FLUKE ®

Biomedical

Ansur QED 6
Plug-In

Users Manual

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Chapter 1
Introduction

Ansur Software

Ansur Test Automation software is the backbone of all Fluke Biomedical test systems. Ansur manages your test procedures by allowing both manual and visual automated test sequences.

The software works hand-in-hand with Fluke Biomedical analyzers and simulators, creating a seamless integration for:

- Visual inspections
- Preventive maintenance
- Work procedures
- Performance tests
- Safety tests

Ansur Plug-ins

Ansur Test Executive software utilizes plug-in modules that work with a wide array of Fluke Biomedical instruments. The plug-in module is a software interface that provides test elements to the Ansur Test Executive program. This scheme lets you use a similar user interface for all analyzers and simulators supported by Ansur.

When you purchase a new Fluke Biomedical analyzer or simulator, you can update your existing Ansur software by installing a new plug-in. Each plug-in module allows you to work only with the options and capabilities you need for the instrument you are testing.

About This Manual

This users manual is designed to assist the reader in using the Ansur QED 6 Plug-In with Ansur software. The manual covers all features specific to the plug-in. Familiarity with both Ansur software and Microsoft Windows and their features will help you design and use tests for the Ansur QED 6 Analyzer.

QED 6 Plug-In

The Ansur QED 6 Plug-In provides remote access to the QED 6 Defibrillator Analyzer, referred to throughout this document as the "Analyzer." In addition to the general test plug-ins, specialized plug-ins address all test requirements for specific instruments.

Note

The Ansur QED 6 Analyzer Users Guide explains its capabilities and use.

Create and use Ansur test procedures with Ansur QED 6 test elements to incorporate the capabilities of your Analyzer into your automating testing.You can customize tests to analyze specific performance requirements. There are unique test elements for each of the tests and simulations typically run on the Analyzer.

Additional References

In addition to this manual, you may find answers to questions using the Analyzer or PC from the following sources:

- *Fluke Biomedical QED 6 Users Guide*
- *Fluke Biomedical Ansur Test Executive Users Manual*
- Microsoft Windows Help and Support Center

Software Updates

Updates for Ansur are published on the Fluke Biomedical website, *http://www.flukebiomedical.com*.

Terms and Abbreviations

Table 1-1 lists terms and abbreviations used in this manual.

Table 1-1. Terms and Abbreviations

Term	Description
Ansur	Ansur is a software suite using plug-ins to perform test and inspection procedures in conjunction with several Fluke Biomedical test instruments.
DUT	Device Under Test–the equipment subjected to a test using the Analyzer.
QED 6	Defibrillator Analyzer from Fluke Biomedical.
Plug-In	Add-on software program that extends Ansur so that it can interface with a specific Fluke Biomedical test instrument to configure it for a specific test and to automatically collect the measured data (if applicable).
Test Element	A test element is an Ansur construct that encapsulates test configuration and results. A test template is built of several test elements.
Test Guide	A test guide is a window displayed by Ansur or any of its plug-ins when a test element is being performed.
Test Record	A test record is an Ansur file containing the results of a performed test template. The test record can be printed as a test report.
Test Template	A test template is an Ansur file containing a set of test elements defining how a particular DUT is to be tested. A test template can also contain instructions on how to perform service, preventive maintenance, repair and other tasks on a DUT.

Chapter 2
Getting Started

Introduction

This chapter describes installation of the QED 6 Plug-In and its use together with the Ansur Test Automation software and a QED 6 Analyzer.

Note

You do not need an Analyzer to create test templates and experiment with the functionality available in Ansur and the QED 6 Plug-In. However, you cannot perform any actual tests unless the Analyzer is connected to your computer.

System Requirements

The following are recommended minimum requirements for installation:

- Microsoft Windows 2000 or Windows XP operating system

- Fluke Biomedical Ansur V2.4.0 or newer

- 50 MB of available hard drive for software

- Hard drive space (from 100 k to several megabytes) for result and template files

Installing the QED 6 Plug-In

The QED 6 Plug-In must be installed on your computer before you can use the features described in this user manual. For information on obtaining the Ansur software and the QED 6 Plug-In, contact your local Fluke Biomedical representative or visit the Fluke Biomedical website (http://www.flukebiomedical.com).

Note

You must have installed Ansur version 2.4.0 or newer before you can install and use the QED 6 Plug-In.

Download the QED 6 Plug-In from the Fluke Biomedical website and follow the steps below:

Note

If you are downloading the QED 6 Plug-In from the Fluke Biomedical web site, you can also select to run the installation without first downloading.

1. Open **Windows Explorer** and browse to the saved the QED 6 Plug-In installation program file, usually named **Ansur QED 6 Plug-In Vn.n.n.msi**, where *n.n.n* is the plug-in version number.

2. Double-click the installation program. The installation extracts the plug-in elements and displays the **Welcome** dialog box.

3. Click **Next** to display the license agreement.

4. Select the checkbox for "**I accept the terms in the license agreement**," and click **Next** to display the default destination folder.

5. Take one of the following options:

- Click **Next** to accept the default destination folder in which Ansur was installed.

- Click **Change** if you have installed Ansur in a different folder. In this case, you must change the destination folder for the plug-in so that it resides in the same directory as the Ansur program.

Note

If you have installed Ansur using a different destination folder than the default, be sure you use the same folder for the QED 6 Plug-In.

6. Click **Install** to begin the installation. A progress bar indicates the status of the Ansur QED 6 Plug-In installation.

   After a few minutes, the installation concludes, and the window displays the dialog box and the **Finish** button.

7. Click **Finish**. The QED 6 Plug-In will load when Ansur is started.

Entering License Key

When using the plug-in for the first time, you are prompted to enter your software license key provided by Fluke Biomedical at the time of purchase.

Note

You can create test templates without a license key by using the demonstration mode. Demonstration mode allows many of the tasks described in this user manual. However, you cannot save or print without licensing the plug-in.

1. Start Ansur by doing one of the following:

   - Double-click the **Ansur** icon on your desktop.

   - From the **Start** menu, select **Start** | **Programs** | **Fluke** | **Ansur**.

Note

The license key dialog box shown in Figure 2-1 appears at startup if a license key has not yet been entered for the plug-in.
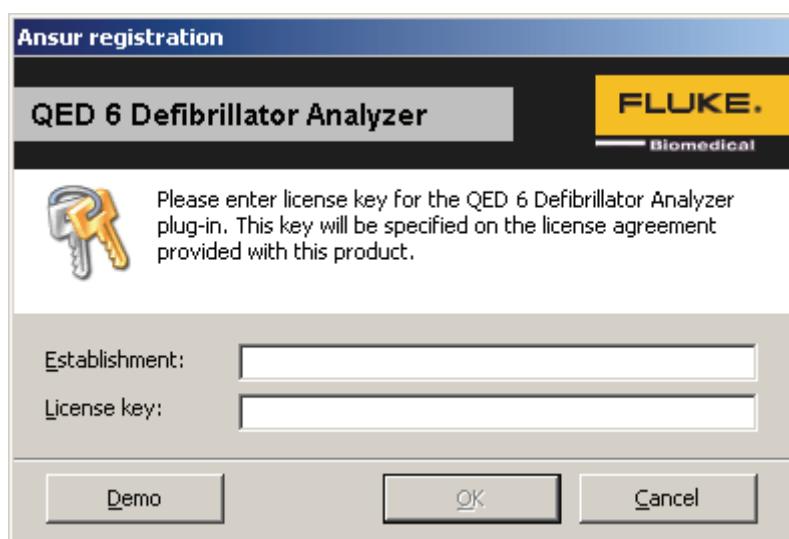
fav001.bmp

Figure 2-1. Ansur Registration Screen-License Key

2. Enter the **Establishment Name** and the plug-in **license key**. If you do not have a license key, click the **Demo** button to start Ansur in demonstration mode.

Note

Because the license key is derived from the establishment name, both strings must match the license information provided by Fluke Biomedical. This information is case sensitive and space sensitive. If you already have entered your establishment name in the past, this field is already filled in for you

3. Click **OK** to start Ansur.

4. Click **Cancel** to prevent the plug-in from being loaded.

UnInstalling the Plug-In

To uninstall the QED 6 Plug-In, do the following:

1. Select **Start** | **Control Panel** and double-click **Add or Remove Programs**.

2. Locate and select the entry named **Ansur QED6 Plug-in**, as shown in Figure 2-2.

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Figure 2-2. Removing QED 6 Plug-In

3. With the entry highlighted, click the **Remove** button.

4. When asked to verify the removal, click **Yes**. A dialog box with a progress bar displays while the QED 6 Plug-In is being removed from your computer.

When the plug-in is no longer listed in the **Add or Remove Programs** window, it has been completely removed.

Ansur Main Window

At startup, Ansur displays the **Main Application** window shown in Figure 2-3. You can create and edit test templates from this window.

Test Explorer

The left pane of the **Main Application** window is called the **Test Explorer**. It displays the installed plug-ins available in Ansur.

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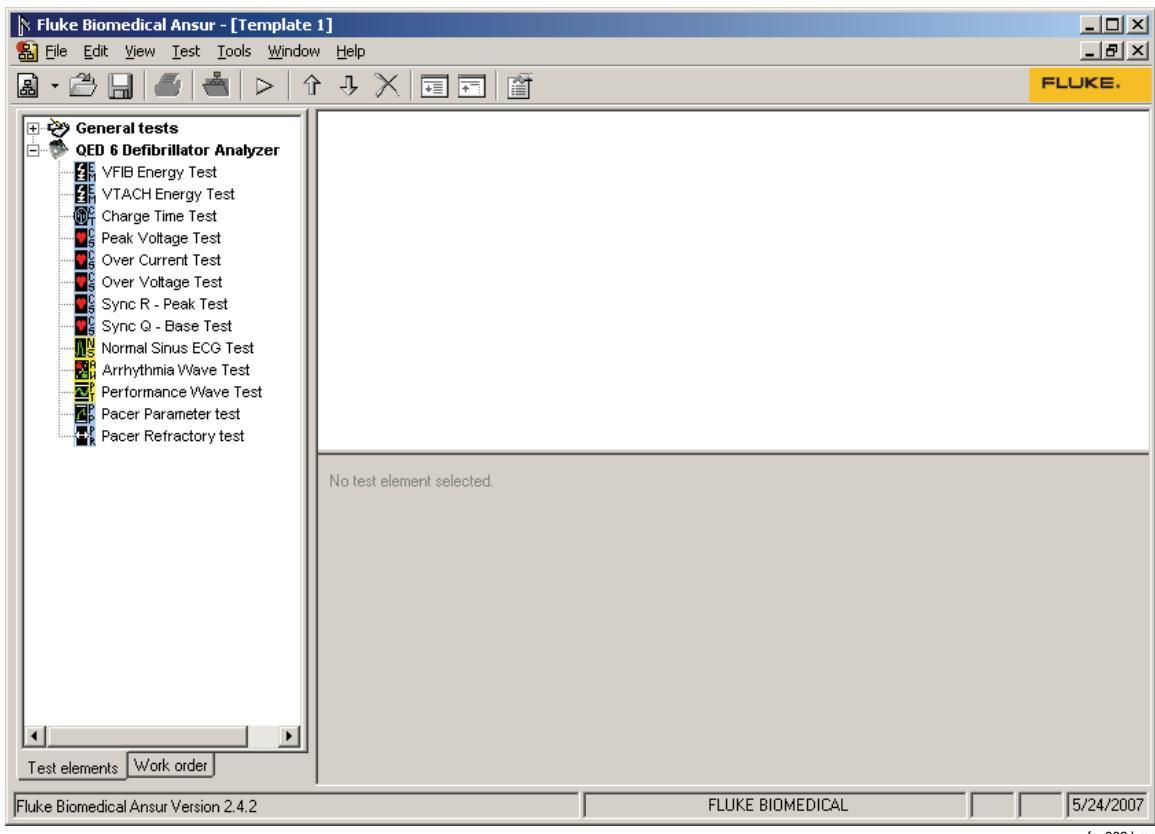
Figure 2-3. QED 6 Main Application Window

Look in the **Test Explorer** to verify that a plug-in has been loaded properly following installation. If the QED 6 Defibrillator Analyzer is listed, the plug-in correctly loaded during startup.

Test Elements

To expand the list and view the available plug-in test elements in the **Test Explorer** window, you can either click the **+** (plus) symbol to the left of the plug-in name or double-click the name itself; in this case **QED 6 Defibrillator Analyzer**. Expanding the plug-in displays the list of test elements, as shown in Figure 2-4.
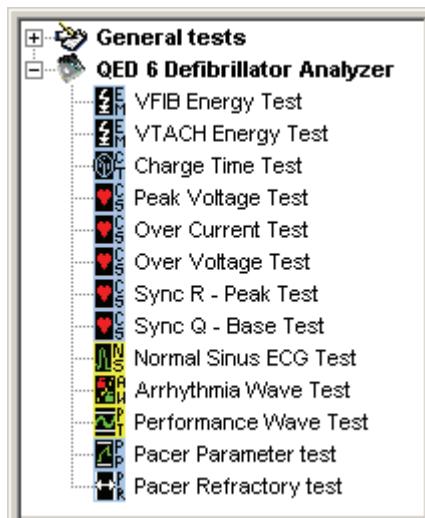
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Figure 2-4. QED 6 Test Explorer Window

Plug-In Preferences

The plug-in preferences let you select default settings that best suit your normal instrument use. Defaults typically handle most performance testing requirements. Use the following procedures, however, if you need to change any settings.

1. Start the Ansur Test Executive program.

2. Click **Tools | Options** to display the **Preferences** window shown in Figure 2-5.
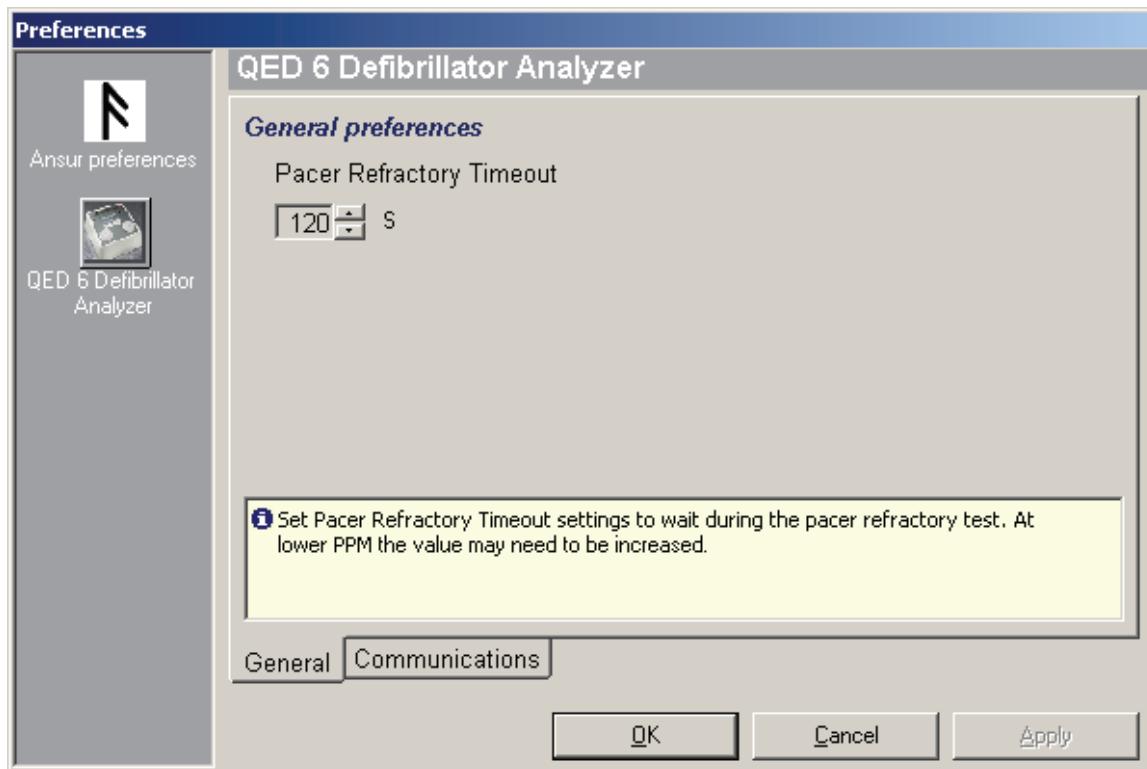
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Figure 2-5. Defibrillator Analyzer Preferences

3. Click the **QED 6 Defibrillator Analyzer** button. The window opens with the **General** tab displayed.

    In this window, you can change the Pacer Refractory time—the time to wait during the Pacer Refractory Test. Tests with low pulses-per-minute may require additional wait time; make adjustments accordingly.

4. Click the **Communications** tab to set preferences for the timeout threshold. The timeout threshold is the maximum time allowed for communications to be initiated before triggering an error.

5. Click **OK**.

6. Restart Ansur for changes to take effect.

Chapter 3
QED 6 Tests

Ansur Test Guide

When a test procedure is executed within Ansur, use the **TEST GUIDE** to step you through each element in the test procedure.

This manual includes tests unique to the plug-in for the QED 6 Analyzer. For overall information on selecting and executing tests with Ansur software, please refer to the latest version of the *Ansur Executive User Manual*.

When you execute a test with the QED 6 Plug-in, the **TEST GUIDE** window opens. Figure 3-1 shows the **TEST GUIDE** for an Energy Measurement test. The panes function as follows:

- Left pane – The left pane displays either the default explanation or one entered when a custom template was created.

- Right pane – The right-side pane provides step-by-step directions for the test being performed.

In this example, the screen directs you to set the energy level for the DUT, in this case a defibrillator, and then press **Start** to begin the test. Analyzer measurements appear in the bottom pane.

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Figure 3-1. Ansur Test Guide Window

Defibrillator Tests

The QED 6 Plug-in lets you test defibrillator performance using a PC running the Ansur software. At the conclusion of each test procedure, Ansur collects the results of the tests to display or to store on a PC.

Note

The Analyzer must be on Main Menu 1 before starting any tests. If it is on any other menu, serial communications cannot be established.
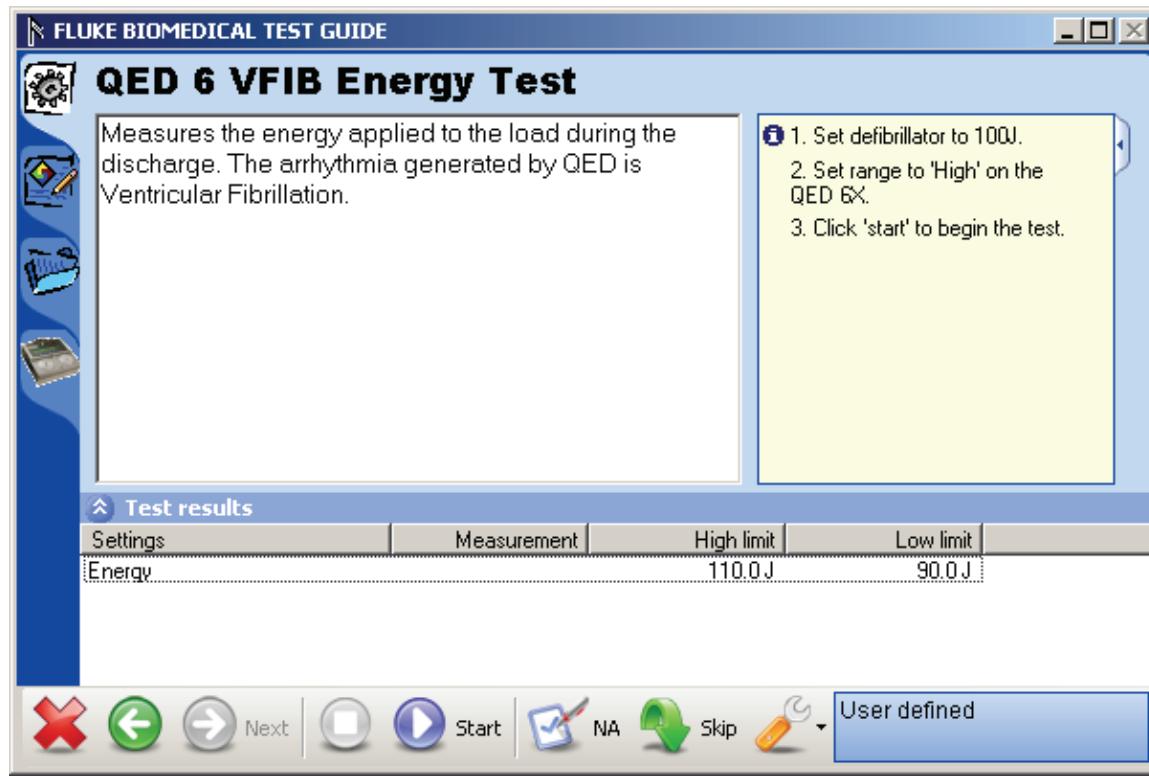
Energy Tests

The energy tests verify the accuracy of the energy delivered by the defibrillator. Two different energy tests are available: VFIB and VTACH. The difference between these two tests is the type of arrhythmia that is simulated during the test.

To run Energy tests, take the following actions;

1. First connect the defibrillator to the Analyzer (refer to the *QED 6 Users Guide* for connection instructions) and set the defibrillator to the energy setting displayed in the information block on the right side of the **TEST GUIDE**. Figure **Error! Reference source not found.** shows an energy setting with both high and low limits (in Joules).

2. Click **Start** in the **TEST GUIDE** toolbar.

3. Charge the defibrillator.

    Ansur software configures the Analyzer for the defibrillator test, indicating the status in the **Test Results** window. Wait for Ansur to finish configuring the Analyzer.

4. When configuration is complete, a window displays the prompt "**Defibrillate now**."

5. Discharge the defibrillator. The **TEST GUIDE** displays the test results immediately.

Peak Voltage Test

The Peak Voltage test is used to measure the maximum voltage of a defibrillator pulse. This test must be performed separately from the Energy Test, but the steps for conducting this test are the same.

Overshoot Tests

Two test elements are included in the plug-in to check for irregular voltage or current in the defib pulse. These tests must be performed separately from the Energy Test, but the steps for conducting them are the same.

Charge Time Test

The Change Time test measures how long it takes to charge the defibrillator to a specified energy level. This test should use the defibrillator's maximum energy level available.

The steps for this test are similar to the Energy test; however, the prompts are different, because the Charge Time test tracks *how long* it takes to perform the charge and discharge.

To run a Change Time test, take the following actions:

1. Connect the defibrillator to the Analyzer.

2. Set the defibrillator to the energy level indicated in the information block on the right side of the main **TEST GUIDE** window.

3. Click **Start** in the **TEST GUIDE** toolbar to start the test. A progress window displays "**Please wait…**" while Ansur configures the Analyzer.

Once configuration completes its routines, a 5 second countdown starts. Wait for the countdown to complete before charging the defibrillator.

4. Begin charging the defibrillator when warning "**START CHARGE NOW…**" appears on your computer screen.

5. As soon as charging is complete, discharge the defibrillator. Test results appear in the **Test Results** window.

Synchronization Tests

Synchronization (Sync) tests determine the ability of the defibrillator to synchronize the discharge of its output pulse with a simulated ECG waveform being generated from the Analyzer. Two sync tests are available: the Sync R-Peak test measures the cardioversion delay time from the peak of the R wave and the Sync Q-Base test measures the delay time from the Q wave.

To run a Synchronization Test, do the following:

1. Connect the defibrillator to the Analyzer and set defibrillator to the energy setting indicated in the **TEST GUIDE** settings pane.

    The Analyzer outputs an ECG waveform to the defibrillator for this test.

2. Click **Start** in the **TEST GUIDE** toolbar.

3. Charge the defibrillator. Ansur configures the Analyzer for the defibrillator test, indicating the status in a **Test Results** window.

4. Wait for Ansur to finish configuring the Analyzer. When configuration is complete, a window displays the prompt "**Defibrillate now**."

5. Discharge the defibrillator. Results of the test appear in the **TEST GUIDE** results pane.

Pacemaker Tests

Pacemaker tests are used to test the basic operation of external transcutaneous pacemakers by measuring various pacemaker outputs and timing.

Pacer Parameter Test

The pacer parameter test measures peak current and pulses per minute delivered by a pacemaker.

To run a Pacer Parameter test, do the following:

1. Connect a pacemaker to the Analyzer.

2. On the pacemaker, set the pacer rate and pacer output current. The **TEST GUIDE** settings pane indicates the pacemaker *current level* to be used.

3. Click **Start** in the **TEST GUIDE** toolbar.

4. When the Analyzer completes its measurements, Ansur retrieves the results and displays them in the **TEST GUIDE**.

5. Click **Next** in the toolbar to proceed, or click **Start** to re-run the test.

Pacer Refractory Test

This test checks the ability of the pacemaker to interact with cardiac activity when the pacemaker is in demand mode. The Ansur program retrieves the Pulsed Refractory

Period (PRP) and the Sensed Refractory Period (SRP) timings as measured by the Analyzer.

To run a Pacer Refractory test, do the following:

1. Connect the pacemaker to the Analyzer.

2. On the pacemaker, set the pacer rate and pacer output current using information specified in the lower right side pane of the **TEST GUIDE**.

3. Click **Start** in the **TEST GUIDE** toolbar. Ansur starts the test, which takes up to two minutes (120 seconds) to complete. The default duration of 120 seconds can be changed in the **Preferences** dialog box.

4. The **Test Results** window displays the timer countdown.

5. When the Analyzer has completed measurements, Ansur retrieves the results and displays them in the **Test Results** window.

6. Click **Next** in the toolbar to proceed to additional tests, or click **Start** to repeat this test.

Running ECG Waveform Simulation Tests

The ECG Waveform tests verify the correct operation of an ECG monitor.

Normal Sinus Wave Simulation

The Analyzer can generate a normal sinus wave between 30 and 240 beats per minute for output to a defibrillator ECG monitor.

To run a Normal Sinus Wave simulation, take the following actions:

1. Follow the directions provided by the ECG equipment manufacturer to connect the ECG leads from the ECG monitor to the Analyzer.

2. Click **Start** in the **TEST GUIDE** toolbar.

   Wait for activity to appear on the ECG monitor. This short test concludes automatically after a few seconds, as specified by the test procedure.

3. If the test duration is set to run indefinitely, click **Stop** (in the toolbar) to conclude the test.

4. Click the **Test passed** checkbox or the **Test failed** checkbox to record the observed result of the test.

Arrhythmia Wave Advisory Test

This test typically verifies the shock advisory capability of a defibrillator in response to various arrhythmia waveforms.

1. Connect the device under test (DUT) to the Analyzer. Set up the shock advisory on the defibrillator, if applicable.

2. Click **Start** in the **TEST GUIDE** window. Wait for activity to appear on the ECG monitor and verify the shock advisory was correct. The test concludes automatically after a few seconds, as specified by the test procedure.

3. If you set the test to run indefinitely, click **Stop** at any time to end the test.

4. Click the checkbox **Test passed** or the checkbox **Test failed** to record the test result based on what you observed on the monitor.

Performance Wave Simulation

The Performance Wave simulation tests the integrity of a defibrillator monitor using a variety of additional waveform shapes such as square, triangle, sine, and pulse.

Refer to the "Normal Sinus Wave Simulation" test earlier in this manual for the instructions in running this test.

Chapter 4
QED 6 Test Templates

Introduction

This chapter introduces the template capabilities of the QED 6 Plug-In and provides guidance for customizing test templates.

You can find detailed information on creating Ansur test templates in the *Ansur Test Executive User Manual.*

Creating Test Templates

Create, modify and review test templates using the Ansur **Main Application** window as a template editor. The QED 6 Plug-In provides 13 test elements that can be used to build new test procedures. These are accessible in **Test Explorer** and are coded as follows:

- Light blue icon - the Analyzer automatically provides test result data to Ansur as the test is completed.

- Yellow icon - resultant data must be manually entered into Ansur by the user.

To build a test template, take the following actions, beginning from the **Main Application** window:

1. Drag a test element from the **Test Explorer** (left pane) into the **Test Template** (right pane), as displayed in Figure 4-1. Clicking the test element in the **Test Template** highlights the test element and its properties. In this illustration, the highlighted element is the **QED 6 VFIB Energy Test,** the first test step to be performed.

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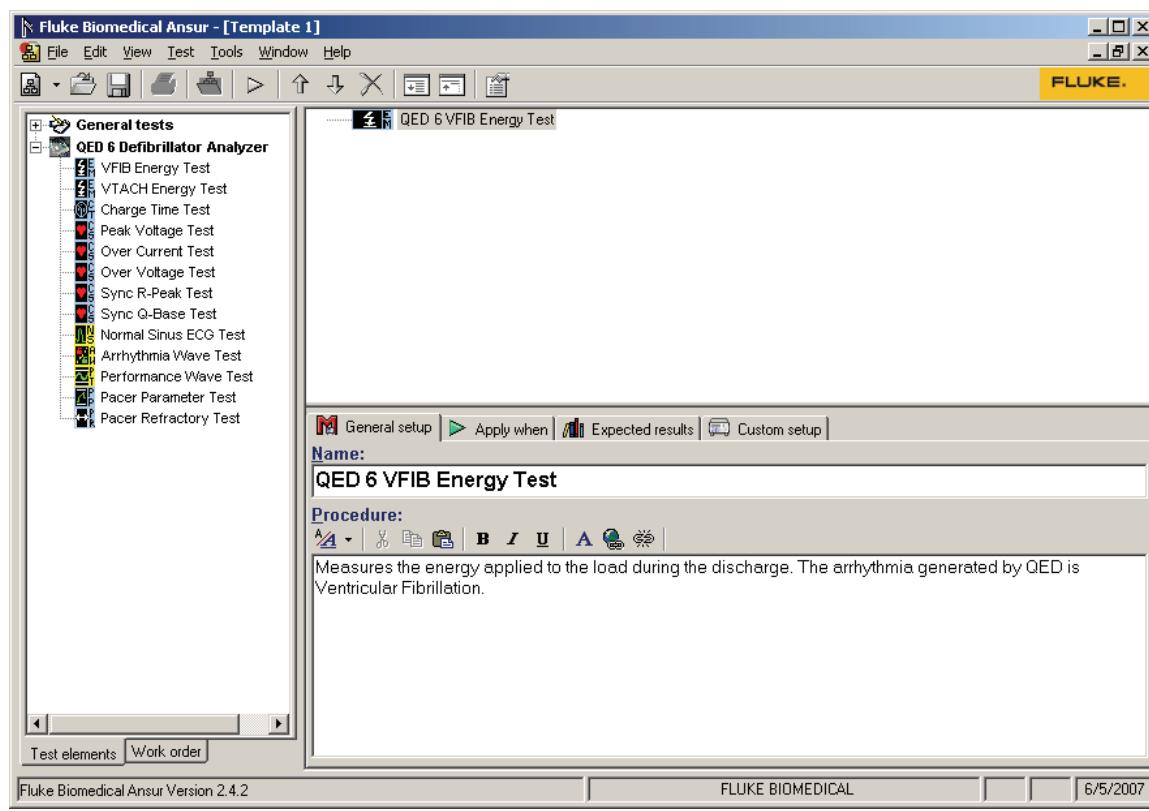
Figure 4-1. Test Template with Selected Test Element

In the middle of the **Test Template** window are located the following tabs to let you define the properties of the highlighted test element.

- **General setup**

- **Apply when**

- **Expected results**

- **Custom setup**

Test element properties consist of multiple pages, described below.

2. Click the **General Setup** tab. A screen opens, allowing you to enter a name for the test. In the example in Figure 4-2, the name shown is "QED 6 VFIB Energy Test." In the space below the name, you can enter the procedures and instructions to be followed when conducting the test.

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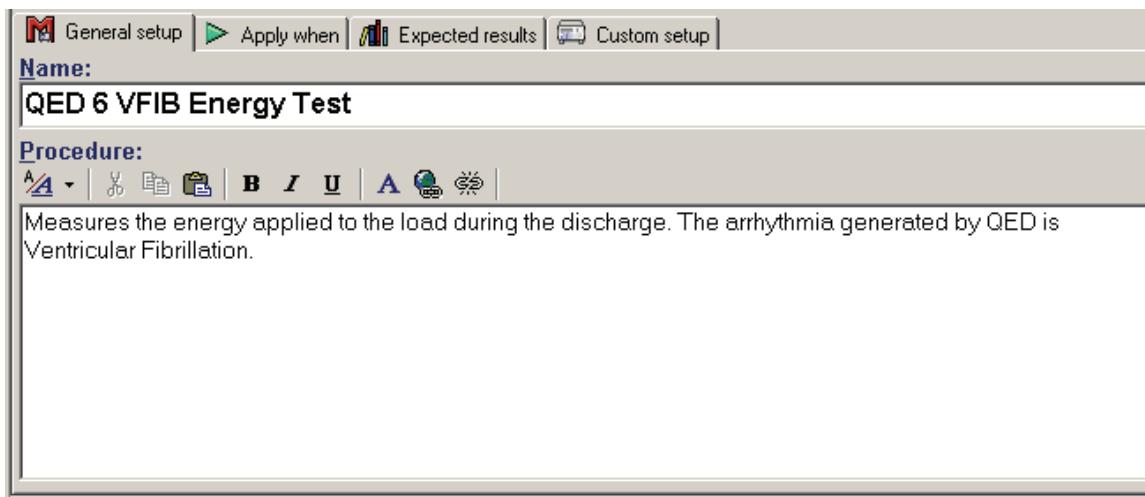
Figure 4-2. User-Definable Parts of the General Setup Tab

3. Click the **Apply when** tab to assign report levels, standards, and service events to rest elements. For more information about this feature, see the *Ansur Test Executive User Manual.*

4. Click the **Expected results** tab to view or change the measurement limits for tests, as shown in Figure 4-3.

Note

*The **Expected results** page is unavailable when test elements do not return measurement data.*

fav009.bmp
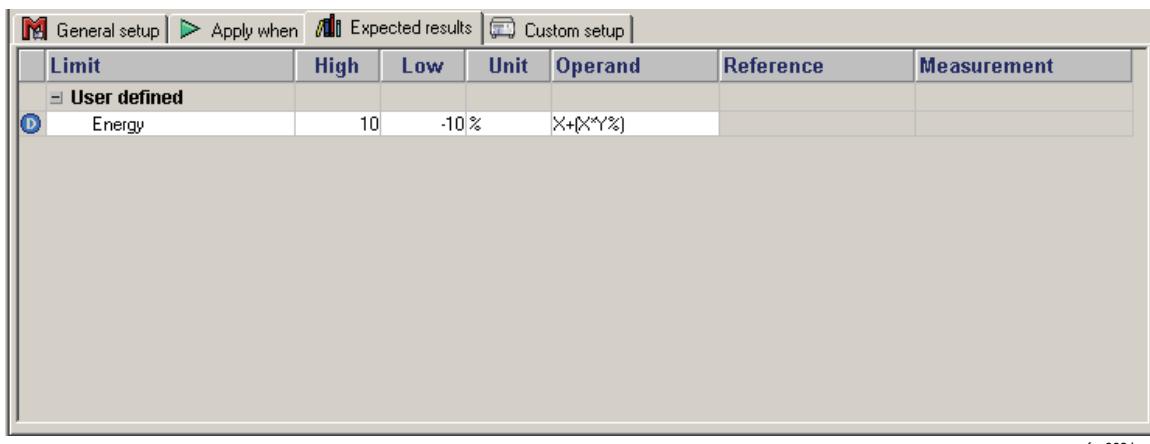
Figure 4-3. Expected Results Options for User Input

5. To define how Ansur calculates the limit values for certain measurements, click the **Operand** field to see a drop-down menu, as shown in Figure 4-4.

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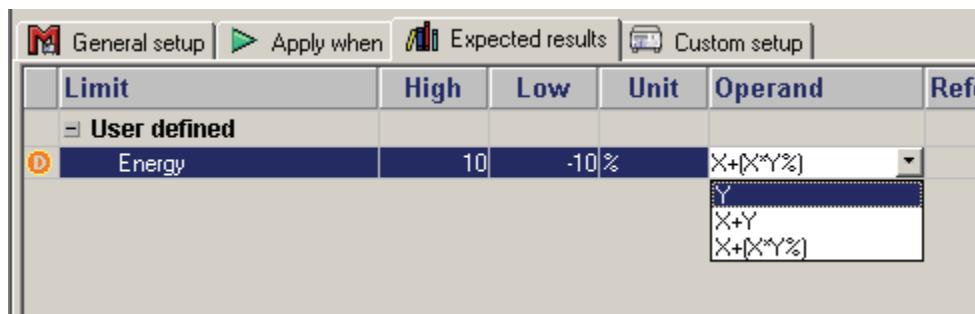
Figure 4-4. Changing the Operand in Expected Results

The operand can be set to any of the following:

- Y – an absolute value

- X + Y – an offset where the limit is calculated as preset value + specified limit

- X + (X * Y%) – calculated as a percentage deviance from the preset value

When the operand is not an absolute limit, the ⊙ (dynamic) icon appears on the left column as shown in the preceding illustration. This indicates the limit will be calculated when the test is run.

6. To add or delete limits, right click one of the rows of the **Expected results** page and select from the pop-up menu, as shown in Figure 4-5.
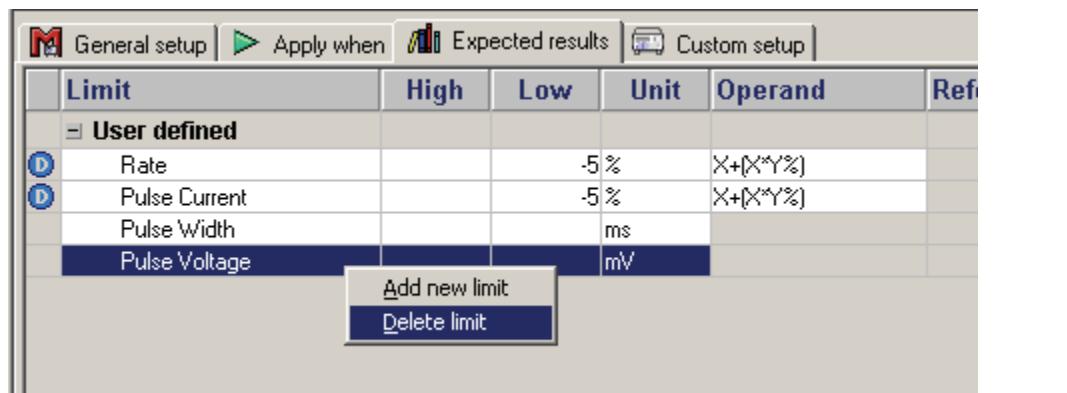
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Figure 4-5. Add or Delete Limits Pop-up Menu

7. Click the **Custom setup** tab to view and define the parameters used in tests. Test elements have unique custom setups for the capabilities they provide. An example is shown in Figure 4-6.
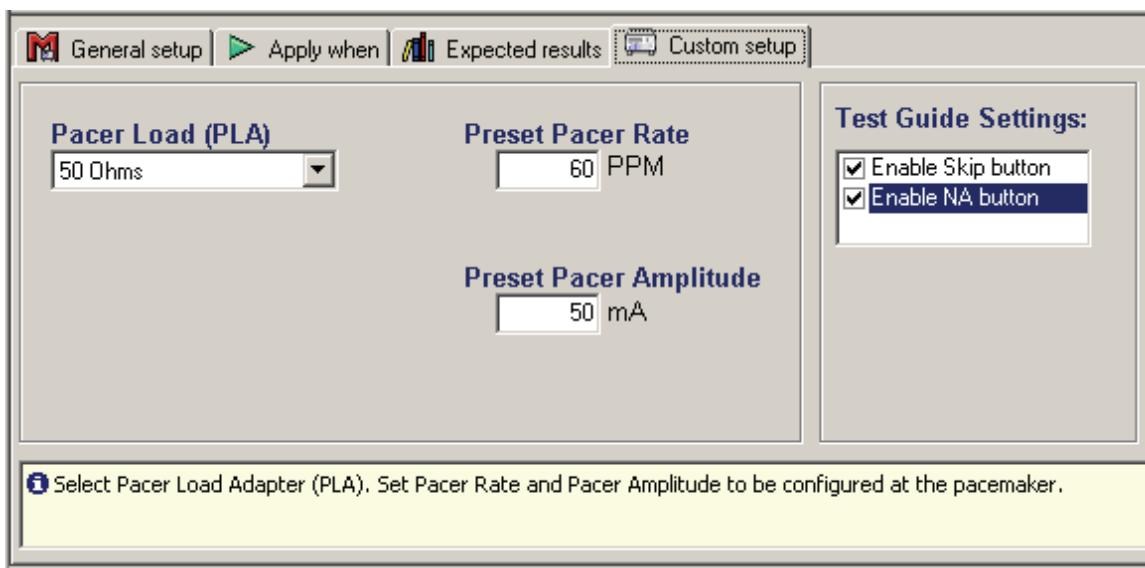
fav012.bmp

Figure 4-6. Custom Setup Page for Pacer Parameter Test Element

8. If desired, de-select (uncheck) either or both of the **Test Guide Settings** checkboxes to disable the **Skip** and **NA** button options.

    The **Test Guide Settings** control whether certain test elements can be skipped altogether or marked as Not Applicable (NA) while the tests run. The **Skip** and **NA** buttons, shown below, are enabled by default. If a setting is *enabled*, the corresponding **Skip** or **NA** button is available on the toolbar.

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Using Defibrillator Test Elements

The QED 6 Plug-In test elements shown in Table 4-1 can be configured by the user. These are discussed below, including units of measurement, setup parameters, and descriptions.

Table 4-1. QED 6 Defibrillator Test Elements

Test	Setup Parameter	Measurement
VFIB Energy Test	Preset Energy	Energy (in joules)
VTACH Energy Test	Preset Energy	Energy (in joules)
Charge Time Test	Preset Energy	Charge Time (seconds)
Peak Voltage Test	Preset Energy	Peak Voltage
Over Current Test	Preset Energy	Over Current
Over Voltage Test	Preset Energy	Over Voltage
Sync R-Peak Test	Preset Energy	Sync Time (milliseconds)
Sync Q-Base Test	Preset Energy	Sync Time (milliseconds)

Energy Tests

The QED 6 Plug-In has two similar test elements for performing an energy test: the VFIB Energy Test and the VTACH Energy Test. The only difference is the type of ECG waveform that is simulated during the test. These tests verify the accuracy of the energy level delivered by the defibrillator, and both include the measurements listed in Table 4-2 and the custom parameters shown in Table 4-3.

Table 4-2. Energy Test Measurements

Measurement	Unit of Measure	Description
Energy	Joules	Amount of energy discharged by the defibrillator.

Table 4-3. Energy Measurement Test Custom Parameters

Parameter	Description
Preset Energy	The energy (in Joules) that is to be used for the test. The field user will be prompted to set the defibrillator to this value.

Charge Time Test

The Change Time test measures how long a defibrillator takes to charge up to a specified energy level. Typically, this test uses as a parameter the maximum energy level available to the defibrillator. Table 4-4 lists the measurements taken for this test. Custom parameters available for the Change Time tests are listed in Table 4-5.

Table 4-4. Charge Time Test Measurements

Measurement	Unit of Measure	Description
Charge Time	seconds	How long it took for the defibrillator to charge to the preset energy that was specified.

Table 4-5. Change Time Test Custom Parameters

Parameter	Description
Preset Energy	The energy (in Joules) that is to be used for the test. For this test it is typically the maximum energy that the defibrillator can generate. The field user will be prompted to set the defibrillator to this value.

Synchronization Time Test

The Synchronization Time test determines the ability of the defibrillator to synchronize the discharge of its output pulse with a simulated ECG waveform being generated by the Analyzer. Synchronization Time test measurements are listed in Table 4-6. The Synchronization Time test custom parameters are shown in Table 4-7.

Table 4-6. Synchronization Time Test Measurements

Measurement	Unit of Measure	Description
Sync Time	milliseconds	Delay between the top of the ECG R-wave and the discharge peak of the defibrillator pulse. For Sync Q-Base Test, this is the delay between the Q Wave and the discharge peak of the defibrillator pulse.

Table 4-7. Synchronization Time Test Custom Parameters

Parameter	Description
ECG Waveform	The ECG waveform the Analyzer should simulate during the test.
Preset Energy	The energy (in Joules) that is to be used for the test. The field user will be prompted to set the defibrillator to this value.

Using Pacemaker Test Elements

Pacemaker tests confirm the basic operation of external transcutaneous pacemakers by measuring various pacemaker outputs and timing.

Pacer Parameter Test

The Pacer Parameter test measures peak current delivered by the pacemaker, as well as the pulse width and pulses per minute. Tables 4-8 and 4-9 list the Pacer Parameter test measurements and custom parameters.

Table 4-8. Pacer Parameter Test Measurements

Measurement	Unit of Measure	Description
Rate	Pulses/minute	Number of pacer pulses detected by the Analyzer during the test.
Pulse Current	Amperes	Peak current detected during the test.
Pulse Width	milliseconds	Pacer pulse width as measured by the Analyzer.
Pulse Voltage	millivolts	Peak voltage detected during the test.

Table 4-9. Pacer Parameter Test Custom Parameters

Parameter	Description
Pacer Load (PLA)	Defines load used for the test. A Pacer Load Adapter (PLA) value can be selected or the default internal 50-ohm load can be used.
Preset Pacer Rate	Expected pacer rate; field user prompted to set pacemaker to this rate.
Preset Pacer Amplitude	Expected pacer amplitude; field user prompted to set the pacemaker output current to this value.

Pacer Refractory Test

The Pacer Refractory test checks the ability of the pacemaker to interact with cardiac activity when the pacemaker is in demand mode. Ansur retrieves the Pulsed Refractory Period (PRP) and the Sensed Refractory Period (SRP) timings as measured by the Analyzer. Tables 4-10 and 4-11 list the Pacer Refractory test measurements and custom parameters.

Table 4-10. Pacer Refractory Test Measurements

Measurement	Unit of Measure	Description
Sensed Rp	milliseconds	Sensed Refractory Period (Rp): period of time that immediately follows sensing of cardiac activity during which time the pacemaker does not sense further cardiac activity. Analyzer measures SRP from the peak of the first ECG R-wave complex to the next ECG R-wave complex following pacemaker pulse.
Paced Rp	milliseconds	Pulsed Refractory Period: that period of time immediately following pacemaker pulse during which time the pacemaker senses no cardiac activity and its output is not inhibited. Analyzer measures PRP from the leading edge of the pacemaker pulse to the peak of the first ECG R-wave complex.

Table 4-11. Pacer Refractory Test Custom Parameters

Parameter	Description
Pacer Load Adapter (PLA)	Defines the load used for the test. A Pacer Load Adapter (PLA) value can be selected, or the default internal 50-ohm load can be used.
Preset Pacer Rate	The desired pacer rate. The field user will be prompted to set the pacemaker to this rate.
Preset Pacer Amplitude	The pacer amplitude for the test. It should be a high enough value to enable the Analyzer to detect the ECG. The field user will be prompted to set the pacemaker output current to this value.

Using ECG Waveform Simulation Test Elements

Normal Sinus Wave Simulation

The Analyzer can generate a normal sinus wave between 30 and 240 beats per minute for output to a defibrillator monitor. Table 4-12 lists the custom parameters for this simulation.

Note

This is a visual / audible test; the Analyzer takes no measurements during this test.

Table 4-12. Normal Sinus Wave Simulation Custom Parameters

Parameter	Description
ECG Waveform	Selects the type of Normal Sinus Wave to use for the test. Choices are 30, 60, 120, and 240 BPM.
Duration	How long the simulation should last. Setting can range from 1 to 60 seconds. If the "Indefinite" check-box is checked, the duration will be ignored and the test must be manually stopped by the field user using the test guide toolbar.

Arrhythmia Wave Advisory Test

This test is typically used to verify the shock advisory capability of a defibrillator in response to various arrhythmia waveforms. Table 4-13 lists test custom parameters.

Note

This is a visual / audible test; the Analyzer takes no measurements during this test.

Table 4-13. Arrhythmia Wave Advisory Test Custom Parameters

Parameter	Description
ECG Waveform	Selects the type of Arrhythmia waveform to use for the test. Choices are: AFIB: Atrial fibrillation AFLUT: Atrial flutter ATACH: Atrial tachycardia PVC1: Premature Ventricular Contractions, type 1 RUN: Run of PVCs R on T: R on T PVCs IDIO: Idioventricular VTACH: Ventricular tachycardia VFIB: Ventricular fibrillation
Duration	How long the simulation should last. Setting can range from 1 to 60 seconds. With check-box **Indefinite** selected, duration ignored and test must be manually stopped by field user (**Stop** in **TEST GUIDE** toolbar).

Performance Wave Simulation

The Performance Wave simulation can be used to test the integrity of a defibrillator monitor with a variety of additional waveform shapes, such as square, triangle, sine and pulse. Table 4-14 lists the custom parameters for this simulation.

Note

This is a visual / audible test; the Analyzer takes no measurements during this test.

Table 4-14. Performance Wave Simulation Custom Parameters

Parameter	Description
ECG Waveform	Selects the type of Waveform to use for the test. Choices are: • Square: 0.125 or 2 Hz • Pulse: 30 or 60 BPM • Sine: 10, 40, 50, 60, 100 Hz • Triangle: 2 Hz
Duration	How long the simulation should last. Setting can range from 1 to 60 seconds. If checkbox **Indefinite** selected, duration will be ignored and user must stop test manually using the TEST GUIDE toolbar.