

LOGIQ Fortis

Proprietary Service Manual

5874372 Rev. 3

PROPRIETARY SERVICE DOCUMENTATION.

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Important Precautions

TRANSLATION POLICY

WARNING

This Service Manual is available in English only.

English
(EN)

- 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.

AVERTISSEMENT

Français
(FR)

- Ce manuel de maintenance est disponible en anglais uniquement.
- Si un client de la personne responsable de la maintenance demande une langue autre que l'anglais, il est de la responsabilité du client de fournir les services de traduction.
 - N'essayez pas d'effectuer vous-même la maintenance de l'équipement avant d'avoir préalablement lu et compris le manuel de maintenance.
 - Le non-respect cet avertissement peut entraîner des blessures dues à un choc électrique, une défaillance mécanique ou à d'autres éléments dangereux chez la personne en charge de la maintenance, l'opérateur ou le patient.

ADVERTENCIA

Español
(ES)

- Este Manual de servicio está disponible en idioma inglés únicamente.
- Si un proveedor de servicio del cliente requiere un idioma distinto, es responsabilidad del cliente ofrecer servicios de traducción.
 - No intente reparar el equipo a menos que haya consultado y comprendido este Manual de servicio.
 - Si no presta atención a esta Advertencia, se pueden ocasionar lesiones al proveedor de servicio, al operador o al paciente por descarga eléctrica, por riesgos mecánicos o de otra índole.

WARNUNG

Deutsch
(DE)

- Dieses Wartungshandbuch ist nur auf Englisch verfügbar.
- Wenn der Kundendiensttechniker eines Kunden eine andere Sprache als Englisch benötigt, unterliegt es der Verantwortung des Kunden eine Übersetzung anfertigen zu lassen.
 - Warten Sie das Gerät nur, wenn Sie dieses Wartungshandbuch gelesen und verstanden haben.
 - Die Nichtbeachtung dieses Warnhinweises kann zu Verletzungen des Kundendiensttechnikers, Anwenders oder Patienten durch Stromschläge, mechanische oder andere Gefahren führen.

AVVERTENZA

italiano
(IT)

- Il presente Manuale di assistenza è disponibile solo in inglese.
- Se il fornitore di servizi di un cliente ne richiede una copia in una lingua diversa dall'inglese, è responsabilità del cliente fornire il servizio di traduzione.
 - Non tentare di riparare l'apparecchio se questo Manuale di assistenza non è stato letto e compreso.
 - Il mancato rispetto di questa avvertenza può comportare il rischio di lesioni al fornitore di servizi, all'operatore o al paziente causate da scosse elettriche o da pericoli di origine meccanica o di altro tipo.

WAARSCHUWING

Nederlands
(NL)

- Deze servicehandleiding is alleen beschikbaar in het Engels.
- Als de serviceleverancier van een klant vraagt om een andere taal dan Engels, is het de verantwoordelijkheid van de klant om een vertaalde versie te bieden.
 - Probeer geen onderhoud aan de apparatuur uit te voeren tenzij deze servicehandleiding is geraadpleegd en begrepen.
 - Het niet opvolgen van deze waarschuwing kan bij de serviceleverancier, de operator of de patiënt leiden tot letsel door elektrische schokken, mechanische of andere gevaren.

ADVERTÊNCIA

Português
(PT-BR)

- Este Manual de Manutenção está disponível apenas em Inglês.
- Caso um prestador de serviços do cliente solicite o manual em idioma diferente do inglês, é de responsabilidade do cliente o fornecimento de serviços de tradução.
 - Não tente realizar a manutenção do equipamento antes de ler e compreender este Manual de manutenção.
 - O não cumprimento desta advertência pode resultar em danos por choque elétrico e riscos mecânicos para o prestador de serviços, operador ou paciente.

OPOZORILO

Slovensčina
(SL)

Ta servisni priročnik je na voljo samo v angleščini.

- Če ponudnik servisnih storitev za stranko potrebuje navodila v drugem jeziku, mora stranka sama poskrbeti za prevajanje.
- Ne poskušajte servisirati opreme, ne da bi prej prebrali in razumeli servisni priročnik.
- Če tega opozorila ne upoštevate, obstaja nevarnost električnega udara, mehanskih ali drugih nevarnosti in posledičnih poškodb ponudnika servisnih storitev, uporabnika opreme ali pacienta.

警告

日本語
(JA)

このサービスマニュアルは英語版のみ提供されています。

- お客様の保守担当者が英語以外のマニュアルを必要とされる場合は、お客様の負担にて翻訳サービスをご利用ください。
- 装置の保守を行う前に、必ずサービスマニュアルを読み、内容を理解してください。
- この警告に注意を払わない場合、保守担当者やオペレータ、患者に対して、電気ショック、機械またはその他の危険による傷害が発生する恐れがあります。

警告

简体中文
(ZH-CN)

本维修手册仅提供英文版。

- 如果客户需要其它语种版本，请自行翻译。
- 在维修机器前，请务必阅读并完全理解本维修手册。
- 若违反本警告，有可能会给维修提供商、操作员或患者带来电击伤害、机械损伤或其它危害。

VARNING

Svenska
(SV)

Den här servicehandboken finns endast på engelska.

- Om en kunds servicetekniker kräver ett annat språk än engelska är det kundens ansvar att tillhandahålla en översatt version.
- Försök inte att utföra service på utrustningen om du inte har läst igenom och förstått den här servicehandboken.
- Om du inte tar hänsyn till den här varningen kan serviceteknikern, operatören eller patienten utsättas för elektriska stötar eller mekaniska eller andra faror, vilket kan leda till personskador.

警告

繁體中文
(ZH-TW)

此服務手冊僅推出英文版。

- 若客戶的維修人員需要英文以外的其他語言版本，客戶需自行負責提供翻譯服務。
- 在詳閱此服務手冊並充分理解其內容之前，請勿試圖開始維修設備。
- 若忽視此警告，可能會導致維修人員、操作人員或病患因為觸電、機械問題或其他危險而受傷。

경고

한국어
(KO)

이 서비스 설명서는 영어로만 제공됩니다.

- 고객의 서비스 공급자가 영어 이외의 언어를 요구하는 경우 번역 서비스를 제공할 책임은 고객에게 있습니다.
- 이 서비스 설명서를 참조 및 이해하지 못한 경우 장비를 만지지 마십시오.
- 이 경고를 무시한 경우 서비스 공급자, 오퍼레이터 또는 환자가 감전, 기계적 위험 또는 기타 위험으로 인한 부상을 입을 수 있습니다.

ПРЕДУПРЕЖДЕНИЕ

На русском языке
(RU)

Данное руководство по обслуживанию доступно только на английском языке.

- Если специалисту по техническому обслуживанию клиента требуется документация на каком-либо другом языке, ответственность за выполнение перевода возлагается на клиента.
- Приступайте к обслуживанию оборудования только после того, как изучите данное руководство по обслуживанию и полностью поймете его содержание.
- Несоблюдение данного требования может привести к травмированию специалиста по техническому обслуживанию, пользователя или пациента вследствие поражения электрическим током, механических и прочих повреждений.

OSTRZEŻENIE

Polski
(PL)

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

- Jeżeli dostawca usług klienta posługuje się językiem innym niż angielski, za zapewnienie usług tłumaczeniowych odpowiada klient.
- Przed przystąpieniem do czynności serwisowych należy zapoznać się z informacjami zawartymi w niniejszym podręczniku serwisowym i je zrozumieć.
- W przeciwnym wypadku dostawca usług, operator lub pacjent mogą odnieść obrażenia spowodowane porażeniem prądem elektrycznym, działaniem elementów mechanicznych lub innymi zagrożeniami.

VAROVANIE

Slovensčina
(SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

- Ak poskytovateľ služieb zákazníkom vyžaduje iný jazyk ako anglický jazyk, jeho povinnosťou je zabezpečiť prekladateľské služby.
- Zariadenie nepoužívajte bez prečítania a porozumenia tejto servisnej príručky.
- Nedodržanie tejto výstrahy môže viesť k zraneniu poskytovateľa služieb, operátora alebo pacienta spôsobeného elektrickým šokom, mechanickým alebo iným nebezpečenstvom.

FIGYELMEZTETÉS

Magyar
(HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

- Amennyiben az ügyfél szolgáltatójának nem felel meg az angol nyelvű dokumentáció, úgy a fordításról az ügyfélnek kell gondoskodnia.
- Kizárólag úgy lásson hozzá a berendezés karbantartásához, hogy elolvasta és megértette a szervizkézikönyvből foglaltakat.
- Ezen figyelmeztetés figyelmen kívül hagyása esetén a szolgáltató, a kezelő vagy a páciens áramütést, mechanikus sérülést vagy más veszély által okozott személyi sérülést szenvedhet.

česky (CZ)	<p style="text-align: center;">VÝSTRAHA</p> <p>Tato servisní příručka je k dispozici pouze v angličtině.</p> <ul style="list-style-type: none"> • Pokud poskytovatel služby zákazníkovi požaduje jiný jazyk než angličtinu, je odpovědností zákazníka poskytnout služby překladu. • Nepokoušejte se provádět servis zařízení, dokud si neprostudujete a neporozumíte servisní příručce. • Nevěnování pozornosti této výstraze může způsobit poskytovateli služeb, obsluze nebo pacientovi úraz elektrickým proudem, mechanická nebo jiná nebezpečí. 	Türkçe (TR)	<p style="text-align: center;">UYARI</p> <p>Servis Kilavuzu yalnızca İngilizce olarak mevcuttur.</p> <ul style="list-style-type: none"> • Müşterinin servis sağlayıcısı için kilavuzun İngilizce dışında başka bir dile çevrilmesi gerekiyorsa çeviri hizmeti sağlamak müşterinin sorumluluğudur. • Bu Servis Kilavuzu'na bakıp talimatları anlamadan ekipmanı kullanmaya çalışmayın. • Bu Uyarının göz ardı edilmesi servis sağlayıcısının, operatörün veya hastanın, elektrik çarpması, mekanik arıza ya da diğer tehlikeler nedeniyle yaralanmasına neden olabilir.
	Norsk (NO)		<p style="text-align: center;">ADVARSEL</p> <p>Denne servicehåndboken er bare tilgjengelig på engelsk.</p> <ul style="list-style-type: none"> • Hvis en kundes tjenestetilbyder krever et annet språk enn engelsk, er det kundens ansvar å tilby oversettelsestjenester. • Ikke forsøk å utføre service på utstyret før denne servicehåndboken er lest og forstått. • Dersom det ikke tas hensyn til denne advarselen, kan det føre til skader på tjenestetilbyderen, operatøren eller pasienten fra elektrisk støt, mekaniske eller andre farer.
Suomi (FI)		<p style="text-align: center;">VAKAVA VAROITUS</p> <p>Tämä huolto-opas on saatavana vain englanniksi.</p> <ul style="list-style-type: none"> • Jos asiakkaan palveluntarjoaja tarvitsee oppaan jollain muulla kielellä, käännöspalveluiden hankkiminen on asiakkaan vastuulla. • Laitetta ei saa huoltaa ellei huolto-oppaaseen ole sitä ennen tutustuttu huolellisesti. • Jos tätä varoitusta ei noudateta, palveluntarjoaja, käyttäjä tai potilas saattaa saada sähköiskun, ja saattaa aiheutua mekaanisia tai muita vaurioita. 	Română (RO)
	Lietuvių k. (LT)	<p style="text-align: center;">ĮSPĖJIMAS</p> <p>Šis priežiūros vadovas galimas tik anglų kalba.</p> <ul style="list-style-type: none"> • Jei kliento paslaugų teikėjas reikalauja kitos kalbos nei anglų, klientas atsako už vertimo paslaugos teikimą. • Atlikite įrangos priežiūrą tik gerai susipažinę su priežiūros vadovu ir jį supratę. • Nesilaikant šio įspėjimo galimas paslaugos teikėjo, operatoriaus ar paciento sužeidimas dėl elektros šoko, mechaninio ar kito pavojaus. 	
Srpski (SR)		<p style="text-align: center;">UPOZORENJE</p> <p>Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ako klijentov serviser zahteva jezik koji nije engleski, odgovornost je na klijentu da pruži usluge prevođenja. • Nemojte da pokušavate da servirate opremu ako prethodno niste pročitali i razumeli ovaj priručnik. • Ako ne poštujuete ovo upozorenje, može doći do povređivanja serviser, operatera ili pacijenta uzrokovanog električnim udarom, mehaničkim i drugim opasnostima. 	Portugués (Portugal) (PT-PT)

Українська (UK)

ПОПЕРЕДЖЕННЯ

Цей посібник із технічного обслуговування доступний лише англійською мовою.

- Якщо постачальнику послуг із технічного обслуговування потрібна інформація мовою, відмінною від англійської, відповідальність за надання послуг перекладу несе користувач.
- Технічне обслуговування обладнання можна виконувати лише після ознайомлення з посібником із технічного обслуговування та усвідомлення його змісту.
- Недотримання цього попередження може призвести до травм постачальника послуг, оператора або пацієнта, спричинених дією електричного струму, механічних або інших пошкоджень.

Bahasa Indonesia (ID)

PERINGATAN

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

- Jika penyedia layanan pelanggan memerlukan bahasa di luar Bahasa Inggris, maka pelanggan bertanggung jawab untuk memberikan layanan tersebut.
- Jangan mencoba menyervis peralatan ini, kecuali Panduan Servis ini telah dijadikan rujukan dan dipahami dengan baik.
- Kelalaian memperhatikan Peringatan ini dapat menyebabkan cedera terhadap penyedia layanan, operator, atau pasien akibat bahaya kejutan listrik, mekanik, dan bahaya lainnya.

ไทย (TH)

คำเตือน

คู่มือซ่อมบำรุงนี้เฉพาะภาษาอังกฤษเท่านั้น

- หากผู้ใช้บริการของลูกค้านี้ต้องการรับภาษาอื่นนอกเหนือจากภาษาอังกฤษ ลูกค้านี้จำเป็นต้องเป็นผู้รับผิดชอบในการจัดเตรียมคู่มือซ่อมบำรุงฉบับแปล
- โปรดอย่าซ่อมบำรุงอุปกรณ์โดยไม่ศึกษา และทำความเข้าใจคู่มือซ่อมบำรุงนี้
- หากไม่ปฏิบัติตามคำแนะนำอาจส่งผลให้ผู้ใช้บริการ ผู้ใช้งานอุปกรณ์ หรือผู้ปฏิบัติงานได้รับบาดเจ็บจากไฟฟ้าช็อต อันตรายจากกลไกของอุปกรณ์ หรืออันตรายอื่น ๆ

Tiếng Việt (VI)

CẢNH BÁO

Hướng dẫn sử dụng dịch vụ này chỉ sẵn dùng bằng tiếng Anh.

- Nếu nhà cung cấp dịch vụ của khách hàng yêu cầu ngôn ngữ khác ngoài tiếng Anh, thì khách hàng phải có trách nhiệm cung cấp các dịch vụ dịch thuật.
- Không được tìm cách sửa chữa thiết bị trừ khi đã tham khảo và hiểu rõ Hướng dẫn sử dụng dịch vụ này.
- Bỏ qua lời cảnh báo này có thể gây thương tích cho nhà cung cấp dịch vụ, nhân viên vận hành hoặc bệnh nhân do sốc điện, những nguy hiểm về máy móc hoặc yếu tố khác.

Қазақ тілінде (KZ)

ЕСКЕРТУ

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

- Егер тұтынушылардың қызметтер жеткізушісі ағылшын тілінен басқа тілді талап етсе, аудару қызметтерімен қамтамасыз ету тұтынушының жауапкершілігіне кіреді.
- Осы қызмет көрсету нұсқаулығын түсініп, ол туралы кеңес алмайынша жабдыққа қызмет көрсетуге тырыспаңыз.
- Осы ескертуді орындамау электр тогының соғуы, механикалық немесе басқа да қауіптер салдарынан қызметтер жеткізушісінің, оператордың немесе емделушінің жарақаттануына алып келуі мүмкін.

Tagalog (TL)

BABALA

Available lamang sa Ingles ang Manwal ng Serbisyo ng ito.

- Kung ang kailangan lamang ng tagabigay ng serbisyo ng kustomer ng wika maliban sa Ingles, responsibilidad ng kustomer na magbigay ng serbisyo sa pagsasalin wika nito.
- Huwag subukan na iserbisyo ang mga kasangkapan maliban kung nakonsulta ang nauunawaan itong Manwal ng Serbisyo.
- Ang pagkabungong maunawaan ang Babalang ito ay maaring maging resulta ng pinsala sa tagabigay ng serbisyo, nagpapagana o pasyente mula sa pagkakakoryente, mekanikal o iba pang peligro.

Eesti (ET)

HOIATUS!

Service Manual (Hooldusjuhend) on saadaval ainult ingliskeelsena.

- Kui kliendi teenusepakkuja nõue on, et juhend oleks mõnes muus keeles, korraldab juhendi tõlkimise klient.
- Tutvuge enne seadme hooldusõude tegemist kindlasti juhendiga Service Manual (Hooldusjuhend).
- Selle nõude eiramise korral võib teenindaja, kasutaja või patsient saada elektrilöögi, samuti võivad kaasna muud ohud.

Ελληνικά (EL)

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

- Εάν ο πάροχος σέρβις του πελάτη απαιτεί γλώσσα εκτός των Αγγλικών, η παροχή μεταφραστικών υπηρεσιών αποτελεί ευθύνη του πελάτη.
- Μην επιχειρήσετε να επισκευάσετε τον εξοπλισμό εάν πρώτα δεν συμβουλευτείτε και κατανοήσετε το παρόν Εγχειρίδιο σέρβις.
- Σε περίπτωση μη τήρησης της παρούσας προειδοποίησης, ενδέχεται να προκληθεί τραυματισμός στον πάροχο σέρβις, το χειριστή ή τον ασθενή εξαιτίας ηλεκτροπληξίας καθώς και μηχανικών ή άλλων κινδύνων.

Български (BG)

ПРЕДУПРЕЖДЕНИЕ

Настоящото Сервизно ръководство се предлага само на английски език.

- Ако доставчикът на сервизни услуги на клиента изисква ръководство на език, който се различава от английския, клиентът има отговорност да осигури адекватен превод.
- Не правете опити за сервиз на оборудването, без да проверите и да разберете съветите в Сервизното ръководство.
- Неспазването на това предупреждение може да доведе до нараняване на доставчика на сервизни услуги, оператора или пациента вследствие на токов удар, механична или други опасности.

Hrvatski (HR)

UPOZORENJE

Ovaj servisni priručnik dostupan je samo na engleskom jeziku.

- Ako klijentov serviser zahtijeva jezik koji nije engleski, odgovornost klijenta je pružiti usluge prijevoda.
- Nemojte pokušavati servisirati opremu ako niste pročitali i razumjeli servisni priručnik.
- Ako ne poštuje ovo upozorenje, može doći do ozljede servisera, operatera ili pacijenta prouzročene strujnim udarom, mehaničkim i drugim opasnostima.

DAMAGE IN TRANSPORTATION

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All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE personnel. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

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OMISSIONS & ERRORS

If there are any omissions, errors or suggestions for improving this documentation, please contact the GE Global Ultrasound Documentation Group with specific information listing the system type, manual title, part number, revision number, page number and suggestion details.

Mail the information to:

Service Documentation
9900 Innovation Drive (RP-2156)
Wauwatosa, WI 53226, USA.

GE employees should use Post-market Quality Management (PQM) to report service documentation issues. These issues will then be in the internal problem reporting tool and communicated to the writer.

SERVICE SAFETY CONSIDERATIONS



DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.



WARNING Use all Personal Protection Equipment (PPE) such as gloves, safety shoes, safety glasses, and kneeling pad, to reduce the risk of injury.

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DECLARATION OF CONFORMITY

The radio equipment used in the LOGIQ Fortis (if present) conforms to the Radio Equipment Directive 2014/53/EU (RED). The declaration of conformity can be found at the following link:

<https://www.intel.com/content/dam/support/us/en/documents/network-and-i-o/wireless-networking/9260NGW-EU-RED-DoC.pdf>

Search under Current or Legacy Adapters for: Intel® 9260

Figure WLAN Label for Intel 9260 Module

THIS SYSTEM CONTAINS THE
FOLLOWING WIRELESS
MODULE: INTEL 9260NGW

Revision History

Revision	Date	Reason for change
Rev. 1	July, 2021	Initial release
Rev. 2	Dec., 2021	Minor Update
Rev. 3	April, 2022	Update China Configuration in Ch 1, Probe Trouble shooting in Ch 7, graphics of Rear cable management in Chpater 8, Back end parts/Probes/FRU list in Ch 9.

List of Effected Pages (LOEP)

Chapter	Revision	Chapter	Revision	Chapter	Revision
Title Page	Rev. 3	Chapter 4	Rev. 3	Chapter 10	Rev. 3
Warnings	Rev. 3	Chapter 5	Rev. 3	Index	Rev. 3
TOC	Rev. 3	Chapter 6	Rev. 3	Back Cover	N/A
Chapter 1	Rev. 3	Chapter 7	Rev. 3		
Chapter 2	Rev. 3	Chapter 8	Rev. 3		
Chapter 3	Rev. 3	Chapter 9	Rev. 3		

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Chapter 1

Introduction

Section 1-1 Overview

1-1-1 Purpose of this chapter

This chapter describes important issues related to safely servicing the LOGIQ Fortis. The service provider must read and understand all the information presented here before installing or servicing the LOGIQ Fortis.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

1-1-2 Contents in this chapter

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Section 1-2 Service Manual Overview

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1-2-1 Attention

This manual provides installation and service information for the LOGIQ Fortis. Advanced equipment training may be provided by factory trained Field Service trainers for the agreed-upon time period.

1-2-2 Contents in this service manual

The service manual is divided into ten chapters.

In the beginning of the manual, before Chapter 1, you will find the revision overview, the important precautions including translation policy, damage in transportation, certified electrical contractor statement, omission & errors, service safety considerations and legal notes, and the Table of Contents (TOC).

An index has been included after Chapter 10.

Table 1-1 Contents in this Service Manual

CHAPTER NUMBER	CHAPTER TITLE	DESCRIPTION
1	Introduction	Contains a content summary and warnings.
2	Site Preparations	Contains pre-setup requirements for the LOGIQ Fortis.
3	LOGIQ Fortis Setup	Contains setup procedure with procedure checklist.
4	Functional Checks	Contains functional checks that must be performed as part of the installation, or as required during servicing, care and maintenance.
5	Components and Functions (Theory)	Contains block diagrams and functional explanations of the electronics.
6	Service Adjustments	Contains instructions on how to make any available adjustments to the LOGIQ Fortis.
7	Diagnostics/Troubleshooting	Provides procedures for running diagnostic or related routines for the LOGIQ Fortis.
8	Replacement Procedures	Provides disassembly procedures and reassembly procedures for all changeable FRUs, available option installation instructions, and upgrade installation instructions.
9	Renewal Parts	Contains a complete list of replacement parts for the LOGIQ Fortis.
10	Care & Maintenance	Provides care and maintenance procedures for the LOGIQ Fortis.
N/A	Index	Provides a quick way to find a topic.

1-2-3 Typical users of LOGIQ Fortis documentation

The information needed to service the LOGIQ Fortis is collected in the Service Manual.

NOTE: *Dates on screenshots are represented in MM/DD/YYYY format throughout the manual. Information on how to change the LOGIQ Fortis's date can be found in Chapter 10, Customizing Your System, of the LOGIQ Fortis User Manual.*

Typical users of the Basic Service Manual

- Service personnel (setup, maintenance, etc.)
- Hospital's service personnel
- Architectural planners/installation planners (some parts of [Chapter 2 - Site Preparations](#))

Typical users of the Proprietary Service Manual

- GE Service personnel (setup, maintenance, etc.)
- GE Online Center personnel
- Licensed hospital's service providers
- GE Repair Center Personnel

1-2-4 LOGIQ Fortis models covered in this manual

Table 1-2 LOGIQ Fortis Software Configuration and Hardware

Destination	MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
GLOBAL (except China)	6601000	LOGIQ Fortis LCD monitor, 100-240 VAC	R3.x.x
	6602000	LOGIQ Fortis HDU Display, 100-240 VAC	R3.x.x
CHINA Only	5876352	LOGIQ Fortis HDU Display console	R3.x.x
	5876353	LOGIQ Fortis Pro HDU Display	R3.x.x
	5876354	LOGIQ Fortis Express HDU Display	R3.x.x
	5876355	LOGIQ Fortis Super HDU Display	R3.x.x
	5876356	LOGIQ Fortis Expert LCD Monitor	R3.x.x
	5876357	LOGIQ Fortis Plus LCD Monitor	R3.x.x
	5876358	LOGIQ Fortis Power LCDMonitor	R3.x.x

1-2-4-1 LOGIQ Fortis Standards/Options

LOGIQ Fortis Global Configuration		Standard(S)/Option(O)	
	Description	HDU console	LCD console
SOFTWARE OPTIONS	Adv. Security	0	0
	Coded Contrast	0	0
	Parametric Imaging	0	0
	Cardiac AFI	0	0
	Report Writer	0	0
	Stress Echo	0	0
	Tricify	0	0
	LOGIQ Apps	0	0
	KOIOS SW	0	0
	LOGIQ Exx KOIOS Thyroid	0	0
	Scan Assistant	0	0
	Advanced Probes	0	0
	AUTO IMT	0	0
	B Steer+	0	0
	B-FLOW	0	0
	Compare Assistant	0	0
	DICOM	0	0
	FLOW QA	0	0
	Measure Assist Breast	0	0
	Measure Assist OB	0	0
	ELASTOGRAPHY	0	0
	ELASTO QA	0	0
	SRI HD Type2	0	0
	Shear Wave Elastography	0	0
	UGAP	0	0
	Hepatic Assistant - SWE-UGAP	0	0
	SonoNT SonoIT	0	0
	LOGIQ Exx DVR	0	0
	LOGIQ Exx SRI HD Type 2	0	0
	LOGIQ Exx VNAV Image	0	0
	EZ Imaging	S	S
	Omni View	0	0
	STIC	0	0
TUI	0	0	
VCI-Static	0	0	
VOCAL_II	0	0	
Thyroid Productivity	0	0	
Breast Productivity	0	0	
VITA on Demand	0	0	
HARDWARE OPTIONS	CW Doppler Option Collector Swallow	0	0
	Realtime 4D	0	0
	ECG	0	0
	Gel Warmer	S	S
	Scan on battery Option kit T1	0	0
	Power Assistant Option kit T1	0	0
	Volume Navigation for V-Nav Inside Fortis	0	0
	Volume Navigation	0	0
	Wireless	0	0
	S-Video	0	0
Pencil CW HW Kit Swallow	0	0	
DVD Drive	S	S	

1-2-4-1 LOGIQ Fortis Standards/Options (cont'd)

	Description	HDU console	LCD console
PERIPHERAL OPTIONS	USB FOOTSWITCH 3 BUTTON	o	o
	SONY UPD25MD COLOR PRINTER	o	o
	Powervar144k120v MG UPS	o	o
	230V UPS	o	o
	BW Printer	o	o
	LOGIQ Exx Protective Cover	o	o
	LOGIQ Exx Inkjet Printer	o	o
	Barcode Reader USBee1000A	o	o
	Magnetic Card Reader	o	o
	High Cabinet installation kit	o	o
	Low Cabinet installation kit	o	o
	Side Cabinet Installation kit	o	o
Option 5inch bay installation kit	o	o	
KEYBOARD OPTIONS	Alpha numeric board assembly	o	o
	GERMAN AN Key board Assy	o	o
	FRENCH AN Key board Assy	o	o
	GREEK AN Key board Assy	o	o
	NORWEGIAN AN Key board Assy	o	o
	RUSSIAN AN Key board Assy	o	o
	SWEDISH AN Key board Assy	o	o
	FC389,ECG CABLE SET	o	o
	VNav Stand (Offboard)	o	o
	VNav NEEDLE TRACKING	o	o
	VNav VirtuTRAX Starter Kit	o	o
	ECG Cables IEC Style	o	o
	VNav Virtual Tracker	o	o
	VNav Active Tracker kit	o	o
	VNav Needle Tracking storage insert	o	o
VNav Needle Tracking Kit - 18/20g or less	o	o	
ACCESSORIES	VNav ETRAX 12 14G ST KT	o	o
	VNav ETRAX 14 16G ST KT	o	o
	VNav Probe sensors	o	o
	VNav MR Active Tracker	o	o
	LOGIQ E10 KOIOS INSTALL	o	o
	KOIOS Thyroid INSTALL	o	o
	Small Probe Holder	o	o
	VERTICAL TV PROBE HOLDER	o	o
	TVTR Probe Holder	o	o
	PROBE CABLE HANGER	o	o
	Ethernet Protection Cable	o	o
	OPTION TRAY BOX	o	o
	OPTION TRAY Bracket	o	o
Option Tray	o	o	

1-2-4-1 LOGIQ Fortis Standards/Options (cont'd)

LOGIQ Fortis Global Configuration		Standard(S)/Option(O)	
	Description	HDU console	LCD console
PROBES	IC5-9-D Probe	o	o
	ML6-15-D Probe	o	o
	L8-18I-D Probe	o	o
	C2-9-D Probe	o	o
	C1-6-D Probe	o	o
	C1-6VN-D Probe	o	o
	C2-9VN-D Probe	o	o
	C3-10-D Probe	o	o
	M5Sc-D Probe	o	o
	L2-9-D Probe	o	o
	L2-9VN-D Probe	o	o
	6Tc-RS Probe	o	o
	TEE RS-DLP Adapter	o	o
	C2-7-D Probe	o	o
	C2-7VN-D Probe	o	o
	C2-7D-LC Probe	o	o
	P2D Probe	o	o
	RIC5-9-D 4D Probe	o	o
	RAB6-D Probe	o	o
	P6D Probe	o	o
BE9CS-D Probe	o	o	
L3-12-D Probe	o	o	
6S-D Probe	o	o	
TEE PROBE ITEMS	KZ200687 BITE GUARD	o	o
	KZ693 BITE GUARD OPR.CLIP ON	o	o
	KZ808 TEE SCANH. PROTECT.COVER	o	o
	086A0016 BITE GUARD AD.16*27MM	o	o
	KZ800,BITE HOLE INDICATOR	o	o
	TEE STORAGE RACK	o	o

1-2-4-2 LOGIQ Fortis China Configuration

LOGIQ Fortis China Configuration		Standard(S)/Option(O)/Not applicable(NA)						
	Description	Fortis	Fortis Pro	Fortis Express	Fortis Super	Fortis Expert	Fortis Plus	Fortis Power
SOFTWARE OPTIONS	Adv. Security	O	O	O	O	O	O	O
	Coded Contrast	O	O	O	O	O	O	O
	Parametric Imaging	O	O	O	O	O	O	O
	Cardiac AFI	O	O	O	O	O	O	O
	Report Writer	S	S	S	S	S	S	S
	Stress Echo	O	O	O	O	O	O	O
	Tricefy	O	O	O	O	O	O	O
	LOGIQ Apps	O	O	O	O	O	O	O
	Scan Assistant	O	O	O	O	O	O	O
	Advanced Probes	S	S	O	O	S	O	O
	AUTO IMT	S	O	S	O	S	O	O
	B Steer+	O	O	O	O	O	O	O
	B-FLOW	S	O	O	O	S	O	O
	Compare Assistant	O	O	S	O	O	O	O
	DICOM	S	S	S	S	S	O	O
	FLOW QA	O	O	O	O	O	O	O
	Measure Assist Breast	O	O	O	O	O	O	O
	Measure Assist OB	S	O	O	O	S	S	O
	ELASTOGRAPHY	S	O	O	O	S	O	O
	ELASTO QA	S	O	O	O	S	O	O
	Shear Wave Elastgraphy	O	O	O	O	O	O	O
	UGAP	O	O	O	O	NA	NA	NA
	Hepatic Assistant - SWE-UGAP	O	O	O	O	NA	NA	NA
	SonoNT SonoIT	O	O	O	O	O	O	O
	LOGIQ Exx DVR	O	O	O	O	O	O	O
	LOGIQ Exx SRI HD Type 2	O	O	O	O	O	O	O
	LOGIQ Exx VNAV Image	O	O	O	O	NA	NA	NA
	EZ Imaging	S	S	S	S	S	S	S
	Omni View	O	O	O	O	O	O	O
	STIC	O	O	O	O	O	O	O
TUI	O	O	O	O	O	O	O	
VCI-Static	O	O	O	O	O	O	O	
VOCAL_II	O	O	O	O	O	O	O	
Thyroid Productivity	O	O	O	O	O	O	O	
Breast Productivity	O	O	O	O	O	O	O	
VITA on Demand	O	O	O	O	O	O	O	
HARDWARE OPTIONS	CW Doppler Option Collector Swallow	O	O	O	O	O	O	O
	Realtime 4D	O	O	O	O	O	O	O
	ECG	O	O	O	O	O	O	O
	Gel Warmer	S	S	S	S	S	S	S
	Scan on battery Option kit T1	O	O	O	O	O	O	O
	Power Assistant Option kit T1	O	O	O	O	O	O	O
	Volume Navigation for V-Nav Inside Fortis	O	O	O	O	O	O	O
	Volume Navigation	O	O	O	O	NA	NA	NA
	Wireless	O	O	O	O	O	O	O
	S-Video	O	O	O	O	O	O	O
Pencil CW HW Kit Swallow	O	O	O	O	O	O	O	
DVD Drive	S	S	S	S	S	S	S	
PERIPHERAL OPTIONS	USB FOOTSWITCH 3 BUTTON	O	O	O	O	O	O	O
	BW Printer	O	O	O	O	O	O	O
	LOGIQ Exx Protective Cover	O	O	O	O	O	O	O
	High Cabinet installation kit	O	O	O	O	O	O	O
	Option 5inch bay installation kit	O	O	O	O	O	O	O
KEYBOARD OPTIONS	Alpha numeric board assembly	O	O	O	O	O	O	O

1-2-4-2 LOGIQ Fortis China Configuration (cont'd)

LOGIQ Fortis China Configuration		Standard(S)/Option(O)/Not applicable(NA)						
	Description	Fortis	Fortis Pro	Fortis Express	Fortis Super	Fortis Expert	Fortis Plus	Fortis Power
ACCESSORIES	FC389_ECG CABLE SET	O	O	O	O	O	O	O
	VNav Stand (Offboard)	O	O	O	O	NA	NA	NA
	VNav NEEDLE TRACKING	O	O	O	O	NA	NA	NA
	VNav VirtuTRAX Starter Kit	O	O	O	O	NA	NA	NA
	ECG Cables IEC Style	O	O	O	O	O	O	O
	VNav Virtual Tracker	O	O	O	O	NA	NA	NA
	VNav Active Tracker kit	O	O	O	O	NA	NA	NA
	VNav Needle Tracking storage insert	O	O	O	O	NA	NA	NA
	VNav Needle Tracking Kit - 18/20g or less	O	O	O	O	NA	NA	NA
	VNav ETRAX 12 14G ST KT	O	O	O	O	NA	NA	NA
	VNav ETRAX 14 16G ST KT	O	O	O	O	NA	NA	NA
	VNav Probe sensors	O	O	O	O	NA	NA	NA
	VNav MR Active Tracker	O	O	O	O	NA	NA	NA
	Small Probe Holder	O	O	O	O	O	O	O
	VERTICAL TV PROBE HOLDER	O	O	O	O	O	O	O
	TVTR Probe Holder	O	O	O	O	O	O	O
	PROBE CABLE HANGER	O	O	O	O	O	O	O
	OPTION TRAY BOX	O	O	O	O	O	O	O
	OPTION TRAY Bracket	O	O	O	O	O	O	O
	Option Tray	O	O	O	O	O	O	O
PROBES	IC5-9-D Probe	O	O	O	O	O	O	O
	ML6-15-D Probe	O	O	O	O	O	O	O
	L8-18I-D Probe	O	O	O	O	O	O	O
	C2-9-D Probe	O	O	O	O	O	O	O
	C1-6-D Probe	O	O	O	O	O	O	O
	C1-6VN-D Probe	O	O	O	O	NA	NA	NA
	C2-9VN-D Probe	O	O	O	O	NA	NA	NA
	C3-10-D Probe	O	O	O	O	O	O	O
	M5Sc-D Probe	O	O	O	O	O	O	O
	L2-9-D Probe	O	O	O	O	O	O	O
	L2-9VN-D Probe	O	O	O	O	NA	NA	NA
	6Tc-RS Probe	O	O	O	O	O	O	O
	TEE RS-DLP Adapter	O	O	O	O	O	O	O
	C2-7-D Probe	O	O	O	O	O	O	O
	C2-7VN-D Probe	O	O	O	O	NA	NA	NA
	C2-7D-LC Probe	NA	NA	NA	NA	NA	NA	NA
	P2D Probe	O	O	O	O	O	O	O
	RIC5-9-D 4D Probe	O	O	O	O	O	O	O
	RAB6-D Probe	O	O	O	O	O	O	O
	P6D Probe	O	O	O	O	O	O	O
BE9CS-D Probe	O	O	O	O	O	O	O	
L3-12-D Probe	O	O	O	O	O	O	O	
6S-D Probe	O	O	O	O	O	O	O	
TEE PROBE ITEMS	KZ200687 BITE GUARD	O	O	O	O	O	O	O
	KZ693 BITE GUARD OPR.CLIP ON	O	O	O	O	O	O	O
	KZ808 TEE SCANH. PROTECT.COVER	O	O	O	O	O	O	O
	086A0016 BITE GUARD AD.16*27MM	O	O	O	O	O	O	O
	KZ800,BITE HOLE INDICATOR	O	O	O	O	O	O	O
	TEE STORAGE RACK	O	O	O	O	O	O	O

1-2-5 Product description

1-2-5-1 Overview

The LOGIQ Fortis is a high performance digital ultrasound imaging system with total data management.

The fully digital architecture of the LOGIQ Fortis allows optimal usage of all scanning modes and probe types throughout the full spectrum of operating frequencies.

The LOGIQ Fortis is a digital beamforming Ultrasound system. The Ultrasound signal flows from the probe through the Ultrasound system where it is processed and finally displayed as a diagnostic image on the monitor. Images and patient data can be sent to peripheral devices to be stored, printed, or displayed.

System configuration is stored on the internal drive.

All necessary software is loaded from the internal drive on power up.

For more information on:

- Installed software versions, see ["Software Status" on page 7-19](#)
- Installed hardware, see [Section 7-4 "Service Desktop" on page 7-11](#)
- Connected probes, see [Section 7-4 "Service Desktop" on page 7-11](#)
- Compatible software, hardware, peripherals, and probes, see ["Software" on page 9-4](#)

1-2-5-2 FRUs for the ultrasound system

Refer to Chapter 9 in this manual.

1-2-5-3 Purpose of the user manual

The user manual should be fully read and understood before operating the LOGIQ Fortis.

The online versions of the user manual is available through the Help function on the LOGIQ Fortis's operator panel.

User manual documentation is provided through electronic Instructions For Use (eIFU).

Section 1-3 Important Conventions

Contents in this section

1-3-1	Conventions used in book	1-11
1-3-2	Standard hazard icons	1-12

1-3-1 Conventions used in book

Model designations

This manual covers the LOGIQ Fortis models listed in [1-2-4 "LOGIQ Fortis models covered in this manual" on page 1-4](#).

Icons

Pictures, or icons, are used wherever they will reinforce the printed message. The icons, labels, and conventions used on the product and in the service information are described in this chapter.

Safety precaution messages

Various levels of safety precaution messages may be found on the equipment and in the service information. The different levels of concern are identified by a flag word that precedes the precautionary message. Known or potential hazards to personnel are labeled in one of three ways:

- DANGER
- WARNING
- CAUTION

When a hazard is present that can cause property damage, but has absolutely no personal injury risk, a NOTICE is used.



DANGER **DANGER IS USED TO INDICATE THAT A SPECIFIC HAZARD IS KNOWN TO EXIST WHICH, THROUGH INAPPROPRIATE CONDITIONS OR ACTIONS, WILL CAUSE SEVERE OR FATAL PERSONAL INJURY.**



WARNING **WARNING IS USED TO INDICATE THAT A SPECIFIC HAZARD IS KNOWN TO EXIST WHICH, THROUGH INAPPROPRIATE CONDITIONS OR ACTIONS, MAY CAUSE MINOR PERSONAL INJURY AND/OR SUBSTANTIAL PROPERTY DAMAGE.**



CAUTION **CAUTION IS USED TO INDICATE THAT A POTENTIAL HAZARD MAY EXIST WHICH, THROUGH INAPPROPRIATE CONDITIONS OR ACTIONS, WILL OR CAN CAUSE PROPERTY DAMAGE.**



NOTICE Notice is used when a hazard is present that can cause property damage but has absolutely no personal injury risk.

Notice Example: Disk drive may crash.

NOTE: *Notes are used to provide important information about an item or a procedure.*

NOTE: *Be sure to read the notes; the information contained in a note can often save you time or effort.*

1-3-2 Standard hazard icons










Important information will always be preceded by the exclamation point  contained within a triangle, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm. Even if a symbol is not used in this manual, it may be included for your reference.






Table 1-3 Standard Hazard Icons

Icon	Meaning	Icon	Meaning
	Biological Hazard Describes precautions necessary to prevent the risk of disease transmission or infections. • Patient/user infection due to contaminated equipment.		Explosion Hazard Describes precautions necessary to prevent the risk of injury through explosion hazard! • Risk of explosion if used in the presence of flammable anesthetics.
	Electrical Hazard Describes precautions necessary to prevent the risk of injury through electric hazards. • Electrical micro-shock to patient, e.g., ventricular		Fire and Smoke Hazard • Patient/user injury or adverse reaction from fire or smoke. • Patient/user injury from explosion and fire.
	Moving Hazard Describes precautions necessary to prevent the risk of injury through moving or tipping hazard! • Console, accessories or optional storage devices that can fall on patient, user, or others. • Collision with persons or objects may result in injury while maneuvering or during system transport. • Injury to user from moving the console.		Caution: HOT Be careful not to burn yourself
	Pinch point Watch your fingers. This symbol indicates that serious injury to the hand may occur.		Pinch point Watch your fingers

1-3-2 Standard hazard icons (cont'd)

Other icons make you aware of specific procedures or requirements that should be followed.

Table 1-4 Standard Icons for Specific Procedures or Requirements

Icon	Meaning		
	<p>AVOID STATIC ELECTRICITY Use grounding devices.</p>		<p>LOCKOUT/TAGOUT (LOTO) before performing the procedure</p>
	<p>WEAR HAND PROTECTION to protect from electrical dangers, cuts, punctures, fractures and amputations, etc.</p>		<p>WEAR FOOT PROTECTION to protect from electrical hazards, falling or rolling objects or from crushing or penetrating materials, etc.</p>
	<p>WEAR EYE PROTECTION to protect eye from dust, liquid, piece of metal, etc.</p>		

Section 1-4 Labels/Icons on the system

Contents in this section

1-4-1 Label Location 1-14
 1-4-2 LOGIQ Fortis used in a veterinary environment 1-14

1-4-1 Label Location

For information on label locations, refer to the appropriate version of the Basic User Manual or the latest version of the Release Notes.

Table 1-5 Basic User Manual and Release Notes for the LOGIQ Fortis

MODEL NUMBER	ENGLISH BASIC USER MANUAL DIRECTION NUMBER	ENGLISH RELEASE NOTES DIRECTION NUMBER
Running R3.x.x software	5855997-1EN	58707681EN





1-4-2 LOGIQ Fortis used in a veterinary environment

There are different handling instructions for a LOGIQ Fortis used in a veterinary environment.

This table lists the labels (and locations) required on the LOGIQ Fortis when it is used in a veterinary environment.

For specific information about label placement, see [Table 8-34 "LOGIQ Fortis used in a Veterinary Environment Label Placement"](#) on page 8-69.

Table 1-6 Product Labels on the LOGIQ Fortis in a Veterinary Environment

Label	Location
	Side covers
	Monitor arm
 or 	Probe cable(s) near the connector

Section 1-5 Safety Considerations

Contents in this section

1-5-1	Introduction	1-15
1-5-2	Human safety	1-15
1-5-3	Mechanical safety	1-19
1-5-4	Electrical safety	1-22
1-5-5	Battery safety	1-23

1-5-1 Introduction

The following safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment.

1-5-2 Human safety

- Operating personnel must not remove the Ultrasound system covers.
- Servicing should be performed by authorized personnel only.

Only personnel who have participated in a LOGIQ Fortis Training Seminar are authorized to service the equipment.



DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.



DANGER WITH THE POWER ASSISTANT OPTION, DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. DO NOT REMOVE THE COVER.




DANGER TILTING THE LOGIQ Fortis REQUIRES TWO PEOPLE IN ORDER TO AVOID INJURY TO SERVICE PERSONNEL AND DAMAGE TO THE EQUIPMENT.




DANGER USE EXTREME CAUTION AS LONG AS THE LOGIQ Fortis IS UN-STABLE, NOT RESTING ON ALL FOUR CASTERS.


1-5-2 Human safety (cont'd)


 **DANGER DO NOT USE UNAPPROVED DEVICES.**
IF DEVICES ARE CONNECTED WITHOUT THE APPROVAL OF GE, THE WARRANTY WILL BE INVALID.

ANY DEVICE CONNECTED TO THE ULTRASOUND SYSTEM MUST CONFORM TO ONE OR MORE OF THE REQUIREMENTS LISTED BELOW:

- IEC standard or equivalent standards appropriate to devices.
- The devices shall be connected to protective earth (ground).

 **DANGER RISK OF ELECTRICAL SHOCK, THE LOGIQ Fortis MUST BE TURNED OFF AND DISCONNECTED FROM POWER SOURCE. CORD MUST BE CONTROLLED AT ALL TIMES. DISCONNECT THE BATTERIES FROM THE BACKPLANE.**

 **BEWARE THAT THE MAIN POWER SUPPLY, THE POWER ASSIST BATTERIES OR POWER MODULE AND BEPS MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF IF THE CORD IS STILL PLUGGED INTO THE AC OUTLET.**

 **DANGER** Be sure to have read and understood control explanations for each mode used before attempting to adjust the Acoustic Output control or any control that can affect Acoustic Output. During a screening and diagnostic ultrasound examination, high frequency sound penetrates and interacts with tissue in and around the area of anatomy to be imaged. Only a small portion of this sound energy is reflected back to the transducer for use in constructing the image, while the remainder is dissipated within the tissue. The interaction of sound energy with tissue at sufficiently high levels can produce biological effects (aka bioeffects) of either a mechanical or thermal nature. Although the generation of bioeffect is intentional with therapeutic ultrasound, it is generally undesired in screening and diagnostic applications and may be harmful in some conditions.




Use the minimum necessary acoustic output (the principle of ALARA (As Low As Reasonably Achievable)) to get the best diagnostic image or measurement during an examination. Begin the exam with the probe that provides an optimum focal depth and penetration.


1-5-2 Human safety (cont'd)

- ⚠ WARNING** *IF THE COVERS ARE REMOVED FROM AN OPERATING LOGIQ Fortis, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUTDOWN MODE.*
- ⚠ WARNING** *USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PADS TO REDUCE THE RISK OF INJURY.*
- ⚠ WARNING** **EXPLOSION WARNING**
DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.
- ⚠ WARNING** *For console Ultrasound systems and Ultrasound systems mounted on a cart, when the top console is in its locked position, the gas shock is compressed and stores mechanical energy. During normal operation the top console, the weight of the main monitor and the mechanical force of the gas shock are in balance. Take care if/when you activate this gas shock. Personal injury can occur after the panel is removed and the shock pressure is released. Take care when you repair the elevation assembly.*
- ⚠ WARNING** *BEWARE OF POSSIBLE SHARP EDGES ON ALL MECHANICAL PARTS. IF SHARP EDGES ARE ENCOUNTERED, THE APPROPRIATE PPE SHOULD BE USED TO REDUCE THE RISK OF INJURY. THE APPROPRIATE PPE IS REQUIRED PER EHS POLICIES AND SRAS.*
- ⚠ WARNING** *WEAR ALL PPE INCLUDING GLOVES AS INDICATED IN THE CHEMICAL SDS.*
- ⚠ WARNING** **HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE LOGIQ FORTIS. ATTEMPTS TO MOVE THE LOGIQ FORTIS CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.**




1-5-2 Human safety (cont'd)


 **CAUTION** BECAUSE OF THE LIMITED ACCESS TO CABINETS AND EQUIPMENT IN THE FIELD, PLACING PEOPLE IN AWKWARD POSITIONS, GE HAS LIMITED THE LIFTING WEIGHT FOR ONE PERSON IN THE FIELD TO 16 KG (35 LBS). ANYTHING OVER 16 KG (35 LBS) REQUIRES 2 PEOPLE.


 **CAUTION** DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT
BECAUSE OF THE DANGER OF INTRODUCING ADDITIONAL HAZARDS, DO NOT INSTALL SUBSTITUTE PARTS OR PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.

1-5-3 Mechanical safety


 **DANGER** **ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.**

 **DANGER** **WHEN THE LOGIQ FORTIS IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE, USE EXTREME CAUTION SINCE IT MAY BECOME UNSTABLE AND TIP OVER.**


 **DANGER** **THE LOGIQ FORTIS WEIGHS 85KG (178 LBS) AND UP TO 95 KG (209 LBS), DEPENDING ON INSTALLED PERIPHERALS. USE CARE WHEN MOVING IT OR REPLACING ITS PARTS. FAILURE TO FOLLOW THE PRECAUTIONS LISTED BELOW COULD RESULT IN INJURY, UNCONTROLLED MOTION, AND COSTLY DAMAGE. ALWAYS:**





- BE SURE THE PATHWAY IS CLEAR.
- USE SLOW, CAREFUL MOTIONS.
- USE TWO PEOPLE WHEN MOVING ON INCLINES OR LIFTING MORE THAN 16 KG (35 LBS).

 **WARNING** ***WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, AND SYSTEM SETUPS TO A MEDIA OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE. FAILURE TO FOLLOW INSTRUCTIONS COULD RESULT IN LOSS OF PATIENT DATA.***














 **WARNING** ***NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.***

 **WARNING** ***TO AVOID INJURY WHEN YOU MOVE THE MAIN MONITOR AND THE MONITOR ARM, DO NOT PUT YOUR FINGER, HAND, OR OBJECT IN THE JOINT OF THE MAIN MONITOR OR THE MONITOR ARM.***

 **WARNING** ***TO AVOID INJURY OR DAMAGE TO THE MAIN MONITOR, MAKE SURE THERE IS NOTHING WITHIN RANGE OF THE MAIN MONITOR BEFORE MOVING THE MAIN MONITOR AND MONITOR ARM. THIS INCLUDES PEOPLE AND OTHER OBJECTS.***

 **CAUTION** **THE LOGIQ FORTIS SHOULD NOT BE MOVED WITH THE OPERATOR PANEL EXTENDED. MOVE THE OPERATOR PANEL TO ITS CENTERED AND LOCKED POSITION. LOWER THE OPERATOR PANEL AS MUCH AS POSSIBLE BEFORE MOVING THE LOGIQ FORTIS.**

1-5-3 Mechanical safety (cont'd)

-  **CAUTION** TO PREVENT SYSTEM DAMAGE WHILE NOT IN USE AND/OR BEFORE MOVING THE SYSTEM, FLIP DOWN THE MONITOR AND LOCK THE MONITOR ARM AND OPERATOR PANEL FIRMLY IN PLACE.
-  **CAUTION** TO AVOID INJURY WHEN YOU MOVE THE MAIN MONITOR AND THE MONITOR ARM, DO NOT PUT YOUR FINGER, HAND, OR OBJECT ON THE JOINT OF THE MAIN MONITOR OR THE MONITOR ARM.
-  **CAUTION** IF THE FRONT CASTER SWIVEL LOCK IS ENGAGED FOR TRANSPORTATION, PRESSING THE RELEASE PEDAL ONCE DISENGAGES THE SWIVEL LOCK. YOU MUST DEPRESS THE RELEASE PEDAL A SECOND TIME TO ENGAGE THE BRAKE.
-  **CAUTION** PRIOR TO ELEVATING THE LOGIQ FORTIS, VERIFY THE FOLLOWING:
- KEYBOARD IS LOCKED IN ITS LOWEST POSITION
 - FRONT BRAKE IS LOCKED SO THE LOGIQ FORTIS IS UNABLE TO SWIVEL
 - REAR BRAKES ARE IN THE LOCKED POSITION
-  **CAUTION** BEFORE YOU MOVE OR TRANSPORT THE LOGIQ FORTIS, MAKE SURE TO FIRMLY LOCK THE MONITOR ARM AND FLIP DOWN THE MAIN MONITOR TO PREVENT DAMAGE TO THE LOGIQ FORTIS.
-  **CAUTION** DO NOT MOVE THE ULTRASOUND SYSTEM IF THE OPERATING PANEL IS IN THE UNLOCKED POSITION.
-  **CAUTION** DO NOT TRANSPORT LOGIQ FORTIS IN A VEHICLE WITHOUT LOCKING THE CASTERS (WHEELS) AND SECURING IT AS DESCRIBED IN CHAPTER 4.
-  **CAUTION**  USE PROTECTIVE GLASSES DURING DRILLING, FILING, AND DURING ALL OTHER WORK WHERE EYES PROTECTION IS NEEDED.
-  **CAUTION**  USE SAFETY SHOES WHEN DOING WORK WHERE THERE IS ANY CHANCE OF FOOT DAMAGE.
-  **CAUTION**  USE PROTECTIVE GLOVES WHEN DRILLING, CUTTING, AND WHEN REACHING INTO CONFINED OR BLIND SPACES.

1-5-3 Mechanical safety (cont'd)

NOTE: Special care should be taken when transporting the Ultrasound system in a vehicle:

- Before transporting, place the Ultrasound system in its special storage case.
- Ensure that the Ultrasound system is firmly secured while inside the vehicle.
- Secure Ultrasound system with straps or as directed otherwise to prevent motion during transport.
- Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds, and erratic stops or starts.



CAUTION BE CAREFUL NOT TO PINCH ANY OF THE CABLES.

1-5-4 Electrical safety

Safe practices

 **CAUTION RISK OF DAMAGE TO EQUIPMENT**
CONNECTING THE LOGIQ FORTIS TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.

 **CAUTION RISK OF DAMAGE TO EQUIPMENT**
USE THE POWER CORD EXCLUSIVELY ON THE LOGIQ FORTIS. DO NOT USE THE POWER CORD TO MAKE ANY OTHER ELECTRICAL CONNECTIONS.

Follow these guidelines to minimize shock hazards whenever you are using the LOGIQ Fortis:

- To minimize shock hazard, the equipment chassis must be connected to an electrical ground.
- The LOGIQ Fortis is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground. A separate power outlet with a 20 amp circuit breaker for 120 VAC for 120V area, 7.5 amp circuit breaker for 220-240 VAC for 220/240V area or 15 amp circuit breaker for 100 VAC for Japan.
- The power outlet used for this equipment should not be shared with other types of equipment.
- Both the LOGIQ Fortis power cable and the power connector must meet international electrical standards.

Probes

Follow these guidelines before connecting a probe to the LOGIQ Fortis:

- Inspect the probe prior to each use for damage or degradation to the:
 - housing
 - cable strain relief
 - lens
 - seal
 - connectors
 - locking mechanism
- Do not use a damaged or defective probe.
- Never immerse the probe connector or adapter into any liquid.
- The LOGIQ Fortis has more than one type of probe port. Use the appropriate probe port designed for the probe you are connecting.

Peripherals

- Refer to the “Peripherals used in the patient environment” in Chapter 2 of the User Manual for peripheral isolation information.

1-5-5 Battery safety

The LOGIQ Fortis is supplied with lithium ion batteries.

The lithium ion technology is significantly less hazardous to the environment than the lithium metal technology used in some other batteries (such as watch batteries). Used batteries should not be placed with common household waste products. Contact local authorities for the location of a chemical waste collection program nearest you.

NOTE: *Regulations vary for different countries. Dispose of used batteries in accordance with local regulations.*



WARNING ***THE LOGIQ Fortis BATTERIES HAVE A SAFETY DEVICE. DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERIES! ALWAYS OBSERVE THE FOLLOWING PRECAUTIONS:***

- DO NOT short-circuit the batteries by directly connecting the negative terminals with metal objects.
- DO NOT heat batteries or discard them into a fire.
- DO NOT expose batteries to temperatures over 50 °C. Keep batteries away from fire and other heat sources.
- DO NOT charge batteries near a heat source, such as, a fire or heater.
- DO NOT leave batteries in direct sunlight.
- DO NOT pierce batteries with a sharp object, hit it, or step on it.
- DO NOT use damaged batteries.
- DO NOT apply solder to batteries.
- DO NOT connect batteries to an electrical power outlet.
- DO NOT immerse batteries in water or allow them to get wet.



CAUTION **USE ONLY BATTERIES APPROVED BY GE AS SUITABLE FOR USE WITH THE LOGIQ Fortis ULTRASOUND SYSTEM.**



CAUTION **TO PREVENT BATTERIES FROM BURSTING OR IGNITING, OR FUMES FROM THE BATTERIES CAUSING EQUIPMENT DAMAGE, ALWAYS OBSERVE THE FOLLOWING PRECAUTIONS:**

- DO NOT place batteries into a microwave oven or pressurized container.
- If a battery leaks or emits an odor, remove it from all possible flammable sources.
- If a battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, recharging or storage, immediately remove it and stop using it.

NOTE: *If you have any questions about the batteries, consult your local GE representative.*

- Store the battery pack between -10 °C (14 °F) and 50 °C (122 °F).

When charging batteries for the first time after long-term storage, recover the battery pack to original performance through repeating several cycles of full charging and discharging.

Section 1-6 Dangerous Procedure Warnings


Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

 **DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**



 **WARNING IF THE COVERS ARE REMOVED FROM AN OPERATING LOGIQ Fortis, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.**

 **WARNING EXPLOSION WARNING**
DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.

 **WARNING DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT.**
BECAUSE OF THE DANGER OF INTRODUCING ADDITIONAL HAZARDS, DO NOT INSTALL SUBSTITUTE PARTS OR PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.

Section 1-7 Lockout/Tagout (LOTO)

Contents in this section







1-7-1 Lockout/tagout requirements 1-25
 1-7-2 Lockout/tagout procedure 1-26

1-7-1 Lockout/tagout requirements

Read and understand the lockout/tagout (LOTO) requirements before performing any replacement procedures. Keep these instructions for future reference. Follow all of the safety measures and procedures listed in this service manual.

Lockout/tagout requirements ensure you are in total control of the AC power plug at all times during the service process.

Table 1-7 Preparations


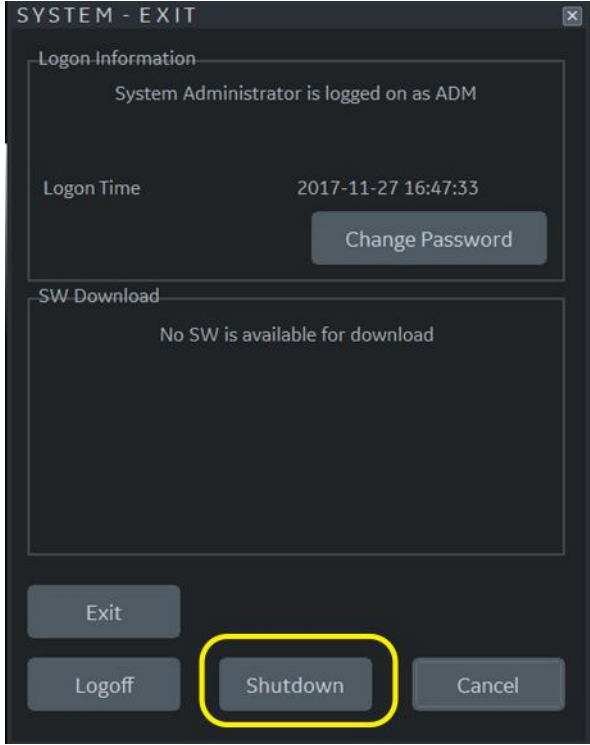
Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis. Follow Lockout/Tagout requirements by ensuring you are in total control of the AC power plug at all times during the service process.</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Isolate the equipment. • Remove/disconnect the battery, if present. • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Control all stored and residual energy. • Verify isolation. <p>All potentially hazardous stored or residual energy is relieved. For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
 <p>DANGER</p> 	<p>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</p>
 <p>DANGER</p> 	<p>Risk of damage to equipment. DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

1-7-2 Lockout/tagout procedure

1-7-2-1 Power down the LOGIQ Fortis


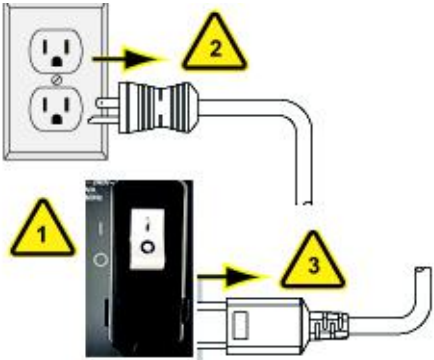
Apply lockout and tagout (LOTO) before servicing the Ultrasound system. Applying LOTO ensures a safe environment when working on the LOGIQ Fortis. Follow all recommended safety procedures when servicing and working near energy sources. Follow LOTO requirements by ensuring you are in total control of the AC power plug at all times during the service process.

Table 1-8 Power Down the LOGIQ Fortis

Step	Corresponding Graphic
<p>1. Set the caster brake. Use the operator panel movement controls to set the panel height as required for this procedure. Lock the panel in place.</p>	
<p>2.</p> <p>To completely power down the LOGIQ Fortis: Lightly press the ON/OFF button on the operator panel to display the System - Exit menu.</p>	
<p>3.</p> <p>Select Shutdown to completely power down the LOGIQ Fortis.</p>	
<p>4. Wait for the ON/OFF button to turn from blue to white.</p>	

1-7-2-2 Disconnect Power to the LOGIQ Fortis




Table 1-9 Disconnect Power to the LOGIQ Fortis

Step	Corresponding Graphic
<p> DANGER</p> <p>Dangerous voltages exist within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist in the LOGIQ Fortis. Always disconnect the power cable from the wall before disconnecting it from the LOGIQ Fortis.</p>	
<p>1. To remove the energy supply from the LOGIQ Fortis, do the following:</p> <ol style="list-style-type: none"> 1. Turn off the breaker on the back of the LOGIQ Fortis. 2. From the wall outlet, disconnect the power cable. 3. Disconnect the power cable from the LOGIQ Fortis. 4. To prevent unexpected re-energization, maintain exclusive control over the power cable. 5. Confirm that the ON/OFF button turns OFF. 	 <p>The diagram illustrates the three steps for disconnecting power. Step 1 shows a hand turning the breaker switch on the back of the LOGIQ Fortis unit to the 'OFF' position. Step 2 shows a hand pulling the power cord out of a wall outlet. Step 3 shows a hand pulling the power cord out of the back of the LOGIQ Fortis unit. Each step is accompanied by a yellow warning triangle with a number inside.</p>
<p>2. Disconnect and store any probes attached to the LOGIQ Fortis.</p>	
<p>3. Disconnect any external I/O cabling.</p>	

1-7-2 Lockout/tagout procedure (cont'd)

Disconnect battery power

Table 1-10 Disconnect Battery Power

Step	Corresponding Graphic
<p> DANGER</p> <p>Dangerous voltages exist within the LOGIQ Fortis. There are no test points to verify isolation. If the power cable is plugged into an AC outlet, be aware that the main power supply, batteries, power module may be energized even if power is turned OFF.</p>	
<p>1. Remove 5 screws and rear cover.</p>	
<p>2. Remove BBG2 Signal Cable and BBG2 Power Cable and 1 screw.</p>	
<p>3. Confirm that all of these steps have been completed to verify isolation.</p>	

Section 1-8 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

GE policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

NOTE: *The US Department of Transportation (DOT) has ruled that “items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care” are “regulated medical waste” for transportation purposes and must be transported as a hazardous material.*

For a LOGIQ Fortis used in a veterinary environment the same restrictions apply.

NOTE: *Return used/unused spare parts from a veterinary environment with the purple recycling label (regardless of its actual condition) and add a description on the label stating that the items were removed from a LOGIQ Fortis Vet in a veterinary environment. This applies for probes and covers labeled as Vet used.*

NOTE: *The USER/SERVICE staff should dispose of all the waste properly, per federal, state, and local waste disposal regulations.*

If the purple recycling label is not used in your region, use the local recycling label.

The LOGIQ Fortis is not meant to be used for long-term storage of patient data or images. The user is responsible for the data on the LOGIQ Fortis and a regular backup is highly recommended.

If the LOGIQ Fortis is sent for repair, please ensure that any patient information is backed up and erased from the LOGIQ Fortis before shipping. It is always possible during system failure and repair to lose patient data. GE is not responsible for the loss of this data.

If PHI (Patient Healthcare Information) data needs to be sent to GE employees for service purposes, GE will ascertain agreement from the customer. Patient information shall only be transferred by approved service processes, tools and devices restricting access, protecting or encrypting data where required, and providing traceability in the form of paper or electronic documents at each stage of the procedure while maintaining compliance with cross-border restrictions of patient information transfers.

Section 1-9 Electromagnetic Compatibility (EMC)

Contents in this section

1-9-1	What is EMC?	1-30
1-9-2	Compliance	1-30
1-9-3	Electrostatic discharge (ESD) prevention	1-31

1-9-1 What is EMC?

Electromagnetic compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due to interference from its environment or when the device produces unacceptable levels of emission to its environment. This interference is often referred to as radio-frequency or electromagnetic interference (RFI/EMI) and can be radiated through space or conducted over interconnecting power or signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

For more information, refer to the appropriate version of the LOGIQ Fortis Basic User Manual Chapter 2, or the appropriate LOGIQ Fortis Release Notes.

1-9-2 Compliance

LOGIQ Fortis conforms to all applicable conducted and radiated emission limits and to immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

Applicable standards are: IEC60601-1-2:2014 (Ed.4).

NOTE: *For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, and clamps are in good condition and installed tightly without skew or stress. Proper installation following all comments noted in this service manual is required in order to achieve full EMC performance.*


1-9-3 Electrostatic discharge (ESD) prevention

 **DANGER** DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:



1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE.

2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

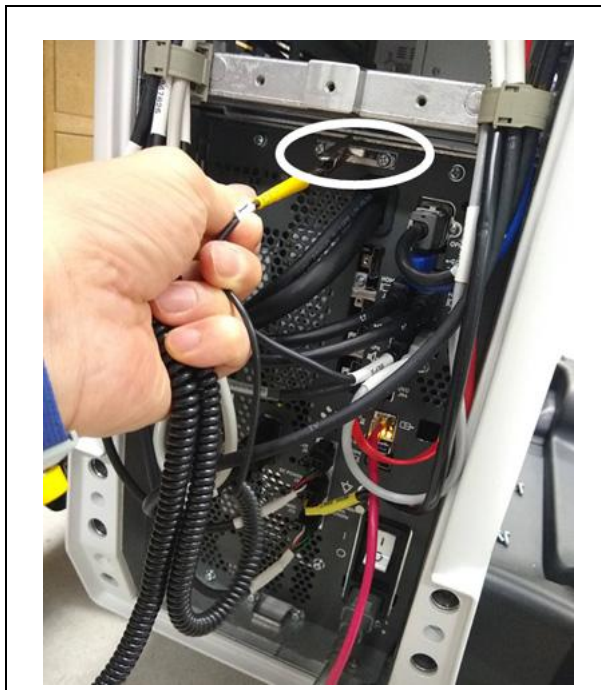
 **DANGER** RISK OF ELECTRICAL SHOCK. THE LOGIQ FORTIS MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.



 **WARNING** RISK OF HEAT HAZARD. IF THE COVERS ARE REMOVED FROM AN OPERATING LOGIQ FORTIS SOME METAL SURFACES (FOR EXAMPLE, THE GPU HEAT SINK ON THE BEPS) MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD EVEN WHILE SHUT DOWN.



Figure 1-1 ESD Receptacle



Section 1-10 Customer Assistance

1-10-1 Contact information

If this equipment does not work as indicated in this service manual or in the user manual, or if you require additional assistance, please contact the local distributor or appropriate support resource as listed in Table 1-11.

Before you call, identify the following information, and acquire an image (Alt+D) to send to the Customer Care team:

- 1.) Ultrasound system ID serial number
- 2.) Software version
- 3.) Date and time of occurrence
- 4.) Sequence of events leading to issue
- 5.) Whether the issue is repeatable
- 6.) Imaging mode, probe, preset/application
- 7.) Media brand, speed, capacity, type
- 8.) Save secondary image capture, cine loop, 4D multi-volume loop
- 9.) Detailed description of any problem encountered
- 10.) Where applicable, save the appropriate log files. Remember to save the log files for each day on a separate media with labels.

NOTE: *Restart the application before resuming clinical scanning.*

1-10-1 Contact information (cont'd)

Table 1-11 Phone Numbers for Customer Assistance

LOCATION	NUMBER	
USA GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive (RP-2156) Wauwatosa, WI 53226	Service	TEL: 1-800-437-1171
	Service Parts	TEL: 1-800-558-2040
	Online Center	TEL: 1-800-321-7937
	Application Support	TEL: 1-800-682-5327
		TEL: 1-262-524-5698
Canada	Service	TEL: 1-800-668-0732
	Application Support	TEL: 1-262-524-5698
Latin America	Service	TEL: 1-262-524-5300
	Application Support	TEL: 1-262-524-5698
Europe GE Ultraschall Deutschland GmbH Beethovenstrasse 239 Postfach 11 05 60, D-42655 Solingen Germany	Support	TEL: +49 (0) 212-2802-652
		FAX: +49 (0) 212-2802-431
EAGM	Algeria	TEL: 213-2179-1212
	Egypt Service Center	TEL: 0020-2322-1252
	Saudi Service Center	TEL: +(966) 800 429 2222
	UAE Service Center	TEL: 0097-1800-3646
Asia (Singapore) GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Placa Singapore 168730	Service Department	TEL: +65 6291-8528
		FAX: +65 6291-7006
Japan	Online Center	TEL: +81 42-846-9011
		FAX: +81 42-648-2905
China	Technical Support	TEL: +86 800-810 8188 TEL: +86 400-812 8188
India	Technical Support	TEL: 1-800-425-8025 TEL: 1-800-425-7255 TEL: 1-800-102-7750
Australia New Zealand	Service Support	TEL: +61 1800 659 465
Korea	Technical Support	TEL: +82 1544-6119

1-10-2 Ultrasound system manufacturer

Information about system manufacturer is located in the Basic User Manual (appropriate revision).

Chapter 2

Site Preparations

Section 2-1 Overview

2-1-1 Purpose of this chapter

This chapter provides the information required to plan and prepare for the setup of a LOGIQ Fortis. Included are descriptions of the facility and electrical needs to be met by the purchaser of the LOGIQ Fortis.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

2-1-2 Contents in this chapter

2-1	Overview	2-1
2-2	General LOGIQ Fortis Requirements	2-2
2-3	Facility Needs	2-9

Section 2-2 General LOGIQ Fortis Requirements

Contents in this section

2-2-1 LOGIQ Fortis environmental requirements 2-2
 2-2-2 Electrical requirements 2-4
 2-2-3 EMI limitations. 2-6
 2-2-4 Probe environmental requirements 2-8
 2-2-5 Time and manpower requirements 2-8

2-2-1 LOGIQ Fortis environmental requirements

If the LOGIQ Fortis is very cold or hot

 **CAUTION RISK OF DAMAGE TO EQUIPMENT**
IF THE ULTRASOUND SYSTEM IS VERY COLD OR HOT, DO NOT TURN ON ITS POWER UNTIL IT HAS HAD A CHANCE TO ACCLIMATE TO ITS OPERATING ENVIRONMENT.

When unpacking the LOGIQ Fortis, allow the temperature to stabilize before powering up.

Refer to [Table 2-1](#) for guidelines on reaching operational temperatures from storage or transport temperatures.

Table 2-1 LOGIQ Fortis Acclimate Time

°C	50	45	40	35	30	25	20	15	10	5	0	-5	-10
°F	122	113	104	95	86	77	68	59	50	41	32	23	14
Hrs	4	2	0	0	0	0	0	0	0	2	4	6	8

Environmental specifications

The LOGIQ Fortis should be operated, stored, and transported according to the listed environmental requirements.

NOTE: Probe environmental specifications may be different than the LOGIQ Fortis.

Refer to [Table 2-2](#) for environmental specifications.

Table 2-2 Environmental Specifications for the LOGIQ Fortis

	Operational	Storage	Transport (< 16 hrs.)
Temperature	10° - 35°C 50° - 95°F	-10° - 50°C 14° - 122°F	-10° - 50°C 14° - 122°F
Humidity	30 - 80% non-condensing	30 - 80% non-condensing	30 - 80% non-condensing
Pressure	70 - 106kPa	70 - 106kPa	70 - 106kPa
Heat Dissipation	3070 Btu/hour	n/a	n/a

2-2-1 LOGIQ Fortis environmental requirements (cont'd)**Cooling**

The cooling requirement for the LOGIQ Fortis with monitor and onboard peripherals is up to 3070 Btu/hr. This figure does not include cooling needed for lights, people, or other equipment in the room. Each person in the room places an additional 300 Btu/hr. demand on the cooling system.

Lighting

Bright light is needed for LOGIQ Fortis set up, updates, and repairs. However, operator and patient comfort may be optimized if the room light is subdued and indirect. Therefore a combination lighting system (dim/bright) is recommended. Keep in mind that lighting controls and dimmers can be a source of EMI which could degrade image quality. These controls should be selected to minimize possible interference.

2-2-2 Electrical requirements

General requirements

NOTE: GE requires a dedicated power and ground for the proper operation of its ultrasound equipment. This dedicated power shall originate at the last distribution panel before the LOGIQ Fortis.

The LOGIQ Fortis will function on voltages from 100-240 volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required.

Sites with a mains power system with defined neutral and live:

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the LOGIQ Fortis outlet.

Sites with a mains power system without a defined neutral:

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the LOGIQ Fortis outlet.

NOTE: Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound system is only a conduit.

Electrical requirements for LOGIQ Fortis

In [Table 2-3](#), the electrical specifications for the LOGIQ Fortis include monitor and on board peripherals.

Table 2-3 Electrical Specifications for the LOGIQ Fortis

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
6601000/6602000	LOGIQ Fortis, 100-240 VAC	100-240 VAC	+/-10%	0.9 KVA	50/60 Hz

Inrush current

During power on, an inrush circuit prevents the current from increasing above the stated values.

Refer to [Table 2-4](#) for inrush currents at various main voltages.

Table 2-4 Inrush Current at Different Mains Voltages

VOLTAGE	Inrush Current
110 VAC	25 A max
120 VAC (with UPS ABCE1442-11MED)	60 A max
230 VAC	50 A max

NOTE: These values are estimations.

Inrush current with UPS

During power on, the inrush current is higher than the one documented in the LOGIQ Fortis manuals due to the use of the UPS. The inrush current value is measured by UPS input point.

Power Supply	230V 50Hz
UPS	ABCE1442-22MED
Inrush Current	70A max

2-2-2 Electrical requirements (cont'd)

Site circuit breaker



CAUTION RISK OF POWER OUTAGE

THE LOGIQ Fortis REQUIRES A DEDICATED SINGLE BRANCH CIRCUIT. TO AVOID CIRCUIT OVERLOAD AND POSSIBLE LOSS OF CRITICAL CARE EQUIPMENT, MAKE SURE YOU DO NOT HAVE ANY OTHER EQUIPMENT OPERATING ON THE SAME CIRCUIT.

It is recommended that the branch circuit breaker for the LOGIQ Fortis be readily accessible.

Site power outlets

A dedicated AC power outlet must be within reach of the LOGIQ Fortis without extension cords. Other outlets adequate for the external peripherals, medical and test equipment needed to support this LOGIQ Fortis must also be present within 1 m (3.2 ft.) of the LOGIQ Fortis. Electrical installation must meet all current local, state, and national electrical codes.

LOGIQ Fortis power plug

If the LOGIQ Fortis arrives without a power plug, or with the wrong plug, you must contact your GE dealer or the installation engineer must supply what is locally required.

Power stability requirements

Voltage drop-out

Max 10 ms.

Power transients (all applications)

Less than 25% of nominal peak voltage for less than 1 ms for any type of transient, including line frequency, synchronous, asynchronous, or aperiodic transients.

2-2-3 EMI limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. Ultrasound machines also generate EMI. The LOGIQ Fortis complies with limits as stated on the EMC label. However there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the LOGIQ Fortis is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. These sources include:

- medical lasers
- scanners
- cauterizing guns
- computers
- monitors
- fans
- gel warmers
- microwave ovens
- light dimmers
- mobile phones
- in-house wireless phones (DECT phones)
- wireless computer keyboard and mouse
- air conditioning system
- High Frequency (HF) surgery equipment
- general AC/DC adapters

The presence of a broadcast station or broadcast van may also cause interference.

2-2-3 EMI limitations (cont'd)

See [Table 2-5](#) for EMI prevention and abatement tips.


Table 2-5 EMI Prevention/Abatement

EMI Rule	Detail
Be aware of RF sources	<ul style="list-style-type: none"> Keep the LOGIQ Fortis at least 5 meters or 15 feet away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the LOGIQ Fortis	Poor grounding is the most likely reason a LOGIQ Fortis will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, RF gaskets, covers, cores	<ul style="list-style-type: none"> After you finish repairing or updating the LOGIQ Fortis, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the card rack cover over the card rack. Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken RF gaskets	If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn on the LOGIQ Fortis until any loose metallic part is removed.
Do not place labels where RF gaskets touch metal	Never place a label where RF gaskets meet the LOGIQ Fortis. Otherwise, the gap created will permit RF leakage. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly dress peripheral cables	Do not allow cables to lie across the top of the card rack or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. Attach the monitor cables to the frame.

2-2-4 Probe environmental requirements


Probes should be operated, stored, and transported according to the listed environmental requirements. For specific information on environmental requirements for the probes, see “Environmental Requirements” in Chapter 3 of the Basic User Manual (latest revision).

NOTE: *LOGIQ Fortis environmental specifications may be different than the probes.*

 **NOTICE** STORAGE TEMPERATURES VARY DEPENDING ON THE TYPE OF PROBE. WHEN EXPOSED TO LARGE TEMPERATURE VARIATIONS, THE LOGIQ Fortis AND PROBES SHOULD BE KEPT AT ROOM TEMPERATURE BEFORE USE.

Refer to the table in *"If the LOGIQ Fortis is very cold or hot" on page 2-2* to determine the needed settlement time.

2-2-5 Time and manpower requirements

 **CAUTION** **RISK OF INJURY OR DAMAGE TO EQUIPMENT**
HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE LOGIQ FORTIS. ATTEMPTS BY ONE PERSON TO MOVE THE LOGIQ Fortis CONSIDERABLE DISTANCES, OR ON AN INCLINE, COULD RESULT IN INJURY, DAMAGE, OR BOTH.



Time requirement

Site preparation takes time. Begin pre-installation checks as soon as possible. If possible, begin pre-installation six weeks before delivery to allow enough time to make any changes.

Manpower requirement

Two persons for delivery and unpacking.

Section 2-3 Facility Needs

Contents in this section

2-3-1	Purchaser responsibilities	2-9
2-3-2	Required facility needs	2-10
2-3-3	Desirable features	2-11
2-3-4	Minimal floor plan suggestions	2-11
2-3-5	Networking setup requirements	2-13
2-3-6	Privacy and security	2-15
2-3-7	Environmental dangers	2-15

2-3-1 Purchaser responsibilities

The work and materials needed to prepare the site are the responsibility of the purchaser. Delay, confusion, and waste of manpower can be avoided by completing pre-installation work before delivery. Purchaser responsibility includes:

- Procuring the materials required.
- Completing the preparations before delivery of the LOGIQ Fortis.
- Paying the costs for any alterations and modifications not specifically provided in the sales contract.

NOTE: *All electrical installations that are preliminary to the positioning of the equipment at the site prepared for the equipment must be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing must also be performed by qualified personnel. The products involved (and the accompanying electrical installations) are highly sophisticated and special engineering competence is required. All electrical work on these products must comply with the requirements of applicable electrical codes. The purchaser of GE equipment must only utilize qualified personnel to perform electrical servicing on the equipment.*

The desire to use a non-listed or customer provided product or to place an approved product further from the LOGIQ Fortis than the interface kit allows, presents challenges to the installation team. To avoid delays during installation, such variances should be made known to the individuals or group performing the installation at the earliest possible date (preferably prior to the purchase).

The ultrasound suite must be clean prior to delivery of the machine. Carpet is not recommended because it collects dust and creates static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact LOGIQ Fortis reliability.

2-3-2 Required facility needs

NOTE: *GE requires a dedicated power and ground for the proper operation of its ultrasound equipment. This dedicated power shall originate at the last distribution panel before the LOGIQ Fortis.*

The LOGIQ Fortis will function on voltages from 100-240 volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required.

Sites with a mains power system with defined neutral and live:

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the ultrasound outlet.

Sites with a mains power system without a defined neutral:

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the ultrasound outlet.

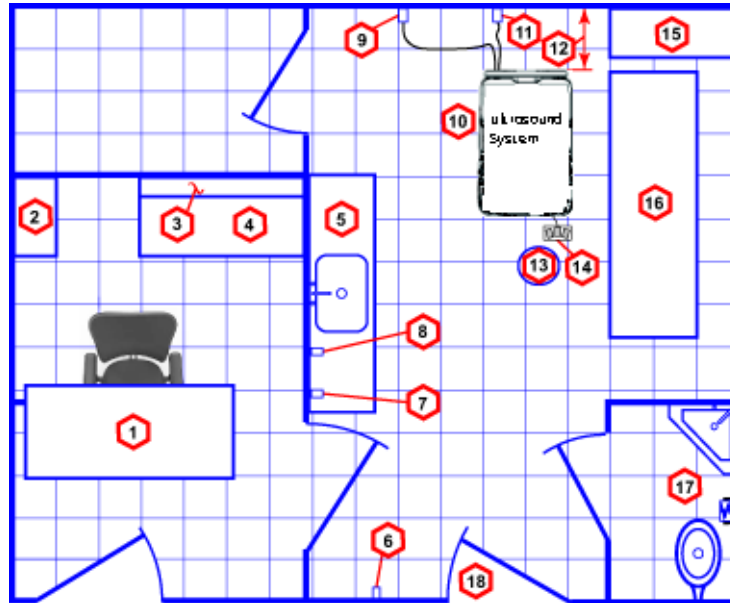
- Dedicated single branch power outlet of adequate amperage (see [Table 2-3 "Electrical Specifications for the LOGIQ Fortis" on page 2-4](#)) meeting all local and national codes which is located less than 2.5 m (8 ft.) from the LOGIQ Fortis's proposed location.
- Door opening is at least 76 cm (30 in) wide.
- Proposed location for LOGIQ Fortis is at least 0.46 m (1.5 ft) from the wall or objects for cooling.
- Power outlet and place for any external peripheral are within 2 m (6.5 ft.) of each other with peripheral within 1 m (3.2 ft.) of the LOGIQ Fortis to connect cables.
- Power outlets for other medical equipment and gel warmer.
- Power outlets for test equipment within 1 m (3.2 ft.) of the LOGIQ Fortis.
- Clean and protected space to store transducers (in their cases or on a rack).
- Material to safely clean probes (done with a plastic container, never metal).

2-3-3 Desirable features

In addition to the floor plan suggestions shown in Figure 2-1 and Figure 2-2, a nearby waiting room and a receptacle for bio-hazardous waste, like used probe sheaths is suggested. Grid represents 30.5 x 30.5 cm (1 x 1 foot).

2-3-4 Minimal floor plan suggestions

Figure 2-1 Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot)

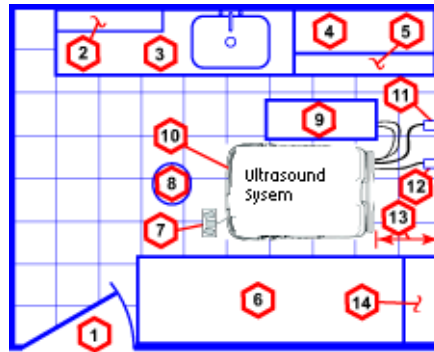


Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot) Key

Item	Description	Item	Description
1.	Secretary or doctors desk	2.	Lockable cabinet ordered by GE for its software and proprietary manuals
3.	Film viewer	4.	Counter top
5.	Counter top and sink with hot and cold water	6.	Overhead light dimmer – dual level lighting (bright/dim)
7.	Emergency oxygen	8.	Suction line
9.	Dedicated power outlet – circuit breaker protected and easily accessible	10.	LOGIQ Fortis
11.	Network interface	12.	45,7 cm (1.5 ft) distance of LOGIQ Fortis from wall or objects
13.	Stool	14.	Footswitch
15.	Storage for linens and equipment	16.	Examination table – 193 x 61 cm (76 x 24 inches)
17.	Lavatory and dressing room	18.	Door – at least 76 cm (30 inches)

2-3-4 Minimal floor plan suggestions (cont'd)

Figure 2-2 Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot)



Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot) Key

Item	Description	Item	Description
1.	Door – at least 76 cm (30 inches)	2.	Film viewer
3.	Counter top, sink with hot and cold water, and supplies storage	4.	Linen supply
5.	Probes/supplies	6.	Examination table – 193 x 61 cm (76 x 24 inches)
7.	Footswitch	8.	Stool
9.	External peripherals	10.	LOGIQ Fortis
11.	Dedicated power outlet – circuit breaker protected and easily accessible	12.	Network interface
13.	45,7 cm (1.5 ft) distance of LOGIQ Fortis from wall or objects	14.	Lockable cabinet ordered by GE for its software and proprietary manuals

2-3-5 Networking setup requirements

Stand alone scanner (without network connection)

None.

Scanner connected to hospital's network

For supported networks, a 10/100/1000 Mbps Ethernet/DICOM network connection is required.

InSite™ requirements

Need internet access on the outbound port to GE's remote service platform (Insite), which is only opened on request by the user and through a secure HTTPS connection on port 443.

Insite requires an Ethernet connection with a 10/100 Mbps or 10/100/1000 Mbps interface.

Purpose of the DICOM network function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network. Inbound and outbound connections through port 104 are for DICOM connectivity. Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues. With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

DICOM option setup requirements

To configure the LOGIQ Fortis to work with other network connections, the site's network administrator must provide information to complete the form in [Figure 2-3 "Worksheet for DICOM Network Information" on page 2-14](#). Ensure that there are no spaces in any field of the form.

Entries must include:

- A host name, local port number, AE Title, IP address and Net Mask for the LOGIQ Fortis.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.
- The host name, IP address, port and AE Title for each device the site wants connected to the LOGIQ Fortis for DICOM APPLICATION INFORMATION. A field for the make (manufacturer) and the revision of the device, is also included. This information may be useful for troubleshooting.

For connectivity setup information, see the current revision of the LOGIQ Fortis Basic User Manual (latest revision). See [1-4-1 "Label Location" on page 1-14](#).

2-3-5 Networking setup requirements (cont'd)

Figure 2-3 Worksheet for DICOM Network Information

LOGIQ Fortis

Host Name IP Address . . . Local Port

AE Title Net Mask . . .

Network Speed Default Gateway . . .

DHCP

DICOM APPLICATION

	NAME	MAKE/	AE TITLE	IP	PORT	OTHER CONFIGURATION
Store 1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Raw Data <input type="checkbox"/> Allow Multiframe <input type="checkbox"/> Structured Reporting <input type="checkbox"/> Compression _____
Store 2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Raw Data <input type="checkbox"/> Allow Multiframe <input type="checkbox"/> Structured Reporting <input type="checkbox"/> Compression _____
Store 3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Raw Data <input type="checkbox"/> Allow Multiframe <input type="checkbox"/> Structured Reporting <input type="checkbox"/> Compression _____
DICOM Print	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	Vendor: _____ Print Size: _____ Medium: _____ Copies: _____ Orientation: _____ Color _____
Worklist	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	
Storage Commit	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	Associated Storage AE _____
DICOM MPPS	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>	<input type="text"/>	

2-3-6 Privacy and security

Since the LOGIQ systems are integrated into your IT-network, GE wants to make sure that you are aware of the proactive measures we are taking to secure the LOGIQ Fortis.

For more information on privacy and security, see "Privacy and Security Manual" (latest revision).

2-3-7 Environmental dangers

Commercial devices such as laser cameras, printers, VCRs and external monitors, usually exceed allowable leakage current limits and, when plugged into separate AC outlets, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets, or providing the device with extra protective earth, will be required in order to meet ANSI/AAMI ES60601-1 and IEC60601-1 standards for electrical leakage.

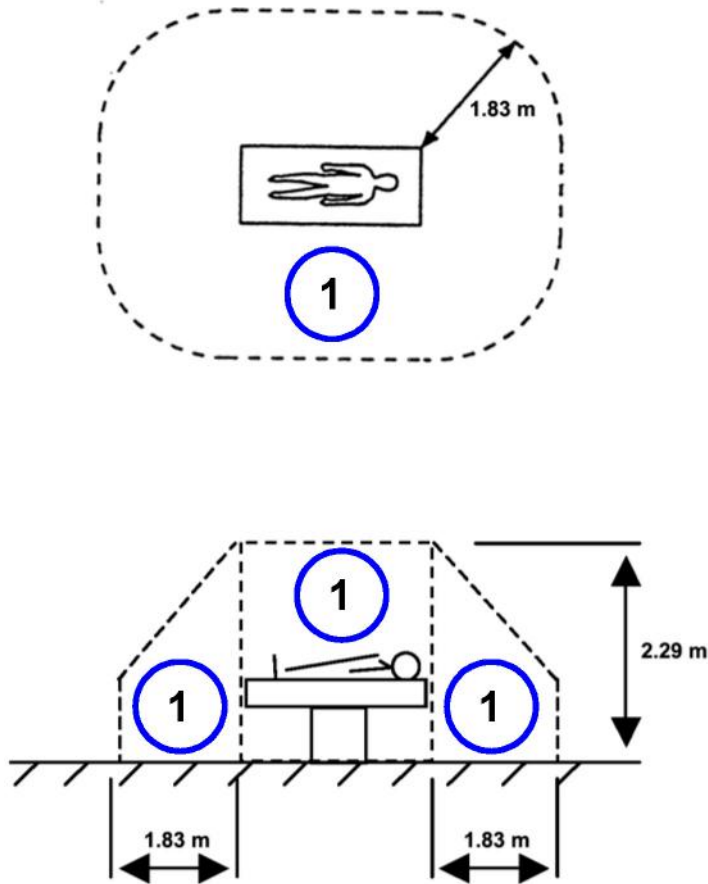
2-3-7 Environmental dangers (cont'd)

Patient Vicinity UL60601-1 (USA)

2.12.20DV (UL60601-1:2003)

In area in which patients are normally cared for, the patient vicinity is the space with surfaces likely to be contacted by the patient or attendant who can touch the patient. This encloses a space within the room 1.83 m (6 ft.) beyond the perimeter of the bed (examination table, dental chair, treatment booth, and the like) in its intended location, and extending vertically 2.29 m (7.5 ft.) above the floor.

Figure 2-4 Patient Vicinity



Item	Description
1.	Patient vicinity

Patient Environment IEC60601-1 (IEC60601-1-1) and ANSI AAMI ES60601-1

Sub Clause 2.202 and figure 201 (IEC60601-1-1:2000)

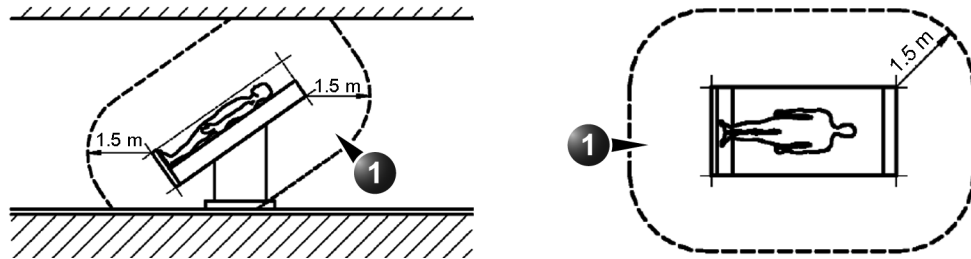
Sub Clause 3.79 and figure A.9 (IEC60601-1:2005 and ANSI AAMI ES60601-1:2005)

Such an area is an environment in which medical diagnosis, monitoring or treatment is carried out. It is very difficult to attach unique dimensions to the PATIENT ENVIROMENT.

In practice, a distance of 2,5 m (8.2 ft.) above the floor on which the medical personnel stand and a horizontal distance of 1,5 m (4.9 ft.) have justified themselves as indicative of the dimensions of the Patient Environment.

The patient environment/vicinity will be depicted as a dashed line in this procedure. See example below.

Figure 2-5 Patient Environment



Item	Description
1.	Patient environment

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Chapter 3

LOGIQ Fortis Setup

Section 3-1 Overview

3-1-1 Purpose of this chapter

This chapter contains information needed to set up the LOGIQ Fortis. Also included in this section are guidelines for transporting the unit to a new site.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

3-1-2 Contents in this chapter

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3-2	Setup Reminders	3-2
3-3	Receiving and Unpacking the Equipment.	3-4
3-4	Preparing for Setup.	3-10
3-5	Completing the Setup	3-13
3-6	Configuring the LOGIQ Fortis.	3-35
3-7	Connectivity	3-54
3-8	Setting Up Paperwork.	3-55

Section 3-2 Setup Reminders

Contents in this section


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 3-2-2 Setup warnings3-2


3-2-1 Average setup time


Table 3-1 Average Setup Time


DESCRIPTION	AVERAGE SETUP TIME	COMMENTS
UNPACK THE LOGIQ Fortis	0.5 HOUR	
SET UP THE LOGIQ Fortis (without OPTIONS)	4 HOURS	DEPENDENT ON THE CONFIGURATION
CONFIGURE DICOM NETWORK	2 HOURS OR MORE	DEPENDENT ON THE CONFIGURATION
INSTALL INSITE	0.5 HOUR	


3-2-2 Setup warnings


-  **DANGER** WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (FOR EXAMPLE, THE METER’S GROUND SWITCH IS OPEN), DO NOT TOUCH THE LOGIQ FORTIS!

-  **DANGER** DO NOT WEAR THE ESD WRIST STRAP WHEN YOU WORK ON LIVE CIRCUITS AND MORE THAN 30V PEAK IS PRESENT.

-  **DANGER** TO PREVENT ELECTRICAL SHOCK, CONNECT THE LOGIQ FORTIS TO A PROPERLY GROUNDED POWER OUTLET. DO NOT USE A THREE-TO-TWO PRONG ADAPTER. THIS DEFEATS SAFETY GROUNDING.

-  **CAUTION** DO NOT OPERATE THE LOGIQ FORTIS UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. LOGIQ FORTIS PERFORMANCE AND COOLING REQUIRE THIS.

-  **CAUTION** NEVER REVERSE POLARITY ON ANY METER THAT INTERCEPTS THE POWER CORD WITH POWER CONNECTED TO THE LOGIQ Fortis.
 EVEN IN THE OFF STATE, REVERSING POLARITY ON THE POWER CAN SERIOUSLY DAMAGE THE POWER SUPPLY.

-  **CAUTION** IF THE LOGIQ FORTIS IS VERY HOT OR COLD, ALLOW THE TEMPERATURE TO STABILIZE BEFORE POWERING UP. FOR GUIDELINES ON REACHING OPERATIONAL TEMPERATURES FROM STORAGE OR TRANSPORT TEMPERATURES, SEE [2-2-1 "LOGIQ Fortis environmental requirements" on page 2-2.](#)

3-2-2 Setup warnings (cont'd)

**CAUTION OPERATOR MANUAL(S)**

THE USER MANUAL(S) SHOULD BE FULLY READ AND UNDERSTOOD BEFORE OPERATING THE LOGIQ FORTIS AND KEPT NEAR THE LOGIQ FORTIS FOR QUICK REFERENCE.

**CAUTION ACOUSTIC OUTPUT HAZARD**

ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE LOGIQ FORTIS PROBE IS WITHIN AIUM/NEMA STANDARDS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.



Section 3-3 Receiving and Unpacking the Equipment

Contents in this section

- 3-3-1 Purpose of this section 3-4
- 3-3-2 Receiving and unpacking warnings. 3-4
- 3-3-3 Tilt Watch Indicator 3-5
- 3-3-4 Transportation box label 3-6
- 3-3-5 Receiving the LOGIQ Fortis 3-7
- 3-3-6 Unpacking the LOGIQ Fortis..... 3-8
- 3-3-7 Packing materials - recycling information 3-9

3-3-1 Purpose of this section

This section describes how to receive and unpack the LOGIQ Fortis.

3-3-2 Receiving and unpacking warnings



TWO PEOPLE ARE NEEDED TO UNPACK THE LOGIQ FORTIS BECAUSE OF ITS WEIGHT. ATTEMPTS TO MOVE THE LOGIQ FORTIS CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH. TWO PEOPLE ARE REQUIRED WHENEVER A PART WEIGHING 16 KG (35 LBS) OR MORE MUST BE LIFTED.

CAUTION REMEMBER TO USE RELEVANT PERSONAL PROTECTING EQUIPMENT (PPE) DURING PACKING/UNPACKING. CHECK WITH YOUR LOCAL EHS REPRESENTATIVE.

3-3-3 Tilt Watch Indicator

Improper handling during transportation may harm the equipment inside the package even if the package itself is undamaged.

To make it easier to detect if the handling during transportation has been improper, a set of Tilt Watch Indicator have been attached to the transportation box.

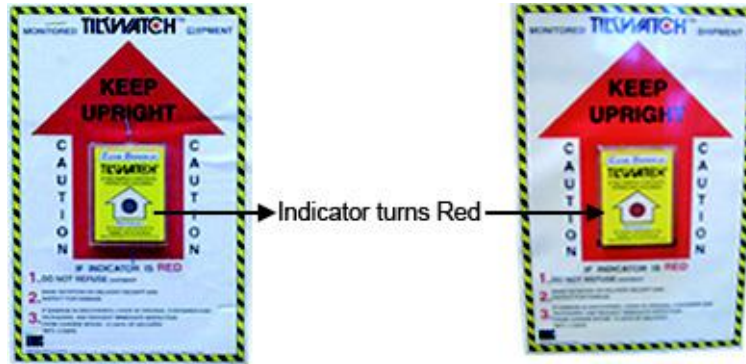


Figure 3-1 Tilt Watch Indicator (example)

3-3-3-1 If Tilt Watch Indicator has triggered or is missing

The purpose of the Tilt Watch Indicator label is to alert people handling a product that it is sensitive to tipping and it must remain upright at all times. It is basically an active “Up Arrow” that changes color if the package is tipped 89 degrees or more from horizontal. These labels can be false activated if tipped less than 89 degrees, and shocked or vibrated at the same time. This event does occur, but is considered uncommon. If a package is received with an activated Tilt Watch Indicator label, there is high degree of certainty it tipped 89 degrees or more from horizontal during shipment.

An activated Tilt Watch Indicator label does not indicate if the package was simply “Tipped” (laid down with no impact shock) or “Tipped Over” (free fall, with an impact shock). Using both shock indicator labels and Tilt Watch Indicator labels will help identify if a Tip Over impact shock occurred.

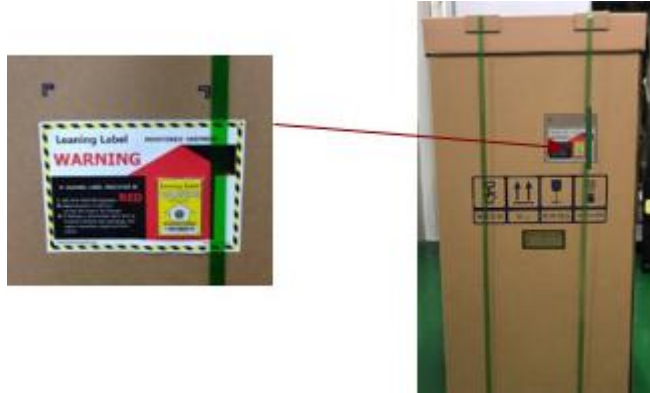
Table 3-2 Tilt Watch Indicator has triggered or is missing

Step	Task
1.	If the Tilt Watch Indicator is missing: Note on the shipping papers at the time of receipt that the Tilt Watch Indicator label is missing. If the Tilt Watch Indicator has triggered: Note on the shipping papers at the time of receipt that the Tilt Watch Indicator label was activated.
2.	Inspect the product for possible concealed damage.

3-3-3-2 Position of the Tilt Watch Indicators

Before cutting the straps, check the indicator to make sure they have not been triggered. If damaged, report it to the carrier. If not, then cut the straps around the crate.

The Tilt & Shock indicators have been attached to the transportation box as illustrated in the figure below.



3-3-4 Transportation box label

Figure 3-2 Transportation box label



Table 3-3 LOGIQ Fortis Transportation Box Labeling

SYMBOL	DEFINITION	SYMBOL	DEFINITION		
	RECYCLING Recyclable Wood		TOP, UPRIGHT - Transportation and Storage		FRAGILE, Handle with Care
	DO NOT STACK		KEEP DRY (protect from moisture)		Thermal management
Air Pressure 700~1060hPa	Range of Air Pressure		RECYCLING Recyclable Wood		

3-3-5 Receiving the LOGIQ Fortis

Improper handling during transportation may harm the equipment inside the package even if the package itself is undamaged.

Examine package

Examine package closely at time of delivery.

Damage in transportation

Follow this procedure if damage is apparent:

Table 3-4 Damage in Transportation

STEP	TASK
1.	Write "Damage In Shipment" on ALL copies of the freight or express bill BEFORE delivery is accepted or "signed for" by a GE representative or hospital receiving agent.
2.	Take pictures of any damage to the packaging and the LOGIQ Fortis. These pictures will be needed if a claim against the carrier is applied.
3.	Report the damage to the carrier. <ul style="list-style-type: none"> • Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. • A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

3-3-6 Unpacking the LOGIQ Fortis

The instruction manual describes the best method for unpacking the LOGIQ Fortis ultrasound scanning unit. Images are ONLY for reference; wear proper PPE when handling packaging (gloves, safety shoes, etc....).

Table 3-5 Unpacking Procedure

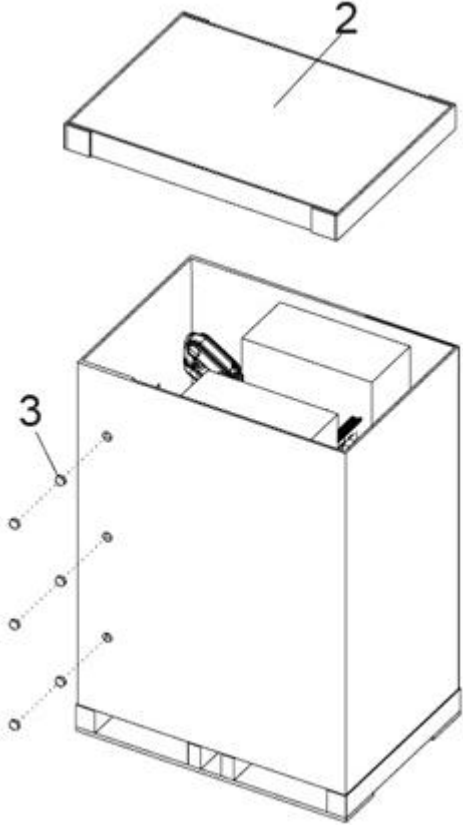
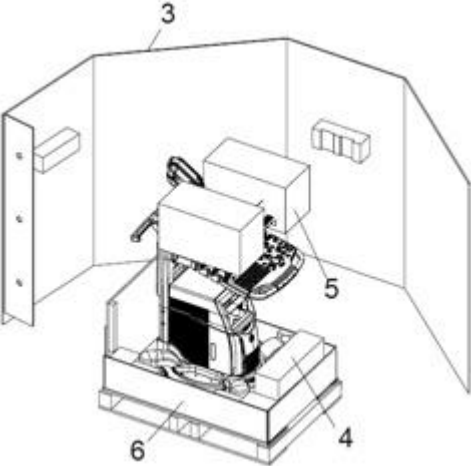
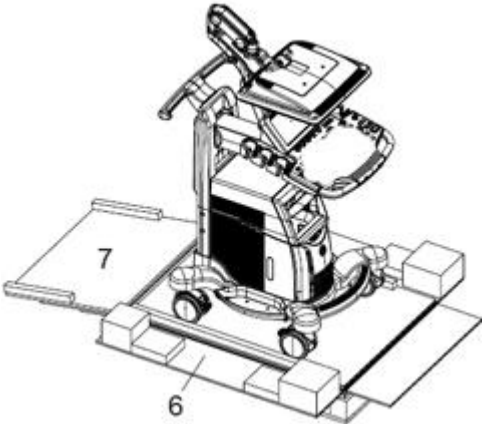
Step	Task	Corresponding graphic
1.	Cut the straps around the crate.	
2.	Remove the top cover.	
3.	Remove three P-Joint, then remove the out sleeve.	 <p>The diagram illustrates the removal of the top cover (labeled 2) and the three P-joints (labeled 3) from the crate. The top cover is shown as a flat rectangular piece. The P-joints are shown as three small circular components being removed from the side of the crate.</p>
4.	Remove the option box.	
5.	Carefully remove foam packing material and plastic bag from the ultrasound unit and monitor	
6.	Remove the box bottom assy.	 <p>The diagram illustrates the removal of the box bottom assembly (labeled 6) and the option box (labeled 4) from the ultrasound unit (labeled 5) and monitor (labeled 3). The ultrasound unit and monitor are shown inside the crate, with the option box and bottom assembly being removed.</p>

Table 3-5 Unpacking Procedure

Step	Task	Corresponding graphic
7.	<p>Unlock the casters and align the orientation of the 4 caster's direction (refer to 4-3-3 "Brakes and direction lock functional checks" on page 4-15) and then using the incline plane of the box bottom assy., slowly move the system from the box.</p>	

Note: Place all of the filling inside the Transportation Box. Close the box, and store the filling for possible future use.

3-3-7 Packing materials - recycling information

The packing materials for the LOGIQ Fortis are recyclable:

- The transportation box is made of cardboard.
- Lever locking (hinges) is made of zinc plated steel.
- The inner reinforcements are made of Ethafoam (Polyethylene foam).
- The plastic wrap is made of LDPE (Low Density Polyethylene).

Section 3-4 Preparing for Setup

Contents in this section

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3-4-2	Physical inspection	3-10
3-4-3	Location of Multi Caution label and rating label	3-11
3-4-4	EMI protection.	3-12

3-4-1 Verify customer order

Compare items received by the customer to what is listed on the delivery order. Report any items that are missing, back ordered, or damaged.

3-4-2 Physical inspection

Verify that the LOGIQ Fortis arrived intact (visual inspection). If the LOGIQ Fortis has been damaged, see [3-3-5 "Receiving the LOGIQ Fortis" on page 3-7](#).

3-4-3 Location of Multi Caution label and rating label

Figure 3-3 Multi Caution Label

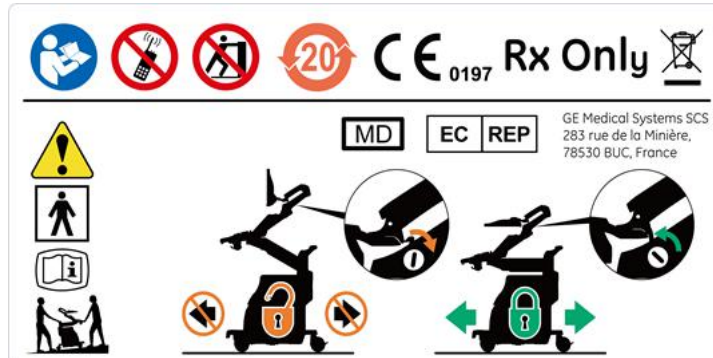


Figure 3-4 Rating Label (OPIO arm)



3-4-3 Location of Multi Caution label and rating label (cont'd)

Figure 3-5 Rear Cover Label



3-4-4 EMI protection

The LOGIQ Fortis has been designed to minimize the effects of Electro-Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the LOGIQ Fortis from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the LOGIQ Fortis is put into operation.

See [2-2-3 "EMI limitations" on page 2-6](#) for more information about EMI protection.

Section 3-5 Completing the Setup

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3-5-1 Purpose of this section

This section describes how to complete the set up of LOGIQ Fortis.

3-5-2 LOGIQ Fortis specification verification

Verification of the LOGIQ Fortis requirements

- Verify that the site meets the requirements listed in (see [Section 2-3 "Facility Needs" on page 2-9](#)).
- Verify that the specifications (physical dimensions, mass, and acoustic noise output) below do not conflict with any on-site conditions.

Physical dimensions

- Height: 1250 - 1800 mm, 49 - 71 in (HDU display), 1210 - 1760 mm, 48 - 69 in (LCD Monitor)
- Width: 530mm, 20.9 inch (Caster), 545mm, 21.5 inch (LCD Monitor), 565mm, 22.2 inch (HDU display)
- Depth: 885mm, 34.8 inch
- Weight: 85 kg (187.4 lb.)

Acoustic noise output

The acoustic noise output is less than 48 dB(A) at 20 degrees Celsius at a distance of 1 meter at all four sides and 1 meter above the floor.

3-5-3 Electrical specification verification

 **CAUTION** CONNECTING A LOGIQ FORTIS TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.

Verification of the LOGIQ Fortis voltage setting

Verify that the mains voltage specified for the LOGIQ Fortis is available on-site.

The voltage setting for the LOGIQ Fortis is found on the rating label on the back of the LOGIQ Fortis on the lower rear frame.

Figure 3-6 Rating Label - LOGIQ Fortis



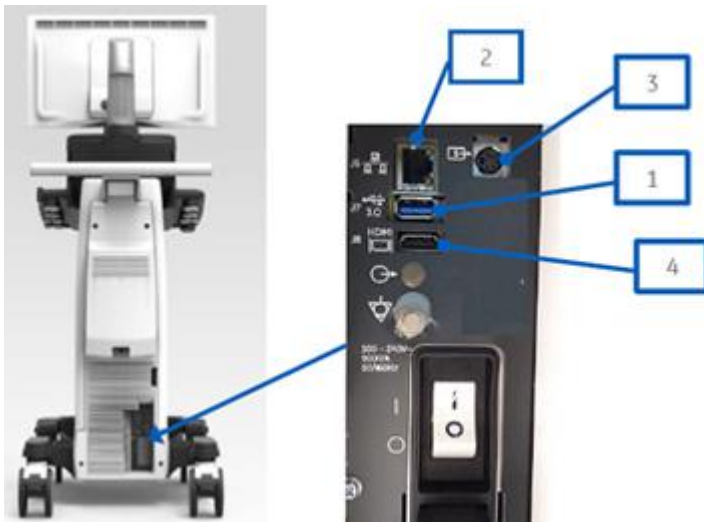
3-5-4 Connections on the rear I/O panel

NOTE: *Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC60950-1 or IEC62368-1 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the LOGIQ Fortis standard IEC60601-1-1. Everybody who connects additional equipment to the signal input part or signal output part of LOGIQ Fortis, configures a medical system, and is therefore responsible that the LOGIQ Fortis complies with the requirements of the valid version of IEC60601-1-1. If in doubt, consult the technical service department or your local representative for GE.*

Connect Ethernet

Connect the Ethernet cable to the Ethernet connector on the external I/O (rear side of LOGIQ Fortis).

Figure 3-7 I/O Rear Panel



- 1.) USB 3.0 Port
- 2.) Ethernet connector (RJ-45 modular, 8-pin)
- 3.) S-Video Option (NTSC (720x480i, 60Hz) and PAL (720x576i, 50Hz))
- 4.) HDMI Port (1920x1080 is the only supported resolution)

Connect USB Flash Drive

For information, see “USB Hard Disk Drive and USB Flash Drive” in Chapter 9 of the LOGIQ Fortis Basic User Manual (latest revision).

3-5-5 Connections on the patient I/O panel

Connect ECG

For information on the ECG, see “Patient Cardiac and ECG Connections” in Chapter 3 of the Basic User Manual (appropriate version).

3-5-6 Connecting probes

Probes can be connected at any time, whether the LOGIQ Fortis is on or off.

CAUTION  **DO NOT CONNECT A PROBE WHILE THE LOGIQ FORTIS IS POWERING UP.**

The LOGIQ Fortis has four DLP probe ports ([Figure 3-8](#)). This is the only type of probe port on the LOGIQ Fortis


Figure 3-8 Probe Connectors, Four DLP Probe Ports



To connect a probe:

NOTE: *It is not necessary to turn OFF power to connect or disconnect a probe. However, it is a good idea to select a different probe or to freeze the image when removing a probe to avoid disconnecting a live probe.*

CAUTION  **DO NOT ALLOW THE PROBE HEAD TO HANG FREELY. EXCESSIVE IMPACT TO THE PROBE WILL RESULT IN IRREPARABLE DAMAGE.**

CAUTION  **KEEP THE PROBE CABLES AWAY FROM THE WHEELS.
DO NOT BEND THE PROBE CABLES.
DO NOT CROSS CABLES BETWEEN PROBES.**






- 1.) Before connecting the probe:
 - a.) Perform a visual check of the probe and LOGIQ Fortis sockets.
 - b.) Remove any dust or foam rests from the probe.
 - c.) Verify the probe and the probe cable for any visual damage.
- 2.) Hold the probe connector vertically with the cable pointing upward.
- 3.) Turn the connector locking handle counter-clockwise to the horizontal position.
- 4.) Align the connector with the probe port and carefully push into place.
- 5.) Turn the locking handle clockwise to the full vertical position to lock in place.
- 6.) Position the probe cable so that it is not resting on the floor.

3-5-6 Connecting probes (cont'd)

To disconnect a probe:

- 1.) Select a different probe or freeze the image before removing a probe to avoid disconnecting a live probe.
- 2.) Rotate the lock handle counter-clockwise to the horizontal position to unlock the connector.
- 3.) Remove the connector from the port.
- 4.) Ensure that the probe head is clean before placing the probe in its storage case. For cleaning instructions, see "Probe Cleaning Process" in Chapter 11 of the LOGIQ Fortis Basic User Manual (latest revision).

3-5-7 Power on/boot up**Warnings**

-  **DANGER** ALWAYS CONNECT THE ULTRASOUND SYSTEM TO A FIXED POWER SOCKET WHICH HAS THE PROTECTIVE GROUNDING CONNECTOR. FAILURE TO FOLLOW THESE INSTRUCTION COULD LEAD TO ELECTRICAL SHOCK.
-  **DANGER** NEVER USE A THREE-TO-TWO PRONG ADAPTER; THIS DEFEATS THE SAFETY GROUND. FAILURE TO FOLLOW THESE INSTRUCTION COULD LEAD TO ELECTRICAL SHOCK.
-  **DANGER** ENSURE THAT THE POWER CORD AND PLUG ARE INTACT AND THAT THE POWER PLUG IS THE PROPER HOSPITAL-GRADE TYPE (WHERE REQUIRED). FAILURE TO FOLLOW THESE INSTRUCTION COULD LEAD TO ELECTRICAL SHOCK.
-  **CAUTION** LOGIQ FORTIS REQUIRES ALL COVERS.
ONLY OPERATE THE LOGIQ FORTIS WHEN ALL OF THE BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. THE COVERS ARE REQUIRED FOR SAFE OPERATION, GOOD PERFORMANCE AND COOLING PURPOSES.
-  **CAUTION** USE ONLY POWER SUPPLY CORDS, CABLES, AND PLUGS PROVIDED BY OR DESIGNATED BY GE.

NOTE: Do not cycle the circuit breaker ON-OFF-ON in less than five seconds. When turning OFF the circuit breaker, WAIT until the ON/OFF button is no longer lit. The LOGIQ Fortis should de-energize completely before turning the circuit breaker ON.

3-5-7 Power on/boot up (cont'd)

Connect AC (mains) power to the LOGIQ Fortis

Connecting AC power to the LOGIQ Fortis involves preliminary checks of the power cord, voltage level and compliance with electrical safety requirements.

NOTE: *The LOGIQ Fortis will function on voltages from 100-240 volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required (North America Only).*

- 1.) Ensure that the wall outlet is of appropriate type, and that the circuit breaker is turned off.
- 2.) Uncoil the power cable, allowing sufficient slack so that the LOGIQ Fortis can be moved slightly.
- 3.) Verify that the:
 - power cable is without any visible scratches, any sign of damage or tangled.
 - on-site mains voltage is within the limits indicated on the rating label near the circuit breaker on the rear of the LOGIQ Fortis.
- 4.) Connect the female plug of the power cable to the power inlet at the rear of the LOGIQ Fortis.
- 5.) Verify that the mains power circuit breaker is in OFF position, If not, switch it to OFF.

Figure 3-9 Circuit Breaker



- 6.) Connect the other end (male plug) of the power cable to a hospital grade mains power outlet with the proper rated voltage, and the LOGIQ Fortis is ready for power ON/boot up.

3-5-7 Power on/boot up (cont'd)

Switch ON the AC power to LOGIQ Fortis

1.) Switch ON the circuit breaker at the rear of the LOGIQ Fortis. The **ON/OFF** button turns white.

Figure 3-10 ON/OFF Button



You should hear a click from the relays in the AC power and the LOGIQ Fortis is ready to boot. This indicates that there is power to the PS, but the LOGIQ Fortis is OFF.

2.) Press once on the **ON/OFF** button on the Operator Panel to boot the LOGIQ Fortis. The **ON/OFF** button turns blue when it is pressed.

During a normal boot, you may observe that:

- a.) The ventilation fans start on full speed, but slow down after a few seconds (listen to the fan).
- b.) Power is distributed to the peripherals, operator panel, monitor, front end and back end.
- c.) Back end and rest of the LOGIQ Fortis starts with the sequence listed in the next steps:
 - 1.) Back end is turned ON and starts to load the software.
 - 2.) The Start screen is displayed on the monitor.
 - 3.) A start-up bar indicating the time used for software loading, is displayed on the monitor.
 - 4.) The software initiates and sets up the front end electronics and the rest of the instrument.
 - 5.) The backlight in the keyboard is lit.
 - 6.) As soon as the software has been loaded, either a B-Mode screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

NOTE: *Total time used for start-up is typically less than 170 seconds.*

After the B-Mode screen is displayed and any function is touched, the LOGIQ Fortis will prompt a password protected Login.

3-5-8 Default security level

The Default Security Level dialog box displays when the software is initially installed and whenever the software is reloaded. When the ADM user logs onto the LOGIQ Fortis, the password level dialog will display. This dialog will display every time the ADM user logs on until a level selection is made. If they make a selection and then reload software, the level will be cleared and they will need to select the level again.

To set the login security level:

- After boot up, log in as ADM (no password required) and, when prompted, select **Lowest** for the security level.

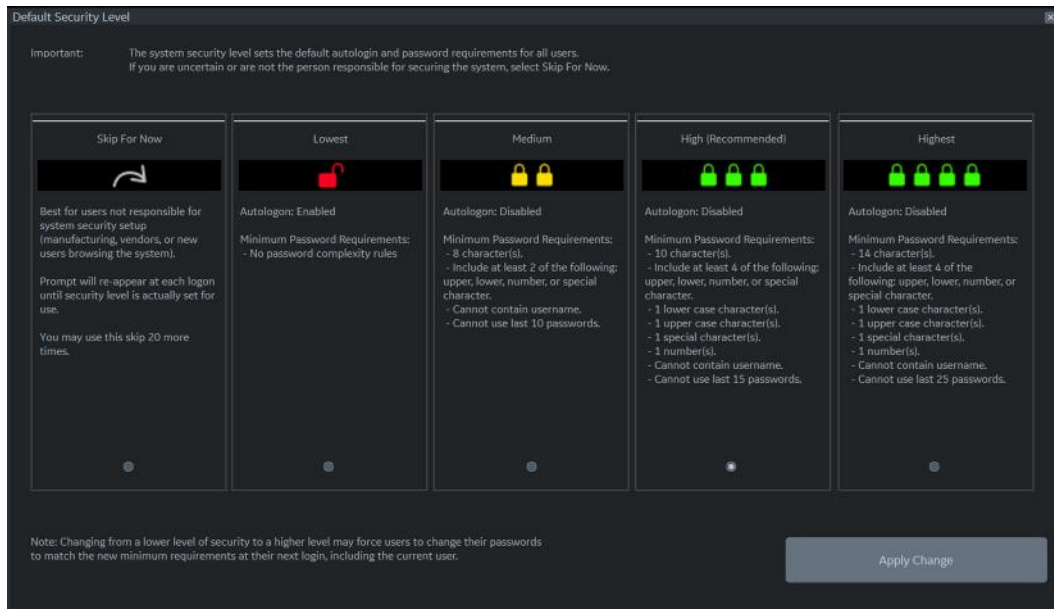
NOTE: *Select the Lowest security level and then continue with installation and testing.*

After installation and testing is complete, transfer the LOGIQ Fortis to the Site Administrator who can reset the security level for the site.

The security level can be reset through **Utility > Admin > Logon**.

Refer to “Initial Login to the LOGIQ Fortis“ in the Basic User Manual (latest revision) for more information.

Figure 3-11 Default Security Level Dialog Box

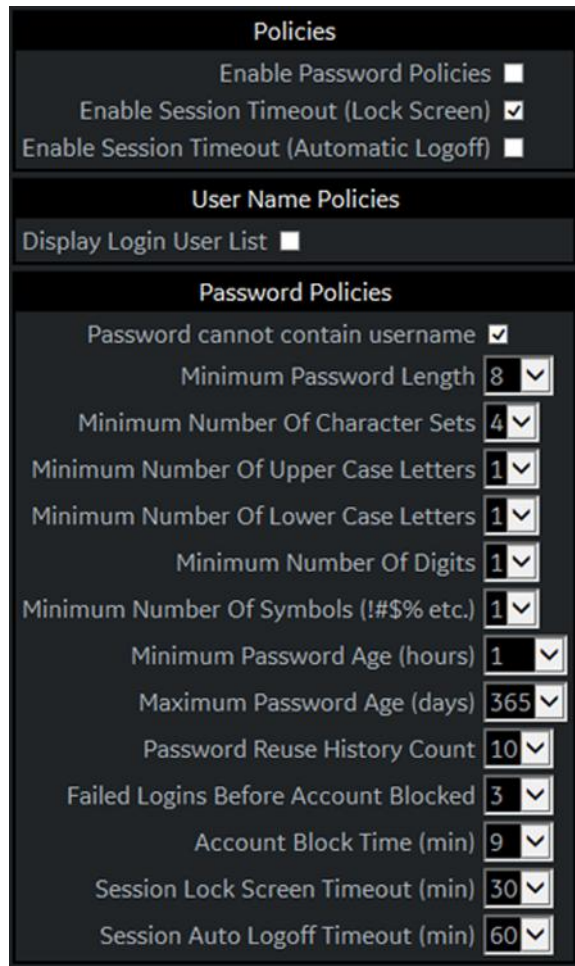


3-5-9 Password policies

To create password policies:

- 1.) Navigate to **Utility > Admin > Logon**.
- 2.) Select **Enable Password Policies**. The LOGIQ Fortis prompts the user for a password at logon.

Figure 3-12 Policies Window



Policies	
Enable Password Policies	<input type="checkbox"/>
Enable Session Timeout (Lock Screen)	<input checked="" type="checkbox"/>
Enable Session Timeout (Automatic Logoff)	<input type="checkbox"/>
User Name Policies	
Display Login User List	<input type="checkbox"/>
Password Policies	
Password cannot contain username	<input checked="" type="checkbox"/>
Minimum Password Length	8
Minimum Number Of Character Sets	4
Minimum Number Of Upper Case Letters	1
Minimum Number Of Lower Case Letters	1
Minimum Number Of Digits	1
Minimum Number Of Symbols (!#\$% etc.)	1
Minimum Password Age (hours)	1
Maximum Password Age (days)	365
Password Reuse History Count	10
Failed Logins Before Account Blocked	3
Account Block Time (min)	9
Session Lock Screen Timeout (min)	30
Session Auto Logoff Timeout (min)	60

- 3.) Under **Password Policies**, use the drop down selection beside each feature to set the rules for passwords.
- 4.) Click **Save**.

3-5-10 Users

See the Basic User Manual (appropriate version) for more information.

To add users:

- 1.) Navigate to **Utility > Admin > Users**.
- 2.) Select **Add** and enter the user details.

NOTE: You will need to edit the ID field from NewUser default. Do not push "Add" again until adding another user.

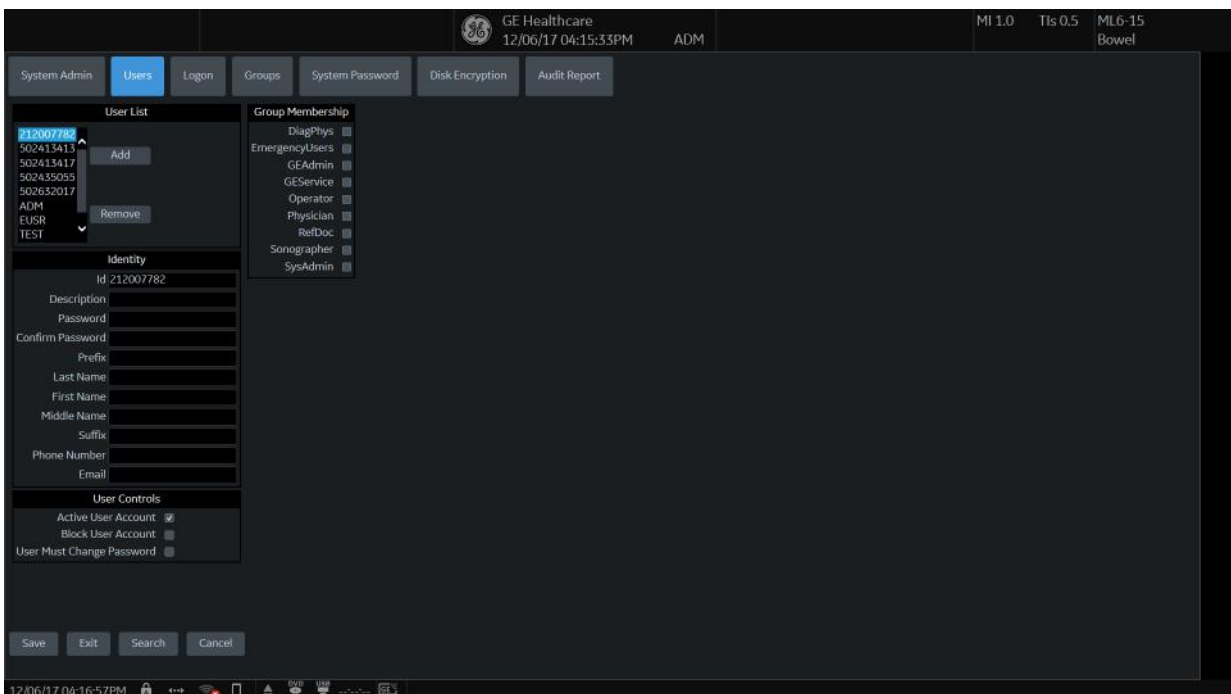
NOTE: Touch Keyboard is available with User Defined Key. Please use it if you need to type any texts.

DO NOT include the following characters in a user ID: slash (/), dash (-), asterisk (*), question mark (?), an underscore (_), ampersand (&), or blank spaces. Also, DO NOT set up Users with the same initials/signifier.

- 3.) Enter password using the defined policies.
- 4.) If needed, select **User Must Change Password**. The user will be prompted to change the password on the next logon.
- 5.) Under **Group Membership**, select the groups for the new user.

NOTE: The user password is system specific. If the user needs to access multiple systems the password will need to be entered manually on each system.

Figure 3-13 Users Window



- 6.) Allow the system administrator to specify whether the user account is active, blocked or requires a password change.
- 7.) Allow the system administrator to remove a user by highlighting the user ID, selecting **Remove** to mark the user as inactive, and then selecting **Remove** again to remove user from the list.

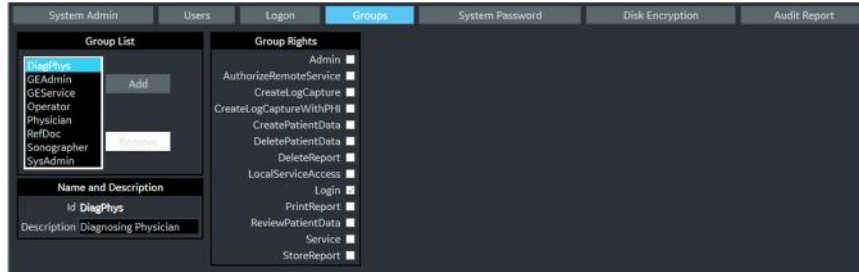
3-5-11 Groups

To use groups:

You can use predefined groups or create new groups. Assign groups to a user from **Users** and under **Group Memberships**.

- 1.) Navigate to **Utility > Admin > Groups**.

Figure 3-14 Groups Window



- 2.) To use a pre-defined group:
 - a.) Under **Group List**, select from the list of groups with pre-determined access is available to select for each new user.
 - b.) To view access rights for these groups, highlight a group and then, under **Group Rights**, view the access rights.
- 3.) To create a new group and assign access rights:
 - a.) Select **Add**.
 - b.) Under **Name and Description**, type in the name and a description.
 - c.) Under **Group Rights**, select the boxes according to the users access needs.
 - d.) Select **Exit** and then select **Admin** before trying to assign new groups to a user.

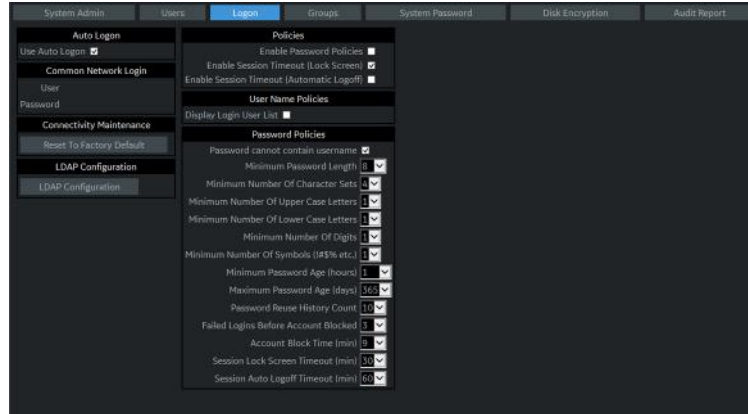
NOTE: *Admin has full system access rights.*

3-5-12 Lock out and log on

To set lock out and log on:

1.) Navigate to **Utility > Admin > Logon**.

Figure 3-15 Logon Window



- 2.) Under **Policies**, select **Enable Session Timeout**.
- 3.) Under **Password Policies**, in **Session Lock Screen Timeout**, select the system idle time for timeout (lock screen) in minutes. The screen will appear completely black when locked (timeout).
- 4.) Click **Save**.
- 5.) Press or move any button/trackball on the operator panel to display Login window.
- 6.) On the **Logon** window, enter the user ID, enter the password, and then select **Ok**.
The user will have access according to the rights in their assigned group.

To set auto logon:

Auto LOGON only works when password policies are disabled and if there is no password assigned to the user.

- 1.) Navigate to **Utility > Admin > Logon**.
- 2.) Select **Auto Logon**. The LOGIQ Fortis will start by using the ID of the last operator.

NOTE: *Auto LOGON only works when password policies are disabled and if there is no password assigned to the user.*

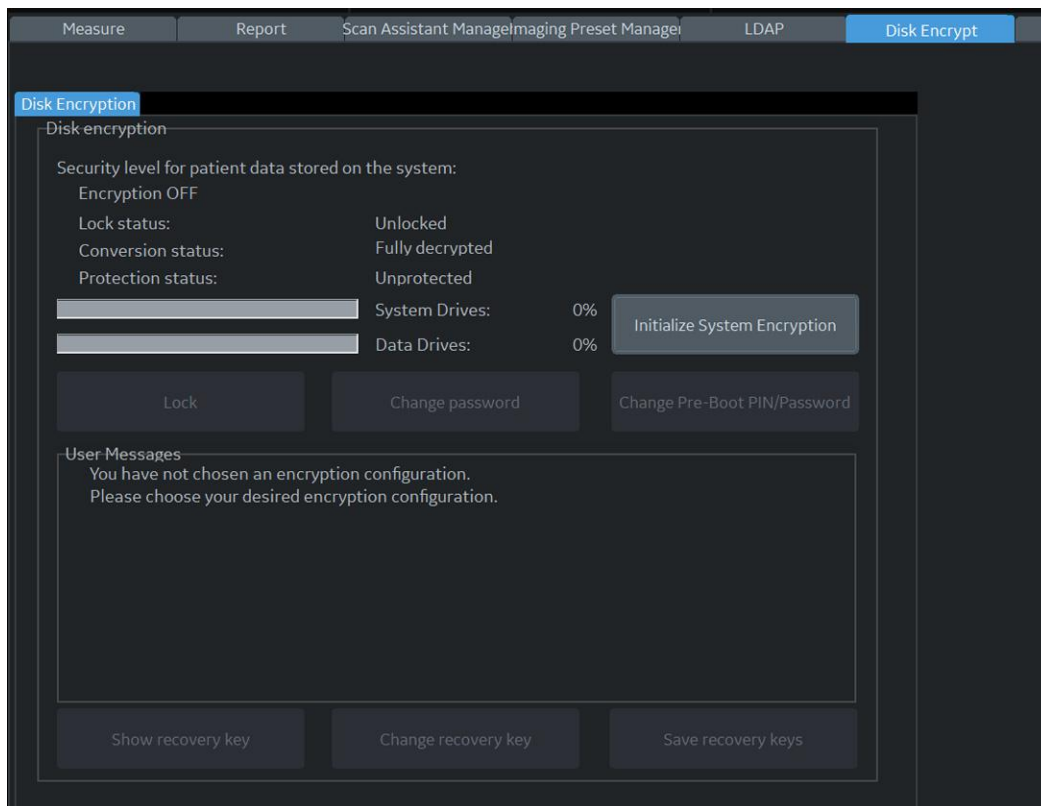
3-5-13 Disk encryption

The LOGIQ Fortis supports full disk encryption. Both system partition and user partitions can be encrypted. GE requires the SSD (System partitions) to be encrypted to protect Intellectual property and safe system performance. The SSD (Patient archive) can be encrypted or decrypted based on user preference. GE highly recommends to keep Encryption on/automatically unlocked at the minimum to ensure privacy and security.

Encryption OFF (Initialize System Encryption not selected)

This is how the Disk Encryption tab appears when first opened and before any initialization has been selected. (after a software installation).

Figure 3-16 Encryption OFF (Initialize System Encryption not selected)



These are the values for the encryption fields:

- Conversion status: Fully decrypted (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 0%
- Data Drives: 0%

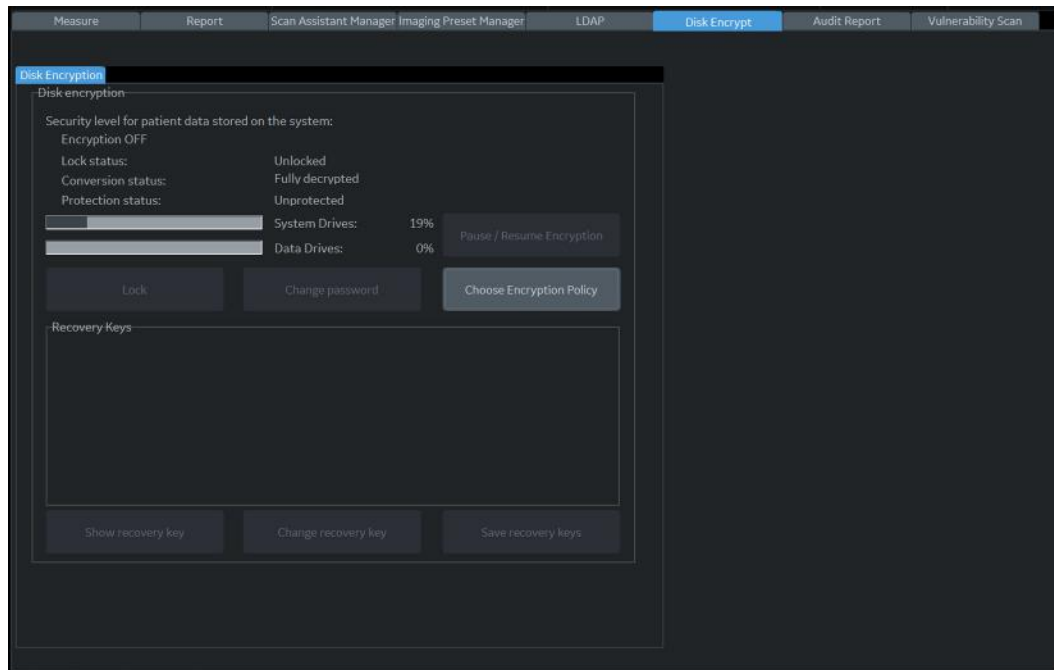
3-5-13 Disk encryption (cont'd)

Encryption OFF

- 1.) Select **Initialize System Encryption**.
- 2.) Select **Choose Encryption Policy** and set it to **Encryption OFF**. This only affects data drives.
- 3.) View **System Drive** as it continues to encrypt up to 100%.

This is how the Disk Encryption tab appears once initialization and a policy has been selected.

Figure 3-17 Disk Encryption - Encryption OFF



These are the values for the encryption fields (The % values are examples and will not always display as shown):

- Conversion status: Fully decrypted (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 19% - once initialized, the SSD drive will be encrypted.
- Data Drives: 0% - once initialized, the use data drive will be encrypted. If the encryption policy is changed to OFF, the data drive will be unencrypted.

3-5-13 Disk encryption (cont'd)

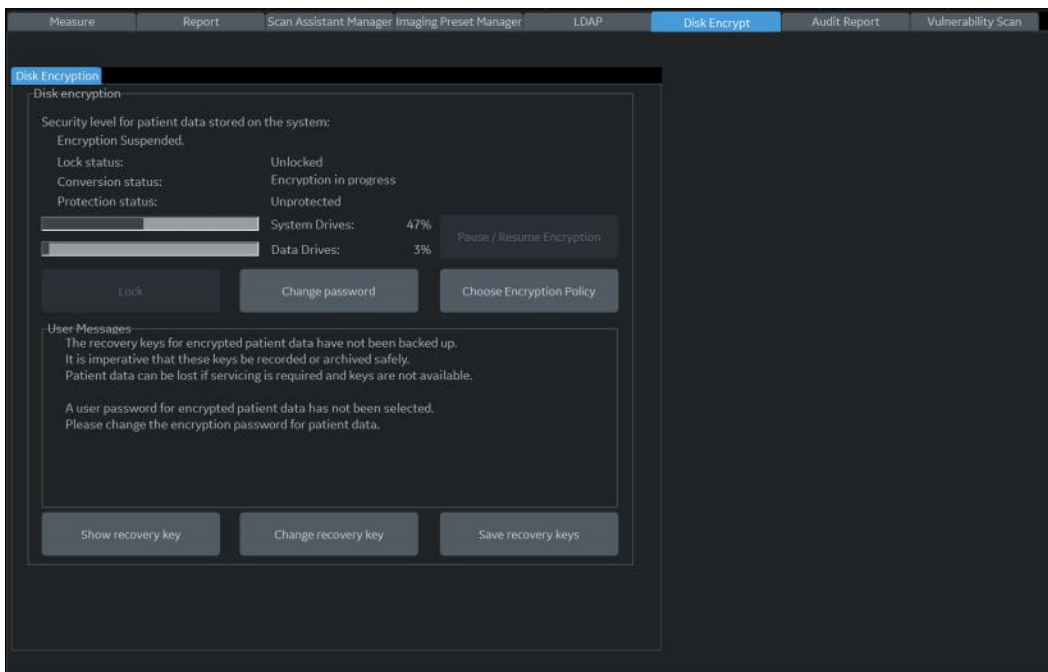
Encryption Suspended

NOTE: *Suspend is a service only option. SSA or Class M is required. If SW reload is initiated from the Class A/Class C CSD the suspension happens automatically but there is no way to manually trigger it without service options/key.*

- 1.) Once Initialize System Encryption has started, encryption can be suspended on the data drives if needed.
- 2.) Select **Choose Encryption Policy** and set it to **Encryption Suspended**.

This is how the Disk Encryption tab appears once initialization has been selected and encryption has begun, but the policy has been changed to suspend encryption.

Figure 3-18 Disk Encryption - Encryption Suspended



These are the values for the encryption fields (The % values are examples and will not always display as shown):

- Conversion status: Encryption in progress (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 47%
- Data Drives: 3%

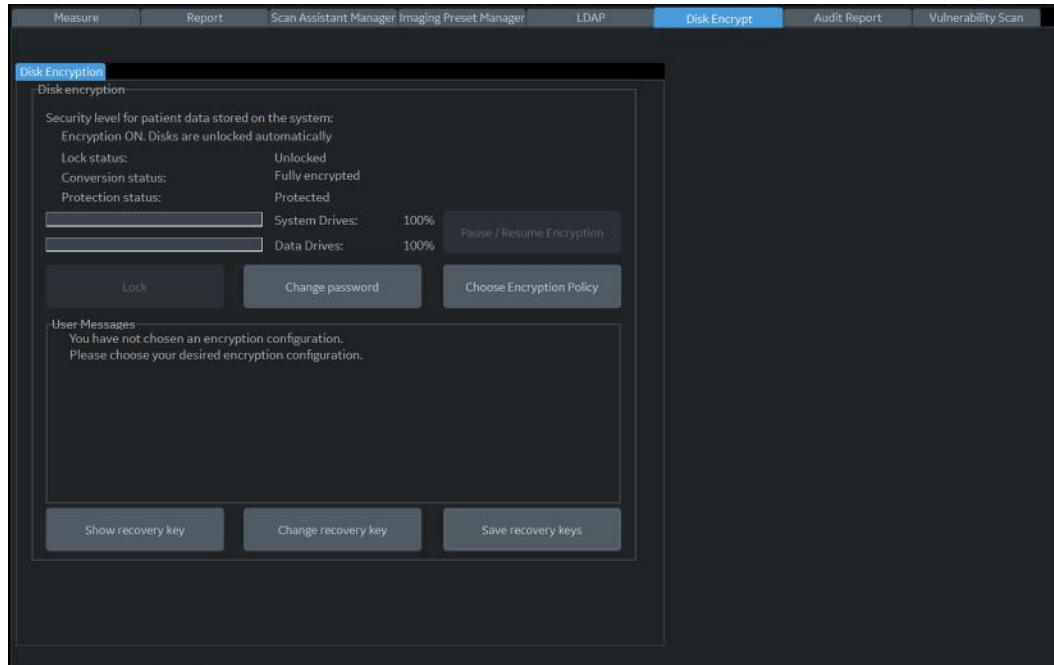
3-5-13 Disk encryption (cont'd)

Encryption ON. Disks are unlocked automatically

- 1.) Select **Initialize System Encryption**.
- 2.) Select **Choose Encryption Policy** and set it to **Encryption ON**. Disks are unlocked automatically.

This is how the Disk Encryption tab appears once initialization and a policy has been selected and encryption has been to run through completion.

Figure 3-19 Disk Encryption - Encryption ON



These are the values for the encryption fields:

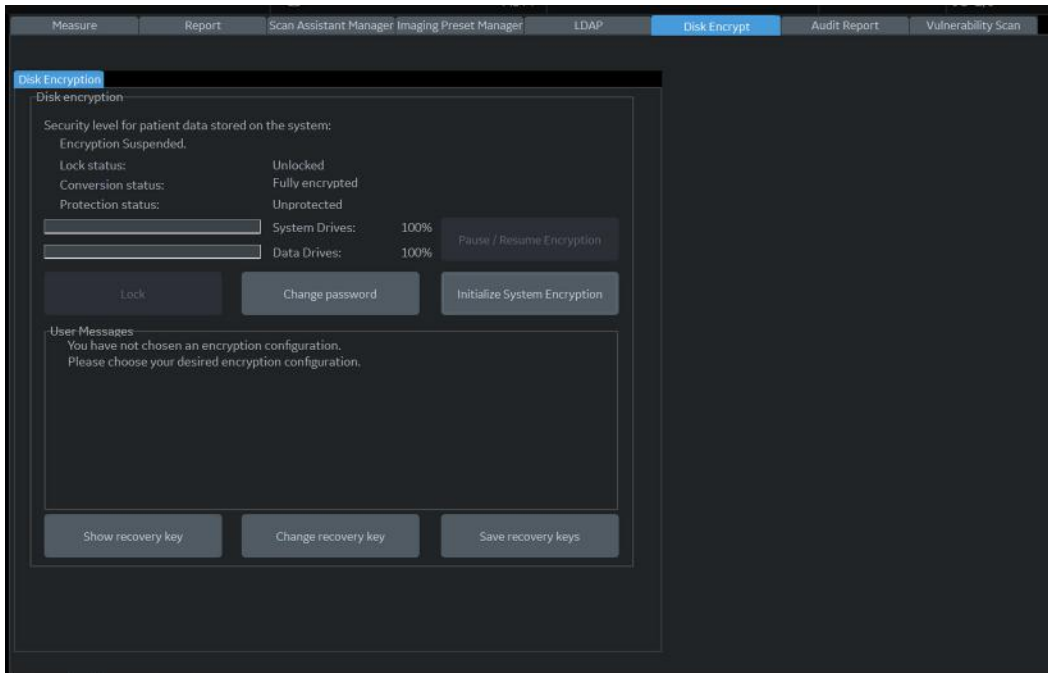
- Conversion status: Fully encrypted (data drives)
- Protection status: Protected (data drives)
- System Drives: 100%
- Data Drives: 100%

3-5-13 Disk encryption (cont'd)

Encryption Suspended after encryption

This is how the Disk Encryption tab appears once initialization and a policy has been selected and encryption has been to run through completion, but has then been suspended.

Figure 3-20 Disk Encryption - Encryption Suspended



These are the values for the encryption fields:

- Conversion status: Fully encrypted (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 100%
- Data Drives: 100%

3-5-14 Login

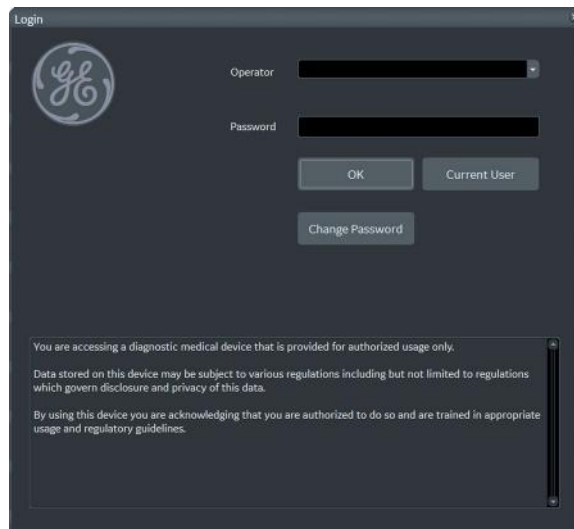
At login, you are notified that “You are accessing a diagnostic medical device that is provided by authorized usage only. Data stored on this device may be subject to various regulations including but not limited to regulations which govern disclosure and privacy of this data. By using this device you are acknowledging that you are authorized to do so and are trained in appropriate use and regulatory guidelines.”



NOTICE The System Administrator manages system groups, users, and permissions. After you have been added as a valid user, the System Administrator assigns you a temporary password. When you log into the LOGIQ Fortis for the first time, you will be prompted to change your password.

NOTE: *Touch Keyboard pop-ups automatically when edit boxes are focused. Please use it if you need to type any texts.*

Figure 3-21 Login Window



After you have established your password, follow these steps to login.

- 1.) Type your user name in the **Operator** field.
- 2.) Type your password in the **Password** field.
- 3.) Press **OK** to login, or **Cancel** to cancel login.

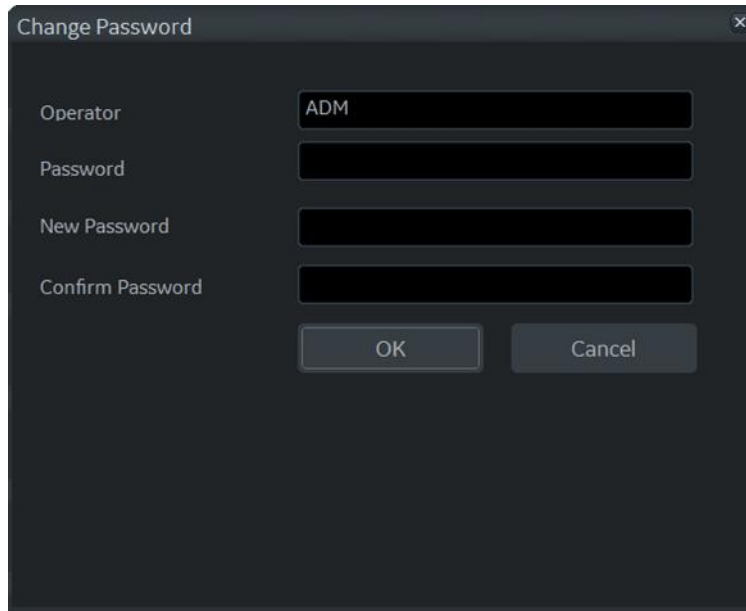
You can change the password when first logging onto the LOGIQ Fortis.

3-5-14 Login (cont'd)

To change your password:

- 1.) In **Operator**, enter your name.
- 2.) Select **Change Password**. The **Change Password** dialog box displays.

Figure 3-22 Change Password Dialog Box



The image shows a dark-themed dialog box titled "Change Password". It has a close button (X) in the top right corner. The dialog contains four text input fields stacked vertically, each with a label to its left: "Operator" (containing the text "ADM"), "Password", "New Password", and "Confirm Password". At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

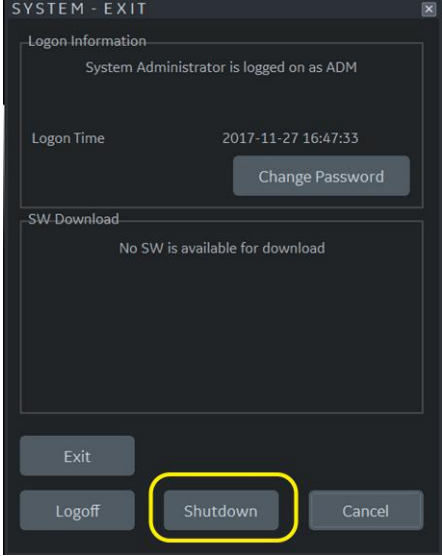
- 3.) Type the following:
 - **Password:** Type your current password.
 - **New Password:** Type your new password.
 - **Confirm Password:** Retype your new password.
- 4.) Press **OK** to confirm your changes, or **Cancel** to cancel your changes.

3-5-15 Logoff/Power shut down

You can use the **SYSTEM - EXIT** menu to log off, shut down, and exit.

- 1.) Press once on the **ON/OFF** button on the operator panel to display the **SYSTEM - EXIT** menu.
- 2.) Select **Logoff** to logoff the system, select **Shutdown** to shutdown the system.

Table 3-6 SYSTEM - EXIT Menu

	Corresponding Graphic
<p>The SYSTEM - EXIT menu, used when switching OFF the LOGIQ Fortis, gives you these choices:</p> <p>Logoff: Use this button to log off the current user. The Ultrasound system remains ON and ready for a new user to log on. If the Logoff button is dimmed, it indicates that no user is logged on to the LOGIQ Fortis at the moment.</p> <p>Shutdown: Use this button to shut down the Ultrasound system. The entire system will shut down. It is recommended to perform a full shutdown at least once a week. If the Shutdown button is dimmed, press the ON/OFF button or Alt+F10 to shut down the LOGIQ Fortis.</p> <p>Cancel: Use this button to exit from the SYSTEM - EXIT menu and return to the previous operation.</p> <p>Exit (Only available when logged in as GE Service with an SSA key): Select this button when you want to exit to the Windows desktop.</p>	


3-5-16 Complete power down

- 1.) Press once on the **ON/OFF** button on the operator panel to display the **SYSTEM - EXIT** menu
- 2.) Select **Shutdown** to do a complete power down of the LOGIQ Fortis.

The back end will first turn off the LOGIQ Fortis activity and print the message "Please wait - Shutdown in progress" in the display on the operator panel.

Next, it starts to shut down. The time to turn down the LOGIQ Fortis, including the back end, may vary from 10 seconds up to approximately 1 minute.

The last thing that shuts down, is the light on the operator panel, indicating that you can continue with the next step.

 **WARNING** ***RISK OF LOSING DATA. BE SURE TO WAIT UNTIL THE LOGIQ FORTIS HAS FINISHED ITS SHUT-DOWN. FAILING TO DO SO MAY CORRUPT DATA ON THE HDD, MAKING THE LOGIQ FORTIS FAIL.***

- 3.) Switch off the Mains Power Circuit Breaker, located on the rear of the LOGIQ Fortis. This will cut power distribution within the LOGIQ Fortis.

Section 3-6 Configuring the LOGIQ Fortis

Contents in this section

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After completing configuration, the next step is to control/adjust connectivity settings starting with [Section 3-7 "Connectivity" on page 3-54](#).

3-6-1 Purpose of this section

This section describes how to configure the LOGIQ Fortis.

3-6-2 LOGIQ Fortis configuration

For complete instructions, see the appropriate version of the LOGIQ Fortis Basic User Manual or LOGIQ Fortis Release Notes.

3-6-3 Optional peripherals/peripheral connection

Approved internal peripherals (optional)

This list covers the internal peripherals available for the LOGIQ Fortis. All of these internal peripherals should be connected already when the LOGIQ Fortis is delivered.

- 4D Option
- CW Option
- Volume Navigation (V Nav) Option
- Patient I/O ECG Option
- Printer (Digital Graphic) Option
- Power Assistant Option
- Scan on Battery Option
- Pencil CW Option
- S-Video Option
- Wireless LAN Option

Approved external peripherals (optional)

This list covers the external peripherals available for the LOGIQ Fortis. The external printers are network DICOM devices. The inkjet printer is USB connected.

- Customer-supplied USB Flash Drives/Hard Drives
- Color Inkjet Printer
- USB Hard Disk Drives
- Report Printer
- Footswitch
- DICOM Printers
- Rolling Volume Navigation Stand
- Option Tray
- Probe Holder Option

Additional information

See [Section 9-15 "Options" on page 9-25](#) for replacement units.

Printer checks

Check to see if the printer works as described in Table 3-7.

Table 3-7 Peripheral Checks

Step	Task	Note
1.	Press Freeze .	Stops image acquisition.
2.	Press (Print 1) , (Print 2) , (Print 3) or (Print 4) on the control panel.	Prints image displayed on the screen on a black and white or color printer, depending on the key assignment configuration.

3-6-4 Software options configuration

Software option installation

A password (Software Option String) enables a software option or a combination of software options. This password is specific for each LOGIQ Fortis.

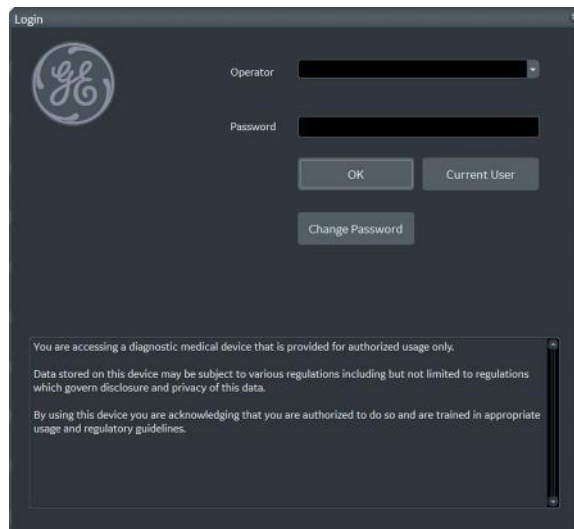
Installing a software option

NOTE: Before you install a software option, you must login.

After you have established your password, follow these steps to login.

- 1.) Type your user name in the **Operator** field.
- 2.) Type your password in the **Password** field.
- 3.) Press **OK** to login, or **Cancel** to cancel login.

Figure 3-23 Login Window

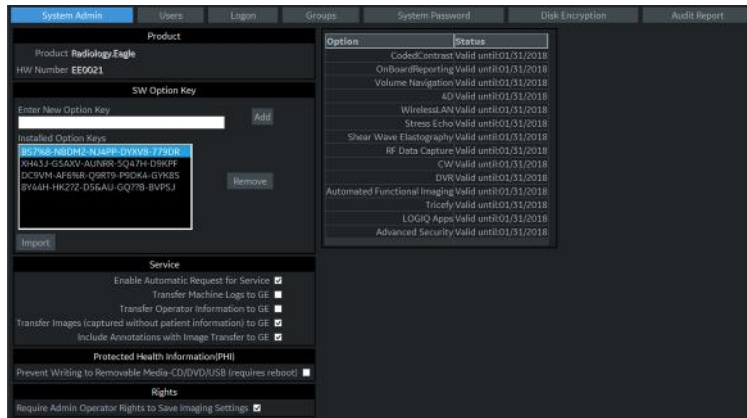


- 4.) From the touch panel, select **Utility > Admin > System Admin**.

3-6-4 Software options configuration (cont'd)

5.) Enter the new option key code in the **SW Option Key** section.

Figure 3-24 System Admin Window - Add Button

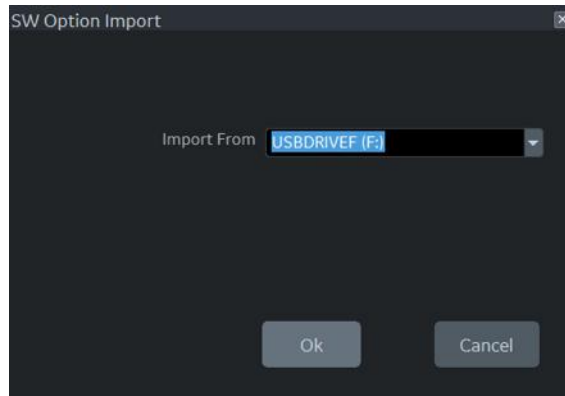


6.) Select the **Add** button.

CAUTION INCORRECT PASSWORD ENTRY WILL RESULT IN LOSS OF SYSTEM OPTIONS. IF PASSWORD IS INCORRECT, PLEASE CONTACT YOUR LOCAL GE SERVICE REPRESENTATIVE OR THE ONLINE CENTER.

7.) Import the Option String from the media.

Figure 3-25 SW Option Import



Option keys file can be imported from Media (CD/DVD, USB) or the Service Folder.

There is an **Import** button on the **Utility > Admin > System Admin** menu.

8.) Press **Save** to save the new setting.

9.) Restart to save and activate the settings and adjustments you have done so far.

3-6-5 Breast Assistant and Thyroid Assistant, Powered by Koios DS

Breast Assistant, Powered by Koios DS

In LOGIQ Fortis, integration with Breast Assistant, Powered by Koios DS is available. Breast Assistant, Powered by Koios DS is a breast lesion diagnostic assessment tool and is an option.

NOTE: Some options are not available in all areas.

Breast Assistant, Powered by Koios DS is integrated with the LOGIQ Fortis through DICOM and is configured similar to a DICOM service. The user can accept/reject analysis results. If accepted, these results are included in DICOM Structured Reporting. These are the related HCATs for the Breast Assistant, Powered by Koios DS option:

- H4919KO - This required HCAT allows the activation of Koios communication on a compatible scanner (LOGIQ Fortis, for example), with this option the scanner can communicate with the Koios Medical software/application which is installed on the network.
- H4919KI - This required HCAT allows for the installation and configuration of the Koios web server on a customer networked virtual machine. The installation is performed by Koios Medical and is required for accessing Koios capabilities from a compatible scanner (Breast Assistant on the LOGIQ Fortis, for example.) and/or a compatible PACS system.
- In addition, one of the following is required:
 - H4919SO – This optional HCAT to use Breast Assistant, Powered by Koios DS on the LOGIQ Fortis only. This catalog item is for the initial term of a subscription to the Koios software (breast lesion diagnostic assessment tool) which automatically renews annually. The subscription provides access from compatible Ultrasound scanners (Breast Assistant on LOGIQ Fortis, for example). Koios manages the activation of the subscription on the Koios web server installed on a customer networked virtual machine.
 - H4919SP – This is the HCAT to use Breast Assistant, Powered by Koios DS with PACs. This catalog item is for the initial term of a subscription to the Koios software (breast lesion diagnostic assessment tool) which automatically renews annually. The subscription provides access from compatible ultrasound scanners (Breast Assistant on the LOGIQ Fortis, for example) and compatible PACS systems. Koios manages the activation of the subscription on the Koios web server installed on a customer networked virtual machine.

3-6-5 Breast Assistant and Thyroid Assistant, Powered by Koios DS (cont'd)

Thyroid Assistant, Powered by Koios DS

In LOGIQ Fortis, integration with Thyroid Assistant, Powered by Koios DS is available. Thyroid Assistant, Powered by Koios DS is a thyroid lesion diagnostic assessment tool and is an option.

NOTE: Some options are not available in all areas.

Thyroid Assistant, Powered by Koios DS is integrated with the LOGIQ Fortis through DICOM and is configured similar to a DICOM service. The user can accept/reject analysis results. If accepted, these results are included in DICOM Structured Reporting. These are the related HCATs for the Thyroid Assistant, Powered by Koios DS option:

- H4920KT - This required HCAT allows the activation of Koios communication on a compatible scanner (LOGIQ Fortis, for example), with this option the scanner can communicate with the Koios Medical software/application which is installed on the network.
- H4921KY - This required HCAT allows for the installation and configuration of the Koios web server on a customer networked virtual machine. The installation is performed by Koios Medical and is required for accessing Koios capabilities from a compatible scanner (Thyroid Assistant on the LOGIQ Fortis, for example.) and/or a compatible PACS system.
- In addition, one of the following is required:
 - H4921TL – This optional HCAT to use Thyroid Assistant, Powered by Koios DS on the LOGIQ Fortis only. This catalog item is for the initial term of a subscription to the Koios software (thyroid lesion diagnostic assessment tool) which automatically renews annually. The subscription provides access from compatible Ultrasound scanners (Thyroid Assistant on LOGIQ Fortis, for example). Koios manages the activation of the subscription on the Koios web server installed on a customer networked virtual machine.
 - H4919TP – This is the HCAT to use Thyroid Assistant, Powered by Koios DS with PACs. This catalog item is for the initial term of a subscription to the Koios software (thyroid lesion diagnostic assessment tool) which automatically renews annually. The subscription provides access from compatible ultrasound scanners (Thyroid Assistant on the LOGIQ Fortis, for example) and compatible PACS systems. Koios manages the activation of the subscription on the Koios web server installed on a customer networked virtual machine.

3-6-5 Breast Assistant and Thyroid Assistant, Powered by Koios DS (cont'd)

Checklist for Breast Assistant and Thyroid Assistant, Powered by Koios DS

Use Table Table 3-8 to determine the steps needed to set up, test, and check the Breast Assistant and Thyroid Assistant, Powered by Koios DS options.

For more information, refer to "Koios DS Configuration" in the Basic User Manual (appropriate version).

Table 3-8 Checklist for the Breast Assistant/Thyroid Assistant, Powered by Koios DS Option

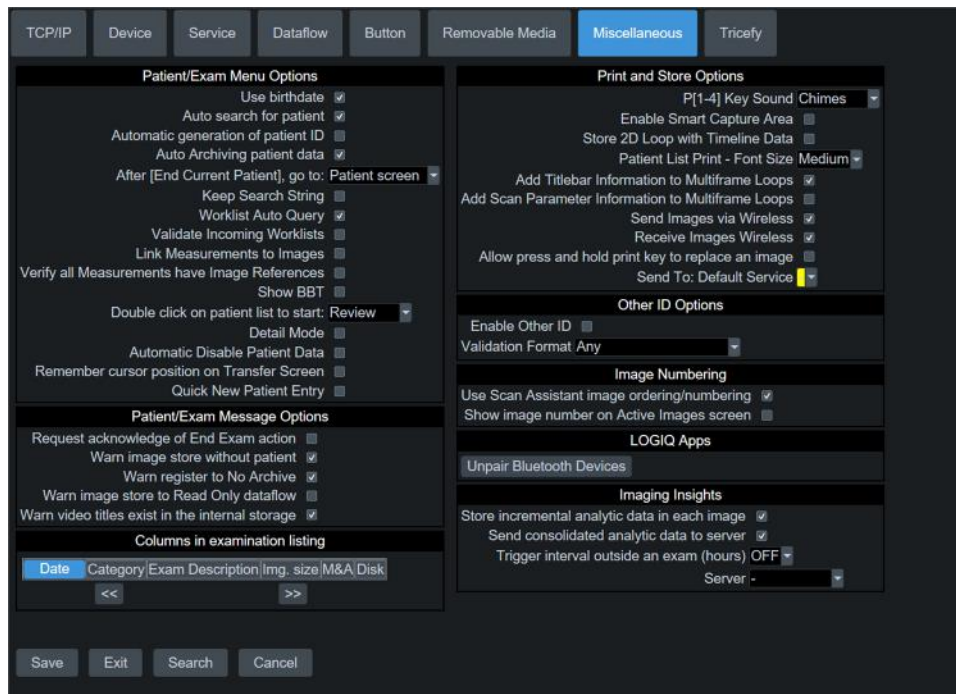
Topic	Steps
Notification of the LOGIQ Fortis with Breast Assistant, Powered by Koios DS or Thyroid Assistant, Powered by Koios DS.	Confirm that the Breast Assistant, Powered by Koios DS or Thyroid Assistant, Powered by Koios DS option is installed in the customer network.
Confirm the option is enabled on the LOGIQ Fortis.	Navigate to Utility > Admin > System Admin and enter the option string (if not already present) to enable the option.
Set up and test the Breast Assistant, Powered by Koios DS or Thyroid Assistant, Powered by Koios DS connection.	<ol style="list-style-type: none"> 1. For a new installation contact your commercial project leader or your Applications leader in the region to confirm that the system is ready to be set up for Breast Assistant, Powered by Koios DS or Thyroid Assistant, Powered by Koios DS. Do not proceed until obtaining that confirmation. If this is a set up after reloading the software and assuming that the system was already set up for Breast Assistant, Powered by Koios DS or Thyroid Assistant, Powered by Koios DS, this step is not necessary. 2. Navigate to Utility > Connectivity > Koios. 3. In IP Address, enter the IP address for the Koios DS server. 4. Select Activate. You will receive notification that you have successfully connected to the Koios DS server and the required device, service, and printflows will be automatically created. 5. In the confirmation dialog box, select Ok. 6. Navigate to Utility > Connectivity > Device and ping the Koios DS server to confirm that the connection was successful. 7. Navigate to Utility > Connectivity > Service and ping the Koios_Assessment service to confirm that the service is running.
Create an image.	Refer to the Basic User Manual (appropriate version) for complete instructions.
Confirm that the results are received.	
Perform the functional tests for Koios.	

3-6-6 Imaging Insights

In LOGIQ Fortis, a log file for Imaging Insights has been added. Enabling Imaging Insights appends analytics information to DICOM images and, at the end of each exam, creates a summary DICOM object. The Imaging Insights log file uses common data format (CDF) logging and is sent to the DICOM server and then on to the back office through an autofile transfer.

To access Imaging Insights, navigate to **Utility > Connectivity > Miscellaneous**.

Figure 3-26 Miscellaneous > Imaging Insights



This table shows all the elements available under Imaging Insights with descriptions.

Table 3-9 Imaging Insights

Element	Description
Store incremental analytic data in each image	Determines whether analytics information is appended to individual DICOM images. Default value is enabled.
Send consolidated analytic data to server	Determines whether consolidated analytics data [Between exam start and end or data collected for a time period] that will get sent to the configured DICOM server (Connectivity > Device Image Storage Server). Default value is disabled
Trigger interval outside an exam (hours)	Time duration (in hours) that elapses before the collected consolidated analytics data is sent to the selection made in Server (normally configured on Connectivity > Device as the Image Storage Server). These are the valid values available are OFF, 1,2,3,5. Default value is OFF.f
Server	Name of the DICOM server. This server is located on premise at the hospital and parses the DICOM tags to provide the customer with Clinical Performance Management insights. The DICOM server is configured as a device on Connectivity > Device . All of the configured devices are available except MyComputer. Default value is "-".

3-6-6 Imaging Insights (cont'd)

To configure Imaging Insights:

- 1.) Navigate to **Utility > Connectivity > Device** and add a DICOM device.
- 2.) Navigate to **Utility > Connectivity > Service** and add a DICOM Storage service and Modality Performed Step service against the added DICOM device.
- 3.) Save and exit the configuration.
- 4.) Navigate to **Utility > Connectivity > Miscellaneous**.
- 5.) Enable Imaging Insight.
- 6.) Enable Imaging Insight Service
- 7.) Trigger interval as appropriate.
- 8.) In Imaging Insights Server, select the device configured for DICOM image store and DICOM Performed Procedure services.
- 9.) Save the configuration.
- 10.) Reboot the LOGIQ Fortis.

3-6-7 Device Management (Device Mgmt)

Device Mgmt is a way to back up and restore presets to and from the back office. Use Device Mgmt to do the following:

- Send presets from the LOGIQ Fortis to the back office (using Manual Backup)
- Send presets from the LOGIQ Fortis to the back office (using Backup Automatically)
- Send presets from the LOGIQ Fortis to the back office (using Upload For Fleet)
- Restore presets from the back office to the LOGIQ Fortis (using Download from the tool bar)

NOTE: *These timeout fields (editable when Device Mgmt is active) were added:*

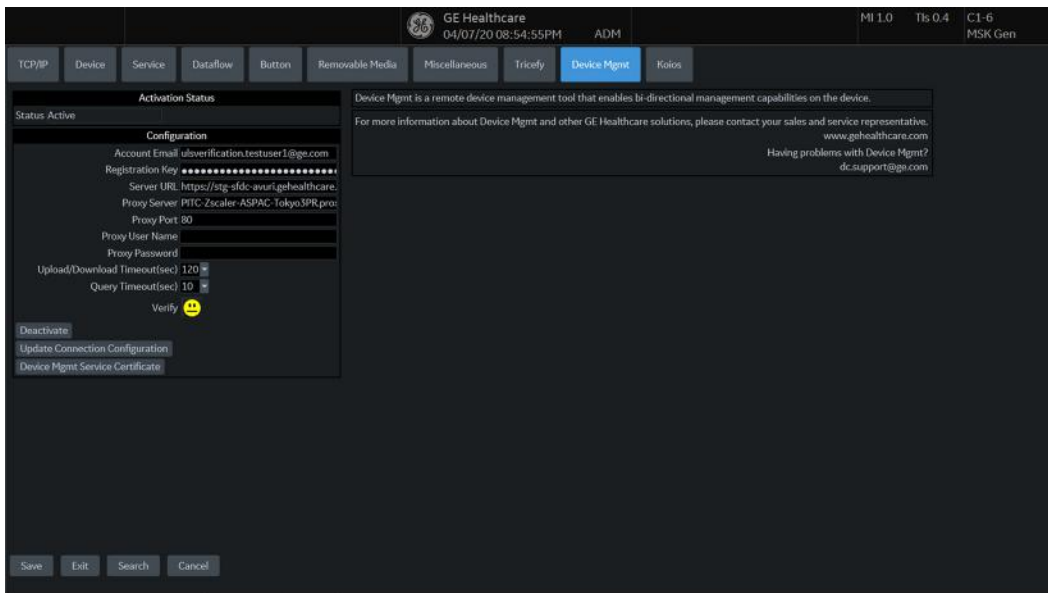
- Upload/Download Timeout (sec)
- Query Timeout (sec) - This is a query for Device management updates.

The support email has been updated to: dc.support@ge.com.

For more information, refer to the Basic User Manual (appropriate version).

To access Device Connect, navigate to **Utility > Connectivity > Device Mgmt.**

Figure 3-27 Device Management (Device Mgmt)



3-6-7 Device Management (Device Mgmt) (cont'd)

This table shows all the elements available on Device Mgmt with descriptions.

Table 3-10 Device Management

Element	Description
Status	Indicates whether Device Management is active or not. Valid values are Inactive or Active. NOTE: This field will be Inactive only the right after the Activate was failed. Otherwise the field will be empty. if you never activated or activated and then deactivated, this field will be empty.
Account Email	Email address for the Device Management account.
Registration Key	Registration key for the Device Management account. Product specific key strings, pre-populated by the device (can be overwritten if necessary).
Server URL	URL of registration server strings, pre-populated by the device (can be overwritten if necessary).
Proxy Server	Name of the proxy server IP provided by the customer. This field is optional unless required by the customer facility infrastructure.
Proxy Port	Number of the proxy server port provided by the customer. This field is optional unless required by the customer facility infrastructure.
Proxy User Name	Name of the proxy user provided by the customer. This field is optional unless required by the customer facility infrastructure.
Proxy Password	Password for the proxy user name provided by the customer. This field is optional unless required by the customer facility infrastructure.
Upload/Download Timeout (sec)	Runs for the set number of seconds when the upload, (Auto Backup, Manual Backup, and Upload for Fleet) or download (Install) operation begins. When the timeout occurs, an error displays indicating you should attempt the operation again.
Query Timeout (sec)	For Device Management updates, runs for the set number of seconds when the New Patient and End Current Patient, logging off, logging on, or unlocking the lock screen operations begin. When the timeout occurs, an error displays indicating you should attempt the operation again.
Verify	Select to verify a connection with the service.
Activate/Deactivate	Select to activate/deactivate Device Management.
Update Connection Configuration	Select to update changes made on the Device Mgmt page.
Device Management Service Certificate	Select to download the certificate for Device Management from the backoffice server.

3-6-8 GE Backoffice Connectivity

A connection between the LOGIQ Fortis to the GE back office (InSite RSVP) allows for a direct link with GE Service (either through a GE Online Service Engineer or Applications Support Engineer).

NOTE: A connection to the back office is only reversible by reloading the base image full load software.

To disable GE back office (InSite RSVP)

When the customer does not want to connect to the GE back office (InSite RSVP), use **Disable Remote Connectivity** to uninstall remote connectivity items like **Agent Configuration**, **SSH** and **Virtual Console Observation (VCO)** from the Service desktop.

To access **Disable Remote Connectivity**, select **Utility (second page) > Service > Utilities > Disable Remote Connectivity**. For more information, refer to Disable Remote Connectivity in "Utilities" on page 7-52.

If the InSite agent is disabled, these are some additional results:

- Remote Connectivity is no longer available.
- Remote service can no longer connect to the LOGIQ Fortis to diagnose system issues.
- The customer will not be able to initiate a Request for Service or Clinical Support Request using the GE InSite icon located at the bottom of the monitor display.

To connect to the GE back office (InSite RSVP)

When the customer wants to connect to the GE back office (InSite RSVP), use Agent Configuration.

To access **Agent Configuration**, navigate to **Utility (second page) > Service > Agent Configuration**. For more information, refer to "Agent Configuration" on page 7-82.

3-6-8 GE Backoffice Connectivity (cont'd)

GE back office (InSite) wizard

In LOGIQ Fortis, there is a GE Backoffice Connectivity Troubleshooting wizard that can be used to set up a connection to the InSite back office.

NOTE: *You can perform all required functions from this tool. For example, you have to start the agent from **Agent Configuration**.*

For more information, see the latest revision of the LOGIQ Fortis Basic User Manual.

Figure 3-28 GE Backoffice Connectivity Troubleshooting

The screenshot displays the 'GE Backoffice Connectivity Troubleshooting' wizard. The title bar includes a wrench icon and the text 'GE Backoffice Connectivity Troubleshooting'. Below the title, a subtitle reads: 'This wizard walks you through the process of setting up the back office connectivity.' On the left side, there is a vertical navigation menu with the following items: 'Agent Configuration' (checked with a blue bar), 'Network Connection', 'Agent Proxy Configuration', 'DNS Configuration', and 'Network Firewall'. The main content area is titled 'Agent Configuration Wizard' and contains two input fields: 'Serial ID' with the value 'engineer_E70012' and 'CRM ID' with the value 'LE10ENGINEER_E70012'. A blue informational box below the fields contains the text: 'Ensure the CRM Number displayed is correct. If not, update with the correct CRM and save changes. If the Serial and CRM Numbers are correct, proceed to next step.' At the bottom right of the main area, there are three buttons: 'Save Changes', 'Refresh', and 'Next >>'.

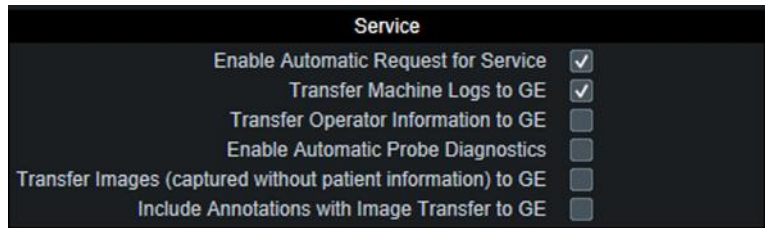
3-6-9 Service settings

When the InSite agent is activated, you can edit some service settings (shown in Figure 3-29 and Table 3-11).

NOTE: If the InSite agent is disabled, the Service section will be removed from the System Admin page.

To access Service settings, navigate to **Utility > System Admin**.

Figure 3-29 System Admin > Service



This table shows all the elements available under Service with descriptions.

Table 3-11 Service Settings

Element	Description
Enable Automatic Request for Service	Allows system-generated requests for service to be sent without user intervention.
Transfer Machine Logs to GE	Allows transfer of monitoring errors and status log files to the GE back office for data analytics.
Transfer Operator Information to GE	When Transfer Machine Logs to GE is enabled, allows the transfer of operator information to the GE back office for usage analytics.
Enable Automatic Probe Diagnostics	When Transfer Machine Logs to GE is enabled, allows the VITA Tool to gather information about probes used and put that information into a VITA dump file. Once enabled, the VITA routine will run once at system startup to generate this dump file. The VITA dump file is then transferred to the data lake like the other log files.
Transfer Images (captured without patient information) to GE	When Transfer Machine Logs to GE is enabled, allows the transfer of images for analysis.
Include Annotations with Image Transfer to GE	Allows transfer of operator information to the GE back office for usage analytics.

3-6-10 Magstripe card reader

The Magstripe card reader can be used to populate the following:

- Patient screen: Patient ID, First Name, Last Name, Middle Name, Perf. Physician, Ref. Physician.
- Worklist: Patient ID, Search String.
- Image Display: Comments (Annotation)



To connect the card reader:

- 1.) Connect the card reader to any USB port. For example, on the user USB ports on the left side of the upper operator panel Boot up the Ultrasound system.
- 2.) Scan the card that comes with the card reader to activate device.

NOTE: Consult the card reader manufacturer's instructions. This configuration process will vary based on the card reader model/manufacturer and the keyboard language set on the Ultrasound system.

Once the configuration process is complete, the card reader is ready to use to start a new patient.

You do not need to repeat this process if software is reloaded, this card reader can be used on any scanner as long as they have the same keyboard language selection.

3-6-11 Barcode reader

The barcode reader can be used to populate the following:

- Patient screen: Patient ID, First Name, Last Name, Middle Name, Perf. Physician, Ref. Physician.
- Worklist: Patient ID, Search String.
- Image Display: Comments (Annotation)

To connect the barcode reader:

- 1.) Connect the barcode reader to any USB port. For example, on the user USB ports on the left side of the upper operator panel (shown below).



- 2.) Boot up the Ultrasound system.
- 3.) Scan the bar code that comes with the barcode reader to activate device.

NOTE: Consult the barcode reader manufacturer's instructions. This configuration process will vary based on the barcode reader model/manufacturer and the keyboard language set on the Ultrasound system.

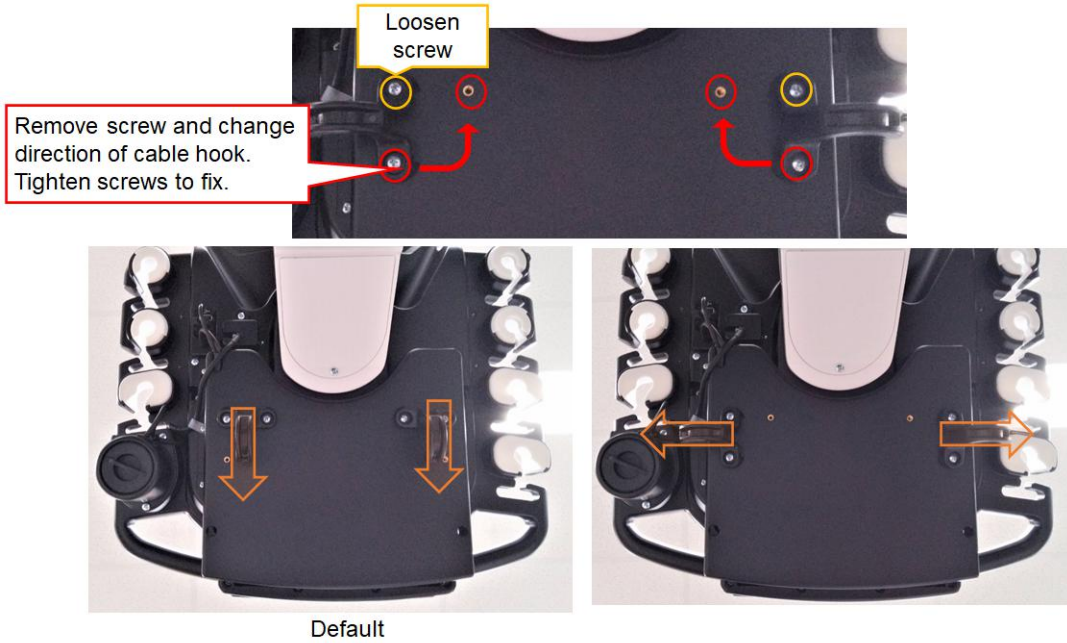
Once the configuration process is complete, the barcode reader is ready to use to start a new patient.

You do not need to repeat this process if software is reloaded, this barcode reader can be used on any scanner as long as they have the same keyboard language selection.

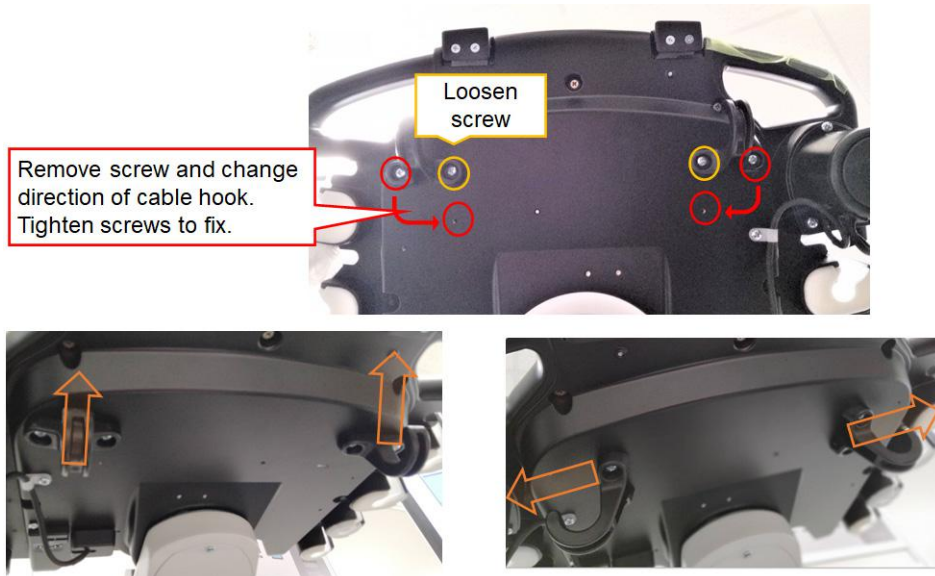
3-6-12 Cable hook direction

Cable hook direction can be changed depending on Customer preference.

With keyboard option,



Without keyboard option,



3-6-13 LAN Protection Cable (Option)

NOTE: To prevent claw breakage of LAN cable, use LAN protection cable as below.

If LAN cable is pulled away from the console, the connection will be unplugged first preventing damage to the LAN connector in the unit.



Figure 3-30 LAN protection cable



Figure 3-31 LAN cable with protection cable (example)

3-6-14 Network printers

In R3.x.x, you can add a network printer when logged on to the system as an administrator.

NOTE: It is solely the customer's responsibility to determine printer and network settings and configuration to enable and ensure the specific network printer usage and functionality.

To add a network printer, navigate to **Utility > System > Peripherals**, and then under **Network Printer**, select **Add Network Printer**.

Refer to "Network Printer" in the Basic User Manual (appropriate version) for more information. See [Section 1-4 "Labels/Icons on the system" on page 1-14](#) for a list of the available user documentation.

Technical details:

- The only supported driver for the network printer is Microsoft Enhanced Point and Print Compatibility driver.
- Adding a network printer requires the user is logged in with Admin group rights.
- You cannot use the same IP address for two printer names.
- Adding a network printer logs an event to both the main log and the audit log.

Section 3-7 Connectivity

NOTE: *If you are new or unfamiliar to connectivity on the LOGIQ Fortis, see “Customizing Your System” in Chapter 10 of the LOGIQ Fortis Basic User Manual (latest revision) before you continue with the next descriptions and procedures.*

3-7-1 Physical connection

Stand-alone LOGIQ Fortis

No network connection needed.

Sneaker Net environment

No network connection needed.

Wired Ethernet from LOGIQ Fortis to a workstation

For a direct cable connection from the LOGIQ Fortis to a workstation, you will only need a crossover cable for network use to connect the two units this way.

- 1.) Connect one end of the crossed network cable to the network connector on the LOGIQ Fortis.
- 2.) Connect the other end to the network connector to the workstation, see the Workstation Service Manual.

Connection through a peer-to-peer network

You will need a network switch and one network cable for each unit connected to the switch.

Connection through the hospital network

You will need one network cable to connect the LOGIQ Fortis to a wall outlet on the hospital's network.

Chapter 4

Functional Checks

Section 4-1 Overview

4-1-1 Purpose of this chapter

This chapter provides procedures for quickly checking major functions of the LOGIQ Fortis Ultrasound system and diagnostic instructions using the built-in service software.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

4-1-2 Contents in this chapter

4-1	Overview	4-1
4-2	General Procedures	4-3
4-3	Functional Checks	4-11
4-4	Site Log	4-32

4-1-3 Special equipment required

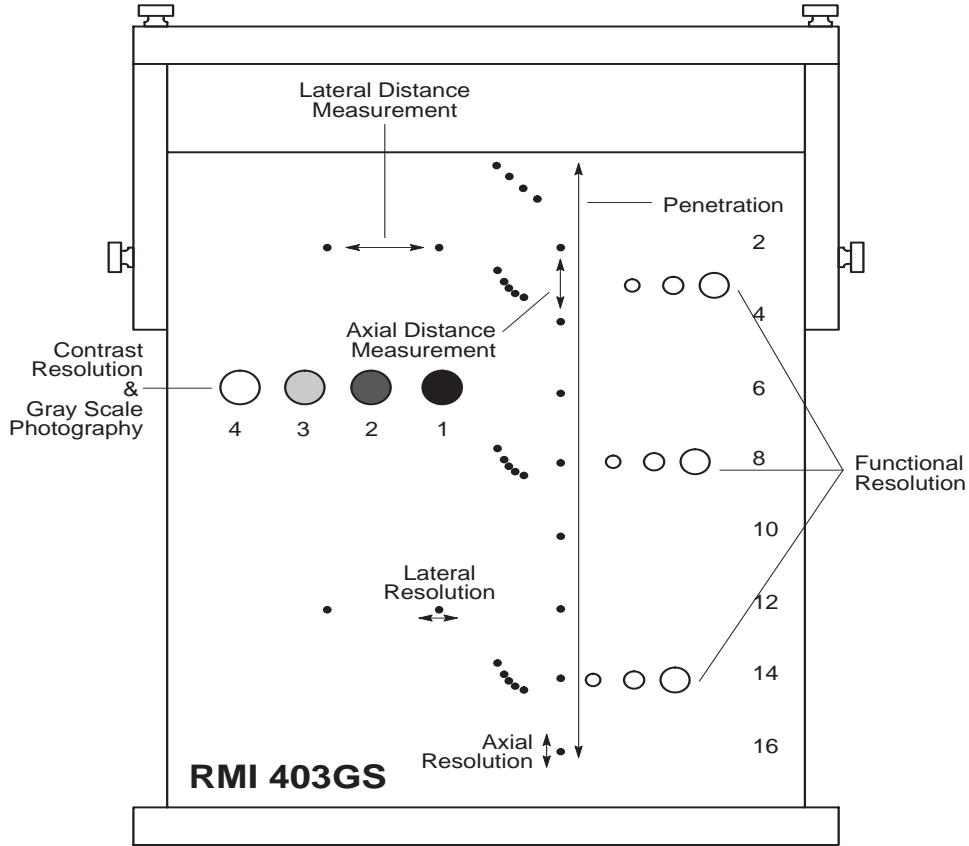
This is the special equipment you may need to complete functional checks:

- An empty (blank) DVD-R disk.
- At least one probe (ideally you should check all of the site probes that will be used with the Ultrasound system.) For available probes, see [Section 9-14 "Probes" on page 9-20](#).
- If the ECG option is present, ECG cables (AHA or IEC) and pads. For part numbers, see [Section 9-15 "Options" on page 9-25](#).
- Test phantom. See [4-1-4 "Recommended test phantoms" on page 4-2](#).

4-1-4 Recommended test phantoms

GE recommends the RMI 430GS phantom is preferred, but it is not required. It is the most current phantom recommended to our field service personnel and provides the necessary targets and extended life necessary for consistent Ultrasound system testing.

Figure 4-1 Performance Tests










Section 4-2 General Procedures

Contents in this section

4-2-1	General safety information	4-4
4-2-2	General system functional checks	4-5
4-2-3	Power ON/Boot Up	4-7
4-2-4	Power shut down	4-10

4-2-1 General safety information

Table 4-1 Energy Control and Power Lockout for LOGIQ Fortis

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
 <p>DANGER</p> 	<p>Risk of electrical shock, system must be turned off.</p> <p>Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</p>
 <p>CAUTION</p>	<p>THE ULTRASOUND SYSTEM REQUIRES ALL COVERS.</p> <p>Operate the LOGIQ Fortis only when all board covers and frame panels are securely in place. The covers are required for safe operation, good system performance and cooling purposes.</p>
 <p>CAUTION</p> 	<p>Risk of damage to equipment.</p> <p>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

4-2-2 General system functional checks

After setting up the Ultrasound system, performing an upgrade, or replacing hardware, perform all appropriate functional checks before returning a system to the customer. Include the functional check information in the service dispatch.

For a service call with FRU replacement:

- Perform the functional checks and include the debrief script found at the end of the respective replacement procedure in Chapter 8.

For a service call with no FRU replacement or when installing the LOGIQ Fortis:

- Perform the following general functional tests. If all are successful, include the debrief script provided below.

Some procedures are used more often than others. The intention with this section is to keep the most used procedures in one place.

NOTE: In case of replacing hardware, refer to related section in Chapter 8.

NOTE: NOT ALL functional checks will have to be repeated or performed if not all options are present. If ONLY a particular option is present, perform the functional checks for that particular option and the options installed.

Table 4-2 General System Functional Checks


See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down DO NOT POWER SHUT DOWN until ALL functional checks have been performed	
In addition: Perform the following functional checks if the option was or options were removed during backplane replacement.		
4D		
4-3-23	4D option functional checks Perform a 4D sweep	
Pedof CW		
4-3-14	PW/CW Doppler mode functional checks use pencil probes	
GCW		
4-3-15	CW Doppler mode functional checks	


Table 4-2 General System Functional Checks (Continued)


See Section	Functional Check	Debrief Script
VSIO (ECG)		Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-22	<p>ECG Checks Active ECG: Utility > Applications > Settings > ECG > Show ECG Tools. Connect cables. Press Display ECG Tab on TP. Verify ECG signal displayed on monitor. Plug in the ECG cables with nothing attached so they pick up noise. Diagnostics</p>	
Power Assistant/		
4-3-25	<p>Power Assistant functional checks</p>	
V Nav		
4-3-24	<p>Volume Navigation with inside probe functional checks</p>	


4-2-3 Power ON/Boot Up


Warnings

-  **DANGER** ALWAYS CONNECT THE LOGIQ FORTIS TO A FIXED POWER SOCKET WHICH HAS THE PROTECTIVE GROUNDING CONNECTOR.

-  **DANGER** NEVER USE A THREE-TO-TWO PRONG ADAPTER; THIS DEFEATS THE SAFETY GROUND.

-  **DANGER** ENSURE THAT THE POWER CORD AND PLUG ARE INTACT AND THAT THE POWER PLUG IS THE PROPER HOSPITAL-GRADE TYPE (WHERE REQUIRED).

-  **CAUTION** LOGIQ FORTIS REQUIRES ALL COVERS.
ONLY OPERATE THE LOGIQ FORTIS WHEN ALL OF THE BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. THE COVERS ARE REQUIRED FOR SAFE OPERATION, GOOD PERFORMANCE, AND COOLING PURPOSES.

-  **CAUTION** Use only power supply cords, cables, and plugs provided by or designated by GE.

NOTE: Do not cycle the circuit breaker ON-OFF-ON in less than five seconds. When turning OFF the circuit breaker, WAIT until the ON/OFF button is no longer lit. The LOGIQ Fortis should de-energize completely before turning the circuit breaker ON.

4-2-3 Power ON/Boot Up (cont'd)

Connect AC (mains) power to the LOGIQ Fortis

Connecting AC power to the LOGIQ Fortis involves preliminary checks of the power cord, voltage level, and compliance with electrical safety requirements.

NOTE: *The LOGIQ Fortis will function on voltages from 100-240 volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required (North America Only).*

- 1.) Ensure that the wall outlet is of appropriate type, and that the circuit breaker is turned off.
- 2.) Uncoil the power cable, allowing sufficient slack so that the LOGIQ Fortis can be moved slightly.
- 3.) Verify that the:
 - power cable is without any visible scratches, any sign of damage or tangled.
 - on-site mains voltage is within the limits indicated on the rating label near the circuit breaker on the rear of the LOGIQ Fortis.
- 4.) Connect the female plug of the power cable to the power inlet at the rear of the LOGIQ Fortis.
- 5.) Verify that the mains power circuit breaker is in OFF position, If not, switch it to OFF.

Figure 4-2 Circuit Breaker



- 6.) Connect the other end (male plug) of the power cable to a hospital grade mains power outlet with the proper rated voltage, and the LOGIQ Fortis is ready for power ON/boot up.

4-2-3 Power ON/Boot Up (cont'd)

Switch ON the AC power to LOGIQ Fortis

1.) Switch ON the circuit breaker at the rear of the LOGIQ Fortis. The **ON/OFF** button turns white.

Figure 4-3 ON/OFF Button



You should hear a click from the relays in the AC power and the LOGIQ Fortis is ready to boot. This indicates that there is power to the PS, but the LOGIQ Fortis is OFF.

2.) Press once on the **ON/OFF** button on the Operator Panel to boot the LOGIQ Fortis. The **ON/OFF** button turns blue when it is pressed.

During a normal boot, you may observe that:

- a.) The ventilation fans start on full speed, but slow down after a few seconds (listen to the fan).
- b.) Power is distributed to the peripherals, operator panel, monitor, front end and back end.
- c.) Back end and rest of the LOGIQ Fortis starts with the sequence listed in the next steps:
 - 1.) Back end is turned ON and starts to load the software.
 - 2.) The Start screen is displayed on the monitor.
 - 3.) A start-up bar indicating the time used for software loading, is displayed on the monitor.
 - 4.) The software initiates and sets up the front end electronics and the rest of the instrument.
 - 5.) The backlight in the keyboard is lit.
 - 6.) As soon as the software has been loaded, either a B-Mode screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

NOTE: *Total time used for start-up is typically less than 170 seconds.*

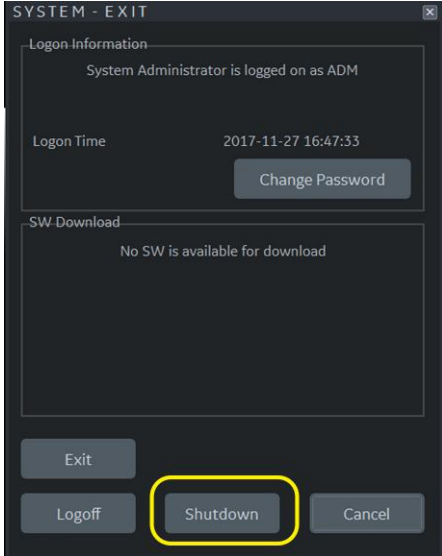
After the B-Mode screen is displayed and any function is touched, the LOGIQ Fortis will prompt a password protected Login.

4-2-4 Power shut down

When you switch OFF the LOGIQ Fortis, the Ultrasound system performs an automatic shutdown sequence.

- 1.) Press once on the **ON/OFF** button on the operator panel to display the **SYSTEM - EXIT** menu.
- 2.) Select **Shutdown** to shutdown the system..

Table 4-3 SYSTEM - EXIT Menu

	Corresponding Graphic
<p>The SYSTEM - EXIT menu, used when switching OFF the LOGIQ Fortis, gives you these choices:</p> <p>Logoff: Use this button to log off the current user. The Ultrasound system remains ON and ready for a new user to log on. If the Logoff button is dimmed, it indicates that no user is logged on to the LOGIQ Fortis at the moment.</p> <p>Shutdown: Use this button to shut down the Ultrasound system. The entire system will shut down. It is recommended to perform a full shutdown at least once a week. If the Shutdown button is dimmed, press the ON/OFF button or Alt+F10 to shut down the LOGIQ Fortis.</p> <p>Cancel: Use this button to exit from the SYSTEM - EXIT menu and return to the previous operation.</p> <p>Exit (Only available when logged in as GE Service with an SSA key): Select this button when you want to exit to the Windows desktop.</p>	

4-2-5 Complete power down

- 1.) Press once on the **ON/OFF** button on the operator panel to display the **SYSTEM - EXIT** menu
- 2.) Select **Shutdown** to do a complete power down of the LOGIQ Fortis.

The back end will first turn off the LOGIQ Fortis activity and print the message “Please wait - Shutdown in progress” in the display on the operator panel.

Next, it starts to shut down. The time to turn down the LOGIQ Fortis, including the back end, may vary from 10 seconds up to approximately 1 minute.

The last thing that shuts down, is the light on the operator panel, indicating that you can continue with the next step.

⚠ NOTICE Risk of losing data. Be sure to wait with the next step until the LOGIQ Fortis has finished its shut-down. Failing to do so may destroy data on the hard disk drive, making the LOGIQ Fortis fail later.

- 3.) Switch off the Mains Power Circuit Breaker, located on the rear of the LOGIQ Fortis. This will cut power distribution within the LOGIQ Fortis.

Section 4-3 Functional Checks

Contents in this section

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4-3-1 Top console adjustment control functional checks





 **CAUTION** To avoid injury or damage, make sure nothing is within the range of motion before moving the top console. This includes both objects and people.

Table 4-4 Top Console Adjustment Controls

Step	Corresponding Graphic
<p> CAUTION To avoid injury or damage, make sure nothing is within the range of motion before moving the top console. This includes both objects and people.</p>	
<p>1. To SWIVEL the top console: Press and hold down the SWIVEL button to move the console left or right. Release the button.</p>	
<p>2. To RAISE/LOWER the top console: Press and hold the Up/Down button accordingly to raise or lower the top console. Release the button when the top console is at the desired height.</p>	

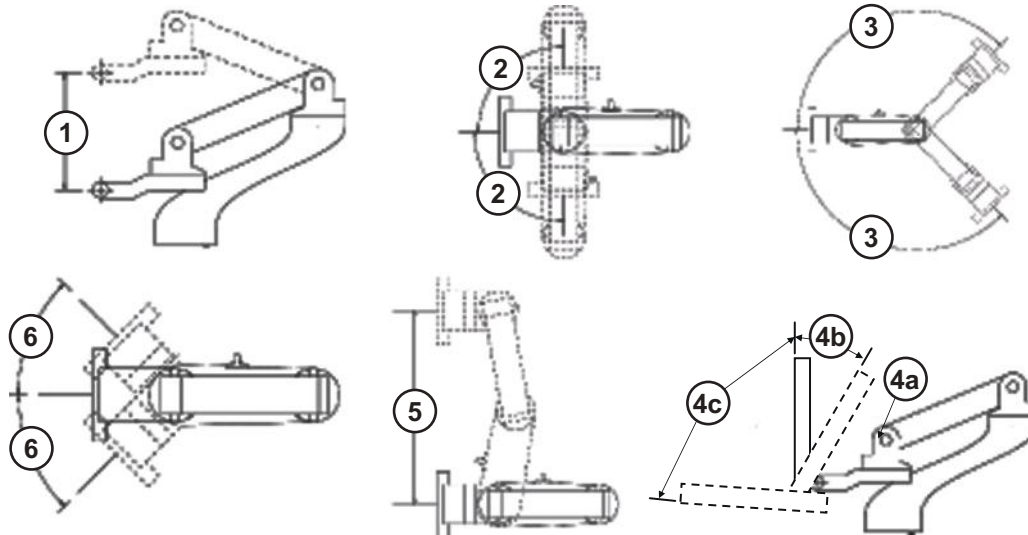
4-3-2 Main monitor positions and lock functional checks

To perform the function checks for the main monitor:

- When the monitor arm lock is unlocked, verify the monitor can move up/down (vertically) and left/right (horizontally).

NOTE: The monitor can move approximately 150 mm (5.91 inches) vertically and 350 mm (13.78 inches) horizontally from center.

Figure 4-4 Main Monitor Positions - Ergotron Arm



<p>1. Vertical Travel = 150mm</p>	<p>Tilt a. No Collision b. Approximately 20° (based on Pan Arm Off-set) c. 85°-90°</p>
<p>2. Rotation at Mount = 90° (180° total)</p>	<p>5. Monitor Translation = 350mm (both sides from center)</p>
<p>3. Lift Arm Rotation = 135° (270° total)</p>	<p>6. Pan Arm Rotation = 45° (90° total)</p>

4-3-2 Main monitor positions and lock functional checks (cont'd)

To check main monitor platform maneuverability:

Check that the main monitor functions as described below.

Table 4-5 Main Monitor Platform Maneuverability Checks

Step	Task	Note(s)
1.	Tilt the main monitor forward/back	Use both hands, one at the top of the main monitor and one at the bottom, to rotate the screen forward and back.
2.	Move the main monitor left/right	Use both hands, one at the lower left handle hold of the main monitor and one at the lower right handle hold, to adjust the screen left and right.

To unlock the main monitor:

- Turn the knob clockwise to unlock the main monitor. The main monitor can be moved freely in all directions.

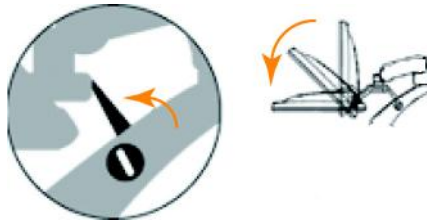
To lock the main monitor:

- Turn the knob counter clockwise to lock the main monitor in the parked position.

To set the main monitor position for transport:

- Lock the arm and tilt the main monitor down.

Figure 4-5 Main Monitor Transport Position



4-3-3 Brakes and direction lock functional checks

Examine the wheels frequently for any obvious defects that could cause them to break or bind. Each wheel has an independent brake pedal. A left rear wheel also has a swivel lock.

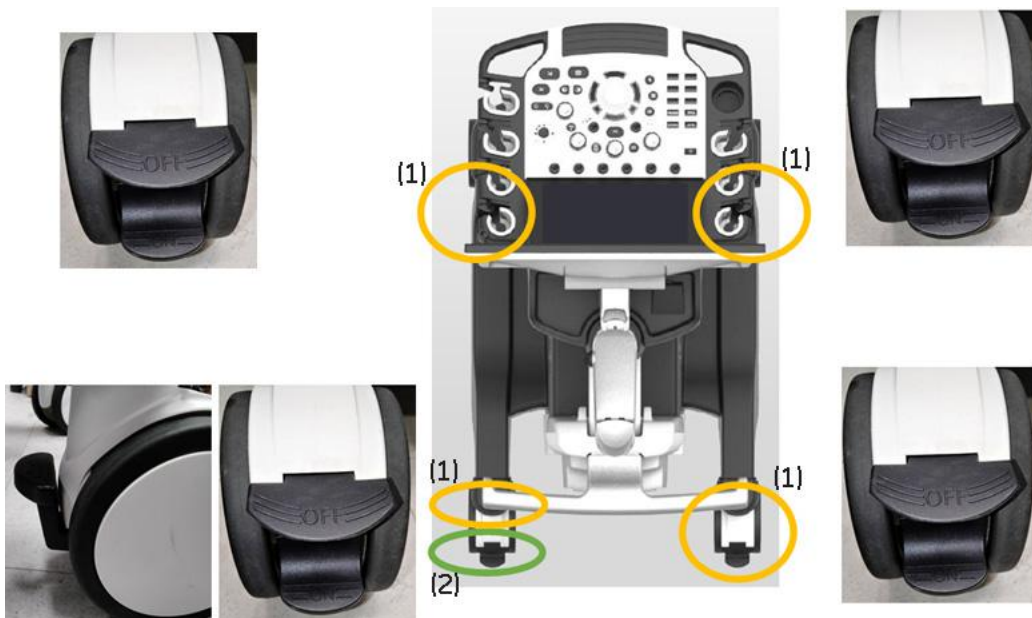


Figure 4-6 Wheel lock and Swivel lock

- 1.) Brake pedal
- 2.) Swivel lock

4-3-3-1 Brake pedal



Figure 4-7 Front and right-rear caster

- 1.) Step on Lower side pedal to activate Brake
- 2.) Step on Upper side pedal to release Brake



Figure 4-8 Left-rear caster

- 1.) Step on to activate Brake
- 2.) Raise up to release Brake

4-3-3-2 Swivel lock

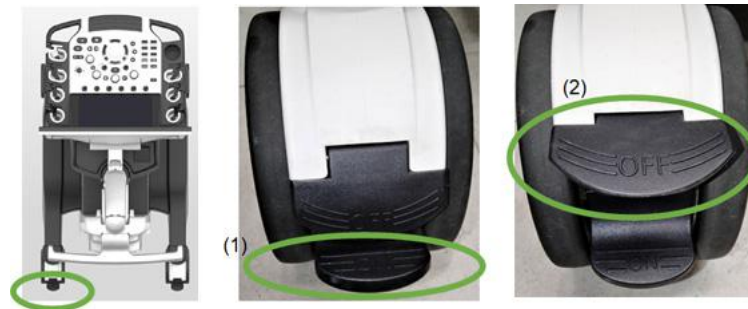


Figure 4-9 Rear-left with Swivel lock

- 1.) Step on Lower side pedal to activate Swivel Lock with clicking sound
- 2.) Step on Lower side pedal to De-activate Swivel Lock

NOTE: Wheel needs to be straight when you activate Swivel Lock.



Figure 4-10 Caster position for Swivel lock

4-3-4 Alphanumeric keyboard functional checks

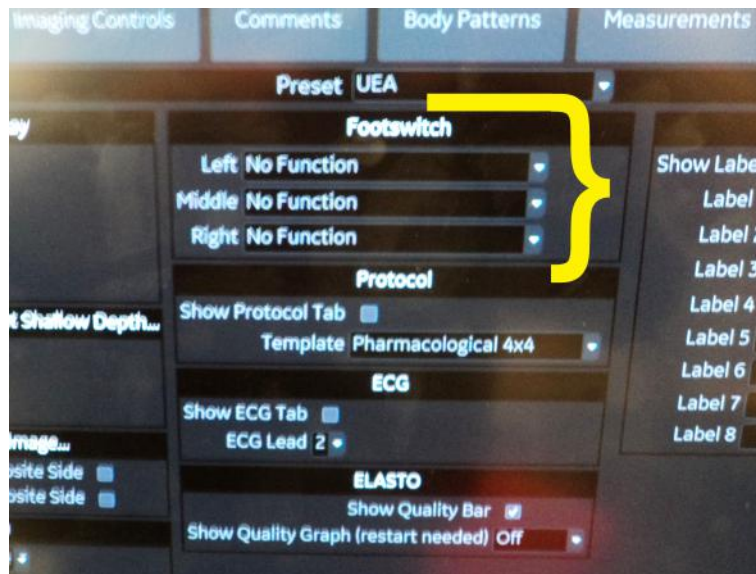
To perform the function checks for the alphanumeric keyboard:

- 1.) Press **Comment** on the operator control panel to activate Comment.
- 2.) Type any comments using alphanumeric keys to confirm keyboard functionality.

4-3-5 Footswitch functional checks

- 1.) Plug in the footswitch.
- 2.) Select **Utility > Application**. Under **Footswitch**, you should see the footswitch programming options for **Left**, **Middle**, and **Right**.
- 3.) Program the left, middle, and right footswitch pedals for **Freeze**.
- 4.) Scan and use each footswitch pedal to freeze and unfreeze to confirm each one works.

Figure 4-11 Footswitch Functional Checks



4-3-6 Basic control functional checks

Different functions can be assigned to the basic controls depending on the current active mode. The trackball area consist of the following:

Controls are grouped together by function for ease of use.

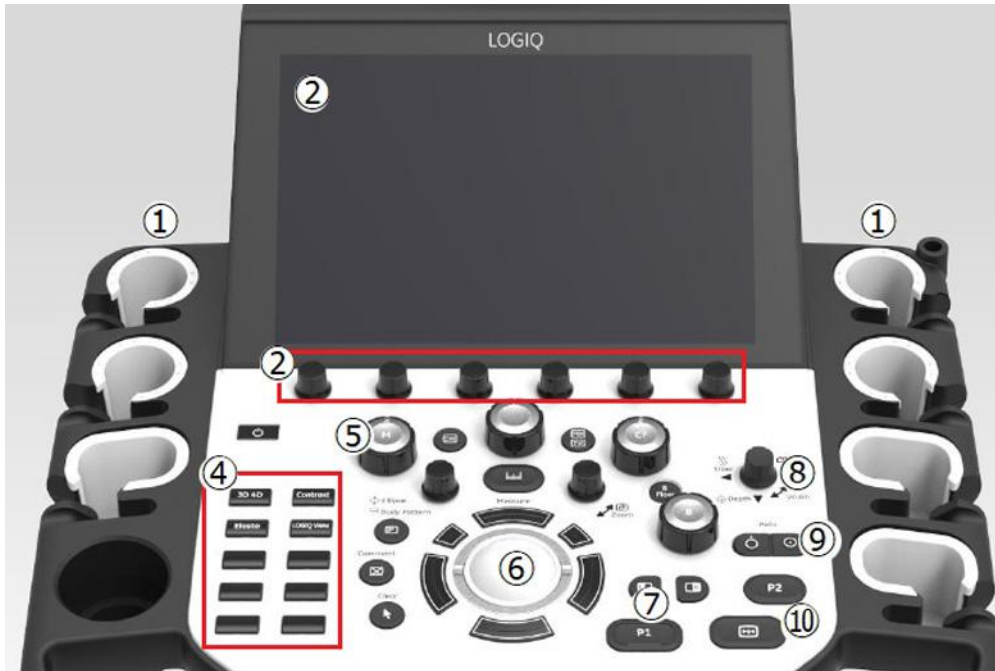


Figure 4-12 Control Panel

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Probe Holder and Cable Management 2. Touch Panel and Joystick controls 3. On Screen Keyboard (not display in this graphic) 4. User Defined Keys. 5. Mode/Gain/XYZ (3D) Controls 6. Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Zoom, Programmable Keys | <ol style="list-style-type: none"> 7. L/R, Start/Stop, P1, Simultaneous 8. Steer/Width/Depth/Reverse 9. Auto, CF/PW Auto Positioning 10. Freeze, P2 |
|---|---|

4-3-7 Probe/connector functional checks

NOTE: Probes can be connected at any time, whether the LOGIQ Fortis is ON or OFF.

For information about connecting a probe, see [3-5-6 "Connecting probes" on page 3-16](#).

To perform the function checks for a probe/connector:

Table 4-6 Probe and Connector Functional Checks

Step	Task	Expected Result(s)
1.	Select the appropriate connected probe from the probe indicators on the Touch Panel.	The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.
2.	Launch the application. To change application without changing the current probe, press THE DESIRED MODE on the Operator Panel.	The selected application starts.
3.	Verify no missing channels.	All channels is functioning.
4.	Verify there is no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
5.	Test the probe in each active connector slot. See Section 3-5-6 "Connecting probes" on page 3-16 .	It will display pictorial data each time.
6.	Repeat this procedure for all available probes.	

Probes requiring a leakage test

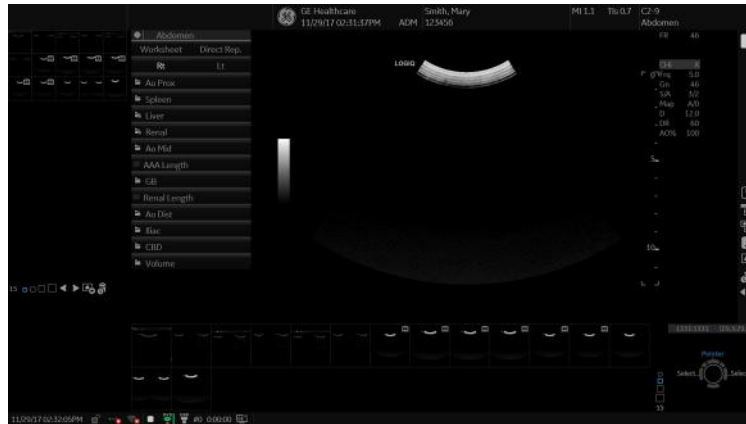
If the probe requires a leakage test, see [Section 10-6 "Electrical Safety Tests" on page 10-20](#).

4-3-8 B-Mode functional checks

B-Mode is the Ultrasound system's default mode.

For information on the Ultrasound system's different modes as well as expected results, see Chapter 5 of the LOGIQ Fortis Basic User Manual (latest revision), or the appropriate LOGIQ Fortis Release Notes. See [1-4-1 "Label Location" on page 1-14](#).

Figure 4-13 B-Mode Screen Example



Depending on probe availability, choose the preset application shown below. The LOGIQ Fortis probes are ONLY approved for use in the applications listed in Chapter 11 of the LOGIQ Fortis Basic User Manual (latest revision), or the appropriate LOGIQ Fortis Release Notes.

IQC preset for Service is available

Image Quality Check (IQC) is intended to facilitate image quality checks during quality assurance evaluations. Quality assurance tests are used to determine whether a scanner is providing the same level of performance year after year.

By using the same settings year after year, this ensures that the data collection is consistent independently of who performs the test.

This preset only includes fundamental settings for B-Mode.

Processing modes like SRI, Harmonics, etc., are turned off.

To do an Image Quality Check (IQC):

- 1.) Navigate to **Utility > Imaging Preset Manager**.
- 2.) Select the probe.
- 3.) Under **Imaging Preset Selections**, select **Category**.
- 4.) Expand the plus sign in front of **IQC for Service**.
- 5.) Select **IQC** and then the right arrow to assign it to a touch panel key.
- 6.) Map the IQC to the location you want it to appear on the touch panel.
- 7.) Select **Probe > IQC**.

4-3-8 B-Mode functional checks (cont'd)

Probe indications for use

See the online Help or Chapter 11 of the appropriate version of the LOGIQ Fortis Basic User Manual. See [1-4-1 "Label Location" on page 1-14](#).

Preparations

You may use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
 - See [Section 3-5-6 "Connecting probes" on page 3-16](#) for info about connecting the probes.
 - For available probes, see [Section 9-14 "Probes" on page 9-20](#).
- 2.) Turn ON the scanner. The B-Mode window is displayed (default mode).
- 3.) If needed, adjust the Brightness and Contrast setting on the monitor (see [Section 6-2 "Monitor Adjustments" on page 6-2](#)).



WARNING ALWAYS USE THE MINIMUM POWER REQUIRED TO OBTAIN ACCEPTABLE IMAGES IN ACCORDANCE WITH APPLICABLE GUIDELINES AND POLICIES.

- 4.) Press **B-MODE** on the Operator Panel to access B-Mode.
- 5.) These Image Controls are used to optimize the B-Mode picture:
 - Use **Gain** and **TGC** controls to optimize the overall image together with the **Power** control.
 - Use **Depth** to adjust the range to be imaged.
 - Use **Frequency** (move to higher frequencies) or **Frame rate** (move to lower frame rate) to increase resolution in image.
 - Use **Frequency** (move to lower frequency) to increase penetration.
 - Use the control to optimize imaging in the blood flow regions and make a cleaner, less noisy image.
 - Use **Reject** controls to reduce noise in the image.

Checks

- Check Width, Frame rate, Frequency. The results of these adjustments must be verified on the B-Mode sector on the screen.
- Check Up/Down, Left/Right, B Color Maps and Cineloop. The results of these adjustments must be verified on the B-Mode sector on the screen.
- Check Gain, TGC and Depth.
- Check B-Mode Soft Menu Controls.
- Check Compress, Contour, Reject and Tilt.
- Check Power and Dynamic Range.

4-3-9 M-Mode functional checks

For information on the Ultrasound system's different modes as well as expected results, see the LOGIQ Fortis Basic User Manual. It will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

Table 4-7 B/M-Mode Functions

Control	Description
Power Output (Acoustic Power)	Optimizes image quality and allows user to reduce beam intensity. 10% increments between 0-100%. Values greater than 0.1 are displayed.
Dynamic Range	Controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.
Rejection	Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).
Frame Average	Temporal filter that averages frames together. This has the effect of presenting a smoother, softer image.
Colorize	Enables gray scale image colorization. To deactivate, reselect a Gray Map.
Gray Map	Determines how the echo intensity levels received are presented as shades of gray.
Rotation (Up/Down)	Rotates the image by selecting the value from the pop up menu.
Frequency	Multi Frequency mode lets you downshift to probe's next lower frequency or shift up to a higher frequency.
Frame Rate/Resolution	Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Sweep Speed	Changes the speed at which the timeline is swept.

Preparations

You may use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
 - See [Section 3-5-6 "Connecting probes" on page 3-16](#) for info about connecting the probes.
 - For available probes, see the online Help or the appropriate version of the LOGIQ Fortis Basic User Manual. See [1-4-1 "Label Location" on page 1-14](#).
- 2.) Turn ON the scanner.

Checks

- Check Horizontal Sweep, Frequency, and Focus.
- Check Compress, Reject, Power and Dynamic Range.

4-3-10 System CFM and PWD functional checks

For information on the Ultrasound system's different modes as well as expected results, the Basic User Manual will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

For complete information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 5, or the appropriate LOGIQ Fortis Release Notes. See [1-2-5 "Product description" on page 1-10](#).

Preparations

You may use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
- 2.) Turn ON the scanner.

4-3-11 Color Mode functional checks

Color Flow screens are B- or M-Mode screens with colors representing blood or tissue movement. Color Flow may be selected both from B-Mode, or from M-Mode, or a combination of these screens.

For more information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 5, or the appropriate LOGIQ Fortis Release Notes.

4-3-12 Color B-Mode functional checks

For information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 5, or the appropriate LOGIQ Fortis Release Notes.

4-3-13 Color M-Mode functional checks

For information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 5, or the appropriate LOGIQ Fortis Release Notes.

- Check Horizontal Sweep, PRF, Baseline, and Invert.
- Check Variance, Color Maps, and Cineloop.
- Check Frequency and Acoustic Power.
- Adjust ROI.

4-3-14 PW/CW Doppler mode functional checks

For information on the Ultrasound system's different modes, the Basic User Manual will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

Doppler is used to measure velocity (most often in blood). Doppler mode can be done with a special pencil probe or with an ordinary probe. By using an ordinary probe, you can first bring up a B-Mode picture for navigation purpose and then add Doppler.

Preparations

- 1.) Connect one of the probes to the scanner.
- 2.) Turn ON the scanner.
- 3.) The 2D Mode window is displayed (default mode).
- 4.) If needed, adjust the display's Brightness and Contrast setting.
- 5.) Press **PW** or **CW** to start Pulsed Wave Doppler (PW) or Continuous Wave Doppler (CW).
- 6.) Use the Trackball to select the Area of Interest (Sample Volume) in PW or direction of interest in CW.

To adjust the PW/CW Doppler Mode controls:

Adjust the **Active mode gain** to set the gain in the spectral Doppler area.

- Adjust **Low velocity reject** to reduce unwanted low velocity blood flow and tissue movement.
- In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows.
- Adjust the **Compress** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.
- Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.
- Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

NOTE: Frequency and Frame rate settings may affect the Low Velocity Reject.

- Adjust **Power** to obtain an acceptable image using the lowest setting possible. This is particularly important in CW-mode, as the energy duty cycle is 100% (constant).

NOTE: The Doppler Power setting affects only Doppler operating modes.

- Adjust the following settings to further optimize the display of the image.
- Use the **Horizontal sweep** to optimize the sweep speed.
- To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace.
- Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.
- Use **Angle correction** to steer the ultrasound beam to the blood flow to be measured.

4-3-15 CW Doppler mode functional checks

For information on the Ultrasound system's different modes, the Basic User Manual will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

- 1.) Connect one of the probes to the scanner.
- 2.) Turn ON the scanner.
- 3.) The 2D Mode window is displayed (default mode).
- 4.) If needed, adjust the display's Brightness and Contrast setting.
- 5.) Press **CW** to start Continuous Wave Doppler (CW).
- 6.) Use the Trackball to select the direction of interest in CW.

4-3-16 Cineloop functional checks

For complete information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 5, or the appropriate LOGIQ Fortis Release Notes. See [1-4-1 "Label Location" on page 1-14](#).

To activate CINE:

- 1.) Press **Freeze**, then roll the trackball to activate CINE.
- 2.) To start CINE Loop playback, press **Run/Stop**.
- 3.) To stop CINE Loop playback, press **Run/Stop**.

To omit images:

- Roll the trackball to the frame you want to delete and press **Omit Image**.

To restore images:

- To undo deleting an image from the CINE Loop, press **Restore Image**.

To move quickly to start/end frame:

- 1.) Press **First** to move to the first CINE frame.
- 2.) Press **Last** to move to the last CINE frame.

To start frame/end frame:

- 1.) Turn the Start Frame dial to the left to move to the beginning of the CINE Loop.
- 2.) Turn the dial to the right to move forward through the CINE Loop.
- 3.) Turn the End Frame dial to the right to move to the end of the CINE Loop.
- 4.) Turn the dial to the left to move backward through the CINE Loop.

To adjust the CINE loop playback speed:

- Turn the Loop Speed dial right/left to increase/decrease the CINE Loop playback speed.

To move through a CINE loop frame by frame:

- Turn Frame by Frame to move through CINE memory one frame at a time.

Checks

- Check Left Marker, Right Marker, Cycle Select and Number of Cycles.
- Check First, Last Cycle, Select all.
- Adjust Scroll and Cine Speed.

4-3-17 Removable media functional checks

Refer to Chapter 9 of the appropriate LOGIQ Fortis Basic User Manual.

- Using Removable Media
- Labeling Removable Media
- Formatting Removable Media
- Verifying Removable Media

Types of removable media - CD/DVD, USB - flash drive and HDD

4-3-18 Archiving and loading presets

To load presets from removable media:

Refer to Chapter 9 of the appropriate LOGIQ Fortis Basic User Manual.

4-3-19 Installation and setup procedures for peripherals

Refer to [3-6-3 "Optional peripherals/peripheral connection" on page 3-36](#).

Table 4-8 Printer Functional Check

See Section	Functional Test	Debrief Script
7-15-1	Test of printers	Equipment passed all required tests and is ready for use.

4-3-20 Basic measurement functional checks

NOTE: *The following instructions assume that you first scan the patient and then press Freeze.*

To check Distance and Tissue Depth Measurement:

- 1.) Press **Measure** once to display an active caliper.
- 2.) Move the trackball to position the active caliper at the start point (distance) or the most anterior point (tissue depth).
- 3.) Press **Set** to fix the start point. The LOGIQ Fortis fixes the first caliper and displays a second active caliper.
- 4.) Move the trackball to position the second active caliper at the end point (distance) or the most posterior point (tissue depth).
- 5.) Press **Set** to complete the measurement. The Ultrasound system displays the distance or tissue depth value in the measurement results window.

NOTE: *Before you complete a measurement:*

- *To toggle between active calipers, press **MEASURE**.*
- *To erase the second caliper and the current data measured and start the measurement again, press **CLEAR** once.*
- *To rotate through and activate previously fixed calipers, turn **Cursor Select**.*

After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press Clear.

To check Circumference/Area (Ellipse) Measurement:

- 1.) Press **Measure** once to display an active caliper.
- 2.) Move the trackball to position the active caliper.
- 3.) Press **Set** to fix the start point. The LOGIQ Fortis fixes the first caliper and displays a second active caliper.
- 4.) Move the trackball to position the second caliper.
- 5.) Turn the **Ellipse** control; an ellipse with an initial circle shape appears.

NOTE: *Be careful not to press the Ellipse control as this activates the Body Pattern.*

- 6.) Move the trackball to position the ellipse and to size the measured axes (the calipers).
- 7.) To increase the size, turn the Ellipse control in a clockwise direction.
- 8.) To decrease the size, turn the Ellipse control in a counterclockwise direction.
- 9.) To toggle between active calipers, press **Measure**.
- 10.) Press **Set** to complete the measurement. The Ultrasound system displays the circumference and area in the measurement results window.

Before you complete a measurement:

- *To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.*
- *To exit the measurement function without completing the measurement, press **Clear** again.*

4-3-20 Basic measurement functional checks (cont'd)

Worksheets

Measurement/Calculation worksheets are available to display and edit measurements and calculations. There are generic worksheets as well as Application specific worksheets. The worksheets are selected from the Measurement Touch Panel.

Report Pages

Measurements/Calculations that are included on the worksheet can also be displayed on Report Pages. Report Pages can be customized to meet the appropriate needs of the user.

4-3-21 Multi image functional checks

- 1.) Press **L** to activate a dual screen. The single image is placed on the left side.
- 2.) Press **R**. The left side image is freezed and the image displays in the right side.
- 3.) Press **B** key to return to the single screen.
- 4.) Press and hold down **L** to activate a quad screen. The single image is placed on the upper left.
- 5.) Press **B** key to return to the single screen.

4-3-22 ECG functional checks

The ECG capability on this LOGIQ Fortis is intended as a trigger for measurements, but can also be viewed on the screen.

Parts needed: ECG cable and M5Sc-D

ECG Checks

Table 4-9 ECG Functional Checks

Step	Task	Expected Result(s)
1.	Select Preset , select Cardiac , select Scan .	
2.	If you do not see the ECG line, select the ECG tab, you should see selection on touch screen for DISPLAY ECG. Select and press.	You should then see the line.
3.	Plug in the ECG cables with nothing attached so you pick up noise.	The line should display noise.
4.	Connect the ECG harness to the connector on the front of the Ultrasound system.	The LOGIQ Fortis displays a straight curve along the bottom edge of the image sector on the screen.
5.	Connect the three leads to an ECG simulator, or fasten the three ECG Pads to your body and connect the three leads to respective ECG Pad.	When connecting, the signal on the screen will be noisy. When the connection is completed, a typical clean ECG signal is displayed.

4-3-23 4D option functional checks

Required equipment: 4D Probe (RAB6-D or RIC5-9-D)

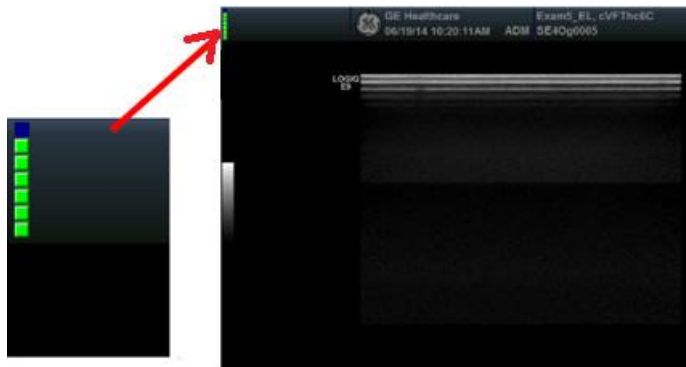
To perform the functional checks for 4D:

- 1.) Connect a 4D probe. Press the [3D/4D] button on the console.
- 2.) Press the [4D] button on the [Mode] tab. Press the [Visualization] button, then select Render.
- 3.) Press the [L] key the console to start 4D data acquisition.
- 4.) To complete the acquisition, press [Freeze] or [R].

4-3-24 Volume Navigation with inside probe functional checks

Required tools: a supported VN probe, Transmitter

- 1.) Connect a transmitter. Connect a VN probe to any probe ports and select it.
- 2.) Using a VN probe scan and enable VNAV.
- 3.) Check the system detects sensor and scans by confirming the appearance of a single quality bar on the screen.
- 4.) Move a VN probe towards transmitter. Expected result is that the quality bar gauge shows 4.

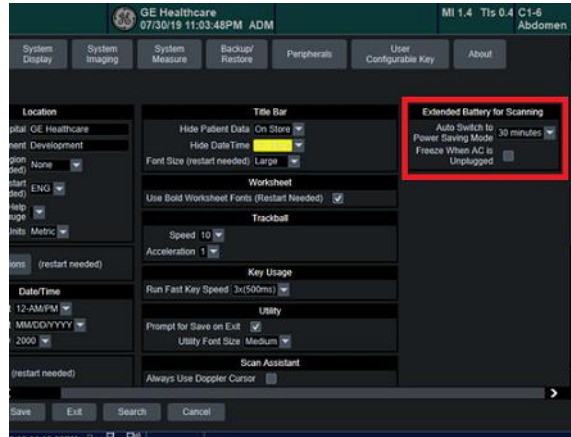


4-3-25 Power Assistant functional checks

- 1.) With the LOGIQ Fortis powered up, verify the “batteries charging” icon displays in the status bar and the LOGIQ Fortis operates as intended.
- 2.) Unplug the mains cable from the wall. The LOGIQ Fortis enters Power Assistant upon AC power loss. There is an initial temporary message saying the LOGIQ Fortis is entering battering mode, then a message appears, saying the LOGIQ Fortis is “running on battery”.
- 3.) Plug the mains cable back into the wall power and continue with functional checks.

4-3-26 Scan on Battery functional checks

- 1.) With the LOGIQ Fortis powered up, verify the “batteries charging” icon displays in the status bar and the LOGIQ Fortis operates as intended.
- 2.) Go to Utility -> System->General then make sure “Auto Switch to Power Saving Mode” is 30minutes and “Freeze When AC is Unplugged” is unchecked like following picture.



- 3.) Then the system should be able to be unplugged and remain on for at least several seconds and plugged back on without shutting down. A message may appear to user with a notification of being in this mode.
- 4.) Verify that Scan is continued while the system is unplugged without shutdown.
- 5.) Reconnect AC power. Verify that the batteries begin charging via the battery status icon.

4-3-27 Shear Wave Elastography (Shear Elasto) functional checks

- 1.) Select a probe (L2-9-D or C1-6-D).
- 2.) Select the **ELASTO** button.
- 3.) From the touch panel, select the **Shear Wave** button (if not already selected).
- 4.) Verify that the **Shear Wave** button is available.

Chapter 5

Components and Functions (Theory)

Section 5-1 Overview

5-1-1 Purpose of this chapter

This chapter explains LOGIQ Fortis's Ultrasound system concepts, component arrangement, and subsystem functions. It also describes the power distribution system. Refer to the LOGIQ Fortis Basic User Manual (latest revision) for more information.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

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Section 5-2 LOGIQ Fortis Models

Table 5-1 LOGIQ Fortis Software Configuration and Hardware

MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
6601000	LOGIQ Fortis LCD monitor CONSOLE, 100-240 VAC	R3.x.x
6602000	LOGIQ Fortis HDU Display CONSOLE, 100-240 VAC	R3.x.x

Section 5-3 LOGIQ Fortis Description

5-3-1 Purpose of this section

The purpose of this section is to give you an overview of the LOGIQ Fortis and how it functions.

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5-3-2 Introduction

The LOGIQ Fortis Ultrasound system is a high performance digital Ultrasound imaging system with total data management.

The LOGIQ Fortis provides image generation in B-Mode, Color Doppler, Power Doppler, M-Mode, PW, 4D, Harmonic Imaging, and Contrast imaging applications. The fully digital architecture of the LOGIQ Fortis Ultrasound system allows optimal usage of all scanning modes and probe types throughout the full spectrum of operating frequencies.

5-3-3 LOGIQ Fortis general description

The LOGIQ Fortis is a digital beamforming Ultrasound system. The Ultrasound signal flows from the probe through the Ultrasound system where it is processed and finally displayed as a diagnostic image on the monitor. Images and patient data can be sent to peripheral devices to be stored, printed, or displayed.

System configuration is stored on the hard drive and all necessary software is loaded from the hard drive on power up.

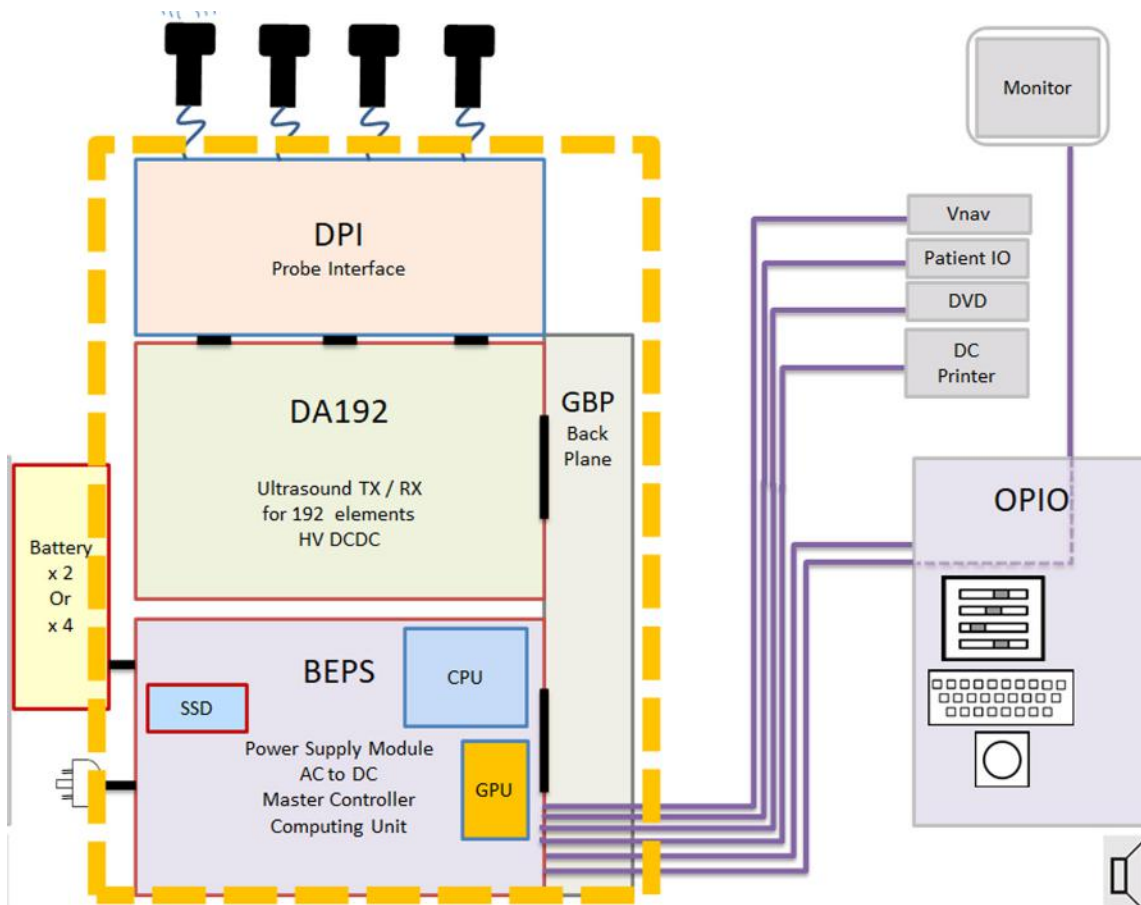
The LOGIQ Fortis is comprised of the following major components:

- BEPS (Back end and Power supply)
- DA192 (Front end, Data Acquisition)
- DPI-L (Probe Interface relay)
- Operator panel
- Peripherals
- Options
- Mechanical Parts
- Software

5-3-4 LOGIQ Fortis block diagram

The transmitted pulse bursts are routed from the DA192 board to the DPI-L relay board where the ultrasound probes send the energy into the body. Weak ultrasound echoes from body structures and blood cells are received by the probes and routed through the DPI-L relay board to the DA192 board. The DA192 board amplifies the ultrasound signal and connects it with an A/D converter to the digital domain. The digital signals are then further processed on the back end. The user operates the Ultrasound system operation through the operator panel which consists of an alphanumeric keyboard, customized controls, trackball, and a touch panel display. Images and patient data are displayed on the main monitor.

Figure 5-1 LOGIQ Fortis Block Diagram



Section 5-4 Software Description

5-4-1 Purpose of this section

This section gives you a brief overview of the software used on LOGIQ Fortis. You can also see the LOGIQ Fortis Basic User Manual (latest revision) for more information.

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5-4-3	Electronic media	5-8
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5-4-2 LOGIQ Fortis base load image and application software

LOGIQ Fortis software consists of:

- Base load image
 - Windows 10 Embedded
 - Contains all necessary drivers to support devices and peripherals approved for this product
- Application software
 - Contains customized software to perform all functions and features for the LOGIQ Fortis

Software location:

- Software resides in the SSD.

Drive partitions

Table 5-2 Drive Partitions

Drive Type	Partition Letter	Usage	GB (approximately)
SSD	C:	Windows 10/application	79
	Z:	Software Repository	31
	D:	User settings/configuration	42
	E:	Database/data	783
	V:	Future Use	10

Software installation:

- Software can be loaded/reloaded with USB media.
- System partition (Base+Application) can be reloaded from the Z partition.
- System partition (Base+Application) can be updated through a remote connection to the Service Back Office.

Network capabilities:

- LAN is IPv6 ready.
- Can only be set up for IPv4 or IPv6. They cannot be mixed.

5-4-3 Electronic media**To access and view user documentation through a Windows PC:**

- 1.) Insert the media into the media drive.
- 2.) Open the media drive on your desktop.
- 3.) Double click on the 'gedocumentation.html' document.
- 4.) Select the item you want to view (click on the blue, underlined link in the File Name column).
- 5.) To close the window, click on the 'X' in the upper, right-hand corner of the browser window.

NOTE: If your PC does not have Adobe Reader, a free download is available on the Adobe website at <http://www.adobe.com>.

5-4-4 LOGIQ Fortis's operating modes

B-Mode

B-Mode is a two-dimensional image of the amplitude of the echo signal. It is used for location and measurement of anatomical structures and for spatial orientation during operation of other modes. In B-Mode, a two-dimensional cross-section of a three-dimensional soft tissue structure such as the heart is displayed in real time. Ultrasound echoes of different intensities are mapped to different gray scale or color values in the display. The outline of the 2D (B-Mode) cross-section is a sector, depending on the particular transducer used. B-Mode can be used in combination with any other mode.

Harmonic imaging

Tissue Harmonic Imaging, acoustic aberrations due to tissue, are minimized by receiving and processing the second harmonic signal that is generated within the insonified tissue. LOGIQ Fortis's high performance Harmonic Imaging provides superb detail resolution and penetration, outstanding contrast resolution, excellent acoustic clutter rejection and an easy to operate user interface for switching into Harmonic Imaging mode. Coded Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration. It diminishes low frequency amplitude noise and improves imaging technically difficult patients. It may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver and hard-to-visualize fetal anatomy. Coded Harmonics may improve the B-Mode (2D) image quality without introducing a contrast agent.

M-Mode

In M-Mode, soft tissue structure is presented as scrolling display, with depth on the Y-axis and time on the X-axis. It is used primarily for cardiac measurements such as valve timing on septal wall thickness when accurate timing information is required. M-Mode is also known as T-M mode or time-motion mode. Ultrasound echoes of different intensities are mapped to different gray scale values in the display. M-Mode displays time motion information of the ultrasound data derived from a stationary beam. Depth is arranged along the vertical axis with time along the horizontal axis. M-Mode is normally used in conjunction with a 2D (B-Mode) image for spatial reference. The 2D (B-Mode) image has a graphical line (M-line) superimposed on the 2D (B-Mode) image indicating where the M-Mode beam is located.

5-4-4 LOGIQ Fortis's operating modes (cont'd)

Color flow Doppler mode

Color Doppler is used to detect motion presented as a two-dimensional display. There are three applications of this technique:

- Color Flow Mode - used to visualize blood flow velocity and direction
- Power Doppler (Angio) - used to visualize the spatial distribution of blood

A real-time two-dimensional cross-section image of blood flow is displayed. The 2D (B-Mode) cross-section is presented as a full color display, with various colors being used to represent blood flow (velocity, variance, power and/or direction). To provide spatial orientation, the full color blood flow cross-section is overlaid on top of the gray scale cross-section of soft tissue structure (2D (B-Mode) echo). For each pixel in the overlay, the decision of whether to display color (Doppler), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft tissue structures and from the red blood cells. Blood velocity is the primary parameter used to determine the display colors, but power and variance may also be used. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures. Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. Color flow can be used in combination with 2D (B-Mode) and Spectral Doppler modes.

Power Doppler

A real-time two dimensional cross-section of blood flow is displayed. The 2D (B-Mode) cross-section is presented as a full color display, with various colors being used to represent the power in blood flow echoes. Often, to provide spatial orientation, the full color blood flow cross-section is overlaid on top of the gray scale cross-section of soft tissue structure (2D (B-Mode) echo). For each pixel in the overlay, the decision of whether to display color (Doppler power), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft-tissue structures and from the red blood cells. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures. Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. The power in the remaining signal after wall filtering is then averaged over time (persistence) to present a steady state image of blood flow distribution. Power Doppler can be used in combination with 2D (B-Mode) and Spectral Doppler modes as well as with 4D mode.

Pulsed (PW) Doppler

PW Doppler processing is one of two spectral Doppler modalities, the other being CW Doppler. In spectral Doppler, blood flow is presented as a scrolling display, with flow velocity on the Y-axis and time on the X-axis. The presence of spectral broadening indicates turbulent flow, while the absence of spectral broadening indicates laminar flow. PW Doppler provides real time spectral analysis of pulsed Doppler signals. This information describes the Doppler shifted signal from the moving reflectors in the sample volume. PW Doppler can be used alone but is normally used in conjunction with a 2D (B-Mode) image with an M-line and sample volume marker superimposed on the 2-D image indicating the position of the Doppler sample volume. The sample volume size and location are specified by the operator. Sample volume can be overlaid by a flow direction cursor which is aligned, by the operator, with the direction of flow in the vessel, thus determining the Doppler angle. This allows the spectral display to be calibrated in flow velocity (m/sec.) as well as frequency (Hz). PW Doppler also provides the capability of performing spectral analysis at a selectable depth and sample volume size. PW Doppler can be used in combination with 2D (B-Mode) and Color Flow modes.

5-4-4 LOGIQ Fortis's operating modes (cont'd)

Continuous Wave (CW) Doppler

Continuous Wave Doppler systems use two crystals, one to send and one to receive the echoes.

The transmitter inputs a continuous sinusoidal wave. The receiver detects the shift.

An audible sound is created and recorded by either an analog recorder or spectral analyzer. Spectral analysis separates the signal into individual components and assigns a relative importance.

The benefits of CW Doppler include high sensitivity to low velocities and detection of high velocities without aliasing. Although CW Doppler cannot distinguish between the sending and receiving signals or extraneous echoes, nor does CW Doppler produce a precise image like Pulsed Wave Doppler.

Other modes

4D

The LOGIQ Fortis Ultrasound system may be used to acquire multiple, sequential 2D (B-Mode) images which can be combined to reconstruct a three dimensional image. These 4D images are useful in visualizing three-dimensional structures, and in understanding the spatial or temporal relationships between the images in the 2D (B-Mode) sequence. The 4D image is presented using standard visualization techniques, such as surface or volume rendering.

For more information on Volume Navigation and Contrast Imaging, see the LOGIQ Fortis Basic User Manual (latest revision).

4D Data Collection and Reconstruction

2D (B-Mode) gray scale images may be reconstructed. The acquisition of volume data sets is performed by sweeping 2D (B-Mode) scans with special transducers (called 4D-transducers) designed for the 2D (B-Mode)-scans and the 4D-sweep.

Images are spatially registered, using internal probe position sensing and a position control to ensure geometric accuracy of the 4D data.

2D (B-Mode) ultrasound imaging modes are used to view a two dimensional cross-sections of parts of the body. For example in 2D (B-Mode) gray scale imaging, a 2 dimensional cross-section of a 3-dimensional soft-tissue structure such as the heart is displayed in real time. Typical, the user of an ultrasound machine manipulates the position and orientation of this 2D (B-Mode) cross-section in real time during an ultrasound exam.

By changing the position of the cross-section, a variety of views of the underlying structure are obtained, and these views can be used to understand a 3-dimensional structure in the body.

To complete survey a 3-dimensional structure in the body, it is necessary to collect 2D (B-Mode) images which span a volume containing the structure. One way is to sweep the imaging cross-section by translating it in a direction perpendicular to the cross-section. Another example method is to rotate the cross section about a line contained in the cross section. The LOGIQ Fortis Ultrasound system uses the automated so called C-Scan for the motion perpendicular to automated B-scan. Once a representative set of 2D (B-Mode) cross-sections are obtained, standard reconstruction techniques can be used to construct other 2D (B-Mode) cross-sections, or to view the collection of the cross-sections as a 4D images.

5-4-4 LOGIQ Fortis's operating modes (cont'd)

4D Image Presentation

The basic technique for 4D image presentation is to combine the 2D (B-Mode) cross-sections into an image which represents how the volume of the data would appear from a particular viewing direction. The mathematics behind this feature is called 4D-rendering. Such combined images are called projections, because the data from the volume is projected onto a flat 2-dimensional surface, e.g. the Ultrasound system display. This technique can be applied to any 2D (B-Mode) ultrasound mode.

Several techniques can be used to aid the human observer in understanding the resulting 2D (B-Mode) image as a representation of a three-dimensional object. One is to rotate the volume of data, and present the resulting sequence of 2D (B-Mode) projections to the observer. The changing direction of observation helps the observer to separate the features in the volume according to their distance from the observer.

Volume Navigation

Using a position sensor attached to the probe, Volume Navigation Fusion (V Nav) lets you import a pre-acquired Ultrasound, CT or MR DICOM volume dataset and register it to the live Ultrasound image. As a result, you can view live Ultrasound scanning simultaneously with the corresponding multi-planar reformatted (MPR) slice from the pre-acquired dataset.

In addition, you can use V Nav as a type of "GPS" positioning marker to track an anatomy of interest.

V Nav is available in B-Mode, Color Flow, PDI, and Contrast Modes; it is not available while in 3D/4D or when timeline modes are active. Biopsy capability is available while in V Nav.

Contrast Imaging

The LOGIQ Fortis is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast related product features are enabled only on Ultrasound systems for delivery to an authorized country or region of use. It is not currently approved for use in the United States.

Elastography

Elastography shows the spatial distribution of tissue elasticity properties in a region of interest by estimating the strain before and after tissue distortion caused by external or internal forces. The strain estimation is filtered and scaled to provide a smooth presentation when displayed.

With Elastography active, the image will show a color map/bar indicating the level of elasticity detected by the Ultrasound system. The Elastography image is achieved by pulsating the probe manually while you are scanning the anatomy of interest.

Shear Wave Elastography

With the Shear Wave option, the scanner creates the distortion by generating shear waves in tissue using a diagnostic ultrasound transducer. Shear waves "push" the tissue at a low frequency in either a single burst of high amplitude, long duration pulses or a series of such pulses.

UGAP

Ultrasound-Guided Attenuation Parameter (UGAP) measures the attenuation value (i.e. attenuation coefficient [dB/cm/MHz] or attenuation rate [dB/m]) in the liver to evaluate diffuse liver disease. There are three visualizations: B Ref, Color Ref and Color Dual. All visualizations measure a representative attenuation value. Color Ref and Color Dual measure a representative attenuation value in 2D color map and dual display of B-Mode and 2D color map, respectively.

5-4-5 Option activation keys

Option keys are a string of characters that activate purchased options and are stored in two different locations.

BEPS

- Non Volatile RAM
- Primary source

Internal drive

- Stored as a text file under userdefs
- Can be backed up to CD/DVD/USB
- Can be Imported from Media or from Service folder

5-4-6 System password

The system password is the Windows password used by the LOGIQ Fortis to automatically log into the Windows operating system. This is the password you would use from a locked Windows desktop.

Users of the LOGIQ Fortis will never need to use this password. The only reason to change the password would be if the user, for security reasons, prefers to define their own password instead of the factory created default password. As with all passwords, this should be treated with care and archived appropriately so that it can be provided to service personnel if necessary.

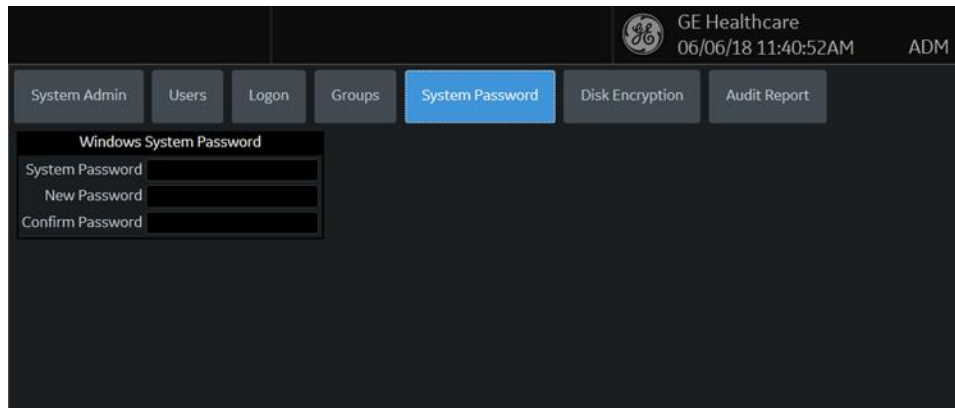
The requirement for this password is a minimum of 15 characters including an uppercase letter and a special character.

The Windows password is not backed up with system presets.

The procedure to change the system password depends on the software version. These are the available procedures:

A system administrator can change the password of the underlying Windows user from **Utility (first page) > Admin > System Password**.

Figure 5-2 System Password



To change the system password:

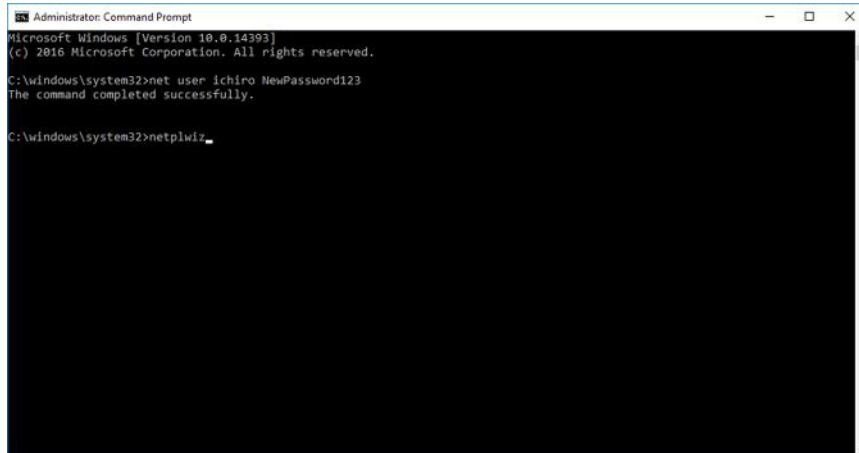
- 1.) Navigate to **Utility (first page) > Admin**, and then select **System Password**.
- 2.) In **System Password**, type the current password.
- 3.) In **New Password**, type a new password according to the password requirements (minimum 15 characters including one upper cap and one symbol).
- 4.) In **Confirm Password**, type the new password.
- 5.) Select **Save**.

NOTE: *The new password procedure will need to be performed each time the LOGIQ Fortis is rehosted.*

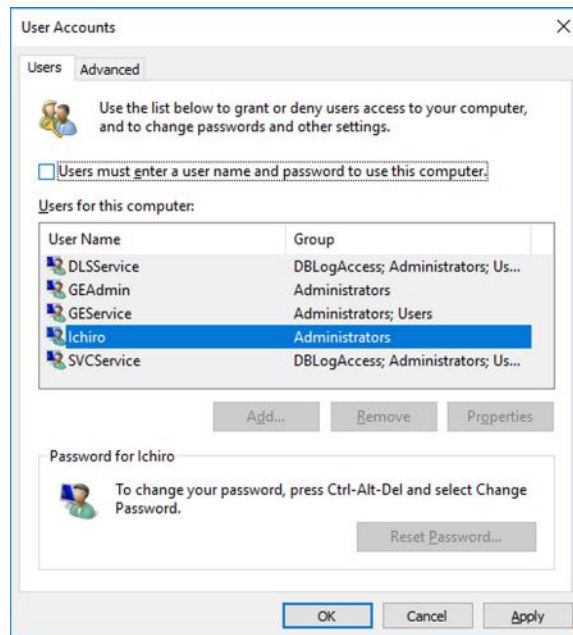
5-4-6 System password (cont'd)

To confirm the new password:

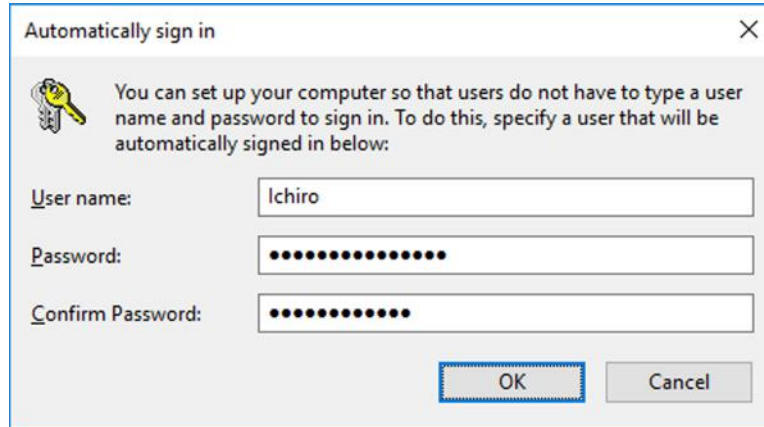
- 1.) Insert an activated SSA key.
- 2.) Exit to the Windows desktop.
- 3.) Press **Start** with the left Trackpad key and select **Command Prompt (Admin)**.
- 4.) In the **Command Prompt** window, type “netplwiz” and then press **Enter**.



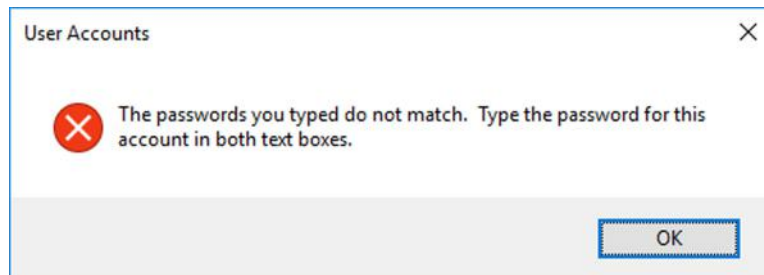
The **User Accounts** window appears.



- 5.) In the **User Accounts** window, do the following:
- Check the **Users must enter a user name and password to use this computer** box.
 - Under **Users for this computer**, select “Ichiro”.
 - Uncheck the **Users must enter a user name and password to use this computer** box.
 - Press **OK**. The **Automatically sign in** popup appears.



- In **Password** and **Confirm Password**, enter the new password and then press **OK**.
- If you incorrectly type the password, in the following popup, press **OK** and re-enter the Password and Confirm Password information on the “Automatically sign in” popup again.



NOTE: *The new password procedure will need to be performed each time the LOGIQ Fortis is reghosted.*

5-4-7 Log file content

Uncompressing the log files provides a subdirectory with the results.

- **SysConfig.csv** – Contains serial number, hardware info, software version, etc.
- **log/ExceptionTrace** – subdirectory contains text file with call stack of system crashes.
- **log/DL** – (Deep Learning) subdirectory contains anonymized low resolution jpg images. Can be used for troubleshooting. Every time you press the print key. Very low resolution images, may be useful to get examples of image issues visible in low resolution. Used for data analytics. Users can disable them through the UI.
- **log/Diag** – subdirectory contains diagnostics results.
- **log/Crashes** – subdirectory may contain Windows/application crash info.
- **log/CrashDump** – subdirectory may contain Windows/application crash info.
- **Log/ScLogsDatabase** – subdirectory containing tab-separated text files (Data Logging).
- **Log/ScLogsDatabase_PI** – subdirectory with Patient Proprietary Info (keyboard shadow).
- **WinEvt** – subdirectory with Windows Event logs.

Logs are text files and can be open in Microsoft Excel. Fields are separated by tabs in order to make it easier to be opened in Excel.

Logs will not be present until they are collected through **Alt+D** or **Gather Logs**.

5-4-8 Smart Device applications

The following Smart Device applications (apps) are available for Android devices through a Bluetooth connection:

- LOGIQ Remote
- LOGIQ Photo

For more information, see “Smart Device Apps” in Chapter 13 of the LOGIQ Fortis Basic User Manual (latest revision).

LOGIQ Remote

With the LOGIQ Remote app, you will be able to adjust the following controls:

- Depth
- PW Gain
- CF Gain
- B-Mode Gain
- Left/Right
- Measure
- Comment
- Clear
- Trackball
- Freeze
- Store
- Color Flow Scale
- Cursor

LOGIQ Photo

With the LOGIQ Photo app, you can capture images that will go to the patient’s exam.

Section 5-5 Service Desktop Description

The Service Desktop is an interface that provides access to system information, status, and diagnostics. The Service Desktop has different content or views depending on the access level. The access level is determined by the user profile as well as the service options enabled on the LOGIQ Fortis.

- Basic view is the standard view, restricted only by the user through the user profile settings. Administrator default user has access to the Service Desktop. Any user with “local Service access” in their user profile can have access to this view.
- Class C view is the view enabled by the service options purchased.
 - Service Advanced
 - Service Expert (requires Service Advanced)
 - Service Pro (requires Service Advanced)

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5-5-1 User level of the Service Desktop

Table 5-3 shows Service Desktop widgets available for local service user without an SSA Key and without service options.

Table 5-3 User Level of the Service Desktop

Main Menus	Main Sub-menus	Basic View	Class C View Levels		
		Simple	Service Advanced	Service Expert	Service Pro
Home		X	X	X	X
Diags			X	X	X
	Run Diags		X	X	X
	e-PAT diagnostic				X
	Diag History		X	X	X
DICOM			X	X	X
	DICOM Service Status		X	X	X
	DICOM Spooler		X	X	X
Utilities		X	X	X	X
	Change Password	X	X	X	X
	Checkpoints		X	X	X
	Clean Userdefs			X	X
	Data Transfer	X	X	X	X

Table 5-3 User Level of the Service Desktop (Continued)

Main Menus	Main Sub-menus	Basic View	Class C View Levels		
		Simple	Service Advanced	Service Expert	Service Pro
	Delete Files	X	X	X	X
	Disk Defragment		X	X	X
	Disruptive Mode Utility		X	X	X
	Gather Logs	X	X	X	X
	Network Capture	X	X	X	X
	Reset Patient Database			X	X
	Secure Delete			X	
	Software Reload			X	X
	SSA License	X	X	X	X
	Third Party Licences	X	X	X	X
Options		X	X	X	X
Agent Configuration		X	X	X	X

Section 5-6 Front End Description

5-6-1 Purpose of this section

The intention with this section is to give you a brief overview of the front end configuration used on the LOGIQ Fortis.

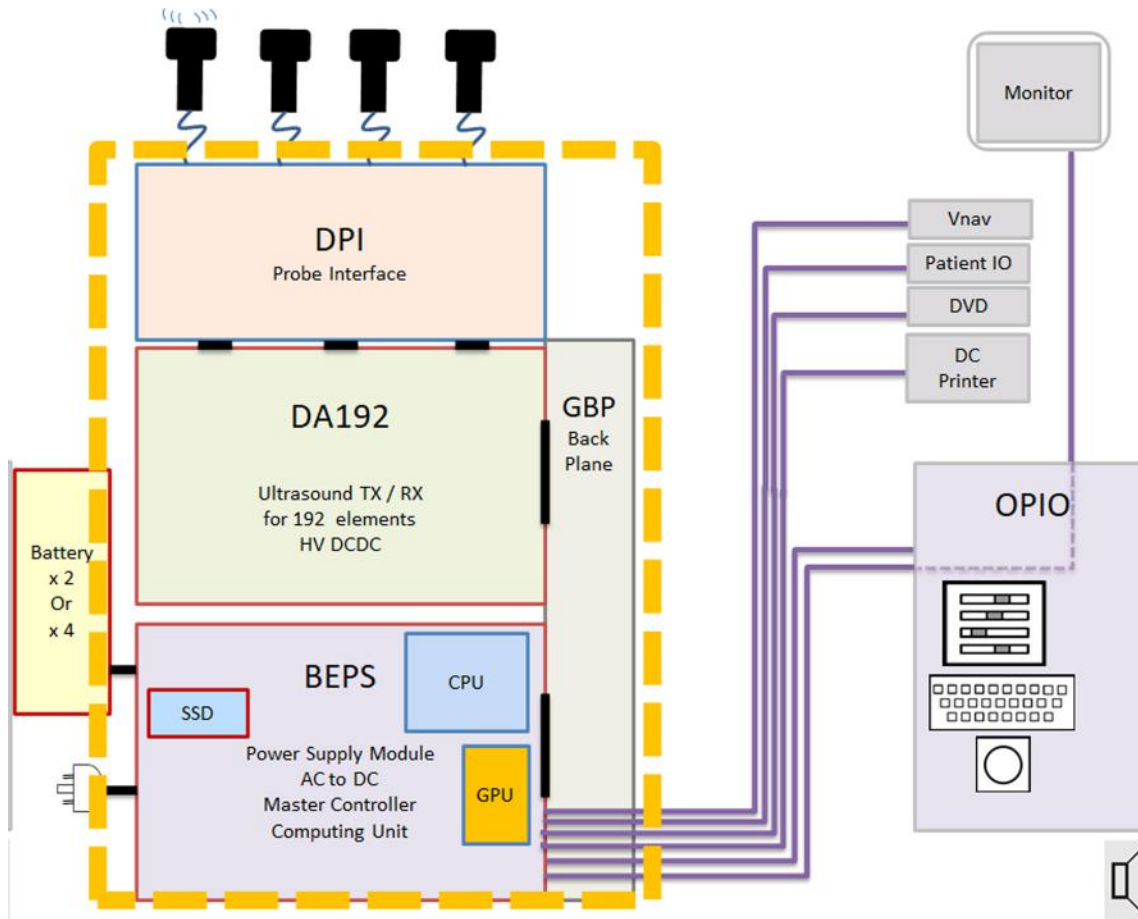
Contents in this section

5-6-1	Purpose of this section	5-21
5-6-2	Card rack circuit boards overview and location	5-22
5-6-3	Relay board (DPI-L)	5-25
5-6-4	Data Acquisition Board (DA192).....	5-28

5-6-2 Card rack circuit boards overview and location

The card rack houses all the transmit, receive, and processing circuit boards.

Figure 5-3 Card Rack Boards (indicate orange box)

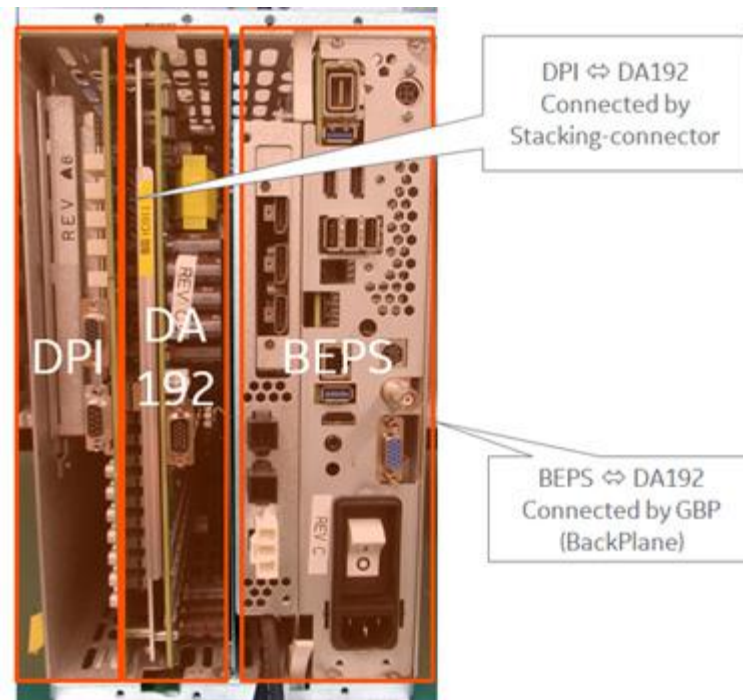


5-6-2 Card rack circuit boards overview and location (cont'd)

Table 5-4 Card Rack Boards

ABBREVIATION	BOARD NAME	TOTAL NUMBER OF CARDS PER LOGIQ Fortis
BEPS	Back End and Power Supply	1
DA192	Data Acquisition 192 ch	1
DPI-L	DLP Probe Interface	1
GBP	Back Plane	1

Figure 5-4 Details of Card Rack



5-6-2 Card rack circuit boards overview and location (cont'd)

Card rack location in the LOGIQ Fortis

The card rack can be accessible by Rear side of the system.

Figure 5-5 Card Rack Location



5-6-3 Relay board (DPI-L)

The main task of the relay board is to route the transducer channels between the active probe and the Transmitter or Receiver modules that are active. Relays are used in order to switch the connections between the active probe connectors.

The module contain four probe connectors:

- All connectors have a metal door enclosure that opens only when inserting the probe. The enclosure protects the pins that connect to the probe flat contact pads. This connector type is identified as DLP. Probes compatible with this style of connector are identified as “-D”
- All connectors support probes with 192 channels (one connector is designed to support probes up to 256 channels).

Location in the LOGIQ Fortis

For DPI-L board location, see [5-6-2 "Card rack circuit boards overview and location" on page 5-22](#).

5-6-3 Relay board (DPI-L) (cont'd)

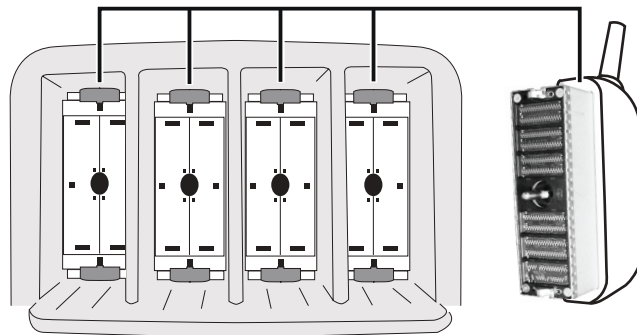
Figure 5-6 Relay Board



There are four probe connectors mounted on the solder side of the board.

The LOGIQ Fortis Ultrasound systems have one type of probe port that connects directly to the relay board: four DLP probe ports.

Figure 5-7 Probe Connectors, Four DLP Probe Ports



LOGIQ Fortis has Probe port illumination to indicate the Probe port location in the Dark Room.

Brightness of illumination can be controlled on the Touch Panel and in Utility page.

Fiber cable is used as lighting, and LED power is provided by DPI-L though connector.



5-6-3 Relay board (DPI-L) (cont'd)

Pencil probes (P2D and P6D probes) can be connected to DPI-L board by applying Pencil CW installation kit Hardware onto DPI-L board.

LOGIQ Fortis is using different connection, but Necessary TX/RX signals are automatically switched/connected to applicable signal lines.

Figure 5-8 Pencil Probe Connector



5-6-4 Data Acquisition Board (DA192)

DA192 Board has two main tasks. One is to provide the transmitter channel hardware and function for the beamformer system. Another is to receive the Weak ultrasound echoes and process 192 channels concurrently. DA192 board has HV Power bank that generates HV +/- Power for Transmit, and MUX-HV +/- for MUX-inside Probes.

Figure 5-9 Data Acquisition Board (DA192) Block Diagram

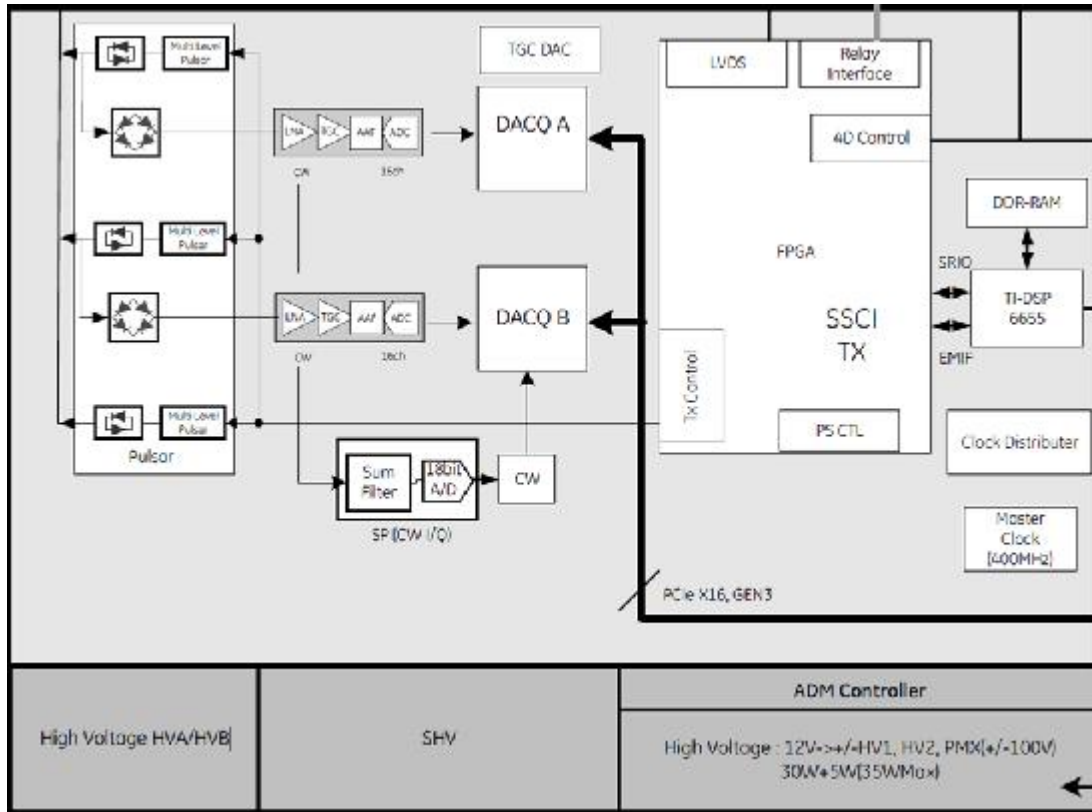


Figure 5-10 Data Acquisition Board (DA192)

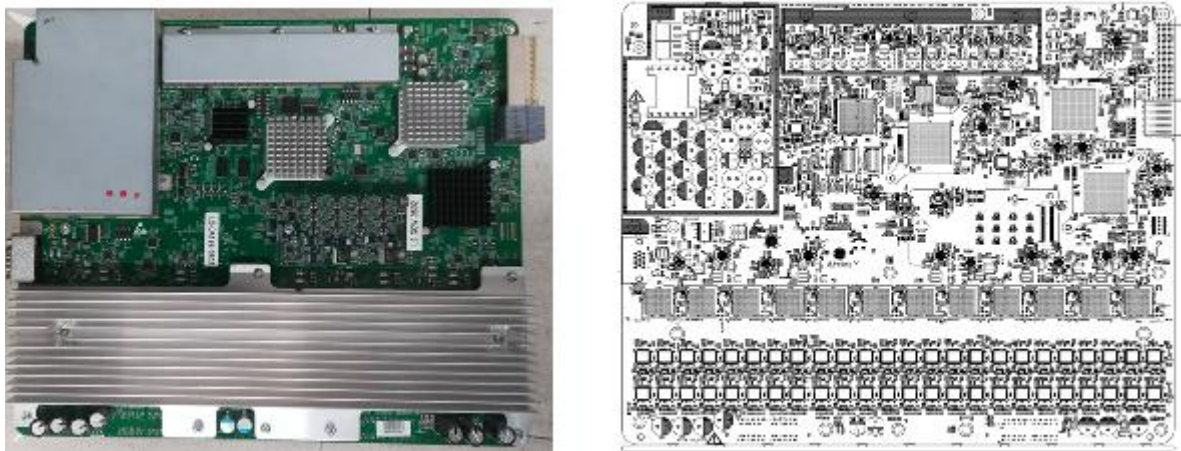
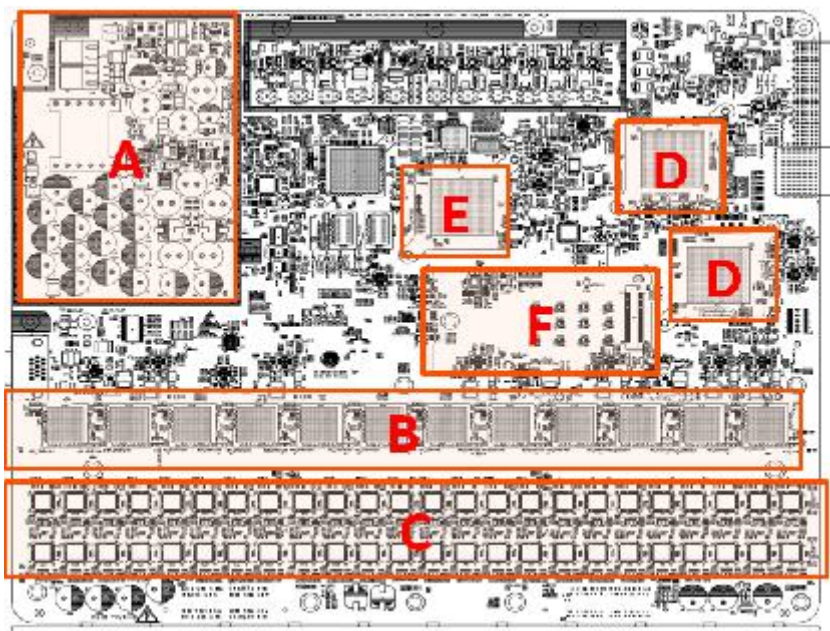


Figure 5-11 Parts Location on Data Acquisition Board (DA192)



A.	HV Power Circuit
B.	Analog Front End IC
D.	Transmit IC
D.	Data acquisition (DACQ) FPGA
E.	SSCI FPGA
F.	CW Doppler Option Board (GCW)

Location in the LOGIQ Fortis

For DA192 board location, see [5-6-2 "Card rack circuit boards overview and location" on page 5-22.](#)

Section 5-7

Back End Description

5-7-1 Purpose of this section

The intention with this section is to give you a brief overview of the back end configuration used on the LOGIQ Fortis.

Contents in this section

5-7-1	Purpose of this section	5-30
5-7-2	BEPS	5-31

5-7-2 BEPS

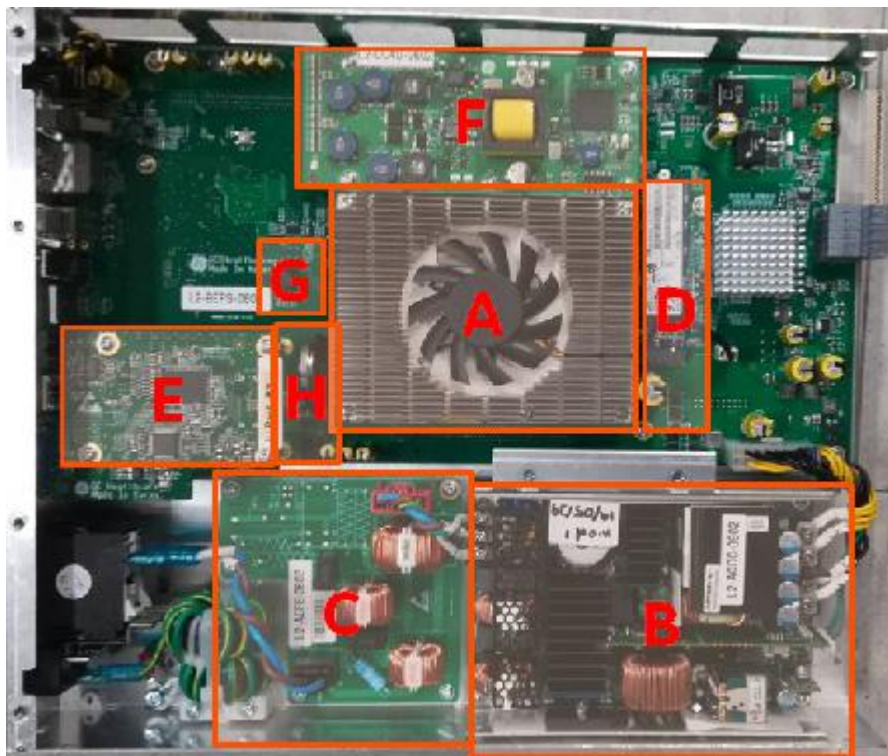
The BEPS (Back End and Power Supply) module has two main tasks.

One is single board computer built from a COM express module fitted into customized rack. Its main function is to be the central processing unit of the Ultrasound system, controlling all the functionality, user interface and connectivity of the scanner. Another is the Main Power Supply unit with semi-customized ACDC converter unit.

BackPlane connectors give the Power to DA192/DPI-L boards, and PCI-e signals for image-processing.

The BEPS also host a single slot GPU card, a M.2 Solid State Drive (SSD).

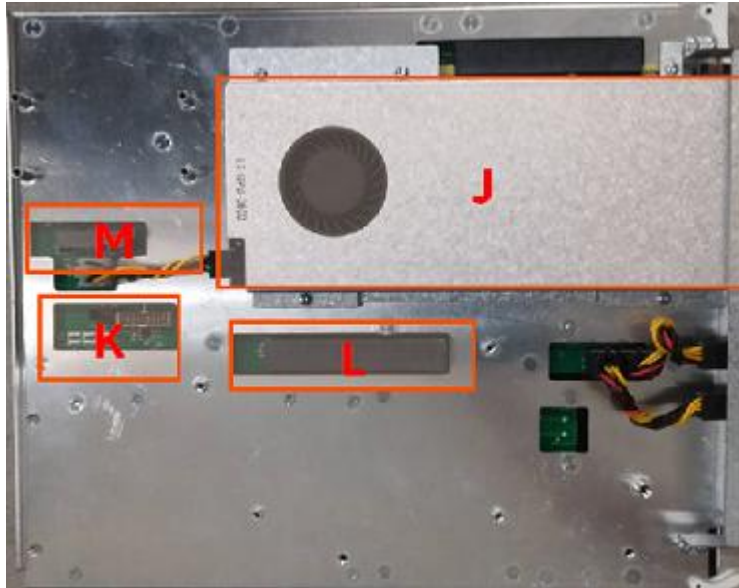
Figure 5-12 Location of each module



A	CPU module
B	ACDC Converter module (Shield cover bracket is applied, module size/design may be different)
C	ACFE (Filter) board
D	M.2 SSD Hard Drive
E	VCS (S-Video) board - option
F	DC4D (4D motor control) board - Option
G	Removable EEPROM to store Console S/N and Option keys
H	Lithium Coin Battery

5-7-2 BEPS (cont'd)

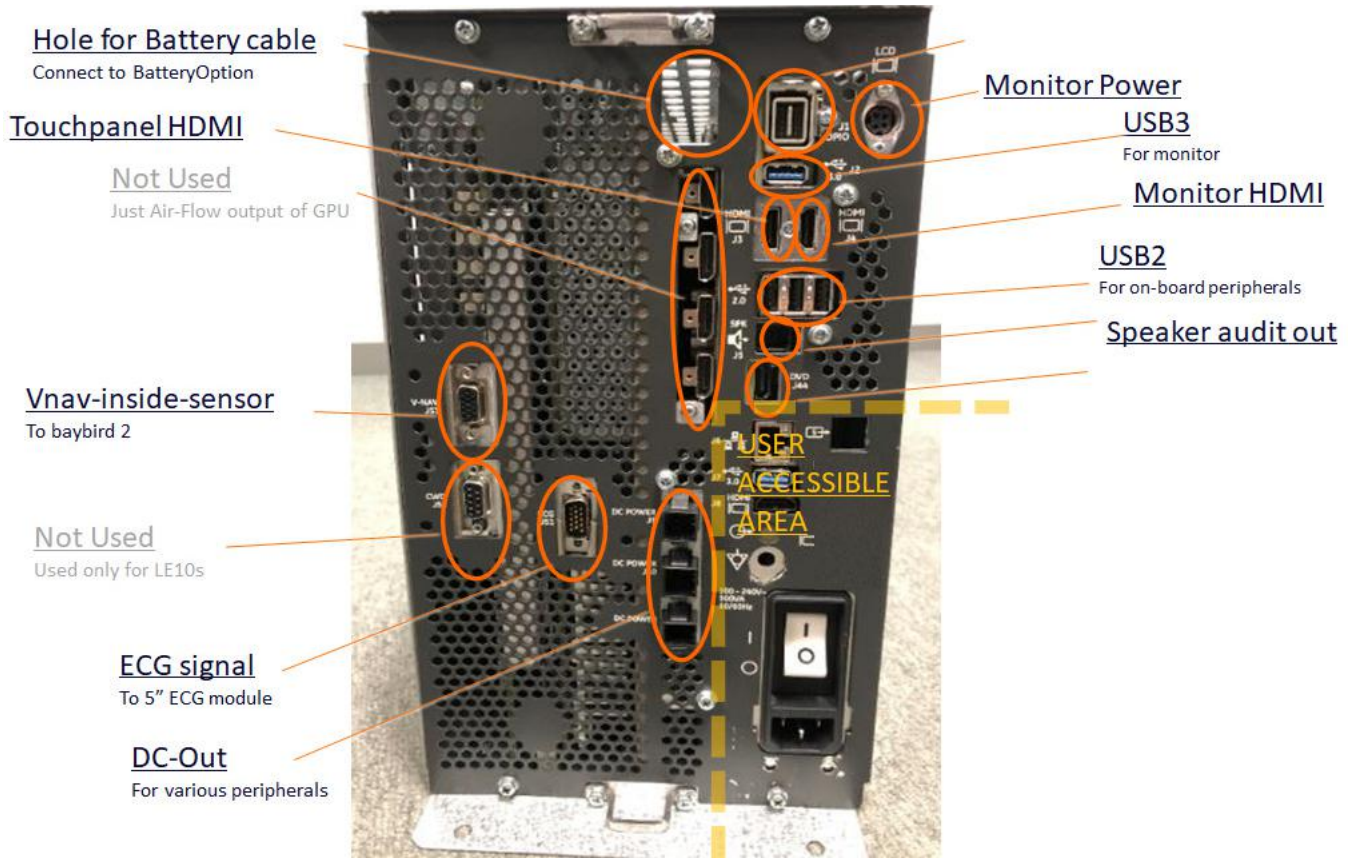
Figure 5-13 Location of each module (Back side)



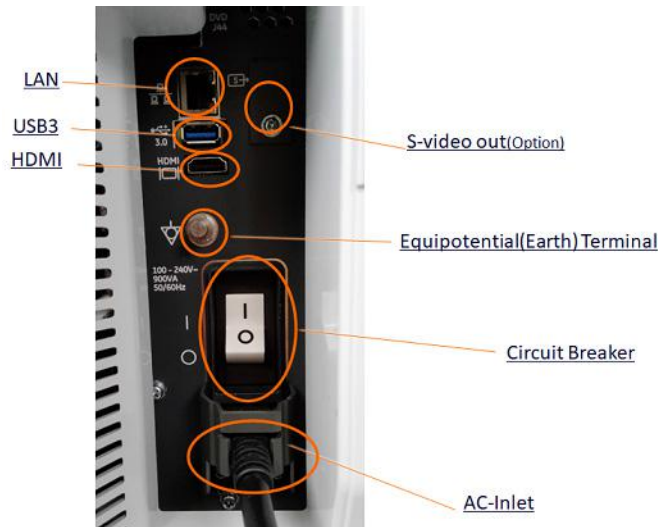
J	GPU module
K	Connector for Battery Option
L	Not used
M	Not used

5-7-2 BEPS (cont'd)

Figure 5-14 Connector description



User accessible area



NOTE: Internal Breaker must ON always (ON means, always "I" should be activated, as graphic above).

**Section 5-8
Backplane Description**

5-8-1 Purpose of this section

The intention with this section is to give you a brief overview of the backplane used on the LOGIQ Fortis.

Contents in this section

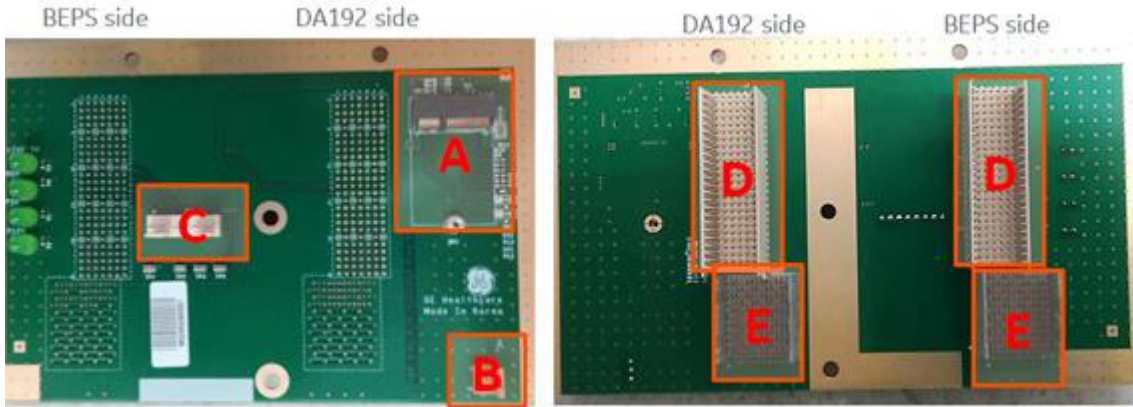
5-8-1	Purpose of this section	5-34
5-8-2	Backplane (GBP)	5-35

5-8-2 Backplane (GBP)

The LOGIQ Fortis backplane (GBP) is part of an Ultrasound system, main purpose is to connect BEPS board and DA192 board, capable of processing 192 ultrasound channels concurrently. It also has connector for Main FAN power, Front-LED, and Wireless LAN module.

GBP does not have ROM for VPD.

Figure 5-15 Backplane



A	Wireless LAN Option
B	Connector for Main-FAN
C	Connector for Front LED
D	Backplane connector for normal signals
E	Backplane connector for High speed (PCIe Gen3 signals)

Section 5-9 Top Console Description

5-9-1 Purpose of this section

The purpose of this section is to give you an overview of the top console and to tell you how it functions.

Contents in this section


5-9-1	Purpose of this section	5-36
5-9-2	Transporting the LOGIQ Fortis	5-36
5-9-3	Operator panel movement - principle of operation	5-37
5-9-4	Top console description.	5-38
5-9-5	Top console block diagram	5-39
5-9-6	Main monitor	5-40
5-9-7	Operator panel	5-42
5-9-8	Op panel Interface.	5-43

5-9-2 Transporting the LOGIQ Fortis

Refer to the appropriate version of the LOGIQ Fortis Basic User Manual, or the appropriate LOGIQ Fortis Release Notes.

5-9-3 Operator panel movement - principle of operation

 **CAUTION** To avoid injury or damage, make sure nothing is within the range of motion before moving the operator panel. This includes both objects and people.

 **NOTICE** Do NOT attempt to apply excessive rotating force to the operator panel. The elevation brake is designed to hold the operator panel in desired position during normal use, and not meant to completely fix the operator panel position.

Push right side button to raise/lower the operator panel.

- 1.) Hold the front handle in two hands.
- 2.) Push and hold down the Up/Down button next to the right front handle.
- 3.) Raise or lower the control panel.
- 4.) Release the Up/Down button at the desired height.



Push left side button to swivel the operator pane

- 1.) Hold the front handle in two hands.
- 2.) Push and hold down the swivel button next to the left front handle.
- 3.) Move the control panel to the left or the right.
- 4.) Release the swivel button at the desired position.



5-9-4 **Top console description**

The top console includes the following:

- Main monitor
- Operator panel with:
 - An On/Off switch.
 - A touch panel screen and a control panel with controls for manipulating the picture quality and for use in Measure & Analyze (M&A).
 - Gel warmer
 - A trackball.
 - Top console adjustment controls; controls and a lock to move the top console left/right, and up/down.
- Sound output (used during Doppler scanning/replay) not visible externally.

The top console is located on the top of the LOGIQ Fortis.

5-9-5 Top console block diagram

Figure 5-16 Top Console Block Diagram

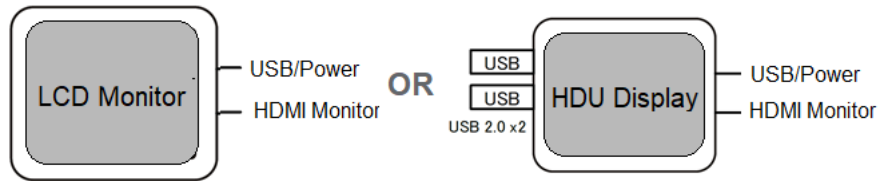


Figure 5-17 Lower OPIO Block Diagram

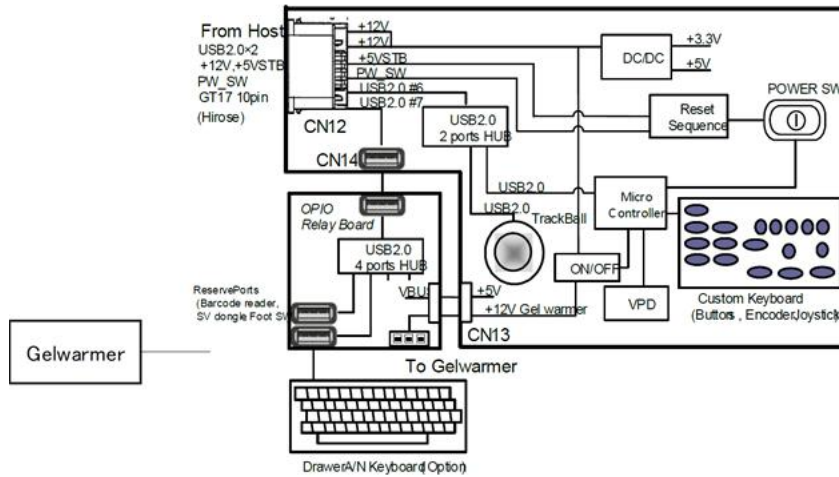
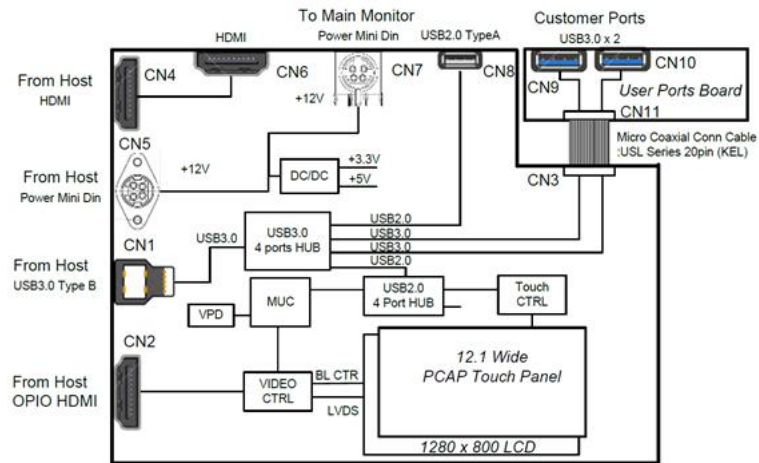


Figure 5-18 Upper OPIO Block Diagram



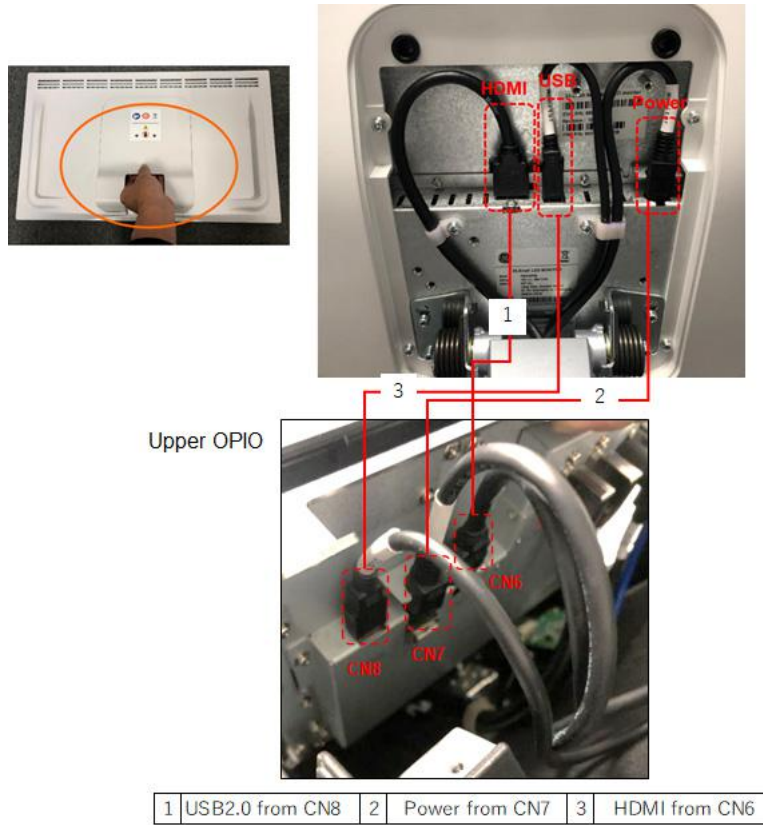
5-9-6 Main monitor

LOGIQ Fortis supports Two monitors, LCD Monitor and HDU Display.

5-9-6-1 LCD Monitor

23.8" Wide screen high-resolution LCD Display

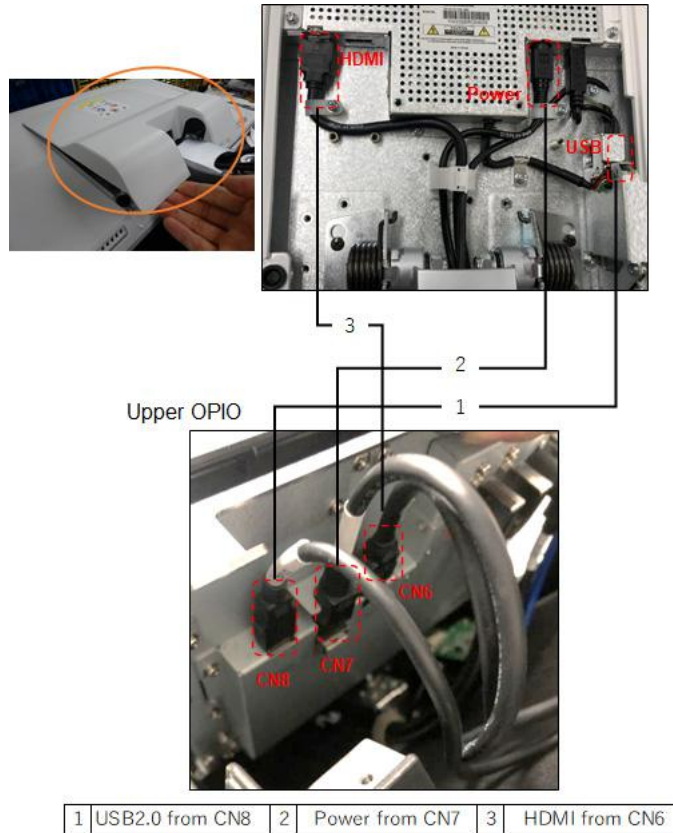
Figure 5-19 LCD Monitor Connections



5-9-6-2 High Definition Ultrasound (HDU)

A 23.8-inch wide screen, high definition Ultrasound Dual Layer LED-LCD (Liquid Crystal Display) with localized dimming and non-interlace scan is used as the main monitor.

Figure 5-20 HDU Display Connections



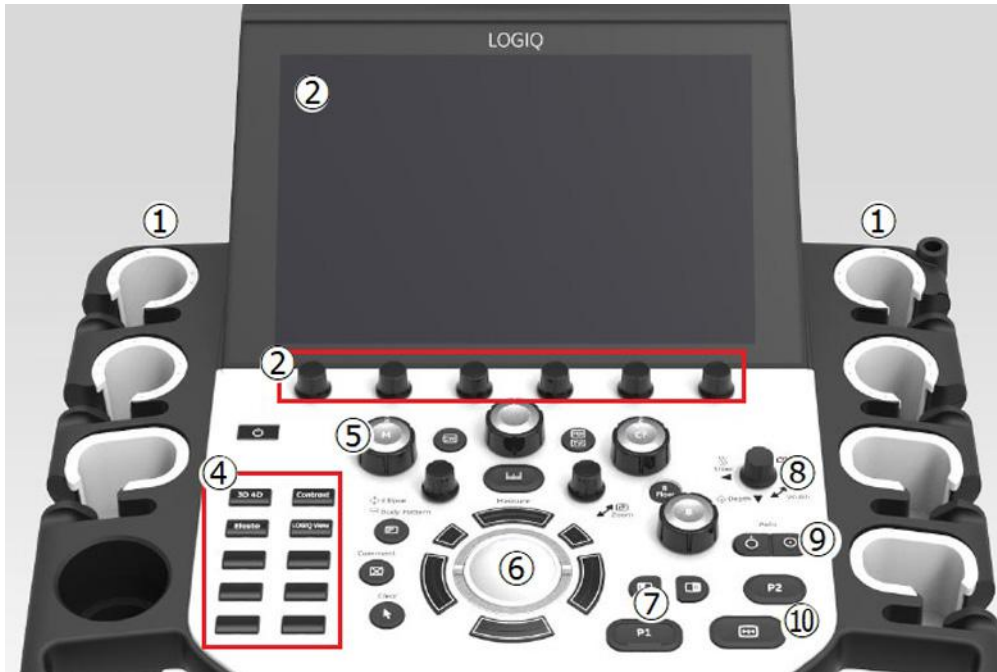
5-9-7 Operator panel

The operator panel includes an On/Off switch, different controls for manipulating the picture quality, and controls for use in Measure & Analyze (M&A), top console adjustment controls.

An alphanumeric keyboard is Hardware Option, and can be assembled to bottom side of the operator panel.

Upper Operator panel is 12.1" High-resolution, color, touch, display screen.

Figure 5-21 Operator Panel



- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Probe Holder and Cord Management 2. Touch Panel and Joystick controls 3. On Screen Keyboard (not display in this graphic) 4. User Defined Keys 5. Mode/Gain/XYZ (3D) Controls | <ul style="list-style-type: none"> 6. Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Zoom, Programmable Keys 7. L/R, Start/Stop, Freeze, Simultaneous 8. Steer/Width/Depth/Reverse 9. Auto, CF/PW Auto Positioning 10. P1, P2 |
|--|--|

5-9-8 Op panel Interface

Figure 5-22 Upper Op Panel/Touch Panel Assembly Connections



	To
CN1	BEPS USB3
CN2	From BEPS to Upper OPIO (for touch panel)
CN3	Upper Tray USB3 ports (EUSB2)
CN4	From BEPS to Upper OPIO HDMI (for main monitor)
CN5	From BEPS to Upper OPIO Power
CN6	From Upper OPIO To Monitor HDMI
CN7	Monitor Power
CN8	Monitor USB2

Section 5-10 Power Distribution Description

5-10-1 Purpose of this section

The power distribution within the LOGIQ Fortis is described in this section.

Contents in this section

5-10-1	Purpose of this section	5-44
5-10-2	Power Supply Distribution	5-45
5-10-3	Power on sequence	5-47

5-10-2 Power Supply Distribution

The main power module is located in the BEPS assy, and main task is to isolate the scanner from the on-site mains power system and to supply the various internal subsystems with DC power.

Power from the wall outlet (100 to 240 VAC, 50/60 Hz) is connected to the main power supply. The main power supply (ACDC module) provides main P12V Live (Stand-by) 5V.

LOGIQ Fortis does not have Motors for Operator panel motion. Thus, LOGIQ Fortis does not have 48Vdc lane.

Each DCDC converter (located on DPI-L, DA192, BEPS) generates the needed voltages to the rest of the LOGIQ Fortis:

- Printer (12 Vdc)
- Main Monitor(12Vdc)
- Lower/Upper OPIO, Gelwarmer(12Vdc)
- HV (variable DC High voltage, +/-10V ~ +/-100V), THV(+/- 97V), on DA192
- P5V, M5V on BEPS

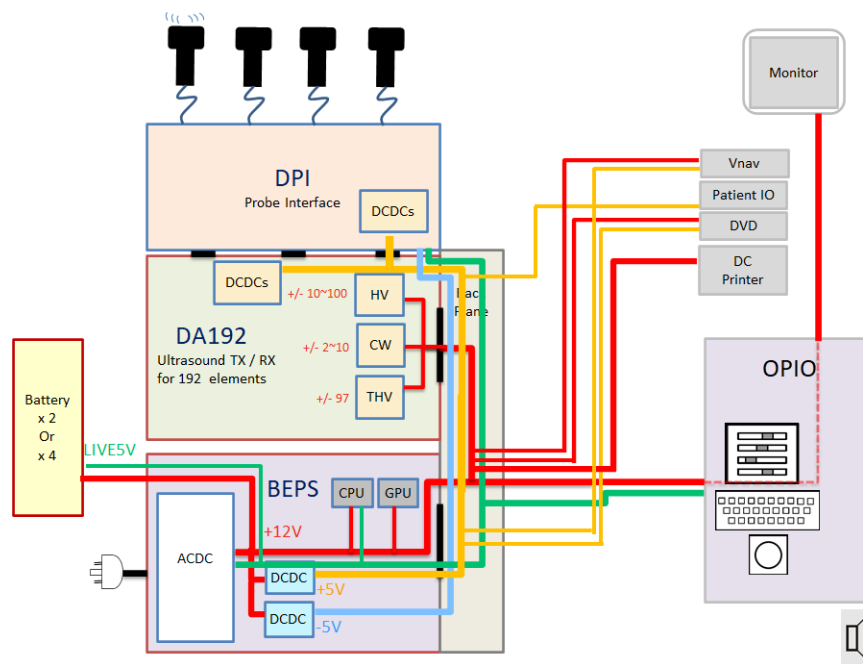


Figure 5-23 Power Distribution Diagram

The mains cord has plugs in both ends. A female plug connects to the scanner and a male plug to the wall outlet.

User cannot detach the mains cord by regulation (fixed by Bracket).

Fuses are located inside the ACDC module (cannot be replaced).

5-10-2 Power Supply Distribution (cont'd)

LOGIQ Fortis has a Circuit Breaker, located on Rear bottom side.

Figure 5-24 Circuit Breaker



The main power module is located in the BEPS assy, and main task is to isolate the scanner from the on-site mains power system and to supply the various internal subsystems with DC power.

LOGIQ Fortis Power module does not have dedicated FAN. Necessary Air-Flow is provided by Main-FAN.

A current limiter will switch off the power if any of the outputs overload.

Under-voltage and over-voltage protection is provided for all of the output voltages.

The power supply will be turned off if the temperature goes too high.



Figure 5-25 Cooling Air Flow of Power Supply

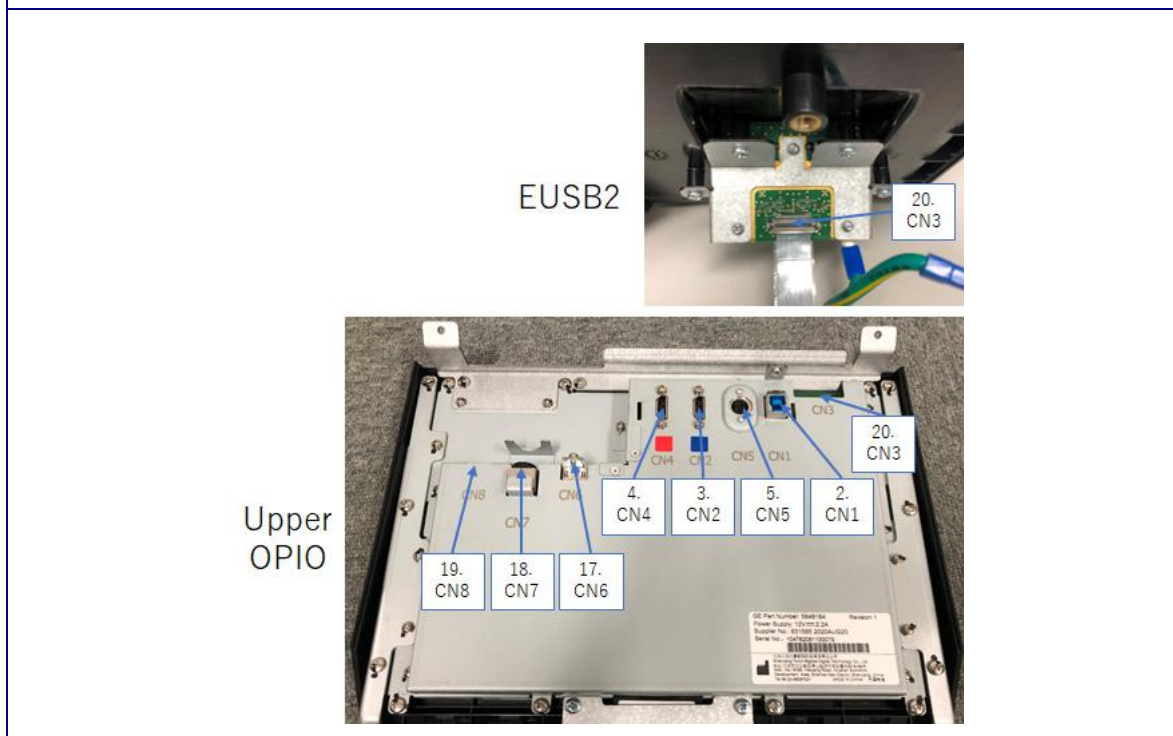
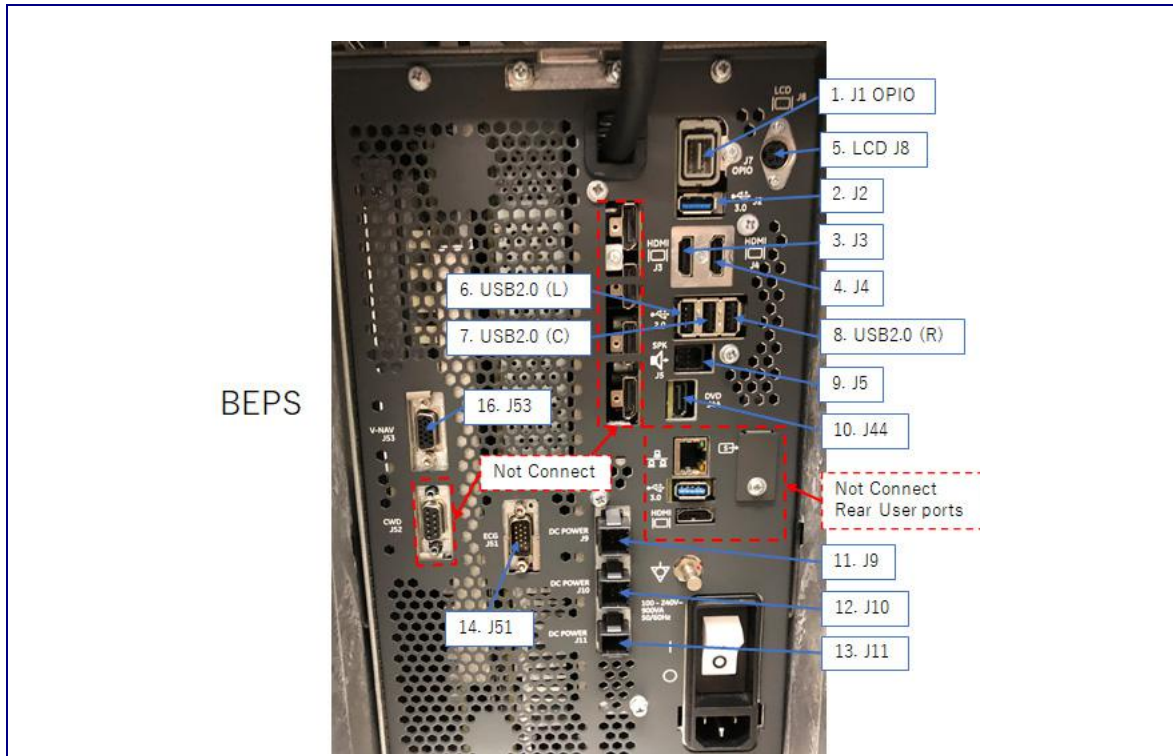
5-10-3 Power on sequence

- 1.) BEPS, powered by LIVE5V(stand by 5V), PIC-micon (to manage Power Sequence, on BEPS) starts working.
=>If Battery Option is installed (and Capacity is not Full), battery-charging starts with operating Main-Fan.
- 2.) BEPS sends PSON signal to ACDC-module when Power button is pushed.
- 3.) ACDC-module powers up +12V, and provides Power Good signal.
- 4.) DCDC circuit on BEPS module powers up, +5V, -5V
THV circuit on DA192 powers up, +/- 97V
- 5.) HV circuit on DA192 powers up after booting up Echoloader application, +/-10~100V variable.

Section 5-11 Cable Connection BEPS - OP

Almost internal Cables are outputted from BEPS, and connected to each board/modules through ICM board.

#	From		To		Description
1	BEPS	J1 OPIO	Lower OPIO	CN1	USB2.0 x2_PWR_PW-On, Lower OPIO
2	BEPS	J2	Upper OPIO	CN1	USB3.0, Upper OPIO
3	BEPS	J3	Upper OPIO	CN2	HDMI Touch panel LCD, Upper OPIO
4	BEPS	J4	Upper OPIO	CN4	HDMI Main Monitor, Upper OPIO
5	BEPS	LCD J8	Upper OPIO	CN5	PWR, Upper OPIO and Main LCD
6	BEPS	USB2.0 (L)	BW Printer	NA	USB2.0, Option DC BW PRINTER
7	BEPS	USB2.0 (C)	V-Nav	NA	USB2.0, Option V-Nav
8	BEPS	USB2.0 (R)	NA	NA	NA
9	BEPS	J5	Speaker	NA	Audio, Speaker
10	BEPS	J44	DVD	NA	SATA, DVD
11	BEPS	J9	DVD	NA	PWR, DVD
12	BEPS	J10	V-Nav	NA	PWR, Option V-Nav
13	BEPS	J11	BW Printer	NA	PWR, Option DC BW PRINTER
14	BEPS	J51	VSIO (ECG)	NA	Option VSIO (ECG)
15	BEPS	J52	NA	NA	Not Use
16	BEPS	J53	V-Nav	NA	Signals, Option V-Nav
17	Upper OPIO	CN6	Main Monitor	NA	HDMI, Main Monitor
18	Upper OPIO	CN7	Main Monitor	NA	PWR, Main Monitor
19	Upper OPIO	CN8	Main Monitor	NA	USB2.0, Main Monitor
20	Upper OPIO	J51CN3	EUSB2	CN3	USB3.0 x2, EUSB2 User ports
21	Lower OPIO	J1	EXT USB BOARD	J3	USB2.0, EXT HUB BOARD
22	Lower OPIO	J2	EXT USB BOARD	J7	PWR, EXT HUB BOARD
23	EXT USB BOARD	J1	Gel warmer	NA	PWR, Gel warmer
24	EXT USB BOARD	J5	AN Keyboard	NA	USB2.0, Option AN Keyboard
25	EXT USB BOARD	J8	AN Keyboard	NA	LED, Option AN Keyboard
26	GBP	U1	CSI2	NA	LED indicator cable



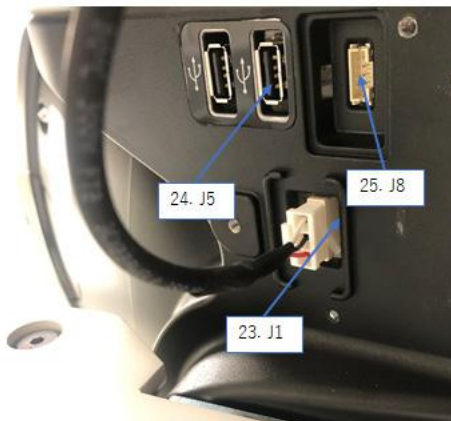
Lower OPIO



EXT HUB BOARD (Top)



EXT HUB BOARD (Bottom)



GBP
(Backplane)



Section 5-12 Air Flow Distribution

5-12-1 Air Flow Distribution

Through the filter grid on the front of the system, air flow into the LOGIQ Fortis.

By means of the 1 FAN, air is blown through the nest-box, and the warm air exits the system through holes in the left side panel and rear of the system.

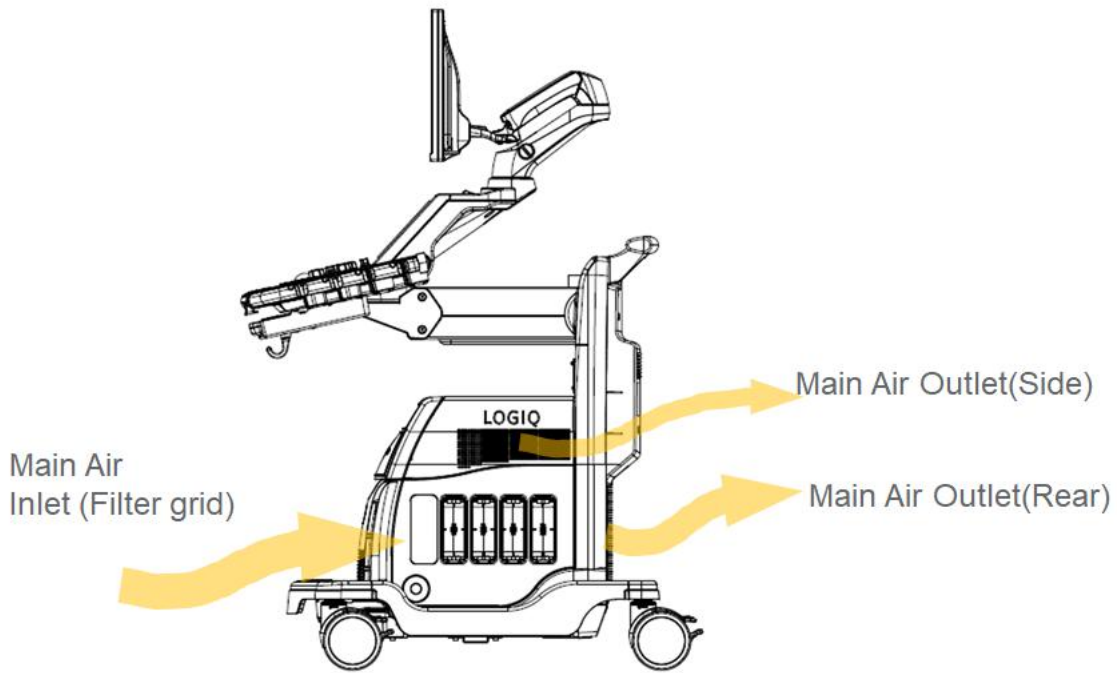


Figure 5-26 Air Inlet/Outlet

Section 5-13 Casters and Brakes Description

Examine the wheels frequently for any obvious defects that could cause them to break or bind.

Each wheel has an independent brake pedal. A left rear wheel also has a swivel lock.

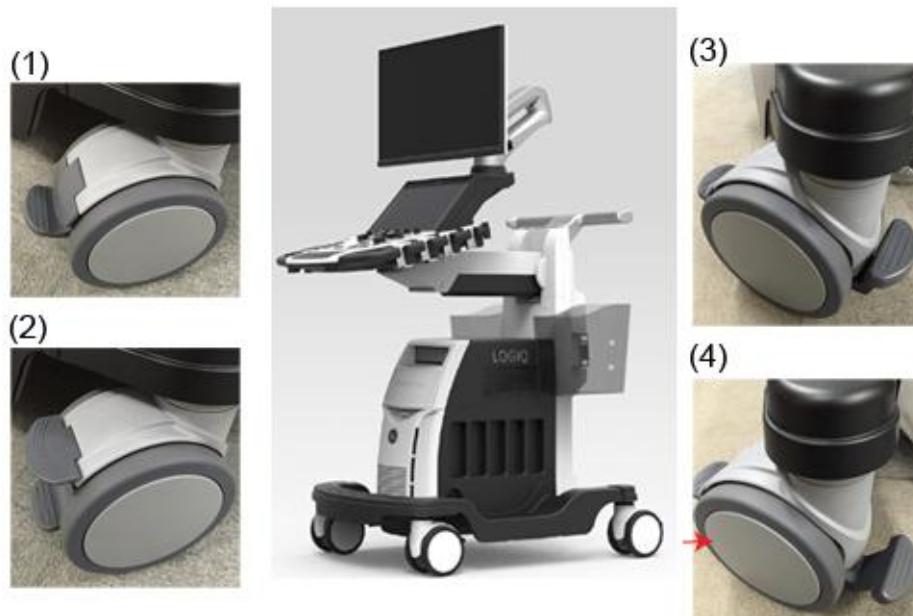


Figure 5-27 Wheel lock and Swivel lock

Section 5-14 Options and Peripherals Description

5-14-1 Purpose of this section

The options and peripherals within the LOGIQ Fortis is described in this section.

Contents in this section

5-14-1	Purpose of this section	5-54
5-14-2	Internal hardware options and peripherals	5-54
5-14-3	External peripherals	5-55
5-14-4	Real Time 4D option	5-56
5-14-5	CW Doppler (Continuous Wave Doppler) option	5-56
5-14-6	Pencil CW option.	5-56
5-14-7	S-Video (VCS) option	5-56
5-14-8	Patient I/O (ECG) option	5-57
5-14-9	Power Assistant Option.	5-58
5-14-10	Volume Navigation option	5-60
5-14-11	Wireless LAN option	5-61

5-14-2 Internal hardware options and peripherals

(See 3-6-3 "*Optional peripherals/peripheral connection*" on page 3-36)

This list covers the internal peripherals available for the LOGIQ Fortis. All of these internal peripherals should be connected already when the LOGIQ Fortis is delivered.

- Realtime 4D Option (DC4D)
- CW Doppler Option (GCW)
- Pencil CW Option
- S-Video (VCS) Option
- Patient I/O (ECG) Option
- Power Assistant Option
- Scan on Battery Option
- Volume Navigation (V Nav) Option
- Wireless Option
- DVD Drive option
- Printer (Digital Graphic) Option

5-14-3 External peripherals

This list covers the external peripherals available for the LOGIQ Fortis. The external printers are network DICOM devices. The inkjet printer is USB connected.

- OPTION TRAY
- Physical AN KEYBOARD
- Probe Holders
- Ethernet Protection cable
- Inkjet Printer
- Powervar144k120v MG UPS
- SONY UPD25MD COLOR PRINTR
- USB Footswitch 3 Button
- Barcode Reader / Card Reader
- Digital Expert tools
- Rolling Volume Navigation Stand
- Customer - supplied USB Flash Drive/Hard Drive

5-14-4 Real Time 4D option

The Real Time 4D option is located on the BEPS assy of the LOGIQ Fortis and necessary Motor control signals are delivered to DPI-L board and 4D Probes through an BackPlane connector.

See [8-8-6 "BEPS Assy Replacement" on page 8-144](#) for location of each modules on BEPS.

5-14-5 CW Doppler (Continuous Wave Doppler) option

The CW Doppler option is to enable the CW scanning mode on the LOGIQ Fortis. CW Doppler option board (GCW) is located on the DA192 assy of the LOGIQ Fortis.

5-14-6 Pencil CW option

The Pencil CW option is intended to support the connection of CW pencil probes. To enable Pencil CW option, CW Doppler option board (GCW) is also need to be installed.

See [8-10-6 "GCW \(CW Doppler\) Replacement" on page 8-224](#) for location.

5-14-7 S-Video (VCS) option

The S-video (VCS) Option is located on the BEPS assy of the LOGIQ Fortis.

S-Video output signal is generated on the VCS board, and provided to Rear S-Video port.

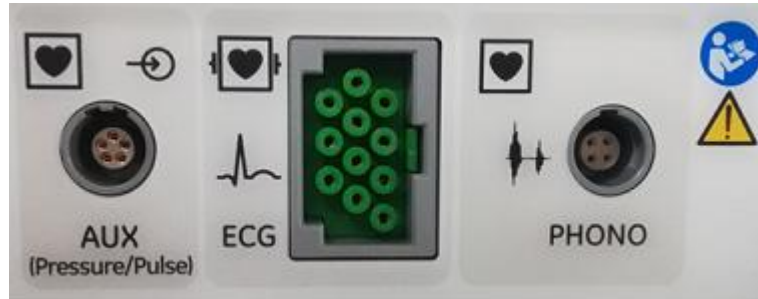
See [5-7-2 "BEPS" on page 5-31](#) for location of each modules on BEPS.

5-14-8 Patient I/O (ECG) option

NOTE: *The ECG functionality of the Patient I/O module is not intended for patient monitoring nor to support alarm functionality. This input is intended as a tool for easier synchronization of images and cine loop control during ultrasound examinations.*

The ECG (Patient I/O) panel is located on the front of LOGIQ Fortis

Figure 5-28 ECG (Patient I/O) Panel



The ECG (Patient I/O) contains the electronics for:

- 1.) Analog inputs - AUX (Pressure/Pulse)
- 2.) ECG
- 3.) Phono

The three inputs are separately isolated due to safety requirements.

The patient leads for ECG can be possible to change between Lead I, II and III by pushing a button).

The scanned image that is displayed, is synchronized with the ECG and phono traces. In M-Mode or Doppler, the traces are synchronized to that particular mode's sweep. The operator can control the gain, the position and the sweep rate of the traces using the assignable controls.

AUX is capable of handling a pulse/pressure signal.

5-14-9 Power Assistant Option

LOGIQ Fortis has two kinds of Battery Options, Power Assistant (PA) Option and (ScoB) Option.

No Activation Code (Option String) is required for both Options.

The LOGIQ Fortis will identify the option if it is installed.

Power Assistant Option allows the user to move the LOGIQ Fortis from room to room (at least 20 minutes with Brand-new Battery Packs) without completely shutting down the console. Where the typical boot up time is <100 seconds, typical Power Assistant boot up time is <10 seconds.

Power Assistant Option includes two Li-ion Battery packs.

Scan on Battery Option allows the user to keep scanning without Wall-outlet-Power (at least 50 minutes as B-mode, with Brand-new Battery Packs).

Also on the Scan-on-Battery Option, User can choose the Power Saving mode. This can save Power-consumption by freezing Scanning.

Scan on Battery Option includes four Li-ion Battery packs.

Both Options are using same Charger-board (BBG2) and Metal-Box.

Only internal Battery Qty is different (2pcs or 4pcs).

Battery Box is located to the Upper Rear side of the System

Power Cable and Signal Cable are connected to BEPS board.

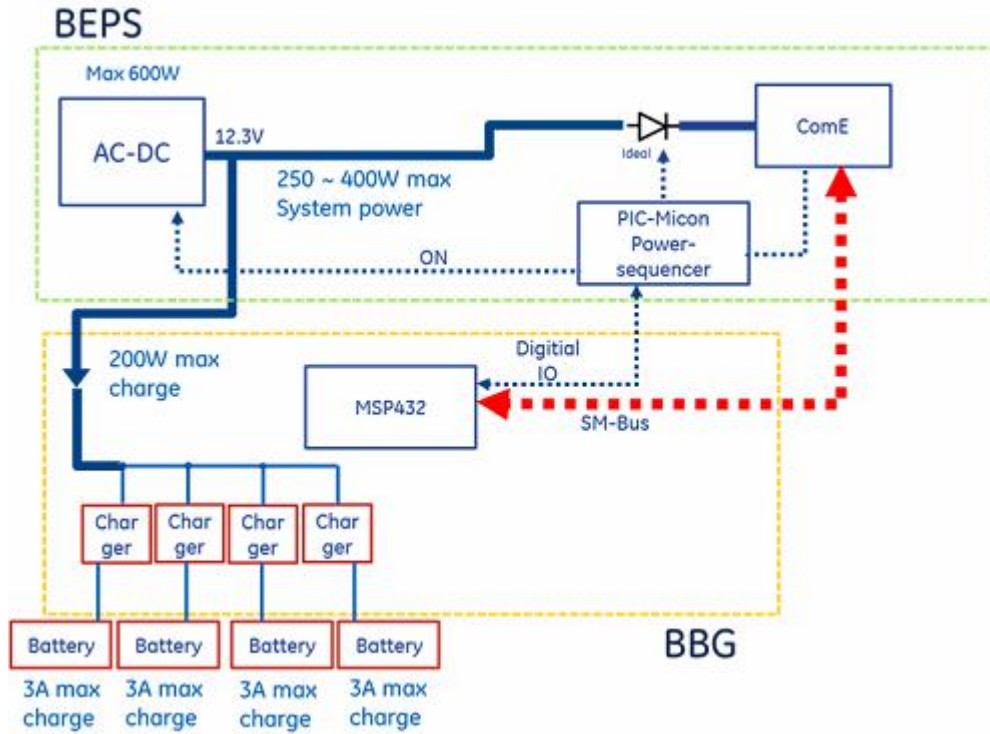


Figure 5-29 Battery location

5-14-9 Power Assistant Option (cont'd)

Battery Charger board (BBG2) is connected to BEPS board, and communicating with CPU-module (Host) via SM-bus signals.

Microcontroller on the BBG2 (MSP432) controls overall Charger operation and transfer the summarized Battery information to Host.

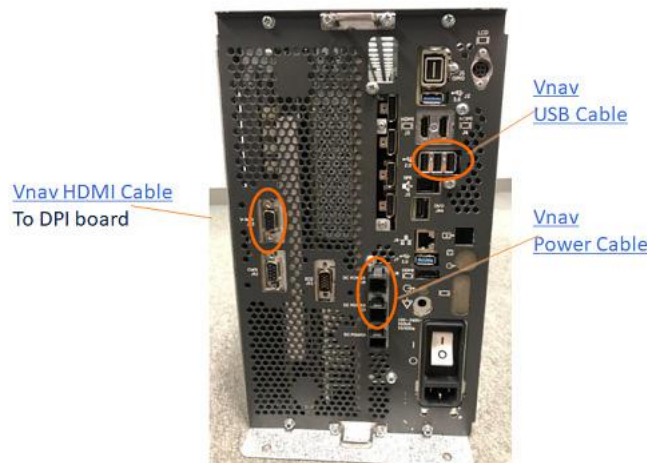


5-14-10 Volume Navigation option

The V Nav (Volume Navigation) option allows for the use of probes that have built-in V Nav sensors, avoiding having external cables and V Nav bracket use.

LOGIQ Fortis supports the Baybird2 module only. (Baybird1 is not supported)

Figure 5-30 V Nav Option HDMI Routing



NOTE: If the DriveBay power connector is a 5-pin type, use a V-Nav power conversion cable (V-Nav Unit accessories).



+



5-14-11 Wireless LAN option

The WLAN (Wireless LAN) option allows the LOGIQ Fortis to connect to a Local Area Network wireless network.

The WLAN is installed on the Backplane board (GBP) with the WLAN card mounting screw (A). Antennas are attached to the exterior of the GBP.

Refer to the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 13.

Figure 5-31 Wireless LAN Option



Section 5-15 Product Manuals

The information needed to use and service the LOGIQ Fortis scanner is collected in the documents described in this section.

NOTE: Dates on screenshots are represented in MM/DD/YYYY format throughout the manual. Information on how to change the LOGIQ Fortis's date can be found in Customizing Your System, Chapter 10 in the LOGIQ Fortis User Manual.

5-15-1 User documentation

- LOGIQ Fortis User Manual
- LOGIQ Fortis Advanced Reference Manual
- LOGIQ Fortis Release Notes
- LOGIQ Fortis eLabeling Kit (contains LOGIQ Fortis eDOCs Thumb Drive, which contains all User Manuals and translations, and the Basic Service Manual)

5-15-2 Basic Service documentation

- LOGIQ Fortis Basic Service Manual
- LOGIQ Fortis Unpacking/Packing Procedure

5-15-3 Service/Proprietary documentation

- LOGIQ Fortis Proprietary Service Manual
- LOGIQ Fortis Service Notes

Chapter 6

Service Adjustments

Section 6-1 Overview

6-1-1 Purpose of this chapter

This section describes how to adjust the LOGIQ Fortis.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

6-1-2 Contents in this chapter

6-1	Overview	6-1
6-2	Monitor Adjustments	6-2
6-3	Monitor Arm and/or Monitor Range of Motion Adjustment	6-10
6-4	DICOM Server Service Adjustments	6-13
6-5	Volume Navigation (V Nav) Calibration	6-13

Section 6-2 Monitor Adjustments

6-2-1 Purpose of this section

This section describes how to adjust the monitor for optimal performance.

Contents in this section

6-2-1	Purpose of this section	6-2
6-2-2	Access to monitor adjustments	6-3
6-2-3	Monitor adjustments	6-4
6-2-4	Advanced monitor adjustments	6-6

6-2-2 Access to monitor adjustments

All monitor settings have been optimized at the factory, so there should be no need for any further adjustments. The default settings on **Scan Screen** are:.

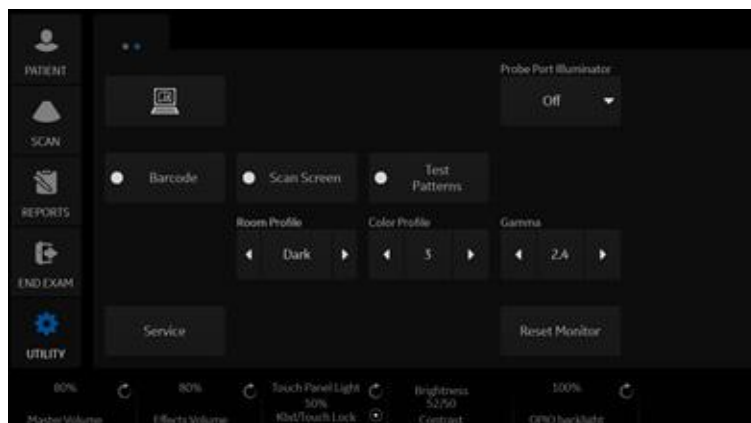
Table 6-1 Room Profile Table

HDU Display	LCD Monitor
Room Profile: Dark	Room Profile: Dark
Brightness/Contrast: 52/50	Brightness/Contrast: 50/85

For more information, see the appropriate version of the LOGIQ Fortis Basic User Manual Chapter 3, or the appropriate LOGIQ Fortis Release Notes. See [1-4-1 "Label Location" on page 1-14](#).

To access the Scan Screen, navigate to **Utility (second page) > Scan Screen**

Figure 6-1 Scan Screen



Use the encoder knobs to adjust the Scan Screen settings (shown on the Scan Screen directly above each encoder knob).

Figure 6-2 Operator Panel Encoder Knobs



6-2-3 Monitor adjustments

Room profile

To set the monitor to different room lighting conditions, you may want to manually adjust the room profile.

To set the room profile:

- 1.) Navigate to **Utility (second page) > Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.
- 2.) Under **Room Profile**, select the room type.

Table 6-2 Room Profile Table

Room Profile	Brightness/Contrast HDU	Brightness/Contrast LCD
Dark	52/50	50/85
Semi-Dark	60/70	70/85
Light	62/93	90/85
User Defined	User-adjustable Brightness/Contrast	User-adjustable Brightness/Contrast

Backlight

Under special lighting conditions, you may want to adjust the monitor screen's backlight intensity.

To set the OPIO backlight:

- 1.) Navigate to **Utility (second page) > Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.
- 2.) Under the operator panel, turn the encoder to adjust the OPIO backlight setting.

Brightness and contrast

Under special lighting conditions, you may want to manually adjust the brightness and contrast.

To manually set the brightness and contrast:

- 1.) Navigate to **Utility (second page) > Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.
- 2.) Under **Room Profile**, select **User Defined**.
- 3.) Under the operator panel, turn the encoder to adjust the brightness/contrast setting.

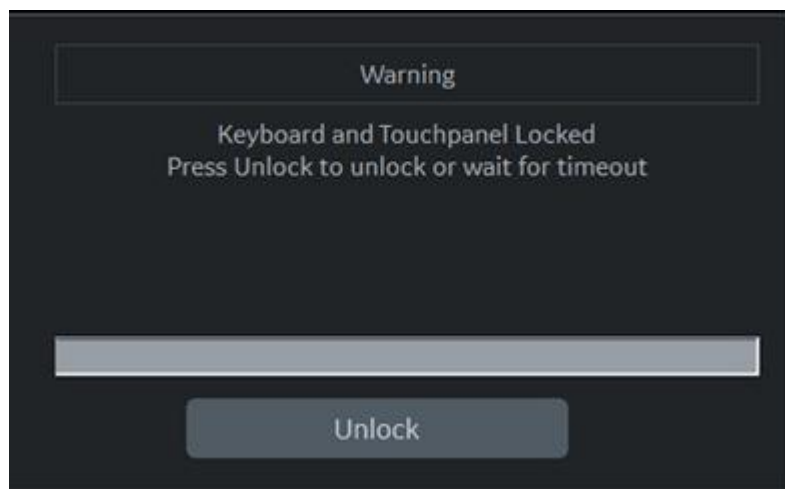
6-2-3 Monitor adjustments (cont'd)

Touch panel light

- 1.) Navigate to **Utility (second page) > Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.
- 2.) Touch panel encoder labeled as Touch Panel Light, rotate for brightness.
- 3.) Push the mode button once to display the popup and select **Unlock** or wait for the timeout.
- 4.) Adjust the Touch Panel between 10% to 100%.

For complete information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 3 or the appropriate LOGIQ Fortis Release Notes. See [1-4-1 "Label Location" on page 1-14](#).

Figure 6-3 Touch Panel Adjustment Button



6-2-4 Advanced monitor adjustments

Review Gamma Setting

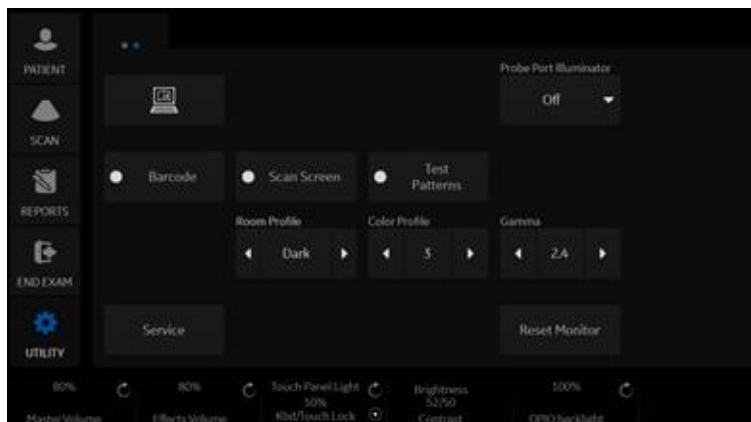
Gamma settings can be adjusted in two ways, with or without DICOM Gray Scale Standard Display Function (GSDF) enabled. GSDF-compliant with all contrast settings, but not all brightness settings.

Because of differences in display technology, the HDU Display or LCD Monitor is GSDF-compliant with all contrast settings, but not compliant with all brightness settings.

To enable the GSDF mode:

- 1.) Navigate to **Utilities > System > System Display**.
- 2.) Select **Enable DICOM grayscale display mode (GSDF)**.
- 3.) Set **Use Wide Screen for... > Single Image** to **Off**.
- 4.) Navigate to **Utility (second page) > Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.
- 5.) With GSDF enabled, the Gamma button on the touch panel affects the image, emulating the appearance of that gamma, but does not affect the monitor.

Figure 6-4 Check to Enable GSDF Mode



If a site's PACS workstations are calibrated to the GSDF, this setting may help to make the image appearance more uniform between the Ultrasound system and PACS.

- With GSDF disabled, the monitor still uses a gamma curve that may be selected on the Touch Panel (for backwards compatibility with sites that are happy with their PACS or may have a mix of older systems).
- With GSDF enabled, the gamma button on the touch panel affects the image, emulating the appearance of that gamma, but does not affect the monitor.

6-2-4 Advanced monitor adjustments (cont'd)

Test patterns

Test patterns are available to aid in evaluating the display visually and quantitatively.

For complete information, see the appropriate version of the LOGIQ Fortis Basic User Manual, Chapter 3. See [1-4-1 "Label Location" on page 1-14](#).

Table 6-3 Test Patterns


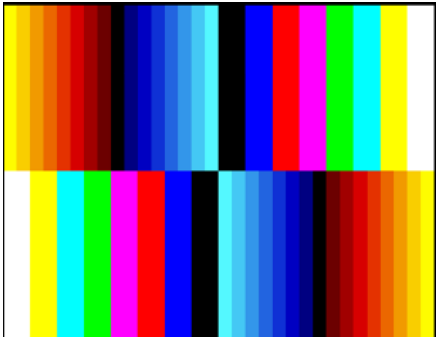
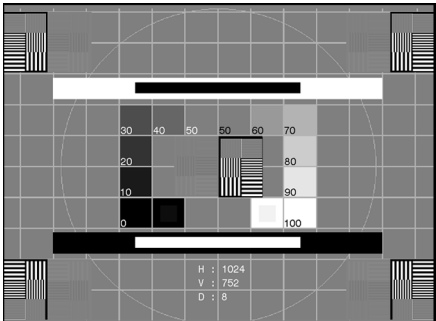
Test Pattern	Description	Corresponding Graphic
Gray Bars	Confirm that you can clearly see all of the different gradations of the grayscale in each gray cell.	
Color Bars	Confirm that you can clearly see all of the different colors in each colored cell.	
Resolution	Confirm that this image is clear and crisp, without jagged edges or lines.	

Table 6-3 Test Patterns (Continued)

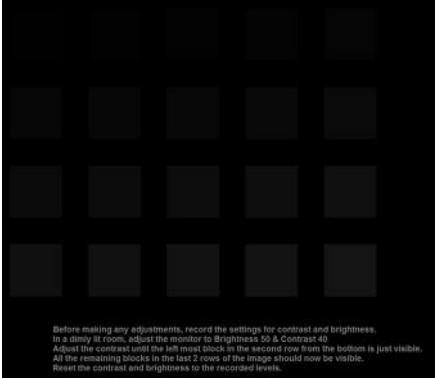
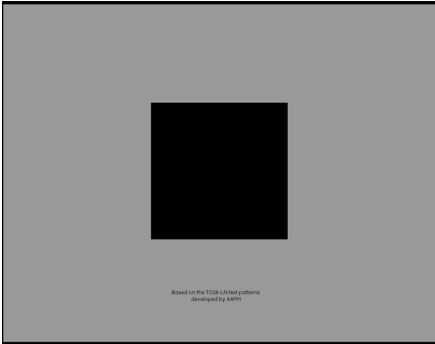
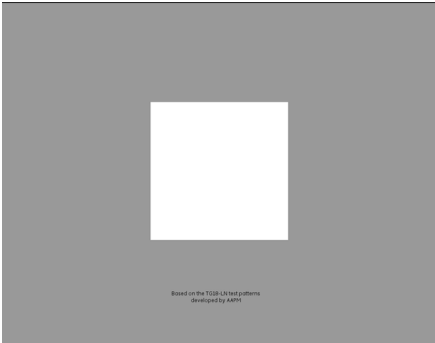
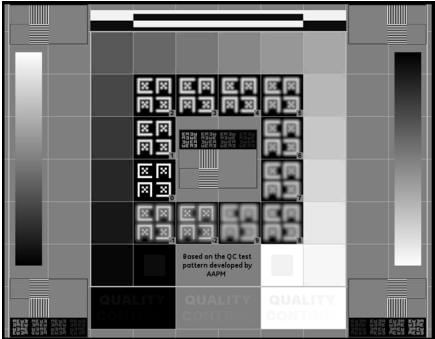
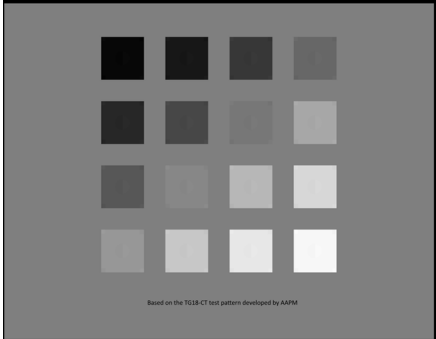
Test Pattern	Description	Corresponding Graphic
<p>Brightness Contrast</p>	<p>Before making any adjustments, record the settings for contrast and brightness. In a dimly lit room, adjust the monitor to Brightness 50 and Contrast 40. Increase the contrast until the left most block in the second row from the bottom is just visible. All the remaining blocks in the last 2 rows of the image should now be visible. Reset the contrast and brightness to the recorded levels.</p>	
<p>LN1 to LN18</p>	<p>Luminance for different grayscale levels. Usually, the facility's Biomed Engineer tests each gray level map on the monitor from LN-1 to LN-18 with a light meter and then graphs these on a scale to ensure that the curve falls within the GSDF's standard. This can be performed with all three LOGIQ Fortis monitors with GSDF enabled. Generally, this is performed yearly.</p>	<p style="text-align: center;">LN-1</p>  <p style="text-align: center;">LN-18</p> 
<p>QC</p>	<p>Quality Control. Confirm that this image is clear and crisp, without jagged edges or lines.</p>	

Table 6-3 Test Patterns (Continued)

Test Pattern	Description	Corresponding Graphic
CT Used for Luminance response	Contrast. Confirm that you can detect the circles within the square grayscale boxes.	

Section 6-3 Monitor Arm and/or Monitor Range of Motion Adjustment

6-3-1 Purpose of this section

This section describes how to adjust the monitor arm and/or monitor range of motion for optimal performance.

Contents in this section

6-3-1	Purpose of this section	6-10
6-3-2	Monitor and Ergotron arm	6-10
6-3-3	Cautions and warnings	6-10
6-3-4	Main monitor adjustments	6-11

6-3-2 Monitor and Ergotron arm

These procedures are available for monitor range of motion and monitor vertical adjustment:

- "Monitor arm vertical adjustment" on page 6-11
- "Monitor arm tilt adjustment" on page 6-12



6-3-3 Cautions and warnings

Be aware of pinch points at hinges when adjusting the monitor arm and monitor.

Table 6-4 Pinch Point Caution and Warning Icons



		
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6-3-4 Main monitor adjustments

Monitor arm vertical adjustment

If the monitor rises or falls when it is released, perform a vertical adjustment.

Table 6-5 Monitor Arm Vertical Adjustment


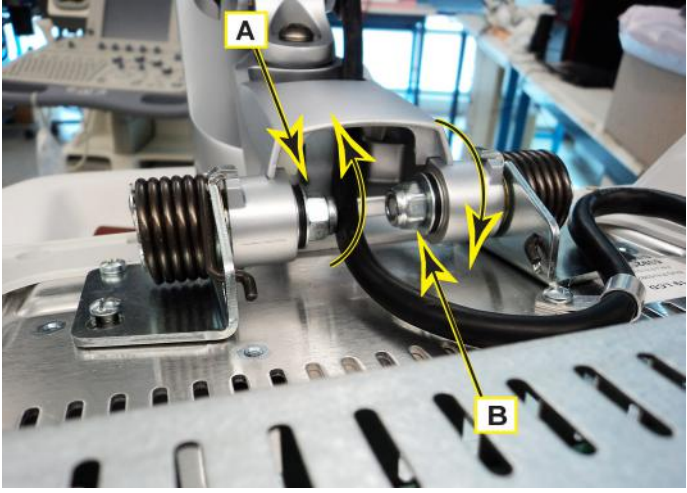
Step	Corresponding Graphic
<p>1.</p> <p>Tilt the monitor down to access the vertical adjustment screw.</p>	<p>Monitor Arm Vertical Adjustment Screw</p> 
<p>2.</p> <p>If the monitor was rising, turn the adjustment screw clockwise to increase the friction, using a 4 mm hex wrench.</p> <p>If the monitor was falling, turn the adjustment screw counterclockwise to decrease the friction.</p> <p>The monitor should stay in the position it is released at.</p> <p>NOTE: The heavier the monitor, the more friction will be required.</p>	

6-3-4 Main monitor adjustments (cont'd)

Monitor arm tilt adjustment

If the monitor is too loose or too tight when it is tilted, perform a tilt adjustment.

Table 6-6 Monitor Arm Tilt Adjustment

Step	Corresponding Graphic
<p>1.</p> <p>Tilt the monitor down and remove the monitor rear cover. If you have a thick wrench, it is easier to reach the nuts by using the boxed end of the wrench.</p>	
<p>2.</p> <p>If the monitor is too loose, turn the adjustment nut (A) towards the back and nut (B) towards the front to increase the friction, using a 13 mm wrench.</p> <p>Turn the nuts the opposite direction to decrease the friction. The monitor should stay in the position it is released at.</p> <p>NOTE: Be sure to tighten or loosen both sides equally. Start with 1/4 turn and test full 90 degree movement before tightening or loosening more.</p>	
<p>3.</p> <p>Reinstall the monitor rear cover.</p>	

Section 6-4 DICOM Server Service Adjustments

6-4-1 Slow response rate between the LOGIQ Fortis and a DICOM (PACS) server

Problems with slow responses may result in images being re-sent automatically and low transfer rates. If you are experiencing problems with slow responses from a DICOM server, increase the timeout setting.

To adjust properties for a DICOM server (online):

- 1.) Navigate to **Utility > Connectivity > Service**.
- 2.) Select the service for the DICOM server.
- 3.) Under **Properties**, set **Timeout (sec)** to **360**.

6-4-2 Shutdown problems when running a portable LOGIQ Fortis

When portable (offline and not communicating with a PACS server), use the following settings to avoid problems with shutdown speed:

To adjust properties for a DICOM server (offline):

- 1.) Navigate to **Utility > Connectivity > Service**.
- 2.) Select the service for the DICOM server.
- 3.) Under **Properties**, set these parameters:
 - **Maximum Retries** - Set to **0**.
 - **Retry Interval (sec)** - Set to the lowest possible value.
 - **Timeout (sec)** - Set to the lowest possible value.

Section 6-5 Volume Navigation (V Nav) Calibration

There is no calibration available in the field. If the registration seems to be out of calibration, reloading the software will restore the factory settings. If the registration still seems out of calibration, replace the Volume Navigation (V Nav) hardware.

For information on the hardware replacement, see [8-10-10 "V-Nav Option Replacement" on page 8-239](#).

Chapter 7

Diagnostics/Troubleshooting

Section 7-1 Overview

7-1-1 Purpose of this chapter





This chapter describes how to setup and run the tools and software that help maintain image quality and system operation. Basic host-, system-, and board-level diagnostics are run whenever power is applied. Some Service Tools may be run at the application level.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

7-1-2 Contents in this chapter

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7-2	Service Safety Considerations	7-2
7-3	Gathering Troubleshooting Data	7-3
7-4	Service Desktop	7-11
7-5	Diagnostics	7-90
7-6	Back End Troubleshooting	7-104
7-7	Connectivity Troubleshooting	7-106
7-8	Electromagnetic Interference (EMI) Troubleshooting	7-113
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7-15	Peripherals Troubleshooting	7-142
7-16	Setting Troubleshooting	7-143
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Section 7-2 Service Safety Considerations

-  **DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING, AND ADJUSTING THE LOGIQ Fortis.**
-  **DANGER *IF A LOGIQ Fortis IS ENERGIZED AND THE NEST EMI BACK BRACKET IS REMOVED, THE VOLTAGE TEST POINTS POSE A POTENTIAL SHOCK HAZARD.***
-  **WARNING *IF THE COVERS ARE REMOVED FROM AN OPERATING LOGIQ Fortis, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUTDOWN MODE.***
-  **WARNING *USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD TO REDUCE THE RISK OF INJURY.***

Section 7-3

Gathering Troubleshooting Data

Contents in this section

7-3-1	Purpose of this section	7-3
7-3-2	Collecting vital system information	7-4
7-3-3	Shortcut keys	7-4
7-3-4	Collecting a screen capture with logs	7-5
7-3-5	Capturing network logs to use for troubleshooting	7-9

7-3-1 Purpose of this section

Problem images and system data (logs) can be acquired at the LOGIQ Fortis or through service remote connectivity. Use this data to perform service at the LOGIQ Fortis or to send it back to the manufacturer for analysis.

For more information, see:

- "Diagnostics" on page 7-90
- "Back End Troubleshooting" on page 7-104
- "Connectivity Troubleshooting" on page 7-106
- "Electromagnetic Interference (EMI) Troubleshooting" on page 7-113
- "Image Troubleshooting" on page 7-114
- "Smart Device Apps Troubleshooting" on page 7-115
- "Boot Issue Troubleshooting" on page 7-116
- "Noise Troubleshooting" on page 7-117
- "Options Troubleshooting" on page 7-123
- "Probes Troubleshooting" on page 7-138
- "Peripherals Troubleshooting" on page 7-142
- "Setting Troubleshooting" on page 7-143
- "Scan Assistant Troubleshooting" on page 7-144
- "Log File Troubleshooting" on page 7-145

7-3-2 Collecting vital system information

The following information is necessary to properly analyze data or images being reported as a malfunction or a LOGIQ Fortis being returned to the manufacturer:

NOTE: *This information is normally collected with Alt+D or Gather Logs.*

Product Name = LOGIQ Fortis

Navigate to **Utility > System > About**.

Record the **Package Type, Release Information** and **Part Number** for the following:

- Application Software
- Service Platform
- Security Package
- Base Image
- Base Image Update

7-3-3 Shortcut keys

There are several shortcut keys on the LOGIQ Fortis that can be useful during troubleshooting:

Table 7-1 Shortcut Keys

Key	Description
Alt+1 or Alt+2	Marks events in the log file. Used for the flagging issues during operation.
Alt+F10	Displays SW Shut Down. If the LOGIQ Fortis can be shut-down by using these keys, it means that SW is working and the problem could be the ON/OFF switch or the wire that carries the shut-down signal.
Alt+F5 and F11	For the echo simulator (keyboard simulation), brings up or removes the front panel simulator. It may be used with VCO to press buttons on the front panel that are not standard keys on your PC.
F4 and F12	Displays the DICOM Job Spooler.
Alt+A	Displays a cursor (Alt+A stands for arrow).
Alt+D	Captures scanner logs.
Alt+Ctrl+D	With the SSA key connected, displays the Debug command window to run Sclogs.
Alt+Tab	With the SSA key connected, switches between screens. Access Windows and relaunch the application to use this functionality.

7-3-4 Collecting a screen capture with logs

If the LOGIQ Fortis malfunctions, simultaneously press the **Alt+D** keys. Alt+D is available at all times and collects a screen capture of the image monitor, user-defined presets, and these logs:

- Keyboard Shadow Log (protected information)
- Error Logs
- Crash Log (protected information)
- Vital Product Data
- DICOM Logs
- Windows Event Logs
- Windows Modem Log
- Diagnostic Logs
- Service Logs

For a detailed list of Service Logs captured, see [7-3-5 "Capturing network logs to use for troubleshooting" on page 7-9.](#)

Figure 7-1 ALT+D Dialog Box

System Problem Reporting

Export stored reports

Description of issue :
Address the following :

- 1) Date and time of occurrence
- 2) Sequence of events leading to issue
- 3) Is this repeatable ?

Address the following, as applicable :

- 4) Imaging mode, probe, preset/application
- 5) Media brand, speed, capacity, type (eg. CD-R, DVD+RW, etc.)
- 6) Save secondary image capture, cine loop, 4D multi volume loop

System lockup (application has been restarted after problem)
Please include the date and times when the problem occurred.

Include Protected Information, requires Admin privileges
(This may be required for GE to determine the cause of your problem.)

Time Duration All

Destination: HD (D:\SERVICE)

Store Cancel

7-3-4 Collecting a screen capture with logs (cont'd)

To collect a screen capture with logs:

- 1.) Press **Alt+D**. The System Problem Reporting dialog box opens.
- 2.) Enter the following information:
 - System ID serial number
 - Software version
 - System date and time of occurrence
 - Sequence of events leading to issue
 - Whether the issue is repeatable
 - Imaging mode, probe, preset/application
 - Media brand, speed, capacity, and type
- 3.) To authorize the collection of protected information, check **Include Protected Information, requires Admin privileges**. If this box is checked, the LOGIQ Fortis creates two log files with the following format name:
 - log_<SN>_<DATE>_<TIME>_DB.zip
 - log_<SN>_<DATE>_<TIME>_ProtectedInfo_DB.zipWhere <SN> is the serial number, <DATE> is the date in format YYMMDD and <TIME> is the time in format HHMMSS.
- 4.) To include a duration, check **Time Duration** and select a duration from the dropdown.
- 5.) Under **Destination**, select a storage media or *Service* directory for remote viewing.
- 6.) Click the **Store** button.

NOTE: *To save to a CD/DVD or USB Flash Drive, you **MUST** select CD/DVD Recordable or USB drive as the destination device, otherwise the data is written to the default Export/Service directory on the hard drive. The Export/Service directory is only used for remote service and is not intended for images or report storage use.*

For a CD/DVD, the LOGIQ Fortis automatically formats an unformatted disk, gathers logs and writes it out to the disk.

The subsequent file is compressed and time stamped. The screen capture is a bitmap which eliminates the possibility of artifacts from compression.

7-3-4 Collecting a screen capture with logs (cont'd)

Double check the media that you made to ensure it contains the file. An example is shown in [Figure 7-2 "Example of Zipped Trouble Image and Logs File" on page 7-7](#).

Figure 7-2 Example of Zipped Trouble Image and Logs File

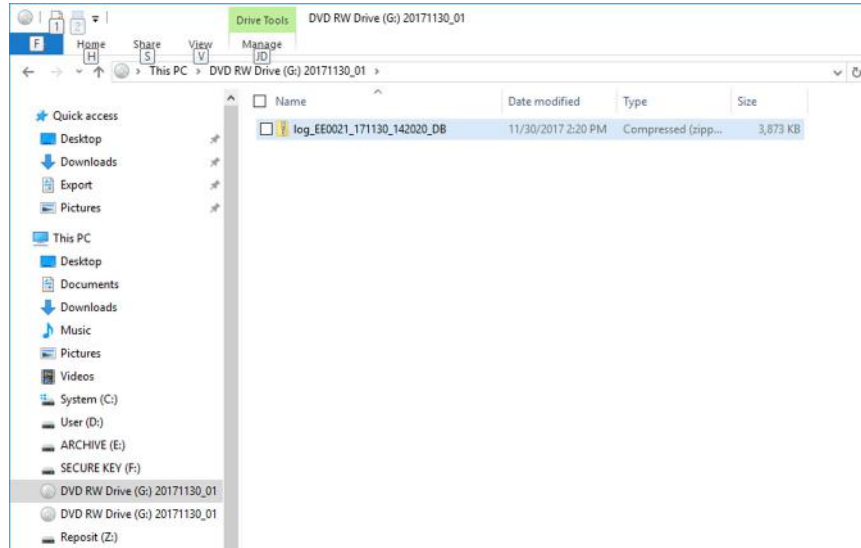
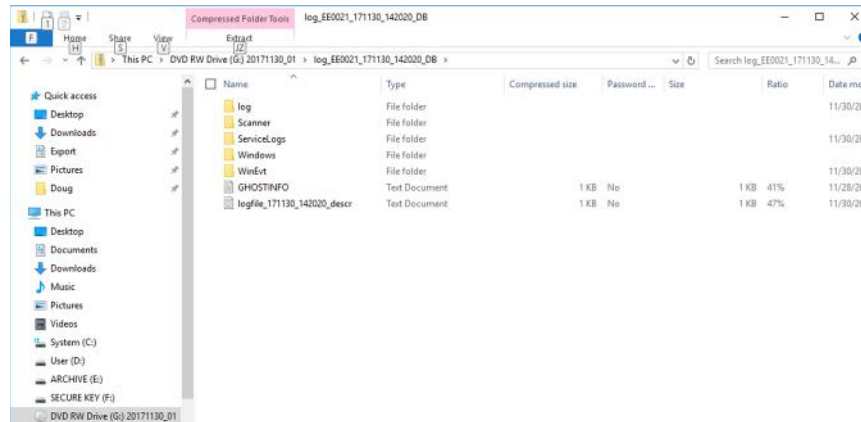


Figure 7-3 Contents of the Zipped Trouble Image and Logs File



Mark log files

If a customer is experiencing issues during operation, mark the issue by pressing **Alt+1** or **Alt+2** when the event occurs. When **Alt+1** or **Alt+2** is pressed, a marker is placed in the log to aid analysis.

7-3-4 Collecting a screen capture with logs (cont'd)

Trouble image without patient information

To collect a trouble image you need to enable **Transfer Images** (captured without patient information) to GE under **ADMIN > System Admin**.

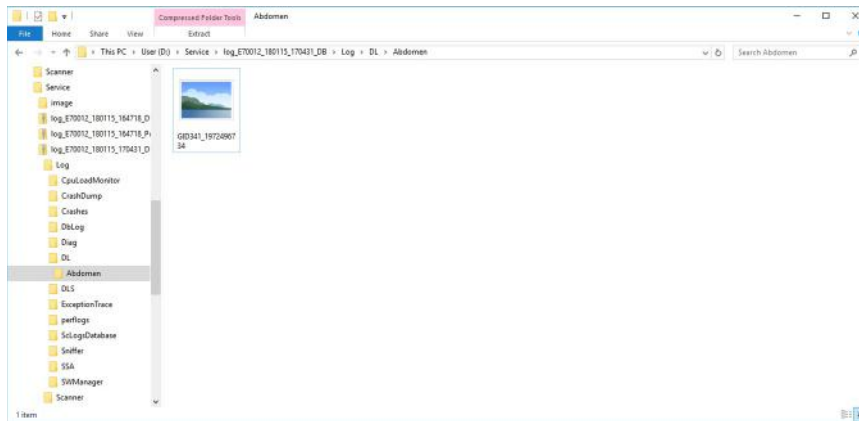
To collect the image, press the **P1** key (copy to hard drive). This places an unidentified .jpeg image in the D:\Log \DL folder. This folder will be transferred to the back office if a transfer is scheduled.

Figure 7-4 Example of a Trouble Image Collected with P1



To collect logs using **Gather Logs**, the image or images will be captured in the log collection Zip file and will be deleted from the D:\Log \DL folder.

Figure 7-5 Example of a Trouble Image Collected with Gather Logs



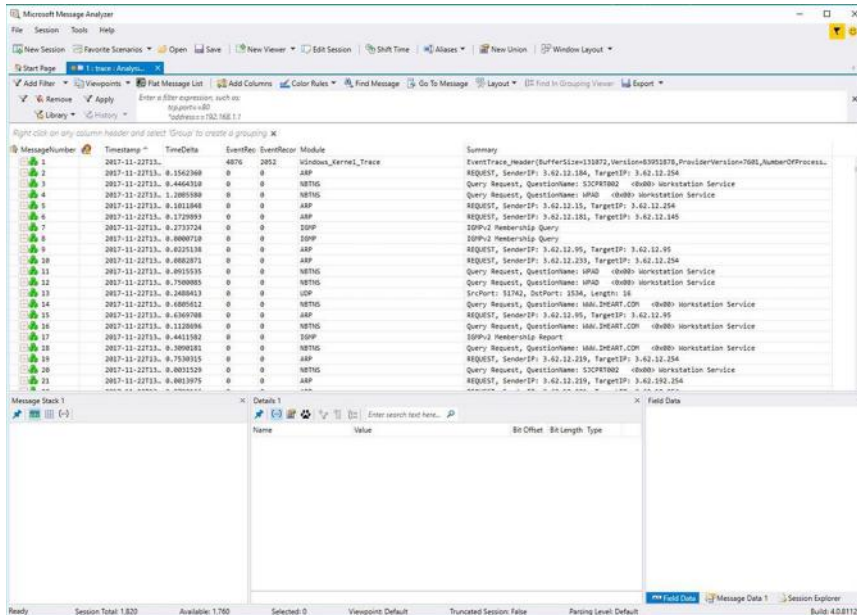
7-3-5 Capturing network logs to use for troubleshooting

Use the **Network Capture** utility to capture network logs. Once the logs are captured and extracted from the LOGIQ Fortis, use Microsoft Message Analyzer to convert the output, and then Wireshark (or some other network sniffer) to analyze it.

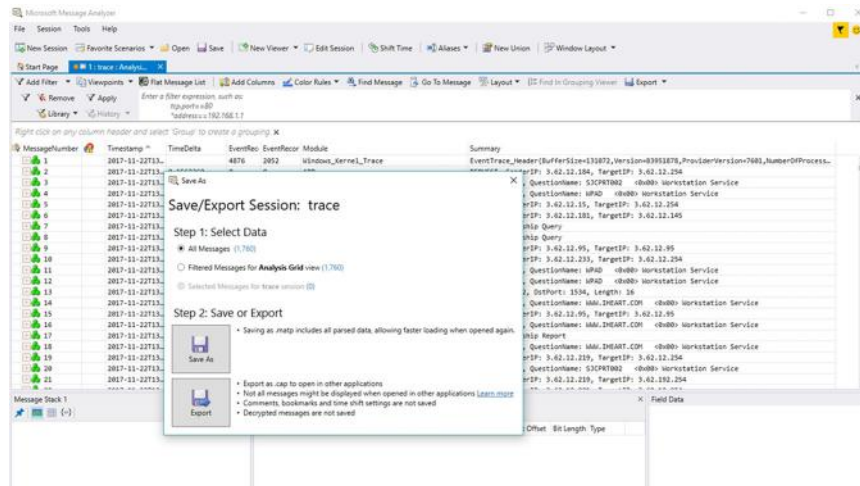
To troubleshoot network capture logs:

- 1.) On the LOGIQ Fortis, run the **Network Capture** utility to generate .etl and .cab files for analysis. For more information, see "[Network Capture](#)" on page 7-68.
- 2.) Locate the .etl file at D:\Service.
- 3.) Transfer these files to a laptop.
- 4.) On the laptop, download Microsoft Message Analyzer (if not already done).
- 5.) In Microsoft Message Analyzer, open the .etl file.

If the DICOM connection is encrypted, you will not be able to see the contents of the packets. Microsoft Message Analyzer does not have a plug-in to decode DICOM packets.



6.) To export the .etl file to .cab, select **File > Save As** and then select **Save As** or **Export**.



If the network capture was of a wireless connection, Microsoft Message Analyzer creates a .pcap file that does not have any of the packets and is probably useless.

7.) Use Wireshark or some other third-party network sniffer to examine the .cab file.

Section 7-4 Service Desktop

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7-4-11	Software Maintenance	7-85

7-4-1 Purpose of this section

This section describes the features of the Service desktop. These are the different levels of access to the Service desktop:

- Service Basic access (Class A) – a user locally logged into the machine with Local Service Access privilege. This level provides limited access to Service desktop widgets and utilities.
- Service Expert, Pro, and Advanced access (Class C) Local – Depending on the purchase level, includes an option string to control access.
- GE Service access (Class M) and an SSA key. For users with local Service Access privileges, this level provides unrestricted access to all Service desktop widgets and utilities.
- Remote access – a user remotely accessing the LOGIQ Fortis. This level provides unrestricted access to all Service desktop widgets and utilities. Disruptive mode is limited to the user access privileges to Remote Service Access.

7-4-2 Disruptive mode

Disruptive mode is a way to control interruptions to operation of the LOGIQ Fortis. Disruptive mode is required whenever service performs a function that may disrupt a normal scan. Activating Disruptive mode results in a red message displayed on the task bar. This message indicates that the LOGIQ Fortis needs to be restarted once the service activity is complete. The message remains until the LOGIQ Fortis is restarted. This prevents patient scanning while the LOGIQ Fortis is not operating at an optimal status. For example, running a diagnostic may leave the LOGIQ Fortis in a state that is not good for imaging.

Specifically, Disruptive mode is required to run diagnostics, clean presets, and reset the patient database, and turn on Virtual Console Observation (VCO).

- When Disruptive mode is On, all service functionality on the Service desktop is allowed but user operation of the LOGIQ Fortis may be limited.
- When Disruptive mode is Off, some service functionality on the Service desktop is not available and user operation of the LOGIQ Fortis is normal.

Additionally, the ability to enable Disruptive mode depends on the logged in user.

- Local user – a user locally logged into the machine will be able to set the LOGIQ Fortis to Disruptive mode or allow a Disruptive mode request from a remote user through the Service desktop. The local user must have Authorize Remote Service Access to allow Disruptive mode. If the local user does not have this right, the remote user's request will be automatically denied.
- Remote user – a user remotely accessing the LOGIQ Fortis will not be able to automatically switch Disruptive mode to On. The logged in user (user actually logged on to the LOGIQ Fortis) needs to have the ability to grant remote access. The logged in user will be notified through a dialog box and asked to allow Disruptive mode.

NOTE: *Change Password and Disk Defragment are not available for the remote user whether Disruptive mode is On or Off.*

For more information, see ["Disruptive Mode" on page 7-65](#).

7-4-3 Color statuses

Throughout the Service desktop, colors indicate the following:

- Green – Status is normal
- Orange – Status is a warning
- Red – Status is an error

7-4-4 Service Classes

With Service Basic Access (Class A), these are the available options:

- HOME
- Utilities
 - Change Password
 - Data Transfer
 - Delete Files
 - Gather Logs
 - Network Capture
 - Resolve Agent Quarantine
 - Secure Delete
 - SSA License
 - Third Party Licenses
- Options
- Agent Configuration
- Software maintenance

With Service Advanced (Class C), these are the available options:

NOTE: With a Class C license, options display according to these purchased level of access.

- HOME
- Diags
- DICOM
- Utilities
 - Backup and Clean LogDb
 - Change Password
 - Checkpoints
 - Data Transfer
 - Delete Files
 - Disk Defragment
 - Disruptive Mode Utility
 - Gather Logs
 - Network Capture
 - Resolve Agent Quarantine
 - Secure Delete
 - SSA License
 - Third Party Licenses
 - Virtual Console Observation
- Options
- Agent Configuration
- Software maintenance

7-4-4 Service Classes (cont'd)

With Service Advanced plus Service Expert (Class C), the Clean Userdefs, Reset Patient Database, Secure Delete, and Software Reload utilities are added to the Service Advanced options listed.

With Service Advanced and Service Expert plus Service PRO (Class C), the probe assessment tool (e-PAT) diagnostic is added to the Service Advanced and Service Expert options listed.

7-4-4 Service Classes (cont'd)

With GE Service access (Class M) and an SSA key, these are the available options:

- HOME
- Diags
- DICOM
- Utilities
 - Backup and Clean LogDb
 - Change Password (not available through a remote connection)
 - Checkpoints
 - Clean Userdefs
 - Data Transfer
 - Delete Files
 - Disable Remote Connectivity
 - Disk Defragment (not available through a remote connection)
 - Disruptive Mode Utility
 - Gather Logs
 - Network Capture
 - Reset Patient Database
 - Reset Log Database
 - Resolve Agent Quarantine
 - Secure Delete (not available through a remote connection)
 - Software Reload
 - SSA License
 - SSH
 - System Shutdown
 - Third Party Licenses
 - Virtual Console Observation
- Options
- Agent Configuration
- Software Maintenance

For more information, see [Section 5-5 "Service Desktop Description" on page 5-19](#).

7-4-5 Home

Home configurations vary depending upon the purchased service level.

Figure 7-6 Home with Class C and Class M Access

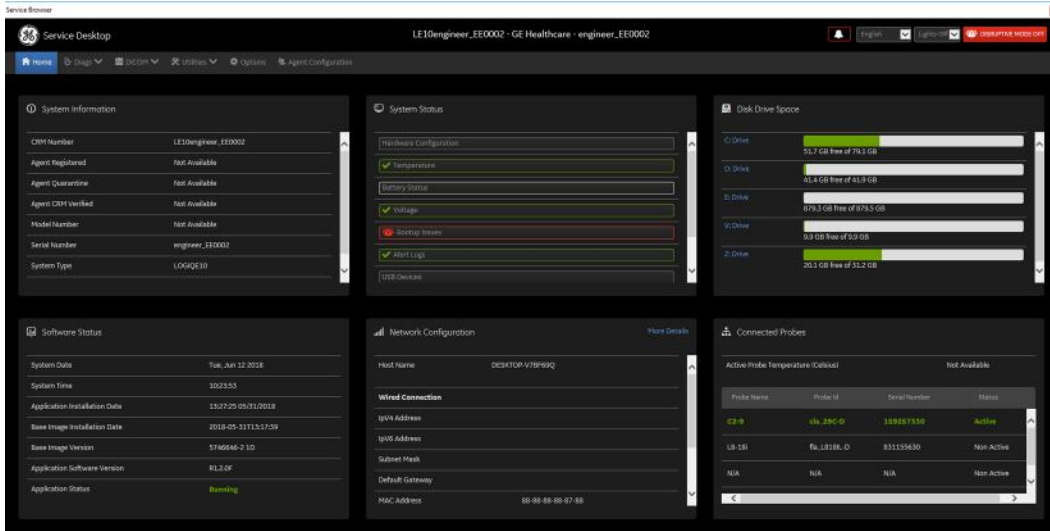
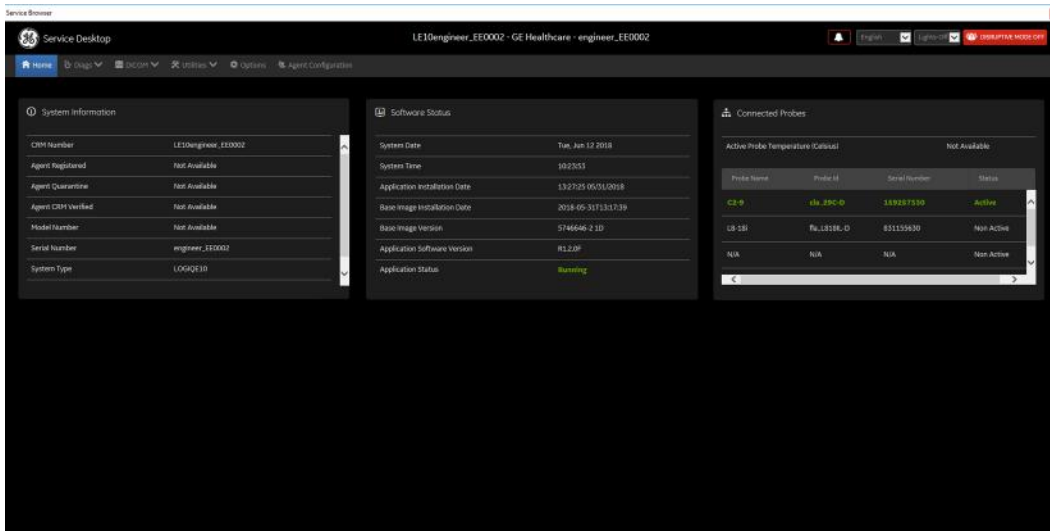


Figure 7-7 Home with Class A Access



For more information, see:

- "System Information" on page 7-17
- "Software Status" on page 7-19
- "System Status" on page 7-20
- "Disk Drive Space" on page 7-34
- "Network Configuration" on page 7-39
- "Connected Probes" on page 7-41

7-4-5 Home (cont'd)

System Information

System Information displays general information about the LOGIQ Fortis. When the LOGIQ Fortis has been successfully configured with the back office, these elements will have the corresponding values:

- **Agent Registered** will be **Yes**
- **Agent Quarantine** will be **No**
- **Agent CRM Verified** will be **Yes**

The information on **System Information** is available to all service class licenses.

To access **System Information**, navigate to **Utility (second page) > Service > Home**.

Figure 7-8 System Information



System Information	
CRM Number	LE10ENGINEER_E70012
Agent Registered	Yes
Agent Quarantine	No
Agent CRM Verified	Yes
Agent Connected	No
Model Number	5920000P4
Serial Number	engineer_E70012

7-4-5 Home (cont'd)

This table shows all the elements available on **System Information** with descriptions.

Table 7-2 System Information

Element	Description
CRM Number	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region.
Agent Registered	Registered status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – The agent is not running or has not been configured.
Agent Quarantine	Quarantine status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent has more than one device registered with the same CRM Number in the back office. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – The agent is not running or has not been configured.
Agent CRM Verified	CRM verified status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent is verified in the back office. • No – The agent is not verified in the back office. • Not Available – The agent is not running or has not been configured.
Agent Connected	Connection status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent is connected to the back office. • No – The agent is not connected to the back office. • Not Available – The agent is not configured or running.
Model Number	GE part number for the LOGIQ Fortis. The same number as listed on the rating plate.
Serial Number	Serial number of the LOGIQ Fortis. The same number as listed on the rating plate.
System Type	Product name of the LOGIQ Fortis.
Facility	Name of the hospital or facility where the LOGIQ Fortis is installed.

For more information, see:

- "Home" on page 7-16

7-4-5 Home (cont'd)

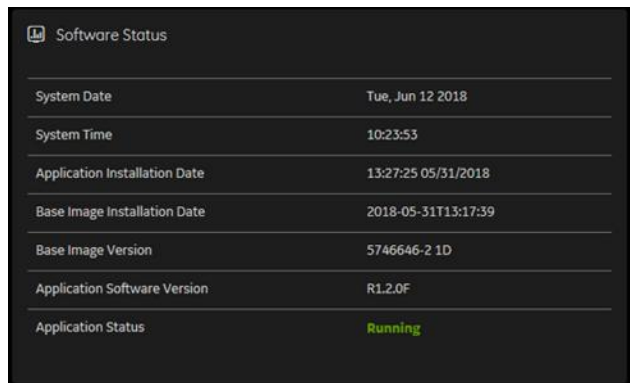
Software Status

Use **Software Status** to view general information about the software installed on the LOGIQ Fortis.

The information on **Software Status** is available to all service class licenses.

To access **Software Status**, navigate to **Utility (second page) > Service > Home**.

Figure 7-9 Software Status



This table shows all the elements available on **Software Status** with descriptions.

Table 7-3 Software Status

Element	Description
System Date	Current date in the format <day>, <month> <date> <year>.
System Time	Local time based on the last time the desktop was refreshed in the format <hh:mm:ss>.
Application Installation Date	Date the application software was installed. The application software includes the LOGIQ Fortis product-specific software.
Base Image Installation Date	Date the base image software was installed. The base image software includes the Windows operating system and other supporting software.
Base Image Version	Version number (part number) of the base image software.
Application Software Version	Version number of the application software.
Application Status	Status of the application. Valid values are: <ul style="list-style-type: none"> • Running • Stopped

For more information, see:

- "Home" on page 7-16
- "Software Reload" on page 7-78

7-4-5 Home (cont'd)

System Status

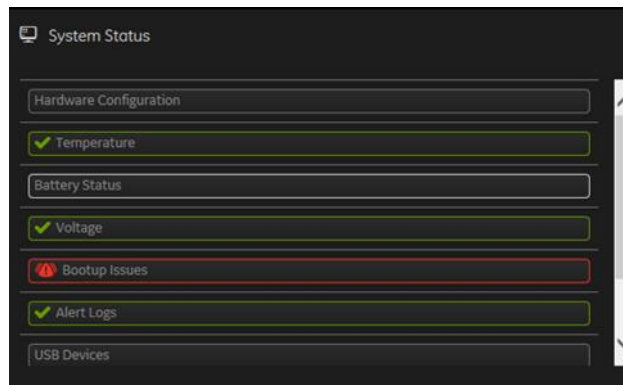
Use **System Status** to view status information on the LOGIQ Fortis. Specifically, do the following:

- View the hardware configuration file
- View temperatures for FRUs and a graphical representation of the monitored temperatures
- View statuses of the batteries
- View voltages for FRUs.
- View issues with the boot process
- View alert logs
- View logs that occurred before and after an error
- View USB devices connected to the LOGIQ Fortis
- View the amount of time the LOGIQ Fortis has been running
- View the amount of time since the LOGIQ Fortis has last been rebooted

The information on **System Status** is available to Class C and Class M licenses.

To access **System Status**, navigate to **Utility (second page) > Service > Home**.

Figure 7-10 System Status



7-4-5 Home (cont'd)

This table shows all the elements available on **System Status** with descriptions.

Table 7-4 System Status

Element	Description
Hardware Configuration	Displays the contents of the hardware configuration file.
Temperature	Displays the temperature monitoring of the LOGIQ Fortis as normal, warning, or error using the standard colors and icons. Includes temperature out-of-spec events including an overall count of event warnings and errors for the last 30 days or the last status checkpoint whichever is sooner. Temperature displays temperature a graph for the configured monitoring points.
Battery Status	Displays the battery monitoring of the LOGIQ Fortis.
Voltage	Displays the voltage monitoring of the LOGIQ Fortis as normal, warning or error using the standard colors and icons. Includes voltage out-of-spec events including an overall count of the event warnings and errors for the last 30 days or last status checkpoint whichever is sooner.
Bootup Issues	Based on the latest occurrence, displays all abnormal boots of the LOGIQ Fortis for either the past 30 days or the latest check point.
Alert Logs	Based on the latest occurrence, displays all alerts generated by the LOGIQ Fortis for either the past 30 days or the latest check point.
Log Analyzer	Displays a list of errors and associated log files for troubleshooting.
USB Devices	Displays the USB connected devices and their status.
System On Time	Displays the time the LOGIQ Fortis was turned on.
Time Since Last Reboot	Displays the time the LOGIQ Fortis was last rebooted.

For more information, see:

- "Hardware Configuration" on page 7-22
- "Temperature" on page 7-23
- "Battery Status" on page 7-26
- "Voltage" on page 7-28
- "Bootup Issues" on page 7-30
- "Alert Logs" on page 7-32
- "USB Devices" on page 7-33
- "Home" on page 7-16

7-4-5 Home (cont'd)

Hardware Configuration

Hardware Configuration displays the contents of the hardware configuration file which includes all the vital product data (VPD).

To access **Hardware Configuration**, navigate to **Utility (second page) > Service > Home**, and then under **System Status**, select **Hardware Configuration**.

Figure 7-11 Hardware Configuration

Component	Item	Value
BEP	COMPUTERNAME	DFR001
BEP	BIOS Manufacturer	American Megatrends Inc.
BEP	BIOS Name	UEFI Firmware VB100281 - Release Candidate 2018/04/23
BEP	BIOS Serial Number	64205786
BEP	SMBIOS Version	UEFI Firmware VB100281 - Release Candidate 2018/04/23
BEP	BIOS Version	_GEIP_ - 20151117
BP	VPD revision field	2
BP	Pole that owns the design	mke
BP	Functional revision	3A
BP	System Platform	Eagle
BP	Part number (GE format)	5503292-2

This table shows all the elements available on **Hardware Configuration** with descriptions.

Table 7-5 Hardware Configuration

Element	Description
Component	Hardware component.
Item	Parameter with the vital product data (VPD).
Value	Actual value of the Item.

For more information, see:

- "System Status" on page 7-20
- "Home" on page 7-16

7-4-5 Home (cont'd)

Temperature

Use **Temperature** to troubleshoot problems with monitored FRUs. Specifically, use these pages:

- FRU Status
- Graphs

To access **Temperature**, navigate to **Utility (second page) > Service > Home**, and then under **System Status**, select **Temperature**.

For more information, see:

- "FRU Status" on page 7-24
- "Graphs" on page 7-25
- "System Status" on page 7-20
- "Home" on page 7-16

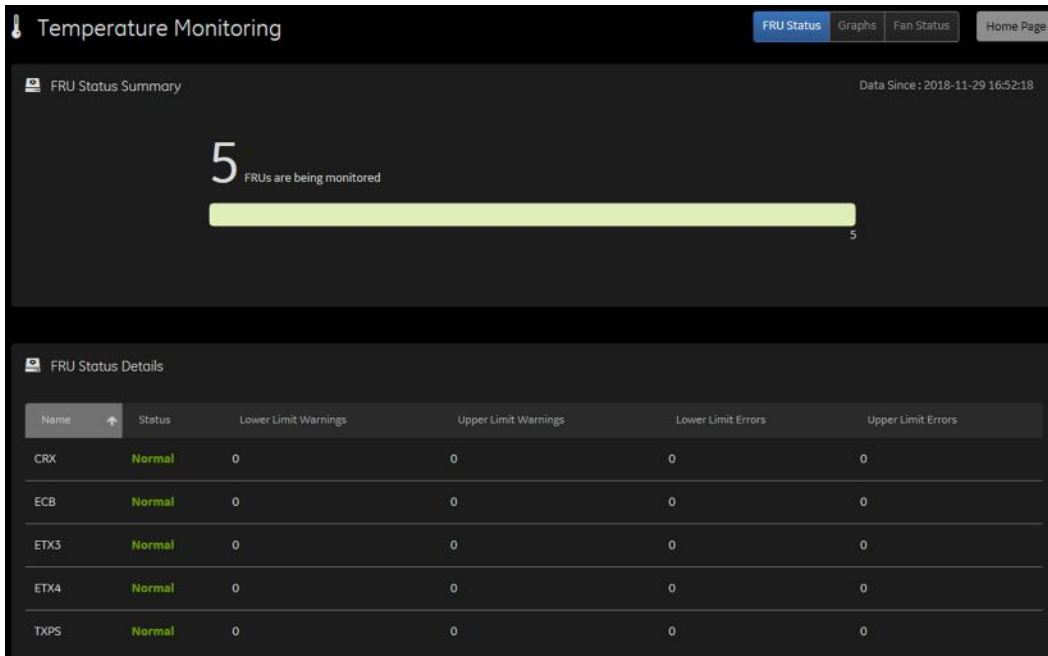
7-4-5 Home (cont'd)

FRU Status

FRU Status displays a summary of the FRUs being monitored and the details for each FRU.

To access this page, under **System Status**, select **Temperature** and then select **FRU Status**.

Figure 7-12 FRU Status



This table shows all the elements available on **FRU Status** with descriptions.

Table 7-6 FRU Status

Element	Description
FRU Status Summary	Number of the FRUs being monitored.
FRU Status Details	
Name	Name of the FRU.
Status	Status of the FRU. Valid values are: <ul style="list-style-type: none"> • Normal – Indicates that the FRU is operating within the allowable range. • Warning – Indicates that the FRU is operating close to the limit of the allowable range. • Error – Indicates that the FRU is operating outside the allowable range.
Lower Limit Warning	Number of low temperature warnings.
Upper Limit Warning	Number of high temperature warnings.
Lower Limit Errors	Number of low temperature errors.
Upper Limit Errors	Number of high temperature errors.

For more information, see:

- "Temperature" on page 7-23

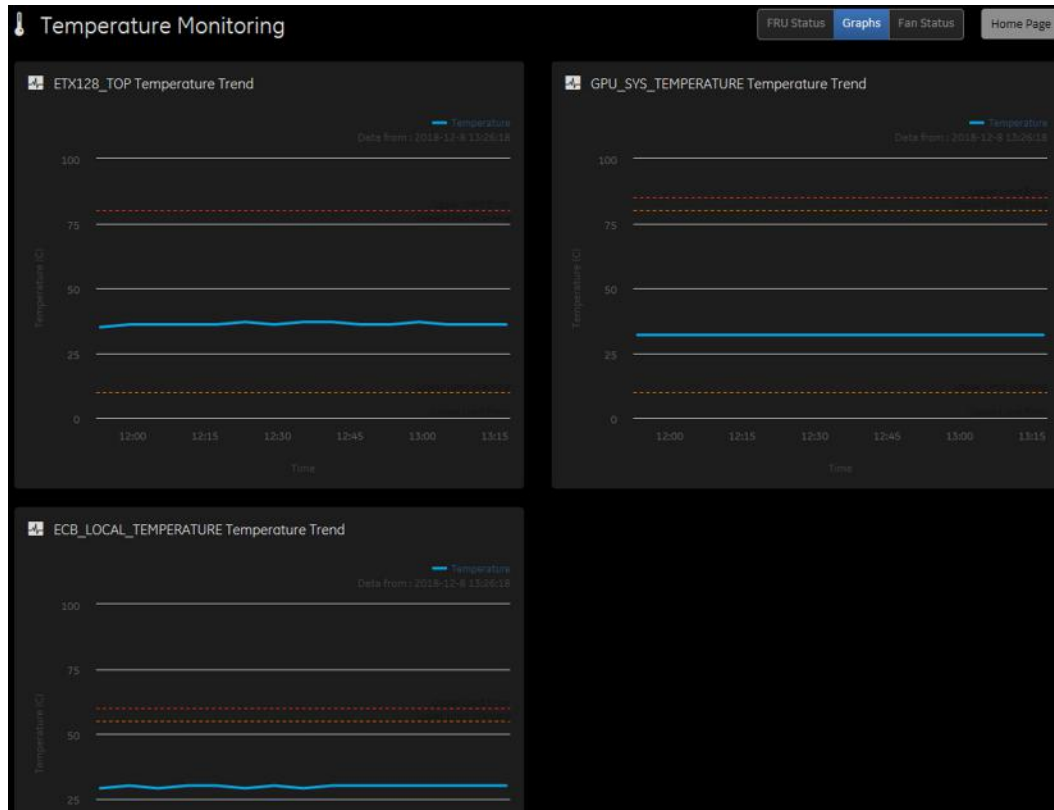
7-4-5 Home (cont'd)

Graphs

Graphs displays trend graphs for selected elements which have been selected as key indicators of overall temperature status inside the card rack.

To access this page, under **System Status**, select **Temperature** and then select **Graphs**.

Figure 7-13 Graphs



For more information, see:

- "Temperature" on page 7-23
- "Home" on page 7-16

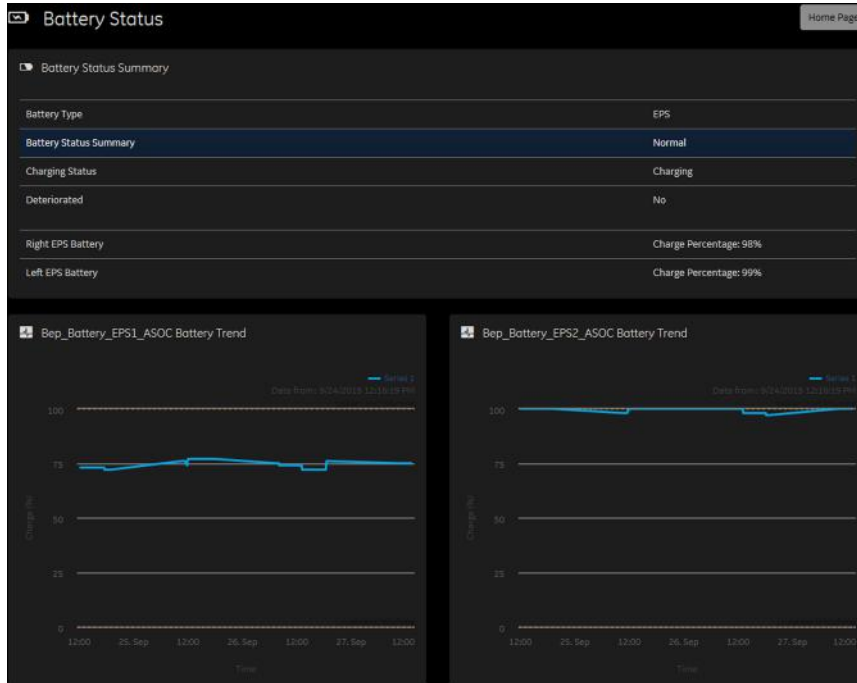
7-4-5 Home (cont'd)

Battery Status

Battery Status displays details for each battery.

To access **Battery Status**, navigate to **Utility (second page) > Service > Home**, and then under **System Status**, select **Battery Status**.

Figure 7-14 Battery Status



This table shows all the elements available on **Battery Status** with descriptions.

Table 7-7 Battery Status

Element	Description
Battery Type	Type of the batteries. Valid values are: <ul style="list-style-type: none"> No battery – Indicates that no batteries are present. EPS only – Indicates that the extended power shutdown batteries are used. Power Assistant – Indicates that the power assistant batteries are used.
Battery Status	Status of the batteries. Valid values are: <ul style="list-style-type: none"> Normal – Indicates that batteries are charging or fully charged. Error – Indicates a problem with the batteries.
Charging Status	Status of the batteries concerning charging. Valid values are: <ul style="list-style-type: none"> Charging – Indicates that the batteries are charging. Discharging – Indicates that the batteries are discharging.
Deteriorated	Deterioration state of the batteries. Valid values are: <ul style="list-style-type: none"> Yes – Indicates that there is a problem with one or both of the batteries. No – Indicates that the batteries are operating normally.
Right PA Battery Charge Percentage	Percentage of the right battery charge.

Table 7-7 Battery Status

Element	Description
Left PA Battery Charge Percentage	Percentage of the left battery charge.

7-4-5 Home (cont'd)

Voltage

Use **Voltage** to troubleshoot problems with monitored FRUs of the LOGIQ Fortis. Specifically, use these pages:

- FRU Status

To access **Voltage**, navigate to **Utility (second page) > Service > Home**, and then under **System Status**, select **Voltage**.

For more information, see:

- "FRU Status" on page 7-28
- "System Status" on page 7-20
- "Home" on page 7-16

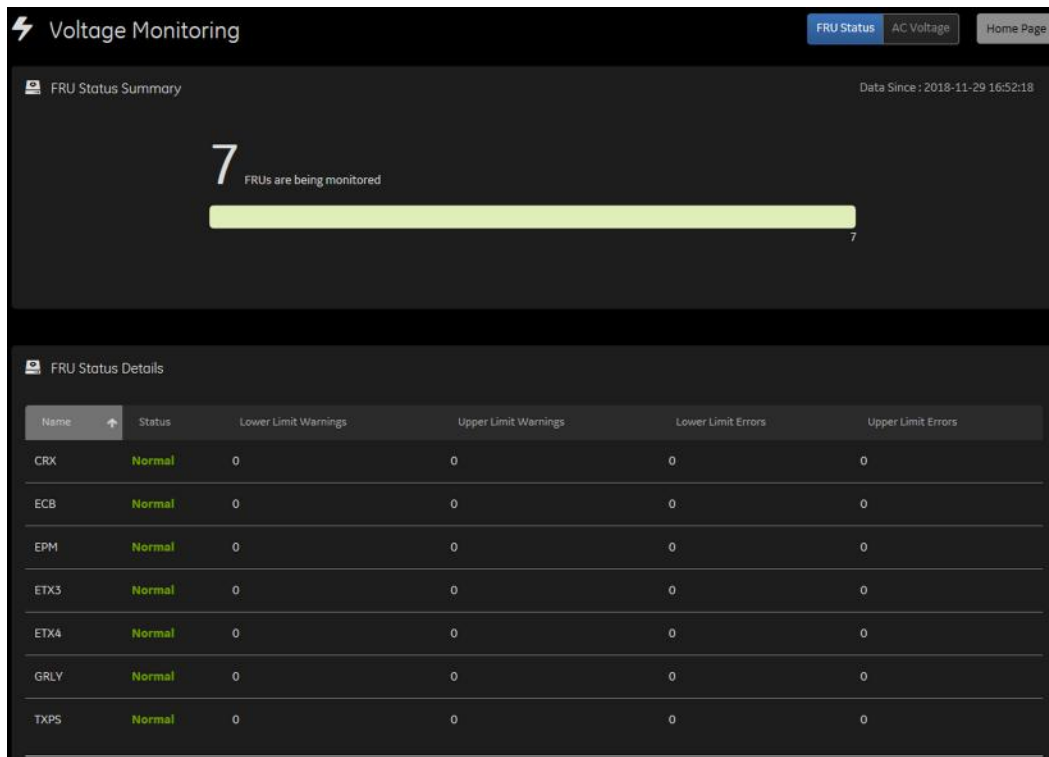
NOTE: AC voltage monitoring is not available on LOGIQ Fortis.

FRU Status

FRU Status displays a summary of the voltages for the FRUs being monitored and the details for each FRU.

To access this page, under **System Status**, select **Voltage** and then select **FRU Status**.

Figure 7-15 FRU Status



7-4-5 Home (cont'd)

This table shows all the elements available on **FRU Status** with descriptions.

Table 7-8 FRU Status

Element	Description
Name	Name of the FRU.
Status	Status of the voltage for the FRU. Valid values are: <ul style="list-style-type: none"> • Normal – Indicates that the voltage is within the allowable range. • Warning – Indicates that the voltage is close to the limit of the allowable range. • Error – Indicates that the voltage is outside the allowable range.
Lower Limit Warnings	Number of low limit voltage warnings.
Upper Limit Warnings	Number of high limit voltage warnings.
Lower Limit Errors	Number of low limit voltage errors.
Upper Limit Errors	Number of high limit voltage errors.

For more information, see:

- "Voltage" on page 7-28
- "Home" on page 7-16

7-4-5 Home (cont'd)

Bootup Issues

Bootup Issues displays a summary of bootup issues detected by the LOGIQ Fortis that prevented normal scanning, shutdowns, or abnormal statuses.

To access this page, under **System Status**, select **Bootup Issues**.

Figure 7-16 Bootup Issues

Id	Timestamp	Cycle Count	Missing Devices	Battery State of	Previous Boot Crash Dump	Warm Boot	AC Full	Abnormal Control	Exit Requested
2	2017-12-18 09:58:28.1460000 -0600	0	Details	RA	0	0	0	1	A
3	2017-12-18 10:01:06.2740000 -0600	0	Details	RA	0	1	0	1	A
4	2017-12-18 10:03:34.8960000 -0600	0	Details	RA	0	1	0	1	1

Figure 7-17 Bootup Issues with Missing Devices

Id	Timestamp	Cycle Count	Missing Devices	Battery State of	Previous Boot Crash Dump	Warm Boot	AC Full	Abnormal Control	Exit Requested
2	2017-12-18 09:58:28.1460000 -0600	0	Details	RA	0	0	0	1	A
3	2017-12-18 10:01:06.2740000 -0600	0	Details	RA	0	1	0	1	A
4	2017-12-18 10:03:34.8960000 -0600	0	Details	RA	0	1	0	1	1

7-4-5 Home (cont'd)

This table shows all the elements available on **Bootup Issues** with descriptions.

Table 7-9 Bootup Issues

Element	Description
ID	Identifier for the LOGIQ Fortis software boot. For example, 10 for the tenth boot and so on.
Timestamp	Date and time that the associated issue for the boot occurred.
Cycle Count	Number of times EchoLoader was restarted during the associated boot. <ul style="list-style-type: none"> • 0 – Normal. EchoLoader started without attempting a restart. • 1 or more – Indicates the number of times EchoLoader attempted to restart.
Missing Devices	Displays the devices that were missing during the boot.
Incompatible Board	Displays whether an incompatible board exists.
Battery State ID	Type of battery detected. For example, EPS or PA. Invalid displays if no battery was detected.
Previous Boot Crash Dump	Displays whether a crash dump has occurred. Valid values are: <ul style="list-style-type: none"> • 1 – Indicates a crash dump has occurred in the previous boot. • 0 – Normal. No crash dump has occurred.
Warm Boot	Displays whether a warm boot has occurred. Valid values are: <ul style="list-style-type: none"> • 1 – The LOGIQ Fortis was rebooted. • 0 – The LOGIQ Fortis was started after a shutdown.
AC Fail	AC Fail is not available on LOGIQ Fortis.
Abnormal Context	Displays whether the software has booted to a stable state (Interface manager successfully initiated). Valid values are: <ul style="list-style-type: none"> • 1 – The LOGIQ Fortis has not booted to a stable state. Only abnormal logs display. • 0 – Normal. The LOGIQ Fortis initialized to a stable state.
Exit Requested	Displays the type of exit that has been requested. For example, 4 displays the operating system was restarted.
Echoloader Exit Code	Displays the exit code generated by EchoLoader. 0 indicates that Echoloader exited without any issues.
Echoloader Exit String	Displays the type of exit requested by EchoLoader. For example, restart the operating system or exit the application software.

For more information, see:

- "System Status" on page 7-20
- "Home" on page 7-16

7-4-5 Home (cont'd)

Alert Logs

Alert Logs displays the details for each alert. Alerts are status logs typically reported as a result of an error. Alerts are sent to the back office to be managed and reported to service.

To access this page, under **System Status**, select **Alert Logs**.

Figure 7-18 Alert Logs

Alert ID	Sub System	Rule	Description	Value	Lower Limit	Upper Limit	Severity	First Alert Time	Last Alert Time	Last Alert Local Time	Last Alert Sent Time	Count
VOLT_FAULT.TXPS HV MaxV	TXPS	VOLT_FAULT	TxPs Alarm source(Transmit supply 2 negl type)(Error Limit 2) (Local)(Maximum Voltage)				1	2018-12-07T19:59:51Z	2018-12-07T20:01:57Z	2018-12-07T14:01:37		8

This table shows all the elements available on **Alert Logs** with descriptions.

Table 7-10 Alert Logs

Element	Description
Alert ID	Identifier for the alert log that has been sent to the back office.
Sub System	Hardware component.
Rule	Code for the alert. Alerts are filtered in the back office using rule codes.
Description	Description of the alert log.
Value	Current value read for the associated hardware component.
Lower Limit	Value for the lower limit for the associated hardware component.
Upper Limit	Value for the upper limit for the associated hardware component.
Severity	Severity of the alert. These are the valid values: <ul style="list-style-type: none"> • 1 – Error. Out of specification • 2 – Warning • 3 – Normal
First Alert Time	Time the alert first occurred.
Last Alert Time	Time the alert last occurred.
Last Alert Local Time	Time (local) the alert last occurred.
Last Alert Sent Time	Time the alert was last sent to the back office.
Count	Number of times that the alert has occurred.

For more information, see:

- "System Status" on page 7-20
- "Home" on page 7-16

7-4-5 Home (cont'd)

USB Devices

USB Devices displays the details for each USB device.

To access this page, under **System Status**, select **USB Devices**.

Figure 7-19 USB Devices

Name	Serial Number	Speed	HW Version	SW Version	Status
AIS USB Console	N/A	UsbFullSpeed	N/A	N/A	Connected
GEHC XYZ Motor Controller	N/A	UsbFullSpeed	N/A	N/A	Connected
GEHCUS Alpha MPS for E10	9413 00129101	UsbFullSpeed	N/A	N/A	Connected
GEHCUS PatioUsb - 64bit capable	N/A	UsbHighSpeed	N/A	N/A	Connected
USB Composite Device	N/A	UsbHighSpeed	N/A	N/A	Connected
USB Input Device	08000214	UsbHighSpeed	N/A	N/A	Connected
USB Input Device	N/A	UsbFullSpeed	N/A	N/A	Connected
USB Input Device	N/A	UsbFullSpeed	N/A	N/A	Connected
USB Input Device	N/A	UsbFullSpeed	N/A	N/A	Connected
USB Input Device	N/A	UsbLowSpeed	N/A	N/A	Connected
USB Mass Storage Device	60A4AC2651781317621	UsbHighSpeed	N/A	N/A	Connected
USB Mass Storage Device	016172441941	UsbHighSpeed	N/A	N/A	Not Connected

This table shows all the elements available on **USB Devices** with descriptions.

Table 7-11 USB Devices

Element	Description
Name	Name of the USB device.
Serial Number	Serial number of the USB device.
Speed	Speed of the USB device. For example, USB 3.0.
HW Version	Hardware version of the USB device.
SW Version	Software version of the USB device.
Status	Status of the USB device.

For more information, see:

- "System Status" on page 7-20
- "Home" on page 7-16

7-4-5 Home (cont'd)

Disk Drive Space

Use **Disk Drive Space** to view the hard drive partitions including total size and available free space in GB. Includes the overall health of the drive in one of these colors:

- Red – Available free space is less than 10% of the total size.
- Orange – Available free space is more than 10% and less than 20% of the total size.
- Green – Available free space is more than 20% of the total size.

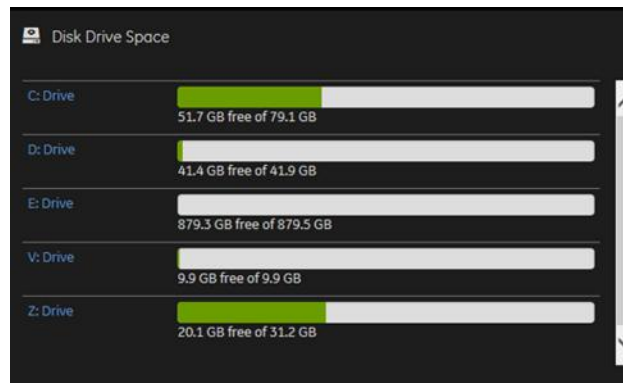
Each partition displays these encryption statuses:

- Conversion status
- Percentage encrypted
- Encryption method
- Protection status
- Lock status

The information on **Disk Drive Space** is available to Class C and Class M licenses.

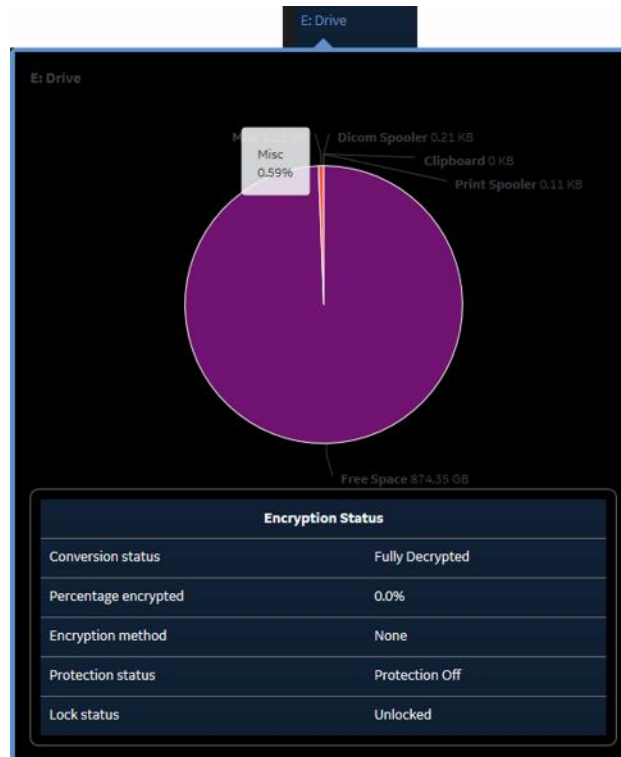
To access **Disk Drive Space**, navigate to **Utility (second page) > Service > Home**.

Figure 7-20 Disk Drive Space



7-4-5 Home (cont'd)

Figure 7-21 E: Drive Details



7-4-5 Home (cont'd)

This table shows all the elements available on **Disk Drive Space** with descriptions.

Table 7-12 Disk Drive Space

Element	Description
C: Drive	C: partition shows the graphical representation of the following: <ul style="list-style-type: none"> • Used space in GB • Available free space in GB
D: Drive	D: partition shows the graphical representation of the following: <ul style="list-style-type: none"> • Service • Logs • Temp • Export • Service configuration • Misc • Available free space in GB
E: Drive	E: partition shows the graphical representation of the following: <ul style="list-style-type: none"> • Print spooler • Clipboard • DICOM spooler • Misc • Available free space in GB
V: Drive	V: partition shows the graphical representation of the following: <ul style="list-style-type: none"> • Misc • Available free space in GB
Z: Drive	Z: partition shows the graphical representation of the following: <ul style="list-style-type: none"> • Package repository • Misc • Available free space in GB

For more information, see:

- "Home" on page 7-16

7-4-5 Home (cont'd)

Smart Disk Details

Smart Disk Details displays general information for the following drives:

- Solid State Drive (SSD) – Displays SMART disk.

The information on **Smart Disk Details** is available to Class C and Class M.

To access **Smart Disk Details**, navigate to **Utility (second page) > Service > Home > Disk Drive Space** and then select **Smart Disk Details**.

Figure 7-22 Solid State Drive (SSD) Details

Index	Name	Value	Threshold	Worst	Raw	Type
5	Reallocated Sectors Count	100	0	100	0	OldAge
9	Power-On Hours	100	0	100	5182	OldAge
12	Power Cycle Count	100	0	100	596	OldAge
165	Unknown Attribute	100	0	100	60186624786	OldAge
166	Unknown Attribute	100	0	100	7	OldAge
167	Unknown Attribute	100	0	100	22	OldAge
168	Unknown Attribute	100	0	100	24	OldAge
169	Unknown Attribute	100	0	100	110	OldAge
170	Available Reserved Space	100	0	100	0	OldAge
171	SSD Program Fail Count	100	0	100	0	OldAge
172	SSD Erase Fail Count	100	0	100	0	OldAge
173	SSD Wear Leveling Count	100	0	100	21	OldAge
174	Unexpected power loss count	100	0	100	211	OldAge
184	End-to-End error / IOEDC	100	0	100	0	OldAge
187	Reported Uncorrectable Errors	100	0	100	0	OldAge

7-4-5 Home (cont'd)

This table shows all the elements available on **Smart Disk Details** with descriptions.

Table 7-13 Smart Disk Details

Element	Description
Serial No	Serial number for the disk drive (SSD or HD).
Firmware Version	Version number for the firmware installed on the disk drive (SSD or HD).
Drive Letter	Drive letters associated with the disk drive.
Time Collected	Time the details for the disk were collected in YYYY-MM-DDThh:mm:ssZ format.
Index	Number associated with the disk drive attribute.
Name	Name of the disk drive attribute.
Value	Value for the disk drive attribute.
Threshold	Threshold for the value of the disk drive attribute.
Worst	Lowest value recorded for the disk drive attribute.
Raw	Value determined by the drive manufacturer.
Type	Type associated with the disk drive attribute. These are the valid values: <ul style="list-style-type: none"> • OldAge • Prefail

7-4-5 Home (cont'd)

Network Configuration

Use **Network Configuration** to view network (wired and wireless) information (the full ipconfig details) for the network configured with the LOGIQ Fortis.

The information on **Network Configuration** is available to Class C and Class M licenses.

To access **Network Configuration**, navigate to **Utility (second page) > Service > Home**.

Figure 7-23 Network Configuration

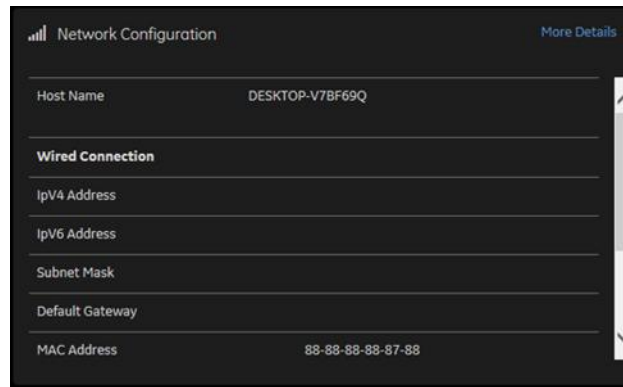
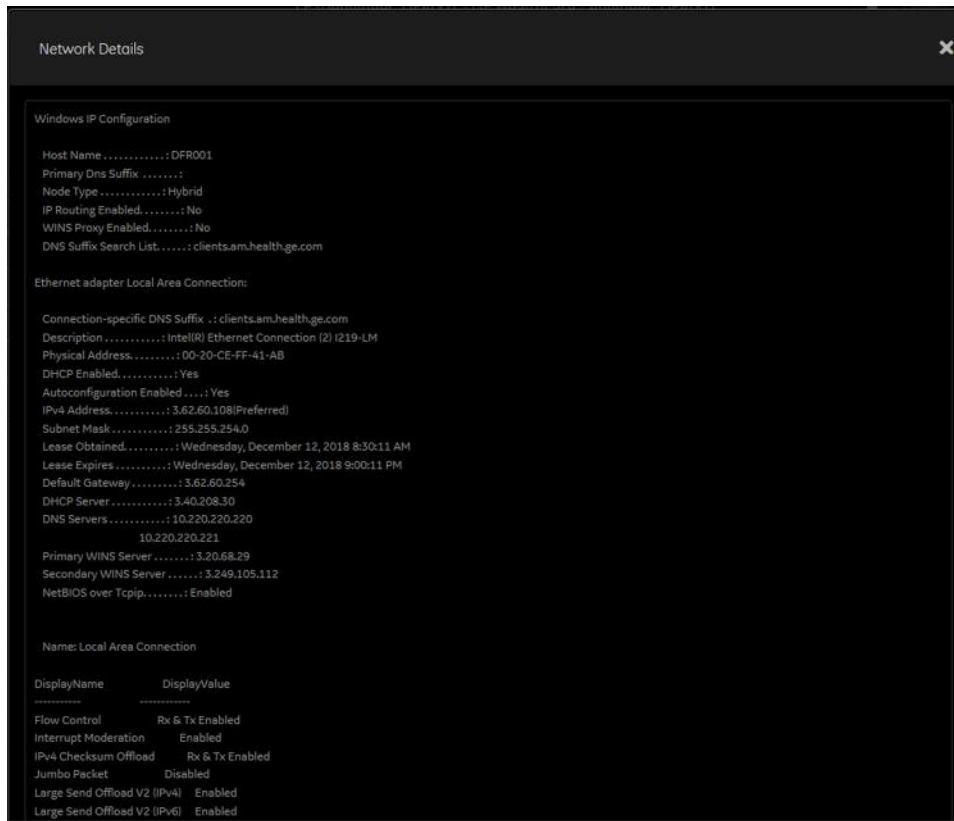


Figure 7-24 Network Configuration with More Details



7-4-5 Home (cont'd)

This table shows all the elements available on **Network Configuration** with descriptions.

Table 7-14 Network Configuration

Element	Description
Host Name	Name of the local host for the LOGIQ Fortis.
More Details	Displays the ipconfig details.
Wired Connection	
IPv4 Address	Local IP address for the wired network connection.
IPv6 Address	Local IP address for the wired network connection.
Subnet Mask	Local subnet mask for the wired network.
Default Gateway	Default gateway for the wired network.
MAC Address	Address for the MAC for the wired network.
Speed (Mbps)	Speed of the wireless connection.
Wireless Connection	
IP Address	IP address for the wireless network connection.
Subnet Mask	Subnet mask for the wireless connection.
Default Gateway	Default gateway for the wireless connection.
MAC Address	Address for the MAC for the wireless connection.
Speed (Mbps)	Speed of the wireless connection.
Status	Current status of the wireless connection.

For more information, see:

- "Home" on page 7-16

7-4-5 Home (cont'd)

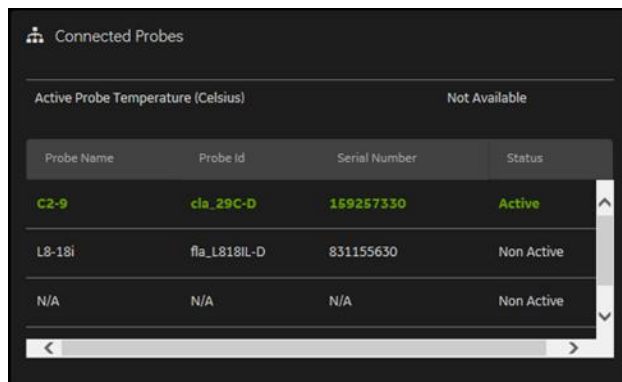
Connected Probes

Connected Probes shows probes connected to the LOGIQ Fortis. The order on the user interface is top down matching the left-to-right order on the LOGIQ Fortis.

The information on **Connected Probes** is available to all service class licenses.

To access **Connected Probes**, navigate to **Utility (second page) > Service > Home**.

Figure 7-25 Connected Probes



This table shows all the elements available on **Connected Probes** with descriptions.

Table 7-15 Connected Probes

Element	Description
Active Probe Temperature (Celsius)	When available, temperature of the active probe. Not all probes report temperature. The most common probe to report temperature is the TEE probe.
Probe Name	Name of the probe connected to the LOGIQ Fortis.
Probe ID	Identifier of the probe connected to the LOGIQ Fortis.
Serial Number	Serial number of the probe connected to the LOGIQ Fortis. If the serial number of the probe is not available, then N/A displays.
Status	Statuses of the probe connected to the LOGIQ Fortis. Valid values are: <ul style="list-style-type: none"> Active Non Active

For more information, see:

- "Home" on page 7-16

7-4-6 Diags

Use **Diags** to troubleshoot functionality with hardware components. With an active Service PRO license, probe diagnostics will be available. Specifically, use these pages:

- **Run Diags** – Run diagnostics on hardware components.
- **Diag History** – View a history of the diagnostics you have run and the results.

NOTE: *Reboot the LOGIQ Fortis after performing any diagnostics before returning the LOGIQ Fortis to customer use.*

For more information, see:

- "Run Diags" on page 7-42
- "Diag History" on page 7-45
- ["Diagnostics" on page 7-90](#)

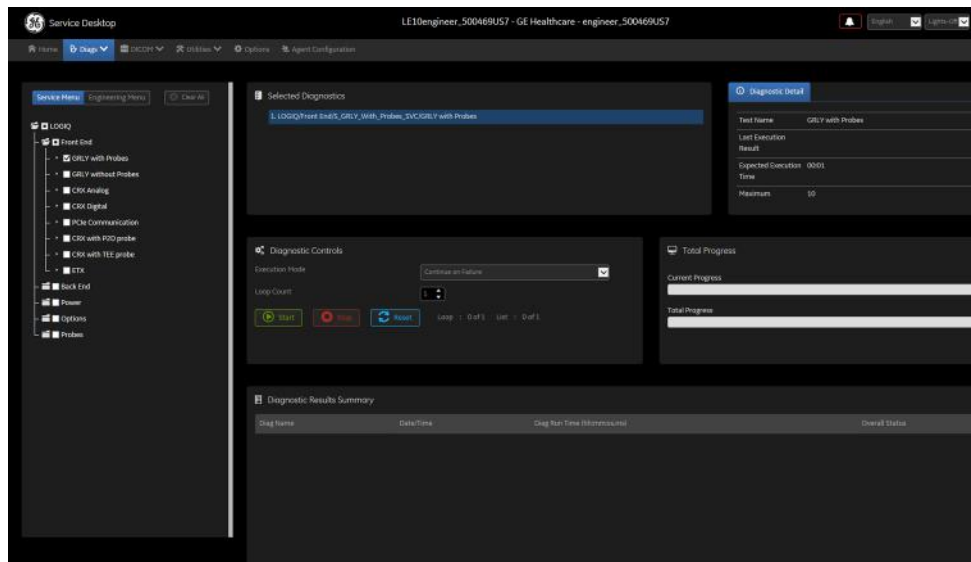
Run Diags

With Disruptive mode set to On, use **Run Diags** to run diagnostics on hardware components with the LOGIQ Fortis. For information on disruptive mode, see "Disruptive Mode" on page 7-65.

The information on **Run Diags** is available to Class C and Class M licenses.

To access **Run Diags**, navigate to **Utility (second page) > Service > Diags > Run Diags**.

Figure 7-26 Run Diags



7-4-6 Diags (cont'd)

This table shows all the elements available on **Run Diags** with descriptions.

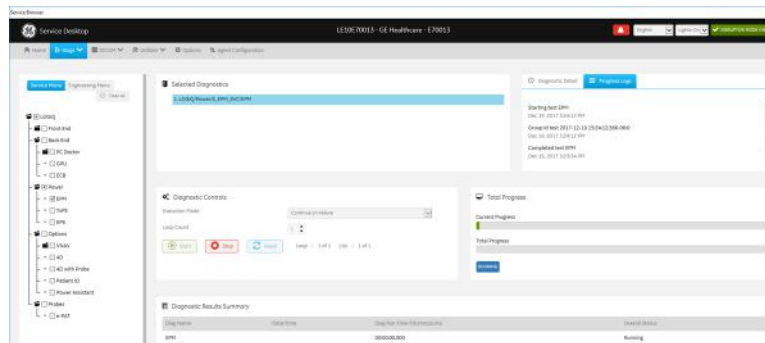
Table 7-16 Run Diags

Element	Description
Service Menu	Available service diagnostics in a diagnostics tree.
Engineering Menu	Available engineering diagnostics in a diagnostics tree.
Clear All	Resets the selections within the diagnostics tree.
Selected Diagnostics	Diagnostics that have been selected.
Diagnostic Detail	
Test Name	Name of the diagnostic.
Last Execution Result	Result of the diagnostic run.
Expected Execution Time	Time expected to run the diagnostic.
Maximum Execution Time	Maximum amount of time allowed to run the diagnostic.
Instruction	Special instructions needed in order to perform the diagnostic.
Diagnostic Controls	
Execution Mode	Way the diagnostic behaves when a failure occurs. Valid values are: <ul style="list-style-type: none"> • Continue on Failure • Finish Loop and Stop on Failure • Stop on Failure
Loop Count	Number of times to run the selected diagnostic.
Start	Starts the selected diagnostic.
Stop	Stops the selected diagnostic.
Reset	Clears the current diagnostic information.
Total Progress	
Current Progress	Progress the current diagnostic.
Total Progress	Progress for all of the selected diagnostics.
Diagnostic Results Summary	
Diag Name	Name of the diagnostic.
Date/Time	Date and time of the diagnostic run.
Diag Run Time	Amount of time taken to run the diagnostic.
Overall Status	Current status of the diagnostic.
Pass/Fail	Whether the selected diagnostic passed or failed. <ul style="list-style-type: none"> • Green – Diagnostic passed • Red – Diagnostic failed

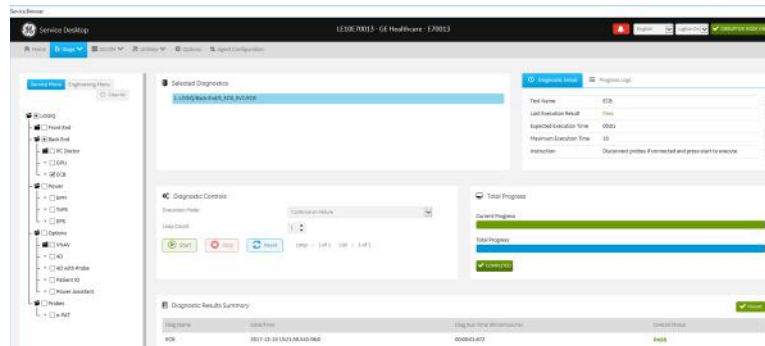
7-4-6 Diags (cont'd)

To run a diagnostic:

- 1.) Navigate to **Utility (second page) > Service > Utilities > Disruptive Mode Utility** and set Disruptive mode to On.
- 2.) Navigate to **Utility (second page) > Service > Diags > Run Diags**.
- 3.) From the **Service Menu** tab, select the diagnostic (For example, DPI_L). The **Selected Diagnostics** and **Diagnostic Detail** areas populate with information specific to the selected diagnostic.
- 4.) In **Execution Mode**, select the desired mode.
- 5.) In **Loop Count**, select the number of times to run the diagnostic.
- 6.) Click **Start**.



- 7.) View progress in the **Total Progress** area.
- 8.) View the results (Passed or Failed) in the **Diagnostic Results Summary** area.



- 9.) To view details about the diagnostics run, see "Diag History" on page 7-45.

For more information, see:

- "Diags" on page 7-42
- "Diag History" on page 7-45

7-4-6 Diags (cont'd)

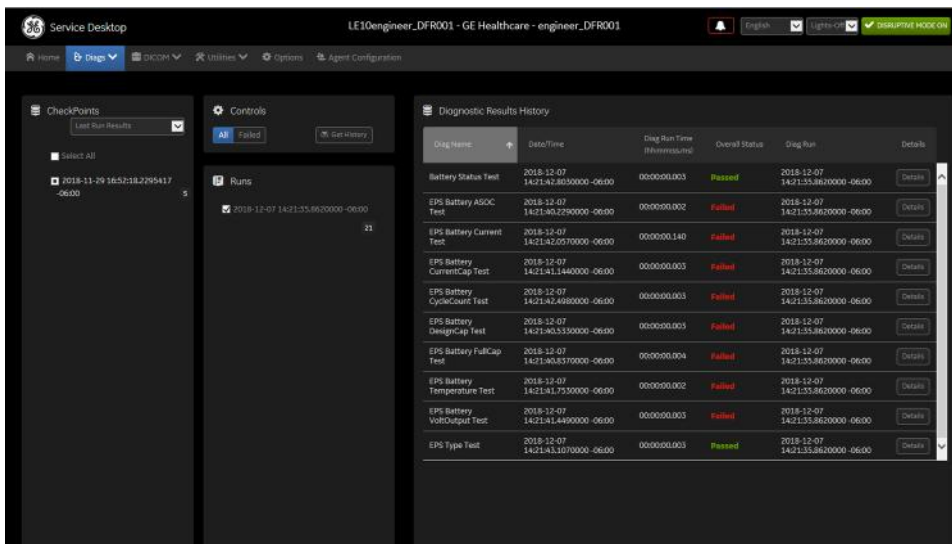
Diag History

Use **Diag History** to view a history of the diagnostics run on the LOGIQ Fortis and the results.

The information on **Diag History** is available to Class C and Class M licenses.

To access **Diag History**, navigate to **Utility (second page) > Service > Diags > Diag History**.

Figure 7-27 Diag History



This table shows all the elements available on **Diag History** with descriptions.

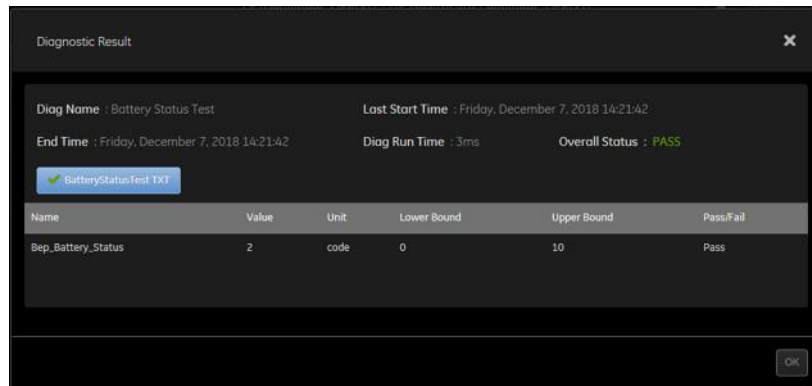
Table 7-17 Diag History

Element	Description
Checkpoints	
Select All	Selects all of the available checkpoints in the list.
Controls	
All	Filters results to show all of the diagnostics.
Failed	Filters results to show failed diagnostics.
Get History	Select to display a history of the run diagnostics.
Runs	
	List of diagnostics run on the LOGIQ Fortis.
Diagnostic Results History	
	Details about the diagnostics run.

7-4-6 Diags (cont'd)

To view a history of diagnostics:

- 1.) Navigate to **Utility (second page) > Service > Diags > Diag History**.
- 2.) Select the options that you want to view.
- 3.) Click **Get History**.
- 4.) View the results of your query.
- 5.) To view specific details, click **Details**



For more information, see:

- "Diags" on page 7-42
- "Run Diags" on page 7-42

7-4-6 Diags (cont'd)

Operator Test Panel

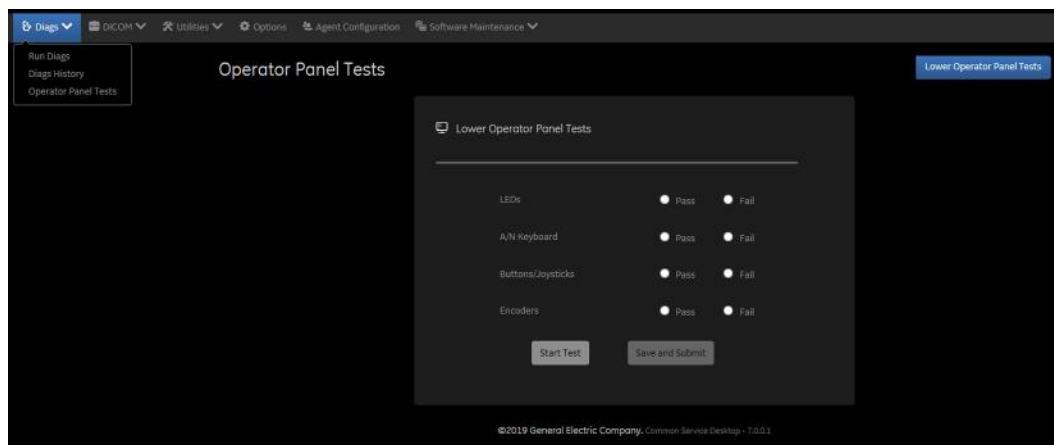
In LOGIQ Fortis uses **Operator Test Panel** to test the following controls:

- LEDs
- A/N Keyboard
- Buttons/Joysticks
- Encoders

The information on **Operator Test Panel** is available to Class C and Class M.

To access **Operator Test Panel**, navigate to **Utility (second page) > Service > Diags > Operator Test Panel**.

Figure 7-28 Operator Test Panel



7-4-7 DICOM

Use **DICOM** to troubleshoot DICOM components and connectivity. Specifically, use these pages:

- DICOM Service Status
- DICOM Spooler

For more information, see:

- "DICOM Service Status" on page 7-48
- "DICOM Spooler" on page 7-50

DICOM Service Status

DICOM Service Status displays information on the DICOM components and connectivity. Use DICOM to test the connectivity of all the available DICOM devices or individual DICOM devices. In addition, you can:

- View DICOM details
- View DICOM connectivity status
- Stop a service
- Ping a single service
- Ping all services

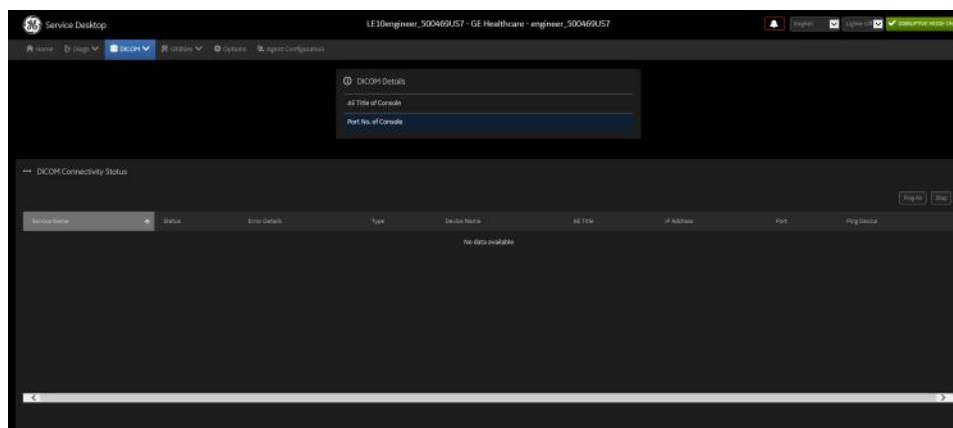
DICOM connectivity status displays as green or red.

- Green means that the DICOM ping passed
- Red means that the DICOM ping failed

The information on **DICOM Service Status** is available to Class C and Class M licenses.

To access **DICOM Service Status**, navigate to **Utility (second page) > Service > DICOM > DICOM Service Status**.

Figure 7-29 DICOM Service Status



7-4-7 DICOM (cont'd)

This table shows all the elements available on **DICOM Service Status** with descriptions.

Table 7-18 DICOM Service Status

Element	Description
DICOM Details	
AE Title of Console	Application entity title of the LOGIQ Fortis.
Port No of Console	Port number of the LOGIQ Fortis.
DICOM Connectivity Status	
Service Name	Name of the DICOM services configured for the LOGIQ Fortis.
Status	Status of the DICOM service. Valid values are: <ul style="list-style-type: none"> • OK • Not Ok • Not Ping • Ping in progress • Queued
Error Details	Details for any errors associated DICOM services.
Type	Type of error.
Device Name	Name of the device.
AE Title	Application entity title for the device.
IP Address	IP address for the device.
Port	Port for the device.
Ping Device	Select to confirm that a device is connected or not.

For more information, see:

- "DICOM" on page 7-48
- "DICOM Spooler" on page 7-50

7-4-7 DICOM (cont'd)

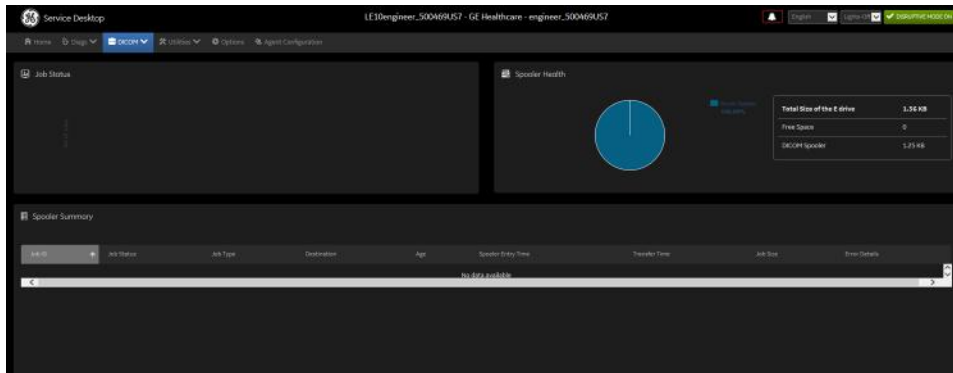
DICOM Spooler

DICOM Spooler provides a summary of the current and recent outgoing jobs.

The information on **DICOM Spooler** is available to Class C and Class M licenses.

To access **DICOM Spooler**, navigate to **Utility (second page) > Service > DICOM > DICOM Spooler**.

Figure 7-30 DICOM Spooler



7-4-7 DICOM (cont'd)

This table shows all the elements available on **DICOM Spooler** with descriptions.

Table 7-19 DICOM Spooler

Element	Description
Job Status	Displays the number of jobs for each type by status. For example, Pending.
Spooler Health	
DICOM Spooler	Space allotted to DICOM jobs on the E: drive.
Free Space	Available space on the E: drive.
Total Size of the E: Drive	Total space on the E: drive.
Spooler Summary	
Job ID	Number for the job.
Job Status	Current status of the job. These are the valid values: <ul style="list-style-type: none"> • Pending • Active • Hold • Done • Success • Failed
Job Type	Type of job. These are the valid values: <ul style="list-style-type: none"> • Storage – Images • Structured Reports • Key Image Notes • STC – Storage Commitment • MPPS – Modality Performed Procedure Step
Destination	Name of service receiving the objects.
Age	Amount of time the job has been in the spooler.
Spooler Entry time	Time the job entered the spooler.
Transfer time	Time the job was transferred from the spooler.
Job Size	Size of the job.
Error details	If applicable, details for the error.

For more information, see:

- "DICOM" on page 7-48
- "DICOM Service Status" on page 7-48

7-4-8 Utilities

Utilities configurations vary depending upon the service class.

For more information, see:

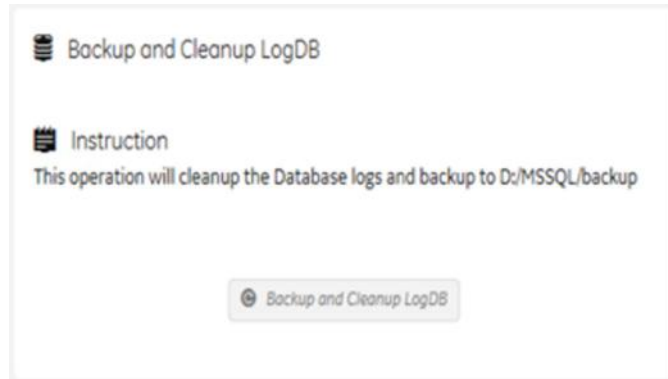
- "Backup and Clean LogDb" on page 7-53
- "Change Password" on page 7-54
- "Checkpoints" on page 7-56
- "Clean Userdefs" on page 7-58
- "Data Transfer" on page 7-60
- "Delete Files" on page 7-63
- "Disk Defragment" on page 7-64
- "Disruptive Mode" on page 7-65
- "Gather Logs" on page 7-67
- "Network Capture" on page 7-68
- "Reset Patient Database" on page 7-71
- "Resolve Agent Quarantine" on page 7-73
- "Secure Delete" on page 7-74
- "SSA License" on page 7-76
- "Software Reload" on page 7-78
- "Third Party Software Licenses" on page 7-80

7-4-8 Utilities (cont'd)

Backup and Clean LogDb

Backup and Clean LogDb allows you to

Figure 7-31 Backup and Clean LogDb



7-4-8 Utilities (cont'd)

Change Password

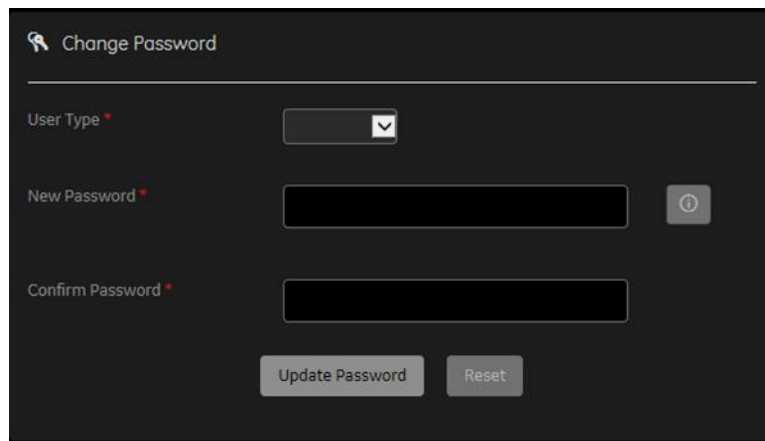
Change Password allows you to change the password for a specified user type.

CAUTION ***RISK OF LOSING DATA.***
IF THE PASSWORD IS LOST, GE WILL NOT BE ABLE TO RECOVER OR RESET IT.
LOSS OF A PASSWORD MAY RESULT IN THE LOSS OF PATIENT DATA.

The information on **Change Password** is available to all service class licenses. **Change Password** is not available through a remote connection.

To access **Change Password**, select **Utility (second page) > Service > Utilities > Change Password**.

Figure 7-32 Change Password



This table shows all the elements available on **Change Password** with descriptions.

Table 7-20 Change Password

Element	Description
User Type	Type of user for the password reset. <ul style="list-style-type: none"> • GEService – Windows user for GE Service. • SVCService – Windows user loaded with the base image load software.
New Password	New password according to the password requirements (14-25 characters including one upper cap, one lower cap, one number, and one symbol).
Confirm Password	Password you entered in New Password .
Update Password	Select to update the password.
Reset	Select to reset the information.

7-4-8 Utilities (cont'd)

To change the password:

NOTE: Before changing the GEService password (the default is SvcForward123\$), make sure the LOGIQ Fortis is connected to the network and the agent is configured. The GEService password is used to perform portions of remote service. If the password is changed and the LOGIQ Fortis information is not updated, it may slow down remote service. Both file transfer and SSH depend on the GEService password.

To change the service desktop user password:

- 1.) Navigate to **Utility (second page) > Service > Utilities**, and then select **Change Password**.
- 2.) From **User Type**, select one of the following:
 - **GEService** – This is the Windows user for GE Service. Both file transfer and SSH depend on this user and password combination. When using SSH in FFA, the user and password will always be requested. Entering the incorrect password multiple times will lock you out. When changing this password, the LOGIQ Fortis should be online (check the online icon at the bottom of the screen) so the back office updates. If the password is changed when offline, the back office will not be updated and you will have to change the password again with the LOGIQ Fortis online. There is no notification when this password has been changed. Changes to this password do not affect logs sent to the GE Service data lake.
 - **SVCService** – This is the Windows user loaded with the base image load software. You will never be prompted for this password. When it is set to default (no password selected), a randomly generated password will be supplied by the LOGIQ Fortis. If this password is changed with **Change Password**, the base image software will automatically store the new password in the LOGIQ Fortis and it will be fixed to the value entered. The SVCService password will not be requested of any user. It is only used by the LOGIQ Fortis software.



CAUTION RISK OF LOSING DATA.

**GE WILL NOT BE ABLE TO RECOVER OR RESET CHANGED PASSWORDS.
SECURELY RECORD THE NEW PASSWORD.**

- 3.) In **New Password** type a new password according to the password requirements (14-25 characters including one upper cap, one lower cap, one number, and one symbol).
- 4.) In **Confirm Password**, type the new password.
- 5.) Click **Update Password**. The following message displays if the LOGIQ Fortis is offline.

Password changed successfully, but failed to update new password at back office. This password is used by GE Remote service to perform portions of remote service. This may slow down remote service because GE will need to get the password from you. ✕

- 6.) When a SVCService user password has been changed, reboot the LOGIQ Fortis to reflect the password change.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

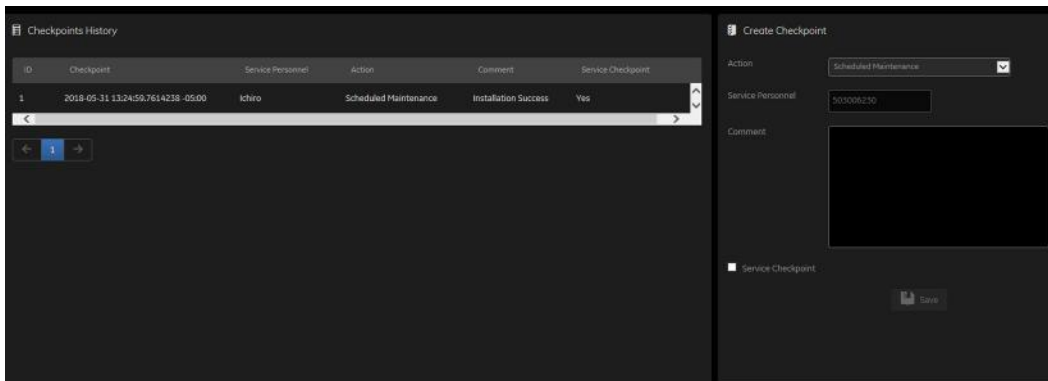
Checkpoints

Checkpoints allows for the creation of checkpoints and displays the history of those checkpoints. Checkpoints are used to indicate when the LOGIQ Fortis has been serviced, status has been reset, and information related to the service performed has been added.

The information on **Checkpoints** is available to Class C (Service Advanced and Service Expert) and Class M licenses.

To access **Checkpoints**, select **Utility (second page) > Service > Utilities > Checkpoints**.

Figure 7-33 Checkpoints



7-4-8 Utilities (cont'd)

This table shows all the elements available on **Checkpoints** with descriptions.

Table 7-21 Checkpoints

Element	Description
Checkpoints History	
Checkpoint	Displays the name of the checkpoint.
Service Personnel	Displays the ID for the logged in user.
Action	Displays the service action.
Comment	Displays comment text entered when the checkpoint was created.
Service Checkpoint	Displays whether the checkpoint is a service checkpoint or not.
Create Checkpoint	
Action	Selects the service action. Value values are <ul style="list-style-type: none"> • Scheduled Maintenance • Unscheduled Maintenance • Upgrade • FMI
Service Personnel	ID for the logged in user. Value values are: <ul style="list-style-type: none"> • SSO ID – When a Class M key is plugged in, the SSO ID for the logged in user. • Remote user ID – If there is a remote connection, the remote user ID. • User ID – If the SSO ID and remote user ID are not available, the user ID for the logged in user. • Unknown – The logged in user ID is not available.
Comment	Enter comments for creating a checkpoint.
Service Checkpoint	Select whether to mark a service checkpoint or not.
Save	Saves the information.

To create a check point:

- 1.) Navigate to **Utility (second page) > Service > Utilities > Checkpoints**.
- 2.) Under **Create Checkpoints**, from **Action**, select the action.
- 3.) In **Comment**, enter notes for the checkpoint.
- 4.) If this is a checkpoint for service, select **Service Checkpoint**.
- 5.) Click **Save**.

For more information:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Clean Userdefs

Clean Userdefs provides a way to delete user-defined data when user presets may be inhibiting proper operation. User-defined data returns to the user-defined settings to the factory default values. **Clean Userdefs** provides information to backup the current settings if you want to use them later. Disruptive mode must be On to clean user-defined data. If Disruptive mode is Off, a warning message displays asking to turn on Disruptive mode.

Before cleaning user-defined data, the LOGIQ Fortis application software automatically shuts down. Once the operation is complete, the LOGIQ Fortis reboots.

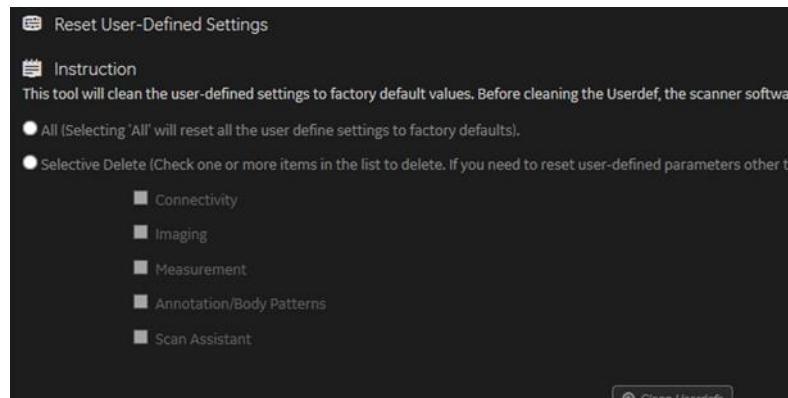
Clean Userdefs provides a way to selectively delete the following user-defined data:

- Connectivity – Deletes this file: %TEST_ROOT%\resources\userdefs\connectivity.res
- Imaging – Deletes this folder: %TEST_ROOT%\resources\userdefs\ImagingPresets\
- Measurement – Delete this folder: %TEST_ROOT%\resources\userdefs\EchoMeasure\
- Annotation/Bodymark – Deletes the folder: %TEST_ROOT%\resources\userdefs\EchoAnnotation\
- Scan Assistant – Deletes the folder: %TEST_ROOT%\resources\userdefs\EchoExamProtocol

The information on **Clean Userdefs** is available to Class C (Service Expert) and Class M licenses.

To access **Clean Userdefs**, select **Utility (second page) > Service > Utilities > Clean Userdefs**.

Figure 7-34 Clean Userdefs



7-4-8 Utilities (cont'd)

This table shows all the elements available on **Clean Userdefs** with descriptions.

Table 7-22 Clean Userdefs

Element	Description
All	When Disruptive mode is ON, deletes all of the user-defined data and returns the LOGIQ Fortis to factory default settings.
Selective Delete	When Disruptive mode is ON, deletes the selected user-defined data.
Connectivity	When Selective Delete is selected, deletes this file: D:\scanner\target\resources\userdefs\connectivity.res
Imaging	When Selective Delete is selected, deletes this folder: D:\scanner\target\resources\userdefs\ImagingPresets\
Measurement	When Selective Delete is selected, delete this folder: D:\scanner\target\resources\userdefs\EchoMeasure\
Annotation/Body Patterns	When Selective Delete is selected, deletes this folder: D:\scanner\target\resources\userdefs\EchoAnnotation\
Scan Assistant	When Selective Delete is selected, deletes this folder: D:\scanner\target\resources\userdefs\EchoExamProtocol
Clean Userdefs	Restarts the application software with a fresh database.

To clean user-defined data:

- 1.) If you want to use the current settings later, back them up now.
- 2.) Navigate to **Utility (second page) > Service > Utilities > Disruptive Mode Utility** and set Disruptive mode to On.
- 3.) Navigate to **Utility (second page) > Service > Utilities > Clean Userdefs**.
- 4.) Select the data you want to set to the default settings.
- 5.) Click **Clean Userdefs**.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Data Transfer

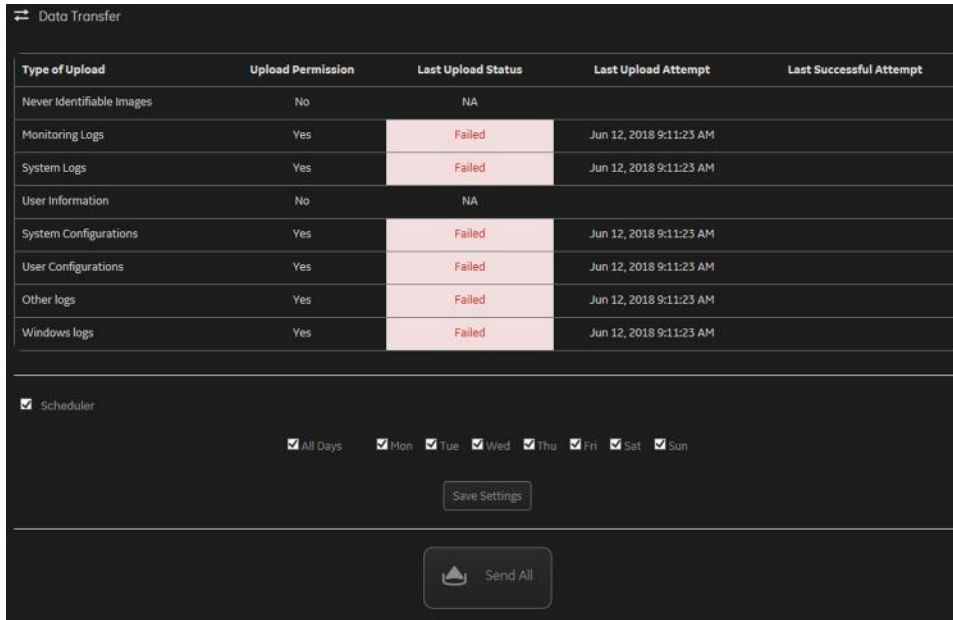
Data Transfer provides a way to do the following:

- View information about past transfers of (APM) information.
- Set up automatic/scheduled transfer of allowed data files from the LOGIQ Fortis to the server.
- Manually transfer data files allowed data files from the LOGIQ Fortis to the server.

The information on **Data Transfer** is available to all service class licenses.

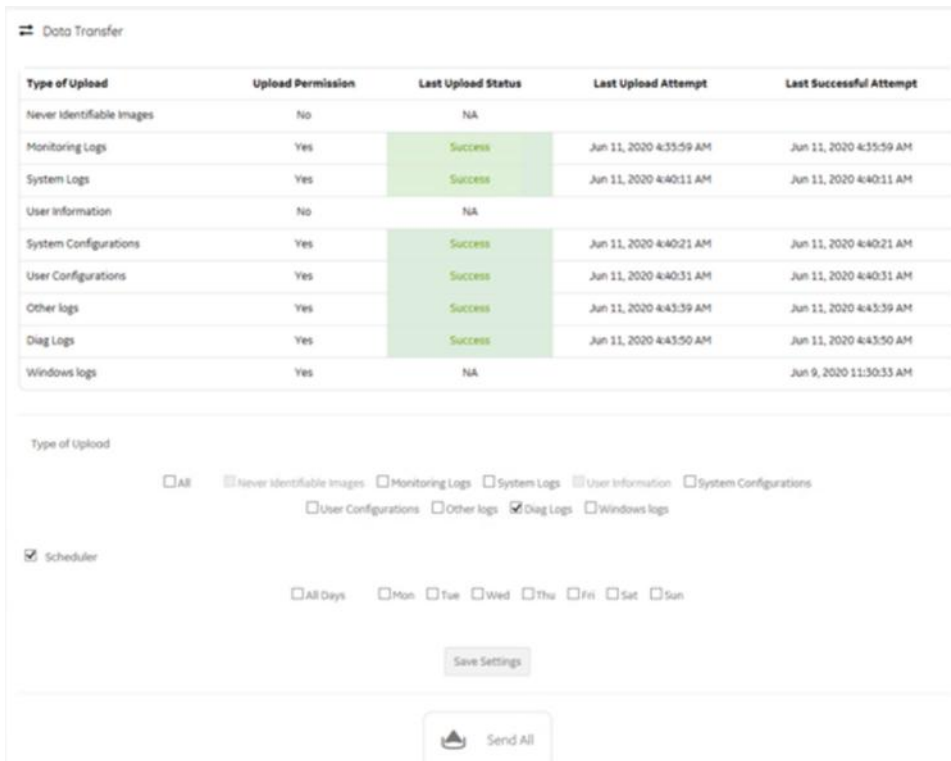
To access **Data Transfer**, select **Utility (second page) > Service > Utilities > Data Transfer**.

Figure 7-35 Data Transfer



7-4-8 Utilities (cont'd)

Figure 7-36 Date Transfer



This table shows all the elements available on **Data Transfer** with descriptions.

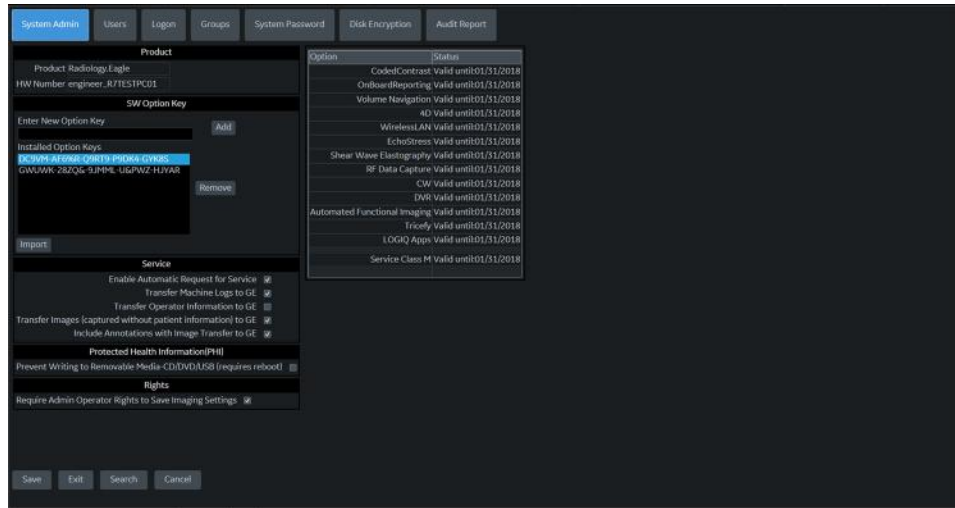
Table 7-23 Data Transfer

Element	Description
Type of Upload	Type of log file. For example, Incremental Logs or Full Logs . Monitoring Logs , System Logs , and Windows Logs are incrementally transferred when automatic transfer is enabled. To enable automatic transfer, navigate to System Admin and, under Service , check Enable Automatic Request for Service .
Upload Permission	Whether the permission to upload the log file is allowed or not.
Last Upload Status	Whether the last log file upload was successful or not.
Last Upload Attempt	Date and time the last log file upload was attempted.
Last Successful Upload	Date and time the last log file was successfully uploaded.
Type of Upload	When selected, type of log file to transfer. Making these selections will limit the data flow to the data lake.
Scheduler	When selected, enables the related day selections. For example, All Days , Monday , and Tuesday .
Save Settings	Saves the information.
Send All	Manually send the selected log files to the server.

7-4-8 Utilities (cont'd)

To configure automatic data transfers:

- 1.) Navigate to **ADMIN > System Admin**.



- 2.) On **System Admin**, configure these settings:
 - **Transfer Machine Logs to GE** – Default is checked
 - **Transfer Operator Information to GE**
 - **Transfer Images (captured without patient information) to GE** – Default is checked.
- 3.) Click **Save**.
- 4.) Navigate to **Utility (second page) > Service > Utilities > Data Transfer**.
- 5.) On **Data Transfer**, select **Scheduler**, and then select the days to perform the data transfer.
- 6.) Click **Save Settings**.
- 7.) To manually perform a data transfer, click **Send All**.

For more information:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Delete Files

Delete Files displays all the files and folders present in the D:\Service folder and allows for their deletion. Deleting unneeded files improves performance and reduces the need to defragment the disk drive.

The information on **Delete Files** is available to all service class licenses.

To access Delete Files, select **Utility (second page) > Service > Utilities > Delete Files**.

Figure 7-37 Delete Files



This table shows all the elements available on **Delete Files** with descriptions.

Table 7-24 Delete Files

Element	Description
Delete Files	Displays the files that are available for deletion.
Delete	Deletes the selected files.

To delete files:

- 1.) Navigate to select **Utility (second page) > Service > Utilities > Delete Files**.
- 2.) Under **Delete Files**, select the available folders and files that you want to delete.
- 3.) Click **Delete**.
- 4.) In the resulting dialog box, click **Delete** and then click **OK**.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

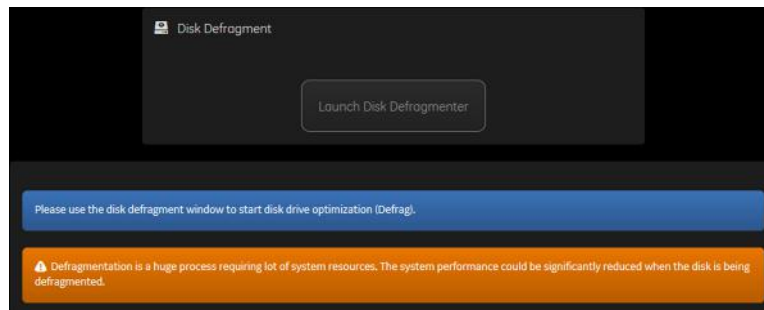
Disk Defragment

Disk Defragment provides a way to launch the Windows Disk Defragmenter tool to use to defragment the disks. Disk fragmentation can reduce the amount of disk space available, and slow computing speed. Use the disk defragmenter to restore optimum disk space and speed performance. If LOGIQ Fortis performance would be significantly reduced when the disk is being defragmented, a warning message displays. It is not possible to analyze the SSH drives.

The information on **Disk Defragment** is available to Class C (Service Advanced and Service Expert) and Class M licenses. **Disk Defragment** is not available through a remote connection.

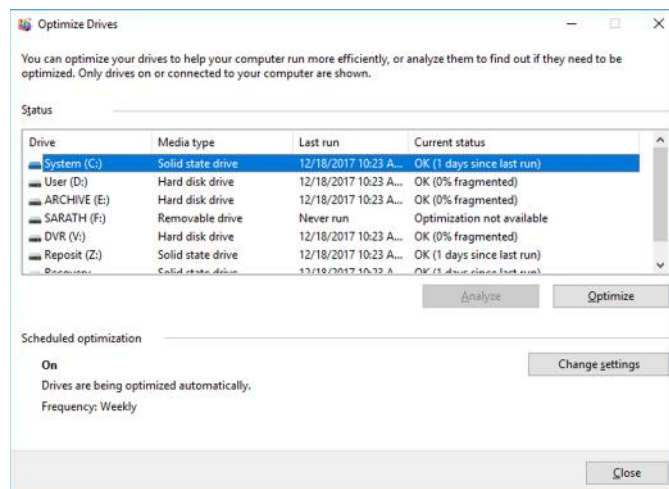
To access **Disk Defragment**, select **Utility (second page) > Service > Utilities > Disk Defragment**.

Figure 7-38 Disk Defragment



To analyze, optimize, or schedule optimization for a disk:

- 1.) Navigate to **Utility (second page) > Service > Utilities > Disk Defragment**.
- 2.) Click **Launch Disk Defragmenter**.
- 3.) In the **Optimize Drives** dialog box, select the drive.



- 4.) To analyze the selected drive, click **Analyze**.
- 5.) To optimize the selected drive, click **Optimize**.
- 6.) To set up a schedule, click **Change settings** and select the schedule.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Disruptive Mode

Disruptive Mode provides a way to enable and disable Disruptive mode. When enabled, Disruptive mode allows a remote user to access the LOGIQ Fortis which can disrupt normal operation of the LOGIQ Fortis. Disruptive mode can be remotely turned on when the logged-in user has Authorize Remote Service Access privilege. If the logged-in user does not have remote service privilege, displays this error message: "You do not have the required permission to perform this operation."

When initiating Disruptive mode from a remote location, a message displays on the LOGIQ Fortis asking whether the user will allow Disruptive mode and notifying them that normal operation might be disturbed.

- If **Yes** is selected, then Disruptive mode is turned on.
- If **No** is selected, then Disruptive mode is not turned on and an error message displays saying that permission to change the mode was denied.

When Disruptive mode is On, the GE icon in the status bar changes to red and displays this message: "Due to Service testing restart needed."

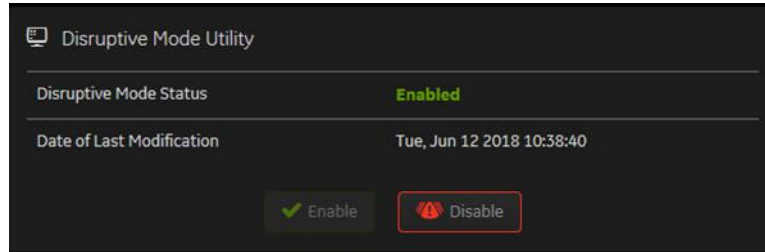
When Disruptive mode is changed to Off, the GE icon turns white and displays this message: "Due to Service testing restart needed." In addition, VCO and SSH stop if running.

The information on **Disruptive Mode** is available to Class C (Service Advanced and Service Expert) and Class M licenses.

7-4-8 Utilities (cont'd)

To access **Disruptive Mode**, select **Utility (second page) > Service > Utilities > Disruptive Mode Utility**.

Figure 7-39 Disruptive Mode



This table shows all the elements available on **Disruptive Mode Utility** with descriptions.

Table 7-25 Disruptive Mode Utility

Element	Description
Disruptive Mode Status	Indicates whether the LOGIQ Fortis is in Disruptive mode or not. Valid values are: ✦ Enabled – Disruptive mode is on. ✦ Disabled – Disruptive mode is off.
Date of Last Modification	Date the LOGIQ Fortis was last enabled or disabled.
Start SSH	Select this check box and then select Enable to place the LOGIQ Fortis into Disruptive mode and start the Secure Shell (SSH) server. The SSH server can also be started from the SSH utility.
Stop SSH	Select this check box and then select Enable to place the LOGIQ Fortis into Disruptive mode and stop the Secure Shell (SSH) server. The SSH server can also be stopped from the SSH utility.
Start VNC	Select this check box and then select Enable to place the LOGIQ Fortis into Disruptive mode and start the Virtual Network Computing (VNC) server. The VNC server can also be started from the Virtual Console Observation utility.
Stop VNC	Select this check box and then select Enable to place the LOGIQ Fortis into Disruptive mode and stop the Virtual Network Computing (VNC) server. The VNC server can also be stopped from the Virtual Console Observation utility.
Enable	Select to enable Disruptive mode.
Disable	Select to disable Disruptive mode.

For more information:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

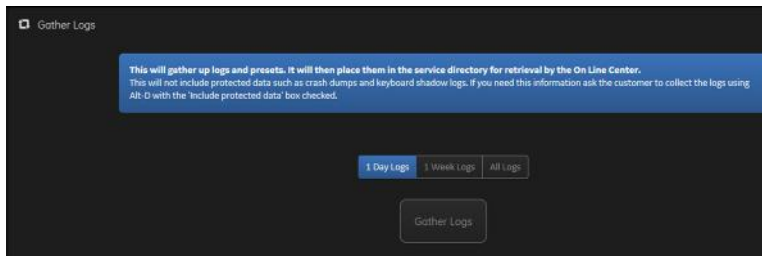
Gather Logs

Gather Logs provides a way to collect system logs and place the log files in the D:\Service directory for retrieval by the online center. These log files do not include protected data such as crash dumps and keyboard shadow logs. The customer can collect logs (including protected data) using Alt+D when Protected Data is checked. Log files are compressed into a .zip file and the file path and name display. If the application software is not running, use the **Gather Logs** shortcut on the Windows desktop.

The information on **Gather Logs** is available to all service class licenses.

To access **Gather Logs**, select **Utility (second page) > Service > Utilities > Gather Logs**.

Figure 7-40 Gather Logs



This table shows all the elements available on **Gather Logs** with descriptions.

Table 7-26 Gather Logs

Element	Description
1 Day Logs	When selected, gathers log files for one day.
1 Week Logs	When selected, gathers log files for one week.
All Logs	When selected, gathers all available log files.
Gather Logs	Select to gather the log files for the selected time period.

To gather log files:

- 1.) Navigate to **Utility (second page) > Service > Utilities > Gather Logs**.
- 2.) Select one of the following:
 - 1 Day Logs
 - 1 Week Logs
 - All Logs
- 3.) Click **Gather Logs**. In the resulting dialog box, record the location of the log files and click **OK**.
- 4.) When the gather log operation is complete, click the notification icon in the banner to view the location of the log files.



For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

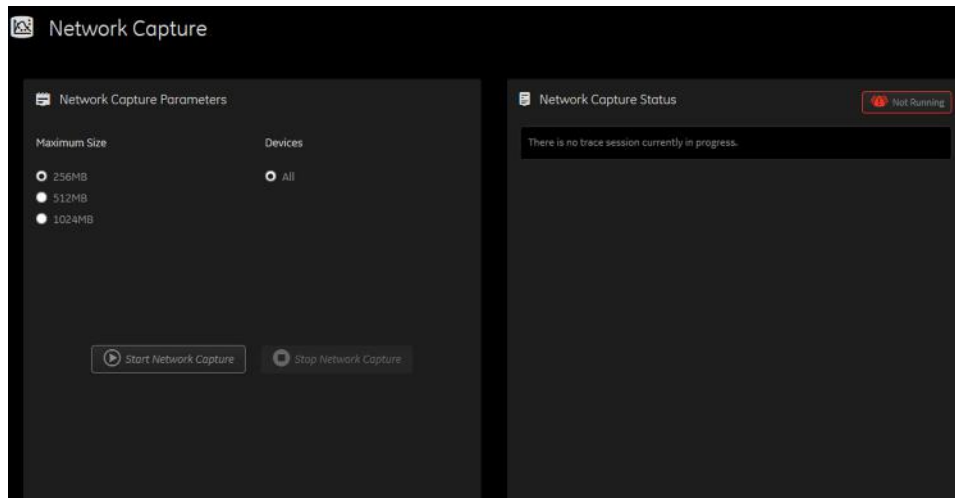
Network Capture

Network Capture displays network traffic between the LOGIQ Fortis and configured devices. A network capture outputs two log files: one for main logging with no protected information and another including protected information. These log files are useful when debugging connectivity issues. Because these log files can be large, they are only kept for one week.

The information on **Network Capture** is available to all service class licenses.

To access **Network Capture**, select **Utility (second page) > Service > Utilities > Network Capture**.

Figure 7-41 Network Capture



7-4-8 Utilities (cont'd)

This table shows all the elements available on **Network Capture** with descriptions.

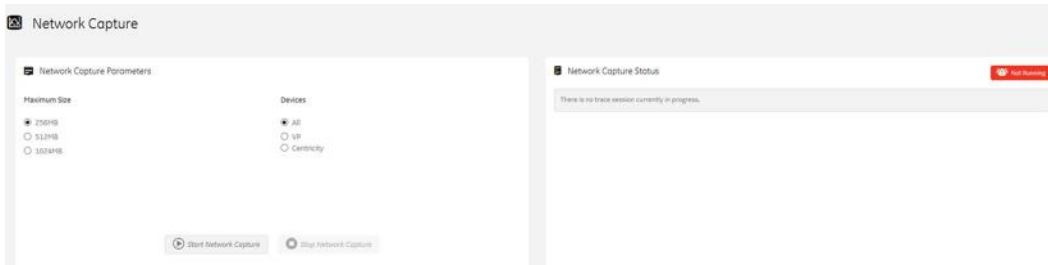
Table 7-27 Network Capture

Element	Description
Network Capture Parameters	
Maximum Size	Allowed size of the generated log file. Valid value are: <ul style="list-style-type: none"> • 256MB • 512MB • 1024MB
Devices	DICOM-configured devices for which you want to capture information. If no additional devices are configured, only All will be available.
Start Network Capture	Select to start the process. This causes the network capture to start, enables the Stop button, and updates the Network Capture Status pane and changes the Status to Running .
Stop Network Capture	Select to stop the process.
Network Capture Status	
	Displays information about the status of the network capture. The language setting for this information is set in Windows and not through the Service desktop or LOGIQ Fortis application software.
	Displays the current status of the network capture. Valid values are: <ul style="list-style-type: none"> • Not Running • Running

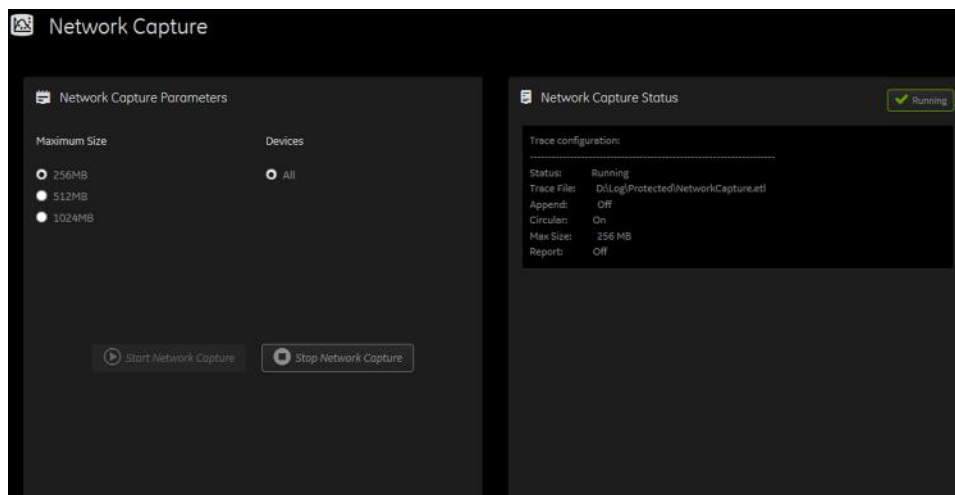
7-4-8 Utilities (cont'd)

To perform a network capture:

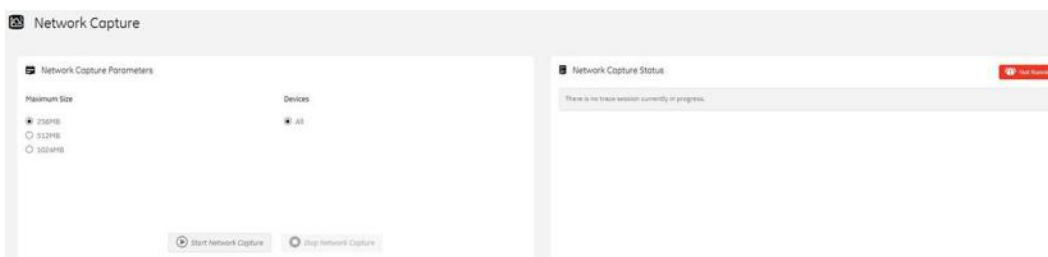
- 1.) Navigate to **Utility (second page) > Service > Utilities > Network Capture**.



- 2.) From **Network Capture**, do the following:
 - Under **Maximum Size**, select the allowed size of the generated log file.
 - Under **Devices**, select the DICOM-configured device for which you want to capture information. If no additional devices are configured, only **All** will be available.
- 3.) Select **Start Network Capture** to start the process. This causes the network capture to start, enables the **Stop** button, and updates the **Network Capture Status** pane and changes the **Status** to **Running**.



- 4.) Click the **Stop** button to end data collection. Stopping is a two-step process:
 - Stops the data collection and immediately closes the .etl file.
 - Collects additional diagnostic data that may help diagnose network issues. When the file is closed, you see "There is no trace session currently in progress". When the remaining data is collected and the .cab file is closed, you are notified in the banner.



For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Reset Patient Database

Reset Patient Database resets the LOGIQ Fortis patient database. This operation automatically shuts down the application before cleaning the patient database. Once the operation is complete, the LOGIQ Fortis reboots with an empty database. Disruptive mode must be On to reset the patient database. If Disruptive mode is Off, a warning message displays asking to turn on Disruptive mode.

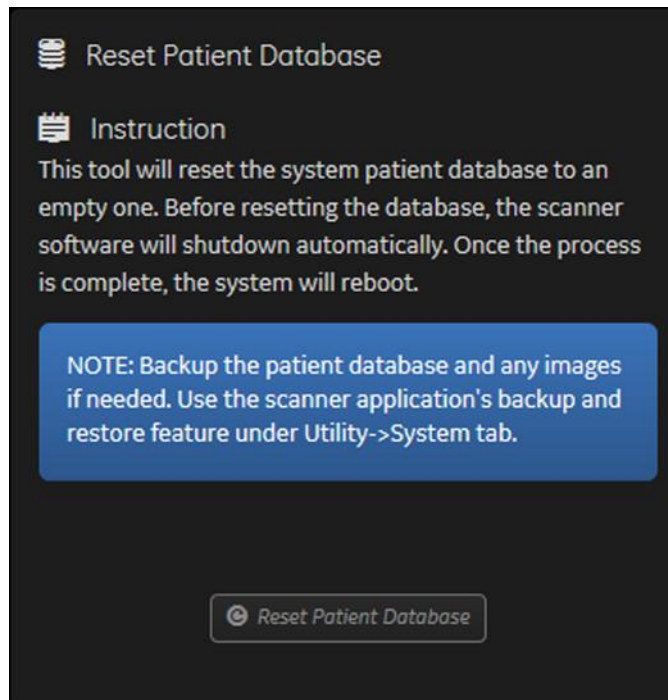
Reset Patient Database deletes the contents of the following folders:

- E:\Scanner\GEMS_IMG
- E:\Scanner\GEMS_REP

The information on **Reset Patient Database** is available to Class C (Service Expert) and Class M licenses.

To access **Reset Patient Database**, select **Utility (second page) > Service > Utilities > Reset Patient Database**.

Figure 7-42 Reset Patient Database



7-4-8 Utilities (cont'd)

This table shows all the elements available on **Reset Patient Database** with descriptions.

Table 7-28 Reset Patient Database

Element	Description
Instruction	Information about the database reset.
Reset Patient Database	When Disruptive mode is ON, resets the LOGIQ Fortis patient database.

To reset the patient database:

- 1.) Back up the patient database.
- 2.) Navigate to **Utility (second page) > Service > Utilities > Disruptive Mode Utility** and set Disruptive mode to On.
- 3.) Navigate to **Utility (second page) > Service > Utilities > Reset Patient Database**.
- 4.) Click **Reset Patient Database**.
- 5.) Confirm the patient database has been emptied.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Resolve Agent Quarantine

LOGIQ Fortis **Resolve Agent Quarantine** is available on the Service Desktop. **Resolve Agent Quarantine** allows you to move the LOGIQ Fortis out of quarantine after an agent update.

Figure 7-43 Resolve Agent Quarantine - Submit

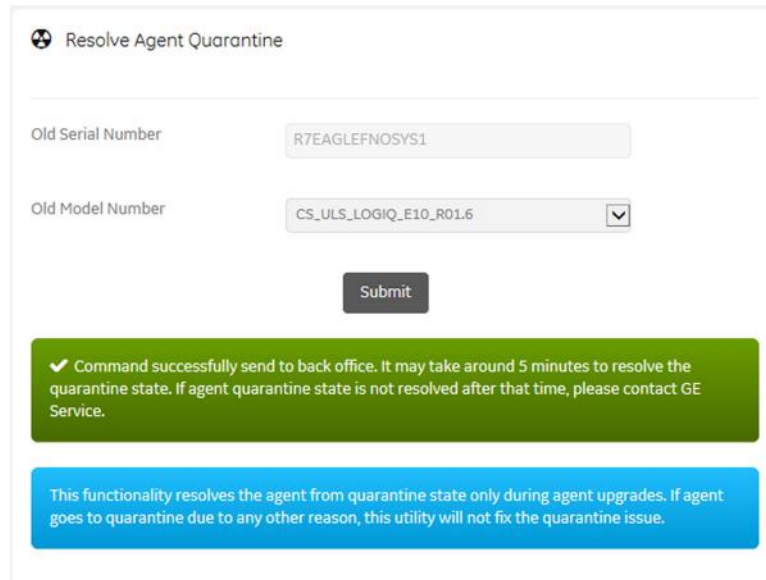
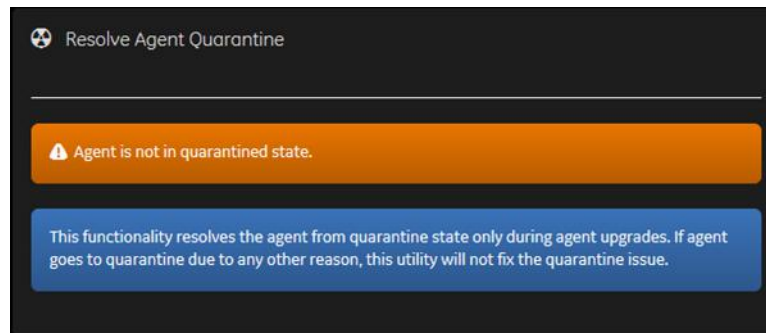


Figure 7-44 Resolve Agent Quarantine - No Quarantine



To resolve a quarantine in Agent Configuration:

- 1.) From **Utility (second page) > Service > Utilities**, select **Resolve Agent Quarantine**.
- 2.) View the information in **Old Serial Number** and **Old Model Number**.
- 3.) If the information is correct, select **Submit**.

7-4-8 Utilities (cont'd)

Secure Delete

Secure Delete will be available on the Service desktop. As part of Privacy and Security, this utility allows you to delete files on the D:/ and E:/ drives returning the LOGIQ Fortis to a factory clean state, including the deletion of log files, unless presets are restored.

Secure Delete does not provide a report or log file that can be used as report.

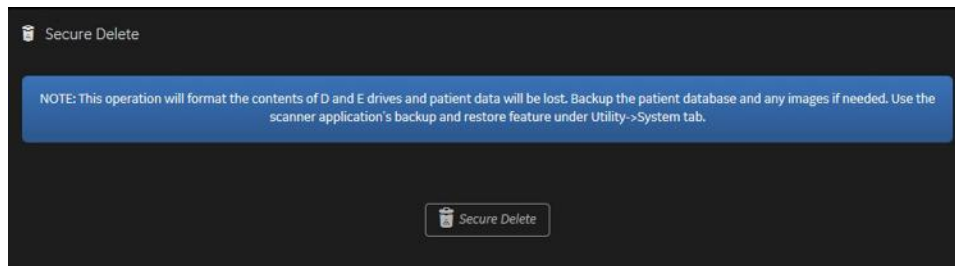
The **Secure Delete** deletion process encrypts the data on the E:/ drive and then deletes the recovery keys. This renders all data on the E:/ drive unrecoverable. The D:/ and E:/ drives are then reformatted. An empty database is then loaded onto the E:/ drive, and if any are selected, userdefs (presets) are reloaded onto the D:/ drive.

NOTE: Use the **Delete Files** utility to improve performance. This utility deletes image files from the Service folder but does not render the data unrecoverable.

The information on **Secure Delete** is available to all service classes. **Secure Delete** is not available through a remote connection.

To perform a secure deletion of files on the D:/ and E:/ drives:

- 1.) Insert an activated SSA key.
- 2.) Navigate to **Utility (second page) > Service > Utilities > Disruptive Mode Utility** and set Disruptive mode to On.
- 3.) From **Utilities**, select **Secure Delete**. The Secure Delete utility displays.

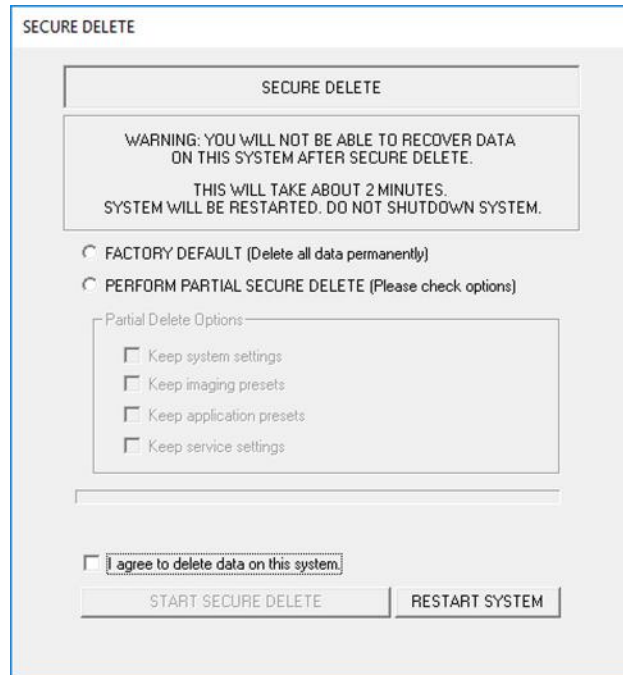


- 4.) Select **Secure Delete**, and then select **OK**.



7-4-8 Utilities (cont'd)

- 5.) In the **Secure Delete** selection dialog box, select one of the following:
- **Factory Default:** This selection deletes all information on the D:/ and E:/ drives and reformats these drives to the factory default settings.
 - **Perform Partial Secure Delete:** This selection enables the **Partial Delete Options** and allows you to select from the check boxes. Partial Delete Options allows you to keep information per customer request.



- 6.) If you selected **Perform Partial Secure Delete**, under **Partial Delete Options**, select from the following:
- **Keep system settings** – Select to retain general system configuration, measurement, analysis, video, and backup and restore settings made under **Utility > System**.
 - **Keep imaging presets** – Select to retain exam and imaging parameter settings made under **Utility > Imaging**.
 - **Keep application presets** – Select to retain application- and user-specific settings made under **Utility > Application**.
 - **Keep service presets** – Select to retain remote connectivity settings made under **Utility > Connectivity**.
- 7.) Select the **I agree to delete data on this system** check box.
- 8.) Select **Start Secure Delete**. After performing secure delete, the LOGIQ Fortis automatically restarts.

NOTE: To terminate the Secure Delete dialog box and immediately restart the LOGIQ Fortis, use the Restart System button.

7-4-8 Utilities (cont'd)

SSA License

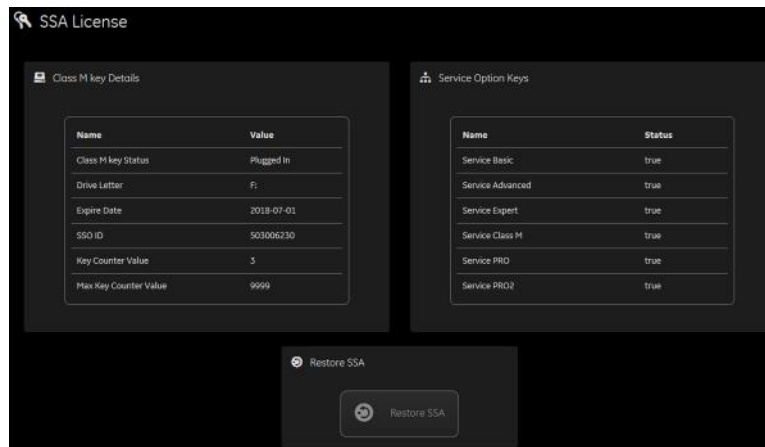
SSA License provides a way to do the following:

- When inserted, view the details of an SSA key.
- View the status of the service class options.
- Restore an SSA license when the SSA key is not validating or when a remote log in shows as a Class A user.

The information on **SSA License** is available to all service class licenses.

To access **SSA License**, select **Utility (second page) > Service > Utilities > SSA License**.

Figure 7-45 SSA License



This table shows all the elements available on **SSA License** with descriptions.

Table 7-29 SSA License

Element	Description
Class M Key Details	
Class M Key Status	Status of the SSA key. Valid values are: <ul style="list-style-type: none"> • Not Plugged In • Plugged In
Drive Letter	Drive where the SSA key is plugged into the LOGIQ Fortis.
Expire Date	Date the SSA key is set to expire.
SSO ID	Identifier for the user assigned to the SSA key.
Key Counter Value	Number of times the SSA key has been used.
Max Key Counter Value	Number of remaining times the SSA key can be used.
Service Option Keys	
Name	Name of the service class option.
Status	Status of the access to the associated service class option. Valid values are: <ul style="list-style-type: none"> • True • False
Restore SSA	Restores the SSA license to the SSA key.

7-4-8 Utilities (cont'd)

To view the Class M license information:

- 1.) Insert the SSA key.
- 2.) Navigate to **Utility (second page) > Service > Utilities > SSA License**.
- 3.) Under **Class M key Details**, view the values. For example, the **SSO ID** for the user assigned to the SSA key.

If **Not Available** displays for all of these values, the SSA key is not validating.

To restore an SSA key that is not validating:

- 1.) Remove the SSA key from the LOGIQ Fortis.
- 2.) If open, close the Service desktop.
- 3.) Restart the LOGIQ Fortis.
- 4.) Once the LOGIQ Fortis has restarted, plug in the SSA key.
- 5.) Navigate to **Utility (second page) > Service > Utilities > SSA License**.
- 6.) Click **Restore SSA**.
- 7.) Check to see if the SSA key validates.

For more information, see:

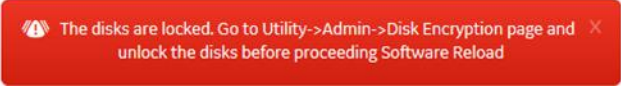
- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

Software Reload

Software Reload displays versions of the base image, application software, base patch, service platform, and documentation packages currently installed on the LOGIQ Fortis. **Software Reload** reimages the C:\ drive and installs the base image.

Software Reload indicates whether the disks have been encrypted. If the disk is encrypted AND locked, when you open Software Reload, this message displays instead of the Software Reload button.



The disks are locked. Go to Utility->Admin->Disk Encryption page and unlock the disks before proceeding Software Reload

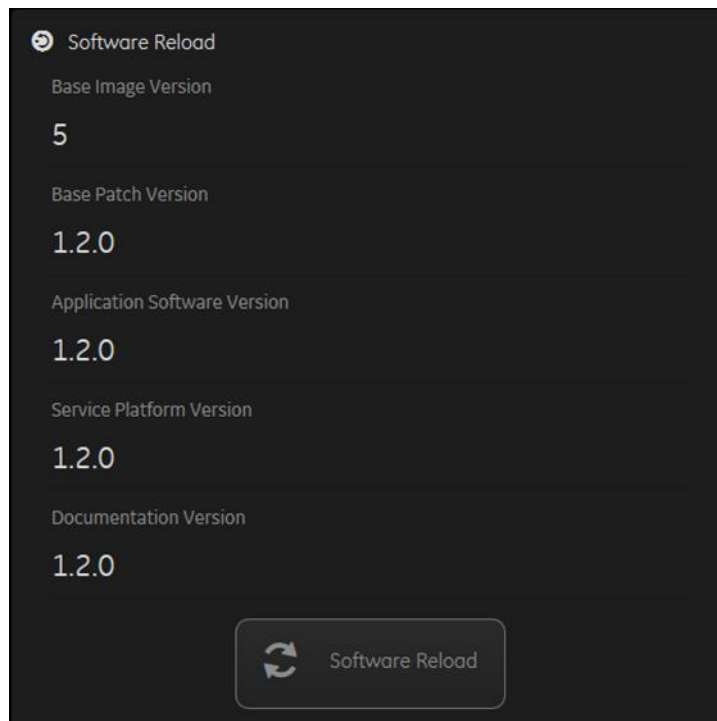
The message above will **not** prompt if Encryption is Off, On with disks unlocked automatically, or On with the key stored on USB/password is entered manually (Disks not locked.)

With Disruptive mode set to On, reload these software versions from repository partition on the hard drive. The software reload is automatic without any loss of presets, patient data, or connectivity settings.

The information on **Software Reload** is available to Class C (Service Expert) and Class M licenses.

To access **Software Reload**, select **Utility (second page) > Service > Utilities > Software Reload**.

Figure 7-46 Software Reload



7-4-8 Utilities (cont'd)

This table shows all the elements available on **Software Reload** with descriptions.

Table 7-30 Software Reload

Element	Description
Base Image Version	Displays the version number of the base image software.
Base Patch Version	Displays the version number of the base patch.
Application Software Version	Displays the version number of the application software.
Service Platform Version	Displays the version number of the service platform.
Documentation Version	Displays the version number for the documentation.
Software Reload	Reloads the versions listed.

To reload software:

- 1.) If the drives are encrypted, obtain the recovery key.
- 2.) Navigate to **Utility (second page) > Service > Utilities > Disruptive Mode Utility** and set Disruptive mode to On.
- 3.) Navigate to **Utility (second page) > Service > Utilities > Software Reload**.
- 4.) If the disk is encrypted AND locked, follow the instructions on this message and then return to Software Reload.



- 5.) View the current version numbers.
- 6.) Click **Software Reload**.

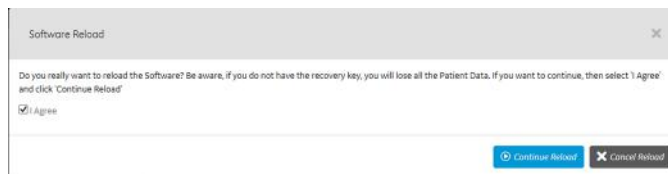


CAUTION RELOADING SOFTWARE WITHOUT A RECOVERY KEY WILL RESULT IN THE LOSS OF PATIENT DATA.

- 7.) If you have a recovery key, select **I have a recovery key** and then click **Continue**.



- 8.) If you have a recovery key, select **I Agree** and then click **Continue Reload**.



- 9.) If the SVCService and/or GEService passwords have been changed, these passwords will need to be updated on **Change Password** after software is reloaded.

For more information, see:

- "Utilities" on page 7-52

7-4-8 Utilities (cont'd)

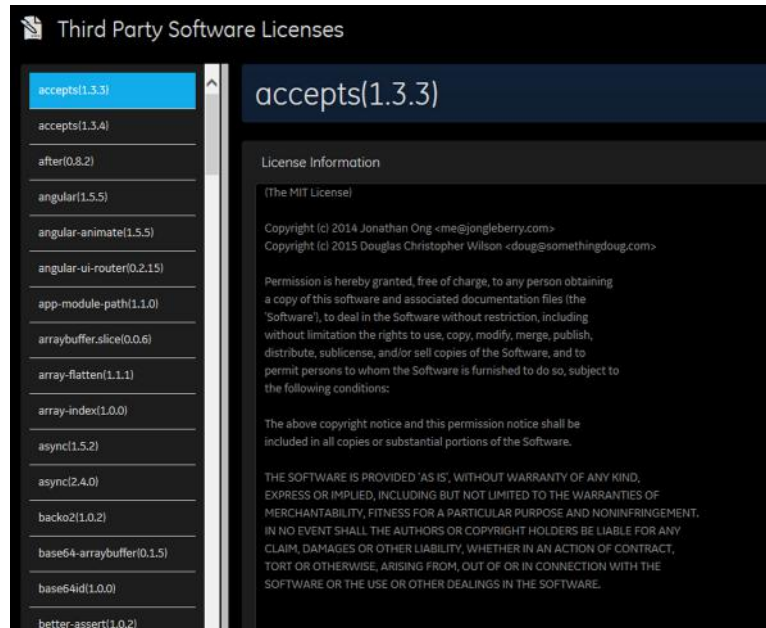
Third Party Software Licenses

Third Party Software Licenses displays the third-party software licenses used as part of the service platform.

The information on **Third Party Software Licenses** is available to all service class licenses.

To access **Third Party Software Licenses**, select **Utility (second page) > Service > Utilities > Third Party Software Licenses**.

Figure 7-47 Third Party Software Licenses



For more information, see:

- "Utilities" on page 7-52

7-4-9 Options

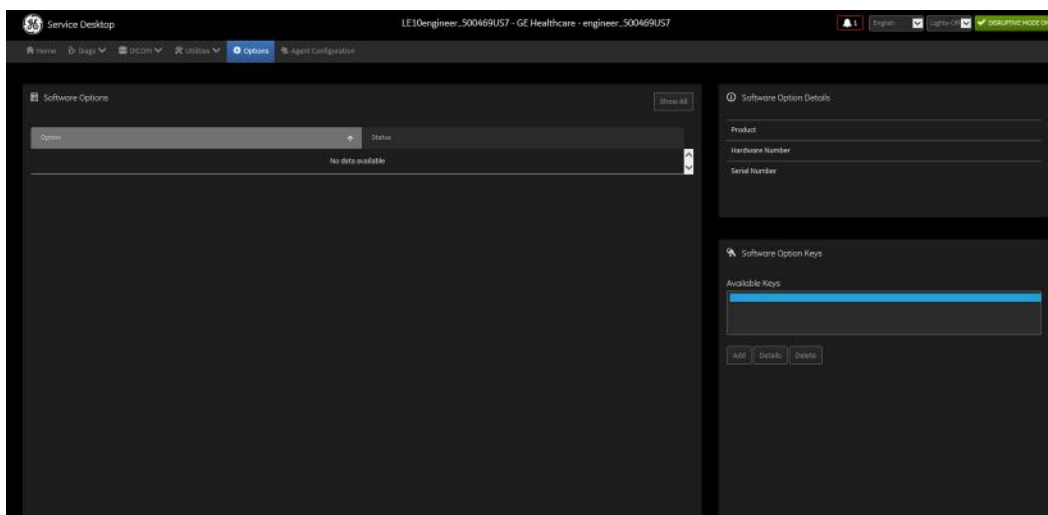
Use **Options** to:

- View software options.
- View software option details.
- Add (or delete) a valid option key, add a duplicate option key, not add an invalid option key, and ask for confirmation before deleting an option key.
- View software option key details. Key details are a list of options that are enabled by a particular key. Under **Available Keys**, highlight the option string, select **Details** and then view the options on the left side of the screen. Press **Show All** to view all of the activated options.

The information on **Options** is available to all service class licenses.

To access **Options**, navigate to **Utility (second page) > Service > Options**.

Figure 7-48 Options



This table shows all the elements available on **Options** with descriptions.

Table 7-31 Options

Element	Description
Software Options	
Option	Software options on the LOGIQ Fortis.
Status	Status of the options on the LOGIQ Fortis.
Software Option Details	
Product	Name of the product.
Hardware Number	Number for the hardware. The hardware number is the hash of the serial number that is used to generate the option key.
Serial Number	Serial number of the LOGIQ Fortis.
Software Option Keys	
Available Keys	List of the option keys installed on the LOGIQ Fortis.

7-4-10 Agent Configuration

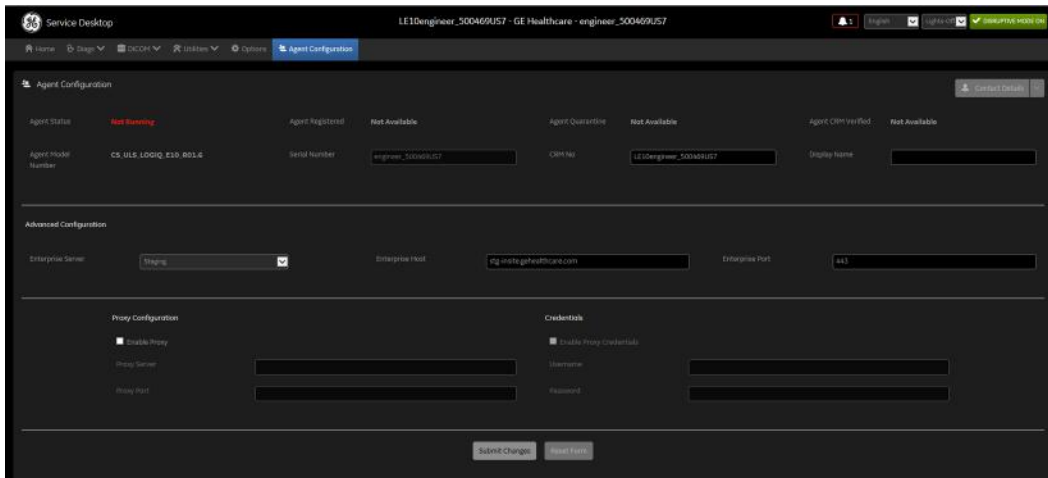
Use **Agent Configuration** to:

- Edit and configure the following:
 - Enterprise host name in the agent
 - Enterprise port number in the agent
 - URL for software downloads
 - Proxy server in the agent
 - Proxy port in the agent
 - CRM number in the agent
 - Display name in the agent
- Set the serial number in the agent
- Enter the username and password for the proxy
- Reset the edited unsaved value
- Update contact details

The information on **Agent Configuration** is available to all service class licenses.

To access **Agent Configuration**, navigate to **Utility (second page) > Service > Agent Configuration**.

Figure 7-49 Agent Configuration



This table shows all the elements available on **Agent Configuration** with descriptions.

Table 7-32 Agent Configuration

Element	Description
Agent Configuration	
Contact Details	Phone number for the person at the customer site a GE remote service engineer would contact. The phone number is entered during installation and reviewed at every service call to make sure the information is correct.
Agent Status	Status for the agent. Valid values are: <ul style="list-style-type: none"> • Running • Not Running

Table 7-32 Agent Configuration (Continued)

Element	Description
Agent Registered	Registration status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – The agent is not configured or running.
Agent Quarantine	Quarantine status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent has more than one device registered with the same CRM Number in the back office. This scanner cannot send data back to GE or be remotely accessed. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – The agent is not configured or running.
Agent CRM Verified	Verification status of the Customer Relationship Management (CRM) number for the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The CRM number for the agent is verified in the back office. • No – The CRM number for the agent is not verified in the back office. • Not Available – The agent is not configured or running.
Agent Model Number	GE part number for the LOGIQ Fortis. The same number as listed on the rating plate.
Serial Number	Serial number of the agent (read-only). If the agent is not registered with a serial number, this field is populated with the serial number of the LOGIQ Fortis. The serial number of the agent is tied to the serial number of the LOGIQ Fortis.
CRM No	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region. CRM is pre-populated by adding LFortis to the CRM number. The CRM number of the LOGIQ Fortis is editable.
Display Name	Displayed name of the agent.
Agent Connected	Connection status of the agent. Valid values are: <ul style="list-style-type: none"> • Yes – The agent is connected to the back office. • No – The agent is not connected to the back office. • Not Available – The agent is not configured or running.
Last Connected Time	When Agent Connected is Yes, the last time the LOGIQ Fortis successfully connected to the agent. When Agent Connected is No, this field does not display.
Advanced Configuration	
Server	Name of the enterprise server. Should be set to Production . Do not use the IP address of the enterprise server using the "other" selection as Windows 10 has removed the ability to bypass a certificate error that occurs when using the IP address. This error can block connectivity.
Enterprise Host	Number of the enterprise host. Should be set to insite.gehealthcare.com .
Enterprise Port	Number of the enterprise port. Should be set to 443 .
Software Download URL	Address where software will be downloaded from to the LOGIQ Fortis.
Proxy Configuration	
Enable Proxy	Enables the proxy server.
Proxy Server	When Enable Proxy is selected, name of the proxy server IP provided by the customer.
Proxy Port	When Enable Proxy is selected, number of the proxy server port provided by the customer.
Credentials	
Enable Proxy Credentials	Enables the proxy credentials.
Username	When Enable Proxy Credentials is selected, name of the user provided by the customer.

Table 7-32 Agent Configuration (Continued)

Element	Description
Password	When Enable Proxy Credentials is selected, password for the user provided by the customer.
Submit Changes	Saves the changes made on the Agent Configuration page. Once Submit Changes has been selected, exit the Agent Configuration page. Wait between 4 and 5 minutes and then reopen the Agent Configuration page. Agent Status should display Running .
Reset Form	Clears the values on the Agent Configuration page.

7-4-11 Software Maintenance

In LOGIQ Fortis uses **Software Maintenance** to manage software updates including check for pending updates and initiate the download for installation. Additionally, use these pages to reset declined software packages and view information about installed software.

*NOTE: Use **Software Maintenance** after a full load/C only load from media as the LOGIQ Fortis will lose any downloaded updates after these software loads.*

Specifically, use these pages:

- **Software Updates** – Query and view available software updates.
- **Reset Declined Packages** – Reset software updates declined through the **Software Download and Install** dialog box.
- **Software Information** – View information that is currently installed on the LOGIQ Fortis.

For more information, see:

- "Software Updates" on page 7-86
- "Reset Declined Packages" on page 7-87
- "Software Information" on page 7-88

7-4-11 Software Maintenance (cont'd)

Software Updates

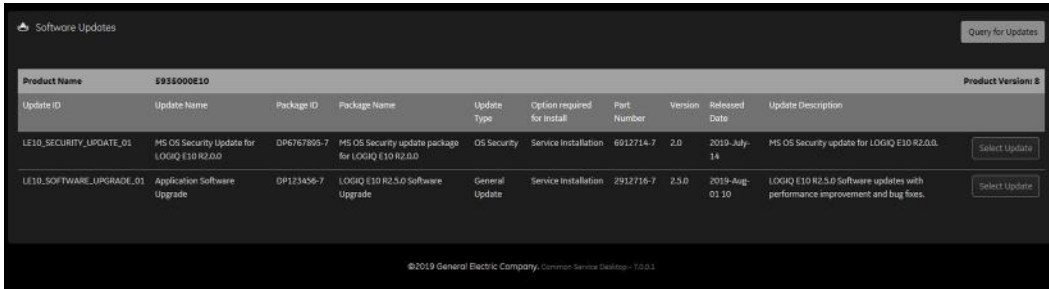
Software Updates provides a way to do the following:

- Query for available software updates
- View available software updates
- Select and download from the available software updates

The information on **Software Updates** is available to all service classes.

To access **Software Updates**, navigate to **Utility (second page) > Service > Software Maintenance > Software Updates**.

Figure 7-50 Software Updates



This table shows all the elements available on **Software Updates** with descriptions.

Table 7-33 Software Updates

Element	Description
Product Name	Model number for the LOGIQ Fortis.
Product Version	Version for the LOGIQ Fortis.
Update ID	Identifier for the software update.
Update Name	Name for the software update.
Package ID	Identifier for the package.
Package Name	Name for the package.
Update Type	Type for the software update. Valid values include: <ul style="list-style-type: none"> • OS Security • General Update
Option required for install	Requirement for installation of the related software update. Valid values include: <ul style="list-style-type: none"> • Service installation
Part Number	Part number for the software update.
Version	Version for the software update.
Released Date	Date the software update was released.
Update Description	Description for the software update.
Query for Updates	Select to populate the page with the available software updates.
Select Update	Select to initiate the download of the associated software update.

7-4-11 Software Maintenance (cont'd)

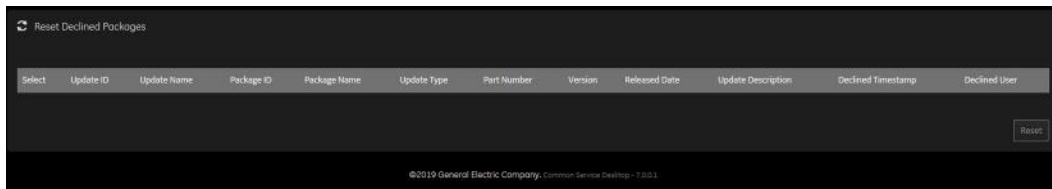
Reset Declined Packages

Reset Declined Packages provides a way to reset software updates that have been previously declined through software download.

The information on **Reset Declined Packages** is available to all service classes. **Reset Declined Packages** is not available through a remote connection.

To access **Reset Declined Packages**, navigate to **Utility (second page) > Service > Software Maintenance > Reset Declined Packages**.

Figure 7-51 Reset Declined Packages



This table shows all the elements available on **Reset Declined Packages** with descriptions.

Table 7-34 Reset Declined Packages

Element	Description
Select	Check box for the associated software update that has been declined.
Update ID	Identifier for the software update.
Update Name	Name for the software update.
Package ID	Identifier for the package.
Package Name	Name for the package.
Update Type	Type for the software update. Valid values include: <ul style="list-style-type: none"> OS Security General Update
Part Number	Part number for the software update.
Version	Version for the software update.
Released Date	Date the software update was released.
Update Description	Description for the software update.
Declined Timestamp	Timestamp for when the software update was declined.
Declined User	Name for the user who declined the software update.
Reset	Clears the declined software update so that it is again available through a query on Software Updates .

7-4-11 Software Maintenance (cont'd)

Software Information

Software Information displays general information about the software currently installed on the LOGIQ Fortis.

The information on **Software Information** is available to all service classes. **Software Information** is not available through a remote connection.

To access **Software Updates**, navigate to **Utility (second page) > Service > Software Maintenance > Software Information**.

Figure 7-52 Software Information

The screenshot displays the 'Software Information' interface, which is divided into two main sections: 'Installed Packages' and 'Installed HotFixes'. The 'Installed Packages' section contains a table with the following data:

Package Type	Part Number	Version	Installed Date
Base Image	582194	582194.1E	2019-08-13T14:43:100
Application Software	5821700-6	2.0.0	13 August 2019, 06:21 PM
Service Platform	5821703	1.0	13 August 2019, 06:16 PM
Online Help	5822741	1.0	13 August 2019, 06:21 PM
Security Package	5822741	1.0	13 August 2019, 06:21 PM
Base Image Update	5821701-6	1.0	13 August 2019, 06:14 PM

The 'Installed HotFixes' section contains a table with the following data:

Hot Fix ID	Installed On	Description
KB4013393	Monday, April 8, 2019 12:00:00 AM	Update
KB4054590	Friday, November 16, 2018 12:00:00 AM	Update
KB4054855	Monday, April 8, 2019 12:00:00 AM	Update
KB4132216	Saturday, August 25, 2018 12:00:00 AM	Update
KB4346087	Friday, April 26, 2019 12:00:00 AM	Update
KB4485447	Monday, April 8, 2019 12:00:00 AM	Security Update

On the right side of the interface, there is a 'Windows Defender Status' section displaying the following details:

- AMEngineVersion: 1.1.15800.1
- AMProductVersion: A.10.14393.2848
- AMServiceEnabled: True
- AMServiceVersion: A.10.14393.2848
- AntiSpywareEnabled: True
- AntiSpywareSignatureAge: 137
- AntiSpywareSignatureLastUpdated: 4/5/2019 10:46:01 AM
- AntiSpywareSignatureVersion: 1.291.1238.0
- AntivirusEnabled: True
- AntivirusSignatureAge: 137
- AntivirusSignatureLastUpdated: 4/5/2019 10:46:03 AM
- AntivirusSignatureVersion: 1.291.1238.0
- Real-timeMonitoringEnabled: True

At the bottom of the interface, the copyright notice reads: ©2019 General Electric Company. Common Service Desktop - 7.0.0.1

7-4-11 Software Maintenance (cont'd)

This table shows all the elements available on **Software Information** with descriptions.

Table 7-35 Software Information

Element	Description
Installed Packages	
Package Type	Type for the software update.
Part Number	Part number for the software update.
Version	Version for the software update.
Installed Date	Date the software update was installed.
Installed Hotfixes	
Hot Fix ID	Identifier for the hot fix.
Installed On	Date the hot fix was installed.
Description	Description for the hot fix.
Windows Defender Status	Status information for Windows Defender.

Section 7-5 Diagnostics

Contents in this section

7-5-1	Purpose of this section	7-90
7-5-2	Available diagnostics	7-91
7-5-3	Service Diagnostics List	7-92

7-5-1 Purpose of this section

This section describes the available diagnostics.

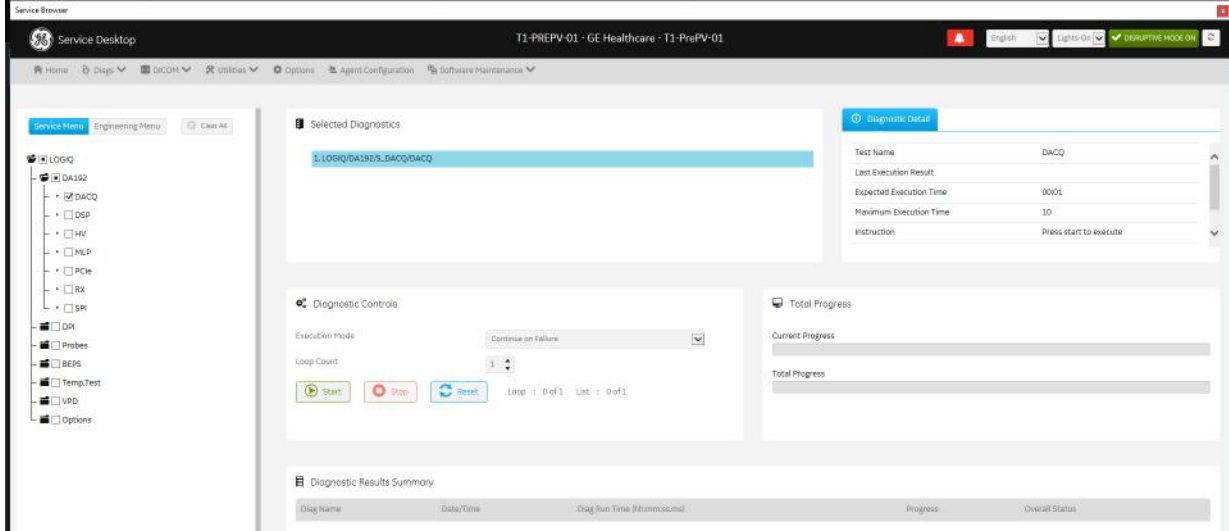
NOTE: Reboot the LOGIQ Fortis after performing any diagnostics and before returning it to customer use.

7-5-2 Available diagnostics

To enter service diagnostic mode, use **Utility (second page) > Service > Diags > Run Diags**.

See "Service Diagnostics List" on page 7-92 for more information.

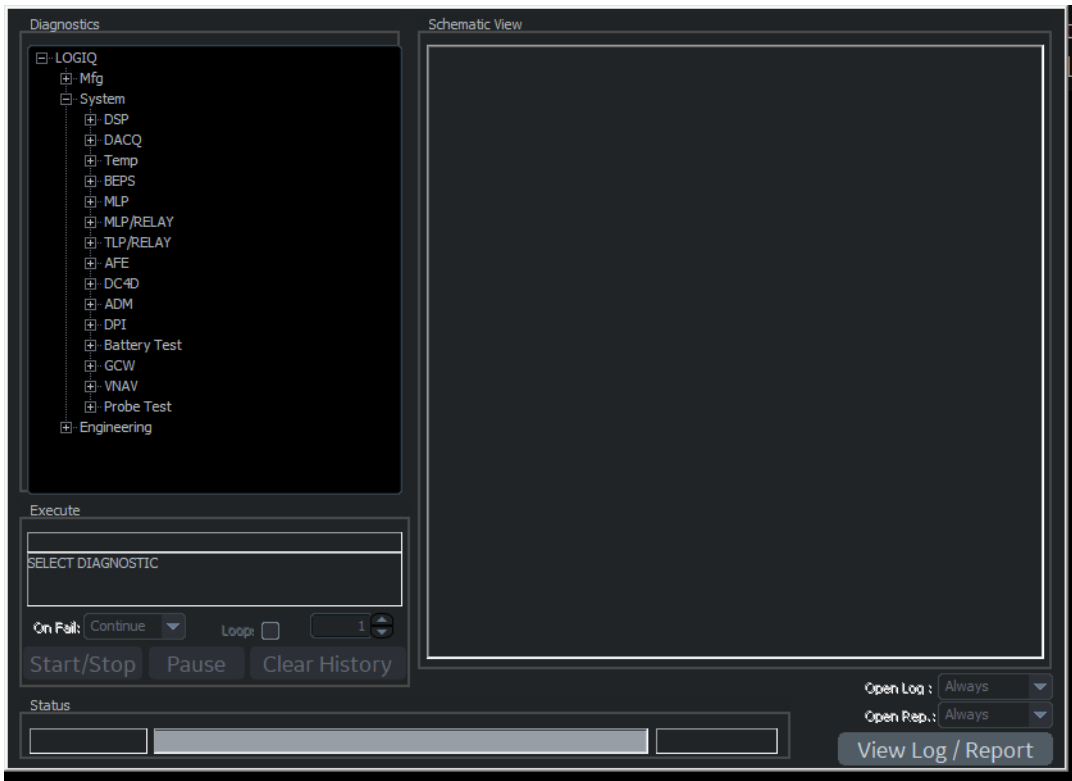
Figure 7-53 Run Diags Display



To enter into engineering diagnostic mode, press **ALT+F2**.

NOTE: Do not use engineering diagnostic mode unless requested by engineering. Some of the tests require special tools that are not available in the field.

Figure 7-54 Alt+F2 Display



7-5-3 Service Diagnostics List

	Diag.	Description	Test
DA192	DACQ	DACQ FPGA test	A_DACQ_Access_Test
			A_DACQ_Memory_Test
			A_DMAConfigurationTest
	DSP	DSP IC test	A_DSP_DDR3_Test
			A_DSP_EMIF_Test
			A_DSP_SRIO_Test
	HV	High voltage (for TX) test including Power Sequencer check, and Emergency HV stop check	A_ADM_I2C_Test
			A_HV_Stop_Test
			A_TX_Power_Control_Test
	MLP	TX Pulser IC test	A_MLP_MEMORY_Test
			A_MLP_SPI_Test
	PCIe	PCIe signal communication test	A_PCl_e_ClearRegisters_Test
			A_PCl_e_ReadRegisters_Test
			A_PCl_e_ReceiveImagePath_NonRdma_Test
			A_PCl_e_ReceiveImagePath_Rdma_Test
			A_PCl_e_Communication_Test
RX	AFE RX test	A_AnalogReceivePathHi_Test	
		A_AnalogReceivePathLow_Test	
		A_AnalogReceivePathMed_Test	
		A_NoiseFloorTest	
SPI	SPI test	DSP AFE SPI Test	
DPI-L	I2C Probes Test	I2C communicaiton test between Probe and System	I2C Probes Test
	LVDS SAP Test	NA	NA
Probes	EPAT	Probe Channel check test	E-PAT Test
	I2C	I2C communication test between Probe and System	I2C Probes Test
	TEE	NA	NA

	Diag.	Description	Test
BEPS	PC Doctor	PC Doctor test	AVI Playback
			CDR
			DVD Read Only
			DVD-R
			Essential Test No Network
			Essential Test
			HD Test Long
			HD Test Short
			Keyboard
			LAN Network interface
			LAN Network interface reliability test
			Memory
			Monitor
			Mouse
			Sound
			RTC clock
			USB Ports Test
Video cards			
WLAN	Wireless LAN Option test	Wireless Network interface	
		Wireless Network interface reliability test	
Temp.Test	DA192	DA192 Temperature monitoring test	DA192 Temperature Test
	GPU	GPU Temperature monitoring test	GPU Temperature Test
	COMe	CPU module Temperature monitoring test	SOM Temperature Test
VPD	DA192/DP(L)/BEPS	Vital Product Data communication test	VPD I2C Test
Option	4D basic test without Probe	4D Motor controller (DC4D) Option, basic test without Probe	Presence Test
			Version Test
	4D with Probe	4D Motor controller (DC4D) Option test with 4D Probe	Static 3D Test
			4D Test
	Battery	Battery Option (Power Assistant or Scan-on-Battery) test	A_Battery_Status_Test
	CW	CW doppler Option (GCW) test	A_CWTest_g1_Polaris
			A_CWTest_g8_Polaris
			A_CWTest_g16_Polaris
			A_CWTest_g24_Polaris
			A_CWTest_g96_Polaris
A_CWDopplerBeamformerTest_Polaris			
A_CWChannelSelectionSwitchControlTest			
A_CWSummingGainControlTest_Polaris			

	Diag.	Description	Test
Option	Vnav	Volume navigation(Baybird2) test, including Sensor test and Transmitter test	Sensor 1
			Sensor 2
			Sensor 3
			Sensor 4
			Transmitter
			System

7-5-3-1 DA192 diagnostics

Name: DACQ

Table 7-36 DACQ Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
DACQ FPGA test	A_DACQ_Access_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > DACQ . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	-
	A_DACQ_Memory_Test			-
	A_DMAConfigurationTest			-

Name: DSP

Table 7-37 DSP Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
DSP IC test	A_DSP_DDR3_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > DSP . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	-
	A_DSP_EMIF_Test			-
	A_DSP_SRIO_Test			-

Name: HV

Table 7-38 HV Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
High voltage (for TX) test including Power Sequencer check, and Emergency HV stop check	A_ADM_I2C_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > HV . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	-
	A_HV_Stop_Test			-
	A_TX_Power_Control_Test			-

Name: MLP

Table 7-39 MLP Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
MLP	TX Pulsar IC test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > MLP . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	-
				-

Name: PCIe

Table 7-40 PCIe Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
PCIe signal communication test	A_PcCle_ClearRegisters_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > PCIe . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192. If still Fail, replace BEPS.	-
	A_PcCle_ReadRegisters_Test			-
	A_PcCle_ReceiveImagePath_NonRdma_Test			-
	A_PcCle_ReceiveImagePath_Rdma_Test			-
	A_PcCle_Communication_Test			-

Name: RX

NOTE: Perform RX test only at first. RX test may be Fail when all DA192 tests are performed at one time. If you do all DA192 test at one time, perform RX test after re-booting system (Workaround).

Table 7-41 RX Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
AFE RX test	A_AnalogReceivePathHi_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select DA192 > RX . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	Perform RX test only at first. RX test may be Fail when all DA192 tests are performed at one time. If you do all DA192 test at one time, perform RX test after re-booting system (Workaround).
	A_AnalogReceivePathLow_Test			
	A_AnalogReceivePathMed_Test			
	A_NoiseFloorTest			

Name: SPI

Table 7-42 SPI Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
SPI test	DSP AFE SPI Test	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select DA192 > SPI. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Confirm if DA192 and BEPS are inserted to BackPlane properly. If still Fail, replace DA192.	-

7-5-3-2 DPI-L diagnostics

Name: I2C Probe Test

Table 7-43 I2C Probe Test Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
I2C Probes Test	I2C communicaiton test between Probe and System	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select DPI > I2C Probe Test. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Confirm if Probe is connected to DPI-L board properly. Confirm if Probe-Connector-Pin is clean. If still Fail, try to use another Probe. If still Fail, replace DPI-L board. If still Fail, replace BEPS board.	-

Name: LVDS SAP Test

NOTE: DO NOT perform this test. Always Fail without Engineering loopback-JIG.

Table 7-44 LVDS SAP Test Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
NA	NA	NA	NA	DO NOT perform this test. Always Fail without Engineering-loopback-JIG.

7-5-3-3 Probes diagnostics

Name: E-PAT Test

NOTE: E-PAT does not support Pencil probes and 6Tc probe. E-PAT may not work properly with 6S-D, L3-12-D, M5Sc-D, ML6-15D.

Table 7-45 E-PAT Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
Probe Channel check test	E-PAT Test	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select Probes > e-PAT. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	<p>This test is pass or fail. Passing means that the test is complete. Not that the probe has passed.</p> <p>If test fails, it is probably due to an unsupported/improperly connected probe or a malfunctioning probe. To keep track of probe performance, graph the results for comparison over time.</p>	<p>EPAT does not support Pencil probes and 6Tc probe .</p> <p>EPAT may not work properly with 6S-D, L3-12-D, M5Sc-D, ML6-15D</p>

Name: I2C Probe Test

Table 7-46 I2C Probe Test Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
I2C communication test between Probe and System	I2C Probes Test	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select Probes > I2C Probe Test 3. Select the Execution Mode and Loop Count. 4. Select Start. 	<p>Confirm if Probe is connected to DPI-L board properly.</p> <p>Confirm if Probe-Connector-Pin is clean.</p> <p>If still Fail, try to use another Probe.</p> <p>If still Fail, replace DPI-L board.</p> <p>If still Fail, replace BEPS board.</p>	-

Name: TEE Probe Test

NOTE: DO NOT perform this test. Always Fail without Engineering loopback-JIG.

Table 7-47 TEE Probe Test Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
NA	NA	NA	NA	DO NOT perform this test. Always Fail without Engineering-loopback-JIG.

7-5-3-4 BEPS diagnostics
Name: PC Doctor Test

Description	Test		If the test fails...	NOTE
PC Doctor test	AVI Playback	Not used	-	-
	CDR	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > CDRk . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the DVD-R drive.	-
	DVD Read Only	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > DVD Read Only . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the DVD-R drive.	-
	DVD-R	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > DVD-R . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the DVD-R drive.	-
	Essential Test No Network	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > Essential Test No Network . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the BEPS.	-
	Essential Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > Essential Test . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Due to the network, check the network connection and setup. This test expects the network to be connected and active. And the network connection is up and active, replace the BEPS.	-
	HD Test Long	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > HD Test Long . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the SSD.	-

Description	Test		If the test fails...	NOTE
PC Doctor Test	HD Test Short	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > HD Test Short 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Replace the SSD.	-
	Keyboard	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > Keyboard. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	If there are any errors, keys may be damaged and you may have to replace or repair the keyboard.	-
	LAN Network interface	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > LAN Network Interface. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	<p>Check the ICM and internal LAN cable.</p> <p>Check the BEPS.</p>	Overall test result may indicate FAIL, please confirm Diag detail result on ServiceDesktop, then wired-LAN or wireless-LAN test result can be confirmed.
	LAN Network interface reliability test	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > LAN Network interface reliability test. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	<p>Check the ICM and internal LAN cable.</p> <p>Check the BEPS.</p>	Overall test result may indicate FAIL, please confirm Diag detail result on ServiceDesktop, then wired-LAN or wireless-LAN test result can be confirmed.
	Memory	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > Memory. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Replace the SOM	DO NOT perform this test. Test result may not be displayed depends on the SW-version.
	Monitor	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > Monitor. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Replace the monitor	-
	Mouse	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > Mouse. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	Replace the trackball.	-
	Sound	<ol style="list-style-type: none"> 1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags, select BEPS > PC Doctor > Sound. 3. Select the Execution Mode and Loop Count. 4. Select Start. 	If no sound is produced in these tests, choose the More Info button in the Audio Test dialog box for information about possible causes and solutions.	-

Description	Test		If the test fails...	NOTE
PC Doctor Test	RTC clock	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > Sound . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace the battery on the BEPS board. If the test still fails, replace the BEPS board. If still fail, replace the SOM.	-
	USB Ports Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > USB Ports Test . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Check the USB device.	-
	Video cards	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > PC Doctor > Video cards . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace VCS. If still fail, replace BEPS. If still fail, replace SOM.	-

Name: WLAN

Table 7-48 WLAN Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
Wireless LAN Option test	Wireless Network interface	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select BEPS > WLAN . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm Wireless network setting. If still fail, replace Wifi module. if still fail, replace SOM. If still fail, replace BEPS. If still fail, replace BackPlane.	-
	Wireless Network interface reliability test			-

7-5-3-5 Temp. Test diagnostics
Name: DA192

Table 7-49 DA192 Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
DA192 Temperature monitoring test	DA192 Temperature Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Temp. Test > DA192 Temperature Test 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace DA192. If still fail, replace BEPS.	-

Name: GPU

Table 7-50 GPU Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
GPU Temperature monitoring test	GPU Temperature Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Temp. Test > GPU Temperature Test 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace GPU. If still fail, replace BEPS	-

Name: COMe

Table 7-51 COMe Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
CPU module Temperature monitoring test	SOM Temperature Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Temp. Test > SOM Temperature Test 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace SOM. If still fail, replace BEPS	-

7-5-3-6 VPD diagnostics
Name: DA192/DPI-L/BEPS

Table 7-52 DA192/DPI-L/BEPS Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
Vital Product Data communication test	VPD I2C Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select VPD> VPD I2C Test 3. Select the Execution Mode and Loop Count . 4. Select Start .	Specify Failed board by LOG file or VPD editor. Replace defect board.	-

7-5-3-7 Option diagnostics

Name: 4D basic test without Probe

Table 7-53 4D basic test without Probe Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
4D Motor controller (DC4D) Option, basic test without Probe	Presence Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Option > 4D basic test without Probe . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Check to see if the option is installed. If the option is installed, replace DC4D. If still Fail, replace BEPS.	-
	Version Test			-

Name: 4D basic test with Probe

Table 7-54 4D basic test with Probe Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
4D Motor controller (DC4D) Option test with 4D Probe	Static 3D Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Option > 4D basic test with Probe . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Check to see if the option is installed. If the option is installed, try to use another 4D probe. If still Fail, replace DC4D. If still Fail, replace DPI-L.	-
	4D Test			-

Name: Battery

Table 7-55 Battery Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
Battery Option (Power Assistant or Scan-on-Battery) test	A_Battery_Status_Test	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Option > Battery . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Confirm if Battery Cable (of each Battery Pack, both of Power-cable and Signal-cable) is connected to BBG2 board. Confirm if BBG2 Power cable and signal cable are connected to BEPS properly. If installed Option is Power-Assistant(2 packs), confirm the assembled-Battery location is same as Installation-manual. if still fail, replace BBG2. if still fail, replace all Battery Packs. If still fail, replace Harness between BBG2 and BEPS.	-

Name: CW

Table 7-56 CW Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
CW doppler Option (GCW) test	A_CWTest_g1_Polaris	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Option > CW . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Replace GCW. If still fail, replace DA192.	-
	A_CWTest_g8_Polaris			-
	A_CWTest_g16_Polaris			-
	A_CWTest_g24_Polaris			-
	A_CWTest_g96_Polaris			-
	A_CWDopplerBeamformerTest_Polaris			-
	A_CWChannelSelectionSwitchControlTest			-
	A_CWSummingGainControlTest_Polaris			-

Name: Volume Navigation

Table 7-57 Volume Navigation Diagnostics

Description	Test	Instruction	If the test fails...	NOTE
Volume navigation (Baybird2) test, including Sensor test and Transmitter test	Sensor 1	1. Disconnect probes to all four ports. 2. From Service > Diags > Run Diags , select Option > Volume Navigation . 3. Select the Execution Mode and Loop Count . 4. Select Start .	Move sensor 1 (transducer) to a different port. If the transducer fails, replace the transducer. If the problem still persists, replace the bayBIRD.	-
	Sensor 2		Move sensor 2 (transducer) to a different port. If the transducer fails, replace the transducer. If the problem still persists, replace the bayBIRD.	-
	Sensor 3		Move sensor 3 (transducer) to a different port. If the transducer fails, replace the transducer. If the problem still persists, replace the bayBIRD.	-
	Sensor 4		Move sensor 4 (transducer) to a different port. If the transducer fails, replace the transducer. If the problem still persists, replace the bayBIRD.	-
	Transmitter		If the problem still persists, replace the bayBIRD.	-
	System		If the problem still persists, replace the bayBIRD.	-

Section 7-6

Back End Troubleshooting

Contents in this section

7-6-1	Back end isolation from the front end (Simulator mode)	7-104
7-6-2	GPU processing errors	7-104

7-6-1 Back end isolation from the front end (Simulator mode)

To isolate the front end from the back end and boot up in Simulator mode, you must:

- Power down the LOGIQ Fortis, and open the card rack.
- Disconnect the BEPS board from the back plane.
- If present, Disconnect the BBG2 Power/Signal cable for Battery Option.

In Simulator mode, the scan screen may display a white image screen or no scan at all, but will allow other application functions to run normally.

7-6-2 GPU processing errors

If transmitting errors between DA192 and GPU occur, a message appears as a system error, indicating that the system cannot keep up with the streaming data. If minor errors occur, the system can recover on its own and the system error will request the user to re-select the probe to continue scanning.

The signal path between the DA192 and GPU is digital and can be tested using the DA192 Digital diagnostics. The PCIe transfer test in the DA192 (Digital) tests communication and errors between the DA192 Digital interface and the GPU.

It may be hard to isolate problems with the GPU versus the DA192. These PCIe Communication diagnostics can help determine the origin of a problem:

- PCIe ImagePath NonRdma tests the communication between the DA192 Digital interface and the BEPS CPU
- PCIe ImagePath Rdma tests the communication between DA192 Digital interface and the GPU

7-6-3 GPU overheating

If the GPU is collecting lint or dirt inside, it will cause overheating messages and the system will typically shut down. Follow the instructions below to clean the GPU.



CAUTION Risk of damage to the GPU. Please be careful when opening and cleaning the GPU.

To clean the GPU:

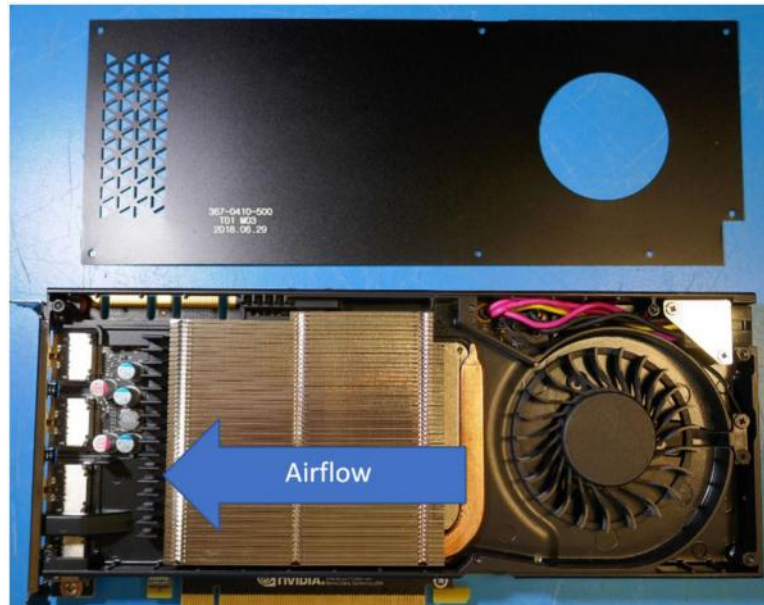
- 1.) Remove GPU from BEPS Assy. Refer to [8-8-6 "BEPS Assy Replacement" on page 8-144](#) and [8-8-9 "GPU replacement" on page 8-156](#).
- 2.) Remove the seven T5 Torx screws from the top cover on the GPU.

NOTE: The screws are very small. Take care to not lose any of the screws.



CAUTION Risk of damage to the fan blades on the GPU. Take extra caution as the fan blades can be easily broken.

- 3.) Carefully remove visible lint from the fan blades and heat sink assembly. If necessary, use a static-free vacuum cleaner.



- 4.) Replace the cover on the GPU and reinstall the seven T5 Torx screws.
- 5.) Reinstall all parts to the system in reverse procedure.
- 6.) Start the Ultrasound system and check the temperature of the GPU.

Section 7-7 Connectivity Troubleshooting

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7-7-1 Image problems

Table 7-58 Image Problems

Symptom	Cause	Solution
No images sent on wireless.	Incorrect settings.	Check Utility > Connectivity > Miscellaneous and, under Print and Store options, select Send Images via Wireless.
	Wireless is not available on all systems.	When connected to the network through a wireless LAN connection and Send Images via Wireless is selected, images will be sent to the DICOM device over the wireless LAN. If not selected, spooled images will be sent when the Ultrasound system is connected to the wired network.
Images from one patient ended up on prior patient exam.	Edit and Copy tool used incorrectly.	Have customer contact GE Service.
Frozen dual image with ECG graph stored as clip when printing and sending to PACS.	Unknown.	Frozen dual image with ECG graph stored as clip when printing and sending to PACS.
Getting double images of everything on DICOM Store Device.	Most likely Direct Store is selected on the Dataflow and/or the DICOM Store Device is selected on the print key.	Disable the DICOM Store Device on the print key. or Disable the DICOM Store in the dataflow.
Color images are transferring with No color or color is showing as white.	Incorrect color settings.	Change Color Support to Mixed.
		Disable Use Button Settings.
Dual screen images are very small on DICOM Store Device monitor.	Incorrect setting.	Under Utility > System > System Display > Use Wide Screen For..., unselect Dual screen.
Images are populating out of order on DICOM Store Device.	Most likely the "hanging" protocol on the DICOM Device is not sorting by image instance ID.	Under Utility > Connectivity > Miscellaneous; change Image Order Scheme to Acquisition.
Image number on DICOM Store device are not 1,2,3.	Incorrect setting.	Under Utility > Connectivity > Miscellaneous; change Image Order Scheme to Off.
No Title bar and/or Image Parameters on cine clip images.	Incorrect setting.	Under Utility > Connectivity > Misc. select Add Titlebar information to multiframe loops and/or Add Scan Parameter Information to multiframe loops.

7-7-2 Network problems

Table 7-59 Network Problems

Symptom	Cause	Solution
Cannot connect to PACS through the network.	Network properties are not correct. Network card failure.	Open a command prompt. "Ping 127.0.0.1" and verify no lost packets. If there is an error, try to reimage.
		"Ping" IP address for the LOGIQ Fortis (given by hospital or the listed default in manual) and verify no lost packets. If there is an error, replace the BEPS.
		"Ping" gateway if given one and verify no lost packets. If there is an error, verify that network cable plugged in, and the network lights on the front are blinking. Double check subunit and gateway are correctly entered. This point and beyond are hospital issues.
		"Ping" another machine on the network and verify no lost packets. If there is an error, try pinging from another computer on the same network.

7-7-3 Ping problems

Table 7-60 Ping Problems

Symptom	Cause	Solution
No ping through the network.	Media type not set to Auto Select.	Check the speed of your connection. Media type should be set for Auto Select. Remember that every time the LOGIQ Fortis is re-ghosted that setting goes back to the default value.
	Hardware not connected properly.	Check cables. You need a crossover cable if you are connected directly to the device. Use a straight cable whenever you go through a hub. The use of a hub is highly recommended. Try connecting the network cable directly to the Ethernet port in the BEPS. If the connection works, troubleshoot the cabling to the external device.
	Incorrect address.	Check proper addressing. The LOGIQ Fortis should be under the same subnet or have a gateway address to be able to connect to another subnet.
	Network is down.	Verify that the network is active and running. With your laptop check to see if you can ping the LOGIQ Fortis and the device (Printer or PACs).

Table 7-60 Ping Problems (Continued)

Symptom	Cause	Solution
No verify for the DICOM server.	Server does not support the DICOM service.	Check if the device supports Verify.
	Port or AE title settings are not correct.	Check port and AE title info.
	Server is not running.	Check if the device is up and running. It may be up but in an error status. Reboot the device if possible. You also may need to reboot the LOGIQ Fortis.
	Unknown	Use Network Capture. See "Network Capture" on page 7-68. Clean User Defs before reloading software in case there is a corrupt Connectivity.res file. Perform an Alt+D to capture logs before performing a Clean User Defs so that, if the presets are corrupt, the logs can be sent to Engineering for review. See "Clean Userdefs" on page 7-58 for more information. Reload software. See "Software Reload" on page 7-78 for more information.
Ping fails for a device.	Bad network connection.	Verify network connection, check "computer" icon on the Windows Desktop.
	Bad network wall port.	Try plugging the network cable into a different network wall port.
	Bad cable.	Try a new network cable.
	Incorrect IP address.	Confirm IP Address is correct on the Device page.
	Remote DICOM device does not accept pings.	Contact the PACS Administrator.
Pings successful for a device but fails for a service.	Incorrect settings.	Confirm AE Title and Port Number are correct on the Device page.
	System is not set up on the host table at the remote DICOM device.	Contact the PACS Administrator and make sure the Service Class User (SCU) and Service Class Provider (SCP) between the LOGIQ Fortis and the remote DICOM device is correct.
	Remote DICOM device does not support the ping.	Contact the PACS Administrator.
Pings successful and verified for a DICOM worklist service, but a query returns no results.	Incorrect/incompatible date or time settings on the system.	Check date and time (AM & PM) setting on the LOGIQ Fortis. May need to set the LOGIQ Fortis so that it is one or two minutes later than the DICOM device.
	Modality setting is not correct.	Make sure Modality is correct under Search Criteria on the Service page.
	Scheduled Procedure Step Start Date is not correct.	Make sure Scheduled Procedure Step Start Date is correct under Search Criteria on the Service page.
	System is not set up on the host table at the remote DICOM device.	Contact the PACS Administrator and make sure the Service Class User (SCU) and Service Class Provider (SCP) between the LOGIQ Fortis and the remote DICOM device is correct.
	No patients match the search criteria.	Contact the PACS administrator and make sure the Ultrasound system is registered. This scenario usually results in an error displayed on the Ultrasound system.

7-7-4 Storage problems

Table 7-61 Storage Problems

Symptom	Cause	Solution
System will not store images.	Dataflow is set to No Archive under Properties.	Change from No Archive to Local Archive. Reboot the scanner. If the problem persists, contact GE Service. As a workaround to save images, set up a print key to send to DICOM Store Device only or use Save As to save images to external media.
Query and retrieve does not work when alternating between a wired and wireless network connection.	Going back and forth between a wired and wireless connection can result in improper network settings.	Check the network settings.
LOGIQ Fortis is not receiving exams.	LOGIQ Fortis does not have the correct device set up.	Set up the remote DICOM device on the Device page.

7-7-5 Setting problems

Table 7-62 Setting Problems

Symptom	Cause	Solution
Unchecking of DHCP does not stick on reboot.	Default Gateway was not entered.	When selecting Static IP connectivity, always enter Default Gateway . If you do not enter a value, the static IP settings will be erased on reboot.
It takes time to show patient list for DICOM Read and Import.	Unknown	When there are multiple patient files on a USB device, the LOGIQ Fortis may take a longer than expected amount of time to display the patient list when reading and importing DICOM files.
Measuring pixels on DICOM Store Device.	Print key is not set to Single.	Under Utility> Applications set the print key to Single.
	Incorrect button setting.	Under Connectivity > Button make sure Format under Still Images is set to Ultrasound Image.
	Incorrect compression setting.	Under Connectivity, check compression for DICOM Store Device. Typically, compression is not preferred because it reduces the quality.
	Incorrect setting.	Dual images are stored as secondary capture on all but the LOGIQ Fortis and do not send Regional calibration data.

7-7-6 Transfer times and failures

Table 7-63 Transfer Times and Failures

Symptom	Cause	Solution
System pings and verifies but there is a transfer failure from the LOGIQ Fortis to the DICOM server.	Slow response from the DICOM server.	Check device configuration. Increase the time out properties.
	Large data sets.	
	Server limitations.	Check device configuration. Increase the number of parallel ports if possible.
	Problem with the spooler.	Clean the spooler (F4). If the jobs in the spooler cannot be deleted, you need to do it in Windows. These jobs may be corrupted or may be using a lot of space in the disk and causing problems with the sending of DICOM images. Insert the SSA key, turn the LOGIQ Fortis on and log in into maintenance and exit to Windows (the application should not be running). Then go to Windows Explorer and look for the file E:\Spooler\jobqueue.xml. Delete the file. See "DICOM Spooler" on page 7-50 . Delete the files from E:\Spooler and then the Recycle Bin. Reboot the LOGIQ Fortis.
	Problems with the Connectivity configuration.	Check the Connectivity configuration on the LOGIQ Fortis. <ul style="list-style-type: none"> If it is a printer, check that the printer supports the film type and format. Some printers do not support different image sizes (or different formats, such as the Patient entry screen). If this is the case, the spooler may show the job in a "Done" status but the images never get printed. Try sending secondary capture. If it is a storage device, check whether the image type is supported (color, gray, Multiframe). If it is a Worklist broker, use a Dataflow in which your Worklist is the primary input. Otherwise, it will not let you retrieve patients. Also, check your Worklist search criteria configuration.
	Unknown	Use Network Capture. See "Network Capture" on page 7-68 . Clean user-defined data before reloading software in case there is a corrupt Connectivity.res file. Do an Alt+D to capture logs before cleaning user-defined data so that if the presets prove corrupt the logs can be sent for review. See "Clean Userdefs" on page 7-58 . Reload the software. See "Software Reload" on page 7-78 .
Long transfer times.	Problem with file size and compression.	Check Compression under Still Images on the Button page. Large files need to be compressed to improve transfer time.
	Size of the exam.	
	Network speed and settings on the Ultrasound system.	Check Network Speed on the TCP/IP page. Auto Detect is generally a preferred selection. NOTE: Using a wireless connection to transfer images can take 4-5 times longer than a wired connection.

7-7-7 Spooler problems

Table 7-64 Spooler Problems

Symptom	Cause	Solution
Jobs exist on the spooler but do not display at destination (sometimes only on Cine or Secondary Capture).	Destination unable to view the particular photometric interpretation.	Check what compression and photometric interpretation the destination device supports and adjust (if possible) on the destination service to the settings, which results in successful viewing. Note that compression JPEG will give photometric interpretation YBR_FULL_422, RLE will give YBR_FULL and uncompressed will give RGB. The exception to this is if you enable B/W only, then you will get photometric interpretation MONOCHROME2 for all compressions.
Images say Done in Spooler but are not populated on DICOM Store Device.	Incorrect settings.	Confirm My Computer > AE Title on the Device page is correct. The DICOM Store Device may use the AE Title of the ultrasound machine to determine where the images are placed in the DICOM store device.

7-7-8 Slow transfer rates

Table 7-65 Slow Transfer Rates

Symptom	Cause	Solution
Slow transfer between the LOGIQ Fortis and DICOM server.	Images being re-sent automatically and low transfer rates.	Adjust the retry settings to make jobs retry on bad networks. There is no need to set retries for mobile (off-line) use. See 6-4-1 "Slow response rate between the LOGIQ Fortis and a DICOM (PACS) server" on page 6-13. Increase compression <ul style="list-style-type: none"> • Uncheck Use Button Settings • Set the Max Framerate to 25% • Set Clip Quality to 85% • Set Color Support to Mixed

7-7-9 InSite connection

Table 7-66 InSite Connection

Symptom	Cause	Solution
Cannot connect to InSite because of missing DNS address.	Some customer sites cannot connect to the GE back office using the URLs provided by default in the Agent Configuration page. A DNS address is needed but the LAN connectivity set up pages do not offer the entry field. Only the WLAN set up pages allow that entry. The agent configuration on the service desktop does not work using IP addresses when selecting Enterprise server as "other".	See 7-4-10 "Agent Configuration" on page 7-82. This needs to be repeated if the software has been reloaded to regain InSite connectivity.

7-7-10 Wireless

Table 7-67 Wireless

Symptom	Cause	Solution
Cannot set up wireless connection.	CISCO PEAP authentication methods for wireless connectivity are not available.	If the hospital wireless network supports PEAP authentication, use the Microsoft PEAP authentication methods for wireless connectivity.

Section 7-8

Electromagnetic Interference (EMI) Troubleshooting

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7-8-1 Prevention/abatement

For electromagnetic interference (EMI) rules and details, see [2-2-3 "EMI limitations" on page 2-6](#).

7-8-2 Different power outlet

Connect the LOGIQ Fortis to another power outlet and check to see if the noise changes or disappears.

NOTE: Image artifacts can occur if, at any time within the facility, the ground from the main facility's incoming power source to the LOGIQ Fortis is only a conduit.
See [2-3-4 "Minimal floor plan suggestions" on page 2-11](#).

7-8-3 Different system

Try another LOGIQ Fortis at the same location and look for the same noise. If the noise is present on the new system too, the noise is most likely from an external source/equipment.

7-8-4 Different location

Move the LOGIQ Fortis to another location and check to see if the noise changes or disappears. This may help to locate an external noise source.

Try to move the LOGIQ Fortis to:

- another location inside the room
- another room
- another floor

7-8-5 Disconnect external cables

Disconnect all external cables (network, all unused probes, ECG leads, etc.) and check to see if the noise disappears.

Section 7-9 Image Troubleshooting

Contents in this section

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7-9-2	Image management	7-114
7-9-3	Image quality	7-114

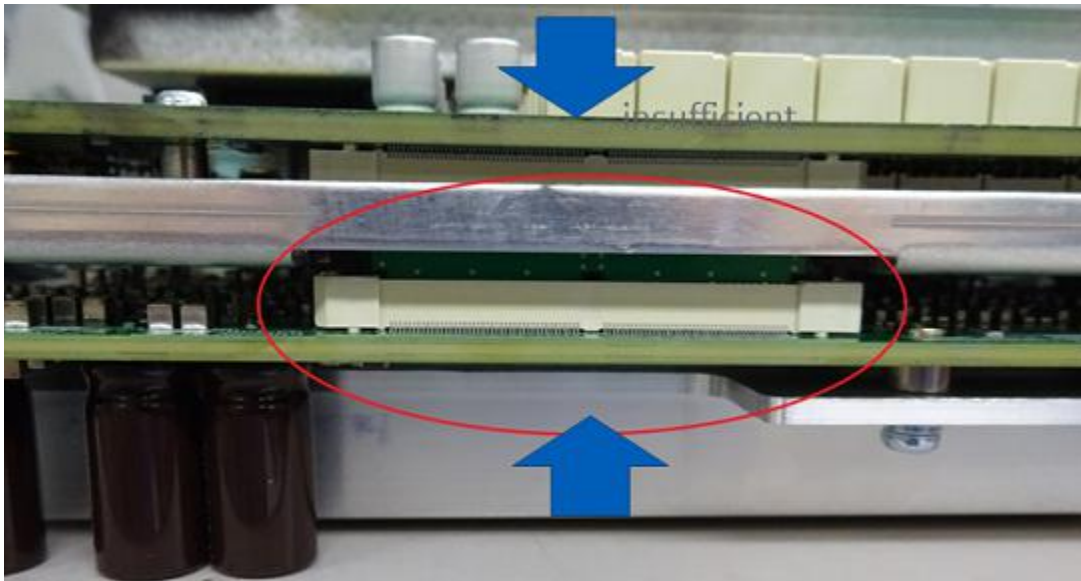
7-9-1 Image artifacts

When the image artifact is observed or Analog RX diag is Failed, that may be caused by insufficient connection of Stacking-connector (between DPI-L and DA192).

It is recommended to confirm the Stacking-connection. If connection is insufficient, Gold-Plating area may be observed.

In that case, try to push each board by strong force to hidden Gold-Plating area.

Figure 7-55 Image Artifacts



7-9-2 Image management

When a VCI Omniview clip is recalled from the clipboard for the first time after reselecting an Application, trackball does not show Omniview controls. Reselect the Omniview line selection from the touch panel.

Cannot delete Images from Active Images Screen after a Save As operation. If a clip is saved from the active images screen via Save As it cannot be deleted until system is rebooted.

7-9-3 Image quality

B-Mode IQ change when activating M-Mode on recalled cine Activating M-Mode on recalled images introduces undesirable image quality and is not recommended.

Acquire M-Mode Acquisition while scanning.

Section 7-10

Smart Device Apps Troubleshooting

Smart Device apps are used on Android devices (both phone and tablet) through a Bluetooth connection to the LOGIQ Fortis. For more information, see [5-4-8 "Smart Device applications" on page 5-18](#).

7-10-1 Smart Device apps pairing confirmation delay

The Smart Device apps may require 10-30 seconds to pair. Turn the Bluetooth setting off and then on again can minimize this delay time.

7-10-2 Smart Device apps library downloads

After downloading LOGIQ Remote and LOGIQ Photo immediately enter the barcode reader or pairing screen. This initiates download of critical libraries to the device. Only turn off wireless after this has been completed or the apps will fail to function.

7-10-3 LOGIQ Photo crashes if camera permission denied

If a user decides to deny permission to the camera on first launch of one of the Smart device apps the app crashes when attempting to use it.

If a user decides to deny permission to the Camera on first launch of one of the LOGIQ Apps the app crashes when attempting to use it

7-10-4 Upside down image from LOGIQ Photo

On certain devices (including the Lenovo Tab4 10"), the images are sent to the LOGIQ Fortis upside down.

Lock the device screen rotation and take pictures upside down.

Section 7-11

Boot Issue Troubleshooting

7-11-1 No boot (Minimum configuration to boot)

Try to determine how far the system tries to boot:

- With the main breaker on, do you get a white back light on the on/off button?
If not, check AC outlet. If AC outlet is connected correctly, then check internal-connection of BEPS inside, including ACDC module connection. Also, recommend to try to disconnect Battery Cables.
- If you press the power on button, does it change color to blue? Power on button tells the BEPS to turn ON and drives PSON_N low (active) to power up ACDC-module. ACDC-module turns on 12V. If the BEPS is not booting, BEPS module and/or CPU-module may need to be replaced.
- Is Windows loading? If it seems to hang while loading, try reloading the software.
- Is Windows loading but the application software does not start, try reloading the application software.
- Is the application ready to scan? If not, check logs to see if there are any hardware compatibility issues that would prevent a normal scan.

Try minimum configuration to boot:

- Minimum configuration 1 - WARNING DO NOT LEAVE SYSTEM ON as fans will not be running.
- The minimum configuration to boot the LOGIQ Fortis requires the BEPS (with CPU module), Lower/Upper OPIO for Power On, and the main display.

These boards may be removed/unplugged:

- DA192
- DPI-L
- GBP (Backplane)
- All options (DC4D, VCS, GCW, VSIO, V-Nav, etc.)

The following are connected to the BEPS:

- LCD J8 (on BEPS) to provide P12V Power to Monitor
- J1 (on BEPS) to provide Live5V power to Lower OP IO, and to connect PSON signal
- J3/J4(on BEPS) for HDMI signals (NOTE: keep all connection, Lower OP IO <-> Upper OPIO, Upper OPIO<->Monitor)

If the LOGIQ Fortis is not powering up by pressing the On/Off button, try to power up pushing the U66 button on the BEPS board.

Section 7-12 Noise Troubleshooting

Contents in this section

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7-12-1 Noise

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. They also generate EMI. Possible EMI sources should be identified before the unit is installed. Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. Some of these sources include:

- medical lasers
- scanners
- cauterizing guns
- computers
- monitors
- fans
- gel warmers
- microwave ovens
- light dimmers
- portable phones

The presence of a broadcast station or broadcast van may also cause interference.

When talking to the customer, try to gather as much information as possible about the conditions when the noise appears.

Table 7-68 Noise Conditions

The noise is present	Determine	If the test fails, see...
All the time	n/a	7-12-2 "Noise picked up from the air" on page 7-118 and 7-12-3 "Noise received through the external cables" on page 7-118.
After some time of use	The amount of time between initial use and when the noise begins.	7-12-2 "Noise picked up from the air" on page 7-118.
Certain times of the day or night	The time of day or night along with the duration.	7-12-2 "Noise picked up from the air" on page 7-118 and 7-12-3 "Noise received through the external cables" on page 7-118.
At all locations in the hospital	n/a	7-12-2 "Noise picked up from the air" on page 7-118.
Only in one room or area	The room or area	7-12-2 "Noise picked up from the air" on page 7-118 and 7-12-3 "Noise received through the external cables" on page 7-118.

Table 7-68 Noise Conditions (Continued)

The noise is present	Determine	If the test fails, see...
From time to time with no special pattern of time is observed	n/a	7-12-2 "Noise picked up from the air" on page 7-118 and 7-12-3 "Noise received through the external cables" on page 7-118.

7-12-2 Noise picked up from the air

Table 7-69 Noise Conditions Picked Up from the Air

Symptom	Cause	Solution
Noise is coherent -"penlight noise" pointing down in the picture due to the fact that the noise is received on all channels.	The electromagnetic interference (EMI) from radio frequencies, magnetic fields, and transients in the air.	Test whether the noise is picked up by a probe cable.
Noise is a problem on a single probe.		Test with another probe.
Noise is a problem on a single probe port.		Move the LOGIQ Fortis to another location to see if the noise persists.

7-12-3 Noise received through the external cables

Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the wiring. The noise can enter the LOGIQ Fortis through the mains power cable, probe cable(s) or any other external connected cable(s).

Disconnect cables that are not needed for the basic use of the LOGIQ Fortis:

- Network cable
- Cables to any external peripherals
- ECG cables and other cables connected to the Patient I/O

Verify whether the noise changed or disappeared when the cables were removed.

Often, this type of noise is due to grounding problems in the mains power system or when the LOGIQ Fortis is sharing a power line with other equipment.

7-12-4 Doppler noise

Doppler noise symptoms can be horizontal stripes or spikes.

Table 7-70 Noise Conditions for Doppler

Symptom	Cause	Solution
Horizontal stripes	Typically an analog problem caused by the DA192 or DPI-L	Determine if one of these boards is the cause: <ul style="list-style-type: none"> • Transmit & Receive board (DA192) • Probe interface board (DPI-L)
Spikes	Typically a digital problem caused by either the DA192 or DPI-L	Determine if one of these boards is the cause: <ul style="list-style-type: none"> • Transmit & Receive board (DA192) • Probe interface board (DPI-L)

7-12-5 Intermittent noise

Intermittent noise can be caused by other equipment.

Table 7-71 Noise Conditions for Intermittent

Symptom	Solution
Intermittent noise	Check equipment that is turned on and off near the scanner.
Intermittent noise present around the clock	Check the clock.
Intermittent noise present at certain times	Check equipment that is turned on and off near the scanner at certain times.

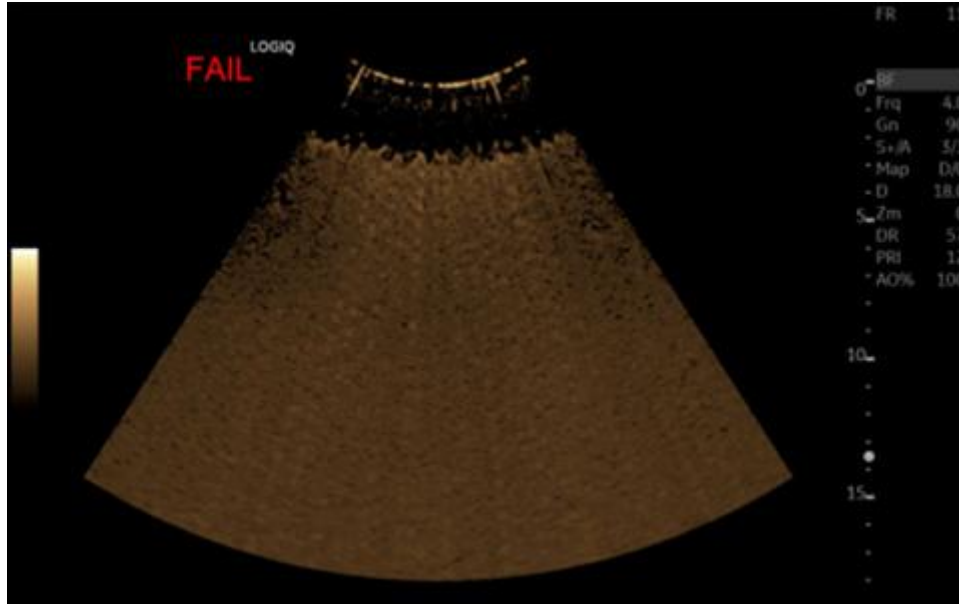
7-12-6 Noise on a board**Table 7-72 Noise on a Board**

Symptom	Solution
There is noise on a board	Isolate the board to see if you can determine the specific board where the noise originates. For example, unplug the receive area of the board and see if the noise persists.

7-12-7 B-Flow noise issue

At B-Flow with C1-6 probe, B-Flow noise induced by AC power supply (TDK-ACDC) was observed on LOGIQ Fortis. See the B-Flow issue image.

Figure 7-56 Vertical noise issue image



To prevent this issue, BEPS2 assy has Power supply bracket cover included absorber sheet. This BEPS2 assy is being used for all forward production for LOGIQ Fortis. But some of the FRU parts (BEPS2 Assy - 8813300-10) in stock have not included this sheet. If BEPS2 assy needs to be replaced in the field, make sure to check that power supply bracket cover is included absorber sheet to the new BEPS2 assy. If it is not included, it needs to transfer the power supply bracket cover of BEPS2 in console to new FRU part (BEPS2 assy). perform the following procedure to prevent the issue.

The absorber sheet on power supply bracket cover and BEPS2 Assy with absorber sheet images:



Power Supply Bracket cover with absorber sheet



BEPS2 Assy with absorber sheet (The image in BEPS2 assy)

7-12-7-1 To transfer the Power supply bracket cover to new FRU part

About BEPS assy replacement procedure, See "BEPS Assy Replacement" on page 8-144.

Table 7-73 BEPS removal


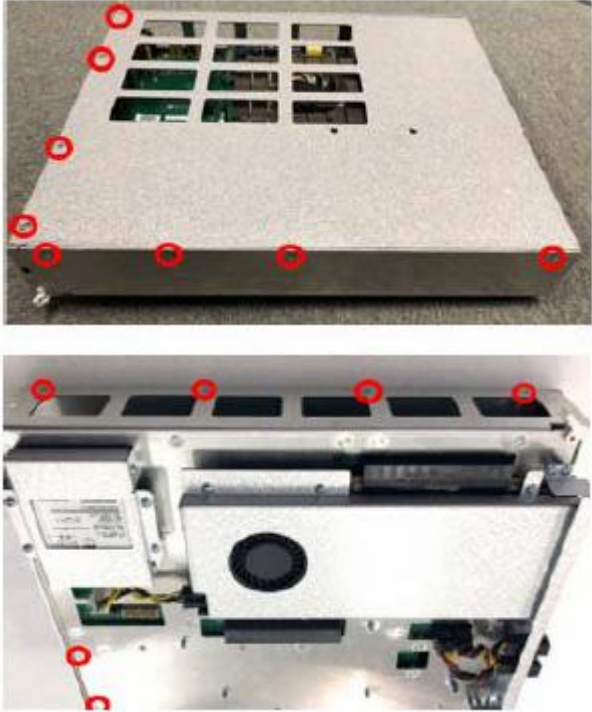

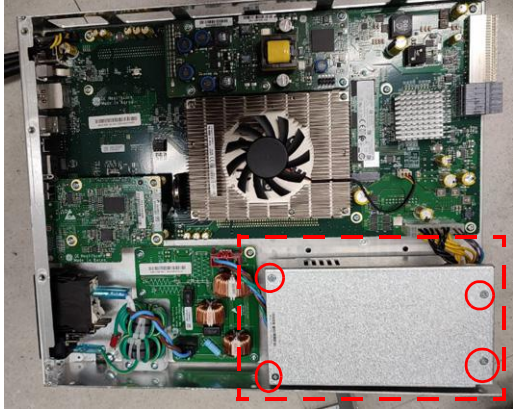
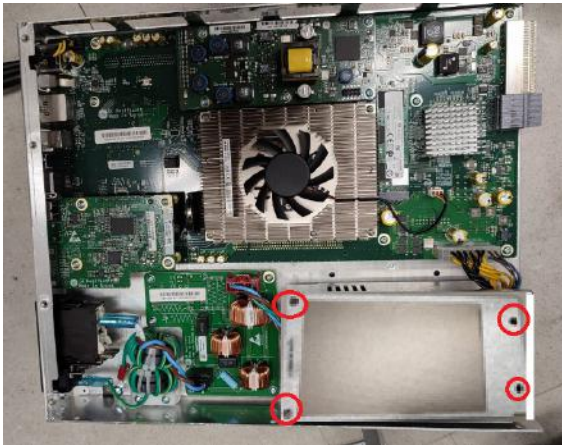
Step	Corresponding Graphic
<p>1. Remove the BEPS Assy. Place it on an ESD safe place.</p> <p>NOTE: Use Card puller (indicate orange circle) to pull out BEPS assy.</p>	
<p>2. Remove BEP TOP PLATE from current BEPS Assy2 and new BEPS Assy (14 screws).</p>	

Table 7-73 BEPS removal

Step	Corresponding Graphic
<p>3. *For current BEPS assy</p> <p>Unscrew 4 screws (red circle) from Power supply bracket cover (with Absorber sheet), then take it from current BEPS assy.</p>	
<p>4. *For New BEPS2 assy (FRU part)</p> <p>Unscrew 4 screws (red circle) from Power supply bracket cover. Also, Take Power supply bracket cover (without Absorber sheet) from New BEPS Assy.</p>	
<p>5. *For New BEPS2 assy(FRU part)</p> <p>Install Power supply bracket cover of Step 3 to New FRU part (Step4), fasten 4 screws (red circle).</p>	

Section 7-13

Options Troubleshooting

Contents in this section

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7-13-1 ECG display disappears after backup/restore

With ECG, after system auto-restart, turn system off and then back on. Otherwise ECG and TGC may not function until next full power cycle.

7-13-2 Unable to measure in both stiffness and velocity in Breast and Thyroid

With Shearwave, when entering Measurement in Breast or Thyroid, only the stiffness measurements show up on the touch panel if display units is set to kPa, even though both stiffness and velocity are enabled in the Utility pages.

7-13-3 Breast Assistant, Powered by Koios DS

Use Table 7-74 to troubleshooting Breast Assistant, Powered by Koios DS installations.

Table 7-74 Troubleshooting the Breast Assistant, Powered by Koios DS Option

Symptom	Solution
Analysis takes longer than 5 seconds.	Check the spooler and clear any failures. Check the connection to the server and attempt to ping the device on Utility > Connectivity > Device to verify the service.
On Utility > Connectivity > Koios , the Activate button does not display (may be encountered during demos).	If Breast Assistant, Powered by Koios DS was previously activated, and only the Deactivate button displays, on Utility > Connectivity > Koios , select Deactivate , and then follow the steps in Table 3-8 on page 3-41 under “Set up and test the Koios connection” to activate again.
Do not know the IP address to enter on Utility > Connectivity > Koios .	You cannot activate Breast Assistant, Powered by Koios DS without a valid IP address. Breast Assistant, Powered by Koios DS should have been installed on the customer network. Obtain a valid address by contacting the customer IT department to confirm the installation occurred. Contact Koios DS Support to confirm this installation occurred.
On Utility > Connectivity , cannot find the Koios tab.	Make sure the option string has been entered on the LOGIQ Fortis and the option is enabled. Check that the LOGIQ Fortis has the correct software version that includes Breast Assistant, Powered by Koios DS installed.
On Utility > Connectivity > Device , clicking the Verify button fails.	Verify that the IP Address field matches the address/hostname of the Koios DS server on file and update the field if necessary. If the information is correct, the Koios DS server information may have changed or an error may have occurred. Contact Koios DS Support and provide the scanner AE Title, Port, and IP Address.
On Utility > Connectivity > Service , clicking the Verify button fails.	Verify that the AE Title and Port Number fields match the values of the Koios Server on file and update the fields if necessary. If the fields are correct, from the Device tab, try to ping the server. If the ping is successful, the Koios Server info may have changed or an error may have occurred. Contact Koios DS Support and provide the scanner AE Title, Port, and IP Address.

For Koios DS Support contact:

- Koios DS Support / Servicing Email: logiq@koiosmedical.com
- Koios DS Vendor Support Phone Number: +1(732)529-5755 Ext. 2

7-13-4 Device Management (Device Mgmt)

Use Table 7-75 to troubleshoot Device Management (Device Mgmt).

Table 7-75 Troubleshooting the Device Management Option

Symptom	Solution
Do not have or lost the "DEVICE MANAGEMENT" server URL address.	Under Utilities > Connectivity > DEVICE MANAGEMENT , under Server URL, enter the default URL: https://iot.gehealthcare.com .
LOGIQ Fortis cannot connect to the "DEVICE MANAGEMENT" cloud.	<p>Confirm with the site IT department the following conditions:</p> <ul style="list-style-type: none"> • Internet access is required • Ethernet connection required 10/100 Mbps or an 10/100/1000 Mbps • LOGIQ Fortis uses port 443 on a secure HTTPS connection <p>If the site uses Proxy servers: Under Utilities > Connectivity > DEVICE MANAGEMENT, confirm proxy settings (Server/ port/ Username and password).</p> <p>Contact the site IT administrator to ensure these settings are correct. Also check for possible issues with the site firewall preventing the device from reaching the cloud server. Additionally, to connect with Cloud through proxy, the proxy port that was setup in the Utility page opens.</p>
Missing the registration key for the "DEVICE MANAGEMENT" cloud.	<p>Reset the registration key by:</p> <ol style="list-style-type: none"> 1. Delete any information in Registration Key. 2. Enter the default registration key in Registration Key. <p>The registration key is prepopulated by the software on the device, reloading software will restore the original value but you will need to re-register.</p>
Incorrect email address entered.	In Account Email, select Update and enter the correct email address. This is the user e-mail account that was used when signing up online.
Missing email address (Account Email) associated with the Device Management account after a full load of software.	<p>Restore email account information (Account Email):</p> <ol style="list-style-type: none"> 1. Navigate to Utility > Connectivity > Device Mgmt to access Device Management. Do not select Remove Registration. If you do, you will need to contact the support team to re-establish registration to the server. 2. Select Deactivate. 3. In Account Email, enter the email address for the account. 4. If applicable, enter Proxy Server, Proxy Port, Proxy User Name, and Proxy Password. 5. Select Activate. 6. Select Save.
After a full software load, cannot connect to the "DEVICE MANAGEMENT" cloud.	<p>If Device Management was active prior to the software load, confirm that the cloud still verifies your activation. Navigate to Utility > Connectivity > Device Mgmt and confirm that status shows "Active". It is normal if the e-mail address is not visible. If so, proceed to select "Verify" and confirm that you get a smiley face. Keep in mind that you need to be connected to the network for the Device manager to verify successfully.</p> <p>If the system is not successfully connecting to the cloud, contact the Device management team for support at email: dc.support@ge.com indicating the serial number of the unit, description of the problem and e-mail of the admin user registered in the account.</p>
As a user, do not have account to the "DEVICE MANAGEMENT" cloud.	Go to https://AVURI.gehealthcare.com/signup for sign up instructions.

Table 7-75 Troubleshooting the Device Management Option

Symptom	Solution
<p>After a manual backup (Utility > System > Backup/Restore > Manual Backup), a new user is not able to see any backups or the history on the web app.</p>	<p>If the system shows it is connected to Device Management, perform these steps to associate a time zone with your profile. Once the steps are complete, you will be able to view the backups and the history on the web app.</p> <ol style="list-style-type: none"> 1. Navigate to http://AVURI.gehealthcare.com. 2. Sign in to access your profile. 3. Confirm the time zone.
<p>After preset information is uploaded from the master system (Utility > System > Backup/Restore > Upload for Fleet), a new user is not able to see any backups or the history on the web app.</p>	
<p>Other issues needing help with "DEVICE MANAGEMENT" feature.</p>	<p>Contact the support team: Support email: dc.support@ge.com</p>

7-13-4 Device Management (Device Mgmt) (cont'd)

Use Table 7-76 to troubleshoot Device Management (Device Mgmt) through the error codes. These error codes will appear in the IoTAgentService.log log file. This log file can be found under D:\log.

NOTE: Error codes may change over time.

Table 7-76 Errors for the Device Management Option

Error	Details	Solution
Activate		
Agent service config file is corrupted. Please contact your GE service personnel.	Agent side config file(IoTAgentConfig.json) is corrupted.	Contact service for enabling re-registration.
Activation failed. Missing input Parameter. (Error code: 000104)	Invalid Account Email has been entered.	Enter valid Account Email.
Activation failed. Please contact your GE service personnel. (Error code: 401)	Invalid Registration Key has been entered.	Enter valid Registration Key.
Activation failed.	Invalid Server URL has been entered.	Enter valid Server URL.
Activation failed.	Invalid Proxy server or Proxy port has been entered.	Enter valid Proxy server and Proxy port.
Activation failed. Please contact your GE service personnel. (Error code: 403)	After successful registration again perform register.	Contact service for enabling re-registration.
Invalid fleet account email format. Activation failed.	Invalid or empty Account Email format field.	Enter valid Account Email.
Invalid proxy port. Activation failed.	Enter string value in Proxy port field.	Enter valid Proxy port.
Agent service config file is corrupted. Please contact your GE service personnel.	Empty Registration Key field.	Enter valid Registration Key.
Agent service config file is corrupted. Please contact your GE service personnel.	Empty Server URL field.	Enter valid Server URL.
Invalid server certificate. Please contact your GE service personnel.	Invalid server certificate	Install valid certificate using Device Connect Service Certificate.
Activation failed. Timeout occurred.	Console side did not receive any response from Agent\ThingWorx side in predefined activation time delay.	Ensure network connection and retry.
Activation failed. Please contact your GE service personnel. (Error code: 400)	Bad request	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code: 500)	Internal server error	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code: 503)	Service unavailable	Retry
Activation failed. Please contact your GE service personnel. (Error code: 404)	Digital twin not found	Contact AVURI Device Connect Support at dc.support@ge.com to initiate device re-Register.
Activation failed. Please contact your GE service personnel. (Error code: 000011)	Unknown error	Contact AVURI Device Connect Support at dc.support@ge.com.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Activation failed. Please contact your GE service personnel. (Error code: 000010)	Internal error	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code:000115)	Default application not found for Digital Twin	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code: 000100)	Missing appID or appName	Device error. Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code: 000105)	Application does not exist	Contact AVURI Device Connect Support at dc.support@ge.com, escalate to L3 or L4 for support.
Activation failed. Please contact your GE service personnel. (Error code: 000116)	The application has not been associated with your digital twin. No application device exists.	Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com if problem persists.
Activation failed. Missing input Parameter. (Error code: 000100)	Missing Input user or application not provided.	Ensure valid user email is used in Device Mgmt and then retry.
Activation failed. Invalid input parameter. (Error code: 000102)	Invalid data format	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Invalid input parameter. (Error code: 000103)	Invalid data type	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Invalid input field size. (Error code: 000101)	Field size error	Contact AVURI Device Connect Support at dc.support@ge.com.
Activation failed. Please contact your GE service personnel. (Error code: xxxxxx)	Unknown	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload for Fleet		
Upload of backup to cloud failed. Timeout occurred.	Console side did not receive a response from Agent\ThingWorx side in predefined upload time delay.	Ensure network connection and retry.
Agent service config file is corrupted. Please contact your GE service personnel.	Agent side config file(IoTAgentConfig.json) is corrupt.	<ol style="list-style-type: none"> 1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.	Invalid server certificate	Install valid certificate using Device Connect Service Certificate.
Upload of backup to cloud failed.	1.Retry count elapsed. (Any exception happened in service APIAgent code and there is no specific error code) 2. Any unknown connection issue.	Ensure network connection and retry.
	Network is disconnected.	Establish network connection.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact AVURI Device Connect Support at dc.support@ge.com.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000101)	Field size error	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000102)	Invalid data format	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000103)	Invalid data type	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000119)	Invalid data value File type is invalid	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000120)	Invalid data value Data classification is invalid	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000118)	Insufficient storage	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000100)	Missing Input	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000111)	File transfer subsystem encountered an error (I/O error)	Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com if problem persists.
	Internal error	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000105)	App Id does not exist (Resource not found)	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000113)	Invalid data value	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: 000010)	External error	Contact AVURI Device Connect Support at dc.support@ge.com.
Upload of backup to cloud failed. Please contact your GE service personnel. (Error code: xxxxxx)	Unknown	Contact AVURI Device Connect Support at dc.support@ge.com.
Update Connection Configuration		
Invalid proxy port. Update proxy configuration failed.	Invalid string value in Proxy port field.	Enter valid Proxy port.
Proxy configuration update failed.	1. Retry count elapsed. (Any exception happened in service APIAgent code and there is no specific error code) 2. Any unknown connection issue.	Ensure network connection and retry.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Proxy configuration update failed. Timeout occurred.	Console side did not receive any response from Agent\ThingWorx side in predefined update proxy time delay.	Check the new configuration and retry.
Agent service config file is corrupted. Please contact your GE service personnel.	Agent service configuration file is corrupt.	<ol style="list-style-type: none"> 1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.	The application key has expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.	The server certificate is invalid.	Install valid certificate using Device Connect Service Certificate.
	Network is disconnected.	Establish a network connection.
Deactivate		
Deactivation failed. Timeout occurred.	Console side did not receive any response from Agent\ThingWorx side in predefined deactivate time delay.	Ensure network connection and retry.
Agent service config file is corrupted. Please contact your GE service personnel.		<ol style="list-style-type: none"> 1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.		Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.		Install valid certificate using Device Connect Service Certificate.
Deactivation failed.	<ol style="list-style-type: none"> 1. Network not connected state 2. Any unknown connection issue 	Ensure the network connection and retry.
Deactivation failed. Please contact your GE service personnel. (Error code: 500)	After activation remove digital twin from ThingWorx server.	Contact GE support.
Deactivation failed. Please contact your GE service personnel. (Error code: 400)	Bad request	Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com.
Deactivation failed. Please contact your GE service personnel. (Error code: 401)	Unauthorized	Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com.
Deactivation failed. Please contact your GE service personnel. (Error code: 404)	Digital twin not found	Contact AVURI Device Connect Support at dc.support@ge.com to initiate Device re-registration.
Deactivation failed. Please contact your GE service personnel. (Error code: 503)	Service unavailable	Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Backup		
Backup to cloud failed.	1. Retry count elapsed. (Any exception in service API\Agent code and no specific error code). 2. Any unknown connection issue.	Ensure network connection and retry.
Backup to cloud failed. Timeout occurred.	Console side did not receive any response from Agent\ThingWorx side in predefined backup time delay.	Ensure network connection and retry.
No change identified. Backup not performed.		No action needed.
Agent service config file is corrupted. Please contact your GE service personnel.	Agent side config file (IoTAgentConfig.json) is corrupt.	1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.	Invalid server certificate.	Install valid certificate using Device Connect Service Certificate.
	Network is disconnected.	Establish network connection.
Local restore completed successfully. Failed to backup newly restored backups to cloud.	Auto backup will be triggered after completing restore operation.	If Auto backup fails, execute Manual Backup.
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000109) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact AVURI Device Connect Support at dc.support@ge.com.
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000101) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000101)	Field size error	Contact AVURI Device Connect Support at dc.support@ge.com.
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000102) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000102)	Invalid data format	Contact AVURI Device Connect Support at dc.support@ge.com.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000103) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000103)</p>	<p>Invalid data type</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000119) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000119)</p>	<p>Invalid data value File type is invalid</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000120) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000120)</p>	<p>Invalid data value Data classification is invalid</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000118) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000118)</p>	<p>Insufficient storage</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000100) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000100)</p>	<p>Missing Input</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000111) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000111)</p>	<p>File transfer subsystem encountered an error (I/O error).</p>	<p>Retry desired action. Contact AVURI Device Connect Support at dc.support@ge.com if problem persists.</p>
<p>Backup to cloud failed. Please contact your GE service personnel. (Error code: 000011) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000011)</p>	<p>Internal error</p>	<p>Contact AVURI Device Connect Support at dc.support@ge.com.</p>

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000105) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000105)	App Id does not exist (Resource not found).	Contact AVURI Device Connect Support at dc.support@ge.com.
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000113) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000113)	Invalid data value	Contact AVURI Device Connect Support at dc.support@ge.com.
Backup to cloud failed. Please contact your GE service personnel. (Error code: 000010) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: 000010)	External Error	Contact AVURI Device Connect Support at dc.support@ge.com.
Backup to cloud failed. Please contact your GE service personnel. (Error code: xxxxxx) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE service personnel. (Error code: xxxxxx)	Unknown	Contact AVURI Device Connect Support at dc.support@ge.com.
Install		
Configuration installation failed.	1. Retry count elapsed (Agent or service API exception). 3. Any unknown connection issue. Console side did not receive any response from Agent\ThingWorx side in predefined download time delay.	Ensure network connection and retry.
Configuration downloaded is identical to the current configuration. Press OK to discontinue installation.	Stop installation.	No action needed.
Agent service config file is corrupted. Please contact your GE service personnel.	Agent side config file(loTAgentConfig.json) is corrupt.	1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.	Invalid server certificate	Install valid certificate using Device Connect Service Certificate.
	Network is disconnected.	Establish network connection.

Table 7-76 Errors for the Device Management Option (Continued)

Error	Details	Solution
Configuration installation failed. Please contact your GE service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000101)	Field size error	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000102)	Invalid data format	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000103)	Invalid data type	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000119)	Invalid data value File type is invalid	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000120)	Invalid data value Data classification is invalid	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000118)	Insufficient storage	Insufficient storage on device. Reclaim device storage. Contact AVURI Device Connect Support at dc.support@ge.com if problem persists.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000100)	Missing input	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000111)	File transfer subsystem encountered an error (I/O error).	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000011)	Internal error	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000010)	External error	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: 000110)	Not authorized to access file	Contact AVURI Device Connect Support at dc.support@ge.com.
Configuration installation failed. Please contact your GE service personnel. (Error code: xxxxxx)	Unknown	Contact AVURI Device Connect Support at dc.support@ge.com.
Get Notification		
Failed to retrieve notification from Cloud.	1. Retry count elapsed. (Any exception happened in service API\Agent side code and no specific error code). 2. Any unknown connection issue.	Ensure network connection and execute Verify.

Table 7-76 Errors for the Device Management Option (Continued)

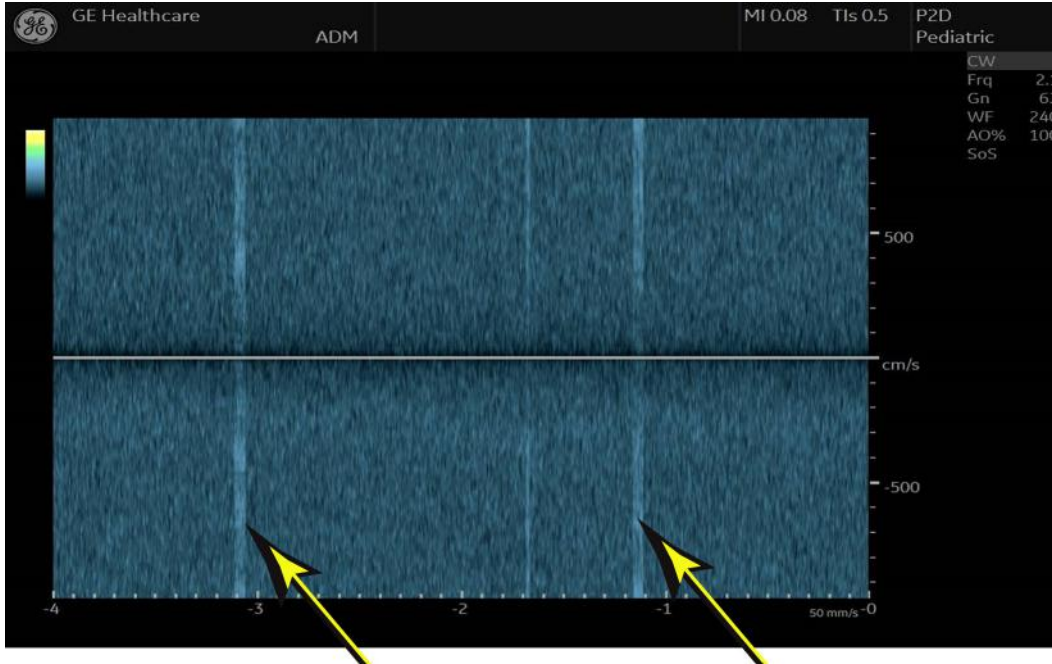
Error	Details	Solution
Timeout occurred. Device Connect notification request has been sent, but there is not confirmation yet. Please try again later.	Console side did not receive any response from Agent\ThingWorx side in predefined notification time delay.	Ensure network connection and execute Verify.
Agent service config file is corrupted. Please contact your GE service personnel.	Agent side config file (IoTAgentConfig.json) is corrupt.	<ol style="list-style-type: none"> 1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE service personnel.	Invalid server certificate	Install valid certificate using Device Connect Service Certificate.
The message retrieved from the cloud at %s is too large.		Contact fleet owner for correction of the message.
	Network is disconnected.	Establish network connection.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000112)	Invalid data range	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000113)	Invalid data value	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000101)	Field size error	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000105)	App Id does not exist	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000011)	Internal Error	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: 000010)	External Error	Contact AVURI Device Connect Support at dc.support@ge.com.
Failed to retrieve notification from Cloud. Please contact your GE service personnel. (Error code: xxxxxx)	Unknown	Contact AVURI Device Connect Support at dc.support@ge.com.
Verify		
Smiley icon display	Check whether the Agent is connected to the ThingWorx Core using BaseClient::isConnected() method.	Ensure the network connection and retry.

7-13-5 Continuous Wave (CW)

7-13-5-1 Vertical noise with P2D/P6D probes and Continuous Wave (CW)

A vertical noise issue (Figure 7-57) may exist when using P2D/P6D probes and Continuous Wave (CW).

Figure 7-57 Example of Vertical Noise



Workaround for vertical noise

There is no workaround for this issue. Hardware does not need to be replaced when this issue is identified.

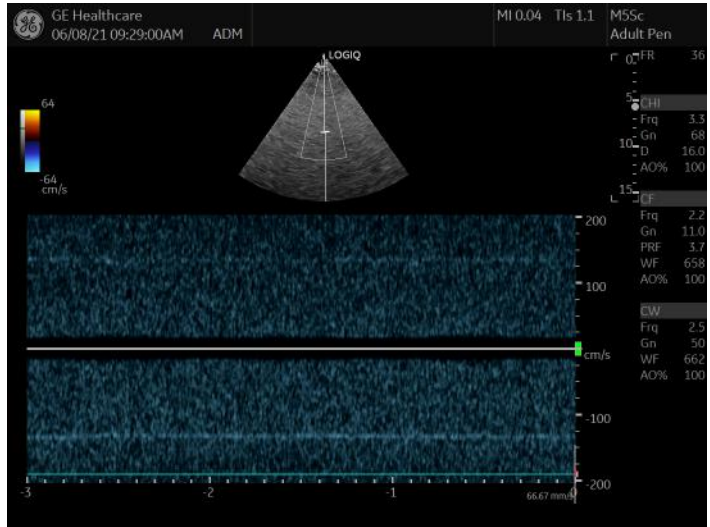
7-13-5-2 Tone noise with M5Sc-D / 6S-D probes and Continuous Wave (CW)

A Tone noise issue may exist when using M5Sc-D / 6S-D probes and Continuous Wave (CW) with limited position.

There is no workaround for this issue. Hardware does not need to be replaced when this issue is identified.

But if noise is quite stronger than this image, replacing BEPS assy may improve noise level.

Figure 7-58 Example of Tone Noise



Section 7-14

Probes Troubleshooting

Contents in this section

7-14-1	Probe recognition	7-138
7-14-2	IC/RIC5-9 CHI M-Mode too dark.	7-138
7-14-3	ML6-15 breast B and color flow “zipper artifact”	7-138
7-14-4	Body pattern probe mark shift.	7-138
7-14-5	Automatic probe diagnostics (VITAOnDemand)	7-139
7-14-6	Advanced Probe Option	7-141

7-14-1 Probe recognition

Check all of the probes on all the ports. Remove all of the probes, and then check each probe singly in every port.

- If only one probe fails to be recognized, clean User Defs to check if the problem is caused by corrupted presets. If the problem is not resolved, replace the probe.

7-14-2 IC/RIC5-9 CHI M-Mode too dark

With IC5-9 and RIC5-9 probes CHI M-Mode appears too dark compared to B-Mode image and is limited on the amount it can be brightened. Fundamental M-Mode gain is acceptable.

Use Anatomical M-Mode.

7-14-3 ML6-15 breast B and color flow “zipper artifact”

With ML-6-15 probes, a zipper artifact may appear. Try the following to resolve:

- Decrease the frame rate to minimize artifact.
- Change FR to 0 (this causes a slower FR).
- Do not use during a biopsy.
- Decrease depth to above 4 cm's.

7-14-4 Body pattern probe mark shift

If system is set to active body pattern on freeze, the body pattern will shift to the right on freeze. If it is then moved back it will save as desired.

Do not activate body pattern on freeze.

7-14-5 Automatic probe diagnostics (VITAOnDemand)

If there is VITAOnDemand option string and Enable Automatic Probe Diagnostics is selected on Utility > Admin, the Probe Test button appears when using the applicable probes with any B mode application.

NOTE: Supported probes are C1-6-D, M5SC-D, IC5-9-D, RIC5-9-D, and ML6-15-D.

To enable automatic probe diagnostics (VITA), see "Service settings" on page 3-48.

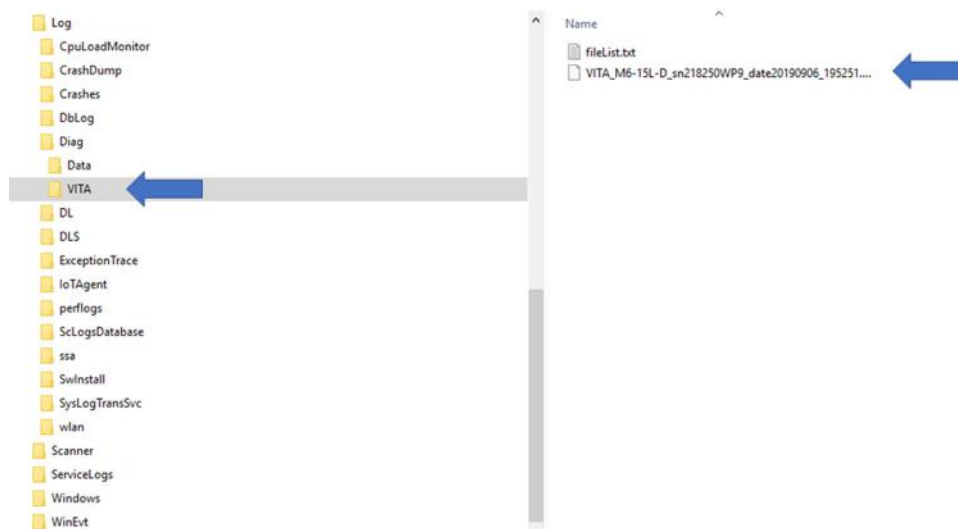
The initial VITA version collects diagnostic data at boot up from the first supported probe found connected from the left to the right.

- **Automatic Test Routine** - Periodically between patient exams, an automatic routine pulses a single element and lens echoes are recorded by other elements in the array. This is repeated until all elements are pulsed.
- **Advanced Data Analysis** - The system compiles the lens echo data into a sensitivity matrix comprising the relative transmit and receive frequencies between each combination of elements. This matrix is then analyzed for patterns.
- **On-Board Customer Features** - The result of this analysis will assess the health of the customers probe, alert to specific failure types, and can even adjust image quality to compensate for probe wear and degradation.

The diagnostic result will be logged in a file, stored under the Diag/VITA folder, with a .JSON extension.

This file can be transferred to the GE backoffice through a data transfer or can be collected with the Alt+D logs.

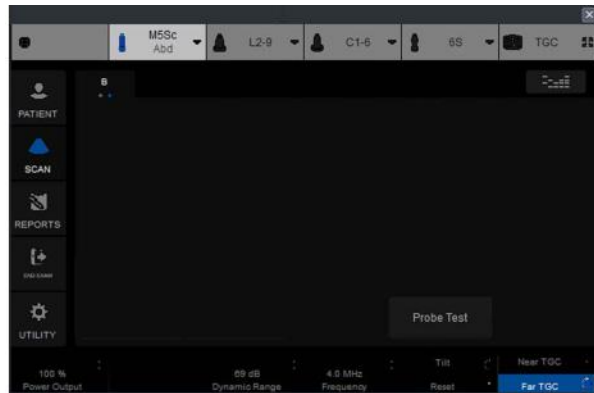
Figure 7-59 VITA Folder and File Location



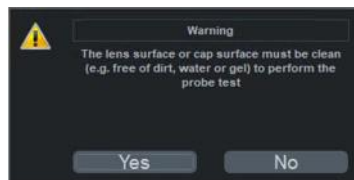
7-14-5 Automatic probe diagnostics (VITAOnDemand) (cont'd)

To run a VITAOnDemand probe test:

- 1.) From Scan, navigate to the second page of the B-mode tab.



- 2.) Select **Probe Test**. A popup window displays requesting to clean the probe before starting the test.



- 3.) Clean the probe.
- 4.) Select **Yes** to start the test.
- 5.) If the test passes, a popup window will show that the probe test passed.
- 6.) If the test fails, a popup window displays to suggest next steps to retest the probe.

7-14-5 Automatic probe diagnostics (VITAOnDemand) (cont'd)

After running the test again with a test fail, perform the following steps to identify if the failure is a system problem or a probe problem:

To determine a system failure or a probe failure:

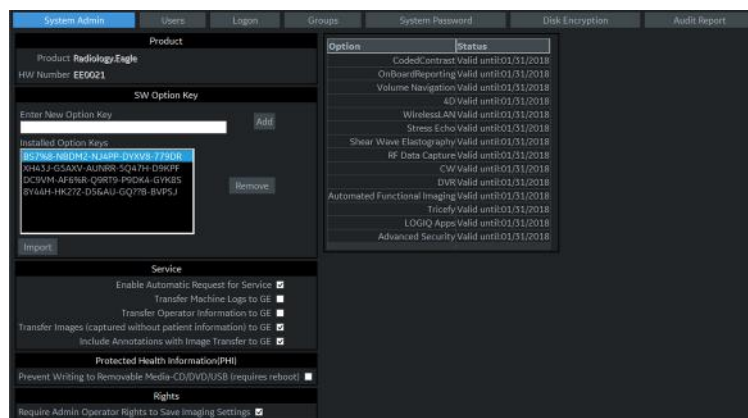
- 1.) Using a good probe on the same connector, run a VITAOnDemand probe test.
- 2.) If the test passes, then this might be a probe problem. Refer to the detailed VITA analysis results in the coming days from the Datalake.
- 3.) If the test fails, then this is a system problem.
- 4.) Run system diagnostics to detect where the problem is and replace whichever board is causing the problem.
- 5.) If the system diagnostics passes, this is relay board problem.
- 6.) Replace the relay board.

7-14-6 Advanced Probe Option

If the following probes does not activate even if you select, check the Advanced Probe Option (H46612LS) is installed in Utility -> Admin-> System Admin.

- C2-9-D probe
- C2-9VN-D probe
- C1-6-D probe
- C1-6VN-D probe
- C3-10-D probe
- M5Sc-D Probe
- L2-9-D probe
- L2-9VN-D probe.

Figure 7-60 System Admin Window



Section 7-15 Peripherals Troubleshooting

Contents in this section

7-15-1 Test of printers. 7-142
 7-15-2 EZbackup will not delete images to open disk space 7-142

7-15-1 Test of printers

Print Test Page tests that the printer is installed correctly and hooked up at the Windows level.

- 1.) Open the **Printers** folder, either from **Start > Settings > Printers** or **Utilities > System > Printers**.
- 2.) Right click on a printer and select **Preferences**.
- 3.) Select **Print Test Page** (this sends a print to the printer bypassing all of the scanner software).
- 4.) Observe the page. If the page prints out, the problem is probably a Windows configuration issue or a configuration issue with Connectivity. If the page does not print out, there probably is a cabling issue or a printer configuration issue in Windows.

NOTE: For the Sony small format printers you will see the test page clipped. This is normal.

7-15-2 EZbackup will not delete images to open disk space

Customers have to manually delete the patients after successful EZBackup operation to free up disk space.

Section 7-16

Setting Troubleshooting

Table 7-77 Setting Troubleshooting

Symptom	Solution
Incorrect group assignment of CMFN group in Breast Comment Library page 2	The cm from nipple annotations are assigned to the same group as the o'clock annotations. This group needs to be adjusted in the utility pages for these annotations. Assign as Group 5
Region presets have not been set up, If the European region is used the finger and hip models are not functional.	Set the region to None.
Imaging preset selection is not highlighted on Imaging Preset Manager	The issue is Utility > Imaging Preset Manager > Imaging Preset Selections list items are not highlighted when selected. All functions work, the selection is just not highlighted.
Print button with both Copy to Dataflow and USB QuickSave does not save image to clipboard.	If both Copy to Dataflow and USB QuickSave are programmed to the same print button, images may fail to save. Do not program Copy to Dataflow and USB QuickSave to the same print button.
GSDF is defaulted to on which may cause undesirable image quality on PACS systems that do not support GSDF.	Change the default GSDF setting to off.
System crashes if multiple commas are placed in annotations.	Avoid putting multiple periods, commas, etc. in annotations as this will cause a system crash.

Section 7-17

Scan Assistant Troubleshooting

7-17-1 Scan Assistant Creator

With Scan Assistant Creator, when the LOGIQ Fortis is locked or in auto-logoff, you can lose your Scan Assistant protocol. Do not allow the LOGIQ Fortis to enter lock screen or auto-logoff the Scan Assistant.

Saving and closing Scan Assistant Creator before leaving the LOGIQ Fortis is recommended.

7-17-2 Problems with annotations/comments and Scan Assistant

When running Scan Assistant and pausing or editing annotations/comments, the annotation/comments might remain on screen or may fail to display. To fix this problem, press the **Comment** key twice to close or display annotation/comments.

Section 7-18

Log File Troubleshooting

Contents in this section

7-18-1	Use ScLogWindow	7-146
7-18-2	Log analysis	7-149
7-18-3	Log analysis with button presses and touch panel events	7-150

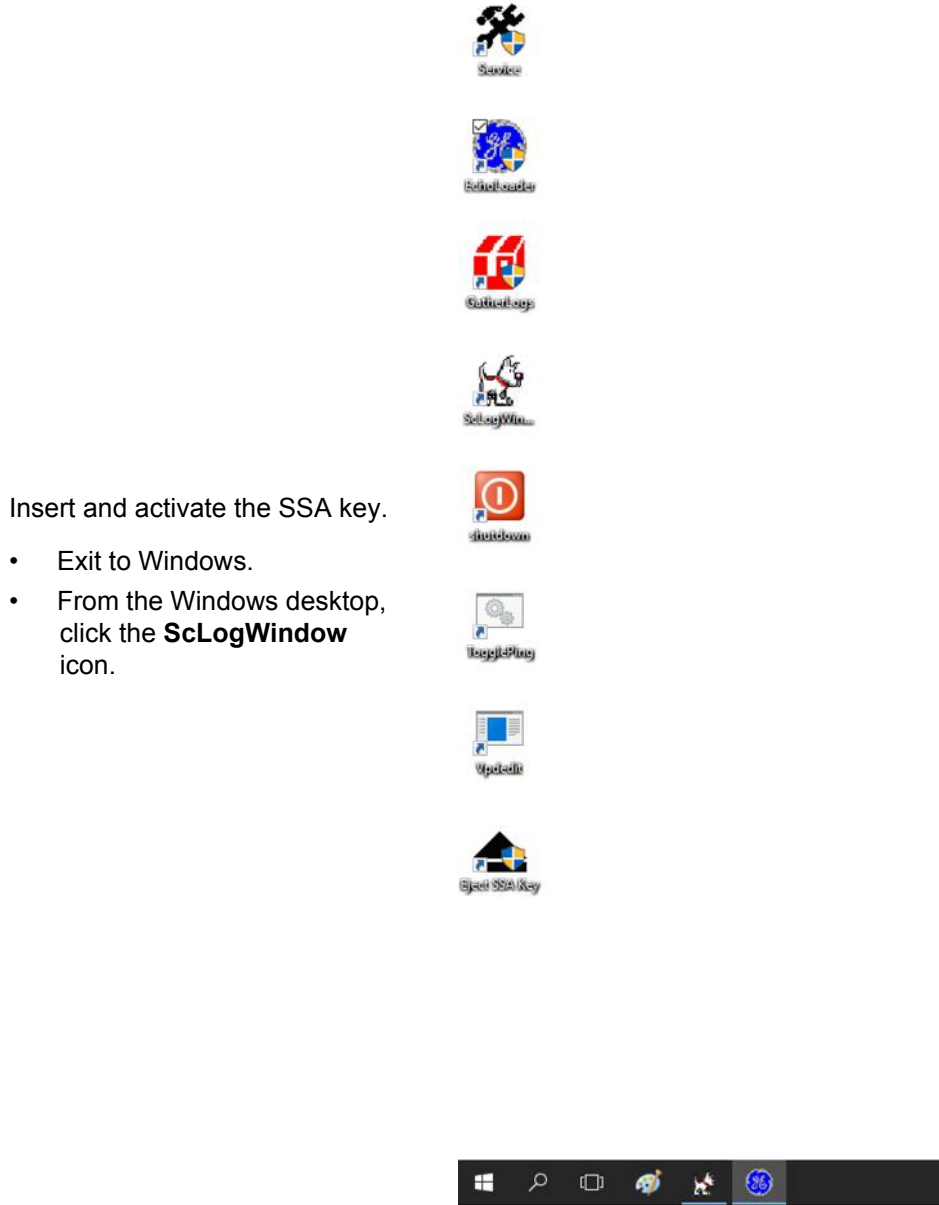
7-18-1 Use ScLogWindow

The ScLogWindow application helps identify errors while the LOGIQ Fortis is running. Access this application from the Windows desktop or through Task Manager. From **ScLogWindow**, you can:

- View the logs
- Save the log
- Filter the log

To open ScLogWindow from the Windows desktop:

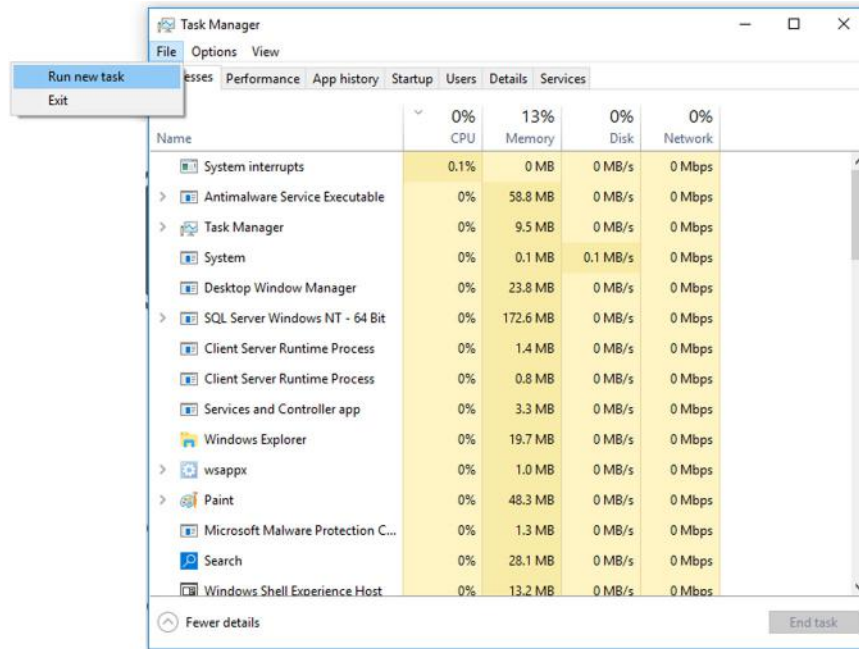
Figure 7-61 ScLogWindow from the Windows desktop



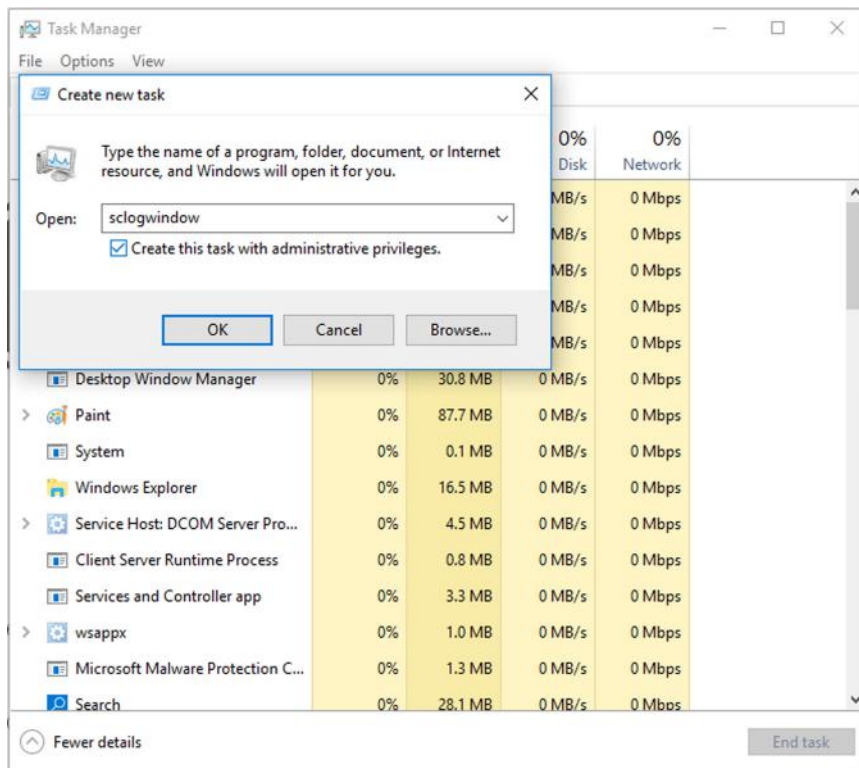
7-18-1 Use ScLogWindow (cont'd)

To open ScLogWindow from Task Manager:

- 1.) Insert and activate the SSA key.
- 2.) Press **Ctrl+Alt+Del** and select **Task Manager**.
- 3.) In Task Manager, select **File > Run New Task**.



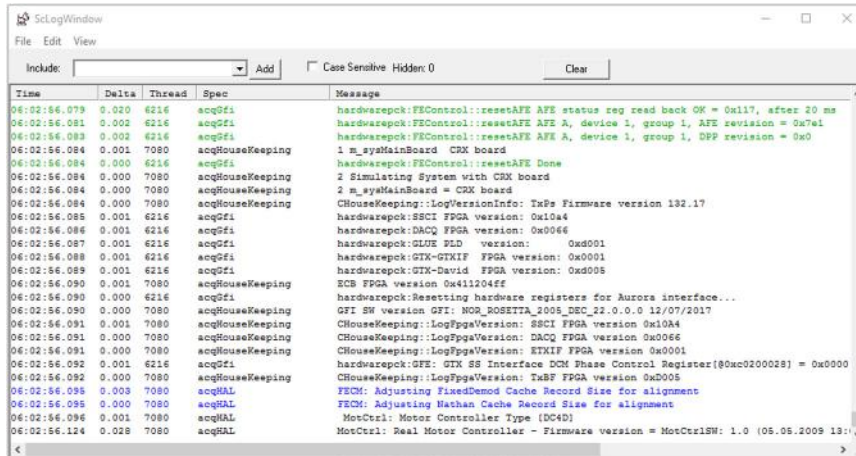
- 4.) In **Open**, enter **SclogWindow**, check **Create this task with administrative privileges**, and then press **OK**.



7-18-1 Use ScLogWindow (cont'd)

To view logs in the ScLogWindow:

- 1.) With the ScLogWindow open, double-click the **EchoLoader** icon.
- 2.) Use **Alt+Tab** to put the ScLogWindow in front.
- 3.) While the application is booting up, observe logging in ScLogWindow.



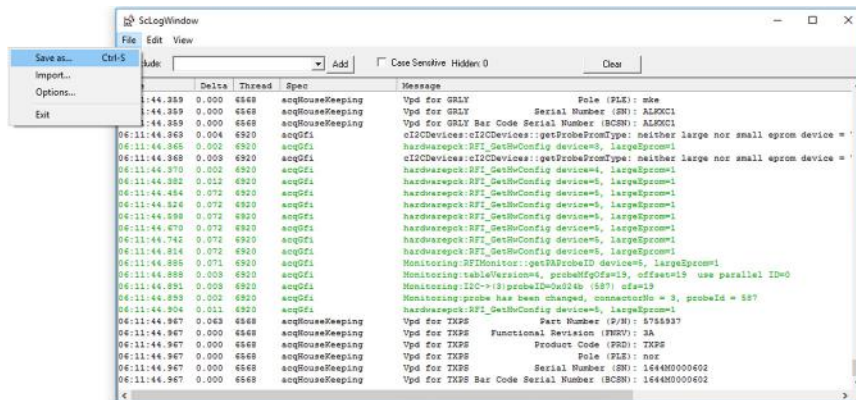
```

ScLogWindow
File Edit View
Include: [ ] Add Case Sensitive Hidden: 0 Clear
Time Delta Thread Spec Message
06:02:56.079 0.000 6216 acqZFI hardwarepck:FEControl::resetAFE AFE status reg read back OK = 0x117, after 20 ms
06:02:56.081 0.000 6216 acqZFI hardwarepck:FEControl::resetAFE AFE A, device 1, group 1, AFE revision = 0x7e1
06:02:56.083 0.000 6216 acqZFI hardwarepck:FEControl::resetAFE AFE A, device 1, group 1, SPP revision = 0x0
06:02:56.084 0.001 7080 acqHouseKeeping 1_m_ayMainBoard CRX board
06:02:56.084 0.000 6216 acqZFI hardwarepck:FEControl::resetAFE Done
06:02:56.084 0.000 7080 acqHouseKeeping 2_Simulating System with CRX board
06:02:56.084 0.000 7080 acqHouseKeeping 2_m_ayMainBoard = CRX board
06:02:56.084 0.000 7080 acqHouseKeeping CHouseKeeping::LogPpgaVersion: TmpF Firmware version 132.17
06:02:56.085 0.001 6216 acqZFI hardwarepck:SECI FPGA version: 0x10a4
06:02:56.086 0.001 6216 acqZFI hardwarepck:DACQ FPGA version: 0x0066
06:02:56.087 0.001 6216 acqZFI hardwarepck:GLUE PLD version: 0xd001
06:02:56.088 0.001 6216 acqZFI hardwarepck:GTX-GTXIF FPGA version: 0x0001
06:02:56.089 0.001 6216 acqZFI hardwarepck:GTX-David FPGA version: 0x0005
06:02:56.090 0.001 6216 acqZFI hardwarepck:GFE: GTX SE Interface DCM Phase Control Register{0x0c0200028} = 0x0000
06:02:56.090 0.000 6216 acqZFI hardwarepck:Resetting hardware registers for Aurora interface...
06:02:56.090 0.000 7080 acqHouseKeeping GFI SW version GFI: NOR_ROSETTA_2008_DEC_22.0.0.0 12/07/2017
06:02:56.091 0.001 7080 acqHouseKeeping CHouseKeeping::LogPpgaVersion: SECI FPGA version 0x10A4
06:02:56.091 0.000 7080 acqHouseKeeping CHouseKeeping::LogPpgaVersion: DACQ FPGA version 0x0066
06:02:56.091 0.000 7080 acqHouseKeeping CHouseKeeping::LogPpgaVersion: ETXIF FPGA version 0x0001
06:02:56.092 0.001 6216 acqZFI hardwarepck:GFE: GTX SE Interface DCM Phase Control Register{0x0c0200028} = 0x0000
06:02:56.092 0.000 7080 acqHouseKeeping CHouseKeeping::LogPpgaVersion: TMBF FPGA version 0x0005
06:02:56.095 0.003 7080 acqHAL FECM: Adjusting FixedDemod Cache Record Size for alignment
06:02:56.095 0.000 7080 acqHAL FECM: Adjusting Nathan Cache Record Size for alignment
06:02:56.096 0.001 7080 acqHAL MotCtrl: Motor Controller Type (DC4D)
06:02:56.124 0.028 7080 acqHAL MotCtrl: Real Motor Controller - Firmware version = MotCtrlSW: 1.0 (05.05.2009 13:

```

To save logs in ScLogWindow:

- Select **File > Save as**



```

ScLogWindow
File Edit View
Save as... Ctrl-S
Import...
Options...
Exit
Include: [ ] Add Case Sensitive Hidden: 0 Clear
Time Delta Thread Spec Message
06:11:44.359 0.000 6568 acqHouseKeeping Upd for GRLY Pole (PL): nke
06:11:44.359 0.000 6568 acqHouseKeeping Upd for GRLY Serial Number (SN): ALMKC1
06:11:44.359 0.004 6568 acqHouseKeeping Upd for GRLY Bar Code Serial Number (BCSN): ALMKC1
06:11:44.365 0.000 6920 acqZFI c12CDevices:c12CDevices::getProbeFromType: neither large nor small eptom device =
06:11:44.368 0.009 6920 acqZFI hardwarepck:RFI_GetBnConfig device=0, largeEptom=1
06:11:44.368 0.009 6920 acqZFI c12CDevices:c12CDevices::getProbeFromType: neither large nor small eptom device =
06:11:44.370 0.000 6920 acqZFI hardwarepck:RFI_GetBnConfig device=4, largeEptom=1
06:11:44.382 0.012 6920 acqZFI hardwarepck:RFI_GetBnConfig device=0, largeEptom=1
06:11:44.484 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=5, largeEptom=1
06:11:44.324 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=3, largeEptom=1
06:11:44.388 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=4, largeEptom=1
06:11:44.470 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=4, largeEptom=1
06:11:44.742 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=5, largeEptom=1
06:11:44.914 0.072 6920 acqZFI hardwarepck:RFI_GetBnConfig device=5, largeEptom=1
06:11:44.895 0.071 6920 acqZFI hardwarepck:RFI_GetBnConfig device=5, largeEptom=1
06:11:44.898 0.008 6920 acqZFI Monitoring:tableVersion=4, probalff0faw=19, offset=19 use parallel ID=0
06:11:44.891 0.008 6920 acqZFI Monitoring:IDC->13)probeID=0x024b (587) offset=19
06:11:44.893 0.000 6920 acqZFI Monitoring:probe has been changed, comment=0b = 3, probeId = 587
06:11:44.904 0.011 6920 acqZFI hardwarepck:RFI_GetBnConfig device=0, largeEptom=1
06:11:44.947 0.043 6568 acqHouseKeeping Upd for TXPS Part Number (P/N): 5755937
06:11:44.947 0.000 6568 acqHouseKeeping Upd for TXPS Functional Revision (FRV): 3A
06:11:44.947 0.000 6568 acqHouseKeeping Upd for TXPS Product Code (PCD): TXPS
06:11:44.947 0.000 6568 acqHouseKeeping Upd for TXPS Pole (PL): nor
06:11:44.947 0.000 6568 acqHouseKeeping Upd for TXPS Serial Number (SN): 1644M0000602
06:11:44.947 0.000 6568 acqHouseKeeping Upd for TXPS Bar Code Serial Number (BCSN): 1644M0000602

```

To filter logs in ScLogWindow:

- 1.) Select **View** and check the entries to filter.
- 2.) Select **Stop** to stop the logging.
- 3.) View the filtered logs.
- 4.) To clear the window and start a fresh log capture, select **Clear**.

7-18-2 Log analysis

Error logs and monitoring logs are kept in a database format. If needed for troubleshooting, collect them with Alt+D or gather logs. Either process extract information from the database in a collection of files that are readable for the field.

Crashes

Crash information is contained in **/Log/CrashDump**.

Use this log to troubleshoot issues with software crashes. Send these files to engineering for evaluation and determination of the root cause.

Auto transfer errors

When auto transfer is enabled, error information is contained in **CSD_LogFile.log**.

Auto transfer periodically logs data to the back office. For example:

```
13:27:49] ERROR data-transfer.js:764 DataTransfer Manual Data Transfer: Error in uploading full logs file D:\Scanner\upload\log_LogOther_E70034_171221_132748_DB.zip "error"
```

This example may indicate that network connectivity has been compromised on the LOGIQ Fortis or there is an issue with the facility reaching out to the back office. Check with the network administrator.

Service alerts

Service alert information is contained in **/Log/SvcAlert*.txt**.

Use this log to troubleshoot issues with alerts generated by the LOGIQ Fortis. Alerts can also be viewed on the Service desktop. Review log file content to determine the errors the LOGIQ Fortis has generated in the past.

USB issues

USB information is contained in **/Log/ScLogsDatabase/UsbLog.txt**.

Use this log to troubleshoot issues with a USB device that may be working intermittently. This log indicates connection and disconnection of USB devices during operation.

Probe use

Probe use information is contained in **/Log/ScLogsDatabase/MainLog.txt**.

Use this log to troubleshoot issues with probes. This log indicates probe selection and mode.

Monitoring logs

Monitoring log information is contained in **/Log/ScLogsDatabase/MonitoringLog.txt**.

Use this log to troubleshoot issues with voltage and temperature. This log contains the monitoring parameters for voltage and temperature, same used to the status indicators on the Service desktop. Use this log to evaluate details of red indicators in the Service desktop.

7-18-2 Log analysis (cont'd)

System configuration logs

Hardware configuration information is contained in `/Log/SysCfg.csv`.

Use this file to troubleshoot issues with hardware configuration (also known as VPD). This log helps to determine the part numbers of boards installed along with versions and serial numbers.

Boot up issues

To troubleshoot issues at boot up, see Bootup Issues on page 2-30.

7-18-3 Log analysis with button presses and touch panel events

You can see button presses (Touch button) and touch panel events (Touchpanel action) in the SCLogViewer window. The button press is logged as both protected with the value and as an ASCII button in the main log for the characters on the normal keyboard.

Figure 7-62 ScLogWindow with action|buttonpress Selected

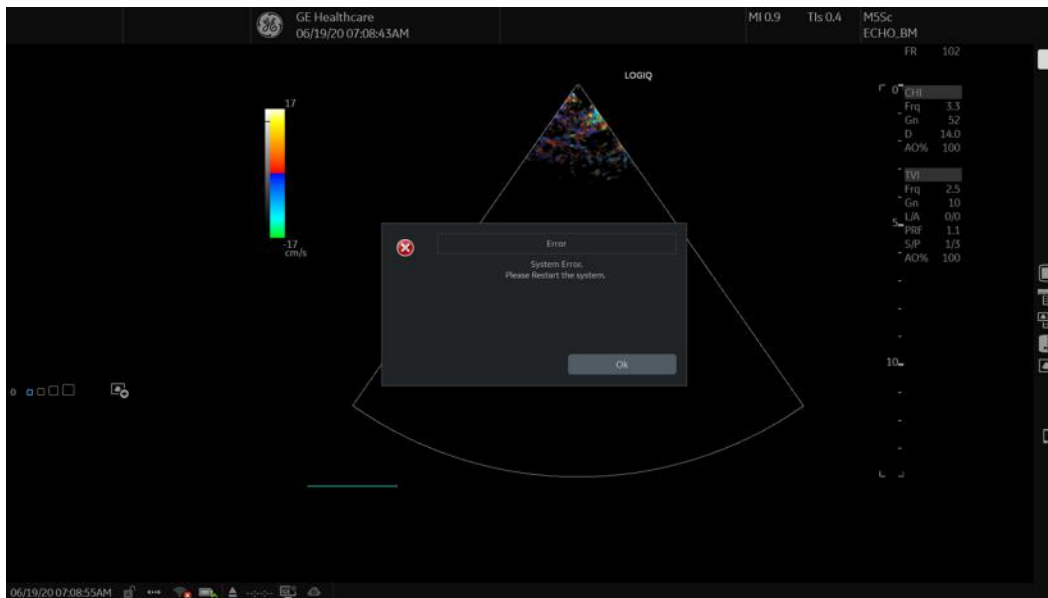
The screenshot shows the ScLogWindow application interface. At the top, there is a menu bar with 'File', 'Edit', and 'View'. Below the menu bar, there is a toolbar with an 'Include' dropdown menu set to 'action|buttonpress', an 'Add' button, a 'Case Sensitive' checkbox, a 'Hidden: 434' indicator, and a 'Clear' button. The main area contains a table with the following columns: Time, Delta, Thread, Spec, and Message. The table displays several log entries, including touch panel actions and button presses.

Time	Delta	Thread	Spec	Message
12:28:47.725	-	10400	EchoTouchpanel	Touchpanel action, Touch button: ButtonID_PatientInformation, Touch Position : x = -652, y = 388, operation: 1
12:24:59.216	51.491	10400	EchoTouchpanel	Touchpanel action, Touch button: ButtonID_ShowDetail, Touch Position : x = -465, y = 385, operation: 1
12:28:27.523	48.307	10400	UserEventLog	ButtonPress: name=FreezeBut, value=0
12:25:34.477	6.954	10400	EchoTouchpanel	Touchpanel action, Touch button: Popup_BiopsyKit, Touch Position : x = -270, y = 391, operation: 1
12:27:49.169	134.692	10400	EchoTouchpanel	Touchpanel action, Touch button: Cycle_BFrameAverageSpatComp, Touch Position : x = -459, y = 683, operation: 2
12:27:59.109	9.940	10400	EchoTouchpanel	Touchpanel action, Touch button: Cycle_BFrameAverageSpatComp, Touch Position : x = -466, y = 683, operation: 2
12:28:02.813	3.704	10400	EchoTouchpanel	Touchpanel action, Touch button: Popup_BiopsyKit, Touch Position : x = -219, y = 383, operation: 1
12:28:47.156	44.343	10400	EchoTouchpanel	Touchpanel action, Touch button: ButtonID_Probel, Touch Position : x = -430, y = 290, operation: 1
12:50:02.881	1278.72	10400	Protected	ButtonPress: name=AsciiBut, value=a
12:50:02.881	0.000	10400	UserEventLog	ButtonPress: AsciiBut
12:50:03.768	0.887	10400	Protected	ButtonPress: name=AsciiBut, value=a
12:50:03.768	0.000	10400	UserEventLog	ButtonPress: AsciiBut

Section 7-19 System Error with TVD and Sample Volume Length from Utility

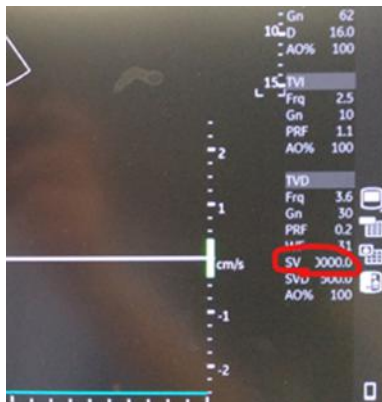
A system error sometimes occurs when entering TVD after changing the Sample Volume (SV) Length from Utility for Cardiac presets.

Figure 7-63 Example of System Error



Be aware that SV can display the wrong value even if the system error does not display.

Figure 7-64 Example of SV with Incorrect Value



When changing the Sample Volume (SV) Length in the Cardiac presets, avoid changing it from Utility and change it from the touch panel. Perform these steps.

- 1.) When system error occurs, click OK.
- 2.) On the touch panel, change SV Length to 6 mm.
- 3.) Select M5Sc, Save and then Overwrite.
- 4.) Shut down the system.

Chapter 8

Replacement Procedures

Section 8-1 Overview

8-1-1 Purpose of this chapter

This chapter describes how to remove and install, or replace, modules and subsystems in the LOGIQ Fortis. It also includes instructions for installing and re-installing the software.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

8-1-2 Contents in this chapter

8-1	Overview	8-1
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8-3	Definitions of Left, Rear / Back, Right and Front	8-7
8-4	Loading / Reloading / Upgrading the Software	8-8
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Section 8-2

Warnings and important information

8-2-1 Purpose of this section





This section includes important information. Read it before doing any of the procedures in this chapter.

Contents in this section

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8-2-2 Warnings

Table 8-1 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis. To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10 • 4-2-5 "Complete power down" on page 4-10
 <p>DANGER</p> 	<p>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</p>


 **DANGER AT LEAST TWO PERSONS ARE NEEDED WHEN REPLACING CASTERS (WHEELS) OR ADJUSTING BRAKES.**

 **DANGER DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTACLES INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE.

2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **CAUTION BECAUSE OF THE LIMITED ACCESS TO CABINETS AND EQUIPMENT IN THE FIELD, AND PLACING PEOPLE IN AWKWARD POSITIONS, WE HAVE LIMITED THE LIFTING WEIGHT FOR ONE PERSON IN THE FIELD TO 16 KG (35 LBS). ANYTHING OVER 16 KG (35 LBS) REQUIRES TWO PEOPLE.**

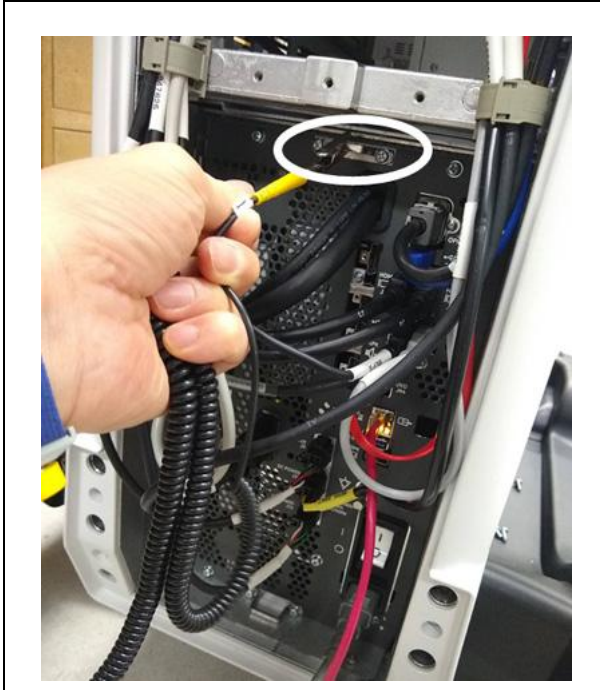
 **CAUTION THE WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT MUST NOT BE DISPOSED AS UNSORTED MUNICIPAL WASTE AND MUST BE COLLECTED SEPARATELY.**



CONTACT THE MANUFACTURER OR OTHER AUTHORIZED DISPOSAL COMPANY TO DECOMMISSION YOUR EQUIPMENT.

8-2-3 ESD receptacles

Figure 8-1 ESD Receptacles



8-2-4 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances. For more information, see "Returning/Shipping Probes and Repair Parts" on page 1-29.

8-2-5 Manpower - When two persons are needed

These replacement procedures require two persons:

- Casters Replacement
- Elevation Arm Replacement
- HDU Monitor Arm Replacement

The rest of the replacement procedures can be carried out by one person.

8-2-6 Tools needed for servicing the LOGIQ Fortis

The following tools are needed to service the LOGIQ Fortis. If the torque is not indicated with the procedure, hand tighten the screws/nuts.

Table 8-2 Tools Used for Servicing LOGIQ Fortis

Tool Type	Tool Size	GE Part Number
Torx Driver	BIT # TX-5	Use available equivalent
	BIT # TX-8	29-899073-00 or available equivalent
	BIT # TX-10	
	BIT # TX-15	
	BIT # TX-20	
	BIT # TX-25	
	BIT # TX-30*	Use available equivalent
BIT # TX-45*		
Flat-head Screwdriver	1/4 inch or 6 mm	5384716 or use available equivalent
Phillips Screwdriver	#1	46-258100P92 or use equivalent available
	#2 and #2 "Stubby"	46-258100P93 or use equivalent available
	#3	46-320688P4 or available equivalent
Nut Driver	7 mm, 10 inches long	Use available equivalent
	1/4"	
Hex Wrench	0.9 mm	Use available equivalent
	1 mm	
	1.5 mm	
	2 mm	
	3 mm	
	4 mm	
	5 mm	
	6 mm	
	8 mm	
Open End Wrench	10 mm	Use available equivalent
	2 mm	
	3 mm	
	4 mm	
	5 mm	
	13 mm	
	3/16 inch	
Torque Wrench Kit [^]	Two wrenches and one driver includes extra batteries. Covers 5 lb-in to 250 lb-ft (0.55 Nm to 339 Nm)**	5135228 or available equivalent
Adjustable Wrench	152 mm (6 inches) long	Use available equivalent
Pry Bar	Approximately 18 inches (457 mm) overall	Use available equivalent
Drill	Bosch GSR 12-2-LI Cordless Drill	5815870 or available equivalent
Digital Multimeter [^]	Digital Multimeter, Model 2020	2102278-050 or available equivalent
Digital Multimeter Test Leads	Test Leads Pomona kit	5110653 or available equivalent
Safety Analyzer [^]	Fluke ESA 612 120V Safety Analyzer Service Tool	5453348-2 or available equivalent
ESD Vacuum Cleaner	Vacuum cleaner	46-194427P392 or available equivalent
Grease	Krytox 227 by DuPont	2301-0478-00
Chapman Kit	Number 7331	Use available equivalent
Thumb Drive	Class M SSA	5431898-3 or available equivalent

Table 8-2 Tools Used for Servicing LOGIQ Fortis (Continued)

Tool Type	Tool Size	GE Part Number
Adjustable Torque Driver	2.5-11.5 in-lbs	46-282782P1 or available equivalent
	11-29 in-lbs.	2102278-043 or available equivalent
Spanner Open End Wrench	1 1/8 inch thin profile	2356552 or available equivalent
Allen Hex Head Long Shaft Ball End Driver Set	American	46-194427P353 or available equivalent
Needle Nose Pliers and Cutters Set	Part of small maintenance tool set	5112579-2 or available equivalent
Channel Lock Pliers	10 inch	5109897 or available equivalent
Combination Open And Box End Ratchet Wrench	1/2 inch	2246823 or available equivalent
* 90 degree "L" is suggested. A full set of 90 degree "L" TORX wrenches are recommended. ** Heavy mechanical parts may need a specific torque. Each procedure will indicate the torque needed. ^ Torque wrenches, digital multimeters and safety analyzers are tools that required periodic calibration. Check with your local Service Organization to ensure the tools periodic calibration is performed.		

8-2-7 PPE Required During Service

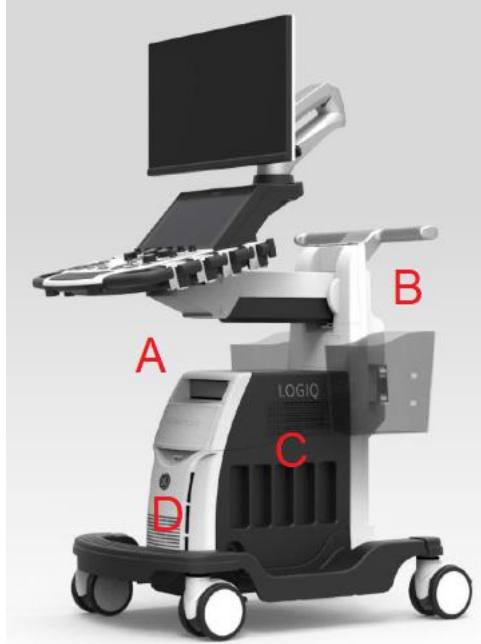
The following PPE are required during service tasks, per EHS Policy:

PPE Required During Service
<ul style="list-style-type: none"> • Safety Glasses • Safety Shoes • Cut Resistant Gloves • Kneel pad (if kneeling is required) • ESD - mat and wrist strap

Section 8-3 Definitions of Left, Rear / Back, Right and Front

Figure 8-2 illustrates what is the Left Side (**A**), Rear / Back (**B**), Right Side (**C**), and Front (**D**).

Figure 8-2 Definitions of Left, Rear / Back, Right and Front



Section 8-4 Loading / Reloading / Upgrading the Software

8-4-1 Purpose of this section

This section describes how to install and/or re-install software on LOGIQ Fortis.

Contents in this section

8-4-1	Purpose of this section	8-8
8-4-2	LOGIQ Fortis Model Software Configuration and Hardware	8-9
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8-4-4	Space management - moving all images	8-9
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8-4-6	Overview of the Base Image and Application Software	8-10
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8-4-8	Loading the base image and application software - full load	8-13
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8-4-2 LOGIQ Fortis Model Software Configuration and Hardware


Table 8-3 LOGIQ Fortis Software Configuration and Hardware

MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
6601000	LOGIQ Fortis LCD monitor CONSOLE, 100-240 VAC	R3.x.x
6602000	LOGIQ Fortis HDU Display CONSOLE, 100-240 VAC	R3.x.x

8-4-3 Software provided with the LOGIQ Fortis

Software is provided on a flash drive with base load image and application software. If patch software has been included, an additional flash drive may be included with patch software. Verify that the software is current. Updated software may be available. Check for any available FMIs.

8-4-4 Space management - moving all images


-  **NOTICE** In order to complete a successful restore of the Patient Database, if needed, the images must be moved away from LOGIQ Fortis before doing backup of the Patient Database. Depending on the location set-up, either move the images to a remote server or to removable media like DVD or CD discs. As the images are moved, the database will point to the new location. If the backup procedure is not completed correctly, the images and database information could be lost.

Refer to “Recording Images” in Chapter 9 of the Basic User Manual (appropriate version).

-  **WARNING** *Before loading software, CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR whether the patient archive has been encrypted and if the customer has the password or the key to unlock the data. Failure to obtain those items will cause permanent DATA LOSS!*

Speak with the personnel at the site to determine which patient images need to be backed up prior to starting.

8-4-5 Backing up the Patient Archive and System Configurations

-  **CAUTION** An error, or a power loss, may occur during the software loading. Always back up the patient images, patient archive, and the system configurations before starting a software load. In order to complete a successful restore of the patient database, if needed, the images must be moved away from the LOGIQ Fortis before backing up the patient database. Depending on the location set-up, either move the images to a remote server or to removable media like DVD or CD discs. If the backup procedure is not completed correctly, the images and database information could be lost.

See “Backup and Restore” in Chapter 9 of the Basic User Manual (appropriate version).

8-4-6 Overview of the Base Image and Application Software

The SSD on the LOGIQ Fortis are divided into five partitions.

NOTE: *The LOGIQ Fortis has three visible partitions (two partitions are hidden).*

Table 8-4 Drive Partitions


Drive Type	Partition Letter	Usage	GB (approximately)
SSD	C:	Windows 10/application	79
	Z:	Software repository	31
	D:	User settings/configuration	42
	E:	Database/data	750
	V:	Future use	10

When installing (and re-installing) software, you get the choice to either replace all the contents or only install the software on the System partition. If you chose to replace all the contents, all stored data (including all set-up data) will be lost. It is considered a best practice to always move images away from the drive, do backup of databases, etc. and record important configuration data on paper before starting a software load or reload.

The software is delivered on a thumb drive with the base load image and LOGIQ Fortis application software. In some cases, a second thumb drive with a software patch, may also be included. A software patch is used when a few new files should be installed or changed, but the changes do not require a complete software load.

When installing the software, start with the system software, then the application software and if included, install the patch software at the end. This is described in detail over the next pages.

NOTE: *System software may also be referred to as the base image or ghost.*

 **WARNING** ***WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS AND CUSTOMER PRESETS TO CD, DVD OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE. FAILURE TO FOLLOW INSTRUCTIONS COULD RESULT IN LOSS OF PATIENT DATA.***

Before the system software load, you must perform the following steps:

- Contact the customer to allow enough lead time to back up the system.
- Review troubleshooting section to collect information for future analysis if you are troubleshooting loss of image or patient data.

NOTE: *After a full or partial system software load, confirm the Windows automatic Daylight Saving Time feature is turned off (**Utility > System > General > Date/Time > Time Zone tab > Automatically Adjust Clock** check box). Be sure the system and DVR date, time and time zone are set correctly.*

NOTE: *System and application software disables the Run window normally accessed from **Start > Run**, and the mouse right-click (left set key) feature.*

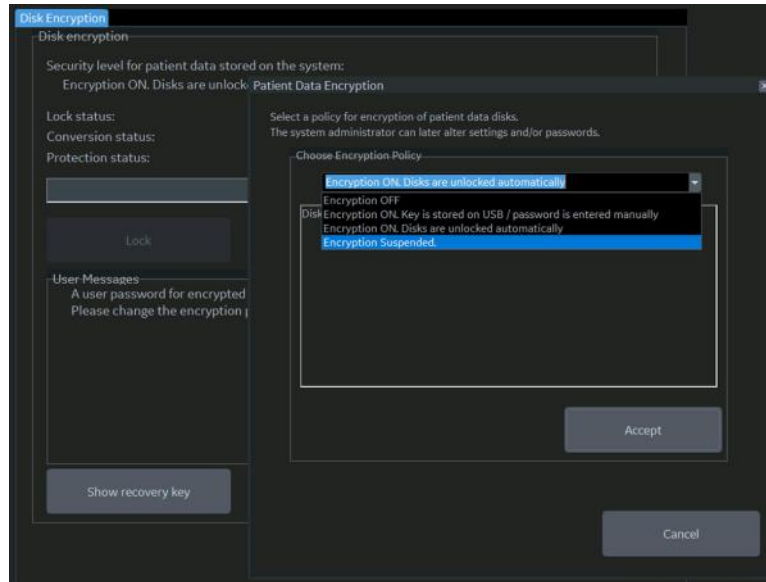
8-4-7 Suspending encryption to load software

With an activated SSA key on the LOGIQ Fortis, Encryption Suspended is available. Encryption Suspended temporarily disables encryption without un-encrypting the drives to enable the C:\ only software load through external media. You can suspend the encryption process to reload software or replace the BEPS/hard disk drive.

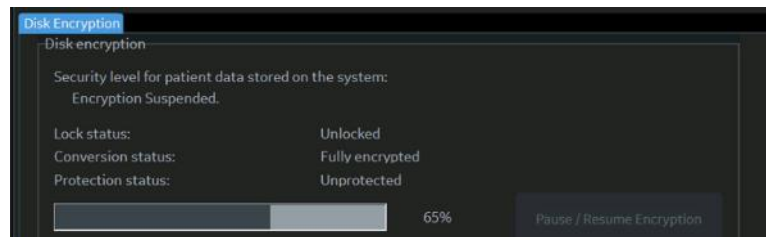
NOTE: If you reload software through the Service Desktop, then encryption is automatically suspended.

To suspend encryption to load software:

- 1.) Insert an activated SSA key.
- 2.) Navigate to **Utility > Admin > Disk Encryption**.
- 3.) Under **Choose Encryption Policy**, select **Encryption Suspended**.



- 4.) View **Encryption Suspended** information.

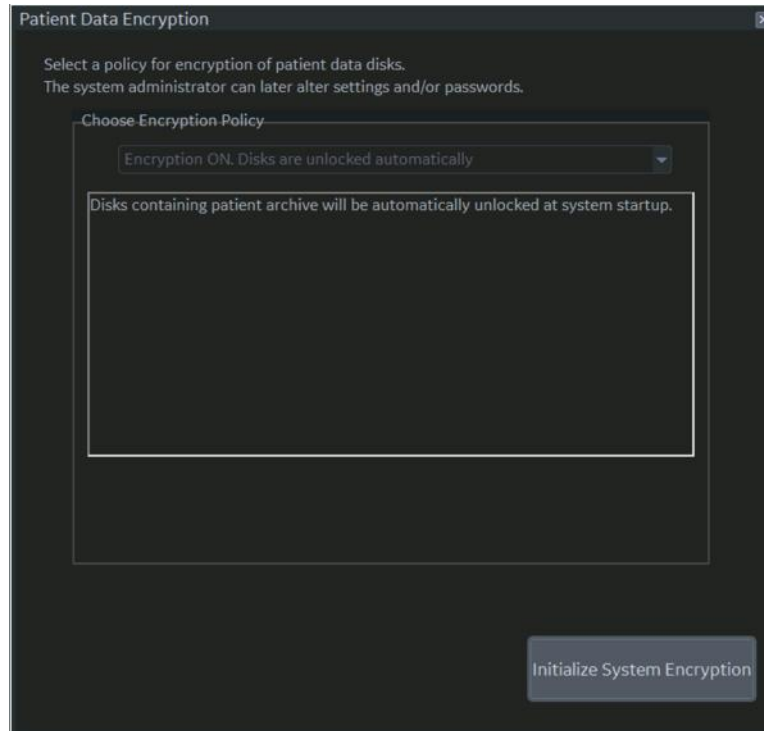


- 5.) Perform the software load.
- 6.) After the software load is complete, under **Choose Encryption Policy**, select the encryption policy.

8-4-7 Suspending encryption to load software (cont'd)

7.) Select **Initialize System Encryption** or set encryption to ON.

NOTE: *If you have done a full system restore, this is what Patient Data Encryption will look like. You need to select "Initialize System Encryption".*



8-4-8 Loading the base image and application software - full load

Follow this procedure to load the base image software and application software from the thumb drive.

NOTE: Lockout/tagout (LOTO) is not required as you will not manipulate any electronics.

NOTE: A Service key is not required to run this procedure.


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) and [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-5 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 1 hour and 30 minutes to 2 hours and 30 minutes depending on the amount of back-up/restore activities (presets and patient archive) needed prior to and after the installation.	3 mm hex wrench Software thumb drive	No PPE required

Loading base image and application software

 **WARNING** *Before loading software, CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR that the patient archive has been backed up. Failure to do so will cause permanent DATA LOSS!*

 **NOTICE** Before loading the base image load software, remove all media from USB ports and internal drives (for example, DVD), and disconnect any portable hard drives. Failing to do so may interrupt the software load process.

8-4-8 Loading the base image and application software - full load (cont'd)

Read and understand the contents of this procedure before performing the software update.

Before loading the base image and application software, you must perform the following steps:

- Back up patient data by using EZBackup or Export.

NOTE: *Do not use Patient Archive Backup/Restore in Utility > System > Backup Restore to back up patient data. For more information on backing up and restoring patient data or system presets, see "Backup and Restore" in the LOGIQ Fortis Basic User Manual, Direction 5817681-1EN.*

- Back up user-defined configurations only. Leave service unchecked.

NOTE: *Use a USB thumb drive to back up user-defined configurations. These configurations will be restored once the software load is complete.*

- For software options (for example, Breast Assistant, Powered by Koios DS (**Utility > Connectivity > Koios**), Tricefy (**Utility > Connectivity > Tricefy**), and Device Management (**Utility > Connectivity > Device Mgmt**) capture the information on those screens before loading the full ghost.

NOTE: *Once the software installation is complete, use this information to set up the options again.*

- Confirm that no images are in the clipboard or opened exams.
- Disconnect the Ultrasound system from the network and remove all transducers from the system.
- If used, disconnect the secondary monitor.
- Connect and turn ON the printer to retain printer preferences. Before you load the base image, record any printer preferences. After the base image is loaded, check the printer preferences and update as needed.
If a printer is plugged in at this time, it is automatically installed.
- You must record all service presets on paper to restore remote connectivity after software installation is complete. You will have to manually restore service presets (for example, Agent Configuration).
- From Windows, **Utility > Connectivity > TCP/IP** or from the customer, manually record the DNS server settings.

8-4-8 Loading the base image and application software - full load (cont'd)

Table 8-6 Load Base Image and Application Software- full load



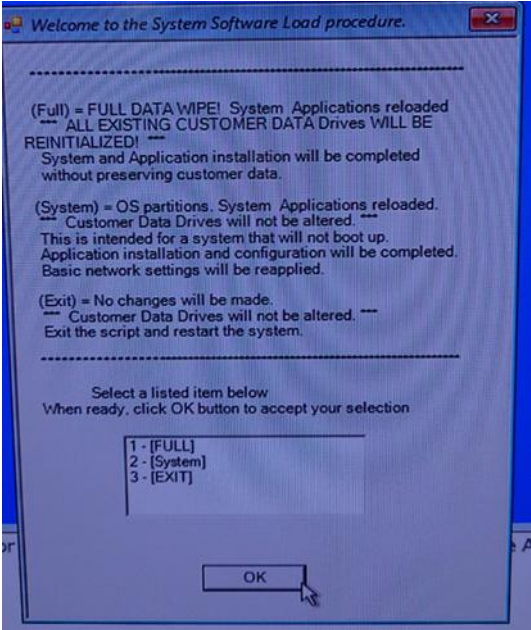
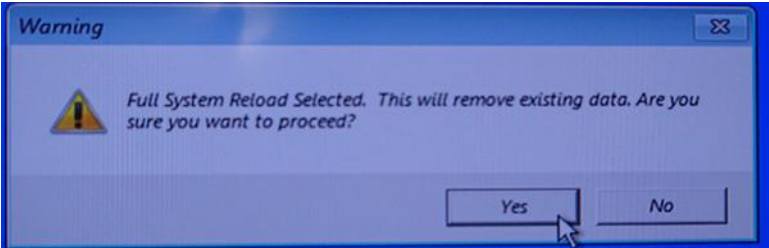
Step	Corresponding Graphic
<p>1. Remove any USB flash drives and any CD/DVDs from the DVD drive prior to updating the software. Disconnect the system from the network and remove all transducers from the system. If used, disconnect the secondary monitor, any HDMI cables and/or external monitors.</p> <p>Power down the LOGIQ Fortis.</p> <p>Insert the software thumb drive into the USB port on the back of the LOGIQ Fortis.</p> <p>Power on the LOGIQ Fortis.</p>	
<p>2.  CAUTION</p> <p>Selecting 1- (FULL) is a DATA WIPE & System Application reload. ALL EXISTING PATIENT DATA WILL BE REMOVED. All existing data will be removed. System and application installation will be completed without preserving customer data.</p>	
<p>With the trackball, point to 1 - (FULL) and then press the left set key to select 1 - (FULL).</p> <p>With the trackball, point to OK and press the left set key to select OK.</p> <p>In the Warning dialog box, select Yes.</p> <p>This will take approximately 10-15 minutes.</p>	
	

Table 8-6 Load Base Image and Application Software- full load(Continued)


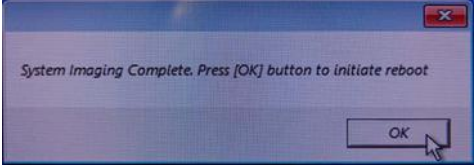
Step	Corresponding Graphic
<p>2.</p> <p>View these screens as the application software loads.</p> <p>This will take approximately 15-20 minutes.</p>	
<p>3.</p> <p>When System Imaging is Complete displays, do the following:</p> <ul style="list-style-type: none"> • Select OK to reboot the system. • Remove the USB media BEFORE the system starts rebooting. 	

Table 8-6 Load Base Image and Application Software- full load(Continued)



Step	Corresponding Graphic
<p>4.</p> <p>After the system reboots, view these screens as the application software loads.</p> <p>This will take approximately 15-20 minutes.</p>	<p>NOTE: These screen shots are examples of the progress screens that will display as the software loads. These progress screens vary according to the software revision and version.</p>  

Table 8-6 Load Base Image and Application Software- full load(Continued)



Step	Corresponding Graphic
<p>5.</p> <p>After the system reboots again, view these screens as the application software loads.</p> <p>This will take approximately 15-20 minutes.</p>	
<p>6.</p> <p>When the Install Success dialog box displays, if necessary, select OK to reboot the system.</p>	

Table 8-6 Load Base Image and Application Software- full load(Continued)

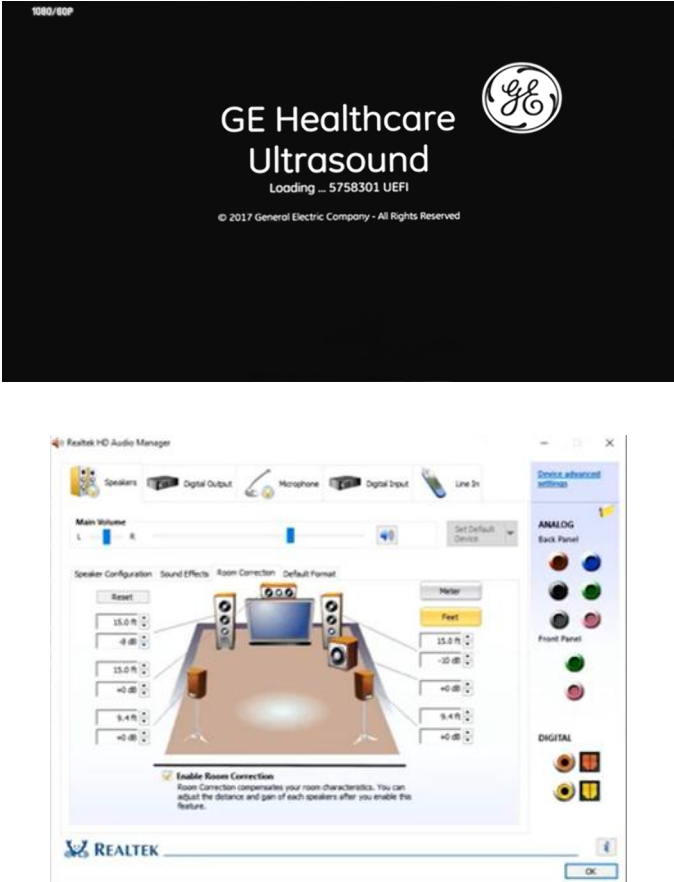

Step	Corresponding Graphic
<p>7.</p> <p>After the system reboots, view these screens as the audio is configured.</p> <p>This will take approximately 15-20 minutes.</p>	 <p>The graphic for step 7 consists of two screenshots. The top screenshot is a black loading screen for 'GE Healthcare Ultrasound' with the GE logo and text: 'Loading ... 5758301 UEFI' and '© 2017 General Electric Company - All Rights Reserved'. The bottom screenshot shows the 'Realtek HD Audio Manager' software interface. It features a central 3D diagram of a room with speakers and a monitor. The interface includes sections for 'Speaker Configuration', 'Sound Effects', 'Room Correction', and 'Default Format'. There are volume sliders for various speakers and a 'Meter' section. A 'Room Correction' section is checked and includes a brief explanation: 'Room Correction compensates your room characteristics. You can adjust the distance and gain of each speaker after you enable this feature.' The Realtek logo is at the bottom left, and an 'OK' button is at the bottom right.</p>
<p>8.</p> <p>Once the application software installation is complete, the LOGIQ Fortis restarts.</p>	 <p>The graphic for step 8 consists of two screenshots. The top screenshot is identical to the one in step 7, showing the 'GE Healthcare Ultrasound' loading screen. The bottom screenshot is a blue notification box with white text that reads: 'You're about to be signed out' and 'The system is being rebooted to complete the software installation'. There is a 'Close' button in the bottom right corner of the notification box.</p>

Table 8-6 Load Base Image and Application Software- full load(Continued)

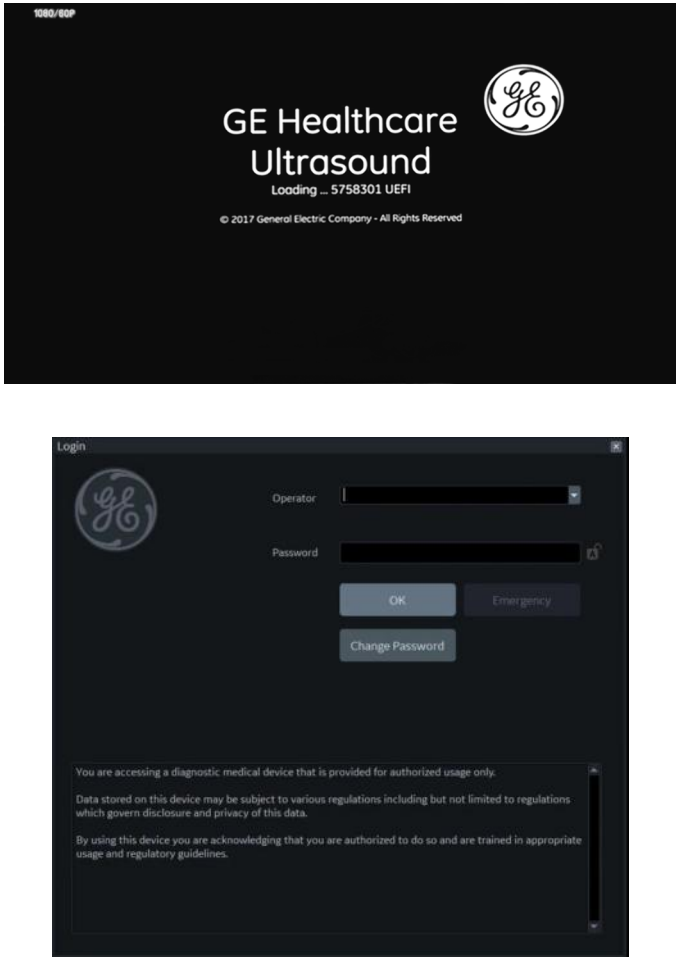
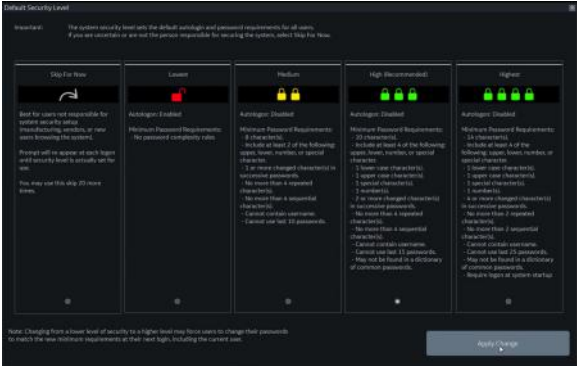

Step	Corresponding Graphic
<p>9.</p> <p>After boot up, in Operator, enter ADM. In Password, leave this field empty. NOTE: No password is required. Do not create any password at this time. Select OK.</p>	 <p>The first graphic shows the GE Healthcare Ultrasound loading screen with the GE logo and text: "GE Healthcare Ultrasound Loading ... 5758301 UEFI © 2017 General Electric Company - All Rights Reserved".</p> <p>The second graphic is the Login screen. It features the GE logo, a dropdown menu for "Operator" (set to "ADM"), a "Password" field, and buttons for "OK", "Emergency", and "Change Password". Below the login fields is a disclaimer: "You are accessing a diagnostic medical device that is provided for authorized usage only. Data stored on this device may be subject to various regulations including but not limited to regulations which govern disclosure and privacy of this data. By using this device you are acknowledging that you are authorized to do so and are trained in appropriate usage and regulatory guidelines."</p>
<p>10.</p> <p>When prompted with Default Security Level, select Skip for Now for the security level, and then select Apply Change. NOTE: If you select the Lowest security level and then continue with installation and testing. After the update is complete, you can transfer the LOGIQ Fortis to the Site Administrator who can reset the security level for the site. The security level can be reset through Utility > Admin > Logon.</p>	 <p>The graphic shows the "Default Security Level" screen. It includes a warning: "The system security level sets the default settings and password requirements for all users. If you are concerned or are not the person responsible for securing the system, select Skip the flow." Below this are five security level options: "Skip for Now", "Lowest", "Medium", "High Recommended", and "Highest". Each option has a list of requirements. The "Skip for Now" option is selected.</p>

Table 8-6 Load Base Image and Application Software- full load(Continued)

Step		Corresponding Graphic
11.	Put USB flash memory about BASE SYSTEM SOFTWARE and APPLICATION SOFTWARE in a pocket on the rear cover again.	

8-4-8 Loading the base image and application software - full load (cont'd)

Verifying the software versions:

- 1.) From the touch panel, select **Utility > System > About**.
- 2.) If upgrading the software, verify software version matches the version in the software used during installation, version received with the kit.

Verifying the software option key settings:

NOTE: Software option keys are software version dependent. If a new software version has been installed, please follow installation instructions for that software. Usually, with new software option strings are needed. When re-installing the same software, the software option strings should be reused.

- 1.) From the touch panel, select **Utility > Admin > System Admin**.
- 2.) Verify that the options previously installed in the system are still activated after the software installation.
- 3.) If any option is missing, request new option strings from the Online Support. Enter any new or missing option key string(s) in the **S/W Option Key** field and select **Add**, or by importing from a USB or DVD drive.

Verifying the TCP/IP settings:

- 1.) From the touch panel, select **Utility > Connectivity > TCP/IP**.
- 2.) Verify TCP/IP settings.
- 3.) If needed, manually set the DNS server settings you recorded.
- 4.) If you modified or updated any settings, select **Save settings**.
- 5.) Select **OK** to continue.
- 6.) Reboot the system.

Restoring the patient archive

Restore the patient archive (if previously exported or backed up with EZBACKUP) using the import function. If the patient archive media is encrypted and locked, you will need the encryption key or password to unlock it.

From the touch panel, select **Patient > Data Transfer > Import**.

Verifying the AE title and port settings:

- 1.) From the touch panel, select **Utility > Connectivity > Device**.
- 2.) Verify device settings.
- 3.) If you modified or updated any settings, select **Save settings**.
- 4.) Select **OK** to continue.

8-4-8 Loading the base image and application software - full load (cont'd)

Restoring system configurations:

- 1.) From the touch panel, select **Utility > System > Backup/Restore**.
- 2.) On the **Restore** screen, select System configuration to restore System settings/User Defined Configuration.
- 3.) Select the appropriate source device.



CAUTION The restore procedure will **OVERWRITE** the existing data on the local hard drive. Make sure to select the correct source device.

- 4.) If restore is done from a backup on a removable media, insert the media in the drive.
- 5.) Select **Restore Now**.
Depending on the selection, one or two restore confirmation windows are displayed.
- 6.) Ensure that the correct source is selected, and select **OK**.
The selected items are copied to the LOGIQ Fortis. If items from the System Configuration are restored, the LOGIQ Fortis needs to be rebooted. The Reboot system window is displayed.
- 7.) Select **OK** to reboot the system, and verify the Customer Presets are working properly.
- 8.) Import scan assistant programs previously exported.
- 9.) Check the printer selection and reselect the standard printer color and/or B&W if needed. Reloading software may reset the printer selection even after restoring user configurations.
- 10.) Load the online help files from the eIFU flash drive. For more information, see "Updating Documentation on the Ultrasound Scanner Via the USB" in the Basic User Manual (appropriate revision) or the eIFU leaflet.
- 11.) Check for any field that appears highlighted in yellow as this is an indication that the field needs to be reset.
- 12.) Confirm that at least the system drive encryption has been initialized. Contact the site administrator for them to set up the user partitions encryption.
- 13.) Set up InSite. See the Basic User Manual for instructions if using GE Connect Guide under the InSite icon menu, or the Service Manual if using the Agent Configuration from the Service Desktop.
 - Navigate to **Utility (second page) > Service > Utilities**, select **Resolve Agent Quarantine** and, if the system appears to be in quarantine, resolve the quarantine. If the quarantine does not resolve, contact the On Line support team to escalate the issue.
- 14.) If Device Management was active prior to the upgrade, you need to re-enter the e-mail address since it does not get repopulated automatically.
 - If Device Management was active prior to the software load, confirm that the cloud still verifies your activation.
 - Navigate to **Utility > Connectivity > Device Mgmt** and confirm that status shows "Active". It is normal if the e-mail address is not visible. If so, proceed to select "Verify" and confirm that you get a smiley face. Keep in mind that you need to be connected to the network for the Device manager to verify successfully.
 - If the system is not successfully connecting to the cloud, contact the Device management team for support at email: dc.support@ge.com indicating the serial number of the unit, description of the problem and e-mail of the admin user registered in the account.

8-4-8 Loading the base image and application software - full load (cont'd)

- 15.) Configure any new features (for example, Device Management) if applicable. Refer to the LOGIQ Fortis Basic User Manual for more information. For software options (for example, Breast Assistant, Powered by Koios DS and Tricefy), restore the information you recorded before loading the full ghost.
- 16.) Store the software thumb drive on the inside pocket of the left side cover. Reinstall any covers and Verify that all screws and covers removed earlier have been installed.

Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-7 Loading Software all Partitions Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

8-4-9 Loading the base image and application software - System only

Follow this procedure to load the application software and Windows operating system from the thumb drive. This procedure will load System partition only and will also load the repository partition. Neither Patient data nor user data is lost.

If disk encryption is enabled, you will need the correct recovery keys (32-bit string) and password (if set up). If recovery keys are not available, you will have to do a full load instead. The only way to recover the patient data is if the customer has previously backed up data and images.

NOTE: It is recommended to suspend encryption rather than turning it off. For non self-encrypted drives, turning encryption off will take 24 hours.

NOTE: Lockout/tagout (LOTO) is not required as you will not manipulate any electronics.

NOTE: A Service key is not required to run this procedure.


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) and [8-2-7 "PPE Required During Service" on page 8-6](#).


Table 8-8 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 1 hour and 30 minutes to 2 hours and 30 minutes depending on the amount of back-up/restore activities (presets and patient archive) needed prior to and after the installation.	Phillips screw driver Software thumb drive	No PPE required

8-4-9 Loading the base image and application software - System only (cont'd)

Loading application software

WARNING  Before loading software, **CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR** if the patient archive has been encrypted and if the customer has the password or the key to unlock the data. Failure to obtain those items, will cause permanent DATA LOSS!

NOTICE  Before loading the base image load software, remove all media from USB ports and internal drives (for example, DVD), and disconnect any portable hard drives. Failing to do so may interrupt the software load process.

Read and understand the contents of this procedure before performing the software update.

Before loading the base image and application software, you must perform the following steps:

- Back up patient data and system presets.
- Confirm that no images are in the clipboard or opened exams.
- Disconnect the system from the network and remove all transducers from the system.
- If used, disconnect the secondary monitor.
- Connect and turn ON the printer to retain printer preferences. Before you load the base image, record any printer preferences. After the base image is loaded, check the printer preferences and update as needed.
If a printer is plugged in at this time, it is automatically installed.
- Save all service presets to restore remote connectivity after software installation is complete.
- Save all user presets.

NOTE: For more information on backing up and restoring patient data or system presets, see “Backup and Restore” in the LOGIQ Fortis Basic User Manual (latest revision).

Table 8-9 Loading the base image and application software - System only


Step	Corresponding Graphic
<p>1. Suspend encryption prior to turn off the system. Suspended encryption will be maintained until reboot, make sure this is the last step prior to reload.</p> <p>Remove any USB flash drives and any CD/DVDs from the DVD drive prior to updating the software.</p> <p>Power down the LOGIQ Fortis.</p> <p>Insert the software thumb drive into the USB port on the back of the LOGIQ Fortis.</p> <p>Power on the LOGIQ Fortis.</p>	

Table 8-9 Loading the base image and application software - System only(Continued)

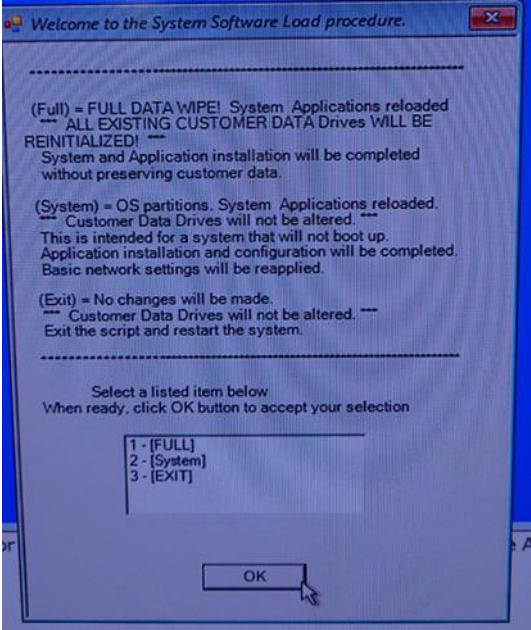

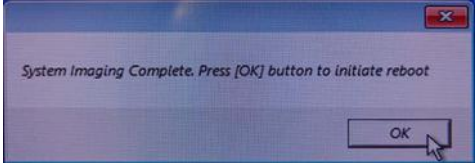
Step	Corresponding Graphic
<p>2.</p> <p>With the trackball, point to 2 - (SYSTEM) and press the left set key to select 2 - (System).</p> <p>With the trackball, point to OK and press the left set key to select OK.</p> <p>NOTE: Selecting 2-System is a not DATA WIPE. ALL EXISTING PATIENT DATA WILL BE PRESERVED.</p> <p>This will take approximately 10-15 minutes.</p> <p>NOTE: If encryption is enabled, a warning message will appear requesting to connect a USB keyboard to enter the encryption recovery key. Select OK to continue and enter the key using the alphanumeric keyboard.</p>	
<p>3.</p> <p>View the different screens that appear as the following tasks are performed:</p> <ul style="list-style-type: none"> Identifying Local Disk Properties Configuring Disk Partitions Populating Repository Populating System Drive. This may take some time... Populating Data Drives 	
<p>4.</p> <p>When System Imaging is Complete displays, do the following:</p> <ul style="list-style-type: none"> Press OK to reboot the system. Remove the USB media BEFORE the system starts rebooting. <p>Remove the USB media BEFORE the system starts rebooting (right after the screens go black).</p>	

Table 8-9 Loading the base image and application software - System only(Continued)

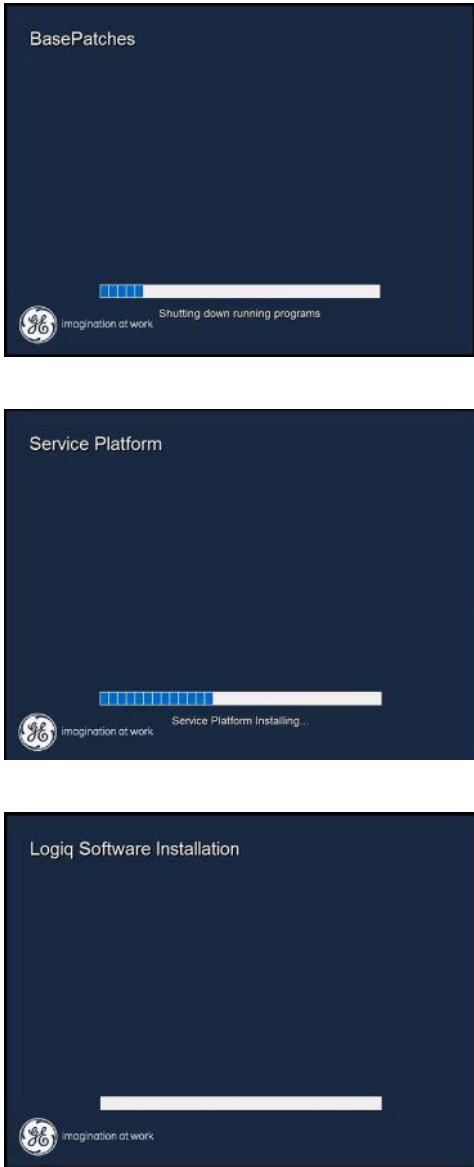
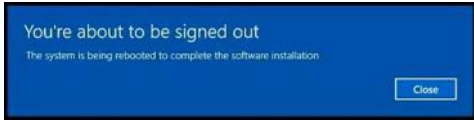
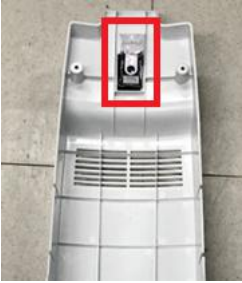
Step	Corresponding Graphic
<p>5.</p> <p>View these screens as the application software loads.</p> <p>This will take approximately 15-20 minutes.</p> <p>BasePatches</p> <ul style="list-style-type: none"> • Shutting down running programs • Updating policy files • Updating drivers • Applying Security Patches <p>Service Platform</p> <p>LOGIQ Software Installation</p> <ul style="list-style-type: none"> • Removing previous installation • Installing application • Configuring application • Updating Files • Service Platform Prerequisites 	 <p>The corresponding graphics for step 5 are three screenshots of the installation process:</p> <ul style="list-style-type: none"> BasePatches: A dark blue screen with a progress bar and the text "Shutting down running programs". Service Platform: A dark blue screen with a progress bar and the text "Service Platform Installing...". Logiq Software Installation: A dark blue screen with a progress bar and the text "Logiq Software Installation".
<p>6.</p> <p>Once the application software installation is complete, the LOGIQ Fortis restarts.</p>	 <p>The corresponding graphic for step 6 is a blue dialog box with the text "You're about to be signed out" and "The system is being rebooted to complete the software installation". A "Close" button is visible in the bottom right corner.</p>
<p>7.</p> <p>After boot up, log in as ADM (no password required) and, when prompted, select Lowest for the security level.</p> <p>NOTE: Select the Lowest security level and then continue with installation and testing. After the update is complete, you can transfer the LOGIQ Fortis to the Site Administrator who can reset the security level for the site. The security level can be reset through Utility > Admin > Logon.</p>	
<p>8.</p> <p>Go to "Full disk encryption and replacement procedures" on page 8-39.</p>	

Table 8-9 Loading the base image and application software - System only(Continued)

Step		Corresponding Graphic
9.	<p>Put USB flash memory about BASE SYSTEM SOFTWARE and APPLICATION SOFTWARE in a pocket on the rear cover again. If applicable, remove the old version of the software thumb drive and dispose of it per local policy.</p>	

8-4-9 Loading the base image and application software - System only (cont'd)

Verifying the software versions:

- 1.) From the touch panel, select **Utility > System > About**.
- 2.) Verify software version matches the version in the software used during installation, version received with kit.

Verifying the TCP/IP settings:

- 1.) From the touch panel, select **Utility > Connectivity > TCP/IP**.
- 2.) Verify TCP/IP settings.
- 3.) If you modified or updated any settings, select **Save settings**.
- 4.) Select **OK** to continue.
- 5.) Reboot the system.

Verifying the AE title and port settings:

- 1.) From the touch panel, select **Utility > Connectivity > Device**.
- 2.) Verify device settings.
- 3.) If you modified or updated any settings, select **Save settings**.
- 4.) Select **OK** to continue.

Check patient archive

Confirm that the patient archive is available. If the patient archive is encrypted, you will need the encryption key or password to unlock.

Check system configurations

Check the printer selection and reselect the standard printer color and/or B&W if needed. Reloading software may reset the printer selection even after restoring user configurations.

Check that the online help language is set.

Check for any field that appears highlighted in yellow as this is an indication that the field needs to be reset.

Confirm that at least the system drive encryption has been initialized. Contact the site administrator for them to set up the user partitions encryption.

Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-10 Loading System Partition Only Software Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

8-4-10 Loading only the application software

Follow this procedure to only load the application software (and not the Windows operating system).

If disk encryption is enabled, you will need the correct recovery keys (32-bit string) and password (if set up). If recovery keys are not available, you will have to do a full load instead. The only way to recover the patient data is if the customer has previously backed up data and images.

NOTE: Lockout/tagout (LOTO) is not required as you will not manipulate any electronics.

NOTE: A Service key is not required to run this procedure.

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) and [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-11 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 1 hour and 30 minutes to 2 hours and 30 minutes depending on the amount of back-up/restore activities (presets and patient archive) needed prior to and after the installation.	Phillips screw driver Software thumb drive	No PPE required

8-4-10 Loading only the application software (cont'd)

Loading only application software

Table 8-12 Loading Only Application Software


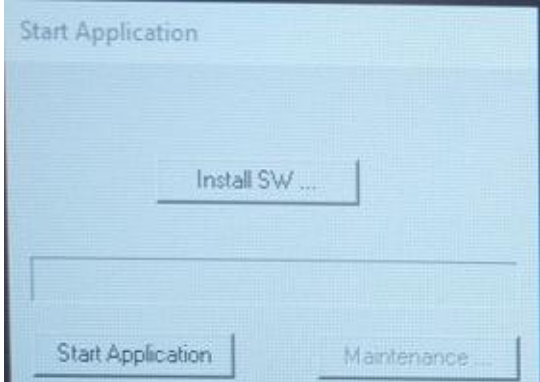
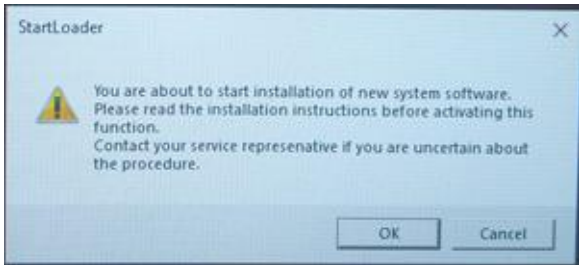
Step	Corresponding Graphic
<p>1.</p> <p>Turn on the LOGIQ Fortis and wait until Windows has booted and is loading. Watch carefully for the screen swirling circles, as shown.</p>	 <p>The graphic shows a black screen with the GE Healthcare Ultrasound logo at the top right. The text reads: "GE Healthcare Ultrasound", "Loading ... 5758301 Rev 7 UEFI", and "© 2017 General Electric Company - All Rights Reserved". At the bottom center, there are three small white dots arranged in a slight arc, indicating a loading or booting process.</p>
<p>2.</p> <p>Promptly insert the software thumb drive into the USB port on the back of the LOGIQ Fortis. This action will trigger the application only installation. If you wait too long, the application will start without detecting the thumb drive and you will have start the process again.</p>	
<p>3.</p> <p>At the Start Application dialog, select Install SW...</p>	 <p>The graphic shows a "Start Application" dialog box with a light blue background. It contains three buttons: "Install SW ..." at the top, "Start Application" at the bottom left, and "Maintenance ..." at the bottom right.</p>
<p>4.</p> <p>At the StartLoader dialog, select OK.</p>	 <p>The graphic shows a "StartLoader" warning dialog box with a light blue background and a yellow warning triangle icon. The text reads: "You are about to start installation of new system software. Please read the installation instructions before activating this function. Contact your service representative if you are uncertain about the procedure." At the bottom, there are "OK" and "Cancel" buttons.</p>

Table 8-12 Loading Only Application Software (Continued)

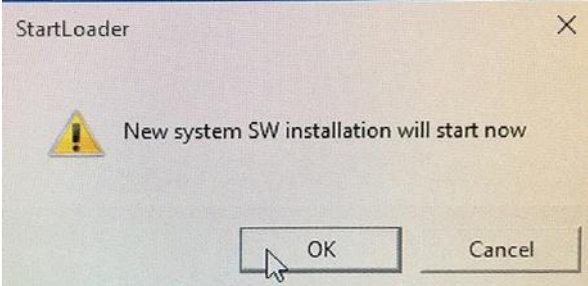

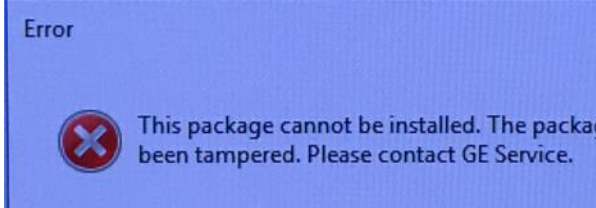
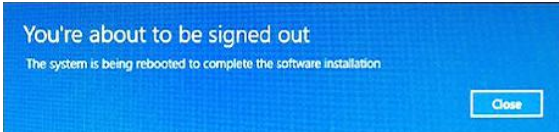
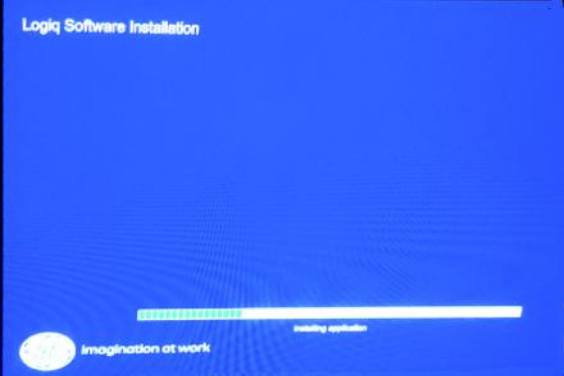
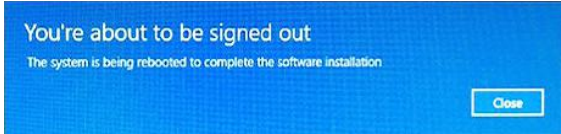
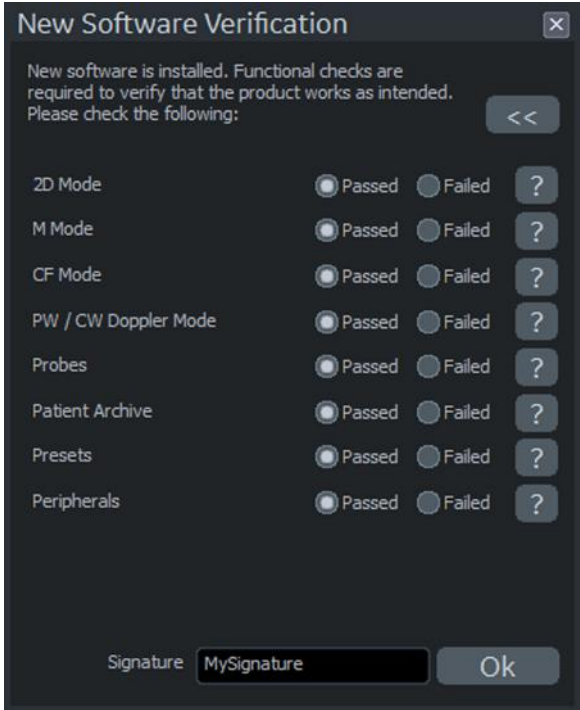
	Step	Corresponding Graphic
5.	<p>Select OK to continue with the application software load process.</p>	
6.	<p>If prompted, select Install to begin the software installation.</p>	
7.	<p>If you get an error stating “This package cannot be installed. The package is not compatible or has been tampered. Please contact GE Service”, select OK and try to select the correct file again.</p>	
8.	<p>Once the application software installation is complete this screen will display, remove the thumb drive before the system re-starts. The system will boot up.</p>	
9.	<p>Let the load process continue. It will take several minutes. DO NOT disturb the process.</p>	

Table 8-12 Loading Only Application Software (Continued)

Step	Corresponding Graphic
<p>10. Once the application software installation is complete this screen will display, remove the thumb drive before the system re-starts. The system will boot up.</p>	
<p>11. After boot up, log in as ADM (no password required) and, when prompted, select Lowest for the security level. NOTE: Select the Lowest security level and then continue with installation and testing. After the update is complete, you can transfer the LOGIQ Fortis to the Site Administrator who can reset the security level for the site. The security level can be reset through Utility > Admin > Logon.</p>	
<p>12. Whether encryption is On or Off and after a load of the application software (only), the New Software Verification dialog box may display outlining the functional checks required for the software installation. Select each of the functional checks. Enter a signature and select OK.</p>	

8-4-10 Loading only the application software (cont'd)

Verifying the software versions:

- 1.) From the touch panel, select **Utility > System > About**.
- 2.) Verify software version matches the version in the software used during installation, version received with the kit.

Verifying the TCP/IP settings:

- 1.) From the touch panel, select **Utility > Connectivity > TCP/IP**.
- 2.) Verify TCP/IP settings.
- 3.) If you modified or updated any settings, select **Save settings**.
- 4.) Select **OK** to continue.
- 5.) Reboot the system.

Verifying the AE Title and Port settings:

- 1.) From the touch panel, select **Utility > Connectivity > Device**.
- 2.) Verify device settings.
- 3.) If you modified or updated any settings, select **Save settings**.
- 4.) Select **OK** to continue.

Check patient archive

Confirm that the patient archive is available. If the patient archive is encrypted, you will need the encryption key or password to unlock.

Check system configurations

- 1.) Check the printer selection and reselect the standard printer color and/or B&W if needed. Reloading software may reset the printer selection even after restoring user configurations.
- 2.) Check that the online help language is set.
- 3.) Check for any field that appears highlighted in yellow as this is an indication that the field needs to be reset.
- 4.) Confirm that at least the system drive encryption has been initialized. Contact the site administrator for them to set up the user partitions encryption.

Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-13 Loading Application Software Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

8-4-11 Loading software from the internal partition

Use this procedure to reload base load and application software from the repository partition in the hard drive.

NOTE: Lockout/tagout (LOTO) is not required as you will not manipulate any electronics.

NOTE: A Service key is not required to run this procedure if run remotely.

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) and [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-14 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 1 hour and 30 minutes to 2 hours and 30 minutes depending on the amount of back-up/restore activities (presets and patient archive) needed prior to and after the installation.	If reloading locally, SSA key Software thumb drive	No PPE required


WARNING  Before loading software, **CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR** if the patient archive has been encrypted and if the customer has the password or the key to unlock the data. Failure to obtain those items will cause permanent **DATA LOSS!**

Table 8-15 Loading Software from the Internal Partition

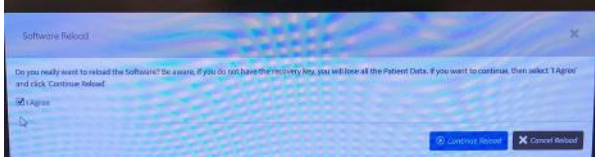
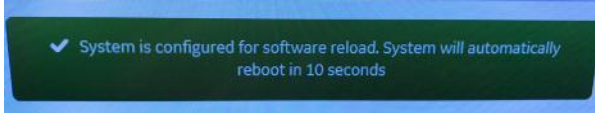
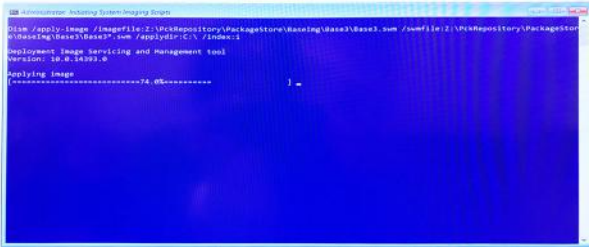

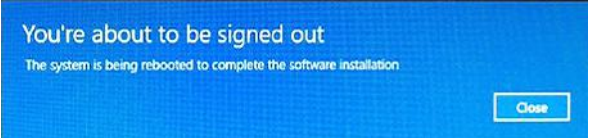
Step	Corresponding Graphic
1. Log into Service Desktop (if FE is reloading locally, SSA key is required. IF Reload is triggered remotely by the OLC, no SSA key is required). Navigate to Utility (second page) > Service > Utilities > Disruptive Mode Utility and set Disruptive mode to On. Navigate to Utilities > Software Reload . View the current version numbers. Select Software Reload .	
2. Before proceeding you need to check for encryption. System asks to confirm if encryption key is available. If yes, select the I Agree check box and then select Continue Reload .	
3. System message will appear on the screen stating that reload is configured and system will automatically restart in 10 seconds.	

Table 8-15 Loading Software from the Internal Partition (Continued)

	Step	Corresponding Graphic
4.	<p>Wait until the system goes through the whole loading process. System will boot up to applications automatically after about 30 minutes.</p>	
5.	<p>You will see several screens as the application software is being loaded. Let it run. At this point, the load time will be approximately 20 minutes.</p>	
6.	<p>Once the software installation is complete the LOGIQ Fortis will restart twice. When the LOGIQ Fortis restarts, it will be active and ready for testing.</p>	

8-4-11 Loading software from the internal partition (cont'd)

Verifying the software versions:

- 1.) From the touch panel, select **Utility > System > About**.
- 2.) Verify software version matches the version in the software used during installation, version received with kit.

Check patient archive

Confirm that the patient archive is available. If the patient archive is encrypted, you will need the encryption key or password to unlock.

Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-16 Loading Software from the Internal Partition Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

8-4-12 Full disk encryption and replacement procedures

Full disk encryption (all partitions on the SSD are encrypted) is available. Previously, only patient data on the E: drive could be encrypted.

Due to full disk encryption, some replacement procedures require an extra step to make sure the data is recoverable after the replacement.

- If the LOGIQ Fortis is down, you must have the correct recovery keys and password (if set up), otherwise the data will be irretrievable. recovery keys are required.
- If the LOGIQ Fortis is up and running, suspend encryption before performing a replacement procedure (hardware or software). Otherwise you must have the correct recovery keys and password (if set up). The length of encryption varies. Generally, encryption with SSD takes about 20 minutes. recovery keys are required.

Patient data should be backed up before these replacement procedures. If possible, the customer should be backing up data on a regular basis. In the event the system cannot access the patient data after the repair, the backup would be the only way to return the data to the LOGIQ Fortis.

Use Table 8-17 to determine the steps needed when performing a replacement procedure. Refer to the complete replacement steps in Chapter 8.

Table 8-17 Replacement Procedures and Encryption Updates

Procedure	Full disk encryption is...	After replacement, load...	After load, perform...
Loading application software	On	n/a	n/a
	Off	n/a	n/a
Loading base and application only (C only) software *1	On	n/a	"To complete a replacement procedure with full disk encryption On:" on page 8-40
	Off	n/a	n/a
Software Reload (from Service Desktop)	On	If encryption is On and Locked, you will be prompted to turn it off. Encryption will then be suspended. (Encryption is automatically suspended if you load software from the Service Desktop).	Go back and select initialize encryption again as loading from the repository leaves the drives encrypted but Off (in case there is an issue).
	Off	n/a	n/a
SOM replacement using the existing SSD *1, *2	On	Application only (C only) software	"To complete a replacement procedure with full disk encryption On:" on page 8-40
	Off		n/a
SSD (solid state drive) replacement	On	Full load image and application software	Go to Encryption > Select Initialize Encryption again. Doing a full load leaves the application drive unencrypted.
	Off		

*1) If system has been full disk encryption, the system may request to type the correct recovery keys and password, in advance, note the correct recovery keys and password.

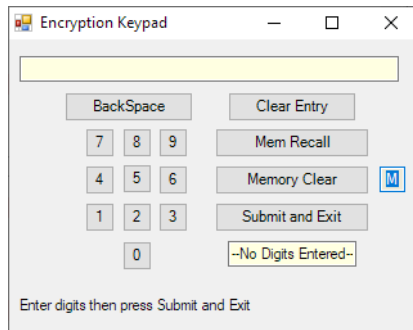
*2) If it needs to replace the SSD with new one at same time as SOM replacement, refer to SSD (solid drive) replacement in same table.

8-4-12 Full disk encryption and replacement procedures (cont'd)

To complete a replacement procedure with full disk encryption On:

The system may request the recovery keys through the Numeric Key dialog box. This dialog box may display up to three times (once for each of the encrypted partitions).

- 1.) Once you select to load C only or System, the system will check for encryption status and if not suspended or turned off, it will prompt you to enter the recovery keys. On the Numeric Key dialog box, enter the recovery key and then select Submit and Exit. This step automatically place the entered number in Memory.



- 2.) When the Numeric Key displays Second time, select **Mem Recall** to recall the recovery key from memory and then select **Submit and Exit**.
- 3.) When the Numeric Key displays the third time, select **Mem Recall** to recall the recovery key from memory and then select **Submit and Exit**. If the keys are accepted, the system will continue to load the software.
- 4.) Close with the X.
- 5.) When the Numeric Key displays again, select **Mem Recall** to recall the recovery key from memory or manually enter the recovery key.
- 6.) Close with the X.

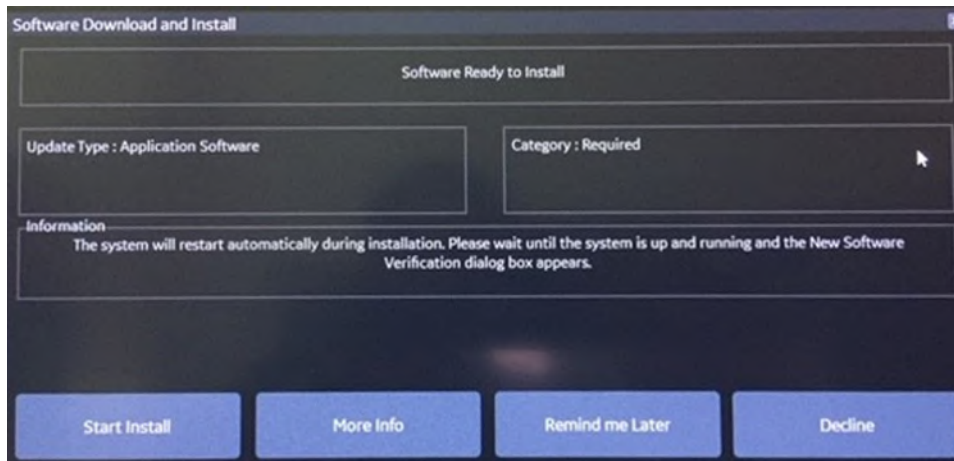
8-4-13 Software download and install

Use **Software Download and Install** to view available software updates and to install them.

- To view more information about the software download, select **More Info**.
- To postpone the software download, select **Remind me later**.
- To decline the software download, select **Decline**.
- To accept the software download, select **Start**.

For more information about software download, see the Basic User Manual (appropriate version).

Figure 8-3 Software Download and Install



Section 8-5 Replacing Cable

8-5-1 Purpose of this section



This section describes how to replace the cables used by LOGIQ Fortis.

Contents in this section

8-5-2	Preparation	8-42
8-5-3	Power cable replacement	8-43
8-5-4	Cable Duct and OPIO Cable Assy Replacement	8-46

8-5-2 Preparation

Table 8-18 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters. 2. Power down the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 	
<p>Preparation Links (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. 	

8-5-3 Power cable replacement

When preparing for the replacement, confirm that no images are in the clipboard or opened exams.

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) and [8-2-7 "PPE Required During Service" on page 8-6](#).



Table 8-19 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screw driver	Safety Glasses Kneel pad (if kneeling is required)

Table 8-20 Power cable removal

Step	Corresponding Graphic
<p>CAUTION</p> <p>Risk of losing patient data To avoid losing patient data, ensure that you have properly ended the patient's exam and transferred all exam data/images/clips.</p>	
1. Set the caster brake.	
2. To completely power down the LOGIQ Fortis: Lightly press the ON/OFF button on the operator panel to display the System - Exit menu. Select Shutdown to completely power down the LOGIQ Fortis.	
<p>CAUTION</p> <p>DO NOT turn off the breaker before the Power button is changed to blue. Data may be lost or system software damaged if the breaker is turned off before the Power button is changed to blue.</p>	
3. Turn off the breaker on the back of the system.	

Table 8-20 Power cable removal

Step	Corresponding Graphic
<p>⚠ WARNING</p> <p><i>To avoid risk of fire, the system's power must be supplied from a separate, properly rated outlet.</i></p> <p>Under no circumstances should the AC power plug be altered, changed, or adapted to a configuration rated less than specified. Never use an extension cord or adapter plug.</p> <p>To help assure grounding reliability, connect to a "hospital grade" or "hospital only" grounded power outlet.</p>	
<p>⚠ CAUTION</p> <p>Use caution to ensure that the power cable does not disconnect during system use.</p> <p>If the system is accidentally unplugged, data may be lost.</p>	
<p>⚠ WARNING</p> <p>To avoid leakage current above safety limits as prescribed by IEC 60601-1 and to ensure continuity of protective earth, DO NOT connect the Ultrasound system and mains-operated accessories to a single or multiple socket extension cord or power strip.</p>	
<p>4.</p> <p>Unscrew 2 screws to remove the power cable clamp.</p>	
<p>5.</p> <p>Remove the power cable.</p>	

8-5-3-1 Installation

Install components in reverse order of removal.

8-5-3-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-5-3-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-5-3-4 Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Leakage current is NOT required since no electronic part is being replaced. Ground continuity, however, is recommended..

Table 8-21 Cable replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
10-6-7	Grounding continuity	
4-2-4	Power shut down	

8-5-4 Cable Duct and OPIO Cable Assy Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-22 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screwdriver Hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-5-4-1 Removal Procedure of Monitor Cable and OPIO Cable.

Table 8-23 Removal procedure



Steps	Corresponding Graphic
1. Disconnect all cables from NEST.	
2. Unscrew 1 screw to remove BBG2 Signal Cable and BBG2 Power Cable.	

Table 8-23 Removal procedure

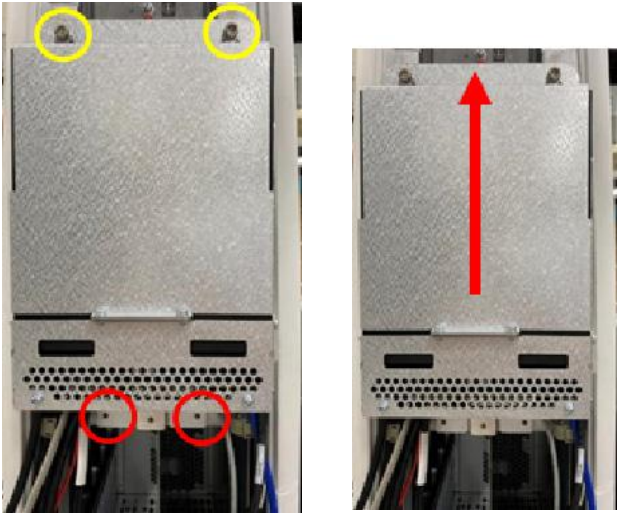
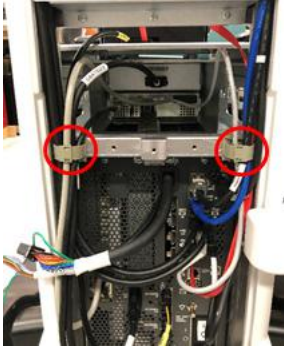



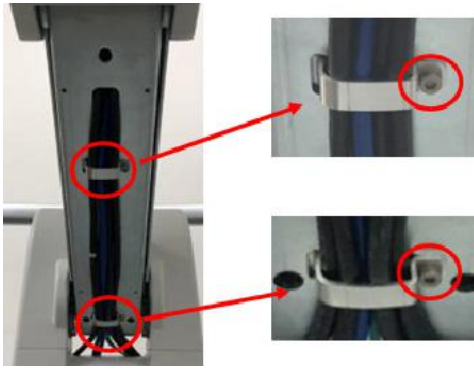

Steps		Corresponding Graphic	
3.	Remove Battery installation kit from frame. Loosen the upper 2 screws (indicate yellow circle). Unscrew lower 2 screws (indicate red circle).		
4.	Loosen 2 cable clamp.		
5.	Loosen 1 screw to remove Front Block Dummy Cover.		
6.	Remove the tie-wrap		

Table 8-23 Removal procedure

Steps		Corresponding Graphic
7.	Remove 4 screws and Elevation arm lower cover.	
8.	Remove 2 screws to loosen the 2 cable clamp.	
9.	Remove the cable clamp.	
10.	Gently push the connectors through center of the operator panel base and pull the cables downward.	

8-5-4-2 Installation Main Cable (Harness) Cables

Install components in reverse order of removal.

8-5-4-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-5-4-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-5-4-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-24 Cable replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-11	Color Mode functional checks	
4-3-14	PW/CW Doppler mode functional checks	
4-3-1	Top console adjustment control functional checks	
4-2-4	Power shut down	

Section 8-6 Replacing Covers

8-6-1 Purpose of this section.

This section describes how to replace the covers and bumpers on the Ultrasound system.

Contents in this section

8-6-2	Preparation	8-50
8-6-3	Covers and bumpers overview	8-50
8-6-4	Front Cover Replacement	8-51
8-6-5	Cabinet Cover Replacement	8-53
8-6-6	Low Cabinet Cover replacement	8-55
8-6-7	Side Cover Replacement	8-57
8-6-8	Rear Cover Replacement	8-61
8-6-9	Base Cover & Foot Cover replacement	8-63
8-6-10	OPIO Top Cover Replacement	8-66
8-6-11	Label Placement for the LOGIQ Fortis used in a Veterinary Environment	8-69
8-6-12	Rear handle Replacement	8-70
8-6-13	Main Monitor Arm Assembly Covers Replacement	8-71
8-6-14	Elevation Arm Cover Replacement	8-74
8-6-15	OPIO Bottom Base Back Cover Replacement	8-77
8-6-16	Side Cabinet Replacement	8-78


8-6-2 Preparation

Table 8-25 Preparations and Preparation Links

Preparations - you must perform the following steps
1. Lock the casters. 2. Completely shutdown the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling.
Preparation Links (if you need more information): • 4-2-4 "Power shut down" on page 4-10.

8-6-3 Covers and bumpers overview

The main console has a front cover, two side covers, a front bumper (foot rest) and rear bumper, a rear cover with a top trim, and a top cover.

 **WARNING** *When replacing side covers and/or the rear cover for an Ultrasound system used in veterinary environment, the labels for veterinary systems MUST BE re-installed before the LOGIQ Fortis is returned for use. See [8-6-11 "Label Placement for the LOGIQ Fortis used in a Veterinary Environment" on page 8-69](#) and [Section 9-16 "Product Labels" on page 9-30](#).*


8-6-4 Front Cover Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)


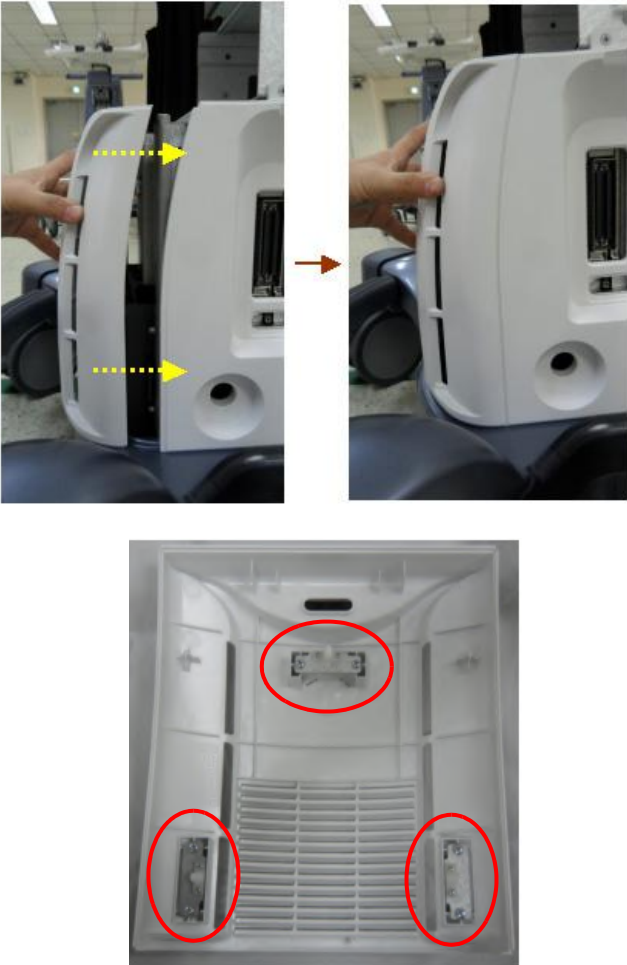
Table 8-26 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Kneel pad

8-6-4-1 Removal Procedure

Step		Corresponding graphic
1.	Pull the Front Cover Assy to remove it (no tool required).	

8-6-4-2 Installation Procedure

Step	Corresponding graphic
<p>1. Remove the window film.</p>	
<p>2. Align the edges and simply push to make sure all three "latches" are engaged.</p>	

8-6-4-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-4-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes removed earlier.
- 2.) Power up the system to verify that it operates as intended.

8-6-4-5 Functional Check

Visual inspection only.

8-6-5 Cabinet Cover Replacement


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-27 Manpower, Time, Tools, and PPE



Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Cut resistant gloves Kneel pad

8-6-5-1 Mid and High Cabinet Cover Removal Procedure

NOTE: Cabinet Cover shapes differ for each configuration, but removal/installation procedure are the same.

Step	Corresponding graphic
1. Slide out Cabinet Cover toward front of the console.	

8-6-5-2 Mid/High Cabinet Cover Installation Procedure

Step	Corresponding graphic
<p>Slide the Cabinet cover as shown in right figure.</p>	
<p>1. Make sure "latches" on both sides are engaged. NOTE: For Mid and High Cabinet type, there is "Guide Rail" for installation. Simply align "Cover Rail" on cover side to "Rail Guide" in chassis side.</p>	

8-6-5-3 Calibration and adjustments
No calibrations or adjustments are needed after this part replacement.

8-6-5-4 Verification
Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes removed earlier.
- 2.) Power up the system to verify that it operates as intended.

8-6-5-5 Functional Check
Visual inspection only.


8-6-6 Low Cabinet Cover replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)


Table 8-28 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Cut resistant gloves Kneel pad

8-6-6-1 Removal Procedure

Step	Corresponding graphic
1. Lift the top cover upwards.	

8-6-6-2 Installation Procedure

Step	Corresponding graphic
1. Push the top cover downward.	

8-6-6-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-6-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes removed earlier.
- 2.) Power up the system to verify that it operates as intended.

8-6-6-5 Functional Check

Visual inspection only.


8-6-7 Side Cover Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-29 Manpower, Time, Tools, and PPE

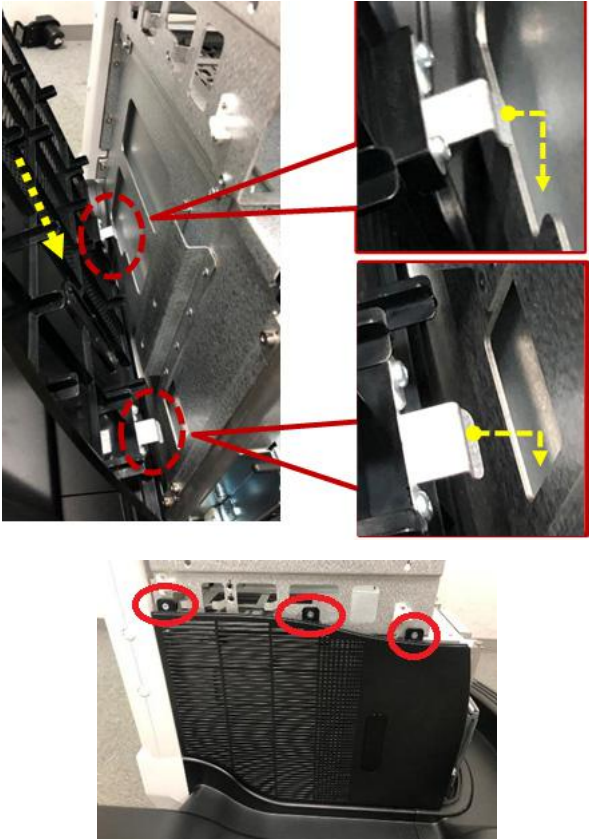
Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Safety glasses Cut resistant gloves Kneel pad

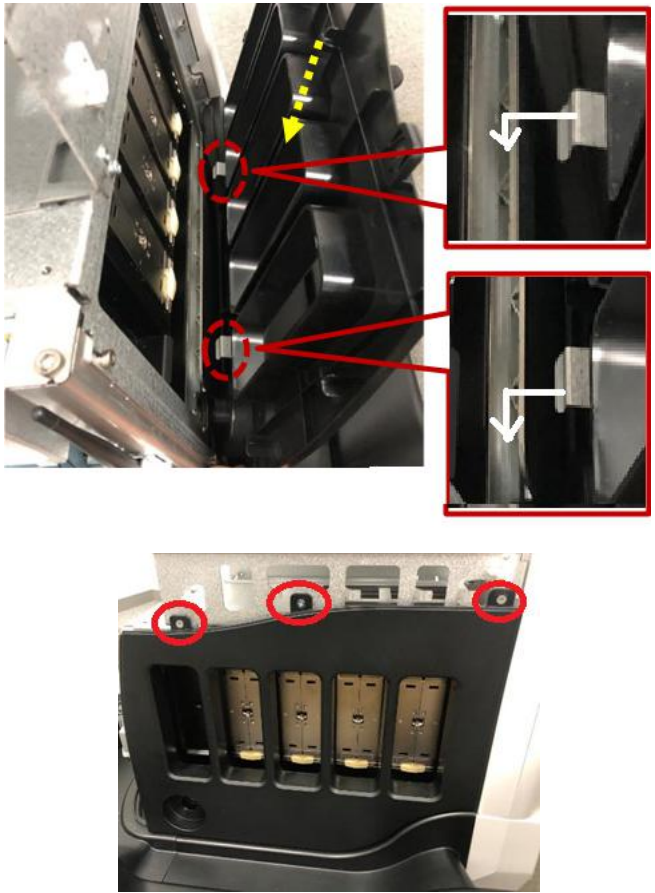
8-6-7-1 Removable procedure

Step	Corresponding graphic
1. Remove the Cabinet Cover and the front cover.	
2. Unscrew 3 screws to remove the Side Cover L Assy. Disengage the hook from the frame.	

Step	Corresponding graphic
<p>3. Unscrew 3 screws to remove the Side Cover R Assy. Disengage the hook from the frame.</p>	

8-6-7-2 Installation Procedure

Step	Corresponding graphic
1. Engage the hook and fasten 3 screws to attach the Side Cover L Assy.	

Step	Corresponding graphic
<p>2. Engage the hook and fasten 3 screws to attach the Side Cover R Assy.</p>	
<p>3. Install the front cover and Cabinet cover.</p>	

8-6-7-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-7-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-6-7-5 Functional Check

Visual inspection only.


8-6-8 Rear Cover Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-30 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Safety glasses Kneel pad

8-6-8-1 Removal Procedure

Step	Corresponding graphic
1. Unscrew 5 screws to remove the rear cover.	

8-6-8-2 Installation Procedure

Step		Corresponding graphic
1.	Check that the ODD SATA SHIELD CABLE (red) is clamped to the left position. If it is clamped to the right position, move to the left position.	
2.	Check that the internal cables have not entered the I/O Rear Panel area. If there is a cable in the area, pull up the clamp position of the cable to move it away from the area.	
3.	Install the cover with 5 screws.	

8-6-8-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-8-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Internal cables have not entered the I / O rear panel area.
- 3.) Connect cables and Probes removed earlier.
- 4.) Power up the system to verify that it operates as intended.

8-6-8-5 Functional Checks

Visual inspection only.

8-6-9 Base Cover & Foot Cover replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-31 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Cut resistant gloves Kneel pad

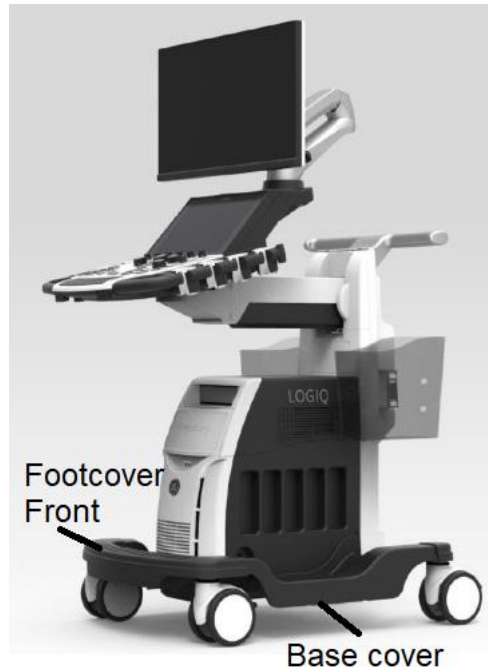



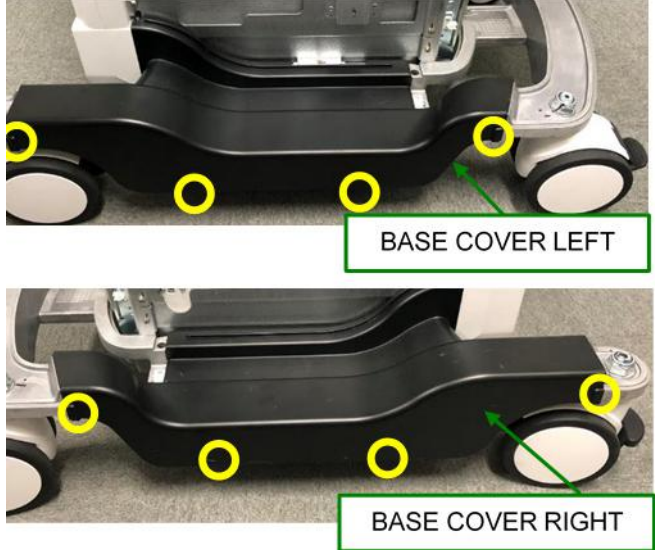


Figure 8-4 Base Cover and Foot Cover

8-6-9-1 Removal Procedure

Step	Corresponding graphic
1. Remove the cabinet cover. Remove the front cover. Remove the side cabinet (If installed).	See 8-6-5 "Cabinet Cover Replacement" on page 8-53 8-6-4 "Front Cover Replacement" on page 8-51 8-6-16 "Side Cabinet Replacement" on page 8-78

Step	Corresponding graphic
<p>2.</p> <p>Remove Base Cover Front. Pulling edge of each side to unhook the base cover front.</p>	
<p>There are 2 attached latches under the base cover front. Pulling out the base cover front upward to disconnect the latch from the base. Then remove the foot cover front.</p>	
<p>3.</p> <p>Remove Foot Cover Front. Pulling side edge of the foot cover front to unhook and then move upward.</p>	
<p>4.</p> <p>Remove Base Cover Left / Right.</p>	

8-6-9-2 Installation Procedure

Parts to be installed in reverse order of removal.

8-6-9-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-9-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-6-9-5 Functional Check

Visual inspection only.



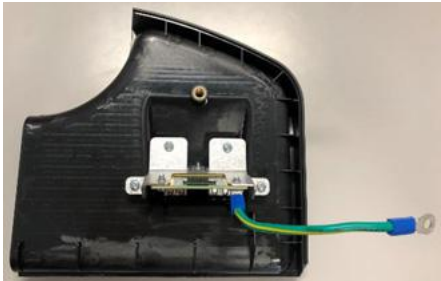
8-6-10 OPIO Top Cover Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)


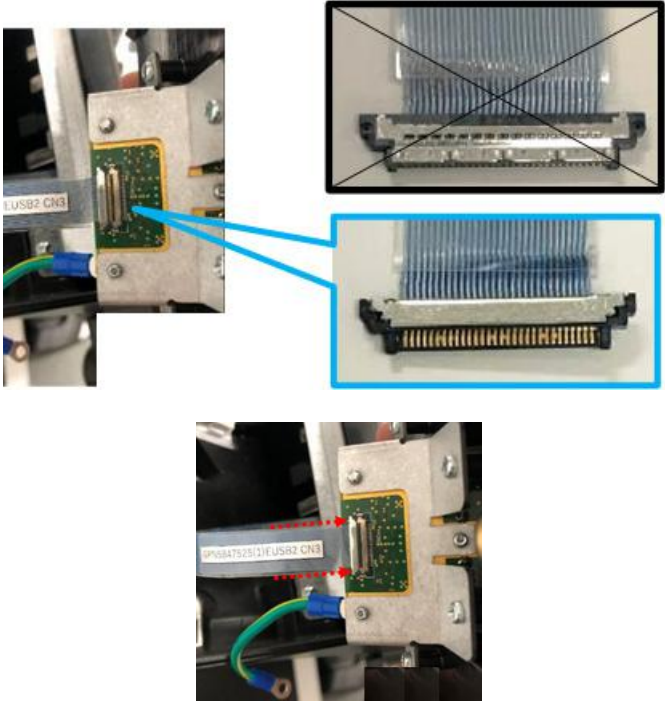

Table 8-32 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

8-6-10-1 Removal Procedure

Step	Corresponding graphic
1. Unscrew 2 screws from the rear of the OPIO Base.	
2. Remove the OPIO Top cover Left and Right. Disconnect USB3.0 Cable from CN3 on the EUSB2 PWA and unscrew 1 screw on the bottom of the OPIO base.	
3. Unscrew 4 screws to separate Ext USB CON from OPIO TOP COVER Right	 OPIO Top Cover Right

8-6-10-2 OPIO TOP Cover installation

Step		Corresponding graphic
1.	Assemble Ext USB CON and OPIO TOP COVER Right with 4 screws.	
2.	Insert the connector on CN3 label side of the user port USB3.0 cable into the CN3 connector on the EUSB2 PWA. Push the metal frame part of the connector with fingernail and insert until feel a click.	
3.	Assemble EUSB2 GND cable with 1 screw.	

Step		Corresponding graphic
4.	Put on the OPIO TOP COVER R / L on OPIO.	
5.	Assemble LOWER OPIO with 2 screws.	

8-6-10-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-10-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-6-10-5 Functional Check


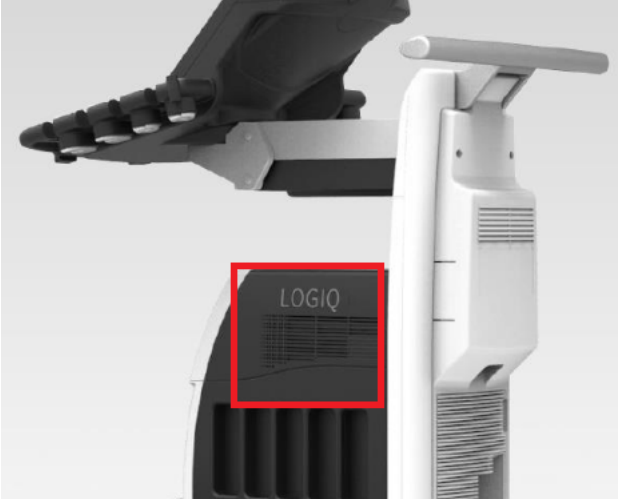



Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-33 Main Monitor assembly replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-17	Removable media functional checks	
4-2-4	Power shut down	

8-6-11 Label Placement for the LOGIQ Fortis used in a Veterinary Environment

Table 8-34 LOGIQ Fortis used in a Veterinary Environment Label Placement

Steps	Corresponding Graphic
<p>1. If the Side Cover Assemblies are replaced, re-install the "VET" Label as shown on both side.</p> 	
<p>2. If the monitor cover is replaced, re-install the "Vet label" as shown.</p> 	
<p>3. If a Probe is replaced, re-install ALL the "For Veterinary use only" Label(s) for Probes as shown (Example). This label is shown on the Probe Cable, near the connector.</p>	


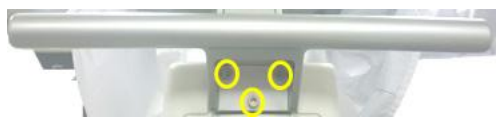
8-6-12 Rear handle Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-35 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips Screw Driver	Safety glasses Safety shoes Cut resistant gloves Kneel pad

8-6-12-1 Remove the rear handle

Step	Corresponding graphic
1. Unscrew 5 screws to remove the rear cover.	
2. Unscrew 3 screws to remove the Rear Handle.	

8-6-12-2 Installation

Parts to be installed in reverse order of removal.

8-6-12-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-12-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-6-12-5 Functional Check

Visual inspection only.




8-6-13 Main Monitor Arm Assembly Covers Replacement

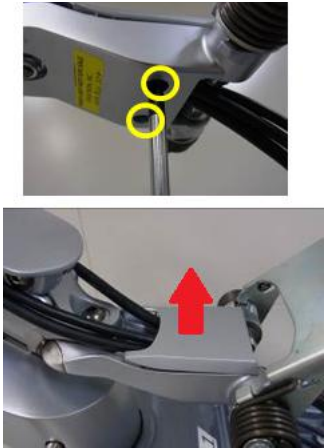
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-36 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screw driver Hex Wrench	Safety glasses Cut resistant gloves Kneel pad

8-6-13-1 Remove the covers

Step		Corresponding graphic
1.	Unscrew 1 screw to remove 1st cover Polaris.	
2.	Remove 2nd axis cover.	
3.	Unscrew 2 screws (indicate yellow circle) to remove 2nd Arm Cover L/R.	

Step		Corresponding graphic
4.	Unscrew 2 screws to remove 3rd Arm Cover.	

8-6-13-2 Installation

Parts to be installed in reverse order of removal.

8-6-13-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-13-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-6-13-5 Functional Check

Visual inspection only.

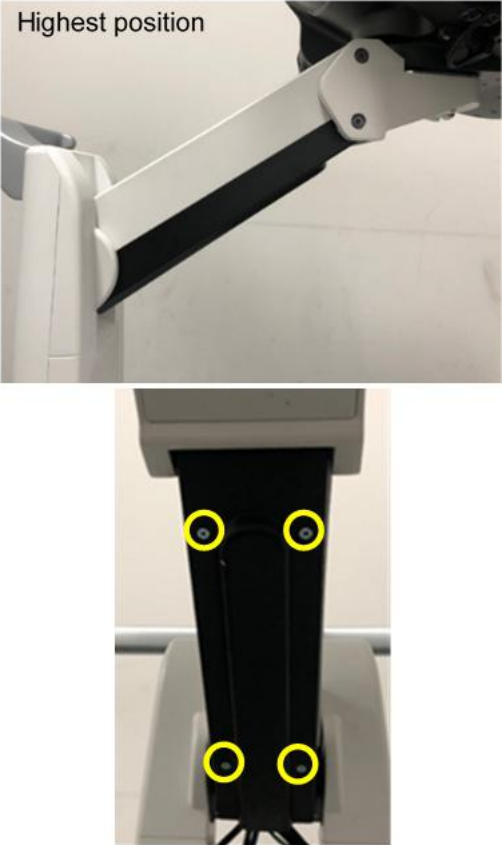
8-6-14 Elevation Arm Cover Replacement

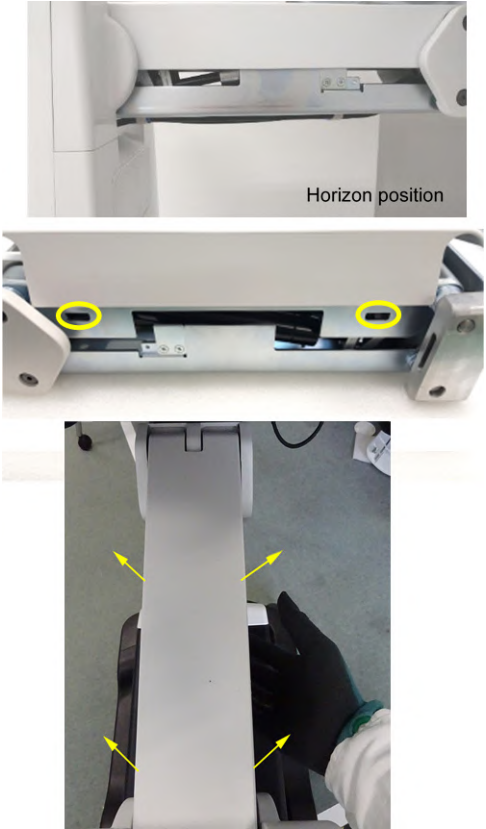
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-37 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips Screw Driver	Safety glasses Cut resistant gloves Kneel pad

8-6-14-1 Remove the covers

Step	Corresponding graphic
<p>1. Lift the Elevation Arm Assy to the highest position. Unscrew 4 screws to remove the Elevation Arm Lower Cover LCF.</p>	<p>Highest position</p> 

	Step	Corresponding graphic
	<p>2. Down the Elevation Arm Assy to the horizontal position. Unhook to remove the Elevation Arm Upper Cover LCF from Elevation Arm Upper Frame LCF (4 places).</p>	

8-6-14-2 Installation

Parts to be installed in reverse order of removal.

8-6-14-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-14-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-6-14-5 Functional Check

Visual inspection only.


8-6-15 OPIO Bottom Base Back Cover Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-38 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips Screw Driver	Safety glasses

8-6-15-1 Remove the air filter

Step		Corresponding graphic
1.	Unscrew 1 screw to remove the OPIO bottom base back cover.	

8-6-15-2 Installation

Parts to be installed in reverse order of removal.

8-6-15-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-15-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-6-15-5 Functional Check

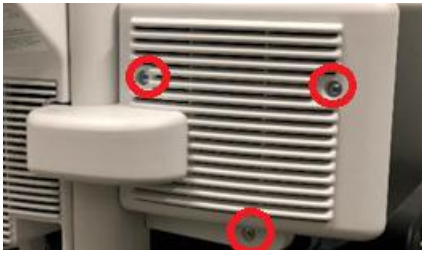

Visual inspection only.


8-6-16 Side Cabinet Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#) Remove the air filter

Table 8-39 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips Screw Driver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

Step		Corresponding graphic
1.	Unscrew 3 screws to remove the SIDE CABINET REAR COVER.	
2.	Remove POWER CORD FIX BRACKET and Main power cable.	See 8-5-3 "Power cable replacement" on page 8-43.
3.	Unscrew 5 screws to remove Rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61
4.	Remove OPTIONAL PERIPHERAL DEVICES (ECG / Vnav / BW Printer) from the side cabinet.	See 8-10-13 "BW Printer Replacement" on page 8-251 8-10-11 "VSIO (ECG) Option Replacement" on page 8-244 8-10-10 "V-Nav Option Replacement" on page 8-239
5.	Unscrew 4 screws to remove the Side Cabinet.	

Step		Corresponding graphic
6.	Unscrew 2 screws to remove the SUPPORT ARM OPTION TRAY from Side Cabinet.	

8-6-16-1 Installation

Parts to be installed in reverse order of removal.

8-6-16-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-6-16-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-6-16-4 Functional Check

Visual inspection only.

Section 8-7

Replacing Top Console Parts

8-7-1 Purpose of this section



This section describes how to replace the Top Console parts.

Contents in this section

8-7-2	Preparation	8-81
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8-7-4	Main monitor - LCD monitor Assembly Replacement	8-89
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8-7-2 Preparation

Table 8-40 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters 2. Completely shutdown the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 	
<p>Preparation Link (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. 	

8-7-3 Main monitor - High Definition Ultrasound (HDU) assembly replacement



NOTE: Before removing the Monitor, record old monitor settings or user settings if possible.

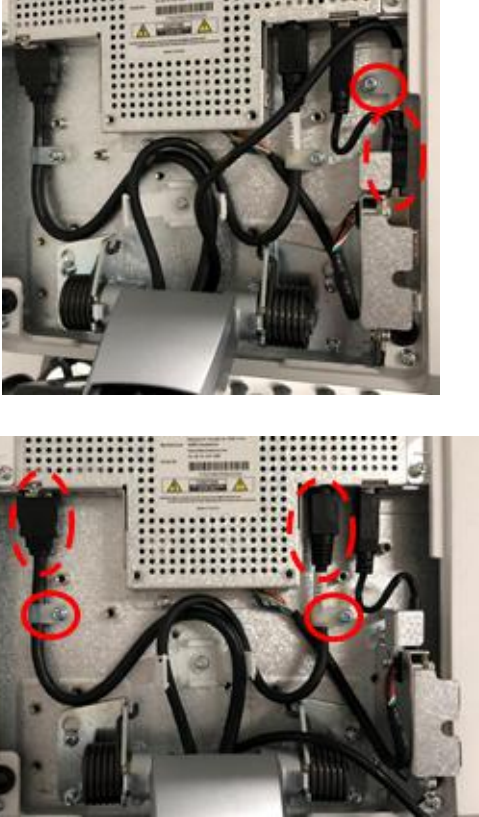

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

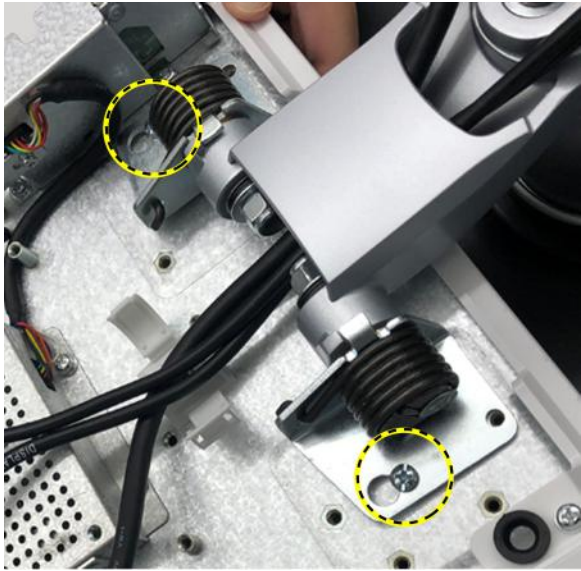
Table 8-41 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
Two people NOTE: The monitor weighs approximately 15 lbs. It is recommended two people perform this procedure.	Approximately 40 minutes	Flathead screwdriver/plastic tool Phillips screwdriver Level (optional)	Safety glasses Safety shoes Cut resistant gloves ESD mat and wrist strap


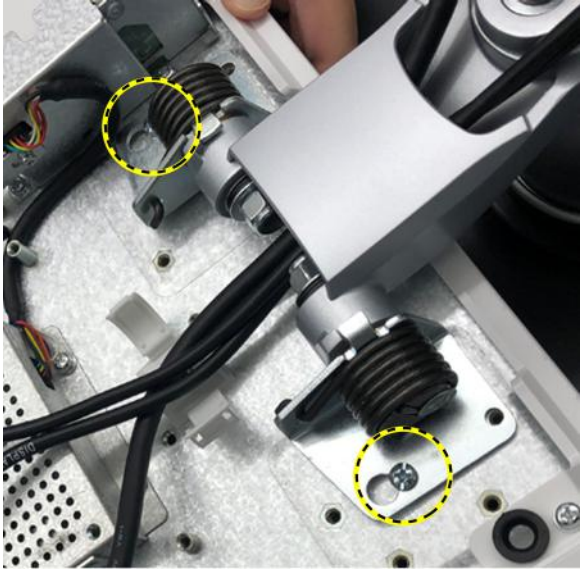
8-7-3-1 Removal procedure



Step	Corresponding Graphic	
<p>⚠ DANGER</p> <p>WHEN REMOVING THE MONITOR FROM THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</p>		
1.	Make sure the user interface (top console) has been moved to its lower position.	
2.	Lock the brakes.	
3.	Lower the monitor to a flat (horizontal) position.	
4.	Rotate the monitor arm assembly so that it is facing the left or right side of the console to allow easier access.	
5.	Lock the monitor arm assembly.	
6.	<p>Using a flathead screwdriver, carefully pry up the monitor cable cover from the bottom.</p> <p>NOTE: The monitor back cover fits into slots at the top and is held in place by posts at the bottom. It is removed by prying it up from the bottom with a flat tool.</p> <p>Remove the monitor cable cover.</p> <p>NOTE: DO NOT discard the cable cover of the monitor, transfer it to the replacement monitor. The cover IS NOT included in the monitor FRU.</p>	



	Step	Corresponding Graphic
7.	<p>Disconnect the HDMI, USB and power cables from the monitor. NOTE: Re-use the cable clamps on new HDU monitor.</p>	<p>Cable connectors</p> 
8.	<p>Remove the two lower Phillips screws. Open the plastic clamp that holds the cables in place.</p>	<p>Monitor mounting screws and holes</p> 
<p>⚠ WARNING</p> <p><i>Two people are recommended for this procedure because it is very difficult for one person to loosen the screws and support the main monitor at the same time; the second person does not need to be a trained FE or do any lifting.</i></p>		

	Step	Corresponding Graphic
9.	<p>Loosen the two upper Phillips screws. The monitor will be supported by these two upper screws.</p> <p>Slide the monitor off of the arm assembly.</p> <p>Remove the upper Phillips screws to re-install into the replacement monitor.</p>	 <p>The photograph shows a close-up of the monitor arm assembly. Two Phillips screws are circled in yellow, indicating they are the focus of the step. The assembly includes a metal plate with a spring and various cables.</p>

8-7-3-2 Installation procedure

Step		Corresponding Graphic
	<p>⚠ DANGER</p> <p>WHEN INSTALLING THE MONITOR TO THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</p>	
<p>1.</p>	<p>Re-install the upper two Phillips screws into the replacement monitor leaving enough clearance to slide the monitor back onto the arm.</p>	
<p>2.</p>	<p>With the monitor flat, slide the monitor onto the arm assembly using the two upper Phillips screws to support the monitor.</p>	<p style="text-align: center;">Monitor</p> 

Step	Corresponding Graphic
<p>3.</p> <p>Support the lower portion of the monitor and install the two lower Phillips screws.</p> <p>NOTE: Do not completely tighten the lower Phillips screws. You will level the monitor later in this procedure.</p>	
<p>4.</p> <p>Re-connect the HDMI, USB and power cables to the monitor.</p> <p>NOTE: you may need to disconnect the USB cable coming from the side USB port to have more room to route the USB cable coming from the arm.</p> <p>Close the plastic clamp that holds the cables in place.</p>	<p>Cable connectors</p> 

	Step	Corresponding Graphic
<p>5.</p>	<p>Put on gloves</p> <p>Place a level on the monitor (as shown). Check that the Ultrasound system is level. NOTE: To ensure the monitor is installed level with the system and before re-installing the cable cover, MAKE SURE THE:</p> <ul style="list-style-type: none"> - Ultrasound system is on a level surface. - wheels are in-line. - monitor arm lock is LOCKED. <p>NOTE: If a level is not available, make sure the monitor is visually as square as possible with the Ultrasound system.</p>	
<p>6.</p>	<p>If any adjustment is required, loosen the four mounting screws and make the adjustment. Tighten the four screws after the adjustment. Torque to 160 Ncm (14.2 lbf-in) NOTE: These torque specs are required to prevent the monitor from falling.</p>	
<p>7.</p>	<p>Re-install the cable cover by sliding into the slots at the top and then pressing down onto the button of the cable cover.</p>	

8-7-3-3 Calibration and adjustments

See: [Section 6-2 "Monitor Adjustments" on page 6-2](#) for Main Monitor calibration instructions and/or Monitor Arm and Monitor Friction Adjustment.

8-7-3-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

NOTE: The Wide Screen Monitor may need a second reboot for the system to fully identify the monitor's USB device. To confirm, verify that the Monitor Controls for the Wide Screen Monitors are available on the Touch Panel Utility pages.

8-7-3-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-42 Main Monitor assembly replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-7-4 Main monitor - LCD monitor Assembly Replacement





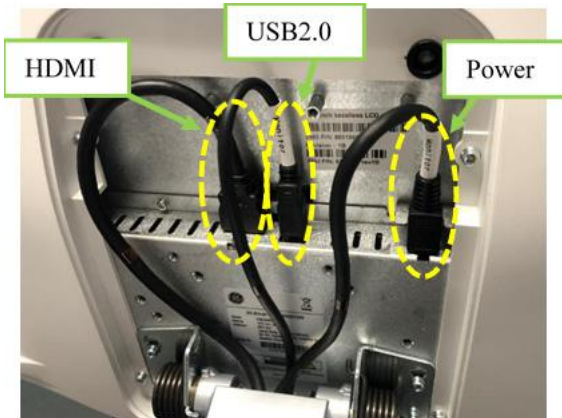
NOTE: Before removing the Monitor, record old monitor settings or user settings if possible.



This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-43 Manpower, Time, Tools, and PPE


Manpower	Time	Tools	PPE
Two people NOTE: The monitor weighs approximately 15 lbs. It is recommended two people perform this procedure.	Approximately 40 minutes	Flathead screwdriver/plastic tool Phillips screwdriver Level (optional)	Safety glasses Safety shoes Cut resistant gloves ESD mat and wrist strap

8-7-4-1 Removal procedure

Steps		Corresponding Graphic
<p>1.  WARNING WHEN REMOVING THE MONITOR FROM THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</p>		
<p>2. Make sure the user interface (top console) has been moved to its lower position.</p>		
<p>3. Lock the brakes.</p>		
<p>4. Lower the monitor to a flat (horizontal) position.</p>		
<p>5. Rotate the monitor arm assembly so that it is facing the left or right side of the console to allow easier access.</p>		
<p>6. Lock the monitor arm assembly.</p>		
<p>7. Remove the LCD Rear Cover from the current LCD Monitor.</p>		
<p>8. Unscrew 2 screws to remove 2 cable clamps.</p>		
<p>9. Remove HDMI cable, Power cable and USB cable.</p>		

Steps		Corresponding Graphic
10.	Unscrew 2 screws on the bottom side.	
11.	Loosen 2 screws on the upper side. Remove the LCD monitor from the monitor arm bracket.	

8-7-4-2 Installation procedure

Steps		Corresponding Graphic
1.	Remove the monitor rear cover of the new monitor.	
2.	Parts to be installed in reverse order of removal.	

8-7-4-3 Calibration and adjustments

See: [Section 6-2 "Monitor Adjustments" on page 6-2](#) for Main Monitor calibration instructions and/or Monitor Arm and Monitor Friction Adjustment.

8-7-4-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

NOTE: The Wide Screen Monitor may need a second reboot for the system to fully identify the monitor's USB device. To confirm, verify that the Monitor Controls for the Wide Screen Monitors are available on the Touch Panel Utility pages.

8-7-4-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-44 Main Monitor assembly replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	




8-7-5 LCD Arm with Cable Assembly replacement

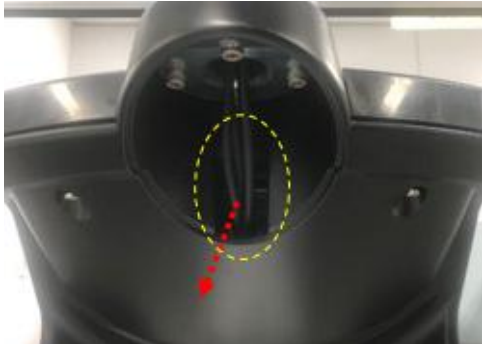


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-45 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Flathead screwdriver/plastic tool Phillips screwdriver Hex wrench Level (optional)	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-5-1 Removal procedure

Steps	Corresponding Graphic
<p>⚠ WARNING</p> <p>WHEN REMOVING OR INSTALLING THE MONITOR ARM, KEEP THE ARM LOCKED, AS SHOWN TO ENSURE THE MONITOR ARM ASSEMBLY IS IN THE LOCKED POSITION UNTILL THE ARM AND MONITOR ARE INSTALLED. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</p>	
<p>1 Remove the Upper/Lower Operator Panel. Refer from 8-7-10-1 "Preparation if the system has Drawer AN keyboard" on page 8-104 to step 5 of 8-7-10-2 "Upper/Lower OP Assembly removal" on page 8-106.</p>	
<p>2 Unscrew 1 screw to remove OPIO bottom base back cover.</p>	
<p>3 Remove HDMI, Power and USB2.0 monitor cable.</p> <p>* Lift the OPIO Upper Assy slightly.</p> <ul style="list-style-type: none"> - CN6: MONITOR HDMI CABLE - CN7: MONITOR POWER CABLE - CN8: MONITOR USB2.0 CABLE 	

Steps		Corresponding Graphic
4	Pull out Monitor Cables (HDMI, Power and USB).	
5	Remove the Set Screw using a 5 mm hex wrench. Carefully lift the Arm Assembly up and retrieve the cables and connectors out, one at a time from the LOGIQ Fortis.	
6	Pull out the LCD arm from the LCD ARM SHAFT BASE and pull out the 3 cables one by one from the shaft..	

8-7-5-2 Installation Procedure

Parts to be installed in reverse order of removal (Monitor Arm, Upper/Lower Operator Pane, Monitor).

8-7-5-3 Calibration and adjustments

See: [Section 6-2 "Monitor Adjustments" on page 6-2](#) for Main Monitor calibration instructions and/or Monitor Arm and Monitor Friction Adjustment.

8-7-5-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-5-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-46 Main Monitor assembly adapter replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-7-6 Option VERTICAL TV PROBE HOLDER Left or Right Support replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-47 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips screwdriver	Safety glasses Safety shoes Kneel pad

8-7-6-1 Option Vertical TV Probe Holder removal

Steps	Corresponding Graphic
1. Disconnect and remove all probes on the side with the Vertical TV Probe holder. Store Probes in safe place.	
2. Unscrew 2 screws to remove the Option Vertical TV Probe Holder. Be careful do not drop the holder. NOTE: The photo shows an example on the left.	

8-7-6-2 Option Vertical TV Probe Holder installation

Assemble Option VERTICAL TV PROBE HOLDER in reverse procedure.

8-7-6-3 Calibration and adjustments

No calibration and adjustments are needed.

8-7-6-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.

8-7-6-5 Functional Check

Visual inspection only.

8-7-7 Option TVTR Probe Holder Assembly Left or Right Support replacement

The Probe Holder Inserts are soft rubber inserts, used to protect the Probes from scratches, when stored on the LOGIQ Fortis. You can place the Probe Holder Inserts in any of the desired places on the edge of the Operator Panel. The following types of inserts are available:


- Probe Holder Insert STD
- Probe Holder Insert 3D
- Probe Holder Soft insert Doppler

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-48 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	No PPE required.

8-7-7-1 Option TVTR Probe Holder Assembly removal

Steps		Corresponding Graphic
1.	Disconnect and remove all probes on the side with the TVTR Probe holder. Store Probes in safe place.	
2.	Carefully pull out the TVTR probe holder assembly from the left or right probe holder as shown in right graphic. Be careful do not drop the holder. NOTE: The photo shows an example on the left.	

- 8-7-7-2 Installation**
Insert the TVTR probe holder assembly into the left or right rear probe holder.
- 8-7-7-3 Calibration and adjustments**
No calibration and adjustments are needed.
- 8-7-7-4 Verification**
No verification is needed.
- 8-7-7-5 Functional Check**
Visual inspection only.



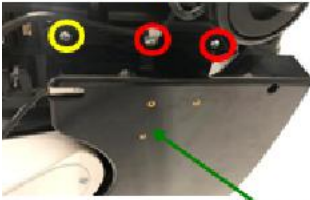

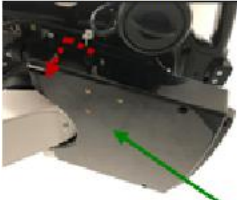
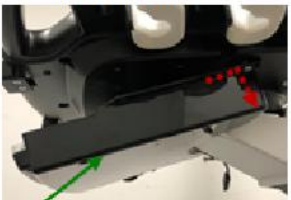
8-7-8 OPTIONAL DRAWER AN KEYBOARD Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-49 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-8-1 Replacement and Installation Procedure

Steps		Corresponding Graphic
1.	Disconnect and remove all probes. Store Probes in safe place.	
2.	Keep the console extended upward to gain access to the Lower OP screws. The screws are accessible from the bottom of the OP Lower Frame.	
3.	Remove the METAL CAP EXT HUB BOARD from OPIO Base.	 <p>METAL CAP EXT HUB BOARD T1</p>
4.	Remove AN Keyboard USB cable and AN Keyboard LED cable.	 <p>AN KEYBOARD USB cable</p> <p>AN KEYBOARD LED cable</p>
5.	Remove 4 screws (indicate red circle). Loosen 2 screws (indicate yellow circle). NOTE: AN KEYBOARD ASSY can be dropped when 2 screws are loosen	<p>LEFT side</p>  <p>RIGHT side</p>  <p>AN KEYBOARD ASSY T1</p>
6.	Remove AN KEYBOARD ASSY from OPIO Base.	<p>LEFT side</p>  <p>RIGHT side</p>  <p>AN KEYBOARD ASSY T1</p>

8-7-8-2 Installation

Install new AN KEYBOARD ASSY by reverse steps.

8-7-8-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-8-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier
- 3.) Power up the system to verify that it operates as intended.
- 4.) Select comments and type different A/N keys to confirm keyboard functionality.

8-7-8-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-50 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-4	Alphanumeric keyboard functional checks	
4-2-4	Power shut down	


8-7-9 OP (Operator Panel) Knobs replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-51 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	n/a	Safety glasses

8-7-9-1 Replacement procedure

Steps	Corresponding Graphic
<p>To remove Carefully pull the knobs, one by one, to remove them.</p> <p>To install Insert the knobs one by one in their respective positions.</p> <p>NOTE: The OP knobs are concentric knobs, the center shaft has a D shape. Replace the outer knobs first then the inner ones.</p>	

8-7-9-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-9-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Power up the system to verify that it operates as intended.
- 2.) Operate all knobs and verify that they don't slip when operated.

8-7-9-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-52 Main Cable replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	



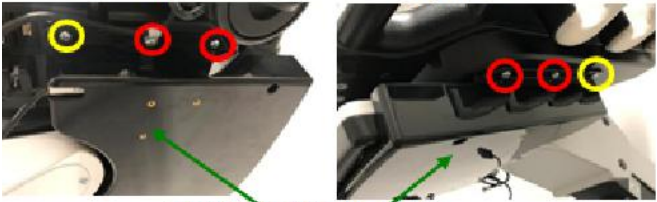
8-7-10 Upper/Lower Operator Panel replacement

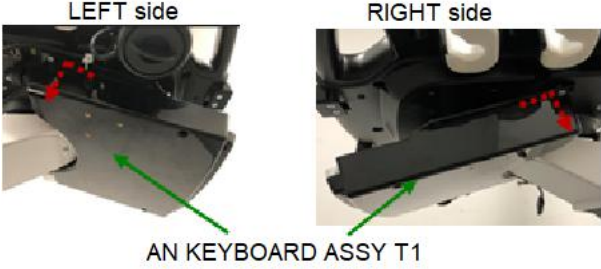
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-53 Manpower, Time, Tools, and PPE



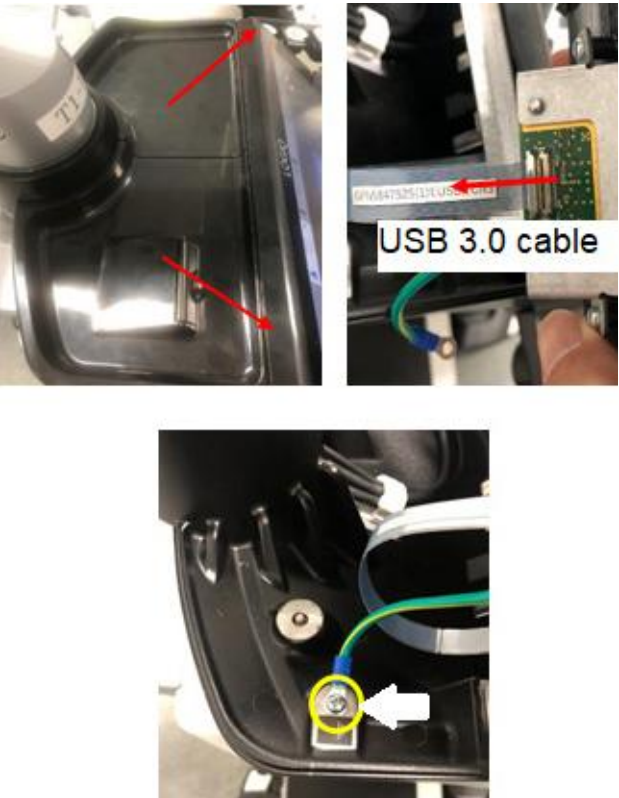
Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap


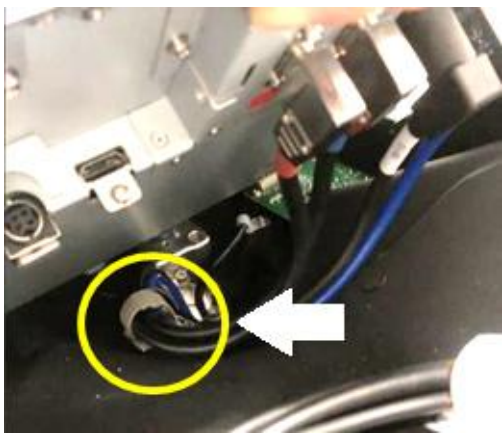
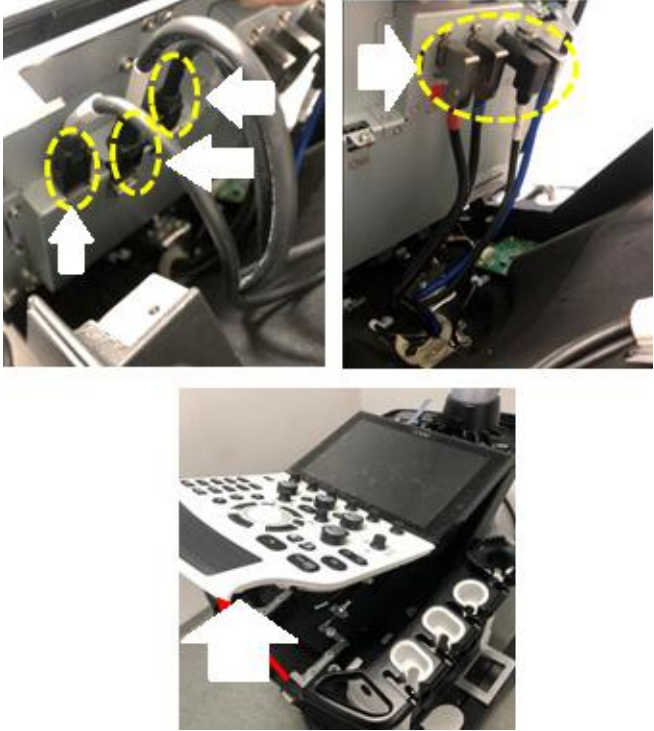
8-7-10-1 Preparation if the system has Drawer AN keyboard

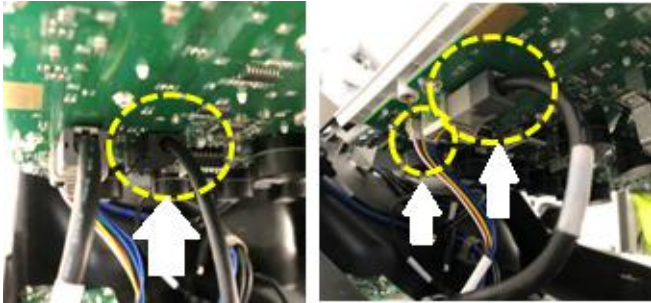

Steps	Corresponding Graphic
1. Remove the METAL CAP EXT HUB BOARD from OPIO Base.	 <p>METAL CAP EXT HUB BOARD T1</p>
2. Remove AN Keyboard USB cable and AN Keyboard LED cable.	 <p>AN KEYBOARD USB cable</p> <p>AN KEYBOARD LED cable</p>
3. Remove 4 screws (indicate red circle). Loosen 2 screws (indicate yellow circle). NOTE: AN KEYBOARD ASSY can be dropped when 2 screws are loosen	 <p>LEFT side</p> <p>Right side</p> <p>AN KEYBOARD ASSY T1</p>

Steps		Corresponding Graphic
4.	Remove AN KEYBOARD ASSY from OPIO Base.	 <p>LEFT side</p> <p>RIGHT side</p> <p>AN KEYBOARD ASSY T1</p>

8-7-10-2 Upper/Lower OP Assembly removal

Steps	Corresponding Graphic
<p>1. Keep the console extended upward to gain access to the Lower OP screws. The screws are accessible from the bottom of the OP Lower Frame.</p>	
<p>2. Remove the five screws from the bottom of the OPIO Base. Access the screws from the bottom.</p>	<p style="text-align: center;">Lower OP shown removed</p> 
<p>3. Unscrew 2 screws from the rear of the OPIO Base.</p>	
<p>4. Remove the OPIO Top cover Left and Right. Disconnect USB3.0 Cable from CN3 on the EUSB2 PWA and unscrew 1 screw on the bottom of the OPIO base.</p>	

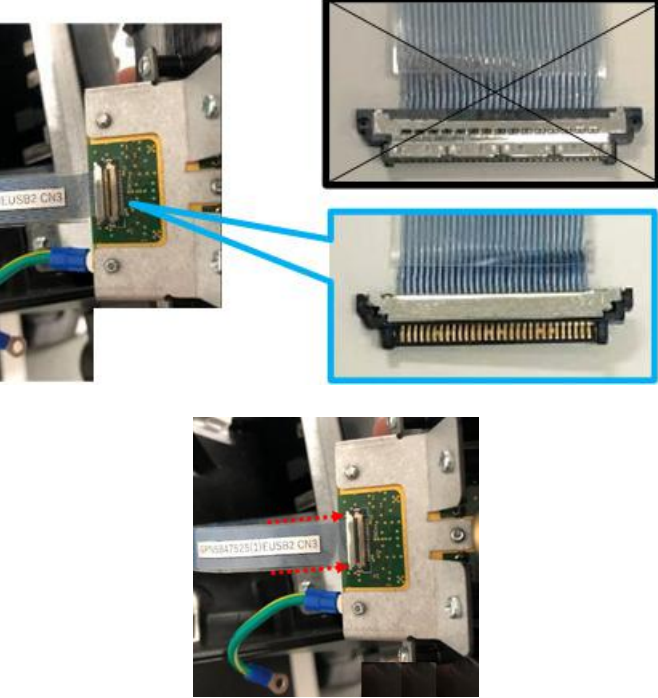
Steps		Corresponding Graphic	
5	Unscrew 2 screws from top of the OPIO ASSY and lift up top of OPIO ASSY.		
6	Release the cable clamp.		
7	Disconnect 7 cables. Refer to the figure and lift up bottom of OPIO ASSY.		

Steps		Corresponding Graphic
8	Disconnect 3 cables.	
9	Separate OPIO ASSY from the console.	
10	Unscrew 6 screws to separate Upper and Lower OPIO. Slowly disassemble Upper OPIO Assy from Lower OPIO Assy.	

8-7-10-3 Lower/Upper OP installation

Assemble Lower/Upper OP and AN keyboard in reverse procedure.

Be careful when insert the USB3.0 cable into the CN3 connector as below.

Step	Corresponding graphic
<p>1. Insert the connector on CN3 label side of the USB3.0 cable into the CN3 connector on the EUSB2 PWA. Push the metal frame part of the connector with fingernail and insert until feel a click.</p>	

8-7-10-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-10-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-10-6 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-54 Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-3-4	Alphanumeric keyboard functional checks	
4-2-4	Power shut down	


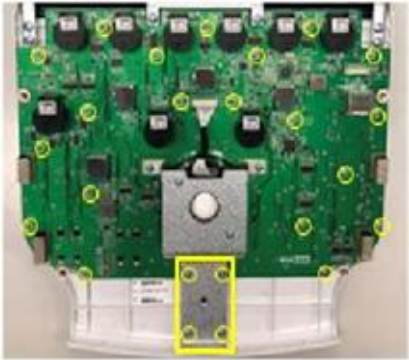
8-7-11 OPIO Lower Main PWA ASSY replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-55 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-11-1 OPIO Lower Main PWA ASSY removal

Steps		Corresponding Graphic
1.	Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO.	See 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104.
2.	Remove the OP knobs. If possible, place them in their relative position on a table, or other place where you can keep them until you start the re-installation. Before you install the Bezel, you should move the OP controls over to the new Bezel, one by one.	
3.	Unscrew 24 screws around the PWA and remove the cover (Marked yellow). Slowly lift the OPIO Main PWA Assy from OP Panel.	

8-7-11-2 OPIO Lower Main PWA ASSY installation

Assemble OPIO Lower Main PWA ASSY, OPIO Assembly and AN keyboard in reverse procedure.

8-7-11-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-11-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-11-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-56 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
	Joysticks	
4-2-4	Power shut down	


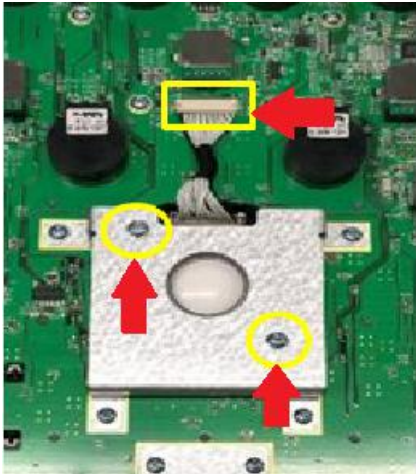
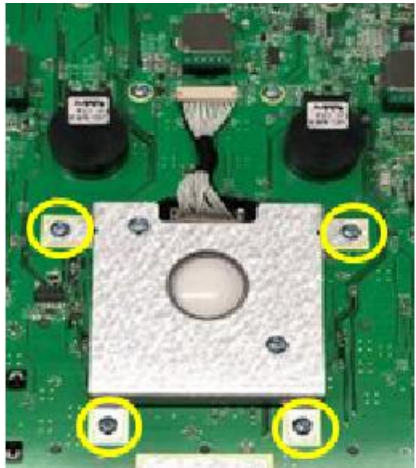
8-7-12 Trackball Assembly replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-57 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-12-1 Trackball Assembly removal

Steps		Corresponding Graphic
1.	Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO.	See 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104.
2.	Turn the ring counter clock-wise and lift trackball from the operator panel.	
3.	<p>Disconnect the signal cable connector from the OPIO Main PWA ASSY and unscrew 2 screws on the bracket.</p> <p>Note: Grasp the connector on the large, flat sides and pull straight away from the board. The Trackball includes the Trackball Cable. The Customer Removable Trackball can be cleaned from the top.</p>	
4.	Unscrew 4 screws from rear of the OPIO Base and remove Trackball Assembly.	

8-7-12-2 Trackball Assembly Installation

Assemble Trackball Assembly in reverse procedure.

8-7-12-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-12-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Verify that the Trackball operates as intended.

8-7-12-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-58 Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-2-4	Power shut down	


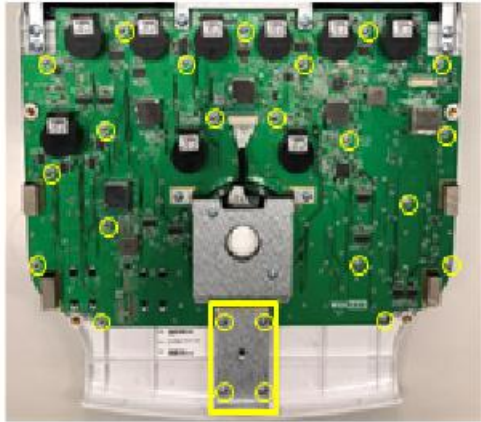


8-7-13 Lower Bezel replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-59 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-13-1 Lower Bezel removal procedure

Steps		Corresponding Graphic
1.	Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO.	See 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104.
2.	Remove the OP knobs. If possible, place them in their relative position on a table, or other place where you can keep them until you start the re-installation. Before you install the Bezel, you should move the OP controls over to the new Bezel, one by one.	
3.	Unscrew 24 screws around the PWA and remove the cover (Marked yellow). Slowly lift OPIO Main PWA Assy from OP Panel.	
4.	Remove Rubber Sheath on reverse side of PWA Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>OPIO PWA Assy.</p>  </div> <div style="text-align: center;"> <p>Rubber sheet removed</p>  </div> </div>
5.	Remove the boards to assemble with new Lower Bezel.	

8-7-13-2 Lower Bezel Installation procedure

- 1.) Set the new Bezel in place.
- 2.) Reattach the Boards with screws.

NOTE: Before continuing, test the Encoders and Op Panel controls to ensure they operate properly. If the Encoder seals are too close to the Encoder, the seals can cause the Encoder operation to bind. If the seals are too high, they can limit the joystick operation.

- 3.) Re-install the Lower OP, Upper OP/Touch Panel Assembly (verify Encoder operation) and all covers removed.

8-7-13-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-13-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-13-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-60 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
	Joysticks	
4-2-4	Power shut down	


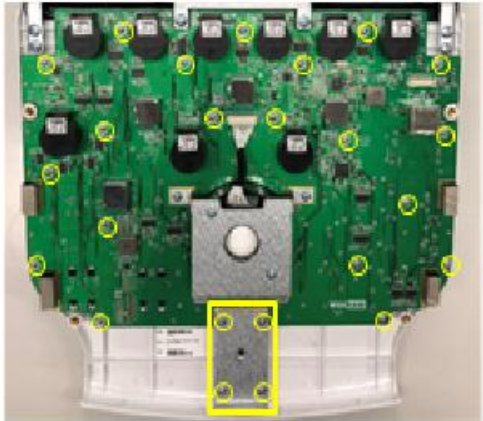



8-7-14 Encoder/Joystick replacement




This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-61 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver Open end wrench Torque wrench Adjustable wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-7-14-1 Encoder/Joystick replacement procedure

Steps		Corresponding Graphic
1.	Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO.	See 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104.
2.	Remove the OP knobs. If possible, place them in their relative position on a table, or other place where you can keep them until you start the re-installation. Before you install the Bezel, you should move the OP controls over to the new Bezel, one by one.	
3.	Unscrew 24 screws around the PWA and remove the cover (Marked yellow). Slowly lift OPIO Main PWA Assy from OP Panel.	
4.	Remove Rubber Sheath on reverse side of PWA Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>OPIO PWA Assy.</p>  </div> <div style="text-align: center;"> <p>Rubber sheet removed</p>  </div> </div>
5.	Loosen the Encoder/Joystick nut, using use a 24 mm socket an adjustable wrench and remove the nut.	

Steps		Corresponding Graphic
6.	<p>Remove the remaining 8 nuts. Disconnect the 9 Encoders. Grasp the Encoder/Joystick and pull straight away from the board.</p>	
7.	<p>Loosen the Encoder nut, using a 7/16 inch, deep socket wrench or 7/16 inch open-ended wrench and remove the nut.</p>	
8.	<p>Remove the remaining 3 nuts. Disconnect the 4 Encoders. Grasp the Encoder and pull straight away from the board.</p>	
9.	<p>Replace Encoder(s)/Joystick(s) and Encoder(s) as necessary. Secure the Encoder(s)/Joystick(s) and Encoder(s).</p>	
10.	<p>Re-assemble Lower OP. Re-install Lower Op, Upper Op and all Covers removed.</p>	

8-7-14-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-14-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-14-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-62 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	


8-7-15 Hard key caps replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-63 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Flathead screwdriver	Safety glasses

8-7-15-1 Hard key caps replacement procedure

Steps	Corresponding Graphic
1. Turn off the system with the Power On/Off button on the control panel.	
2. With small slotted screwdriver, carefully push against the hard key cap.	
3. Lift the cap, until it is completely loosened from its base.	
4. Place the new hard key cap down until it snaps into position.	

8-7-15-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-15-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Verify that the replaced key operates as intended.

8-7-15-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-64 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	



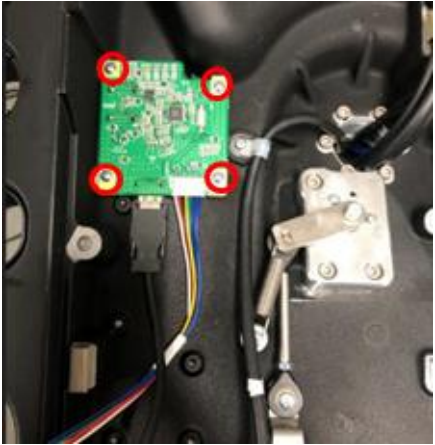
8-7-16 EXT Hub Board Assy replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-65 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves

8-7-16-1 EXT Hub Board ASSY removal procedure

Steps		Corresponding Graphic
1.	Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO.	See 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104.
2.	Unscrew 1 screw to remove the GEL WARMER CABLE COVER.	
3.	Remove the GEL WARMER CONNECTOR.	
4.	Unscrew 4 screws to remove EXT HUB BOARD.	

8-7-16-2 ExT Hub Board Assy Installation procedure

Assemble EXT Hub Board ASSY, OPIO Assembly and AN keyboard in reverse procedure.

8-7-16-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-16-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-7-16-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-66 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

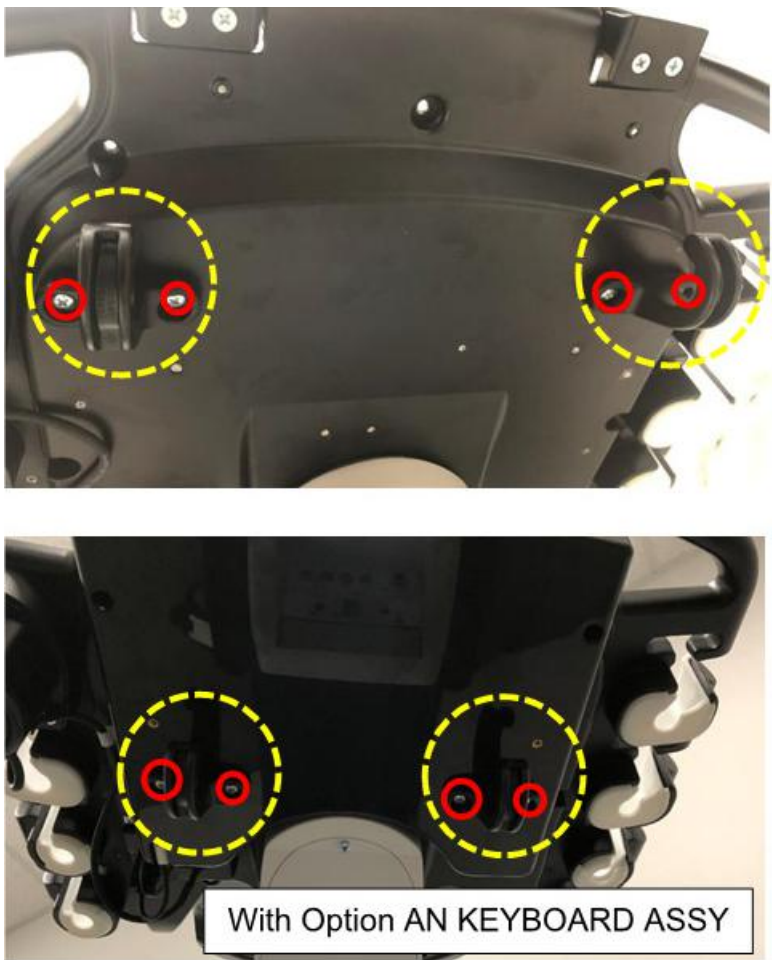
8-7-17 OPIO FRONT HOOK replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis"](#) on page 8-5 / [8-2-7 "PPE Required During Service"](#) on page 8-6.

Table 8-67 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips screwdriver	n/a

8-7-17-1 OPIO FRONT HOOK removal

Steps	Corresponding Graphic
1. Disconnect and remove all Probes. Store Probes in safe place.	
2. Unscrew 2 screws to remove the target OPIO FRONT HOOK.	

8-7-17-2 Installation procedure

Assemble OPIO FRONT HOOK in reverse procedure.

NOTE: If the customer wants change the direction of cable hook, see [3-6-12 "Cable hook direction" on page 3-51](#).

8-7-17-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-17-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.

8-7-17-5 Functional Check

Visual inspection only.






8-7-18 Gel warmer /Gel warmer cap replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

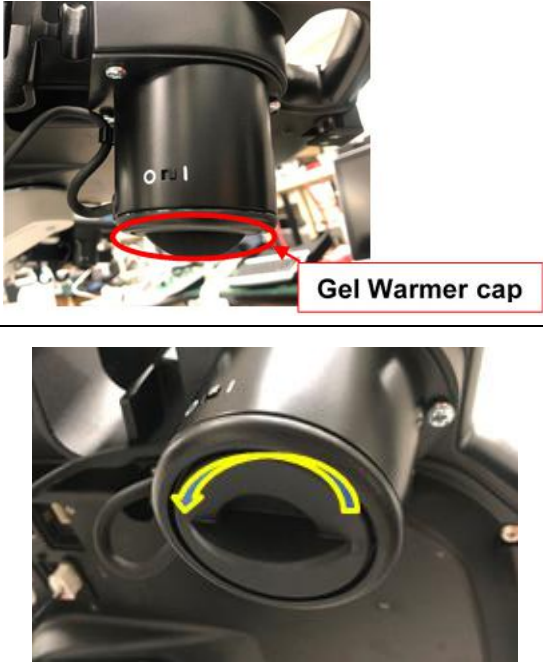
Table 8-68 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	n/a

8-7-18-1 Gel warmer removal

Steps		Corresponding Graphic
1.	Turn Gel warmer off (o) and store the Gel in safe place.	
2.	Unscrew 1 screw to remove the cable clamp.	
3.	Unscrew 1 screw to remove the GEL WARMER CABLE COVER cable.	
4.	Disconnect the Gel warmer cable.	
5.	Unscrew 3 screws to remove the Gel warmer.	

8-7-18-2 Gel warmer cap removal

Steps		Corresponding Graphic
1.	Rotate the Gel warmer cap counterclockwise.	

8-7-18-3 Installation procedure

Assemble Gel warmer cap and Gel warmer in reverse procedure.

8-7-18-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-7-18-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and cables removed earlier have been installed.
- 2.) Power up the system.
- 3.) Place a closed bottle of gel, applicator end first, in the gel warmer. Turn the Gel warmer on to verify it works properly.

8-7-18-6 Functional Check

Visual inspection only.

8-7-19 Probe Holder Insert replacement

The Probe Holder Inserts are soft rubber inserts, used to protect the Probes from scratches, when stored on the LOGIQ Fortis. You can place the Probe Holder Inserts in any of the desired places on the edge of the Operator Panel. The following types of inserts are available:

- Probe Holder Insert STD
- Probe Holder Insert 3D
- Probe Holder Soft insert Doppler

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).


Table 8-69 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	n/a

8-7-19-1 Probe Holder Insert removal

Steps		Corresponding Graphic
1.	Disconnect and remove all Probes. Store Probes in safe place.	
2.	Carefully pull out the flexible Probe Holder Insert from the Lower UI Frame. Left Large (1), Right Large (2) and Small (3) soft, Probe Holder Inserts. Remove the SMALL PROBE HOLDER if it is attached.	

8-7-19-2 Probe Holder Insert installation

Steps		Corresponding Graphic
1.	Install the flexible Probe Holder Insert into the Lower UI Frame. Be sure the hooks and tab fit properly and the Probe Holder fits snugly.	

8-7-19-3 Calibration and adjustments

No calibrations or adjustments are needed.

8-7-19-4 Verification

No verification is needed after this part replacement.

8-7-19-5 Functional Checks

Visual inspection Only

Section 8-8

Replacing Front End Acquisition / Card Cage parts

8-8-1 Purpose of this section







This section describes how to replace the parts in the Front End / Card Cage.

8-8-2 Contents in this section

8-8-1	Purpose of this section	8-136
8-8-2	Contents in this section	8-136
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8-8-4	DA192 Replacement	8-138
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8-8-12	Coin Battery replacement	8-162
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8-8-3 Preparation

Table 8-70 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p><i>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</i></p>
 <p>DANGER</p> 	<p>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters. 2. Completely shut down the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 4. Remove the Rear Cover. 	
<p>Preparation Links (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. • 8-6-8 "Rear Cover Replacement" on page 8-61. 	

8-8-4 DA192 Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-71 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-4-1 DA192 Removal procedure

NOTE: *If the WLAN Option is present, note the orientation of the antennas, they MUST BE returned to the same position. Reposition the antennas when removing the Cover.*

Table 8-72 DA192 removal procedure



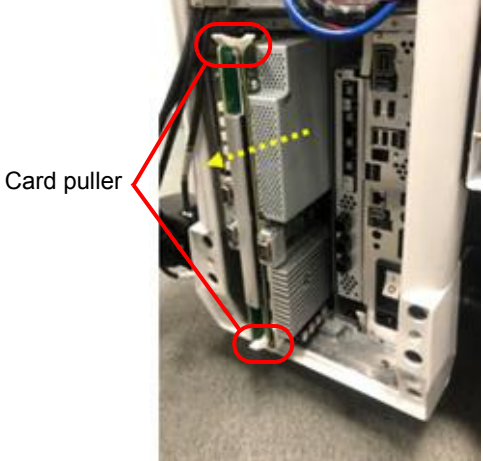


Steps	Corresponding Graphic
1. Remove the Rear Cover and disconnect all cables from NEST.	
2. Remove the 9 screws securing the NEST EMI back bracket.	

Table 8-72 DA192 removal procedure

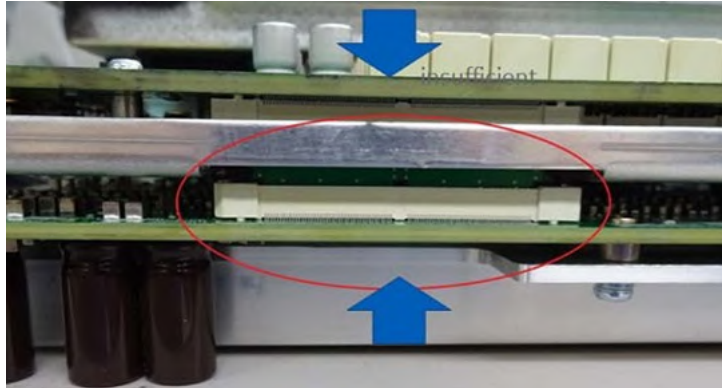
Steps		Corresponding Graphic
<p>3.</p>	<p>Pull out DA192/DPI-L Board Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	
<p>4.</p>	<p>Unscrew 6 screws to disassemble DA192 and DPI-L Board Assy.</p>	
<p>5.</p>	<p>NOTE: If DA192 Board has GCW option, remove one more screw (indicate yellow circle) and remove it from current Board and mount (re-use) it on new DA192 Board.</p>	
<p>6.</p>	<p>Replace DA192 Board Assy.</p>	

8-8-4-2 DA192 Installation procedure

1.) Assemble DA192/DPI-L Board Assy with 7 screws (See Step 4 in Table 8-72).

NOTE: If DA192 Board has GCW option, assemble GCW option with 1 screw.

NOTE: Confirm the Stacking-connection before install the Assy to the system.



- 2.) Put DA192/DPI-L Board Assy back to the system. Re-install the NEST EMI BRKT with 9 screws.
- 3.) Connect all cables to NEST.
- 4.) Re-install the rear cover removed.

8-8-4-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-4-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-4-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-73 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-1	Top console adjustment control functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-8-5 DPI-L PWA Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-74 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-5-1 DPI-L PWA Removal procedure

Table 8-75 DPI-L PWA removal procedure



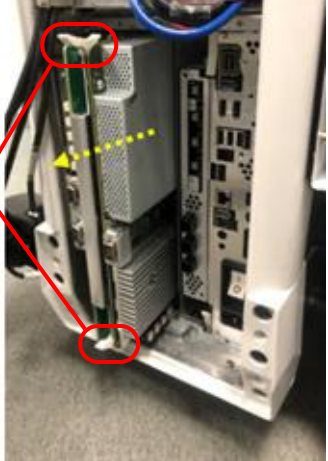
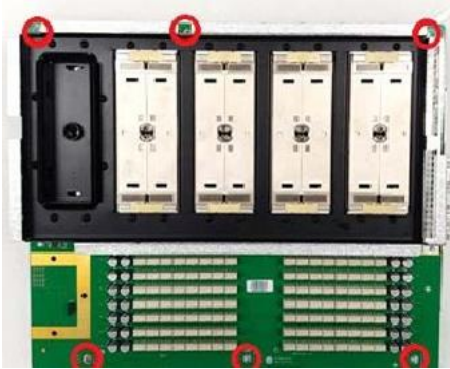
Steps		Corresponding Graphic
1.	Remove the Rear Cover and disconnect all cables from NEST.	
2.	Remove the 9 screws securing the NEST EMI back bracket.	

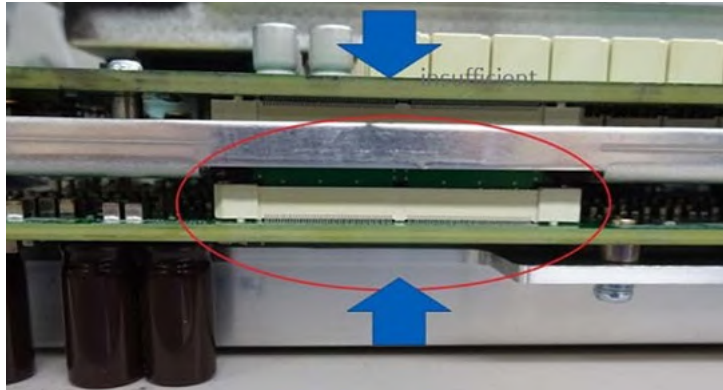
Table 8-75 DPI-L PWA removal procedure

Steps		Corresponding Graphic
3.	<p>Pull out DA192/DPI-L Board Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	 <p>Card puller</p>
4.	<p>Disassemble DA192 and DPI-L Board Assy. (Remove 6 screws).</p>	
5.	<p>Replace DPI-L PWA.</p>	

8-8-5-2 DPI-L PWA Installation procedure

- 1.) Assemble DA192/DPI-L Board Assy with 6screws (See Step 4 in Table 8-73).

NOTE: Confirm the Stacking-connection before install the Assy to the system.



- 2.) Put DA192/DPI-L Board Assy back to the system. Re-install the NEST EMI BRKT with 9 screws.
- 3.) Connect all cables to NEST.
- 4.) Re-install the rear cover removed.

8-8-5-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-5-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-5-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-76 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-15	CW Doppler mode functional checks	
4-3-1	Top console adjustment control functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	



8-8-6 BEPS Assy Replacement


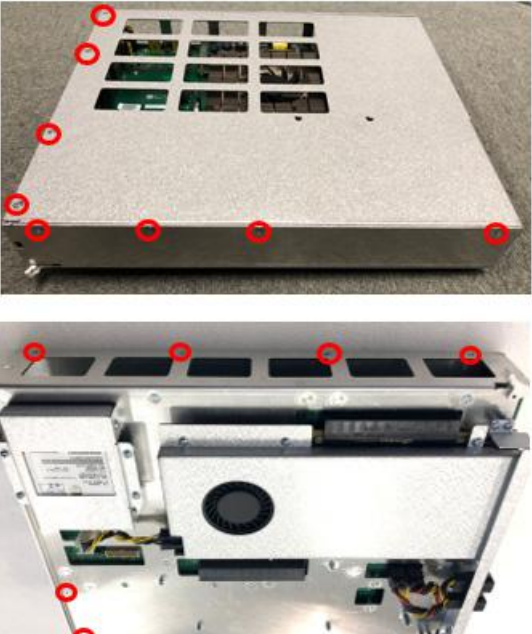
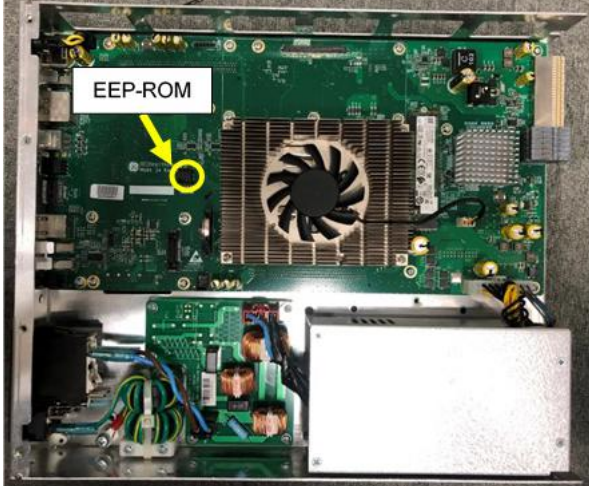
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

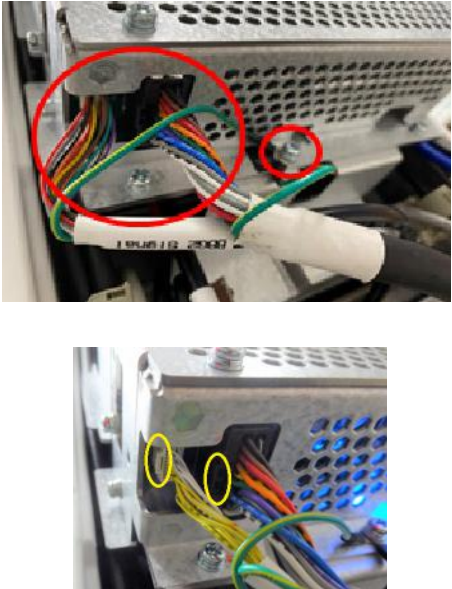
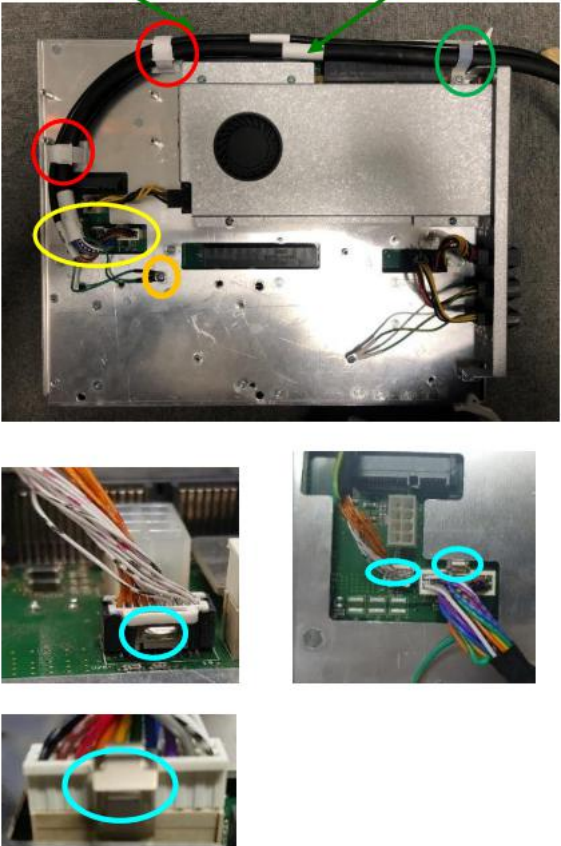
Table 8-77 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-6-1 BEPS Removal procedure

Steps	Corresponding Graphic
1. Remove the Rear Cover and disconnect all cables from NEST.	
2. Remove the 9 screws securing the NEST EMI back bracket.	

Steps	Corresponding Graphic
<p>3. Pull out the BEPS Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	 <p>Card puller</p> <p>BEPS ASSY & SSD & SOM & GPU</p>
<p>4. Remove BEPS TOP PLATE from current BEPS Assy and new BEPS Assy (14 screws).</p>	
<p>5. Take EEPROM, SOM, SSD and GPU (also DC4D and VCS, if installed.) out from current BEP Assy. Install those parts on new BEP Assy.</p> <p>For details, 8-8-9 "GPU replacement" on page 8-156 8-8-10 "SOM replacement" on page 8-158 8-8-11 "SSD replacement" on page 8-160 8-10-8 "DC4D Replacement" on page 8-231 8-10-9 "VCS (S-Video) Replacement" on page 8-235</p>	 <p>EEP-ROM</p>

Steps	Corresponding Graphic
<p>6.</p> <p>If the system has Scan on Battery /Power Assistant option, you have to reuse battery cables with new BEPS2 Assy.</p> <p>Disconnect BBG2 Signal Cable and BBG2 Power Cable.</p> <p>Unscrew 1 screw to remove one ground line.</p> <p>WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob</p>	
<p>Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (RED CIRCLE).</p> <p>Loosen one screw and Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (GREEN CIRCLE).</p> <p>Loosen one screw and disconnect the ground cable of the BBG2 power cable (ORANGE CIRCLE).</p> <p>Disconnect the BBG2 Signal Cable and BBG2 Power Cable (YELLOW CIRCLE).</p> <p>WARNING: Hold down a knob (LIGHT BLUE CIRCLE) to unlatch the connector and then disconnect a cable. Connector may DAMAGE if you don't hold a knob.</p>	<div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="border: 1px solid green; padding: 2px; text-align: center;">BBG Signal Cable</div> <div style="border: 1px solid green; padding: 2px; text-align: center;">BBG Power Cable</div> </div> 

8-8-6-2 Installation procedure

- 1.) Assemble BEPS TOP PLATE with 14 screws.
- 2.) Put BEPS Assy back to the system. Re-install the NEST EMI BRKT with 9 screws.
- 3.) Connect all cables to NEST.
- 4.) Re-install the rear cover removed.

8-8-6-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-6-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-6-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-78 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-25 4-3-26	Power Assistant functional checks Scan on Battery functional checks (if the system has or Power Assistant)	
4-3-23	4D option functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	







8-8-7 GBP (Backplane) Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).



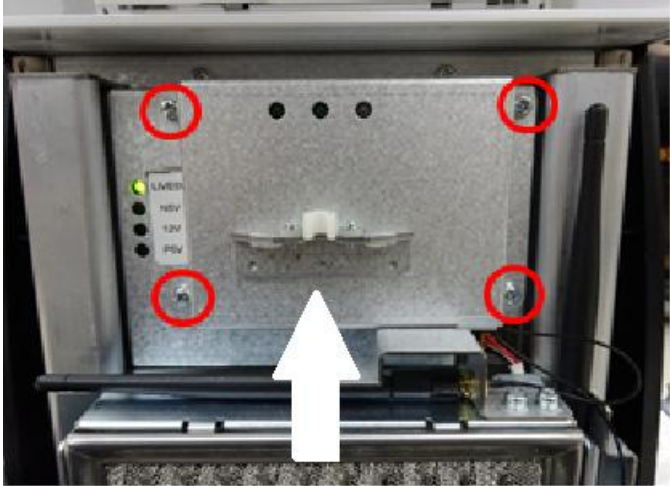
Table 8-79 Manpower, Time, Tools, and PPE

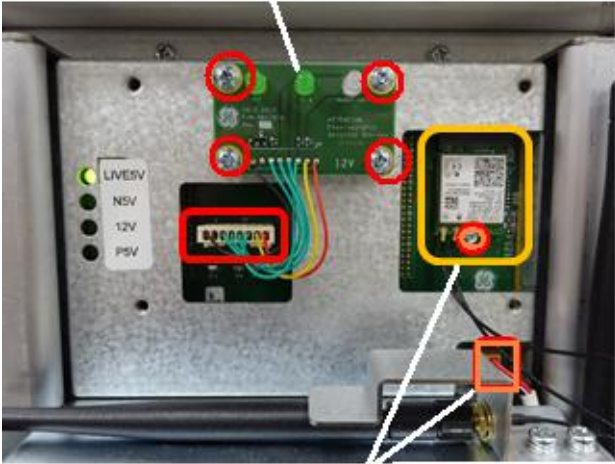


Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver Hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap




Table 8-80 Preparations and Preparation Links

Preparations - you must perform the following steps	
 DANGER 	<p><i>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</i></p>
 DANGER 	<p>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.
 DANGER 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters. 2. Completely shut down the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 4. Remove the Rear Cover. 	
<p>Preparation Links (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. • 8-6-4 "Front Cover Replacement" on page 8-51 • 8-6-8 "Rear Cover Replacement" on page 8-61. • 8-8-4 "DA192 Replacement" on page 8-138. • 8-8-5 "DPI-L PWA Replacement" on page 8-141. • 8-8-6 "BEPS Assy Replacement" on page 8-144. 	

8-8-7-1 GBP Removal procedure

Steps	Corresponding Graphic
<p>1. Pull the Front Cover Assy to remove it (no tool required).</p>	
<p>2. Unscrew 2 screws.</p>	
<p>3. Remove LED Indicator BRKT. (4 screws)</p>	 <p style="text-align: center;">LED indicator BRKT T1 Assy</p>

Steps	Corresponding Graphic
<p>4. Unscrew 4 screws to remove CSI2 Assy and cable and Fan Assy cable (indicate red frame).</p> <p>If the system has WiFi option, unscrew 1 screw to remove WiFi module and WiFi antenna (indicate orange frame).</p>	 <p>CSI2 Assy with cable</p> <p>WiFi module and antenna</p>
<p>5. Remove the Rear Cover and disconnect all cables from NEST.</p> <p>Please see the below link:</p> <p>8-8-4 "DA192 Replacement" on page 8-138</p> <p>8-8-5 "DPI-L PWA Replacement" on page 8-141</p> <p>8-8-6 "BEPS Assy Replacement" on page 8-144</p>	
<p>6. Unscrew 2 screws to remove NEST Assy.</p>	

Steps		Corresponding Graphic
7.	Pull out Nest box from console.	
8.	Remove BACKPLANE BRKT(6 screws).	
9.	Unscrew 4 screws to remove GBP.	

8-8-7-2 Installation procedure

- 1.) Assemble new GBP and BACKPLANE BRKT.
- 2.) Put Nest Box back to the system.
- 3.) Assemble the Nest Box with 4 screws. (2 screws for front side and 2 screws for rear side).
- 4.) Install CSI2 Assy and FAN Assy cable. If the system has WiFi option, install Wifi module and antenna.
- 5.) Assemble LED Indicator BRKT.
- 6.) Assemble BEPS/DPI-L/DA192 to Next box.
- 7.) Connect all cables to NEST.
- 8.) Re-install the rear cover and the front cover removed.

8-8-7-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-7-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-7-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-81 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	


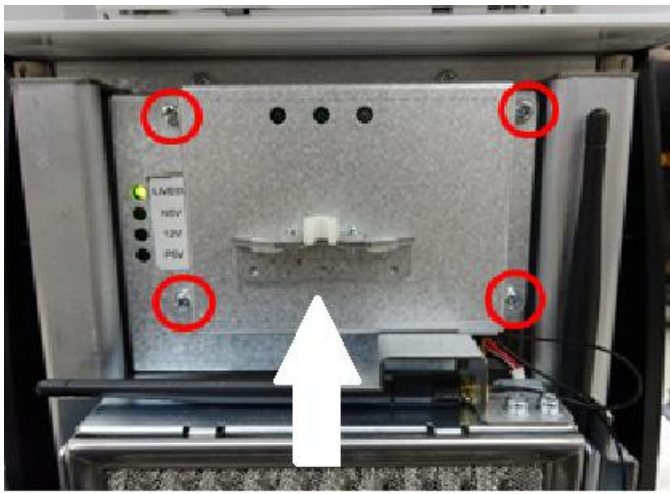
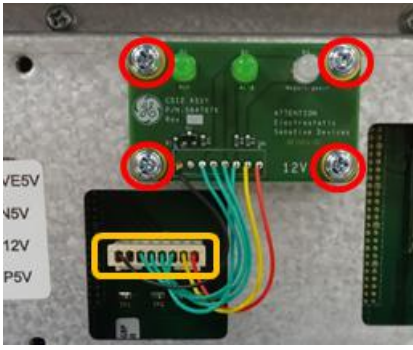
8-8-8 CSI2 (LED Indicator) Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-82 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-8-1 CSI2 Removal procedure

Steps		Corresponding Graphic
1.	Pull the Front Cover Assy to remove it (no tool required).	
2.	Remove LED Indicator BRKT. (4 screws)	 <p data-bbox="964 1142 1292 1171">LED indicator BRKT T1 Assy</p>
3.	Remove CSI2 Assy (1 connector and 4 screws). Note: Pick both sides of the connector and pull it out. Don't pull the cable.	

8-8-8-2 Installation procedure

- 1.) Assemble new CSI2 Assy.
- 2.) Assemble LED indicator BRKT.
- 3.) Re-install the front cover removed.

8-8-8-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-8-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-8-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-83 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-2-4	Power shut down	

8-8-9 GPU replacement


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-84 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-9-1 GPU Assy replacement

Table 8-85 GPU Assy replacement

Steps	Corresponding Graphic
1. Remove BEPS from the console.	See 8-8-6 "BEPS Assy Replacement" on page 8-144 .
2. Remove GPU Assy from BEPS (5 screws and 1 connector).	
3. Replace with new GPU Assy and fasten it with the fixing screw. Re-install in reverse procedure.	

8-8-9-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-9-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-9-4 Functional Checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-86 GPU replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-8-10 SOM replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-87 Manpower, Time, Tools, and PPE


Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

Table 8-88 Preparations and Preparation Links

Preparations - you must perform the following steps
<ul style="list-style-type: none"> • 8-4-7 "Suspending encryption to load software" on page 8-11. • 8-4-12 "Full disk encryption and replacement procedures" on page 8-39.

8-8-10-1 SOM replacement

Table 8-89 SOM replacement

Steps	Corresponding Graphic
1. Remove BEP Assy and BEPS TOP PLATE from the console.	See 8-8-6 "BEPS Assy Replacement" on page 8-144.
2. Remove SOM from BEP Assy (5 screws and 1 connector).	
3. Replace with new SOM and fasten it with the fixing screw. Re-install in reverse procedure.	

8-8-10-2 Calibration and adjustments

No calibrations or adjustments are needed after these parts replacement.

8-8-10-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-10-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-90 SOM replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-8-11 SSD replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).


NOTE: *If you are replacing the SSD drive as FRU, the new SSD drive does not come loaded with software, therefore a full software load is needed. See [Section 8-4 "Loading / Reloading / Upgrading the Software" on page 8-8](#).*

Table 8-91 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-11-1 SSD replacement

Table 8-92 SSD replacement

Steps		Corresponding Graphic
1.	Remove BEP Assy and BEPS TOP PLATE from the console.	See 8-8-6 "BEPS Assy Replacement" on page 8-144 .
2.	Remove SSD from BEP Assy (1 screws).	
3.	Replace with the new SSD and fasten it with the fixing screw. Re-install in reverse procedure.	

8-8-11-2 Calibration and adjustments

No calibrations or adjustments are needed after these parts replacement.

8-8-11-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-11-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-93 SSD replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-8-12 Coin Battery replacement

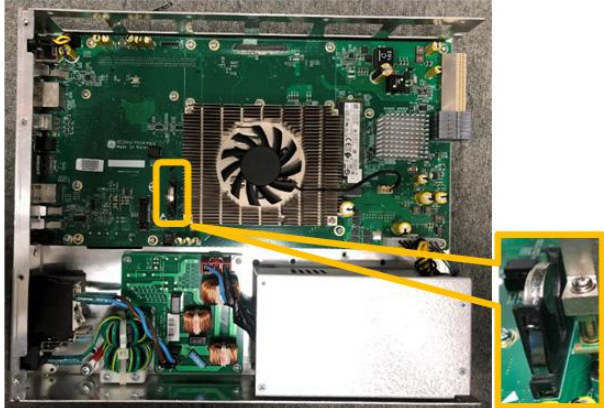
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-94 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-12-1 Coin Battery replacement

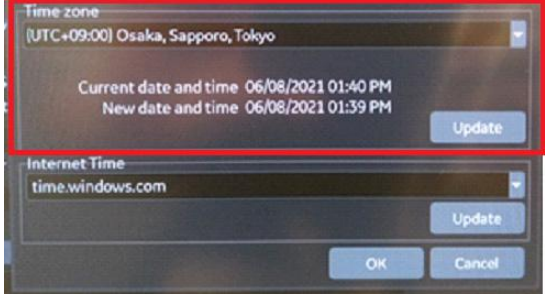
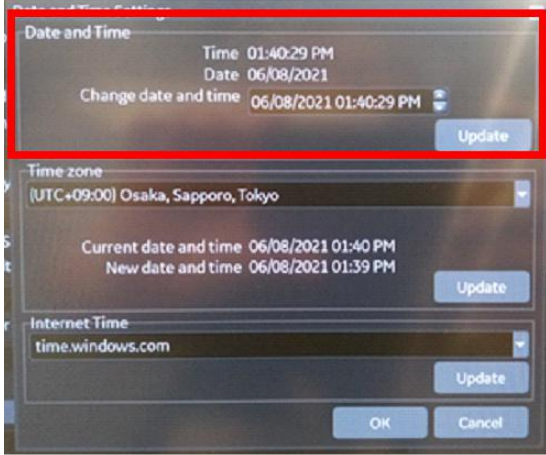
Table 8-95 Coin Battery replacement

Steps		Corresponding Graphic
1.	Remove BEP Assy and BEPS TOP PLATE from the console.	See 8-8-6 "BEPS Assy Replacement" on page 8-144 .
2.	Remove Coin Battery from BEP Assy.	
3.	Replace with the new Coin Battery. Re-install BEPS in reverse procedure.	

8-8-12-2 Calibration and adjustments

Clock adjustment is needed after the coin battery replacement.

Table 8-96 Clock adjustment

Steps		Corresponding Graphic
1.	Go to The Utility -> System -> General, and click Date/Time button.	
2.	Select time zone of your region, then click Update button in Time zone. If Time zone Updated successfully pop up is shown, select OK button.	
3.	Set current date and time in Date and Time, then click Update button in Date and Time.	
4.	Click OK on the Date and Time Settings dialog.	
5.	Restart the system. After booting, check Date/Time on left-bottom side of task bar. New date and time are correct.	

8-8-12-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-12-4 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-97 Coin Battery replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-20	Basic measurement functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	


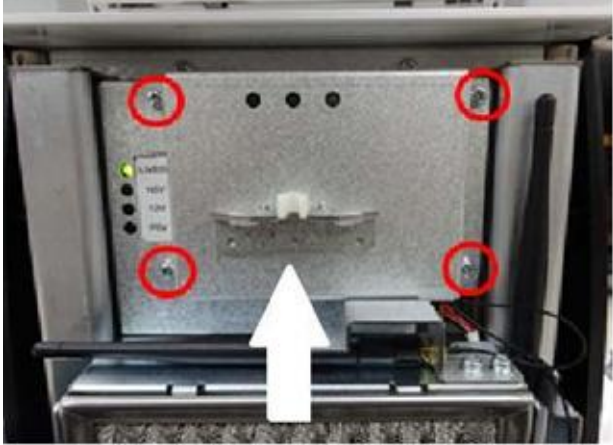
8-8-13 FAN Assy Replacement

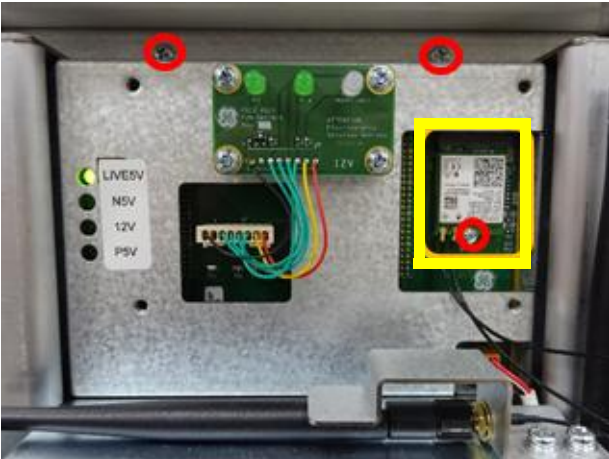


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).



Table 8-98 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 10 minutes	Phillips screwdriver Hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-13-1 FAN Assy replacement

Steps	Corresponding Graphic
1. Remove the Rear Cover and disconnect all cables from NEST.	
2. Remove the front cover and LED Indicator BRKT (4 screws).	 <p>LED indicator BRKT T1 Assy</p>

Steps		Corresponding Graphic
<p>3.</p>	<p>Remove 2 screws indicate red circle.</p> <p>If the system has WiFi option, remove WiFi module (1 screw indicate red circle in yellow frame).</p>	
<p>4.</p>	<p>Unscrew 2 screws to remove NEST Assy.</p>	
<p>5.</p>	<p>Remove the 9 screws securing the NEST EMI back bracket.</p>	

Steps		Corresponding Graphic
6.	Pull out Nest box from console.	
7.	Remove FAN cable and FAN Assy (8 screws).	

8-8-13-2 Installation procedure

- 1.) Assemble FAN Assy and FAN cable.
- 2.) Put Nest Box back to the system.
- 3.) Assemble the Nest Box with 4 screws. (2 screws for front side and 2 screws for rear side).
- 4.) Install CSI2 Assy. If the system has WiFi option, install Wifi module and antenna.
- 5.) Assemble LED Indicator BRKT.
- 6.) Connect all cables to NEST.
- 7.) Re-install the rear cover and the front cover removed.

8-8-13-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-13-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-8-13-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-99 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	



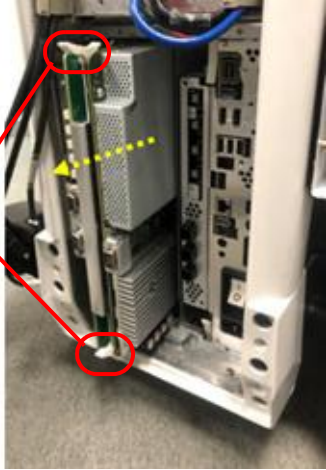
8-8-14 Probe Port Illumination Replacement


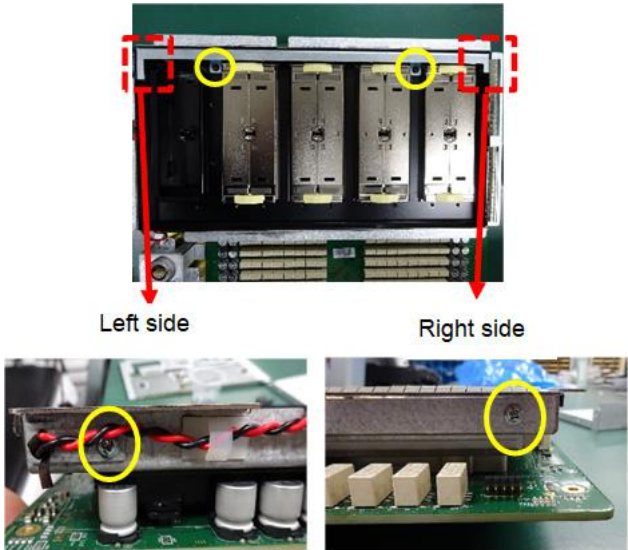
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-100 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

8-8-14-1 Replace Procedure

Steps		Corresponding Graphic
1.	Remove the Rear Cover and disconnect all cables from NEST.	
2.	Remove the 9 screws securing the NEST EMI back bracket.	
3.	Pull out DA192/DPI-L Board Assy. Use Card Puller to pull out. Place it on an ESD safe place.	 <p data-bbox="868 1560 992 1587">Card Puller</p>

Steps		Corresponding Graphic
4.	Remove the LED cable from DPI-L Assy.	
5.	Remove 4 screws from DLP Front Bracket. (1 screw from left side, 1 screw from right side, 2 screws from front side)	 <p style="text-align: center;">Left side Right side</p>
6.	Replace DPI-L Lighting Assy and re-install by reverse steps.	

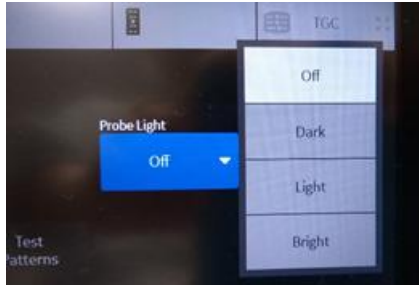
8-8-14-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-8-14-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Check that Probe port LED is Lighted when “Bright” is selected in Probe Light (Illuminator) button of Utility Page.
- 3.) Check that Probe port LED is NOT Lighted when “Off” is selected in Probe Light (Illuminator) button of Utility Page.



- 4.) Power up the system to verify that it operates as intended.

8-8-14-4 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-101 Probe Port Illumination replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-2-4	Power shut down	

Section 8-9 Replacing Main Console Parts

8-9-1 Purpose of this section




This section describes how to replace the replaceable parts in the main console.

8-9-2 Contents in this section

8-9-1	Purpose of this section	8-173
8-9-2	Contents in this section.	8-173
8-9-3	Preparation.	8-174
8-9-4	Elevation Arm Replacement.	8-175
8-9-5	Speaker Replacement	8-181
8-9-6	BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF Replacement	8-184
8-9-7	Metal Air Filter Assy Replacement	8-188
8-9-8	Caster Replacement.	8-191

8-9-3 Preparation.

Table 8-102 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p>	<p><i>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</i></p>
 <p>DANGER</p>	<p>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.
 <p>DANGER</p>	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters. 2. Completely shut down the system. 2. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 3. Remove the HDU/LCD Monitor, Main Monitor Arm, OPIO Assembly Battery pack, Option tray 	
<p>Preparation Links (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. • 8-7-3 "Main monitor - High Definition Ultrasound (HDU) assembly replacement" on page 8-82. • 8-7-4 "Main monitor - LCD monitor Assembly Replacement" on page 8-89. • 8-7-5 "LCD Arm with Cable Assembly replacement" on page 8-93. • 8-7-10 "Upper/Lower Operator Panel replacement" on page 8-104. • 8-9-6 "BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF Replacement" on page 8-184. • 8-10-3 "Scan on Battery replacement" on page 8-196. • 8-10-12 "Option Tray Replacement" on page 8-249. 	

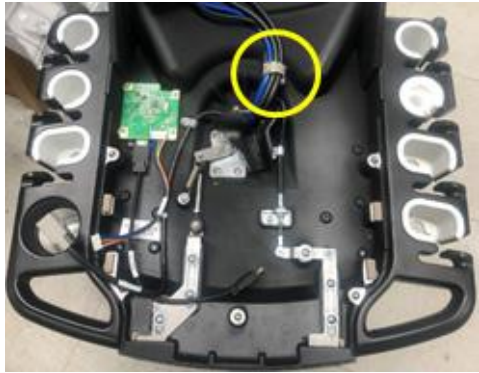


8-9-4 Elevation Arm Replacement



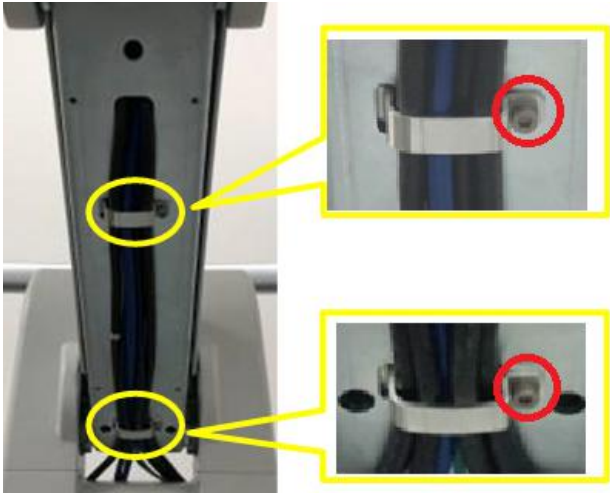
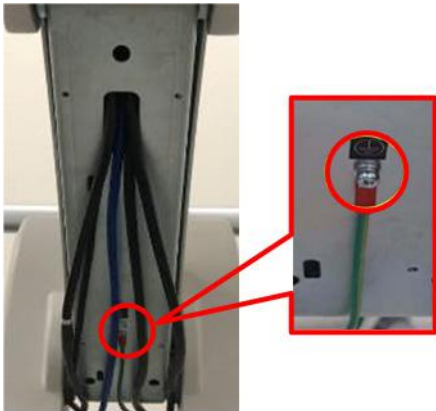
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)






Table 8-103 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 90 minutes	Phillips screwdriver Hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-9-4-1 Removal Procedure



Steps		Corresponding Graphic
1.	Power down the system.	
2.	Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.	
3.	Remove HDU/LCD Monitor, Main Monitor Arm, OPIO Assembly.	
4.	Unlock cable ties to untie cables.	
5.	Unscrew 1 screw to remove the cable clamp.	
6.	Unscrew 4 screws to remove Elevation Arm Lower Cover.	

Steps		Corresponding Graphic
7.	Unscrew 1 screw to remove ELEVATION ARM FRONT DUMMY COVER.	
8.	Remove the cable tie.	
9.	Unscrew 2 screws to remove Elevation cable clamps. NOTE: Removed cable clamps will be used when new elevation arm installation.	
10.	Unscrew 1 screw to remove ground cable.	

Steps		Corresponding Graphic
11.	Pull out the Monitor cables and OP Panel cable through the hole. (5 cables)	
12.	<p>Gently push and pull the cables through the hole under the ELEVATION ARM LOWER FRAME.</p> <p>(1) Pull out the following cables along the route indicated by the yellow arrow.</p> <ul style="list-style-type: none"> - OPIO Upper Monitor - OPIO Upper Touch HDMI <p>(2) Pull out the following cables along the route indicated by the yellow arrow.</p> <ul style="list-style-type: none"> - Lower OPIO CABLE - OPIO POWER CABLE - OPIO USB3.0 CABLE 	
13.	<p>Pull out the Monitor cables and OP Panel cable.</p> <p>(1) Pull out the 2 types of cables on the left side in the opening at the top of the BACKBONE LCF.</p> <ul style="list-style-type: none"> - OPIO Upper Monitor - OPIO Upper Touch HDMI <p>(2) Pull out the 3 types of cables on the right side in the opening at the top of the BACKBONE LCF.</p> <ul style="list-style-type: none"> - Lower OPIO CABLE - OPIO POWER CABLE - OPIO USB3.0 CABLE 	
14.	Unscrew 1 screw to remove the ground cable.	
15.	Unscrew 1 nut.	

Steps		Corresponding Graphic	
16.	Remove the gas spring wire from the cable wire fixing bracket as shown in the picture. (1) Remove a nut. (2) Move up side. (3) Move right side.		
17.	Unscrew 1 screw to remove the cable clamp. Pull out the gas spring wire.		
18.	Remove the OPIO Bottom Base Assy from the Elevation Arm Assy.		
19.	Hold Elevation ARM ASSY with one hand and unscrew 6 screws to disassemble ELEVATION ARM ASSY from Frame.		
20.	For High cabinet, Remove the stopper.		

8-9-4-2 Elevation Arm Assy LCD Installation

Steps		Corresponding Graphic
1.	Assemble the Elevation Arm Assy LCF in reverse procedure.	
2.	For High cabinet, Replace the stopper that was removed in Step 20, 8-9-4-1 "Removal Procedure" on page 8-176	
	For Low Cabinet, Remove the stopper from both side from the new Elevation arm.	

8-9-4-3 Installation Procedure

Parts to be installed in reverse order of removal.

NOTE: ELEVATION ARM LOWER COVER should be reused.

8-9-4-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-9-4-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-9-4-6 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-104 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-2	Main monitor positions and lock functional checks	
4-3-8	B-Mode functional checks	
4-2-4	Power shut down	


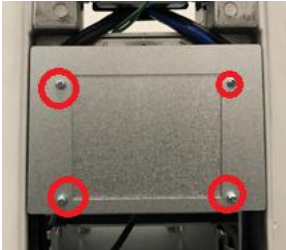
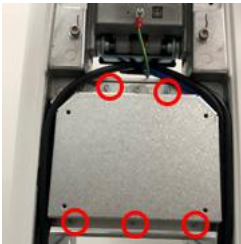
8-9-5 Speaker Replacement


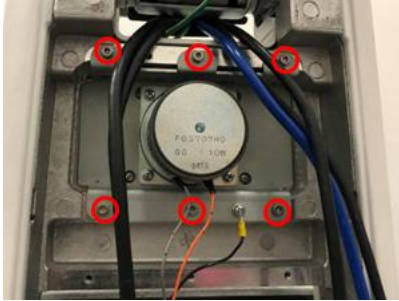

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-105 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Screw Driver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-9-5-1 Removal procedure

Steps		Corresponding Graphic
1.	Remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61 .
2.	If the system has Battery option kit option, remove it. See 8-10-3 "Scan on Battery replacement" on page 8-196 .	
3.	Unscrew 4 screws to remove Speaker Dummy Cover BRKT Polaris.	
4.	Unscrew 5 screws to remove Speaker Dummy Back BRKT Polaris.	

Steps		Corresponding Graphic
5.	Remove Speaker cable.	
6.	Unscrew 6 screws to remove Speaker Unit.	
7.	Unscrew 5 screws to remove Speaker Cable ASSY and ground cable.	

8-9-5-2 Installation Procedure

Parts to be installed in reverse order of removal.

8-9-5-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-9-5-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Turn the volume control on at the Operator Panel.
- 5.) Select PW mode and press on the selected Probe to ensure the Speaker produces sound.

8-9-5-5 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-106 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-14	PW/CW Doppler mode functional checks	
4-2-4	Power shut down	

8-9-6 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-107 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Screw Driver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-9-6-1 Removal procedure

Table 8-108 BACKBONE REAR COVER LCF


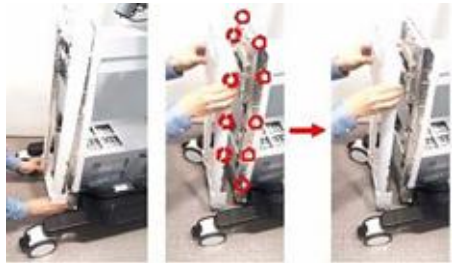
Steps		Corresponding Graphic
1.	Shut down the System. Turn Circuit breaker off. Unscrew 2 screws to remove the POWER CORD FIX BRACKET and disconnect the Main power cable.	See Table 8-20 "Power cable removal" on page 8-43 .
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61 .
3.	Unscrew 3 screws to remove the HANDLE.	
4.	Unhook and pull out the BACKBONE REAR COVER LCF. There are 10 points of hook around the BACKBONE REAR COVER LCF. Unhook from bottom to top.	

Table 8-109 BACKBONE FRONT TOP LCF

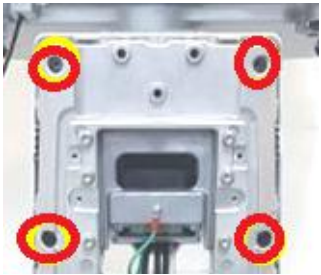




Steps		Corresponding Graphic
1.	Shut down the System. Turn Circuit breaker off. Unscrew 2 screws to remove the POWER CORD FIX BRACKET and disconnect the Main power cable.	See Table 8-20 "Power cable removal" on page 8-43.
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61.
3.	Set the ELEVATION ARM ASSY in horizontal position.	
4.	Remove the BACKBONE REAR COVER LCF.	See Table 8-108 "BACKBONE REAR COVER LCF" on page 8-184.
5.	Unscrew 4 screws to disassemble the BACKBONE FRONT TOP LCF from the BACKBONE.	
6.	Slightly lift the BACKBONE FRONT TOP LCF to disassemble.	

Table 8-110 BACKBONE FRONT BOTTOM LCF

Steps		Corresponding Graphic
1.	Shut down the System. Turn Circuit breaker off. Unscrew 2 screws to remove the POWER CORD FIX BRACKET and disconnect the Main power cable.	See Table 8-20 "Power cable removal" on page 8-43.
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61.
3.	Set the ELEVATION ARM ASSY in horizontal position.	
4.	Remove the BACKBONE REAR COVER LCF.	See Table 8-108 "BACKBONE REAR COVER LCF" on page 8-184.
5.	Remove the Cabinet Cover (High / Mid / Low). Remove the Front Cover. Remove the Side Cover.	See 8-6-4 "Front Cover Replacement" on page 8-51. 8-6-5 "Cabinet Cover Replacement" on page 8-53 8-6-7 "Side Cover Replacement" on page 8-57
6.	Disconnect 2 cables from DVD. * If other Option is attached, unplug the cable.	
7.	Unscrew 4 screws to remove the HIGH or MID FRAME POLARIS.	
8.	Unscrew 6 screws and then pull out the BACKBONE FRONT BOTTOM LCF.	

8-9-6-2 Installation Procedure

Parts to be installed in reverse order of removal.

8-9-6-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-9-6-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-9-6-5 Functional Check

Visual inspection only.


8-9-7 Metal Air Filter Assy Replacement


This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)

Table 8-111 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 10 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad

8-9-7-1 Removal procedure

Steps		Corresponding Graphic
1.	Remove the front cover.	
2.	If the system has WiFi option, remove antenna (4 screws).	

Steps		Corresponding Graphic
3.	Remove Metal Air Filter Assy (4 screws).	

8-9-7-2 Installation Procedure

Parts to be installed in reverse order of removal.

8-9-7-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-9-7-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-9-7-5 Functional Check

Visual inspection only.

8-9-8 Caster Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-112 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver Hex wrench Open end wrench / Torque wrench Adjustable wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad

8-9-8-1 Caster location and caster type

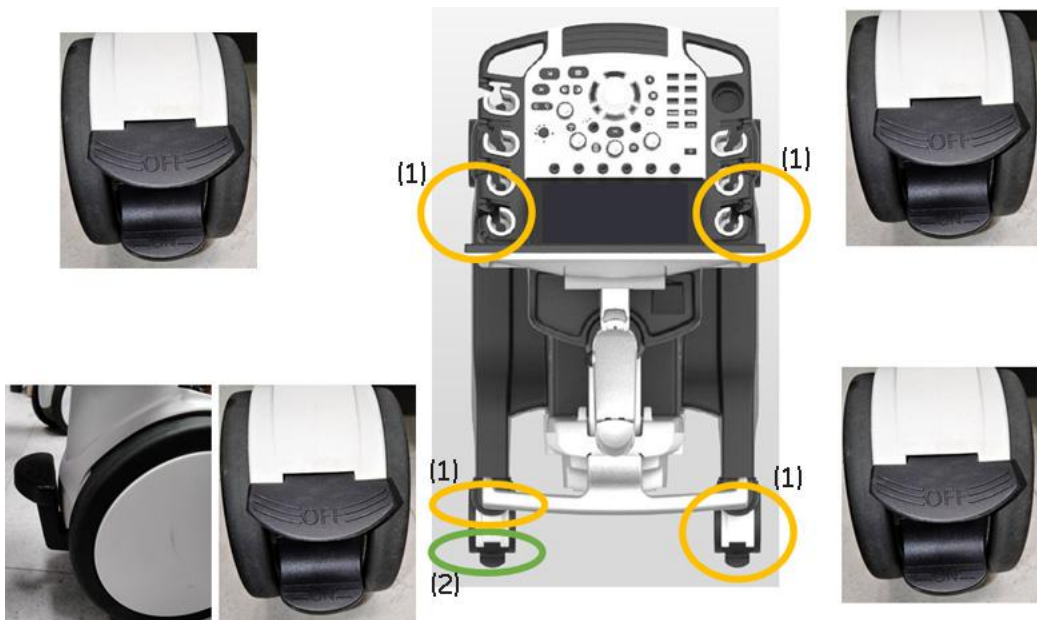





Figure 8-5 Caster location and caster type

- 1.) Brake pedal
- 2.) Swivel lock

8-9-8-2 Removal procedure

Steps		Corresponding Graphic
1.	Remove the cabinet cover and left/right side cover. If the system has the side cabinet, also remove it.	See 8-6-5 "Cabinet Cover Replacement" on page 8-53 and 8-6-7 "Side Cover Replacement" on page 8-57. See 8-6-16 "Side Cabinet Replacement" on page 8-78
2.	Pulling edge of each side to unhook the foot cover front. Pulling out the 3 points of edge of front side to unhook the foot cover front. Then move Foot cover front upward. Refer to figure right.	
3.	Remove base cover rear by slightly pulling edge of the cover to outside and then move upward.	
3.	Loosen the nut to remove the caster.	

8-9-8-3 Installation Procedure

Parts to be installed in reverse order of removal.

8-9-8-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-9-8-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-9-8-6 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-113 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-3-3	Brakes and direction lock functional checks	

Section 8-10 Replacing Options

8-10-1 Purpose of this section







This section describes how to install LOGIQ Fortis options.

Contents in this section

8-10-1	Purpose of this section	8-194
8-10-2	Preparation	8-195
8-10-3	Scan on Battery replacement	8-196
8-10-4	Power Assistant replacement	8-206
8-10-5	WLAN Replacement	8-219
8-10-6	GCW (CW Doppler) Replacement	8-224
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8-10-2 Preparation

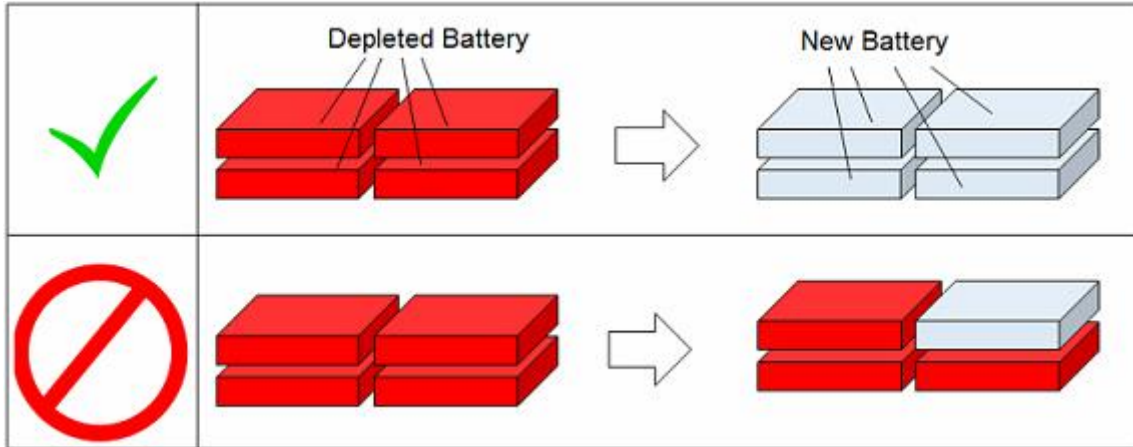
Table 8-114 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <p>DANGER</p> 	<p><i>Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.</i></p>
 <p>DANGER</p> 	<p>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:</p> <ol style="list-style-type: none"> 1. ALWAYS CONNECT YOURSELF. THE ESD WRIST STRAP SHOULD BE CONNECTED TO ONE OF THE TWO RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE. 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.
 <p>DANGER</p> 	<p>Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis.</p> <p>To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:</p> <ul style="list-style-type: none"> • Plan and prepare for shutdown. • Completely power down the LOGIQ Fortis. • Disconnect the power cable (first from the wall and then from the LOGIQ Fortis). • Apply lockout/tagout devices to maintain exclusive control of the power cable. • Relieve all potentially hazardous stored or residual energy (batteries). • Verify isolation. <p>For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:</p> <ul style="list-style-type: none"> • 1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26. • 1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27. • "Disconnect battery power" on page 1-28.
<ol style="list-style-type: none"> 1. Lock the casters. 2. Completely shut down the system. 3. Disconnect the mains power cable from the wall outlet, all Probes and External I/O Cabling. 4. Remove the Rear Cover. 	
<p>Preparation Links (if you need more information):</p> <ul style="list-style-type: none"> • 4-2-4 "Power shut down" on page 4-10. • 8-5-3 "Power cable replacement" on page 8-43 • 8-6-8 "Rear Cover Replacement" on page 8-61. • 8-8-6 "BEPS Assy Replacement" on page 8-144 	

8-10-3 Scan on Battery replacement

⚠ WARNING *THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.*

⚠ WARNING *Replace all 4 batteries when you replace the Extended Battery. If you replace partially, there is a possibility of battery failure.*



This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-115 Manpower, Time, Tools, and PPE


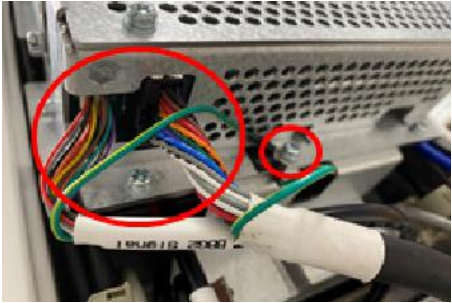

Manpower	Time	Tools	PPE
One person	Approximately 15minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad (if kneeling is required)

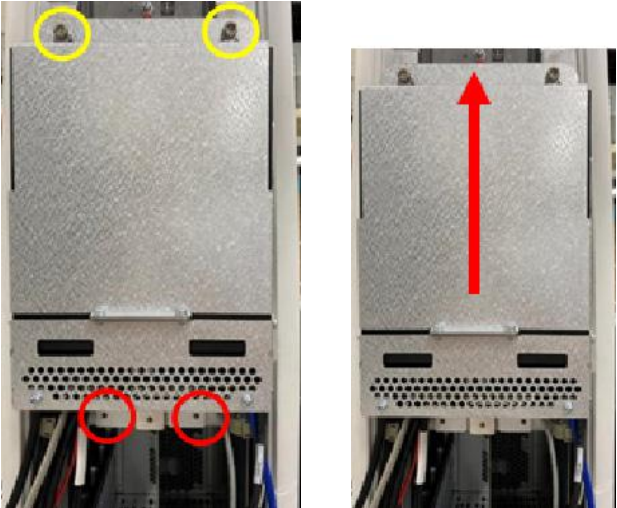


NOTE: *If you don't have Torque driver, assemble a battery without causing looseness. However, apply too much torque have the potential for causing the cover damage or twist off the stud. Take extra care when you screw up.*



NOTE: *The replacement includes all the hardware for the Battery, replace all the hardware when the is replaced.*

8-10-3-1 Battery Installation kit replacement procedure


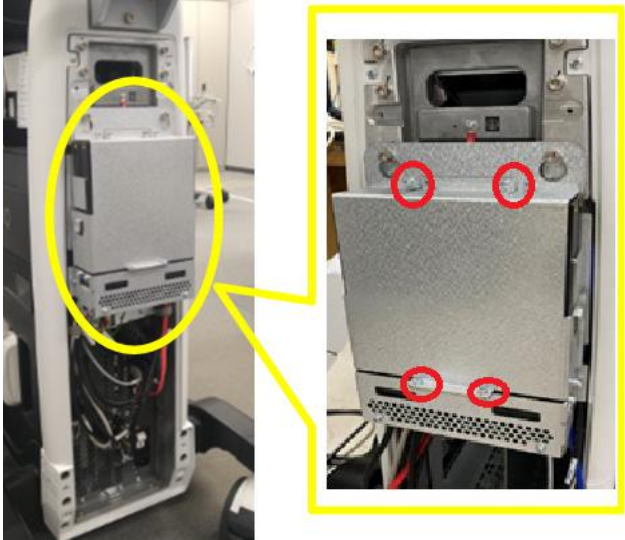

⚠ WARNING *THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.*




Step		Corresponding graphic
1.	Remove 5 screws and rear cover.	
2.	Disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line. WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob	 

	Step	Corresponding graphic
	<p>3. Remove Battery installation kit from frame. Loosen the upper 2 screws (indicate yellow circle). Unscrew lower 2 screws (indicate red circle).</p>	
	<p>4. Unscrew 8 screws and remove the battery box cover.</p>	
	<p>5. Disconnect upper 2 battery packs.</p>	





Step		Corresponding graphic
6.	Unscrew 2 screws to remove Battery pack mid Bracket.	 <p data-bbox="1235 506 1425 558">BATTERY PACK MID BRKT T1</p>
7.	Disconnect lower 2 battery packs.	
8.	Install Battery Packs to new Battery Installation kit and re-install all parts by reverse steps. Make sure that the BBG2 power and signal cable fit together correctly and that they will not come off even if you pull them lightly.	



8-10-3-2 Battery 4 Pack Replacement procedure

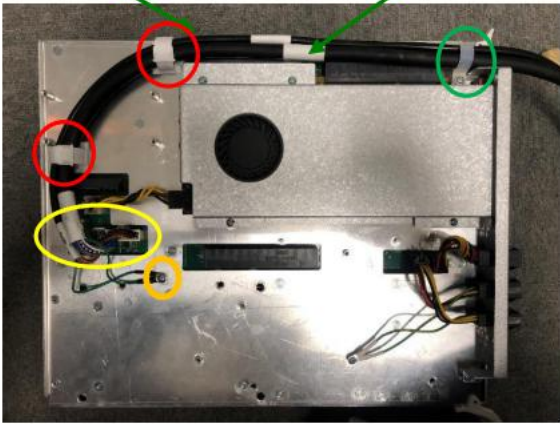
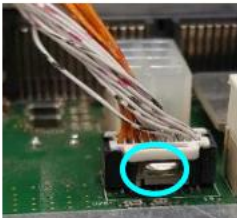


Step		Corresponding graphic
1.	Remove 5 screws and rear cover.	
2.	Remove the metal bracket. Loosen the upper 2 screws (indicate yellow circle). Unscrew lower 2 screws (indicate red circle).	
3.	Unscrew 4 screws to remove battery packs. 2 screws on each side.	

	Step	Corresponding graphic
4.	Remove the two 4S2P BATTERY PACKS from the front side.	
5.	Unscrew 2 screws to remove the BATTERY PACK MID BRKT.	
6.	Remove the two 4S2P BATTERY PACKS.	
7.	Install new 4S2P BATTERY PACK. Re-install all parts and cover removed in reverse procedure.	

8-10-3-3 Battery Cable replacement

Step	Corresponding graphic
<p>1. Unscrew 5 screws to remove the rear cover.</p>	
<p>2. Disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line. WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob</p>	 
<p>3. Remove all cables and unscrew 9 screws to remove the NEST BACK BRKT.</p>	

Step		Corresponding graphic
4.	Pass the BBG2 Power Cable and the BBG2 Signal Cable through the hole of the NEST EMI BRKT.	 <p>A close-up photograph showing two cables, one power and one signal, being inserted into a hole in a metal bracket. A red arrow points upwards towards the hole.</p>
5.	Pull out the BEPS Assy. Use Card Puller to pull out. Place it on an ESD safe place.	 <p>Card puller</p> <p>BEPS ASSY & SSD & SOM & GPU</p> <p>A photograph of a server rack. A yellow card puller is being used to remove a component. Red circles highlight the BEPS Assy & SSD and SOM & GPU. A red arrow points to the card puller.</p>

Step	Corresponding graphic
<p>6.</p> <p>Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (RED CIRCLE).</p> <p>Loosen one screw and Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (GREEN CIRCLE).</p> <p>Loosen one screw and disconnect the ground cable of the BBG2 power cable (ORANGE CIRCLE).</p> <p>Disconnect the BBG2 Signal Cable and BBG2 Power Cable (YELLOW CIRCLE).</p> <p>WARNING: Hold down a knob (LIGHT BLUE CIRCLE) to unlatch the connector and then disconnect a cable. Connector may DAMAGE if you don't hold a knob.</p>	<div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="border: 1px solid green; padding: 2px; font-weight: bold;">BBG Signal Cable</div> <div style="border: 1px solid green; padding: 2px; font-weight: bold;">BBG Power Cable</div> </div>  <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div> <div style="text-align: center; margin-top: 10px;">  </div>
<p>7.</p> <p>Replace the BBG2 Signal Cable and BBG2 Power Cable, and assemble in reverse procedure.</p> <p>Gently pull the cable to make sure that the cable does not come off.</p>	

8-10-3-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-3-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.

8-10-3-6 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

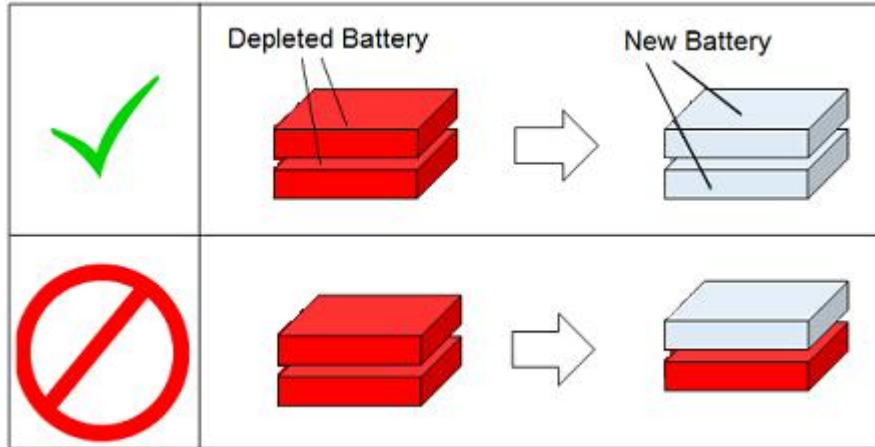
Table 8-116 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-25	Power Assistant functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-10-4 Power Assistant replacement

⚠ WARNING *THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.*

⚠ WARNING *Replace all 2 batteries when you replace the Extended Battery. If you replace partially, there is a possibility of battery failure.*



This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-117 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad (if kneeling is required) ESD mat and wrist strap




NOTE: *The Power Assistant Option replacement includes all the hardware for the Battery, replace all the hardware when the Power Assistant is replaced.*

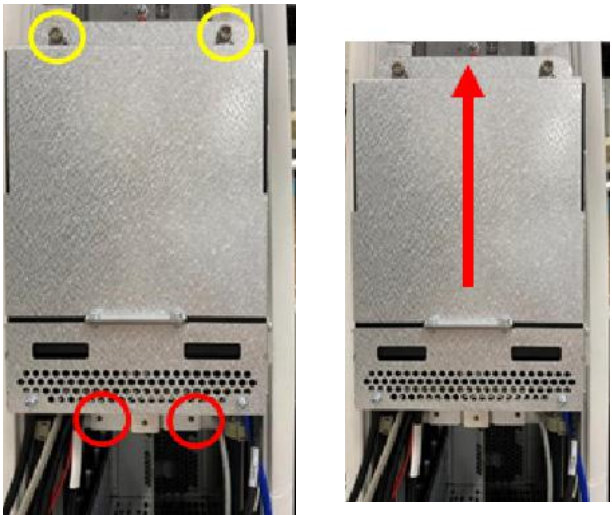


NOTE: *If you don't have Torque driver, assemble a battery without causing looseness. However, apply too much torque have the potential for causing the cover damage or twist off the stud. Take extra care when you screw up.*



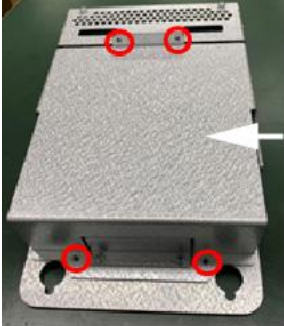

NOTE: *The Power Assistant replacement includes all the hardware for the Battery, replace all the hardware when the Power Assistant is replaced.*

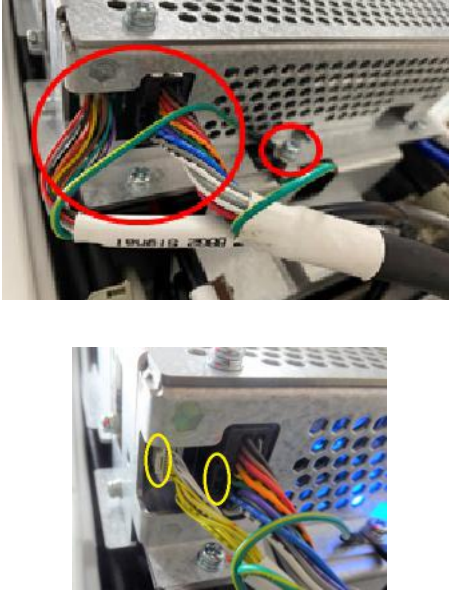

8-10-4-1 Battery Installation Kit Replacement procedure

⚠ WARNING *THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.*


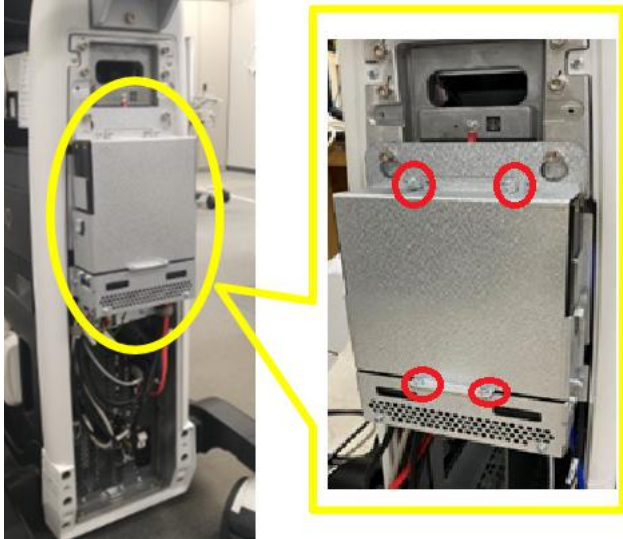

Step	Corresponding graphic
<p>1. Remove 5 screws and rear cover.</p>	
<p>2. Disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line.</p> <p>WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob</p>	 

Step	Corresponding graphic
3. Remove Battery installation kit from frame. Loosen the upper 2 screws (indicate yellow circle). Unscrew lower 2 screws (indicate red circle).	
4. Unscrew 8 screws and remove the battery box cover.	
5. Unscrew 2 screws to remove Battery pack mid Bracket.	



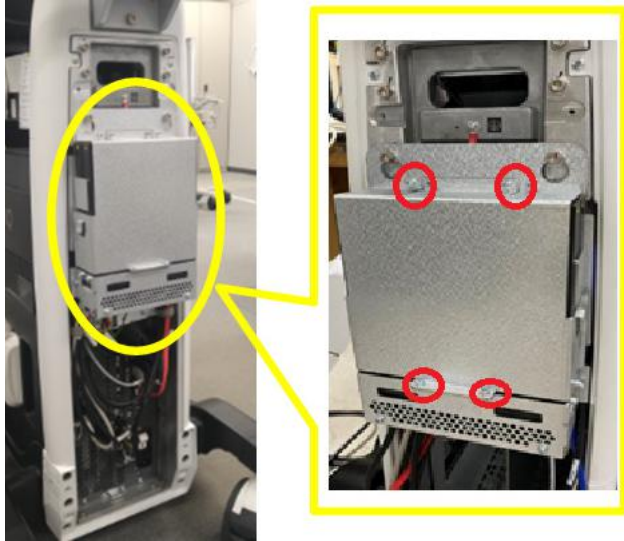
Step	Corresponding graphic
<p>6. Install Battery Packs to new Battery Installation kit and re-install all parts by reverse steps.</p> <p>Assemble BATTERY PACK MID BRKT with 2 screws.</p> <p>Note: Power Assistant batteries only use those connectors. Failing to install batteries properly will cause battery charging errors.</p>	 <p>Battery Pack Mid Bracket T1</p>
<p>7. Assemble the battery pack with 2 screws on both sides.</p>	
<p>8. Assemble the BATTERY PACK TOP BRKT by 4 screws.</p>	 <p>Battery Pack Top BRKT T1</p>
<p>9. Loosen 2 screws (YELLOW CIRCLES).</p> <p>Hang the BBG2 ASSY on 2 screws (ORANGE CIRCLES).</p> <p>Assemble the BBG2 ASSY to FRAME with 2 screws should be tightened with proper torque 120KgfEcm (ORANGE CIRCLES).</p> <p>Assemble the BBG2 ASSY to FRAME with 2 SCREWS (RED CIRCLES).</p>	


	Step	Corresponding graphic
10.	<p>Connect BBG2 Signal Cable and BVG2 Power Cable to the connector of bottom of battery.</p> <p>Fasten the 1 screw with GROUND cable of BBG Power and Signal Cable.</p> <p>WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob.</p>	
11.	<p>Assemble the AC power cable and Rear Cover with 5 screws.</p>	

8-10-4-2 Battery 2 Pack replacement procedure





Step	Corresponding graphic
<p>1. Remove 5 screws and rear cover.</p>	
<p>2. Remove the metal bracket. Loosen the upper 2 screws (indicate yellow circle). Unscrew lower 2 screws (indicate red circle).</p>	
<p>3. Unscrew 2 screws to remove the BATTERY PACK MID BRKT.</p>	



Step		Corresponding graphic
4.	Unscrew 2 screws to remove the battery packs.	
5.	Remove the two 4S2P BATTERY PACKS.	
6.	Install the battery packs to Battery bracket. Be sure to insert the battery pack to J15 and J17 connector.	

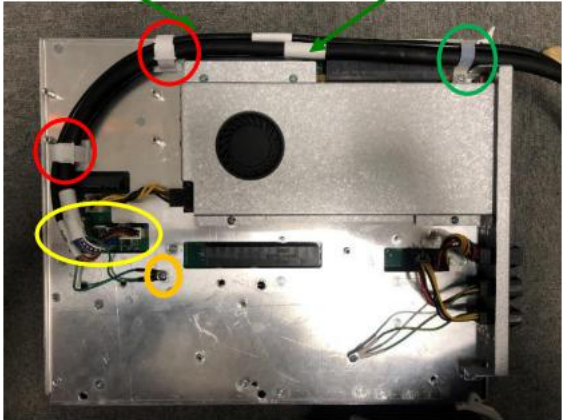



Step	Corresponding graphic
<p>7. Assemble the battery pack with 2 screws on both sides.</p>	
<p>8. Assemble BATTERY PACK MID BRKT with 2 screws.</p>	
<p>9. Install the metal bracket. Fasten the upper 2 screws and lower 2 screws.</p>	

Step		Corresponding graphic
10.	Assemble the AC power cable and Rear Cover with 5screws..	

8-10-4-3 Battery Cable replacement

Step	Corresponding graphic
<p>1. Unscrew 5 screws to remove the rear cover.</p>	
<p>2. Disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line. WARNING: Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob</p>	 
<p>3. Remove all cables and unscrew 9 screws to remove the NEST BACK BRKT.</p>	

Step	Corresponding graphic
<p>4.</p> <p>Pass the BBG2 Power Cable and the BBG2 Signal Cable through the hole of the NEST EMI BRKT.</p>	
<p>5.</p> <p>Pull out the BEPS Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	 <p>Card puller</p> <p>BEPS ASSY & SSD & SOM & GPU</p>

Step	Corresponding graphic
<p>6.</p> <p>Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (RED CIRCLE).</p> <p>Loosen one screw and Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (GREEN CIRCLE).</p> <p>Loosen one screw and disconnect the ground cable of the BBG2 power cable (ORANGE CIRCLE).</p> <p>Disconnect the BBG2 Signal Cable and BBG2 Power Cable (YELLOW CIRCLE).</p> <p>WARNING: Hold down a knob (LIGHT BLUE CIRCLE) to unlatch the connector and then disconnect a cable. Connector may DAMAGE if you don't hold a knob.</p>	   
<p>7.</p> <p>Replace the BBG2 Signal Cable and BBG2 Power Cable, and assemble in reverse procedure.</p> <p>Gently pull the cable to make sure that the cable does not come off.</p>	

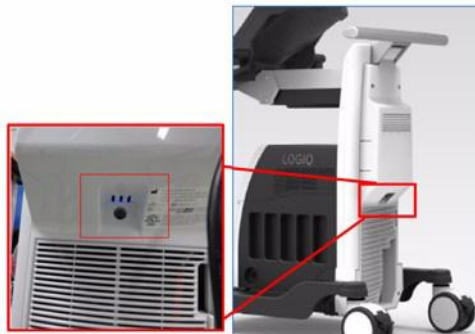
8-10-4-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-4-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws and covers removed earlier have been installed.
- 2.) After connecting the power cable and turn on the breaker, then check the battery LED. Blue LED behaves
 - Under charging : blinking
 - Full: ON
 - Discharge or Not charging (e.g. battery mounted on wrong position) : OFF



- 3.) Power up the system to verify that it operates as intended.

8-10-4-6 Functional Check

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 8-118 Lower Bezel replacement Functional Checks

See: Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-25	Power Assistant functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-10-5 WLAN Replacement

NOTE: The WLAN Card replacement Kit includes all the hardware for the WLAN, replace all the hardware when the WLAN Card is replaced.

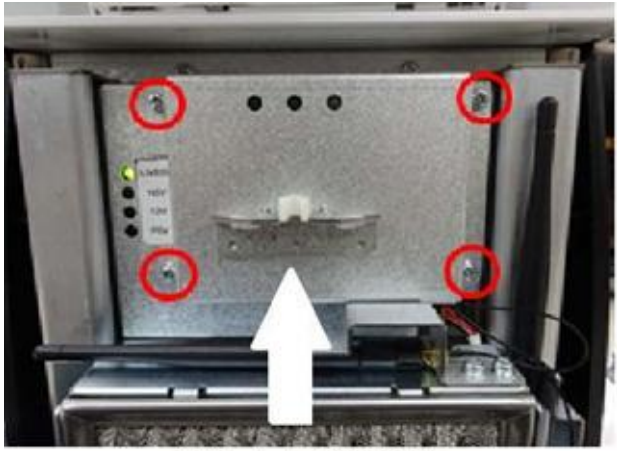

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).


Table 8-119 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

A magnifying glass to connect the WLAN antenna cables to the WLAN Card will be very useful for this procedure.

8-10-5-1 Replacement procedure

Steps		Corresponding Graphic
1.	Remove the Front cover.	
2.	Unscrew 4 screws to remove the LED Indicator BRKT.	 <p data-bbox="974 819 1279 850">LED indicator BRKT T1 Assy</p>
3.	Unscrew 4 screws to remove antenna cable clamp.	

Steps		Corresponding Graphic	
4.	Unscrew 1 screw to remove WiFi module.		
5.	Replace antenna and Wifi module. Re-install all parts and cover removed in reverse procedure.		

8-10-5-2 WLAN Set-up

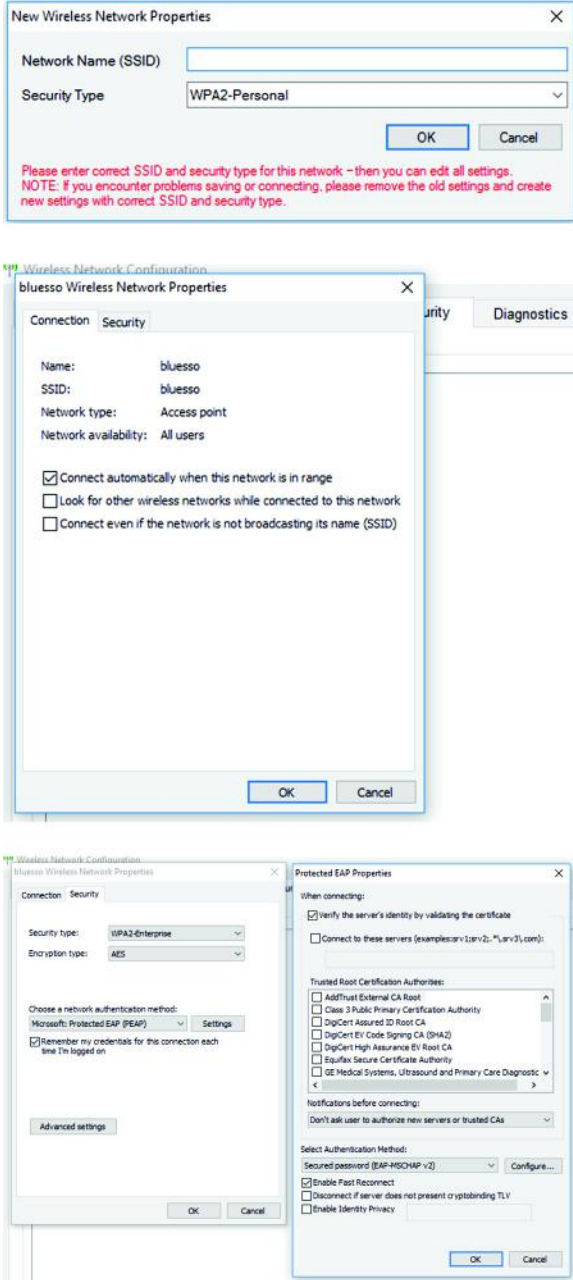
For configuring the WLAN, refer to the latest revision of the LOGIQ Fortis Basic User Manual, Chapter 13 “Configuring the Wireless Network”.

Services Security Set-up

NOTE: This step is mandatory in order to insure proper functionality of services and communications security settings.

- 1.) Connect the Service key and access Windows.
- 2.) Open an explorer window.
- 3.) Navigate to C:\Remap.
- 4.) Run the batch file “EnableWLAN.bat”. A screen will flash “updating network configuration for WLAN.”

8-10-5-3 Basic Configuration of WLAN

Steps	Corresponding Graphic
<p>1. Contact the site Network Administrator to obtain the necessary parameters to configure the WLAN.</p> <ul style="list-style-type: none">• IP Address or DHCP• Network ID and Network key• Security type• Encryption type, etc. <p>Perform the WLAN configuration as described in Basic User Manual. See: Configuring the Wireless Network in Chapter 13 of the of the Basic User Manual. Configure as required by the site IT department.</p>	 <p>The 'New Wireless Network Properties' dialog box shows 'Network Name (SSID)' as an empty text field and 'Security Type' as 'WPA2-Personal'. A red note at the bottom states: 'Please enter correct SSID and security type for this network - then you can edit all settings. NOTE: If you encounter problems saving or connecting, please remove the old settings and create new settings with correct SSID and security type.'</p> <p>The 'bluessoo Wireless Network Properties' dialog box shows 'Name' and 'SSID' as 'bluessoo', 'Network type' as 'Access point', and 'Network availability' as 'All users'. It has three checked options: 'Connect automatically when this network is in range', 'Look for other wireless networks while connected to this network', and 'Connect even if the network is not broadcasting its name (SSID)'. There are 'OK' and 'Cancel' buttons at the bottom.</p> <p>The 'Protected EAP Properties' dialog box shows 'When connecting' with 'Verify the server's identity by validating the certificate' checked. Under 'Trusted Root Certification Authorities', several options are listed with checkboxes. Under 'Notifications before connecting', 'Don't ask user to authorize new servers or trusted CAs' is selected. Under 'Select Authentication Method', 'Secured password (EAP-MSCHAP v2)' is selected. There are 'OK' and 'Cancel' buttons at the bottom.</p>

8-10-5-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-5-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-5-6 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-120 WLAN Option replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-2-4	Power shut down	

8-10-6 GCW (CW Doppler) Replacement



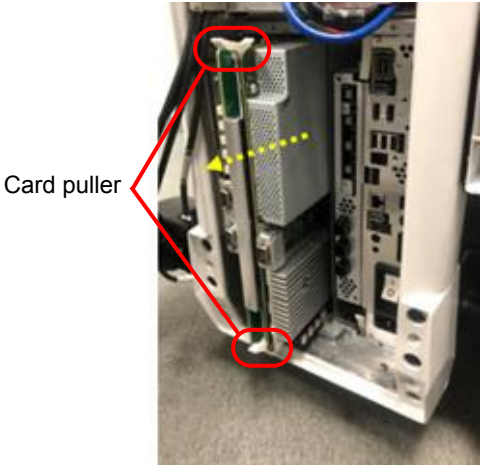
NOTE: The CW Doppler Option Collector Swallow replacement Kit includes all the hardware for the GCW PWA, replace all the hardware when the GCW PWA is replaced.

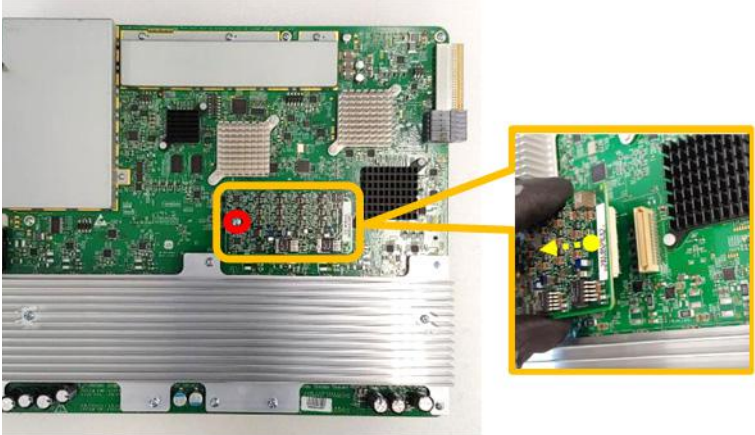
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-121 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-6-1 Replacement procedure

Step	Corresponding graphic
<p>1. Unscrew 5 screws to remove the rear cover.</p>	
<p>2. Remove the 9 screws securing the NEST EMI back bracket.</p>	
<p>3. Pull out DA192/DPI-L Board Assy. Use Card Puller to pull out. Place it on an ESD safe place.</p>	

Step	Corresponding graphic
4. Unscrew 1 screw (red circle) and remove the GCW PWA to the DA192 BOARD ASSY	
5. Replace CW Doppler Option Collector Swallow. Reinstall all parts and cover by reverse steps.	

8-10-6-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-6-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-6-4 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-122 GCW replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-15	CW Doppler mode functional checks	
4-3-14	PW/CW Doppler mode functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-10-7 Pedof CW Replacement




NOTE: The Pencil CW HW Kit Swallow replacement Kit includes all the hardware for the Pencil CW, replace all the hardware when the Pencil CW is replaced.

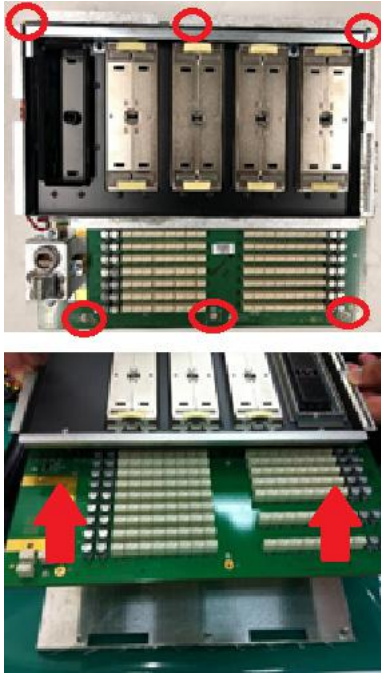
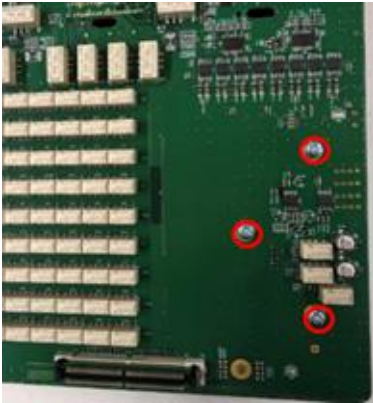
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-123 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-7-1 Replacement procedure

Step		Corresponding graphic
1.	Unscrew 5 screws to remove the rear cover.	
2.	Remove all cables and unscrew 9 screws securing the NEST EMI back bracket to remove.	
3.	<p>Pull out DA192/DPI-L Board Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	

Step		Corresponding graphic
4.	Unscrew 6 screws to disassemble DPI shield plate. Detach DPI-I boards from the shield plate.	
5.	Unscrew 3 screws to remove the CWD assy from the DPI-L Board assy.	
6.	Replace Pencil CW HW kit. Reinstall all parts and cover by reverse steps.	

8-10-7-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-7-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-7-4 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-124 GCW replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-15	CW Doppler mode functional checks	
4-3-14	PW/CW Doppler mode functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-10-8 DC4D Replacement




NOTE: The Realtime 4D Option Collector Swallow replacement Kit includes all the hardware for the Realtime 4D, replace all the hardware when the Realtime 4D is replaced


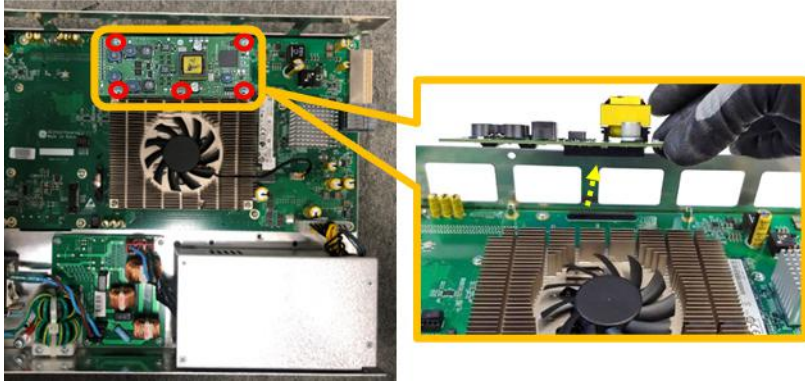
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-125 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-8-1 Replacement procedure

Step	Corresponding graphic
<p>1. Unscrew 5 screws to remove the rear cover.</p>	
<p>2. Remove all cables and unscrew 9 screws securing the NEST EMI back bracket to remove.</p>	
<p>3. Pull out the BEPS Assy. Use Card Puller to pull out. Place it on an ESD safe place.</p>	 <p>Card puller</p> <p>BEPS ASSY & SSD & SOM & GPU</p>

Step	Corresponding graphic
<p>4. Unscrew 14 screws to remove BEPS TOP PLATE.</p>	
<p>5. Unscrew 5 screws to remove the DC4D PWA.</p>	
<p>6. Replace DC4W PWA. Reinstall all parts and cover by reverse steps.</p>	

8-10-8-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-8-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-8-4 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-126 DC4D replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-1	Top console adjustment control functional checks	
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-23	4D option functional checks	
10-6-7	Grounding continuity	
10-6-8	Chassis leakage current test	
4-2-4	Power shut down	

8-10-9 VCS (S-Video) Replacement


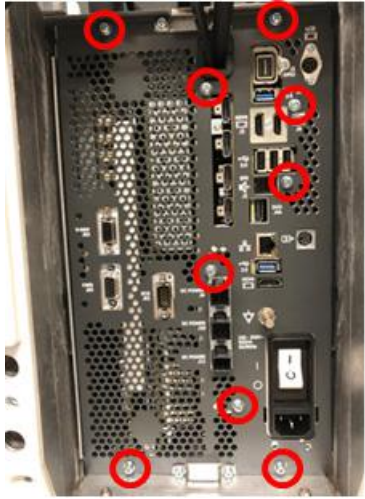

NOTE: The S-Video Option Collector Swallow replacement Kit includes all the hardware for the VCS (S-video), replace all the hardware when the VCS (S-video) is replaced


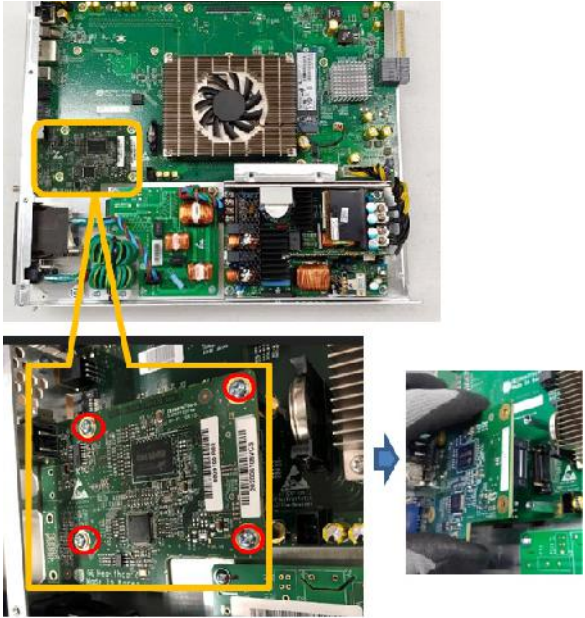
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-127 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-9-1 Replacement procedure

Step		Corresponding graphic
1.	Unscrew 5 screws to remove the rear cover.	
2.	Remove the 9 screws securing the NEST EMI back bracket.	
3.	<p>Pull out the BEPS Assy. Use Card Puller to pull out.</p> <p>Place it on an ESD safe place.</p>	 <p>Card puller</p> <p>BEPS ASSY & SSD & SOM & GPU</p>

	Step	Corresponding graphic
4.	Unscrew 14 screws to remove BEPS TOP PLATE.	
5.	Unscrew 4 screws to remove the VCS (S-Video).	
6.	Replace VCS (S-Video). Reinstall all parts and cover by reverse steps.	

8-10-9-2 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-9-3 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) If finished, connect cables and probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-9-4 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-128 DC4D replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
10-6-8	Chassis leakage current test	
	Attach the customer's S-Video device to the rear I/O. Confirm content displayed on the monitor mirrors content displayed on the main monitor of the LOGIQ Fortis. Confirm that the customer's S-Video device can record content displayed on the main monitor of the LOGIQ Fortis.	
4-2-4	Power shut down	

8-10-10 V-Nav Option Replacement






NOTE: The V Nav Option replacement includes all the hardware for the V Nav Option, replace all the hardware when the V Nav Option is replaced.

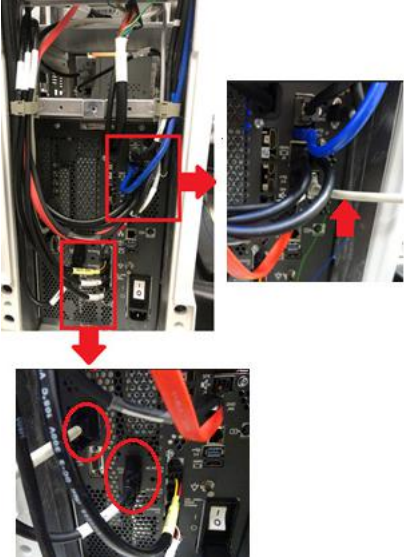



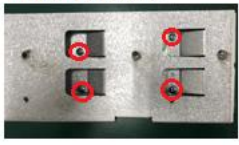



This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).


Table 8-129 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap


8-10-10-1 V-Nav on the Mid/High cabinet replacement




Step		Corresponding graphic
1.	Remove the Front Cover and Mid Cabinet Cover or High Cabinet Cover.	See 8-6-4 "Front Cover Replacement" on page 8-51 / 8-6-5 "Cabinet Cover Replacement" on page 8-53 .
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61 .
3.	Unscrew 4 screws to remove Dual 5inch Bay Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Mid Cabinet</p>  <p>Left side</p> </div> <div style="text-align: center;"> <p>High Cabinet</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Right side</p>  </div> <div style="text-align: center;">  </div> </div>
4.	Unscrew 4 screws to remove the Dual 5inch Bay Mid Cover	

Step		Corresponding graphic
5.	Remove V Nav cables.(V-Nav Power Cable, V-Nav Hdmi-D-Sub Cable, V-Nav Usb Cable)	
6.	Remove the Dual 5inch Bay Assy from Mid or High Frame Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Mid Cabinet</p>  <p>Mid Frame Assy</p> </div> <div style="text-align: center;"> <p>High Cabinet</p>  <p>High Frame Assy</p> </div> </div>
7.	Unscrew 5 screws to remove DriveBay2 Unit With Cables to Dual 5inch Bay Mid Bracket Assy or Dual 5inch Bay High Bracket Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Dual 5 inch Bay Mid Bracket</p>  <p>Left side</p> </div> <div style="text-align: center;"> <p>Dual 5 inch Bay High Bracket</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Right side</p>  </div> <div style="text-align: center;">  </div> </div> <p style="text-align: center;">Cable position</p>
8.	Disconnect the Cable-Tie to Dual 5inch Bay High Bracket Assy.	

Step		Corresponding graphic
9.	Remove V Nav cables.	
10.	Replace V Nav Option Assy. Re-install all parts and cover removed in reverse procedure.	

8-10-10-2 V-Nav on the side cabinet replacement

Step		Corresponding graphic
1.	Unscrew 3 screws to remove the Cabinet Rear Cover.	
2.	Unscrew 2 screws to remove the upper blind tray.	
3.	Cut the Cable-Tie.	

Step		Corresponding graphic
4.	Unscrew 5 screws to remove Option Tray 5-Inch Bay Assy.	<p>Left side</p>  <p>Right side</p> 
5.	Remove V Nav cables.	
6.	Replace V Nav Option Assy. Re-install all parts and cover removed in reverse procedure.	

8-10-10-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-10-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) Connect cables and probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Perform scans requiring V Nav module.

8-10-10-5 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-130 DC4D replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-7	Probe/connector functional checks	
4-3-8	B-Mode functional checks	
4-3-10	System CFM and PWD functional checks	
4-3-20	Basic measurement functional checks	
4-3-24	Volume Navigation with inside probe functional checks	
4-2-4	Power shut down	

8-10-11 VSIO (ECG) Option Replacement



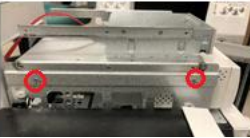


NOTE: The VSIO (ECG) Option replacement includes all the hardware for the VSIO, replace all the hardware when the VSIO is replaced.

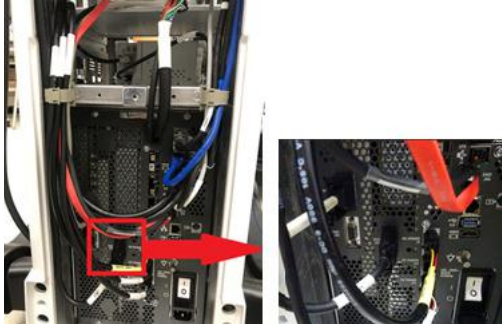



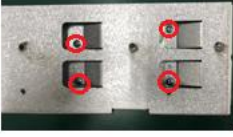


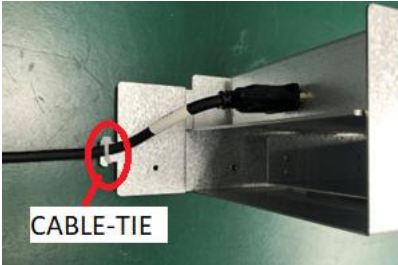
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#)/[8-2-7 "PPE Required During Service" on page 8-6](#)..


Table 8-131 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap





8-10-11-1 VSIO on the Mid/Highcabinet replacement


Step		Corresponding graphic
1.	Remove the Front Cover and Mid Cabinet Assy or High Cabinet Assy.	See 8-6-4 "Front Cover Replacement" on page 8-51 and 8-6-5 "Cabinet Cover Replacement" on page 8-53 .
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61
3.	Unscrew 4 screws to remove Dual 5inch Bay Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Mid Cabinet</p>  <p>Left side</p> </div> <div style="text-align: center;"> <p>High Cabinet</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">  <p>Right side</p> </div> <div style="text-align: center;">  </div> </div>
4.	Unscrew 4 screws to remove the Dual 5inch Bay Mid Cover	

Step		Corresponding graphic
5.	Disconnect ECG cable.	
6.	Remove the Dual 5inch Bay Assy from Mid or High Frame Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p data-bbox="954 604 1101 632">Mid Cabinet</p>  <p data-bbox="946 856 1146 884">Mid Frame Assy</p> </div> <div style="text-align: center;"> <p data-bbox="1268 604 1414 632">High Cabinet</p>  <p data-bbox="1252 856 1451 884">High Frame Assy</p> </div> </div>
7.	Unscrew 5 screws to remove DriveBay2 Unit With Cables to Dual 5inch Bay Mid Bracket Assy or Dual 5inch Bay High Bracket Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p data-bbox="1003 928 1187 989">Dual 5 inch Bay Mid Bracket</p>  <p data-bbox="927 1031 987 1092">Left side</p> </div> <div style="text-align: center;"> <p data-bbox="1247 928 1430 989">Dual 5 inch Bay High Bracket</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p data-bbox="911 1199 987 1260">Right side</p>  </div> <div style="text-align: center;">  </div> </div> <p data-bbox="1105 1304 1279 1331" style="text-align: center;">Cable position</p>
8.	Disconnect the Cable-Tie to Dual 5inch Bay High Bracket Assy.	 <p data-bbox="1019 1570 1154 1598" style="text-align: center;">CABLE-TIE</p>

Step		Corresponding graphic
9.	Remove VSIOcables.	
10.	Replace VSIO Option. Re-install all parts and cover removed in reverse procedure.	

8-10-11-2 VSIO on the side cabinet replacement

Step		Corresponding graphic
1.	Unscrew 3 screws to remove the Cabinet Rear Cover.	
2.	Unscrew 2 screws to remove the upper blind tray.	
3.	Unscrew 5 screws to remove Option Tray 5-Inch Bay Assy.	<p>Left side</p>  <p>Right side</p> 

Step		Corresponding graphic
4.	Remove VSIO cable.	
5.	Replace VSIO Option Assy. Re-install all parts and cover removed in reverse procedure.	

8-10-11-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-11-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) Connect cables and probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Perform and record a scan, and play back to confirm proper ECG operation.

8-10-11-5 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-132 DC4D replacement Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
4-3-14	PW/CW Doppler mode functional checks	
10-6-9	System CFM and PWD functional checks	
10-6-10	Basic measurement functional checks	
10-6-11	Volume Navigation with inside probe functional checks	
4-3-22	<p style="text-align: center;">ECG functional checks</p> Utility->Applications->Settings->ECG->Show ECG tools. Connect cables. Press Display ECG tab on Touch Panel. Verify ECG signal displayed on the monitor. Plug in the ECG cables with nothing attached so they pick up noise.	
4-2-4	Power shut down	





8-10-12 Option Tray Replacement

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#).

Table 8-133 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad

8-10-12-1 Removal procedure

Steps	Corresponding Graphic
1. Loosen a screw (1) to remove OPTION TRAY.	 
2. Unscrew 5 screws to remove the rear cover.	
3. Unscrew 1 screw to remove the TRAY HOLDING BRKT.	 

8-10-12-2 Installation

Parts to be installed in reverse order of removal.

8-10-12-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-12-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.

8-10-12-5 Functional Check

Visual inspection only.

8-10-13 BW Printer Replacement





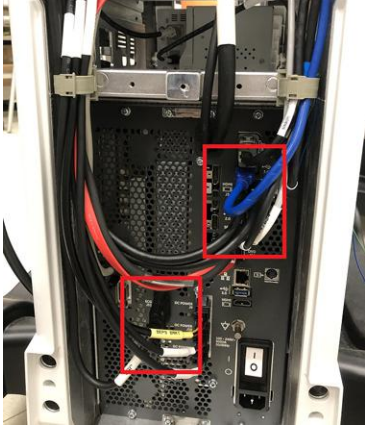



NOTE: The Black and White Printer replacement includes all the hardware for the Black and White Printer, replace all the hardware when the Black and White Printer is replaced.

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#)/[8-2-7 "PPE Required During Service" on page 8-6](#)..

Table 8-134 Manpower, Time, Tools, and PPE


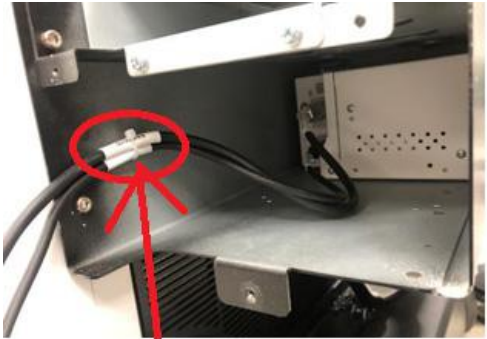

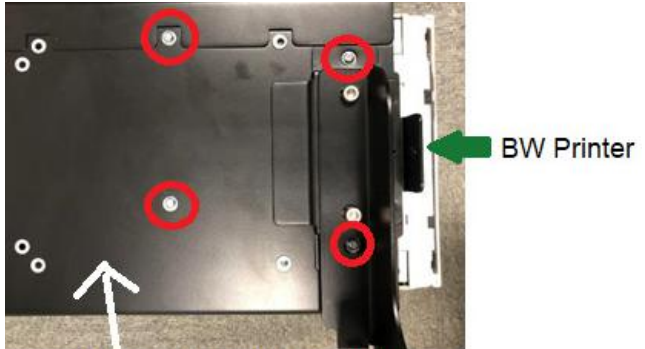
Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

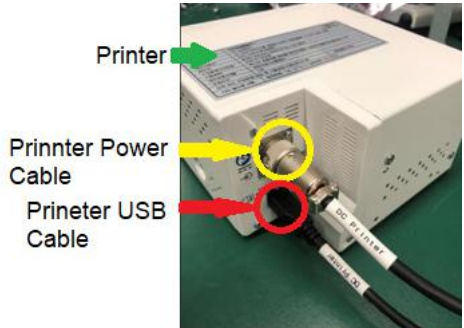
8-10-13-1 BW Printer on Mid/High Cabinet Replacement procedure

Step		Corresponding graphic
1.	Remove the Front Cover and Mid Cabinet Cover or High Cabinet Cover.	See 8-6-4 "Front Cover Replacement" on page 8-51 8-6-5 "Cabinet Cover Replacement" on page 8-53.
2.	Unscrew 5 screws to remove the rear cover.	See 8-6-8 "Rear Cover Replacement" on page 8-61.
3.	Unscrew 4 screws to remove BW Printer Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Mid Cabinet</p>  <p>Left side</p> </div> <div style="text-align: center;"> <p>High Cabinet</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Right side</p>  </div> <div style="text-align: center;">  </div> </div>
4.	Disconnect BW Printer cables.(Dc Bw Pr Power Cable, Bw Printer USB Cable)	
5.	Remove the BW Printer Assy from Mid or High Frame Assy.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>MID Cabinet</p>  </div> <div style="text-align: center;"> <p>High Cabinet</p>  </div> </div>
6.	Remove BW Printer cables.	

Step		Corresponding graphic
7.	Replace BW Printer Assy. Re-install all parts and cover removed in reverse procedure.	

8-10-13-2 BW Printer on Side Cabinet Replacement procedure

Step		Corresponding graphic
1.	Unscrew 3 screws (RED CIRCLE) and remove the SIDE CABINET REAR.	
2.	Disconnect the Cable-tie..	 <p>Cable-Tie</p>
3.	Pull out the LOWER BLIND TRAYS.	
4.	Unscrew 4 screws to remove BW Printer assy. NOTE: The graphic right shows from bottom side.	 <p>Bottom of the Side Cabinet</p> <p>BW Printer</p>

Step		Corresponding graphic
5.	Remove BW Printer cables.	
6.	Replace BW Printer Assy. Re-install all parts and cover removed in reverse procedure.	

8-10-13-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-13-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-13-5 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-135 Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
	Print by BW Printer	
4-2-4	Power shut down	

8-10-14 DVD Drive Replacement


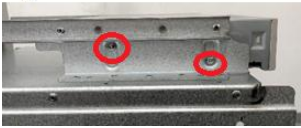
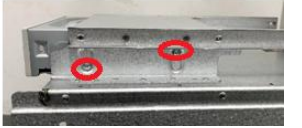
NOTE: The DVD R/W drive replacement Kit includes all the hardware for the DVD R/W drive, replace all the hardware when the DVD R/W drive is replaced.

This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#)/[8-2-7 "PPE Required During Service" on page 8-6](#)..

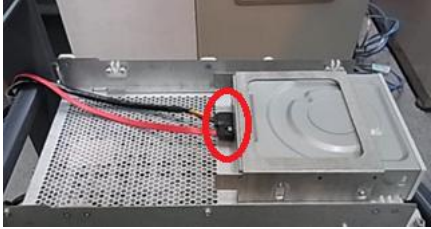



Table 8-136 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-14-1 DVD Drive on Mid/Hight Cabinet Replacement procedure

Step		Corresponding graphic
1.	Remove the Front Cover and Mid Cabinet Cover or High Cabinet Cover.	See 8-6-4 "Front Cover Replacement" on page 8-51 8-6-5 "Cabinet Cover Replacement" on page 8-53 .
2.	Remove cables from DVD drive.	
3.	Unscrew 4 screws to remove DVD Drive assy to remove DVD Drive.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Right side</p>  </div> <div style="text-align: center;"> <p>Left side</p>  </div> </div>
4.	Replace DVD Drive. Re-install all parts and cover removed in reverse procedure.	

8-10-14-2 DVD Drive on Low Cabinet Replacement procedure

Step		Corresponding graphic
1.	Remove the Front Cover and Low Cabinet Cover.	See 8-6-4 "Front Cover Replacement" on page 8-51 8-6-5 "Cabinet Cover Replacement" on page 8-53.
2.	Remove cables from DVD drive.	
3.	Unscrew 4 screws to remove DVD Drive Assy.	
4.	Unscrew 4 screws to remove DVD Drive Assy to remove DVD Drive.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Right side</p>  </div> <div style="text-align: center;"> <p>Left side</p>  </div> </div>
5.	Replace DVD Drive. Re-install all parts and cover removed in reverse procedure.	

8-10-14-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-14-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.
- 2.) Connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

8-10-14-5 Functional Check

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 8-137 Functional Checks

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	Equipment passed all required checks and is ready for use.
4-3-8	B-Mode functional checks	
	Burn the data to media	
4-2-4	Power shut down	

8-10-15 V-Nav Roll Stand assembly and replacement

The purpose of this section is to describe assembly or replacement of the V Nav roll stand assembly.

NOTE: Be sure the wheels on the roll stand are not locked and move the roll stand slowly, with caution to avoid tip over. DO NOT move with the arm extended.

NOTE: The roll stand basket is designed to hold the transmitter, which weighs about five pounds (2.27 kg). DO NOT overload the basket.

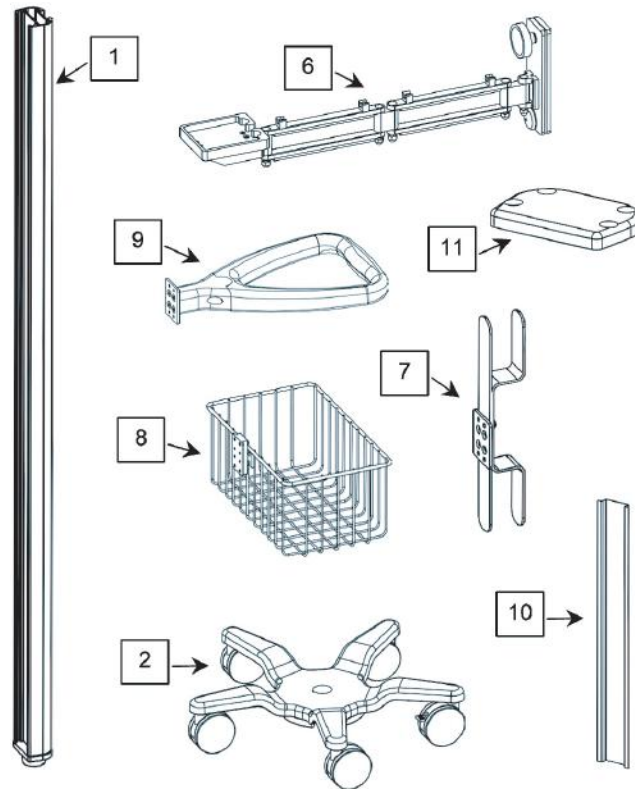
This table includes information specific to these instructions. For more information, see [8-2-6 "Tools needed for servicing the LOGIQ Fortis" on page 8-5](#) / [8-2-7 "PPE Required During Service" on page 8-6](#)..

Table 8-138 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	1/2 inch socket wrench 3/32 inch hex wrench 1/8 inch hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

8-10-15-1 Parts Reference - Roll Stand
Parts reference for the roll stand assembly

Figure 8-6 Volume Navigation Roll Stand Installation Kit



8-10-15-1 Parts Reference - Roll Stand (cont'd)

The following parts and hardware are included with this installation kit (hardware not shown):

Table 8-139 Volume Navigation Roll Stand Installation Kit - Parts Reference

Item #	Description	Quantity
1	Roll Stand Post, 60 inches	1
2	Roll Stand Base with 21-lb. Counterweight	1
3	5/16-18 x 1 inch Hex Head Cap Screw (HHCS)	1
4	5/16 Flat Washer	1
5	5/16 Split Lock Washer	1
6	GE Volume Navigation Arm	1
7	Cord Loop Hook	1
8	Utility Basket	1
9	Handle	1
10	Track Cover, 12 inches	3
11	Cover Plate	1
not shown	1/4-20 x 3/8 inch Socket Head Cap Screw (SHCS)	4
not shown	1/2 inch Socket Wrench	1
not shown	3/16 inch hex wrench	1
not shown	3/32 inch hex wrench	1
not shown	1/8 inch hex wrench	1

8-10-15-2 Assembling or replacing the Roll Stand Roll stand assembly or replacement

Use these instructions to assembled or replace the Roll Stand.

- 1.) Insert the post in the base. The locator pin ensures correct alignment.

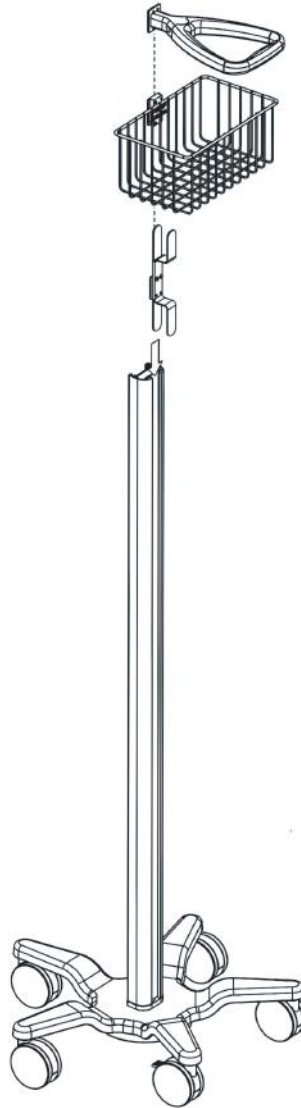
Figure 8-7 Post into Base - (1) 5/16 fLAT Washer, (2) 5/16 Lock Washer, (3) 5/16-18 x 1 inch Screw - Roll Stand only



- 2.) Using the 1/2 inch socket wrench provided, fasten the post to the base with the hardware shown.

8-10-15-2 Assembling or replacing the Roll Stand (cont'd)

- 3.) Slide the cord loop hook, basket and handle into the rear channel in the order shown.

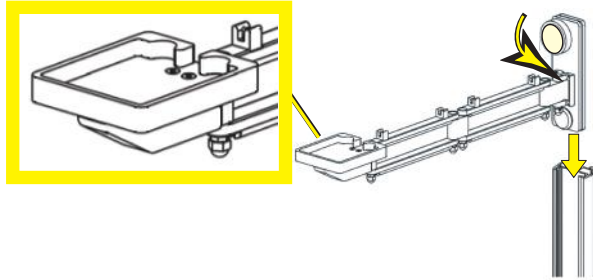
Figure 8-8 Post Assembly

- 4.) Using the hex wrenches provided, tighten all of the set screws in each accessory to secure the position in the track.
 - a.) Tighten the top four set screws with the 3/32 inch hex wrench.
 - b.) Tighten the center four set screws with the 1/8 inch hex wrench.
 - c.) Tighten the bottom two set screws with 3/32 inch hex wrench.

8-10-15-2 Assembling or replacing the Roll Stand (cont'd)

5.) Loosen the knob slightly, guide the arm into the channel and move it to the mounting position.

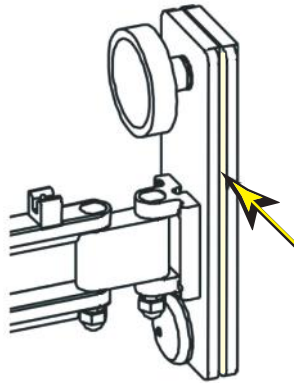
Figure 8-9 Loosening Knob



NOTE: Make sure the Transformer Support Platform (larger view) is installed in the UP position.

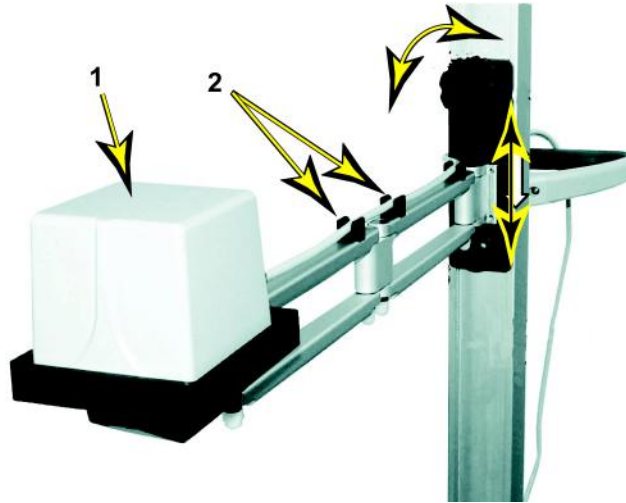
NOTE: The channel fits between the front and rear slide plates.

Figure 8-10 Channel Location



8-10-15-2 Assembling or replacing the Roll Stand (cont'd)

- 6.) Tighten the knob to lock the arm into position.
- 7.) Mount the transmitter (1) on the arm and route the cable through the cable clips (2) on the top side of the arm.

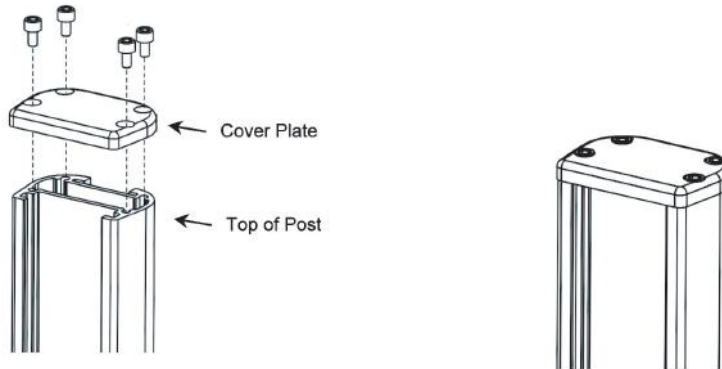
Figure 8-11 Cable Clips - Roll Stand only

- 8.) While supporting the arm (loaded with the transmitter), slowly loosen the knob which allows the arm to gradually move down the channel.

NOTE: *The arm must move down the channel very slowly when the knob is loosened, and it must move easily upward when the lifting arm is in the channel. If the arm free-falls or will not move, follow the adjustment procedure, see: [8-10-15-3 "Adjusting Tension on Sliding Mechanism" on page 8-268.](#)*

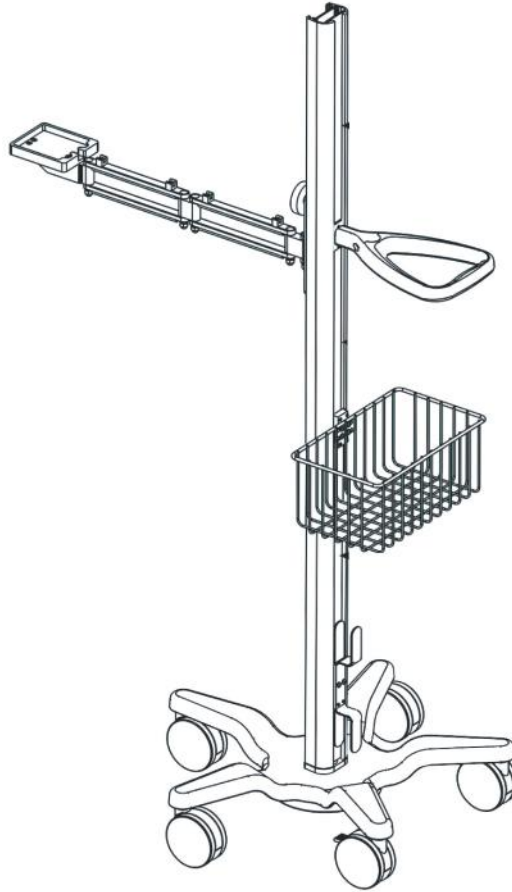
8-10-15-2 Assembling or replacing the Roll Stand (cont'd)

- 9.) Using the 3/16 inch hex wrench provided, fasten the cover plate to the top of the post with four (4) 1/4-20 x 3/8 inch SHCS as shown.

Figure 8-12 Cover Plate Installation

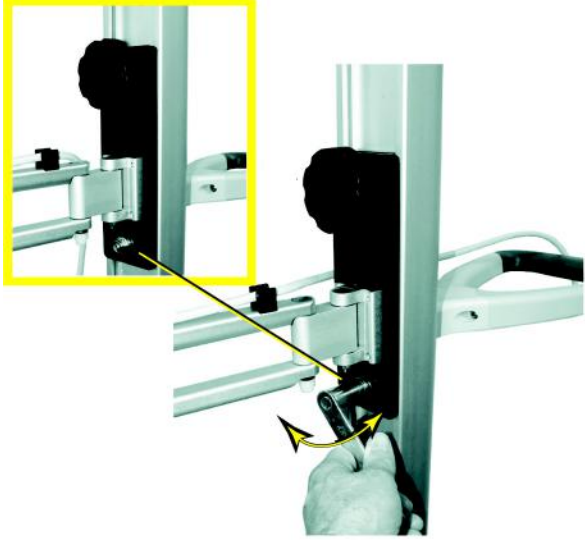
8-10-15-2 Assembling or replacing the Roll Stand (cont'd)

10.) Snap the three Rear Track Covers into place in locations shown.

Figure 8-13 Rear Track Covers Installation

8-10-15-3 Adjusting Tension on Sliding Mechanism

Table 8-140 Adjusting Tension on Sliding Mechanism

Steps		Corresponding Graphic
1.	<p>Remove the plastic bolt cap from the lower tension nut.</p> <p>The clamping knob must be unlocked while making this adjustment. Using the 1/2 inch socket wrench, loosen or tighten the tension nut for the desired tension.</p>	<p>Plastic Bolt Cap for tension nut and Unlocking Clamping Knob</p> 
2.	Perform Functional Checks.	

8-10-15-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

8-10-15-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that the screw that you removed earlier has been installed.

8-10-15-6 Functional Checks

Visually check.

Chapter 9

Renewal Parts

Section 9-1 Overview

9-1-1 Purpose of this chapter

This chapter provides an overview of the available spare parts for the LOGIQ Fortis and probes that may be used with the LOGIQ Fortis.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.

9-1-2 Contents in this chapter

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Section 9-2

List of Abbreviations

Table 9-1 List of Abbreviations

ABBREVIATION	DESCRIPTION
3D	THREE DIMENSIONAL (See RT3D and 4D)
4D	FOUR DIMENSIONAL IS THE SAME AS THREE DIMENSIONAL + REALTIME
ACP	AC CONTROLLER (AC POWER)
ACT	AC TRANSFORMER
ASSY	ASSEMBLY
CRU	Customer Replacement Unit
CTRL	CONTROL
EXT.	EXTERNAL
FRU Y	REPLACEMENT PART
FRU N	NON STOCK PART
I/O	INPUT/OUTPUT
INT	INTERNAL
LCD	LIQUID CRYSTAL DISPLAY
OP	OPERATOR PANEL
PC	PERSONAL COMPUTER (Back End Processor)
PS	POWER SUPPLY
PWA	PRINTED WIRE ASSEMBLY
QTY	QUANTITY USED PER SCANNER
RT3D	REAL TIME THREE DIMENSIONAL (Same as 4D)
RX	RECEIVER
SWAVE	SHEAR WAVE ELASTOGRAPHY
TX	TRANSMITTER
XFRMR	TRANSFORMER
CW	CONTINUOUS DOPPLER
ECG	ELECTRO CARDIO GRAPHY

**Section 9-3
Parts List Groups**

Table 9-2 Parts Groups

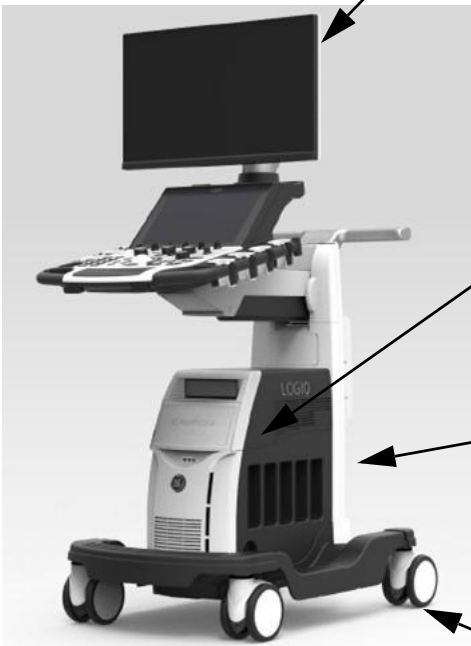
		Top Console Parts (Monitor, Monitor Arm, Operator Panel)	
Software			Options
Mains Power Cables			
Internal Cables			Covers
Main Console Parts			Back End Parts
Supported Probes	Product Labels on LOGIQ Fortis and Consoles Used in a Veterinary Environment		Casters (Wheels) Parts

Table 9-3 Parts List Groups

TABLE NO.	DESCRIPTION	PAGE NUMBER
Table 9-5	Software	9-4
Table 9-6	Covers	9-5
Table 9-7	Mechanical Parts	9-7
Table 9-8	Top Console Parts	9-8
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Table 9-10	Casters (Wheels) Parts	9-12
Table 9-11	Back End Parts	9-14
Table 9-12	Mains Power Cables	9-16
Table 9-13	Internal Cables	9-18
Table 9-14	Supported Probes	9-20
Table 9-15	Options	9-25
Table 9-16	Product Labels	9-30

Section 9-4 LOGIQ Fortis Model


Table 9-4 LOGIQ Fortis Model

MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
6601000	LOGIQ Fortis LCD monitor CONSOLE, 100-240 VAC	R3.x.x
6602000	LOGIQ Fortis HDU Display CONSOLE, 100-240 VAC	R3.x.x

Section 9-5 Software

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-5 LOGIQ Fortis Software

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5863164-2	LOGIQ Fortis, R3.1.0 Software Thumb Drive Assembly		1	Y	N

Section 9-6 Covers

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).




Table 9-6 Covers - LOGIQ Fortis 1 of 3

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5412187-10	SIDE COVER R DLP ASSY		1	Y	N
5405169-10	SIDE COVER L ASSY Plastic, w/ cap		1	Y	N
5722797-10	FRONT COVER ASSY		1	Y	Y
5859038	HIGH CABINET ASSY		1	Y	N

Table 9-6 Covers - LOGIQ Fortis 2 of 3 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5722798-10	MID CABINET ASSY		1	Y	N
5859041	LOW CABINET ASSY		1	Y	N
5859042	SIDE CABINET INSTALLATION KIT		1	Y	N
5857692	REAR COVER ASSY		1	Y	N
5725244	DUMMY COVER SET Plastics, BW PRT Bezel, Dummy for Mid and High Cabinets		1	Y	Y
5726078	BASE COVER SET		1	Y	N

Table 9-6 Covers - LOGIQ Fortis 3 of 3 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5768155	BACKBONE REAR COVER LCF		1	Y	N
5773476	BACKBONE FRONT COVER SET LCF		1	Y	N
S5862492	ELEVATION ARM COVER SET		1	Y	N

**Section 9-7
Mechanical Parts**

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-7 Mechanical Parts

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5721896-2	HANDLE VS BT16 -2		1	Y	N

Section 9-8 Top Console Parts

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-8 Top Console Parts 1 of 4

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
S5957000-150	LCD ARM WITH CABLE ASSY Include HDMI cable for Upper OPIO to Monitor Monitor USB 2.0 cable Monitor Power Cable CABLE-TIE, DACT-100A		1	Y	N
5957000-1	LCD Arm Plastic Covers (Ergotron Arm)		1	Y	N
5857693	OPIO TOP COVER w/ USB3 2port PWA		1	Y	N
8501560-20	Ultrasound bezelless 23.8inch LCD monitor V2.0		1	Y	N
5874481	MONITOR CABLE COVER LCD		1	Y	N

Table 9-8 Top Console Parts 2 of 4 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5860239-40	HDU Display 23 inch GI		1	Y	N
5861127-20	Symmetric cable cover USB for HDU Monitor 23.8 inch		1	Y	N
5848184	Upper OPIO		1	Y	N
5848185	Lower OPIO		1	Y	N
5862480	OPIO Lower Main PWA Assy w/ Elastomers, Encoder 4pcs and Joystick 9pcs		1	Y	N
5862481	OPIO Laser Trackball Assy with cable		1	Y	N

Table 9-8 Top Console Parts 3 of 4 (Continued)







PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5862482	OPIO Button Sets		1	Y	N
5862483	OPIO Function key set		1	Y	N
5862484	OP Mode select Encoder 4pcs		1	Y	N
5862485	OPIO Joystick with KNOB		1	Y	N
S5862501	OPIO Lower Plastic set LOWER BEZEL, ROTATE BUTTON, UP DOWN BUTTON and BOTTOM BASE BACK COVER		1	Y	N
5862473	EXT HUB BOARD ASSY		1	Y	N




Table 9-8 Top Console Parts 4 of 4 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
S5862493	Probe Holder set		1	Y	N
5692044-10	Gel Warmer		1	Y	N
5692045	Gel Warmer Cap		1	Y	Y
5730659	OPIO-FRONT_HOOK R3		1	Y	N

Section 9-9 Main Console Parts

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-9 Main Console Parts

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5774085	ELEVATION ARM ASSY LCF		1	Y	N
5871123	Metal Air Filter Assy		1	Y	N
5393433	DVD Drive		1	Y	N

Section 9-10 Casters (Wheels) Parts

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-10 Casters (Wheels) Parts 1 of 2

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5746120	CASTOR TOTAL LOCK N9 except swivel lock caster (3 per console)		1	Y	N

Table 9-10 Casters (Wheels) Parts 2 of 2 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5746121	CASTOR DUAL LOCK N9 Rear-Right caster (1 per console)		1	Y	N

Section 9-11 Back End Parts

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-11 Back End Parts 1 of 2








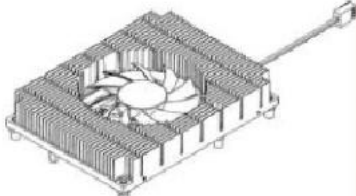
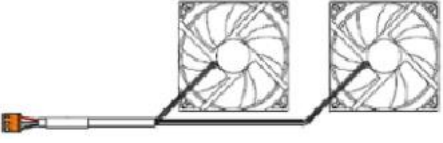


PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
8806600-2	DPI-L PWA		1	Y	N
5862486	DPI_L LIGHTING ASSY		1	Y	N
8804400-2	DA192 PWA		1	Y	N
8802200	GBP PWA		1	Y	N
8813300-10	BEPS2 ASSY		1	Y	N
5807260	GPU Quadro P4000 D5 8GB		1	Y	N

Table 9-11 Back End Parts 2 of 2(Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5173038	Lithium Coin Battery, CR2450		1	Y	N
5832284	1TB M.2 SSD		1	Y	N
5829291-2	I5 Coffeelake with 16GB Memory		1	Y	N
5808653	FAN ASSY		1	Y	N
5847676	CSI2 Assy with Cable		1	Y	N
5897133	BEPS RF absorber Assy		1	Y	N

Section 9-12 Mains Power Cables

Table 9-12 Mains Power Cables 1 of 2










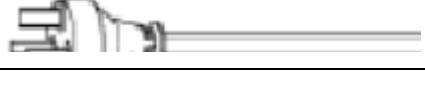







PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
6736114-3	Power Cord for Canada/USA		1	Y	N
6736107-3	Power Cord for UK		1	Y	N
6736112-3	Power Cord for South Africa		1	Y	N
6736101-3	Power Cord for Argentina		1	Y	N
6736109-3	Power Cord for Israel		1	Y	N
6736113-3	Power Cord for Switzerland		1	Y	N
6736115-3	Power Cord for Denmark		1	Y	N
6736106-12	PWR SPLY CRD ST DENMARK NON-HOSPITAL GRADE STD PLUG 10A 250V		1	Y	N
6736111-3	Power Cord for Japan/Taiwan		1	Y	N
6736102-3	Power Cord for ANZ		1	Y	N
6736104-3	Power Cord for China		1	Y	N
6736108-3	Power Cord for India		1	Y	N

Table 9-12 Mains Power Cables 2 of 2 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
6736110-3	Power Cord for Italy		1	Y	N
6736103-3	Power Cord for Brazil		1	Y	N
6736105-3	Power Cord for EU/Korea		1	Y	N
6736106-12	PWR SPLY CRD ST DENMARK NONHOSPITAL GRADE STD PLUG 10A 250V		1	Y	N
5858676	Power Cord FIX BRKT		1	Y	N

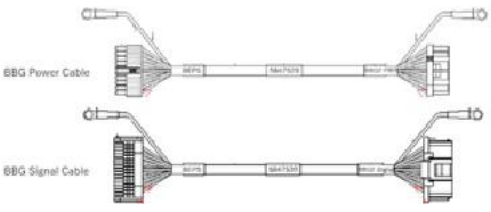

Section 9-13 Internal Cables

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-13 Internal Cables 1 of 2

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
S5862494	Peripheral Cable set includes 6581979 New ODD SATA Cable 5856945 ODD PWR Cable 5847625 DC Printer PWR cable 5847626 DC Printer USB cable 5847623 VSIO Cable 5847531 DC Branch Output Cable T1 5808343 DC Output Cable		1	Y	N
5847525	User Port USB3.0 Cable		1	Y	N
5863728	Lower OPIO CABLE		1	Y	N
S5862498	Upper OPIO Cable set includes 5845730 OPIO Upper Touch HDMI 5845730-2 OPIO Upper Monitor HDMI 5845731 USB 3.0 cable for Upper OPIO 5847522 OPIO Upper Power Cable		1	Y	N
5860519	Single Speaker with Cable Assembly		1	Y	N
S5862500	BEP Cable Set includes 5847527 TDK ACDC input Cable 5847627 TDK ACDC Output Cable 5808347 GPU PWR Cable 5808346 MONITOR PWR Cable		1	Y	N
S5862496	VNAV Option Cable Set includes 5847622 VNAV PWR cable 5802718 VNAV HDMI cable 5847624 VNAV USB cable		1	Y	N

Table 9-13 Internal Cables 2 of 2 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
S5862497	Battery Option Cable set includes 5847529 BBG2 Power Cable 5847530 BBG2 Signal Cable	 <p>The diagram shows two cables. The top cable is labeled 'BBG2 Power Cable' and has a multi-pin connector on the left and a multi-pin connector on the right. The bottom cable is labeled 'BBG2 Signal Cable' and has a multi-pin connector on the left and a multi-pin connector on the right.</p>	1	Y	N
5847621	AN Keyboard cable	 <p>The diagram shows a single cable labeled 'Drawer AN Keyboard cable'. It has a multi-pin connector on the left and a multi-pin connector on the right.</p>	1	Y	N

**Section 9-14
Probes**

Table 9-14 Supported Probes 1 of 5

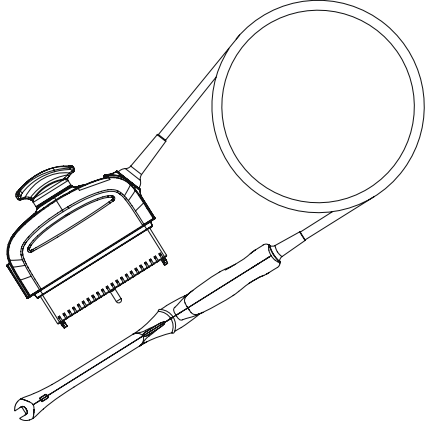
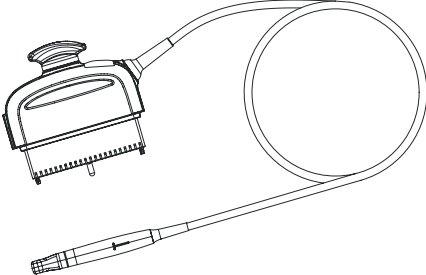
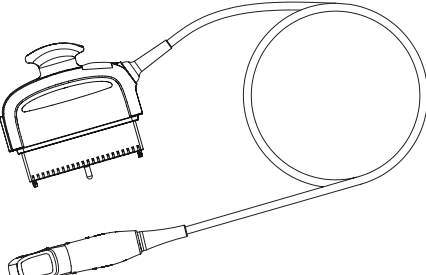
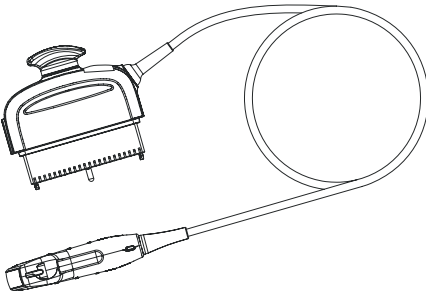
PROBE	PART NUMBER	Description
IC5-9-D	5499592	 <p>A line drawing of the IC5-9-D probe. It features a rectangular base with a handle on top and a multi-pin connector on the front. A long, thin cable extends from the base, ending in a specialized probe tip. A circular loop is drawn around the cable to indicate its length.</p>
L8-18i-D	5499594	 <p>A line drawing of the L8-18i-D probe. It has a similar design to the IC5-9-D, with a rectangular base, a handle, and a multi-pin connector. The cable is longer, and the probe tip is more complex. A circular loop is drawn around the cable.</p>
<p>C2-9-D * Need H46612LS Advanced Probe option to activate.</p>	5499605	 <p>A line drawing of the C2-9-D probe. It features a rectangular base with a handle and a multi-pin connector. The cable is long, and the probe tip is specialized. A circular loop is drawn around the cable.</p>
<p>C1-6-D * Need H46612LS Advanced Probe option to activate.</p>	5499606	 <p>A line drawing of the C1-6-D probe. It has a rectangular base with a handle and a multi-pin connector. The cable is long, and the probe tip is specialized. A circular loop is drawn around the cable.</p>

Table 9-14 Supported Probes 2 of 5 (Continued)

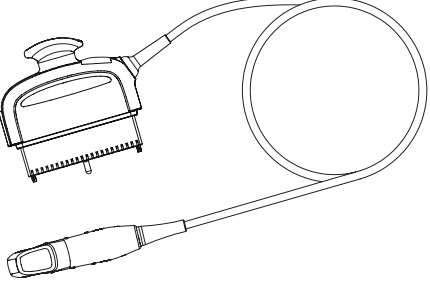
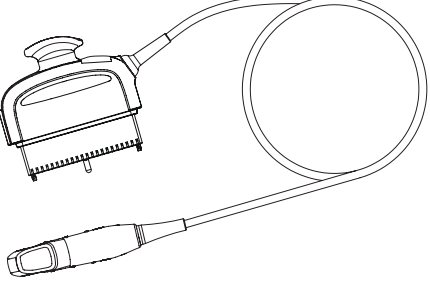
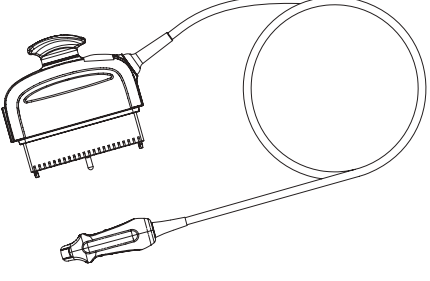
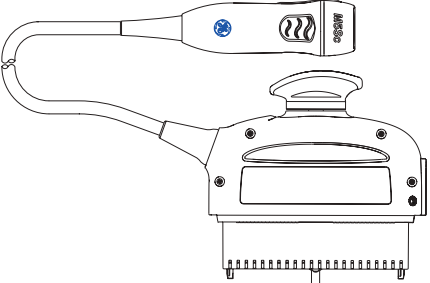
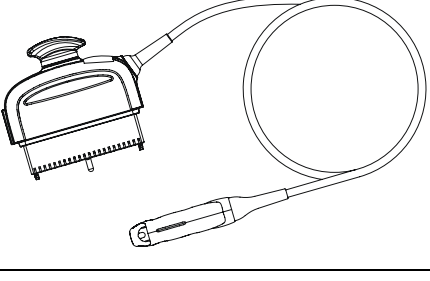
PROBE	PART NUMBER	Description
<p>C1-6VN-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5476279</p>	
<p>C2-9VN-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5488219</p>	
<p>C3-10-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5493012</p>	
<p>M5Sc-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5446030</p>	
<p>ML6-15-D</p>	<p>5499600</p>	

Table 9-14 Supported Probes 3 of 5 (Continued)


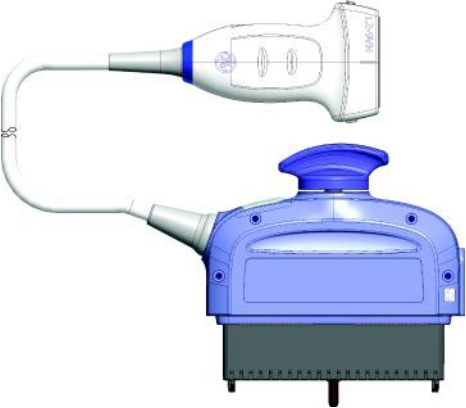

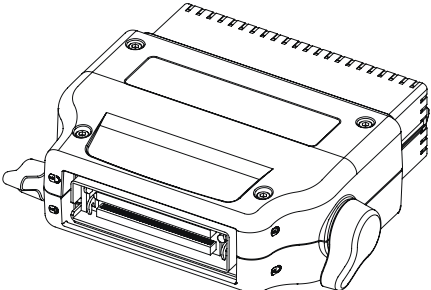
PROBE	PART NUMBER	Description
<p>L2-9-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5765796</p>	
<p>L2-9VN-D * Need H46612LS Advanced Probe option to activate.</p>	<p>5765797</p>	
<p>6Tc-RS</p>	<p>5729431</p>	<p>Included with H46402LW</p> 
<p>RS-DLP Adapter</p>	<p>5444874</p>	<p>Included with H46402LW to be used with H45551ZE</p> 

Table 9-14 Supported Probes 4 of 5 (Continued)


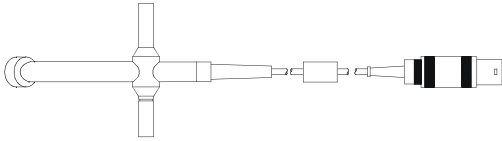
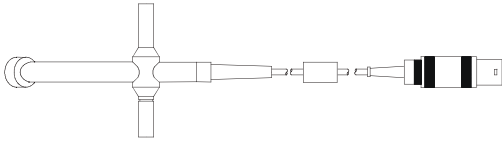
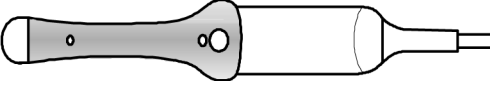



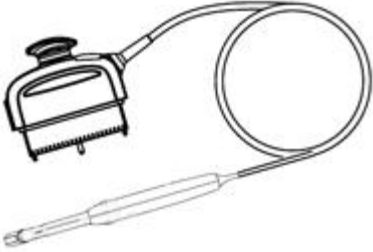

PROBE	PART NUMBER	Description
C2-7-D	5505700	
C2-7VN-D	5505701	
P2D	5729434	
P6D	5729437	
RIC5-9-D	KTZ303987	
RAB6-D	KTZ303986	
6S-D	5499318	
L3-12-D	5482856	

Table 9-14 Supported Probes 5 of 5 (Continued)

PROBE	PART NUMBER	Description
BE9CS-D	5535371	
L6-24-D	5833059	

Section 9-15 Options

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-15 Options 1 of 5



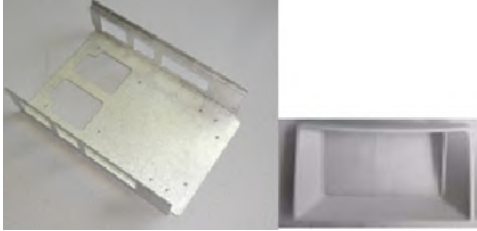


PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5859061	AN KEYBOARD ASSY		1	Y	N
5863206	AN KEYBOARD ASSY Greek		1	Y	N
5863207	AN KEYBOARD ASSY Norwegian		1	Y	N
5863208	AN KEYBOARD ASSY Russian		1	Y	N
5863209	AN KEYBOARD ASSY French		1	Y	N
5863210	AN KEYBOARD ASSY Swedish		1	Y	N
5863211	AN KEYBOARD ASSY German		1	Y	N
5535200	SONY UP-D898DC black and white thermal printer for ultrasound		1	Y	N
5863205	BW Printer Installation Kit		1	Y	N
5859053	Option 5inch bay installation kit		2	Y	N
164L0025	ECG Cable Adult, AHA		1	Y	Y

Table 9-15 Options 2 of 5 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
164L0026	ECG CABLE, IEC		1	Y	Y
5808900-2	4S2P Battery Pack		1	Y	N
5307472-2	PROBEHOLDER INSERT FOR 4D PROBE- - Onyx Black		1	Y	Y
5861624	Small Probe Holder		1	Y	Y
5172249	CABLE HANGER ASSY_4 CABLE		1	Y	Y
5873732	TVTR Probe Holder		1	Y	Y




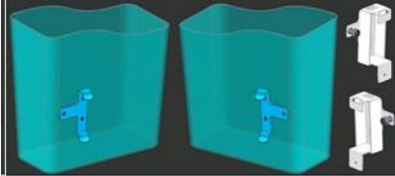
Table 9-15 Options 3 of 5 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5859083	VERTICAL TV PROBE HOLDER		1	Y	N
5763696	HP Officejet Pro 8210 Printer		1	Y	Y
5459862	DriveBay2+ (System Electronics Unit)		1	Y	N
5457453	V Nav, Drive Bay 3D Tracking System Mid Range Transmitter Assembly		1	Y	N
5380960-2	3 button footswitch		1	Y	Y
5268740	Stand for Tru3D Transmitter		1	Y	Y
8805500	DC4D PWA		1	Y	N

Table 9-15 Options 4 of 5 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5832804	WIFI MODULE ASSY		1	Y	N
5815323	VSIO ASSY		1	Y	N
5859045	Pencil CW HW Kit		1	Y	N
8807700	GCW PWA		1	Y	N
8809100-2	VCS PWA		1	Y	N
5863240	Battery Installation kit BATTERY PACK BRKTS w/ Charge and Control PWA		1	Y	N






Table 9-15 Options 5 of 5 (Continued)

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5389822	SONY UP-D25MD		1	Y	N
5555266	SONY UP-DR80MD		1	Y	N
5863421	Ethernet protection cable		1	Y	Y
5873734	OPTION TRAY WITH BRKT ASSY		1	Y	N

Section 9-16 Product Labels

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 9-16 Product Labels on LOGIQ Fortis and Consoles Used in a Veterinary Environment

PART NUMBER	PART NAME	DESCRIPTION	QTY	FRU	CRU
5858168	MULTI CAUTION LABEL		1	Y	N
2112014-5	GE CARE_SYSTEM ID LABEL		1	Y	N
5790735	Label - Vet Side Covers		2	Y	N
5723475	AFU Vet Safety Label		1	Y	N
S5848344	Power Assistant and Label Set		1	Y	N
5878742	5878742 MULTI CAUTION LABEL T1 CHINA		1	Y	N

Section 9-17

LOGIQ Fortis Master FRU List Compatibility Chart

Table 9-17 lists software-dependent configuration compatibility.

Table 9-17 LOGIQ Fortis FRUs

Part Group	Part Number	Description	Replace with	R3
Covers	5412187-10	SIDE COVER L ASSY	N/A	Y
	5405169-10	SIDE COVER LDLP ASSY	N/A	Y
	5722797-10	FRONT COVER ASSY	N/A	Y
	5859038	HIGH CABINET ASSY	N/A	Y
	5722798-10	MID CABINET ASSY	N/A	Y
	5859041	LOW CABINET ASSY	N/A	Y
	5859042	SIDE CABINET INSTALLATION KIT	N/A	Y
	5857692	REAR COVER ASSY	N/A	Y
	5725244	DUMMY COVER SET	N/A	Y
	5726078	BASE COVER SET	N/A	Y
	5768155	BACKBONE REAR COVER LCF	N/A	Y
	5773476	BACKBONE FRONT COVER SET LCF	N/A	Y
	S5862492	ELEVATION ARM COVER SET	N/A	Y
Mechanical Parts	5721896-2	Rear handle	N/A	Y
Top Console Parts	S5957000-150	LCD ARM with cable assy	N/A	Y
	5957000-1	LCD Arm Plastic Covers (Ergotron Arm)	N/A	Y
	5857693	OPIO TOP COVER	N/A	Y
	8501560-20	Bezelless 23.8inch LCD monitor V2.0	N/A	Y
	5474481	Monitor Cable Cover LCD	N/A	Y
	5860239-40	HDU Monitor 23 inch GI	N/A	Y
	5861127-20	Symmetric cable cover USB for HDU Monitor 23.8 inch	N/A	Y
	5848184	Upper OPIO	N/A	Y
	5848185	Lower OPIO	N/A	Y
	5862480	OPIO Lower Main PWA Assy	N/A	Y
	5862481	OPIO Laser Trackball Assy with cable	N/A	Y
	5862482	OPIO Button Sets	N/A	Y
	5862483	OPIO Function key set	N/A	Y
	5862484	OP Mode select Encoder 4pcs	N/A	Y
	5862485	OPIO Joystick with KNOB	N/A	Y

Table 9-17 LOGIQ Fortis FRUs (Continued)

Part Group	Part Number	Description	Replace with	R3
Top Console Parts	S5862501	OPIO Lower Plastic set	N/A	Y
	5862473	EXT HUB BOARD ASSY	N/A	Y
	S5862493	Probe Holder set	N/A	Y
	5692044-10	Gel Warmer	N/A	Y
	5692045	Gel Warmer Cap	N/A	Y
	5730659	OPIO-FRONT_HOOK R3	N/A	Y
Main Console Parts	5774085	ELEVATION ARM ASSY LCF	N/A	Y
	5871123	Metal Air Filter Assy	N/A	Y
	5393433	DVD Drive	N/A	Y
Casters parts	5746120	CASTOR TOTAL LOCK N9	N/A	Y
	5746121	CASTOR DUAL LOCK N9	N/A	Y
Back End parts	8806600-2	DPI-L PWA	N/A	Y
	5862486	DPI_L LIGHTING ASSY	N/A	Y
	8804400-2	DA192 PWA	N/A	Y
	8802200	GBP PWA	N/A	Y
	8813300-10	BEPS2 ASSY	N/A	Y
	5807260	GPU Quadro P4000 D5 8GB	N/A	Y
	5173038	Lithium Coin Battery, CR2450	N/A	Y
	5832284	1TB M.2 SSD	N/A	Y
	5829291-2	I5 Coffeelake with 16GB Memory	N/A	Y
	5808653	FAN ASSY	N/A	Y
	5847676	CSI2 Assy with Cable	N/A	Y
	5897133	BEPS RF absorber Assy	N/A	Y

Table 9-17 LOGIQ Fortis FRUs (Continued)

Part Group	Part Number	Description	Replace with	R3
Main Power Cables	6736115-3	Power Cord for Denmark	N/A	Y
	6736110-3	Power Cord for Italy	N/A	Y
	6736108-3	Power Cord for India	N/A	Y
	6736109-3	Power Cord for Israel	N/A	Y
	6736111-3	Power Cord for Japan/Taiwan	N/A	Y
	6736107-3	Power Cord for UK	N/A	Y
	6736101-3	Power Cord for Argentina	N/A	Y
	6736103-3	Power Cord for Brazil	N/A	Y
	6736102-3	Power Cord for ANZ	N/A	Y
	6736113-3	Power Cord for Switzerland	N/A	Y
	6736104-3	Power Cord for China	N/A	Y
	6736114-3	Power Cord 110V for Canada, USA	N/A	Y
Main Power Cables	6736105-3	Power Cord 220V for EU/Korea	N/A	Y
	6736112-3	Power Cord for South Africa	N/A	Y
	6736106-12	PWR SPLY CRD ST DENMARK NONHOSPITAL GRADE STD PLUG 10A 250V	N/A	Y
	5858676	POWER CORD FIX BRKT	N/A	Y
Internal Cable	S5862494	Peripheral Cable set	N/A	Y
	5847525	User Port USB3.0 Cable	N/A	Y
	5863728	Lower OPIO CABLE	N/A	Y
	S5862498	Upper OPIO Cable set	N/A	Y
	5860519	Single Speaker with Cable Assembly	N/A	Y
	S5862500	BEPS Cable set	N/A	Y
	S5862496	VNAV Option Cable Set	N/A	Y
	S5862497	Battery Option Cable set	N/A	Y
	5847621	AN Keyboard cable	N/A	Y

Table 9-17 LOGIQ Fortis FRUs (Continued)

Part Group	Part Number	Description	Replace with	R3
Options	5859061	AN KEYBOARD ASSY	N/A	Y
	5863206	AN KEYBOARD ASSY GREEK	N/A	Y
	5863207	AN KEYBOARD ASSY NORWEGIAN	N/A	Y
	5863208	AN KEYBOARD ASSY RUSSIAN	N/A	Y
	5863209	AN KEYBOARD ASSY FRENCH	N/A	Y
	5863210	AN KEYBOARD ASSY SWEDISH	N/A	Y
	5863211	AN KEYBOARD ASSY GERMAN	N/A	Y
	5535200	SONY UP-D898DC black and white thermal printer for ultrasound	N/A	Y
	5859060	BW Printer Installation Kit	N/A	Y
	5859053	Option 5inch bay installation kit	N/A	Y
	164L0025	ECG Cable Adult, AHA	N/A	Y
	164L0026	ECG CABLE, IEC	n/a	Y
	5808900-2	4S2P Battery Pack	n/a	Y
	5307472-2	PROBEHOLDER INSERT FOR 4D PROBE- - Onyx Black	n/a	Y
	5861624	Small Probe Holder	n/a	Y
	5172249	CABLE HANGER ASSY_4 CABLE	n/a	Y
	5873732	TVTR Probe Holder Assembly	n/a	Y
	5859083	VERTICAL TV PROBE HOLDER	n/a	Y
	5763696	HP Officejet Pro 8210 Printer	n/a	Y
	5459862	DriveBay2+ (System Electronics Unit)	n/a	Y
	5457453	V Nav. Drive Bay 3D Tracking System Mid Range Transmitter Assembly	n/a	Y
	5380960-2	3 button footswitch	n/a	Y
	5268740	Stand for Tru3D Transmitter	n/a	Y
	8805500	DC4D PWA	n/a	Y
	5832804	WIFI MODULE ASSY	n/a	Y
	5815323	VSIO ASSY	n/a	Y
	5859045	Pencil CW HW Kit	n/a	Y
	8807700	GCW PWA	n/a	Y
	8809100-2	VCS PWA	n/a	Y
	5863240	Battery Installation kit	n/a	Y
	5389822	SONY UP-D25MD	n/a	Y
	5555266	SONY UP-DR80MD	n/a	Y
5863421	Ethernet protection cable	n/a	Y	

Table 9-17 LOGIQ Fortis FRUs (Continued)

Part Group	Part Number	Description	Replace with	R3
Options	5873734	Option Tray with BRKT Assy	n/a	Y
Probes	5499606	C1-6-D	n/a	Y
	5476279	C1-6VN-D	n/a	Y
	5505700	C2-7-D	n/a	Y
	5505701	C2-7VN-D	n/a	Y
	5499605	C2-9-D	n/a	Y
	5488219	C2-9VN-D	n/a	Y
	5493012	C3-10-D	n/a	Y
	5499592	IC5-9-D	n/a	Y
	5765796	L2-9-D	n/a	Y
	5765797	L2-9VN-D	n/a	Y
	5499594	L8-18i-D	n/a	Y
	5446030	M5Sc-D	n/a	Y
	5499600	ML6-15-D	n/a	Y
	5729434	P2D (Doppler Probe for Service)	n/a	Y
	5729437	P6D (Doppler Probe for Service)	n/a	Y
	KTZ303986	RAB6-D	n/a	Y
	KTZ303987	RIC5-9-D (4D Endocavity Probe)	n/a	Y
	5444874	RS-DLP Adapter	n/a	Y
	5729431	6Tc-RS	n/a	Y
	5482856	L3-12-D	n/a	Y
5499318	6S-D	n/a	Y	
5535371	BE9CS-D	n/a	Y	
5833059	L6-24-D	n/a	Y	
Product labels	5858168	MULTI CAUTION LABEL	n/a	Y
	5878742	MULTI CAUTION LABEL CHINA	n/a	Y
	2112014-2	GE CARE_SYSTEM ID LABEL	n/a	Y
	5790735	Label - Vet Side Covers	n/a	Y
	5723475	AFU Vet Safety Label	n/a	Y
	S5848344	Power Assistant and Scan on Battery Label Set	n/a	Y
Software	5863164-2	LOGIQ Fortis R3.1.0 Software Thumb Drive Assembly	n/a	Y

Chapter 10

Care & Maintenance

Section 10-1 Overview

10-1-1 Purpose of this chapter

This chapter describes care and maintenance on the Ultrasound system and peripherals. These procedures are intended to maintain the quality of the Ultrasound system's performance. Read this chapter completely and familiarize yourself with the procedures before performing a task.

NOTE: The information in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified.


10-1-2 Contents in this chapter


10-1	Overview.....	10-1
10-2	Why Do Maintenance.....	10-4
10-3	Maintenance Task Schedule.....	10-5
10-4	System Maintenance.....	10-8
10-5	Using a Phantom.....	10-19
10-6	Electrical Safety Tests.....	10-20
10-7	When There Is Too Much Leakage Current.....	10-44


10-1-3 Care and maintenance inspections


It has been determined by engineering that your Ultrasound system does not have any high wear components that fail with use, therefore no care and maintenance inspections are mandatory.

However, some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

-  **DANGER** There are several places on the backplane, the AC distribution, and DC distribution that are dangerous. Be sure to disconnect the system power plug and switch off the main circuit breaker before you remove any parts. Be cautious whenever power is still on and covers are removed.

-  **DANGER** Do not pull out or insert circuit boards while power is ON.

-  **CAUTION** Practice good ESD prevention. Wear an anti-static strap when handling electronic parts and even when disconnecting/connecting cables.

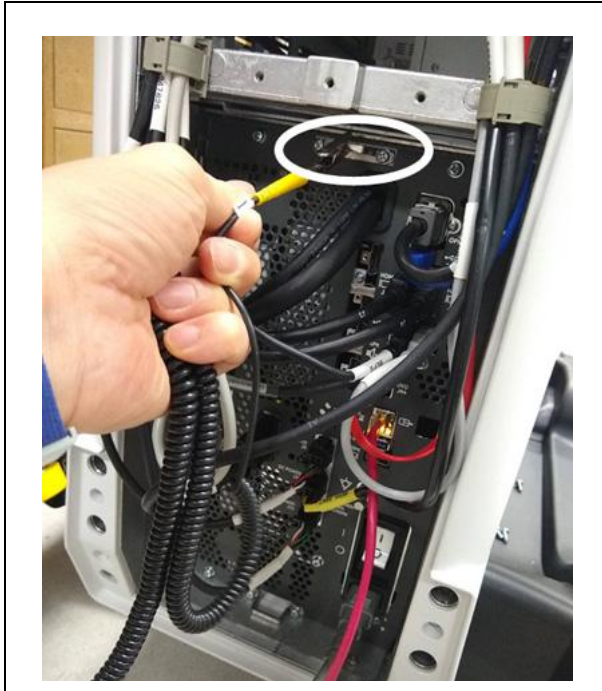
-  **CAUTION** DO NOT operate this system unless all board covers and frame panels are securely in place, to ensure optimal system performance and cooling. When covers are removed, electromagnetic interference (EMI) may be present.

10-1-4 Grounding points

There are several grounding points on the LOGIQ Fortis.

These grounding points (ESD receptacles) must be used when an ESD wrist strap is used during servicing of the LOGIQ Fortis.

Figure 10-1 ESD Receptacles



The ground stud near the circuit breaker and ON/OFF button is also a grounding point.

Figure 10-2 LOGIQ Fortis Main Power Supply Grounding Point



Section 10-2 Why Do Maintenance

10-2-1 Keeping records

It is good business practice that ultrasound facilities maintain records of care and corrective maintenance. The Ultrasound Equipment Quality Check (EQC and IQC), see [10-7-6 "Ultrasound equipment quality check \(EQC and IQC\)" on page 10-45](#), provides the customer with documentation that the Ultrasound system is maintained on a regular basis.

A copy of the Ultrasound Equipment Quality Check form should be kept in the same room or near the Ultrasound system.

10-2-2 Quality assurance

In order to gain accreditation from organizations such as the American College of Radiology (USA), it is the customer's responsibility to have a quality assurance program in place for each Ultrasound system. The program must be directed by a medical physicist, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action, and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing, and maintaining records for a quality assurance program. Contact GE for coverage and/or price for service.

Section 10-3 Maintenance Task Schedule

10-3-1 How often should care and maintenance tasks be performed?

The care and maintenance task schedule specifies how often your Ultrasound system should be serviced and outlines items requiring special attention.

NOTE: It is the customer's responsibility to ensure the Ultrasound system care and maintenance is performed as scheduled in order to retain its high level of safety, dependability, and performance.

Your GE Service Representative has an in-depth knowledge of your Ultrasound system and can best provide competent, efficient service. Contact GE for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Care and Maintenance Task Schedule assumes that you use your Ultrasound system for an average patient load and not use it as a primary mobile Ultrasound system which is transported between diagnostic facilities.

NOTE: If conditions exist which exceed typical usage and patient load, then it is recommended to increase the care and maintenance frequencies.

Refer to the Customer Care Schedule in the service manual for the Ultrasound system for the recommended care and maintenance schedule.

See [Table 10-1 "Customer Care Schedule" on page 10-6](#).

10-3-1 How often should care and maintenance tasks be performed? (cont'd)

Abbreviations used in the Customer Care Schedule [Table 10-1](#):

D = Daily W = Weekly M = Monthly A = Annually

Table 10-1 Customer Care Schedule

Item	Service at Indicated Time	D	W	M	A	Notes
Air Filter Grid	Remove the filter grid and clean the air filter.		•			Or at least bi-weekly.
AC Mains Cable	Inspect AC mains cable.			•		Mobile Unit Check weekly.
Cables and Connectors	Check if all cables are fixed, well seated at the correct position, and if there is no mechanical damage visible.				•	Also after corrective maintenance.
User Interface	Clean alphanumeric keyboard, functional keys, digital potentiometers.		•			Be careful not to get the cloth too wet so that moisture does not enter the entire system.
Display Monitor, Touch Panel and Probe Holder	Clean the display monitor and Touch panel surface and probe holder.		•			Be careful not to get the cloth too wet so that moisture does not enter the entire system.
Mechanical Parts	Clean and inspect the mechanical function of wheels, casters, brakes, and swivel locks as well as side door, foot rest, front and rear handle, and monitor holder. Remove dust and coupling gel.			•		Mobile Unit Check Daily.
V Nav roll stand	Inspect all fasteners associated with the mounting system on the V Nav roll stand. Tighten them as necessary for optimal operation and safety.			•		DO NOT overtighten any fasteners.
Control Console Movement	Check translation/rotation and height adjustment (elevation).				•	More frequently at Mobile Units.
Trackball Check	Check proper operation (Cursor movement X, Y direction).	•				If failure occurs go to trackball cleaning.
Trackball Cleaning	Remove trackball ring; open the trackball housing and take out the trackball to clean it with a soft tissue.				•	Please record it in the systems setup maintenance report.
Disk Drives (Data Backup)	Test Image filing (Archive) Import and Export data capability (DVD/CD Drive).		•	•*		* Save the image filing data weekly or at least monthly on DVD/CD depending on the number of examinations.
Safe Probe Operation	Clean probes and probe cables and check acoustic lens housing (cracks) and probe cables. In case of mechanical damage, do not use them! Danger: Safety risk for operator and patient.	•*				* Or before each use.
Probe Air Bubbles	To detect air bubbles in filling liquid, shake the probe carefully and check abnormal noise.				•	
Probe Connectors	Remove dust/dirt of all probe connectors. Clean with vacuum cleaner if dust is visible.			•		
Console Leakage Current Checks					•	Also after corrective maintenance or as required by your facilities QA program.

Table 10-1 Customer Care Schedule (Continued)

Item	Service at Indicated Time	D	W	M	A	Notes
Peripheral Leakage Current Checks						<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.
Surface Probe Leakage Current Checks						<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.
Endocavity Probe Leakage Current Checks						<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.
Measurement Accuracy Checks						<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.
Probe/Phantom Checks	Check axial and lateral resolution (see Basic User Manual Technical specifications). Check Gain and TGC changes, vary the focus and check reaction on screen. Check deviation of brightness in the US-Image (missing elements / probe cable defect). Probe must be coupled as this test.					<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.
Functional Checks of All Probes section 10-4-5 on page 10-10	Check general functions and image appearance at human body with all available modes.					<ul style="list-style-type: none"> Also after corrective maintenance or as required by your facilities QA program.

Section 10-4 System Maintenance

10-4-1 Preliminary checks

The preliminary checks take about 15 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

Table 10-2 System Preliminary Checks

Step	Item	Description
1.	Ask and Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Paperwork	Fill in the top of the EQC inspection form. Record all probes and Ultrasound system options.
3.	Power up	<ul style="list-style-type: none"> • Turn the Ultrasound system power on and verify that all fans and peripherals turn on. • Watch the displays during power up to verify that no warning or error messages are displayed. • Where applicable, confirm that the batteries are charged. If no AC Input present, use the internal batteries.
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the monitor and touch panel (where present).
6.	InSite	Where applicable, for Warranty and Contract Customers only: <ul style="list-style-type: none"> • Verify that InSite is functioning properly. • Ensure two-way remote communications.
7.	Review Error Logs	Where applicable, error logs can be reviewed through system diagnostics.
8.	Diagnostics	Optional.
9.	Presets	Backup all Customer Presets to an appropriate media.
10.	Image Archive	Back up the Image Archive onto appropriate media.

10-4-2 Tools, supplies and equipment

[Table 10-3](#) lists the suggested tools, supplies and equipment that can be used during the maintenance tasks.

10-4-3 Specific requirements for care and maintenance

See [Table 10-3](#) and [8-2-6 "Tools needed for servicing the LOGIQ Fortis"](#) on page 8-5.

Table 10-3 Tools Supplies and Equipment

Item	Comments
Digital Volt Meter (DVM)	
Anti Static Kit	Typically includes antistatic-mat, wrist strap and ground cable.
Anti Static Vacuum Cleaner	If available on site.
Safety Analyzer	Any calibrated Electrical Safety Analyzer compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551. Check that the safety analyzer calibration date is current to ensure measurement accuracy.
Phantom	If available on site.
CD-R/DVD-R Media (minimum quad speed)	
B/W Printer Cleaning Sheet	See printer user manual for requirements.
Color Printer Cleaning Sheet	See printer user manual for requirements.
Disposable Gloves	

10-4-4 Functional checks

The functional checks take about 60 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

10-4-5 System functional checks**Table 10-4 System Functional Checks**

Step	Item	Description
1	B-Mode	Verify basic B-Mode (2D) operation. Check the basic Ultrasound system controls that affect this mode of operation.
2	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic Ultrasound system controls that affect this mode of operation.
3	Doppler Modes	Where applicable, verify basic Doppler operation (PW and CW if available). Check the basic Ultrasound system controls that affect this mode of operation.
4	M-Mode	Verify basic M-Mode operation. Check the basic Ultrasound system controls that affect this mode of operation.
5	3D Mode	Where applicable, verify basic 3D Mode operation. Check the basic system controls that affect this mode of operation.
6	RealTime 4D Mode	Where applicable, verify basic RealTime 4D Mode operation. Check the basic system controls that affect this mode of operation.
7	Basic Measurements	Check Distance and Tissue Depth Measurement.
8	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
9	Applicable Software Options	Verify the basic operation of all optional modes. Check the basic system controls that affect each options operation.
10	System Diagnostic	Perform the Automatic Tests.
11	Transmit/Receive	Use the Visual Channel Utility on the 12L probe to verify that all system smut/rcv channels are functional.
12	Operator Panel test	Operator panel tests are available to service. Contact GE.
13	Keyboard	Do the interactive keyboard test.
14	Touch Panel	Where applicable, verify basic Touch Panel display functions.
15	Monitor	Verify basic monitor display functions.
16	Peripherals	See 10-4-6 "Peripheral/option checks" on page 10-11 .

10-4-6 Peripheral/option checks

If any peripherals or options are not part of the system configuration, the check can be omitted.

Table 10-5 GE Approved Peripheral/Hardware Option Functional Checks

Step	Item	Description
1	Media	Verify media drive(s) read/write properly. Clean if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5	ECG	Verify basic operation with customer
6	Footswitch	Verify that the footswitch is functioning as programmed. Clean as necessary.

10-4-7 Mains cable inspection

Table 10-6 Mains Cable Inspection, As Appropriate

Step	Item	Description
1	Unplug cord	Disconnect the mains cable from the wall.
2		Disconnect the mains cable from the Ultrasound system.
3	Inspect	Inspect the mains cable and its connectors for damage of any kind.
4	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
5	Verify	Make sure the inlet connector retainer is functional.

10-4-8 Optional diagnostic checks

To complete the Ultrasound system checks, view the error logs and run desired diagnostics.

10-4-9 View the logs

- 1.) Review the Ultrasound system error log for any problems.
- 2.) Check the temperature log to see if there are any trends that could cause problems in the future.

10-4-10 Physical inspection

NOTE: *These features may not be present on all Ultrasound systems.*

Table 10-7 Physical Checks

Step	Item	Description
1	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2	Scratches & Dents	Inspect the exterior for dents, scratches or cracks.
3	Covers	Where applicable, verify all covers are secured in place and are properly aligned with other covers. Replace any covers that are damaged.
4	Input Power	Refer to: 10-4-7 "Mains cable inspection" on page 10-11.
5	External I/O	Check all connectors for damage.
6	Wheels and Brakes	<ul style="list-style-type: none"> • Where applicable, check all wheels and casters for wear and verify operation of foot brake, to stop the Ultrasound system from moving, and release mechanism. • Where applicable, check all wheel locks and wheel swivel locks for proper operation.
7	Control Panel Movement	<ul style="list-style-type: none"> • Where applicable, verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions. • Where applicable, ensure that the Control panel latches in position as required.
8	Control Panel Lighting	Check for proper operation of all operator panel lights.
9	Display Monitor	<p>Inspect the displays for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the monitor arm allows:</p> <ul style="list-style-type: none"> • swivelling the screen to the left and to the right. • folding the screen to the locked position. • release and adjustment backwards and forwards. • can be adjusted in the up/down positions.
10	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to probe strain or bend reliefs.
11	Shielding and Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
12	Control Panel	Inspect alphanumeric keyboard and operator panel. Record any damaged or missing items.
13	Probe Holders	Where applicable, inspect the Probe Holders for cracks or damage.
14	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
15	Batteries	Where applicable, check that the batteries are not damaged, do not leak, do not emit an odor, and are not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal.

10-4-11 Cleaners/Disinfectants

These cleaners/disinfectants can be used anywhere on the console (Operator Panel, Monitor, Probe Holders, etc.), except for the probes.

Appropriate cleaners/disinfectants for the console are shown below:

Table 10-8: Appropriate Cleaners/Disinfectants

Product	Manufacturer	Notes	Chemistry	Locale	Cleaner/Disinfectant
Mild Soap					Cleaner
ALCOHOL (ISOPROPANOL) 70%	Generic	CAUTION: Avoid using on the trackball interior housing surface.	Alcohol	Global	Disinfectant
Cleanisept Wipes	Dr. Schumacher GMBH	Same as GE branded Septiwipe	Quat	Europe	Disinfectant
Caviwipes 1	Metrex Research, LLC.		Quaternary ammonium compound (QUAT) + Alcohol	US	Disinfectant
Clinell Universal Sanitising Wipes	GAMA Healthcare		Quat+ Polyhexanide (PHMB)	Europe	Disinfectant
Clorox Healthcare Bleach Germicidal Wipes	Clorox Professional	Same formula as Clinell Clorox Wipes	Bleach	US Canada Europe	Disinfectant
Mikrobac Tissues	BODE Chemie GmbH		Quat	Europe	Disinfectant
Mikrozid Sensitive Wipes	Schülke & Mayr GmbH	Same formula as Acryl-Des wipes	Quat	Europe	Disinfectant
Oxivir TB Wipes	Sealed Air	CAUTION: May reduce the paint durability of the silver metallic painted parts.	H2O2	US Canada	Disinfectant
Sani-Cloth HB Germicidal Disposable Wipe	Professional Disposables Inc. (PDI)		Quat	US	Disinfectant
Sani-Cloth Plus Germicidal Disposable Cloth	Professional Disposables Inc. (PDI)	Same Formula as Asepti Wipes II	Quat + Alcohol	US	Disinfectant
Sani-Cloth Prime Germicidal Disposable Cloth	Professional Disposables Inc. (PDI)		Quat + Alcohol	US	Disinfectant
SONO ULTRASOUND WIPES	Advanced Ultrasound Solutions, Inc.		Quat	US	Disinfectant
Super Sani-Cloth Germicidal Disposable Wipes	Professional Disposables Inc. (PDI)		Quat + Alcohol	US	Disinfectant
Tristel Distel	Tristel		Quat+PHMB	Europe	Disinfectant

Table 10-8: Appropriate Cleaners/Disinfectants(Continued)

Product	Manufacturer	Notes	Chemistry	Locale	Cleaner/ Disinfectant
Septiwipes	EDM Medical Imaging	This product is the same as Cleanisept Wipes by Dr. Schumacher	Quat	Europe	Disinfectant
Clinell Clorox Wipes	GAMA Healthcare	Same formula as Clorox Wipes sold in USA	Bleach	Europe	Disinfectant
Acryl-Des Wipes	Schulke & Mayr GmbH	This product is the same formula as Mikrozyd Sensitive Wipes also by Schulke	Quat	Europe	Disinfectant
Virox Accel TB wipes	Virox Technologies Inc. (owned by Sealed Air)	This product is the same formula as Oxivir TB	H2O2	CAN but no longer available	Disinfectant
Protex Ultra Wipes	arker Laboratories	Same Formula as SONO Wipes (Same EPA number)	Quat	US	Disinfectant
Trophon Companion Cleaning Wipes	Nanosonics	Same Formula as SONO Wipes (Same EPA number)	Quat	US	Disinfectant
Easy Screen Cleaning Wipes	Professional Disposables Inc. (PDI)	This product is 70% IPA	Alcohol	US	Disinfectant
Sodium Hypochlorite 5.25% (Bleach) diluted 10:1	Generic	Clorox Healthcare Bleach Germicidal Wipes contain similar concentration of Sodium Hypochlorite	Bleach	Worldwide	Disinfectant

10-4-12 Cleaning



CAUTION All cleaners and disinfectants NOT on this list are unapproved by GE.



CAUTION When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.

NOTE: *The cloth/wipe should be damp, not dripping wet and running. Moisture should not drip into the crevices anywhere on the console.*

NOTE: *Do not spray any liquid directly into the unit.*

NOTE: *A scrubbing action with the wipe may be necessary to help remove stubborn soil from the surfaces. However be careful with this action over cervices and gaps in the surface to prevent liquid from being scraped off the wipe and entering the product.*

Console

To clean the console:

- 1.) Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution or approved cleaning/disinfecting agent.
- 2.) Use a gentle wiping action to clean any surface on the console.
- 3.) Wipe off excess cleaning agents.

Monitor

NOTE: *DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.*

NOTE: *Never use thinner, benzene, alcohol (ethanol, methanol, or isopropyl alcohol), abrasive cleaners, or other strong solvents, as these may cause damage to the monitor.*

To clean the Monitor:

- 1.) Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
- 2.) Wipe down the top, front, back, and both sides of the monitor.
- 3.) Wipe off excess cleaning agents.

Monitor Frame

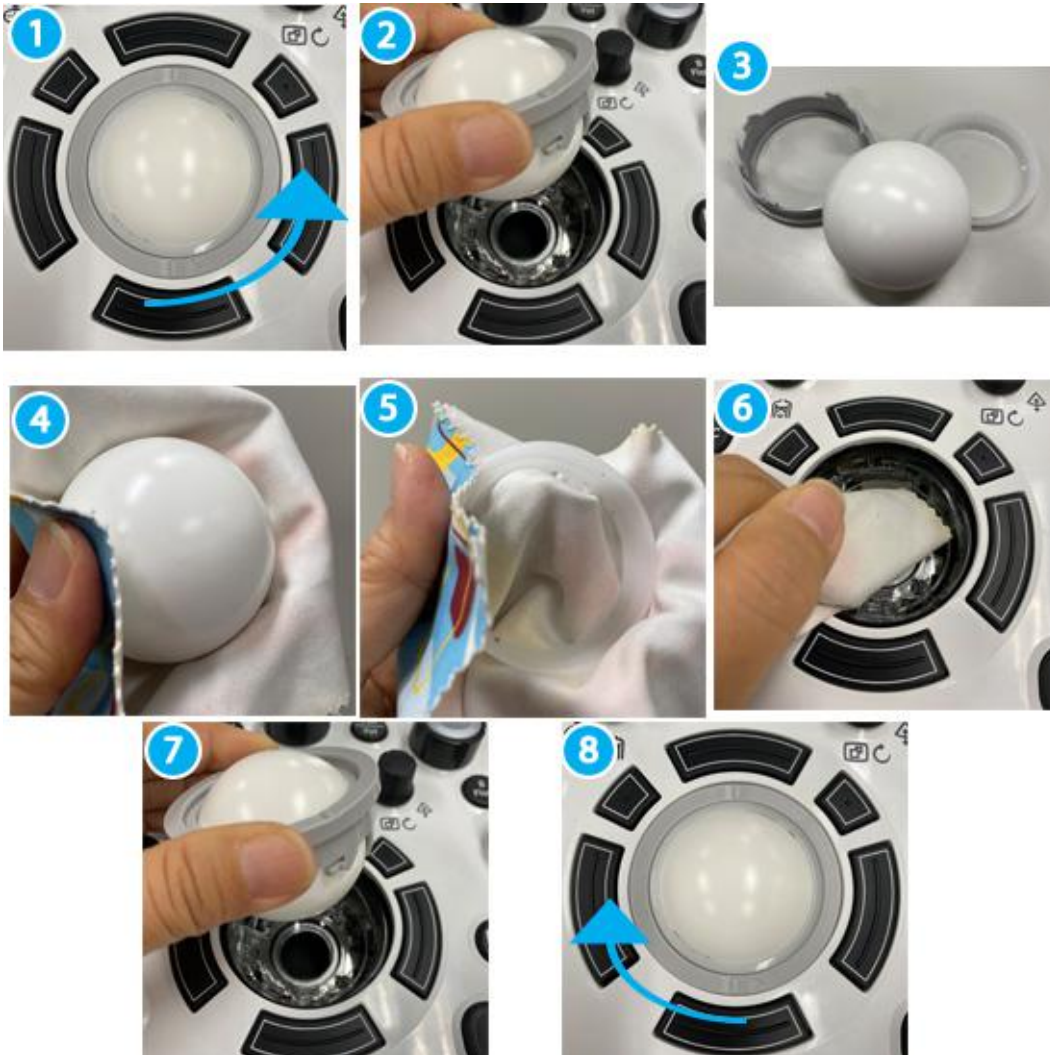
To clean the monitor frame:

- 1.) Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
- 2.) Wipe down the top, front, back, and both sides of the monitor frame.
- 3.) Wipe off excess cleaning agents.

10-4-12 Cleaning (cont'd)**Trackball**

To clean the Trackball,

- 1.) Twist and remove the Trackball prior to cleaning both the Trackball and Trackball housing with a dry cloth (1-3).



- 2.) Clean the Trackball and Trackball Housing (4-6).

- 3.) After cleaning the Trackball, replace and twist the Trackball into the Trackball housing (7-8).

10-4-13 Air filter cleaning

Clean the system's air filters to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned every two weeks, but the requirements will vary with environment.



CAUTION Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the system.

DO NOT operate the unit without the air filters in place.

Allow the air filters to dry thoroughly before re-installing them on the unit.

- 1.) Pull the front cover of cabinet.



Figure 10-3 Remove the front cover

- 2.) Pull out the air filter with the frame.

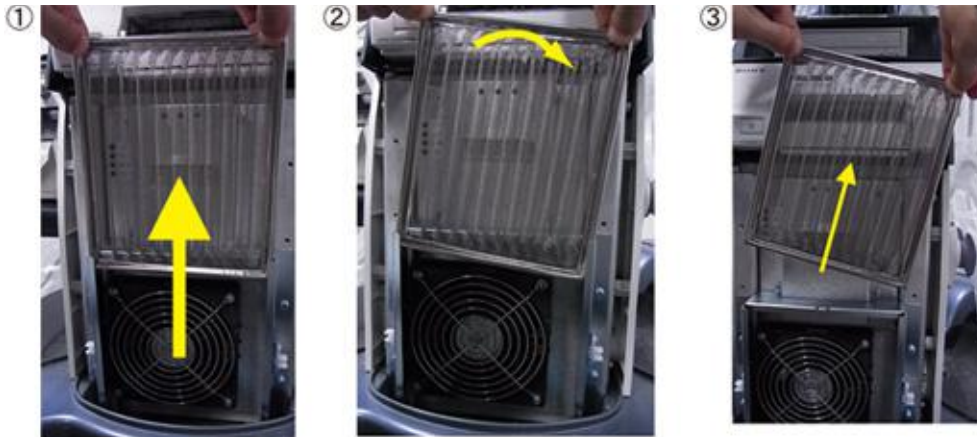


Figure 10-4 Remove the air filter

- 3.) Dust the filter with a vacuum cleaner and/or wash it with a mild soapy solution. If washed, rinse and dry the filter before re-installation.
- 4.) Put back the air filter with both hands and the front cover.

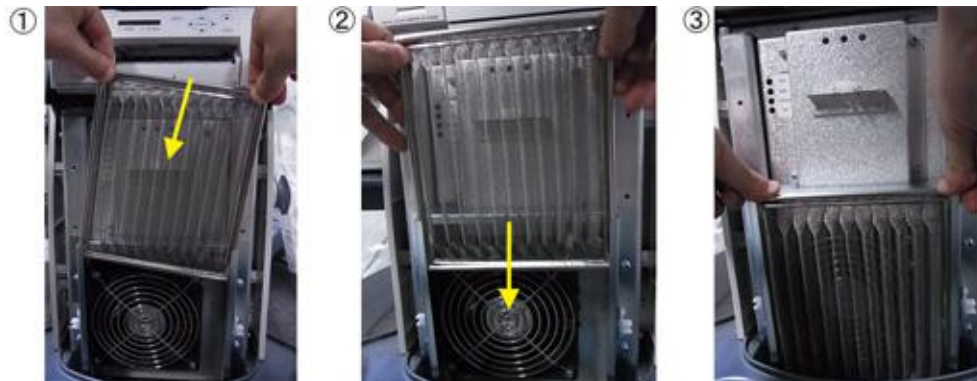


Figure 10-5 Put back the air filter

NOTE: For your convenience or if the air filter is too dirty, replacement filters are available. Refer to Chapter 9 for the air filter replacement part number.

10-4-14 Probe maintenance

Refer to “Care and Maintenance” in Chapter 11 of the LOGIQ Fortis Basic User Manual for instructions, or the probe’s User Manual/Probe Care Card for probe maintenance, checks, cleaning, and disinfecting instructions.

Ultrasound Probe Web Site for find Compatible Cleaning, Disinfection & Gel Products: <https://www.gehealthcare.com/products/ultrasound/ultrasound-transducers>

10-4-15 V Nav maintenance

Refer to “V Nav Cleaning Requirements” in Chapter 11 of the LOGIQ Fortis Basic User Manual for instructions.

Section 10-5

Using a Phantom

The use of a phantom is not required during care and maintenance. Customer may use it as part of their Quality Assurance Program tests.

Refer to the phantom's User Manual for information on how to use it.

Section 10-6 Electrical Safety Tests



10-6-1 Overview

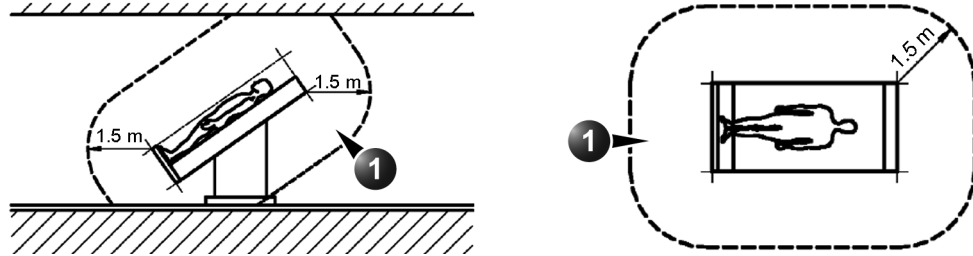
NOTE: For all instructions in the "Electrical safety tests" section in case of using a UPS (un-interruptible power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.

The following topics and measurements are covered in this subsection:

- "Uninterruptible power supply (UPS)" on page 10-21
- "Safety test overview" on page 10-22
- "Leakage current limits" on page 10-24
- "LOGIQ Fortis Ultrasound system leakage current limits" on page 10-25
- "Outlet test - wiring arrangement - USA and Canada" on page 10-27
- "Grounding continuity" on page 10-28
- "Chassis leakage current test" on page 10-29
- "Isolated patient lead (source) leakage–lead to ground" on page 10-31
- "Isolated patient lead (source) leakage–lead to lead" on page 10-33
- "Isolated patient lead (sink) leakage-isolation test" on page 10-35
- "Probe (source) leakage current test" on page 10-37


10-6-2 Uninterruptible power supply (UPS)

-  **CAUTION** For all instructions in the “Electrical Safety Tests” section in case of using a UPS (uninterruptible power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices..
-  **CAUTION** Please observe that some uninterruptible power supplies may not be medical devices! If the UPS is not a medical device, it has to be located outside of the patient environment (according to IEC 60601-1).



1. Patient environment

10-6-3 Safety test overview


 **DANGER** Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis. To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:




- Plan and prepare for shutdown.
- Completely power down the LOGIQ Fortis.
- Disconnect the power cable (first from the wall and then from the LOGIQ Fortis).
- Apply lockout/tagout devices to maintain exclusive control of the power cable.
- Relieve all potentially hazardous stored or residual energy (batteries).
- Verify isolation.

For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:

- [1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26](#)
- [1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27](#)
- [1-7-2-3 "Disconnect battery power" on page 1-28](#)

 **DANGER** Risk of electrical shock, system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.



 **DANGER** Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.

The electrical safety tests in this section are based on IEC60601 standard including national deviations for Health Care Facilities and IEC 62353 Medical electrical equipment – Recurrent test and test after repair of medical electrical equipment. These standards provide guidance on evaluating electrical safety of medical devices which are placed into service and are intended for use in normal Care and Maintenance or testing following service or repair activities. They differ somewhat from the standards that are used for design verification and manufacturing tests (e.g., IEC 60601-1 including national deviations) which require a controlled test environment and can place unnecessary stress on the Ultrasound system.

Equipment users must ensure that safety inspections are performed whenever damage is suspected and at least every 12 months in accordance with local authorities and facility procedures. Do not use the Ultrasound system or individual probes which fail any portion of the safety test.

10-6-3 Safety test overview (cont'd)

These tests may refer to specific safety analyzer equipment as an example. Always refer to the safety analyzer's user manual that will be used to perform the tests.

Prior to initiating any electrical test, the Ultrasound system must be visually inspected. Perform the following visual checks:

- Check for missing or loose enclosure covers that could allow access to internal live parts.
- Examine the mains cord, mains plug and appliance inlet for damaged insulation and adequacy of strain relief and cable clamps.
- Locate and examine all associated probes. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.



DANGER To avoid electrical shock, the Ultrasound system under test **MUST NOT** be connected to other electrical equipment. Remove all interconnecting cables and wires. The Ultrasound system under test must not be contacted by users or patients while performing these tests.



DANGER To minimize the risk and avoid an electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.



WARNING *Users must ensure that safety inspections are performed whenever damage is suspected and on a regular basis in accordance with local authorities and facility procedures. DO NOT use the Ultrasound system or individual probes which fail any portion of the safety test.*




CAUTION For all instructions in this section in case of using a UPS (uninterrupted power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused/not connected to any other devices.



CAUTION Compare all safety-test results with safety-test results of previously performed safety tests (for example, last year). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE for further analysis.

10-6-4 Leakage current limits

 **DANGER** Risk of dangerous voltage within the LOGIQ Fortis. Hazardous voltages, greater than 30 volts, exist within the LOGIQ Fortis. To avoid potentially hazardous voltage when servicing the LOGIQ Fortis, do the following:



- Plan and prepare for shutdown.
- Completely power down the LOGIQ Fortis.
- Disconnect the power cable (first from the wall and then from the LOGIQ Fortis).
- Apply lockout/tagout devices to maintain exclusive control of the power cable.
- Relieve all potentially hazardous stored or residual energy (batteries).
- Verify isolation.

For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:

- [1-7-2-1 "Power down the LOGIQ Fortis" on page 1-26](#)
- [1-7-2-2 "Disconnect Power to the LOGIQ Fortis" on page 1-27](#)
- [1-7-2-3 "Disconnect battery power" on page 1-28](#)

The following acceptance limits and test conditions are summarized from IEC 60601-1 including national deviations and IEC 62353 and in some cases are lower than that specified by the standards.

Because the main source of leakage current is the mains supply, there are different acceptance limits depending on the configuration of the mains (100-130 volt, 220-240 volt, or 230-240 volt mains).

10-6-5 LOGIQ Fortis Ultrasound system leakage current limits

Leakage current limits for LOGIQ Fortis Ultrasound systems are shown below for 100-240 volt mains.

NOTE: Open Grounding is also known as "Lift Ground".

Table 10-9 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit in mA	Limit in μ A
Earth Leakage	On and Off	N/A	0.5	500
Chassis/Enclosure Leakage	On and Off	Closed Open	0.1 0.5	100 500
Type BF Applied Parts	On (transmit)	Closed Open	0.1 0.5	100 500
Type CF Applied Parts	On (transmit)	Closed Open	0.01 0.05	10 50
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5	5000
Type CF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	0.05	50
Values based on IEC60601				

Table 10-10 ISO and Mains Applied Limits*





Probe Type	Measurement
BF	5.0 mA (5000 μ A)
CF	0.05 mA (50 μ A)

*ISO and Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the applied part to determine the amount of current that will pass (or sink) to ground if a patient is in contact with mains voltage.

10-6-5 LOGIQ Fortis Ultrasound system leakage current limits (cont'd)

NOTE: Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ES1 1993 or IEC 60601 or AS/NZS 3551 or IEC62353 or other relevant national regulation.

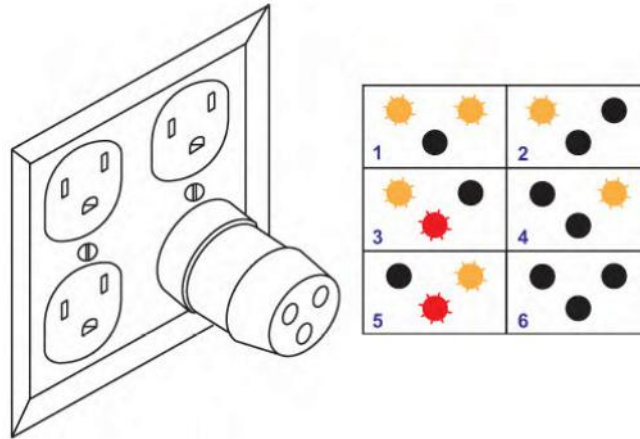
Table 10-11 Equipment Type and Test Definitions

Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For ultrasound equipment, this includes transducers, ECG leads and the e-TRAX Needle Sensor.	
Type BF	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60417-5333. For example, ultrasound probes which are marked with the 'man in box' BF symbol.	
Type BF Defib.- Proof	Type BF defibrillation proof Applied Part (man in the box with paddle) symbol is in accordance with IEC 60417-5334. Not used on the LOGIQ Fortis.	
Type CF	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60417-5335. For example, intraoperative probes for direct cardiac contact and the e-TRAX Needle Sensor which are marked with the 'heart in box' CF symbol.	
Type CF Defib.- Proof	Type CF defibrillation proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60417-5336. For example, intraoperative probes for direct cardiac contact and isolated ECG connections which are marked with the 'heart in box with paddle' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required for Type BF and CF applied parts.	

10-6-6 Outlet test - wiring arrangement - USA and Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

Figure 10-6 Typical Alternate Outlet Tester



- 1. Correct Wiring
- 2. Open Ground Wire
- 3. Reversed Polarity
- 4. Open Neutral Wire
- 5. Hot and Ground Reversed
- 6. Open Hot Wire

NOTE: *No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.*

10-6-7 Grounding continuity

⚠ DANGER Electric Shock Hazard!

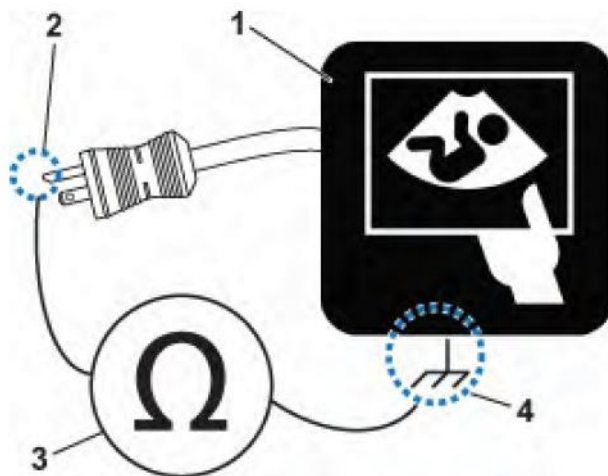
The patient or operator **MUST NOT** come into contact with the equipment during this test.



⚠ CAUTION Lacquer is an isolation barrier! Measure only on blank accessible metal parts.

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2 ohms**. Reference the procedure in the IEC60601-1-1 and/or IEC62353.

Figure 10-7 Ground Continuity Test



- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Ultrasound System 2. Ground Pin 3. Ohmmeter or Electrical Safety Analyzer | <ol style="list-style-type: none"> 4. Accessible Metal Part such as: <ul style="list-style-type: none"> • Potential equilibrium connector • Monitor housing • Probe connector |
|--|--|

10-6-8 Chassis leakage current test



DANGER Electric Shock Hazard.



When the Electrical Safety Analyzer's ground switch is OPEN, DO NOT touch the Ultrasound system!



CAUTION Equipment damage possibility.

Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.

Definition

This test, also known as Enclosure Leakage current test, measures the current that would flow through a grounded person who touches the accessible conductive parts of the equipment during normal and fault conditions.

The test verifies the isolation of the power line from the chassis.

The testing Electrical Safety Analyzer is connected to parts of the equipment, easily contacted by the user or patient.

NOTE: *Check that the safety analyzer calibration date is current to ensure measurement accuracy.*

Record the highest reading.

Generic procedure

The test verifies the isolation of the power line from the chassis. The testing Electrical Safety Analyzer is connected from accessible metal parts of the case to ground. Measurements should be made under the test conditions specified in:

- Table 10-9 on page 10-25, as applicable.

Record the highest reading of current.

- 1.) Connect the Safety analyzer to wall AC wall outlet.
- 2.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
- 3.) Connect the Electrical Safety Analyzer to an accessible metal surface of the Ultrasound system using the cable provided with the Electrical Safety Analyzer.
- 4.) Select the "Chassis" or "Enclosure Leakage" function on the Electrical Safety Analyzer.
- 5.) Test opening and closing the ground with the Ultrasound system on and off as indicated in Table 10-9 on page 10-25 as applicable.

NOTE: *For more information, see the safety analyzer's user manual that will be used to perform the tests.*

10-6-8 Chassis leakage current test (cont'd)

The maximum allowable limit for chassis source leakage is shown in:

- Table 10-9 on page 10-25, as Chassis/Enclosure Leakage.

Data sheet for enclosure/chassis leakage current

Table 10-12 shows a typical format for recording the enclosure/chassis leakage current. Measurements should be recorded from multiple locations for each set of test conditions. The actual location of the test probe may vary by Ultrasound system.

Record all data in the Electrical safety tests log.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353 and IEC 60601-1.

NOTE: Values in italics font are given as examples only.

Table 10-12 Typical Data Format for Recording Enclosure/Chassis Leakage

Unit under test _____			Date of test: _____			
Test Conditions			Measurement/Test Point Location			
System Power	Grounding/ PE	Limit μ A	<i>Potential Equilibrium Connector</i>	<i>Monitor Housing</i>	<i>Probe Connector</i>	
Off	Closed	100				
Off	Open	500				
On	Closed	100				
On	Open	500				
Off	Closed (reversed polarity)	100				
Off	Open (reversed polarity)	500				
On	Closed (reversed polarity)	100				
On	Open (reversed polarity)	500				

10-6-9 Isolated patient lead (source) leakage—lead to ground



CAUTION Equipment damage possibility.

Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the “POLARITY” switch and/or the “NEUTRAL” switch on the Electrical Safety Analyzer to avoid possible power supply damage.

Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The Electrical Safety Analyzer simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the Ultrasound system on and off (per IEC 62353).

For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

10-6-9 Isolated patient lead (source) leakage–lead to ground (cont'd)

Generic procedure

- 1.) Check that safety analyzer calibration date is current to ensure measurement accuracy.
- 2.) Connect the safety analyzer to the wall AC power outlet.
- 3.) Plug the equipment under test power cable into the receptacle on the panel of the Electrical Safety Analyzer.
- 4.) Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
- 5.) Select the “Patient Lead Leakage” function on the Electrical Safety Analyzer.
- 6.) Test opening and closing the ground with the Ultrasound system on and off.

NOTE: For more information, see the safety analyzer's user manual.

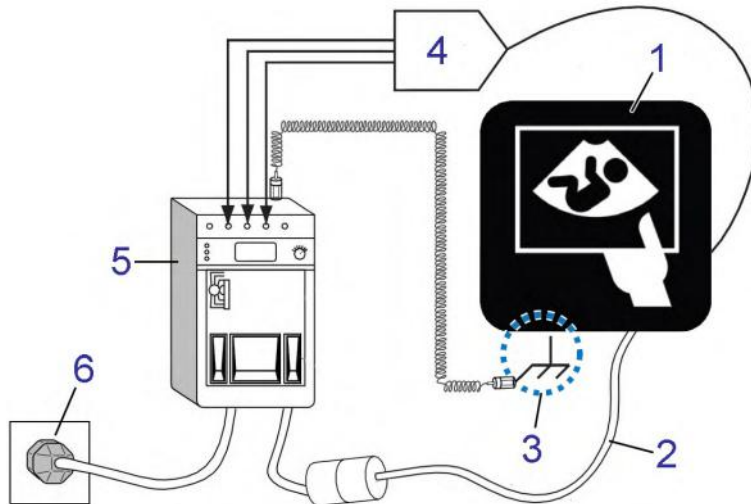
Measurements should be made under the test conditions specified in:

- Table 10-9 on page 10-25, as applicable.

For each combination, the operating controls, such as the lead switch, should be operated to find the worst case condition.

Record all data and keep the record of the results with other hard copies of maintenance data.

Figure 10-8 Set Up for Test of Earth Leakage Current, IEC60601-1



- | | |
|---|-------------------------------|
| 1. Ultrasound system | 4. ECG patient cable |
| 2. Mains power cable | 5. Electrical safety analyzer |
| 3. Accessible Metal Parts (chassis - non-earth ground, unprotected surface) | 6. AC wall outlet |

10-6-10 Isolated patient lead (source) leakage—lead to lead

Select and test each of the ECG lead positions (except ALL) on the LEAD selector, testing each to the power and ground condition combinations found in:

- Table 10-9 on page 10-25, as applicable.

Record the highest leakage current measured.

NOTE: This test is also known as the Patient Auxiliary Current test.

Lead to lead leakage test record

Table 10-13 on page 10-34 shows a typical format for recording the patient lead to lead leakage current.

Measurements should be recorded from each lead combination under each set of test conditions specified in:

- Table 10-9 on page 10-25, as applicable.

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1.) Check that safety analyzer calibration date is current to ensure measurement accuracy.
- 2.) Connect the safety analyzer to a wall AC power outlet.
- 3.) Plug the equipment under test into the receptacle on the Electrical Safety Analyzer's panel.
- 4.) Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
- 5.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 6.) Test opening and closing the ground with the Ultrasound system on and off.

NOTE: Refer to the safety analyzer's user manual that will be used to perform the tests.

10-6-10 Isolated patient lead (source) leakage—lead to lead (cont'd)

Keep a record of the results with other hard copies of maintenance data

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353 and IEC 60601-1.

Table 10-13 Typical Data Format for Recording Patient Lead to Lead Leakage

Unit under test _____		Date of test: _____		
Test Conditions		Patient Lead or Combination Measured		
System Power	Grounding/PE	<i>RA to LA</i>	<i>LA to LL</i>	<i>LL to RA</i>
Off	Closed			
Off	Open			
On (Transmit)	Closed			
On (Transmit)	Open			

NOTE: Values in italics font are given as examples only.

Table 10-14 Typical Data Format for Recording Patient Lead to Lead Leakage

Unit under test _____			Date of test: _____			
Test Conditions			Measurement/Test Point Location			
System Power	Grounding/PE	Limit μ A	<i>RA to LA</i>	<i>LA to LL</i>	<i>LL to RA</i>	<i>(RA+LA+LL) to GRND</i>
Off	Closed	10				
Off	Open	50				
On	Closed	10				
On	Open	50				
Off	Closed (reversed polarity)	10				
Off	Open (reversed polarity)	50				
On	Closed (reversed polarity)	10				
On	Open (reversed polarity)	50				

10-6-11 Isolated patient lead (sink) leakage-isolation test

Select the Individual Leads as well as All Lead position since the test is performed with mains applied to all ECG leads at the same time.



DANGER Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the Ultrasound system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.

Isolated lead (sink) leakage test record

Table 10-15 shows a typical format for recording the isolated patient lead sink leakage current.

Measurements should be recorded for full lead combination under each set of test conditions specified in:

- Table 10-10 on page 10-25

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1.) Check that safety analyzer calibration date is current to ensure measurement accuracy.
- 2.) Connect the safety analyzer to a wall AC power outlet.
- 3.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
- 4.) Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
- 5.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 6.) Test with closed ground with the Ultrasound system on and off.

NOTE: Refer to the electrical safety analyzer's user manual that will be used to perform the tests.

10-6-11 Isolated patient lead (sink) leakage-isolation test (cont'd)

Keep a record of the results with other hard copies of maintenance data.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353 and IEC 60601-1.

NOTE: Values in italics font are given as examples only.

Table 10-15 Typical Data Format for Recording Isolated Patient Lead (Sink) Leakage

Unit under test _____			Date of test: _____
Test Conditions			Patient Lead
System Power	Grounding/PE	Limit μ A	<i>RA+LA+LL</i>
Off	Closed	50	
On	Closed	50	
Off	Closed (reversed polarity)	50	
On	Closed (reversed polarity)	50	

10-6-12 Probe (source) leakage current test



DANGER Do not use the probe if the insulating material has been punctured or otherwise compromised. Integrity of the insulation material and patient safety can be verified by safety testing according to IEC60601-1.

Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

NOTE: *Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.*

Generic procedure on probe leakage current

The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the Ultrasound system and active. This method measures the actual leakage current resulting from the probe RF drive.

Measurements should be made under the test conditions specified in:

- [Table 10-9 on page 10-25](#) as applicable.

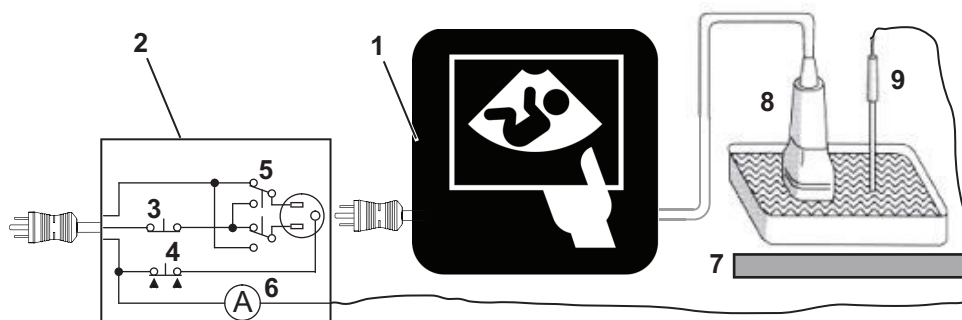
For each combination, the probe must be active to find the worst case condition.

Record all data and keep the record of the results with other hard copies of maintenance data.

NOTE: *Saline water pod should be insulated from floor and earth ground.*

NOTE: *The saline solution is a mixture of water and salt. The salt adds free ions to the water, making it conductive. Normal saline solution is 0.9% salt and 99.1% water. If ready-mixed saline solution is not available, a mixture of 1 quart or 1 liter water with 9 or more grams of table salt, mixed thoroughly, will substitute.*

Figure 10-9 Set Up for Probe Leakage Current



- | | | |
|-------------------------------|------------------------------|---------------------|
| 1. Ultrasound System | 4. Ground Switch | 7. Isolator |
| 2. Electrical Safety Analyzer | 5. Polarity Reversing Switch | 8. Ultrasound Probe |
| 3. Neutral Switch | 6. Meter | 9. Saline Probe |

10-6-12 Probe (source) leakage current test (cont'd)

NOTE: *Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.*


The ultrasound probes imaging area is immersed in the Saline solution along with a grounding probe from the Electrical Safety Analyzer to complete the current path.

This test is also known as Patient Leakage Current.

- 1.) Turn the Ultrasound system **OFF**.
- 2.) Check that safety analyzer calibration date is current to ensure measurement accuracy.
- 3.) Connect the Safety analyzer to AC wall outlet.
- 4.) Set the Safety analyzer's function switch to "Chassis" or "Enclosure Leakage".
- 5.) Plug the Ultrasound system's power cord into the Electrical Safety Analyzer.
- 6.) Plug the Chassis Ground Probe (saline probe) into the Electrical Safety Analyzer's "CHASSIS" connector.
- 7.) Connect the Ultrasound Probe to the Ultrasound system.
- 8.) Immerse the Saline Probe in the saline solution.
- 9.) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.

 **DANGER** To avoid probe damage and possible electric shock, do not immerse probes into any liquid beyond the level indicated in the Basic User Manual (appropriate version).

Do not touch the probe, conductive liquid or any part of the Ultrasound system under test while doing the test.

 **CAUTION** Equipment damage possibility.
Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.

- 10.) Test opening and closing the ground with the Ultrasound system on and off.
 - a.) Power ON the Ultrasound system.
 - b.) After the Ultrasound system has completed the boot process, select the probe to be tested so it is the active probe.
 - c.) Depress the "LIFT GROUND" rocker switch and record the highest current reading.
 - d.) Follow the test conditions and test limits described in:
 - * [Table 10-9 on page 10-25](#) as applicable.

11.) Record the highest current reading.

The test passes when all readings measure less than the stated limits.

The actual location of the test probe may vary by Ultrasound system. Measurements should be recorded for each probe under the set of test conditions.

10-6-12 Probe (source) leakage current test (cont'd)

Record all data and keep the record of the results with other hard copies of maintenance data.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353 and IEC 60601-1.


NOTE: Values in italics font are given as examples only.

Table 10-16 Typical Data Format for Recording Probe (Source) Leakage Current

Unit under test _____			Date of test: _____			
Test Conditions			Probe as measured in saline bath			
System Power	Grounding/PE	Limit μ A	<i>4C</i>	<i>i12L</i>	<i>TS</i>	<i>E8C</i>
Off	Closed	100				
Off	Open	500				
On	Closed	100				
On	Open	500				
Off	Closed (reversed polarity)	100				
Off	Open (reversed polarity)	500				
On	Closed (reversed polarity)	100				
On	Open (reversed polarity)	500				

10-6-13 Isolated probe (sink) leakage-isolation test

 **DANGER** Do not use the probe if the insulating material has been punctured or otherwise compromised. Integrity of the insulation material and patient safety can be verified by safety testing according to IEC60601-1.

 **DANGER** Line voltage is applied to the ultrasound probe during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.

Measurements should be recorded for probes and transducers under each set of test conditions specified in:

- [Table 10-9 on page 10-25.](#)

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1.) Check that safety analyzer calibration date is current to ensure measurement accuracy.
- 2.) Connect the Safety analyzer to an AC wall outlet.
- 3.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
- 4.) Connect the Ultrasound probe to be tested to the Ultrasound system.
- 5.) Immerse the saline probe in the saline solution.
- 6.) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.
- 7.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 8.) Test with closed ground with the Ultrasound system on and off.

NOTE: For more information, see the safety analyzer's user manual.

10-6-13 Isolated probe (sink) leakage-isolation test (cont'd)

Record all data and keep the record of the result with other hard copies of maintenance data.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353 and IEC 60601-1.

NOTE: Probe names in italics font are given as examples only.

Table 10-17 Typical Data Format for Recording Isolated Probe (Sink) Leakage

Unit under test _____			Date of test: _____			
Test Conditions			Probe as measured in saline bath			
System Power	Grounding/PE	Limit μ A	<i>4C</i>	<i>i12L</i>	<i>TS</i>	<i>E8C</i>
Off	Closed	5000				
On	Closed	5000				
Off	Closed (reversed polarity)	5000				
On	Closed (reversed polarity)	5000				

10-6-13 Isolated probe (sink) leakage-isolation test (cont'd)

Mains on applied part

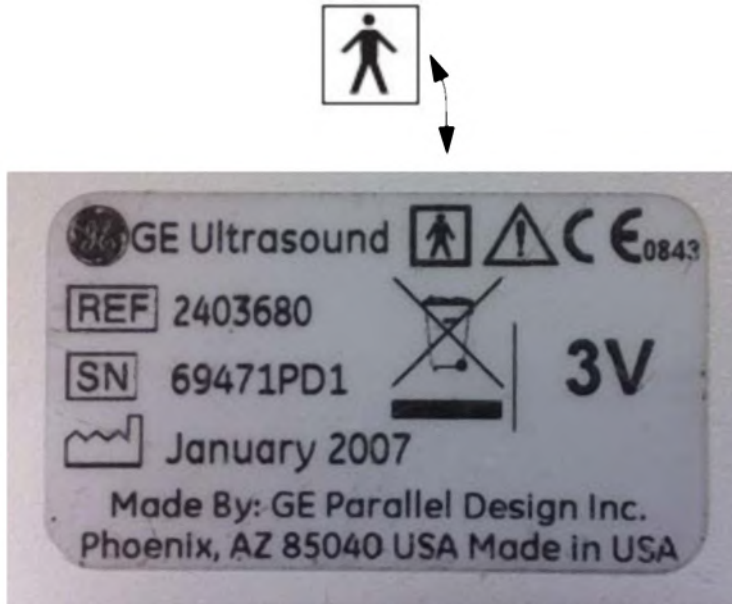
NOTE: Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.

Mains on applied part is one of the described leakage current tests applicable for probes (Ref: IEC60601-1). This is to be performed with the probe disconnected from the Ultrasound system. Apply mains voltage over the insulation barrier. (Between protective earth on the probe connector, and an electrical anode in saline solution. The patient applied part of the probe is immersed into the saline solution.) Measure current flowing in the circuit = leakage current.

As a minimum, tests according to IEC60601-1 must be performed once a year. The requirements for Body Floating (BF) have to be applied for TEE and Trans thorax probes bearing the symbol for safety class BF.

The symbol for BF is indicated on the probe connector label below:

Figure 10-10 GE Probe Connector Label Example



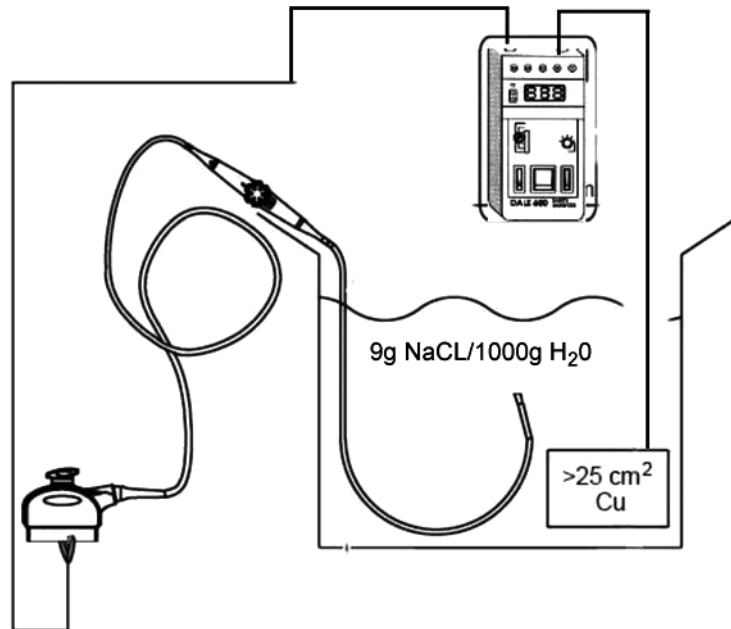
10-6-13 Isolated probe (sink) leakage-isolation test (cont'd)

Mains on applied part (continued)

⚠ WARNING *The handle of the TEE probes must not be immersed.
For immersion levels, please see the user manual.*

A typical test setup for TEE probes could be as indicated below:

Figure 10-11 TEE Probe Leakage Isolation (Sink) Current Test



NOTE: *Where applicable, a typical test setup of non-TEE probes can be as illustrated in [Figure 10-9](#) on [page 10-37](#).*

The test passes when the reading measure less than the values in:

- Table 10-10 on page 10-25.

Section 10-7

When There Is Too Much Leakage Current...

10-7-1 Chassis fails

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Where applicable, tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work around, check the other outlets to see if they could be used instead.

NOTE: No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

10-7-2 Probe fails

Test another probe to isolate if the fault lies with the probe or the scanner.

NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable leakage current for body surface contact probe differs from an inter-cavity probe. Be sure to enter the correct probe type in the appropriate space on the check list.

If excessive leakage current is slot dependent, inspect the Ultrasound system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

10-7-3 Peripheral fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

10-7-4 Still fails

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

Where applicable, in the case of using a UPS (un-interruptible power supply), perform the tests in the "Electrical Safety tests" section without using the UPS (i.e. directly connect the Ultrasound system to the AC wall outlet). If this leads to a pass result, the specific UPS must no longer be used.

New unit

If the leakage current measurement tests fail on a new Ultrasound system and if situation can not be corrected, submit a Safety Failure Report to document the Ultrasound system problem. Remove Ultrasound system from operation.

10-7-5 ECG fails

Inspect cables for damage or poor connections.

10-7-6 Ultrasound equipment quality check (EQC and IQC)

GE employees can download and use the latest version of these forms. They can be retrieved from MyWorkshop.

- EQC -- Refer to DOC0929340 in MyWorkshop

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