Technical Publication

LOGIQ V3/V5/V5 Expert

Basic Service Manual
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Rev.8

Product Information

This Manual covers the software version of R2.x.x for LOGIQ V3, LOGIQ V5, LOGIQ V5 Expert ultrasound system.

GE

Revision history

Revision History

Revision	Date (YYYY/MM/DD)	Reason for change
Rev.1	2016/01/21	Initial Release
Rev.2	2016/06/12	Update control panel figure and book format
Rev.3	2016/08/10	Update warning label
Rev.4	2016/08/24	Update peripheral list
Rev.5	2016/10/12	Update unpacking process
Rev.6	2017/04/19	Update as software updates
Rev.7	2017/06/14	Add manufacturer information
Rev.8	2017/08/23	Update peripheral list

List of Effected Pages (LOEP)

CHAPTER NUMBER	Revision	CHAPTER NUMBER	Revision
Front	Rev.8	Chapter 6	Rev.8
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TOC	Rev.8	Chapter 8	Rev.8
Chapter 1	Rev.8	Chapter 9	Rev.8
Chapter 2	Rev.8	Chapter 10	Rev.8
Chapter 3	Rev.8	Index	Rev.8
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Chapter 5	Rev.8		

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Important precautions

Translation policy

WARNING

WARNUNG

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!

OPOZORILO

警告

警告

OSTRZEŻENIE

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

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

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

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

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

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.

JSPĖJIMAS

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.

CẢNH BÁO

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

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

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.

Damage in transportation

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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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.

1-1 Overview

1-1-1 Contents in this chapter

1-2 Manual Overview

This manual provides installation and service information for the LOGIQ V3/V5/V5 Expert Ultrasound system. It is divided in ten chapters as shown below.

1-2-1 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 V3/V5/V5 Expert.
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 V3/V5/V5 Expert.

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 V3/V5/V5 Expert.
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 V3/V5/V5 Expert.
10.	Care & Maintenance	Provides periodic maintenance procedures for LOGIQ V3/V5/V5 Expert.
N/A	Index	A quick way to the topic you're looking for.

1-2-2 Typical users of the Proprietary Service Manual

- GEHC Service Personnel (setup, maintenance, etc.)
- GEHC Online Center Personnel
- Licensed Hospital's Service Providers

1-2-3 Purpose of Operator Manual(s)

The Operator Manual(s) should be fully read and understood before operating the LOGIQ V5/LOGIQ V3 and also kept near the unit for quick reference.

NOTE: *Probe information displayed on screen does not necessarily reflect the probes available on your ultrasound system. Please refer to the probe list for available probes and features.*

1-2-4 LOGIQ V3/V5/V5 Expert models covered by this manual

Table 1-2:   LOGIQ V3/V5/V5 Expert Model Designations

Model Number	Description	System SW
H48612AA	LOGIQ V3	R2.x.x
H48612AB	LOGIQ V5	R2.x.x
H48612AC	LOGIQ V5 EXPERT	R2.x.x

NOTE: *When not otherwise specified, the contents of this manual applies to all LOGIQ V3/V5/V5 Expert models.*

1-3 Important conventions

1-3-1 Conventions used in book

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

1-3-1-1 Model designations

This manual covers the LOGIQ V3/V5/V5 Expert Ultrasound systems listed in:

1-3-1-2 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.

1-3-1-3 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.*

1-3-2 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.

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.

1-3-2-1 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.

1-4 Product icons

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

1-5 Labels locations

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

1-5-1 Rating Plate Location

LOGIQ V3/V5/V5 Expert labels are provided in English.

The labels are at the bottom of the system. The label content may be different for different regions. Please refer to the labels on the system for the actual content.

1-5-1 Rating Plate Location(continued)
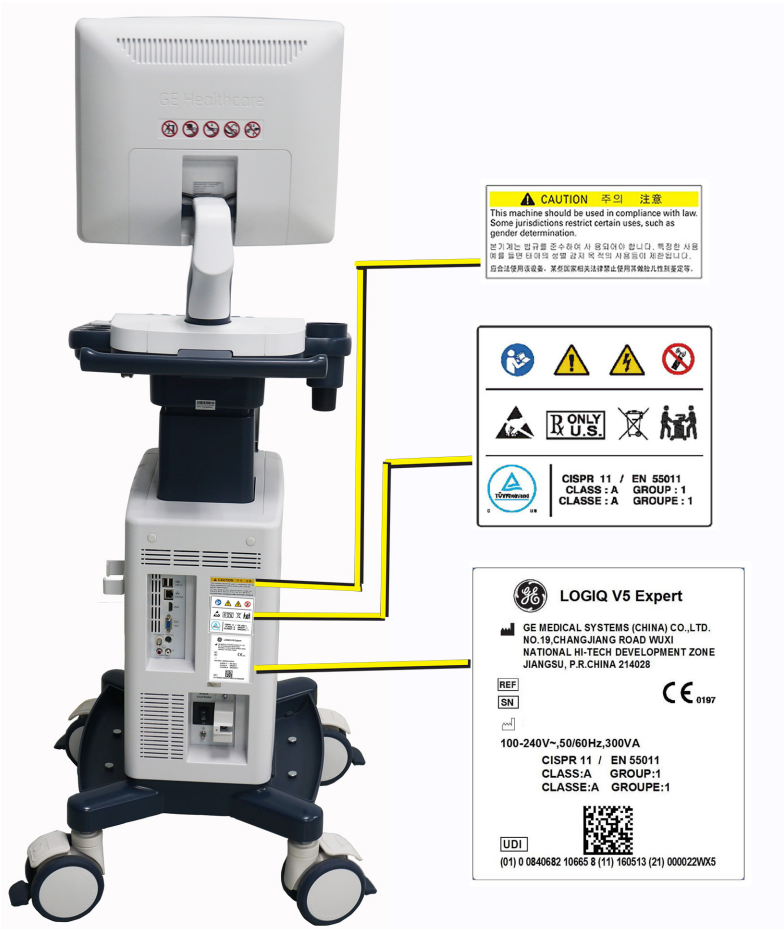
Figure 1-1.   LOGIQ V5 Expert Label Location

1-5-1 Rating Plate Location(continued)
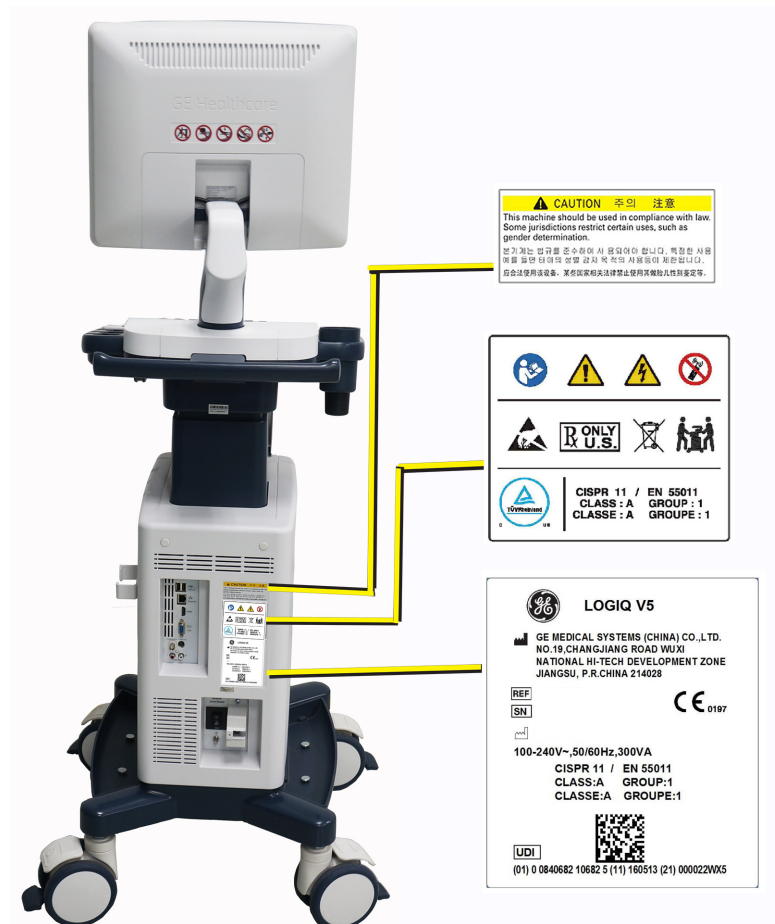
Figure 1-2.   LOGIQ V5 Label Location

1-5-1 Rating Plate Location(continued)
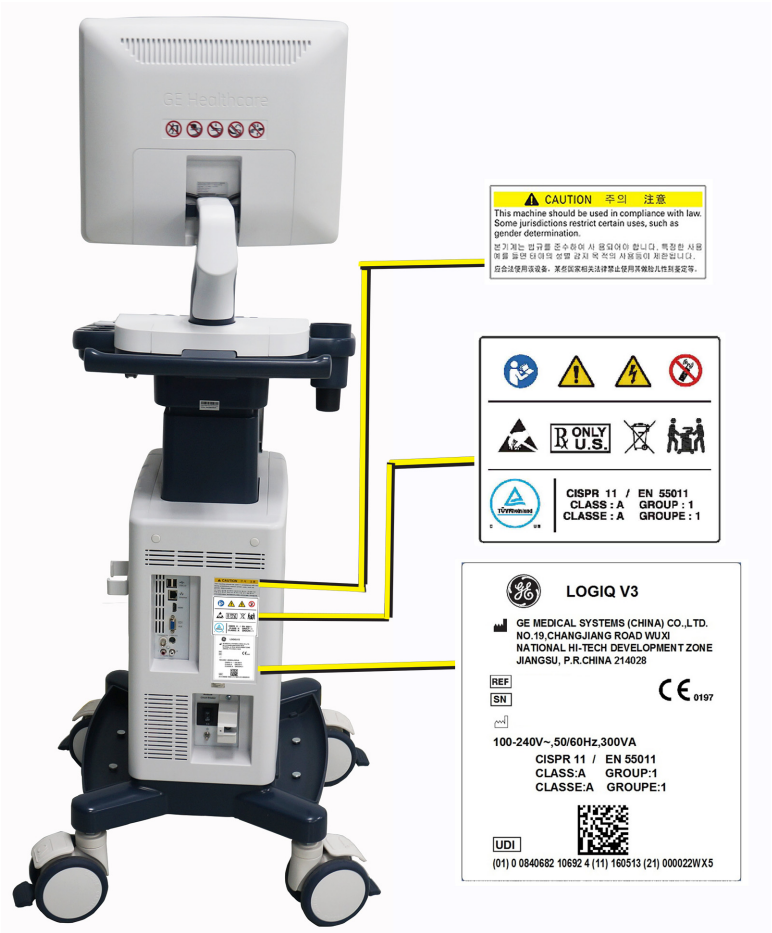
Figure 1-3.   LOGIQ V3 Label Location

1-5-1 Rating Plate Location(continued)

1. Rating Plate

Table 1-5:   Label Icons

Label/Icon	Purpose/Meaning	Location
UDI (01) 0 0840682 10692 4 (11) 160513 (21) 000022WX5	Every system has a unique marking for identification, the Unique Device Identification (UDI) Label. The UDI label consists of a series of alpha-numeric characters and barcode which uniquely identify the LOGIQ V3/ V5/V5 Expert system as a medical device manufactured by General Electric. Scan or enter the UDI information into the patient health record as required by country-specific laws.	Rating plate
SN	Serial Number.	Rating plate

NOTE: *If the new label is needed during the service activities, please click "Ask an Expert" to submit the case in the support central: http://supportcentral.ge.com/products/sup_products.asp?prod_id=44177.*

1-6 Safety considerations

1-6-1 Contents in this section

1-6-2 Introduction

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

1-6-3 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 V3/V5/V5 Expert Training Seminar are authorized to service the equipment.

1-6-3 Human Safety(continued)

| w ⚠ 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. |

| w ⚠ WARNING | Have two people available to deliver and unpack the LOGIQ V3/V5/V5 Expert. |

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

| w ⚠ 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

1-6-3 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.

1-6-4 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 V3/V5/V5 Expert weighs approximately 65 kg (144 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.

1-6-4 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 V3/V5/V5 Expert 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.

1-6-4 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.

1-6-5 Electrical safety

1-6-5-1 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.

 WARNING Connecting a LOGIQ V3/V5/V5 Expert to the wrong voltage level will most likely destroy it.

 WARNING DO NOT SERVICE OR DISASSEMBLE PARTS UNDER FRU UNIT LEVEL AT ANY CIRCUMSTANCES.

1-6-5-2 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.

1-6-5-3 Peripherals

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

1-7 Dangerous procedure warnings

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

⚠ DANGER	DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.
⚠ WARNING	If the covers are removed from an operating LOGIQ V3/V5/V5 Expert, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shutdown mode.
⚠ WARNING	Explosion Warning **DO NOT** operate the equipment in an explosive atmosphere. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.
⚠ WARNING	**DO NOT** substitute parts or modify equipment Because of the danger of introducing additional hazards, ONLY install GE approved parts. DO NOT perform any unauthorized modification of the equipment.
⚠ WARNING	SHUT DOWN FORCEDLY OR PLUG IN/OUT ACDC INVALID MAY CAUSE THE DAMAGE OF SYSTEM FILES.
⚠ WARNING	AFTER UNPLUG POWER CORD, WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

1-8 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. Apply Lockout/Tagout Devices.
5. Control all stored and residual energy.
6. Verify isolation.

All potentially hazardous stored or residual energy is relieved.

 WARNING Energy Control and Power Lockout for LOGIQ V3/V5/V5 Expert.

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.

Ultrasound System components may be energized.

TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON

1-9 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.

1-10 EMC, EMI and ESD

1-10-1 Electromagnetic Compatibility (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.

1-10-2 CE Compliance

LOGIQ V3/V5/V5 Expert 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 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.*

1-10-3 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.

1-11 Customer assistance

1-11-1 Contact information

If this equipment does not work as indicated in this service manual or in the basic 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 log (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.

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

1-11-2 Phone numbers for Customer Assistance

Table 1-6: 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

1-11-3 System manufacturer

Table 1-7: 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

1-11-4 Authorized Representative

Table 1-8:   Authorized Representative

AUTHORIZED REPRESENTATIVE	TELEPHONE / FAX NUMBER
The location of the CE marking is shown in the Safety chapter of the Basic 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

1-11-5 Factory Site

Table 1-9:   Factory Site

Factory Site	TELEPHONE / FAX NUMBER
GE Medical Systems (China) Co., Ltd. No.19, Changjiang Road, Wuxi National Hi-Tech Development Zone, Jiangsu, P.R. China 214028	TEL: +86 510-85225888 FAX: +86 510-85226688

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.

2-1 Overview

2-1-1 Contents in this chapter

2-2 General Ultrasound system requirements

2-2-1 Contents in this section

2-2-2 Ultrasound system environmental requirements

2-2-2-1 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.

⚠ CAUTION   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	-4.5	-2	0.5	3	40	42.5	45	47.5	50	55	60
Degree F	23.9	28.4	32.9	37.4	104	108.5	113	117.5	122	131	140
hours	3	2	1	0	0	1	2	3	4	6	8

2-2-2-2 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

*NOTE: Temperature in degrees C. Conversion to Degrees F = (Degrees C * 9/5) + 32.*

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

⚠ CAUTION   The LOGIQ V3/V5/V5 Expert system and probe connector is not waterproof. Do not expose the device to water or any kind of liquid.

2-2-2-3 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.*

2-2-2-4 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.

2-2-3 Electrical requirements

2-2-3-1 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.*

2-2-3-2 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 V3/V5/V5 Expert system

Voltage	Tolerance	Power Consumption	Frequency
100-240 VAC	±10%	Max. 300VA	50/ 60HZ

2-2-3-3 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.

2-2-3-4 Site circuit breaker

It is recommended that the branch circuit breaker for the Ultrasound system be readily accessible.

⚠ CAUTION   POWER OUTAGE MAY OCCURE.

The LOGIQ V3/V5/V5 Expert 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.

2-2-3-5 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.

2-2-3-6 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.

2-2-3-7 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	

2-2-4 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
- portable phones

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

See: 2-2-4-1 'EMI prevention/abatement' on *page 2-10* for EMI prevention tips.

2-2-4-1 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.

2-2-5 Probes environmental requirements

2-2-5-1 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	3° - 40° C 38° - 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

⚠ 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.*

2-2-6 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.

2-3 Facility needs

2-3-1 Contents in this section

2-3-2 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.

2-3-3 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.*

<u>Sites with a mains power system with defined Neutral and Live</u>:

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.

<u>Sites with a mains power system without a defined Neutral</u>:

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.

2-3-3 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 Ultrasound 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: 2-2-3 'Electrical requirements' on *page 2-6*.

2-3-4 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

2-3-5 Minimal floor plan suggestion

CSI 8x10
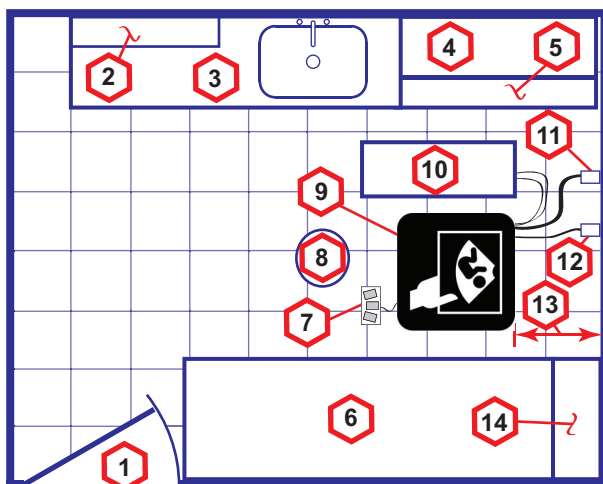
Scale:
Each square equals one square foot (app. 31 x 31 cm)

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)

2-3-6 Recommended floor plan suggestion

CSI 14x17
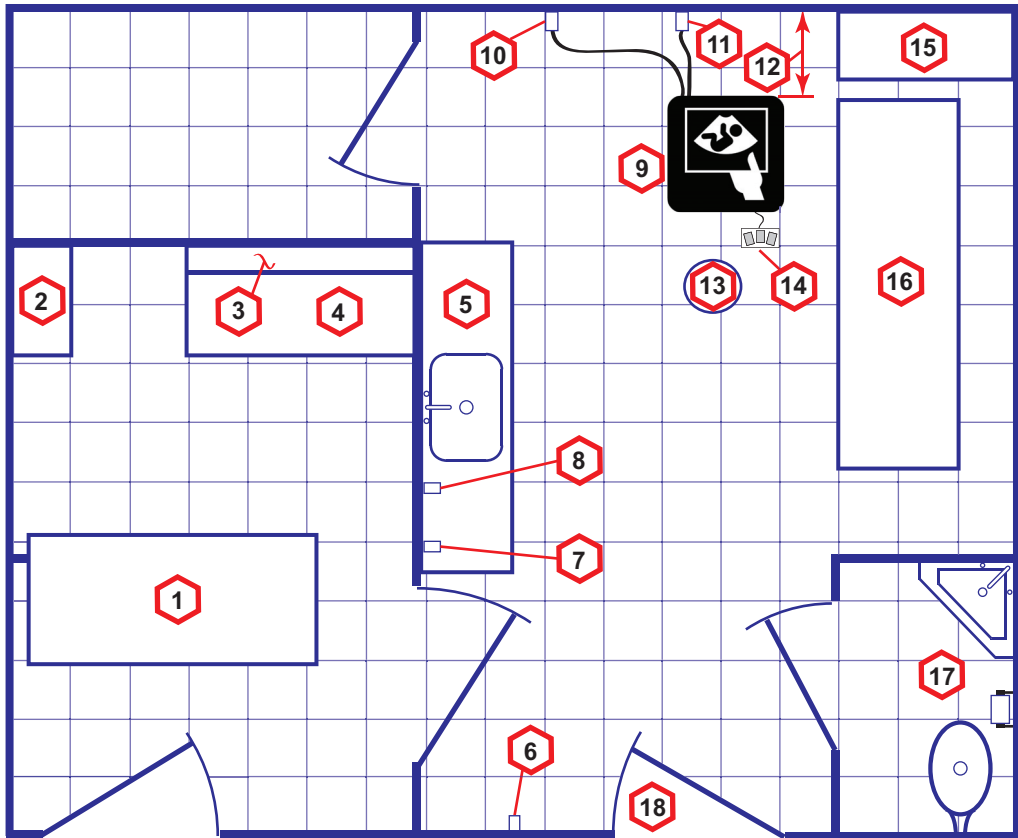
Scale: Each square equals one square foot (app. 31 x 31 cm)

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

2-3-7 Networking setup requirements

2-3-7-1 Stand alone Ultrasound system (without network connection)

None.

2-3-7-2 Scanner connected to hospital's network

Supported networks:

100/1000 Mbit Ethernet/DICOM network (option)

2-3-7-3 InSite requirements

InSite requires an Ethernet connection via:

• 100/1000 Mbit Interface

2-3-7-4 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.

2-3-7-5 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.

2-3-7-5 DICOM option setup requirements(continued)

Figure 2-3.   Worksheet for DICOM Network Information

Chapter 3

System Setup

This chapter contains information needed to install LOGIQ V3/V5/V5 Expert 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.

3-1 Overview

3-1-1 Contents in this chapter

3-2 Setup reminders

3-2-1 Average setup time

- Unpacking the LOGIQ V3/V5/V5 Expert: 30 minutes
- Set up LOGIQ V3/V5/V5 Expert options: 30 minutes
- DICOM Network Configuration: 30 minutes or more, depending on the configuration
- Install Insite: 0.5 hour

The LOGIQ V3/V5/V5 Expert installation and functional checkout will take approximately 1 hour. LOGIQ V3/V5/V5 Expert consoles with optional equipment may take slightly longer.

3-2-2 Setup warnings

⚠ **DANGER** 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!

⚠ **CAUTION** 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.

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

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

3-2-2 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 3°C or above 40°C.

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

CAUTION   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	23	23
hours	4	2	0	0	0	0	0	0	0	2	4	6

3-2-2 Setup warnings(continued)

⚠️ CAUTION   Operator Manual(s)

The User Manual(s) should be fully read and understood before operating the LOGIQ V3/V5/V5 Expert and kept near the Ultrasound system for quick reference.

⚠️ CAUTION   Acoustic Output Hazard

Although the ultrasound energy transmitted from the LOGIQ V3/V5/V5 Expert probe is within AIUM/NEMA standards, avoid unnecessary exposure. ultrasound energy can produce heat and mechanical damage.

3-3 Receiving and unpacking the equipment

3-3-1 Purpose of this section

This section describes how to receive and unpack LOGIQ V3/V5/V5 Expert.

3-3-2 Contents in this section

3-3-3 Warnings for receiving and unpacking

⚠ CAUTION	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.

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

3-3-4 LOGIQ V3/V5/V5 Expert transportation box label

The LOGIQ V3/V5/V5 Expert transportation box label is located at the front of the transportation box.
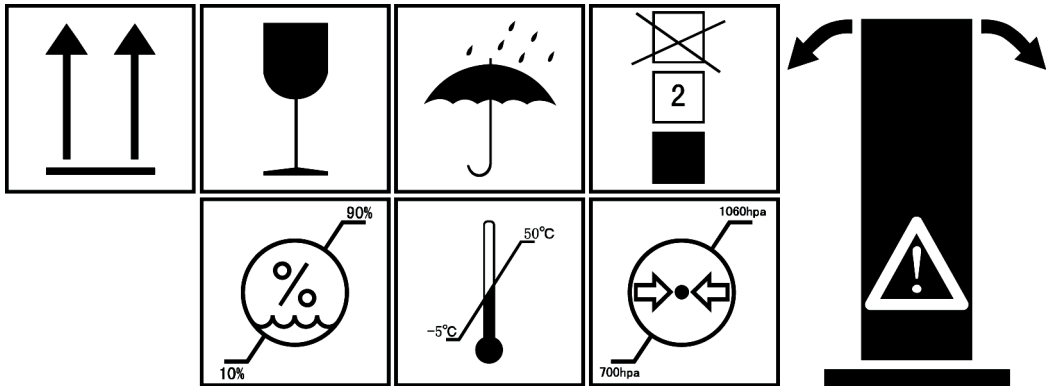
Figure 3-1.   LOGIQ V3/V5/V5 Expert transportation box label 1
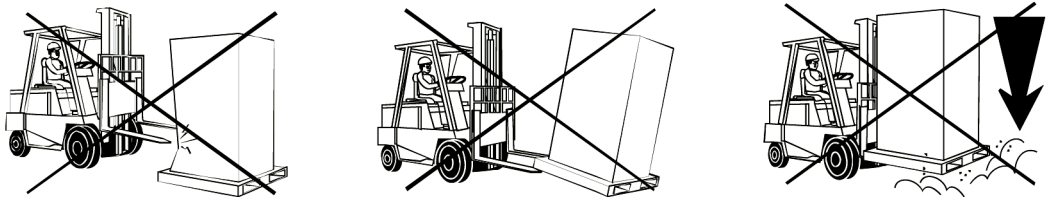
Figure 3-2.   LOGIQ V3/V5/V5 Expert transportation box label 2

3-3-5 Unpacking the LOGIQ V3/V5/V5 Expert

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 V3/V5/V5 Expert, so that it can be reused for service.

⚠ CAUTION   Do not lift the unit by the Keyboard. Equipment damage may result.

⚠ CAUTION   The crate with the LOGIQ V5/LOGIQ V3 weighs approximately 50kg. Be prepared for a sudden shift of weight as the unit is removed from its base (pallet).

NOTE: Please check the LOGIQ V3/V5/V5 Expert console is well assembly after unpacking the system.

Table 3-2:   Unpacking the LOGIQ V3/V5/V5 Expert

Step	Description	Corresponding Graphic
1	Tear off the "stop open" mark.	

Table 3-2:   Unpacking the LOGIQ V3/V5/V5 Expert
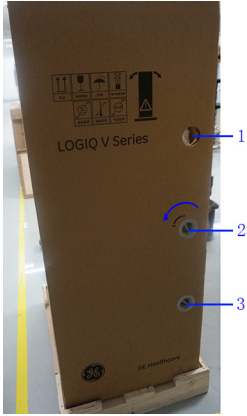
Step	Description	Corresponding Graphic
2	Cut off the two packing straps around the crate. *Note: To avoid injury, hold the strap clasp with one hand when cutting the strap.*	
3	Remove the top cover.	
4	Remove the three plastic locks. *Note: Rotate the inside plastic lock* counterclockwise to remove it and then remove the outside lock.	
5	Remove the outside shipping box.	

Table 3-2:   Unpacking the LOGIQ V3/V5/V5 Expert
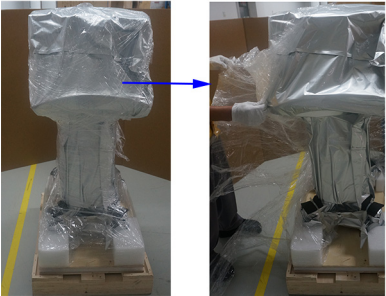
Step	Description	Corresponding Graphic
6	Remove the dust bag from the unit. *Note: There is no dust bag if the system is transported by sea. Ignore this step if there is no dust bag.*	
7	Remove the clear plastic (wrapped around the LOGIQ V3/V5/V5 Expert) from the unit.	
8	Cut the packing straps around the four wheels.	

Table 3-2:   Unpacking the LOGIQ V3/V5/V5 Expert

Step	Description	Corresponding Graphic
9	Remove the 4 foams besides the wheels and remove the aluminum foil bag from the unit. *Note: To avoid damaging the unit, please use a pair of scissors instead of the knife.*	
10	Remove the foams beside the LCD monitor.	
11	Unlock the wheels, and then hold the control panel at the front side to move the system until the front two wheels on the ground and then slowly move the whole system on the ground.	

3-3-5-1 Moving into Position

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

3-3-6 Packing the Equipment

Please pack LOGIQ V3/V5/V5 Expert in the reverse order of unpacking.

3-4 Preparing for setup

3-4-1 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.

3-4-2 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.

3-4-3 EMI protection

The LOGIQ V3/V5/V5 Expert 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 2-2-4 'EMI limitations' on *page 2-9* for more information about EMI protection.

3-5 Completing the setup

3-5-1 Purpose of this section

This section describes how to complete the installation of LOGIQ V3/V5/V5 Expert.

3-5-2 Contents in this section

3-5-3 System specifications

3-5-3-1 System requirements verification

- Verify that the site meets the requirements listed in Chapter 2.
  (See: 2-3 'Facility needs' on *page 2-12*.)
- Verify that the specifications below don't conflict with any on-site conditions.

3-5-3-2 Physical dimensions

Table 3-3:   Physical dimensions of LOGIQ V3/V5/V5 Expert

Height	Width	Depth	Unit
1344 (system with 15" LCD Monitor) 1399 (system with 17" LCD Monitor) 1415 (system with 19" LCD Monitor)	455	722	mm
52.91 (system with 15" LCD Monitor) 55.08 (system with 17" LCD Monitor) 55.71 (system with 19" LCD Monitor)	17.9	28.43	Inches

3-5-3-3 Console Weight

- Weight (system with 15" LCD Monitor): approx. 43 kg (95 lbs)
- Weight (system with 17" LCD Monitor): approx. 45 kg (99 lbs)
- Weight (system with 19" LCD Monitor): approx. 48 kg (106 lbs)

3-5-4 Electrical specifications

^w ⚠️ WARNING   Connecting a LOGIQ V3/V5/V5 Expert to the wrong voltage level will most likely destroy it.

3-5-4-1 Verification of the system's voltage setting

Verify that the mains voltage specified for the LOGIQ V3/V5/V5 Expert is available on-site.

Refer to the latest revision of the Basic User Manual for a full list of product labels prior to serving the system.

3-5-4-2 Electrical specifications for LOGIQ V3/V5/V5 Expert

In the table below, the electrical specifications for LOGIQ V3/V5/V5 Expert includes monitor and on board peripherals.

Table 3-4:   Electrical specifications for LOGIQ V3/V5/V5 Expert

Part Number	Description	Voltage	Tolerances	Power consumntion	Frequency
5715379	LOGIQ V3	100-240V	±10%	Max.300VA	50/60 Hz
5715380	LOGIQ V5				
5718054	LOGIQ V5 EXPERT				
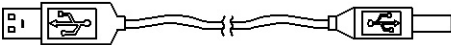
3-5-5 Connecting Cables

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

Table 3-5:   List of Connecting Cables.

Name	Part No.	Figure	NOTE
USB Cable		Max.300VA	For USB Printer

3-5-6 Peripherals/Accessories Connector Panel

LOGIQ V5/LOGIQ V3 peripherals and accessories can be properly connected using the side connector panel.
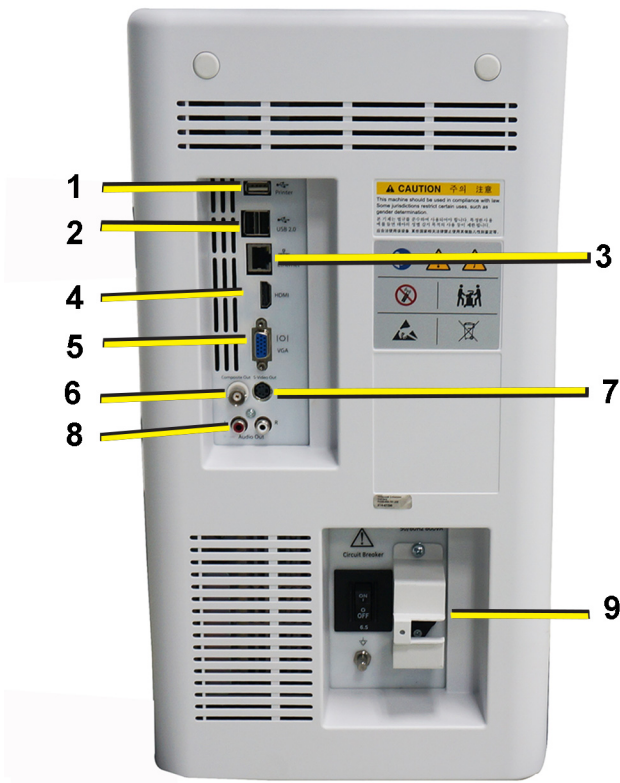
Figure 3-3.   Rear Connector Panel

NOTE: The AC printer can be connected to the isolated Printer USB port on the rear panel only.

1.	Printer	Dedicated external USB printer connection
2.	Dual USB port	USB for use
3.	Ethernet	100MBase-T for net connectivity
4.	HDMI port	For video port
5.	VGA	VGA Video Out
6.	Composite Out	Composited Video Out
7.	S-Video	S-Video Out
8.	Audio Out	Audio Line Out
9.	AC Inlet	100-240V

3-5-6-1 Pin assignment for each connector

Table 3-6:   Pin Assignments of External VGA

Pin No.	Signal	Pin No.	Signal
1	RED	9	NC
2	GREEN	10	NC
3	BLUE	11	NC
4	NC	12	NC
5	NC	13	HSY
6	GND	14	VSY
7	GND	15	NC
8	GND		

Table 3-7:   Pin Assignments of USB

Pin No.	Signal	Pin No.	Signal
1	+5 VDC	5	+5 VDC
2	DATA	6	DATA
3	DATA	7	DATA
4	GND	8	GND

Table 3-8:   Pin Assignments of Audio

Pin No.	Signal	Pin No.	Signal
1	GND	4	NC
2	L+	5	R+
3	Speaker L	6	Speaker R

Table 3-9:   Pin Assignment of S-Video

Pin No.	Output Signal	Pin No.	Output Signal
1	GND	3	Y
2	GND	4	C

Table 3-10:   Pin Assignment of Composite Video Out

Pin No.	Output Signal	Pin No.	Output Signal
1	Composite Out	2	GND

3-5-7 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 V3/V5/V5 Expert, 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.*

3-5-7-1 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 V3/V5/V5 Expert.

3-5-7-2 Connect USB Flash Drive

NOTE: *USB Flash Drive approved for LOGIQ V3/V5/V5 Expert 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 V3/V5/V5 Expert 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 V3/V5/V5 Expert.

3-5-8 Connecting probes

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

3-5-9 Powering the system

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

3-6 System Configuration

3-6-1 Purpose of this section

This section describes how to configure the LOGIQ V3/V5/V5 Expert.

3-6-2 LOGIQ V3/V5/V5 Expert configuration

For complete instructions, refer to the latest revision of the LOGIQ V3/V5/V5 Expert Basic User Manual, Chapter 16.

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

3-6-2-1 User Configurable Key installation

When the system is received, please check the software option installed on the system, you can refer to the label on the system's rear neck for detailed information. The option with check mark enabled means it is installed.

```
┌─────────────────────────────────────────┐
│       LOGIQ V Series S/W Function        │
│                                          │
│  ☑ Basic        ☑ Auto IMT     ☑ CWD     │
│  ☑ Color Flow   ☑ AMM          ☑ 4D      │
│  ☑ ScanCoach    ☑ Easy 3D      ☑ Report  │
│  ☑ Sonobiometry ☑ LOGIQ View   ☑ 12L-RS  │
│  ☑ TVI          ☑ DICOM        ☑ DVD RW  │
│                                          │
│  System Serial#:XXXXXXXX                 │
│  S/W Key:XXXXX-XXXXX-XXXXX-XXXXX-XXXXX    │
│  GE Medical Systems(China)Co., Ltd.      │
└─────────────────────────────────────────┘
```

Figure 3-4.   Software Option Label

3-6-2-1 User Configurable Key installation(continued)

TVI, LOGIQ View or 3D/4D, If any of them is installed, please replace the blank key cap according to the assigned software function.

Figure 3-5.   Replace Key Cap

There is a key reserved for CWD function, replace the blank key cap for CWD option if CWD option installed.

Figure 3-6.   CWD Key Cap

3-6-2-1 User Configurable Key installation(continued)

After the key cap is replaced, Enter Utility-> System-> User Configurable Key and assign the user defined key.
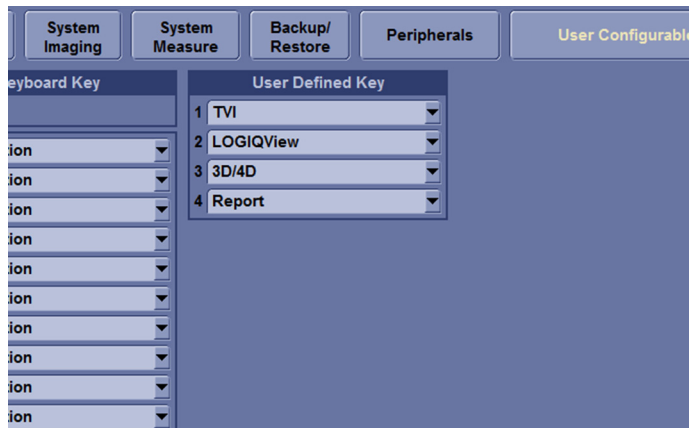
Figure 3-7.   Assign User Configurable Key

3-6-2-2 Multi-language Keyboard Film installation

1.   Take out the keyboard film.
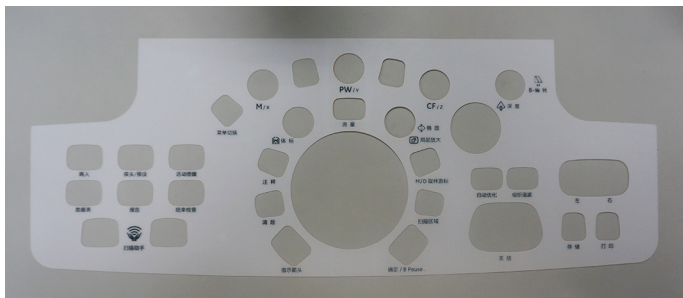
Figure 3-8.   Keyboard Film

3-6-2-2 Multi-language Keyboard Film installation(continued)

2. The paster is divided into four parts, peel off two parts of the paster in the middle of the keyboard film.

Figure 3-9.   Peel Off the Paster

3. Make sure the keyboard is clean. Align the keyboard film on the keyboard and attach it.

Figure 3-10.   Attach The Film

3-6-2-2 Multi-language Keyboard Film installation(continued)

4. Peel off the other part of the paster and align the whole film on the keyboard.

Figure 3-11.   Peel Off the Paster

3-7 Peripherals Installation

3-7-1 Overview

This section describes how to install and configure the peripherals validated for the LOGIQ V3/V5/V5 Expert.

About the operation check-out of peripherals, See 4-3-34 'Peripheral checks' on *page 4-43 for more information.*

Table 3-11:   LOGIQ V3/V5/V5 Expert Peripherals

Description	Weight (kg)	Power	Control	Model
B/W USB Printer			USB port	Sony UP-D898MD Printer
B/W USB Printer			USB port	Sony UP-D711MD Printer
Color USB Printer			USB port	Sony UP-D25MD Printer
3-Pedal Footswitch			USB port	MKF 2-MED GP26
1-Pedal Footswitch			USB port	USB FOOT SWITCH FSU-1000
USB Stick			USB port	Keeber 8G USB stick
USB HDD			USB port	USB HDD 1T
ECG			ECG Port	USB ECG Module
VGA to Svideo adapter			VGA Port	VGA Video Adapter
Wireless Adaptor			USB port	Netgear A6210 USB Wireless Adapter
DVD RW Kit			USB port	LV R2 DVD RW Kit

3-7-2 Furnished materials

This section describes the materials 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 3-12:   Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	Sony UP-D711MD Printer	1	
2	Sony UP-D898MD Printer	1	
3	Paper Roll	1	
4	USB cable	1	

• Color USB Printer

Table 3-13:   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	

• USB Stick

Table 3-14:   Materials furnished with USB Stick

Item	Description	Quantity	Note
1	Keeber USB Stick	1	
2	USB cable	1	

• USB HDD

Table 3-15:   Materials furnished with the USB HDD

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

• Footswitch

Table 3-16: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	1 Pedal Footswitch	1	
2	3 Pedal Footswitch	1	

• Wireless Adaptor

Table 3-17: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	1 Wireless Adaptor	1	

• DVD RW

Table 3-18: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	1 DVD RW	1	
2	1 Y cable	1	

3-7-3 Peripherals Installation Instructions

3-7-3-1 Sony UP-D711MD Printer Installation

3-7-3-1-1 Tools

No special tools needed.

3-7-3-1-2 Manpower

One person 5 min.

3-7-3-1-3 Preparations

1. Unpack B/W Printer.
2. Ensure no physical damage.

3-7-3-2 Installation Procedure

NOTE: *The printer driver is customized for the LOGIQ V3/V5/V5 Expert at the factory, you do not need to change the settings.*

1. UP-D711MD Printer can be properly connected using USB Ports.

Figure 3-12.   Connect UP-D711MD to LOGIQ V3/V5/V5 Expert

Sony UP-D711MD Printer is connected to LOGIQ V3/V5/V5 Expert system via the USB port under the control panel.

3-7-3-2-13-7-3-2 Installation Procedure(continued)

NOTE: *The DC printer only can be connected to the system via the DC power port and USB port on the neck of the system as shown below.*
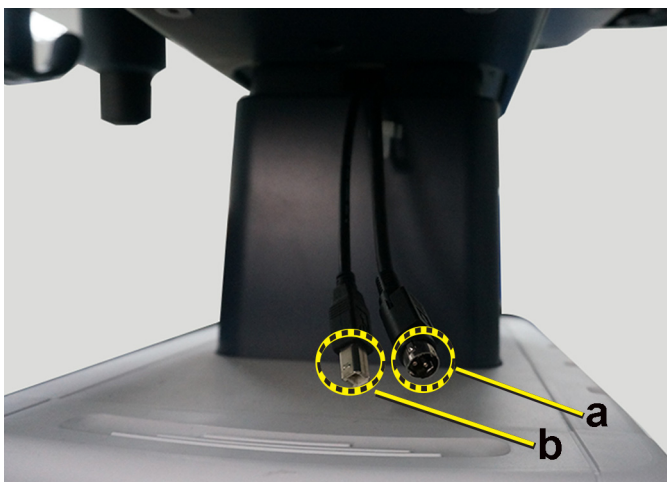
Figure 3-13. Power and USB Ports for DC printer

a. DC Power Port

b. USB POrt

2. Press *Utility* on the Control Panel.

3. Select **Connectivity**-> **Service**, add **Standard Print**.
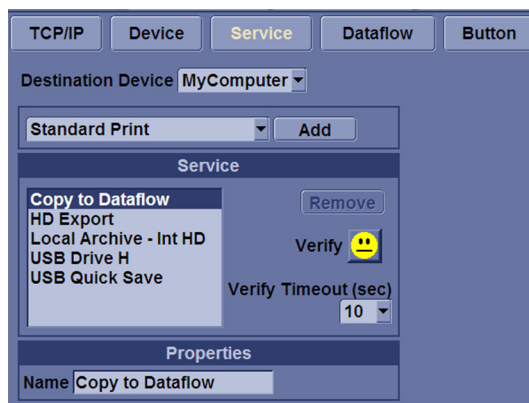
Figure 3-14. Connectivity->Service

3-7-3-2-23-7-3-2 Installation Procedure(continued)

4. Highlight **Standard Print** in the Service list. Select the printer from the Printer pull-down Properties menu. Type the printer name in the Name Filed. This name is used on the Button screen. After you select the printer from the Printer pull-down Properties menu again, it turns white. Press **Save**.

NOTE: After selecting the printer, the field turns white.
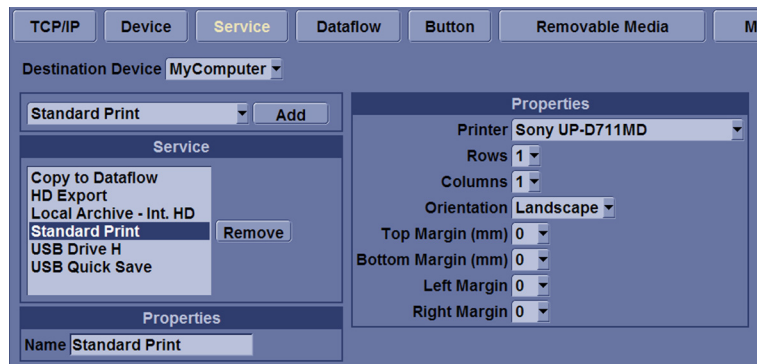
Figure 3-15.   Select the Printer

5. Select **Button**. Select the appropriate print key (Print1, Print2...) from the **Physical Print Buttons** selection. Select the printer from **MyComputer** column and press >> to move it to the Printflow View column. Press**Save**.
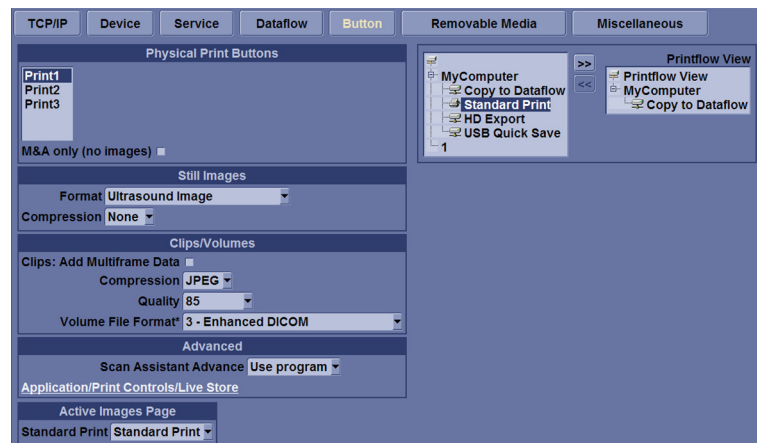
Figure 3-16.   Select Button

3-7-3-2-3 Installation Procedure

Follow these steps to set up the paper size of the printer, take Sony UP-D898 as an example.

- Press Utility-->System-->Peripherals. Select the UP-D898 from the pull-down menu under. Then Click Properties.
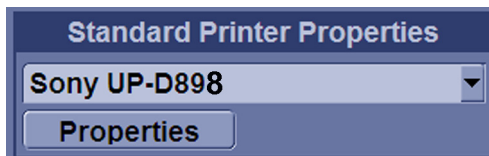
Figure 3-17.   Properties

- Click Print -> Printing Preferences at the menu of Properties Window.
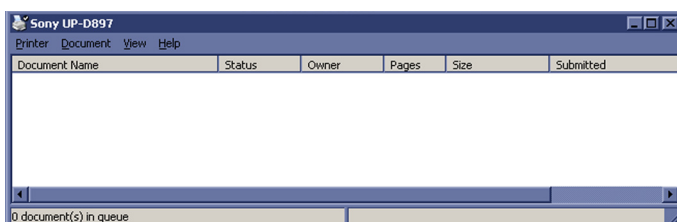
Figure 3-18.   Properties

- Select Paper Size. Press Apply. Press OK.
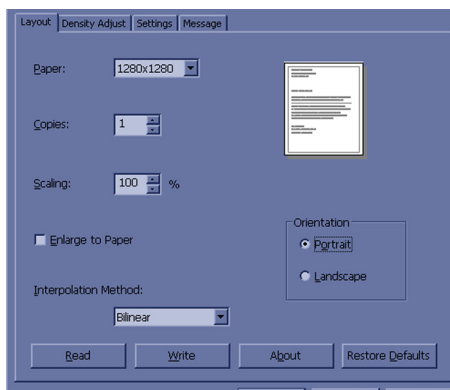
Figure 3-19.   Printing Preferences

- Press Save, then Exit.

3-7-3-3 Sony UP-D25MD Printer Installation

3-7-3-3-1 Tools

No special tools needed.

3-7-3-3-2 Manpower

One person 5 min.

3-7-3-3-3 Preparations

1. Unpack the Sony UP-D25MD Printer.
2. Ensure no physical damage.

3-7-3-3-4 Installation Procedure

1. Place the device in a suitable place.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet, then turn on the printer.
4. Connect USB cable to LOGIQ V3/V5/V5 Expert isolated USB port.

Figure 3-20.   Color Printer connection

5. Refer to the Connectivity configure steps of 3-7-3-1 'Sony UP-D711MD Printer Installation' on *page 3-29*.

3-7-3-4 UP-D898 Printer Installation

3-7-3-4-1 Tools

No special tools needed.

3-7-3-4-2 Manpower

One person 5 min.

3-7-3-4-3 Preparations

1. Unpack the UP-D898 Printer.
2. Ensure no physical damage.

3-7-3-4-4 Installation Procedure

1. Place the device on printer shelf.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet, then turn on the printer.
4. Connect USB cable to LOGIQ V3/V5/V5 Expert via the USB port under the control panel.

Figure 3-21.   UP-D898 Connection

5. Refer to the Connectivity configure steps of 3-7-3-1 'Sony UP-D711MD Printer Installation' on *page 3-29*.

3-7-3-5 Print Shelf Installation

3-7-3-5-1 Tools

No special tools needed.

3-7-3-5-2 Manpower

One person 5 min.

3-7-3-5-3 Preparations

1. Unpack the Printer Shelf.
2. Ensure no physical damage.

3-7-3-5-4 Installation Procedure

1. Screw 2 screws on the rear side of the keyboard bottom.
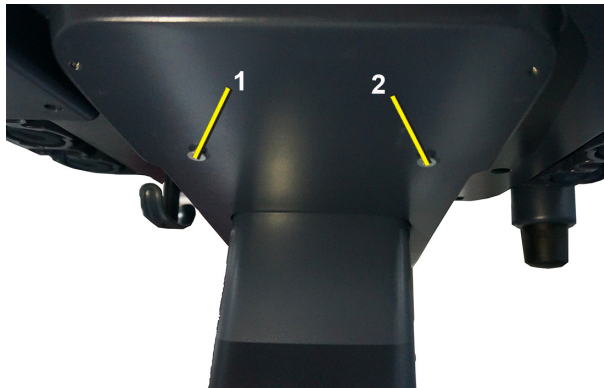
Figure 3-22.   Screw Screws

2. Mount the printer shelf on the system and make sure the 2 screws are in the fixed position.
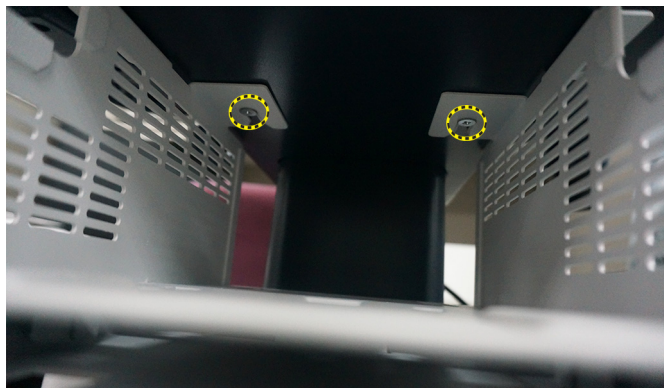
Figure 3-23.   Mount the Printer Shelf

3-7-3-5-4 Installation Procedure(continued)

3. Fix 2 screws on both left and right sides to fix the printer shelf.
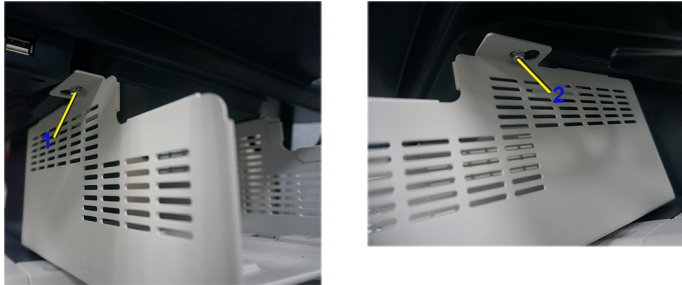
Figure 3-24.   Fix the Printer Shelf

3-7-3-6 Footswitch Installation

3-7-3-6-1 Tools

No special tools needed.

3-7-3-6-2 Manpower

One person 2 min.

3-7-3-6-3 Preparations

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

3-7-3-6-4 Installation Procedure

1. Connect the Footswitch to the USB port on the LOGIQ V3/ V5/V5 Expert system.

Figure 3-25.   Connect Footswitch to the system

3-7-3-6 Footswitch Installation(continued)

3-7-3-6-5 Configuring Footswitch

Footswitch supports these configurations: No Function, Freeze, Next Heartcycle, Prev Heartcycle, Print1, Print2, Update, Next Step (Scan Assistant), Previous Step (Scan Assistant), Scan Assistant pause/Resume.

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

Figure 3-26.   Configuring Footswitch Functions

3-7-3-7 USB HDD Installation

3-7-3-7-1 Tools

No special tools needed.

3-7-3-7-2 Manpower

One person 1 min.

3-7-3-7-3 Preparations

1. Unpack the USB HDD.
2. Ensure no physical damage.

3-7-3-7-4 Installation Procedure

1. Connect the USB HDD to the USB port on the LOGIQ V3/V5/V5 Expert system.

Figure 3-27.   Connect HDD to the system

3-7-3-8 ECG Installation

3-7-3-8-1 Tools

No special tools needed.

3-7-3-8-2 Manpower

One person 1 min.

3-7-3-8-3 Preparations

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

3-7-3-8-4 Installation Procedure

1. Connect the ECG to the USB port on the LOGIQ V3/V5/V5 Expert system and the cables can be hang in the cable hook.

Figure 3-28.   Connect ECG to the system

3-7-3-9 DVDRW Installation

3-7-3-9-1 Tools

No special tools needed.

3-7-3-9-2 Manpower

One person 1 min.

3-7-3-9-3 Preparations

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

3-7-3-9-4 Installation Procedure

1. Take out the DVDRW and USB Y cable and connect the USB Y cable to the DVDRW.

Figure 3-29.   Connect Y cable

2. Insert the DVDRW in the printer shelf right below the printer.

Figure 3-30.   Insert the DVDRW

3-7-3-9-4 Installation Procedure(continued)

3. Connect the two connectors on the Y cable to the USB ports on the system.

Figure 3-31.   DVD RW Connector

3-7-3-10 Wireless Adaptor

3-7-3-10-1 Tools

No special tools needed.

3-7-3-10-2 Manpower

One person 1 min.

3-7-3-10-3 Preparations

1. Unpack the wireless adaptor
2. Ensure no physical damage.

3-7-3-10-4 Installation Procedure

1. Connect the wireless adaptor to the USB port on the LOGIQ V3/V5/V5 Expert system.

Figure 3-32.   Wireless Adaptor Connector

3-8 Option Setup

3-8-1 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, press **Utility** on the control panel, and then select **Admin-> System Admin**.

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

3. Enter the new SW Option key and then select **Add**.

Figure 3-33.   New Option Key

3-8-1 Software Option Installation Procedure(continued)

4. To activate the changes, press **OK** to restart the system.
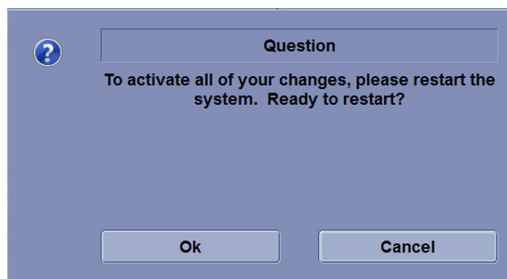
Figure 3-34.   Dialog Window

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.
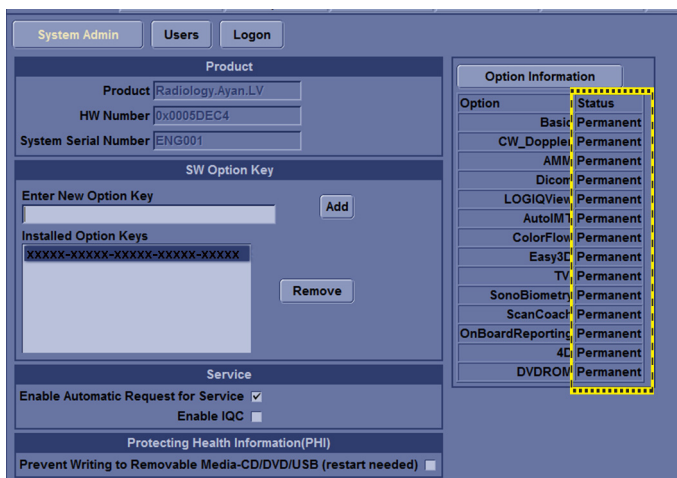
Figure 3-35.   Check Option Status

The option status explanation:

*   Permanent: This option is enabled in the system.
*   Disabled: This option is disabled in the system.

3-8-1 Software Option Installation Procedure(continued)

6. For TVI, LOGIQ View and 3D/4D after the software option installation is complete, replace the blanket user defined key caps with the corresponding option caps on the control panel.

Figure 3-36.   Replace Caps

7. This completes the option installation of LOGIQ V3/V5/V5 Expert.

NOTE: *Installing corresponding hardware is a prerequisite of loading software option successfully. Please check below table for correspondence.*

Table 3-19:   Software Corresponding Hardware

Software Option	Hardware
4D	S4DC PWA
DVDROM	DVD KIT
CW_Doppler	CWD PWA
12L-RS	12L-RS Probe

3-9 Paperwork after setup

NOTE: *During and after setup, the documentation (i.e. CDs with documentation, User Manuals, Installation Manuals, etc.) for the LOGIQ V3/V5/V5 Expert 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.*

3-9-1 Contents in this Section

3-9-2 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.

3-9-3 Product Locator Installation Card

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

Figure 3-37.   Product Locator Installation Card (Example)

Chapter 4

General Procedures and Functional Checks

This chapter provides procedures for quickly checking major functions of the LOGIQ V3/V5/V5 Expert and diagnostics instructions using the built-in service software.

4-1 Overview

4-1-1 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.

4-1-2 Contents in this chapter

4-1-3 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).

4-2 General procedures

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.

WARNING Energy Control and Power Lockout for LOGIQ V3/V5/V5 Expert.

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.

Ultrasound System components may be energized.

4-2-1 Overview

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

4-2-1-1 Contents in this section

4-2-2 Power ON/Boot Up

4-2-2-1 Warnings

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

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

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

^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.

^c ⚠ CAUTION   Use only power supply cords, cables and plugs provided by or designated by GE.

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

4-2-2-2 Connect AC (mains) Power to LOGIQ V3/V5/V5 Expert

Connecting AC Power to the LOGIQ V3/V5/V5 Expert 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.

4-2-2-3 Switch ON the AC Power to LOGIQ V3/V5/V5 Expert

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.*

4-2-3 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:
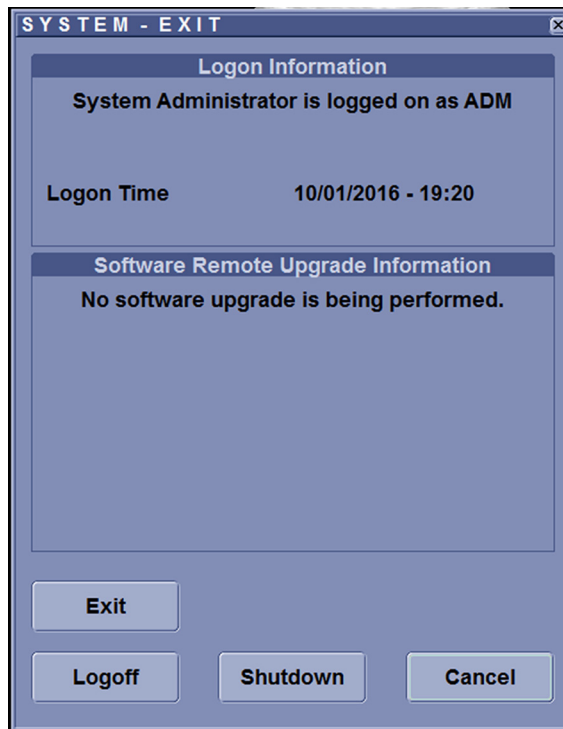
Figure 4-1.   System Exit Window

- **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.

4-2-3 Power off(continued)

NOTE: *To enable the key-combination <Ctrl+Alt+Delete>, the dongle should be connected to the system.*

- **Cancel**

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

4-2-3-1 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.

4-2-4 Check System Date and Time

A warning message "Please check the system date and time are correct" appears on the screen when the system is powered on. This warning message appears for the possible reasons:

• The system is not boot up for over 14 days.
• The system time has been changed by 24 hours earlier than the current system time of last boot-up.
• The BIOS time is changed by 24 hours earlier than the current system by resetting BIOS time, replacing BIOS module or changing BIOS time.

This warning message is to remind the user to check the system date in case the system date and time is incorrect.
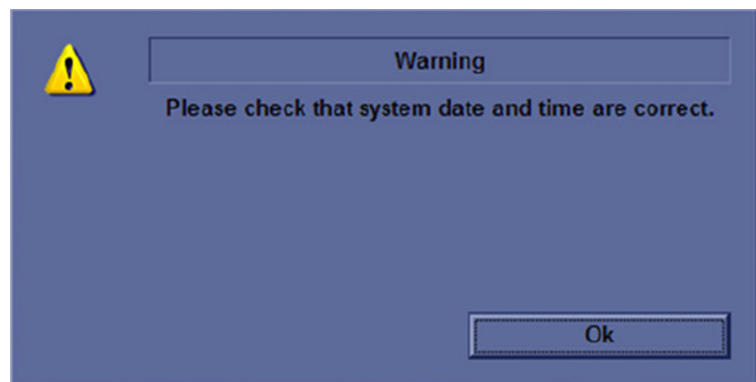
Figure 4-2.   Check system date and time message

Move the cursor to OK and press Cursor key on the control panel to select OK. The system enters.

Check the system date and time. If it is incorrect, follow below steps to reset the system date and time.

• Enter Utility -> System -> General -> Date/Time.
• Reset the system date and time.
• Select Apply and then select OK.
• Select Save.

4-2-5 Manufacturer

Check CPU manufacturer, via **System**-> **About**.
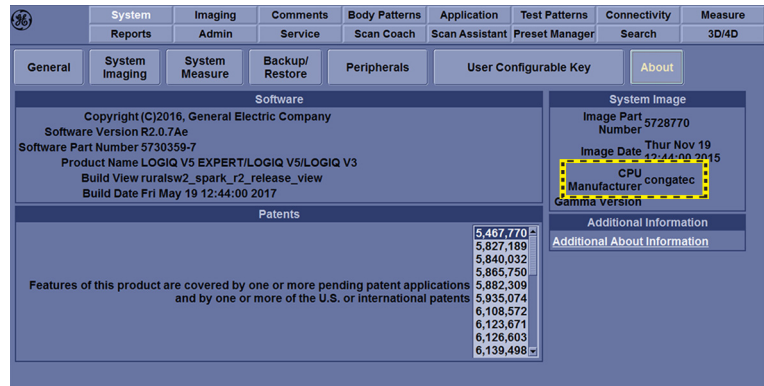
Figure 4-3.   Manufacturer

Or via **System** -> **About** -> **Additional About Information** to check the CPU manufacturer information.
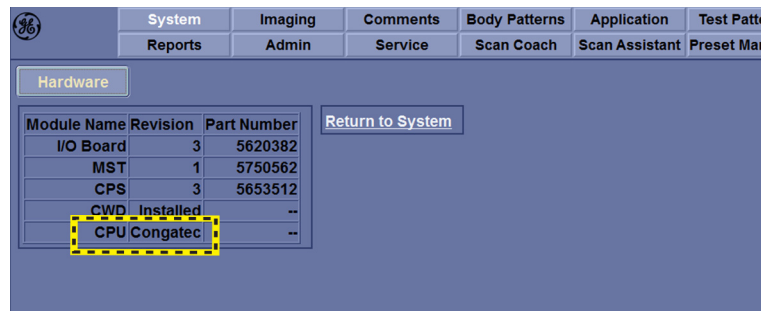
Figure 4-4.   Additional About Information

4-2-6 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

4-2-7 Backup and Restore Database, Preset Configurations and Images

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 USB memory device (or DVD-R disk) as images. The Archive Menu lists the images but does NOT list the presets stored on a USB memory device (or DVD-R disk).*

4-2-7-1 Formatting Media

1. Select **Utility** -> **Connectivity** -> **Removable Media**.
2. Select the media type from the drop down menu.
3. Enter the label for the media. It is best to use all capital letters with no spaces or punctuation marks. Select Format.
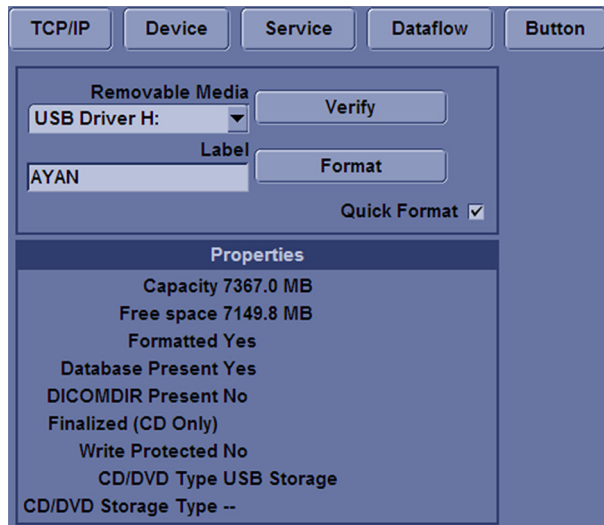
Figure 4-5.   Format and Verify Media

4. The system displays a pop-up menu, as shown in Figure 4-6, select OK to continue.
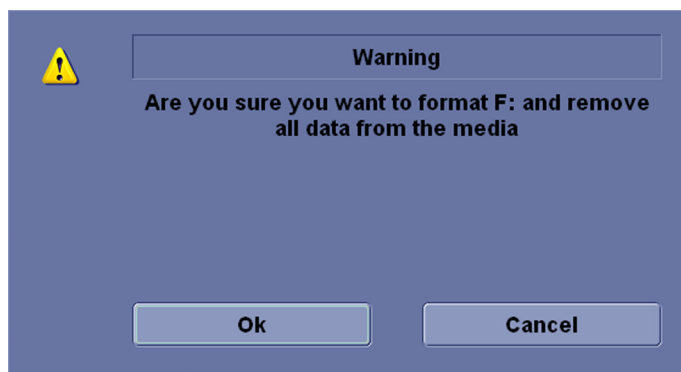
Figure 4-6.   Format Warning Pop-up Window

5. If desired, verify that the format was successful by returning to Utility-> Connectivity->Removable Media and selecting Verify.

4-2-7-2 Backup System Presets and Configurations

NOTE: *Always backup any preset configurations before a software reload. This ensures that if the presets need to be reloaded, after the software update, they will be the same ones the customer was using prior service.*

1. Insert a formatted media into the drive.
2. Enter enter Utility-> System-> Backup/Restore.

NOTE: *If you are not logged in as GE Service or with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

3. In the Backup list, select Patient Archive, Report Archive, User Defined Configuration and Service.
4. In the Media field, select CD/DVD (or USB memory device).
5. Select Backup.

The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

Figure 4-7. Backup/Restore Menu

4-2-7-3 Restore System Presets and Configurations

⚠️ **CAUTION**   The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct CD (or USB memory device).

1. Insert the Backup/Restore CD/DVD (or USB memory device) into the drive.

2. Enter enter Utility-> System-> Backup/Restore.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed.Log on with administrator privileges.*

3. In the Restore list, select Patient Archive, Report Archive, User Defined Configuration and Service.

4. In the Media field, select the Backup/Restore CD/DVD (or USB memory device).

5. Select Restore.

The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.

Figure 4-8.   Restore message

4-2-7-4 Archiving Images

1. Insert the archive media.
2. To format the archive media, enter Utility-> Connectivity-> Removable Media.
3. Format the CD. Verify the format if desired.
4. Images will be moved from the hard drive by date. Therefore, the best way is to label media by date.

NOTE: *Images will be moved from the hard drive by date. Therefore, the best way to label media is by date. When images are moved to the archive media, they will be deleted from the system hard drive. However, the patient database (backed up earlier) maintains pointers to the location of the images on the archive media.*
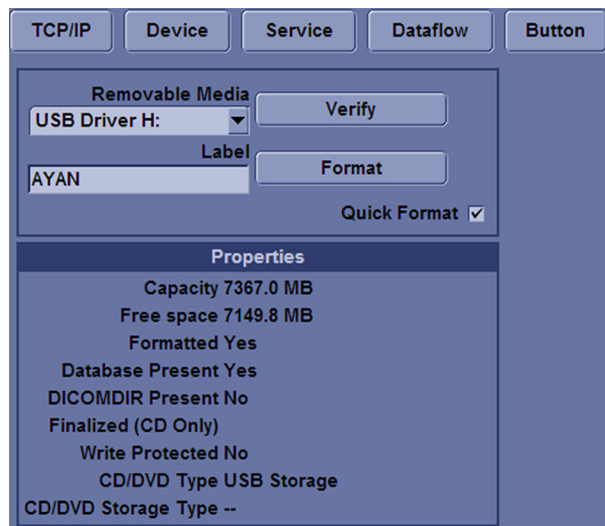
Figure 4-9.   Format Media Screen

5. Enter Utility-> System-> Backup/Restore.
6. Select "Move File Older Than in Days".

4-2-7-4 Archiving Images(continued)
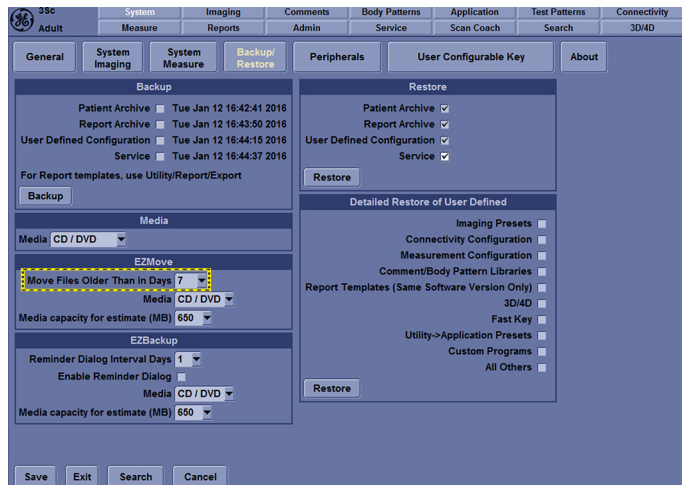
Figure 4-10.   EZBackup/Move

7.   Press **EZBackup/EZMove**.
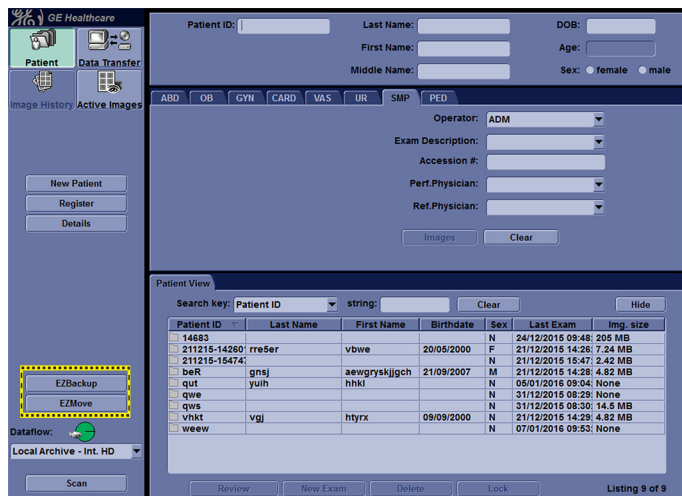
Figure 4-11.   EZBackup Wizard 1

8.   Verify the information on the first page of EZBack/EZMove wizard, then select Next.If you want to backup all of the exams in the range (even if the exam was previously up), check this option. If you uncheck this option, the system only backs up exams which have not yet been backed up.

4-2-7-4 Archiving Images(continued)

Figure 4-12.   EZBackup Wizard 1

9.   It indicates the size of the data and the storage. Select Next to continue.

NOTE: *The calculation for the number of backup CD is only an estimate. Allow for one additional CD when performing an EZBack/EZMove.*
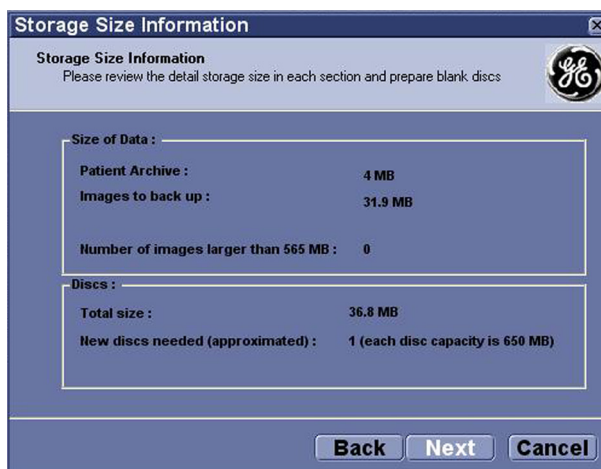
Figure 4-13.   EZBackup Wizard 2

NOTE: *This message "Please insert a blank media..." appears if you press Next without inserting the backup media. Insert the media and continue.*

4-2-7-4 Archiving Images(continued)
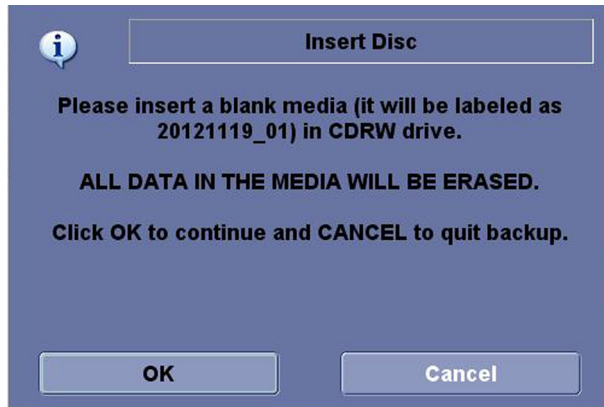
Figure 4-14.   Insert Media Message

10. The status menu appears. When the backup/move has been complete, press Next.
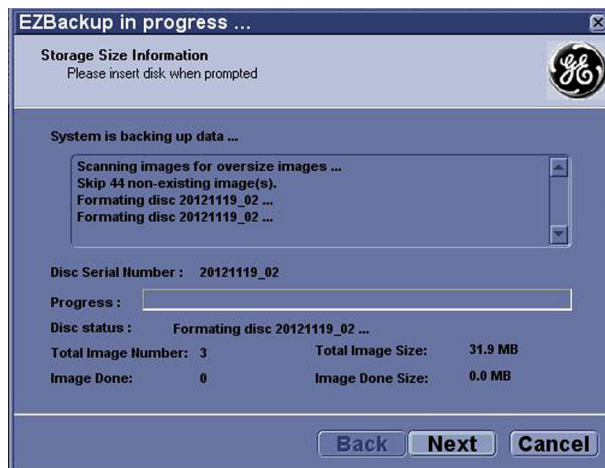
Figure 4-15.   EZBackup Wizard 3

NOTE: *If you need to insert the next media, a message appears providing you with the media label.*

11. When the backup is complete, the completion wizard page appears. Press Finish.

4-2-7-4 Archiving Images(continued)

Figure 4-16.   EZBackup Completion Window

All databases, presets and images should now be saved to removable media.

4-3 Functional checks

4-3-1 Overview

In this section, the functional checks for LOGIQ V3/V5/V5 Expert are described. Functional checks are used to verify that the product works as intended. Functional checks may also be used during troubleshooting.

4-3-2 Contents in this Section

4-3-3 Preparation

Turn on power to LOGIQ V3/V5/V5 Expert. For detailed description, See 4-2-2 'Power ON/Boot Up' on *page 4-5 for more information.*

4-3-4 Basic Controls

4-3-5 Control Panel

Figure 4-17.   Control Panel Map

1.   Power On/Off
2.   Up/Down keys
3.   Menu keys
4.   TGC
5.   User Configurable keys
6.   Patient key
7.   Probe/Preset key
8.   Active Images key
9.   Worksheet key
10.   Report key
11.   End Exam key
12.   Alphanumeric Keyboard

13. Scan Coach
14. PW Mode/PW Gain/CW Gain
15. B Mode/B Mode Gain
16. Depth/B-Steer
17. Trackball
18. Comment key
19. Measure key
20. Scan Area key
21. Set/B Pause key
22. Freeze key
23. Print key

24. Store key
25. AO/CHI key
26. Left/Right key
27. Active key
28. Clear key
29. Cursor key
30. Body Pattern key
31. Ellipse/Zoom key
32. M/D Cursor key
33. M Mode/M Mode Gain
34. CW (Option)
35. PDI
36. CF Mode/CF Gain/PDI Gain

4-3-6 LOGIQ V5/LOGIQ V3 SoftMenu Key Tour

- Rotary key: Rotate to adjust the menu.
- Page Up/Down key: To turn the menu page up and down.

Figure 4-18.   SoftMenu Key Tour

4-3-7 Control Panel
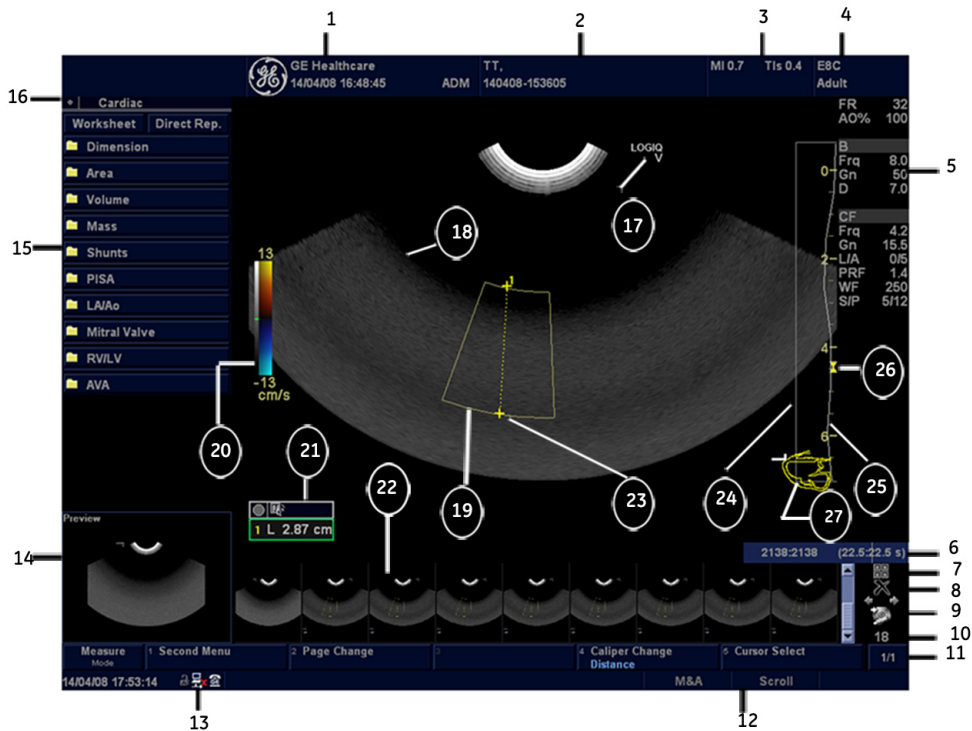
Figure 4-19.   Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout.
4. Probe Identifier. Exam Preset.
5. Imaging Parameters by Mode.
6. Cine Gauge.
7. Active Images screen.
8. Delete Image.
9. Save As Menu.
10. Number of Images in Exam.
11. Page Indication.
12. Trackball Functionality Status.
13. Current date and time, Caps Lock: (lit when on), network connection indicator (PC=connected, PC with X=not connected), system messages display, InSite status, InSite controls. Image Preview

14. Image Preview.
15. Measurement Summary Window.
16. Worksheet/Direct Report.
17. Probe Orientation Marker.
18. Image.
19. Region of interest.
20. Gray/Color Bar.
21. Measurement Results Window.
22. Image Clipboard.
23. Measurement Calipers.
24. TGC.
25. Depth Scale.
26. Focal Zone Indicator.
27. Body Pattern.

4-3-8 Performance Tests

4-3-8-1 Test Phantoms

The use of test phantoms is only recommended if required by your facility's (customer's) QA program.

4-3-9 2D Mode (B mode) Checks

4-3-9-1 Introduction

The 2D Mode is the system's default mode.

4-3-10 2D Mode Screen Example

4-3-11 Preparations

- Connect one of the probes.
- Turn ON the scanner.

  The 2D Mode is displayed (default mode).

4-3-12 Adjust the 2D mode controls

Press **B Mode** on the Operator Panel to access 2D mode.

These Image Controls are used to optimize the 2D picture. Verify that all the listed controls are working as intended:

- Use **Gain** and TGC controls to optimize the overall image together with the Power control.
- Use **Depth** to adjust the range to be imaged.
- Use **Focus** to center the focal point(s) around the region of interest.
- Use **Frequency** (move to higher frequencies) or **Line Density** (move to higher line density) to increase resolution in image.
- Use **Frequency** (move to lower frequency) to increase penetration.
- Use the **Rejection** control to reduce noise in the image.

4-3-13 Image Quality Check (IQC) preset for service

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

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

This preset only includes fundamental settings for 2D mode. Processing modes like SRI, Harmonics, etc., are turned off.

To do IQC, follow the steps below:

NOTE: *The IQCforService is only visible when service dongle is connected to the system.*

1. Activate IQC via **Utility**--> **Admin**--> **System Admin**. Check the "Enable IQC for Service" box. Select **Save**, then select **Exit**.
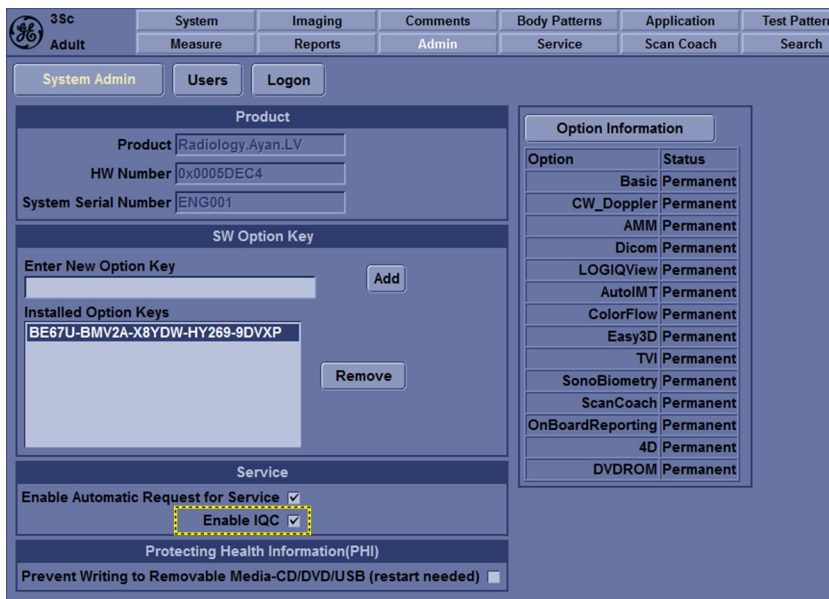
Figure 4-20.   Check "Enable IQC for Service"

2. Press **Utility -> Scan Coach -> Imaging Preset Manager.** Select IQC from the left column, and select [→] to move it to the **Imaging Preset Selection**. Then Select **Exit**.

4-3-13 Image Quality Check (IQC) preset for service(continued)
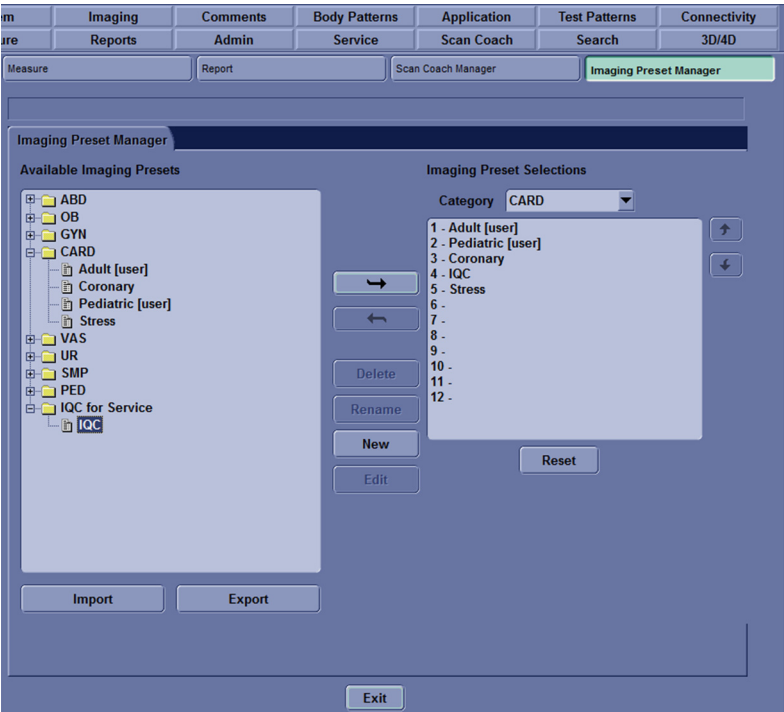
Figure 4-21.   Image Quality Check

3. Press **Probe/Preset** on the control panel. Select SVC, then select

Figure 4-22.   Image Quality Check

4-3-14 M Mode Checks

4-3-15 M-Mode Screen Example

4-3-16 Preparations

- Connect one of the probes to the scanner's left-most probe connector.
- Turn ON the scanner.

  The 2D Mode window is displayed (default mode).

- Press **M Mode** on the Operator panel to bring up an M-Mode picture on the screen.

  Use the trackball to position the cursor over the required area of the image.

4-3-17 Adjust the M Mode controls

These Image Controls are used to optimize the M mode picture. Verify that all the listed controls are working as intended:

- Adjust **Horizontal sweep** to optimize the display resolution.

  Adjust **Gain** and TGC controls to adjust the range to be imaged.

  Adjust **Compression** and **Edge Enhance** to further optimize the display.

  Adjust **Rejection** to reduce noise while taking care not to eliminate significant low-level diagnostic information.

4-3-18 Color Mode Checks

4-3-18-1 Introduction

Color Flow screens are 2D or M Mode screens with colors representing blood or tissue movement.

Color Flow may be selected both from 2D mode or from M mode or a combination of these.

4-3-18-2 Preparations

- Connect one of the probes to the scanner's left-most probe connector.
- Turn ON the scanner.

  The 2D Mode window is displayed (default mode).

4-3-19 Select Color 2D Mode

1. From an optimized 2D image, press **CF.**
2. Use the trackball to position the ROI frame over the area to be examined.
3. Press **Scan Area**. The instruction **Size** should be highlighted in the trackball status bar. Use the trackball to adjust the dimension of the ROI.

4-3-20 Adjust the Color Mode controls

- Adjust the **Active mode gain** to set the gain in the color flow area.

  Adjust **Scale** to the highest setting that provides adequate flow detection.

NOTE: *The scale value may affect FPS, Low Velocity Reject, and Sample Volume.*

  Adjust **Wall Filter** to remove low velocity blood flow and tissue movement that reduces image quality.

  Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows.

  Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

NOTE: *Frequency setting may affect FPS, SV and Low Velocity Reject.*

  Adjust **PowerOutput** to obtain an acceptable image using the lowest setting possible.

NOTE: *The Power setting affects all other operating modes.*

Adjust the following settings to further optimize display of the image:

- Use **Invert** to reverse the color assignments in the color flow area of the display.

  Use **Threshold** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.

  Use **Baseline** to emphasize flow either toward or away from the probe.

  Use **Spatial Filter** to reduce noise in the color flow area. Spatial Filter smooths the image by averaging collected data along the same horizontal line. An increase of the spatial filter will reduce noise, but this will also reduce the lateral resolution.

4-3-21 Select Color M Mode

1. Select M Mode.
2. Use the trackball to position the ROI frame over the area to be examined.
3. Press **Scan Area**. The instruction **Size** should be highlighted in the trackball status bar. Use the trackball to adjust the dimension of the ROI.

4-3-21-1 Adjust the Color M Mode controls

- Adjust the Active mode gain to set the gain in the color flow area.

  Adjust **Scale** to the highest setting that provides adequate flow detection.

NOTE: *The scale value may affect FPS, Low Velocity Reject, and Sample Volume.*

  Adjust **Wall Filter** to remove low velocity blood flow and tissue movement that reduces image quality.

  Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows

  Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

NOTE: *NOTE: Frequency setting may affect FPS, SV and Low Velocity Reject.*

  Adjust **PowerOutput** to obtain an acceptable image using the lowest setting possible.

NOTE: *The Power setting affects all other operating modes.*

Adjust the following settings to further optimize display of the image:

- Use **Invert** to reverse the color assignments in the color flow area of the display.

  Use **Threshold** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.

  Use **Baseline** to emphasize flow either toward or away from the probe.

4-3-22 PW Doppler Mode Checks

4-3-22-1 Introduction

PW Doppler are used to measure velocity (most often in blood).

Doppler mode can be done with a special pencil probe or with an ordinary probe. By using an ordinary probe, you can first bring up a 2D picture for navigation purpose and then add PW Doppler.

4-3-22-2 Preparations

- Connect one of the probes to the scanner.
- See 4-3-27 'Probe/Connectors Check' on *page 4-39* for info about connecting the probes.

  For available probes, see 9-3-2 'Probe' on *page 9-5*:
- Turn ON the scanner

  The 2D Mode window is displayed (default mode).
- If needed, adjust the Display's Brightness and Contrast setting.

  Press **PW** to start Pulsed Wave Doppler (PW).

  Use the trackball to select the Area of Interest (Sample Volume) in PW.

4-3-23 Adjust the PW Doppler Mode controls

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

• Adjust **Wall Filter** to reduce unwanted low velocity blood flow and tissue movement.

In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows.

Adjust the **Compression** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.

Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.

Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

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

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

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

Adjust the following settings to further optimize the display of the image.

Use the **Sweep Speed** to optimize the sweep speed.

To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace.

Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.

Use **Angle Correct** to steer the ultrasound beam to the blood flow to be measured.

4-3-24 Tissue Velocity Imaging (TVI) Checks

4-3-24-1 Introduction

TVI calculates and color codes the velocities in tissue. The tissue velocity information is acquired by sampling of tissue Doppler velocity values at discrete points. The information is stored in a combined format with grey scale imaging during one or several cardiac cycles with high temporal resolution.

4-3-24-2 Preparations

- Connect one of the probes, to the scanner's left-most probe connector.
- See 4-3-27 'Probe/Connectors Check' on *page 4-39* for info about connecting the probes.

  For available probes, see 9-3-2 'Probe' on *page 9-5*:
- Turn ON the scanner.

  The 2D Mode window is displayed (default mode).
- If needed, adjust the Display's Brightness and Contrast setting.

  Press **TVI**.

  Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.

  Press **Scan Area**. The instruction Size should be highlighted in the trackball status bar.

NOTE: *If the trackball control pointer is selected, press **trackball** to be able to select between Position and Size controls.*

Use the trackball to adjust the dimension of the ROI.

4-3-25 Adjust the TVI Controls

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the **Scale** value.

NOTE: *The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.*

TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

NOTE: *PW will be optimized for Tissue Velocities when activated from inside TVI.*

4-3-26 Basic Measurements

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

4-3-26-1 Check Distance and Tissue Depth Measurement

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

Before you complete a measurement:

To toggle between active calipers, rotate Cursor Select button.

To erase the second caliper and the current data measured and start the measurement again, press Clear.

NOTE: *To rotate through and activate previously fixed calipers, rotate Cursor Select button.*

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

4-3-27 Probe/Connectors Check

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

4-3-27-1 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. Put the porbe in the probe holder.

CAUTION   DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.

4. Hold the probe connector vertically with the cable pointing upward.
5. Slide the connector lock to the left (unlocked position).
6. Align the connector with the probe port and carefully push into place.
7. Slide the connector lock to the right position to secure the probe connector.
8. 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.	The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.
2	Launch the application. To change application, press **Probe/Preset** key on the Control Panel.	The selected application starts.
3	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.

Table 4-1:   Probe and Connectors Checks

Step	Task	Expected Results
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 10-7 'Electrical safety tests' on *page 10-19 for more information.*	It passes the test.
6	Repeat this procedure for all available probes.	

4-3-27-2 Activating the probe

The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.

4-3-27-3 Deactivating the probe

1. Press the Freeze key.
2. Gently wipe the excess gel from the face of the probe. (Refer to the User Guide for complete probe cleaning instructions.)
3. Carefully slide the probe around the right side of the keyboard, toward the probe holder. Ensure that the probe is placed gently in the probe holder.

4-3-27-4 Disconnecting the probe

Probes can be disconnected at any time. However, the probe should not be selected as the active

1. Unlock the probe.
2. Pull the probe and connector straight out of the probe port.
3. Carefully slide the probe and connector away from the probe port and around the right side of the keyboard.
4. Ensure the cable is free.
5. Be sure that the probe head is clean before placing the probe in its storage box.

⚠ **WARNING**   Take the following precautions with the probe cables: Do not bend, be sure to keep probe cables free from the wheels.

4-3-28 ECG Check

4-3-28-1 Introduction

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

4-3-28-2 Parts needed

- USB ECG Module (AHA) (H41852LK) or USB ECG Module (IEC) (H41852LL) or ECG ASSY w/ Chinese Label (H41852LM)

4-3-28-3 Preparations

None

4-3-28-4 ECG Check

Table 4-2:   ECG Checks

Step	Task	Expected Result(s)
1	Connect the ECG harness to the connector under the control panel.	The unit displays a straight curve along the bottom edge of the image sector on the screen.
2	Connect the three leads to an ECG simulator, or Fasten the three ECG Pads to your body and connect the three leads to respective ECG Pad.	When connecting, the signal on the screen will be noisy. When the connection is completed, a typical clean ECG signal is displayed.

4-3-29 Cineloop Check

4-3-29-1 Introduction

A cineloop is a sequence of images recorded over a certain time frame. When using ECG the time frame can be adjusted to cover one or more heart cycles. When frozen, the System automatically displays the cineloop boundary markers on either side of the last detected heart cycle.

4-3-30 Preparation

- Connect one of the probes to the scanner.
- See 4-3-27 'Probe/Connectors Check' on *page 4-39* for info about connecting the probes

  For available probes, see 9-3-2 'Probe' on *page 9-5*:
- Turn ON the scanner. The 2D Mode is displayed (default mode).

4-3-31 Adjust the Cineloop controls

- Press Freeze.

  The left and right markers are displayed on either side of the last detected heart cycle on the ECG trace.
- Press Freeze.

  The selected heart beat is played back.
- Press **Freeze** to freeze the cineloop.

  Use the trackball to scroll through the acquisition and find the sequence of interest.
- Adjust **Cycle** select to move from heart beat to heart beat and select the heart cycle of interest.

  Adjust **Num cycles** to increase or decrease the number of heart beats to be played back.

  Adjust **Left marker** and **Right marker** to trim or expand the cineloop boundaries.

4-3-32 Back End Processor checks

- If all the previous tests have been passed successfully, the Back End Processor is most likely OK.

  If the system seems to be operating erratically, please refer to 'Diagnostics/Troubleshooting' on *page 7-1*.

4-3-33 Operator Panel Test

- The Operator Panel is tested when the LOGIQ V3/V5/V5 Expert is powered up as part of the start-up scripts, run at every start-up.

  For more info, please refer to 'Diagnostics/Troubleshooting' on *page 7-1*.

4-3-34 Peripheral checks

Check that peripherals work as described below:

Table 4-3:   Peripheral Checks

Step	Task to do	Expected Result(s)
1.	Press FREEZE	Stop image acquisition.
2.	Press PRINT on the Control Panel	The image displayed on the screen is printed on B&W printer.
3.	Connect with Foot Switch on USB port and press once.	To start image acquisition (the same function as FREEZE key).

4-3-34-1 Printer checks

The internal printer is controlled from the **Print** and **Store** keys on the LOGIQ V3/V5/V5 Expert's Operator Panel.

The factory default is:

- **Print** for the standard printer

  Store for the screen capture to clipboard

4-3-35 Turn OFF Power to LOGIQ V3/V5/V5 Expert

See 4-2-3 'Power off' on *page 4-8 for more information.*

4-3-36 Mechanical Functions Checks

4-3-36-1 Operator Panel Movement

Please refer to:

- 6-2 'LCD Monitor Adjustments' on *page 6-3*

4-3-36-2 Casters (Wheels) and Brakes Checks

Examine the wheels frequently for defects to avoid breaking or jamming.

Table 4-4:   Wheel Characteristics

Wheel	Characteristics
Front and Rear	Swivel and Brake

4-4 Application Turnover Check List

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

4-4-1 Software Configuration Checks

Table 4-5:   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

4-5 Site Log

Table 4-6:   Site Log

DATE	SRVICE PERSON	PROBLEM	COMMENTS

4-6 My Trainer

4-6-1 Overview

My Trainer provides a quick guide to operate the system.

To access My Trainer,

1. Press Alt + H to enter My Trainer.
    Or,
    Press Utility -> System -> User Configurable Key. Check Enable, then set **My Trainer** in the Keyboard Key or User Defined Key.
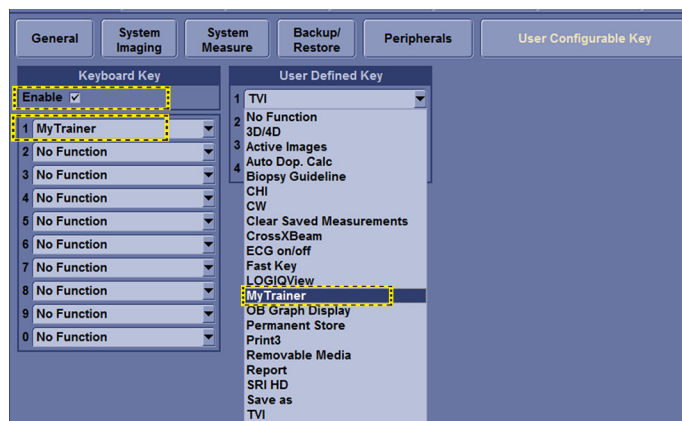
Figure 4-23.   Set My Trainer

2. Press defined key to access My Trainer.

There are four sections in My Trainer. The four sections are displayed on the left side of the My Trainer interface.

4-6-1 Overview(continued)
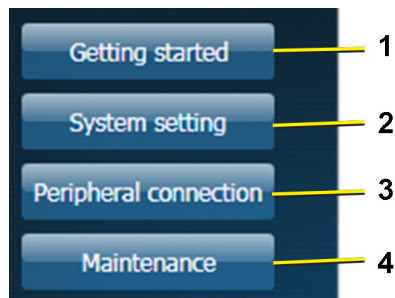
Figure 4-24.   Sections display

1. Getting Started: Circuit breaker, Probe Connection
2. System Setting: Facility name set up, Date time set up, Enable options check, Language setting, User conf, User preset
3. Peripheral Connection: Back panel ports, Network Connectivity, Connect to a printer, DICOM setting, Back-up/restore the patient information, software version
4. Maintenance: Trackball, Contact GE service, Insite, Log export, Air Filter Replacement

4-6-1 Overview(continued)

Figure 4-25.   Interface Illustration

The interface of the My Trainer includes below information:

1.   The product name of the system.
2.   Sections. Select the button to expand the section to show the list of subsections.
3.   Subsections.
4.   The highlighted subsection shows this subsection is currently opened and displayed on the right side.
5.   Exit. Press this button to exit this interface.
6.   The left number shows the current page of the subsection. The right number shows the total pages of the subsection.
7.   Illustration with graphic.
8.

Table 4-7:   Page turning

	Select the arrow to go to the previous page

Table 4-7:   Page turning

	Select the arrow to move to the next page.
	Select the arrow to go to the home page .
	Select the arrow to go to the end page.

9.   Text instruction about how to operate.

Chapter 5

Components and Functions (Theory)

This chapter explains LOGIQ V3/V5/V5 Expert's system concepts, component arrangement, and subsystem functions.

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

5-1 Overview

5-1-1 Contents in this chapter

5-2 Block Diagram and Theory

5-2-1 Block Diagram

5-2-1-1 System Diagram
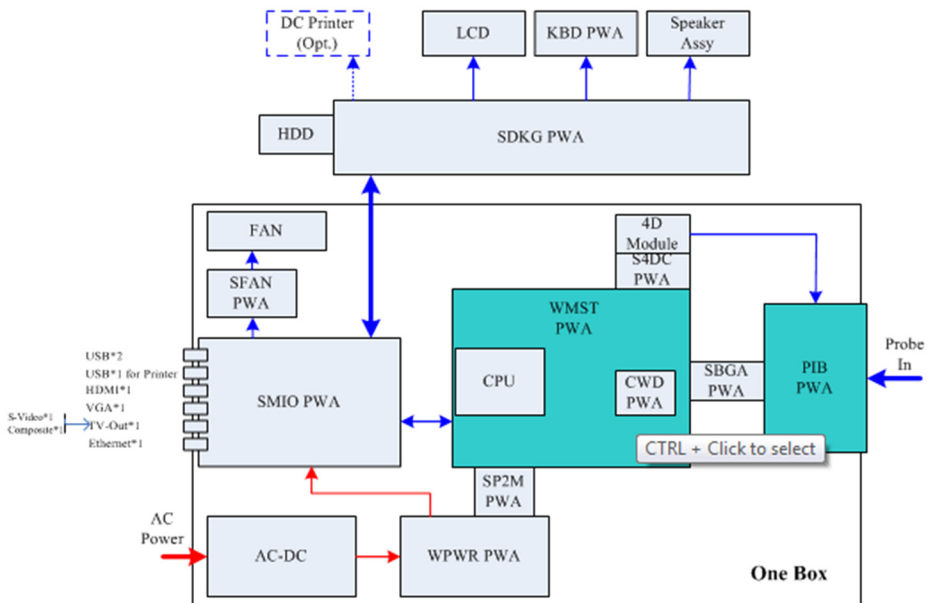
Figure 5-1.   LOGIQ V3/V5/V5 Expert System Block Diagram

5-2-1-2 Introduction

WMST PWA is a main board, it provides the main control function, 64 channels transmitting/receiving and related signal processing, and it connects to CWD board.

SMIO PWA receives all interface signals (such as SATA, USB, DDI, Ethernet etc) from WMST board and make necessary processing. And then, SMIO provide interface to user (Example: USB, HDMI, VGA, TV-out, Ethernet.) It also interfaces with SDKG board to provide Keyboard (KBD), LCD, Speaker and HDD connection.

SDKG PWA is backplane board; it has a backplane connector which interfaces with SMIO board, and provides connection with HDD, LCD, Keyboard (KBD) board, Speaker, and USB & Power to DC printer.

PIB (Probe Interface board) PWA is a probe interface board. It can support 3 probe ports. It switches elements signals, probe control signals to the selected probe.

WPWR PWA is a DC-DC power board. It gets DC power from ACDC and provides all voltage needed to WMST board and SMIO board.

SFAN PWA is a system FAN interface board, it provides power and control to system FAN (quantity is 4 internal the box).

5-3 Common Service Platform

5-3-1 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 V3/V5/V5 Expert. You can use these to test the system for errors.

6-1 Overview

6-1-1 Contents in this chapter

6-2 LCD Monitor Adjustments

6-2-1 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.

In rare cases, LCD monitor might have defect pixels appearing. This section describes how to discriminate the defect pixels with the number of defect pixels allowed for the LOGIQ V3/V5/V5 Expert to support LCD monitor replacement decision.

6-2-1-1 Monitor Adjustments

6-2-1-2 To adjust the LCD Monitor Position

Grab the bottom of the LCD monitor when you adjust the position of the monitor and monitor arm.

Figure 6-1.   Grab the bottom of the LCD monitor

⚠ CAUTION   When flipping up the monitor from the flip down status, you can grab the upper corner of the monitor.

6-2-1-3 Brightness and Contrast

There are two types of LCD monitors using different methods to adjust the brightness and contrast. Which method you should use depends on the type of LCD monitor on your system.

6-2-1-3-1 Adjust LCD Monitor by Buttons

The LCD Brightness and Contrast adjust buttons are at the right side bottom of LCD.
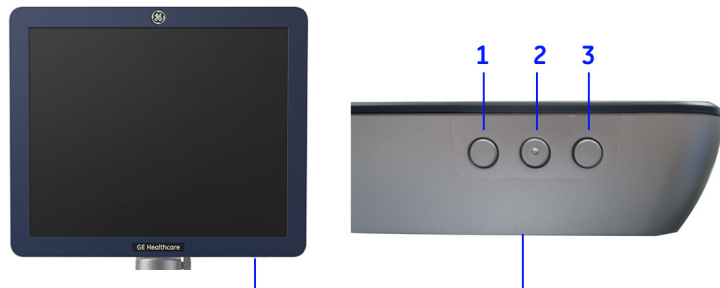
Figure 6-2.   LCD Brightness and Contrast adjust buttons

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

To adjust the Brightness:

1.   Press Middle key once, the Brightness indicator displays;

Figure 6-3.   Brightness setting menu

2.   Press Left key or to decrease brightness or press right key to increase brightness.

To adjust the Contrast:

1.   Press Middle key twice, the contrast indicator displays;

Figure 6-4.   Contrast setting menu

2.   Press Left key or to decrease contrast or press right key to increase contrast.

6-2-1-3-1 Adjust LCD Monitor by Buttons(continued)

To exit the setting menu, press the Middle key for the third time.

The setting menu disappears if there is no operation in 3 to 5 seconds.

Keep pressing the middle key for 3 to 5 seconds, the Brightness and Contrast are reset.

☀ 50 ◐ 50

Figure 6-5.　Reset setting menu

Press the Right key once to activate main menu to have more settings.
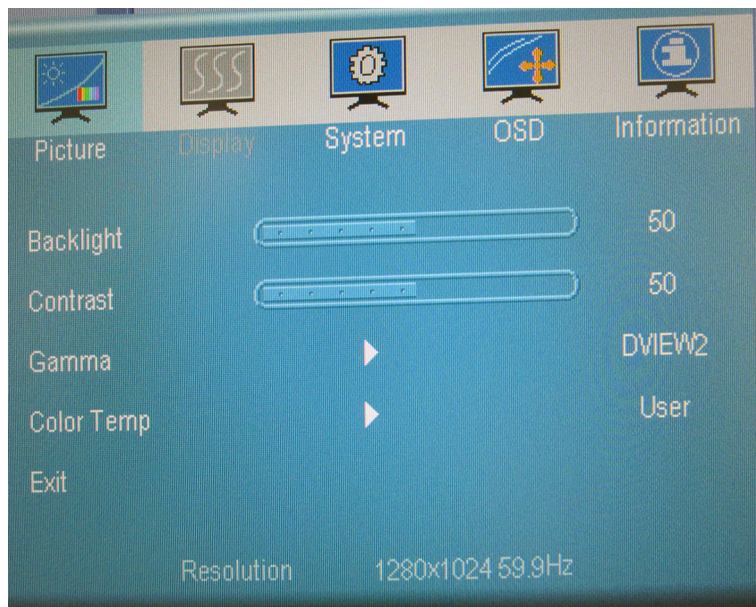
Figure 6-6.　Main Menu

6-2-1-3-2 Adjust LCD Monitor by Software

1. Press **Cursor** key on the control panel. Move the trackball to position the cursor over the adjustment icon, then press **Set/B Pause** to display the setting menu.
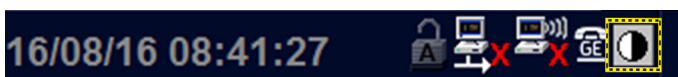
Figure 6-7.   Setting Menu Icon

2. Follow the procedure below to adjust the Color Temperature, Contrast, and Brightness:

   • To adjust the color temperature: press **Standard**, **Brown**, or **Blue** to choose the color temperature. The chosen color temperature displays in the **Active** area.
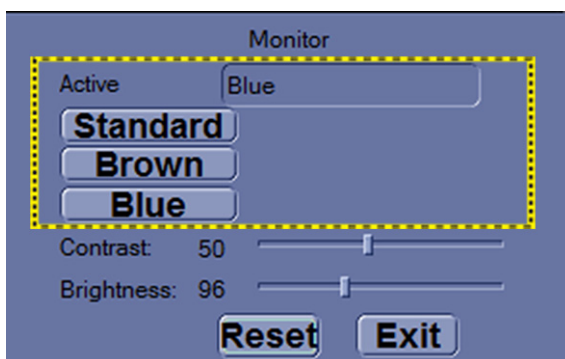
Figure 6-8.   Active Color Temperature

6-2-1-3-2 Adjust LCD Monitor by Software(continued)

For R 2.0.3 and above, to adjust the color temperature: press **Standard**, **Brown,** or **Blue** to choose the color temperature. The chosen color temperature displays in the **Color Temp** area.
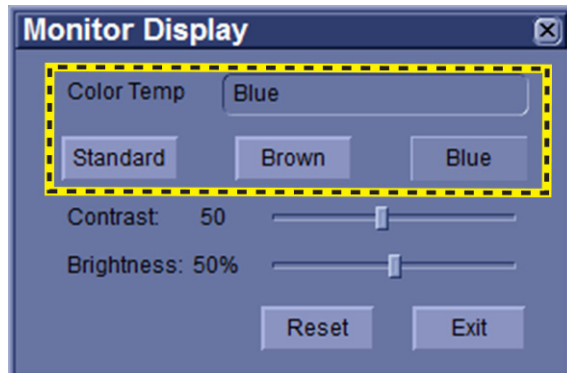
Figure 6-9.   Color Temperature

•   To adjust the Contrast: Press **Set/B Pause** to choose the adjustment button, hold down the **Set/B Pause** key and move the trackball to move the adjustment button. Move the adjustment button to the left to decrease the contrast or move the adjustment button to the right to increase the contrast.
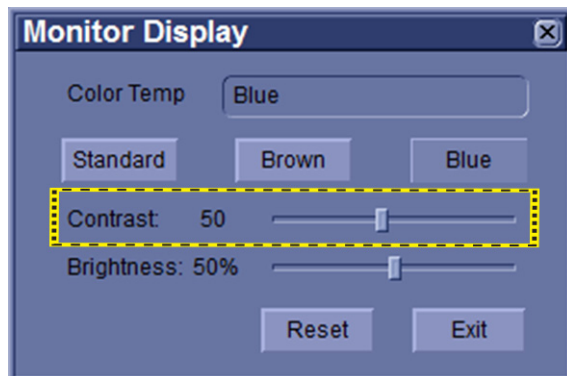
Figure 6-10.   Contrast

6-2-1-3-2 Adjust LCD Monitor by Software(continued)

- To adjust the Brightness: Press **Set/B Pause** to choose the adjustment button, hold down the **Set/B Pause** key and move the trackball to move the adjustment button. Move the adjustment button to the left to decrease the brightness or move the adjustment button to the right to increase the brightness.
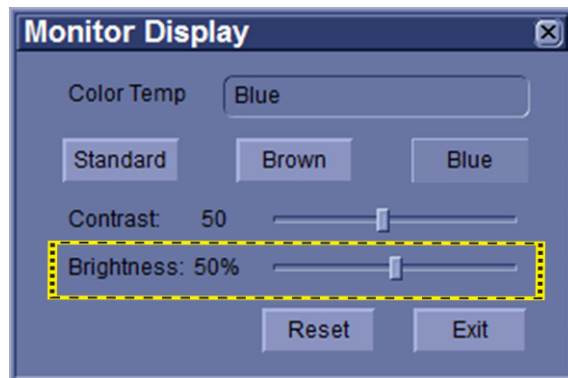
Figure 6-11.   Brightness

3. Press **Reset** to return to the default setting; Press Exit to exit the setting menu.
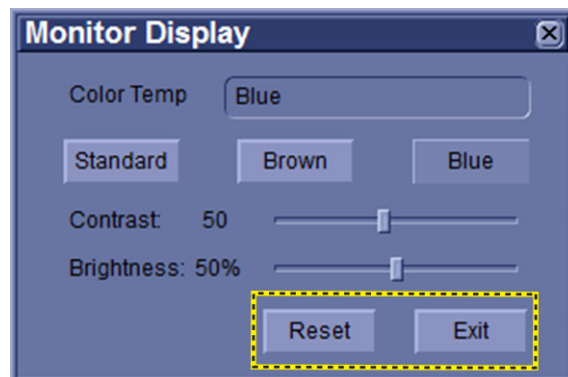
Figure 6-12.   Reset

NOTE: *Press Reset button and the three color temperature settings will return to the default settings.*

Chapter 7

Diagnostics/Troubleshooting

This chapter describes LOGIQ V3/V5/V5 Expert Series 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. However most software tests are required.

7-1 Overview

7-1-1 Contents in this chapter

7-2 Gathering Trouble Data

7-2-1 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

7-2-2 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 V3/V5/V5 Expert

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

Applications Software

- Software Version
- Software Part Number

System Image Software

- Image Date
- Image Part Number

Additional Information

7-2-3 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 several log files in a date and time stamped ".zip" file.

NOTE: *This function may also be used to make a Print Screen.*

This **Alt+D** function is available at all times.

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

- a place to enter a description od the issue
- a checkbox to indicate a System lockup
- a choice to Export a pre-formatted CD-R/DVD-R or save to the Export directory D: drive (for remote viewing through InSite)
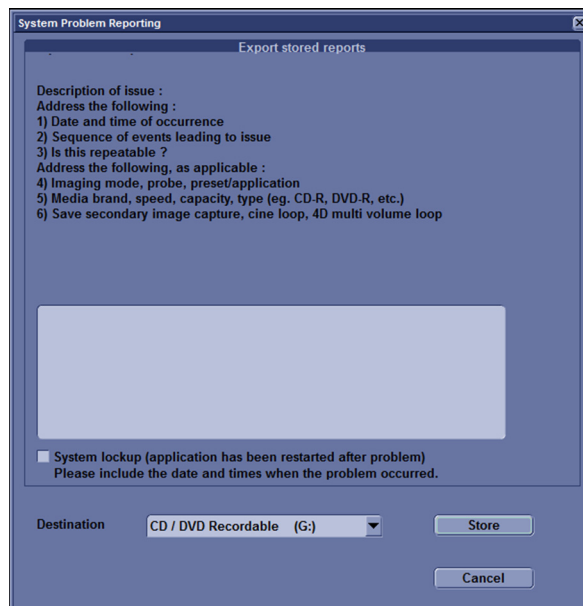
Figure 7-1. Alt+D Dialog Box

7-2-3-1 Advanced log options

- **Extensive Log** enables the creation of a log file containing additional information for the selected functionality.
- **Options** enables creation of a log file based on a selected bookmark or for a user configurable time frame. Different type of information can be selected to be part of the log file.

7-3 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 Store Key.

7-3-1 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 **Store**. This will place a snapshot of the screen on the "clipboard" displayed at the bottom of the scan image display.
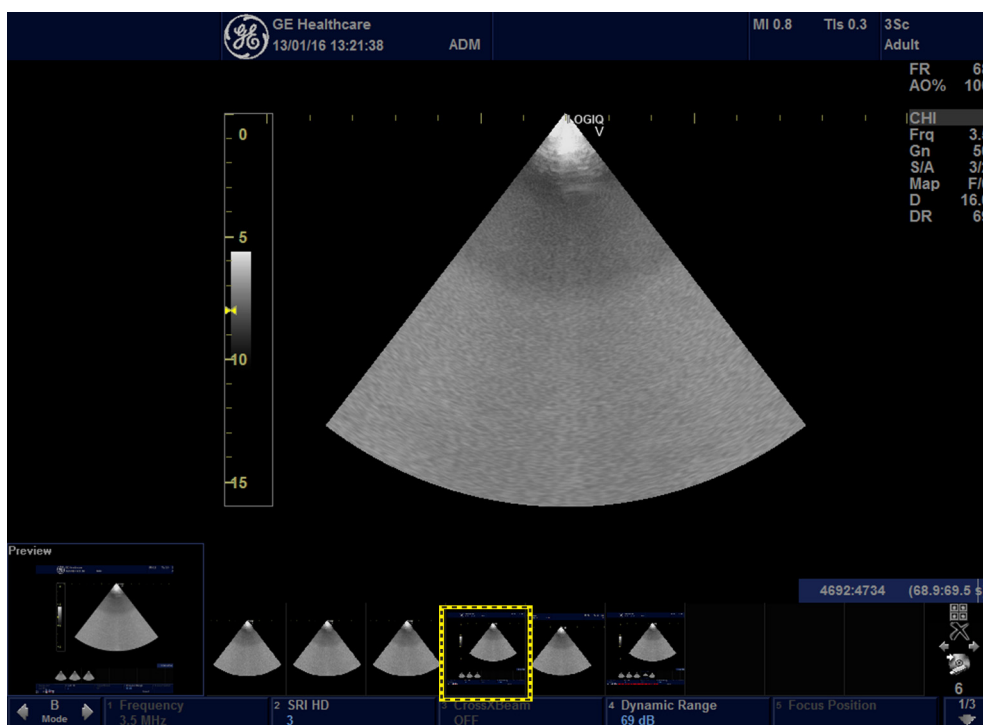
Figure 7-2.   Select Image to Capture

7-3-1 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.
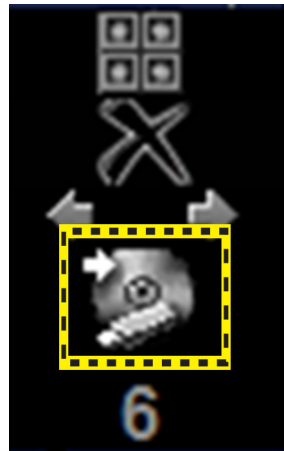
Figure 7-3.   Menu > Save As

5. A Save dialog box will be opened. Choose the archive location to save image on the USB Drive or CD/DVD.
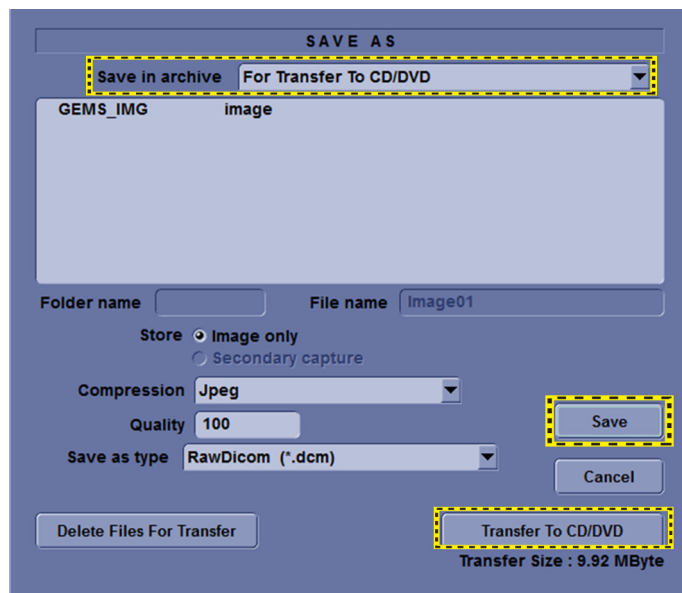
Figure 7-4.   Save Dialog Box

NOTE: *Click **Save** -> **Transfer To CD/DVD**, if the archive location on the DVD/CD; Click **Save**, if the archive location is USB.*

7-3-1 Capturing a Screen(continued)

NOTE: *It is better to save the image in Jpeg format. Image of this format can be easily reviewed in the computer.*

7-3-2 Capturing a Screen with Service Dongle

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

1. Insert the Service Dongle in the system's USB port.
2. Press *NL/SL* key on the control panel, the whole screen is captured.
3. Press *Ctrl+Alt+Delete*, the Windows Security dialog is displayed. Then select **Task Manager**.
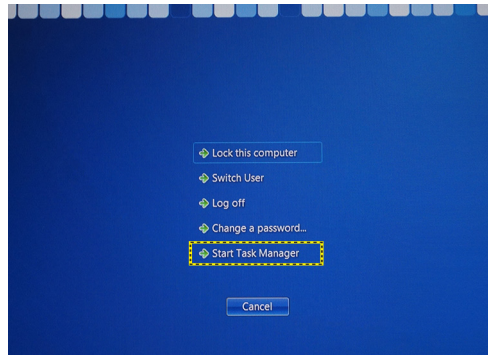
Figure 7-5.   Windows Security

NOTE: *It is also available to Exit to Windows and save the image on the system or removal media.*

7-3-2 Capturing a Screen with Service Dongle(continued)

4. In **Windows Task Manager**, select **File**-> **New Task (Run...)**.
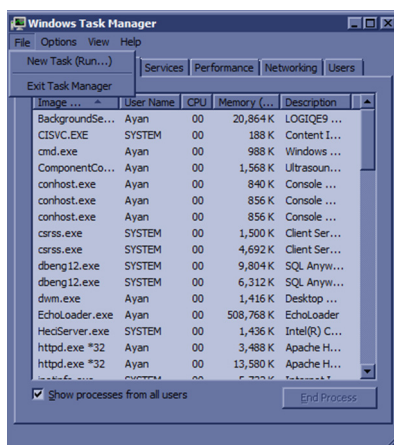
Figure 7-6.   Windows Task Manager

5. Type in the program name: **mspaint**.
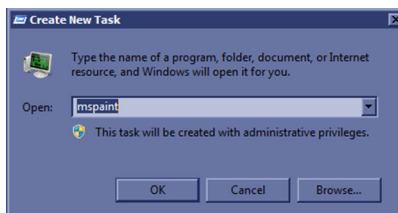
Figure 7-7.   Create New Task

7-3-2 Capturing a Screen with Service Dongle(continued)

6. The paint screen is displayed, press *Ctrl+V* to paste the captured screen. And then save the image in the appropriate destination.
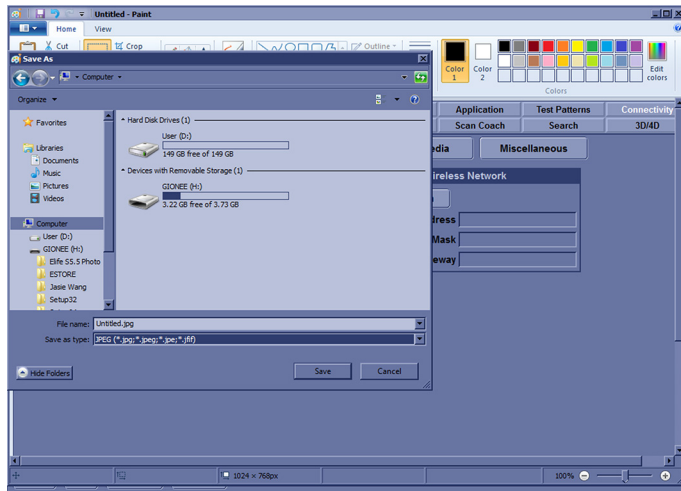
Figure 7-8.   Save Image

7-4 Global Service User Interface (GSUI)

7-4-1 Enter global service user interface

1. Select Utility -> Service, then the service browser will start.
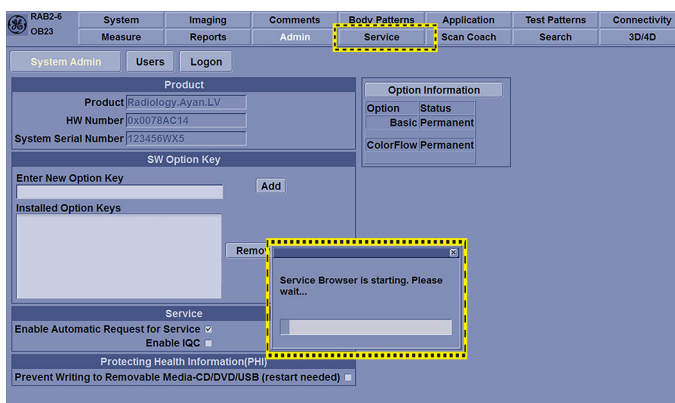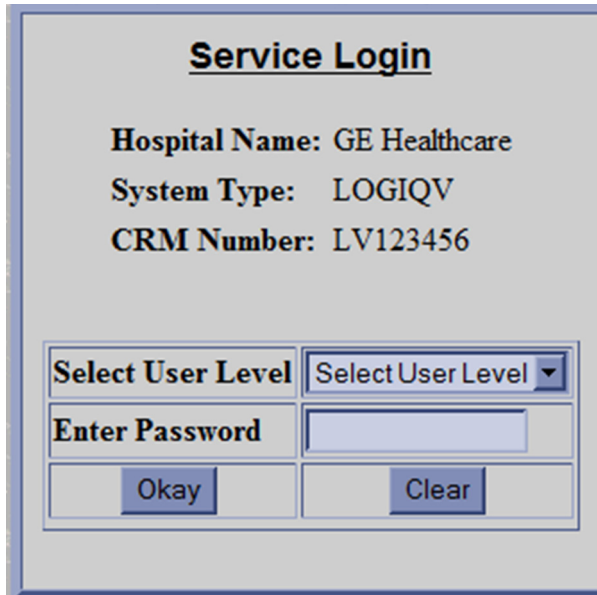
Figure 7-9.

2. Select GE Service in option of User Level of GEMS Service Home page and input correct password, press OK button.

7-4-1 Enter global service user interface(continued)

Figure 7-10.   Service Login Page

3. Choose Diagnostic in Global Service Interface to active diagnostic functions, choose options to activate various functions correspondingly.

7-4-1 Enter global service user interface(continued)
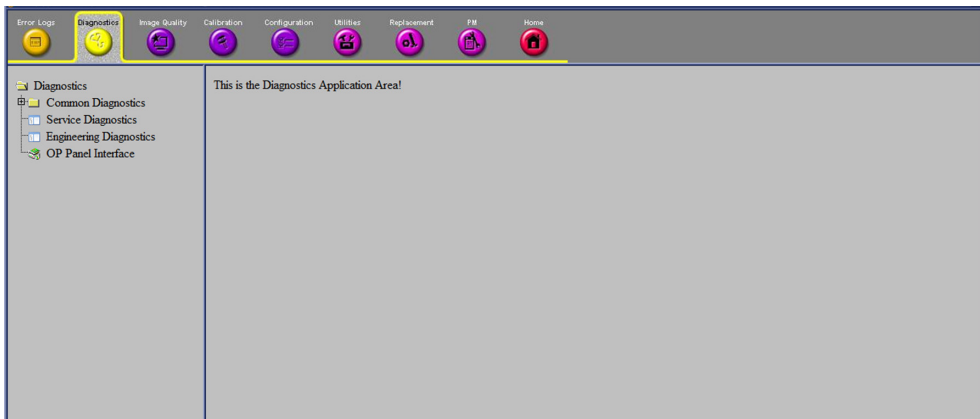
Figure 7-11.   Active Diagnostic Function

7-4-2 Control Frame

Contains the user interface elements used for:

- Diagnostic control, and
- Operator feedback

7-4-2-1 Button

This button has two modes each with appropriate text:

- Execute - to start the diagnostic, and
- Abort - to stop a diagnostic

The button can also be disabled.

7-4-2-2 Loop Count

This is an editable text field that will only accept numeric values with 4 digits or less. When the button is configured as an "execute" button and pressed, the loop count field will be queried to determine the number of times to execute the diagnostic.

7-4-2-3 Progress Indicator

Displays a graphical progress indication to the user.

7-4-2-4 Short Text Message

Displays either a starting message or aborting message, as well as the diagnostic completion status.

7-4-2-5 Background Color

Initially gray, the Control Frame background color changes upon completion of a diagnostic to indicate completion status.

- Fail = Red
- Pass = Green
- Neither pass nor fail = Set back to Gray (for example, final code status is Aborted).

7-4-3 Common Diagnostics

7-4-3-1 Utilities

Provides two selections:

- **Disruptive Mode**

    Allows you to enable or disable disruptive mode troubleshooting.

- **System Shutdown**

    Allows for system shutdown from the 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.

7-4-3-1-1 Remote access

Remote access is a feature designed to enable OLE's access to customer's desktop remotely, service engineers don't have to be on site to connect the physical dongle to exit to desktop, it's doable remotely by using this feature.

1. In the server side, select the system which the OLE would remotely connect to, and select **Connect to device**.
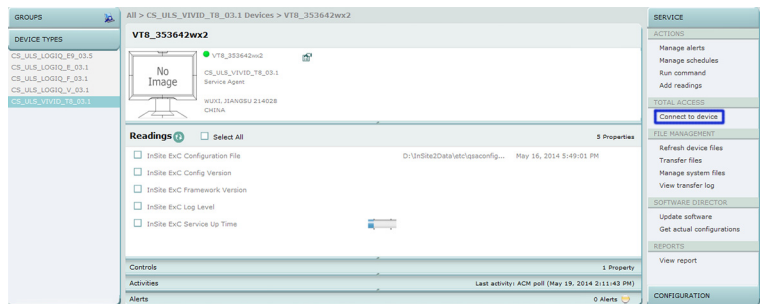
Figure 7-12.   Connect to device

2. Select **CSD** to **Connect**. Then the OLE is remotely connected to the system.

7-4-3-1-27-4-3-1-1 Remote access(continued)

Figure 7-13.   Remotely Connect

3.   Enter **Utility**-> **Common Utilities**-> **Disruptive Mode**, then select **Yes**.

7-4-3-1-37-4-3-1-1 Remote access(continued)
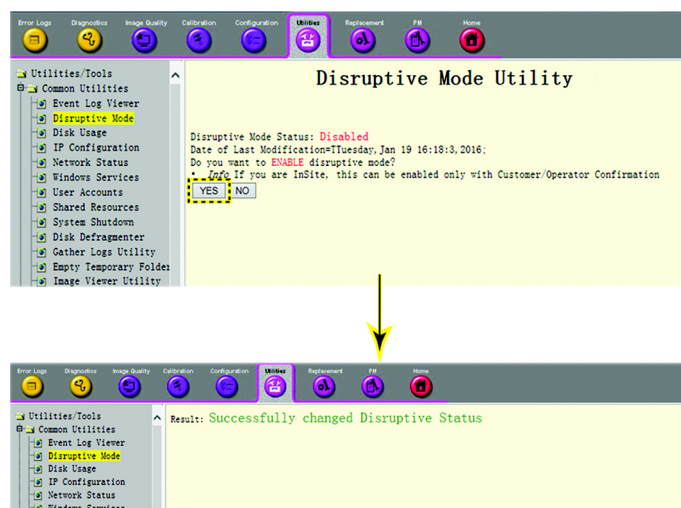
Figure 7-14.   Enable Virtual Dongle

4. If we want to see the Scan screen or have control of the unit, we have to go to Virtual Console Observation and Start it. Then connect using VNC.
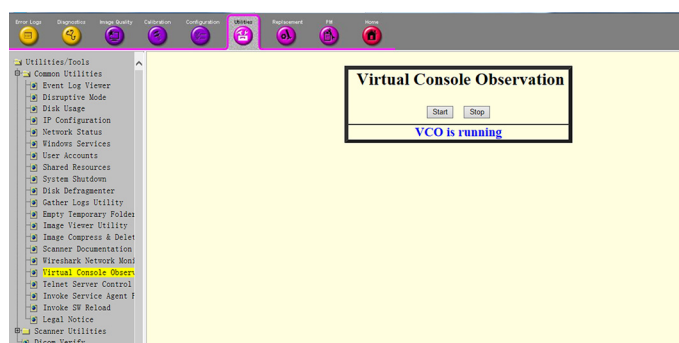
Figure 7-15.   Virtual Console Observation

5. Select the VNC to Connect. Then the OLE is remotely connected to the system.

7-4-3-1-47-4-3-1-1 Remote access(continued)
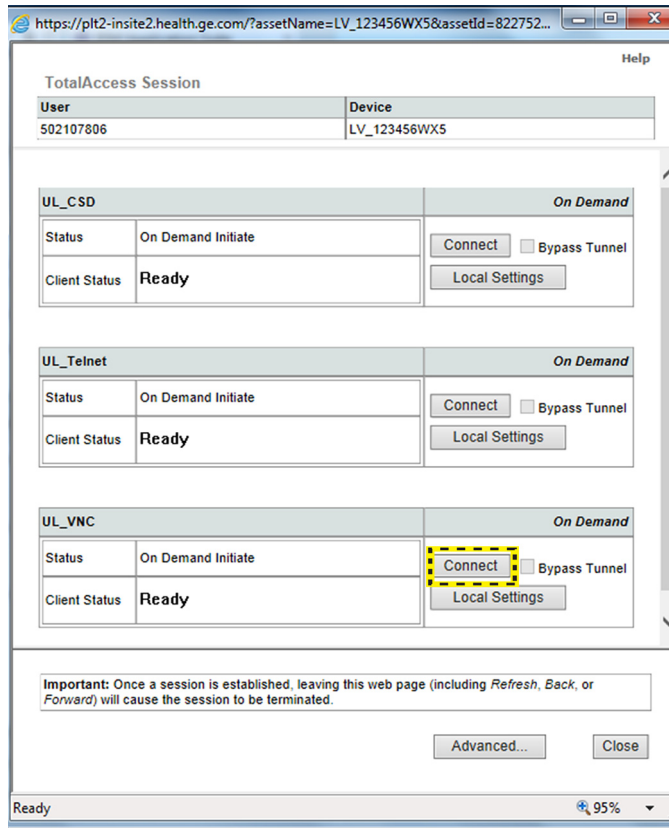
Figure 7-16.   Virtual Console Observation Connect

7-4-3-2 Service Diagnostics

BF, COMEXP and GFS modules are on the LOGIQ V3/V5/V5 Expert WMST PWA.

CPS is WPWR/DCDC PWA.

IOS is SMIO PWA.

PID is SLRY 4-Probe PWA.

7-4-3-2-1 GFS

- GFS Swept Demodulator Test performs a signal path test of the swept demodulator FPGA on the GFS.
- GFS Front-End Interface Test tests that the GFS can access Front-End boards.
- GFS Analog Test.
- GFS Memory Access Test tests that GFS can access to the internal, external, external cache memory spaces.
- Front End Interface FPGA Test reads the version of the GFE FPGA.
- GFS Fixed Demo Test: GFS Fixed Demodulator signal path test.
- DSP Master Clock Test tests DSP Master Clock.
- GFS Swept Demodulator Long Test.

7-4-3-2 Service Diagnostics(continued)

7-4-3-2-2 System

- CPU Temperature Test.
- CPS Temperature Test.
- WMST Temperature Test.
- WMST Voltage Test.
- CPS Voltage Test.
- FPGA Version Test.
- HV_STOP Test tests HV-STOP mechanism and checks each board is able to assert HV_STOP using its HV_STOP source.

7-4-3-2-3 Memory

- Callisto Memory Test.

NOTE: *The Callisto Memory test may fail if it is performed with other tests at the same time.*

7-4-3-2-4 AnalogReceive

- Noise Floor Test.

7-4-3-2-5 AnalogCW

- aCW IQ Symmetry Test

7-4-3-2-6 Digital Receive

- AFE IF Test
- Complex Mixer Test
- CE Decoder Test

7-4-3-2-7 ECG Tests

- ECG Tests

7-4-3-2-8 Doppler Tests

- Doppler Audio Test runs the tests for Doppler.

7-4-3-2 Service Diagnostics(continued)

7-4-3-2-9 PC

- Essential Test tests: PCI, PCI Express, CPU, Memory, HD Disk and Video.
- Hard Drive Long tests functionality of the hard drive.
- Hard Drive Short tests functionality of the hard drive.
- Memory tests the memory on the mother board.
- Network Adapter: Network cable must be connected.
- System board tests the real time clock.
- Video tests functionality of video adapters.

7-4-3-2-10 PC Interactive

- **AVI playback** tests playing back an AVI file.
    - Click "Play" to run the test. If the test is successful, you will see a brief video clipo with audio. For more information about the test, click "More Information".
    - Click "Pass" if the test successfully reproduces the video clip.
    - Click "Fail" if the test is unable to successfully reproduce the video clip.
    - Click "Cancel" button to quit the test without recording a test result.

- **Keyboard**
    - Press each key on the keyboard and it will be added to the History. Hold down a key to test the repeat of that key. To cancel, click Cancel or press Alt-X.
    - Special purpose keys like volume control or Internet access keys may not be detected. To test the Fn key of a notebook computer, hold down the Fn key while pressing another key.
    - Note: This diagnostic is intended to verify keyboard keys are in good working order. It is not intended to verify that keyboards produce desired characters.

7-4-3-2-117-4-3-2-10 PC Interactive(continued)

- **Monitor Test Patterns**
    - This test is composed of various elements that verify a monitor functions correctly. To test a monitor feature, click the appropriate button. You can return to this dialog by clicking the mouse button or pressing any key.
    - The Combination Test helps you verify your monitor is properly aligned, and set at the correct color depth and resolution. Use the crosshair pattern in each corner of the screen to visually determine if the monitor aligns correctly. If the crosshairs appear distorted or out of focus, a problem may exist with the monitor alignment. Use the color spectrum array for visually verifying the monitor color depth capacity. If the colors in the color spectrum do no blend smoothly together, a problem may exist with the monitor color depth. Use the graduated horizontal and vertical alignment bars to determine the monitor resolution capabilities. The better you can discern individual lines as they move closer together, the higher the resolution capabilities of the monitor.
    - The Solid Color Test helps point out malfunctioning or dysfunctional pixels using five basic colors: red, green, blue, black, and white. Fill the screen with an appropriate color by clicking the associated button. If a pixel is malfunctioning, the pixel color will contrast with the color of all other pixels.
    - The VESA Test Patterns allow you to test the monitor for proper luminance, geometry and focus. Click the appropriate button to fill the screen with the associated test pattern. You can return to this dialog by clicking the mouse button or pressing any key.

7-4-3-2-127-4-3-2-10 PC Interactive(continued)

- **Trackball**
    - The Mouse Status Test verifies the cursor position and mouse button state. When a mouse button is pressed, the corresponding button on the picture will change color. If the mouse is a wheel or scroll mouse, an arrow will indicate the direction the wheel is being rotated. Clicking the wheel will flash the picture of the mouse in the Mouse Status Test area.
    - The Drag and Drop Test verifies a mouse can successfully perform drag and drop operations. Left click the picture of the CD and drag is onto the picture of the drive. If successful, the picture will change.
    - The Double Click Test verifies a mouse can successfully perform double-click operations. Double-click on the picture of the monitor. If successful, the picture will change.
- **Sound Test** generates sounds for testing the speakers.
- **USB Ports Test** lists USB Devices.

7-4-3-2-13 Assessment Utility

Probe Assessment

NOTE: *The probe assessment is only available for the probe connected in the first probe port.*

NOTE: *P2D probe is not supported in Probe Assessment.*

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cord.
3. Put the probe in the probe holder.

⚠️ CAUTION DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.

4. Align the connector with the probe port and carefully push into the left-most probe port.
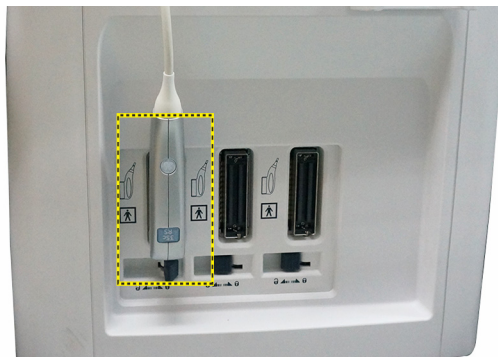
Figure 7-17. Left-most probe port

5. Turn the connector locking handle to the right to secure the probe connector.
6. Carefully position the probe cord so it is free to move and is not resting on the floor.
7. Press *Probe* button on the control panel and select the first probe from the probe indicators.
8. Enter global service user interface as GE service.

7-4-3-2-147-4-3-2-13 Assessment Utility(continued)

9. In the **Diagnostic-> Service Diagnostics-> Assessment Utility-> Probe Assessment** to check the probe.

    If there is no broken element and the probe is acceptable for diagnostic, the following result window displays.
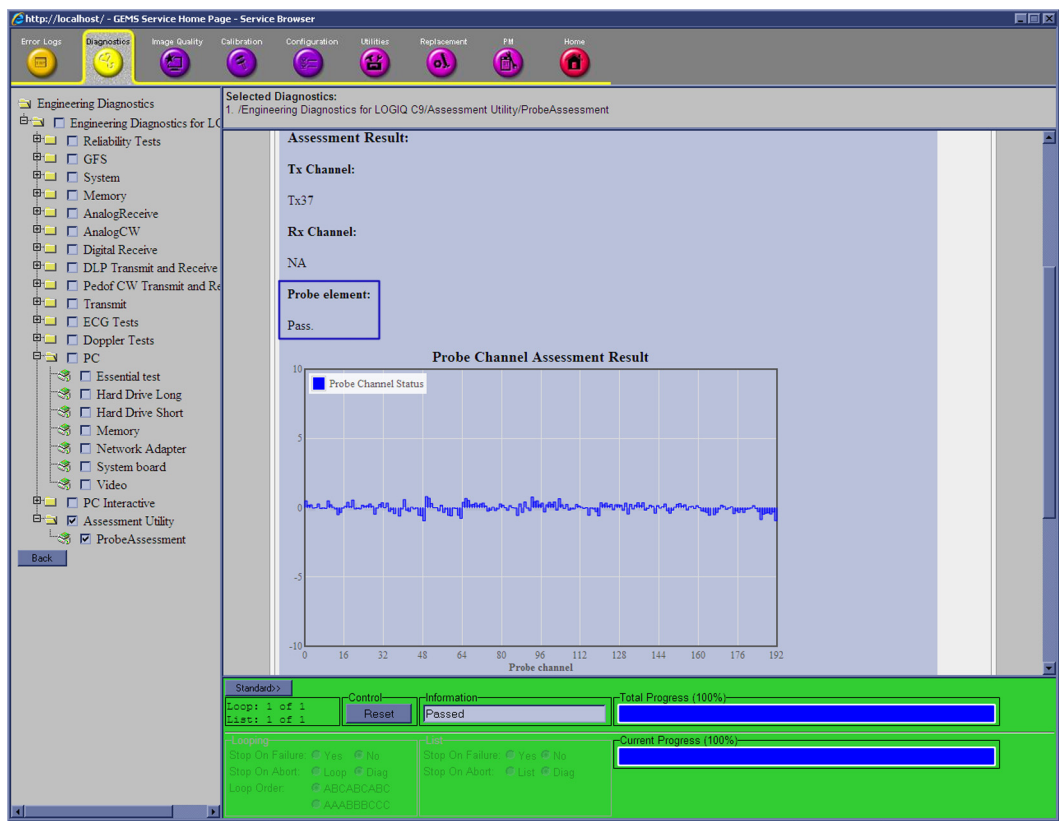
Figure 7-18.   **Probe Assessment Pass**

7-4-3-2-157-4-3-2-13 Assessment Utility(continued)

If there are broken elements and the probe is not acceptable for diagnostic. The assessment is fail and the failed elements are shown in the graphic.
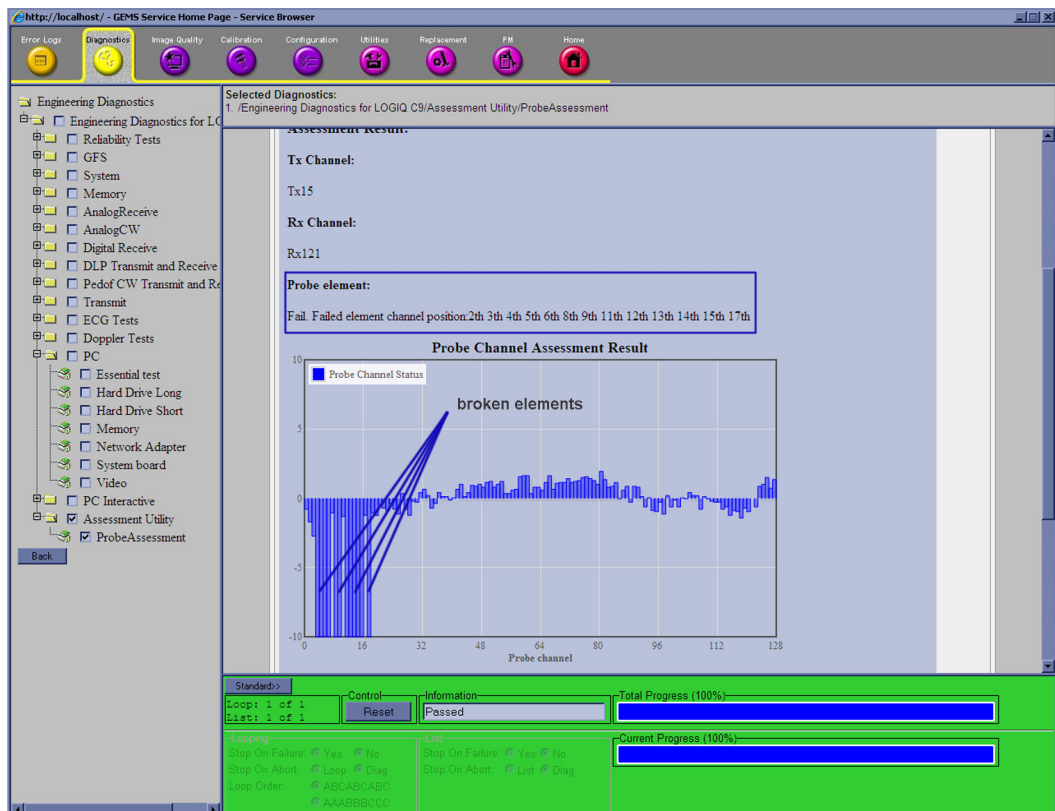
Figure 7-19. **Probe Assessment Fail**

CAUTION   Reboot the system after the probe assessment.

7-4-3-2-16 Probe Pass/Fail Criteria

Pass

- No dead element
- Dead elements on the edge (#0, #1 or #end-1, #end)

Fail

- Max 2 weak elements on the scan line:
  -3dB<elements<-2dB
- Any one of the elements in one scan line: element<-3dB

7-4-3-3 Restart the system after diagnostics

Always shutdown the system and reboot after a diagnostics session.

7-5 Network and Insite II Configuration

7-5-1 Network Configuration

7-5-1-1 Wire-LAN Network

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**.
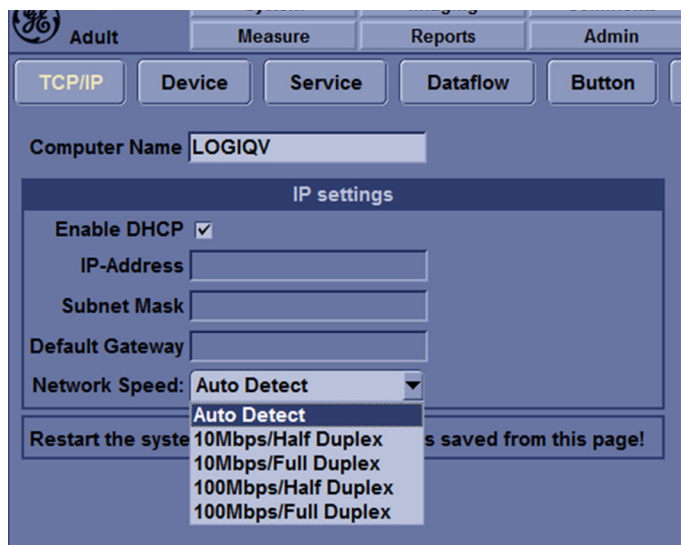
Figure 7-20.   Enable DHCP

7-5-1 Network Configuration(continued)

> *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.*
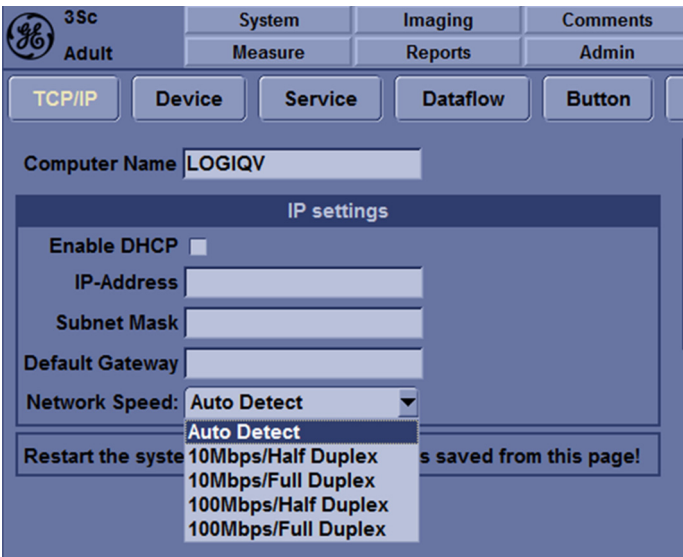
Figure 7-21.   Input static address

3. Select **Save**, and a popup window displays. Select **OK** to restart the system and activate the changes.
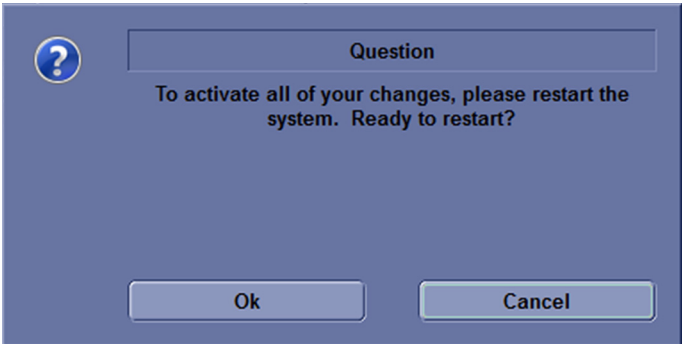
Figure 7-22.   System Restart inquiry dialog

4. After the system restarts, the network icon at the left bottom of screen shows that the network is available.

7-5-1 Network Configuration(continued)

Figure 7-23.   Network icon

7-5-1-2 Wireless-LAN Network

NOTE: *To configure the Wireless-LAN network, the operator must login as administrator.*

1. Connect the wireless adapter in the USB port.
2. Enter **Utility**-> **Connectivity**-> **TCP/IP**, press **Configuration**.
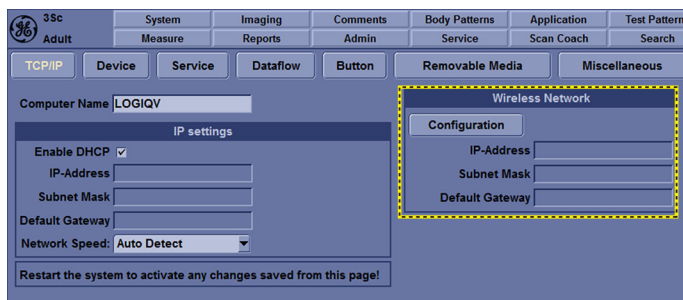
Figure 7-24.   Network Settings

3. Double click **Wireless network**. you chosen, or clink the **Connect** at the left bottom of screen.
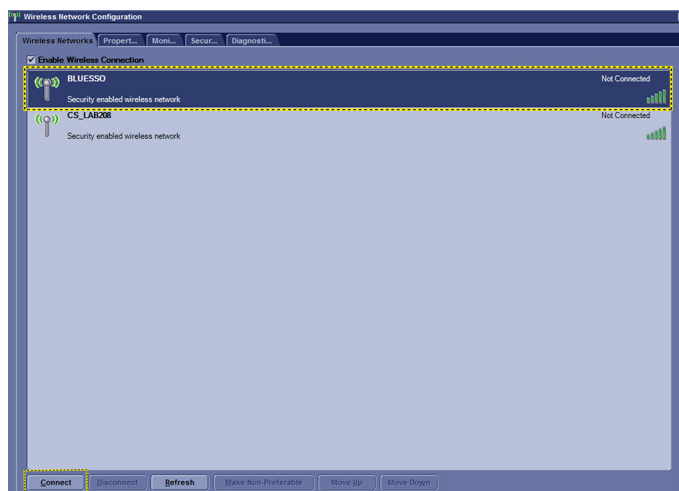
Figure 7-25.   Wireless Network Conection

7-5-1 Network Configuration(continued)

4. Input Network Key and Confirm Network Key, then click
    Connect.
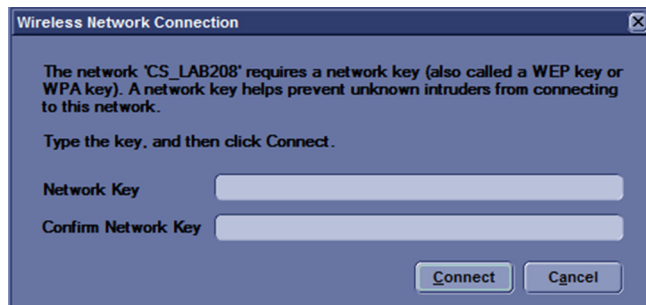
Figure 7-26.   Connection Status

5. The network icon at the left bottom of screen shows that the
    wireless network is available.

Figure 7-27.   Wireless-LAN Connection

Chapter 8

Replacement Procedures

This chapter describes how to remove and install, or replace, modules and subsystems in the LOGIQ V3/V5/ V5 Expert. It also includes instructions for installing and re-installing the software.

8-1 Overview

8-1-1 Contents in this chapter

8-2 Warnings and important information

8-2-1 Warnings

⚠ WARNING

Energy Control and Power Lockout for LOGIQ V3/V5/V5 Expert.

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.

8-2-1 Warnings(continued)

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.

8-2-2 Returning/shipping probes and repair parts

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

GE policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe). The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

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

8-3 Loading the software

8-3-1 Purpose of this section

This section describes how to reinstall software on LOGIQ V3/V5/V5 Expert.

8-3-2 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.

8-3-3 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 V3/V5/V5 Expert 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 Basic User Manual/User Guide.

8-3-4 Backing up the Patient Archive and System Configurations

^c ⚠ 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 V3/V5/V5 Expert 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 Basic User Manual/User Guide.

8-3-5 Restoring up the Patient Archive and System Configurations

- For instructions, please see "Data Backup and Restore" in the Basic User Manual/User Guide.

NOTE: *It is not suggested to manually delete the files in D:\dunn\target\resources\idunn\userdefs.*

^w ⚠ WARNING   To avoid lacking of connecting to Local Archive, connecivity.res and IPSave *in D:\dunn\target\resources\idunn\userdefs* could not be deleted. If they are deleted, please rewirte the serial number.

8-3-6 Recording important settings and parameters

8-3-6-1 Overview

CAUTION   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 V3/V5/V5 Expert. Verify if it is current before you start to load software!

Always keep a record of the settings for the LOGIQ V3/V5/V5 Expert 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:

8-3-7 Loading the System Software

WARNING *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.*

NOTE: *Before loading/reload the system software, please change system language to English. Otherwise, there will be garbage on the system after software loading/reload.*

There is one method to load the system software:

• Load the system software with USB memory stick.

8-3-7-1 Loading the C Disk with USB memory stick

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 USB memory stick labeled "System & Application Software" to 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 automatically.

8-3-7-1 Loading the C Disk with USB memory stick(continued)

4. Select one of the options for loading the system. Select choice [1] to load the C disk only.

NOTE: *During the upgrade process, **Cursor** works as left mouse button and **Set/B Pause** works as right mouse button. It is opposite from that in scanning screen.*

• To select [1], 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.

• To select [2], wipe tool: This option is to wipe tool all the patient data.

NOTE: *All the patient data cannot be recovered after wipe tool.*

• To select [3], Service tool. The complete disk will be loaded. This option is recommended for application software upgrade.

NOTE: *This option is used by service engineer only. It needs password to continue, the password is **GEWuXiChina** and it is case sensitive.*

NOTE: *When to select [3] to load complete disk, please ensure that any patient data on the disk has been backed up.*

CAUTION   If you select [3], 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 [4], Screen size. This option is to adjust the size of screen display.

NOTE: *All the patient data cannot be recovered after wipe tool.*

8-3-7-1 Loading the C Disk with USB memory stick(continued)
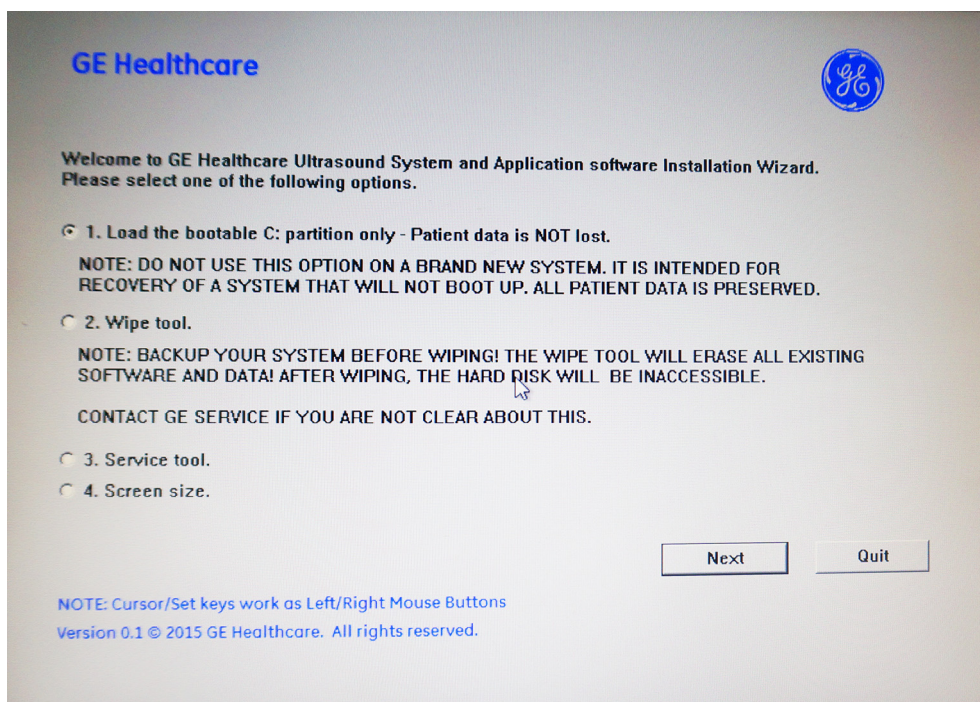
Figure 8-1.   System Software load instruction

⚠ WARNING   *While the software install procedure is designed to preserve data, you should select choice [1] to format disk C only.*

NOTE: *If selected to load C Disk only when loading the system software, the system will display a screen to restore Computer name before entering the scanning screen.*

5.   System USB memory stick will be loading. Wait for the software installation to complete. (Typical installation time: 10-15 minutes). Status bar on the screen indicates progress.

⚠ WARNING   *Do not interrupt the software loading at any time.*

8-3-7-1 Loading the C Disk with USB memory stick(continued)

Figure 8-2.   Loading status

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

NOTE: *If you do not remove the USB memory stick, the software system loading process repeats when the system boots up.Do not remove the USB stick after the software reload if you want to adjust the screen size.*

8-3-7-1 Loading the C Disk with USB memory stick(continued)
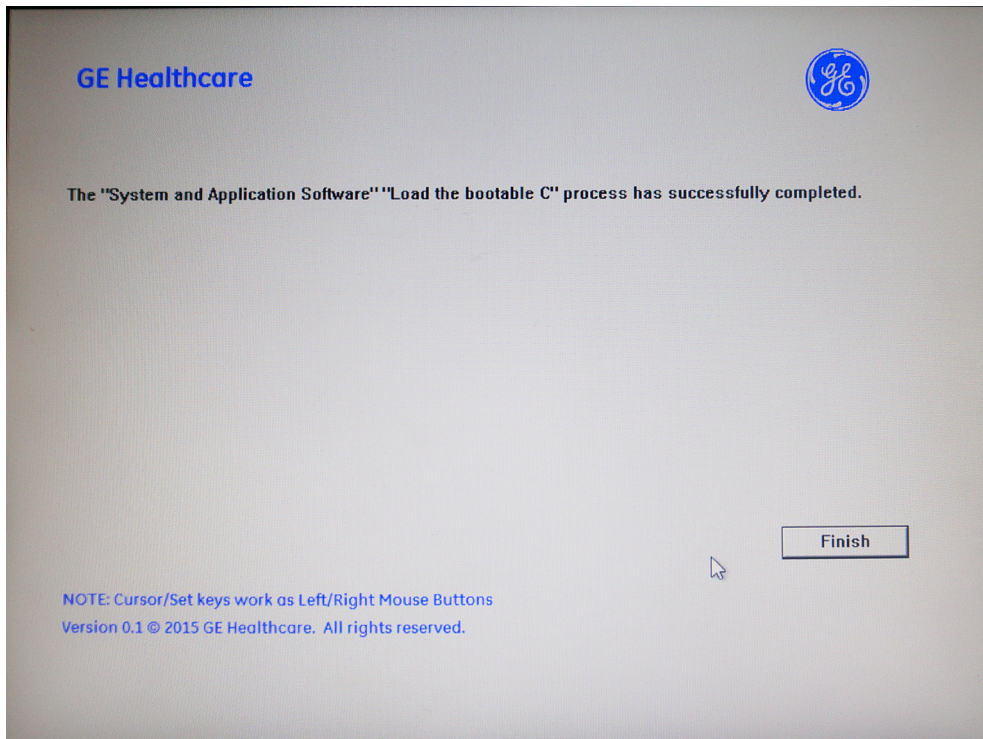
Figure 8-3.   System upgrade complete

8-3-7-2 Wipe Tool

> *NOTE:*   *Before starting this procedure, remove all probes and peripherals and remove them from the system.*

> *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 USB memory stick labeled "System & Application Software" to 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.*

8-3-7-2 Wipe Tool(continued)

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

4. Select **2. Wipe Tool** and then select **Next** to continue.
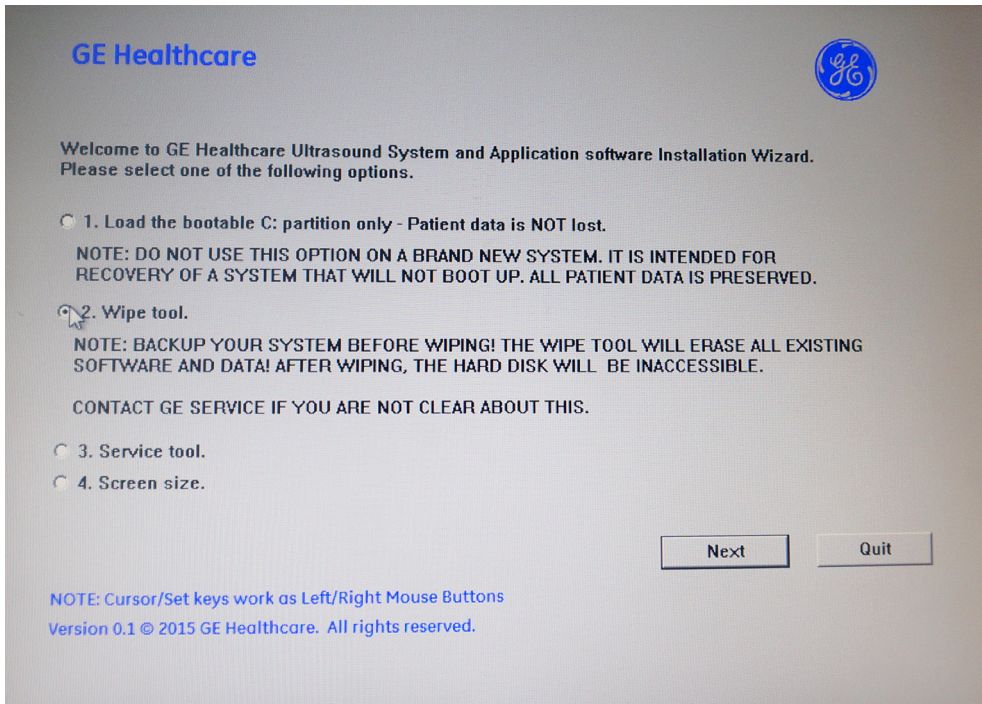
Figure 8-4.   Upgrade message

5. The system indicates all data will be erased, select **Yes** to continue.
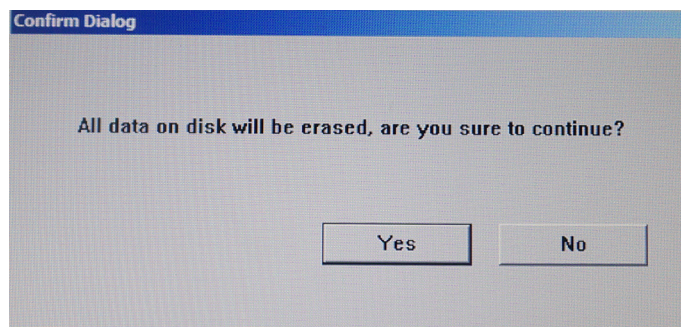
Figure 8-5.   Confirm Dialog

NOTE: All the patient data cannot be recovered after wipe tool.

8-3-7-2 Wipe Tool(continued)

6. The process may take twenty minutes or more.
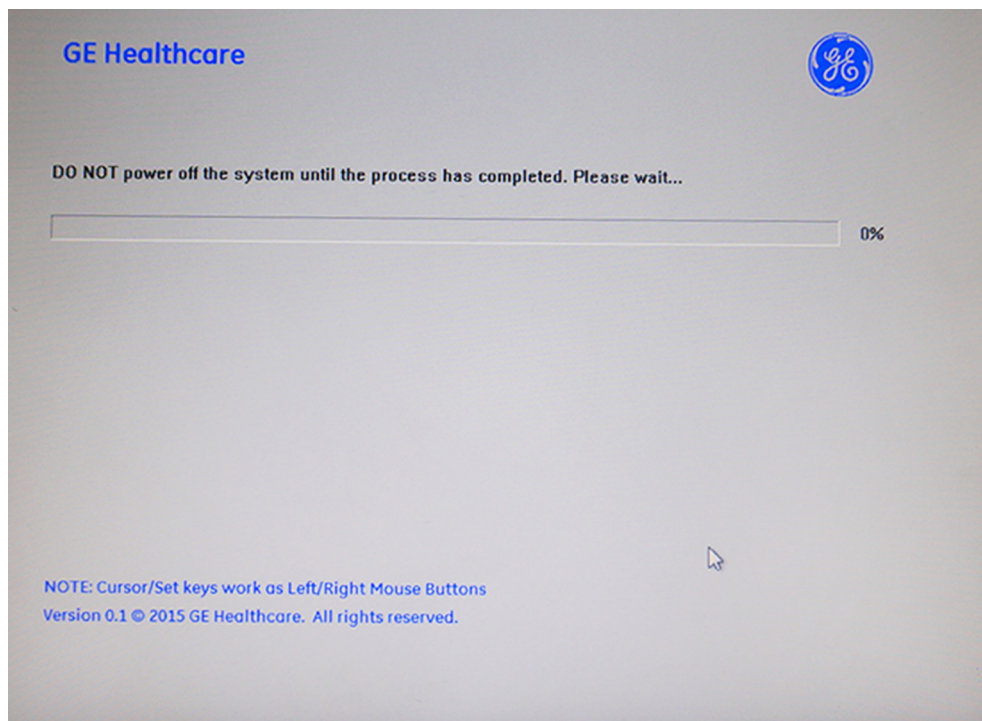
Figure 8-6.   Wipe Tool Process

7. Select **OK** when the process is complete, and the system will shutdown automatically.

8-3-7-2 Wipe Tool(continued)
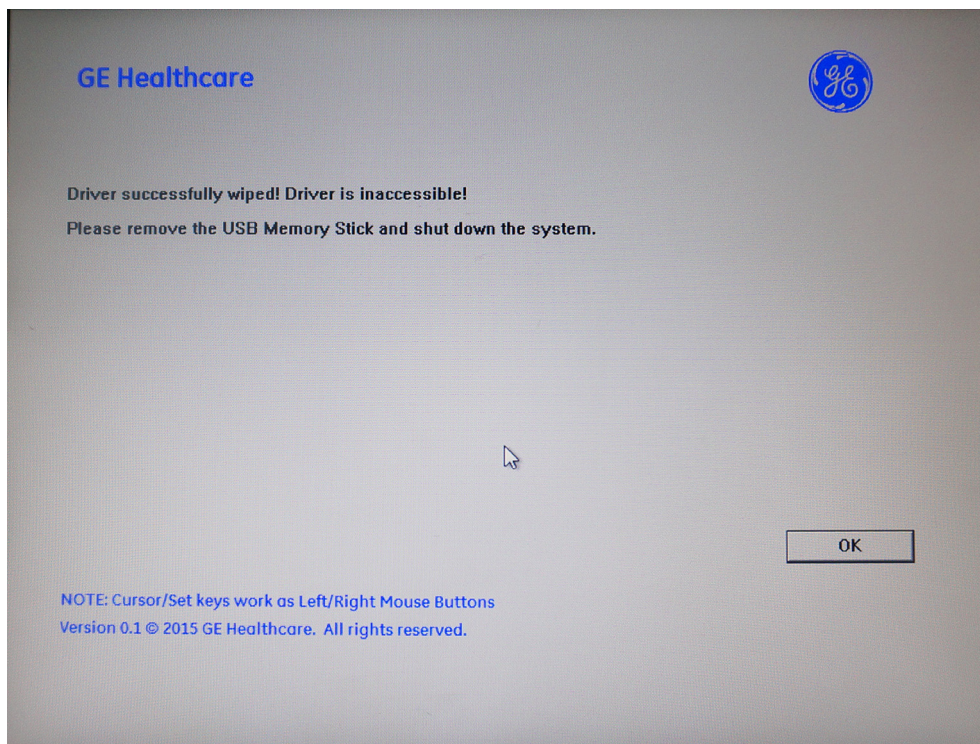
Figure 8-7.   Process Complete

NOTE: *As the SSD is empty after wipe tool, the system cannot boot up. The software should be loaded first after the wipe tool.*

8-3-7-3 Loading the system with USB memory stick

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!*

NOTE: *Serial number and option key are needed to be input after loading the complete disk. The serial number abd option key MUST be the same as the ones before installation. Please record the serial number and option key before installation.*

   1.   Insert the USB memory stick labeled "System & Application Software" to the system.

8-3-7-3 Loading the system with USB memory stick(continued)

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 automatically.

4. Select one of the options for loading the system. Select choice [3] to load the complete disk.

^c ⚠ CAUTION   If you select [3], 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.
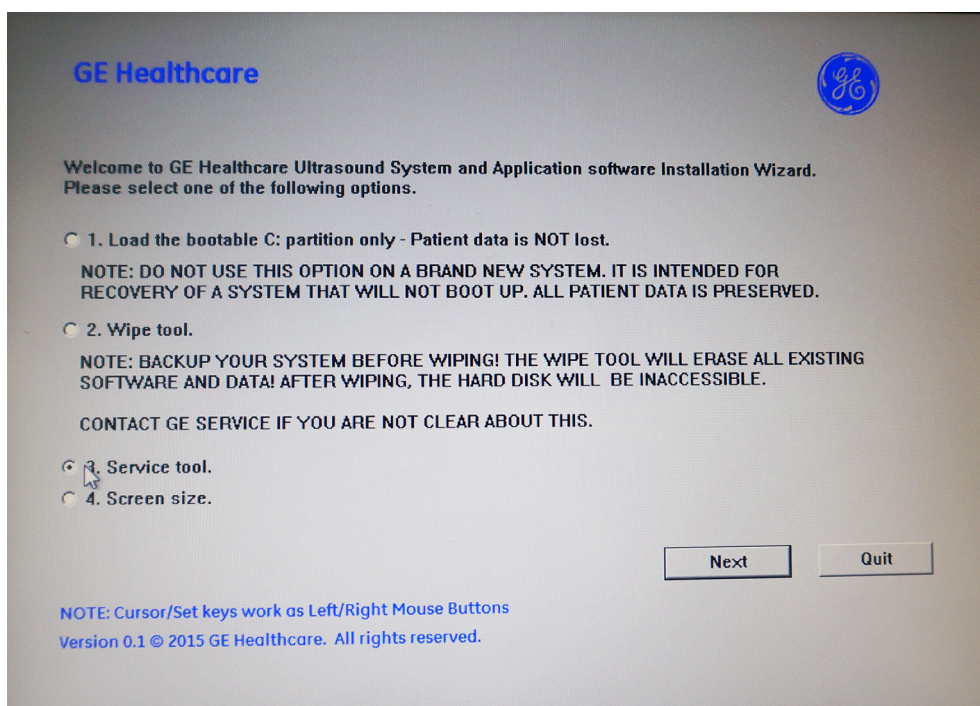
Figure 8-8.   System Software load instruction

8-3-7-3 Loading the system with USB memory stick(continued)

5. This option is used by service engineer only. It needs password to continue, the password is **GEWuXiChina** and it is case sensitive.
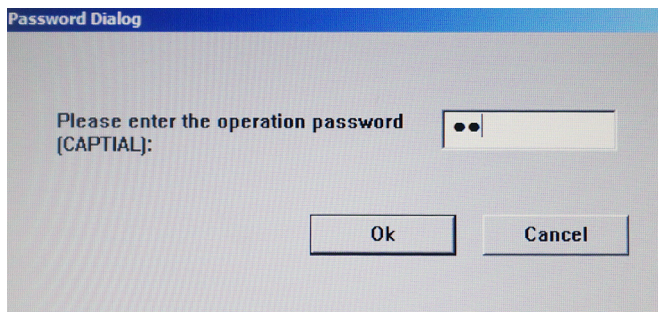
Figure 8-9.   System upgrade complete

6. Click **Next** to continue this operation.
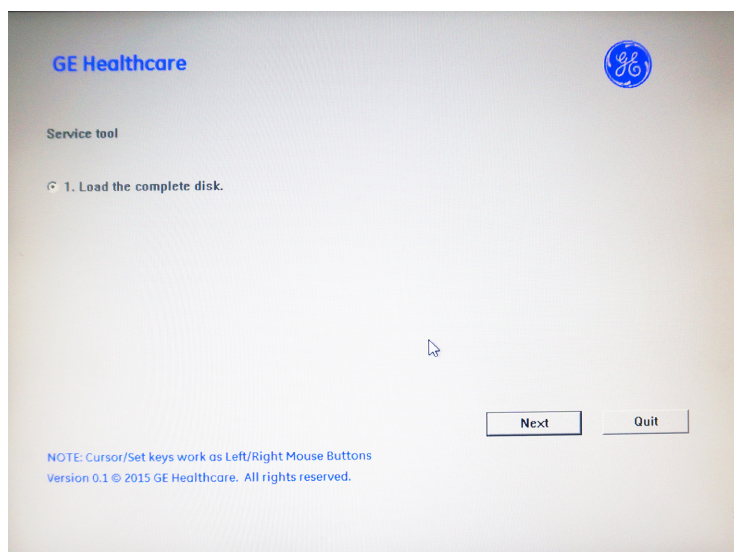
Figure 8-10.   System upgrade complete

7. Select **Yes**.

8-3-7-3 Loading the system with USB memory stick(continued)
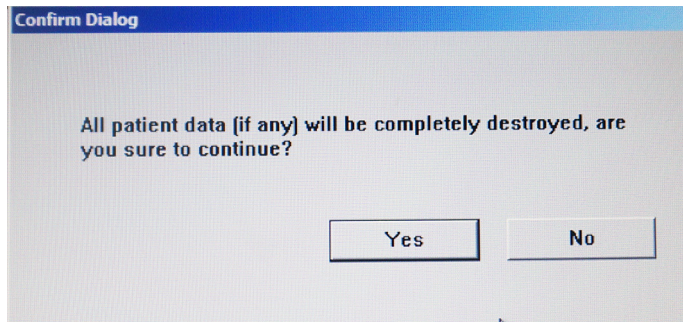
Figure 8-11.   System upgrade complete

8.   System USB memory stick will be loading. Wait for the software installation to complete.

NOTE: *Do not interrupt the software loading at any time.*
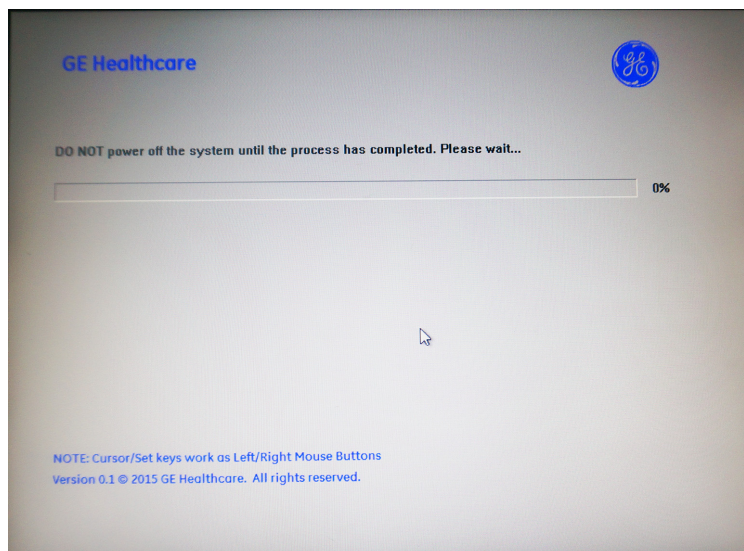
Figure 8-12.   System upgrade complete

8-3-7-3 Loading the system with USB memory stick(continued)
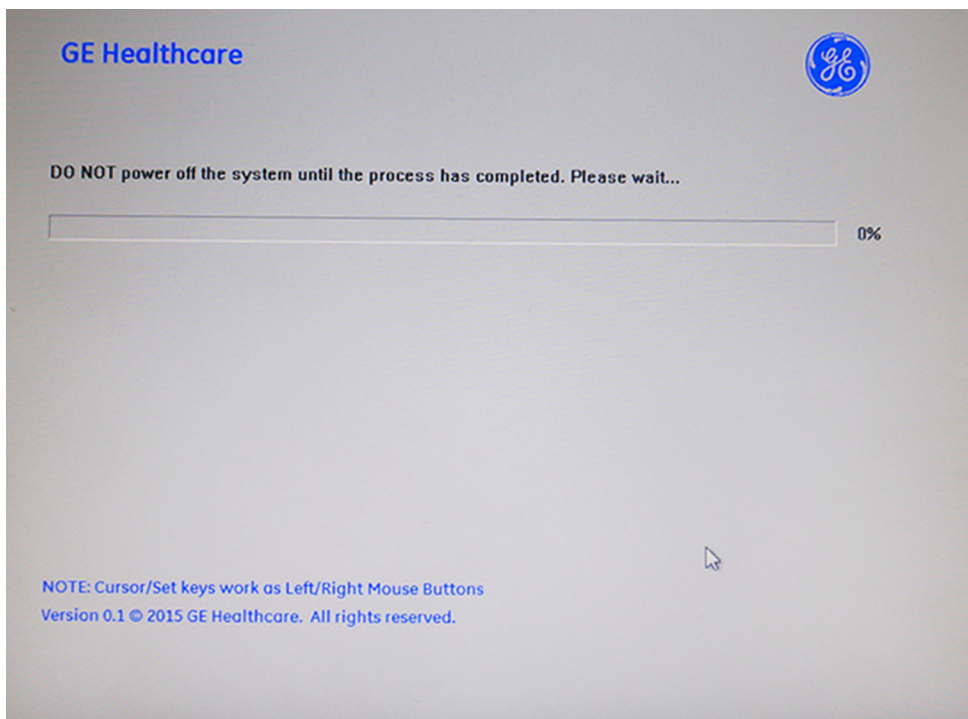
9. After finish updating system, remove the USB memory stick and press any key to shut down the system.

NOTE: *If you do not remove the USB memory stick, the software system loading process repeats when the system boots up. Do not remove the USB stick after the software reload if you want to adjust the screen size.*
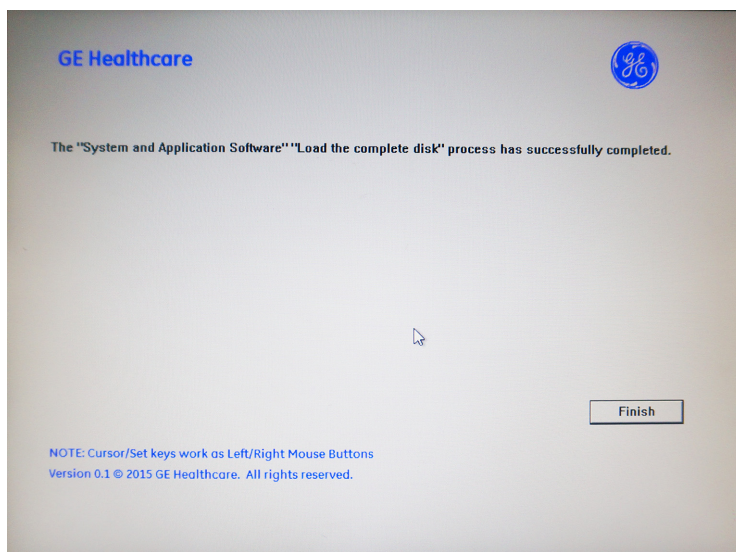
Figure 8-13.   System upgrade complete

10. Password, serial number and option key are needed to be input after loading the complete disk.

NOTE: *The serial number and option key MUST be the same as the ones before installation. Please record the serial number and option key before installation.*

8-3-7-4 Screen Size

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. Do not remove the USB stick after the software reload if you want to adjust the screen size.

NOTE: *Do not remove the USB stick after the software reload if you want to adjust the screen size.*

2. Power on the system. The system will detect the USB memory stick automatically.

3. Select choice [4] -> **Next**.
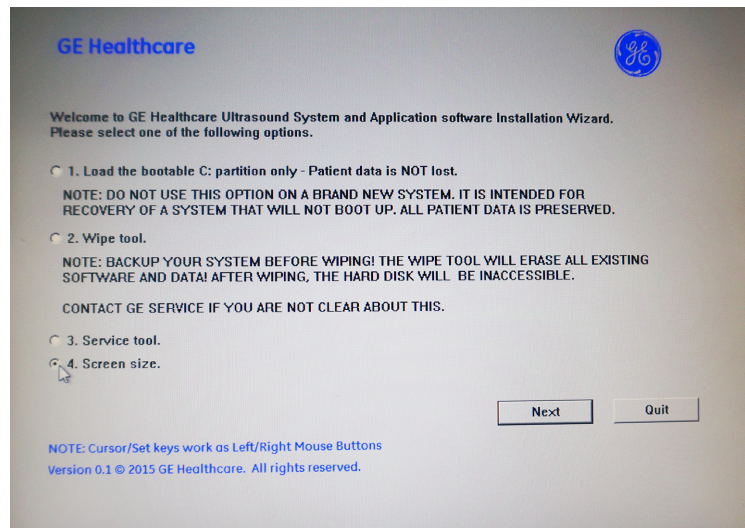
Figure 8-14.   Screen size

4. Enter the ultrasound maintenance access password.The password is **GEWuXiChina** and it is case sensitive.

8-3-7-4 Screen Size(continued)
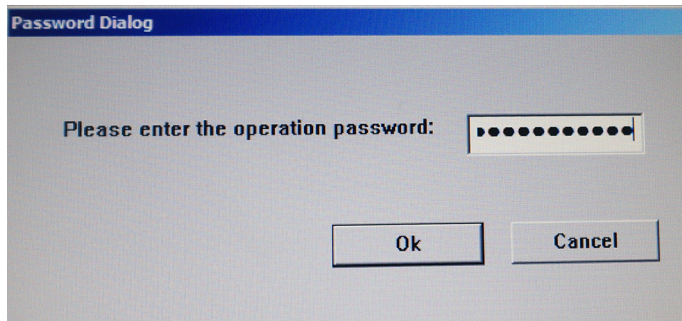
Figure 8-15.   Screen Size

5. Select the screen size according to the monitor size which you can get from the rear cover of monitor.
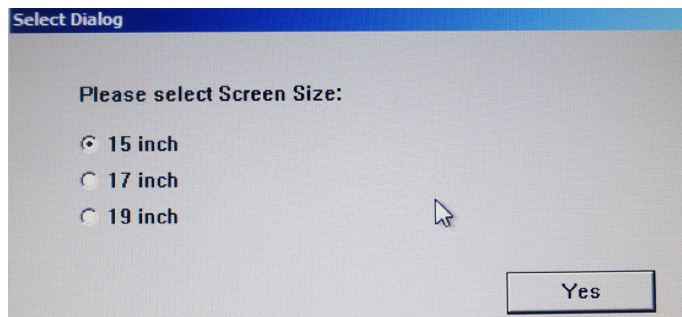
Figure 8-16.   Screen Size

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

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

8-3-7-4 Screen Size(continued)
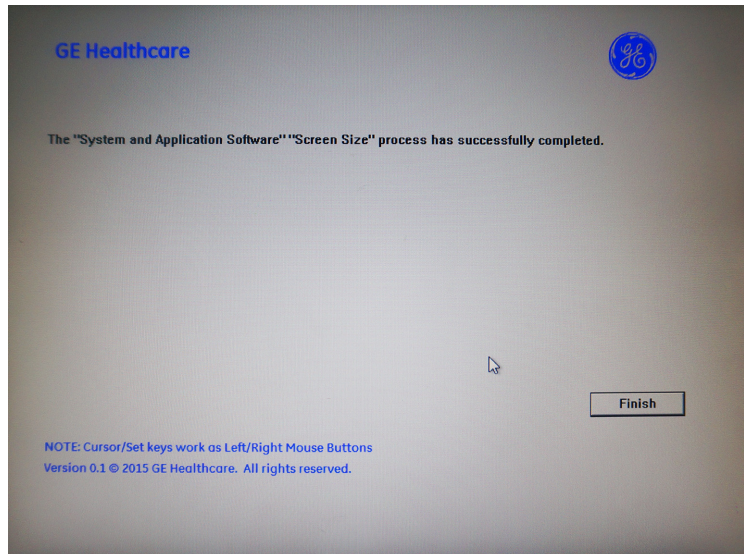
Figure 8-17.   Screen Size

8-3-8 Rewrite the Serial Number

If selected to load the complete disk during the software loading process, when powering the system, the system will indicate to rewrite the serial number.

1.   If the serial number on VPD and HDD does not match, the following dialog will display when the system is booting up.The password is the same as that of service dongle.
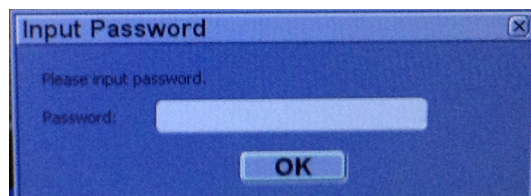
Figure 8-18.   Input Password

8-3-8 Rewrite the Serial Number(continued)

For software R 2.0.3 and above, the following dialog will display.

There are two options for you to continue.

- If you will input a new serial number in step 2 on *page 8-23*, input the password and select **OK**.

- If you will input the same serial number as the original in the step 2 on *page 8-23*, you can select **Ignore** without input of the password. Then the step 2 on *page 8-23* in the following procedure will be skipped.
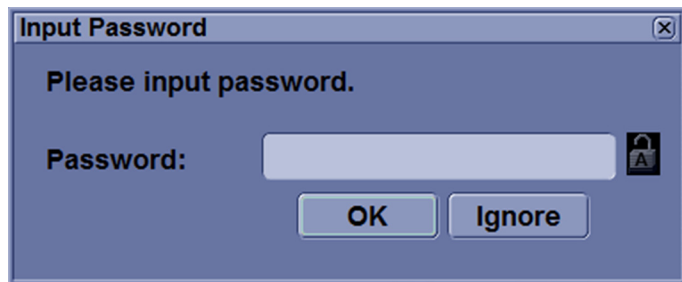
Figure 8-19.   Ignore Button

2.   Then input the correct Serial number, select OK.

NOTE: *The serial number is case sensitivity.*
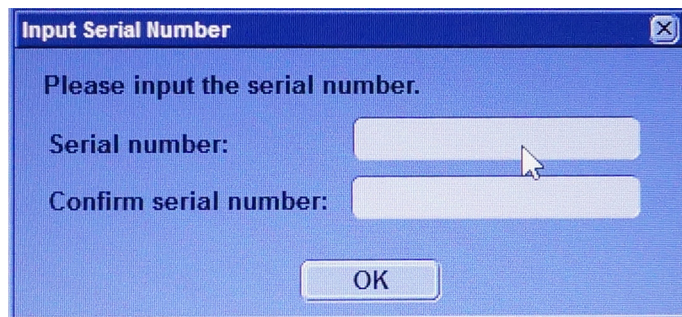
Figure 8-20.   Input Serial Number

NOTE: *The serial number can be found on the rating plate on the rear side of the system.*

8-3-8 Rewrite the Serial Number(continued)

3. The serial number is reset, reboot the system.
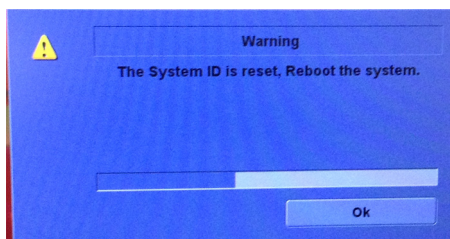
Figure 8-21.   Reboot the System

NOTE: *Make sure the system is shut down after the serial number is reset.*

8-3-8-1 Software Version check out

8-3-8-1-1 Functional Check-out

1. Power on LOGIQ V3/V5/V5 Expert system and wait until system booting to scanning screen.

NOTE: *If selected to load C Disk only when loading the system software, the system will display a screen to restore Computer name before entering the scanning screen.*

2. Press **Utility** on the control panel.

3. Select the **System** -> **About** and check whether the software version is right.
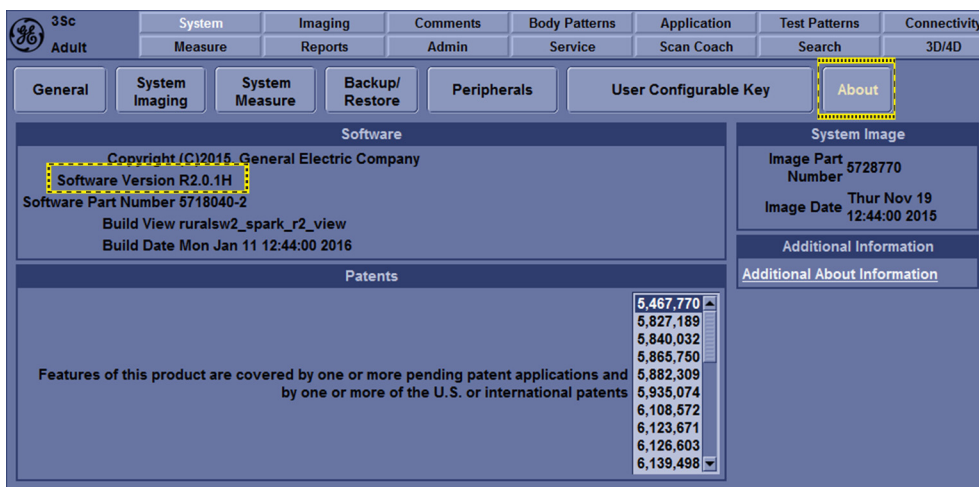
Figure 8-22. Software version

8-3-8-2 Reload the Correct Preset Region

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

1. Reboot the system.

2. Press **Utility** on the Control Pane, then select **System** -> **General**.

3. In the **Location** portion, select the right region in the field of **Preset Region**.
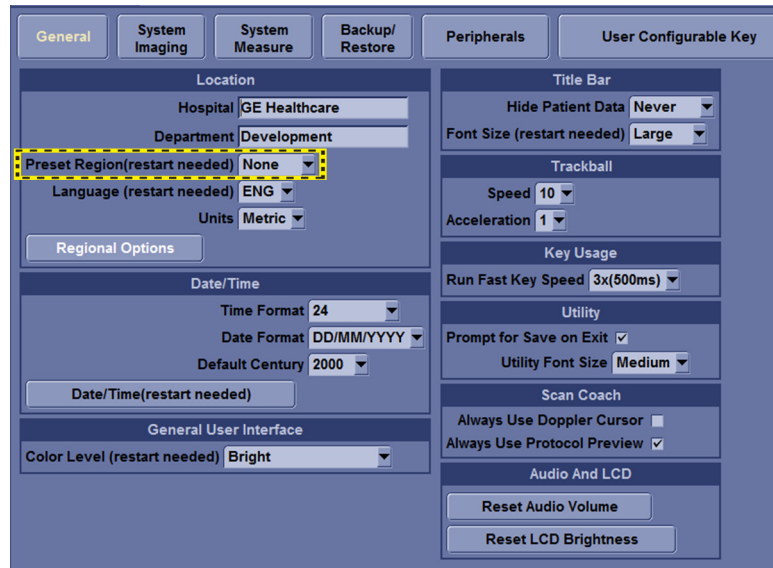
Figure 8-23.   Preset Region

4. Reboot the system.

8-3-8-3 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. Press *Utility* on the control panel.
3. Select **Admin** -> **System Admin**.
4. Ensure that all the installed option keys are displayed and the status of Options are valid.

    •   The status "Valid" 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.

Figure 8-24.   Software Option

8-3-8-4 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 V3/V5/V5 Expert.

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.
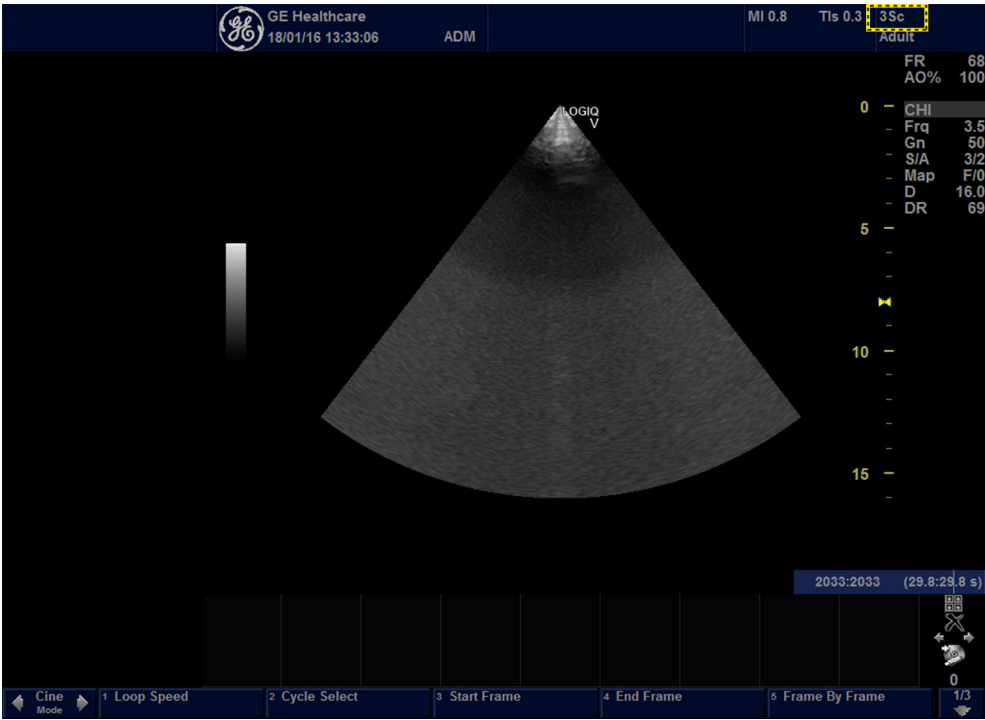
Figure 8-25.   Probe identification

8-3-8-5 Peripheral Device Check

Check to ensure that all the peripheral devices work properly.

For instruction of peripheral device check, See 4-3-34 'Peripheral checks' on *page 4-43 for more information.*

8-3-8-6 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.

Chapter 9

Renewal Parts

This chapter lists the renewal parts available for the LOGIQ V3/V5/V5 Expert.

9-1 Overview

9-1-1 Contents in this chapter

- List of Abbreviations
- Renewal Parts Lists

9-2 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
WMST	Master Board

9-3 Renewal Parts Lists

9-3-1 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

9-3-2 Probe

Table 9-2:   Probes for LOGIQ V3/V5/V5 Expert

Item	Part Name	Part Number	Center Image Frequency (MHz)	Replaced By	Qty	FRU
700	4C-RS	5451471	3.10 ± 10%	5488477	1	1
701	4C-RS	5488477	3.10 ± 10%		1	1
702	8C-RS	5434194	6.5 ± 20%	5499508	1	1
703	8C-RS	5499508	6.5 ± 20%		1	1
704	E8C-RS	5409293	6.5 ± 20%	5499516	1	1
705	E8C-RS	5499516	6.5 ± 20%		1	1
706	E8Cs-RS	5670375	6.5 ± 20%		1	1
707	3Sc-RS	47237516	2.75 ± 20%		1	1
708	6S-RS	5499316	4.5 ± 20%		1	1
709	RAB2-6-RS	KTZ303982	3.3 ± 10%		1	1
710	L6-12-RS	5454332	7.75 ± 20%		1	1
711	12L-RS	5499501	7.75 ± 20%		1	1

9-3-3 Peripheral

Table 9-3:   Peripherals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty
		Footswitch	
801	5151236	Footswitch MKF 2-MED USB GP26	1
802	5338419	USB FOOT SWITCH FSU-1000	1
		USB Stick	
803	5446638	USB Stick	1
		ECG	
804	5146056	ECG Detachable cable AHA Type USA	1
805	5146739	ECG detachable cable IEC type EURO and ASIA	1
806	5146055	USB Cable for ECG	1
807	5129487	ECG module from Norav Isral (not applies to Muslim country and China)	1

Table 9-3: Peripherals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty
808	5149641	ECG Module with Chinese label	1
		Printer	
809	5494719	SONY UP-D711MD Printer with Paper Kit	1
810	5494718	SONY UP-D711MD Printer Paper 1 roll	1
811	5543548	SONY UP-D711MD Printer Paper 10 rolls	1
812	5449734	SONY MEADICAL DC PRINTER UP-D711MD	1
813	5133107-2	SONY UPD25 Color Printer USA Kit	1
814	5133108-2	SONY UPD25 Color Printer EUP Kit	1
815	5133106-2	SONY UPD25 Color Printer CHN Kit	1
816	5133109-2	SONY UPD25 Color Printer JPN Kit	1
817	5491253	SONY UPD25 Color Printer BRAZIL kit	1
818	5151259-2	BW PRINTER (UP-D898MD) USA	1
819	5151261-2	BW PRINTER (UP-D898MD) EU	1
820	5151262-2	BW PRINTER (UP-D898MD) CHN	1
821	5151263-2	BW PRINTER (UP-D898MD) JPN	1
822	5495509-2	BW PRINTER (UP-D898MD) BRA	1
823	5130409	898 printer paper	1
824	OFC	UP-D898MD Printer Kits USA	1
		Biopsy Kit	
825	E8385NA	4C-RS Biopsy Kit	1
826	H40412LN	E8C-RS reusable Biopsy Kit	1
827	H40432LC	L6-12-RS Biopsy Kit	1
828	H46222LC	3Sc-RS Biopsy Kit	1
829	H48681ML	RAB2-6-RS Biopsy Kit	1
830	E8385MJ	E8C-RS Biopsy Kit	1
		USB HDD	
831	5434317-4	1TB mobile USB HDD	1
		DVD RW	
832	5729697	LV R2 DVD RW Kit with SW	1
833	5653589	LITEON eBAU108 DVD Writer Kit	1

Table 9-3:   Peripherals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty
834	5421869	Peripheral Driver Kits for LF/LV R2	1
System and Application Software USB			
835	5730360-2S	Ayan R2 R2.0.2 System and Application Software USB (for Service)	1
836	5730360-3S	Ayan R2 R2.0.3 System and Application Software (for Service)	1
837	5730360-4S	Ayan R2 R2.0.4 System and Application Software (for Service)	1
838	5730360-5S	Ayan R2 R2.0.5 System and Application Software (for Service)	1
839	5730360-6S	Ayan R2 R2.0.6 System and Application Software (for Service)	1
840	5730360-7S	Ayan R2 R2.0.7 System and Application Software (for Service)	1
Others			
841	H48702AS	VGA to Svideo adapter	1
842	H48822AC	LF/LV AN Key film	1
843	H48612AS	LV R2 CHN KBD Film	1
844	H48832AC	Wireless Adaptor	1
845	H48552LJ	Printer Power Cable for Brazil	1

9-3-4 Power Cord

Table 9-4:   Power Cord for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty	FRU
900	5177123-2	AC Power Cord Europe	1	1
901	5176304-2	AC Power Cord China	1	1
902	5176773-2	AC Power Cord India	1	1
903	5177195-2	AC Power Cord Argentina	1	1
904	5176907-2	AC Power Cord UK	1	1
905	5177153-2	AC Power Cord Denmark	1	1
906	5177154-2	AC Power Cord Switzerland	1	1
907	5177187-3	AC Power Cord Australia	1	1
908	5177146-2	AC Power Cord USA	1	1
909	5400868-2	AC Power Cord Brazil	1	1
910	5176753-2	AC Power Cord Israel	1	1
911	5177126-2	AC Power Cord Japan	1	1

9-3-5 Manuals

Table 9-5:   Manuals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty	FRU
1000	5729745 -100	LOGIQ V3/V5/V5 Expert Quick Card for USA	1	N
1001	5726265-200	LOGIQ V3/V5/V5 Expert Manual CD	1	N
1002	5719190-100	LOGIQ V3/V5/V5 Expert Advanced Reference Manual	1	N
1003	5726264-100	LOGIQ V3/V5/V5 Expert Basic Service Manual	1	N
1004	5719187-100	LOGIQ V3/V5/V5 Expert Basic User Manual	1	N
1005	5719188-100	LOGIQ V3/V5/V5 Expert User Guide English version	1	N
1006	5719188-101	LOGIQ V3/V5/V5 Expert User Guide French version	1	N
1007	5719188-106	LOGIQ V3/V5/V5 Expert User Guide Spanish version	1	N
1008	5719188-108	LOGIQ V3/V5/V5 Expert User Guide German version	1	N
1009	5719188-111	LOGIQ V3/V5/V5 Expert User Guide Italian version	1	N
1010	5719188-121	LOGIQ V3/V5/V5 Expert User Guide Dutch version	1	N
1011	5719188-127	LOGIQ V3/V5/V5 Expert User Guide Brazilian Portuguese version	1	N
1012	5719188-129	LOGIQ V3/V5/V5 Expert User Guide Estonian version	1	N
1013	5719188-131	LOGIQ V3/V5/V5 Expert User Guide Slovenian version	1	N
1014	5719188-140	LOGIQ V3/V5/V5 Expert User Guide Japanese version	1	N
1015	5719188-142	LOGIQ V3/V5/V5 Expert User Guide Swedish version	1	N
1016	5719188-144	LOGIQ V3/V5/V5 Expert User Guide Korean version	1	N
1017	5719188-145	LOGIQ V3/V5/V5 Expert User Guide Russian version	1	N
1018	5719188-150	LOGIQ V3/V5/V5 Expert User Guide Polish version	1	N
1019	5719188-151	LOGIQ V3/V5/V5 Expert User Guide Greek version	1	N
1020	5719188-153	LOGIQ V3/V5/V5 Expert User Guide Hungarian version	1	N
1021	5719188-154	LOGIQ V3/V5/V5 Expert User Guide Slovakian version	1	N
1022	5719188-155	LOGIQ V3/V5/V5 Expert User Guide Czech version	1	N
1023	5719188-159	LOGIQ V3/V5/V5 Expert User Guide Turkish version	1	N
1024	5719188-160	LOGIQ V3/V5/V5 Expert User Guide Danish version	1	N
1025	5719188-161	LOGIQ V3/V5/V5 Expert User Guide Norwegian version	1	N
1026	5719188-162	LOGIQ V3/V5/V5 Expert User Guide Finnish version	1	N
1027	5719188-165	LOGIQ V3/V5/V5 Expert User Guide Bulgarian version	1	N

Table 9-5:   Manuals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty	FRU
1028	5719188-167	LOGIQ V3/V5/V5 Expert User Guide Romanian version	1	N
1029	5719188-168	LOGIQ V3/V5/V5 Expert User Guide Croatian version	1	N
1030	5719188-174	LOGIQ V3/V5/V5 Expert User Guide Lithuanian version	1	N
1031	5719188-175	LOGIQ V3/V5/V5 Expert User Guide Latvian version	1	N
1032	5719188-176	LOGIQ V3/V5/V5 Expert User Guide Serbian version	1	N
1033	5719188-177	LOGIQ V3/V5/V5 Expert User Guide European Portuguese version	1	N
1034	5719188-181	LOGIQ V3/V5/V5 Expert User Guide Indonesian version	1	N
1035	5719188-180	LOGIQ V3/V5/V5 Expert User Guide Ukrainian version	1	N
1036	5719188-184	LOGIQ V3/V5/V5 Expert User Guide Kazakh version	1	N
1037	5730411-140	LOGIQ V3/V5/V5 Expert Highlight document	1	N
1038	5719057-141	LOGIQ V3/V5/V5 Expert User Guide Kazakh version	1	N
1039	5726260-141	LOGIQ V3/V5/V5 Expert User Guide Kazakh version	1	N
1040	5726260-100	LOGIQ V3/V5/V5 Expert Release Notes English version	1	N
1041	5726260-101	LOGIQ V3/V5/V5 Expert Release Notes French version	1	N
1042	5726260-106	LOGIQ V3/V5/V5 Expert Release Notes Spanish version	1	N
1043	5726260-108	LOGIQ V3/V5/V5 Expert Release Notes German version	1	N
1044	5726260-111	LOGIQ V3/V5/V5 Expert Release Notes Italian version	1	N
1045	5726260-121	LOGIQ V3/V5/V5 Expert Release Notes Dutch version	1	N
1046	5726260-127	LOGIQ V3/V5/V5 Expert Release Notes Brazilian Portuguese version	1	N
1047	5726260-129	LOGIQ V3/V5/V5 Expert Release Notes Estonian version	1	N
1048	5726260-131	LOGIQ V3/V5/V5 Expert Release Notes Slovenian version	1	N
1049	5726260-140	LOGIQ V3/V5/V5 Expert Release Notes Japanese version	1	N
1050	5726260-142	LOGIQ V3/V5/V5 Expert Release Notes Swedish version	1	N
1051	5726260-144	LOGIQ V3/V5/V5 Expert Release Notes Korean version	1	N
1052	5726260-145	LOGIQ V3/V5/V5 Expert Release Notes Russian version	1	N
1053	5726260-150	LOGIQ V3/V5/V5 Expert Release Notes Polish version	1	N
1054	5726260-151	LOGIQ V3/V5/V5 Expert Release Notes Greek version	1	N
1055	5726260-153	LOGIQ V3/V5/V5 Expert Release Notes Hungarian version	1	N
1056	5726260-154	LOGIQ V3/V5/V5 Expert Release Notes Slovakian version	1	N

Table 9-5:   Manuals for LOGIQ V3/V5/V5 Expert

Item	Part Number	Description	Qty	FRU
1057	5726260-155	LOGIQ V3/V5/V5 Expert Release Notes Czech version	1	N
1058	5726260-159	LOGIQ V3/V5/V5 Expert Release Notes Turkish version	1	N
1059	5726260-160	LOGIQ V3/V5/V5 Expert Release Notes Danish version	1	N
1060	5726260-161	LOGIQ V3/V5/V5 Expert Release Notes Norwegian version	1	N
1061	5726260-162	LOGIQ V3/V5/V5 Expert Release Notes Finnish version	1	N
1062	5726260-165	LOGIQ V3/V5/V5 Expert Release Notes Bulgarian version	1	N
1063	5726260-167	LOGIQ V3/V5/V5 Expert Release Notes Romanian version	1	N
1064	5726260-168	LOGIQ V3/V5/V5 Expert Release Notes Croatian version	1	N
1065	5726260-174	LOGIQ V3/V5/V5 Expert Release Notes Lithuanian version	1	N
1066	5726260-175	LOGIQ V3/V5/V5 Expert Release Notes Latvian version	1	N
1067	5726260-176	LOGIQ V3/V5/V5 Expert Release Notes Serbian version	1	N
1068	5726260-177	LOGIQ V3/V5/V5 Expert Release Notes European Portuguese version	1	N
1069	5726260-180	LOGIQ V3/V5/V5 Expert Release Notes Ukrainian version	1	N
1070	5726260-181	LOGIQ V3/V5/V5 Expert Release Notes Indonesian version	1	N
1071	5726260-184	LOGIQ V3/V5/V5 Expert Release Notes Kazakh version	1	N
1072	5726260-141	LOGIQ V3/V5/V5 Expert Release Notes Chinese version	1	N

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.*

10-1 Overview

10-1-1 Contents in this chapter

10-2 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.

10-3 Why do maintenance

10-3-1 Periodic maintenance inspections

It has been determined by engineering that your LOGIQ V3/V5/ V5 Expert 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.

10-3-2 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.

10-3-3 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.

10-4 Maintenance task schedule

10-4-1 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 V3/V5/V5 Expert should be serviced and outlines items requiring special attention.

NOTE: *It is the customer's responsibility to ensure the LOGIQ V3/V5/V5 Expert 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 V3/V5/V5 Expert 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 V3/V5/V5 Expert 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.

10-5 Tools required

NOTE: *For a list of required tools for servicing the LOGIQ V3/V5/V5 Expert, refer to chapter 8.*

10-5-1 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 2mm
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		

10-5-2 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		

10-5-3 Special tools, supplies and equipment used for maintenance

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

Tool / kit	Comments
Digital Volt Meter (DVM)	
Anti Static Kit	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	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	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	

10-6 System maintenance

10-6-1 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.	Diagnostics	Optional.
8.	Presets	Backup all Customer Presets to an appropriate media.
9.	Image Archive	Back up the Image Archive onto appropriate media.

10-6-2 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.

10-6-2-1 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 Basic User Manual.
11.	Software Menu check	Verify Software Menu display functions. Refer to Chapter 3 of the Basic User Manual.
12.	Peripherals	See: 4-3-34 'Peripheral checks' on *page 4-43*.
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)

10-6-2-2 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 properly. Clean if necessary.
2.	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3.	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4.	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5.	ECG	Verify basic operation with customer
6.	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.
7.	DVD	Verify that the DVD is functioning properly. Clean heads and covers if necessary.

10-6-2-3 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.
4.	Verify	Inlet connector retainer is functional.

10-6-2-4 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).

10-6-3 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: 10-6-2-3 '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,

10-6-4 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.

10-6-4-1 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.

10-6-5 Probe maintenance

10-6-5-1 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.

10-6-5-2 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.

10-6-5-3 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.

10-7 Electrical safety tests

10-7-1 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.

10-7-1 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.

10-7-2 Leakage current limits

WARNING

Energy Control and Power Lockout for LOGIQ V3/V5/V5 Expert.

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

10-7-2 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.	

10-7-3 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.

CORRECT WIRING	OPEN GROUND WIRE
REVERSED POLARITY	OPEN NEUTRAL WIRE
HOT AND GROUND REVERSED	OPEN HOT WIRE
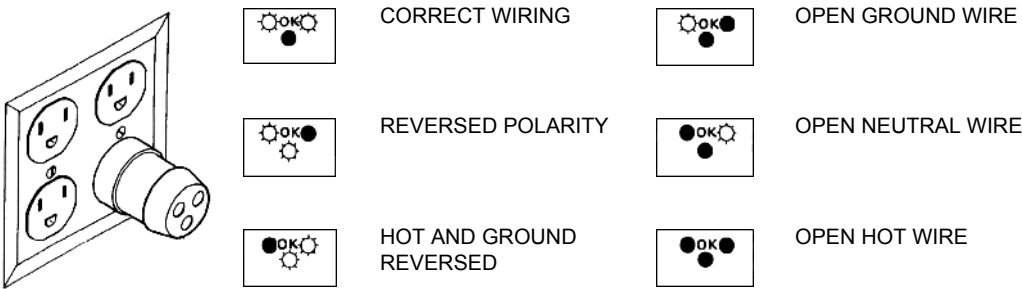
Figure 10-1.   Typical alternate outlet tester

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.*

10-7-4 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.
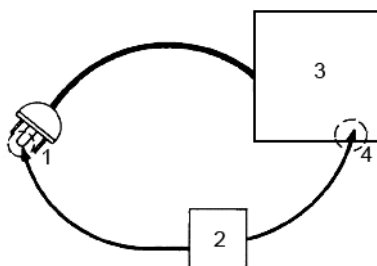
1. GROUND PIN
2. OHMMETER
3. LOGIQ V3/V5/V5 Expert
4. ACCESSIBLE METAL PART:
   • MONITOR HOUSING
   • PEAR PANEL CONNECTOR
   • ANY CASTER/WHEEL SUPPORT

Figure 10-2.   Ground continuity test

10-7-5 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.

10-7-5-1 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.
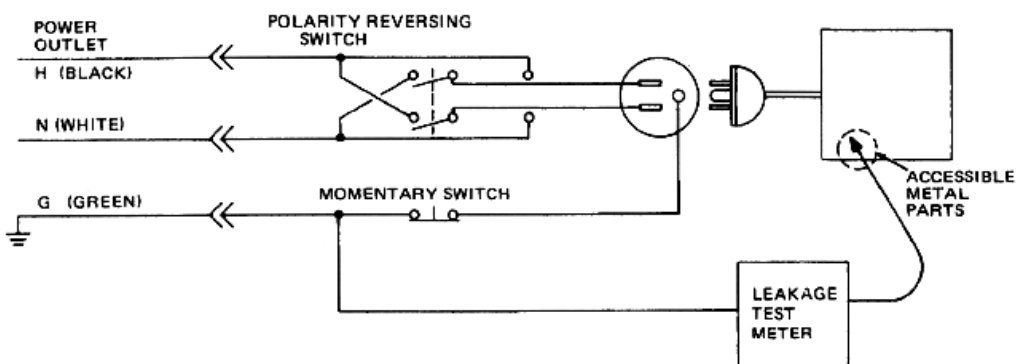
Figure 10-3.   Set Up for Chassis Source Leakage Current, IEC 601-1 Clause 19 - Continuos Leakage Currents and Patient, Auxiliary Currents

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*.

10-7-5-2 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				

10-7-6 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.

10-7-6-1 Definition

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

NOTE: *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.*

10-7-6-2 Tools

For needed tools, see: 10-5 'Tools required' on *page 10-8*.

10-7-6-3 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.
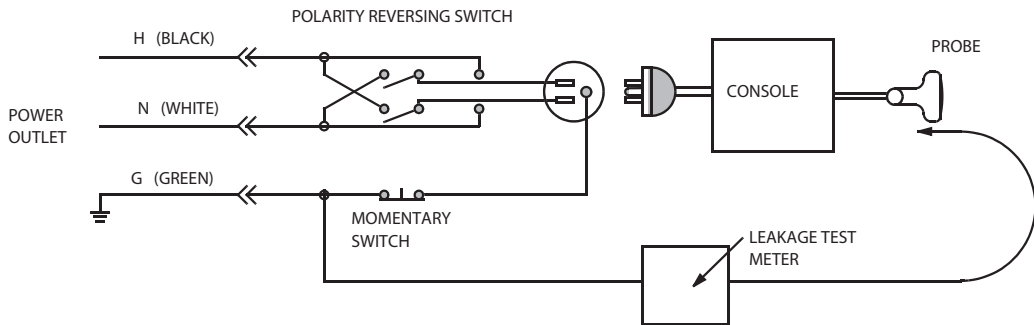
Figure 10-4.   Set up for probe leakage current

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**.

10-7-6-4 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.

10-7-6-5 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.

10-7-6-6 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.

⚠ **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.

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	

10-8 When there's too much leakage current …

10-8-1 AC/DC Fails

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

10-8-2 Chassis Fails

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Where applicable, tighten all grounds. Ensure star washers are under all ground studs.

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

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work around, check the other outlets to see if they could be used instead.

NOTE: *No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.*

10-8-3 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.

10-8-4 Peripheral Fails

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

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

10-8-5 Still Fails

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

10-8-6 New Unit

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

10-8-7 ECG Fails

Inspect cables for damage or poor connections.

10-9 Inspection Paperwork

10-9-1 Ultrasound Inspection Forms

ULTRASOUND INSPECTION CERTIFICATE

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/C ontract/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

10-9-1 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 Options	
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

10-10 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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