GE HealthCare

MAC™ 5 A4/MAC™ 5 A5/MAC™ 5 Lite Resting ECG Analysis System

Service Manual

CE 0197

Publication Information

This document describes version 1.01 of MAC™ 5 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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This product complies with the requirements concerning medical devices from the following regulatory bodies.

Date of first CE mark - 2022.

The MAC™ 5 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.

> **NOTE**
> 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.

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	20 September 2021	Initial Release
2	20 January 2022	Update according to the service validation
3	22 July 2022	Update according to the service team's feedback
4	1 September 2022	Add battery troubleshooting content, update FRU part number
5	15 January 2024	Update content for Software Version V1.01
6	25 September 2024	Update according to the service team's feedback

Access other GE Healthcare Diagnostic Cardiology documents at the Customer Documentation Portal. Go to https://www.gehealthcare.com/en/support/support-documentation-library and scroll to the bottom of the page.

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

Support

GE Healthcare maintains a trained staff of application and technical experts to answer questions and to respond to issues and problems that may arise during the installation, maintenance, and use of this product.

If you require additional assistance, contact your GE Healthcare representative or GE Healthcare support at one of the following numbers:

- North America: 1-800-558-7044

- Europe: +49 761 45 43 -0

- Asia: +86 21 3877 7888

Training

This document is intended as a supplement to, not a substitute for, thorough product training. If you have not received training on the use of the product, you should request training assistance from GE Healthcare.

To see available training, go to the GE Healthcare training website (www.gehealthcare.com/training). Select **Education** > **Product Education-Technical** > **Diagnostic Cardiology**. For more self-paced course offerings, tools, and reference guides you may find useful, please visit the GE Healthcare Education Store at www.gehealthcare.com/educationstore.

Service manual language information

WARNING English (EN)	This service manual is available in English only. • If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services. • Do not attempt to service the equipment unless this service manual has been consulted and is understood. • Failure to heed this warning may result in injury to the service provider, operator, or patient, from electric shock, mechanical or other hazards.
ПРЕДУПРЕЖДЕНИЕ Bulgarian (BG)	Това упътване за работа е налично само на английски език. • Ако доставчикът на услугата на клиента изисква друг език, задължение на клиента е да осигури превод. • Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа. • Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациент в резултат на токов удар или механична или друга опасност.
警告 Chinese-Simplified (ZH-CN)	本维修手册仅提供英文版本。 • 如果维修服务提供商需要非英文版本，客户需自行提供翻译服务。 • 未详细阅读和完全理解本维修手册之前，不得进行维修。 • 忽略本警告可能对维修人员，操作员或患者造成触电、机械伤害或其他形式的伤害。
警告 Chinese-Traditional (ZH-TW)	本維修手冊只提供英文版。 • 如果客戶的維修人員有英語以外的其他語言版本需求，則由該客戶負責 提供翻譯服務。 • 除非您已詳閱本維修手冊並了解其內容，否則切勿嘗試對本設備進行維 修。 • 不重視本警告可能導致維修人員、操作人員或病患因電擊、機械因素或 其他因素而受到傷害。

UPOZORENJE Croatian (HR)	Ove upute za servisiranje dostupne su samo na engleskom jeziku. • Ukoliko korisnički servis zahtijeva neki drugi jezik, korisnikova je odgovornost osigura-ti odgovarajući prijevod. • Nemojte pokušavati servisirati opremu ukoliko niste konzultirali i razumjeli ove upute. • Nepoštivanje ovog upozorenja može rezultirati ozljedama servisnog osoblja, korisnika ili pacijenta prouzročenim električnim udarom te mehaničkim ili nekim drugim opas-nostima.
VAROVÁNÍ Czech (CS)	Tento provozní návod existuje pouze vanglickém jazyce. • Vpřípadě, že externí služba zákazníkům potřebuje návod vjiném jazyce, je zajištění překladu doodpovídajícího jazyka úkolem zákazníka. • Nesnažte se oúdržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • Vpřípadě nedodržování této varování může dojít kporanění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
ADVARSEL Danish (DA)	Denne servicemanual findes kun på engelsk. • Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse. • Forsøg ikke at servicere udstyret medmindre denne servicemanual har været konsul-teret og er forstået. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
WAARSCHUWING Dutch (NL)	Deze service manual is alleen in het Engels verkrijgbaar. • Indien het onderhoudspersoneel een andere taal nodig heeft, dan is de klant verant-woordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden voordat deze service manual geraad-pleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de gebruiker of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
HOIATUS Estonian (ET)	Käesolev teenindusjuhend on saadaval ainult inglise keeles. • Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest. • Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tut-vumist ja sellest aru saamist. • Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsien-di vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.
VAROITUS Finnish (FI)	Tämä huolto-ohje on saatavilla vain englanniksi. • Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tar-vittavan käännöksen hankkiminen on asiakkaan vastuulla. • Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen. • Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaara-tilanteen vuoksi.

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ATTENTION French (FR)	Ce manuel technique n'est disponible qu'en anglais. • Si un service technique client souhaite obtenir ce manuel dans une autre langue que l'anglais, il devra prendre en charge la traduction et la responsabilité du contenu. • Ne pas tenter d'intervenir sur les équipements tant que le manuel technique n'a pas été consulté et compris. • Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.
WARNUNG German (DE)	Diese Serviceanleitung ist nur in englischer Sprache verfügbar. • Falls der Kundendienst eine andere Sprache benötigt, muss er für eine entsprechende Übersetzung sorgen. • Keine Wartung durchführen, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Bei Zuwiderhandlung kann es zu Verletzungen des Kundendiensttechnikers, des Anwenders oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
ΠΡΟΕΙΔΟΠΟΙΗΣΗ Greek (EL)	Το παρόν εγχειρίδιο σέρβις διατίθεται στα αγγλικά μόνο. • Εάν το άτομο παροχής σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει υπηρεσίες μετάφρασης. • Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό εκτός εάν έχετε συμβουλευτεί και έχετε κατανοήσει το παρόν εγχειρίδιο σέρβις. • Εάν δεν λάβετε υπόψη την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στο άτομο παροχής σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.
FIGYELMEZTETÉS Hungarian (HU)	Ez a szerviz kézikönyv kizárólag angol nyelven érhető el. • Ha a vevő szerviz ellátója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészíttetése. • Ne próbálja elkezdeni használni a berendezést, amíg a szerviz kézikönyvben leírtakat nem értelmezték és értették meg. • Ezen figyelmeztetés figyelmen kívül hagyása a szerviz ellátó, a működtető vagy a páciens áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.
AÐVÖRUN Icelandic (IS)	Þessi þjónustuhandbók er eingöngu fáanleg á ensku. • Ef að þjónustuveitandi viðskiptamanns þarfnast annars tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu. • Reynið ekki að afgreiða tækið nema þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á að sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklingi frá raflosti, vélrænum eða öðrum áhættum.
PERINGATAN Indonesian (ID)	Manual servis ini hanya tersedia dalam bahasa Inggris. • Jika penyedia jasa servis pelanggan memerlukan bahasa lain selain dari Bahasa Inggris, merupakan tanggung jawab dari penyedia jasa servis tersebut untuk menyediakan terjemahannya. • Jangan mencoba melakukan servis terhadap perlengkapan kecuali telah membaca dan memahami manual servis ini. • Mengabaikan peringatan ini bisa mengakibatkan cedera pada penyedia servis, operator, atau pasien, karena terkena kejut listrik, bahaya mekanis atau bahaya lainnya.

AVVERTENZA Italian (IT)	Il presente manuale di manutenzione è disponibile soltanto in Inglese. • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Si proceda alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il non rispetto della presente avvertenza potrebbe far compiere operazioni da cui derivino lesioni all'addetto, alla manutenzione, all'utilizzatore ed al paziente per folgorazione elettrica, per urti meccanici od altri rischi.
警告 Japanese (JA)	このサービスマニュアルは英語版しかありません。 • サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。 • このサービスマニュアルを熟読し、十分に理解をした上で装置のサービスを行ってください。 • この警告に従わない場合、サービスを担当される方、操作員あるいは患者が、感電や機械的又はその他の危険により負傷する可能性があります。
ЕСКЕРТУ Kazakh (KK)	Бұл қызмет көрсету бойынша нұсқаулығы тек ағылшын тілінде қолжетімді. • Тұтынушының қызмет провайдері ағылшын тілінен басқа тілдегі нұсқаны талап етсе, аудару бойынша қызметтерімен қамтамасыз ету тұтынушы жауапкершілігінде болуы тиіс. • Бұл қызмет көрсету бойынша нұсқаулығын назарға алып, түсінбегенше, жабдыққа қызмет көрсетуден бас тартыңыз. • Бұл ескертуді елемеу қызмет провайдері, оператор немесе емделушінің электр шогынан, механикалық немесе басқа қауіптер нәтижесінде жарақат алуына әкелуі мүмкін.
경고 Korean (KO)	본 서비스 지침서는 영어로만 이용하실 수 있습니다. • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다. • 본 서비스 지침서를 참고했고 이해하지 않는 한은 해당 장비를 수리하려고 시도하지 마십시오. • 이 경고에 유의하지 않으면 전기 쇼크, 기계상의 혹은 다른 위험으로부터 서비스 제공자, 운영자 혹은 환자에게 위해를 가할 수 있습니다.
BRĪDINĀJUMS Latvian (LV)	Šī apkalpotāju rokasgrāmata ir pieejama tikai angļu valodā. • Ja apkalpošanas sniedzējam nepieciešama informācija citā, nevis angļu, valodā, klienta pienākums ir nodrošināt tās tulkošanu. • Neveiciet aprīkojuma apkopi, neizlasot un nesaprotot apkalpotāju rokasgrāmatu. • Šī brīdinājuma neievērošana var radīt elektriskās strāvas trieciena, mehānisku vai citu risku izraisītu traumu apkopes sniedzējam, operatoram vai pacientam.
ĮSPĖJIMAS Lithuanian (LT)	Šis eksploatavimo vadovas yra prieinamas tik anglų kalba. • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba - ne anglų, numatyti vertimo paslaugas yra kliento atsakomybė. • Nemėginkite atlikti įrangos techninės priežiūros, nebent atsižvelgėte į šį eksploatavimo vadovą ir jį supratote. • Jei neatkreipsite dėmesio į šį perspėjimą, galimi sužalojimai dėl elektros šoko, mechaninių ar kitų paslaugų tiekėjui, operatoriui ar pacientui.

ADVARSEL Norwegian (NO)	Denne servicehåndboken finnes bare på engelsk. • Hvis kundens serviceleverandør trenger et annet språk, er det kundens ansvar å sørge for oversettelse. • Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått. • Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.
OSTRZEŻENIE Polish (PL)	Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim. • Jeśli dostawca usług klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie należy serwisować wyposażenia bez zapoznania się i zrozumienia niniejszego podręcznika serwisowego. • Niezastosowanie się do tego ostrzeżenia może spowodować urazy dostawcy usług, operatora lub pacjenta w wyniku porażenia elektrycznego, zagrożenia mechanicznego bądź innego.
AVISO Portuguese-Brazilian (PT-BR)	Este manual de assistência técnica só se encontra disponível em inglês. • Se o serviço de assistência técnica do cliente não for GE, e precisar de outro idioma, será da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode por em perigo a segurança do técnico, operador ou paciente devido a choques elétricos, mecânicos ou outros.
AVISO Portuguese-European (PT-PT)	Este manual técnico só se encontra disponível em inglês. • Se a assistência técnica do cliente solicitar estes manuais noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual técnico. • O não cumprimento deste aviso pode provocar lesões ao técnico, ao utilizador ou ao paciente devido a choques eléctricos, mecânicos ou outros.
AVERTISMENT Romanian (RO)	Acest manual de service este disponibil numai în limba engleză. • Dacă un furnizor de servicii pentru clienţi necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere. • Nu încercaţi să reparaţi echipamentul decât ulterior consultării şi înţelegerii acestui manual de service. • Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.
ПРЕДУПРЕЖДЕНИЕ Russian (RU)	Настоящее руководство по обслуживанию предлагается только на английском языке. • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует обеспечить перевод самостоятельно. • Прежде чем приступать к обслуживанию оборудования, обязательно обратитесь к настоящему руководству и внимательно изучите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалисты по обслуживанию, операторы или пациенты получат удар электрическим током, механическую травму или другое повреждение.

UPOZORENJE Serbian (SR)	Ovo servisno uputstvo je dostupno samo na engleskom jeziku. • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodi-lačke usluge. • Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo. • Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara, ili mehaničkih i drugih opasnosti.
VAROVANIE Slovak (SK)	Tento návod na obsluhu je k dispozícii len v angličtine. • Ak zákazníkov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia skôr, ako si neprečítate návod na obsluhu a neporozumiete mu. • Zanedbanie tohto varovania môže vyústiť do zranenia poskytovateľa služieb, obsluhu-júcej osoby alebo pacienta elektrickým prúdom, mechanickým alebo iným nebezpe-čenstvom.
OPOZORILO Slovenian (SL)	Ta servisni priročnik je na voljo samo v angleškem jeziku. • Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zago-toviti prevod. • Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli. • Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.
ADVERTENCIA Spanish (ES)	Este manual de servicio sólo existe en inglés. • Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual. • No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio. • La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.
VARNING Swedish (SV)	Den här servicehandboken finns bara tillgänglig på engelska. • Om en kunds servicetekniker har behov av ett annat språk än engelska ansvarar kunden för att tillhandahålla översättningstjänster. • Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken. • Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknik-ern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.
UYARI Turkish (TR)	Bu servis klavuzunun sadece İngilizcesi mevcuttur. • Eğer müşteri teknisyeni bu klavuzu İngilizce dşnda bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis klavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarya uyulmamas, elektrik, mekanik veya diğer tehlikelerden dolay teknisyen, operatör veya hastann yaralanmasna yol açabilir.

ЗАСТЕРЕЖЕННЯ Ukrainian (UK)	Дане керівництво з сервісного обслуговування постачається виключно англійською мовою. • Якщо сервісний інженер потребує керівництво іншою мовою, користувач зобов'язаний забезпечити послуги перекладача. • Не намагайтеся здійснювати технічне обслуговування даного обладнання, якщо ви не читали, або не зрозуміли інформацію, надану в керівництві з сервісного обслуговування. • Недотримання цього застереження може призвести до травмування сервісного інженера, користувача даного обладнання або пацієнта внаслідок електричного шоку, механічного ушкодження або з інших причин невірного обслуговування обладнання.
CẢNH BÁO Vietnamese (VI)	Tài Liệu Hướng Dẫn Sửa Chữa chỉ có bản tiếng Anh. • Nếu các đơn vị cung cấp dịch vụ cho khách hàng yêu cầu một ngôn ngữ nào khác tiếng Anh, thì khách hàng sẽ có trách nhiệm cung cấp các dịch vụ dịch thuật. • Không được sửa chữa thiết bị trừ khi đã tham khảo và hiểu Tài liệu Hướng dẫn Sửa chữa. • Không tuân thủ những cảnh báo này có thể dẫn đến các tổn thương cho người thực hiện sửa chữa, người vận hành hay bệnh nhân, do sốc điện, các rủi ro về cơ khí hay các rủi ro khác

Contents

1 Product Overview

The MAC 5 Resting ECG Analysis System has three modes:

- MAC 5 A4 - This mode includes an A4/Letter paper size thermal printer.
- MAC 5 A5 - This mode includes an A5 paper size thermal printer.
- MAC 5 Lite - This mode does not include a thermal printer.

The MAC 5 Resting ECG Analysis System, (referred to as "the device"), supplies 12-lead ECG measurement and interpretative analysis, prints 12-leads of ECG, and transmits ECG data to and from a central ECG cardiovascular information system.

1.1 Front View

The image below is an example of the MAC 5 A4. The information in the table applies to all MAC 5 devices.
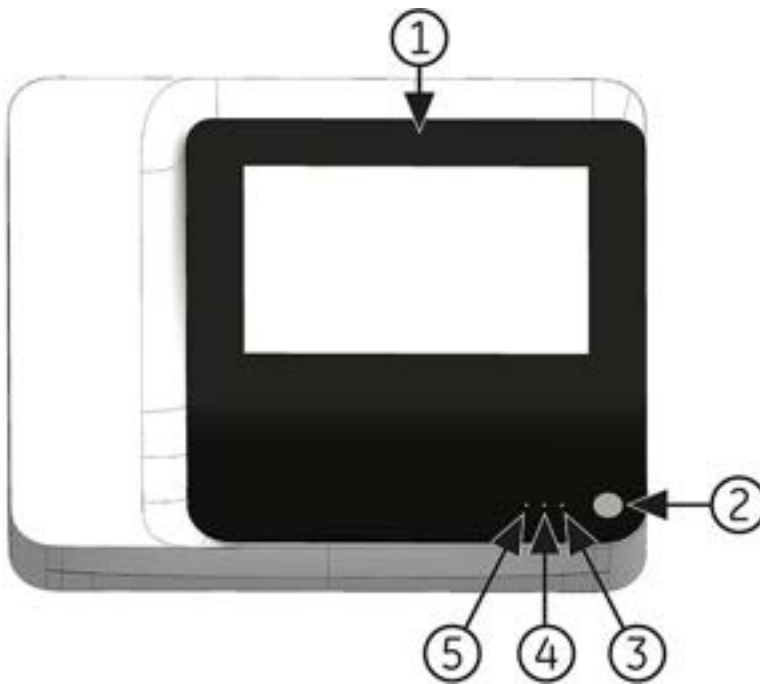
Item	Name	Description
1	Display and Touchscreen	Displays waveform and text data. The touchscreen enables you to interact directly with the device through touch gestures.
2	Power button	Turns the device on or off.
3	Power on LED	Shows if the device is on or off. • Green light - on. • No light - off. • Flashing green light - standby mode.

Continues on the next page

Item	Name	Description
4	Battery LED	Battery status: • Flashing amber light at 2 second intervals - battery is charging. • Flashing amber light at a 1 second interval - battery is critically low. • Flashing amber light at a 1/2 interval - battery has a communication failure. • No light - battery is fully charged, not installed, or discharging. The detailed battery status shows on the **Status Bar** of the Acquisition screen, see section Battery Status in the *MAC 5 Resting ECG Analysis System Operator's Manual.*
5	AC Power LED	AC power status: • Green light - the device is plugged in and receiving power. • No light - the device is not plugged into AC power.

1.2 Side and Rear View

Rear View

The image below is an example of the MAC 5 A4. The information in the table applies to all MAC 5 devices.

Item	Name	Description
1	KISS Pump Connector	Used to connect a KISS pump cable.
2	ECG Patient Cable Connector	D-sub 15–pin female connector for the acquisition cable.
3	USB Slot A	• Use to connect a USB flash drive or USB cable. You can connect a USB flash drive for a software update, backup/restore or export operations, or a barcode reader USB cable. • Standard USB connector for USB devices, for example, the external barcode reader, USB memory stick, USB keyboard, and USB mouse.
4	USB Slot B	• Use to connect a USB flash drive or USB cable. You can connect a USB flash drive for a software update, backup/restore or export operations, or a barcode reader USB cable. • Standard USB connector for USB devices, for example, the external barcode reader, USB memory stick, USB keyboard, and USB mouse.
5	Ethernet/LAN Port	Use to connect an Ethernet cable.
6	DC Power Inlet	Use to connect the DC power cord.
7	Battery Door	Use to insert the battery.
8	Equipotential Grounding Plug	Use to connect non-grounded peripheral devices.

Side View

The image below is an example of the MAC 5 A4. The information in the table also applies to MAC 5 A5.
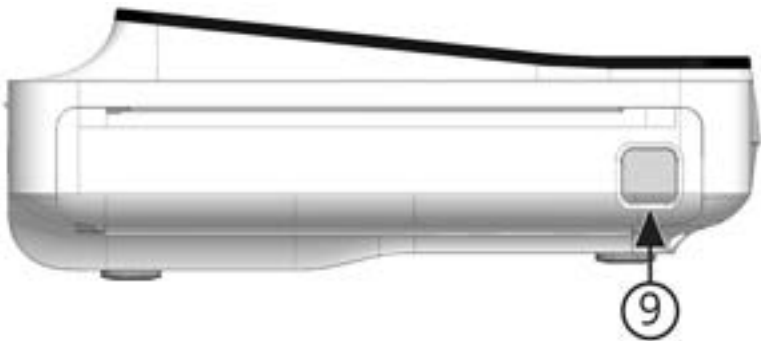
Item	Name	Description
9	Printer Door Button	Use to release the printer door.

1.3 Bottom View

The image below is an example of the MAC 5 A4. The information in the table also applies to all MAC 5 devices.
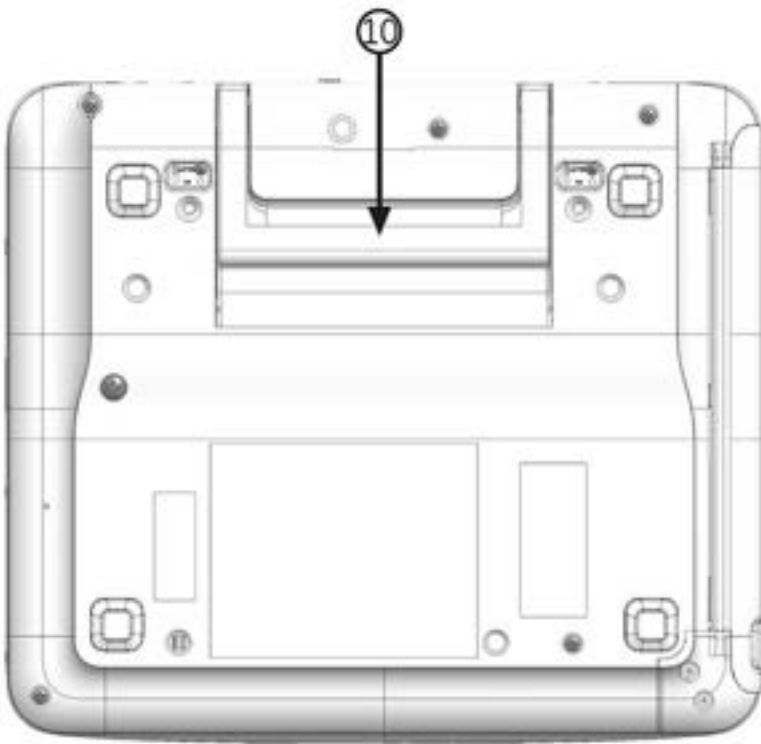
Item	Name	Description
10	Handle	Use to carry and support the device.

1.4 Serial Number Label

The serial number labels are in the format as follows:
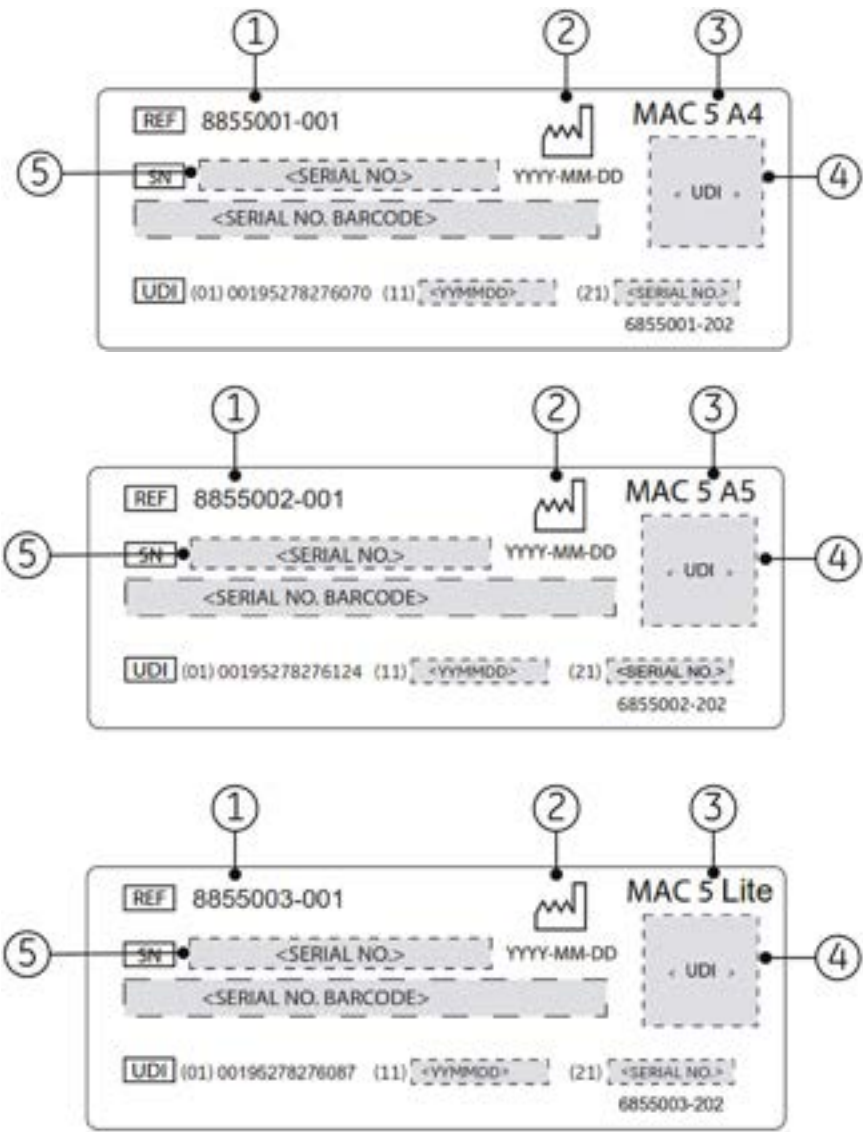
Table 1-1 Serial Number Label Format

Item	Description
1	Product Part Number
2	Date of Manufacture in YYYY-MM-DD Format
3	Product Mode
4	UDI Barcode
5	Device Serial Number

1.5 Serial Number Format

Each device has a serial number that uniquely identifies the device and provides important information about the device. The serial number format is shown in the illustration below:
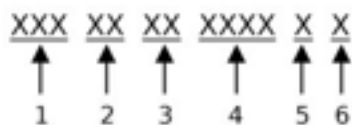
Table 1-2 Serial Number Format

Item	Name	Description
1	Product Code	A three-character code that uniquely identifies the product line.
2	Year Manufactured	A two-digit code identifying the year the device was manufactured.
		Values range from 00 to 99. For example: 00 = 2000, 04 = 2004, 17 = 2017 (and so on).
3	Fiscal Week Manufactured	A two-digit code identifying the week the device was manufactured.
		Values range from 01 to 52. GE Healthcare's fiscal weeks correspond to the calendar week. For example, 01 = the first week in January.
4	Product Sequence	A four-digit number identifying the order in which this device was manufactured.
		Values range from 0001 to 9999.
5	Manufacturing Site	A one-letter code identifying the site where the device was manufactured.
		For example, F = Milwaukee, N = Freiburg, P = Bangalore, W = Wuxi, H = Helsinki, S = Mexico
6	Miscellaneous Characteristic	A one-letter code identifying manufacturing status.
		For example, P = the device is a prototype, R = the device was refurbished, U = the device was upgraded to meet the specifications of another product code, A = device is in production.

2 Architecture

2.1 Hardware and Firmware Architecture

The diagram below illustrates the system architecture of the device:
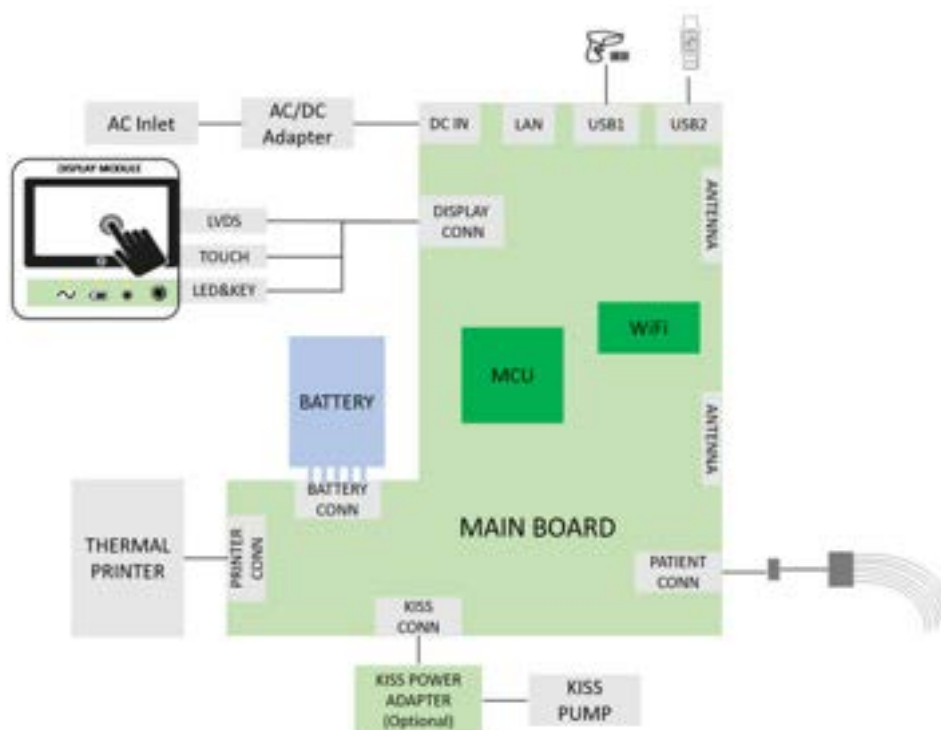
Table 2-1 Subsystem Components

Component	Description
Main Board	All the peripherals, such as the display, touchscreen, LAN, Wireless, USB ports, printer, and battery are interfaced and controlled by the CPU through the Main board.
Display Module	The display is a 8.9–inch diagonal graphics, LED backlight display with P-CAP multipoint touch input, 892 x 558 resolution, and interfaced to the Main Board through the LVDS interface cable. The Display module, contains: • the system on/off button • the LED indicators used for battery status • AC mains
Power Supply	The power inlet connector interfaces with the AD/DC module. The AC/DC is a 60 Watt power supply accepting a wide input AC voltage and delivering 24V DC to the Main Board.
Thermal Printer	The printer has an A4/Letter thermal printhead, motor, paper sensors, and door sensor.
KISS Pump	A KISS pump is powered by the KISS pump power adapter board. The suction connector is next to the patient connector in the assembly.

Table 2-1 Subsystem Components (Table continued)

Component	Description
KISS Power Adapter	The KISS power adapter is powered by the main board. This adapter converts the voltage to 12V DC.

2.2 Product Interfaces External Connections

Table 2-2 Product Interfaces External Connections

Type of Port	Number of Ports	Description
RJ45 port	1	Connects to an ethernet network using a 10/100Base-T Ethernet connector.
USB connector	2	Connects to USB-capable devices, for example, the barcode reader, the wireless dongle, or external USB storage devices. The external USB storage device is used for: • Storing ECGs • Flashing the device with software updates • Connecting memory or future I/O extensions
DIN connector	1	Connects to a KISS Pump system.

2.3 Harness Diagram
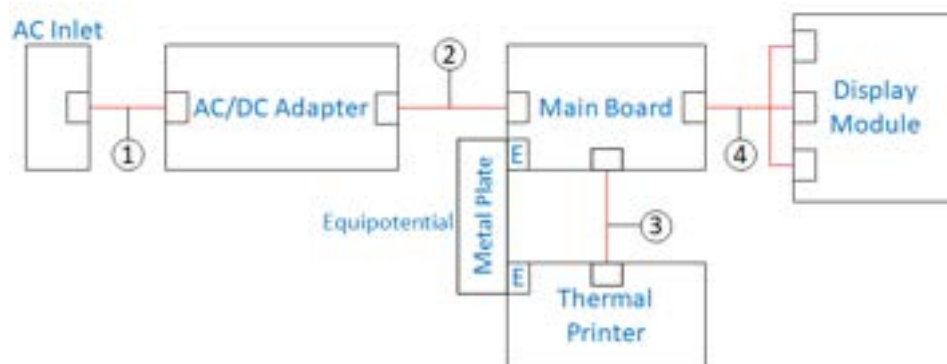
Callout	Description	Parts Included In	
		FRU Description	**FRU Part Number**
1	AC Inlet to AC/DC Adapter	Not Applicable	Not Applicable
2	AC/DC Adapter to Main Board	MAC 5 FRU AC/DC Adapter	2205621-001-S
3	Thermal Printer to Main Board Cable	MAC 5 FRU Printer Cable	2207897-001-S
4	Main Board to Display Module Cable	MAC 5 FRU Display Module Cable	2206377-001-S

3 Equipment Setup

3.1 Insert the Battery

The device is shipped with one lithium ion battery with minimum charge.

Fully charge the battery before you use the device for the first time. Use the device on AC power while the battery is charging.

1. Place your thumb on the door release tab of the battery compartment door and gently pull it open.

MAC 5 A4   MAC 5 A5

MAC 5 Lite

2. Slide the battery into the battery compartment slots in the correct orientation.

MAC 5 A4   MAC 5 A5

MAC 5 Lite

3. Lift the battery compartment door to close it.

MAC 5 A4

MAC 5 A5

MAC 5 Lite

3.2 Connect the AC Power

This device can run with AC or battery power. When the device is plugged into an AC outlet, it uses AC power and charges the installed battery.

> **NOTE**
> If the integrity of the protective earth conductor is in doubt, operate the unit from its battery.
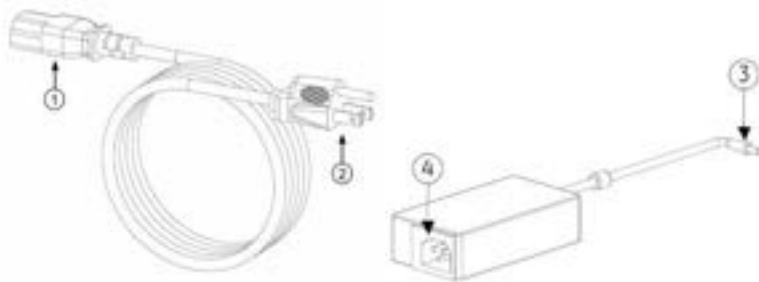
Table 3-1 Power Cord Parts

Item	Description
1	Female end of the AC power cord connected to the back of the AC/DC adapter.
2	Male end of the AC power cord connected to an AC outlet.
3	Female end of the AC/DC adapter cord connected to the back of the device.
4	Male end of the AC/DC adapter connected to the AC power cord.

> **NOTE**
> Before you connect the device to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the unit label. If this is not the case, do not connect the system to the power line until you adjust the power source to match the unit power requirements.

1. Connect the female end of the power cord (1) to the AC/DC adapter.

2. Plug the female end of the AC/DC adapter cord (3) to the power connector on the back of the device.
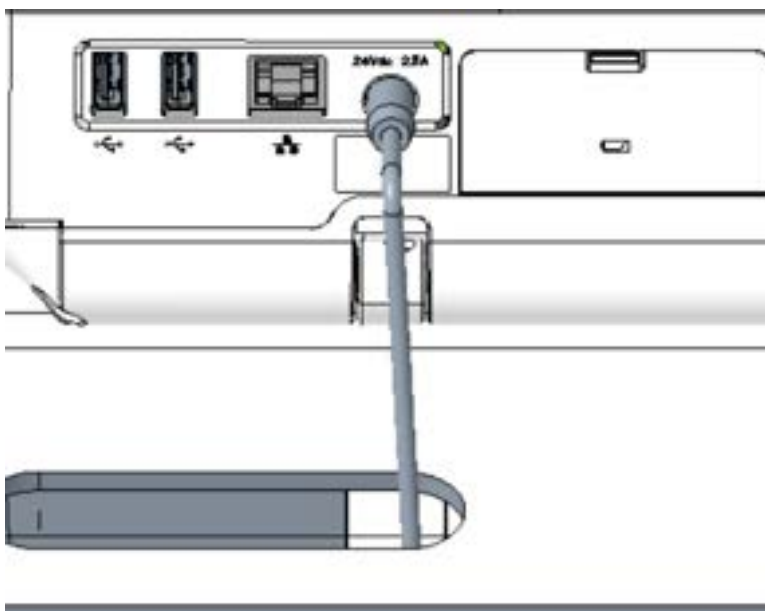
3. Plug the male end of the power cord (2) into an AC outlet.

> **NOTE**
> It is recommended that you connect the device into an uninterruptible power supply (UPS) or a surge suppressor.

4. Check the AC Power LED. If the AC Power LED is green, the device is receiving power from the AC outlet.

3.3 Connect the External Barcode Reader

If you purchase the optional barcode reader with the device, connect it to the USB port on the device.

> **NOTE**
> The **BRCD - External Barcode Reader** option is activated at the factory when you purchase the barcode reader with the device. Configure the barcode settings for your site before you use the barcode reader.
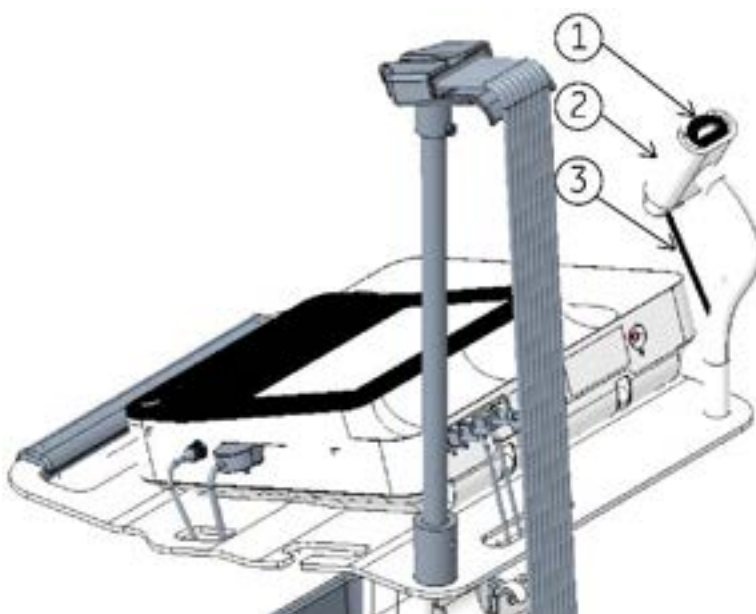
Table 3-2 Barcode Reader Parts

Item	Description
1	Barcode reader
2	Barcode reader holder
3	Barcode reader cable connected to the USB slot

1. Insert the barcode reader cable connector (3) into the USB slot of the device. Make sure that the cable is seated securely.

2. If you have a trolley, place the barcode reader (1) in the barcode reader holder (2) attached to the trolley. Refer to the *Compact Trolley Reference Manual*.

3.4 Adjust the Device for Paper Size

MAC 5 A4 printer supports the paper sizes:

- A4 (8.27 x 11.7 inches) - 2104772-001
- Letter (8.4 x 11 inches) - 2104771-001

MAC 5 A5 printer supports the paper sizes:

- A5 (8.27 x 5.9 inches) - 5684683

MAC 5 Lite does not support paper printing.

You can configure the printer module to use the appropriate paper size only on the MAC 5 A4 device. Use the instructions below to change the paper size.

1. Turn off the device.

2. Open the printer door and remove the paper.

3. Attach the paper spacer to the printer module.
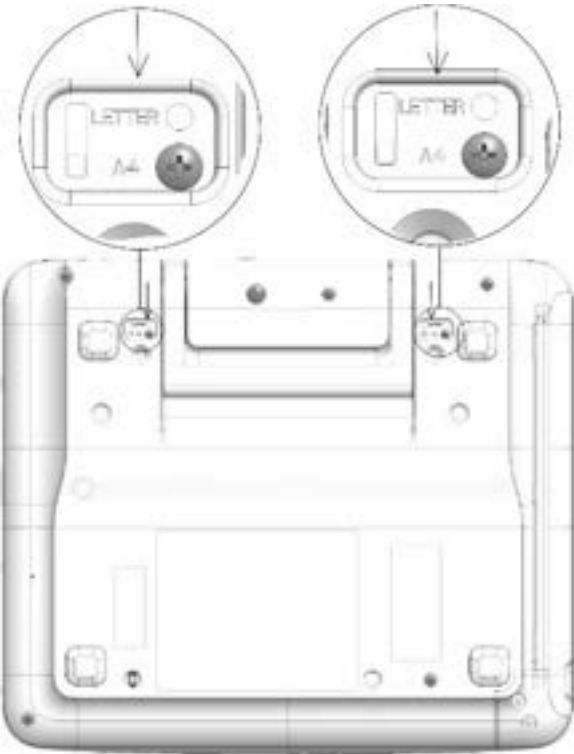
The paper spacer placement depends on the paper size.

If the paper size is	Then
A4	Attach the paper spacer at the inside slot of the printer head.
Modified letter	Attach the paper spacer at the outside slot of the printer head.
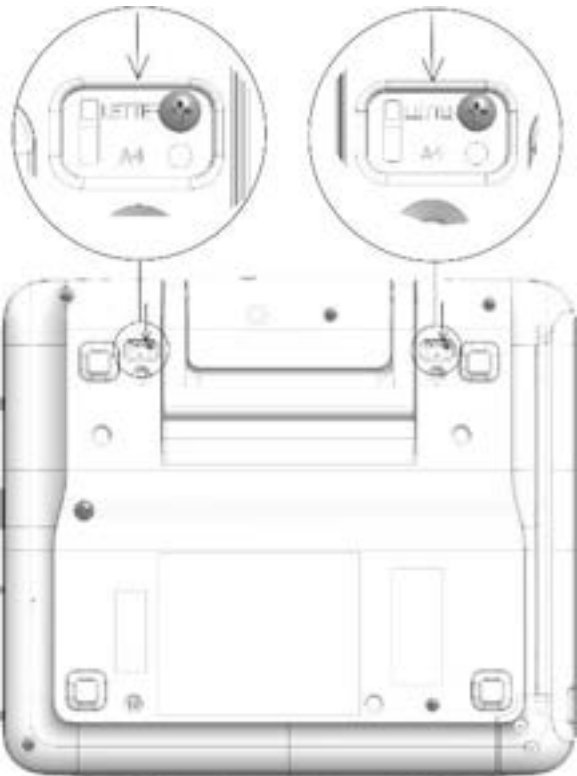
Make sure that the paper spacer is applied at the correct position.

4. Push the printer door to its closed position and verify that the unit is closed.

5. Carefully flip the device to display the bottom.
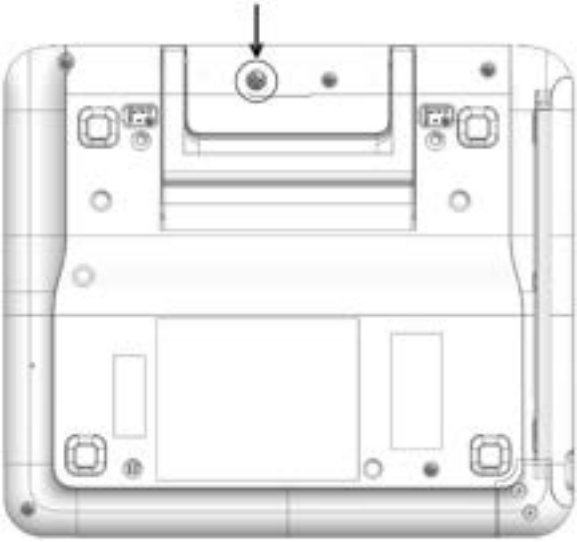
6. Move the paper latch at the bottom of the device.

The paper latch placement depends on the paper size.

If the paper size is	Then
A4	Move the two paper latches to the position of "A4", and fasten the screws using a PH 1x150 mm screwdriver.

If the paper size is	Then
Modified letter	Move the two paper latches to the position of "Letter", and fasten the screws using a PH 1x150 mm screwdriver.
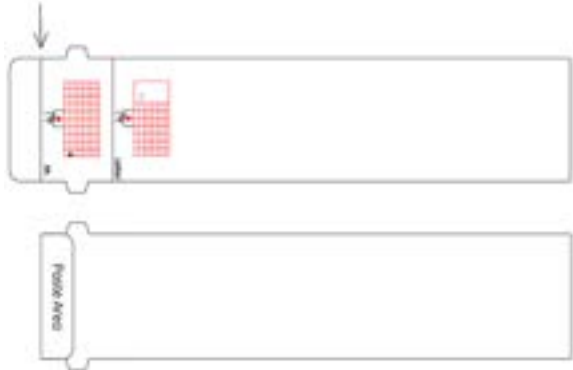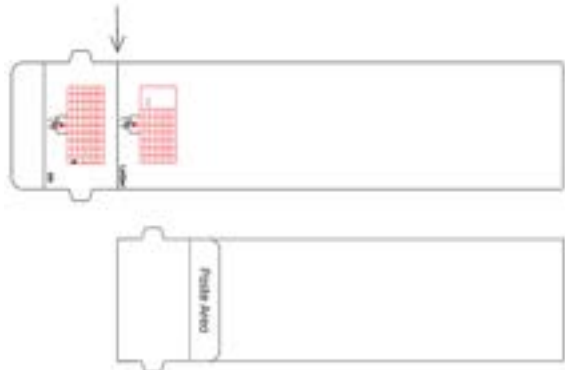
7. Move the screw at the bottom of the device.

   The screw position depends on the paper size.

If the paper size is	Then
A4	Place the screw at below position, and fasten it using a PH 1x150 mm screwdriver.

Continues on the next page

If the paper size is	Then
Modified letter	Place the screw at below position, and fasten it using a PH 1x150 mm screwdriver.

8. Adjust the paper pull tab.

The folding position of the paper pull tab depends on the paper size.

If the paper size is	Then
A4	Fold and paste the paper pull tab along the **A4** line.
Modified letter	Fold and paste the paper pull tab along the **Letter** line.

3.5 Insert the Paper

MAC 5 A4 printer supports the paper sizes:

- A4 (8.27 x 11.7 inches) - 2104772-001

- Letter (8.4 x 11 inches) - 2104771-001

MAC 5 A5 printer supports the paper sizes:

- A5 (8.27 x 5.9 inches) - 5684683

MAC 5 Lite does not support paper printing.

Make sure you put down the handle and place the device on a flat surface. To insert the paper:

1.   Press the printer door button to release the printer door.

2. Pull the paper pull tab and place the paper above it, but do not remove the paper pull tab from the device. Then slide the paper into the device until it is fully inserted.

> **NOTE**
> *   If the paper has Q holes, the Q holes must be on the top left side.
> *   If the paper has Q marks, the Q marks must be on the bottom left side.

3. Advance the first sheet of paper.
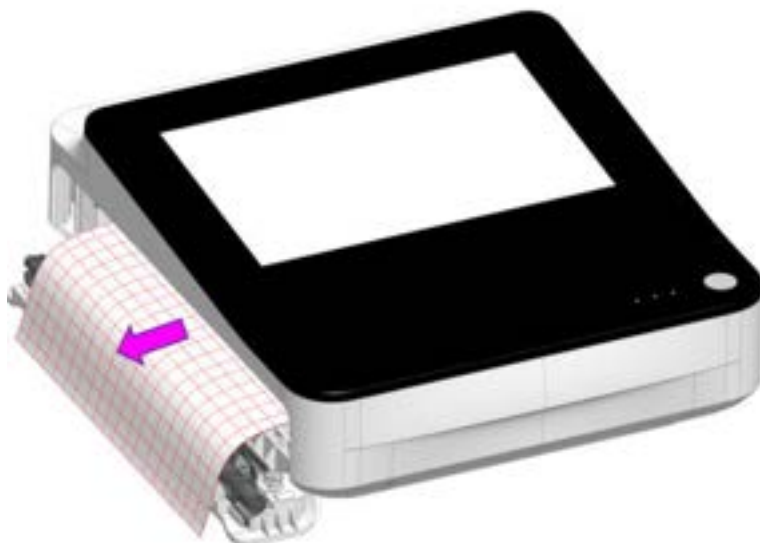
4. Push both ends of the printer door to close it and verify that the unit closes.

3.6 Lock and Unlock the Trolley Wheels

1. To lock each trolley wheel, press the wheel brake down.

   Lock the wheels before each use for safety purposes.

2.   To unlock the trolley wheel, push the wheel brake up.

3.7 Attach the Device to the Trolley

1.   Align the positioning holes on the bottom of the device with the positioning pins on the trolley top plate.

2.   Gently put the device on the trolley top plate and insert the foot pads on the bottom of the device into the holes on the top plate

| MAC 5 A4 | MAC 5 A5 |

MAC 5 Lite

3. Insert the screws (M6x20 Screw GB/T 70.2-2000) and washers (D12xD6.5x1.5 Plate GB/T 848-2002) provided with the trolley through the bottom of the top plate into the device, and tighten them with 4mm torque spanner.

> **NOTE**
> Before you insert the screws, make sure that there are no cables between the device and the top plate of the trolley.

MAC 5 A4
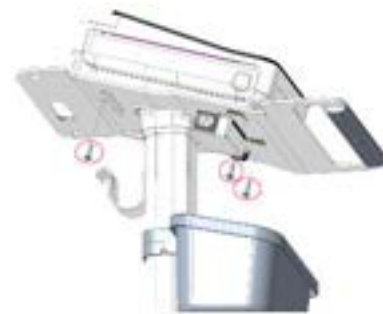
MAC 5 A5

MAC 5 Lite

3.8 Connect the LAN Cable

A wireless module is installed in the device before it is shipped from the factory. If you do not configure the device to connect to a wireless network, you can use a wired connection.

1. To connect to a wired network, insert an Ethernet cable to the RJ45 network connector of the device.
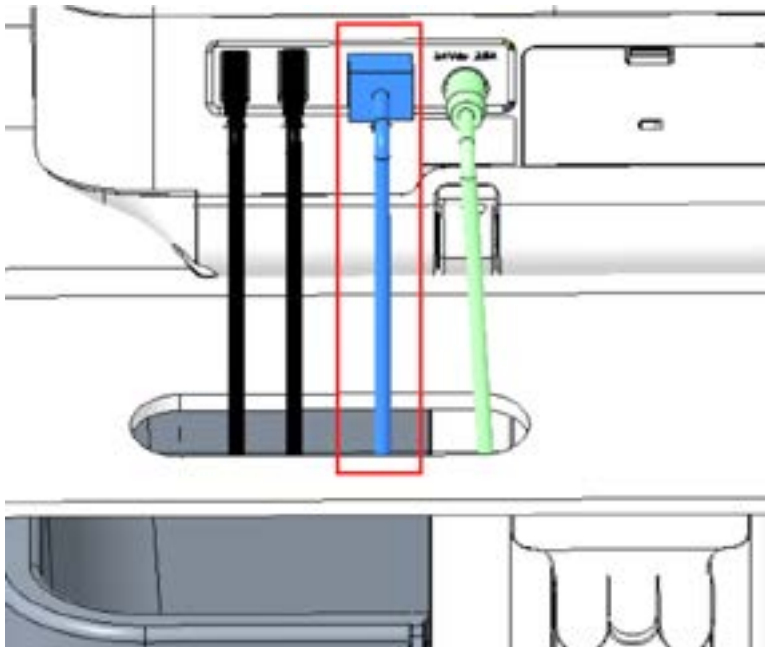
NOTE
This applies only if you use the device as a stationary device. If you use it as a mobile unit, do not connect the device to a LAN until you are ready to import, transmit, or export patient reports.

2. Configure the device to connect to a wired network. See section *Configure Wired Network* in the *MAC 5 Resting ECG Analysis System Operator's Manual*.

3.9 Configure the Device

When the device is ready for operation, use the information in the *MAC 5 Resting ECG Analysis System Operator's Manual* to configure the system.

If you apply the same settings to more than one device at the site, save the device settings to a USB flash drive to restore them to other devices. See section *Save and Restore Configuration Settings* in the *MAC 5 Resting ECG Analysis System Operator's Manual*.

3.10 Test the Device

1. After you set up and configure the device, test the device before you use it with patients. Use the test recommendations as follows:

   • Record and print a resting ECG.

   • Save, print, delete, transmit, and export patient reports.See Chapter *Record an ECG or Rhythm* in the *MAC 5 Resting ECG Analysis System Operator's Manual*.

4 Login and Security

4.1 Power On the ECG Device

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

   The device is powered on. The **Power on** LED on the front panel is green.

   - The activation screen displays, if you use the device for the first time. You must complete the self registration before logging in. For more information, see section *Self Registration* in the *MAC 5 Resting ECG Analysis System Service Manual*.

   - 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**.

4.2 Self Registration

Self registration enables you to activate the device and create a GE HealthCare Electronic Software Delivery account.

1. Power on the device and scan the QR code on the screen to launch the online registration page.

   If it fails, go to https://ecg.gehealthcare.com for registration.

2. Complete the required (*) fields in the online registration form and click **Submit**.

NOTE
- You can click the **Remember Me** checkbox to store the filled information.
- Enter a valid email address in the **Email (owner / contact)** field and select anywhere to confirm. You will receive an OTP (One Time Passcode) via email. Enter the code in the **Email Verification Code** field and select **Verify** to complete the email verification.

Activation Key displays after selecting **Submit**.
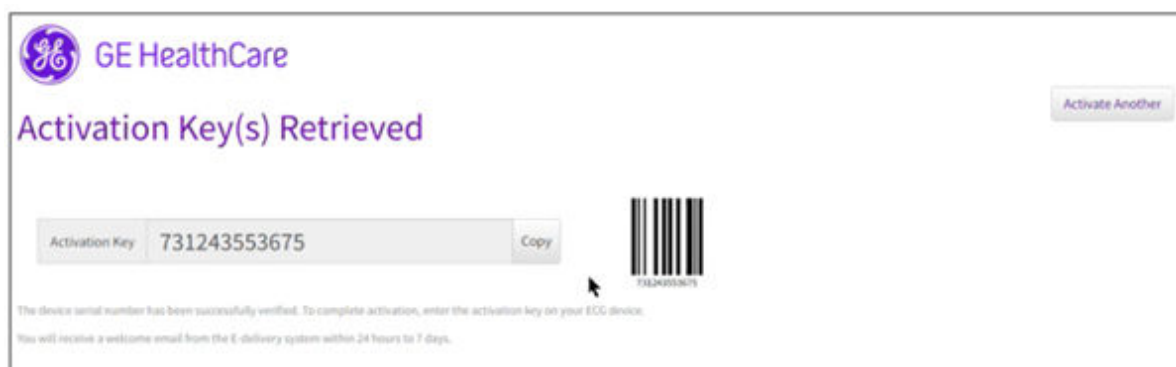
> **NOTE**
> If you register with the same serial number, you will receive the same **Activation Key** and no new E-delivery account will be generated.
>
> After you register the first device, you can use **Activate Another** to register multiple devices with the same account.

3. Enter the **Activation Key** in the **Activation Code** field on the device and select **Activate**.

You are logged on to the device after setting the password for the **Admin** user. To resolve errors related to the self registration, see .

> **NOTE**
> You can also select **Skip**, then the activation screen will display every time when you power on the device.

4.2.1 E-Delivery Welcome and Entitlement Emails

After the registration process completes, you will receive the E-Delivery Welcome email and the Entitlement email for the product you have self-registered.

1. Open the Welcome email.

2. Click the **Software Portal** and login with the supplied User ID and Password.

The Change Password screen displays. Set a new password.

NOTE

E-delivery enables you to access the latest software versions. After the self registration completes, you will receive a Welcome email and an Entitlement email in a period of 1 to 7 days.

3. Click the **MAC 5** link in the **Your Downloads** field.

If the **MAC 5** link is not available in the **Your Downloads** field, click **Home** or refresh your web browser.

4. In the **New Versions** tab, click the description of the software version to download.

5. In the **Files** tab, perform one of the actions below to download the files for software upgrade:

- Click each of the files separately.

- Select the files and then click **Download Selected Files**.

- Application Production: product image
- Manuals: PDF version manuals
- Release note: release note and instruction of software upgrade

> **NOTE**
> Make sure you download the correct file. If not, the software upgrade may fail.

6. Extract the file that you downloaded.

7. Upgrade the software, refer to 6.1 Upgrade or Downgrade Production Software on page 80 for details.

4.2.2 E-Delivery Entitlement Email after Bulk Entitlement

After the self registration completes, you will be included in the bulk entitlement process for the next software release. When the bulk entitlement and email wizard complete, you will receive an Entitlement email if a new software update is available for your device.

To download the software, see step 3 to step 5 in 4.2.1 E-Delivery Welcome and Entitlement Emails on page 39.

4.3 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:

   2.1. 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 front panel is off.

   2.2. Press the **Power** button on the front panel for a few seconds:

   The **Power Options** window opens with **Cancel**, **Standby**, **Log Out**, **Privacy**, and **Power Off** options. 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 front panel is off.

4.4 User Authentication

The device supports different modes of user authentication.

Table 4-1 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.

Table 4-1 Supported User Authentication Modes (Table continued)

User Authentication Mode	Description
Technician ID login	The **Login** screen displays when the device is powered on or unlocked. A technician can access the device with a valid **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.

4.4.1 Log On to the Device as a Full Authentication User without STAT

Use the username and password to log on to the device through the **Login** screen.

Table 4-2 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. Perform one of the steps below:

   - If the device is shutdown, power on the device. See 4.1 Power On the ECG Device on page 37.

   - If the device is locked, unlock the device. See 4.9 Unlock the Device on page 51.

The **Login** screen displays.

2. Perform one of the steps below:

    - Enter your username and password.

        ✎ **NOTE**

        - 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 4.14 Perform System Reset on page 57.

    - Use an external barcode reader to scan your username barcode, then enter your password.

        ✎ **NOTE**
        For more information, see 3.3 Connect the External Barcode Reader 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 4-3 Login Errors

Symptom	Cause	Solution
`The username or pass-word 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. • You do not belong to any groups authorized access to this device.	• Wait for the connection to the LDAP server to be restored and log on to the device again. • 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.

Table 4-3 Login Errors (Table continued)

Symptom	Cause	Solution
You are prompted to change your password.	You are a local or Admin user and your password has expired.	Perform the procedure 4.6 Change the User Password on page 49 and log on to the device again.

4.4.2 Log On to 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 assigned to the **STAT** user role. You are not able to review any report generated by other users.

4.4.3 Access the Device using a Technician ID

Make sure that you enable the Technician ID in the **User Authentication** setting.

On the **Login** screen, perform one of these steps:

1. Enter a valid Technician ID in the **Technician ID** field and select **Continue**.

2. **NOTE**
    If you use an external barcode reader, make sure that:

    *   The **BRCD - External Barcode Reader** option is activated on the device.

    *   You enable External USB Storage in **Settings** > **System** > **Storage** and enable at least one USB port in **Settings** > **Hardware** > **USB Port**.

    *   The barcode reader is correctly connected to the device.

    Use an external barcode reader to scan a valid Technician ID barcode. It will automatically fill in the **Technician ID** field.

    A message **Logging in...** displays on the screen. You do not need to 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.

4.4.4 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. 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.

3. Perform one of these steps:

- If you have unsaved data, select **Cancel**.
- If you want to log off, select **Log Out**.

  You are logged off your user session.

4.5 User Menu Options Description

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

Table 4-4 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.

Continues on the next page

Table 4-4 User Menu Options (Table continued)

Item	Option	Description
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**	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.
9	**Power Off**	Powers off the device. **NOTE** Pressing the **Power** button on the front panel can also stop the device.
10	**About**	Displays the device software information.
11	**Help**	Displays help information about the device.

4.6 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 requirements:

- Password must contain at least 8 characters or the minimum password length configured, whichever is higher.

- You can configure the desired password characters. The password must contain at least one occurrence of each of the configured characters:

  ○ Lowercase letter (a-z)

  ○ Uppercase letter (A-Z)

  ○ Number (0-9)

  ○ All special characters (!,@,#,$,%,^,&,*, single space)

- You can configure the password with repeat characters to the maximum number. You can set up in **Security** settings.

- You can configure the password with sequential characters to the maximum number. You can set up in **Security** settings.

- You can configure the password for the number of times to prevent the reuse of previously used password. You can set up in **Security** settings.

- You can configure the password with characters to change from the password that you used before to the minimum number. You can set up in **Security** settings.

- The password cannot be a commonly used password.

- The username cannot be used as a password.

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

4.7 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 the **Power** button on the front panel.

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

  The GE HealthCare 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, tap anywhere on the screen.

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

4.8 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.   From the User Menu on the Acquisition screen, select **Lock**.

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

4.9 Unlock the Device

1.   Tap the lock icon ▥ on the screen.

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.

4.10 Enable and Configure Service User

Make sure that your user role is assigned to the user management privilege.

1.   Select **Settings** > **User Account** > **Users**.

2.   Select **User Profiles**.

The user profiles settings screen displays.

3.   Select **Service** user profile.

The **User Profiles-Name-Service** settings screen displays.

4.   Click **Disable User** button to enable and configure the service user profile.

5.   Configure the **Service** user profile as per the information in the table.

Table 4-5 Configure Service User Profiles

Field	Action	Description
Password	Enter the password for the user according to the password rules listed in the Description column.	Each character in the password displays an asterisk (*). If the password rules are not met, the **Password** field display a red box and relevant error messages. Allowed values: • User-defined value up to 126 characters • Minimum number of characters and type of characters allowed is set in the **Settings** > **User Account** > *Security* settings screen. No default value. **NOTE** If a local user forgets the user password, a user with the **User Management** privilege can change the password for the user account in the *Users* settings screen. The local user can log into the device with the changed password.
Confirm Password	Enter the exact duplicate entry of the password entered in the **Password** field	Each character in the password displays an asterisk (*). If there is a mismatch with the password entered in this field and the **Password** field, the **Confirm Password** field displays a red box. Re-enter the password to match the **Password** field. No default value.
Disable User	Enable or disable this setting.	• If this setting is enabled, the user is disabled from using the device. • If this setting is disabled, the user is enabled to access the device. Default value: Enabled (User Disabled)
Force User to Change Password at Next Login	Enable or disable this setting.	• If this setting is enabled, the user must change the password at the next login. • If this setting is disabled, the user does not need to change the password at the next login. Default value: Enabled **NOTE** For **Service** user, this button is inactive.

6.   Select **Apply**.

7.   Select **Save**.

4.11 Disable Service User Profile

Make sure that your user role is assigned to the user management privilege.

The configured service user can access the **Service** screen using the credentials set by the Administrator until it is disabled for a service user profile.

When the Administrator disables the service user, you cannot use the credentials that you set before to access the **Service** screen. For next service user to login, the Administrator needs to again enable and configure the service user profile.

1. Select **Settings** > **User Account** > **Users**.

2. Select **User Profiles**.

    The user profiles settings screen displays.

3. Select **Service** user profile.

    The **User Profiles-Name-Service** settings screen displays.

4. Tap **Disable User** button to disable the service user profile.

    The service user profile settings is disabled and you cannot configure the service user credentials.

5. Select **Apply**.

6. Select **Save**.

4.12 Configure Service User Role

Make sure that your user role is assigned to the user management privilege.

1. Select **Settings** > **User Account** > **Users**.

2. Select **User Roles**.

    The user roles setting screen displays.
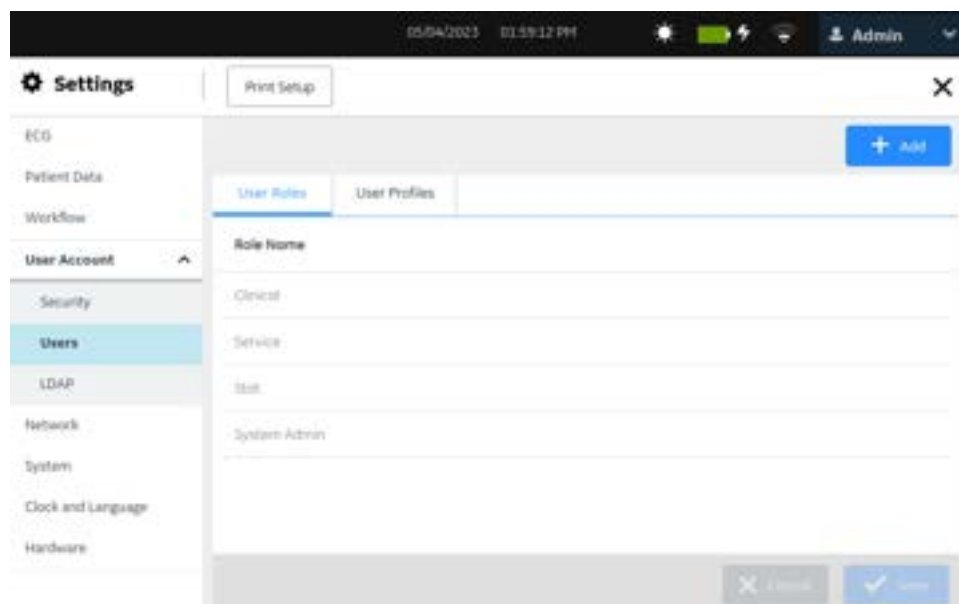
3. Select **Service** user role.

    The **User Roles-Name-Service** settings screen displays.
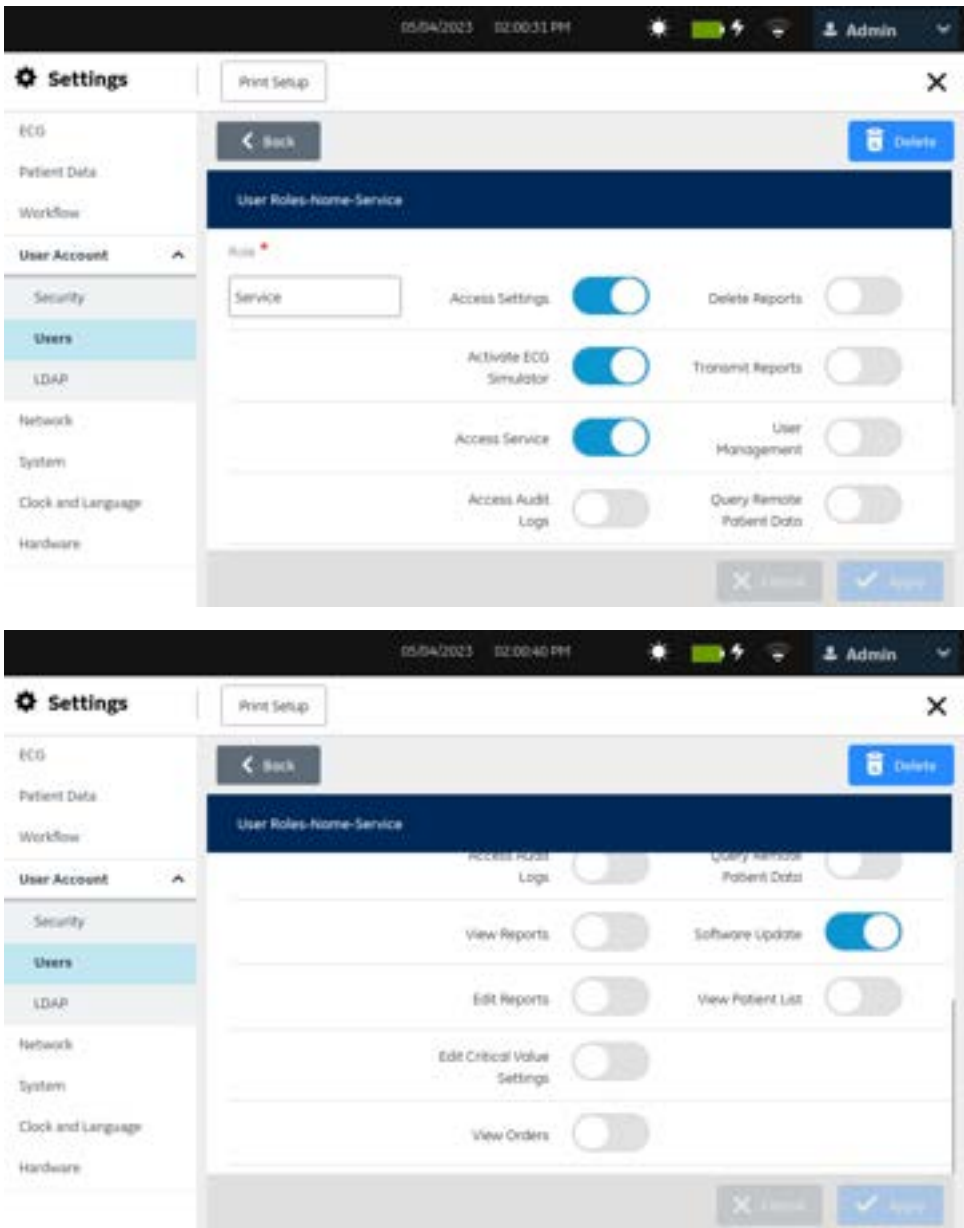
4. Configure the **Service** user role with the appropriate privileges as per the information in the table.

Table 4-6 Configure Service User Roles

Field	Description
Role Name	Enter the unique name of the service user role. Up to 15 characters are allowed.

<div align="right">Continues on the next page</div>

Table 4-6 Configure Service User Roles (Table continued)

Field	Description
Access Settings	Default value: The **Access Settings** privilege is enabled. Access the *Settings* screen and view the network parameters upon selecting the network status icon. **NOTE** If this privilege is disabled: • The **Activate ECG Simulator**, **Edit Critical Value Settings**, and **User Management** privileges are also disabled. • You can only view the network status upon selecting the network status icon, but cannot view the network parameters such as Device Name, IP address, Subnet Mask, MAC address, Gateway address, and DNS.
Activate ECG Simulator	Default value: The **Activate ECG Simulator** privilege is enabled. Access to activate the ECG simulator. **NOTE** If this privilege is enabled, the **Access Settings** privilege is also enabled.
Access Service	Default value: The **Access Service** privilege is enabled. Access the *Service* screen. **NOTE** If this privilege is disabled, the **Software Update** and **Access Audit Logs** privileges are also disabled.
Access Audit Logs	Default value: The **Access Audit Logs** privilege is disabled. View audit logs. **NOTE** If this privilege is enabled, the **Access Service** privilege is also enabled.
View Reports	Default value: The **View Reports** privilege is disabled. View patient reports previously stored in the **Files** view. **NOTE** If this privilege is disabled, a user can only view patient reports that acquired during their current login session.

Continues on the next page

Table 4-6 Configure Service User Roles (Table continued)

Field	Description
Edit Reports	Default value: The **Edit Reports** privilege is disabled. Edit stored patient reports. **NOTE** If the user only has edit patient report privileges and not viewing patient report privileges, they can only edit patient reports they acquired.
Edit Critical Value Settings	Default value: The **Edit Critical Value Settings** privilege is disabled. Edit the critical values setting. **NOTE** This privilege displays only if the CRIT option is purchased and enabled. Contact GE Healthcare Service Support to purchase this option. If you enable this privilege, the **Access Settings** privilege is also enabled.
View Orders	Default value: The **View Orders** privilege is disabled. View orders in the **Orders** view.
Delete Reports	Default value: The **Delete Reports** privilege is disabled. Delete stored patient reports.
Transmit Reports	Default value: The **Transmit Reports** privilege is disabled. Transmit patient reports.
User Management	Default value: The **User Management** privilege is disabled. Manage the user profiles and user roles. **NOTE** If you enable this privilege, the **Access Settings** privilege is also enabled.
Query Remote Patient Data	Default value: The **Query Remote Patient Data** privilege is disabled. Query a remote patient data.
Software Update	Default value: The **Software Update** privilege is enabled. Update the software on the device. **NOTE** If you enable this privilege, the **Access Service** privilege is also enabled.
View Patient List	Default value: The **View Patient List** privilege is disabled. View the patient list.

5. Select **Apply**.

6. Select **Save**.

4.13 Access the Service Screen

Make sure that your user role is assigned the privileges to access the **Service** screen.

To access the **Service** screen, select **Service** from the User Menu in the Acquisition screen.

If you have sufficient privileges to access the **Service** screen, the **Service** screen opens.

If you do not have the required privileges to access the **Service** screen, a relevant message displays depending on the configured authentication mode:

User Profile	Action
Default User	Log in as a user with sufficient privileges to open the **Service** screen.
STAT, local or LDAP user	Log off and log in as a user with sufficient privileges to access the **Service** screen.

4.14 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, 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 ↑↓←→↑↓←→, consecutively, on the soft keyboard.

   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 and select **Save**.

   If the serial number is correct, the **Restore** button will be active.

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*.

4.15 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.

      The **Power Options** dialog opens. Select **Standby**.

    To exit standby mode, press the **Power** button on the front panel.

    If user authentication is configured, standby mode is off and the lock screen displays. Perform the procedure to unlock and login to the device.

5 Service Tasks

5.1 Service Screen Overview

The **Service** screen enables a user with privileges to do these tasks:

- Review system information
- Configure various options
- Conduct diagnostics and tests
- Review, print, and export various logs
- Format internal memory
- Manage option codes
- Update software
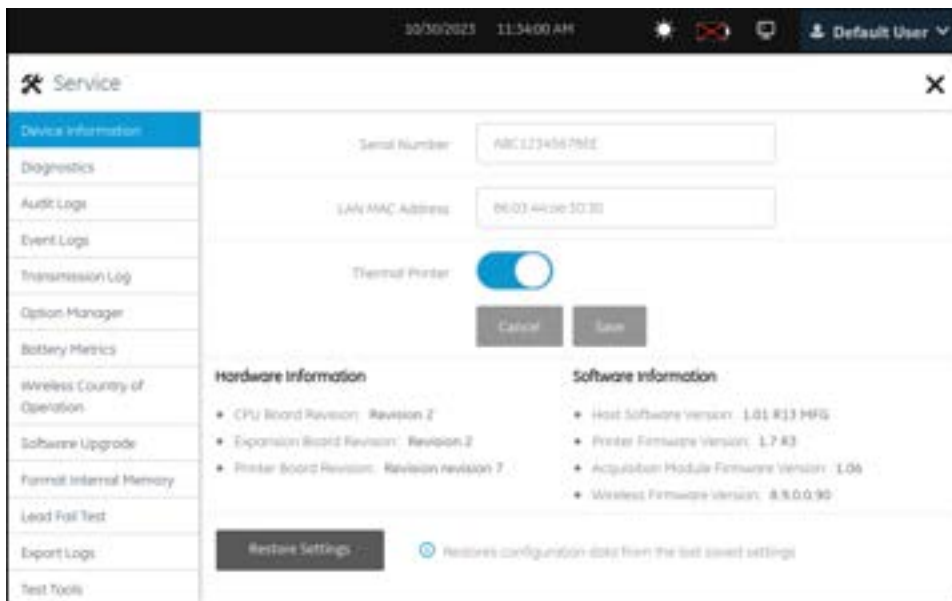
5.2 Enter Chinese or Japanese Characters

If the Pinyin input method is configured, when you enter data in the fields, a numbered list of matching Chinese characters display in a pull-down menu. Select the desired value in the list to display the Chinese character in the field.

If the Japanese (**HIRAGANA** and **KATAKANA**) characters input method is configured, when you enter data in the fields, a numbered list of matching Japanese characters display in a pull-down menu. Select or type the number of the desired value in the list to display the Japanese character in the field.

You can select the Japanese character icons あ and カ on the screen to switch between Hiragana and Katakana Japanese character sets.

5.3 Display Device Information

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

    The *About* window opens.

Table 5-1 Field Descriptions

Field	Description
Serial Number	The identifier for the device. The serial number displayed in this field must match the serial number on the device label.
Software Release Version	The version of the released software on this device.
Software Full Version	The full version of the software on this device. The version displayed in this field provides if the software is a development, manufacturing, or release build.
Writer Software Version	The version of the PSoC software on this device.
12SL Version	The version of the 12SL software on this device.
Acquisition Module Software Version	The version of the Acquisition Module software on this device. This displays only when an Acquisition Module is attached to the device.
Wireless Firmware Version	The version of wireless firmware on this device.

2. Close the screen.

    The Acquisition screen displays.

5.4 Configure Device Information

Only a Service user can perform this procedure. See for information on how to log in as Service user.

1. Open the **Service** screen.

2. Select **Device Information**.

    The **Device Information** screen opens.

3. Configure **Device Information** as per the information in the table.

Field	Action	Description
Serial Number	Enter the serial number of the device.	The serial number is set by the manufacturer at the factory during initial setup of the device. The serial number can be edited only if you replace the main board and install a manufacturing software. The serial number stored in the main board must match the serial number on the product label on the display rear cover. Allowed values: 1 to 13 characters • A to Z • a to z • 0 to 9
LAN MAC Address	Enter the LAN MAC address of the device.	The LAN MAC address is set by the manufacturer at the factory during initial setup of the device. The LAN MAC address can be edited only if you replace the main board and install a manufacturing software. The LAN MAC address stored in the main board must match the LAN MAC address on the label placed on the bottom of the device. Allowed values: *XX:XX:XX:XX:XX:XX* format, where *X* is a hexadecimal digit with values ranging from `0` to `9` and `a` to `f`.
Thermal Printer	Enable or Disable the thermal printer setting.	The thermal printer is set by the manufacturer at the factory during initial setup of the device. The thermal printer can be configured only if you replace the main board and install a manufacturing software. By default this setting will be enabled. • For MAC 5 A4 and MAC 5 A5, set this value as **Enabled**. If this setting is disabled, you can not print the report via thermal printer. • For MAC 5 Lite, set the value as **Disabled**.

4. Verify the hardware and software version information of the device displayed on the screen.

5. Perform one of the following steps:

   - Select **Save**.

   - Select **Cancel** to cancel the changes. The configuration changes you made are cancelled.

6. To restore settings from PSoC memory, see .

7. Close the screen.

   The Acquisition screen displays.

5.5 Restore Configuration Data from PSoC

Only a Service user can perform this procedure. Use this procedure to restore saved configurations and options from the device memory.

> **NOTE**
> If you replace the main board, you can not restore the configuration data from PSoC.

Before restoring the configuration data from device memory, make sure that you back up the configuration data to a USB flash drive. See the *Export and Import Configuration Settings* section in the *Configure Settings* chapter of the *MAC 5 Operator's Manual* for the backup procedure.

> **NOTE**
> Only configuration data can be saved to a USB flash drive. Options and serial number cannot be saved to a USB flash drive.

If restoration of configuration data from device memory fails, you can restore the configuration data from the USB flash drive.

1. Open the **Service** screen.

2. Select **Device Information**.

   The *Device Information* screen displays.

3. Select **Restore Settings**.

   A message displays.

4. Select **Restore** to restore the configuration to the backuped settings, or **Cancel** to cancel the action.

   When you select **Restore**,

   - If the configuration is restored successfully, a message displays indicating the configuration was restored successfully.

   - If the configuration is not restored due to an error, resolve the error. See the following table:

   Table 5-2 Troubleshooting Possible Error Conditions to Restore Configuration

Error Message	Error Condition	How to Troubleshoot:
`Failed to restore configu-ration from PSOC.`	PSoC does not have backed-up configuration due to error or hardware failure.	Try to restore settings again. If the error persists, configure settings and options manually. If you have backed up the configuration data to a USB flash drive, you

   Continues on the next page

Table 5-2 Troubleshooting Possible Error Conditions to Restore Configuration (Table continued)

Error Message	Error Condition	How to Troubleshoot:
`Failed to restore configu-ration due to incompatible database schema. Upgrade to latest software.`	The database schema is incompatible.	can restore the data from the USB flash drive.

5. Close the screen.

   The Acquisition screen displays.

5.6 Restore to Factory Defaults

> **NOTE**
> A **System Reset** is used to delete all data including patient data and settings. The system is reset to factory defaults and the default password for the admin user can be used to log in. It retains the previously enabled option codes, serial number, MAC address, and Wireless Country of Operation configuration.

A **Restore to Factory Defaults** is used to reset the settings or section of settings.

- Make sure that you have backed up the current configuration settings, before you reset the settings to factory defaults. Refer to the *Export and Import Configuration Settings* section in *MAC™ 5 Resting ECG Analysis System Operator Manual* to back up the current configuration settings.

  If you do not save the current configuration settings prior to restore the settings to factory defaults, you do not have the option of restoring the current settings later. You need to manually re-configure the settings.

- Make sure that your user role is assigned the privileges to access the **Settings** screen.

> **NOTE**
> The enabled options are not reset when the device is reset to factory default settings.

1. Select **Settings** > **System** > **Storage**.
2. Select **Restore to Factory Defaults**.
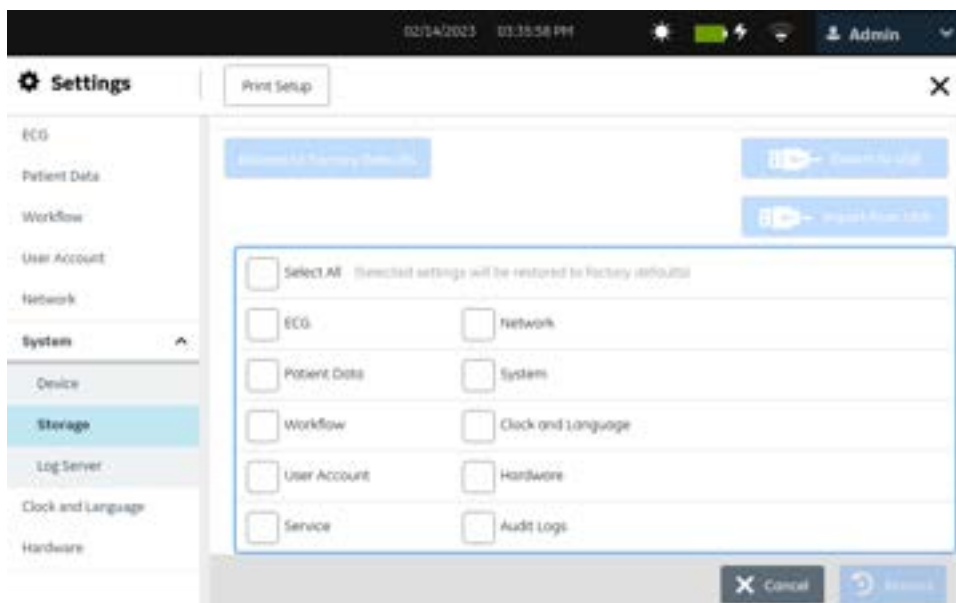
3. Perform *one* of the steps below:

    - If you want to restore all the settings to factory defaults, Select **Select All**.

    - If you only want to restore several specific settings to factory defaults, select the check boxes beside those settings.

4. Select **Restore**.

    A confirmation message displays: **Selected configurations will be reset to default values. Resetting User Settings will logoff the system. Do you want to continue?**

5. Perform one of the steps below:

    - Select **Restore** to confirm the action.

    - Select **Cancel** to cancel the action.

- If you select all the settings and click **Restore**, all the selected settings are restored to default values and the Acquisition screen displays.

- If you select a specified settings and click **Restore**, the selected settings are restored to default values. Close the screen to view the Acquisition screen.

5.7 Enable the Options

Before you begin this procedure, make sure:

- Your user role is assigned the privileges to enable options for this device.

- The serial number of the device is configured. See .

- You obtain the required option codes. Contact your GE Healthcare Service Support representative to obtain the unique code for your device. You cannot enable the options without the appropriate code.

> **NOTE**
> The enabled options are not reset when the device is reset to factory default settings.

Table 5-3 Available Device Options

Option	Description
ACCS - Acute Coronary Syndrome	Enables the acute coronary syndrome (ACS) function for the device. This function performs an ACS analysis on resting ECGs and 12-lead ECGs. When you enable this option, the **ACS** button diaplays on the lower portion of the Acquisition screen.
AECG - Auto ECG	Allows the device to automatically start recording an ECG.
BRCD - External Barcode Reader	Allows you to enter patient information using an external barcode reader.
CRIT - Critical Values Notifications	Enables the critical value function, which allows you to define and configure custom alerts based on key ECG values.
DRHM - Digital Rhythm	Allows you to configure the digital rhythm, mainly how many seconds of data can be acquired.
F300 - 300 Hz Acquisition	Allows you to use 300 Hz filter for lead sets.
FLDS - Full Disclosure	Allows you to record a Full Disclosure ECG. For more information, please see section *Full Disclosure Overview* in the *MAC 5 Resting ECG Analysis System Operator's Manual*
ME12 - 12SL Measurements	Enables the 12SL measurement matrix.
MI12 - 12SL Measurements and Interpretation	Allows you to display and print global measurements and interpretation.
NETP - Network Printer	Allows you to print reports via a network printer.
ORDM - Order Manager	Allows you to manage available orders.
PHAR - Pharmacy	Allows you to configure the clinical trail. > **NOTE** > If you change the status of this option, reboot the device to activate the change.

Continues on the next page

Table 5-3 Available Device Options (Table continued)

Option	Description
WRLS - Global Wireless	Allows you to configure the default wireless network. The wireless LAN country of operation needs to be set to configure wireless settings. See 5.14 Configure Wireless Country of Operation on page 73.
XMLO - XML Format Output	Allows you to save Sapphire XML formatted record files to external storage devices.

1. Open the **Service** screen.

2. Select **Option Manager**.

    The *Option Manager* screen opens.
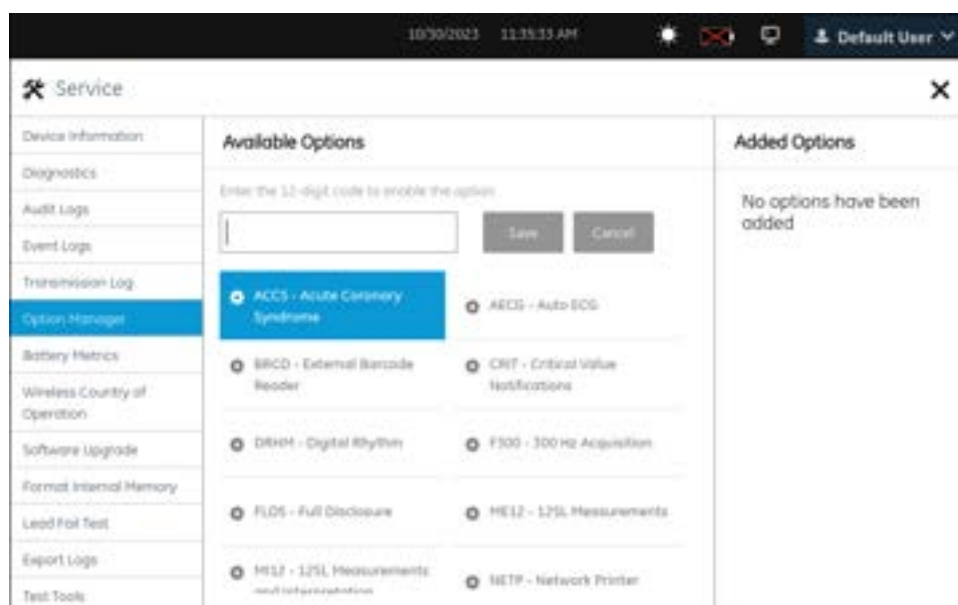
3. From the **Available Options** list, select the option you want to enable.

    > **NOTE**
    > Because each option has a unique option code, you can enable only one option at a time.

4. Enter the option code for the selected option in the **Enter the 12-digit code to enable the option** field.

5. Select **Save** to enable the selected option. The selected option is added to the **Added Options** list on the right side.

    An error message displays if you enter an invalid option code. Select **OK** to close the window.

6. Repeat Step 3 through Step 5 for each option you want to enable.

7. Close the screen.

    The Acquisition screen displays.

5.8 Disable the Options

1. Open the **Service** screen.

2. Select **Option Manager**.

    The **Option Manager** screen opens.
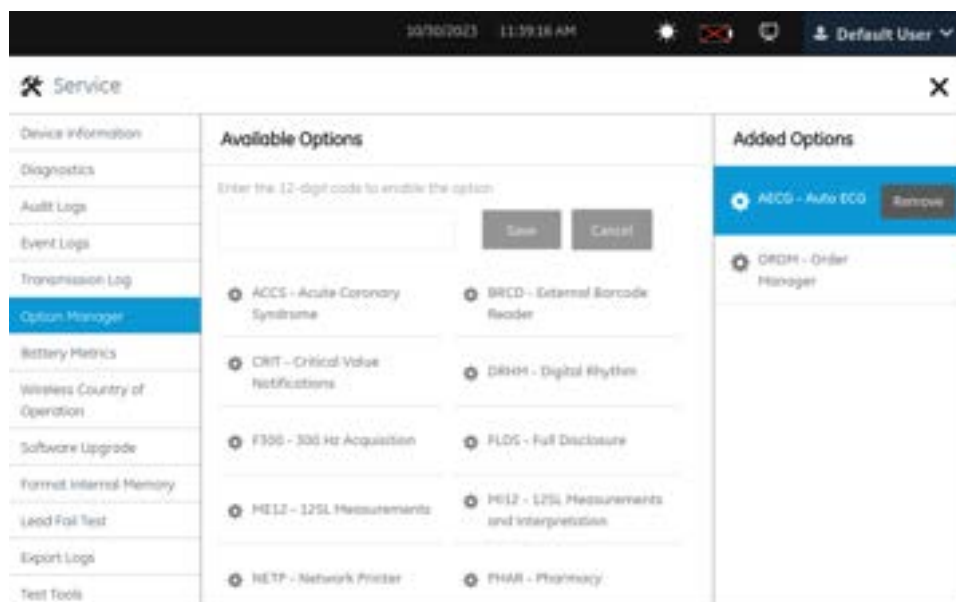
3. Select the option you want to remove from the **Added Options** list.

4. Select **Remove**.

    A warning message displays indicating that removing the option will disable the option from the device.

    > **NOTE**
    > You cannot disable or remove the **WRLS - Global Wireless** option.

5. Select **Yes**.

6. Close the screen.

    The Acquisition screen displays.

5.9 Display Battery Metrics

1. Open the **Service** screen.

2. Select **Battery Metrics**.

Table 5-4 Descriptions for Temperature Metrics

Temperature Metric	Description
Ambient Temperature (deg. C)	The actual ambient temperature of the device environment in Degree Celsius (C).
Maximum Ambient Temperature (deg. C)	The maximum ambient temperature of the environment that the battery can be expected to perform successfully in Degree Celsius (C).
Minimum Ambient Temperature (deg. C)	The minimum ambient temperature of the environment that the battery can be expected to perform successfully in Degree Celsius (C).

Table 5-5 Descriptions for Battery Metrics

Battery Metric	Description
Power Status	Indicates the power source for the device. The values are as follows: • **On AC Power** • **On Battery** • **Status Not Available** (if the status is not available due to any error)
Battery Status	Indicates if the battery is in the device. The values are as follows: • **Present** • **Absent**
Percentage of Charge Remaining	The remaining percentage of power in the battery.
Battery Charge Status	The charge status of the battery. The statuses are as follows: • **Charging** • **Discharging**
Battery Voltage Level (mV)	The voltage (mV) level of the battery.

Continues on the next page

Table 5-5 Descriptions for Battery Metrics (Table continued)

Battery Metric	Description
Battery Current (mA)	The measurement of the battery current for the battery in milliamperes (mA).
Battery Temperature (deg. C)	The actual internal temperature of the battery in Degree Celsius (C).
Maximum Battery Temperature (deg .C)	The maximum operational temperature of the battery in Degree Celsius (C).
Minimum Battery Temperature (deg. C)	The minimum operational temperature of the battery in Degree Celsius (C).
Charge Cycle Count	The number of times that the battery has been recharged.
Conditioning Required	Indicates the condition of each battery. After a large number of charging and discharging cycles, the storage capacity of the battery reduces and the battery drains quickly. In that case, you need to change the battery. The conditions are as follows: • **Yes** - Change the battery or charge the battery using an external battery charger. See the *Diagnostic Cardiology Supplies and Accessories Guide, 2102946-001* for the part number of the external battery charger. • **No** - No need to change the battery.
Real-time Battery Message	A message describes the current state of the battery. Examples of messages: • **Fully charged** • **Fully discharged** • **Charging in AC mode** • **Temperature too high** • **Voltage too high**

3. Close the screen.

    The Acquisition screen displays.

5.10 Format Log Data Partition

Connect the device to AC power for the entire duration of this procedure.

1. Open the **Service** screen.

2. Select **Format Internal Memory**.

    The **Format Internal Memory** screen displays.
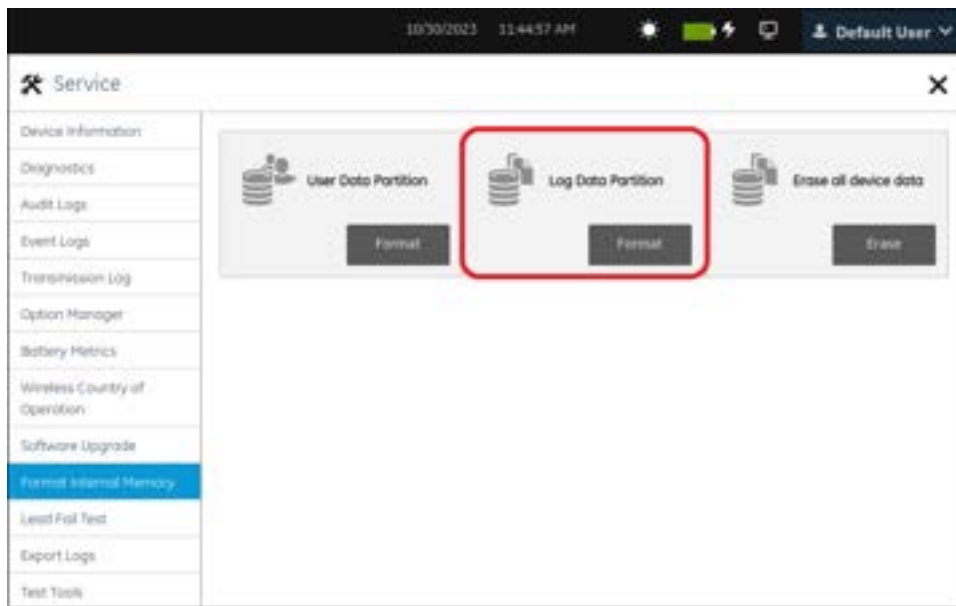
3. Select **Format** in the **Log Data Partition** section to format the log partition.

    A warning message displays indicating that formatting will erase the complete log data from memory and asking you to confirm the action.

4. Select **Format** to confirm.

    - If the device is running on AC power, it reboots immediately.

    - If the device is running on battery, a message displays asking you to connect the device to AC power before proceeding. Perform the following steps:

        4.2.1. Connect the device to AC power.

        4.2.2. Select **OK** to close the message.

        4.2.3. Restart the procedure.

    The **Formating Internal Memory** screen opens and displays the progress of formatting log data (in percentage).

If	Then
Log data formatting is successful	A success message displays. The Acquisition screen opens.
Log data formatting is unsuccessful	An error message displays. The Acquisition screen opens. Restart this procedure to format log data.

5.11 Format User Data Partition

Connect the device to AC power for the entire duration of this procedure.

1. Open the **Service** screen.

2. Select **Format Internal Memory**.

    The **Format Internal Memory** screen displays.
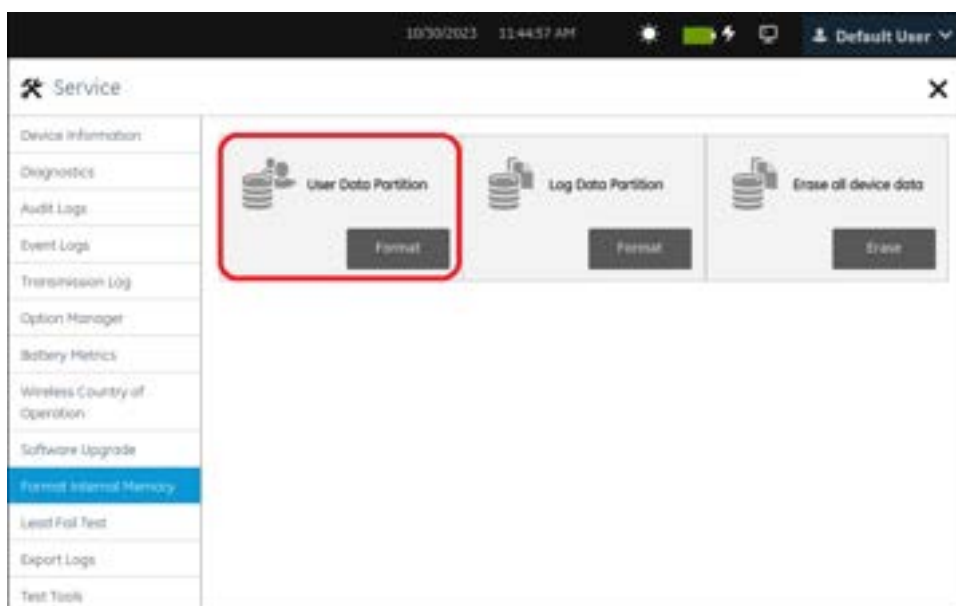
3. Select **Format** in the **User Data Partition** section to format the user partition.

    A warning message displays indicating that formatting will erase the complete user data from memory and asking you to confirm the action.

4. Select **Format** to confirm.

    - If the device is running on AC power, it reboots immediately.

    - If the device is running on battery, a message displays asking you to connect the device to AC power before proceeding. Perform the following steps:

        4.2.1. Connect the device to AC power.

        4.2.2. Select **OK** to close the message.

        4.2.3. Restart the procedure.

    The **Formating Internal Memory** screen opens and displays the progress of formatting user data (in percentage).

If	Then
User data formatting is successful	A success message displays. The Acquisition screen opens.
User data formatting is unsuccessful	An error message displays. The Acquisition screen opens. Restart this procedure to format user data.

5.12 Erase all Device Data

Make sure that the device is connected to AC power during this procedure.

1. Open the **Service** screen.

2. Select **Format Internal Memory**.

    The **Format Internal Memory** screen displays.
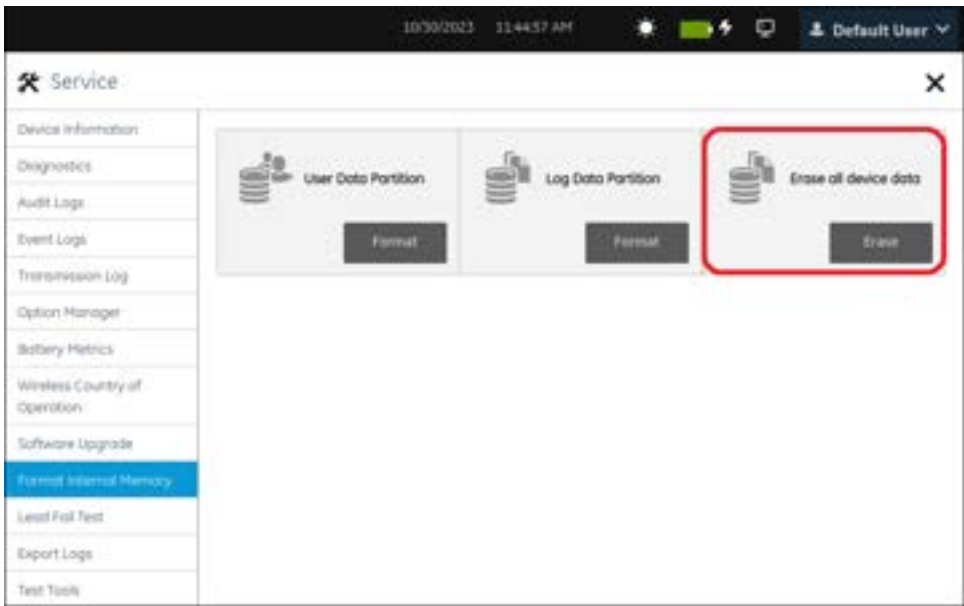
3. Select **Erase** in the **Erase all device data** section to erase all device data, including all option codes set in the device.

    A warning displays that all device data will be erased from the device.

4. Select **Erase**.

    • `Preparing to erase all device data` message displays.

    • If the device is on battery power, a message displays to connect the device to AC power. Do the steps that follow:

        4.2.1.   Connect the device to AC power.

        4.2.2.   Select **OK** to close the message.

        4.2.3.   Restart the procedure.

    • If the device is on AC power, it reboots immediately.

    The Erase screen opens and displays:

    • `Erasing all device data. Do not disconnect the device from AC power..`

    • progress of completion, in percentages.

If	Then
All device data erase is successful	A success message displays. The Acquisition screen opens.
All device data erase fails	An error message displays. Manually reboot the device. The **Erase** screen opens and the procedure restarts for the failed partition. If it is successful, a success message displays. The Acquisition screen opens. **NOTE** If the device data erase fails repetitively, contact your GE Healthcare Service Support representative.

> **NOTE**
> Reactive the device after you erase all the device data, refer to 4.2 Self
> Registration on page 37 for details.

5.13 Configure Lead Fail Test Mode

> **NOTE**
> By default, the **Lead Fail Test Mode** value is off. The **Lead Fail Test Mode** value is also reset to off upon a system reboot.

1. Open the **Service** screen.

2. Select **Lead Fail Test**.

   The **Lead Fail Test** screen opens.

3. Turn the **Lead Fail Test Mode** option on or off.

4. Save and close the **Service** screen.

   The Acquisition screen opens.

   If the **Lead Fail Test Mode** option is on:

   - when an electrode is disconnected, you will see noise on the respective waveform as a result of the lead failure.

   - during live (real-time) waveform display, the III, aVR, aVL, and aVF leads are derived as normal regardless of any failed electrodes.

   If the **Lead Fail Test Mode** option is off:

   - when an electrode is disconnected, the waveform of the failed lead or leads is flat-lined to prevent unwanted noise.

   - during live (real-time) waveform display, the III, aVR, aVL, and aVF leads are flat-lined for all data samples while the LA or LL electrodes are in a failed state.

5.14 Configure Wireless Country of Operation

> **NOTE**
> The device ships with configured settings for the Wireless Country of Operation option. You can only edit the country code for the **Rest of the World** setting. If the device is set to **US** or **Canada**, you cannot alter the configuration and **Wireless Country of Operation** option will not be available in the **Service** menu.

Before you begin this procedure:

Disable the Network status option in the **Settings** > **Network** > **Wireless Network** settings, see the *Configure Settings* chapter in the *MAC 5 Resting ECG Analysis Operator's Manual*. If the WLAN is enabled and you try to configure Wireless, the following error message displays: `Disable WLAN to set the Wireless Country of Operation`.

1. Open the **Service** screen.

2. Select **Wireless Country of Operation** > **Rest of the World**.
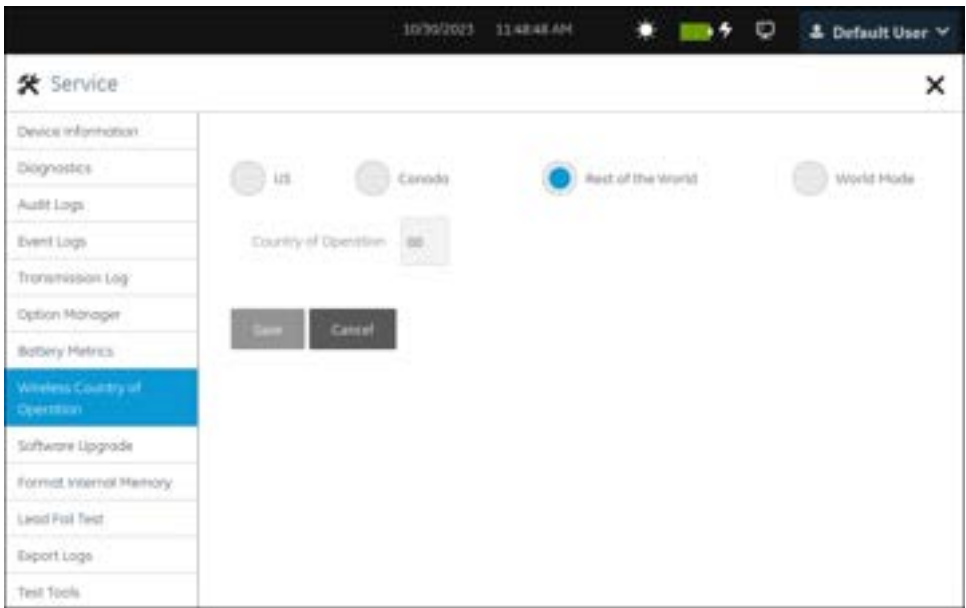
3. Configure the country code for the **Rest of the World** wireless option as per the information in the table.

To set Wireless Country of Operation in:	Perform the following steps:
Rest of the World	The **Country of Operation** option displays. 1. Enter a two-character country code in the text field. The list of possible country codes is available at: https://www.iso.org/obp/ui/#search/code/. The allowed values are a to z and A to Z. **NOTE** You cannot enter US and Canada country codes. 2. Select **Save** to save the configuration. The wireless is set as per the country code you select in 3.1. If you enter an invalid country code, an error message displays, and the device is set to 00 for World Regulatory Domain. If you do not enter a country code, the device is set to **00** for World Regulatory Domain.

4. Close the screen.

The Acquisition screen displays.

5.15 Configure the Remote Service

You can configure the remote service to the device through the default InSite server.

1. Open the **Service** screen.

2. Select **Remote Service**.

The **Remote Service** screen displays.
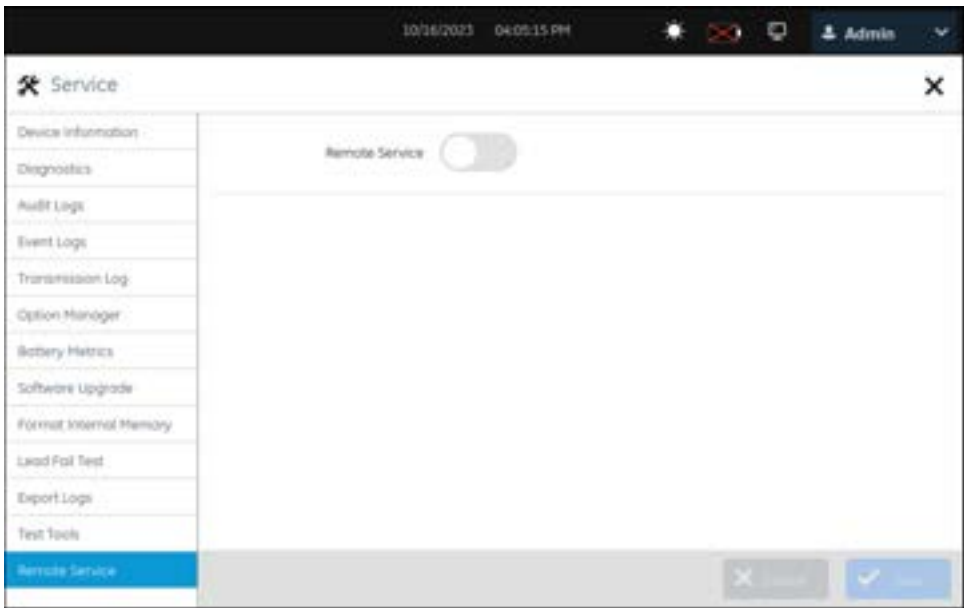
3. Turn on the **Remote Service** to configure the remote service server.
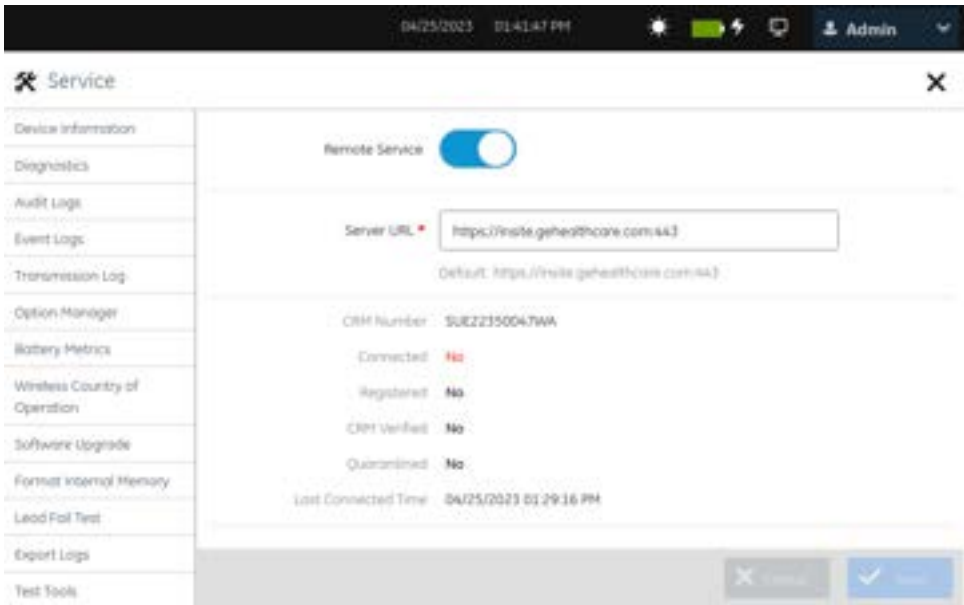
4. Configure a remote service server as per the information in the table.

    Table 5-6 Configure a Remote Service Server

Field	Action	Description
Remote Service	Enable or disable the button.	You can enable to configure the remote service. Default value: Disabled.

Continues on the next page

Table 5-6 Configure a Remote Service Server (Table continued)

Field	Action	Description
Server URL	Enter the remote server URL and the corresponding port number to connect to the device.	You can enter the remote server URL based on the country or region. Allowed values: • For Europe region - https://insite-eu.gehealthcare.com:443 • For China region - https://insite.gehealthcare.cn:443 • For USCAN & rest of the world - https://insite.gehealth-care.com:443
CRM Number	Displays the connected device serial number.	If the remote server is connected to the device, the connected device serial number displays.
Connected	Displays **Yes** or **No**	If the remote service server is connected to the device, the **Yes** displays. If the remote service server is not connected to the device, the **No** displays.
Registered	Displays **Yes** or **No**	If the remote service server is registered to the device, the **Yes** displays. If the remote service server is not registered to the device, the **No** displays.
CRM Verified	Displays **Yes** or **No**	If the remote service server is verified to the device, the **Yes** displays. If the remote service server is not verified to the device, the **No** displays.
Quarantined	Displays **Yes** or **No**	If the remote service server is quarantined to the device, the **Yes** displays. If the remote service server is not quarantined to the device, the **No** displays.
Last Connected Time	Displays the date and time.	Displays the time stamp when the device is connected to the remote service server.

5. Select **Save** to save the configuration.

    NOTE
    To make sure that the configuration is correct, you need to wait until the remote service server gets connected. If the configuration is correct, the status for fields **Connected**, **Registered** and **CRM Verified** change from **NO** to **Yes**.
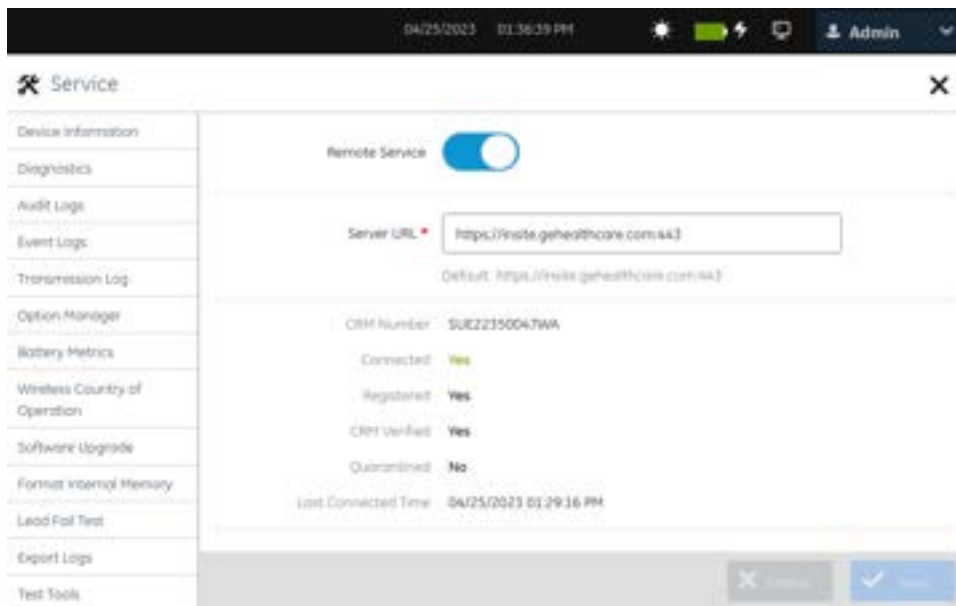
6.   Close the screen.

The Acquisition screen displays.

5.16 Entitle the Device in CRM

To enable the service snapshot upload feature, you need to entitle the device in CRM. After the device is installed, call a qualified GE Healthcare Service representative to entitle the device with a valid warranty. For more information on how to configure the remote service server, see 5.15 Configure the Remote Service on page 74.

5.17 View the Logs in Field Force Automation

If the user configures the **Remote Serive** and generates the service snapshot, a qualified GE HealthCare Service representative can view the logs through the **Field Force Automation** system.

1.   Go to:

Region	Intranet	Internet
CN	https://ffa-cn.cloud.ge-healthcare.net/	https://ffa.gehealthcare.cn
US	https://ffa.cloud.ge-healthcare.net/	https://ffa.gehealthcare.com
EU	https://ffa.cloud.ge-healthcare.net/	https://ffa.gehealthcare.com

The **Start Remote Troubleshooting** screen displays.

2. Enter the required information, then select **Get Started**.

    The **REVIEW** tab displays.

3. Select **RESEARCH** tab > **Log Viewer**.
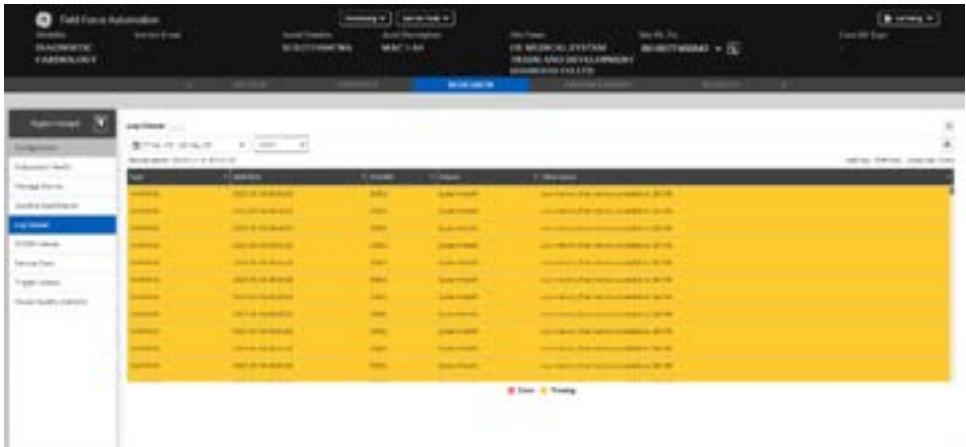
Field	Discription
Date	Click anywhere on the **Date** field to populate the **Calendar**. Select the date from the **Calendar**. Select **Apply**. If you select **Cancel**, the calendar closes and your changes are not applied. **Minimum** duration: 1 day **Maximum** duration: 60 days
Event/System	Switches between event logs and system logs from the drop-down list.
Download Icon	You can download the logs to the local destination.

Continues on the next page

Field	Discription
Type	Shows the type of the log: • CRITICAL • ERROR • INFORMATION • WARNING • TOUCH_AND_KEY • INVALID
DateTime	Shows the date and time of the log.
EventID/SystemID	Shows the Event ID or System ID of the log.
Source	Source of the event. The name of the software component (module or library name) where the event occurred.
Discription	Description of the event that occurred and the outcome of that event (success or failure).

5.18 Print a Service Report

Only the MAC 5 A4 and MAC 5 A5 mode can print a service report that you can use to diagnose or troubleshoot an issue.

NOTE
Before you print a service report, check the **Rhythm Record** screen and make sure that you set the **Paper Size** value consistent with the configuration of the printer module.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.

3. Select **Print**.

   A job to print the service report is sent to the printer.

   • If the print job is successful, the report is printed and a success message displays.

   • If the print job fails, an error message displays.

   The service report consists of the following sections:

   • Device Information

   • Hardware Information

   • Software Information

   • Option Settings

   • Battery/Power Information

   • Diagnostics Results

4. Close the screen.

   The Acquisition screen displays.

6 Software Upgrade

6.1 Upgrade or Downgrade Production Software

WARNING

⚠️ DATA LOSS

You may lose all the patient data and device settings after you upgrade or downgrade the software version.

Save all the patient data and device settings to a USB flash drive before you upgrade or downgrade the software version.

Perform this procedure to:

- Upgrade the software/manual version from the current version to a newer version.
- Downgrade the software/manual version from the current version to a previous version.

Before you begin, confirm the information below:

- All the patient data and device settings have been saved to a USB flash drive.

  NOTE
  You must use the FAT32 formatted USB flash drive.

  Do not put the different versions packages in the same folder.

- Your user role is assigned the privileges to upgrade software.

Do these tasks below if you want to upgrade or downgrade the software from a shared network folder:

- Configure the shared network path in the **Settings** > **Network** > **Shared Network** setting.
- Copy the software image files (`<sw-filename>.tar.bz2.sign`, `<sw-filename>.tar.bz2`), the manual image files(`<sw-filename>.manuals.r<version number>.tar.bz2.sign`, `<sw-filename>.manuals.r<version number>.tar.bz2`) and the u-boot file (`u-boot.imx`) to the root directory of the shared network folder.

Do these tasks below if you want to upgrade or downgrade the software using the USB flash drive:

- Copy the software image files (`<sw-filename>.tar.bz2.sign`, `<sw-filename>.tar.bz2`), the manual image files(`<sw-filename>.manuals.r<version number>.tar.bz2.sign`, `<sw-filename>.manuals.r<version number>.tar.bz2`) and the u-boot file (`u-boot.imx`) to the root directory of the USB flash drive.
- Enable **External USB Storage** in **Settings** > **System** > **Storage** setting.
- Enable USB ports in **Settings** > **Hardware** > **USB Port** and select **Save** to save the settings.
- Connect the USB flash drive to a USB port of the device.

Follow the steps below to upgrade or downgrade the software version.

1. Connect the device to AC power.
2. Open the **Service** screen.

3. Select **Software Upgrade**.

   The *Software Upgrade* screen opens.

4. Select **USB** or **Shared Folder**.

   The version of the currently installed software/manual and the available software/manual displays.

   > ✏️ **NOTE**
   > The manual version displays only when the currently installed software version is V1.01 or higher.

   If the available software version is:

   - Higher than the current installed version, the *Upgrade* option displays.
   - Lower than the current installed version, the *Downgrade* option displays.

5. Select the option:

   - **Upgrade**. The software upgrade begins.
   - **Downgrade**. A warning message displays indicating that patient data and device settings are erased from the device. The device is restored to factory defaults.

     Select **Yes** to proceed with software downgrade.

   The *Host Software Upgrade/Downgrade Progress* screen displays.

   - If the software upgrade/downgrade is unsuccessful, an error message displays. Troubleshoot the error. For more information, see 13.3 Software Upgrade Errors on page 218. Return to the **Software Upgrade** screen and restart the upgrade/downgrade procedure.
   - If the upgrade/downgrade is a success, a message displays and the device reboots.

6. On reboot, the system may need to perform additional software updates. If the writer software needs update, upgrade starts automatically.

   - If the upgrade is unsuccessful, an error message displays. Troubleshoot the error. For more information, see 13.3 Software Upgrade Errors on page 218. To retry the software upgrade, select **Reboot**.
   - If the upgrade is a success, a message displays and the device reboots.

7. If the software version upgrades from 1.00 to 1.01 or higher, the system performs additional manual upgrade automatically.

   - If the manual upgrade is unsuccessful, an error message displays. Troubleshoot the error. For more information, see 13.3 Software Upgrade Errors on page 218. To retry the manual upgrade, select **Retry**.
   - If the manual upgrade is a success, a message displays and the device reboots.

8. After all of the updates complete, the login screen displays if authentication is enabled on the device. Log into the device and verify the software version in the **About** dialog and the manual version on the **Software Upgrade** screen.

   > ✏️ **NOTE**
   > The manual version displays on the **Software Upgrade** screen only when the device detects the package in the USB flash drive or shared network folder.

6.2 Download and Install Manufacturer Software

If you replace the main board, do the procedure below to download and install the manufacturer software after replace the main board.

Before you start this procedure, do these tasks:

- Obtain the manufacturer software, then obtain production software which you want to upgrade to. If the software version to which you want to upgrade is lower than the software version previously running on the system, you will lose all configuration and patient data.

- Obtain the latest version of the manufacturing tool.

- Copy the manufacturing software image files (8755502-103SDD) and manufacturing tool (8755502-103DDW) to a laptop that runs on Microsoft Windows OS version 10 or higher. Unzip the manufacturing tool to your local drive. Copy the image file "anna-image-rel.tar.bz2" and u-boot file "u-boot.imx" to the folder "Profiles\Linux\OS Firmware\files\anna" under the manufacturing tool installation path.

- Obtain the USB Type A to Type A and Micro USB 2.0 OTG cable.

1. Power off the device. See .

2. Disconnect the device from AC/DC adapter.

3. Remove the battery from the device.

4. Insert the OTG Micro-USB terminal to the Micro-USB socket.
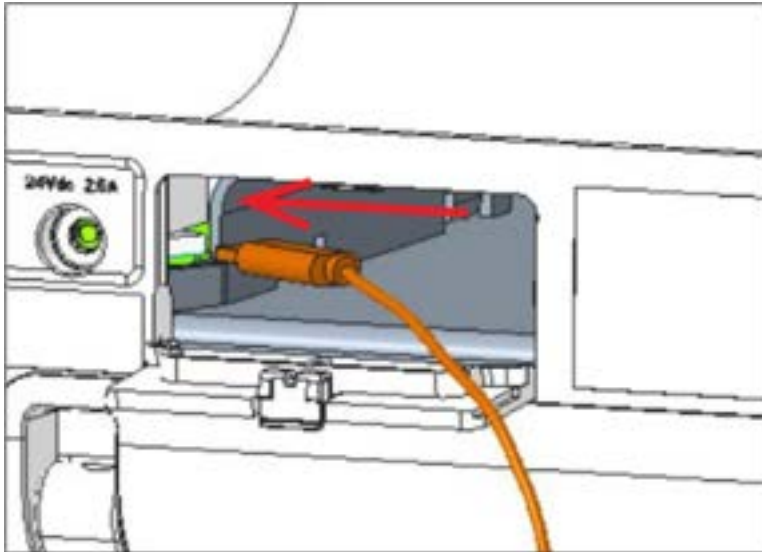
5. Insert the Type-A terminal to the PC-USB socket where the manufacturing tool is installed.

6. Connect the device to the AC/DC adapter.

7. Power on the device. See .

8. Click the **MAC5.vbs** icon on your laptop to launch the manufacturing tool. The **MAC5.vbs** file is in the manufacturing tool installation path.

    MAC5.vbs
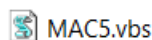
9. When the window displays as shown below, and **HID-compliant vendor defines device** displays, select **Start**.
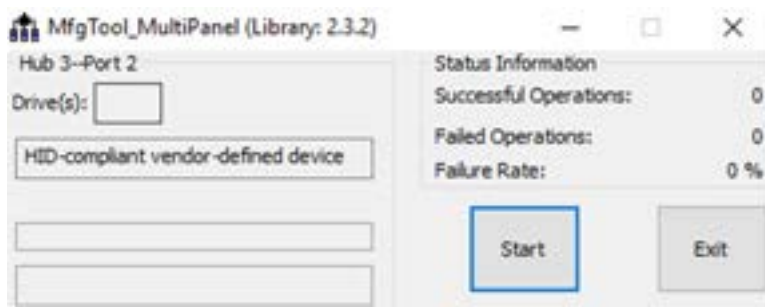
    The file transfer begins.

10. If the error message displays as shown below, select **Cancel** to continue.

    Once the file transfer is complete, the status in the tool updates to **Done**.
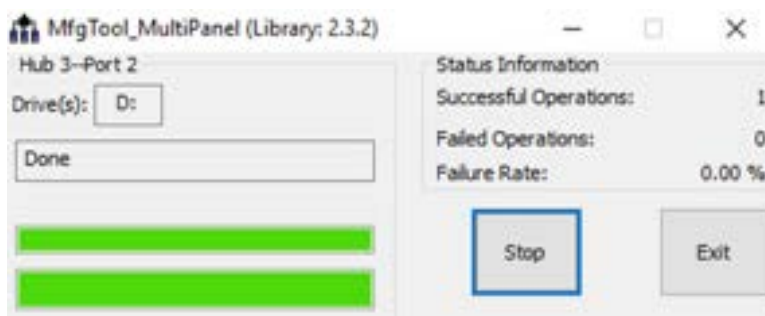
11. Select **Stop**.

12. Select **Exit**.

13. Power off the device. See .

14. Disconnect the device from AC/DC adapter.

15. Disconnect the OTG Micro-USB from the socket-USB of the device.
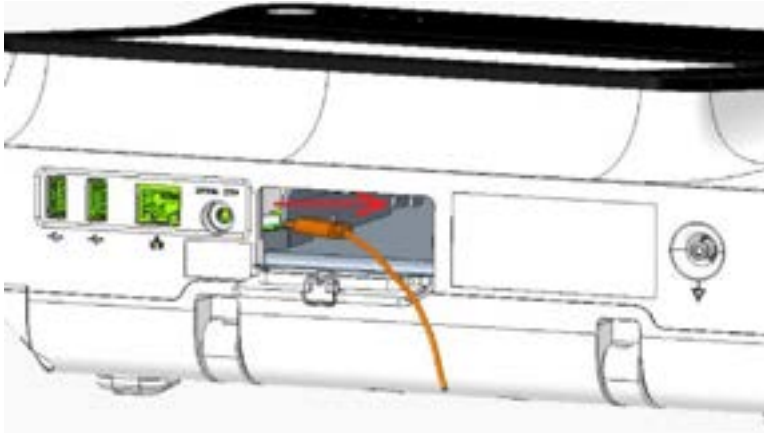
16. Restore the manufacturing configuration data (except serial number and options) from the USB flash drive or reset the manufacturing configuration data manually as follows:

16.1. On the **Settings** screen, configure these settings:

- **AC Filter**

- **Paper Size**

- **Date Format**

- **Language**

For more details, refer to chapter *Configure Settings* in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.

16.2. On the **Service** screen,

- Enter the **Serial Number** of the device, see 5.4 Configure Device Information on page 60.

- Configure the **LAN MAC Address** of the device, see 5.4 Configure Device Information on page 60.

- Configure the **Thermal Printer** settings, see 5.4 Configure Device Information on page 60.

- Enable all the purchased options on the **Option Manager** screen, see 5.7 Enable the Options on page 65.

- Configure the **Wireless Country of Operation** settings, see 5.14 Configure Wireless Country of Operation on page 73.

7 Diagnostics

7.1 Diagnostics Screen Overview

In the **Diagnostics** screen, a **Service** user or a user with **Service** privileges can perform various system diagnostics.
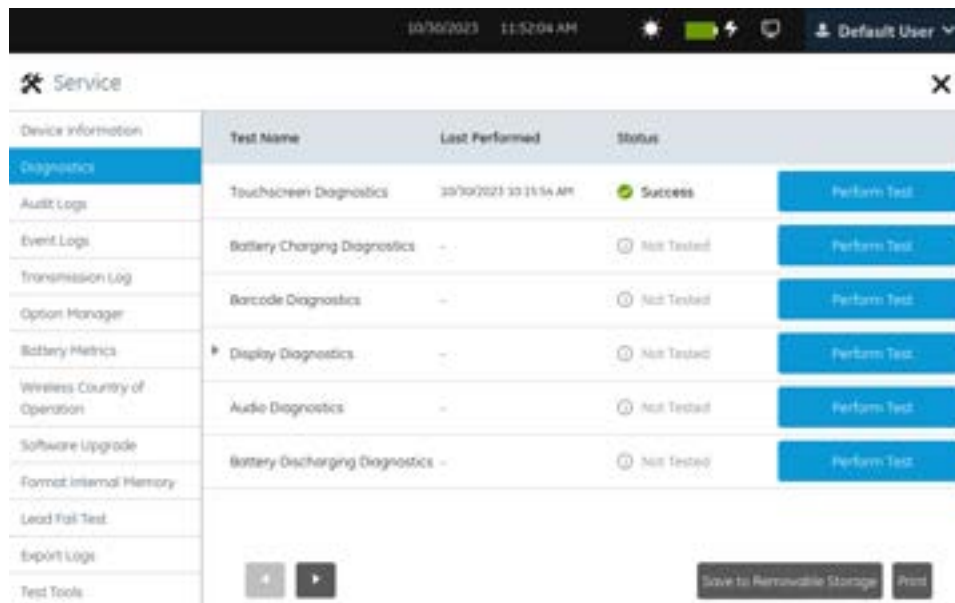
To switch between screens, select the arrows at the bottom of the screen.

If the diagnostics fails, refer to the relevant troubleshooting procedure.

7.2 Perform Touchscreen Diagnostics

This test helps to verify if the touch sensor is functioning properly.

1. Open the **Service** screen.
2. Select **Diagnostics**.

    The **Diagnostics** screen opens.
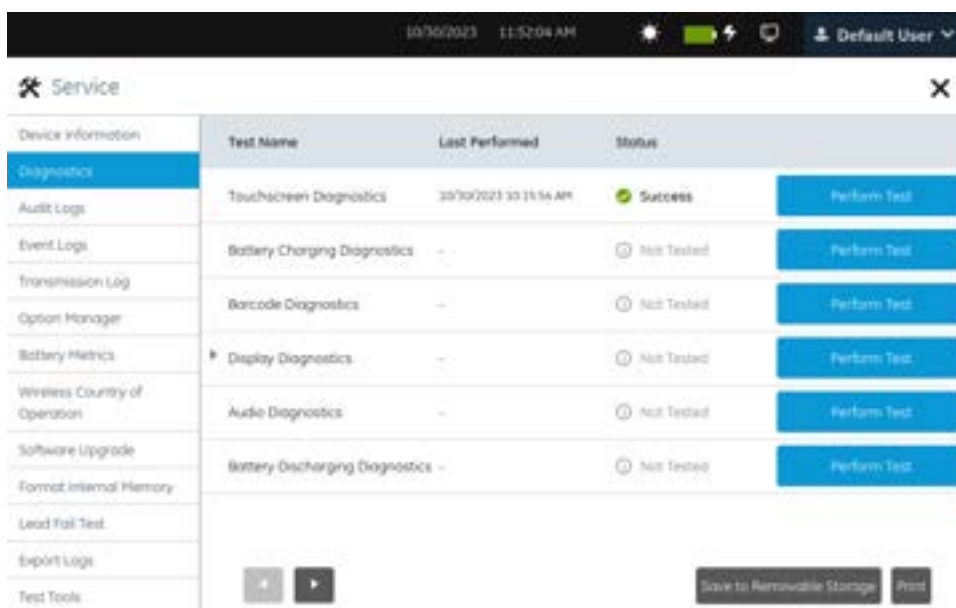
3. Select **Perform Test** next to **Touchscreen Diagnostics**.

    The **Touchscreen Diagnostics** screen opens.
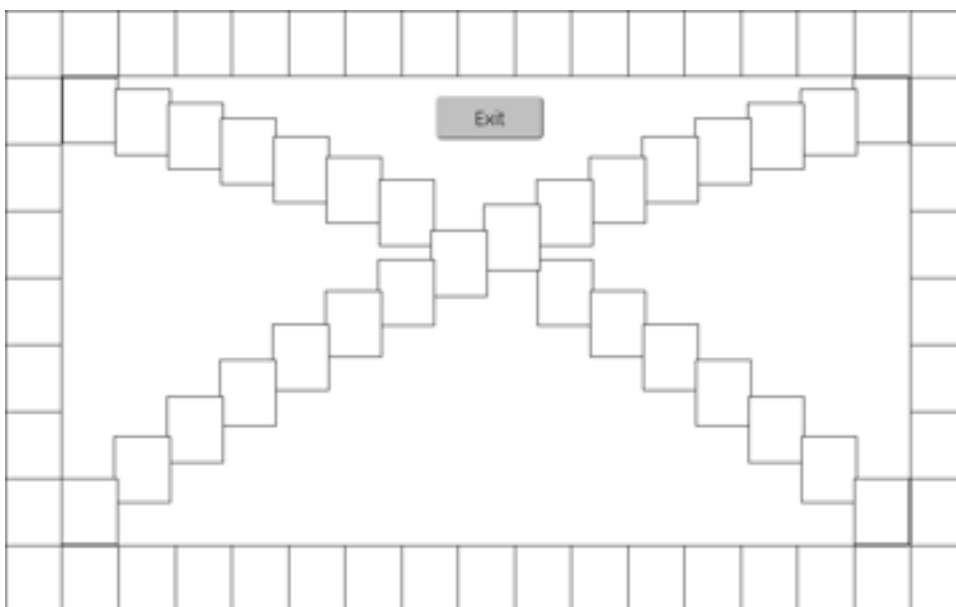
4. Tap the squared areas of the touchscreen to verify that the area is working correctly.

    - If the touch sensor in the area is working properly, the square turns blue.

    - If the touch sensor in the area is not working properly, the square remains white.

5. When the test is complete, select **Exit**.

    A message displays asking you to confirm whether the test passed.

6. Based on the test results, select one of the following:

    - If the test passed, select **Yes**. The test result displays in the **Diagnostics** screen as: `Success`.

    - If the test failed, select **No**. The test result displays in the **Diagnostics** screen as: `Failure`.

7. Close the screen.

The Acquisition screen displays.

7.3 Perform Battery Charging Diagnostics

This test determines whether the battery is charging properly.

- If the battery is not fully discharged but more than 3% and the device is in AC power mode, the following message displays when you start the test: `Disconnect from AC power and discharge the battery to less than 3%.` It takes approximately 3 hours to fully discharge the battery.

- If the battery is not fully discharged but more than 3% and the device is in Battery mode, the following message displays when you start the test: `Discharge the battery to less than 3% and start the test.`

The battery charge test can take several hours to complete.

1. Select the battery icon on the status bar to confirm that the battery is discharged to less than 3%.

2. Connect the device to AC power.

3. Open the **Service** screen.

4. Select **Diagnostics**.

   The **Diagnostics** screen opens.
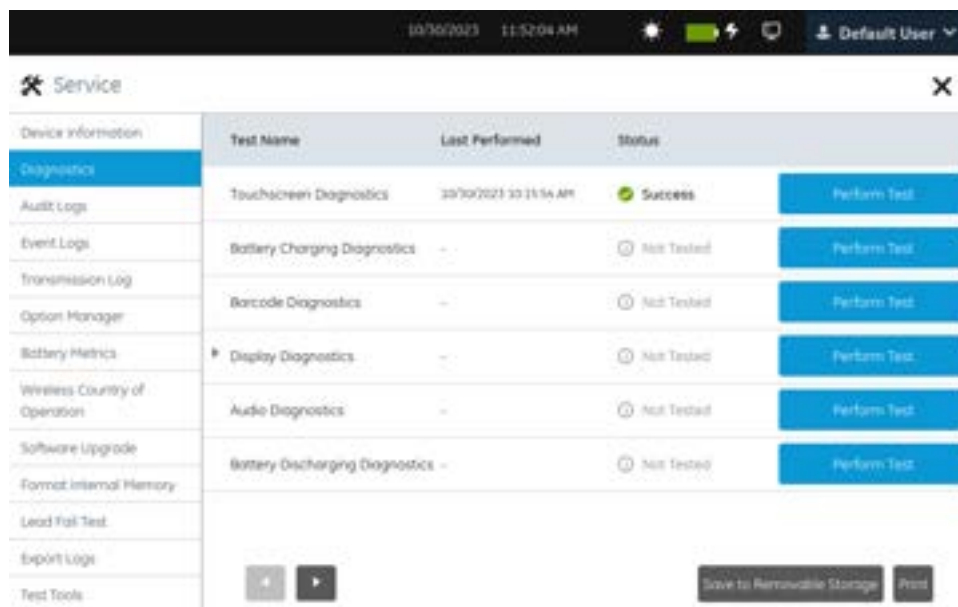
5. Select **Perform Test** next to **Battery Charging Diagnostics**.

   The **Battery Charging Diagnostics** screen opens.

   - Red indicates the battery charge is very low.

   - Orange indicates the battery charge is low.

   - Green indicates the battery charge is high.

   As the test executes, the following information displays and refreshes every minute.

   - Elapsed test time

   - Charge rate (mAH) of the battery

- Internal temperature of the battery

- Voltage for the battery

- Battery gauge

- Battery charge status

- Percentage of power available for the battery

The test continues until the battery is fully charged. The **Diagnostics** screen opens and automatically updates with the result: `Success` or `Failure`.

To manually stop the test before the battery is fully charged, select **Stop** at the bottom of the **Battery Charging Diagnostics** screen to return to the **Diagnostics** screen.

6. Based on the test results, select one of the following:

   - If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

   - If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

7. Close the screen.

   The Acquisition screen displays.

7.4 Perform Battery Discharging Diagnostics

This test determines if the battery is discharging properly. Make sure you charge the battery at 100% before you start this test.

- If the battery is not fully charged and the device is not in AC power mode, the following message displays when you start the test: `Connect to AC power and charge the battery up to 100% to start the test.` It takes approximately 4 hours to fully charge the battery.

- If the battery is not fully charged and the device is in AC power mode, the following message displays when you start the test: `Charge the battery to 100% and disconnect AC power to start the test.`

- If the battery is fully charged and the device is in AC power mode, the following message displays when you start the test: `Disconnect from AC power to start the test.`

The battery discharge test can take several hours to complete.

1. Select the battery icon on the status bar to confirm that the batteries are fully charged.

2. Disconnect the device from the AC power.

3. Open the **Service** screen.

4. Select **Diagnostics**.

   The **Diagnostics** screen opens.
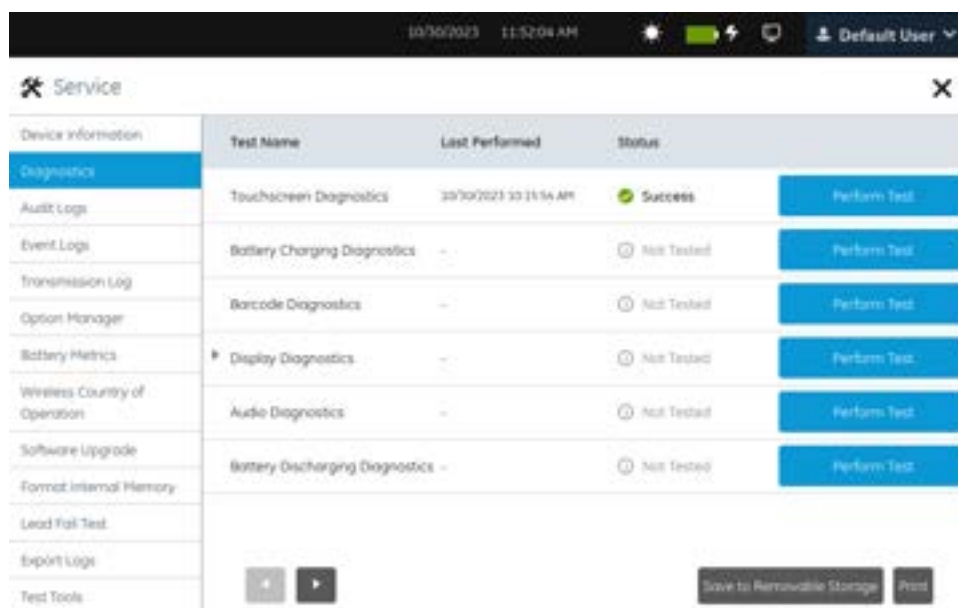
5. Select **Perform Test** next to **Battery Discharging Diagnostics**.

    The **Battery Discharging Diagnostics** screen opens.

    - Green indicates the battery charge is high.

    - Orange indicates the battery charge is low.

    - Red indicates the battery charge is very low.

    As the test executes, the information below displays and refreshes every minute.

    - Elapsed test time

    - Discharge rate (mAH) of the battery

    - Internal temperature of the battery

    - Voltage for the battery

    - Battery gauge

    - Battery charge status

    - Percentage of power available for the battery

    The test continues until the battery is fully discharged and the device shuts down. Proceed to Step 6.

    If you want to cancel the test before the battery is fully discharged, select **Stop** at the bottom of the **Battery Discharging Diagnostics** screen to return to the **Diagnostics** screen. Skip to step Step 10.

6. Connect the device to AC power.

7. Power on the device. See 4.1 Power On the ECG Device on page 37.

8. Open the **Service** screen.

9. Select **Diagnostics**.

    The **Diagnostics** screen opens.

    If the discharge rate is equal or greater than the minimum discharge rate, the test result displays in the **Diagnostics** screen as: Success.

If the discharge rate is less than the minimum discharge rate, the test result displays in the **Diagnostics** screen as: `Failure`.

10. Close the screen.

    The Acquisition screen displays.

7.5 Perform Quick Battery Charge and Discharge Test

1. Do the steps below to analyze the battery charge state:

   1.1. Remove the battery from the system.

   1.2. Press the TEST button on the battery pack to check the percentage of charge.

   The number of charge level indicator LEDs that illuminate indicate the approximate charge remaining in the battery pack.

   - Four LEDs indicate 75%-100% of full charge capacity (WHr) of the pack

   - Three LEDs indicate 50%-74.9% of full charge capacity (WHr) of the pack

   - Two LEDs indicate 25%-49.9% of full charge capacity (WHr) of the pack

   - One LED indicates 10%-24.9% of full charge capacity (WHr) of the pack

   If the LEDs do not illuminate, the battery pack is fully discharged or faulty. Re-test or recharge the battery pack with the external battery charger. See the DCAR *Supplies and Accessory Guide* for the part number of the external battery charger.

2. Do the steps below for the quick battery charge test:

   2.1. Insert the battery into the battery compartment of the device.

   2.2. From the battery icon on the status bar, make sure that the percent of battery charge is between 5% and 80%.

   2.3. Connect the device to AC power.

   2.4. Open the **Service** screen.

   2.5. Select **Battery Metrics** and record the initial **Percentage of Charge Remaining** and **Battery current** values.

   - A Red battery icon indicates the battery charge is very low.

   - An Orange battery icon indicates the battery charge is low.

   - A Green battery icon indicates the battery charge is high.

   Observe the values for the next 5 minutes. As the test executes, the battery metrics refresh every minute on the screen.

   - If the **Percentage of Charge Remaining** is greater than 2% from the initial value, and **Battery current** is between 100 to 2200 mA, the test result is **PASS** and the battery is in good condition.

   - If the **Percentage of Charge Remaining** is unchanged from the initial value for up to 5 minutes of observation, the test result is **FAIL**. The battery pack is faulty or discharged. Recharge the battery pack with the external battery charger. See the DCAR *Supplies and Accessory Guide* for the part number of the external battery charger.

3. Do the steps below for the quick battery discharge test:

3.1. Insert the battery into the battery compartment of the device.

3.2. From the battery icon on the status bar, make sure that the percent of battery charge is above 20%.

3.3. Disconnect the device to AC power.

3.4. Open the Service screen.

3.5. Select **Battery Metrics** and record the initial **Battery current** value.

Observe the values for the next 5 minutes. As the test executes, the battery metrics are refreshed every minute on the screen.

- A Red battery icon indicates the battery charge is very low.

- An Orange battery icon indicates the battery charge is low.

- A Green battery icon indicates the battery charge is high.

- If the **Battery current** value reads the charge current in negative, the battery is discharging. The current value of **Battery current** must not vary ± 10% from the initial recorded **Battery current** value within 5 minutes of observation. If this condition is met, the battery is good to use.

- If this condition is not met, the battery pack is faulty or discharged. Recondition the battery pack with the external battery charger. See *Supplies and Accessory Guide* (2102946-001) for more information on the part number of external battery charger.

Part Number	Part Description
2083292-001	BATTERY CHARGER WITH USA/CANADA POWER CORD
2083292-002	BATTERY CHARGER WITH AUSTRALIA POWER CORD
2083292-003	BATTERY CHARGER WITH BRITISH POWER CORD
2083292-004	BATTERY CHARGER WITH CONT EUROPE POWER CORD
2083292-006	BATTERY CHARGER WITH ISRAEL POWER CORD
2083292-007	BATTERY CHARGER WITH ITALY POWER CORD
2083292-008	BATTERY CHARGER WITH JAPAN POWER CORD
2083292-009	BATTERY CHARGER WITH SWISS POWER CORD
2083292-010	BATTERY CHARGER WITH DENMARK POWER CORD
2083292-013	BATTERY CHARGER WITH CHINA POWER CORD
2083292-015	BATTERY CHARGER WITH INDIA POWER CORD

4. Close the screen.

The Acquisition screen opens.

7.6 Perform Barcode Reader Diagnostics

The device is compatible with barcode readers that support the following symbologies for all supported languages:

- Code-128

- PDF417

- Code 39

- Interleaved Code 2 of 5
- Data Matrix symbology for characters A-Z (upper case), a-z (lower case), and 0-9

If you purchase the external barcode reader separately, perform these steps for the first time to make sure it is compatible with the device:

1. Connect the barcode reader to the device.

2. Use the external barcode reader to scan the barcode:

External barcode reader	Barcode
Jadak barcode reader	 PAP131.
Zebra barcode reader **NOTE** Zebra barcode reader is compatible with software version V1.00 SP03 and higher.	Scan both the barcode codes to configure Zebra barcode reader. To change the interface to HID-POS. To enable Code 39 Full ASCII.
Honeywell barcode reader **NOTE** Honeywell barcode reader is compatible with software version V1.01 and higher.	Scan both the barcode codes to configure Zebra barcode reader. To change the interface to HID-POS. PAP131. To enable Code 39 Full ASCII. C39ASC1.

The external barcode reader is in the correct mode of operation with the device. Perform the barcode diagnostic test to determine if the barcode reader operates correctly.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.
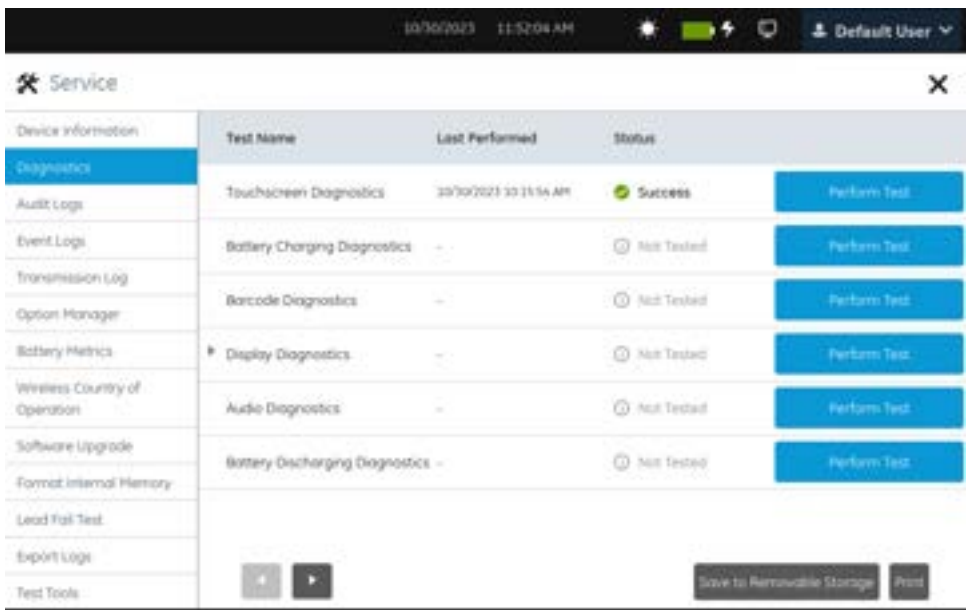
3. Select **Perform Test** next to **Barcode Diagnostics**.

   The **Barcode Diagnostics** screen opens.

4. Scan the barcode on the screen using the barcode reader.

   If the barcode reader scans the barcode successfully, the scanned information shows on the screen as text, and the test result displays as `Success`.

   If the barcode reader does not scan the barcode successfully, the information does not show on the screen, and the test result displays as `Failure`.

5. When the test is complete, close the screen.

   The **Diagnostics** screen opens.

   The test result for barcode diagnostics displays on the screen as `Success` or `Failure`.

6. Close the screen.

   The Acquisition screen displays.

7.7 Perform Display Diagnostics

This test confirms if the screen displays all pixels correctly. It requires you to verify that you are able to see the screen in the five colors below:

- Red
- Blue
- Green
- Black
- White

The color must cover the entire screen.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.
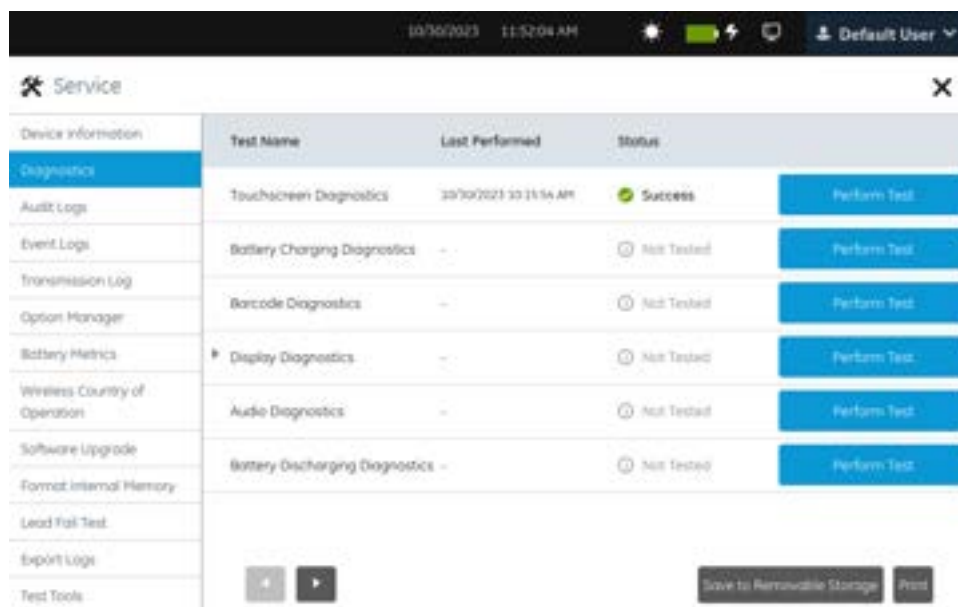
3. Select **Perform Test** next to **Display Diagnostics**.

   The red screen opens.

4. Tap the screen.

   A message displays asking you to confirm if you can see the screen in red.

5. Based on the test result, select **Yes** or **No**.

   The blue screen opens.

6. Tap the screen.

   A message displays asking you to confirm if you can see the screen in blue.

7. Based on the test result, select **Yes** or **No**.

   The green screen opens.

8. Tap the screen.

   A message displays asking you to confirm if you can see the screen in green.

9. Based on the test result, select **Yes** or **No**.

   The black screen opens.

10. Tap the screen.

    A message displays asking you to confirm if you can see the screen in black.

11. Based on the test result, select **Yes** or **No**.

    The white screen opens.

12. Tap the screen.

    A message displays asking you to confirm if you can see the screen in white.

13. Based on the test result, select **Yes** or **No**.

    The **Display Diagnostics** screen closes. The **Diagnostics** screen updates with the test result: `Success` or `Failure`.

14. Close the screen.

    The Acquisition screen displays.

7.8 Perform Audio Diagnostics

This test determines if the audio is working properly.

1. Open the **Service** screen.

2. Select **Perform Test** next to **Audio Diagnostics**.

   The **Audio Diagnostics** screen opens.

3. Select each of the tones to test.

   The device emits sound of the selected tone.

   A message displays asking if you can hear the tone.

4. Based on your test results, select one of the following for each tone:

   • If you select **Yes**, the test result corresponding to the selected tone displays as: `Success`.

   • If you select **No**, the test result corresponding to the selected tone displays as: `Failure`.

5. When the test is complete, close the screen.

The **Diagnostics** screen opens.

- If the test passed, the test result displays in the **Diagnostics** screen as: `Success.`
- If the test failed, the test result displays in the **Diagnostics** screen as: `Failure.`

6. Close the screen.

The Acquisition screen displays.

7.9 Perform Writer Diagnostics

This test determines if the writer is printing correctly. It provides several test options to allow you to confirm the writer can correctly print at a variety of different settings.

1. Open the **Service** screen.

2. Select **Diagnostics**.

The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

The second page of the **Diagnostics** screen displays.
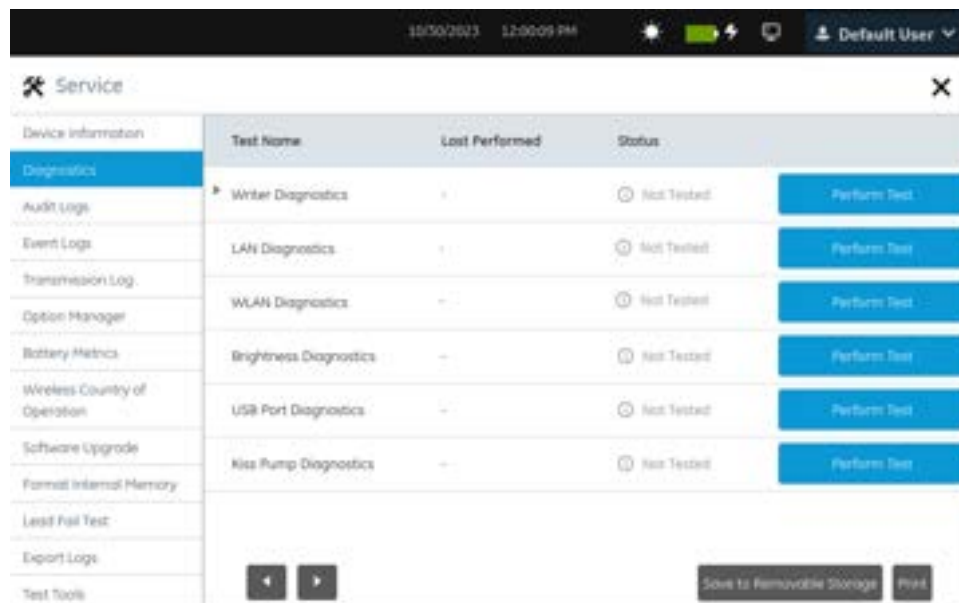
4. Select **Perform Test** next to **Writer Diagnostics**.

The **Writer Diagnostics** screen opens.

5. Select the relevant button for the writer test you want to run. The table below describes the types of writer tests.

Table 7-1 Writer Diagnostics Tests

Select a Writer Diagnostics Test Button	Expected Test Result
50mm/s Multi-page	Prints 5 pages at 50 mm/sec. Printing at each page begins with a mark. • Dimensions: Height: 210 mm; Width: 250 mm • Header: Writer Diagnostics Page 1, 50 mm/sec • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed
25mm/s & 5mm/s Multi-page	Prints page 1 test pattern at 25 mm/sec. Printing begins with a mark. • Dimensions: Height: 210 mm; Width: 250 mm • Header: Writer Diagnostics Page 1, 25 mm/sec • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 2 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm Prints page 3 test pattern at 5 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 5 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 4 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm

Table 7-1 Writer Diagnostics Tests (Table continued)

Select a Writer Diagnostics Test Button	Expected Test Result
50mm/s, 25mm/s & 5mm/s Multi-page	Prints page 1 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 2 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm Prints 5 pages at 50 mm/sec. Printing at each page begins with a mark. • Header: Writer Diagnostics Page 1, 50 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 8 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 9 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm

Table 7-1 Writer Diagnostics Tests (Table continued)

Select a Writer Diagnostics Test Button	Expected Test Result
50mm/s, 25mm/s & 5mm/s Multi-page (continued..)	Prints page 10 test pattern at 5 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 5 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm • Straight line of width 5 mm, gap of 1 mm text with count of 5 mm straight lines printed Prints page 11 test pattern at 25 mm/sec. Printing begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm
50mm/s Test Pattern	Prints at 50 mm/sec. Printing at each page begins with a mark. • Header: Writer Diagnostics Page 1, 50 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm
25mm/s Test Pattern	Prints at 25 mm/sec. Printing at each page begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm
5mm/s Test Pattern	Prints at 5 mm/sec. Printing at each page begins with a mark. • Header: Writer Diagnostics Page 1, 5 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Straight line with width 250 mm • Scale that prints 1 mm grid on top • Scale that prints 1 mm grid on bottom • Line Cross that covers page diagonals (210 mm x 250 mm) • Triangular waveform with width 5 mm and height 12 mm • Triangular waveform with width 50 mm and height 210 mm

Table 7-1 Writer Diagnostics Tests (Table continued)

Select a Writer Diagnostics Test Button	Expected Test Result
Roller Test	Prints at 25 mm/sec. Printing at each page begins with a mark. • Header: Writer Diagnostics Page 1, 25 mm/sec • Dimensions: Height: 210 mm; Width: 250 mm • Lines starts with x, y and ends at x+2, y+210 mm. These lines are repeated for 250 mm. The x starting position is 13 mm. The gap between the lines is 1 mm.
1000 lines/second Test	Test pattern 1: Prints 1000 lines per second at 50 mm/sec. • Header: Writer Diagnostic Pattern 1000 Lines per second • Footer: Writer Diagnostic Pattern 50 mm per second • Straight line with width 1000 lines per second • Scale that prints 2 mm grid on top (1000 lines per second) • Scale that prints 2 mm grid on bottom (1000 lines per second) • Triangular waveform with width 10 mm and height 12 mm Test pattern 2: Prints 1000 lines per second at 25 mm/sec. • Header: Writer Diagnostic Pattern 1000 Lines per second • Footer: Writer Diagnostic Pattern 25 mm per second • Straight line with width 1000 lines per second • Scale that prints 1 mm grid on top (1000 lines per second) • Scale that prints 1 mm grid on bottom (1000 lines per second) • Triangular waveform with width 5 mm and height 12 mm Test pattern 3: Roller test at 25 mm/sec. • Header: Writer Diagnostic Pattern 1000 Lines per second Roller Diagnostic Pattern • Footer: Writer Diagnostic Pattern 25 mm per second

A message displays next to each test pattern asking you to confirm whether the pattern is printing.

- If you select **Yes**, the test result displays on the **Writer Diagnostics** screen as: `Success`.
- If you select **No**, the test result displays on the **Writer Diagnostics** screen as: `Failure`.

6. Perform the writer door sensor test while performing any of the writer diagnostics tests as per the Table 7-1 Writer Diagnostics Tests on page 97, **Open the Printer door**.

   Observe below error messages.

   - If the printer door is open and if the error message **Printer error. Door is open.** appears on the diagnostic screen, the test is passed.
   - If the printer door is open and if the error message **Printer error. Door is open.** does not appear on the diagnostic screen, the test is failed.

7. **Close the Printer door** to close the error message from the **Diagnostics** screen.

8. When the test is complete, close the screen.

   The **Diagnostics** screen opens.

   A message displays asking you to confirm whether the test passed.

9. Based on the test results, select one of the following:

   - If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

- If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

10. Close the screen.

    The Acquisition screen displays.

7.10 Perform LAN Diagnostics

This test determines if the LAN is working properly. Before proceeding, verify below items:

- The LAN cable is plugged in properly.
- Wired Network Connectivity is enabled on the device.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

   The second page of the **Diagnostics** screen displays.
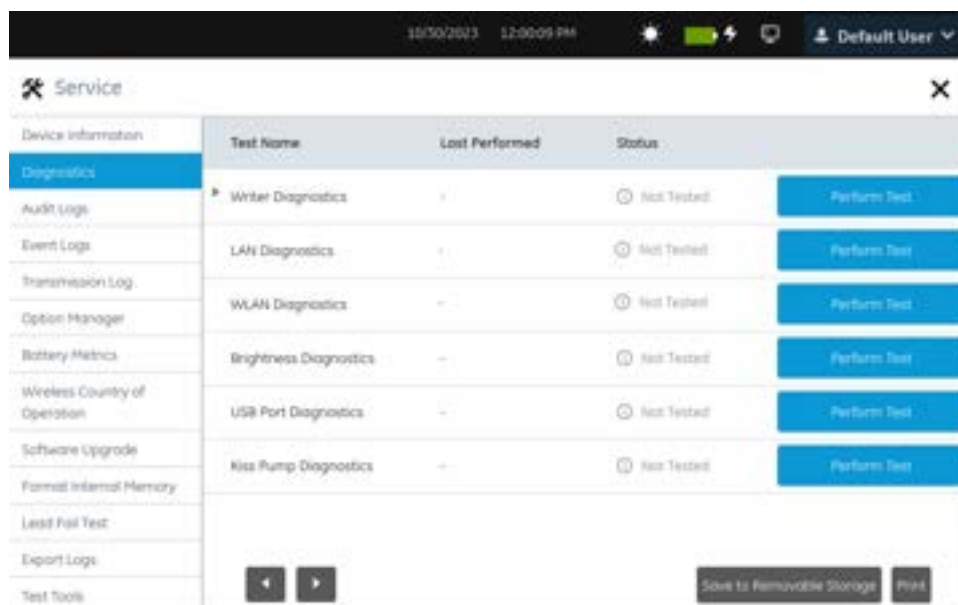
4. Select **Perform Test** next to **LAN Diagnostics**.

   The **LAN Diagnostics** screen opens.

5. Select **Start LAN Diagnostics** to initiate the LAN Diagnostics test.

   The LAN diagnostics progresses in the order below:

   - Hardware
   - Software
   - IP Configuration

   The test result displays on the screen as `Success` or `Failure`.

   In the case of failure, the failure indication displays.

Table 7-2 List of Failures

Area of Failure	Type of Failure
Hardware Failure	• Adapter not available
Software Failure	• LAN interface is disabled • LAN Interface is not found
IP Configuration Failure	• Failed to retrieve IP configuration • Unable to retrieve network configuration • Invalid IP configuration • Failed to retrieve IP address • Failed to add IP rule

6. After the Hardware, Software, and IP Configuration tests are completed, enter the IP address of a remote device in the **Enter IP Address** and select **Ping** to perform the LAN Ping test.

> **NOTE**
> • The IP address can be a valid IPv4 address or DNS.
> • The DNS should be a Fully Qualified Domain Name (FQDN). Example: mydevice.mydomain.myorg.com.

The connection to the remote device is established.

In the case of a failure, this message displays: `ping test failed`.

7. When the test is complete, close the screen.

A message displays asking you to confirm whether the test passed.

8. Based on the test results, select one of the following:

• If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

• If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

9. Close the screen.

The Acquisition screen displays.

7.11 Perform WLAN Diagnostics

This test determines if the WLAN is working properly. Before proceeding, make sure you enable the **WRLS - Global Wireless** option in the **Option Manager**, and you configure the wireless network in the **Settings** screen.

1. Open the **Service** screen.

2. Select **Diagnostics**.

The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

The second page of the **Diagnostics** screen displays.
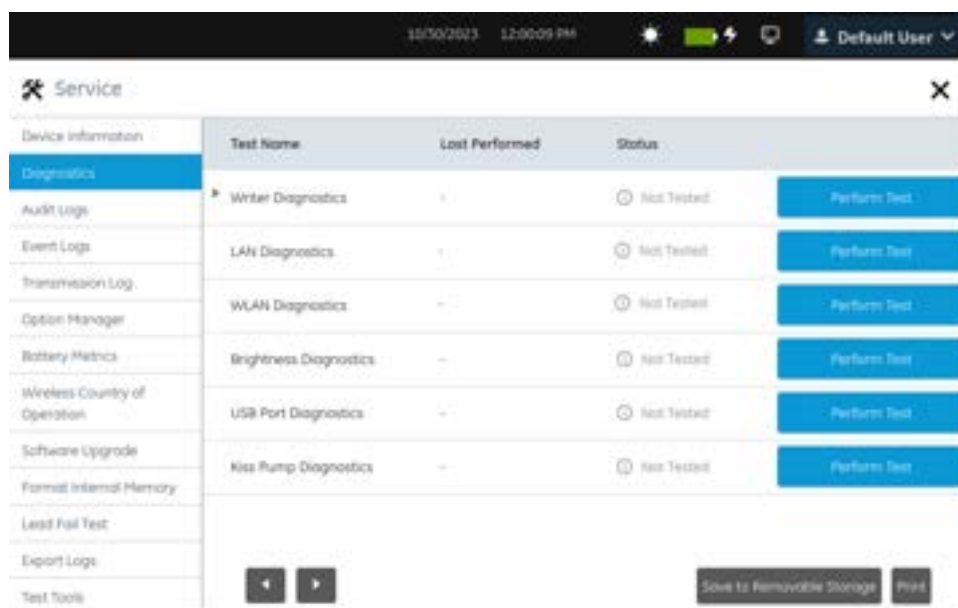
4. Select **Perform Test** next to **WLAN Diagnostics**.

    The **WLAN Diagnostics** screen opens.

5. Select **Start WLAN Diagnostics** to initiate the WLAN Diagnostics test.

    The WLAN diagnostics progresses in the order below:

    -   Hardware
    -   Software
    -   Connectivity
    -   IP Configuration

    The test result displays on the screen as `Success` or `Failure`.

    In the case of failure, the failure indication displays.

Table 7-3 List of Failures

Area of Failure	Type of Failure
Hardware Failure **NOTE** The hardware failure test will not be available in manufacturing (MFG) build.	• WLAN hardware is not available
Software Failure	• Wireless drivers are not loaded • WLAN interface is not enabled • WLAN Interface is not found
Connectivity Failure	• Supplicant ping failed • Obtaining connection status from Supplicant failed • Connection to the wireless network failed • Retrieving credentials from configuration failed • SSID is not visible • No valid SSID is configured
IP Configuration Failure	• Failed to retrieve IP configuration • Unable to retrieve network configuration • Invalid IP configuration • Failed to retrieve IP address

6. After the Hardware, Software, Connectivity, and IP Configuration tests are completed, enter the IP address of a remote device in the **Enter IP Address** and select **Ping** to perform the WLAN Ping test.

NOTE
- The IP address can be a valid IPv4 address or DNS.
- The DNS should be a Fully Qualified Domain Name (FQDN). For example, mydevice.mydomain.myorg.com.

The connection to the remote device is established.

In the case of failure, an error message displays.

7. Enable or disable **Verbose Logging**.
- If the slide bar is blue, verbose logging is enabled and `Verbose Logging Enabled` text displays. The wireless supplicant verbose logs are created and stored in memory for future reference.

- If the slide bar is greyed out, verbose logging is disabled and `Verbose Logging Disabled` text displays. No new logs are created, but you can view the logs from the previous six months.

8. Select **View Supplicant logs** to view the wireless supplicant verbose logs.

   The **Supplicant Logs** screen opens.

   You can perform the following actions related to supplicant logs:

   - Select a log to view the log details in the right side of the screen.

   - Perform the following steps to delete a log.

     8.2.1.   Select a log that you want to delete.

     8.2.2.   Select the **Delete** icon to delete the log.

              A message displays asking you to confirm whether you want to remove the selected log.

     8.2.3.   Select **Yes** to delete the log.

              The log is deleted.

   - Perform the steps below to clear all the logs.

     8.3.1.   Select **Clear All Logs**.

              A message displays asking you to confirm whether you want to remove all logs.

     8.3.2.   Select **Yes** to clear all the logs.

              The logs are cleared.

9. When the test is complete, close the screen.

   The **Diagnostics** screen opens.

   A message displays asking you to confirm whether the test passed.

10. Based on the test results, select one of the following:

    - If the test passed, select **Yes**. The test result displays in the **Diagnostics** screen as: `Success`.

    - If the test failed, select **No**. The test result displays in the **Diagnostics** screen as: `Failure`.

11. Close the screen.

    The Acquisition screen displays.

7.12 Perform Brightness Diagnostics

This test determines if the display's brightness control is working properly.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

   The second page of the **Diagnostics** screen displays.
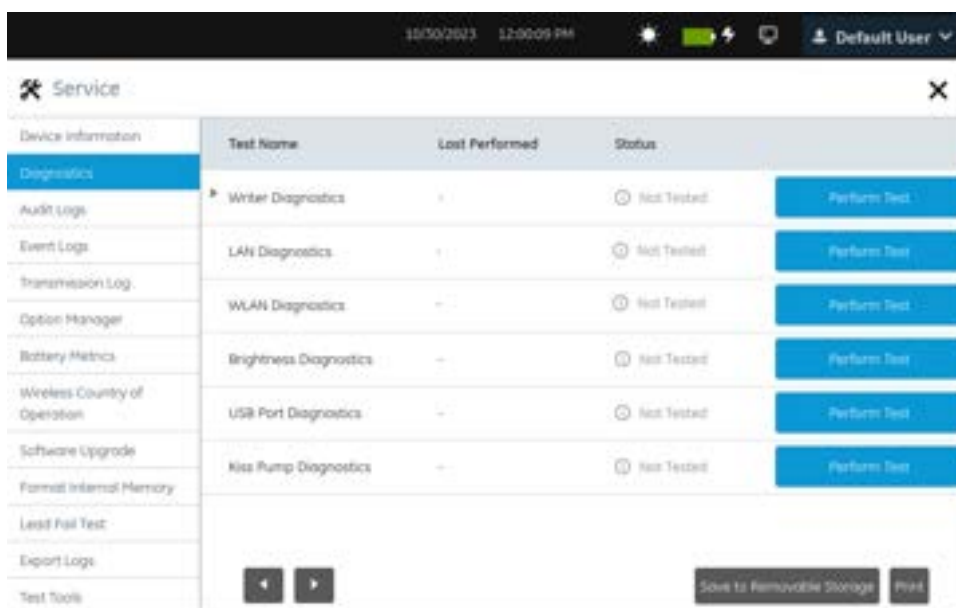
4. Select **Perform Test** next to **Brightness Diagnostics**.

    The **Brightness Diagnostics** screen opens.

5. Slide the brightness control on the screen from minimum to maximum brightness levels and observe the change in the backlight intensity of the display.

6. When the test is complete, close the screen.

    The **Diagnostics** screen opens.

    A message displays asking you to confirm whether the test passed.

7. Based on the test results, select one of the following:

    • If the test passed, select **Yes**. The test result displays in the **Diagnostics** screen as: `Success`.

    • If the test failed, select **No**. The test result displays in the **Diagnostics** screen as: `Failure`.

    The screen brightness reverts back to the brightness that was configured for the Battery or AC power mode prior to starting the test.

8. Close the screen.

    The Acquisition screen displays.

7.13 Perform USB Port Diagnostics

This test determines if the USB ports are functioning properly. Before proceeding, make sure you Enable External USB Storage in **Settings** > **System** > **Storage** and enable all the USB ports in **Settings** > **Hardware** > **USB Port**. To conduct this test, you will need a USB flash drive.

1. Open the **Service** screen.

2. Select **Diagnostics**.

    The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

    The second page of the **Diagnostics** screen displays.
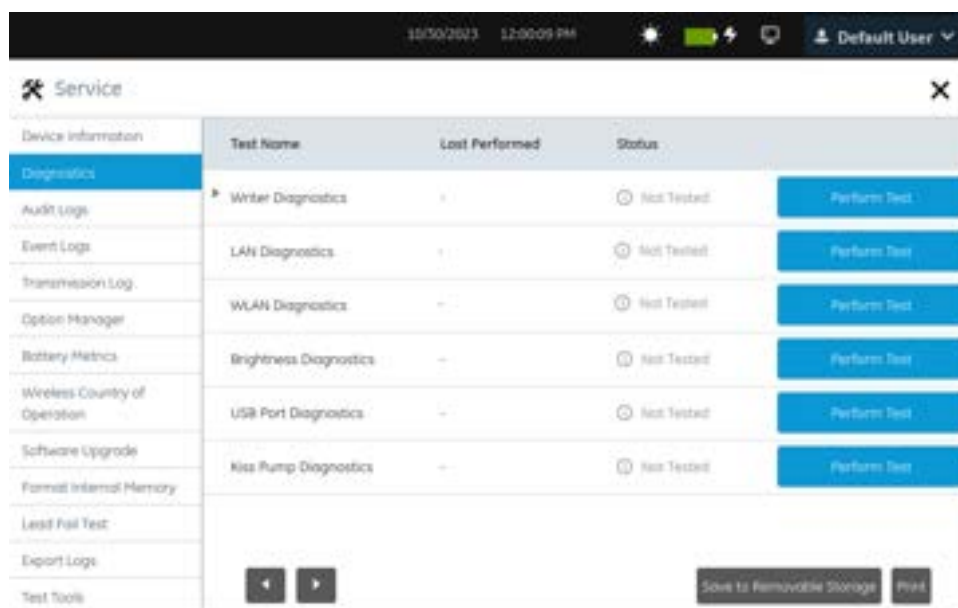
4. Select **Perform Test** next to **USB Port Diagnostics**.

    The **USB Port Diagnostics** screen opens.

5. Test the two USB ports by inserting a USB flash drive in each slot, one at a time.

    • If a USB port detects a USB flash drive in its slot, the respective USB port icon changes from grey to blue and its test result displays on the screen as `Success`.

    • If a USB port does not detect a USB flash drive in its slot, the USB port icon remains grey.

6. When the test is complete, close the screen.

    The **Diagnostics** screen opens.

    A message displays asking you to confirm whether the test passed.

7. Based on the test results, select one of the following:

    • If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

    • If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

8. Close the screen.

    The Acquisition screen displays.

7.14 Perform KISS Pump Diagnostics

This test determines if the KISS pump is working properly. Before proceeding, make sure you connect the KISS pump to the device.

1. Open the **Service** screen.

2. Select **Diagnostics**.

    The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

    The second page of the **Diagnostics** screen displays.
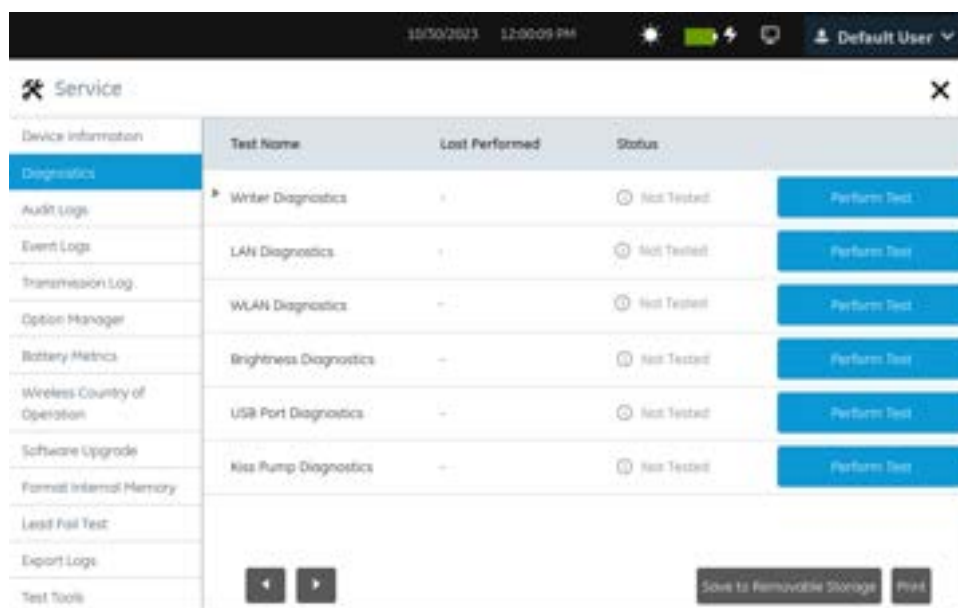
4. Select **Perform Test** next to **KISS Pump Diagnostics**.

    The **KISS Pump Diagnostics** screen opens.

5. Turn the KISS Pump diagnostics option on or off.

    > **NOTE**
    > Do not disconnect the KISS pump when testing is in progress.

    - If the option is on, power supply to the KISS pump is on. Test the KISS system as per the procedure *Testing the KISS System* in the *KISS™+ EEAS/KISS™+ Multilead Electrode Application System Operator's Manual (5858128-01)*.

    - If the option is off, power supply to the KISS pump is off.

6. When the test is complete, close the screen.

    The **Diagnostics** screen opens.

    A message displays asking you to confirm whether the test passed.

7. Based on the test results, select one of the following:

    - If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

    - If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

8. Close the screen.

    The Acquisition screen displays.

7.15 Perform Keyboard LED Diagnostics

This test determines if the Keyboard LEDs are working properly.

1. Open the **Service** screen.

2. Select **Diagnostics**.

    The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

The third page of the **Diagnostics** screen displays.
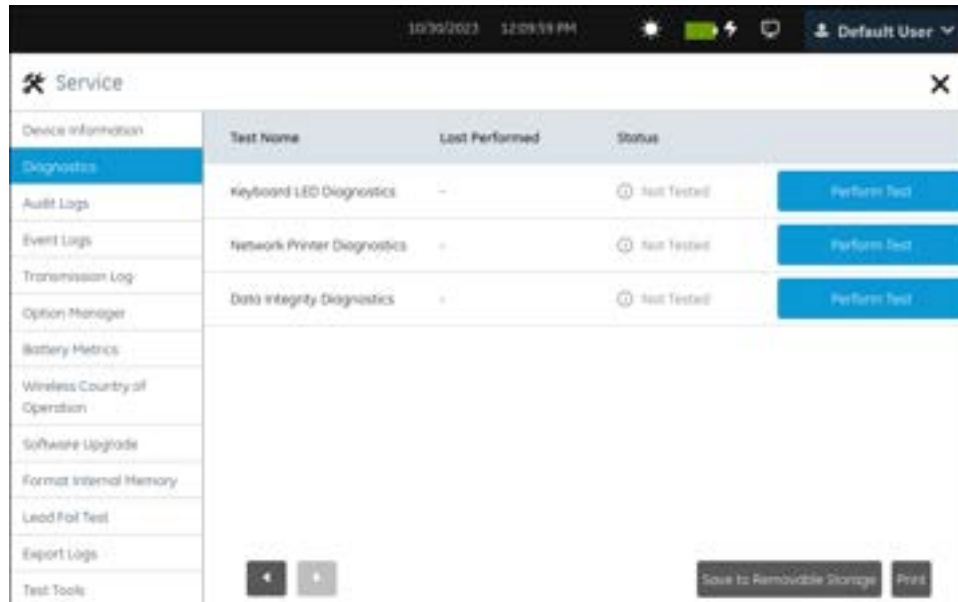
4.   Select **Perform Test** next to **Keyboard LED Diagnostics**.

The **Keyboard LED Diagnostics** screen opens.

5.   To test the battery LED, perform the following:

5.1. Connect the device to AC power.

5.2. Insert a battery that is not fully charged into the device, and verify the battery LED on the keyboard is on.

5.3. Insert a fully charged battery into the device, and verify that the battery LED on the keyboard is off.

5.4. Remove the battery from the device, and verify that the battery LED on the keyboard is off.

6.   To test the AC adapter LED, perform the following:

6.1. Insert the battery.

6.2. Connect the device to AC power, and verify that the AC adapter LED on the keyboard is on.

6.3. Disconnect the device from AC power, and verify that the AC adapter LED on the keyboard is off.

7.   To test the Power LED, verify it is on.

By default, the Power LED on the keyboard is on. If it is not glowing, it has failed.

8.   When the test is complete, close the screen.

The **Diagnostics** screen opens.

A message displays asking you to confirm whether the test passed.

9.   Based on the test results, select one of the following:

  •   If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

  •   If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

10.   Close the screen.

The Acquisition screen displays.

7.16 Perform Network Printer Diagnostics

This test determines if the network printer is working properly.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.

3. Select the right arrow at the bottom of the screen.

   The third page of the **Diagnostics** screen displays.
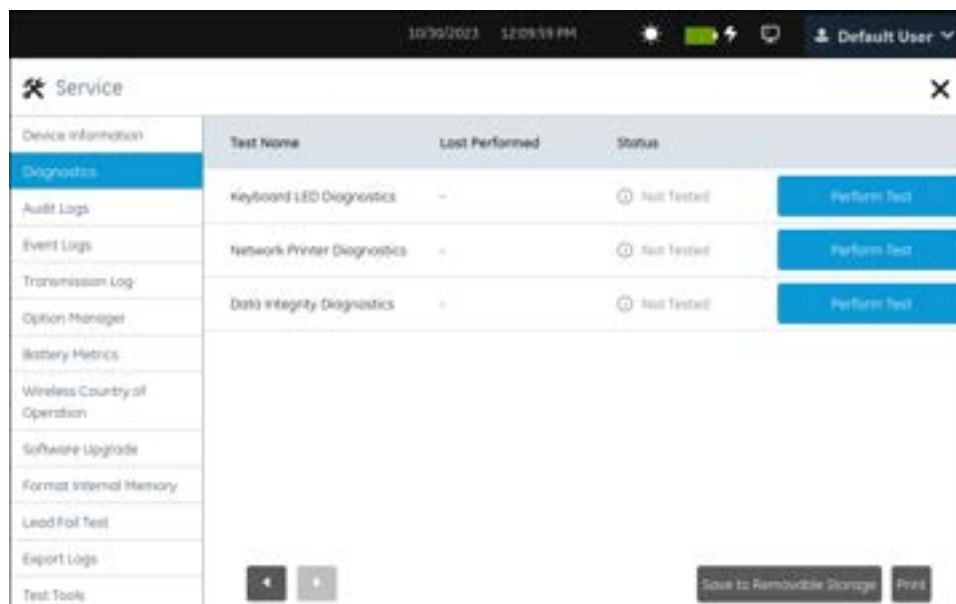
4. Select **Perform Test** next to **Network Printer Diagnostics**.

   The **Network Printer Diagnostics** screen opens.

5. Enter the URL of the configured network printer.

6. Select **Start Network Printer Diagnostics** to initiate the test.

   The Network Printer Diagnostics progresses in the following order:

   • Avahi Daemon

   • CUPS Daemon

   • Printer Available

   • Print Test Page

   The test result displays on the screen as `Success` or `Failure`.

   In the case of failure, the failure indication displays.

Table 7-4 List of Failures

Area of Failure	Type of Failure
Avahi Daemon Failure	• The process crashed
CUPS Daemon Failure	• The process crashed
Printer Available Failure	• Device is not connected to the network • Network printer is not connected to the network • Network printer does not support IPP protocol • Firewall blocks the IPP port • Device and Network Printer are not connected to the same network • Toner empty/Low toner
Print Test Page Failure	• No paper in the paper tray • Paper jam occurs • Network printer needs user authentication • Toner empty/Low toner

7. After all the tests are completed, close the screen.

   The **Diagnostics** screen opens.

   A message displays asking you to confirm whether the test passed.

8. Based on the test results, select one of the following:

   • If the test passed, select **Yes**. The test result displays on the **Diagnostics** screen as: `Success`.

   • If the test failed, select **No**. The test result displays on the **Diagnostics** screen as: `Failure`.

9. Close the screen.

   The Acquisition screen displays.

7.17 Perform Data Integrity Diagnostics

This test checks for database if it is correct or corrupt.

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.

3. Select **Perform Test** next to **Data Integrity Diagnostics**.

    The **Data Integrity Diagnostics** screen opens.

4. Select **Start Test**.

    - ![note icon] **NOTE**
      The **Start Test** button continue to be active after you complete the test.

    If the test passed, the **Data integrity test passed** message displays.

- If the test failed, the **Data corruption detected** message displays.
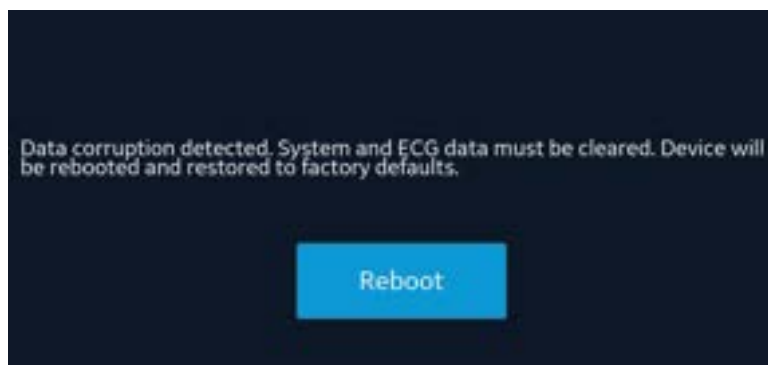
5. Based on the test results, select one of the following:

   - If the test failed, select **Reboot**. The system restarts and resets to factory default settings.

   - If the test passed with a success, close the screen. The Acquisition screen displays.

7.18 View Diagnostic Test Results

1. Open the **Service** screen.

2. Select **Diagnostics**.

   The **Diagnostics** screen opens.
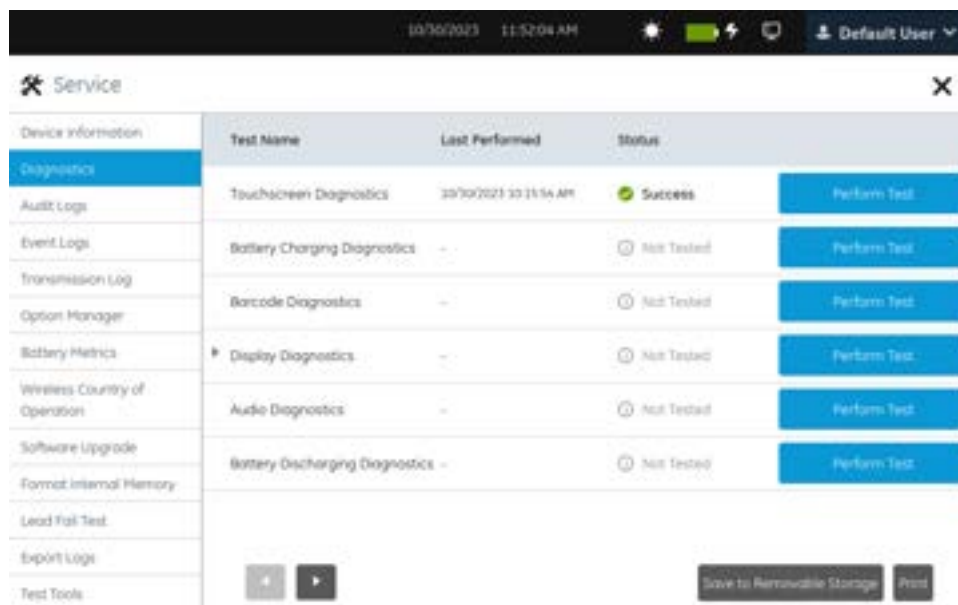
Table 7-5 Column Name and Description

Column Name	Description
Test Name	The name of the diagnostic test. Each available test is listed.
Last Performed	The date and time when the test was last executed. If this field is blank, the test was not executed.

Continues on the next page

Table 7-5 Column Name and Description (Table continued)

Column Name	Description
Test Status	The status of the last test. The possible statuses are: • **Success**: The diagnostic test was successful. • **Failure**: The diagnostic test failed. • **Not Tested**: The test was not executed.

3. To export diagnostic results to a USB drive, see .

4. Close the screen.

The Acquisition screen displays.

7.19 Export Diagnostic Test Results to a USB Flash Drive

Before proceeding, make sure you enable External USB Storage in **Settings** > **System** > **Storage** and enable at least one USB port in **Settings** > **Hardware** > **USB Port**. If you do not enable these options, access to the USB ports is blocked. See section *Configure External Storage* in the *MAC™ 5 Resting ECG Analysis Operator's Manual* for more information.

The USB flash drive supports the FAT32 file system.

1. Open the **Service** screen.

2. Select **Diagnostics**.

The **Diagnostics** screen opens.

3. Connect a USB drive to the device.

4. Select **Save to Removable Storage**.

If the export succeeds, the diagnostics service report is saved to USB flash drive in PDF format and a success message displays.

The filename of the report is `<Serial_Number>_ServiceDiagReport.pdf`.

Remove the USB flash drive and store it as directed by your site standards.

If the export fails, review the following table for a possible resolution.

Table 7-6 Error Message and Resolution

Message	Possible Resolution
Sufficient space is not available	Remove files from the USB flash drive to create space or use another USB flash drive.
Corrupt or unsupported file format	• The USB flash drive is corrupted. Use another USB flash drive. • The diagnostic file is corrupted. Contact your GE Healthcare Service Support representative.
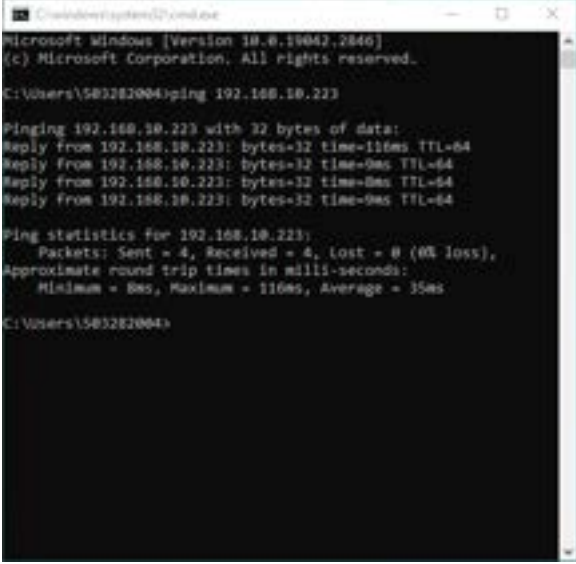
5. Close the screen.

The Acquisition screen displays.

7.20 Perform Ping Response

Ping Response tests if a device is available for connection. Before proceeding, make sure you enable the **Ping Response** setting in **Settings** > **Network** > **Miscellaneous** and you have a laptop that runs on Microsoft Windows OS version 10 or higher.

1. Connect the device to a network. For more details, refer to section *Configure Wireless Network* or *Configure Wired Network* in the *MAC™ 5 Resting ECG Analysis System Operator ManualMAC™ 7 Resting ECG Analysis System Operator Manual*.

2. Select the **Network Status Icon** on the screen to obtain the device IP address.

3. Connect the laptop to the same network.

4. Run the **cmd.exe** application on the laptop.

5. Enter **ping** followed by a space and the device IP address (for example: `ping 192.168.10.223`), then press **Enter**.

   - If the response `Reply from <IP address>` displays , the device is available for connection.

   - If other responses such as `Request Timed Out` display, the device is not available for connection. Contact the IT department at the customer site.

8 Working with Logs

8.1 Audit Logs

Audit logs are saved for two weeks for you to review. Logs older than two weeks are deleted. Implement a schedule to export the audit logs every two weeks to view logs older than two weeks.
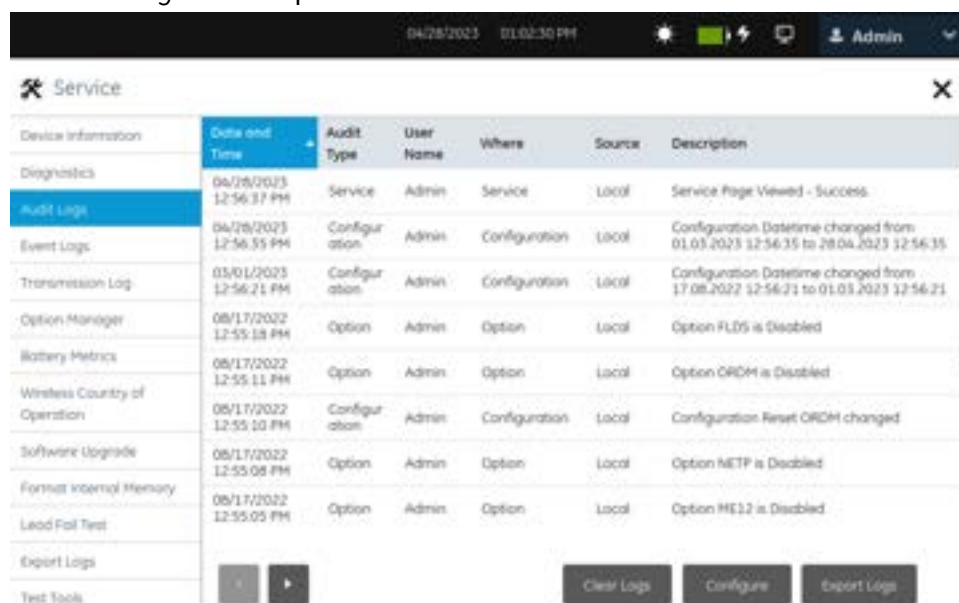
If you enable the PHAR - Pharmacy Option, the audit logs are saved for one year for you to review. You can clear these audit records manually.

You need privileges to view and export audit logs.

8.1.1 View the Audit Logs

1. Open the **Service** screen.
2. Select **Audit Logs**.

   The *Audit Logs* screen opens.

   Events in the audit log are listed in the order of date and time of occurrence of the event. The most recent event is the first entry in the audit log.

   Table 8-1 Audit Logs Fields and Their Descriptions

Field	Description
Date and Time	The date and time stamp is recorded in the format you selected when you initially set up the device.

   Continues on the next page

Table 8-1 Audit Logs Fields and Their Descriptions (Table continued)

Field	Description
Audit Type	The name of the audit type. The audit types include the following: • Access changes (log on, log off, user account creation or modification, and other user-related modifications) • Configuration changes (changes to settings) • Patient report changes (save, edit, delete, print, or transmit) • Task data changes (audit logs viewed, exported, or expired, files viewed and queues viewed) • Event data changes (event logs viewed, exported, or cleared) • Order changes (orders viewed, attached, or detached, and orders manually or automatically updated) • Patient list changes (patient list viewed and patient record added/modified) • Option changes
Username	The identification of the user logged in to the device when the event occurred.
Source	Source of the event: • Local • Remote
Where	The name of the software component (module or library name) where the event occurred.
Description	Description of the event that occurred and the outcome of that event (success or failure).

3. Close the screen.

    The Acquisition screen displays.

8.1.2 Configure the Audit Logs Destination

Audit logs can be exported to USB, shared folders, and SFTP destinations. You can configure the destination to export the audit logs.

1. Open the **Service** screen.

2. Select **Audit Logs**.

    The **Audit Logs** screen displays.

3. To configure the destination to export audit logs, select **Configure**.

    The **Configure audit logs export** screen displays.
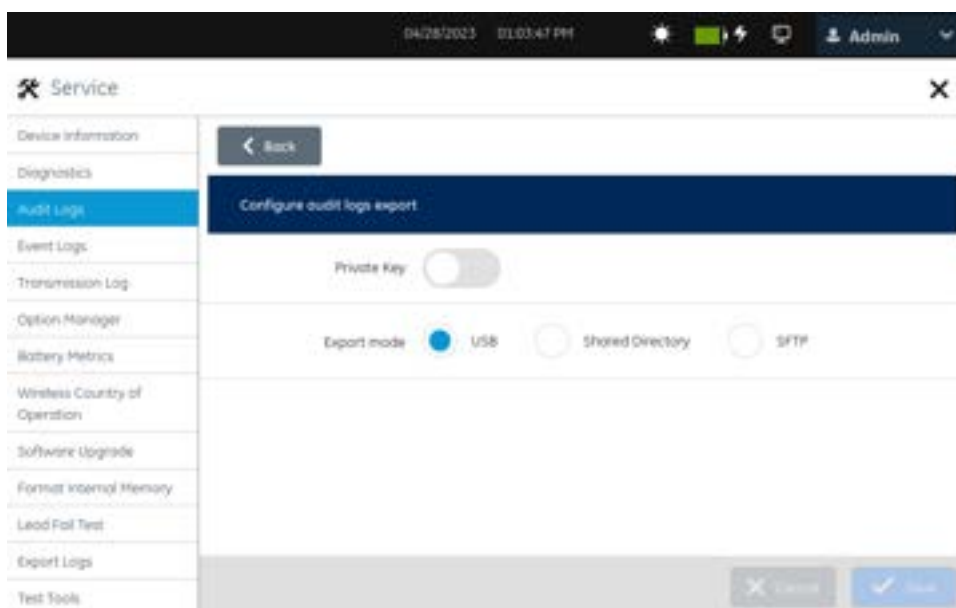
4. Select **USB**, **Shared Directory**, or **SFTP** from the **Export mode** to configure the destination to export the audit logs.

5. Continue to install the **Private Key** for the selected destination, see .

8.1.3 Install Private Key Signature to the Audit Logs

You can install the private key to sign the audit logs, and export the signature file to verify the audit log. You need to use the **PKCS#8** private key format.

1. Open the **Service** screen.

2. Select **Audit Logs**.

    The **Audit Logs** screen displays.

3. To configure the destination to export audit logs, select **Configure**.

    The **Configure audit logs export** screen displays.
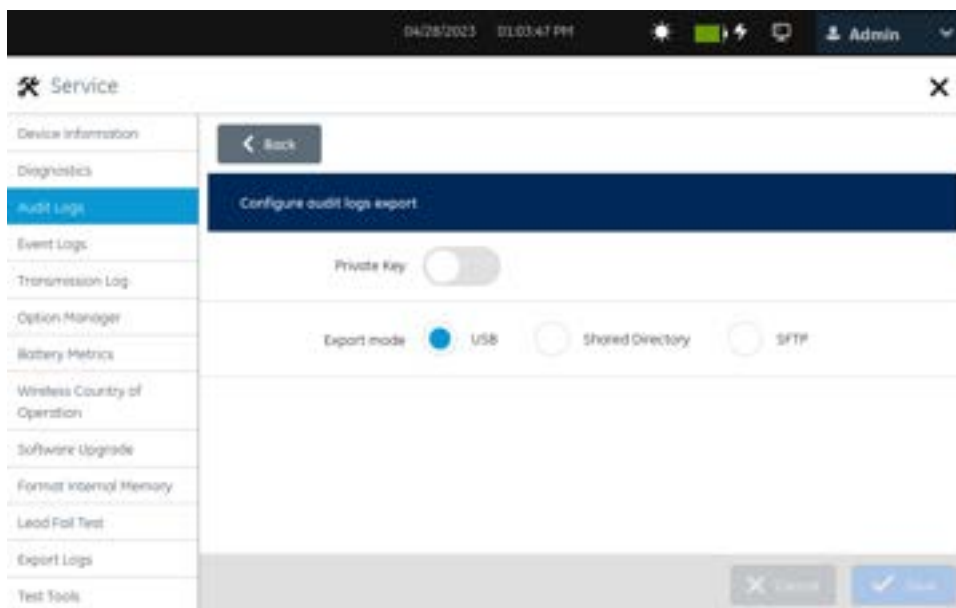
4.   Enable **Private Key** to install the private key.
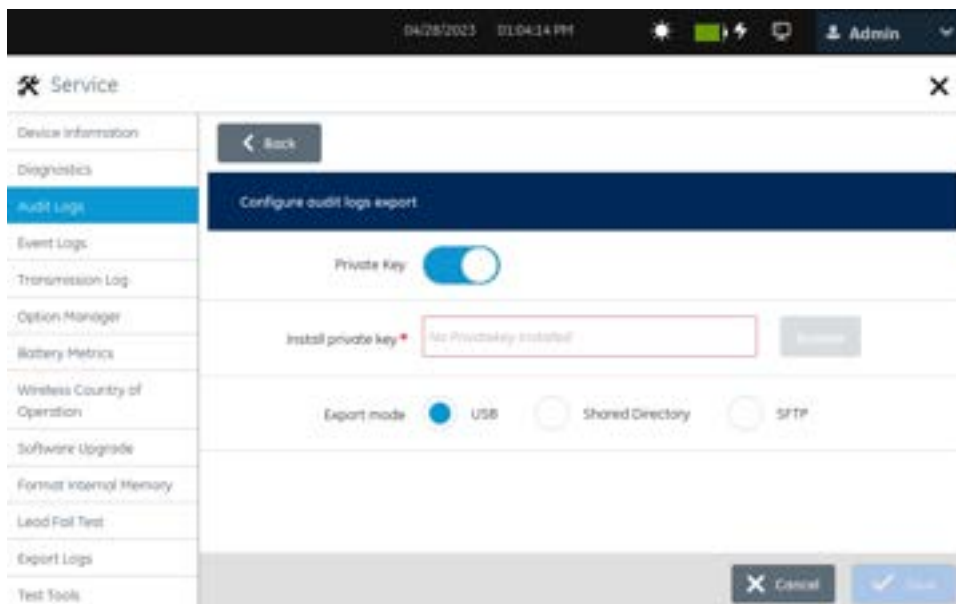
5.   Click **Browse** to select the private key.

6.   Select **Save** to save the changes.

7.   Close the screen.

The Acquisition screen displays.

8.1.4 Configure a Shared Directory to Export Audit Logs

The shared directory supports only SMB version 3.0.

1.   Open the **Service** screen.

2.   Select **Audit Logs**.

The **Audit Logs** screen displays.

3. To configure the destination to export audit logs, select **Configure**.

    The **Configure audit logs export** screen displays.

4. Select **Shared Directory** from the **Export mode**.

    The **Shared Directory** export setting screen displays.
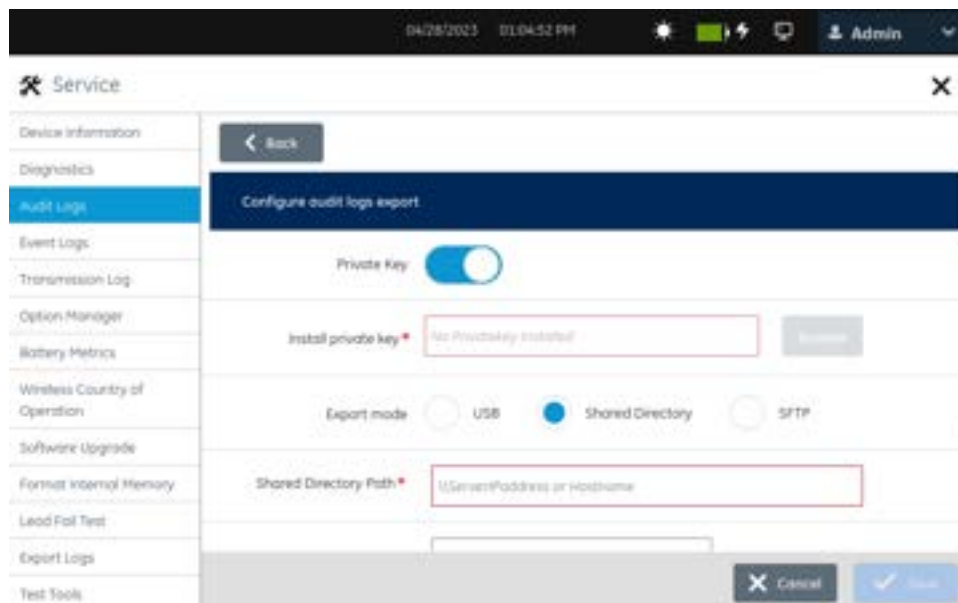
5. Configure a shared directory as per the information in the table.

    Table 8-2 Configure a Shared Directory Destination to Export Audit Logs

Field	Action	Description
Shared Directory Path	Enter the server IP address or host-name path of the shared directory. For example, `//ServerIPaddress or Hostname/sharename`.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters
User Name	Enter the user name allowed to access the shared directory.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters
Password	Enter the password of the user name allowed to access the shared directory.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters (a single space)

6. Select **Test Connection** to test the configured connection.

    • If the test displays `Test Successful`, you have a successful connection to that destination.

- If the test displays `Test Failed`, you do not have a connection to that destination. Troubleshoot the connection failure.

7. Select **Save**.

   The Shared Directory is successfully saved and configured to export the audit logs.
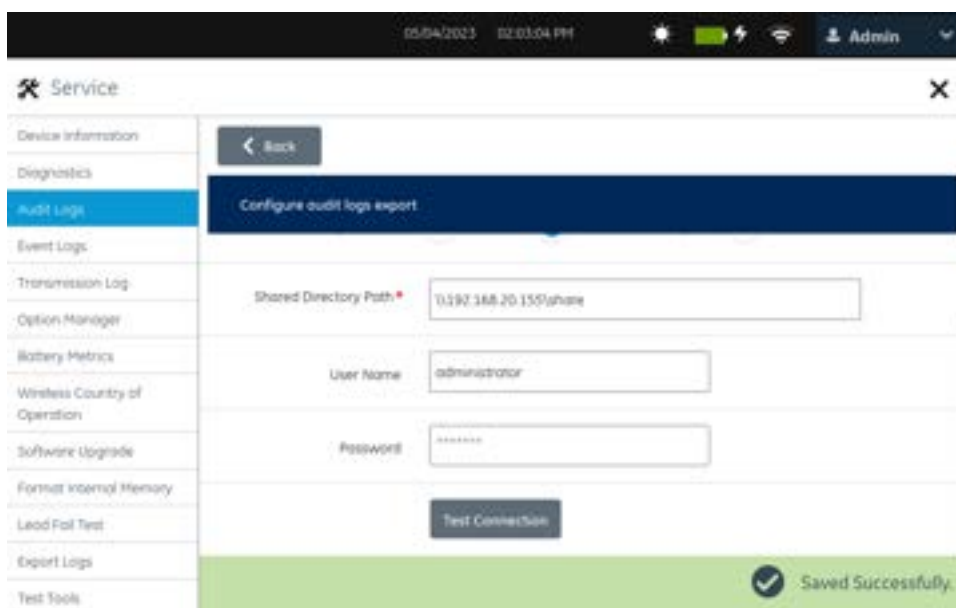
8.1.5 Configure an SFTP Destination to Export Audit Logs

1. Open the **Service** screen.

2. Select **Audit Logs**.

   The **Audit Logs** screen displays.

3. To configure the destination to export audit logs, select **Configure**.

   The **Configure audit logs export** screen displays.

4. Select **SFTP**.

   The **SFTP** export setting screen displays.

5. Configure the destination as per the information in the table.

Table 8-3 Configure an SFTP Destination to Export Audit Logs

Field	Action	Description
Server Name	Enter the IP Address or Hostname of the SFTP server where the reports will be sent.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters

Continues on the next page

Table 8-3 Configure an SFTP Destination to Export Audit Logs (Table continued)

Field	Action	Description
Remote Directory	Enter the path of the remote directory in the SFTP server where the reports will be sent.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters
User Name	Enter the user name allowed to access the SFTP server.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters
Password	Enter the password of the user name allowed to access the SFTP server.	Allowed values: • A to Z • a to z • 0 to 9 • All special characters
Authorize Server	Select **Authorize** to acknowledge, upload the key file, and download the SFTP server advertised finger print key.	The **Authorize** setting is enabled only after entering the values for **Server Name**, **Remote Directory**, **User Name**, and **Password** mandatory fields. Default value: Disabled The authorize server is configured through one of the settings below: • **Upload File** • **Server Finger Print**
Upload File	Select **Browse** to upload the public key file that is used to sign the server host certificate from USB. The SFTP server should be configured to use OpenSSH host certificate.	You can select the public key file that is used to sign the server host certificate from the USB to authorize the SFTP server.
Server Finger Print	Select **Download** to download the available finger print from the server.	You can download the finger print from the server to authorize the server.
Test Connection	Select **Test Connection** to test the SFTP server configuration.	You can test the SFTP server configuration.

6. Select **Authorize** to test the configured connection.

    The **Authorize Server** screen opens.

7. To authorize a server, perform Step 8 or Step 9.

8. To authorize the server through a public key file that is used to sign the host certificate:

    8.1. Select **Upload File** to upload the public key file that is used to sign the host certificate.

    8.2. Make sure that the USB port is enabled and the USB flash drive with a public key file that is used to sign the host certificate is inserted into the device.

8.3. Select **Browse** to choose the public key file that is used to sign the host certificate from the USB.
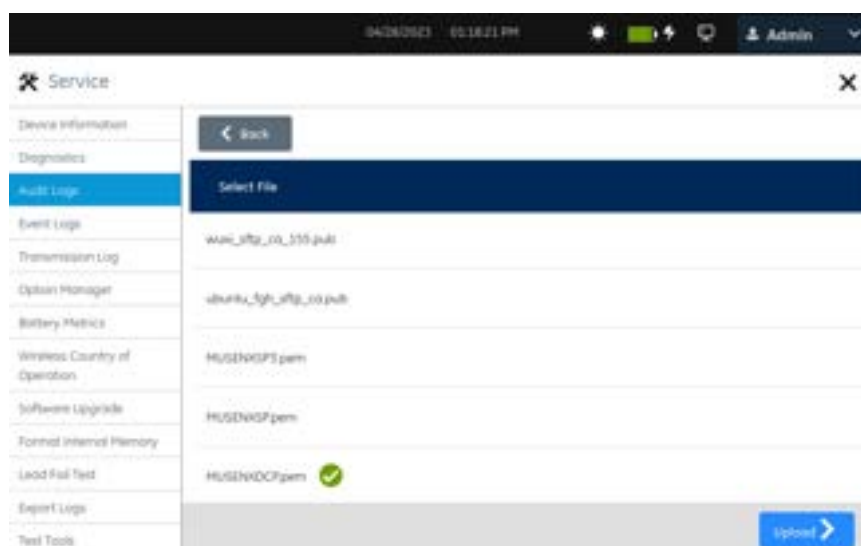
If you select an invalid public key file, a **Invalid file selected** message diaplays in the status bar.

8.4. After you select the correct public key file, click **Upload** to upload the file successfully.
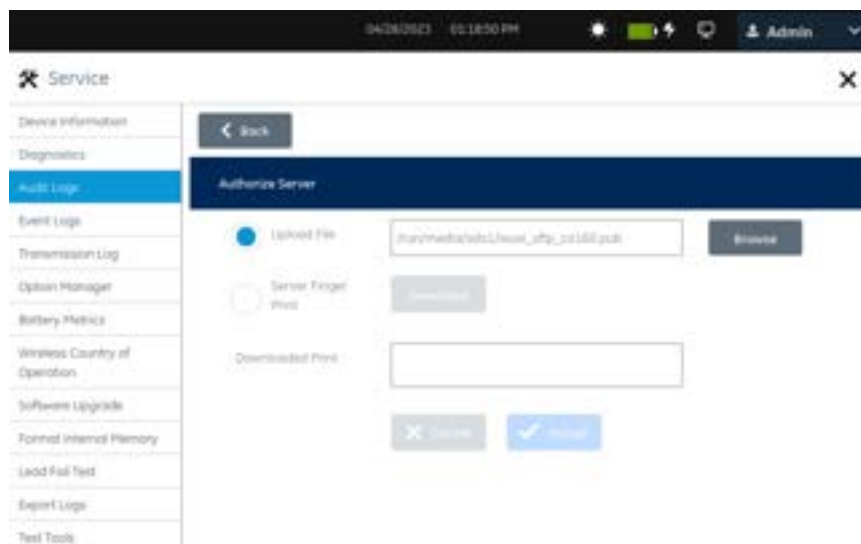
9. To authorize a server through a finger print:

9.1. Select **Server Finger Print** to download and use the available finger print from the server.

The **Authorize Server** for **Finger Print** screen opens.
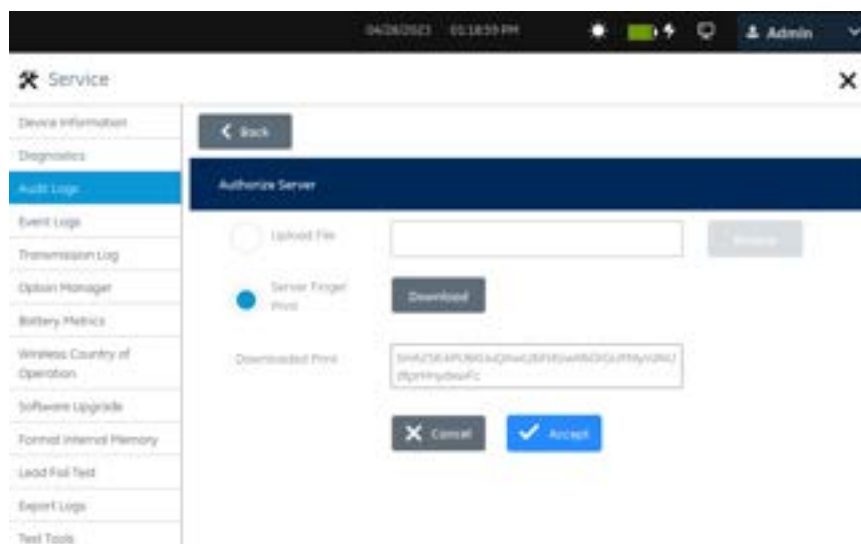
9.2. Select **Download** to download the finger print.

> 📝 **NOTE**
> Make sure that you connect to the correct SFTP server by comparing the displayed finger print against the expected server finger print.

- If the download is successful, the finger print displays in the **Downloaded Print** field.
- If the download is failed, you cannot authorize the server. Troubleshoot the SFTP server configuration.

9.3. Select **Accept** to accept and close the authorize server settings screen.

10. Select **Back** to view the SFTP server configuration.

The SFTP server **Configure audit logs export** screen opens.

11. Select **Test Connection** to test the SFTP server configuration.

    • If the test connection is successful, the SFTP server is configured and you can transmit the reports.

    • If the test connection is failed, the SFTP server is not configured and you cannot trasnmit the reports.

12. Select **Save**.

    The SFTP server is saved successfully and configured to export the audit logs.
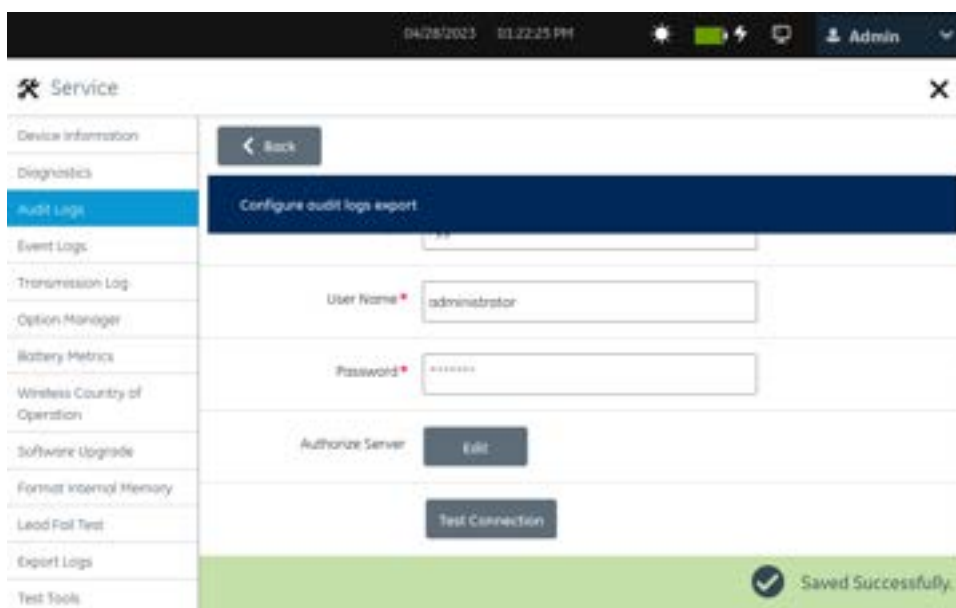
13. To edit the authorize server:

    13.1. Edit the authorize server as per steps from Step 6 to Step 9.

    13.2. Select **Save**.

8.1.6 Export an Audit Logs File

Before proceeding, make sure you enable External USB Storage in **Settings** > **System** > **Storage** and enable at least one USB port in **Settings** > **Hardware** > **USB Port**. If you do not enable these options, access to the USB ports is blocked. *MAC™ 5 Resting ECG Analysis System Operator's Manual*.

Make sure to configure the **USB**, **Shared Directory**, or **SFTP** destination to export the audit logs, see:

- 8.1.2 Configure the Audit Logs Destination on page 117
- 8.1.4 Configure a Shared Directory to Export Audit Logs on page 119
- 8.1.5 Configure an SFTP Destination to Export Audit Logs on page 122
- 8.1.3 Install Private Key Signature to the Audit Logs on page 118

The USB flash drive supports the FAT32 file system.

When you export audit log files to the USB flash drive, shared folder or SFTP, an entry is made to the audit log with the file name format `Auditlog_<Serial_Number>_dd.mm.yyyy_hh-mm-ss.log`.

> **NOTE**
> If you previously install a private key signature to the audit logs, a signature file (`Auditlog_<Serial_Number>_dd.mm.yyyy_hh-mm-ss.log.sign`) will also be exported to the configured destination. You can use OpenSSL tool and the signature file to verify that the audit logs are not tampered.

1. Open the **Service** screen.

2. Select **Audit Logs**.

    The **Audit Logs** screen displays.

3. Select **Export Logs**.

The audit log file is exported to the configured destination and a success message displays.
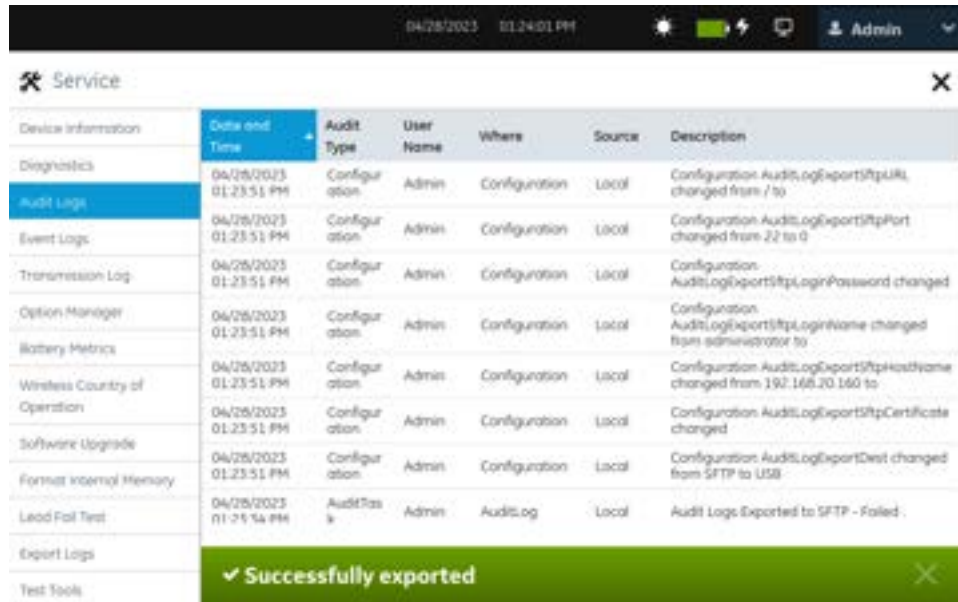
If a file with the same name exists on the configured destination, the old file is overwritten.

4. If the export to the USB, shared folder or SFTP fails, review the following table for a possible resolution.

Table 8-4 Error Messages and Resolutions

Message	Error Condition	Possible Resolution
No USB device detected	The USB flash drive is not inserted properly in the USB port, or the USB port is not enabled.	Make sure that the USB flash drive is firmly inserted into the USB port. If the USB flash drive is still not detected, enable the USB port in **Settings** > **Hardware** > **USB Port** setting.
Save to USB failed	The USB flash drive has an unknown error.	Remove this USB flash drive, insert another write-enabled USB flash drive.
No network connection	The device is not connected to the network.	Connect and configure LAN or WLAN in the device.
Shared Directory Incorrect Username and Password	User-specified username or password to access the shared directory is incorrect.	Reconfigure the shared directory with correct username and password.
Shared Directory No Free Space	The shared directory does not have sufficient space.	Clean up files in the shared directory to create sufficient space.
Shared Directory Copy Failed	Transmission to the shared directory fails due to network reasons.	Make sure the device is connected to the network. Click **Export Logs** to retransmit the Audit Log to the shared directory.
SFTP Invalid credentials	User-specified credentials to access the SFTP server is invalid.	Reconfigure the SFTP with valid credentials.
SFTP SSH Connection Failed	The connection to the SFTP server fails due to any unknown reason(for example, the server is down).	Verify that the SFTP server is up and test the connection.

Continues on the next page

Table 8-4 Error Messages and Resolutions (Table continued)

Message	Error Condition	Possible Resolution
The private key file does not exist, please reinstall.	The audit log and signature file are imported from the USB to the device but no private key is installed in the device.	Reinstall the private key.
Audit Log Signature Failed.	The installed private key in the device is corrupted.	Reinstall the private key.
SFTP Invalid Argument	• The network connection is not stable. • The configuration of the SFTP is changed.	• Click **Export Logs** to retransmit the Audit Log to the SFTP. • Reconfigure the SFTP server with the correct fingerprint or key file.

5. Close the screen.

    The Acquisition screen displays.

8.2 Event Log

Archived event logs are used to send troubleshooting information to GE Healthcare. The maximum size for the event log is 50 MB. The device can have a maximum of 5 event log files of 10 MB each. When the event log reaches 50 MB, the oldest 10 MB file is deleted, and new events are written to it. The frequency with which the event log files are deleted and overwritten depends on the number of users and their level of activity.

You can view the event logs. You can also export the event logs to a USB flash drive for historical reference. Export the log files on a regular basis to make sure no historical data is lost.

8.2.1 View the Event Log

1. Open the **Service** screen.

2. Select **Event Log**.

    The **Event Log** screen opens.

    Events in the event log are listed in the order of date and time of occurrence of the event. The most recent event is the first entry in the event log.

Table 8-5 Event Logs Fields and Their Descriptions

Field	Description
Date and Time	The date and time stamp is recorded in the format you selected when you initially set up the device.
Event Type	The name of the event type. Available event types are: • Critical • Error • Information • Warning • Touch_and_key • Invalid

Continues on the next page

Table 8-5 Event Logs Fields and Their Descriptions (Table continued)

Field	Description
Source	Source of the event. The name of the software component (module or library name) where the event occurred.
Event ID	Unique identifier number for each event.
Description	Description of the event that occurred and the outcome of that event (success or failure).

3. To filter the event logs by **Date and Time**, **Event Type**, and **Source**:

    3.1. Locate the filter entry field for the needed parameter.

    3.2. Enter the value for the parameter.

    3.3. Press **Enter**.

        The events that match the filter criterion are shown.

        If not logs match the filter, a message displays.

    You can filter on only one parameter at a time.

4. To clear the filter, highlight the value in the search field, press **Backspace**, and then press **Enter**.

5. Close the screen.

    The Acquisition screen displays.

8.2.2 Export an Event Log File to a USB Flash Drive

Make sure you Enable External USB Storage in **Settings** > **System** > **Storage** setting and enable at least one USB port in **Settings** > **Hardware** > **USB Port** setting. If these options are not enabled, access to USB flash drives is blocked. See the *MAC™ 5 Resting ECG Analysis Operator's Manual* for more information.

The USB flash drive supports the FAT32 file system.

When you export event log files to the USB flash drive, an entry is made to the audit log.

The event log file is exported as a .zip file with the following file name format: `EventLog.DeviceSerialNumber.zip`.

1. Open the **Service** screen.

2. Select **Event Logs**.

    The **Event Logs** screen opens.

3. Connect a USB drive to the device.

4. Select **Export Logs**.

    The event logs are exported to a zip file on the USB flash drive and a success message displays.

    If a file with the same name exists on the USB flash drive, the old file is overwritten.

5.   If the export function fails, review the following table for a possible resolution.

Table 8-6 Error Messages and Resolutions

Message	Error Condition	Possible Resolution
No USB device detected	The USB flash drive is not inserted properly in the USB port, or the USB port is not enabled.	Make sure that the USB flash drive is firmly inserted into the USB port. If the USB flash drive is still not detected, enable the USB port in **Settings** > **Hardware** > **USB Port** setting.
Save to USB failed	The USB flash drive has an unknown error.	Remove this USB flash drive, insert another write-enabled USB flash drive.

6.   Close the screen.

The Acquisition screen displays.

8.2.3 Clear the Event Logs

When you clear the event log, an entry is made to the audit log.

1.   Open the **Service** screen.

2.   Select **Event Log**.

The **Event Log** screen opens.

3.   To clear all events from the event file, select **Clear Logs**.

A message displays asking you to confirm whether you want to clear all event logs from the device.

4.   Select **Yes** to delete all the event logs from the file.

The event log file now has only one entry. The entry shows the log for clearing the log with the Date Time, Event Type, Source, Event ID, and a description of the event.

5.   Close the screen.

The Acquisition screen displays.

8.3 View the Transmission Log

The transmission log provides detailed information on the transmission of patient reports to the selected destination. You cannot edit or manually purge the Transmission Log.

1.   Open the **Service** screen.

2.   Select **Transmission Log**.

The **Transmission Log** screen opens.

Table 8-7 Transmission Log Fields and their Descriptions

Field	Description
Acquisition Date/Time	Displays the date and time the patient report was acquired in the format you selected when you initially set up the device.

Continues on the next page

Table 8-7 Transmission Log Fields and their Descriptions (Table continued)

Field	Description
Report Type	Identifies the report type: • Resting ECG • Digital Rhythm • Full Disclosure
Job Status	Indicates the status of the report. • Sent • Not Sent • In Progress • Failed • Cancelled
Job Failure Reason	Displays the reason for the job failure in the event of a failed attempt to transmit a report.
First Retry Date/Time	Displays the date and time of the first attempt to send the report to an external destination in the format you selected when you initially set up the device.
Last Retry Date/Time	Displays the date and time of the most recent attempt to send the report to an external destination in the format you selected when you initially set up the device.
Retry Count	Displays the number of times an attempt was made to send the report to an external destination.
Destination Name	Displays the name of selected destination for the report.

3. To export the log to a USB flash drive, connect a USB flash drive to the device and select **Export**.

    • If the log is exported, a success message displays.

    • If an error occurs, an error message displays. Troubleshoot the error and retry.

4. To print the log, select **Print**.

5. Close the screen.

    The Acquisition screen displays.

8.4 Generate the Service Snapshot

You can generate a service snapshot to save the service information to the device memory. The saved information is used for troubleshooting.

From the **User Menu** on the Acquisition screen, select **Service Snapshot**.

A progress message of the service snapshot creation displays in the notification area of the Acquisition screen.

If	Then
The service snapshot is generated	If you enable the remote service, device has internet connectivity and you authorize the device in CRM, the service snapshot is uploaded to service backoffice. The upload status of the service snapshot displays in the Event Logs and Audit Logs.
	If you do not enable the remote service, the service snapshot is generated but not uploaded to service backoffice. The upload status of the service snapshot does not display in the Event Logs and Audit Logs.
The service snapshot is not generated	An error message displays in the notification area.
	Perform the procedure again to generate the service snapshot.

8.5 Export Logs to a USB Flash Drive

Before proceeding, make sure the following:

- Enable External USB Storage in **Settings** > **System** > **Storage** and enable at least one USB port in **Settings** > **Hardware** > **USB Port**. If you do not enable these options, access to USB flash drives is blocked. See section *Configure External Storage* in the *MAC™ 5 Resting ECG Analysis Operator's Manual* for more information.

- The USB flash drive supports the FAT32 file system.

- A USB flash drive with sufficient space is inserted into the device.

- The service snapshot is generated. See .

1. Open the **Service** screen.

2. Select **Export Logs**.

   The **Export Logs** screen opens and displays the following sections:

   - **System Logs**
   - **Wireless Logs**
   - **Service Snapshot**
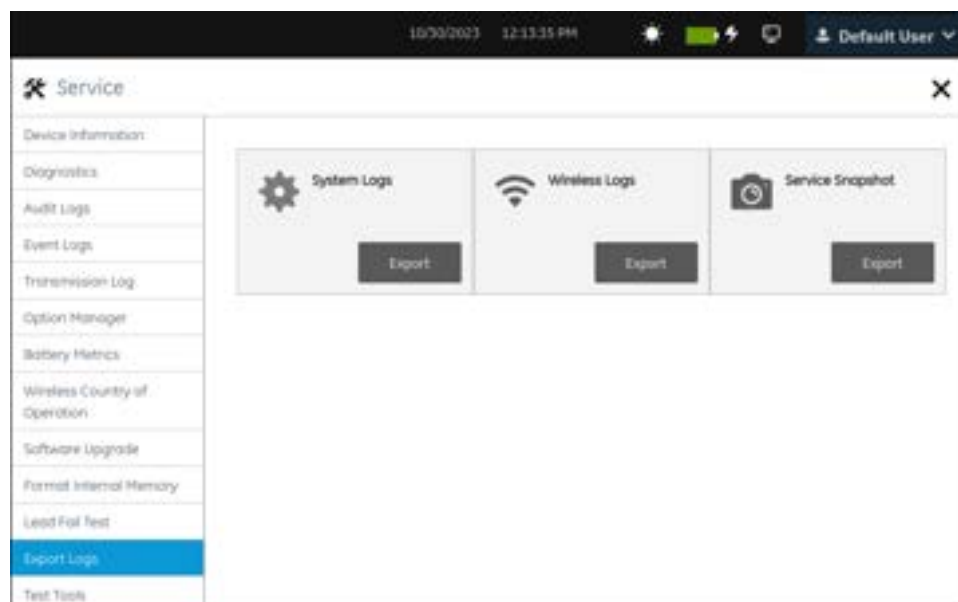
3. Select **Export** next to the name of the log to export to a USB flash drive.

> **NOTE**
> By default, the USB option is selected for export.

If there are problems with the USB flash drive, the file does not save and an error message displays. Review the following table for possible resolutions.

Table 8-8 Export to USB Flash Drive Errors

Error Message	Reason for Failure	How to Troubleshoot
`USB access denied`	The option to allow access to external storage devices is not enabled in the **Enable External USB Storage** in the **Settings** > **System > Storage** setting.	Enable this option and repeat this procedure.
`Insert USB drive to export logs`	The option to allow access to USB ports is not enabled in **Settings** > **Hardware** > **USB Port** setting.	Enable this option and repeat this procedure.
	The USB flash drive is not inserted into the device.	Connect a USB flash drive to the device and repeat step Step 3.
`Sufficient space is not available`	The USB flash drive does not have sufficient space.	Insert a USB flash drive that has sufficient space, and repeat step Step 3.
`USB write-protected`	USB drive is write-protected.	Ensure that the USB drive is write enabled, and repeat step Step 3.
`USB unknown error`	Unknown USB error.	Safely eject this USB flash drive, insert another USB flash drive with write enabled, and repeat step Step 3.

Once export begins, a message displays indicating that the export of logs is in progress.

- If the export of the selected log succeeds, the following message displays: `Exported <Log_Type> to USB`, where <Log_Type> is the type of the exported log. For example, `Exported Wireless log to USB`.

  The log is exported as a .zip file to the USB flash drive. If a file with the same name exists on the USB flash drive, the previous file is overwritten with the new file.

  The log filename is `<LogType>.<DeviceSerialNumber>.zip`, where:

  ◦ <LogType> is type of the exported log. For example, `SystemLog`, `AcquisitionModuleLog`, `WirelessLog` or `ServiceSnapshot`.

  ◦ <DeviceSerialNumber> is the serial number of the device.

- If the export of log fails, the following message displays: `Failed to export <Log_Type> to USB`, where <Log_Type> is the type of the log. For example, `Failed to export System log to USB`.

- If the service snapshot had not been generated, the service information will not be available in the device memory. An error message displays indicating the service snapshot file cannot be found.

4. Close the screen.

   The Acquisition screen displays.

9 Parts List

The Field Replaceable Unit (FRU) parts lists in this chapter supply enough detail for you to order parts for the assemblies, stand-alone FRUs, and FRU kits considered field serviceable. Only items, assemblies, and kits that have part numbers given in this chapter are available for purchase as FRUs. To order parts, contact GE Healthcare Service Parts. FRUs may not be available in all regions.

This chapter is divided into two sections:

- Part Identification

  This section helps to identify the parts associated with the device and the FRU or FRUs in which each part is available.

- FRU Lists

  This section describes the contents of each FRU.

9.1 Part Identification

This section provides the information you need to identify the parts associated with the MAC™ 5 Resting ECG Analysis System. It is intended to help you identify which FRUs to order.

The section begins with a series of exploded diagrams calling out the individual parts of the device. That is followed by a table that identifies each part called out in the diagrams and lists the FRU or FRUs in which the part is available.

To use this section, do the following:

1. Review the diagrams until you locate the part to be identified.

2. Note the number in the callout associated with the identified part.

3. Turn to the table following the diagrams and locate the row with the same number as the callout.

4. Review the part description and the FRU or FRUs in which the part is available.

5. If necessary, review the associated FRU details in the FRU Lists to determine which FRU is appropriate to order.

9.1.1 Prepare the System for FRU Replacement

Before performing any disassembly procedures, perform the following steps:

> **NOTE**
> Take strict precautions against electrostatic discharge damage while replacing field replaceable units.

1. Store and print your device settings so that you can restore them or manually reconfigure the system when you are done.

   For information on storing or printing your settings, see the *Configure Settings* chapter of the *MAC™ 5 Resting ECG Analysis Operator's Manual*.

2. Power off the device.

3. Disconnect the device from the AC wall outlet.

4. Disconnect the power cord from the rear of the device.

5. Disconnect the following from the device, if connected:

   • External storage devices connected to the USB slots

   • KISS pump connector cable

   • Barcode reader cable

   • LAN cable

6. Remove the barcode reader from its respective holder.

7. If the device is attached to a compact trolley, remove the device by releasing the screws on the bottom of the trolley plate.

8. Remove any paper from the paper tray.

9. Remove the battery from the battery compartment.

9.1.2 Tools

Table 9-1 Tools

Item	Description
1	#1 Phillips screwdriver
2	T15 Torx screwdriver
3	Diagonal pliers
4	Anti-static bracelet

9.1.3 MAC 5 A4: Field Replaceable Parts List
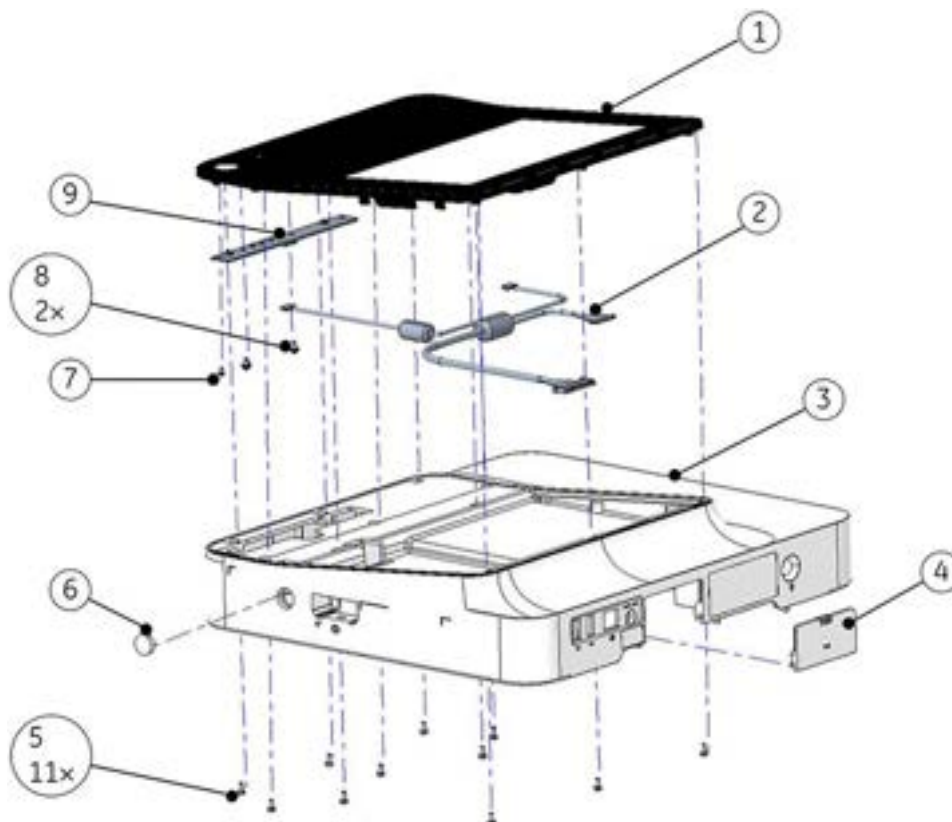
Top Subsystem

Item	Part Description	Available in
1	VIEW PANEL Assembly	VIEW PANEL Assembly for MAC 5 Medical Device Make_T (2208365-001-S)
2	Display Module Cable	MAC 5 FRU Display Module Cable (2206377-001-S)
3	Base Frame	MAC 5 FRU A4 Base Frame (2206345-001-S)
4	Battery Door	MAC 5 FRU MISC ME Parts (2206839-001-S)
5	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
6	KISS Adapter Plug	MAC 5 FRU MISC ME Parts (2206839-001-S)
7	Display Screw ST2.9X6.5 GB845	MAC 5 FRU Screw Kit (2201342-001-S)
8	Screw M3×6 GB9074.4 Zinc Plated	MAC 5 FRU Screw Kit (2201342-001-S)
9	Power Button PCB	MAC 7 FRU Power Button PCB (2105949-001-S)

Bottom Subsystem

Item	Part Description	Available in
1	KISS Cable	MAC 5 FRU KISS Board with Cable (2206188-001-S)
2	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
3	Main Board PWA	MAC 5 FRU Main Board PWA (2206912-001-S)
4	KISS Board PWA	MAC 5 FRU KISS Board with Cable (2206188-001-S)
5	Thermal Pad	MAC 5 FRU MISC ME Parts (2206839-001-S)
6	SCREW M4X10 CROSS PAN GB818	MAC 5 FRU Screw Kit (2201342-001-S)
7	Paper Spacer	MAC 5 FRU Paper Spacer (2205349-001-S)
8	Ground Metal	MAC 5 FRU MISC ME Parts (2206839-001-S)
9	Bottom	MAC 5 FRU A4 Bottom with Paper Pull Tab A4 (2206365-001-S)
10	Foot Pad A4	MAC 5 FRU MISC ME Parts (2206839-001-S)
11	Handle with Hinge	MAC 5 FRU Handle with Hinge (2206245-001-S)
12	Printer Door Shaft Sleeve	MAC 5 FRU Printer Door Kit (2205912-001-S)
13	Printer Door Button	MAC 5 FRU MISC ME Parts (2206839-001-S)
14	Printer Door Spring	MAC 5 FRU MISC ME Parts (2206839-001-S)
15	Printer Door	MAC 5 FRU Printer Door Kit (2205912-001-S)
16	Paper Outlet Spacer	MAC 5 FRU MISC ME Parts (2206839-001-S)

Item	Part Description	Available in
17	Printer Roller	MAC 7 FRU Printer Head with Roller (2105942-002-S)
18	Paper Pull Tab A4	MAC 5 FRU MISC ME Parts (2206839-001-S)
19	Printer Head	MAC 7 FRU Printer Head with Roller (2105942-002-S)
20	Printer Cable	MAC 5 FRU Printer Cable (2207897-001-S)
21	Printer Sheet Metal	MAC 5 FRU Printer Sheet Metal (2212459-002-S)

9.1.4 MAC 5 A5: Field Replaceable Parts List
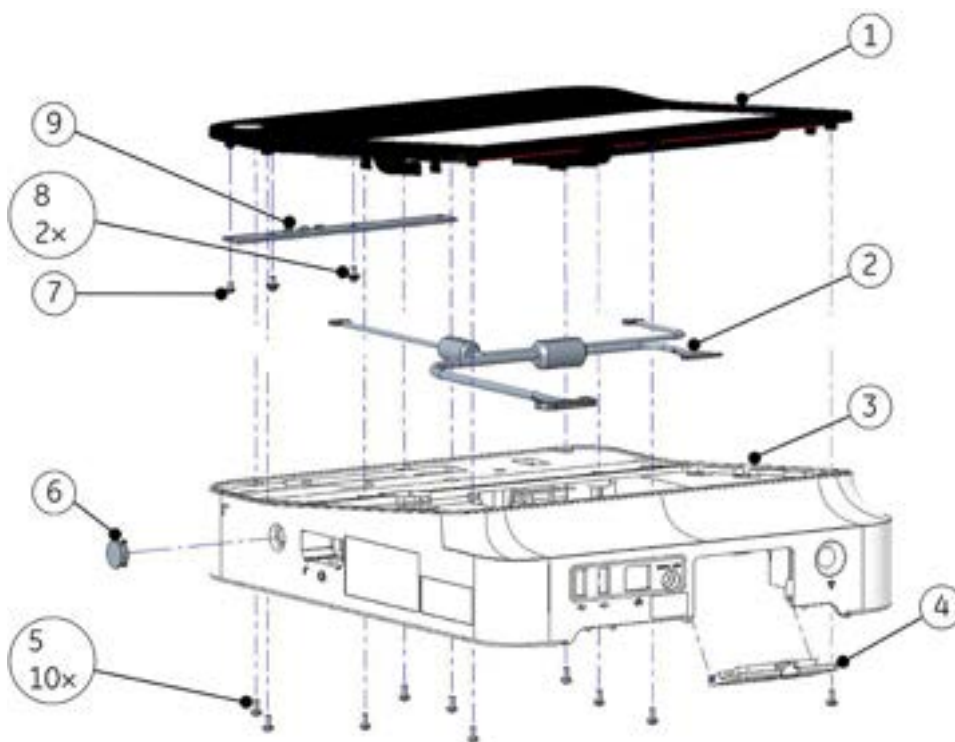
Top Subsystem

Item	Part Description	Available in
1	VIEW PANEL Assembly	VIEW PANEL Assembly for MAC 5 Medical Device Make_T (2208365-001-S)
2	Display Module Cable	MAC 5 FRU Display Module Cable (2206377-001-S)
3	Base Frame	MAC 5 FRU A5 base frame (2201290-001-S)
4	Battery Door	MAC 5 FRU MISC ME Parts (2206839-001-S)
5	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
6	KISS Adapter Plug	MAC 5 FRU MISC ME Parts (2206839-001-S)
7	Display Screw ST2.9X6.5 GB845	MAC 5 FRU Screw Kit (2201342-001-S)
8	Screw M3×6 GB9074.4 Zinc Plated	MAC 5 FRU Screw Kit (2201342-001-S)
9	Power Button PCB	MAC 7 FRU Power Button PCB (2105949-001-S)

Bottom Subsystem

Item	Part Description	Available in
1	KISS Cable	MAC 5 FRU KISS Board with Cable (2206188-001-S)
2	KISS Board PWA	MAC 5 FRU KISS Board with Cable (2206188-001-S)
3	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
4	Main Board PWA	MAC 5 FRU Main Board PWA (2206912-001-S)
5	Thermal Pad	MAC 5 FRU MISC ME Parts (2206839-001-S)
6	SCREW M4X10 CROSS PAN GB818	MAC 5 FRU Screw Kit (2201342-001-S)
7	Ground Metal	MAC 5 FRU MISC ME Parts (2206839-001-S)
8	Bottom	MAC 5 FRU bottom A5 with Paper Pull Tab A5 (2204989-001-S)
9	Foot Pad A4	MAC 5 FRU MISC ME Parts (2206839-001-S)
10	Handle with Hinge	MAC 5 FRU Handle with Hinge (2206245-001-S)
11	Printer Door Shaft Sleeve	MAC 5 FRU Printer Door Kit (2205912-001-S)
12	Printer Door Button	MAC 5 FRU MISC ME Parts (2206839-001-S)
13	Printer Door Spring	MAC 5 FRU MISC ME Parts (2206839-001-S)
14	Printer Door	MAC 5 FRU Printer Door Kit (2205912-001-S)
15	Paper Outlet Spacer	MAC 5 FRU MISC ME Parts (2206839-001-S)
16	Printer Roller	MAC 7 FRU Printer Head with Roller (2105942-002-S)

Item	Part Description	Available in
17	Paper Pull Tab A5	MAC 5 FRU MISC ME Parts (2206839-001-S)
18	Printer Head	MAC 7 FRU Printer Head with Roller (2105942-002-S)
19	Printer Cable	MAC 5 FRU Printer Cable (2207897-001-S)
20	Printer Sheet Metal	MAC 5 FRU Printer Sheet Metal (2212459-002-S)

9.1.5 MAC 5 Lite: Field Replaceable Parts List
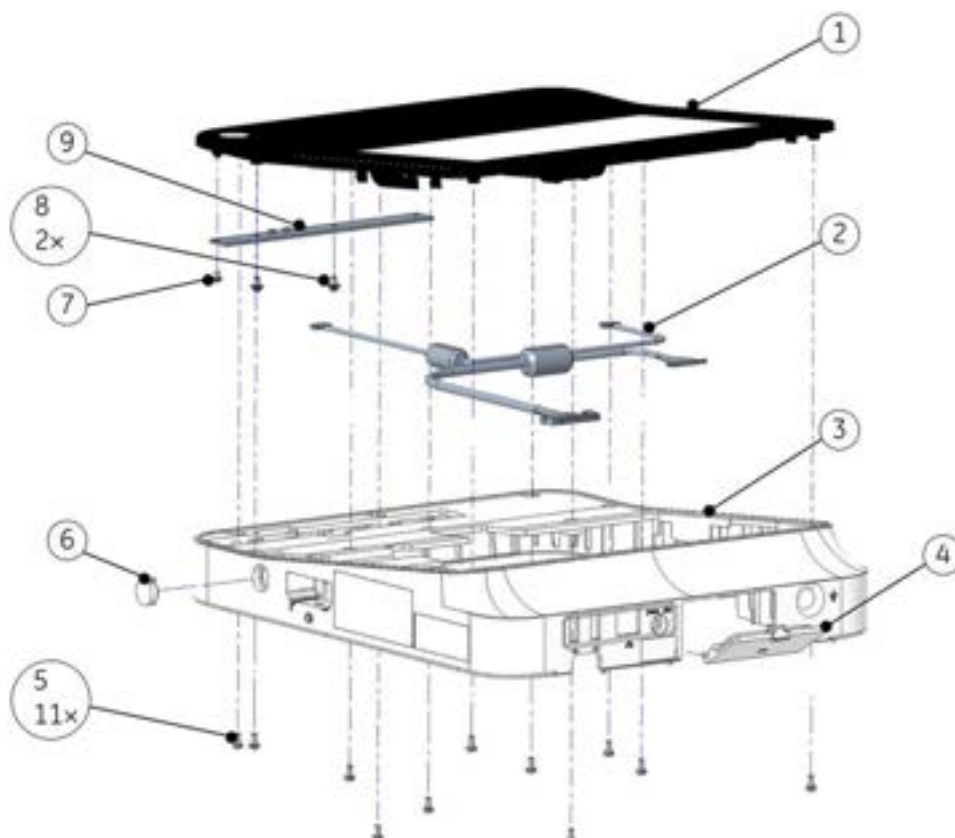
Top Subsystem

Item	Part Description	Available in
1	VIEW PANEL Assembly	VIEW PANEL Assembly for MAC 5 Medical Device Make_T (2208365-001-S)
2	Display Module Cable	MAC 5 FRU Display Module Cable (2206377-001-S)
3	Base Frame	MAC 5 FRU Lite Base Frame (2209167-001-S)
4	Battery Door	MAC 5 FRU MISC ME Parts (2206839-001-S)
5	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
6	KISS Adapter Plug	MAC 5 FRU MISC ME Parts (2206839-001-S)
7	Display Screw ST2.9X6.5 GB845	MAC 5 FRU Screw Kit (2201342-001-S)
8	Screw M3×6 GB9074.4 Zinc Plated	MAC 5 FRU Screw Kit (2201342-001-S)
9	Power Button PCB	MAC 7 FRU Power Button PCB (2105949-001-S)

Bottom Subsystem

Item	Part Description	Available in
1	KISS Cable	MAC 5 FRU KISS Board with Cable (2206188-001-S)
2	KISS Board PWA	MAC 5 FRU KISS Board with Cable (2206188-001-S)
3	Screw M3X6 Cross Pan Head GB818	MAC 5 FRU Screw Kit (2201342-001-S)
4	Main Board PWA	MAC 5 FRU Main Board PWA (2206912-001-S)
5	SCREW M4X10 CROSS PAN GB818	MAC 5 FRU Screw Kit (2201342-001-S)
6	Thermal Pad	MAC 5 FRU MISC ME Parts (2206839-001-S)
7	Ground Metal	MAC 5 FRU MISC ME Parts (2206839-001-S)
8	Bottom	MAC 5 FRU Lite Bottom (2209582-001-S)

Item	Part Description	Available in
9	Handle with Hinge	MAC 5 FRU Handle with Hinge (2206245-001-S)
10	Foot Pad Lite	MAC 5 FRU MISC ME Parts (2206839-001-S)

9.2 FRU Lists

The FRU lists are sorted by ascending Part Number.

9.2.1 Top FRU List

Table 9-2 VIEW PANEL Assembly for MAC 5 Medical Device Make_T (2208365-001-S)

Description	Quantity	Reference
VIEW PANEL Assembly	1	

Table 9-3 Display Module Cable (2206377-001-S)

Description	Quantity	Reference
Display Module Cable	1	

Table 9-4 Button PCB (2105949-001-S)

Description	Quantity	Reference
Keyboard PWA	1	

Table 9-5 A4 Base Frame (2206345-001-S)

Description	Quantity	Reference
A4 Base Frame	1	

Table 9-6 A5 Base Frame (2201290-001-S)

Description	Quantity	Reference
A5 Base Frame	1	

Table 9-7 Lite Base Frame (2209167-001-S)

Description	Quantity	Reference
Lite Base Frame	1	

9.2.2 Bottom FRU List

Table 9-8 A4 Bottom with Paper Pull Tab A4 (2206365-001-S)

Description	Quantity	Reference
A4 Bottom with Foot Pad	1	
Paper Pull Tab A4	1	

Table 9-9 A5 Bottom with Paper Pull Tab A5 (2204989-001-S)

Description	Quantity	Reference
A5 Bottom with Foot Pad	1	
Paper Pull Tab A5	1	

Table 9-10 Lite Bottom (2209582-001-S)

Description	Quantity	Reference
Lite Bottom with Foot Pad	1	

Table 9-11 Handle with Hinge (2206245-001-S)

Description	Quantity	Reference
Handle	1	
Hinge	2	

Table 9-12 Printer Door kit (2205912-001-S)

Description	Quantity	Reference
Printer Door with Botton and Spring	1	
Printer Door Shaft Sleeve	1	
Paper Outlet Spacer	1	

Table 9-13 Printer Module (2105942-002-S)

Description	Quantity	Reference
Printer Head with Roller	1	

Table 9-14 Printer Sheet Metal (2212459-002-S)

Description	Quantity	Reference
Printer Sheet Metal	1	

Table 9-15 Thermal Printer Cable (2207897-001-S)

Description	Quantity	Reference
Thermal Printer Cable	1	
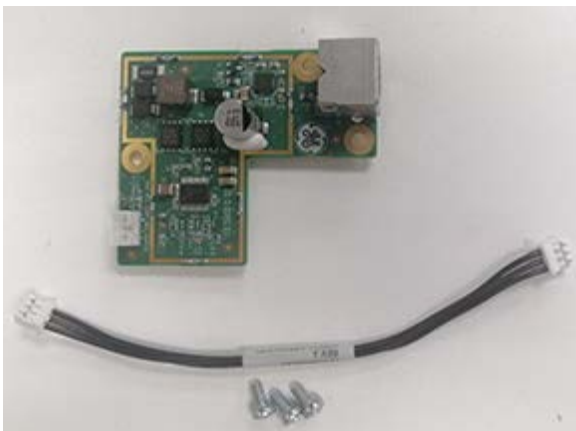
Table 9-16 Main Board PWA with Thermal Pad (2206912-001-S)

Description	Quantity	Reference
Main Board PWA	1	
Thermal Pad	2	

Table 9-17 MAC 5 FRU Software 1.00 SP05 (8877000-003)

Description	Quantity	Reference
1.00 SP05 Software	1	

Table 9-18 KISS Board with Cable (2206188-001-S)

Description	Quantity	Reference
KISS Pump Power Adapter PWA	1	
KISS Pump Power Adapter Cable	1	
MAC 7 Screw M3X6 Cross Pan Head GB818	3	

Table 9-19 Battery (2062895-001)

Description	Quantity	Reference
Battery	1	

Table 9-20 A4 Paper Spacer (2205349-001-S)

Description	Quantity	Reference
A4 Paper Spacer	1	

9.2.3 Miscellaneous FRU List

Table 9-21 MISC ME PARTS (2206839-001-S)

Description	Quantity	Reference
Paper Pull Tab A4	1	
Paper Pull Tab A5	1	
Battery Door	1	
Printer Door Button	1	
Paper Outlet Spacer	1	
KISS Adapter Plug	1	
Ground Metal	1	
Equipotential Plug D2600	1	
Printer Door Spring	1	
Washer Equipotential Plug	1	
Thermal Pad	6	
Foot Pad A4	4	
Foot Pad Lite	2	

Table 9-22 Screw Kit (2201342-001-S)

Description	Quantity	Reference
MAC 7 SCREW M4X10 CROSS PAN GB818	20	
MAC 7 SCREW M3X6 CROSS PAN HEAD GB818	40	
MAC 7 DISPLAY SCREW ST2.9X6.5 GB845	10	
MAC 7 SCREW M3×6 GB9074.4 ZINC PLATED	10	

Table 9-23 AC/DC Adapter (2205621-001-S)

Description	Quantity	Reference
AC/DC Adapter	1	

Table 9-24 Barcode (2106084-025)

Description	Quantity	Reference
ACCESSORY JADAK EXTERNAL BARCODE SCANNER KIT	1	

Table 9-25 Barcode (2106084-028)

Description	Quantity	Reference
ACCESSORY ZEBRA EXTERNAL BARCODE SCANNER KIT	1	

Table 9-26 Barcode (5844816-001-S)

Description	Quantity	Reference
ACCESSORY HONEYWELL EXTERNAL BARCODE SCANNER KIT	1	

10 FRU Replacement: Top Subsystem

10.1 Battery Door FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in .

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

10.1.1 Remove the Battery Door

1. Remove the equipotential plug and washer using a T15 Torx screwdriver.

2. Turn over the device gently.
3. Remove the screws at the bottom using a PH 1x150 mm screwdriver.

MAC 5 A4

MAC 5 A5

MAC 5 Lite

4.   Turn over the device gently.

5.   Lift the top cover gently and release the cable from the bottom in sequence.

6.   Release the latch and open the battery door.

7. Lift one side of the battery door.

8. Remove the battery door.

10.1.2 Replace the Battery Door

1. Align one side of the battery door into the slot.

2. Press the other side of the battery door into the slot.

3.   Close the battery door.

4.   Connect the cable on the top cover to the bottom in sequence.

5.   Place the top cover in position and affix it to the bottom.

MAC 5 A4

MAC 5 A5 / MAC 5 Lite

6.   Turn over the device gently.

7.   Using a PH 1x150 mm screwdriver, fasten the screws on the bottom to secure it with the top cover.

MAC 5 A4

MAC 5 A5

MAC 5 Lite

8. Turn over the device gently.

9. Put the washer through the equipotential plug, fasten them using a T15 Torx screwdriver.

10.2 KISS Adapter Plug FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

10.2.1 Remove the KISS Adapter Plug

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Release the latch and remove the KISS adapter plug.

10.2.2 Replace the KISS Adapter Plug

1. Press the KISS Adapter Plug to affix it to the top cover.

2. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

10.3 Base Frame FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

10.3.1 Remove the Base Frame

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the screws using a PH 1x150 mm screwdriver.
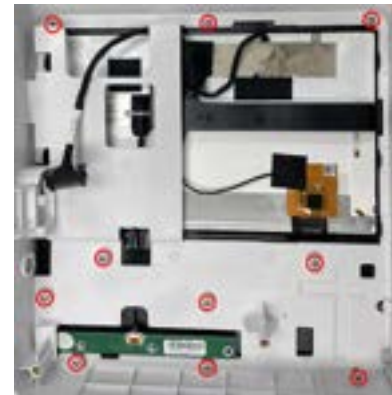
MAC 5 A4

MAC 5 A5

MAC 5 Lite

3. Hold the top cover and release the latch to remove the base frame.

MAC 5 A4
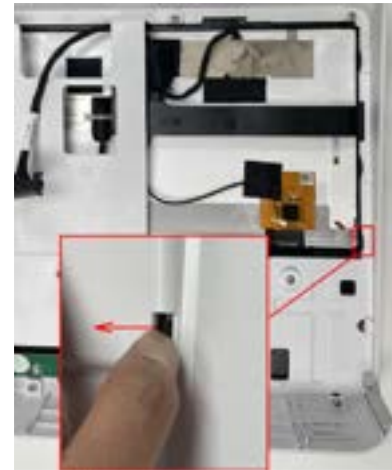
MAC 5 A5
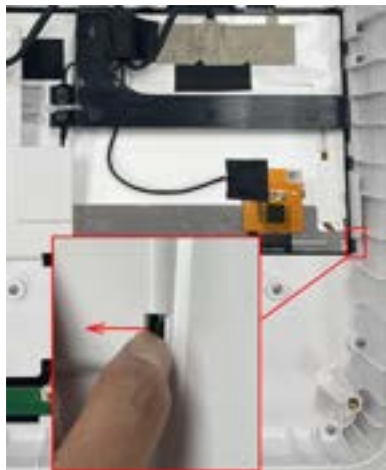
MAC 5 Lite

4. Remove the KISS Adapter Plug.

5. Remove the battery door.

10.3.2 Replace the Base Frame

1. Assemble the battery door. See step 1 to step 3 in .

2. Assemble the KISS Adapter Plug.

3. Place the base frame in position, then press the latch gently to affix the base frame to the display unit.

MAC 5 A4	MAC 5 A5

MAC 5 Lite

4.   Using a PH 1x150 mm screwdriver, fasten the screws to secure the base frame to the display unit.
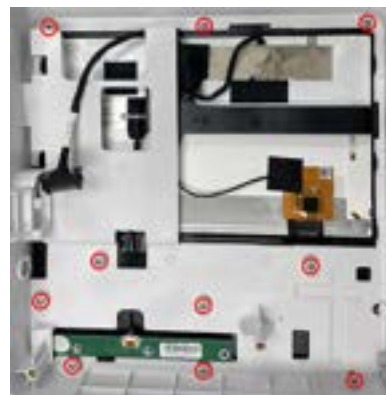
MAC 5 A4

MAC 5 A5

MAC 5 Lite

5.   Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

10.4 Keyboard PWA FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

10.4.1 Remove the Keyboard PWA

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the base frame. See step 2 to step 3 in 10.3.1 Remove the Base Frame on page 160.

3. Release the cable from the keyboard PWA.

4. Remove the screws using a PH 1x150 mm screwdriver.

5. Remove the keyboard PWA.

10.4.2 Replace the Keyboard PWA

1. Place the keyboard PWA in position and affix it to the display unit.

2. Using a PH 1x150 mm screwdriver, fasten the screws to secure the keyboard PWA to the display unit.

3. Connect the display module cable to the keyboard PWA.

4. Assemble the base frame. See step 3 to step 4 in 10.3.2 Replace the Base Frame on page 162.

5. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

10.5 Display Module Cable FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

-   PH 1x150 mm screwdriver
-   T15 Torx screwdriver
-   Diagonal pliers

10.5.1 Remove the Display Module Cable

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the base frame. See step 2 to step 3 in 10.3.1 Remove the Base Frame on page 160.

3. Release the cable from the keyboard PWA.

4. Remove the tape and release the cable from the middle of the display unit.
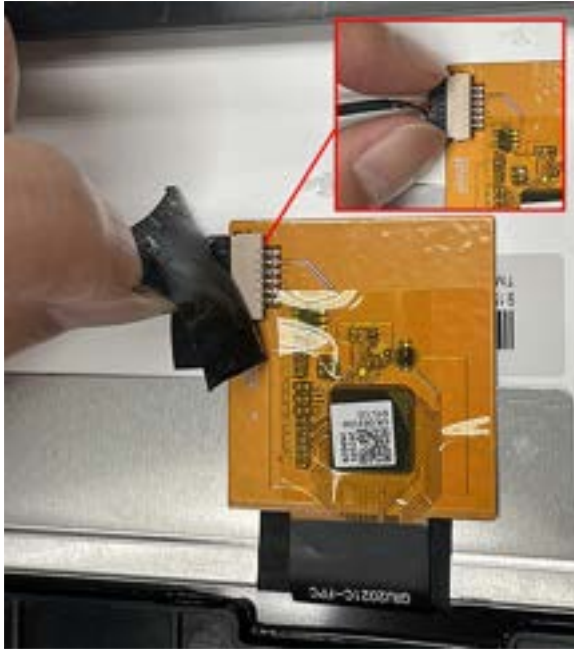
5. Remove the tape from each location outlined in red below.

6. Remove the zip tie using the diagonal pliers.

7. Remove the two pieces of tape from the location outlined in red below, tearing from the top right corner. Then pull the holder gently to release the cable from the top of the display unit.

8. Lift the frame gently and remove the magnet ring through it.
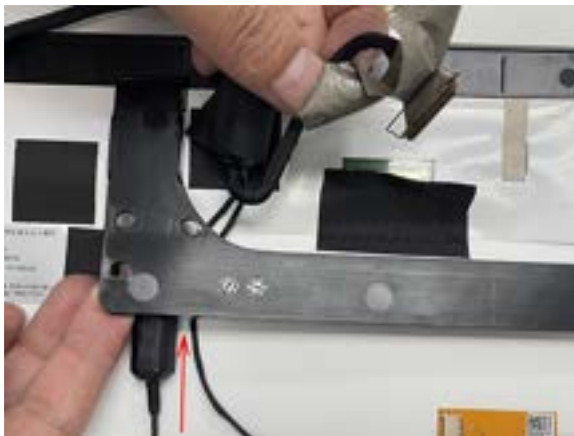
10.5.2 Replace the Display Module Cable

1. Lift the frame gently and place the magnet ring through it.

2.   Tie the cable to the display module.

3.   Connect the cable and paste the tape on the connector in the middle of the display unit.

4.   Push the holder gently to connect the cable and paste the tape on the connector on the top of the display unit.

5. Place the magnet ring on the cusion and paste the tape.

6. Connect the cable to the keyboard PWA.

7. Paste the line on the display unit.

8. Assemble the base frame. See step 3 to step 4 in 10.3.2 Replace the Base Frame on page 162.

9.   Attach the top cover. See step 4 to step 9 in .

10.6 Display Unit FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in .

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver
- Diagonal pliers

10.6.1 Remove the Display Unit

1.   Remove the top cover. See step 1 to step 5 in .

2.   Remove the base frame. See step 2 to step 3 in .

3.   Remove the keyboard PWA. See step 3 to step 5 in .

4.   Remove the display module cable. See step 4 to step 8 in

10.6.2 Replace the Display Unit

1.   Assemble the keyboard PWA. See step 1 to step 2 in .

2.   Assemble the display module cable. See step 1 to step 7 in .

3.   Assemble the base frame. See step 3 to step 4 in .

4.   Attach the top cover. See step 4 to step 9 in .

11 FRU Replacement: Bottom Subsystem

11.1 Printer Door Button FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in .

Tools Required:

 • PH 1x150 mm screwdriver

11.1.1 Remove the Printer Door Button

1. Press the button and open the printer door.

2. Release the latch and remove the button along with the spring.

3. Lift the spring and remove it.

11.1.2 Replace the Printer Door Button

1. Place the spring on the printer door button.

2. Press the button to affix it to the printer door.

3. Push both ends of the the printer door to its closed position.

11.2 Printer Door FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

* PH 1x150 mm screwdriver

11.2.1 Remove the Printer Door Shaft Sleeve

1. Turn over the device gently.

2. Remove the screws on the bottom using a PH 1x150 mm screwdriver.

3. Remove the printer door shaft sleeve.

11.2.2 Replace the Print Door Shaft Sleeve

1. Align the slot of the shaft sleeve with the printer shaft and place the shaft sleeve in position.

2. Using a PH 1x150 mm screwdriver, fasten the screws to secure the shaft sleeve to the bottom.

11.2.3 Remove the Printer Door

1. Remove the shaft sleeve. See .
2. Hold the printer door and press the button to remove the printer door along with the roller.

3.   Remove the screws using a PH 1x150 mm screwdriver.

4.   Remove the printer roller.

5.   Remove the screws using a PH 1x150 mm screwdriver.

6.   Remove the sheet metal.

11.2.4 Replace the Printer Door

1.   Assemble the paper outlet spacer.

A4 Paper / A5 Paper   Letter Paper

2. Place the sheet metal in position and affix it to the printer door.

3. Using a PH 1x150 mm screwdriver, fasten the screws to secure the sheet metal to the printer door.

4. Place the printer roller in position and affix it to the printer door.

5. Using a PH 1x150 mm screwdriver, fasten the screws to secure the printer roller to the printer door.

6. Align one side of the printer shaft into the slot.

7.   Push both ends of the printer door to its closed position.

8.   Assemble the shaft sleeve. See 11.2.2 Replace the Print Door Shaft Sleeve on page 174.

11.3 Printer Roller FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver

11.3.1 Remove the Printer Roller

1.   Remove the shaft sleeve. See 11.2.1 Remove the Printer Door Shaft Sleeve on page 173.

2.   Remove the printer roller. See step 2 to step 4 in 11.2.3 Remove the Printer Door on page 174.

11.3.2 Replace the Printer Roller

1.   Assemble the printer roller. See step 4 to step 7 in 11.2.4 Replace the Printer Door on page 175.

2.   Assemble the shaft sleeve. See 11.2.2 Replace the Print Door Shaft Sleeve on page 174.

11.4 Printer Sheet Metal FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.4.1 Remove the Printer Sheet Metal

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Press the printer button and open the printer door.

3. Remove the screws using a PH 1x150 mm screwdriver.

4. Lift the printer sheet metal along with the printer head gently.

5. Remove the screws using a PH 1x150 mm screwdriver.

6. Remove the printer sheet metal.

11.4.2 Replace the Printer Sheet Metal

1. Place the printer sheet metal in position and affix it to the printer head.

2. Using a PH 1x150 mm screwdriver, fasten the screws to secure the printer sheet metal to the printer head.

3.   Affix the thermal pad on the metal plate along the edge.

4.   Place the printer sheet metal along with the printer head in position and affix it to the metal plate.

5.   Using a PH 1x150 mm screwdriver, fasten the screws to secure the printer sheet metal to the metal plate.

6.   Push both ends of the the printer door to its closed position.

7.   Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.5 Printer Head FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.5.1 Remove the Printer Head

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.
2. Remove the printer sheet metal. See step 2 to step 6 in 11.4.1 Remove the Printer Sheet Metal on page 178.
3. Release the printer cable from the printer head.

4. Remove the printer head.

11.5.2 Replacing the Printer Head

1. Connect the printer cable to the printer head.
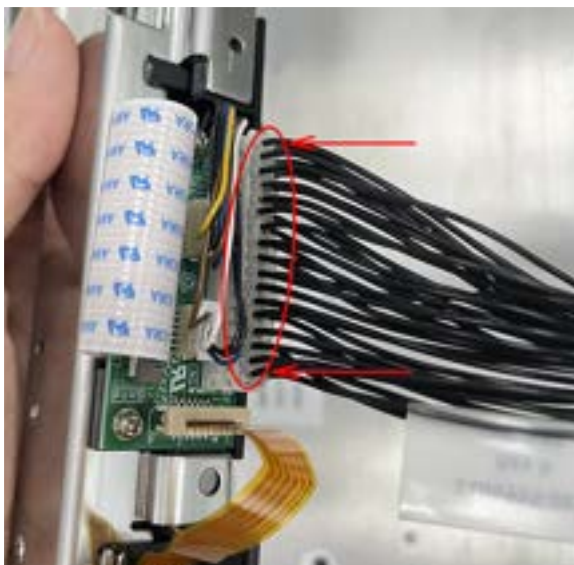
2. Assemble the printer sheet metal. See step 1 to step 6 in 11.4.2 Replace the Printer Sheet Metal on page 178.

3. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.6 Printer Cable FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.6.1 Remove the Printer Cable

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the printer sheet metal. See step 2 to step 6 in 11.4.1 Remove the Printer Sheet Metal on page 178.

3. Release the cable connectors from the main board and the printer head.

4. Remove the printer cable.

11.6.2 Replace the Printer Cable

1. Connect the printer cable to the main board and the printer head.

2. Assemble the printer sheet metal. See step 1 to step 6 in 11.4.2 Replace the Printer Sheet Metal on page 178.

3.   Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.7 Main Board FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.7.1 Remove the Main Board

1.   Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2.   Release the printer cable from the main board.

3.   If you purchase the KISS system, release the KISS cable from the main board.
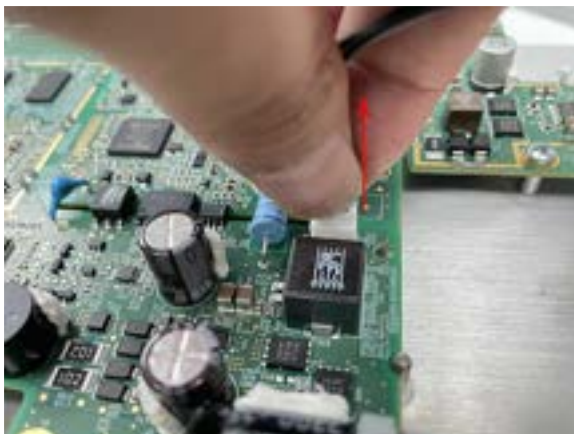
4.   Remove the screws using a PH 1x150 mm screwdriver.

5. Remove the main board.

6. Remove the thermal pads.
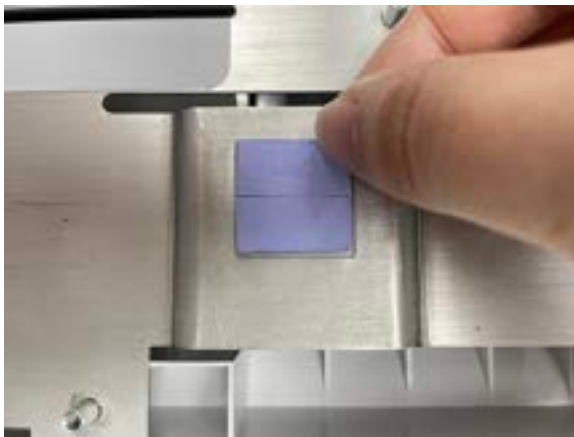
11.7.2 Replace the Main Board

1. Place the thermal pad in position along the upper left corner.
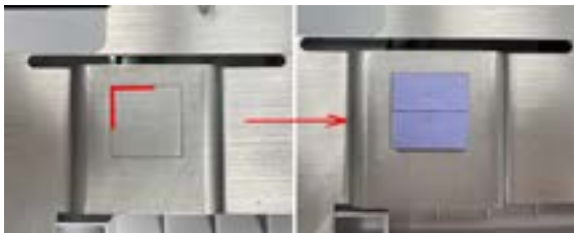
2. Place the main board in position and affix it to the metal plate.

3.   Using a PH 1x150 mm screwdriver, fasten the screws to secure the main board to the metal plate.

4.   Connect the printer cable to the main board.

5.   If you purchase the KISS system, connect the KISS cable to the main board.

6. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

7. Power on the device. See 4.1 Power On the ECG Device on page 37.

   The device boots up. You have full access to the device.

8. Perform diagnostics tests. See 7.1 Diagnostics Screen Overview on page 85.

9. From the **User Menu**, select **About**.

   The **About** dialog opens and displays information on the manufacturing software version installed on the device.

Scenario	Example	Procedure

1
 	
The manufacturing software version installed on the main board is at least as high as the production software version previously installed on the system but not higher than the production software version to which you want to upgrade
	If the system was previously running on production software version 1.01, and the main board contains manufacturing software version 1.01, and you want to install version 1.01 or higher; in this case, you need to upgrade to the production software version 1.01 or higher.	Perform the procedures as follows:
		
		1. Restore the manufacturing configuration data (except serial number and options) from the USB flash drive or reset the manufacturing configuration data manually as follows.
		
		  1.1. On the **Settings** screen, configure these settings:
		    • **AC Filter**
		    • **Paper Size**
		    • **Date Format**
		    • **Language**
		    For more details, refer to chapter *Configure Settings* in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.
		
		  1.2. On the **Service** screen,
		    • Enter the **Serial Number** of the device, see 5.4 Configure Device Information on page 60.
		    • Configure the **LAN MAC Address** of the device, see 5.4 Configure Device Information on page 60.
		    • Configure the **Thermal Printer** settings, see 5.4 Configure Device Information on page 60.
		    • Enable all the purchased options on the **Option Manager** screen, see 5.7 Enable the Options on page 65.
		    • Configure the **Wireless Country of Operation** settings, see 5.14 Configure Wireless Country of Operation on page 73.
		
		2. Upgrade the production software on the **Service** screen, see 6.1 Upgrade or Downgrade Production Software on page 80.
		
		3. Reactive the device, refer to 4.2 Self Registration on page 37 for details.
		
		4. On the **Settings** screen, install the certificates below:
		  • Wireless certificate
		  • MUSE certificate
		  • SFTP certificate
		  • Log server certificate
		  • LDAP server certificate
		  For more details, refer to chapter *Configure Settings* in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.
		
		5. Configure the network printer with LAN or WLAN network if the **NETP - Network Printer** option is

Scenario	Example	Procedure
		purchased and enabled on the **Option Manager** screen.

2
 	
The manufacturing software version installed on the main board is lower than the production software version previously running on your system or higher than the production software version to which you want to upgrade
	Example 1: If the system was previously running on production software version 1.01, but the main board contains manufacturing software version 1.0, and you want to install version 1.01 or higher; in this case, you need to install the manufacturing software version 1.01, and then upgrade to the production software version 1.01 or higher.
	
	Example 2: If the system was previously running on production software version 1.0, but the main board contains manufacturing software version 1.01, and you want to install version 1.0; in this case, you need to install the manufacturing software version 1.0, and then upgrade to the production software version 1.0.
		Perform the procedures as follows:
		
		1. Download and install the manufacturing software version you need, see 6.2 Download and Install Manufacturer Software on page 82.
		
		2. Restore the manufacturing configuration data (except serial number and options) from the USB flash drive or reset the manufacturing configuration data manually as follows.
		
		  2.1. On the **Settings** screen, configure these settings:
		    • **AC Filter**
		    • **Paper Size**
		    • **Date Format**
		    • **Language**
		  For more details, refer to chapter *Configure Settings* in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.
		
		  2.2. On the **Service** screen,
		    • Enter the **Serial Number** of the device, see 5.4 Configure Device Information on page 60.
		    • Configure the **LAN MAC Address** of the device, see 5.4 Configure Device Information on page 60.
		    • Configure the **Thermal Printer** settings, see 5.4 Configure Device Information on page 60.
		    • Enable all the purchased options on the **Option Manager** screen, see 5.7 Enable the Options on page 65.
		    • Configure the **Wireless Country of Operation** settings, see 5.14 Configure Wireless Country of Operation on page 73.
		
		3. On the **Service** screen, upgrade the production software to the same or higher version, see 6.1 Upgrade or Downgrade Production Software on page 80.
		
		4. Reactive the device, refer to 4.2 Self Registration on page 37 for details.
		
		5. On the **Settings** screen, install the certificates below:
		  • Wireless certificate
		  • MUSE certificate
		  • SFTP certificate
		  • Log server certificate
		  • LDAP server certificate

Scenario	Example	Procedure
3 The manufacturing software version installed on the main board is higher than the production software version previously running on your system	If the system was previously running on production software version 1.0, but the main board contains manufacturing software version 1.01, and you want to install version 1.01 or higher; in this case, you need to install the manufacturing software version 1.0, and then upgrade to the production software version 1.01 or higher.	For more details, refer to chapter *Configure Settings* in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*. 6. Configure the network printer with LAN or WLAN network if the **NETP - Network Printer** option is purchased and enabled on the **Option Manager** screen.

11.8 KISS Board with Cable FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in .

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.8.1 Remove the KISS Cable

1. Remove the top cover. See step 1 to step 5 in .

2. Release the cable connectors from the KISS board and the main board.

3. Remove the KISS cable.

11.8.2 Replace the KISS Cable

1. Connect the cable to the KISS board.

2. Connect the cable to the main board.

3. Attach the top cover. See step 4 to step 9 in .

11.8.3 Remove the KISS Board

1. Remove the top cover. See step 1 to step 5 in .

2. Release the cable from the KISS board.
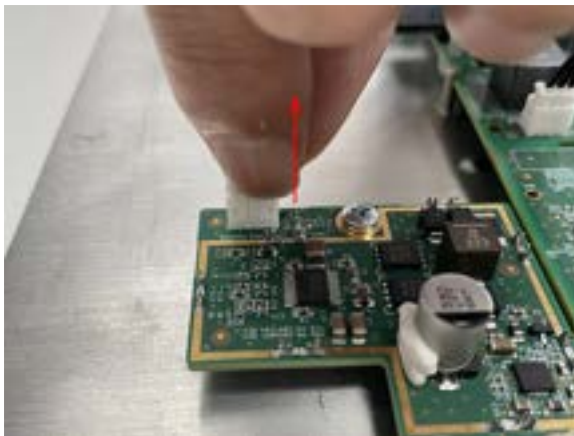
3. Remove the screws using a PH 1x150 mm screwdriver.

4. Remove the KISS board.

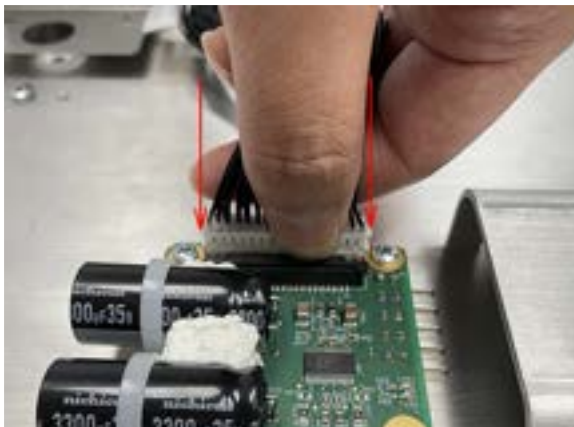# 11.8.4 Replace the KISS Board

1. Place the KISS board in position and affix it to the metal plate.

2. Using a PH 1x150 mm screwdriver, fasten the screws to secure the KISS board to the metal plate.

3. Connect the cable to the KISS board.
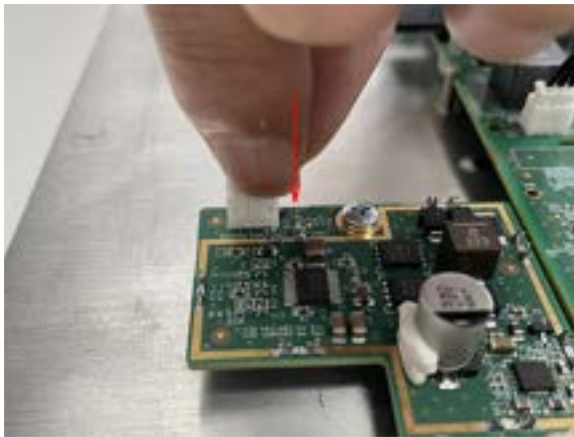
4. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.9 Ground Metal FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.9.1 Remove the Ground Metal

1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the main board. See step 2 to step 6 in 11.7.1 Remove the Main Board on page 182.

3. If you purchase the KISS system, remove the KISS board. See step 2 to 4 in 11.8.3 Remove the KISS Board on page 189.

4. If the device is MAC 5 A4 or MAC 5 A5 module, execute this step. Other modules skip this step. Remove the printer sheet metal along with the printer head. See step 2 to step 4 in 11.4.1 Remove the Printer Sheet Metal on page 178.

5. Remove the screws using a PH 1x150 mm screwdriver.

MAC 5 Lite

6.   Lift the metal plate gently and remove the ground metal.

11.9.2 Replace the Ground Metal

1.   Lift the metal plate and place the ground metal in position.
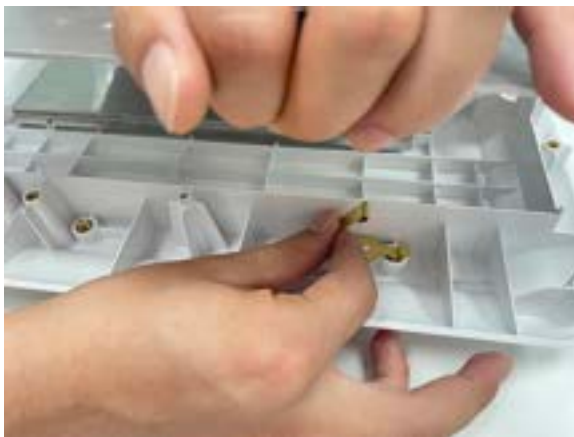
2.   Place the matel plate in position and affix it to the base.

MAC 5 A4
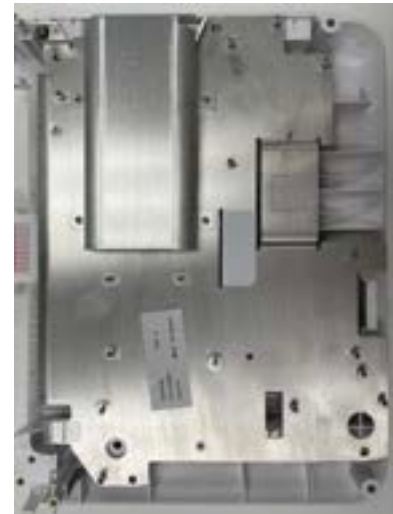
MAC 5 A5

MAC 5 Lite

3.   Using a PH 1x150 mm screwdriver, fasten the screws to secure the metal plate to the base.

MAC 5 A4

MAC 5 A5

MAC 5 Lite

4.   Assemble the printer sheet metal along with the printer head. See step 3 to step 6 in 11.4.2 Replace the Printer Sheet Metal on page 178.

5.   If you purchase the KISS system, assemble the KISS board. See step 1 to 3 in 11.8.4 Replace the KISS Board on page 190.

6.   Assemble the main board. See step 1 to step 5 in 11.7.2 Replace the Main Board on page 183.

7.   Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.10 Handle FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

 • PH 1x150 mm screwdriver

 • T15 Torx screwdriver

11.10.1 Remove the Handle

1.   Turn over the device gently.

2.   Turn the handle to the maximum.

MAC 5 A4

MAC 5 A5 / MAC 5 Lite

3.   Remove the screws on the handle using a PH 1x150 mm screwdriver.
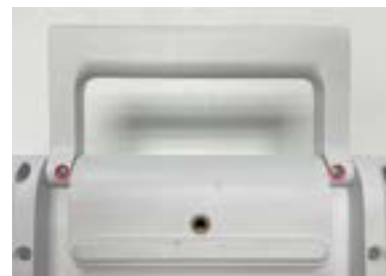
MAC 5 A4

MAC 5 A5 / MAC 5 Lite

4. Turn the handle to the initial position.

MAC 5 A4

MAC 5 A5 / MAC 5 Lite

5. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

6. Remove the main board. See step 2 to step 6 in 11.7.1 Remove the Main Board on page 182.

7. If you purchase the KISS system, remove the KISS board. See step 2 to 4 in 11.8.3 Remove the KISS Board on page 189.

8. If the device is MAC 5 A4 or MAC 5 A5 module, execute this step. Other modules skip this step. Remove the printer sheet metal along with the printer head. See step 2 to step 4 in 11.4.1 Remove the Printer Sheet Metal on page 178.

9. Remove the screws using a PH 1x150 mm screwdriver.

MAC 5 A4

MAC 5 A5

MAC 5 Lite

10. Move the metal plate a little bit to make the hinges visible.

11. Remove the screws on the hinges using a PH 1x150 mm screwdriver.

12. Pull and remove the right hinge.

13. Pull and remove the left hinge.

14. Remove the handle.

11.10.2 Replace the Handle

1. Place the handle to the bottom cover and hold.

2. Align the holes of the bottom cover to the slots of the handle on both sides.

3.   Insert the hinge marked as R into the right slot.

4.   Insert the hinge marked as L into the left slot.

5.   Using a PH 1x150 mm screwdriver, fasten the screws to secure the hinges to the bottom cover.

6. Assembly the metal plate. See step 2 to step 6 in 11.9.2 Replace the Ground Metal on page 192.

7. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

8. Turn over the device gently.

9. Turn the handle to the maximum.

| MAC 5 A4 | MAC 5 A5 / MAC 5 Lite |

10. Using a PH 1x150 mm screwdriver, fasten the screws on the handle.

| MAC 5 A4 | MAC 5 A5 / MAC 5 Lite |

11. Turn the handle to the initial position.

MAC 5 A4   MAC 5 A5 / MAC 5 Lite

11.11 Paper Spacer FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.11.1 Remove the Paper Spacer

1. Turn over the device gently.

2. Remove the screws on the bottom using a PH 1x150 mm screwdriver.

3. Remove the top cover. See step 1 to step 5 in 10.3.1 Remove the Base Frame on page 160.

4. Remove the main board. See step 2 to step 6 in 11.7.1 Remove the Main Board on page 182.

5. If you purchase the KISS system, assemble the KISS board. See step 1 to 3 in 11.8.4 Replace the KISS Board on page 190.

6. Remove the printer sheet metal along with the printer head. See step 2 to step 4 in 11.4.1 Remove the Printer Sheet Metal on page 178.

7. Remove the screws using a PH 1x150 mm screwdriver.

8. Move the metal plate a little bit to make the paper spacer visible.

9. Lift the paper spacer.

11.11.2 Replace the Paper Spacer

1. Place the paper spacer in position.

2. Assembly the metal plate. See step 2 to step 6 in 11.9.2 Replace the Ground Metal on page 192.

3. Attach the top cover assembly. See step 4 to step 9 in 10.3.2 Replace the Base Frame on page 162.

4. Turn over the device gently.

5. Move the two paper latches, basing on the paper size.

6. Using a PH 1x150 mm screwdriver, fasten the screws to secure the paper spacer.

A4 Paper   Letter Paper

11.12 Paper Pull Tab FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.12.1 Remove the Paper Pull Tab
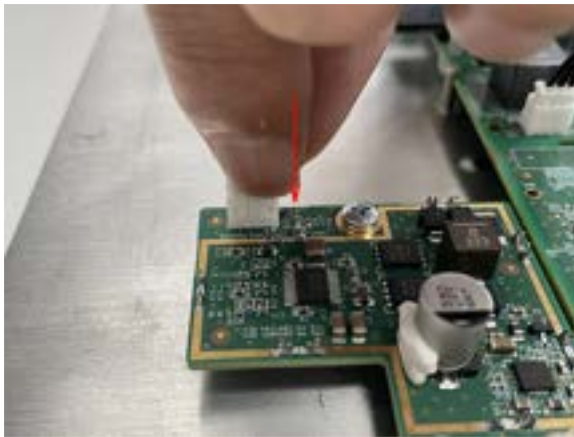
1. Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

2. Remove the main board. See step 2 to step 6 in 11.7.1 Remove the Main Board on page 182.

3. If you purchase the KISS system, remove the KISS board. See step 2 to 4 in 11.8.3 Remove the KISS Board on page 189.

4. Remove the printer sheet metal along with the printer head. See step 2 to step 4 in 11.4.1 Remove the Printer Sheet Metal on page 178.

5. Remove the screws using a PH 1x150 mm screwdriver.

MAC 5 A4   MAC 5 A5

6. Tear the paper pull tab from the metal plate.

7. Remove the metal plate.

8. Remove the screws using a PH 1x150 mm screwdriver.

9. Remove the cover plate.

10. Remove the paper pull tab.

11.12.2 Replace the Paper Pull Tab

1. Place the paper pull tab in position, the patterned end is close to the printer.

2. Place the cover plate in position and affix it to the bottom cover.

3. Using a PH 1x150 mm screwdriver, fasten the screws to secure the cover plate to the bottom cover.

4. Put the no patterned end through the metal plate and paste on it.

5.   Fold and paste the paper pull tab along the line, based on the paper size.

A4 Paper
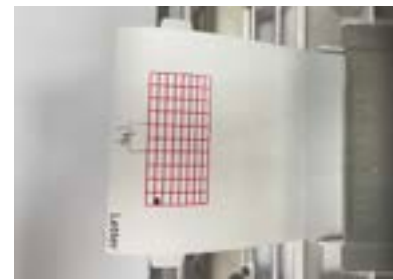
Letter Paper

A5 Paper

6.   Assembly the metal plate. See step 2 to step 6 in 11.9.2 Replace the Ground Metal on page 192.

7.   Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

11.13 Bottom FRU Replacement

Before beginning the FRU replacement procedure, follow the instructions in 9.1.1 Prepare the System for FRU Replacement on page 137.

Tools Required:

- PH 1x150 mm screwdriver
- T15 Torx screwdriver

11.13.1 Remove the Bottom

1.   Turn over the device gently.

2.   Turn the handle to the maximum.

3.   Remove the screws on the bottom using a PH 1x150 mm screwdriver.

4.   Remove the printer door along with the roller. See step 1 to step 2 in 11.2.3 Remove the Printer Door on page 174.

5.   Remove the top cover. See step 1 to step 5 in 10.1.1 Remove the Battery Door on page 154.

6.   Remove the metal ground. See step 2 to step 7 in 11.12.1 Remove the Paper Pull Tab on page 202.

7.   If the device is MAC 5 A4 or MAC 5 A5 module, execute this step. Other modules skip this step. Remove the paper pull tab. See step 8 to step 10 in 11.12.1 Remove the Paper Pull Tab on page 202.

8.   Remove the ground metal.

9. If the device is MAC 5 A4 module, execute this step. Other modules skip this step. Remove the paper spacer.

10. Remove the handle. See step 11 to step 14 in 11.10.1 Remove the Handle on page 194.

11.13.2 Replace the Bottom

1. Apply the new foot pads.

2. Turn over the bottom cover gently.

3. Assemble the handle. See step 1 to step 5 in 11.10.2 Replace the Handle on page 197.

4. If the device is MAC 5 A4 module, execute this step. Other modules skip this step. Place the paper spacer in position.

5. Place the ground metal in position.

6. If the device is MAC 5 A4 or MAC 5 A5 module, execute this step. Other modules skip this step. Assemble the paper pull tab. See step 1 to step 5 in 11.12.2 Replace the Paper Pull Tab on page 204.

7. Assembly the metal plate. See step 2 to step 6 in 11.9.2 Replace the Ground Metal on page 192.

8. Attach the top cover. See step 4 to step 9 in 10.1.2 Replace the Battery Door on page 156.

9. Assemble the printer door. See step 6 to step 8 in 11.2.4 Replace the Printer Door on page 175.

10. Turn the handle to the maximum and fasten the screws using a PH 1x150 mm screwdriver

MAC 5 A4   MAC 5 A5 / MAC 5 Lite

11. If the device is MAC 5 A4 module, execute this step. Other modules skip this step. Move the two paper latches to the proper position, and fasten the screws using a PH 1x150 mm screwdriver.

A4 Paper   Letter Paper

12 Functional Checkout

12.1 Recommended Maintenance

Regular yearly maintenance, irrespective of usage, is essential to ensure that the equipment is always functional when required.

Refer to the *MAC™ 5 Resting ECG Analysis System Operator's Manual* for cleaning procedures. The system does not require any calibration procedures.

12.2 Functional Checkout Workflow

This procedure shows you the workflow to perform a functional checkout of the device.

This section identifies the workflow of the visual inspections and functional checkout procedures that you must perform when you replace a FRU. All inspection and checkout procedures identified for a FRU also apply to the FRU's internal expansion boards and components.

1. Locate the appropriate FRU or non-FRU repair in one of the following tables:

   - Table 12-2 Optional System FRU Repairs on page 210
   - Table 12-3 Non-FRU Repairs on page 210

2. To perform the visual inspections required for the repair, do the following:

   2.1. Record the numbers in the repair's corresponding Visual Inspections column.

   2.2. Refer to 12.5 Visual Inspection [as per IEC62353:2014(subsection 5.2) requirement] on page 211.

   2.3. Locate and perform the inspections associated with the numbers in the repair's corresponding Visual Inspections column.

3. To perform the functional checkouts required for the repair, do the following:

   3.1. Record the numbers in the repair's corresponding Functional Checkouts column.

   3.2. Refer to 12.7 Functional Checkout Procedures on page 214.

   3.3. Record the numbers in the repair's corresponding Functional Checkouts column.

12.3 FRU Repairs

This section provides an overview of the types of FRU repairs and their associated visual inspections and functional checkout procedures.

FRU repairs can be categorized into two types:

- Table 12-1 Basic System FRU Repairs on page 210
- Table 12-2 Optional System FRU Repairs on page 210

Table 12-1 Basic System FRU Repairs

FRU	Visual Inspections	Functional Checkouts		
		Operational Checks	Diagnostic Checks	Electrical Safety Checks
Printer Module	1, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14	1, 2	1, 3, 5, 6	Yes
Battery	1, 7	-	2	-
Display Assembly	1, 2, 4, 5, 10, 12, 13, 14	6	1, 4, 9, 12	Yes
Main Board	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Yes
Power Cord	1, 6	-	2	-
Hardware Kit (Plastic parts, fasteners, bracket)	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14	1, 6	-	Yes
Harness/Cables	1, 2, 9, 10, 12, 13, 14	1, 2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Yes

Table 12-2 Optional System FRU Repairs

FRU	Visual Inspections	Functional Checkouts		
		Operational Checks	Diagnostic Checks	Electrical Safety Checks
KISS Pump	1, 2	1, 2	11	-
Barcode Reader	1, 2	1, 2, 5	3	-
KISS Board	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	1, 2, 6	6, 11	Yes

12.4 Non-FRU Repairs

This section provides an overview of the types of non-FRU repairs and their associated visual inspections and functional checkout procedures.

Table 12-3 Non-FRU Repairs

Type of Repair	Visual Inspection	Functional Checkouts		
		Operational Checks	Diagnostic Checks	Electrical Safety Checks
No parts replaced	7, 10, 11, 12	1, 2, 3, 4, 5, 6	-	Yes (If the device is opened)
Installation	7, 10, 11, 12	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	-	Yes (If the device is opened)
Software Update	-	1, 2, 3, 4, 5, 6	-	-
Hardware Upgrade	10, 11, 12, 13	1, 2, 3, 4, 5, 6	-	Yes (If the device is opened)
Annual Electrical Safety Checkout	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	Yes

12.5 Visual Inspection [as per IEC62353:2014(subsection 5.2) requirement]

Visual inspections are performed to make sure that the repair procedure is successful. A thorough visual inspection of the equipment can save time. Disconnected cables, foreign debris on expansion boards, missing hardware, or loose components can frequently cause symptoms and equipment failures that may seem to be unrelated and difficult to track.

WARNING

ELECTRICAL HAZARD

Improper handling during visual inspection could result in electrical shock.

To avoid potential shock, observe the following guideline at all times: Before inspecting or cleaning the device, turn it off, unplug it from AC power, and remove the battery.

1. Verify the device surface is free of cracks, dust collection, or other damages.

2. Inspect the patient cable, leadwires, and electrodes and verify they do not exhibit any of the following problems:

   • Defects or damages

   • Metal part corrosion

   • Discoloration

   • Brittle wires and connectors

   • Expiration

3. Verify the keyboard does not exhibit any of the following problems:

   • Cuts or cracks in the keyboard membrane

   • Illegible labels on the keys

4. Verify the touchscreen display does not exhibit any of the following problems:

   • Scratches or cracks

   • An opaque display filter (transparent part of the keyboard bezel) that impair viewing

5. Verify the power source does not exhibit any of the following problems:

   • Faulty wiring, especially the AC outlet

   • Circuit not dedicated to the system

   NOTE
   Power source problems can cause static discharge, resetting problems, and noise.

6. Verify the I/O connectors, cables, and AC power cord do not exhibit any of the following problems:

   • Fraying or other damage

   • Bent prongs or pins

   • Cracked housing

   • Loose screws in the plugs

7. Verify the battery pack does not exhibit any of the following problems:

    - Cracked, swollen, or leaky battery pack enclosure

    - Debris on the battery pack electrical contacts

8. Verify the trolley and casters do not exhibit any problem.

9. Verify the wireless antenna does not exhibit any of the following problems:

    - Loose connection

    - Dirt, scratches, or debris on the contacts

10. Verify all harnesses do not exhibit any of the following problems:

    - Excessive tension or wear

    - Loose connection

    - Strain reliefs out of place

11. Verify all ground wires/wiring does not exhibit any of the following problems:

    - Loose wires or ground strap connections

    - Faulty wiring

    - Wires pinched or in a vulnerable position

12. Verify all mounting hardware/fasteners have been replaced and secured.

    Check for loose or missing screws or other hardware, especially fasteners used as connections to ground planes on expansion boards.

13. Verify the circuit boards do not exhibit any of the following problems:

    - Moisture, dust, or debris (top and bottom)

    - Loose or missing components

    - Burn damage or the smell of over-heated components

    - Socketed components not firmly seated

    - Expansion board not seated properly in edge connectors

    - Solder problems: cracks, splashes on board, incomplete feedthrough, prior modifications or repairs

14. Verify the safety related marking, labels and labeling on the product are legible and complete.

15. Verify all the gaps of the plastic parts is fit and finished. Verify there is no deformation on the plastic parts.

12.6 Electrical Safety Checks

1. Perform the current leakage test and ground continuity tests and verify the test results meet requirements.

Table 12-4 Electrical Safety Checklist

Step	Test	Condition	UUT - ON	Result	Leakage Current Limits
Measuring of Protective Earth Resistance [As per IEC 62353:2014 (subsection 5.3.2) requirement]					
1	AC mains power cord ground prong to exposed metal surface (ground lug)	NA	_____ Ohm	Pass/Fail	<= 100 mΩ
Equipment Leakage Current [As per IEC 62353:2014 (subsection 5.3.4.2) requirement]					
1	Forward Polarity	NC	_____ uA	Pass/Fail	<=500 uA
2	Neutral open, Forward Polarity	SFC	_____ uA	Pass/Fail	<=1000 uA
3	Neutral open, Reverse Polarity	SFC	_____ uA	Pass/Fail	<=1000 uA
4	Reverse Polarity	NC	_____ uA	Pass/Fail	<=500 uA
Touch Current (Not Mandatory for IEC 62353 Standard)					
1	Forward Polarity	NC	_____ uA	Pass/Fail	<=100 uA
2	Neutral open, Forward Polarity	SFC	_____ uA	Pass/Fail	<=500 uA
3	Ground open, Forward Polarity	SFC	_____ uA	Pass/Fail	<=500 uA
4	Ground open, Reverse Polarity	SFC	_____ uA	Pass/Fail	<=500 uA
5	Neutral open, Reverse Polarity	SFC	_____ uA	Pass/Fail	<=500 uA
6	Reverse Polarity	NC	_____ uA	Pass/Fail	<=100 uA
Patient Leakage Current (Not Mandatory for IEC 62353 Standard)					
1	Forward Polarity	NC	_____ uA	Pass/Fail	<=10 uA
2	Neutral open, Forward Polarity	SFC	_____ uA	Pass/Fail	<=50 uA
3	Ground open, Forward Polarity	SFC	_____ uA	Pass/Fail	<=50 uA
4	Ground open, Reverse Polarity	SFC	_____ uA	Pass/Fail	<=50 uA
5	Neutral open, Reverse Polarity	SFC	_____ uA	Pass/Fail	<=50 uA
6	Reverse Polarity	NC	_____ uA	Pass/Fail	<=10 uA
Applied Part leakage current [As per IEC 62353:2014 (subsection 5.3.4.3) requirement]					
1	Forward Polarity Neutral / Ground Closed	SFC	_____ uA	Pass/Fail	<=50 uA
2	Reverse Polarity Neutral / Ground Closed	SFC	_____ uA	Pass/Fail	<=50 uA

Key to Condition Abbreviations

- NC = Normal Condition
- SFC = Single Fault Condition
- NA = Not Applicable
- UUT = Unit Under Test
- All SIPs/SOPs grounded.

12.7 Functional Checkout Procedures

This procedure shows you how to perform a functional checkout of the device.

Make sure that you have performed a visual inspection of the replaced FRU.

Functional checkouts are performed to verify that the repair procedure is successful. There are two types of functional checkout procedures.

- Operational Checks on page 214
- Diagnostic Checks on page 214

Operational Checks

> **NOTE**
>
> For more information on each check, refer the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.

1. Record a rhythm strip of simulated ECG data and verify it recorded successfully.

2. Record a 12-lead ECG and verify it is analyzed and recorded successfully. Use an ECG simulator set with Normal Sinus Rhythm (NSR), a known heart rate, and a known gain, for example, NSR @ 80bpm, 1 mV R-wave.

3. Store a simulated ECG and verify it stored successfully.

4. Scan a barcode using the barcode reader connected to the device and verify the barcode reader communicated successfully with the device.

5. Lock the trolley casters and verify the wheels did not move.

6. Configure wireless network and verify it connected successfully.

7. Verify if the default Location ID was configured correctly.

8. Configure DCP transmission to MUSE or Gateway:

   - Verify if the server URL and port were configured correctly;
   - Verify if the test was transmitted successfully.

9. Configure order download from MUSE or Gateway and verify the order was downloaded successfully.

   - Verify if the server URL and port, username, password and Download Location Filter were configured correctly;
   - Verify if the order was downloaded successfully.

10. Configure USB/Shared Folder/SFTP transmission per customer needs and verify the test was transmitted successfully.

Diagnostic Checks

1. Perform the Touchscreen Diagnostics and verify the test passed successfully.

   See 7.2 Perform Touchscreen Diagnostics on page 85.

2. Perform the quick battery charge and discharge test and verify the test passed successfully.

   See 7.5 Perform Quick Battery Charge and Discharge Test on page 90.

3. Perform the Barcode Diagnostics and verify the test passed successfully.

   See 7.6 Perform Barcode Reader Diagnostics on page 91.

4. Perform the Display Diagnostics and verify the test passed successfully.

   See 7.7 Perform Display Diagnostics on page 94.

5. Perform the Audio Diagnostics and verify the test passed successfully.

   See 7.8 Perform Audio Diagnostics on page 95.

6. Perform the Writer Diagnostics and verify the test passed successfully.

   See 7.9 Perform Writer Diagnostics on page 96.

7. Perform the LAN Diagnostics and verify the test passed successfully.

   See 7.10 Perform LAN Diagnostics on page 101.

8. Perform the WLAN Diagnostics and verify the test passed successfully.

   See 7.11 Perform WLAN Diagnostics on page 102.

9. Perform the Brightness Diagnostics and verify the test passed successfully.

   See 7.12 Perform Brightness Diagnostics on page 105.

10. Perform the USB Port Diagnostics and verify the test passed successfully.

    See 7.13 Perform USB Port Diagnostics on page 106.

11. Perform the KISS Pump Diagnostics and verify the test passed successfully.

    See 7.14 Perform KISS Pump Diagnostics on page 107.

12. Perform the Keyboard LED Diagnostics and verify the test passed successfully.

    See 7.15 Perform Keyboard LED Diagnostics on page 108.

13 Troubleshooting

13.1 Self Registration Errors

You may encounter the errors below during self registration:

- **Invalid Email**
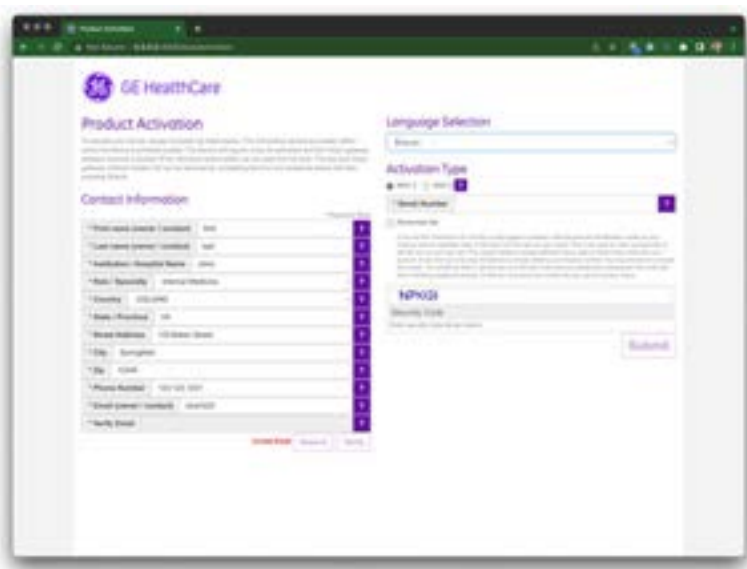
Troubleshooting: Make sure that you enter a valid email address in the **Email (owner / contact)** field.

- **Invalid OTP (One Time Passcode)**
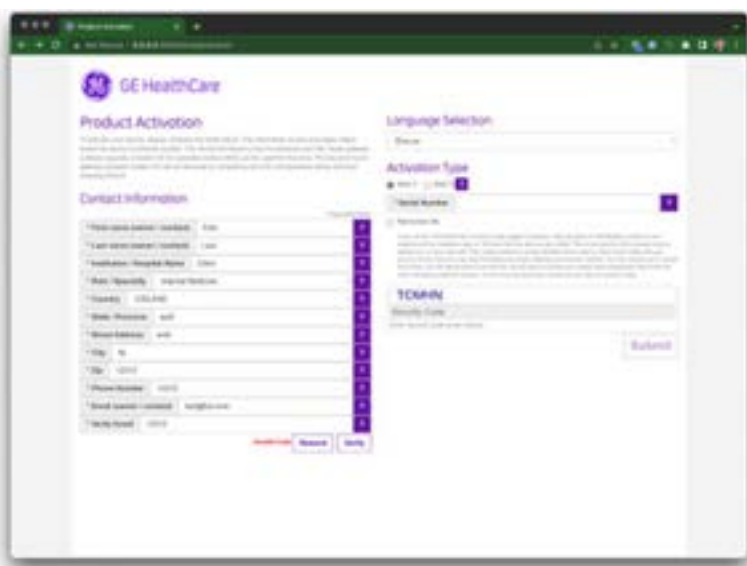
Troubleshooting: Enter the correct OTP (One Time Passcode) that you receive via email in the **Email Verification Code** field.

- **Invalid Serial Number and Security Code**
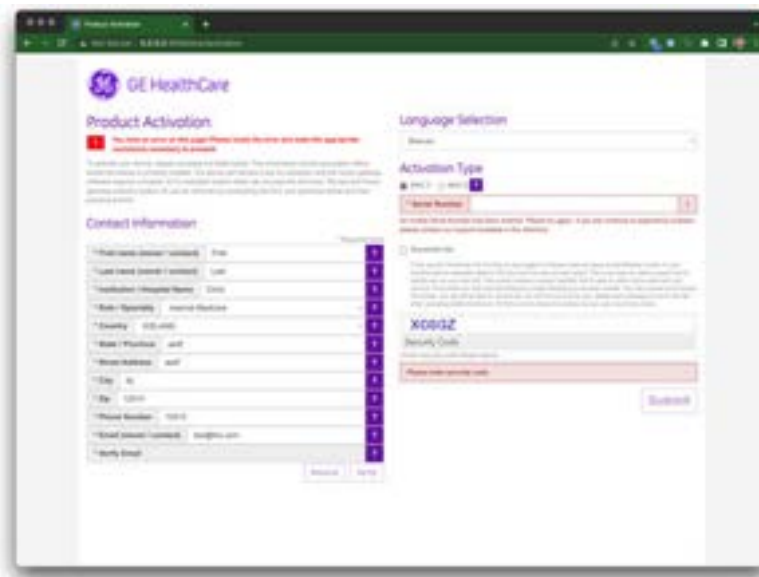
Troubleshooting: Make sure that you enter the correct **Serial Number** and **Security Code**.

- **Activation Failure**
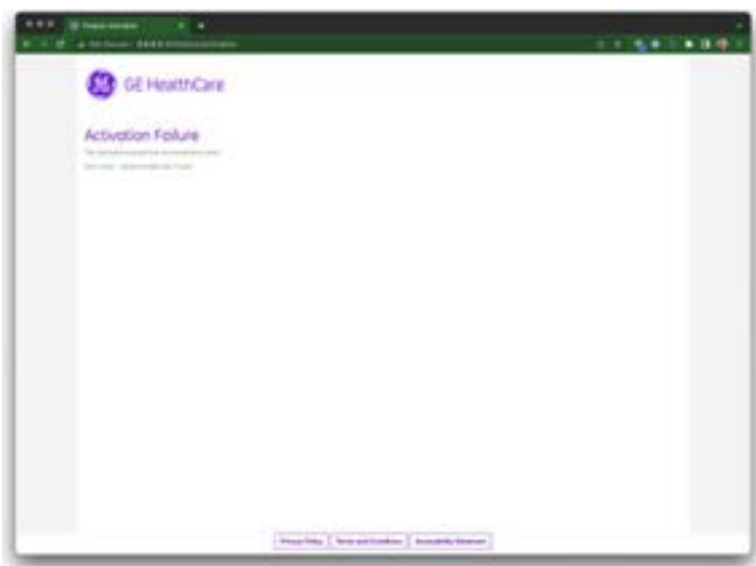
Troubleshooting: If you encounter this error, contact the GE HealthCare Contact Center.

13.2 ECG Data Noise

Several factors can result in unacceptable noise levels on ECGs:

- **Environmental factors**

Interference from electromagnetic equipment (such as radios, cell phones, or other medical equipment) can result in excess noise. Verify the environment in which the device is being used

meets the minimum EMC requirements. Refer to the *MAC™ 5 Resting ECG Operator's Manual* for more information.

- **Inadequate patient preparation**

    Improper patient preparation or electrode placement can result in excess noise on ECGs.

    ◦ Verify the patient's skin has been properly prepared and that the electrodes have been placed correctly.

    ◦ Check the patient's position. The patient should remain motionless during the acquisition of a resting ECG.

    Refer to the *MAC™ 5 Resting ECG Operator's Manual* for more information.

- **Leadwire, cable, and electrode failure**

    Do the following:

    ◦ Check for defective, broken, or disconnected leadwires.

    ◦ Check for defective or expired electrodes.

You can use the Hookup Advisor to monitor ECG signal quality. It can help you pinpoint whether the noise is caused by leadwire failure, baseline shift, muscle artifacts, power line interference, baseline wander, or electrode noise. This can point you to the correct areas for additional troubleshooting. Refer to the *MAC™ 5 Resting ECG Operator's Manual* for more information.

13.3 Software Upgrade Errors

Table 13-1 Software Upgrade Errors

Error Message	Reason for Failure	How to Troubleshoot
`Digital signature validation failed`	The software image available in the USB flash drive or shared folder is not digitally signed or corrupted.	Ensure the software image in the USB flash drive or shared folder is digitally signed.
`Invalid software image`	The software image in the USB flash drive or shared path is invalid.	Ensure the USB flash drive or shared path contains a valid version of the digitally signed software image.
`Software upgrade failed. Retry. Contact GE Service if problem persists.`	System error.	Retry software upgrade. Contact your local GE Healthcare Service support representative, if problem persists.
`Host software image is not digitally signed`	The software image is not digitally signed.	Contact your GE Healthcare Service Support representative to obtain the digitally signed version of the software image.
`Cannot find compatible software and manual packages.`	Before the manual upgrade, the software or manual packages are not available in the USB flash drive or shared folder.	Ensure the software and manual packages are present in the root directory of the USB flash drive or shared folder. Then retry upgrade.
`Plug in the USB or connect the device to the network and then continue the upgrade progress.`	Before the manual upgrade, the USB flash drive is removed or the device is disconnected from the network.	Ensure the USB flash drive is reinserted or the device is reconnected to the network. Then retry upgrade.

Table 13-2 Software Upgrade Errors- via USB

Error Message	Reason for Failure	How to Troubleshoot
`Image is not found in the USB path`	The software image is not present in the inserted USB flash drive.	Ensure the USB flash drive contains the correct version of the digitally signed software image.
`Copying software upgrade files unsuccessful`	The software image or digital signature in the USB flash drive is not assigned with sufficient permissions to copy the files.	Verify and provide RW permissions to the software upgrade files in the USB flash drive.
`Connect the USB drive to upgrade software`	Software upgrade using the **USB** option is selected, but the USB flash drive is not detected.	Connect the USB flash drive containing the digitally signed version of the software image.
`Software image is not found in the USB`	Software upgrade using the **USB** option is selected, but the software image is not found on the USB flash drive.	Verify that the USB flash drive contains the host software image in the root directory.
`USB access denied`	Software upgrade using the **USB** option is selected, but access to the USB flash drive is denied.	Enable the option to allow access to external storage devices in the **Settings** > **System > Storage** settings. See *MAC™ 5 Resting ECG Analysis System Operator's Manual* for more information.

Table 13-3 Software Upgrade Errors- via Shared Folder

Error Message	Reason for Failure	How to Troubleshoot
`Shared network folder is disabled in Settings screen`	The network shared path is disabled in the settings.	Ensure that the network shared path is enabled and configured in the **Network > Shared Network** settings. See the *Configuring Settings* chapter in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.
`Shared network not configured`	The shared path is not configured in the device.	Ensure that the shared path is configured in the **Network > Shared Network** settings. See the *Configuring Settings* chapter in the *MAC™ 5 Resting ECG Analysis System Operator's Manual*.
`Software image not found in shared folder`	The software image is not present in the shared path.	Ensure that the shared path contains a valid version of the digitally signed software image.
`No network connection`	The device is not connected to the network.	Connect and configure LAN or WLAN in the device.
`Failed to download digital signature`	The digital signature file is not present in the network shared path.	Ensure the network shared path contains a digitally signed version of the software image.
`Installation of software image unsuccessful`	Failed to extract the software image to the inactive partition during the software upgrade via a shared network.	Copy the valid software image to the USB flash drive and retry software upgrade.

Continues on the next page

Table 13-3 Software Upgrade Errors- via Shared Folder (Table continued)

Error Message	Reason for Failure	How to Troubleshoot
`Software image not found in shared folder`	The software image is not present in the shared path.	Ensure that a valid version of the digitally signed software image files is present in the root directory of the shared folder.
`Shared network folder is disabled in Settings screen`	Software upgrade using the **Shared Folder** option is selected, but the shared folder is not configured.	Configure the shared network path in the **Network > Shared Network** settings. See the *MAC*™ *5 Resting ECG Analysis System Operator's Manual*.

13.4 Troubleshooting USB Port Failures

```
                        ┌─────────────────────────────┐
                        │       USB port failure       │
                        └─────────────────────────────┘
                                      │
                                      ▼
              ┌──────────────────────────────────────────────┐
              │ Verify that the Enable External Storage option and │
              │  the USB ports are enabled in General settings. If  │
              │  this option is disabled, access to USB devices is  │
              │                   blocked.                    │
              └──────────────────────────────────────────────┘
                                      │
                                      ▼
                   ┌─────────────────────────────────┐
                   │   Perform USB Port Diagnostics    │
                   └─────────────────────────────────┘
                                      │
                                      ▼
                                   ◇ Is the USB device ◇
     ┌──────────────────┐  Yes     detected in both
     │ End of procedure  │◄──────    two USB ports?
     └──────────────────┘
                                      │ No
                                      ▼
              ┌──────────────────────────────────────────┐
              │    Check for physical damage of USB ports   │
              └──────────────────────────────────────────┘
                                      │
                                      ▼
                 ┌────────────────────────────────────┐
                 │ If there is no damage, verify that the  │
                 │   USB device is inserted correctly    │
                 └────────────────────────────────────┘
                                      │
                                      ▼
                                   ◇ Is the USB device ◇
     ┌──────────────────┐  Yes     detected in both
     │ End of procedure  │◄──────    two USB ports?
     └──────────────────┘
                                      │ No
                                      ▼
                 ┌────────────────────────────────────┐
                 │   Perform USB Port Diagnostics with   │
                 │           another USB device          │
                 └────────────────────────────────────┘
                                      │
                                      ▼
                                   ◇ Is the USB device ◇
     ┌──────────────────┐  Yes     detected in both
     │ End of procedure  │◄──────    two USB ports?
     └──────────────────┘
                                      │ No
                                      ▼
                       ┌──────────────────────┐
                       │      Replace the       │
                       │    expansion board     │
                       └──────────────────────┘
                                      │
                                      ▼
                                   ◇ Is the USB port ◇
     ┌──────────────────┐  Yes     failure resolved?
     │ End of procedure  │◄──────
     └──────────────────┘
                                      │
                                      ▼
                       ┌──────────────────────┐
                       │   Replace the CPU board │
                       └──────────────────────┘
```

If a USB port is not working, perform the following steps to detect and troubleshoot the failure:

1. Verify that the **Enable External USB Storage** option is enabled in **Settings** > **System** > **Storage** setting. If this option is disabled, access to USB flash drives is blocked.

2. Verify that at least one USB port is enabled in **Settings** > **Hardware** > **USB Port** setting. If this option is disabled, access to USB flash drives is blocked.

3. Perform the USB Port Diagnostics Test. See .

If ….	Then ….
The USB flash drive is detected in all two USB ports	The USB ports are working.

The USB flash drive is not detected in the USB ports	1. Check for physical damage of USB ports.
	2. Verify that the USB flash drive is inserted correctly in the USB port.
	  • If the USB flash drive is detected, the USB ports are working.
	  • If the USB flash drive is not detected, proceed to the next step.
	3. Repeat the diagnostics with another USB flash drive.
	  • If the USB flash drive is detected, the USB ports are working.
	  • If the USB flash drive is not detected, proceed to the next step.
	4. Replace the expansion board. If the problem persists, proceed to the next step.
	5. Replace the main board.

13.5 Troubleshooting LAN Communication Failures
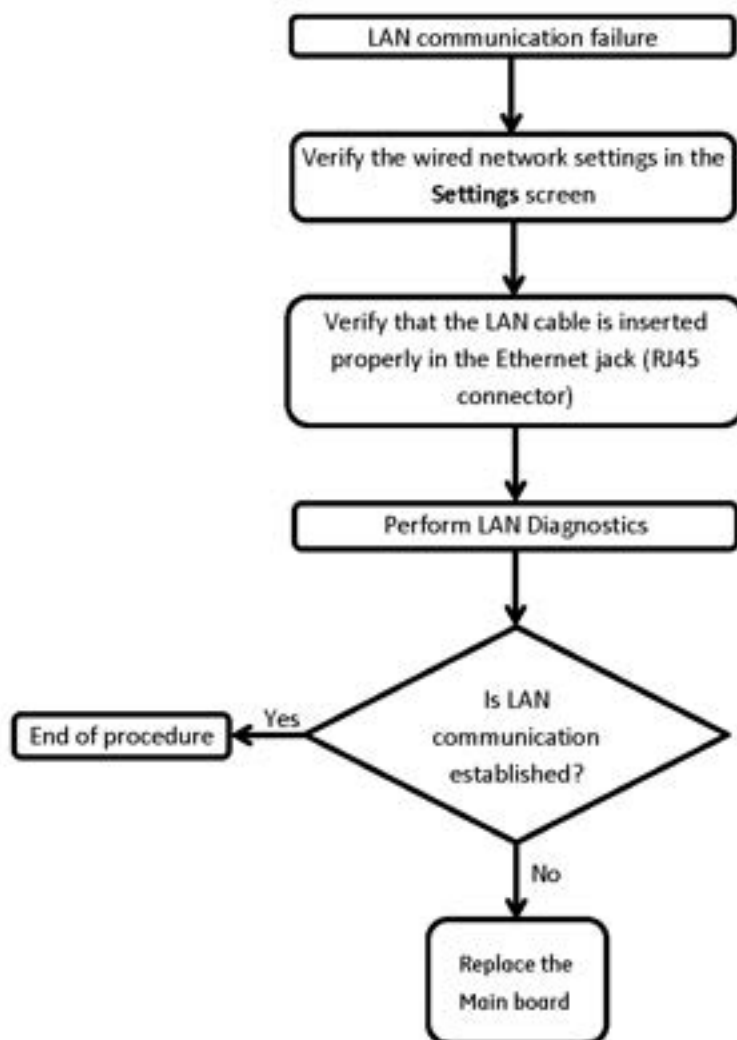
If the device is not connecting to the LAN, perform the following steps to detect and troubleshoot the LAN communication failure:

1. Verify the wired network configuration in the *Settings* screen.

2. Verify the LAN cable is inserted properly in the Ethernet jack (RJ45 connector).

3. Perform the LAN Diagnostics Test. See .

If ….	Then ….
LAN communication is established	LAN is working.
LAN communication is not established	Replace the main board.

13.6 Troubleshooting Wireless Communication Failures
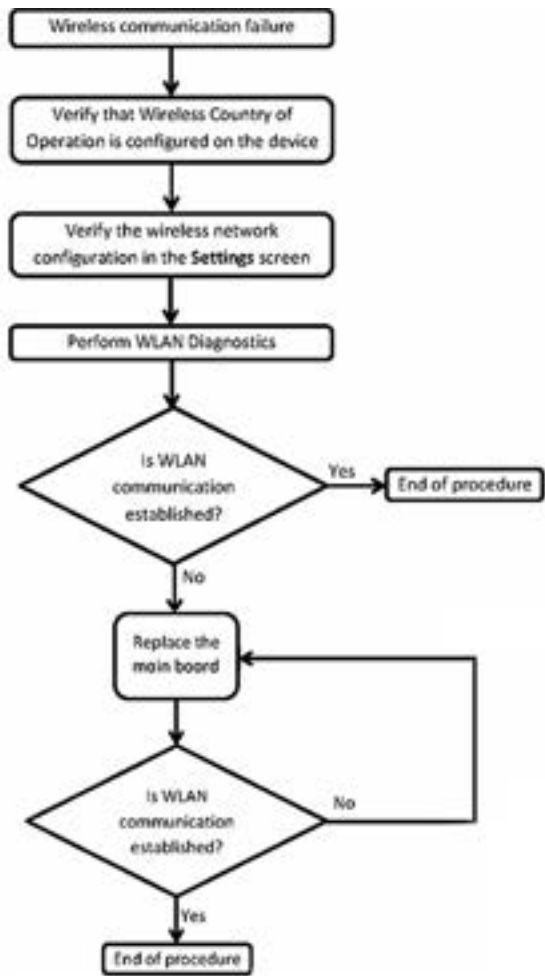
If the device is not connecting to the WLAN, perform the following steps to detect and troubleshoot the WLAN communication failure:

1. Verify **Wireless** is configured on the device.

2. Verify the wireless network configuration in the *Settings* screen.

3. Perform the WLAN Diagnostics Test. See .

If ….	Then ….
WLAN communication is established	WLAN is working.
WLAN communication is not established	For the global wireless option: • Replace the main board.

13.7 Troubleshooting Touchscreen Failures
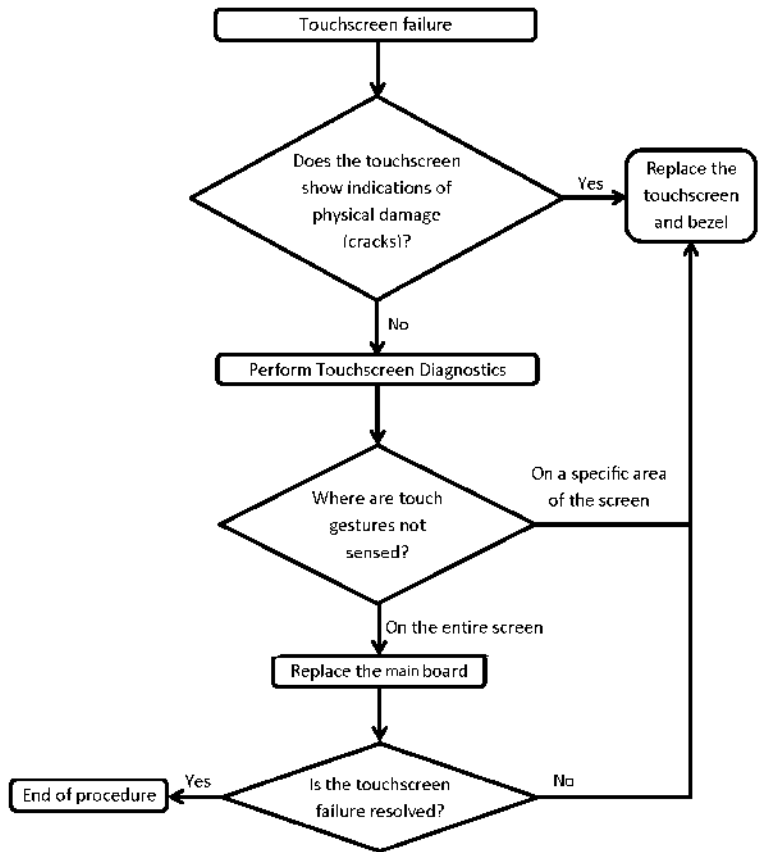
If touch gestures are not working on the screen, perform the following steps to detect and troubleshoot the failure:

Check the touchscreen for cracks or other indications of physical damage.

If ….	Then ….
There are cracks on the touchscreen	Replace the touchscreen and bezel.

There are no indications of physical damage to the screen	1. Perform the Touchscreen Diagnostics test. See 7.2 Perform Touchscreen Diagnostics on page 85.
	
	   • If touch gestures are not sensed in a specific area in the screen, the touchscreen is faulty. Replace the touchscreen and bezel.
	   • If touch gestures are not sensed in the entire screen, then the problem may not be with the touchscreen. Proceed to the next step.
	
	2. Replace the display to expansion board cable. If the problem persists, proceed to the next step.
	
	3. Replace the expansion board. If the problem persists, proceed to the next step.
	
	4. Replace the main board. If the problem persists, proceed to the next step.
	
	5. Replace the touchscreen and bezel.

13.8 Troubleshooting Printer Door Failures

If you can't pull the printer door out, perform below steps to troubleshoot the failure:

1. Remove the shaft sleeve. See 11.2.1 Remove the Printer Door Shaft Sleeve on page 173.

2. Insert the screwdriver into the slit at a horizontal 45 degree angle as the figure. Insert depth is about 4cm.
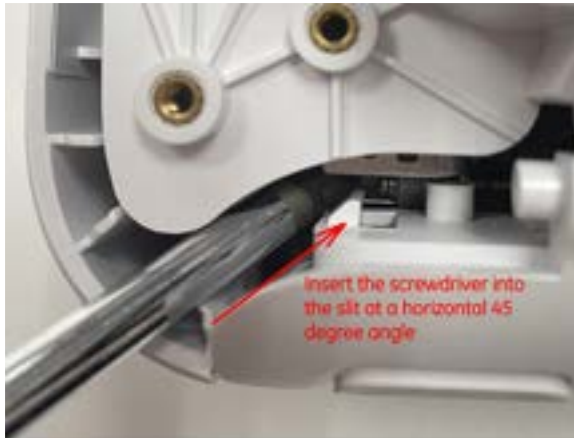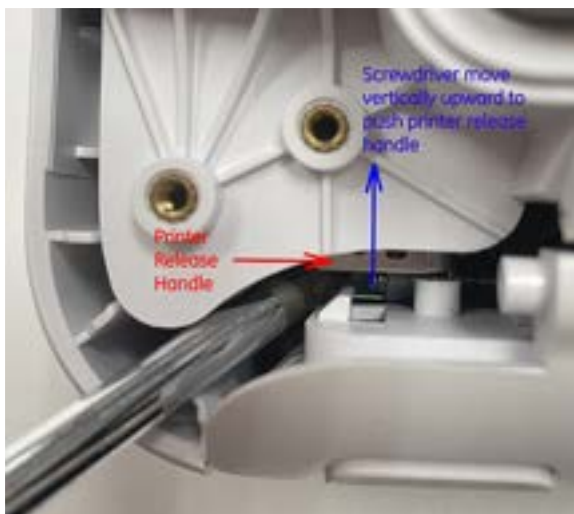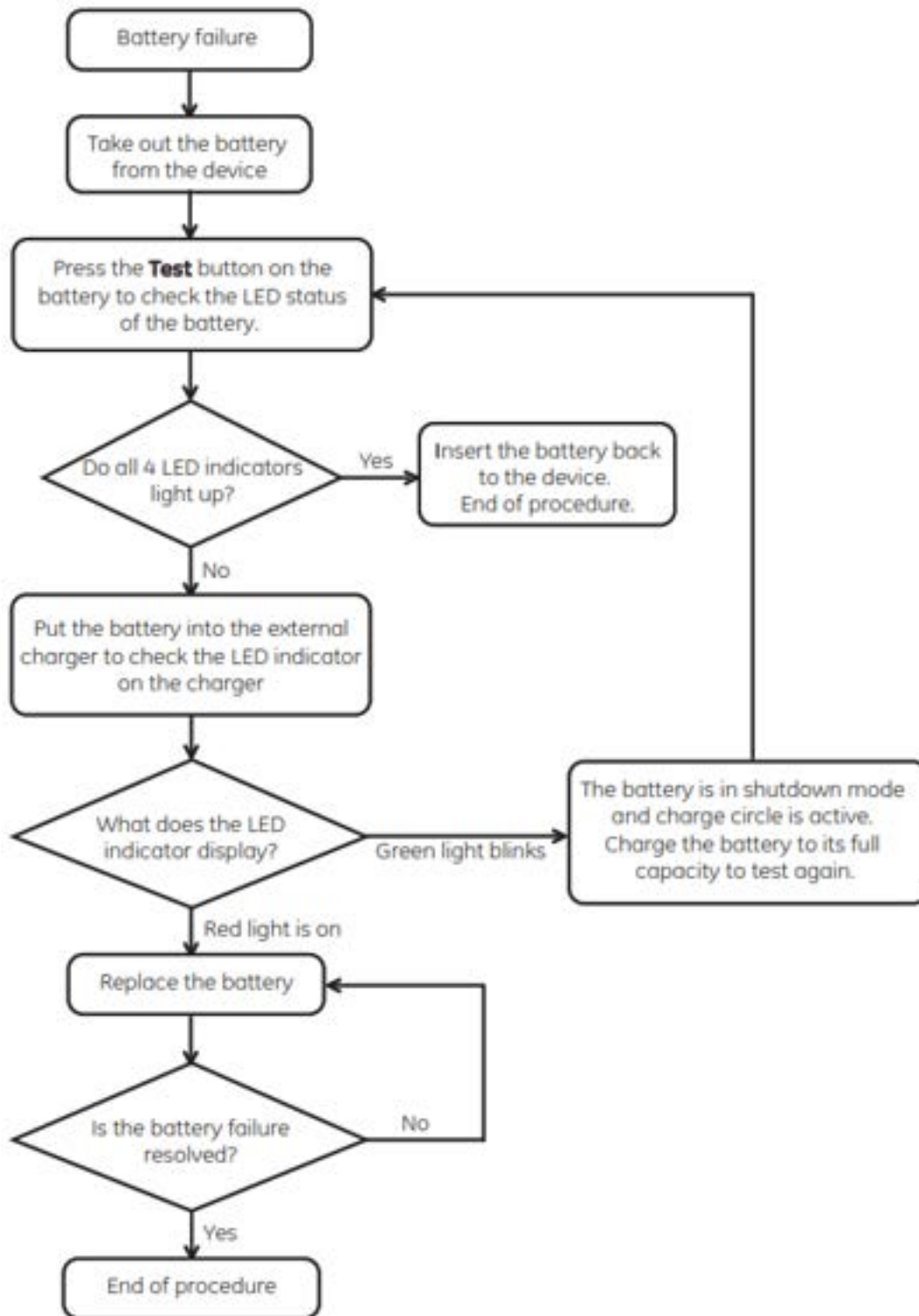

3. Move the screwdriver handle vertically upward to release the roller hook.

13.9 Troubleshooting Battery Failures


```
                    ┌─────────────────────┐
                    │   Battery failure   │
                    └─────────────────────┘
                               │
                    ┌─────────────────────┐
                    │ Take out the battery│
                    │   from the device   │
                    └─────────────────────┘
                               │
                    ┌─────────────────────┐
                    │ Press the Test button on the │◄──────────────┐
                    │ battery to check the LED status │             │
                    │   of the battery.   │                         │
                    └─────────────────────┘                         │
                               │                                    │
                          ◇ Do all 4 LED ◇  Yes  ┌──────────────┐   │
                          ◇ indicators    ◇─────►│ Insert the battery back │
                          ◇ light up?     ◇      │   to the device.        │
                                                 │ End of procedure.       │
                               │ No              └──────────────┘          │
                    ┌─────────────────────┐                               │
                    │ Put the battery into the external │                 │
                    │ charger to check the LED indicator │                │
                    │     on the charger  │                               │
                    └─────────────────────┘                               │
                               │                                          │
                          ◇ What does the ◇  Green light blinks  ┌────────────────┐
                          ◇ LED indicator  ◇────────────────────►│ The battery is in shutdown mode │
                          ◇ display?        ◇                    │ and charge circle is active.    │
                                                                 │ Charge the battery to its full  │
                               │ Red light is on                 │ capacity to test again.         │
                    ┌─────────────────────┐                      └────────────────┘
                    │ Replace the battery │◄─────────────────────────┐
                    └─────────────────────┘                          │
                               │                                     │
                          ◇ Is the battery ◇   No ──────────────────┘
                          ◇ failure         ◇
                          ◇ resolved?       ◇
                               │ Yes
                    ┌─────────────────────┐
                    │  End of procedure   │
                    └─────────────────────┘
```

If the battery is not charging or unable to charge when connected to AC Mains power, perform the steps below to detect and troubleshoot the battery failure:

1. Press the **Test** button on the battery and check the status of the battery LED indicators.

If ….	Then ….
All 4 LED indicators light up	The battery is fully charged and working.
Not all 4 LED indicators light up	The battery is not fully charged. It should be put into an external battery charger for further test.

2. Put the battery into the external charger and check the LED indicators on the external charger.

If ….	Then ….
Green light blinks	The battery is in shutdown mode and charge circle is active. Charge the battery to 100% and repeat step 1.
Red light is on	The battery is faulty. Replace the battery.

13.10 Device Disaster Recovery

Use this procedure if:

- You are unable to boot the device because of software corruption (bad sectors).

- Device is configured with a wrong **Wireless Country of Operation**.

Only a GE Healthcare Service Support representative must perform this procedure.

> **NOTE**
> DATA LOSS - Performing this procedure erases all existing patient data, device settings, and activated option codes from the device.

1. Download and install the manufacturer software. See 6.2 Download and Install Manufacturer Software on page 82.

2. Insert the battery and connect the device to AC power.

3. Power on the device. See 4.1 Power On the ECG Device on page 37.

    The device boots up automatically. You have full access to the device.

4. Open the **Service** screen and perform diagnostics tests. See 7.1 Diagnostics Screen Overview on page 85.

5. Go to **Service** > **Device Information** and update the **Serial Number** and **LAN MAC Address** of the device.

6. Update the serial number, language settings and MAC Address of the device.

7. Enable the **WRLS - Global Wireless** option in the **Option Manager**. See 5.7 Enable the Options on page 65.

    7.1. Disable the wireless option in the **Network** tab of the **Settings** screen. See the *Configure Settings* chapter in the *MAC 5 Resting ECG Analysis System Operator's Manual*. If the wireless option is enabled and you try to configure **Wireless Country of Operation**, the `Disable WLAN to set the Wireless Country of Operation` error message displays.

    7.2. Open the **Service** screen.

    7.3. Select **Wireless**.

    The **Wireless Country of Operation** screen displays.
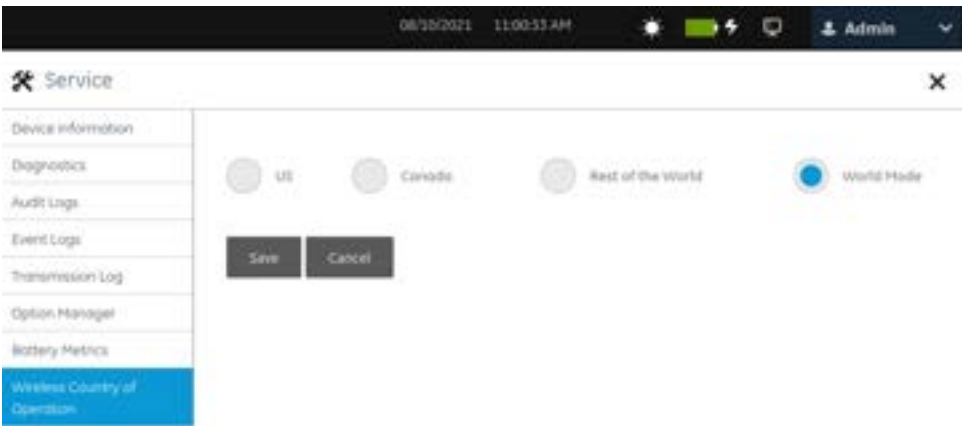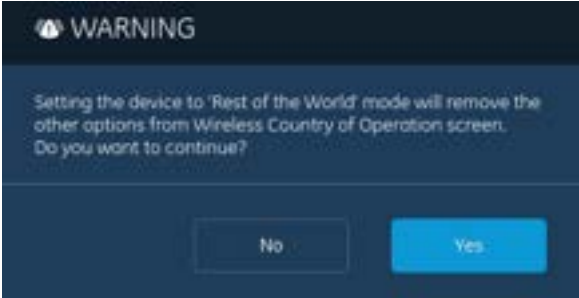
7.4. Configure one of the following options:

By default the **World Mode** option is selected.

To set Wireless Country of Operation in:	Perform the following steps:
US	1. Select **US**. 2. Select **Save** to save the configuration. A warning message displays indicating that setting the device to **US** mode is an irreversible operation and will remove the **Wireless Country of Operation** option from the **Service** screen. 3. Select **Yes**. The wireless country of operation is set as **US**. If the configuration could not be saved, an error message displays. Repeat the procedure.

Continues on the next page

To set Wireless Country of Operation in:	Perform the following steps:
Canada	1. Select **Canada**. 2. Select **Save** to save the configuration. A warning message displays indicating that setting the device to **Canada** mode is an irreversible operation and will remove the **Wireless Country of Operation** option from the **Service** screen. 3. Select **Yes**. The wireless country of operation is set as **Canada**. If the configuration could not be saved, an error message displays. Repeat the procedure.

| To set Wireless Country of Operation in:	Perform the following steps:
Rest of the World	1. Select **Rest of the World**. The **Country of Operation** option displays. 2. Enter a two-character country code in the text field. The list of possible country codes is available at: https://www.iso.org/obp/ui/#search/code/. The allowed values are a to z and A to Z. **NOTE** You cannot enter US and Canada country codes. 3. Select **Save** to save the configuration. A warning message displays indicating that setting the device to **Rest of the World** mode will remove the other options from the **Wireless Country of Operation** screen. 4. Select **Yes**. The wireless is set as per the country code you select in step 11.2. If you enter an invalid country code, an error message displays, and the device is set to **00** for World Regulatory Domain. If you do not enter country code, the device is set to **00** for World Regulatory Domain. The **US**, **Canada**, and **World Mode** modes are removed from the **Country of Operation** and **Wireless Country of Operation** option is removed from the **Service** screen.

  7.5. Close the screen.

The Acquisition screen displays.

8. Restore configuration data from the PSoC. See 5.5 Restore Configuration Data from PSoC on page 62.

9. Upgrade the production software from the **Service** screen. See 6.1 Upgrade or Downgrade Production Software on page 80.

10. Reactive the device, refer to 4.2 Self Registration on page 37 for details.

11. Configure the settings manually in the **Settings** screen. For more information see *MAC 5 Resting ECG Analysis System Operator's Manual*.
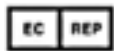
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