GE

Technical Publication

LOGIQ C9 Series

Basic Service Manual

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Product Information

This Manual covers the software version of R1.x.x for LOGIQ C9 Series ultrasound system.

GE

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Revision history

Revision History

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List of Effected Pages (LOEP)

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Important precautions

Translation policy

English (EN)

WARNING

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.

Français (FR)

AVERTISSEMENT

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.

Español (ES)

ADVERTENCIA

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.

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

简体中文 (ZH-CN)

本维修手册仅提供英文版。

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

VARNING

Svenska (SV)

Den här servicehandboken finns endast på engelska.

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

警告

繁體中文 (ZH-TW)

此服務手冊僅推出英文版。

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

경고

한국어 (KO)

이 서비스 설명서는 영어로만 제공됩니다.

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

ПРЕДУПРЕЖДЕНИЕ

На русском языке (RU)

Данное руководство по обслуживанию доступно только на английском языке.

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

OSTRZEŻENIE

Polski (PL)

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

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

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 oversættelsesydelserne.
- 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 încercaţi să efectuaţi lucrări de service asupra echipamentului, în afară de cazul când aţi consultat acest manual de service şi l-aţi înţeles.
- 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 servisera, 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 (LV)

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 (SR)

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 servisera, operatera ili pacijenta uzrokovanog električnim udarom, mehaničkim i drugim opasnostima.

AVISO

Português (Portugal) (PT-PT)

Este manual de assistência está disponível apenas em inglês.

- Se o prestador de serviços de assistência do cliente necessitar do manual noutro 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

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

CẢNH BÁO

Tiếng Việt (VI)

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

Қазақ тілінде (KK)

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

Tagalog (TL)

Available lamang sa Ingles ang Manwal ng Serbisyong 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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All packages should be closely examined at time of delivery. If damage is apparent, write “Damage In Shipment” on ALL copies of the freight or express bill BEFORE delivery is accepted or “signed for” by a GE representative or hospital receiving agent. 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.

Certified electrical contractor statement - For USA Only

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

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

Omission and errors

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

Mail the information to:

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No. 19 Changiang Road
Wuxi National Hi-Tech Dev. Zone
Jiangsu
P.R.China 214028

GE employees should use TrackWise to report service documentation issues.

These issues will then be in the internal problem reporting tool and communicated to the writer.

Service Safety Considerations

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

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

For a complete review of all safety requirements, refer to Chapter 1 in the Service Manual.

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Chapter 1

Introduction

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

Overview

Contents in this chapter

- 'Overview' on *page 1-2*
- 'Manual Overview' on *page 1-3*
- 'Important conventions' on *page 1-6*
- 'Product icons' on *page 1-10*
- 'Labels locations' on *page 1-11*
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- 'Dangerous procedure warnings' on *page 1-20*
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- 'Returning probes and repair parts' on *page 1-22*
- 'EMC, EMI and ESD' on *page 1-23*
- 'Customer assistance' on *page 1-25*

Manual Overview

This manual provides installation and service information for the LOGIQ C9 Series Ultrasound system. It is divided in ten chapters as shown below.

Contents in this manual

The manual is divided into ten chapters.

In the beginning of the manual, before chapter 1, you will find the *Revision overview*, the *Important precautions* including *Translation policy*, *Damage in transportation*, *Certified electrical contractor statement*, *Omission & errors*, *Service safety considerations* and *Legal notes*, and the *Table of Contents* (*TOC*).

An Index has been included after Chapter 10.

Table 1-1: Contents in this manual

Chapter number	Chapter title	Description
1.	Introduction	Contains a content summary and warnings.
2.	Site preparations	Contains pre-setup requirements for the LOGIQ C9 Series.
3.	System Setup	Contains setup procedure with procedure checklist for the system.
4.	General Procedures and Functional Checks	Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5.	Components and Functions (Theory)	Contains block diagrams and functional explanations of the electronics.
6.	Service Adjustments	Contains instructions on how to make any available adjustments to the LOGIQ C9 Series.

Table 1-1: Contents in this manual (Continued)

Chapter number	Chapter title	Description
7.	Diagnostics/ Troubleshooting	Provides procedures for running diagnostic or related routines for the LOGIQ C9 Series.
8.	Replacement procedures	Provides disassembly procedures and reassembly procedures for all changeable FRU.
9.	Renewal Parts	Contains a complete list of replacement parts for LOGIQ C9 Series.
10.	Care & Maintenance	Provides periodic maintenance procedures for LOGIQ C9 Series.
N/A	Index	A quick way to the topic you're looking for.

LOGIQ C9 Series models covered by this manual

Table 1-2: LOGIQ C9 Series Model Designations

Model Number	Description	System SW
5489329	LOGIQ C9 Premium for China	R1.x.x
5489330	LOGIQ C9 Expert for China (with 4D)	R1.x.x
5489331	LOGIQ C9 Expert for China	R1.x.x
5489332	LOGIQ C9 Expert for India	R1.x.x

NOTE: When not otherwise specified, the contents of this manual applies to all LOGIQ C9 Series models.

Important conventions

Conventions used in book

Important conventions, used in this document, are described next.

Model designations

This manual covers the LOGIQ C9 Series Ultrasound systems listed in:

‘LOGIQ C9 Series models covered by this manual’ on *page 1-5*.

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

d DANGER

Danger is used to indicate the presence of a hazard that will cause severe personal injury or death if the instructions are ignored.

w WARNING

Warning is used to indicate the presence of a hazard that can cause severe personal injury and property damage if instructions are ignored.

c CAUTION

Caution is used to indicate the presence of a hazard that will or can cause minor personal injury and property damage if instructions are ignored. Equipment damage possible.

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.

Standard hazard icons

Important information will always be preceded by either the exclamation point (!) contained within a triangle, or the symbols for “Danger”, “Warning” or “Caution”, 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 isn’t used in this manual, it may be included for your reference.

Table 1-3: Standard hazard icons

	ELECTRICAL
	MECHANICAL
	RADIATION
	LASER
	HEAT
	PINCH

NOTE: Even if a symbol isn’t used on the product or in this manual, it may be included for your reference.

Standard Icons that indicate that a special procedure is to be used

Some others icons make you aware of specific procedures that should be followed.

Table 1-4: Standard Icons that indicates that a special procedure is to be used

Avoid Static Electricity	Tag and Lock Out	Wear Eye Protection
Hand Protection	**Foot Protection**	**Wear Eye Protection**

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

Product icons

It is important to refer to the current revision of the Ultrasound system's User Manual for a full list of product labels prior to servicing the system.

Labels locations

It is important to refer to the current revision of the Ultrasound system's User Manual for a full list of product labels prior to servicing the system.

Safety considerations

Contents in this section

- ‘Introduction’ on *page 1-12*
- ‘Human Safety’ on *page 1-12*
- ‘Mechanical safety’ on *page 1-15*
- ‘Electrical safety’ on *page 1-18*

Introduction

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

Human Safety

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

Only personnel who have participated in a LOGIQ C9 Series Training Seminar are authorized to service the equipment.

d DANGER

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

w WARNING

If the covers are removed from an operating LOGIQ C9 Series, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shutdown mode.

Human Safety (continued)

WARNING

Because of the limited access to cabinets and equipment in the field, placing people in awkward positions, GE has limited the lifting weight for one person in the field to 16 KG (35 LBS). Anything over 16 KG (35 LBS) requires 2 people.

WARNING

Have two people available to deliver and unpack the LOGIQ C9 Series.

Attempts to move the Ultrasound system considerable distances or on an incline by one person could result in injury or damage or both.

WARNING

Explosion Warning

DO NOT operate the equipment in an explosive atmosphere. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

WARNING

DO NOT substitute parts or modify equipment

Because of the danger of introducing additional hazards, ONLY install GE approved parts. DO NOT perform any unauthorized modification of the equipment.

WARNING

Ensure that the Ultrasound system is turned off and unplugged

Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation. The amber light on the OP panel ON/OFF button will turn off.

Ultrasound system components may be energized. Always refer to the Ultrasound system's Proprietary Service Manual for LOTO warnings and cautions

Human Safety (continued)

WARNING

Risk of electrical shock, Ultrasound system must be turned off and disconnected from power source. Cord must be controlled at all times.

Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation. The amber light on the OP panel on/off button will turn off.

Ultrasound System components may be energized. Always refer to the Ultrasound system's Proprietary Service Manual for LOTO warnings and cautions

WARNING

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

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.

WARNING

Wear all PPE including gloves as indicated in the chemical MSDS.

Mechanical safety

WARNING

While the software install procedure is designed to preserve data, you should save any patient data, images, system setups to removable media or hardcopy before doing a software upgrade.

WARNING

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.

WARNING

Never use a probe that has fallen to the floor. Even if it looks OK, it may be damaged.

WARNING

When the Ultrasound system is raised for a repair or moved along any incline, use extreme caution since it may become unstable and tip over.

CAUTION

Take extra care when moving the system.

The LOGIQ C9 Series weighs approximately 130 kg (287 lbs) or more, depending on installed peripherals, when ready for use. To avoid possible injury and equipment damage when transporting from one area of use to another:

- Be sure the pathway is clear.
- Limit movement to a slow careful walk.
- Use two or more persons to move the equipment on inclines or long distance.

CAUTION

Before you move or transport the Ultrasound system, make sure to lock the LCD monitor arm firmly and flip down the monitor to prevent damage to the Ultrasound system.

Mechanical safety (continued)

CAUTION

To avoid injury when you move the LCD monitor and the monitor arm, do not put your finger, hand, or object on the joint of the monitor or the monitor arm.

CAUTION

Ensure that nobody touches the console arm when moving the operator panel.

CAUTION

Do not move the Ultrasound system if the Operator Panel is in unlocked position.

CAUTION

Do not transport LOGIQ C9 Series in a vehicle without locking the casters (wheels) and securing it as described in chapter 4.

CAUTION

Use protective glasses during drilling, filing smooth surfaces, and during all other work where eyes need protection.

CAUTION

Use safety shoes when doing work where there is any chance of foot injury.

Mechanical safety (continued)

CAUTION

Use protective gloves when working with sharp edges or when directed to wear PPE during a removal/replacement procedure.

CAUTION

Be careful not to pinch any of the cables.

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

- Before transporting, place the system in its special storage case.
- Lock the wheels (brake)
- Ensure that the system is firmly secured while inside the vehicle.
- Secure 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.

Electrical safety

Safe practices

Follow these guidelines to minimize shock hazards whenever you are using the Ultrasound system:

- To minimize shock hazard, the equipment chassis must be connected to an electrical ground.
- The Ultrasound system is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground.
- The power outlet used for this equipment should not be shared with other types of equipment.
- Both the system power cable and the power connector must meet international electrical standards

Connecting a LOGIQ C9 Series to the wrong voltage level will most likely destroy it.

Probes

Follow these guidelines before connecting a probe to the Ultrasound system:

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

Peripherals

Refer to the Patient Safety Environment section of the User's Manual for peripheral isolation information.

Dangerous procedure warnings

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

d DANGER

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

w WARNING

If the covers are removed from an operating LOGIQ C9 Series, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shutdown mode.

w 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.

w WARNING

DO NOT substitute parts or modify equipment

Because of the danger of introducing additional hazards, ONLY install GE approved parts. DO NOT perform any unauthorized modification of the equipment.

w WARNING

SHUT DOWN FORCEDLY OR PLUG IN/OUT ACDC INVALID MAY CAUSE THE DAMAGE OF SYSTEM FILES.

Lockout/Tagout (LOTO) requirements

Follow Lockout/Tagout requirements by ensuring you are in total control of the AC power plug at all times during the service process.

To apply Lockout/Tagout (LOTO):

1. Plan and prepare for shutdown.
2. Shutdown the equipment.
3. Isolate the equipment.
4. Remove/disconnect the battery, if present.
5. Apply Lockout/Tagout Devices.
6. Control all stored and residual energy.
7. Verify isolation.

All potentially hazardous stored or residual energy is relieved.

WARNING

Energy Control and Power Lockout for LOGIQ C9 Series.

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 Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for 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.

Returning probes and repair parts

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

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

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

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

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

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

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

EMC, EMI and ESD

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 of 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.

CE Compliance

LOGIQ C9 Series 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.

For applicable standards, refer to the Safety Chapter of the Ultrasound system's User's Manual.

NOTE: For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, clamps, are in good condition, 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.

Electrostatic discharge (ESD) prevention

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

WARNING

Risk of electrical shock, Ultrasound 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.

Customer assistance

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 below.

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

1. System ID serial number.
2. Software version.
3. Date and time of occurrence.
4. Sequence of events leading to issue.
5. Is the issue repeatable?
6. Imaging mode, probe, preset/application.
7. Media brand, speed, capacity, type.
8. Save secondary image capture, cine loop, 4D multi-volume loop.

NOTE: Restart the application before resuming clinical scanning.

Phone numbers for Customer Assistance

Table 1-5: Phone numbers for Customer Assistance

LOCATION	PHONE NUMBER	
USA GE Healthcare - GE Medical Systems Ultrasound Service Engineering 9900 Innovation Drive Wauwatosa, WI 53226	Service: On-site	1-800-437-1171
	Service Parts	1-800-558-2040
	Application Support	1-800-682-5327 or 1-262-524-5698
Canada	Phone:	1-800-668-0732
Latin America	Service Application Support	1-800-321-7937 1-262-524-5698
Europe (OLC-EMEA) GE Ultraschall Deutschland Gmbh & Co. KG Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	OLC - EMEA Phone:	 +49 (0) 212 2802 - 652 +33 1 3083 1300
	Fax:	+49 (0) 2122-8024-31
Online Services Ultrasound Asia	Phone: • Australia • China • India • Japan • Korea • Singapore	 +(61) 1-800-647-855 +(86) 800-810-8188 +(91) 1800-425-8025 +(81) 42-648-2940 +(82) 2620 13585 +(95) 6277-3444

System manufacturer

Table 1-6: System manufacturer

MANUFACTURER	PHONE NUMBER	FAX NUMBER
GE Medical Systems (China) Co., Ltd. No.19 Changjiang Road WuXi National Hi-Tech Development Zone Jiangsu P.R.China 214028	+86 510 85225888	+86 510 85226688

Authorized Representative

Table 1-7: Authorized Representative

AUTHORIZED REPRESENTATIVE	TELEPHONE / FAX NUMBER
The location of the CE marking is shown in the Safety chapter of the User manual. **EC REP** Authorized EU Representative/European registered place of business: GE Medical Systems Information Technologies GmbH (GEMS IT GmbH) Munzinger Strasse 5, D-79111 Freiburg, GERMANY	+49 761 45 43 -0 / +49 761 45 43 -233

Chapter 2

Site Preparations

This chapter provides the information required to plan and prepare for the setup of an Ultrasound system. Included are descriptions of the facility and electrical needs to be met by the purchaser of the units.

Overview

Contents in this chapter

- 'Overview' on *page 2-2*
- 'General Ultrasound system requirements' on *page 2-3*
- 'Facility needs' on *page 2-12*
- 'Environmental Dangers' on *page 2-22*

General Ultrasound system requirements

Contents in this section

- 'Ultrasound system environmental requirements' on *page 2-3*
- 'Electrical requirements' on *page 2-6*
- 'EMI limitations' on *page 2-9*
- 'Probes environmental requirements' on *page 2-11*
- 'Time and manpower requirements' on *page 2-11*

Ultrasound system environmental requirements

If the Ultrasound system is very cold or hot

When unpacking the Ultrasound system, allow the temperature of the Ultrasound system to stabilize before powering up. The following table describes guidelines for reaching operational temperatures from storage or transport temperatures.

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.

Table 2-1: System Acclimation Time Chart

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

Environmental specifications for Ultrasound system

The system should be operated, stored, or transported within the parameters outlined below. Either its operational environment must be constantly maintained or the unit must be turned off.

Table 2-2: System Environmental Requirements

	Operational	**Storage**	**Transport** (<16hrs.)
Temperature	10° - 40°C 50° - 104°F	-5° - 50°C 23° - 122°F	-5° - 50°C 23° - 122°F
Humidity	30 - 80% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Ensure that the probe face temperature does not exceed the normal operation temperature range.

The LOGIQ C9 Series system and probe connector is not waterproof. Do not expose the device to water or any kind of liquid.

Cooling

The cooling requirement for a console Ultrasound system with monitor and on board peripherals, is up to 3800 BTU/h. This figure does not include cooling needed for lights, people, or other equipment in the room.

NOTE: Each person in the room places an additional 300 BTU/h demand on the cooling system.

Lighting

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

Electrical requirements

General requirements

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

Sites with a mains power system with defined Neutral and Live:

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

Sites with a mains power system without a defined Neutral:

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

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 the table below, the electrical specifications for the Ultrasound system includes monitor and on board peripherals.

Table 2-3: Electrical Specifications for LOGIQ C9 Series system

Voltage	Tolerance	Power Consumption	Frequency
220-240 VAC	±10%	Max. 950VA	50/ 60HZ

Site circuit breaker

Power outage may occur. The LOGIQ C9 Series 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 Ultrasound system be readily accessible.

POWER OUTAGE MAY OCCURE.

The LOGIQ C9 Series 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.

Site power outlets

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

Unit power plug

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

Power stability requirement

Table 2-4: Power stability requirement

IEC 61000-4-11 Voltage dips, short interruptions and voltage variations on mains supply	< 5%T (> 95% dip) for 0.5 cycle;	< 5%T (> 95% dip) for 0.5 cycle;	Mains power quality should be that of a typical commercial or hospital environment.
	40%T (60% dip) for 5 cycles;	40%T (60% dip) for 5 cycles;	
	70%T (30% dip) for 25 cycles;	70%T (30% dip) for 25 cycles;	
	< 5%T (>95% dip) for 5 sec	< 5%T (>95% dip) for 5 sec	

EMI limitations

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

Possible EMI sources should be identified before the Ultrasound system 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
- mobile phones
- in-house wireless phones (DECT phones)
- wireless computer keyboard and mouse
- air conditioning system
- High Frequency (HF) surgery equipment
- general AC/DC adapters

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

See: ‘EMI prevention/abatement’ on *page 2-10* for EMI prevention tips.

EMI prevention/abatement

Table 2-5: EMI prevention/abatement

EMI RULE	DETAILS
Be aware of Radio Frequency sources	• Keep the Ultrasound system at least 5 meters (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 Ultrasound system	Poor grounding is the most likely reason an Ultrasound system will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, Radio Frequency gaskets, covers, cores	• After you finish repairing or updating the Ultrasound system, replace all covers and tighten all screws. • Any cable with an external connection requires a magnet wrap at each end. • Install all covers. Loose or missing covers or Radio Frequency gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken Radio Frequency gaskets	If more than 20% or a pair of the fingers on an Radio Frequency gasket are broken, replace the gasket. Do not turn on the Ultrasound system until any loose metallic part is removed.
Do not place labels where Radio Frequency gaskets touch metal	Where applicable, never place a label where Radio Frequency gaskets meet the Ultrasound system. Otherwise, the gap created will permit Radio Frequency leakage. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly route peripheral cables	Where applicable, 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.

Probes environmental requirements

Operation, storage and transport temperatures for probes

Probes should be operated, stored, or transported within the parameters outlined below.

CAUTION

Ensure that the probe face temperature does not exceed the normal operation temperature range.

Table 2-6: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 40° C 50° - 104° F	0° - 55° C 32° - 131° F	-40° - 55° C -40° - 131° F
Humidity	5 - 85% non-condensing	5 - 85% non-condensing	5 - 85% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

CAUTION

Check the room temperature before you use the probe.

CAUTION

Ensure that the probe face temperature does not exceed the normal operation temperature range.

NOTE: Refer to Table 2-1 on page 2-3 to determine the needed settlement time.

Time and manpower requirements

Site preparation takes time. Begin site preparation checks as soon as possible, if possible, six weeks before delivery, to allow enough time to make any changes.

Facility needs

Contents in this section

- 'Purchaser responsibilities' on *page 2-13*
- 'Required facility needs' on *page 2-14*
- 'Desirable features' on *page 2-15*
- 'Minimal floor plan suggestion' on *page 2-16*
- 'Recommended floor plan suggestion' on *page 2-17*
- 'Suggested floor plan, Ultrasound system, and EchoPAC PC in same room' on *page 2-18*
- 'Networking setup requirements' on *page 2-18*

Purchaser responsibilities

The work and materials needed to prepare the site is 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 Ultrasound system
- Paying the costs for any alterations and modifications not specifically provided in the sales contract

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

The desire to use a non–listed or customer provided product or to place an approved product further from the Ultrasound system 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 Ultrasound system. Carpet is not recommended because it collects dust and creates static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact Ultrasound system reliability.

Required facility needs

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

Sites with a mains power system with defined Neutral and Live:

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

Sites with a mains power system without a defined Neutral:

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

Required facility needs (continued)

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 unit is only a conduit.

- Dedicated single branch power outlet of adequate amperage meeting all local and national codes which is located less than 2.5 m (8 ft.) from the unit's proposed location
- Door opening is at least 76 cm (30 in) wide
- Proposed location for unit is at least 0.5m (1.5 ft.) from the wall 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 of the unit to connect cables.
- Power outlets for other medical equipment.
- Power outlets for test equipment within 1 m (3.2 ft.) of Ultrsound system.
- Clean and protected space to store probes (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

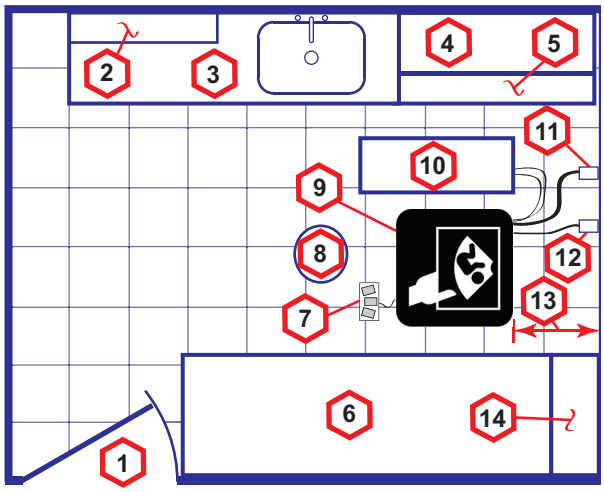
For the amperage requirements, see: 'Electrical requirements' on *page 2-6*.

Desirable features

- Door is at least 92 cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Sink with hot and cold water
- Receptacle for bio–hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and equipment
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet ordered by GE for its software and proprietary manuals

Minimal floor plan suggestion

CSI 8x10



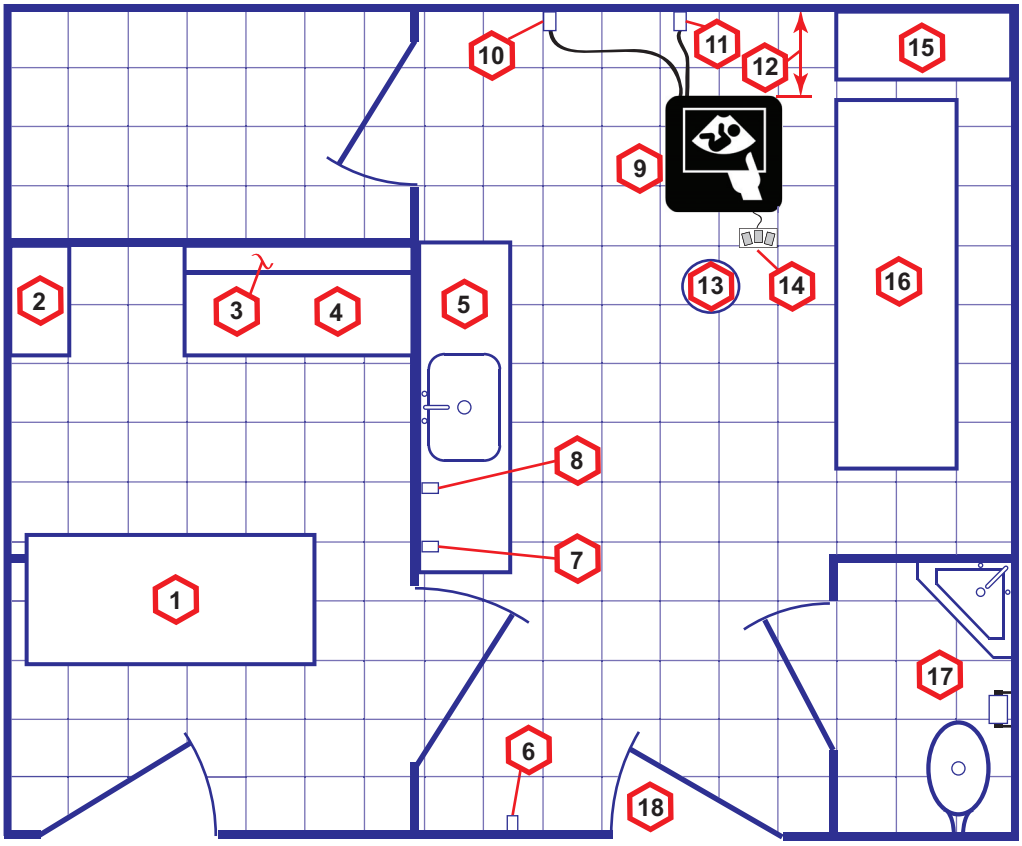
Scale:
Each square equals one square foot (app. 31 x 31 cm)

1. Door – at least 762 mm (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 – 1930 x 610 mm (76 x 24 inches)
7. Footswitch
8. Stool
9. Ultrasound system
10. External Peripherals
11. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
12. Network Interface
13. 457 mm (18 inches) distance of Ultrasound system from wall or objects
14. GE Cabinet for Software and Manuals

Figure 2-1. Minimal floor plan, 2.5 m x 3 m (8 by 10 foot)

Recommended floor plan suggestion

CSI 14x17

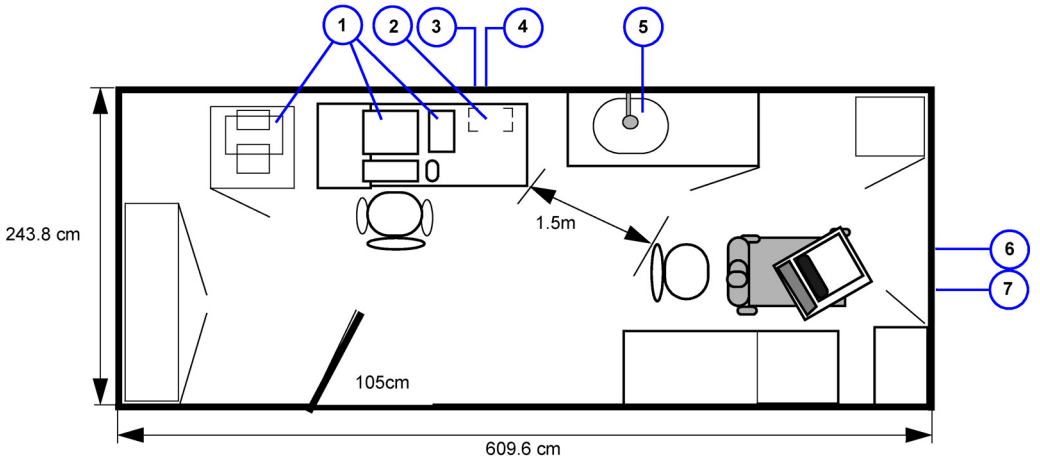


Scale: Each square equals one square foot (app. 31 x 31 cm)

1. Secretaries or Doctors Desk
2. File Cabinet
3. Film Viewer
4. Counter Top
5. Counter Top and Sink with hot and cold water
6. Overhead Lights Dimmer - Dual Level Lighting (bright and dim)
7. Emergency Oxygen
8. Suction Line
9. Ultrasound system
10. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
11. Network Interface
12. 457 mm (18 inches) distance of Ultrasound system from wall or objects
13. Stool
14. Footswitch
15. Storage for Linens and Equipment
16. Examination Table – 1930 x 610 mm (76 x 24 inches)
17. Lavatory and Dressing Room
18. Door – at least 762 mm (30 inches)

Figure 2-2. A 14 by 17 foot recommended floor plan

Suggested floor plan, Ultrasound system, and EchoPAC PC in same room



1. EchoPAC PC workstation parts
2. UPS
3. Ethernet network wall outlet
4. 3x mains power outlets
5. Hot and Cold water
6. Dedicated mains power outlet
7. Ethernet network wall outlet

Figure 2-3. Suggested Room with EchoPAC PC workstation and Ultrasound Scanner

Networking setup requirements

Stand alone Ultrasound system (without network connection)

None.

Scanner connected to hospital's network

Supported networks:

10/100 Mbit Ethernet/DICOM network (option)

InSite requirements

InSite requires an Ethernet connection via:

- 10/100 Mbit Interface

Purpose of the DICOM network function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network.

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 Ultrasound system to work with other network connections, the site's network administrator must provide information to complete the form "Worksheet for DICOM Network Information". Ensure that there are no spaces in any field of the form.

See:

Entries must include:

- A host name, local port number, AE Title, IP address and Net Mask for the Ultrasound system.
- 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 Ultrasound system 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 error solving.

DICOM option setup requirements (continued)

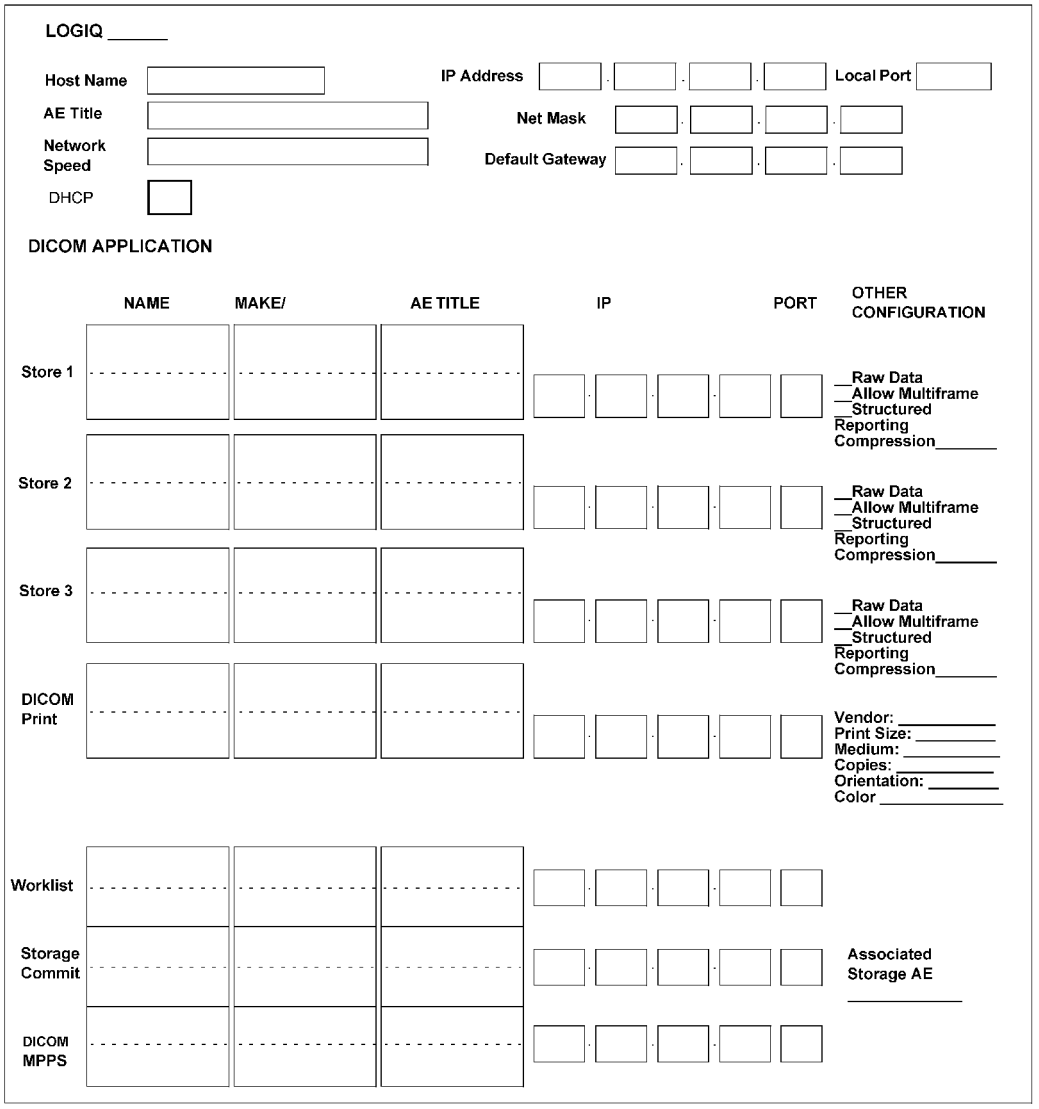


Figure 2-4. Worksheet for DICOM Network Information

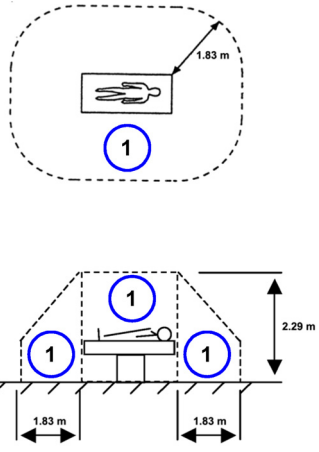
Environmental Dangers

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 UL60601-1 and IEC60601-1 / IEC60601-1-1 standards for electrical leakage.

Patient Vicinity UL60601-1 (USA)

2.12.20DV (UL60601-1:2003)

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



1. Patient environment

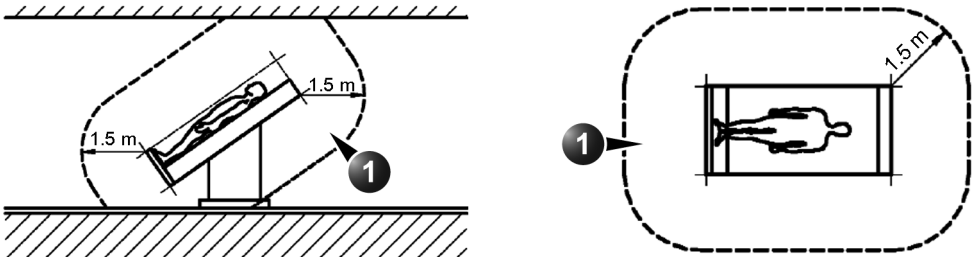
Patient Environment IEC60601-1 and ANSI AAMI ES60601-1

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

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

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

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



1. Patient environment

Figure 2-5. Patient environment

Chapter 3

System Setup

This chapter contains information needed to install LOGIQ C9 Series system.

Included is a procedure that describes how to receive and unpack the equipment and how to file a damage or loss claim.

How to prepare the facility and unit of the actual installation, and how to check and test the unit, probes, and external peripherals for electrical safety are also included in this procedure.

Overview

Contents in this chapter

- 'Overview' on *page 3-2*
- 'Setup reminders' on *page 3-3*
- 'Receiving and unpacking the equipment' on *page 3-6*
- 'Preparing for setup' on *page 3-18*
- 'Completing the setup' on *page 3-19*
- 'System Configuration' on *page 3-22*
- 'Peripherals Installation Instructions' on *page 3-26*
- 'Connectivity setup' on *page 3-34*
- 'Paperwork after setup' on *page 3-40*

Setup reminders

Average setup time

- Unpacking the LOGIQ C9 Series: 30 minutes
- Set up LOGIQ C9 Series wo/options: 30 minutes
- DICOM Network Configuration: 30 minutes or more, depending on the configuration
- Install Insite: 0.5 hour

The LOGIQ C9 Series installation and functional checkout will take approximately 1 hour. LOGIQ C9 Series consoles with optional equipment may take slightly longer.

Setup warnings

WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DON'T TOUCH THE ULTRASOUND SYSTEM!

To prevent electrical shock, connect the unit to a properly grounded power outlet. **DO NOT** use a three to two prong adapter. This defeats safety grounding.

DO NOT wear the ESD wrist strap when you work on live circuits and more than 30 V peak is present.

DO NOT operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.

Setup warnings (continued)

1. There are no operator serviceable components. To prevent shock, do not remove any covers or panels. Should problems or malfunctions occur, unplug the power cord. Only qualified service personnel should carry out servicing.

NOTE: *For information regarding packing labels, refer to LABELS ON PACKAGE.*

2. After being transported, the unit may be very cold or hot. If this is the case, allow the unit to acclimate before you turn it on. It requires one hour for each 2.5°C increment it's temperature is below 10°C or above 40°C.

Equipment damage possibility. Turning the system on without acclimation after arriving at site may cause the system to be damaged.

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.

The following table describes guidelines for reaching operational temperatures from storage or transport temperatures.

Table 3-1: System Acclimation Time Chart

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

Setup warnings (continued)

CAUTION

Operator Manual(s)

The User Manual(s) should be fully read and understood before operating the LOGIQ C9 Series and kept near the Ultrasound system for quick reference.

CAUTION

Acoustic Output Hazard

Although the ultrasound energy transmitted from the LOGIQ C9 Series probe is within AIUM/NEMA standards, avoid unnecessary exposure. ultrasound energy can produce heat and mechanical damage.

Receiving and unpacking the equipment

Purpose of this section

This section describes how to receive and unpack LOGIQ C9 Series.

Contents in this section

- 'Warnings for receiving and unpacking' on *page 3-6*
- 'The Tilt indicator' on *page 3-7*
- 'Receiving the LOGIQ C9 Series' on *page 3-7*
- 'Unpacking the LOGIQ C9 Series' on *page 3-12*

Warnings for receiving and unpacking

GENERIC CRT VERSION

Two people are needed to unpack the Ultrasound system because of its weight. Attempts to move the Ultrasound system considerable distances or on an incline by one person could result in injury or damage or both.

Two people are required whenever a part weighing 16 KG (35 LBS) or more must be lifted.

Remember to use relevant personal protecting equipment (PPE) during packing and unpacking. Check with your local EHS representative.

The Tilt indicator

Overview

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

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

Table 3-2: Tilt Watch

Description	Illustration
Tilt Watch	

Receiving the LOGIQ C9 Series

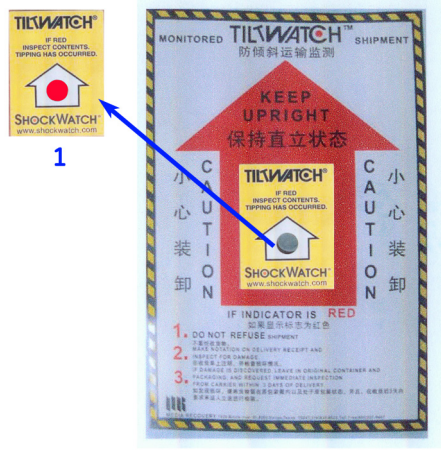
Overview

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

Examine all packages

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

Table 3-3: Examine all packages

Step	Task	Illustrations
1.	Is damage apparent? • If **YES**; continue with the instructions in 'Damage in transportation' on *page 3-11*. • If **NO**; continue with the next step.	
2.	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 3-11* before you continue with the next step. • If **NO**: continue with the next step.	 1 - Red Color
3.	Continue with the instructions in 'Unpacking the LOGIQ C9 Series' on *page 3-12*.	

Position of the Tilt indicator

The Tilt indicator has been attached to the transportation box as illustrated in the figure below.

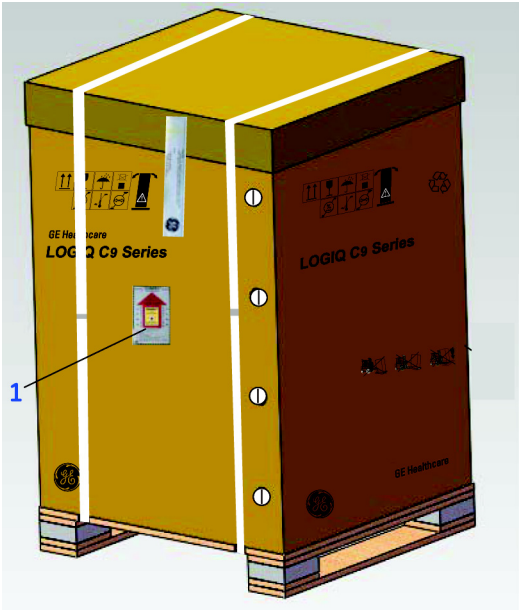


Figure 3-1. Tilt indicator

1. Tilt Indicator

NOTE: Before cutting the straps, check Tilt Tags to make sure it has not been triggered. If damaged, report it to the carrier. If not, then cut the straps around the crate.

If Tilt Indicator has triggered or is missing

The purpose of the tilt 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 indicator label, there is high degree of certainty it tipped 89 degrees or more from horizontal during shipment.

An activated tilt 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 indicator labels will help identify if a Tip Over impact shock occurred.

Table 3-4: Tilt 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 triggered:** Note on the shipping papers at the time of receipt that the Tilt Indicator label was activated.
2.	Inspect the product for possible concealed damage.

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 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.

LOGIQ C9 Series transportation box label

The LOGIQ C9 Series transportation box label is located at the front of the transportation box.

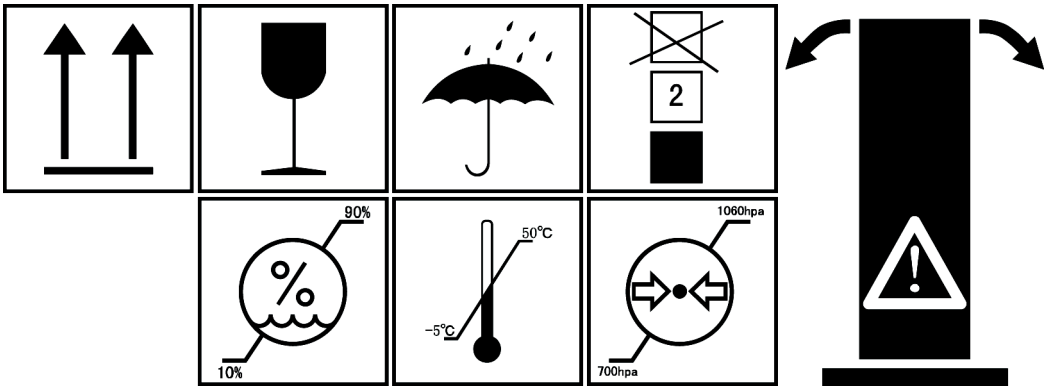


Figure 3-2. LOGIQ C9 Series transportation box label 1

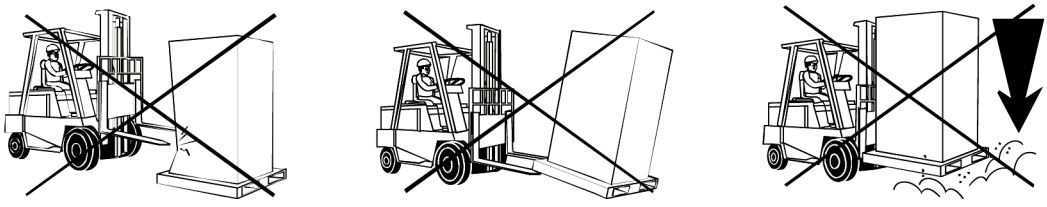


Figure 3-3. LOGIQ C9 Series transportation box label 2

Unpacking the LOGIQ C9 Series

When a new system arrives, check that any components are not damaged and are not in short supply. If shipping damage or shortage occurs, contact the address shown in Chapter 1.

CAUTION

Please carefully unpack the system, and do not dispose the package of LOGIQ C9 Series, so that it can be reused for service.

Table 3-5: Unpacking the LOGIQ C9 Series

Step	Description	Corresponding Graphic
1	Tear the stop open mark.	
2	Cut the two packing straps around the crate. *Note: To avoid injury, with one hand holding the strap clasp when cutting the strap.*	

Table 3-5: Unpacking the LOGIQ C9 Series

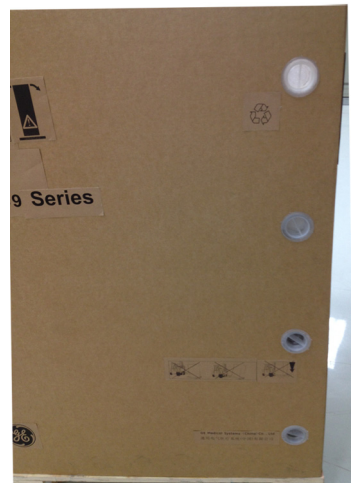
Step	Description	Corresponding Graphic
3	Remove the top cover.	
4	Open the four plastic locks. *Note: Rotate the inside plastic lock counterclockwise to remove it and then remove the outside lock.*	

Table 3-5: Unpacking the LOGIQ C9 Series

Step	Description	Corresponding Graphic
5	Remove the outside shipping box.	
6	Remove the dust bag from the unit and remove the foam in the front of the control panel.	

Table 3-5: Unpacking the LOGIQ C9 Series

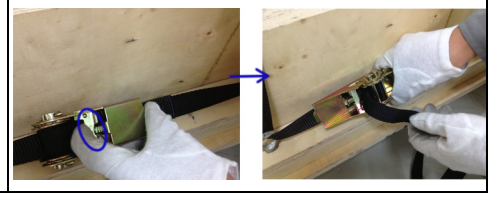
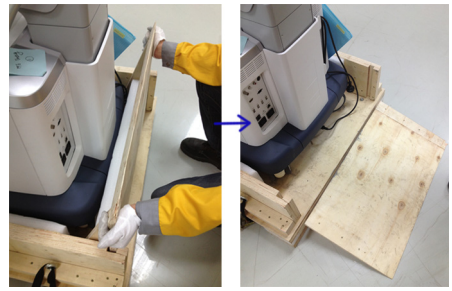
Step	Description	Corresponding Graphic
7	Remove the clear plastic (wrapped around the LOGIQ C9 Series) from the unit. *Note: To avoid damaging the unit, please use a pair of scissors instead of the knife.*	
8	Remove the foams between the LCD and control panel.	
9	Loosen the tie-down strap. Push the brass piece to pull back handle, then loosen the strap.	

Table 3-5: Unpacking the LOGIQ C9 Series

Step	Description	Corresponding Graphic
10	Remove the wooden ramp and attach it to the Pallet base on the rear side of the LOGIQ C9 Series.	
11	Pull the LOGIQ C9 Series down the Pallet base ramp. *Note: Remember to pull the* LOGIQ C9 Series *from the back for safer transportation.*	
12	Remove all the covers and foams from the unit.	
13	Place all of the filling inside the Transportation Box. Close the box, and store the filling for possible future use.	

Moving into Position

Please refer to User Manual on how to move the system.

Packing the Equipment

Please pack LOGIQ C9 Series in the reverse order of unpacking.

Packing materials - recycling information

The packing materials for LOGIQ C9 Series are recyclable:

- The Transportation Box is made of spruce or similar material. (“PHYTOSANITARY CERTIFICATE” included in all shipments to The People's Republic of China.)
- Lever lockings (hinges) are made of zinc plated steel.
- The inner reinforcements are made of Ethafoam (Polyethylene foam).
- The plastic foil is made of LDPE (Low Density Polyethylene).

Preparing for setup

Verify customer order

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

Physical inspection

Verify that the system arrived intact (visual inspection).

If the system has been damaged, please refer to ‘Damage in transportation’ on *page i-12* in the beginning of this manual.

EMI protection

The LOGIQ C9 Series 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 system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

See ‘EMI limitations’ on *page 2-9* for more information about EMI protection.

Completing the setup

Purpose of this section

This section describes how to complete the installation of LOGIQ C9 Series.

Contents in this section

- 'System specifications' on *page 3-19*
- 'Electrical specifications' on *page 3-20*
- 'Connections on the I/O Rear Panel' on *page 3-21*
- 'Connecting probes' on *page 3-21*
- 'Powering the system' on *page 3-21*

System specifications

System requirements verification

- Verify that the site meets the requirements listed in Chapter 2.

  (See: 'Facility needs' on *page 2-12*.)
- Verify that the specifications below don't conflict with any on-site conditions.

Physical dimensions

Table 3-6: Physical dimensions of LOGIQ C9 Series

Height	Width	Depth	Depth
1250	700	900	mm
49.12	27.56	35.43	Inches

Console Weight

- Weight: approx. 130 kg (287 lbs)

Electrical specifications

Connecting a LOGIQ C9 Series to the wrong voltage level will most likely destroy it.

Verification of the system's voltage setting

Verify that the mains voltage specified for the LOGIQ C9 Series is available on-site.

The voltage setting for the unit is found on a label near the Mains Power Circuit Breaker on the rear of the system.

Refer to the latest revision User Manual for a fill list of product labels.

Electrical specifications for LOGIQ C9 Series

In the table below, the electrical specifications for LOGIQ C9 Series includes monitor and on board peripherals.

Table 3-7: Electrical specifications for LOGIQ C9 Series

Part Number	Description	Voltage	Tolerances	Power consumntion	Frequency
5489329	LOGIQ C9 Premium for China	220-240V	±10%	Max.950VA	50/60 Hz
5489330	LOGIQ C9 Expert for China (with 4D)	220-240V	±10%	Max.950VA	50/60 Hz
5489331	LOGIQ C9 Expert for China	220-240V	±10%	Max.950VA	50/60 Hz
5489332	LOGIQ C9 Expert for India	220-240V	±10%	Max.950VA	50/60 Hz

Connections on the I/O Rear Panel

NOTE: Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC60950 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC60601-1. Everybody who connects additional equipment to the signal input part or signal output part of LOGIQ C9 Series, configures a medical system, and is therefore responsible that the Ultrasound system complies with the requirements of the valid version of IEC60601-1. If in doubt, consult the technical service department or your local representative for GE Healthcare.

Connect Ethernet

Connect the network cable to the Ethernet connector on the I/O Rear Panel.

The connector is located on the rear side of LOGIQ C9 Series.

Connect USB Flash Drive

NOTE: USB Flash Drive approved for LOGIQ C9 Series are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Drive will compromise this verification, and may cause interference on LOGIQ C9 Series itself, or on other electronic devices.

For approved models, please refer to Chapter 9.

Insert the USB Flash Drive in one of the USB ports on the LOGIQ C9 Series.

Connecting probes

Please refer to User Manual on how to connect/disconnect a probe.

Powering the system

Please refer to User Manual on how to power the system.

System Configuration

Purpose of this section

This section describes how to configure the LOGIQ C9 Series.

Contents in this section

LOGIQ C9 Series configuration

For complete instructions, refer to the lastest revision of the LOGIQ C9 Series Basic User Manual, Chapter 16.

Information includes Entering Location, Adjusting Date and Time, Selecting User interface Language, Selecting Online Manual Language, Slelecting Unites of Measure.

Peripherals Installation

Overview

This section describes how to install and configure the peripherals validated for the LOGIQ C9 Series.

For LOGIQ C9 Series peripheral list, please refer to ‘Peripheral’ on *page 9-5* .

About the operation check-out of peripherals, See ‘Peripheral checks’ on *page 4-25 for more information.*

Furnished materials

This section describes the materials furnished with the Peripherals and with the system.

Retain the original carton and packing materials in case transport is needed in the future.

- B/W USB Printer

Table 3-8: Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	Sony UP-D897 MD Printer	1	
2	Paper Roll	1	
3	USB cable	1	

- Color USB Printer

Table 3-9: Materials furnished with Color USB Printer

Item	Description	Quantity	Note
1	Sony UP-D25MD Printer	1	
2	Paper Roll	1	
3	AC Power Cord (local purchase)	1	
4	USB cable	1	

- Digital Printer

Table 3-10: Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	HP Officejet 100 Printer	1	
2	Paper Roll	1	
3	USB cable	1	

- USB Stick

Table 3-11: Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	SanDisk USB Stick	1	
2	Paper Roll	1	
3	USB cable	1	

Furnished materials (continued)

- USB 2.0 HDD

Table 3-12: Materials furnished with the USB 2.0 HDD

Item	Description	Quantity	Note
1	USB 2.0 HDD	1	
2	USB Cable	1	

- 1 Pedal Footswitch

Table 3-13: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	Footswitch	1	

- 3 Pedal Footswitch

Table 3-14: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	Footswitch	1	

Peripherals Installation Instructions

Sony UP-D897MD Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack B/W Printer.

Installation Procedure

NOTE: The printer driver is customized for the LOGIQ C9 Series at the factory; you do not need to change the settings.

1. Place the device in a suitable place.
2. Connect power cord and USB Cable on the Printer.
3. Connect the power cord with the AC output on the rear panel of LOGIQ C9 Series, then turn on the printer.
4. Connect the printer to the USB port.

Figure 3-4. Connect UP-D897MD to LOGIQ C9 Series

Installation Procedure (continued)

5. Select ***Utility***--> ***Connectivity***--> ***Service***. Select or add the *Standard Print* service.

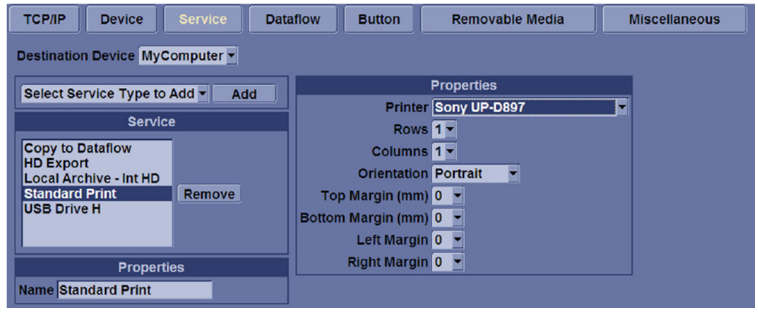


Figure 3-5. Connectivity -> Service Screen

6. Select the printer from the Printer pull-down Properties menu.

NOTE: After selecting the printer, the field turns white.

7. Set the following parameters in Properties:
   - *Rows*=3
   - *Columns*=2
   - *Orientation*=Portrait
   - *Right Margin (mm)*=10
8. Type the printer name in the *Name* field.

NOTE: This name is used on the Button screen.

9. Press ***Save***, then select the Button tab.
10. Select the appropriate print key (Print1 or Print2) from the Physical Print Buttons section.
11. Select the printer from the MyComputer column and press ">>" to move it to the Printflow View column.

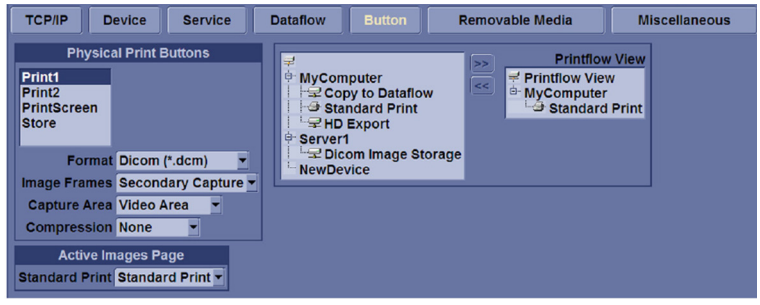


Figure 3-6. Connectivity -> Button Screen

Installation Procedure (continued)

12. If you want to assign this printer to the Standard Print Button on the Active Image Screen, select this printer at the Active Image Printer section.
13. Press ***Save***.

Sony UP-D25MD Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the Sony UP-D25MD Printer.

Installation Procedure

1. Place the device in a suitable place.
2. Connect power cord and USB Cable on the Printer.
3. Connect the power cord with the AC output on the rear panel of LOGIQ C9 Series, then turn on the printer.
4. Connect USB cable to LOGIQ C9 Series USB port.

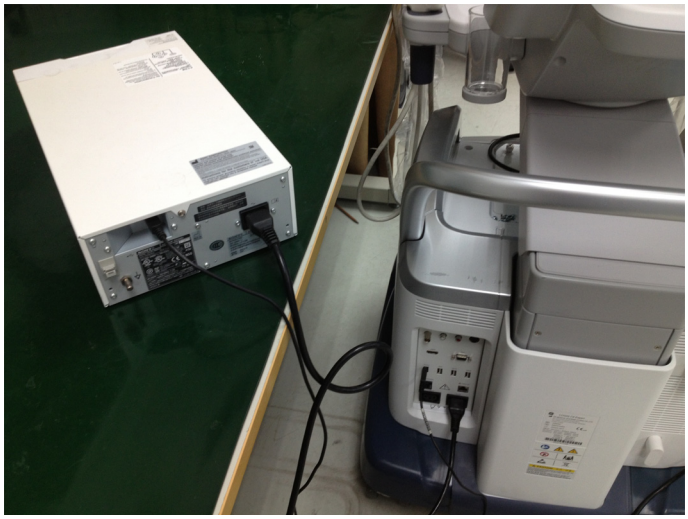


Figure 3-7. Color Printer connection

Footswitch Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the Footswitch.
2. Ensure no physical damage.

Installation Procedure

1. Connect the Footswitch to the USB port on the LOGIQ C9 Series system.

Figure 3-8. Connect Footswitch to the system

Footswitch Installation (continued)

Configuring Footswitch

Footswitch supports these configurations: No Function, Rec/ Pause, Freeze, Next Heartcycle, Prev Heartcycle, Print 1, Print 2, Update, Next Step (Scan Assistant), Previous Step (Scan Assistant), Scan Assistant Pause/Resume or Mark Cine. The default setting is No Function.

Enter **Utility -> Application -> Settings** to configure the Footswitch functions.

Figure 3-9. Configuring Footswitch Functions

USB2.0 HDD Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the USB2.0 HDD.
2. Ensure no physical damage.

Installation Procedure

1. Connect the USB2.0 HDD to the USB port on the LOGIQ C9 Series system.

Figure 3-10. Connect HDD to the system

ECG Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the ECG.
2. Ensure no physical damage.

Installation Procedure

1. Connect the ECG to the USB port on the LOGIQ C9 Series system.

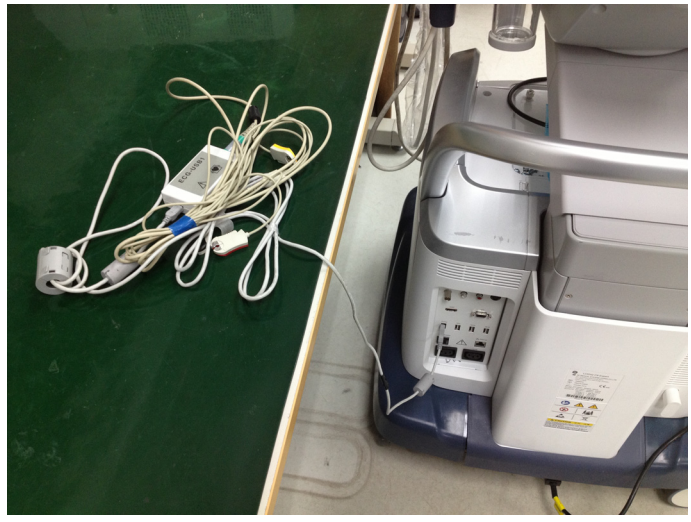
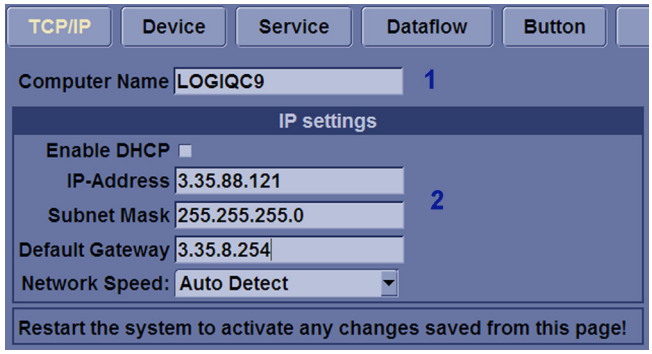


Figure 3-11. Connect ECG to the system

Connectivity setup

Setup the LOGIQ C9 Series for DICOM Communications

Table 3-15: Utility ->Connectivity ->TCP/IP screen



1	Enter the LOGIQ C9 Series computer name. This may be the same as the station name.
2	Enter the LOGIQ C9 Series IP address, subnet mask, default gateway and network speed. For automatic assignment of IP address, subnet mask and default gateway, select **DHCP**. *Note: If possible, set the* LOGIQ C9 Series *netwoek Speed to match that of the Network switch. if in doubt, set it to AutoDetect. Otherwise, transfer times can be two or five times longer, during which the* LOGIQ C9 Series *will appear to be locked up. (If the Hard Drive activity light on the front of the console is lit steady or blinks quickly, the* LOGIQ C9 Series *is most likely not hung.)*

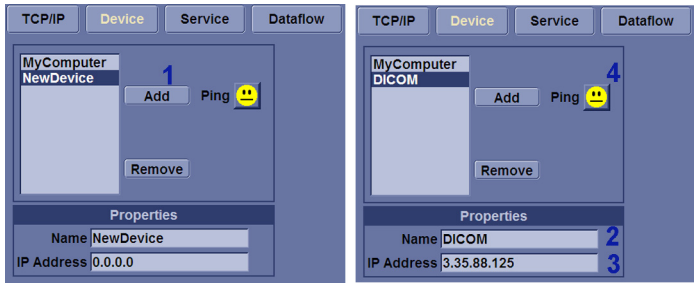
Setup the LOGIQ C9 Series for DICOM Communications (continued)

Table 3-16: Utility ->Connectivity ->Device screen

1	Select **MyComputer**.
2	Assign an AE title to the LOGIQ C9 Series. (AE stands for Application Entity. DICOM services use this to identify the LOGIQ C9 Series.) AE title is case-sensitive. This title may containn the Computer Name from the TCP/IP page, if desired. *Note: It is NOT recommended to use the factory default. This is not prohibited, but more than one system with the same AE title can cause confusion.*
3	Edit Port Number if needed. **104** is typical. Save your changes and reboot the system.

How to get the LOGIQ C9 Series to recognize another Device on the Network

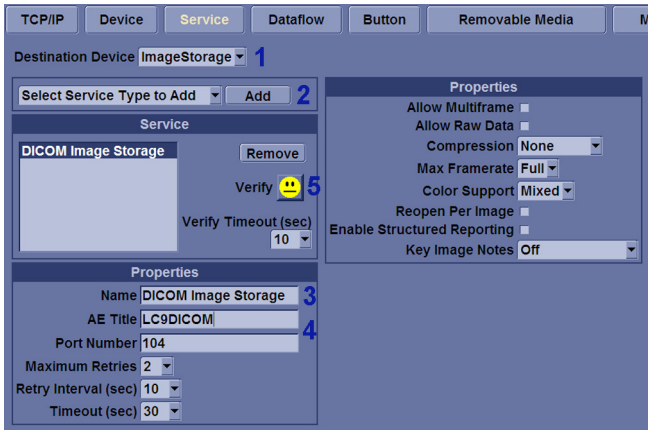
Table 3-17: Utility ->Connectivity ->Device screen

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td>1</td><td>Select Add. The system creates a device called “NewDevice”.</td></tr>
<tr><td>2</td><td>Change the name to one of your choosing.</td></tr>
<tr><td>3</td><td>Enter the IP address of the device.</td></tr>
<tr><td colspan="2"> </td></tr>
<tr><td>4</td><td>Save your changes and then press Ping. A “Smiley Face” indicates successful communication between your LOGIQ C9 Series and the device. A “Frown” indicates failed communication. Check the following:
• Is the device running?
• Is it connected to the network?
• Did you enter the right IP address?</td></tr>
</table>

How to Setup and Use a DICOM Image Storage Service

An Image Storage Service provides a place to store patient and exam data from LOGIQ C9 Series and corresponding images. The Image Storage Service, or the device that hosts it, is often called a Patient Archiving and Communication System (PACS).

Table 3-18: Setup an Image Storage Service



1	In **Utility -> Connectivity -> Service**, from the Destination Device drop-down menu, select the device on which the service resides. (This assumes you have already setup the device in the Device tab in 'How to Setup and Use a DICOM Image Storage Service' on *page 3-37* .
2	From the *Slect Service Type to add* drop-down menu, select **DICOM Image Storage** and press **Add**.
3	Change the name of the service to one of your choosing.
4	Enter the AE Title and port Number of the service. AE Title is case-sensitive.
4	Save your changes and then press **Verify**. A "Smiley Face" indicates successful communication with the service. Note: If you get a successful Ping (Smiley Face) at the device level but not at the service level, it is possible that the AE Ttitle or Port Number of the service settings are incorrect. Ensure that these are correct then re-verify. Be sure that the service type (Store, Print, etc) is correct and supported by the device.

Option Setup

Software Option Installation Procedure

NOTE: Not all features described in this section may be available or cleared for sale in all markets. Please contact with your local GE Ultrasound representative to get the latest information.

1. Power on the system.

NOTE: Keep the power cord connection during the installation.

2. After the power-up sequence is complete, select **Utility** on the touch panel, and then select **Admin** in the **Utility** menu.

WARNING

For software Option Installation, the operator must login as Administrator.

3. In **System Admin** tab, etner the new option keys, then select **Add**.

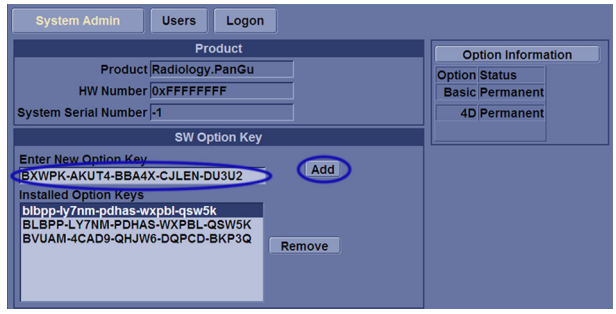


Figure 3-12. Input Option Key

Software Option Installation Procedure (continued)

4. Select **OK** to restart the system.

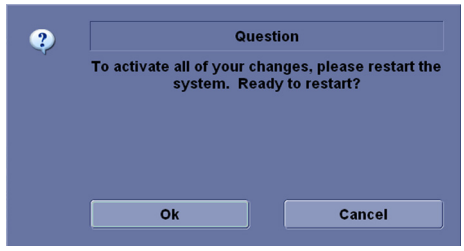


Figure 3-13. Dialog Window

NOTE: There is no need to restart the system after each installation, if several option keys are installed at one time. Select Cancel for the first several times, and select OK after the last installation to activate all the changes.

5. After the system is powered on, check the option status.

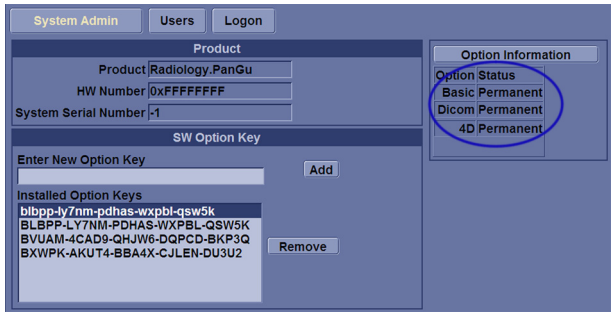


Figure 3-14. Check Option Status

The option status explanation:

- Permanent: This option is enabled in the system.

6. Exit **Utility** and check the function of the option installed.

Paperwork after setup

NOTE: During and after setup, the documentation (i.e. CDs with documentation, User Manuals, Installation Manuals, etc.) for the LOGIQ C9 Series and the peripherals must be kept as part of the original Ultrasound system documentation. This ensures that all relevant safety and user information is available during the operation and service of the complete Ultrasound system.

Contents in this Section

- 'User's Manual(s)' on *page 3-40*
- 'Product Locator Installation Card' on *page 3-41*

User's Manual(s)

User Check that the correct User Manual(s) for the system and software revision, is included with the installation. Specific language versions of the User Manual may also be available. Check with your GE Sales Representative for availability.

Product Locator Installation Card

NOTE: The Product Locator Installation Card shown may not be the same as the provided Product Locator card.

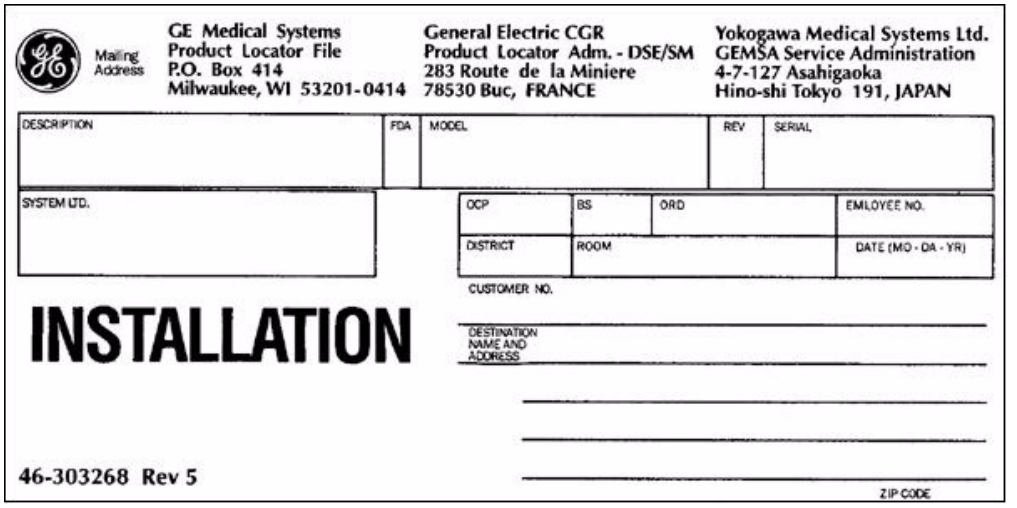


Figure 3-15. Product Locator Installation Card (Example)

Chapter 4

General Procedures and Functional Checks

This chapter provides procedures for quickly checking major functions of the LOGIQ C9 Series and diagnostics instructions using the built-in service software.

Overview

Purpose of this chapter

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

Contents in this chapter

- 'Overview' on *page 4-2*
- 'General procedures' on *page 4-3*
- 'Functional checks' on *page 4-21*
- 'Power supply test & adjustments' on *page 4-26*

Special Equipment required

To perform these tests, you'll need any of the sector, linear, or convex probes. (Normally you should check all the probes used on the system).

General procedures

C CAUTION

Ultrasound system requires all covers.

Operate this Ultrasound system only when all board covers and frame panels are securely in place. The covers are required for safe operation, good Ultrasound system performance and cooling purposes.

W WARNING

Energy Control and Power Lockout for LOGIQ C9 Series.

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 Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for 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.

Overview

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

Contents in this section

- ‘Power ON/Boot Up’ on *page 4-5*
- ‘Power off’ on *page 4-8*
- ‘LCD Monitor position adjustment’ on *page 4-10*
- ‘Logging on to LOGIQ C9 Series as “ADM”’ on *page 4-10*
- ‘Service Key (Dongle, HASP)’ on *page 4-11*
- ‘Exit to Windows Desktop from the LOGIQ C9 Series application software’ on *page 4-13*
- ‘Removable media’ on *page 4-15*
- ‘Archiving and loading presets’ on *page 4-16*
- ‘Download/Upload of System Presets via InSite ExC’ on *page 4-17*
- ‘Data Management’ on *page 4-17*
- ‘Backup’ on *page 4-17*
- ‘Installation and Setup Procedure for Peripherals’ on *page 4-17*
- ‘Moving and transporting the LOGIQ C9 Series’ on *page 4-17*
- ‘Recording important settings and parameters’ on *page 4-17*
- ‘Cleaning the Tracball’ on *page 4-19*

Power ON/Boot Up

Warnings

DANGER

ALWAYS CONNECT THE ULTRASOUND SYSTEM TO A FIXED POWER SOCKET WHICH HAS THE PROTECTIVE GROUNDING CONNECTOR.

DANGER

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

DANGER

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

CAUTION

Ultrasound system requires all covers.

Operate this Ultrasound system only when all board covers and frame panels are securely in place. The covers are required for safe operation, good Ultrasound system performance and cooling purposes.

CAUTION

Use only power supply cords, cables and plugs provided by or designated by GE Healthcare.

NOTE: Do not cycle the Circuit Breaker ON-OFF-ON in less than five (5) seconds. When turning OFF the Circuit Breaker, the Ultrasound system should de-energize completely before turning the circuit breaker ON.

Connect AC (mains) Power to LOGIQ C9 Series

Connecting AC/DC to the LOGIQ C9 Series ultrasound unit, involves preliminary checks of the power cord, voltage level and compliance with electrical safety requirements.

1. Ensure that the wall outlet is of appropriate type, and that the Circuit Breaker is turned off.
2. Uncoil the power cable, allowing sufficient slack so that the unit can be moved slightly.
3. Verify that the power cable is without any visible scratches or any sign of damage.
4. Verify that the on-site mains voltage is within the limits indicated on the rating label near the Circuit Breaker on the rear of the unit.
5. Connect the Power Cable's female plug to the Power Inlet at the rear of the unit.
6. Lock the plug in position with the Retaining Clamp (ACC Clamp).
7. Verify that the Mains Power Circuit Breaker is in OFF position, if not, switch it OFF.
8. Connect the Power Cable's other end (male plug) to a hospital grade mains power outlet with the proper rated voltage, and the unit is ready for Power ON/Boot Up.

Switch ON the AC Power to LOGIQ C9 Series

1. Switch ON the Mains Power Circuit Breaker at the rear of the unit.

   You should hear a “click” from the relays in the AC Power and the unit is ready to boot.
2. Press once on the **On/Off** key on the Operator Panel to boot the unit.

   During a normal boot, you may observe that:

   a. The unit’s ventilation fan starts on full speed, but slows down after a few seconds (listen to the fan sound).

   b. Power is distributed to the peripherals, Operator Panel (Console), Monitor, Front End Processor and Back End Processor.

   c. Back End Processor and rest of scanner starts with the sequence listed in the next steps:

   d. Back End Processor is turned ON and starts to load the software.

   e. The Start Screen is displayed on the monitor.

   f. A start-up bar indicating the time used for software loading, is displayed on the monitor.

   g. The software initiates and sets up the Front End electronics and the rest of the instrument.

   h. The backlight in the keyboard is lit.

   i. 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 typical one and a half minutes or less. If starting after a power loss or a lock-up, the start-up time may be up to four minutes.*

Power off

When you switch off the unit, the system performs an automatic shutdown sequence.

The SYSTEM - EXIT menu, used when switching off the unit, gives you these choices:

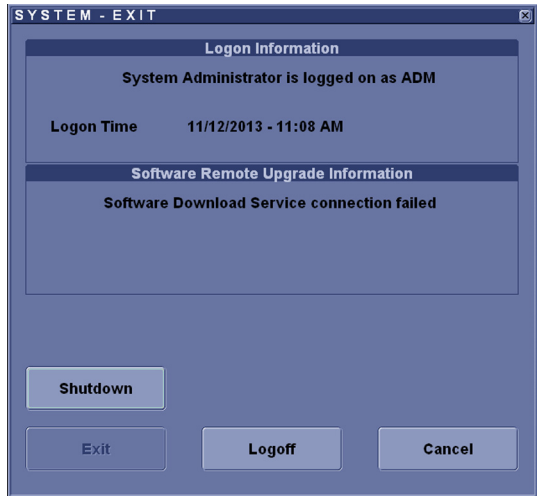


Figure 4-1. System Exit Window

- **Logoff**

  Use this button to log off the current user.

  The system remains ON and ready for a new user to log on.

  If the Logoff button is dimmed, it indicates that no user is logged on to the unit at the moment.

- **Shutdown**

  Use this button to shut down the system. The entire system will shut down. It is recommended to perform a full shutdown at least once a week.

  If the Shutdown button is dimmed, use the key-combination <Ctrl+Alt+Delete> to shut down the unit.

Power off (continued)

- **Cancel**

  Use this button to exit from the System-Exit menu and return to the previous operation.

- **Exit**

  (Only available when logged in as GE Service with Service Dongle)

  Select this button when you want to exit to the Windows Desktop.

NOTE: *If you need to restart LOGIQ C9 Series when logged on to the Windows Desktop, ensure that you do a complete power down (Shut Down). This is required to power up the Front End Processor.*

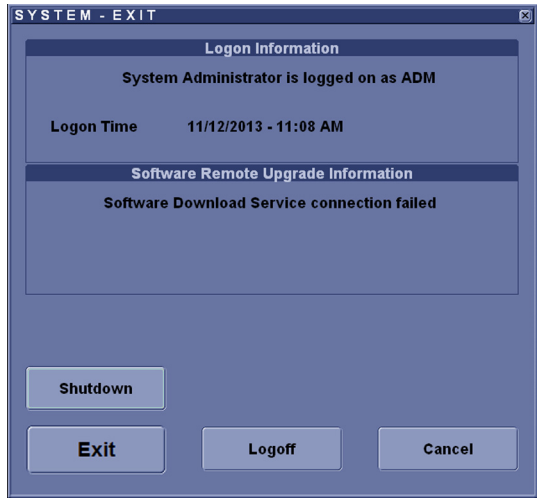


Figure 4-2. System - Exit menu (when logged in using Service Dongle)

System shutdown

Disconnect the Mains Power Cable is necessary. *For example:* Relocating the scanner.

CAUTION

DO NOT unplug and/or transport the unit until after the power off sequence has been completed. Failure to do so may result in corrupted patient files.

LCD Monitor position adjustment

Refer to User Manual for LCD Monitor position adjustment.

Logging on to LOGIQ C9 Series as “ADM”

Select **Utility** tab on the touch screen, then select **Config**.

It will bring up the **Operator Login** dialog where you must log on.

Figure 4-3. Operator Login Window

1. **Operator**: Select the operator.
2. **Password**: Enter Operator’s password (optional).
3. Select the type of Login or Cancel.
   - **OK**: Standard login.
   - **Cancel**: Cancel login.

As default, two users are defined, USR and ADM.

- USR

If you log on as **USR,** you will have access to do set-up tasks that a user may need to do during daily use.

As default, no password has been set for **USR**. Just type the name **USR**, and select **Login**.

- ADM

If you log on as **ADM**, you will have access to do general set-up, service adjustments, adjust network and connectivity settings.

As default, the password for **ADM** is **ulsadm** .

Select the name **ADM**, the password (**ulsadm**) and select **Login**.

It is possible for the administrator (*ADM*) to establish new users and set unique passwords for each user, including a new password for ADM. If the login as ADM fails, contact the responsible person in the hospital to get access.

Service Key (Dongle, HASP)

A Service Dongle and a proprietary GE Service password are necessary for use by GE Service when performing proprietary level diagnostics like accessing the desktop on the BEP. The password used with the GE service dongle changes at specific intervals.

1. Power down the unit, See ‘System shutdown’ on *page 4-9 for more information.*
2. Attach your GE Service Dongle to any accessible USB ports. LOGIQ C9 Series has several USB ports to choose between. There are USB ports besides the touch screen and on the front and rear panel of the system.
3. Power ON the unit. If a Service Dongle is plugged in, a Maintenance Access dialog will be displayed on the screen.

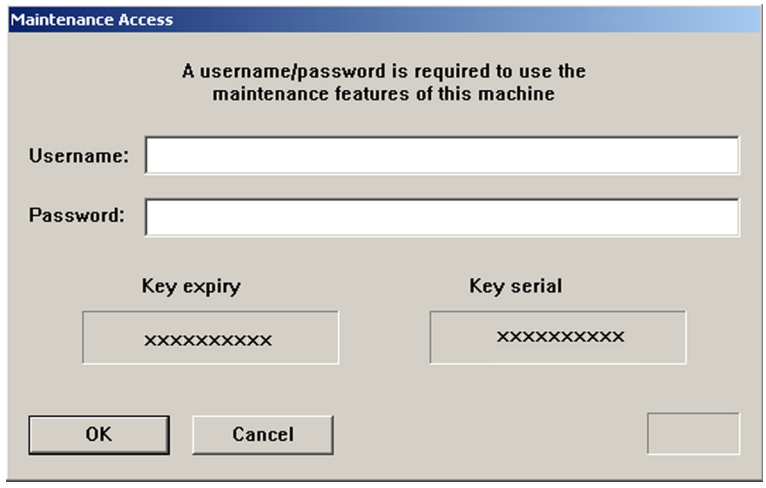


Figure 4-4. Maintenace Access dialog

4. Leace the **Username** field empty.
5. Type the current GE Service Password in the password field.

NOTE: *READ THIS NOTE BEFORE YOU CONTINUE: After you have selected OK, the Start Application dialog will be displayed on screen. Be ready to select **MAINTENANCE...** before the Time Bar is “full”, or the application software will be started. A description on how to recover, if you fail to select **MAINTENANCE... is included, but you will spend some extra time doing it.***

Service Key (Dongle, HASP) (continued)

6. Select **OK** in the Maintenance Access dialog to verify the password. The Start Application dialog will be displayed.

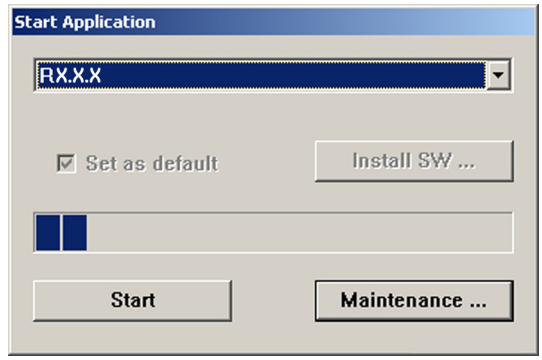


Figure 4-5. Start Application dialog

NOTE: Install SW button is only enabled if there is an Application software disk in the DVD drive.

7. Select **MAINTENANCE...** to enter maintenance mode. This will bring up the Maintenance dialog.
8. Select **Exit to Windows**. This will display the Windows Desktop on the screen.

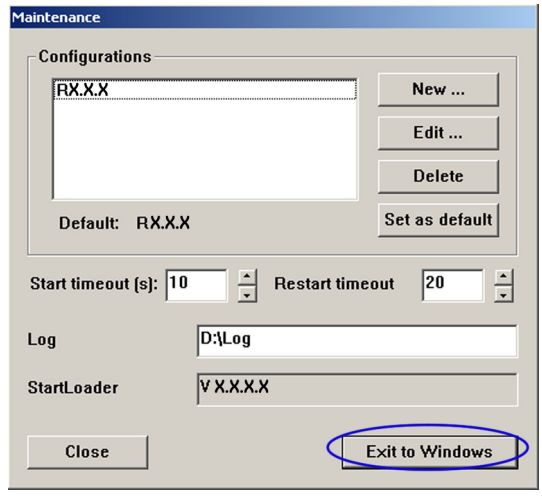


Figure 4-6. Maintenance dialog

Exit to Windows Desktop from the LOGIQ C9 Series application software

Follow these steps if you want to exit to the Windows Desktop when the application software is running. The Service Dongle must be plugged in, if not, See ‘Service Key (Dongle, HASP)’ on *page 4-11 for more information.*

1. On the alphanumeric keyboard, press **Ctrl+Alt+Delete** and then select **Task Management**.

Figure 4-7. Task Management

2. Select **EchoLoader.exe** in the Processes list, and then select **End Process**.

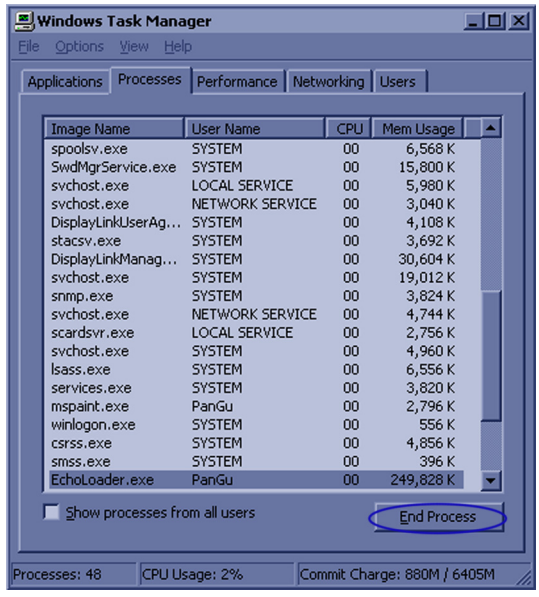


Figure 4-8. Processes List

Exit to Windows Desktop from the LOGIQ C9 Series application software (continued)

3. Select **Yes** to continue.

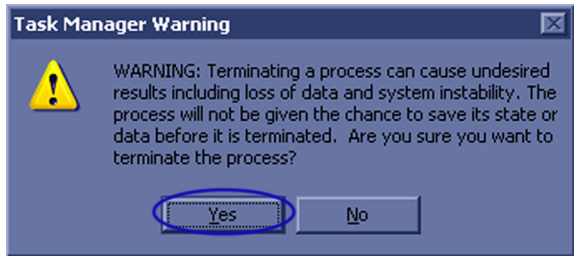


Figure 4-9. Warning Message

4. Be ready to select **Maintenance** before the Time Bar is "full".

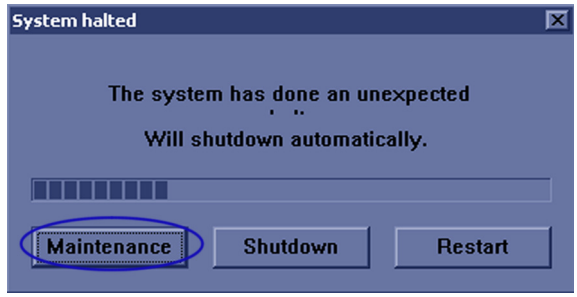


Figure 4-10. System Halted

Exit to Windows Desktop from the LOGIQ C9 Series application software (continued)

5. In the **Maintenance** window, select **Exit to Windows**. This will display the Windows Desktop on the screen.

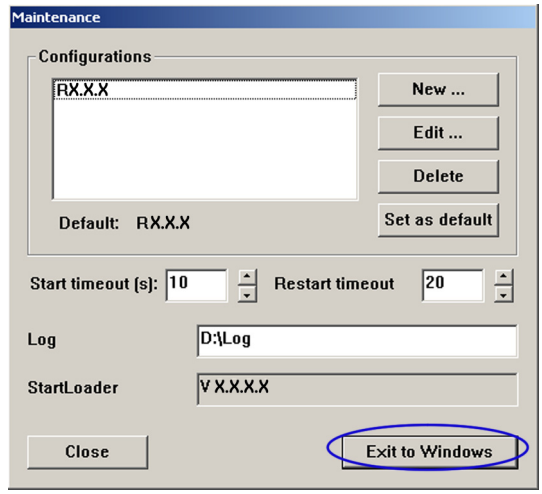


Figure 4-11. Maintenance dialog

NOTE: If you need to restart , ensure that you do a complete power down (Shut Down). This is required to power up the Front End Processor.

Removable media

Refer to the latest revision of the User Manual to perform the following tasks:

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

Archiving and loading presets

NOTE: Always save presets before any software reload. This ensures the presets loaded after the software reload are as up–to–date as possible.

All user presets except changes to Summary, Anatomy, and Biometry pages, can be saved on an DVD-R disk or USB memory device for reloading on the system.

NOTE: Presets should NOT be saved on the same DVD-R disk or USB memory device as images. The Archive Menu lists the images but does NOT list the presets stored on a DVD-R disk or USB memory device.

Archiving Presets to an DVD-R Disk or USB memory device

1. Insert an empty (blank) DVD-R disk into the DVD-RW.
2. Access to the Utility Menu, and select System. The Backup/Restore sheet will be shown on the LCD display.

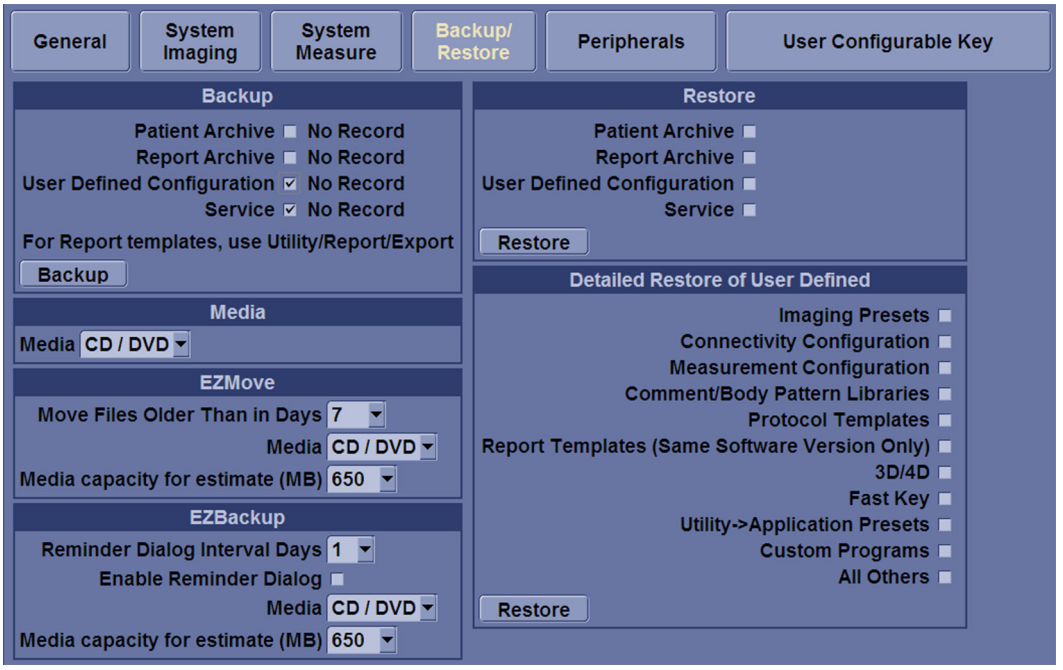


Figure 4-12. Backup Sheet

Archiving Presets to an DVD-R Disk or USB memory device (continued)

3. Select the item to Backup/Restore.
4. Enter backup destination or browse through the disk to locate the destination.
5. Select Backup. The backup status for each item is displayed on the Result column.

Loading Presets from an DVD-R disk or USB memory device

1. Insert the DVD-R disk with the archived Presets into the DVD-RW.
2. Access to Utility->System->Backup/Restore. The Restore sheet will be shown on the LCD display. See Figure 4-12 *on page 4-16*.
3. Select the items needed to be restored.
4. Select Restore. The system performs the restore and restarts.

Download/Upload of System Presets via InSite ExC

Data Management

Backup

Installation and Setup Procedure for Peripherals

Moving and transporting the LOGIQ C9 Series

Recording important settings and parameters

Where are the User Manuals and the Service Manual?

Online versions of the User Manuals are available via the help function.

Both the User Manuals and the Service Manual are delivered as PDF files on a CD-ROM. Paper copies may be ordered from GE.

How to display or print the PDF files from the Manual CD-ROM?

1. Insert the CD-R disk (CD-ROM) into the CD-drive on a PC or Laptop with Adobe Acrobat Reader.

Do not try to use the LOGIQ C9 Series to read these files, it will not work!

2. Follow the instructions on the screen to display the manual of choice.
3. Before printing the complete manual, or pages from the manual, select **File > Page Setup**.
4. Select the **paper size** and choose **Portrait**.
5. Select **File > Print** to start printing. In the pop up window, you may choose which pages to print and the number of copies you want to print (usually 1 copy).

Cleaning the Tracball

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

Manpower

One person, 10 minutes,

Tools

- Antistatic brush and/or antistatic vacuum cleaner

Preparations

To get access to the trackball for cleaning, you must must perform the following steps:

1. Power down the system.
2. Disconnect the mains power cable from the wall outlet.

   Disconnect all probes and external I/O cabling.

   Remove the Operator Panel, Lower and place it on a clean surface with the front down.

Follow these links if you need more information: See ‘Power off’ on *page 4-8 for more information.*

Clean the Trackball

Dust is often building up behind the ball, so it interferes with the ball rotation and for optical trackballs the light used for sensing. To get access for cleaning, you need to remove the ball.

The ball is held in position by the Dust Gasket.

1. Power off the system.
2. Rotate the dust gasket counterclockwise until it can be removed from the keyboard.

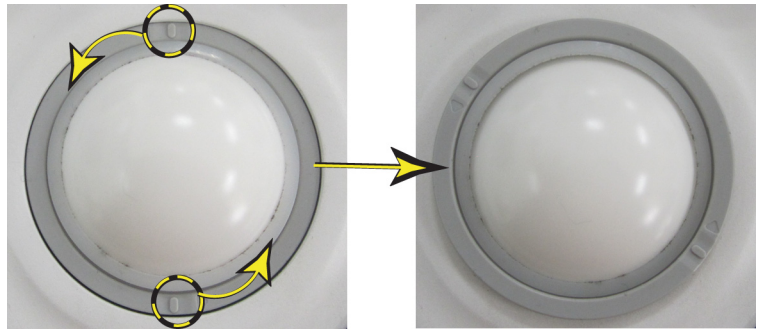


Figure 4-13. Remove the retainer

3. Separate the trackball and the gasket. Wipe off any oil or dust from the trackball, gasket and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and gasket, then put it into the housing and rotate it clockwise until its notches are set in the position.

CAUTION

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Test the Trackball

Power up the and test that the trackball now works as intended.

Functional checks

Overview

In this section, the functional checks for are described. Functional checks are used to verify that the product works as intended. Functional checks may also be used during troubleshooting.

Contents in this Section

Preparation

Turn on power to LOGIQ C9 Series. For detailed description, See ‘Power ON/Boot Up’ on *page 4-5 for more information.*

Basic Controls

Operator Panel

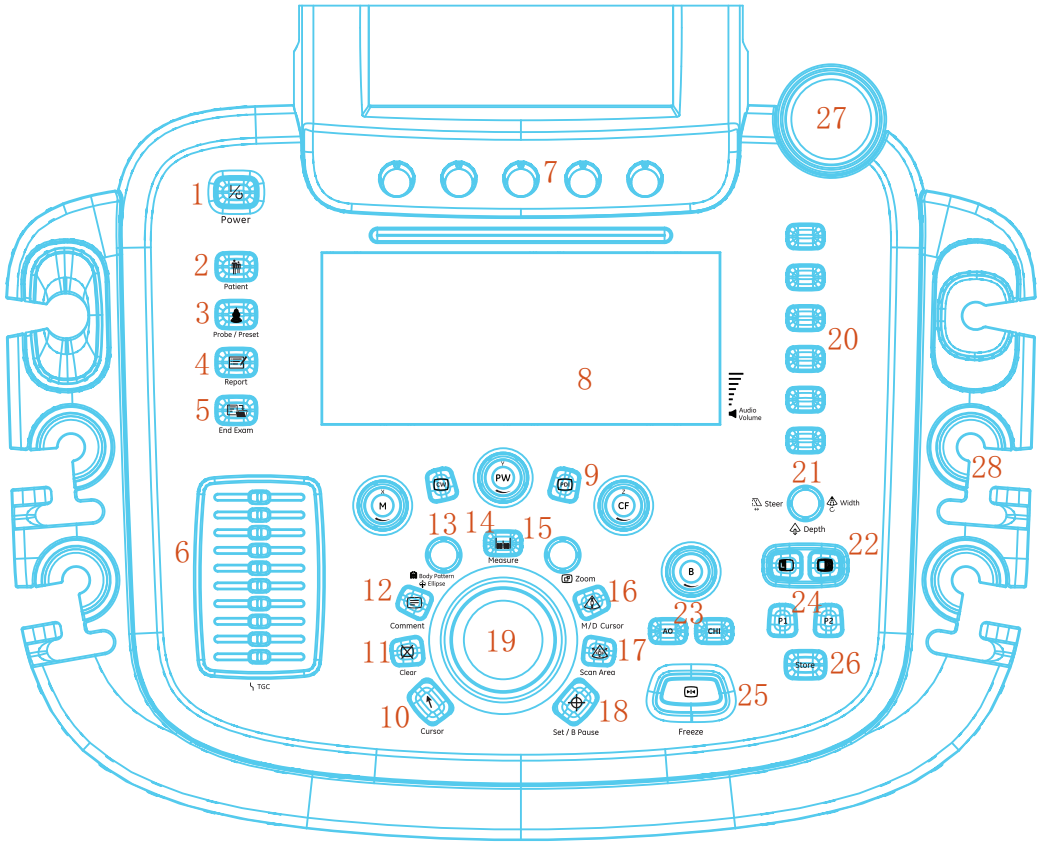


Figure 4-14. Control Panel Map

Operator Panel (continued)

1. Power On/Off Switch
2. Patient Key
3. Probe/Preset Key
4. Report Key
5. End Exam Key
6. TGC Sliders
7. Rotary controls
8. A/N Keyboard
9. Mode/Gain/XYZ Controls
10. Cursor Key
11. Clear Key
12. Comment Key
13. Body Pattern/Ellipse key
14. Measure key
15. Zoom Key
16. M/D Cursor Key
17. Scan Area Key
18. Set/B Pause key
19. Trackball
20. User Defined Keys
21. Steer/Width/Depth key
22. Left/Right key
23. AO and CHI keys
24. P1, P2 Printer keys
25. Freeze key
26. Store key
27. Gel holder
28. Probe Holders

Touch panel

The Touch panel enables the access of context specific controls. The mode/function specific controls are organized in tabbed folders. Within each folder several pages may be accessed. Only the folders available in the current state are displayed and can be accessed by pressing the corresponding folder tab on the Touch panel.

At the bottom of the Touch panel, there are five combination rotary/push buttons. The functionality of these rotaries changes, depending upon the currently-displayed folder/page.

Probe/Connectors Check

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

To connect a Probe

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cable.
3. DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.
4. Turn the connector locking handle counterclockwise.
5. Align the connector with the probe port and carefully push into place.
6. Turn the connector locking hadle clockwise to secure the probe connector.
7. Carefully position the probe cable in the probe cord holder spot so it is free to move, but not resting on the floor.

CAUTION

TAKE THE FOLLOWING PRECAUTIONS WITH THE PROBE CABELS:

-KEEP AWAY FROM THE WHEELS

-DO NOT BEND

-DO NOT CROSS CABLES BETWEEN PROBES

Table 4-1: Probe and Connectors Checks

Step	Task	Expected Results
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	Lauch the application. To change application without changing the current probe, press **Model** on the Touch Panel.	The selected application starts.
3	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
4	Test the probe in each active connector slot.	It will display pictorial data each time.
5	Do a leakage test on the probe, See 'Electrical safety tests' on *page 10-19 for more information.*	It passes the test.
6	Repeat this procedure for all available probes.	

Peripheral checks

Overview

Checks for the following peripherals are included:

Printer checks

The internal printer is controlled from the **P1** and **P2** keys on the LOGIQ C9 Series's Operator Panel.

The factory default is:

- **P1** for the internal printer

  P2 for external (network) printer

Pedals

Follow the steps below to verify that Brakes and Direction Locks function as intended.

1. Press the right pedal to engage the front wheel brakes. Apply a pressure on the scanner to verify that the brakes works as intended.
2. Press the center pedal to release the front wheel brakes.

   Press the left pedal to engage the Swivel lock. Ensure that the wheels lock, making it impossible to turn the scanner to the sides.

   Press the center pedal to release the Swivel lock.

   Apply the additional brakes on the rear wheels and verify that they function. When finished, release the additional brakes.

Power supply test & adjustments

Power Supply Test Procedure

There is no need to do any special tests on the Power Supplies if there don't seems to be a problem that may be related to the Power Supply.

Refer to , if you appear to have a problem that may be related to the Power Supplies.

Power Supply Adjustment

There are no adjustments on the power supply. The DC Power is self-regulated. If a voltage is outside the specified range, it means that something is wrong, either with the power supply itself or with a unit connected to that specific power outlet. When an error occur, the power will be turned off immediately.

Refer to , if you appear to have a problem that may be related to the Power Supplies.

Application Turnover Check List

Complete these checks before returning the scanner to customer for use:

Software Configuration Checks

Table 4-2: Software Configuration Checks

Step	Task to do	Notes
1	Verify Date and Time is correct.	
2	Verify that Location (Hospital Name) is correct.	
3	Verify Language settings are correct.	
4	Verify assignment of Print Keys.	
5	Verify all of the customer's options are set up correctly.	Demo Option strings turn on

Site Log

Table 4-3: Site Log

DATE	SRVICE PERSON	PROBLEM	COMMENTS

Chapter 5

Components and Functions (Theory)

This chapter explains LOGIQ C9 Series's system concepts, component arrangement, and subsystem functions.

It also describes the power distribution and the Common Service Desktop interface.

Overview

Contents in this chapter

- 'Overview' on *page 5-2*
- 'Block Diagram and Theory' on *page 5-3*
- 'Power Diagram' on *page 5-7*
- 'Common Service Platform' on *page 5-8*

Block Diagram and Theory

General Information

LOGIQ C9 Series is an ultrasound imaging scanner.

The system can be used for:

- 2D Black and White imaging
- 2D Color Flow
- M-Mode Black and White imaging
- Doppler
- A number of combinations of the above

LOGIQ C9 Series is a digital beam forming system that can handle up to 128 elements linear probes.

Signal flow from the Probe Connector Panel to the Front End, to the Mid Processors and Back End Processor and finally to the LCD and peripherals.

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

Top Console

The Top Console includes a Standby/On switch, a keyboard, different controls for manipulating the picture quality, controls for use in Measure & Analyze (M&A), and loudspeakers for stereo sound output (used during Doppler scanning).

Block Diagram

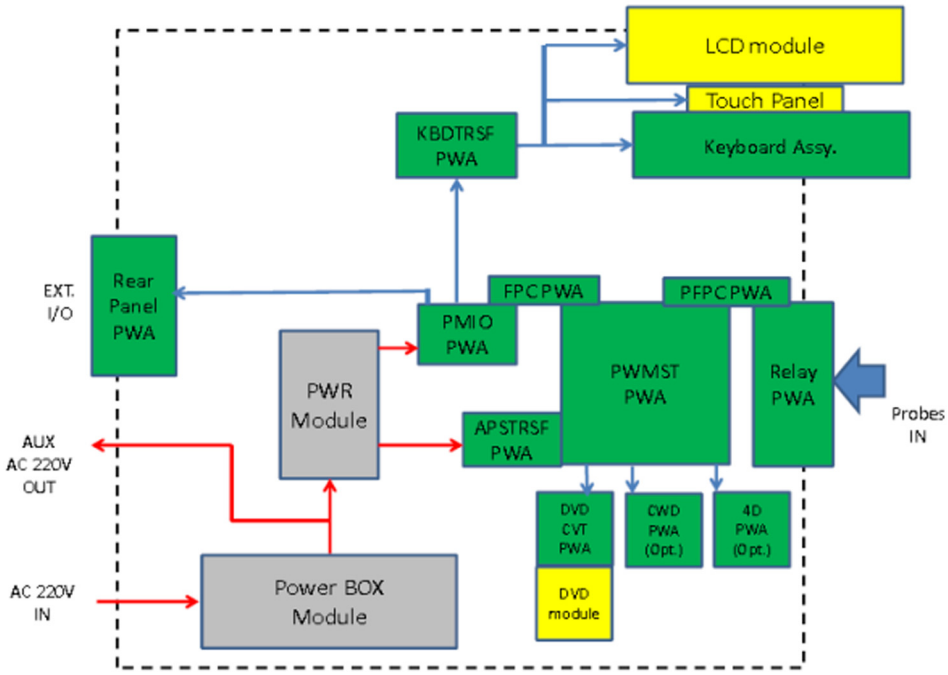


Figure 5-1. LOGIQ C9 Series System Block Diagram

Introduction

PWMST provides the main control function, 128 channels transmitting/receiving and related signal processing. It is also the connection to options 4D board and CWD board.

PMIO board receives MISC signals from PWMST board and make necessary processing. And then, PMIO sends to Rear Panel and KBDTRSF board.

KBDTRSF board receives MISC signals from PMIO board. It males necessary processing and then sends to LCD monitor, touch panel, main KBDboard, SoftKBD board and system speakers.

4D Transfer board connects with 4D module via board-to-board connector. And it provides signals to relay board and MST board respctively.

APSTRSF is a power supply board in LOGIQ C9 Series, it accepts power from APS module and ACDC adapter. Under the PWMST's control, it generates all kinds of voltages to meet the power requirements of PWMST.

Power Control PWA is assembled in the power box. It provides an interface for AC power input and provides isolated AC power output for the system.

Relay board provides an interface for PWMST and four probes. It transmit/receives signals from PWMST and provides an interface for drive the LED board.

Rear Panel and BNC Board will receive MISC signals from PMIO board and make necessary processing. It provides MISC user interface.

DVD_CNT Board provides a connect interface for DVD driver and makes the DVD driver easy to be assembled and replaced.

Software Diagram

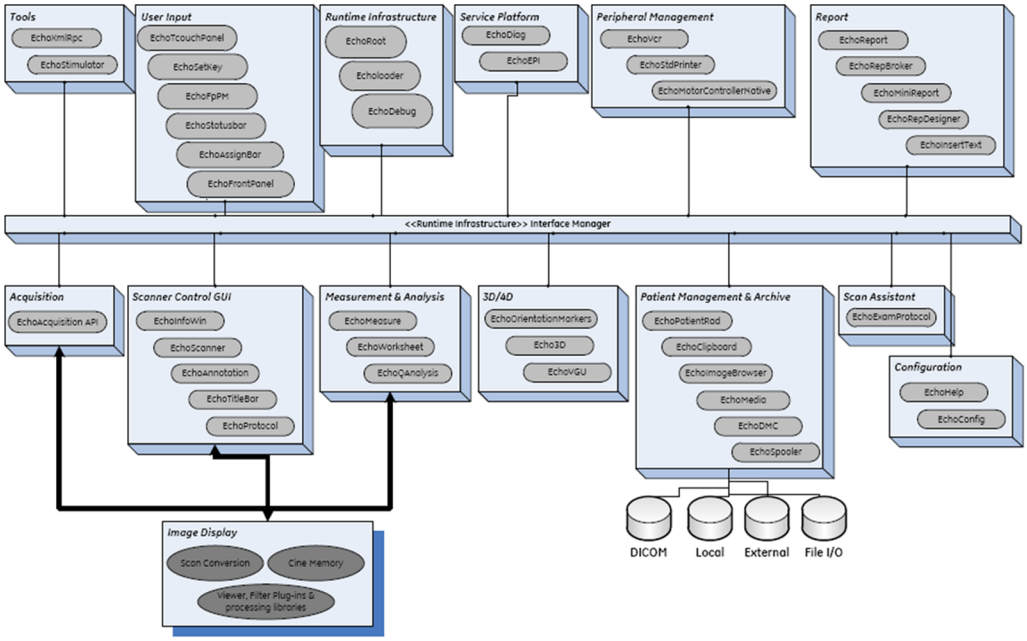


Figure 5-2. Software Diagram

Power Diagram

Overview

The AC Power assy's main tasks are to isolate and output to the DC/DC unit which is inside the system console. The input of AC power pack will be the AC outlet and it's universal, the range is AC 90V-264V, 47-63Hz. And no main power switch located on this power pack.

AC Power

The mains cord has plugs in one side end. A male plug connects to the mains outlet on site.

The mains voltage is routed to the AC power pack through a Circuit Breaker located on the site.

The Circuit Breaker is of the auto fuse type, if for some reason the current grows to high, the switch will automatically break the power.

From the Main Circuit Breaker, the AC power is routed via an Inrush Current Limiter to a internal outlet connector for the Mains Transformer.

Common Service Platform

Introduction

The Service Platform contains a set of software modules that are common to all PC backend ultrasound and cardiology systems. The Common Service Platform will increase service productivity and reduce training and service costs.

Chapter 6

Service Adjustments

This chapter describes how to test and make adjustments to the LOGIQ C9 Series. You can use these to test the system for errors.

Overview

Contents in this chapter

- 'Overview' on *page 6-2*
- 'LCD Monitor adjustments' on *page 6-3*

LCD Monitor adjustments

Purpose of this section

This section describes how to test and adjust the scanner. These tests are optional. You may use them to check the system for errors.

Monitor Adjustments

Please refer to User Manual for how to adjust the LCD Monitor Position, Brightness and Contrast

Factory Reset of LCD settings

The LCD Brightness and Contrast adjust buttons are at the right side bottom of LCD.

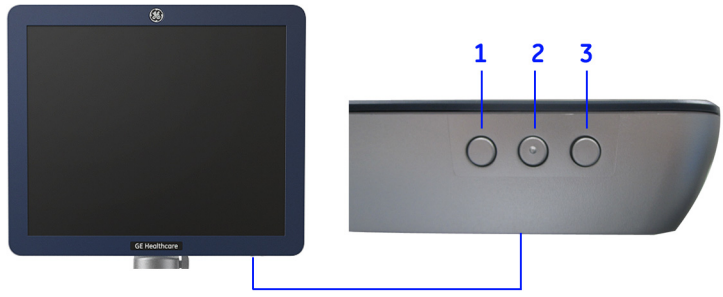


Figure 6-1. LCD Brightness and Contrast adjust buttons

1. Left key: adjustment (-) button
2. Middle key: press to display Brightness or contrast indicators
3. Right key: adjustment (+) button

Keep pressing the Middle key for 3 to 5 seconds, the Brightness and Contrast are reset to factory default setting.

It is recommended to set the brightness value as 50.

Factory Reset of LCD settings (continued)

To reset all the settings to factory default settings,

1. Press Right key once to activate the main menu.
2. Press Right key to select the **System** icon. Then Press the Middle key.
3. Select **Factory Reset** and press Middle key.

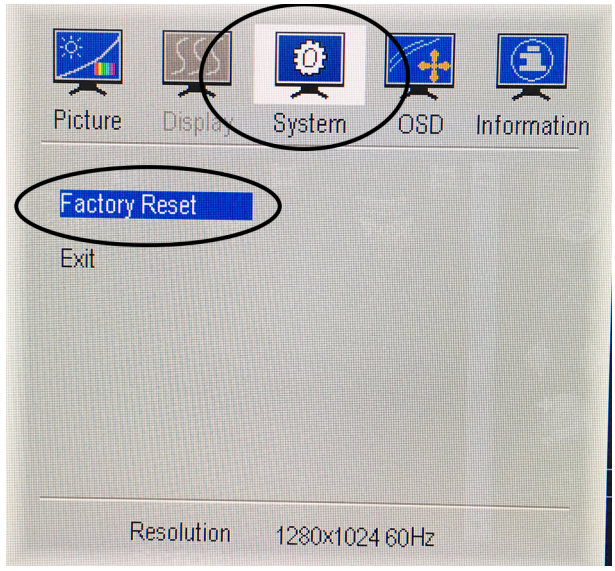


Figure 6-2. Factory reset

Touch Panel

Touch Panel Resolution

NOTE: After the system is powered on, if the touch panel resolution is changed and the touch panel does not work properly, restart the system.

Control Panel adjustment

Please refer to User Manual for how to adjust LCD Panel.

Chapter 7

Diagnostics/Troubleshooting

This chapter describes how to setup and run the tools and software that help maintain image quality and system operation. Very basic host, system and board levels are run whenever power is applied. Some Service Tools may be run at the application level.

Overview

Contents in this chapter

- 'Overview' on *page 7-2*
- 'Gathering Trouble Data' on *page 7-3*
- 'Screen Capture' on *page 7-6*
- 'Network Configuration' on *page 7-13*

Gathering Trouble Data

Overview

There may be a time when it would be advantageous to capture trouble images and system data (logs) for acquisition to be sent back to the manufacturer for analysis. There are different options to acquire this data that would give different results

Collect Vital System Information

The following information is necessary in order to properly analyze data or images being reported as a malfunction or being returned to the manufacturer:

Product Name = LOGIQ C9 Series

From the *Utility->System->About* screen:

Applications Software

- Software Version
- Software Part Number

System Image Software

- Image Date
- Image Part Number

Collect a Trouble Image with Logs

If the system should malfunction, press the Alt-D keys simultaneously. This will collect a screen capture of the image monitor, system presets and the following logs:

- Keyboard Shadow Log
- Error Logs
- Crash Log
- Power Supply
- Temperature

NOTE: Power Supply and Temperature logs are not currently being updated by the LOGIQ C9 Series.

This Alt-D function is available at all times.

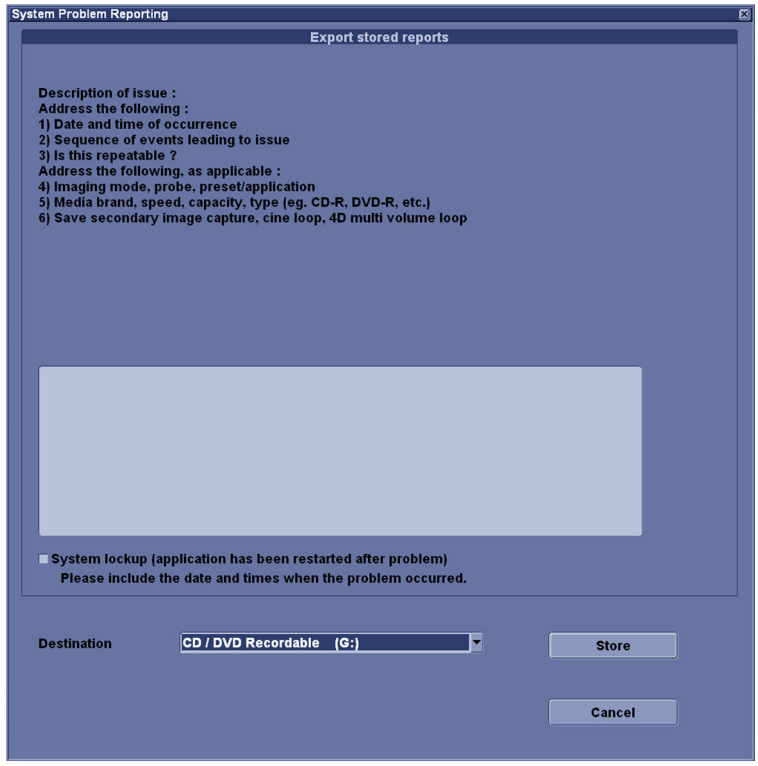


Figure 7-1. Alt-D Dialog Box

When Alt-D is pressed, a menu box appears that allows for:

- A place to enter a description of the proplem
- A choice to store to a pre-formatted DVD-R, RD (Removable Disk) or to the Export directory D:\SERVICE.

Collect a Trouble Image with Logs (continued)

Use a log to if the user wants to send information to GE. There are two methods to follow:

The subsequent file is compressed and time stamped. The screen capture is a bitmap which eliminates the possibility of artifacts from compression.

- To save log files and an image snapshot, press Alt-D, select the save logs function, and fill in the form. Use a USB flash drive or CD-R to store the log(s). When you fill out the form, fill in the system behavior you saw, plus any other comments. Fill in the check box if the system crashed.
- To save log files and an image snapshot, press Alt-D. Describe the issues, then select to store logs to D:\SERVICE. Select ContactGE in Serivce Menu, then complete the form of Contact Information, Problem Type and Problem Description and select Send.

Screen Capture

There may be times when the customer or field engineer will want to capture a presentation on the screen. This is accomplished by first saving the image(s) to the clipboard using a Print Key.

There's no factory default print key to accomplish a secondary screen capture. However, customer may have customize Print Keys or Store key function. Therefore, screen capture should involve the following steps:

1. Check and record any custom settings for the Print/Store button
2. Set the Print/Store button to Whole Screen, Secondary Capture.
3. Capture the required screens to the Hard Disk Drive or DVD-R.
4. Restore the Print/Store button to it's original settings.

Below is an example on how to assign P1 key to screen capture.

Check and Record the P1 Key Function

Check the function of the P1 Key in the event that the customer may have made some custom settings.

1. Press **Utility** on the Touch Panel.
2. Select **Connectivity** from the Utilities Menu.
3. Select the **Button** tab on the Connectivity screen.
4. In the **Physical Print Buttons** field, select Print1.

   The Connectivity/Buttons Screen will be displayed.

   If P1 is not set to Whole Screen, proceed to step 5 to record the customer's customized settings.

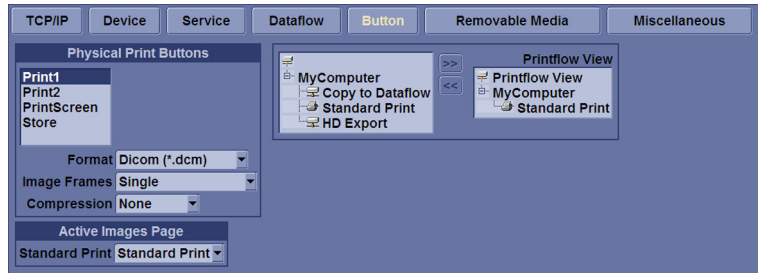


Figure 7-2. Connectivity/Button screen

5. In the Destinations section, record the service that is displayed.
6. In the **Physical Print Buttons** section, record the parameters related to the service.

Setting the P1 Key to Screen Capture

If the P1 Key is not set to screen capture:

1. While on the Connectivity screen, with the Buttons tab displayed, go to the *Destinations* list.
2. From the list select **Copy To Dataflow.** Press [>>] to add the selection to the **Printflow View** section.
3. Ensure that the **Physical Print Buttons** section for **capture Area** is set to Whole Screen, secondary Capture and No Image Compression.
4. The P1 Key should now be set up for whole screen capture, sending the screens to the image buffer (clipboard).
5. Select Save and Exit.

Capturing a Screen

The following is a generic process to capture any screen from the scanner:

1. Navigate to and display the image/screen to be captured.
2. Press **P1**. This will place a snapshot of the screen on the “clipboard” displayed at the bottom of the scan image display.

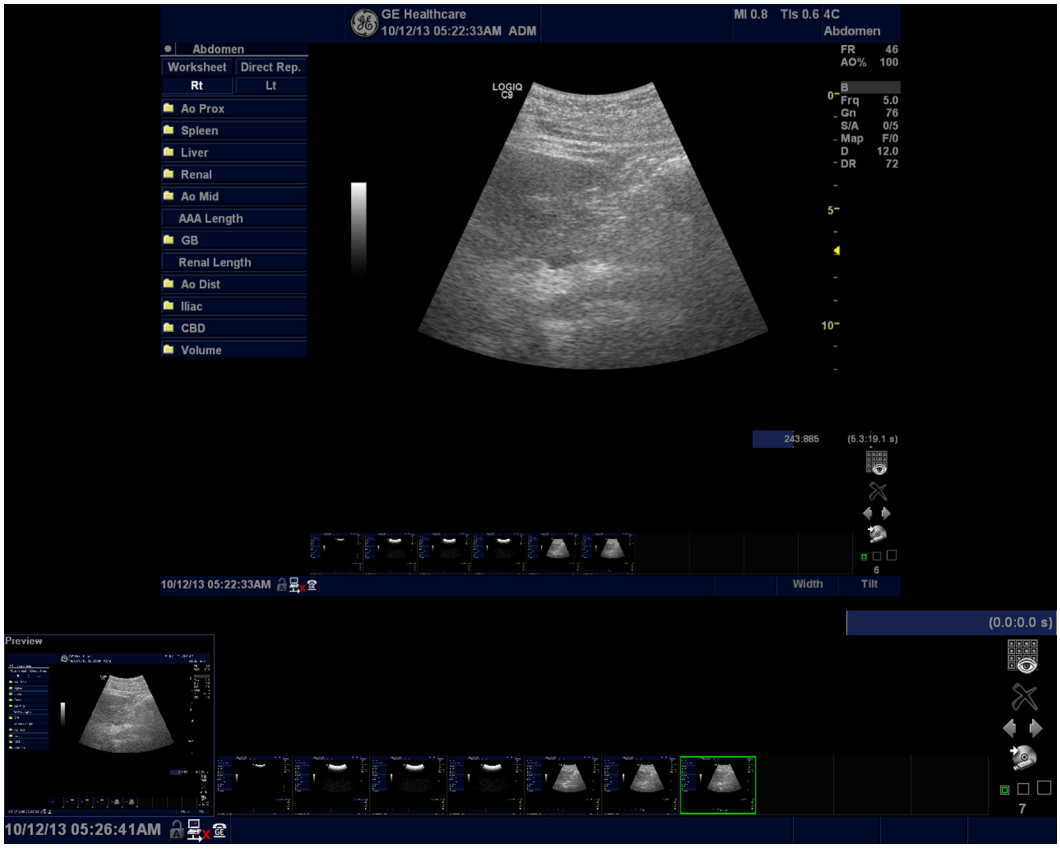


Figure 7-3. Select Image to Capture

Capturing a Screen (continued)

3. Select and highlight the snapshot to be stored
4. Select Save As Icon on the right side of the image screen.

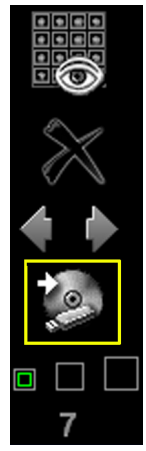


Figure 7-4. Menue > Save As

5. A Save dialog box will be opened. Choose the archive location to save image on the USB Drive or CD/DVD.

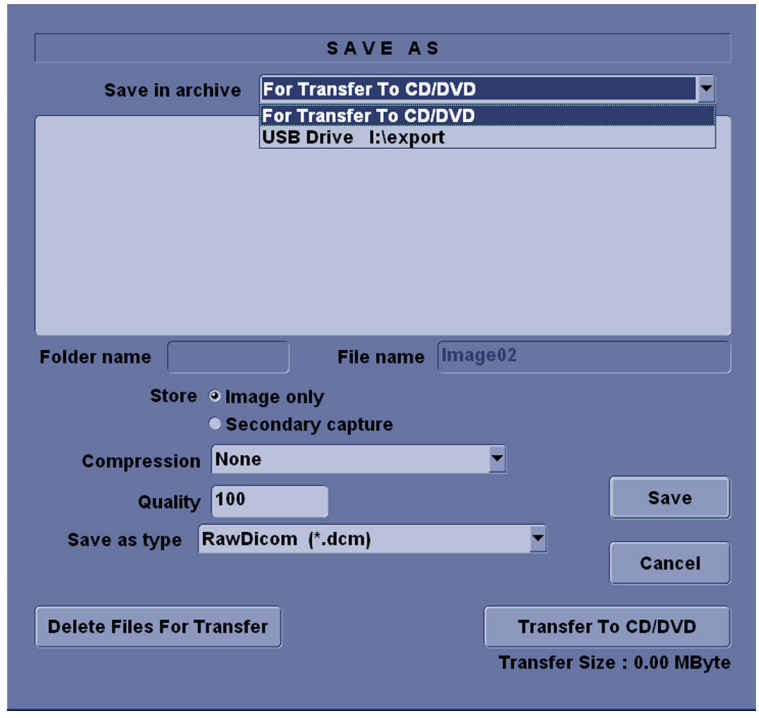


Figure 7-5. Save Dialog Box

Reset the P1 Key to Customer's Functionality

If the customer had programmed the P1 Key to a function other than screen capture, restore that functionality recorded in section 'Check and Record the P1 Key Function' on *page 7-7*. Refer to Figure 7-2 *on page 7-7*.

1. Seclect **Utility** on the control panel.
2. Select Connectivity -> Button.
3. In the ***Physical Print Buttons*** field, select Print1.
4. In the *Destinations* list, select the service(s) recorded in step 5, Section 'Check and Record the P1 Key Function' on *page 7-7*.
5. In the *Physical Print Buttons* section, select the parameters related to the service recorded in step 6, section 'Check and Record the P1 Key Function' on *page 7-7*.

Common Diagnostics

Utilities

Provides two selections:

Disruptive Mode

Allows you to enable or disable disruptive mode troubleshooting.

System Shutdown

Allows for system shutdown from diagnostic menu. Select to Restart System or Shutdown System. Also, select to retain Disruptive Mode or Not.

After submitting to restart or shutdown a confirmation screen gives one last chance to confirm or cancel the request.

PC Diagnostics

- Essential Test
- Hard Drive Long
- Hard Drive Short
- Memory
- Network Adapter
- System Board
- Video

PC Diagnostics (Interactive Tests)

- AVI Playback
- Keyboard
- Microphone
- Monitor
- Sound
- USB Ports

Restart LOGIQ C9 Series After Diagnostics

Always shutdown the system and reboot after a diagnostics session.

Network Configuration

Network Configuration

1. Connect system with network.
2. Enter **Utility**-> **Connectivity**-> **TCP/IP**, in IP settings window, check **Enable DHCP**, and select the proper network speed in **Network Speed**.

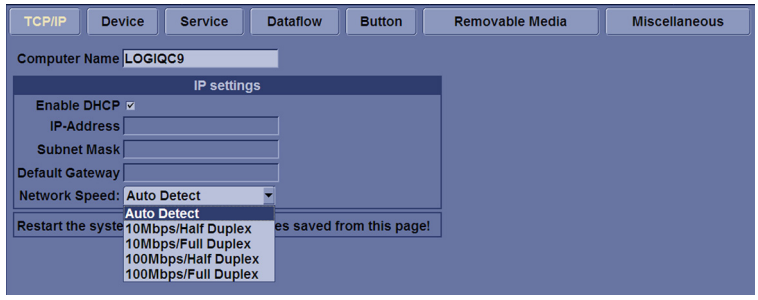


Figure 7-6. Enable DHCP

NOTE: *If user wants to setup static IP address, uncheck* ***Enable DHCP*** *option, input static address in* ***IP-Address box****,* ***Subnet Mask*** *and* ***Default Gateway*** *box.* In ***Network Speed***, choose the proper speed available.

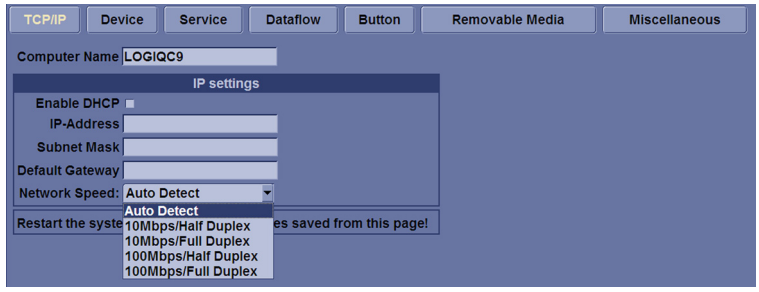


Figure 7-7. Input static address

Network Configuration (continued)

3. Select **Save**, and a popup window displays. Select **OK** to restart the system and activate the changes.

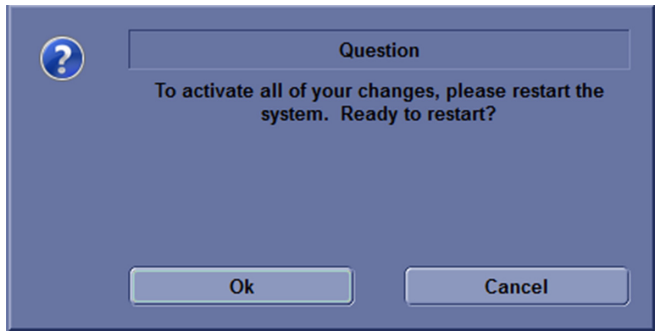


Figure 7-8. System Restart inquiry dialog

4. After the system restarts, the network icon at the left bottom of screen turns green.

Figure 7-9. Network icon

Chapter 8

Replacement Procedures

This chapter describes how to remove and install, or replace, modules and subsystems in the LOGIQ C9 Series. It also includes instructions for installing and re-installing the software.

Overview

Contents in this chapter

- 'Overview' on page 8-2
- 'Warnings and important information' on page 8-3
- 'Disassembly/Re-assembly' on page 8-5
- 'Loading the software' on page 8-13

Warnings and important information

Warnings

WARNING

Energy Control and Power Lockout for LOGIQ C9 Series.

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 Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for 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.

WARNING

Because of the limited access to cabinets and equipment in the field, placing people in awkward positions, GE has limited the lifting weight for one person in the field to 16 KG (35 LBS). Anything over 16 KG (35 LBS) requires 2 people.

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

NOTE: Use an ESD compatible work space or the ESD-kit during parts replacement.

WARNING

The waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately.

Please contact the manufacturer or other authorized disposal company to decommission your equipment.

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.

Disassembly/Re-assembly

Warning and Caution

WARNING

ONLY QUALIFIED SERVICE PERSONNEL SHOULD REMOVE ANY COVERS OR PANELS. ELECTRICAL HAZARDS EXISTS AT SEVERAL POINTS INSIDE. BECOME THOROUGHLY FAMILIAR WITH ALL HAZARDOUS VOLTAGES AND HIGH CURRENT LEVELS TO AVOID ACCIDENTAL CONTACT

CAUTION

Do not wear the ESD wrist strap when you work on live circuits and more than 30V peak is present.

Tools needed for servicing LOGIQ C9 Series

Table 8-1: Standard tools list for LOGIQ C9 Series

No	Part Name	Part No.	QTY	Screw Description	Screwdriver Description
1	screw	2159632	2	Screw BH M4x6	Common Phillips Screwdriver
2	screw	2159634	4	Screw BH M4x10 WHT	Common Phillips Screwdriver
3	screw	2327793	135	D2 Screw SJ2836-87 M3x8	Common Phillips Screwdriver
4	screw	2373562	3	Screw M4x10	Common Phillips Screwdriver
5	screw	5138465	10	Screw FH M2.5x5(NL)	Common Phillips Screwdriver
6	screw	5176890	6	Screw DIN965A M4x8	Small Phillips Screwdriver
7	screw	5244775	2	Screw GB T820-2000 M3x8	Common Phillips Screwdriver
8	screw	5342274	4	Inch SScrew #6-32UNC	Common Phillips Screwdriver
9	screw	5439265	246	Screw-M4x10	Common Phillips Screwdriver
10	screw	5445720	12	GB 818-2000 M4x30	Common Phillips Screwdriver
11	screw	2337572	2	Screw FH M3x6	Common Phillips Screwdriver
12	screw	5476381	20	Bolt M8x18 with Washer	6# Inner Six Angel
13	screw	5476387	34	Bolt M6x15 with Washer	5# Inner Six Angel
14	screw	5476394	5	Bolt M8x30	6# Inner Six Angel
15	screw	5476438	14	Bolt M8x36 With Washer	6# Inner Six Angel
16	screw	5476440	17	Bolt M6x24 With Washer	5# Inner Six Angel
17	screw	5477579	2	Screw_DIN912 M6_20	5# Inner Six Angel
18	screw	5490719	4	Screw PM SW4x8	Common Phillips Screwdriver
19	screw	5491747	1	Screw Pan Head M4x4	Common Phillips Screwdriver
20	screw	5491847	2	Hand Screw M2p5x5	by hand

NOTE: Please use the correct Screwdrivers listed in Table 8-1

Overview of LOGIQ C9 Series

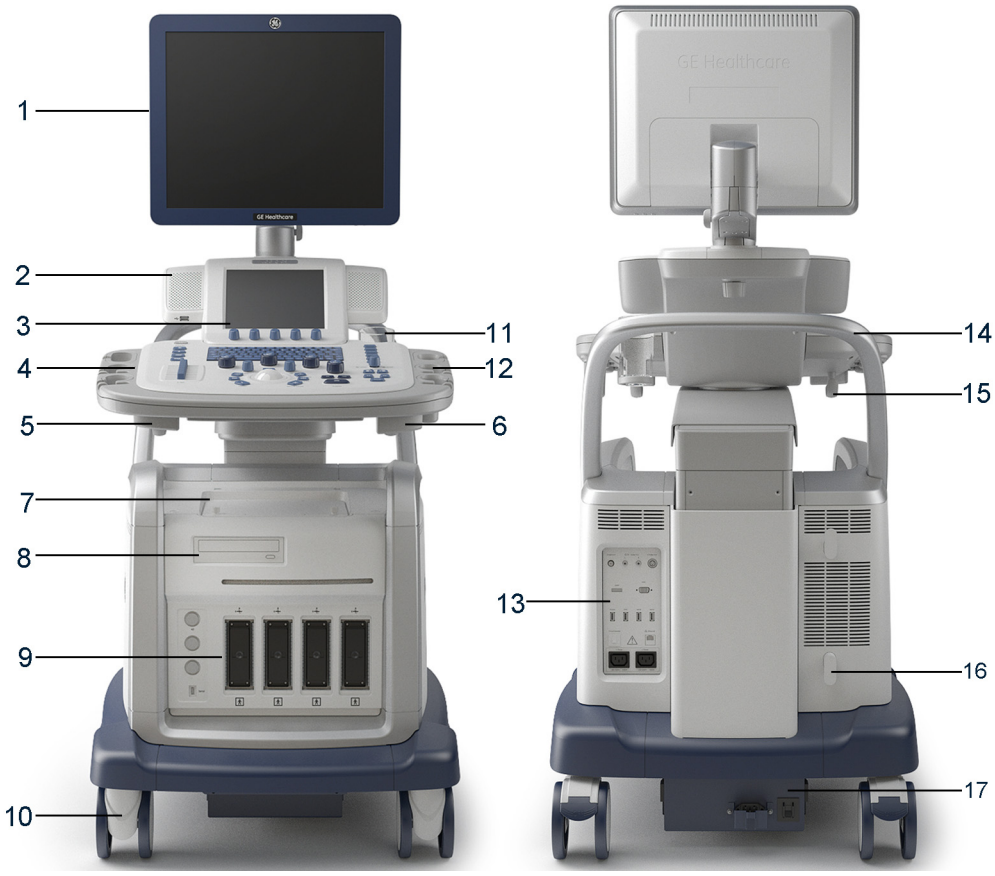


Figure 8-1. System Overview 1

1. LCD Monitor
2. Audio speaker
3. Touch Panel
4. Control panel
5. Control panel up/down lever
6. Control Panel swivel lever
7. B/W printer storage area
8. DVD-R Drive
9. Probe connector ports
10. Wheels
11. Gel holder
12. Probe holder.
13. Rear Panel
14. Rear Handle
15. Probe cable hook
16. Power cable hook
17. Power Box

Overview (continued)

Figure 8-2. System Overview 2

1. LCD Assy
2. Neck Assy
3. Control Panel Assy
4. Body Assy
5. Power Box Assy

Body Assy

Figure 8-3. Bottom Assy Overview

1. Body Front Cover Assy
2. Body Back Cover Assy
3. Body Left Side Cover Assy
4. Body Right Side Cover Assy
5. Base Cover Assy

NOTE: Left Side here means the side which is NOT beside the real panel.

NOTE: Right Side here means the side which is beside the real panel.

Air Filter Cleaning

Clean the system's air filter to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned every two weeks, but the requirements will vary with environment.

Be sure to lock the wheels before cleaning the air filters to aviod injury by any unexpected movement of the system.

DO NOT operate the unit without the air filters in place.

Allow the air filters to dry throughly before re-installing them on the unit.

Tools

- None

Preparation

- Shut down the system and disconnect the power cord.

Needed Manpower

- 1 person, 5 minutes + travel

Cleaning Procedure

1. Pull out the two air filters from both sides of the power box.

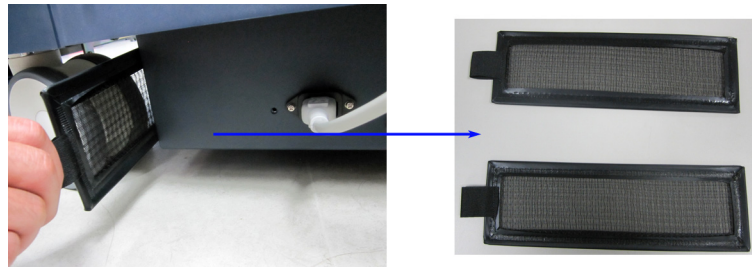


Figure 8-4. Pull out Air Filter

2. Dust the filter with a vacumm cleaner and/or wash it with a mild soapy solution.

   If washed, rinse and dry the filter before re-installation.
3. Put back the two air filters to both sides of the power box.

Trackball Roller Cleaning

Tools

- None

Preparation

- Shut down the system and disconnect the power cord.

Needed Manpower

- 1 person, 5 minutes + travel

Cleaning Procedure

1. Power off the system.
2. Rotate the retainer counterclockwise until it can be removed from the keyboard.

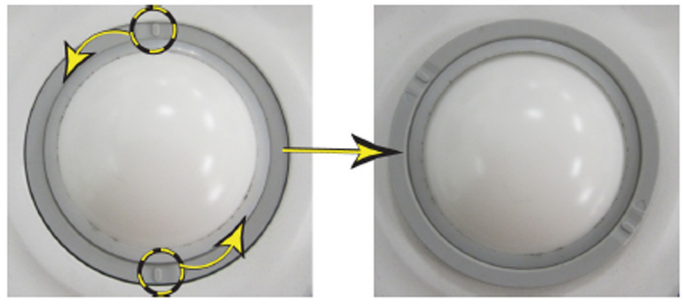


Figure 8-5. Remove the retainer

3. Separate the trackball and the retainer. Wipe off any oil or dust from the trackball, retainer and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and retainer, then put into the housing and rotate it clockwise until its notches are set in the position.

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Loading the software

Purpose of this section

This section describes how to reinstall software on LOGIQ C9 Series.

Customer provided prerequisite

- Formatted and labelled media for Images storage.
- Formatted and labelled media for Patient Archive and Presets (User Defined Settings).
- Password for the user ADM.

Data Management - moving all images

CAUTION

An error, or a power loss may occur.

Always backup the Patient Archive and the Presets (System Configurations) before loading the software!

In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from LOGIQ C9 Series 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.

- Move the images to a remote server or to removable media.

  For instructions, please see “Disk management” in the User Manual/User Guide.

Backing up the Patient Archive and System Configurations

An error, or a power loss may occur.

Always backup the Patient Archive and the Presets (System Configurations) before loading the software!

In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from LOGIQ C9 Series 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.

- Backup the Patient Archive and System Configurations.

  For instructions, please see “Data Backup and Restore” in the User Manual/User Guide.

Recording important settings and parameters

Overview

An error, or a power loss may occur.

It is considered to be best practice to always keep a record on paper of the settings for the LOGIQ C9 Series. Verify if it is current before you start to load software!

Always keep a record of the settings for the LOGIQ C9 Series on paper. Verify if it is current before starting a software loading! If needed, record the settings.

This subsection includes descriptions for recording data from the following screens:

Loading the System Software

While the software install procedure is designed to preserved data, you should save any patient data, images, system setups and customer presets to CD, DVD, USB Flash Drive, or USB Hard Disk before doing a software upgrade.

NOTE: Before loading the system software, please ensure that the power can be continuously supplied and there is no risk of power cut off during loading procedure.

There are two methods to load the system software:

- Load the system software with USB memory stick.
- Load the system software with DVD.

Before software upgrade, be sure to DISCONNECT all the peripherals from the system, otherwise the software upgrade will fail or the system cannot work properly after software upgrade.

Loading the System Software with USB memory stick/DVD

NOTE: Before starting this procedure, remove all probes and peripherals and remove them from the Docking Cart.

NOTE: While it is believed to be unnecessary, it would not hurt to disconnect the system from the network and remove all transducer.

NOTE: Please ensure AC adapter is connected during system upgrade!

1. Insert the Upgrade DVD labeled "System & Application Software" in the DVD-RW or insert the USB memory stick to the USB port of the system.
2. Properly turn off the scanner by momentarily pressing the *Power On/Off* Switch. In System-Exit window, select **Shutdown** to shutdown the system.

NOTE: If the system will not shutdown normally, hold down the Power On/Off Switch until the light turns off.

3. Power on the system. The system will detect the USB memory stick/DVD automatically.

Loading the System Software with USB memory stick/DVD (continued)

4. Press any key to continue when below message displays.

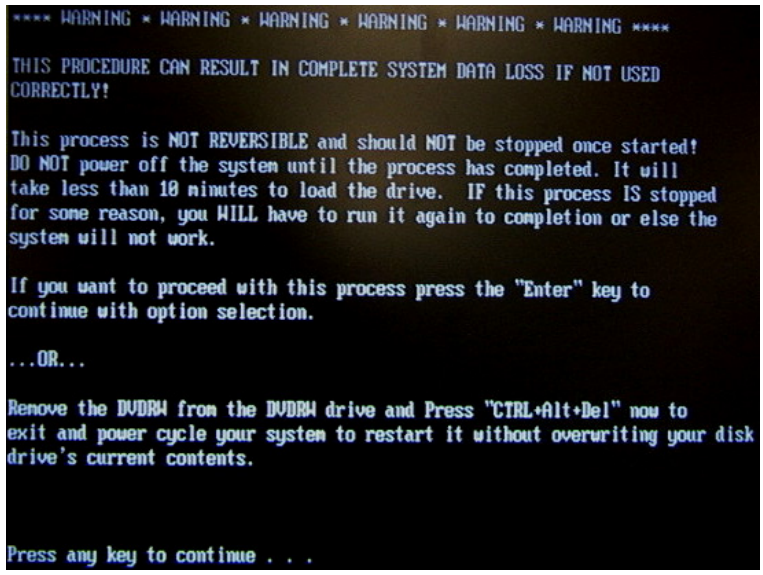


Figure 8-6. Upgrade message

5. Select one of the options for loading the system. Select choice [a] to load the complete disk.

CAUTION

If you select [a], ALL existing software and data will be erased. If backup has not been performed, all data like Patient Database, System Configuration and User Configurations (Customer Presets) will be lost.

- To select [a], the complete disk will be loaded. This option is recommended for application software upgrade.

NOTE: When to select [a] to load complete disk, please ensure that any patient data on the disk has been backed up.

NOTE: If you upgrade the software from R1.0.x to R1.1.x, be sure to select [1] to load the complete disk.

Loading the System Software with USB memory stick/DVD (continued)

- To select [b], only the bootable C: partition is loaded. This option is intended for recovery of a system that will not boot up. It is not recommended for application software upgrade because during upgrade process, the data on the system would possibly be impacted.

NOTE: *If you upgrade the software from R1.0.x to R1.1.x, DO NOT select [2] for loading C disk only.*

- To select [c] to quit system upgrade process.

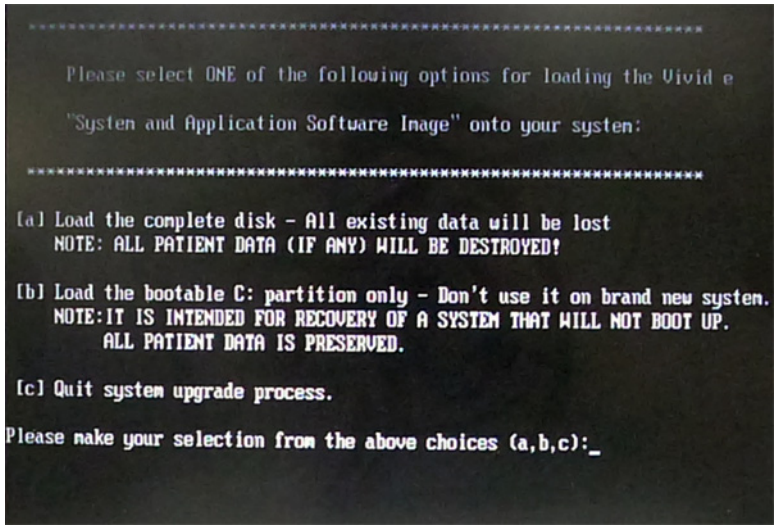


Figure 8-7. System Software load instruction

WARNING *While the software install procedure is designed to preserve data, you should select choice [b] to format disk C only.*

Loading the System Software with USB memory stick/DVD (continued)

6. Input “Yes” or “No” and press Enter key to continue.

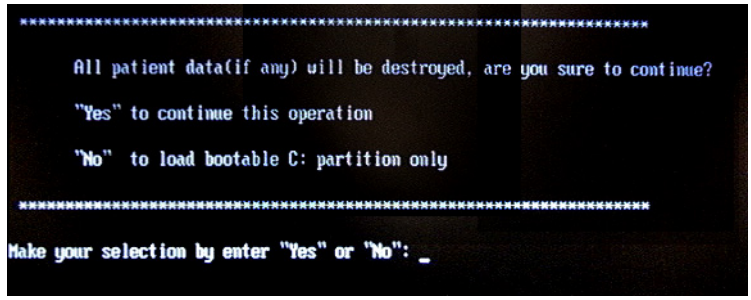


Figure 8-8. Confirmation on loading the system

7. System USB memory stick/DVD will be loading. Wait for the software installation to complete. (Typical installation time: 5-10 minutes). Status bar on the screen indicates progress.

WARNING

Do not interrupt the software loading at any time.

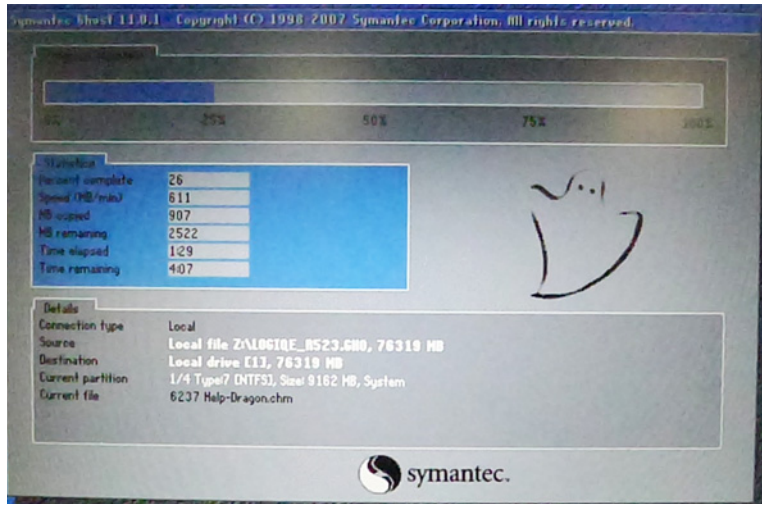


Figure 8-9. Loading status

Loading the System Software with USB memory stick/DVD (continued)

8. After finish updating system, remove the USB memory stick/ DVD and press any key to shut down the system.

NOTE: If you don not remove the USB memory stick/DVD, the software system loading process repeats when the system boots up.

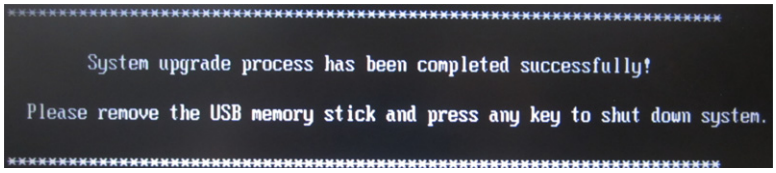


Figure 8-10. System upgrade complete

Software Version check out

Functional Check-out

1. Power on LOGIQ C9 Series system and wait until system booting to main screen.
2. Press **Utility** on the Touch Panel.
3. Select the **About** button on the right.

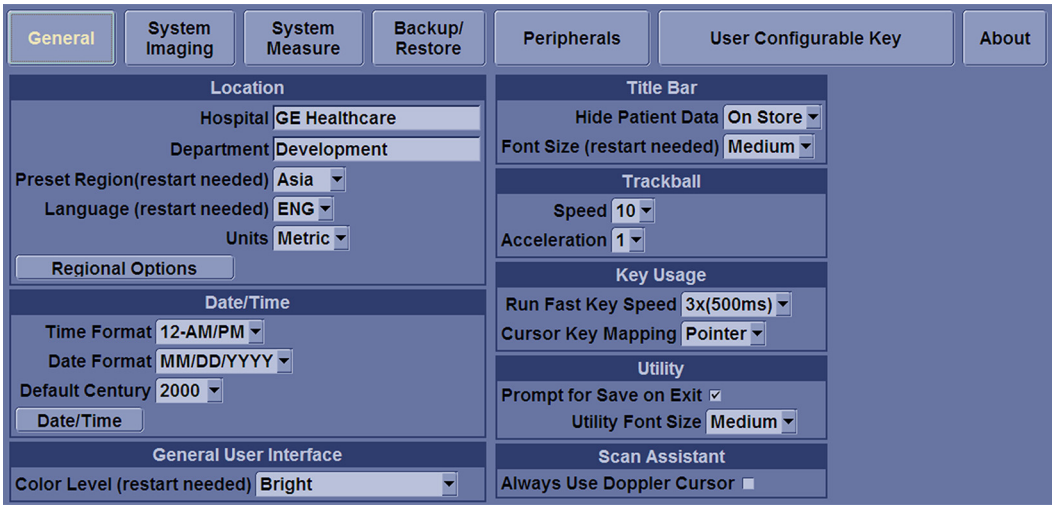


Figure 8-11. Utility-> System

4. Check whether “Software Version” is the right version for use.

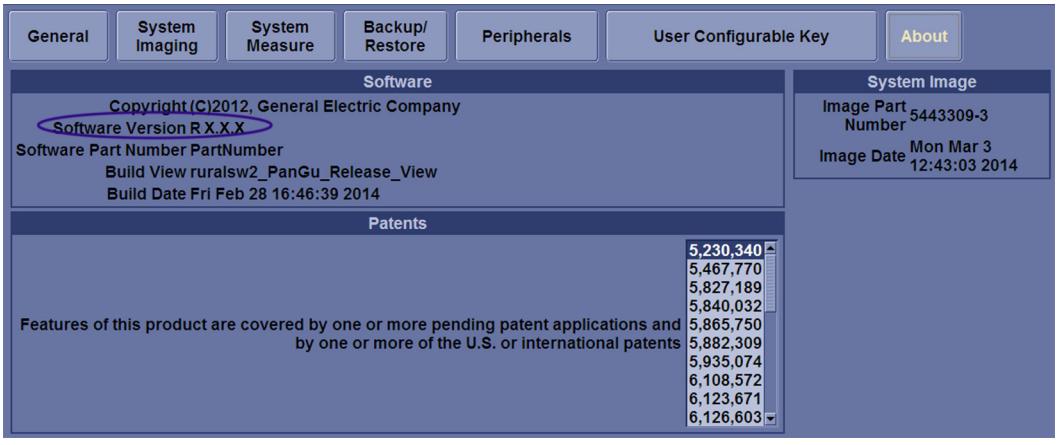


Figure 8-12. Software version

Reload the Correct Preset Region

NOTE: After the system software loading completion, please reload the correct preset region.

1. Reboot the system.
2. Select Utility -> General.
3. In the **Location** portion, select the right region in the field of **Preset Region**.

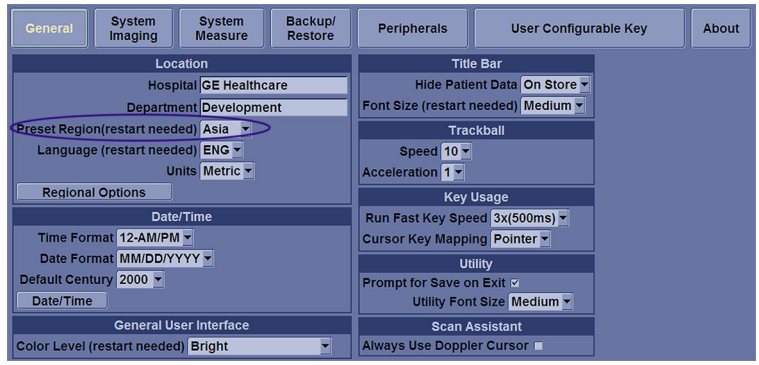


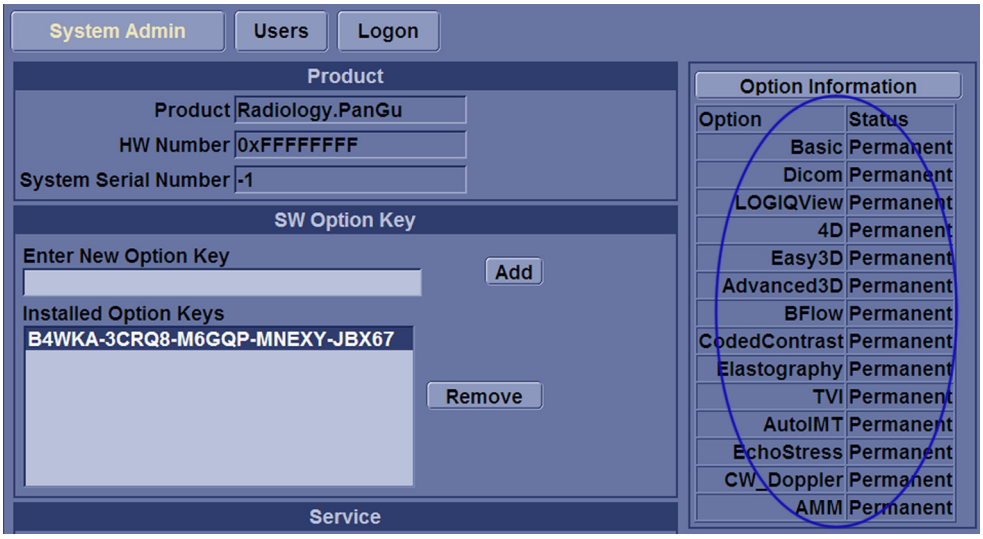
Figure 8-13. Preset Region

4. Reboot the system.

Option Strings Check

NOTE: After the system software loading completion, please check the option strings to ensure that the options are activated and working.

1. Reboot the system.
2. Select Utility -> Admin -> System Admin.
3. Ensure that all the installed option keys are displayed and the status of Options are valid.
   - The status “Permanent” means the option keys are activated and working.
   - The status “disabled” means the option keys are not activated and not working. Check if the option is installed and if the serial number and option key are correct.



Option strings

Probe Recognition Check

NOTE: After the system software loading completion, please check to ensure that the system can recognize the probes.

Plug in the probe. In scanning mode, the probe information is displayed on the **right top** location of the screen. About the probe specification for intended use on LOGIQ C9 Series.

Plug in at least one of each type of the probes and check if each of the probes is recognized and the probe information is displayed correctly.

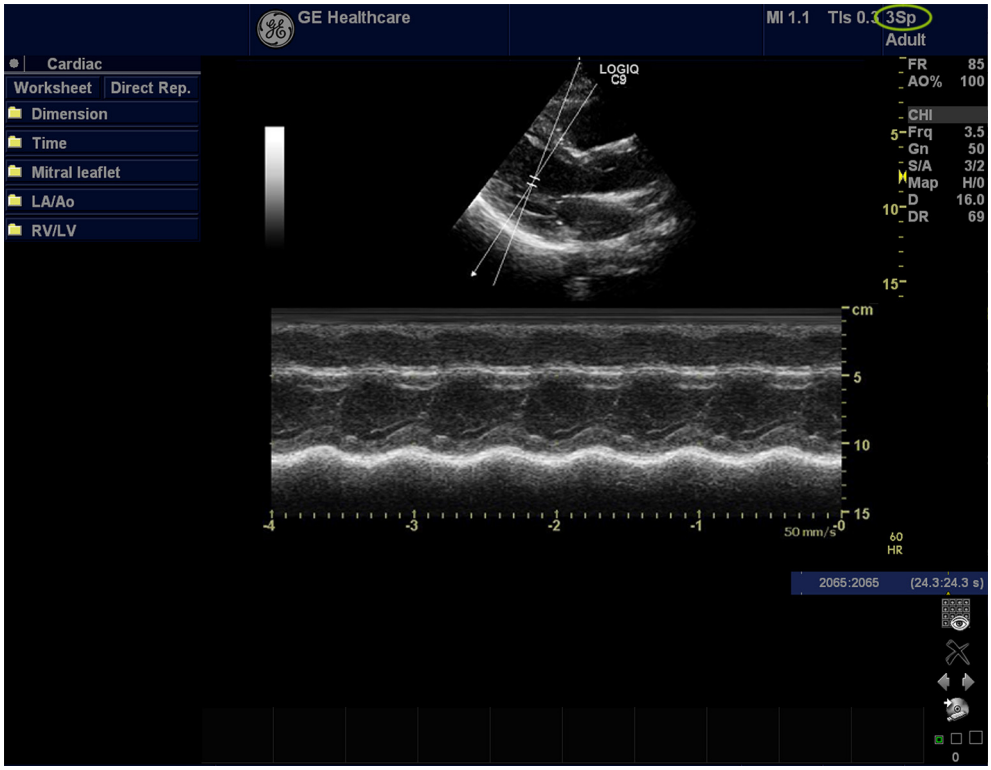


Figure 8-14. Probe identification

Peripheral Device Check

Check to ensure that all the peripheral devices work properly.

For instruction of peripheral device check, See ‘Peripheral checks’ on *page 4-25 for more information.*

Reinstall DICOM Devices

Reinstall any DICOM devices used by the customers and check to ensure these DICOM devices work properly.

The instruction about installing DICOM devices is not incorporated in this manual. To access the instruction about installing DICOM devices please refer to another manual **Basic User Manual**. Please use the latest revision of this document.

Touch Panel Calibration

After the software upgrade, check if the touch panel works properly. If the touch panel does not work properly, perform the touch panel calibration. Please contact GE service representative to do touch panel calibration.

Chapter 9

Renewal Parts

This chapter lists the renewal parts available for the LOGIQ C9 Series.

Overview

Contents in this chapter

- 'Overview' on *page 9-2*
- 'List of Abbreviations' on *page 9-3*
- 'Renewal Parts Lists' on *page 9-4*

List of Abbreviations

Table 9-1: List of Abbreviations

ABBREVIATION	DESCRIPTION
3D	THREE DIMENSIONAL
Assy	ASSEMBLY
FRU 1	Replacement part available in part hub
FRU 2	Replacement part available from the manufacturer (lead time involved)
KBD	Keyboard
LCD	Liquid Crystal Display
BnV	Brightness and Volume
TMST	Master Board

Renewal Parts Lists

ACDC Power Pack

Table 9-2: ACDC Power Pack & ACDC Power Cable List

Item	Part Number	Part Name	Quantity	FRU
001	5460229	ACDC Adapter with Clamp Filter	1	1

Operator Console Assy

The following figure illustrates what is the front side (1), left side (2), back/Rear side (3), right side (4) of the system.

Figure 9-1. Operator Console Assy

Probe

Table 9-3: Probes for LOGIQ C9 Series

Item	Part Name	Part Number	Center Image Frequency (MHz)	Replaced By	Qty	FRU
100	9L	5410633	5.3	5499509	1	1
100A	9L	5499509	5.3		1	1
101	11L	5441887	7.3		1	1
102	ML6-15	5409291	9.0		1	1
103	4C	47237516	2.9		1	1
104	E8CS	5434194	6.5	5499319	1	1
104A	E8CS	5499319	6.5		1	1
105	3Sp	5384875	3.2		1	1
106	4D3C-L	KTI195894	3.2		1	1

Peripheral

Table 9-4: Peripherals for LOGIQ C9 Series

Item	Part Number	Description	Qty	FRU
ECG module				
200	5173040	ECG Assy with IEC cable	1	1
201	5173105	ECG Assy with Chinese label	1	1
Footswitch				
202	5338419	USB foot switch FSU-1000	1	1
203	5151236	USB foot switch	1	1
USB Stick				
204	5395754	Sandisk USB Stick 4G	1	1
205	5434317-3	1TB USB mobile HDD	1	1
Printer				
206	5489354	UPD897 Printer Kit	1	1
207	5398061	UPD25 Color Printer Chinese Kit	1	1
208	5398063	UPD25 Color Printer European Kit	1	1
209	5426598	HP100 Printer Chinese Kit	1	1

Table 9-4: Peripherals for LOGIQ C9 Series

Item	Part Number	Description	Qty	FRU
210	5426599	HP100 Printer European Kit	1	1
221	5489354-2	SONY UP-D898MD BW Printer Kit	1	1
Biopsy Kit				
211	5160703	4C/5CS Biopsy Bracket	1	1
212	2398164	E8CS reusable Biopsy Kit	1	1
213	E8385MJ	E8CS Starter Kit	1	1
214	E8385MY	E8CS Sterile Needle Guide	1	1
215	5178413	9L Biopsy Guide Starter Kit	1	1
216	5176499	11L Multi Biopsy Guide	1	1
217	H48621Y	4D3C-L Biopsy Kit	1	1
218	H46701AE	4D3C-L Biopsy Starter Kit	1	1
219	5329137	3Sp Multi-Angle Biopsy	1	1
220	5264178	ML6-15 Multi Biopsy Kit	1	1

Power Cord

Table 9-5: Power Cord for LOGIQ C9 Series

Item	Part Number	Description	Qty	FRU
300	5176304	LOGIQ C9 Series Power Cord Chinese Class	1	1
301	5176773	LOGIQ C9 Series Power Cord India Class	1	1

Manuals

Table 9-6: Manuals for LOGIQ C9 Series

Item	Part Number	Description	Qty	FRU
400	5482300-200	LOGIQ C9 Series Manual CD	1	N
401	5482298-100	LOGIQ C9 Series Basic Service Manual, English	1	N
402	5482297-100	LOGIQ C9 Series Advanced Reference Manual, English	1	N
403	5453344-100	LOGIQ C9 Series Basic User Manual, English	1	N
404	5453344-141	LOGIQ C9 Series Basic User Manual, Simplified Chinese	1	N
405	5478150-100	LOGIQ C9 Series User Guide, English	1	N
406	5478150-141	LOGIQ C9 Series User Guide, Simplified Chinese	1	N
407	5482295-100	LOGIQ C9 Series Release Notes, English	1	N
408	5482295-141	LOGIQ C9 Series Release Notes, Simplified Chinese	1	N

Accessories and Kits

Table 9-7: Accessories and Kits

Item	Part Number	Part Name	Replaced By	Qty	FRU
505	5453562-4	Peripheral Driver Patch USB Installation Kit		1	1
506	5490778-3S	LOGIQ C9 Series R1.0.2 System and Application DVD	5490778-4 S	1	1
507	5490778-4S	LOGIQ C9 Series R1.0.3 System and Application DVD	5490778-5 S	1	1
508	5490778-5S	LOGIQ C9 Series R1.0.4 System and Application DVD		1	1
509	5757856-S	LOGIQ C9 Series R1.1.0. System and Application Software USB		1	1

Chapter 10

Care and Maintenance

*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.*

Overview

Contents in this chapter

- ‘Overview’ on *page 10-2*
- ‘Warnings’ on *page 10-3*
- ‘Why do maintenance’ on *page 10-4*
- ‘Maintenance task schedule’ on *page 10-6*
- ‘Tools required’ on *page 10-8*
- ‘System maintenance’ on *page 10-12*
- ‘Electrical safety tests’ on *page 10-19*
- ‘When there's too much leakage current …’ on *page 10-30*
- ‘Inspection Paperwork’ on *page 10-32*
- ‘Electrical Safety Tests Log’ on *page 10-34*

Warnings

DANGER

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.

CAUTION

Practice good ESD prevention. Wear an anti–static strap when handling electronic parts and even when disconnecting/ connecting cables.

CAUTION

Do not pull out or insert circuit boards while power is on.

CAUTION

Do not operate this Ultrasound system unless all board covers and frame panels are securely in place. System performance and cooling require this.

Why do maintenance

Periodic maintenance inspections

It has been determined by engineering that your LOGIQ C9 Series does not have any high wear components that fail with use, therefore no Periodic Maintenance inspections are mandatory.

However, some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

Keeping records

It is good business practice that ultrasound facilities maintain records of periodic and corrective maintenance. The Ultrasound Periodic Maintenance Inspection Certificate provides the customer with documentation that the Ultrasound system is maintained on a periodic basis.

A copy of the *Ultrasound Periodic Maintenance Inspection Certificate* should be kept in the same room or near the Ultrasound system.

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 physicists, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program. Contact GE for coverage and/or price for service.

Maintenance task schedule

How often should maintenance tasks be performed?

The Care and Maintenance task schedule (provided in Table 10-1 *on page 10-6*) specifies how often your LOGIQ C9 Series should be serviced and outlines items requiring special attention.

NOTE: It is the customer's responsibility to ensure the LOGIQ C9 Series care and maintenance is performed as scheduled in order to retain its high level of safety, dependability and performance.

Your GE Service Representative has an in-depth knowledge of your LOGIQ C9 Series and can best provide competent, efficient service. Contact GE for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Care and Maintenance Task Schedule assumes that you use your LOGIQ C9 Series 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 periodic maintenance frequencies.

Table 10-1: Customer Care Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Clean Probes	•*				* or before each use
Inspect AC Mains Cable			•		Mobile Ultrasound system: Check Weekly
Inspect Cables and Connectors			•		
Clean Console			•		

Table 10-1: Customer Care Schedule (Continued)

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Clean LCD			•		
Console Leakage Current Checks				See Notes	Twice Annually
Peripheral Leakage Current Checks				See Notes	Twice Annually
Surface Probe Leakage Current Checks				See Notes	Twice Annually
Endocavity Probe Leakage Current Checks				See Notes	Quarterly Annually
Surgical Probe Leakage Current Checks				See Notes	Quarterly Annually
Measurement Accuracy Checks				See Notes	Twice Annually
Functional Checks				See Notes	also after corrective maintenance

NOTE: The maintenance may require specialized equipment to complete.

NOTE: The periodic maintenances are not mandatory. The table above is for reference only.

Tools required

NOTE: For a list of required tools for servicing the LOGIQ C9 Series, refer to chapter 8.

Standard GE tool kit

The following is a description of the “Standard” GE tool kit in the USA. Not all tools are required.

Table 10-2: Overview of GE-1 tool kit contents

Tool ID	Description	Tool ID	Description
9-45358	Pliers Retaining Ring	9-XL9971MM	Xcelite-hex Blade 1.27mm
9-4078	Scribe	9-XL9972MM	Xcelite-hex Blade 1.5mm
9-44572	Wrench Open End 3/8 - 7/16	9-XL9973MM	Xcelite-hex Blade 2 mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9974MM	Xcelite-hex Blade 2.5mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9975MM	Xcelite-hex Blade 3mm
9-45385	Pliers, Arc Joint 7 inch	9-XL9976MM	Xcelite-hex Blade 4mm
9-45378	Pliers, Slip Joint	9-XL9977MM	Xcelite-hex Blade 5mm
9-4518	Pliers, Long Nose, Miniature	9-XL991CM	Handle
9-4518	Pliers, Long Nose, Miniature	C2356E	Screw starter - Kedman Quick Wedge
9-44776	Ignition Wrench Set, 10 pc.	BLBO	Box - 18 Compartment
9-44601	Wrench, Adj., 4 inch	DWL4283T	Box - 5 Compartment
9-4151	Screwdriver, Blade, Stubby	9-41322	Pickup Tool, Claw type
9-41421	Screwdriver, Blade, Pocket clip	9-6757	6 pc Needle File Set
9-41594	Screwdriver, Blade 1/8 in. × 4 in.	9-9487	Utility Knife
9-41581	Screwdriver, Blade 3/16 in. × 4 in.	9-45341	Pliers Vice Grip 10 inch
9-39451	20' Steel Tape, locking Spring load	9-3001	Xacto Pen Knife

Table 10-2: Overview of GE-1 tool kit contents (Continued)

Tool ID	Description	Tool ID	Description
9-GH807	Ratchet, Offset, Slotted	9-HT62002	Solder Aid, Fork and Hook
68-412	Ratchet, Offset, Phillips	9-4099	Mirror, Round, Telescoping
9-GH130	Tapered Reamer	9-GH3001	Steel Rule Decimal 6 inch
9-41584	Screwdriver, slotted 1/4 in. × 6 in.	9-GH300ME	Steel Rule Metric 6 inch
9-4118	Screwdriver, Phillips #2, Stubby	9-XL9920	Xcelite-hex Blade.050 inch
9-41293	Screwdriver, Phillips #0	9-XL9921	Xcelite-hex Blade 1/16 inch
9-41294	Screwdriver, Phillips #1	9-XL9922	Xcelite-hex Blade 5/16 inch
9-41295	Screwdriver, Phillips #2	9-XL9923	Xcelite-hex Blade 3/32 inch
9-46677	Hex Keys, 20 pc., Metric	9-XL9924	Xcelite-hex Blade 1/8 inch
9-34701	1/4 in. Standard Socket set (19 pc)	9-XL9925	Xcelite-hex Blade 5/32 inch
9-43499	1/2 inch Socket 1/4 inch drive	9-XL9926	Xcelite-hex Blade 3/16 inch
9-4355	Flex Spinner	9-XL99764	Xcelite-hex Blade 7/64
9-43523	Breaker	9-XL99964	Xcelite-hex Blade 9/64
9-43531	6 inch Ext.	9-XLM60	Mini-screwdriver kit
9-65283	Case 8.5 in. × 4.5 in. × 2 in. Deep	9-45072	Pliers 6 inch Diagonal
9-46696	Hex Keys	9-XL100X	Wire Stripper/Cutter 5 inch - 100X
9-39829	Torpedo Level, Magnetic	9-XL87CG	Pliers - very fine needle nose-87CG
9-38461	Hammer, Ball Peen, 4 oz.	9-WEWDT-07	Weller-Soldering-Replacement Tip(1)
9-4280	Universal Joint 1/4 inch	9-WS175-E	Wiss - Surgical Scissors
9-WEW60P3	Weller - Soldering Iron, 3 wire	KH174	Hemostat 5 inch Straight
9-WECT5B6	Weller - Soldering Iron Tip	KH175	Hemostat 5 inch curved
9-WEWDP12	Weller - Desoldering Pump	9-Z9480121	Alignment tool (red)
93383	Flashlight Mini-Mag Lite (AAA Bat.)		
9-GH408	Tweezers		
21576	Brush - Bristle		

Table 10-2: Overview of GE-1 tool kit contents (Continued)

Tool ID	Description	Tool ID	Description
9-4516	Pliers 4 1/4 inch Diagonal		

GE-2 tool kit

Table 10-3: Overview of GE-2 tool kit contents

GE-2 Sears Kit (#99034)			
Tool ID	**Description**	**Tool ID**	**Description**
9-45381	Pliers, Arc Joint 9 1/2 inch	9-44067	Socket 1 1/16 in. for 1/2 in. drive
9-45092	Pliers, Linesman 8 1/2 inch	9-42679	Socket 10MM Hex for 1/2 in. drive (2273333)
9-42882	Punch, Pin 3/32 inch	9-44262	Extension 10 inch for 1/2 in. drive (2273405)
9-42884	Punch, Pin 5/32 inch	9-4258	3/8 inch to 1/2 inch Adapter
9-42886	Punch, Pin 1/4 inch	9-34374	3/8 inch Metric Socket Set - 12 PT
9-42973	Cold Chisel 1/2 inch	9-44311	16mm Socket 12 pt.
9-GH77	Center Punch Automatic	9-33485	Metal Socket Tray
9-GH890	File Handle, Adj.	9-33484	Metal Socket Tray
9-31276	File, Round, Bastard 8 inch	9-33484	Metal Socket Tray
9-31277	File, Half Round, Bastard 8 inch	9-52068	Tap and Drill Set
9-31263	File, Flat Mill 8 inch	9-52722	#6 Tap
21045C	Close Quarter Saw	9-52723	#8 Tap
9-44604	Wrench, Adj. 10 inch		High Speed Drill Set
9-41587	Screwdriver 5/16 inch × 8 inch		#36 Drill
9-41586	Screwdriver, Stubby 5/16 inch		#29 Drill
9-GH19512	Countersink 1/2 inch	9-44046	3/8 inch Socket Set
9-44741	12 PC Combination Wrench Set		

Special tools, supplies and equipment used for maintenance

Table 10-4: Overview of tool requirements for periodic maintenance

Tool / kit	Part Number	Comments
Digital Volt Meter (DVM)		
Anti Static Kit	46–194427P231 46–194427P279 46–194427P369 46–194427P373 46–194427P370	Kit includes anti–static mat, wrist strap and cables for 200 to 240V system 3M #2204 Large adjustable wrist strap 3M #2214 Small adjustable wrist strap 3M #3051 conductive ground cord
Anti Static Vacuum Cleaner	46–194427P278 46–194427P279	120V 230V
Safety Analyzer		The safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.
QIQ Phantom	E8370RB	RMI Grayscale Target Model 403GS ***NOTE! The use of a Phantom is not required during Preventive Maintenance. Customer may use it as part of their Quality Assurance Program tests***.
B/W Printer Cleaning Sheet		See printer user manual for requirements
Color Printer Cleaning Sheet		See printer user manual for requirements
Disposable Gloves		

System maintenance

Preliminary checks

The preliminary checks take about 15 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

Table 10-5: 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 Ultrasound Inspection Certificate (see Figure 10-5 *on page 10-32*). 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.
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	Backup all Customer Presets to an appropriate media.
10.	Image Archive	Back up the Image Archive onto appropriate media.

Functional checks

NOTE: See also Chapter 4

The functional checks take about 60 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

System checks

Table 10-6: System functional checks

Step	Item	Description
1.	B-Mode	Verify basic B-Mode (2D) operation. Check the basic Ultrasound system controls that affect this mode of operation.
2.	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic Ultrasound system controls that affect this mode of operation.
3.	Doppler Modes	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.	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
6.	Applicable Software Options	Verify the basic operation of all optional modes such as Contrast. Check the basic Ultrasound system controls that affect each options operation.
7.	Xmit/Recv Elements	Use the Visual Channel Utility on the loop connect to verify that all system xmit/recv channels are functional.
8.	Operator Panel test	Perform the Operator Panel Test Procedure.
9.	Keyboard	Do the interactive keyboard test.
10.	LCD	Verify basic LCD display functions. Refer to Chapter 3 of the User Manual.
11.	Software Menu check	Verify Software Menu display functions. Refer to Chapter 3 of the User Manual.
12.	Peripherals	See: ‘Peripheral checks’ on *page 4-25*.
13.	Measurements	In measurement mode, make distance measurement, get result in result window. Verify the distance by graduate rule. Distance Accuracy should be within ±5%. (Name result from result window Result A, result from graduate rule Result B; Distance Accuracy = (Result B-Result A)/Result A)

Peripheral/option checks

If any peripherals or options are not part of the system configuration, the check can be omitted.

Refer to the User Manual for a list of approved peripherals/ options.

Table 10-7: GE approved peripheral/hardware option functional checks

Step	Item	Description
1.	Media	Verify media drive(s) read/write properlty. Clean if necessary.
2.	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3.	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4.	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5.	ECG	Verify basic operation with customer
6.	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.
7.	DVD	Verify that the DVD is functioning properly. Clean heads and covers if necessary.

Mains cable inspection

Table 10-8: Mains Cable Inspection, As Appropriate

Step	Item	Description
1.	Unplug Cord	Disconnect the mains cable from the wall and Ultrasound system.
2.	Inspect	Inspect it and its connectors for damage of any kinds.
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.

Cleaning

Table 10-9: General Cleaning

Step	Item	Description
1.	Console	Remove the battery. Use a fluid detergent in warm water on a soft, damp cloth to carefully wipe the entire system. Be careful not to get the cloth too wet so that moisture does not enter the console.
2.	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
3.	LCD	Use a soft, non-abrasive folder cloth. Gently wipe the LCD face. DO NOT use a glass cleaner that has a hydrocarbon base (such as Benzene, Methy Alcohol or Methy Ethyl Ketone) on LCD with the filter (anti-glare shield).

Physical inspection

NOTE: These features may not be present on all Ultrasound systems.

Table 10-10: 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.	Input Power	Refer to: 'Mains cable inspection' on *page 10-14*.
4.	Cables & 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.
5.	Shielding & 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.
6.	Control Panel	Inspect keyboard and control panel. Note any damaged or missing items.
7.	Control Panel Lighting	Check for proper operation of all operator panel and Freeze Key light.
8.	LCD	Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the LCD arm allows: • swivelling the screen to the left and to the right • folding the screen to the locked position • release and adjustment backwards and forwards • can be adjusted in the up/down positions. Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.
9.	External I/O	Check all connectors for damage.

Table 10-10: Physical checks (Continued)

Step	Item	Description
10.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
11.	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,

Optional Diagnostic Checks

Optionally you can access the diagnostic software as described in Chapter 5 or 7. View the error logs and run desired diagnostics.

View the Log

1. Review the 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.
3. Check the Configuration Log; update if needed.

Probe maintenance

Probe related checks

Table 10-11: System preliminary checks

Step	Item	Description
1.	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
2.	Probes	Thoroughly check the Ultrasound system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins.
3.	Probes	Verify that the Ultrasound system properly recognizes all probes.

Basic probe care

The Ultrasound system user manuals and various probe handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

Ultrasound probes can be easily damaged by improper handling. See the User Manual and probe care cards for more details. Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.

Any evidence of wear indicates the probe cannot be used.

Do a visual check of the probe pins and Ultrasound system sockets before plugging in a probe.

The Interoperative probes often have special considerations and individual probe user manuals. For Interoperative probes also refer to their separate user manuals.

Basic probe cleaning

Refer to the User's Manual for details on probe cleaning.

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.

Electrical safety tests

Safety test overview

The electrical safety tests in this section are based on and conform to IEC 60601-1 Medical Equipment Safety Standards. They are intended for the electrical safety evaluation of cord-connected, electrically operated, patient care equipment. If additional information is needed, refer to the IEC 60601-1 documents

WARNING

THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 12 MONTHS ACCORDING TO THE HISTORICAL DATA. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE SAFETY INSPECTIONS MENTIONED ABOVE.

DANGER

TO MINIMIZE RISK OF ELECTRICAL 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.

CAUTION

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.

Safety test overview (continued)

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 transducers. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.

Test the system, peripherals and probes for leakage current. Excessive leakage current can cause injury or death in sensitive patients. High leakage current can also indicate degradation of insulation and a potential for electrical failure. Do not use probes or equipment having excessive leakage current.

To minimize the risk that a probe may shock someone the customer should:

- Not use a probe that is cracked or damaged in any way.
- Check probe leakage current:
    - Based on your facilities QA program for surface probes.
    - Based on your facilities QA program for endocavitary probes.
    - whenever probe damage is suspected.

Leakage current limits

WARNING

Energy Control and Power Lockout for LOGIQ C9 Series.

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 Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for 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.

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 for further analysis.

The following limits are summarized for IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

Table 10-12: Chassis Leakage Current Limits - Accessible Metal Surface

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
All (Except USA & Canada)	0.1 mA	0.5 mA	0.5 mA	0.5 mA
USA & Canada	0.1 mA	0.3 mA	0.3 mA	0.3 mA

Table 10-13: Type BF Applied Part Leakage Current Limits - Probes Surface

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
All	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

Leakage current limits (continued)

Table 10-14: Type CF Applied Part Leakage Current Limits - ECG Connections

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
All	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

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.*

The following tests are performed at the factory and should be performed at the site. These tests are: chassis leakage current, and probe leakage current. All measurements are made with an electrical safety analyzer which should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

Table 10-15: 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 and ECG leads.	
Type BF	Body Floating or non-conductive ultrasound probes which are marked with the 'man in box' BF symbol. this includes all transducers.	
Type CF	Cardiac Floating or non-conductive intraoperative probes for direct cardiac contact and isolated ECG connections so marked with the 'heart in box' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required test for Type CF applied parts.	

Outlet test - wiring arrangement

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

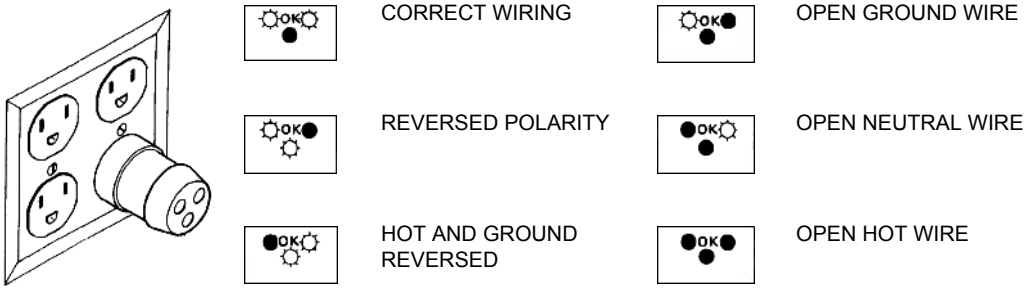


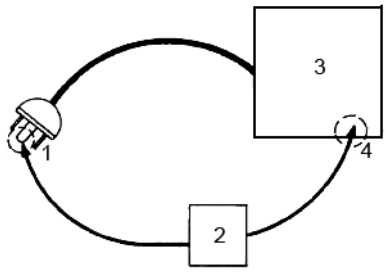
Figure 10-1. Typical alternate outlet tester

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.

Grounding continuity

DANGER ELECTRIC SHOCK HAZARD. THE PATIENT MUST NOT BE CONTACTED TO THE EQUIPMENT DURING THIS TEST.

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2** ohms. Reference the procedure in the IEC60601-1.



1. GROUND PIN
2. OHMMETER
3. LOGIQ C9 Series
4. ACCESSIBLE METAL PART:
   - MONITOR HOUSING
   - PEAR PANEL CONNECTOR
   - ANY CASTER/WHEEL SUPPORT

Figure 10-2. Ground continuity test

Chassis leakage current test

DANGER ELECTRIC SHOCK HAZARD. WHEN THE METER'S GROUND SWITCH IS OPEN, DON'T TOUCH THE ULTRASOUND SYSTEM!.

CAUTION

Equipment damage possibility. Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the Ultrasound system may be damaged.

Generic procedure

The test verifies the isolation of the power line from the chassis. The testing meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading of current.

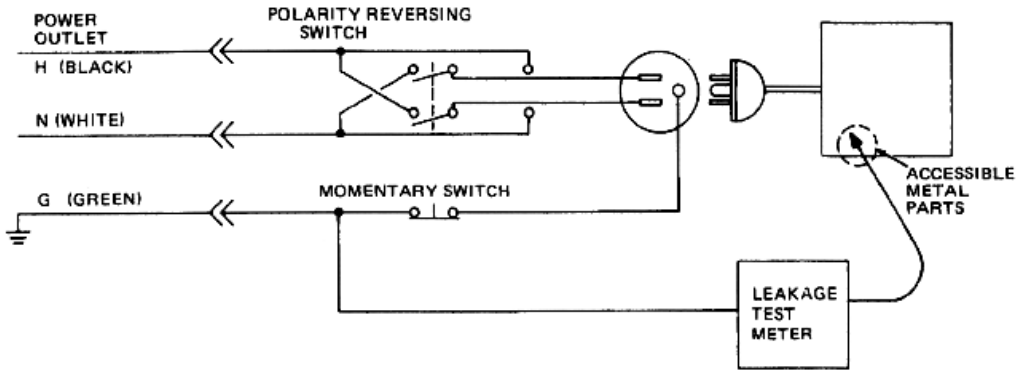


Figure 10-3. Set Up for Chassis Source Leakage Current, IEC 601-1 Clause 19 - Continuos Leakage Currents and Patient, Auxiliary Currents

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to ground will be indicated in any of the current ranges. The maximum allowable limit for chassis source leakage is shown in Table 10-12 *on page 10-21*.

Data Sheet for enclosure Source Leakage Current

The test passes when all readings measure less than the value shown in Table 10-12 *on page 10-21*. Record all data on the PM Inspection Certificate.

Table 10-16: Typical Data Sheet for enclosure Source Leakage Current

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Speaker Cover	Test 2 Real Panel Metal Parts	Optional Test 3	Optional Test 4
Enter Name of tested peripheral here:						
ON	NORM	OPEN				
ON	NORM	CLOSED				
ON	REV	OPEN				
ON	REV	CLOSED				
OFF	NORM	OPEN				
OFF	NORM	CLOSED				
OFF	REV	OPEN				
OFF	REV	CLOSED				

Probe leakage current test

d

DANGER

DO NOT USE THE PROBE IF THE INSULATING MATERIAL HAS BEEN PUNCTURED OR OTHERWISE COMPROMISED.

INTEGRITY OF THE INSULATION MATERIAL AND PATIENT SAFETY CAN BE VERIFIED BY SAFETY TESTING ACCORDING TO IEC60601-1.

c

CAUTION

Equipment damage possibility. Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the Ultrasound system may be damaged.

Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

NOTE: Some leakage current is expected on each probe, depending 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.

Tools

For needed tools, see: ‘Tools required’ on *page 10-8*.

Generic procedure on probe leakage current

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the probe must be active to find the worst case condition.

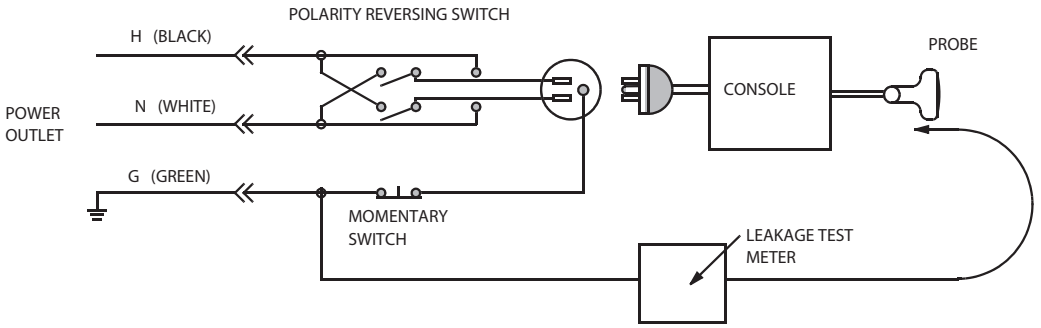


Figure 10-4. Set up for probe leakage current

NOTE: Each probe will have some amount of leakage current, 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.

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 UNIT UNDER TEST WHILE DOING THE TEST**.

Meter Procedure Using Probe Adapter

Follow the Safety Analyzer tool instruction to test each transducer for leakage current.

The electrical Safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

No Meter Procedure Using Probe Adapter

Follow the Safety Analyzer tool instruction to test each transducer for leakage current.

The electrical Safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

Data Sheet for Transducer Source Leakage Current

The test passes when all readings measure less than the values shown in Table 10-13 *on page 10-21*. Record all data on the PM Inspection Certificate.

Table 10-17: Typical Data Sheet For Transducer Source Leakage Current

Transducer Tested:			
Unit Power	**Tester Power Polarity Switch**	**Tester GROUND or NUETRAL Switch**	**Measurement**
ON	NORM	OPEN	
ON	NORM	CLOSED	
ON	REV	OPEN	
ON	REV	CLOSED	
OFF	NORM	OPEN	
OFF	NORM	CLOSED	
OFF	REV	OPEN	
OFF	REV	CLOSED	

When there's too much leakage current …

AC/DC Fails

Where applicable, check the AC/DC adapter and its cable. Replace a new one if any portion is defective.

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.

Probe Fails

Test the probe in another connector to isolate if the fault lies with the probe or the Ultrasound system. Or Change another probe to confirm if the fail is caused by console.

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 system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

Peripheral Fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

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.

New Unit

If the leakage current measurement tests fail on a new Ultrasound system and if situation can not be corrected, submit a Safety Failure Report to document the Ultrasound system problem. Remove Ultrasound system from operation.

ECG Fails

Inspect cables for damage or poor connections.

Inspection Paperwork

Ultrasound Inspection Forms

ULTRASOUND INSPECTION CERTIFICATE

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/Contract/HBS
System Type		Model Number:	Serial Number:	Manufacture Date:
Probe 1:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 2:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 3:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 4:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 5:	Frequency:	Scan Format*:	Model Number:	Serial Number:

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

Figure 10-5. Ultrasound Inspection Certificate

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

Ultrasound Inspection Forms (continued)

FUNCTIONAL CHECKS

Functional Check (if applicable)	OK? or N/A
B-Mode Function	
Doppler Modes Function	
CF-Mode Function	
M-Mode Function	
Applicable Software Opti ons	
Applicable Hardware Options	
Control Panel	
LCD	
Measurement Accuracy	
GE Approved Peripherals	

PHYSICAL INSPECTION AND CLEANING

Physical Inspection and Cleaning (if applicable)	Inspect	Clean
Console		
LCD		
External I/O		
Cables and Connectors		
GE Approved Peripherals (DVD-RW, Printer)		
Labeling (see User Manual for Labeling)		

COMMENTS:

_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____

Figure 10-6. Functional Checks

ELECTRICAL SAFETY

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct ground &wiring config.)				
Type BF Applied Part Leakage Current Limits- Probe				
enclosure Source Leakage Current - Chassis Leakage Current Limits				
Peripheral 1 Leakage Current				
Peripheral 2 Leakage Current				

PROBES

Probe Number (from previous page)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				

Final Check. All system covers are in place. System scans with all probes as expected.

Accepted by: _____

Figure 10-7. Electrical Safety

Electrical Safety Tests Log

Table 10-18: Electrical safety tests log

Electrical test performed	Max value allowed	Value measured	OK?	Comments
Outlet (correct ground and wiring config.)				
System ground continuity				
Chassis source leakage current - probe				
Chassis source leakage current - wheel				
Chassis source leakage current - monitor				
Patient lead source leakage (lead to ground)				
Patient lead source leakage (lead to lead)				
Patient lead source leakage (isolation)				
Peripheral 1 leakage current				
Peripheral 1 ground continuity				
Peripheral 2 leakage current				

Table 10-18: Electrical safety tests log (Continued)

Electrical test performed	Max value allowed	Value measured	OK?	Comments
Peripheral 2 ground continuity				
Peripheral 3 leakage current				
Peripheral 3 ground continuity				

Table 10-19: Electrical safety tests (probes) log

Probe	Max value allowed	Max value measured	OK?	Comments

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