MAC VU360™ Resting ECG Analysis System

Operator's Manual

Version 1.02

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Publication Information

This document describes version 1.02 of the MAC VU360™ Resting ECG Analysis System, also referred to as the “product” or "system" or "device". It does not apply to earlier product versions. Due to continuing product innovation, specifications in this document are subject to change without notice.

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Date of first CE mark - 2018.

For more information about compliance, refer to the *Regulatory and Safety Manual* for this product.

The document part number and revision are on each page of the document. The revision identifies the document’s update level. The revision history of this document is summarized in the following table.

Revision	Date	Comment
1	23 August 2022	Customer Release

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To access Original Equipment Manufacturer (OEM) documents, go to the device manufacturer's website.

This document describes the MAC VU360™ Resting ECG Analysis System, also referred to as the” product”, “system”, or “device”. This document is intended to be used by an operator of the MAC VU360™ Resting ECG Analysis system.

Installation should be performed by a qualified personnel.

The MAC VU360™ Resting ECG Analysis System is intended to be used under the direct supervision of a licensed healthcare practitioner, by trained operators in a hospital or facility providing patient care.

This document provides information required for the proper use of the system. Familiarize yourself with this information and read and understand all instructions before attempting to use this system. Keep this document with the Regulatory and Safety manual, and with the equipment at all times, and periodically review it.

Illustrations in this document are provided as examples only. Depending on system configuration, screens in the document may differ from the screens on your system. Patient names and data are fictitious. Any similarity to actual persons is coincidental.

Third-party Licenses

This product includes software developed by:

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- NXP Semiconductors (https://www.nxp.com)

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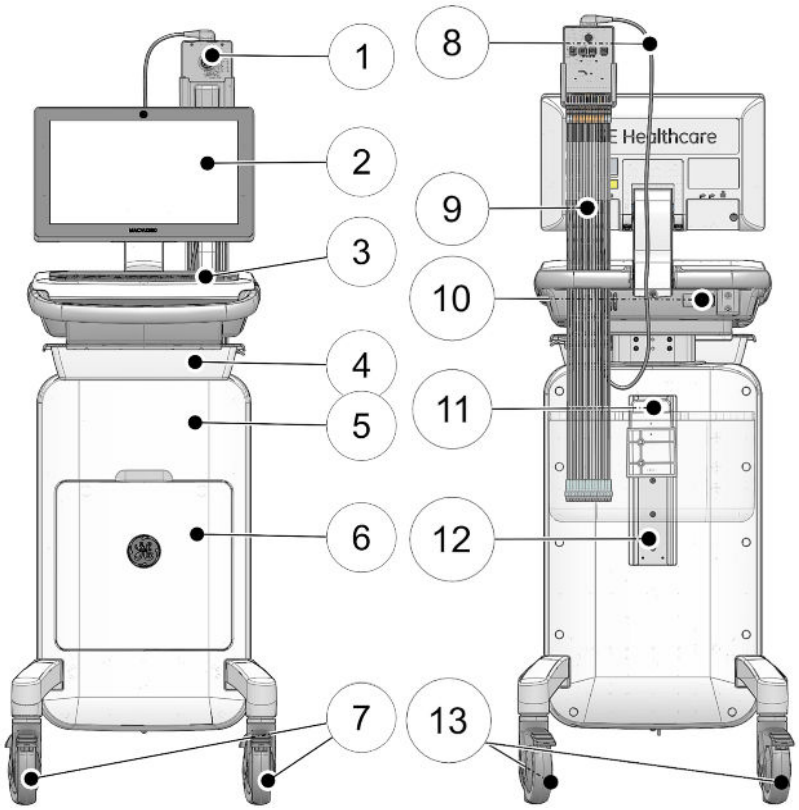
1 Product Overview

The MAC VU360™ *Resting ECG Analysis System*, (referred to as "the device" throughout this document), supplies 12-lead or 15-lead ECG measurement and interpretative analysis, prints 12-leads or 15-leads of ECG, and transmits ECG data to and from a central ECG cardiovascular information system.

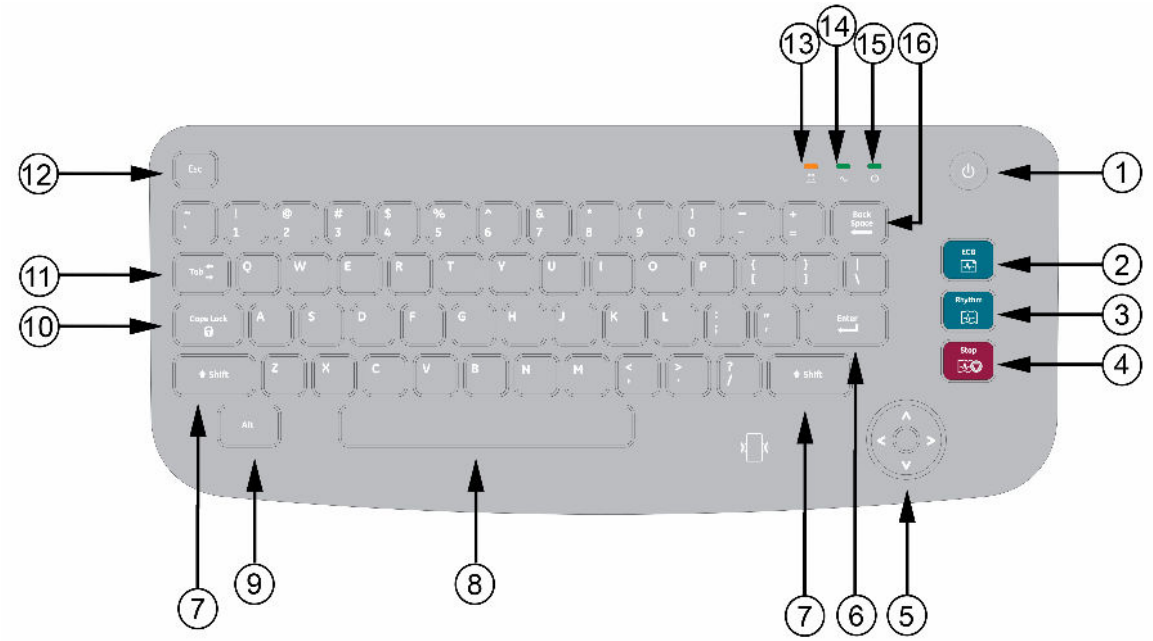
1.1 Front and Rear View



Item	Part Name	Description
1	Acquisition Module	Used to acquire, digitize, and transmit analog ECG signals to the ECG device.
2	Display and Touchscreen	Presents waveform and text data. The touchscreen enables you to interact directly with the device through touch gestures without the use of the keyboard.
3	Standard Keyboard	Used to enter data on the screen or perform functions such as recording or printing an ECG or rhythm.
4	Sliding Tray	Used for storage.
5	Integrated Trolley	Used to move the device from one location to another.
6	Front Bin	Used for storage.
7	Front Wheels and Lock	Used to mobilize and lock the trolley in position. The front wheels are fixed wheels and non-conductive.
8	Acquisition Module Cable	Connects the Acquisition Module to the device.

Item	Part Name	Description
9	Leadwire Cables	Connects the leadwires to the Acquisition Module.
10	AC Power Inlet	Slot to connect the AC power cord.
11	Rear Bin Mounting Bracket	Used to mount the rear bin.
12	Accessory Track	Used to change the position of the rear bin.
13	Rear Wheels and Lock	Used to mobilize and lock the trolley in position. The rear wheels are swivel wheels and conductive.

1.2 Keyboard



Item	Name of Key	Description
1	Power button	Powers the device on or off.
2	**ECG**	Records an ECG.
3	**Rhythm**	Starts recording or printing a real-time, continuous rhythm.
4	**Stop**	Stops printing an ECG or rhythm report.
5	Trimpad	Provides movement through menus and windows.
6	**Enter**	Use to advance the focus in a window or to select items from the screen.
7	**Shift**	Use to type a capital letter. For example, press **Shift + p** to type a capital P.
8	Space bar	Enters a space in the text.
9	**Alt**	Switches between different international methods of entry (IME) for the Chinese keyboard language.
10	**Caps Lock**	Capitalizes the letters in a text.
11	**Tab**	Moves to the next field in a screen. **Shift + Tab** key moves to the previous field in a screen.
12	**Esc**	Closes a window on a screen.

Item	Name of Key	Description
13	Battery LED	Indicates various battery states: • Flashing amber light at two-second intervals indicates that the battery is charging. • Flashing amber light at one-second intervals indicates that the battery is critically low. • Flashing amber light at half-second intervals indicates that the battery has a communication failure. • No light indicates the battery is fully charged, not present, or discharging.
14	AC Power LED	Indicates various AC power states: • Green light indicates the device is plugged in and receiving power. • No light indicates the device is not plugged into AC power.
15	Power on LED	Indicates if the device is powered on or off: • Green light indicates the device is powered on. • No light indicates the device is off. • Flashing green light indicates the device is in standby mode.
16	**Backspace**	Deletes characters or text.

1.3 Acquisition Screen Overview

The Acquisition screen is the main screen that displays when you first log on to the device. You can acquire and ECG from the Acquisition screen.

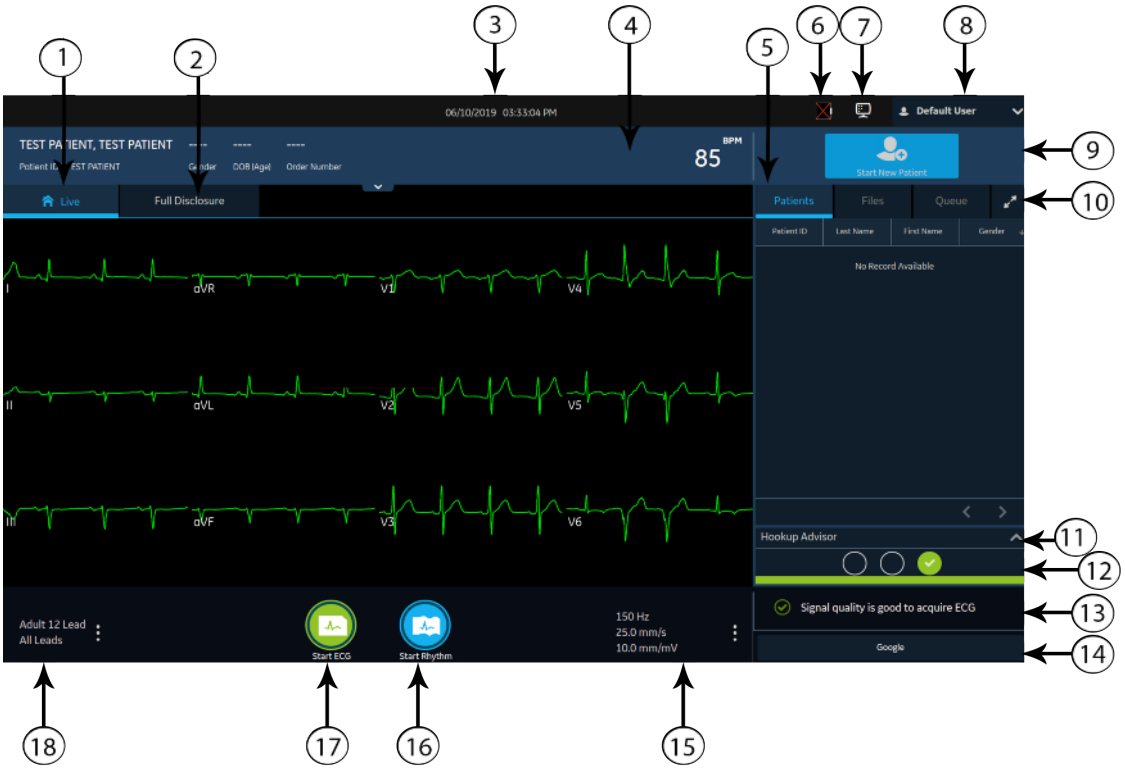


Table 1-1 Acquisition Screen

Item	Name	Description
1	**Live** tab	Displays the live waveform for the current patient connected to the device.

Table 1-1 Acquisition Screen (Table continued)

Item	Name	Description
2	**Full Disclosure** tab	Displays a Full Disclosure ECG. **NOTE** The *Full Disclosure* tab displays after you purchase and enable the Full Disclosure option.
3	Date and Time	Current local date and time in the configured date and time format. To configure a date and time format, refer to the *MAC VU360™ Resting ECG Analysis System Setup and Configuration Manual*.
4	*Patient Information* Banner	Displays *Patient Information* such as the patient first name, surname, and gender. Select anywhere on the banner to add or edit patient information.
5	*Orders*/**Patients**, *Files*, and *Queue* tabs	• The **Orders** tab displays when you enable order management. Select **Orders** to open the *Orders* list and view a list of the available orders. • The **Orders** tab does not display if you disable order management, the **Patients** tab displays. Select **Patients** to open the *Patients* list. View a list of the last 500 patients with ECGs that were acquired on the device. • Select **Files** to open the *Files* list and view the list of stored patient reports. • Select **Queue** to open the *Queue* list to view the list of reports in the queue to transmit to a configured destination.
6	Battery or AC Power Icon	Displays the battery status.
7	Network Status Icon	Displays the wireless or LAN connection status.
8	User Menu	Displays the name of the user logged on to the device. When you select the name, the user menu expands and displays the available menu options. You do not have access to some menu options. Your administrator can assign the proper privileges. If you disable user authentication or configure with Technician ID access, the Default user must to log on as a user with sufficient privileges to access a menu option.
9	**Start New Patient** icon	Select to enter the patient data for a new patient test.
10	**Expand** icon	Select the tab (*Orders*/*Patients*, *Files*, or *Queue*) that you want to expand, and select the **Expand** icon to open the list.
11	Electrode Placement Picture	Select the arrow to expand and view the picture that shows the placement of electrodes and the electrode quality of each lead. Each lead quality indicator on the picture changes to yellow, red and green, based on its connection status. You can enable or disable the auto-expansion of the picture. If you enable auto-expansion of the picture: • The picture automatically expands if the *Hookup Advisor* Lead Quality Indicator is yellow or red. • The picture automatically collapses if the *Hookup Advisor* Lead Quality Indicator is consistently green for some seconds.
12	*Hookup Advisor* Lead Quality Status Indicator	Displays the lead quality status indicator in three circles that change to yellow, red, or green, based on the lead quality.

Table 1-1 Acquisition Screen (Table continued)

Item	Name	Description
13	Notification Area	Displays messages: • printing status and progress • report transmission status • *Hookup Advisor* lead quality status The messages display one at a time in the sequence of occurrence. The messages do not display when a patient is connected and hookup advisor is evaluating the waveform.
14	Remote Applications Panel	Displays remote applications. Select the buttons to open the application.
15	Filter, Speed and Gain	Displays the default waveform filter, speed, and gain. Select anywhere around the ellipsis icon and select a different value. You can only make a change before you record an ECG. You can make a change before and during the recording of a rhythm. **NOTE** A change to the filter, speed or gain is applicable to the current patient. For a new patient, the values are reset to default settings.
16	**Start Rhythm** icon	Select to print or digitally record the rhythm report.
17	**Start ECG** icon	Select to record an ECG.
18	Lead Set and Display Format	Displays the default test type and display format. Select anywhere around the ellipsis icon and select a different value. You can only make a change before you record an ECG. You can make a change before and during the recording of a rhythm. **NOTE** Any change to the test type and display format only applies to the current patient. For a new patient, the values are reset to the default settings.

1.4 User Menu Options Description

The **User Menu** is located at the top right corner of the Acquisition screen.

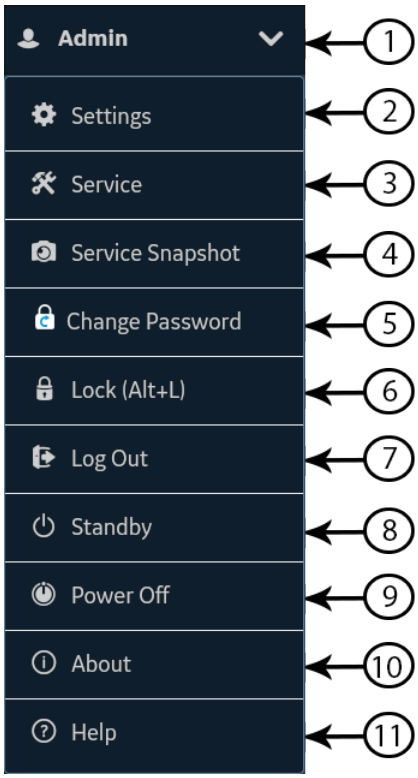


Table 1-2 User Menu Options

Item	Option	Description
1	**<User>**	Displays the name of the user logged into the device as configured by your administrator. Pre-defined users display as follows: • Admin • STAT • Service • Default
2	**Settings**	Displays the **Settings** screen used to configure the device. The administrator must grant you privileges to access this screen. If the user does not have access to the screen and if user authentication is disabled or configured with Technician ID access, the Default user is prompted to log on as a user with sufficient privileges.
3	**Service**	Displays the **Service** screen used to service the device. Your administrator must grant you privileges to access this screen. If the user does not have access to the screen and if user authentication is disabled or configured with Technician ID access, the Default user is prompted to log on as a user with sufficient privileges.
4	**Service Snapshot**	The user can get a service snapshot without the **Service** privileges. Complete the snapshot to help identify a problem on the device.
5	**Change Password**	The Admin user or a local user can change their password. Displays only if you enable full user authentication.
6	**Lock (Alt+L)**	Locks the device. Displays only if you enable full user authentication.
7	**Log Out**	Logs off the user. Displays only when you are logged on to the device.
8	**Standby**	Puts the device in standby mode to save battery power without turning it off.

Table 1-2 User Menu Options (Table continued)

Item	Option	Description
9	**Power Off**	Powers off the device. **NOTE** You can also power off the device by pressing the **Power** button on the keyboard.
10	**About**	Displays the device software information.
11	**Help**	Displays help information about the device.

1.5 Battery Status

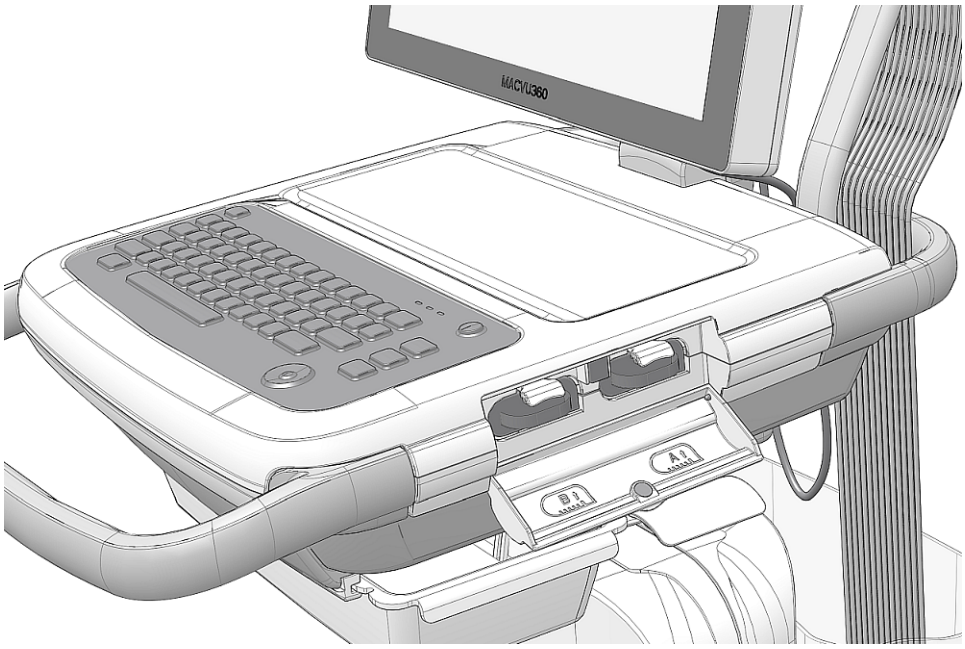
The battery icon shows the stored power of each battery. The power levels are shown in 10% increments. The color of the icons change to show the level of battery life.

You can operate the device connected to the AC Mains power when the batteries are removed. The device can also operate with a single battery installed to allow hot swapping of the batteries without plugging into AC Power.

Table 1-3 Examples of Battery and Power Icon Status

Icon	Status	Description
Green 	Connected to AC Mains	The device is connected to the AC Mains power and the batteries are charging.
White 	Operating on Battery	The device is only using batteries and the batteries are discharging. The device is not connected to the AC Mains power.
White 	Batteries – Fully Charged and Disconnected from AC Mains	Shows that the batteries are fully charged and the device is disconnected from the AC Mains power. When the device is connected to the AC Mains power and the battery icon is solid green, shows that the battery is fully charged.
Red 	Batteries – Low or Critically Low	Shows that the batteries are at low capacity and the device is disconnected from the AC Mains power. If the charge level is below 15%, an error tone sounds. If the charge level is below 10%, the error tone is louder, longer, and sounds every minute. A message opens that tells you the battery is critically low and you should connect to AC power immediately.
No color with red X 	Battery Not Present, AC Mains Power	Shows that batteryB is not in the device and the AC Mains power is connected. If you select the battery icon, a message opens that tells you the battery is not present.

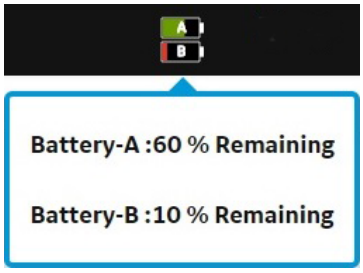
The following image illustrates the batteries A and B in the battery compartment:



1.6 Show Battery Status

To show the status of the two batteries, use the following steps.

1. Select the battery icon on the **Status Bar** of the Acquisition screen.
2. An image opens showing the battery life.



1.7 Show Network Connection Status

When the wireless and wired connection is set to **Enable**, the device uses a wired connection when you connect a Local Area Network (LAN) cable. If you remove the LAN cable, the device uses the wireless connection.

To view the status of your device's connection to your LAN or Wireless Local Area Network (WLAN), perform the procedure as follows:

1. Select the **Network Status** icon on the status bar.

2. Review the tables for the description of the network status icon when connected to a LAN or WLAN network.

Table 1-4 LAN Icons

Network Status Icon	Status	Description
	LAN Active	The device is connected to a LAN.
	LAN Connected	The device is connected to a remote server through a LAN and is in the process of obtaining an IP address. If this icon is blinking, the device is acquiring an IP address from DHCP.
	LAN Disconnected	The device is not connected to a LAN; no LAN (Ethernet) cable is attached to the device.

Table 1-5 WLAN Icons

Icon	Status	Description
	WLAN Active	The device is connected to a WLAN and has a valid IP address. The icon shows a number of wireless bars to indicate the strength of the wireless signal.
	WLAN Connected	The device is connected to an access point and is in the process of obtaining an IP address. If this icon is blinking, the device is acquiring an IP address from DHCP.
	WLAN Disconnected	The device is not connected to a WLAN.

For more information about wireless certificate errors, see 12.5 Wireless Network Connectivity Errors on page 109.

3. Close the *Network Status* window by selecting something on the screen outside of the window.

1.8 Changing the Brightness of the Screen

1. Perform one of the following steps to change the brightness level of the screen from 10% to 100%:

NOTE

The specified keys combination works only for English keyboard.

- To increase the brightness of the screen, select **Alt** + **Arrow up** keys on the keyboard.
- To decrease the brightness of the screen, select **Alt** + **Arrow down** keys on the keyboard.

Continue to select the keys to reach the desired level of brightness.

Table 1-6 Brightness Level

Condition	When the device is powered by A/C Power	When the device is powered by the battery
Brightness level on initial power up	80%	50%

Table 1-6 Brightness Level (Table continued)

Condition	When the device is powered by A/C Power	When the device is powered by the battery
Brightness level when you change the power source when the device is on	Resets to the saved brightness value when the device was last used on AC Power.	Resets to the saved brightness value when the device was last used on the battery.

The changes you make are automatically saved to your device and will not change when you turn the device on or off.

2 Login and Security

2.1 Power On the ECG Device

1. Press the **Power** button on the keyboard for a few seconds to start the device.

   The device is powered on. The **Power on** LED on the keyboard is green.

   A notification message displays, if it is configured by the administrator.

2. Click **Accept**.
   - If user authentication is enabled, you are prompted to log on to the device.
   - If user authentication is disabled, you are automatically logged on to the device as the **Default User**.
   - If the user authentication mode is **Technician ID**, enter the **Technician ID** to log on as a **Default User**.

2.2 Power Off the ECG Device

1. Before you **Power Off** the device, complete pending tasks, for example, acquire an ECG and save configuration settings.
2. Do one of these steps to remove power from the ECG device:
   a. From the **User Menu** on the screen, select **Power Off**.

      The *Power off* window opens and displays a message. Select **Power Off**.

      The device is off. The **Power on** LED on the keyboard is off.

   b. Press the **Power** button on the keyboard for a few seconds:

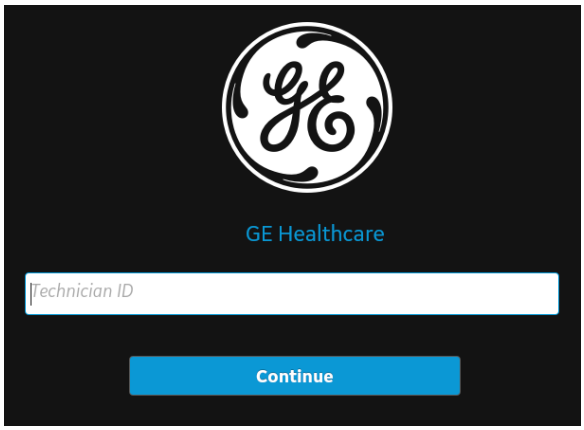
      The *Power Options* window opens with, **Standby**, **Log Out**, and **Power Off** options. Select **Power Off**.

      The device is off. The **Power on** LED on the keyboard is off.

2.3 User Authentication

The device supports different modes of user authentication.

Table 2-1 Supported User Authentication Modes

User Authentication Mode	Description
Full authentication with STAT login	The **Login** screen displays with these fields when the device is powered on or unlocked.  The users below can log on to the device: • Pre-defined users (**Admin**, **Service**) • LDAP users (If LDAP-based user authentication is configured) • Local users (If user profiles are locally managed on the device) • **STAT User** if **STAT** button is selected. The user can configure the text for this button.
Technician ID login	The *Login* screen displays when the device is powered on or unlocked.  A technician can access the device by entering the **Technician ID**.
No authentication	A Login screen does not display when you power on the device. You are automatically logged on as the **Default User**. The **Default User** cannot access the device if user authentication is enabled.

2.3.1 Log On to the Device

Enter the user name and password on the **Login** screen to enable User authentication to allow users to log on to the device.

Table 2-2 Type of Users

Type of User	Description
Admin user	The username is **Admin**. The default password to log on as the Admin user is **admin123**. The Admin user is prompted to change the default password immediately after the first login.
Service user	The username is **Service**. This username is intended for use by Service personnel. A user with the user management privilege can set the password for the **Service** user.
Local users	The local user profiles are managed by the device administrator. Obtain your username and password from the device administrator.
LDAP users	LDAP user authentication is available only if you configure the device to support LDAP. The LDAP server administrator manages the LDAP user profiles. Obtain your username and password from the LDAP server administrator. Your privileges are based on the user role assigned to the LDAP group to which your user profile belongs.

1. Do one of these steps:
   - If the device is shutdown, power on the device. See 2.1 Power On the ECG Device on page 19.
   - If the device is locked, unlock the device. See 2.7 Unlock the Device on page 24.

   The **Login** screen displays.
2. Enter your username and password.
   - If you are an LDAP user and the default domain name is not configured, or your user profile is part of an LDAP server domain which is not the default domain, enter the domain name and username. For example, Domain\Username.
   - To verify that you entered the correct password, select **Show** to view the password.
   - Contact your administrator to reset your password. Log on to the device using the new password. Change the password immediately for security reasons.
   - If you are the Admin user and forgot your password, perform a system reset to reset the password to the default password **admin123**. For more information, see 2.9 Perform System Reset on page 25.
3. Select **Log In**.
   - If the login credentials are correct, you are successfully logged on to the device. Your username displays on the upper-right corner of all of the screens you have access.
   - If your login fails, see the table below:

Table 2-3 Login Errors

Symptom	Cause	Solution
The username or password is incorrect.	You entered your username or password incorrectly.	Re-enter your correct username and password again.
	You are a local user and you forgot your password	Contact your administrator to reset your password, then log on to the device again.
	If you are an LDAP user, the error is caused by: • No connection to the LDAP server. Your username cannot be authenticated against cached LDAP user credentials.	• Wait for the connection to the LDAP server to be restored and log on to the device again.

Table 2-3 Login Errors

Symptom	Cause	Solution
	• You do not belong to any groups authorized access to this device.	• Contact your LDAP administrator to assign your user profile to an LDAP group authorized for this device and log on to the device again.
	• Your current password has expired.	• Contact your LDAP administrator to change your password.
You are prompted to change your password.	You are a local or Admin user and your password has expired.	Perform the procedure 2.4 Change the User Password on page 23 and log on to the device again.

2.3.2 Log On the Device as a STAT User

If you enable user authentication **STAT**, a **STAT** user can log on to the device to get a patient ECG in an emergency.

1. On the **Login** screen, select **STAT**.

   The Acquisition screen opens.

2. You can get an ECG or other tasks the administrator has given to the **STAT** user role.

2.3.3 Access the Device using a Technician ID

Make sure that you enable the user authentication.

1. On the *Login* screen, enter a valid Technician ID to populate the **Technician ID** field.
2. Select **Continue**.

   You are logged on as the **Default User**. The Acquisition screen displays. You can perform tasks with **Default User** or **Technician ID** assigned privileges.

2.3.4 Log Out of the Device

Log out of your user session when you are done using the device. You must enable User authentication.

1. Complete pending tasks, for example, acquire an ECG or save configuration settings, before you log off from your user session.
2. Perform one of these steps to log off of the device:
   - Press the **Power** button on the keyboard.

     The *Power Options* dialog box opens. Select **Log Out**.
   - From the User Menu on the Acquisition screen, select **Log Out** to log off the device.

   If you log off before a task is completed, a message displays that you will lose incomplete data.

   If a remote session is open, for example, a web application and you log off of the device, a message displays that incomplete data will be lost and open remote application sessions will be closed.
3. Perform one of these steps:

- If you have unsaved data and do not want to close the remote application session, select **Cancel**.
- If you want to log off, select **Log Out**.

  You are logged off your user session and open remote application sessions close.

2.4 Change the User Password

This procedure applies only to the Admin user and local users. LDAP users must change their password externally as per the instructions provided by their LDAP administrator.

Make sure that the new password follows the password rules:

Password must contain at least:

- One lowercase letter
- One uppercase letter
- One number
- One special character

1. From the User Menu on the Acquisition screen, select **Change Password**.

   The *Change Password* dialog box opens.
2. Enter the current password and new password, and confirm the new password.
3. Select **Change Password**.
   - If the new password meets the password requirements, a message displays that your password was changed successfully.

     Select **OK** to close the *Change Password* window. You are logged into the device.
   - If the new password does not meet the password requirements, an error message displays.

     Follow the password rules for a new password and repeat the steps in this procedure to create a new password.

2.5 Activate or Deactivate Privacy Mode

Privacy mode can be activated to prevent the display of confidential information on the screen. During this mode, the screen will be blank. Processes such as ECG acquisition, transmission, and printing continue to work in background, but the device ignores input from a barcode reader.

- To activate privacy mode, press **Alt + P** on the keyboard.

  The GE logo displays on the center of the screen with a black background, and a message displays indicating screen privacy is turned on.
- To deactivate privacy mode, press any key on the keyboard or tap anywhere on the screen.

  The screen you were working on before activating privacy mode displays.

2.6 Lock the Device

You can lock the device if you enable user authentication. You cannot lock the device while ECG or rhythm acquisition or report printing is in progress.

NOTE

The **STAT User** cannot lock the device.

1. Complete your tasks.
2. Perform one of the following steps to lock the device:
   - From the User Menu on the Acquisition screen, select **Lock**.
   - Press **Alt + L** on the keyboard.

     NOTE

     This only works when **Full Authentication with STAT** is enabled.

   The device is locked. Your username displays on the lock screen.

2.7 Unlock the Device

1. Perform one of the following steps to unlock the device:
   - Tap on the lock icon on the screen.
   - Press **Alt + U** on the keyboard.

     NOTE

     You must enable the **Full Authentication with STAT** for this step to work.

   A message displays prior to login if one is configured by your administrator. Click **Accept**.

   The **Login** screen displays. The **User Name** field displays the name of the user who is logged on.
2. Enter your password and select **Log In** to log on to the device.

   You can also log in as:
   - A **STAT User** (if STAT access is enabled)
   - A different user

     A message displays that the current user will be logged out and any unsaved data will be lost. Select **Continue** to log into the device.

2.8 Put the Device on Standby

1. Perform one of the steps below to put the device on standby:
   - From the User Menu on the Acquisition screen, select **Standby**.
   - Press the **Power** button on the keyboard.

     The *Power Options* dialog opens. Select **Standby**.
   - If a remote application session is not open, the device is put on standby.
   - If a remote application session is open in the foreground or background and you select **Standby**, a message displays indicating that the standby mode will close remote sessions and any unsaved data will be lost.

   Select **Continue** to put the device on standby.

To exit standby mode, press the **Power** button on the keyboard:



- If user authentication is configured, standby mode is off and the lock screen displays. Perform the procedure 2.7 Unlock the Device on page 24 to unlock and log in to the device.
- If user authentication is not configured, you return to the last screen displayed when the device was put on standby mode.

2.9 Perform System Reset

Before you start this procedure, make sure that:

- You have the serial number of the device.
- You connect the device to AC Power.
- If the authentication mode of the device is **No authentication**, access the **Settings** screen from the user menu to open the **Login** screen.
- If the authentication mode of the device is **Full Authentication with Stat**, power on the device to view the **Login** screen.
- You must log on to the device as the Admin user.

NOTE

The **System Reset** deletes all data and settings. The system is reset to factory defaults. Use the default admin password to log on to the device. It keeps the previously enabled option codes, serial number, keyboard language, MAC address, and Wireless Country of Operation configuration.

NOTE

The **Restore to Factory Defaults** resets the settings or section of settings.

Use this procedure as a last solution. **Transfer your data from the system before you start the procedure.**

1. When the **Login** screen displays, press and hold **Shift + Esc** for 5 seconds.

   The **System Restore** screen displays a warning that the System Restore will return your system to the original factory shipped configuration. All patient data, system setup changes, logs, and user data will be lost and unrecoverable.

2. Enter the serial number of the device in the **Enter the system serial number** field. The **Restore** button enables after you enter the correct serial number.

3. Select **Restore** to proceed with system restore.

   The system configuration is reset to factory defaults and all patient data records are deleted. The device reboots. You can access the device as the **Default** user without login credentials.

4. To reconfigure the device, access the **Settings** screen from the user menu. A login screen opens. Log on as **Admin** user with the default password *admin123*.

3 Patient Information

3.1 Patient Information Screen Overview

Patient information helps you to identify the patient. View and make sure the patient information is complete and correct before you start an ECG.

You can update the patient information on the **Patient Information** screen as follows:

- Attach an order from the orders list (if order management is enabled).
- Attach patient information from the recent patients list (if order management is disabled).
- Read a patient barcode with a barcode scanner.
- Use a keyboard to enter **Patient Information**.
- Do an Admission, Discharge, Transfer (ADT) query.

WARNING

INACCURATE PATIENT DATA

Patient data from the last patient may remain in the patient information banner if the last user did not finish and close out of their session. Incorrect patient data can affect diagnosis and treatment. Make sure to check the patient information screen for each patient. Make sure that you enter patient data for the correct patient.

On the Acquisition screen, the **Patient Information** bar above the waveform and shows minimum information about the patient. The text boxes shown in the bar are configurable.

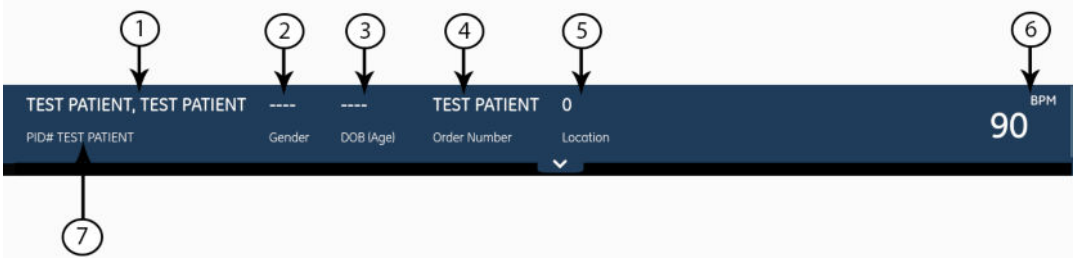


Table 3-1 Patient Information bar

Item	Field	Description
1	**Name**	Shows the last name and first name of the patient.
2	**Gender**	Shows the patient gender.
3	**DOB (Age)**	Shows the patient date of birth and age. If the **Date of Birth** field is configured to be hidden on the **Patient Information** screen, only **Age** Shows on the bar.
4	**Order Number**	Shows the order number attached to the patient test, if an order is attached.
5	**Location**	Shows the location where the ECG is being taken. For each patient test, the location is filled in from the Location ID configured in the System Settings.

Table 3-1 Patient Information bar (Table continued)

Item	Field	Description
6	**BPM**	Shows the real-time beats per minute (BPM). The shown heart rate updates whenever the heart rate calculation algorithm reports a change in the heart rate. The heart rate is not shown if it drops below 30 bpm, increases above 300 bpm, or the system is not getting ECG data. In cases where the heart rate is not shown, three asterisk symbols show instead of the heart rate: 
7	**PID#**	Shows the unique identification number of the patient (patient ID).

Select the **Patient Information** banner to expand it into a full screen view. Fields configured by your administrator display in the **Patient Information** screen.

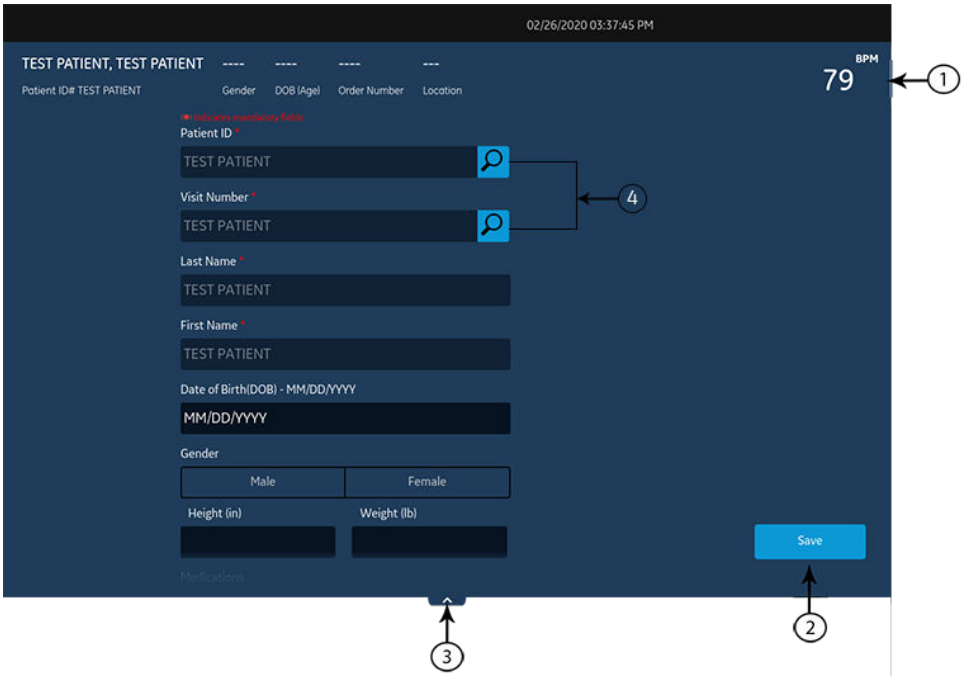


Table 3-2 Patient Information Screen

Item	Field	Description
1	**Patient Information** banner	Shows patient information, such as patient first name, last name, gender, age, and other configured information.
2	**Save** button	Select **Save** to save the patient information.
3	**Collapse** button	Select the **Collapse** button or select a spont on the **Patient Information** screen to collapse and show only the bar. Collapsing the screen saves the entered information.
4	**Search** icon	Use the keyboard to enter the **Patient ID** or **Visit Number** on the screen and press **Search** icon on the respective field.

Swipe your finger in the upward or downward direction on the screen to scroll through the screen. For information on updating data in the **Patient Information** screen, see 3.3 Enter Patient Information on page 28.

3.2 Start a Test for a New Patient

Start a test for a new patient in the Acquisition screen.

1. Select the **Start New Patient** icon located in the upper right corner of the Acquisition screen:



If	Then
A patient test is open with unsaved data, a message opens that unsaved patient data will be lost.	Select one: • Select `Start New Patient`, all unsaved patient data is deleted and you can enter new patient data. • Select `Continue with Same Patient`, the patient information on the screen is used for you to continue with the same patient.
Electrodes are put on a patient and then removed or disconnected, the LED sensors time out after 30 seconds. When the electrodes are put on a patient again, the LED sensors identify a patient. A message opens: A new patient is identified.	Select one: • `No` if you put electrodes on the same patientand will continue a test for that patient. • `Yes` if you put electrodes on a new patient and will start a test.

2. If there are pending print tasks in the queue, a message opens that pending print tasks will be deleted from the queue.
   - Select `Continue` to delete pending print tasks and start the test for the new patient. The **Patient Information** screen expands.
   - Select `Cancel` to cancel the test for the new patient, and complete the pending print tasks.
3. The **Patient Information** screen opens, enter information for the patient.

3.3 Enter Patient Information

Use the methods below to enter or update patient data in the **Patient Information** screen:

- Use a barcode reader, see 3.3.1 Update Patient Information with a Barcode Reader on page 28.
- Do ADT queries, see 3.3.2 Query Orders or ADT for Patient Demographics on page 30.
- Open a patient record in the **Patients** list, see 8.2 Select a Patient from the Patients List on page 88.
- Attach an order, see 5 Work with Orders on page 63.
- Use a keyboard, see 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.

3.3.1 Update Patient Information with a Barcode Reader

Using a barcode reader can simplify the entry of patient information and reduce the chance of introducing errors. When you scan a patient's barcode, it retrieves the patient information encoded in the barcode. You can then verify and modify the information.

You can scan a patient's barcode using an external barcode reader or the internal barcode reader of the Acquisition Module.

Before you use an external barcode reader, make sure that:

- The BRCD option to use an external barcode reader is activated on the device.
- The barcode reader is connected to the device, and the device is correctly configured to use the peripheral. For more information, see the *MAC VU360™ Resting ECG Analysis System Setup and Configuration Manual*.
- You are in the **Live** or **Full Disclosure** ECG screen, or when patient demographics banner is open.

Before you use the Acquisition Module barcode reader, make sure that:

- The Acquisition Module is connected to the device, and the barcode settings are configured on the device. For more information, see the *MAC VU360™ Resting ECG Analysis System Setup and Configuration Manual*.
- You are in the **Live** or **Full Disclosure** ECG screen, or when patient demographics banner is open.

An error message displays if you scan a barcode during the acquisition of a Resting ECG, Rhythm ECG or a Full Disclosure ECG for the patient.

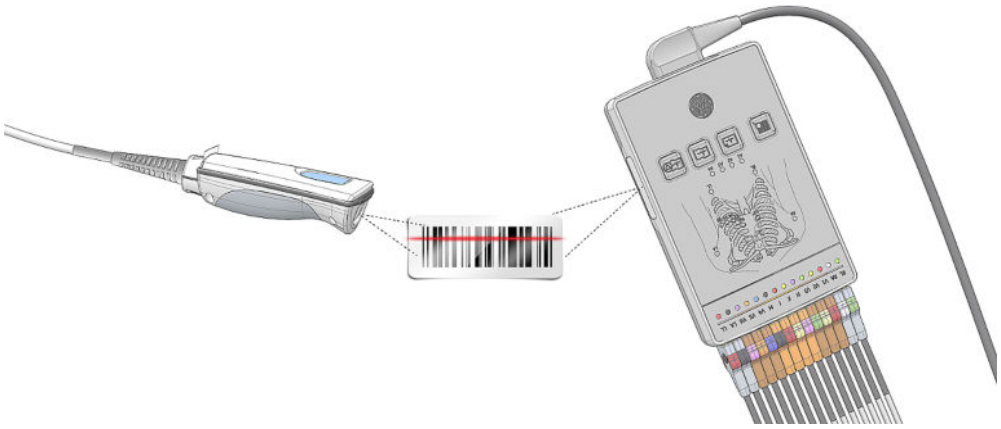
Use the procedure below to scan the patient's barcode:

1. Start a test for a new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.
2. Scan the patient's barcode to populate the **Patient Information** screen.

   Hold the button and position the barcode reader 10 cm to 15 cm (4 inches to 6 inches) above the barcode to be scanned.

   If you are using the Acquisition Module barcode reader, press the **Barcode Scan** button.

   If you are using an external barcode reader, the barcode is automatically scanned.



   The barcode reader emits a sound to confirm the barcode scan. The **Patient Information** screen expands and displays the fields populated with patient information.
3. If there is a mismatch between the data scanned from the barcode and existing patient information, a message displays. Perform one of the steps as follows:
   - Select **Use Scanned Data** to populate the barcode data into the relevant fields on the **Patient Information** screen, and confirm the data entered from the barcode is accurate.
   - Select **Use Current Data** to retain the manually entered information on the **Patient Information** screen, and enter or modify patient information as necessary.

3.3.2 Query Orders or ADT for Patient Demographics

Make sure that:

- You have privileges to see orders and do remote patient query.
- Use orders of ADT data as configured on the device to do remote patient query.
- A barcode reader is connected to the device.

1. Start a test for a new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.
2. Do one of the steps below:
   - Scan the patient barcode.
   - Use the keyboard to enter the **Patient ID** or **Visit Number** on the screen and press **Search** icon on the respective field.

   The device queries
   - orders only
   - or orders and then ADT data
   - or ADT data only

   depending on how the administrator configured the device. Go to:
   - 3.3.2.1 Order Query Workflow on page 30 if your device queries orders only.
   - 3.3.2.2 Orders and then ADT Query Workflow on page 32 if your device queries orders and then ADT data.
   - 3.3.2.3 ADT Query Workflow on page 34 if your device queries ADT data only or if no matching order is found.
3. Enter or change patient information, as necessary.

3.3.2.1 Order Query Workflow

The device first searches for local orders with the **Patient ID**.

If	Then
Multiple local orders are found on the device	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One local order is found on the device	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.
No local orders are found on the device	A message displays in the notification area that no matching local orders are found.

The device first searches for local orders with the **Visit Number**.

If	Then
Multiple local orders are found on the device	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One local order is found on the device	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.

If	Then
No local orders are found on the device	A message displays in the notification area that no matching local orders are found.

The device then searches for remote orders in the MUSE system with **Patient ID**.

If	Then
Multiple remote orders are found on the MUSE system	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One remote order is found on the MUSE system	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.
No remote orders are found on the MUSE system	A message displays in the notification area that no matching remote orders are found.
Remote order query failed on the MUSE system	A message displays in the notification area that remote order query has failed.

The device then searches for ADT data in the MUSE system with **Visit Number**.

If	Then
Multiple ADT records are found on the MUSE system	The matching records show on the Acquisition screen, and a message displays in the notification area that matching ADT data is found. The maximum of five records display on the Acquisition screen. Select the ADT record to search the order using that selected record's **Patient ID**.
Only one ADT record is found on the MUSE system	System searches for the **Patient ID** order found in that ADT record. • If multiple orders are found on the system - The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test. • If only one order is found on the system - The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen. • If no orders are found on the system - A message displays in the notification area that no matching remote orders are found. • If remote order query is failed on the system - A message displays in the notification area that remote order query has failed.
No ADT records are found on the MUSE system	A message displays in the notification area that no ADT data found.
Remote ADT data query failed on the MUSE system	A message displays in the notification area that ADT query has failed.

When local or remote orders are found, and you try to attach the order:

If	Then
The selected order matches the patient demographics in the **Patient Information** screen	A warning message displays on the screen: *Are you sure you want to attach this order to the current test?* Select **Yes** to attach the order, **No** to cancel the action.
The selected order does not match the patient demographics in the **Patient Information** screen	A warning message displays on the screen: **Name or Patient ID Mismatch** *Are you sure you want to attach this order to the current test?* Select **Yes** to attach the order, **No** to cancel the action.

3.3.2.2 Orders and then ADT Query Workflow

The device first searches for local orders with the **Patient ID**.

If	Then
Multiple local orders are found on the device	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One local order is found on the device	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.
No local orders are found on the device	A message displays in the notification area that no matching local orders are found.

The device first searches for local orders with the **Visit Number**.

If	Then
Multiple local orders are found on the device	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One local order is found on the device	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.
No local orders are found on the device	A message displays in the notification area that no matching local orders are found.

The device then searches for remote orders in the MUSE system with **Patient ID**.

If	Then
Multiple remote orders are found on the MUSE system	The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
One remote order is found on the MUSE system	The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.

If	Then

No remote orders are found on the MUSE system	A message displays in the notification area that no matching remote orders are found. The device then searches for ADT data in the MUSE system.
	• If multiple ADT records are found on the MUSE system - The matching records show on the Acquisition screen, and a message displays in the notification area that matching ADT data is found. Select the ADT record to search the order using that selected record's **Patient ID**.
	• If only one ADT record is found on the MUSE system - The device searches for the **Patient ID** order found in that ADT record.
	  • If multiple orders are found on the system - The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test.
	  • If only one order is found on the system - The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen.
	  • If no orders are found on the system - A message displays in the notification area that no matching remote orders are found.
	  • If remote order query is failed on the system - A message displays in the notification area that remote order query has failed.
	• If no ADT records are found on the MUSE system - A message displays in the notification area that no ADT data/remote orders found.
	• If remote ADT data query failed on the MUSE system - A message opens in the notification area that ADT query has failed.

Remote order query failed on the MUSE system	A message displays in the notification area that remote order query has failed.

The device then searches for ADT data in the MUSE system with **Visit Number**.

If	Then
Multiple ADT records are found on the MUSE system	The matching records show on the Acquisition screen, and a message displays in the notification area that matching ADT data is found. The maximum of five records display on the Acquisition screen. Select the ADT record to search the order using that selected record's **Patient ID**.

If	Then
Only one ADT record is found on the MUSE system	System searches for the **Patient ID** order found in that ADT record. • If multiple orders are found on the system - The orders show on the **Orders** tab in a filtered list. Select the order you will to attach to the patient test. • If only one order is found on the system - The order fills in the **Patient Information** screen, if there is no mismatch with the patient data on the screen. • If no orders are found on the system - A message displays in the notification area that no matching remote orders are found. • If remote order query is failed on the system - A message displays in the notification area that remote order query has failed.
No ADT records are found on the MUSE system	A message displays in the notification area that no ADT data/remote orders found.
Remote ADT data query failed on the MUSE system	A message displays in the notification area that ADT query has failed.

When local or remote orders are found, and you try to attach the order:

If	Then
The selected order matches the patient demographics in the **Patient Information** screen	A warning message displays on the screen: *Are you sure you want to attach this order to the current test?* Select **Yes** to attach the order, **No** to cancel the action.
The selected order does not match the patient demographics in the **Patient Information** screen	A warning message displays on the screen: *Are you sure you want to attach this order to the current test?* Select **Yes** to attach the order, **No** to cancel the action.

3.3.2.3 ADT Query Workflow

The device searches for ADT data in the MUSE system with the **Patient ID** or **Visit Number**.

If	Then
An ADT record that matches the **Patient ID** or **Visit Number** is found on the MUSE system	The patient demographics fills in on the **Patient Information** screen.
Multiple ADT records that match the **Patient ID** or **Visit Number** are found on the MUSE system	The matching records show on the Acquisition screen, and a message opens in the notification area that matching ADT data is found. Select a ADT record, and click **Select** to fill in the patient demographics on the **Patient Information** screen.
No ADT records that match the **Patient ID** or **Visit Number** are found on the MUSE system	A message opens in the notification area that no matching ADT data is found.
The ADT query failed	A message opens in the notification area that ADT query has failed.

NOTE

If multiple sites are configured on a MUSE system, ADT query is done only on Site 1, if the MUSE system version is MUSE v9 SP5 or earlier. ADT query to the MUSE system for sites other than Site 1 requires MUSE v9 SP6 or later.

3.3.3 Enter or Edit Patient Information Using the Keyboard

1. Enter data in the fields displayed in the **Patient Information** screen using the keyboard. Only fields that are configured to be displayed in the **Patient Information** screen display. See C.1 Patient Information Text Box Names on page 128 for a list of fields that can display on the screen.
   - If the Pinyin input method is configured:
     - When you enter data in the fields, a number list of matching Chinese characters is displayed in a drop-down menu. Select or enter the number of the desired value in the list to populate the Chinese character in the field.
     - The pinyin checkbox is selected in the status bar:  You can unselect the checkbox or press **Alt + Space** or **Shift + Space** on the keyboard to switch to the device language.
   - If you enter incorrect data in a field, the field border changes to red.
   - An asterisk (*) displays adjacent to mandatory fields in the **Patient Information**.

   NOTE

   If you go to the **Settings** or **Service** screen before you complete a patient test, the data entered in the **Patient Information** screen clears when you go back to the **Acquisition** screen.
2. To save your entries, select **Save**.

   The information is saved and the **Patient Information** screen closes.

   Based on the **Mandatory fields apply for Transmission** or **Acquisition** settings, the ECG report will not be accepted, transmitted, or printed until you enter the patient demographic data for any of the mandatory fields. You need to complete the data for the mandatory fields.

4 Record an ECG or Rhythm

4.1 Hookup Advisor Overview

The **Hookup Advisor** is a tool to monitor the lead signal quality during ECG acquisition. It can decrease or eliminate the occurrence of poor quality ECGs, by allowing you to view each leadwire signal quality and adjust as necessary.

The **Hookup Advisor** reports the status based on signals from each leadwire. Connect the RA/R leadwire, and then another leadwire to the patient, an electrode placement image expands in the **Hookup Advisor** panel. If all leadwires are disconnected from the patient, the electrode placement image collapses after a few seconds.

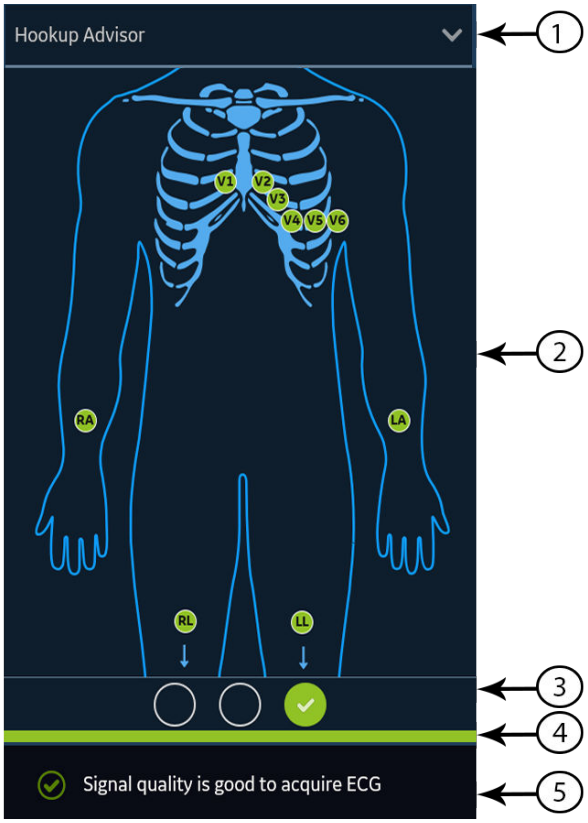


Table 4-1 Hookup Advisor Panel

Item	Name	Description
1	**Collapse** arrow	Select the arrow to collapse the electrode placement image.

Table 4-1 Hookup Advisor Panel (Table continued)

Item	Name	Description
2	Electrode Placement Image	Displays electrode placement and quality of each lead. Each lead quality indicator changes color to red, yellow or green, based on its connection status. On the Acquisition screen, the image displays the real-time electrode quality of each lead. During preview of an ECG patient report, the image displays the electrode quality of each lead at the time of ECG acquisition; not the real-time electrode quality of each lead. During review of a patient report, all electrode lead quality indicators are turned off. You can set up a lead condition indicator in settings, if the **Hookup Advisor** level is configured as: • **Yellow**, the image automatically expands when the **Hookup Advisor** status is yellow or red in the Acquisition screen, or during preview of an ECG patient report. • **Red**, the image automatically expands when the **Hookup Advisor** status is red in the Acquisition screen, or during preview of an ECG patient report. The image collapses during review of a patient report, irrespective of the overall **Hookup Advisor** status. • **Never**, the image does not automatically expand when the overall **Hookup Advisor** status is yellow or red. Only the **Hookup Advisor** lead quality status indicator and status messages display in the Notification Area.
3	Lead Quality Status Indicator	Displays three circles that change color to yellow, red, or green, based on the overall lead quality. This indicator does not apply to review of rhythm reports.
4	Status Bar	Displays a solid color bar that matches the same color as the lead quality status indicator. For example, if the lead quality status indicator is green, the status bar displays a solid green color. In the pre-acquisition (refer to 4.5 ECG Acquisition Overview on page 41) mode , when the lead quality status indicator changes from red or yellow to green, the status bar shows a progress bar of acquiring 10 seconds of ECG data with good quality.
5	Notification Area	Displays lead quality status messages indicating the specific problem in each lead. Messages display one at a time. If there are more than one failures, messages for red states display first. When you resolve a problem, the next message displays. Continue to resolve the problems until the indicator is green.

Table 4-2 Lead Quality Indicators on the Electrode Placement Image

Lead Quality Indicator	Description
Green	The leadwire connection is good. The acquisition module is sending a good signal to the device.
Yellow	The leadwire connection is experiencing noise and the signal is not clear.
Red	The lead is disconnected or not receiving a usable signal.
No color (unlit)	No ECG data is being acquired.

Table 4-3 Hookup Advisor Lead Quality Status Indicators

Indicator	Description
Red 	Shows a lead fail condition or extreme baseline shifts. The red indicator is always the left circle of the indicator. It flashes on and off approximately each second and contains an X symbol. The two circles to the right are black. A message displays with information to help you resolve the problem.

Table 4-3 Hookup Advisor Lead Quality Status Indicators (Table continued)

Indicator	Description
Yellow 	Shows muscle artifact, power line interference, baseline wander, or electrode noise. The yellow indicator is always the middle circle of the indicator and contains a dash. The left and right circles are black. A message displays with information to help you resolve the problem.
Green 	Shows acceptable signal quality. The green indicator is always the right circle of the indicator and contains a check mark. The two circles to the left are black. A message displays showing that the signal lead quality is good to acquire an ECG.

NOTE

The background color of the **Start ECG** icon is green, when the **Hookup Advisor** status is green. The background color of the **Start ECG** icon is blue, when the **Hookup Advisor** status is red or yellow.

If a leadwire is disconnected, the overall status shows as failed (red). To determine which leadwire has failed, you need to understand which electrodes are used to form a lead. If RA is the reference electrode and it is not connected, all the electrodes display as failed. If another leadwire is the reference electrode and it is not connected, only that electrode displays as failed.

If the Acquisition Module is disconnected during ECG acquisition, the *Hookup Advisor* does not display the lead status or messages and ECG acquisition is stopped. An error message showing that the acquisition module is disconnected displays in the waveform area of the Acquisition screen.

CAUTION



ELECTRICAL INTERFERENCE

Electrostatic discharges may interfere with the acquisition of ECG recordings. The acquisition module could be temporarily disconnected with an error message displayed due to an ESD event. The device recovers automatically from this error. ECG recordings need to be restarted after the error message is removed and the acquisition module recovers.

Restart the ECG after the Acquisition Module is connected and the *Hookup Advisor* displays a green status. After you resolve the errors, the electrode placement image collapses after the **Hookup Advisor** status indicator is green for at least four seconds.

The preview or review of a patient report is based on the **Hookup Advisor** status at the time of ECG acquisition, and not the real-time status of a currently connected patient.

4.1.1 Acquire an ECG based on the Hookup Advisor status in Post-Acquisition Mode

In post-acquisition mode (refer to 4.5 ECG Acquisition Overview on page 41), the next 10 seconds of ECG data is acquired when you start to record an ECG.

Review the Hookup Advisor status before you start an ECG. If the Hookup Advisor status is green, it shows that the signal quality is good, you can start to record an ECG that acquires the next 10 seconds of ECG data.

- If the status stays green during the 10 seconds ECG acquisition, you can accept the ECG.

- If the quality of the ECG signal has problems during the 10 seconds ECG acquisition, the status changes from green to yellow or red.

  It is recommended to reject an ECG that is acquired in the post-acquisition mode with poor signal quality.

4.1.2 Acquire an ECG based on the Hookup Advisor status in Pre-Acquisition Mode

In pre-acquisition mode (refer to 4.5 ECG Acquisition Overview on page 41), the previous 10 seconds of ECG data is acquired when you start to record an ECG.

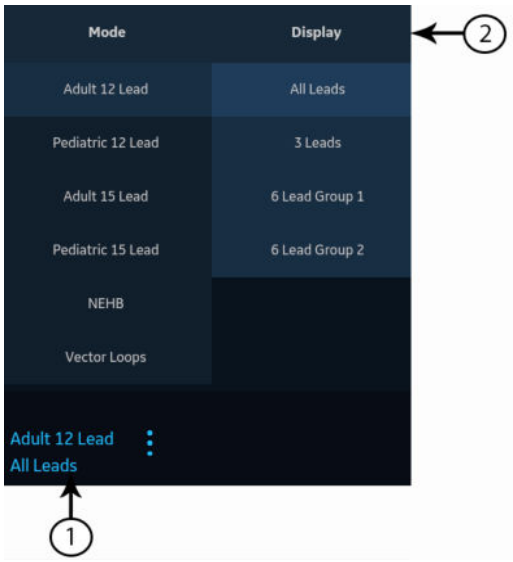
Review the Hookup Advisor status before you start an ECG:

- If the status is green, it shows that the previous 10 seconds of ECG data is good. You can start to record an ECG.
- If the status changes from green to yellow or red, it shows that the quality of the ECG signal is not good. A message displays for the most critical state in the last 10 seconds.
- If the status changes from yellow or red to green, Hookup Advisor displays a message that you need to wait for 10 seconds before you start to record an ECG.

4.2 Change Lead Sets and Lead Formats

The Acquisition screen displays the waveform based on the configured lead format, lead set, speed, gain, and filter. After you start a new patient, you can change the lead set or lead format on the Acquisition screen.

1. At the bottom, left-side of the Acquisition screen, select anywhere to the left of the ellipsis icon (1).



   The **Mode** and **Display** menus (2) are expanded.

2. Select a different lead set below **Mode**.

   If you change the lead set, it resets the acquisition of data and cannot be done while recording or printing a rhythm.

   The selected lead set is applied to the waveform.

3. Select a different lead format below **Display**.

   The selected lead format is applied to the waveform. Select anywhere outside the menu to collapse it.

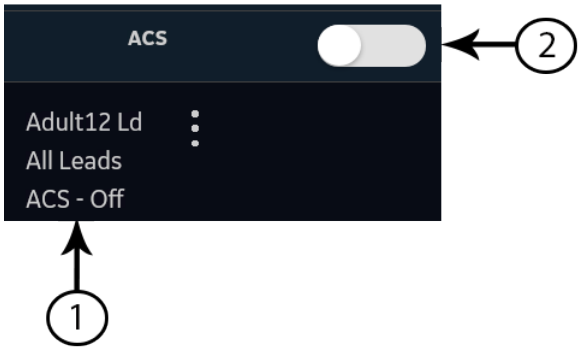
   These changes apply only to the current patient test(s). If you start a new patient, the changes reset to the values configured for the device.

4.3 Enable ACS Interpretation

You can enable the ACS option on the Acquisition screen before you record an ECG patient test if the ACS option, which detects Acute Coronary Syndrome, is bought and activated on the device.

This option records a resting ECG with ACS interpretation statements. By default, ACS interpretation statements are disabled for each patient. ACS must be enabled on a per-patient basis.

1. At the bottom, left side of the Acquisition screen, select anywhere to the left of the ellipsis icon (1).



   The **ACS** option displays in the expanded menu.

2. Turn the **ACS** option (2) on to enable ACS interpretation statements for the patient report.

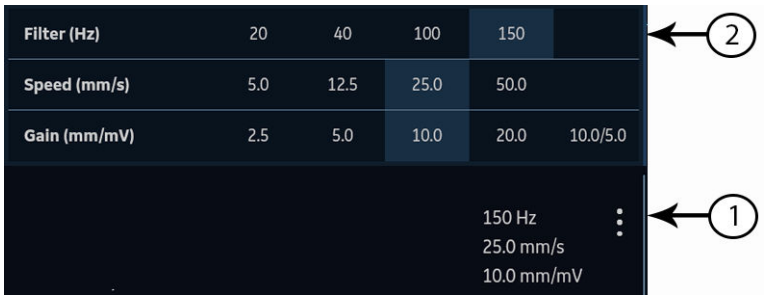
   If you enable this option, it will stay enabled for the subsequent patient test(s) for that visit. It must be enabled again for the next patient.

   If the patient demographics show that the patient is younger than 16 years of age, the device records a pediatric ECG with a standard 12SL analysis. The ACS algorithm is not executed.

4.4 Change Speed, Gain, and Filter

The Acquisition screen displays the waveform from the configured speed, gain, and filter. After you start a new patient, you can change the speed, gain, or filter on the Acquisition screen.

1. At the bottom, right side of the Acquisition screen, select anywhere onto the left side of the ellipses icon (1).



   The **Filter (Hz)**, **Speed (mm/s)**, and **Gain (mm/mV)** menu (2) expands.

2. To adjust the speed, gain, and filter of the waveform, select a different value from the list.

   The selected values are applied to the waveform. Select anywhere outside the menu to collapse it.

   These changes apply only to the existent patient test(s). If you start a new patient, the changes reset to the values configured for the device.

4.5 ECG Acquisition Overview

You can record an ECG in pre-acquisition or post-acquisition modes.

Table 4-4 ECG Acquisition Modes

Acquisition Mode	Description
Pre-acquisition	When you start recording an ECG: • If 10 seconds of ECG data is available, the system records the previous 10 seconds of data for analysis. • If 10 seconds of ECG data is not available, the system continues recording until 10 seconds of ECG data is obtained.
Post-acquisition	When you start recording an ECG, the system records the next 10 seconds of data for analysis.

If the **Auto-ECG** option is enabled on the device, the device automatically records one ECG for each new patient. For more information on automatic ECG acquisition, see 4.5.1 Automatically Acquire an ECG on page 41.

To record an ECG patient test manually, see 4.5.2 Manually Start an ECG recording on page 42.

4.5.1 Automatically Acquire an ECG

Start a test for a new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.

Make sure that your administrator enables the **Auto-ECG** setting.

The system starts to automatically record an ECG:

- When **Auto-ECG** setting is enabled.
- If the **Hookup Advisor** status is green.
- If you are viewing the scrolling waveforms in the **Live** tab.

The automatic acquisition of ECG happens only once per patient connection.

The **Stop Auto ECG** icon displays the count of acquisition progress until you record 10 seconds of data. After acquiring 10 seconds of data with good signal quality, the recording stops and a preview of the ECG patient report displays in the **ECG** tab.

If you record the ECG before you enter patient information in the *Patient Information* screen, you can edit patient information before accepting the preview. For more information, see 4.5.4 Accept or Reject an ECG Patient Report on page 44.

Automatic ECG acquisition is triggered only one time for the current patient test. Start any new ECG tests for that same patient manually.

When Auto-ECG is in progress, the **Start ECG** button changes to the **Stop ECG** button:

- If you select the **Stop ECG** button, automatic ECG acquisition stops and the **Start ECG** button displays.
- If you select the **Start ECG** button, ECG acquisition starts manually.

If you perform other functions during automatic ECG acquisition, a message displays in the notification area. For example:

- If you perform Start New Patient - a message displays that **(For unsaved data will be lost)** .
- If you navigate to Settings - a message displays that **(For cannot perform this action)** .

Select **Cancel**, to continue to perform automatic ECG acquisition and retain current patient data. If you select **Continue**, automatic ECG acquisition stops.

The automatic ECG function is aborted and the device will function in manual ECG mode if:

- An automatic ECG acquisition is stopped before 10 seconds of data is acquired.
- The preview of an ECG that was automatically acquired is rejected.

4.5.2 Manually Start an ECG recording

1. Start a test for a new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.

   NOTE

   If you want to record an ECG for the current patient, do not start a new patient test.

2. Change the lead set or format, gain, speed, or filter, if required. For more information, see 4.2 Change Lead Sets and Lead Formats on page 39 and 4.4 Change Speed, Gain, and Filter on page 40.
3. Start recording the patient ECG by performing one of the following:
   - Select the **Start ECG** icon at the bottom of the Acquisition screen:

   - Press the **ECG** key on the keyboard:

   - Press the **ECG** button on the Acquisition Module:

   In pre-acquisition mode, the system checks if 10 seconds of ECG data is available.

   - If 10 seconds of ECG data is available, the system records the previous 10 seconds of data for analysis. You cannot stop or cancel the acquisition at this time.
   - If 10 seconds of ECG data is not available, the system continues recording until 10 seconds of ECG data is obtained. The **Start ECG** icon changes to **Stop ECG**, and the count of acquisition progress displays on the icon until you have recorded 10 seconds of data. You can cancel the acquisition before 10 seconds of data is recorded. For more information, see 4.5.3 Cancel an ECG on page 43.

   In post-acquistion mode, the system starts recording the next 10 seconds of ECG data for analysis. The **Start ECG** icon changes to **Stop ECG**, and the 10 seconds count of acquisition progress

displays on the icon. You can cancel the acquisition before 10 seconds of data is recorded. For more information, see 4.5.3 Cancel an ECG on page 43.

The patient ECG test report begins generating. Based on the print preview mode configuration and the *Hookup Advisor* status, the recorded ECG patient test opens in a separate tab.

If ...	Then ...
Print preview mode is configured as **Always**	The ECG patient report preview is displayed in the *ECG* tab for you to accept or reject the report. For more information on how to accept or reject the report, see 4.5.4 Accept or Reject an ECG Patient Report on page 44.
Print preview mode is configured as **Yellow** and the Hookup Advisor Status is **Yellow** or **Red**	
Print preview mode is configured as **Red** and the Hookup Advisor Status is **Red**	
Print preview mode is configured as **Yellow** and the Hookup Advisor Status is **Green**	The ECG patient report preview is not displayed. The ECG patient report is automatically accepted, saved in the **Files** list, and displayed in the **ECG** tab for review. For more information, see 4.5.5 Review an ECG Patient Report on page 47. The report is automatically printed. For more information, see 4.5.6 Automatically Print an ECG Patient Report on page 49. If a destination is configured for ECG reports to be automatically sent after acquisition, the ECG report is automatically added to the queue of pending reports to be sent to the configured destination. For more information, see 7.1 Display the Report Queue on page 85. **NOTE** Based on the **Mandatory fields apply for Transmission** settings, the ECG report is not added to the transmission queue until you enter the patient demographic data for the mandatory fields. An error message displays in the notification area. You need to complete the data for the mandatory fields and manually resend the report to a configured destination. **NOTE** Based on the **Mandatory fields apply for Acquisition** settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields. An error message **Unable to accept. Incomplete patient data.** displays on the **Acquisition** screen. You need to complete the data for the mandatory fields to accept the ECG report.
Print preview mode is configured as **Red** and the Hookup Advisor Status is **Yellow** or **Green**	
Print preview mode is configured as **Never**	

4.5.3 Cancel an ECG

You can stop recording an ECG before 10 seconds of data are recorded.

1. Select the **Stop ECG** icon at the bottom of the Acquisition screen to cancel the ECG acquisition:



The device stops recording the ECG data and the **Start ECG** icon displays.

4.5.4 Accept or Reject an ECG Patient Report

CAUTION

DELAY IN TREATMENT

Unaccepted ECGs in the preview screen will be automatically rejected and deleted when all patient leads are disconnected and the MAC VU360 device is inactive for 2 minutes.

A preview of the recorded 10 seconds of data is displayed in the *ECG* tab in the configured preview report format if:

- The ECG is recorded in automatic ECG mode.
- Your administrator has configured the preview mode to display the recorded 10 seconds of data.
- The 10 seconds of ECG is selected from the Full Disclosure screen.

NOTE

The *Full Disclosure* tab displays after you purchase and enable the Full Disclosure option.

You can accept this preview to save the ECG patient report in the *Files* tab, or reject it and start another ECG.

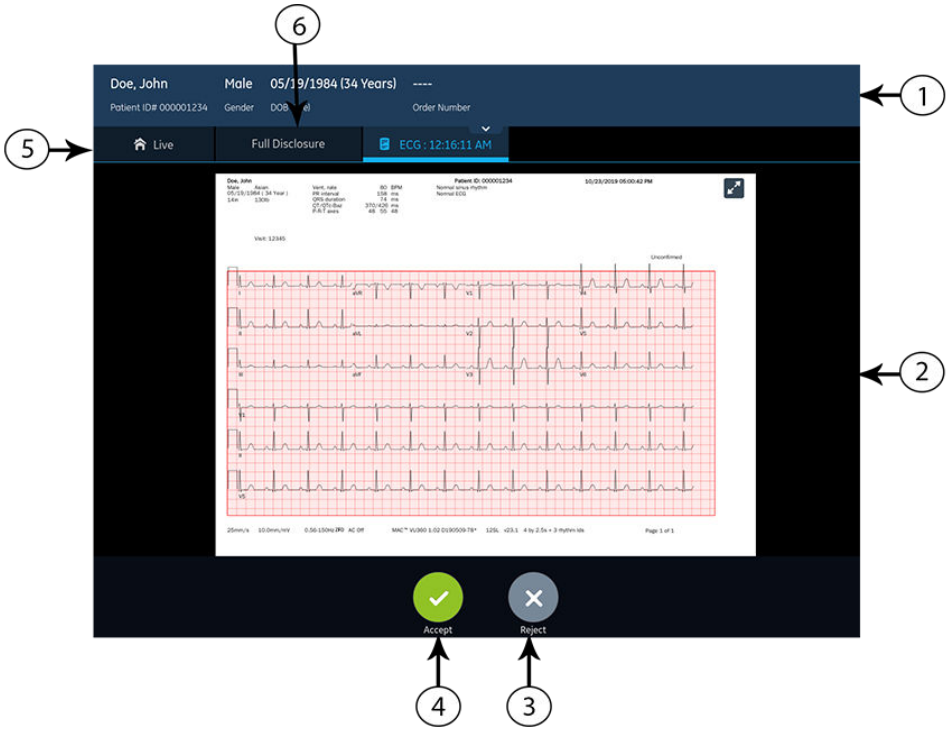


Table 4-5 ECG Tab Displaying a Preview of the ECG Patient Report

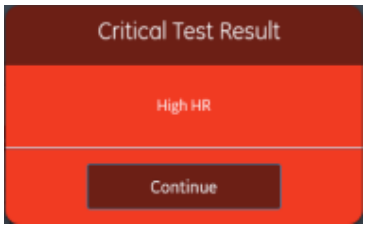
Item	Name	Description
1	*Patient Information* Banner	Displays patient information. Select anywhere in the *Patient Information* banner to edit patient information for the patient report. Modify the information by using the keyboard, attaching an order, scanning the patient barcode, selecting a patient from the *Patients* tab, or performing an ADT query.

Table 4-5 ECG Tab Displaying a Preview of the ECG Patient Report (Table continued)

Item	Name	Description
2	Preview of ECG patient report	Displays the preview of the ECG patient report. If a patient report contains multiple pages, a part of another page is displayed on the right-side of the screen. Press the left and right arrows on the screen to navigate from one page to another. For more information on the report formats and the standard layout of the ECG patient report, see A.1 ECG Report Formats on page 111.
3	**Reject** icon	Select the **Reject** icon to return to the live waveform display in the Acquisition screen.
4	**Accept** icon	Select the **Accept** icon to accept the preview of the ECG patient report and save it in the *Files* list. The accepted ECG patient report is refreshed and displayed in the same tab for review with additional options.
5	**Live** tab	Select the **Live** tab to return to the live waveform displayed in the Acquisition screen. The current ECG preview is retained until you record another ECG, or go back to the preview and accept or reject it.
6	**Full Disclosure** tab	Click the **Full Disclosure** tab from the patient record menu bar to navigate to the Full Disclosure waveform and application. The **ECG Preview** does not change until you accept or reject the **ECG Preview** or record the new ECG.

To accept or reject the ECG preview, perform the steps as follows:

1. Review the patient report and *Hookup Advisor* status.
2. If the **CRIT- Critical Value Notifications** option is enabled on the device, and one or more critical values are detected during ECG acquisition, a window opens on top of the *ECG* tab displaying critical value notifications in the order in which they are detected.



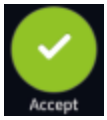
3. Select **Continue** to acknowledge each notification.

   If you try to perform other functions such as accessing the *Settings* or *Service* screen prior to accepting or rejecting the ECG, a message displays indicating that the ECG is not saved, and the preview will be lost if you navigate to the screen.

   Select one of the options as follows:

   - If you select **Continue**, the preview will be lost.
   - If you select **Cancel**, you can proceed to accept or reject the ECG preview.

4. Accept or reject the ECG preview based on the *Hookup Advisor* status.

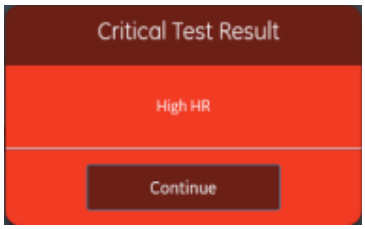
If ...	Then ...	Next Steps
Hookup Advisor status is green, the ECG signal quality is good. The **Accept** icon is highlighted in green. The **Reject** icon is not highlighted.	Select the **Accept** icon:  The preview of the ECG patient report is accepted and saved in the *Files* list. The patient report is refreshed and displayed in the same tab for review with additional options.	• Review the ECG patient report and decide on the next steps. For more information, see 4.5.5 Review an ECG Patient Report on page 47. • The ECG patient report is automatically printed. For more information, see Autoprint an ECG Report on page 49. • The patient report is added to the queue of pending reports to be sent to the configured automatic destination. For more information, see 7.1 Display the Report Queue on page 85. **NOTE** Based on the **Mandatory fields apply for Transmission** settings, the ECG report is not added to the transmission queue until you enter the patient demographic data for the mandatory fields. An error message displays in the notification area. You need to complete the data for the mandatory fields and manually resend the report to a configured destination. **NOTE** Based on the **Mandatory fields apply for Acquisition** settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields. An error message **Unable to accept. Incomplete patient data.** displays on the **Acquisition** screen. You need to complete the data for the mandatory fields to accept the ECG report.
Hookup Advisor status is yellow or red, there are issues with the ECG signal quality during the recording of this ECG. The **Reject** icon is highlighted in blue to reflect the status of *Hookup Advisor*. The **Accept** icon is not highlighted.	Select the **Reject** icon:  The ECG patient report is discarded. The *ECG Preview* tab closes and returns to the Acquisition screen.	Start a new ECG on the same patient. For more information, see 4.5 ECG Acquisition Overview on page 41.

4.5.5 Review an ECG Patient Report

When you disconnect patient leads and there is no activity with the MAC VU360 device for 2 minutes, all ECG reports will automatically close.

After the 10 seconds ECG is acquired and the ECG preview is accepted, the patient report is displayed in the *ECG* tab in the configured report format for review.

If the *CRIT* option is enabled on the device, and one or more critical values are detected during ECG acquisition, a window opens on top of the *ECG* tab displaying the notifications for the critical values in the order in which they are detected.



Select **Continue** to acknowledge the notification and proceed with other tasks.

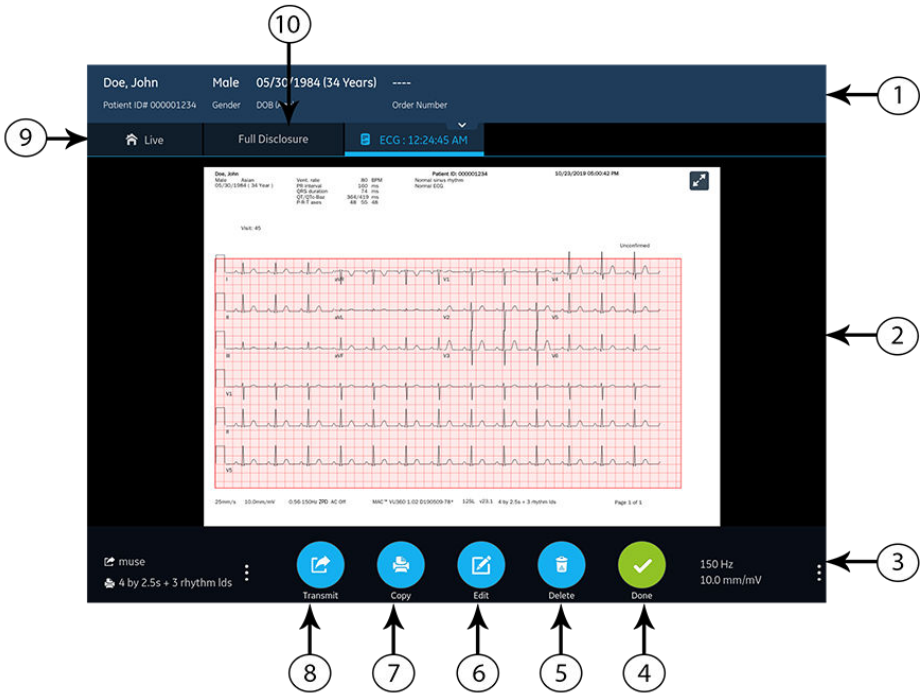


Table 4-6 ECG Tab Displaying an ECG Patient Report for Review

Item	Name	Description
1	*Patient Information* Banner	Displays patient information such as patient first name, last name, gender, age, and so on. Select anywhere in the *Patient Information* banner to edit patient information for the patient report.

Table 4-6 ECG Tab Displaying an ECG Patient Report for Review (Table continued)

Item	Name	Description
2	ECG patient report	Displays the ECG patient report. If a patient report contains multiple pages, a part of another page is displayed on the right-side of the screen. Select the left and right arrows on the screen to navigate from one page to another. For more information on the report formats and the standard layout of the ECG patient report, see A.1 ECG Report Formats on page 111.
3	Gain and Filter	To change the waveform gain or filter, select anywhere around the ellipsis icon next to **Gain** and **Filter** and select a new value from the expanded list. The patient report is refreshed with the selected gain and filter.
4	**Done** icon	Closes the patient report after completing your tasks. For more information, see 4.12 Close a Patient Report on page 58.
5	**Delete** icon	Deletes the patient report. For more information, see 4.10 Delete a Patient Report on page 57.
6	**Edit** icon	Edits patient information for the patient report. For more information, see 4.9 Edit Patient Information in a Patient Report on page 56.
7	**Copy** icon	Prints a copy of the patient report. For more information, see 4.8 Print a Patient Report on page 55.
8	**Transmit** icon	Transmits the patient report. For more information, see 4.7 Transmit a Patient Report to a Configured Destination on page 52.
9	**Live** tab	Select the **Live** tab to return to the live waveform display in the Acquisition screen.
10	**Full Disclosure** tab	Click the **Full Disclosure** tab from the patient record menu bar to navigate to the Full Disclosure waveform and application. **NOTE** The **Full Disclosure** tab displays after you purchase and enable the Full Disclosure option.

To start a new ECG on the same patient, select the **Live** tab to return to the live waveform display in the Acquisition screen, and restart the ECG. For more information, see 4.5 ECG Acquisition Overview on page 41.

After you select **Done** on the **Review** screen of an ECG patient report, disconnect patient leads before you select **Start New Patient** on the MAC VU360 device.

To start an ECG for a new patient, select **Start New Patient**. For more information, see 3.2 Start a Test for a New Patient on page 28.

To start a new 10 seconds ECG on the same patient from the Full Disclosure tab, click the **Full Disclosure** tab from the patient record menu bar to navigate to the Full Disclosure waveform and application, and select 10 seconds ECG from the Full Disclosure waveform. For more information, see 4.13.1 Record a Full Disclosure ECG on page 59.

To start a new 10 seconds ECG on the same patient from the Full Disclosure tab, click the **Full Disclosure** tab from the patient record menu bar to navigate to the Full Disclosure waveform and application, and select 10 seconds ECG from the Full Disclosure waveform. For more information, see 4.13.1 Record a Full Disclosure ECG on page 59.

4.5.6 Automatically Print an ECG Patient Report

When a patient report is saved in the *Files* list, it is automatically printed in the configured report formats.

The configured report formats determine the following:

- Number of copies printed
- Inclusion or exclusion of 12SL interpretation statements
- Printing of all reports
- Printing of only the reports interpreted by the 12SL analysis as abnormal

The ECG patient report is printed in the order in which it was received. If no other patient reports are printing, the report is printed immediately.

You will see a progress message at the bottom of the screen indicating the printing status.

If the device is configured to print the barcode of the patient ID in the patient reports, the printed patient report includes the barcode. The barcode can be used to perform a query by patient ID in the MUSE system.

If a printer error occurs, the progress message is replaced by the related printer error. The printing restarts automatically after the error is resolved. For more information on printer errors, see 12.3 Printing Errors on page 106.

To stop printing a patient report, do one of the following:

- Press the **Stop** key on the keyboard:



- Press the **Stop** button on the Acquisition Module:



All pending print jobs are cancelled.

4.6 Record a Rhythm

Make sure that sufficient paper is available in the paper tray to print a rhythm report.

A rhythm report can be stored in digital form in the *Files* list or printed on paper, depending on how the device has been configured for your site. A digital rhythm report cannot be transmitted to a configured automatic destination.

1. Start a test for a new patient. See 3.2 Start a Test for a New Patient on page 28.
2. Change the lead set or format, gain, speed, or filter, if required. See 4.2 Change Lead Sets and Lead Formats on page 39.
3. Start the rhythm for the patient in one of the following ways:
    - Select the **Start Rhythm** icon on the Acquisition screen:



- Press the **Rhythm** key on the keyboard:



- Press the **Rhythm** button on the Acquisition Module:



The **Start Rhythm** icon on the Acquisition screen changes to **Stop Rhythm**. A count of the recording progress starting at one-second displays on the icon if the configured rhythm mode is **Digital Only** or **Both**.

If the **Delay Rhythm Printing** option is disabled, the rhythm for the patient is recorded and/or printed in real-time.

If the **Delay Rhythm Printing** option is enabled, the rhythm for the patient is recorded and/or printed with the previous 10 seconds data.

If the Rhythm Mode is ...	Then
Print Only	The rhythm is only printed. It is not digitally recorded. Go to step Step 4 to stop printing the rhythm. If you do not stop printing the rhythm, printing continues until the paper tray is out of paper.
Digital Only	The rhythm is only digitally recorded in real-time at the configured speed and for the configured duration. When the configured duration is reached, the rhythm stops recording. The digital rhythm report is displayed in a new **Rhythm** tab and saved in the *Files* list. The rhythm is not printed. Go to step Step 4 if you want to stop recording the rhythm before its configured duration is reached, otherwise go to step 5. **NOTE** **Digital Only** is available only if you enable the **DHRM - Digital Rhythm** option.
Both	The rhythm for the patient is digitally recorded and printed in real-time at the configured speed and for the configured duration. When the configured duration is reached, the rhythm stops recording and printing. The digital rhythm report is displayed in a new **Rhythm** tab and saved in the *Files* list. Go to step Step 4 if you want to stop recording and printing the rhythm before its configured duration is reached, otherwise go to step 5. **NOTE** **Both** is available only if you enable the **DHRM - Digital Rhythm** option.

If a printer error occurs and rhythm printing is stopped, you need to troubleshoot the error. For more information, see 12.3 Printing Errors on page 106. Digital rhythm continues even if there is a printing error. To restart rhythm printing, you must stop the digital rhythm and then restart both.

4. Select the **Stop Rhythm** icon on the Acquisition screen to stop both digital rhythm recording and printing:



To stop printing the rhythm report while the digital acquisition of rhythm continues, perform one of the following:

- Press the **Stop** key on the keyboard:



- Press the **Stop** button on the Acquisition Module:



5. Review the rhythm report. For more information, see 4.6.1 Review a Digital Rhythm Report on page 51.

4.6.1 Review a Digital Rhythm Report

After the digital rhythm report is recorded, the report is displayed in the *Rhythm* tab for your review.

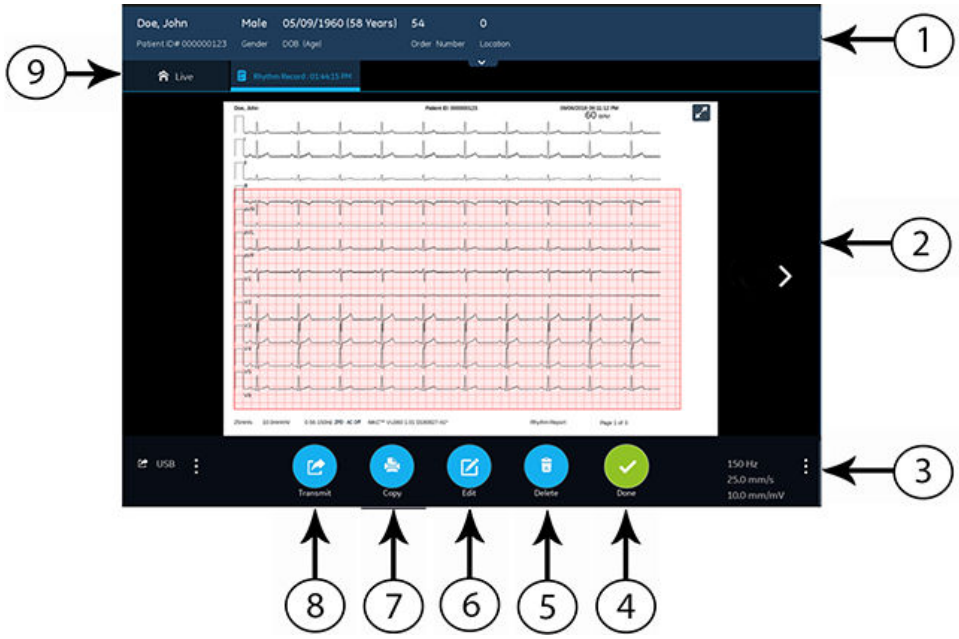


Table 4-7 Rhythm Tab

Item	Name	Description
1	*Patient Information* Banner	Displays patient information such as patient first name, last name, gender, age, and so on. Select anywhere in the *Patient Information* banner to edit patient information for the rhythm report.

Table 4-7 Rhythm Tab (Table continued)

Item	Name	Description
2	Rhythm report	Displays the rhythm report. If a rhythm report contains multiple pages, press the left and right arrows on the screen to navigate from one page to another. For more information on the rhythm report format, see A.2 Rhythm Report Format on page 116.
3	Gain, Filter, and Speed	To change the gain, filter, or speed of the waveform, select anywhere around the ellipsis icon on the lower, right corner of the **Rhythm** tab and select a new value from the expanded list. The rhythm report is refreshed with the selected gain, filter, and speed.
4	**Done** icon	Closes the rhythm report after completing your tasks. For more information, see 4.12 Close a Patient Report on page 58.
5	**Delete** icon	Deletes the rhythm report. For more information, see 4.10 Delete a Patient Report on page 57.
6	**Edit** icon	Edits patient information for the rhythm report. For more information, see 4.9 Edit Patient Information in a Patient Report on page 56.
7	**Copy** icon	Prints a copy of the rhythm report. For more information, see 4.8 Print a Patient Report on page 55.
8	**Transmit** icon	Transmits the rhythm report. For more information, see 4.7 Transmit a Patient Report to a Configured Destination on page 52.
9	**Live** tab	Select the **Live** tab to return to the live waveform display in the Acquisition screen.

To start a new rhythm for the same patient, select the **Live** tab to return to the live waveform display in the Acquisition screen, and restart the rhythm. For more information, see 4.6 Record a Rhythm on page 49.

To start a rhythm for a new patient, select **Start New Patient**. For more information, see 3.2 Start a Test for a New Patient on page 28.

4.7 Transmit a Patient Report to a Configured Destination

Before you start the procedure, make sure that:

- You have the privilege to transmit patient reports to a configured destination.
- The USB flash drive supports the FAT32 file system.

Select the correct destination for your patient report. For more information, see the table below:

Patient Report Type	Destination	Supported File Format
Resting ECG	DCP server destination (MUSE v8 SP3 or higher, v9, or MUSE NX and MUSE DICOM Gateway Pro SP1 or higher)	Hilltop format
Resting ECG	USB R/W flash drive	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.

Patient Report Type	Destination	Supported File Format
Resting ECG	SFTP server destination with remote directory path	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.
Resting ECG	Shared directory destination with folder path	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.
Digital Rhythm	USB R/W flash drive	PDF format
Digital Rhythm	DCP server destination (MUSE v9 SP6 or higher, or MUSE NX and MUSE DICOM Gateway Pro SP6 or higher)	PDF format
Digital Rhythm	SFTP server destination with remote directory path	PDF format
Digital Rhythm	Shared directory destination with folder path	PDF format
Full Disclosure	USB R/W flash drive	PDF format
Full Disclosure	DCP server destination (MUSE v9 SP6 or higher, or MUSE NX and MUSE DICOM Gateway Pro SP6 or higher)	PDF format
Full Disclosure	SFTP server destination with remote directory path	PDF format
Full Disclosure	Shared directory destination with folder path	PDF format

To transmit a patient report to the default or configured destination immediately after acquisition, perform the steps below:

1. Review the patient report to confirm that it can be transmitted to the required destination.

   To review an ECG patient report, see 4.5.5 Review an ECG Patient Report on page 47.

   To review a rhythm report, see 4.6.1 Review a Digital Rhythm Report on page 51.

   To review a Full Disclosure report, see 4.13.2 Review a Full Disclosure Report on page 60.

2. To transmit the report to the required destination, perform one of the steps below:

To transmit the report ...	Perform the following:
To the default destination	Select the **Transmit** icon: 

To transmit the report ...	Perform the following:
To another configured destination	1. Select anywhere around the ellipsis icon on the left, bottom corner of the tab to view the **Transmit** menu. 2. From the expanded **Transmit** menu, select the destination where you want to transmit the patient report. 3. Select the **Transmit** icon:  One or more destinations must be configured for the **Transmit** icon to be enabled. If no destinations are configured, the **Transmit** icon is disabled.

The selected patient report is added to the **Queue**, processed and transmitted to the selected destination. The **Job Status** in the **Queue** is updated. For information on the status, see 7.1 Display the Report Queue on page 85.

The status of a manually submitted job displays on the notification bar in the lower, right-side of the screen in the format: `<Destination_Name>: <Job_Status>`.

For example, if the destination name is USB, and the job status is **Failed**, the status displays as follows: `USB: Failed`.

A tick mark displays in the **Sent** column of the *Files* expanded list for patient reports successfully transmitted to the default destination.

If	Then
The transmission queue has reached its maximum limit of 1000 reports, a message displays in the notification area that the transmission queue is full and no additional reports can be added.	Wait for the reports in the queue to transmit and try again.
The patient report has already been transmitted to the selected destination, a message displays in the notification asking you to confirm if you want to re-transmit the already transmitted report.	Perform one of the actions below: • Select **Continue** to re-transmit the patient report. • Select **Cancel** to cancel the report transmission.

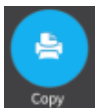
If	Then
Patient information is incomplete in the patient report (for example, mandatory fields are blank or contain invalid data), a message displays in the notification area indicating that the patient report cannot be transmitted because of incomplete patient data. **NOTE** Based on the **Mandatory fields apply for Transmission** settings, the ECG report is not added to the transmission queue until you enter the patient demographic data for the mandatory fields. An error message displays in the notification area. You need to complete the data for the mandatory fields and manually resend the report to a configured destination. **NOTE** Based on the **Mandatory fields apply for Acquisition** settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields. If you manually transmit ECG report, an error message **Unable to transmit. Incomplete patient data.** displays on the **Acquisition** screen. You need to complete the data for the mandatory fields to transmit the ECG report.	Perform the steps below: 1. Edit the patient report to enter missing patient data. 2. Retry transmission.

4.8 Print a Patient Report

You can print a copy of a Rhythm, Full Disclosure, or ECG patient report in any configured report format for the selected lead set.

- An ECG patient report opens in the **ECG** tab.
- A Rhythm report opens in the **Rhythm** tab.
- A Full Disclosure report opens in the **FD Report** tab.

1. Before printing a copy of the report, review the patient report and verify:
   - The patient information in the patient report is correct.
   - The ECG or Rhythm or Full Disclosure ECG is acquired with the desired gain and filter.
2. Perform one of the following steps:

To print a copy of the patient report ...	Perform the following:
In the default or selected report format displayed on the *ECG* or **Rhythm** or **FD Report** tab	Select the **Copy** icon:  A job to print one copy of the patient report in the default report format is sent to the printer.

To print a copy of the patient report ...	Perform the following:
In a different report format	1. Select anywhere around the ellipsis icon on the left, bottom corner of the **ECG** or **Rhythm** or **FD Report** tab to view the **Copy Format** menu. 2. From the expanded **Copy Format** menu, select the desired report format to be used to print a copy of the report. Only the report formats supported for the lead set used to record the ECG or rhythm are available for selection. For example, if a 12-lead ECG is recorded, only 12-lead ECG patient report formats are available for selection. 3. Select the **Copy** icon:  The patient report is refreshed and displayed in the *ECG* or **Rhythm** or **FD Report** tab in the selected report format. A job to print one copy of the ECG or rhythm in the selected report format is sent to the printer.

The patient report is printed in the order in which it was received. If no other patient reports are printing, the report is printed immediately. The printing status displays at the bottom of the screen.

NOTE

Based on the **Mandatory fields apply for Acquisition** settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields. An error message **Unable to print. Incomplete patient data.** displays on the **Acquisition** screen. You need to complete the data for the mandatory fields and reprint the patient report.

If a printer error occurs, the progress message is replaced by the printer error. The printing restarts automatically after the error is resolved. For more information on printer errors, see 12.3 Printing Errors on page 106.

If the device is configured to print the barcode of the patient ID in the patient reports, the printed patient report includes the barcode. The barcode can be used to perform a query by patient ID in the MUSE system.

3. To stop printing a patient report, do one of the following:
   - Press the **Stop** key on the keyboard:

   - Press the **Stop** button on the Acquisition Module:

4.9 Edit Patient Information in a Patient Report

Make sure that you have the privilege to edit patient reports.

After a test is acquired, you can edit patient information using the keyboard or by attaching an order. When an order is attached to a patient test, some fields are read-only.

If you try to edit or attach an order to a patient report that is transmitted to the default destination, an error message displays.

You cannot edit patient information by scanning a patient barcode, selecting a patient record from the *Patients* list, or performing ADT queries.

WARNING

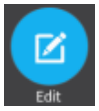


INACCURATE PATIENT DATA

Incorrect patient information can cause patient data mismatch. Data assigned to the wrong patient causes erroneous patient data that can affect diagnosis and treatment.

Be sure to check the patient information screen for each new patient. Make sure that you enter patient data for the correct patient.

1. To edit patient information for the patient report, select the **Edit** icon in the **ECG** tab or the **Rhythm** or **FD Report** tab in the Acquisition screen:

   The *Patient Information* screen opens.

2. Edit the patient information using a keyboard. See 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.

3. Select **Save** to save your changes for this patient and collapse the screen.

   If you select any other icons at the bottom of the tab prior to saving, the *Patient Information* screen collapses and the edited patient information is saved.

   The updated patient information displays on the patient report.

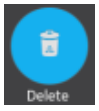
4.10 Delete a Patient Report

Make sure that you have the privilege to delete Rhythm, Full Disclosure, or ECG patient reports.

NOTE

If you do not have the privilege to view patient reports, but you have the privilege to delete patient reports, you can only view and delete patient reports you created in the current session.

1. Select the **Delete** icon in the **ECG** tab or the **Rhythm** or the **FD Report** tab on the Acquisition screen to delete the patient report:

   A message displays asking you to confirm if you want to permanently delete the patient report.

2. Select **Delete** to delete the patient report.

   The selected patient report(s) are deleted from the *Files* list.

3. A confirmation message may display if you are trying to delete a patient report that has not yet been transmitted to the default destination (if a message has been configured by your administrator). Perform one of the actions below:
   - Select **Delete** to delete the patient report. The selected patient report is deleted from the *Files* list. Deleting the patient report closes the tab where it was opened for viewing, and returns you to the **Live** tab.
   - Select **Cancel** to cancel the deletion. The selected patient report is not deleted from the *Files* list.

4.11 View the Patient Report

You can use the icons in the ECG, Rhythm, or Full Disclosure report tab to view the patient report:

Icon	Name	Description
	Maximize View	Select this icon or double-tap the patient report to maximize the view of the patient report.
	Minimize View	Select this icon or double-tap the maximized patient report to minimize the view of the patient report.
	Previous	Select this icon to navigate to the previous page of the multiple-page reports.
	Next	Select this icon to navigate to the next page of the multiple-page reports.

4.12 Close a Patient Report

1. Review the patient report.
2. After completing your tasks, select the **Done** icon in the **ECG** or the **Rhythm** or the **FD Report** tab to close the patient report:

   A message displays asking you if you want to start a new patient test.

   Select one of the options below:

   - **Start New Patient** to start a test for a new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.
   - **Continue with Same Patient** to start a test for the same patient.

4.13 Full Disclosure Overview

The Full Disclosure ECG option shows one lead of the patient waveform for a maximum of 5 minutes. From this waveform, you can create a Full Disclosure report (FD Report) or create a 12-lead or 15-lead ECG. It starts after you connect a patient to the acquisition module AND you are viewing the waveforms.

This feature may be helpful for clinicians that need to acquire an ECG on:

- A child that will not sit still or is anxious.
- A patient that is experiencing symptoms or stable arrythmias and would require a 12 lead ECG during those symptoms.

You can acquire a Full Disclosure ECG only if you purchase the Full Disclosure option, and enable it in the **Options Manager**.

Automatic acquisition of ECG does not start while in the **Full Disclosure** tab. Automatic ECG acquisition stops when you change from the **Live** tab to the **Full Disclosure** tab.

4.13.1 Record a Full Disclosure ECG

Before you start this procedure, make sure:

- You purchase and enable the Full Disclosure option in the **Options Manager**.
- You enable the Full Disclosure option in the **Setting** screen.

1. Start a new patient test.
2. To view a Full Disclosure ECG, click the **Full Disclosure** tab on the Acquisition screen.
   - One lead of the Full Disclosure ECG displays. The Full Disclosure shows the waveform from the left to right side of the screen.
   - The Full Disclosure ECG records for a maximum of 5 minutes. The recording stops after the 5 minutes is complete.
   - The Full Disclosure screen displays 10 lines of ECG data and each line is of 30 seconds.
   - A notification message displays on the **Acquisition** screen after the Full Disclosure ECG records for 5 minutes.
   - The Full Disclosure screen displays the previous 5 minutes of Full Disclosure ECG data.
   - If you disconnect the acquisition module, the ECG acquisition stops in 10 seconds.
3. To change the lead, click **Select Lead**.

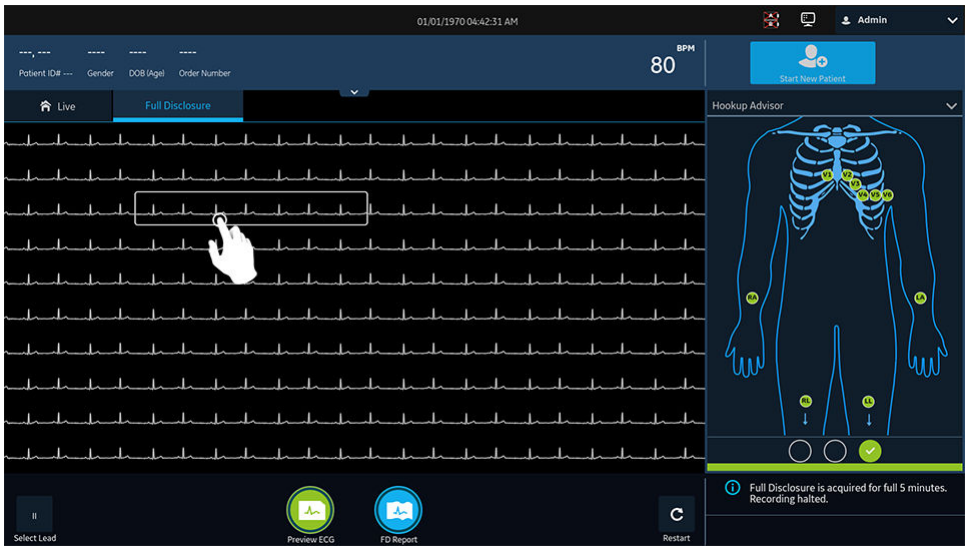
   All the configured leads display. Select the single lead you want to display on the screen and on the printed FD reports. If you connect the leads to a patient after being fully disconnected for at least 30 seconds, all the data will be cleared from the display.

   You can record a 15-lead ECG from the Full Disclosure waveform. To do this, select the **Live** screen and change the mode to **Adult 15 Lead**.

   The ECG recording restarts and the selected lead is applied to the Full Disclosure waveform. Clears all the previous recorded data.
4. To restart the Full Disclosure ECG, click **Restart**. All of the current waveform data is deleted.

   The message **(For unsaved data will be lost)** . **(For Confirm to proceed)** displays.

5. To record a 10 seconds ECG when in the Full Disclosure screen, do the steps that follow:



   a. Select anywhere on the Full Disclosure ECG. The 10 seconds of ECG data is selected.

   b. Click **Preview ECG**.

      A preview of the recorded 10 seconds of data for all leads displays in the configured preview report in the maximize view. Select the minimize icon to view the report in the ECG tab.

   c. To accept or reject an ECG Patient Report, see 4.5.4 Accept or Reject an ECG Patient Report on page 44.

   d. To review an ECG Patient Report, see 4.5.5 Review an ECG Patient Report on page 47.

6. To generate a Full Disclosure report, click **FD Report**.

   The Full Disclosure report for the selected lead displays in the **FD Report** tab for your review.

7. To review the Full Disclosure report, see 4.13.2 Review a Full Disclosure Report on page 60.

4.13.2 Review a Full Disclosure Report

The Full Disclosure report displays in the **FD Report** tab for your review.

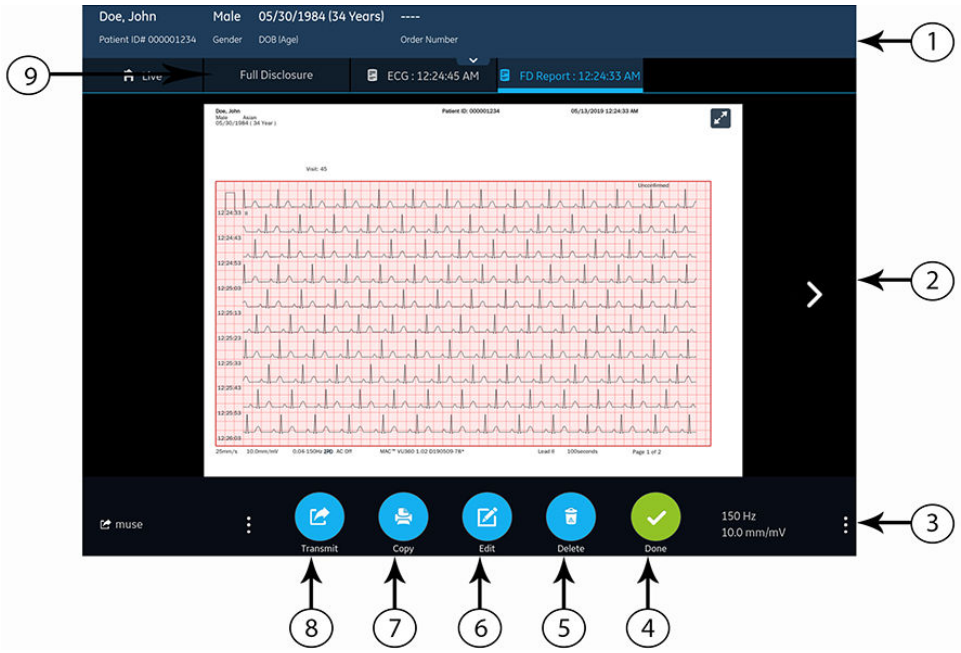


Table 4-8 Full Disclosure Report Tab

Item	Name	Description
1	*Patient Information* Banner	The information that displays on the screen for the patient such as first name, last name, gender, age, and so on. To edit the patient information, click anywhere on the *Patient Information* screen.
2	Full Disclosure Report	Displays the Full Disclosure report. If a Full Disclosure report contains more than one pages, click the left and right arrows on the screen to see the next page. When you record Full Disclosure ECG: • If the acquisition module is disconnected, the Full Disclosure report displays empty space on the screen. • If the lead is disconnected or the ECG waveform does not display, the Full Disclosure report displays a straight horizontal line on the screen, and transforms into square waves on the printed or transmitted FD Report. **NOTE** Only a FD Report or Rhythm Report can have a single tab. The ECG report will always have a tab, but if you enable a Rhythm tab and select a FD Report, the Rhythm tab will be replaced by the FD tab.
3	Gain, Filter, and Speed	To edit the gain, filter, or speed of the waveform in the report, do the steps as follow: • Click the ellipsis icon that is on the lower right of the **FD Report** tab. • Select a new value from the expanded list. • The Full Disclosure report refreshes with the selected gain, filter, and speed.
4	**Done** icon	Closes the Full Disclosure report. For more information, see 4.12 Close a Patient Report on page 58.
5	**Delete** icon	Deletes the Full Disclosure report. For more information, see 4.10 Delete a Patient Report on page 57.
6	**Edit** icon	Edits the patient information for the Full Disclosure report. For more information, see 4.9 Edit Patient Information in a Patient Report on page 56.

Table 4-8 Full Disclosure Report Tab (Table continued)

Item	Name	Description
7	**Copy** icon	Prints a copy of the Full Disclosure report. For more information, see 4.8 Print a Patient Report on page 55.
8	**Transmit** icon	Transmits the Full Disclosure report. For more information, see 4.7 Transmit a Patient Report to a Configured Destination on page 52.
9	**Full Disclosure** tab	Click the **Full Disclosure** tab to navigate to the Full Disclosure waveform and application.

To start a new Full Disclosure report for the same patient, click the **Full Disclosure** tab to navigate to the Full Disclosure waveform and application, and restart the Full Disclosure ECG. For more information, see 4.13.1 Record a Full Disclosure ECG on page 59.

5 Work with Orders

If order management is enabled, the **Orders** list displays in the Acquisition screen. You can retrieve orders from an order management server (such as a MUSE system) that is connected to your network.

When the orders list is updated, either automatically or manually, new orders are populated in the list.

The figure illustrates the **Orders** collapsed list:

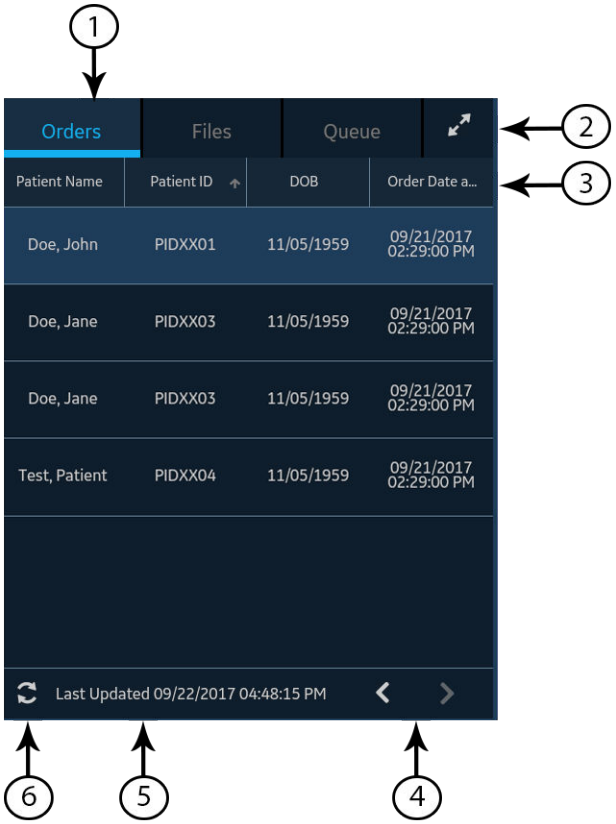


Table 5-1 Orders Collapsed List

Item	Name	Description
1	**Orders** tab	Displays a list of orders downloaded from an order management server. A filter icon next to the tab name indicates that the order list is filtered by a location.
2	**Expand** icon	Opens the **Orders** expanded list.
3	**Orders** collapsed list columns	Displays up to four configurable columns that provide information about the orders. This view will include at least one of the columns: **Patient Name**, **Patient ID**, or **Visit Number**.
4	Navigation arrows	Navigates to the previous and next pages in the **Orders** list.
5	**Last Updated** date and time	Displays the date and time the order list was last updated.
6	**Refresh** icon	Downloads the list of orders.

The figure illustrates the **Orders** expanded list:

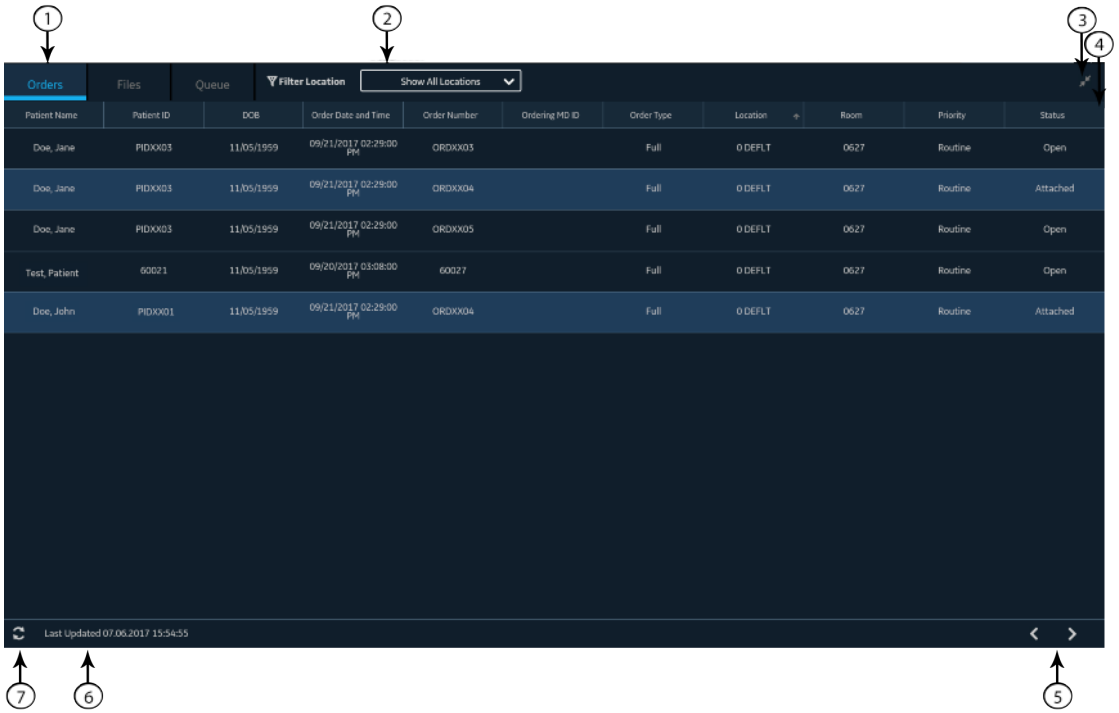


Table 5-2 Orders Expanded List

Item	Name	Description
1	**Orders** tab	Displays the **Orders** expanded list. A filter icon next to the tab name indicates that the order list is filtered by a location.
2	**Filter Location** list	Select anywhere on the **Filter Location** field. From the drop-down menu, select the location filter you want to apply to the orders list.
3	**Collapse** icon	Collapses the **Orders** list.
4	**Orders** expanded list columns	Displays up to eleven configurable columns that provide information about the orders.
5	Navigation arrows	Navigates to the previous and next pages in the **Orders** list.
6	**Last Updated** date and time	Displays the date and time the order list was last updated.
7	**Refresh** icon	Downloads the list of orders.

Only one order can be associated with a patient test at any given time.

Orders cannot be attached to:

- Transmitted patient reports, or
- Digital Rhythm patient reports.

If you do not have permissions to edit patient reports, you cannot attach an order to the patient report.

When an order is attached to a patient test, all fields are read-only except for which can be edited below:

- **Blood Pressure**
- **Room Number**
- **Bed Number**

- **Test Indication**
- **Priority**
- **Comments**
- **Technician**
- **Patient History**
- **Location**
- **<Question>**
- **Attending MD ID**
- **Attending MD First Name**
- **Attending MD Last Name**

WARNING



INACCURATE PATIENT DATA

Incorrect patient information can cause patient data mismatch. Data assigned to the wrong patient causes erroneous patient data that can affect diagnosis and treatment.

Be sure to check the patient information screen for each new patient. Make sure that you attach the correct order for the correct patient.

5.1 Automatically Update the Orders List

The auto-update option must be enabled by your administrator to automatically update orders from the order management server. Orders are automatically updated when:

- The device is powered on.
- A user logs into the device or unlocks the device.
- The **Start New Patient** button is selected.
- A report is successfully sent to a remote device over the network.

The **Last Updated** date and time is updated. No error messages display if orders are not being automatically updated. You can also manually update the *Orders* list.

5.2 Manually Update the Orders List

You can manually update the orders list at any time, even if the auto-update option is enabled.

1. From the Acquisition screen, select the **Orders** tab.

   The *Orders* collapsed list opens.

2. Select the **Refresh** icon to update the orders list .

   The list of orders is refreshed and updated with the latest information. All previous data is overwritten. The date and time when the list was last updated display next to the **Refresh** icon.

If the device is not connected to the network, a message displays in the notification area indicating that the update has failed because the device is not connected to the network. If the message persists, contact your administrator to resolve the network issue.

If the device fails to connect to the order management server, a message displays in the notification area indicating that the update has failed because the connection to the order management server could not be established. If the message persists, contact your administrator.

You can download a maximum of 1000 orders. If the number of orders exceeds this limit, an error message displays asking you to restrict the order download filter.

5.3 Sort Orders in the Orders List

By default, the *Orders* list is sorted in descending order by the **Location** column, if the **Location** column is configured as one of the display columns.

If the **Location** column is not configured to display in the *Orders* list, the list is sorted in descending order by the column configured to display as the first column.

If you select the **Priority** column header or if the **Priority** column is the first column, the orders list is sorted in the order of priority:

- STAT
- ASAP
- Pre-Op
- Call back
- Routine

If you select the **Priority** column again, the sorting order is reversed.

You can change the sort order by selecting any one of the column headers. The orders list is sorted in ascending order by the selected column. If you select the same column header again, the orders list is sorted in the reverse order. If you select another column header, the orders list is sorted in ascending order by that column.

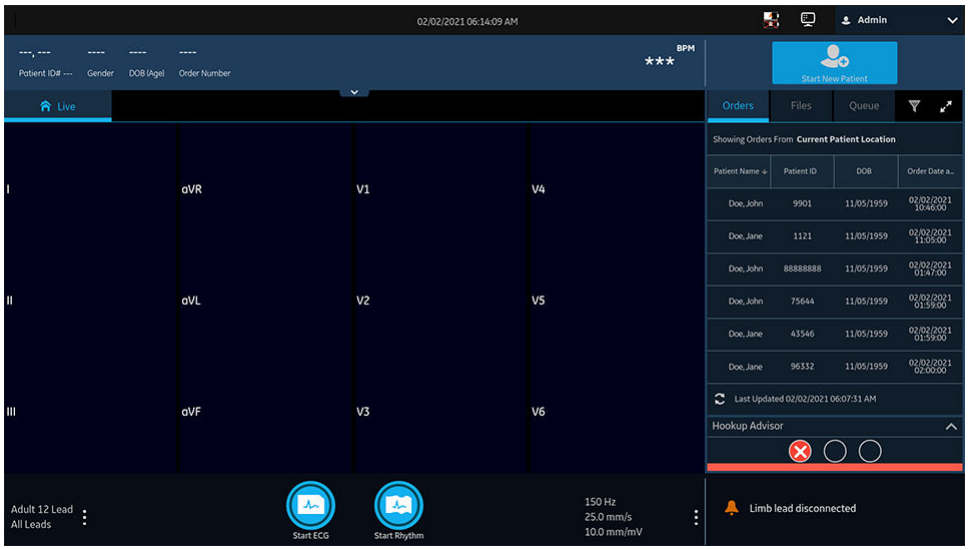
Changes made to the sort order apply until you log out or shutdown the device.

5.4 Filter Orders in the Orders List

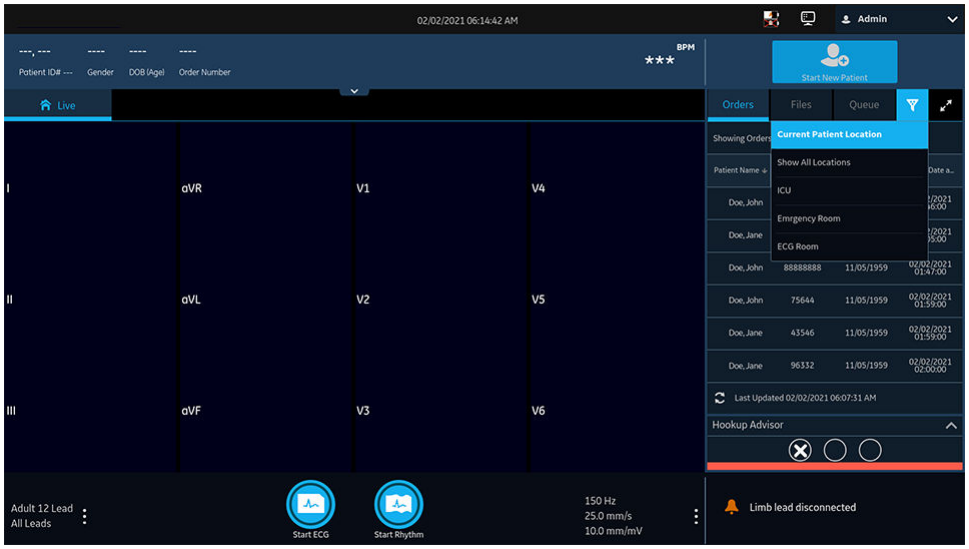
The *Orders* list is filtered by **Show All Locations**, **Current Patient Location**, or 1 out of 10 pre-configured filter groups. All of the order lists display based on the location filter you apply.

1. From the Acquisition screen, select the **Orders** tab.

   The **Orders** collapsed list opens.

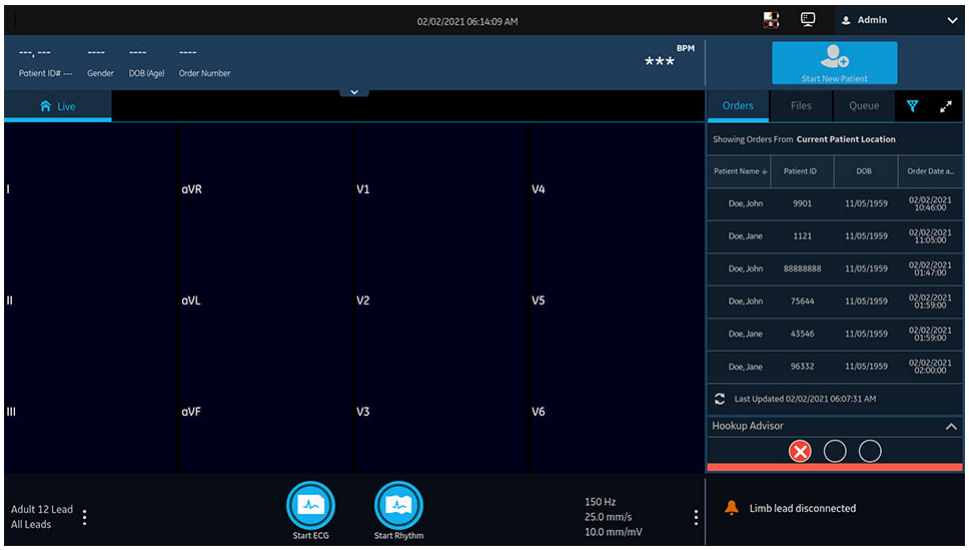


2. Select the necessary filter location from the drop-down list.



The order list refreshes and displays only the locations in the selected filter. If you select the filter drop-down list, the filter icon changes to . If you apply a location filter in the **Orders** list, the filter icon changes to to indicate that the order list is filtered and does not display all orders.

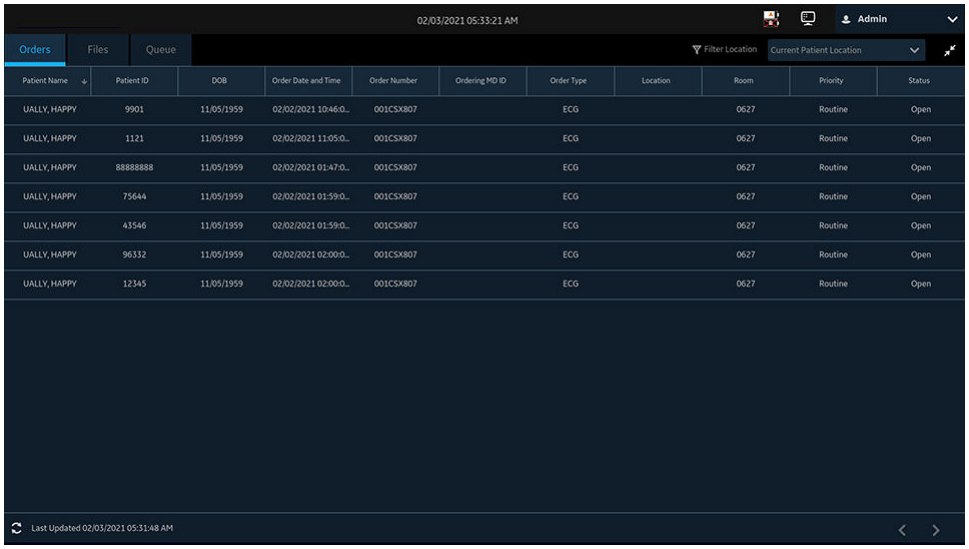
If you select...	Then...
A pre-configured filter group	The orders list displays orders from the locations in the selected filter group.
The **Current Patient Location**	The orders list displays only the orders from the current location of the device configured in the device settings.
The **Show All Locations**	The orders list displays the orders from all the locations of the device configured in the device settings.



3. To display an expanded list of **Orders**, select the **Expand** icon.



The **Orders** expanded list opens.



By default, the applied filter is **Current Patient Location**



, and displays all orders from the current location of the device.

5.5 Attach an Order when the Patient Test is Not Started

1. Start a test for the new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.
2. Double-tap the order in the *Orders* list to attach it to a patient test.

   The order number and other details available in the order are populated in the patient test record and the *Patient Information* screen is automatically expanded.
3. Edit patient information and select **Save** to save the patient data.

4. Record the ECG. For more information, see 4.5.2 Manually Start an ECG recording on page 42.
5. Verify that the status of the order in the *Orders* list is **Attached**.

5.6 Attach an Order to a New Patient Test

NOTE

You cannot attach an order that is already attached to another test. You must first detach the order. See 5.10 Detach an Order from a Patient Test on page 71.

1. Start a test for the new patient. For more information, see 3.2 Start a Test for a New Patient on page 28.
2. Double-tap the order in the *Orders* list to attach it to the current patient test.

If	Then
You did not manually enter patient data in the *Patient Information* screen after starting the test	There is no data mismatch upon attaching the order. Therefore, the order number and other details available in the order are populated in the patient test record and the *Patient Information* screen is automatically expanded. The status of the order is changed to **Attached**. Go to step Step 4.
You manually entered patient data in the *Patient Information* screen after starting the test	There is a data mismatch between the order data and the manually entered patient data. A warning message displays indicating a mismatch in the patient name or patient ID and asks you to confirm that the selected order can be attached to the patient test, overwriting existing patient data. Go to the step Step 3.

3. Select **Yes** to overwrite the patient information with data from the order. The order is attached to the patient report.
   - All patient demographic fields included in the order are populated in the test, overwriting the existing patient data.
   - The status of the order is changed to **Attached**.
4. Update test demographics in the *Patient Information* screen and select **Save**. For more information, see 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.
5. Record the ECG. For more information, see 4.5.2 Manually Start an ECG recording on page 42.

5.7 Attach an Order when the Patient Test is Completed

NOTE

You cannot attach an order that is already attached to another test. You must first detach the order. See 5.10 Detach an Order from a Patient Test on page 71.

1. From the *Files* list, open the stored patient report.
2. Double-tap the order in the *Orders* list to attach it to the current patient test.

If	Then
You did not manually enter patient data in the *Patient Information* screen after starting the test	There is no data mismatch, but a message displays asking you to confirm that the selected order can be attached to the patient test, overwriting existing patient data. Go to step Step 3.

If	Then
You manually entered patient data in the *Patient Information* screen after starting the test	There is a data mismatch between the order data and the manually entered patient data. A warning message displays indicating a mismatch in the patient name or patient ID and asks you to confirm that the selected order can be attached to the patient test, overwriting existing patient data. Go to the step Step 3.

3. Select **Yes** to update the patient information with data from the order. The order is attached to the patient report.
   - All patient demographic fields included in the order are populated in the test, overwriting the existing patient data.
   - The status of the order is changed to **Attached**.
4. Update test demographics in the *Patient Information* screen and select **Save**. For more information, see 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.

5.8 Attach an Order that is Attached to a Different Patient Test

NOTE

Only one patient test can be associated with an order at any given time, regardless of the status of the patient test.

1. Start a new patient test.
2. Double-tap an order attached to a patient test in the *Orders* list.

   A message displays indicating that the order is already attached to a patient test.
3. Perform one of the actions below:
   - Select **Detach** to detach the order from the existing patient test and attach the order to the new patient test.

If	Then
The patient test the order is attached to is already transmitted to its default destination	The order cannot be removed from this test. A message displays indicating that the patient test has been transmitted to the default destination and the order cannot be detached. Select **OK**.
If the patient test is not transmitted	A message displays notifying you that the order will be detached from the patient test. Go to step Step 4.

   - Select **View Test** to open the patient test and view it as if the test had been opened from the **Files** list.
4. Select **Continue** to detach the order from the existing patient test and attach the order to the new patient test.

5.9 Change the Order Attached to a Patient Test

If an incorrect order is attached to a patient test, use below procedure to detach the order from the patient test and replace it with a different order.

Before you start this procedure, make sure that the patient test is not already transmitted to its default destination. If the test has the **Sent** status of **Yes** (for example, the test was already sent to its default destination), the order can no longer be detached from the test. A message displays indicating that the patient test has been transmitted and the order cannot be detached.

WARNING



INACCURATE PATIENT DATA

Incorrect patient information can cause patient data mismatch. Data assigned to the wrong patient causes erroneous patient data that can affect diagnosis and treatment.

Be sure to check the patient information screen for each new patient. Make sure that you attach the correct order for the correct patient.

1. Detach the incorrect order from the patient test. See 5.10 Detach an Order from a Patient Test on page 71.
2. Attach the correct order to the patient test. See 5.7 Attach an Order when the Patient Test is Completed on page 69.

5.10 Detach an Order from a Patient Test

Before you start this procedure, make sure that the patient test with the incorrect order has not been transmitted to its default destination.

NOTE

If the patient test to which the order is attached has been transmitted to its default destination, the order cannot be detached from the test. A message displays indicating that the patient test has been transmitted and the order cannot be detached.

1. From the *Files* list, select the patient report with the incorrect order that you want to detach.

   The patient report displays in the **ECG** tab.
2. Expand the *Patient Information* screen and scroll down to the **Order Number** field.
3. Select **Detach** next to the **Order Number** field to clear the field.

   A message displays asking you to confirm if you want to detach the order from the selected test.
4. Select **Yes** to detach the order from the current test.

   The order number field is cleared.
5. Select **Save** to save your changes.

   The order is detached from the patient test and moves back to the **Open** status.

5.11 Order Status

Each order in the *Orders* list has one of the states below:

- Open
- Pending
- Attached

When an order is downloaded from the order management server, the status of the order can be **Open** or **Pending**. After an ECG has been acquired for an order, or an order has been attached to an existing ECG patient report, the order is moved to the **Attached** state in the *Orders* list.

The table describes various order status changes:

If...	Then...
You add an order to a patient test from the *Orders* list	• The order status changes from **Open** to **Attached**. • The MUSE server is notified to change the status of the corresponding order on the MUSE system from **Open** to **Pending**, if the device is connected to the network. If the attempt to notify the MUSE server fails, the status remains as **Open**.
The order number is detached from a patient test before acquiring the ECG	The order status changes from **Attached** to **Open**. The order status changes from **Pending** to **Open** on the MUSE server.
An order attached to an acquired, but untransmitted ECG patient test, is detached	The order status changes from **Attached** to **Open**. The order status changes from **Pending** to **Open** on the MUSE server.

When the order list is updated, the orders attached to completed ECG patient reports transmitted to the MUSE server are cleared from the *Orders* list, and new orders are downloaded from the MUSE server.

NOTE

The **Attached** order status is not included in the transmitted patient reports.

6 Work with the Files List

The *Files* list displays stored digital rhythm and ECG patient reports.

The figure illustrates the *Files* collapsed list:

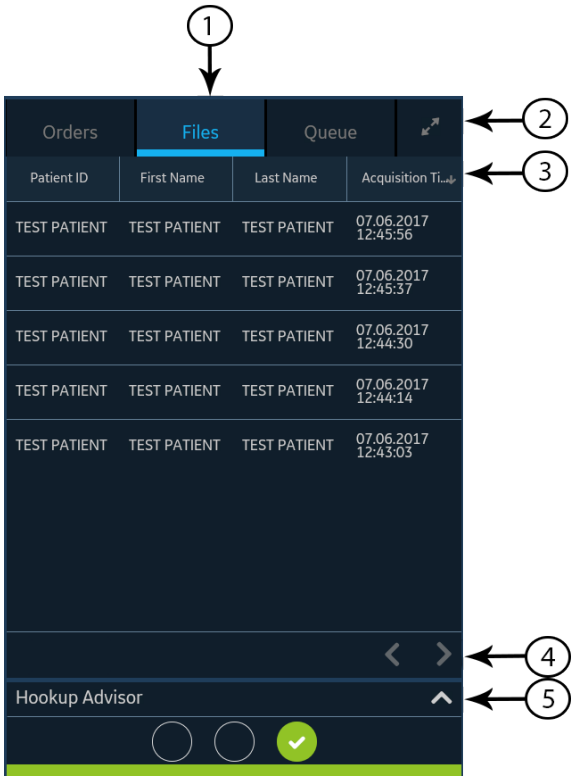


Table 6-1 *Files* Collapsed List

Item	Name	Description
1	**Files** tab	Opens the *Files* collapsed list that stores the saved patient reports.
2	**Expand** icon	Opens the *Files* expanded list.
3	*Files* collpased list columns	Displays columns that provide information about the stored patient reports.
4	Navigation arrows	Navigates to the previous and next page in the *Files* list.
5	**Expand** arrow	Expands the *Hookup Advisor* electrode placement image. When expanded, the image overlays the *Files* list.

The figure illustrates the *Files* expanded list:

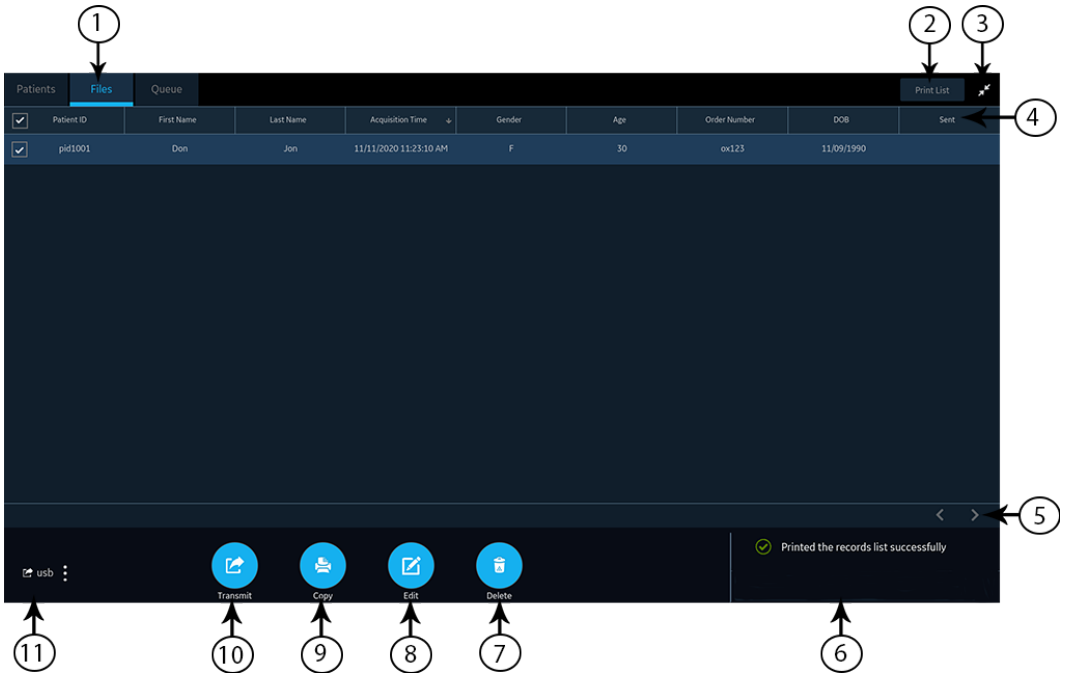


Table 6-2 *Files* Expanded List

Item	Name	Description
1	**Files** tab	Opens the *Files* expanded list that stores the saved patient reports.
2	**Print List**	Prints the stored records from the **Files** list. This button is enabled only if the stored records are available.
3	**Collapse** icon	Collapses the *Files* list.
4	*Files* expanded list columns	Displays columns that provide information about the stored patient reports.
5	Navigation arrows	Navigates to the previous and next pages in the *Files* list.
6	Notification status	Shows the progress, error, or successful messages.
7	**Delete** icon	Deletes the selected patient reports.
8	**Edit** icon	Edits patient information for the selected patient report.
9	**Copy** icon	Prints a copy of the selected patient reports.
10	**Transmit** icon	Transmits the patient reports to the selected destination.
11	**Destination** menu	

6.1 Review a Stored Patient Report

Make sure that you have the privilege to view Rhythm, Full Disclosure, or ECG patient reports in the *Files* list. If you do not have the privilege, you can only view the patient reports you created in the current session.

1. From the Acquisition screen, select the **Files** tab.

   The *Files* collapsed list opens.

2. Select the Rhythm or Full Disclosure or ECG patient report that you want to view.

   An ECG patient report opens in an **ECG** tab.

A Rhythm report opens in a **Rhythm** tab.

A Full Disclosure report opens in a **FD Report** tab.

3. Review and make necessary changes to the patient report, before printing a copy of the report or transmitting the report to a configured destination.

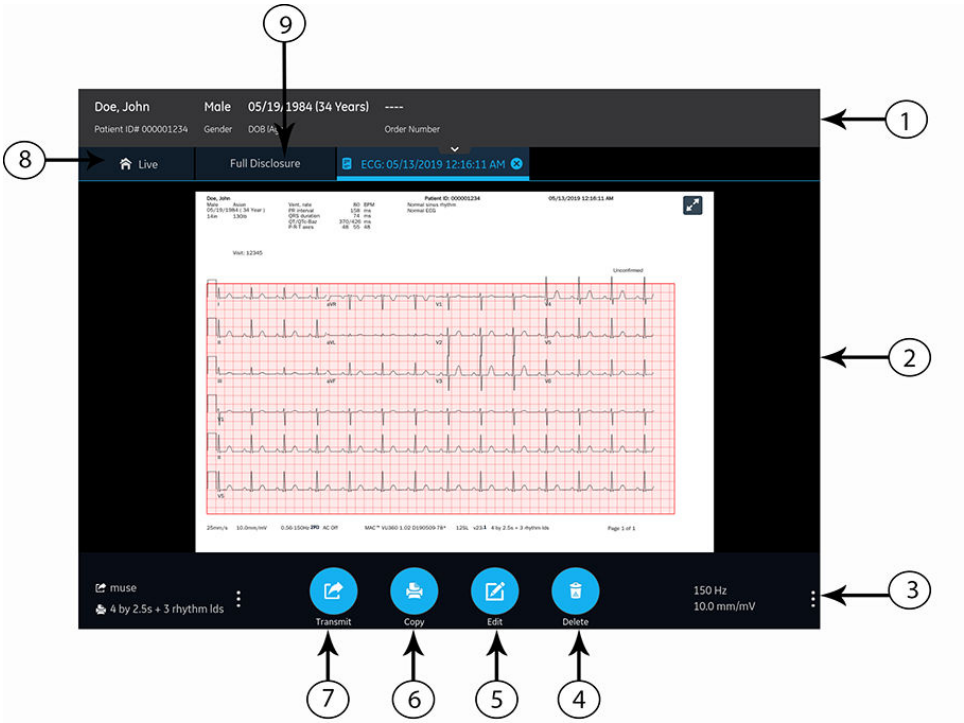


Table 6-3 ECG, FD Report, or Rhythm Tab Displaying a Stored Patient Report

Item	Name	Description
1	*Patient Information* Banner	Displays patient information. A grey banner indicates the patient report has been stored in the device. Select anywhere in the banner to expand the screen and edit patient information.
2	ECG patient report, Rhythm report, or Full Disclosure report	Displays the patient report. For more information on the report formats, see A.1 ECG Report Formats on page 111 and A.2 Rhythm Report Format on page 116.
3	Gain, Filter, and Speed	Allows you to change the waveform gain, filter or speed. Select anywhere around the ellipsis icon next to **Gain**, **Filter** or **Speed** and select a value from the gain, filter, or speed options in the menu. The patient report is refreshed with the selected configurations. **NOTE** The **Speed** option displays only for the rhythm reports.
4	**Delete** icon	Select the **Delete** icon to delete the patient report from the *Files* list. Deleting the patient report closes the current tab and displays the **Live** tab. For more information, see 6.6 Delete Stored Patient Reports from the Files List on page 81.
5	**Edit** icon	Select the **Edit** icon to expand the *Patient Information* screen and edit patient information for the patient report. For more information, see 6.5 Edit Patient Information in a Stored Patient Report on page 80.

Table 6-3 ECG, FD Report, or Rhythm Tab Displaying a Stored Patient Report (Table continued)

Item	Name	Description
6	**Copy** icon	Select the **Copy** icon to print a copy of the patient report in the default report format. For more information on printing a copy of the report, see 6.3 Print a Stored Patient Report on page 78.
7	**Transmit** icon	Select the **Transmit** icon to transmit the patient report to the default destination. For more information, see 6.2 Transmit a Stored Patient Report to a Configured Destination on page 76.
8	**Live** tab	Select the **Live** tab to close the opened stored patient report tab and return to the live waveform display in the Acquisition screen. The *Patient Information* banner displays the demographics of the current active patient.
9	**Full Disclosure** tab	Select the **Full Disclosure** tab to close the opened stored patient report tab and navigate to the Full Disclosure waveform and application. The *Patient Information* banner displays the demographics of the active patient.

4. Select to close the tab.

6.2 Transmit a Stored Patient Report to a Configured Destination

- Make sure that you have the privilege to transmit patient reports to a configured destination.
- Select the correct destination for your patient report.

Patient Report Type	Destination	Supported File Format
Resting ECG	DCP server destination (MUSE v8 SP3 or higher, v9, or MUSE NX and MUSE DICOM Gateway Pro SP1 or higher)	Hilltop format
Resting ECG	USB R/W flash drive	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.
Resting ECG	SFTP server destination with remote directory path	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.
Resting ECG	Shared directory destination with folder path	PDF, Hilltop and Sapphire XML (Sapphire XML format is available if you enable the XML format output in the **Option Manager**) formats.
Digital Rhythm	USB R/W flash drive	PDF format
Digital Rhythm	DCP server destination (MUSE v9 SP6 or higher, or MUSE NX and MUSE DICOM Gateway Pro SP6 or higher)	PDF format
Digital Rhythm	SFTP server destination with remote directory path	PDF format
Digital Rhythm	Shared directory destination with folder path	PDF format
Full Disclosure	USB R/W flash drive	PDF format

Patient Report Type	Destination	Supported File Format
Full Disclosure	DCP server destination (MUSE v9 SP6 or higher, or MUSE NX and MUSE DICOM Gateway Pro SP6 or higher)	PDF format
Full Disclosure	SFTP server destination with remote directory path	PDF format
Full Disclosure	Shared directory destination with folder path	PDF format

To transmit a patient report to the default or configured destination, perform the steps below:

1. From the Acquisition screen, select **Files**.

   The *Files* collapsed list opens.

2. Perform one of the steps below:

If	Then
You want to transmit one patient report	Select the Rhythm or Full Disclosure report or ECG patient report you want to transmit to a configured destination. The selected patient report opens in a new tab (**ECG** or **FD Report** or **Rhythm** tab), depending on the report type.
You want to transmit multiple patient reports	Select the **Expand** icon to expand the *Files* list, and select the check box next to the patient reports to be transmitted. 

3. Perform one of the steps below:

To transmit the report(s) ...	Perform the following:
To the default destination	Select the **Transmit** icon: 
To another configured destination	1. Select anywhere around the ellipsis icon on the lower, left-side of the screen to expand the **Transmit** menu. 2. From the expanded **Transmit** menu, select any configured destination to transmit the patient report(s). 3. Select the **Transmit** icon:  One or more destinations must be configured for the **Transmit** icon to be enabled. If no destinations are configured, the **Transmit** icon is disabled.

The selected patient reports are added to the **Queue**, processed and transmitted to the selected destination. The **Job Status** can be viewed in the **Queue**. See 7.1 Display the Report Queue on page 85.

If you select patient reports for transmission from the expanded *Files* list, the message displays on the notification area in the lower, right-side of the screen: `<Count> reports added to the queue`, where `<Count>` is the number of selected reports.

If you select patient reports for transmission from the collapsed *Files* list, the message displays on the notification area in the lower, right-side of the screen: `<Destination_Name>: <Job_Status>`.

For example, if the destination name is USB, and the job status is **Failed**, the status displays as follows: `USB: Failed`.

A tick mark displays in the **Sent** column of the *Files* expanded list for patient reports successfully transmitted to the default destination.

If	Then
The transmission queue has reached its maximum limit of 1,000 reports, a message displays in the notification area that the transmission queue is full and no additional reports can be added.	Wait for the reports in the queue to transmit and try again.
One or more patient reports have been transmitted to the selected destination, a message displays in the notification asking you to confirm if you want to re-transmit the already transmitted reports.	Perform one of the actions below: • Select **OK** to re-transmit the patient report. • Select **Cancel** to cancel the report transmission.
Patient information is incomplete in one or more patient reports selected for transmission (for example, required fields are blank or contain invalid data), a message displays in the notification area indicating that one or patient reports cannot be transmitted because of incomplete patient data.	Perform the steps below: 1. Edit the incomplete patient report to enter missing patient data. 2. Retry transmission.

6.3 Print a Stored Patient Report

You can print a copy of a stored ECG patient report in any configured report format for the selected lead set.

1. From the Acquisition screen, select the **Files** list.

   The *Files* collapsed list opens. You can also select the **Expand** icon to open the *Files* expanded list:

If	Then
You are in the *Files* collapsed list	Select the patient report for which you want to print a copy. The patient report opens in a new tab next to the **Live** tab. • If the selected report is an ECG patient report, it opens in an **ECG** tab. • If the selected report is a rhythm report, it opens in a **Rhythm** tab. • If the selected report is a Full Disclosure report, it opens in a **FD Report** tab.
You are in the *Files* expanded list	Select the check box next to the patient report for which you want to print a copy.

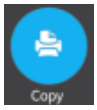
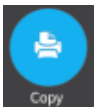
2. Select the Rhythm or Full Disclosure or ECG patient report for which you want to print a copy.

   The selected patient report opens in a new tab.

   - An ECG patient report displays in the **ECG** tab.
   - A Rhythm report displays in the **Rhythm** tab.

- A Full Disclosure report displays in the **FD Report** tab.

3. Before printing a copy of the report, review the patient report and verify:
   - The patient information in the patient report is correct.
   - The ECG, Full Disclosure, or Rhythm test is acquired with the desired gain and filter.
4. Perform one of the steps below:

To print a copy of the patient report ...	Perform the following:
In the default or selected report format displayed on the *ECG* or **FD Report** or **Rhythm** tab	Select the **Copy** icon:  A job to print one copy of the patient report in the displayed report format is sent to the printer.
In a different report format	1. Select anywhere around the ellipsis in the left, bottom corner of the screen. 2. From the expanded **Copy Format** menu, select the report format. For example, if a 12-lead ECG is recorded, you can only select 12-lead ECG patient report formats. 3. Select the **Copy** icon:  The patient report is refreshed and displayed on the *ECG* or **FD Report** or **Rhythm** tab in the selected report format. A job to print one copy of the ECG or rhythm in the selected report format is sent to the printer.

The patient report is printed in the order in which it was received. If no other patient reports are printing, the report is printed immediately. You will see a progress message at the bottom of the screen indicating the printing status.

NOTE

Based on the **Mandatory fields apply for Acquisition** settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields. If you manually print, an error message **Unable to print. Incomplete patient data.** displays on the **Acquisition** screen. You need to complete the data for the mandatory fields to print the patient report.

If a printer error occurs, the progress message is replaced by the printer error. The printing restarts automatically after the error is resolved. For more information on printer errors, see 12.3 Printing Errors on page 106.

If the device is configured to print the barcode of the patient ID in the patient reports, the printed patient report includes the barcode. The barcode can be used to perform a query by patient ID in the MUSE system.

To stop printing a patient report, do one of the following:

- Press the **Stop** key on the keyboard:



- Press the **Stop** button on the Acquisition Module:



6.4 Print a List of Stored Records

You can print all the stored records that display in the **Files Manager**.

1. From the Acquisition screen, select the **Files** list.

   The **Files** collapsed list opens.

2. Select the **Expand** icon  to open the **Files** list.

   The **Files** expanded list opens.

3. Select the **Print List** button  to print the list of stored records.

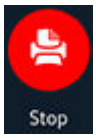
   The printing starts and a stop icon displays on the screen.

The stored record prints in the order in which it was displayed in the **Files Manager** view.

If a printer error occurs, the printer error message displays. Resolve the error and manually restart the print. For more information on printer errors, see Table 12-3 Printing Errors Encountered During Printing of the List of Stored Records on page 106.

To stop printing a list of stored records, do one of the following:

- Press the **Stop** icon on the screen.



- Press the **Stop** key on the keyboard:



- Press the **Stop** button on the Acquisition Module:



6.5 Edit Patient Information in a Stored Patient Report

Make sure that you have the privilege to open stored rhythm, Full Disclosure, or ECG patient reports from the *Files* list and edit patient information.

You can edit patient information using a keyboard or by attaching an order, but not by scanning a patient barcode, selecting a patient record from the *Patients* list, or performing ADT queries. When an order is attached to a patient test, some fields are read-only.

If you try to edit or attach an order to a patient report that is transmitted to the default destination, an error message displays.

WARNING

INACCURATE PATIENT DATA

Incorrect patient information can cause patient data mismatch. Data assigned to the wrong patient causes erroneous patient data that can affect diagnosis and treatment.

Be sure to check the patient information screen for each patient. Make sure that you enter patient data for the correct patient.

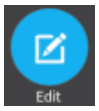
1. From the Acquisition screen, select **Files**.

   The *Files* collapsed list opens. You can also select the **Expand** icon to open the *Files* expanded list:

If	Then
You are in the *Files* collapsed list	Select the patient report for which you want to edit. The patient report opens in a new tab next to the **Live** tab. • If the selected report is an ECG patient report, it opens in an **ECG** tab. • If the selected report is a rhythm report, it opens in a **Rhythm** tab. • If the selected report is a Full Disclosure report, it opens in a **FD Report** tab.
You are in the *Files* expanded list	Select the check box next to the patient report you want to edit.

2. Select the **Edit** icon to edit patient information for the stored patient report:

   The *Patient Information* screen opens with a grey background indicating that this is a stored patient report.

3. Edit the patient information using a keyboard. See 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.

4. Select **Save** to save your changes for this patient and collapse the screen.

   If you select any other icons at the bottom of the tab prior to saving, the *Patient Information* screen collapses and the edited patient information is saved.

   The updated patient information displays on the patient report.

5. Select to close the tab.

6.6 Delete Stored Patient Reports from the Files List

Make sure that you have the privilege to delete Rhythm, Full Disclosure, or ECG patient reports from the *Files* list.

If you do not have the privilege to view patient reports, but you have the privilege to delete patient reports, you can only view and delete patient reports you created in the current session.

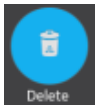
1. From the Acquisition screen, select **Files**.

   The *Files* collapsed list opens.

2. Perform one of the steps below:

If	Then
You want to delete one patient report	Select the Rhythm, Full Disclosure, or ECG patient report you want to delete. The selected patient report opens in a new tab (**ECG** or **FD Report** or **Rhythm** tab), depending on the report type.
You want to delete multiple patient reports	Select the **Expand** icon to expand the *Files* list, and select the check box next to the patient reports to be deleted. 

3. Select the **Delete** icon:

   A message displays asking you to confirm if you want to permanently delete the selected patient report(s).

4. Select **Delete** to delete the patient reports.

   The selected patient reports are deleted from the *Files* list.

   An alert may be configured by your administrator to warn you before deletion of untransmitted reports.

   If this alert is configured, and one or more patient reports you are trying to delete have not yet been transmitted to the default destination, a message displays asking you to confirm the deletion.

   Perform one of the actions below:

   - Select **Delete** to delete the selected patient reports. The selected patient reports are deleted from the *Files* list. If the patient report was opened for viewing on the Acquisition screen, deleting the patient report closes the tab, and returns you to the **Live** tab.
   - Select **Cancel** to cancel the deletion. The selected patient reports are not deleted from the *Files* list.

7 Work with the Queue List

The digital rhythm, FD report and ECG patient reports transmitting to a designated location are temporarily stored in the *Queue* list.

The successfully transmitted digital rhythm, FD report and ECG patient reports are immediately deleted from the **Queue** list.

The figure illustrates the *Queue* collapsed list:

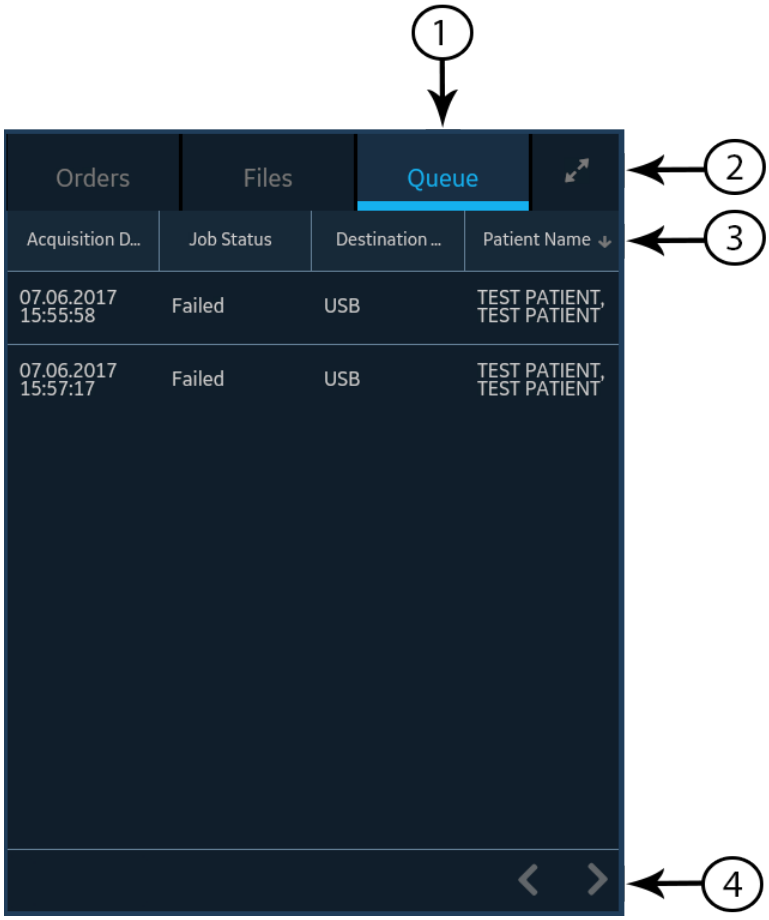


Table 7-1 *Queue* Collapsed List

Item	Name	Description
1	**Queue** tab	Displays the list of patient reports in the transmission queue.
2	**Expand** icon	Opens the *Queue* expanded list.
3	*Queue* collapsed list columns	Displays columns that provide information about the patient reports in the transmission queue.
4	Navigation arrows	Navigates to the previous and next pages in the *Queue* list.

The figure illustrates the *Queue* expanded list:

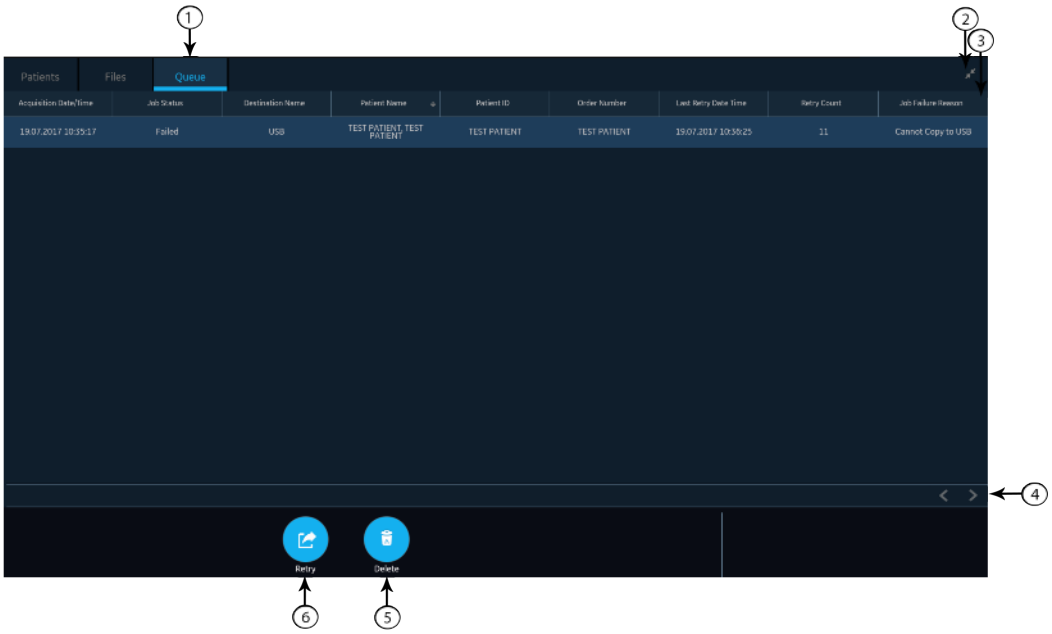


Table 7-2 *Queue* Expanded List

Item	Name	Description
1	**Queue** tab	Displays the list of patient reports in the transmission queue.
2	**Collapse** icon	Collapses the *Queue* list.
3	*Queue* expanded list columns	Displays columns that provide information about the patient reports in the transmission queue.
4	Navigation arrows	Navigates to the previous and next pages in the *Queue* list.
5	**Delete** icon	Deletes the selected transmission or network printing job from the *Queue* list.
6	**Retry** icon	Retries the transmission of an unsuccessful job.

Table 7-3 Columns in the *Queue* List

Column Name	Description
Acquisition Date/ Time	Displays the date and time of the rhythm, FD report or ECG patient report, in the configured date and time format.
Job Status	Displays the status of the job. Below statuses display: • **In Progress**: The job is currently being processed. • **Failed**: The transmission failed. The reason for failure is provided in the **Job Failure Reason** column. • **Not Sent**: The job is waiting to be processed. When the job is completed, the report is removed from the *Queue* list.
Destination Name	Displays the name of the configured destination.
Patient Name	Displays the name of the patient in the format `First Name, Last Name`.
Patient ID*	Displays the unique ID assigned to the patient.
Order Number*	Displays the order number.
Last Retry Date Time*	Displays the date and time of the last re-tried transmission, in the configured date and time format.

Table 7-3 Columns in the *Queue* List (Table continued)

Column Name	Description
Retry Count*	Displays the re-tried transmission count in numbers. If the device sends the report on the first attempt, the **Retry Count** is 0.
Job Failure Reason*	Displays the reason for the failed transmission. If the device fails to transmit a report, contact your IT department. If the device sent the report successfully, this field is blank. To troubleshoot the errors, see 12.4 Report Transmission Errors on page 108.

Column names suffixed with an asterisk (*) in the table are visible only in the expanded *Queue* list.

7.1 Display the Report Queue

This procedure describes how to view the queue for the reports that are ready to be sent, were successfully sent, or failed in transmission.

NOTE

For auto-transmitted reports, a message `Transmission complete x/y` displays in the notification area indicating that transmission is complete, where *x* is the current count of patient reports being transmitted, and *y* is the total count of reports being transmitted for the current patient.

1. From the Acquisition screen, select **Queue**.

   The *Queue* collapsed list opens.

2. To open the *Queue* expanded list, select the **Expand** icon:

   The *Queue* expanded list opens.

3. Select the **Collapse** icon to collapse the list and return to the Acquisition screen:

7.2 Delete Jobs from the Queue

1. From the Acquisition screen, select **Queue**.

   The *Queue* collapsed list opens.

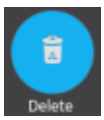
2. To display an expanded list of the *Queue*, select the **Expand** icon:

   The *Queue* expanded list opens.

3. Select the transmission job you want to delete.

4. Select the **Delete** icon to delete the selected jobs:

- If the job status is **In Progress**, a message displays indicating that the job is in progress and cannot be deleted.

  You cannot delete the job. Wait until the transmission attempt completes and then try again, if necessary.

- If the job is in **Not Sent** or **Failed** status, a message displays asking you to confirm the deletion of the selected job.

5. Select **Delete** to confirm the deletion.

   The selected jobs are deleted from the *Queue*. The patient report remains in the *Files* list. You can transmit the patient report to a destination again, if required.

7.3 Retry Transmission of a Patient Report

Make sure that you have the privilege to transmit Rhythm, Full Disclosure, or ECG patient reports to a configured destination.

The system automatically tries to transmit a patient report. If you need to re-transmit the patient report before the next automatic attempt, you can use this procedure to transmit the patient report immediately.

1. From the Acquisition screen, select **Queue**.

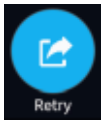
   The *Queue* collapsed list opens.

2. To display the expanded list of the *Queue*, select the **Expand** icon:

   The *Queue* expanded list opens.

3. Select one or multiple patient reports that you want to re-transmit and select the **Retry** icon:

   If no other report transmission is in progress at the time, the selected patient report will be immediately transmitted. If another patient report is in the process of being transmitted, the selected patient report starts transmission as soon as the current patient report is transmitted.

   If a patient report is successfully transmitted, it is immediately deleted from the **Queue**. Review the queue to confirm that the patient report was transmitted. All report transmissions are also logged in the **Report Transmission Log** in the *Service* screen.

   If the patient report is not successfully transmitted (**Job Status** is **Failed**), the reason for the failure is listed in the **Job Failure Reason** field. You can try to re-transmit the report again.

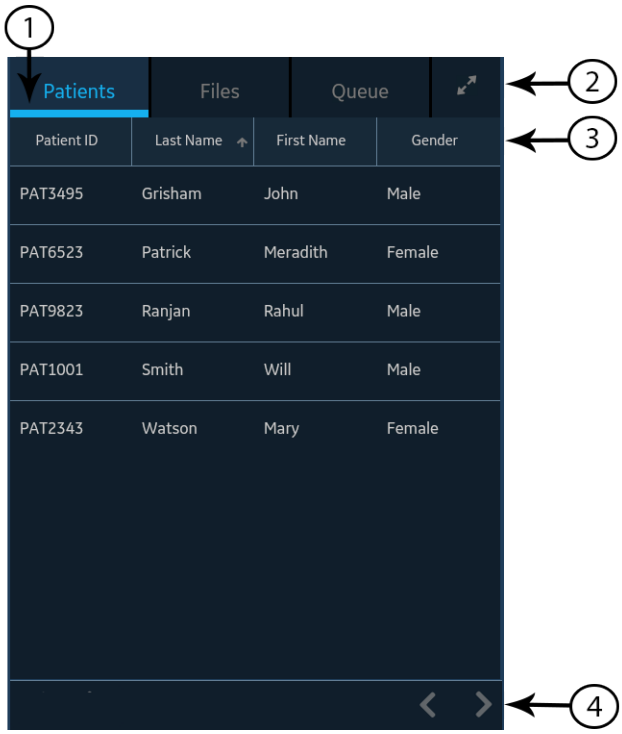
4. Select the **Collapse** icon to close the **Queue** expanded list and return to the Acquisition screen:

8 Work with the Patients List

If the **Order Manager** is disabled in the **Settings** screen, the **Patients** list displays in the Acquisition screen. The information of recent patients is stored in the *Patients* list, and you can view up to 500 recent patient information records.

The figure below illustrates the *Patients* collapsed list:



The figure below illustrates the *Patients* expanded list:

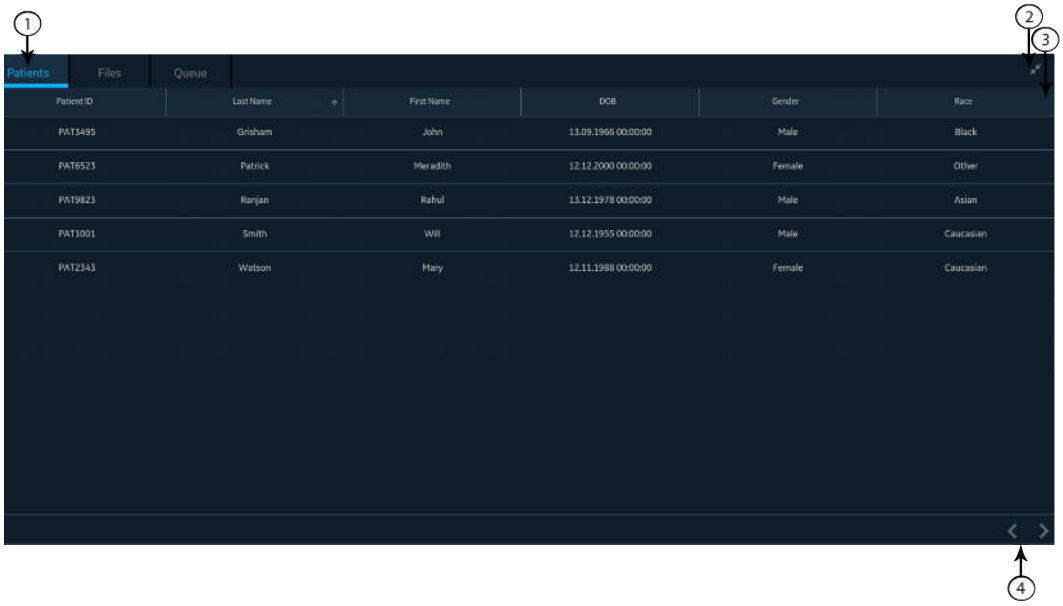


Table 8-1 *Patients* List

Item	Name	Description
1	**Patients** tab	Displays the *Patients* list.
2	**Expand** or **Collapse** icon	Expands or collapses the *Patients* list.
3	*Patients* collapsed and expanded list columns	Displays these four columns in the collapsed list: • **Patient ID** • **Last Name** • **First Name** • **Gender** Displays these six columns in the expanded list: • **Patient ID** • **Last Name** • **First Name** • **DOB** (Date of Birth) • **Gender** • **Race** By default, the list is sorted by **Last Name** in ascending order. You can sort by any column by selecting the column header. Select the same column header again to sort in descending order.
4	Navigation arrows	Navigates to the previous and next pages in the *Patients* list.

8.1 Open the Patients List

The **Patients** list displays on the Acquisition screen if order management is disabled.

Make sure that you have the privilege to view the patients lists or an error message will display when you try to view it.

1. From the Acquisition screen, select **Patients**.

   The *Patients* collapsed list opens and displays a list of patients.

2. To display an expanded list of **Patients**, select the **Expand** icon:

   The **Patients** expanded list opens.

8.2 Select a Patient from the Patients List

1. Select **Start New Patient**. For more information, see 3.2 Start a Test for a New Patient on page 28.
2. Select the **Patients** tab on the right-side of the Acquisition screen.

   The *Patients* collapsed list opens and displays a list of patients.

3. Double-tap the patient record that you want to associate with the patient test.

   If the desired patient record is not visible, select the navigation arrows to navigate to the previous and next pages of the **Patients** list and search for the patient record.

The patient data from the selected patient record is populated in the **Patient Information** banner and screen, and the screen expands.

4. Edit patient information in the fields. For more information, see 3.3.3 Enter or Edit Patient Information Using the Keyboard on page 35.

9 Work with Remote Applications

9.1 Launch a Remote Application

Make sure that you have the privilege to launch remote applications.

If remote applications have been configured, you can launch the remote application and do any task that the remote application allows.

When you launch a remote application, any processes that are active in the Acquisition screen remain active, such as recording or printing an ECG or rhythm, Hookup Advisor analysis, or report transmission.

1. From the *Remote Applications* panel on the Acquisition screen, select the button for the remote application that you want to open.

   The remote application opens in a web browser. The tab is called by the name of the application. You can configure three remote applications, and you can open a maximum of three tabs at a time.

   If the remote application is slow to load, the following message displays: **(For Loading <URL>)** .

   Any errors generated because of the link display in the middle of the browser page. Select **Reload** to reload the selected remote application. If the remote application fails to load, select the **Close** icon ✕ at the top of the page to close the browser. Select ↻ to refresh the page.

2. To return to the Acquisition screen, select the Close icon ✕ at the top of the page.

   The browser session of the remote application does not end but remains inactive. The browser session resumes when you go back to the open remote application.

3. To lock the device while working on remote applications, select **ALT + L** on the keyboard.

4. To unlock the device that was locked while working on remote applications, perform the steps in the procedure 2.7 Unlock the Device on page 24.

5. To log out of the device while working on remote applications, select the **Close** icon ✕ to return to the device and perform the steps in the procedure 2.3.4 Log Out of the Device on page 22. Logging out of the device closes the open remote application sessions.

9.2 View the PDF in a Remote Application

PDFs can be viewed through a remote application. Confirm that you have the privilege to launch remote applications.

If remote applications have been configured on this device, you can launch the remote application and view, zoom, or rotate a PDF.

1. Launch the remote application to open the PDF. For more information, see 9.1 Launch a Remote Application on page 90.

2. Open the PDF.

   To navigate the PDF, do any of the following:

   - Move through the PDF.
     - Select ▶ to move to the next page in the PDF.

- Select ◀ to move to the previous page in the PDF.
- Enter a specific page number in the **Current Page Number** field.

- Zoom in or out on a PDF page.
  - To zoom in, select ➕ or select the up arrow ▲ to increase the zoom percentage.
  - To zoom out, select ➖ or select the down arrow ▼ to decrease the zoom percentage.
- Rotate a PDF at 90° intervals.
  - Select ↻ to rotate the PDF clockwise.
  - Select ↺ to rotate the PDF counterclockwise.

3. To return to the Acquisition screen, select the **Close** icon ✕ at top of the page.

   The browser session of the remote application does not end but remains inactive. The browser session resumes when you go back to the open remote application.

4. Close the browser session and return to the Acquisition screen.

10 Maintenance

10.1 Adjust the Paper Tray for Paper Size

The printer supports the paper sizes:

- A4 (8.27 x 11.7 inches) - See the *Diagnostic Cardiology Supplies and Accessories Guide, 2102946-001* for the part numbers of different paper size.
- Letter (8.4 x 11 inches) - See the *Diagnostic Cardiology Supplies and Accessories Guide, 2102946-001* for the part numbers of different paper size.

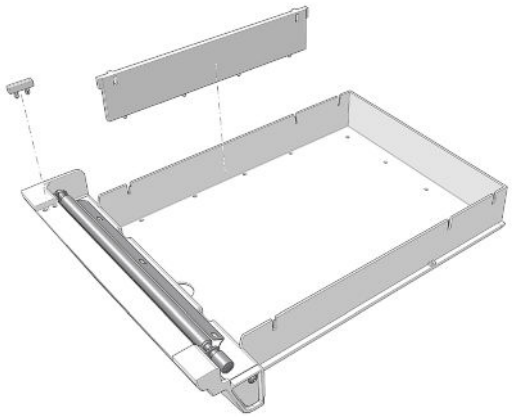
The paper tray is configured to use the appropriate paper size for the destination location. Use the instructions to change the paper size by moving the spacers in the paper tray.

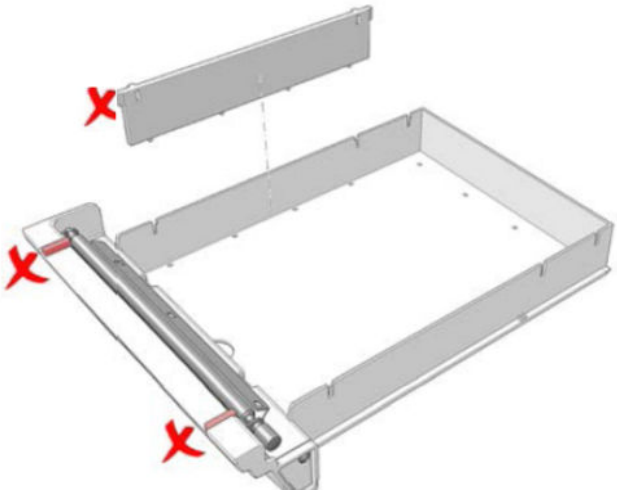
1. Turn off the device.
2. Open the paper tray and remove the paper.
3. Press the tab on the right side of the paper tray with a flat-head screwdriver to release the paper tray from the printer assembly and pull it out completely.



4. Put the spacer in the paper tray.

   The spacer placement depends on the paper size.

If the paper size is	Then
A4	Place the pre-spacer and post-spacer along the left side of the tray. 

If the paper size is	Then
Letter	Do not place the pre-spacer and post-spacer of the tray. 

While placing the spacer, make sure that the spacer is aligned in the correct position so that the tabs at the bottom of the spacer fit into the Q holes on the bottom of the tray, and the tabs on both sides of the spacer are affixed to the designated tab spaces on the tray.

5. Push the paper tray back to the printer assembly.

10.2 Store Thermal Paper

When imaged and stored properly, ECG tracings resist fading for several years. If your retention requirements exceed five years, consider using GE Archivist paper.

To make sure the tracing is imaged properly, the device must be maintained in accordance with its service and technical manuals.

To make sure the tracing lasts for the paper's expected life span, observe these guidelines when storing your printouts:

- Store in a cool, dark, and dry location.
  - Standard paper

    Temperature must be less than 27°C (80°F).

    Relative humidity must be less than 65%.
  - Archivist paper

    Temperature must be less than 40°C (104°F).

    Relative humidity must be between 40% and 60%.
- Avoid exposure to bright light or UV sources.

  Sources of ultraviolet light include sunlight, fluorescent lights, halogen lights, mercury vapor lamps, and germicidal lamps.
- Avoid contact with cleaning liquids and solvents.

  Solvents to avoid include alcohols, ketones, esters, ether, and so forth.
- Store thermal paper separately in manila folders or polyester or polyimide protectors.

Plastic document protectors, envelopes, or sheet separators made of polystyrene, polypropylene, or polyethylene do not degrade thermal traces. However, these materials afford no protection against fading from external causes.

- Do NOT store thermal papers with any of the cases below:
  - carbon or carbonless forms
  - document protectors, envelopes, and sheet separators containing polyvinyl chloride or other vinyl chlorides

    non-thermal chart papers or any other products containing tributyl phosphate, dibutyl phthalate, or any other organic solvents

    NOTE

    Many medical and industrial charts contain these chemicals.
- NOT use mounting forms, pressure-sensitive tapes, and labels that use solvent- based adhesives.

  Use only mounting forms and pressure-sensitive tapes made with starch or water- based adhesives.

10.3 Clean the Printhead

If the printer does not function, you may need to clean dust and foreign particles from the printhead.

Use below procedure to clean the printhead:

1. Dip cotton swabs in ethyl alcohol and wring out the excess solution.

   NOTE

   Do not use products that can harm the heating element, such as sandpaper.
2. Open the printer door.
3. Gently wipe the heating element with the cotton swabs.

   NOTE

   - The printhead gets hot when recording. Do not touch the thermal printhead directly.
   - Avoid unnecessary force when handling the printhead.
4. Re-insert the paper and close the printer door when the heating element is completely dry.

   NOTE

   Use only original GE Healthcare writer paper. This paper has a special coating that prevents electrostatic buildup and contamination and debris collection on the printhead. Using other paper may result in recordings of poor quality. Use of other papers may wear out the printhead prematurely and may void the warranty.

10.4 Charge the Battery

You must charge the battery before initial use and in between acquisitions.

- To make sure a fully charged battery before initial use, charge the device before you use it for the first time.
- To make sure a fully charged battery in between acquisitions, power off the system and connect it to an AC wall outlet until you use the system again. This prolongs battery runtime.

The battery status indicator in the upper-right corner of the Acquisition screen shows how much charge the battery has available, and when the device is charging the battery. For more information on the battery status indicator, see 1.5 Battery Status on page 15.

- When the battery is charging, the color of the battery status indicator on the screen is green. The battery LED on the keyboard flashes the amber light at two-second intervals.
- When the battery is low or critically low, the color of the battery status indicator on the screen is red. If the total charge level drops below 15%, an error tone notifies you and a message displays indicating that the battery is low. If the total charge level drops below 10%, the error tone is louder, longer, and sounds every minute, and a message displays indicating that the battery is critically low and you should connect to AC power immediately. The battery LED on the keyboard flashes the amber light at half-second intervals.
- When the battery is completely discharged, the device powers off. To operate your device, you must connect the system to an AC wall outlet. The battery LED on the keyboard turns off.
- If the battery is fully charged or exceeds safe charging temperature, the device will not charge the battery. The color of the battery status indicator on the screen is:
  - Green, if the device is connected to AC power.
  - White, if the device is not connected to AC power.

  The battery LED on the keyboard turns off.

1. Power off the device.
2. Connect the system to an AC wall outlet.
3. Charge the battery for 3 hours or until the battery status indicator displays a full charge.

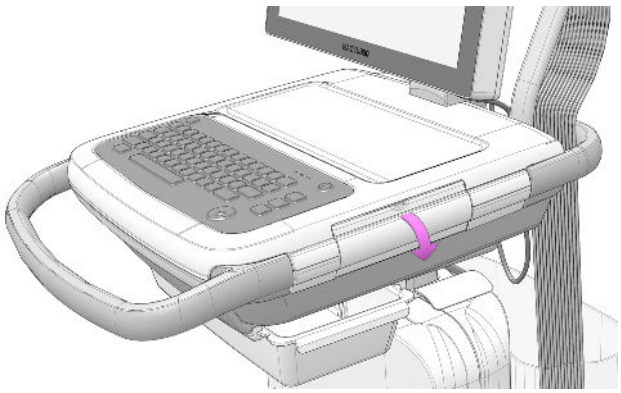
10.5 Replace the Battery

NOTICE

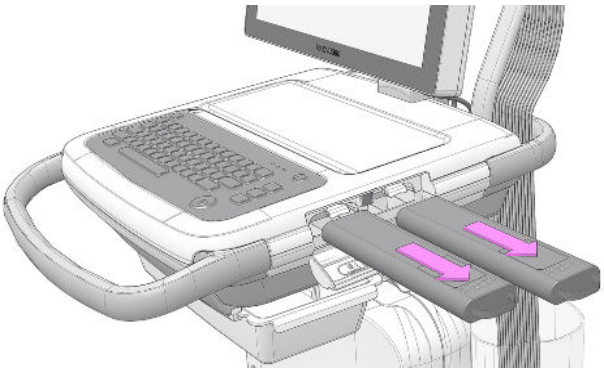
BATTERY PACK DISPOSAL

Do not dispose of the battery pack by fire or burning. Follow local environmental guidelines concerning disposal and recycling.

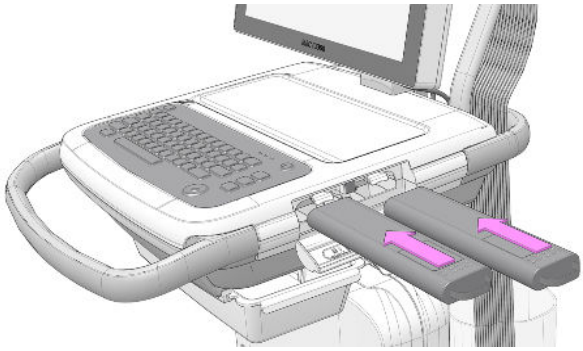
1. Place your thumb on the door release tab of the battery compartment door and gently pull it open. The arrow indicates the direction to pull the tab to open the door.



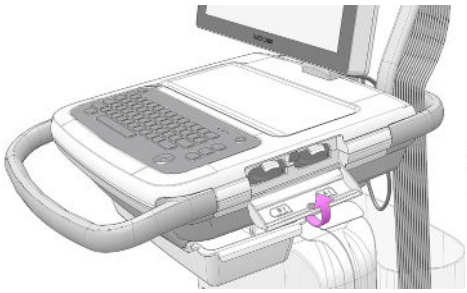
2. Press the lever of the battery slot from which you want to remove the battery in the upward direction and pull the battery handle to remove the battery. Repeat the action for the second battery.

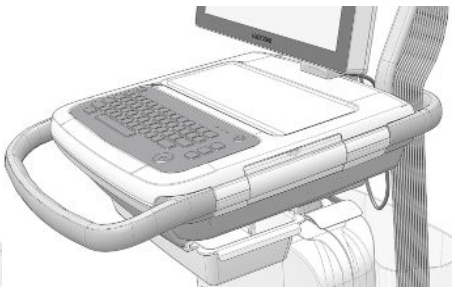


3. Slide the two batteries into the battery compartment slots in the correct orientation and direction indicated by the arrow.



4. Lift the battery compartment door in the upward direction and close it.





11 Cleaning and Disinfection

11.1 Clean and Disinfect Guidelines

Observe the guidelines while cleaning and disinfecting the device.

- Follow cleaning instructions and observe hazards exactly as issued by GE Healthcare or other suppliers listed.
- Avoid exposure to hypochlorite solutions and solutions containing iodine or high chlorine content, as these will promote corrosion.
- Avoid exposure to highly alkaline conditions (pH > 11), as this can damage products (for example, aluminum parts).
- Never use conductive solutions or solutions that contain wax or wax compounds to clean the equipment.
- Do not immerse the device in any liquid as this may corrode metal contacts and affect signal quality.
- Do not drip or expose the writer assembly to any liquids.
- Do not allow fluid to pool around connection pins. If this happens, blot dry with a soft, lint-free cloth.
- Avoid contact with open vents, plugs, or connectors during the cleaning and disinfecting procedures.
- Never autoclave or steam-clean the device.
- Do not use until thoroughly dry.
- Do not use any of below materials to clean the device, because their use may damage equipment surfaces.
  - Organic solvents
  - Abrasive cleaners or solvents of any kind
  - Acetone
  - Ketone
  - Betadine
  - Sodium salts

11.2 Inspect the Device

Carefully inspect devices between uses to verify proper function.

Evidence of damage and wear on a device may include but is not limited to discoloration, excessive scratches, wear, and cracks. Improperly functioning devices, damaged, and excessively worn devices should not be used.

11.3 Care at the Point of Use

Clean instruments as soon as possible after use.

Soiled devices must be separated from non-contaminated devices to avoid contamination of personnel or surroundings.

11.4 Preparation for Cleaning

For multi-piece or complex instruments, refer to their disassembly instructions. The disassembly instructions are available in the *MAC VU360™ Resting ECG Analysis System Service Manual*.

Contact your local GE Healthcare service representative for further information. For instruments produced by another manufacturer, reference the manufacturer's instructions for use.

11.5 Visual Inspection, Cleaning and Disinfection Frequency

The table indicates the frequency of visual inspection, cleaning, and disinfection procedures.

Component	Visual Inspection	Cleaning	Disinfection
Device and Trolley	Daily, preferably before the equipment's first use each day	Monthly, or more frequently, as needed	Follow the same frequency as cleaning. Disinfection must be performed after cleaning.
Acquisition Module	Daily	After use on each patient and prior to use on subsequent patient.	After use on each patient and prior to use on subsequent patient. Disinfection must be performed after cleaning.
Leadwires	Refer to the supplier's instructions for leadwire cleaning and disinfection.		
Reusable electrodes	Refer to the supplier's instructions for reusable electrode cleaning, disinfection and sterilization.		

11.6 Cleaning and Disinfecting the Acquisition Module

Proper cleaning and disinfecting prolongs the life of acquisition devices. Failure to use the proper cleaning solutions or to follow proper procedures can result in the following:

- Appearance of waveforms when not connected to a patient, resulting in false alarms instead of lead failure alarms
- Brittle and cracked device case
- Melting, dulling, or distortion of the case
- Total device failure, requiring replacement
- Unit malfunction
- Voided warranty

Soiled devices must be separated from non-contaminated devices to avoid contamination of personnel or surroundings.

11.6.1 Pre-Cleaning Inspection and Functional Testing

Inspect the Acquisition Module each time you clean it or if you suspect a problem.

- Check the pins that the leadwires plug into. They should not be bent or loose. Contact GE Healthcare Customer Support for any repairs needed.
- Check the Acquisition Module plastic case for any damage. Contact GE Healthcare Customer Support for any repairs needed.

11.6.2 Cleaning the Acquisition Module

1. Dispense Super Sani-Cloth® Wipe(s) from the canister.
2. If soil is present, thoroughly wipe the surfaces of the device with a fresh Super Sani-Cloth® Wipe for a minimum of two minutes and until soil and organic matter have been visibly removed.

   Treated surfaces must remain visibly wet for a minimum of two minutes. Use additional fresh disinfectant wipes, if needed, to ensure continuous two minutes contact time. Pay attention to the recessed areas and ridges; use a cotton swab to press onto the wipe for scrubbing these areas.
3. Inspect the device and trolley to ensure the complete removal of soil from surfaces, holes, and movable parts.

   If soil is still present, re-clean the equipment by repeating step Step 2.
4. Allow the device to air dry.
5. Discard wipes to clinical waste.

   Do not reuse wipes.

11.6.3 Post-Clean Inspection

GE Healthcare devices should be visually inspected and functionally tested after cleaning and prior to disinfection for below items:

- Cleanliness.
- Damage, including but not limited to corrosion (rust, pitting), discoloration, excessive scratches, flaking, cracks, and wear.
- Missing or worn part numbers.
- Proper functioning, including but not limited to the quality of ECGs; correct movement of hinges, joints, box locks, handles, ratchets, and couplings; proper alignment of jaws and teeth; and secure fastening of all locking mechanisms.

Do not use devices that are not functioning properly, that have unrecognizable markings, that have missing or worn part numbers, or that are damaged. Disassembled devices should be reassembled prior to disinfection unless otherwise instructed.

11.6.4 Disinfecting the Acquisition Module

Ensure that thorough cleaning is performed to remove all visible soil and organic matter prior to disinfection. See 11.6.2 Cleaning the Acquisition Module on page 99.

1. Dispense fresh Super Sani-Cloth® Wipe(s) from the canister.
2. Apply disinfectant to the entire surface using fresh wipes.

   Treated surfaces must remain visibly wet for a minimum of three minutes. Use additional fresh disinfectant wipes, if needed, to ensure continuous three minutes of contact time. Pay attention to the recessed areas and ridges; use a cotton swab to press onto the wipe to moisten these areas.

3. Remove disinfectant residue from the device by thoroughly wiping surfaces with a disposable, lint-free wipe moistened with 70% Isopropyl Alcohol (IPA) solution.
4. Allow the device to air dry.
5. Discard wipes to clinical waste.

   Do not reuse wipes.

11.7 Clean and Disinfect the Device and Trolley

The device and trolley are designed to require regular inspection and cleaning to function properly. The cleaning instructions for the device includes the touchscreen.

WARNING



ELECTRICAL HAZARD

Improper handling during inspection or cleaning could result in electrical shock.

To avoid potential shock, observe the guidelines at all times:

Before inspecting or cleaning the device, turn it off, unplug it from AC power, and remove the battery.

Do not immerse any part of the equipment in water.

11.7.1 Pre-Clean Inspection and Functional Test

Perform a visual inspection to verify that the device meets the minimum conditions:

- The case and display screen are free of cracks and other damage.
- All plugs, cords, cables, and connectors are free of kinks, frays, and other damage.
- All cords and connectors are securely seated.
- All keys and controls operate properly.
- The trolley exterior is free of cracks and other damage.
- The accessory track is functioning properly.
- All cords and connectors are securely seated.
- The actuation lever is functioning properly.
- The castor wheels are functioning properly.

If you notice any items that need repair, contact an authorized service representative to make the repairs. Discontinue using the device until the appropriate repairs can be made.

11.7.2 Clean the Device and Trolley

NOTE

The automated washer-disinfector is not applicable for MAC 5 A4/MAC 5 A5/ MAC 5 Lite medical devices.

1. Dispense Super Sani-Cloth® Wipe(s) from the canister.

2. If soil is present, thoroughly wipe the surfaces of the device with a fresh Super Sani-Cloth® Wipe for a minimum of two minutes and until soil and organic matter have been visibly removed.

   Treated surfaces must remain visibly wet for a minimum of two minutes. Use additional fresh disinfectant wipes, if needed, to make sure continuous two minutes contact time. Pay attention to the recessed areas and ridges; use a cotton swab to press onto the wipe for scrubbing these areas.

3. Inspect the device and trolley to make sure the complete removal of soil from surfaces, holes, and moveable parts.

   If soil is still present, re-clean the equipment by repeating step Step 2.

4. Allow the device to air dry.

5. Discard wipes to clinical waste.

   Do not reuse wipes.

11.7.3 Post-Clean Inspection

GE Healthcare devices should be visually inspected and functionally tested after cleaning and prior to disinfection for below items:

- Cleanliness.
- Damage, including but not limited to corrosion (rust, pitting), discoloration, excessive scratches, flaking, cracks, and wear.
- Missing or worn part numbers.
- Proper functioning, including but not limited to the quality of ECGs; correct movement of hinges, joints, box locks, handles, ratchets, and couplings; proper alignment of jaws and teeth; and secure fastening of all locking mechanisms.

Do not use devices that are not functioning properly, that have unrecognizable markings, that have missing or worn part numbers, or that are damaged. Disassembled devices should be reassembled prior to disinfection unless otherwise instructed.

11.7.4 Disinfect the Device and Trolley

NOTE

The automated washer-disinfector is not applicable for MAC 5 A4/MAC 5 A5/ MAC 5 Lite medical devices.

Make sure that cleaning is carried out to remove all visible soil and organic matter. See 11.7.2 Clean the Device and Trolley on page 100.

1. Dispense fresh Super Sani-Cloth® Wipe(s) from the canister.

2. Apply disinfectant to the entire surface using fresh wipes.

   Treated surfaces must remain visibly wet for a minimum of three minutes. Use additional fresh disinfectant wipes, if needed, to make sure continuous three minutes contact time. Pay attention to the recessed areas and ridges; use a cotton swab to press onto the wipe to moisten these areas.

3. Remove disinfectant residue from the device by thoroughly wiping surfaces with a disposable, lint free wipe moistened with 70% Isopropyl Alcohol (IPA) solution.

4. Allow the device to air dry.

5. Discard wipes to clinical waste.

   Do not reuse wipes.

11.8 Clean and Disinfect Leadwires and Reusable Electrodes

CAUTION



IMPROPER FUNCTIONING

Leadwires and electrodes that are not functioning properly could result in ECG distortion or failure.

Carefully inspect instruments between uses to verify proper functioning

Refer to the supplier's instructions for leadwire cleaning and disinfection.

Refer to the supplier's instructions for reusable electrode cleaning, disinfection, and sterilization.

See the *Diagnostic Cardiology Supplies and Accessories Guide, 2102946-001*.

11.9 Storage

Follow the storage instructions:

- Store the device, trolley, and acquisition module in a clean and dry, well-ventilated area protected from dust, moisture, insects, vermin, and extremes of temperature and humidity.
- Use below guidelines when storing acquisition modules:
  - Hang the device using a holder, if available.
  - If cables and leadwires are attached, route the additional length cables and store them in the basket behind the device.

11.10 Other Cleaning and Disinfection Agents

Super Sani-Cloth® Wipes is the recommended cleaning and disinfection solution, which has been validated on the device. However, below products are compatible with the device and may be used for cleaning and disinfection.

- PDI Easy Screen Cleaning®
- PDI Super Sani-Cloth®
- PDI Sani-Cloth® Bleach
- Clinell Sporicidal Wipes
- PDI Sani-Cloth® AF3
- PDI Sani-Cloth® Plus
- PDI Sani-Cloth® HB
- Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant Wipes
- Oxivir® Tb Wipes

- Clinell Universal Range
- Cleanisept Wipes
- Mikrozid Sensitive Wipes
- Caviwipes
- Phenol 2% (v/v)
- Ethanol (ethyl alcohol) 96% (v/v)
- Hydrogen Peroxide 20% (v/v)
- Sodium Hypochlorite (NaOCl) 5% solution)
- Isopropyl alcohol 70% (m/m)

11.11 Additional Information

- GE Healthcare used Super Sani-Cloth® wipes during cleaning and disinfection validation. This cleaning agent is not listed in preference to other available cleaning agents which may perform satisfactorily.
- The cleaning and disinfection information is provided in accordance with ANSI/AAMIST81, ISO 17664. The recommendations provided above have been validated as capable of preparing non-sterile GE Healthcare MAC VU360™ medical devices. It remains the responsibility of the user to make sure that the cleaning and disinfection are performed using appropriate equipment, materials, and personnel and achieves the desired result. This requires validation and routine monitoring of the process. Any deviation from the provided recommendations should be properly evaluated for effectiveness and potential adverse consequences.
- All users should be qualified personnel with documented expertise, competency, and training. Users should be trained on hospital policies and procedures along with current applicable guidelines and standards.
- Users should utilize appropriate Personal Protective Equipment (PPE) when cleaning and disinfecting devices in accordance with the Department of Environmental and Occupational Health and Safety's (OSHA) blood-borne pathogen guidelines or equivalent.

12 Troubleshooting

12.1 System Errors

The table lists messages that you may encounter while using this device.

Message	Cause	Solution
`WARNING: Approaching <xx>% of ECG storage limit. Transmit and delete reports to free memory.`	The device storage capacity is approaching 80% or 90%. This occurs as patient reports are added to the *Files* list.	Transmit patient reports to configured destinations and delete the transmitted reports from the *Files* list to create additional storage space.
`Memory is full. Transmit and delete reports to free memory.`	The device storage capacity is between 99% and 100%.	Transmit patient reports to configured destinations and delete the transmitted reports from the *Files* list to create additional storage space.
`Memory is full. This ECG cannot be saved.`	The device storage capacity is full.	Transmit patient reports to configured destinations and delete the transmitted reports from the *Files* list to create additional storage space.
`Memory is full. New ECGs cannot be saved.`	The device storage capacity is full.	Transmit patient reports to configured destinations and delete the transmitted reports from the *Files* list to create additional storage space.
`Battery error. Attach power cord. Contact Service.`	• Power sensor failure • Battery capacity sensor failure	Replace the battery. Contact your GE Healthcare Service Support representative if the error persists.
`Battery unknown error`	An unexpected battery error has occurred.	Replace the battery. Contact your GE Healthcare Service Support representative if the error persists.
`Battery not detected`	The battery is not detected by the device.	Perform below steps: 1. Remove the battery. 2. Re-insert the battery. If the battery is still not detected, replace the battery. Contact your GE Healthcare Service Support representative if the error persists.
`Device date/time is incorrect. Update.`	The date and time set on the device is not correct.	Select **Adjust** to set the correct date and time. For more information, see *Configuring Date and Time* chapter of *MAC VU360™ Resting ECG Analysis System Setup and Configuration Manual*.

Message	Cause	Solution
`Keyboard failure`	The keyboard is not working.	Contact your GE Healthcare Service Support representative if the error persists.
`Touchscreen failure`	The touchscreen is not working.	Contact your GE Healthcare Service Support representative if the error persists.
`Cannot perform action while acquiring ECG data`	You have tried to perform below actions while acquiring an ECG or rhythm: • Start a test for a new patient • Enter or edit patient information (available for rhythm) • Change speed, gain, or filter (available for rhythm) • Access User Menu • Access *Orders*, *Files*, or *Queue* list • Start ECG • Power off, lock, log out, standby or privacy mode	Perform only allowed actions.
`Possible reversal: <lead names> (eg: V2 V3)`	This notification is displayed in **Preview** screen when lead reversal has been detected during ECG acquisition.	Reject the acquired ECG, correct the lead position, and restart the ECG.

12.2 ECG Acquisition Errors

The table lists messages that you may encounter while acquiring ECG.

Message	Cause	Solution
`Communication Error with Acquisition Module`	The acquisition module is unable to communicate with the device.	The acquisition module recovers from the error unless it is a hardware failure. If the error occurs while the device is recording or printing an ECG or rhythm report, the operation is aborted. Restart the recording or printing manually.
`Report generation failed`	Unknown error	1. Retry the action. 2. If the error persists, power off and power on the device. 3. If the error persists, contact your GE Healthcare Service Support representative.
`Cannot open report`		
`ECG recording failed`		

12.3 Printing Errors

Table 12-1 Printer Errors Encountered During ECG Patient Report Printing

Error Message	Error Condition	How to troubleshoot:
`Printer error. Paper jam detected.`	Paper is jammed.	Carefully remove the stuck paper from the rollers inside the printer and verify that the remaining papers are loaded correctly in the tray. Printing will restart automatically.
`Printer error. Out of paper.`	The paper tray is empty.	Insert sufficient paper in the paper tray. Printing will restart automatically.
`Printer error. Door is open.`	The printer door is open.	Close the printer door. Printing will restart automatically.

Table 12-2 Printing Errors Encountered During Rhythm Printing

Error Message	Error Condition	How to troubleshoot:
`Printer error. Paper jam detected.`	Paper is jammed.	1. Carefully remove the stuck paper from the rollers inside the printer and verify that the remaining papers are loaded correctly in the tray. 2. Select **Start Rhythm** to restart rhythm printing.
`Printer error. Out of paper.`	The paper tray is empty.	1. Insert sufficient paper in the paper tray. 2. Select **Start Rhythm** to restart rhythm printing.
`Printer error. Door is open.`	The printer door is open.	1. Close the printer door. 2. Select **Start Rhythm** to restart rhythm printing.

Table 12-3 Printing Errors Encountered During Printing of the List of Stored Records

Error Message	Error Condition	How to troubleshoot:
`Printer error. Paper jam detected.`	Paper is jammed.	1. Carefully remove the stuck paper from the rollers inside the printer and verify that the remaining papers are loaded correctly in the tray. 2. Select **Print List** from the **Files Manager** to restart printing of the stored records list.
`Printer error. Out of paper.`	The paper tray is empty.	1. Insert sufficient paper in the paper tray. 2. Select **Print List** from the **Files Manager** to restart printing of the stored records list.

Table 12-3 Printing Errors Encountered During Printing of the List of Stored Records (Table continued)

Error Message	Error Condition	How to troubleshoot:
`Printer error. Door is open.`	The printer door is open.	1. Close the printer door. 2. Select **Print List** from the **Files Manager** to restart printing of the stored records list.
`Cannot perform action while printing`	You have tried to perform below actions while printing a patient report: • Start a test for a new patient • Delete the patient report • Change speed, gain, or filter • Access User Menu • Access *Orders*, *Files*, or *Queue* lists • Power off, lock, log out, standby, or privacy mode	Perform only the allowed actions.

Table 12-4 Common Printer Errors

Error Message	Error Condition	How to troubleshoot:
`Low Battery. Printer is disabled. Connect power cord.`	Low battery	Connect the power cord.
`High printer temperature. Printer disabled. Contact Service.`	High printer temperature	Restart the system to check if the error is resolved. If the error persists, contact your GE Healthcare Service Support representative.
`Printer error. Restart system. Contact Service.`	Unknown error or hardware failure in printer	Restart the system to check if the error is resolved. If the error persists, contact your GE Healthcare Service Support representative.
`Incompatible firmware.`	Incompatible printer firmware	Contact your GE Healthcare Service Support representative to upgrade the printer firmware.
`Acquisition error. Fix and retry printing.`	Printing stopped due to acquisition error	Rectify the error with the acquisition module and retry printing.
`Printer error. Retry. If issue persists, restart system.`	Unknown error in printer	Retry printing. If the error persists, restart the system.
`Printer is recovering. Please wait ...`	Printer recovery error	Wait for the printer to recover. If the error persists, restart the system.
`Cannot perform action while printing`	You have tried to perform below actions while printing a patient report: • Start a test for a new patient • Delete the patient report • Change speed, gain, or filter • Access User Menu • Access *Orders*, *Files*, or *Queue* lists • Power off, lock, log out, standby or privacy mode	Perform only allowed actions.

12.4 Report Transmission Errors

Table 12-5 Errors Encountered During Patient Report Transmission

Error Message	Error Condition	How to troubleshoot:
`Transmission queue is full. Additional reports cannot be added to the queue.`	The transmission queue has reached its maximum limit of 1,000 reports.	Wait for the reports in the queue to transmit and try again.
`Unable to transmit. Incomplete patient data.`	One or multiple patient reports cannot be added to the transmission queue because required fields in the patient demographics are blank or contain invalid data.	1. Edit the incomplete patient report(s) to enter missing patient data. 2. Retry transmission.
`Unable to transmit one or more reports. Incomplete patient data.`		
`Report transmission is in progress. Delete job from queue to edit.`	You are trying to edit a patient report that is being transmitted.	Delete the job from the queue to continue editing the patient report.
`Destination unknown`	The destination is not found.	Reconfigure the destination. See *MAC VU360™ Resting ECG Analysis System Set-up and Configuration Manual*.
`No USB device detected`	The USB flash drive is not detected.	Verify that the USB flash drive is firmly inserted into the USB port. If the error persists, verify that external USB storage is enabled and the USB port is enabled. If the error persists, use another USB flash drive.
`USB storage is full`	The USB storage is full.	Remove this USB flash drive, and insert another USB flash drive with write permissions.
`USB unknown error`	The USB flash drive has an unknown error.	Remove this USB flash drive, and insert another USB flash drive with write permissions.
`Cannot copy to USB`	The report cannot be transmitted to the USB flash drive.	Make sure that the USB flash drive is firmly inserted into the USB port.
`Hilltop generation unsuccessful`	The file generation is unsuccessful.	Retry transmission. Contact your GE Healthcare Service Support representative if the error persists.
`PDF generation unsuccessful`		
`Sapphire generation unsuccessful`		
`Unknown error`	Unknown error	Contact your GE Healthcare Service Support representative if the error persists.
`Server not connected`	The server connection is unsuccessful.	Retry transmission. Contact your GE Healthcare Service Support representative if the error persists.
`DCP not found`	The DCP connection is unsuccessful.	

Table 12-5 Errors Encountered During Patient Report Transmission (Table continued)

Error Message	Error Condition	How to troubleshoot:
`Unknown server version`	The server version is unknown.	
`Server is not accepting the test.`	The server is not accepting the transmission.	
`No network connection`	The network connection is lost.	Reconnect to the network.

12.5 Wireless Network Connectivity Errors

Table 12-6 CA Certificate Errors

Error Message	Error Condition	How to troubleshoot:
`CA Certificate PEM Check Failed`	The CA certificate format is invalid.	Obtain a PEM-encoded CA certificate.
`CA Certificate has expired`	The CA certificate has expired.	Obtain a PEM-encoded CA certificate.
`CA Certificate is invalid`	The CA certificate is invalid.	Obtain a PEM-encoded CA certificate.
`Unrecognized certificate format`	Certificate format is invalid.	Obtain a PEM-encoded CA certificate.

Table 12-7 Client Certificate Errors

Error Message	Error Condition	How to troubleshoot:
`Client Public Key Certificate PEM Check Failed`	The client certificate format is invalid.	Obtain a PEM-encoded client certificate.
`Client Certificate has expired`	The client certificate has expired.	Obtain a PEM-encoded client certificate.
`Invalid Client Private Key Password`	The client private key password is invalid.	Enter a valid client private key password.
`Client Certificate is invalid`	The client certificate is invalid.	Obtain a PEM-encoded client certificate.
`CA Certificate Compatibility Check Failed`	The client certificate is not compatible with the CA certificate in the device or the CA certificate is not installed in the device.	Obtain a PEM-encoded client certificate which is compatible with the PEM-encoded CA certificate in the device or turn the **Self-signed** option on.
`Unrecognized certificate format`	Certificate format is invalid.	Obtain a PEM-encoded client certificate.

Table 12-8 Errors During Wireless Network Connection

Error Message	Error Condition	How to troubleshoot:
`CA Certificate has expired`	The CA certificate has expired.	Obtain a PEM-encoded CA certificate.

Table 12-8 Errors During Wireless Network Connection (Table continued)

Error Message	Error Condition	How to troubleshoot:
`Client Certificate has expired`	The client certificate has expired.	Obtain a PEM-encoded client certificate.
`CA and Client Certificates have expired`	The CA and Client certificates have expired.	Obtain valid PEM-encoded CA and client certificates.
`CA Certificate is not installed`	The CA certificate is not installed in the device.	Obtain a PEM-encoded CA certificate.
`Client Certificate is not installed`	The client certificate is not installed in the device.	Obtain a PEM-encoded client certificate.
`CA and Client Certificates are not installed`	The CA and client certificates are not installed in the device.	Obtain valid PEM-encoded CA and client certificates.
`FIPS module is not detected`	FIPS module is not installed.	Contact your GE Healthcare Service representative to install the FIPS module.
`FIPS unrecoverable error`	Incompatible firmware version of FIPS module.	Contact your GE Healthcare Service representative to replace the FIPS module with a compatible version.
`FIPS initialization failed. Reconfigure wireless. If problem persists, contact GE service.`	Installation of the FIPS option has failed.	Contact your GE Healthcare Service representative to install the FIPS option.

Table 12-9 Errors During Network Connection

Error Message	Error Condition	How to troubleshoot:
`IP address conflict`	The user entered an invalid IP address.	Enter the correct IP address.
`Invalid subnet mask`	The user entered an invalid subnet mask.	Enter the correct subnet mask.
`Invalid default gateway`	The user entered an invalid default gateway.	Enter the correct default gateway.
`Invalid primary DNS`	The user entered an invalid primary DNS.	Enter the correct primary DNS.
`Invalid secondary DNS`	The user entered an invalid secondary DNS.	Enter the correct secondary DNS.

A Report Formats

A.1 ECG Report Formats

Table A-1 Supported 12-Lead ECG Report Formats

Report Format Name	Description	One Page or Multiple Page Report
1 by 10s @25mm/s	Shows one column of 12 rows of waveforms. Each column is 10 seconds wide and printed at 25 mm/s.	One page report
1 by 10s @ 50 mm/s	Shows one column of 12 rows of waveforms. Each column is 10 seconds wide and printed at 50 mm/s. 5 seconds are printed on each page. This results in a two page report.	Multiple page report
2 by 5s @25mm/s	Shows two columns of six rows of waveforms. Each column is 5 seconds wide and printed at 25 mm/s.	One page report
2 by 5s @ 50 mm/s	Shows two columns of six rows of waveforms. Each column is 5 seconds wide and printed at 50 mm/s. One column is printed on each page. This results in a two page report.	Multiple page report
2 by 5s + 1 Rhythm Ld	Shows two parts: • The upper part consists of two columns of six rows of waveforms. Each column is 5 seconds wide and printed at 25 mm/s. • The lower part consists of one row of 10 seconds of one lead. The rhythm lead shown in the report is configurable.	One page report
2 by 10s	Shows two columns of six rows of waveforms. Each column is 10 seconds wide and printed at 25 mm/s. One column is printed on each page. This results in a two page report.	Multiple page report
4 by 2.5s	Shows four columns of three rows of waveforms. Each column is 2.5 seconds wide and printed at 25 mm/s.	One page report
4 by 2.5s + 1 Rhythm Ld	Shows two parts: • The upper part shows four columns of three rows of waveforms. Each column is 2.5 seconds wide and printed at 25 mm/s. • The lower part shows one row of 10 seconds of one lead. The rhythm lead shown in the report is configurable.	One page report
4 by 2.5s + 3 Rhythm Ld	Shows two parts: • The upper part shows four columns of three rows of waveforms. Each column is 2.5 seconds wide and printed at 25 mm/s. • The lower part shows three rows of 10 seconds of three leads. The rhythm leads shown in the report are configurable.	One page report
4 by 10s	Shows four columns of 3 rows of waveforms. Each column is 10 seconds wide and printed at 25 mm/s. Three leads are printed on each page. This results in a four page report.	Multiple page report

Table A-2 Additional Supported 12-Lead ECG Report Formats

Report Format Name	Description	One Page or Multiple Page Report
Computer Graphic Record (CGR)	Shows three columns of four rows of medians at 25 mm/s on the left side and three rows of waveforms printed at 12.5 mm/s on the right side (resulting in 10 seconds of rhythm). The upper part of the report is text, such as the measurements or interpretation. This results in a one page report.	One page report
Swedish Format 1	Shows two columns of six rows of medians at 50 mm/s on the left side and six rows of waveforms printed at 12.5 mm/s on the right side (resulting in 10 seconds of rhythm). The lower part of the report is text, such as the measurements or interpretation. This results in a one page report.	One page report
Swedish Format 2	Shows below parts: • The upper part of the report is six rows of 5 seconds of waveform printed at 50 mm/s. • The lower part of the report is text, such as the measurements or interpretation. Each column (page) is from the first 5 seconds of data. This results in a two page report.	Multiple page report

Table A-3 Supported 15-Lead ECG Report Formats

Report Format Name	Description	One Page or Multiple Page Report
3 by 5s @ 50mm/s	Shows three columns of six rows of waveforms in a three page report. Each column is 5 seconds wide and printed at 50 mm/s. The first page contains six rows from the first 5 seconds of data. The second page is six rows from the last 5 seconds of data. The third page is the remaining three leads.	Multiple page report
3 by 10s	Shows three columns of six rows of waveforms in a three-page report. Each column is 10 seconds wide. The first two pages are six rows each. The third page is the remaining three leads.	Multiple page report
5 by 2s	Shows five columns of three rows of waveforms. Each column is 2 seconds wide and printed at 25 mm/s.	One page report
5 by 2s +1 Rhythm Ld	Shows two parts: • The upper part is five columns of three rows of waveforms. Each column is 2 seconds wide and printed at 25 mm/s. • The lower part isone row of 10 seconds of one lead. The rhythm lead shown in the report is configurable.	One page report
5 by 2s +3 Rhythm Lds	Shows two parts: • The upper part is five columns of three rows of waveforms. Each column is 2 seconds wide and printed at 25 mm/s. • The lower part is three rows of 10 seconds of three leads. The rhythm leads shown in the report are configurable.	One page report
5 by 10s	Shows five columns by three rows of waveforms. Each column is 10 seconds wide. This results in a five page report.	Multiple page report

Table A-4 Supported 12-Lead and 15-Lead ECG Report Formats

Report Format Name	Description	One Page or Multiple Page Report
Autorhythm	Shows one column of three, six, or 12 rows of waveforms (selectable). Each column is 10 seconds wide. • When printing 12 rows, this report does not have space for any additional text, such as measurements or interpretation. • When printing three or six rows, this report contains additional text, such as measurements or interpretation.	One page report
Rhythm and Morphology Report (RMR)	Shows the following parts: • The upper part of the report is text, such as the measurements or interpretation. • The central part of the report is six to eight columns of two rows of medians printed at 25 mm/s. • The lower part of the report is three rows of waveforms printed at 25 mm/s (resulting in 10 seconds of rhythm). There are six columns for 12-lead records and eight columns for 15-lead records. This results in a one page report.	One page report

Expanded Median	Shows the following parts:
	• The upper part of the report is text (including the measurements but not the interpretation) and the measurement matrix, which is the measurements for each lead in the record (12 or 15 lines).
	• The lower part of the report is:
	  • Four columns by three rows of medians at 50 mm/s for 12-lead records
	  • Four columns by four rows of medians at 50 mm/s for 15-lead records
	  • Medians printed at either 10 mm/mV or 20 mm/mV. The medians can have vertical tic marks added at the wave onsets and offsets (pon, poff, qon, qoff, and toff).
	There is no space in this report to print the interpretation. This results in a one page report.
		One page report

Table A-5 Vector Loop

Report Format Name	Description	One Page or Multiple Page Report
Vector Loop	Shows four main sections: • Demographics and Measurements Patient demographics (name, ID, age or date of birth, etc.) and basic measurements (vent rate, PR interval, etc.) are in the report. Interpretation is not in the report. • Median waveforms The X, Y and Z medians are printed at the selected gain, but twice the speed. For a standard 10 mm/mV and 25 mm/s selection, the medians print at 10 mm/mV and 50 mm/s. • Loops This is the projection of the cardiac vector on to the horizontal, frontal, and sagittal planes. There are four charts for each plane showing the entire cardiac cycle at the selected gain. The gain can be selected from 20 mm/mv, 40 mm/mV, 80 mm/V, or 160 mm/mV. Each chart uses a dot to show the position of the vector every 2 ms. A tail is attached to each dot to more clearly outline each loop. The length of the tail is related to the rate of change of the vector at that point in time. A marker is put every 10 ms as an aid to count time around the loop. • Legend The legend is used only for the loop charts. It contains the gains for each and a scale chart. The scale shows how many mV are in 20 mm along the axes of each chart.	One page report

The figure shows the standard report layout:

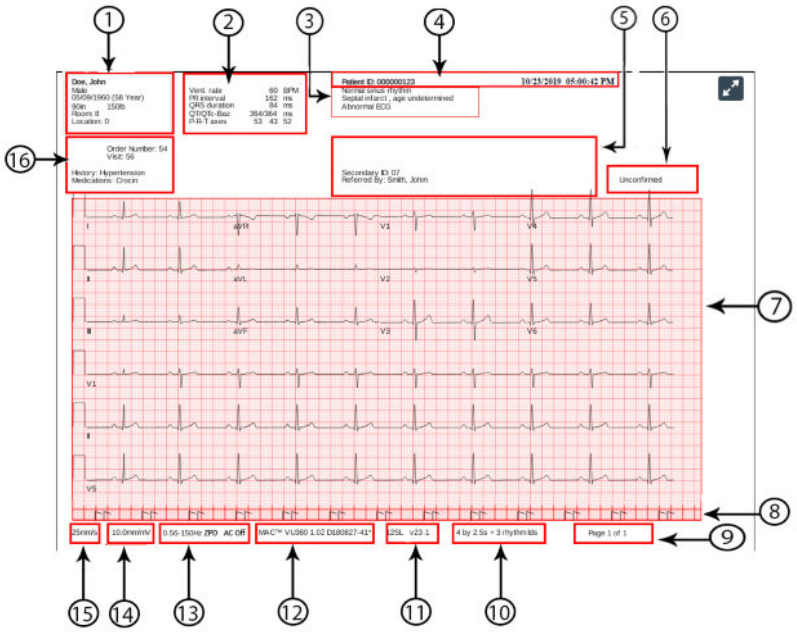


Table A-6 Standard Report Layout

Item	Name	Description
1	**Patient Demographics**	Displays information about the patient, such as: • **First Name** and **Last Name** • **Age** and/or **Date of Birth** • **Gender** • **Race** • **Height** and **Weight** • **Room** • **Location**
2	**Vital Signs**	Displays information about the patient's vital signs, such as: • Heart rate • PR interval • QRS duration • QT/QTc • P-R-T axes • Blood pressure
3	**12SL Interpretation Statements**	Displays automated 12SL interpretation statements if the report format is configured to include 12SL interpretation statements. Clinicians use this information to make decisions about cardiac care for the patient. The patient report includes ACS interpretation statements when the ECG is recorded with the ACS option. The status of *Hookup Advisor* is based on the 12SL analysis of the patient report.
4	**ECG Header**	Displays the **Patient ID**, date and time of ECG acquisition in the configured date and time format, and the name of the institution, if configured.
5	**Physician Information**	Displays the details below: • **Referred by**: Name of the physician who referred the patient • **Secondary ID**: Alternate identification number of the patient
6	**Report Status**	Displays the status of the report.
7	**Waveforms**	Displays the 10 seconds ECG patient report in the configured report format for the selected lead set.
8	**Pace Annotations**	Displays pace annotaions for patients with a pacemaker. The pace annotations represent pacemaker pulses. **NOTE** When two pace annotations are detected so close to each other that they cannot be uniquely shown on the report, a single pace flag with two flag tips is printed to indicate this condition. 
9	**Page Number**	Displays the page number of the ECG patient report in the format page *x* of *y*, where *x* is the current page number and *y* is the total number of pages.
10	**Report Format**	Displays the configured report format title used to preview the ECG patient report.
11	**12SL Version**	Displays the 12SL version used to analyze the ECG patient report.
12	**Product Model**	Displays the product model.
13	**Filter Setting**	Displays the filter of the ECG waveform (measured in Hz), with Zero Phase Distortion (ZPD for High Pass filter).

Table A-6 Standard Report Layout (Table continued)

Item	Name	Description
14	**Gain Setting**	Displays the gain of the ECG waveform (measured in mm/mV).
15	**Speed Setting**	Displays the speed of the ECG waveform (measured in mm/s).
16	**Clinical Data**	Displays the clinical data gathered during the ECG test, such as: • **Technician ID** **NOTE** If the logged-in user has a **Technician ID** associated with their user account, the **Technician ID** is automatically populated in the preview. If the user modifies the value of the **Technician ID** field in the *Patient Information* screen, the preview is refreshed with the updated **Technician ID**. • **Test Indication** • **Priority** • **Visit Number** • **Medical History** • **List of Medications**

A.2 Rhythm Report Format

Rhythm reports contain patient information, waveform data, and ECG acquisition data. A rhythm report is a continuous recording of a patient's ECG in a digital format or in print. A continuous rhythm recording is done for a patient so cardiac events are not missed.

This section describes the information contained in a rhythm report and explains where in the report that the information is located. After generating a rhythm report, it is a recommended best practice to review the report before allowing the patient to leave.

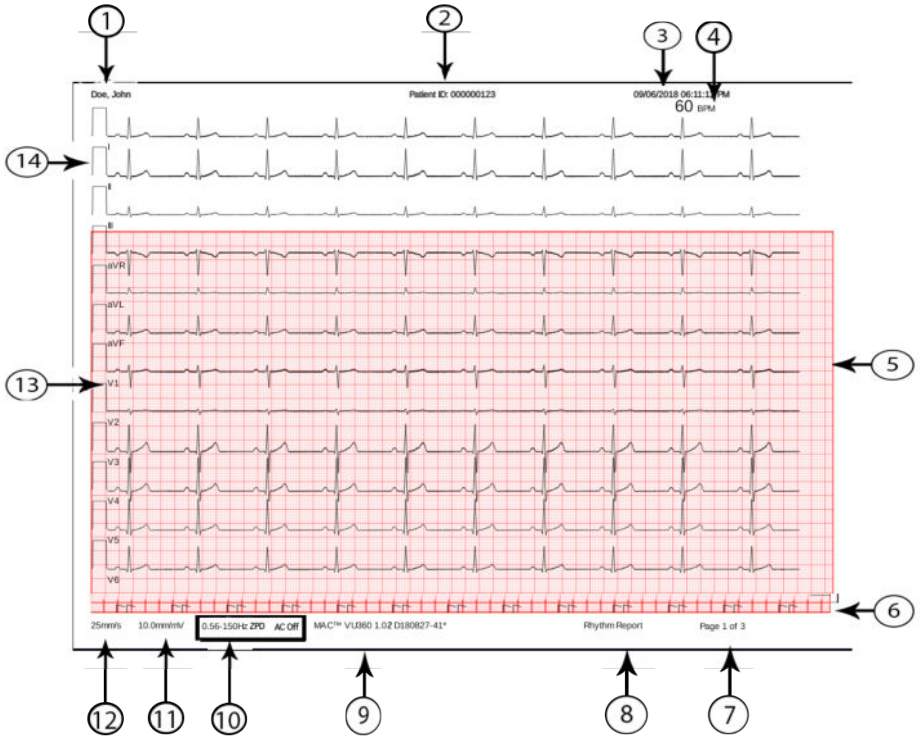


Table A-7 Standard Rhythm Report Layout

Item	Description
1	Patient name
2	Patient ID and the name of the institution
3	The date and time of acquisition for the report. If the report contains more than one page, the time of acquisition changes on each page to the current time of acquisition.
4	The beats per minute (BPM) for the heart rate of the patient. If the report contains more than one page, the BPM changes on each page of the waveform data.
5	The waveform data The rhythm report contains waveform data for 12 leads configured for the rhythm report.
6	Pace channel. Pace annotations display in this channel for patients with a pacemaker. The pace annotations show pacemaker pulses. **NOTE** When 2 pacemaker pulses are sensed so near each other that they cannot be uniquely shown on the report, a one pace spike with two flag tips is printed to show this condition: 
7	Page number of the report. The page number increments for each page of the rhythm report. For the digital rhythm report, the page number is shown as **Page <x> of <y>**. For the printed rhythm report, the page number is shown as **Page <x>**.
8	The type of report format (rhythm report).
9	The product name.

Table A-7 Standard Rhythm Report Layout (Table continued)

Item	Description
10	The **Filter** of the ECG waveform (measured in Hz), indicated with ZPD (for High Pass filter). **NOTE** You can change the filter before or during the recording and/or printing of a rhythm. For the printed rhythm report, the printing stops and restarts at the newly selected filter. A gap is shown on the printed rhythm report where the change occurred. Each time the rhythm printing starts after a change in filter, a calibration pulse is added for each lead that tells which filter on the printed rhythm. For the digital rhythm report, the calibration pulse of the last filter selected during recording is shown on the full report.
11	The **Gain** of the ECG waveform (measured in mm/mV). **NOTE** You can change the gain before or during the recording and/or printing of a rhythm. For the printed rhythm report, the printing stops and restarts at the newly selected gain. A gap is shown on the printed rhythm report where the change occurred. Each time the rhythm printing starts after a change in gain, a calibration pulse is added for each lead that tells the gain on the printed rhythm. For the digital rhythm report, the calibration pulse of the last gain selected during recording is shown on the full report.
12	The **Speed** of the ECG waveform (measured in mm/s). **NOTE** You can change the speed before or during the printing of a rhythm. For the printed rhythm report, the printing stops and restarts at the newly selected speed. A gap is shown on the printed rhythm report where the change occurred. Each time the rhythm printing starts after a change in speed, a calibration pulse is added for each lead that tells the speed on the is printed rhythm. The digital rhythm report is recorded at the configured rhythm speed.
13	The **Leads**.
14	The **Calibration pulses**. When a rhythm recording is started, a calibration pulse is added at the beginning of each lead in the patient report, which shows the speed and gain at which the rhythm is recorded. Each calibration pulse represents 1 mV of amplitude and 200 ms duration of the waveform. Each time the rhythm recording starts after a change in speed or gain, a calibration pulse is printed for each lead. **NOTE** The standard grid paper is divided into small squares of 1 mm x 1 mm and large squares of 5 mm x 5 mm. When recording 25 mm/s, 1 second of data is shown in 25 mm (5 large squares) on the rhythm report. When recording 10 mm/mV, 1 mV of data is shown in 10 mm/mV (2 large squares) on the printout.

A.3 Full Disclosure (FD) Report Format

Full Disclosure (FD) reports contain patient information, waveform data, and ECG acquisition data in FD buffer at the time of generating report. A FD report is a continuous recording of a patient's ECG in a digital, print, or transmit format for a single lead.

This section describes the information contained in a FD report and explains where in the report that the information is located. After generating a FD report, it is a recommended best practice to review the report before allowing the patient to leave.

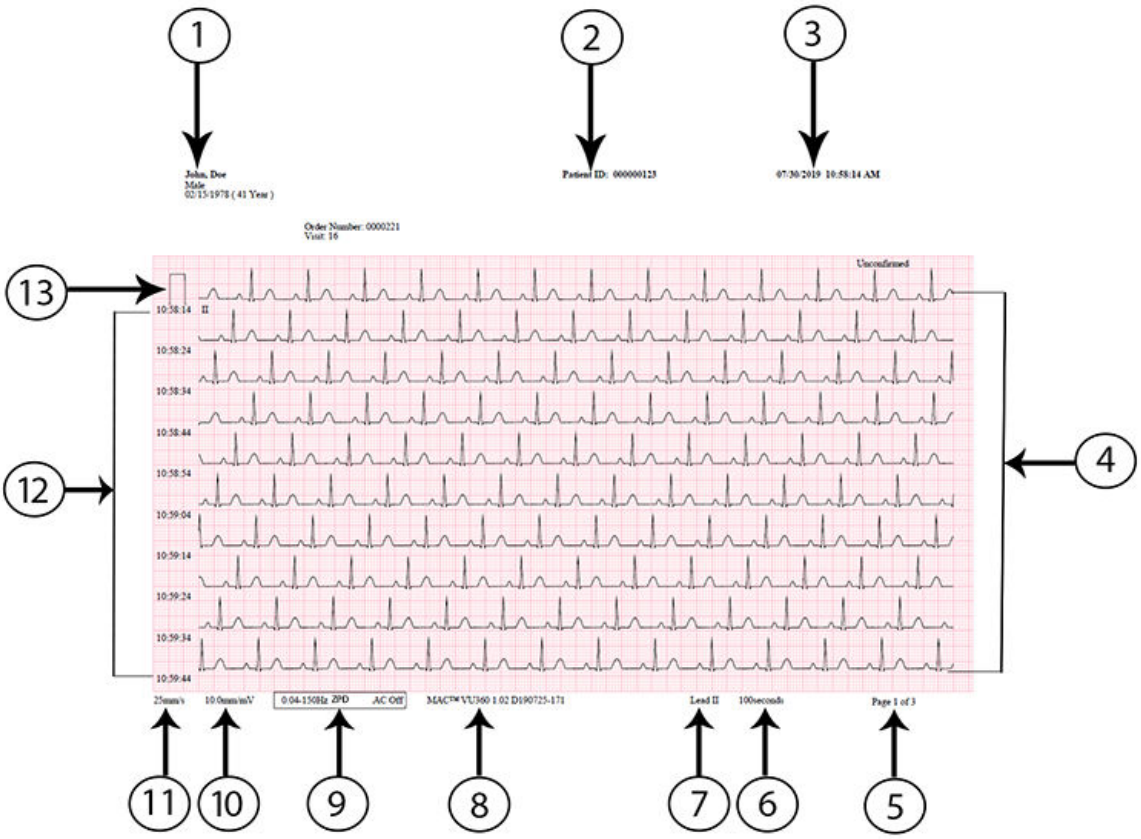


Table A-8 FD Report Layout

Item	Description
1	Prints the patient name.
2	Prints the patient ID and name of the institution.
3	Prints the date and time of acquisition for the report.

Table A-8 FD Report Layout (Table continued)

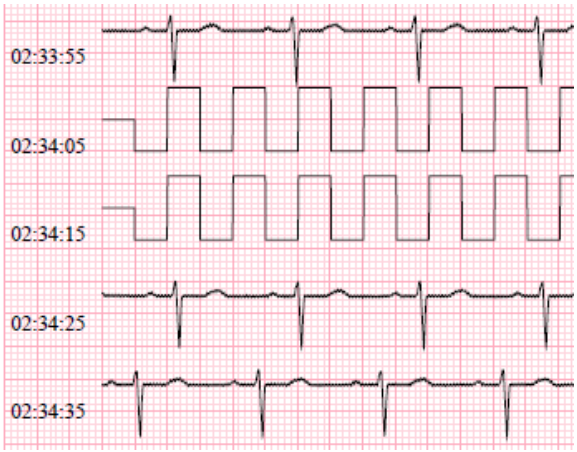
Item	Description
4	Prints the waveform. The FD report contains waveform data for a single lead selected in Full Disclosure mode. **NOTE** A gap is shown on the printed or transmitted FD report when the acquisition module is disconnected.  **NOTE** A square waves is shown on the printed or transmitted FD report when the lead is disconnected. 
5	Prints the page number of the report. The page number increments for each page of the FD report. For the FD report, the page number is shown as **Page <1> of <3>**.
6	Prints the total number of seconds in the rhythm report on each page.
7	Prints the selected single **Lead** information.
8	Prints the product name.
9	Prints the **Filter** of the ECG waveform (measured in Hz), indicated with ZPD (for High Pass filter). **NOTE** You can change the filter after recording and/or printing of a rhythm. For the printed FD report, the recording stops and restarts at the newly selected filter. Each time the Full Disclosure recording starts after a change in filter, a calibration pulse is added for each lead that tells which filter on the printed rhythm. For the digital FD report, the calibration pulse of the last filter selected during recording is shown on the full report.

Table A-8 FD Report Layout (Table continued)

Item	Description
10	Prints the **Gain** of the ECG waveform (measured in mm/mV). **NOTE** You can change the gain after recording and/or printing of a rhythm. For the printed FD report, the recording stops and restarts at the newly selected gain. Each time the Full Disclosure recording starts after a change in gain, a calibration pulse is added for a single lead that tells the gain on the printed FD report. For the digital FD report, the calibration pulse of the last gain selected during recording is shown on the full report.
11	Prints the **Speed** of the ECG waveform (measured in mm/s). **NOTE** The digital FD report is recorded at the configured rhythm speed.
12	Displays the time stamp for each row. The time stamp corresponds to clock time when the first sample is acquired in that row.
13	Prints the **Calibration pulses**. When a rhythm recording is started, a calibration pulse is added at the beginning of a single lead in the patient report , which shows the speed and gain at which the rhythm is recorded. Each calibration pulse represents 1 mV of amplitude and 200 ms duration of the waveform. Each time the Full Disclosure recording starts after a change in speed or gain, a calibration pulse is printed for a single lead. **NOTE** The standard grid paper is divided into small squares of 1 mm x 1 mm and large squares of 5 mm x 5 mm. When recording 25 mm/s, 10 rows of data, 10 seconds of data per row is shown in each page on the FD report.

B Patient Preparation

B.1 Prepare the Patient's Skin

Below steps are necessary to properly prepare a patient's skin before acquiring an ECG.

Careful skin preparation is the key to an interference-free ECG. Signal quality is indicated on the device via the *Hookup Advisor* status and messages.

1. Select the electrode placement sites for ECG diagnosis per the protocol specified by the hospital or physician.

   Refer to the electrode placement diagrams and descriptions for the various protocols.

2. Make sure that each site is dry, clean, and free of excessive hair.

   NOTE

   Do not use solvents to clean the skin; solvents trapped under electrodes may lead to abnormal skin reactions.

3. Apply the electrodes to the prepared sites.

   WARNING

   ELECTRIC SHOCK

   Touching the conductive elements cancels the protection provided by the isolated signal input.

   Make sure that conductive parts of the electrodes or leadwires, including the neutral electrode, do not come in contact with other conductive parts, including earth.

4. Check the *Hookup Advisor* for any indication of lead problems.

   NOTE

   Use only electrodes and contact agents recommended by GE Healthcare. The signal quality on the *Hookup Advisor* is not indicated until the RA/R electrode is applied. If RA/R becomes disconnected, the system reports that all electrodes are off the patient.

5. Check the Acquisition Module for any indication of lead problems.

   If all the LED indicators on the Acquisition Module display red in a lead fail state, after 30 seconds of this status, all the indicators are turned off. All the LED indicators are turned on only when at least one lead is detected after electrodes are connected to a patient.

   If electrodes are placed on a patient and then removed or disconnected, the LED indicators time out after 30 seconds. When the electrodes are connected again on a patient, the LED indicators are turned on, and a warning message displays if the **Start New Patient** option was not selected prior to electrode placement. The warning indicates that a new patient connection is detected, and asks you to confirm whether to start a new patient test.

   Select one of the following options:

   - **No** if you placed electrodes on the same patient and want to continue the test for the patient.
   - **Yes** if you placed electrodes on a new patient and want to start a test for the new patient.

- If there are no pending print jobs in the queue, the *Patient Information* screen is expanded. You can enter patient data for the new patient.
- If there are pending print jobs from the previous patient test in the queue, a message displays indicating that pending print jobs will be cleared from the queue.

  Select one of the following options:

  - **Continue** to clear pending print jobs and start the test for the new patient. The *Patient Information* screen is expanded.
  - **Cancel** to cancel the test for the new patient, and complete the pending print jobs.

B.2 Electrode Placement

This section describes various methods for placing electrodes for resting ECGs on a patient.

CAUTION

INACCURATE DIAGNOSIS

Improper connection of the leadwires to the electrodes or the acquisition module will cause inaccuracies in the ECG.

Make sure the leadwires are connected properly to the electrodes and the acquisition module. Trace each leadwire from its acquisition module label to its colored connector and then to its electrode to make sure that it is matched to the correct label leadwire connection location.

B.2.1 Standard 12-Lead Electrode Placement

To acquire a standard 12-lead ECG, use the electrode placement shown in the diagram below.

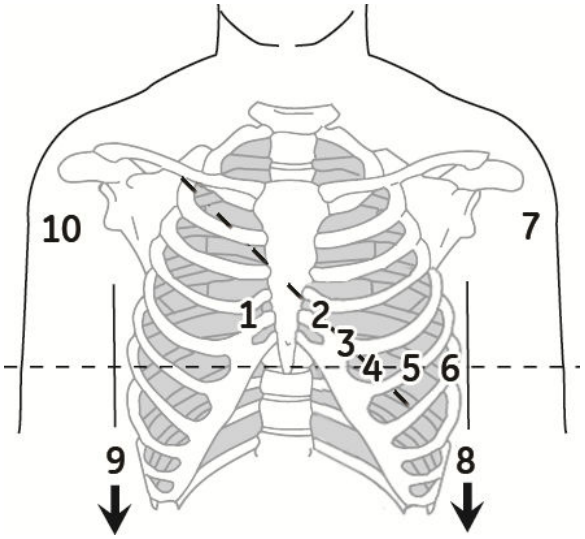


Table B-1 Standard 12-Lead Electrode Placement

Item	AHA Label	IEC Label	Description
1	V1 red	C1 red	Fourth intercostal space at the right sternal border.
2	V2 yellow.	C2 yellow	Fourth intercostal space at the left sternal border.

Table B-1 Standard 12-Lead Electrode Placement (Table continued)

Item	AHA Label	IEC Label	Description
3	V3 green.	C3 green	Midway between location 2 and 4.
4	V4 blue	C4 brown	Mid-clavicular line in the fifth intercostal space.
5	V5 orange	C5 black	Anterior axillary line on the same horizontal level as 4.
6	V6 violet	C6 violet	Mid-axillary line on the same horizontal level as 4 and 5.
7	LA black	L yellow	Left deltoid.
8	LL red	F green	Above the left ankle (alternate placement— upper leg as close to the torso as possible).
9	RL green	N black	Above the right ankle (alternate placement—upper leg as close to the torso as possible).
10	RA white	R red	Right deltoid.

B.2.2 Standard 15-Lead Electrode Placement

To acquire a standard 15-lead ECG, use the electrode placement shown in the following diagram.

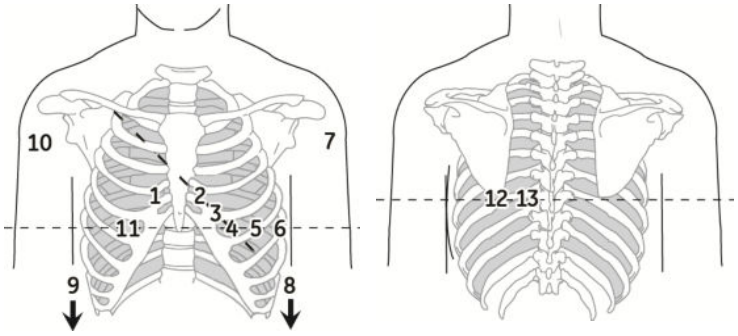


Table B-2 Standard 15-Lead Electrode Placement

Item	AHA Label	IEC Label	Description
1	V1 red	C1 red	Fourth intercostal space at the right sternal border.
2	V2 yellow.	C2 yellow	Fourth intercostal space at the left sternal border.
3	V3 green.	C3 green	Midway between location 2 and 4.
4	V4 blue	C4 brown	Mid-clavicular line in the fifth intercostal space.
5	V5 orange	C5 black	Anterior axillary line on the same horizontal level as 4.
6	V6 violet	C6 violet	Mid-axillary line on the same horizontal level as 4 and 5.
7	LA black	L yellow	Left deltoid.
8	LL red	F green	Above the left ankle (alternate placement— upper leg as close to the torso as possible).
9	RL green	N black	Above the right ankle (alternate placement—upper leg as close to the torso as possible).
10	RA white	R red	Right deltoid.
11	V4R gray	C4R gray	Right anterior chest opposite of 4.
12	V8 gray	C8 gray	Under left mid-scapular line.

Table B-2 Standard 15-Lead Electrode Placement (Table continued)

Item	AHA Label	IEC Label	Description
13	V9 gray	C9 gray	Left paraspinal border.

B.2.3 Pediatric Electrode Placement

To acquire a pediatric ECG, use the electrode placement shown in the following diagram.

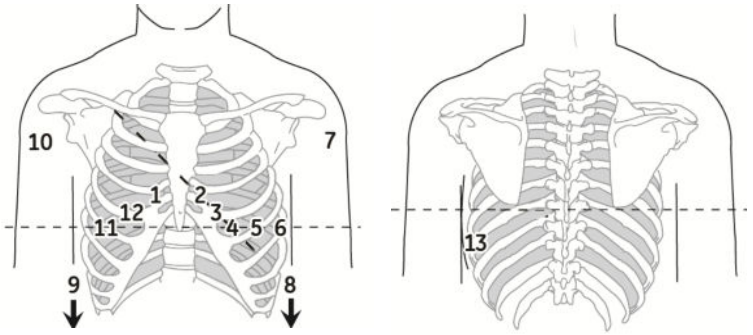


Table B-3 Pediatric Electrode Placement

Item	AHA Label	IEC Label	Description
1	V1 red	C1 red	Fourth intercostal space at the right sternal border.
2	V2 yellow.	C2 yellow	Fourth intercostal space at the left sternal border.
3	V3 green.	C3 green	Midway between location 2 and 4.
4	V4 blue	C4 brown	Mid-clavicular line in the fifth intercostal space.
5	V5 orange	C5 black	Anterior axillary line on the same horizontal level as 4.
6	V6 violet	C6 violet	Mid-axillary line on the same horizontal level as 4 and 5.
7	LA black	L yellow	Left deltoid.
8	LL red	F green	Above the left ankle (alternate placement— upper leg as close to the torso as possible).
9	RL green	N black	Above the right ankle (alternate placement—upper leg as close to the torso as possible).
10	RA white	R red	Right deltoid.
11	V4R gray	C4R gray	Mid-clavicular line in the fifth right intercostal space.
12	V3R gray	C3R gray	Halfway between 1 and 11.
13	V7 gray	C7 gray	Same horizontal level of 4 in the left posterior axillary line.

B.2.4 NEHB Electrode Placement

To acquire a NEHB ECG, use the standard 12-lead electrode placement and items 1, 2 and 3 as shown in the following diagram.

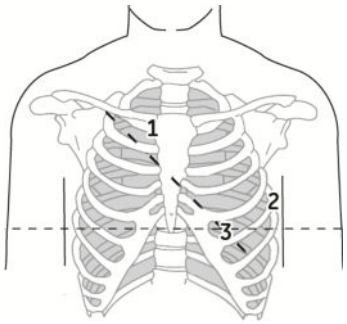


Table B-4 NEHB Electrode Placement

Item	AHA Label	IEC Label	Description
1	A1 orange	Nst white	Attachment point is the second rib of the right sternal edge.
2	A2 orange	Nax white	Fifth intercostal space on the left posterior axillary line (same position as V7 or C7).
3	V4 blue	Nap white	Mid-clavicular line in the fifth intercostal space (same as C4).

B.2.5 Vector Loops Electrode Placement

To acquire a Vector Loops ECG, use the electrode placement shown in the following diagram.

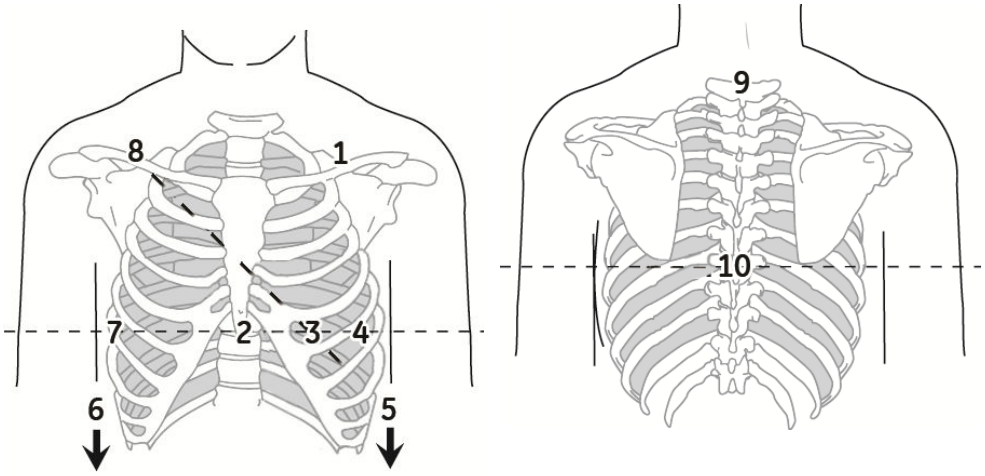


Table B-5 Vector Loops Electrode Placement

Item	AHA Label	IEC Label	Description
1	LA black	L yellow	Just below the clavicle of the left arm.
2	E orange	E light blue	Mid-sternum on the same horizontal level as 3 and 4.
3	V4 blue	C4 brown	Mid-clavicular line in the fifth intercostal space.
4	V6 violet	C6 violet	Mid-axillary line on the same horizontal level as 3.
5	LL red	F green	Left leg, in the lower abdominal quadrant.
6	RL green	N black	Right leg, in the lower abdominal quadrant.
7	I orange	I light blue	Right mid-axillary line on the same horizontal level as 3 and 4.
8	RA white	R red	Just below the clavicle of the right arm.

Table B-5 Vector Loops Electrode Placement (Table continued)

Item	AHA Label	IEC Label	Description
9	H orange	H light blue	Back of the neck—avoid the carotid artery and jugular vein.
10	M orange	M light blue	Center of the spine on the same horizontal level as 3 and 4.

C Patient Information Fields

C.1 Patient Information Text Box Names

When an order is attached to a patient test, all Patient Information text boxes are read-only. The text box names in the table with an asterisk (*) are not.

Table C-1 *Patient Information* text boxs

Name	Description	Length	Accepted Values
Patient ID	Identification number given to the patient. The Patient ID (PID) can be configured by the administrator for a specified country requirement (for example, Denmark, Sweden, or Norway), customize text box names, and add leading zeroes for specified character lengths. If the Patient ID does not agree with the configuration, an error message opens by the Patient ID text box. If the Patient ID agrees with the configuration, the patient **Date of Birth** and **Gender** text boxes are automatically updated.	Standard Patient ID:	
		1 to 16 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
		Danish Patient ID:	

		10 characters	Valid values: '0 to 9' and '-'.
			The PID must be in the format *ddmmyyexxg* or *ddmmyyexxg*, where:
			• *dd* = patient day of birth
			• *mm* = patient month of birth
			• *yy* = patient year of birth
			• *e* = patient year of birth is calculated as follows:
			  • *e* = 0, 1, 2, 3 or 4, if the patient year of birth is between 1900 to 1999.
			  • *e* = 5, 6, 7, 8 or 9, if the patient year of birth is between 2000 to existent year.
			• *xx* = patient place of birth
			• *g* = patient gender
			  • male = odd number
			  • female = even number

		Swedish Patient ID:	

Table C-1 *Patient Information* text boxs

Name	Description	Length	Accepted Values
		10 (Short) to 12 (Long) characters	Valid values: '0 to 9' and '-' or '+'. The PID must be in one of the below short formats: • *yymmdd+xxgc* • *yymmdd-xxgc* • *yymmddxxgc* or in the long formats as follows: • *yyyymmdd+xxgc* • *yyyymmdd-xxgc* • *yyyymmddxxgc* • *yy* and *yyyy* = patient year of birth • *dd* = patient day of birth • *mm* = patient month of birth • *+* or *-* = patient age **NOTE** If *+* or *-* is not before the patient age, the age is less than 100 years. • *xx* = patient place of birth • *g* = patient gender • male = odd number • female = even number • *c* = checksum digit
		Norwegian PID:	
		11 characters	Valid values: '0 to 9' and '-'. The PID must be in the format *ddmmyy-efgxx* or *ddmmyyefgxx*, where: • *dd* = patient day of birth • *mm* = patient month of birth • *yy* = patient year of birth • *efg* = patient year of birth calculated as follows: • *efg* = 000 to 499, if patient year of birth is between 1900 to 1999. • *efg* = 500 to 750 and *yy* is more than 49, if the patient year of birth is between 1800 to 1899. • *efg* = 500 to 999 and *yy* is less than 50, if the patient year of birth is between 2000 to current year. • *g* = patient gender • male = odd number • female = even number • *xx* = patient place of birth

Table C-1 *Patient Information* text boxs (Table continued)

Name	Description	Length	Accepted Values
Mandatory fields apply for	The mandatory fields that can be configured for **Transmission** or **Acquisition** of the ECG report. Based on the **Mandatory fields apply for Transmission** settings, the ECG report is not added to the transmission queue until you enter the patient demographic data for the mandatory fields. Based on the **Mandatory fields apply for Acquisition**settings, the ECG report is not accepted, transmitted, or printed until you enter the patient demographic data for the mandatory fields.	Not Applicable	• Transmission • Acquisition
First Name	Patient first name	1 to 20 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Last Name	Patient last name	1 to 40 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Height	Patient height in inches (in) or centimeters (cm), refer to the configured unit of measurement.	Maximum 3 characters	0 to 127 in 0 to 232 cm
Weight	Patient weight in pounds (lb) or kilograms (kg), refer to the configured unit of measurement.	Maximum 3 characters	0 to 999 lb 0 to 454 kg
Gender	Patient gender	Not Applicable	• Male • Female
Date of Birth	Patient date of birth	Not Applicable	Enter the patient date of birth in the format configured by your administrator. • The date of birth must not be more than the current date. • The date must be less than 127 years from the current date. The date of birth (DOB) also shows in the *Patient Information* bar. The calculated age shows near it.

Table C-1 *Patient Information* text boxs (Table continued)

Name	Description	Length	Accepted Values
Age	Patient age	Not Applicable	If the **Age** text box is on the *Patient Information* screen, the **Date of Birth** text box is not on the screen. 0 to 127 Enter the patient age and select the applicable unit of measurement (hours, days, weeks, months, years). The **Age** also shows in the *Patient Information* bar. The date of birth (DOB) does not.
Race	Patient race	Not Applicable	• Caucasian • Black • Hispanic • American Indian • Eskimo • Hawaiian • Pacific Islander • Asian • Unknown • Other
Order Number	Unique order number given to a patient test. If the order number is given by the computer when an order is attached to the patient test, the order number cannot be edited. **NOTE** You can clear the order number which removes the number from the patient test. If you enter an order number manually, you can edit the order number.	1 to 22 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Secondary ID	An alternative identification method.	1 to 17 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Blood Pressure*	High and Low blood pressures of the patient measured in mmHg.	Maximum 3 characters	0 to 999
Location	Description of where the ECG is to be done. For each patient test, this text box is filled in from the **Location ID** configured in the *System Settings*. You can edit the location.	Maximum 5 characters	0 to 65534
Room Number*	The room number where the ECG is to be done.	Maximum 10 characters	• A to Z • a to z • 0 to 9 • All characters are supported.

Table C-1 *Patient Information* text boxs (Table continued)

Name	Description	Length	Accepted Values
Bed Number*	The bed number where the ECG is to be done.	Maximum 32 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Priority*	Priority of ECG patient test.	Not Applicable	• Routine • STAT • PreOp The default is *Routine*.
Comments*	Additional information	Maximum 127 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Medications	Record of the medications the patient uses which is separated by a comma.	Maximum 32 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Ordering MD Last Name	Physician last name who ordered the ECG.	Maximum 40 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Ordering MD First Name	Physician first name who ordered the ECG.	Maximum 20 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Ordering MD ID	Physician ID who ordered the ECG	Maximum 5 characters	0 to 65534
Referring MD Last Name	Referring physician last name	Maximum 40 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Referring MD First Name	Referring physician first name	Maximum 20 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Referring MD ID	Referring physician ID	Maximum 5 characters	0 to 65534

Table C-1 *Patient Information* text boxs (Table continued)

Name	Description	Length	Accepted Values
Technician*	Technician doing the ECG. • If you are a local user and your user account is configured with a technician name or ID, this text box is filled in with the technician configured to your user account. You can edit this text box. • If you are an LDAP user, this text box is filled in with your HIS user ID, if the HIS server is configured. You can edit the ID.	Maximum 20 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Test Indication*	The ECG is done because of this.	Maximum 64 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Patient History*	The patient's medical history	Not Applicable	• Hypertension • CAD • Cardiac Surgery • Unknown
Visit Number	Visit number given to this patient.	Maximum 19 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
<Question 1>* **<Question 2>*** **<Question 3>*** **<Question 4>***	The name of this text box is configured by the administrator. See the accepted values of these text boxes before configuration.	Alphanumeric	
		17 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
		Number	
		10 characters Extra optional one special character (+) or (-) in the beginning	• 0 to 9
		Yes or No or Unknown	
		Not Applicable	• Yes • No • Unknown
Attending MD Last Name*	Attending physician last name	Maximum 40 characters	• A to Z • a to z • 0 to 9 • All characters are supported.

Table C-1 *Patient Information* text boxs (Table continued)

Name	Description	Length	Accepted Values
Attending MD First Name*	Attending physician first name	Maximum 20 characters	• A to Z • a to z • 0 to 9 • All characters are supported.
Attending MD ID*	Attending physician ID	Maximum 5 characters	0 to 65534

D Technical Specifications

D.1 System Specifications

Table D-1 Device Physical Specifications

Item	Description
Device type	Microprocessor augmented automatic electrocardiograph; 14-leadwire acquisition with programmable lead configuration Integrated unit with display, printer and trolley
System with adjustable height premium trolley	Handle height: from 35 in (89 cm) to 41 in (104 cm) Maximum height: 56 in (142 cm) to 62 in (158 cm) Width: 19 in (48 cm) Depth: 28 in (71 cm)
System with fixed height premium trolley	Handle height: 35 in (89 cm) or 37 in (94 cm) Maximum height: 56 in (142 cm) to 58 in (147 cm) Width: 19 in (48 cm) Depth: 28 in (71 cm)
System with fixed height basic trolley	Handle height: 36 in (91 cm) Maximum height: 57 in (145 cm) Width: 20.5 in (52 cm) Depth: 23.5 in (60 cm)
Weight	75.3 lbs max with adjustable height premium trolley and 1 battery
USB Port	3 USB 2.0 ports supplying 0.5 Amps of current each
Mechanical design	Housing with built-in tiltable graphics display Software on mainboard

Table D-2 Display Specifications

Item	Description
Display	39.6 cm (15.6 in) diagonal graphics LED backlit full HD
Touchscreen	Projected Capacitative (PCAP) multipoint touch input that works while wearing medical exam gloves
Resolution	1920 X 1080 pixels, with waveform enhancement
Data	Heart rate, patient name, patient ID, date and time, battery power indicator, scrolling waveforms, lead labels, speed, gain and filter settings, warning messages, prompts, hookup advisor, and help messages.
Sensors	Accelerometer for putting unit in standby when display is closed

Table D-3 Keypad Specifications

Item	Description
Type	Sealed elastomer membrane keyboard with tactile feedback

Table D-3 Keypad Specifications (Table continued)

Item	Description
Keys	Function keys Alphanumeric keys Writer controls Trimpad cursor controls
Keypad	Keypad and lettering are water and chemical resistant tested in accordance with ASTM D 543.

Table D-4 Printer Specifications

Item	Description
Technology	Integrated thermal dot array
Writer speed	5, 12.5, 25, and 50 mm/s
Number of traces	3, 6, 12, or 15 (user-selectable)
Sensitivity/gain	2.5, 5, 10, 20 mm/mV, and 10/5 mm/mV split gain
Speed accuracy	5, 12.5 mm/s at ±5% 25, 50 mm/s at ±2%
Amplitude accuracy	±5%
Horizontal resolution	40 dots/mm at 25 mm/s
Vertical resolution	8 dots/mm
Paper type	Z-fold thermal with pre-printed grid and perforation
Paper size	215 mm x 280 mm (8.5 in x 11 in) (modified letter) 210 mm x 297.5 mm (8.27 in x 11.7 in) (A4)
Paper tray capacity	Holds up to 300 sheets

Table D-5 Electrical Specifications

Item	Description
Power supply	AC mains or battery operation
Input voltage	100–240 VAC ±10%
Input current range	1.5A @100V to 625mA @240V
Input frequency	50-60 Hz ± 3 Hz

Table D-6 Battery Specifications

Item	Description
Type	Replaceable and rechargeable internal battery
Charge time	Approximately 240 minutes from total discharge when device is off (standby).
Battery capacity	The system shall be able to continuously display scrolling waveforms without printing for a minimum of six hours when the maximum total battery capacity is installed and the batteries are fully charged.

Table D-7 Other Input Device Specifications

Item	Description
External USB barcode reader	Fixed and variable length types Symbologies: Code-128, PDF417, Code 39, Interleaved Code 2 of 5, and Data Matrix symbology for characters A-Z (upper case), a-z (lower case), and 0-9 for all supported languages.
Acquisition Module	Real-time Hookup Advisor with LED lead quality indicators Ingress protection level: IPx4 Optional integrated barcode reader

D.2 ECG Specifications

Table D-8 ECG Data Acquisition Specifications

Item	Description
Signal input	Type CF, Defibrillation-Proof Defibrillation protection: Per IEC 60601-2-25:2011
Dynamic range	AC Differential ± 5mV, DC offset ± 300 mV
Common mode rejection	>130 dB (>100 dB with AC filter disabled)
Input impedance	>10 MΩ @ 10 Hz, defibrillator protected
Patient leakage current	<10 µA
Detection of pacemaker pulse	Duration: 0.2 ms to 2.2 ms Amplitude: 2 mV to 700 mV Separation: 1 ms or greater
Pace Annotation	Dedicated pace channel on display and printed reports
Pace digital sampling rate	75,000 samples/second per channel

Table D-9 ECG Data Processing Specifications

Item	Description
ECG Interpretation	Marquette 12SL ECG Analysis Program for Adults and Pediatrics
Computerized measurements	15-lead analysis (includes measurements of user-selectable additional 3 leads)
Additional ECG function	Vectorcardiography
Heart rate meter	30 to 300 beats per minute (BPM) with an accuracy of ±10% or 5 BPM, whichever is greater. Heart rates outside this range will not display.
ECG data formats	GE Hi-Fidelity ECG, XML
Pre-acquisition	Provides 10 seconds of instantaneous ECG acquisition
Digital rhythm	Up to 5 minutes of continuous rhythm storage (exportable as a PDF)
Storage	1000 records consisting of 10 second Resting ECG records and Digital Rhythm records on the device internal memory
External storage	USB-compliant flash drive supporting the FAT32 file system

Table D-9 ECG Data Processing Specifications (Table continued)

Item	Description
Downsampled ECG waveform	Bandwidth: 0.04 to 150 Hz Sample rate: 2 ksps Resolution: 1.22 µV
Analyzed ECG waveform	Bandwidth: 0.04, 0.56 ZPD to 150 Hz Sample rate: 500 and 1000 sps Resolution: 4.88 µV
Additional report filters	20 Hz, 40 Hz, 100 Hz, or 150 Hz
Channels	Up to 15 channels

D.3 Environmental Specifications

Table D-10 Environmental Specifications

Item	Description
Operating Conditions	
Temperature	10°C to 40°C (50° F to 104° F)
Relative Humidity (RH)	20% to 95% (non-condensing)
Atmospheric Pressure	70 to 106kPa
Transport/Storage Conditions	
Temperature	-20°C to +60°C (–4° F to 140° F)
Relative Humidity (RH)	15% to 95% (non-condensing)
Atmospheric Pressure	50kPa to 106kPa

D.4 Safety Specifications

Table D-11 Safety Specifications

Item	Description
Certification marks	 The medical device has a lifetime of 7 years with respect to the Council Regulation EU 2017/745 Annex I, Requirement 6.
Certification	CAN/CSA-C22.2 No. 60601-1, ES60601-1 IEC 60601-1 IEC 60601-1-2 IEC 60601-2-25 IEC 60601-2-51

Table D-11 Safety Specifications (Table continued)

Item	Description
Type of Protection Against Electrical Shock	Class 1, internally powered
Degree of Protection Against Ingress of Liquids	IP 20
Patient Mode of Operation	Continuous
Patient Leakage Current	<10 µA Normal Condition (NC), <50 µA Single Fault Condition (SFC)
Degree of Protection Against Electrical Shock	Type CF defibrillation-proof applied part

D.5 Network Specifications

Table D-12 Network Specifications

Item	Description
Frequency bands of transmission	2.401 – 2.461 GHz 5.180 – 5.825 GHz
Maximum radiated power in frequency bands	2.4 GHz: 18.5 dBm 5 GHz: 18.0 dBm
Antenna	Laird Technologies CAF94505 Nanoblade internal embedded antenna
Modulation	DSSS, CCK, OFDM, BPSK, QPSK, QAM
Supported certificate key lengths	1024/2048/4096-bit encryption
Supported certificate digest algorithms	SHA1, SHA2
Wireless specifications	
Wireless Standards	802.11a/b/g/n WLAN interfaces Configured manually or via DHCP
Authentication Protocols (non-FIPS)	• Open • WEP • WPA • WPA2
Authentication Protocols (FIPS)	WPA2
Authentication Methods (non-FIPS)	• PSK • PEAP-MSCHAPV2 • PEAP-GTC • EAP-TLS • TTLS-MSCHAPV2 • TTLS-GTC
Authentication Methods (FIPS)	• PSK • PEAP-GTC • EAP-TLS
Wired Specifications	

Table D-12 Network Specifications (Table continued)

Item	Description
Ethernet interface	802.3 Ethernet interface via RJ45 connector
Wired Standards	10Base-T, 100Base-T, and 1000Base-T LAN x 1 port Configured manually or via DHCP

Glossary

ACS Acute Coronary Syndrome

ADT Admission, Discharge, Transfer

Filter A filter sets the upper frequency limit for the ECG waveform displayed on the Acquisition screen and the printout. Selecting a filter eliminates signals that exceed that frequency. The smaller the filter selected, the more signal is filtered out. For example, a filter of 40 Hz displays only signals less than 40 Hz; signals greater than 40 Hz are ignored.

Gain Gain indicates how many mm represent 1 mV of waveform data on the screen and printout. You can change the gain to modify the display or printout of the waveform to your preference. Changing the gain changes the amplitude of the waveforms. A higher gain makes the amplitude of the waveform appear higher; a lower gain makes the amplitude of the waveform appear lower.

The 10/5 mm/mV setting is used to display the limb leads (I, II, III, aVr, aVI, and aVf) at 10mm/mV and chest leads (V1 to V6) at 5 mm/mV. This is done to reduce or prevent waveform overlap in the chest leads, while avoiding tiny waveforms in the limb leads.

HIS Hospital Information System

LAN Local Area Network

Speed Speed indicates the speed the ECG waveform displays on the screen and rhythm printout. You can change the speed to render the waveform slower or faster to aid in viewing or analysis of the waveform. A faster speed makes the waveform display more stretched out; a slower speed makes the waveform display closer together.

WLAN Wireless Local Area Network

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