashes do not indicate any problem or condition.
- The 'Transfer' button does not perform any function in the LVP Programming System.

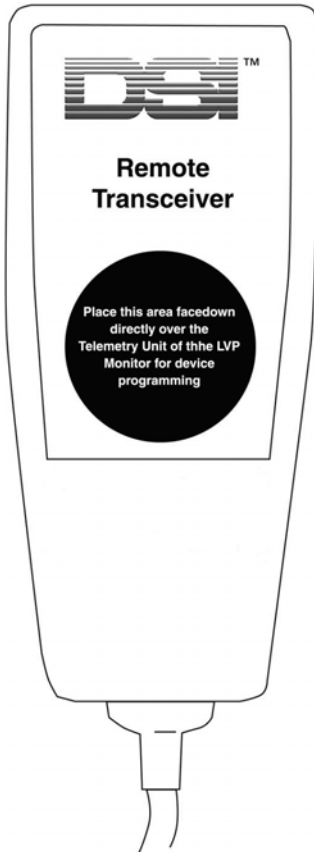
### Note

- You will not be able to use the Program Wizard of the LVP Program Utility if all of the LVP Programming System's hardware is not connected to the computer.
- Always disconnect the Data Monitor from your computer or disconnect the Data Monitor power supply before starting your computer. Reconnect the hardware after the computer fully boots. If it is connected when your computer boots, the Windows operating system may mistakenly recognize it as mouse. You will notice your mouse pointer moving randomly around the screen, not under the control of your mouse. If this occurs, simply disconnect the Data Monitor.



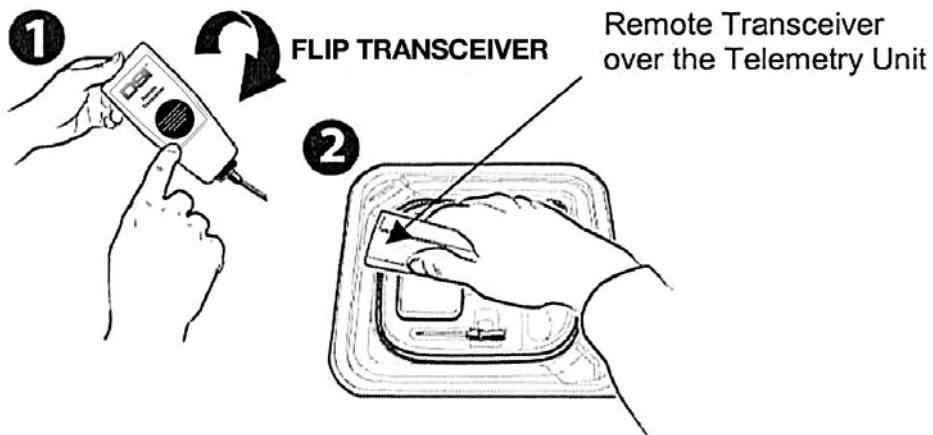
## About the Remote Transceiver

The Remote Transceiver, XC-1000, is a component of the LVP Programming System's hardware.



The Remote Transceiver is connected to the back of the Data Monitor. It is used to send and receive programming signals from the LVP-1000 during programming.

The Remote Transceiver has a red-colored circle on the front label. When programming, hold the circle directly over the LVP-1000 transmitter. (see figure below).



The Remote Transceiver should be held within 2 inches of the LVP-1000 during programming. To program, you will first activate the LVP-1000 transmitter by passing the magnet over it. Pass the magnet and then move the Remote Transceiver into place within 2 seconds to start receiving the signals.

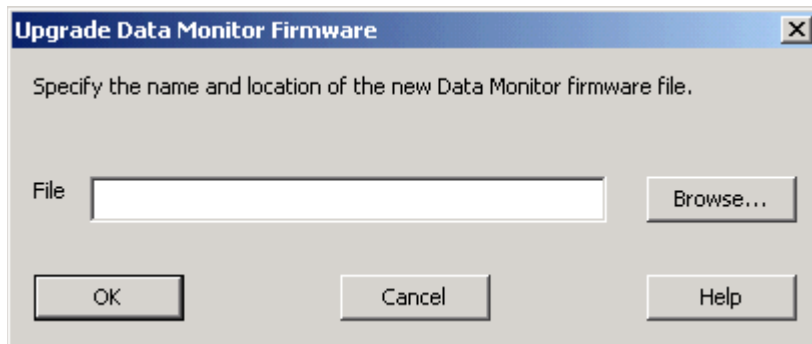
## Upgrading Firmware

Occasionally, DSI may recommend that you upgrade the firmware of your Data Monitor to improve its function. If this occurs, DSI will provide you with a computer file and instructions for installing the firmware. The instructions provided below are a general outline of the procedure.

There are 2 sets of instructions here, depending on how the firmware file is provided, either on CD or electronically via email or the DSI website.

### If the Firmware file is provided on a CD.

1. Insert the CD containing the firmware file into the computer's CD-ROM drive.
2. Start the LVP Program Utility.
3. From the toolbar, select **Actions --> Upgrade Firmware....** The Upgrade Data Monitor Firmware dialog appears.



4. Click the **Browse...** button to locate the CD-ROM drive and the upgrade file. The upgrade file type will be \*.s19.
5. Click **Open**. The file location and extension will appear in the **File** field.
6. Click **OK**. The Status Area of the Main Screen will show a message stating "Applying Upgrade... Please wait..." This process may take a few minutes.
7. The Status Area will display the message "Upgrade completed successfully." when finished.
8. You may then use the LVP Program Utility as normal.

**If the Firmware file is provided via email or downloaded from the DSI website.**

1. Save the Firmware file on the computer.
2. Start the LVP Program Utility.
3. From the toolbar, select **Actions --> Upgrade Firmware....** The Upgrade Data Monitor Firmware dialog appears.
4. Click the **Browse...** button to navigate to where the firmware file was saved. The firmware file type will be \*.s19.
5. Click **Open**. The file location and extension will appear in the **File** field.
6. Click **OK**. The Status Area of the Main Screen will show a messages stating "Applying Upgrade... Please wait..." This process may take a few minutes.
7. The Status Area will display the message "Upgrade completed successfully." when finished.
8. You may then use the LVP Program Utility as normal.

# Getting Started

## Computer Hardware and Software Requirements

The LVP Programming System is designed for use with a personal computer. The LVP Program Utility will run on any computer system that meets the minimum requirements for the Windows 2000 or Windows XP operating systems and has a serial port. Installing the LVP Program Utility on a computer that has Dataquest A.R.T. or OpenART installed will ensure that these requirements are met.

At a minimum, a computer must have:

- Windows 2000 (Service Pack 2) or Windows XP Professional
- One serial port available for the Data Monitor connection
- A hard drive with 7 megabytes of hard drive storage to install the LVP Program Utility
- A CD-ROM drive
- 128 MB RAM

## Installing the LVP Program Utility

Follow this procedure to install the LVP Program Utility software.

### Assumptions

The computer meets the minimum requirements as specified in Computer Hardware and Software Requirements.

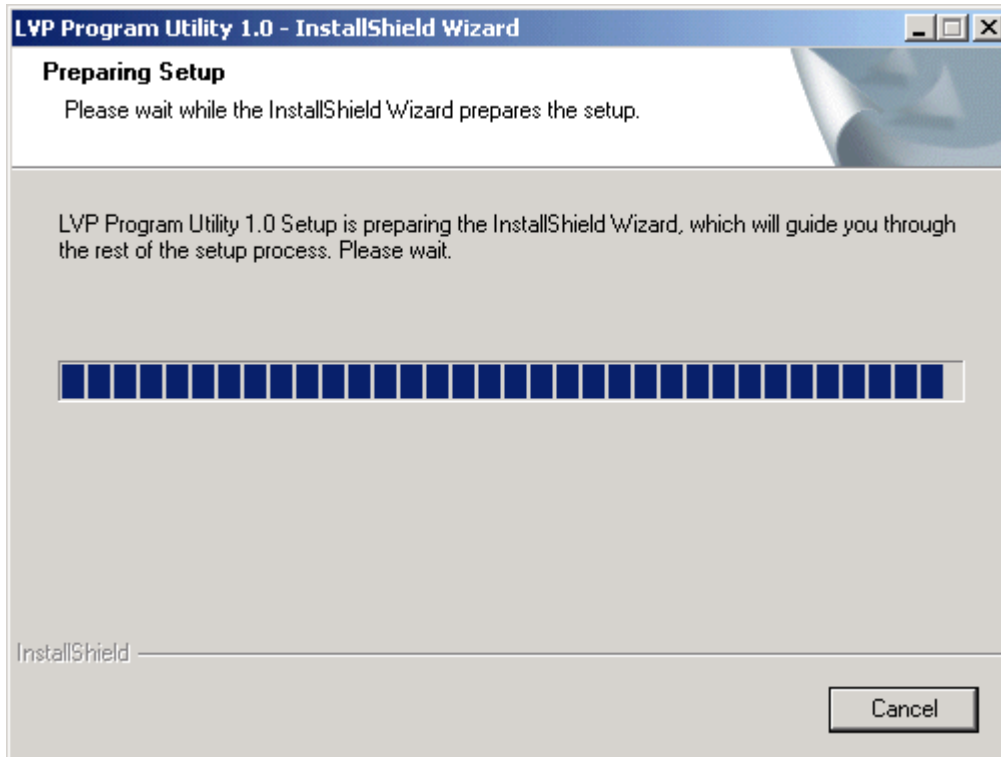
### Before Installation

1. Log in to the computer as a system administrator.
2. Ensure that the time zone is properly set and that Windows is set to automatically adjust clock for daylight saving changes.

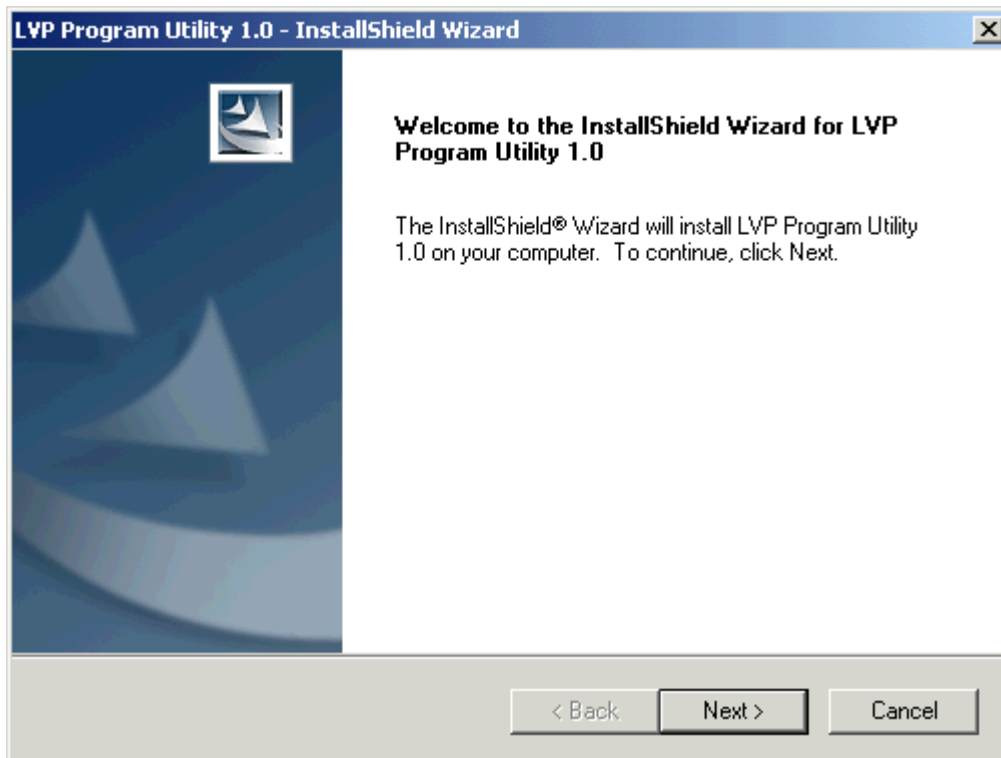
### To install the software

1. Insert the LVP Program Utility CD into the CD-ROM drive of your computer.

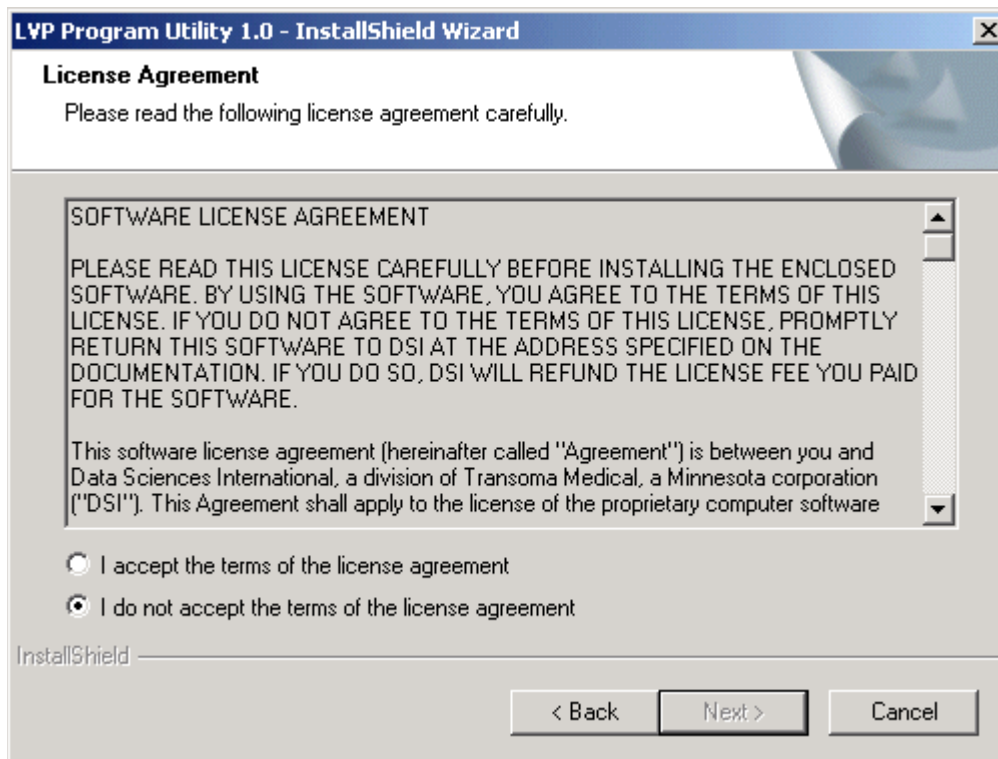
If your CD-ROM drive is configured to run automatically, the InstallShield - Preparing Setup window appears. Otherwise, double click on the **My Computer** icon on the desktop, double click on the CD-ROM drive, and double click on **Setup.exe** to start the InstallShield Wizard.



The Welcome window appears.

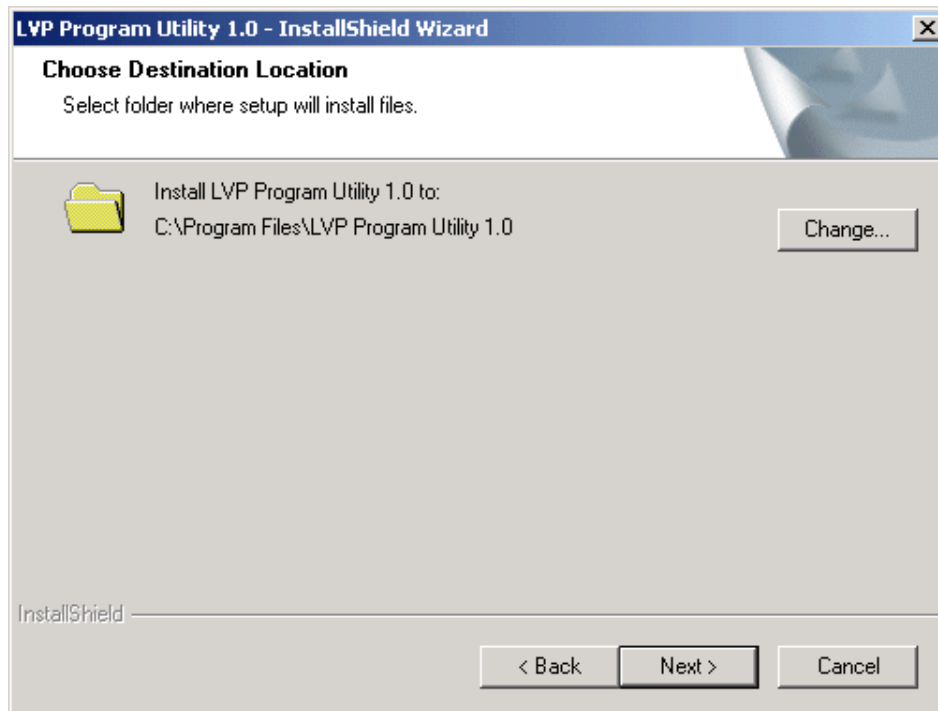


2. Click **Next >** to display the Software License Agreement window.

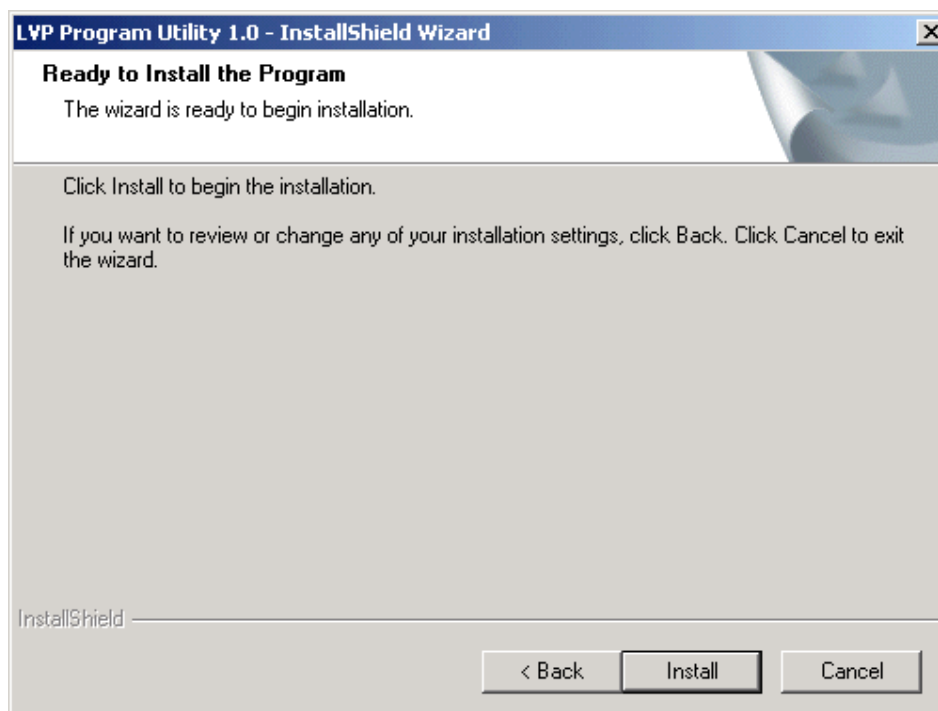


3. Read the License Agreement and then select "I accept the terms of the license agreement" to accept. Click **Next >** to continue.

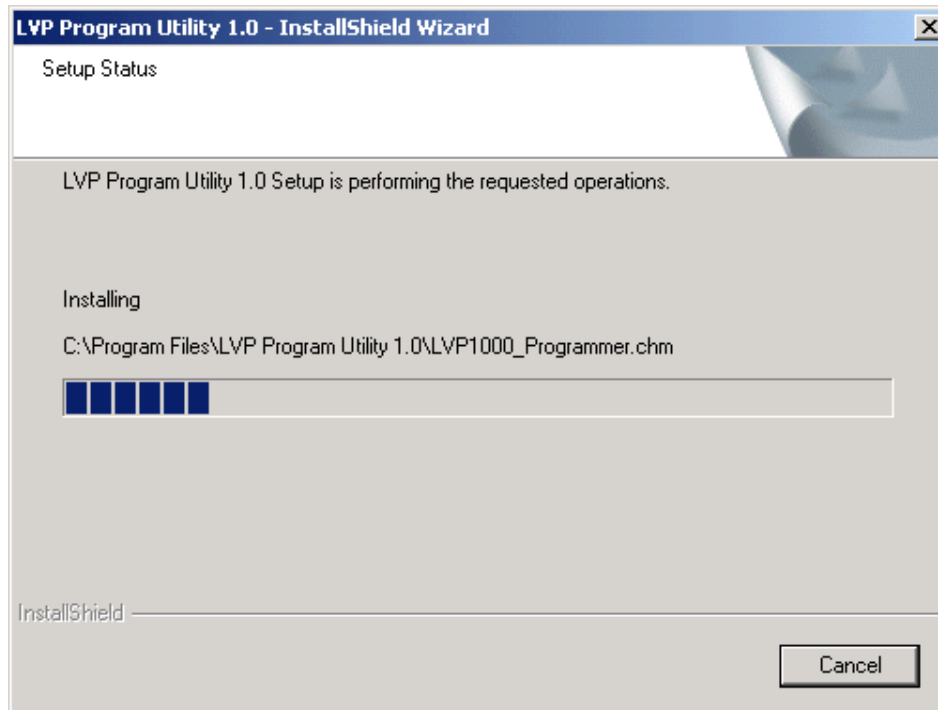
4. The Choose Destination Location window appears. To change the installation location of the LVP Program Utility files, click **Change...** and use the browser to change the folder. (Use the default setting if possible.) Click **Next >** to continue to the next window.



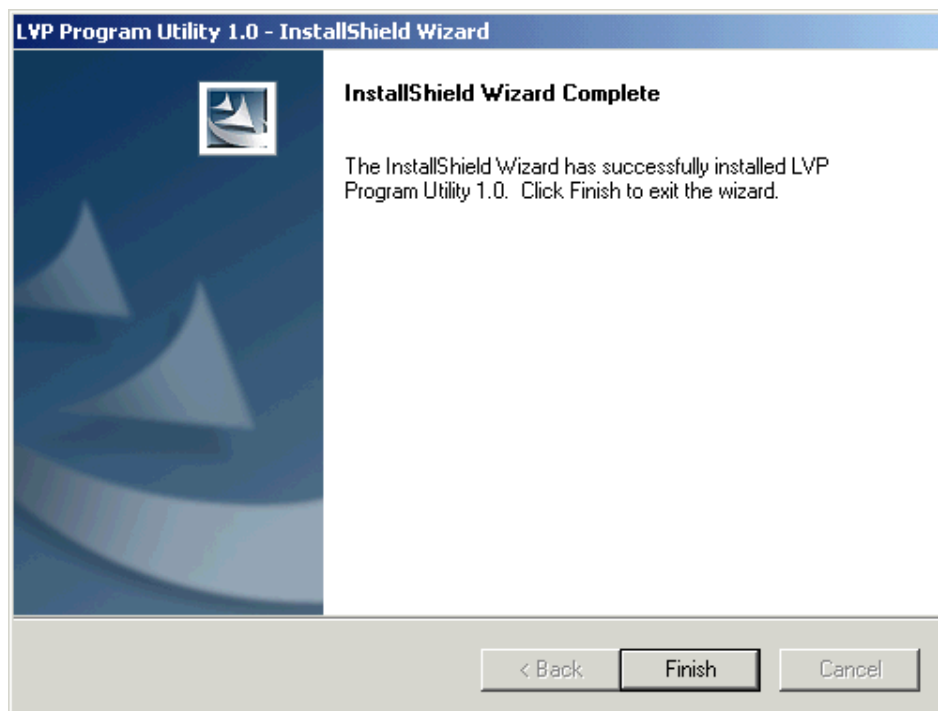
5. The Ready to Install the Program window appears. Click **Install** to begin the installation.



- The Setup Status window appears and shows the file copy status.



- The InstallShield Wizard Complete window appears when the software is installed. Click **Finish** to complete the setup.





**Note**

- Consult your IT staff or call DSI Technical Services for assistance with the installation procedure.
- You may install the LVP Program Utility on a computer that already has Dataquest A.R.T. installed.
- The computer's Windows operating system must be set to automatically adjust the clock for daylight saving changes to install and operate the LVP Programming Utility. If you are using a computer with Dataquest A.R.T. 3.0 also installed, you will need to turn this setting off to operate the Dataquest A.R.T. software.

# Programming the LVP-1000

## Using the Program Wizard

The Program Wizard allows you to define the LVP-1000 transmission schedule and settings.

Consider the following when using the Program Wizard:

- You must have the LVP Programming System hardware connected to your computer to start the Program Wizard. The Data Monitor, Remote Transceiver, and power supply must all be correctly connected.
- Animals may be implanted with both an LVP-1000 and another DSI transmitter model, such as a D70-PCT. In this case, turn off the second transmitter before attempting to program the LVP-1000.
- Do not try to collect data from the LVP-1000 using Dataquest A.R.T.™ during programming. Before starting the LVP Program Utility, stop sampling from all LVP-1000 devices in Dataquest A.R.T.™
- Determine how you wish to program the LVP-1000 for your studies, depending on how you wish to collect data. See Choosing the Transmission Schedule for more information on the differences between the transmission schedules.
- The LVP-1000 will retain this transmission schedule until it is reprogrammed with different settings.

## Choosing the Transmission Schedule

The LVP-1000 can be programmed for one of three modes of transmission: Manual Transmission, Continuous Transmission, or Automatic (duty-cycle) Transmission. These each have different benefits and uses.

### Manual Transmission

- The LVP-1000 must be activated with a magnet to collect a data transmission.
- The LVP-1000 is OFF unless activated.
- The transmission length is programmed to a discreet length.
- The LVP-1000 will turn OFF when the transmission is complete.
- Use this mode when the animal is not actively being studied.
- Use the Duty-cycle sampling mode in Dataquest A.R.T.

### Continuous Transmission

- The LVP-1000 can continuously transmit data in this mode.
- After programming, the LVP-1000 is turned OFF. Turn it ON by activating with the magnet.
- When ON, the LVP-1000 will transmit until you use a magnet to turn it OFF. (This is similar to other DSI transmitters.) When OFF the LVP-1000 will not transmit until you use a magnet to turn it ON.
- A transmission length is not selected.
- The LVP-1000 must be reprogrammed to stop data transmissions.
- Use either Continuous or Scheduled sampling modes in Dataquest A.R.T.
- This mode uses the most battery power: the battery will last 6 weeks in this mode.

### **Automatic (Duty-Cycle) Transmission**

- The LVP-1000 transmits data according to the programmed schedule.
- The LVP-1000 automatically turns ON and transmits for the programmed transmission length. It is OFF at all other times.
- A magnet can be used to activate the LVP-1000 to collect a transmission when it is OFF.
- The LVP-1000 can be programmed to transmit only during certain parts of the day, using a Start and End time; or to transmit periodically 24 hours a day.
- The transmission length is programmed to a discreet length. All transmissions will be this length.
- Use the Duty-cycle sampling mode in Dataquest A.R.T.
- The battery life will depend on the transmission schedule. The battery can last for over 2 years in this mode.

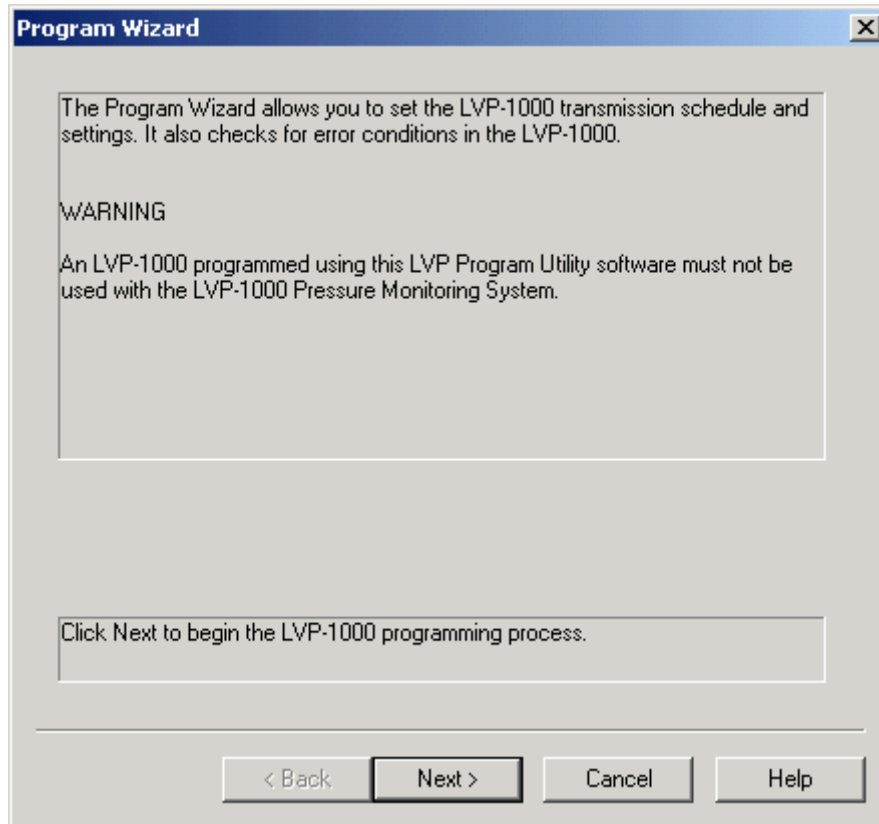
### **Programming the LVP-1000**

The Program Wizard allows you to set the LVP-1000 transmission schedule and configuration settings. The Program Wizard guides you through the following programming procedures.

1. Starting the Wizard and reading the current configuration
2. Enabling automatic LVP-1000 transmissions
3. Reviewing the updated configuration settings and programming the LVP-1000

### **To start the Program Wizard and read the configuration**

1. From the Main Window, click on the Program icon or select **Actions -> Program ....** The LVP Program Utility will verify that the Data Monitor is connected and functioning properly. The Program Wizard window appears.



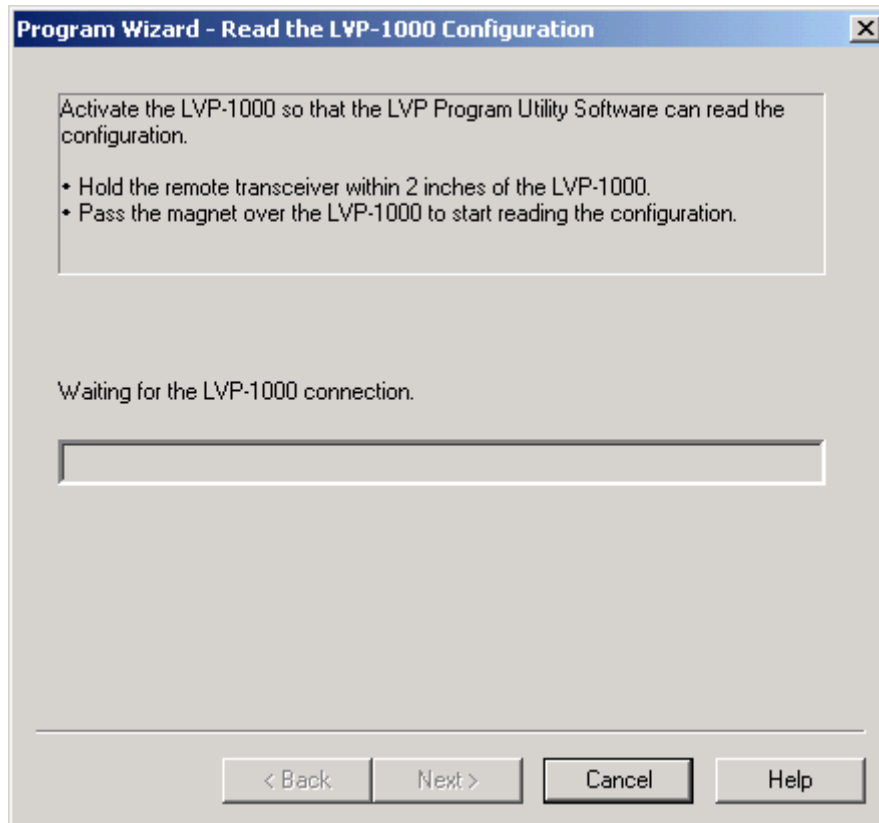
**Note:** The Program Wizard Window contains the following warning:

**WARNING:** An LVP-1000 programmed using this LVP Program Utility software must not be used with the *LVP-1000 Pressure Monitoring System*.

**Explanation:** The *LVP-1000 Pressure Monitoring System* is a product of Transoma Medical and is designed for human clinical use. Do not use the LVP Program Utility to program LVP-1000 devices if you are collecting data using the clinical *LVP-1000 Pressure Monitoring System* because data may not be collected properly.

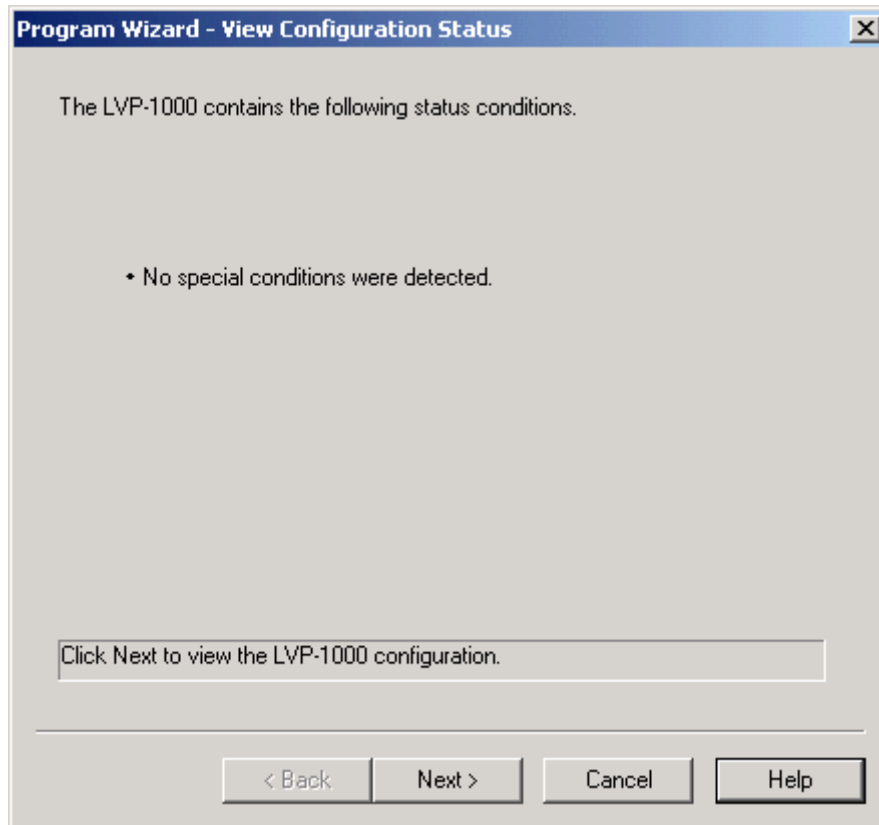
The LVP Program Utility should only be used to program LVP-1000 devices that are implanted in research animals and used in conjunction with Dataquest A.R.T. or Dataquest OpenART for data collection.

2. Click **Next >**. The Read the LVP-1000 Configuration window appears



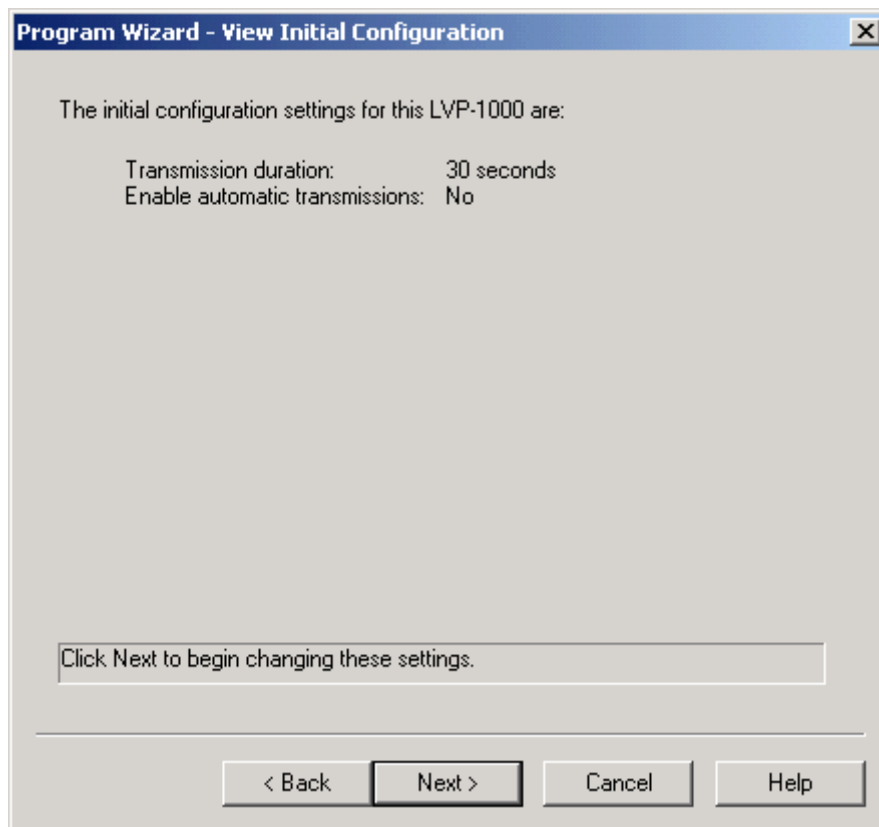
3. Hold the Remote Transceiver within 2 inches of the LVP-1000 transmitter.
4. Pass the magnet over the transmitter to start reading the configuration. The Program Wizard reads the current LVP-1000 configuration and displays the message, *LVP-1000 configuration reading complete*.
5. Remove the Remote Transceiver from the transmitter.
6. Click **Next >** to view any status or warning messages.

7. On the View Configuration Status window, note all status messages. Normally, the message "No special conditions were detected." will appear.



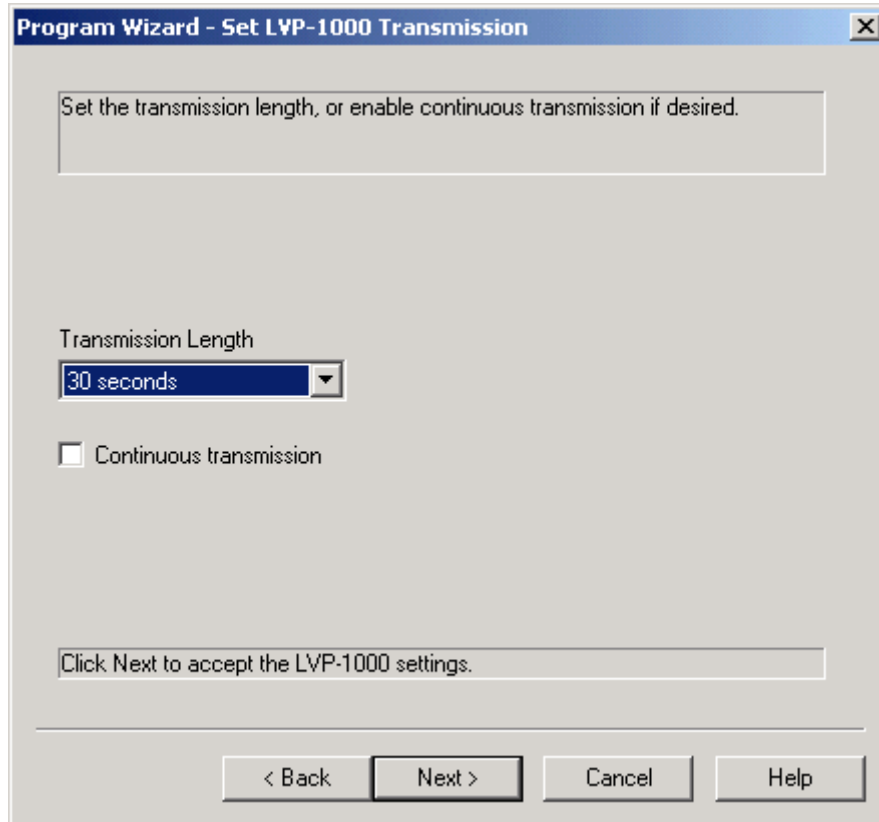
- If the configuration status messages are acceptable, click **Next >** to continue programming the LVP-1000.
- If any of the messages are unacceptable, click **Cancel** to leave the Program Wizard and locate another LVP-1000, if appropriate. Refer to Error Messages and/or contact Technical Services if you need assistance.

8. The View Initial Configuration window shows the current program configuration of the LVP-1000. Click **Next >** to begin changing these settings.



**To enable LVP-1000 transmissions**

1. From the Set LVP-1000 Transmission window, choose one of the following actions:



- Select a transmission length from the **Transmission Length** field. Proceed to Step 2.
- Place a check mark next to **Continuous transmission**. This will disable the Transmission Length field. Click **Next >**. The Program Wizard displays the View Updated Configuration window. Continue with Step 1 of the To view the updated configuration and program the LVP-1000 procedure.



2. Click **Next >**. The Enable Automatic Transmission window appears.

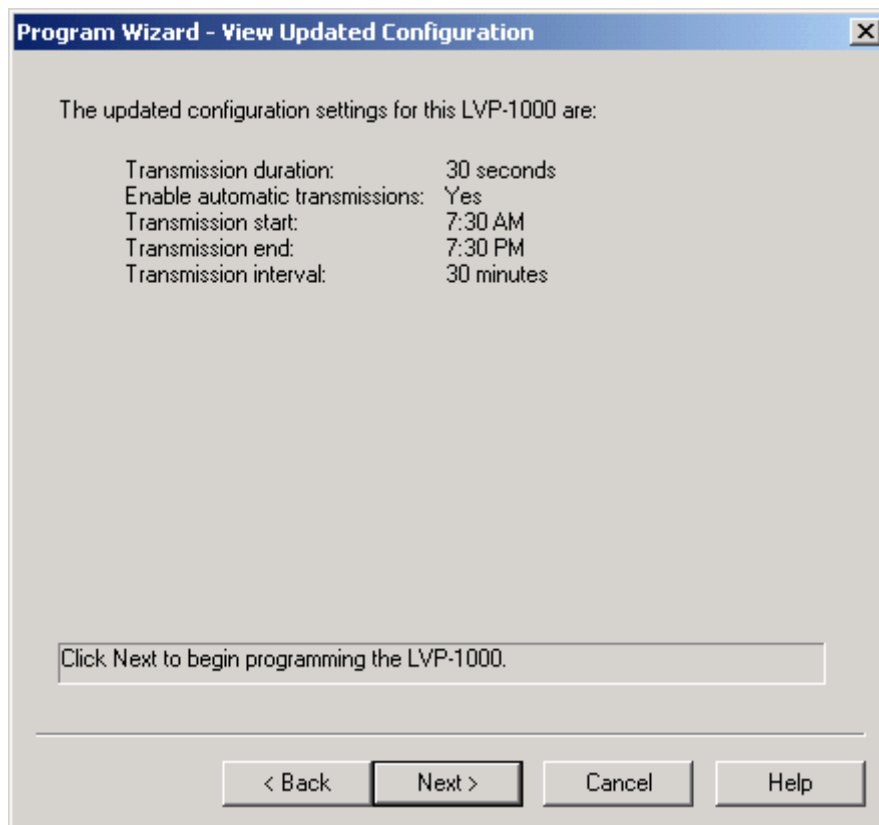
3. Take one of the following actions:
  - Place a check mark next to **Enable automatic transmissions** to schedule transmissions at a particular time of the day. Proceed to Step 6.
  - If you do not want to enable automatic transmissions, clear the **Enable automatic transmissions** checkbox. The rest of the fields in this window become disabled.  
Click **Next >**. The Program Wizard displays the View Updated Configuration window. Go to Step 1 of the To view the updated configuration and program the LVP-1000 procedure to continue programming the LVP-1000.

**Note:** If automatic transmissions are not enabled, you must pass a magnet over the LVP-1000 each time you need to begin a transmission.
6. Select a transmission start and end time from the **Start** and **End transmission time of day** fields on the Enable Automatic Transmission window. During this time period, the LVP-1000 will transmit data to the system at defined intervals. If 24-hour monitoring is desired, set these two fields to the same time.
7. Select an interval between LVP-1000 transmissions from the **Interval between transmissions** box. The interval cannot be larger than the time span between the Start and End transmission times selected in the previous step.

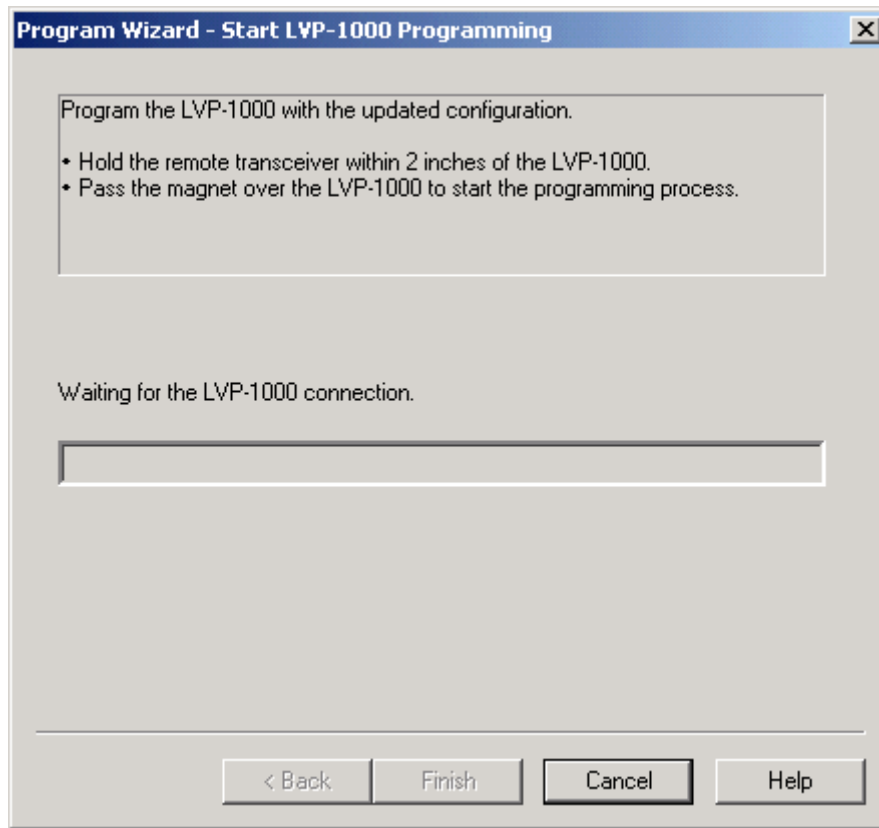
8. Click **Next >** to accept all automatic transmission settings and view the updated configuration settings.

### To view the updated configuration and program the LVP-1000

1. From the View Updated Configuration window, examine the updated configuration. If any of the listed settings are unacceptable, use the **Back** button to return to the appropriate window to make changes.



2. Click **Next >** to begin the programming process. The Start LVP-1000 Programming window appears.



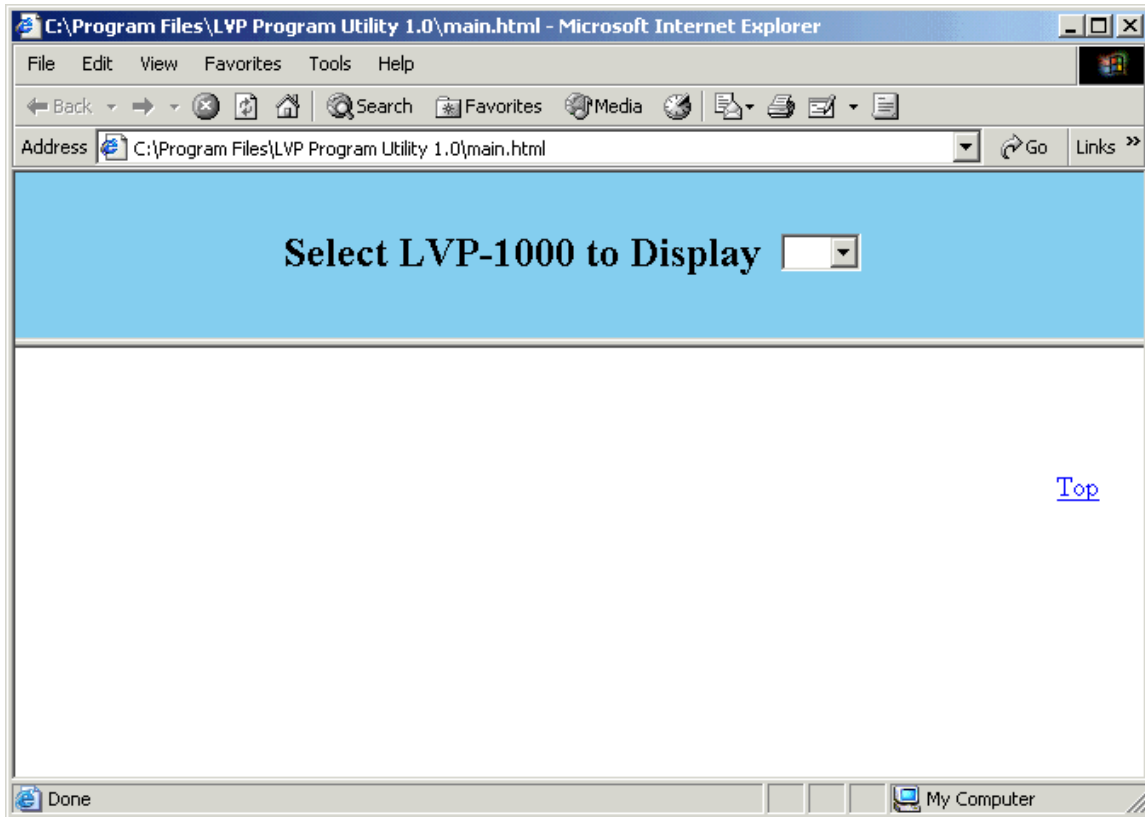
3. Hold the Remote Transceiver within 2 inches of the LVP-1000 transmitter.
4. Pass the magnet over the transmitter so the LVP Program Utility can begin programming the new configuration. The LVP Program Utility programs the LVP-1000 with the settings defined in the updated configuration and displays the message, *LVP-1000 programming complete* when complete.
5. Remove the Remote Transceiver from the transmitter.
6. Click **Finish** to complete the programming process and to return to the LVP Program Utility Main window.

**Note**

- The time zone an LVP-1000 Transmitter will use for automatic transmissions (duty-cycle transmissions) is the time zone setting of the computer used for programming.
- The LVP-1000 Transmitter does not automatically adjust for Daylight Savings Time (DST, also known as Summer Time). The automated transmission schedule is based on the Daylight Savings status of the computer when programmed. Transmissions will be offset by one hour when the computer clock is adjusted for DST. For example, if the LVP-1000 is programmed to transmit at 3:00 AM during Standard Time (Winter Time), the transmission will occur at 4:00 AM during DST. Adjust the LVP-1000 transmission schedule by reprogramming.
- The LVP-1000 cannot transmit data until it has been programmed.

## Using the Log Viewer

Use the Log Viewer to review the LVP-1000s you have programmed, as well as the configurations programmed.



To locate this dialog select Actions --> **View the Log ...** or click the Log Viewer Icon.

The Log Viewer opens in an Internet Explorer Window. You must select the LVP-1000 Serial Number of the LVP-1000 log you wish to view, or you can view all Serial Numbers (All).

After making a Serial Number selection, the log will be displayed. The log entries are listed in chronological order with the most recent entry at the top of the list and the earliest entry at the bottom of the list.

**Select LVP-1000 to Display** All

Serial Number                    277  
 Model Number                    LVP-1000-433  
 Date and Time of Programming 12/22/2004 9:21:52 AM  
 Firmware Version                1.5.1  
 Battery Status                    OK

Completion Status                **Programmed Successfully**

Previous Settings		Current Settings	
Transmission Length	2 minutes	Transmission Length	30 seconds
Interval Between Scheduled Transmissions	30 minutes	Interval Between Scheduled Transmissions	30 minutes
Scheduled Start Time	6:15 AM	Scheduled Start Time	6:15 AM
Scheduled End Time	6:15 PM	Scheduled End Time	6:15 PM

Serial Number                    231  
 Model Number                    LVP-1000-916  
 Date and Time of Programming 12/22/2004 9:17:58 AM  
 Firmware Version                1.5.1  
 Battery Status                    OK

## Dataquest A.R.T. and the LVP-1000

The LVP-1000 is designed to be used with Dataquest A.R.T. and/or Dataquest OpenART. The following sections of the manual show how to configure an RMC-433 or RMC-916 receiver and an LVP-1000, as well as how to acquire data using Duty-cycle sampling in Dataquest A.R.T.

This information is also available in the Dataquest A.R.T. and OpenART manuals. This manual assumes that the user is generally familiar with Dataquest A.R.T. or Dataquest OpenART. If you are a new user of one of these software packages, it is recommended that you read the manuals included with them for information that is not included here.

### **LVP-1000 Features in Dataquest A.R.T.**

Compared to PhysioTel transmitters, the LVP-1000 has some new and exciting features:

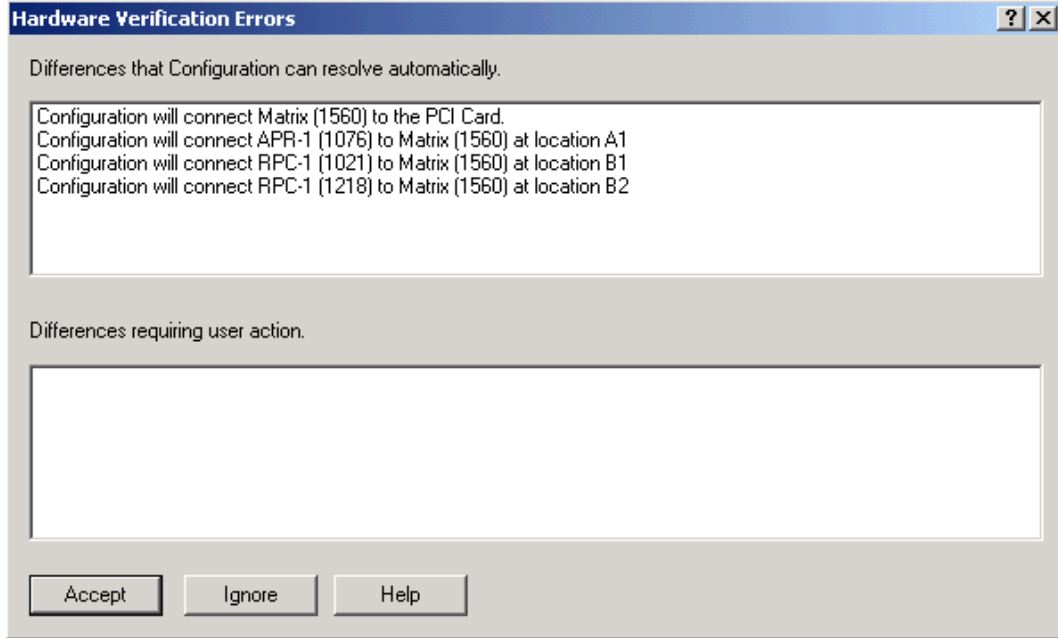
- **Automated Configuration** - The serial number and calibration values are stored in the LVP-1000. During configuration, you simply place a receiver near the LVP-1000 to collect this data. See *Using the New LVP-1000 Wizard* for details.
- **Duty-cycle Sampling** - The LVP-1000 can be programmed to transmit on a regular schedule to prolong battery life.
- **Different Transmission Frequency** - The LVP-1000 can be implanted along with a PhysioTel transmitter in a single animal to maximize the amount of data collected.

## Configuration

### Configuring a Receiver

#### **To configure an RMC-433 or RMC-916**

1. Connect the RMC-433, or an RMC-916 to a Data Exchange Matrix.
2. Select **Hardware - Verify** from the Configuration window. The Hardware Verification Errors window appears stating "Differences that Configuration can resolve automatically."



3. Click **Accept** to have the program add the receiver model and its serial number to the configuration tree. The New Transmitter window appears.



4. Click **Yes** to add a new transmitter and continue with Configuring an LVP-1000.

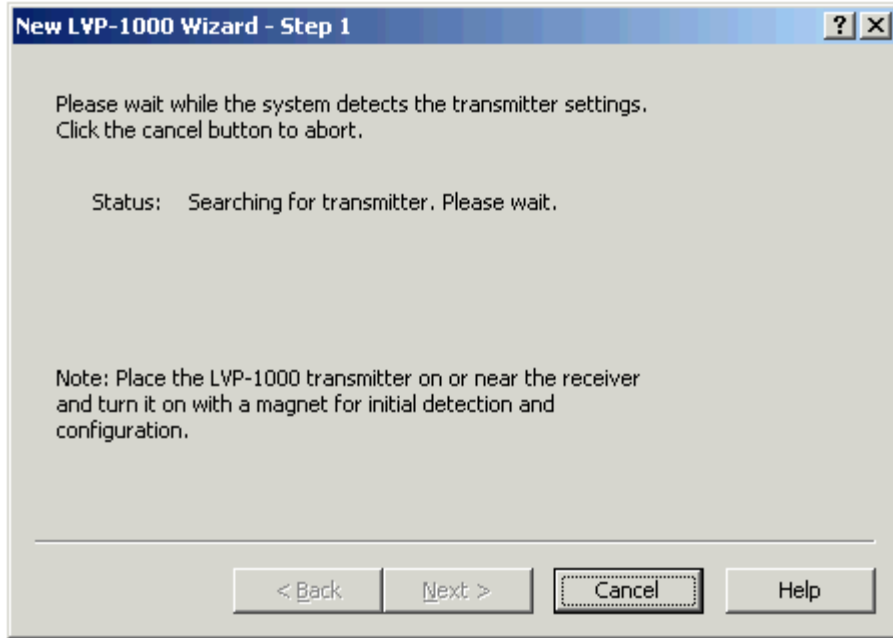
## Configuring an LVP-1000

### Assumption

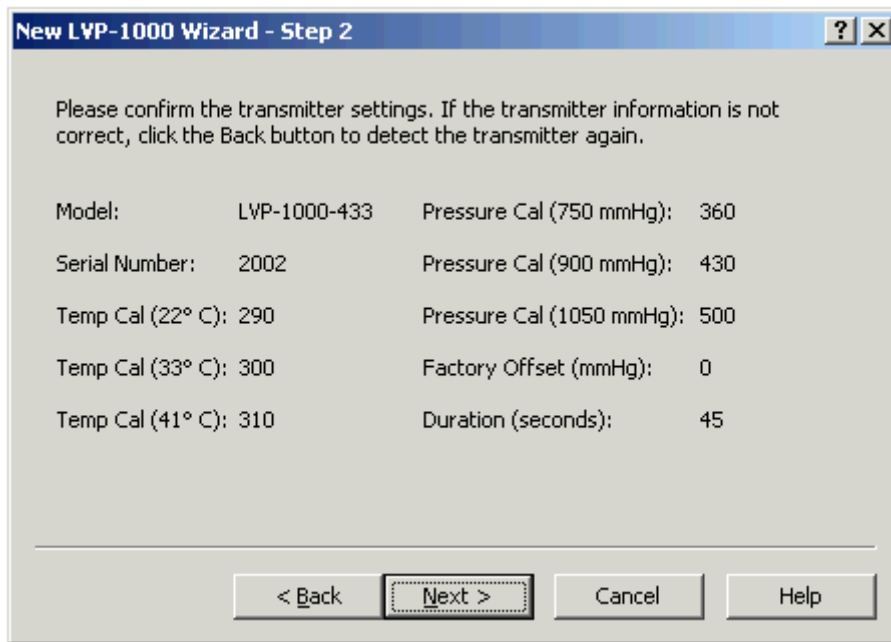
You have configured your Data Exchange Matrix and an RMC-433 or RMC-916.

1. Highlight the receiver you would like to assign the transmitter to, right click and choose **New Transmitter**. The New LVP-1000 Wizard dialog will appear.



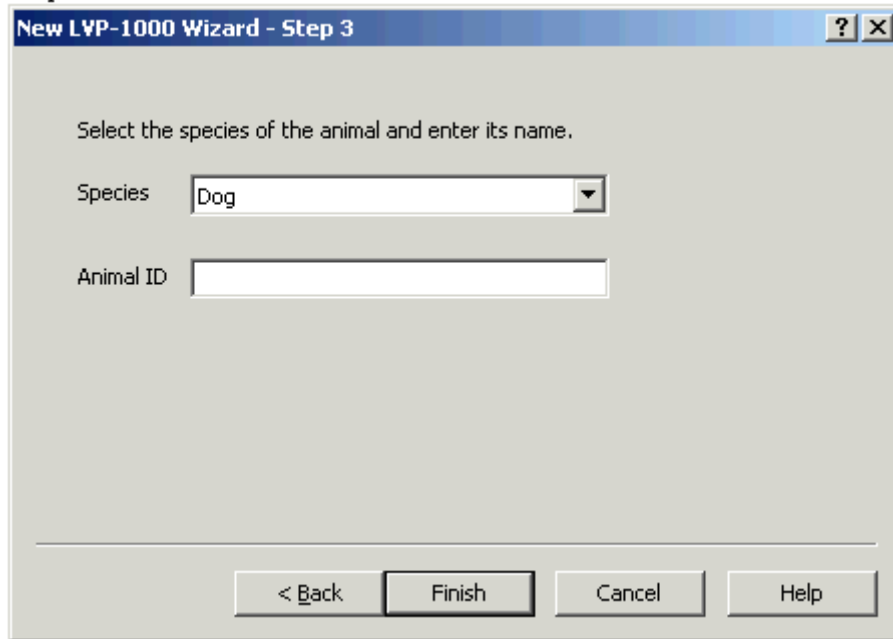


2. Use a magnet to activate the LVP-1000 transmitter.
3. Physically place the LVP-1000 transmitter on or near an RMC-433 or RMC-916 receiver.
4. Once the transmitter signal is detected, the New LVP-1000 Wizard - Step 1 window will be replaced with the New LVP-1000 Wizard - Step 2.



5. Confirm the transmitter model and serial number. The serial number must be unique.

6. Click **Next >** to continue. The New LVP-1000 Wizard - Step 3 window appears.



New LVP-1000 Wizard - Step 3

Select the species of the animal and enter its name.

Species

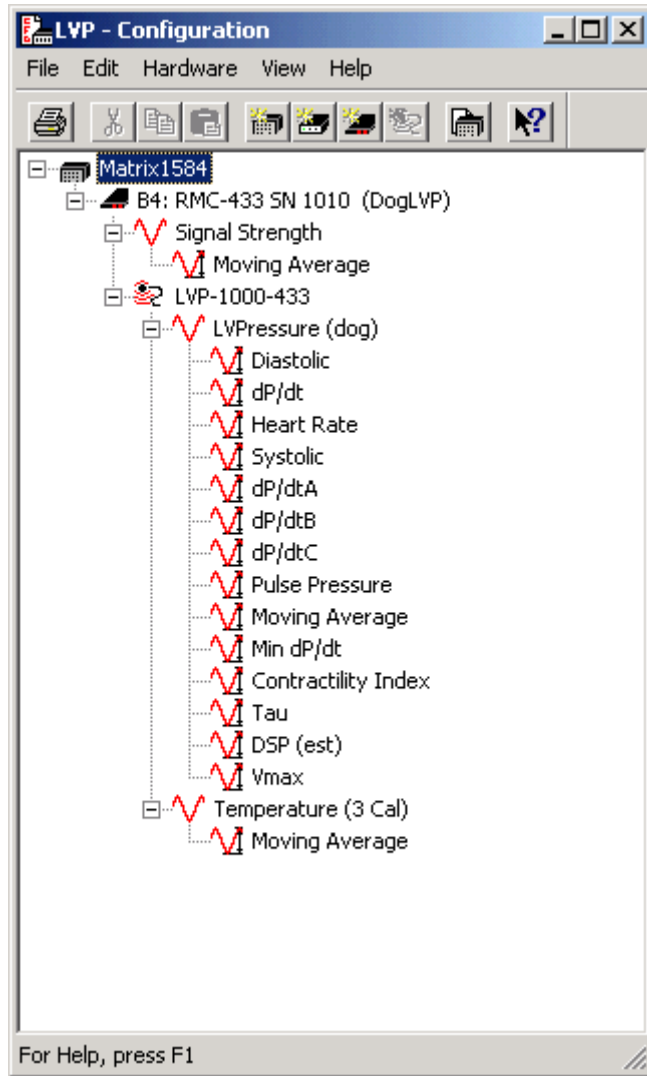
Animal ID

< Back Finish Cancel Help

7. Select the species of your animal to ensure proper algorithm selection. A default species automatically appears based on the transmitter that you selected.

If your species is not available, choose a species from the drop down list whose heart rate is similar to the expected heart rate of your animal. When debating between two species with different heart rates, DSI recommends selecting the species that has a higher heart rate than the expected heart rate for your animal. This ensures that the processing algorithm will not 'miss' any trends.

8. Enter a unique animal ID of your choice.
9. Click **Finish** to complete the transmitter configuration process and return to the Configuration window.



10. Configure additional transmitters by repeating steps 1-9. After configuring all transmitters, continue with Completing the Configuration.

#### Note

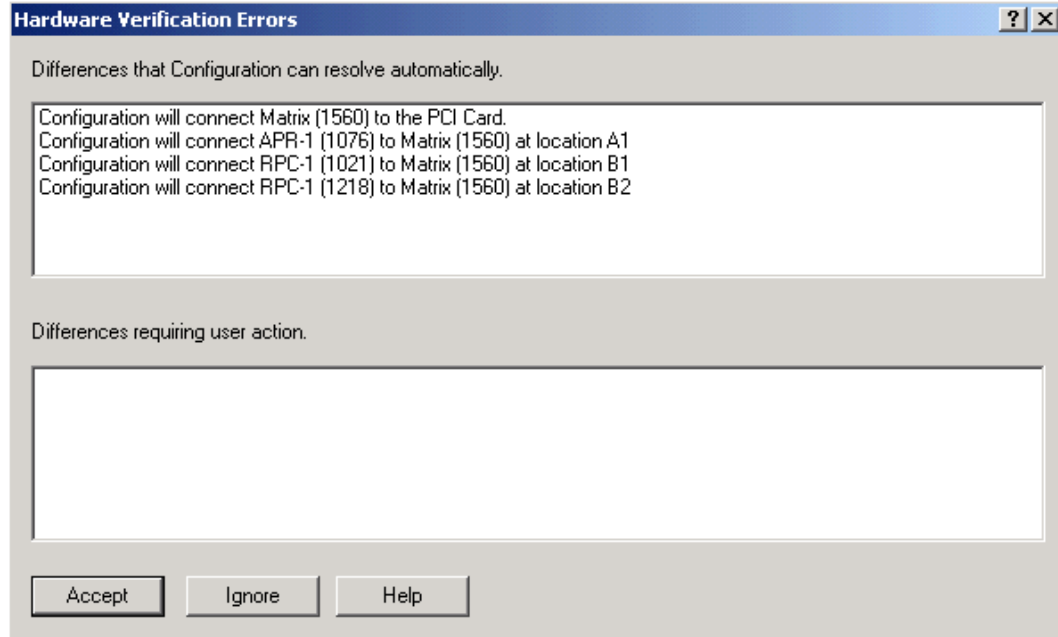
- Factory calibration values are automatically detected by the software.
- After configuring an LVP-1000 transmitter, you can move it to the Inventory and use the same receiver to configure another LVP-1000 transmitter.
- To move a configured transmitter to Inventory, highlight it, right click, and choose **Move to Inventory**.
- Transmitters in Inventory retain their calibration values. Click and drag a transmitter out of Inventory to a receiver when you wish to collect data from the transmitter.

## Completing the Configuration

Your final configuration step is to verify the hardware configuration.

### To verify your hardware configuration

1. From the Acquisition program, select **Hardware - Verify** to make sure the hardware and configuration match. You should receive a message stating "Hardware and settings verified successfully."
2. Click **OK**.
3. If any changes were made or errors are detected, the Hardware Verification Errors window appears. The section entitled "Differences that Configuration can resolve automatically" contains connecting or disconnecting messages about a receiver, Data Exchange Matrix, or converter.



4. Click **Accept** to have the Configuration module resolve these differences.
5. If there are errors listed in the "Differences requiring user action" section, choose **Edit** to return to the Configuration window and correct the configuration. The messages listed in this section require user interaction. For example if calibrations were not entered for a transmitter, a message about adjusting calibrations would appear.

6. Before running **Hardware - Verify** again, be sure to resolve any of the user action differences. Once all of the differences have been resolved, a message window appears confirming hardware and settings verification. The software will add any changes to the configuration tree.
7. Exit Configuration.

### Note

- This action automatically identifies new generation hardware (Data Exchange Matrices, APR-1, RPC-1, RMC-1, RMC-1HF, RMC-433, and RMC-916). It will also check for signal calibrations.
- The **Hardware - Verify** action runs automatically the very first time you open a configuration and can perform much of the maintenance by recognizing the hardware connection locations.
- If a Data Exchange Matrix or new generation receiver is moved or disconnected, all of the associated configuration items are moved or disconnected with it.
- When new generation hardware is disconnected, all devices and associated configuration information in the database will be moved into the Recycle Bin located on the Configuration window for retrieval.
- Old generation hardware is not automatically moved.

## Data Collection\*

### Selecting a Sampling Protocol in Dataquest A.R.T.

There are two ways to sample data: continuously or on a schedule. Both types of sampling require an understanding of sampling slots - see your Dataquest A.R.T. manual for more information on sampling slots.

Each type of sampling method is described here. For more information on a specific step see the following headings.

### Duty-Cycle Sampling

Duty-cycled sampling is for use with LVP-1000 transmitters. However, additional PhysioTel transmitters can also be sampled using duty-cycle sampling if they are grouped with an LVP-1000 transmitter. Each duty-cycled animal fills a sampling slot until its sampling is turned off by the user. An LVP-1000 should be programmed to enable automatic transmissions.

### Perform the following steps for duty-cycle sampling

1. Program the LVP-1000 transmitter - see Programming the LVP-1000
2. Define Source Settings
3. Define the Size of Data Files
4. Start Duty-Cycled Sampling
5. Stop Duty-Cycled Sampling

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\* If you are using Dataquest OpenART, refer to your OpenART 3<sup>rd</sup> party software user guide for further instructions.

## Continuous Sampling

Continuous sampling is just what the name implies - sampling one or more transmitters for an extended period without breaks in the data. A user manually starts continuous sampling, and it continues uninterrupted for minutes, hours, or days until a user stops the process. Each animal that is sampled continuously will fill a sampling slot until its sampling is terminated by the user. An LVP-1000 should be programmed to transmit continuously for continuous sampling.

### Perform the following steps to sample continuously

1. Program the LVP-1000 transmitter - see Programming the LVP-1000
2. Define Source Settings
3. Define the Size of Data Files
4. Start Continuous Sampling
5. Stop Continuous Sampling

## Scheduled Sampling

Scheduled sampling allows the sampling of many transmitters sequentially and at intervals defined by the user in the Acquisition software. Each animal that is sampled on a schedule will fill a sampling slot only during its scheduled time of sampling. An LVP-1000 should be programmed to transmit continuously for scheduled sampling.

### Perform the following steps for a scheduled sampling protocol

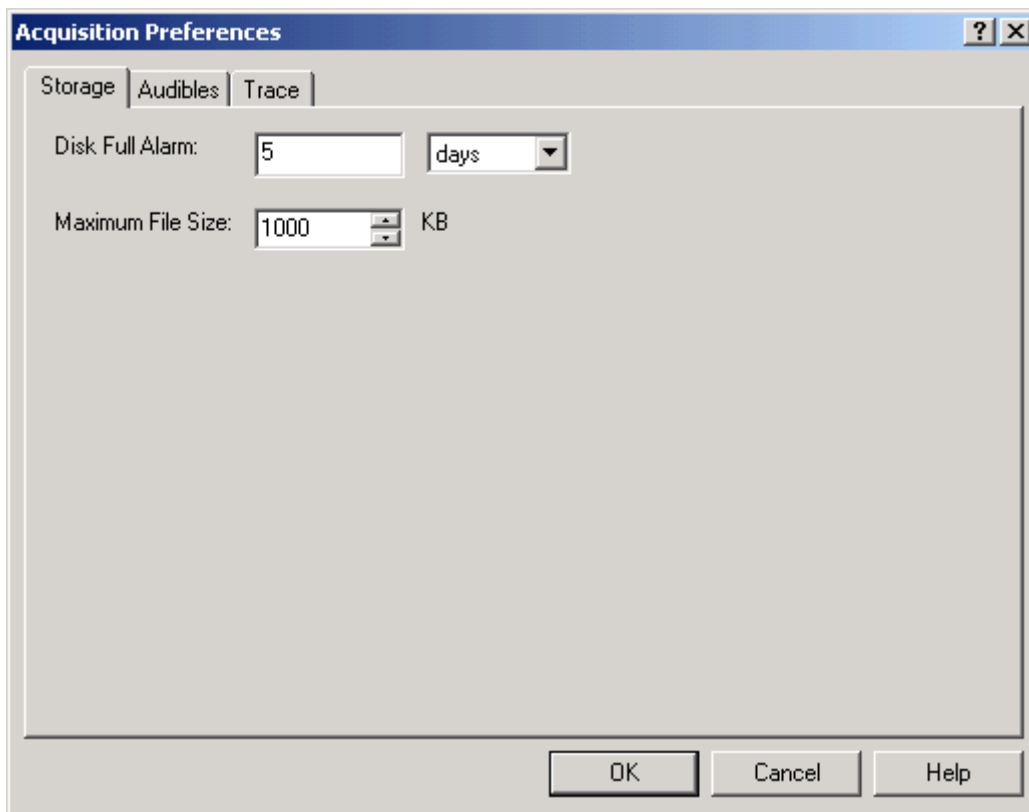
1. Program the LVP-1000 transmitter - see Programming the LVP-1000
2. Define the Size of Data Files
3. Select Data Types to Collect
4. Set Up Scheduled Sampling
5. Start Scheduled Sampling
6. Stop Scheduled Sampling

## Defining the Size of Data Files

After selecting which parameters and waveforms you wish to collect from each animal, define the maximum size of your data files.

### To define the size of the data files

1. From the Acquisition window, select **Control - Preferences**. The Acquisition Preferences Window appears.



2. Click the **Storage** tab.
3. Enter a value of 1 to 32 megabytes as the maximum size of the collected data files. The default value is 1 MB.
4. Click **OK** to accept the settings and return to the Acquisition window.

### Notes

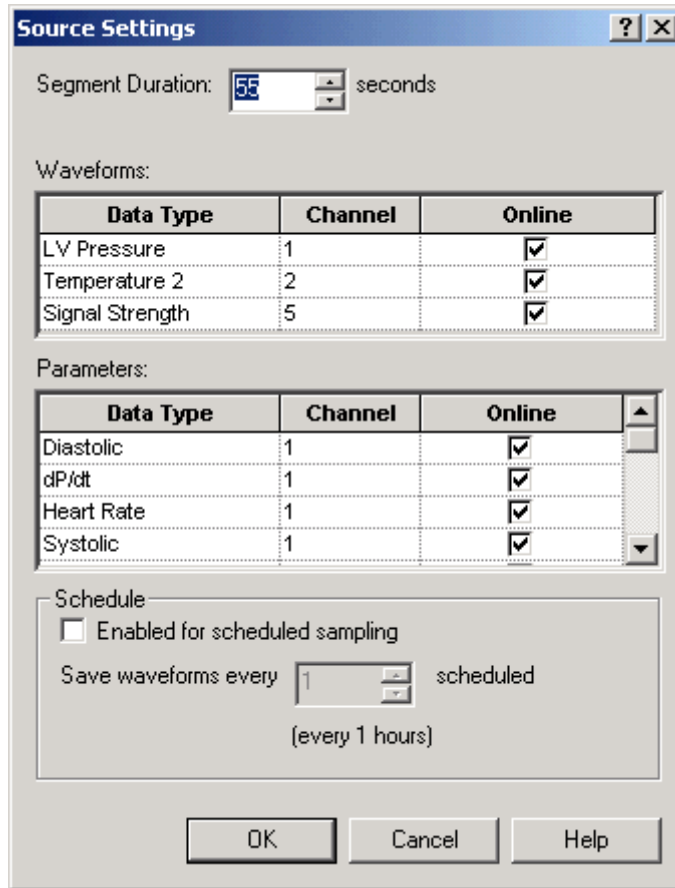
- DSI recommends increasing the maximum file size if collecting waveform data continuously over a long period of time.
- Make sure that your back up method (floppy disk, Zip disk, CD, DVD, network, etc.) can accommodate the size of your individual data files.

### Selecting Data Types to Collect

After creating a configuration and study folders, select the data types to collect from each animal. Designate which parameters and waveforms you wish to collect from each animal, by marking them online. Parameters and waveforms for each animal need to be marked online in order to be collected.

### To select data types to collect

1. From the Acquisition window, select an animal. Double click on the animal icon to display the Source Settings window.



Source Settings

Segment Duration:  seconds

Waveforms:

Data Type	Channel	Online
LV Pressure	1	<input checked="" type="checkbox"/>
Temperature 2	2	<input checked="" type="checkbox"/>
Signal Strength	5	<input checked="" type="checkbox"/>

Parameters:

Data Type	Channel	Online
Diastolic	1	<input checked="" type="checkbox"/>
dP/dt	1	<input checked="" type="checkbox"/>
Heart Rate	1	<input checked="" type="checkbox"/>
Systolic	1	<input checked="" type="checkbox"/>

Schedule

Enabled for scheduled sampling

Save waveforms every  scheduled  
(every 1 hours)

OK Cancel Help

- Enter the following information for each animal.
  - Segment Duration** - Enter a value of 1 to 300 seconds to specify the length of the scheduled sample. This value is used to break continuous sampling into contiguous segments for parameter extracting, browsing, and analysis. If using an LVP-1000 transmitter, the segment duration must be less than or equal to the length.
  - Waveforms** - Click each of the waveform check boxes to select them as online for sampling. A check mark indicates waveforms for this data signal will be sampled and saved to the designated study folder.
  - Parameters** - Click on each of the parameter check boxes to select them as online for sampling. A check mark indicates parameters for this data signal will be sampled and saved to the designated study folder.

### Schedule

- Enabled for scheduled sampling** - Place a check mark in the box to enable the animal ID for scheduled sampling according to the sampling schedule you defined in the previous section.
- Save Waveforms Every** - Enter a numeric number using the spin dial to select how often you would like to save a waveform. The computer will automatically calculate the sampling interval between waveform samples based on the entered number. This option is only available when the animal ID is set for scheduled sampling.



3. Click **OK** to accept the settings and return to the Acquisition window.

### Note

If you have many animals using the same transmitter model, you can copy and paste the Source Settings from one animal to another. See "Copy/Paste Source Settings" in the Dataquest A.R.T. Manual for more information.

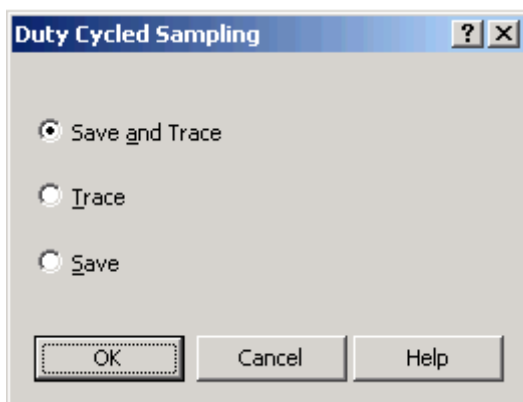
## Starting Duty-Cycled Sampling

### Assumptions

LVP-1000 transmitters are turned on and programmed for duty-cycled sampling.

### To start duty-cycled sampling

1. From the Acquisition window, select the animal icon.
2. Right-click and choose **Duty-Cycled Sampling...** to display the Duty Cycled Sampling window.



3. Select one of the three duty-cycled sampling options:
  - **Save and Trace** - Begins duty-cycled sampling and saving of data to the hard drive while displaying waveform traces in the graph window when a signal is received from the LVP-1000 transmitter. The selected waveforms and parameters defined in the Source Settings window will be saved.
  - **Trace** - Begins duty-cycled sampling and displays the waveform traces in the graph window when a signal is received from the LVP-1000 transmitter. It *will not* save the displayed graphs.
  - **Save** - Begins duty-cycled sampling and saving of data to the hard drive when a signal is received from the LVP-1000 transmitter. The selected

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\* Only appears in Dataquest A.R.T. 3.1 or later versions. If Dataquest A.R.T. 3.0 or 3.01 is used, duty-cycled sampling only saves the data and begins as soon as Duty-Cycled Sampling... is selected; no trace options are available.

waveforms and parameters defined in the Source Settings window will be saved. A graph window *will not* be shown.

4. Click **OK**. The animal icon will turn yellow until it receives a signal from the LVP-1000 transmitter and green when a signal is received.

### To start duty-cycled sampling of an LVP-1000 and another transmitter

A PhysioTel transmitter (non-LVP-1000) can be selected to sample at the same time as an LVP-1000 that is transmitting in Duty-cycle mode. For example, this is useful if an animal is implanted with both an LVP-1000 and a D70-PCTP transmitter.

1. Set both animal IDs to the same group and priority number.

#### To set priority and group

From the Acquisition window, select the animal icon, right click, and choose Set Priority. The Set Priority window appears.

Assign priority and group to the selected animal icon.

- Level – The priority level, with 99 being the highest priority. The system samples scheduled sources in priority order from highest to lowest. Therefore, the system samples an animal with a priority of 99 before an animal with a priority of 98 or 97.
- Group – Forces all sources with the same priority to be sampled together. For example, all sources with 99 are sampled together, if possible. Click this box to place a checkmark in it and identify this animal as a member of a group. This is typically used to ensure simultaneous scheduled sampling of related sources such as a TA11PA-C40 transmitter and a flow probe converter.

Repeat steps to assign each animal ID a priority and group.

2. From the Acquisition window, select both animal IDs by holding down the **Ctrl** key and selecting the animal icons with the mouse.
3. Right-click and choose **Duty-Cycled Sampling...** to display the Duty Cycled Sampling window\*.
4. Select one of the three duty-cycled sampling options as described in the previous section.
5. The animal icons will turn yellow until Acquisition receives a signal from the LVP-1000 transmitter. Both icons will then turn green and begin sampling when a signal is received.

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\* Only appears in Dataquest A.R.T. 3.1 or later versions. If Dataquest A.R.T. 3.0 or 3.01 is used, duty-cycled sampling only saves the data and begins as soon as Duty-Cycled Sampling... is selected; no trace options are available.

## Note

- Duty-cycled sampling uses the sampling slots the same way as continuous sampling.
- To start sampling multiple animals with LVP-1000 transmitters at the same time, hold the **Ctrl** key and select the animal icons with the mouse so they are highlighted. Then follow steps 2-3.
- The Duty Cycled Sampling Window will only appear in Dataquest A.R.T. 3.1 or later. If Dataquest A.R.T. 3.0 or 3.01 is used, duty-cycled sampling only saves the data and begins as soon as **Duty-Cycled Sampling...** is selected; no trace options are available.

## Stopping Duty-Cycled Sampling

### To stop duty-cycled sampling

1. From the Acquisition window, select the appropriate animal icon or multiple animal icons by holding the **Ctrl** button.
2. Right click and choose **Sampling Off**.
3. Alternatively, you can choose from the menu bar, **Control - Stop All Sampling** to stop continuous, duty-cycled, and scheduled sampling. Choosing this option results in the following message: "Are you sure you want to stop ALL sampling now?"

Choosing **Yes** will stop all sampling; choosing **No** will not affect data sampling.

## Starting Continuous Sampling

### Assumptions

Transmitters are turned on.

### To start continuous sampling

1. From the Acquisition window, select the animal icon.
2. Right-click and choose **Continuous Sampling...** to display the Continuous Sampling window.
3. Select one of the four continuous sampling options:
  - **Save and Trace** - Begins continuous sampling and saving of data to the hard drive while displaying waveform traces in the graph window. The selected waveforms and parameters defined in the Source Settings window will be saved.
  - **Trace** - Begins continuous sampling and displays the waveform traces in the graph window. It *will not* save the displayed graphs.

- **Save** - Begins continuous sampling and saving of data to the hard drive. The selected waveforms and parameters defined in the Source Settings window will be saved. A graph window *will not* be shown.
- **Diagnostic** - Begins a continuous diagnostic trace. Use Diagnostic tracing to view unconverted data, or to individually set axis limits, sampling rates, and filter cutoffs. Use the Settings button located on the Continuous Sampling window to change Diagnostic settings.

### Notes

- To start sampling multiple animals at the same time, hold the **Ctrl** button and select the animal icons with the mouse so they are highlighted. Follow steps 2-3.
- To enable or disable data types for tracing, or to set Y-axis limits, select the **Trace** tab in the Acquisition Preferences window.
- For more information about the Diagnostics option, please refer to Diagnostic Trace in the Acquisition section of the Dataquest A.R.T. manual.

## Stopping Continuous Sampling

### To stop continuous sampling

1. From the Acquisition window, select the appropriate animal icon or multiple animal icons by holding the **Ctrl** button.
2. Right click and choose **Sampling Off**.
3. Alternatively, you can choose from the menu bar, **Control – Stop All Sampling** to stop both continuous and scheduled sampling. Choosing this option results in the following message: "Are you sure you want to stop ALL sampling now?"

Choosing **Yes** will stop all sampling; choosing **No** will not affect data sampling.

## Starting Scheduled Sampling

### Assumptions

Transmitters are turned on.

### To start scheduled sampling

1. From the Acquisition window, select **Control – Scheduled Sampling ON**. Data sampling begins for each animal defined for scheduled sampling.
2. (Steps 2 - 5 are Optional) From the Acquisition window, select the animal icon.
3. Right-click and choose **Continuous Sampling...** to display the Continuous Sampling window.
4. Select one of the two available continuous sampling options to view a waveform trace:

5. **Trace** - Begins continuous sampling and displays the waveform traces in the graph window. It *will not* save the displayed graphs.
6. **Diagnostic** - Begins a continuous diagnostic trace. Use Diagnostic tracing to view unconverted data, or to individually set axis limits, sampling rates and filter cutoffs. Use the Settings button located on the Continuous Sampling window to change diagnostic settings.
5. Click **OK** to view the Real-Time Graphs window containing the waveform traces for the selected animal.

#### Note

- Each Trace window in the Real-Time Graphs window uses an additional sampling slot.
- The Trace windows only display waveforms checked Online in the Source Settings window.

### Stopping Scheduled Sampling

#### To stop scheduled sampling

1. From the Acquisition window, choose **Control – Scheduled Sampling OFF**.
2. A warning message appears: "Are you sure you want to stop scheduled sampling?"
3. Click on the **Yes** button to end data sampling or click on **No** to continue sampling data.
4. Alternatively, choosing **Control – Stop All Sampling** will stop both continuous and scheduled sampling. Choosing this option results in the following message: "Are you sure you want to stop ALL sampling now?"

Choosing **Yes** will stop all sampling; choosing **No** will not affect data sampling.

### Receivers

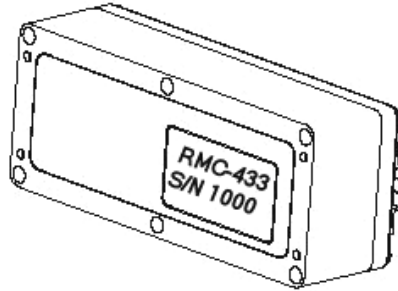
There are two models of receivers, the RMC-433 and RMC-916. The receiver model number should match the model number of LVP-1000, either LVP-1000-433 or LVP-1000-916.

#### RMC-433 Specifications

This receiver meets the following mechanical specifications:

- **External chassis dimensions** - The Height x Width x Length dimensions are 3.15"(8.0cm) x 2.5"(6.4cm) x 7.68"(19.5 cm).
- **Weight** - 1.41 lbs. (640 g)
- **Connector** - One 8 pin Fischer watertight connector.

- **I/O cable interface** - Use a Category 5 twisted pair LAN cable or better that is less than 100 meters in length to connect an RMC-433 to a Data Exchange Matrix.



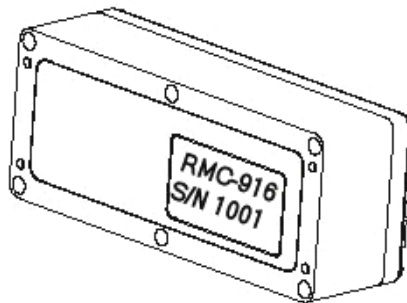
### Notes

- Only the LVP-1000-433 transmitter model can be used with this receiver model.
- The LVP-1000-433 transmitter model is available in Europe (EU and EFTA).
- The Distributed Receiver Array function is available for this receiver model.
- Activity parameter collection is not available with this receiver model.

### RMC-916 Specifications

This receiver meets the following mechanical specifications:

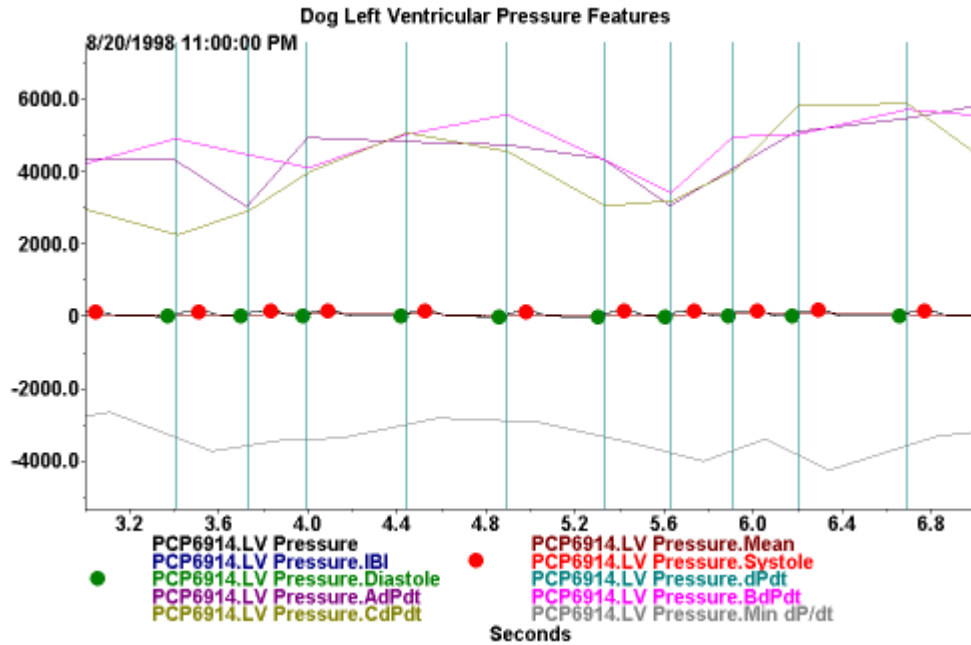
- **External chassis dimensions** - The Height x Width x Length dimensions are 3.15"(8.0cm) x 2.5"(6.4cm) x 7.68"(19.5 cm).
- **Weight** - 1.41 lbs. (640 g)
- **Connector** - One 8 pin Fisher watertight connector.
- **I/O cable interface** - Use a Category 5 twisted pair LAN cable or better that is less than 100 meters in length to connect an RMC-916 to a Data Exchange Matrix.



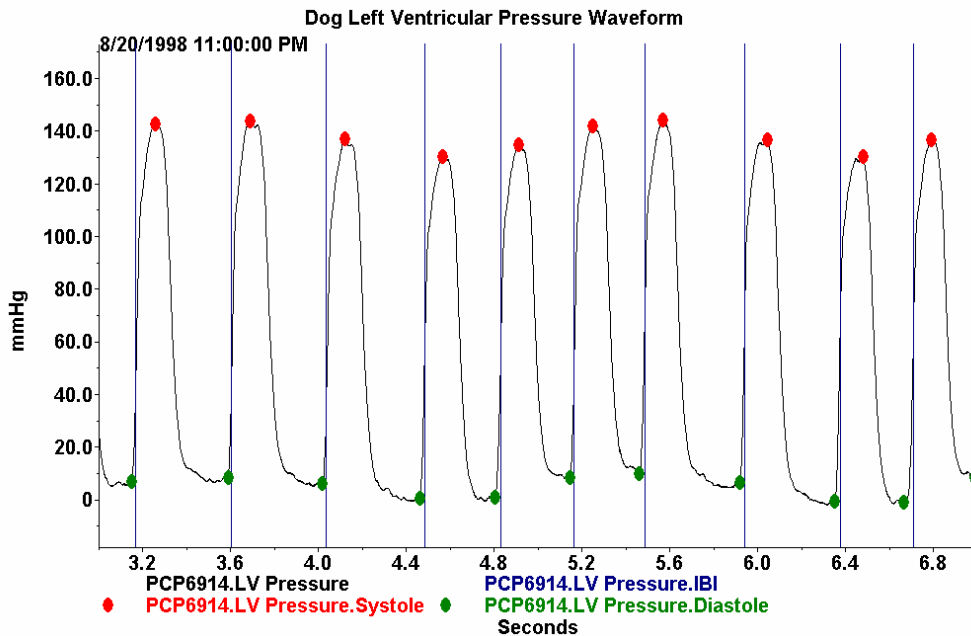
### Notes

- Only the LVP-1000-916 transmitter model can be used with this receiver model.
- The LVP-1000-916 transmitter model is available in the U.S.A. and Canada.
- The Distributed Receiver Array function is available for this receiver model.
- Activity parameter collection is not available with this receiver model.

## Left Ventricular Pressure



The above graph displays a marked left ventricular blood pressure waveform and the table on the following page describes the feature marks. The graph below shows the same waveform segment, but is scaled to show the waveform clearly.



<b>Data Series Abbreviation</b>	<b>Parameter</b>	<b>Description</b>
IBI	Inter-beat interval	Interval between beats registered at position of max dP/dt.
Diastole	End Diastolic pressure	Pressure immediately before ventricular contraction.
AdPdt	dP/dt at pressure A	Pressure over time at fixed pressure relative to diastolic pressure value. Default pressure value = 40mmHg.
BdPdt	dP/dt at pressure B	Pressure over time at fixed pressure relative to diastolic pressure value. Default pressure value = 60mmHg.
CdPdt	dP/dt at pressure C	Pressure over time at fixed pressure relative to diastolic pressure value. Default pressure value = 80mmHg.
Contractility Index	Contractility Index	The maximum change in pressure over time divided by the pressure at that point (max dP/dt)/P. P is defined as the absolute pressure minus end diastolic pressure.
DSP (est)	Estimated systemic diastolic pressure	Estimated systemic diastolic pressure. This is the pressure at the point of max dP/dt, sometimes referred to as P@maxdP/dt. This should reflect the point where the valve opens in the left ventricle of the heart.
Mean	Mean pressure	Mean pressure is calculated based on averaging the pressure over 20 sub-segments of the segment length. The default reduced mean calculation discards outliers in the sub-segments in the calculation.
Systole	Systolic pressure	Peak pressure after detected max dP/dt.
dPdt	Max dP/dt	Maximum change in pressure over time between any two sample points on the rising edge of a pressure cycle.
Min dP/dt	Minimum dP/dt (max negative dP/dt)	Maximum negative change in pressure over time between any two sample points on the falling edge of a pressure cycle.
Tau	Relaxation index	The relaxation time constant from min dP/dt to the point where the pressure has dropped 66% of the distance from systolic to diastolic pressure.
Vmax	Contractility index	This is the extrapolation of dP/dt vs pressure extrapolated back to P=0. This is the contractility of the heart unaffected by loading.



## Obtaining DSI Technical Services

Contact DSI Technical Services for help if you experience a problem with any part of the LVP Program Utility, the Dataquest A.R.T. system, or with the LVP-1000 transmitters.

### **Before contacting DSI Technical Services**

- Check that you correctly performed any procedures that correspond to the problem.
- Locate your assigned customer number. Whenever you contact DSI Technical Services, you need to provide your:
  - Name
  - Company name
  - Phone number
  - Fax number
  - DSI customer number

### **To obtain system installation or software-related assistance**

Provide the following information:

- A printed copy or the exact error message that was received including the error code number.
- The name and version of the software you are using. You also need to indicate whether your Dataquest A.R.T. or OpenART software is the Platinum, Gold, Silver, or Analysis Only version.
- The computer's operating system.
- The computer brand.
- Your name, DSI customer number, company name, phone number, email address, and fax number.

### **To receive answers to surgical procedure questions**

Provide the following information:

- Model name and serial number of the transmitter.
- Placement of the transmitter (subcutaneous or intraperitoneal) and catheter.
- Your name, DSI customer number, company name, phone number, email address, and fax number.

### **To obtain information about transmitters or hardware equipment**

Provide the following information:

- The hardware or transmitter model name and serial number.
- The name and version of the software you are using. You also need to indicate whether your Dataquest A.R.T. or OpenART software is the Platinum, Gold, Silver, or Analysis Only version.
- Your computer's operating system.
- Your name, DSI customer number, company name, phone number, email address, and fax number.

**DSI Technical Services Contact Information**

**Web Site:** [www.datasci.com](http://www.datasci.com)  
**Phone:** 1-651-481-7400  
**Phone:** 1-800-262-9687 (U.S. and Canada)  
**Fax:** 1-651-481-7404

## Error Messages

These error messages are for the LVP Programming System only. If the error you experienced is not listed here, contact DSI Technical Services. Consult the Dataquest A.R.T. Manual for error messages experiences while using that software.

### Errors associated with programming

Unable to start reading LVP-1000 settings. Please retry.

Pop-up dialog during the Program Wizard.

**Cause:** The LVP-1000 was out of range of the Remote Transceiver or there is electrical noise interference.

**Solution:** Make sure the Remote Transceiver is properly positioned over the transmitter of the LVP-1000. The red area of the Remote Transceiver must be positioned facing the transmitter. Pass the magnet over the transmitter again to retry programming.

Unable to start programming LVP-1000 settings. Please retry.

Pop-up dialog during the Program Wizard.

**Cause:** The LVP-1000 was out of range of the Remote Transceiver or there is electrical noise interference.

**Solution:** Make sure the Remote Transceiver is properly positioned over the transmitter of the LVP-1000. The red area of the Remote Transceiver must be positioned facing the transmitter. Pass the magnet over the transmitter again to retry programming.

CRC data error. The LVP-1000 may be out of range. Please try again.

Pop-up error dialog

**Cause:** The LVP-1000 is too far away from the Remote Transceiver.

**Solution:** Retry. Pass the magnet over the telemetry unit and reposition the red area of the Remote Transceiver within 2 inches of the LVP-1000.

Programming has timed out. Please cancel and retry.

Appears in the Program Wizard dialogs.

**Cause:** No signal was received from the LVP-1000 when the Program Wizard was waiting for a signal to either read the configuration or start programming a new configuration.

**Solution:** Cancel and restart the Program Wizard.

Unable to communicate with the LVP-1000. Please try again.

Appears as a pop-up dialog.

**Cause:** An unspecified error occurred during programming of the LVP-1000.

**Solution:** Close the Program Wizard and retry.

### Errors associated with hardware

Failure during hardware detection. Please check the hardware connection and try again.

Pop-up dialog appears when trying to open the Program Wizard.

**Cause:** The LVP Program Utility encountered problems during the hardware check prior to open the Program Wizard.

**Solution:** Ensure that the hardware, Data Monitor, Remote Transceiver, and power supply are all correctly connected. Next, check the Settings dialog to make sure that the Serial Port selected is indeed where the Data Monitor is connected.

Please check the hardware connection and try again.

Appears as pop-up dialog.

**Cause:** The Data Monitor or Remote Transceiver became disconnected or failed in the middle of programming.

**Solution:** Check the connections and retry.

Hardware failure. Please check the hardware connection and restart the software.

A pop up dialog appears when trying to open the Program Wizard.

**Cause:** There was an unexpected error during the hardware check.

**Solution:** Close and restart the LVP Program Utility. Also ensure that all the hardware is properly connected.

Could not get hardware info.

Appears when trying to view the Hardware Info dialog.

**Cause:** The software experienced a problem communicating with the Data Monitor or Remote Transceiver.

**Solution:** Check all connections on the Data Monitor and the connection to the computer. Retry.

## **Errors associated with the Serial Port**

Could not connect to the Serial Port.

Appears when trying to start the Program Wizard.

**Cause:** The software cannot communicate with the Serial Port selected.

**Solution:** Use the Settings dialog to select a different Serial Port. Check the connection to the Data Monitor.

Invalid Serial Port

Appears as a pop-up dialog from the Settings Dialog.

**Cause:** An invalid Serial Port number was entered.

**Solution:** Select or enter a valid Serial Port number. Most computers will use COM1.

## **Errors Associated with the Log File**

LVP Program Utility was unable to write a log entry because the log file was corrupted.

Appears in the Main Window status area.

**Cause:** This message appears if information cannot be written to the log file due to a corrupted log file. This would occur when the Program Wizard is finished or is canceled by the user.

**Solution:** Using Windows Explorer, browse to the LVP Program Utility folder. (The default location is C:\Program Files\LVP Program Utility 1.0.) Locate the file 'log.xml'. Move this file to another folder, and make sure all copies are deleted from the LVP Program Utility folder. The LVP Program Utility will create a new log file the next time the Program Wizard is used.

Contact DSI Technical Services if you do not feel comfortable performing this solution by yourself. Technical Services may also be able to determine the cause of the corruption in the log file and may be able to repair it for you.

LVP Program Utility was unable to read the log file because the log file was corrupted.

Appears when the Log Viewer is opened.

**Cause:** The log file has been corrupted.

**Solution:** Using Windows Explorer, browse to the LVP Program Utility folder. (The default location is C:\Program Files\LVP Program Utility 1.0.) Locate the file 'log.xml'. Move this file to another folder, and make sure all copies are deleted from the LVP Program Utility folder. The LVP Program Utility will create a new log file the next time the Program Wizard is used.

Contact DSI Technical Services if you do not feel comfortable performing this solution by yourself. Technical Services may also be able to determine the cause of the corruption in the log file and may be able to repair it for you.

The log file is corrupt. No log record was created.

**Cause:** The log file is corrupt and the new record could not be added.

**Solution:** Contact DSI Technical Services for information on how to proceed.

The log file is corrupt. The log viewer will not be opened.

**Cause:** The log file is corrupt and cannot be viewed.

**Solution:** Contact DSI Technical Services for information on how to proceed.

Logging error. No log record was created.

**Cause:** The log file is corrupt and the new record could not be added.

**Solution:** Contact DSI Technical Services for information on how to proceed.

Unable to save the log file.

**Cause:** The log file is corrupt and the new record could not be added.

**Solution:** Contact DSI Technical Services for information on how to proceed.

## Miscellaneous Error Messages

Error displaying dialog

Appears when trying to open a dialog.

**Cause:** An internal error of the LVP Program Utility.

**Solution:** Close the LVP Program Utility, disconnect the Data Monitor power supply, and reboot the computer. Reconnect the Data Monitor power supply and restart the LVP Program Utility. If the problem recurs, contact DSI Technical services.

Automatic adjustment for daylight savings time is disabled. Please change this in Date and Time Properties.

**Cause:** The Program Wizard will not open if the Windows operating system function to automatically adjust the clock for daylight savings changes has been disabled. This may occur if the computer also has Dataquest A.R.T. 3.0 installed.

**Solution:** Enable the daylight savings adjustment in the Windows Date and Time Properties. Retry the Program Wizard.

Unable to open Internet Explorer.

Appears when trying to open the Log Viewer.

**Cause:** The software was unable to open the Log Viewer in Internet Explorer.

**Solution:** Disconnect the Data Monitor power supply and reboot the computer.

Reconnect the power supply and retry.

If the problem persists, the software should be re-installed. You may save the log.xml file to a new location prior to the re-installation, and copy it into the LVP Program Utility folder after the installation. This will preserve the log file. Contact DSI Technical Services if you are uncomfortable performing this procedure without assistance.

Unexpected exception. Please restart the software.

**Cause:** An internal error has occurred in the software.

**Solution:** Close the software and restart. If this does not solve the problem, disconnect the Data Monitor power supply and reboot the computer. Reconnect the power supply and retry. If the problem persists, contact DSI Technical Services.

**Errors associated with firmware files**

Unknown firmware file.

**Cause:** The LVP Program Utility did not recognize the file specified when the Upgrade Firmware function was used.

**Solution:** Firmware Upgrades should only be performed with a file and instructions from DSI. Verify the location of the firmware upgrade file provided. Retry the action with this file. If problems persist, contact DSI Technical Services.

Error in the firmware file.

**Cause:** An error was encountered when the software tried to upgrade the firmware. The firmware file may have been corrupted.

**Solution:** Firmware Upgrades should only be performed with a file and instructions from DSI. Contact DSI Technical Services for a new copy of the firmware file.

Unable to upgrade the firmware.

**Cause:** An error occurred during the upgrade process and the upgrade was not completed.

**Solution:** Firmware Upgrades should only be performed with a file and instructions from DSI. Retry the procedure. If the problem persists, contact DSI Technical Services.

Could not copy the firmware file.

Appears during a firmware upgrade.

**Cause:** The \*.s19 file was not copied properly during the upgrade process.

**Solution:** Retry the upgrade procedure. If this fails, contact DSI Technical Services for further assistance.

# Glossary

## C

**continuous:** A transmission setting of the LVP-1000. The LVP-1000 is always sending telemetry data in this setting. Using this setting uses the most battery power.

## D

**Data Monitor:** Hardware that converts the data received from the remote transceiver into a digital format and transfers the data to the computer. The Data Monitor is connected to the computer via a serial port.

**duty-cycle:** A transmission setting for the LVP-1000. The LVP-1000 follows a schedule to automatically turn on, measure the LV Pressure and transmit the data to the receiver. Can occur once or multiple times per day. This mode consumes the least battery power, but consumption will depend on the schedule selected.

## E

**end diastolic pressure (LVEDP):** End of the diastolic period and start of the systolic period, typically characterized by a sharp upturn in pressure, before the climb to LVSP through max LV dP/dt.

## L

**left ventricle (LV):** The chamber on the left side of the heart that receives arterial blood from the left atrium and pumps it into the aorta.

**Left Ventricular Pressure (LVP):** Blood pressure measured in the heart's left ventricle. The LVP-1000 catheter is inserted through the ventricle wall into the LV.

**log:** See system log.

**LV:** Left ventricle

**LVP:** see Left Ventricular Pressure

**LVP-1000:** Implanted telemetry transmitter that measures the LV pressure and transmits the pressure data to the Dataquest system using a radio telemetry signal. It has two main parts: the Remote Sensor Assembly (RSA) and the Telemetry Unit (TU), connected by Multi-conductor leads.

## M

**max LV -dP/dt:** The maximum negative derivative (dP/dt) value between LVSP and LVBDP of the following cycle that is calculated using 2 or more data points.

**max LV +dP/dt:** The maximum positive derivative (dP/dt) value between LVEDP and LVSP that is calculated using 2 or more adjacent data points.

**mean diastolic pressure (LVMDP):** The average of the LV pressure waveform between and including LVBDP and LVEDP.

**Multi-Conductor Lead:** Connects the Remote Sensor Assembly to the transmitter of the LVP-1000

**P**

**Program wizard:** The Program wizard allows you to set the LVP-1000 transmission schedule and configuration settings.

**R**

**Remote Sensor Assembly:** Part of the LVP-1000. It is comprised of the Pressure Transmitting Catheter and pressure sensor. It is surgically attached to the epicardium by the suture skirt.

**Remote Transceiver:** A device that sends and receives programming signals to and from the implanted LVP-1000 and is connected to the Data Monitor.

**RSA:** see Remote Sensor Assembly

**S**

**serial port:** A connection interface on the computer. It has 9 pins organized in 2 rows and usually located on the back of the computer. Some computers may have more than one serial port.

**system log:** The record of all LVP Program Utility attempts to program LVP-1000 transmitters. It also records the configurations programmed.

**systolic pressure (LVSP):** End of the systolic period, determined by a maximum pressure value.

**T**

**telemetry data:** Data that is collected by the LVP-1000 and transmitted to the Dataquest System receiver via radio signals.

**Telemetry Unit:** Refers to the transmitter portion of the LVP-1000. See transmitter for more details.

**transmission:** A telemetry data communication from the LVP-1000.

**transmission length:** The period of time that a transmission will last. All transmissions, both scheduled and manual, will last this period of time. Use the Program Wizard to set the transmission length.

**transmitter:** Part of the LVP-1000. It transmits the telemetry data to the receiver. It also sends and receives programming information from the Remote Transceiver. The transmitter is implanted in a subcutaneous pocket and is connected to the Remote Sensor Assembly via two Multi-Conductor leads.

**W**

**wizard:** Refers to an interactive utility that guides you through a particular task . The Program Wizard is the only wizard in the LVP Program Utility.



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