



LOGIQ Fortis

General Service Manual

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General Service Documentation

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This manual is a reference for the LOGIQ Fortis (hereafter listed as the ultrasound system). All information provided in this manual is relevant for all systems unless otherwise specified.

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Language Disclaimers

WARNING

- (English)
(EN)
- This Service Manual is available in English only.
- If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.
 - Do not attempt to service the equipment unless this Service Manual has been consulted and is understood.
 - Failure to heed this Warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.

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.

VIÐVÖRUN

Íslenska
(IS)

Þessi þjónustuhandbók er aðeins fánleg á ensku.

- Ef þjónustuaðili viðskiptavinar þarf annað tungumál en ensku er það á ábyrgð viðskiptavinarins að veita þýðingarþjónustu.
- Ekki reyna að þjónusta búnaðinn nema þessir þjónustuhandbækur hafi verið skoðaðir og skilið.
- Ef ekki er gætt að þessari viðvörðun getur það valdið meiðslum á þjónustuaðila, stjórnanda eða sjúklingi vegna raflosts, vélrænni hættu eða annarri hættu.

HOIATUS!

Eesti
(ET)

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 hooldustööde tegemist kindlasti juhendiga Service Manual (Hooldusjuhend).
- Selle nõude eiramise korral võib teenindaja, kasutaja või patsient saada elektrilöögi, samuti võivad kaasneda muud ohud.

OPOZORILO

Slovenščina
(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

繁体中文
(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

- 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

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

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.

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά
(EL)

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.

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 szervizkézikönyvben 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.

VAROVANIE

Slovenčina
(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.

VÝSTRAHA

česky
(CZ)

Tato servisní příručka je k dispozici pouze v angličtině.

- 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.

UYARI

Türkçe
(TK)

Servis Kılavuzu yalnızca İngilizce olarak mevcuttur.

- Müşterinin servis sağlayıcısı için kılavuzun İngilizce dışında başka bir dile çevrilmesi gerekiyorsa çeviri hizmeti sağlamak müşterinin sorumluluğudur.
- Bu Servis Kılavuzu'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.

ADVARSEL

Dansk
(DA)

Denne servicemanual fås kun på engelsk.

- Hvis en kundes tjenesteudbyder kræver et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelsesydelse.
- Forsøg ikke at udføre service på udstyret, medmindre denne servicemanual er læst og forstået.
- Manglende overholdelse af denne advarsel kan medføre skade på serviceudbyderen, operatøren eller patienten som følge af elektrisk stød, mekaniske eller andre farer.

ADVARSEL

Norsk
(NO)

Denne servicehåndboken er bare tilgjengelig på engelsk.

- 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.

VAKAVA VAROITUS

Suomi
(FI)

Tämä huolto-opas on saatavana vain englanniksi.

- 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.

ПРЕДУПРЕЖДЕНИЕ

Български
(BG)

- 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.

AVERTISMENT

Română
(RO)

- Acest manual de service este disponibil doar în engleză.
- Dacă furnizorul de servicii al unui client solicită altă limbă decât engleza, este responsabilitatea clientului să ofere servicii de traducere.
 - Nu încercați să efectuați lucrări de service asupra echipamentului, în afară de cazul când ați consultat acest manual de service și l-ați înțeles.
 - Nerespectarea acestui avertisment poate avea ca rezultat rănirea furnizorului de servicii, a operatorului sau a pacientului ca urmare a electrocutării, pericolelor mecanice sau a altor pericole.

UPOZORENJE

Hrvatski
(HR)

- 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 poštujete ovo upozorenje, može doći do ozljede serviser, operatera ili pacijenta prouzročene strujnim udarom, mehaničkim i drugim opasnostima.

ĮSPĖJIMAS

Lietuvių k.
(LT)

- Šis priežiūros vadovas galimas tik anglų kalba.
- 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.

BRĪDINĀJUMS

-  Latviski
- Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.
- Ja klienta pakalpojumu sniedzējam ir nepieciešama cita valoda, kas nav angļu valoda, klienta pienākums ir nodrošināt tulkojumu.
 - Nemēģiniet apkalpot aprīkojumu, ja apkalpes rokasgrāmata nav izlasīta un izprasta.
 - Ja šis brīdinājums netiek ievērots, pakalpojumu sniedzējs, operators vai pacients var gūt traumas no elektrošoka vai var rasties mehānisks vai cita veida apdraudējums.

UPOZORENJE

-  Srpski
- Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.
- Ako klijentov serviser zahteva jezik koji nije engleski, odgovornost je na klijentu da pruži usluge prevođenja.
 - Nemojte da pokušavate da servisirate opremu ako prethodno niste pročitali i razumeli ovaj priručnik.
 - Ako ne poštujete ovo upozorenje, može doći do povređivanja serviser, operatera ili pacijenta uzrokovanog električnim udarom, mehaničkim i drugim opasnostima.

AVISO

-  Português (Portugal)
- Este manual de assistência está disponível apenas em inglês.
- Se o prestador de serviços de assistência do cliente necessitar do manual noutra idioma, a disponibilização dos serviços de tradução é da responsabilidade do cliente.
 - Não tente reparar o equipamento se não tiver consultado e compreendido este manual de assistência.
 - O não cumprimento das instruções constantes neste aviso pode resultar em ferimentos no prestador de serviços de assistência, no operador ou no paciente devido a choques eléctricos, perigos mecânicos ou outros problemas.

ПОПЕРЕДЖЕННЯ

Українська
(UK)

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.

PERINGATAN

Bahasa
Indonesia
(ID)

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.

คำเตือน

ไทย
(TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

- หากผู้ให้บริการของลูกค้าต้องการจบบัญชีภาษาอื่นนอกเหนือจากภาษาอังกฤษ ลูกค้าต้องเป็นผู้รับผิดชอบในการจัดเตรียมคู่มือซ่อมบำรุงฉบับแปล
- โปรดอย่าซ่อมบำรุงอุปกรณ์โดยไม่ศึกษา และทำความเข้าใจคู่มือซ่อมบำรุงนี้
- หากไม่ปฏิบัติตามคำเตือนนี้อาจส่งผลให้ผู้ให้บริการ ผู้ใช้งานอุปกรณ์ หรือผู้ป่วยได้รับบาดเจ็บจากไฟฟ้าช็อต อันตรายจากกลไกของอุปกรณ์ หรืออันตรายอื่น ๆ

CẢNH BÁO

(VI) Tiếng Việt

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.

ЕСКЕРТУ

(KK) Қазақ тілінде

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.

BABALA

(TL) Tagalog

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 pagkabigong 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.

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1. Write "Damage in Shipment" on ALL copies of the freight or express bill BEFORE delivery is accepted or "signed for" by a GE HealthCare representative or hospital receiving agent.
2. Report the damage to the carrier.
 - 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.

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The purchaser of GE HealthCare equipment shall only utilize qualified personnel (i.e. GE HealthCare field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

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Declaration of Conformity

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

Intel 9260 Module

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

Intel AX210 Module

<https://www.intel.com/content/dam/support/us/en/documents/network-and-i-o/wireless-networking/ax210ngw-eu-red-doc.pdf>

Search under Current or Legacy Adapters for: Intel® 9260 / Intel® AX210

NETGEAR A8000 Module

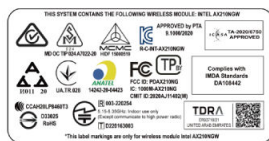
https://www.downloads.netgear.com/files/DoC/204-11879-03_CE_A8000_EN-GR-FR-IT-SP-EP_28Jul25.pdf

Figure -1 WLAN Label

Intel 9260 Module



Intel AX210 Module



NETGEAR A8000 Module



Revision History

Revision	Date	Reason for change
Rev. 3	July, 2021	Initial release
Rev. 4	Dec., 2021	Minor Update
Rev. 5	April, 2022	Update China Configuration in Ch 1, Probe Trouble shooting in Ch 7, Rear cable management graphic in Chapter 8, Back end parts/ Probes/FRU list in Ch 9.
Rev. 6	Nov, 2023	Update for R4. Update per Process Validation.
Rev. 7	Apr, 2024	Add R4 Vet console information, misc correction
Rev. 8	Nov, 2025	• Converted to Tridion Docs format. • Updated chapter structure based on the Service Manual Standard (DOC1824402). • Improvement of illustration and diagram. • Added R5 information.
Rev.9	Jan, 2026	Updated Rating Label location in Section 4.3.5.

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Chapter 1

Safety and General Information

In this chapter

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Lockout/Tagout (LOTO).	49
Returning/Shipping Probes and Repair Parts.	54

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

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

1.1 Service Manual Overview

Contents in this section

- *Attention* on page 30
- *Contents in this service manual* on page 31
- *Typical users of LOGIQ Fortis documentation* on page 32
- *Product description* on page 33

1.1.1 Attention

This manual contains necessary and sufficient information for the Field Service Engineer or Biotech Engineer to safely maintain and service the LOGIQ Fortis. Advanced equipment training may be provided by factory trained Field Service trainers for the agreed-upon time period.

1.1.2 Contents in this service manual

The service manual is divided into the chapters shown below.

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 is included after the chapters.

Table 1-1 Contents in this Service Manual

Chapter Number	Chapter Title	Description
1	Safety and General Information	Contains labels, icons, warnings and Lockout/Tagout (LOTO) descriptions.
2	Pre-installation	Contains pre-setup requirements for the LOGIQ Fortis.
3	Tools	Contains tools needed to service LOGIQ Fortis.
4	Installation	Contains installation and setup procedures with checklist.
5	Alignment Setup Calibration	Contains instructions on how to make any available adjustments to the LOGIQ Fortis.
6	Functional Checks	Contains functional checks that must be performed as part of the installation, or as required during servicing, and care and maintenance.
7	Software	Provides procedures for installing and/or re-installing software on LOGIQ Fortis.
8	Theory	Contains functional explanations of the electronics, hardware, and software.
9	System Diagrams	Provides system diagrams of the LOGIQ Fortis.
10	Troubleshooting	Provides procedures for running diagnostic or related routines for the LOGIQ Fortis.
11	Parts	Contains a complete list of replacement parts for the LOGIQ Fortis.
12	Parts Replacement	Provides disassembly procedures and reassembly procedures for all changeable FRUs, available option installation instructions, and upgrade installation instructions.
13	Planned Maintenance	Provides care and maintenance procedures for the LOGIQ Fortis.
14	Deinstallation	Contains the deinstallation procedure.
15	Favorite Links	Provides reference links for additional resources.
16	Glossary	Provides a glossary of terms used in the Ultrasound System.

1.1.3 Typical users of LOGIQ Fortis documentation

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

Typical users of the General Service Manual

- Service personnel (setup, maintenance, etc.)
- Hospital's service personnel
- Architectural planners/installation planners (some parts of *Chapter 2 - Pre-installation*)

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 in the User Manual (appropriate version).

1.1.4 Product description

Overview of the LOGIQ Fortis

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 hard drive.

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

For more information on:

- Installed software versions, see *Table 10-3 Software Status* on page 265.
- Installed hardware, see *Service Desktop* on page 258.
- Connected probes, see *Service Desktop* on page 258.
- Compatible software, hardware, peripherals, and probes, see *Parts* on page 323.

Purpose of the user manual

The purpose of the user manual is to provide instructions for the safe use of the system for examination, diagnosis and treatment of medical conditions.

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).

NOTE

For LOGIQ Fortis R3 Vet Console, only paper manual is provided.

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

1.2 Important Conventions

Contents in this section

- *Conventions used in book* on page 34
- *Standard hazard icons* on page 34
- *Labels/icons on the system* on page 36
- *When used in a veterinary environment* on page 38

1.2.1 Conventions used in book

Model designations

This manual covers the models listed in *LOGIQ Fortis Models* on page 225.

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.

1.2.2 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 1-2 Standard Hazard Icons

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.
	Acoustic Output Hazard Patient injury or tissue damage from ultrasound radiation. ALARA, the use of Power Output following the 'as low as reasonably achievable' principle

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

Table 1-3 Standard Icons for Specific Procedures or Requirements

Icon	Meaning
	AVOID STATIC ELECTRICITY Use grounding devices.

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

1.2.3 Labels/Icons on the system

Contents in this section

Label Locations on page 36

When used in a veterinary environment on page 38

1.2.3.1 Label Locations

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

Table 1-4 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	5870768-1EN
Running R4.x.x software	5919773-1EN	n/a
Running R5.x.x software	5957889-1EN	n/a

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

MODEL NUMBER	BASIC USER MANUAL DIRECTION NUMBER	RELEASE NOTES DIRECTION NUMBER
Running R3.x.x software	5855997V-1EN	n/a

NOTE

For LOGIQ Fortis-V R4 and R5, user manual is provided through electronic Instruction For Use (eIFU)".

1.2.3.2 Product icons

Information about product icons is located in the User Manual (appropriate revision).

1.2.3.3 When used in a veterinary environment

There are different handling instructions for an Ultrasound system used in a veterinary environment. This table lists the labels (and locations) required on the Ultrasound system when it is used in a veterinary environment.

For specific information about label placement, see *Label Placement for the LOGIQ Fortis used in a Veterinary Environment* on page 753.

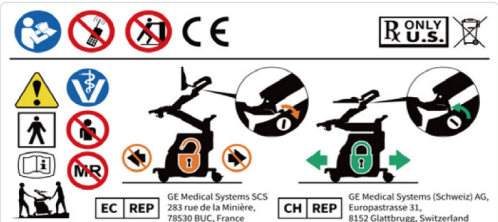
Table 1-6 Product Labels on the LOGIQ Fortis for legacy Vet configurations

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

From 1Q 2023, LOGIQ Fortis Vet Console is released. For specific information about label placement, see *Label Placement for the LOGIQ Fortis used in a Veterinary Environment* on page 753

Table 1-7 Product Labels on the LOGIQ Fortis Vet Console

Label	Location
	Side covers

Label	Location
For R4 and later  For R3 	Rear of Console
	Probe cable(s) near the connector

1.3 Safety Considerations

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.

- *Human safety* on page 40
- *Mechanical safety* on page 43
- *Electrical safety* on page 46
- *Battery safety* on page 47

1.3.1 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 EXIST WITHIN THE LOGIQ Fortis. THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

THE POWER MODULE MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF AND THE MAINS POWER CABLE IS DISCONNECTED.

DISCONNECT THE MAINS POWER CABLE FROM THE POWER MODULE (BATTERY) AS WELL TO PREVENT ELECTRIC SHOCK.

**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.

**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 ULTRASOUND SYSTEM MUST BE TURNED OFF AND DISCONNECTED FROM POWER SOURCE. MAINS POWER CABLE MUST BE CONTROLLED AT ALL TIMES.

DISCONNECT THE POWER CABLE FROM THE POWER MODULE (BATTERY) AS WELL.

BEWARE THAT THE MAIN POWER SUPPLY, POWER MODULE (BATTERY), AND BEPS MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF IF THE MAINS POWER CABLE IS STILL PLUGGED INTO THE AC OUTLET AND/OR THE POWER CABLE FOR THE POWER MODULE (BATTERY) IS CONNECTED.

**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.

**WARNING**

If the covers are removed from an operating ultrasound system, 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 for 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 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 MSDS/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.

**CAUTION**

BECAUSE OF THE LIMITED ACCESS TO CABINETS AND EQUIPMENT IN THE FIELD, AND 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 TWO 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.

1.3.2 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 126 KG (278 LBS) AND UP TO 135 KG (298 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, POSSIBLY RESULTING IN MISDIAGNOSIS.

**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**

IF THE OPERATOR CONTROL PANEL GAS SPRING IS NOT FUNCTIONING CORRECTLY, THERE IS A CHANCE THAT THE OPERATOR PANEL COULD DROP DOWN SUDDENLY WHEN YOU USE THE MANUAL RELEASE HANDLE. TO AVOID INJURY, TAKE CARE THAT YOU ARE NOT POSITIONED BELOW THE OPERATOR PANEL WHEN USING THE MANUAL RELEASE HANDLE.

**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.

**WARNING**

ENSURE THAT NOBODY TOUCHES THE CONSOLE ARM/XY MECHANISM WHEN MOVING THE OPERATOR PANEL. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY.



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.



CAUTION

REMEMBER: 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

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

ALWAYS LOCK THE TOP/UPPER CONSOLE IN ITS PARKING (LOCKED) POSITION BEFORE MOVING THE LOGIQ Fortis.



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

DO NOT MOVE THE ULTRASOUND SYSTEM IF THE OPERATING PANEL IS IN THE UNLOCKED POSITION.



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.



**CAUTION**

DO NOT TRANSPORT LOGIQ Fortis IN A VEHICLE WITHOUT LOCKING THE CASTERS (WHEELS) AND SECURING IT AS DESCRIBED IN CHAPTER 4.

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.

1.3.3 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.
 - 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.

Peripherals

- Refer to the "Peripherals used in the patient environment" in the User Manual (appropriate version) for peripheral isolation information. See *"Label Locations"* for a list of the available user documentation.

1.3.4 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 HEALTHCARE 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 HealthCare 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.

1.4 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 SHUT DOWN.



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.



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 Lockout/Tagout (LOTO)

Contents in this section

- *Lockout/tagout requirements* on page 49
- *Lockout/tagout procedure* on page 50

1.5.1 Lockout/tagout requirements

Read and understand the lockout/tagout (LOTO) requirements before performing any replacement/installation 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.

Preparations



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.
 - Address potentially accumulated energy (capacitors).
 - 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 *Lockout/tagout procedure* on page 50.
- "Power down the LOGIQ Fortis"
 - "Disconnect Power to the LOGIQ Fortis"
 - "Disconnect battery power"



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.

Prior to removing the card rack boards, the LEDs on the end of each board should be unlit, to indicate boards are NOT powered.



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 RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE.
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

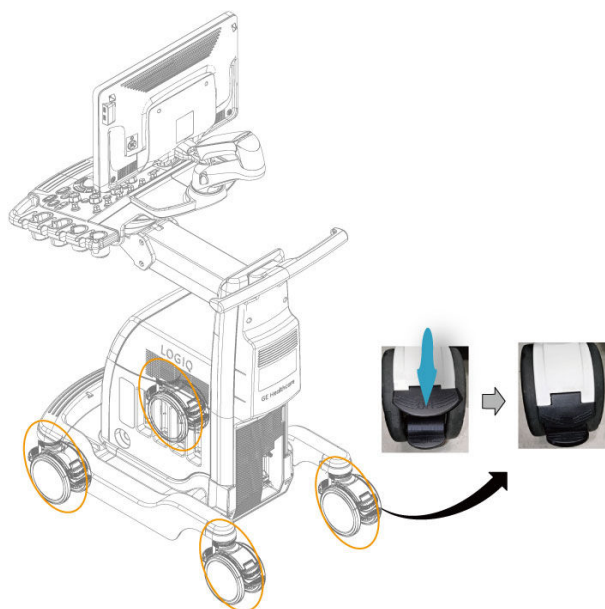
1.5.2 Lockout/tagout procedure

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.

1. Set the caster brake.

Figure 1-1 Caster brake



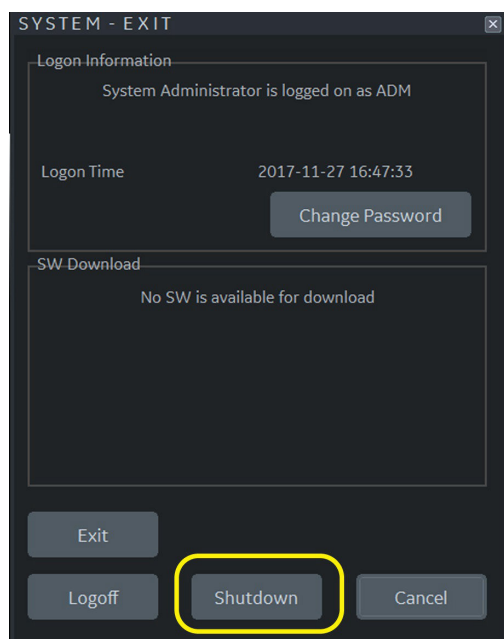
2. Use the operator panel movement controls to set the panel height as required for this procedure.
3. Lock the panel in place.
4. Lightly press the **ON/OFF** button on the operator panel to display the **System - Exit** menu.

Figure 1-2 ON/OFF button



5. Select **Shutdown** to completely power down the LOGIQ Fortis.

Figure 1-3 Shutdown button



6. Wait for the ON/OFF button to turn from blue to white.
7. To address potentially accumulated energy, wait at least 20 seconds for the capacitors to discharge energy.

Disconnect Power to the LOGIQ Fortis

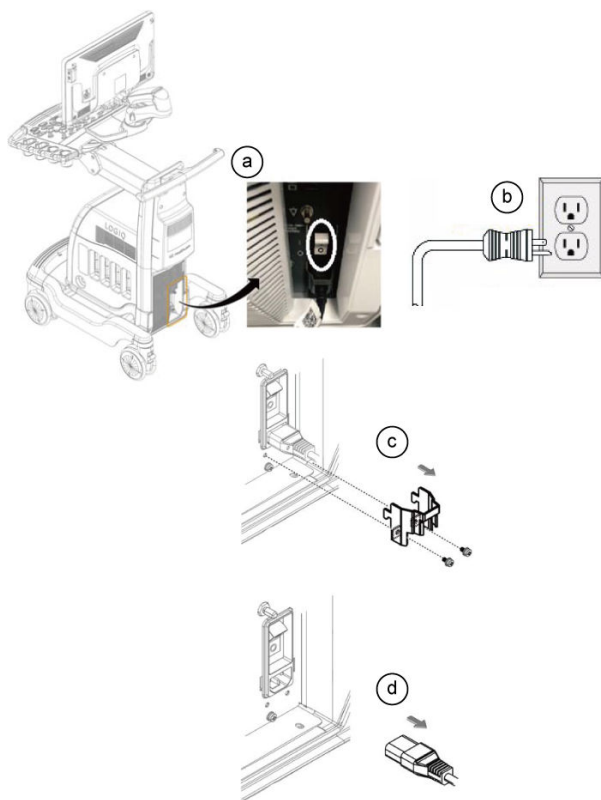


DANGER

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.

1. To remove the energy supply from the LOGIQ Fortis, do the following:
 - a. Turn off the breaker on the back of the LOGIQ Fortis.
 - b. From the wall outlet, disconnect the power cable.
 - c. Remove the power cable FIX BRKT by unscrewing 2 screws.
 - d. Disconnect the power cable from the LOGIQ Fortis.

Figure 1-4 Disconnecting Power



- e. To prevent unexpected reenergization, maintain exclusive control over the power cable.
 - f. Confirm that the ON/OFF button turns OFF.
2. Disconnect and store any probes attached to the LOGIQ Fortis.
3. Disconnect any external I/O cabling.

Disconnect battery power



DANGER

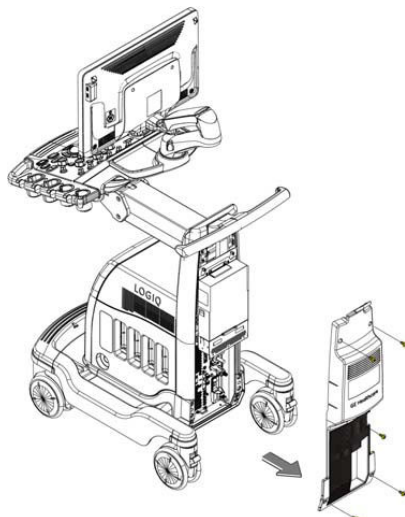
DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT.

The power module may be energized even if the power is turned OFF and the AC power cable is disconnected.

Disconnect the power cable from the power module (battery) as well to prevent electric shock.

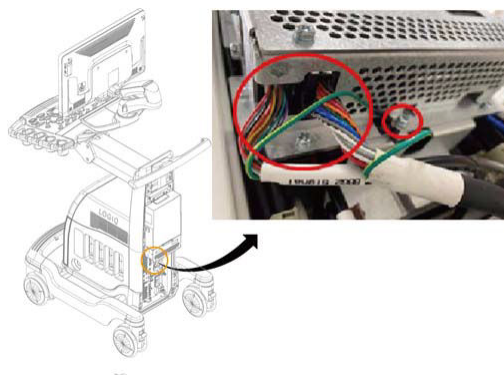
1. Remove 5 screws and rear cover.

Figure 1-5 Removing Rear Cover



2. Remove BBG2 Signal Cable and BBG2 Power Cable and 1 screw.

Figure 1-6 Removing Signal, Power, and GND Cable



3. Confirm that all of these steps have been completed to make sure the Ultrasound system is properly locked out/ tagged out and safe for servicing.

1.6 Returning/Shipping Probes and Repair Parts

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

GE HealthCare policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE HealthCare 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 HealthCare is not responsible for the loss of this data.

If PHI (Patient Healthcare Information) data needs to be sent to GE HealthCare employees for service purposes, GE HealthCare 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.

Chapter 2

Pre-installation

In this chapter

General Requirements.	56
Electromagnetic Compatibility (EMC).	63
Facility Needs.	65
Customer Assistance.	72

This chapter provides the information required to plan and prepare for the setup of an 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.

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

2.1 General Requirements

Contents in this section

- *Environmental requirements* on page 57
- *Electrical requirements* on page 58
- *Electromagnetic interference (EMI) limitations* on page 60
- *Probe environmental requirements* on page 62
- *Time and manpower requirements* on page 62

2.1.1 Environmental requirements



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.

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

Refer to *Table 2-1 Ultrasound System Acclimation Time* on page 57 for guidelines on reaching operational temperatures from storage or transport temperatures.

Table 2-1 Ultrasound System Acclimation 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 those for the LOGIQ Fortis.

Refer to *Table 2-2 Environmental Specifications for the LOGIQ Fortis* on page 57 for environmental specifications.

Table 2-2 Environmental Specifications for the LOGIQ Fortis

	Operational	Storage	Transport (< 16 hrs.)
Temperature	10° - 35° C (50° - 96° 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 - 106 kPa	70 - 106 kPa	70 - 106 kPa
Heat Dissipation	3070 Btu/hour	n/a	n/a

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 electromagnetic interference (EMI) which could degrade image quality. These controls should be selected to minimize possible interference.

2.1.2 Electrical requirements

General requirements

NOTE

GE HealthCare 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 system 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 system 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 the Ultrasound system

In *Table 2-3 Electrical Specifications for the LOGIQ Fortis* on page 58, 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	TOLERANCE	POWER CONSUMPTION	FREQUENCY
6601000/6602000 6601000-10/660200-10 6601000-5/660200-5	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 Inrush Current at Different Mains Voltages* on page 58 for inrush currents at various main voltages.

Table 2-4 Inrush Current at Different Mains Voltages

VOLTAGE	Inrush Current	Remarks
115 VAC (Console only)	25 A max	< 0.2 mSec
120 VAC - 60 Hz (Console with UPS (ABCE1442-11MED))	99 A Max	1~4 mSec
120 VAC - 60 Hz (Console with UPS (9XS1500*))	45 A Max	< 1 mSec
230 VAC (Console only)	50 A max	< 0.2 mSec
230 VAC - 50 Hz (Console with UPS (ABCE1442-22MED))	99 A Max	1~4 mSec
230 VAC - 50 Hz (Console with UPS (SMX12000XLHG))	75 A Max	n/a

* UPS 9SX1500 must be used with Isolation Transformer (IS1800HG)

NOTE

These values are estimations.

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 HealthCare 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.

2.1.3 Electromagnetic interference (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 electromagnetic compatibility (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
- RFID access
- ID card readers

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

See *Table 2-5 EMI Prevention and Abatement* on page 60 for EMI prevention and abatement tips.

Table 2-5 EMI Prevention and Abatement

EMI Rule	Detail
Be aware of RF sources	• 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	• 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.

EMI Rule	Detail
Use GE HealthCare 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.

2.1.4 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 the User Manual (appropriate version). See "*Label Locations*" for a list of the available user documentation.

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 *Table 2-1 Ultrasound System Acclimation Time* on page 57 to determine the needed settlement time.

2.1.5 Time and manpower requirements



DANGER

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.

2.2 Electromagnetic Compatibility (EMC)

Contents in this section

- *What is EMC?* on page 63
- *Compliance* on page 63
- *Electrostatic discharge (ESD) prevention* on page 64

2.2.1 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 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 User Manual or Release Notes. See "*Label Locations*" for a list of the available user documentation.

2.2.2 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.

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.

2.2.3 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.

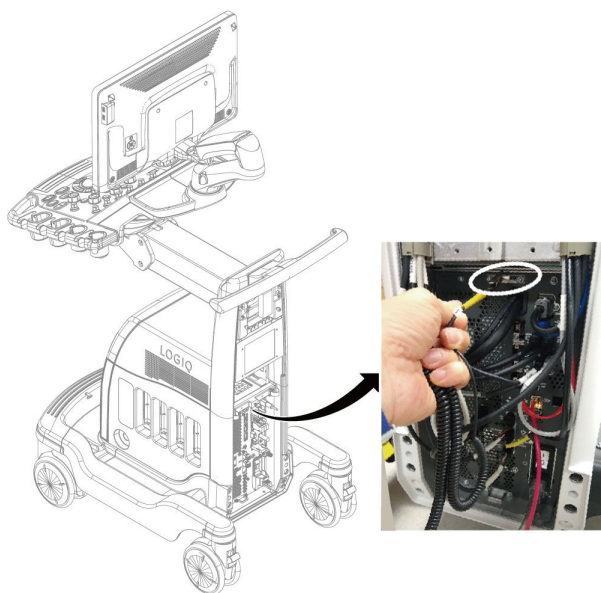
**DANGER**

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 IN SHUTDOWN MODE.

Figure 2-1 ESD Receptacle



2.3 Facility Needs

Contents in this section

- *Purchaser responsibilities* on page 65
- *Required facility needs* on page 66
- *Desirable features* on page 66
- *Minimal floor plan suggestions* on page 67
- *Networking setup requirements* on page 69
- *Privacy and security* on page 70
- *Environmental dangers* on page 70

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 HealthCare 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 electromagnetic interference (EMI) should also be investigated before delivery. Dirt, static, and EMI can negatively impact LOGIQ Fortis reliability.

2.3.2 Required facility needs

NOTE

GE HealthCare 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 system 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 system outlet.

- Dedicated single branch power outlet of adequate amperage (see *Table 2-3 Electrical Specifications for the LOGIQ Fortis* on page 58) 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 2-2 Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot)* on page 67 and *Figure 2-3 Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot)* on page 68, 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 2-2 Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot)

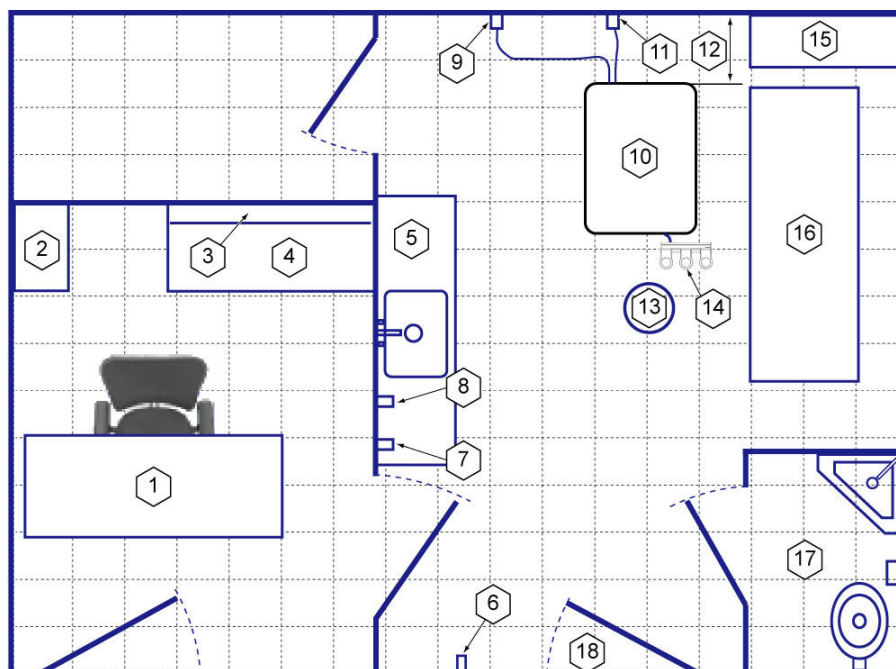


Table 2-6 Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot) key

Item	Description	Item	Description
1.	Secretary or doctors desk	2.	Lockable cabinet ordered by GE HealthCare 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 the Ultrasound system 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)

Item	Description	Item	Description
17.	Lavatory and dressing room	18.	Door – at least 76 cm (30 inches)

Figure 2-3 Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot)

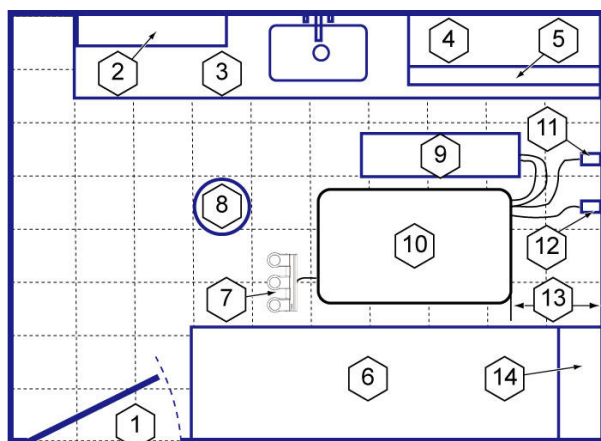


Table 2-7 Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot) Key

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 the Ultrasound system from wall or objects	14.	Lockable cabinet ordered by GE HealthCare 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.

A DNS server is required to connect to the GE Backoffice.

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

Device Management (Device Mgmt) requirements

Need internet access on the outbound port to fleet management service platform, which is only opened on request by the user and through the internet on SSL/TLS on port 443. These are the URLs to access Device Management (Device Mgmt):

- iot.gehealthcare.com through https (Hypertext Transfer Protocol Secure)
- [na.avuri.gehealthcare.com](wss://na.avuri.gehealthcare.com) through wss (WebSocket Secure)

NOTE

Accessing to the Internet often requires a hospital/clinic employee placing a help desk request. If the customer has questions you are unable to answer, please get them in touch with your region's Connectivity Team.

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

NOTE

To connect with the Cloud through a proxy connection, the proxy port needs to be set up on Utility > Device Mgmt.

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 2-4 Worksheet for DICOM Network Information* on page 70. 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 User Manual (appropriate version). See *Label Locations* on page 36 for a list of the available user documentation.

Figure 2-4 Worksheet for DICOM Network Information

LOGIQ						
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				. . .		☐ Raw Data ☐ Allow Multiframe ☐ Structured Reporting ☐ Compression
Store 2				. . .		☐ Raw Data ☐ Allow Multiframe ☐ Structured Reporting ☐ Compression
Store 3				. . .		☐ Raw Data ☐ Allow Multiframe ☐ Structured Reporting ☐ Compression
DICOM Print				. . .		Vendor: _____ Print Size: _____ Medium: _____ Copies: _____ Orientation: _____ Color: _____
Worklist				. . .		
Storage Commit				. . .		Associated Storage AE _____
DICOM MPPS				. . .		

2.3.6 Privacy and security

Since the LOGIQ systems are integrated into your IT-network, GE HealthCare 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" in the User Manual (appropriate version). See *Label Locations* on page 36 for a list of the available user documentation.

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.

Patient Environment IEC60601-1

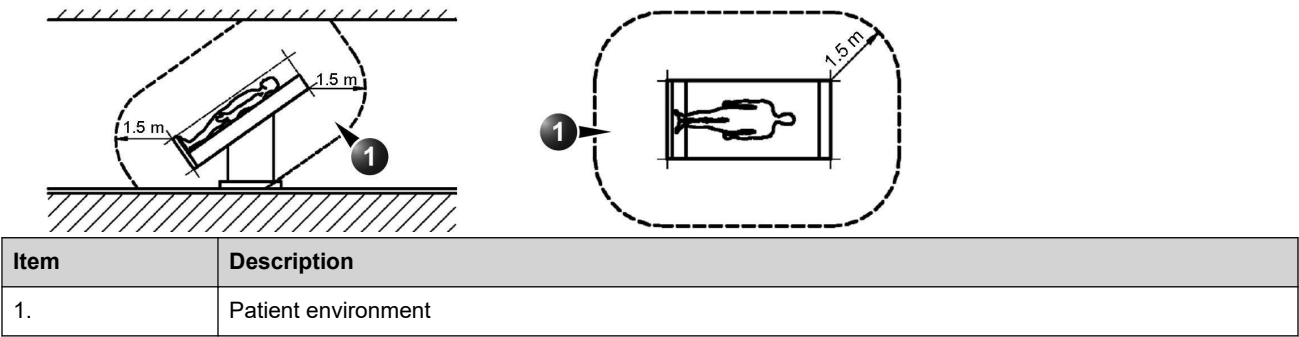
Sub Clause 3.79 and figure A.9 (IEC60601-1)

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



2.4 Customer Assistance

Contents in this section

- *Contact information* on page 72
- *Ultrasound system manufacturer* on page 73

2.4.1 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 2-8 Phone Numbers for Customer Assistance* on page 72.

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.

If you do not see contact information for your region, please contact the local distributor or appropriate support resource.

Table 2-8 Phone Numbers for Customer Assistance

LOCATION	NUMBER	
USA GE HealthCare Ultrasound Service Engineering 3200 N Grandview Blvd Waukesha, WI 53188	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

LOCATION	NUMBER	
Latin America	Argentina	TEL: 800 222 4342
	Brazil	TEL: 3004-2525 (Capitais e Regiões metropolitanas)
		TEL: 08000 165 799 (Demais localidades)
	Chilie	TEL: 888 0020 4342 / 800204302
	Colombia	TEL: 01 800 018 1350
		TEL: #417 (Movistar/Claro/Tigo)
	Mexico	TEL: 800 2000 111
	Peru	TEL: 0 800 54 342
	Puerto Rico	TEL: 1 855 964 0639
EMEA GE Healthcare GmbH Peter-Müller-Straße 24-26 40468 Düsseldorf Germany	Support	TEL: +49 (0) 211 73744789 TEL: +33 1 3083 1300
		FAX: +49 (0) 211 73744685
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
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

2.4.2 Ultrasound system manufacturer

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

Chapter 3

Tools

In this chapter

Tools needed for servicing the LOGIQ Fortis. 76

PPE Required During Service. 78

This chapter provides information on the tools required to service the Ultrasound system.

NOTE
The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE
The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

3.1 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 3-1 Tools Used for Servicing LOGIQ Fortis

Tool Type	Tool Size	GE HealthCare 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*	
	BIT # TX-45*	Use available equivalent
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	
	10 mm	

Tool Type	Tool Size	GE HealthCare Part Number
Open End Wrench	2 mm	Use available equivalent
	3 mm	
	4 mm	
	5 mm	
	10 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. This tool is Region specific.
Digital Multimeter Test Leads	Test Leads Pomona kit	5110653 or available equivalent. This tool is Region specific.
Safety Analyzer [^]	Fluke ESA 612 120V Safety Analyzer Service Tool	5453348-2 or available equivalent. This tool is Region specific.
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
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. The Regional Service Organizations are responsible for ensuring periodic calibration of these tools.		

3.2 PPE Required During Service

The following PPE are required during service tasks, per EHS Policy:

- Safety Glasses
- Safety Shoes
- Cut Resistant Gloves
- Kneel pad (if kneeling is required)
- ESD - mat and wrist strap

Chapter 4

Installation

In this chapter

Setup Reminders.	80
Receiving and Unpacking the Equipment.	82
Preparing for Setup.	88
Completing the Setup.	92
Configuring the LOGIQ Fortis.	115
Setting Up Paperwork.	123

This chapter contains information needed to install the Ultrasound system.

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

4.1 Setup Reminders

Contents in this section

- *Average setup time* on page 80
- *Setup warnings* on page 80

4.1.1 Average setup time

Table 4-1 Average Setup Time

DESCRIPTION	AVERAGE SETUP TIME	COMMENTS
Unpack the LOGIQ Fortis	0.5 hour	
Set Up the LOGIQ Fortis(without options)	4 hours	Depends on the configuration
Configure DICOM Network	2 hours or more	Depends on the configuration
Install InSite	0.5 hour	

4.1.2 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

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.



DANGER

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



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 *Environmental requirements* on page 57.



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.

4.2 Receiving and Unpacking the Equipment

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

- *Receiving and unpacking warnings* on page 82
- *Tilt Watch indicator* on page 83
- *Examine all packages* on page 85
- *Damage in Transportation* on page 86
- *Transportation box label* on page 87
- *Packing materials - recycling information* on page 87

4.2.1 Receiving and unpacking warnings

**DANGER**

TWO PEOPLE ARE NEEDED TO UNPACK THE LOGIQ Fortis DUE TO ITS WEIGHT.

ATTEMPTS TO MOVE THE LOGIQ Fortis CONSIDERABLE DISTANCES, OR ON AN INCLINE, WITH 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.

**DANGER**

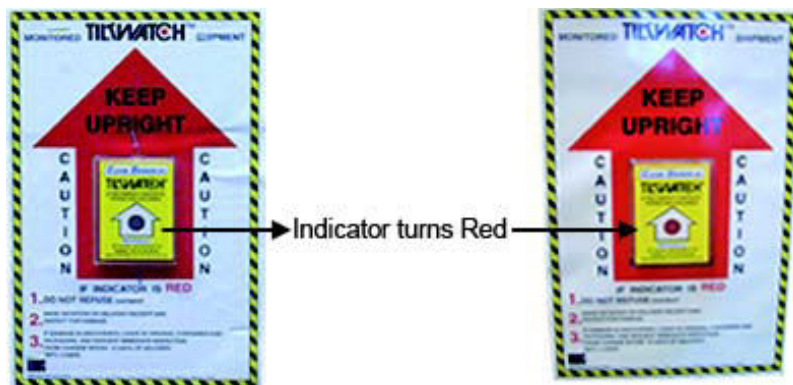
REMEMBER TO USE RELEVANT PERSONAL PROTECTING EQUIPMENT (PPE) DURING PACKING/ UNPACKING. CHECK WITH YOUR LOCAL EHS REPRESENTATIVE.

4.2.2 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 tilt indicator has been attached to the transportation box.

Figure 4-1 Tilt Watch Indicator (example)



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 4-2 Tilt Watch Indicator has triggered or is missing

STEP	TASK
1.	If the tilt indicator is missing: Note on the shipping papers at the time of receipt that the tilt indicator label is missing. If the tilt indicator has been triggered (activated): Note on the shipping papers at the time of receipt that the tilt indicator label was activated.
2.	Inspect the product for damage.

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.

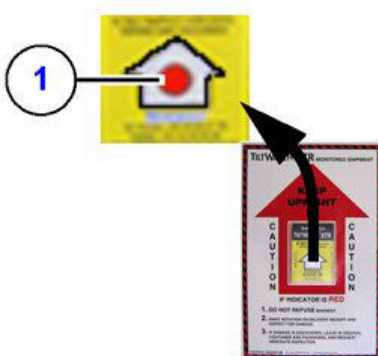


4.2.3 Examine all packages

Examine packages closely at time of delivery as described in the procedure below.

1. Is damage apparent?
 - If **YES**; continue with the instructions in *Damage in Transportation* on page 86.
 - If **NO**; continue with the next step.
2. Before cutting the straps, check the tilt indicator. Is the tilt indicator red colored inside the middle of the indicator?
 - If YES: The tilt Indicator has been activated. Continue with the instructions in *Damage in Transportation* on page 86.

Figure 4-2 Tilt Indicator - Red



1 - Red Color

4.2.4 Damage in Transportation

Follow this procedure if damage is apparent:

1. Write "Damage In Shipment" on ALL copies of the freight or express bill BEFORE delivery is accepted or "signed for" by a GE HealthCare 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.
 - 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.

4.2.5 Transportation box label

Figure 4-3 Transportation box label

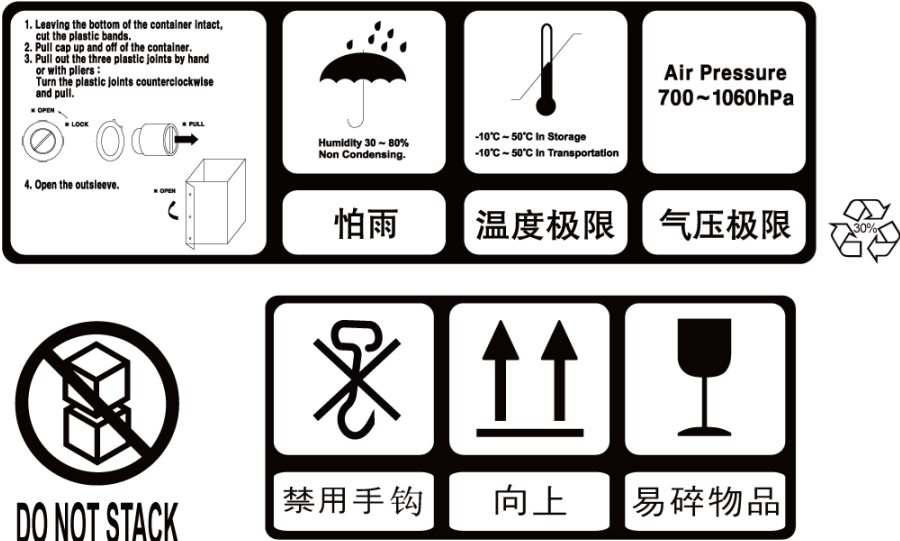


Table 4-3 LOGIQ Fortis Transportation Box Labeling

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

4.2.6 Packing materials - recycling information

The packing materials for the LOGIQ Fortis are recyclable:

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

4.3 Preparing for Setup

Contents in this section

- *Verify customer order* on page 88
- *Physical inspection* on page 88
- *Physical connection* on page 88
- *Volume Navigation stand (optional)* on page 88
- *Location of Multi Caution label and rating label* on page 89
- *EMI protection* on page 91

4.3.1 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.

4.3.2 Physical inspection

Verify that the LOGIQ Fortis arrived intact (visual inspection). If the LOGIQ Fortis has been damaged, see "*Damage in transportation*".

4.3.3 Physical connection

4.3.3.1 Stand-alone LOGIQ Fortis

No network connection needed.

4.3.3.2 Sneaker Net environment

No network connection needed.

4.3.3.3 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.

4.3.3.4 Connection through a peer-to-peer network

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

4.3.3.5 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.

4.3.4 Volume Navigation stand (optional)

To assemble the Volume Navigation stand, see "*Roll stand assembly or replacement*".

4.3.5 Location of Multi Caution label and rating label

Figure 4-4 Multi Caution Label

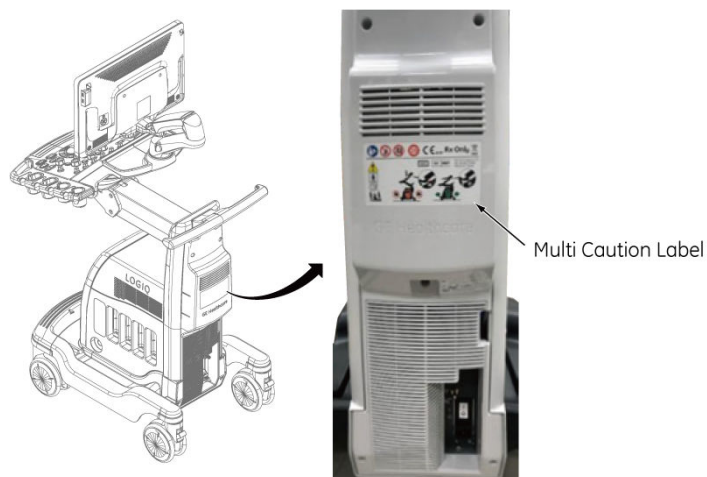


Figure 4-5 Rating Label (Operator Panel Base)

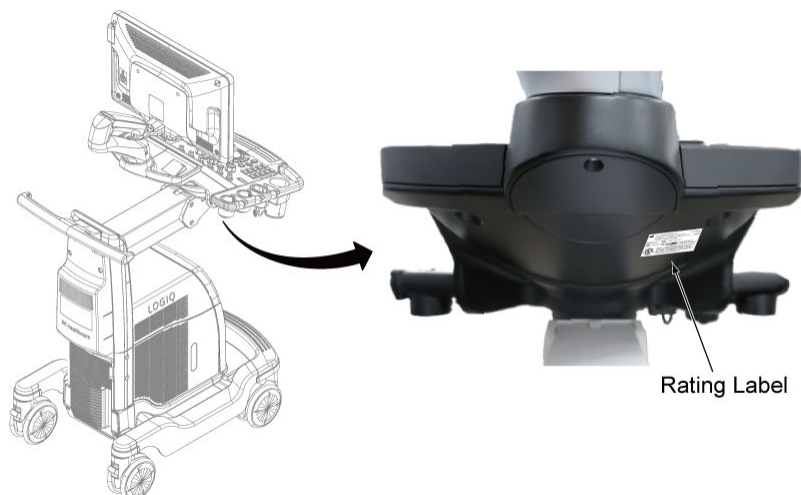


Figure 4-6 Rear Cover Label

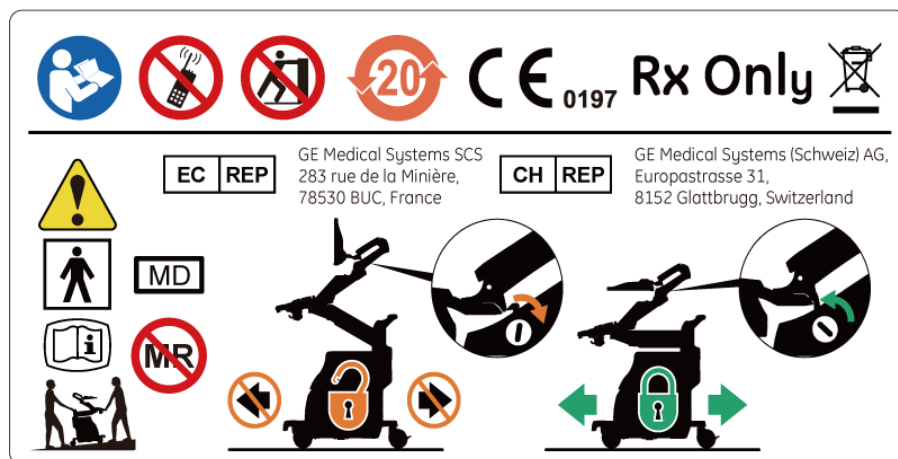
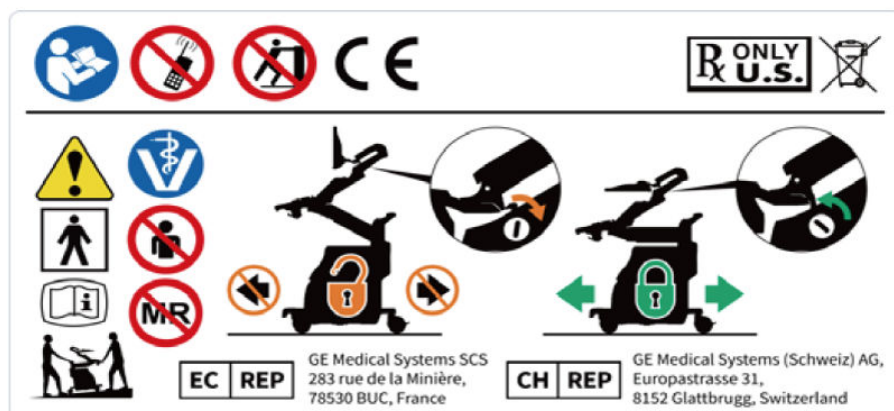


Figure 4-7 Rear Cover Label for Vet Console

For R4 and later



For R3



Figure 4-8 Rating Label



4.3.6 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 *Electromagnetic interference (EMI) limitations* on page 60 for more information about EMI protection.

4.4 Completing the Setup

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

- *LOGIQ Fortis specification verification* on page 93
- *Electrical specification verification* on page 93
- *Connections on the rear I/O panel* on page 94
- *Connections on the patient I/O panel* on page 95
- *Connecting/disconnecting probes* on page 96
- *Power on/boot up* on page 98
- *Default security level* on page 101
- *Password policies* on page 102
- *Users* on page 103
- *Groups* on page 105
- *Lock out and log on* on page 106
- *Disk encryption* on page 107
- *Login* on page 111
- *Power shut down* on page 113
- *Complete power down* on page 114

NOTE

For information on System customizations (including setting date/time and hospital name), refer to the User Manual (appropriate version).

4.4.1 LOGIQ Fortis specification verification

4.4.1.1 Verification of the LOGIQ Fortis requirements

- Verify that the site meets the requirements listed in (see *Facility Needs* on page 65).
- Verify that the specifications (physical dimensions, mass, and acoustic noise output) below do not conflict with any on-site conditions.

4.4.1.2 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.)

4.4.1.3 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.

4.4.2 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 OPIO arm of the LOGIQ Fortis.

Refer to *Location of Multi Caution label and rating label* on page 89 for more information.

4.4.3 Connections on the rear I/O panel



DANGER

THE CONNECTION OF EQUIPMENT OR TRANSMISSION NETWORKS OTHER THAN AS SPECIFIED IN THESE INSTRUCTIONS CAN RESULT IN ELECTRIC SHOCK HAZARD. ALTERNATE CONNECTIONS WILL REQUIRE VERIFICATION OF COMPATIBILITY AND CONFORMITY TO IEC/EN 60601-1 BY THE INSTALLER. EQUIPMENT MODIFICATIONS AND POSSIBLE RESULTING MALFUNCTIONS AND ELECTROMAGNETIC INTERFERENCE ARE THE RESPONSIBILITY OF THE OWNER.



CAUTION

FOR COMPATIBILITY REASONS, USE ONLY GE HEALTHCARE-APPROVED PROBES, PERIPHERALS, OR ACCESSORIES.

DO NOT connect any probes or accessories without approval by GE HealthCare. Failure to follow these instructions could lead to unexpected diagnostic performance.

NOTE

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (for example, IEC 60950 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the LOGIQ Fortis standard IEC 60601-1. 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 IEC 60601-1. If in doubt, consult the technical service department or your local representative for GE HealthCare.

4.4.3.1 Connect Ethernet

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

Figure 4-9 I/O Rear Panel

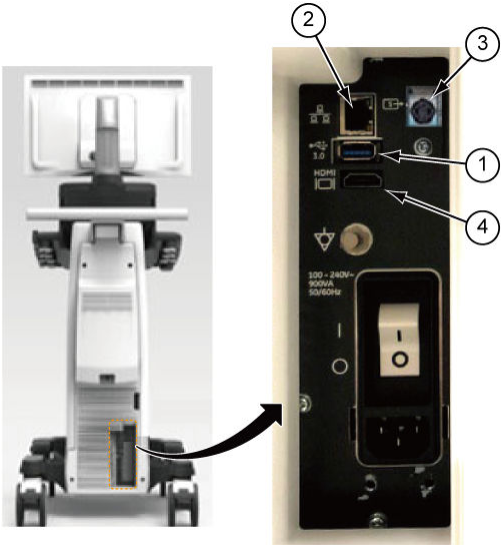


Table 4-4 I/O Rear Panel

Item	Connection	Specification
1	USB port	3.0
2	Ethernet connector	RJ-45 modular, 8-pin
3	S-Video (optional)	NTSC (720x480i, 60Hz) and PAL (720x576i, 50Hz)

Item	Connection	Specification
4	HDMI port	1920x1080 is the only supported resolution.

4.4.3.2 Connect USB Flash Drive

For information, see “USB Hard Disk Drive and USB Flash Drive” in the User Manual (appropriate version).

4.4.4 Connections on the patient I/O panel

Connect ECG

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

4.4.5 Connecting/disconnecting probes


CAUTION

DO NOT CONNECT A PROBE WHILE THE LOGIQ Fortis IS POWERING UP.

Probes can be connected at any time, whether the Ultrasound system is on or off. The Ultrasound system has four DLP probe ports (*Figure 4-10 Probe Connectors, Four DLP Probe Ports* on page 96). This is the only type of probe port on the LOGIQ Fortis.

Probes can be disconnected at any time. However, the probe should not be active when disconnecting the probe.

Figure 4-10 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 free. Impact to the probe head could result in irreparable damage. Use the integrated cable management hook to wrap the cord.


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.

NOTE

When connecting the probe, DO NOT turn the locking lever if resistance is felt. If this is the case, remove the probe connector and check for misaligned or damaged pins. Probes with damaged connector pins should be taken out of service immediately.

5. Turn the locking handle clockwise to the full vertical position to lock in place.
6. Position the probe cable (using a cable hook) so that it is not resting on the floor.

To disconnect a probe:

1. Ensure the probe is deactivated. Deactivate by selecting another probe or pressing Freeze.
2. Move the probe locking handle to the left.
3. Pull the probe connector straight out of the probe port carefully.
4. Carefully slide the probe and connector away from the probe port and around the right side of the keyboard.
5. Ensure the cable is free.
6. Ensure that the probe head is clean before placing the probe in its storage case or wall hanging unit. For cleaning instructions, see "Probe Cleaning Process" in the User Manual (appropriate version).

4.4.6 Power on/boot up

**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.

4.4.6.1 Connect mains power cable to the LOGIQ Fortis

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

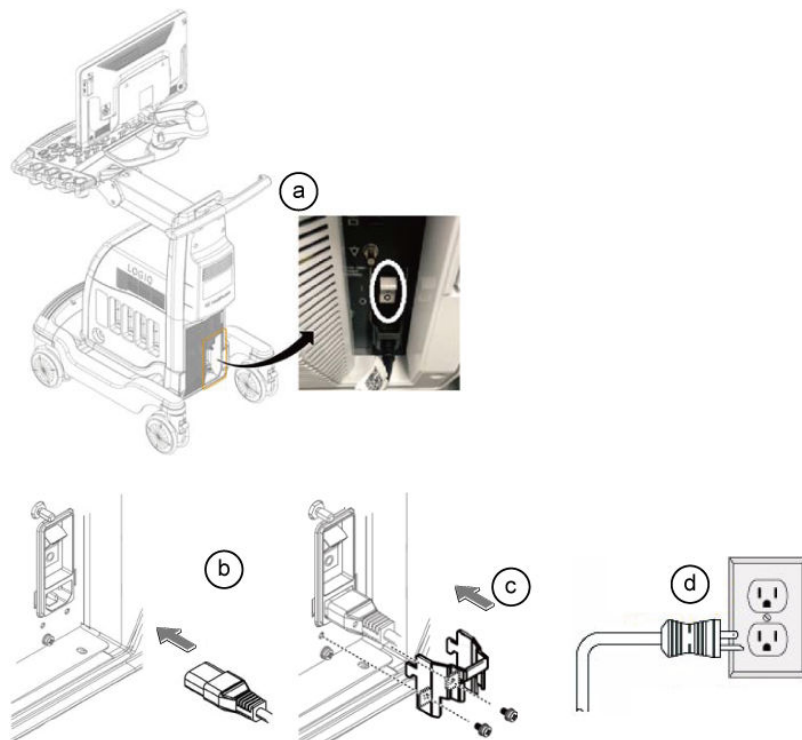
NOTE

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 mains 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 mains power cable per following steps.
 - a. Verify that the mains power circuit breaker is in OFF position, If not, switch it to OFF.
 - b. Connect the female plug of the power cable to the power inlet at the rear of the Ultrasound system.
 - c. Install the mains power cable FIX BRKT with 2 screws (2159625, Screw PH WSP M4x8).

- d. 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.

Figure 4-11 Connecting mains power cable



4.4.6.2 Switch ON the AC power to LOGIQ Fortis

1. Switch ON the circuit breaker at the rear of the Ultrasound system. The **ON/OFF** button turns white.

Figure 4-12 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 power supply, 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 green 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 2D 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 Ultrasound system will prompt a password protected Login.

4.4.7 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.

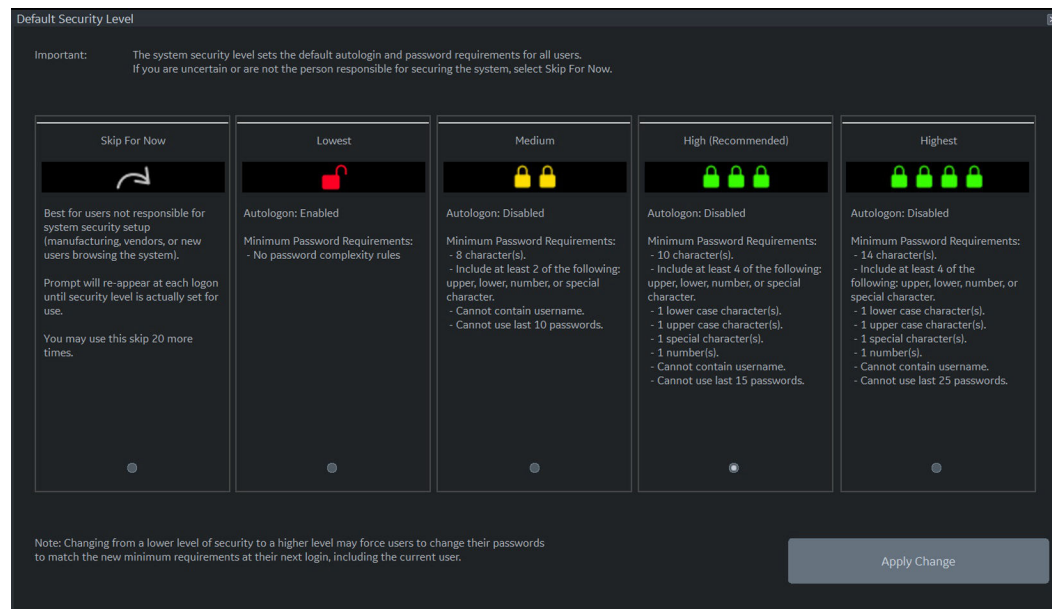
NOTE

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 User Manual (appropriate version) for more information.

Figure 4-13 Default Security Level Dialog Box



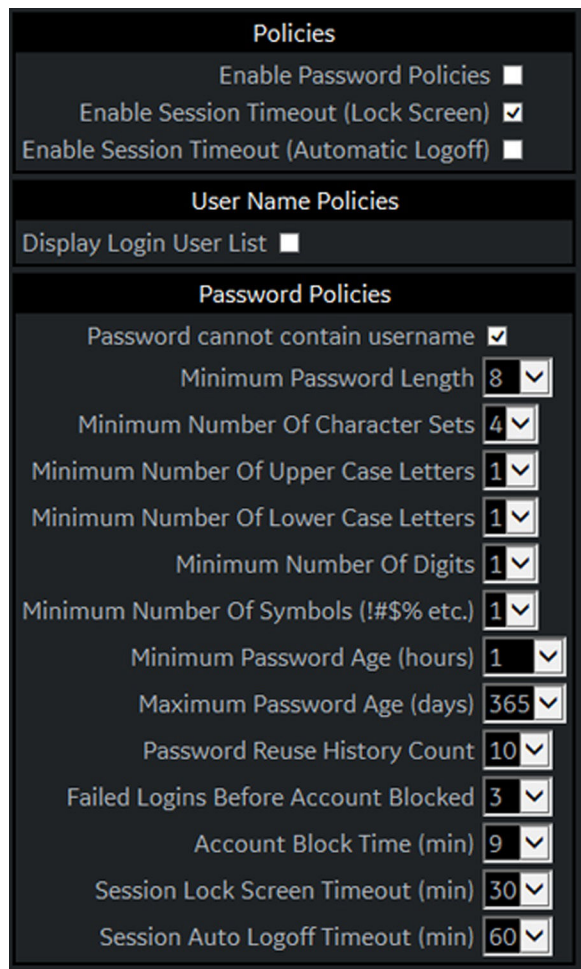
4.4.8 Password policies

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

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 4-14 Policies Window



Policies	
Enable Password Policies	☐
Enable Session Timeout (Lock Screen)	☒
Enable Session Timeout (Automatic Logoff)	☐

User Name Policies	
Display Login User List	☐

Password Policies	
Password cannot contain username	☒
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**.

4.4.9 Users

See the 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 4-15 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.

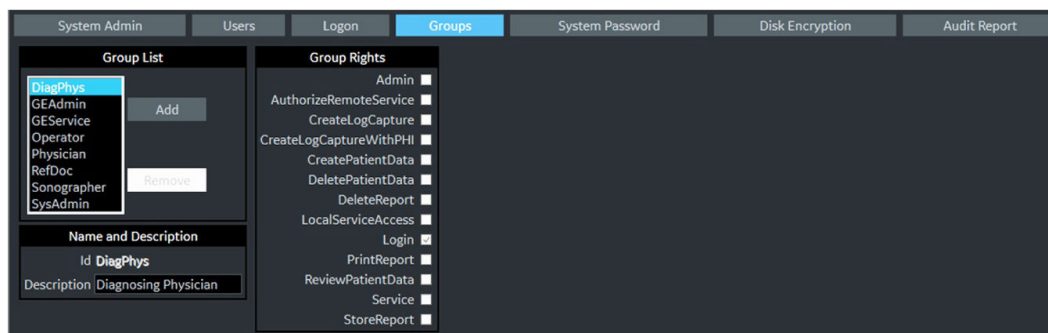
4.4.10 Groups

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 4-16 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.

4.4.11 Lock out and log on

To set lock out and log on

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

Figure 4-17 Logon Window

The screenshot shows the 'Logon' configuration window. The 'Policies' section is expanded, showing the following settings:

- Policies:**
 - Enable Password Policies: ☐
 - Enable Session Timeout (Lock Screen): ☒
 - Enable Session Timeout (Automatic Logoff): ☐
- User Name Policies:**
 - Display Login User List: ☐
- Password Policies:**
 - Password cannot contain username: ☒
 - 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

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 **Login** window, enter the user ID, enter the password, and then select **Ok**.

NOTE

The user will have access according to the rights in their assigned group.

To set auto logon

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.

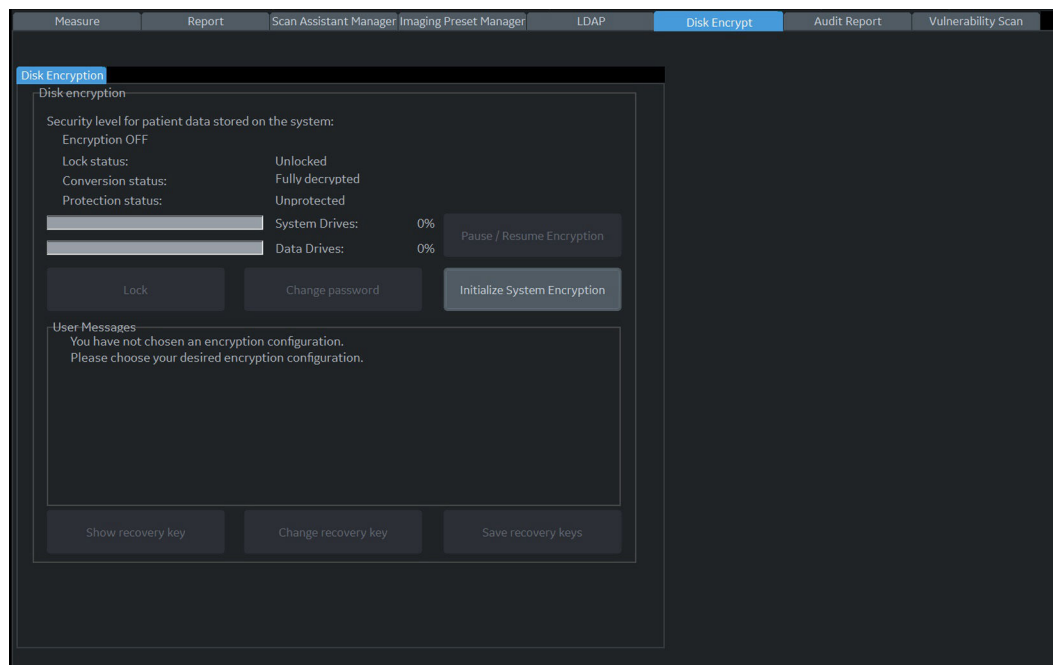
4.4.12 Disk encryption

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

4.4.12.1 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 4-18 Encryption OFF (Initialize System Encryption not selected)



These are the values for the encryption fields:

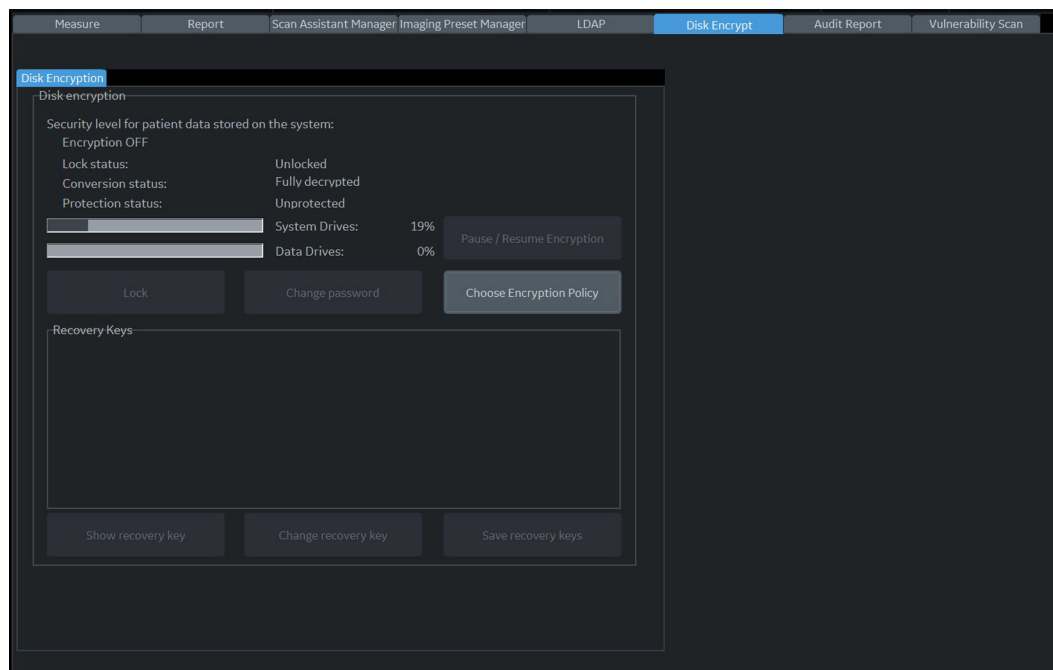
- Conversion status: Fully decrypted (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 0%
- Data Drives (user partitions): 0%

4.4.12.2 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 4-19 Disk Encryption - Encryption OFF



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

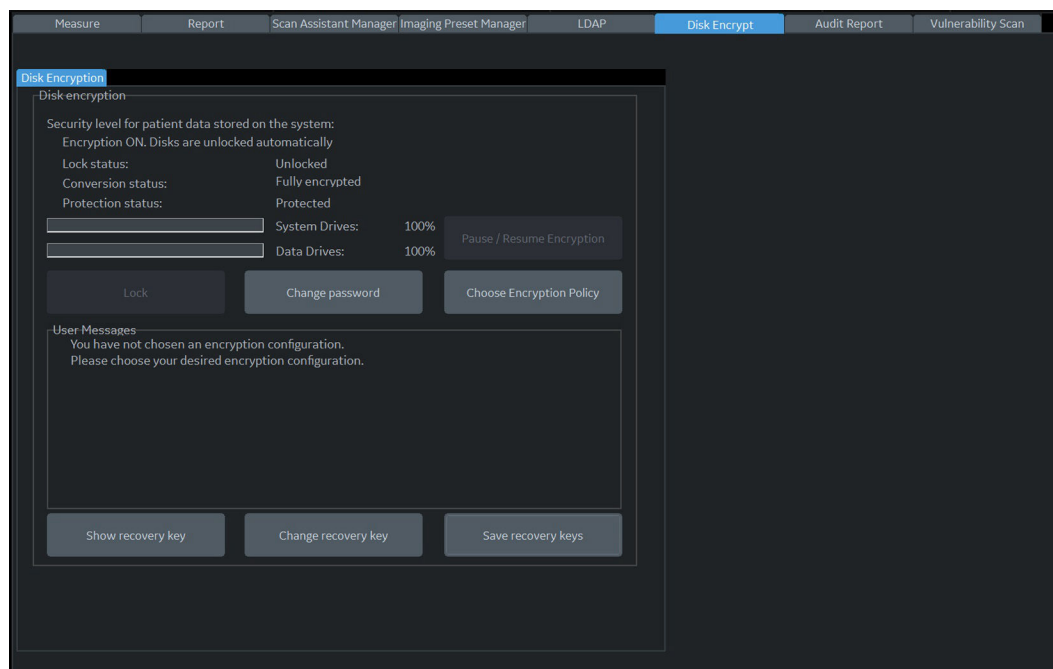
- Conversion status: Fully decrypted (data drives)
- Protection status: Unprotected (data drives)
- System Drives: 19% - once initialized, the SSD drive will be encrypted.
- Data Drives (user partitions): 0% - once initialized, the user partitions drive will be encrypted. If the encryption policy is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

4.4.12.3 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 set to run through completion.

Figure 4-20 Disk Encryption - Encryption ON



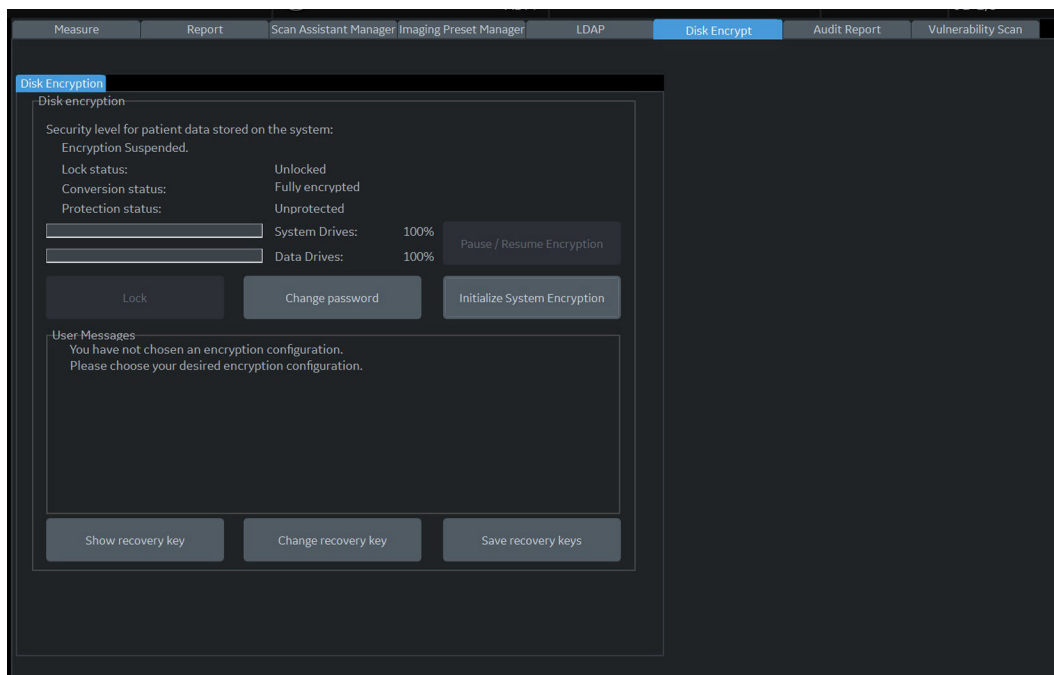
These are the values for the encryption fields (These % values display when the encryption task is complete):

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

4.4.12.4 Encryption Suspended after encryption

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

Figure 4-21 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 (user partitions): 100%

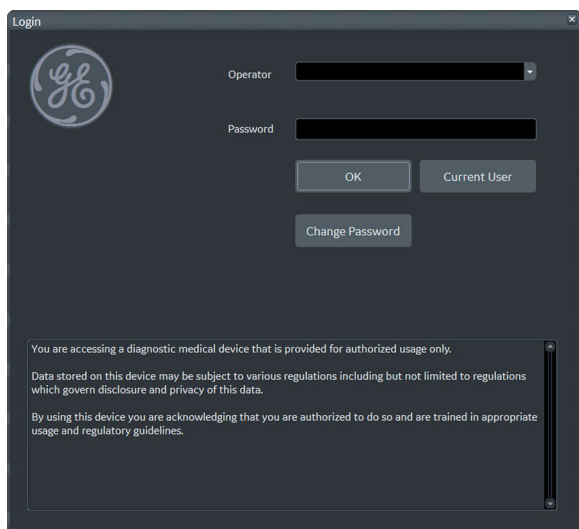
4.4.13 Login

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.

Figure 4-22 Login Window



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.

To change your password

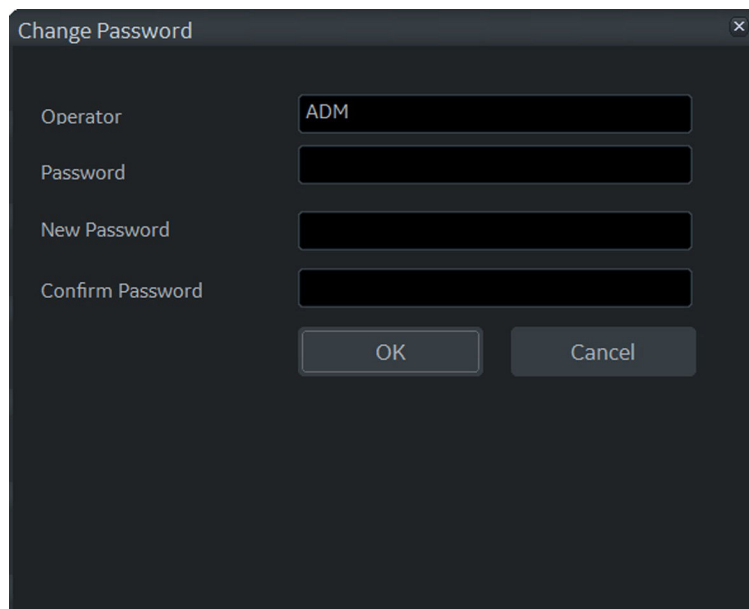
You can change the password when first logging onto the LOGIQ Fortis.

NOTE

If the ADM password is lost, the GE service engineer can reset the ADM and USR passwords to the default values.

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

Figure 4-23 Change Password Dialog Box

A screenshot of a 'Change Password' dialog box. The dialog box has a title bar with the text 'Change Password' and a close button (X). Inside the dialog box, there are four text input fields labeled 'Operator', 'Password', 'New Password', and 'Confirm Password'. The 'Operator' field contains the text 'ADM'. Below the input fields are two buttons: 'OK' and 'Cancel'.

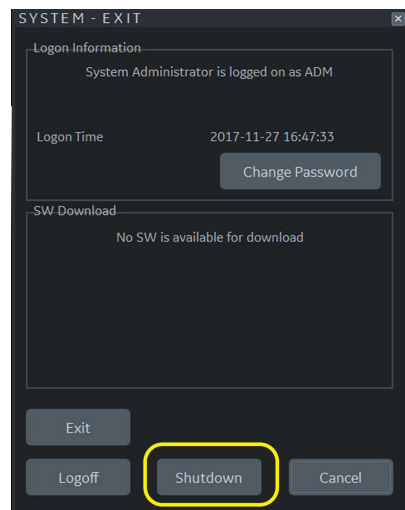
3. Type the following:
 - **Password:** Type your current password.
 - **New Password:** Type your new password.
 - **Confirm Password:** Retype your new password.
4. Press **OK** to confirm your changes, or **Cancel** to cancel your changes.

4.4.14 Power shut down

You can use the **SYSTEM - EXIT** menu to log off, shut down, and exit. Power shut down occurs when selecting shut down with 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.

Figure 4-24 SYSTEM - EXIT menu



The **SYSTEM - EXIT** menu, used when switching OFF the LOGIQ Fortis, gives you the following choices:

- **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 this button is dimmed, it indicates that no user is logged on to the LOGIQ Fortis at the moment.
- **Shutdown**
Use this button to shut down the Ultrasound system. It is recommended to perform a full shutdown at least once a week.
If **Shutdown** button is dimmed, press the **ON/OFF** button or **Alt+F10** to shut down the LOGIQ Fortis.
- **Cancel**
Use this button to exit from the **SYSTEM-EXIT** menu and return to the previous operation.

4.4.15 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.

4.5 Configuring the LOGIQ Fortis

This section describes how to configure the LOGIQ Fortis.

- *LOGIQ Fortis configuration* on page 115
- *Optional peripherals/peripheral connection* on page 116
- *Barcode reader* on page 116
- *Magstripe card reader* on page 117
- *RFID reader* on page 118
- *Cable hook direction* on page 119
- *LAN Protection Cable (Option)* on page 120
- *Network printers* on page 122

4.5.1 LOGIQ Fortis configuration

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

4.5.2 Optional peripherals/peripheral connection

4.5.2.1 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
- Wireless LAN Option
- 2nd Wireless LAN Option for Vscan Air
- Tablet Option
- Vscan Air Charger Option

4.5.2.2 Optional peripherals/peripheral connection

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

4.5.2.3 Additional information

See *Options and Peripherals* on page 350 for replacement units.

4.5.2.4 Printer checks

Check to see if the printer works as described in the table below.

Table 4-5 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.

4.5.3 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 the 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.

4.5.4 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)

Figure 4-25 Card Reader



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.
2. Boot up the Ultrasound system.
3. Scan the card that comes with the card reader to activate the 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.

4.5.5 RFID reader

The RFID reader can be used to populate the following:

- username
- password

Once the RFID reader is installed, and the user's card has been activated, they can log in to the Ultrasound system by simply holding the card near the RFID reader.

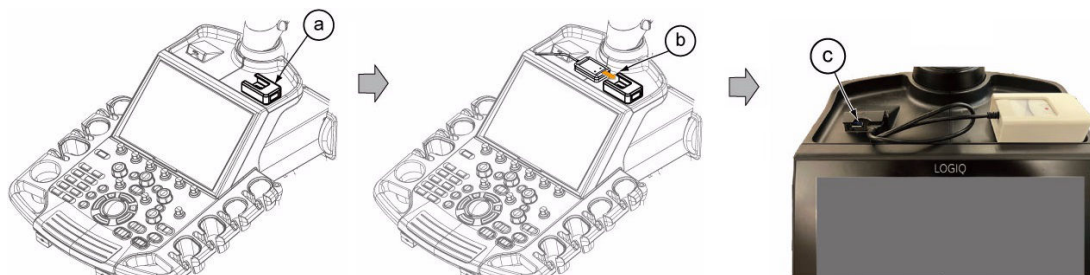
For complete instructions on installing the RFID reader, see the RFID Option in the LOGIQ Fortis Hardware and Software Option Installation Manual(DOC2548436).

To connect the RFID reader:

1. Clean and degrease the surface of the OPIO top cover before attaching the RFID cradle.
2. Peel off the brown backing on the double sided tape and apply tape to RFID cradle.
3. Peel off the red backing on the double sided tape on the back of the RFID cradle using tweezers.
4. Install RFID on the OPIO top cover per following steps.
 - a. Attach RFID cradle on the OPIO top cover as shown in the illustration.
 - b. Insert RFID into the cradle.

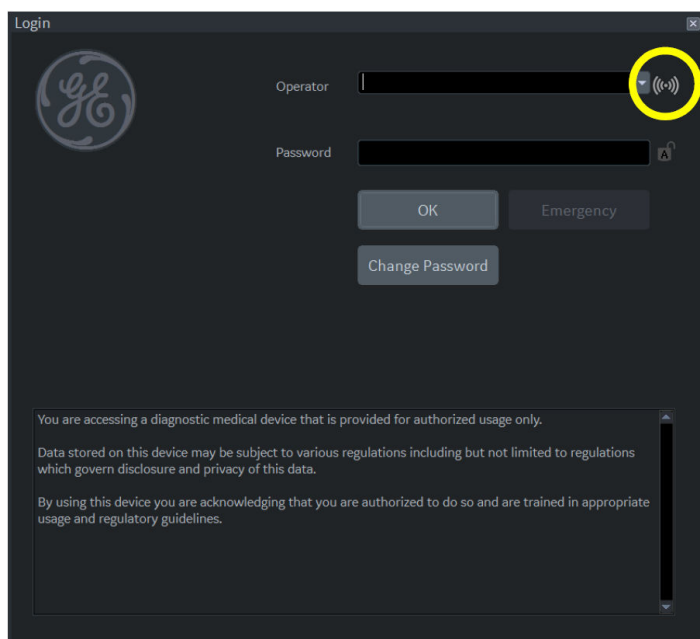
- c. Connect USB cable to the monitor USB port.

Figure 4-26 RFID Reader



5. Turn the Ultrasound system on. If the Ultrasound system is already on, reboot the Ultrasound system.
6. On the Ultrasound system is on, confirm that the RFID symbol (circled below) appears on the Login page.

Figure 4-27 RFID Symbol



7. Activate the RFID-enabled card. To activate a card, see Assign RFID Card in the user manual.

4.5.6 Cable hook direction

Cable hook direction can be changed depending on Customer preference.

1. Loosen the screw circled by orange.
2. Remove the screw circled by red.

3. Change the cable hook direction and fix with the screws.

Figure 4-28 With keyboard option

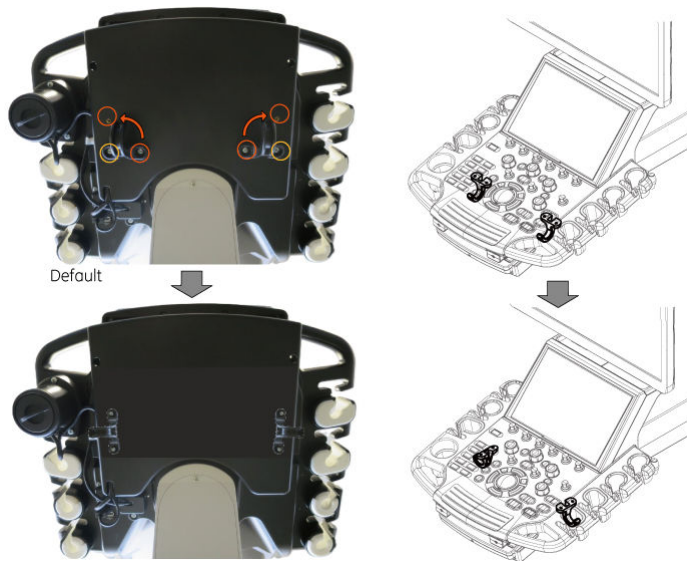


Figure 4-29 Without keyboard option



4.5.7 LAN Protection Cable (Option)

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

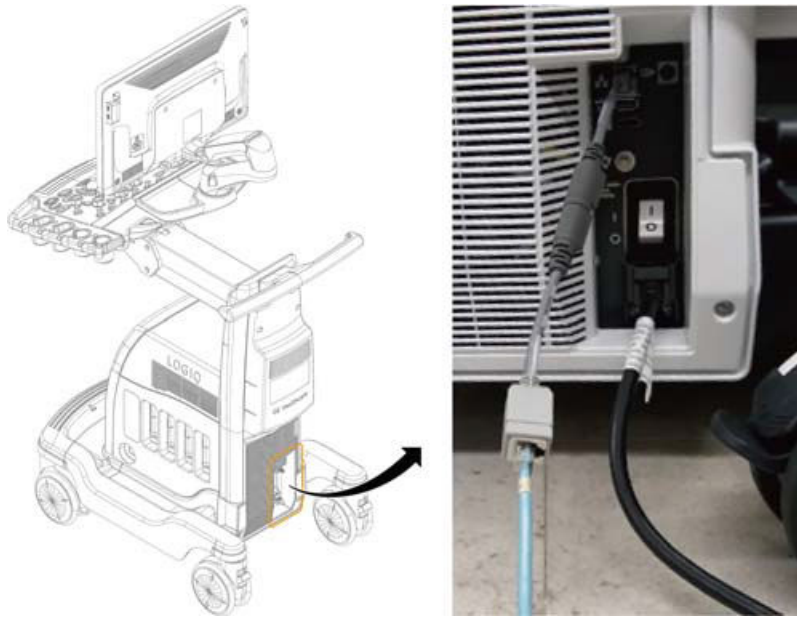
NOTE

To prevent claw breakage of LAN cable, use the LAN protection cable as below.]

Figure 4-30 LAN Protection Cable



Figure 4-31 LAN Cable with Protection Cable (Example)



4.5.8 Network printers

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

NOTE

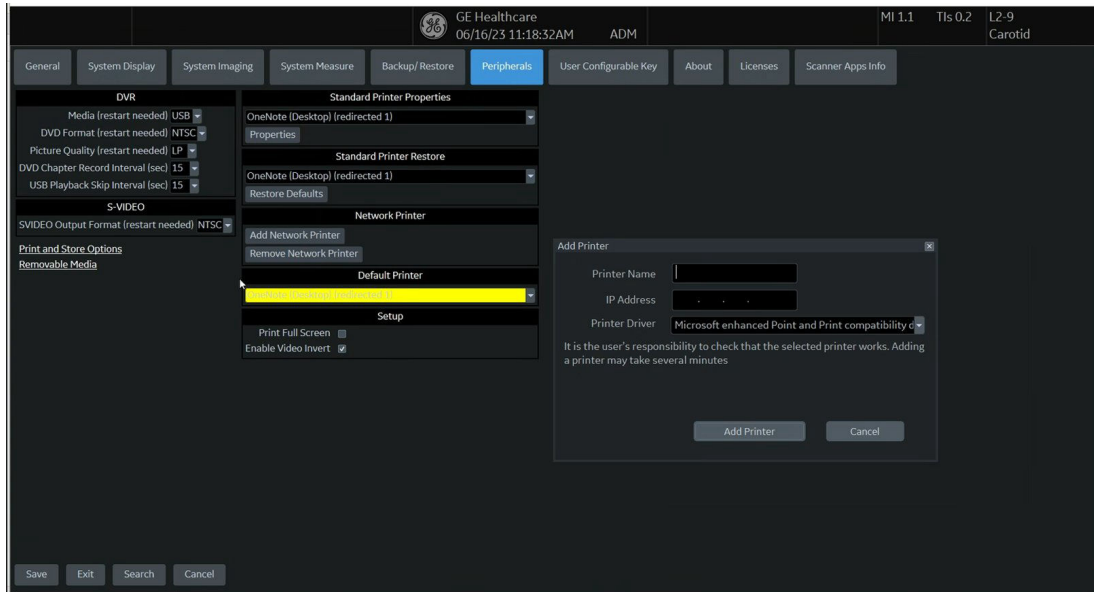
It is solely the customer's responsibility to determine printer and network settings and configuration to enable and ensure the specific network printer usage and functionality.

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

NOTE

Network printer is not available through Connection Manager.

Figure 4-32 Utility > System > Peripherals > Add Network Printer



Refer to "Network Printer" in the User Manual (appropriate version) for more information.

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.

4.6 Setting Up Paperwork

NOTE

During and after setup, the documentation (for example, removable medias with documentation, user manuals, and installation manuals) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user information is available during the operation and service of the complete system.

4.6.1 User manual(s)

Check that the correct user manual (or removable media with user manuals) for the software revision and language of the LOGIQ Fortis is included.

4.6.2 Product locator card/UDI

NOTE

The product locator card shown may not be the same as the provided product locator card.
The UDI of the medical device must be captured when any work is performed on that device. Refer to your local procedures on the actual capturing of the UDI.

Figure 4-33 Product Locator Card (Example)

 Mailing Address GEHC - Americas Product Locator - W523 P.O. Box 414 Milwaukee, WI 53201-0414		GIB, European Central Admin Product Locator Cards XEROX Office VÁKUUMTECHNOLÓGIAI GÉPGYÁR FŐTÍ ÚT 141 1046 Budapest Hungary		Product Locator Card Asia Service Operation No. 1, Yongchang North Road Beijing Economic and Technologic Development Area Beijing 100176 China	
DESCRIPTION		FDA	MODEL	REV	SERIAL
SHIPMENT		OCP	BS	ORD	
		DISTRICT	CUSTOMER NO.		DATE (MO - DA - YR)
		DESTINATION NAME AND ADDRESS _____ _____ _____ ZIP CODE			
46-303268P1 Rev 14					
 Mailing Address GEHC - Americas Product Locator - W523 P.O. Box 414 Milwaukee, WI 53201-0414		GIB, European Central Admin Product Locator Cards XEROX Office VÁKUUMTECHNOLÓGIAI GÉPGYÁR FŐTÍ ÚT 141 1046 Budapest Hungary		Product Locator Card Asia Service Operation No. 1, Yongchang North Road Beijing Economic and Technologic Development Area Beijing 100176 China	
DESCRIPTION		FDA	MODEL	REV	SERIAL
SYSTEM LTD.		OCP	BS	ORD	EMPLOYEE NO.
		DISTRICT	ROOM		DATE (MO - DA - YR)
		CUSTOMER NO.			
INSTALLATION		DESTINATION NAME AND ADDRESS _____ _____ _____ ZIP CODE			
46-303268P1 Rev 14					

Chapter 5

Alignment, Setup and Calibration

In this chapter

Monitor Adjustments.	126
Monitor Arm and/or Monitor Range of Motion Adjustment.	133
DICOM Server Service Adjustments.	137
Volume Navigation (V Nav) Calibration.	138

This section describes how to adjust the LOGIQ Fortis.

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

5.1 Monitor Adjustments

This section describes how to adjust the monitor for optimal performance.

Contents in this section

- *Access to monitor adjustments* on page 126
- *Monitor adjustments* on page 128
- *Advanced monitor adjustments* on page 130

5.1.1 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 shown in the table below.

NOTE

If Color Profile is not displayed on the Utility (second page), check the USB Connection.

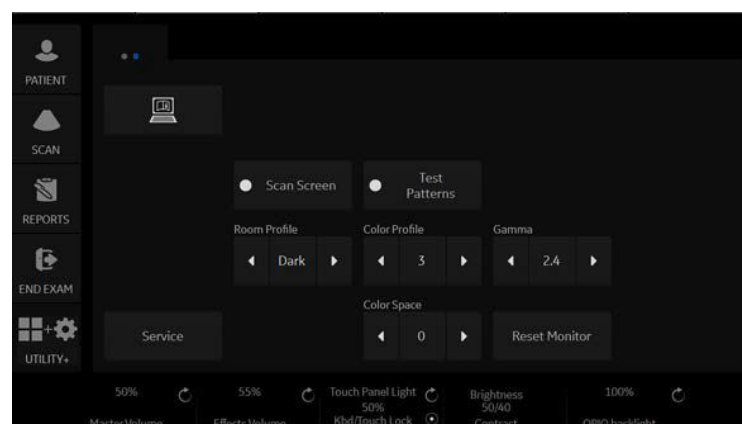
Table 5-1 Room Profile Table

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 User Manual or Release Notes.

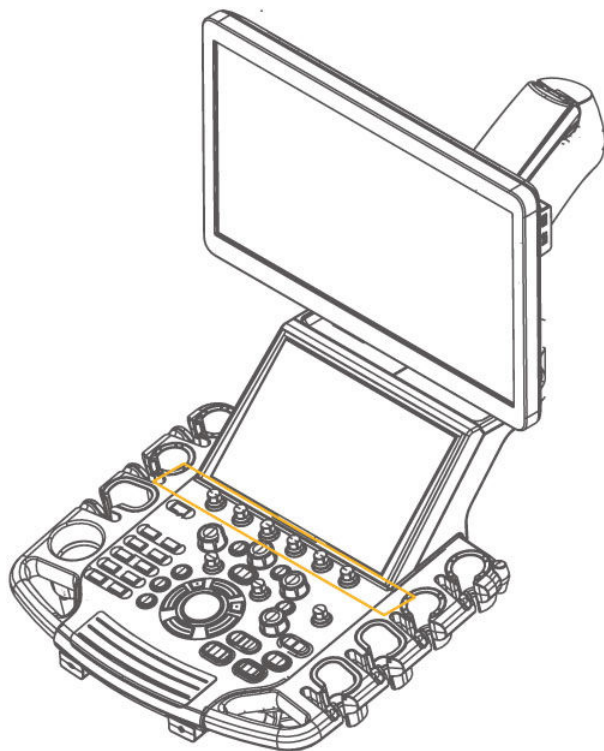
To access the Scan Screen, navigate to **Utility (second page) > Scan Screen**

Figure 5-1 Scan Screen



Use the encoder knobs to adjust the Scan Screen settings (shown on the Scan Screen directly above each encoder knob).

Figure 5-2 Operator Panel Encoder Knobs



5.1.2 Monitor adjustments

For complete information, see the appropriate version of the User Manual or Release Notes.

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 5-2 Room Profile Table

Room Profile	Brightness/Contrast HDU Monitor	Brightness/Contrast LCD Monitor
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

OPIO 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.

Touch panel light

Under special lighting conditions, you may want to manually adjust the touch panel light. Adjust the touch panel light between 10% to 100%.

To adjust the 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. Under the operator panel, turn the **Touch Panel Light** encoder to adjust the brightness of the touch panel light.

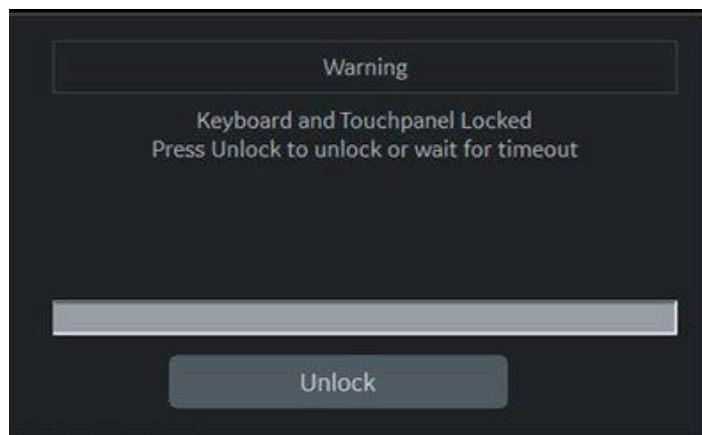
Keyboard and touch panel lock

When you need to clean the Ultrasound system keyboard or touch panel, lock the keyboard and touch panel controls.

To lock the keyboard/touch panel

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, push the **Kbd/Touch Lock** encoder once to display the dialog box and lock the keyboard and touch panel controls.
3. To unlock lock the keyboard and touch panel controls, select **Unlock** or wait for the timeout.

Figure 5-3 Touch Panel Adjustment Lock Dialog Box



5.1.3 Advanced monitor adjustments

Review Gamma Setting

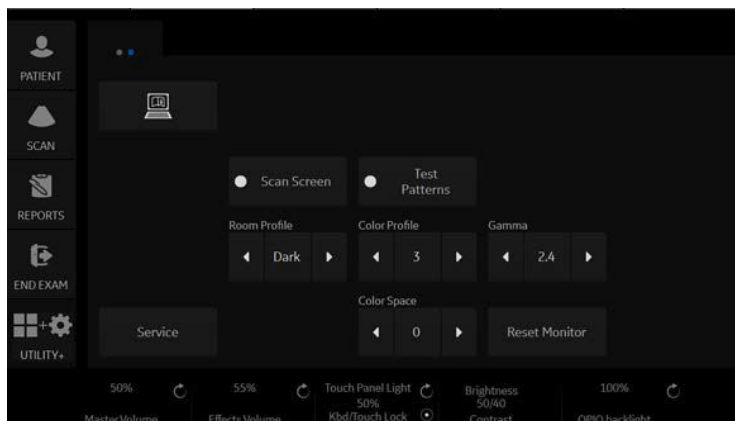
Gamma settings can be adjusted in two ways, with or without DICOM Gray Scale Standard Display Function (GSDF) enabled. GSDF-compliant with all contrast settings, but not all brightness settings.

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 5-4 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.

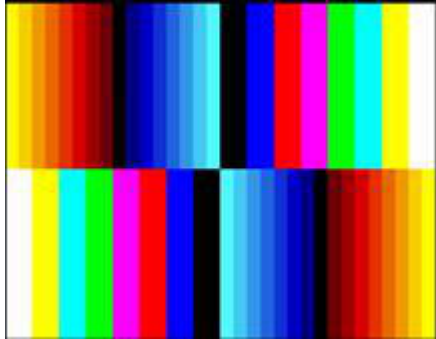
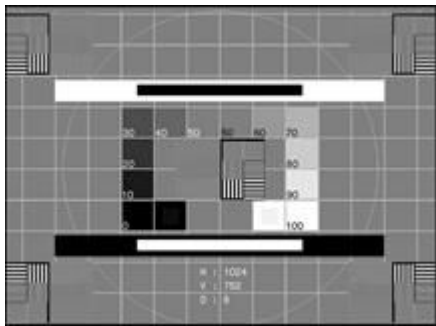
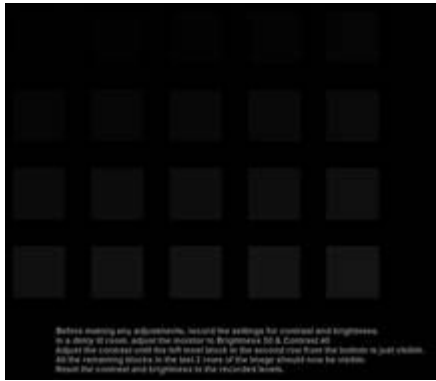
- With GSDF disabled, the monitor still uses a gamma curve that may be selected on the Touch Panel (for backwards compatibility with sites that are happy with their PACS or may have a mix of older systems).
- With GSDF enabled, the gamma button on the touch panel affects the image, emulating the appearance of that gamma, but does not affect the monitor.

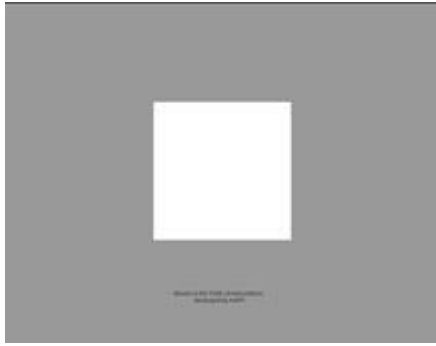
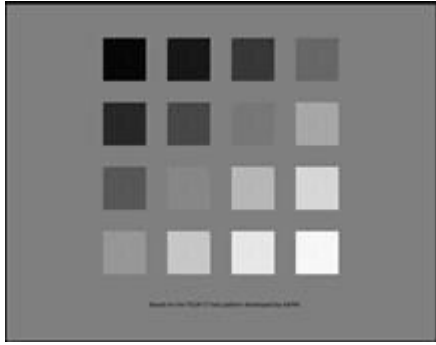
Test patterns

Test patterns are available to aid in evaluating the display visually and quantitatively.

For complete information, see the appropriate version of the User Manual.

Table 5-3 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.	
Brightness Contrast	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.	

Test Pattern	Description	Corresponding Graphic
LN1 to LN18	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.	LN-1  LN-18 
QC	Quality Control. Confirm that this image is clear and crisp, without jagged edges or lines.	
CT Used for Luminance response	Contrast. Confirm that you can detect the circles within the square grayscale boxes.	

5.2 Monitor Arm and/or Monitor Range of Motion Adjustment

This section describes how to adjust the monitor arm and/or monitor range of motion for optimal performance.

Contents in this section

- *Monitor and Ergotron arm* on page 133
- *Cautions and warnings* on page 133
- *Main Monitor Adjustment* on page 133

5.2.1 Monitor and Ergotron arm

These procedures are available for monitor range of motion and monitor vertical adjustment:

- *Monitor arm vertical adjustment* on page 133
- *Monitor arm tilt adjustment* on page 134

Figure 5-5 Ergotron arm



5.2.2 Cautions and warnings

Be aware of pinch points at hinges when adjusting the monitor arm and monitor.

Table 5-4 Pinch Point Caution and Warning Icons

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5.2.3 Main Monitor Adjustment

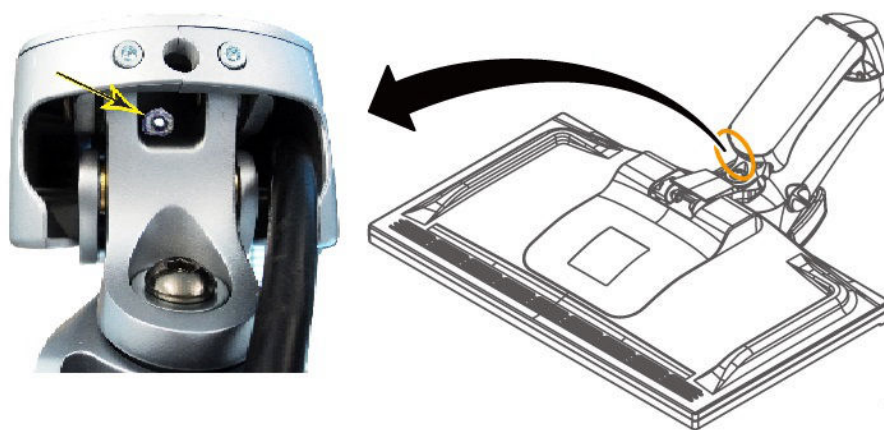
Monitor arm vertical adjustment

If the monitor rises or falls when it is released, perform a vertical adjustment.

If the monitor is too loose or too tight when it is tilted, perform a tilt adjustment.

1. Tilt the monitor down to access the vertical adjustment screw.

Figure 5-6 Monitor Arm Vertical Adjustment Screw



2. If the monitor was falling, turn the adjustment screw clockwise to increase the friction, using a 4 mm hex wrench. If the monitor was rising, turn the adjustment screw counterclockwise to decrease the friction.

NOTE

The monitor should stay in position when released. The heavier the monitor, the more friction will be required.

Figure 5-7 Turn the adjustment screw

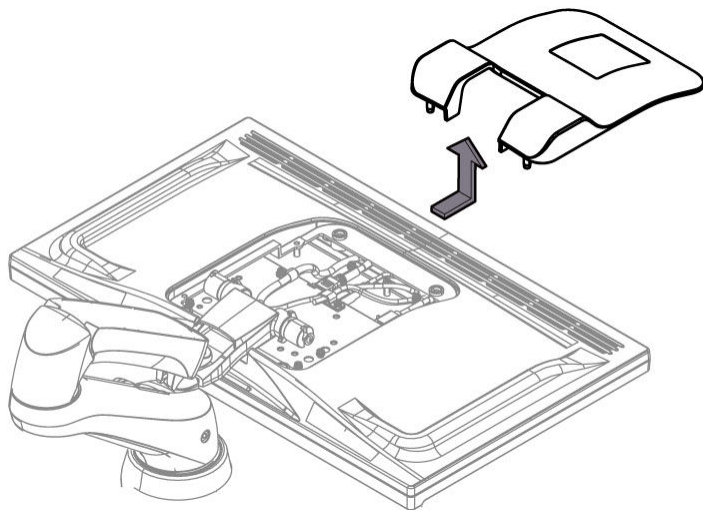


Monitor arm tilt adjustment

If the monitor is too loose or too tight when it is tilted, perform a tilt adjustment.

1. Tilt the monitor down and remove the monitor rear cover.

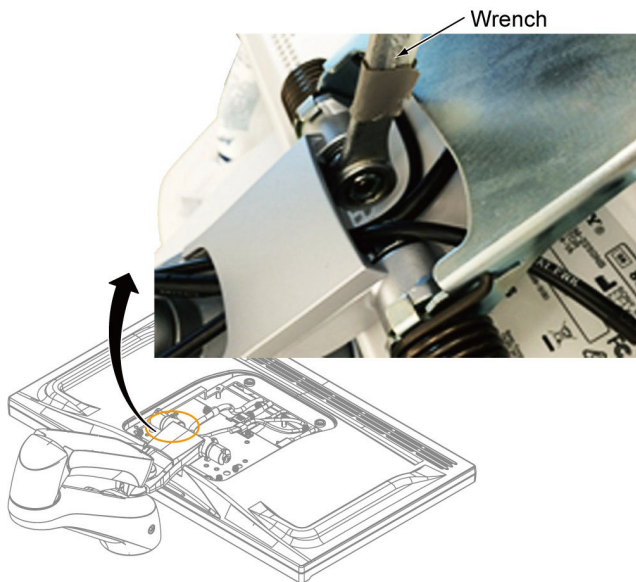
Figure 5-8 Remove the monitor rear cover



2. Access the adjustment nuts with wrench.

If you have a thick wrench, it is easier to reach the nuts by using the boxed end of the wrench.

Figure 5-9 Adjustment nuts



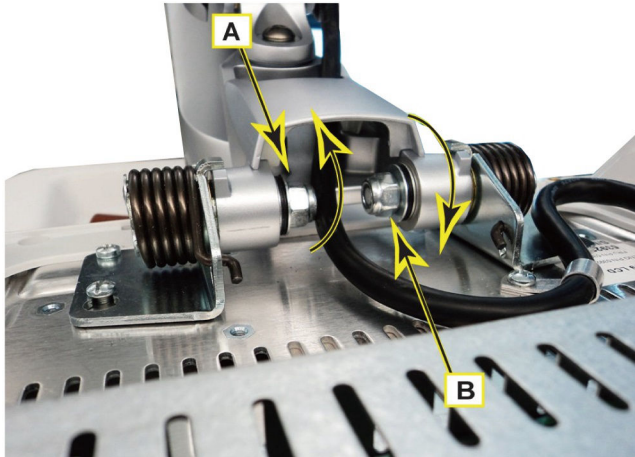
3. If the monitor is too loose, turn the adjustment nut **(A)** towards the back and nut **(B)** towards the front to increase the friction, using a 13 mm wrench.

Turn the nuts the opposite direction to decrease the friction. The monitor should stay in the position it is released at.

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.

Figure 5-10 Adjustment nut direction



4. Reinstall the monitor rear cover.

5.3 DICOM Server Service Adjustments

5.3.1 Slow response rate between the Ultrasound system 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:
 - For R3: Utility > Connectivity > Service
 - For R4: Utility > Connectivity > Dicom> Service
2. Select the service for the DICOM server.
3. Under **Properties (R3)** or **Connection (R4)**, set **Timeout (sec)** to **360**.

5.3.2 Shutdown problems when running a portable Ultrasound system

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:
 - For R3: Utility > Connectivity > Service
 - For R4: Utility > Connectivity > Dicom> Service
2. Select the service for the DICOM server.
3. Under **Properties (R3)** or **Connection (R4)**, 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.

5.4 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 *V-Nav Option Replacement* on page 708.

Chapter 6

Functional Checks

In this chapter

Special equipment required.	140
Recommended test phantoms.	141
General Procedures.	142
Functional Checks.	151
Site Log.	188

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

NOTE
The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE
The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

6.1 Special equipment required

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

- An empty (blank) DVD-R disk.
- USB Media.
- At least one probe (check all of the probes that will be used with the Ultrasound system at the site.)
- If the Shear Wave option is present, a Shear Wave-capable probe.
- If the V Nav option is present, a V Nav-capable probe.
- If the ECG option is present, ECG cables (AHA or IEC) and pads.
- Test phantom. See *Recommended test phantoms* on page 141.

NOTE

For a list of available probes, see *Supported Probes* on page 345.

NOTE

For a list of probes supported with Shear Wave or V Nav, see the User Manual (appropriate version). See *Label Locations* on page 36 or a list of the available user documentation.

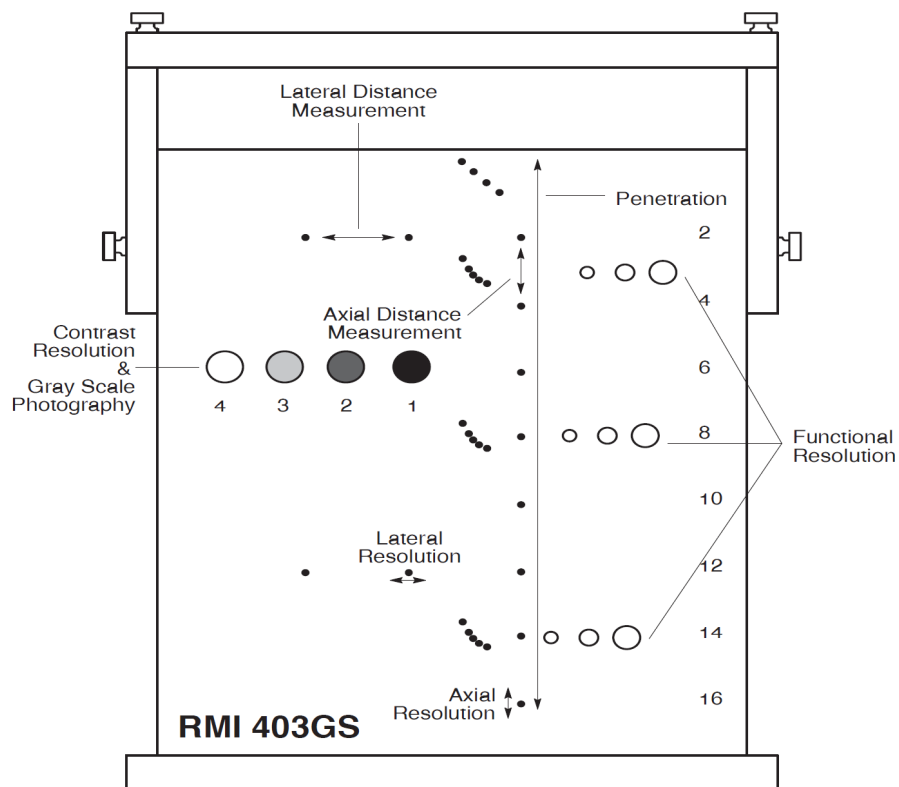
NOTE

For part numbers for the options, see *Options and Peripherals* on page 350.

6.2 Recommended test phantoms

GE HealthCare 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 6-1 Performance Tests



6.3 General Procedures

- *General system functional checks* on page 144
- *Power on/boot up* on page 98
- *Power shut down* on page 113
- *Complete power down* on page 114

6.3.1 General safety information



DANGER

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.

- Plan and prepare for shutdown.
- Completely power down the LOGIQ Fortis.
- Address potentially accumulated energy.
- 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.
- Control all stored and residual energy.
- Verify isolation.

After these steps are completed, all potentially hazardous stored or residual energy is relieved.

For step-by-step instructions to lock out and tag out the LOGIQ Fortis, see:

- *Power down the LOGIQ Fortis* on page 50
- *Disconnect Power to the LOGIQ Fortis* on page 52
- *Disconnect battery power* on page 53



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.

Before removing the card rack boards, the LEDs on the end of each board should be unlit to indicate boards are NOT powered.



DANGER

Risk of damage to equipment.

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 RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE.
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

**CAUTION**

THE ULTRASOUND SYSTEM REQUIRES ALL COVERS.

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.

6.3.2 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 record.

NOTE

Follow the GE HealthCare Field Service Documentation Quality Standards. Service records must provide a comprehensive account of the customer issue and all related service activities.

For service calls involving a FRU replacement:

- Perform all relevant functional checks as described in the applicable FRU replacement procedure.
- Include the Service Record Debrief Script found at the end of the corresponding procedure.

For service calls without a FRU replacement:

- Perform the general functional tests listed in *Table 6-1 General System Functional Checks* on page 144. If all tests pass, include the following Service Record Debrief Script: "Leakage current measured at (record value) and is within allowable limits. Equipment has passed all required checks and is ready for use."

For service calls related to system upgrades:

- Perform the general functional tests listed in *Table 6-1 General System Functional Checks* on page 144. If all tests pass, include the following Service Record Debrief Script: "Leakage current measured at (record value) and is within allowable limits. Equipment has passed all required checks and is ready for use."

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

NOTE

NOT ALL functional checks 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 6-1 General System Functional Checks

Functional Check
<i>Power on/boot up</i> on page 98
<i>B-Mode functional checks</i> on page 162
<i>System CFM and PWD functional checks</i> on page 165
<i>Basic measurement functional checks</i> on page 175
<i>Grounding continuity test</i> on page 775
<i>Chassis leakage current test</i> on page 776
<i>Power shut down</i> on page 113 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
<i>4D option functional checks</i> on page 179 Perform a 4D sweep
Pedof CW
<i>PW/CW Doppler mode functional checks</i> on page 169 Use pencil probes
<i>Probe/connector functional checks</i> on page 161

Functional Check
<i>Chassis leakage current test</i> on page 776 Perform a CW scan with a pencil probe probes (plug in and scan)
GCW
<i>CW Doppler mode functional checks</i> on page 170
<i>Probe/connector functional checks</i> on page 161
<i>Chassis leakage current test</i> on page 776 Perform a CW scan with P2D, P6D, M5S-D probes (plug in and scan)
VSIO (ECG)
<i>ECG functional checks</i> on page 178 Active ECG: Utility > Applications > Settings > ECG > Show ECG Tools. Connect cables. Press Display ECG tab on the touch panel. Verify ECG signal displayed on monitor. Plug in the ECG cables with nothing attached so they pick up noise.
Power Assistant/Scan on Battery
<i>Power Assistant functional checks</i> on page 181
<i>Scan on Battery functional checks</i> on page 182
<i>Probe/connector functional checks</i> on page 161
Shear Wave
<i>Probe/connector functional checks</i> on page 161
<i>Shear Wave Elastography (Shear Elasto) functional checks</i> on page 183
Perform a 4D sweep, if 4D MC was removed.
V Nav
<i>Volume Navigation with inside probe functional checks</i> on page 180
<i>4D option functional checks</i> on page 179
<i>Basic control functional checks</i> on page 160

6.3.3 Power on/boot up

**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.

6.3.3.1 Connect mains power cable to the LOGIQ Fortis

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

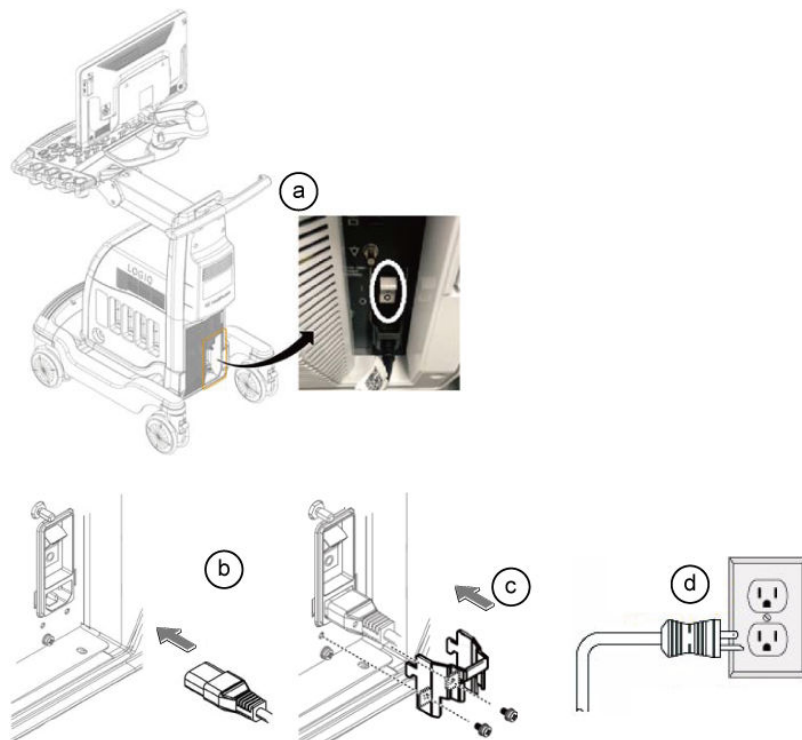
NOTE

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 mains 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 mains power cable per following steps.
 - a. Verify that the mains power circuit breaker is in OFF position, If not, switch it to OFF.
 - b. Connect the female plug of the power cable to the power inlet at the rear of the Ultrasound system.
 - c. Install the mains power cable FIX BRKT with 2 screws (2159625, Screw PH WSP M4x8).

- d. 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.

Figure 6-2 Connecting mains power cable



6.3.3.2 Switch ON the AC power to LOGIQ Fortis

1. Switch ON the circuit breaker at the rear of the Ultrasound system. The **ON/OFF** button turns white.

Figure 6-3 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 power supply, 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 green 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 2D 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.

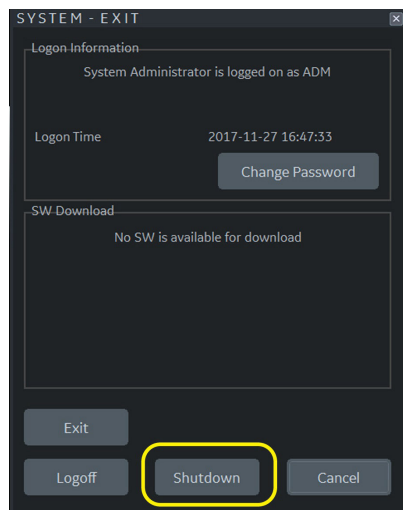
After the B-Mode screen is displayed and any function is touched, the Ultrasound system will prompt a password protected Login.

6.3.4 Power shut down

You can use the **SYSTEM - EXIT** menu to log off, shut down, and exit. Power shut down occurs when selecting shut down with 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.

Figure 6-4 **SYSTEM - EXIT** menu



The **SYSTEM - EXIT** menu, used when switching OFF the LOGIQ Fortis, gives you the following choices:

- **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 this button is dimmed, it indicates that no user is logged on to the LOGIQ Fortis at the moment.
- **Shutdown**
Use this button to shut down the Ultrasound system. It is recommended to perform a full shutdown at least once a week.
If **Shutdown** button is dimmed, press the **ON/OFF** button or **Alt+F10** to shut down the LOGIQ Fortis.
- **Cancel**
Use this button to exit from the **SYSTEM-EXIT** menu and return to the previous operation.

6.3.5 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.

**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.

6.4 Functional Checks

Contents in this section

- *Top console adjustment control functional checks* on page 152
- *Main monitor positions and lock functional checks* on page 153
- *Brakes and direction lock functional checks* on page 155
- *Alphanumeric keyboard functional checks* on page 158
- *Footswitch functional checks* on page 159
- *Basic control functional checks* on page 160
- *Probe/connector functional checks* on page 161
- *B-Mode functional checks* on page 162
- *M-Mode functional checks* on page 164
- *System CFM and PWD functional checks* on page 165
- *Color Mode functional checks* on page 166
- *Color B-Mode functional checks* on page 167
- *Color M-Mode functional checks* on page 168
- *PW/CW Doppler mode functional checks* on page 169
- *CW Doppler mode functional checks* on page 170
- *Cineloop functional checks* on page 171
- *Removable media functional checks* on page 172
- *Archiving and loading presets* on page 173
- *Installation and setup procedures for peripherals* on page 174
- *Basic measurement functional checks* on page 175
- *Multi image functional checks* on page 177
- *ECG functional checks* on page 178
- *4D option functional checks* on page 179
- *Volume Navigation with inside probe functional checks* on page 180
- *Power Assistant functional checks* on page 181
- *Scan on Battery functional checks* on page 182
- *Shear Wave Elastography (Shear Elasto) functional checks* on page 183
- *Vscan Air CL probe connection check* on page 186
- *Vscan Air CL charger functional check* on page 187

6.4.1 Top console adjustment control functional checks

**WARNING**

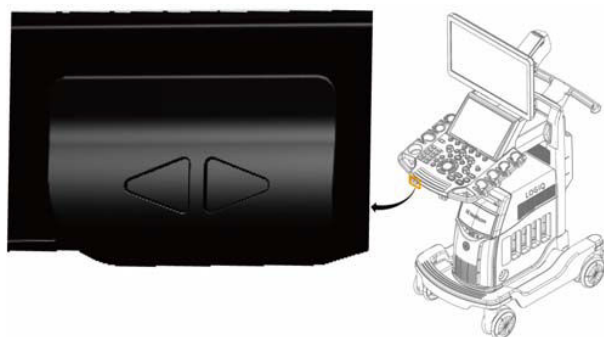
To avoid injury or damage, make sure nothing is within the range of motion of the top console before moving the top console. This includes both objects and people.

To perform the function checks for the top console adjustment controls:

Power ON the LOGIQ Fortis before performing the following steps.

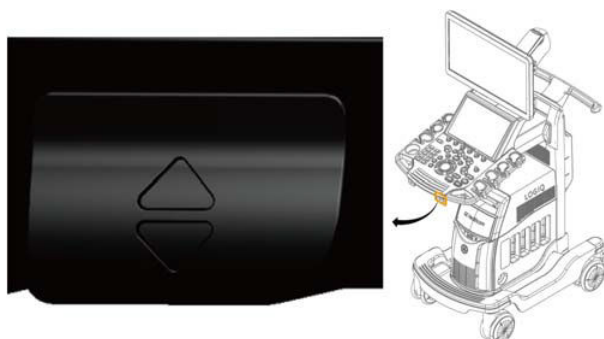
1. To SWIVEL the top console:
 - a. Press and hold down the SWIVEL button to move the console left or right.
 - b. Release the button.

Figure 6-5 Swiveling the top console



2. To raise/lower the top console:
 - a. Press and hold the Up/Down button to raise or lower the top console.
 - b. Release the button when the top console is at the desired height.

Figure 6-6 Raising/lowering the top console



6.4.2 Main monitor positions and lock functional checks

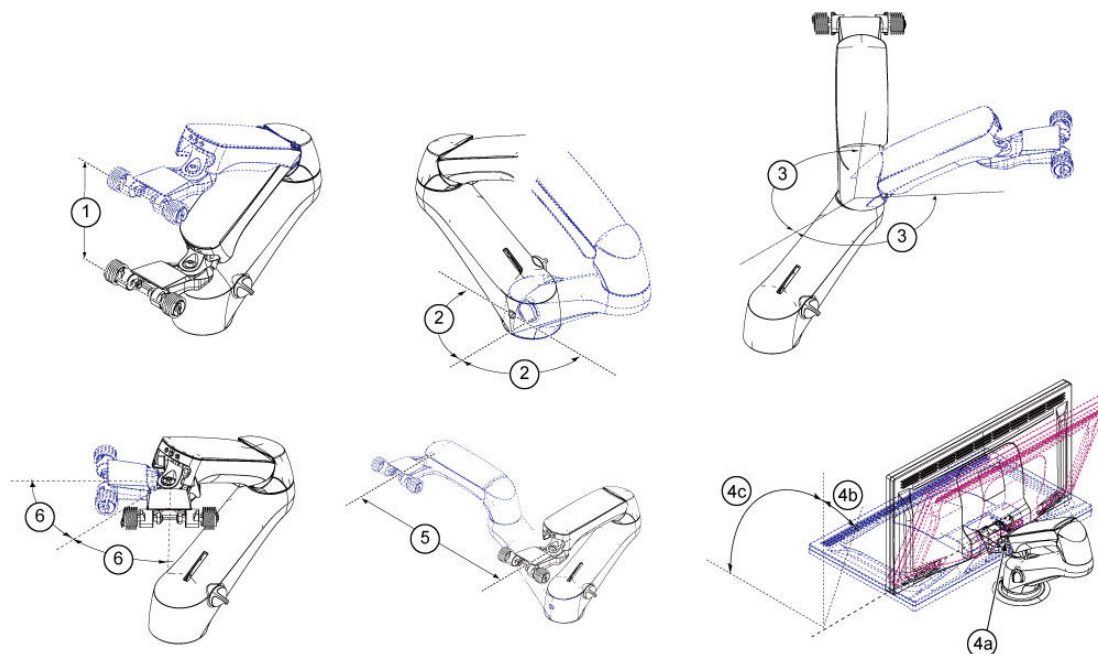
To perform the function checks for the main monitor:

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 6-7 Main Monitor Positions - Ergotron Arm



1.	Vertical Travel = 150mm	4.	Tilt a: No Collision b. Approximately 20° (based on Pan Arm Off-set) c. 85°-90°
2.	Rotation at Mount = 90° (180° total)	5.	Monitor Translation = 350mm(both sides from center)
3.	Lift Arm Rotation = 135° (270° total)	6.	Pan Arm Rotation = 45° (90° total)

To check main monitor platform maneuverability:

Check that the main monitor functions as described below.

1. Tilt the main monitor forward/back.

NOTE

Use both hands, one at the top of the main monitor and one at the bottom, to rotate the screen forward and back.

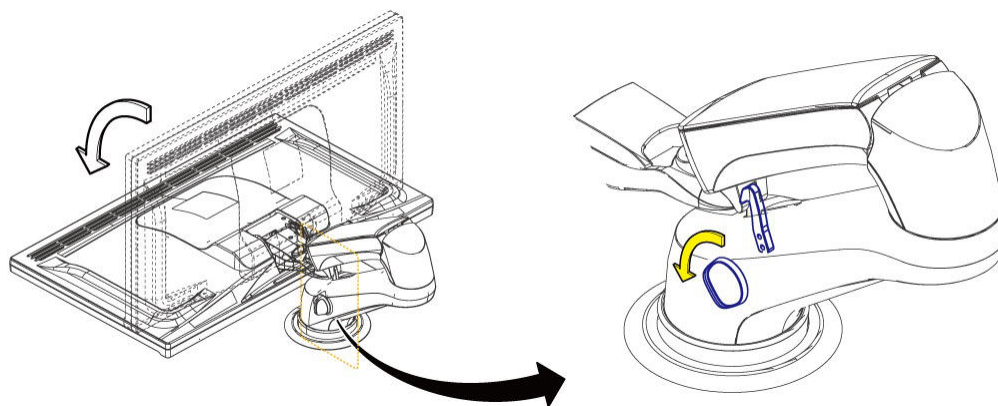
2. Move the main monitor left/right.

NOTE

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.

3. To unlock the main monitor, turn the knob clockwise to unlock the main monitor. The main monitor can be moved freely in all directions.
4. To lock the main monitor, turn the knob counter clockwise to lock the main monitor in the parked position.
5. To set the main monitor position for transport, Lock the arm and tilt the main monitor down.

Figure 6-8 Main Monitor Transport Position



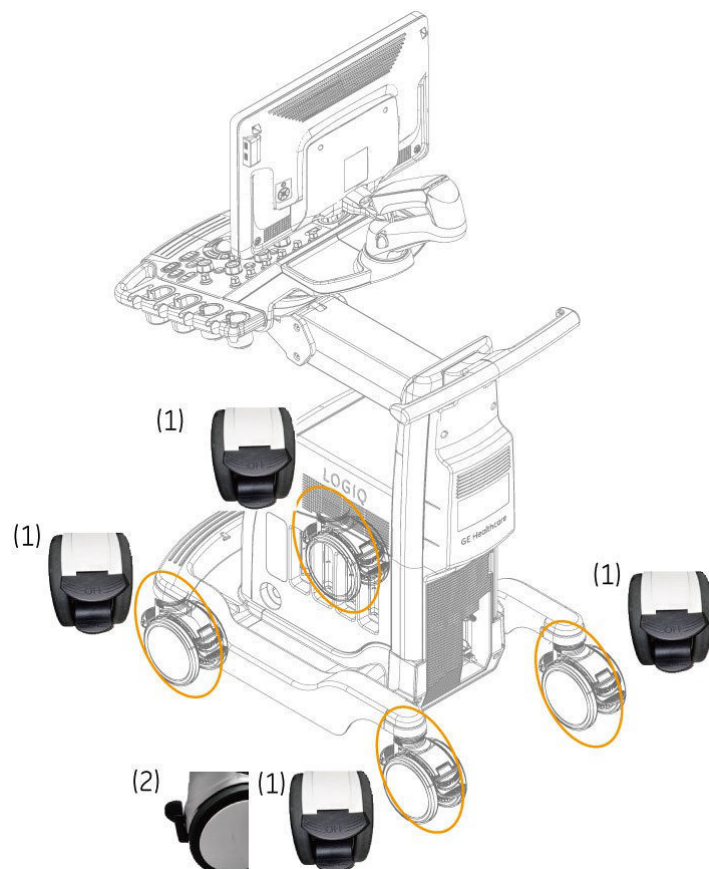
6.4.3 Brakes and direction lock functional checks

Check that the brakes and direction lock function as described below.

Overview

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 6-9 Wheel lock and Swivel lock



1. Brake pedal
2. Swivel lock

Brake pedal function except Left-rear caster

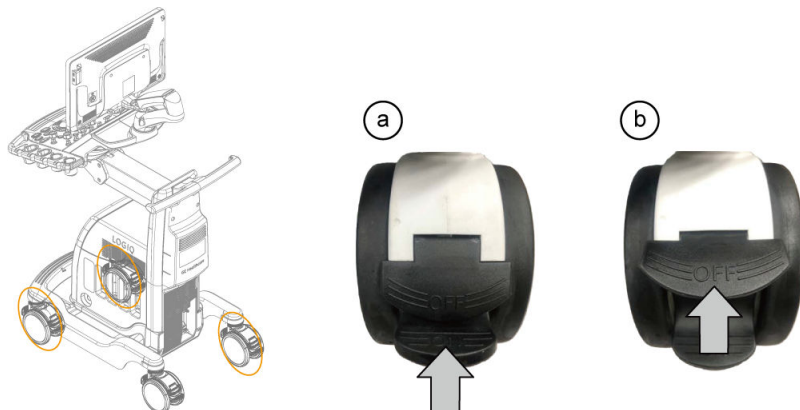
Check the break function of each caster except left-rear caster per following steps.

- a. Step on Lower side pedal to activate Brake.
- b. Step on Upper side pedal to release Brake.

NOTE

You may need to move the Ultrasound system a little to check the break function.

Figure 6-10 Front and right-rear caster



Brake pedal function for Left-rear caster

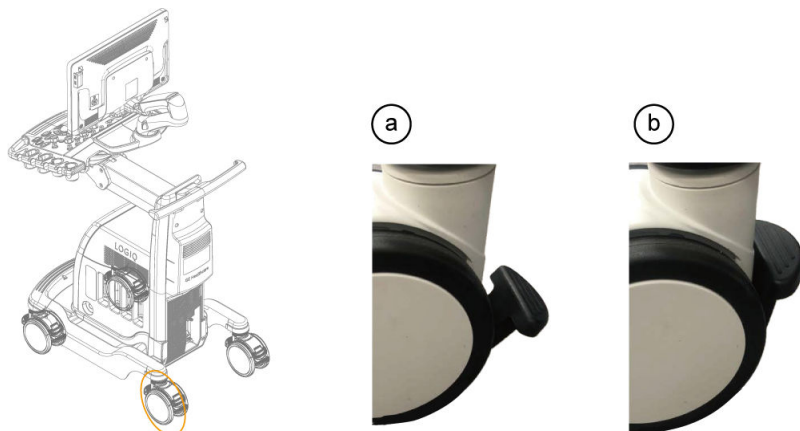
Check the left-rear caster break function per following steps.

- a. Step on to activate Brake.
- b. Raise up to release Brake.

NOTE

You may need to move the Ultrasound system a little to check the break function.

Figure 6-11



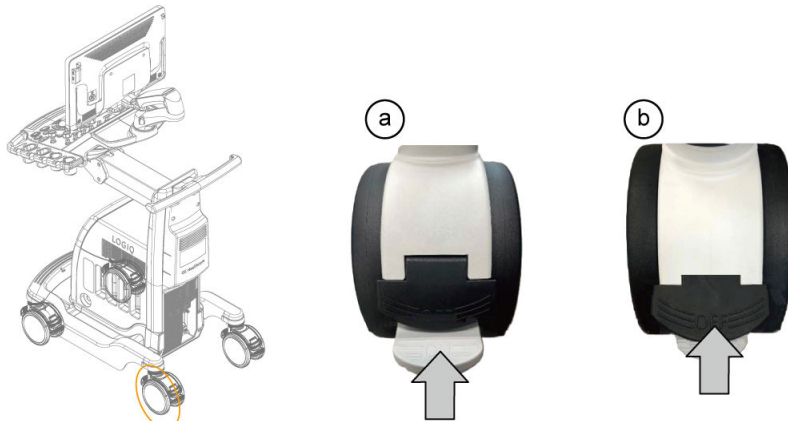
Swivel lock

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

You may need to move the Ultrasound system a little to check the Swivel lock function.

Figure 6-12 Rear-left with Swivel lock

**NOTE**

Wheel needs to be straight when you activate Swivel Lock.

Figure 6-13 Caster position for Swivel lock



6.4.4 Alphanumeric keyboard functional checks

To perform the function checks for the alphanumeric keyboard:

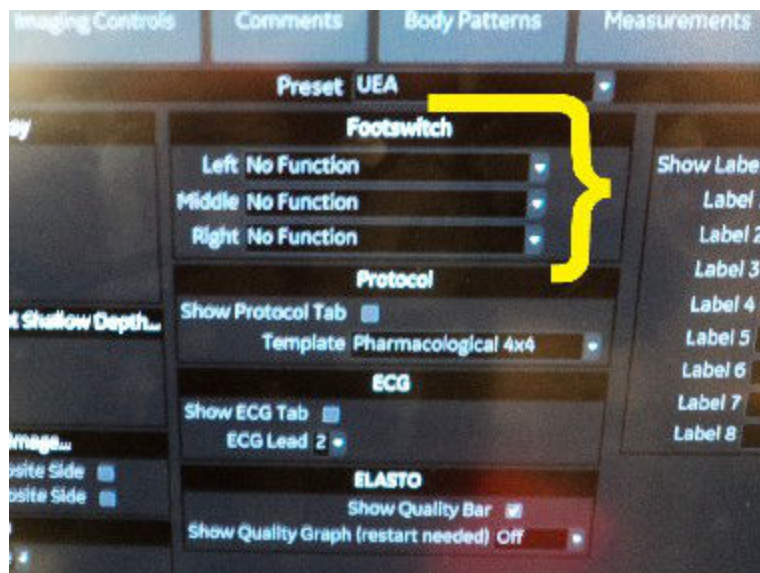
1. Press **Comment** (ABC button) on the operator control panel to activate Comment.
2. Type any comments using alphanumeric keys to confirm keyboard functionality.

6.4.5 Footswitch functional checks

To perform the function checks for the footswitch:

1. Plug in the footswitch.
2. Select **Utility > Application**.
3. Under **Footswitch**, view the footswitch programming options for **Left**, **Middle**, and **Right**.
4. Select **Freeze** for the **Left**, **Middle**, and **Right** footswitch pedals.
5. Scan and use each footswitch pedal to freeze and unfreeze to confirm each one works.

Figure 6-14 Footswitch Functional Checks



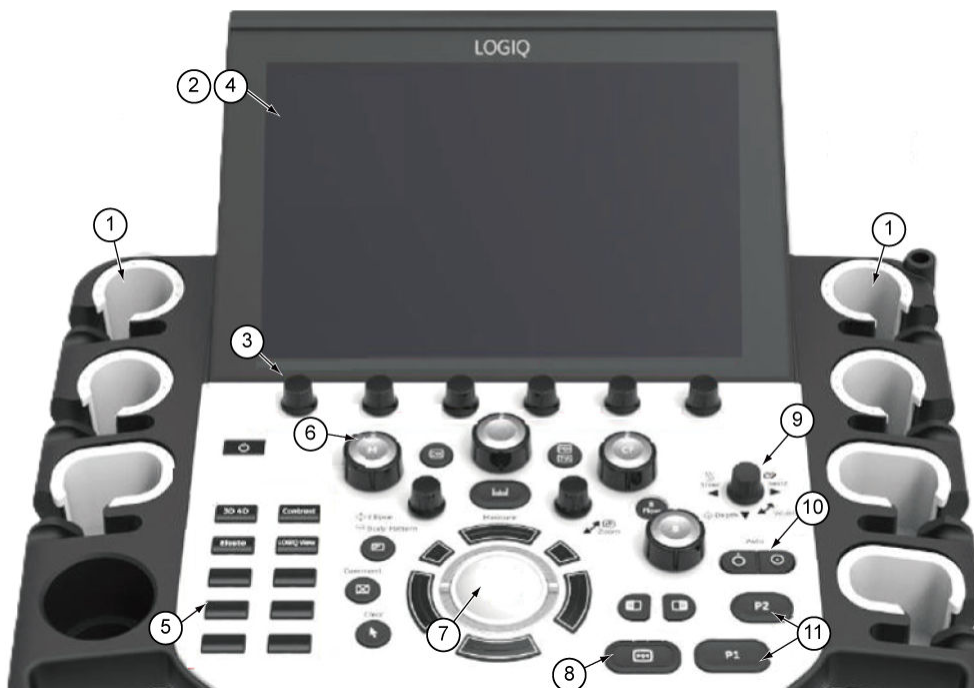
6.4.6 Basic control functional checks

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 6-15 Control Panel



1. Probe Holder and Cable Management
2. Touch Panel
3. Joystick controls
4. On Screen Keyboard (not display in this graphic)
5. User Defined Keys
6. Mode/Gain/XYZ (3D) Controls
7. Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Zoom, Programmable Keys
8. L/R, Start/Stop, Freeze, Simultaneous
9. Steer/Width/Depth/Reverse
10. Auto, CF/PW Auto Positioning
11. P1, P2

6.4.7 Probe/connector functional checks

NOTE

Probes can be connected at any time, whether the LOGIQ Fortis is ON or OFF. 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. For information about connecting a probe, see *Connecting/disconnecting probes* on page 96.

To perform the function checks for a probe/connector:

NOTE

While a probe check can correctly identify most damaged probes, there are some less common types of probe defects that a probe check is not able to detect. If a probe passes the probe test but the image quality of the probe is unacceptable, please contact your service partner or Technical Support Engineer.

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 *Connecting/disconnecting probes* on page 96.
It will display pictorial data each time.
6. Repeat this procedure for all available probes.

Probes requiring a leakage test

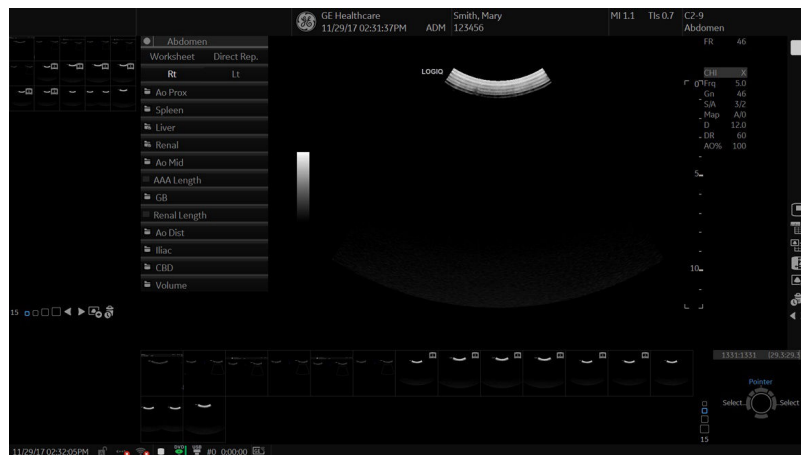
If the probe requires a leakage test, see *Electrical Safety Tests* on page 770.

6.4.8 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 the User Manual (appropriate version) or Release Notes.

Figure 6-16 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 the User Manual (appropriate version) or Release Notes.

Image Quality Check (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.

Using the same settings year after year ensures that 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**.

Probe indications for use

See the online Help or the appropriate version of the User Manual.

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 *Connecting/disconnecting probes* on page 96 for info about connecting the probes.

- For available probes, see *Supported Probes* on page 345 .
2. Turn ON the Ultrasound system. The B-Mode window is displayed (default mode).
 3. If needed, adjust the Brightness and Contrast setting on the monitor (see *Monitor Adjustments* on page 126).

**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.

Functional checks

1. Check Width, Frame rate, Frequency. The results of these adjustments must be verified on the B-Mode sector on the screen.
2. 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.
3. Check Gain, TGC and Depth.
4. Check B-Mode Soft Menu Controls.
5. Check Compress, Contour, Reject and Tilt.
6. Check Power and Dynamic Range.

6.4.9 M-Mode functional checks

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

Table 6-2 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 *Connecting/disconnecting probes* on page 96 for info about connecting the probes.
 - For available probes, see *Supported Probes* on page 345 .
2. Turn ON the Ultrasound system.

Functional Checks

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

6.4.10 System CFM and PWD functional checks

For information on the Ultrasound system's different modes as well as expected results, the 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 User Manual or Release Notes.

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 *Connecting/disconnecting probes* on page 96 for info about connecting the probes.
 - For available probes, see *Supported Probes* on page 345 .
2. Turn ON the Ultrasound system.

6.4.11 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 User Manual or Release Notes.

6.4.12 Color B-Mode functional checks

For information, see the appropriate version of the User Manual or Release Notes.

6.4.13 Color M-Mode functional checks

For information, see the appropriate version of the User Manual or Release Notes.

1. Check Horizontal Sweep, PRF, Baseline, and Invert.
2. Check Variance, Color Maps, and Cineloop.
3. Check Frequency and Acoustic Power.
4. Adjust ROI.

6.4.14 PW/CW Doppler mode functional checks

For information on the Ultrasound system's different modes, the 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.

For information, see the appropriate version of the User Manual or Release Notes.

Preparations

1. Connect one of the probes to the scanner.
 - See *Connecting/disconnecting probes* on page 96 for info about connecting the probes.
 - For available probes, see *Supported Probes* on page 345 .
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.

6.4.15 CW Doppler mode functional checks

For information on the Ultrasound system's different modes, the 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 Ultrasound system.
 - See *Connecting/disconnecting probes* on page 96 for info about connecting the probes.
 - For available probes, see *Supported Probes* on page 345 .
2. Turn ON the Ultrasound system. The B-Mode window is displayed (default mode).
3. If needed, adjust the display's Brightness and Contrast setting.
4. Press **CW** to start Continuous Wave Doppler (CW).
5. Use the Trackball to select the direction of interest in CW.

6.4.16 Cineloop functional checks

For complete information, see the appropriate version of the User Manual or Release Notes.

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

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

6.4.17 Removable media functional checks

Refer to the appropriate version of the User Manual or Release Notes to perform the following tasks:

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

Types of removable media:

- CD/DVD
- USB flash drive
- USB hard disk drive (external)

6.4.18 Archiving and loading presets

To load presets from removable media:

Refer to the appropriate User Manual.

6.4.19 Installation and setup procedures for peripherals

Refer to *Optional peripherals/peripheral connection* on page 116.

Printer Functional Check

- Perform *Test of printers* on page 320.
Equipment passed all required tests and is ready for use.

6.4.20 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 Ultrasound system 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 Ultrasound system 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.

NOTE

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.

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.

6.4.21 Multi image functional checks

1. Press **L** to activate a dual screen. The single image is placed on the left side.
2. Press **R** to freeze the left side image and display the image on the right side.
3. Press **B** 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** to return to the single screen.

6.4.22 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 harness and ECG pads (3 pc) (see *Options and Peripherals* on page 350 for part numbers) or an ECG simulator.

1. Select **Preset > Cardiac> Scan**.
2. If you do not see the ECG line, select the **ECG** tab. You should see the selection on the touch screen for DISPLAY ECG. Select and press.
You should 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 Ultrasound system 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.

6.4.23 4D option functional checks

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

To perform the functional checks for 4D:

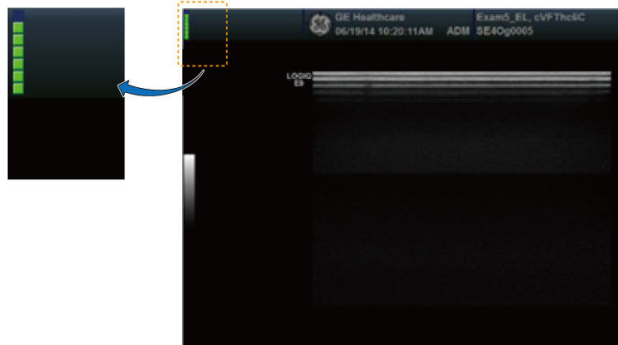
1. Connect a 4D probe.
2. Press the [3D/4D] button on the console.
3. Press the [4D] button on the [Mode] tab.
4. Press the [Visualization] button, then select Render.
5. Press the [L] key the console to start 4D data acquisition.
6. To complete the acquisition, press [Freeze] or [R].

6.4.24 Volume Navigation with inside probe functional checks

Required tools: a supported VN probe, Transmitter

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

Figure 6-17 Quality bar gauge



Expected result is that the quality bar gauge shows 4.

6.4.25 Power Assistant functional checks

NOTE

Depending on the battery health status, the system may experience a crash during this procedure. Please make sure that all system data is saved, and the system is properly backed up before proceeding.

To perform the functional checks for Power Assistant:

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 power 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.

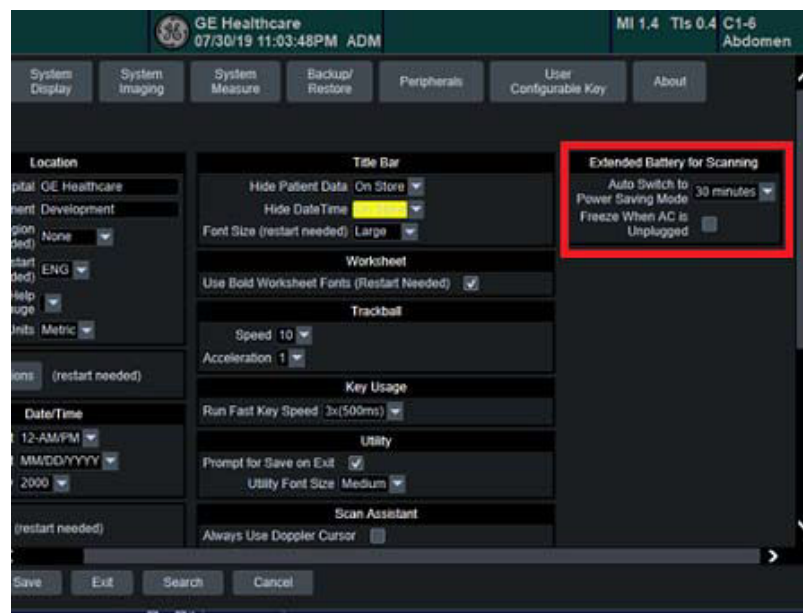
6.4.26 Scan on Battery functional checks

NOTE

Depending on the battery health status, the system may experience a crash during this procedure. Please make sure that all system data is saved, and the system is properly backed up before proceeding.

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.

Figure 6-18 Checking the extended battery set up



3. Confirm you can unplug the Ultrasound system, it remains on for several seconds and then plug it back in without it shutting down. A message may appear to 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.
6. Verify that the batteries begin charging via the battery status icon.

6.4.27 Shear Wave Elastography (Shear Elasto) functional checks

If the Shear Wave software option is not enabled, the option to select the Shear Elasto soft button after pressing the Elasto button on the touch panel key "Shear Elasto/strain Elasto" button WILL NOT be present.

To perform the functional checks for Shear Elasto:

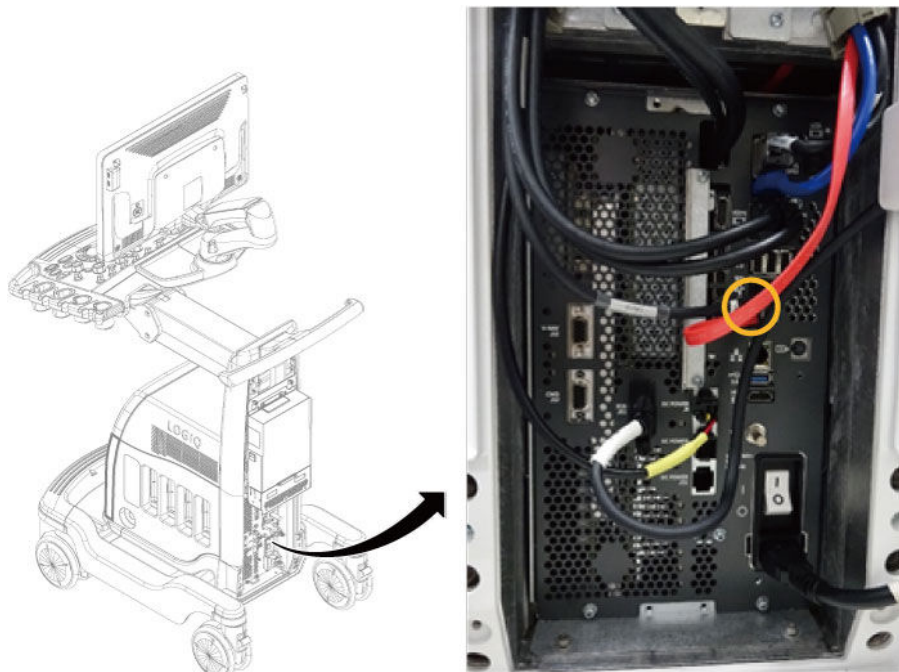
1. Select a probe (L2-9-D or C1-6-D).
2. Select the **ELASTO** button.
3. From the touch panel, select the **Shear Wave** button (if not already selected).
4. Verify that the **Shear Wave** button is available.

6.4.28 Sound check functional test

NOTE

After accessing internal boards, **DO NOT** forget to connect the speaker cable. Also verify that all other cables are properly connected to necessary ports (no loose cables)

Figure 6-19 Checking connection of speaker cable



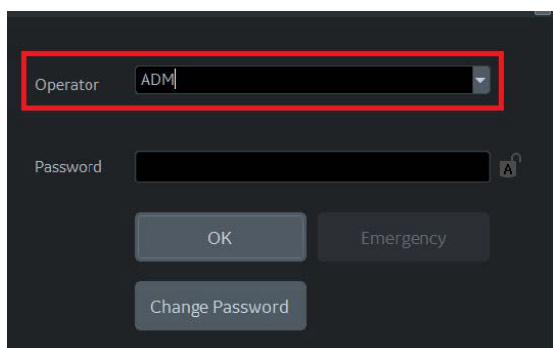
Sound Check test should be performed after accessing internal board.

1. Navigate to the Utility page.

NOTE

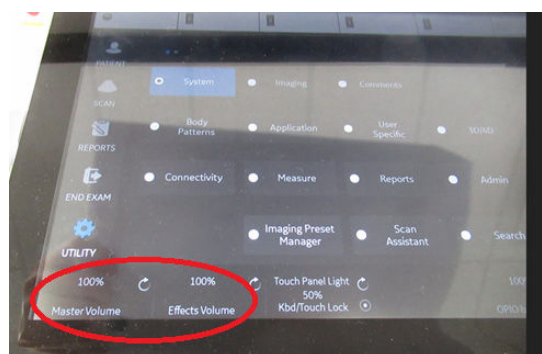
If the following popup appears, type "ADM" on operator and then select OK.

Figure 6-20 LOGIN menu



2. Set 100%(Max) for Master Volume and Effects Volume.

Figure 6-21 Setting Master Volume and Effects Volume



3. Test: Hear clicking sound when press any command (Button) on Touch panel.
Pass if you can hear clicking sound from the speaker. Fail if you cannot hear clicking sound from the speaker.

6.4.29 Vscan Air CL probe connection check

1. Press and hold the Vscan Air CL power button for approximately two seconds while watching the probe LED lights.

NOTE

Do not continuously hold the button for longer than 5 seconds, or the probe will shut down after booting up. The LED lights will first briefly display the battery level (green, yellow, or orange), then the display power up (two blue lights). Release the Vscan Air CL power button when you see the power up light.

2. After the LED lights enter the booting up state (two white lights blinking alternately), followed by the searching state (two white lights blinking synchronously), tap the power button to allow connection during this searching state.
3. Wait for pairing. Pairing will take 5-30 seconds to complete. When pairing is complete, the two LED lights will shine steady blue indicating the connection is established.
4. Confirm that the Vscan Air CL probe icon appears on the Ultrasound system Touch Panel as shown below.

Figure 6-22 Vscan Air CL Touch Panel Icon



5. Confirm that the probe battery and Wi-Fi icons are shown on the Ultrasound system main display as below.

Figure 6-23 Vscan Air Battery and Wi-Fi Icons



6.4.30 Vscan Air CL charger functional check

NOTE

Please note that the Vscan Air CL charger is specifically designed to charge the probe only when the system is turned on.

NOTE

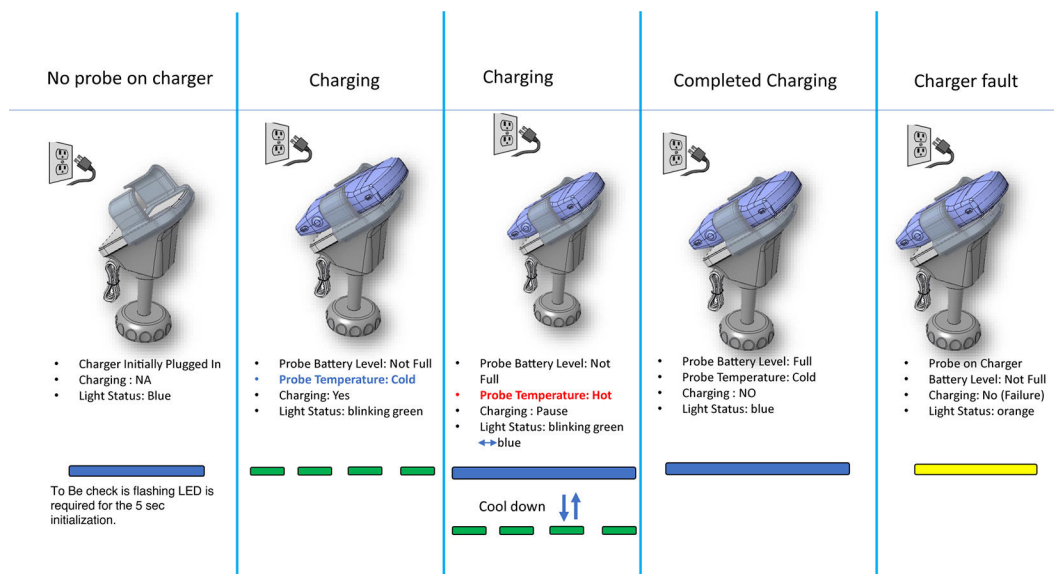
Please note that the Vscan Air CL charger is exclusively designed to charge the probe and cannot be used to charge other devices or accessories.

1. Confirm that charger light status is blue when the Vscan Air CL charger USB cable is plugged into the Ultrasound system.
2. Place the Vscan Air CL probe on the charger and confirm the following:
 - While the Vscan Air CL probe is charging, the charger and probe status are as follows.
 - Charger light status is blinking green
 - Vscan Air CL probe light status is yellow
 - When the Vscan Air CL probe charging is completed, the charger and probe status are as follows.
 - Charger light status is blue
 - Vscan Air CL probe light status is green

NOTE

If the probe overheats during the charging process, the system will suspend charging until the probe temperature drops down.

Figure 6-24 LED status per mode



[illegible]

Date	Service Person	Problem	Comments

Chapter 7

Software

In this chapter

Loading / Reloading / Upgrading the Software.	192
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NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

7.1 Loading / Reloading / Upgrading the Software

This section describes how to install and/or re-install software on LOGIQ Fortis.

Contents in this section

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7.1.1 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.

7.1.2 Software load checklist

This table helps service engineers prepare for performing a software load on a LOGIQ console:

Table 7-1 Software Load Checklist

Impacted Area	Full Software Load	C:\ Drive (System Only) Load	Application Software Load
Disk Encryption	No impact. Entire drive is wiped.	You will need to have the encryption key.	No action required as this is not impacted.
Patient Archive	Backup is required.	Backup is recommended.	Backup is recommended.
User Configuration Settings (Presets)	Backup/Restore is required	Backup is recommended.	Backup is recommended.
System IP Address (if not in DHCP)	Record information. Manually configure after full software load.	Backup is recommended.	Backup is recommended.
Wireless Network Information (Wi-Fi Certificate, Network User and Password)	Record information. Manually configure after full software load.	Record information. Manually reconfigure after C:\ Drive (System Only) Load.	No action required as this is not impacted.
MS OS Patch	Must be manually loaded after full software load.	Manually reinstall after C:\ Drive (System Only) Load.	No action required as this is not impacted.
3rd Party Applications (AppAPI): PIUR Imaging, KOIOS Lite	Must be manually reinstalled after full software load.	Manually reinstall after C:\ Drive (System Only) Load.	No action required as this is not impacted.
Special Devices (Device Management, KOIOS DS, Insite, etc.)	Record information. Manually configure after full software load.	Record information. Manually reconfigure after C:\ Drive (System Only) Load when needed.	No action required as this is not impacted.

Impacted Area	Full Software Load	C:\ Drive (System Only) Load	Application Software Load
Printer (Internal Printer)	Does not need to be disconnected.	Does not need to be disconnected.	Does not need to be disconnected.
Other Peripherals or Connected Devices	Removal is required. Remove all media from USB ports and internal drives (for example, DVD) and disconnect any portable hard drives, HDMI cables and/or external monitors.	Removal is required. Remove all media from USB ports and internal drives (for example, DVD) and disconnect any portable hard drives, HDMI cables and/or external monitors.	Removal is recommended.

7.1.3 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 Ultrasound system 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 the 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.

7.1.4 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 the User Manual (appropriate version).

7.1.4.1 Full and Detailed Restore

Full Restore

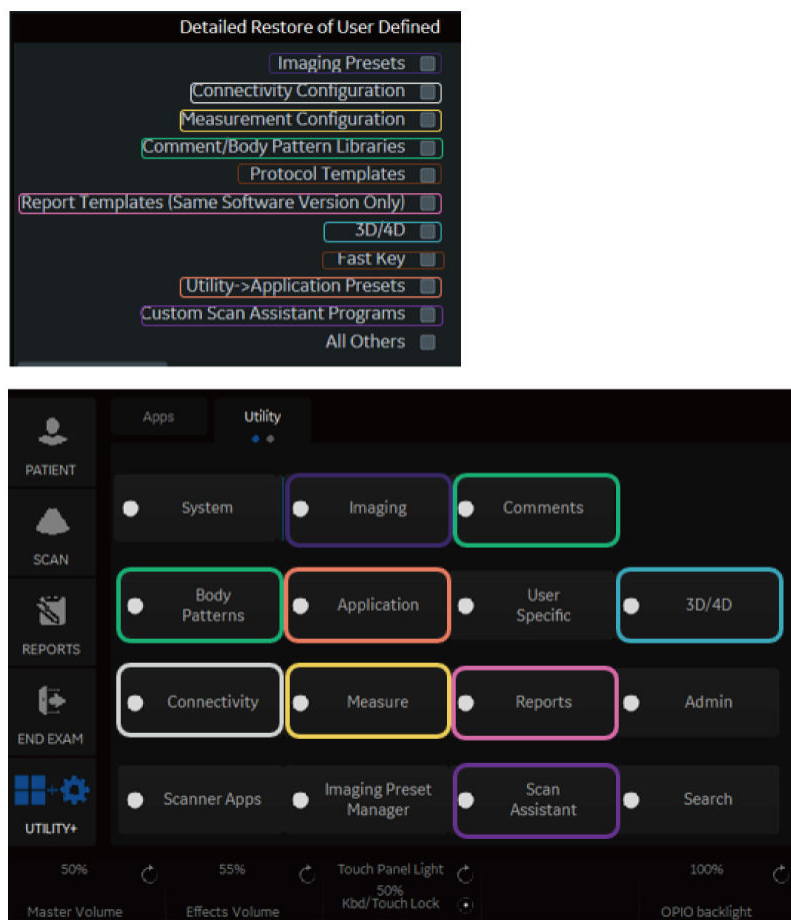
Full Restore will first delete the system preset and then copy the entire preset from the backup. As a result, the system preset will be completely replaced with the backed-up preset.

Detailed Restore

Detailed Restore will delete the selected category preset from the system and then copy the corresponding category preset from the backup. If no preset is saved for a category in the backup, Detailed Restore will not delete the category preset from the system. The result will be the same as if the category were unchecked during a Detailed Restore.

Colored box in the "Detailed Restore of User Defined" corresponds to the same colored box on the button in Utility shown in the illustration below. The configuration of the selected items will be restored.

Figure 7-1 Detailed Restore except All Others



- **Protocol Templates:** It will be created through Protocol Tab from Cardiac applications the preset.
- **Fast Key:** Key sequence will be created by F5.

When **All Others** is selected, it will restore the following configurations enclosed in yellow.

- System
- Admin
- User Specific
- Scanner Apps
- Master/Effect Volume
- Monitor & OPIO Config

- Barcode



NOTE

Make sure the USB media is freshly formatted before use.

7.1.5 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 this table to determine the steps needed when performing a replacement procedure. Refer to the complete replacement steps in Chapter 12.

Table 7-2 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."
	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."
	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.
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.			

7.1.5.1 Replacement procedure with full disk encryption On

To complete a replacement procedure with full disk encryption

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.

7.1.6 Software load with USB media

Perform these procedures to load software from the USB media (thumb drive):

Loading the base image and application software - full load on page 199

Loading the base image and application software - C only on page 209

Loading Only Application Software on page 215

7.1.6.1 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.

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 7-3 Manpower, Time, Tools, and PPE

Manpower	Time	Tool	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 Screwdriver #2 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, HDMI cables and/or external monitors. Failing to do so may interrupt the software load process. The USB printer does not need to be disconnected.

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:

- Verify that third-party software AppAPI is installed (for example, PIUR Imaging).

NOTE

Third-party software AppAPIs must be reinstalled after a base image and application software (full load) and a C:\ Partition load.

- 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 User Manual, (applicable version).

- Back up user-defined configurations only. Leave service unchecked.

NOTE

Use a USB thumb drive to back up user-defined configurations. Format the USB media before using it for preset backups. These configurations will be restored once the software load is complete.

- For software options (for example, Breast Assistant, Powered by Koios DS (for R3 and earlier; Utility > Connectivity > Koios and for R4; Connectivity > Connection Manager > Special Devices > Koios), Tricefy (for R3 and earlier; Utility > Connectivity > Tricefy and for R4; Connectivity > Connection Manager > Special Devices > Tricefy), and Device Management (for R3 and earlier; Utility > Connectivity > Device Mgmt and for R4; Connectivity > Connection Manager > Special Devices > 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.

- Check the Regional preset setting (Utilities > System > Preset Region) and make note of it (None, Americas, Asia, Europe or Japan). This needs to be set up again after the software load to successfully restore imaging presets. If you have a different selection, an error will occur stating that the region does not match.
- 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 for R2/R3, Connectivity > Connection Manager > Network for R4 or from the customer, manually record the DNS server settings.

7.1.6.1.1 Load Base Image and Application Software- full load

1. Perform the following steps before inserting the software thumb drive.
 - a. Remove any USB flash drives and any CD/DVDs from the DVD drive prior to updating the software.
 - b. Disconnect the system from the network and remove all transducers from the system.
 - c. If used, disconnect the secondary monitor, any HDMI cables and/or external monitors.
 - d. Power down the system.
2. Insert the software thumb drive into the USB port on the back of the LOGIQ Fortis.
3. Power on the LOGIQ Fortis.

Figure 7-2 Boot up screen



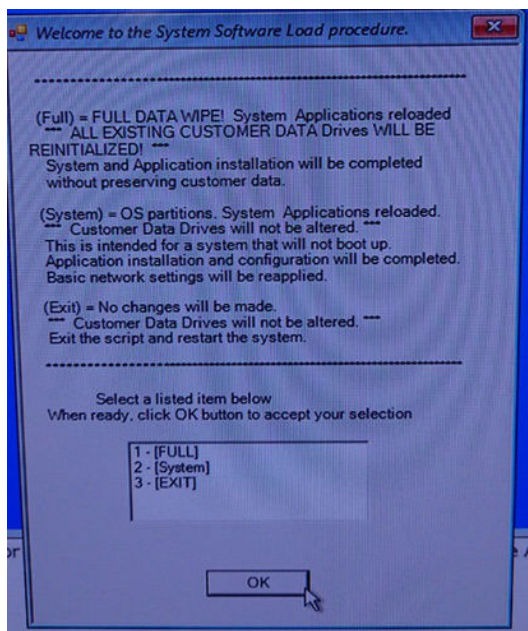
CAUTION

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.

4. Perform the following steps to start the Full load.
 - a. Select **1 - (FULL)**.

- b. With the trackball, point to OK and press the left set key to select **OK**.

Figure 7-3 Software load selection menu



- c. In the Warning dialog box, select **Yes**.

Figure 7-4 Dialog box



NOTE

This will take approximately 10-15 minutes.

5. View the following screens as the application software loads.

NOTE

This will take approximately 15-20 minutes.

Figure 7-5 Application software loading screen

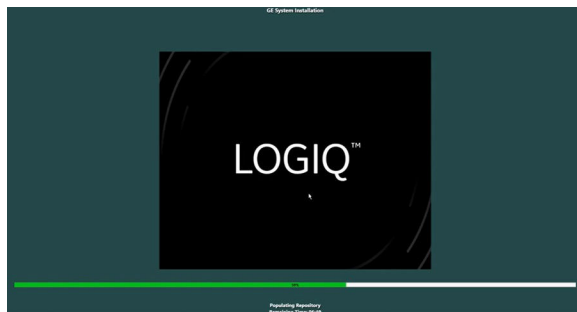
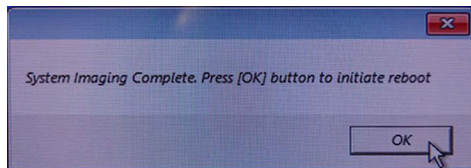


Figure 7-6 Application software loading screen 2



6. When System Imaging is Complete displays, do the following:
 - a. Select OK to reboot the system.
 - b. Remove the USB media BEFORE the system starts rebooting.

Figure 7-7 Initiate Reboot



7. After the system reboots, view the following screens as the application software loads.

NOTE

This will take approximately 15-20 minutes.

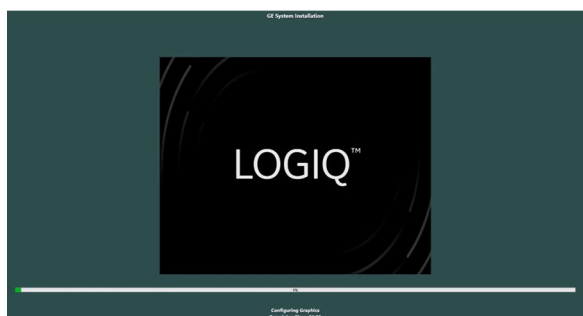
NOTE

The following 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.

Figure 7-8 Boot up screen



Figure 7-9 Application software loading screen

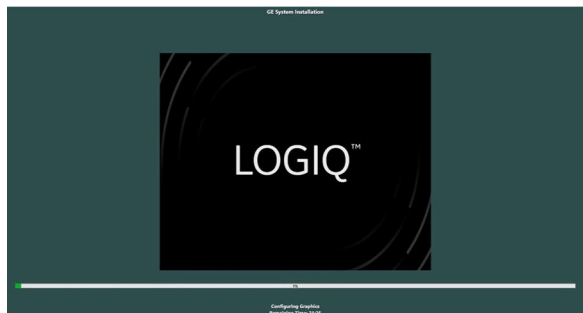


8. After the system reboots again, view the following screens as the application software loads.

Figure 7-10 Boot up screen

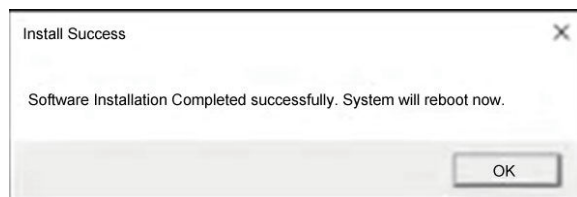


Figure 7-11 Application software loading screen



9. When the Install Success dialog box displays, if necessary, select **OK** to reboot the system.

Figure 7-12 Install Success dialog box



10. After the system reboots, view the following screens as the audio is configured.

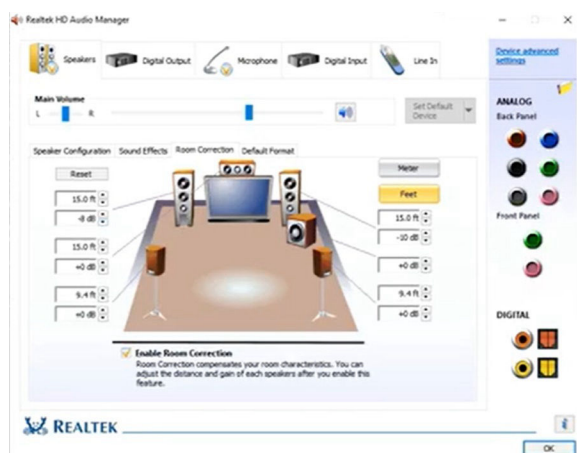
NOTE

This will take approximately 15-20 minutes.

Figure 7-13 Boot up screen



Figure 7-14 Audio configuration screen

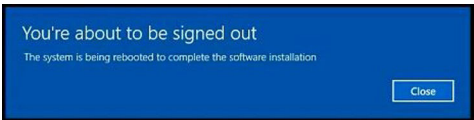


11. Once the application software installation is complete, the LOGIQ Fortis restarts.

Figure 7-15 Boot up screen



Figure 7-16 Sign out message



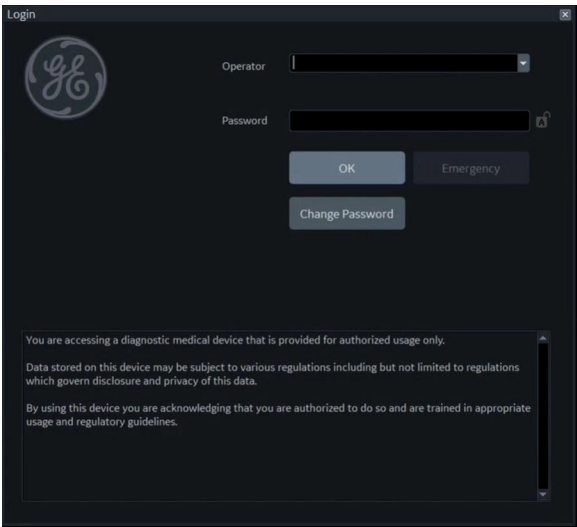
12. After boot up, in **Operator**, enter **ADM**. In **Password**, leave this field empty.

NOTE
No password is required. Do not create any password at this time.

Figure 7-17 Boot up screen



Figure 7-18 Login screen

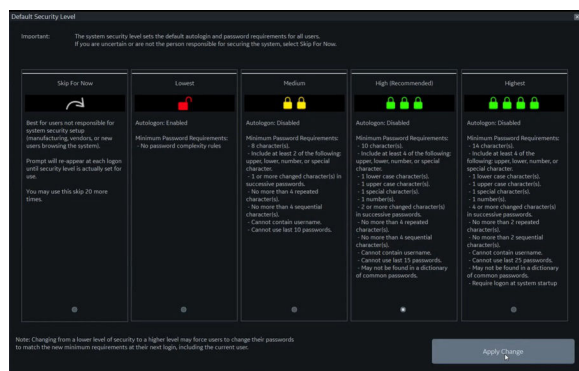


- When prompted with Default Security Level, select **Skip for Now** for the security level, and then select **Apply Change**.

NOTE

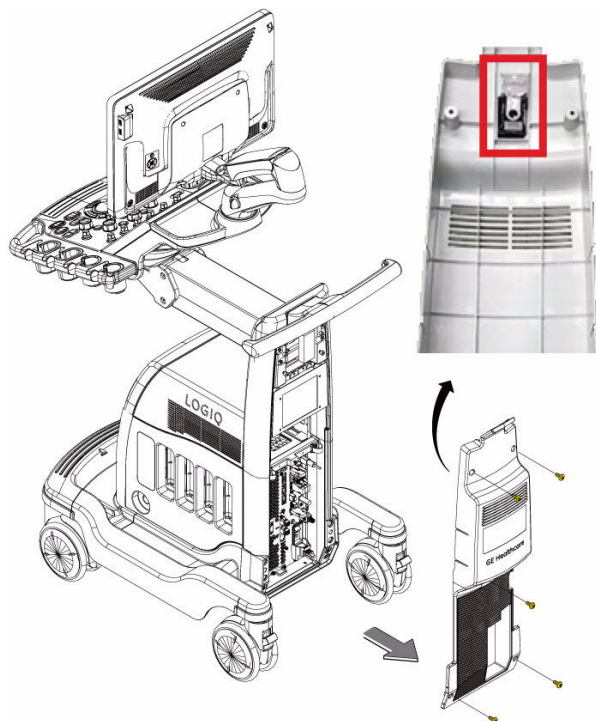
If you select the Lowest security level and then continue with installation and testing. After the update is complete, you can transfer the LOGIQ Fortis to the Site Administrator who can reset the security level for the site. The security level can be reset through **Utility > Admin > Logon**.

Figure 7-19 Security Level Screen



- Put USB flash memory about BASE SYSTEM SOFTWARE and APPLICATION SOFTWARE in a pocket on the rear cover again.

Figure 7-20 USB flash memory storage



7.1.6.1.2 Verifying the software versions

- From the touch panel, select **Utility > System > About**.
- Verify software version matches the version in the software used during installation, version received with the kit.
- If upgrading software, verify the software version matches the version provided with the upgrade kit.

7.1.6.1.3 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.

7.1.6.1.4 Verifying the TCP/IP settings:

For R4 and later:

1. From the touch panel, select **Connectivity > Connection Manager > Network**.
2. Verify the network settings.
3. If needed, manually set the DNS server settings you recorded.
4. If you modified or updated any settings, select **Done**.
5. Reboot the system.

7.1.6.1.5 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**.

7.1.6.1.6 Verifying the AE title and port settings (R3 and earlier)

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.

7.1.6.1.7 Verifying the AE title and port settings (R4 and later)

1. From the touch panel, select **Connectivity > Connection Manager > Scanner**.
2. Verify the settings.
3. If you modified or updated any settings, select **Done**.

7.1.6.1.8 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**.
6. Ensure that the correct source is selected, and select **OK**.
 - Depending on the selection, one or two restore confirmation windows are displayed.
 - 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 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 User Manual for instructions if using GE HealthCare 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 Online Center for support indicating the serial number of the unit, description of the problem and e-mail of the admin user registered in the account.
15. Configure any new features (for example, Device Management) if applicable. Refer to the 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.

7.1.6.1.9 Functional checks

Table 7-4 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

7.1.6.2 Loading the base image and application software - C 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.

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 7-5 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.	Phillips screw driver Software thumb drive	No PPE required

7.1.6.2.1 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!

NOTE

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.
- For more information on backing up and restoring patient data or system presets, see “Backup and Restore” in the User Manual (latest revision).

1. Suspend encryption prior to turn off the system.

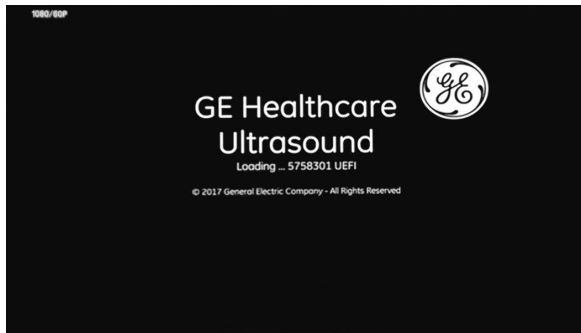
NOTE

Suspended encryption will be maintained until reboot, make sure this is the last step prior to reload.

- a. From the touch panel, select **Utility > Admin**.

- b. Select [Disc Encrypt] Tab.
 - c. Click "Choose Encryption Policy".
 - d. Select "Encryption OFF" and click [Accept].
2. Perform the following steps before inserting the software thumb drive.
 - a. Remove any USB flash drives and any CD/DVDs from the DVD drive prior to updating the software.
 - b. Power down the LOGIQ Fortis.
 - c. If used, disconnect the secondary monitor, any HDMI cables and/or external monitors.
3. Insert the software thumb drive into the USB port on the back of the LOGIQ Fortis.
4. Power on the LOGIQ Fortis.

Figure 7-21 Boot up screen



5. Perform the following steps to start the System only load.

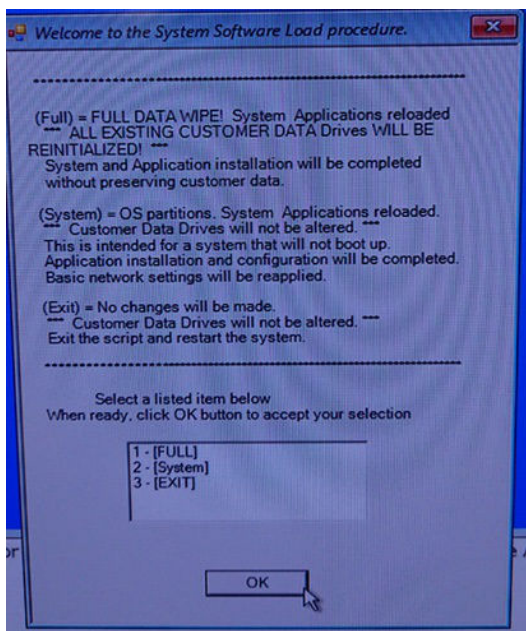
1. Select **2 - (SYSTEM)**.

NOTE

Selecting **2-System** is a not DATA WIPE. ALL EXISTING PATIENT DATA WILL BE PRESERVED.

2. With the trackball, point to OK and press the left set key to select **OK**.

Figure 7-22 Software load selection menu



NOTE

This will take approximately 10-15 minutes.

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.

6. View the different screens that appear as the following tasks are performed:

- Starting System Software Installation
- Cleaning System Disk
- Populating Repository Drive
- Populating System Drive

Figure 7-23 Application software loading screen

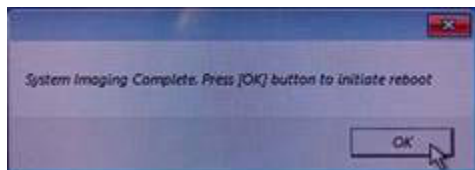
**NOTE**

This will take approximately 10 minutes.

7. When System Imaging is Complete displays, do the following:

- a. Press OK to reboot the system.
- b. Remove the USB media BEFORE the system starts rebooting (right after the screens go black).

Figure 7-24 System Reboot Message



8. View the different tasks on the screen as the application software loads.

NOTE

This will take approximately 20 minutes.

Figure 7-25 Application software loading screen



9. Once the application software installation is complete, the LOGIQ Fortis restarts.

Figure 7-26 Message before reboot



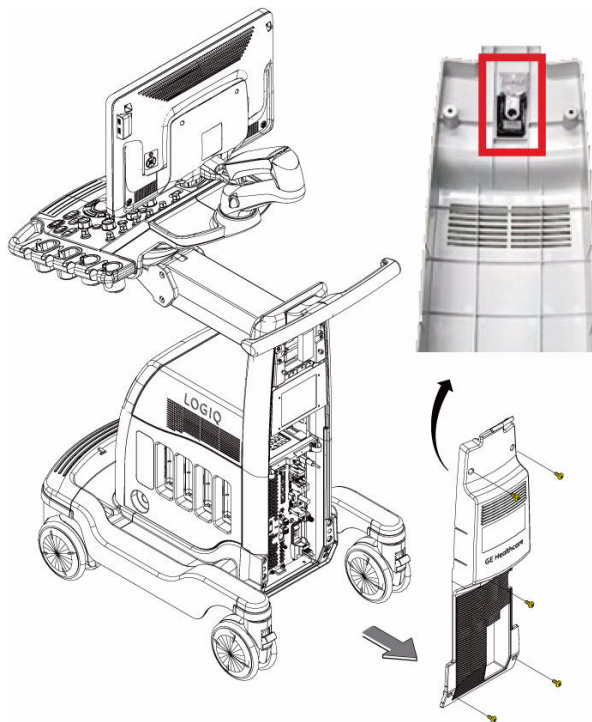
10. After boot up, log in as ADM (no password required) and, when prompted, select **Lowest** for the security level.

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**.

11. Put USB flash memory about BASE SYSTEM SOFTWARE and APPLICATION SOFTWARE in a pocket on the rear cover again.

Figure 7-27 USB flash memory storage



7.1.6.2.2 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.
3. If upgrading software, verify the software version matches the version provided with the upgrade kit.

7.1.6.2.3 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.

7.1.6.2.4 Verifying the TCP/IP settings:

For R4 and later:

1. From the touch panel, select **Connectivity > Connection Manager > Network**.
2. Verify the network settings.
3. If needed, manually set the DNS server settings you recorded.
4. If you modified or updated any settings, select **Done**.
5. Reboot the system.

7.1.6.2.5 Verifying the AE title and port settings (R3 and earlier)

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.

7.1.6.2.6 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.

7.1.6.2.7 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.

7.1.6.2.8 Functional checks

Table 7-6 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

7.1.6.3 Loading Only 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.

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

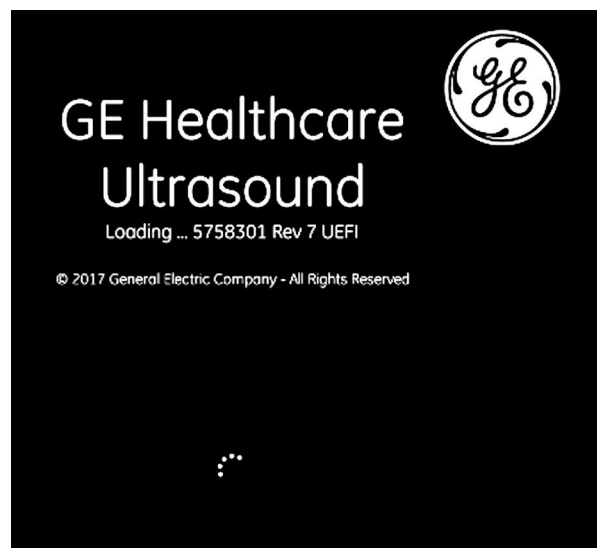
Table 7-7 Manpower, Time, Tools, and PPE

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

7.1.6.3.1 Loading application software

1. Turn on the LOGIQ Fortis and wait until Windows has booted and is loading. Watch carefully for the screen swirling circles, as shown below.

Figure 7-28 boot screen



2. Promptly insert the software thumb drive into the USB port on the back of the LOGIQ Fortis.

NOTE

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 to start the process again.

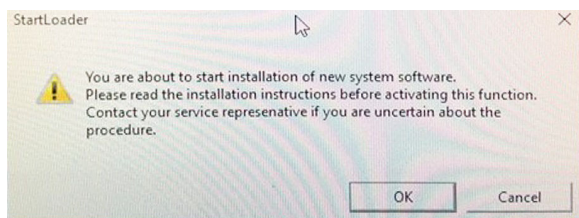
- At the Start Application dialog, select **Install SW...**

Figure 7-29 Start Application Window



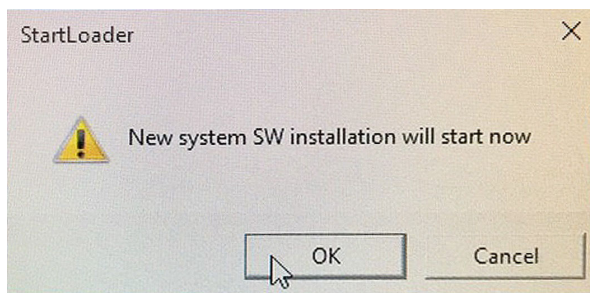
- At the StartLoader dialog, select **OK**.

Figure 7-30 StartLoader Window



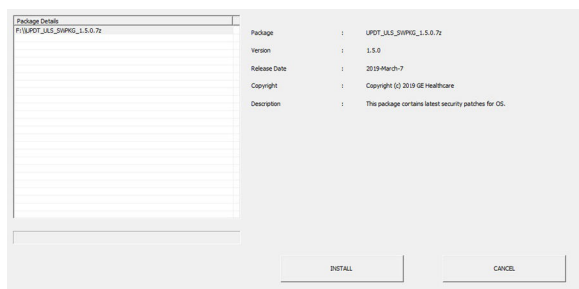
- Select **OK** to continue with the application software load process.

Figure 7-31 StartLoader Window 2



- If prompted, select **Install** to begin the software installation.

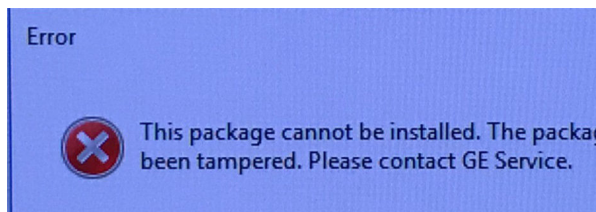
Figure 7-32 Install button



NOTE

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.

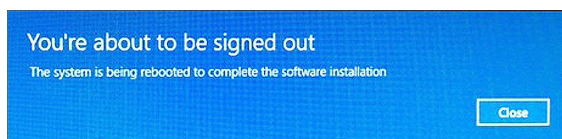
Figure 7-33 Error message



7. Once the application software installation is complete this screen will display, remove the thumb drive before the system re-starts.

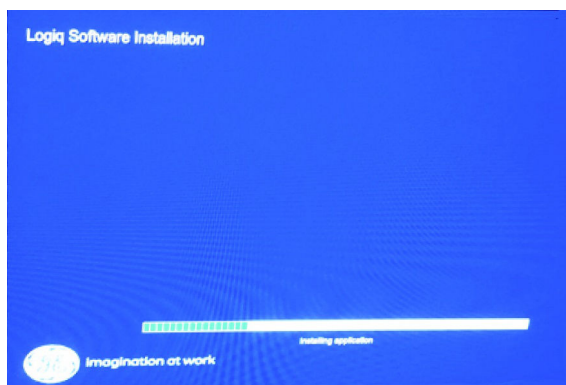
The system will boot up.

Figure 7-34 Message before boot



8. Let the load process continue. It will take several minutes. DO NOT disturb the process.

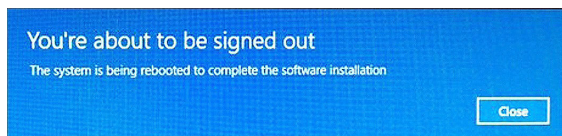
Figure 7-35 Application software load screen



9. 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.

Figure 7-36 Message before boot



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

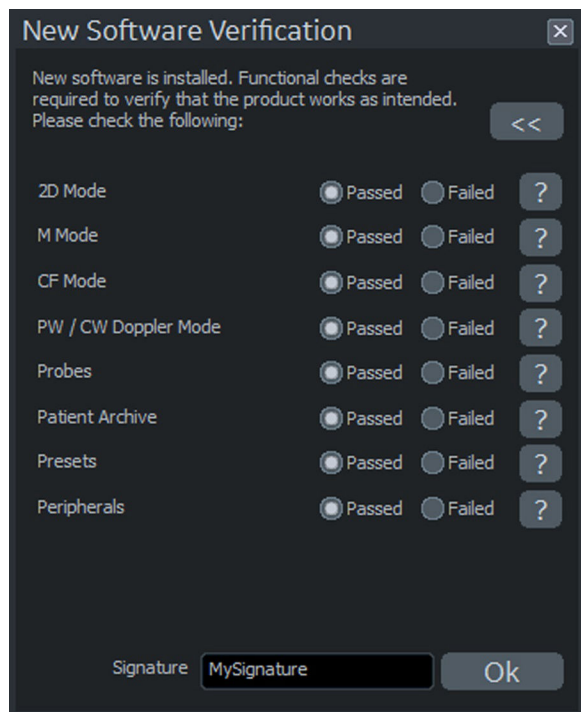
NOTE

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**.

11. 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**.

Figure 7-37 Verification window



7.1.6.3.2 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.
3. If upgrading software, verify the software version matches the version provided with the upgrade kit.

7.1.6.3.3 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.

7.1.6.3.4 Verifying the TCP/IP settings:

For R4 and later:

1. From the touch panel, select **Connectivity > Connection Manager > Network**.
2. Verify the network settings.
3. If needed, manually set the DNS server settings you recorded.
4. If you modified or updated any settings, select **Done**.
5. Reboot the system.

7.1.6.3.5 Verifying the AE title and port settings (R3 and earlier)

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.

7.1.6.3.6 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.

7.1.6.3.7 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.

7.1.6.3.8 Functional checks

Table 7-8 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
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<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

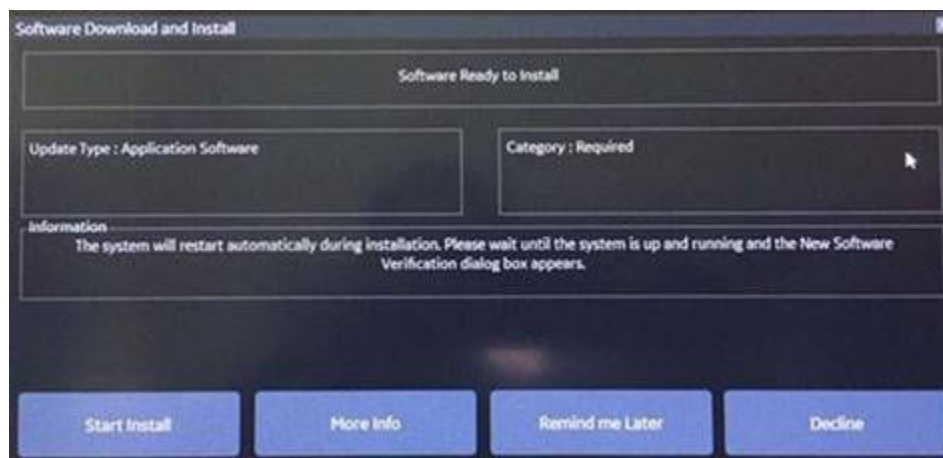
7.1.7 Software load with eDelivery (Direct to Device)

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 TB70620 - eDelivery (Direct to Device) (DOC2911959).

Figure 7-38 Software Download and Install



7.1.8 Microsoft security patch updates

There are Microsoft security patch updates available for the Ultrasound system. There is a separate service note that informs the field of the availability of these Microsoft security patch updates including the part number applicable to consoles and installation instructions.

For more information, see TB70576 “Microsoft Security Patch Updates” (DOC2228260).

Chapter 8

Theory

In this chapter

Overview.	224
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Software Description.	228
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Main Console Description.	233
Casters and Brakes Description.	244
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NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

8.1 Overview

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

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis models unless otherwise specified.

- *Overview* on page 224
- *LOGIQ Fortis Models* on page 225
- *LOGIQ Fortis Description* on page 226
- *Software Description* on page 228
- *Service Desktop Description* on page 231
- *Front End Description* on page 233
- *Back End Description* on page 236
- *Backplane Description* on page 239
- *Top Console Description* on page 232
- *Power Distribution Description* on page 241
- *Air Flow Distribution* on page 242
- *Casters and Brakes Description* on page 244
- *Options and Peripherals Description* on page 245
- *Product Manuals* on page 246

8.2 LOGIQ Fortis Models

Table 8-1 LOGIQ Fortis GLOBAL (except China) Models

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
6601000-10	LOGIQ Fortis R4 LCD monitor, 100-240 VAC	R4.x.x
6602000-10	LOGIQ Fortis R4 HDU Display, 100-240 VAC	R4.x.x
6601000-5	LOGIQ Fortis R5 LCD monitor, 100-240 VAC	R5.x.x
6602000-5	LOGIQ Fortis R5 HDU monitor, 100-240 VAC	R5.x.x

Table 8-2 LOGIQ Fortis China Only Models

MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
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
5876352-4	LOGIQ Fortis R4 HDU Display console	R4.x.x
5876353-4	LOGIQ Fortis Pro R4 HDU Display	R4.x.x
5876354-4	LOGIQ Fortis Express R4 HDU Display	R4.x.x
5876355-4	LOGIQ Fortis Super R4 HDU Display	R4.x.x
5876356-4	LOGIQ Fortis Expert R4 LCD Monitor	R4.x.x
5876357-4	LOGIQ Fortis Plus R4 LCD Monitor	R4.x.x
5876358-4	LOGIQ Fortis Power R4 LCD Monitor	R4.x.x

Table 8-3 LOGIQ Fortis VET GLOBAL (except China) Models

MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION
6602000V	LOGIQ Fortis R3 HDU VET	R3.x.x
6602000-10V	LOGIQ Fortis-V R4 HDU	R4.x.x
6602000-5V	LOGIQ Fortis-V R5 HDU	R5.x.x

8.3 LOGIQ Fortis Description

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

Contents in this section

- *Introduction* on page 226
- *LOGIQ Fortis general description* on page 227

8.3.1 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.

8.3.2 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

8.4 Software Description

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

Contents in this section

- *LOGIQ Fortis base load image and application software* on page 229
- *Electronic media* on page 230
- *LOGIQ Apps* on page 231
- *Service Desktop Description* on page 231

8.4.1 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

NOTE

For software specific details, see *Software* on page 191.

Software location

The software resides on the SSD (Solid State Drive) located on the BEPS.

Software installation

All LOGIQ software installation information is provided in the Software chapter. For software installation, refer to *Software* on page 191.

Network capabilities

These are the network capabilities:

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

8.4.2 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>.

8.4.3 LOGIQ Apps

The following LOGIQ Apps are available for Android devices through a Bluetooth connection:

- LOGIQ Remote
- LOGIQ Photo

For more information, see “LOGIQ Apps” in the 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.

8.4.4 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.

8.5 Top Console Description

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

- *Transporting the LOGIQ Fortis* on page 232

8.5.1 Transporting the LOGIQ Fortis

Refer to the appropriate version of the User Manual or Release Notes.

8.6 Main Console Description

8.6.1 Front End Description

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

- *Card rack circuit boards overview and location* on page 234

8.6.1.1 Card rack circuit boards overview and location

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

Figure 8-1 Card Rack Boards (indicate orange box)

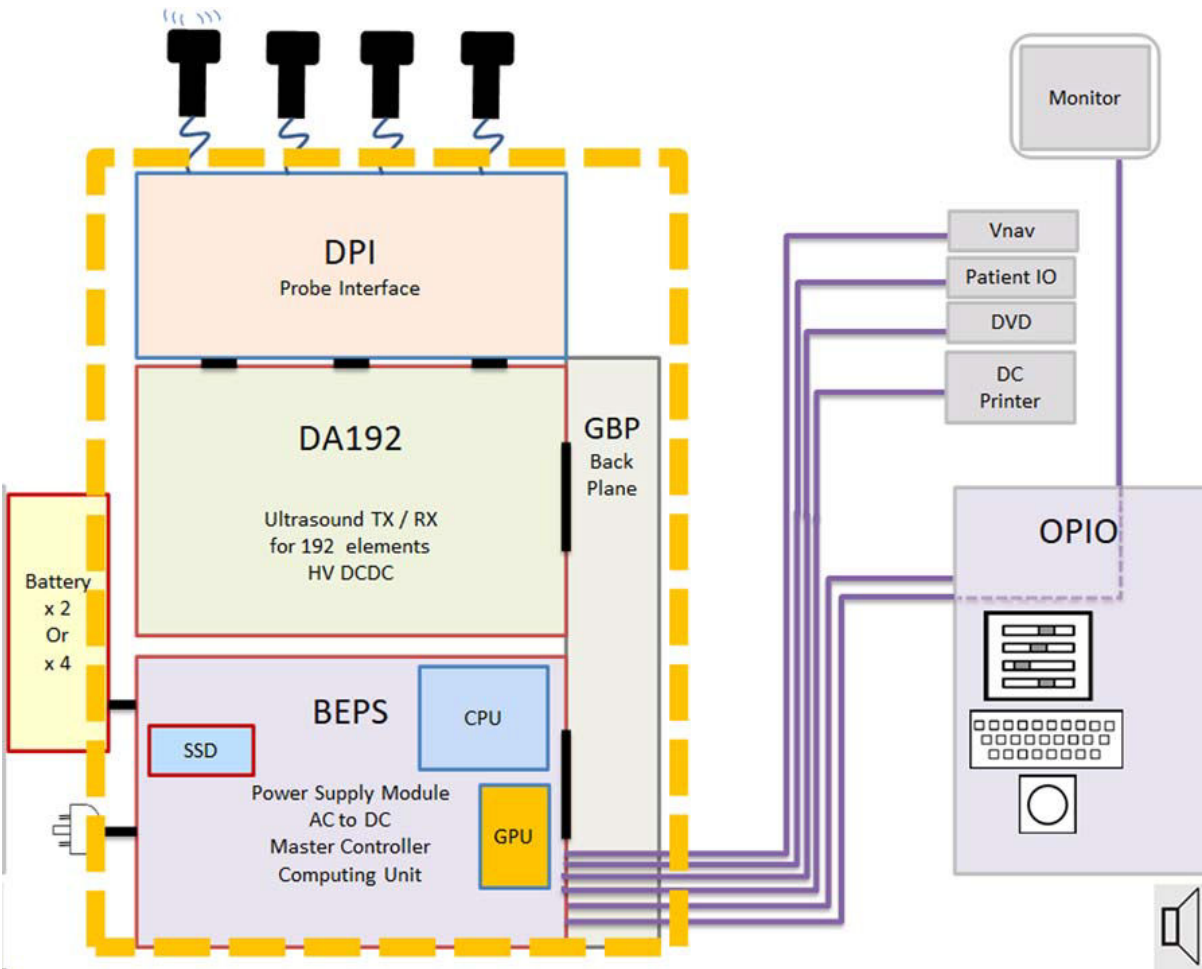
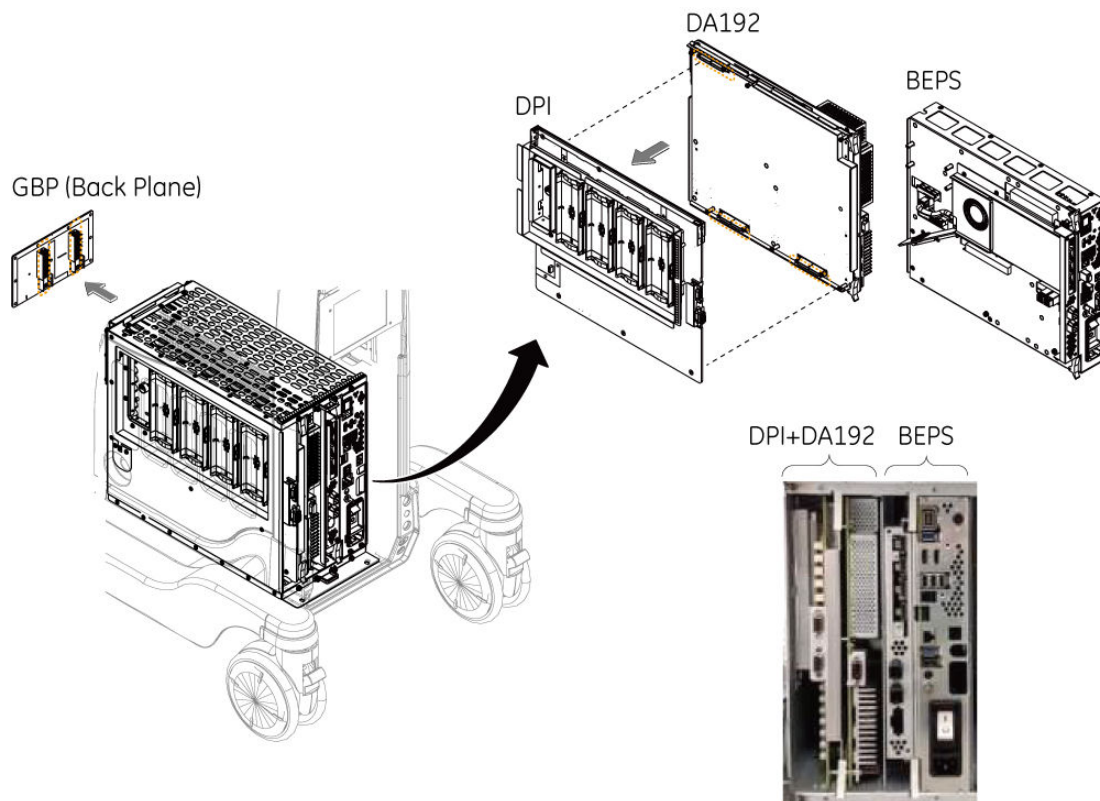


Table 8-4 Card Rack Boards

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

ABBREVIATION	BOARD NAME	TOTAL NUMBER OF CARDS
GBP	Back Plane	1

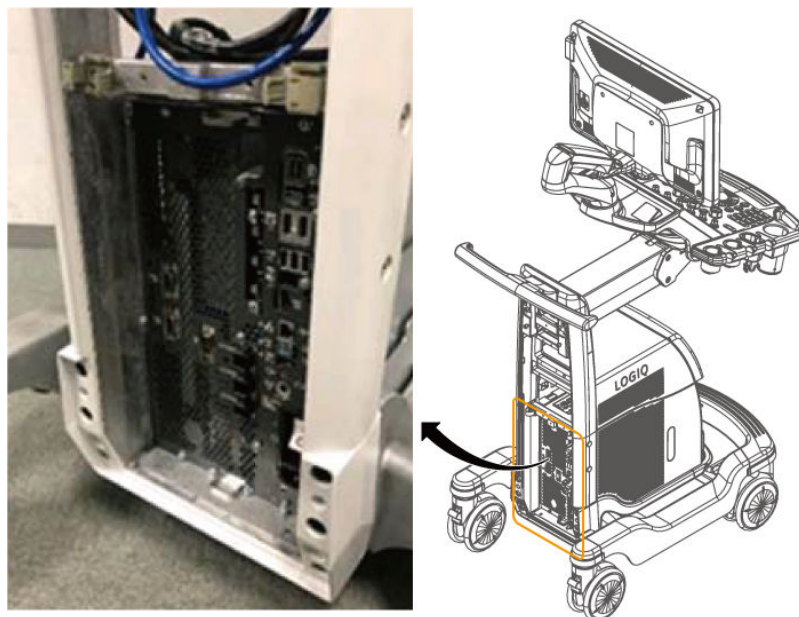
Figure 8-2 Details of Card Rack



Card rack location in the LOGIQ Fortis

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

Figure 8-3 Card Rack Location



8.6.2 Back End Description

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

- *BEPS* on page 237

8.6.2.1 BEPS

The BEPS (Back End and Power Supply) module performs two primary functions:

- It houses a single-board computer, built from a COM Express module mounted on a customized rack. This serves as the central processing unit of the ultrasound system, managing all core functions, including the user interface, system control, and connectivity. The console serial number and option keys are stored on a removable EEPROM connected to the BEPS.

NOTE

The COM Express module is sometimes referred to as the SOM or Coffee Lake module—these are internal product development terms.

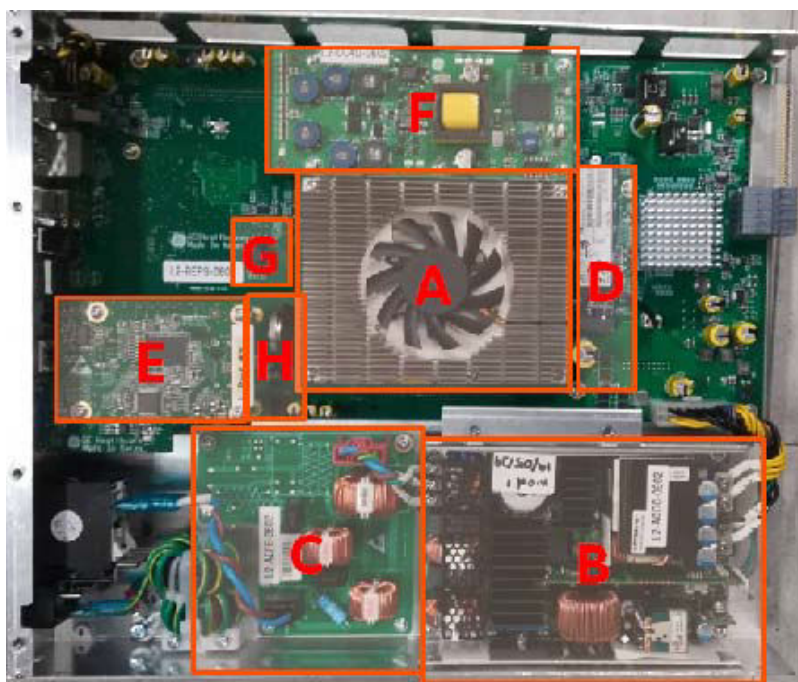
- It integrates the main power supply unit, which includes a semi-customized AC/DC converter to deliver power to the system.

The BEPS hosts a single M.2 Solid State Drive (SSD), which is used for the system base, application software, and patient archive storage. For details on the SSD partitions, refer to Table 8-12: Drive Partitions. For software installation instructions, see the SOFTWARE chapter.

The BEPS also hosts the system GPU. BEPS modules for R2/R3-born systems have a single GPU slot, while those for R4/R5-born systems feature two GPU slots.

Power to the DA192 and DPI-L boards, as well as PCIe signals for image processing, are delivered through the BEPS connection to the backplane.

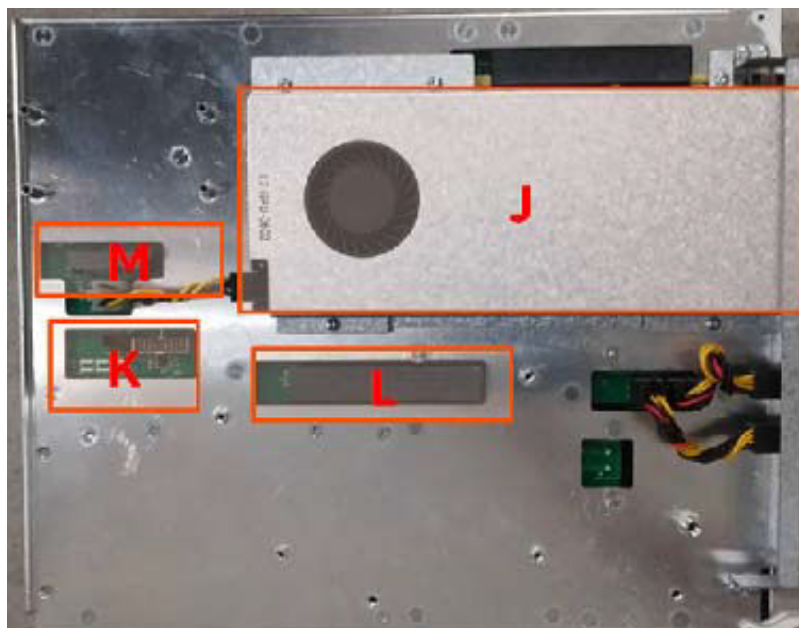
Figure 8-4 Location of each module



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	EEPROM -- removable chip that stores the console serial number and option keys
H	Lithium Coin Battery

Figure 8-5 Location of each module (Back side)



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

Figure 8-6 Connector description

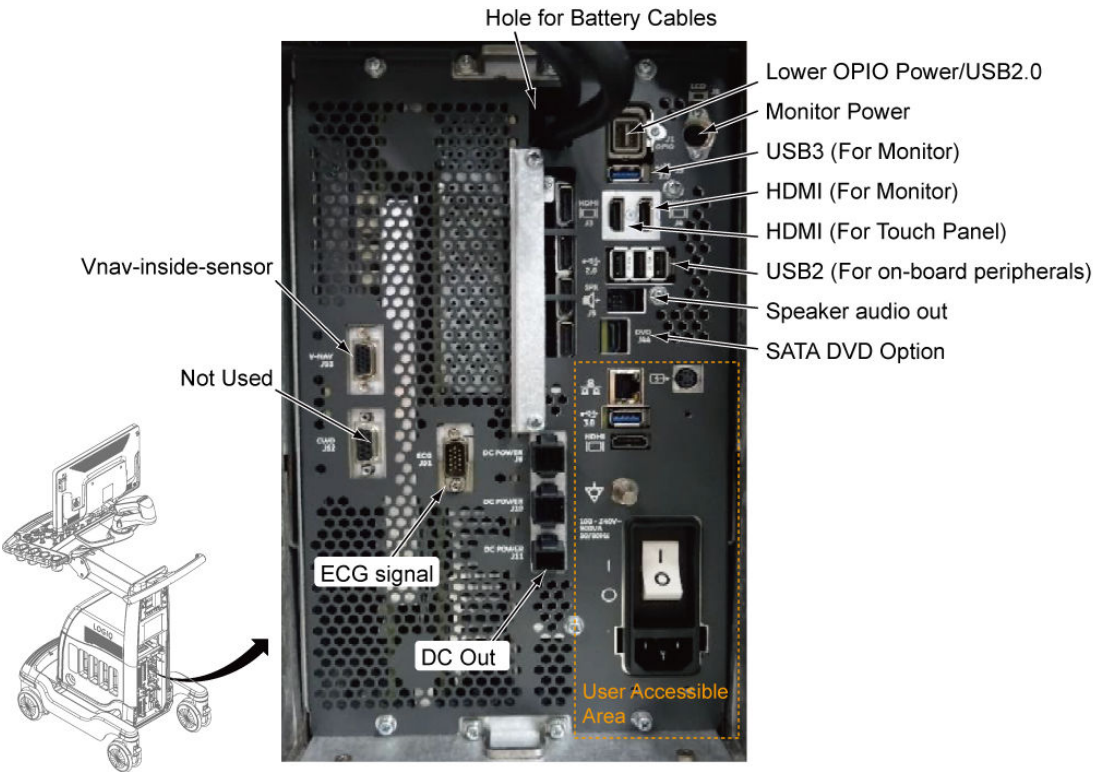
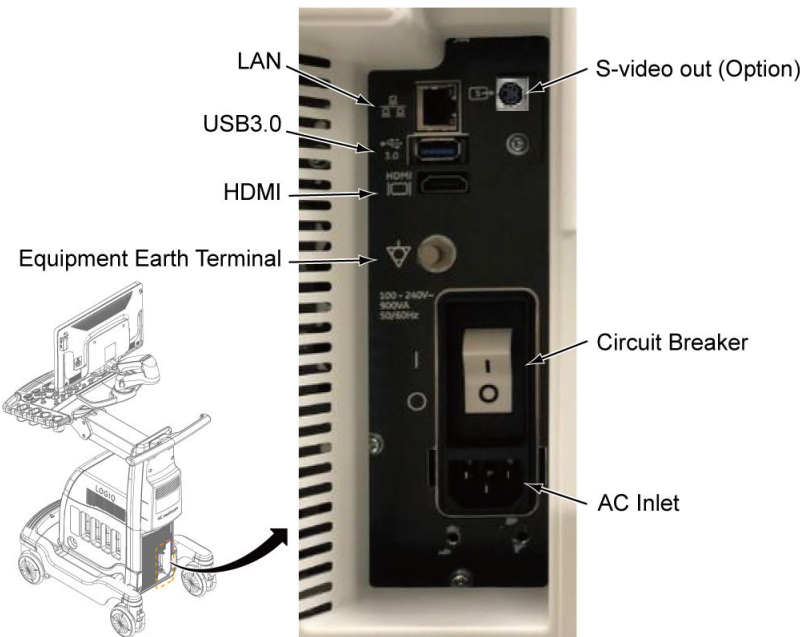


Figure 8-7 User accessible area



8.6.3 Backplane Description

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

Contents in this section

- *Backplane (GBP)* on page 241

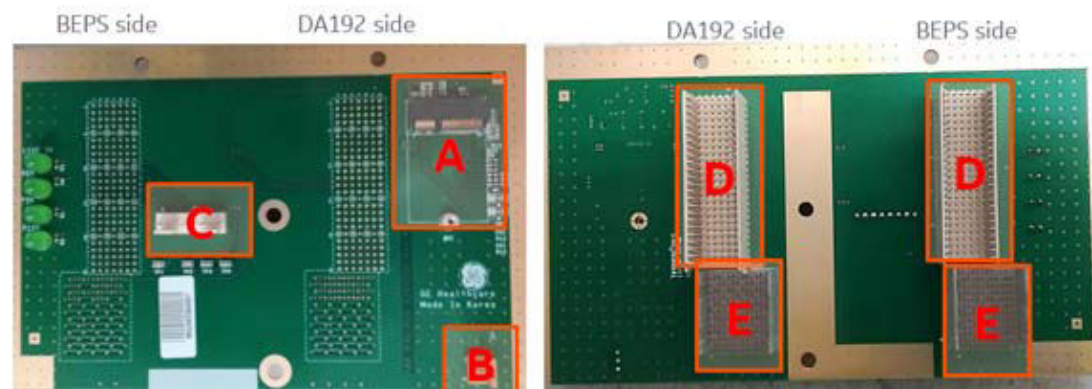
8.6.3.1 Backplane (GBP)

The backplane (GBP) connects the BEPS board and the DA192 board, enabling concurrent processing of up to 192 ultrasound channels. It also includes connectors for main fan power, the front-panel LED, and the wireless LAN module.

NOTE

The Backplane (GBP) does not contain a ROM for VPD.

Figure 8-8 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)

8.6.4 Power Distribution Description

The power distribution within the LOGIQ Fortis is described in this section.

Contents in this section

- *Power Supply Distribution* on page 241

8.6.4.1 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.

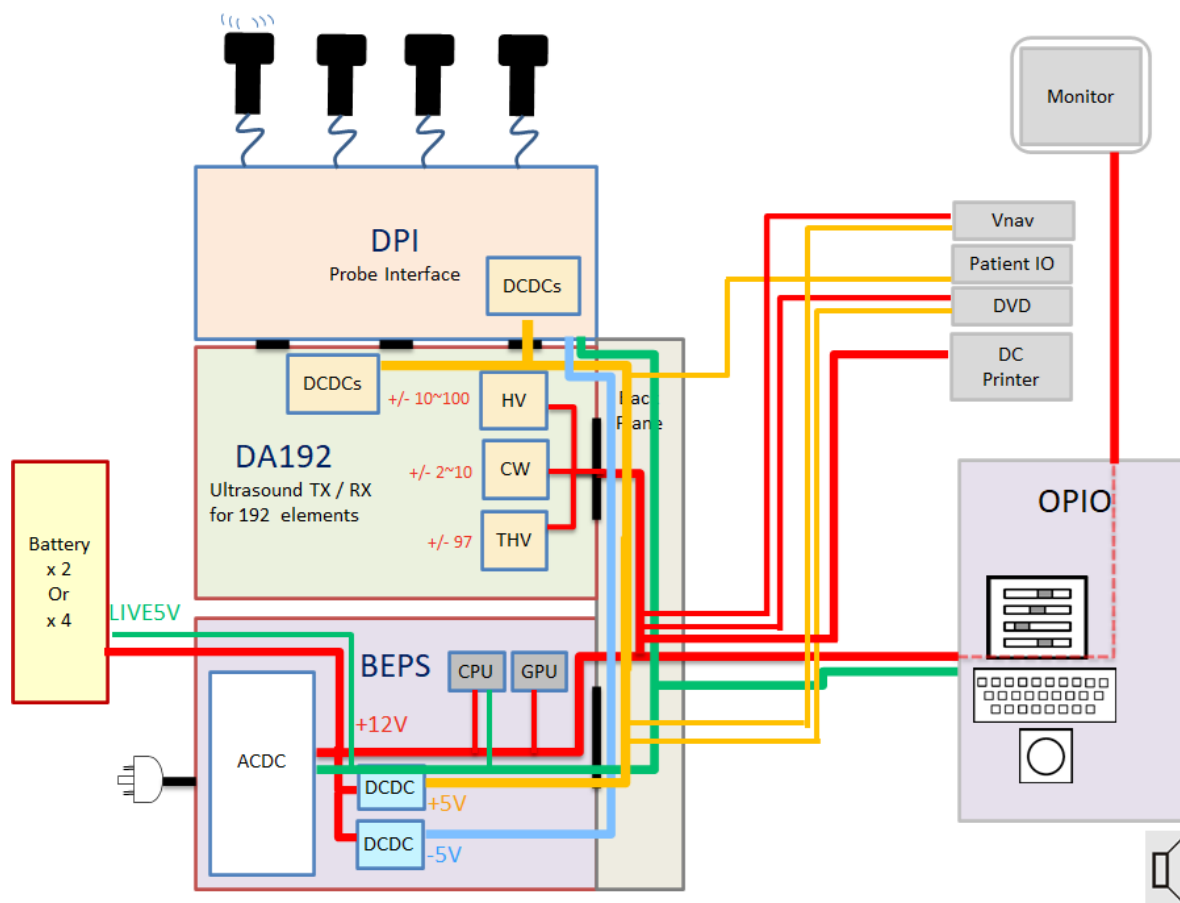
LOGIQ Fortis does not have Motors for Operator panel motion. Thus, LOGIQ Fortis does not have 48Vdc lane.

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 8-9 Power Distribution Diagram



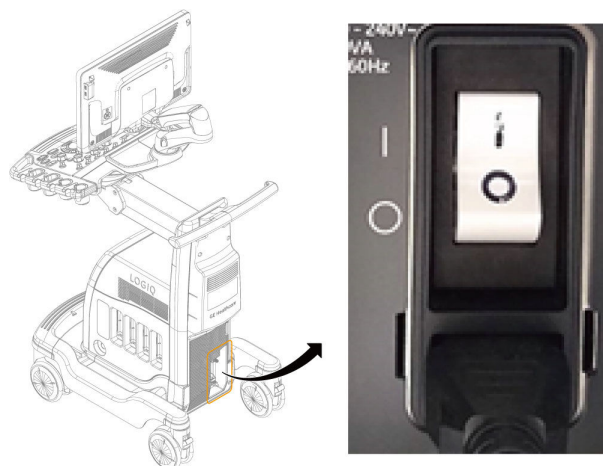
The mains cord has plugs in both ends. A female plug connects to the scanner and a male plug to the wall outlet.

User cannot detach the mains cord by regulation (fixed by Bracket).

Fuses are located inside the ACDC module (cannot be replaced).

LOGIQ Fortis has a Circuit Breaker, located on Rear bottom side.

Figure 8-10 Circuit Breaker



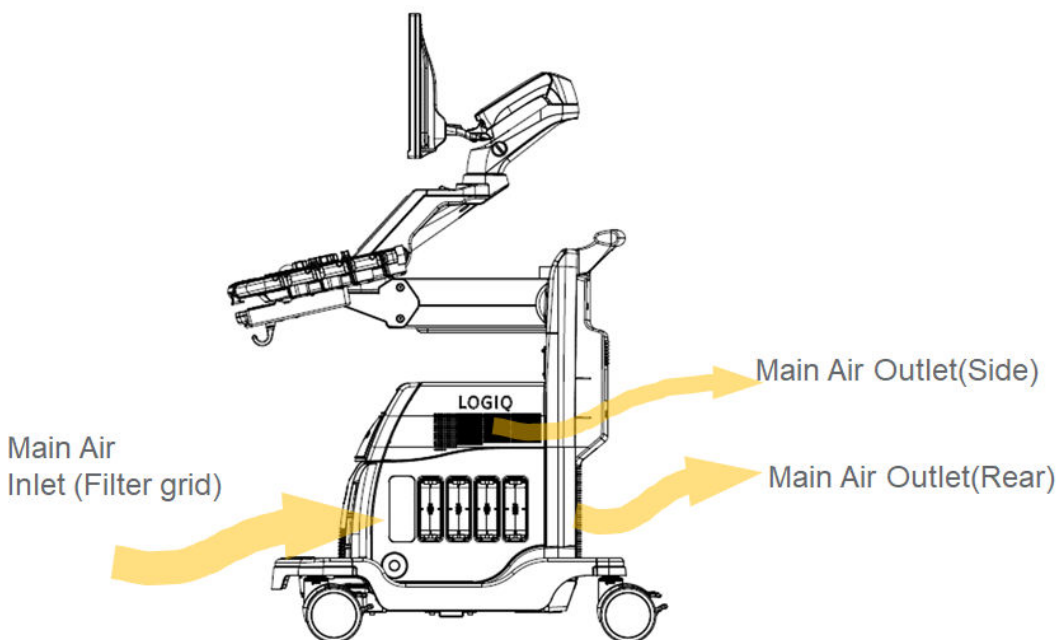
8.6.5 Air Flow Distribution

8.6.5.1 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.

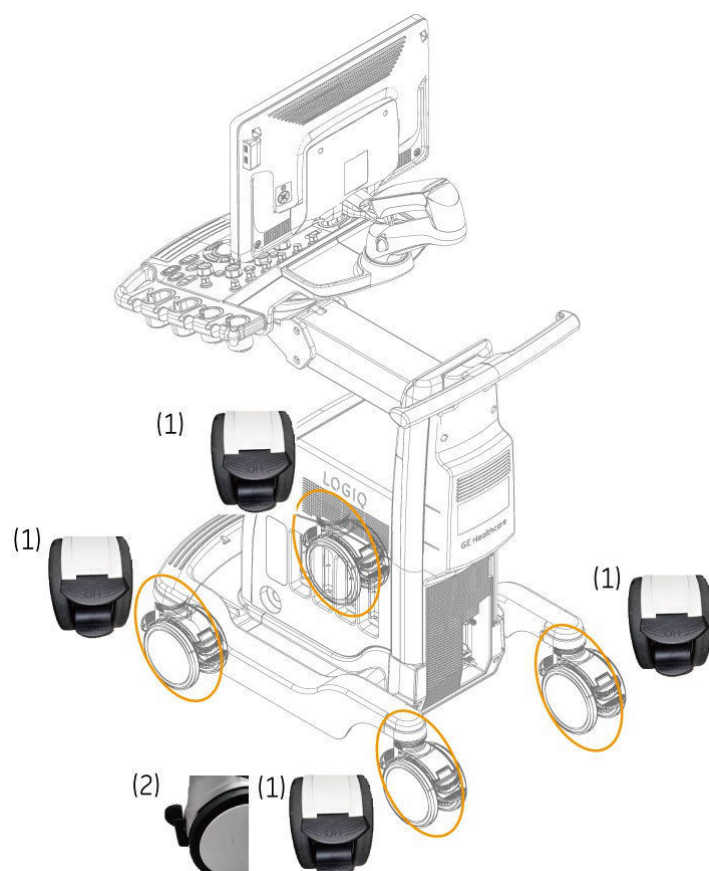
Figure 8-11 Air Inlet/Outlet



8.7 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 8-12 Wheel lock and Swivel lock



- 1. Brake pedal
- 2. Swivel lock

8.8 Options and Peripherals Description

The options and peripherals within the LOGIQ Fortis is described in this section.

- *Internal hardware options and peripherals* on page 245
- *External peripherals* on page 245

8.8.1 Internal hardware options and peripherals

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 if purchased with the system.

- 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
- Gel Warmer Option
- DVD Drive option
- Printer (Digital Graphic) Option

8.8.2 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
- VScan Air dedicated USB Wireless option
- Vscan Air and Charger Option

8.9 Product Manuals

8.9.1 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)

8.9.2 General service documentation

- LOGIQ Fortis General Service Manual
- LOGIQ Fortis Unpacking/Packing Procedure

Chapter 9

System Diagrams

In this chapter

LOGIQ Fortis Internal Cable Connection. 248

This chapter contains system diagrams.

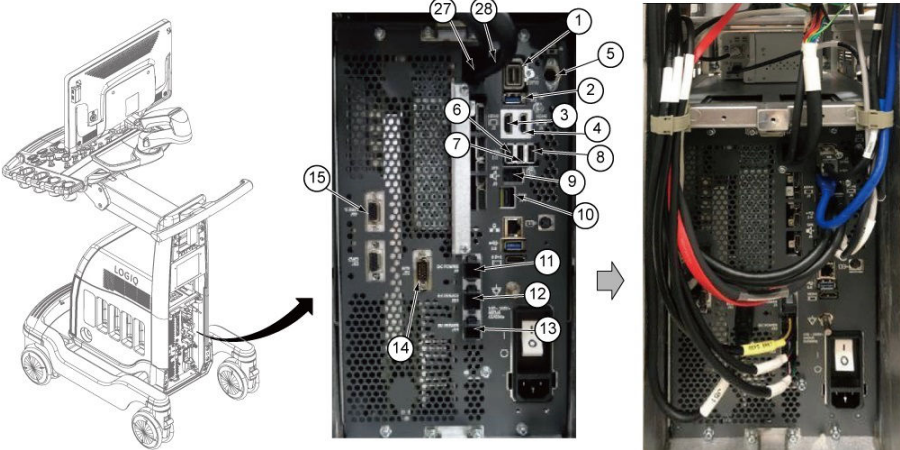
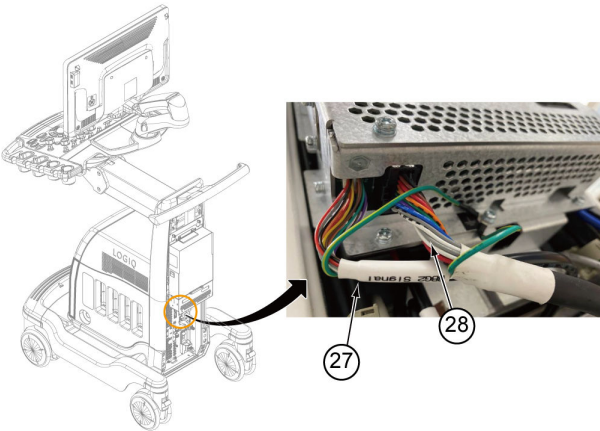
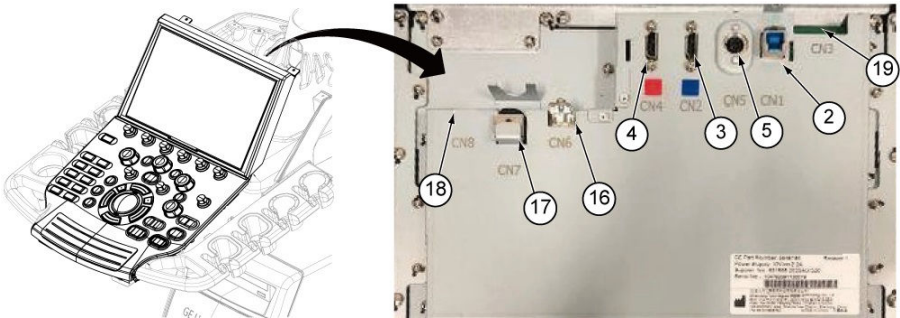
NOTE
The information in this Service Manual is applicable to LOGIQ Fortis.

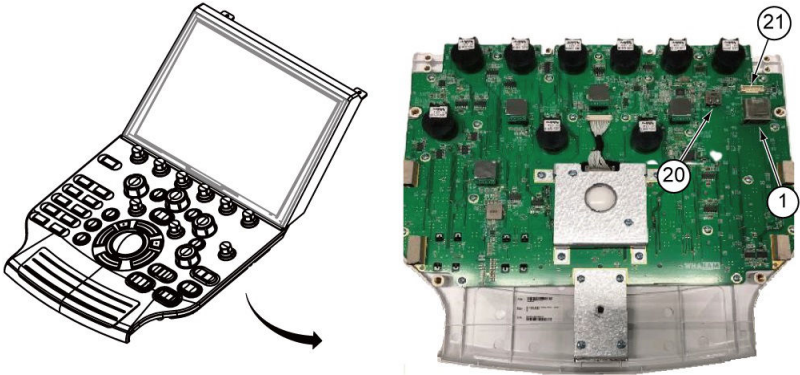
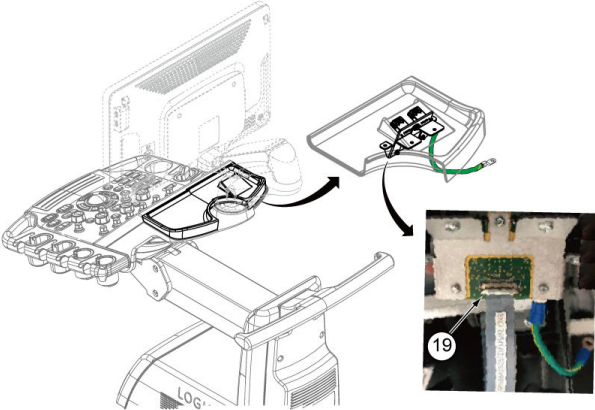
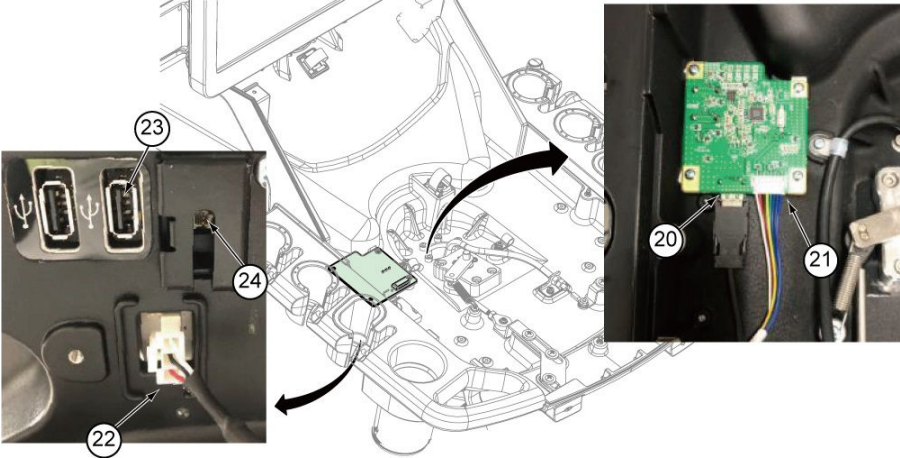
NOTE
The information contained in this Service Manual is applicable to LOGIQ Fortis and LOGIQ Fortis Pro, LOGIQ Fortis Express, LOGIQ Fortis Super, LOGIQ Fortis Expert, LOGIQ Fortis Plus, LOGIQ Fortis Power unless otherwise specified. This Service Manual also applies to Ultrasound systems used in veterinary environments.

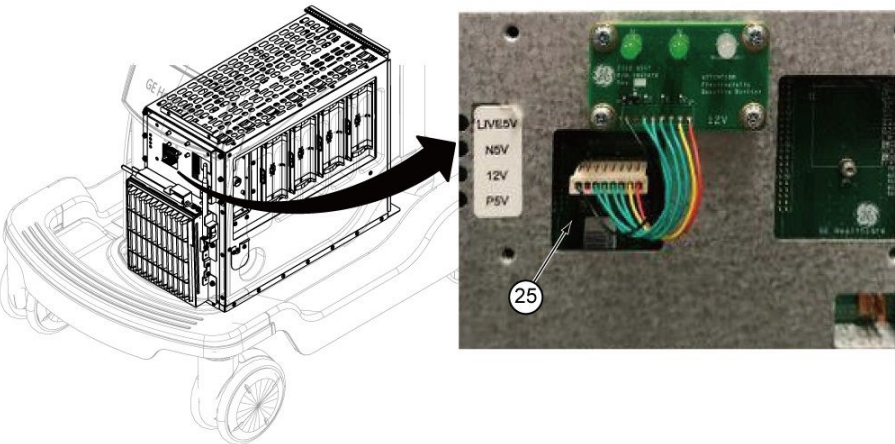
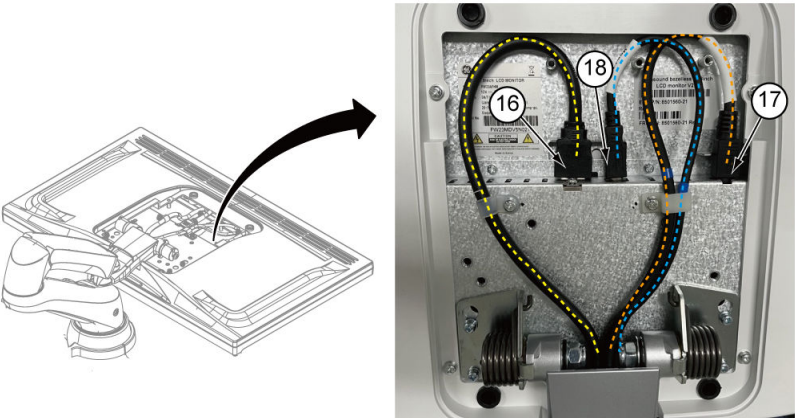
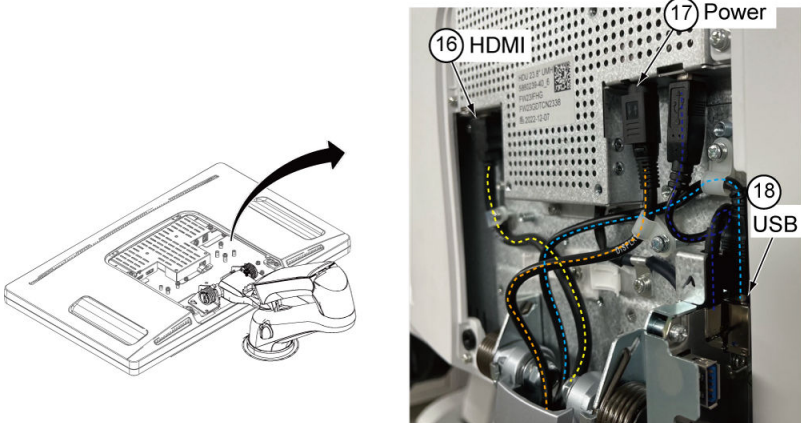
9.1 LOGIQ Fortis Internal Cable Connection

Most of internal Cables are routed from BEPS, and connected to each board/modules.

Table 9-1 LOGIQ Fortis Internal Cable Connection

Component	Picture
BEPS	 The diagram shows a LOGIQ Fortis unit with an arrow pointing to the BEPS (Base Equipment Power Supply) area. The photo shows the internal components of the BEPS with numbered callouts 1 through 15. Callouts 1-10 are on the right side, and 11-15 are on the left side. A grey arrow points from the diagram to the photo.
BBG (Option)	 The diagram shows a LOGIQ Fortis unit with an arrow pointing to the BBG (Base Board Group) area. The photo shows the internal components of the BBG with numbered callouts 27 and 28. Callout 27 points to a cable, and callout 28 points to a connector.
Upper OPIO	 The diagram shows a LOGIQ Fortis unit with an arrow pointing to the Upper OPIO (Output Processor Interface) area. The photo shows the internal components of the Upper OPIO with numbered callouts 2 through 19. Callouts 2-10 are on the right side, and 11-19 are on the left side.

Component	Picture
Lower OPIO	 The diagram shows the lower OPIO assembly being inserted into the device. The photo shows the green circuit board with components labeled 1, 20, and 21. Component 1 is a small component on the right, 20 is a larger component in the center, and 21 is a component on the top right.
Extension USB Board	 The diagram shows the extension USB board being inserted into the device. The photo shows the board being inserted into the slot, with component 19 labeled on the board.
Extension HUB Board	 The diagram shows the extension HUB board being inserted into the device. The photo shows the board being inserted into the slot, with components 20, 21, 22, 23, and 24 labeled. Component 22 is a connector on the left, 23 is a USB port on the left, 24 is a component on the right, 20 is a component on the bottom left, and 21 is a component on the bottom right.

Component	Picture
GBP(Backplane)	 The diagram shows a GBP (Backplane) unit being installed into a chassis. The photo shows the back of the GBP unit with a power connector labeled '25' and a power supply unit with labels for 12V, 5V, and 12V.
Monitor (LCD)	 The diagram shows a Monitor (LCD) unit being installed into a chassis. The photo shows the back of the Monitor (LCD) unit with a power connector labeled '16' and a power supply unit with labels for 12V, 5V, and 12V.
Monitor (HDU)	 The diagram shows a Monitor (HDU) unit being installed into a chassis. The photo shows the back of the Monitor (HDU) unit with a power connector labeled '16' and a power supply unit with labels for 12V, 5V, and 12V. The photo also shows a power connector labeled '17' and a USB connector labeled '18'.

Chapter 10

Troubleshooting

In this chapter

Gathering Troubleshooting Data.	252
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Options Troubleshooting.	303
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NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

10.1 Gathering Troubleshooting Data

Problem images and system data (error logs / ALT+D logs) can be acquired at the LOGIQ Fortis or through service remote connectivity. This data may be used to assist with troubleshooting and local service, or it may be sent to GEHC for further analysis.

Contents in this section

- *Collecting vital system information* on page 253
- *Shortcut keys* on page 254
- *Collecting logs* on page 255
- *Capturing network logs to use for troubleshooting* on page 257

10.1.1 Collecting vital system information

The following information is required to properly analyze system error logs, images reported as malfunctions, or a LOGIQ Fortis being returned to the manufacturer:

NOTE

This information is typically collected using Alt+D or the Gather Logs function on the CSD page.

Product Name = LOGIQ Fortis

Navigate to **Utility > System > About**.

Record the **Package Type**, **Release Information**, **Part Number**, and **Build Information** (when available) for the following:

- Application Software
- Service Platform
- Security Package
- Base Image
- Base Image Update

NOTE

Information displayed on the About page may vary according to software release.

10.1.2 Shortcut keys

There are several shortcut keys on the LOGIQ Fortis that can be useful during troubleshooting:

Table 10-1 Shortcut Keys

Key	Description
Alt+1 or Alt+2	- Marks events in the log file. Used for the flagging issues during operation. - In R3.1.6, R4.x.x, or higher, resets the upper and lower operator panels in certain conditions (nonresponsive).
Alt+F10	Displays SW Shut Down. If the Ultrasound system 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+L	Locks the touch screen.
Alt+Enter	Creates a new line under the Comment attributes.
Alt+Shift	Changes the keyboard layout language. The software displays the keyboard layout change at the bottom of the main display monitor. To cycle through all available keyboard languages, continue to press ALT + SHIFT.
Ctrl+I	In Scan Assistant, inserts a step above the selected step.
Ctrl+up arrow	In Scan Assistant, moves selected step up.
Ctrl+downarrow	In Scan Assistant, moves selected step down.
Ctrl+right Set key	When exporting or transferring a non-consecutive list of patients, select the first name, move the cursor to the next name and then press and hold down the Ctrl+right Set key. These steps can be repeated to select all of the names in a non-consecutive list of patients.
Ctrl+Shift	Selects multiple patients.
Ctrl+leftmouse	In Scan Assistant, use when selecting multiple steps for cutting or copying.
Shift+leftmouse	
Shift+right Set key	When exporting or transferring a consecutive list of patients, select the first name, move the cursor to the last name and then press and hold down the Shift+right Set key to select all of the names.

10.1.3 Collecting logs

If the LOGIQ Fortis malfunctions, simultaneously press the **Alt+D** keys.

NOTE

Alt+D is available at all times when the user has the Capture Log right. To collect a trouble image, enable Transfer Images (captured without patient information) to GE HealthCare under ADMIN > System Admin. There are two check boxes there that determine what is collected with ALT+D. There are no limits to collecting an image.

For a detailed list of Service Logs captured, see *Capturing network logs to use for troubleshooting* on page 257.

Figure 10-1 System Problem Reporting Dialog Box

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.zip

Where <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.

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.

6. Click the **Store** button.

10.1.4 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.

10.2 Service Desktop

Contents in this section

- *Disruptive mode* on page 259
- *Color statuses* on page 260
- *Service Classes* on page 261
- *Home* on page 262
- *Utilities* on page 268
- *Options* on page 283
- *Agent Configuration* on page 285
- *Software Maintenance* on page 289

10.2.1 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.

NOTE

Keep in mind that starting and stopping Disruptive mode turns some features on and off. For example, SSH/VCO. 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.

10.2.2 Color statuses

Throughout the Service desktop, colors indicate the following:

- Green – Status is normal
- Orange – Status is a warning
- Red – Status is an error

10.2.3 Service Classes

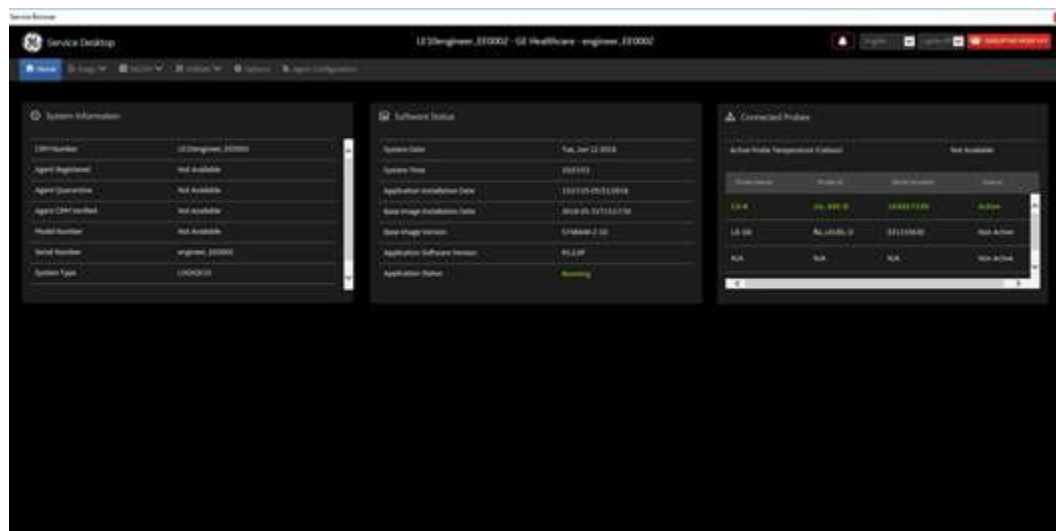
Service Basic Access

With Service Basic Access, these are the available options:

- HOME
- Utilities
 - Change Password
 - Data Transfer
 - Delete Files
 - Gather Logs
 - Network Capture
 - Reset Log Database
 - Resolve Agent Quarantine
 - Secure Delete
 - Third Party Licenses
- Options
- Agent Configuration
- Software Maintenance

10.2.4 Home

Figure 10-2 Home (R4 and Earlier)



For more information, see:

- *System Information* on page 262
- *Software Status* on page 264
- *Connected Probes* on page 266

System Information

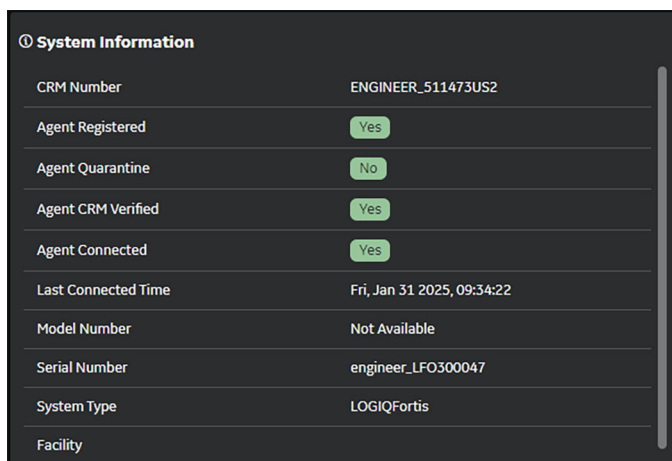
System Information displays general information about the LOGIQ Fortis. When the LOGIQ Fortis has been successfully configured with the back office, these elements will have the corresponding values:

- **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.

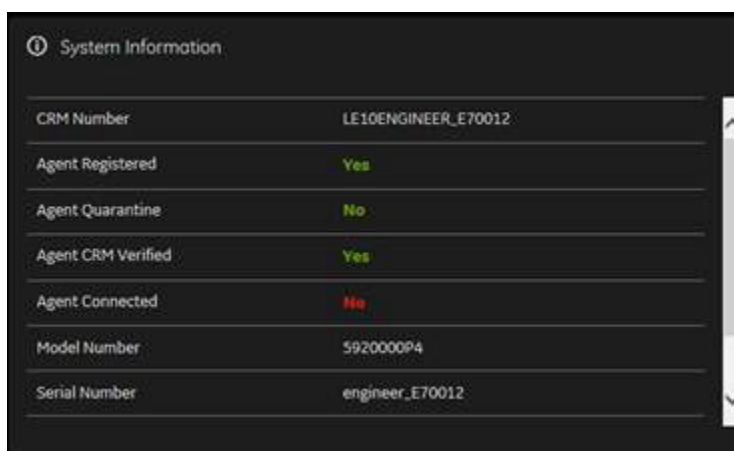
To access **System Information**, navigate to **Utility (second page) > Service > Home**.

Figure 10-3 System Information (R5)



① System Information	
CRM Number	ENGINEER_511473US2
Agent Registered	Yes
Agent Quarantine	No
Agent CRM Verified	Yes
Agent Connected	Yes
Last Connected Time	Fri, Jan 31 2025, 09:34:22
Model Number	Not Available
Serial Number	engineer_LFO300047
System Type	LOGIQFortis
Facility	

Figure 10-4 System Information (R4 and Earlier)



① 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

This table shows all the elements available on **System Information** with descriptions.

Table 10-2 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: - 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: - 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.

Element	Description
Agent CRM Verified	CRM verified status of the agent. Valid values are: • 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: • 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 262

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 10-5 Software Status (R5)

Software Status More Details	
System Date	Fri, Jan 31, 2025
System Time	16:53:32
Application Installation Date	Tue, Jan 28, 2025
Base Image Installation Date	Tue, Jan 28, 2025
Base Image Version	5847664-12D
Application Software Version	R5.0.2C
Application Status	Running

Figure 10-6 Software Status (R4 and Earlier)

Software Status	
System Date	Tue, Jun 12 2018
System Time	10:23:53
Application Installation Date	13:27:25 05/31/2018
Base Image Installation Date	2018-05-31T13:17:39
Base Image Version	5746646-2 1D
Application Software Version	R1.2.0F
Application Status	Running

This table shows all the elements available on **Software Status** with descriptions.

Table 10-3 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: - Running - Stopped

For more information, see:

- *Home* on page 262

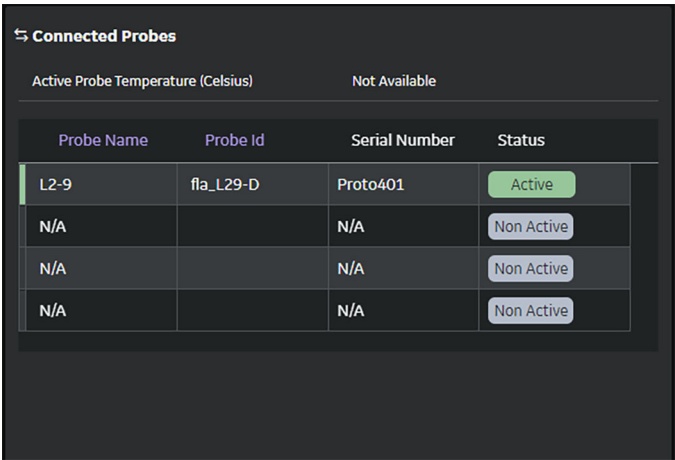
Connected Probes

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.

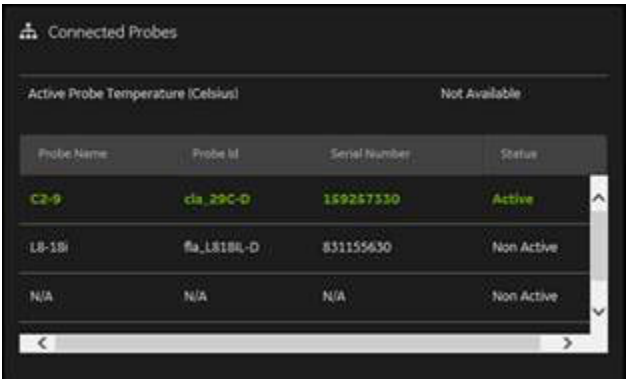
To access **Connected Probes**, navigate to **Utility (second page) > Service > Home**.

Figure 10-7 Connected Probes (R5)



↵ Connected Probes			
Active Probe Temperature (Celsius)		Not Available	
Probe Name	Probe Id	Serial Number	Status
L2-9	fla_L29-D	Proto401	Active
N/A		N/A	Non Active
N/A		N/A	Non Active
N/A		N/A	Non Active

Figure 10-8 Connected Probes (R4 and Earlier)



Connected Probes			
Active Probe Temperature (Celsius)		Not Available	
Probe Name	Probe Id	Serial Number	Status
C2-9	cla_29C-D	159257330	Active
L8-18	fla_L818L-D	831155630	Non Active
N/A	N/A	N/A	Non Active

This table shows all the elements available on **Connected Probes** with descriptions.

Table 10-4 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.

Element	Description
Status	Statuses of the probe connected to the LOGIQ Fortis. Valid values are: Active Non Active

For more information, see:

- *Home* on page 262

10.2.5 Utilities

Utilities configurations vary depending upon the service class.

For more information, see:

- *Change Password* on page 269
- *Data Transfer* on page 271
- *Delete Files* on page 275
- *Gather Logs* on page 276
- *Minisweep (R5)* on page 276
- *Network Capture* on page 278
- *Resolve Agent Quarantine* on page 280
- *Software Media Check (R5)* on page 280
- *Third Party Software Licenses* on page 282

10.2.5.1 Change Password

Change Password allows you to change the password for a specified user type.



WARNING

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 10-9 Change Password (R5)

Figure 10-10 Change Password (R4 and Earlier)

This table shows all the elements available on **Change Password** with descriptions.

Table 10-5 Change Password

Element	Description
User Type	Type of user for the password reset. - GEService – Windows user for GE Service. - SVCSservice – 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.

Element	Description
Reset	Select to reset the information.

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 Healthcare 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 HealthCare 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.



WARNING

RISK OF LOSING DATA.

GE HEALTHCARE 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 268

10.2.5.2 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 10-11 Data Transfer (R5)

Data Transfer

Type of Upload	Upload Permission	Last Upload Status	Last Upload Attempt	Last Successful Attempt
Never Identifiable Images	No			
Monitoring Logs	Yes	Failed	Feb 1, 2025, 1:11:57 AM	Jan 30, 2025, 3:18:01 AM
System Logs	Yes	Failed	Feb 1, 2025, 1:12:09 AM	Jan 30, 2025, 3:18:08 AM
User Information	No			
System Configurations	Yes	Failed	Feb 1, 2025, 1:12:11 AM	Jan 30, 2025, 3:18:11 AM
User Configurations	Yes			
Other logs	Yes	Failed	Feb 1, 2025, 1:12:20 AM	Jan 30, 2025, 3:18:21 AM
Diag Logs	Yes	Failed	Feb 1, 2025, 1:12:22 AM	Jan 30, 2025, 3:18:24 AM

Type of Upload

☐ All ☐ Never Identifiable Images ☒ Monitoring Logs ☒ System Logs ☐ User Information ☒ System Configurations ☐ User Configurations

☒ Other logs ☒ Diag Logs

☒ Scheduler

☒ All Days ☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☒ Sat ☒ Sun

Save Settings

Send All

Figure 10-12 Data Transfer (R4 and Earlier)

Data Transfer

Type of Upload	Upload Permission	Last Upload Status	Last Upload Attempt	Last Successful Attempt
Never Identifiable Images	No	NA		
Monitoring Logs	Yes	Failed	Jun 12, 2018 9:11:23 AM	
System Logs	Yes	Failed	Jun 12, 2018 9:11:23 AM	
User Information	No	NA		
System Configurations	Yes	Failed	Jun 12, 2018 9:11:23 AM	
User Configurations	Yes	Failed	Jun 12, 2018 9:11:23 AM	
Other logs	Yes	Failed	Jun 12, 2018 9:11:23 AM	
Windows logs	Yes	Failed	Jun 12, 2018 9:11:23 AM	

☒ Scheduler

☒ All Days ☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☒ Sat ☒ Sun

Save Settings

Send All

Figure 10-13 Data Transfer

Type of Upload	Upload Permission	Last Upload Status	Last Upload Attempt	Last Successful Attempt
Never identifiable images	No	N/A		
Monitoring Logs	Yes	Success	Jun 11, 2020 4:55:59 AM	Jun 11, 2020 4:55:59 AM
System Logs	Yes	Success	Jun 11, 2020 4:40:11 AM	Jun 11, 2020 4:40:11 AM
User Information	No	N/A		
System Configurations	Yes	Success	Jun 11, 2020 4:40:21 AM	Jun 11, 2020 4:40:21 AM
User Configurations	Yes	Success	Jun 11, 2020 4:40:31 AM	Jun 11, 2020 4:40:31 AM
Other logs	Yes	Success	Jun 11, 2020 4:43:59 AM	Jun 11, 2020 4:43:59 AM
Diag Logs	Yes	Success	Jun 11, 2020 4:43:50 AM	Jun 11, 2020 4:43:50 AM
Windows logs	Yes	N/A		Jun 9, 2020 11:50:33 AM

Type of Upload

☐ All
 ☐ Never identifiable images
 ☐ Monitoring Logs
 ☐ System Logs
 ☐ User Information
 ☐ System Configurations
 ☐ User Configurations
 ☐ Other logs
 ☒ Diag Logs
 ☐ Windows logs

Scheduler

☐ All Days
 ☐ Mon
 ☐ Tue
 ☐ Wed
 ☐ Thu
 ☐ Fri
 ☐ Sat
 ☐ Sun

Save Settings

Send All

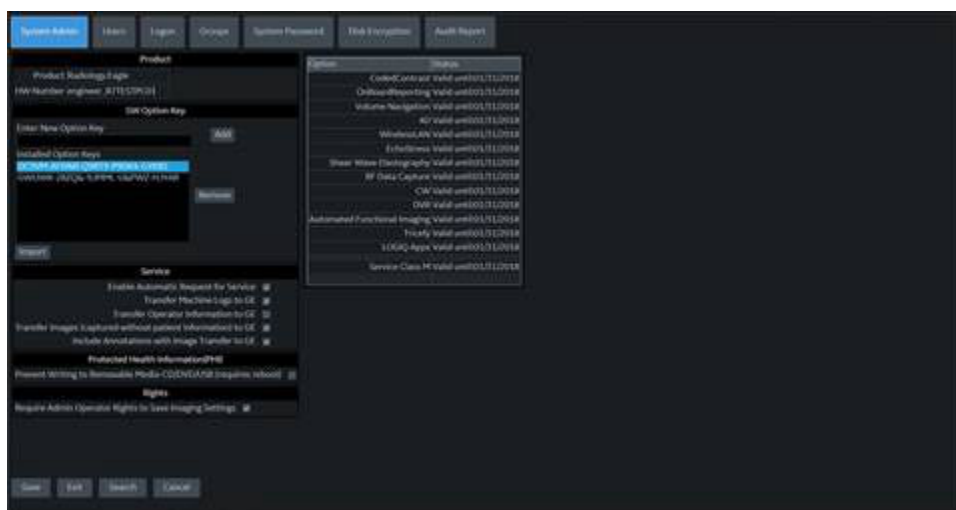
This table shows all the elements available on **Data Transfer** with descriptions.

Table 10-6 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.

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**, configure these settings:
 - In **Type of Upload**, select the data type you want to 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 268

10.2.5.3 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 10-14 Delete Files (R5)

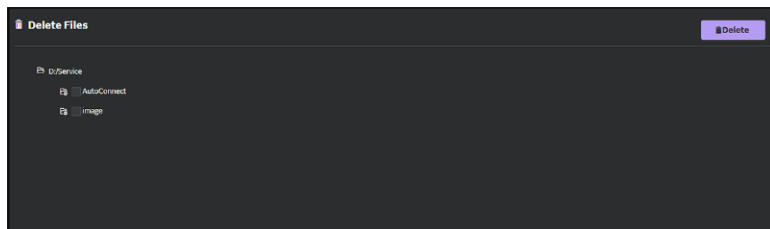
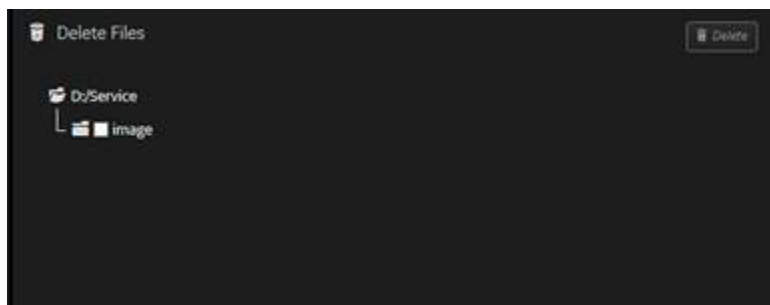


Figure 10-15 Delete Files (R4 and Earlier)



This table shows all the elements available on **Delete Files** with descriptions.

Table 10-7 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 268

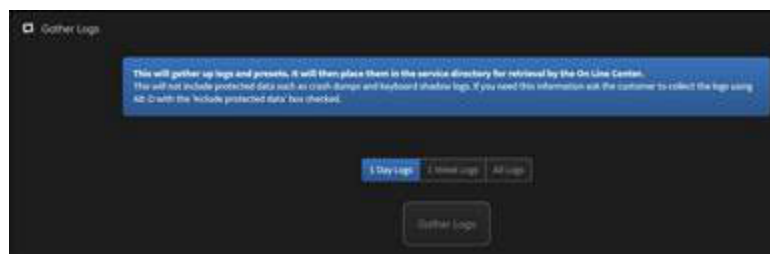
10.2.5.4 Gather Logs

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.

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 10-16 Gather Logs



This table shows all the elements available on **Gather Logs** with descriptions.

Table 10-8 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 268

10.2.5.5 Minisweep (R5)

Minisweep provides a way to capture a list of the error logs. Minisweep does not replace the full error log collection, but can assist in expediting service when a customer calls in regarding certain issues. By default, Minisweep is set to 8 hours, but it can be extended up to 48 hours. The size of the error logs will vary depending on the duration of the logs.

Minisweep does not have a spooler. No additional data or files are created.

The information on **Minisweep** is available to all service class licenses.

To access **Minisweep**, select **Utility (second page) > Service > Utilities > Minisweep**.

Figure 10-17 Minisweep

Minisweep

Requested Time	Status
25-01-31_09:38:45	Executed
25-01-31_09:38:52	Executed
25-01-31_09:38:58	Executed
25-01-31_09:39:00	Executed
25-01-31_09:39:07	Executed
25-02-01_01:11:51	Executed
25-02-01_01:12:01	Executed
25-02-01_01:12:10	Executed
25-02-01_01:12:12	Executed
25-02-01_01:12:21	Executed

Time Duration of Logs (Hours)

8

Table 10-9 Minisweep

Element	Description
Requested Time	Displays the time and date of the error log.
Status	Status of the error log collection. Valid values are: - Executed. Indicates a success in the Minisweep upload. - Failed. Indicates a failure in the Minisweep upload. Failure is most likely on the connection or AutoSC side.
Time Duration of Logs (Hours)	Time (in hours) for the collection of error logs.
Save	Select to gather the error log files for the selected time period.

10.2.5.6 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 10-18 Network Capture (R5)

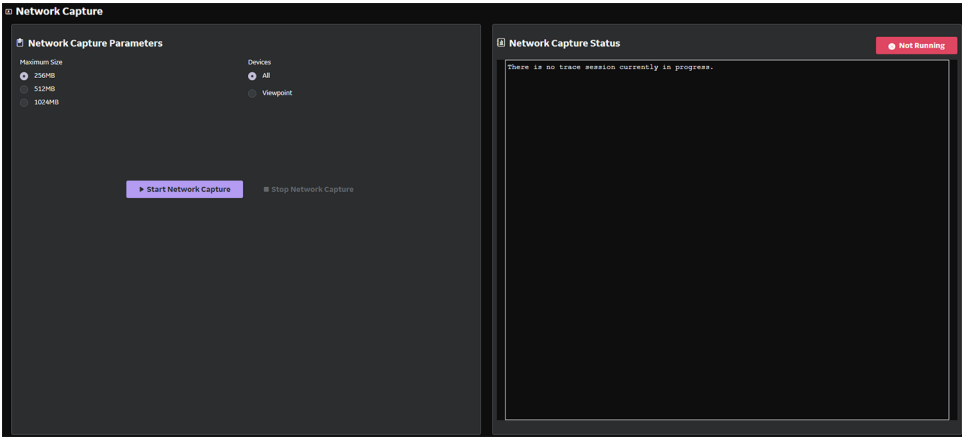
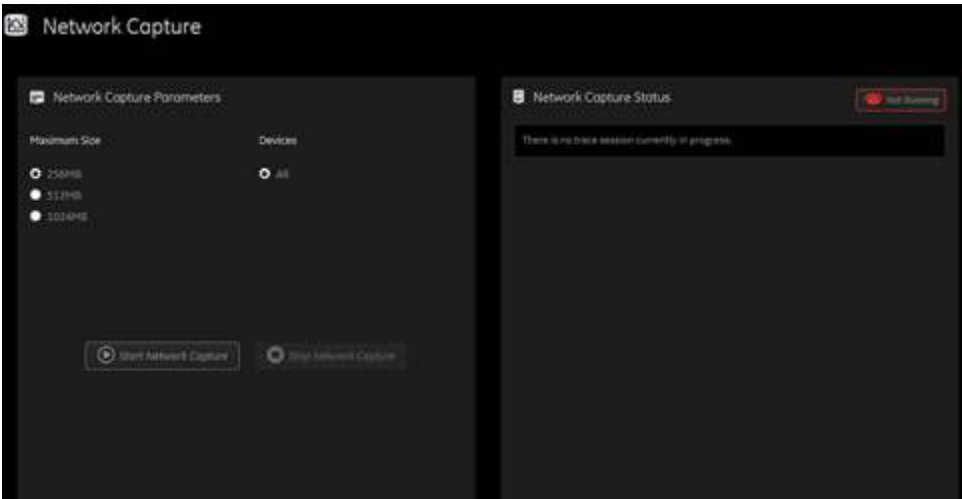


Figure 10-19 Network Capture (R4 and Earlier)



This table shows all the elements available on **Network Capture** with descriptions.

Table 10-10 Network Capture

Element	Description
Network Capture Parameters	
Maximum Size	Allowed size of the generated log file. Valid value are: • 256MB • 512MB • 1024MB

Element	Description
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: - Not Running - Running

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 file is closed, you are notified in the banner.

For more information, see:

- *Utilities* on page 268

10.2.5.7 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 10-20 Resolve Agent Quarantine - Submit

The screenshot shows a web form titled "Resolve Agent Quarantine". It contains two input fields: "Old Serial Number" with the value "R7EAGLEFNOSYS1" and "Old Model Number" with the value "CS_UL5_LOGIQ_E10_R01.6". Below these fields is a "Submit" button. Under the button, there is a green message box stating: "✓ Command successfully send to back office. It may take around 5 minutes to resolve the quarantine state. If agent quarantine state is not resolved after that time, please contact GE Service." Below that is a blue message box stating: "This functionality resolves the agent from quarantine state only during agent upgrades. If agent goes to quarantine due to any other reason, this utility will not fix the quarantine issue."

Figure 10-21 Resolve Agent Quarantine - No Quarantine

The screenshot shows the same "Resolve Agent Quarantine" form, but with a different message. An orange message box at the top states: "⚠ Agent is not in quarantined state." Below it is the same blue informational message box as in Figure 10-20.

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**.

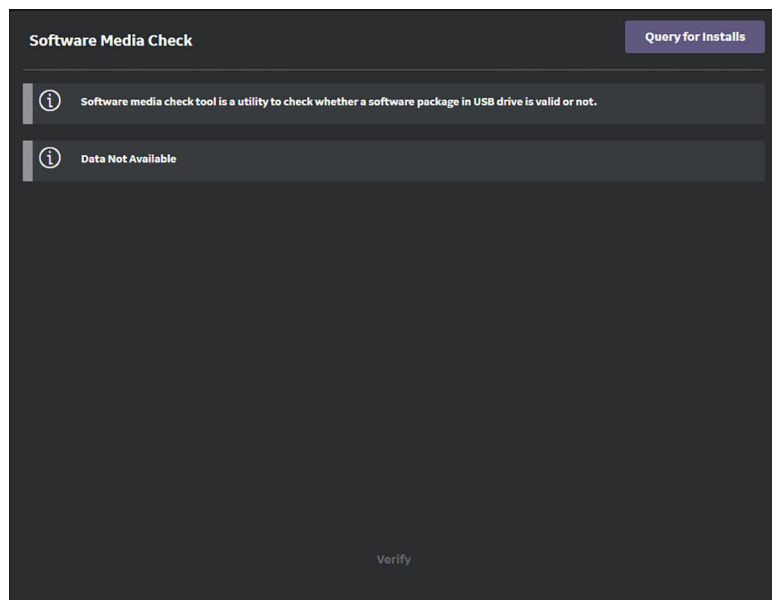
10.2.5.8 Software Media Check (R5)

Software Media Check provides a way to make sure the USB media with LOGIQ software was created correctly—meaning it is bootable—and to verify the integrity of the software. It also checks that the media type, name, format, and file structure are all set up properly.

The information on **Software Media Check** is available to all service class licenses.

To access **Software Media Check**, select **Utility (second page) > Service > Utilities > Software Media Check**.

Figure 10-22 Software Media Check



1. Connect the USB media to an available USB port on the system.
2. Navigate to select **Utility (second page) > Service > Utilities > Software Media Check**.
3. Select **Query for Media**.
4. If the USB contains LOGIQ software, you should see both "**Bootable**" and "**Application**" types listed.
5. Select **Bootable** and then select **Verify**. If the media has a bootable partition, a "Verification successful" message will appear.
6. Select **Application** and then select **Verify**. If the media contains valid software, a "Verification successful" message will appear.

NOTE

This section also displays the software version stored on the media.

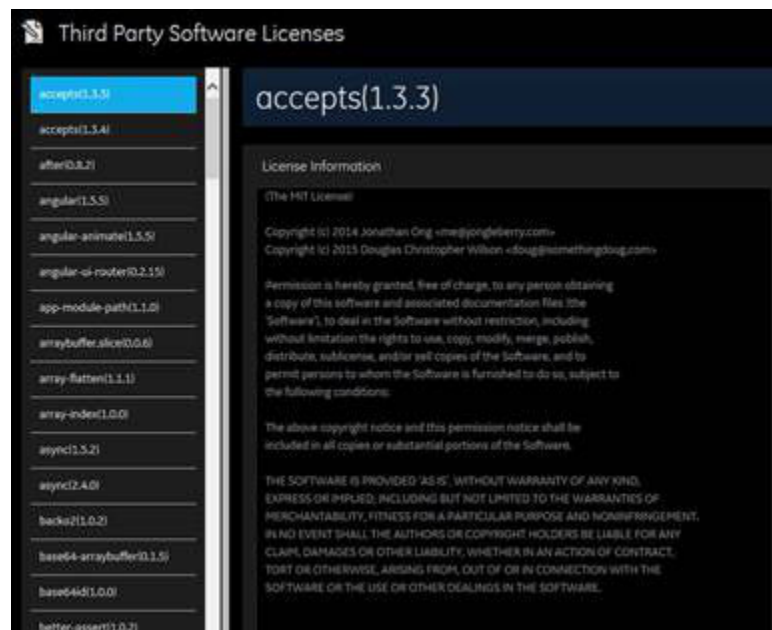
10.2.5.9 Third Party Software Licenses

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 10-23 Third Party Software Licenses



For more information, see:

- *Utilities* on page 268

10.2.6 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 10-24 Options (R5)

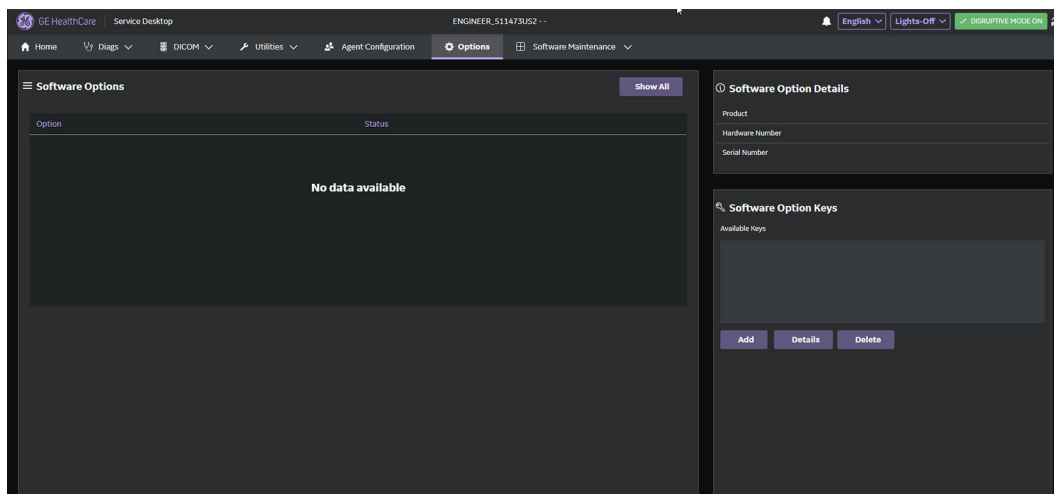
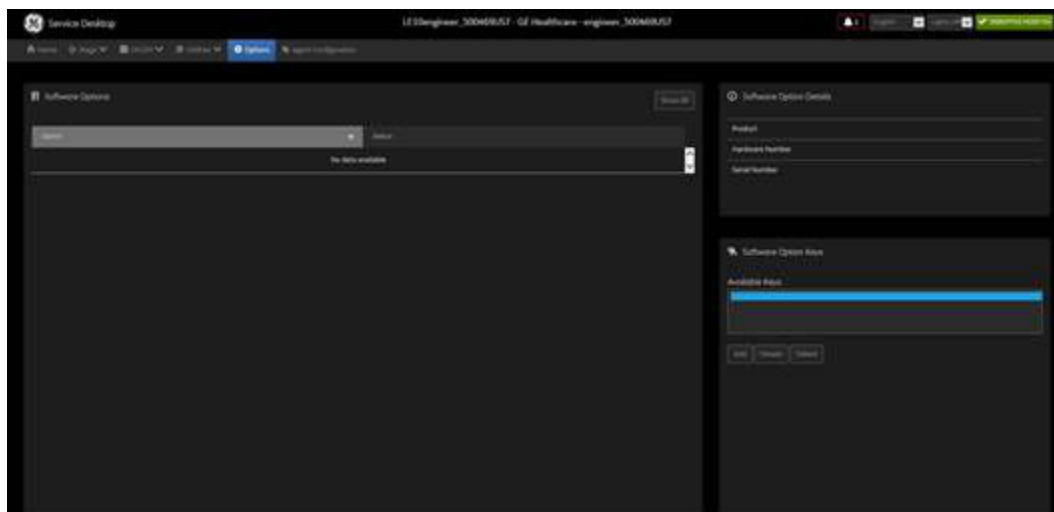


Figure 10-25 Options (R4 and Earlier)



This table shows all the elements available on **Options** with descriptions.

Table 10-11 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.

10.2.7 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(secondpage)>Service>Agent Configuration**.

Figure 10-26 Agent Configuration (R5)

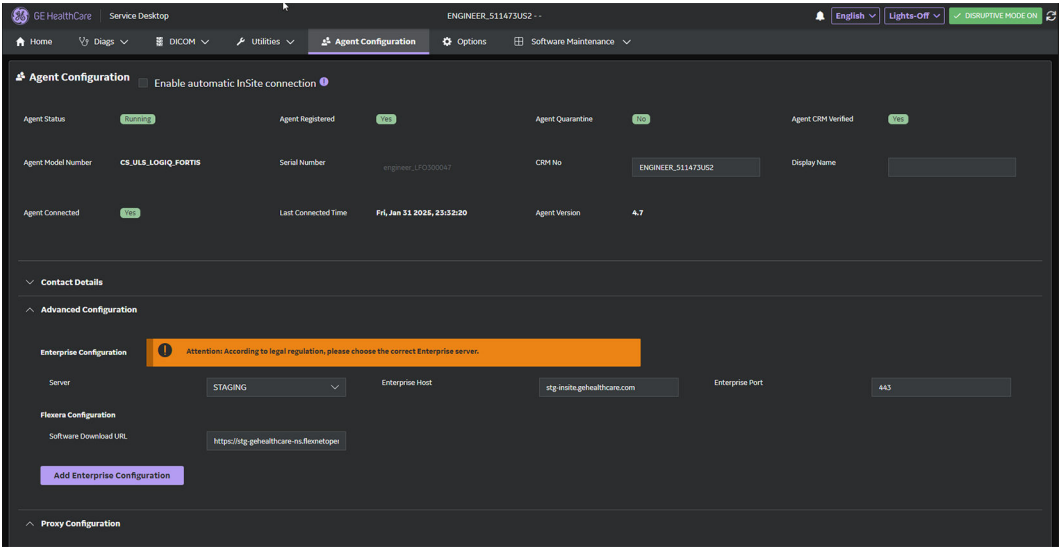


Figure 10-27 Agent Configuration (R4)

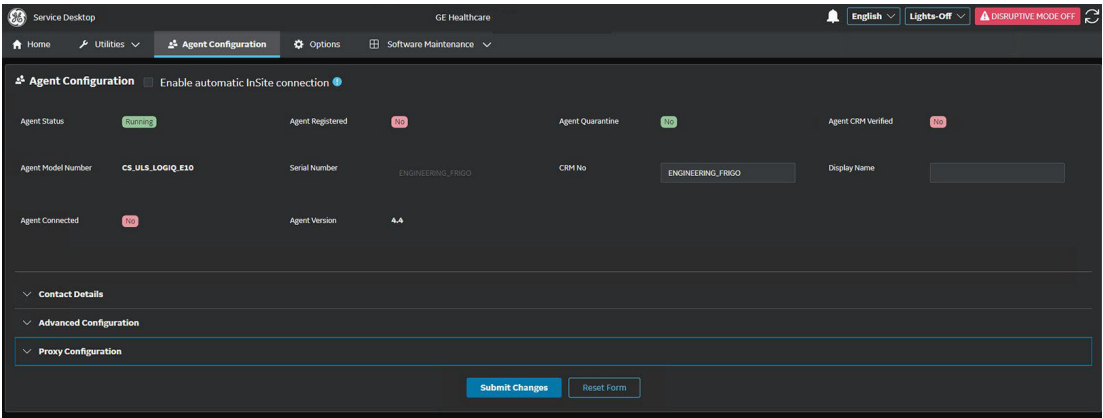
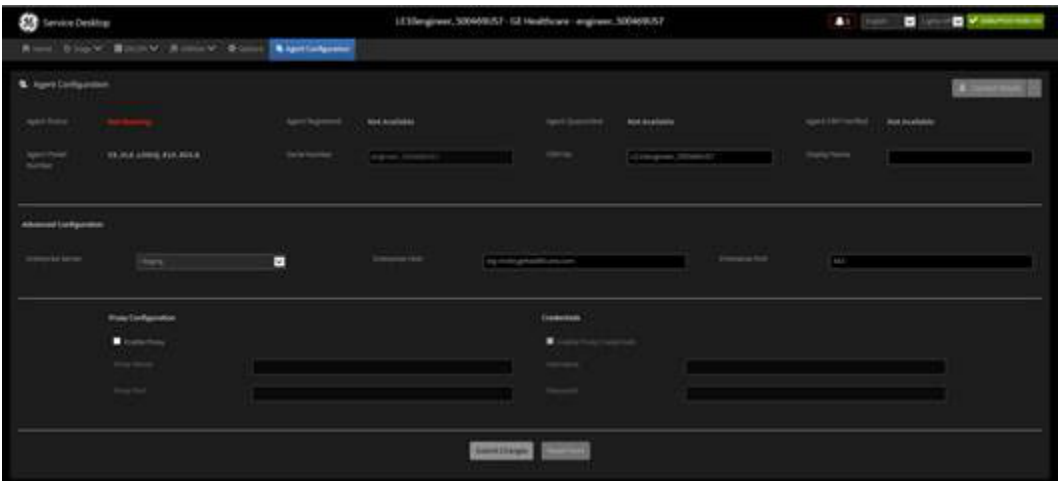


Figure 10-28 Agent Configuration (R3 and Earlier)



This table shows all the elements available on **Agent Configuration** with descriptions.

Table 10-12 Agent Configuration

Element	Description
Agent Configuration	
Enable automatic InSite connection For R4.x.x or later, allows for automatic connection to InSite when enabled.	
Contact Details	Phone number for the person at the customer site a GE HealthCare 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: - Running - Not Running
Agent Registered	Registration status of the agent. Valid values are: - 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: - 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 HealthCare 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: - 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 HealthCare 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 LOGIQ Fortis 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: - 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	

Element	Description
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.
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.

10.2.8 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 289
 - *Reset Declined Packages* on page 291
 - *Software Information* on page 292

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 10-29 Software Updates (R5)

Software Updates											Query for Updates
Product Name: 8935000E10											Product Version: 8
Update ID	Update Name	Package ID	Package Name	Update Type	Category	Option required for install	Part Number	Version	Released Date	Update Description	
R3.2	R3.2 Application Software Package	DP583625-9	FULL SOFTWARE PACKAGE 3.2	Application Service Package	Required	Future	5863234-8	3.2	2023-09-28	LOGIQ Exco Fortis Application SW Module	Select Update
R4.0	R4.0 Full Software Package	DP5917601-6	RA.1.1 Full Software Package	Application Package	Required	Future	5917597-3	R4.0.3	2023-10-30	LOGIQ Exco Fortis Application SW Module General software improvements included with this release	Select Update
R5.0.1	R5.0.1 Application Package (Version F)	DP5962505-2	R5.0.1 Application Package	Application Package	Optional	Future	5962506	R5.0.3	2024-08-01	Application Software Package for R5.0.1F	Select Update
R4.6	R4.6 Application package	DP5917601-7	RA.6 FULL SOFTWARE PACKAGE	Application Package	Required	Future	5917597-4	R4.6	2024-06-09	LOGIQ Exco Fortis Application SW Module	Select Update
BASE_APP	Base and Application Package for R5	DP5962505	Base and App Software package through E-Delivery	Base Image	Required	Future	5867664-10	5.0.1	2024-11-15	LOGIQ Exco Fortis Base and Application SW Module	Select Update
R3.2.1	R3.2.1	DP583625-10	FULL SOFTWARE APPLICATION PACKAGE 3.2.1	Application Package	Required	Future	5947488	3.2.1	2023-11-28	LOGIQ Exco Fortis Application SW Module	Select Update
VSCANR_APP	VSCANR_APP Service Package	DP5875528		Application Service Package	Required	Future	5875528	1	2024-02-28	LOGIQ Exco Fortis Application Service Module	Select Update

Figure 10-30 Software Updates (R4 and Earlier)

Software Updates											Query for Updates
Product Name: 8935000E10											Product Version: 8
Update ID	Update Name	Package ID	Package Name	Update Type	Category	Option required for install	Part Number	Version	Released Date	Update Description	
MS_OS_SECURITY_UPDATE_R3	MS OS Security Update for LOGIQ E30 R3.0.0	098767895-7	MS OS Security update package for LOGIQ E30 R3.0.0	OS Security	Service Installation	Service Installation	8932718-7	8.0	2023-July-14	MS OS Security update for LOGIQ E30 R3.0.0	Select Update
LOGIQ_SOFTWARE_UPGRADE_R3	Application Software Upgrade	DP5917601-7	LOGIQ E30 R3.0.0 Software Upgrade	General Update	Service Installation	Service Installation	5912718-7	3.0.0	2023-Aug-01-10	LOGIQ E30 R3.0.0 Software upgrade with performance improvement and bug fixes.	Select Update

This table shows all the elements available on **Software Updates** with descriptions.

Table 10-13 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: - OS Security - General Update
Option required for install	Requirement for installation of the related software update. Valid values include: Service installation
Part Number	Part number for the software update.

Element	Description
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.

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 10-31 Reset Declined Packages (R5)

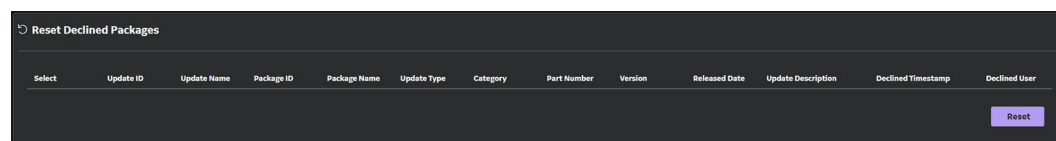
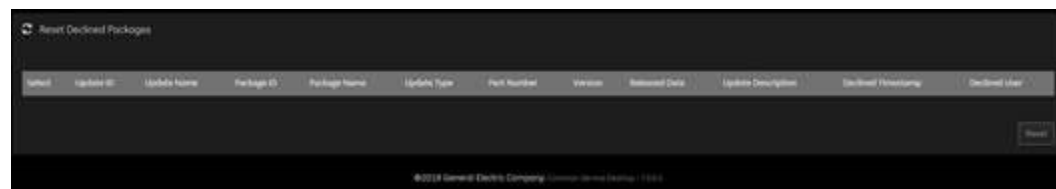


Figure 10-32 Reset Declined Packages (R4 and Earlier)



This table shows all the elements available on **Reset Declined Packages** with descriptions.

Table 10-14 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: - 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.

Element	Description
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 .

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 10-33 Software Information (R5)

The screenshot displays the 'Software Information' interface for R5. It features three main sections: 'Installed Packages', 'Scanner Application Information', and 'Installed Hotfixes'. The 'Installed Packages' section contains a table with columns: Package Type, Part Number, Version and Revision, Installed Date, and Build Information. The 'Scanner Application Information' section contains a table with columns: Name, Company, Description, Revision, License Expiry Date, Contact, License Status, and CLSID. The 'Installed Hotfixes' section is currently empty.

Package Type	Part Number	Version and Revision	Installed Date	Build Information
Base System OS Module	584766A-12D	584766A-12D	2025-01-28T15:41:41	2025.01.28.78101
LOGIQ Echo Fortis Application SW Module	5962506	R5.0.2C	28 January 2025, 03:59 PM	2025.01.23.79236
LOGIQ Echo Fortis Application Servicing SW Module	5962511	R5.0.2C	28 January 2025, 03:59 PM	2025.01.23.79236
HiFU Echo Electronic Documentation SW Module	5962512	R5.0.2C	28 January 2025, 03:59 PM	2025.01.23.79237
LOGIQ Echo Fortis Security Config SW Module	5962509	R5.0.2C	28 January 2025, 04:00 PM	2025.01.23.79237
LOGIQ Echo Fortis Security Update SW Module	5821992	R5.0.2C	28 January 2025, 03:47 PM	2025.01.23.79236

Name	Company	Description	Revision	License Expiry Date	Contact	License Status	CLSID

Figure 10-34 Software Information (R4 and Earlier)

The screenshot displays the 'Software Information' interface for R4 and earlier. It features three main sections: 'Installed Packages', 'Installed Hotfixes', and 'Windows Defender Status'. The 'Installed Packages' section contains a table with columns: Package Type, Part Number, Version, and Installed Date. The 'Installed Hotfixes' section contains a table with columns: Hotfix ID, Installed On, and Description. The 'Windows Defender Status' section displays a list of security features and their status.

Package Type	Part Number	Version	Installed Date
Base Image	5822204	5822204.00	2019-08-13T14:31:00
Application Software	5822204-0	0.0.0	13 August 2019, 08:21 PM
Service Software	5822204	0.0	13 August 2019, 08:08 PM
Online Help	5822204	0.0	13 August 2019, 08:21 PM
Security Package	5822204	0.0	13 August 2019, 08:21 PM
Base Image Update	5822204-0	0.0	13 August 2019, 08:04 PM

Hotfix ID	Installed On	Description
KB4012335	Monday, April 8, 2018 12:00:00 AM	Update
KB4012335	Friday, November 16, 2018 12:00:00 AM	Update
KB4012335	Monday, April 8, 2018 12:00:00 AM	Update
KB4012335	Tuesday, August 25, 2018 12:00:00 AM	Update
KB4012335	Friday, April 26, 2019 12:00:00 AM	Update
KB4012335	Monday, April 8, 2018 12:00:00 AM	Security Update

This table shows all the elements available on **Software Information** with descriptions.

Table 10-15 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.

10.3 Electromagnetic Interference (EMI) Troubleshooting

Contents in this section

- *Prevention/Abatement* on page 294
- *Different power outlet* on page 294
- *Different system* on page 294
- *Different location* on page 294
- *Disconnect external cables* on page 295

10.3.1 Prevention/Abatement

For electromagnetic interference (EMI) rules and details, see *Electromagnetic interference (EMI) limitations* on page 60.

10.3.2 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 *Minimal floor plan suggestions* on page 67.

10.3.3 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.

10.3.4 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

10.3.5 Disconnect external cables

Disconnect all external cables (network, all unused probes, ECG leads, etc.) and check to see if the noise disappears.

10.4 Image Troubleshooting

Contents in this section

- *Noise* on page 296
- *Noise picked up from the air* on page 296
- *Noise received through the external cables* on page 297
- *Doppler noise* on page 297
- *Intermittent noise* on page 297
- *Noise on a board* on page 298
- *B-Flow noise issue* on page 298

10.4.1 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 10-16 Noise Conditions

The noise is present	Determine	If the test fails, see...
All the time	N/A	<i>Noise picked up from the air</i> on page 296 and <i>Noise received through the external cables</i> on page 297
After some time of use	The amount of time between initial use and when the noise begins.	<i>Noise picked up from the air</i> on page 296
Certain times of the day or night	The time of day or night along with the duration.	<i>Noise picked up from the air</i> on page 296 and <i>Noise received through the external cables</i> on page 297
At all locations in the hospital	N/A	<i>Noise picked up from the air</i> on page 296
Only in one room or area	The room or area	<i>Noise picked up from the air</i> on page 296 and <i>Noise received through the external cables</i> on page 297
From time to time with no special pattern of time is observed	N/A	<i>Noise picked up from the air</i> on page 296 and <i>Noise received through the external cables</i> on page 297

10.4.2 Noise picked up from the air

Table 10-17 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.

10.4.3 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.

10.4.4 Doppler noise

Doppler noise symptoms can be horizontal stripes or spikes.

Table 10-18 Noise Conditions for Doppler

Symptom	Cause	Solution
Horizontal stripes	Typically an analog problem caused by the DA192 or DPI	Determine if one of these boards is the cause: • Transmit & Receive board (DA192) • Probe interface board (DPI)
Spikes	Typically a digital problem caused by either the DA192 or DPI	Determine if one of these boards is the cause: • Transmit & Receive board (DA192) • Probe interface board (DPI)

10.4.5 Intermittent noise

Intermittent noise can be caused by other equipment.

Table 10-19 Noise Conditions for Intermittent

Symptom	Solution
Intermittent noise	Check equipment that is turned on and off near the scanner.

Symptom	Solution
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.

10.4.6 Noise on a board

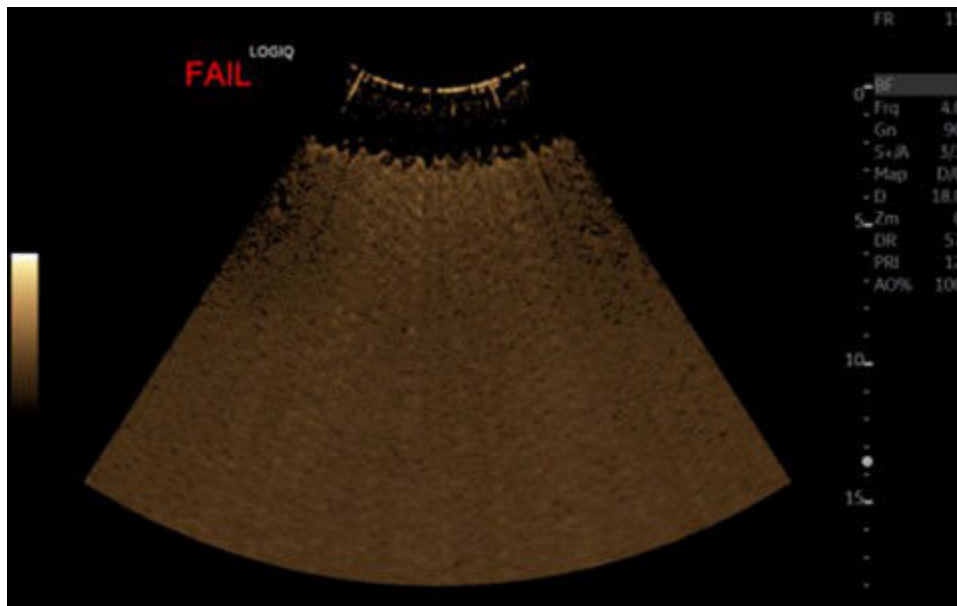
Table 10-20 Noise on a Board

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.

10.4.7 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 10-35 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.

Figure 10-36 The absorber sheet on power supply bracket cover and BEPS2 Assy with absorber sheet images:



Power supply bracket cover with absorber sheet



BEPS2 with absorber sheet (The image in BEPS2)

To transfer the Power supply bracket cover to new FRU part

NOTE

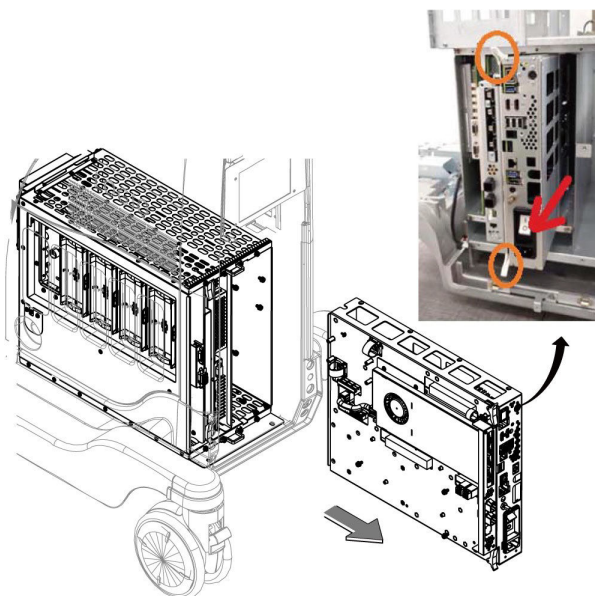
About BEPS assy replacement procedure, See "BEPS Assy Replacement".

1. Remove the BEPS Assy. Place it on an ESD safe place.

NOTE

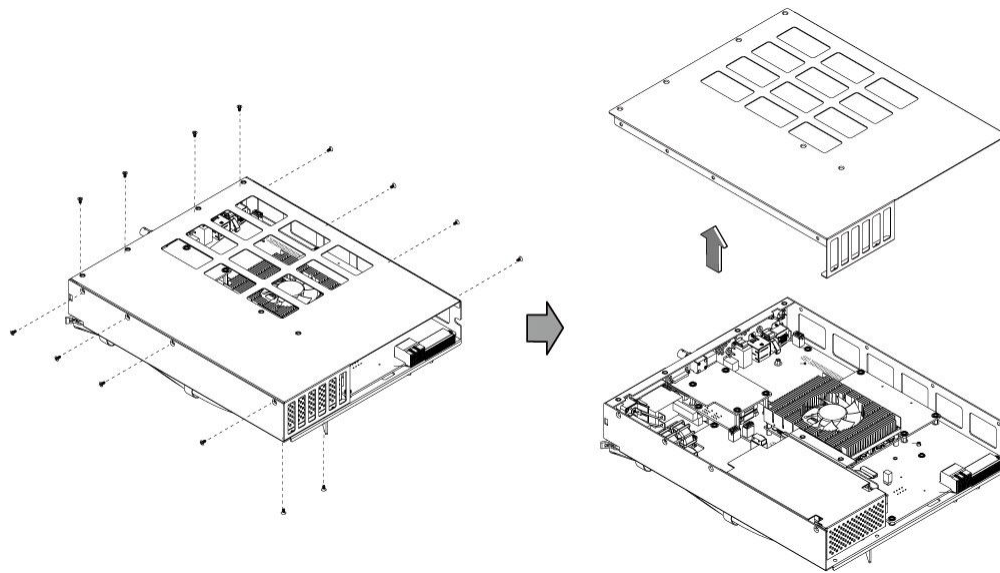
Use Card puller (indicate orange circle) to pull out BEPS assy.

Figure 10-37 Removing BEPS

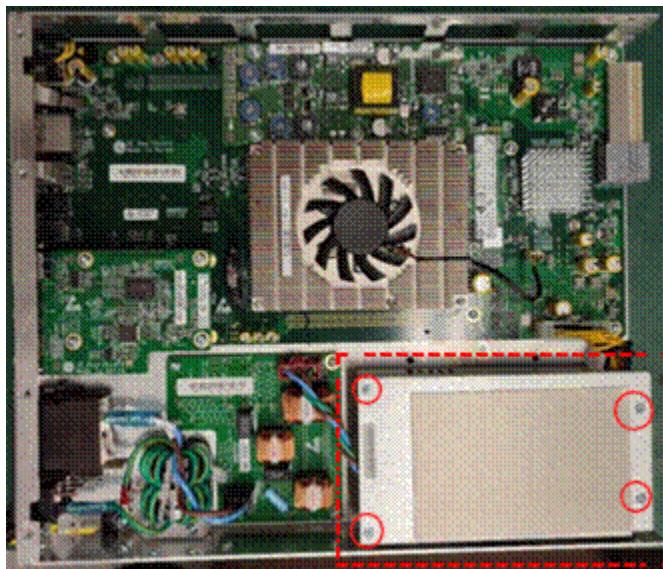


2. Remove BEP TOP PLATE from current BEPS Assy2 and new BEPS Assy (14 screws).

Figure 10-38 Removing BEP TOP PLATE



3. Confirm that the BEPS FRU contains the Noise reduction cover. If new FRU does not include Noise reduction cover, transfer it from the BEPS removed per following steps.
 - a. Unscrew 4 screws (red circle) from Power supply bracket cover (with Absorber sheet), then take it from current BEPS Assy.
 - b. Unscrew 4 screws from Power supply bracket cover(without Absorber sheet). Also, then take it from new BEPS Assy.
 - c. Install Power supply bracket cover(with Absorber sheet) to New FRU part and fasten 4 screws (red circle).

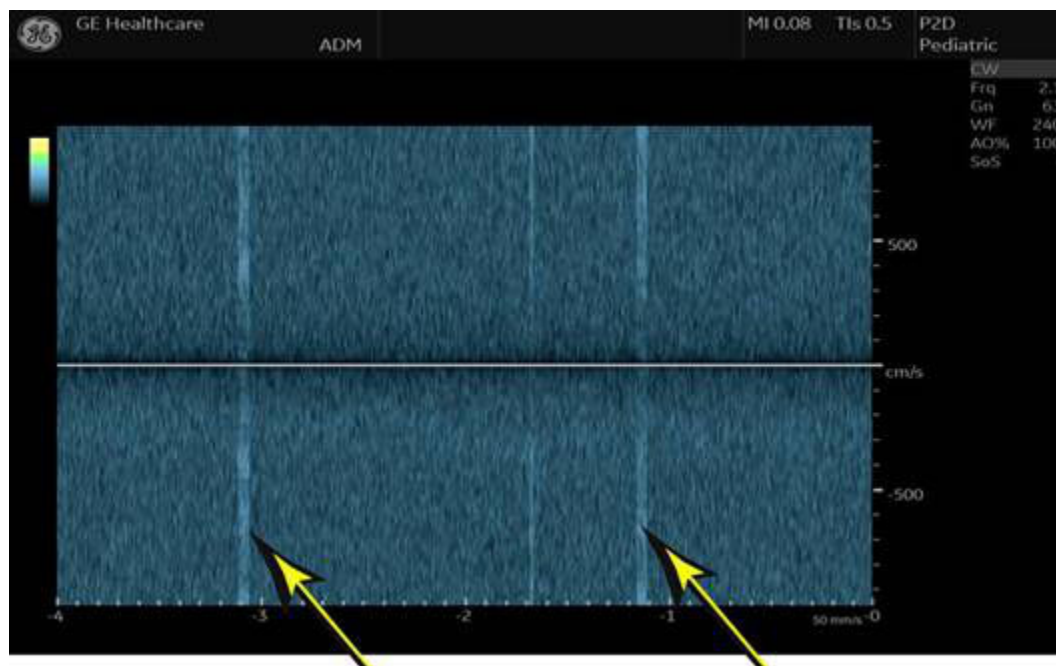


10.4.8 Vertical noise and Tone noise with Continuous Wave (CW)

Vertical noise with P2D/P6D probes and Continuous Wave (CW)

A vertical noise issue (Figure 10-39 Example of Vertical Noise on page 301) may exist when using P2D/P6D probes and Continuous Wave (CW).

Figure 10-39 Example of Vertical Noise



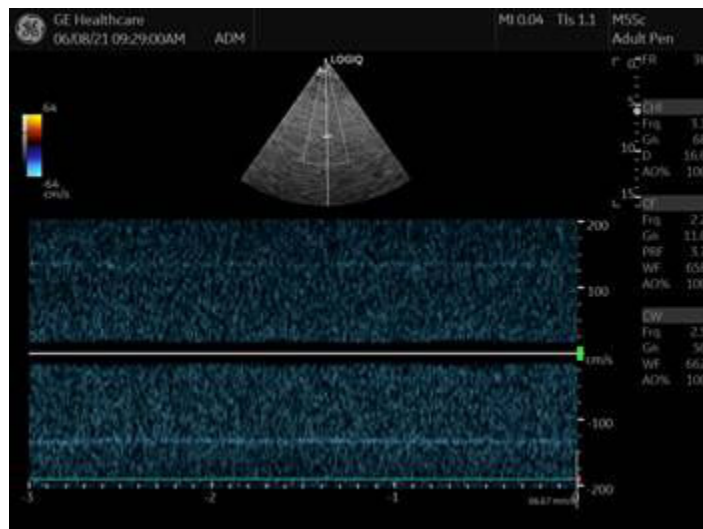
Workaround for vertical noise

There is no workaround for this issue. Hardware does not need to be replaced when this issue is identified.

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.

Figure 10-40 Example of Tone Noise



Workaround for vertical noise

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.

10.5 LOGIQ Apps Troubleshooting

LOGIQ apps are used on Android devices (both phone and tablet) through a Bluetooth connection to the LOGIQ Fortis. For more information, see *LOGIQ Apps* on page 231

10.5.1 LOGIQ Apps pairing confirmation delay

The LOGIQ Apps may require 10-30 seconds to pair. Turn the Bluetooth setting off and then on again can minimize this delay time.

10.5.2 LOGIQ 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.

10.5.3 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

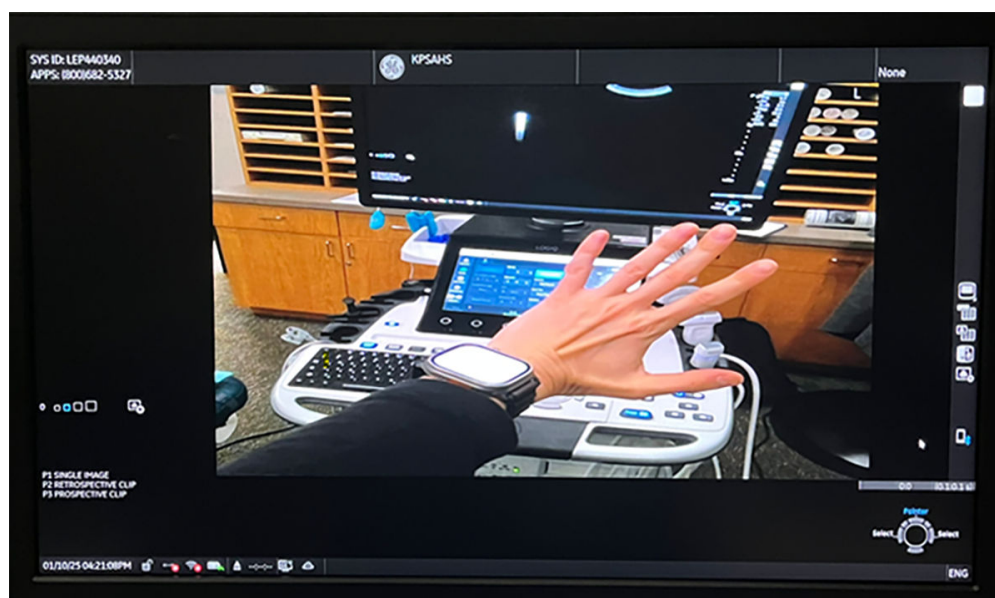
10.5.4 Upside down image from LOGIQ Photo

On certain devices (including the Lenovo Tablet 4 10"), the images are sent to the LOGIQ Fortis upside down. Lock the device screen rotation and take pictures upside down.

10.5.5 LOGIQ Apps photo distortion with the Go4 tablet

The LOGIQ Apps may have an issue with photo distortion (shown below) with the Go4 tablet. If this photo distortion occurs, update to v1.3.0 (Android) or v1.3.2.0 (Microsoft) software.

Figure 10-41 Photo Distortion with the Go4 Tablet



10.6 Options Troubleshooting

Contents in this section

- *ECG display disappears after backup/restore* on page 303
- *Unable to measure in both stiffness and velocity in Breast and Thyroid* on page 303
- *Breast Assistant, Powered by Koios DS* on page 304
- *KOIOS Lite* on page 305
- *Device Management (Device Mgmt)* on page 306

10.6.1 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.

10.6.2 Unable to measure in both stiffness and velocity in Breast and Thyroid

With Shear Wave, 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.

10.6.3 Breast Assistant, Powered by Koios DS

Use *Table 10-21 Troubleshooting the Breast Assistant, Powered by Koios DS Option* on page 304 to troubleshooting Breast Assistant, Powered by Koios DS installations.

Table 10-21 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. - For R3 and earlier, on Utility > Connectivity > Device to verify the service. - For R4 and later, on Connectivity > Connection Manager > Dicom > Devices 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, do the following: - For R3 and earlier, on Utility > Connectivity > Koios, select Deactivate. - For R4 and later, on Connectivity > Connection Manager > Special Devices > Koios, select Deactivate. Follow the steps 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

10.6.4 KOIOS Lite

KOIOS Lite Troubleshooting

Res File Text	Message	Message Displayed in	Context
KOIOS_SERVICE_FAILED	Koios application service failed to start. Please retry.	Statusbar	Koios connection not successful when Nodule/Lesion button is pressed
KoiosLite is not Activated	KoiosLite is not Activated	Statusbar	Koios is not activated, and Nodule/Lesion button is pressed
KoiosLite Activation Token Expired	KoiosLite Activation License Has Expired.	Statusbar	Token expired, and Nodule/Lesion button is pressed
About To Expire	KoiosLite Activation License Expiring in %d Days.	Statusbar	Nodule/Lesion button is pressed
KoiosServiceFailed	Koios application service failed to start. Please retry, and if the issue persists, contact GE HealthCare Service.	Message Box	KoiosLite startup in background failed, and Koios/Analyze button pressed
KoiosNotActivated	The KoiosLite activation license is either not activated or has expired. Please contact GE HealthCare for license activation.	Message Box	KoiosLite startup in background failed, and Koios/Analyze button pressed

1. If KOIOS Enterprise Options are already enabled on the ultrasound system, please contact your regional Support Team, as enabling both KOIOS Enterprise and KOIOS Lite is not supported.
2. The KOIOS token is located on the KOIOS USB flash drive. If the USB media is missing or lost and the token is required but cannot be found, please contact your regional Support Team.

10.6.5 Device Management (Device Mgmt)

Use *Table 10-22 Troubleshooting the Device Management Option* on page 306 to troubleshoot Device Management (Device Mgmt).

Table 10-22 Troubleshooting the Device Management Option

Symptom	Solution
Do not have or lost the "DEVICE MANAGEMENT" server URL address.	For R3 and earlier, under Utilities > Connectivity > DEVICE MANAGEMENT , under Server URL, enter the default URL: https://iot.gehelathcare.com . For R4 and later, under Connectivity > Connection Manager > Special Devices , select Device Mgmt . In Server URL enter the default URL: https://iot.gehelathcare.com .
LOGIQ Fortis cannot connect to the "DEVICE MANAGEMENT" cloud.	Confirm with the site IT department the following conditions: - 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 If the site uses Proxy servers: Under Utilities > Connectivity > DEVICE MANAGEMENT , confirm proxy settings (Server/ port/ Username and password). 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.
Missing the registration key for the "DEVICE MANAGEMENT" cloud.	Reset the registration key by: - Delete any information in Registration Key. - Enter the default registration key in Registration Key. 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.
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.	Restore email account information (Account Email): - 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. - Select Deactivate. - In Account Email, enter the email address for the account. - If applicable, enter Proxy Server, Proxy Port, Proxy User Name, and Proxy Password. - Select Activate. - Select Save.

Symptom	Solution
After a full software load, cannot connect to the “DEVICE MANAGEMENT” cloud.	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 Online Center for support indicating the serial number of the unit, description of the problem and e-mail of the admin user registered in the account.
As a user, do not have account to the “DEVICE MANAGEMENT” cloud.	Go to https://ultrasoundfleet.gehealthcare.com/ for sign up instructions.
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.	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. 1. Navigate to https://ultrasoundfleet.gehealthcare.com/ 2. Sign in to access your profile. 3. Confirm the time zone.
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.	
Other issues needing help with “DEVICE MANAGEMENT” feature.	Contact the Online Center for support.

Use *Table 10-23 Errors for the Device Management Option* on page 307 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 10-23 Errors for the Device Management Option

Error	Details	Solution
Activate		
Agent service config file is corrupted. Please contact your GE HealthCare 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 HealthCare 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 HealthCare 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.

Error	Details	Solution
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 HealthCare service personnel.	Empty Registration Key field.	Enter valid Registration Key.
Agent service config file is corrupted. Please contact your GE HealthCare service personnel.	Empty Server URL field.	Enter valid Server URL.
Invalid server certificate. Please contact your GE HealthCare 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 HealthCare service personnel. (Error code: 400)	Bad request	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 500)	Internal server error	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 503)	Service unavailable	Retry
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 404)	Digital twin not found	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 000011)	Unknown error	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 000010)	Internal error	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code:000115)	Default application not found for Digital Twin	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 000100)	Missing applID or appName	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 000105)	Application does not exist	Contact the Online Center to escalate to L3 or L4 for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: 000116)	The application has not been associated with your digital twin. No application device exists.	Retry desired action. Contact the Online Center for support 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 the Online Center for support.

Error	Details	Solution
Activation failed. Invalid input parameter. (Error code: 000103)	Invalid data type	Contact the Online Center for support.
Activation failed. Invalid input field size. (Error code: 000101)	Field size error	Contact the Online Center for support.
Activation failed. Please contact your GE HealthCare service personnel. (Error code: xxxxxx)	Unknown	Contact the Online Center for support.
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 HealthCare 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 HealthCare service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE HealthCare 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 HealthCare service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000101)	Field size error	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000102)	Invalid data format	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000103)	Invalid data type	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000119)	Invalid data value File type is invalid	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000120)	Invalid data value Data classification is invalid	Contact the Online Center for support.

Error	Details	Solution
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000118)	Insufficient storage	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000100)	Missing Input	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000111)	File transfer subsystem encountered an error (I/O error)	Retry desired action. Contact the Online Center for support if problem persists.
	Internal error	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000105)	App Id does not exist (Resource not found)	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000113)	Invalid data value	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000010)	External error	Contact the Online Center for support.
Upload of backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: xxxxxx)	Unknown	Contact the Online Center for support.
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 API\Agent code and there is no specific error code) 2. Any unknown connection issue.	Ensure network connection and retry.
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 HealthCare service personnel.	Agent service configuration file is corrupt.	1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE HealthCare service personnel.	The application key has expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE HealthCare service personnel.	The server certificate is invalid.	Install valid certificate using Device Connect Service Certificate.
	Network is disconnected.	Establish a network connection.
Deactivate		

Error	Details	Solution
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 HealthCare service personnel.		1. Contact service for enabling re-registration. 2. Select Deactivate. 3. Follow steps for activation.
App key expired. Please contact your GE HealthCare service personnel.		Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE HealthCare service personnel.		Install valid certificate using Device Connect Service Certificate.
Deactivation failed.	1. Network not connected state 2. Any unknown connection issue	Ensure the network connection and retry.
Deactivation failed. Please contact your GE HealthCare service personnel. (Error code: 500)	After activation remove digital twin from ThingWorx server.	Contact GE HealthCare support.
Deactivation failed. Please contact your GE HealthCare service personnel. (Error code: 400)	Bad request	Retry desired action. Contact the Online Center for support if problem persists.
Deactivation failed. Please contact your GE HealthCare service personnel. (Error code: 401)	Unauthorized	Retry desired action. Contact the Online Center for support if problem persists.
Deactivation failed. Please contact your GE HealthCare service personnel. (Error code: 404)	Digital twin not found	Contact the Online Center for support to initiate Device re-registration.
Deactivation failed. Please contact your GE HealthCare service personnel. (Error code: 503)	Service unavailable	Retry desired action. Contact the Online Center for support if problem persists.
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.

Error	Details	Solution
Agent service config file is corrupted. Please contact your GE HealthCare 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 HealthCare service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE HealthCare 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 HealthCare service personnel. (Error code: 000109) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000101) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000101)	Field size error	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000102) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000102)	Invalid data format	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000103) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000103)	Invalid data type	Contact the Online Center for support.

Error	Details	Solution
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000119) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000119)	Invalid data value File type is invalid	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000120) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000120)	Invalid data value Data classification is invalid	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000118) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000118)	Insufficient storage	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000100) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000100)	Missing Input	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000111) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000111)	File transfer subsystem encountered an error (I/O error).	Retry desired action. Contact the Online Center for support if problem persists.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000011) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000011)	Internal error	Contact the Online Center for support.

Error	Details	Solution
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000105) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000105)	App Id does not exist (Resource not found).	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000113) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000113)	Invalid data value	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: 000010) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: 000010)	External Error	Contact the Online Center for support.
Backup to cloud failed. Please contact your GE HealthCare service personnel. (Error code: xxxxxx) or Local restore completed successfully. Failed to backup newly restored backups to cloud. Please contact your GE HealthCare service personnel. (Error code: xxxxxx)	Unknown	Contact the Online Center for support.
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 HealthCare 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 HealthCare service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.

Error	Details	Solution
Invalid server certificate. Please contact your GE HealthCare service personnel.	Invalid server certificate	Install valid certificate using Device Connect Service Certificate.
	Network is disconnected.	Establish network connection.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000109)	File Id or file path/file name not found (Resource not found).	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000101)	Field size error	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000102)	Invalid data format	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000103)	Invalid data type	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000119)	Invalid data value File type is invalid	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000120)	Invalid data value Data classification is invalid	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000118)	Insufficient storage	Insufficient storage on device. Reclaim device storage. Contact the Online Center for support if problem persists.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000100)	Missing input	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000111)	File transfer subsystem encountered an error (I/O error).	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000011)	Internal error	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000010)	External error	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: 000110)	Not authorized to access file	Contact the Online Center for support.
Configuration installation failed. Please contact your GE HealthCare service personnel. (Error code: xxxxxx)	Unknown	Contact the Online Center for support.
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.

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 HealthCare 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 HealthCare service personnel.	ThingWorx server App key expired.	Contact service personnel for app key expiry date correction.
Invalid server certificate. Please contact your GE HealthCare 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 HealthCare service personnel. (Error code: 000112)	Invalid data range	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: 000113)	Invalid data value	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: 000101)	Field size error	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: 000105)	App Id does not exist	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: 000011)	Internal Error	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: 000010)	External Error	Contact the Online Center for support.
Failed to retrieve notification from Cloud. Please contact your GE HealthCare service personnel. (Error code: xxxxxx)	Unknown	Contact the Online Center for support.
Verify		
Smiley icon display	Check whether the Agent is connected to the ThingWorx Core using BaseClient::isConnected() method.	Ensure the network connection and retry.

10.7 Probes Troubleshooting

Contents in this section

- *Advanced Probe Option* on page 317
- *Probe recognition* on page 317
- *IC/RIC5-9 CHI M-Mode too dark* on page 317
- *ML6-15 breast B and color flow “zipper artifact”* on page 318
- *Body pattern probe mark shift* on page 318
- *Probe Check (Automatic Probe Diagnostics)* on page 318

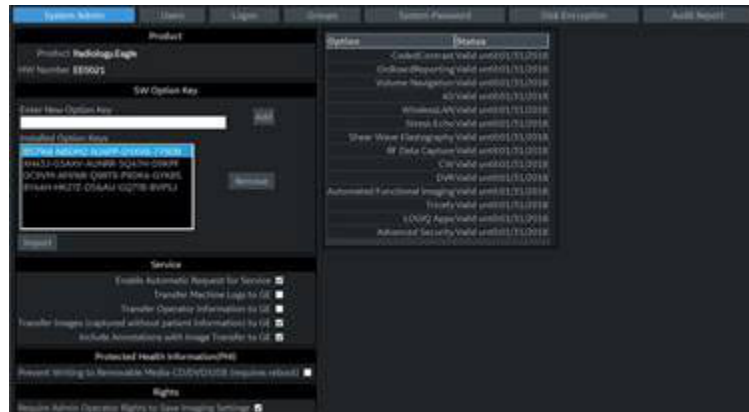
10.7.1 Advanced Probe Option

If the following probes does not activate even if you select, check to see if the Advanced Probe Option (H46612LS) is installed.

- C1-6-D probe
- C1-6VN-D probe
- C2-9-D probe
- C2-9VN-D probe
- C3-10-D probe
- L2-9-D probe
- L2-9VN-D probe.
- M5Sc-D Probe

To determine if the if the Advanced Probe option is installed, navigate to **Utility > Admin > System Admin**, under **Installed Option Keys**, select the option key and then under **Option**, confirm Advanced Probes appears and is current.

Figure 10-42 System Admin Window



10.7.2 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.

10.7.3 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.

10.7.4 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.

10.7.5 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.

10.7.6 Probe Check (Automatic Probe Diagnostics)

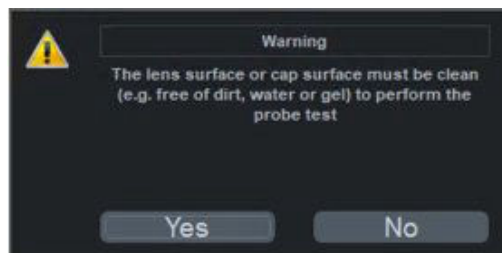
The Probe Check feature is an optional feature (enabled with an OAC license) and was first introduced in R2 software as Automatic Probe Diagnostics (VITA). It has been progressively enhanced in subsequent software versions. The Probe Check software (VITA) uses automated lens echo acquisition and advanced processing to provide real-time probe health information. Keep in mind the following:

- Naming Variations: Probe Check may also be referred to as Automatic Probe Diagnostics (VITA) or Automatic Probe Diagnostics (VITAOnDemand), depending on the software release.
- Availability: Probe Check is an optional feature and may not be available in all regions or countries.
- Enabling the Feature: Customers who have purchased this feature can enable it by selecting "Enable Automatic Probe Diagnostics" on the Utility > Admin page. The frequency of the probe check can also be configured there.
- Version-Dependent Results: Probe check results may vary between software versions, as each update may include enhancements to the VITA software.

10.7.6.1 Probe Check (additional requirement)

The probe lens surface must be clean before performing the probe test. The software will display a popup window prompting the user to clean the probe before the test begins. Failure to properly clean the probe lens may result in a failed test result.

Figure 10-43 Selecting Probe Test and popup



10.7.6.2 Automatic Probe Check

The Automatic Probe Check routine very slightly between different software version and customer settings:

- In the R2 VITA version, diagnostic data is collected at boot-up from the first supported probe detected, scanning from left to right across the connectors.

- For R3 and later versions the Automatic Probe Check runs during probe selection at a time interval specified by the user. Reference the User Manual for additional information: Utility > Admin page > Enable Automatic Probe Diagnostics The time interval options are: Every Time, Once a day, Once a week, Once a month and never.

NOTE

The Automatic Probe Check routine increases the probe selection time by about 5 seconds.

10.7.6.3 Running Probe Check manually

For R3 and later software versions, users have the option to run Probe Check manually.

NOTE

This feature must be enabled (OAC license option) on the Ultrasound system to be accessible.

The Probe Check utility is located on Page 2 of the B-Mode Touch Panel. (The Probe Check utility will not appear while Scan Assistant is active.) This utility allows users to manually run a probe check for supported probes. For a list of supported probes by software version, please refer to the Probe Check (VITA Versions) and Supported Probes section above.

NOTE

In R3, the touch panel button is labeled "Probe Test" and in R4 and later "Probe Check."

NOTE

Make sure the probe lens surface is clean and free of dirt, water or coupling gel before beginning.

10.7.6.4 Probe Check results and actions

Refer to the following scenarios for recommended actions.

Probe Check passes and the customer has no image quality complaints:

- No action is required.

Probe Check passes, but the customer is not satisfied with image quality:

While Probe Check is effective at identifying most damaged probes, there are certain types of probe defects it may not detect. If a probe passes the check but the image quality remains unacceptable:

- Perform a visual inspection of the probe. If the probe lens is compromised, replace the probe.
- Run Probe Check using a different probe port to verify the results. If the probe still fails, replace it.
- Evaluate the issue: If the problem persists with a single probe across all ports, run system diagnostics and perform an Image Quality Check using a phantom. Consider replacing the probe based on the findings.

If problems continue, escalate the problem to the region support in your region or county.

Probe Check fails and the customer has no image quality complaints:

The customer ultimately determines whether the probe's performance meets their requirements. If a probe fails the Probe Check during a routine test and the customer chooses not to replace it following a service visit, the decision and any related actions should be documented accordingly as part of the required service records.

Probe Check fails:

- Run Probe Check using a different probe port to verify the results. If the probe still fails, replace it.
- Evaluate the issue: If the problem persists with a single probe across all ports, run system diagnostics and perform an Image Quality Check using a phantom. Consider replacing the probe based on the findings.

If problems continue, escalate the problem to the region support in your region or country.

10.8 Peripherals Troubleshooting

Contents in this section

- *Test of printers* on page 320
- *EZbackup will not delete images to open disk space* on page 320

10.8.1 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.

10.8.2 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.

10.9 Setting Troubleshooting

Table 10-24 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.

10.10 Scan Assistant Troubleshooting

10.10.1 Scan Assistant Creator

With Scan Assistant Creator, when the LOGIQ Fortis is locked or in auto-logout, you can lose your Scan Assistant protocol. Do not allow the LOGIQ Fortis to enter lock screen or auto-logout the Scan Assistant.

Saving and closing Scan Assistant Creator before leaving the LOGIQ Fortis is recommended.

10.10.2 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.

Chapter 11

Parts

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NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

11.1 Parts List Groups

Figure 11-1 Parts List Groups

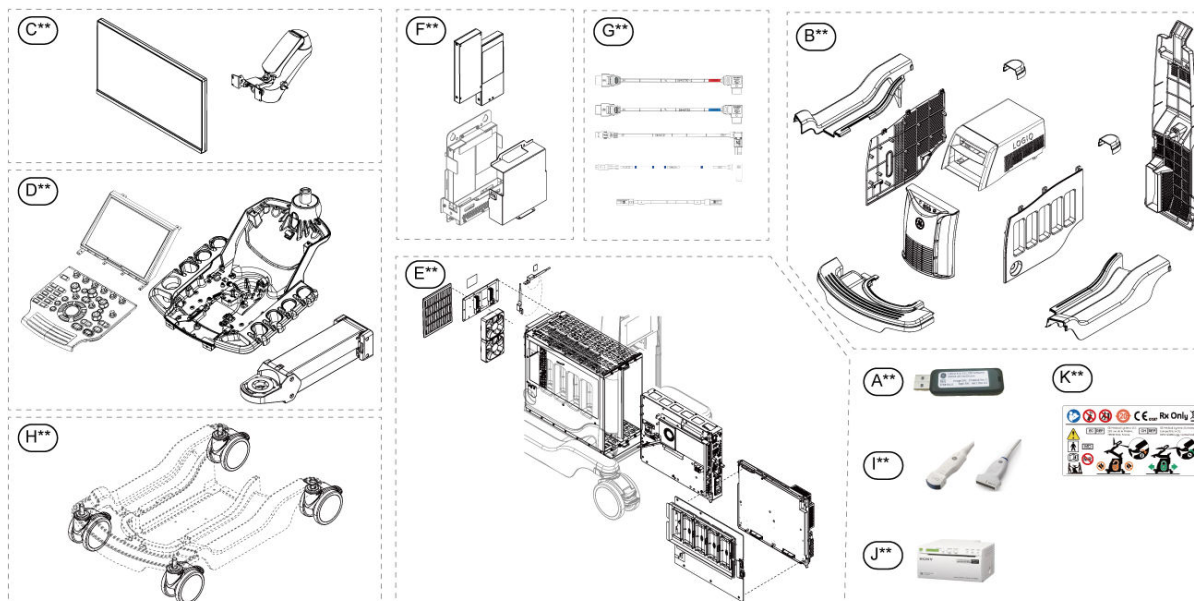


Table 11-1 Parts List Groups

Item	Category	Part Group Name
A**	Software	Software on page 325
B**	Covers and Bumpers	Cover and Bumpers on page 326
C**	Top Console Parts	Main Monitor and Arm on page 329
D**		Operator Panel on page 331
E**	Main Console Parts	Card Rack(Card Cage) Parts on page 336
F**		Power (Main Power Supply, Batteries and Main Power Cables) on page 341
G**		Internal Cables on page 343
H**	Underbody	Casters on page 344
I**	Probes	Supported Probes on page 345
J**	Options	Options and Peripherals on page 350
K**	Labels	Product Labels on page 355

11.2 Software

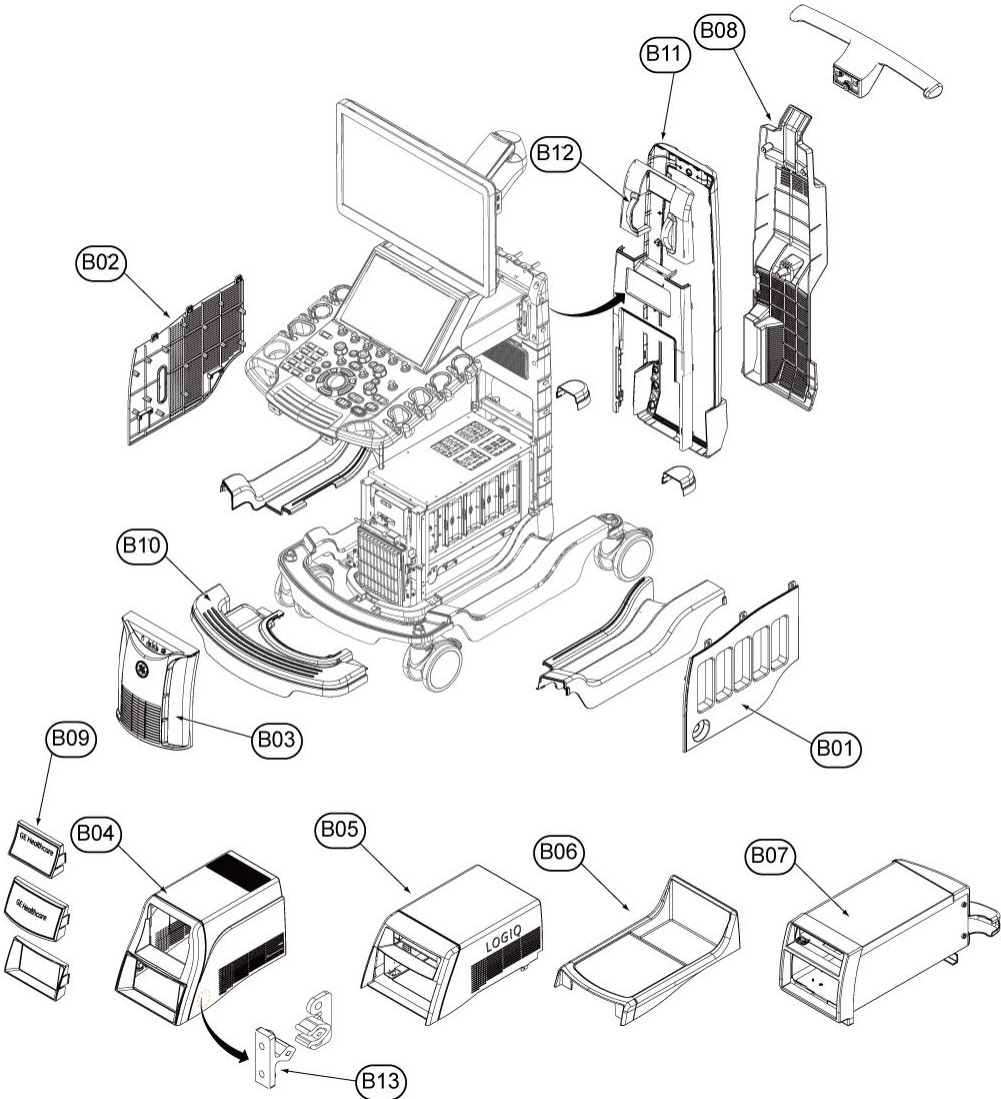
QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-2 LOGIQ Fortis Software

Item	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
A01	LOGIQ Fortis, R3.1.3 Software Thumb Drive Assembly	5858164-5		1	N	Y
A02	LOGIQ Fortis, R3.1.5 Software Thumb Drive Assembly	5858164-6		1	N	Y
A03	LOGIQ Fortis, R3.1.6 Software Thumb Drive Assembly	5858164-7		1	N	Y
A04	LOGIQ Fortis, R3.2.1 Software Thumb Drive Assembly	5951540-2		1	N	Y
A05	LOGIQ Fortis, R3.2.2 Software Thumb Drive Assembly	5951540-3		1	N	Y
A06	LOGIQ Fortis, R3.2.3 Software Thumb Drive Assembly	5951540-4		1	N	Y
A07	LOGIQ Fortis, R4.1.1 Software Thumb Drive Assembly	5928522-5		1	N	Y
A08	LOGIQ Fortis, R4.6.0 Software Thumb Drive Assembly	5928522-6		1	N	Y
A09	LOGIQ Fortis, R4.6.1 Software Thumb Drive Assembly	5928522-7		1	N	Y
A10	LOGIQ Fortis, R5.0.4 Software Thumb Drive Assembly	5962504-4		1	N	Y

11.3 Cover and Bumpers

Figure 11-2 Cover Parts Overview



QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-3 Covers - LOGIQ Fortis

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
B01	SIDE COVER R DLP ASSY	5412187-10		1	N	Y

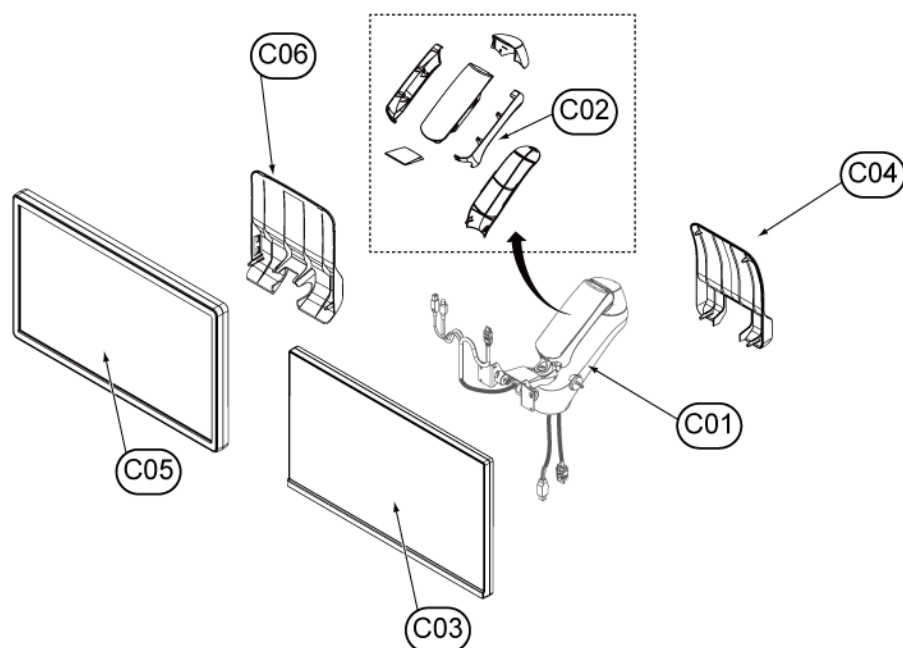
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
B02	SIDE COVER L ASSY Plastic, w/ cap	5405169-10		1	N	Y
B03	FRONT COVER ASSY	5722797-10		1	Y	Y
B04	HIGH CABINET ASSY	5859038		1	N	Y
B05	MID CABINET ASSY	5722798-10		1	N	Y
B06	LOW CABINET ASSY	5859041		1	N	Y
B07	SIDE CABINET INSTALLATION KIT	5859042		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
B08	REAR COVER ASSY	5857692	 NOTE Order appropriate multi-caution label when replacing rear cover.	1	N	Y
B09	DUMMY COVER SET Plastics, BW PRT Bezel, Dummy for Mid and High Cabinets	5725244		1	Y	Y
B10	BASE COVER SET	5726078		1	N	Y
B11	BACKBONE REAR COVER LCF	5768155		1	N	Y
B12	BACKBONE FRONT COVER SET LCF	5773476		1	N	Y
B13	TL-118 LATCH Set FRU	S5396801		1	N	Y

11.4 Top Console Parts

11.4.1 Main Monitor and Arm

Figure 11-3 Main Monitor and Arm Parts Overview



QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

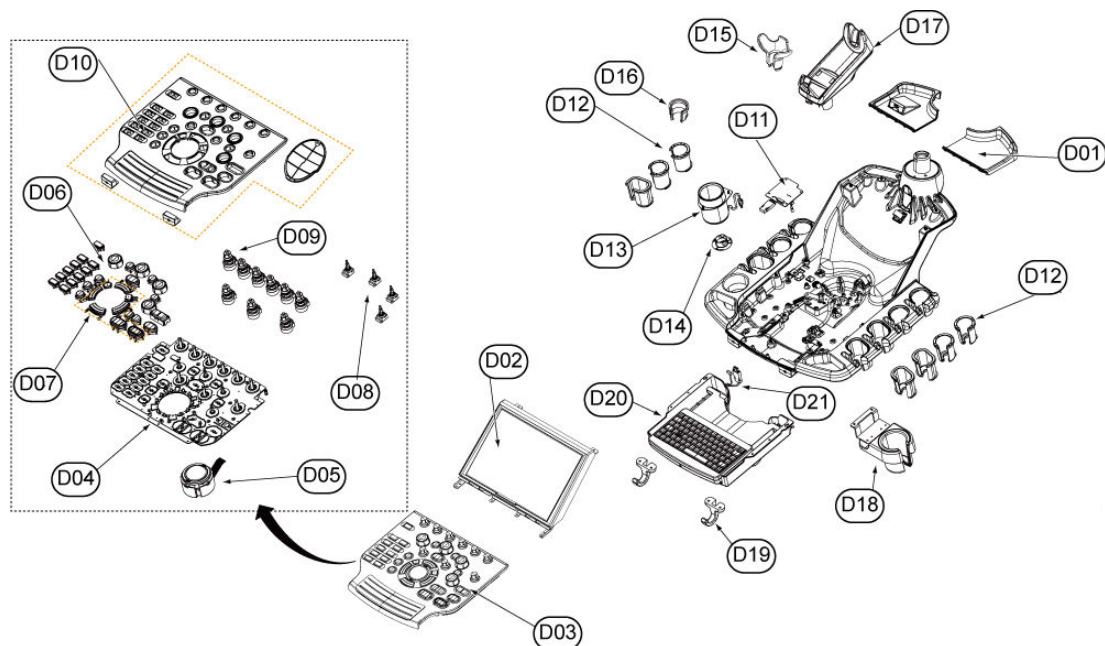
Table 11-4 Main Monitor and Arm Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
C01	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	S5957000-150		1	N	Y
C02	LCD Arm Plastic Covers (Ergotron Arm)	5957000-1		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
C03	Ultrasound bezelless 23.8inch LCD monitor V2.0	8501560-21		1	N	Y
C04	MONITOR CABLE COVER LCD	5874481		1	N	Y
C05	HDU 23.8 inch Monitor LOGIQ Exx FRU with BIS certificate	S5860239-40		1	N	Y
C06	Symmetric cable cover USB for HDU Monitor 23.8 inch	5861127-20		1	N	Y

11.4.2 Operator Panel

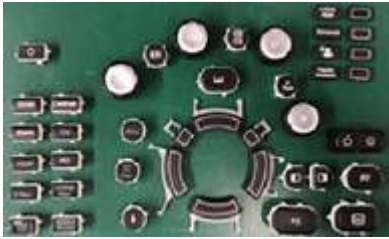
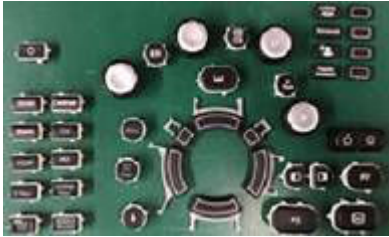
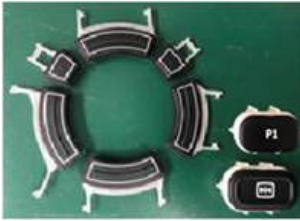
Figure 11-4 Operator Panel Parts Overview



QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-5 Operator Panel Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
D01	OPIO TOP COVER w/ USB3 2port PWA	5857693		1	N	Y
D02	Upper OPIO	5848184		1	N	Y
D03	Lower OPIO	5848185		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
D04	OPIO Lower Main PWA Assy w/ Elastomers, Encoder 4pcs and Joystick 9pcs	5862480		1	N	Y
D05	OPIO Laser Trackball Assy with cable	5862481		1	N	Y
D06	OPIO Button Sets	5862482		1	N	Y
	OPIO button sets R5	S5984700				
D07	OPIO Function key set	5862483		1	N	Y
D08	OP Mode select Encoder 4pcs	5862484		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
D09	OPIO Joystick with KNOB	5862485		1	N	Y
D10	OPIO Lower Plastic set LOWER BEZEL, ROTATE BUTTON, UP DOWN BUTTON and BOTTOM BASE BACK COVER	S5862501		1	N	Y
D11	EXT HUB BOARD ASSY	5862473-2		1	N	Y
D12	Probe Holder set	S5862493		1	N	Y
D13	Gel Warmer	5692044-11		1	N	Y
D14	Gel Warmer Cap	5692045		1	Y	Y

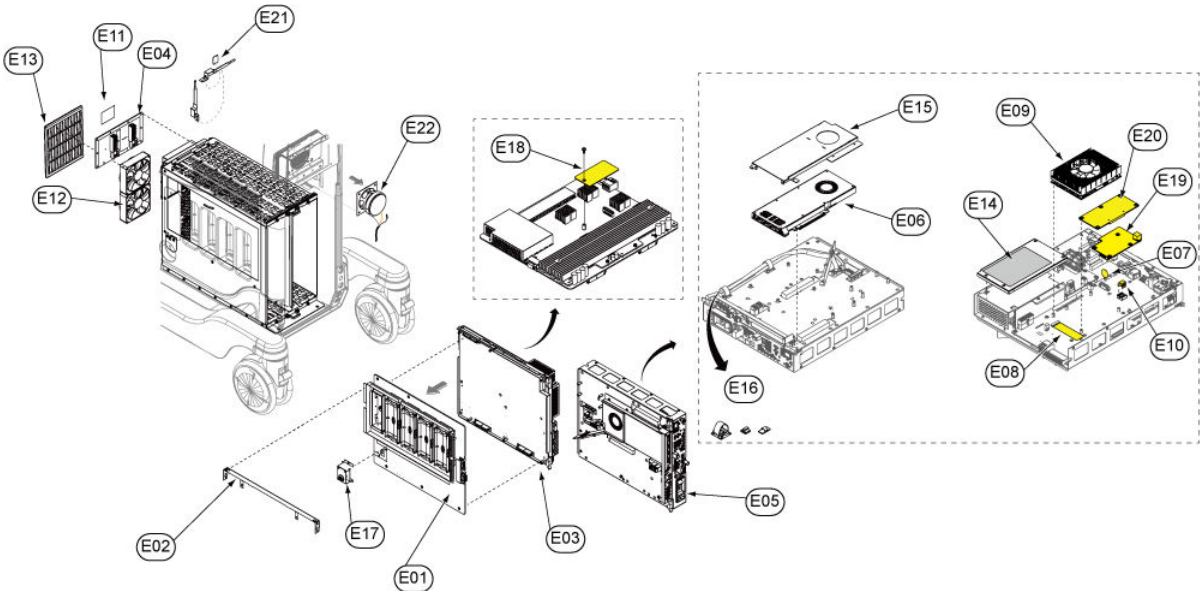
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
D15	PROBEHOLDER INSERT FOR 4D PROBE - Onyx Black	5307472-2		1	Y	Y
D16	Small Probe Holder	5861624		1	Y	Y
D17	TVTR Probe Holder	5873732		1	Y	Y
D18	VERTICAL TV PROBE HOLDER	5859083		1	N	Y
D19	OPIO-FRONT_HOOK R3	5730659		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
D20	AN KEYBOARD ASSY	5859061	 NOTE AN Keyboard cable(5847621) can be ordered separately.	1	N	Y
	AN KEYBOARD ASSY Greek	5863206		1	N	Y
	AN KEYBOARD ASSY Norwegian	5863207		1	N	Y
	AN KEYBOARD ASSY Russian	5863208		1	N	Y
	AN KEYBOARD ASSY French	5863209		1	N	Y
	AN KEYBOARD ASSY Swedish	5863210		1	N	Y
	AN KEYBOARD ASSY German	5863211		1	N	Y
D21	AN Keyboard cable	5847621		1	N	Y

11.5 Main Console Parts

11.5.1 Card Rack(Card Cage) Parts

Figure 11-5 Card Rack(Card Cage) Parts Overview

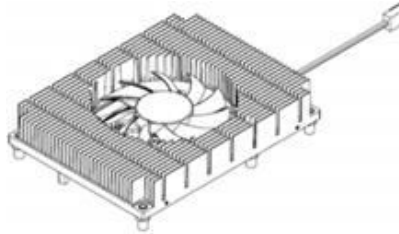


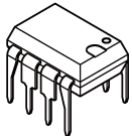
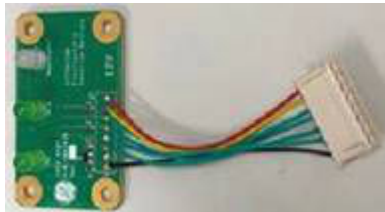
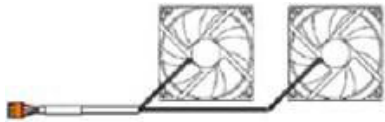
QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

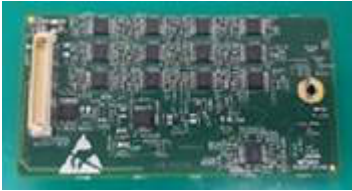
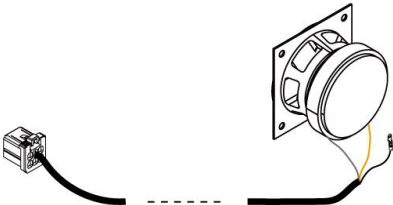
Table 11-6 Back End Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
E01	DPI-L PWA	8806600-2		1	N	Y
E02	DPI_L LIGHTING ASSY	5862486		1	N	Y
E03	DA192 PWA	8804400-2		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
E04	GBP PWA	8802200		1	N	Y
E05	BEPS2S-2G ASSY	8813300-25		1	N	Y
	BEPS2S-1G ASSY	813300-20-R	 NOTE This BEPS is available as a repair part only. If a new part is needed, order part number 8813300-25.	1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
E06	GPU Quadro P4000 D5 8GB * Use this part for the console with GPU P4000 Only.	5807260	 NOTE Compatible with R3.x.x only	1	N	Y
	Nvidia RTX A4000 GPU * Use this part for the console with GPU A4000 Only.	5948723-2	 NOTE Compatible with R3.1.2 and R4 systems	1	N	Y
	Nvidia RTX A4000H GPU * Use this part for the console with GPU A4000H Only.	KTZ304327	 NOTE This GPU can be used for R4.6.0 and higher only.	1	N	Y
E07	Lithium Coin Battery, CR2450	5173038		1	N	Y
E08	1TB M.2 SSD	5832284		1	N	Y
	M.2 SSD 1TB	5904513		1	N	Y
E09	I5 Coffeelake with 16GB Memory, COM Express module with 512M pre-graphic memory and new Verb table	5829291-3		1	N	Y

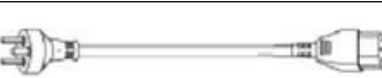
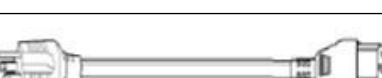
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
E10	EEPROM	5418291		1	N	Y
E11	CSI2 Assy with Cable	5847676		1	N	Y
E12	FAN ASSY	5808653		1	N	Y
E13	Metal Air Filter Assy	5871123		1	N	Y
E14	BEPS RF absorber Assy	5897133		1	N	Y
E15	GPU FIX bracket	S5780967		1	N	Y
E16	Cable Clamps	5962435		1	N	Y
E17	Pencil CW HW Kit	5859045		1	N	Y

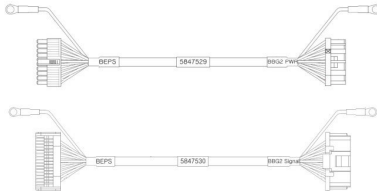
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
E18	GCW PWA	8807700		1	N	Y
E19	VCS PWA	8809100-2		1	N	Y
E20	DC4D PWA	8805500		1	N	Y
E21	WIFI MODULE ASSY (For R3)	5832804	 NOTE Compatible with R3 software only	1	N	Y
	WIFI MODULE ASSY (For R4)	5832804-2	 NOTE Compatible with R4 and R5	1	N	Y
E22	Single Speaker with Cable Assembly	5860519		1	N	Y

11.5.2 Power (Main Power Supply, Batteries and Main Power Cables)

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-7 Power (Main Power Supply, Batteries and Main Power Cables)

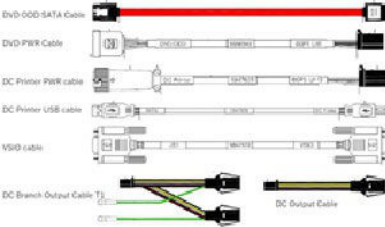
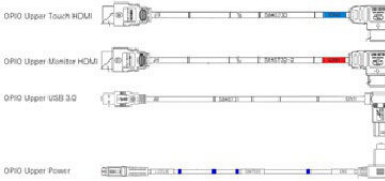
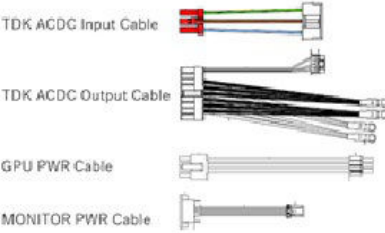
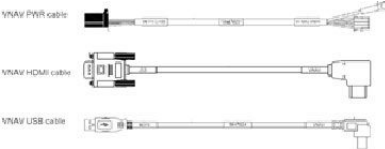
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU	CRU
F01	Power Cord for Canada/USA	6736114-3		1	Y	N
F02	Power Cord for UK	6736107-3		1	Y	N
F03	Power Cord for South Africa	6736112-3		1	Y	N
F04	Power Cord for Argentina	6736101-3		1	Y	N
F05	Power Cord for Israel	6736109-3		1	Y	N
F06	Power Cord for Switzerland	6736113-3		1	Y	N
F07	Power Cord for Denmark	6736115-3		1	Y	N
F08	PWR SPLY CRD ST DENMARK NON- HOSPITAL GRADE STD PLUG 10A 250V	6736106-12		1	Y	N
F09	Power Cord for Japan/ Taiwan	6736111-3		1	Y	N
F10	Power Cord for ANZ	6736102-3		1	Y	N
F11	Power Cord for China	6736104-3		1	Y	N
F12	Power Cord for India	6736108-3		1	Y	N
F13	Power Cord for Italy	6736110-3		1	Y	N

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU	CRU
F14	Power Cord for Brazil	6736103-3		1	Y	N
F15	Power Cord for EU/ Korea	6736105-3		1	Y	N
F16	Power Cord FIX BRKT	5858676		1	Y	N
F17	Battery Installation kit BATTERY PACK BRKTS w/ Charge and Control PWA	5863240		1	Y	N
F18	4S2P Battery Pack (14.4V Li-ion 5900 mAh Rechargeable)	5808900-4	 Part number contains one piece. Order two for Power Assistant or four for Scan on Battery when replacing in the field	1	Y	N
	4S2P Battery Pack (14.4V Li-ion 5900 mAh Rechargeable)	S5808900-4	 Part number contains one piece. Order two for Power Assistant or four for Scan on Battery when replacing in the field	1	Y	N
F19	Battery Option Cable set includes 5847529 BBG2 Power Cable 5847530 BBG2 Signal Cable	S5862497		1	Y	N

11.5.3 Internal Cables

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-8 Internal Cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
G01	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	S5862494		1	N	Y
G02	User Port USB3.0 Cable	5847525		1	N	Y
G03	Lower OPIO CABLE	5863728		1	N	Y
G04	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	S5862498		1	N	Y
G05	BEP Cable Set includes 5847527 TDK ACDC input Cable 5847627 TDK ACDC Output Cable 5808347 GPU PWR Cable 5808346 MONITOR PWR Cable	S5862500		1	N	Y
G06	VNAV Option Cable Set includes 5847622 VNAV PWR cable 5802718 VNAV HDMI cable 5847624 VNAV USB cable	S5862496		1	N	Y

11.6 Casters

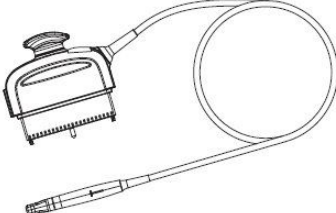
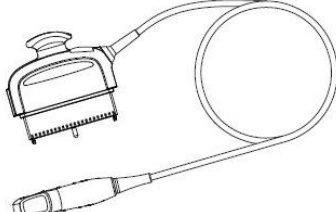
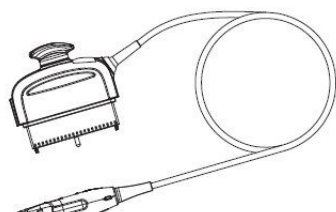
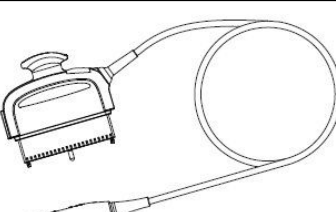
QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

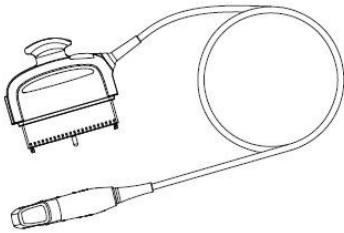
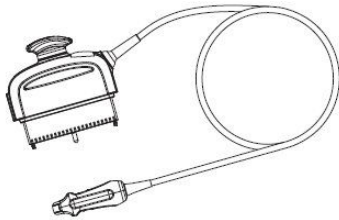
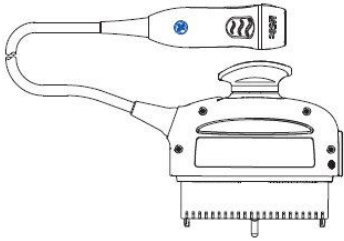
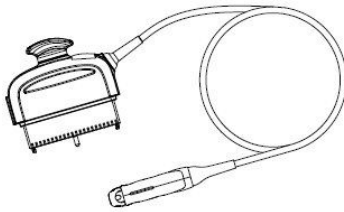
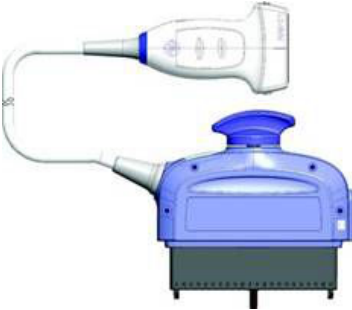
Table 11-9 Casters (Wheels) Parts

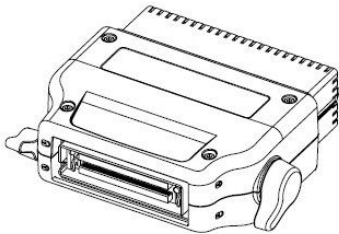
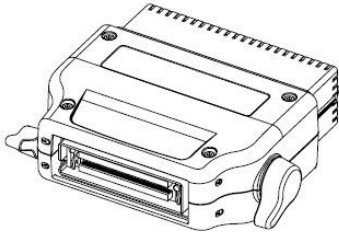
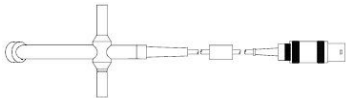
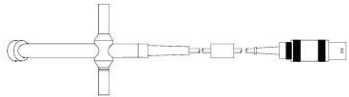
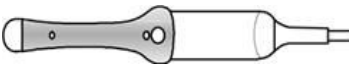
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
H01	CASTOR TOTAL LOCK N9 except swivel lock caster (3 per console)	5746120		1	N	Y
H02	CASTOR DUAL LOCK N9 Rear-Right caster (1 per console)	5746121		1	N	Y
	CASTOR DUAL LOCK N9 with Gray Pedal Rear-Right caster (1 per console)	S5746121-3	 NOTE New caster is introduced for forward production to improve visibility of the lock pedal. Please check the installed caster and order the same FRU (like-for-like). Once the old part(5746121) is used up, it will be connected to the new one(5746121-3) in Global parts.	1	N	Y

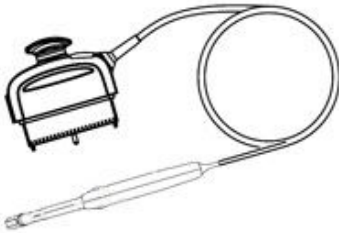
11.7 Supported Probes

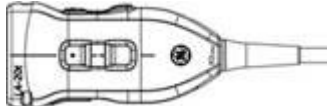
Table 11-10 Supported Probes

ITEM	PROBE	PART NUMBER	Description	QTY	CRU	FRU
I01	IC5-9-D	5499592		1	Y	Y
I02	L8-18i-D	5499594		1	Y	Y
I03	C2-9-D * Need H46612LS Advanced Probe option to activate.	5499605		1	Y	Y
I04	C1-6-D * Need H46612LS Advanced Probe option to activate.	5499606		1	Y	Y
I05	C1-6VN-D * Need H46612LS Advanced Probe option to activate.	5476279		1	Y	Y

ITEM	PROBE	PART NUMBER	Description	QTY	CRU	FRU
I06	C2-9VN-D * Need H46612LS Advanced Probe option to activate.	5488219		1	Y	Y
I07	C3-10-D * Need H46612LS Advanced Probe option to activate.	5493012		1	Y	Y
I08	M5Sc-D * Need H46612LS Advanced Probe option to activate.	5446030		1	Y	Y
I09	ML6-15-D	5499600		1	Y	Y
I10	L2-9-D * Need H46612LS Advanced Probe option to activate.	5765796		1	Y	Y
I11	L2-9VN-D * Need H46612LS Advanced Probe option to activate.	5765797		1	Y	Y

ITEM	PROBE	PART NUMBER	Description	QTY	CRU	FRU
I12	6Tc-RS	5729431	Included with H46402LW 	1	Y	Y
I13	RS-DLP adapter to 6TC-RS Adapter	5444874	Included with H46402LW 	1	Y	Y
I14	RS-DLP adapter to 6TC-RS Adapter	5444874-2	Included with H46402LW 	1	Y	Y
I15	C2-7-D	5505700		1	Y	Y
	C2-7VN-D	5505701		1	Y	Y
	C2-7D-LC	5505702		1	Y	Y
I16	P2D	5729434		1	Y	Y
I17	P6D	5729437		1	Y	Y
I18	RIC5-9-D	KTZ303987		1	Y	Y

ITEM	PROBE	PART NUMBER	Description	QTY	CRU	FRU
I19	RAB6-D	KTZ303986		1	Y	Y
I20	6S-D	5499318		1	Y	Y
I21	L3-12-D	5482856		1	Y	Y
I22	BE9CS-D	5535371		1	Y	Y
I23	L6-24-D	5833059	 Note: In R4, Shear Wave Elastography is available on L6-24-D probes with the probe name underlined on the probe connector label ("<u>L6-24-D</u>").	1	Y	Y
I24	L3-9i-D	5491310		1	Y	Y

ITEM	PROBE	PART NUMBER	Description	QTY	CRU	FRU
I25	L4-20t-D	5882104		1	Y	Y
I26	P8D	5504447		1	Y	Y
I27	12S-D	5499322		1	Y	Y
I28	9L-D PROBE	5499510		1	Y	Y
I29	ML4-20-D	5838848		1	Y	Y
I30	ML4-20VN-D	5838849		1	Y	Y
I31	Vscan Air CL I1 for Service	Multiple Part Numbers. FE should refer to Vscan Air Restrict Manual GP091012-1EN for the appropriate VSCAN Air for their Country		1	Y	Y

11.8 Options and Peripherals

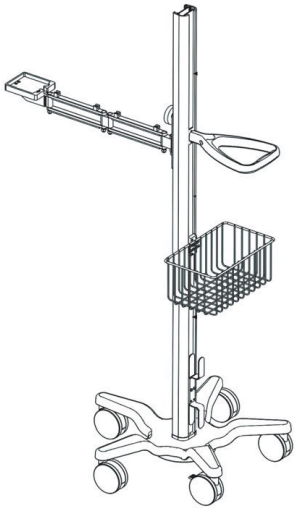
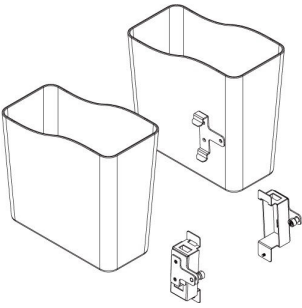
QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-11 Options

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J01	SONY UP-D898DC black and white thermal printer for ultrasound	5535200		1	N	Y
J02	BW Printer Installation Kit	5863205		1	N	Y
J03	Option 5inch bay installation kit	5859053		1	N	Y
J04	LOGIQ Fortis Cabinet Drawer Option	5941777		1	N	Y
J05	DVD Drive	5393433		1	N	Y
J06	VSIO ASSY	5815323-10		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J07	ECG Cable Adult, AHA	2106305-001-S		1	Y	Y
J08	ECG CABLE, IEC	2106305-003-S		1	Y	Y
J09	ECG TRUNK CABLE, 3/5-LEAD, AHA, 3.6 M/12 FT.- service edition	2106305-001-S		1	Y	Y
J10	ECG TRUNK CABLE, 3/5-LEAD, IEC, 3.6 M/12 FT. - service edition	2106305-003-S		1	Y	Y
J11	ECG LEADWIRE SET, 3-LD GROUPED, GRABBER, AHA, 74 CM/ 29 IN - service edition	2106390-001-S		1	Y	Y
J12	ECG LEADWIRE SET, 3-LD GROUPED, GRABBER, IEC, 74 CM/ 29 IN - service edition	2106390-003-S		1	Y	Y
J13	DriveBay2+ (System Electronics Unit)	5459862		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J14	driveBAY 3D Tracking System Dual 10mm Sensor	5168286-30		1	N	Y
J15	DriveBay2+ 3D Tracking System Mid Range Transmitter	5457453		1	N	Y
J16	SONY UP-D25MD	5389822		1	N	Y
J17	SONY UP-DR80MD	5555266		1	N	Y
J18	CABLE HANGER ASSY_4 CABLE	5172249		1	Y	Y
J19	HP Officejet Pro 8210 Printer	5763696		1	Y	Y
J20	3 button footswitch	5380960-2		1	Y	Y

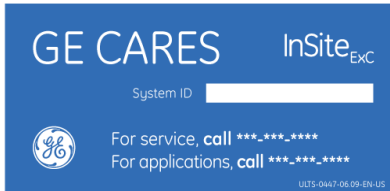
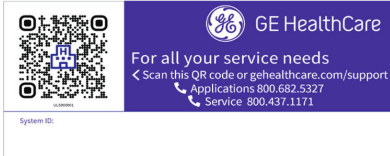
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J21	Ethernet protection cable	5863421		1	Y	Y
J22	Stand for Tru3D Transmitter	5268740		1	Y	Y
J23	OPTION TRAY WITH BRKT ASSY	5873734		1	N	Y
J24	Microsoft Surface Go Tablet	5970519		1	N	Y
J25	Vscan Wireless Option Kit (A8000 USB dongle)	5940019		1	N	Y
J26	Clip holder for Vscan Air Wireless Charger	GP300402-S		1	N	Y

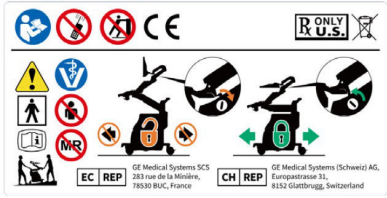
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J27	Base FRU for Vscan Air Wireless Charger	GP300403-S		1	N	Y
J28	Post FRU for Vscan Air Wireless Charger	GP300404-S		1	N	Y
J29	Nut FRU for Vscan Air Wireless Charger	GP300405-S		1	N	Y
J30	USB-C TO USB-A FRU for Vscan Air Wireless Charger	5914965-S		1	N	Y
J31	RFID reader with cable tie	S5984702	 NOTE Applicable for LOGIQ Fortis R5 and later.	1	Y	Y
J32	RFID reader cover set	S5984703	 NOTE Applicable for LOGIQ Fortis R5 and later.	1	N	Y

11.9 Product Labels

QTY is the number used on the LOGIQ Fortis (and not the amount for the part number).

Table 11-12 Product Labels on LOGIQ Fortis and Consoles Used in a Veterinary Environment

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
K01	MULTI CAUTION LABEL	5858168		1	N	Y
K02	GE Care System ID Label	2112014-5	 Replaced by 5961381-10	1	N	Y
	System ID Label GEHC Purple with QR Code	5961381-10		1	N	Y
K03	Label - Vet Side Covers	5790735		2	N	Y
K04	AFU Vet Safety Label for Legacy Vet configuration	5723475		1	N	Y
K05	Power Assistant and Scan on Battery Label Set	S5848344		1	N	Y
K06	5878742 MULTI CAUTION LABEL T1 CHINA	5878742		1	N	Y

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
K07	MULTI CAUTION LABEL T1 Vet for R3 Console	5858168V		1	N	Y
K08	MULTI CAUTION LABEL T1 Vet for R4 and R5 Console	5858168-4V		1	N	Y
K09	Vet Probe Caution Label	5932352-S		1	N	Y

11.10 Master FRU List Compatibility Chart

For a list of software-dependent configuration compatibility for FRUs see TB72280 - Application/Base Image Load Software Compatibility and Spare Part Matrix (DOC2608787).

This technical bulletin provides communication of the latest application and base image load software to the field on a timely basis and informs the field of any configurations which depend on software whenever the following occurs:

- Application or base image load software part number changes
- Spare parts are updated

Field engineers can consult this technical bulletin to confirm the latest software revision, latest part numbers and software-dependent configuration compatibility.

Chapter 12

Parts Replacement

In this chapter

Warnings and important information.	360
Definitions of Left, Rear / Back, Right and Front.	362
Cover and Bumper Parts Replacement.	363
Top Console Parts Replacement.	410
Main Console Parts Replacement.	502
Caster Parts Replacement.	661
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Product Label Parts Replacement.	753

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

12.1 Warnings and important information

12.1.1 Warnings

Table 12-1 Preparations and Preparation Links

Preparations - you must perform the following steps	
 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: • <i>Lockout/tagout procedure on page 50</i>
 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**
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.

 **DANGER**



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).

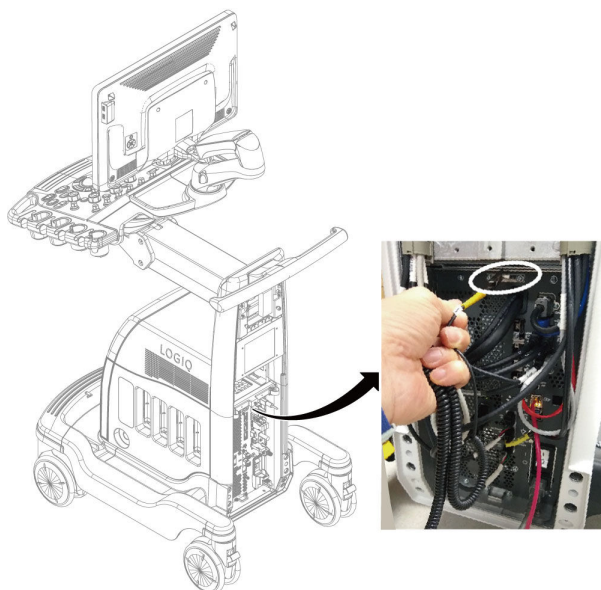
**CAUTION**

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.

12.1.2 ESD receptacles

Figure 12-1 ESD Receptacle



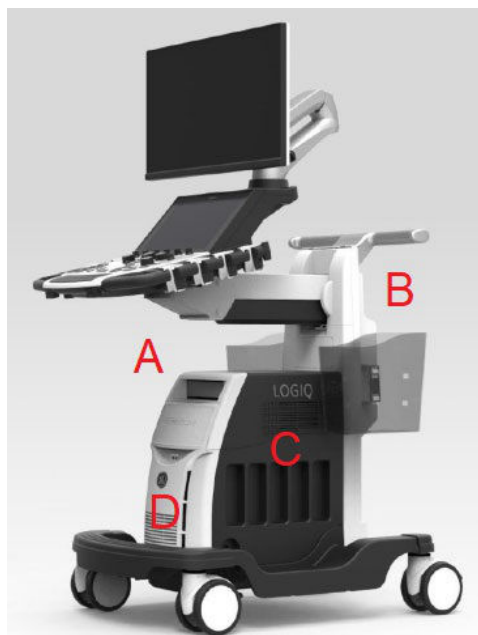
12.1.3 Returning/Shipping Probes and Repair Parts

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 54.

12.2 Definitions of Left, Rear / Back, Right and Front

Figure 12-2 Definitions of Left, Rear/Back, Right and Front on page 362 illustrates what is the Left Side (A), Rear/Back (B), Right Side (C), and Front (D).

Figure 12-2 Definitions of Left, Rear/Back, Right and Front



12.3 Cover and Bumper Parts Replacement

12.3.1 Front Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-2 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Kneel pad



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, perform *Lockout/tagout procedure* on page 50.

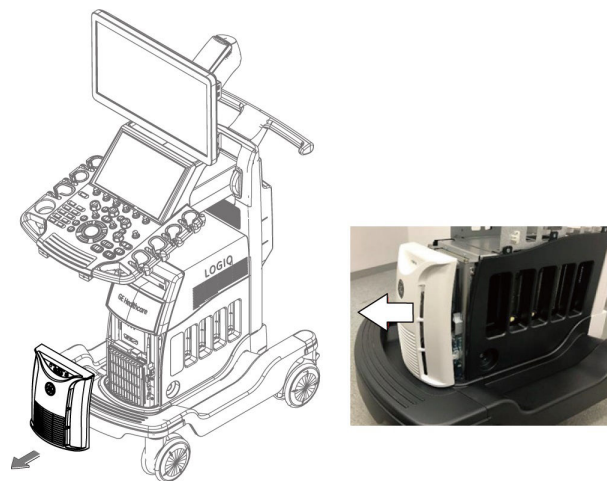
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.1.1 Front Cover - Removal Procedure

Pull the Front Cover Assy to remove it (no tool required).

Figure 12-3 Removing Front Cover



12.3.1.2 Front Cover - Installation Procedure

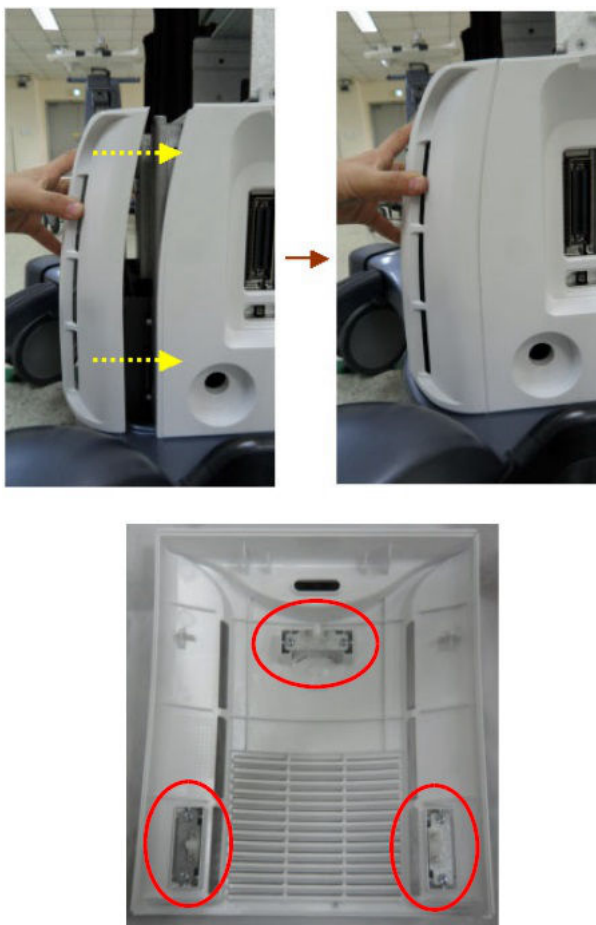
1. Remove the window film.

Figure 12-4 Window Film



2. Align the edges and simply push to make sure all three “latches” are engaged.

Figure 12-5 Installing Front Cover



12.3.1.3 Front Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.1.4 Front Cover - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.1.5 Front Cover - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.2 Mid and High Cabinet Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-3 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Cut resistant gloves Kneel pad



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

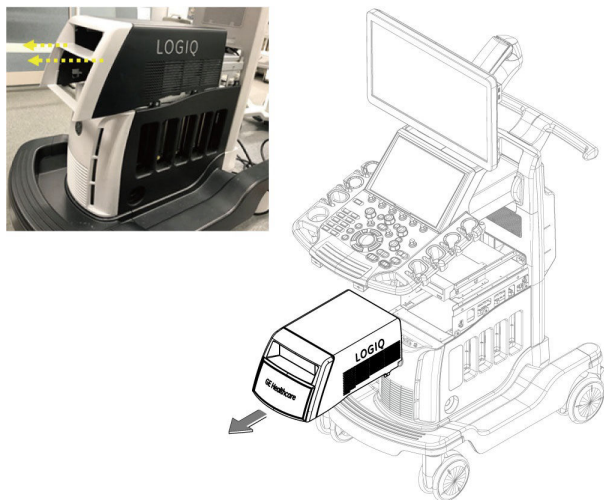
12.3.2.1 Mid and High Cabinet Cover - Removal Procedure

NOTE

Cabinet Cover shapes differ for each configuration, but removal/installation procedure are the same.

Slide out Cabinet Cover toward front of the console.

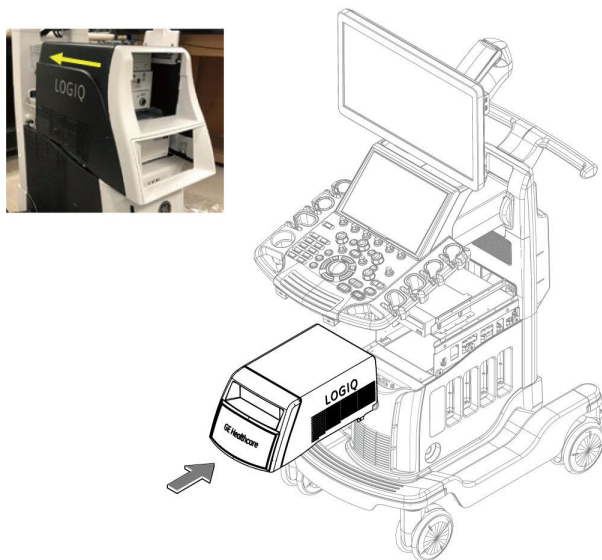
Figure 12-6 Removing Mid or High Cabinet Cover



12.3.2.2 Mid and High Cabinet Cover - Installation Procedure

Slide the Cabinet cover as shown in right figure.

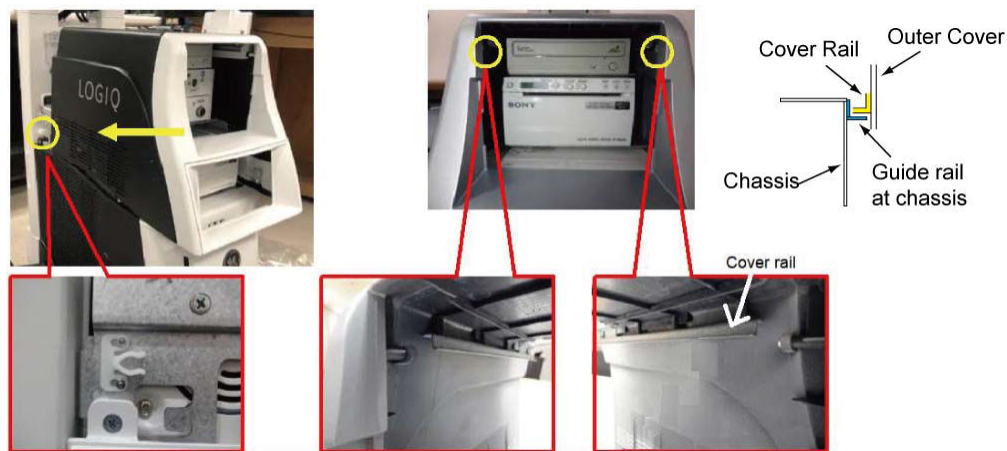
Figure 12-7 Installing Mid or High Cabinet Cover



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.

Figure 12-8 Guide Rail for Cabinet Cover



12.3.2.3 Mid and High Cabinet Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.2.4 Mid and High Cabinet Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.2.5 Mid and High Cabinet Cover - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.3 Low Cabinet Cover replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-4 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	Cut resistant gloves Kneel pad



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, perform *Lockout/tagout procedure* on page 50.

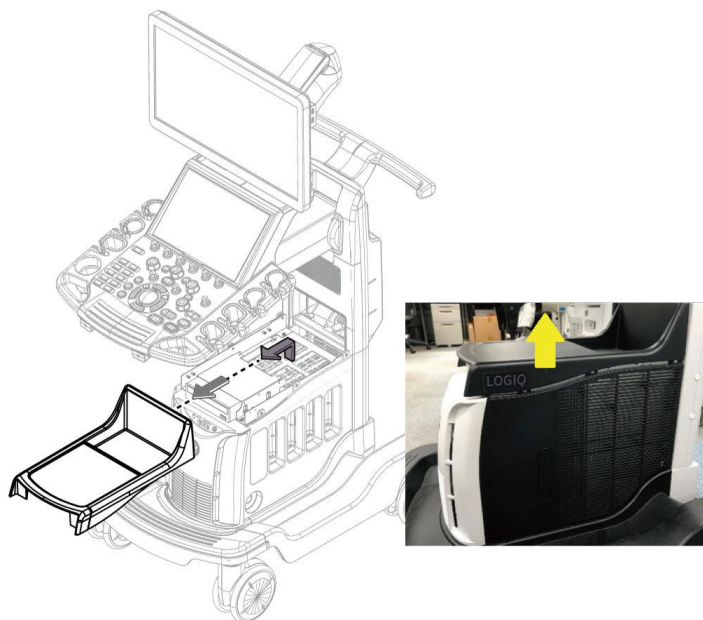
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.3.1 Low Cabinet Cover - Removal Procedure

Lift the top cover upwards.

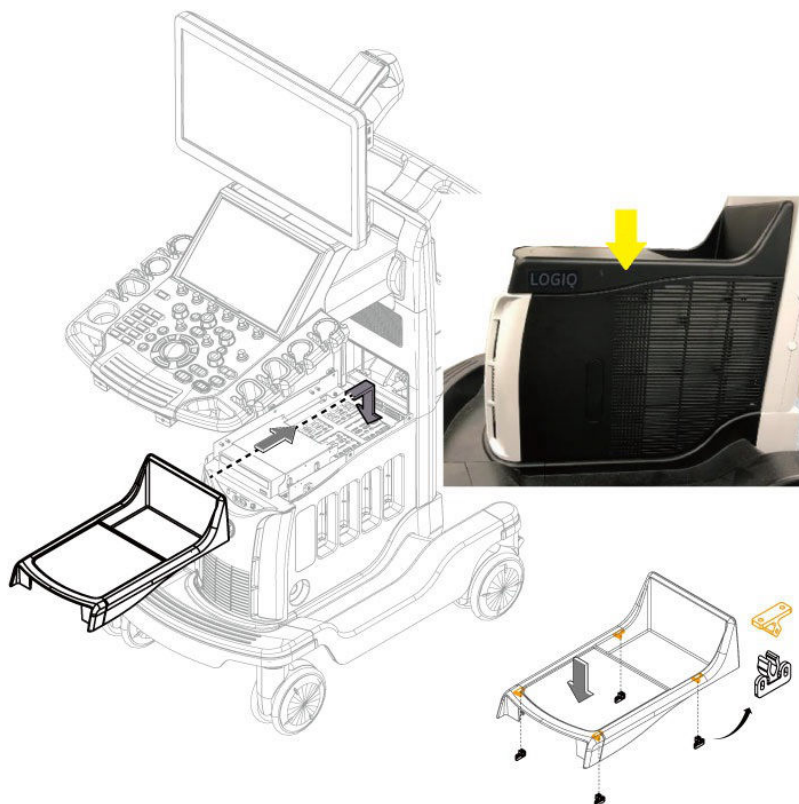
Figure 12-9 Removing top cover



12.3.3.2 Low Cabinet Cover - Installation Procedure

Push the top cover downward.

Figure 12-10 Installing top cover



12.3.3.3 Low Cabinet Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.3.4 Low Cabinet Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.3.5 Low Cabinet Cover - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.4 Side Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-5 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Safety glasses Kneel pad

NOTE

For the VET Console, a VET Label is attached to both sides of the side covers. In this case, order the correct VET Label by referring to Chapter 11, Parts.



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, perform *Lockout/tagout procedure* on page 50.

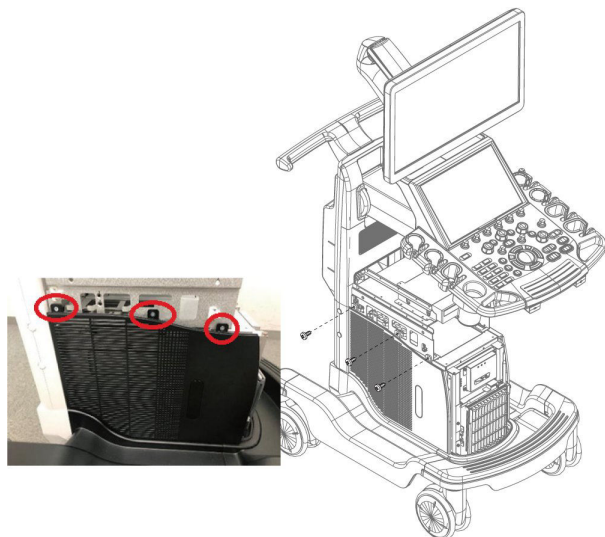
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.4.1 Side Cover - Removal Procedure

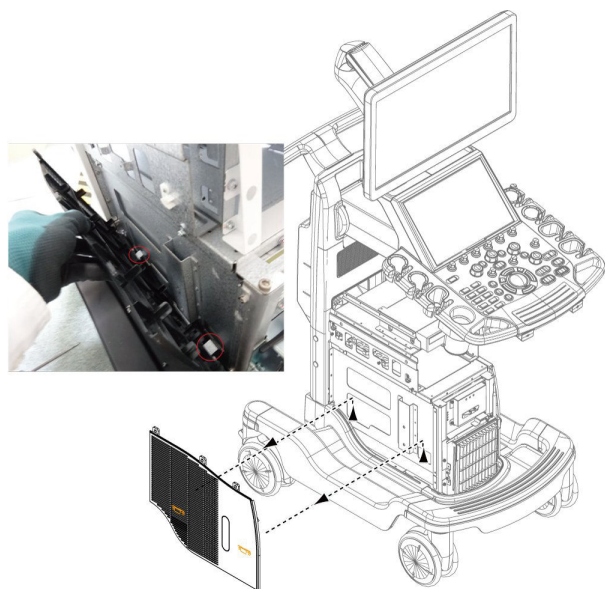
1. Remove the Cabinet Cover and the front cover.
2. Unscrew 3 screws to remove the Side Cover L Assy.

Figure 12-11 Unscrewing 3 screws



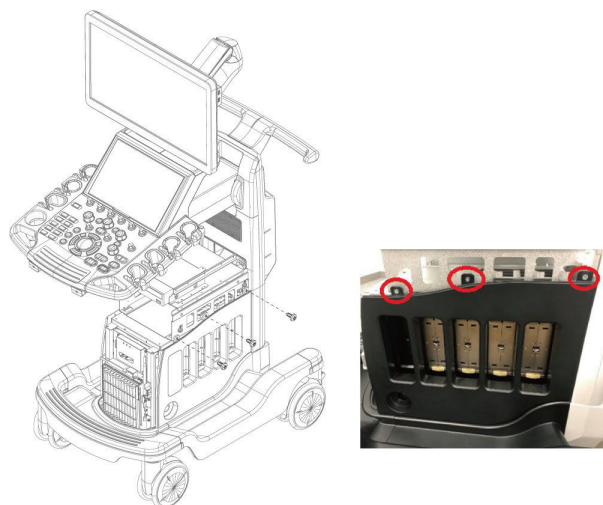
3. Disengage the hook from the frame.

Figure 12-12 Disengaging Side Cover L



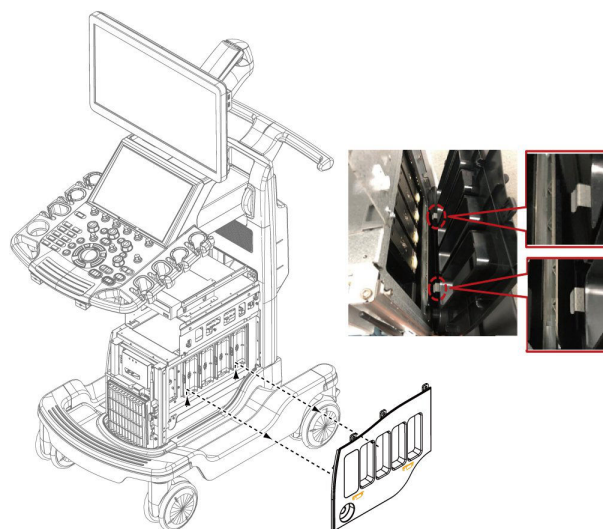
4. Unscrew 3 screws to remove the Side Cover R Assy.

Figure 12-13 Unscrewing 3 screws



5. Disengage the hook from the frame.

Figure 12-14 Disengaging Side Cover R

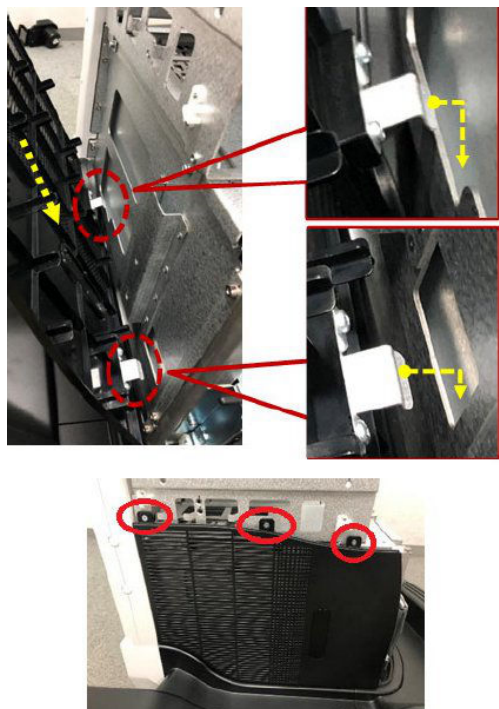


6. Engage the hook and fasten 3 screws to attach the Side Cover L Assy.

12.3.4.2 Side Cover - Installation Procedure

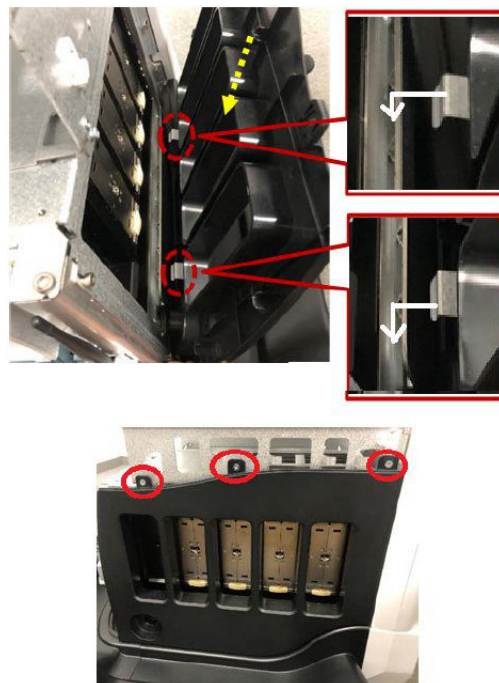
1. Engage the hook and fasten 3 screws with proper torque (1 N·m) to attach the Side Cover L Assy.

Figure 12-15 Engaging Side Cover L



2. Engage the hook and fasten 3 screws with proper torque (1 N·m) to attach the Side Cover R Assy.

Figure 12-16 Engaging Side Cover R



3. Install the front cover and Cabinet cover.

4. If the previous side covers has VET label, perform the following steps to attach the labels on the new cover.
 - a. Clean and degrease the surface.
 - b. Attach the VET Label that was ordered separately.

Figure 12-17 Attaching VET label

High Cabinet



Mid Cabinet



Low Cabinet



12.3.4.3 Side Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.4.4 Side Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.4.5 Side Cover - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.5 Rear Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-6 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips Screw Driver #2	Safety glasses Kneel pad

NOTE

The Multi-Caution Label for the Global Standard Console is attached to the Rear Cover FRU. If the replacement cover has a Multi-Caution Label for the VET or China Console, order the correct FRU by referring to Chapter 11, Parts.



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, perform *Lockout/tagout procedure* on page 50.

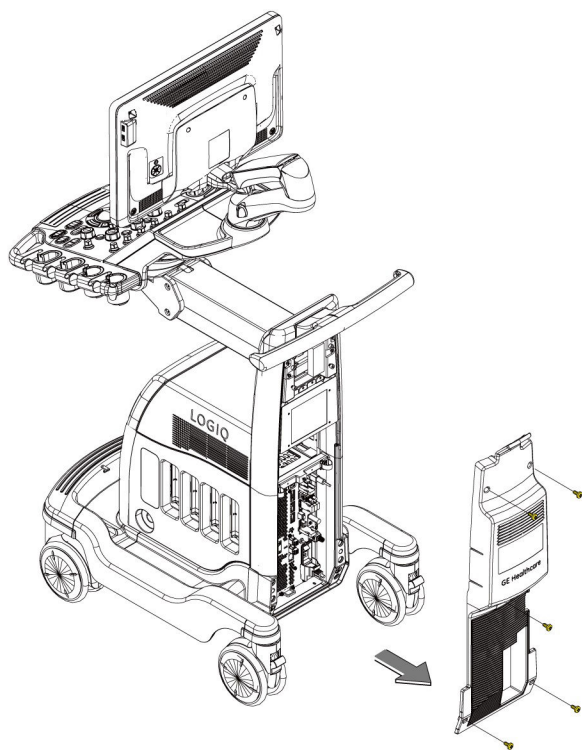
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.5.1 Rear Cover - Removal Procedure

Unscrew 5 screws to remove the rear cover.

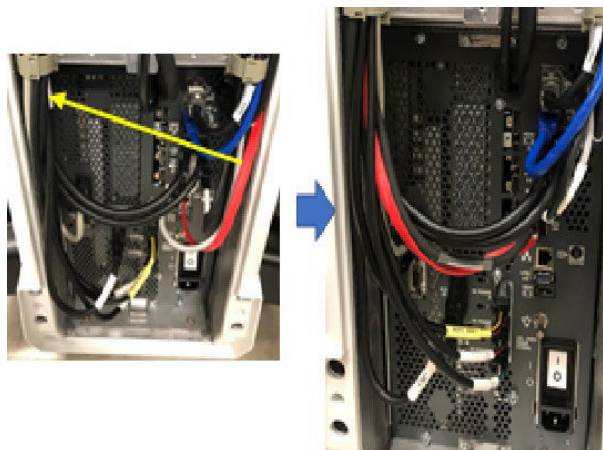
Figure 12-18 Removing Rear Cover



12.3.5.2 Rear Cover - Installation Procedure

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.

Figure 12-19 ODD SATA SHIELD CABLE CHECK



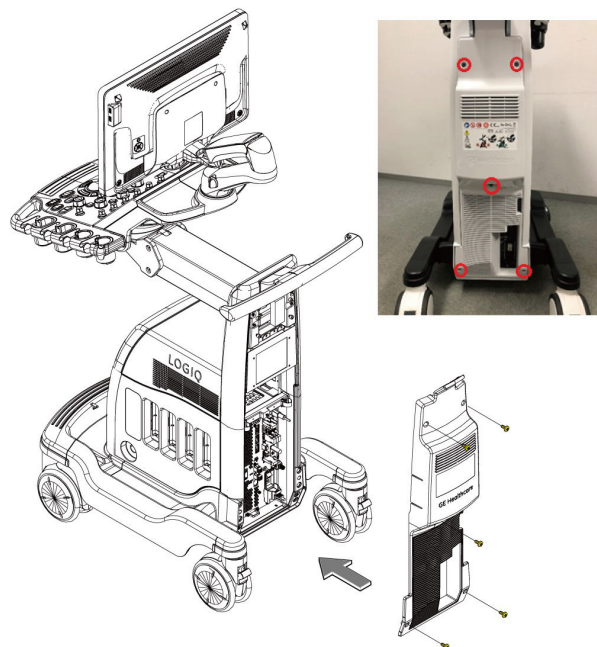
2. Check if there is no internal cable in the I/O Rear Panel area or not. If there is any cable in the area, pull up to the clamp position so that it does not interfere with rear cover at the area.

Figure 12-20 Internal cables check



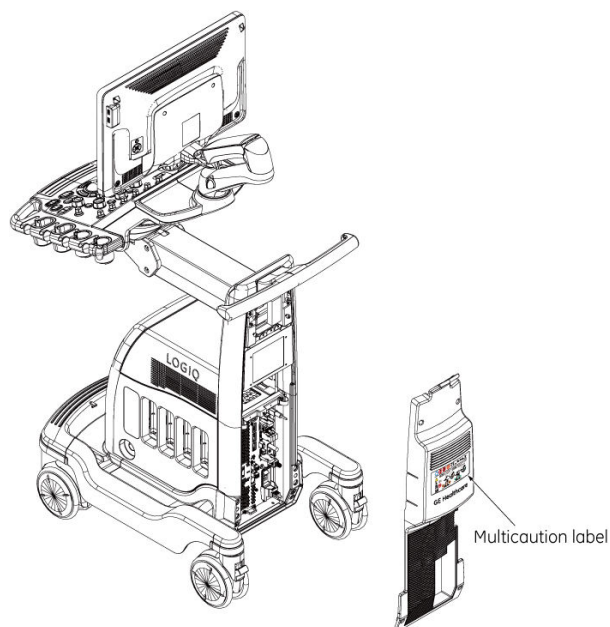
3. Install the cover with 5 screws.

Figure 12-21 Installing Rear Cover



4. If the previous cover has a Multi-Caution Label for the VET or China Console, perform the following steps to replace the label on the new cover.
 - a. Peel off the Multi-Caution Label from the new cover.
 - b. Clean and degrease the surface. Then attach the Multi-Caution Label that was ordered separately.

Figure 12-22 Attaching multi caution label



12.3.5.3 Rear Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.5.4 Rear Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Verify that there is no internal cables in the I/O rear panel area.
3. Connect cables and Probes if removed earlier.
4. Power up the system to verify that it operates as intended.

12.3.5.5 Rear Cover - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

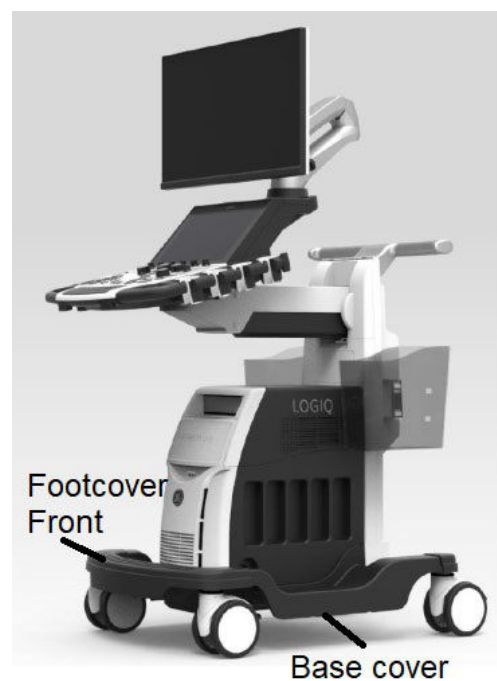
12.3.6 Base Cover & Foot Cover replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-7 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips Screw Driver	Cut resistant gloves Kneel pad

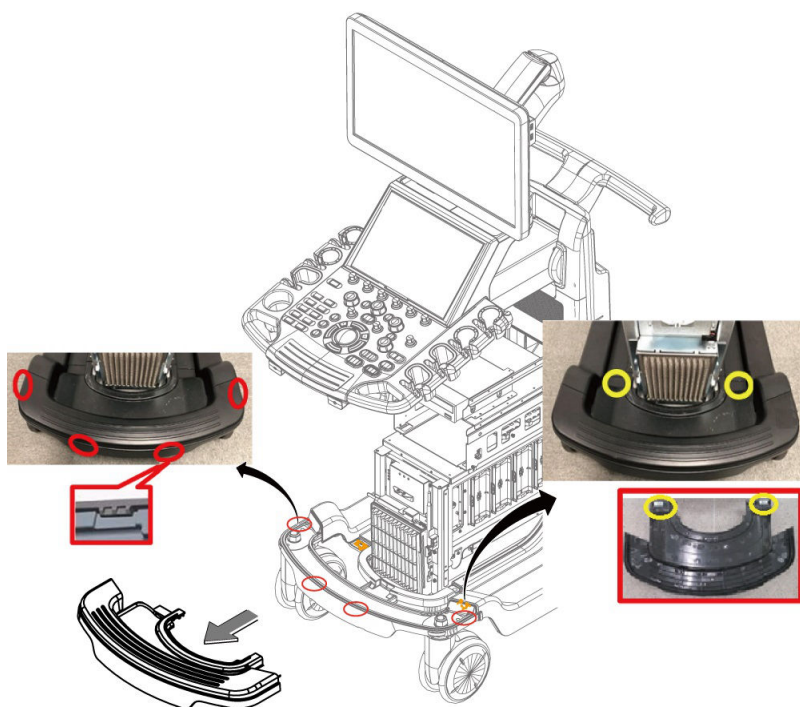
Figure 12-23 Base Cover and Foot Cover



12.3.6.1 Base Cover & Foot Cover - Removal Procedure

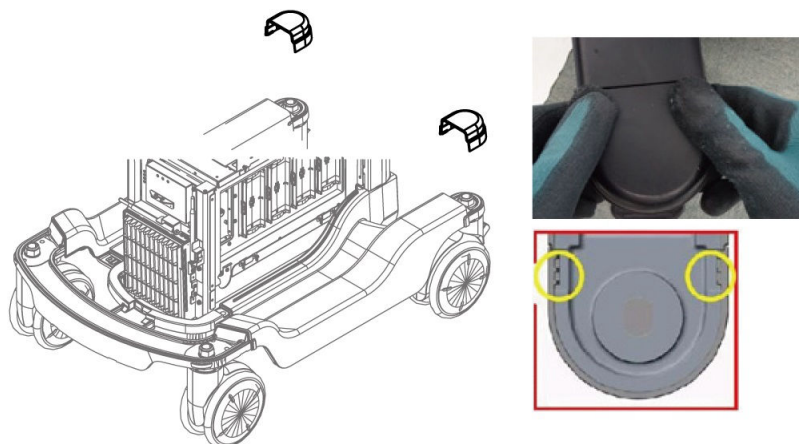
1. Remove the covers.
 - a. Remove the cabinet cover.
 - b. Remove the front cover.
 - c. Remove the side cabinet (If installed).
2. Lock the casters.
3. Remove Base Cover Front.
 - a. Pulling edge of each side to unhook the base cover front.
 - b. There are 2 attached latches under the base cover front. Pulling out the base cover front upward to disconnect the latch from the base.

Figure 12-24 Base Cover Front



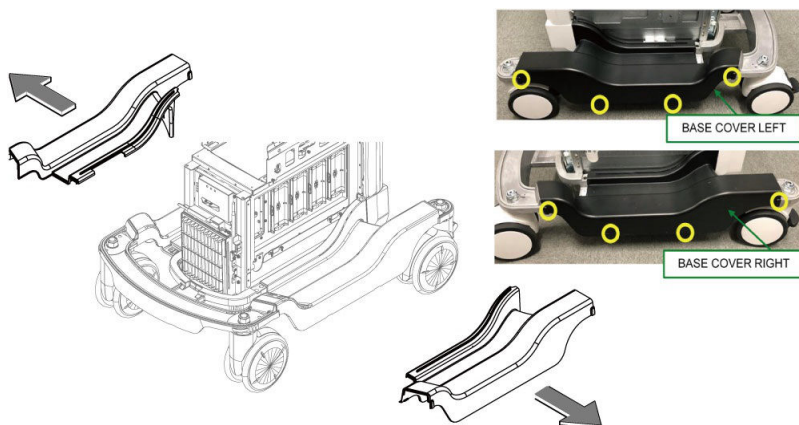
4. Remove Foot Cover Front. Pulling side edge of the foot cover front to unhook and then move upward.

Figure 12-25 Foot Cover Front



5. Remove Base Cover Left / Right.

Figure 12-26 Base Cover Left / Right



12.3.6.2 Base Cover & Foot Cover - Installation Procedure

Install components in reverse order of removal.

12.3.6.3 Base Cover & Foot Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.6.4 Base Cover & Foot Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.6.5 Base Cover & Foot Cover - Functional Check

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.7 Main Monitor Arm Assembly Covers Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-8 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



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, perform *Lockout/tagout procedure* on page 50.

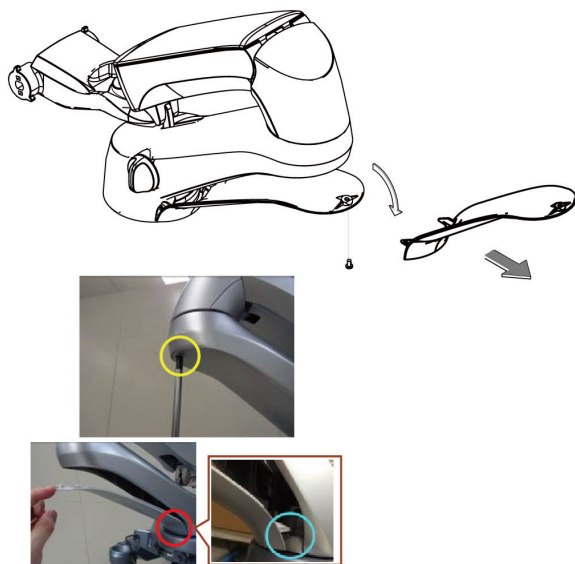
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.7.1 Main Monitor Arm Assembly Covers - Removal Procedure

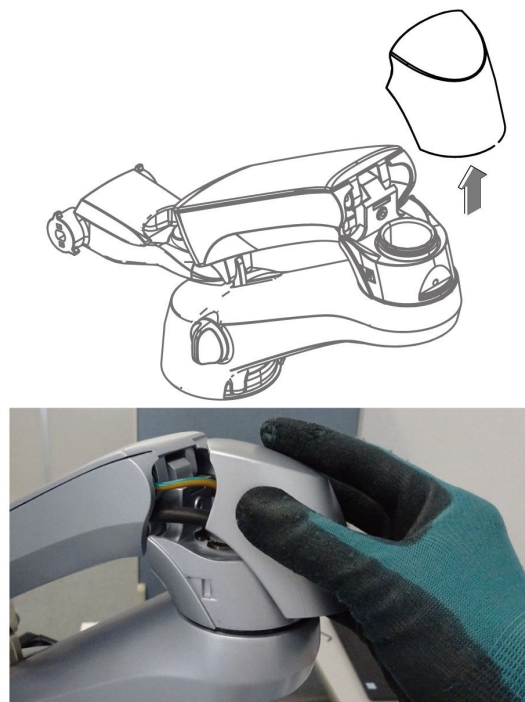
1. Unscrew 1 screw to remove 1st cover Polaris.

Figure 12-27 Removing 1st cover Polaris



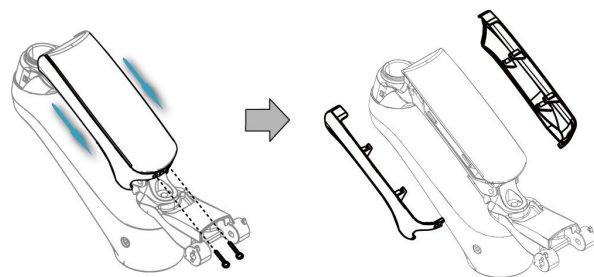
2. Remove 2nd axis cover.

Figure 12-28 Removing 2nd axis cover



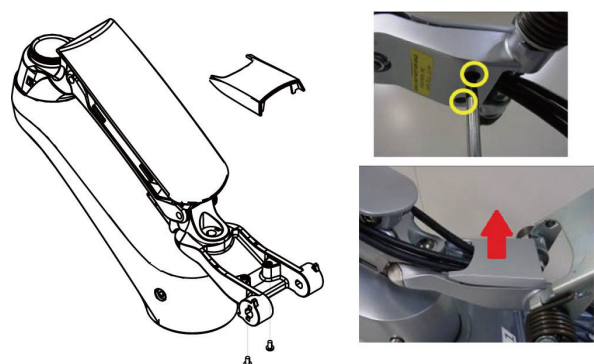
3. Unscrew 2 screws (indicate yellow circle) to remove 2nd Arm Cover L/R.

Figure 12-29 Removing 2nd Arm Cover L/R



4. Unscrew 2 screws to remove 3rd Arm Cover.

Figure 12-30 Removing 3rd Arm Cover



12.3.7.2 Main Monitor Arm Assembly Covers - Installation

Install components in reverse order of removal.

12.3.7.3 Main Monitor Arm Assembly Covers - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.7.4 Main Monitor Arm Assembly Covers - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.7.5 Main Monitor Arm Assembly Covers - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.8 OPIO Bottom Base Back Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-9 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips Screw Driver	Safety glasses



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, perform *Lockout/tagout procedure* on page 50.

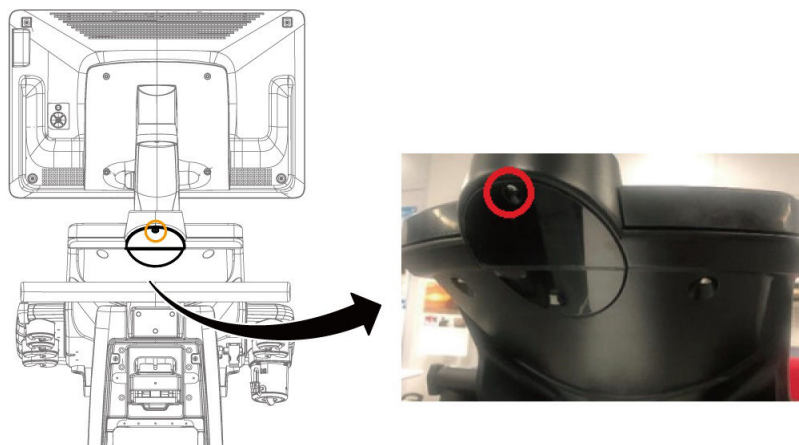
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.8.1 OPIO Bottom Base Back Cover - Removal procedure

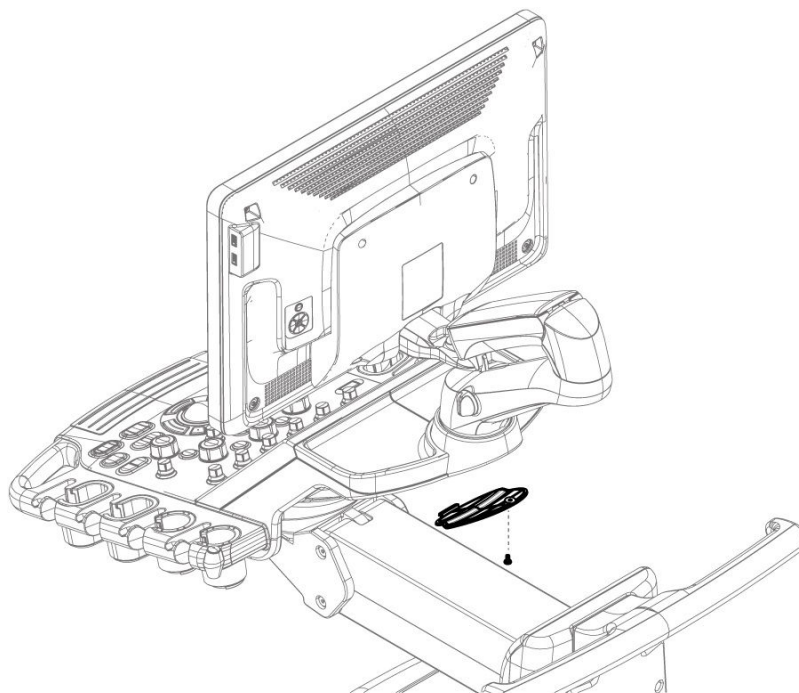
1. Unscrew 1 screw to remove the OPIO bottom base back cover.

Figure 12-31 Removing a screw



2. Remove the OPIO bottom base back cover.

Figure 12-32 Removing OPIO bottom base back cover



12.3.8.2 OPIO Bottom Base Back Cover - Installation procedure

Install components in reverse order of removal.

12.3.8.3 OPIO Bottom Base Back Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.8.4 OPIO Bottom Base Back Cover -Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.8.5 OPIO Bottom Base Back Cover -Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.9 Side Cabinet Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-10 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



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, perform *Lockout/tagout procedure* on page 50.

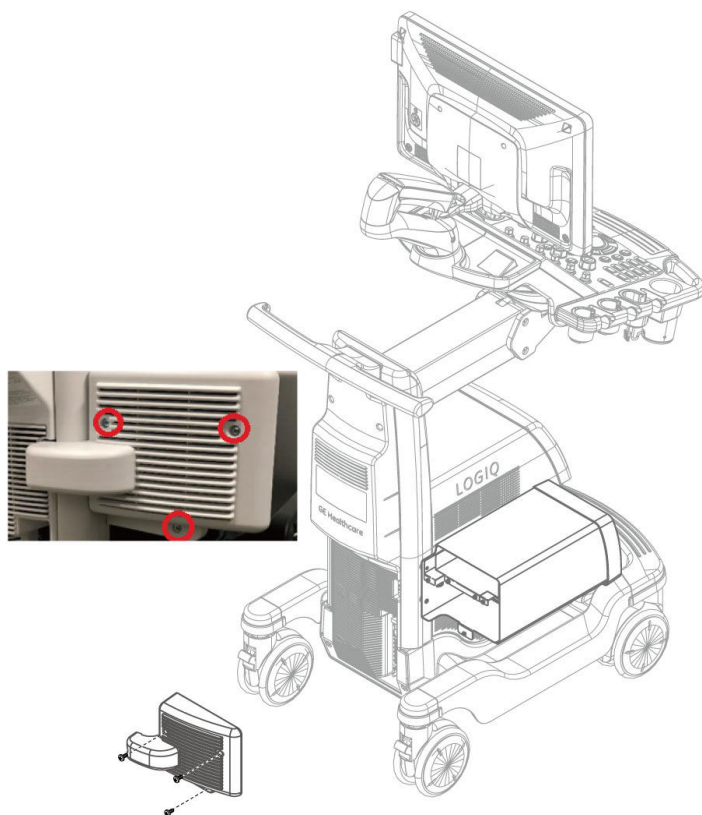
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.9.1 Side Cabinet - Removal Procedure

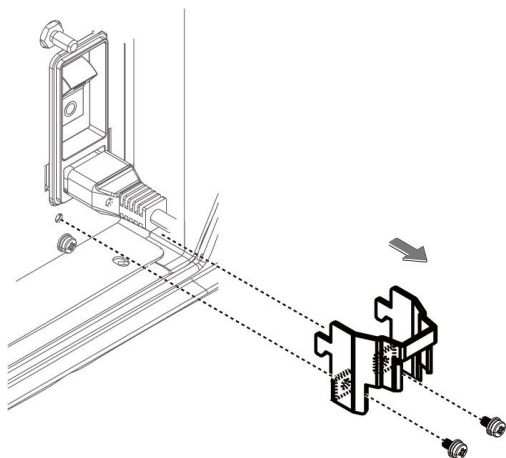
1. Unscrew 3 screws to remove the SIDE CABINET REAR COVER.

Figure 12-33 Removing Side Cabinet Rear Cover



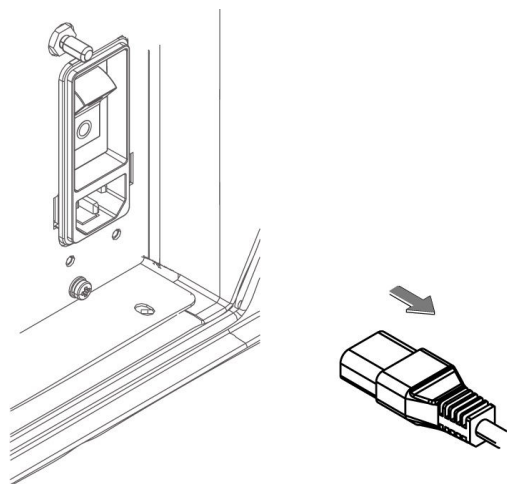
2. Remove POWER CORD FIX BRACKET.

Figure 12-34 Removing POWER CORD FIX BRACKET



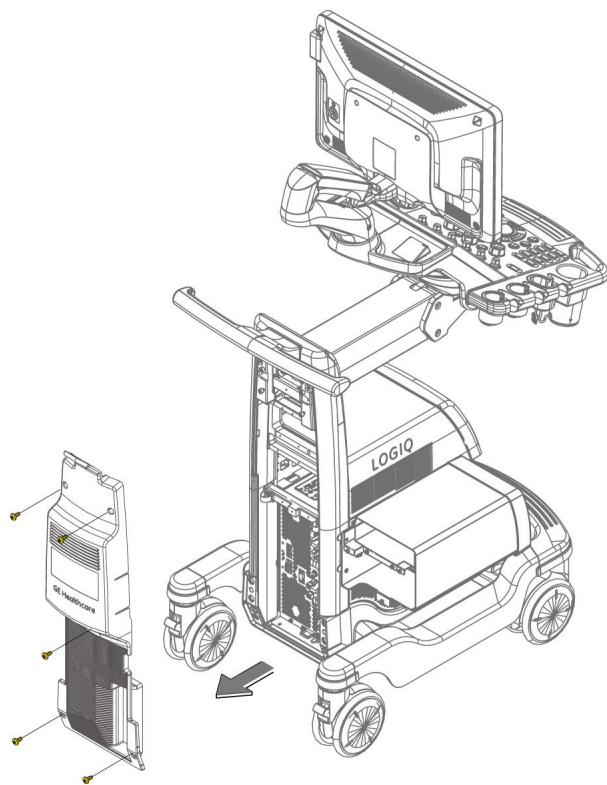
3. Disconnect Main power cable.

Figure 12-35 Disconnecting main power cable



4. Unscrew 5 screws to remove Rear cover.

Figure 12-36 Removing Rear Cover

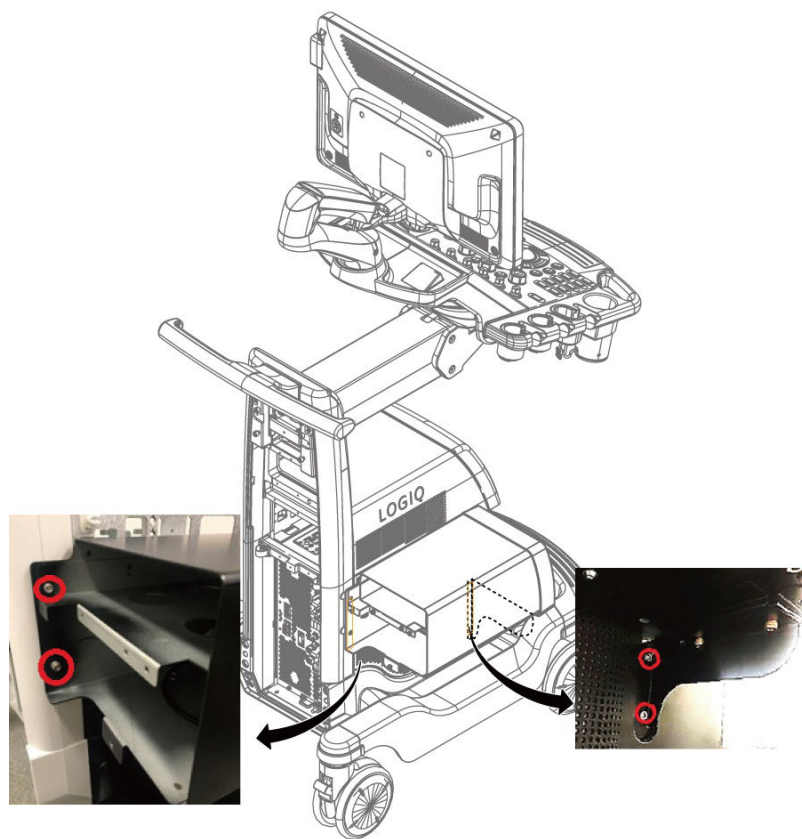


5. Remove OPTIONAL PERIPHERAL DEVICES (ECG / Vnav / BW Printer) from the side cabinet.

- BW Printer Replacement
- VSIO (ECG) Option Replacement
- V-Nav Option Replacement

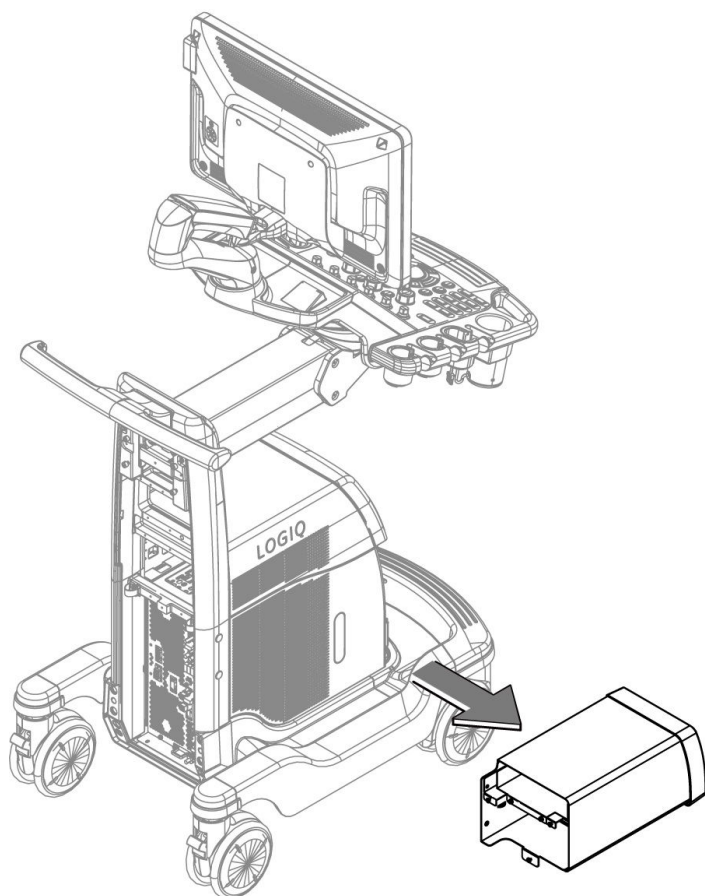
6. Unscrew 4 screws from the Side Cabinet.

Figure 12-37 Removing 4 screws



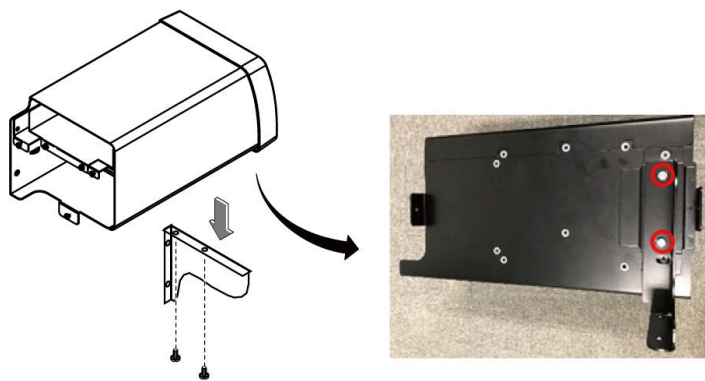
7. Remove the Side Cabinet.

Figure 12-38 Removing Side Cabinet



8. Unscrew 2 screws to remove the SUPPORT ARM OPTION TRAY from Side Cabinet.

Figure 12-39 SUPPORT ARM OPTION TRAY



12.3.9.2 Side Cabinet - Installation procedure

Install components in reverse order of removal.

12.3.9.3 Side Cabinet - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.9.4 Side Cabinet - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.9.5 Side Cabinet - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.3.10 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-11 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

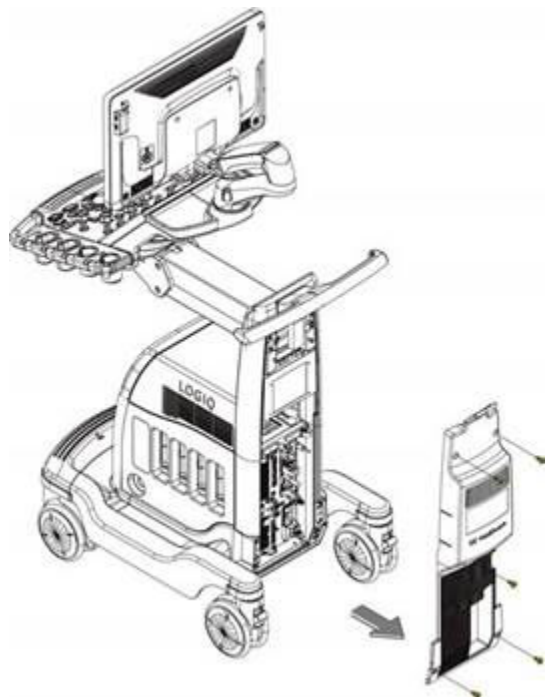
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.3.10.1 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF - Removal procedure

Removal of BACKBONE REAR COVER

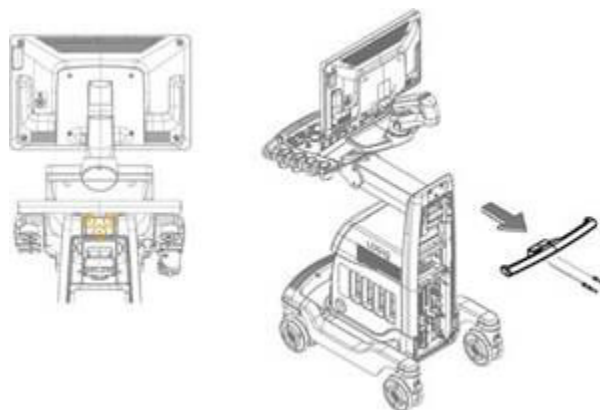
1. Unscrew 5 screws to remove the rear cover.

Figure 12-40 Removing rear cover



2. Unscrew 3 screws to remove the HANDLE.

Figure 12-41 Removing HANDLE

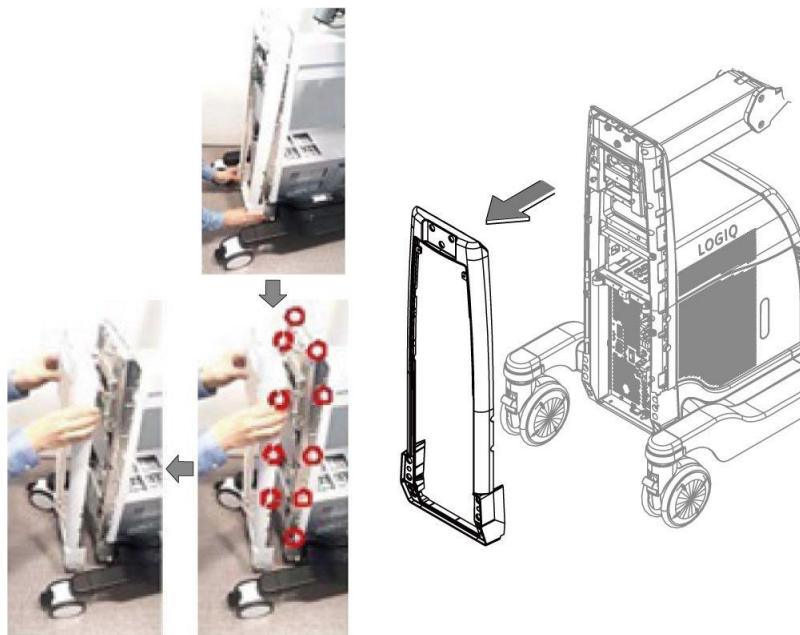


3. Unhook and pull out the BACKBONE REAR COVER. There are 10 points of hook around the BACKBONE REAR COVER.

NOTE

Unhook from bottom to top.

Figure 12-42 Removing BACKBONE REAR COVER

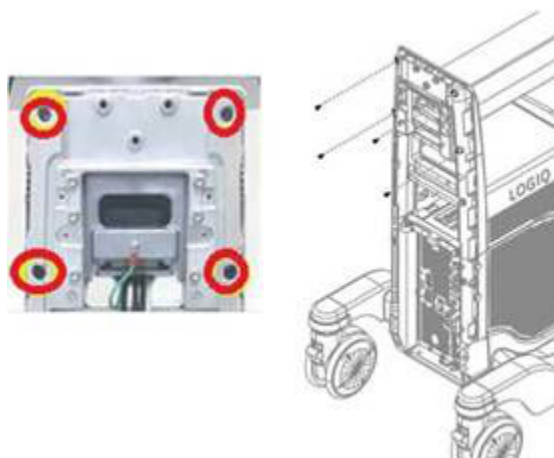


Removal of BACKBONE FRONT TOP COVER

Set the ELEVATION ARM ASSY in horizontal position.

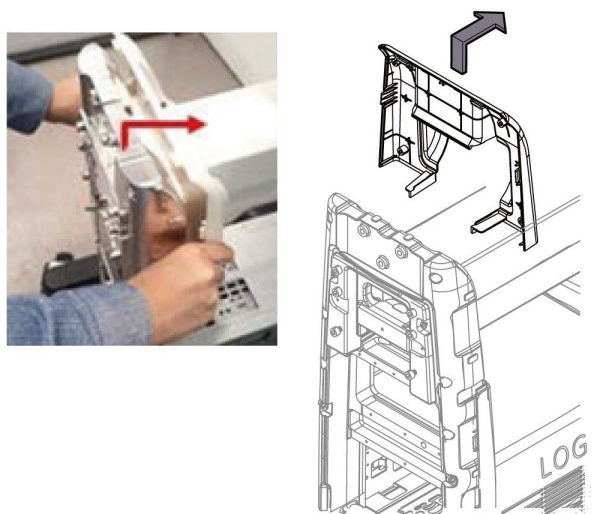
1. Remove the BACKBONE REAR COVER.
2. Unscrew 4 screws to disassemble the BACKBONE FRONT TOP COVER from the BACKBONE.

Figure 12-43 Unscrewing 4 screws for BACKBONE FRONT TOP COVER



3. Slightly lift the BACKBONE FRONT TOP COVER to disassemble.

Figure 12-44 Disassemble BACKBONE FRONT TOP COVER



Removal of BACKBONE FRONT BOTTOM Cover

Set the ELEVATION ARM ASSY in horizontal position.

1. Remove the BACKBONE REAR COVER.
2. Remove the Cabinet Cover(High / Mid / Low), the Front Cover, and Side Covers. Refer to the following links.
 - *Mid and High Cabinet Cover Replacement* on page 367 or *Low Cabinet Cover replacement* on page 371
 - *Front Cover Replacement* on page 363
 - *Side Cover Replacement* on page 375
3. Disconnect 2 cables from DVD.

NOTE

If other Option is attached, unplug the cable.

Figure 12-45 Disconnecting DVD cables

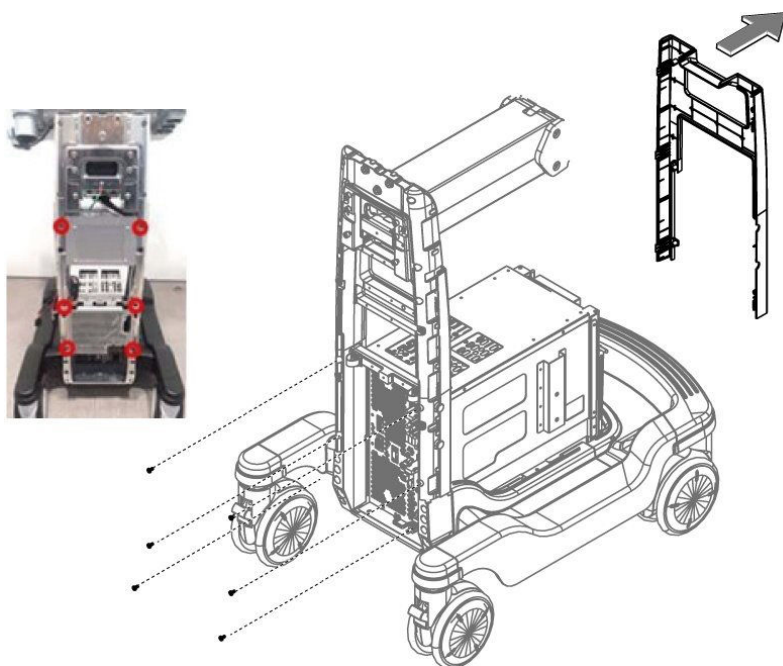


4. Unscrew 4 screws to remove the HIGH or MID FRAME POLARIS.

Figure 12-46 Removing the HIGH or MID FRAME POLARIS



5. Unscrew 6 screws and then pull out the BACKBONE FRONT BOTTOM Cover.



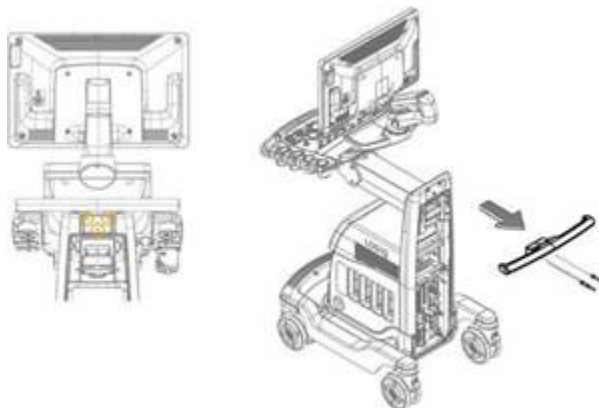
12.3.10.2 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF - Installation Procedure

Install components in reverse order of removal.

**CAUTION**

The three screws shown in illustration below are holding handle for the console.

Apply Loctite243 on the threads and tighten the screws by 150Kgf.cm with proper torque wrench.



12.3.10.3 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.3.10.4 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.3.10.5 BACKBONE Rear Cover LCF/Front Top LCF /Front Bottom LCF - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4 Top Console Parts Replacement

12.4.1 Main Monitor and Arm Parts Replacement

12.4.1.1 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-12 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


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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.1.1.1 Main monitor - High Definition Ultrasound (HDU) assembly - Removal procedure

**DANGER**

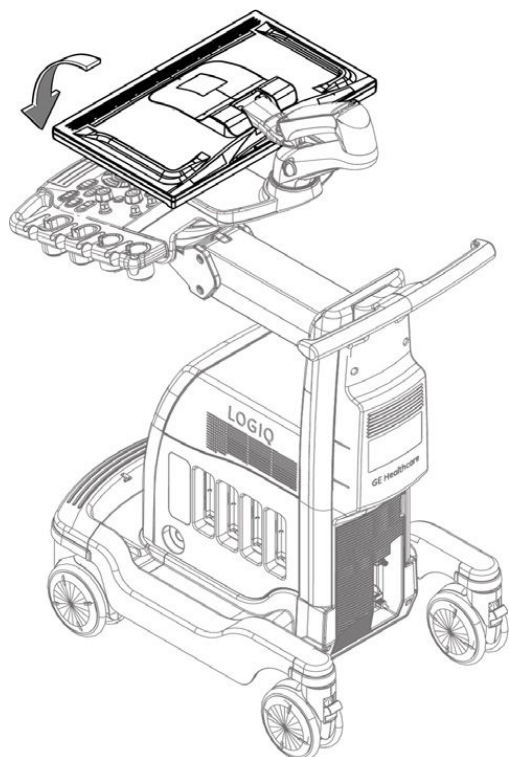
WHEN REMOVING THE MONITOR FROM THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.

Figure 12-47 MONITOR ARM ASSEMBLY IN THE LOCKED POSITION



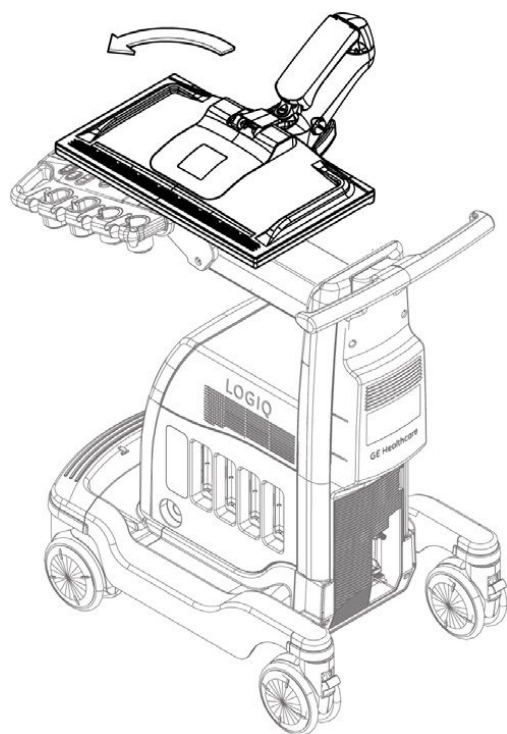
1. Make sure the user interface (top console) has been moved to its lower position.
2. Lock the brakes.
3. Lower the monitor to a flat (horizontal) position.

Figure 12-48 Lowering the monitor



4. Rotate the monitor arm assembly so that it is facing the left or right side of the console to allow easier access.

Figure 12-49 Rotating monitor arm



5. Lock the monitor arm assembly.

Figure 12-50 Locking the monitor arm



6. Using a flathead screwdriver, carefully pry up the monitor cable cover from the bottom.

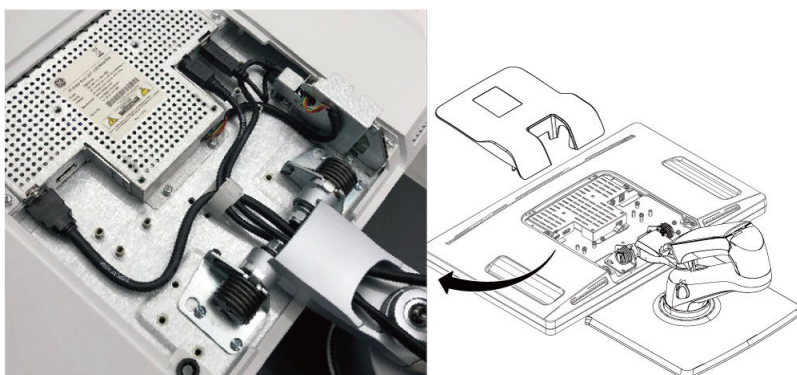
NOTE

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. Remove the monitor cable cover.

Figure 12-51 Prying up the monitor cable cover



Figure 12-52 Removing the monitor cable cover



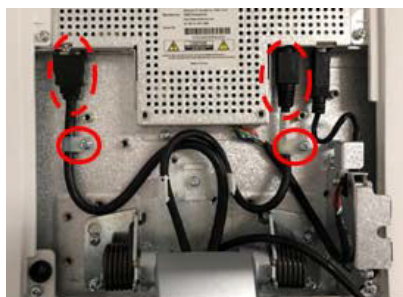
7. Disconnect the HDMI, USB and power cables from the monitor.

NOTE

Re-use the cable clamps on new HDU monitor.

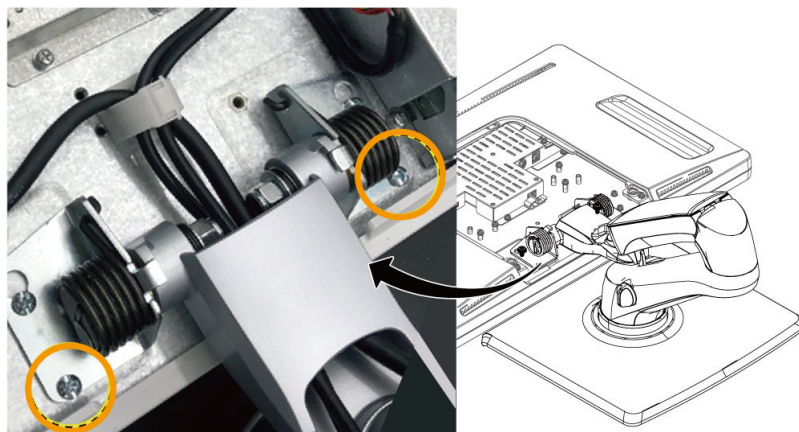
Figure 12-53 Cable connectors





8. Remove the two lower Phillips screws.

Figure 12-54 Monitor mounting screws and holes

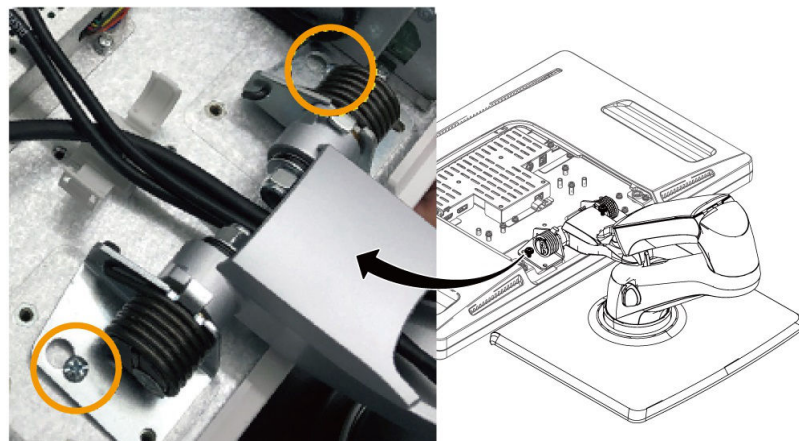


9. Loosen the two upper Phillips screws.

NOTE

The monitor is supported by these two upper screws.

Figure 12-55 Loosen the two upper Phillips screws



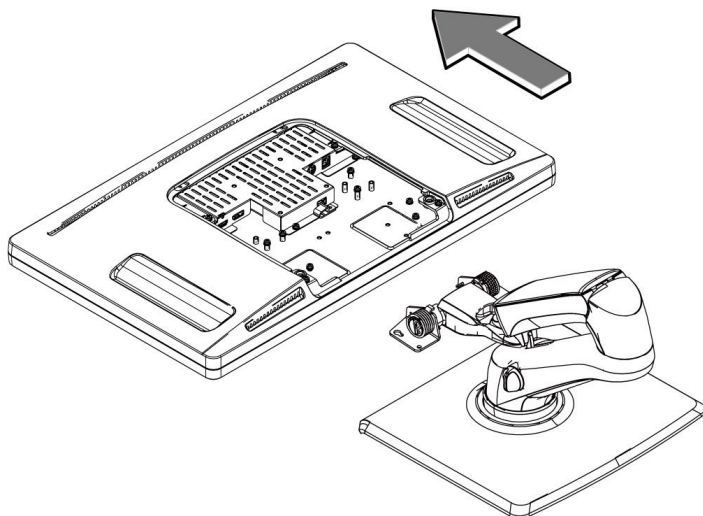
WARNING

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.

10. Open the plastic clamp that holds the cables in place.

11. Slide the monitor off of the arm assembly and remove the monitor.

Figure 12-56 Removing the monitor.



12. Remove the upper Phillips screws to re-install into the replacement monitor.

12.4.1.1.2 Main monitor - High Definition Ultrasound (HDU) assembly - Installation procedure

NOTE

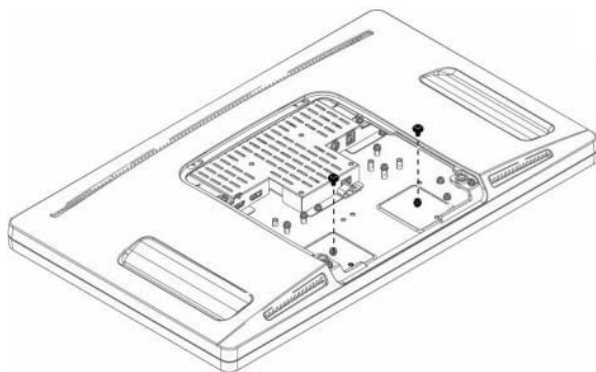
WHEN INSTALLING THE MONITOR TO THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.

Figure 12-57 Locking the monitor arm



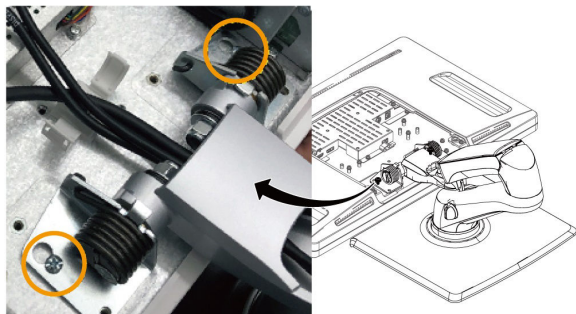
1. Install the upper two Phillips screws into the replacement monitor leaving enough clearance to slide the monitor back onto the arm.

Figure 12-58 Installing two screws



2. With the monitor flat, slide the monitor onto the arm assembly using the two upper Phillips screws to support the monitor.

Figure 12-59 Sliding monitor to two upper Phillips screws

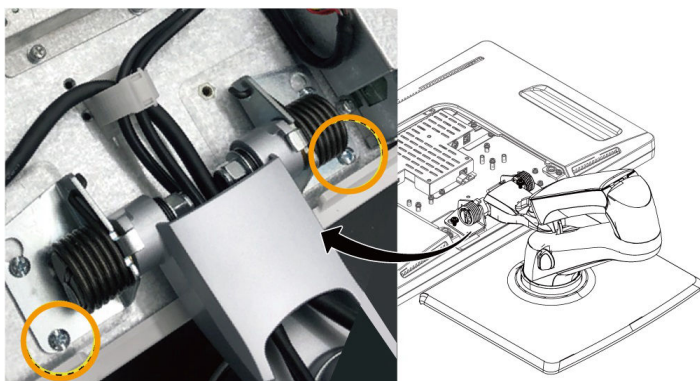


3. Support the lower portion of the monitor and install the two lower Phillips screws.

NOTE

Do not completely tighten the lower Phillips screws. You will level the monitor later in this procedure.

Figure 12-60 Monitor mounting screws and holes



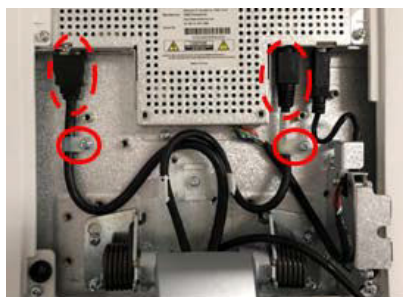
4. Re-connect the HDMI, USB and power cables to the monitor.

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.

Figure 12-61 Cable connectors





5. Close the plastic clamp that holds the cables in place.
6. 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:**

- Ultrasound system is on a level surface.
- wheels are in-line.
- monitor arm lock is **LOCKED**.

NOTE

If a level is not available, make sure the monitor is visually as square as possible with the Ultrasound system.

Figure 12-62 Leveling



7. If any adjustment is required, loosen the four mounting screws and make the adjustment. Tighten the four screws after the adjustment.

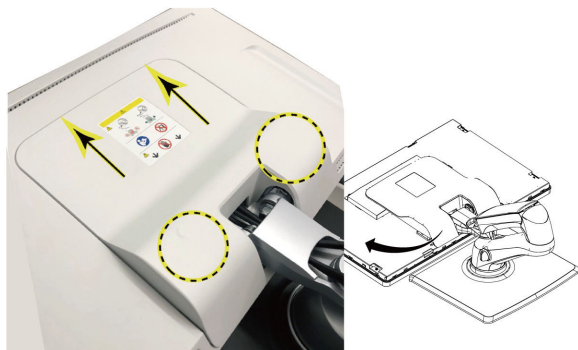
Torque to 160 Ncm (14.2 lbf-in)

NOTE

These torque specs are required to prevent the monitor from falling.

8. Re-install the cable cover by sliding into the slots at the top and then pressing down onto the button of the cable cover.

Figure 12-63 Installing Cable Cover



12.4.1.1.3 Main monitor - High Definition Ultrasound (HDU) assembly - Calibration and adjustments

See *Monitor Adjustments* on page 126 for Main Monitor calibration instructions and/or *Monitor Arm and/or Monitor Range of Motion Adjustment* on page 133.

12.4.1.1.4 Main monitor - High Definition Ultrasound (HDU) assembly - 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.

12.4.1.1.5 Main monitor - High Definition Ultrasound (HDU) assembly - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-13 Main Monitor assembly replacement Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks</i> on page 162	
<i>System CFM and PWD functional checks</i> on page 165	
<i>Grounding continuity test</i> on page 775	
<i>Chassis leakage current test</i> on page 776	
<i>Power shut down</i> on page 113	

12.4.1.2 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-14 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.1.2.1 Main monitor - LCD monitor Assembly - Removal procedure

**WARNING**

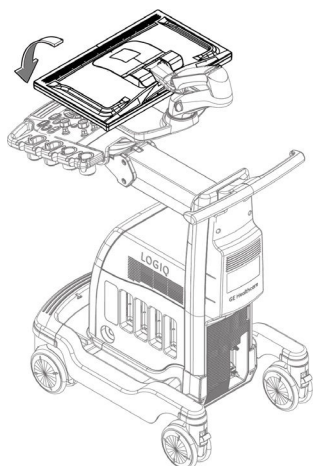
WHEN REMOVING THE MONITOR FROM THE ARM, KEEP THE MONITOR ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.

Figure 12-64 MONITOR ARM ASSEMBLY IN LOCKED POSITION



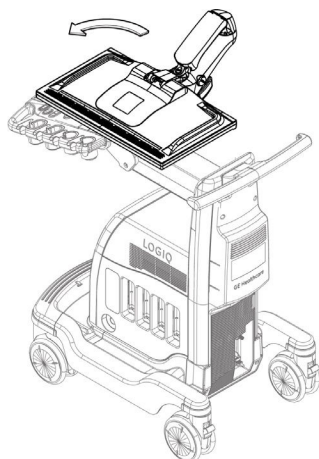
1. Make sure the user interface (top console) has been moved to its lower position.
2. Lock the brakes.
3. Lower the monitor to a flat (horizontal) position.

Figure 12-65 Lower the monitor



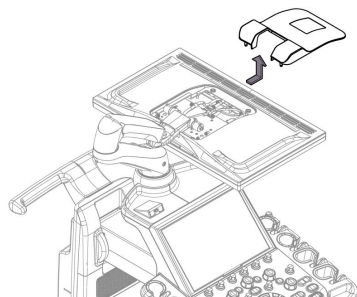
4. Rotate the monitor arm assembly so that it is facing the left or right side of the console to allow easier access.

Figure 12-66 Rotate the monitor arm assembly



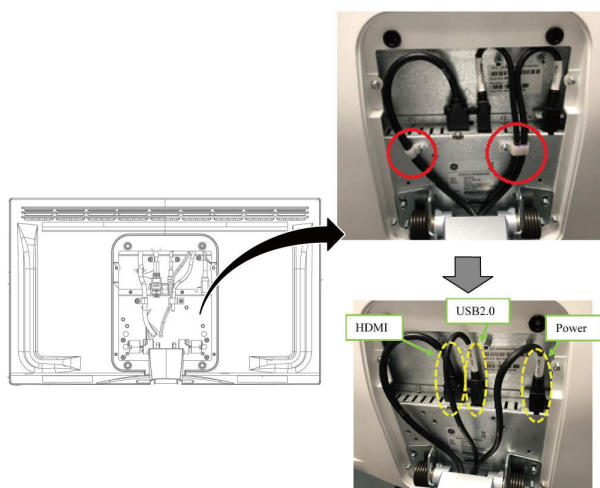
5. Lock the monitor arm assembly.
6. Remove the LCD Rear Cover from the current LCD Monitor.

Figure 12-67 LCD Rear Cover



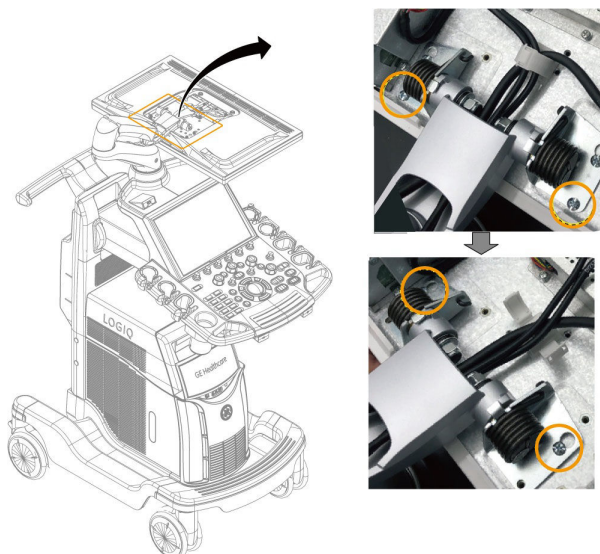
7. Unscrew 2 screws to remove 2 cable clamps.
8. Remove HDMI cable, Power cable and USB cable.

Figure 12-68 Remove cables



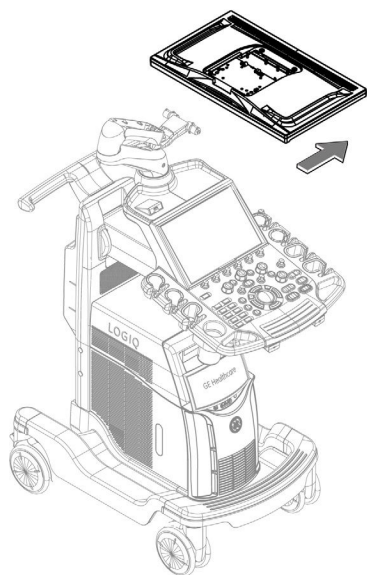
9. Unscrew 2 screws on the bottom side.
10. Loosen 2 screws on the upper side.

Figure 12-69 2 bottom screws



11. Remove the LCD monitor from the monitor arm bracket.

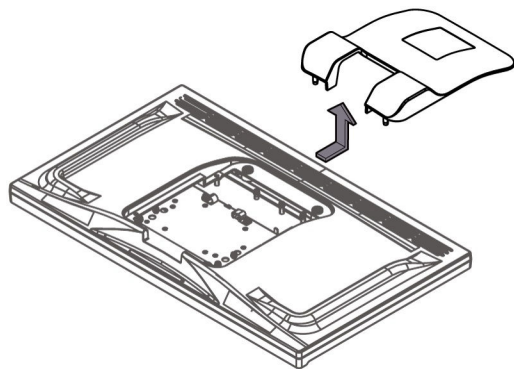
Figure 12-70 Removing the LCD



12.4.1.2.2 Main monitor - LCD monitor Assembly - Installation procedure

1. Remove the monitor rear cover of the new monitor.

Figure 12-71 Monitor rear cover



2. Install the parts in reverse order of removal.

12.4.1.2.3 Main monitor - LCD monitor Assembly - Calibration and adjustments

See *Monitor Adjustments* on page 126 for Main Monitor calibration instructions and/or *Monitor Arm and/or Monitor Range of Motion Adjustment* on page 133.

12.4.1.2.4 Main monitor - LCD monitor Assembly - 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.

12.4.1.2.5 Main monitor - LCD monitor Assembly - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-15 Main Monitor assembly replacement Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks</i> on page 162	
<i>System CFM and PWD functional checks</i> on page 165	
<i>Grounding continuity test</i> on page 775	
<i>Chassis leakage current test</i> on page 776	
<i>Power shut down</i> on page 113	

12.4.1.3 Main Monitor Arm with Cable Assembly replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-16 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.1.3.1 Main Monitor Arm with Cable Assembly - Removal procedure



WARNING

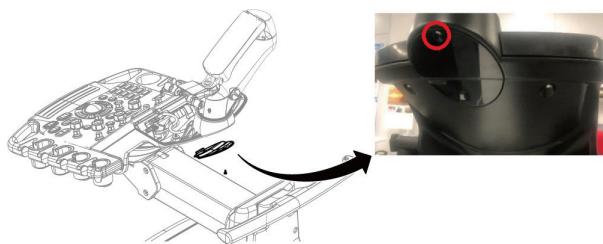
WHEN REMOVING OR INSTALLING THE MONITOR ARM, KEEP THE ARM LOCKED, AS SHOWN TO ENSURE THE MONITOR ARM ASSEMBLY IS IN THE LOCKED POSITION UNTILL THE ARM AND MONITOR ARE INSTALLED. THE SPRINGS TO SUPPORT THE MONITOR CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.

Figure 12-72 MONITOR ARM ASSEMBLY IS IN THE LOCKED POSITION



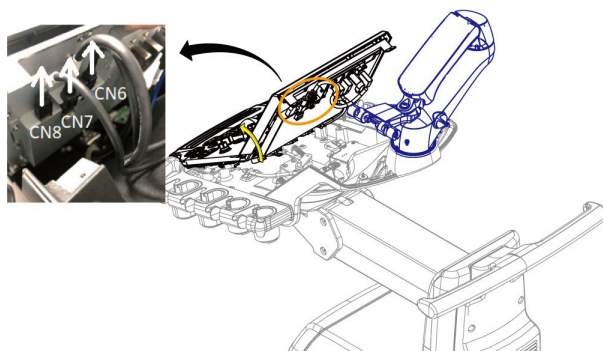
1. Remove the Upper/Lower Operator Panel. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Unscrew 1 screw to remove OPIO bottom base back cover.

Figure 12-73 1 screw for OPIO bottom base back cover.



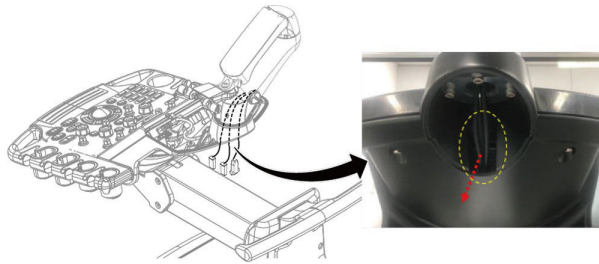
3. Remove HDMI, Power and USB2.0 monitor cable.
 - CN6: MONITOR HDMI CABLE
 - CN7: MONITOR POWER CABLE
 - CN8: MONITOR USB2.0 CABLE

Figure 12-74 Cables on upper OPIO



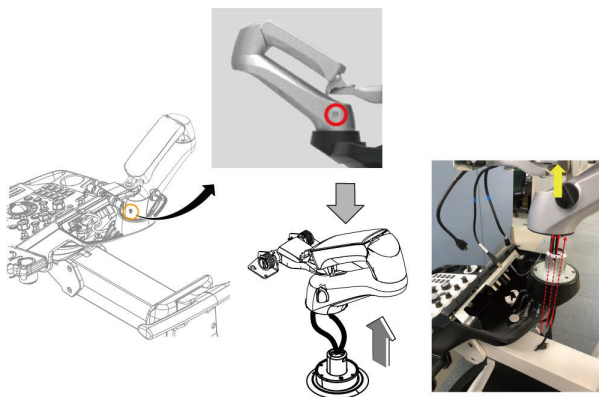
4. Pull out Monitor Cables (HDMI, Power and USB).

Figure 12-75 Pulling out Monitor Cables



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.

Figure 12-76 Pulling out the LCD arm



12.4.1.3.2 Main Monitor Arm with Cable Assembly - Installation procedure

Install components in reverse order of removal.

12.4.1.3.3 Main Monitor Arm with Cable Assembly - Calibration and adjustments

See *Monitor Adjustments* on page 126 for Main Monitor calibration instructions and/or *Monitor Arm and/or Monitor Range of Motion Adjustment* on page 133.

12.4.1.3.4 Main Monitor Arm with Cable Assembly - Verification

See *Monitor Adjustments* on page 126 for Main Monitor calibration instructions and/or *Monitor Arm and/or Monitor Range of Motion Adjustment* on page 133.

12.4.1.3.5 Main Monitor Arm with Cable Assembly - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-17 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.4.2 Operator Panel and Elevation Arm Parts Replacement

12.4.2.1 OPIO Top Cover Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-18 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



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, perform *Lockout/tagout procedure* on page 50.

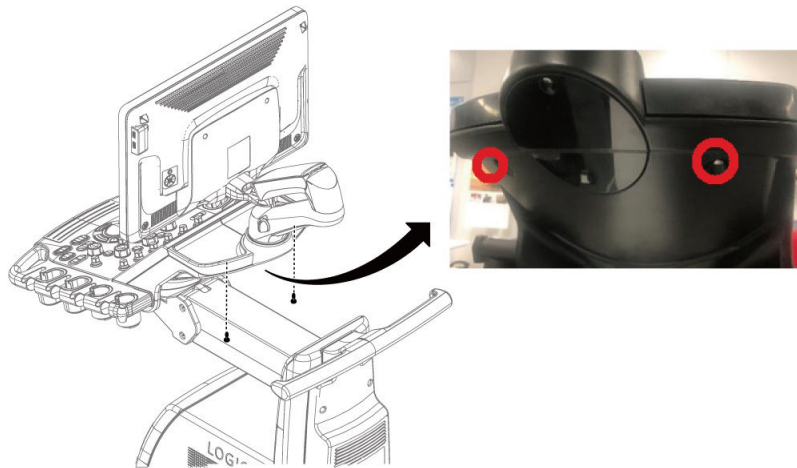
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.1.1 OPIO Top Cover - Removal Procedure

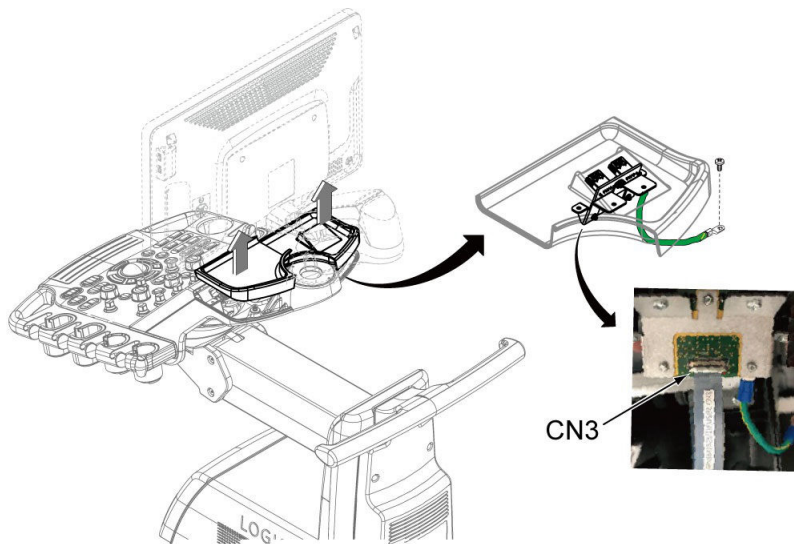
1. Unscrew 2 screws from the rear of the OPIO Base.

Figure 12-77 OPIO Base



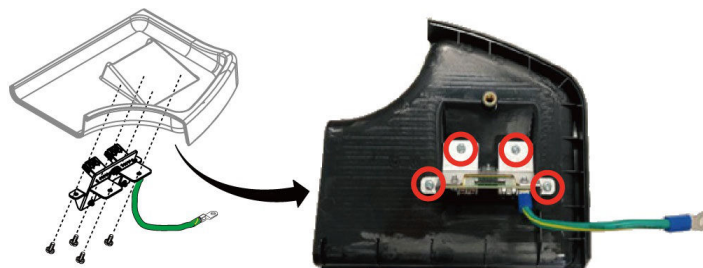
2. Remove the OPIO Top cover Left and Right.
3. Disconnect USB3.0 Cable from CN3 on the EUSB2 PWA and unscrew 1 screw on the bottom of the OPIO base.

Figure 12-78 Removing the OPIO Top cover and disconnecting USB3.0 Cable



4. Unscrew 4 screws to separate Ext USB CON from OPIO TOP COVER Right.

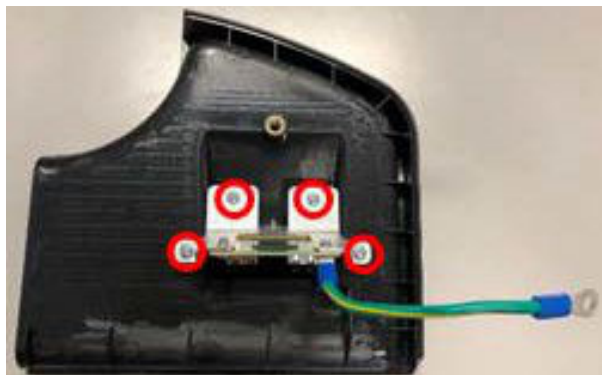
Figure 12-79 Removing Ext USB CON



12.4.2.1.2 OPIO Top Cover - Installation procedure

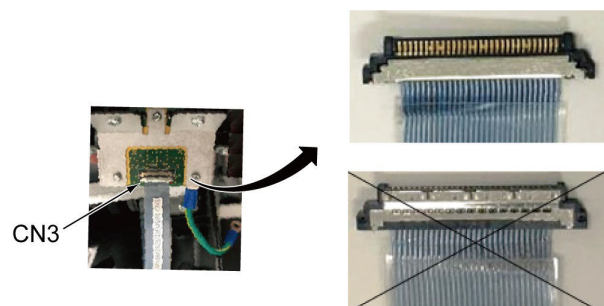
1. Assemble Ext USB CON and OPIO TOP COVER Right with 4 screws.

Figure 12-80 Assembling Ext USB CON



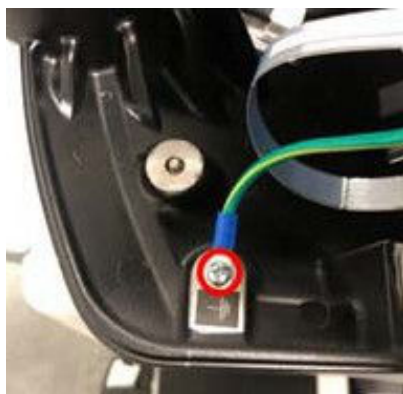
2. Connect the CN3 connector on the EUSB2 PWA per following steps.
 - a. Insert the connector on CN3 label side of the user port USB3.0 cable into the CN3 connector on the EUSB2 PWA.
 - b. Push the metal frame part of the connector with fingernail and insert until feel a click.

Figure 12-81 Connecting CN3 connector



3. Assemble EUSB2 GND cable with 1 screw.

Figure 12-82 EUSB2 GND cable



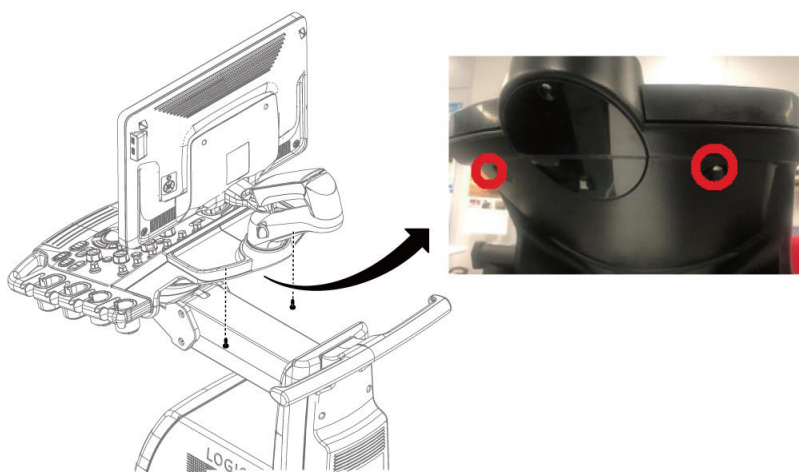
4. Put on the OPIO TOP COVER R / L on OPIO.

Figure 12-83 OPIO TOP COVER R / L



5. Assemble OPIO Base with 2 screws.

Figure 12-84 OPIO Base



12.4.2.1.3 OPIO Top Cover - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.1.4 OPIO Top Cover - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.1.5 OPIO Top Cover - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-19 Functional Checks

Functional Checks	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Removable media functional checks on page 172</i>	
<i>Power shut down on page 113</i>	

12.4.2.2 OP (Operator Panel) Knobs replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-20 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	N/A	Safety glasses



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, perform *Lockout/tagout procedure* on page 50.

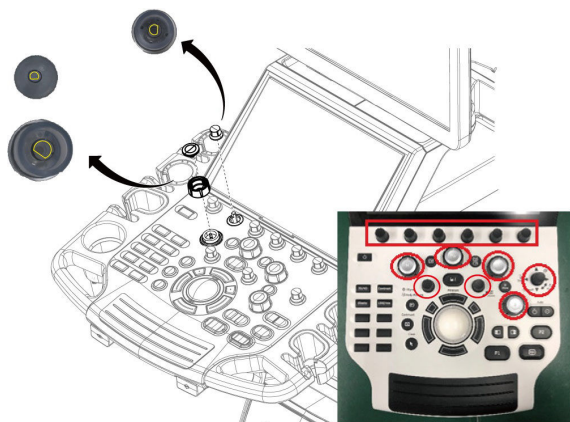
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.2.1 OP (Operator Panel) Knobs - Removal procedure

Carefully pull the knobs, one by one, to remove them.

Figure 12-85 Pulling the knobs



12.4.2.2.2 OP (Operator Panel) Knobs - Installation procedure

Insert the knobs one by one in their respective positions.

NOTE

The OP knobs are concentric knobs, the center shaft has a D shape. Replace the outer knobs first then the inner ones.

Figure 12-86 Inserting the knobs



12.4.2.2.3 OP (Operator Panel) Knobs - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.2.4 OP (Operator Panel) Knobs - 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.

12.4.2.2.5 OP (Operator Panel) Knobs - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-21 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Equipment passed all required checks and is ready for use.
<i>System CFM and PWD functional checks</i> on page 165	
<i>Basic measurement functional checks</i> on page 175	
<i>Power shut down</i> on page 113	

12.4.2.3 Upper/Lower Operator Panel replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-22 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

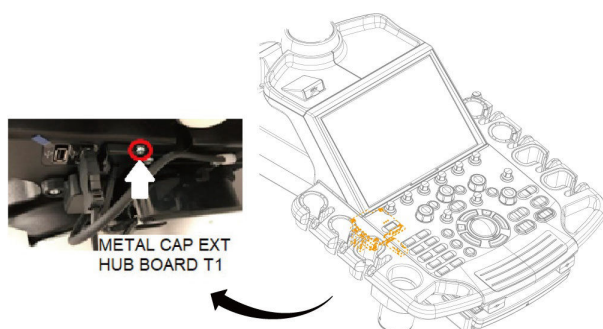
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.3.1 Upper/Lower Operator Panel - Removal procedure

Removal Procedure of Drawer AN keyboard if exist

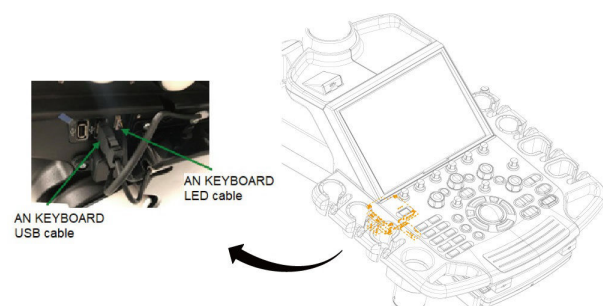
1. Remove the METAL CAP EXT HUB BOARD from OPIO Base.

Figure 12-87 Removing METAL CAP EXT HUB BOARD



2. Remove AN Keyboard USB cable and AN Keyboard LED cable.

Figure 12-88 Removing cables

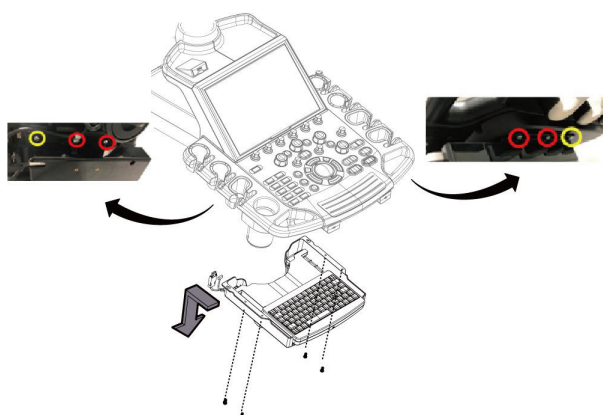


3. Remove 4 screws (indicate red circle). Loosen 2 screws (indicate yellow circle).

NOTE

AN KEYBOARD ASSY can be dropped when 2 screws are loosen.

Figure 12-89 Removing/Loosening 4 screws



4. Remove AN KEYBOARD ASSY from OPIO Base.

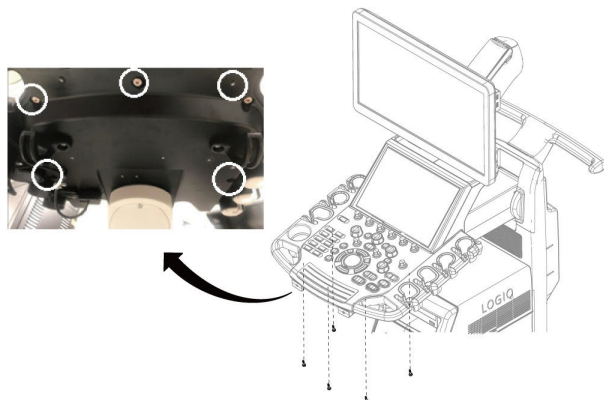
Removal Procedure of Upper/Lower OP Assembly

1. Keep the console extended upward to gain access to the Lower OP screws. Make sure that the screws are accessible from the bottom of the OP Lower Frame.
2. Remove the five screws from the bottom of the OPIO Base.

NOTE

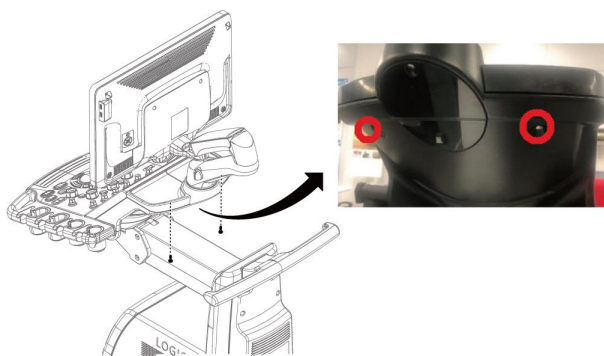
Access the screws from the bottom.

Figure 12-90 Removing the five screws



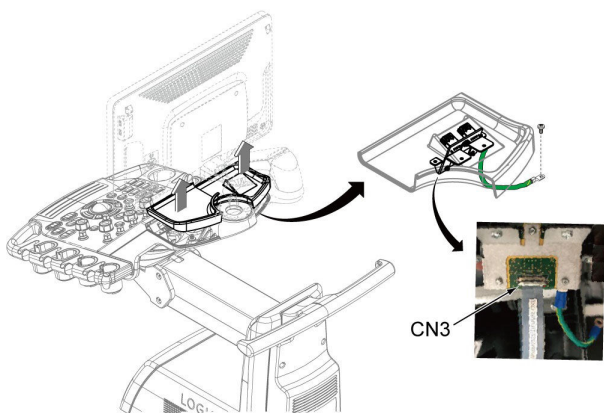
3. Unscrew 2 screws from the rear of the OPIO Base.

Figure 12-91 Unscrewing 2 screws



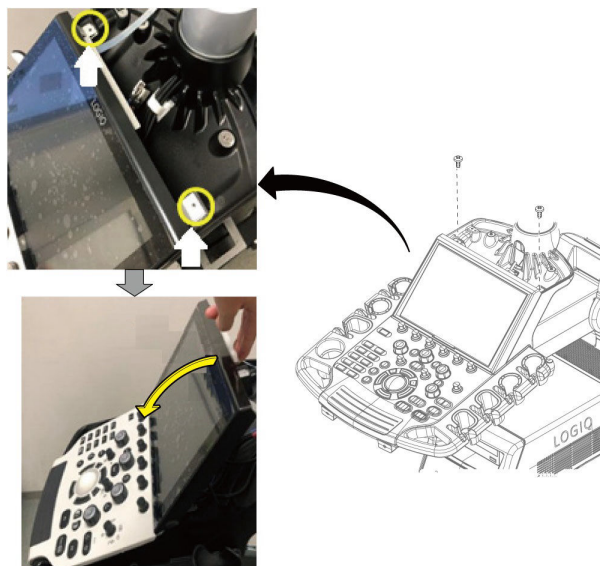
4. Remove the OPIO Top cover Left and Right. Perform the following steps when removing the left OPIO Top cover.
 - a. Disconnect USB3.0 Cable from CN3 on the EUSB2 PWA.
 - b. Unscrew 1 screw on the bottom of the OPIO base.

Figure 12-92 Removing the OPIO Top covers



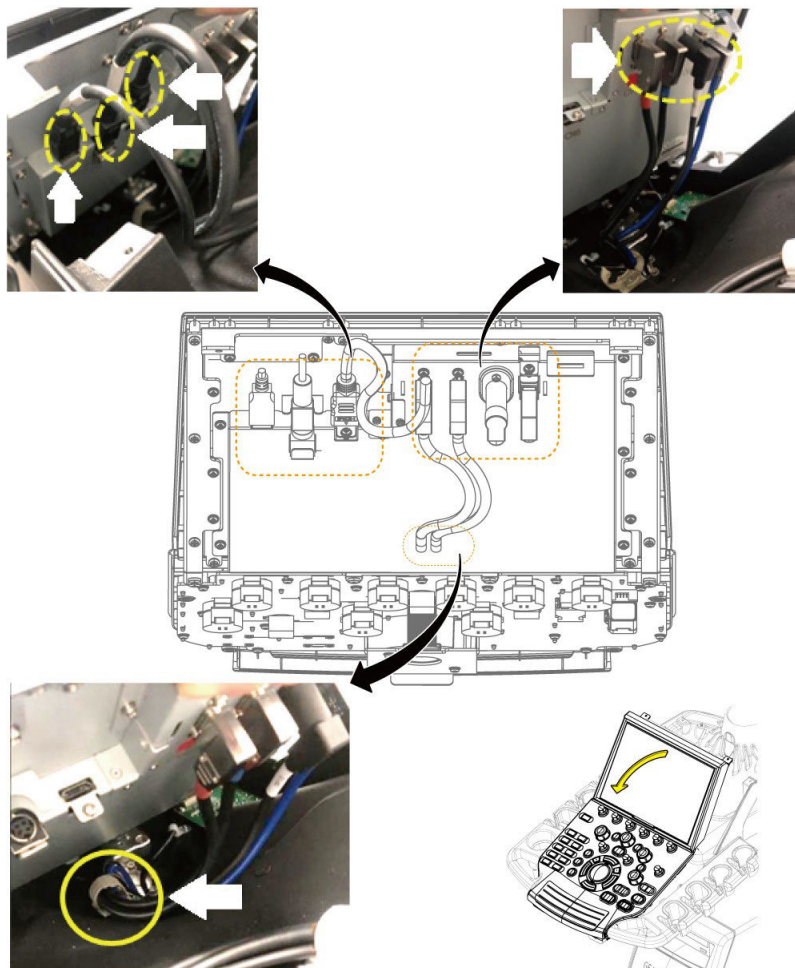
5. Unscrew 2 screws from top of the OPIO ASSY and lift up top of OPIO ASSY.

Figure 12-93 Lifting up top of OPIO ASSY.



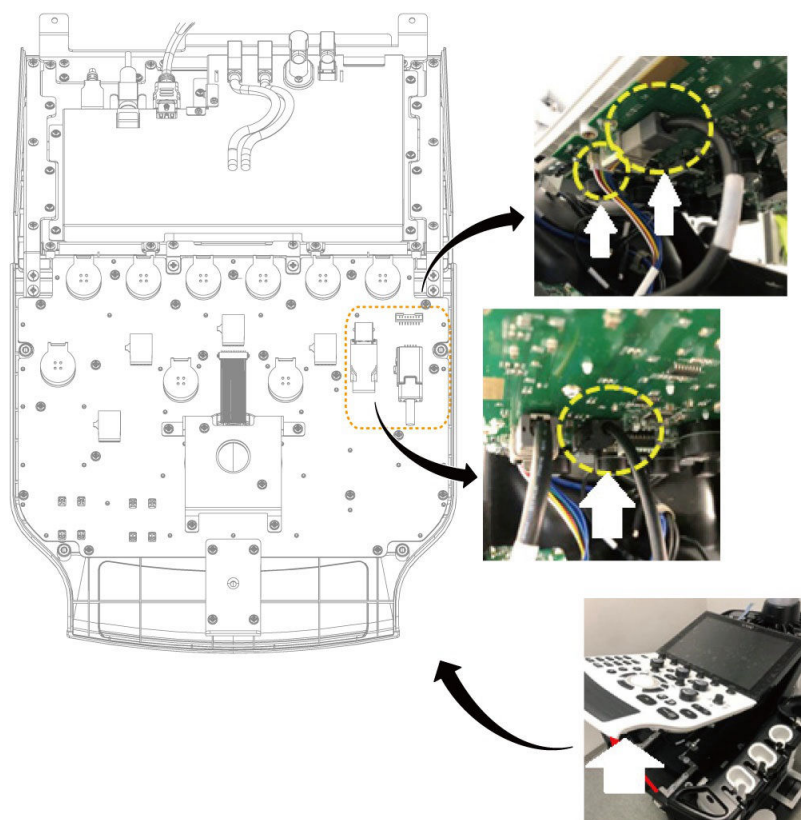
6. Release the cable clamp. Disconnect 7 cables from OPIO.

Figure 12-94 Disconnecting 7 cables from OPIO



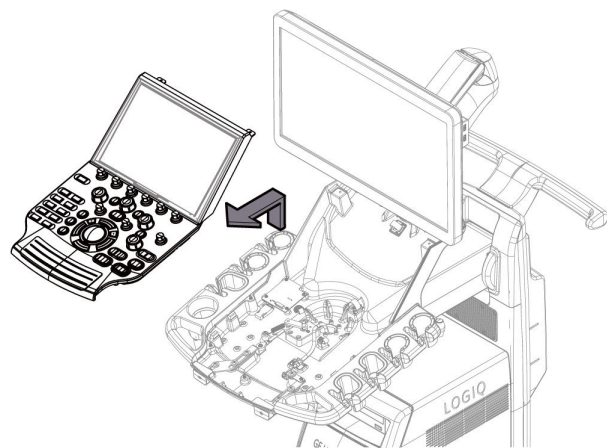
7. Lift up bottom of OPIO ASSY. Disconnect 3 cables from the bottom of OPIO ASSY.

Figure 12-95 Disconnecting 3 cables from the bottom of OPIO ASSY



8. Separate OPIO ASSY from the console.

Figure 12-96 Separating OPIO ASSY



9. Perform the following steps to disassemble Upper OPIO Assy from Lower OPIO Assy.

1. Unscrew 6 screws to separate Upper and Lower OPIO.

2. Slowly disassemble Upper OPIO Assy from Lower OPIO Assy.

Figure 12-97 Disassembling OPIO Assy



12.4.2.3.2 Upper/Lower Operator Panel - Installation procedure

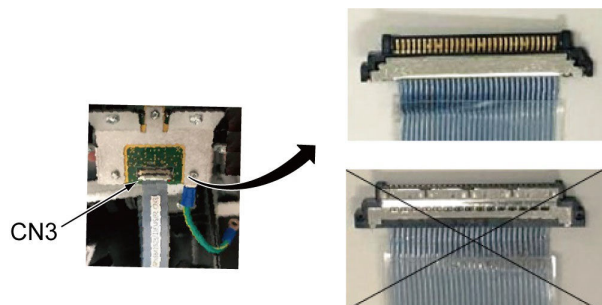
1. Assemble Lower/Upper OP and AN keyboard in reverse order of removal.

NOTE

Be careful when insert the USB3.0 cable into the CN3 connector.

- a. Insert the connector on CN3 label side of the USB3.0 cable into the CN3 connector on the EUSB2 PWA.
- b. Push the metal frame part of the connector with fingernail and insert until feel a click.

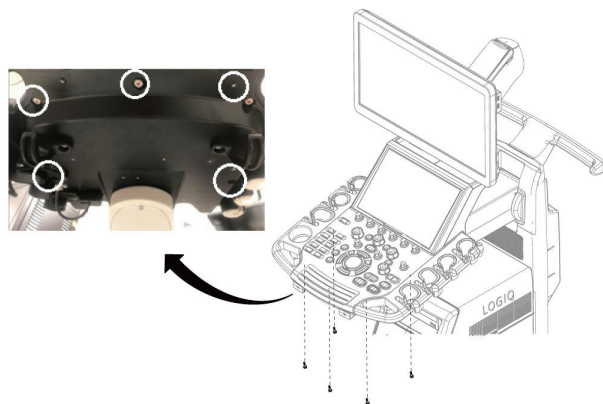
Figure 12-98 Inserting the connector on CN3 label



NOTE

Fasten the five screws from the bottom of the OPIO Base with proper torque (1.1 N·m).

Figure 12-99 Fastening the five screws



2. Install Drawer AN keyboard in reverse order of removal if exist.

12.4.2.3.3 Upper/Lower Operator Panel - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.3.4 Upper/Lower Operator Panel - OP (Operator Panel) Knobs - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.3.5 Upper/Lower Operator Panel - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-23 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Alphanumeric keyboard functional checks on page 158</i>	
<i>Power shut down on page 113</i>	

12.4.2.4 OPIO Lower Main PWA ASSY replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-24 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.4.1 OPIO Lower Main PWA ASSY - Removal Procedure

1. Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Remove the OP knobs.

NOTE

Place the removed OP knobs where you can keep and easily find until re-installation.

NOTE

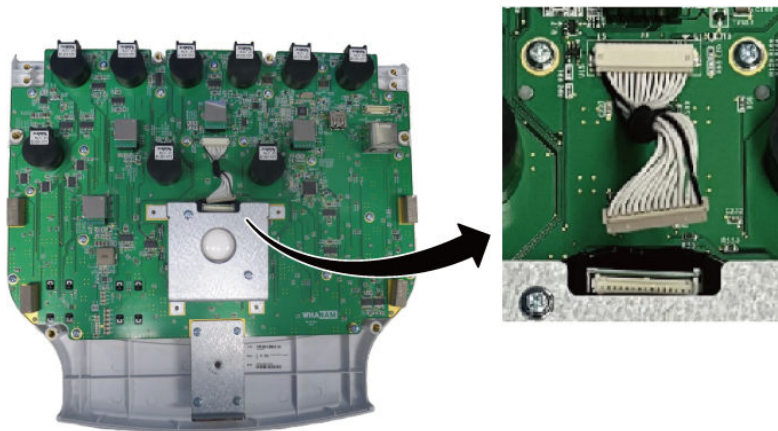
Before installing the Bezel, move the OP controls over to the new Bezel, one by one.

Figure 12-100 Removing OP knobs



3. Disconnect Trackball Cable from trackball side.

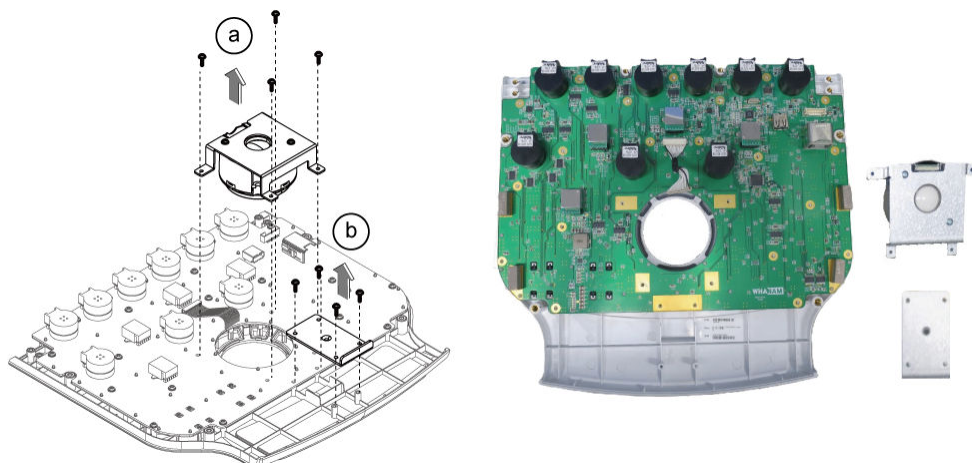
Figure 12-101 Disconnecting Trackball Cable



4. Remove trackball assy and plate bracket per following steps.
 - a. Removing trackball assy by unscrewing 4 screws.

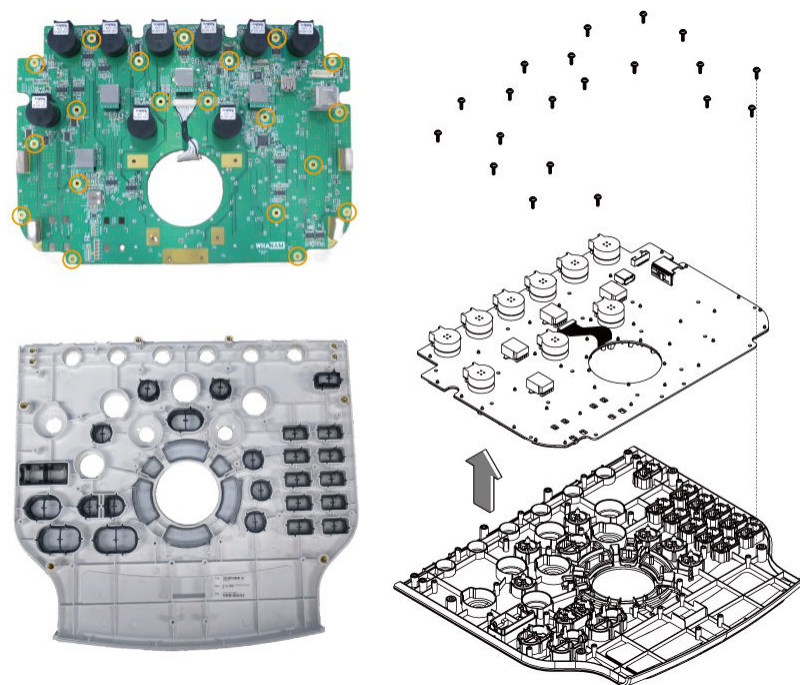
- b. Removing plate bracket by unscrewing 4 screws.

Figure 12-102 Removing trackball assy and plate bracket



5. Remove the OPIO Main PWA Assy per following steps.
 - a. Unscrew 20 screws around the PWA and remove the cover (Marked yellow).
 - b. Slowly lift the OPIO Main PWA Assy from OP Panel.

Figure 12-103 Removing OPIO Main PWA Assy



12.4.2.4.2 OPIO Lower Main PWA ASSY - Installation Procedure

Install components in reverse order of removal.

12.4.2.4.3 OPIO Lower Main PWA ASSY - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.4.4 OPIO Lower Main PWA ASSY - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.4.5 OPIO Lower Main PWA ASSY - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-25 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
Check Joysticks	
<i>Power shut down on page 113</i>	

12.4.2.5 Trackball Assembly replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-26 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

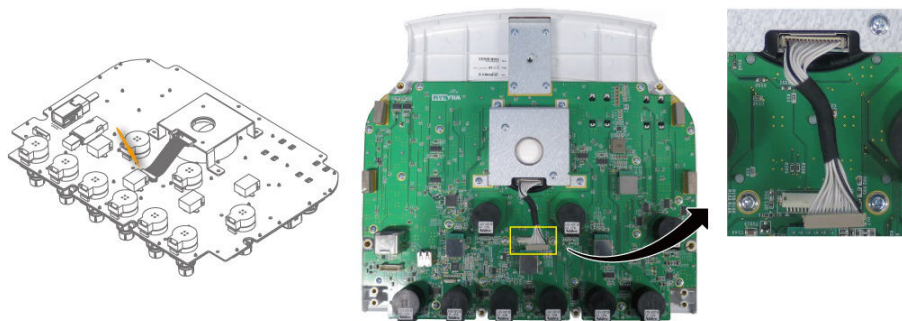
12.4.2.5.1 Trackball Assembly replacement - Removal procedure

1. Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Disconnect the signal cable connector from the OPIO Main PWA ASSY.

NOTE

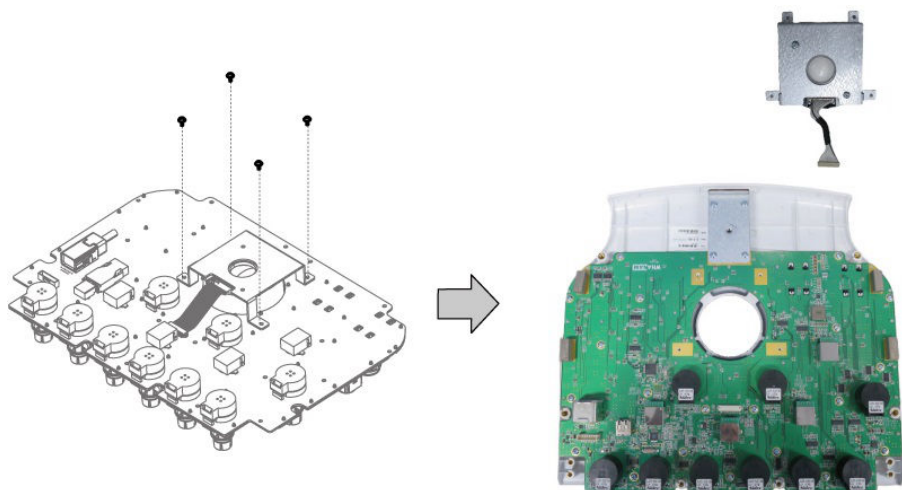
Grasp the connector on the wide flat side and pull straight away from the board. The Trackball includes the Trackball Cable.

Figure 12-104 Disconnecting signal cable connector



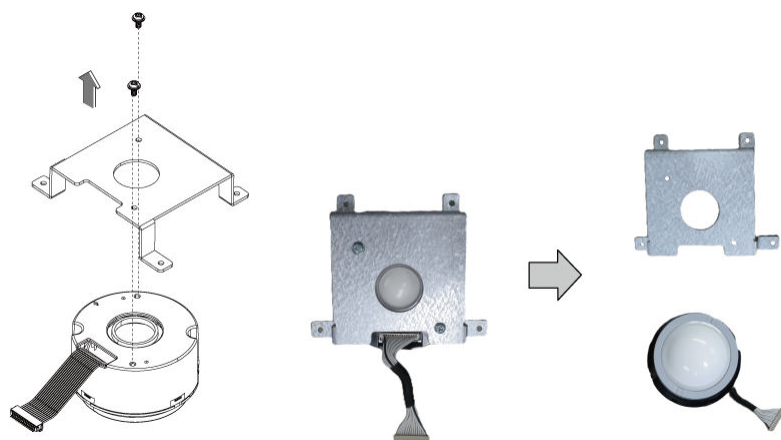
3. Unscrew 4 screws from rear of the OPIO Base and remove Trackball Assembly.

Figure 12-105 Removing Trackball Assembly



4. Remove the bracket by unscrew 2 screws.

Figure 12-106 Removing bracket



12.4.2.5.2 Trackball Assembly replacement - Installation Procedure

Install components in reverse order of removal.

12.4.2.5.3 Trackball Assembly replacement - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.5.4 Trackball Assembly replacement - 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.

12.4.2.5.5 Trackball Assembly replacement - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-27 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks</i> on page 162	
<i>Power shut down</i> on page 113	

12.4.2.6 Lower Bezel replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-28 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.6.1 Lower Bezel - Removal procedure

1. Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Remove the OP knobs.

NOTE

Place the removed OP knobs where you can keep and easily find until re-installation.

NOTE

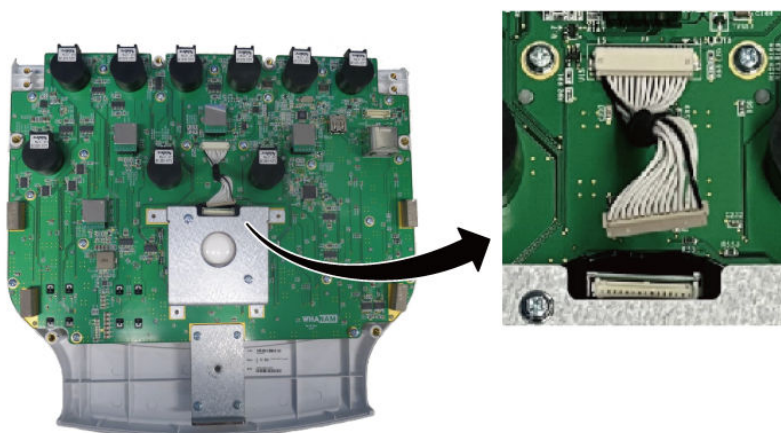
Before installing the Bezel, move the OP controls over to the new Bezel, one by one.

Figure 12-107 Removing OP knobs



3. Disconnect Trackball Cable from trackball side.

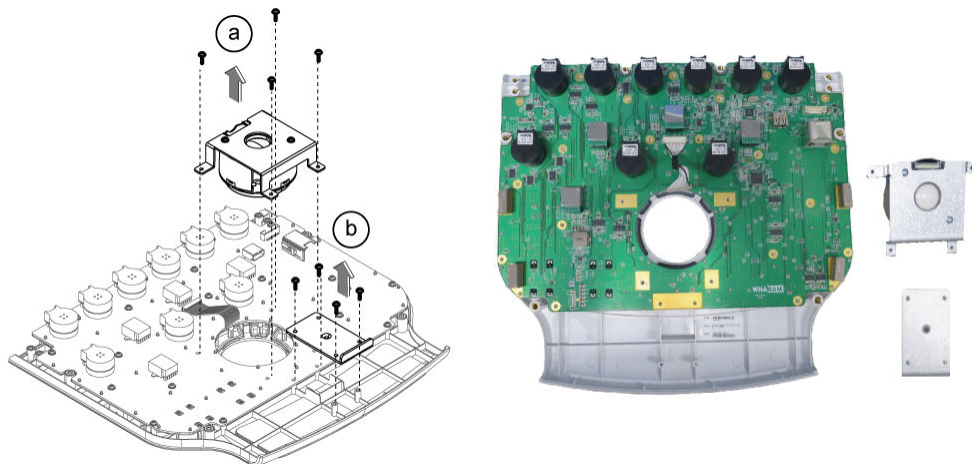
Figure 12-108 Disconnecting Trackball Cable



4. Remove trackball assy and plate bracket per following steps.
 - a. Removing trackball assy by unscrewing 4 screws.

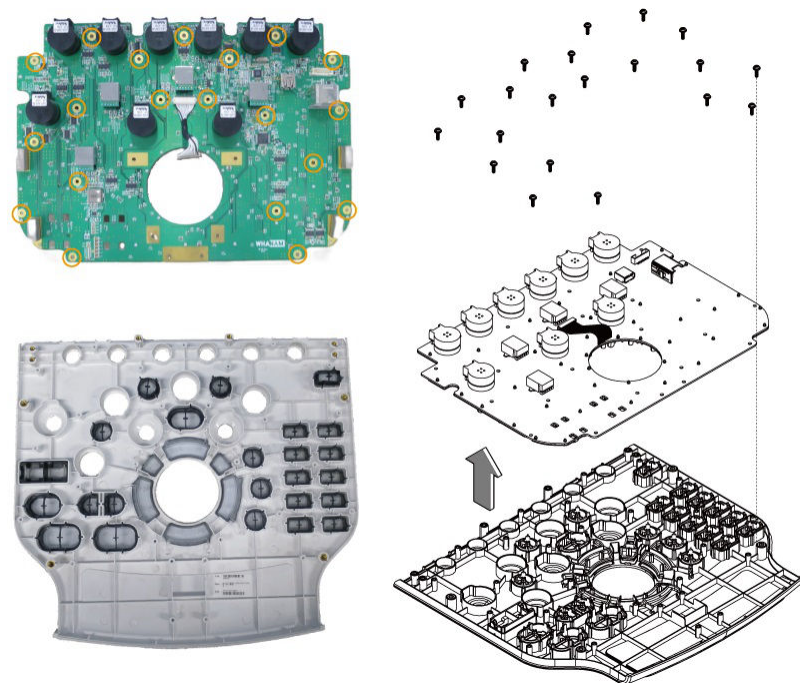
- b. Removing plate bracket by unscrewing 4 screws.

Figure 12-109 Removing trackball assy and plate bracket



5. Remove the OPIO Main PWA Assy per following steps.
 - a. Unscrew 20 screws around the PWA and remove the cover (Marked yellow).
 - b. Slowly lift the OPIO Main PWA Assy from OP Panel.

Figure 12-110 Removing OPIO Main PWA Assy



12.4.2.6.2 Lower Bezel - Installation procedure

1. Set the new Bezel in place.
2. Transfer OPIO key buttons from old Bezel to new Bezel.
3. 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.

4. Re-install the Lower OP, Upper OP/Touch Panel Assembly (verify Encoder operation) and all covers removed.

12.4.2.6.3 Lower Bezel - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.6.4 Lower Bezel - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.6.5 Lower Bezel - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-29 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks</i> on page 161	
<i>B-Mode functional checks</i> on page 162	
<i>System CFM and PWD functional checks</i> on page 165	
<i>Basic measurement functional checks</i> on page 175	
Check Joysticks	
<i>Power shut down</i> on page 113	

12.4.2.7 Encoder/Joystick replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-30 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.7.1 Encoder/Joystick - Removal procedure

1. Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Remove the OP knobs.

NOTE

Place the removed OP knobs where you can keep and easily find until re-installation.

NOTE

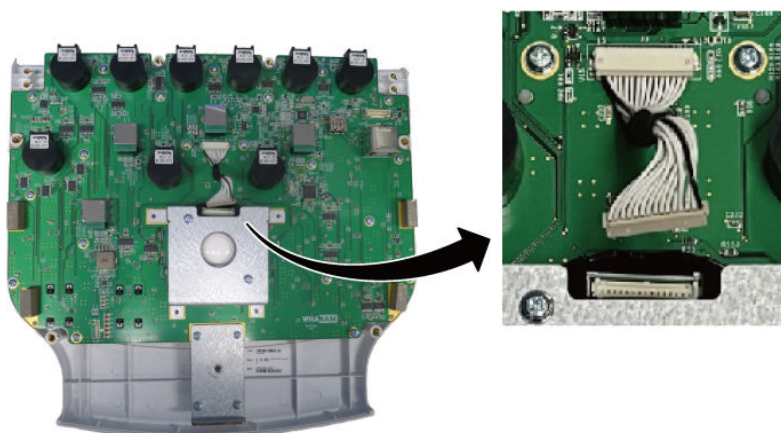
Before installing the Bezel, move the OP controls over to the new Bezel, one by one.

Figure 12-111 Removing OP knobs



3. Disconnect Trackball Cable from trackball side.

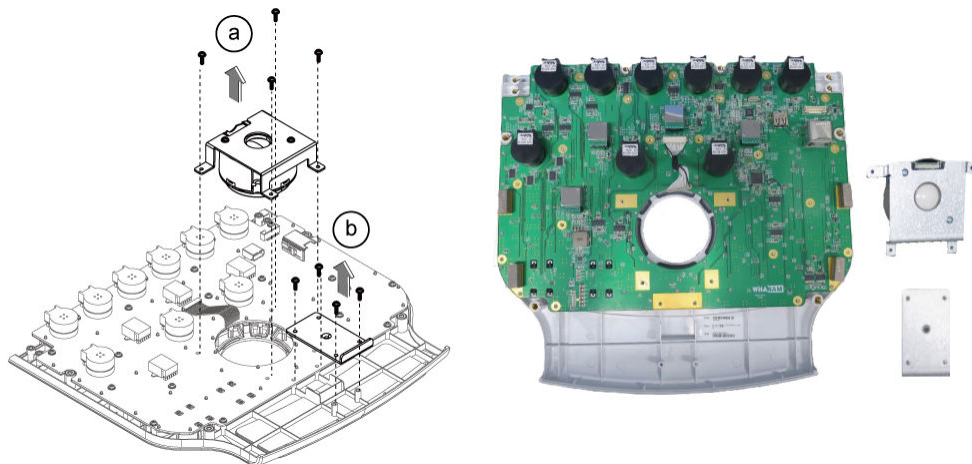
Figure 12-112 Disconnecting Trackball Cable



4. Remove trackball assy and plate bracket per following steps.
 - a. Removing trackball assy by unscrewing 4 screws.

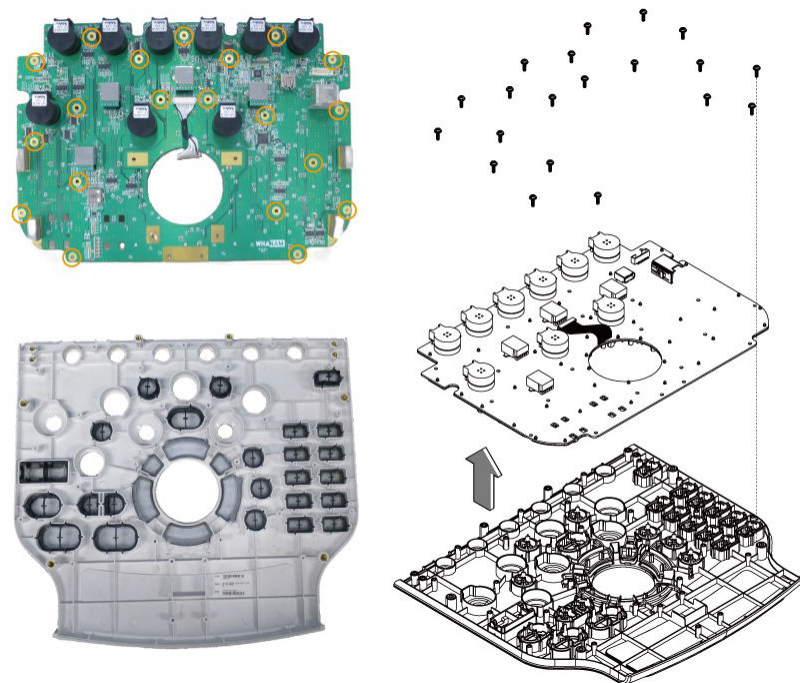
- b. Removing plate bracket by unscrewing 4 screws.

Figure 12-113 Removing trackball assy and plate bracket



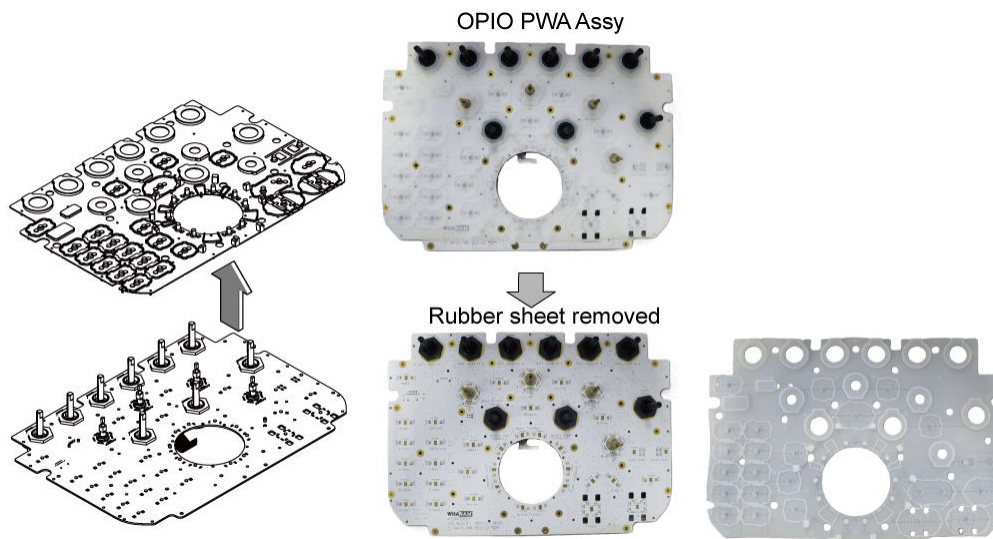
5. Remove the OPIO Main PWA Assy per following steps.
 - a. Unscrew 20 screws around the PWA and remove the cover (Marked yellow).
 - b. Slowly lift the OPIO Main PWA Assy from OP Panel.

Figure 12-114 Removing OPIO Main PWA Assy



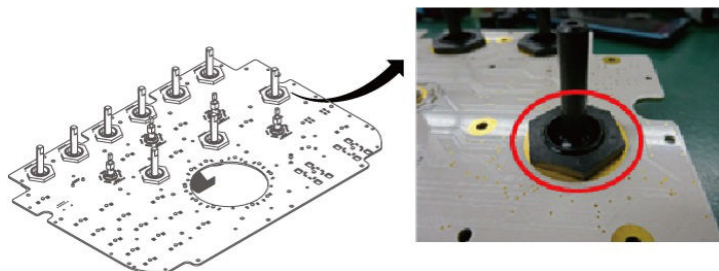
6. Remove Rubber Sheath on reverse side of PWA Assy.

Figure 12-115 Removing Rubber Sheath



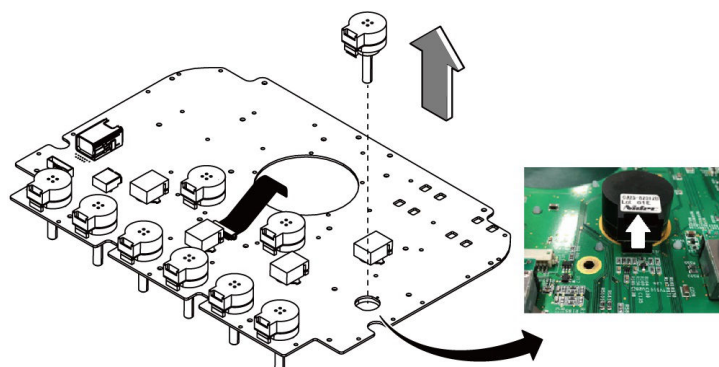
7. Loosen the Encoder/Joystick nut, using use a 24 mm socket an adjustable wrench and remove the nut.

Figure 12-116 Loosening the Encoder/Joystick nut



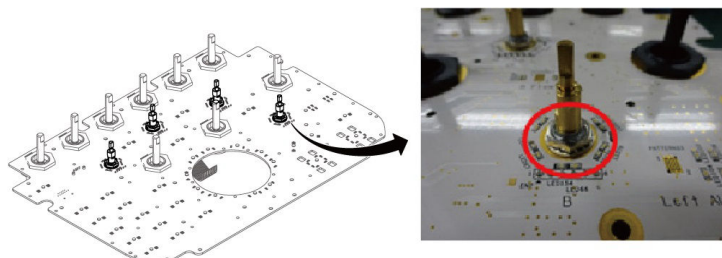
8. Remove the Encoder/Joystick per following steps.
 - a. Remove the remaining 8 nuts. Disconnect the 9 Encoders.
 - b. Grasp the Encoder/Joystick and pull straight away from the board.

Figure 12-117 Removing Encoder/Joystick



9. Loosen the Encoder nut, using a 7/16 inch, deep socket wrench or 7/16 inch open-ended wrench and remove the nut.

Figure 12-118 Removing the Encoder nut

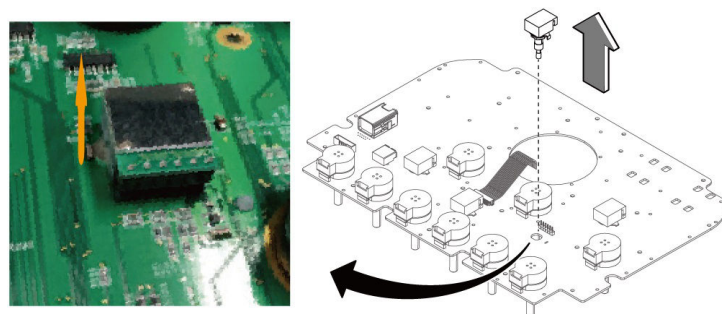


10. Remove the Encoders per following steps.
 - a. Remove the remaining 3 nuts. Disconnect the 4 Encoders.
 - b. Grasp the Encoder and pull straight away from the board.

NOTE

All 4 encoders must be replaced at the same time.

Figure 12-119 Removing Encoders



12.4.2.7.2 Encoder/Joystick - Installation procedure

1. Replace Encoder(s)/Joystick(s) and Encoder(s) as necessary. Secure the Encoder(s)/Joystick(s) and Encoder(s).
2. Re-assemble Lower OP.
3. Re-install Lower Op, Upper Op and all Covers removed.

12.4.2.7.3 Encoder/Joystick - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.7.4 Encoder/Joystick - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.7.5 Encoder/Joystick - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-31 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

12.4.2.8 Hard key caps replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-32 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Flathead screwdriver	Safety glasses



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, perform *Lockout/tagout procedure* on page 50.

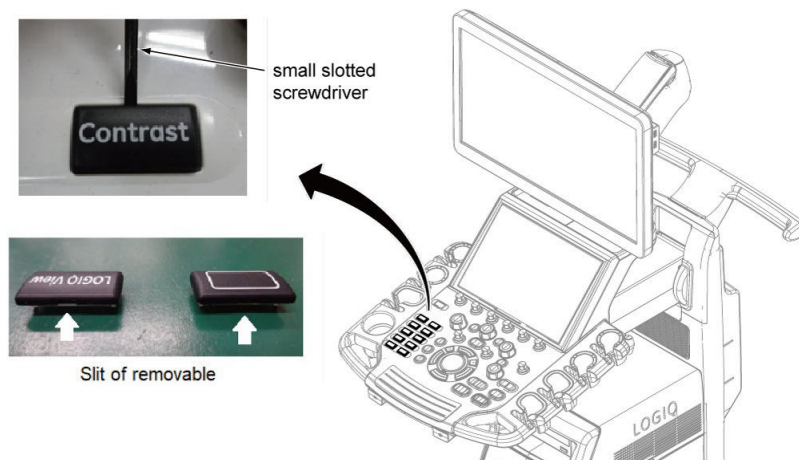
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.8.1 Hard key caps - Removal procedure

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.

Figure 12-120 Small slotted screwdriver against the hard key cap



3. Lift the cap, until it is completely loosened from its base.

12.4.2.8.2 Hard key caps - Installation procedure

Place the new hard key cap down until it snaps into position.

12.4.2.8.3 Hard key caps - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.8.4 Hard key caps - 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.

12.4.2.8.5 Hard key caps - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-33 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	

12.4.2.9 EXT Hub Board Assy replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-34 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves



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, perform *Lockout/tagout procedure* on page 50.

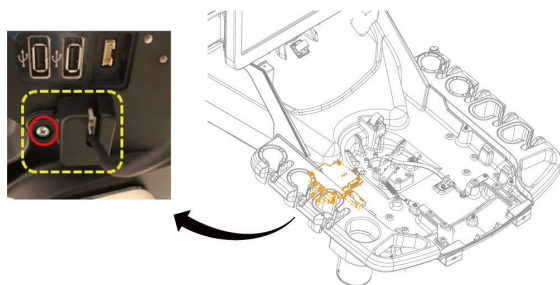
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.9.1 EXT Hub Board Assy - Removal procedure

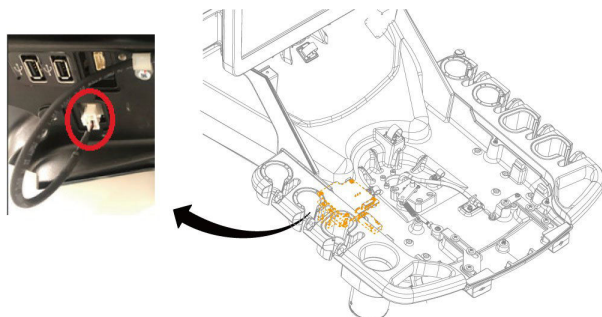
1. Remove Upper/Lower OPIO Assembly and separate Upper and Lower OPIO. Refer to *Upper/Lower Operator Panel replacement* on page 437.
2. Unscrew 1 screw to remove the GEL WARMER CABLE COVER.

Figure 12-121 Removing GEL WARMER CABLE COVER



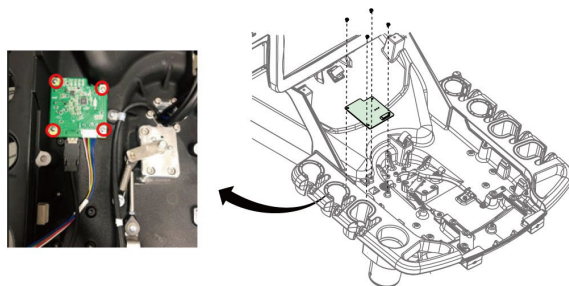
3. Remove the GEL WARMER CONNECTOR.

Figure 12-122 Removing connector



4. Unscrew 4 screws to remove EXT HUB BOARD.

Figure 12-123 Removing EXT HUB BOARD



12.4.2.9.2 EXT Hub Board Assy - Installation procedure

Install components in reverse order of removal.

12.4.2.9.3 EXT Hub Board Assy - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.9.4 EXT Hub Board Assy - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.9.5 EXT Hub Board Assy - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-35 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

12.4.2.10 Gel warmer /Gel warmer cap replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-36 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	N/A



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

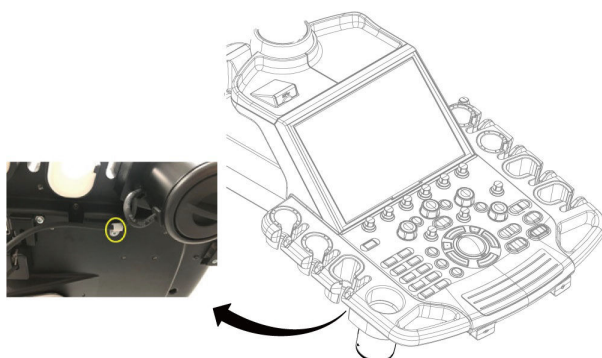
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.10.1 Gel warmer /Gel warmer cap - Removal procedure*Gel warmer Removal procedure*

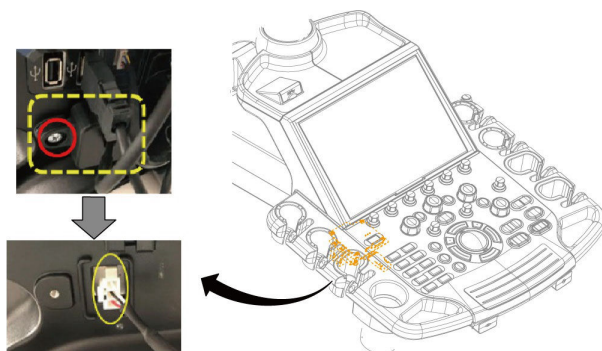
1. Turn Gel warmer off (o) and store the Gel in safe place.

Figure 12-124 Gel warmer switch

2. Unscrew 1 screw to remove the cable clamp.

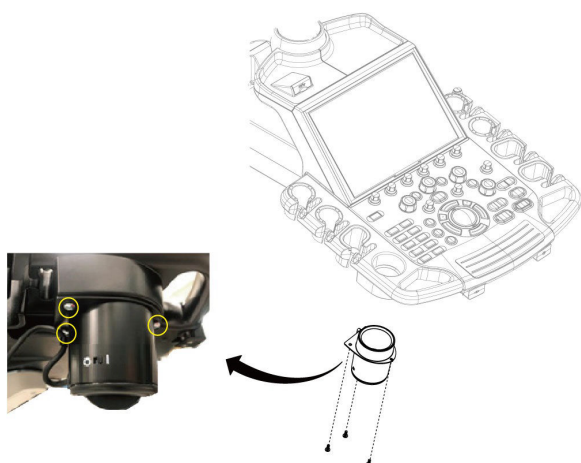
Figure 12-125 Cable clamp screw

3. Unscrew 1 screw to remove the GEL WARMER CABLE COVER.
4. Disconnect the Gel warmer cable.

Figure 12-126 Removing GEL WARMER CABLE COVER and cable

5. Unscrew 3 screws to remove the Gel warmer.

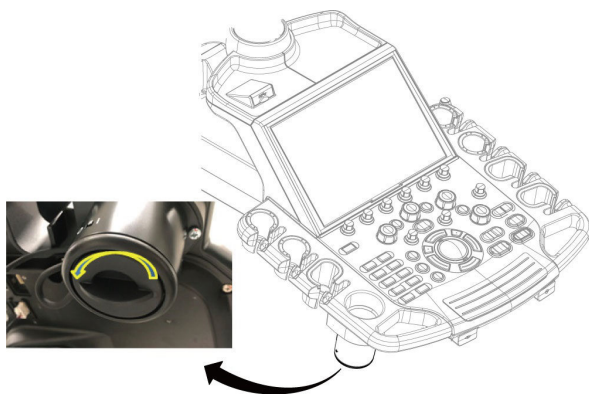
Figure 12-127 Removing the Gel warmer



Gel warmer cap removal procedure

Rotate the Gel warmer cap counterclockwise.

Figure 12-128 Removing Gel warmer cap



12.4.2.10.2 Gel warmer /Gel warmer cap - Installation procedure

Install components in reverse order of removal.

12.4.2.10.3 Gel warmer /Gel warmer cap - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.10.4 Gel warmer /Gel warmer cap - 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.

12.4.2.10.5 Gel warmer /Gel warmer cap - Functional Check

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4.2.11 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-37 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	N/A

12.4.2.11.1 Probe Holder Insert - Removal procedure

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.
 - (1): Left Large Probe Holder Inserts
 - (2): Right Large Probe Holder Inserts
 - (3): Small Probe Holder Inserts

NOTE

Remove the SMALL PROBE HOLDER if attached.

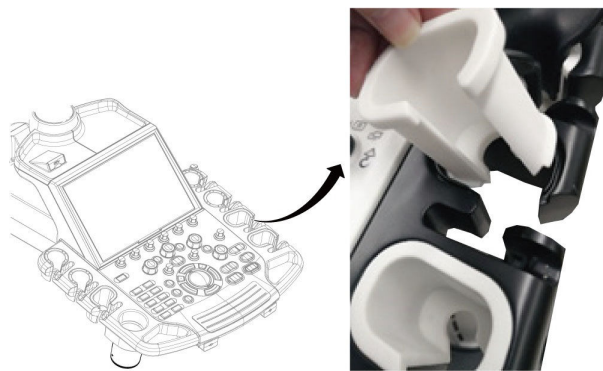
Figure 12-129 Pulling out the flexible Probe Holder Insert



12.4.2.11.2 Probe Holder Insert - Installation procedure

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.

Figure 12-130 Installing flexible Probe Holder Insert



12.4.2.11.3 Probe Holder Insert - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.11.4 Probe Holder Insert - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.11.5 Probe Holder Insert - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4.2.12 OPIO FRONT HOOK replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-38 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips screwdriver	N/A



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, perform *Lockout/tagout procedure* on page 50.

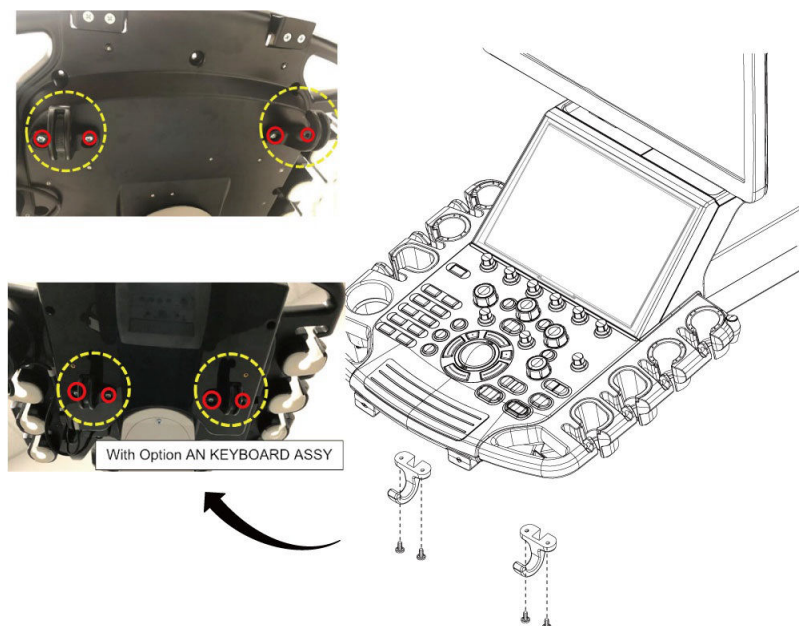
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.12.1 OPIO FRONT HOOK - Removal Procedure

1. Disconnect and remove all Probes. Store Probes in safe place.
2. Unscrew 2 screws to remove the target OPIO FRONT HOOK.

Figure 12-131 Removing OPIO FRONT HOOK



12.4.2.12.2 OPIO FRONT HOOK - Installation procedure

Assemble OPIO FRONT HOOK in reverse order of removal.

NOTE

If the customer wants change the direction of cable hook, refer to *Cable hook direction* on page 119.

12.4.2.12.3 OPIO FRONT HOOK - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.12.4 OPIO FRONT HOOK - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.12.5 OPIO FRONT HOOK - Functional checks**Table 12-39 Functional Checks**

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4.2.13 Option VERTICAL TV PROBE HOLDER Left or Right Support replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-40 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	Phillips screwdriver	Safety glasses Safety shoes Kneel pad



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.13.1 Option VERTICAL TV PROBE HOLDER Left or Right Support - Removal procedure

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.

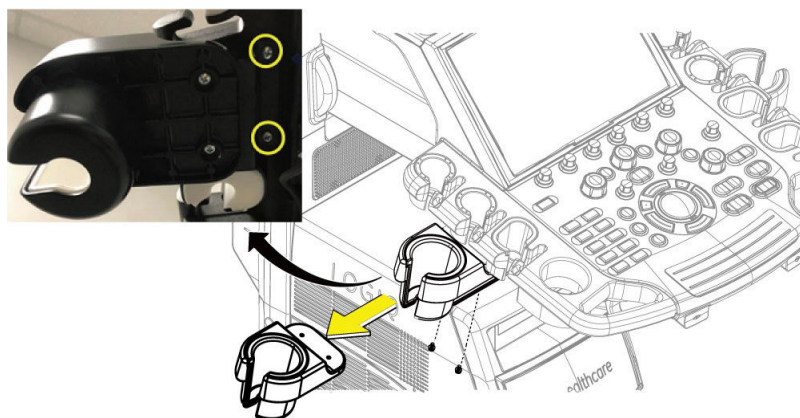
NOTE

Be careful do not drop the holder.

NOTE

The illustration shows an example on the left.

Figure 12-132 Removing Vertical TV Probe Holder



12.4.2.13.2 Option VERTICAL TV PROBE HOLDER Left or Right Support - Installation procedure

Install components in reverse order of removal.

12.4.2.13.3 Option VERTICAL TV PROBE HOLDER Left or Right Support - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.13.4 Option VERTICAL TV PROBE HOLDER Left or Right Support - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.13.5 Option VERTICAL TV PROBE HOLDER Left or Right Support - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4.2.14 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-41 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 5 minutes	No tools required	No PPE required.



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.14.1 Option TVTR Probe Holder Assembly Left or Right Support - Removal procedure

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.

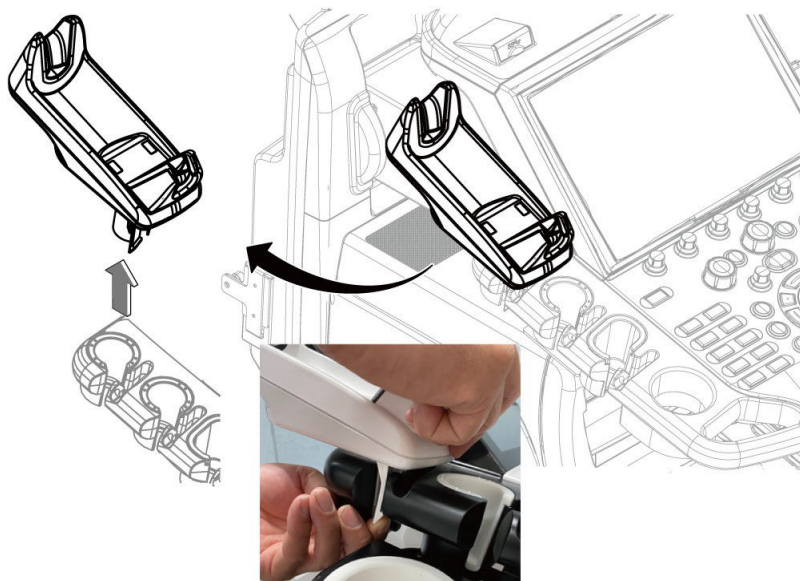
NOTE

Be careful do not drop the holder.

NOTE

The illustration shows an example on the left.

Figure 12-133 Pulling out the TVTR probe holder



12.4.2.14.2 Option TVTR Probe Holder Assembly Left or Right Support - Installation procedure

Install components in reverse order of removal.

12.4.2.14.3 Option TVTR Probe Holder Assembly Left or Right Support - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.14.4 Option TVTR Probe Holder Assembly Left or Right Support - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.14.5 Option TVTR Probe Holder Assembly Left or Right Support - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.4.2.15 OPTIONAL DRAWER AN KEYBOARD Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-42 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.15.1 OPTIONAL DRAWER AN KEYBOARD - Removal Procedure

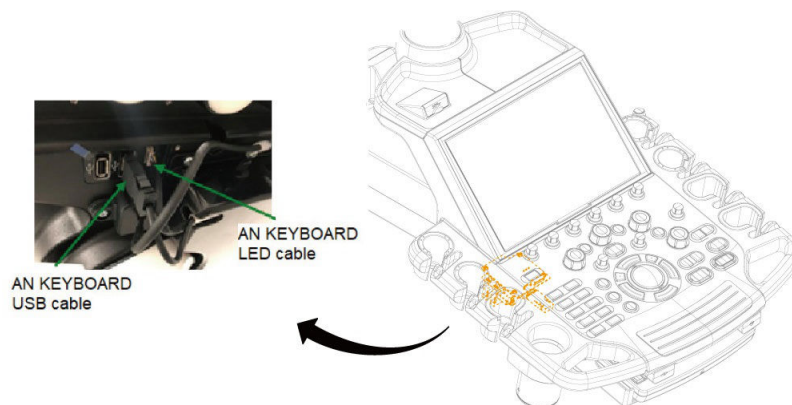
1. Disconnect and remove all probes. Store Probes in safe place.
2. Keep the console extended upward to gain access to the Lower OP screws. The screws are accessible from the bottom of the OP Lower Frame.
3. Remove the METAL CAP EXT HUB BOARD from OPIO Base.

Figure 12-134 Removing METAL CAP EXT HUB BOARD



4. Remove AN Keyboard USB cable and AN Keyboard LED cable.

Figure 12-135 Removing AN Keyboard USB cable

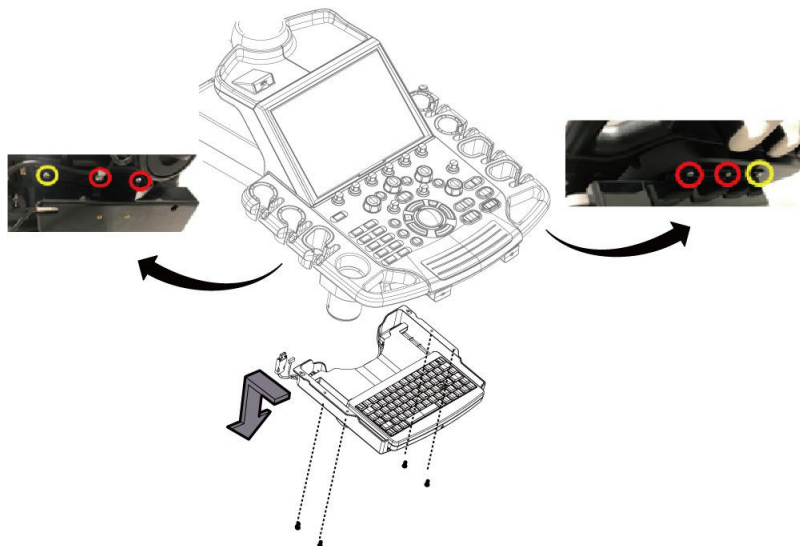


5. Remove 4 screws (indicate red circle). Loosen 2 screws (indicate yellow circle).

NOTE

AN KEYBOARD ASSY can be dropped when 2 screws are loosen.

Figure 12-136 Removing/Loosening screws



6. Remove AN KEYBOARD ASSY from OPIO Base.

12.4.2.15.2 OPTIONAL DRAWER AN KEYBOARD - Installation procedure

Install components in reverse order of removal.

12.4.2.15.3 OPTIONAL DRAWER AN KEYBOARD - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.15.4 OPTIONAL DRAWER AN KEYBOARD - 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.

12.4.2.15.5 OPTIONAL DRAWER AN KEYBOARD - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-43 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Alphanumeric keyboard functional checks on page 158</i>	
<i>Power shut down on page 113</i>	

12.4.2.16 OPTIONAL DRAWER AN KEYBOARD Cable Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-44 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 45 minutes	Phillips screwdriver (Size: #1 and #2)	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.4.2.16.1 OPTIONAL DRAWER AN KEYBOARD Cable - Removal Procedure

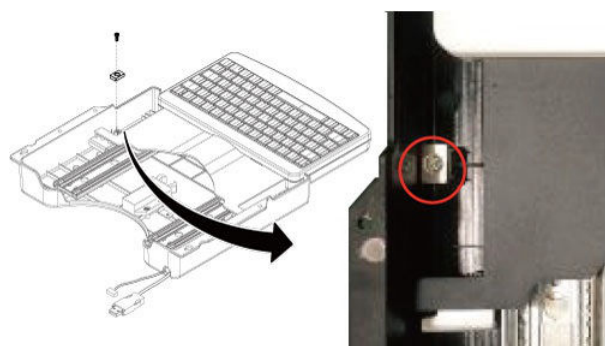
1. Remove DRAWER AN KEYBOARD. Refer to *OPTIONAL DRAWER AN KEYBOARD Replacement* on page 485.
2. Push the keyboard inward to unlock.

Figure 12-137 Unlocking keyboard



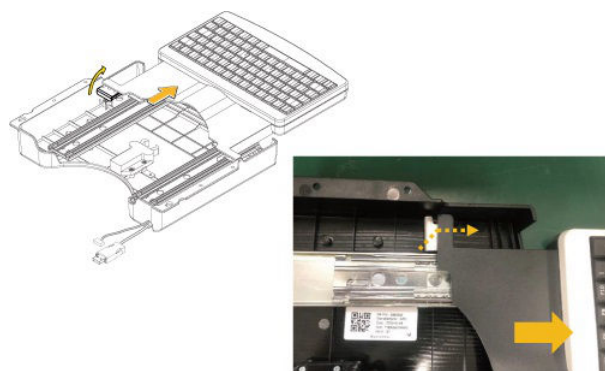
3. Remove a screw to remove the small magnet as shown in illustration.

Figure 12-138 Removing a screw



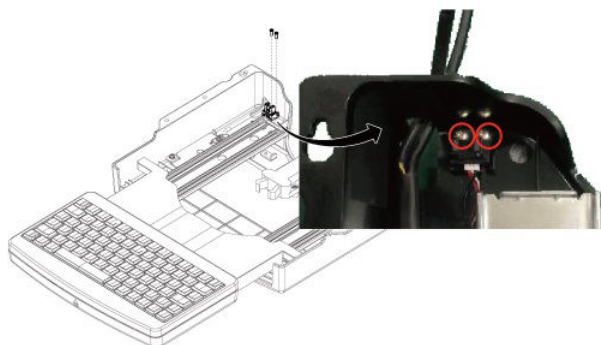
4. Slide the keyboard forward to maximum forward.

Figure 12-139 keyboard to maximum forward



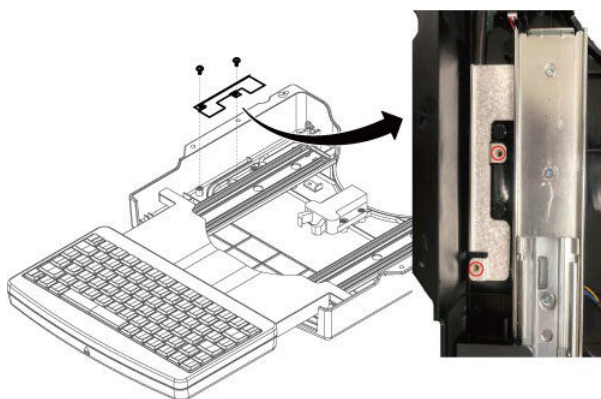
5. Remove the 2 screws for the position sensor.

Figure 12-140 Remove 2 screws



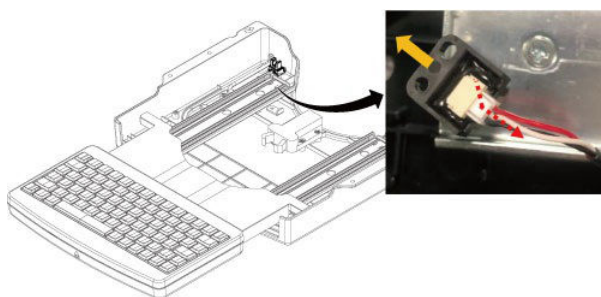
6. Remove 2 screws and remove SLIDE CABLE FIX BRKT T1.

Figure 12-141 Removing SLIDE CABLE FIX BRKT T1



7. Pull out the connector from the position sensor with pressing the latch.

Figure 12-142 Pulling out position sensor connector



8. Perform the following steps.
 - a. Slide the keyboard to the maximum forward.
 - b. Adjust the slide rail to the position so that the 8 screws can be seen.

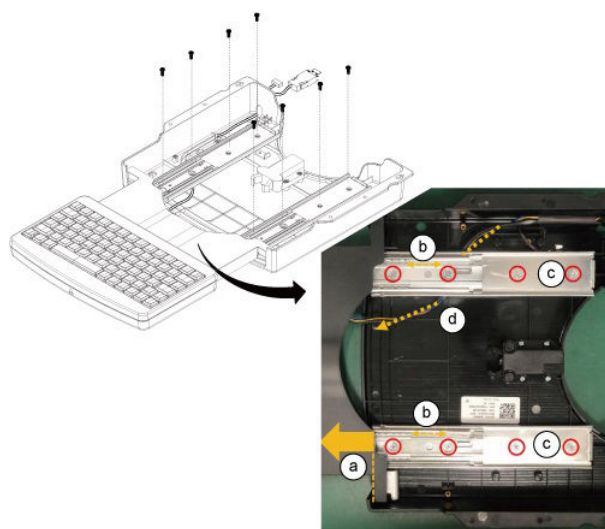
NOTE

2nd and 3rd slides can be adjusted by finger.

- c. Remove the 8 screws.

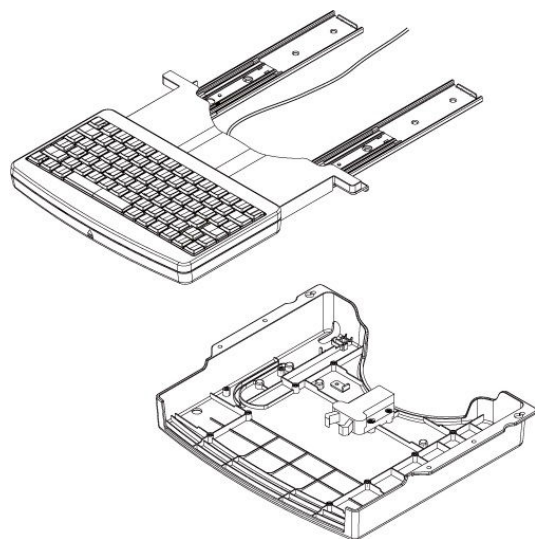
- d. Remove the cable from the groove and pull it to the front.

Figure 12-143 Removing 8 screws and cable



9. Separate the keyboard with rail from AN KEYBOARD FRAME COVER.

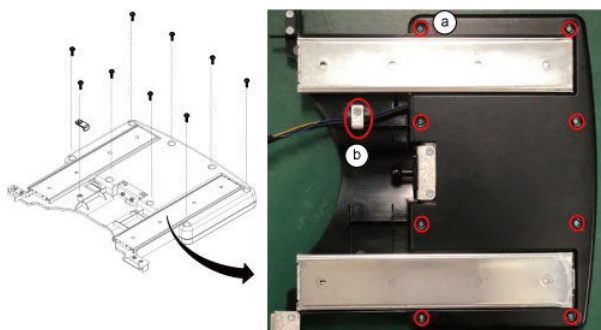
Figure 12-144 Separating the keyboard



10. Flip the keyboard and perform the following steps.
 - a. Remove the 8 screws.

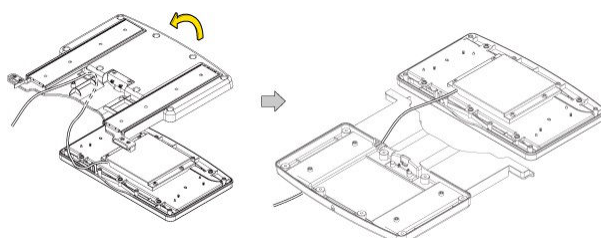
- b. Remove the screw that fixes the ANKEY CABLE COVER BRKT.

Figure 12-145 Removing screws



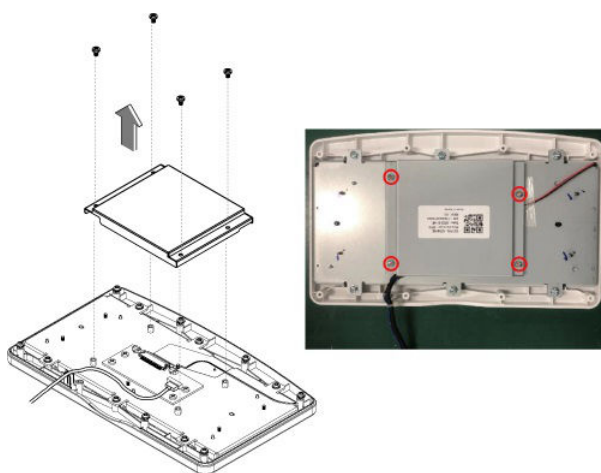
11. Flip the AN KEYBOARD LOWER COVER from the AN KEYBOARD ASSY as shown in illustration.

Figure 12-146 Flipping the AN KEYBOARD LOWER COVER



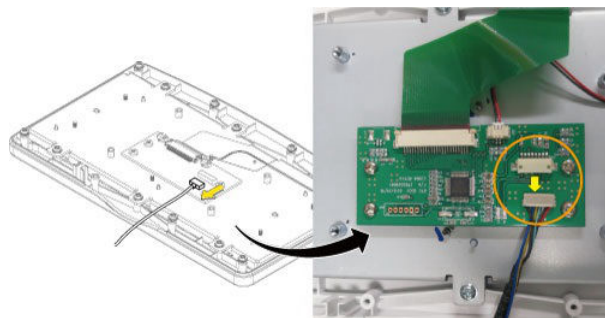
12. Remove 4 screws and remove the AN KEY BACK PLATE.

Figure 12-147 Removing the AN KEY BACK PLATE



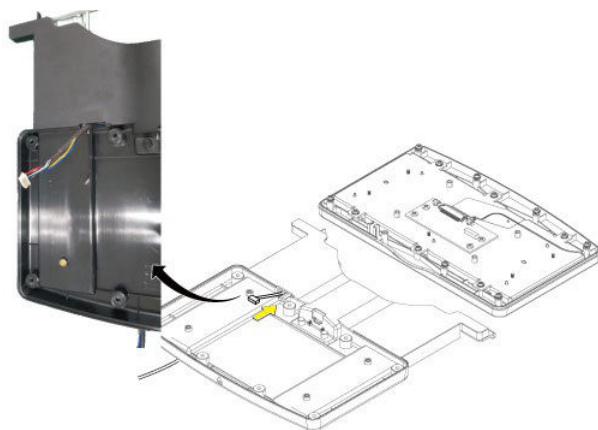
13. Unplug the AN KEYBOARD CABLE from the connector.

Figure 12-148 Unplugging the AN KEYBOARD CABLE



14. Remove the cable from AN KEYBOARD LOWER COVER through the opening.

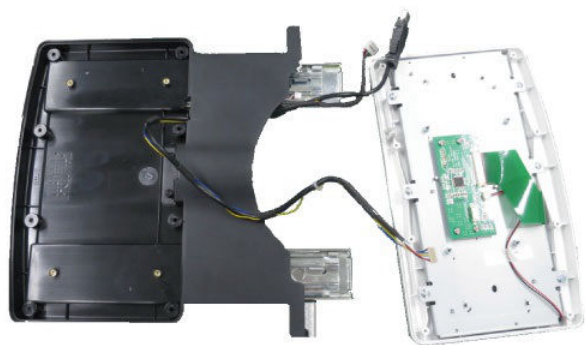
Figure 12-149 Removing cable



12.4.2.16.2 OPTIONAL DRAWER AN KEYBOARD Cable - Installation Procedure

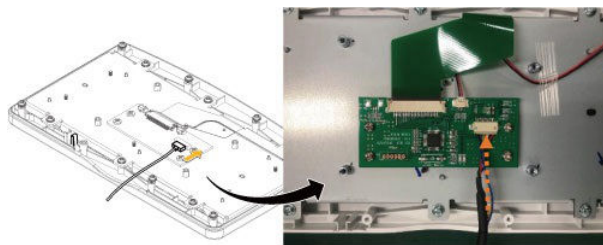
1. Route the new AN KEYBOARD CABLE through the opening of AN KEYBOARD LOWER COVER.

Figure 12-150 Routing new AN KEYBOARD CABLE



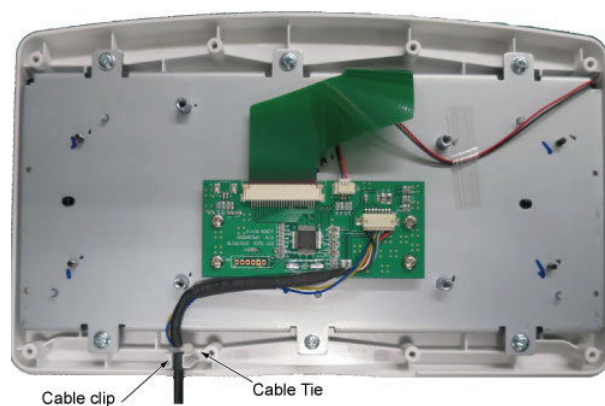
2. Connect the cable to the connector.

Figure 12-151 Connecting the cable



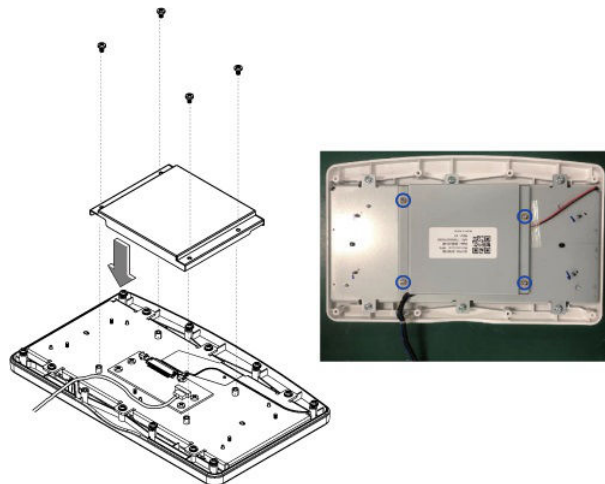
3. Route the cable as shown in illustration.

Figure 12-152 Routing the cable



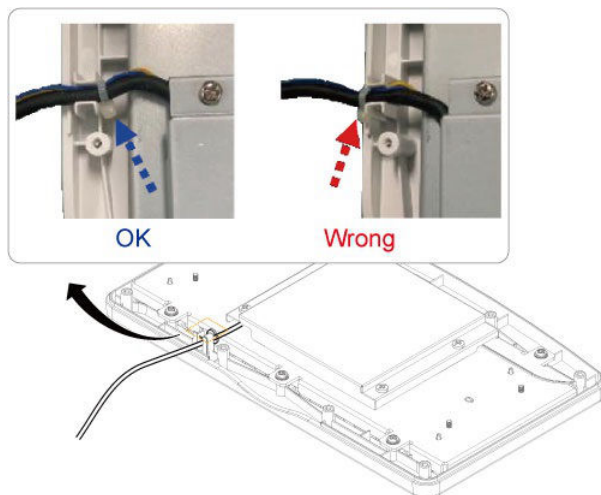
4. Install AN KEY BACK PLATE with 4 screws.

Figure 12-153 Installing AN KEY BACK PLATE



5. Confirm that cable tie is set in front of the clip as shown in illustration.

Figure 12-154 Confirming cable tie

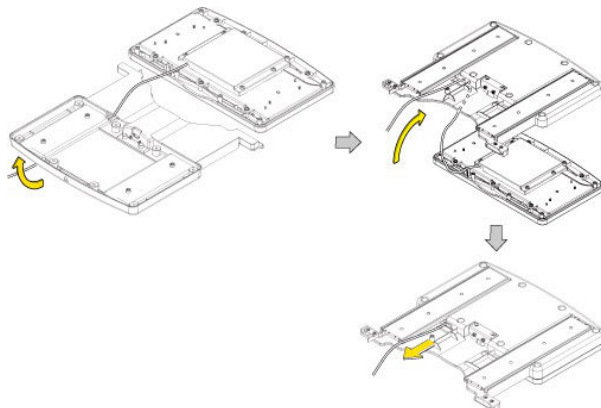


6. Flip the AN KEYBOARD LOWER COVER to the AN KEYBOARD ASSY as shown in illustration.

NOTE

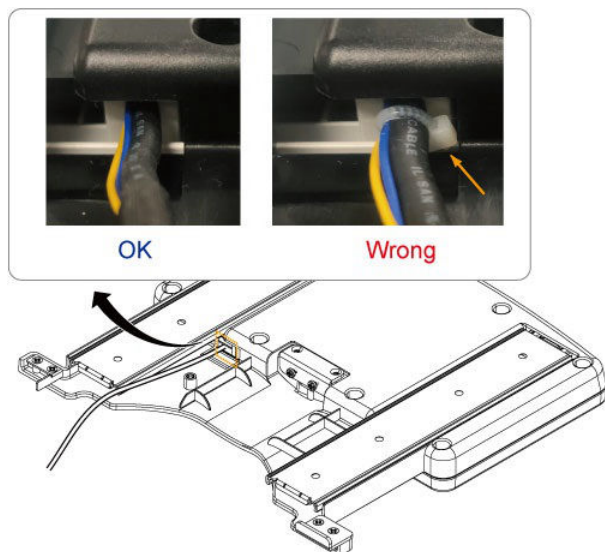
Pull out the slackened cable from the opening.

Figure 12-155 Flipping the AN KEYBOARD LOWER COVER



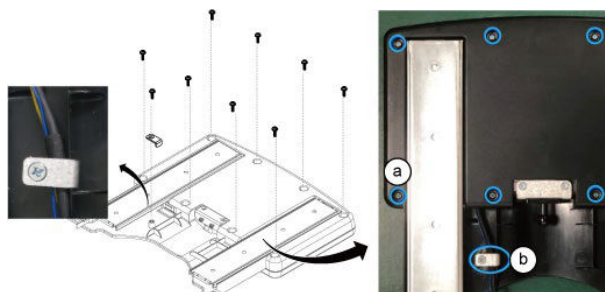
7. Confirm that the cable tie is not visible through the cable opening.

Figure 12-156 Confirming the cable tie



8. Perform the following steps.
 - a. Fix with 8 screws.
 - b. Fix the cable with AN KEY CABLE COVER BRKT with 1 screw as shown.
 - c. Confirm cable tie not visible again.

Figure 12-157 Fixing AN KEYBOARD LOWER COVER



9. Perform the following steps.
 - a. Flip the keyboard and place it near the AN KEYBOARD FRAME COVER as shown in illustration.
 - b. Route the cables through the opening of the AN KEYBOARD FRAME COVER.

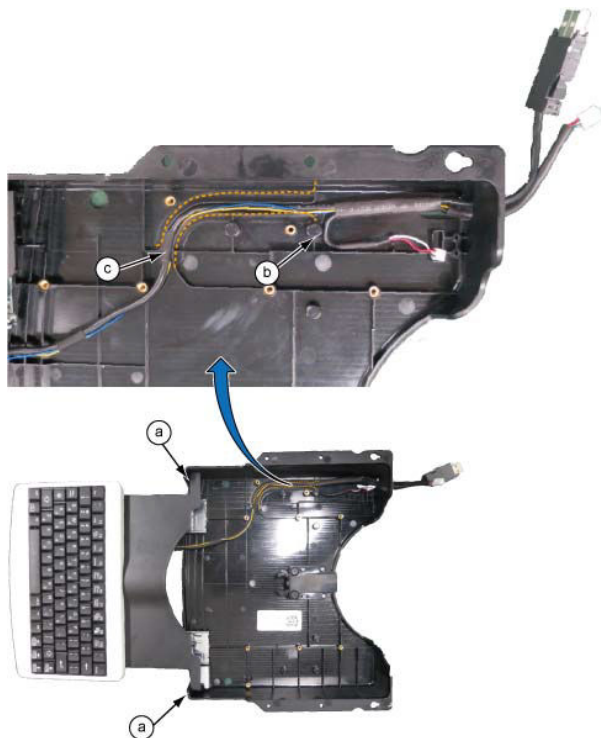
Figure 12-158 Flipping the keyboard and routing the cables



10. Fix the cable per following steps.

- a. Set the tabs of keyboard to the KEYBOARD FRAME COVER as shown (Maximum forward in the frame cover).
- b. Align the branch of the cable with the "b" position.
- c. Set the cable in the cable guide groove.

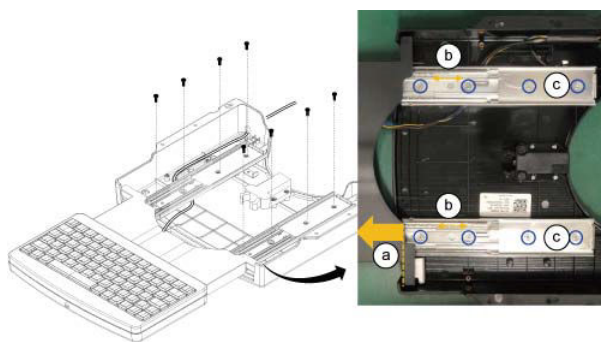
Figure 12-159 Fixing the cable



11. Fix the slide rails per following steps.

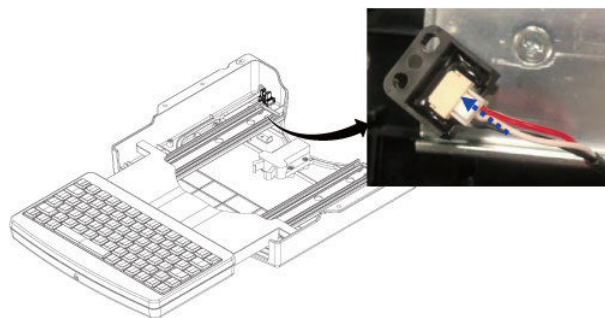
- a. Set the keyboard to the maximum forward.
- b. Extend and adjust the slide rail to the position where the 8 screws are visible.
- c. Fix the slide rails with the 8 screws.

Figure 12-160 Fixing the slide rails



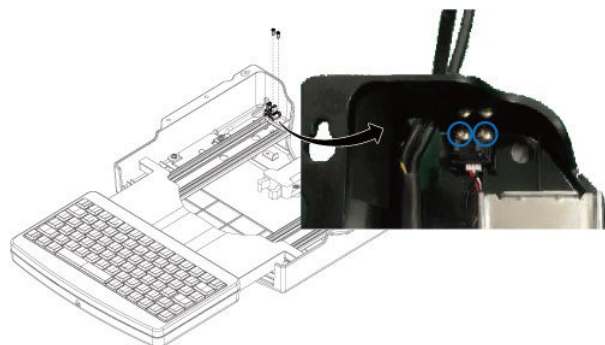
12. Connect the connector to the position sensor.

Figure 12-161 Connecting the position sensor connector



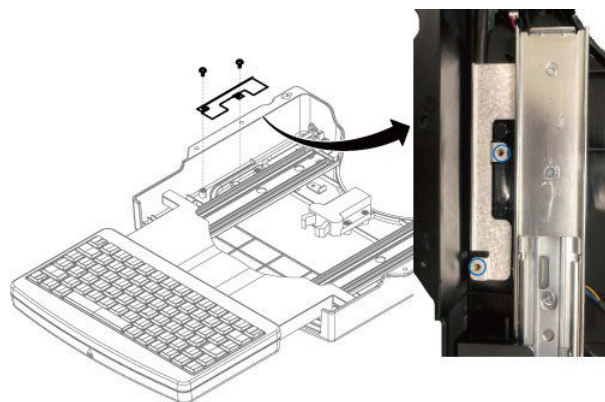
13. Install the position sensor with 2 screws.

Figure 12-162 Installing position sensor



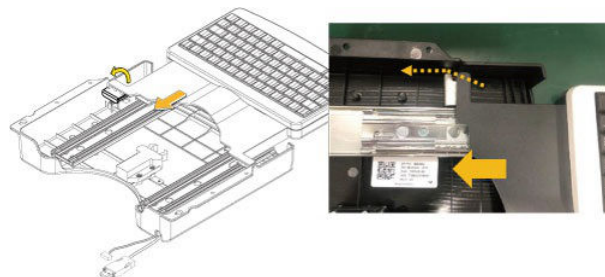
14. Install the SLIDE CABLE FIX BRKT with 2 screws.

Figure 12-163 Installing SLIDE CABLE FIX BRKT



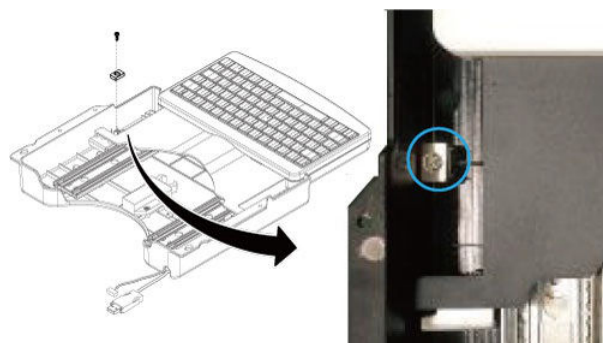
15. Slide the keyboard backward.

Figure 12-164 Sliding the keyboard backward



16. Install the magnet with a screw.

Figure 12-165 Installing the magnet



17. Reinstall the DRAWER AN KEYBOARD. Refer to *OPTIONAL DRAWER AN KEYBOARD Replacement* on page 485

12.4.2.16.3 OPTIONAL DRAWER AN KEYBOARD Cable - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.4.2.16.4 OPTIONAL DRAWER AN KEYBOARD Cable - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.4.2.16.5 OPTIONAL DRAWER AN KEYBOARD Cable - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-45 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Alphanumeric keyboard functional checks on page 158</i>	
<i>Power shut down on page 113</i>	

12.5 Main Console Parts Replacement

12.5.1 Replacing Front End Acquisition / Card Cage parts

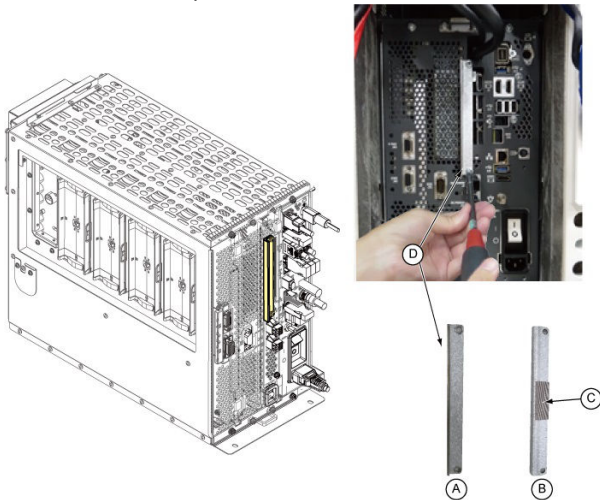
12.5.1.1 DA192 Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-46 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 12-47 Changes of DPI(-L) PWA Replacement Procedure with GPU A4000

Title	Detail
Overview	GPU A4000 is newly introduced from LOGIQ Fortis R3.1.2. NOTE R3.1.2 supports both GPU A4000 and GPU P4000. NOTE R4 and later supports GPU A4000 Only. DPI(-L) PWA Replacement Procedure is changed if GPU A4000 is installed on BEPS Assy. In this replacement procedure, the changes are indicated as “GPU A4000 Console, R4 and later”.
Affected Procedure	For GPU A4000 Console, “EMI SUB Bracket L2 with gasket” must be restored properly as it’s a countermeasure part for noise issue.  - A: Front View of EMI SUB Bracket L2 with gasket - B: Rear View of EMI SUB Bracket L2 with gasket - C: Gasket - D: L shaped bending handle

**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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

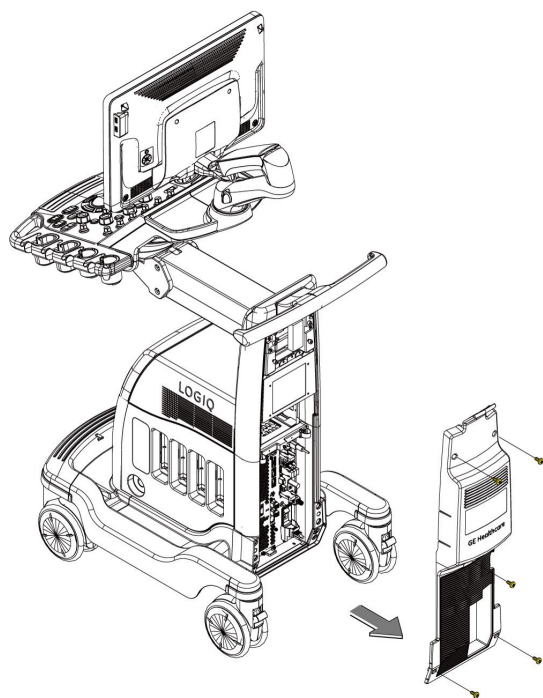
12.5.1.1.1 DA192 - Removal procedure

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.

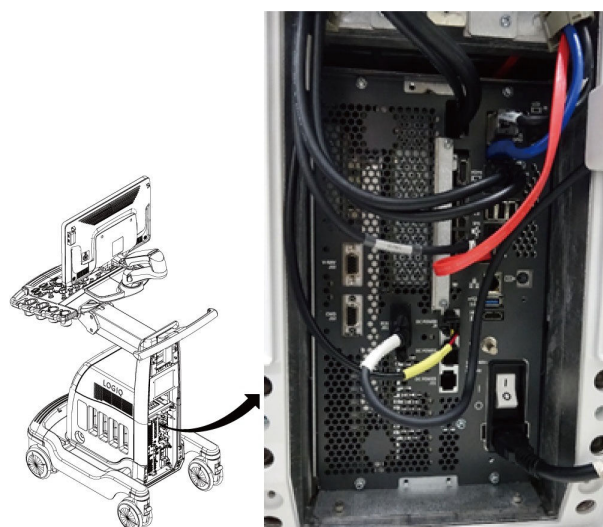
1. Unscrew 5 screws and remove the rear cover.

Figure 12-166 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-167 Disconnecting all cables

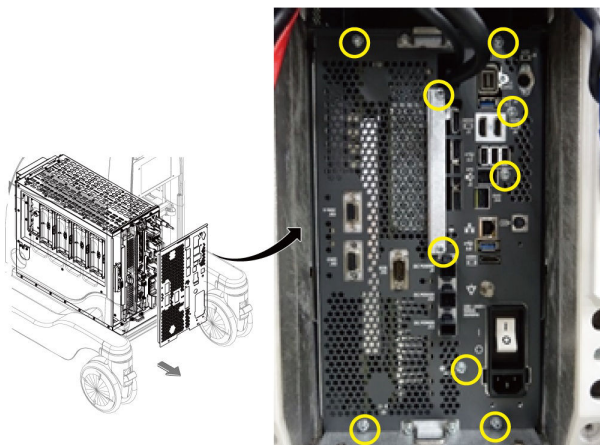


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

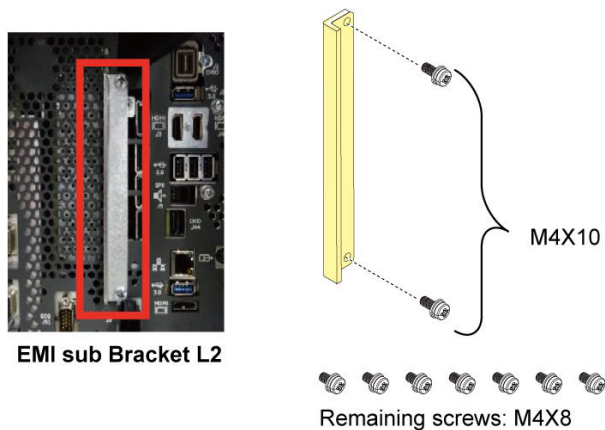
Figure 12-168 Removing NEST EMI back bracket

**NOTE**

For GPU A4000 Console, R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-169 EMI sub bracket

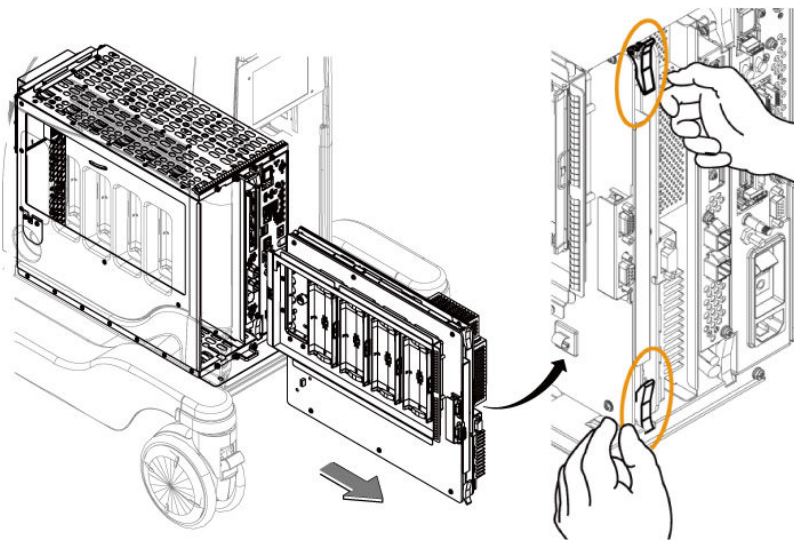


4. Pull out DA192/DPI-L Board Assy per following steps.
 - a. Pull out DA192/DPI-L Board Assy.

NOTE

Use Card Puller to pull out.

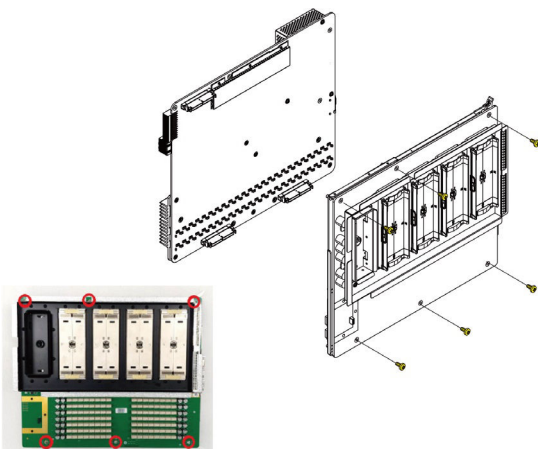
Figure 12-170 Pulling out DA192/DPI-L



b. Place it on an ESD safe place.

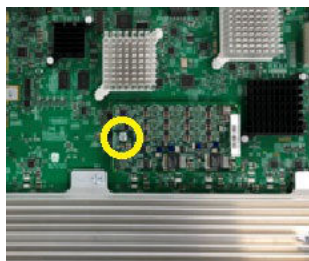
5. Unscrew 6 screws to disassemble DA192 and DPI-L Board Assy.

Figure 12-171 Disassembling DA192 and DPI-L



6. 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.

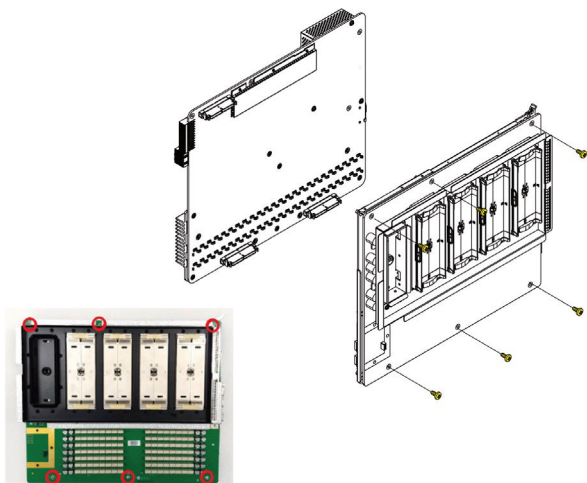
Figure 12-172 Removing/Installing GCW option



12.5.1.1.2 DA192 - Installation procedure

1. Assemble DA192 and DPI PWA Board with 6 screws.

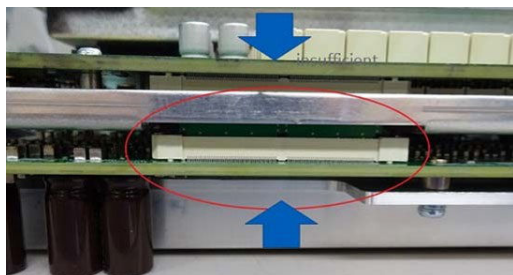
Figure 12-173 Assembling DA192 and DPI PWA



NOTE

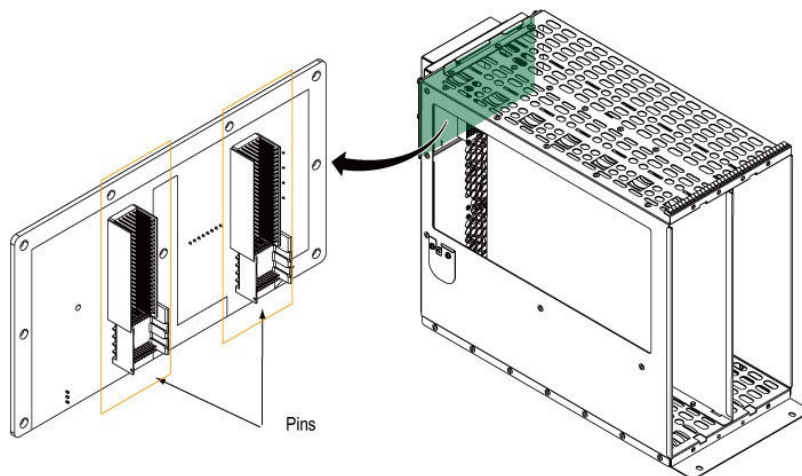
Confirm the Stacking-connection before install the Assy to the system.

Figure 12-174 Stacking-connection check



2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

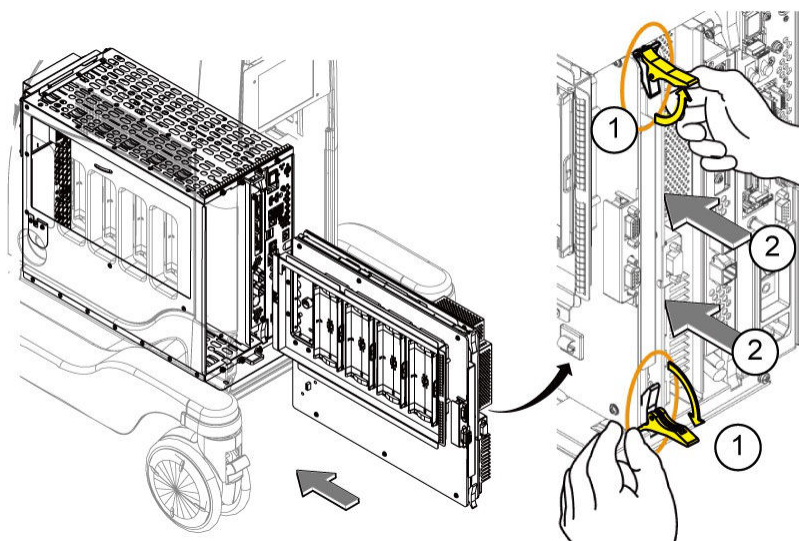
Figure 12-175 Checking pins on backboard



3. Put DA192/DPI(-L) Board Assy back to the system.

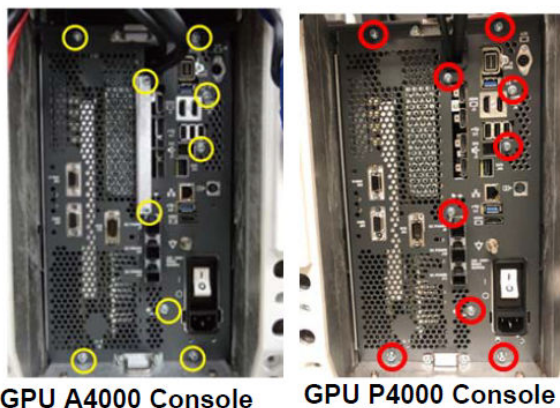
NOTE

When inserting the board, flip the ejector tabs and push the board to seat it easily and firmly. Once the board is seated, restore the ejector position.



4. Re-install the NEST EMI BACK BRKT L2 with 9 screws.

Figure 12-176 NEST EMI BACK BRKT L2



GPU A4000 Console

GPU P4000 Console

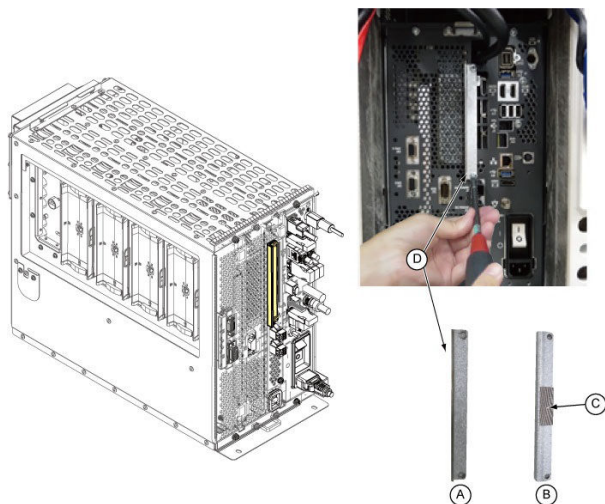
NOTE

GPU A4000 Console , R4 and later: Re-install the NEST EMI BACK BRKT L2 with 7 screws(2159625, SCREW PH WSP M4X8) and EMI SUB Bracket L2 with 2 screws (2159634, SCREW BH M4X10).

NOTE

GPU A4000 Console , R4 and later: L-shaped bending handle of EMI SUB Bracket L2 should be at the left side when facing to the NEST EMI BACK BRKT.

Figure 12-177 EMI SUB Bracket L2



- A: Front View of EMI SUB Bracket L2 with gasket
- B: Rear View of EMI SUB Bracket L2 with gasket
- C: Gasket
- D: L shaped bending handle

5. Connect all cables to NEST.
6. Re-install the rear cover removed.

12.5.1.1.3 DA192 - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.1.4 DA192 - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.1.5 DA192 - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-48 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Top console adjustment control functional checks on page 152</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.2 DPI-L PWA Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-49 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



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, perform *Lockout/tagout procedure* on page 50.

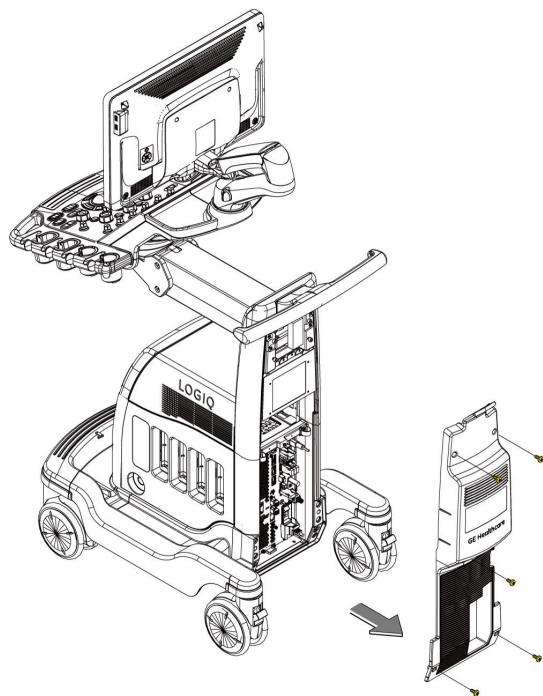
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.2.1 DPI-L PWA - Removal procedure

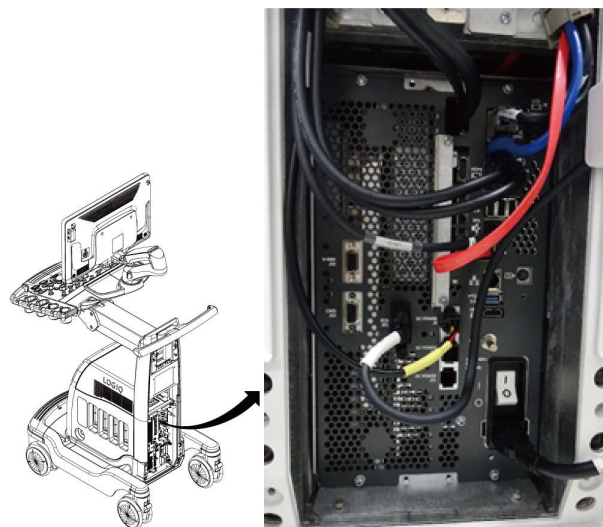
1. Unscrew 5 screws and remove the rear cover.

Figure 12-178 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-179 Disconnecting all cables

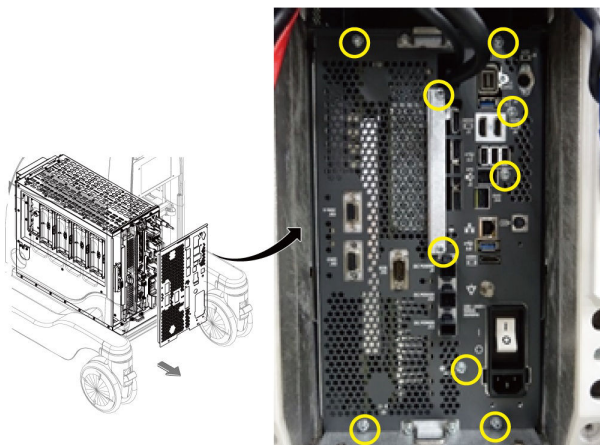


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

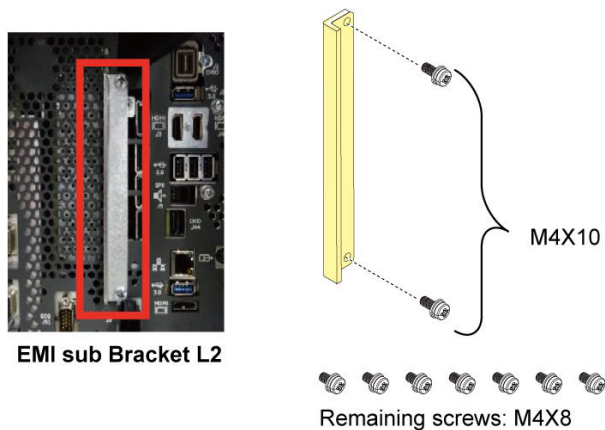
Figure 12-180 Removing NEST EMI back bracket

**NOTE**

For GPU A4000 Console, R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-181 EMI sub bracket

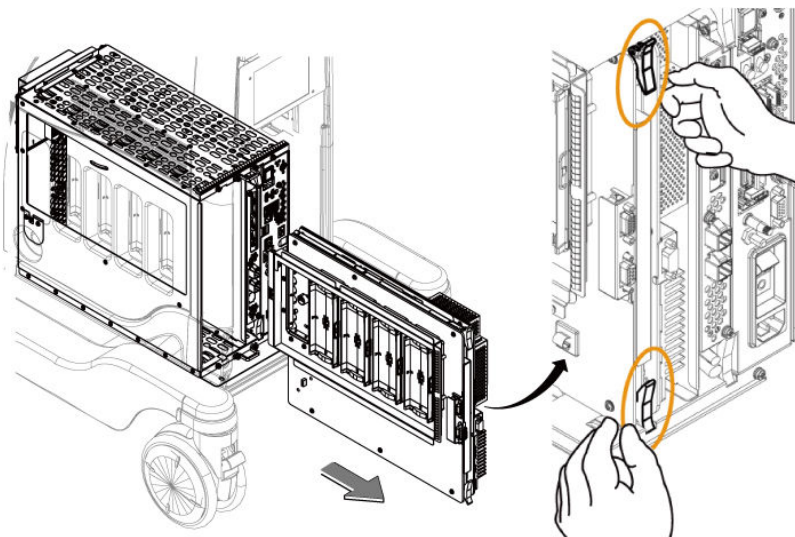


4. Pull out DA192/DPI-L Board Assy per following steps.
 - a. Pull out DA192/DPI-L Board Assy.

NOTE

Use Card Puller to pull out.

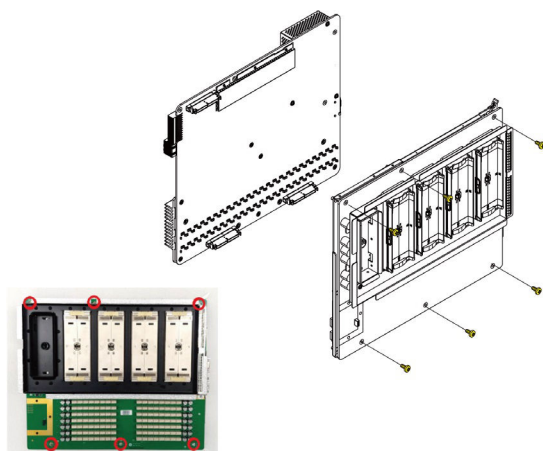
Figure 12-182 Pulling out DA192/DPI-L



b. Place it on an ESD safe place.

5. Unscrew 6 screws to disassemble DA192 and DPI-L Board Assy.

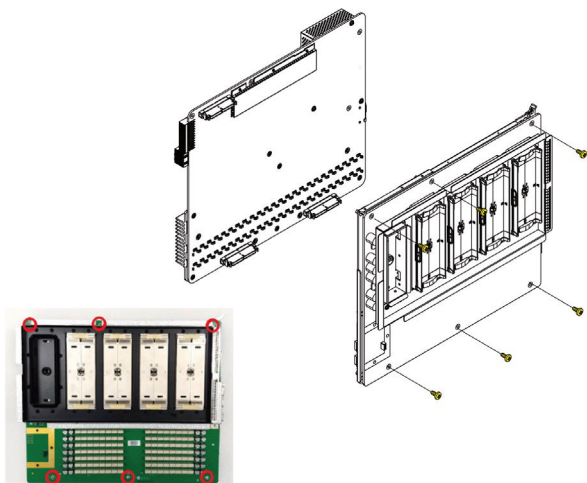
Figure 12-183 Disassembling DA192 and DPI-L



12.5.1.2.2 DPI-L PWA - Installation procedure

1. Assemble DA192 and DPI PWA Board with 6 screws.

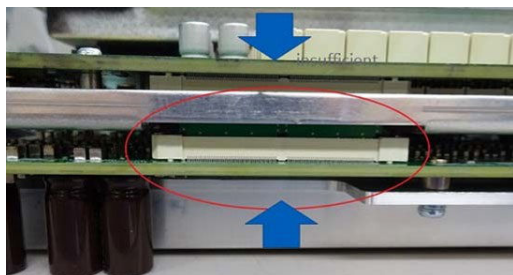
Figure 12-184 Assembling DA192 and DPI PWA



NOTE

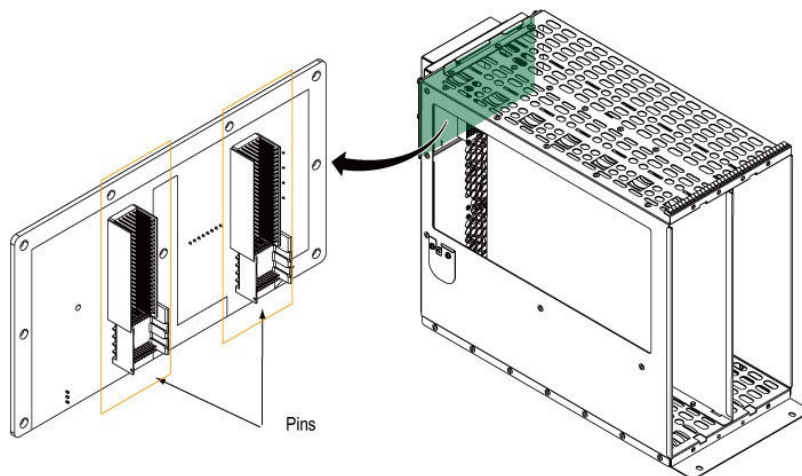
Confirm the Stacking-connection before install the Assy to the system.

Figure 12-185 Stacking-connection check



2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

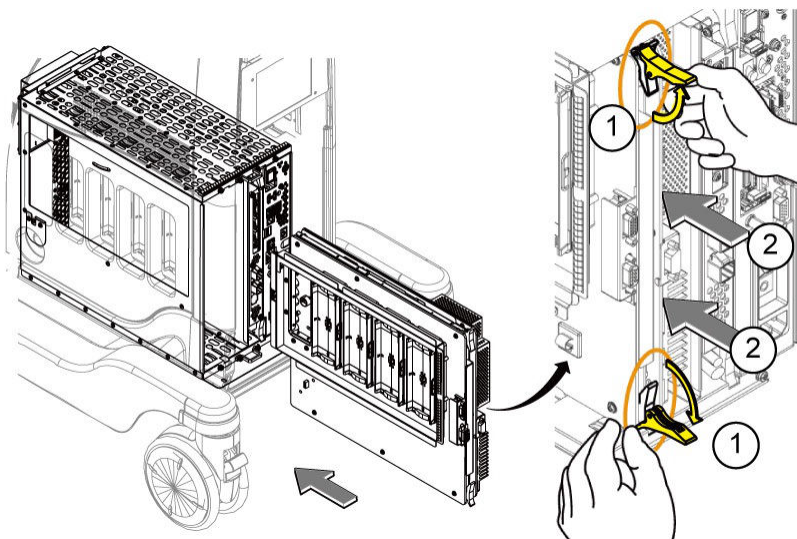
Figure 12-186 Checking pins on backboard



3. Put DA192/DPI(-L) Board Assy back to the system.

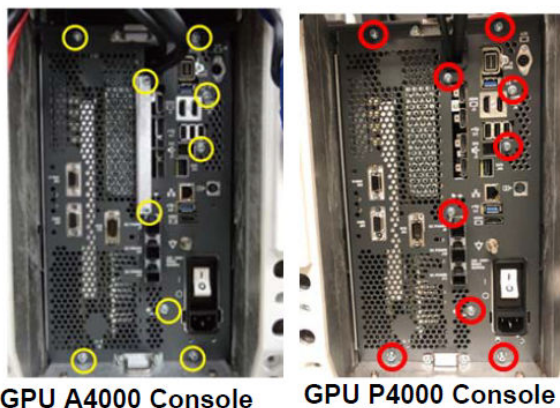
NOTE

When inserting the board, flip the ejector tabs and push the board to seat it easily and firmly. Once the board is seated, restore the ejector position.



4. Re-install the NEST EMI BACK BRKT L2 with 9 screws.

Figure 12-187 NEST EMI BACK BRKT L2



GPU A4000 Console

GPU P4000 Console

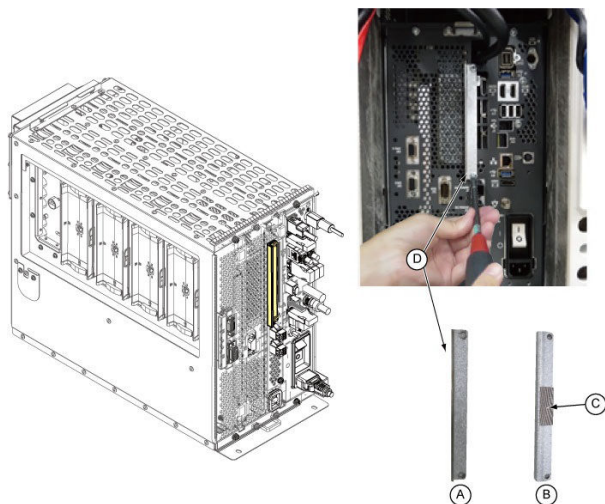
NOTE

GPU A4000 Console , R4 and later: Re-install the NEST EMI BACK BRKT L2 with 7 screws(2159625, SCREW PH WSP M4X8) and EMI SUB Bracket L2 with 2 screws (2159634, SCREW BH M4X10).

NOTE

GPU A4000 Console , R4 and later: L-shaped bending handle of EMI SUB Bracket L2 should be at the left side when facing to the NEST EMI BACK BRKT.

Figure 12-188 EMI SUB Bracket L2



- A: Front View of EMI SUB Bracket L2 with gasket
- B: Rear View of EMI SUB Bracket L2 with gasket
- C: Gasket
- D: L shaped bending handle

5. Connect all cables to NEST.
6. Re-install the rear cover removed.

12.5.1.2.3 DPI-L PWA - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.2.4 DPI-L PWA - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.2.5 DPI-L PWA - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-50 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Top console adjustment control functional checks on page 152</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.3 BEPS Assy Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-51 Manpower, Time, Tools, and PPE

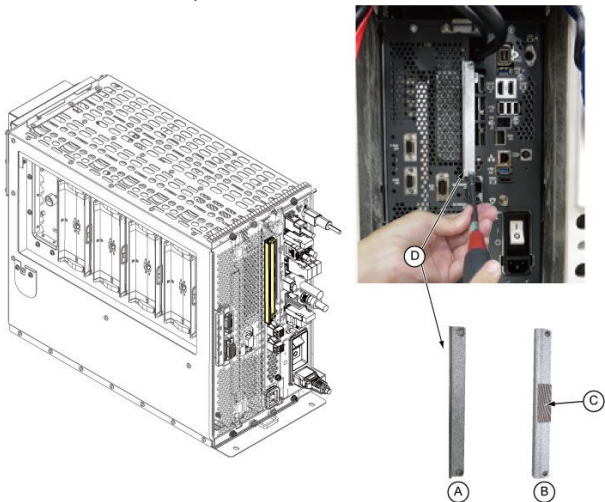
Manpower	Time	Tools	PPE
One person	Approximately 15 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap

Table 12-52 Changes of BEPS Assy Replacement Procedure with GPU A4000

Title	Detail
Overview	GPU A4000 is newly introduced from LOGIQ Fortis R3.1.2. NOTE R3.1.2 supports both GPU A4000 and GPU P4000. NOTE R4 and later supports GPU A4000 Only. DA192 Replacement Procedure is changed if GPU A4000 is installed on BEPS Assy. In this replacement procedure, the changes are indicated as “GPU A4000 Console, R4 and later”.
Note	The followings are the information for GPU A4000 and P4000. 1. Production for China market continues to use P4000 GPU. 2. If software version is R3.1.1 or before, GPU type must be P4000. A4000 GPU is supported from R3.1.2 software. Please note that R3.1.2 supports both GPU A4000 and P4000. 3. If the production date is August 2022 or before, GPU type must be P4000. Manufacturing started using A4000 around the end of August, 2022 for global market except China. Use this information and make like for like replacement plan.

Table 12-53 Changes of BEPS Assy Replacement Procedure with GPU A4000

Title	Detail
Affected Procedure1	NOTE R4 and later supports GPU A4000 Only. For GPU A4000 Console, “EMI SUB Bracket L2 with gasket” must be reused as it’s a countermeasure part for noise issue. When replacing BEPS Assy, check if DC COVER BRKT of original BEPS Assy has gasket or not. If it has gasket, replace the DC COVER BRKT per following procedure. 1. Remove the 4 screws and DC COVER BRKT from both original BEPS Assy and new BEPS Assy. 2. Install the DC COVER BRKT with gasket on new BEPS Assy. Then, install the DC COVER BRKT without gasket on original BEPS Assy before returning the part. • A: Original BEPS Assy • B: New BEPS Assy • C: DC COVER BRKT with gasket • D: DC COVER BRKT without gasket

Title	Detail
Affected Procedure2	NOTE R4 and later supports GPU A4000 Only. For GPU A4000 Console, “EMI SUB Bracket L2 with gasket” must be restored properly as it’s a countermeasure part for noise issue.  - A: Front View of EMI SUB Bracket L2 with gasket - B: Rear View of EMI SUB Bracket L2 with gasket - C: Gasket - D: L shaped bending handle

**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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

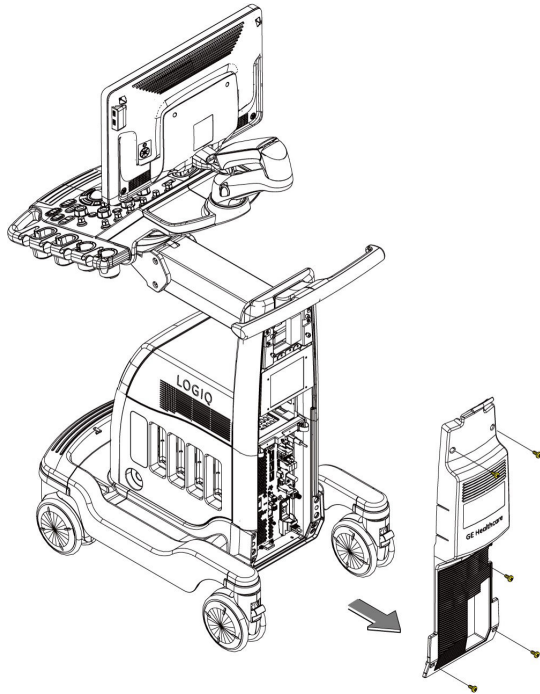
12.5.1.3.1 BEPS Assy - Removal procedure

**WARNING**

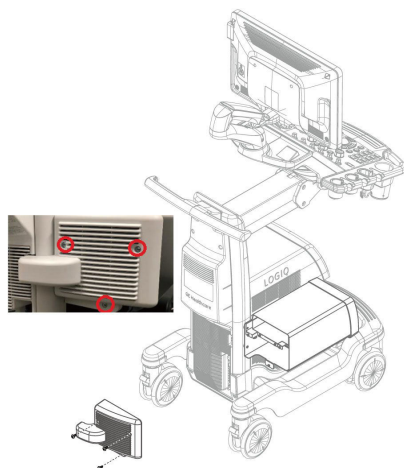
DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. The power module may be energized even if the power is turned OFF and the AC power cable is disconnected. Disconnect the power cable from the power module (battery) as well to prevent electric shock.

1. Unscrew 5 screws and remove the rear cover.

Figure 12-189 Removing rear cover

**NOTE**

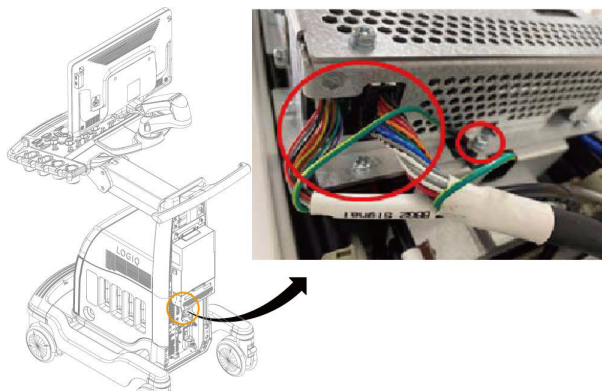
Side cabinet option is installed, remove the rear cover of Side Cabinet before removing the rear cover.



2. If the system has Scan on Battery /Power Assistant option, remove the battery cables.
 - a. Disconnect BBG2 Signal Cable and BBG2 Power Cable from Scan on Battery /Power Assistant option.

- b. Unscrew 1 screw to remove one ground line.

Figure 12-190 Disconnecting BBG2 Signal Cable, BBG2 Power Cable, and GND cable



NOTE

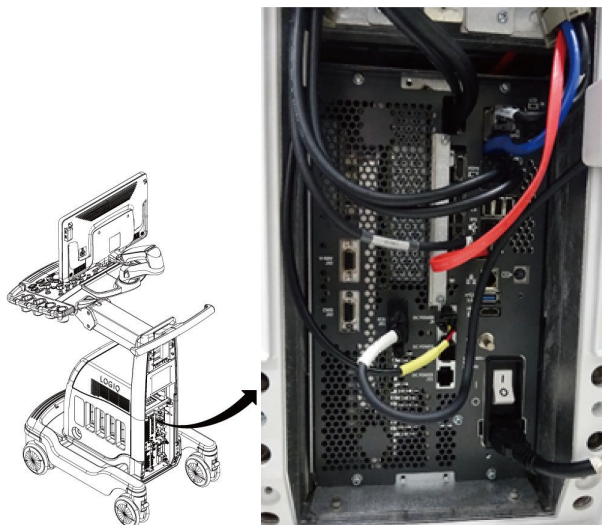
Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob.

Figure 12-191 Unlatching cables



3. Disconnect all cables from NEST.

Figure 12-192 Disconnecting all cables

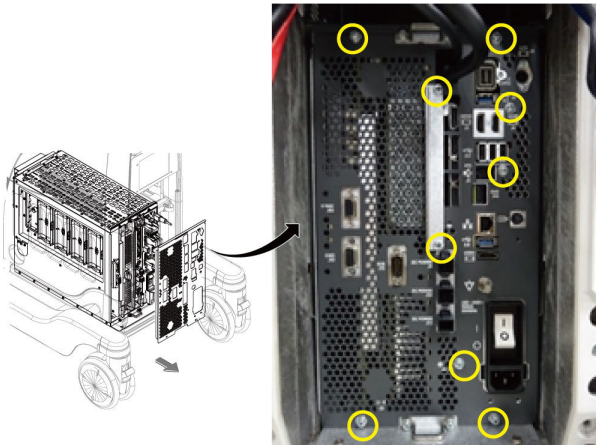


4. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

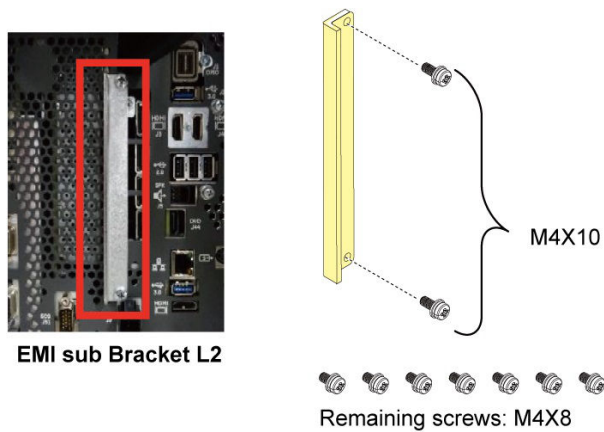
Figure 12-193 Removing NEST EMI back bracket

**NOTE**

For GPU A4000 Console, R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-194 EMI sub bracket



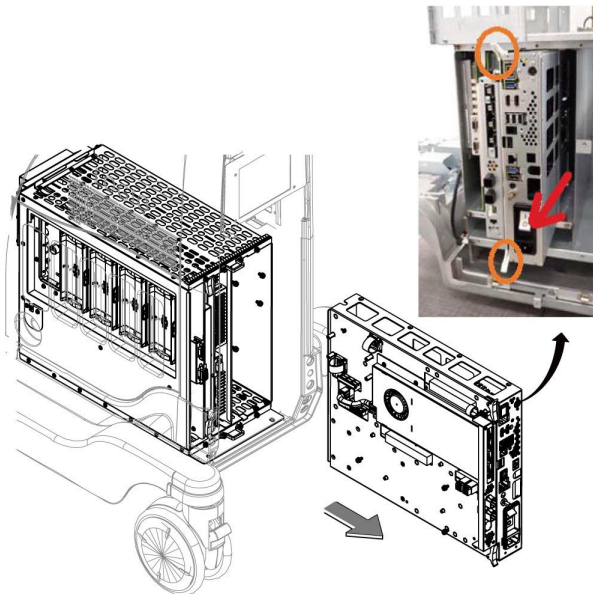
5. Pull out the BEPS Assy per following steps.

- a. Pull out the BEPS Assy.

NOTE

Use Card Puller to pull out.

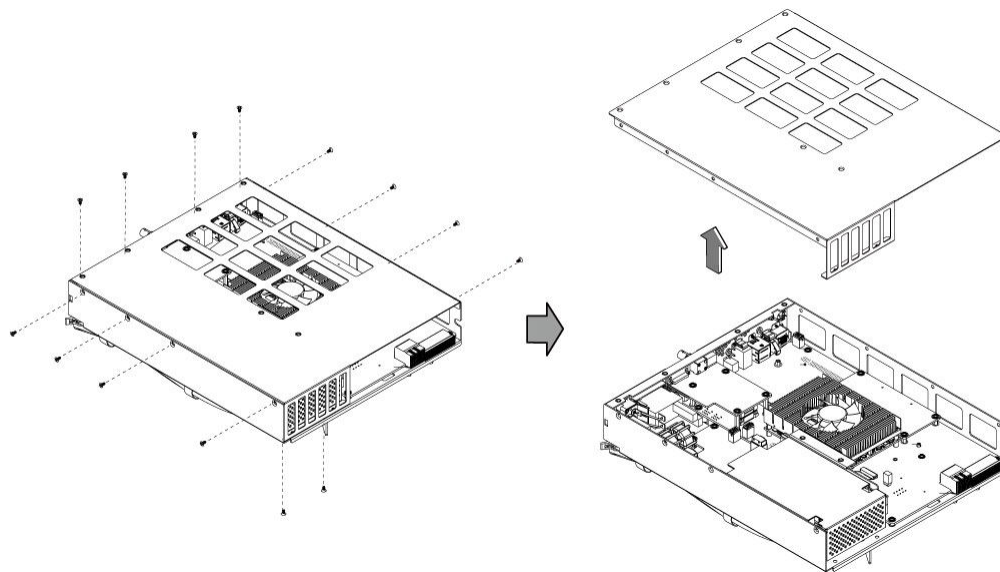
Figure 12-195 Pulling out BEPS Assy



b. Place it on an ESD safe place.

6. Remove BEPS TOP PLATE from current BEPS Assy and new BEPS Assy (14 screws).

Figure 12-196 Removing BEPS TOP PLATE

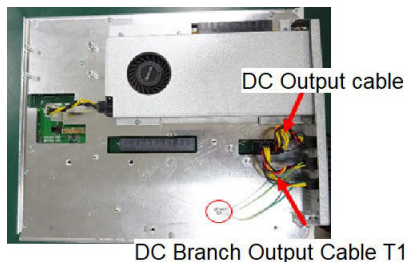


7. Take EEPROM, SOM, SSD and GPU (also DC4D and VCS, if installed.) out from current BEP Assy. Install those parts on new BEPS Assy.

- *#unique_577*
- *SOM replacement* on page 551
- *SSD replacement* on page 556
- *GPU replacement* on page 544
- *DC4D Replacement* on page 570
- *VCS (S-Video) Replacement* on page 576

8. Remove the DC Output Cable and DC Branch Output Cable T1 with one screw from the BEP Assy and keep it. Re-use it with new BEP Assy.

Figure 12-197 Removing DC Output Cable and DC Branch Output Cable T1



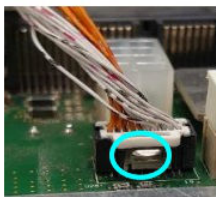
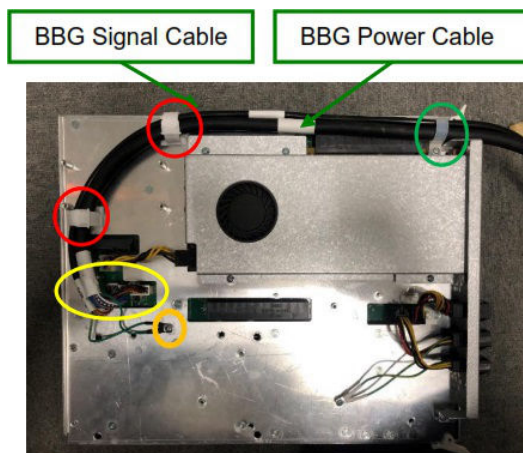
9. If the system has Scan on Battery /Power Assistant option, remove the battery cables to reuse them for new BEPS2 Assy.
 - a. Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (RED CIRCLE).
 - b. Loosen one screw and Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (GREEN CIRCLE).
 - c. Loosen one screw and disconnect the ground cable of the BBG2 power cable (ORANGE CIRCLE).
 - d. Disconnect the BBG2 Signal Cable and BBG2 Power Cable (YELLOW CIRCLE).



WARNING

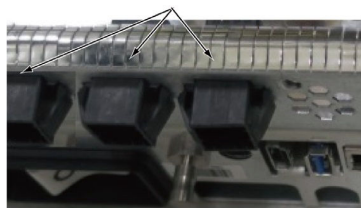
Hold down a knob (LIGHT BLUE CIRCLE) to unlatch the connector and then disconnect a cable. Connector may DAMAGE if you don't hold a knob.

Figure 12-198 Disconnecting BBG2 signal cable and BBG2 power cable



10. **GPU A4000 Console, R4 and later:** Remove 3 DC Output Cable from DC Output BRKT.

Figure 12-199 Removing 3 DC Output Cable

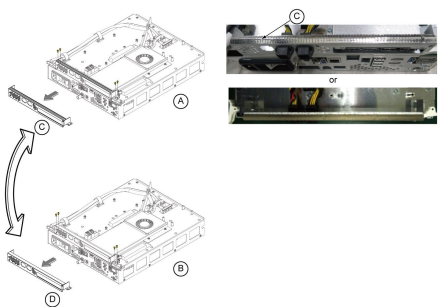


11. **GPU A4000 Console, R4 and later:** Remove the 4 screws and DC COVER BRKT from both original BEPS Assy and new BEPS Assy.
12. **GPU A4000 Console, R4 and later:** Install the DC COVER BRKT with gasket on new BEPS Assy.

NOTE

Install the DC COVER BRKT without gasket on original BEPS Assy before returning the part.

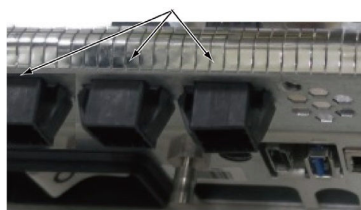
Figure 12-200 Replacing DC COVER BRKT



- A: Original BEPS Assy
- B: New BEPS Assy
- C: DC COVER BRKT with gasket
- D: DC COVER BRKT without gasket

13. **GPU A4000 Console, R4 and later:** Install 3DC Output Cable to the DC Output BRKT on new BEPS Assy.

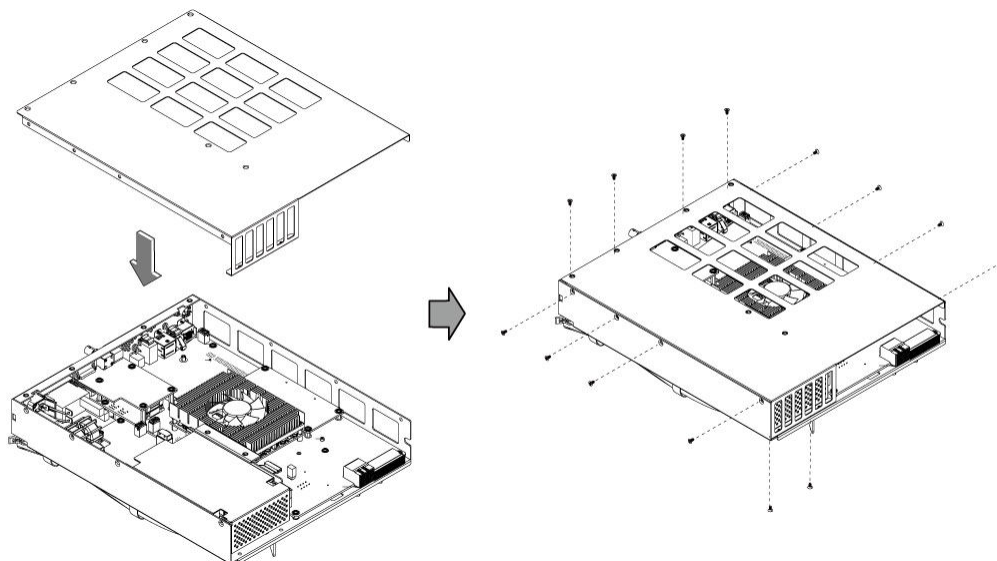
Figure 12-201 Installing 3DC Output Cable



12.5.1.3.2 BEPS Assy - Installation procedure

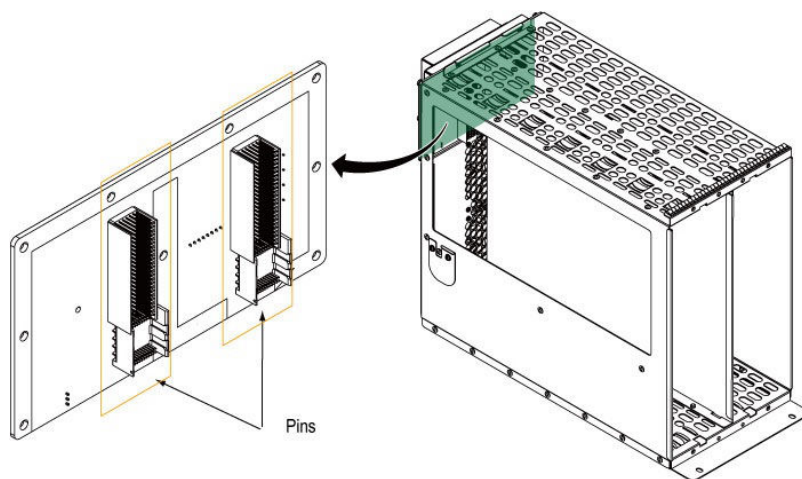
1. Assemble BEPS TOP PLATE with 14 screws.

Figure 12-202 Assembling BEPS TOP PLATE



2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-203 Checking pins on backboard

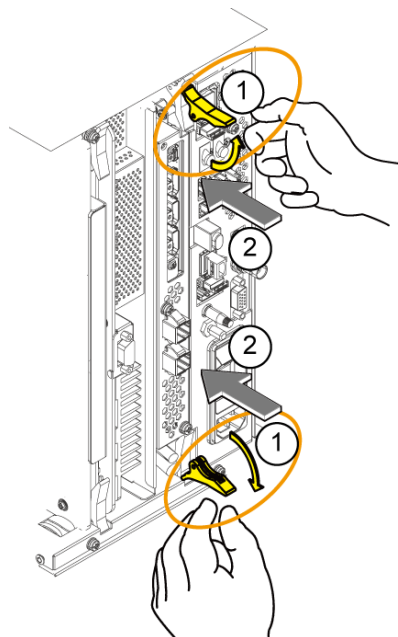


3. Put BEPS Assy back to the system.

NOTE

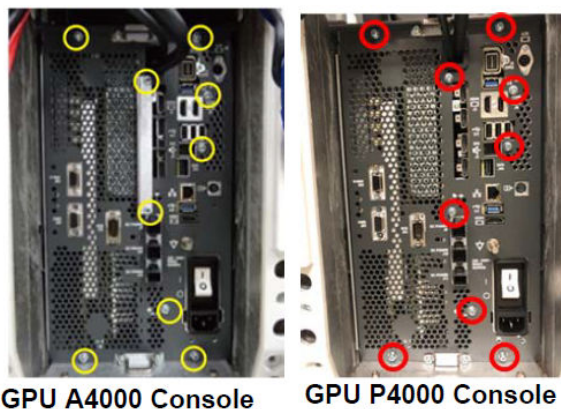
When inserting the board, flip the ejector tabs and push the board to seat it easily and firmly. Once the board is seated, restore the ejector position.

Figure 12-204 Installing BEPS



4. Re-install the NEST EMI BACK BRKT L2 with 9 screws.

Figure 12-205 NEST EMI BACK BRKT L2



GPU A4000 Console

GPU P4000 Console

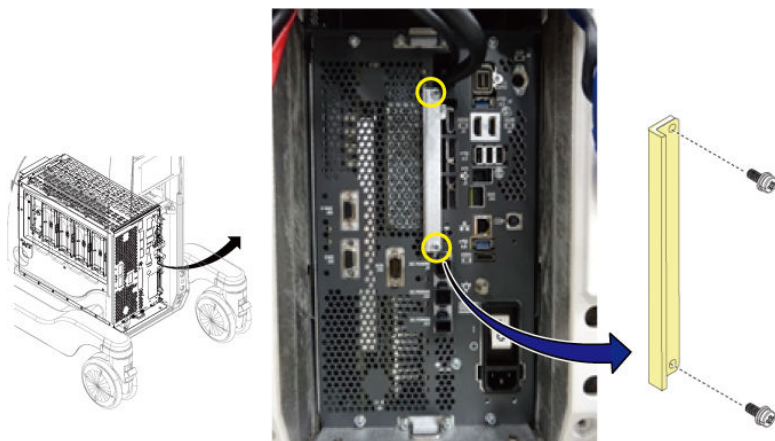
NOTE

GPU A4000 Console , R4 and later: Re-install the NEST EMI BACK BRKT L2 with 7 screws(2159625, SCREW PH WSP M4X8) and EMI SUB Bracket L2 with 2 screws (2159634, SCREW BH M4X10).

NOTE

GPU A4000 Console , R4 and later: L-shaped bending handle of EMI SUB Bracket L2 should be at the left side when facing to the NEST EMI BACK BRKT.

Figure 12-206 EMI SUB Bracket L2



5. Connect all cables to NEST.
6. Re-install the rear cover removed.

12.5.1.3.3 BEPS Assy - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.3.4 BEPS Assy - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.3.5 BEPS Assy - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-54 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks</i> on page 161	
<i>B-Mode functional checks</i> on page 162	
<i>System CFM and PWD functional checks</i> on page 165	
<i>Power Assistant functional checks</i> on page 181 or <i>Scan on Battery functional checks</i> on page 182 (if the system has Battery Option)	
<i>4D option functional checks</i> on page 179	
<i>Grounding continuity test</i> on page 775	
<i>Chassis leakage current test</i> on page 776	
<i>Power shut down</i> on page 113	

12.5.1.4 GBP (Backplane) Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-55 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



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

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 RECEPTICALS INTEGRATED ON THE FRAME, SPECIFICALLY FOR THAT PURPOSE.
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



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, perform *Lockout/tagout procedure* on page 50.

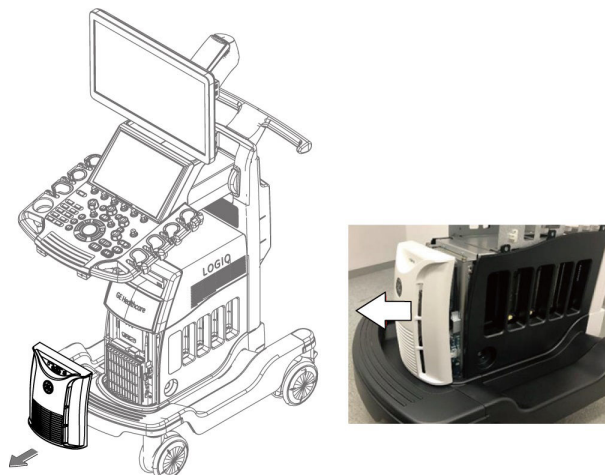
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.4.1 GBP (Backplane) - Removal procedure

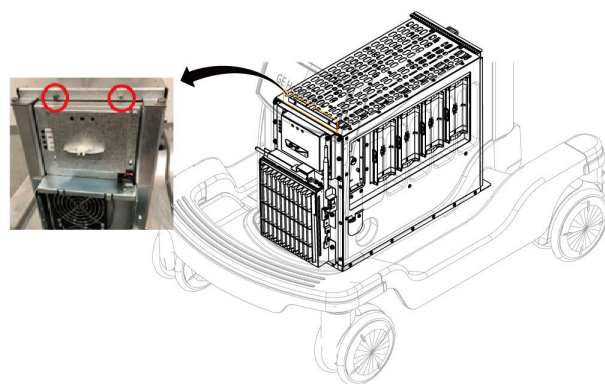
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-207 Removing Front Cover



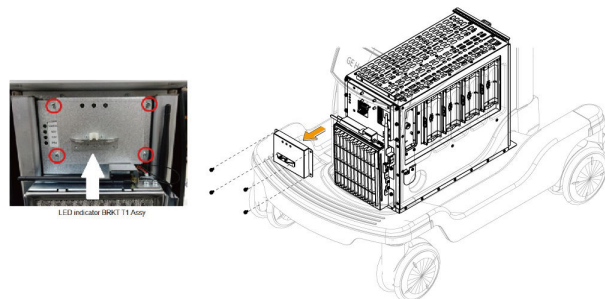
2. Unscrew 2 screws as shown in illustration below.

Figure 12-208 Unscrewing 2 screws



3. Remove LED Indicator BRKT by unscrewing 4 screws.

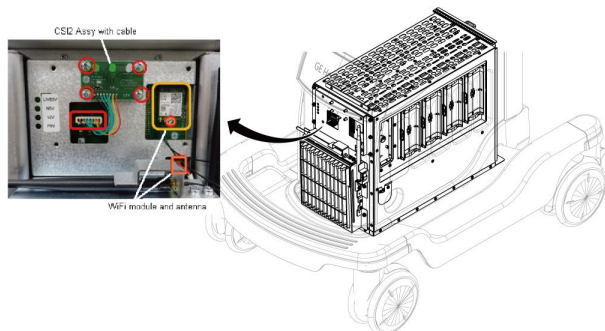
Figure 12-209 Removing LED Indicator BRKT



4. Unscrew 4 screws to remove CSI2 Assy and cable and Fan Assy cable (indicate red frame).

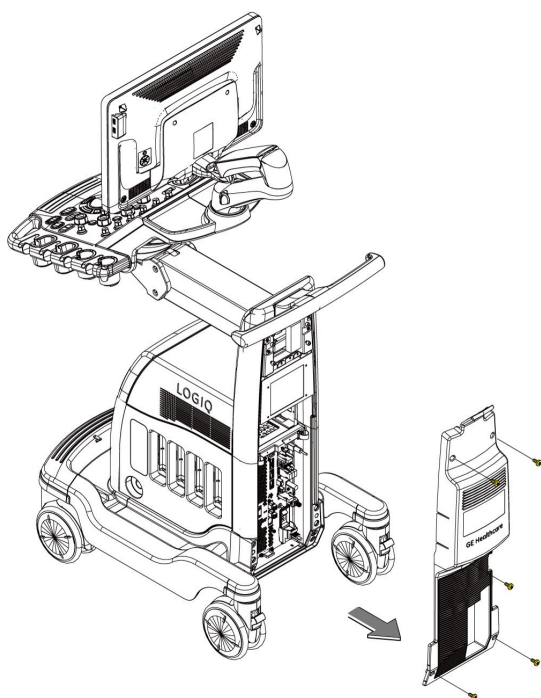
If the system has WiFi option, unscrew 1 screw to remove WiFi module and WiFi antenna (indicate orange frame).

Figure 12-210 Removing CSI2 Assy with cables



5. If not removed yet, unscrew 5 screws and remove the rear cover.

Figure 12-211 Removing rear cover

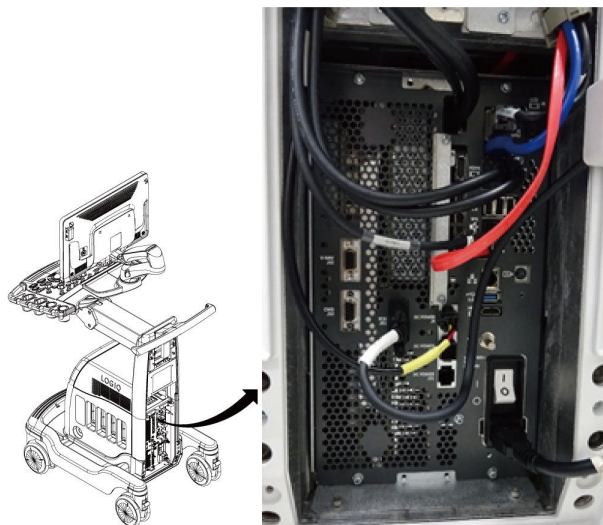


6. Disconnect all cables from NEST.

NOTE

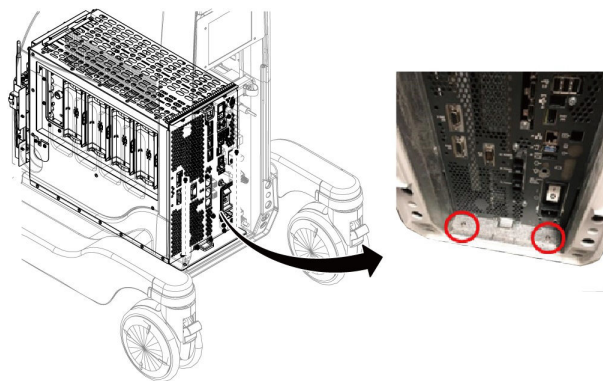
Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-212 Disconnecting all NEST cables



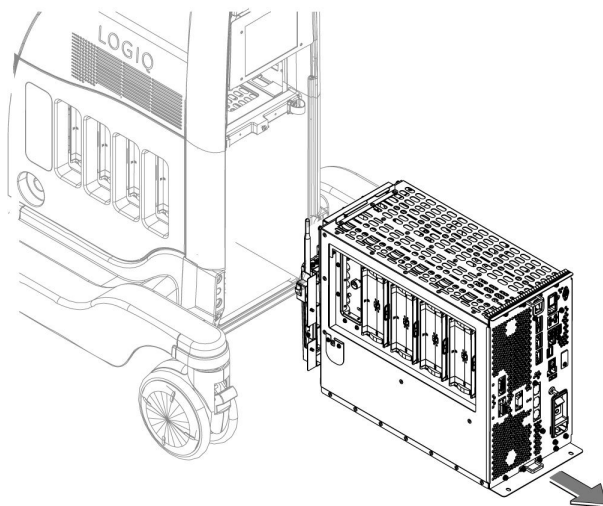
7. Unscrew 2 screws to remove NEST Assy.

Figure 12-213 Unscrewing 2 screws for NEST Assy



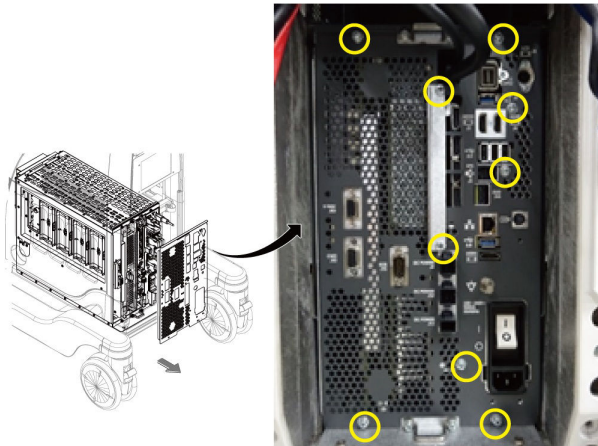
8. Pull out Nest box from console.

Figure 12-214 Pulling out Nest box



9. Remove the 9 screws securing the NEST EMI back bracket.

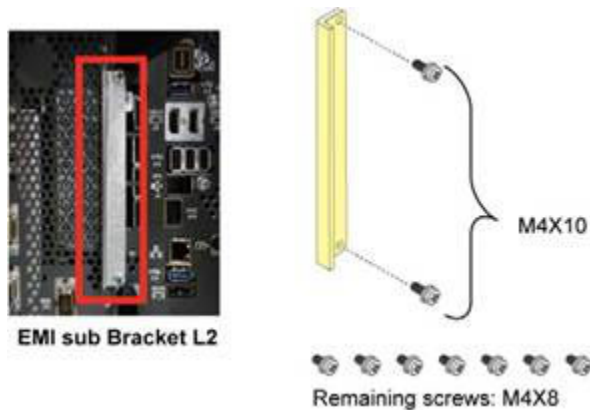
Figure 12-215 Removing 9 screws from NEST EMI back bracket



NOTE

GPU A4000 Console , R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later. This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-216 Removing EMI sub bracket

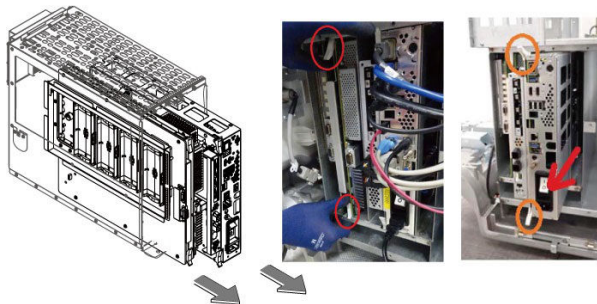


10. Slightly pull out the BEPS Assy and DA192/DPI-L Assy.

NOTE

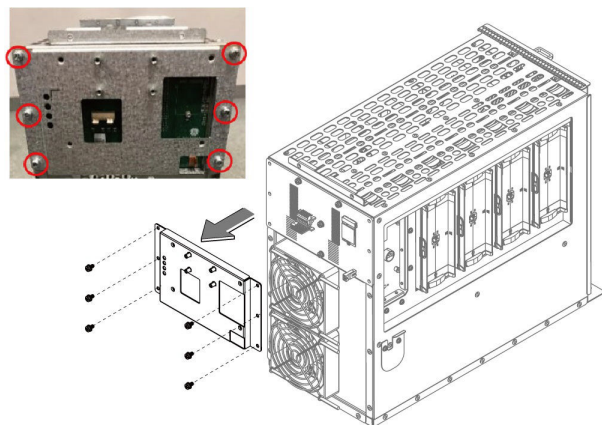
Use Card Puller to pull out.

Figure 12-217 Pulling out BEPS Assy and DA192/DPI-L



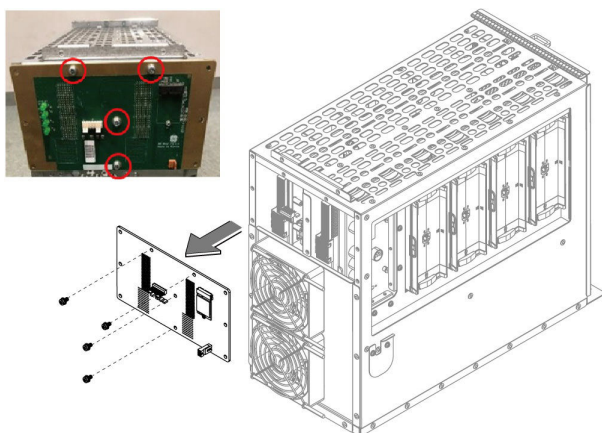
11. Remove BACKPLANE BRKT by removing 6 screws.

Figure 12-218 Removing BACKPLANE BRKT



12. Unscrew 4 screws to remove GBP.

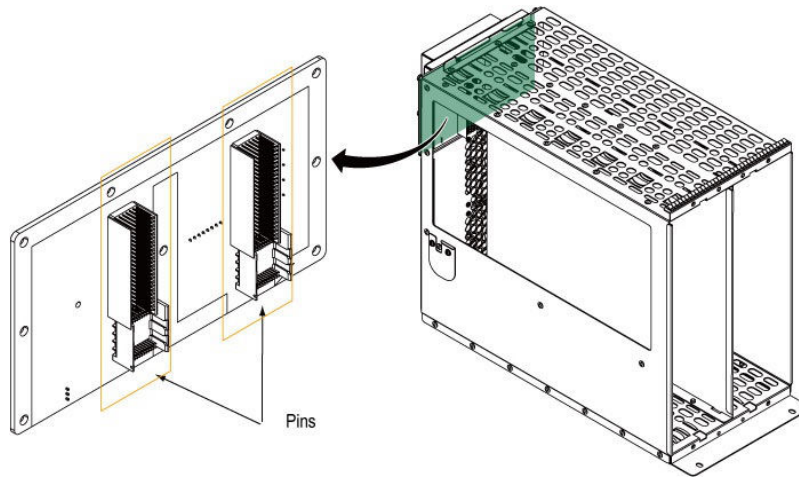
Figure 12-219 Removing GBP



12.5.1.4.2 GBP (Backplane) - Installation procedure

1. Assemble new GBP and BACKPLANE BRKT.
2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-220 Checking pins on backboard



3. Restore BEPS and DA192/DPI and NEST EMI back bracket.
4. Put Nest Box back to the system.
5. Assemble the Nest Box with 4 screws. (2 screws for front side and 2 screws for rear side).
6. Install CSI2 Assy and FAN Assy cable. If the system has WiFi option, install Wifi module and antenna.
7. Assemble LED Indicator BRKT.
8. Assemble BEPS/DPI-L/DA192 to Next box.
9. Connect all cables to NEST.
10. Re-install the rear cover and the front cover removed.

12.5.1.4.3 GBP (Backplane) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.4.4 GBP (Backplane) - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.4.5 GBP (Backplane) - Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-56 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.5 CSI2 (LED Indicator) Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-57 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



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, perform *Lockout/tagout procedure* on page 50.

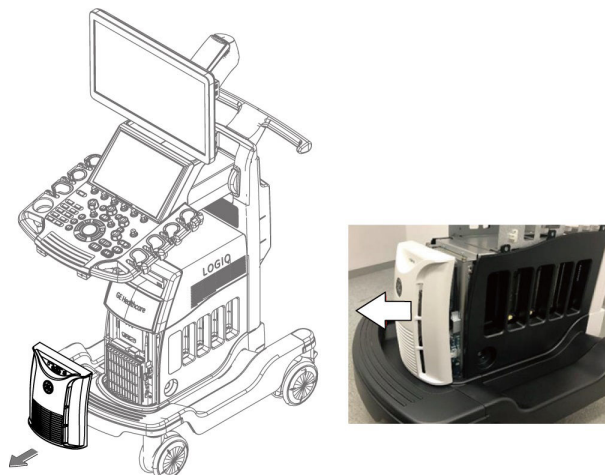
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.5.1 CSI2 (LED Indicator) - Removal procedure

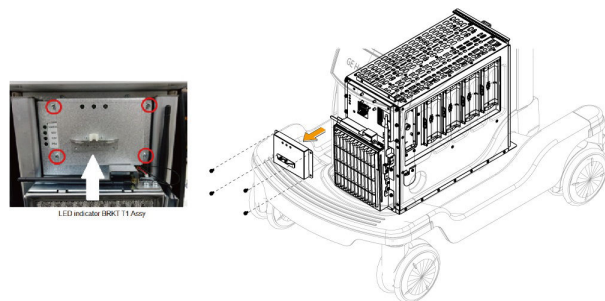
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-221 Removing front cover



2. Remove LED Indicator BRKT by unscrewing 4 screws.

Figure 12-222 Removing LED Indicator BRKT

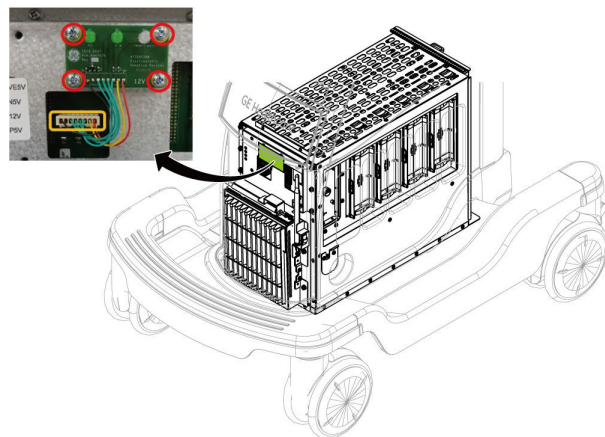


3. Remove CSI2 Assy and connector by unscrewing 4 screws.

NOTE

Pick both sides of the connector and pull it out. Don't pull the cable.

Figure 12-223 Removing CSI2 Assy and connector



12.5.1.5.2 CSI2 (LED Indicator) - Installation procedure

1. Assemble new CSI2 Assy.
2. Assemble LED indicator BRKT.
3. Re-install the front cover removed.

12.5.1.5.3 CSI2 (LED Indicator) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.5.4 CSI2 (LED Indicator) - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.5.5 CSI2 (LED Indicator) - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-58 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>Power shut down on page 113</i>	

12.5.1.6 GPU replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-59 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screwdriver Torx screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.6.1 GPU Assembly - Removal Procedure

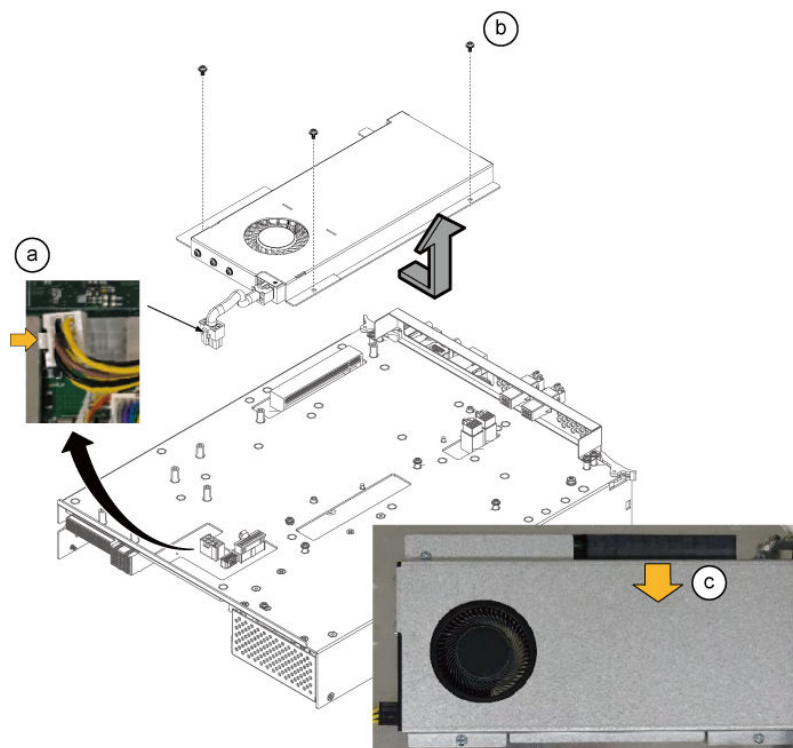
1. Remove BEPS from the console. Refer to *BEPS Assy Replacement* on page 519
2. Remove GPU Assy from BEPS per following steps.
 - a. Disconnect the GPU power connector (White) from the BEPS by pressing the release lock and gently pulling the connector out.
 - b. Remove the screws using a Philips Screw driver.

NOTE

These screws will **be reused**.

- c. Remove the GPU and bracket assembly by sliding it out of the BEPS GPU connector.

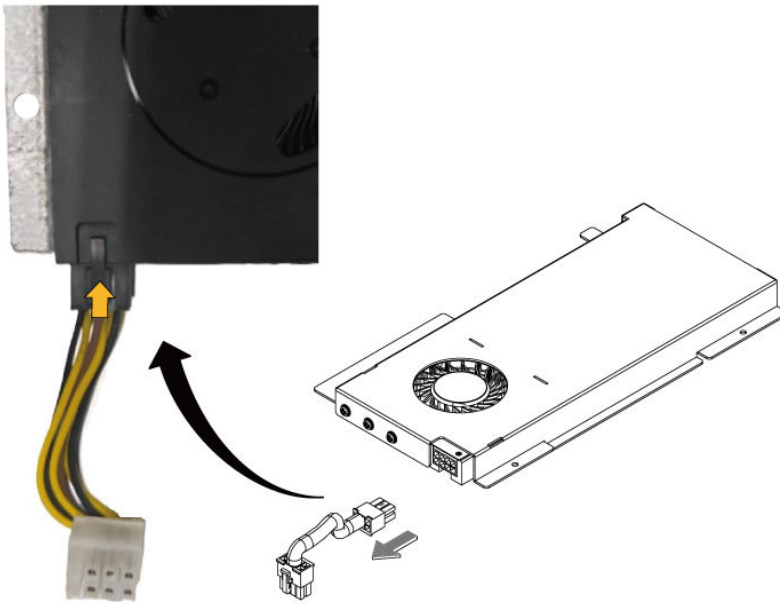
Figure 12-224 Removing GPU Assy with connector



3. Disconnect the GPU power connector (Black) by pressing the release lock and gently pulling the connector out.

NOTE

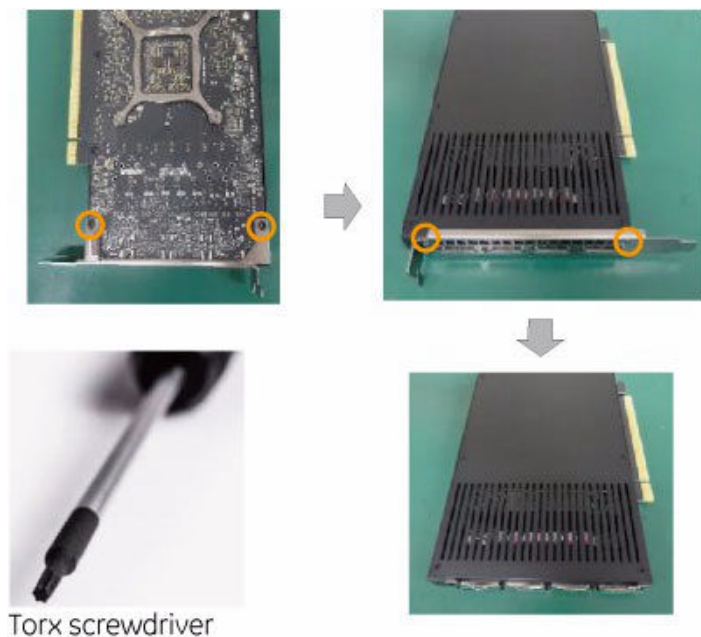
This cable will **be reused**.



12.5.1.6.2 GPU Assembly - Installation procedure

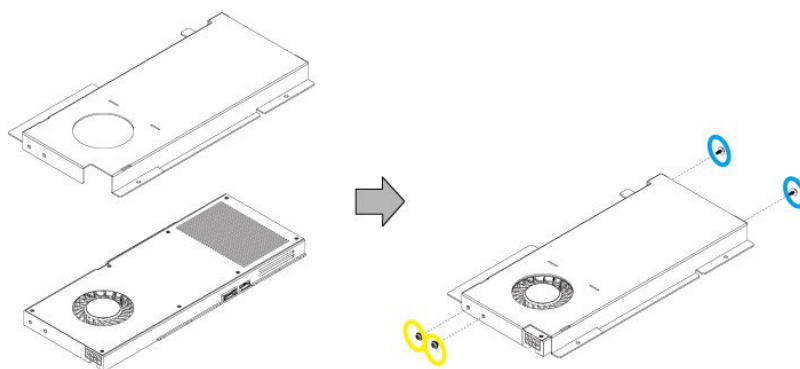
1. Remove the GPU BRKT from GPU per following steps.
 - a. Prepare the new GPU Assembly.
 - b. Remove 4 screws fixing the GPU BRKT with Torx screwdriver.
 - c. Remove the GPU BRKT.

Figure 12-225 Removing GPU BRKT



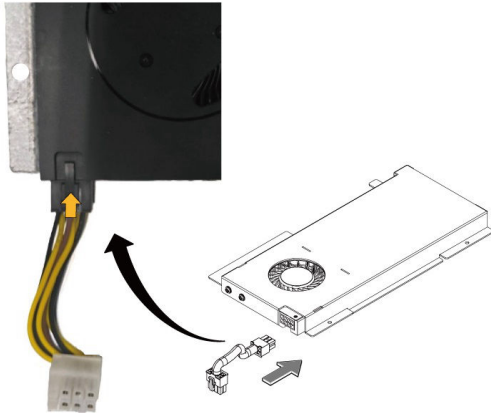
2. Move the GPU metal bracket assembly to the replacement GPU. GPU metal bracket assembly is fixed with 4 screws. (5181749, SCREW WH M3X4 - YELLOW CIRCLES) (5925916, SCREW M2.5X4 - BLUE CIRCLES)

Figure 12-226 Replacing GPU on the GPU FIX BRKT



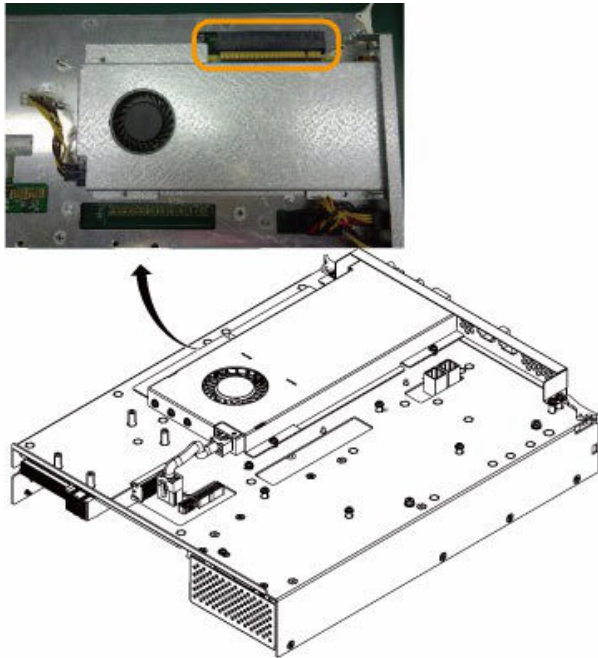
3. Connect the black connector on the GPU PWR cable to the GPU and confirm that the connector is securely locked by pulling the cable lightly.

Figure 12-227 Connecting GPU PWR cable



4. Connect and disconnect the GPU and bracket assembly to the BEPS five (5) times to ensure the conductivity of the GPU and BEPS connector.

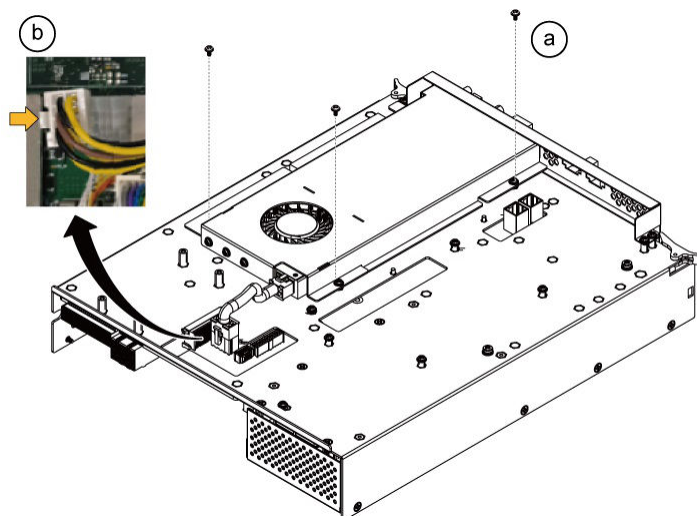
Figure 12-228 Connecting GPU ASSY



5. Install GPU Assy per following steps.
 - a. Fix GPU Assy with screws.

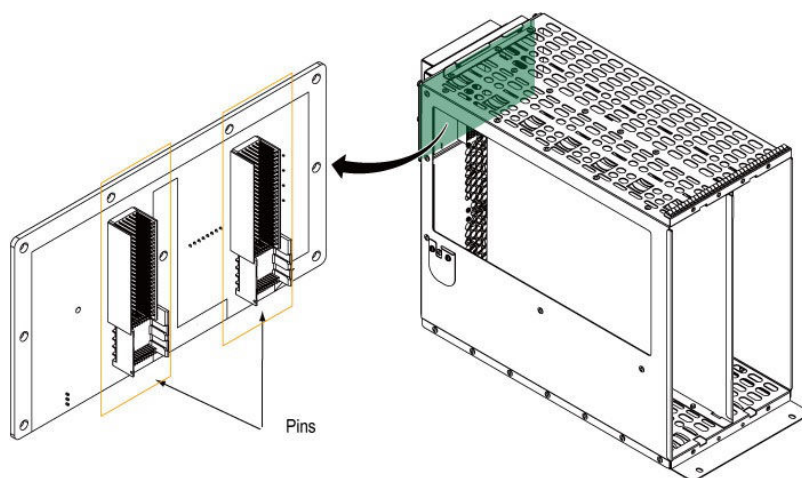
- b. Connect the white connector on the GPU PWR cable to the BEPS and confirm that the connector is securely locked by pulling the cable lightly.

Figure 12-229 Fixing GPU Assy and connecting connector



6. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-230 Checking pins on backboard



7. Install the BEPS and remaining parts in reverse order of removal. Refer to *BEPS Assy Replacement* on page 519.

12.5.1.6.3 GPU Assembly - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.6.4 GPU Assembly - Verification

- 1. Verify that all screws and covers have been installed if removed earlier.
- 2. Connect cables and Probes if removed earlier.
- 3. Power up the system to verify that it operates as intended.

12.5.1.6.5 GPU Assembly - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-60 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
B-Mode functional checks on page 162	
Basic measurement functional checks on page 175	
Grounding continuity test on page 775	
Chassis leakage current test on page 776	
Power shut down on page 113	

12.5.1.7 SOM replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-61 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

1. Perform *#unique_604*.
2. Perform *Full disk encryption and replacement procedures* on page 197.
3. Perform *Lockout/tagout procedure* on page 50.



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, perform *Lockout/tagout procedure* on page 50.

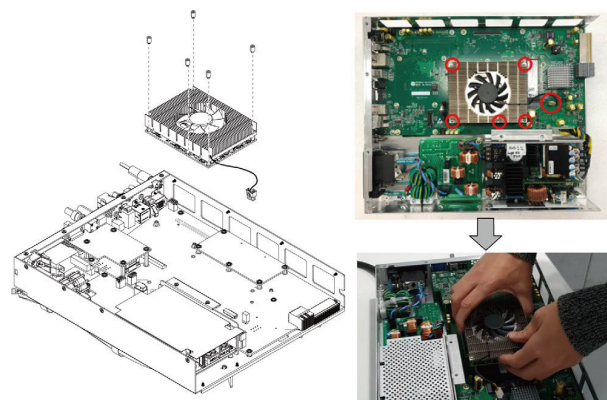
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.7.1 SOM - Removal procedure

1. Remove BEPS from the console. Refer to *BEPS Assy Replacement* on page 519
2. Remove SOM per following steps.
 - a. Remove 5 screws from the SOM.
 - b. Remove 1 connector and remove SOM.

Figure 12-231 Removing SOM



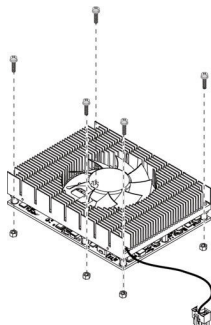
12.5.1.7.2 SOM - Installation procedure

1. Remove 5 screws and nuts from the new SOM.

NOTE

5 screws will be reused. (5 nuts will not be used.)

Figure 12-232 Removing 5 screws



2. Install SOM on the BEPS per following steps.
 - a. Firmly Connect the new SOM to the BEPS Assy.
 - b. Fasten the SOM to the BEPS Assy with 5 screws.
 - c. Connect 1 connector.

NOTE

Confirm that 5 screws were removed from the new SOM before connecting it to the BEPS Assy for firm connection.

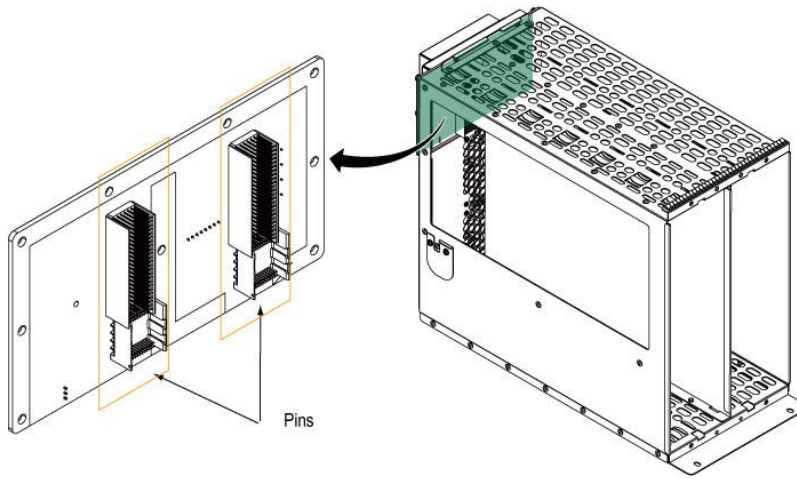
Figure 12-233 Installing SOM



backside of SOM

3. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-234 Checking pins on backboard



4. Install BEPS in reverse order of removal.

12.5.1.7.3 SOM - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.7.4 SOM - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.7.5 SOM - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-62 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.8 SSD replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

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 *Loading the base image and application software - full load* on page 199.

Table 12-63 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

**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, perform *Lockout/tagout procedure* on page 50.

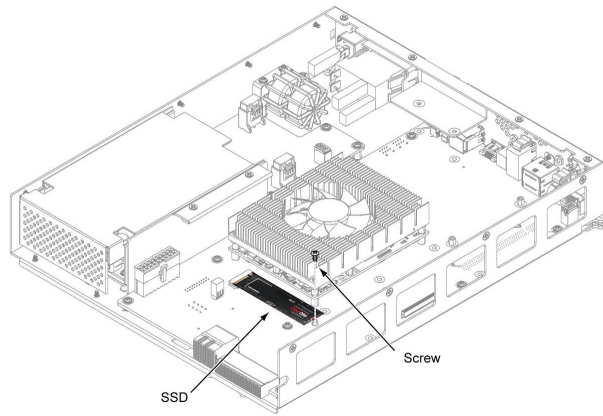
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.8.1 SSD - Removal procedure

1. Remove BEPS from the console. Refer to *BEPS Assy Replacement* on page 519
2. Remove SSD from BEP Assy by unscrewing 1 screws.

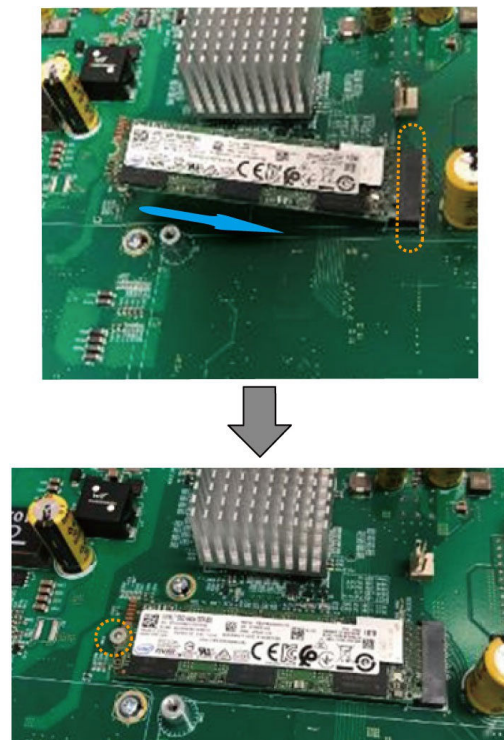
Figure 12-235 Removing SSD



12.5.1.8.2 SSD - Installation procedure

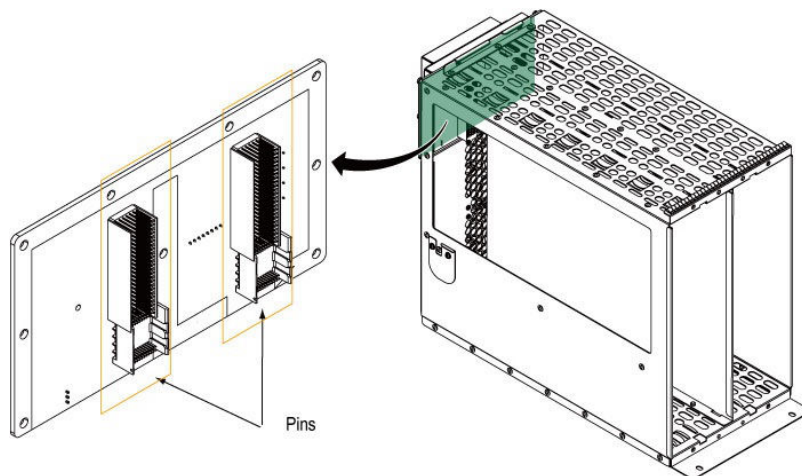
1. Insert the new SSD to the connector and fix it with one screw.

Figure 12-236 Installing SSD



2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-237 Checking pins on backboard



3. Install the BEPS in reverse order of removal.

12.5.1.8.3 SSD - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.8.4 SSD - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.8.5 SSD - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-64 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.9 Coin Battery replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-65 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



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, perform *Lockout/tagout procedure* on page 50.

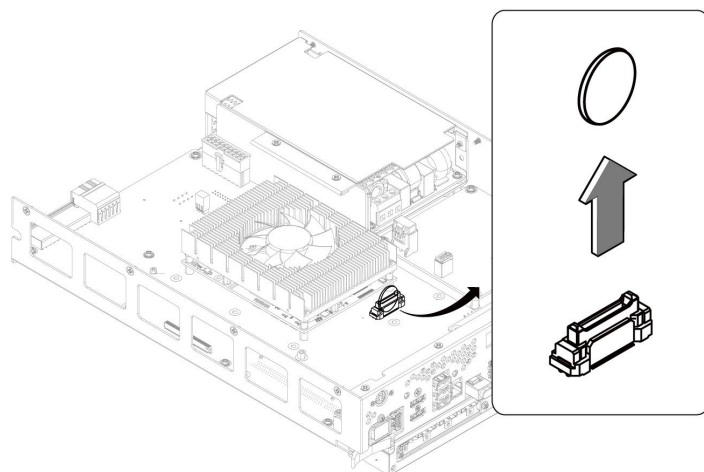
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.9.1 Coin Battery - Replacement procedure

1. Remove BEPS from the console. Refer to *BEPS Assy Replacement* on page 519
2. Remove Coin Battery from BEP Assy.

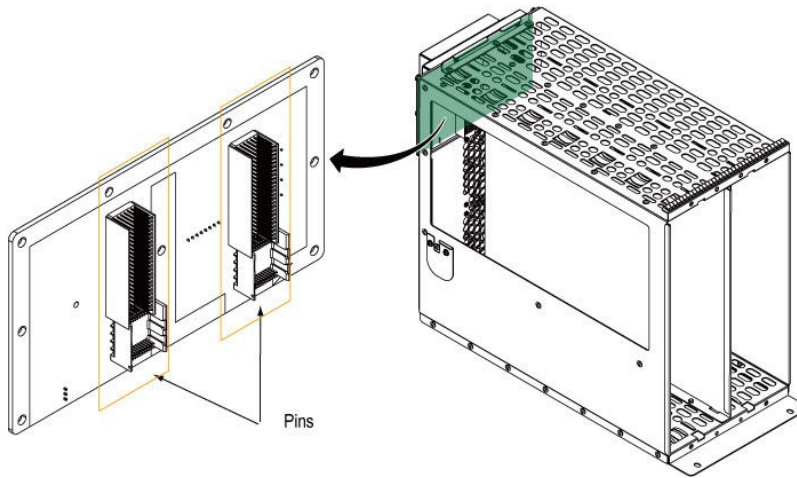
Figure 12-238 Removig Coin Battery



12.5.1.9.2 Coin Battery - Installation procedure

1. Replace with the new Coin Battery.
2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-239 Checking pins on backboard



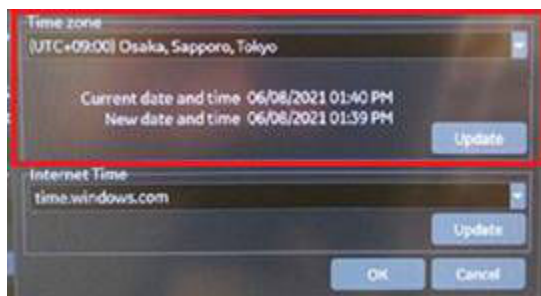
3. Install the BEPS in reverse order of removal.

12.5.1.9.3 Coin Battery - Calibration and adjustments

Clock adjustment is needed after the coin battery replacement.

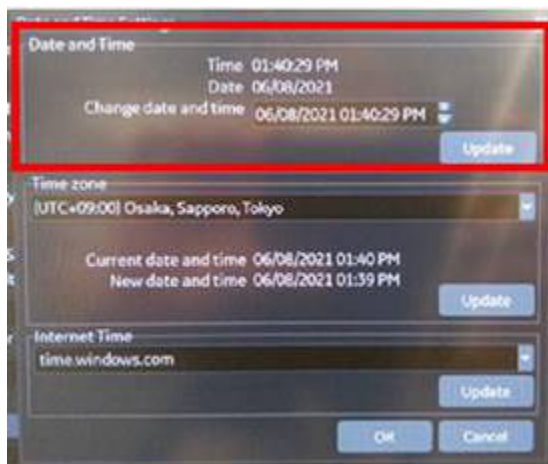
1. Go to The Utility -> System -> General, and click **Date/ Time** button.
2. Select time zone of your region, then click Update button in Time zone. If Time zone Updated successfully pop up is shown, select OK button.

Figure 12-240 Time zone



3. Set current date and time in Date and Time, then click Update button in Date and Time.

Figure 12-241 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.

12.5.1.9.4 Coin Battery - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.9.5 Coin Battery - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-66 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.10 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-67 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



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, perform *Lockout/tagout procedure* on page 50.

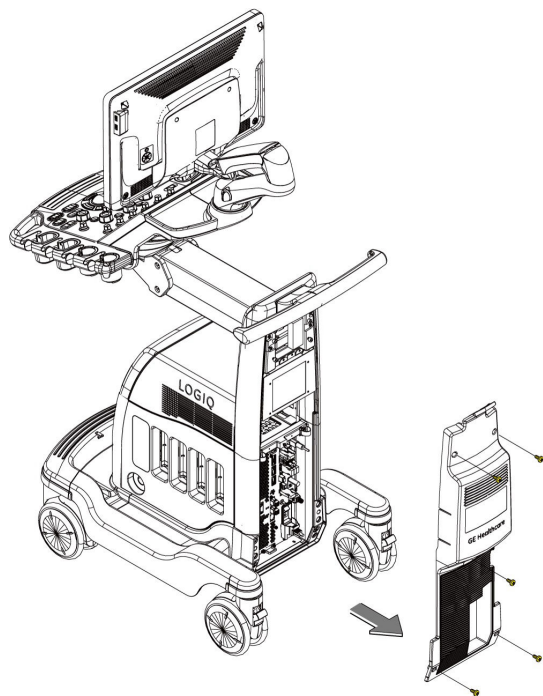
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.10.1 GCW (CW Doppler) - Removal procedure

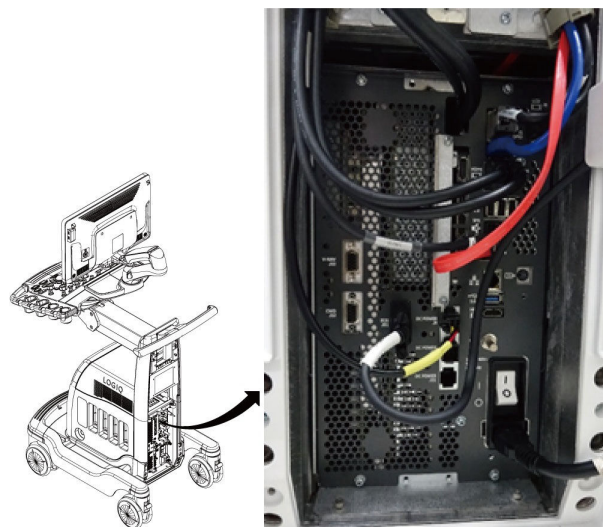
1. Unscrew 5 screws and remove the rear cover.

Figure 12-242 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-243 Disconnecting all cables from NEST

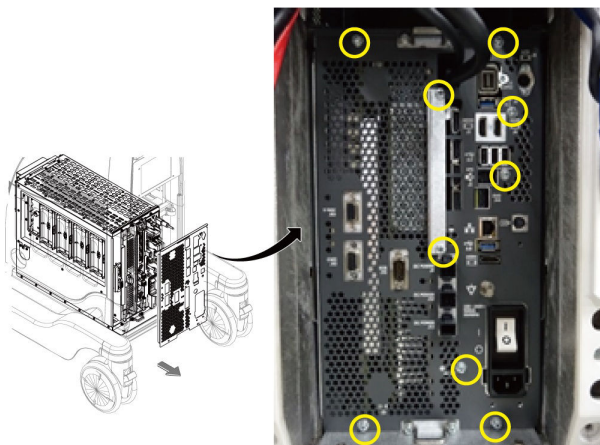


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-244 Remove NEST EMI back bracket.

**NOTE**

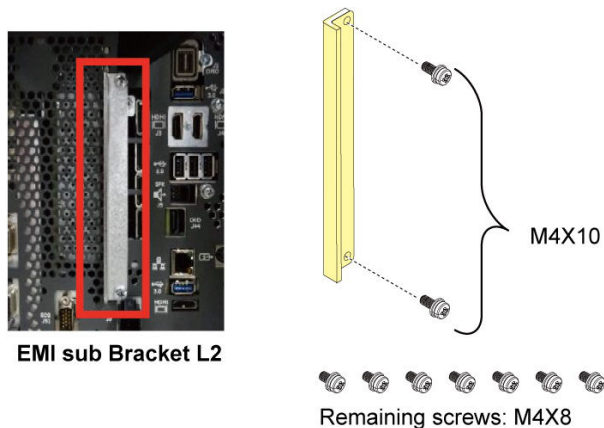
Remove Power Assist cables from NEST EMI back bracket if exist.

NOTE

For GPU A4000 Console, R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-245 Removing EMI sub bracket

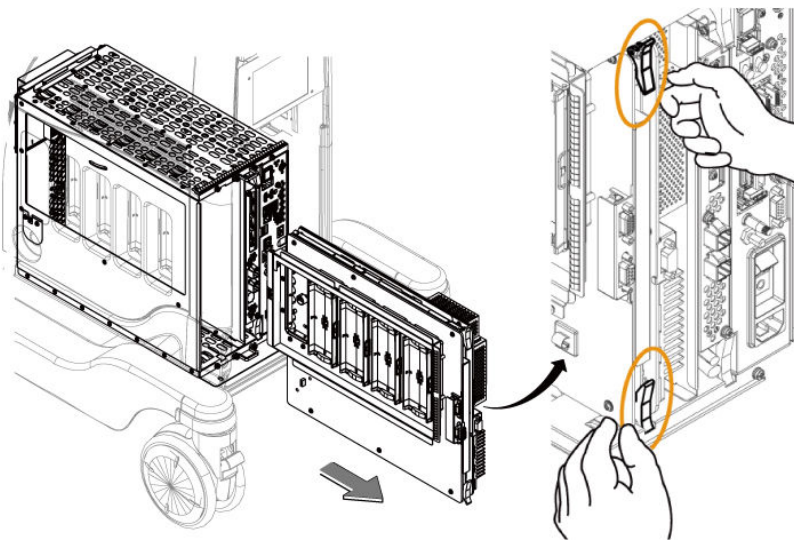


4. Pull out DA192/DPI-L Board Assy and place it on an ESD safe place.

NOTE

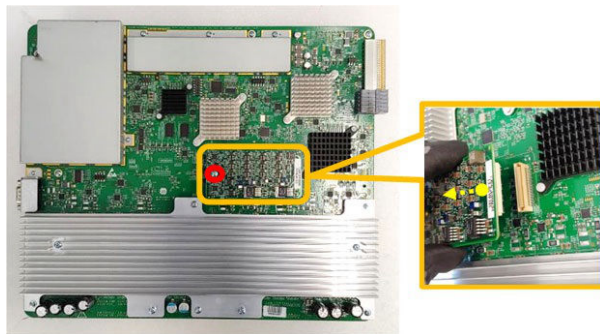
Use Card Puller to pull out.

Figure 12-246 Removing DA192/DPI-L Board



5. Unscrew 1 screw (red circle) and remove the GCW PWA to the DA192 BOARD ASSY.

Figure 12-247 Removing GCW PWA



12.5.1.10.2 GCW (CW Doppler) - Installation procedure

1. Install new GCW PWA(CW Doppler) onto DA192 BOARD ASSY.
2. Install all parts in reverse order of removal.

12.5.1.10.3 GCW (CW Doppler) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.10.4 GCW (CW Doppler) - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.10.5 GCW (CW Doppler) - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-68 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>CW Doppler mode functional checks on page 170</i>	
<i>PW/CW Doppler mode functional checks on page 169</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.11 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-69 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

**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, perform *Lockout/tagout procedure* on page 50.

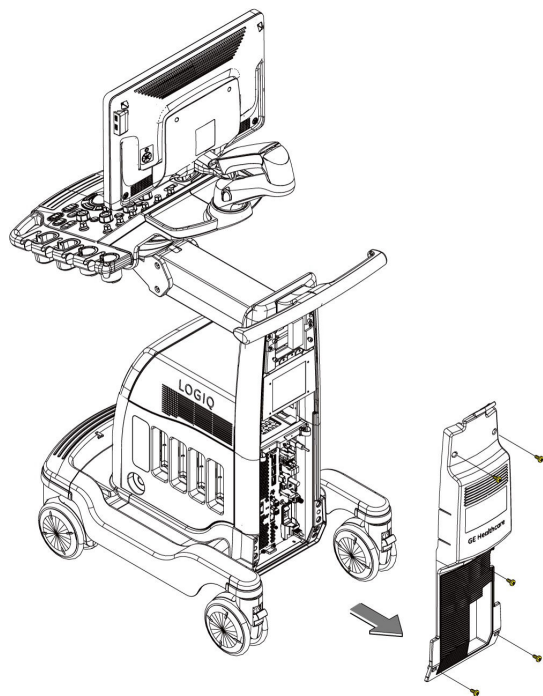
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.11.1 DC4D - Removal procedure

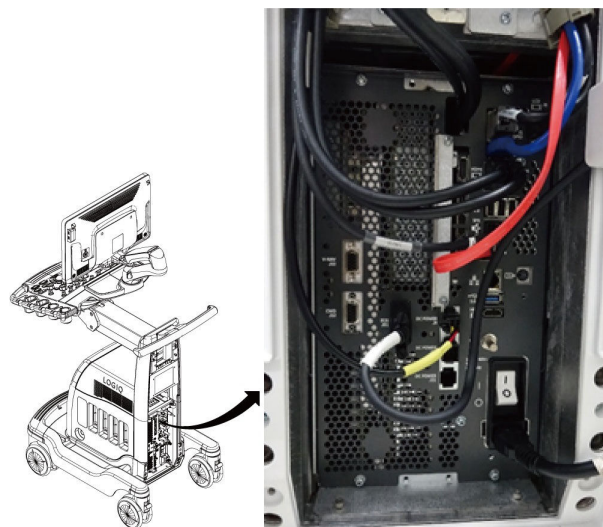
1. Unscrew 5 screws and remove the rear cover.

Figure 12-248 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-249 Disconnecting all cables from NEST

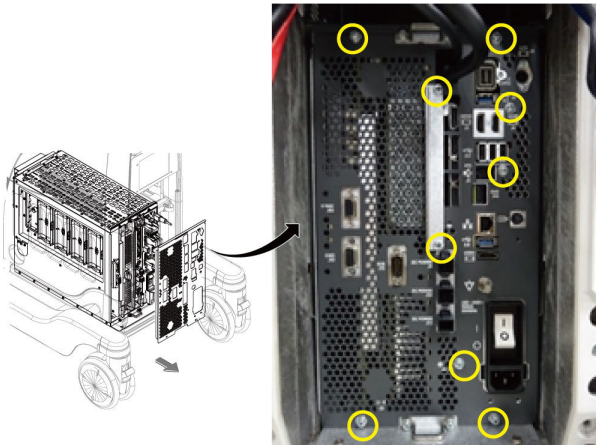


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-250 Remove NEST EMI back bracket.

**NOTE**

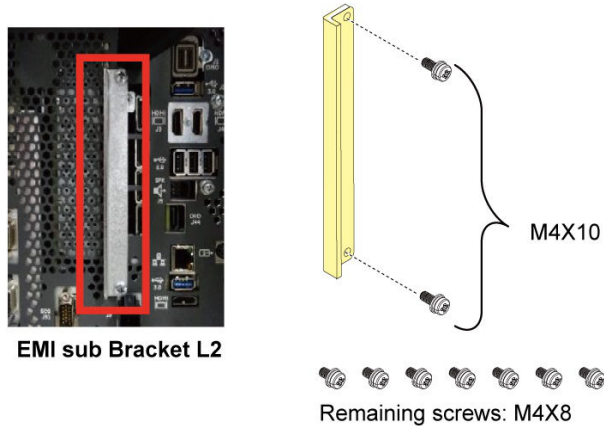
Remove Power Assist cables from NEST EMI back bracket if exist.

NOTE

For GPU A4000 Console, R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-251 Removing EMI sub bracket

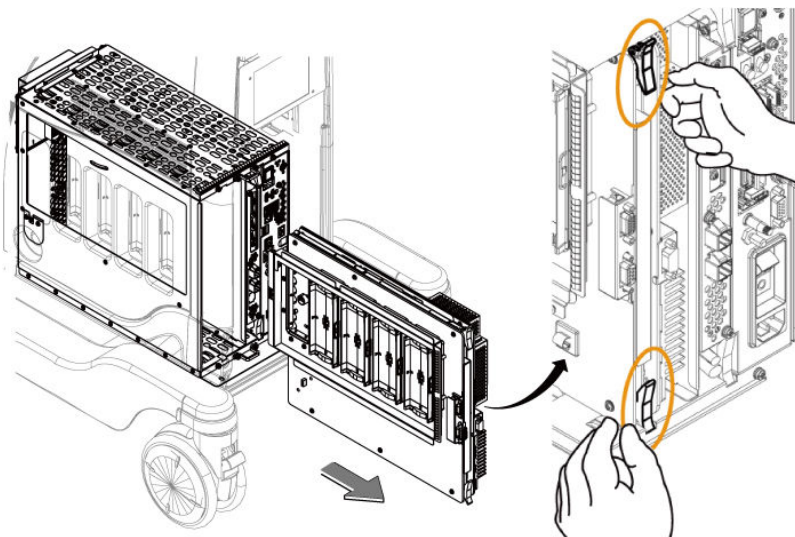


4. Pull out BEPS Assy and place it on an ESD safe place.

NOTE

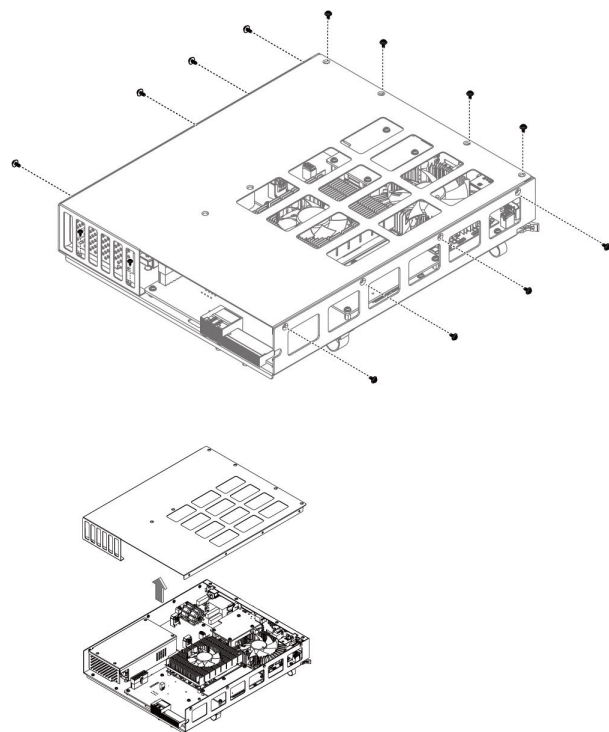
Use Card Puller to pull out.

Figure 12-252 Removing BEPS Assy



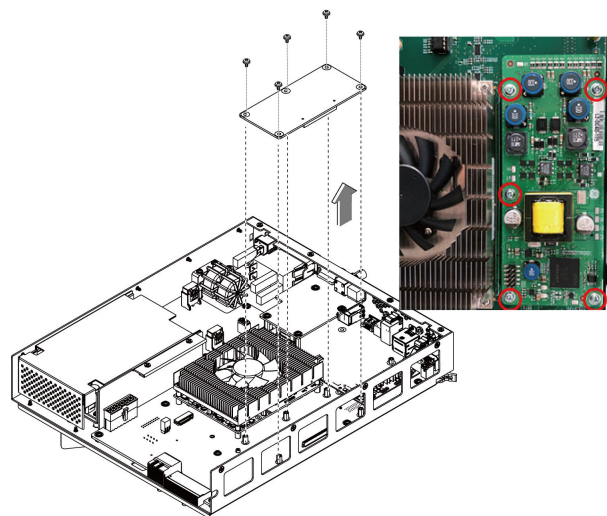
5. Remove BEPS TOP PLATE from current BEPS Assy and new BEPS Assy (14 screws).

Figure 12-253 Removing BEPS TOP PLATE



6. Unscrew 5 screws to remove the DC4D PWA.

Figure 12-254 Removing DC4D PWA



12.5.1.11.2 DC4D - Installation procedure

1. Install DC4W PWA on BEPS Assy.
2. Install all parts and cover in reverse order of removal.

12.5.1.11.3 DC4D - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.11.4 DC4D - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.11.5 DC4D - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-70 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Top console adjustment control functional checks on page 152</i>	
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>4D option functional checks on page 179</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.12 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-71 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

**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, perform *Lockout/tagout procedure* on page 50.

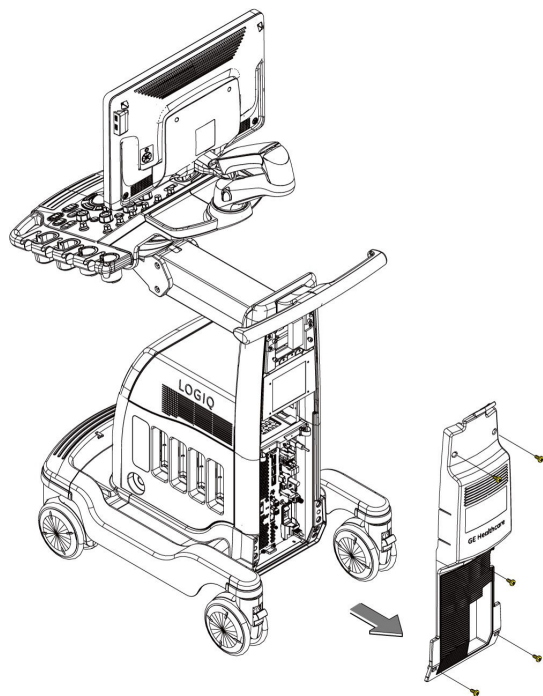
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.12.1 VCS (S-Video) - Removal procedure

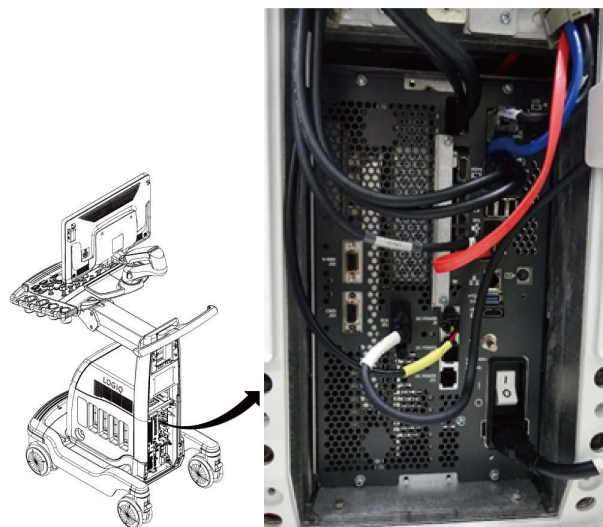
1. Unscrew 5 screws and remove the rear cover.

Figure 12-255 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-256 Disconnecting all cables from NEST

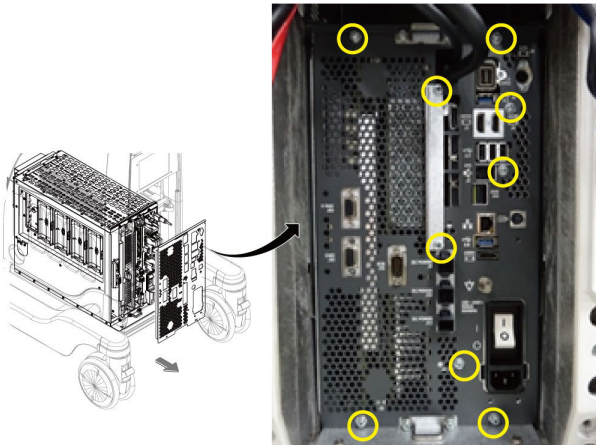


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-257 Remove NEST EMI back bracket.

**NOTE**

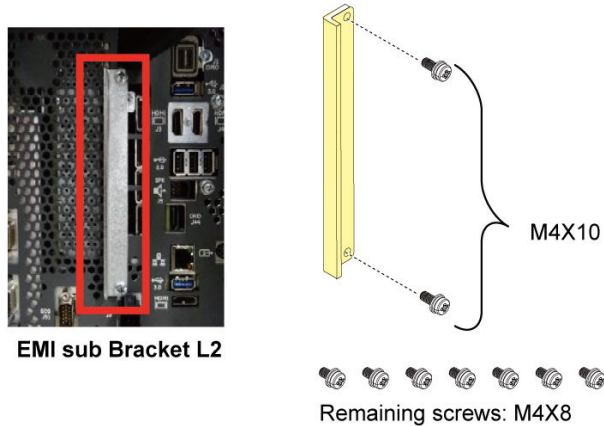
Remove Power Assist cables from NEST EMI back bracket if exist.

NOTE

GPU A4000 Console , R4 and later:When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later. This bracket is for GPU A4000 Console Only.

This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-258 Removing EMI sub bracket

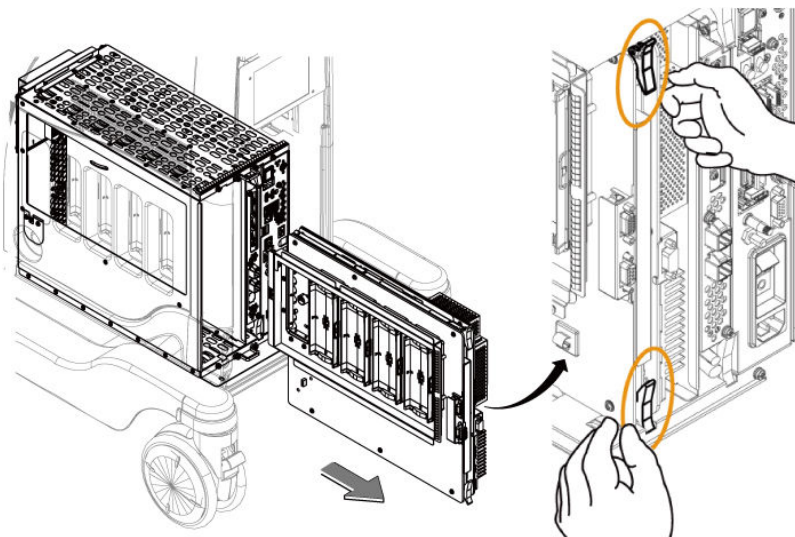


4. Pull out BEPS Assy and place it on an ESD safe place.

NOTE

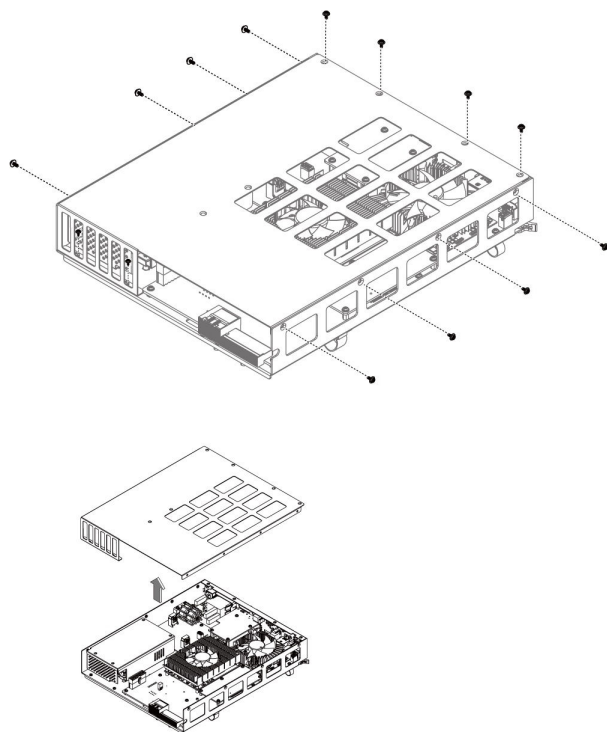
Use Card Puller to pull out.

Figure 12-259 Removing BEPS Assy



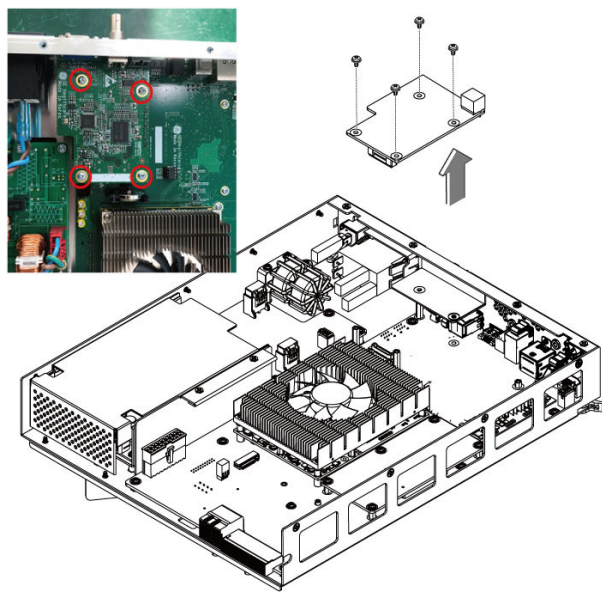
5. Remove BEPS TOP PLATE from current BEPS Assy and new BEPS Assy (14 screws).

Figure 12-260 Removing BEPS TOP PLATE



6. Unscrew 4 screws to remove the VCS (S-Video).

Figure 12-261 Removing VCS (S-Video)



12.5.1.12.2 VCS (S-Video) - Installation procedure

1. Install VCS (S-Video) on BEPS.
2. Install all parts and cover in reverse order of removal.

12.5.1.12.3 VCS (S-Video) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.12.4 VCS (S-Video) - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.12.5 VCS (S-Video) - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-72 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks</i> on page 161	
<i>Chassis leakage current test</i> on page 776	
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.	
<i>Power shut down</i> on page 113	

12.5.1.13 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-73 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

**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, perform *Lockout/tagout procedure* on page 50.

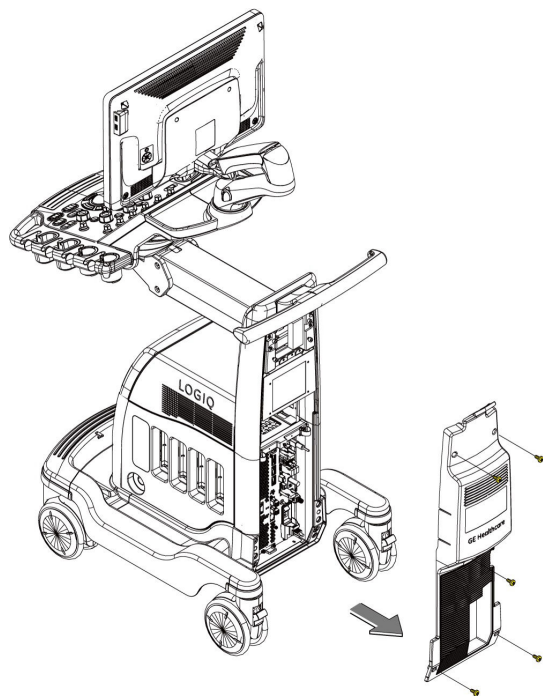
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.13.1 Pedof CW - Removal procedure

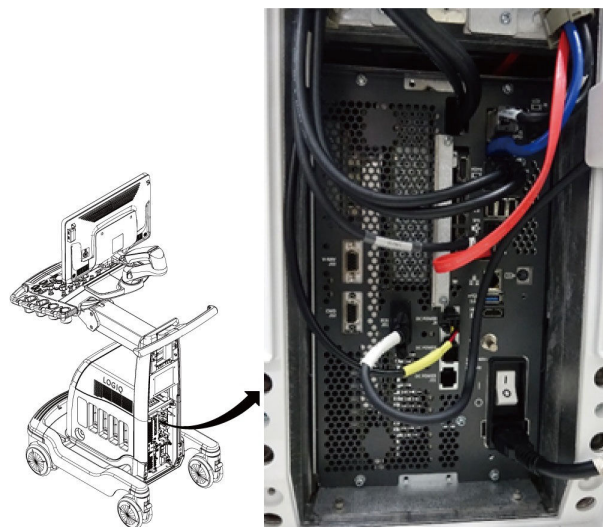
1. Unscrew 5 screws and remove the rear cover.

Figure 12-262 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-263 Disconnecting all cables from NEST

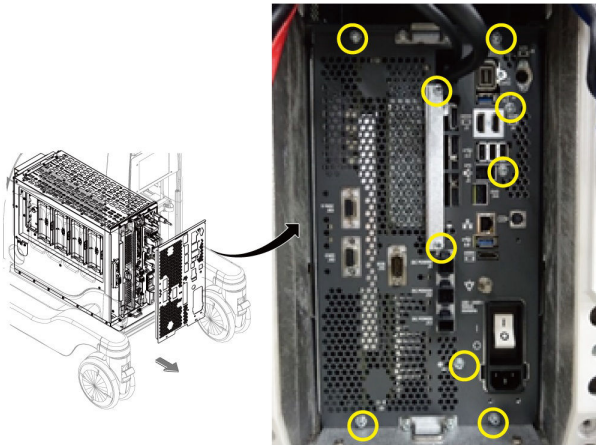


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-264 Remove NEST EMI back bracket.

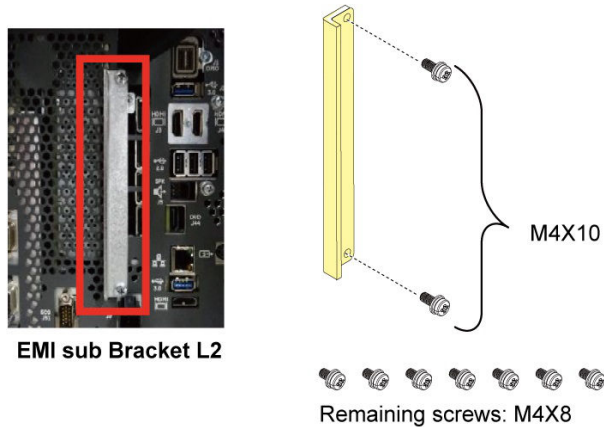
**NOTE**

Remove Power Assist cables from NEST EMI back bracket if exist.

NOTE

GPU A4000 Console , R4 and later:When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later. This bracket is for GPU A4000 Console Only.

Figure 12-265 Removing EMI sub bracket



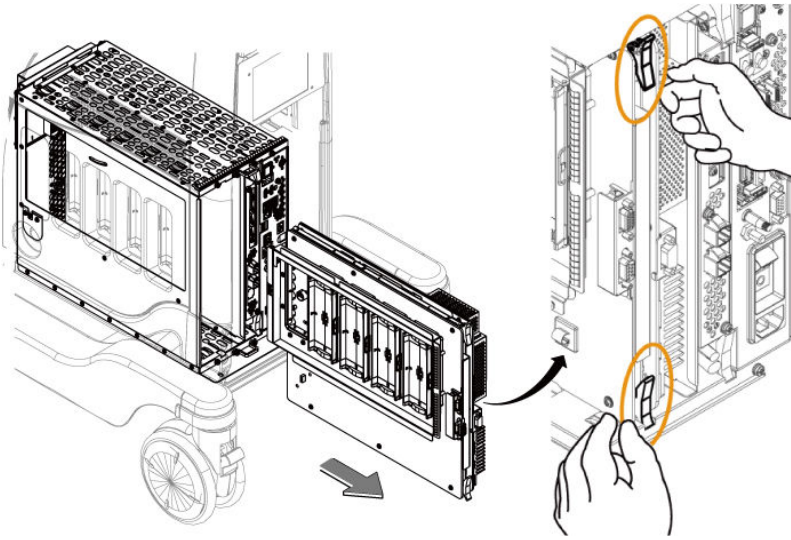
It does not exist for GPU P4000 Console.

4. Pull out DA192/DPI-L Board Assy and place it on an ESD safe place.

NOTE

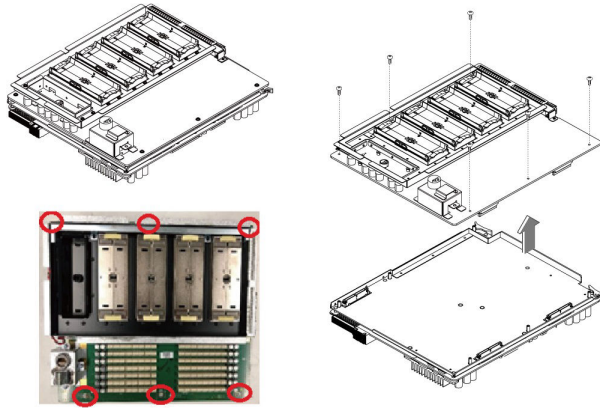
Use Card Puller to pull out.

Figure 12-266 Removing DA192/DPI-L Board



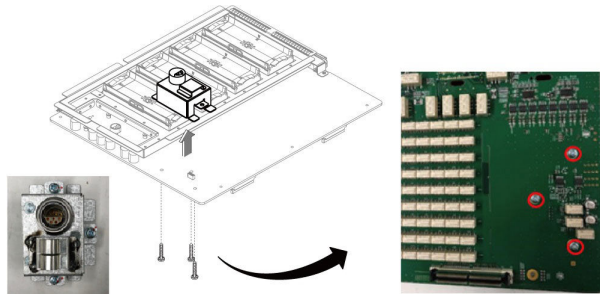
5. Unscrew 6 screws to disassemble DPI shield plate. Detach DPI-I boards from the shield plate.

Figure 12-267 Disassemble DPI shield plate



6. Unscrew 3 screws to remove the CWD assy from the DPI- L Board assy.

Figure 12-268 Removing CWD assy



12.5.1.13.2 Pedof CW - Installation procedure

1. Install Pencil CW HW kit on DPI- L Board assy.
2. Install all parts and cover in reverse order of removal.

12.5.1.13.3 Pedof CW - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.13.4 Pedof CW - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.13.5 Pedof CW - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-74 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>CW Doppler mode functional checks on page 170</i>	
<i>PW/CW Doppler mode functional checks on page 169</i>	
<i>Grounding continuity test on page 775</i>	
<i>Chassis leakage current test on page 776</i>	
<i>Power shut down on page 113</i>	

12.5.1.14 WLAN for Hospital Connectivity 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-75 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

NOTE

A magnifying glass to connect the WLAN antenna cables to the WLAN Card will be very useful for this procedure.


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, perform *Lockout/tagout procedure* on page 50.

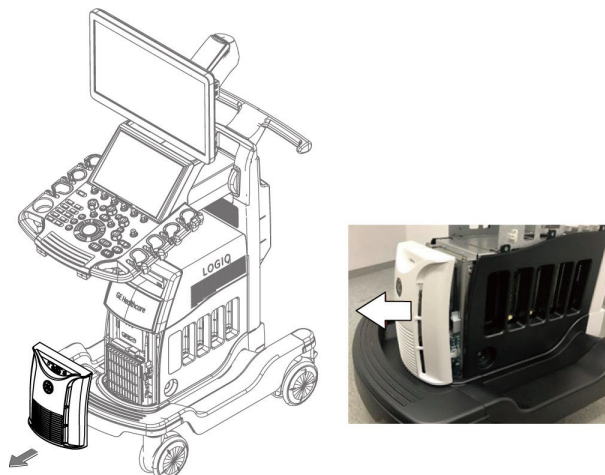
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.14.1 WLAN for Hospital Connectivity - Removal procedure

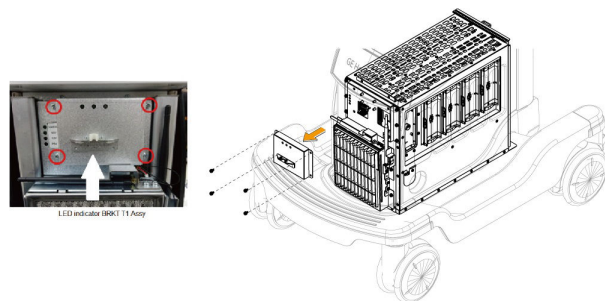
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-269 Removing Front Cover



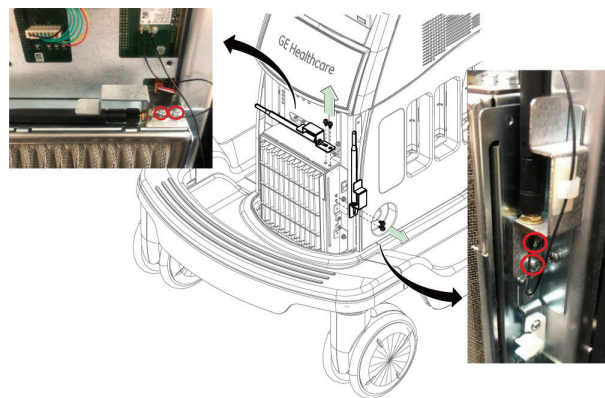
2. Unscrew 4 screws to remove the LED Indicator BRKT.

Figure 12-270 Removing LED Indicator BRKT



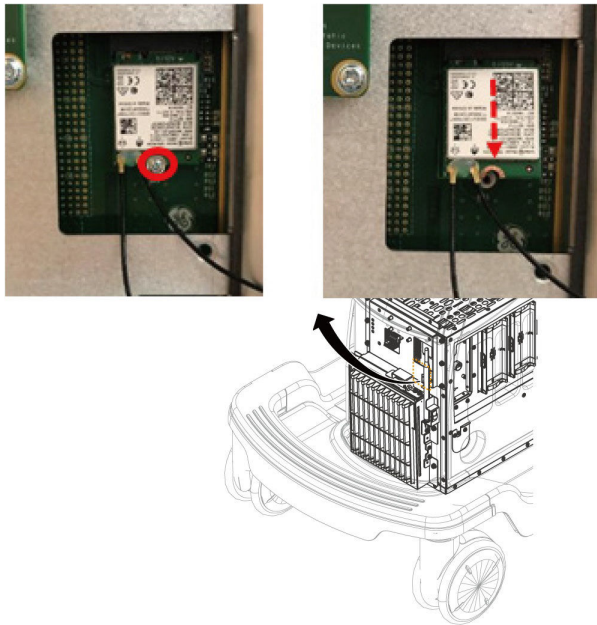
3. Unscrew 4 screws to remove antenna cable clamp.

Figure 12-271 Removing antenna cable clamp



4. Unscrew 1 screw to remove WiFi module.

Figure 12-272 Removing WiFi module



12.5.1.14.2 WLAN for Hospital Connectivity - Installation procedure

1. Replace antenna and Wifi module in reverse order of removal.
2. Re-install all parts and cover removed in reverse order of removal.

12.5.1.14.3 WLAN for Hospital Connectivity - WLAN Set-up

Services Security Set-up

For configuring the WLAN, refer to the latest revision of the LOGIQ Fortis Basic User Manual, Chapter13 "Configuring the Wireless Network".

NOTE

This step is mandatory in order to insure proper functionality of services and communications security settings.

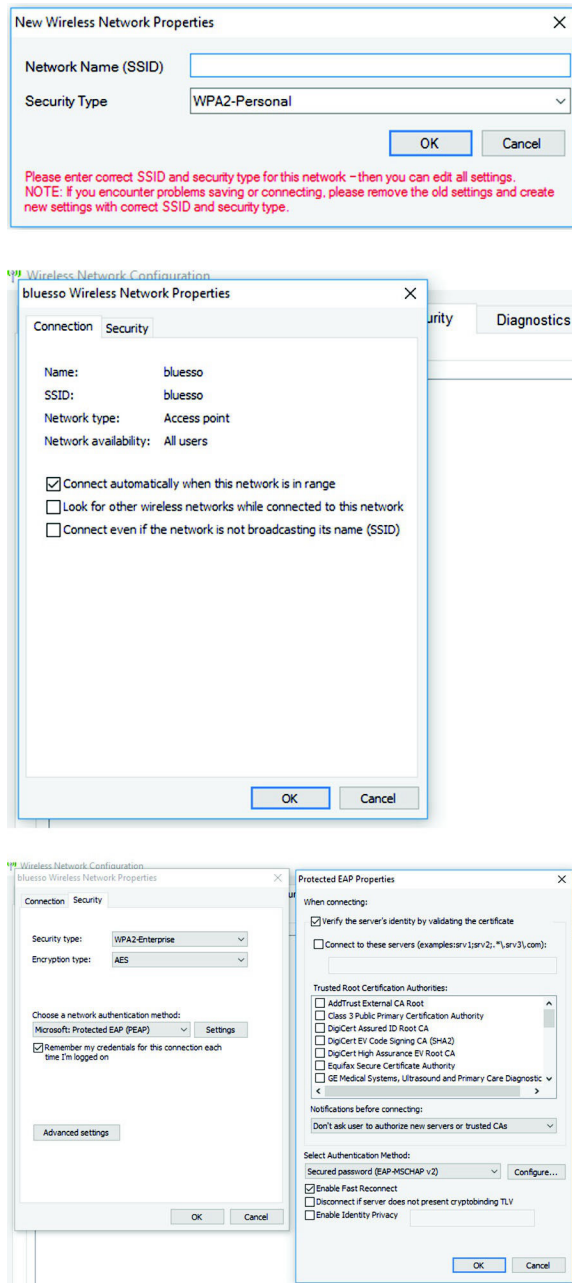
1. Connect the Service key and access Windows.
2. Open an explorer window.
3. Navigate to C:\Remap.
4. Run the batch file "EnableWLAN.bat". A screen will flash "updating network configuration for WLAN."

Basic Configuration of WLAN

1. Contact the site Network Administrator to obtain the necessary parameters to configure the WLAN.
 - IP Address or DHCP
 - Network ID and Network key
 - Security type
 - Encryption type, etc.
2. Perform the WLAN configuration as described in Basic User Manual.
3. See: Configuring the Wireless Network in Chapter 13 of the of the Basic User Manual.

4. Configure as required by the site IT department.

Figure 12-273 WLAN configuration



12.5.1.14.4 WLAN for Hospital Connectivity - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.14.5 WLAN for Hospital Connectivity - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.14.6 WLAN for Hospital Connectivity - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-76 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic measurement functional checks on page 175</i>	
<i>Power shut down on page 113</i>	

12.5.1.15 Metal Air Filter Assy Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-77 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 10 minutes	Phillips screwdriver	Safety glasses Cut resistant gloves Kneel pad



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.15.1 Metal Air Filter Assy - Removal procedure

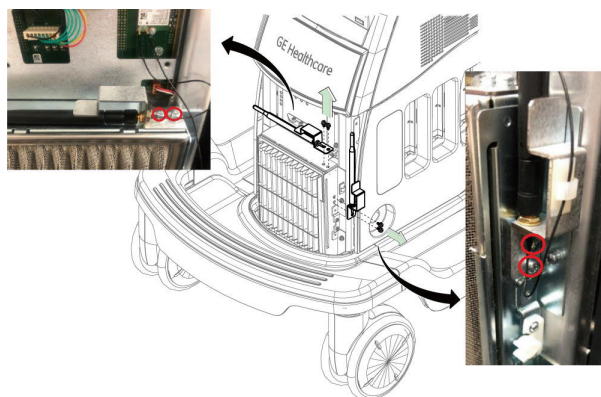
1. Remove the front cover.

Figure 12-274 Removing front cover



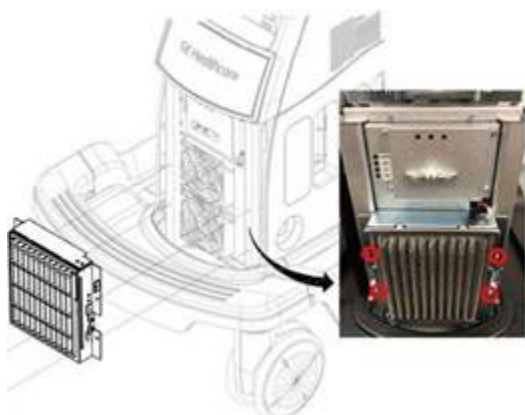
2. If the system has WiFi option, remove antenna by removing 4 screws.

Figure 12-275 Removing antenna



3. Remove Metal Air Filter Assy by removing 4 screws.

Figure 12-276 Removing Metal Air Filter



12.5.1.15.2 Metal Air Filter Assy - Installation Procedure

Install components in reverse order of removal.

12.5.1.15.3 Metal Air Filter Assy - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.15.4 Metal Air Filter Assy - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.15.5 Metal Air Filter Assy - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.5.1.16 FAN Assy Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-78 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 60 minutes	Phillips screwdriver Hex wrench	Safety glasses Safety shoes Cut resistant gloves Kneel pad ESD mat and wrist strap



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, perform *Lockout/tagout procedure* on page 50.

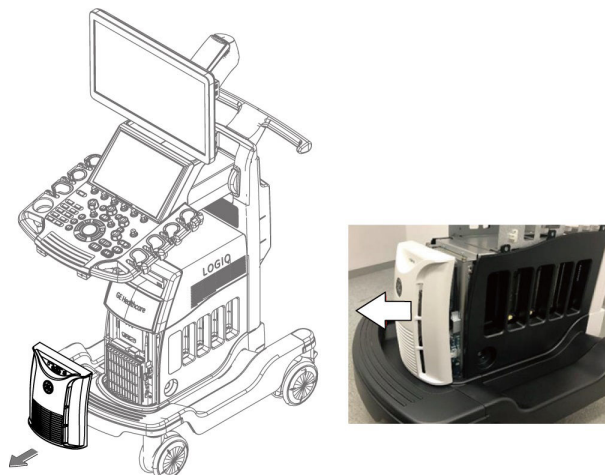
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.16.1 FAN Assy - Removal procedure

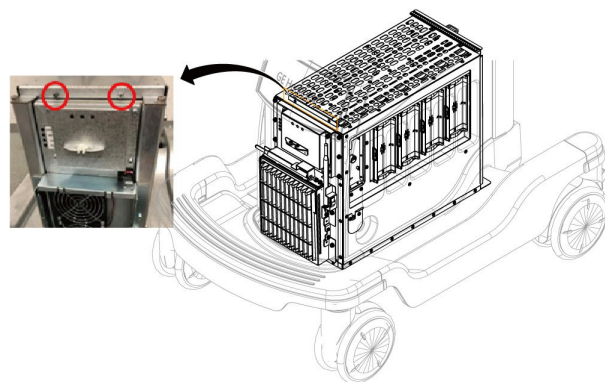
1. Remove the front cover.

Figure 12-277 Removing front cover



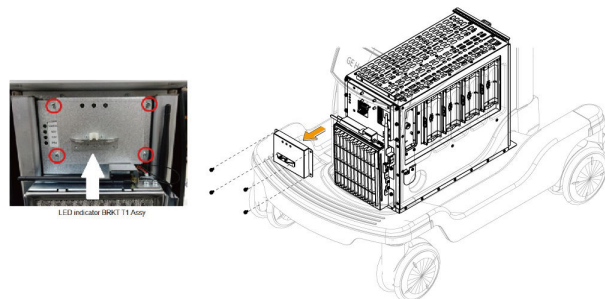
2. Unscrew 2 screws.

Figure 12-278 Unscrewing 2 screws



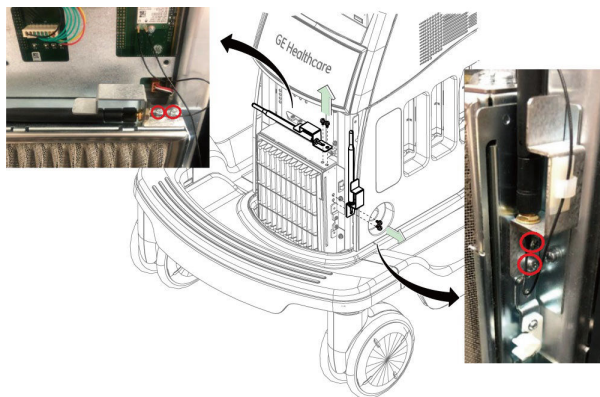
3. Remove LED Indicator BRKT by removing 4 screws.

Figure 12-279 Removing LED Indicator BRKT



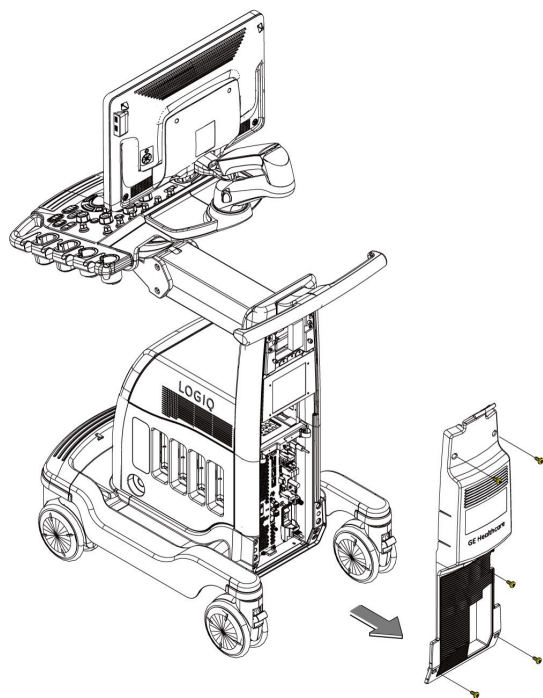
4. If the system has WiFi option, remove antenna by removing 4 screws.

Figure 12-280 Removing antenna



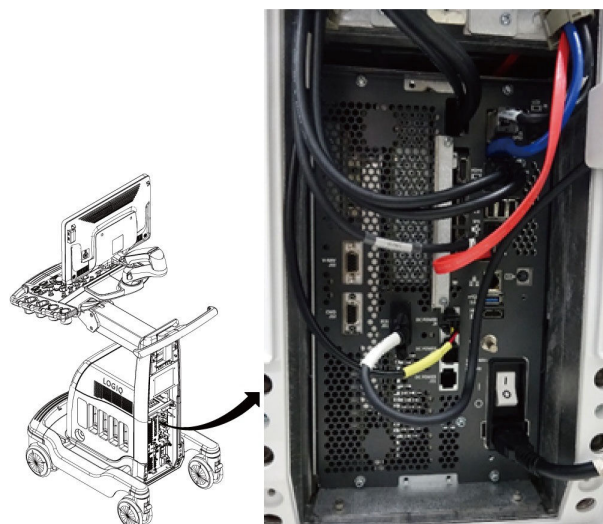
5. If not done yet, unscrew 5 screws and remove the rear cover.

Figure 12-281 Removing rear cover



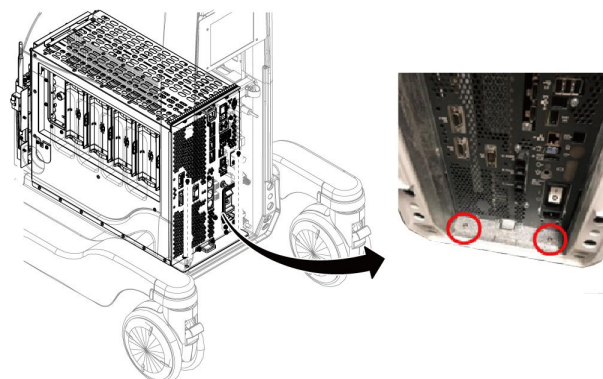
6. Disconnect all cables from NEST.

Figure 12-282 Disconnecting all cables



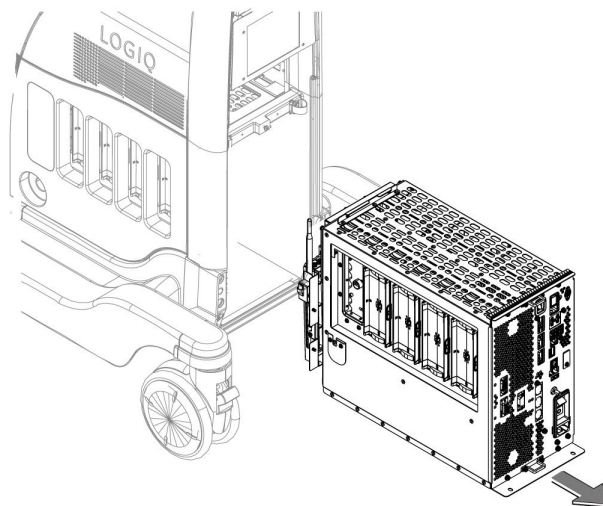
7. Unscrew 2 screws to remove NEST Assy.

Figure 12-283 Removing NEST Assy



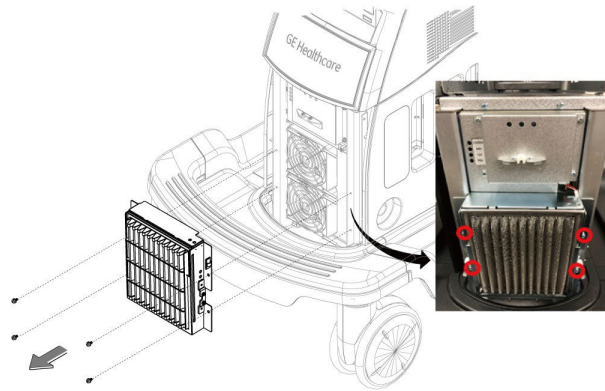
8. Pull out Nest box backward to make space for the fan assy screw removal.

Figure 12-284 Pulling out Nest box



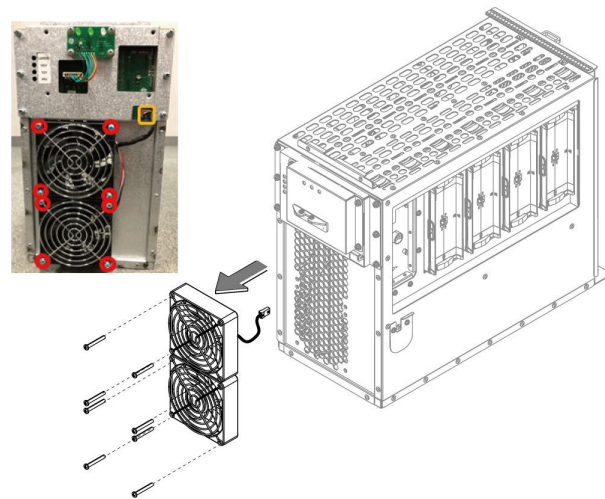
9. Remove Metal Air Filter Assy by removing 4 screws.

Figure 12-285 Removing Metal Air Filter Assy



10. Remove FAN cable and FAN Assy by removing 8 screws.

Figure 12-286 Removing FAN Assy



12.5.1.16.2 FAN Assy - Installation procedure

1. Assemble FAN Assy and FAN cable.
2. Re-install Metal Air Filter Assy.
3. Re-install NEST Box Assy.
4. If the system has WiFi option, re-install antenna.
5. Re-install the LED Indicator BRKT.
6. Re-install the front cover removed.

12.5.1.16.3 FAN Assy - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.16.4 FAN Assy - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.1.16.5 FAN Assy - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-79 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks</i> on page 162	
<i>Basic measurement functional checks</i> on page 175	
<i>Grounding continuity test</i> on page 775	
<i>Chassis leakage current test</i> on page 776	
<i>Power shut down</i> on page 113	

12.5.1.17 Speaker Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-80 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



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, perform *Lockout/tagout procedure* on page 50.

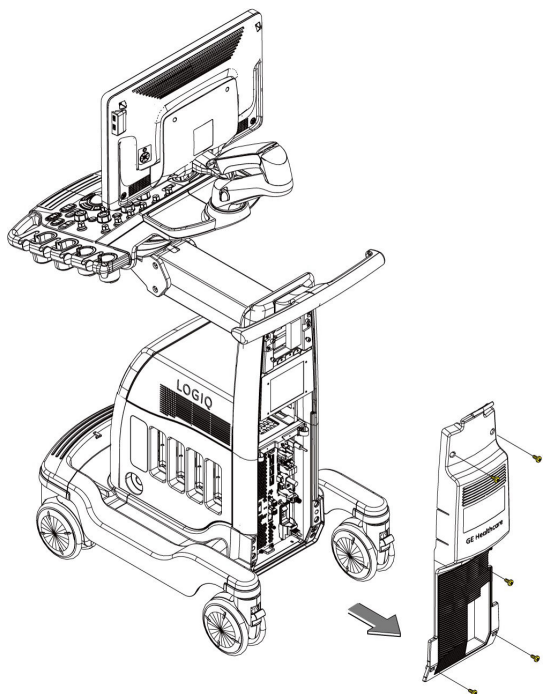
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.17.1 Speaker - Removal Procedure

1. Unscrew 5 screws and remove the rear cover.

Figure 12-287 Removing rear cover



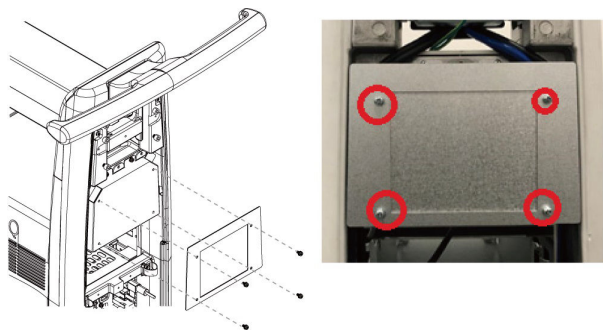
2. If the system has Battery option kit, remove it. Refer to *Power Assistant (Battery Installation Kit) replacement* on page 633.

Figure 12-288 Removing Battery option



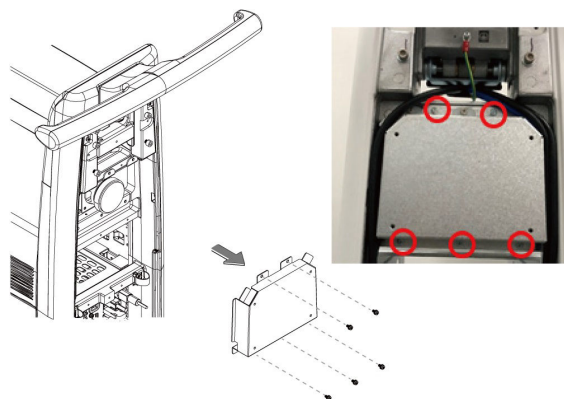
3. Unscrew 4 screws to remove Speaker Dummy Cover BRKT Polaris.

Figure 12-289 Removing Speaker Dummy Cover BRKT Polaris



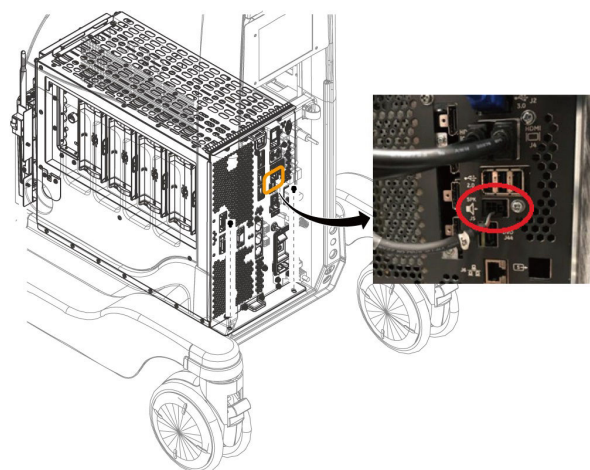
4. Unscrew 5 screws to remove Speaker Dummy Back BRKT Polaris.

Figure 12-290 Removing Speaker Dummy Back BRKT Polaris



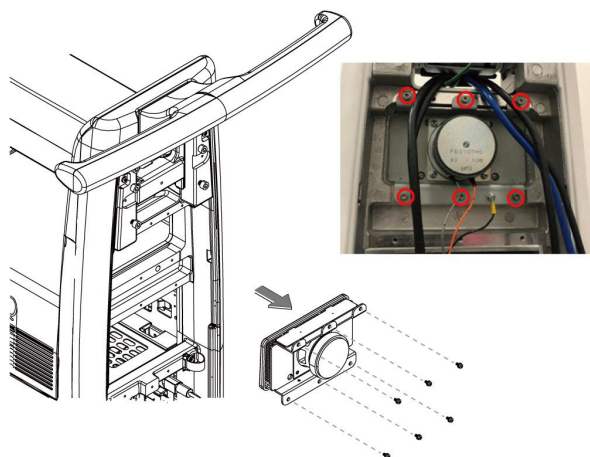
5. Remove Speaker cable.

Figure 12-291 Removing Speaker cable



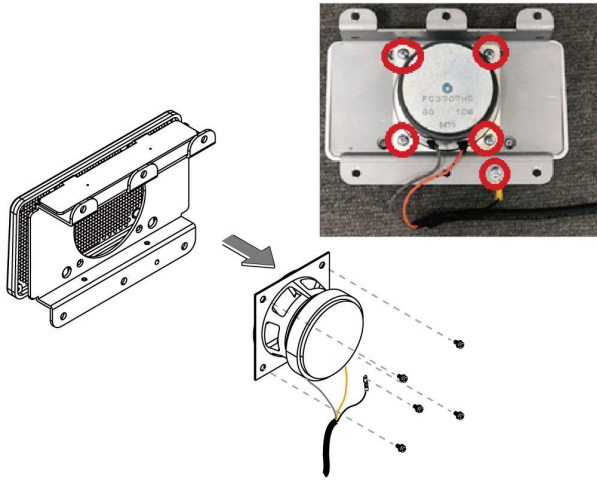
6. Unscrew 6 screws to remove Speaker Unit.

Figure 12-292 Removing Speaker Unit



7. Unscrew 5 screws to remove Speaker and ground cable.

Figure 12-293 Remove Speaker with ground cable



12.5.1.17.2 Speaker - Installation Procedure

Install components in reverse order of removal.

12.5.1.17.3 Speaker - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.17.4 Speaker - 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.

12.5.1.17.5 Speaker - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-81 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>PW/CW Doppler mode functional checks on page 169</i>	
<i>Power shut down on page 113</i>	

12.5.1.18 Probe Port Illumination Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-82 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



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, perform *Lockout/tagout procedure* on page 50.

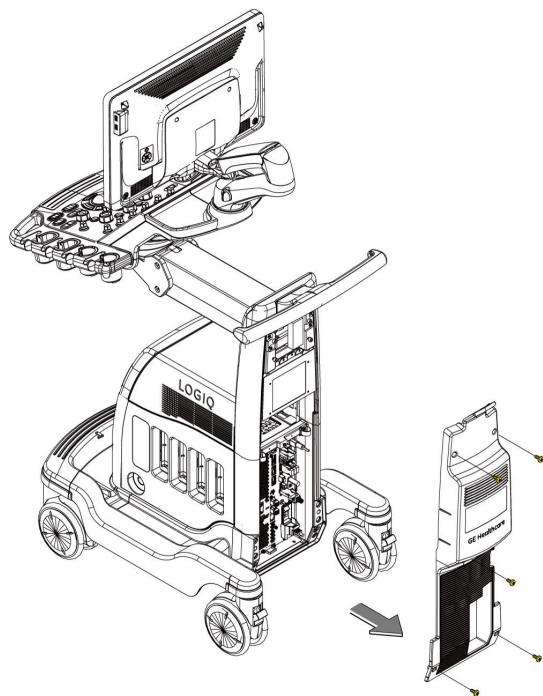
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.1.18.1 Probe Port Illumination - Removal procedure

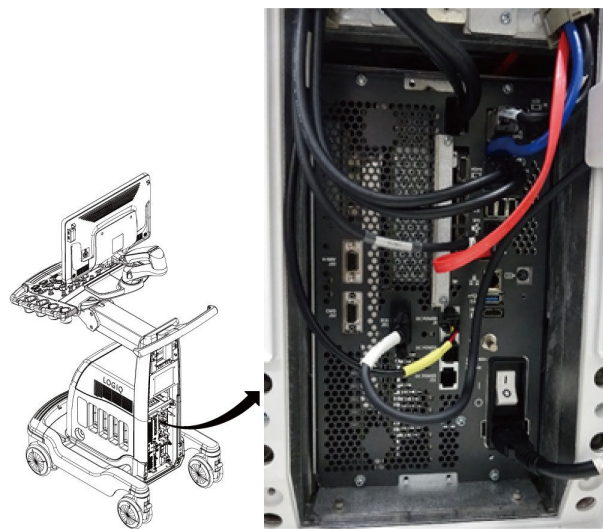
1. If not done yet, unscrew 5 screws and remove the rear cover.

Figure 12-294 Removing rear cover



2. Disconnect all cables from NEST.

Figure 12-295 Disconnecting all cables

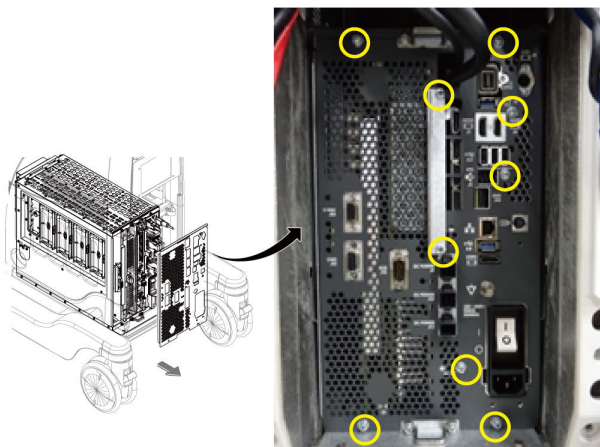


3. Remove the 9 screws securing the NEST EMI back bracket.

NOTE

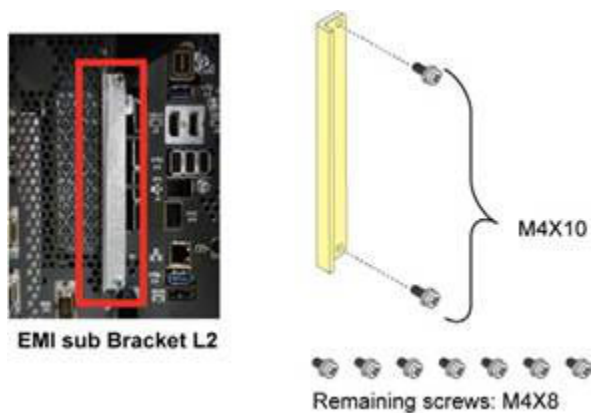
Remove Power Assist cables from NEST EMI back bracket if exist.

Figure 12-296 Removing the 9 screws

**NOTE**

GPU A4000 Console , R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later. This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-297 EMI sub bracket

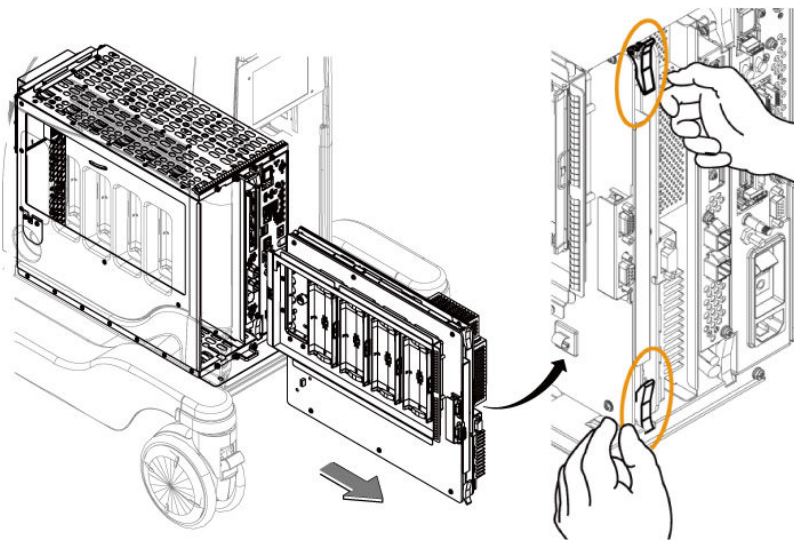


4. Pull out DA192/DPI-L Board Assy and place it on an ESD safe place.

NOTE

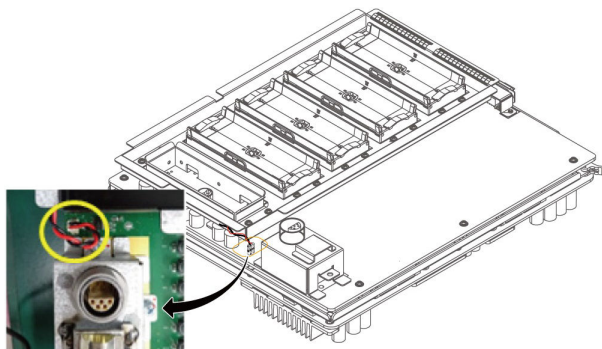
Use Card Puller to pull out.

Figure 12-298 Pulling out DA192/DPI-L



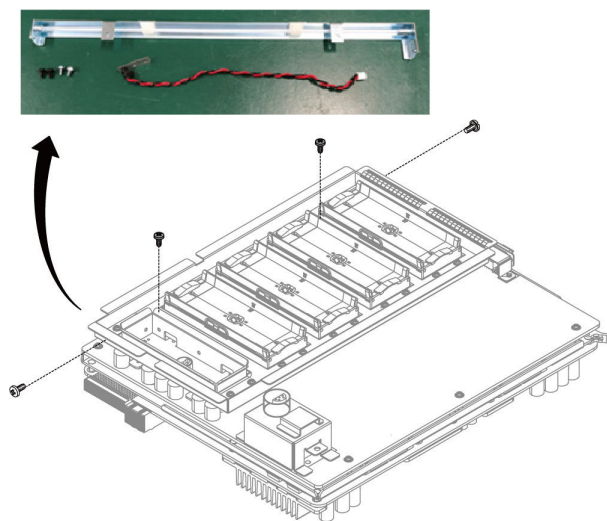
5. Remove the LED cable from DPI-L Assy.

Figure 12-299 Removing the LED cable



6. Remove 4 screws from DLP Front Bracket.(1 screw from left side,1 screw from right side, 2 screws from front side).

Figure 12-300 Removing DPI-L Lighting Assy



12.5.1.18.2 Probe Port Illumination - Installation procedure

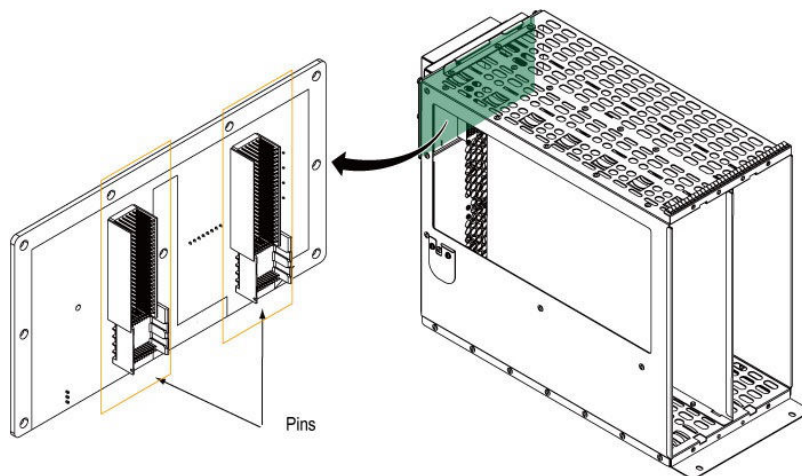
1. Install new DPI-L Lighting Assy.

NOTE

2 clamps in the FRU kit will not be used as these are attached on the frame.

2. Before restoring the BEPS, check for any bent or broken pins on the GBP PWA (BackPlane) using a flashlight (such as from a smartphone). This step will help avoid any issues after the replacement.

Figure 12-301 Checking pins on backboard



3. Install DA192/DPI-L Board Assy and BEPS in reverse order of removal.

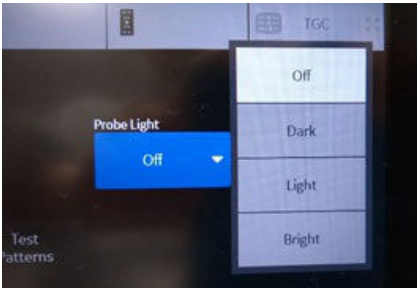
12.5.1.18.3 Probe Port Illumination - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.1.18.4 Probe Port Illumination - 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. Check that Probe port LED is Lighted when “Bright” is selected in Probe Light (Illuminator) button of Utility Page.
- 5. Check that Probe port LED is NOT Lighted when “Off” is selected in Probe Light (Illuminator) button of Utility Page.



12.5.1.18.5 Probe Port Illumination - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-83 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
B-Mode functional checks on page 162	
Power shut down on page 113	

12.5.2 Power Cables and Batteries Parts Replacement

12.5.2.1 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-84 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)



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.2.1.1 Power cable - Removal Procedure

**CAUTION**

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.

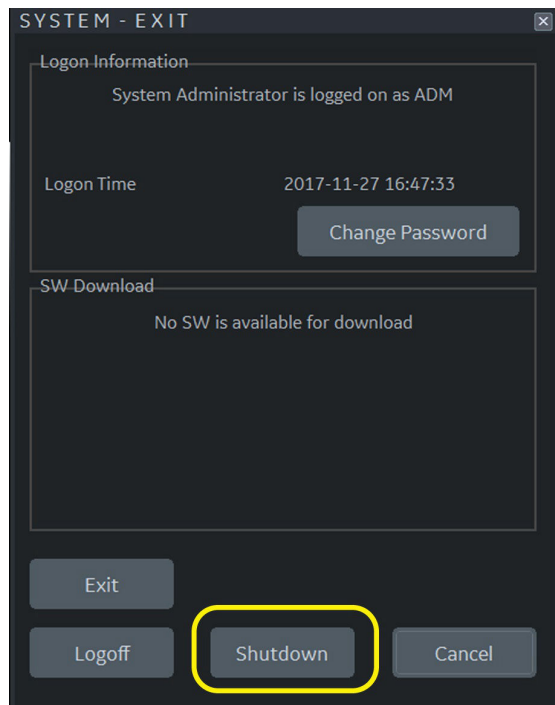
1. Set the caster brake.
2. Power down the LOGIQ Fortis completely per following procedure.
 - a. Lightly press the **ON/OFF** button on the operator panel to display the **System - Exit** menu.

Figure 12-302 ON/OFF button



- b. Select **Shutdown** to completely power down the LOGIQ Fortis.

Figure 12-303 Shutdown button

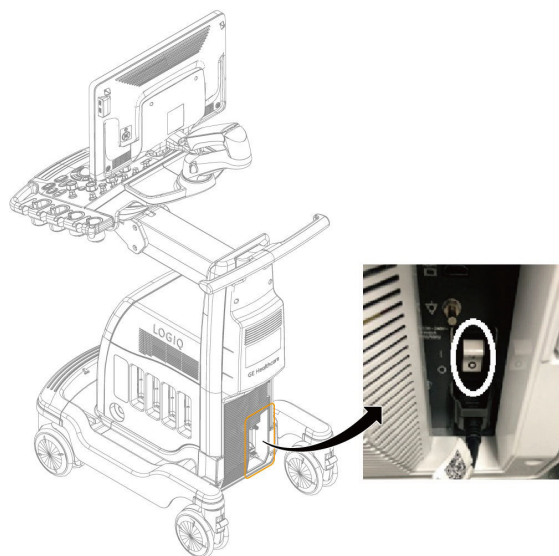
**CAUTION**

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.

3. Turn off the breaker on the back of the system.

Figure 12-304 Breaker



WARNING

- To avoid risk of fire, the system's power must be supplied from a separate, properly rated outlet.
- 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.
- To help assure grounding reliability, connect to a "hospital grade" or "hospital only" grounded power outlet.



CAUTION

Use caution to ensure that the power cable does not disconnect during system use.

If the system is accidentally unplugged, data may be lost.

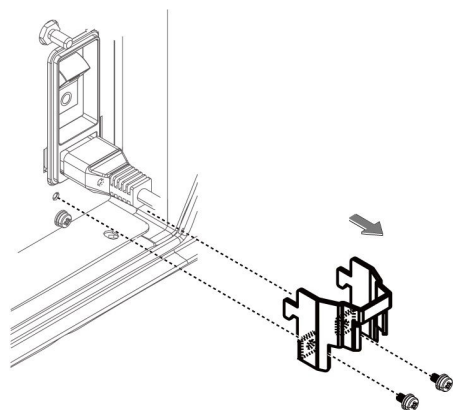


CAUTION

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.

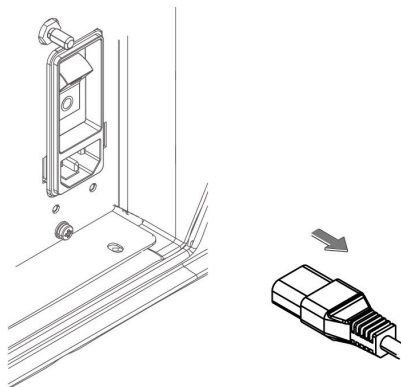
4. Unscrew 2 screws to remove the power cable clamp.

Figure 12-305 Removing cable clamp



5. Remove the power cable.

Figure 12-306 Removing power cable



6. Disconnect the other end (male plug) of the power cable from a hospital grade mains power outlet.

12.5.2.1.2 Power cable - Installation procedure

Install components in reverse order of removal.

12.5.2.1.3 Power cable - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.2.1.4 Power cable - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.2.1.5 Power cable - 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 12-85 Cable replacement Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks</i> on page 161	
<i>Grounding continuity test</i> on page 775	
<i>Power shut down</i> on page 113	

12.5.2.2 Batteries Parts Replacement

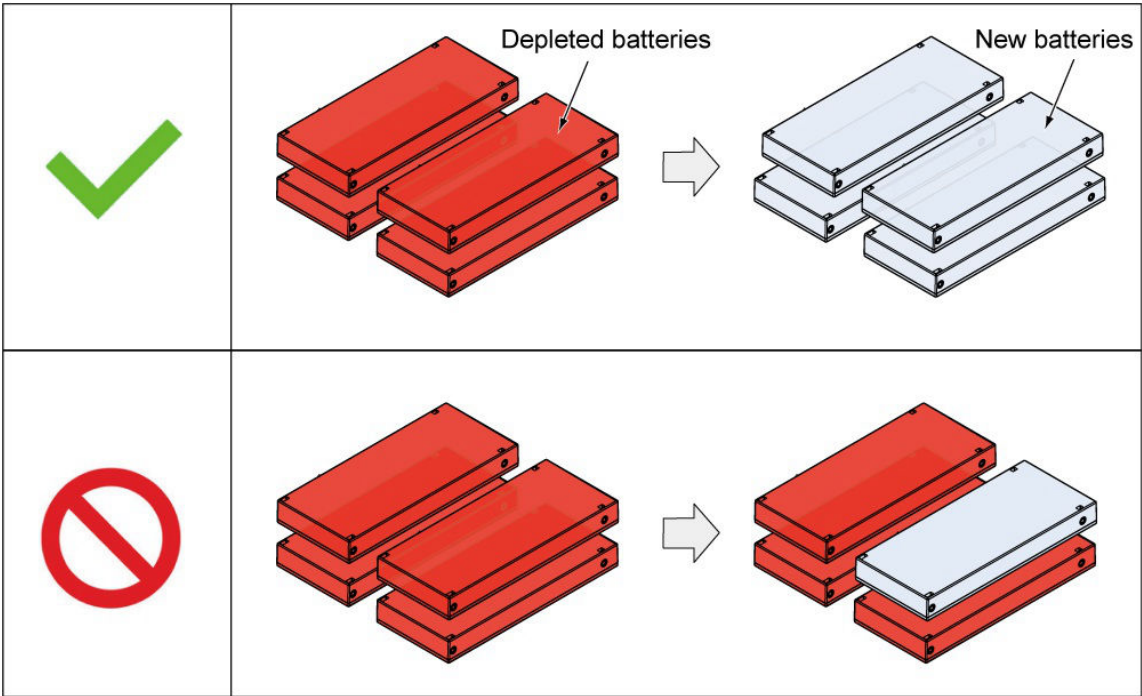
12.5.2.2.1 Scan on Battery (Battery Installation kit) replacement



WARNING
THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BOFORE 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-86 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.

**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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

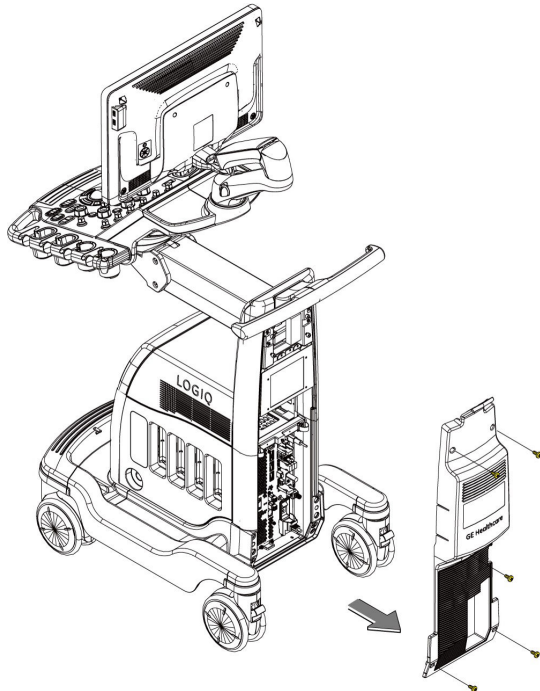
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

Scan on Battery (Battery Installation kit) - Removal procedure

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

1. If not done yet, remove 5 screws and rear cover.

Figure 12-307 Removing rear cover

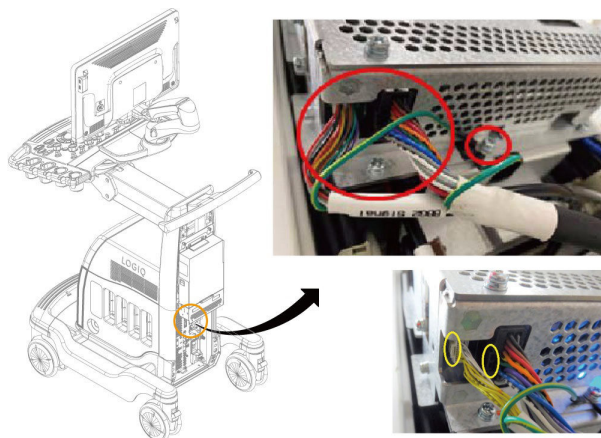


2. If not done yet, disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line.

NOTE

Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob.

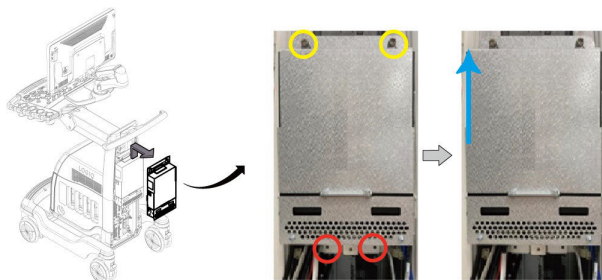
Figure 12-308 Disconnect BBG2 cables



3. Remove Battery Installation Kit from frame per following steps.
 - a. Loosen the upper 2 screws (indicate yellow circle).

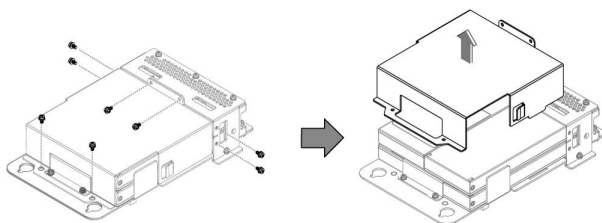
- b. Unscrew lower 2 screws (indicate red circle) and remove Battery Installation Kit.

Figure 12-309 Removing Battery Installation Kit



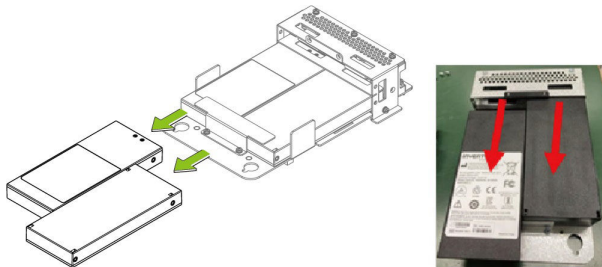
4. Unscrew 8 screws and remove the battery box cover.

Figure 12-310 Removing battery box cover.



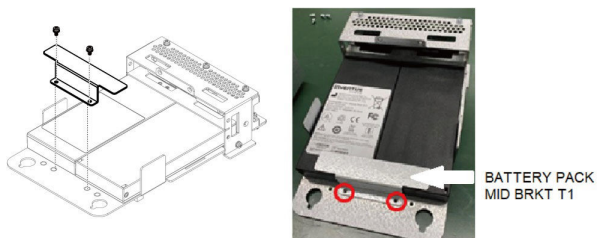
5. Disconnect 2 upper battery packs.

Figure 12-311 Disconnecting upper battery packs



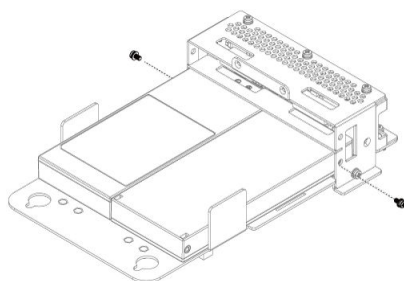
6. Unscrew 2 screws to remove Battery pack mid Bracket.

Figure 12-312 Removing Battery pack mid Bracket



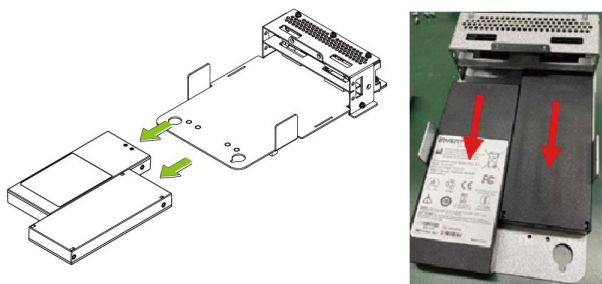
7. Unscrew 2 screws to remove the battery packs.

Figure 12-313 Unscrewing 2 screws



8. Disconnect 2 lower battery packs.

Figure 12-314 Disconnecting lower battery packs



Scan on Battery (Battery Installation kit) - Installation procedure

Install Battery Packs to new Battery Installation kit and re- install all parts in reverse order of removal.

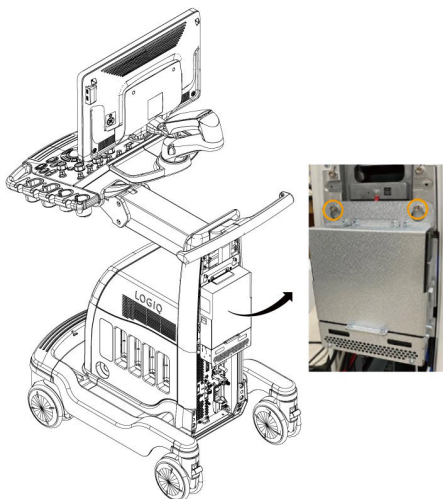
NOTE

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.

**CAUTION**

The two screws shown in illustration below are holding BBG2 and Elevation Arm.

Tighten by 120Kgf.cm with proper torque wrench.



Scan on Battery (Battery Installation kit) - Calibration and adjustments

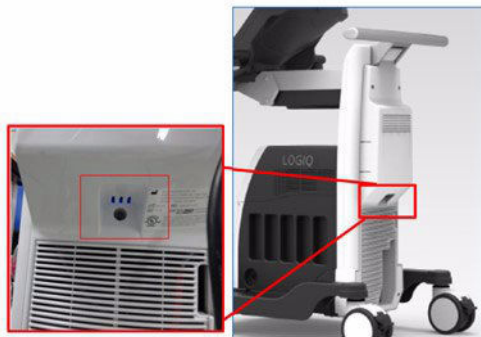
No calibrations or adjustments are needed after this part replacement.

Scan on Battery (Battery Installation kit) - 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

Figure 12-315 Battery LED Check



Scan on Battery (Battery Installation kit) - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-87 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
Scan on Battery functional checks on page 182	
Grounding continuity test on page 775	
Chassis leakage current test on page 776	
Power shut down on page 113	

12.5.2.2.2 Scan on Battery (4 Pack Battery) replacement

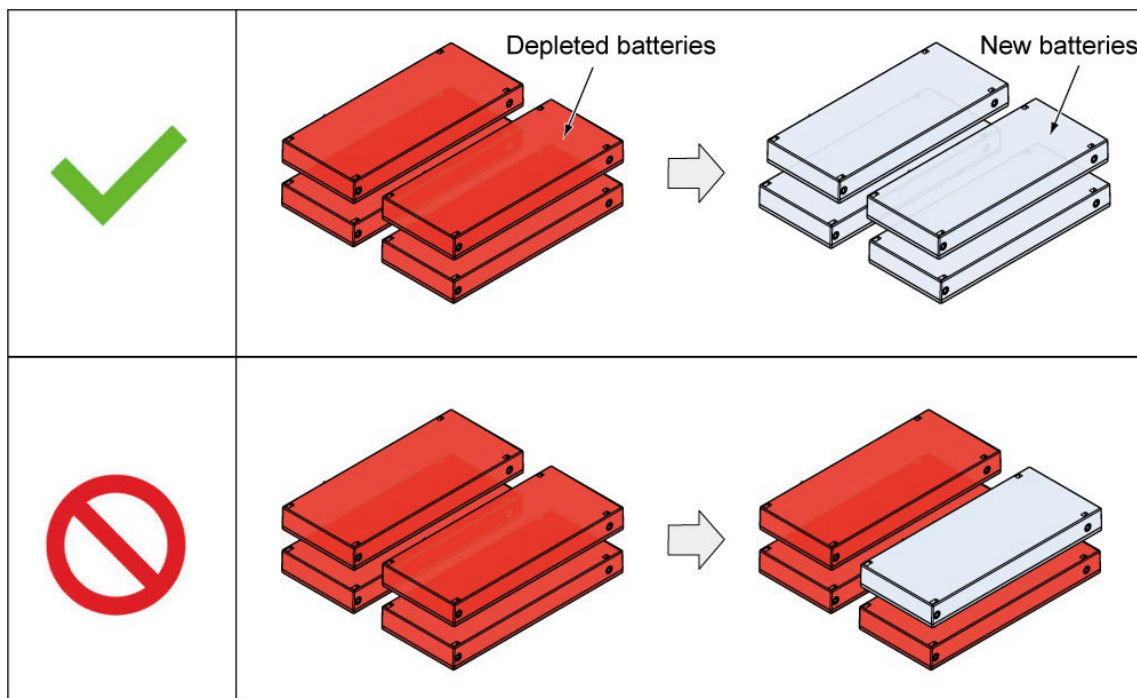

WARNING

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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-88 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.


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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

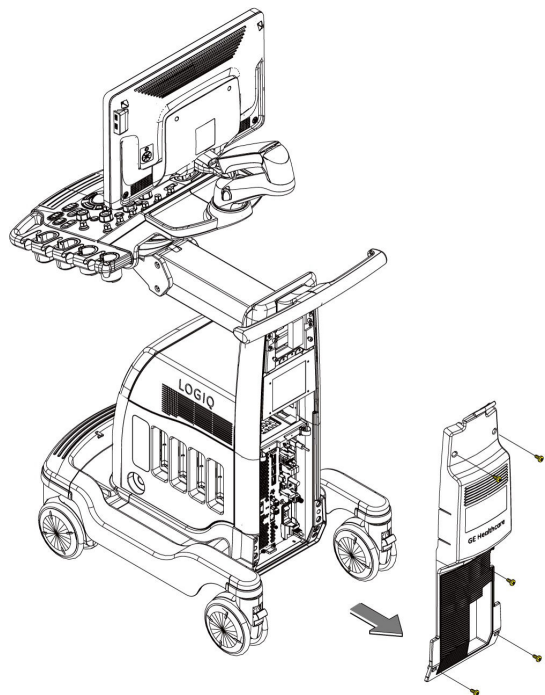
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

Scan on Battery (4 Pack Battery) - Removal procedure

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

1. If not done yet, remove 5 screws and rear cover.

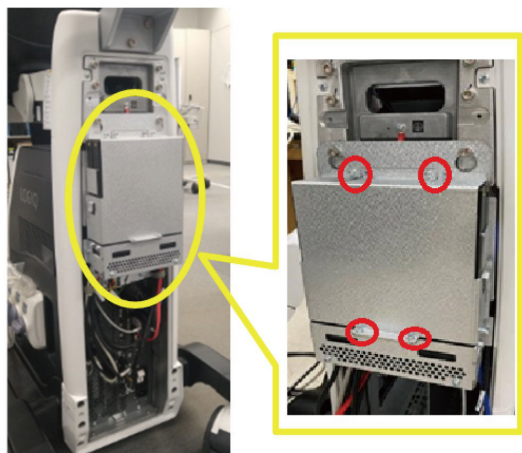
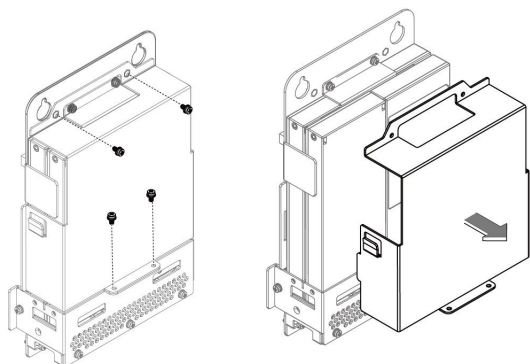
Figure 12-316 Removing rear cover



2. Remove the metal bracket per following steps.
 - a. Loosen the upper 2 screws (indicate yellow circle).

- b. Unscrew lower 2 screws (indicate red circle) and remove metal bracket.

Figure 12-317 Removing the metal bracket

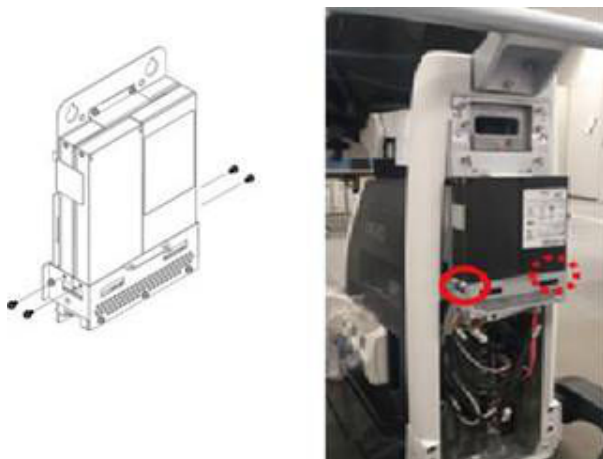


3. Unscrew 4 screws to remove battery packs.

NOTE

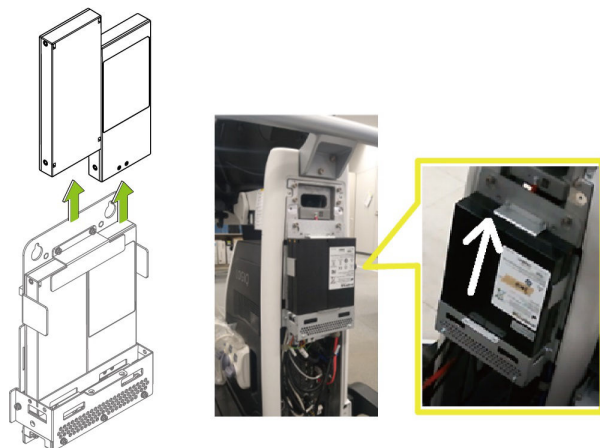
2 screws on each side.

Figure 12-318 Removing battery packs



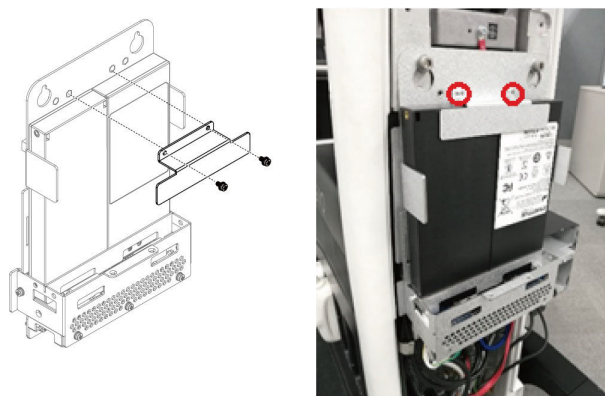
4. Remove the two 4S2P BATTERY PACKs from the front side.

Figure 12-319 Removing two 4S2P BATTERY PACKs



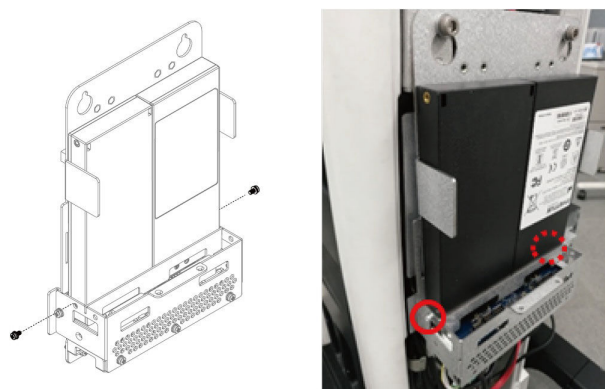
5. Unscrew 2 screws to remove the BATTERY PACK MID BRKT.

Figure 12-320 Removing BATTERY PACK MID BRKT



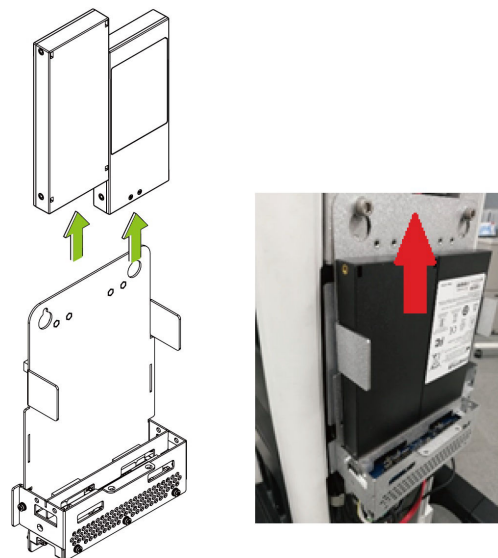
6. Unscrew 2 screws to remove the battery packs.

Figure 12-321 Unscrewing 2 screws



7. Remove the two 4S2P BATTERY PACKs.

Figure 12-322 Removing 4S2P BATTERY PACKs.



Scan on Battery (4 Pack Battery) - Installation procedure

Install new 4S2P BATTERY PACK and re- install all parts and covers in reverse order of removal.

NOTE

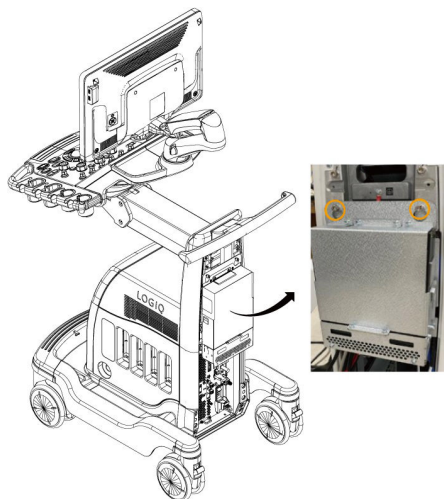
Make sure that the BBG2 power and signal cable fit together correctly and that they will not come off even if you pull them lightly.



CAUTION

The two screws shown in illustration below are holding BBG2 and Elevation Arm.

Tighten by 120Kgf.cm with proper torque wrench.



Scan on Battery (4 Pack Battery) - Calibration and adjustments

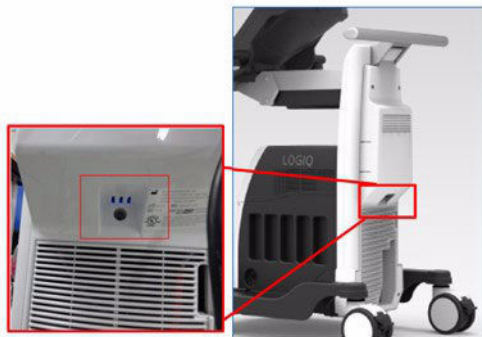
No calibrations or adjustments are needed after this part replacement.

Scan on Battery (4 Pack Battery) - 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

Figure 12-323 Battery LED Check



Scan on Battery (4 Pack Battery) - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-89 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
Scan on Battery functional checks on page 182	
Grounding continuity test on page 775	
Chassis leakage current test on page 776	
Power shut down on page 113	

12.5.2.2.3 Power Assistant (Battery Installation Kit) replacement

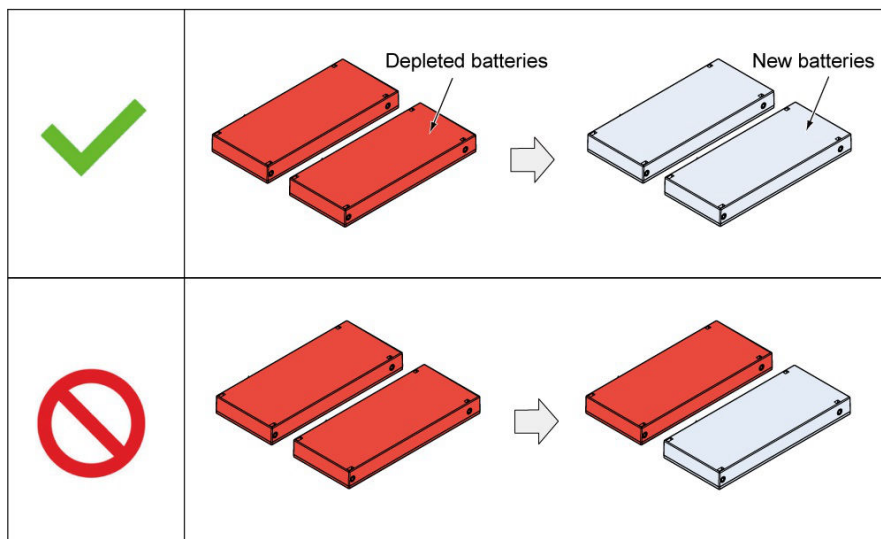

WARNING

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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-90 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)

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.


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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.

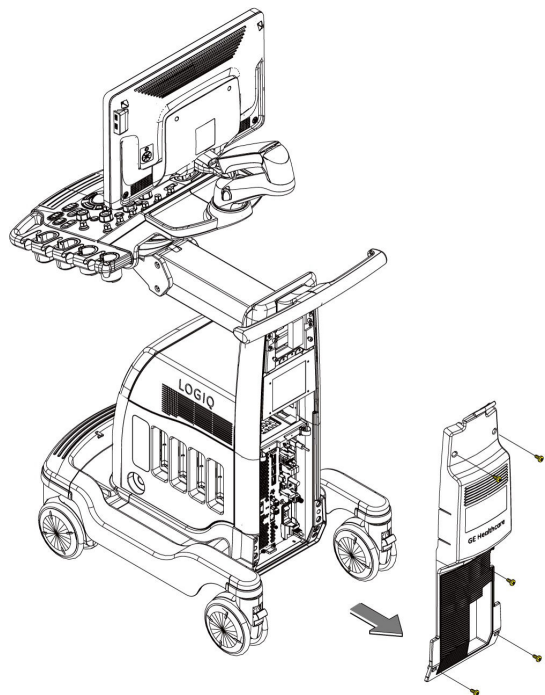
- a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

Power Assistant (Battery Installation Kit) - Removal procedure

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

1. If not done yet, remove 5 screws and rear cover.

Figure 12-324 Removing rear cover

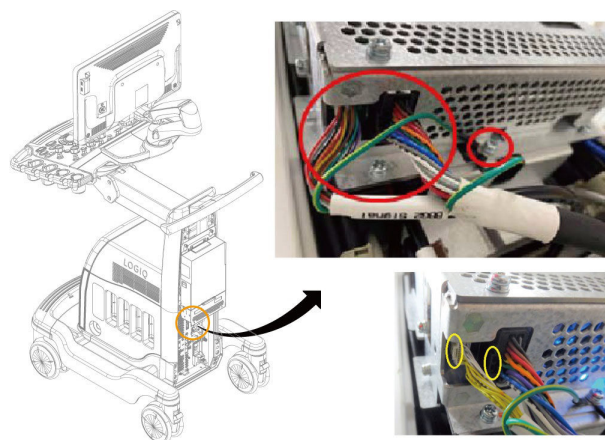


2. If not done yet, disconnect BBG2 Signal Cable and BBG2 Power Cable. Unscrew 1 screw to remove one ground line.

NOTE

Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob.

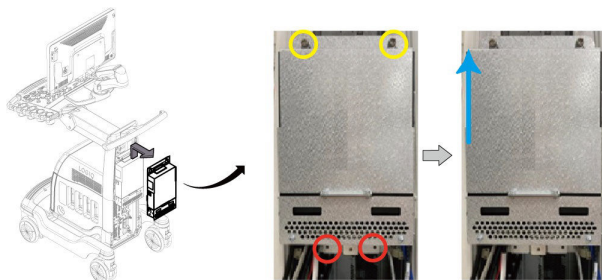
Figure 12-325 Disconnect BBG2 cables



3. Remove Battery Installation Kit from frame per following steps.
 - a. Loosen the upper 2 screws (indicate yellow circle).

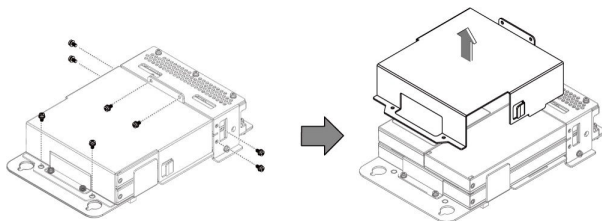
- b. Unscrew lower 2 screws (indicate red circle) and remove Battery Installation Kit.

Figure 12-326 Removing Battery Installation Kit



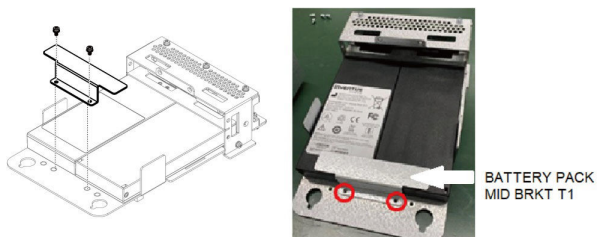
4. Unscrew 8 screws and remove the battery box cover.

Figure 12-327 Removing battery box cover.



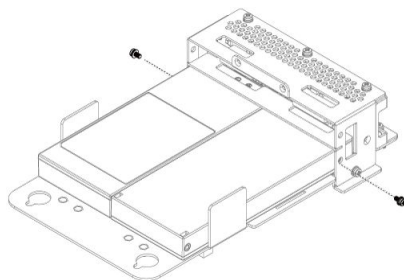
5. Unscrew 2 screws to remove Battery pack mid Bracket.

Figure 12-328 Removing Battery pack mid Bracket



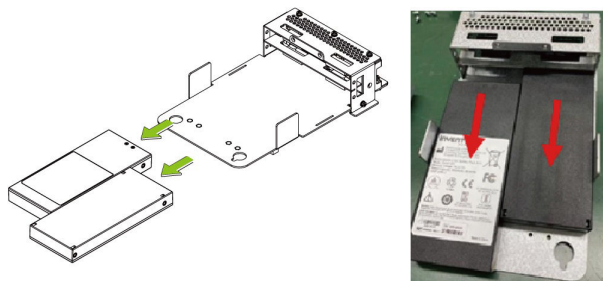
6. Unscrew 2 screws to remove the battery packs.

Figure 12-329 Unscrewing 2 screws



7. Disconnect 2 lower battery packs.

Figure 12-330 Disconnecting lower battery packs



Power Assistant (Battery Installation Kit) - Installation procedure

Install Battery Packs to new Battery Installation kit and re- install all parts in reverse order of removal.

NOTE

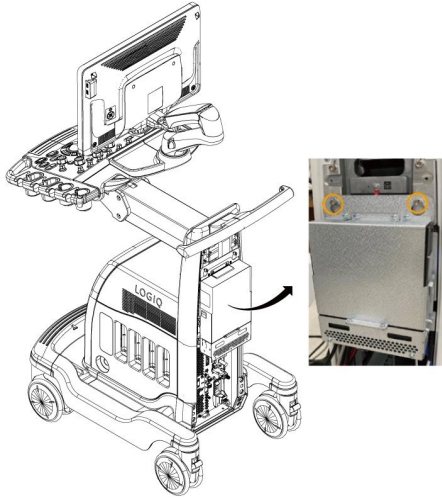
Make sure that the BBG2 power and signal cable fit together correctly and that they will not come off even if you pull them lightly.



CAUTION

The two screws shown in illustration below are holding BBG2 and Elevation Arm.

Tighten by 120Kgf.cm with proper torque wrench.



Power Assistant (Battery Installation Kit) - Calibration and adjustments

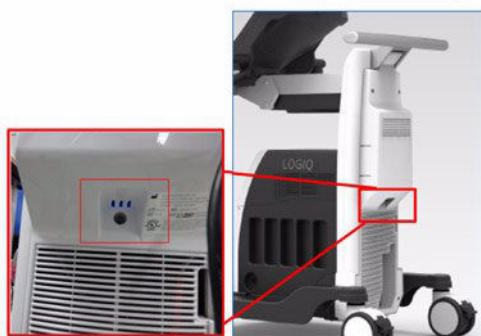
No calibrations or adjustments are needed after this part replacement.

Power Assistant (Battery Installation Kit) - 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

Figure 12-331 Battery LED Check



Power Assistant (Battery Installation Kit) - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-91 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
Power Assistant functional checks on page 181	
Grounding continuity test on page 775	
Chassis leakage current test on page 776	
Power shut down on page 113	

12.5.2.2.4 Power Assistant (2 Pack Battery) replacement

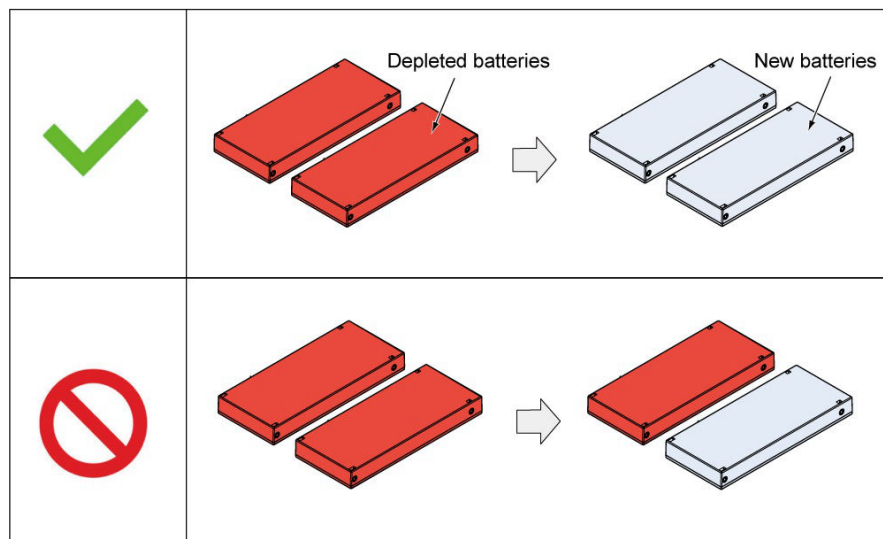

WARNING

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.


WARNING

Replace all 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-92 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 20minutes	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.


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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.

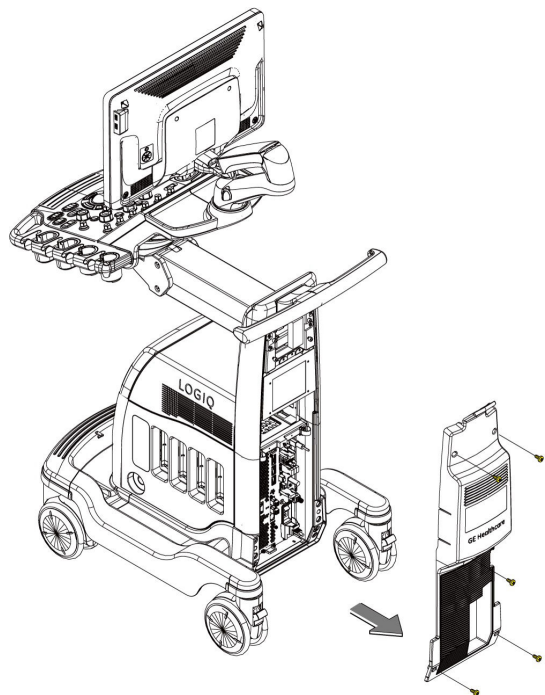
- a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

Power Assistant (2 Pack Battery) - Removal procedure

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

1. If not done yet, remove 5 screws and rear cover.

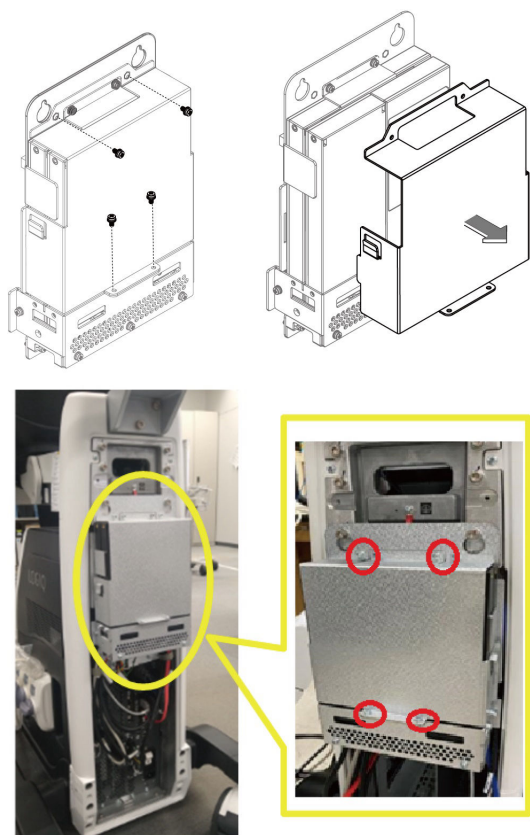
Figure 12-332 Removing rear cover



2. Remove the metal bracket per following steps.
 - a. Loosen the upper 2 screws (indicate yellow circle).

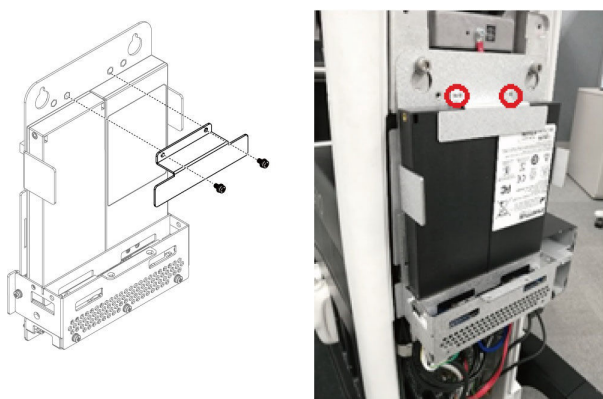
- b. Unscrew lower 2 screws (indicate red circle) and remove metal bracket.

Figure 12-333 Removing the metal bracket



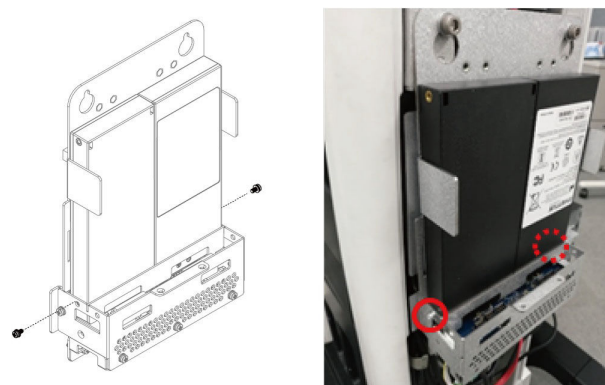
3. Unscrew 2 screws to remove the BATTERY PACK MID BRKT.

Figure 12-334 Removing BATTERY PACK MID BRKT



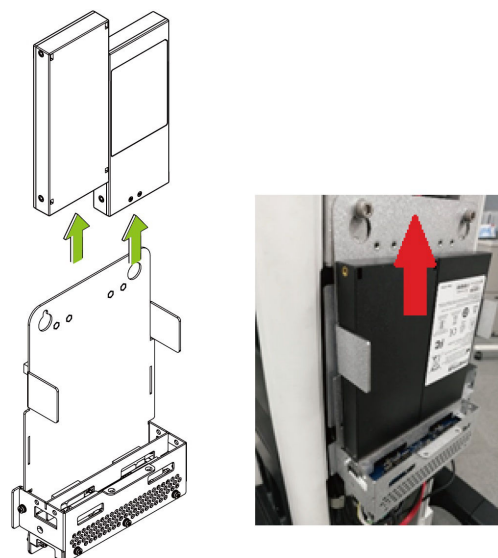
4. Unscrew 2 screws to remove the battery packs.

Figure 12-335 Unscrewing 2 screws



5. Remove the two 4S2P BATTERY PACKs.

Figure 12-336 Removing 4S2P BATTERY PACKs.



Power Assistant (2 Pack Battery) - Installation procedure

1. Install the battery packs to Battery bracket.

NOTE

Be sure to insert the battery pack to J15 and J17 connector.

Figure 12-337 Install the battery packs



2. Install all parts and covers in reverse order of removal.

NOTE

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.



CAUTION

The two screws shown in illustration below are holding BBG2 and Elevation Arm.

Tighten by 120Kgf.cm with proper torque wrench.



Power Assistant (2 Pack Battery) - Calibration and adjustments

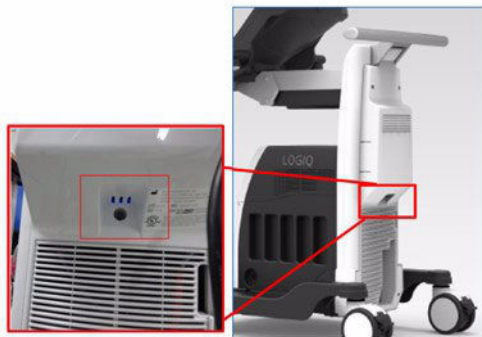
No calibrations or adjustments are needed after this part replacement.

Power Assistant (2 Pack Battery) - 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

Figure 12-338 Battery LED Check



Power Assistant (2 Pack Battery) - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-93 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
Power Assistant functional checks on page 181	
Grounding continuity test on page 775	
Chassis leakage current test on page 776	
Power shut down on page 113	

12.5.2.2.5 Battery Cable replacement


WARNING

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-94 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.


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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

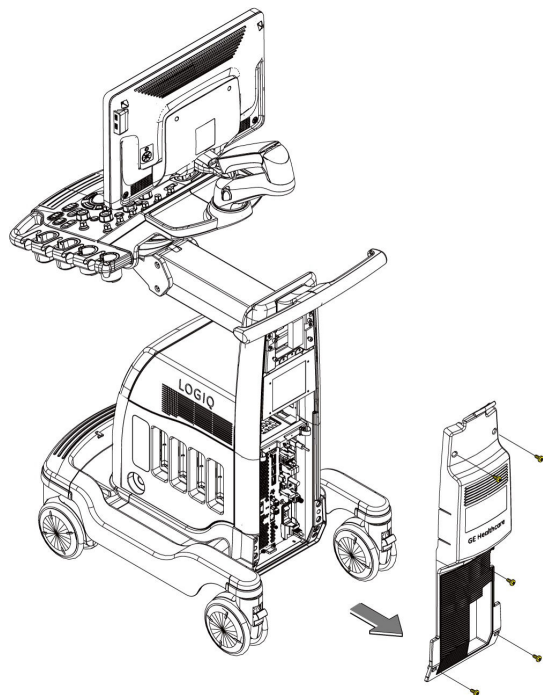
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

Battery Cable - Removal procedure

THE BATTERY MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD. WAIT UNTIL BATTERY HAS COOLED DOWN BEFORE REMOVING.

1. If not done yet, remove 5 screws and rear cover.

Figure 12-339 Removing rear cover



2. Disconnect BBG2 cables per following steps.
 - a. Disconnect BBG2 Signal Cable and BBG2 Power Cable.
 - b. Unscrew 1 screw to remove one ground line.

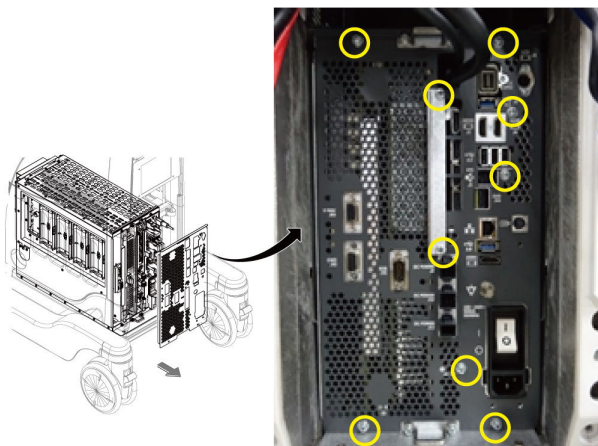
NOTE

Hold down a knob (indicate yellow circle) to unlatch cables before disconnect. Connector may damage if you don't hold down a knob

Figure 12-340 Disconnect BBG2 Cables

3. Remove the 9 screws securing the NEST EMI back bracket.

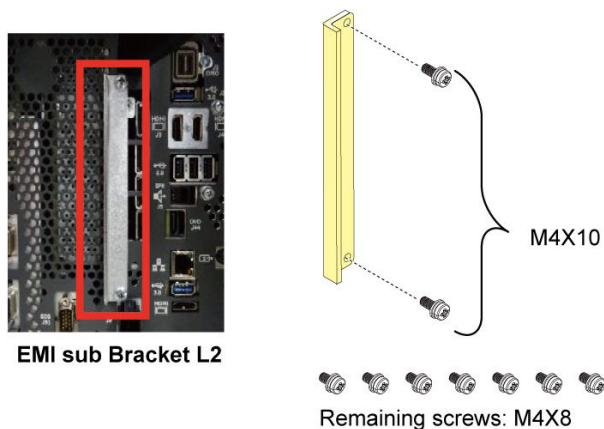
Figure 12-341 Removing NEST EMI back bracket



NOTE

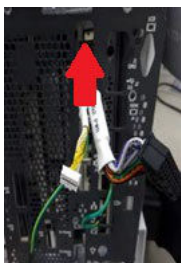
GPU A4000 Console , R4 and later: When removing the NEST EMI back bracket, remove the EMI sub bracket together to re-use it later. This bracket is for GPU A4000 Console Only. It does not exist for GPU P4000 Console.

Figure 12-342 Removing EMI sub bracket



4. Pass the BBG2 Power Cable and the BBG2 Signal Cable through the hole of the NEST EMI BRKT.

Figure 12-343 Passing BBG2 Cables

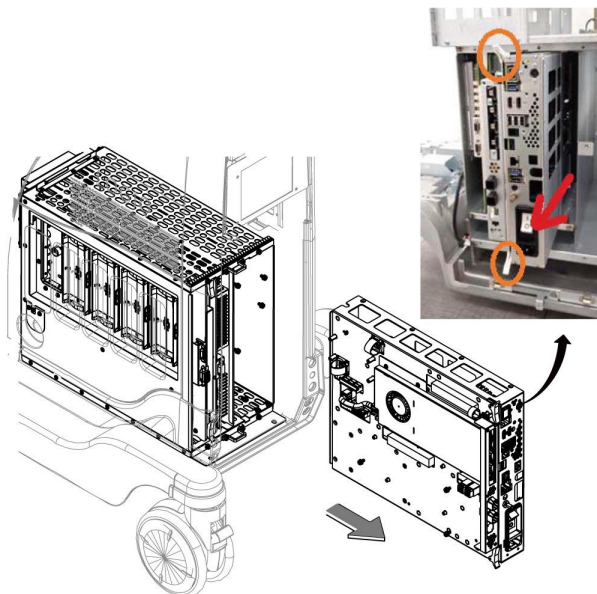


5. Pull out the BEPS Assy and place it on an ESD safe place.

NOTE

Use Card Puller to pull out.

Figure 12-344 Pulling out BEPS Assy



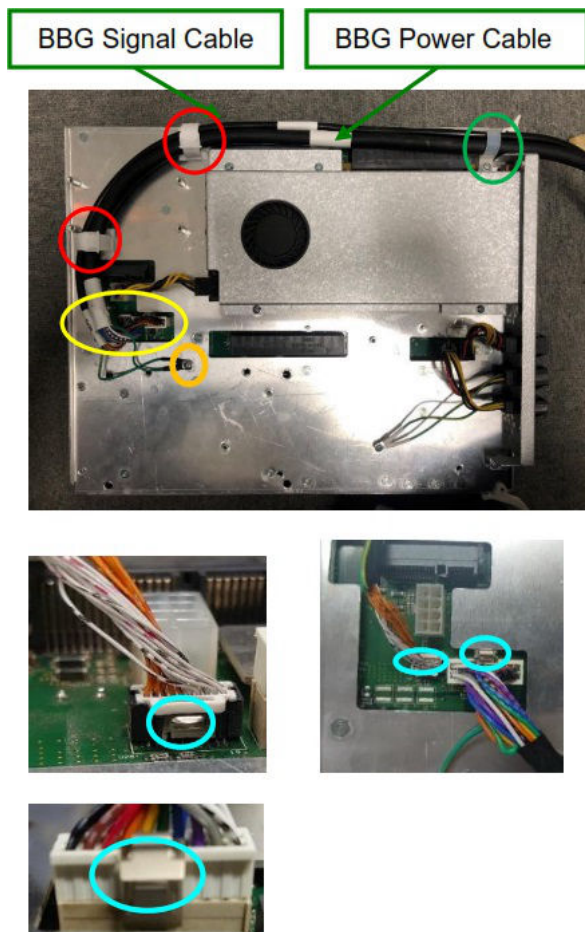
6. Disconnect the BBG2 cables per following steps.

- a. Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (RED CIRCLE).
- b. Loosen one screw and Disconnect the BBG2 signal cable and BBG2 power cable from the cable clamp (GREEN CIRCLE).
- c. Loosen one screw and disconnect the ground cable of the BBG2 power cable (ORANGE CIRCLE).
- d. Disconnect the BBG2 Signal Cable and BBG2 Power Cable (YELLOW CIRCLE).

NOTE

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.

Figure 12-345 Disconnecting BBG2 Cables



Battery Cable - Installation procedure

Replace the BBG2 Signal Cable and BBG2 Power Cable, and assemble parts in reverse order of removal.

NOTE

Once cables are connected, gently pull the cable to make sure that the cable does not come off.

Battery Cable - Calibration and adjustments

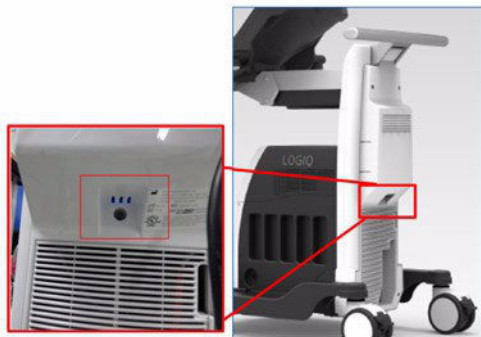
No calibrations or adjustments are needed after this part replacement.

Battery Cable - 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

Figure 12-346 Battery LED Check



Battery Cable - Functional checks

Table 12-95 Functional Checks

Functional Check	Service Record Debrief Script
Power on/boot up on page 98	Equipment passed all required checks and is ready for use.
Probe/connector functional checks on page 161	
B-Mode functional checks on page 162	
System CFM and PWD functional checks on page 165	
Power shut down on page 113	

12.5.3 Cable Duct and OPIO Cable Assy Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-96 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



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, perform *Lockout/tagout procedure* on page 50.

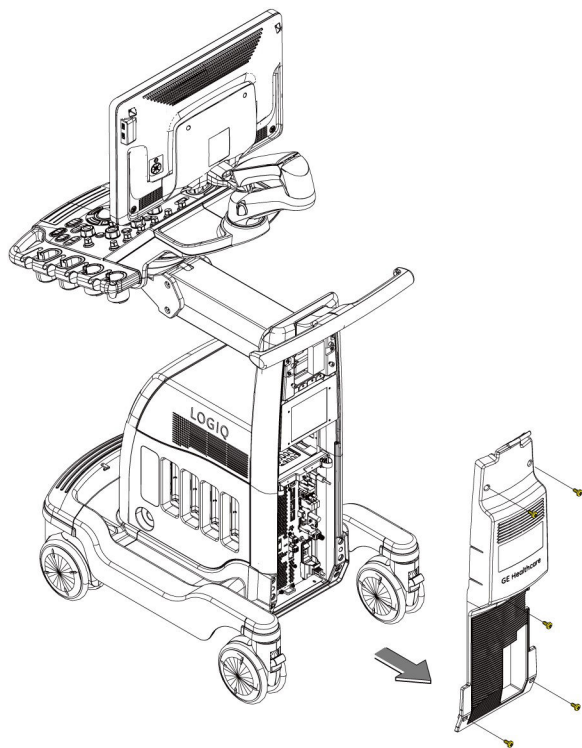
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.5.3.1 Cable Duct and OPIO Cable Assy - Removal Procedure

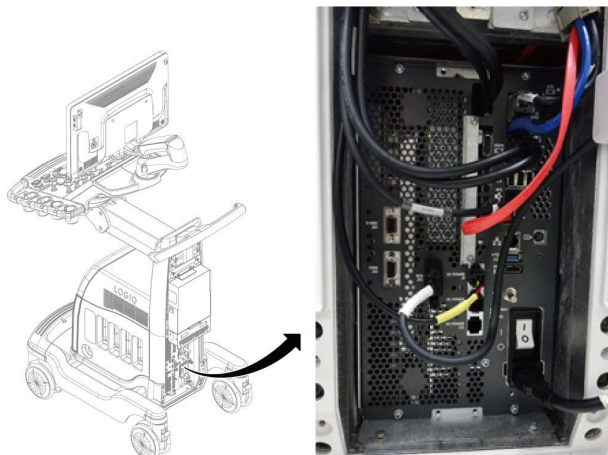
1. Unscrew 5 screws to remove the rear cover.

Figure 12-347 Removing Rear Cover



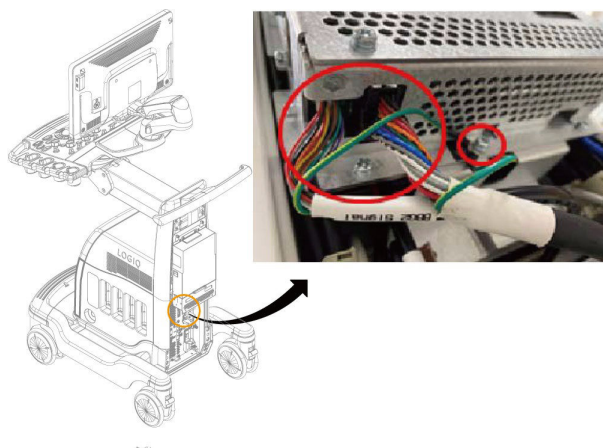
2. Disconnect all cables from NEST.

Figure 12-348 Disconnecting cables from NEST



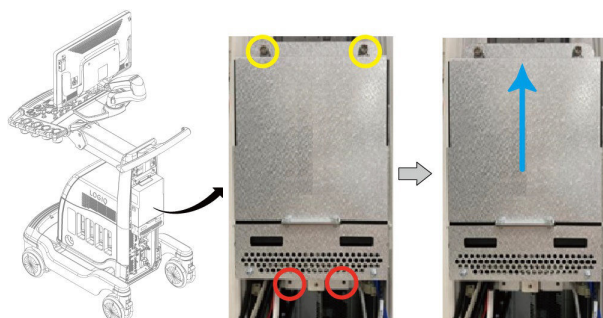
3. Unscrew 1 screw to remove BBG2 Signal Cable and BBG2 Power Cable.

Figure 12-349 Removing BBG2 cables



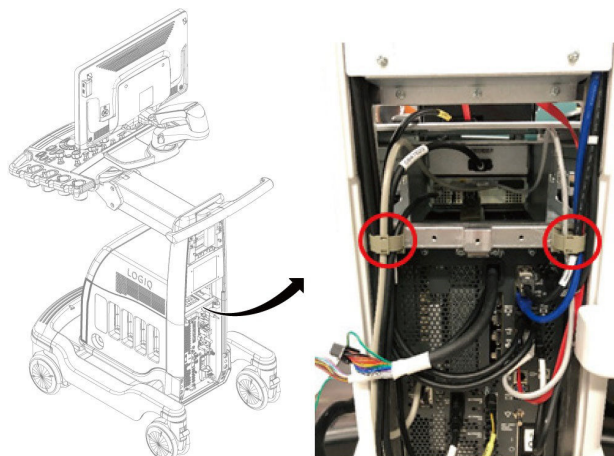
4. Remove Battery installation kit from frame.
 - a. Loosen the upper 2 screws (indicate yellow circle).
 - b. Unscrew lower 2 screws (indicate red circle).

Figure 12-350 Removing Battery installation kit



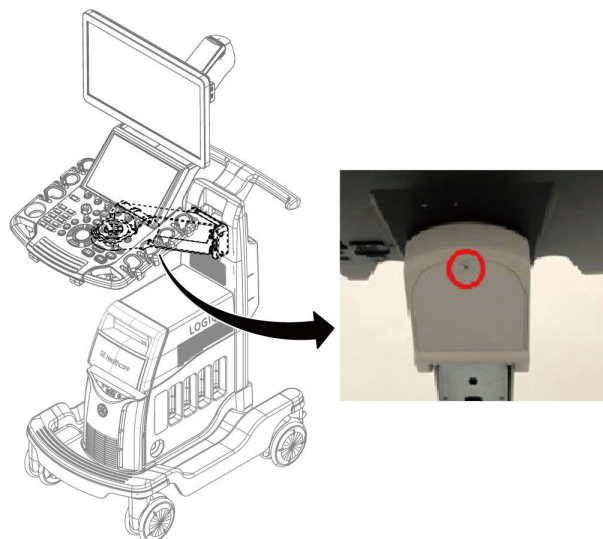
5. Loosen 2 cable clamp.

Figure 12-351 2 cable clamps



6. Loosen 1 screw to remove Front Block Dummy Cover.

Figure 12-352 Removing Front Block Dummy Cover



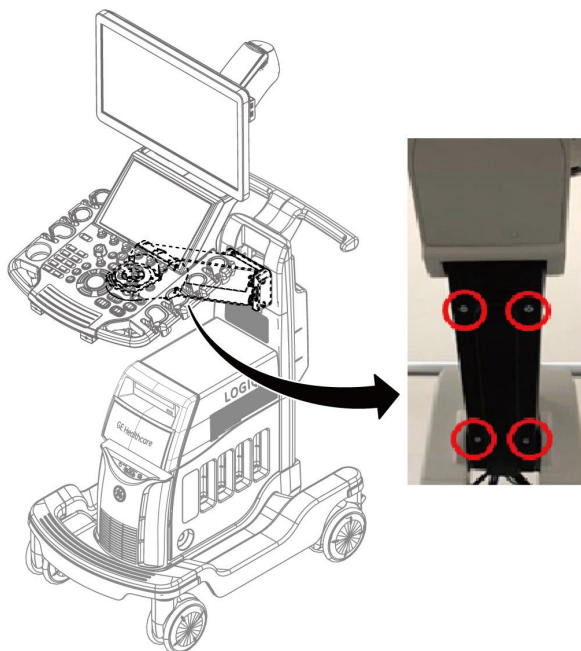
7. Remove the tie-wrap

Figure 12-353 Tie-wrap



8. Remove 4 screws and Elevation arm lower cover.

Figure 12-354 Removing Elevation arm lower cover



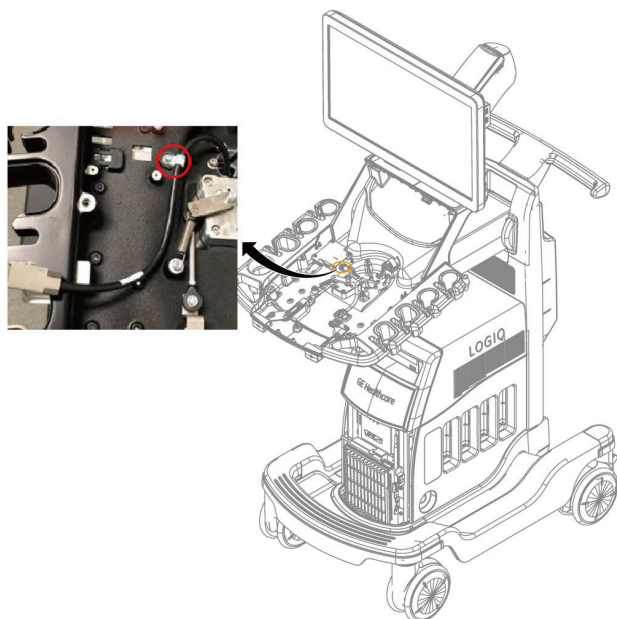
9. Remove 2 screws to loosen the 2 cable clamp.

Figure 12-355 2 cable clamps



10. Remove the cable clamp.

Figure 12-356 Cable clamp



11. Gently push the connectors through center of the operator panel base and pull the cables downward.

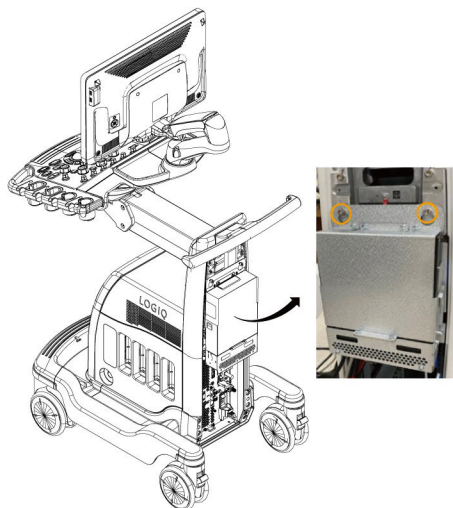
12.5.3.2 Cable Duct and OPIO Cable Assy - Installation procedure

Install components in reverse order of removal.

NOTE

The two screws shown in illustration below are holding BBG2 and Elevation Arm. Tighten by 120Kgf.cm with proper torque wrench.

Figure 12-357 Two screws holding BBG2



12.5.3.3 Cable Duct and OPIO Cable Assy - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.5.3.4 Cable Duct and OPIO Cable Assy - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.5.3.5 Cable Duct and OPIO Cable Assy - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-97 Cable replacement Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Color Mode functional checks on page 166</i>	
<i>PW/CW Doppler mode functional checks on page 169</i>	
<i>Top console adjustment control functional checks on page 152</i>	
<i>Power shut down on page 113</i>	

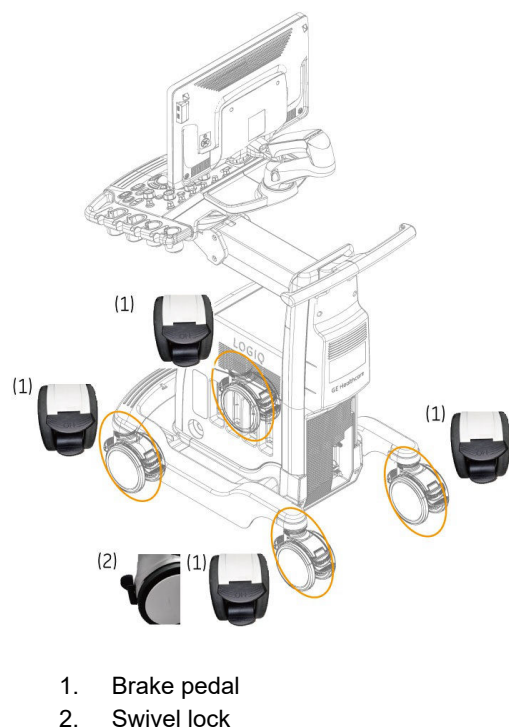
12.6 Caster Parts Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-98 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

Figure 12-358 Caster location and caster type



NOTE

New caster was introduced for forward production to improve visibility of the lock pedal as picture below.



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.6.1 Caster - Removal procedure

1. Remove the following cover.
 - *Side Cabinet Replacement* on page 397 (If exists)
 - *Mid and High Cabinet Cover Replacement* on page 367 or *Low Cabinet Cover replacement* on page 371
 - *Front Cover Replacement* on page 363
 - *Side Cover Replacement* on page 375
2. Pulling edge of each side to unhook the foot cover front.

NOTE

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.

Figure 12-359 Removing the foot cover front



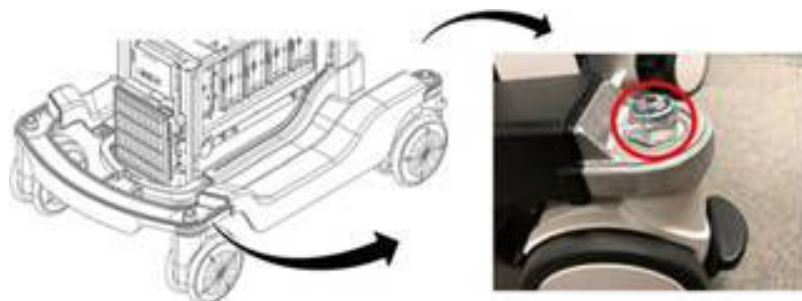
3. Remove base cover rear by slightly pulling edge of the cover to outside and then move upward.

Figure 12-360 Removing base cover rear



4. Loosen the nut to remove the caster.

Figure 12-361 Removing caster



12.6.2 Caster - Installation Procedure

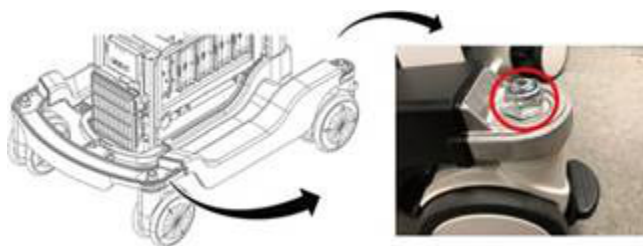
Install components in reverse order of removal.



CAUTION

The four nuts shown in illustration below are sustaining the console.

Tighten the nuts by 900~1200Kgf.cm with proper torque wrench.



12.6.3 Power cable - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.6.4 Power cable - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.6.5 Caster - Functional checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

Table 12-99 Functional Checks

Functional Check	Service Record Debrief Script
<i>Brakes and direction lock functional checks on page 155</i>	Equipment passed all required checks and is ready for use.

12.7 Supported Probe Parts Replacement

For information on replacing supported probes, see *Connecting/disconnecting probes* on page 96.

12.8 Option and Peripheral Parts Replacement

12.8.1 WLAN for Vscan Air Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-100 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



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, perform *Lockout/tagout procedure* on page 50.

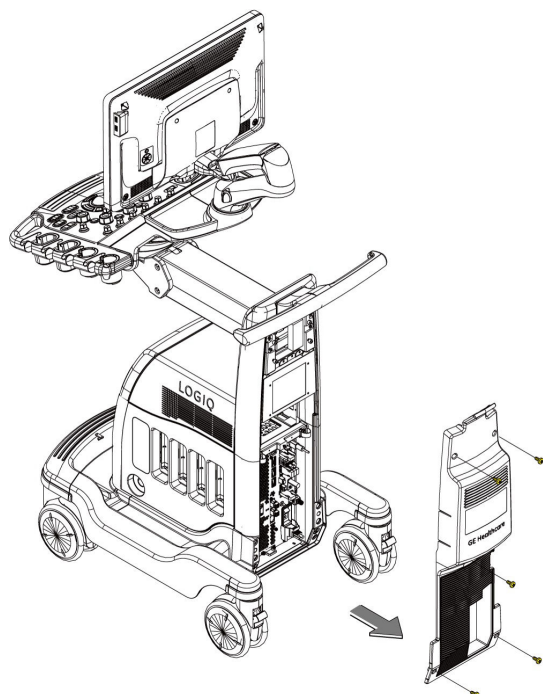
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.1.1 WLAN for Vscan Air - Replacement procedure

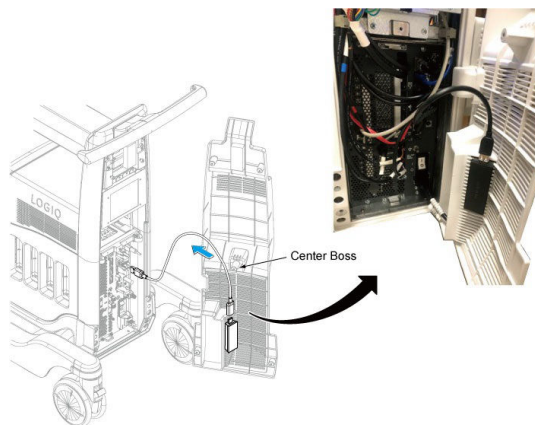
1. Remove 5 screws and rear cover.

Figure 12-362 Removing rear cover



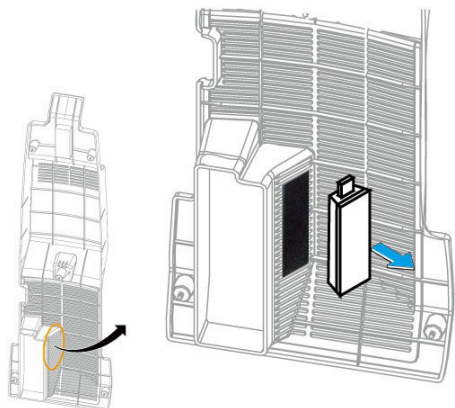
2. Remove USB cable from BEPS USB 2.0 port and Wireless LAN dongle.

Figure 12-363 Removing USB cable



3. Remove defective Wireless LAN dongle fixed by self adhesive tape from inner side of rear cover as shown in illustration.

Figure 12-364 Removing defective Wireless



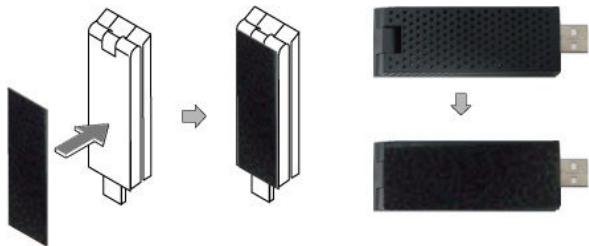
12.8.1.2 WLAN for Vscan Air - Installation Procedure

1. Attach loop sheet on new Wireless LAN dongle as shown in illustration. (5499363, SELF ADHESIVE HOOK AND LOOP W30XL75).

NOTE

Clean and degrease the surface before attaching the loop sheet.

Figure 12-365 Attaching loop sheet

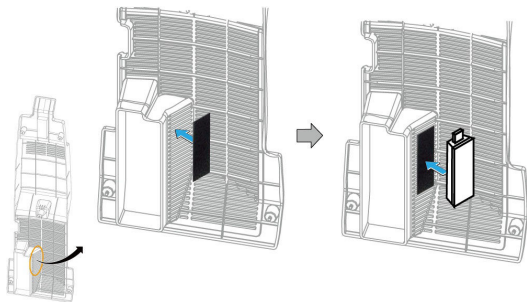


2. Attach the Wireless LAN dongle to the rear cover per following steps.
 - a. Attach hook sheet on inner side of rear cover as shown in illustration. (5499363, SELF ADHESIVE HOOK AND LOOP W30XL75).
 - b. Attach the Wireless LAN dongle to the hook sheet.

NOTE

Clean and degrease the surface before attaching the loop sheet.

Figure 12-366 Attaching Wireless LAN dongle

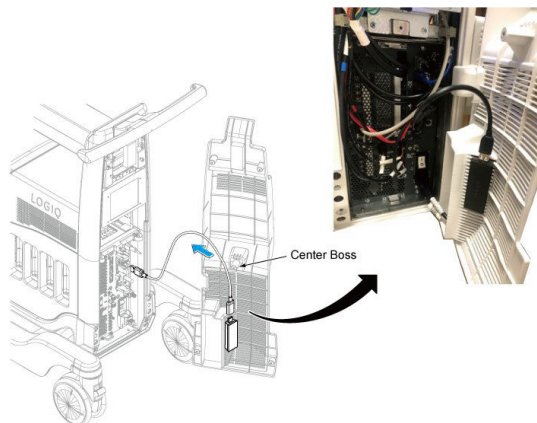


3. Connect and route the USB cable per following steps.
 - a. Connect USB cable to BEPS USB 2.0 port and Wireless LAN dongle.
 - b. Route the USB cable to the left under the center boss to avoid the cable pinch between the rear cover and console frame as shown in illustration.

NOTE

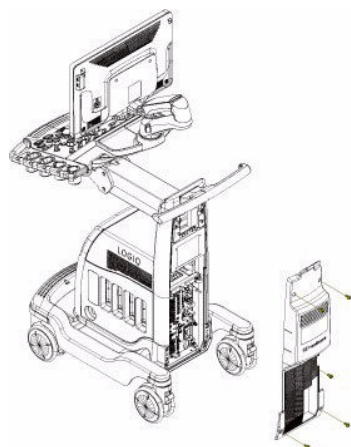
Any open USB port can be used on BEPS.

Figure 12-367 Connecting cable



4. Assemble the Rear Cover with 5 screw.

Figure 12-368 Assembling the Rear Cover



12.8.1.3 WLAN for Vscan Air - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.1.4 WLAN for Vscan Air - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.8.1.5 WLAN for Vscan Air - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-101 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL probe connection check</i> on page 186	Equipment passed all required checks and is ready for use.

12.8.2 Vscan Air Charger(Core) Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

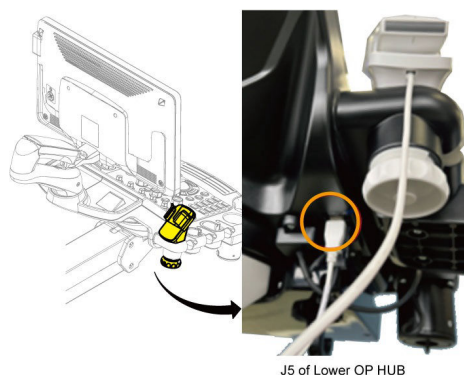
Table 12-102 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 60minutes	No tool is required	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.2.1 Vscan Air Charger(Core) - Removal procedure

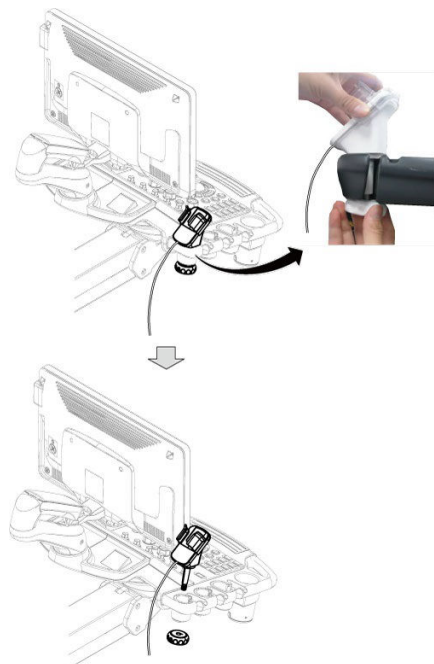
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-369 Removing USB connector



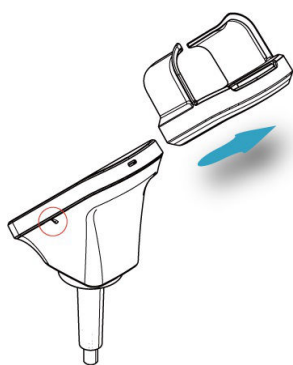
2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-370 Removing Vscan Air Charger



3. Push the clip holder up with an appropriate force to release it from the two projections at the charger base.

Figure 12-371 Removing clip holder



4. Remove the core from the base per following steps.
 - a. Put the charger on a flat table as shown.
 - b. Push the middle of the base to the center with an enough force to release the tab lock from the core.

Figure 12-372 Removing core



5. Remove the cable from the Core.

Figure 12-373 Removing cable



12.8.2.2 Vscan Air Charger(Core) - Installation procedure

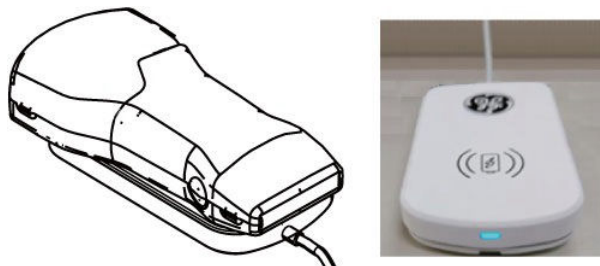
1. Plug the cable to the new Core.

Figure 12-374 Plugging cable



2. Plug in the USB cable to the Ultrasound Device and place the Vscan Air probe on the Core to pre-test the charging function.

Figure 12-375 Pre-test



3. Reinstall the base and post per following steps

- a. Install the base to the Core.

NOTE

Make sure you hear the click when attaching into place and check if it is firmly seated.

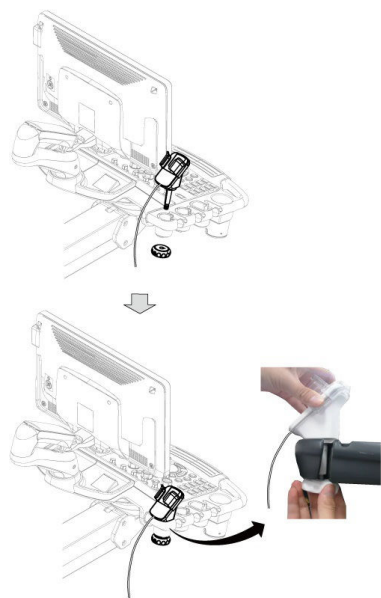
- b. Install the clip holder.

NOTE

Make sure to hear click when it seated.

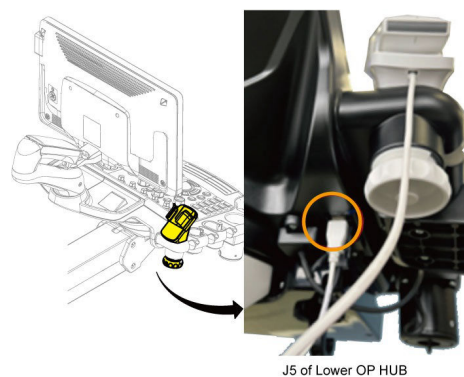
4. Re-install the charger to the Ultrasound system.

Figure 12-376 Re-installing charger



5. Plug USB connector to J5 of Lower OP HUB.

Figure 12-377 Plugging USB connector



12.8.2.3 Vscan Air Charger(Core) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.2.4 Vscan Air Charger(Core) - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.2.5 Vscan Air Charger(Core) - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-103 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL charger functional check on page 187</i>	Equipment passed all required checks and is ready for use.

12.8.3 Vscan Air Charger Clip Holder Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

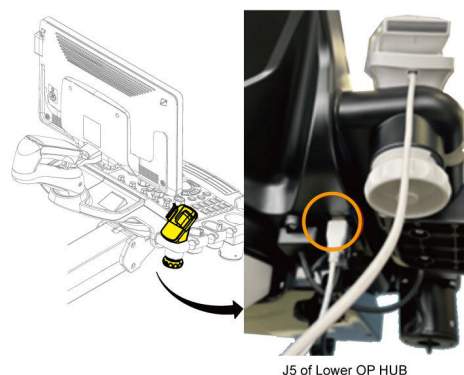
Table 12-104 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30minutes	No Tool is required.	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.3.1 Vscan Air Charger Clip Holder - Removal procedure

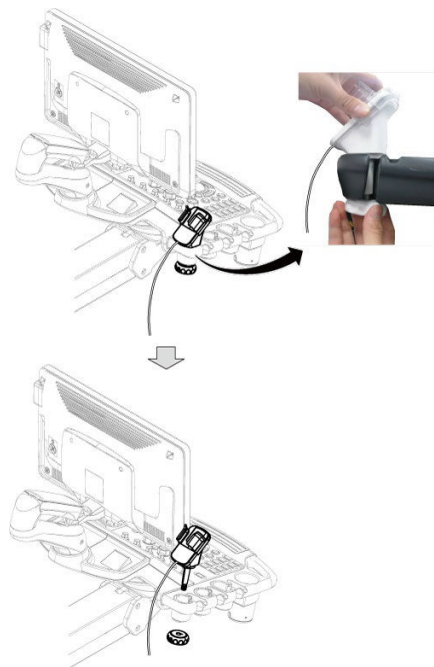
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-378 Removing USB connector



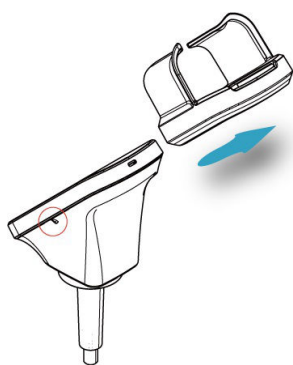
2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-379 Removing Vscan Air Charger



3. Push the clip holder up with an appropriate force to release it from the two projections at the charger base.

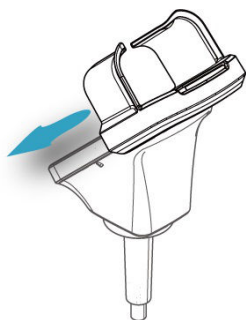
Figure 12-380 Removing clip holder



12.8.3.2 Vscan Air Charger Clip Holder - Installation procedure

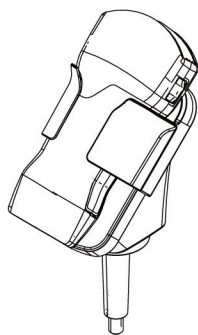
1. Push the new clip holder down to the charger base. Make sure to hear click when it seated.

Figure 12-381 Installing clip holder



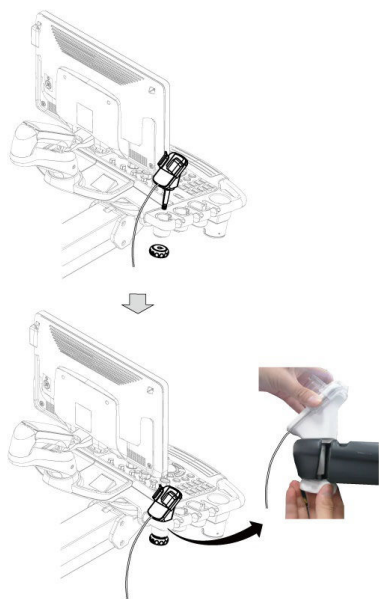
2. Check that the Vscan Air probe can be placed at the proper position.

Figure 12-382 Clip Holder Check



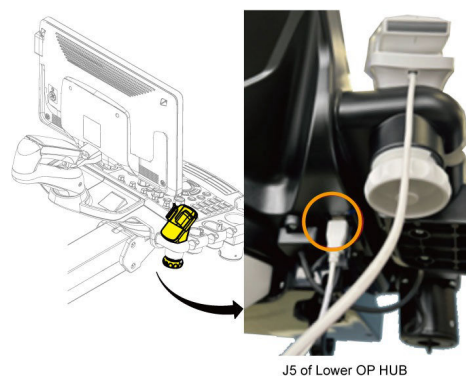
3. Re-install the charger to the Ultrasound system.

Figure 12-383 Re-installing charger



4. Plug USB connector to J5 of Lower OP HUB.

Figure 12-384 Plugging USB connector



12.8.3.3 Vscan Air Charger Clip Holder - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.3.4 Vscan Air Charger Clip Holder - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.3.5 Vscan Air Charger Clip Holder - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-105 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL charger functional check on page 187</i>	Equipment passed all required checks and is ready for use.

12.8.4 Vscan Air Charger Knob Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

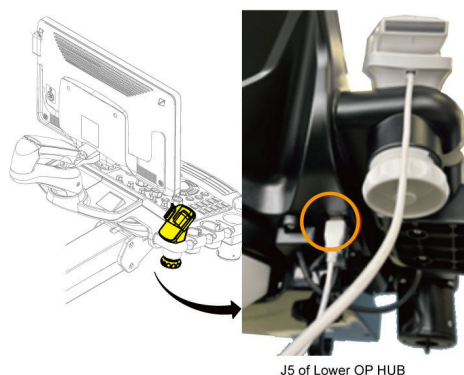
Table 12-106 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 10 minutes	No Tool is required.	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.4.1 Vscan Air Charger Knob - Removal procedure

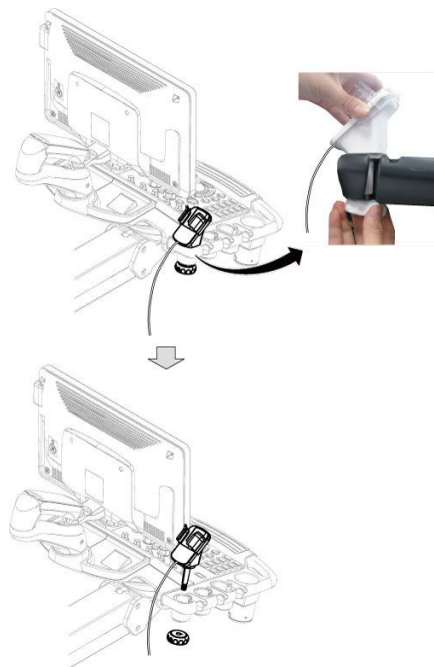
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-385 Removing USB connector



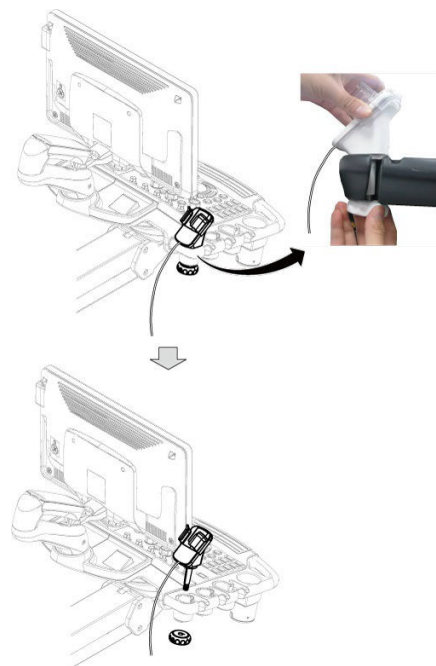
2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-386 Removing Vscan Air Charger



3. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

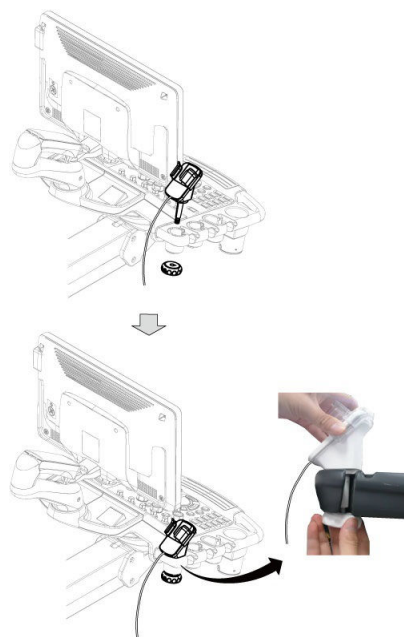
Figure 12-387 Loosening knob



12.8.4.2 Vscan Air Charger Knob - Installation procedure

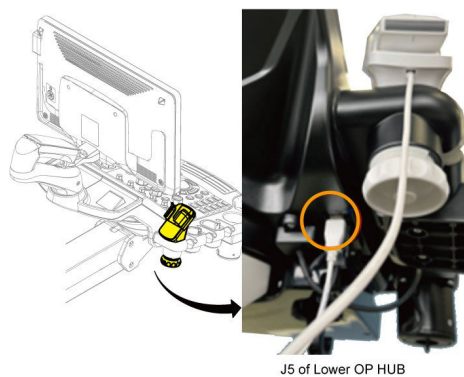
1. Screw the new knob and make sure the charger is firmly installed.

Figure 12-388 Screwing new knob



2. Plug USB connector to J5 of Lower OP HUB.

Figure 12-389 Plugging USB connector



12.8.4.3 Vscan Air Charger Knob - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.4.4 Vscan Air Charger Knob - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.4.5 Vscan Air Charger Knob - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-107 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL charger functional check on page 187</i>	Equipment passed all required checks and is ready for use.

12.8.5 Vscan Air Charger Post Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

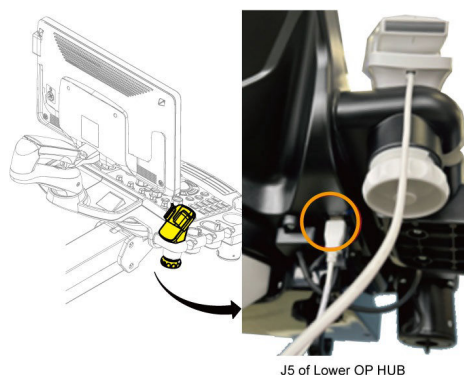
Table 12-108 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30minutes	Cross screwdriver Torque: 0.5N ±10%	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.5.1 Vscan Air Charger Post - Removal procedure

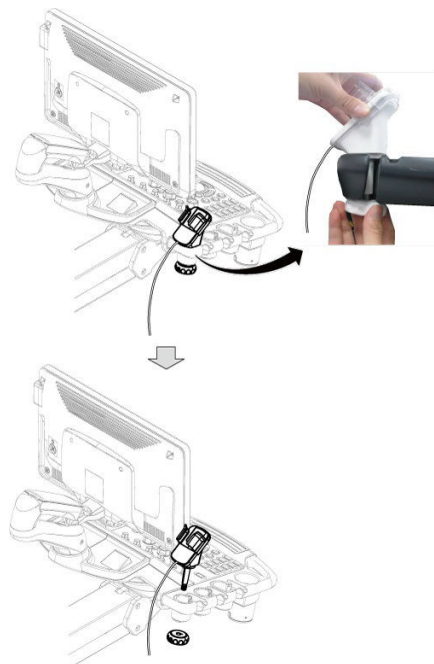
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-390 Removing USB connector



2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-391 Removing Vscan Air Charger



3. Unscrew the two screws to remove the post from the Base.

NOTE

The two screws are captive screws.

Figure 12-392 Removing post



12.8.5.2 Vscan Air Charger Post - Installation procedure

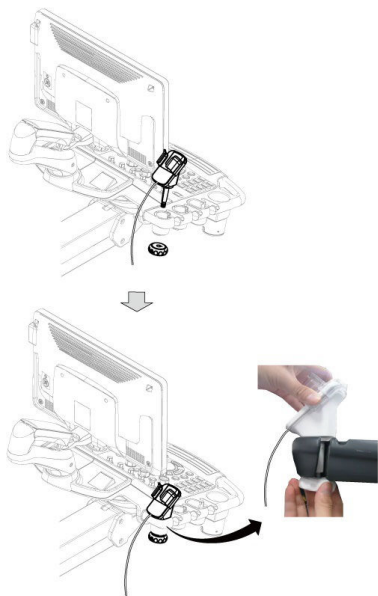
1. Install the new post to the base with 0.5N.m torque.

Figure 12-393 Installing post



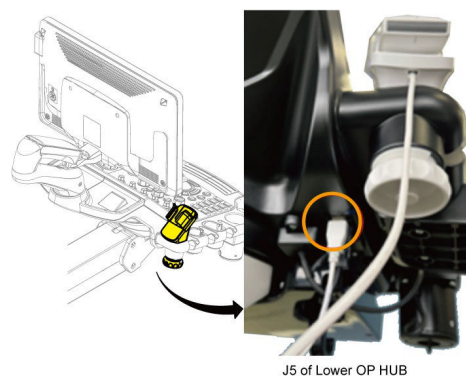
2. Re-install the charger to the Ultrasound system.

Figure 12-394 Re-installing charger



3. Plug USB connector to J5 of Lower OP HUB.

Figure 12-395 Plugging USB connector



12.8.5.3 Vscan Air Charger Post - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.5.4 Vscan Air Charger Post - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.5.5 Vscan Air Charger Post - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-109 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL charger functional check on page 187</i>	Equipment passed all required checks and is ready for use.

12.8.6 Vscan Air Charger Base Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

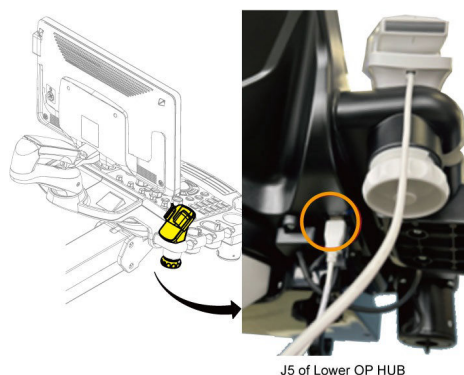
Table 12-110 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30minutes	Cross screwdriver Torque: 0.5N ±10%	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.6.1 Vscan Air Charger Base - Removal procedure

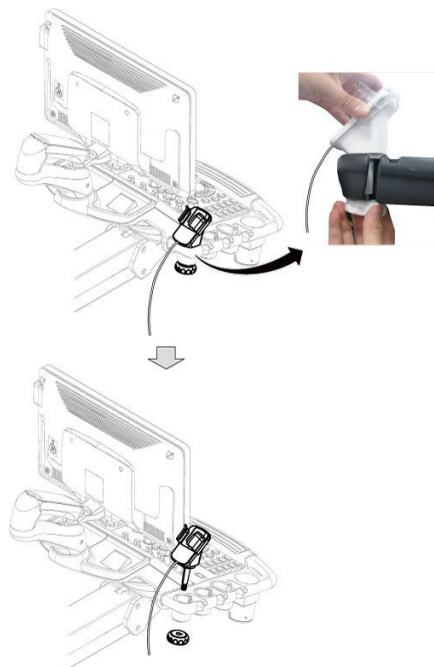
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-396 Removing USB connector



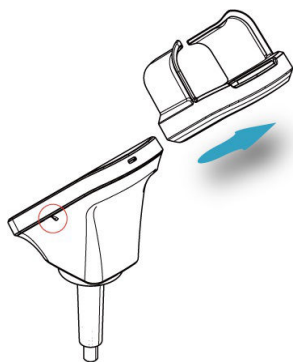
2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-397 Removing Vscan Air Charger



3. Push the clip holder up with an appropriate force to release it from the two projections at the charger base.

Figure 12-398 Removing clip holder



4. Remove the core from the base per following steps.
 - a. Put the charger on a flat table as shown.
 - b. Push the middle of the base to the center with an enough force to release the tab lock from the core.

Figure 12-399 Removing Core



5. Unscrew the two screws to remove the post from the Base.

NOTE

The two screws are captive screws.

Figure 12-400 Removing post



12.8.6.2 Vscan Air Charger Base - Installation procedure

1. Reinstall new base and post per following procedure.
 - a. Install the post into the base. Install the new post to the base with 0.5N.m torque.

Figure 12-401 Removing post



- b. Install the new base to the Core.

NOTE

Make sure you hear the click when attaching into place and check if it is firmly seated.

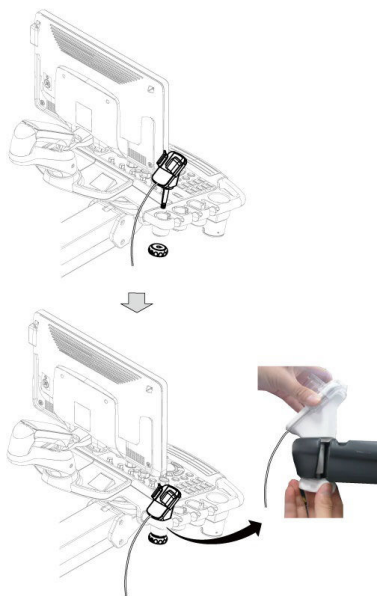
- c. Install the clip holder. Make sure to hear click when it is seated.

NOTE

Make sure to hear click when it is seated.

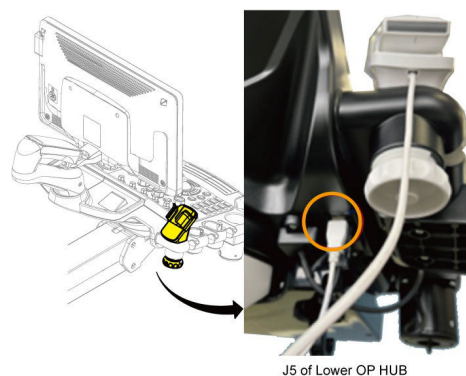
2. Re-install the charger to the Ultrasound system.

Figure 12-402 Re-installing charger



3. Plug USB connector to J5 of Lower OP HUB.

Figure 12-403 Plugging USB connector



12.8.6.3 Vscan Air Charger Base - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.6.4 Vscan Air Charger Base - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.6.5 Vscan Air Charger Base - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-111 Functional Checks

Functional Check	Service Record Debrief Script
<i>Vscan Air CL charger functional check on page 187</i>	Equipment passed all required checks and is ready for use.

12.8.7 Vscan Air Charger Cable Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

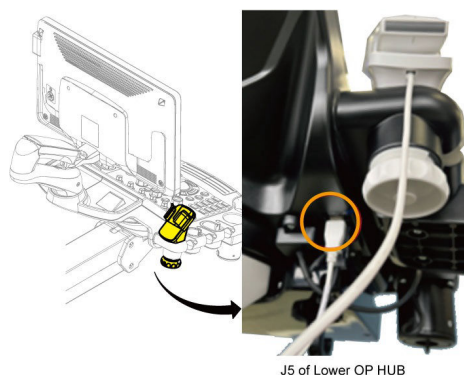
Table 12-112 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 60minutes	No tool is required	Safety glasses Cut resistant gloves Kneel pad ESD mat and wrist strap

12.8.7.1 Vscan Air Charger Cable - Removal procedure

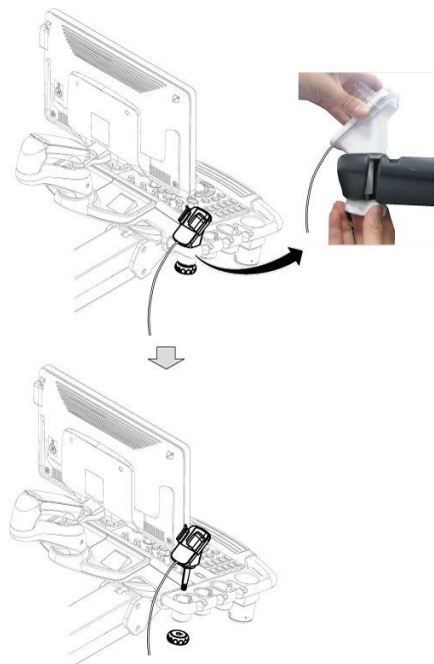
1. Remove USB connector to J5 of Lower OP HUB.

Figure 12-404 Removing USB connector



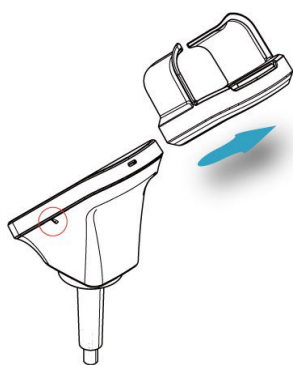
2. Loosen the knob and remove Vscan Air Charger from the Probe Holder as shown in illustration.

Figure 12-405 Removing Vscan Air Charger



3. Push the clip holder up with an appropriate force to release it from the two projections at the charger base.

Figure 12-406 Removing clip holder



4. Remove the core from the base per following steps.
 - a. Put the charger on a flat table as shown.
 - b. Push the middle of the base to the center with an enough force to release the tab lock from the core.

Figure 12-407 Removing core



5. Remove the cable from the Core.

Figure 12-408 Removing cable



12.8.7.2 Vscan Air Charger Cable - Installation procedure

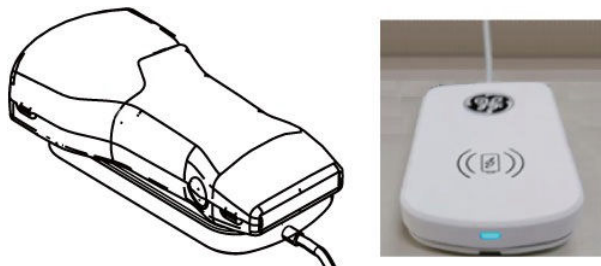
1. Plug the new cable to the Core.

Figure 12-409 Plugging cable



2. Plug in the USB cable to the Ultrasound Device and place the Vscan Air probe on the Core to pre-test the charging function.

Figure 12-410 Pre-test



3. Reinstall the base and post per following steps

- a. Install the base to the Core.

NOTE

Make sure you hear the click when attaching into place and check if it is firmly seated.

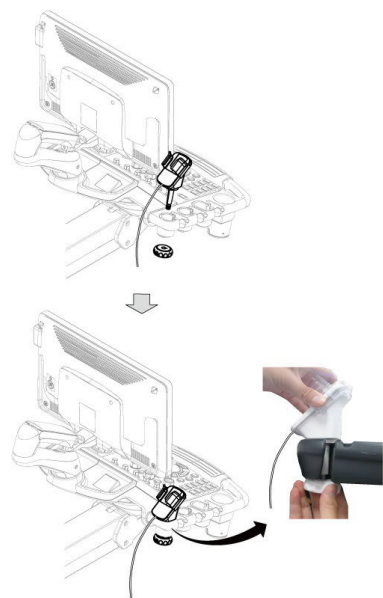
- b. Install the clip holder.

NOTE

Make sure to hear click when it seated.

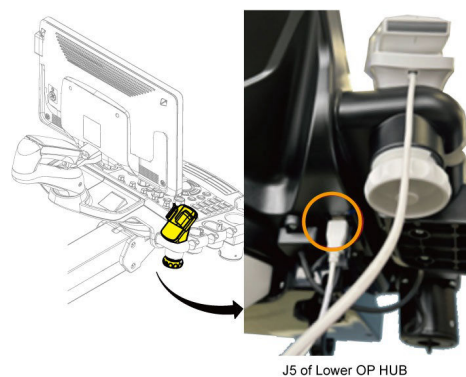
4. Re-install the charger to the Ultrasound system.

Figure 12-411 Re-installing charger



5. Plug USB connector to J5 of Lower OP HUB.

Figure 12-412 Plugging USB connector



12.8.7.3 Vscan Air Charger Cable - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.7.4 Vscan Air Charger Cable - Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

1. Verify that the Vscan Air Charger has been installed.
2. Verify that the USB cable is connected to J5 of Lower OP HUB.

12.8.7.5 Vscan Air Charger Cable - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-113 Functional Checks

Functional Check	Service Record Debrief Script
Vscan Air CL charger functional check on page 187	Equipment passed all required checks and is ready for use.

12.8.8 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-114 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

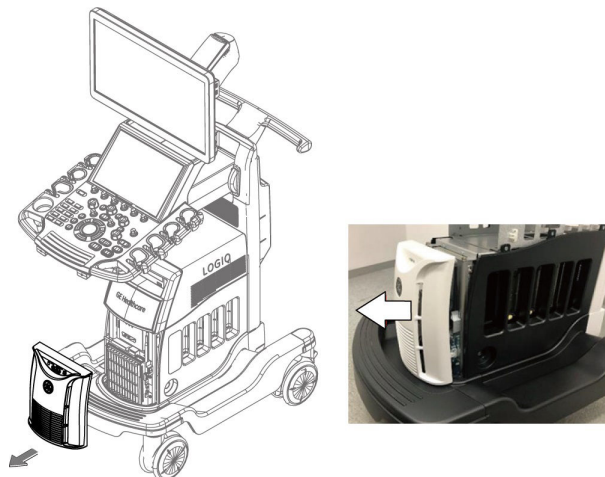
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.8.1 V-Nav Option - Removal Procedure

Removal procedure for Mid/High cabinet

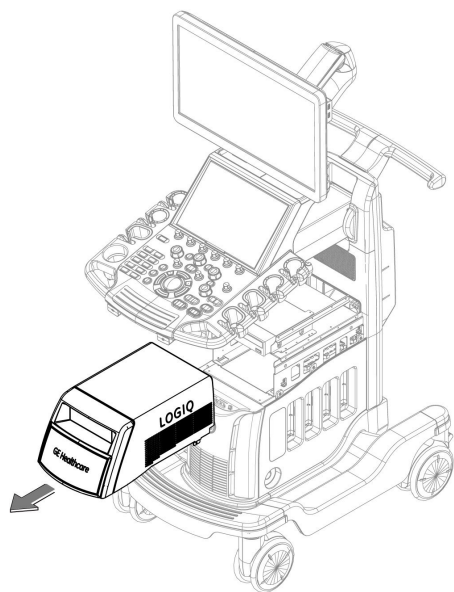
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-413 Removing front cover



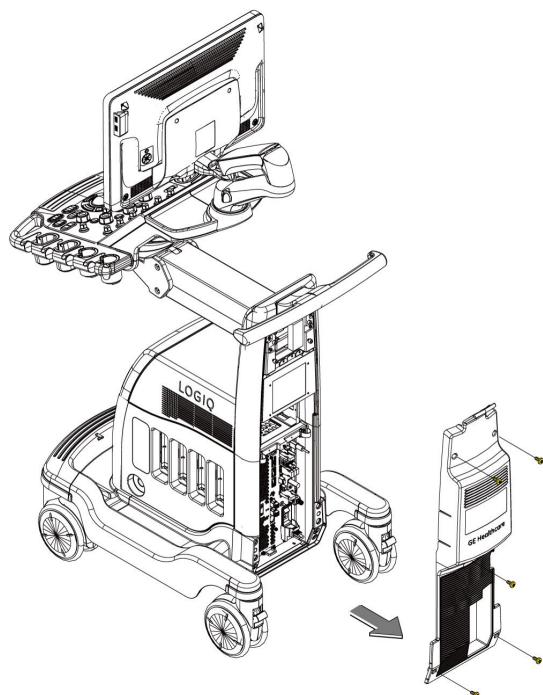
2. Remove the Mid or High Cabinet Cover.

Figure 12-414 Removing Cabinet Cover



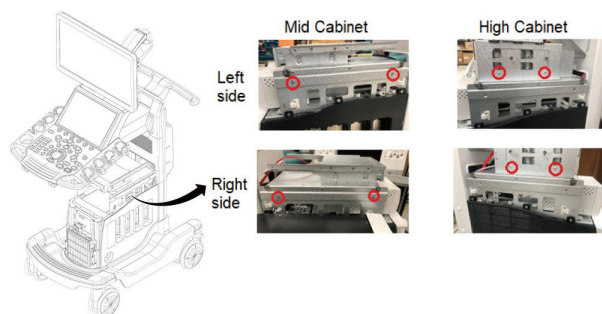
3. Unscrew 5 screws to remove the rear cover.

Figure 12-415 Removing Rear Cover



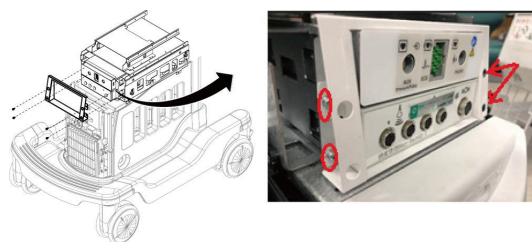
4. Unscrew 4 screws to remove Dual 5inch Bay Assy.

Figure 12-416 Removing Dual 5inch Bay Assy



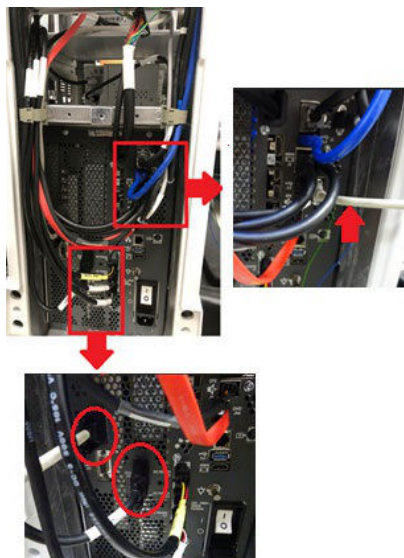
5. Unscrew 4 screws to remove the Dual 5inch Bay Mid Cover.

Figure 12-417 Removing Dual 5inch Bay Mid Cover



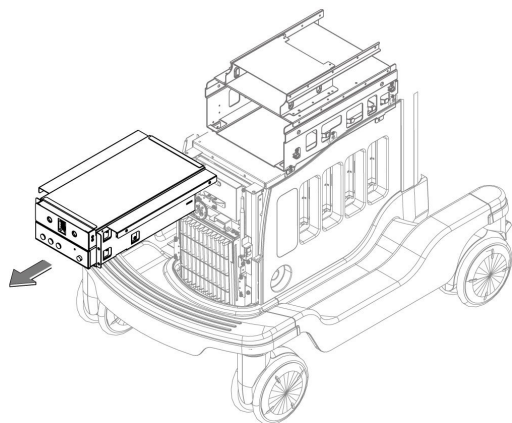
6. Remove V Nav cables.(V-Nav Power Cable, V-Nav Hdmi- D-Sub Cable, V-Nav Usb Cable).

Figure 12-418 Removing V Nav cables



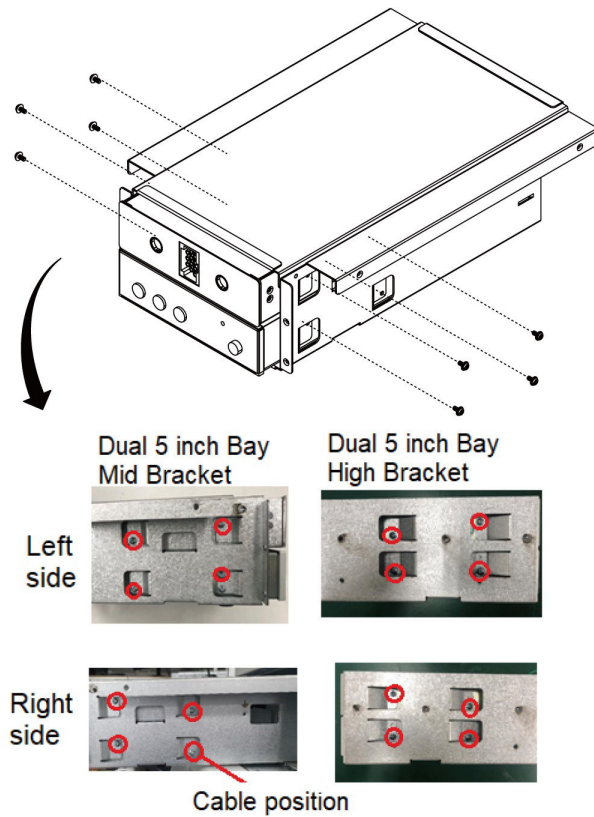
7. Remove the Dual 5inch Bay Assy from Mid or High Frame Assy.

Figure 12-419 Removing Dual 5inch Bay Assy



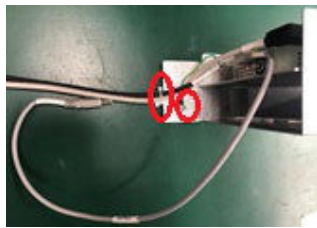
8. Unscrew 5 screws to remove DriveBay2 Unit with Cables to Dual 5inch Bay Mid Bracket Assy or Dual 5inch Bay High Bracket Assy.

Figure 12-420 Removing DriveBay2 Unit



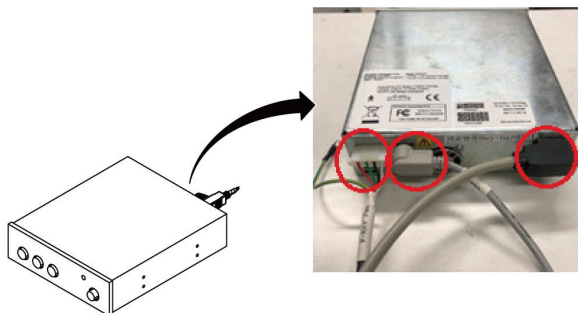
9. Disconnect the Cable-Tie from Dual 5inch Bay High Bracket Assy.

Figure 12-421 Disconnecting the Cable-Tie



10. Remove V Nav cables.

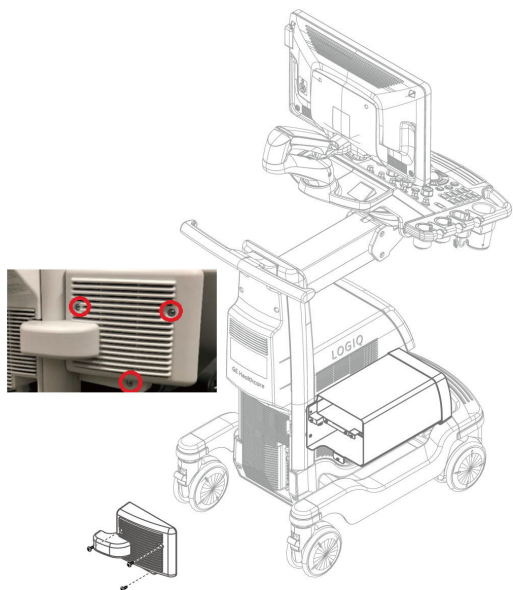
Figure 12-422 Removing V Nav cables



Removal procedure for side cabinet

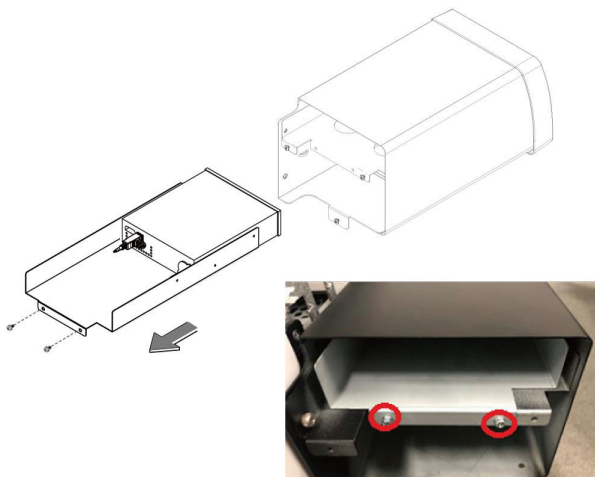
1. Unscrew 3 screws to remove the Cabinet Rear Cover.

Figure 12-423 Removing Cabinet Rear Cover



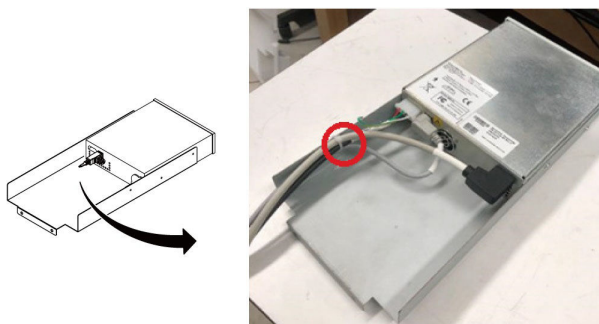
2. Unscrew 2 screws to remove the upper blind tray.

Figure 12-424 Removing upper blind tray



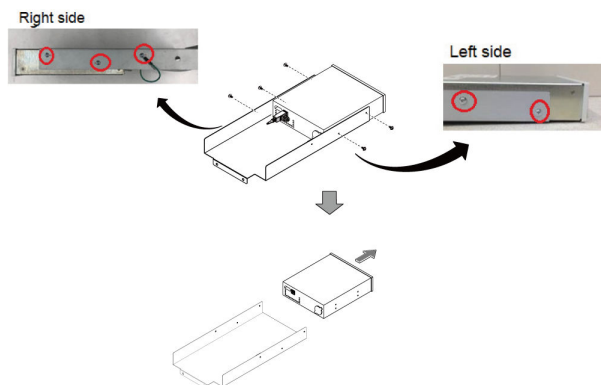
3. Cut the Cable-Tie.

Figure 12-425 Cutting Cable-Tie



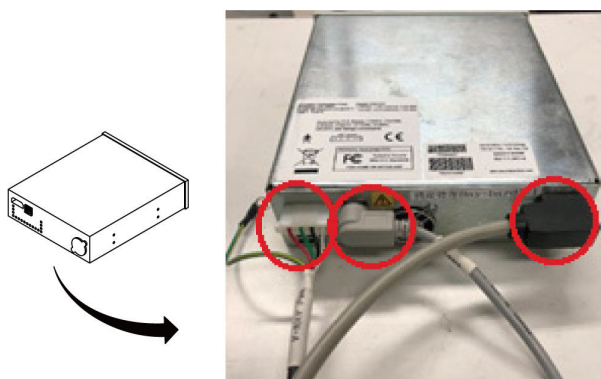
4. Unscrew 5 screws to remove Option Tray 5-Inch Bay Assy.

Figure 12-426 Removing Option Tray 5-Inch Bay Assy



5. Remove V Nav cables.

Figure 12-427 Removing V Nav cables



12.8.8.2 V-Nav Option - Installation procedure

1. Install V Nav Option Assy in reverse order of removal.
2. Install all parts and covers in reverse order of removal.

12.8.8.3 V-Nav Option - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.8.4 V-Nav Option - 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.

12.8.8.5 V-Nav Option - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-115 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>Probe/connector functional checks on page 161</i>	
<i>B-Mode functional checks on page 162</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic control functional checks on page 160</i>	
<i>Volume Navigation with inside probe functional checks on page 180</i>	
<i>Power shut down on page 113</i>	

12.8.9 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-116 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

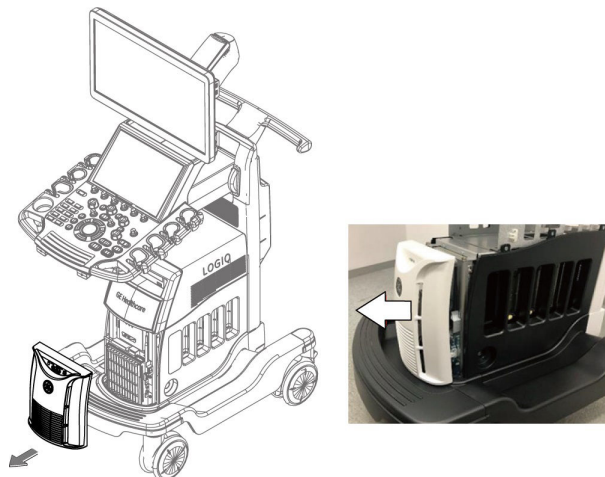
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.9.1 VSIO (ECG) - Replacement procedure

Removal procedure for Mid/High cabinet

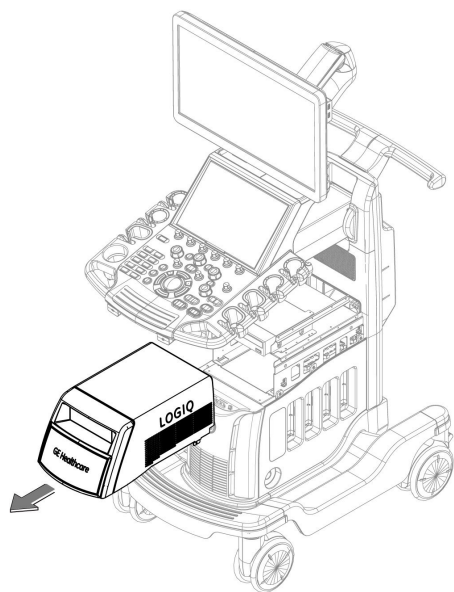
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-428 Removing front cover



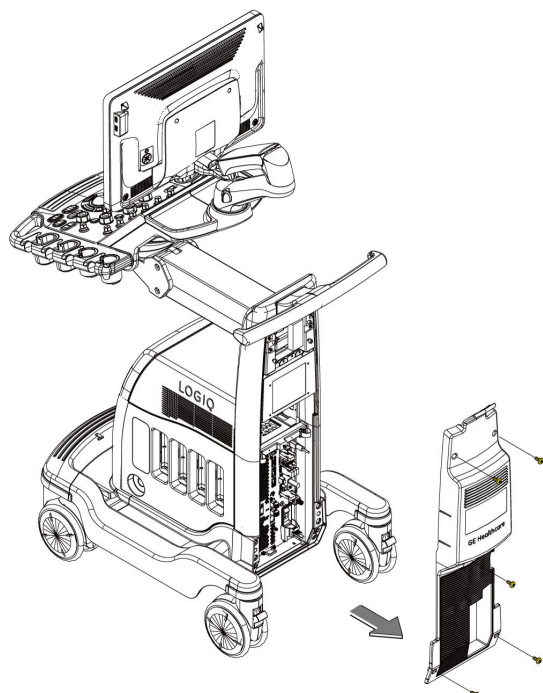
2. Remove the Mid or High Cabinet Cover.

Figure 12-429 Removing Cabinet Cover



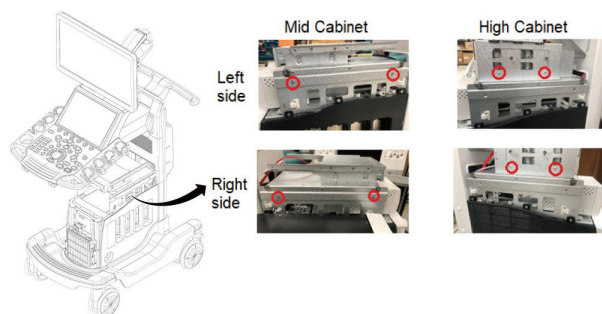
3. Unscrew 5 screws to remove the rear cover.

Figure 12-430 Removing Rear Cover



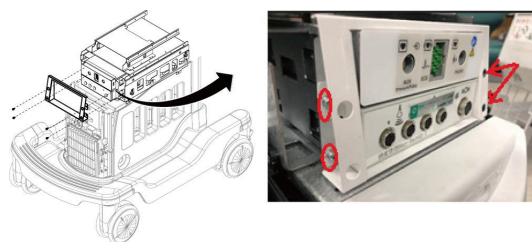
4. Unscrew 4 screws to remove Dual 5inch Bay Assy.

Figure 12-431 Removing Dual 5inch Bay Assy



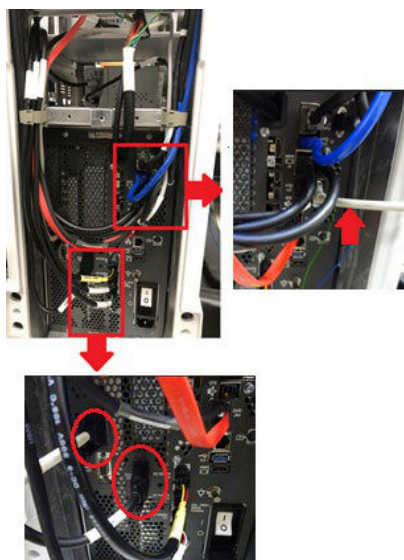
5. Unscrew 4 screws to remove the Dual 5inch Bay Mid Cover.

Figure 12-432 Removing Dual 5inch Bay Mid Cover



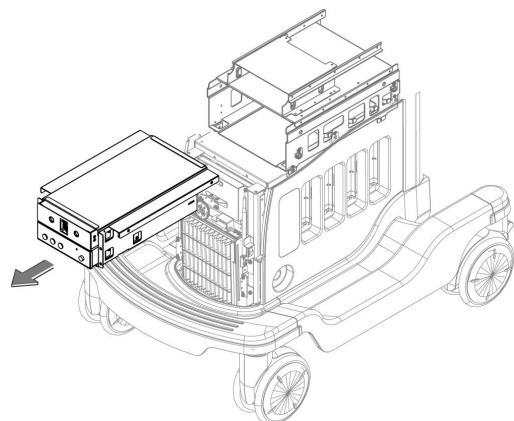
6. Remove V Nav cables.(V-Nav Power Cable, V-Nav Hdmi- D-Sub Cable, V-Nav Usb Cable).

Figure 12-433 Removing V Nav cables



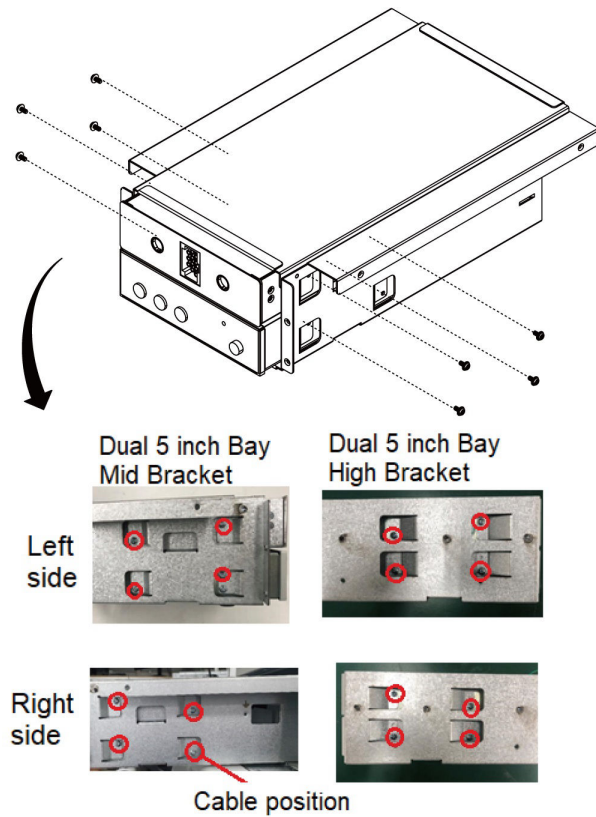
7. Remove the Dual 5inch Bay Assy from Mid or High Frame Assy.

Figure 12-434 Removing Dual 5inch Bay Assy



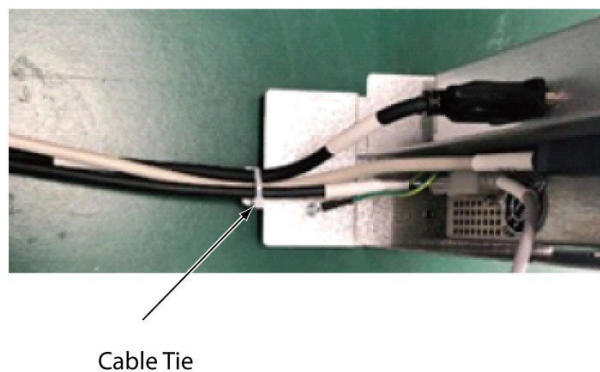
8. Unscrew 5 screws to remove DriveBay2 Unit with Cables to Dual 5inch Bay Mid Bracket Assy or Dual 5inch Bay High Bracket Assy.

Figure 12-435 Removing DriveBay2 Unit



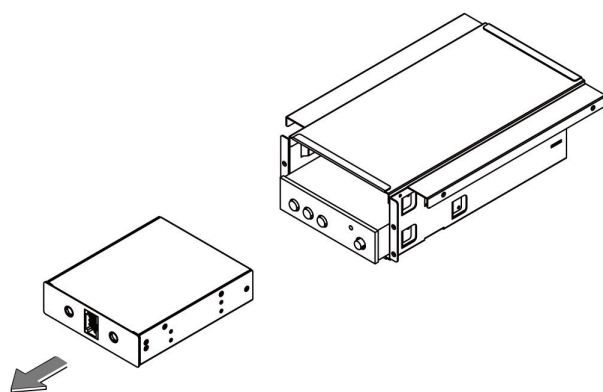
9. Disconnect the Cable-Tie from Dual 5inch Bay High Bracket Assy.

Figure 12-436 Disconnecting the Cable-Tie



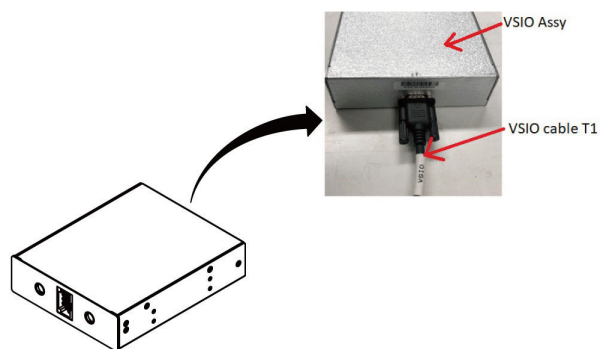
10. Withdraw VSIO Option from Bracket Assy.

Figure 12-437 Removing VSIO Option



11. Remove VSIO cable.

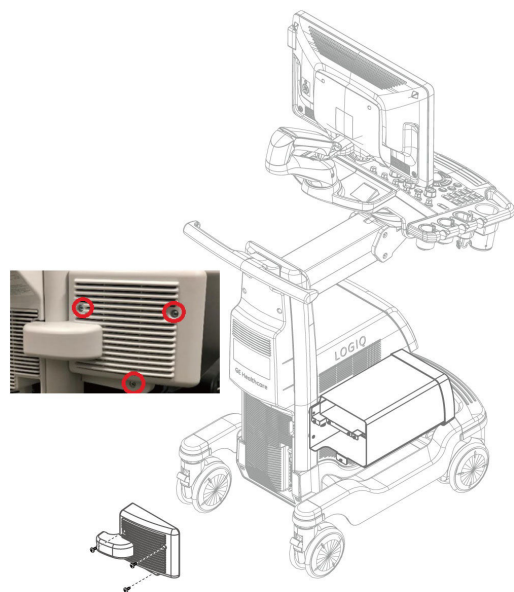
Figure 12-438 Removing VSIO cable



Removal procedure for side cabinet

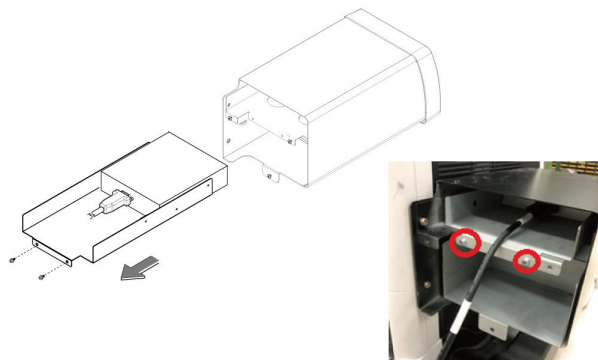
1. Unscrew 3 screws to remove the Cabinet Rear Cover.

Figure 12-439 Removing Cabinet Rear Cover



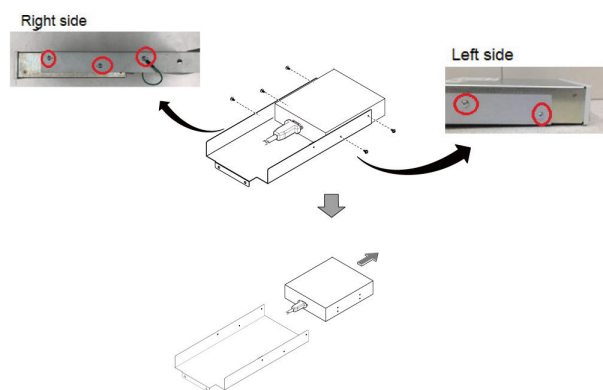
2. Unscrew 2 screws to remove the upper blind tray.

Figure 12-440 Removing upper blind tray



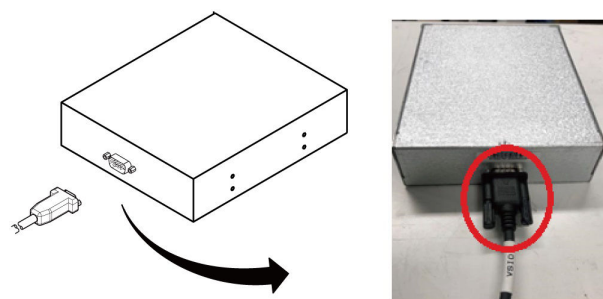
3. Unscrew 5 screws to remove Option Tray 5-Inch Bay Assy.

Figure 12-441 Removing Option Tray 5-Inch Bay Assy



4. Remove VSIO cable.

Figure 12-442 Removing VSIO cable



12.8.9.2 VSIO (ECG) - Installation procedure

1. Install VSIO Option Assy in reverse order of removal.
2. Install all parts and covers in reverse order of removal.

12.8.9.3 VSIO (ECG) - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.9.4 VSIO (ECG) - 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.

12.8.9.5 VSIO (ECG) - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-117 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>PW/CW Doppler mode functional checks on page 169</i>	
<i>System CFM and PWD functional checks on page 165</i>	
<i>Basic control functional checks on page 160</i>	
<i>Volume Navigation with inside probe functional checks on page 180</i>	
ECG functional checks 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.	
<i>Power shut down on page 113</i>	

12.8.10 Option Tray Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

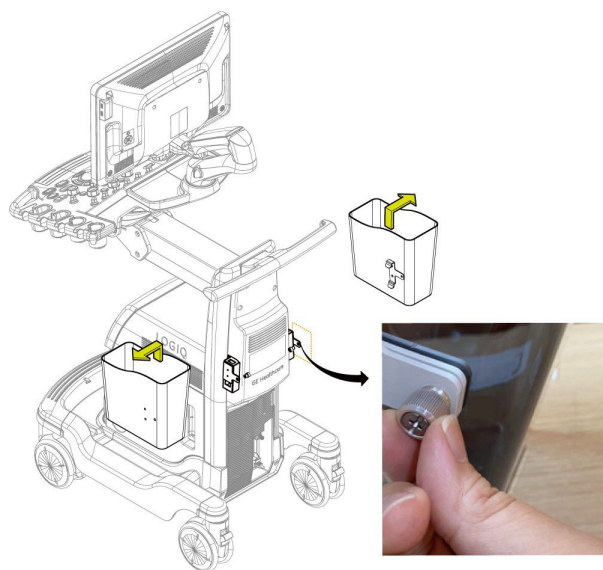
Table 12-118 Manpower, Time, Tools, and PPE

Manpower	Time	Tools	PPE
One person	Approximately 30 minutes	Phillips screwdriver	Safety glasses Safety shoes Cut resistant gloves Kneel pad

12.8.10.1 Option Tray - Removal Procedure

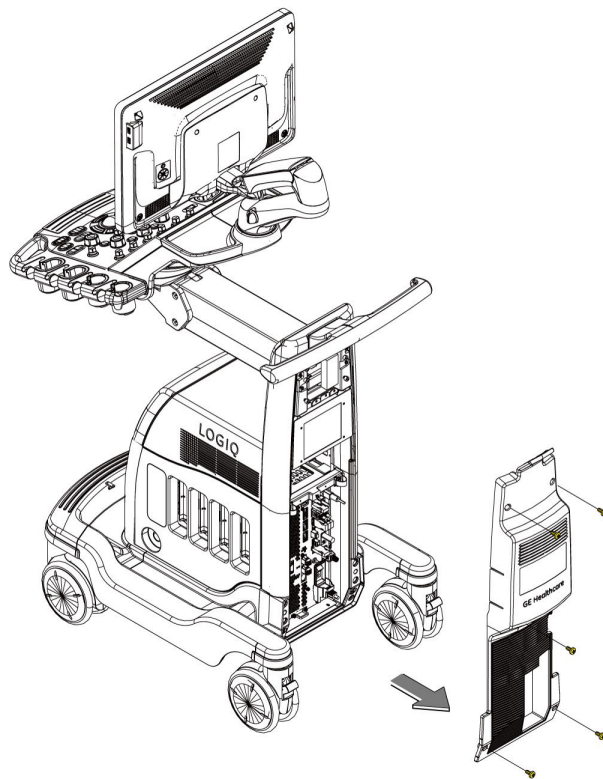
1. Loosen a screw (1) to remove OPTION TRAY.

Figure 12-443 Removing OPTION TRAY



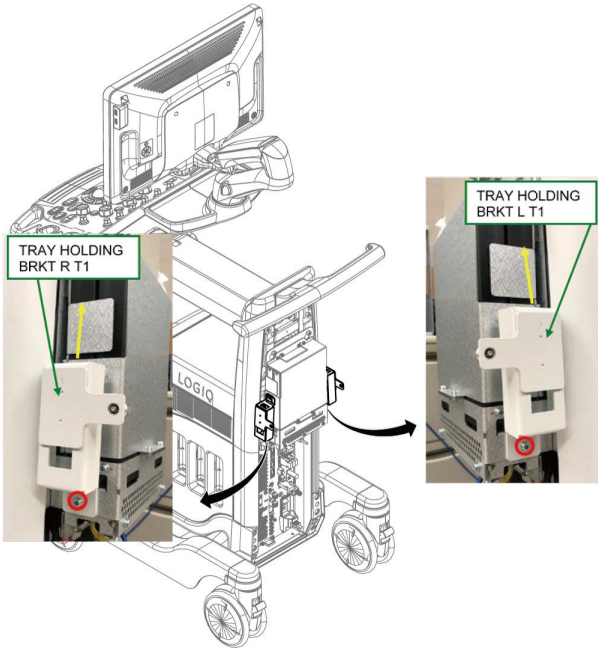
2. Unscrew 5 screws to remove the rear cover.

Figure 12-444 Removing the rear cover



- 3. Unscrew 1 screw to remove the TRAY HOLDING BRKT.

Figure 12-445 Removing TRAY HOLDING BRKT



12.8.10.2 Option Tray - Installation procedure

Install components in reverse order of removal.

12.8.10.3 Option Tray - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.10.4 Option Tray - Verification

- 1. Verify that all screws and covers have been installed if removed earlier.
- 2. Connect cables and Probes if removed earlier.
- 3. Power up the system to verify that it operates as intended.

12.8.10.5 Option Tray - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.8.11 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-119 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

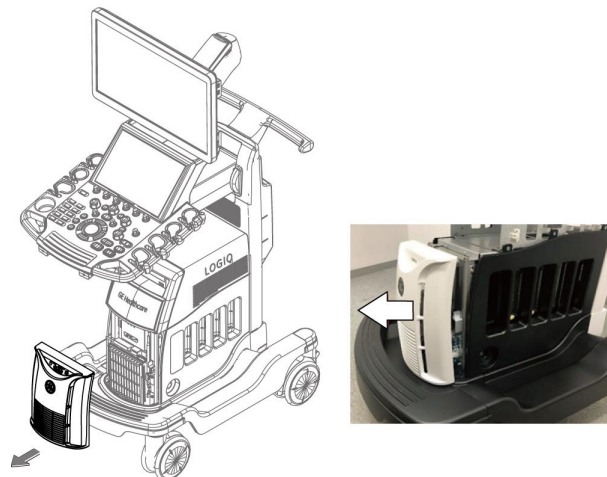
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.11.1 BW Printer - Removal procedure

Removal procedure for Mid/High cabinet

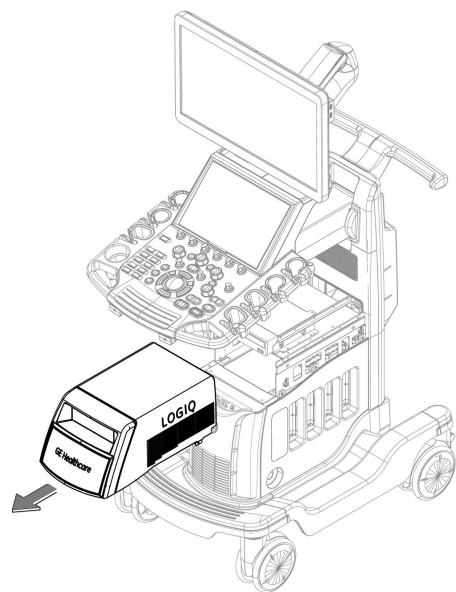
1. Pull the Front Cover Assy to remove it (no tool required).

Figure 12-446 Removing front cover



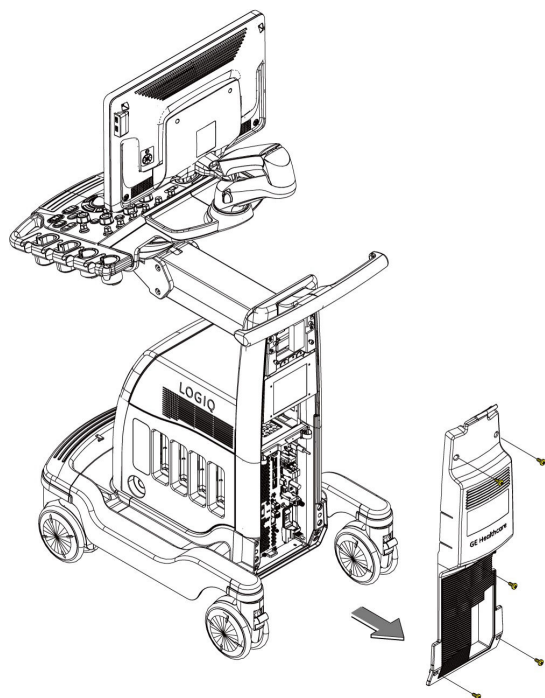
2. Remove the Mid or High Cabinet Cover.

Figure 12-447 Removing Cabinet Cover



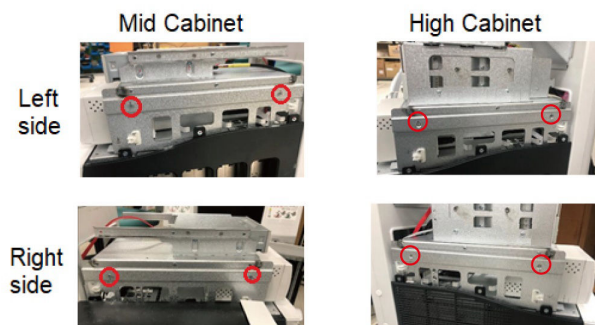
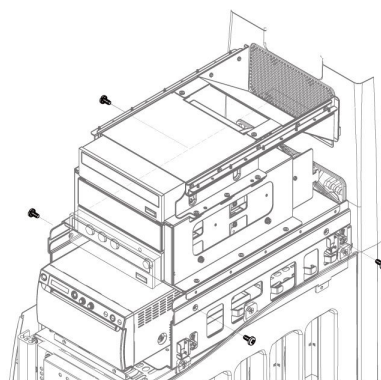
3. Unscrew 5 screws to remove the rear cover.

Figure 12-448 Removing Rear Cover



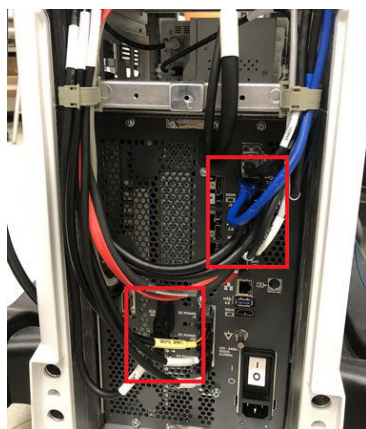
4. Unscrew 4 screws to remove BW Printer assy.

Figure 12-449 Removing BW Printer assy



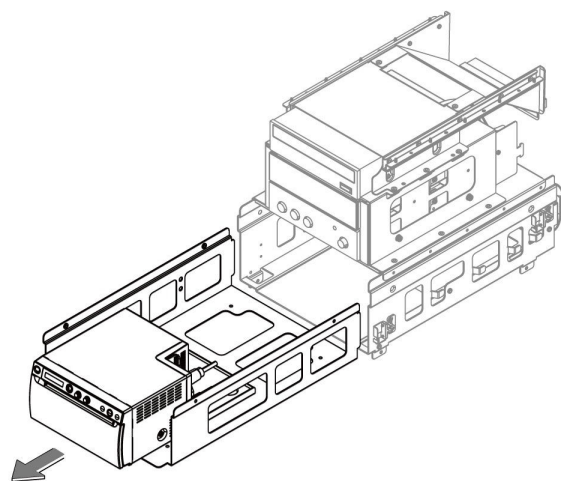
5. Disconnect BW Printer cables.(Dc Bw Pr Power Cable, Bw Printer USB Cable)

Figure 12-450 Removing BW Printer cables



6. Remove the BW Printer Assy from Mid or High Frame Assy.

Figure 12-451 Removing BW Printer Assy



MID Cabinet

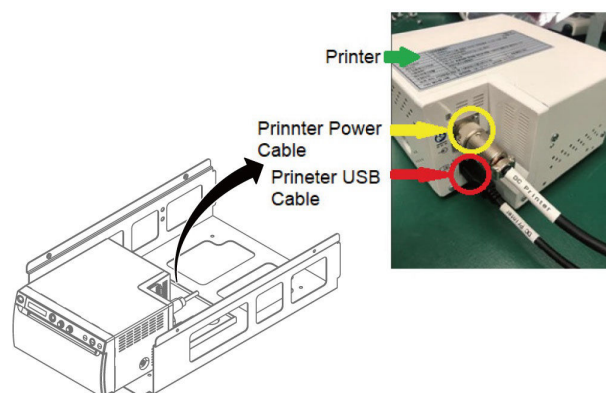


High Cabinet



7. Remove BW Printer cables.

Figure 12-452 Removing BW Printer cables

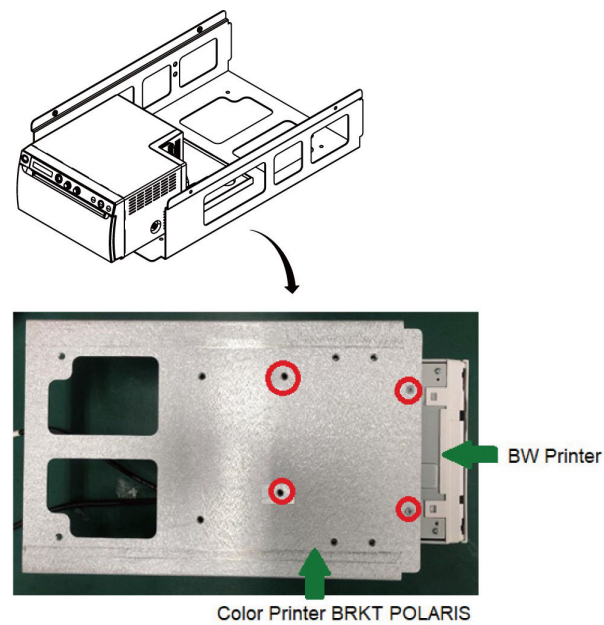


8. Unscrew 4 screws to remove BW Printer assy.

NOTE

The graphic right shows from bottom side.

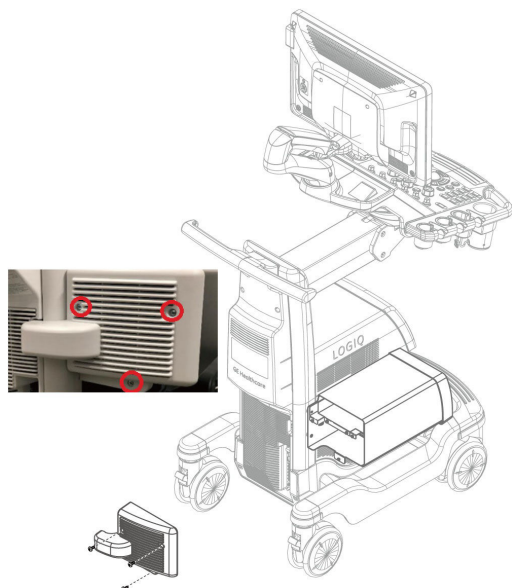
Figure 12-453 Removing BW Printer assy



Removal procedure for side cabinet

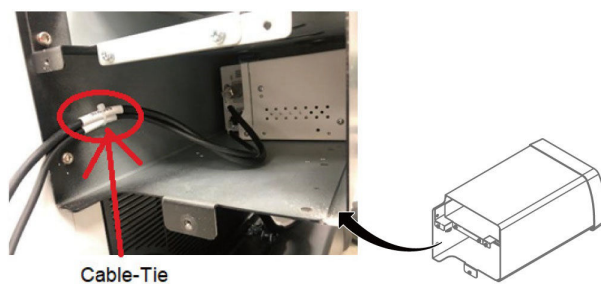
1. Unscrew 3 screws to remove the Cabinet Rear Cover.

Figure 12-454 Removing Cabinet Rear Cover



2. Disconnect the Cable-tie.

Figure 12-455 Disconnecting Cable-Tie



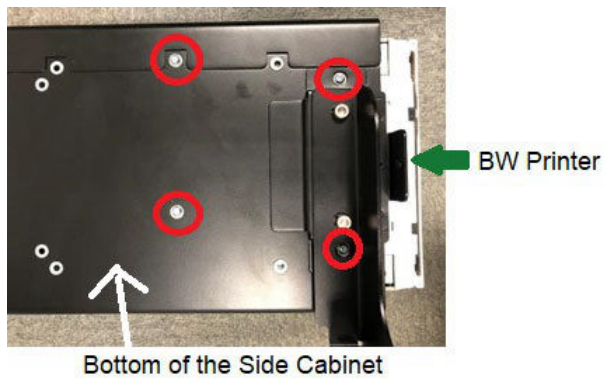
3. Pull out the LOWER BLIND TRAYS.

Figure 12-456 Removing LOWER BLIND TRAYS



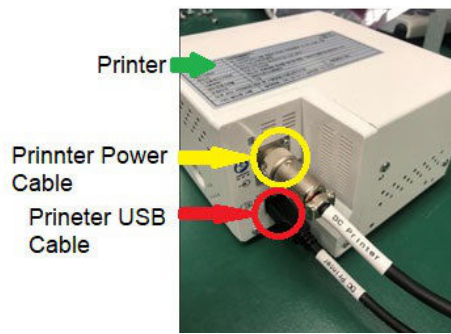
4. Unscrew 5 screws to remove Option Tray 5-Inch Bay Assy.

Figure 12-457 Removing BW Printer assy



5. Remove BW Printer cables.

Figure 12-458 Removing BW Printer cables



12.8.11.2 BW Printer - Installation procedure

1. Install BW Printer Assy in reverse order of removal.
2. Install all parts and covers in reverse order of removal.

12.8.11.3 BW Printer - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.11.4 BW Printer - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.8.11.5 BW Printer - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-120 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up</i> on page 98	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks</i> on page 162	
Print by BW Printer	
<i>Power shut down</i> on page 113	

12.8.12 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 *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-121 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



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, perform *Lockout/tagout procedure* on page 50.

Lock out and tag out procedure

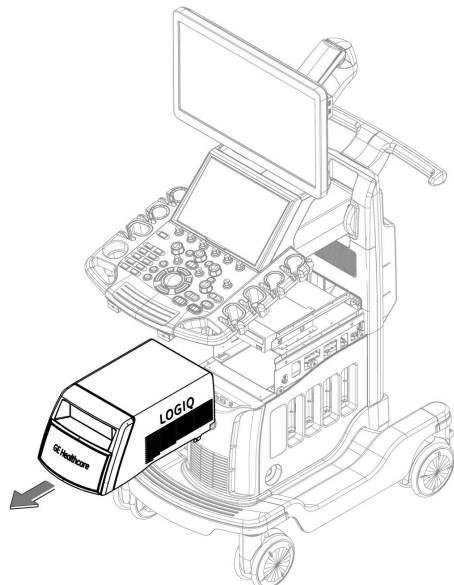
1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.12.1 DVD Drive - Removal procedure

Replacement procedure for Mid/High Cabinet

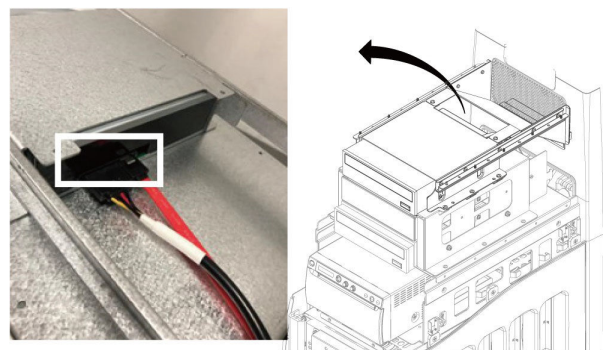
1. Remove the Mid Cabinet Cover or High Cabinet Cover.

Figure 12-459 Removing Mid or High Cabinet Cover



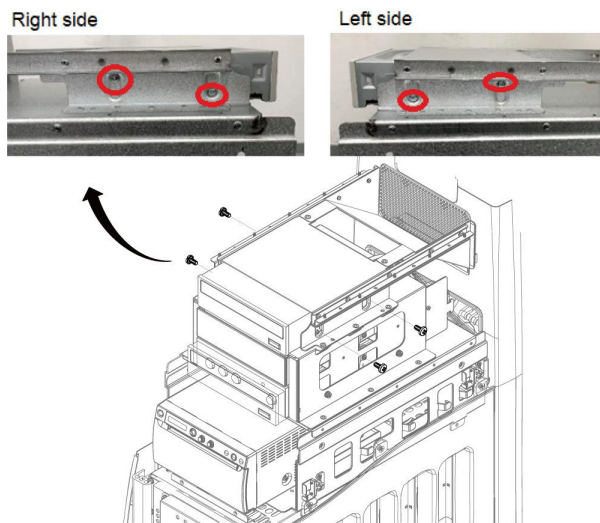
2. Remove cables from DVD drive.

Figure 12-460 Removing cables from DVD drive



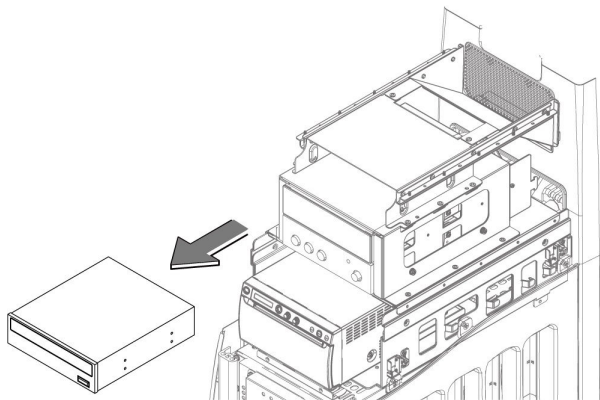
3. Unscrew 4 screws.

Figure 12-461 Unscrewing 4 screws



4. Remove DVD Drive assy.

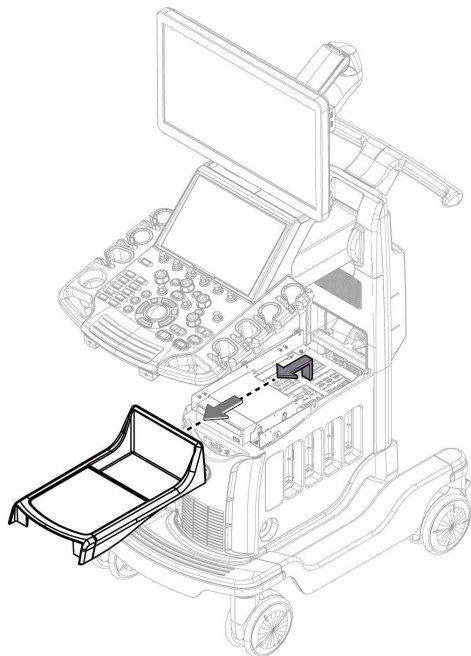
Figure 12-462 Removing DVD Drive assy



Replacement procedure for Low Cabinet

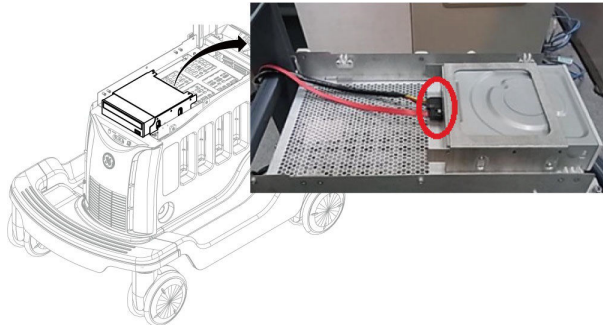
1. Remove the Low Cabinet Cover.

Figure 12-463 Removing Low Cabinet Cover



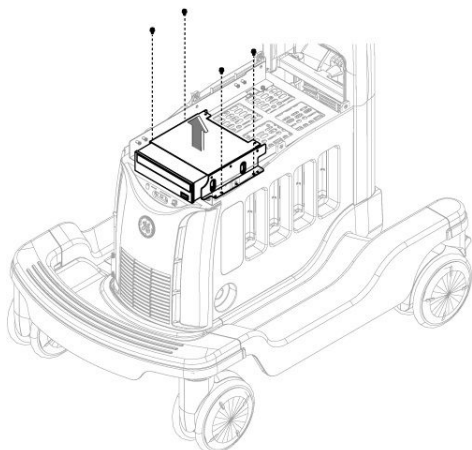
2. Remove cables from DVD drive.

Figure 12-464 Removing cables from DVD drive



3. Remove frame with DVD Drive.

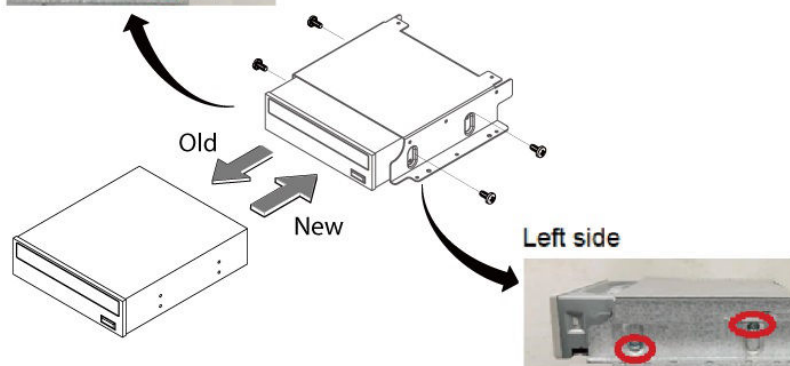
Figure 12-465 Removing frame



4. Replace DVD Drive with new one.

Figure 12-466 Replacing DVD Drive

Right side



Left side

12.8.12.2 DVD Drive - Installation procedure

1. Install the DVD Drive Assy in reverse order of removal.
2. Install all parts and covers in reverse order of removal.

12.8.12.3 DVD Drive - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.12.4 DVD Drive - Verification

1. Verify that all screws and covers have been installed if removed earlier.
2. Connect cables and Probes if removed earlier.
3. Power up the system to verify that it operates as intended.

12.8.12.5 DVD Drive - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-122 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
Burn the data to media	
<i>Power shut down on page 113</i>	

12.8.13 Drawer Replacement

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-123 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



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, perform *Lockout/tagout procedure* on page 50.

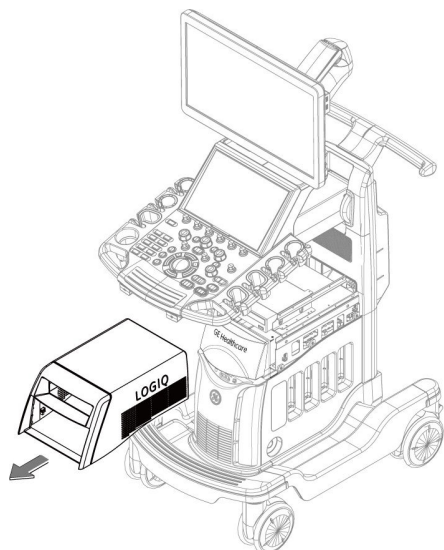
Lock out and tag out procedure

1. Plan and prepare for shutdown.
2. Lock the casters.
3. Completely power down the system.
4. Disconnect the power cable.
 - a. Disconnect the mains power cable from the wall outlet.
 - b. Disconnect the mains power cable from the console.
 - c. Disconnect all Probes and External I/O Cabling from the console.
5. Disconnect battery power.
6. Verify isolation.

12.8.13.1 Drawer - Removal procedure

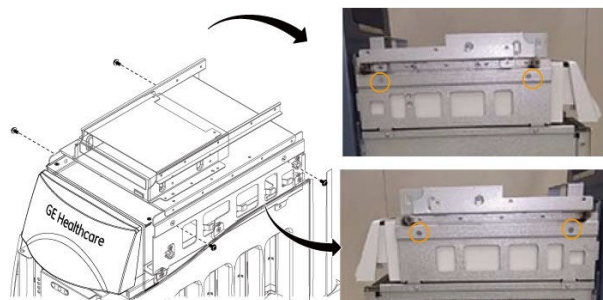
1. Remove the Mid Cabinet Cover or High Cabinet Cover.

Figure 12-467 Removing Mid or High Cabinet Cover



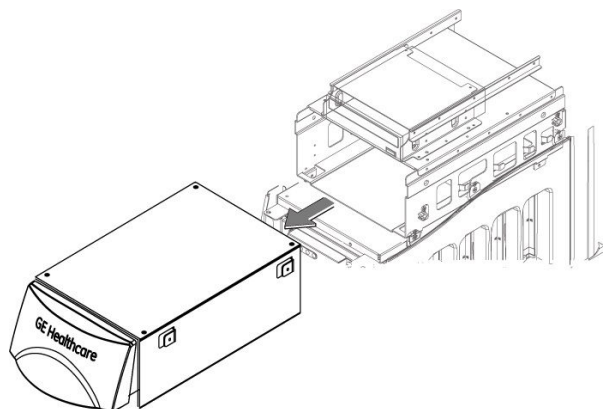
2. Unscrew 4 screws from Cabinet Frame.

Figure 12-468 Removing 4 screws



3. Remove the Drawer.

Figure 12-469 Removing Drawer



12.8.13.2 Drawer - Installation procedure

1. Install the Drawer in reverse order of removal.
2. Install all parts and covers in reverse order of removal.

12.8.13.3 Drawer - Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

12.8.13.4 Drawer - Verification

- 1. Verify that all screws and covers have been installed if removed earlier.
- 2. Connect cables and Probes if removed earlier.
- 3. Power up the system to verify that it operates as intended.

12.8.13.5 Drawer - Functional checks

Perform the following functional tests to confirm the system is operational before returning the system to the customer.

Table 12-124 Functional Checks

Functional Check	Service Record Debrief Script
<i>Power on/boot up on page 98</i>	Equipment passed all required checks and is ready for use.
<i>B-Mode functional checks on page 162</i>	
<i>Power shut down on page 113</i>	

12.8.14 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

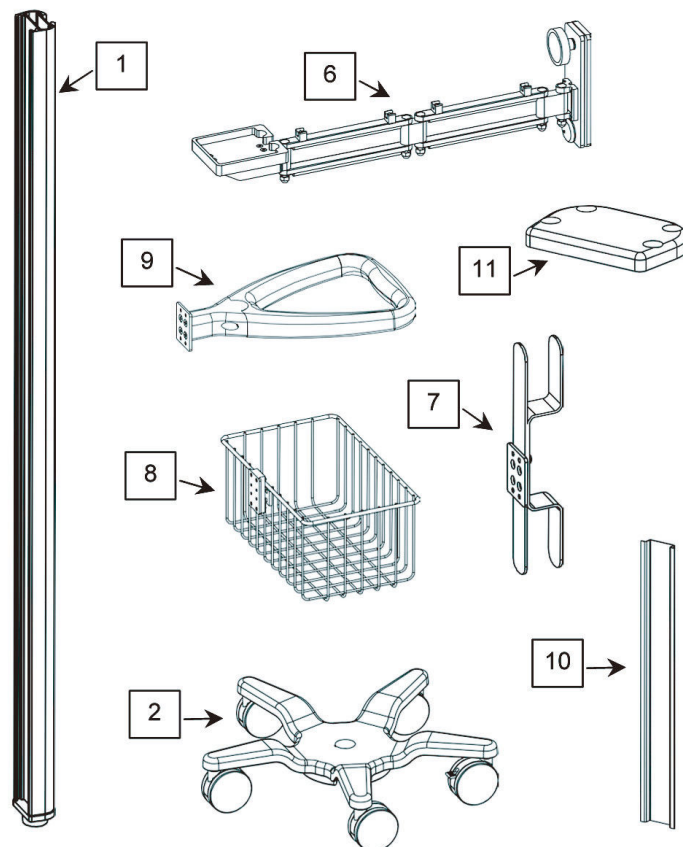
The roll stand basket is designed to hold the transmitter, which weighs about five pounds (2.27 kg). DO NOT overload the basket.

This table includes information specific to these instructions. For more information, see *Tools needed for servicing the LOGIQ Fortis* on page 76/ *PPE Required During Service* on page 78.

Table 12-125 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

Figure 12-470 Volume Navigation Roll Stand Installation Kit



Item #	Description	Quantity
1	Roll Stand Post, 60 inches	1

Item #	Description	Quantity
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

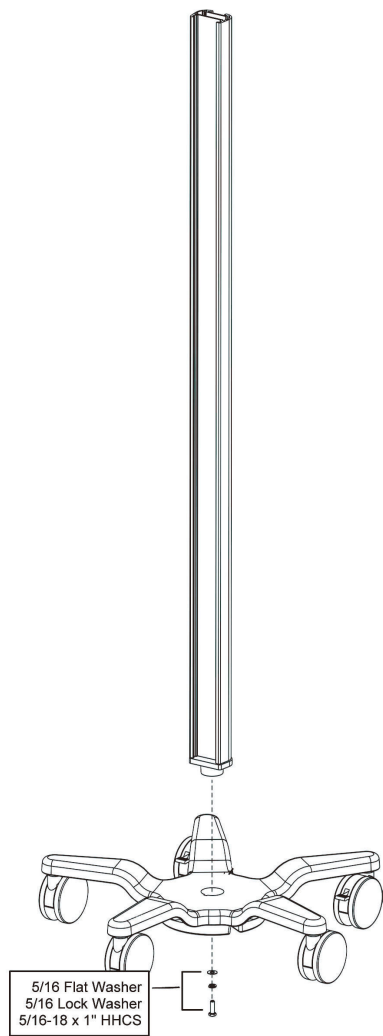
12.8.14.1 V-Nav Roll Stand - Removal procedure

Disassemble and replace the FRU. Disassembling procedure is reverse order of assembling procedure. Refer to *V-Nav Roll Stand - Assembling procedure* on page 747.

12.8.14.2 V-Nav Roll Stand - Assembling procedure

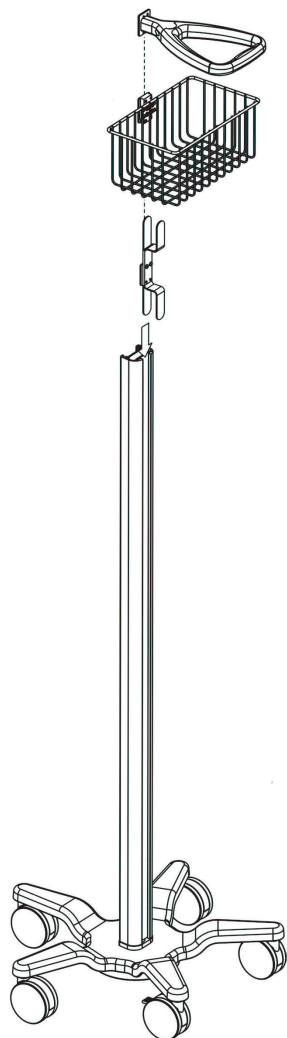
1. Insert the post in the base. The locator pin ensures correct alignment.
2. Using the 1/2 inch socket wrench provided, fasten the post to the base with the hardware shown.

Figure 12-471 Post into Base - (1) 5/16 fLAT Washer, (2) 5/16 Lock Washer, (3) 5/16-18 x 1 inch Screw - Roll Stand only



3. Slide the cord loop hook, basket and handle into the rear channel in the order shown.

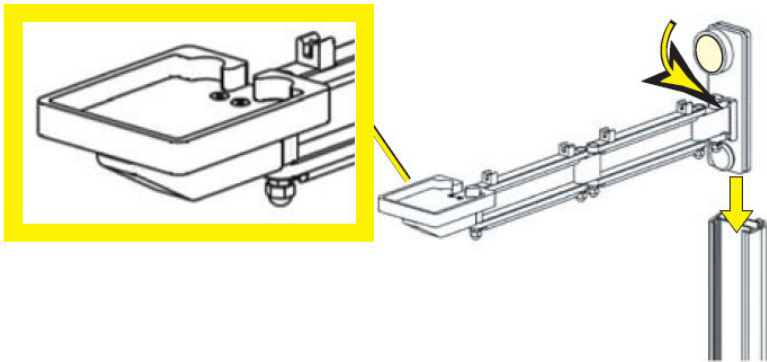
Figure 12-472 Post Assembly



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.

5. Loosen the knob slightly, guide the arm into the channel and move it to the mounting position.

Figure 12-473 Loosening Knob



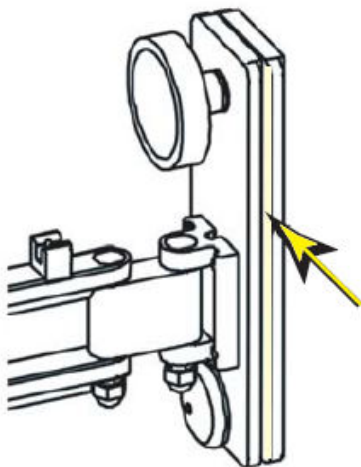
NOTE

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.

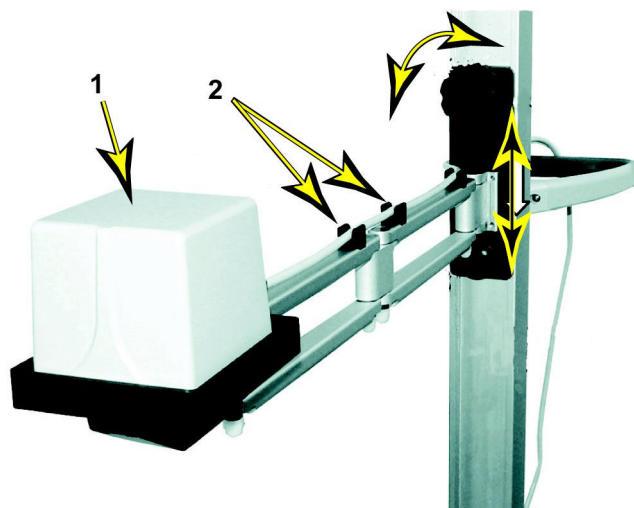
Figure 12-474 Channel Location



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 12-475 Cable Clips - Roll Stand only



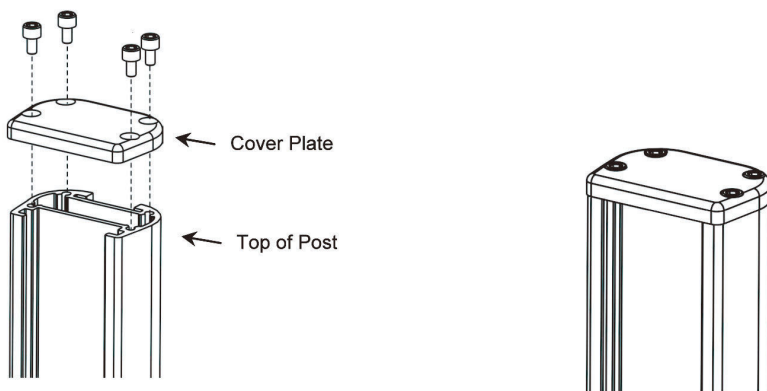
8. While supporting the arm (loaded with the transmitter), slowly loosen the knob which allows the arm to gradually move down the channel.

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. Refer to *V-Nav Roll Stand - Calibration and adjustments* on page 752.

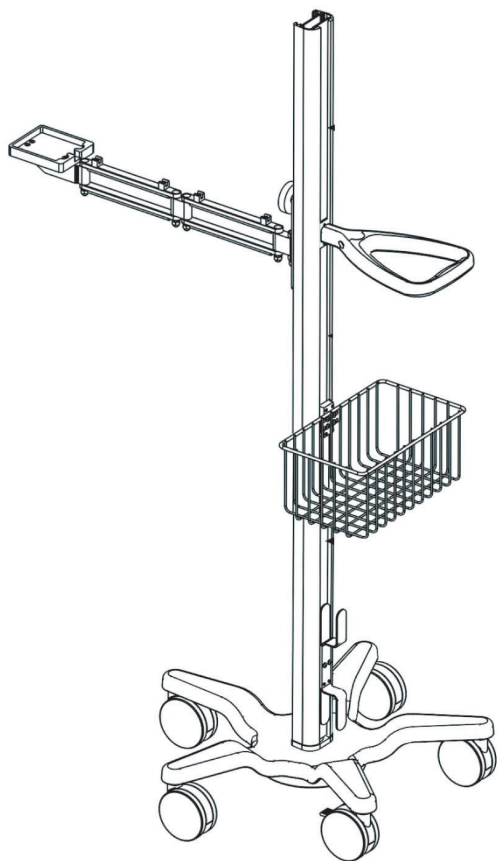
9. Using the 3/16 inch hex wrench provided, fasten the cover plate to the top of the post with four (4) 1/4-20 x 3/8 inch SHCS as shown.

Figure 12-476 Cover Plate Installation



10. Snap the three Rear Track Covers into place in locations shown.

Figure 12-477 Rear Track Covers Installation



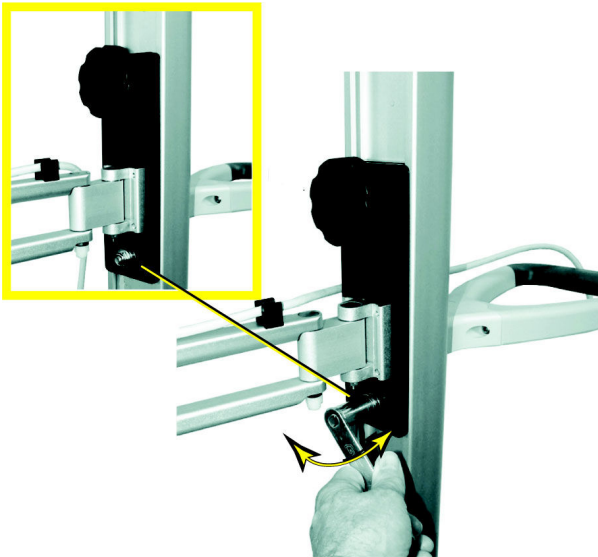
12.8.14.3 V-Nav Roll Stand - Calibration and adjustments

Adjust the Tension on Sliding Mechanism per following steps if the arm free-falls or will not move.

- 1. Remove the plastic bolt cap from the lower tension nut.
- 2. Using the 1/2 inch socket wrench, loosen or tighten the tension nut for the desired tension.

NOTE
The clamping knob must be unlocked while making this adjustment.

Figure 12-478 Plastic Bolt Cap for tension nut and Unlocking Clamping Knob



12.8.14.4 V-Nav Roll Stand - Verification

- 1. Verify that all screws and covers have been installed if removed earlier.
- 2. Connect cables and Probes if removed earlier.
- 3. Power up the system to verify that it operates as intended.

12.8.14.5 V-Nav Roll Stand - Functional checks

Functional Check	Service Record Debrief Script
Visually inspect that there is no scratch or dirt on the replacement part.	Equipment passed all required checks and is ready for use.

12.9 Product Label Parts Replacement

12.9.1 Label Placement for the LOGIQ Fortis used in a Veterinary Environment

LOGIQ Fortis Label Placement for legacy Vet configuration

1. If the Side Cover Assemblies are replaced, re-install the "VET" Label as shown on both side.

NOTE

Clean and degrease the surface before attaching the label.

Figure 12-479 VET Label



Figure 12-480 Vet Label attachment location

High Cabinet



Mid Cabinet



Low Cabinet



2. 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.

NOTE

Clean and degrease the surface before attaching the label.

Figure 12-481 "For Veterinary use only" Label



Figure 12-482 Label attachment location



LOGIQ Fortis Veterinary Console Label Placement

1. If the Side Cover Assemblies are replaced, re-install the "VET" Label as shown on both side.

NOTE

Clean and degrease the surface before attaching the label.

Figure 12-483 VET Label



Figure 12-484 Vet Label attachment location

High Cabinet



Mid Cabinet



Low Cabinet



2. If the rear cover is replaced, re-install the "Vet label" as shown.

NOTE

Clean and degrease the surface before attaching the label.

Figure 12-487 "For Veterinary use only" Label



Figure 12-488 Label attachment location



Chapter 13

Care and Maintenance

In this chapter

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System Maintenance. 762

Using a Phantom. 769

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Ultrasound Equipment Quality Check (EQC and IQC). 792

13.1 Overview

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.

Normal Care and Maintenance is mandatory; it is the responsibility of the customer and includes the following:

- Quality Assurance Program to perform routine quality control testing.

NOTE

Some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

- System Maintenance and Checks (Preliminary System, Functional Checks, Peripheral, Cable, Physical Inspection).
- Probe Maintenance
- System Cleaning, including Air Filter Cleaning
- Electrical Safety Testing

NOTE

It has been determined by engineering that your Ultrasound system DOES NOT have any high wear components that fail with use. Therefore, periodic maintenance inspections are not mandatory for any Ultrasound system. Only normal Care and Maintenance is recommended.

13.2 Warnings

**DANGER**

WHERE APPLICABLE, THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE ULTRASOUND SYSTEM POWER PLUG AND OPEN 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, the Ultrasound system is plugged into the wall and/or batteries (if present) are connected.

**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 Ultrasound system unless all board covers and frame panels are securely in place. System performance and cooling require all board covers and frame panels are securely in place.

**CAUTION**

To ensure the mutual protection and safety of GE HealthCare service personnel and our customers, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts a repair. This includes, but is not limited to, decontamination and/or sterilization, depending on the application or use of the medical device.

13.3 Why Do Maintenance

13.3.1 Keeping records

It is good business practice that ultrasound facilities maintain records of all corrective maintenance and care and maintenance on Ultrasound systems where it is applicable. The Ultrasound Equipment Quality Check form provides the customer with documentation that the Ultrasound system is maintained regularly.

A copy of the Ultrasound Equipment Quality Check form should be kept in the same room or near the Ultrasound system.

13.3.2 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 HealthCare service representative can help you with establishing, performing and maintaining records for a quality assurance program. Contact GE HealthCare for coverage and/or price for service.

13.4 Maintenance Task Schedule

The 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 to retain its high level of safety, dependability and performance.

Your GE HealthCare Service Representative has an in-depth knowledge of your Ultrasound system and can best provide competent, efficient service. Contact GE HealthCare for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Maintenance Task Schedule assumes that you use your Ultrasound system for an average patient load (10-12 per day) 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 maintenance frequencies.

13.5 System Maintenance

The preliminary checks take about 15 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

Table 13-1 Ultrasound 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	- 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 battery is charged. If no AC Input present, use the internal battery.
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: - Verify that InSite is functioning properly. - Ensure two-way remote communications.
7.	Review Error Logs	Where applicable, Error Logs can be reviewed via system diagnostics.
8.	Diagnostics	Optional.
9.	Presets	Back up all Customer Presets to an appropriate media.
10.	Image Archive	Back up the Image Archive onto appropriate media.

13.5.1 Functional checks

The functional checks take about 60 minutes to perform. Refer to the Ultrasound system user documentation and/or Basic Service Manual whenever necessary.

13.5.2 System checks

Table 13-2 Ultrasound System 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.

Step	Item	Description
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 Ultrasound system channels are functional, where applicable.
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, where applicable.
11.	Transmit/Receive	Verify that all system XMIT/RECV channels are functional, where applicable.
12.	Operating Panel test	Perform the Operating Panel Test Procedure.
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 <i>Peripheral/option checks</i> on page 763.

13.5.3 Peripheral/option checks

If any peripherals or options are not part of the Ultrasound system configuration, the check can be omitted.

Table 13-3 GE HealthCare Approved Peripheral/Hardware Option Functional Checks

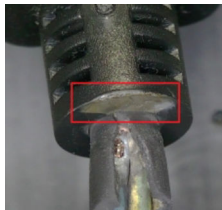
Step	Item	Description
1.	Media	Verify media drive(s) read/write properly. Clean if necessary.
2.	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3.	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4.	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5.	ECG	Verify basic operation with customer.

Step	Item	Description
6.	Footswitch	Verify that the footswitch is functioning as programmed. Clean as necessary.
7.	Other	For tablets and other external peripherals, check peripheral manuals for functional checks if applicable.

13.5.4 Mains power cable inspection

Table 13-4 Mains Power Cable Inspection, As Appropriate

Step	Item	Description
1.	Unplug Cord	Disconnect the mains power cable from the wall and then from the Ultrasound system.

Step	Item	Description
2.	Inspect	Inspect the mains power cable and its connectors for damage of any kind. Examples of damage may include: - Cable showing a curvature after the strain relief of plug which indicates a long-term bending in one direction.  - Bent plug pins and missing/abraded coating on plug pins which indicates heavy usage of the product over a long time.  - Worn plating on the plug pins.  - Damaged inlet connectors (below are undamaged).  - Damaged/burnt area on the connector. For example, wire is missing in exposed area (red rectangle), insulation at wire is damaged and/or copper strands are visible.  IMPORTANT: Mains power cables with any type of damage must be replaced.
3.	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4.	Verify	Make sure the inlet connector retainer is functional.

13.5.5 Optional diagnostic checks

To complete the Ultrasound system checks, view the error logs and run desired diagnostics.

13.5.5.1 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.

13.5.6 Physical inspection

NOTE

These features may not be present on all Ultrasound systems.

Table 13-5 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.	Operating Panel	Inspect alphanumeric keyboard and operator panel (operator control panel). Record any damaged or missing items.
5.	Operating Panel Movement	- Where applicable, verify ease of operating panel (operator control panel) movement in all acceptable directions. - Where applicable, ensure that it latches in position as required.
6.	Operating Panel Lights	Check for proper operation of all operating panel and TGC lights.
7.	Display (Monitor)	Inspect the display for scratches and bad pixels. Verify proper operation of contrast and brightness controls. Where applicable, confirm that the display arm allows: - swiveling 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. Note: Display arm movement may vary and is not applicable to all Ultrasound systems.
8.	Monitor Light	Check for proper operation of any monitor lights, if available.
9.	Input Power	Refer to <i>Mains power cable inspection</i> on page 764.
10.	External I/O	Check all connectors for damage and verify that the labeling is good.
11.	Wheels and Brakes	- Where applicable, check all wheels and casters for wear and verify operation of foot brake and release mechanism. - Where applicable, check all wheel locks and wheel swivel locks for proper operation.
12.	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to footswitch assembly and probe strain or bend reliefs.

Step	Item	Description
13.	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.
14.	Control Panel	Inspect alphanumeric keyboard and operating panel. Record any damaged or missing items.
15.	Probe Holders	Where applicable, inspect the probe holders for cracks or damage.
16.	Power and System Status Indicators	Check for proper operation of all Power and System Status indicators.
17.	Battery	Where applicable, check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal.
18.	External Microphone	Where applicable, check for proper operation of any external microphones by recording an audio test.

13.5.7 Cleaning

Refer to the User Manual for the Ultrasound system for instructions.

13.5.7.1 Air filter cleaning

Refer to the User Manual for the Ultrasound system for instructions.

13.5.8 Disinfecting

Refer to the User Manual for the Ultrasound system for instructions.

13.5.9 Probe maintenance

Refer to the Ultrasound system User Manual, the probe's User Manual/Probe Care Card, or the Probe Addendum (p/n 5661328) for probe maintenance, checks, cleaning, and disinfecting instructions.



WARNING

To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.



CAUTION

Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty.

DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe.

Follow care instructions that came with the probe.



CAUTION

Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.



CAUTION

Transesophageal and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.

NOTE

GE HealthCare does not substantiate the effectiveness of recommended disinfectant products. Questions regarding efficacy, instructions for use, and proper handling should be directed to the disinfectant manufacturer. GE HealthCare publishes a list of material-compatible disinfectants (see below and also refer to the GE HealthCare website at http://www3.gehealthcare.com/en/Products/Categories/Ultrasound/Ultrasound_Probes. DO NOT use non-GE HealthCare-approved disinfectants or products that have not been evaluated by GE HealthCare for material compatibility. Damages linked to the use of disapproved chemicals are not covered under product warranty or service contract.)

13.6 Using a Phantom

The use of a Phantom is not required during Care and Maintenance, except for the Invenia ABUS Scan Station. Customer may use it as part of their Quality Assurance Program tests.

13.7 Electrical Safety Tests

Contents in this section

- *Uninterrupted power supply (UPS)* on page 770
- *Safety test overview* on page 771
- *Leakage current limits* on page 772
- *Outlet test - wiring arrangement - USA and Canada* on page 774
- *Grounding continuity test* on page 775
- *Chassis leakage current test* on page 776
- *Isolated patient lead (source) leakage-lead to ground test (e.g. ECG)* on page 778
- *Isolated patient lead (source) leakage-lead to lead test (e.g. ECG)* on page 780
- *Isolated patient lead (sink) leakage-isolation test (e.g. ECG)* on page 782
- *Probe (source) leakage current test* on page 783
- *Isolated probe (sink) leakage-isolation test* on page 786

13.7.1 Uninterrupted power supply (UPS)



CAUTION

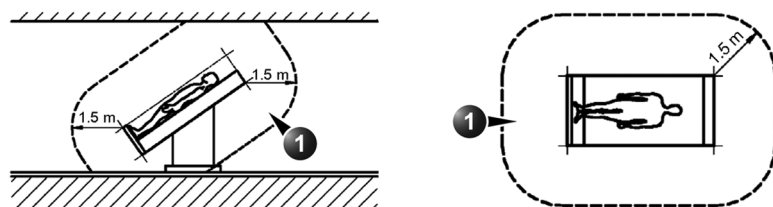
For all instructions in this section, in case of using an uninterruptible power supply (UPS) the terms outlet, wall outlet, AC wall outlet or power outlet refer to the AC wall outlet to which the UPS power input is connected. In case of further available AC (or DC) power outlets at the same used UPS these must remain unused and not connected to any other devices.



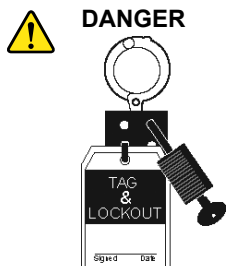
CAUTION

Please observe that some uninterruptible power supplies (UPS) 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).

Figure 13-1 Patient Environment



13.7.2 Safety test overview



Energy Control and Power Lockout for Ultrasound system.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the power cable from the wall outlet, then from the Ultrasound system.
4. Maintain exclusive control of the Ultrasound system power cable by applying Lockout/Tagout Devices.
5. Wait at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.
6. Remove/disconnect the battery if present.

Ultrasound system components may be energized.

Capacitors on Ultrasound systems with the Shearwave Option can take up to 5 minutes to discharge.



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 IEC 60601-1 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 (for example, IEC 60601-1 including national deviations) which require a controlled test environment and can place unnecessary stress on the Ultrasound system.

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 minimize the risk and avoid an electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.



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.

**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**

Compare all safety-test results with safety-test results of previously performed safety tests (e.g. last year etc.). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE HealthCare for further analysis.

**CAUTION**

For all instructions in this section in case of using an uninterruptible power supply (UPS) the terms outlet, wall outlet, AC wall outlet or power outlet refer to the AC wall outlet to which the UPS power input is connected. In case of further available AC (or DC) power outlets at the same used UPS these must remain unused and not connected to any other devices.

13.7.3 Leakage current limits

**DANGER**

Energy Control and Power Lockout for Ultrasound system.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the power cable from the wall outlet, then from the Ultrasound system.
4. Maintain exclusive control of the Ultrasound system power cable.
5. Wait at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.
6. Remove/disconnect the battery if present.

Ultrasound system components may be energized.

Capacitors on Ultrasound systems with the Shearwave Option can take up to 5 minutes to discharge.

The following acceptance limits and test conditions are summarized from IEC 60601 (including national deviations) and IEC 62353. In some cases, the acceptance limits and test conditions are lower than those specified by other valid national or international standards.

In some countries/regions differing acceptance limits and differing test conditions may apply.

13.7.4 LOGIQ/Vivid/Voluson Ultrasound system leakage current limits

Leakage current limits for LOGIQ, Vivid and VOLUSON Ultrasound systems are shown below for 100-240 volt mains.

NOTE

Open Grounding is also known as "Lift Ground."

Table 13-6 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 IEC 60601				

*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.

Table 13-7 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.

NOTE

Electrical leakage testing may be accomplished with any calibrated electrical safety analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551 or IEC 62353 or other relevant national regulation.

Table 13-8 Equipment Type and Test Definitions

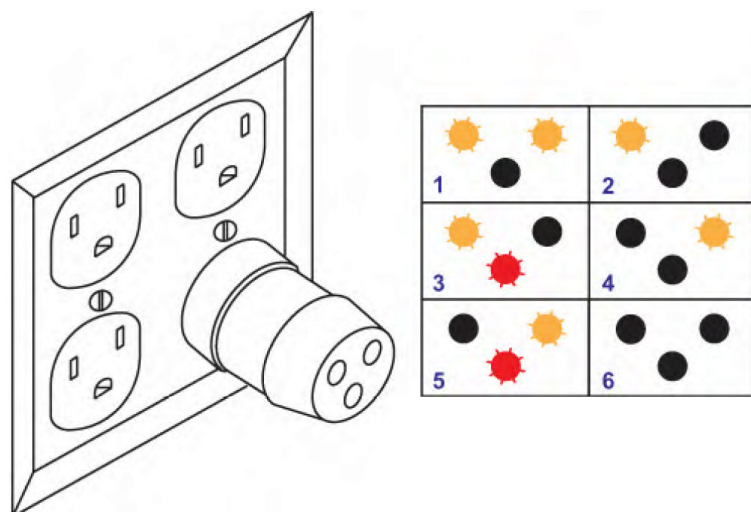
Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For Ultrasound equipment, this includes transducers, ECG leads and e-TRAX Needle Sensor.	
Type BF	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60417-5333, e.g. ultrasound probes which 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, e.g. ECG electrodes which are marked with the 'man in box with paddle' BF symbol.	
Type CF	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60417-5335, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so 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, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so 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.	

13.7.5 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 13-2 Typical Alternate Outlet Tester



1. Correct wiring	4. Open neutral wire
2. Open ground wire	5. Hot and ground reversed
3. Reversed polarity	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.

13.7.6 Grounding continuity test

**DANGER****Electric Shock Hazard!**

The patient or operator **MUST NOT** come into contact with the equipment during this test.

13.7.6.1 Definition of the grounding continuity test

This test measures the impedance between the protective-earth pin of the plug and protectively-earthed parts of the console.

The test verifies that the protective earth conductors in the power cord and console are intact.

The testing electrical safety analyzer is connected to parts of the equipment easily contacted by the user or patient.

The ground wire resistance should comply with the procedure used for the test.

- For IEC 60601-1, the expected result is less than 0.2 ohms.
- For IEC 62353, the expected result is less than 0.3 ohms.
- For NFPA 99, the expected result is less than 0.5 ohms.

NOTE

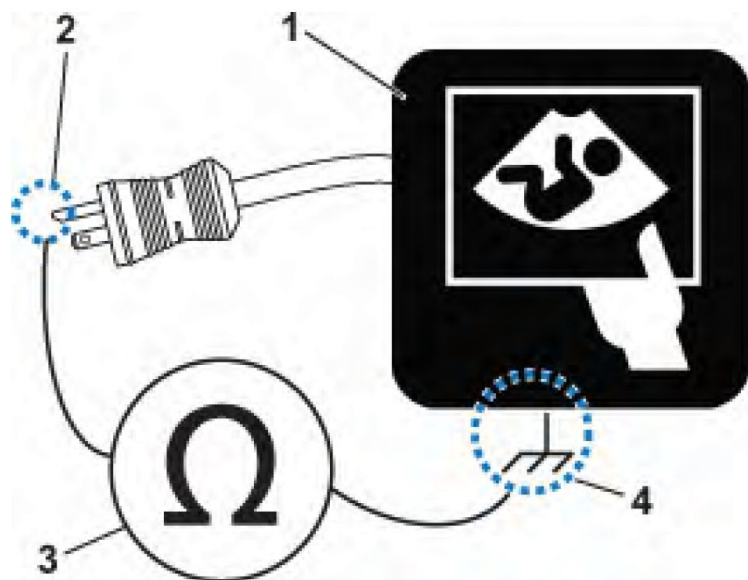
In some countries/regions differing acceptance limits and differing test conditions may apply.

13.7.6.2 Generic procedure for the grounding continuity test

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case.

Record the highest reading of current.

Figure 13-3 Ground Continuity Test



1. Ultrasound system	3. Ohmmeter or electrical safety analyzer
2. Ground pin	4. Accessible metal part such as: • Potential equilibrium connector • Monitor housing • Probe connector

13.7.6.3 Data sheet for the grounding continuity test

This table shows a typical format for recording the grounding continuity.

Record all data and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-9 Typical Data Format For Recording Grounding Continuity

Unit under test _____			Date of test __/__/__			
Test Conditions			Measurement/Test Point Location			
System Power	Grounding/PE	Limit μ A	Third pin of the attachment plug			
off	closed	For IEC 60601-1, the expected result is less than 0.2 ohms. For IEC 62353, the expected result is less than 0.3 ohms. For NFPA 99, the expected result is less than 0.5 ohms.				

13.7.7 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.

**CAUTION**

Lacquer is an isolation barrier! Measure only on blank accessible metal parts.

13.7.7.1 Definition of the chassis leakage current test

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.

13.7.7.2 Generic procedure for the chassis leakage current test

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 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as applicable.

The maximum allowable limit for chassis source leakage is shown in *Table 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as Chassis/Enclosure Leakage.

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.

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 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as applicable.

NOTE

For more information, refer to the safety analyzer's user manual that will be used to perform the tests.

13.7.7.3 Data sheet for the chassis leakage current test

Table 13-10 Typical Data Format For Recording Chassis Leakage (Touch Current) on page 778 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 and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-10 Typical Data Format For Recording Chassis Leakage (Touch Current)

Unit under test _____			Date of test __/__/__			
Test Conditions			Measurement/Test Point Location			
System Power	Grounding/PE	Limit μ A	Potential equilibrium connector	Monitor housing	Probe connector	
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				

13.7.8 Isolated patient lead (source) leakage–lead to ground test (e.g. ECG)



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.

13.7.8.1 Definition of the isolated patient lead (source) leakage–lead to ground test

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 and/or IEC 60601-1).

For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

13.7.8.2 Generic procedure for the isolated patient lead (source) leakage–lead to ground test

Measurements should be made under the test conditions specified in *Table 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as applicable.

For each combination, the operating controls, such as the lead switch, should be operated to find the worst case condition.

Record the highest reading of current.

1. Connect the safety analyzer to wall AC power outlet.

Table 13-11 Typical Data Format For Recording Patient Lead To Ground (GND) Leakage for CF Type Applied Part (e.g. ECG)

Unit under test _____			Date of test __/__/__			
Test Conditions			Patient Lead or Combination Measured			
System Power	Grounding/PE	Limit μ A	RA to GND	LA to GND	LL to GND	(RA+LA+LL) to GND
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				

13.7.9 Isolated patient lead (source) leakage—lead to lead test (e.g. ECG)

**DANGER**

Electric Shock Hazard!

When the electrical safety analyzer's ground switch is OPEN, DO NOT touch the Ultrasound system!

13.7.9.1 Definition of the isolated patient lead (source) leakage—lead to lead test

This test measures the current which would flow between ECG leads. The electrical safety analyzer simulates a patient who is connected to the monitoring equipment.

This test verifies that the separation between the patient connections is adequate to limit the patient leakage current to the allowed value when an external voltage is present.

The testing electrical safety analyzer is connected to parts of the equipment easily contacted by the user or patient.

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 4-6 on page 4-19, as applicable.

NOTE

This test is also known as the patient auxiliary current test.

13.7.9.2 Generic procedure for the lead to lead leakage test

Table 13-12 Typical Data Format For Recording Patient Lead To Lead Leakage for CF Type Applied Part (e.g. ECG) on page 781 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 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains on page 773, as applicable.

Record the highest reading of current.

1. Connect the safety analyzer to a wall AC power outlet.
2. Plug the equipment under test into the receptacle on the electrical safety analyzer's panel.
3. Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
4. Select the "Patient Lead Leakage" function on the electrical safety analyzer.
5. 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.

13.7.9.3 Data sheet for the lead to lead leakage test

This table shows a typical format for recording the lead to lead leakage test.

Record all data and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-12 Typical Data Format For Recording Patient Lead To Lead Leakage for CF Type Applied Part (e.g. ECG)

Unit under test _____			Date of test __/__/__			
Test Conditions			Patient Lead or Combination Measured			
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 GND</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				

13.7.10 Isolated patient lead (sink) leakage-isolation test (e.g. ECG)



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.

13.7.10.1 Definition of the isolated patient lead (sink) leakage-isolation test

This test measures the current which would flow if mains voltage were connected to isolated ECG leads.

This test verifies that the separation between the patient connections and other parts is adequate to limit the patient leakage current to the allowed value when an external voltage is present.

The testing electrical safety analyzer is connected to parts of the equipment easily contacted by the user or patient.

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.

13.7.10.2 Generic procedure for the isolated lead (sink) leakage test

Table 13-13 Typical Data Format For Recording Isolated Patient Lead (Sink) Leakage for CF Type Applied Part (e.g. ECG) on page 783 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 13-7 ISO and Mains Applied Limits** on page 773.

Record the highest reading of current.

1. Connect the safety analyzer to a wall AC power outlet.
2. Plug the equipment under test into the receptacle on the panel of the electrical safety analyzer.
3. Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
4. Select the "Patient Lead Leakage" function on the electrical safety analyzer.
5. 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.

13.7.10.3 Data sheet for the isolated lead (sink) leakage test

This table shows a typical format for recording the isolated lead (sink) leakage test.

Record all data and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-13 Typical Data Format For Recording Isolated Patient Lead (Sink) Leakage for CF Type Applied Part (e.g. ECG)

Unit under test _____		Date of test __/__/__	
Test Conditions			Patient Lead
System Power	Grounding/PE	Limit μ A	RA+LA+LL
off	closed	50	
on	closed	50	
off	closed (reversed polarity)	50	
on	closed (reversed polarity)	50	

13.7.11 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 IEC 60601-1.

13.7.11.1 Definition of probe (source) leakage current test

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.

13.7.11.2 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 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as applicable for every probe.

For each combination, the probe must be active to find the worst case condition.

Record the highest reading of current.

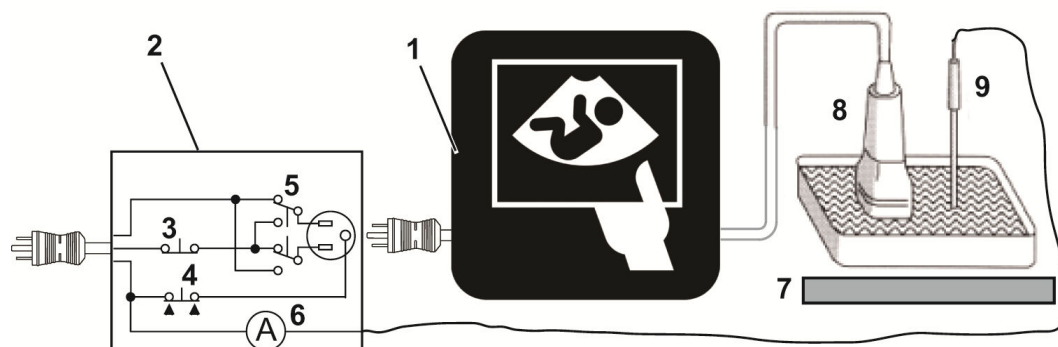
NOTE

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 13-5 Set Up for Probe Leakage Current



1. Ultrasound system	6. Meter
2. Electrical safety analyzer	7. Isolator
3. Neutral switch	8. Ultrasound probe
4. Ground switch	9. Saline probe
5. Polarity reversing switch	

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. Connect the safety analyzer to AC wall outlet.
3. Set the safety analyzer's function switch to "Chassis" or "Enclosure Leakage."
4. Plug the Ultrasound system's power cord into the Electrical Safety Analyzer.
5. Plug the Chassis Ground Probe (saline probe) into the Electrical Safety Analyzer's "CHASSIS" connector.
6. Connect the Ultrasound probe to the Ultrasound system.
7. Immerse the Saline probe in the saline solution.
8. 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 probe users manual.

Do not touch the probe, conductive liquid or any part of the Electrical 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.

9. 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 13-6 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains* on page 773, as applicable for every probe.
10. Test opening the ground (only with IEC 60601-1).
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.

13.7.11.3 Data sheet for the probe (source) leakage current test

This table shows a typical format for recording the probe (source) leakage current test.

Record all data and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-14 Typical Data Format For Recording Probe (Source) Leakage Current for BF Type Applied Part (e.g. ultrasound probe)

Unit under test			Date of test			
Test Conditions			Probe as measured in saline bath			
System Power	Grounding/PE	Limit AC/DC μ A	<i>probe1</i>	<i>probe2</i>	<i>probe3</i>	<i>probe4</i>
off	closed	100/10				
off	open	500/50				
on	closed	100/10				
on	open	500/50				
off	closed (reversed polarity)	100/10				

Unit under test				Date of test		
Test Conditions			Probe as measured in saline bath			
System Power	Grounding/PE	Limit AC/DC μA	<i>probe1</i>	<i>probe2</i>	<i>probe3</i>	<i>probe4</i>
off	open (reversed polarity)	500/50				
on	closed (reversed polarity)	100/10				
on	open (reversed polarity)	500/50				

13.7.12 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 IEC 60601-1.



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.

13.7.12.1 Definition of the isolated probe (sink) leakage-isolation test

This test measures the current that would flow if mains voltage were applied to the probes.

This test verifies that the separation between the patient connections and other parts is adequate to limit the patient leakage current to the allowed value when an external voltage is present.

Measurements should be recorded for probes and transducers under each set of test conditions specified in:

- *Table 13-7 ISO and Mains Applied Limits** on page 773

13.7.12.2 Generic procedure for the isolated probe (sink) leakage-isolation test

Record the highest reading of current.

1. Connect the Safety analyzer to an AC wall outlet.
2. Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
3. Connect the Ultrasound probe to be tested to the Ultrasound system.
4. Immerse the saline probe in the saline solution.
5. Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.
6. Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
7. Test with closed ground with the Ultrasound system on and off.

NOTE

For more information, refer to the safety analyzer's user manual.

13.7.12.3 Data sheet for the isolated probe (sink) leakage-isolation test

This table shows a typical format for recording the isolated probe (sink) leakage-isolation test.

Record all data and keep the record of the results with other hard copies of maintenance data.

When filling out an electronic form (for example, an Ultrasound Equipment Quality Check (EQC and IQC)), record the highest reading from your results.

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 13-15 Typical Data Format for Recording Isolated Probe (Sink) Leakage for BF Type Applied Part (e.g. ultrasound probe)

Unit under test			Date of test __/__/__			
Test Conditions			Probe as measured in saline bath			
System Power	Grounding/PE	Limit μ A	<i>probe1</i>	<i>probe2</i>	<i>probe3</i>	<i>probe4</i>
off	closed	5000				
on	closed	5000				
off	closed (reversed polarity)	5000				
on	closed (reversed polarity)	5000				

13.7.13 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: IEC 60601-1). 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 IEC 60601-1 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.

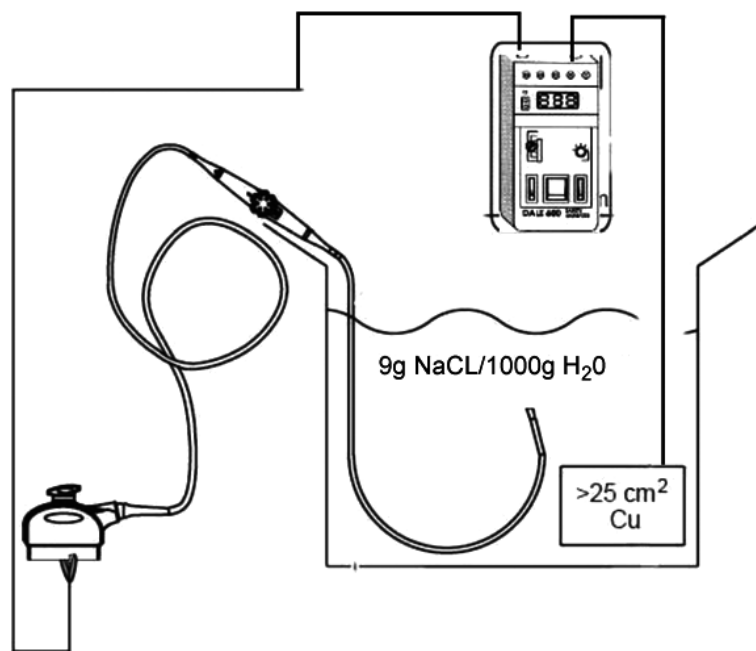
The symbol for BF is indicated on the probe connector label below:

Figure 13-6 Example of a GE HealthCare Probe Connector Label



A typical test setup for TEE probes could be as indicated below:

Figure 13-7 TEE Probe Leakage Isolation (Sink) Current Test



CAUTION

The handle of the TEE probes must not be immersed.

For immersion levels, please refer to the User Manual.

NOTE

Where applicable, a typical test setup of non-TEE probes can be as illustrated in Figure 4-4 on page 4-34. The test passes when the reading measure less than the values in:

- *Table 13-7 ISO and Mains Applied Limits** on page 773

13.8 When There Is Too Much Leakage Current

13.8.1 AC/DC fails

Where applicable, check the AC/DC adapter and its cable. Replace a new one if any portion is defective.

13.8.2 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. If reversed wiring is observed, it is the customers responsibility to have the condition corrected by qualified personnel.

13.8.3 Probe fails

Test the probe in another connector to isolate if the fault lies with the probe or the Ultrasound system.

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 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.

13.8.4 Peripheral fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

13.8.5 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 (uninterruptible 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.

13.8.6 New Ultrasound system

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.

13.8.7 ECG fails

Inspect cables for damage or poor connections.

13.9 Ultrasound Equipment Quality Check (EQC and IQC)

13.9.1 Quality checks

Contact your GE HealthCare Service Representative to perform Equipment and Image Quality Checks.

Based on the region/area of the world that the customer is based in, the customers Quality Assurance Program may require alignment with local standards. Thus, all testing per IEC 60601 and/or IEC 62353 may or may not be required for EQC Care and Maintenance.

For example, United States National Standards for Health Care Facilities (NFPA 99) only requires touch current testing in normal operating configurations (this standard differs from IEC 62353 requirements for recurrent test and test after repair of medical electrical equipment).

13.9.2 Cybersecurity checks

In addition to Ultrasound Equipment Quality Check (EQC and IQC), there may be questions for cybersecurity included on the form.

These questions are designed to determine the cybersecurity state of the product during a service visit.

These are the types of questions that will be required:

- Is the system application software up to date with the most recent patch?
- Have the default admin passwords been changed?
- If encryption is available on the product, are the disks encrypted?

Chapter 14

Deinstallation

In this chapter

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Deinstallation procedures.	796
Critical part packaging for deinstallation.	797
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This chapter contains information needed to ensure the safe, compliant and efficient removal of an ultrasound system whether for replacement, return to GE HealthCare (GoldSeal) or final end-of-life disposition. All tasks listed in the deinstallation process are recommended. Review the requirements and standards specific to your region, as local procedures may vary.

NOTE
The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE
The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

14.1 Customer responsibilities for deinstallation

Before deinstallation begins, make sure the customer has:

- Discontinued clinical use of the system.
- Removed all personal or hospital-owned items from the system (see below).
- Completed any necessary data backups (system and patient data backup).
- Reviewed and acknowledged the SSD Wipe / Secure Delete process for **removal of Protected Health Information (PHI)**
- **Cleaned and disinfected the system to ensure it is safe for handling.**
- Confirmed that the console is properly prepared for removal.

14.2 Prerequisites for deinstallation

Perform these steps prior to deinstallation:

1. Perform a visual inspection to make sure the Ultrasound system has been disinfected and is safe to handle.
2. Remove the MS Tablet and move it to the replacement Ultrasound system (if present).
3. Re-inspect the storage areas and trays and remove any items that belong to the customer.
4. Unplug and remove all probes connected to the Ultrasound system (either store them for transportation).

NOTE

If moving probes to a replacement Ultrasound system, perform electrical safety and IQC.

5. Unplug and remove the VScan Air CL and VScan Air CL Charger (if present).
6. Disconnect and remove the RFID and cradle (if present).
7. Obtain any required predefined packaging materials as applicable.
8. PHI is removed or deleted from the Ultrasound system.
9. Power down requirements.

14.2.1 (EHS) requirements for deinstallation

Field Engineer should wear all required **Personal Protective Equipment (PPE)**:

- Follow **Lockout/Tagout (LOTO)** procedures, if applicable, to isolate power.
- Verify the system has been **cleaned and disinfected** before handling the console removal process.

14.3 Deinstallation procedures

14.3.1 Patient Healthcare Information (PHI) removal process for deinstallation

The most critical step of deinstallation is **removal of Protected Health Information (PHI)**:

- Verify the system has been properly backed up (Patient Data Must is a Customer Responsibility).
- Use the appropriate **service tools or software interface*** to:
 - Erase all PHI and site-specific configurations.
 - Reset to factory defaults if the system is being retired.
- Document completion of this process per regulatory and company policy.

Perform **Secure Delete to ensure all customer and patient data are completely removed from console. **Some customer sites may request to retain the console SSD—be sure to document the request for GEHC records that the customer is taking proper ownership of the SSD.***

14.3.2 Power down requirements for deinstallation

These are the power down requirements for deinstallation:

- Completely power down the Ultrasound system.
- Turn off the breaker on the back of the Ultrasound system.
- Disconnect the power cable (first from the wall and then from the Ultrasound system).
- Remove the batteries or make sure the Ultrasound system is charged to at least 30%.

14.4 Critical part packaging for deinstallation

Complete the following steps in order:

1. **Visually inspect** the system to ensure it has been disinfected and is safe to handle.
2. **Remove or ask the customer to remove** all customer-owned items, including:

Confirm that the system is now **ready for physical removal** from the site.

14.5 Disposition of materials for deinstallation

Dispose of any unneeded parts per local policy.

Chapter 15

Favorite Links

In this chapter

Documentation Web Site Links. 800

Other links.801

This chapter contains information on favorite links used with the Ultrasound system.

NOTE
The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE
The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

15.1 Documentation Web Site Links

Support Documentation Library Web Site

<http://www.gehealthcare.com/DocumentationLibrary>

Customer Documentation Portal

<https://www.gehealthcare.com/documentation>

SIMS

To get access to SIMS you must be a registered user and you must use the application SIMS Content Viewer.

Product Security Portal

<https://www.gehealthcare.com/services/lifecycle-management/product-security-portal/security>

Sustainability reports

<http://www.gehealthcare.com/about/sustainability/reports>

15.2 Other links

GE HealthCare

<https://www.gehealthcare.com>

LOGIQ Club

<https://www.logiqclub.net/>

Ultrasound Probe Web Site

<https://www.gehealthcare.com/products/ultrasound/ultrasound-transducers>

GEHC Chemicals Compatibility

<https://cleaning.gehealthcare.com/>

System Cleaning Site

<https://cleaning.gehealthcare.com/>

Chapter 16

Glossary

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This chapter contains a glossary of terms for the Ultrasound system.

NOTE

The information in this Service Manual is applicable to LOGIQ Fortis.

NOTE

The information contained 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. This Service Manual also applies to Ultrasound systems used in veterinary environments.

16.1 Glossary

Term	Description
3D	Three Dimensional
4D	Four Dimensional. 4D is the same as Three Dimensional + Realtime
AC	Alternating Current
ADC	Analog to Digital Converter
APM	Asset Performance Tool
ASIC	Application Specific Integrated Circuit
ASSY	Assembly
BEPS	Back End Power Supply
CPU	Central Processing Unit
CRM	Customer Relationship Management (number)
CRU	Customer Replaceable Unit
CTRL	Control
CW	Continuous Wave Doppler
DAC	Digital to Analog Converter
DC	Direct Current
DMM	Digital Multimeter
ECG	Electro Cardio Graphy
EFI	Extensible Firmware Interface
eIfU	electronic Instructions for Use
EXT	External
FE	1: Field Engineer 2: Front End
FFA	Field Force Automation (InSite server)
FPGA	Field Programmable Gate Arrays
FRU	Field Replaceable Unit
GB	Gigabyte
GPU	Graphic Processing Unit
GRS	Global Service Room
HDD	Hard Disk Drive
HDU	High Definition Ultrasound
I ² C	Inter-Integrated Circuit (I2C) bus
I2C	Inter-Integrated Circuit (I2C) bus
IfU	Instructions for Use

Term	Description
I/O	Input/output
InSite EXC	InSite with Express Connect
INT	Internal
LCD	Liquid Crystal Display
M&A	Measurements and Analysis
OP	Operating Panel
OPIO	Operator Panel
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PCI	Peripheral Component Interconnect
PCIE	Peripheral Component Interconnect Extended
PS	Power Supply
PWA	Printed Wire Assembly
PWR	Power
PW	Pulsed Wave Doppler
QTY	Quantity used per ultrasound system
RAM	Random Access Memory
RX	Receiver
SSA	Secure Service Access (by means of an "USB Class M" SSA dongle + PIN)
SSD	Solid-State Drive
TB	Terabyte
TX	Transmitter
UI	User interface
UIS	Ultrasound Application Software
μC	Microcontroller
VCO	Virtual Console Observation
WPA	Wi-Fi Protected Access

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