



## Technical Publication

# VIVID™ S60N AND VIVID™ S70N

## Basic Service Manual

Software version v203

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BASIC SERVICE DOCUMENTATION.  
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# Important Precautions

## TRANSLATION POLICY

### WARNING

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

### AVERTISSEMENT

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

### ADVERTENCIA

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

## WARNUNG

Deutsch  
(DE)

Dieses Wartungshandbuch ist nur auf Englisch verfügbar.

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

## AVVERTENZA

italiano  
(IT)

Il presente Manuale di assistenza è disponibile solo in inglese.

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

## WAARSCHUWING

Nederlands  
(NL)

Deze servicehandleiding is alleen beschikbaar in het Engels.

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

## ADVERTÊNCIA

Português  
(PT-BR)

Este Manual de Manutenção está disponível apenas em Inglês.

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

## HOIATUS!

Eesti  
(ET)

Service Manual (Hooldusjuhend) on saadaval ainult ingliskeelsena.

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

## OPOZORILO

Slovenščina  
(SL)

Ta servisni priročnik je na voljo samo v angleščini.

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

## 警告

日本語  
(JA)

このサービスマニュアルは英語版のみ提供されています。

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

## 警告

繁体中文  
(ZH-CN)

本维修手册仅提供英文版。

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

## VARNING

Svenska  
(SV)

Den här servicehandboken finns endast på engelska.

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

## 警告

繁體中文  
(ZH-TW)

此服務手冊僅推出英文版。

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

## 경고

한글  
(KO)

이 서비스 설명서는 영어로만 제공됩니다.

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

## ПРЕДУПРЕЖДЕНИЕ

На русском языке  
(RU)

Данное руководство по обслуживанию доступно только на английском языке.

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

## OSTRZEŻENIE

Polski  
(PL)

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

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



## ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά  
(EL)

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

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

## FIGYELMEZTETÉS

Magyar  
(HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

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

## VAROVANIE

Slovenčina  
(SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

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

## VÝSTRAHA

česky  
(CZ)

Tato servisní příručka je k dispozici pouze v angličtině.

- Pokud poskytovatel služby zákazníkovi požaduje jiný jazyk než angličtinu, je odpovědností zákazníka poskytnout služby překladu.
- Nepokoušejte se provádět servis zařízení, dokud si neprostudujete a neporozumíte servisní příručce.
- Nevěnování pozornosti této výstraze může způsobit poskytovateli služeb, obsluze nebo pacientovi úraz elektrickým proudem, mechanická nebo jiná nebezpečí.

## UYARI

Türkçe  
(TK)

Servis Kılavuzu yalnızca İngilizce olarak mevcuttur.

- Müşterinin servis sağlayıcısı için kılavuzun İngilizce dışında başka bir dile çevrilmesi gerekiyorsa çeviri hizmeti sağlamak müşterinin sorumluluğudur.
- Bu Servis Kılavuzu'na bakıp talimatları anlamadan ekipmanı kullanmaya çalışmayın.
- Bu Uyarının göz ardı edilmesi servis sağlayıcısının, operatörün veya hastanın, elektrik çarpması, mekanik arıza ya da diğer tehlikeler nedeniyle yaralanmasına neden olabilir.

## ADVARSEL

Dansk  
(DA)

Denne servicemanual fås kun på engelsk.

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

## ADVARSEL

Norsk  
(NO)

Denne servicehåndboken er bare tilgjengelig på engelsk.

- Hvis en kundes tjenestetilbyder krever et annet språk enn engelsk, er det kundens ansvar å tilby oversettelsestjenester.
- Ikke forsøk å utføre service på utstyret før denne servicehåndboken er lest og forstått.
- Dersom det ikke tas hensyn til denne advarselen, kan det føre til skader på tjenestetilbyderen, operatøren eller pasienten fra elektrisk støt, mekaniske eller andre farer.

## VAKAVA VAROITUS

Suomi  
(FI)

Tämä huolto-opas on saatavana vain englanniksi.

- Jos asiakkaan palveluntarjoaja tarvitsee oppaan jollain muulla kielellä, käännöspalveluiden hankkiminen on asiakkaan vastuulla.
- Laitetta ei saa huoltaa ellei huolto-oppaaseen ole sitä ennen tutustuttu huolellisesti.
- Jos tätä varoitusta ei noudateta, palveluntarjoaja, käyttäjä tai potilas saattaa saada sähköiskun, ja saattaa aiheutua mekaanisia tai muita vaurioita.

## ПРЕДУПРЕЖДЕНИЕ

Български  
(BG)

Настоящото Сервизно ръководство се предлага само на английски език.

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



## AVERTISMENT

Română  
(RO)

Acest manual de service este disponibil doar în engleză.

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

## UPOZORENJE

Hrvatski  
(HR)

Ovaj servisni priručnik dostupan je samo na engleskom jeziku.

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

## ĮSPĖJIMAS

Lietuvių k.  
(LT)

Šis priežiūros vadovas galimas tik anglų kalba.

- Jei kliento paslaugų teikėjas reikalauja kitos kalbos nei anglų, klientas atsako už vertimo paslaugos teikimą.
- Atlikite įrangos priežiūrą tik gerai susipažinę su priežiūros vadovu ir jį supratę.
- Nesilaikant šio įspėjimo galimas paslaugos teikėjo, operatoriaus ar paciento sužeidimas dėl elektros šoko, mechaninio ar kito pavojaus.

## BRĪDINĀJUMS

Latviski  
(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 serviser, operatera ili pacijenta uzrokovanog električnim udarom, mehaničkim i drugim opasnostima.

## AVISO

Português  
(Portugal)  
(PT-PT)

Este manual de assistência está disponível apenas em inglês.

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

## ПОПЕРЕДЖЕННЯ

Українська  
(UK)

Цей посібник із технічного обслуговування доступний лише англійською мовою.

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

## PERINGATAN

Bahasa  
Indonesia  
(ID)

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

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

## คำเตือน

ไทย  
(TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

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

## CẢNH BÁO

(VI) Tiếng Việt

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

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

## ЕСКЕРТУ

(KK) Қазақ тілінде

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

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

## BABALA

(TL) Tagalog

Available lamang sa Ingles ang Manwal ng Serbisyo ng ito.

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

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**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, see the Chapter 1 [Safety Considerations](#) section in the Service Manual.

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## Revision History

Revision	Date (YYYY-MM-DD)	Reason for change
1	2018-06-08	Initial version of manual.
2	2018-12-18	First released version of the manual.

## List of Effected Pages (LOEP)

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	2	4-1 to 4-44	2	10-1 to 10-36	2
Important Precautions -i to -xvi	2	5-1 to 5-32	2	Back Cover	N/A
TOC	2	6-1 to 6-4	2		
1-1 to 1-28	2	7-1 to 7-30	2		
2-1 to 2-16	2	8-1 to 8-160	2		
3-1 to 3-74	2	9-1 to 9-32	2		

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# Chapter 1

## Introduction

### Section 1-1 Overview

#### 1-1-1 Purpose of Chapter 1

This chapter describes important issues related to safely servicing the Vivid™ S60N/Vivid™ S70N ultrasound scanner. The service provider must read and understand all the information presented here before installing or servicing a unit.

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## Section 1-2 Service Manual Overview

This manual provides setup and service information for the Vivid™ S60N/Vivid™ S70N ultrasound scanner. The ten chapters it contains are outlined in [Table 1-1](#) below.

### 1-2-1 Contents in this Service Manual

The service manual is divided into ten chapters.

In the beginning of the manual, before chapter 1, you will find the language policy for GE service documentation, legal information, a revision overview and the Table of Contents (TOC).

**Table 1-1 Contents in this Service Manual**

CHP NUMBER	TITLE	DESCRIPTION
<a href="#">Chapter 1</a>	<a href="#">Introduction</a>	Contains a content summary and warnings.
<a href="#">Chapter 2</a>	<a href="#">Site Preparations</a>	Contains pre-setup requirements for the Vivid™ S60N/Vivid™ S70N ultrasound scanner.
<a href="#">Chapter 3</a>	<a href="#">System Setup</a>	Contains setup procedure with an setup checklist.
<a href="#">Chapter 4</a>	<a href="#">General Procedures and Functional Checks</a>	Contains functional checks that must be performed as part of the setup, or as required during servicing and periodic maintenance.
<a href="#">Chapter 5</a>	<a href="#">Components and Function (Theory)</a>	Contains block diagrams and functional explanations of the electronic circuits.
<a href="#">Chapter 6</a>	<a href="#">Service Adjustments</a>	Contains instructions on how to make any available service adjustments to the Vivid™ S60N/Vivid™ S70N ultrasound scanner.
<a href="#">Chapter 7</a>	<a href="#">Diagnostics/ Troubleshooting</a>	Provides instructions for setting up and running diagnostic, troubleshooting and other related routines for the Vivid™ S60N/Vivid™ S70N ultrasound scanner.
<a href="#">Chapter 8</a>	<a href="#">Replacement Procedures</a>	Provides removal and installation procedures for replacement of all Field Replaceable Units (FRUs).
<a href="#">Chapter 9</a>	<a href="#">Renewal Parts</a>	Contains a complete list of field replaceable parts for the Vivid™ S60N/Vivid™ S70N ultrasound scanner.
<a href="#">Chapter 10</a>	<a href="#">Care and Maintenance</a>	Provides periodic maintenance procedures for the Vivid™ S60N/Vivid™ S70N ultrasound scanner.

**NOTE:** *The illustrations provided in this service manual are for illustration purposes only and are subject to change without notice.*



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## 1-2-2 Typical Users of the Basic Service Manual

This manual is intended for the following categories of users:

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

**1-2-3 Vivid™ S60N/Vivid™ S70N Models Covered in this Manual****Table 1-2 Vivid™ S60N/Vivid™ S70N Models**

Product	Cat No.	Part Number	Description
Vivid S70N v203CH	H45601GA	BC000700	Vivid™ S70N ultrasound imaging scanner
Vivid S70N v203	H45601GC	FR000700	Vivid™ S70N ultrasound imaging scanner
Vivid S70N v203 Russia	H45601RZ	FR000700-RU	Vivid™ S70N ultrasound imaging scanner
Vivid S60N v203CH	H45601GB	BC000710	Vivid™ S60N ultrasound imaging scanner
Vivid S60N v203	H45601GD	FR000710	Vivid™ S60N ultrasound imaging scanner
Vivid S60N v203 Russia	H45601SA	FR000710-RU	Vivid™ S60N ultrasound imaging scanner

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## **1-2-4 Product Description**

### **1-2-4-1 Overview of the Vivid S60N/Vivid S70N Ultrasound Scanner**

The Vivid S60N/Vivid S70N is a compact, phased, linear array ultrasound imaging scanner. Weighing only 75 kg (165 lb), each system is extremely versatile and, depending upon the installed software, can be used for a variety of applications.

The system provides image generation in 2D, Color Doppler, Power Doppler, M-Mode, Color M-Mode, PW and 4D, Tissue Velocity imaging, and Contrast applications.

The fully digital architecture of the Vivid S60N/Vivid S70N system allows optimal usage of all scanning modes and probe types throughout the full spectrum of operating frequencies.

Signal flows from the Probe Connector Panel to the Front End, and then over to the Back End Processor and finally to the monitor and peripherals.

System configuration is stored on the Vivid S60N/Vivid S70N.

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

### **1-2-4-2 Purpose of Operator Manual(s)**

The Operator Manual(s) should be fully read and understood before operating the Vivid S60N/Vivid S70N system, and also kept near the unit for quick reference.

## Section 1-3 Important Conventions

### 1-3-1 Conventions Used in this Manual

#### 1-3-1-1 Model Designations

This manual covers the Vivid S60N/Vivid S70N ultrasound units listed in [Vivid™ S60N/Vivid™ S70N Models Covered in this Manual](#) on page 1-4.

#### 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 personal are labeled in one of three ways:

- DANGER
- WARNING
- CAUTION

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

 **DANGER** **DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL CAUSE SEVERE PERSONAL INJURY OR DEATH OR SUBSTANTIAL PROPERTY DAMAGE IF THE INSTRUCTIONS ARE IGNORED.**


 **WARNING** **WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT MAY CAUSE SEVERE PERSONAL INJURY OR SUBSTANTIAL PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.**

 **CAUTION** **CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL OR CAN CAUSE MINOR PERSONAL INJURY OR PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED. EQUIPMENT DAMAGE POSSIBLE.**






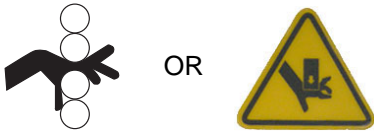
**NOTE:** *Notes are used to provide important information about an item or a procedure.*

**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 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 cause harm. Even if a symbol isn’t used in this manual, it may be included for your reference.







**Table 1-3 Standard Hazard Icons**

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	HEAT	PINCH
		

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

**NOTE:** *The Vivid S60N/Vivid S70N system has no unintended or motorized moving parts that could cause pinching; all moving parts are mechanically operated by the user. Pay attention to move such parts carefully (e.g. LCD arm).*

**Table 1-4 Standard Icons Indicating a Special Procedure Be Used**

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION
		 OR 
HAND PROTECTION	FOOT PROTECTION	
		

## Section 1-4 Safety Considerations

### 1-4-1 Introduction

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


### 1-4-2 Human Safety


- Operating personnel must not remove the Ultrasound system covers.
- Servicing should be performed by authorized personnel only.
- Only personnel who have participated in a Vivid S60N/Vivid S70N Training Seminar are authorized to service the equipment.

**NOTE:** *United States law restricts this device for sale or use by or on the order of a physician.*

 **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 VIVID S60N/VIVID S70N SYSTEM, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.**

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

 **WARNING HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE VIVID S60N/VIVID S70N SYSTEM. ATTEMPTS TO MOVE THE UNIT CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.**

 **WARNING USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.**

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

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



**WARNING** *WHEN THE TOP CONSOLE IS IN ITS LOCKED POSITION, THE GAS SHOCK IS COMPRESSED AND STORES MECHANICAL ENERGY. DURING NORMAL OPERATION, THE TOP CONSOLE, THE WEIGHT OF THE MONITOR AND THE MECHANICAL FORCE OF THE GAS SHOCK ARE IN BALANCE. TAKE CARE IF/ WHEN YOU ACTIVATE THIS GAS SHOCK. PERSONAL INJURY CAN OCCUR AFTER THE PANEL IS REMOVED AND THE SHOCK PRESSURE IS RELEASED. TAKE CARE WHEN YOU REPAIR THE ELEVATION ASSEMBLY.*



**CAUTION** USE PROTECTIVE GLASSES DURING DRILLING, FILING AND DURING ALL OTHER WORK WHERE EYES NEED PROTECTION.












**CAUTION** USE SAFETY SHOES WHEN DOING WORK WHERE THERE IS ANY CHANCE OF FOOT DAMAGE.












**CAUTION** USE PROTECTIVE GLOVES WHEN DRILLING AND CUTTING.



### 1-4-3 Mechanical Safety

-  **WARNING** *WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO A DVD OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE.*
-  **WARNING** *PRIOR TO ELEVATING SCANNER, VERIFY THAT THE MONITOR IS LOCKED IN ITS LOWEST POSITION. VERIFY THAT THE FRONT BRAKE IS LOCKED AND THE SCANNER IS UNABLE TO SWIVEL. VERIFY THAT THE REAR BRAKES ARE IN THE LOCKED POSITION.*
-  **DANGER** *WHENEVER THE UNIT IS TO BE MOVED ALONG ANY INCLINE, USE EXTREME CAUTION. MAKE SURE THAT THE VIVID™ S60N/VIVID™ S70N SCANNER AND ALL PERIPHERALS ARE SECURELY MOUNTED IN PLACE BEFORE ATTEMPTING TO MOVE IT.*
-  **DANGER** *ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.*
-  **DANGER** *NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.*
-  **CAUTION** The Vivid™ S60N/Vivid™ S70N ultrasound scanner weighs 75kg (165 lbs.) or more, depending on carry-on peripherals when ready for use. Care must be used when moving the unit or replacing its parts. Failure to follow the precautions listed could result in injury, uncontrolled motion and costly damage. ALWAYS:
- 
- Use two people when moving on inclines or lifting more than 16 kg (35 lbs)
  - Use the handle to move the system
  - Be sure the pathway is clear
  - Use slow, careful motions
  - Do not let the system strike walls or door frames
  - When moving the system on inclines, make sure that the Vivid S60N/Vivid S70N scanner and all peripherals are securely mounted in place before attempting to move the scanner.
  - The rear handle should only be used for pushing the system. Do NOT use it for pulling the ultrasound scanner (in any direction) as this may cause the system to become unstable in the event of colliding with obstacles
-  **WARNING** *THE SYSTEM SHOULD NOT BE MOVED WITH THE OPERATING PANEL EXTENDED. POSITION THE OPERATING PANEL IN ITS CENTERED AND LOCKED POSITION. LOWER THE OPERATING PANEL AS MUCH AS POSSIBLE BEFORE MOVING THE SYSTEM. See [Figure 5-7](#) on page 5-10 illustrating system in Transportation Mode.*
-  **WARNING** *REMEMBER: IF THE FRONT CASTER SWIVEL LOCK IS ENGAGED FOR TRANSPORTATION, PRESSING THE RELEASE PEDAL ONCE DISENGAGES THE SWIVEL LOCK. YOU MUST DEPRESS THE RELEASE PEDAL A SECOND TIME TO ENGAGE THE BRAKE.*



-  **CAUTION** BEFORE YOU MOVE OR TRANSPORT THE SYSTEM, MAKE SURE TO LOCK THE LCD MONITOR ARM FIRMLY AND FLIP DOWN THE MONITOR TO PREVENT DAMAGE TO THE SYSTEM. See [Figure 5-7](#) on page 5-10 illustrating system in Transportation Mode.
-  **CAUTION** ALWAYS LOCK THE TOP CONSOLE (OPERATOR PANEL) IN ITS PARKING (LOCKED) POSITION BEFORE MOVING THE SCANNER AROUND.
-  **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 NO-ONE TOUCHES THE CONSOLE ARM/FROGLEG WHEN MOVING THE OPERATOR PANEL.
-  **CAUTION** DO NOT MOVE THE UNIT IF THE OPERATOR PANEL IS IN UNLOCKED POSITION.
-  **CAUTION** KEEP THE HEAT VENTING HOLES ON THE MONITOR UNOBSTRUCTED TO AVOID OVERHEATING OF THE MONITOR.
-  **WARNING** *THE SYSTEM SHOULD NOT BE MOVED WITH THE OPERATING PANEL EXTENDED. POSITION THE OPERATING PANEL IN ITS CENTERED AND LOCKED POSITION. LOWER THE OPERATING PANEL AS MUCH AS POSSIBLE BEFORE MOVING THE SYSTEM.* See [Figure 5-7](#) on page 5-10 illustrating system in Transportation Mode.
-  **CAUTION** DO NOT TRANSPORT THE VIVID S60N/VIVID S70N SYSTEM IN A VEHICLE WITHOUT LOCKING THE CASTERS (WHEELS)  
See [Figure 5-7](#) ON PAGE 5-10 illustrating system in Transportation Mode.
-  **WARNING** *EQUIPMENT DAMAGE COULD RESULT IF SPECIAL CARE IS NOT TAKEN WHEN TRANSPORTING THE VIVID S60N/VIVID S70N SYSTEM IN A VEHICLE.*  
See [Figure 5-7](#) on page 5-10 illustrating system in Transportation Mode.

**ALWAYS:**

- Eject any media from the media storage devices DVD, MOD (if installed).
- Ensure that monitor is in folded and locked position.
- Ensure that the Vivid S60N/Vivid S70N system is well prepared and packed in its original packaging before transporting. Special care must be taken to correctly position the packing material, using all screws and brackets.  
For further information, refer to [Chapter 3 - System Setup](#).
- Place the probes in their carrying case.
- Secure the system in an full down position and lock the wheels (brake).
- Ensure that the Vivid S60N/Vivid S70N system is firmly secured while inside the vehicle.
- Secure the 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.


-  **WARNING** *ALWAYS LOCK THE SYSTEM IN ITS PARKED (LOCKED) POSITION AFTER MOVING. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR EQUIPMENT DAMAGE.*

## 1-4-4 Electrical Safety

To minimize shock hazard, the equipment must be connected to a well grounded power source. The system is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety grounding.

To ensure proper grounding, connect this equipment to a receptacle marked "HOSPITAL ONLY" OR "HOSPITAL GRADE".

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 VIVID S60N/VIVID S70N SCANNER TO INCORRECT VOLTAGE LEVEL WILL DESTROY THE SYSTEM!**  
**CONNECT THE SYSTEM ONLY IN ACCORDANCE WITH THE VOLTAGE INDICATED ON THE PRODUCT LABEL.**

### 1-4-4-1 Probes

All the probes for the Vivid S60N/Vivid S70N ultrasound system are designed and manufactured to provide trouble-free, reliable service. To ensure this, correct handling of probes is important and the following points should be noted:

- Do not drop a probe or strike it against a hard surface, as this may damage the transducer elements, acoustic lens, or housing.
- Do not use a cracked or damaged probe. In this event, call your field service representative immediately to obtain a replacement.
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled, or to be caught in the system's wheels.

Follow these guidelines before connecting a probe to the scanner:

- 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.

**NOTE:** *For detailed information on handling endocavity probes, refer to the appropriate supplementary instructions for each probe. In addition, refer to the Vivid™ S60N/Vivid™ S70N User Manual for detailed probe handling instructions.*

## 1-4-4-2 Peripherals

### 1-4-4-2-1 Safety and Environmental Guidelines



#### WARNING *Environmental Dangers*

***All devices meeting IEC60950 must be kept outside the patient environment as defined in IEC60601-1 Clause 16, unless the devices, according to IEC60601-1 Clause 16, are equipped with the following:***

***A) Additional fixed earth protection***

***or:***

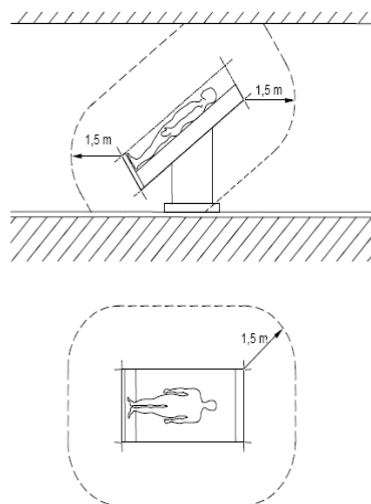
***B) An extra isolating transformer***



**WARNING** *Commercial devices such as laser cameras, printers, VCRs and external monitors, usually exceed allowable leakage current limits and, when plugged into separate AC outlets, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets, or the provision of extra protective earth for the device, is required in order to meet IEC60601-1 Clause 16 standards for electrical leakage.*

- **Patient Environment EN 60601-1**  
**Sub clause 3.79 - Patient Environment**

It is difficult for this standard to define dimensions for the volume in which diagnosis, monitoring or treatment occurs. The dimensions for the PATIENT ENVIRONMENT given in [Figure 1-1](#) have been justified in practice.



IEC 243105

NOTE: The dimensions in the figure show minimum extent of the PATIENT ENVIRONMENT in a free surrounding.

**Figure 1-1 Example of Patient Environment**

## 1-4-5 Vivid S60N/Vivid S70N Battery Safety (part of Power Supply)

**NOTE:** The Vivid™ S60N/Vivid™ S70N ultrasound scanner is supplied with a lithium ion battery in the battery bay, as an option.

The lithium ion battery provides power for safely shutting down the system or placing it in *Standby* mode, when an AC power source is interrupted or the AC power cable is disconnected from the wall outlet. Lithium ion batteries last longer than conventional batteries and do not require replacement as often. In *Standby* mode, you can expect 4 hours of battery life with a fully-charged battery.


Used batteries should not be placed with common household waste products. Contact local authorities for the location of a chemical waste collection program nearest you.

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

 **CAUTION** **USE ONLY BATTERIES APPROVED BY GE AS SUITABLE FOR USE WITH THE VIVID S60N/VIVID S70N ULTRASOUND SCANNER**

 **WARNING** **The Vivid S60N/Vivid S70N battery is an approved UL device.**  
**DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERY!**  
**Always observe the following precautions:**

- Do not short-circuit the battery by directly connecting the negative terminals with metal objects.
- Do not heat the battery or discard it in a fire.
- Do not expose the battery to temperatures over 60° C (140° F). Keep the battery away from fire and other heat sources.
- Do not leave the battery in direct sunlight.
- Do not pierce the battery with a sharp object, hit it, or step on it.
- Do not use a damaged battery.
- Do not apply solder to a battery.
- Do not connect the battery to an electrical power outlet.

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

- Do not immerse the battery in water or allow it to get wet.
- Do not place the battery into a microwave oven or pressurized container.
- If the battery leaks or emits an odor, remove it from all possible flammable sources.
- If the battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, or system storage, **immediately remove it and stop using it.**
- If you have any questions about the battery, consult your local GE representative.

## 1-4-6 Patient Data Safety

 **WARNING** **WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO A DVD OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE.**

## Section 1-5

### Dangerous Procedure Warnings

Warnings, such as the examples 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 VIVID S60N/VIVID S70N SYSTEM, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.***



**WARNING**



**EXPLOSION WARNING**

**DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE.**

**OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.**

**EQUIPMENT IS NOT SUITABLE FOR USE IN THE PRESENCE OF A FLAMMABLE ANAESTHETIC MIXTURE WITH AIR OR WITH OXYGEN OR NITROUS OXIDE.**



**DANGER**

**DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT**

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



## Section 1-6

### Lockout/Tagout (LOTO) Requirements

Follow OSHA Lockout/Tagout requirements (USA) or local Lockout/Tagout requirements by ensuring you are in total control of the AC power plug at all times. This will protect service personnel from injuries caused by unexpected energizing or start-up of equipment during service, repair, or maintenance.

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.

 <b>NOTICE</b> 	<p><b>ENERGY CONTROL AND POWER LOCKOUT FOR VIVID™ S60N/VIVID™ S70N.</b></p> <p>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"><li>1.) TURN OFF THE BREAKER.</li><li>2.) UNPLUG THE SYSTEM.</li><li>3.) MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li><li>4.) 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.</li></ol> <p>BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.</p>
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## Section 1-7

### Product Labels and Icons

The Vivid™ S60N/Vivid™ S70N ultrasound scanner comes equipped with product labels and icons. These represent pertinent information regarding the operation of the unit.



#### 1-7-1 Universal Product Labels

**NOTE:** The following diagrams illustrate the labels found on the Vivid S60N/Vivid S70N ultrasound unit. For an explanation of label icons and symbols, refer to [Table 1-7 on page 1-19](#).

##### 1-7-1-1 System Rating Label

A system Rating Label (examples shown below) is located at the rear of the system. This indicates the ultrasound system's basic power compliance.

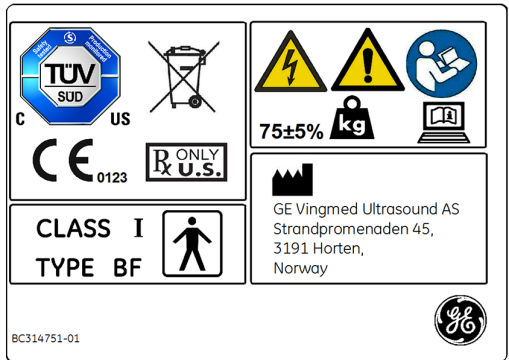
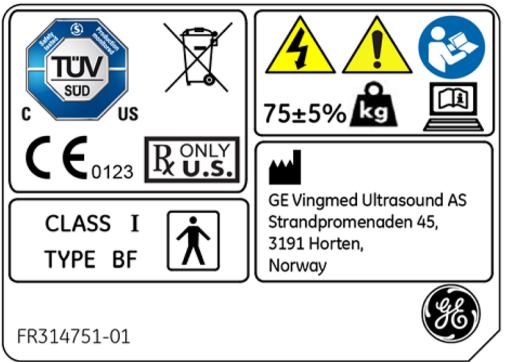
**Table 1-5 Rating Label - v203**

Item #	Description	Illustration
1.	Rating Label - Vivid™ S60N/Vivid™ S70N (100-240V) (Assembled in China)	
2.	Rating Label - Vivid™ S60N/Vivid™ S70N (100-240V) (Assembled in Romania)	

**1-7-1-2 General Label**

A General Label (below) provides details regarding regulatory compliance - as well as warnings and cautions.

**Table 1-6 General Label - v203**

Item #	Description	Illustration
1.	General Label - International (Manufactured in China)	
2.	General Label - International (Manufactured in Norway)	



## 1-7-2 Label Descriptions

The following table shows the labels and symbols that may be found on the Vivid S60N/Vivid S70N ultrasound system, and provides a description of each label's purpose and location.

**Table 1-7 Label Icons and Symbols - Description and Location**

























Label Name	Purpose	Location	Standard
<b>Identification Plate</b>	Manufacturer's name and address Model Device Listing/Certification Labels	Rear	N/A- by GE Healthcare
	On/Off button <b>Warning: System shutdown using the On/Off button does not disconnect the ultrasound system from mains voltage.</b> For disconnecting the ultrasound system from mains voltage after system shutdown, please set the circuit breaker close to the mains inlet to OFF, see: <a href="#">Figure 4-4</a> on page 4-5.	Control panel	IEC 60417-5010
	Equipment Type BF, in which protection against electric shock does not rely on basic insulation only. Provides additional safety precautions such as double insulation or reinforced insulation, because there is no provision for protective earthing or reliance upon installation conditions.	Rear of system. Probes.	IEC 60417-5333
	Defibrillator-proof Type CF equipment	ECG connector	IEC 60417-5336
	Indicates that the product is in compliance with all relevant European Directives and under surveillance by Notified Body 0123.	Rear of system	N/A- by certification body
	Non-ionizing electromagnetic radiation.	Rear of system.	IEC 60417-5140
	Alternating current	Various	IEC 60417-5032
	Protective earth (ground)	Internal	IEC 60417-5019

Table 1-7 Label Icons and Symbols - Description and Location (Continued)

Label Name	Purpose	Location	Standard
	Equipotentiality: Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Peripherals.	IEC 60417-5021
	Follow instructions for use. Read and understand all instructions in the User's Manual before attempting to use the ultrasound system.	Rear of the system.	ISO 7010-M002
	Symbol indicating that the Instructions for Use are supplied in electronic form.	Rear of system.	ISO 7000-1641
	CAUTION - Dangerous voltage: Used to indicate electric shock hazards.	Rear of system. Various.	ISO 7010-W012
	Attention - Consult accompanying documents: Alerts the user to refer to the user documentation when complete information cannot be provided on the label.	Various.	ISO 7010-W001
	The system is not designed for use with flammable anesthetic gases.	Rear of system	N/A- by GE Healthcare
	CAUTION - Do not push the system sideways when casters are in break position. Instability may occur.	Top console (both sides).	ISO 7010-P017
	DO NOT place objects on the surface of the rear of the LCD Panel while folded.	Display rear panel.	ISO 7010-P012
	This symbol indicates that 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.  The disassembly and parts disposition procedure is located on the card cage front cover. To access to the procedure, remove the right side panel.	Rear of system.	EN 50419
	System weight	Rear of system	N/A- by GE Healthcare

**Table 1-7 Label Icons and Symbols - Description and Location (Continued)**

Label Name	Purpose	Location	Standard
	Date of manufacture: The date could be a year, year and month, or year, month and day, as appropriate. See ISO 8601 for date formats.	Rear of system.	ISO 7000-2497
	Manufacturer name and address	Rear of system.	ISO 7000-3082
	Serial number.	Rear of the system.	ISO 7000-2498
	Brand and model identifier	Rear of system.	ISO 7000-3082
	Unique Device Identification (UDI). Every system has a unique marking for identification. Scan or enter the UDI information into the patient health record as required by governing laws.	Rear of system.	N/A- by GE Healthcare
	Device part number identifier	Rear of system	N/A- by GE Healthcare
Assembled in XXXXX (XXXXX represents the country name)	Identify the Customs Country of Origin of the materials.	Rear of system.	N/A- by GE Healthcare
	Precaution intended to prevent injury that may be caused by the weight of the system if one person attempts to move it considerable distances, or on an incline.	Service documentation	N/A- by GE Healthcare

### 1-7-3 Vivid S60N/Vivid S70N External Labels

In addition to the labels described in the previous section, an additional label may be found on the Vivid S60N/Vivid S70N ultrasound system, as described in the following section.

#### 1-7-3-1 GND Label

Indicates the protective earth (grounding) terminal. The GND label ([Figure 1-2](#) below) is located at the rear of the system.



**Figure 1-2 GND Label**

## Section 1-8

### Returning/Shipping Probes and Repair Parts

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

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

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

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

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

The Vivid™ S60N/Vivid™ S70N ultrasound scanner is not meant to be used for long-term storage of patient data or images. The user is responsible for the data on the Vivid S60N/Vivid S70N and a regular backup is highly recommended.

If the Vivid S60N/Vivid S70N is sent for repair, ensure that any patient information is backed up and erased from the Vivid S60N/Vivid S70N before shipping. It is always possible during system failure and repair to lose patient data. GE is not responsible for the loss of this data.

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


## Section 1-9 EMC, EMI, and ESD


### 1-9-1 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 to interference from its environment, or when the device produces unacceptable levels of emission. This interference is often referred to as radio-frequency or electromagnetic interference (RFI/EMI) and can be radiated through space or conducted over interconnecting power or signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

**NOTE:** *The Vivid™ S60N/Vivid™ S70N ultrasound scanner needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the accompanying documents (supplied with the system).*

**NOTE:** *Portable and mobile RF communications equipment can affect the Vivid™ S60N/Vivid™ S70N ultrasound scanner.*

 **WARNING** **THE USE OF ACCESSORIES, TRANSDUCERS AND CABLES OTHER THAN THOSE SPECIFIED, WITH THE EXCEPTION OF TRANSDUCERS AND CABLES SOLD BY THE MANUFACTURER OF THE VIVID™ S60N/VIVID™ S70N AS REPLACEMENT PARTS FOR INTERNAL COMPONENTS, MAY RESULT IN INCREASED EMISSIONS OR DECREASED IMMUNITY OF THE VIVID™ S60N/VIVID™ S70N.**

 **WARNING** **THE VIVID™ S60N/VIVID™ S70N SHOULD NOT BE USED ADJACENT TO OR STACKED WITH OTHER EQUIPMENT AND THAT IF ADJACENT OR STACKED USE IS NECESSARY, THE VIVID™ S60N/VIVID™ S70N SHOULD BE OBSERVED TO VERIFY NORMAL OPERATION IN THE CONFIGURATION IN WHICH IT WILL BE USED.**

### 1-9-2 CE Compliance

The Vivid™ S60N/Vivid™ S70N ultrasound scanner 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.

**NOTE:** *For applicable standards refer to the Safety Chapter in the Vivid™ S60N/Vivid™ S70N User Manual.*

**NOTE:** *For EMC Guidance and Manufacturer's Declarations, refer to the tables provided in [Electrostatic Discharge \(ESD\) Prevention](#) on page 1 - 25.*

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

### 1-9-3 Electrostatic Discharge (ESD) Prevention



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



**1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP CONNECTED TO THE CAGE ASSEMBLY OR ANY GROUND SCREW WHENEVER YOU OPEN THE SYSTEM FOR MAINTENANCE.**

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



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

### 1-9-4 General Caution



**CAUTION** Any changes to accessories, peripheral units or any other part of the system must be approved by the manufacturer. Ignoring this advice may compromise the regulatory approvals obtained for the product.



**WARNING** *IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID™ S60N/VIVID™ S70N, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUTDOWN MODE.*

## Section 1-10

### Customer Assistance

#### 1-10-1 Contact Information

If this equipment does not operate as indicated in this *Service Manual* or in the *Vivid™ S60N/Vivid™ S70N User Manual*, or if you require additional assistance, please contact the local distributor or appropriate support resource, as listed below.

Prepare the following information before you call:

- Ultrasound System ID and/or serial number.
- Software version.
- Date and time of occurrence.
- Sequence of events leading to issue.
- Is the issue reproducible?
- Imaging mode, probe, preset/application.
- Media brand, speed, capacity, type.
- Save secondary image capture, cine loop, 4D multi-volume loop.
- Detailed description of any problem encountered.

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

See also:

- [Phone Numbers for Customer Assistance](#) on page 1 - 27
- [Phone and Fax Numbers for Manufacturer](#) on page 1 - 28



**1-10-1-1 Phone Numbers for Customer Assistance****Table 1-8 Phone Numbers for Customer Assistance**

LOCATION	NUMBER	
<b>USA</b> GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive (RP-2123) Wauwatosa, WI 53226, USA	Service	TEL: 1-800-437-1171
	Service Parts	TEL: 1-800-558-2040
	Online Center	TEL: 1-800-321-7937
	Application Support	TEL: 1-800-682-5327
		TEL: 1-262-524-5698
<b>Canada</b>	Service	TEL: 1-800-668-0732
	Application Support	TEL: 1-262-524-5698
<b>Latin America</b>	Service	TEL: +1-262-524-5300
	Application Support	TEL: +1-262-524-5698
<b>EUROPE</b> Ultrasound Europe GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	Support	TEL: +49 (0) 212 2802 652
		FAX: +49 (0) 212 2802 431
<b>EGM</b>	Saudi Arabia Service Center	TEL: (+966) 800 429 2222
	UAE Service Center	TEL: +971 800 3646
<b>Asia (Singapore)</b> GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Placa Singapore 168730	Service Department	TEL: +65 6291-8528
		FAX: +65 6291-7006
<b>Japan</b>	Online Center	TEL: +81 42-846-9011
		FAX: +81 42-648-2905
<b>China</b>	Technical Support	TEL: +(86) 800-810 8188 TEL: +(86) 400-812 8188
<b>ANZ</b>	Service Support	TEL: +61 1800 659 465
<b>Australia</b>	Service Support	TEL: +(61) 1-800-659-465
<b>India</b>	Technical Support	TEL: 1800-425-8025 TEL: 1800-425-7255 TEL: 1800-102-7750
<b>Korea</b>	Technical Support	TEL: +(82) 1544-6119
<b>Africa</b>	Algeria Service Center	TEL: +213 2179 1212

**1-10-1-2 Phone and Fax Numbers for Manufacturer****Table 1-9 Phone and Fax Numbers for Manufacturer**

MANUFACTURER	PHONE NUMBER	FAX NUMBER
GE VINGMED ULTRASOUND A/S STRANDPROMENADEN 45 P.O. BOX 141 3191 HORTEN NORWAY	+47 3302 1100	+47 3302 1350

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# Chapter 2

## Site Preparations

### Section 2-1 Overview

#### 2-1-1 Purpose of Chapter 2

This chapter provides the information required to plan and prepare for the setup of a Vivid™ S60N or Vivid™ S70N ultrasound system. Included are descriptions of the electrical and facility requirements that must be met by the purchaser. A worksheet is provided at the end of this chapter (see [Figure 2-5](#) on page 2-13) to help ensure that all the required network information is available, prior to setup.

2-1	Overview . . . . .	2-1
2-2	Console Requirements . . . . .	2-2
2-3	Facility Needs . . . . .	2-6
2-4	Connectivity Installation Worksheet . . . . .	2-13

## Section 2-2 Console Requirements

### 2-2-1 Unit Environmental Requirements

#### 2-2-1-1 Environmental Requirements - v203

**Table 2-1 Environmental Requirements - v203**

Requirement	Temperature	Relative Humidity (non-condensing)	Air Pressure
Operational	+10 — +35°C (50 — 95°F)	30 — 85%	700 — 1060 hPa
Storage	-20 — +60°C (-4 — 140°F)	10 — 95%	700 — 1060 hPa
Transport	-20 — +60°C (-4 — 140°F))	10 — 95%	700 — 1060 hPa

**NOTE:** The Vivid S60N/Vivid S70N system may be operated at an altitude of up to 3000 meters (9842 ft).



**CAUTION** IF THE SYSTEM HAS BEEN IN STORAGE OR HAS BEEN TRANSPORTED, PLEASE SEE THE ACCLIMATION REQUIREMENTS BEFORE POWERING ON AND/OR USING THE SYSTEM. Refer to the [Setup Warnings](#) section on page 3-2.

**NOTE:** After a long period of storage, or after transportation of the system with the monitor in the folded-down position (transportation mode), it is highly recommended to place the monitor in the upright position - and to leave it in this position for a period of longer than 1 hour before use. This will enable it to properly adjust to the environmental conditions.

### 2-2-2 Cooling Requirements

The cooling requirement for the Vivid S60N/Vivid S70N ultrasound system environment is 2000 BTU/hr. This figure does not include the cooling required for lights, people, or other equipment in the room.

**Note:** Each person in the room places an additional 300 BTU/hr demand on the environmental cooling.

### 2-2-3 Lighting Requirements

For system setup, updates and repairs, bright lighting is required. However, operator and patient comfort may be optimized if the room lighting is subdued and indirect when a scan is being performed. Therefore, a combination lighting system (dim/bright) is recommended.

### 2-2-4 Time and Manpower Requirements

Site preparation takes time. Begin pre-setup checks as soon as possible to allow sufficient time to make any required changes. If possible, begin these checks as many as six weeks before system delivery.



**CAUTION**



Only one person is required to unpack the Vivid S60N/Vivid S70N ultrasound system; at least two people must be available to roll the system down the wheeling ramp. Attempts to move the system considerable distances (or on an incline) by one person alone, could result in personal injury, and/or damage to the system.

## 2-2-5 Electrical Requirements

**NOTE:** GE requires a dedicated mains power line and Ground for the proper operation of its Ultrasound equipment. This dedicated power line shall originate at the last distribution panel before the 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 unit is only a conduit.

### 2-2-5-1 Vivid S60N/Vivid S70N Power Requirements

Electrical specifications for the Vivid S60N/Vivid S70N system are as follows:

**Table 2-2 Electrical Requirements**

Input Voltage	Tolerances	Op. Current	Frequency
100V AC to 240V AC	±10%	500VA	50-60 Hz

### 2-2-5-2 Inrush Current

Inrush current is not a factor for consideration, due to the inrush current limiting properties of the power supplies.

**Table 2-3 Inrush Current**

Voltage	Inrush Current (Console Only)
100 V	4.5 A
240 V	2.3 A

### 2-2-5-3 Site Power Outlets

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

### 2-2-5-4 Mains Power Plug

The Vivid S60N/Vivid S70N portable ultrasound scanner is supplied with an AC power cable, as standard. In the event that the unit arrives without a power cable, or a power cable fitted with an incorrect plug, contact your GE dealer. When necessary, the installation engineer will supply the appropriate power plug to meet the applicable local regulations.

### 2-2-5-5 Power Stability Requirements

- **Voltage drop-out**

Max 10 msec

- **Power Transients**

The Vivid™ S60N/Vivid™ S70N ultrasound scanner is fully compliant with the following standard: EN/IEC 60601-1-2.

### 2-2-6 EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. They also generate EMI. The Vivid S60N/Vivid S70N ultrasound system complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular setup.

**Note:** Possible EMI sources should be identified before the unit is installed, and should not be on the same line as the ultrasound system. A dedicated line should be used for the ultrasound system.

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

- Medical lasers.
- Scanners.
- Cauterizing guns.
- Computers.
- Monitors.
- Fans.
- Gel warmers.
- Microwave ovens.
- Portable phones.
- Broadcast stations and mobile broadcasting machines.

## 2-2-7 EMI Prevention/Abatement

The following table lists recommendations for preventing EMI:

**Table 2-4 EMI Prevention/ Abatement**

EMI Rule	Details
Ground the unit.	Poor grounding is the most likely reason an ultrasound system will have noisy images. Check the grounding of the power cord and power outlet.
Be aware of RF sources.	Keep the unit at least 5m (16.4 ft) 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.
Replace and/or reassemble all screws, RF gaskets, covers and cores.	After you finish repairing or updating the system, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the shield over the front of the card cage. Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken RF gaskets.	If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn ON the unit until any loose metallic part is removed and replaced, if required.
Do not place labels where RF gaskets touch metal.	Never place a label where RF gaskets meet the unit. Otherwise, the gap created will permit RF leakage. In case a label has been found in such a location, move the label to a different, appropriate location.
Use GE-specified harnesses and peripherals.	The interconnect cables are grounded and require ferrite beads and other shielding. Cable length, material, and routing are all important; do not make any changes that do not meet all specifications.
Take care with cellular phones.	Cellular phones may transmit a 5 V/m signal that causes image artifacts.
Properly address peripheral cables.	Do not allow cables to lie across the top of the system. Loop any peripheral cable excess length into one bundle.

## 2-2-8 Probe Environmental Requirements

**Table 2-5 Probe Operation and Storage Temperatures**

	Electronics
<b>Operation</b>	10 — 40°C (50 — 104°F)
<b>Storage</b>	-20 — 50°C (-4 — 122°F)

**Note:** System and electronic probes are designed for storage temperatures of -20<sup>0</sup> to +50<sup>0</sup> C. When exposed to large temperature variations, the probes should be kept at room temperature for a *minimum* of **10 hours** before use.

## Section 2-3 Facility Needs

### 2-3-1 Purchaser Responsibilities

The work and materials required to prepare the site are the responsibility of the purchaser. To avoid delay, complete all pre-setup work before delivery. Use the Pre-setup Check List (provided in [Table 2-6](#) on page 2-15) to verify that all the required steps have been completed.

Purchaser responsibilities include:

- Procuring the required materials.
- Completing the preparations prior to delivery of the ultrasound system.
- Paying the costs of any alterations and modifications not specifically provided for in the sales contract.

**Note:** All relevant preliminary electrical installations at the prepared site must be performed by licensed electrical contractors. Other connections between electrical equipment, and calibration 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 utilize only qualified personnel to perform electrical servicing of the equipment.

To avoid delays during setup, the individual or team who will perform the setup should be notified at the earliest possible date (preferably prior to setup), of the existence of any of the following variances:

- Use of any non-listed product(s).
- Use of any customer provided product(s).
- Placement of an approved product further from the system than the interface kit allows.

The prepared site must be clean prior to delivery of the system. Carpeting is not recommended because it collects dust and creates static. Potential sources of EMI should also be investigated before delivery. Dirt, static, and EMI can negatively impact system reliability.



## 2-3-2 Mandatory Site Requirements

The following are mandatory site requirements. Additional (optional) recommendations, as well as a recommended ultrasound room layout, are provided in section [2-3-3 - Site Recommendations](#) (see below).

- A dedicated “hospital-grade” single branch power outlet of adequate amperage (see [Table 2-2 on page 2-3.](#)) that meets all local and national codes and is located less than 2.5 m (8.2 ft) from the unit's proposed location. Refer to the [Electrical Requirements](#) section on page 2-3.
- A door opening of at least 0.54 m (1.77 ft) in width.
- The proposed location for the unit is at least 0.2 m (0.67 ft) from the walls, to enable 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 and gel warmer.
- Power outlets for test equipment within 1 m (3.3 ft) of the ultrasound system.
- Clean and protected space for storage of probes (either in their case or on a rack).
- Material to safely clean probes (performed using a plastic container, never metal).
- In the case of a network option:
  - An active network outlet in the vicinity of the ultrasound system.
  - A network cable of appropriate length (regular Pin-to-Pin network cable).
  - An IT administrator who will assist in configuring the unit to work with your local network. A fixed IP address may be required when using DICOM. Refer to the form provided in [Figure 2-5](#) on page 2-13 for network details that are required.

**Note:** All relevant preliminary network outlets installations at the prepared site must be performed by authorized contractors. The purchaser of GE equipment must utilize only qualified personnel to perform servicing of the equipment.

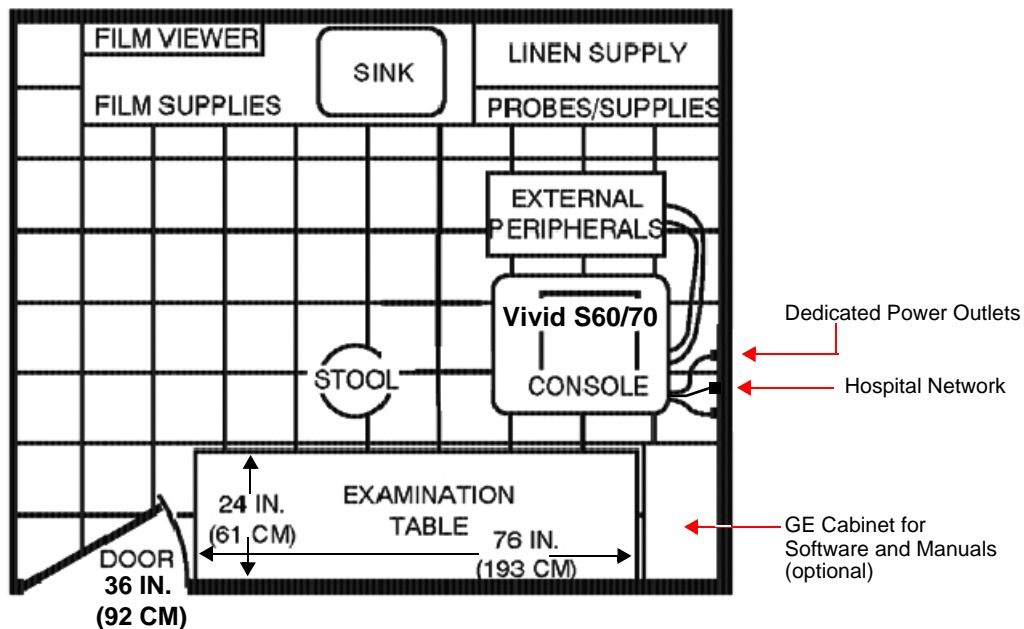
## 2-3-3 Site Recommendations

The following are (optional) site recommendations. Mandatory site requirements are provided in the [Mandatory Site Requirements](#) section, above.

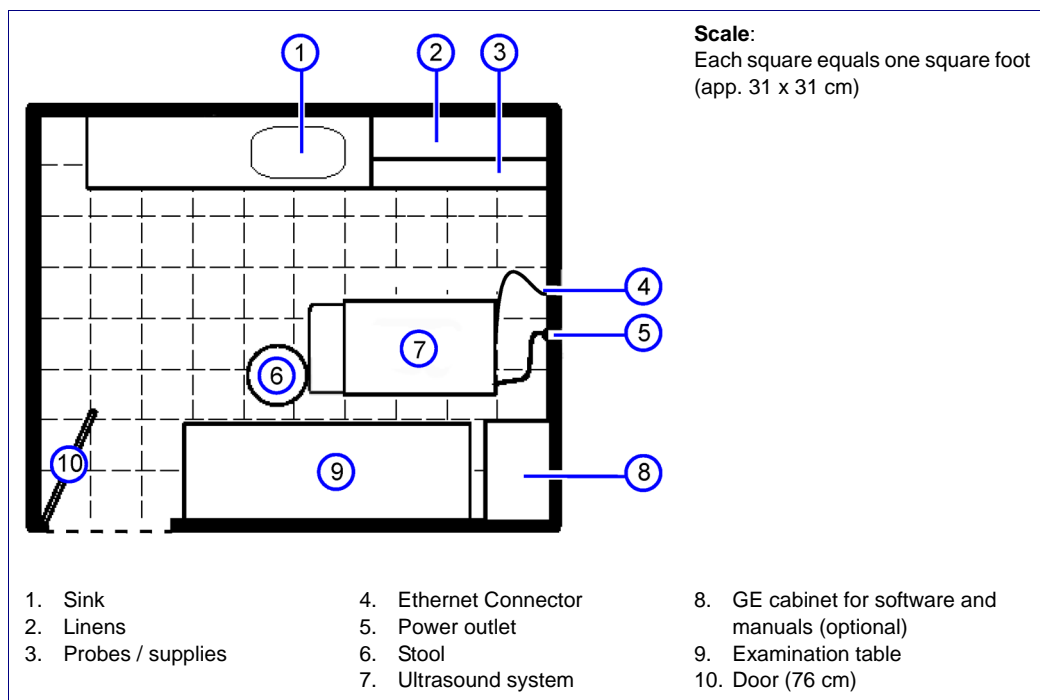
- Door opening of 92 cm (3 ft) in width.
- Accessible circuit breaker for a dedicated “hospital-grade” power outlet.
- Sink with hot and cold running water.
- Receptacle for bio-hazardous waste, for example, used probe sheaths.
- Emergency oxygen supply.
- Storage area for linens and equipment.
- Nearby waiting room, lavatory, and dressing room.
- Dual-level lighting (bright and dim).
- Lockable cabinet for software and manuals.

**2-3-3-1 Recommended Ultrasound Room Layout**

Figure 2-1 below shows a floor plan illustrating the recommended layout of the Ultrasound Room and depicting the minimal room layout requirements.



**Figure 2-1 Recommended Floor Plan 4.3m x 5.2m (14 ft x 17 ft)**

**2-3-3-2 Minimal Floor Plan Suggestion****Figure 2-2 Minimal Floor Plan - 2.5 m x 3 m (8 x 10 ft)**

## 2-3-3-3 Recommended Floor Plan Suggestion

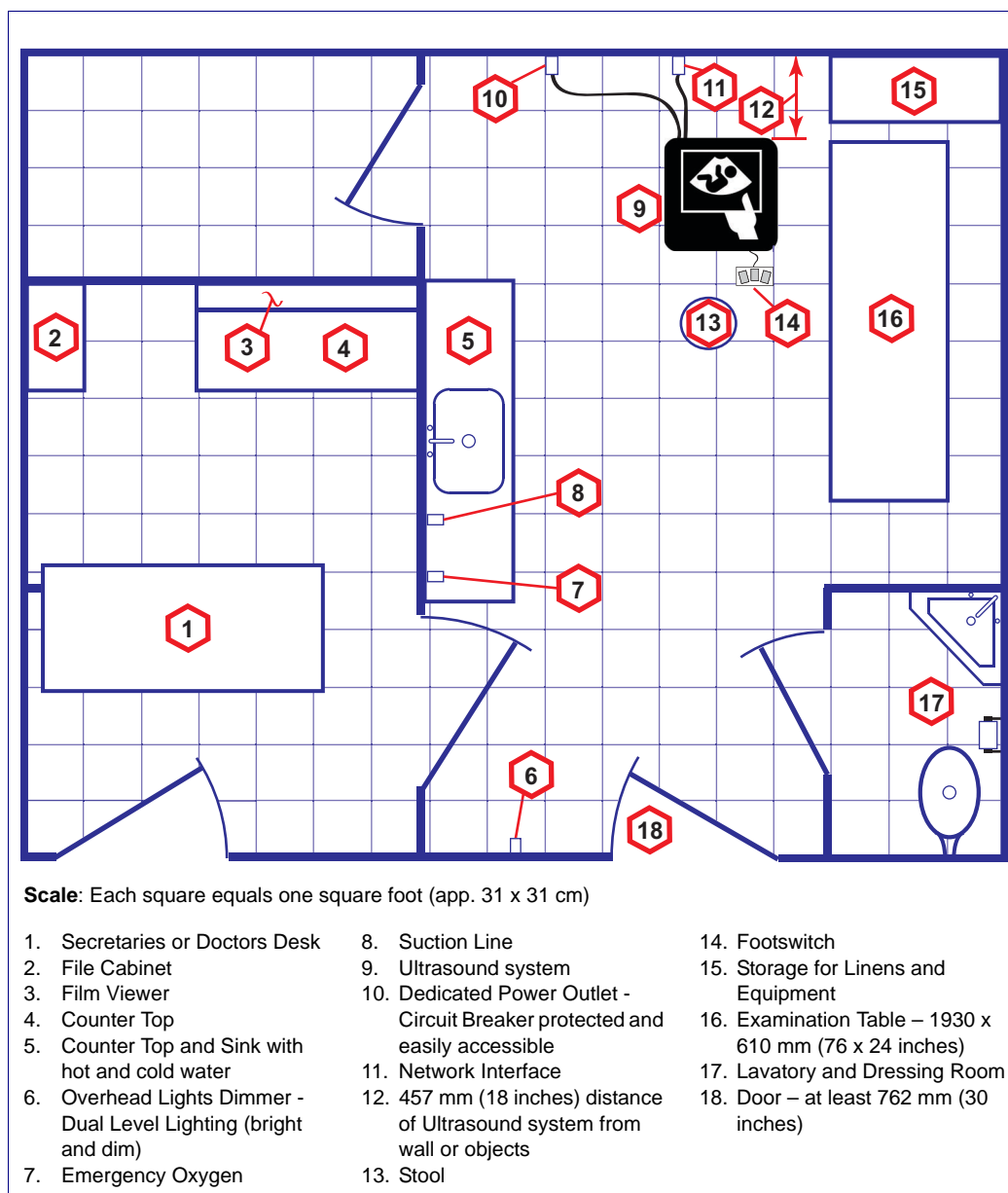
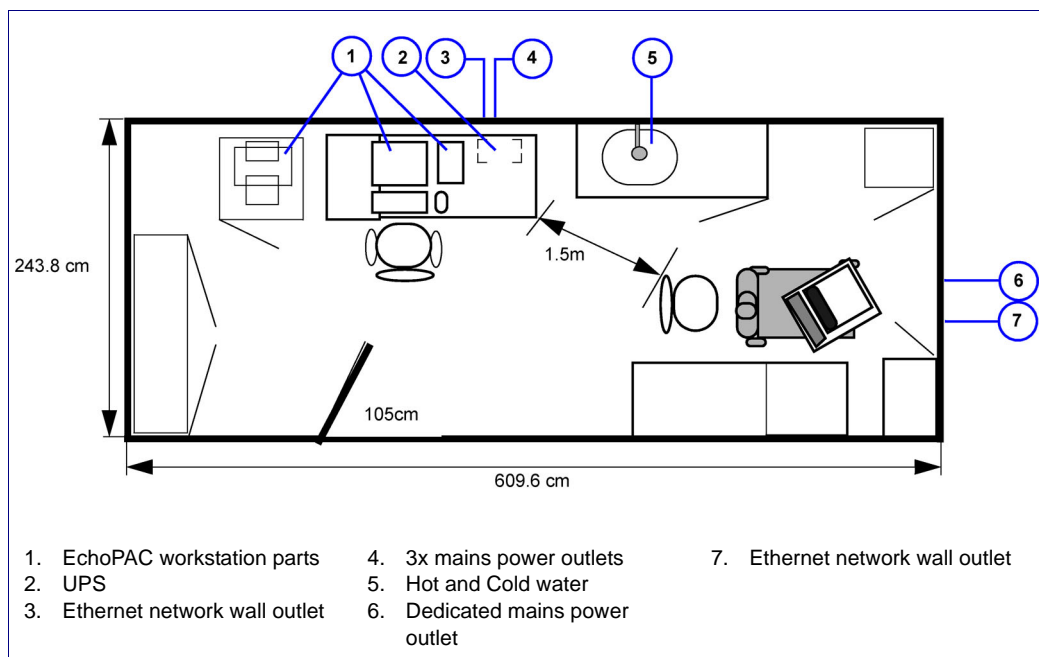


Figure 2-3 Recommended Floor Plan - 4.27 x 5.18 m (14 x 17 ft)

**2-3-3-4 Suggested Floor Plan with System and Workstation in Same Room****Figure 2-4 Suggested Floor Plan with Workstation and Ultrasound System in Same Room**

## 2-3-4 Networking Pre-Installation Requirements

### 2-3-4-1 Stand-alone Unit (without Network Connection)

None.

### 2-3-4-2 Scanner Connected to Hospital's Network

Supported networks:

- Wireless LAN
- 10/100/1000 Mbps Ethernet/DICOM network

### 2-3-4-3 InSite™ requirements

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

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

### 2-3-4-4 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.

### 2-3-4-5 DICOM Option Pre-Installation Requirements

To configure the Vivid S60N/Vivid S70N ultrasound system to work with other network connections, the network administrator must provide the required information, which should include the following:

- **Details:** DICOM network details for the Vivid S60N/Vivid S70N unit, including the host name, local port, IP address, AE title and net mask.
- **Routing Information:** IP addresses for the default gateway and other routers in use at the site.
- **DICOM Application Information:** Details of the DICOM devices in use at the site, including the DICOM host name, AE title and IP addresses.

## Section 2-4

### Connectivity Installation Worksheet

<div style="border: 1px solid black; padding: 5px;"> <h4 style="margin: 0;">Site System Information</h4> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Site: <input style="width: 100%;" type="text"/></p> <p>Dept: <input style="width: 100%;" type="text"/></p> <p>Vivid S60N/ Vivid S70N SN: <input style="width: 100%;" type="text"/></p> </div> <div style="width: 45%;"> <p>Floor: <input style="width: 100%;" type="text"/></p> <p>Room: <input style="width: 100%;" type="text"/></p> <p>Type: <input style="width: 100%;" type="text"/></p> <p>REV: <input style="width: 100%;" type="text"/></p> </div> <div style="width: 10%; text-align: center;"> <p>Comments:</p> <div style="border: 1px solid black; height: 60px; width: 100%;"></div> </div> </div> </div>																																																																																																
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Figure 2-5 Connectivity Installation Worksheet

Vivid S60N/Vivid S70N

Host Name

Local Port

IP Address

AE Title

Net Mask

ROUTING INFORMATION

Destination  
IP Addresses

ROUTER1

ROUTER2

ROUTER3

GATEWAY IP Addresses

Default

DICOM APPLICATION INFORMATION

	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1					
Store 2					
Store 3					
Store 4					
Store 5					
Store 6					
Work list					
Storage Commit					
MPPS					

Figure 2-6 Worksheet for DICOM Network Information



**Table 2-6 Vivid S60N/Vivid S70N Pre-Setup Check List**

Action	Yes	No
Schedule at least 3 hours for setup of the system.		
Notify setup team of the existence of any variances from the basic setup.		
Make sure system and probes have been subject to acclimation period.		
Environmental cooling is sufficient.		
Lighting is adjustable to adapt to varying operational conditions of the scanner.		
Electrical facilities meet system requirements.		
EMI precautions have been taken and all possible sources of interference have been removed.		
Mandatory site requirements have been met.		
If a network is used, IP address has been set for the system and a dedicated network outlet is available.		

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# Chapter 3

## System Setup

### Section 3-1 Overview

#### 3-1-1 Purpose of Chapter 3

This chapter provides instructions for setting up the Vivid S60N/Vivid S70N ultrasound system. Before beginning the setup process, an appropriate site must be prepared, as described in [Chapter 2 - Site Preparations](#). Once the site has been prepared, setup can proceed as described in this chapter.

Included in this chapter are guidelines for transporting the unit to a new site, as well as procedures that describe how to receive and unpack the equipment, and (if necessary) how to file a damage or loss claim. Instructions for checking and testing the unit, probes, and external peripherals for electrical safety are also provided.

**NOTE:** *An ultrasound system is ready for use only if the tests and checks described in [Chapter 3 - System Setup](#) (this chapter) and [Chapter 4 - General Procedures and Functional Checks](#) of this Service Manual meet the expected results.*

3-1	Overview . . . . .	3-1
3-2	Setup Reminders . . . . .	3-2
3-3	Receiving and Unpacking the Equipment . . . . .	3-5
3-4	Preparing for Setup . . . . .	3-20
3-5	Completing the Setup . . . . .	3-25
3-6	Configuration . . . . .	3-32
3-7	Connectivity Overview . . . . .	3-44
3-8	Connectivity Setup . . . . .	3-45
3-9	Options Setup . . . . .	3-50
3-10	Paperwork After Setup . . . . .	3-74

## Section 3-2 Setup Reminders

### 3-2-1 Average Setup Time

The Vivid S60N/Vivid S70N setup and functional checkout will take approximately one hour; Vivid S60N/Vivid S70N consoles with optional equipment (such as Alphanumeric Keyboard) may take slightly longer.

Once the site has been prepared, the average installation time required is shown in [Table 3-1](#) below.

**Table 3-1 Average Setup Time**

Description	Average Setup Time	Comments
Unpacking the scanner	30 minutes	
Installing the scanner	30 minutes	Time may vary, according to the required configuration
DICOM Option (connectivity)	30 minutes	Time may vary, according to the required configuration
Installing InSite	30 minutes	
Encrypting the patient data	Up to several hours	While the system is undergoing encryption, it will not be available for use. It is highly recommended to perform disk encryption overnight or when the system is not needed for use for an extended period of time.

### 3-2-2 Setup Warnings

- 1.) The Vivid S60N/Vivid S70N ultrasound scanner weighs 75 kg (165 lbs), without add-ons/peripherals.  
Two people are always required to unpack the system.
- 2.) There are no operator-serviceable components. To prevent shock, do not remove any covers or panels. If problems or malfunctions occur, unplug the power cord. Only qualified service personnel should carry out servicing and troubleshooting.

**NOTE:** For information on shipping carton labels, refer to [Figure 3-1](#) on page 3-6 and [Figure 3-3](#) on page 3-8.

**3-2-2-1 System Acclimation Time**

Following transport, the Vivid S60N/Vivid S70N system may be very cold, or hot. Allow time for the system to acclimate before being switched ON. Acclimation requires 1 hour for each 2.5°C increment, when the temperature of the system is below 10°C or above 40°C.











**CAUTION** Turning the system ON after arrival at the site - without allowing time for acclimation - may cause system damage!

**Table 3-2 Vivid S60N/Vivid S70N System Acclimation Time**

°C	0	2.5	5	7.5	10	35	40	42.5	45	47.5	50	52.5	55	57.5	60
°F	32	36.5	41	45.5	50	95	104	108.5	113	117.5	122	126.5	131	135.5	140
Hrs	4	3	2	1	0	0	2	3	4	5	6	7	8	9	10

**NOTE:** After a long period of storage, or after transportation of the system with the monitor in the folded-down position, it is highly recommended to place the monitor in the upright position - and to leave it in this position for a period of longer than 1 hour before use. This will enable it to properly adjust to the environmental conditions.

### 3-2-3 Safety Reminders

-  **DANGER** **WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DO NOT TOUCH THE UNIT!**
-  **WARNING** ***TWO PEOPLE ARE REQUIRED TO UNPACK THE SYSTEM AS IT IS HEAVY. TWO PEOPLE ARE ALWAYS REQUIRED WHENEVER A PART WEIGHING 16KG (35 LB.) OR MORE MUST BE LIFTED.***
-  **CAUTION** **IF THE UNIT IS VERY COLD OR HOT, DO NOT TURN ON POWER TO THE UNIT UNTIL IT HAS HAD SUFFICIENT TIME TO ACCLIMATE TO ITS OPERATING ENVIRONMENT.**
-  **CAUTION** **TO PREVENT ELECTRICAL SHOCK, CONNECT THE UNIT TO A PROPERLY GROUNDED POWER OUTLET.  
DO NOT USE A THREE-PRONG TO TWO-PRONG ADAPTER, AS THIS DEFEATS SAFETY GROUNDING.**
-  **CAUTION** **DO NOT WEAR THE ESD WRIST STRAP WHEN YOU WORK ON LIVE CIRCUITS WHERE MORE THAN 30 V PEAK IS PRESENT.**
-  **CAUTION** **DO NOT OPERATE THE UNIT UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE, TO ENSURE OPTIMAL SYSTEM PERFORMANCE AND COOLING. (WHEN COVERS ARE REMOVED, EMI MAY BE PRESENT).**
-  **WARNING**  ***ACOUSTIC OUTPUT HAZARD  
ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE Vivid S60N/Vivid S70N PORTABLE ULTRASOUND SCANNER IS WITHIN AIUM/NEMA STANDARDS AND FDA LIMITATIONS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.***

**Note:** The Vivid™ S60N/Vivid™ S70N User Manual should be fully read and understood before operating the unit. Keep the manual near the unit for reference.

## Section 3-3 Receiving and Unpacking the Equipment

### 3-3-1 Warnings for Receiving and Unpacking the Equipment



**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.

### 3-3-2 Overview



**CAUTION** Please read this section fully before unpacking the Vivid S60N/Vivid S70N ultrasound system.

Depending on manufacturing site and transportation method used for shipping the ultrasound system, a few different packagings may be used:

- Single cardboard shipping carton mounted on a raised wooden base
- Ocean shipping package (for some shipments to USA)

The Vivid S60N/Vivid S70N ultrasound system, together with the peripherals, probes, cables, and accessories, are shipped from the factory in a single cardboard shipping carton mounted on a raised wooden base - see [Figure 3-2](#) on page 3-7.

Unpacking instructions for each type of shipping carton are provided separately in the following sections:

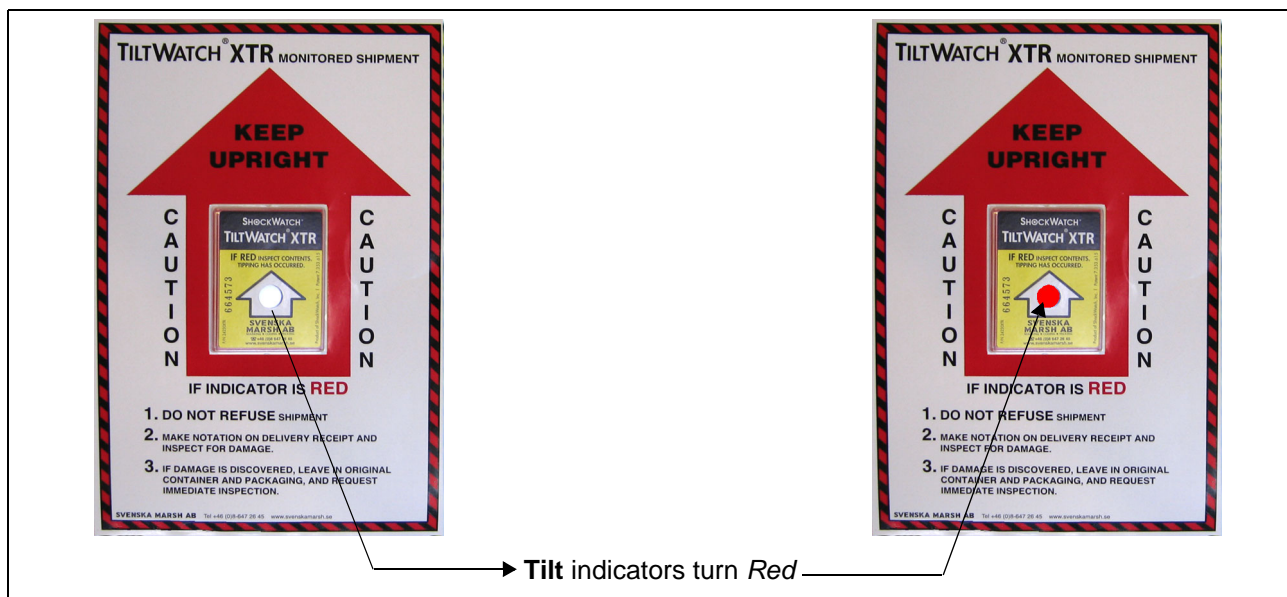
- [Unpacking the Vivid S60N/Vivid S70N Scanner with Peripherals on page 3 - 9](#)
- [Unpacking the Vivid S60N/Vivid S70N Scanner on page 3 - 9](#)
- [Unpacking the Ocean Shipping package on page 3 - 13](#)

**NOTE:** For details of weights and dimensions of the shipping cartons, refer to [Table 3-3](#) on page 3-7.

Each cardboard shipping carton is sealed with plastic tape and secured on the outside with plastic straps. The interior of the carton is fully lined with re-seal-able water-proof wrapping to protect the contents from external moisture; silica gel bags are also placed among the contents to absorb any condensation or moisture within the carton.

Before unpacking the unit:

- Inspect the carton for visible damage.
- Inspect the *Tilt* indicators (on the TiltWatch labels) for evidence of accidental shock or tilting during transit (damage incident) - refer to [Figure 3-1](#).

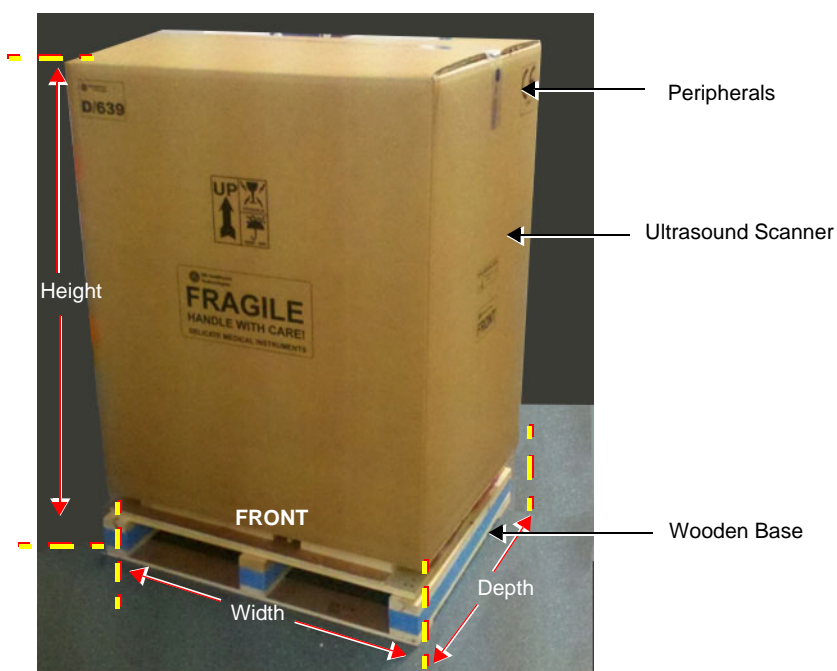


**Figure 3-1 Drop and Tilt Indicators**

**NOTE:** The above illustrations are examples only; indicators actually supplied may differ from those above.

If the carton is damaged, or if the Tilt indicators have turned red (indicating damage incident), please inform the GE sales representative immediately. In addition, mark on the shipping consignment note or packing slip/post-delivery checklist (in the "Package" column) that the Tilt indicators show damage incident.





Note: Weight = 105 Kg (231 lbs)

- Height, Width and Depth: See table below.

**Figure 3-2 Shipping Carton size - Vivid S60N/Vivid S70N with Peripherals**

**Table 3-3 Shipping Cartons - Dimensions and Weights**

Description	Height	Width	Depth	Weight <sup>a</sup>
Vivid S60N/Vivid S70N scanner with peripherals and accessories	157 cm 62 in	73 cm 29 in	87 cm 34 in	105 kg 231 lbs
Vivid S60N/Vivid S70N scanner only	119 cm 47 in	73 cm 29 in	87cm 34 in	95 kg 209 lbs

a. Weight is approximate and will vary depending upon the supplied peripherals

3-3-3

Additional labels on the Shipping Carton

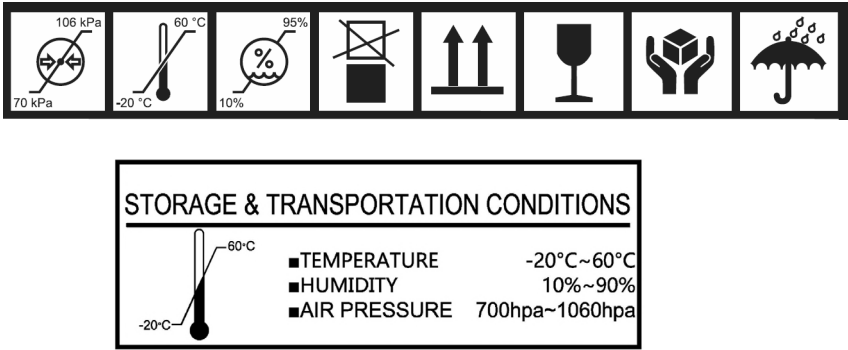


Figure 3-3 Additional Labels on Shipping Carton

### 3-3-4 Unpacking the Vivid S60N/Vivid S70N

As previously described, the Vivid S60N/Vivid S70N ultrasound system is packed in a single cardboard shipping carton comprising a durable outer cardboard carton cover and a wooden platform base; these are firmly joined together with plastic straps. After completing a visual inspection of the shipping carton and *Drop/Tilt* indicators, proceed to the unpacking instructions below, as appropriate:

#### 3-3-4-1 Unpacking the Vivid S60N/Vivid S70N Scanner with Peripherals

- 1.) Cut the plastic straps securing the shipping carton to the wooden base - see [Figure 3-2](#) on page 3-7.



**CAUTION WHEN USING SHARP TOOLS TO OPEN PACKING MATERIALS, TAKE CARE TO AVOID CUTTING OR DAMAGING ANY OF THE CONTENTS.**

- 2.) Remove the options peripherals box (smaller-sized cardboard shipping carton) from the top of the main cardboard shipping carton that contains the scanner.
- 3.) Carefully cut the adhesive tape used to close the shipping carton lids, and open the cartons from the top.
- 4.) Undo the re-seal-able water-proof carton liners.
- 5.) Remove the packing slip (shipping consignment note) detailing the contents of the shipping carton and keep close to hand ready to mark the check list - refer to [Physical Inspection on page 3 - 20](#).
- 6.) Continue with unpacking the main cardboard shipping carton that contains the scanner, as indicated in [Unpacking the Vivid S60N/Vivid S70N Scanner on page 3 - 9](#).

#### 3-3-4-2 Unpacking the Vivid S60N/Vivid S70N Scanner

- 1.) Cut the two plastic straps securing the shipping carton to the wooden base.



**CAUTION WHEN USING SHARP TOOLS TO OPEN PACKING MATERIALS, TAKE CARE TO AVOID CUTTING OR DAMAGING ANY OF THE CONTENTS.**

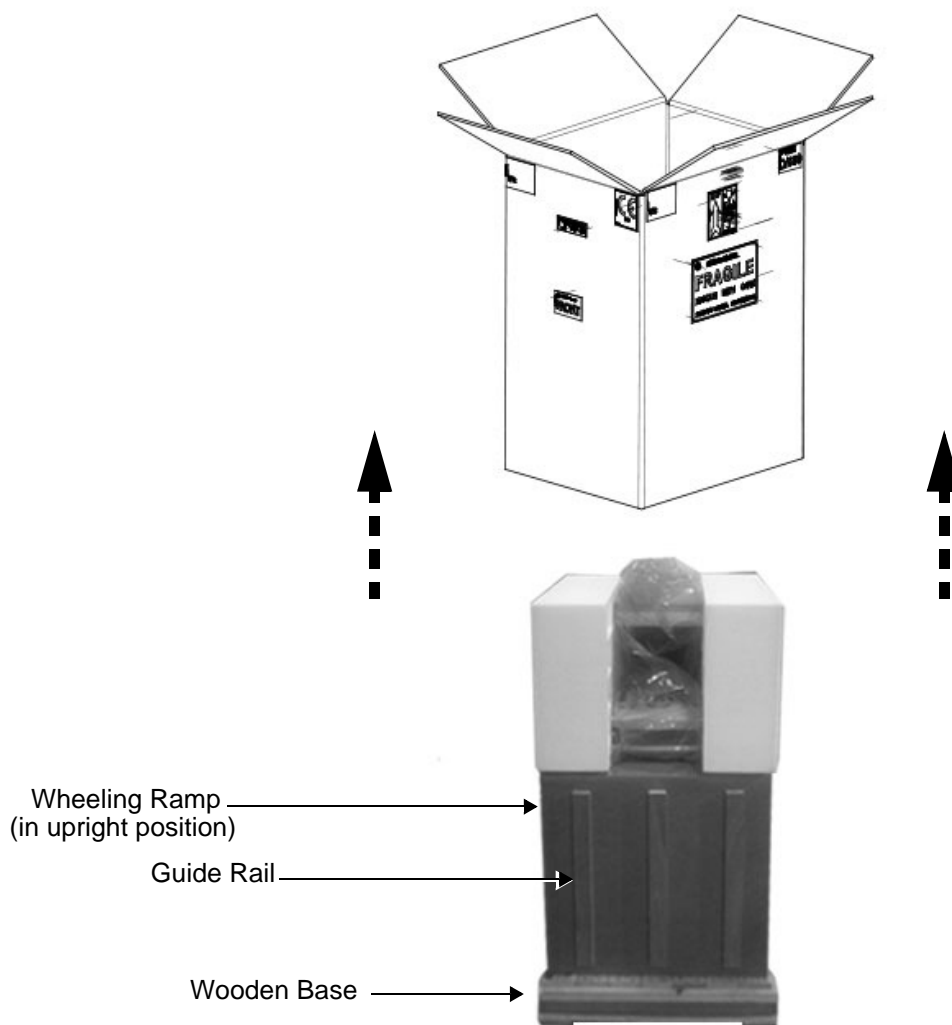
- 2.) Carefully cut the adhesive tape used to close the shipping carton upper lid and open the four folded flaps - see [Figure 3-4](#).



Note: Picture for illustration only

**Figure 3-4 Opening the Shipping Carton**

- 3.) Remove the outer cardboard walls pulling them gently *upwards* and away from the system ([Figure 3-5](#)).

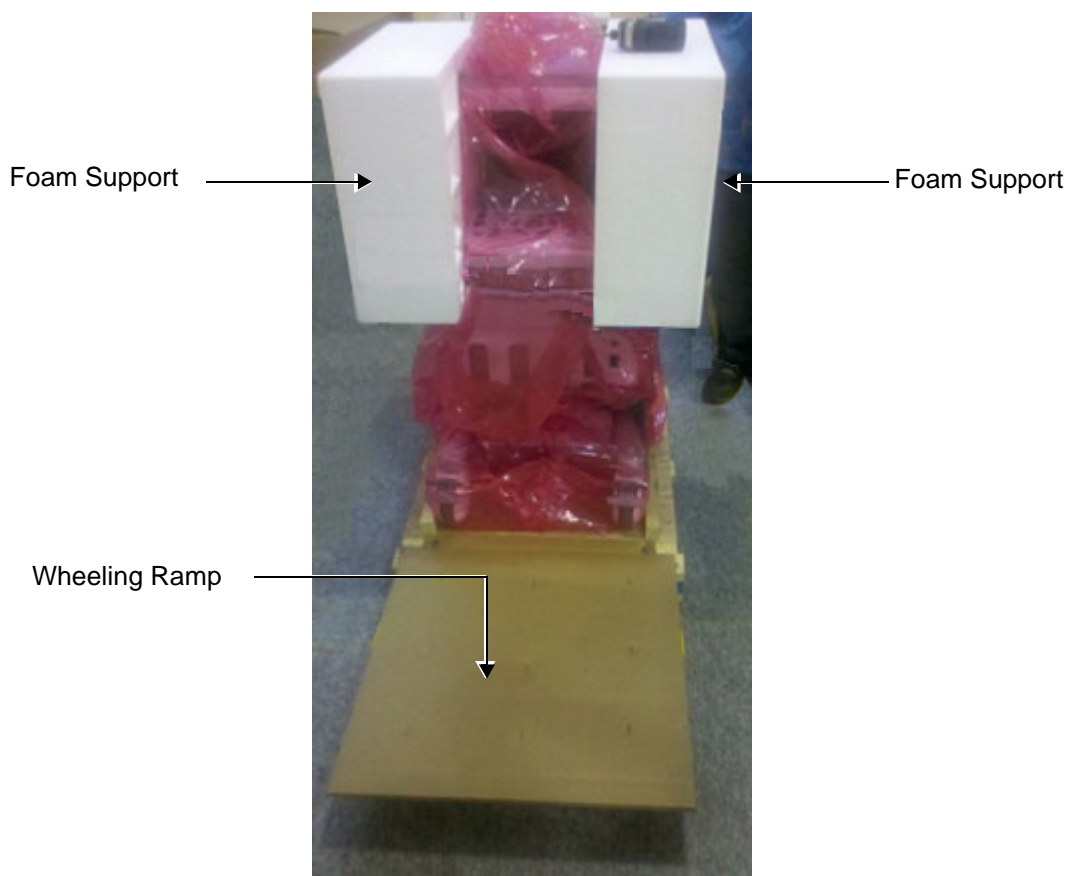


**Figure 3-5 Wheeling Ramp in Upright Position**

**Note:** The front side of the carton is reinforced with wooden guide rails and, when dropped down in the open position, these form a strong ramp used for wheeling the system out of the shipping carton.

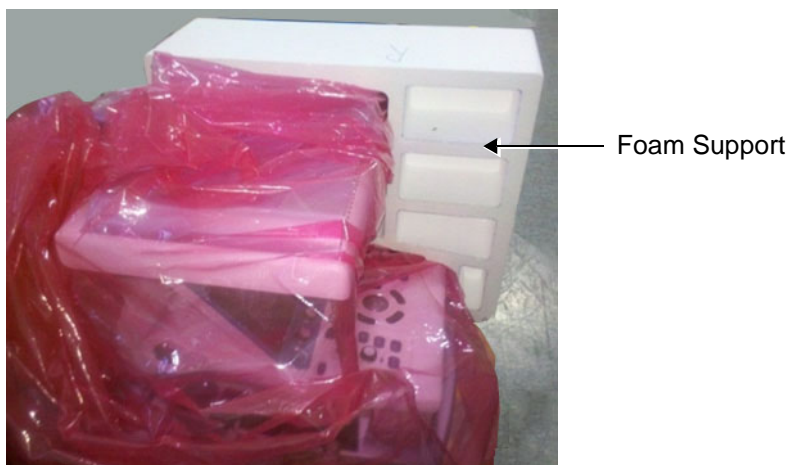
- 4.) Remove the packing slip (shipping consignment note) detailing the contents of the shipping carton and keep close to hand ready to mark the check list - refer to [Physical Inspection on page 3 - 20](#).
- 5.) From each side, remove the screws securing the scanner to the wooden base.

6.) Lower the wheeling ramp into the unloading position, as shown in [Figure 3-6](#) on page 3-11.



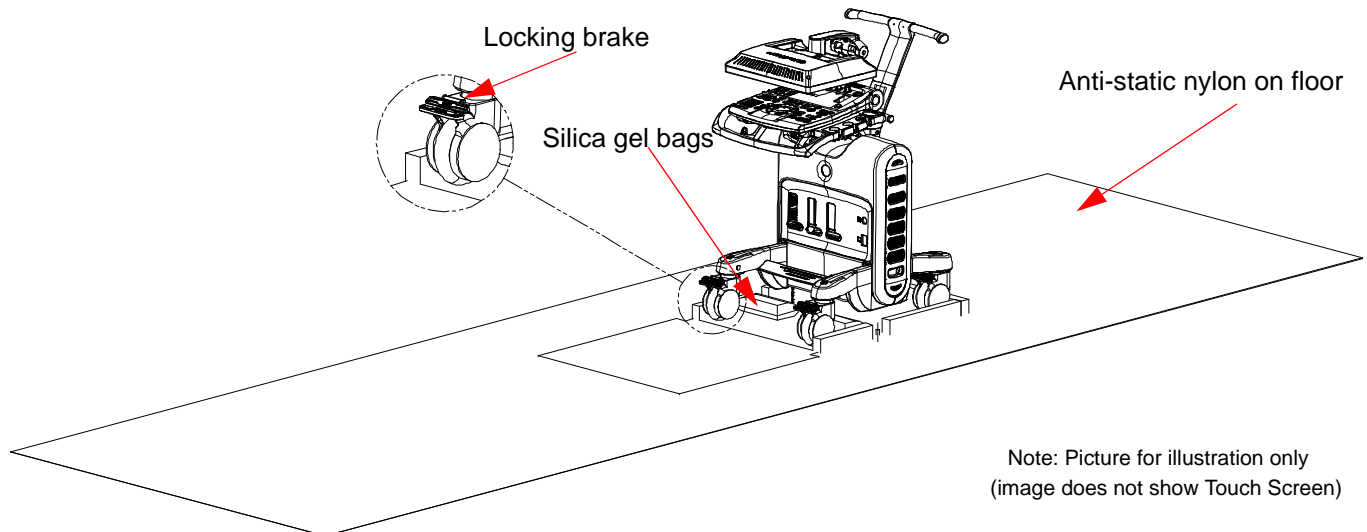
**Figure 3-6 Wheeling Ramp in Unloading Position for Scanner Removal**

7.) Carefully remove the foam supports (from the side and top of the monitor) - see [Figure 3-7](#).



**Figure 3-7 Foam Supports Protecting the LCD Screen**


- 8.) Remove the two screws that secure the console holder, then remove the holder (Figure 3-6).
- 9.) Carefully remove the adhesive tape from the top of the system and spread the anti-static nylon on the floor.
- 10.) Remove any additional packing material from in front of and surrounding the system.
- 11.) Remove the two silica gel bags (Figure 3-8).



**Figure 3-8 Locking Wheel Brake**

- 12.) Press down on the locking brake to unlock the wheel. Repeat for the three other wheels.
- 13.) Using two people, carefully roll the scanner *forwards* down the unloading ramp to remove it completely from the shipping carton.

**CAUTION**




**TWO PEOPLE ARE REQUIRED WHEN MOVING THE Vivid S60N/Vivid S70N SCANNER.**

This precaution is intended to prevent injury that may be caused by the weight of the system if one person attempts to move the scanner considerable distances or on an incline.

- 14.) Make sure the system is standing firmly on the floor before applying the locking brake.
- 15.) Remove the foam sections from the top of the system and from between the main shelf and probe shelf.
- 16.) Using the up/down handle, raise the main shelf up to appropriate height.
- 17.) Pull the monitor locking pin towards you and lift the monitor into the upright position.
- 18.) Before commencing the installation procedure, follow the instructions for [Physical Inspection on page 3 - 19](#).

**NOTICE**



**After unpacking the unit:**  
 It is recommended to keep and store the shipping carton and all other packing materials (including the support foams, anti-static plastic cover, etc.), in case the unit has to be moved to a different location in the future.  
 For warranty purposes, storage of the above is required for one year from date of purchase.

**3-3-4-3 Unpacking the Ocean Shipping package****3-3-4-3-1 Part List****Table 3-4 Part List for Ocean shipping package**

Item	Description	QTY	Material
1	Pallet	1	Poplar plywood
2	Carton box	2	Corrugated card board
3	Ex-Pak type-P lid	1	Poplar plywood
4	Foam for handle	1	PE, laminated
5	Foam for front	1	PE, laminated
6	Left foam	1	PE, laminated
7	Right foam	1	PE, laminated
8	Foam for plastic	1	PE, laminated
9	Tilt watch label	1	Rigid polystyrene housing with non-magnetic steel indicator
10	Anti-static nylon 1.5m	1	Nylon
11	Foam tube	4	PE, laminated
12	500g desiccant	2	Silica
13	Country specific label	1	Polyester
14	Chemical label for Alton system	1	Polyester
15	Ratchet tightening belt	1	

**NOTE:** *The Item Numbers in the table above are referred where applicable in the procedure starting on the next page.*

3-3-4-4      Unpacking instruction (Ocean package)

Table 3-5      Unpacking instruction (Ocean package) 1 of 5



1.	<div>Remove the ExPak type-P lid [3] on top.</div> <div>ExPak type-P</div>	
2.	<div>Remove the Carton box [2].</div> <div>Carton box</div>	



Table 3-5 Unpacking instruction (Ocean package) (Continued)2 of 5

3. Remove the plastic wrap, set aside the accessory box, and remove the anti-static nylon [10].

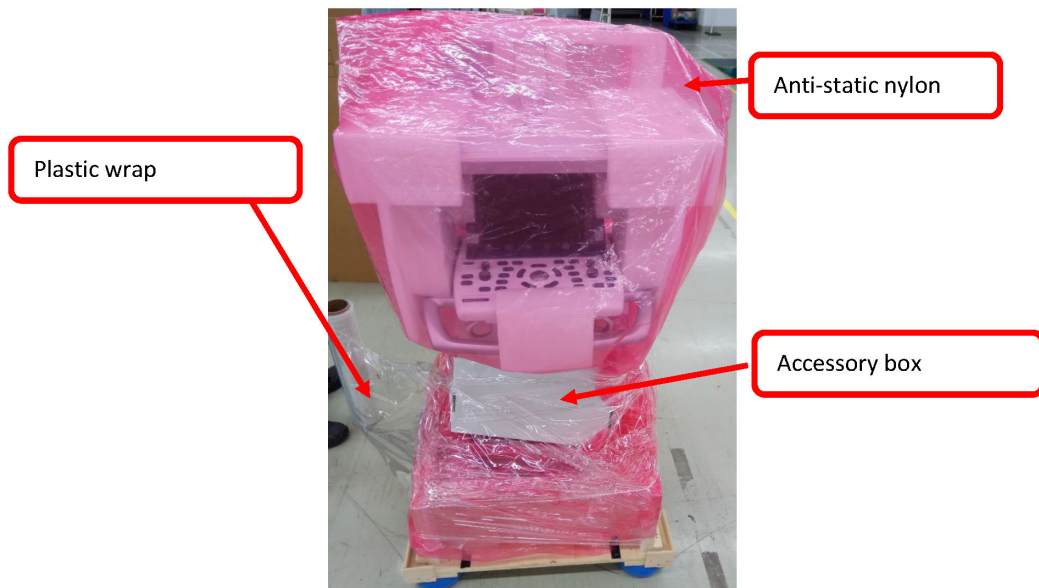


Figure 3-1

4. Remove the Foam for handle [4].

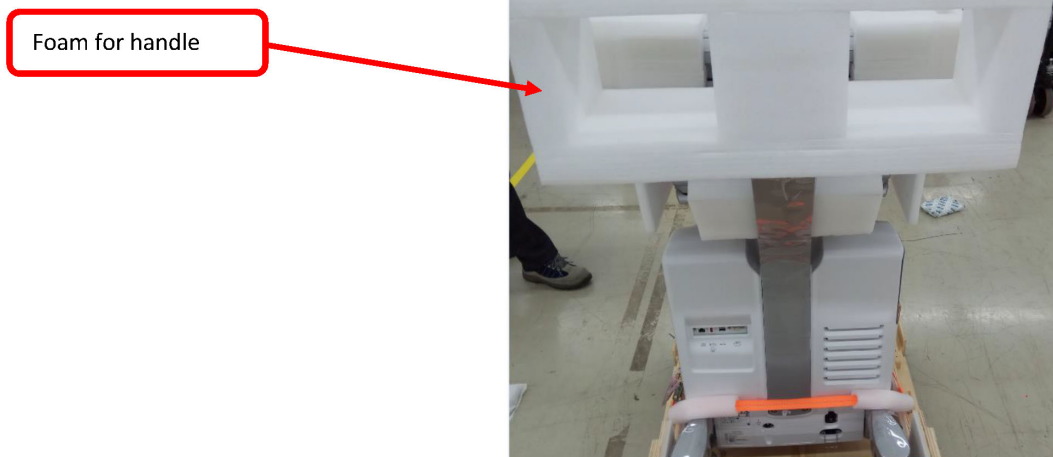


Table 3-5     Unpacking instruction (Ocean package) (Continued)3 of 5

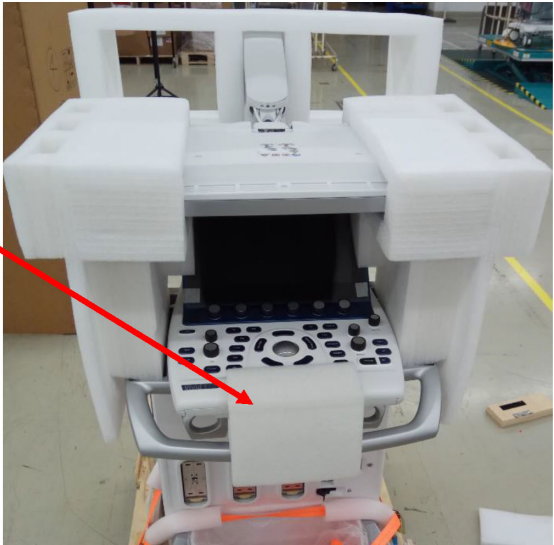

5.	<p>Remove the Foam for front [5].</p> <div>Foam for front</div>	
6.	<p>Remove the Left foam [6] and Right foam [7].</p> <div>Left foam</div>	 <div>Right foam</div>

Table 3-5 Unpacking instruction (Ocean package) (Continued)4 of 5


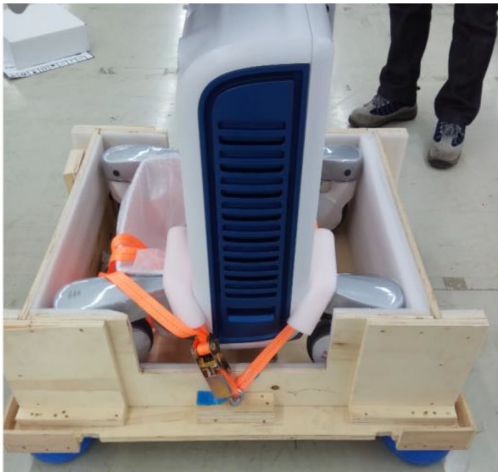


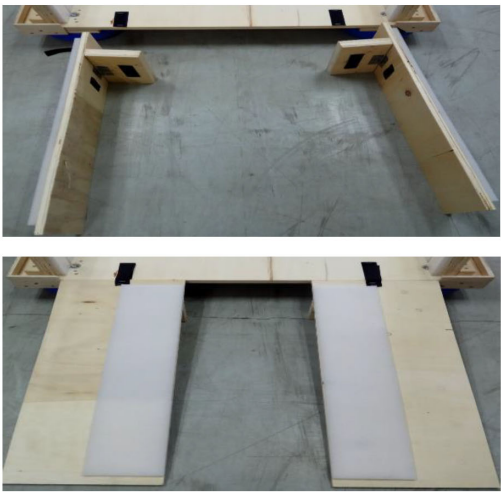

7.	<p>Remove the Foam for plastic [8].</p> <div><p>Foam for plastic</p></div> 
8.	<p>Loosen the ratchet tightening belt [15] and detach it from the Pallet [1]. Unthread the 4x Foam tube [11].</p> <div></div> <div></div>

Table 3-5 Unpacking instruction (Ocean package) (Continued)5 of 5

9.	<p>Remove the Front halt and Back halt from the Pallet, expand as shown to the right - upper, then put it on the ground as shown to the right - lower.</p> 	
10.	<p>Roll the Vivid S70N/S60N system down from the Pallet [1] as shown.</p>	

---

### 3-3-5 Physical Inspection

Verify that the ultrasound system arrived intact (visual inspection).

If the ultrasound system has been damaged, please refer to:

[DAMAGE IN TRANSPORTATION](#) on page - xiii in the beginning of this manual.

#### 3-3-5-1 System Voltage Settings

Verify that the system voltage requirements meet the available voltage on site, refer [Electrical Requirements](#) on page 2 - 3.



**WARNING** *CONNECTING A VIVID S60N/VIVID S70N SCANNER TO INCORRECT VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT. CONNECT THE SYSTEM ONLY IN ACCORDANCE WITH THE VOLTAGE INDICATED ON THE PRODUCT LABEL.*

### 3-3-6 EMI Protection

The Vivid S60N/Vivid S70N ultrasound system 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.



## Section 3-4 Preparing for Setup

### 3-4-1 Verifying 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 ultrasound system arrived intact (visual inspection).

If the ultrasound system has been damaged, please refer to [DAMAGE IN TRANSPORTATION](#) on page xiii in the beginning of this manual.

### 3-4-3 Component Inspection

After verifying that all the required parts are included in the shipping crate, inspect the system components using the checklist supplied below. In addition, ensure that all the labels described in [Chapter 1 - Introduction](#) are present, accurate and in good condition, and enter the serial number printed on the main label into the system installation details card, as described in [Paperwork After Setup](#) on page 3-74.

#### 3-4-3-1 Damage Inspection Checklist

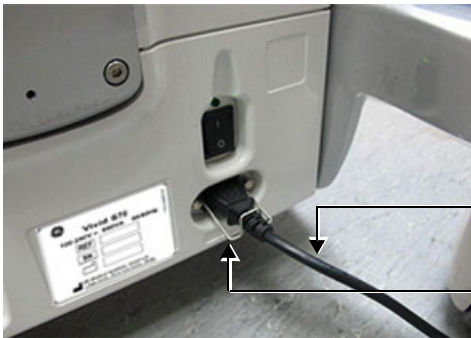

Visually inspect the contents of the shipping carton for damage. If any parts are damaged or missing, contact an authorized GE Service Representative.

A *Damage Inspection Checklist* for the Vivid S60N/Vivid S70N portable ultrasound scanner is provided in [Table 3-6](#) below.

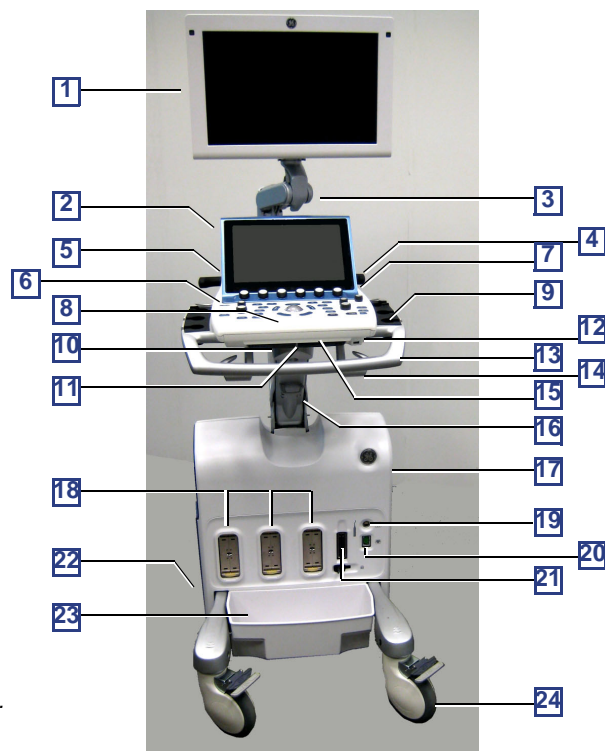
**Table 3-6 Damage Inspection Checklist - Vivid S60N/Vivid S70N Systems**

	Step	Item	Recommended Procedure
	1	Console	Verify that the system is switched OFF and unplugged. Clean the console and control panel.
	2	Control Console	Physically inspect the control console for missing or damaged items. Verify the proper illumination of all the control panel buttons.
	3	Probes	Check all probes for wear and tear on the lens, cable, and connector. Look for bent or damaged pins on the connector and in the connector socket on the unit. Verify that the EMI fingers around the probe connector socket housing are intact. Check the probe locking mechanism and probe switch.
	4	LCD Display	Clean the LCD display by gently wiping with a dry, soft, lint-free non-abrasive folded cloth. Inspect the monitor for scratches and raster burn.
	5	Touch Screen	Clean the Touch Screen by gently wiping with a dry, soft, lint-free non-abrasive folded cloth. Inspect the screen surface for scratches and raster burn.
	6	Fans	Turn on the system and verify that the system's cooling fans and peripheral fans are operating.
	7	Rear Panel	Check the rear panel connectors for bent pins, loose connections and loose or missing hardware. Screw all the cable connectors tightly to the connector sockets on the panel. Verify that the labeling is in good condition.
	8	Covers	Check that all screws are tightly secured in place, that there are no dents or scratches and that no internal parts are exposed.
	9	Peripherals	Check and clean the peripherals in accordance with the manufacturer's directions. To prevent EMI or system overheating, dress the peripheral cables inside the peripheral cover.

**Table 3-6 Damage Inspection Checklist - Vivid S60N/Vivid S70N Systems (Continued)**

	Step	Item	Recommended Procedure
	10	Probe Holders	Clean the gel wells with warm water and a damp cloth to remove all traces of gel.
	11	Covers	Check that all screws are in place, all chassis and internal covers are installed.
	12	Peripherals	Check and clean the peripherals in accordance with the manufacturer's directions. To prevent EMI or system overheating, dress the peripheral cables inside the peripheral cover.
	13	AC System	Check the AC board connectors and the associated cabling for good connection and proper insulation. Verify that the connections are secured.
	14	Power Cord	<p>Check the power cord for cuts, loose hardware, tire marks, exposed insulation, or any deterioration. Verify continuity.</p> <p>Tighten the clamps that secure the power cord to the unit and the outlet plug to the cord. Replace the power cord and/or clamp, as required.</p>  <p><i>Note! Illustration is for a v201 system.</i></p>
	15	Plastic Clamp	<p>Secure the cable to the back of the system using the plastic clamp provided.</p>  <p><i>Note! Illustration is for a v201 system.</i></p>
	16	Front Casters	Check that the front casters can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) <i>down</i> on each. Ensure that the wheels are locked and there is no movement in any direction.
	17	Rear Casters	Check that the front casters can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) <i>down</i> on each. Ensure that the wheels are locked, unable to swivel <i>left</i> or <i>right</i> , and that there is no movement <i>forwards</i> or <i>backwards</i> .

## 3-4-3-2 Front View of the Vivid S60N/Vivid S70N ultrasound system



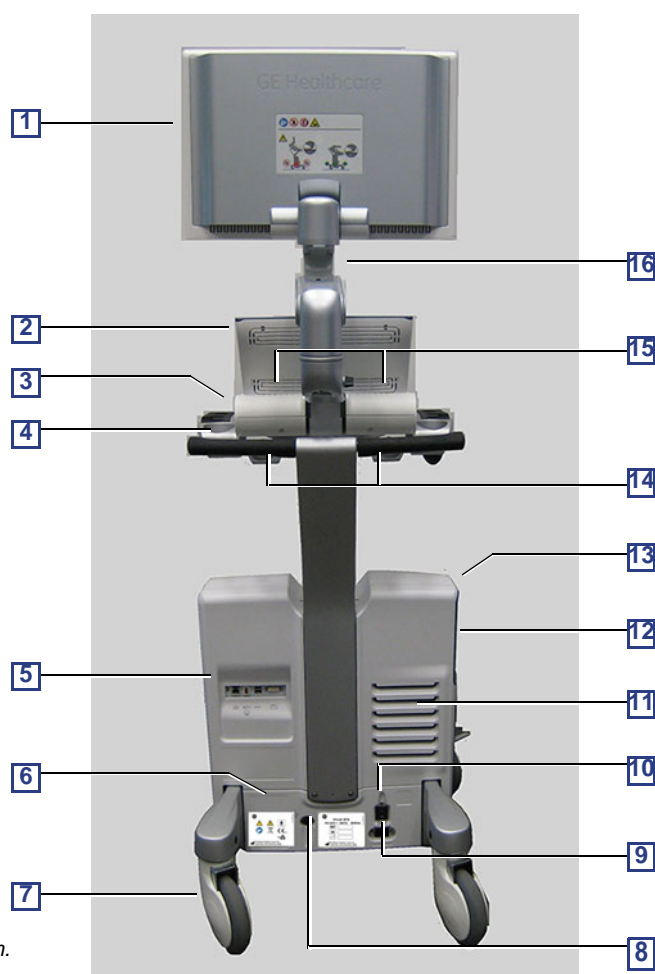
Note! Illustration is for a v201 system.

**Figure 3-9 Front View of the Vivid S60N/Vivid S70N Ultrasound Scanner**

#	Item	#	Item
1	Display Monitor: Tilts up and down and swivels left and right.	13	Front handle
2	Touch Screen: Mounted in a fixed position behind the Control Panel at a convenient angle for viewing.	14	Probe-cable hooks
3	Monitor Articulated Arm. Includes Release pin that enables locking of the monitor in the 90 degree position.	15	Pull-out Alphanumeric Keyboard (optional)
4	Rear Handle	16	Up/down "Flex-Fit" Arm
5	OPIO Basket: Holds paper and other utensils, as required.	17	Air inlet and Sub-woofer: Air flow is via a built-in filter on the side cover, for system air cooling. A sub woofer speaker provides superb sound.
6	ON/OFF: Power ON/OFF knob enables the user turn ON the system (when power is connected and the system is either in Shutdown or Standby mode).	18	Probe Connectors (PDT type)
7	Speakers: Two loudspeakers provided for Doppler sound.	19	Doppler Pencil Probe Connector
8	Control Panel: Contains the buttons used to operate the ultrasound system and the alphanumeric keyboard (optional).	20	ECG Cable Connector: Provides External ECG input connection to an ECG monitor device outlet, or direct patient three-contact ECG lead connection. Important: Do not use the Vivid 7 ECG cable with the Vivid S60N/Vivid S70N system.
9	Probe and gel holders: Provides a safe, rubber-cushioned resting place for probes. (Both sides of the Control Panel).	21	Probe Connector (RS type for TEE probe).
10	Control Panel swivel release handle: Enables locking of the control panel in position; swiveling it left or right.	22	Rear Caster Wheel: Enables locking of swivel motion, or free rolling and swiveling.
11	Control Panel up/down release handle: Enables locking of the control panel in position, or changing the location of the arm by moving it upwards and away from the user, or downwards and away from the system. Provides leg room for the user who may then be seated beside system.	23	Probe-cable management tray (removable). Note: should be used only for small-footprint items of a total weight not exceeding 1 Kg (2.2 lbs).
12	Front USB port.	24	Front Caster Wheel: Enables full-locking of swivel motion, or free rolling and swiveling.



## 3-4-3-3 Rear View of the Vivid S60N/Vivid S70N ultrasound system



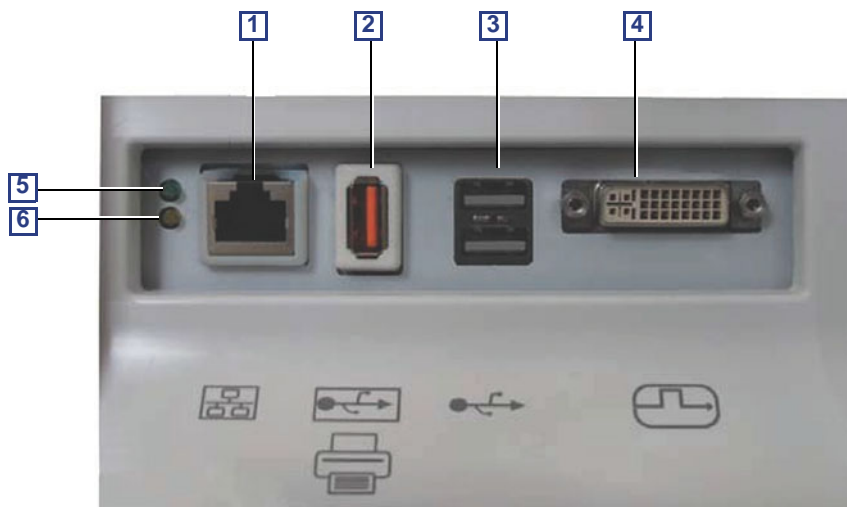
Note! Illustration is for a v201 system.

Figure 3-10 Vivid S60N/Vivid S70N Rear View

#	Item	#	Item
1	Display Monitor - rear	9	Main power input socket (AC IN); fitted with a safety spring for securing AC power cable.
2	Touch Screen - rear	10	Power ON/OFF switch - provides power to the scanner
3	Gel Holders: Provides convenient storage for US Gel bottles. Holders are situated on either side of the control console.	11	Ventilation port
4	Rear Handle: used to pull/push the scanner and place it in the desired position.	12	Black/White Video Printer (optional)
5	Rear I/O Peripheral/Accessory Connector Panel: Provides ports for LAN, Insulated USB, Dual USB and DVI, (see <a href="#">Figure 3-11</a> ).	13	CD/DVD Drive
6	System Labels	14	Rear Cable Hooks: provides a cable management solution for probes and ECG leads.
7	Rear Wheels - Swivel	15	Doppler Speakers
8	Ground - detachable Ground plug.	16	Articulated Arm

### 3-4-3-4 Peripheral/Accessory Connector Panel

Figure 3-11 shows a view of the Vivid S60N/Vivid S70N ultrasound system rear panel showing external peripheral/accessory connectors.



**Figure 3-11 View of the Vivid S60N/Vivid S70N Peripheral/Accessory Connector Panel**

- 1 Ethernet LAN connector — 1000 Base-TX Ethernet IEEE 802.3
- 2 Isolated USB connector (USB 1.0 only)
- 3 Dual USB connector
- 4 DVI-D Display OUT connector (DVI-I type with digital output only [DVIDI-D])
- 5 LED - Network activity
- 6 LED - Network activity

### 3-4-4 EMI Protection

The ultrasound system 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 ultrasound 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 ultrasound system is put into operation.

See [EMI Limitations on page 2 - 4](#) for more information about EMI protection.

## Section 3-5 Completing the Setup

### 3-5-1 Purpose of this Section

This section describes how to complete the setup of the ultrasound system.

### 3-5-2 System Specifications

#### 3-5-2-1 System Requirements Verification

- Verify that the site meets the requirements listed in Chapter 2.  
(See: [Facility Needs on page 2 - 6.](#))
- Verify that the specifications below do not conflict with any on-site conditions.

#### 3-5-2-2 Physical Dimensions

**Table 3-7 Physical Dimensions of ultrasound system with Monitor and Peripherals  
in Transportation Position**

Height	Width	Depth	Unit
119	58	80	cm
46.85	22.83	31.50	Inches

**3-5-2-3 Mass with Monitor, without Probes and Peripherals****Table 3-8 Mass of Vivid™ S60N/Vivid™ S70N with Monitor, without Probes and Peripherals**

Model	Mass [KG]	Mass [LBS]
All Vivid S60N/Vivid S70N	73	161

**3-5-2-4 Acoustic Noise Level**

Less than 55 dB(A) at 20 degrees Celsius, measured in the operators head position, 20 cm in front of the keyboard's right corner, at 1.30 m above the floor, and in a distance of 1 meter at all four sides, 1 meter above the floor.

### 3-5-3 Electrical Specifications


**WARNING**

Connecting a ultrasound system to the wrong voltage level will most likely destroy it.

#### 3-5-3-1 Verification of the ultrasound system Voltage Setting

Verify that the mains voltage specified for the ultrasound system is available on-site.

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

#### 3-5-3-2 Electrical Specifications for the ultrasound system

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

**Table 3-9 Electrical Specifications for all ultrasound system Models**

Voltage	100-240 VAC	±10%
Power Consumption	500 VA	
Frequency	50-60 Hz	

The current drain will vary depending on the mains voltage.

- At 230 VAC the current may be up to 2.2 A.
- At 115 VAC the current may be up to 4.3 A.
- At 110 VAC the current may be up to 4.6 A.

### 3-5-4 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 system requirements of Clause 16 of IEC60601-1. Everybody who connects additional equipment to the signal input part or signal output part of ultrasound system, configures a medical system, and is therefore responsible that the ultrasound system complies with the requirements of Clause 16 of IEC60601-1. If in doubt, consult the technical service department or your local representative for GE.*

#### 3-5-4-1 Connect Ethernet

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

The connector is located on the rear side of the ultrasound system.

#### 3-5-4-2 Connect USB Flash Card

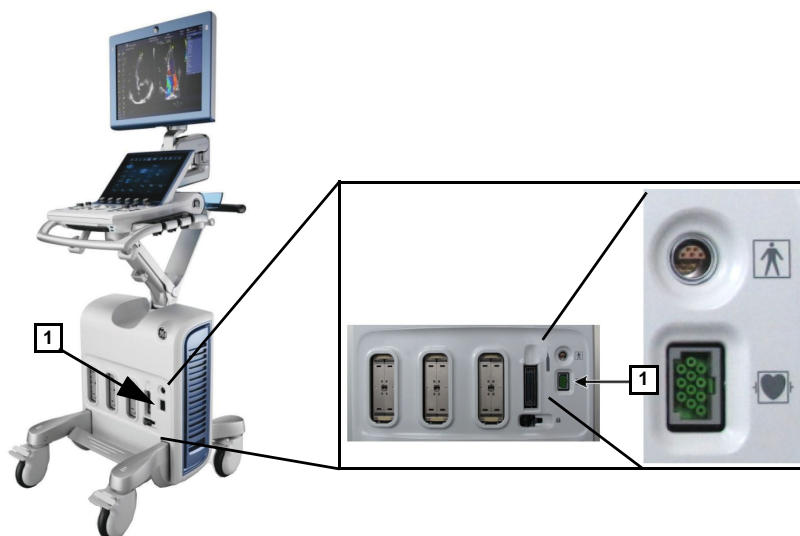
**NOTE:** *USB Flash Cards approved for ultrasound system are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Cards will compromise this verification, and may cause interference on ultrasound system itself, or on other electronic devices.*

For approved models, please refer to [Chapter 9](#).

Insert the USB Flash Card in one of the USB ports on the ultrasound system.

### 3-5-5 Connections on the Patient I/O Panel

The Patient I/O panel is located on the front of ultrasound system.



1. ECG

**Figure 3-12 Patient I/O Panel**

#### 3-5-5-1 Connect ECG

Connect a supported 3-lead ECG cable to the ECG connector on the Patient I/O panel.

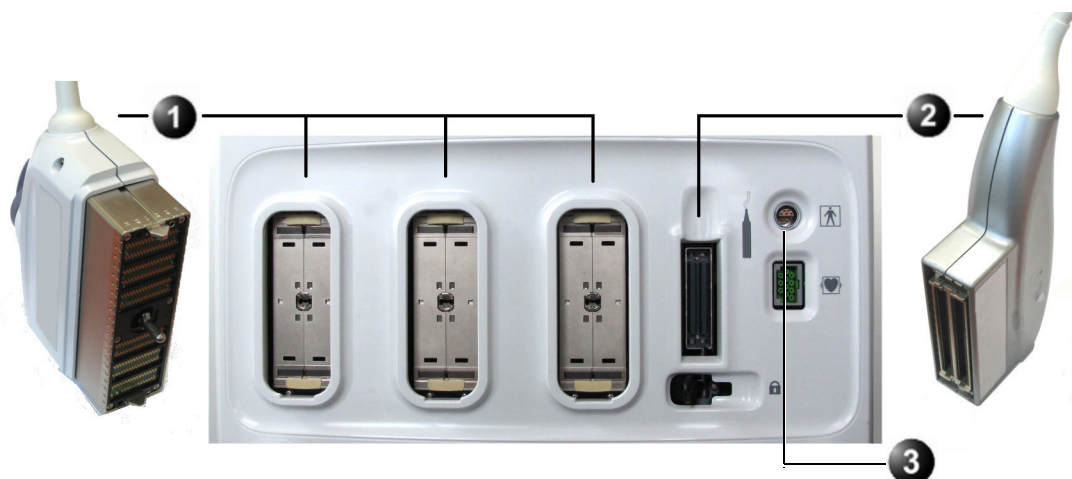
## 3-5-6 Connecting Probes

### 3-5-6-1 Introduction to Connecting Probes

Probes can be connected at any time, whether the ultrasound system is **On** or **Off**.

The ultrasound system has three DLP connectors, one RS connector and a pencil probe port.

**NOTE:** The RS connector is compatible only with 6Tc-RS and 9T-RS probes.



1. DLP Connectors
2. RS Connector
3. Pencil Probe Connector

**Figure 3-13 Probe Connectors on Vivid S60N/Vivid S70N Front Panel**




Probes can be connected or changed any time, as described below, regardless of whether the system is powered ON or OFF.



**CAUTION** **HANDLE THE PROBE GENTLY WHILE CONNECTING AND DISCONNECTING.**  
**DO NOT TOUCH THE PATIENT AND ANY OF THE CONNECTORS ON THE ULTRASOUND UNIT SIMULTANEOUSLY, INCLUDING ULTRASOUND PROBE CONNECTORS.**

**3-5-6-2 Connect a Probe**

**NOTE:** *It is not necessary to turn OFF power to connect or disconnect a probe.*

-  **CAUTION** Do not allow the probe head to hang freely. Excessive impact to the probe will result in irreparable damage.
-  **CAUTION** To prevent probe connector pins damage, or PCB board damage, do not use excessive force when connecting the probes.
-  **CAUTION** Keep the probe cables away from the wheels.  
Do not bend the probe cables.  
Do not cross cables between probes.

**Connecting a probe**

Follow these steps to connect a probe:

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



---

**3-5-6-3 Disconnect Probes**

Follow these steps to disconnect probes, as applicable:

- **DLP Probes**

- 1.) Rotate the lock handle counter-clockwise to the horizontal position to unlock the connector.
- 2.) Carefully remove the connector from the port.
- 3.) Ensure that the probe head is clean before placing the probe in its storage case.

*NOTE:* For cleaning instructions, see the User Manual.

- **RS Probes**

- 1.) Move the connector locking lever to the *left* to unlock the connector.
- 2.) Carefully remove the connector from the port.
- 3.) Ensure that the probe head is clean before placing the probe in its storage case.

*NOTE:* For cleaning instructions, see the User Manual.

- **Pencil Probes**

- 1.) Pull the release sleeve (located on the probe connector) backwards to unlock and release the probe.
- 2.) Carefully remove the connector from the port.
- 3.) Ensure that the probe head is clean before placing the probe in its storage case.

*NOTE:* For cleaning instructions, see the User Manual.

**3-5-7 Power on/Boot up**

For procedure, see: [Power ON/Boot-up on page 4 - 3](#).

**3-5-8 Power Shut Down**

For procedure, see: [Power Shut Down on page 4 - 8](#).

**3-5-9 Complete Power Down**

For procedure, see: [Complete Power Down on page 3 - 31](#).

## Section 3-6 Configuration

### 3-6-1 Purpose of this Section

This section describes how to configure the ultrasound system.

### 3-6-2 Ultrasound System Configuration

#### 3-6-2-1 Select System Settings Screen

- 1) Select **Config** and log on as **adm**.
- 2) Select **System** and then select **Settings**, if needed.

The Settings screen is displayed.

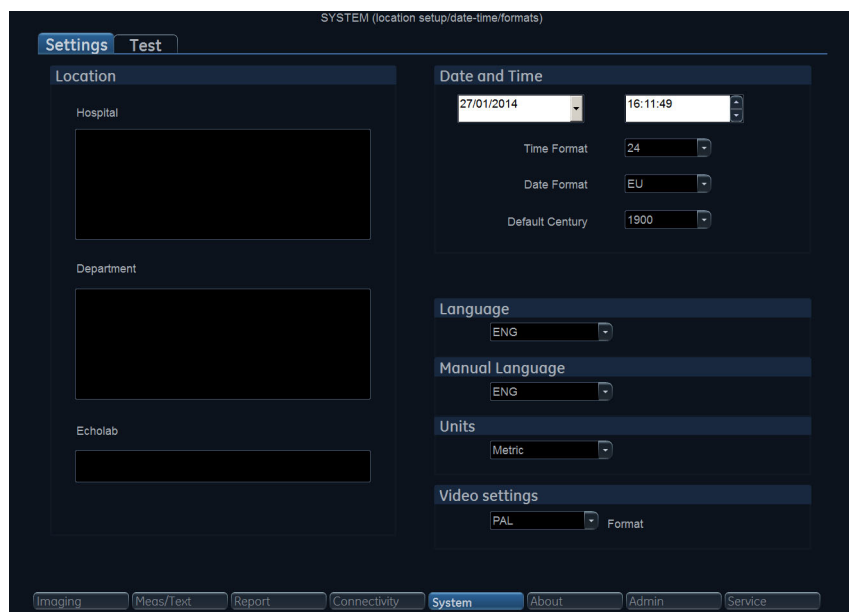
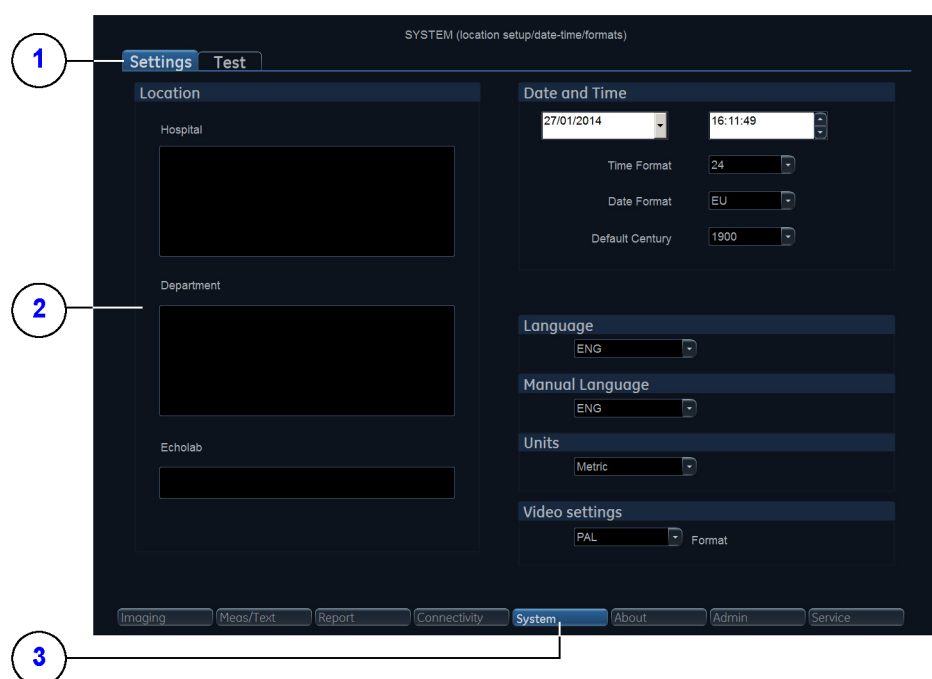


Figure 3-14 Settings Screen

## 3-6-2-2 Enter Location



1. Settings
2. Location
3. System

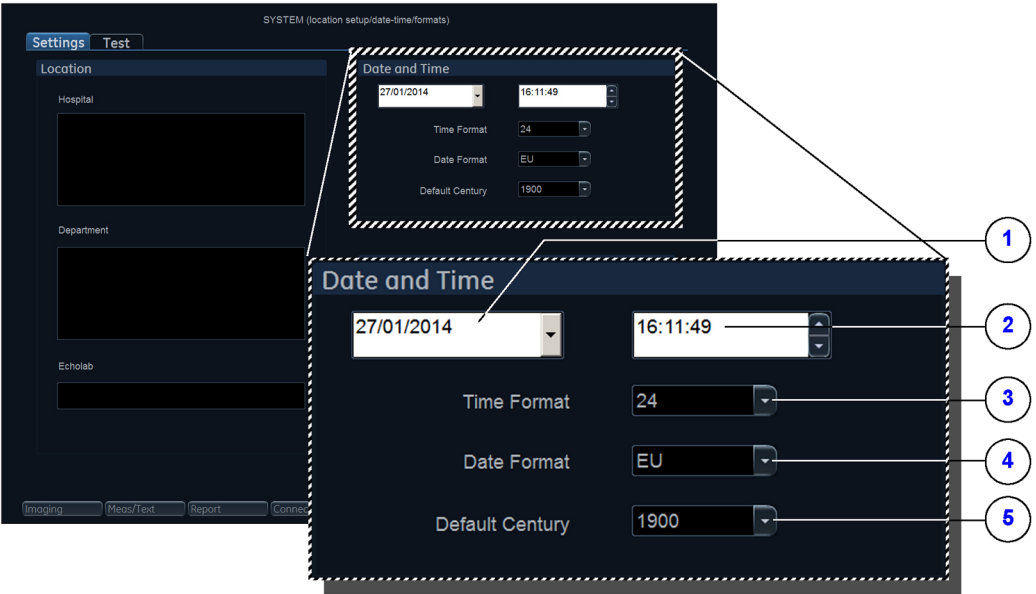
Figure 3-15 Enter Location

Table 3-10 Enter Location

STEP	TASK	EXPECTED RESULT(S)
1.	Select the <b>Hospital</b> field and type the name of the hospital (max 64 characters).	After restart: <ul style="list-style-type: none"> <li>The 24 first characters of this name are displayed on the scanning screen's title bar.</li> <li>All 64 are displayed on the image properties on saved images.</li> </ul>
2.	Select the <b>Department</b> field and type the name of the department (max 64 characters).	After restart: <ul style="list-style-type: none"> <li>This name will be displayed on the image properties on saved images</li> </ul>
3.	Select the <b>Echolab</b> field and type the name.	After restart: <ul style="list-style-type: none"> <li>This name will be displayed on the image properties on saved images</li> </ul>

3-6-2-3

Adjust Date and Time



1. Date

2. Time

3. Time Format
4. Date Format

5. Default Century

Figure 3-16 Date and Time Adjustments

Table 3-11 Date and Time Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	<ul style="list-style-type: none"><li>Open the <b>System</b> (Configuration) Window,</li><li>Select <b>Settings</b>, if needed.</li></ul>	The <b>Settings</b> window is displayed.
2.	Select the preferred <b>Date Format</b> , see (d) in Figure 3-19. <ul style="list-style-type: none"><li>DD = Date (two digits)</li><li>MM = Month (two digits)</li><li>YYYY = Year (four digits)</li></ul>	<ul style="list-style-type: none"><li><b>EU</b>: the European/International "DD.MM.YYYY" format is used</li><li><b>US</b>: the American "MM.DD.YYYY" format is used</li></ul>
3.	Select the preferred <b>Time Format</b> , see (3) in the figure.	<ul style="list-style-type: none"><li><b>24</b>: the 24 hour format is used</li><li><b>12</b>: the 12 AM/PM hour format is used</li></ul>
4.	Adjust the <b>date</b> , see (1) in the figure.	<b>New date</b> is displayed
5.	Adjust the <b>time</b> , see (2) in the figure.	<b>New time</b> is displayed

Table 3-11 Date and Time Adjustments (Continued)

STEP	TASK	EXPECTED RESULT(S)
6.	Select <b>Default Century</b> (1900, 2000 or None), see (5) in the figure.	<ul style="list-style-type: none"> <li>• <b>1900:</b> <ul style="list-style-type: none"> <li>• the number 19 is automatically displayed when entering the year in the patient date of birth.</li> <li>• To edit century, press BACKSPACE twice.</li> </ul> </li> <li>• <b>2000:</b> <ul style="list-style-type: none"> <li>• the number 20 is automatically displayed when entering the year in the patient date of birth.</li> <li>• To edit century, press BACKSPACE twice.</li> </ul> </li> <li>• <b>None:</b> <ul style="list-style-type: none"> <li>• the four digits have to be typed when entering the year in the patient date of birth.</li> <li>• The selected setting will be used as soon as the unit has been restarted.</li> </ul> </li> </ul>

**3-6-2-4 Install the Online User Manuals**

Starting from the release of software v202, the Online User Manuals must be loaded at installation of the system at the customer, and/or after a software reload or update.

For instructions, see: [4-2-4 "Install the On-board User Manuals" on page 4-10.](#)

## 3-6-2-5 Select Language for User Interface and Online Manuals

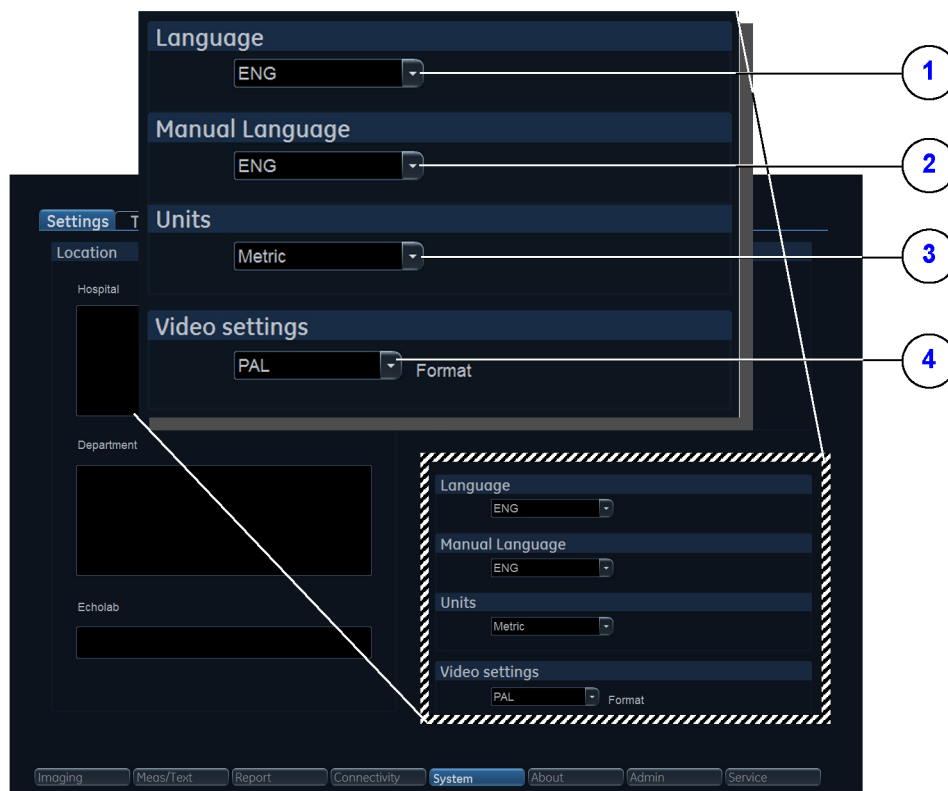


Figure 3-12 Select Language, Units and Video Format

Table 3-12 Select Language for User Interface and Online Manuals

STEP	TASK	EXPECTED RESULT(S)
1.	From the Settings screen, select the preferred User Interface language from the Language pull-down menu (1).	The selected language will be used as soon as the unit has been restarted.
2.	Use the Manual Language pull-down menu (2) to select the preferred language for the online manual.	The selected language will be used as soon as the unit has been restarted.
3.	In the Settings window, use the Units pull down menu (3) to select Metric or US Units.	The selected units (Metric or US) will be used for measurements as soon as the unit has been restarted.
4.	Select the video format from the Video settings pull-down menu (4).	The selected video format will be used as soon as the unit has been restarted.

**3-6-2-6 Select Units of Measure and Video Format****Table 3-13 Select Units of Measure and Video format**

STEP	TASK	EXPECTED RESULT(S)
1.	In the Settings window, use the Units pull down menu (3 in <a href="#">Figure 3-17</a> on page 3-36) to select Metric or US Units.	The selected units (Metric or US) will be used for measurements as soon as the unit has been restarted.
2.	Select the video format from the Video settings pull-down menu (4 in <a href="#">Figure 3-17</a> on page 3-36.)	The selected video format will be used as soon as the unit has been restarted.

## 3-6-3 Service Screen Setup

### 3-6-3-1 Open Service Screen

- 1) Press **Config** and log on as **adm**.
- 2) Select **Service** (lower, right part of window) to view the **Service Screen**.

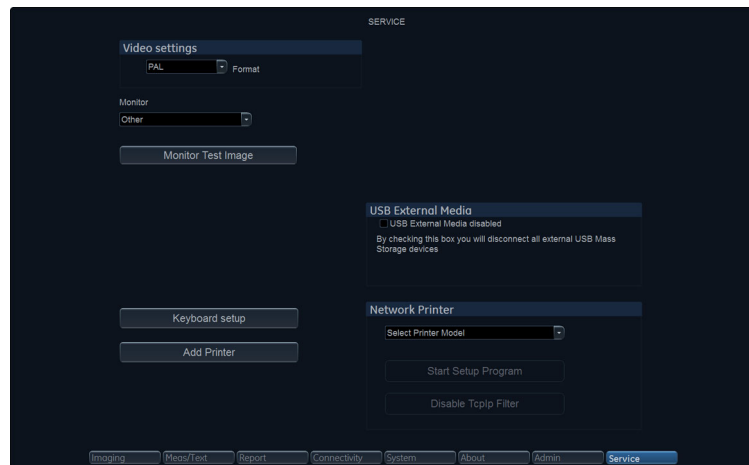


Figure 3-18 Service Screen

### 3-6-3-2 Select Video Format, PAL or NTSC

This selection must correspond to the Video Standard (PAL or NTSC) used at the location.

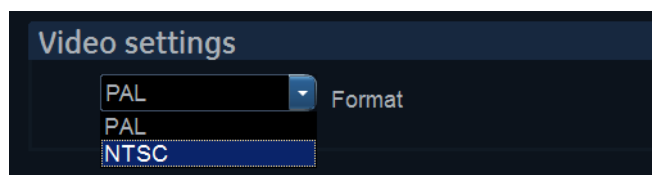


Figure 3-19 Select Video Format

- From the **Video Settings** pull-down menu, select the correct video format (NTSC or PAL).



**3-6-3-3 Alphanumeric Keyboard Configuration**

**NOTE:** You don't need to perform this procedure if the alphanumeric keyboard is a US keyboard, since the default setting is set to US English keyboards.

**Table 3-14 Select Keyboard**

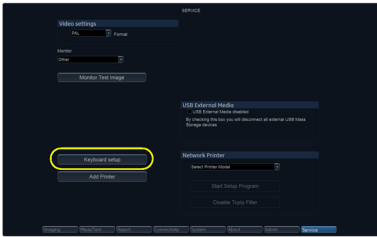
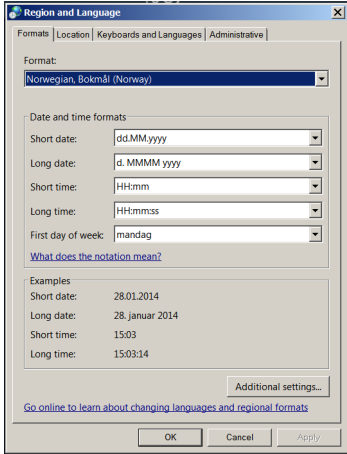
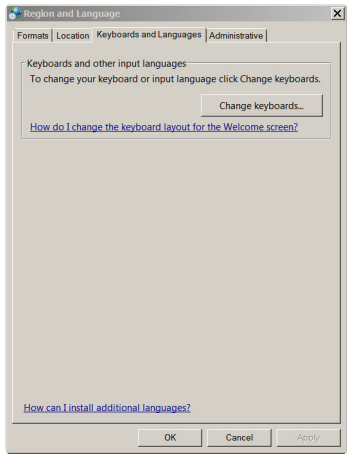
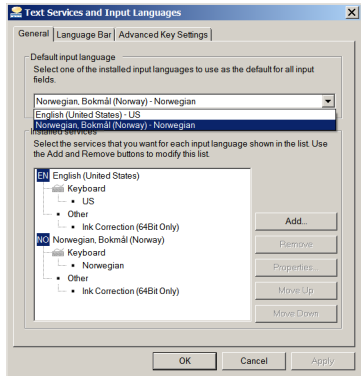
STEP	TASK	EXPECTED RESULT(S)
1.	Select Keyboard Setup to get access to Keyboard Properties.	
2.	Select Keyboards and Languages.	
3.	Select Change Keyboards...	

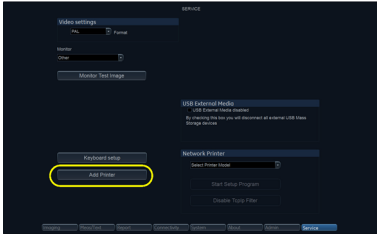
Table 3-14 Select Keyboard (Continued)

STEP	TASK	EXPECTED RESULT(S)
4.	Select the keyboard and then select OK.	

3-6-3-4 Add Printer

**NOTE:** This procedure may not be applicable to all types of printer, therefore a special Installation Wizard is to be used. In this event, please follow instructions in the respective printer installation procedure.

Table 3-15 Add Printer

STEP	TASK	Illustration
1.	Select Add Printer to start the Add Printer (Installation) Wizard.	
2.	Follow the instructions in the Wizard to install a new printer.	

Related information:

- Optional Peripherals/Peripheral Connection on page 3 - 41

## 3-6-4 Optional Peripherals/Peripheral Connection

### 3-6-4-1 Approved Internal Peripherals

This list covers the internal peripherals available for ultrasound system:

- Monochrome (Black and White) Digital Sony UP\_D898 printer

### 3-6-4-2 Approved External Peripherals

One of the external units listed below, may be connected to the USB port on the rear of the ultrasound system:

### 3-6-4-3 External Peripherals for Connection to USB

- Footswitch
  - Configuration of the footswitch is done on the Config > Imaging > Application screen.
  - For more information, refer to the *ultrasound system User Manual*.
- External Data Storage:
  - USB Flash Card
- COLOR Printers:
  - SONY UPD-25MD

### 3-6-4-4 External Peripherals for Connection to Ethernet (TCP/IP)

Related information:

- [Optional Peripherals on page 9 - 30](#)

#### 3-6-4-4-1 Connecting the HP Laserjet M451 Color Printer

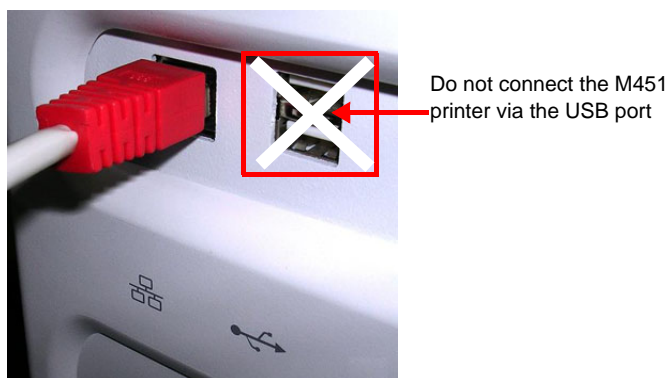


Figure 3-20 HP Laserjet M451 Color Printer



**WARNING** *THE HP LASERJET M451 COLOR PRINTER MUST BE CONNECTED DIRECTLY TO A MAINS AC POWER OUTLET*

**NOTE:** When connecting the printer's network cable, ensure that it is connected to the **network port** at the rear of the Vivid™ S60N/Vivid™ S70N system as shown in [Figure 3-21](#)



**Figure 3-21 Network Cable Connected to Network Port**

---

## 3-6-5 Software Options Configuration

### 3-6-5-1 Software Option Introduction

A Software Option Key, an alphanumeric text string, enables a software option or a combination of software options.

The Software Option Key is specific for each unit.

**NOTE:** *There may be more than one Software Option Keys in use, depending on the installed options.*

### 3-6-5-2 To Install a Software Option

Follow these steps to install the Software Option Key:

- 1) Press **Config** and log on as **adm**.
- 2) Select **Admin** (lower part of window).
- 3) Select the **System Admin** tab.
- 4) Select **New** to open the **New Key** dialog where you type the SW Option Key.



**CAUTION** **Incorrect Software Option Key entry will result in loss of Ultrasound system options. If Software Option Key is incorrect, please contact your local GE Service Representative or the Online Center.**

- 5) Type the Software Option Key.  
You must include the dashes (-) as they are part of the Software Option Key.
- 6) Press **Save** to save the new setting.
- 7) Restart to save and activate the settings and adjustments you have done so far.

### 3-6-5-3 Remote Check and Configurations

Contact the Online Center for InSite checkout.

## Section 3-7 Connectivity Overview

### 3-7-1 Physical Connection

There are several possible connection methods, as outlined below.

### 3-7-2 Stand-alone ultrasound system

No network connection needed.

### 3-7-3 “Sneaker Net” Environment

No network connection needed.

Use removable media to move data from the ultrasound system to another unit.

### 3-7-4 Wired Ethernet from ultrasound system to a Workstation

Either of these situations may apply:

- Direct Cable Connection from ultrasound system to a workstation via a Crossover Cable.  
You will only need a Crossover Cable for network (TCP/IP) use to connect the two units this way.
  - a.) Connect one end of the crossed network cable to the network connector on the ultrasound system.
  - b.) Connect the other end to the network connector to the Workstation.
- Connection via a Peer-to-Peer network.  
You will need a network hub and one network cable for each unit connected to the hub.
- Connection via Hospital Network.  
You will need one network cable to connect the ultrasound system to a wall jack on the hospital's network.

### 3-7-5 Connection from ultrasound system to a DICOM Server on a Network

You will need one network cable.

- 1) Connect one end of the cable to the Ethernet connector on ultrasound system.
- 2) Connect the other end of the cable to the wall jack.

**NOTE:** *If a Peer-to-Peer network is connected to the hospital's network, you may connect the ultrasound system to the Peer-to-Peer network.*

## Section 3-8 Connectivity Setup

**NOTE:** *If connected to a stand-alone network (Peer-to-Peer network with a ultrasound system scanner, an EchoPAC workstation and an optional network printer), you should use default delivery settings.*

### 3-8-1 Introduction

To be able to use the network functions when connected to a hospital network, the ultrasound system must have a proper network address.

- Before you can set up the ultrasound system, you need to collect some information.
- The Worksheet (see sample [Connectivity Installation Worksheet on page 2 - 13](#)) can be used for gathering this information.
- Typical source for this information is the network administrator.

### 3-8-2 Compatibility

The ultrasound system can communicate with:

- EchoPAC
- Image Vault

For networks with an Image Vault 5 server:

If not already done, install the latest version of the Vivid Raw Data Module (RDCM) on the Image Vault server.

For instructions, see the RDCM installation manual:

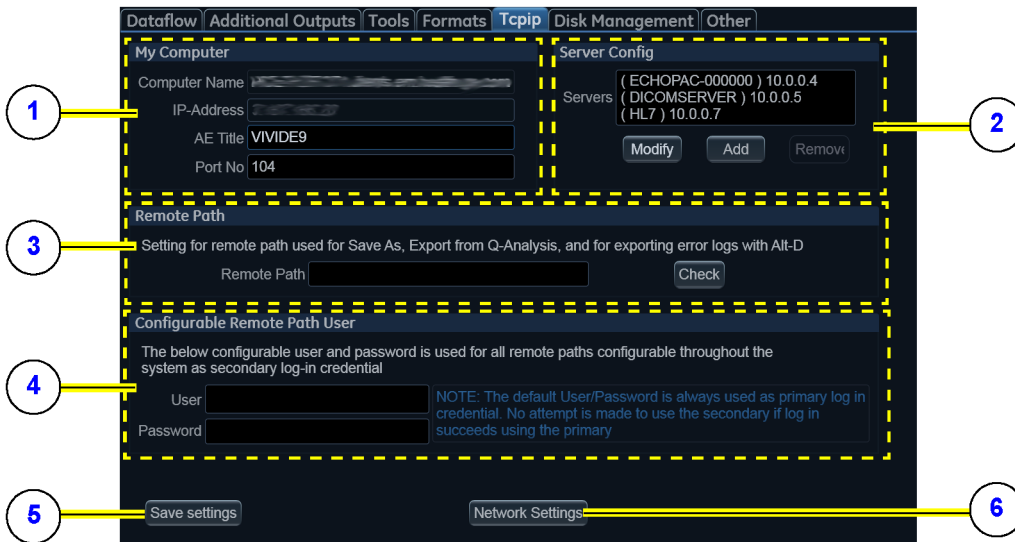
- for software v203, use Direction Number IV294005-1EN

- Other units via DICOM

**NOTE:** *Ultrasound system can't read files directly from EchoPAC MAC or from MAC formatted MO disks. Please use an EchoPAC PC workstation with an MO drive and with MacDrive 5 or MacDrive 6 installed. EchoPAC PC can also open EchoPAC MAC examinations stored on a server.*

### 3-8-3 Select TCP/IP Screen

1. Press **Config** and log on as *adm*.
2. If not already selected, select **Connectivity** from the bottom row of “buttons” on the screen.
3. Select the **TCP/IP TAB**. (it is named **Tcpip**).  
The resulting screen gives you an overview of many of the network settings for ultrasound system.



1. **My Computer:**
  - **Computer Name:**  
For ultrasound system, this name is on the form: *VIVIDX-00NNNN*, where “00NNNN” is a number (NNNN is the scanner’s serial number).
  - **AE Title:**  
VIVIDEx (where ‘x’ is the model number)
  - **Port No:**  
Default port number: 104
2. **Server Config:**
  - **Servers:**  
List of servers
  - **Buttons:**  
Use the buttons to Add, Modify or Remove servers.
3. **Remote Path**  
Used for Save As, Export from Q-Analysis, and for exporting Error Logs with Alt-D.
4. **Configurable Remote Path User:**  
Add Secondary Log-in Credential.
5. **Save Settings:**  
Select **Save Settings** to archive any changes you have done to the TCP/IP settings.
6. **Network Settings:**  
Use **Network Settings** if you need to change ultrasound system’s IP settings or turn DHCP on or off.

Figure 3-22 TCP/IP Overview Screen for ultrasound system

#### Related information:

- [Logging On to the Vivid S60N/Vivid S70N as “ADM” on page 4 - 9](#)



### 3-8-4 Changing the AE Title and/or Port Number (Port No.)

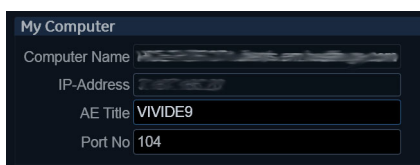


Figure 3-23 AE Title and Port No.

- 1) To change **AE Title** and/or **Port No.**, edit the respective fields.
- 2) Select **Save settings** to store your changes.
- 3) Reboot ultrasound system to activate the settings, or continue with other Tcpip set-up tasks.

### 3-8-5 Set the Remote Archive's Network Information

To be able to connect to a remote archive on a remote computer or server, you must configure ultrasound system to communicate with it.

The configuration is done in the Server Config setup area on the Tcpip screen.

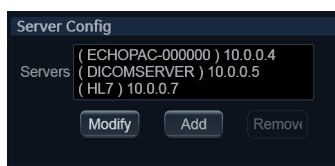


Figure 3-24 Server Config

#### 3-8-5-1 To Access the Tcpip Screen

Follow this procedure to access the Tcpip screen:

- 1) Log on as ADM.
- 2) Select Connectivity > Tcpip.

#### 3-8-5-2 To Add a Server in the Server Config List

Follow this procedure to add a server in the list:

- 1) Select Add.

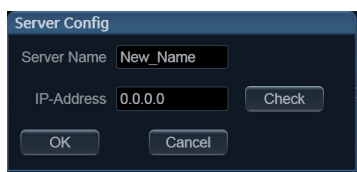


Figure 3-25 Server Config

- 2) Add the server's name in the Server Name field.
- 3) Add the servers IP address in the IP-Address field.

- 4) Select Check to verify that the server is found.

This check is a network Ping. A symbol to the right for the Check button indicates the result:

- A green check mark next to the Check button indicates that the IP-Address is found on the network.
- A red mark indicates that the IP address can't be found.

Possible reasons:

- No network connection between the ultrasound system and the server.
- The wrong IP Address.

### 3-8-5-3 To Modify the Setup for a Server in the List

**NOTE:** Both the pre-defined servers and new servers can be modified.

**Follow this procedure to modify the setup for a server in the list:**

- 1) Highlight the server you want to modify.
- 2) Select Modify.
- 3) Update the information as needed.
- 4) Select Check to verify that the server is found.

This check is a network Ping. A symbol to the right for the Check button indicates the result:

- A green check mark next to the Check button indicates that the IP-Address is found on the network.
- A red mark indicates that the IP address can't be found.

Possible reasons:

- No network connection between the ultrasound system and the server.
- The wrong IP Address.

- 5) Select OK to confirm your new settings, or Cancel to leave without doing any changes.

### 3-8-5-4 To Delete a Server from the List

**Follow these steps to Delete a server from the list:**

- 1) Highlight the server you want to delete from the list.

**NOTE:** You can only delete extra servers. The predefined servers (listed on-screen) can be modified, but not deleted.

- 2) Select Remove.

### 3-8-6 Save the New Settings

- 1) Press **Save Settings** to save the new settings.

The new settings are saved to a common settings file. After a restart, the settings are also included in other screens.

- 2) Restart ultrasound system to activate the changes.

---

### 3-8-7 Wireless Network Configuration

Please refer to:

- [3-9-6 "Wireless Network Configuration" on page 3-52](#)
- ["" on page 3-66](#)

## Section 3-9 Options Setup

### 3-9-1 Overview

### 3-9-2 Software Options

Most of the options for ultrasound system are activated by installing a password (alphanumeric text string).

- For installation instructions, see: [Software Options Configuration on page 3 - 43](#).

### 3-9-3 Color Video Printer Setup

*NOTE: The Color Video Printer is an option.*

An external Color Video Printer may be connected to one of the USB ports on ultrasound system.

*NOTE: SONY UPD-2X-MD is a medical device so it can be placed near the ultrasound system. The USB cable is 5 meters long, so the printer must be placed within reach of this cable.*

Follow these steps to connect the printer to the ultrasound system:

- 1) Connect the USB cable to the printer and to one of the USB ports on ultrasound system.
- 2) Select the correct Power cable and connect it to the printer and to the mains power outlet.
- 3) Switch on the power switch on the printer.

*NOTE: To be able to use the printer, the printer must be selected on the ultrasound system.*

### 3-9-4 USB Flash Card Setup

There is no special setup procedure for use of a USB Flash Card.

### 3-9-5 Tricefy™

Tricefy is a cloud-based image viewer and a platform to archive, collaborate, and share. The corresponding DICOM destinations can be used through the Print keys. An internet connection is necessary for uploading data to Tricefy. The Wireless LAN Option is required. DICOM connectivity to the optional Tricefy Cloud PACS system occurs over a proprietary protocol protected by TLS/HTTPS encryption, although the internal communication is still DICOM-structured.

As soon as the Tricefy option is enabled, relevant Tricefy items are displayed.

**To activate Tricefy:**

**Table 3-16 Tricefy**

TCP/IP	Device	Service	Dataflow	Button	Removable Media	Miscellaneous	Tricefy
<div>Configuration</div> <div><div>Account Status</div><div>deactivate</div></div> <div><div>Account Name</div><div>empty</div></div> <div><div>Customer Name</div><div>empty</div></div> <div><div>Uplink ID</div><div>empty</div></div>				<div>Tricefy is the Ultrasound Cloud. Archive, collaborate and share images and clips. Start your free trial today by registering with your email address. Your Logiq will be immediately cloud-enabled giving you an offsite secure image archive, a zero-footprint DICOM viewer and all of the sharing and collaboration features in Tricefy.</div> <div><div>Visit Trice Imaging Online</div><div><a href="mailto:info@triceimaging.com">info@triceimaging.com</a></div><div><a href="http://www.triceimaging.com">www.triceimaging.com</a></div></div> <div><div>Tricefy Customer Support</div><div><a href="http://www.triceimaging.com">www.triceimaging.com</a></div></div>			
<div>Activation</div> <div><div>Account Email</div><div>email@email.com</div></div> <div><div>Activate</div></div>							

1	Navigate to <b>Utility &gt; Connectivity &gt; Tricefy</b> .
2	In <b>Account Email</b> , enter an email address.
3	Select <b>Activate</b> to activate the Tricefy option.

3-9-6 Wireless Network Configuration

3-9-6-1 Content in the Netgear Wireless Interface USB Adapter A6210 kit

Table 3-17 Content in the Netgear Wireless Interface USB Adapter A6210 kit

Item	Description	Illustration
1	Netgear Wireless Interface USB Adapter A6210	
2	USB-Docking for A6210	
3	Velcro tape strips for attaching USB-docking to the ultrasound system	
4	WiFi Label (Wireless Network Label)	

**3-9-6-2 Connecting the wireless USB adapter A6210 kit to Vivid S60N/Vivid S70N**

For content in the kit, see:

[3-9-6-1 "Content in the Netgear Wireless Interface USB Adapter A6210 kit" on page 3-52.](#)

There are two options for connecting the wireless network adapter to the Vivid S60N/Vivid S70N:

- Connect the USB-dock from kit to rear I/O USB port and attach docking to either left or right topline plastic cover. Connect the wireless network adapter to docking. See section [3-9-6-3 "Connect the adapter using the USB-docking" on page 3-53](#) for instructions (Preferred option).
- Connect wireless network adapter directly into rear I/O USB-port. See section [3-9-6-4 "Connect the adapter directly to the USB-port" on page 3-54](#) for instructions (Secondary option). Be aware that connecting adapter directly in rear USB-port may limit connection to other nearby ports, due to size of adapter.

**3-9-6-3 Connect the adapter using the USB-docking**

Follow the following steps to connect the wireless network adapter to the ultrasound system using USB-docking:

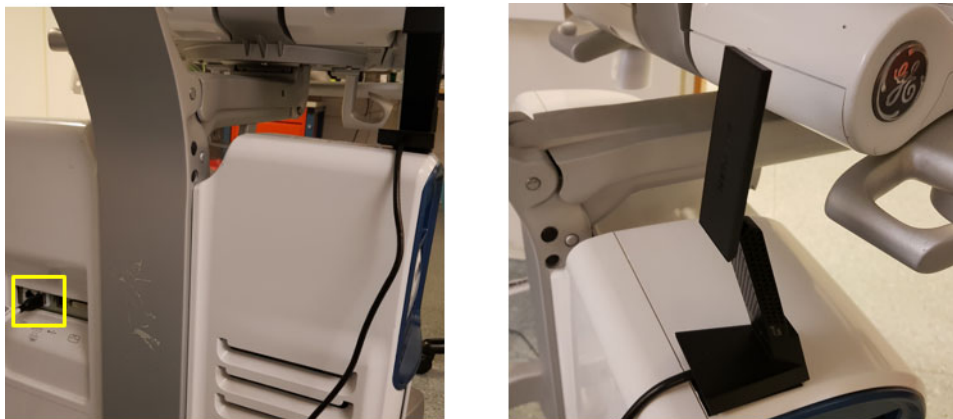
- 1.) Attach the Velcro tape strips to USB-docking and plastic cover:
  - a.) Attach one piece of Velcro tape to the underside of the USB-dock.
  - b.) Attach the other piece on the left or right side of plastic cover. Ensure that the Velcro tape is placed so it only covers front plastic cover, tape on plastic cover must also be placed as close to the right/left edge as possible, to avoid conflict with upper UI. See [Figure 3-26](#) below for guidance:



**Figure 3-26 Placement of Velcro tape**

**3-9-6-3 Connect the adapter using the USB-docking (cont'd)**

- 2.) Insert the wireless network adapter into the USB-dock, place the dock onto the Velcro strip on plastic cover to fasten it. Connect docking USB-port to rear I/O USB-port on the ultrasound system. See [Figure 3-27](#) below for guidance:



**Figure 3-27 Placement/Connection wireless network adapter**

- 3.) Ensure that the wireless network adapter will not interfere with motion of UI by lowering it to bottom position and swivel to left/right. Reposition USB-dock if needed.

**3-9-6-4 Connect the adapter directly to the USB-port**

Follow these steps to connect the wireless network adapter to USB-port directly:

- Connect the wireless network adapter directly into rear I/O USB-port. See [Figure 3-28](#) below for guidance:



**Figure 3-28 Connecting wireless network adapter to rear USB-port**



**3-9-6-5 Install the wireless network label on Vivid S60N/Vivid S70N**

When the wireless network adapter has been installed a label must also be placed on the ultrasound system as instructed below:

- Install the label below the I/O ports on the rear of the Vivid S60N/Vivid S70N as shown in [Figure 3-29](#) below:



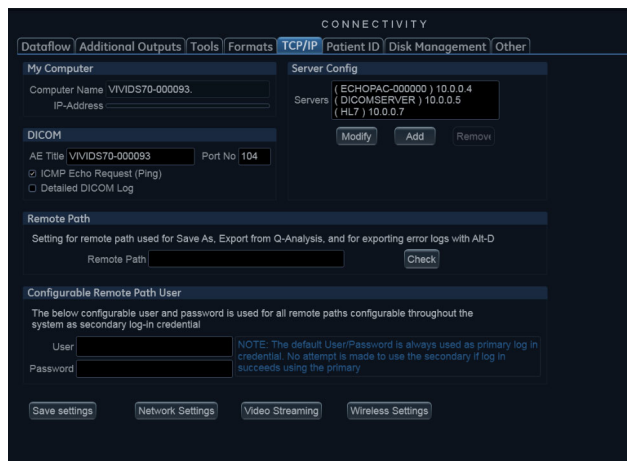
**Figure 3-29 Placement of wireless network Label on Vivid S60N/Vivid S70N**

**3-9-6-6 Wireless Network Configuration - Vivid S60N/Vivid S70N**

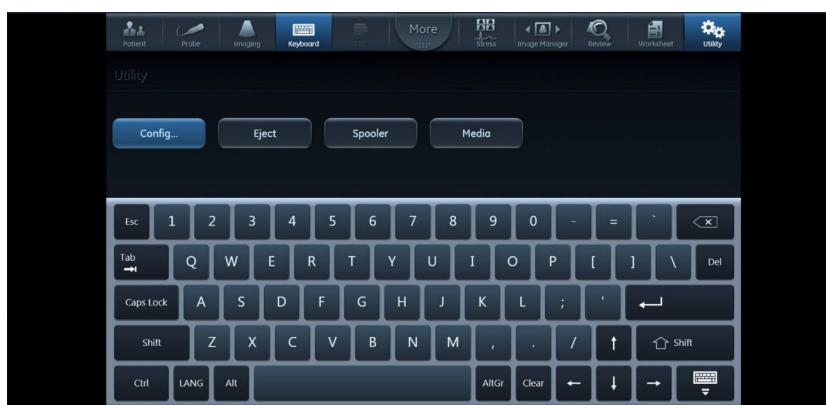
The following procedure is used to configure the ultrasound system for a wireless network environment. This procedure is required for every new wireless network.

**NOTE:** Do not use any type of wireless network adapter other than a GE-approved adapter.

When performing this procedure, if preferred use the Touch Screen Keyboard. Instructions will be displayed on the Monitor (via the Connectivity utility).



**Figure 3-30 Monitor Display**



**Figure 3-31 Touch Screen Keyboard**

### 3-9-6-7 Configuring the Wireless Network Adapter

- 1.) From the default screen on the ultrasound system, press **CONFIG (F2)** and log on as **Adm.** (Refer to Chapter 4 in the service manual for detailed instructions on logging in as Adm.)
- 2.) Select **Connectivity** (lower part of window).
- 3.) Select the **TCP/IP** tab.

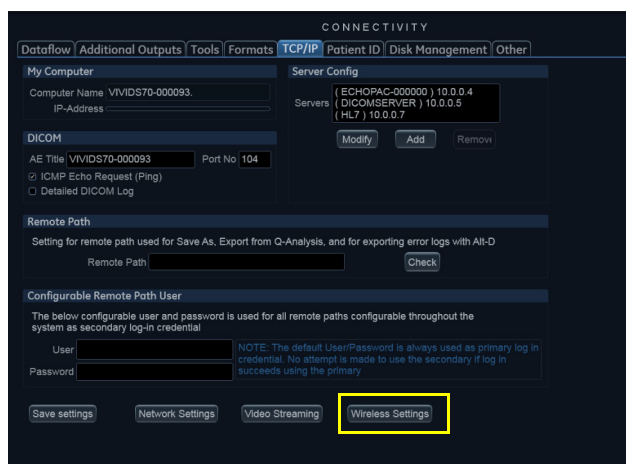


Figure 3-32 Connectivity - TCP/IP Tab

- 4.) Connect a GE-approved wireless network adapter to the lower USB socket on the Rear I/O Peripheral/Accessory Connector Panel. See section 3-9-6-2 for instructions on how to connect the wireless network adapter to the ultrasound system.
- 5.) Click the **Wireless Settings** button - see Figure 3-32.

3-9-6-7

Configuring the Wireless Network Adapter (cont'd)

NOTE: If a wireless network adapter is not connected, or if the connected wireless network adapter is not the correct model, no wireless networks will be listed in the **Wireless Settings** page.

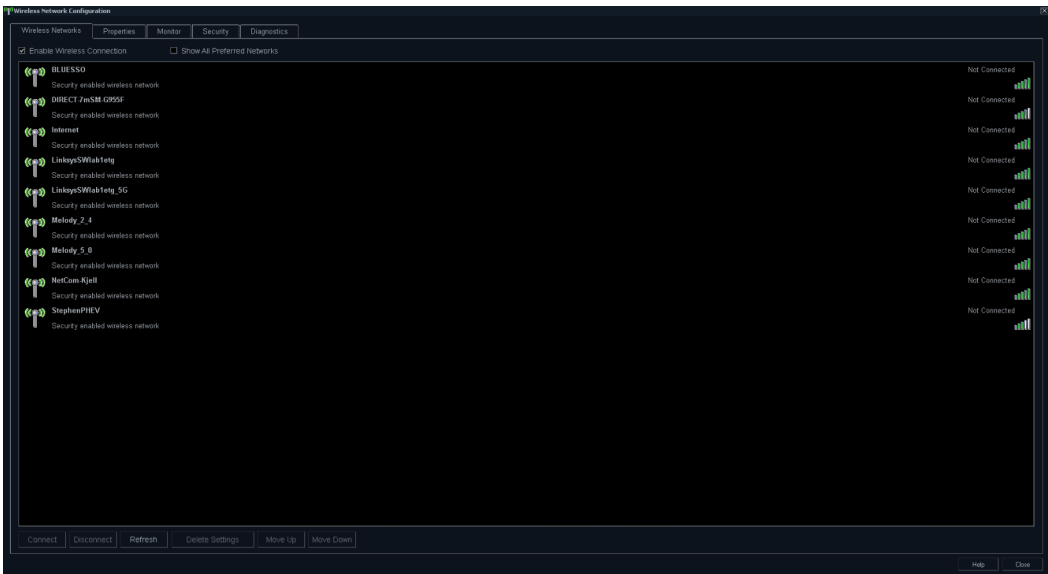


Figure 3-33 Wireless Settings Main Screen

- 6.) Either double-click or select the network you want to connect to, and press the **Connect** button. If this is the first time you attempt to connect to the network, a dialog will pop up on screen asking you to configure the network setting - See [Figure 3-34](#).

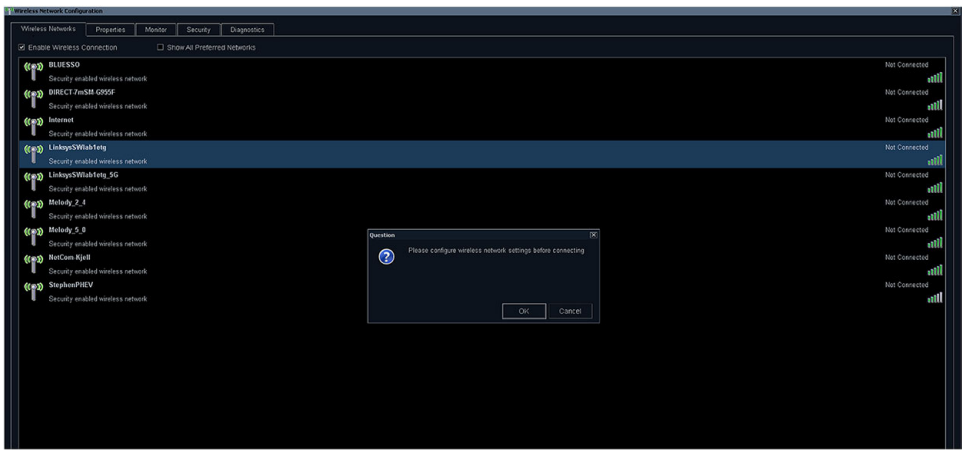
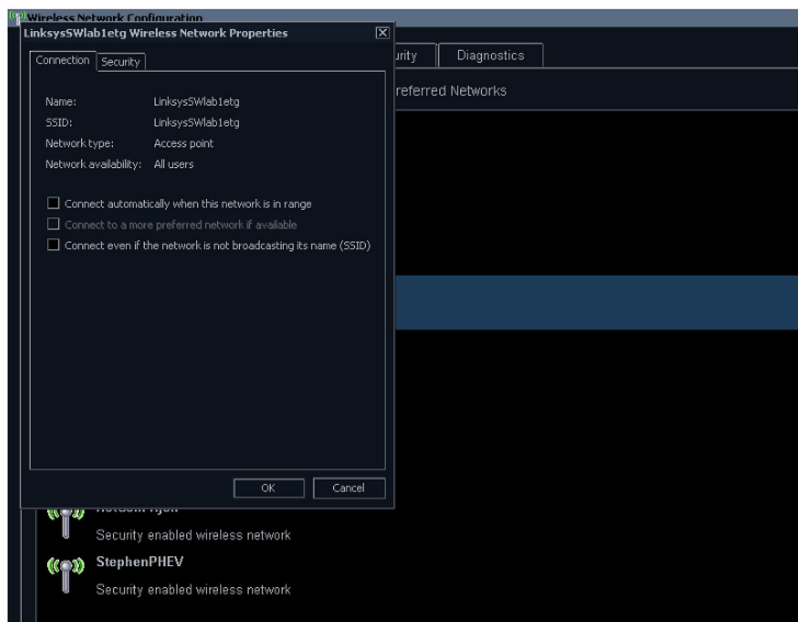


Figure 3-34 First Time Connection Dialog

**3-9-6-7 Configuring the Wireless Network Adapter (cont'd)**

- 7.) Press **OK** in the dialog window.  
A new window for setting up your connection will open - See [Figure 3-35](#).

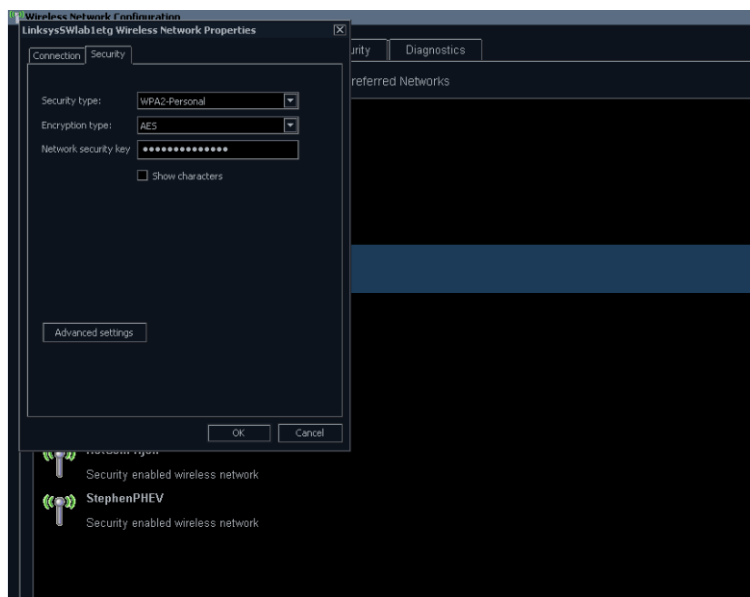


**Figure 3-35 Network Settings Window - Connection**

- 8.) Select check-boxes according to preference.  
If the **Connect automatically when this network is in range** setting is selected, then this network will auto-connect when available, without needing to enter the **Wireless Settings** page.

**3-9-6-7 Configuring the Wireless Network Adapter (cont'd)**

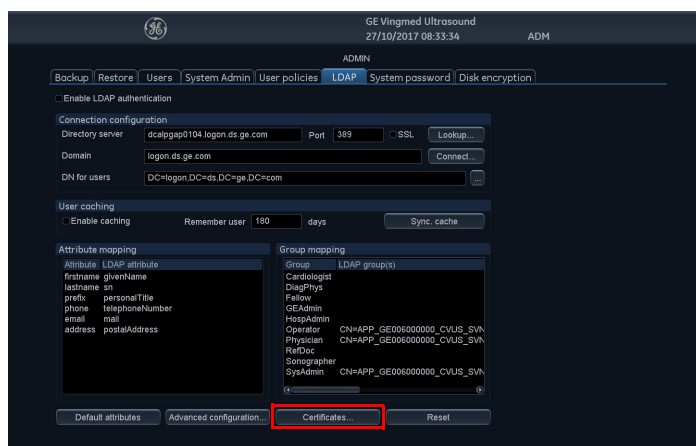
9.) Setup security options in the **Security** tab of connection setup dialog - See [Figure 3-36](#).



**Figure 3-36 Network Settings Window - Security**

10.) If the wireless network is to be configured for WPA/WPA2 Enterprise and a customer specific certificate is to be installed on the system, this can be done by use of the certificate dialog available from the LDAP config page.

a.) First go to LDAP config, see [Figure 3-37](#).

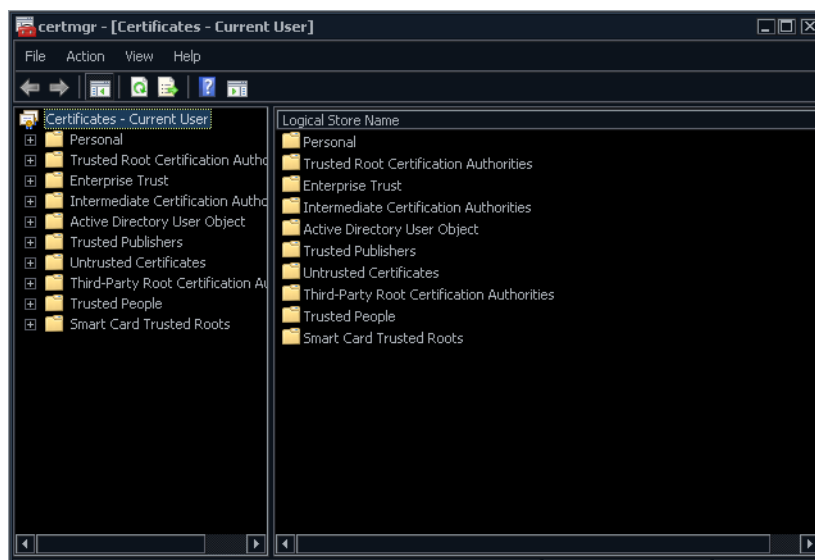


**Figure 3-37 LDAP config screen**

**3-9-6-7 Configuring the Wireless Network Adapter (cont'd)**

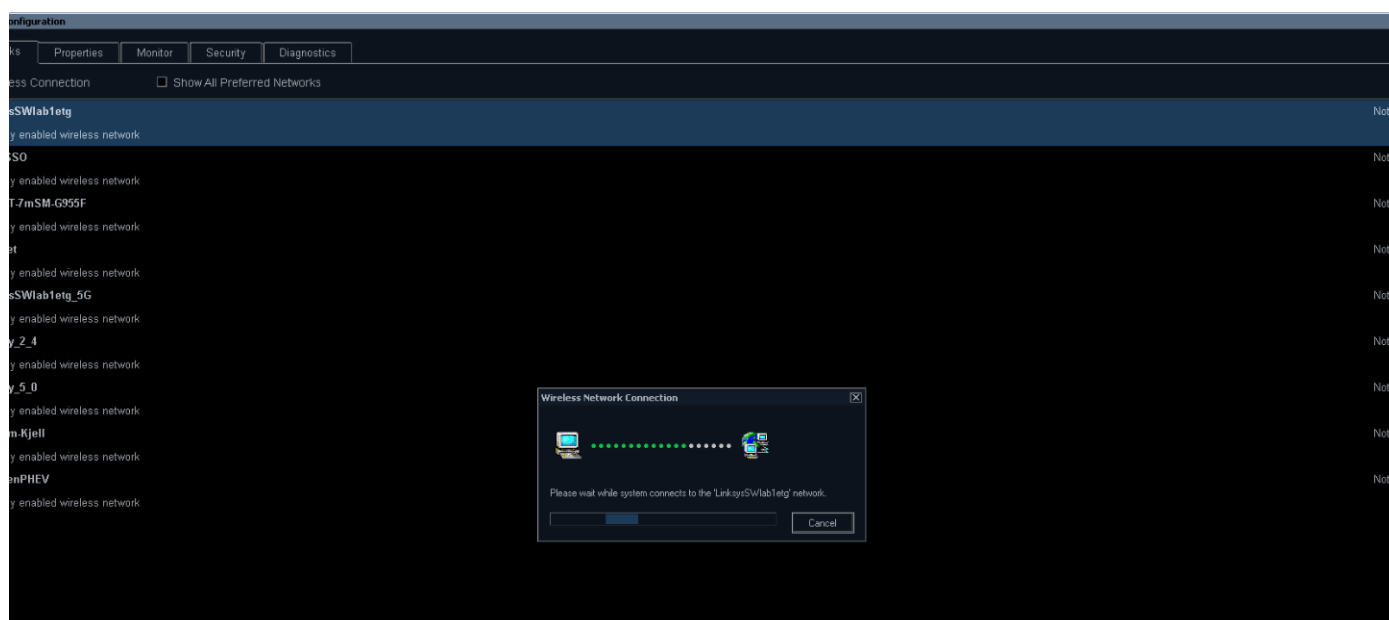
- b.) Then click on the **Certificates...** button to open the Certificate dialog, see [Figure 3-38](#). This dialog is a standard Windows 7 Certificate Manager dialog.

**NOTE:** To add a certificate from a USB memory stick, a Service dongle must be inserted.



**Figure 3-38 Certificate dialog**

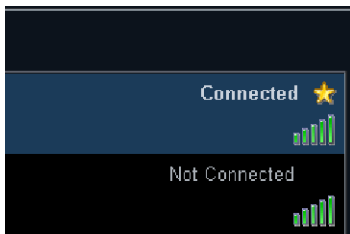
- 11.) After you have finished setting up your connection press **OK**. The system will then try to establish a connection to your network. A dialog will be shown on screen while this is in progress - See [Figure 3-39](#).



**Figure 3-39 Connecting To Network Dialog**

**3-9-6-7 Configuring the Wireless Network Adapter** (cont'd)

- 12.) Once a connection has been established you will see the status **Connected** in the **Wireless Settings** page, next to the network you have connected to.  
All network connections that are configured will also be displayed with a star icon, see [Figure 3-40](#).



**Figure 3-40 Connection Established**

**NOTE:** Whenever connection to a new/different wireless network is required, it will be necessary to repeat all procedure steps above.



### 3-9-6-8 Wireless settings - Other Options

#### 3-9-6-8-1 Reconfigure already configured network

To reconfigure an already configured network you can delete the configuration and reconfigure according to [3-9-6-7 "Configuring the Wireless Network Adapter" on page 3-57](#). To delete configuration for a network, select the network in the list and press the **Delete Settings** button - see [Figure 3-41](#).

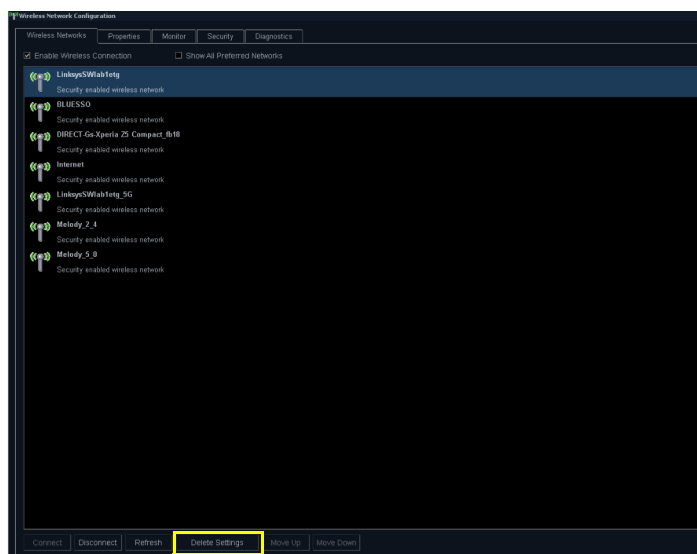


Figure 3-41 Delete Network Settings

It is also possible to edit the configuration for a network without deleting your settings. All configured networks are listed in the **Security** tab in the **Wireless Settings** window. Select the network for which you want to edit configuration and press **Customize** button - See [Figure 3-42](#).

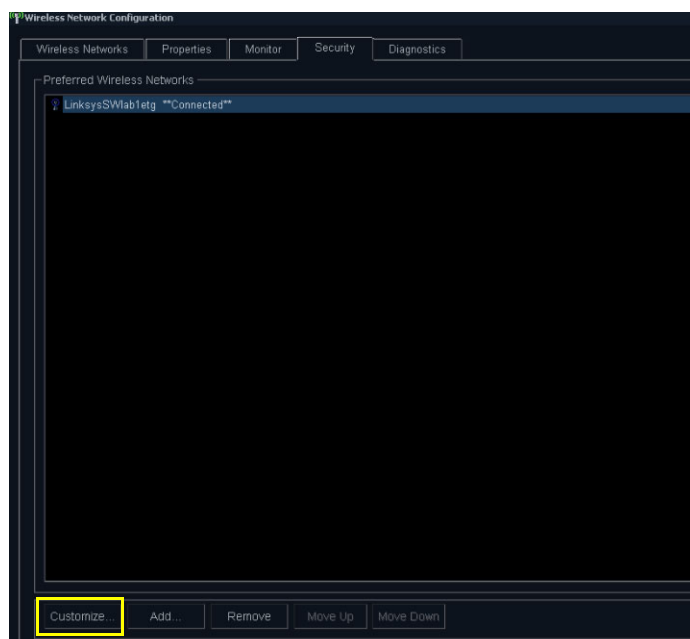


Figure 3-42 Customize Network Settings

3-9-6-8

Wireless settings - Other Options (cont'd)

The window shown in [Figure 3-43](#) and [Figure 3-44](#) will open and you can edit your previously stored settings.

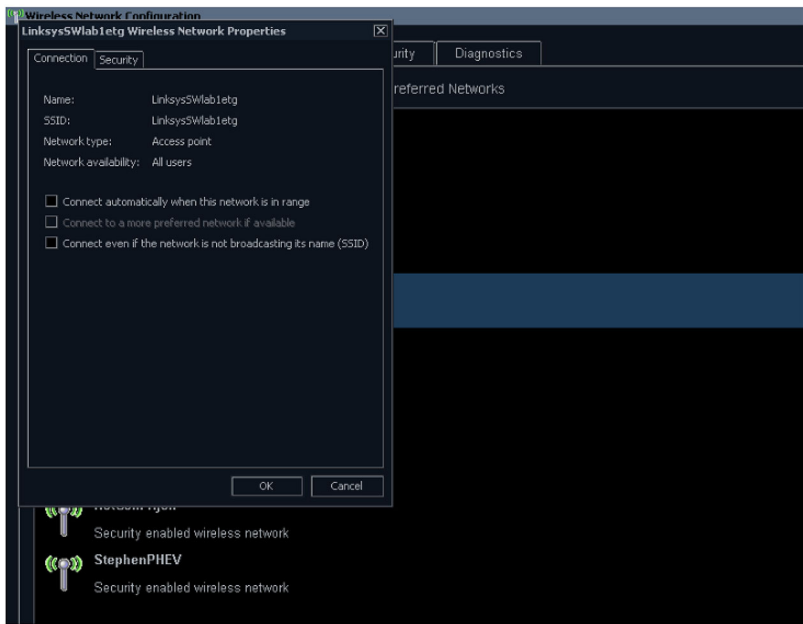


Figure 3-43 Network Settings Window - Connection

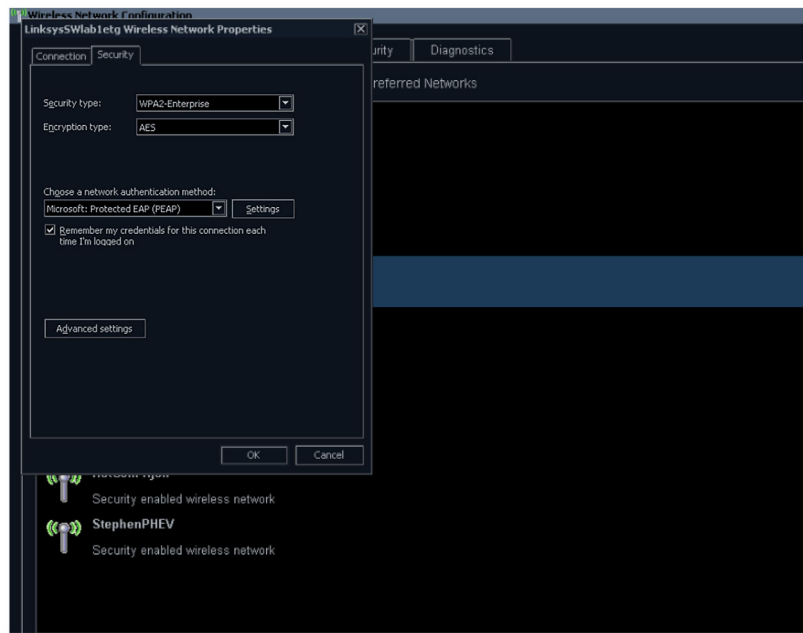


Figure 3-44 Network Settings Window - Security

### 3-9-6-9 Properties

The **Properties** tab shows some basic status information, including connection status, IP address, connected network etc. It is also possible to view all available networks and some signal information for them by pressing **Available Channels...** button, see [Figure 3-45](#).

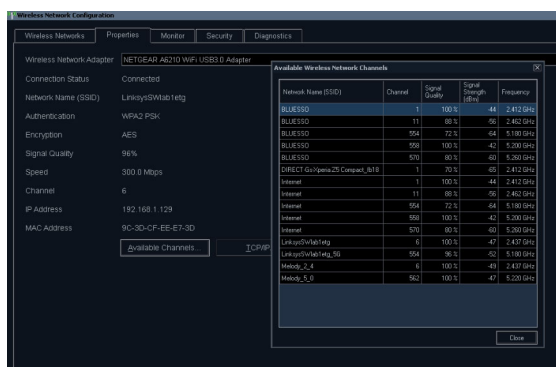


Figure 3-45 Properties Window - Available Channels

### 3-9-6-10 Monitor

The **Monitor** tab shows an error log, see [Figure 3-46](#).

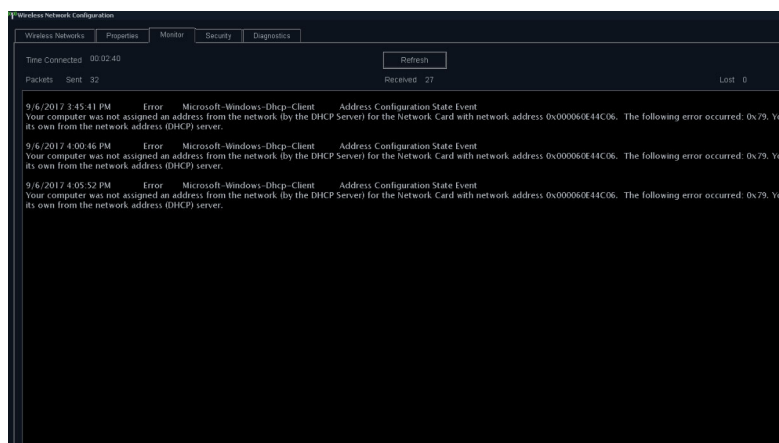


Figure 3-46 Monitor Window - Error Log

3-9-6-11     **Diagnostics**

The **Diagnostics** tab lets you run a test to check if your connection is working correctly, see [Figure 3-47](#).

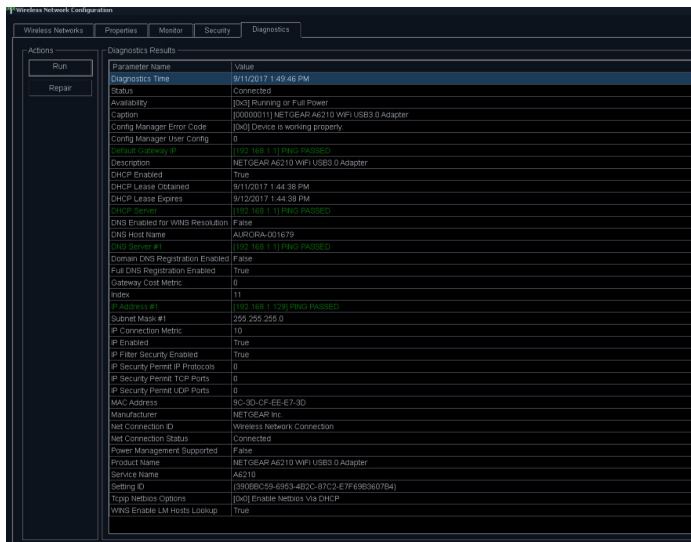


Figure 3-47     Diagnostic Window

---

**3-9-7      Installation and set up of the View-X function**

Installation of the View-X function is described in the “Epiphan DVI Broadcaster Installation Manual”,  
Direction Number: GC294481.

## 3-9-8 CARTO interface installation overview

### 3-9-8-1 HW overview

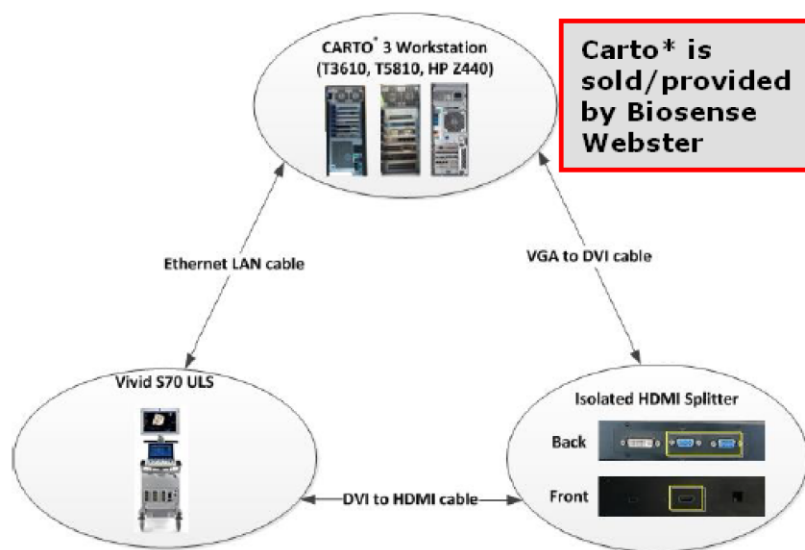
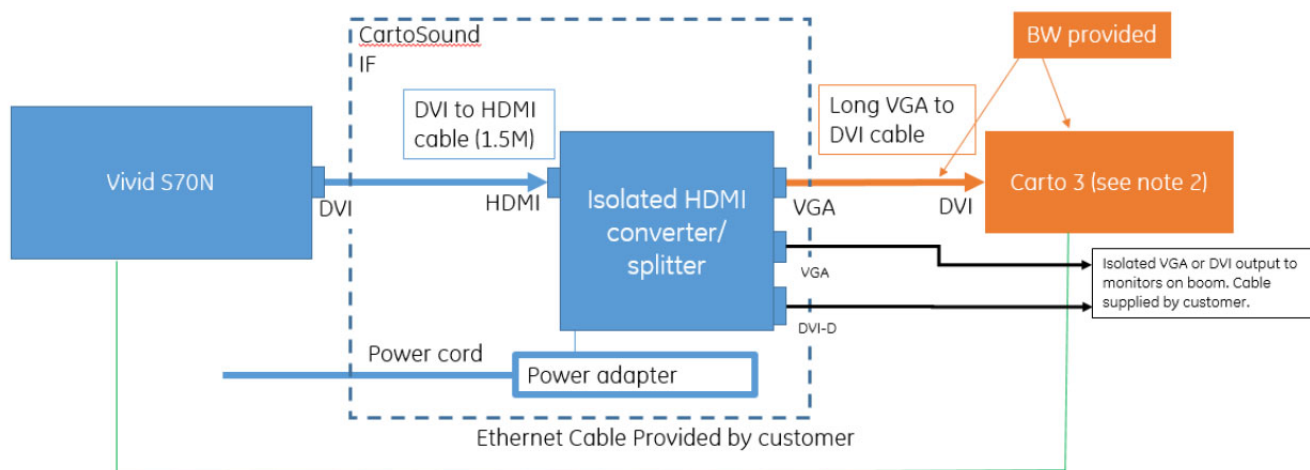


Figure 3-48 CARTO overview



#### Color Description:

- Blue items: Provided by GE
- Orange items: Provided by Biosense Webster
- Green Ethernet Cable: Provided by Customer

#### Included in the CartoSound IF kit:

- Isolated HDMI converter/splitter
- DVI to HDMI cable
- Power Adapter and Power Cord

Figure 3-49 Carto Connection diagram

- NOTE:**
1. The long VGA cable that connects isolated HDMI converter/splitter to the Carto 3 system is supplied by Biosense Webster.
  2. Vivid S60N/S70N is compatible with only Carto 3 v6.0.60.70 or above.

## 3-9-8-2 HDMI video splitter connector overview

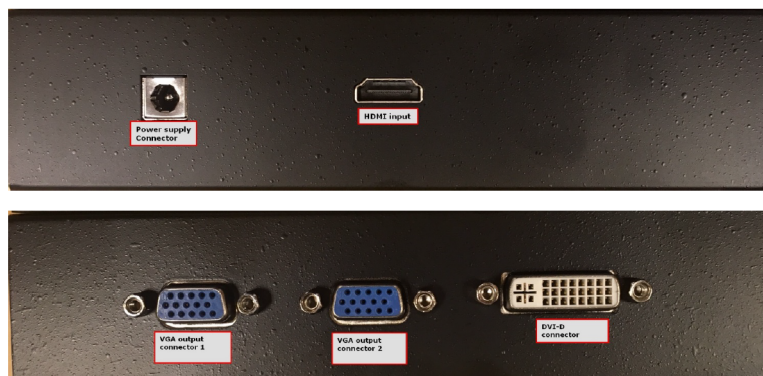


Figure 3-50 HDMI video splitter connector overview

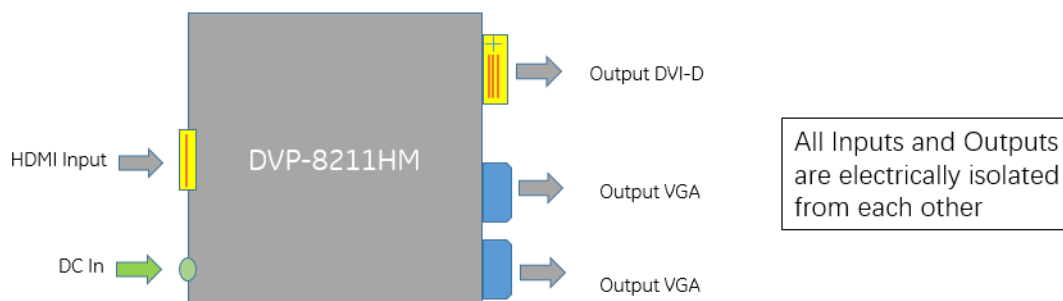


**WARNING** *Advantech HDMI splitter Model number DVP-8211HM is the only splitter that is approved with Vivid S60N/S70N.*

## 3-9-8-3 Isolated HDMI converter/splitter overview

## Isolated HDMI converter/splitter overview

## Product Diagram



## Product Photo



Figure 3-51 Isolated HDMI converter/splitter overview

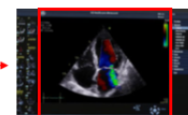
## 3-9-8-4 Video input formats

## Specifications

Model	DVP-8211HM Isolated HDMI Splitter
Description	HDMI to VGA and DVI-D Down Converter
Feature	<ul style="list-style-type: none"> <li>➤ Wall mounting plate supported</li> <li>➤ Auto source format detection</li> <li>➤ Dual converted VGA output</li> </ul>
Input Interface	HDMI x 1
Output Interface	VGA x 2 / DVI-D x 1
Supported Video Input Format	<b>HDMI</b> 1920×1080p@60/50fps → Vivid provides 1920 x 1080 1920×1080p@30/25/24fps 1920×1080i@60/50fps 1280×720p@60/50fps 1280×1024p@60fps 1280×960p@60fps 1024×768p@60fps 800×600p@60fps 640×480p@60fps 720×480p@60fps 720×576p@50fps 720×480i@60fps 720×576i@50fps

## 3-9-8-5 Video Output Formats

Supported Video Output Format	<b>DVI-D:</b> 1920×1080p@60/50fps → Digital Output follows the HDMI Input 1920×1080p@30/25/24fps → S60/S70/S60N/S70N 1920×1080i@60/50fps 1280×720p@60/50fps 1280×1024p@60fps 1280×960p@60fps 1024×768p@60fps 800×600p@60fps 640×480p@60fps 720×480p@60fps 720×576p@50fps 720×480i@60fps 720×576i@50fps  <b>VGA</b> 800×600p@60fps (Cut the 1440*1080 center area from the input, and re-scale to 800*600) ①
Plug & Play	Support
Power Input	12V, 5A



Scale image area down for **analogue video devices**, incl. Carto

① For input formats <1920x1080: center parts is cut and scaled to 800x600 (but is not fitting Carto)  
For input format 800x600: No cutting and scaling

- **Digital video Output** has always the same resolution like the HDMI input.
- Both **Analogue video Outputs** have always the resolution 800x600.



### 3-9-8-6 Optional Monitor Connection

An additional optional monitor can be connected to the Isolated HDMI converter/splitter while being connected to Carto:

- Monitors with DVI connection
  - DVI-D input
  - Monitor resolution: requirement: 1920x1080 or higher
- Monitors with Analogue VGA connection
  - Monitor must support resolution of 800x600

### 3-9-9 Verifying/Installing SW option keys

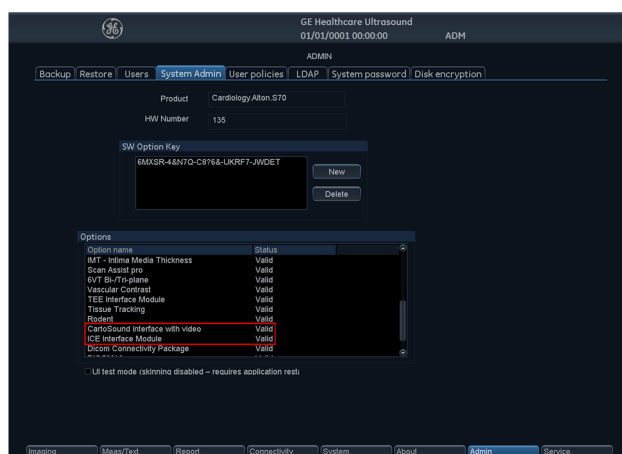


Figure 3-52 Verifying/Installing SW option keys

From the Admin/System Admin menu, verify that the following two options has been added:

- 1.) CartoSound Interface with video
- 2.) ICE Interface Module

If the SW options listed above is not shown, then the SW option keys located in the kit or provided by email must be added by selecting **New** from the SW option menu.

#### 3-9-9-1 Setup

- 1.) Connect AC power to the Isolated HDMI converter/splitter
- 2.) Use the DVI to HDMI cable (1.5 m, 5 ft) that is delivered with the J&J Carto U/S kit (customer supplied), connect the VGA connector to the Vivid S60N/70N to the Isolated HDMI converter/splitter.
- 3.) Use the customer/BW supplied long video cable found in the J&J Carto U/S kit (one port VGA, the other DVI-I), connect the Isolated HDMI converter/splitter to the Carto system (U/S video port)
- 4.) Use an Ethernet cable to connect Vivid S60N/70N to the Carto system (U/S Ethernet port)

**3-9-9-2 Scanning**

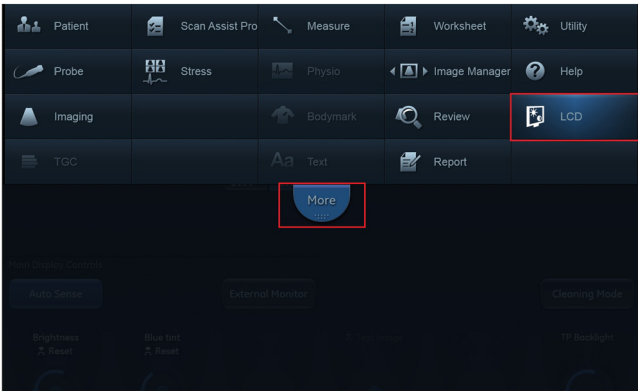
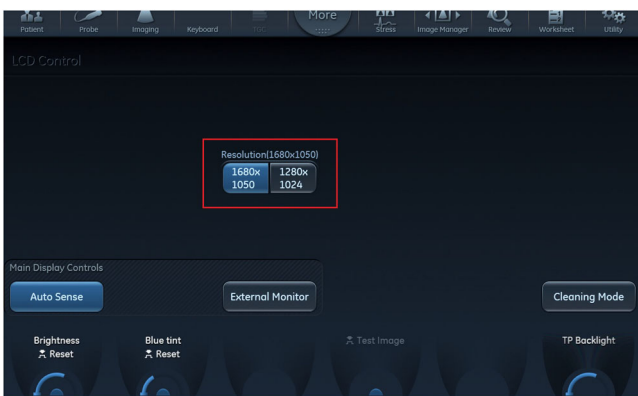
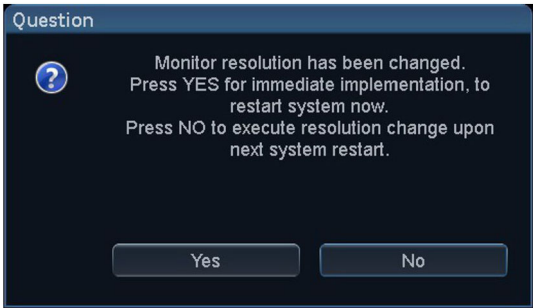
- 1.) Start the ultrasound system.
- 2.) Ensure the ICE Probe Interface Module and the CartoSound interface options are enabled.
- 3.) Connect the ICECord-RS to the ultrasound system.
- 4.) Connect the ICE catheter to the ICECord-RS and to the Carto system.
- 5.) Select on the ultrasound system the Preset "Carto" to see the ICE image on the ultrasound system.
- 6.) On the ultrasound system, select "CartoSound" from the Touch panel - Shortcut bar - More - Utility.
- 7.) Go back to the scanning screen, now the ultrasound system is ready to work with Carto.

### 3-9-10 External Monitor Output Resolution Adjustment

To adjust the external video output for lower resolution monitor, perform the following steps:

**NOTE:** Changing the output resolution will change the resolution of the main screen as well.

**Table 3-18 Adjusting Screen Resolution**

Step	Description	Illustration
1	On the touch panel, press <b>More</b> to expand the options list and then press <b>LCD</b> .	
2	On the <b>LCD Control</b> screen, select one of the available resolutions.	
3	Click <b>Yes</b> to confirm the selection.	
4	Restart the Ultrasound System to implement the performed changes.	

## Section 3-10

### Paperwork After Setup

**NOTE:** During and after setup, the documentation (i.e. storage media with documentation, User Manuals, Installation Manuals, etc.) for the ultrasound system 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.

#### 3-10-1 Installation Acceptance Test Criteria

A Vivid™ S60N/Vivid™ S70N is ready for use after the system has been configured successfully in accordance with the information provided in [Chapter 3 - System Setup](#) (this chapter).

#### 3-10-2 User's Manual(s)

Check that the correct User Manual(s) or storage media with User Manuals, per software (SW) revision and language, for the system is included.

#### 3-10-3 Product Locator Installation Card

**NOTE:** The Product Locator Installation Card shown may not be the same as the provided Product Locator card. From the factory, a sheet with five Product Locator cards for transportation and one for Installation are included.



		GE Medical Systems Product Locator File P.O. Box 414 Milwaukee, WI 53201-0414		GEMS-E Product Locator Administration BP 34 78533 Buc Cedex, FRANCE		Yokogawa Medical Systems Ltd. GEMSA Service Administration 4-7-127 Asahigaoka Hino-shi Tokyo 191, JAPAN	
DESCRIPTION	FDA	MODEL	REV	SERIAL			
<b>SHIPMENT</b>		OCP	BS	ORD			
		DISTRICT	CUSTOMER NO.		DATE (MO-DA-YR)		
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					
		GE Medical Systems Product Locator File P.O. Box 414 Milwaukee, WI 53201-0414		GEMS-E Product Locator Administration BP 34 78533 Buc Cedex, FRANCE		Yokogawa Medical Systems Ltd. GEMSA Service Administration 4-7-127 Asahigaoka Hino-shi Tokyo 191, JAPAN	
DESCRIPTION	FDA	MODEL	REV	SERIAL			
SYSTEM I.D.	OCP	BS	ORD	EMPLOYEE NO.			
	DISTRICT	ROOM		DATE (MO-DA-YR)			
<b>INSTALLATION</b>		CUSTOMER NO.					
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					

Figure 3-53 Product Locator Installation Card (Example)

# Chapter 4

## General Procedures and Functional Checks

### Section 4-1 Overview

#### 4-1-1 Purpose of Chapter 4

This chapter includes the General Procedures, and the Functional Checks.

General Procedures is a collection of commonly-used procedures that are available by cross references from other parts of this manual.

Functional Checks is a collection of procedures for quickly checking major functions of the ultrasound system and diagnostic instructions using the built-in service software. These checks can be a great asset in determining whether the ultrasound system is working as it should.

**Table 4-1 Contents in Chapter 4**


Section	Description	Page Number
4-2	General Procedures	4-2
4-3	Functional Checks	4-19

#### 4-1-2 Special Equipment Required


- ECG Pads
- ECG Harness:
  - CABLE ECG MARQ. AHA/AMERICA, P/N:164L0025
  - LEADWIRES ECG MARQ. AHA/AMERICA, P/N: 164L0027or
  - CABLE ECG MARQ. IEC/EU+AS, P/N:164L0026
  - LEADWIRES ECG MARQ. IEC/EU+AS, P/N:164L0028
- At least one probe (ideally you should check all the site probes used by the system.)

## Section 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 Vivid S60N/Vivid S70N.

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.

#### 4-2-1 Overview

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

## 4-2-2 Power On-Off

### 4-2-2-1 Power ON/Boot-up

#### 4-2-2-1-1 Warnings

**DANGER**

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

**DANGER**

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

**DANGER**

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

**CAUTION**

**THE ULTRASOUND SYSTEM REQUIRES ALL COVERS.**

**OPERATE THIS UNIT ONLY WHEN ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. THE COVERS ARE REQUIRED FOR SAFE OPERATION, GOOD SYSTEM PERFORMANCE AND COOLING PURPOSES.**

**CAUTION**

**USE ONLY POWER SUPPLY CORDS, CABLES AND PLUGS PROVIDED BY OR DESIGNATED BY GE.**

**NOTE:**

*When turning on a system from standby mode, it takes a few seconds before it responds. Do not push the On/off button again during this period. A second push will initiate a full shutdown. Do not cycle the Power ON/OFF switch ON-OFF-ON in less than five (5) seconds. When turning OFF the Power ON/OFF switch, the Ultrasound system should de-energize completely before turning the switch ON.*

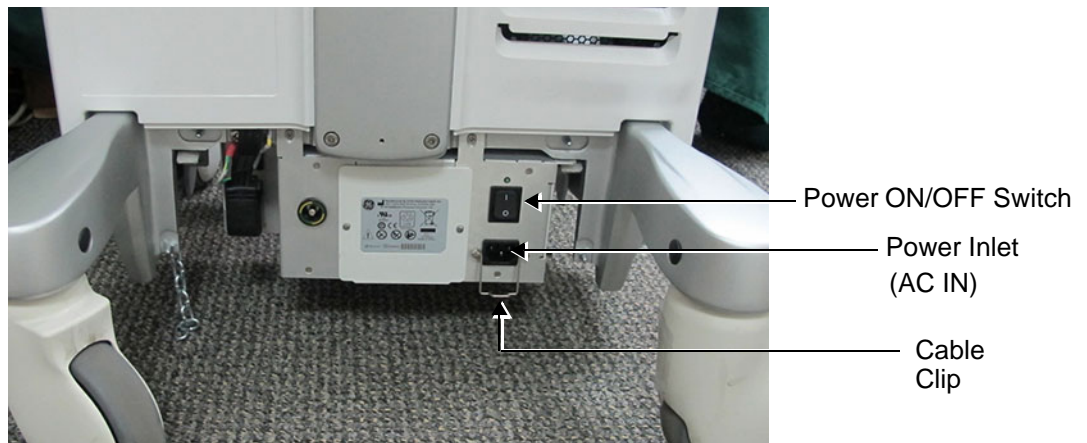
**NOTE:**

*Before performing Power ON or system reboot, disconnect any USB mass storage device from the system (unless a Software Installation procedure is required and the appropriate software installation storage device is connected).*

#### 4-2-2-1-2 Connecting AC (Mains) Power to the Ultrasound System

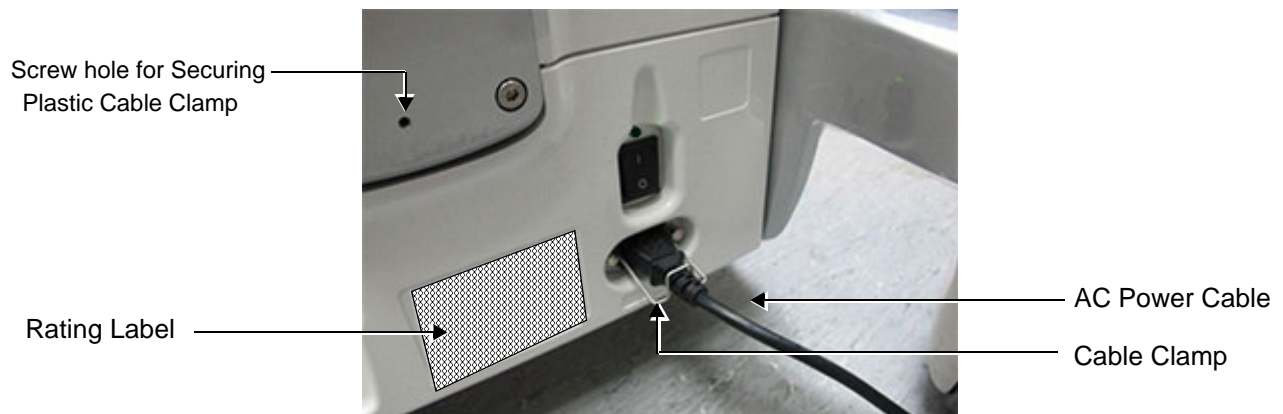
Connecting the ultrasound system involves preliminary checks of the power cord, voltage level and compliance with electrical safety requirements.

- 1) Ensure that the wall outlet is of appropriate type, and that the Power ON/OFF switch 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 on the rear of the Vivid S60N/Vivid S70N ultrasound scanner.



**Figure 4-1 Power ON/OFF Switch and Power (AC IN) Socket - Rear Panel**

- 5) Ensure that the wall outlet is of the appropriate type, and that the AC Power ON/OFF switch on the scanner rear panel is turned OFF. (If necessary, switch it to the OFF position).
- 6.) Connect the AC Power Cable female plug to the Power Inlet (AC IN) at the rear of the unit - see [Figure 4-1](#). Use the cable clip to secure the cable firmly in the socket ([Figure 4-2](#)).



**Figure 4-2 AC Power Cable Connected - Rear Panel**

**Note:** In the next step, it is necessary to screw the plastic cable clamp (into the hole provided in the support column - centrally located at the rear of the system, see [Figure 4-2](#)). Then, to route the Mains Power cable upwards and through the clamp, and secure the clamp in position to prevent the cable from dangling down and becoming caught in the wheels when moving the scanner.

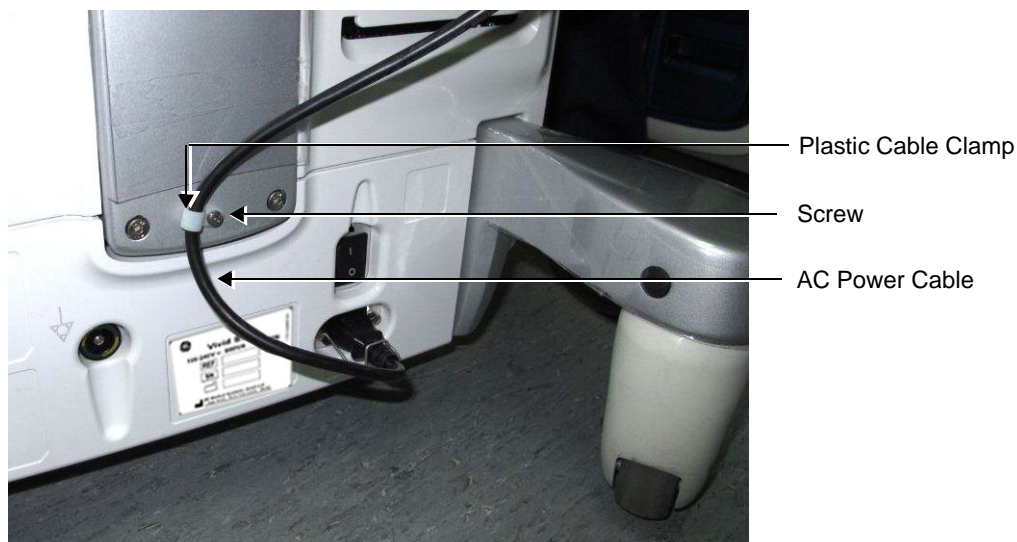


7.) Proceed as follows:

- a.) Loosen the screw to open the plastic cable clamp (see [Figure 4-3](#)).
- b.) Route the AC power cable *upwards* and through the clamp.
- c.) Screw the plastic cable clamp into position on the support column (see below), carefully tightening the screw sufficiently to secure the cable firmly in the clamp.  
***Take care not to over-tighten the screw, or damage the cable!***



Plastic Cable Clamp  
and Screw



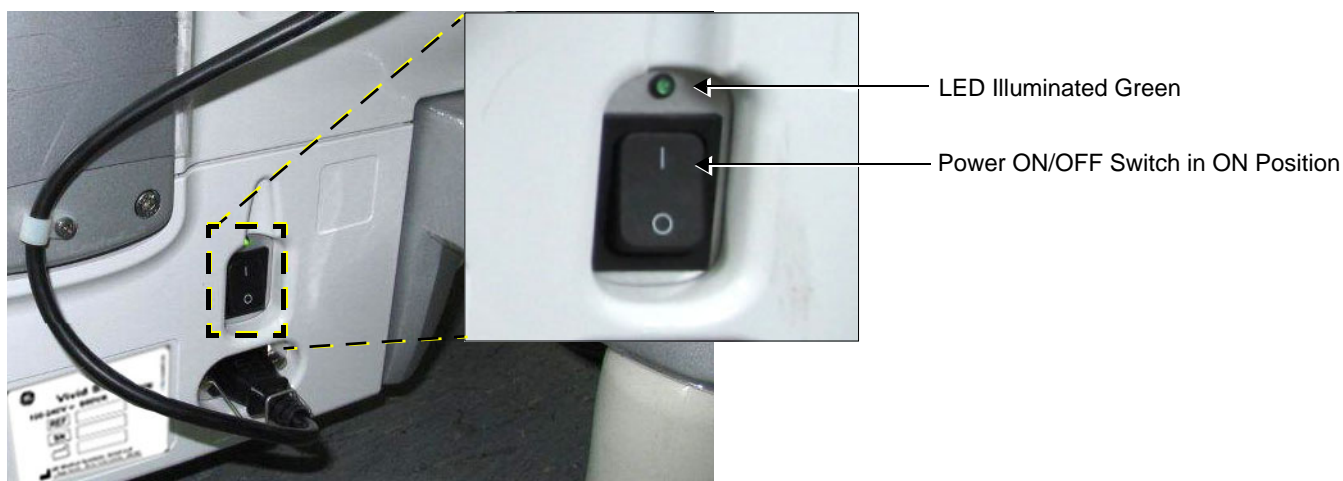
**Figure 4-3 AC Power Cable Secured with Plastic Cable Clamp**

- 8.) Connect the other end of the AC Power Cable (male plug) to a hospital-grade mains power outlet with the proper rated voltage.

*The unit is ready for Power/ON/Boot Up.*

#### 4-2-2-1-3 Switch ON the AC Power to Vivid S60N/Vivid S70N

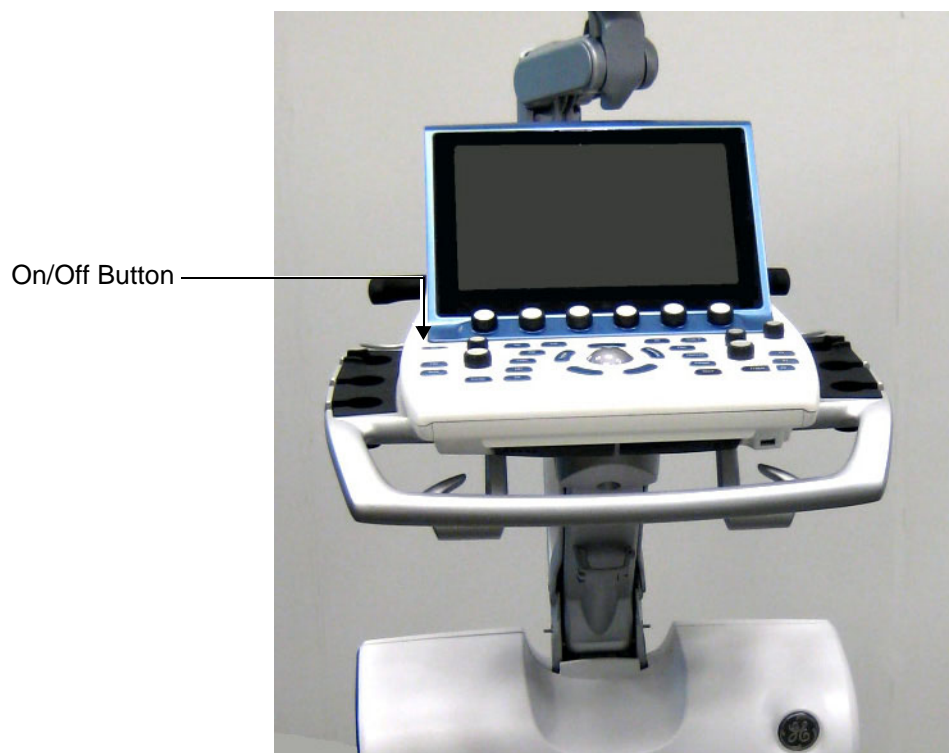
- 1) Turn ON the Power ON/OFF switch at the rear of the system.



**Figure 4-4 AC Power ON**

**NOTE:** The LED is illuminated green, indicating Power ON.  
You should hear a “click” from the relays in the AC Power and the unit is ready for Power ON/Boot Up.

- 2) Press once the **On/Off** button (Figure 4-5) on the control panel to boot up the unit.



**Figure 4-5 On/Off Button on Control Panel**

During normal boot-up, you may observe that:

- a.) The unit's ventilation fans start on full speed, but slow down after a few seconds (listen to the fan sound).
- b.) Power is distributed to the peripherals, Operating Panel (control panel), Monitor, Front-End Processor and Back-End Processor.
- c.) The Back-End Processor and the rest of the scanner starts with the sequence listed in the next steps:
  - 1.) Back-End Processor is turned ON and starts to load the software.
  - 2.) *This step applies for software v203:*

A Warning dialog will be displayed if the patient data on the HDD is not encrypted:



**Figure 4-6 Warning - Disk encryption is not enabled**

It is the Customer's responsibility to decide if encryption should be turned on. If the check box is checked, a new warning will be displayed in three months.

For now, just select OK without checking the check box. (The dialog will be displayed next time the system is turned on.)

- 3.) The Start Screen is displayed on the monitor.
- 4.) A start-up progress bar indicating the time used for software loading, is displayed.
- 5.) The software initiates and sets up the Front-End electronics and the rest of the scanner.
- 6.) The Keyboard backlight illuminates.
- 7.) As soon as the software has been loaded, either a 2D screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

**NOTE:** *Total time used for start-up is typically 1.5 minutes or less. If starting after a power loss or a lock-up, the start-up time may be up to 4 minutes.*

#### 4-2-2-2 Power Shut Down

When switching the unit OFF, the system performs an automatic shutdown sequence.

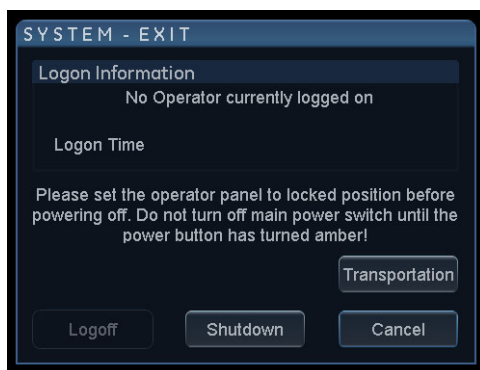


Figure 4-1. Exit Dialog Window

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

- **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 greyed out, 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.  
If the Shutdown button is greyed out, use the key-combination <Ctrl+Alt+R> to shut down the unit.
- **Cancel**  
Use this button to exit from the System-Exit menu and return to the previous operation.

## 4-2-3 Logging On to the Vivid S60N/Vivid S70N as “ADM”

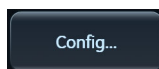
### 4-2-3-1 Introduction

When you need to log on to Vivid S60N/Vivid S70N, you may either use the Touch Screen, or the alphanumeric keyboard.

### 4-2-3-2 Select Config via the Touch Screen

1) Select **Utility**. 

2) Then select **Config...**



This will bring up the **Operator Login** dialog where you can log on to Vivid S60N/Vivid S70N.

### 4-2-3-3 The Operator Login dialog

The first time someone log in to Vivid S60N/Vivid S70N, the Operator field will be blank.

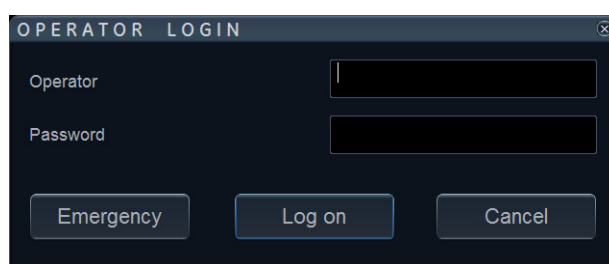


Figure 4-7 Operator Login

As default, two users are defined on Vivid S60N/Vivid S70N; USR and ADM.

- If you log on as **USR**, you will have access to do setup tasks that a user may need to do during daily use.  
*Example:* To select a printer.  
As default, no password has been set for **USR**. Just type the name **USR** and select **Login**.
- If you log on as **ADM**, you will have access to do general setup and service adjustments on Vivid S60N/Vivid S70N.  
*Example:* Adjust network and connectivity settings.

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

The **Emergency** button stores data for the duration of the current examination only.

The **Cancel** button is used to cancel the login.

#### 4-2-3-4 To Log On as ADM

Follow these steps to log on as ADM:

- 1) Select (or type) the name **ADM** in the Operator field.
- 2) Type the current password.

If this is the first time the Vivid S60N/Vivid S70N is turned on, the **Imaging and Analysis - Global Level** window will be displayed. If another screen was displayed earlier, before logging out, or turning unit OFF, that screen will be displayed.

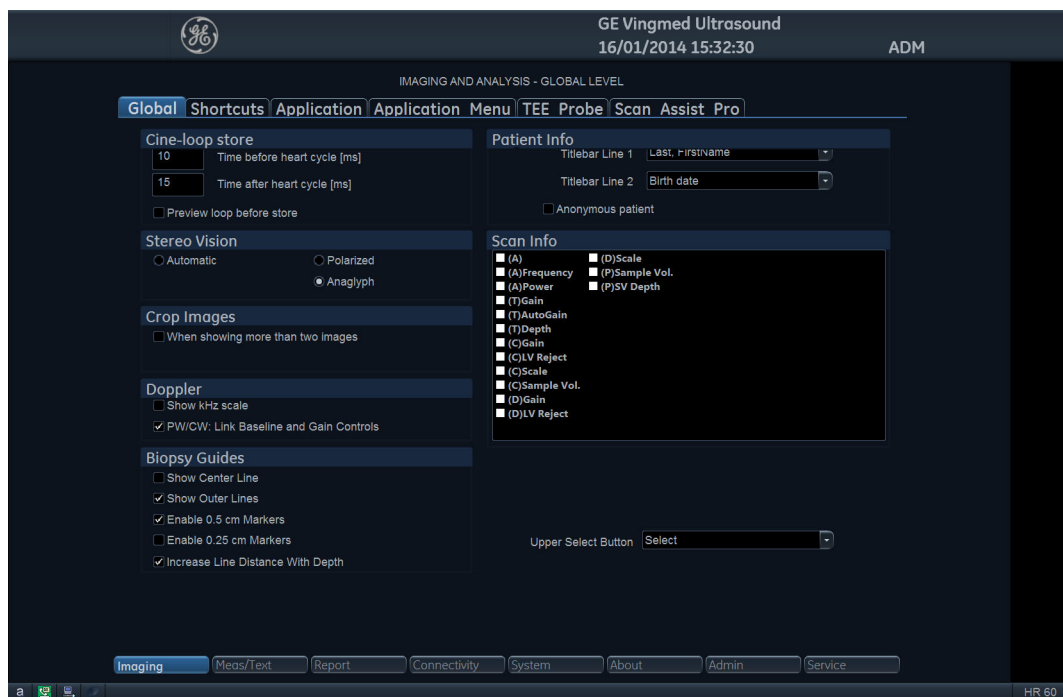


Figure 4-8 Imaging and Analysis - Global Level Window

#### 4-2-4 Install the On-board User Manuals

Starting from the release of software v202, the on-board user manuals must be loaded at installation of the system at the customer, and/or after a software reload or update.

Follow these steps to install the on-board user manuals:

- 1.) Restart the ultrasound system.
- 2.) When the Windows logo appears, insert the User Manuals UFD.  
The Start Application screen appears.
- 3.) Select **Install SW**.
- 4.) Follow the on-screen instructions to install the on-board user manuals.
- 5.) After the installation, restart the system and verify that the on-board user manual can be displayed.

## 4-2-5 Changing Passwords

### 4-2-5-1 Changing the Password for the User ADM

Follow these steps to change the password for the user ADM (administrator):

- 1.) Press **Utility/Config** on the Touch panel and log on as ADM.
- 2.) Select the **Admin** category and **Users** subgroup.

The *Users* sheet is displayed.

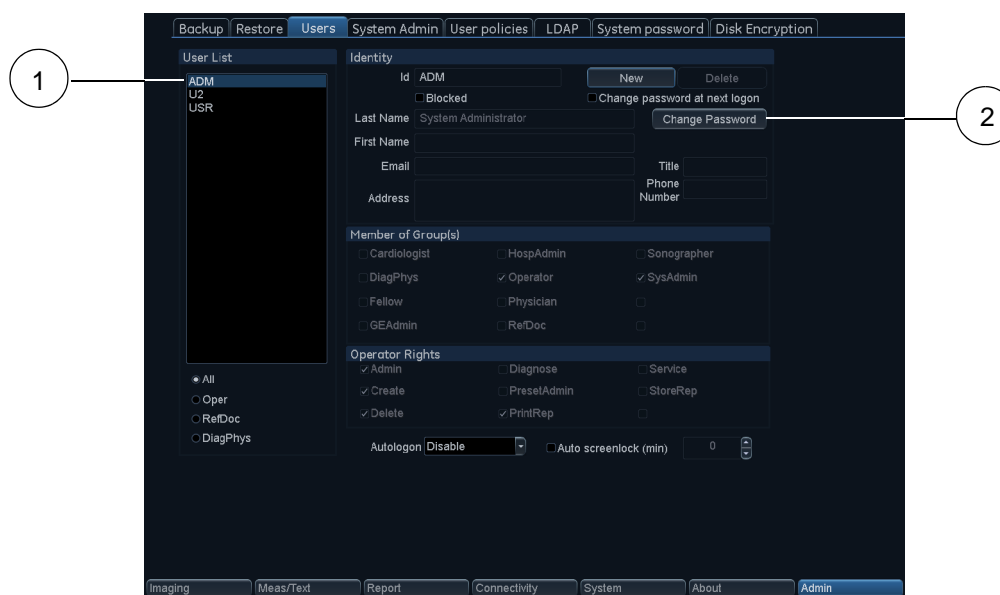


Figure 4-9 The Users sheet

- 3.) Select the user **ADM** (1) in the **User List**.
- 4.) Select **Change Password** (2).

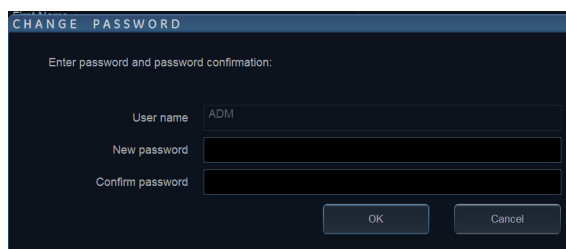


Figure 4-10 Change Password dialog

- 5.) Type the new password in the **New password** field and re-type it in the **Confirm password** field.
- 6.) Select **OK** to confirm the change.

### 4-2-5-2 Changing the UEFI Password

For instructions, see: [4-2-6-2 "UEFI password" on page 4-12.](#)



## 4-2-6 Security setup

### 4-2-6-1 Introduction

Privacy and security capabilities of Vivid S60N/Vivid S70N with software v203 is described in the Privacy and Security Manual Vivid™ Ultrasound System and EchoPAC™, Direction Number GC092763-1EN.

For Vivid S60N/Vivid S70N with software version v201 and v202, see: Privacy and Security Manual - Vivid™ Ultrasound System, Direction Number DOC1559925.

### 4-2-6-2 UEFI password

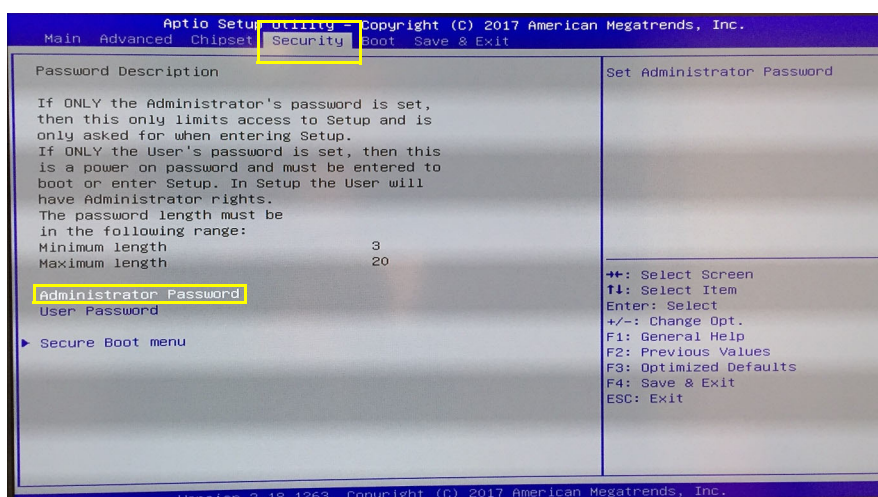
The Vivid system hardware has a UEFI (Unified Extensible Firmware Interface) module that do system initialization at power on. The UEFI also controls the booting process and how the operating system of the Vivid system starts.

The UEFI module on modern Vivid systems has replaced the BIOS (Basic Input / Output System) module on older Vivid systems. The UEFI on modern systems is sometimes still, incorrectly, referred to as the “BIOS”.

At install time, the customer shall be given the option for setting a new UEFI password. It is the customers responsibility to keep this password safe and secure, and to provide the password to Service when needed. GE Service shall not maintain the new customer selected password.

When a customer defined password is set, the customer can repeat this procedure multiple times to change the password when desired.

- 1.) Power down the ultrasound system.
- 2.) Power on the ultrasound system.
- 3.) Press <DEL> key during the system startup to go to the UEFI configuration.
- 4.) Enter the current UEFI password to get access to UEFI configuration.
- 5.) Use arrow keys to select the “Security” page.



**Figure 4-11 Security tab**

- 6.) Select “Administrator Password”.



**4-2-6-2 UEFI password (cont'd)**

7.) Enter the current UEFI password and the new customer selected UEFI password.

**NOTE:** *Contact GE's (or dealer's) technical support for the default password, delivered from the manufacturer.  
If the customer already has changed the password, it is the customer's responsibility to manage the password.*

8.) Press F4 to save the changes and exist from UEFI configuration.

**NOTE:** *Not changing the UEFI password will be to expose your Vivid system to a security risk. The default password is documented in service manuals and might get in the hands of adversary. With physical access to the Vivid system, adversary could jeopardize the clinical functionality and the security of the system. If the "Disk encryption" feature is not enabled (see below), adversary could also access to patient data on the system.*

**NOTE:** *The UEFI password is not needed for normal operations. But it's important to keep the password available when needed for service purposes. Without access to the UEFI password, it will not be possible to do a full re-installation of the software or to install new versions of the operating system when needed for system updates.  
If the UEFI password is lost, the recovery is to replace the UEFI module and related hardware.*

**NOTE:** *Changing any other parameters of the UEFI configuration will jeopardize the clinical functionality and the cyber security capabilities of the system.*

**4-2-6-3 Whitelisting**

The Vivid S60N/Vivid S70N system is protected by "application whitelisting". It is enabled from factory and cannot be changed or disabled. This protection will prevent installations and execution of any programs not being part of the system. Updates to the software of the system by GEHC approved installers is allowed.

**NOTE:** *Some configuration (e.g imaging) can not be kept between different software levels.*

**4-2-7 Data Management**

For information, refer to the latest revision of the *Vivid™ S60N/Vivid™ S70N User Manual*.

## 4-2-8 Deleting Patient Information (PHI)

**WARNING**

Before you dispose of the hard drive, or return the BEP to the local parts organization, make sure you remove ALL PATIENT DATA from the hard drive, given that the hard drive is still functional. In some countries, you may be required to delete all software from the disk before returning the hard drive to the parts warehouse. Follow your local policies.

Ensure that **All Patient Information** has been deleted before:

- shipping/returning the ultrasound system
- returning the Back End Processor to the local parts organization/parts warehouse
- you dispose of the hard drive

**GE employees:** Follow GE's procedures to complete Secure Wipe of Customer System Storage Media.

**Other users of this manual:** Contact GE Service for assistance to perform complete Secure Wipe of Customer System Storage Media.

## 4-2-9 LCD Monitor Position Adjustment

The LCD monitor position can be adjusted for easy viewing.



### CAUTION

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

### 4-2-9-1 To Unlock/Lock the LCD Monitor

#### 4-2-9-1-1 To Unlock and Move the LCD Monitor

- 1) Turn the release knob clockwise to unlock the LCD monitor- [Figure 4-13 \[3\]](#).  
*The LCD monitor can be moved freely in all directions.*
- 2) Hold the upper part of the LCD monitor to adjust the position of the monitor ([Figure 4-12](#)).

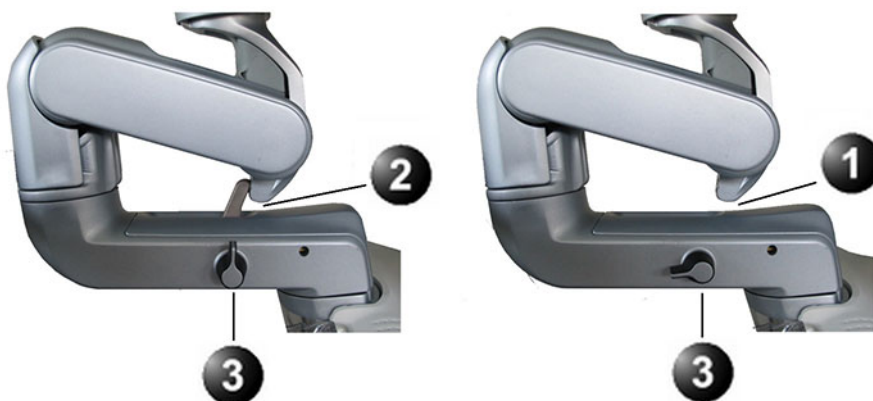


Figure 4-12 Positioning the LCD Monitor

**NOTE:** When lifting up the monitor from the folded-down state, you can hold the upper corner of the monitor.

#### 4-2-9-1-2 To Lock the LCD Monitor

- 1) Turn the release knob counter-clockwise to raise the lock.
- 2) Move the LCD monitor sideways to lock the arm's joints.
- 3) Push the monitor down into parked position.



1. Unlocked LCD monitor
2. Locked LCD monitor
3. Release knob

Figure 4-13 LCD Monitor Locking Mechanism

## 4-2-10 Moving and Transporting the Vivid S60N/Vivid S70N Ultrasound Scanner

### 4-2-10-1 The Casters (Wheels) Control

Both the front wheels and the rear right-side wheel are controlled by gray brake-pedals situated above each wheel.

The left-side rear wheel has a direction lock mechanism, also controlled by a pedal situated above the wheel.

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

### 4-2-10-2 To Prepare the Vivid S60N/Vivid S70N to be Moved

- 1) If not locked, move the keyboard console and LCD monitor to the park position.
- 2) Turn the system OFF, including the Power ON/OFF switch on the rear panel, and remove the plug from the wall.
- 3) Disconnect all cables linking the unit to any off-board peripheral devices and network.
- 4) Secure the unit's power cable.
- 5) Place all probes in the probe holder. Ensure that the probe cables do not protrude from the unit or interfere with the wheels.
- 6) Ensure that no loose items are left on the unit.
- 7) Fold down the monitor.
- 8) Unlock the brake.

#### Related information:

- [LCD Monitor Position Adjustment on page 4 - 15](#)
- [Power Shut Down on page 4 - 8](#)

### 4-2-10-3 To Ensure Safety while Moving the Vivid S60N/Vivid S70N

- 1) Ensure that the keyboard console and LCD monitor are in locked position



#### **WARNING**

DO NOT move/lift the Ultrasound system if the keyboard console and LCD monitor are in free (unlocked) position.

- 2) Proceed cautiously when crossing door or elevator thresholds. Grasp the front handle grips or the back handle bar and push or pull. Do not attempt to move the unit using cables or probe connectors. Take extra care while moving the unit on inclines.
- 3) Ensure that the unit does not strike the walls or door frames.
- 4) Ensure that the pathway is clear.
- 5) Move the unit slowly and carefully.



#### **CAUTION**

Avoid ramps that are steeper than 10 degrees.

- 6) Use two or more persons to move the unit over long distances or on inclines.

#### Related information:

- [LCD Monitor Position Adjustment on page 4 - 15](#)

**4-2-10-4 Transporting the Vivid S60N/Vivid S70N by Vehicle**

Take extra care when transporting the Vivid S60N/Vivid S70N by vehicle. In addition to the precautions listed earlier, follow the steps below.

- If not locked, move the keyboard console and LCD monitor to the park position.

**WARNING**

DO NOT move/lift the Ultrasound system if the keyboard console and LCD monitor are in free (unlocked) position.

- Disconnect all probes and secure them in their boxes.
- Ensure that the transporting vehicle is appropriate for the unit's weight.
- Park the vehicle on a level surface for loading and unloading.
- Secure the Vivid S60N/Vivid S70N while it is on the lift, to prevent rolling.
- Do not attempt to hold it in place by hand.
- Cushion the Vivid S60N/Vivid S70N and strap the lower part so that it does not break loose.
- Ensure that the Vivid S60N/Vivid S70N is secured inside the vehicle. Secure it with straps to the two hooks under the system to prevent movement while in transit.
- Drive cautiously to prevent vibration damage.

**Related information:**

- [To Ensure Safety while Moving the Vivid S60N/Vivid S70N on page 4 - 16](#)
- [LCD Monitor Position Adjustment on page 4 - 15](#)

**4-2-10-5 At the New Location**

- When the Vivid S60N/Vivid S70N is in place at a new location, lock the wheel brakes.

## 4-2-11 Cleaning the Trackball

The optical trackball is used on Vivid S60N/Vivid S70N. If dust is interfering with the light in an optical trackball, cleaning is required.

### 4-2-11-1 When Cleaning is Needed

Follow these steps to clean the trackball:

- 1) Power OFF the Vivid S60N/Vivid S70N.



**Figure 4-14** Removing Top Locking Plate and Rubber Dust Filter Ring

- 2) Place your fingers onto the trackball's Top Locking Plate.
- 3) Rotate the Top Locking Plate *counterclockwise* until it can be removed from the keyboard.
- 4) Lift off the Top Locking Plate including the Rubber Dust Filtering Ring and trackball from the keyboard.
- 5) Wipe off any oil or dust from the trackball using a cleaner or dry cloth.
- 6) Wipe off any oil or dust from the trackball housing, rollers, etc., using a cleaner or cotton bud.



#### CAUTION

Make sure not to spill or spray any liquid into the trackball housing.

Avoid organic solvents that may damage the mechanical parts of the trackball assembly.

Don't apply much force to the trackball.

- 7) Insert the trackball into the housing.
- 8) Place the Top Locking Plate including the Rubber Dust Filtering Ring back on the OP and lock it by rotating it clockwise.

**NOTE:** *Plastic hood is not supposed to be flush due to curvature on the panel.*

- 9) Power up the Vivid S60N/Vivid S70N and check that the trackball now works as intended.

## **Section 4-3**

### **Functional Checks**

#### **4-3-1 Overview**

The functional checks for Vivid S60N/Vivid S70N are described in this section.

Functional checks are used to verify that the Vivid S60N/Vivid S70N operates as intended.

The functional checks may also be used during troubleshooting.

#### **4-3-2 Performance Checks**

##### **4-3-2-1 Test Phantoms**

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

## 4-3-3 2D Mode (B Mode) Checks

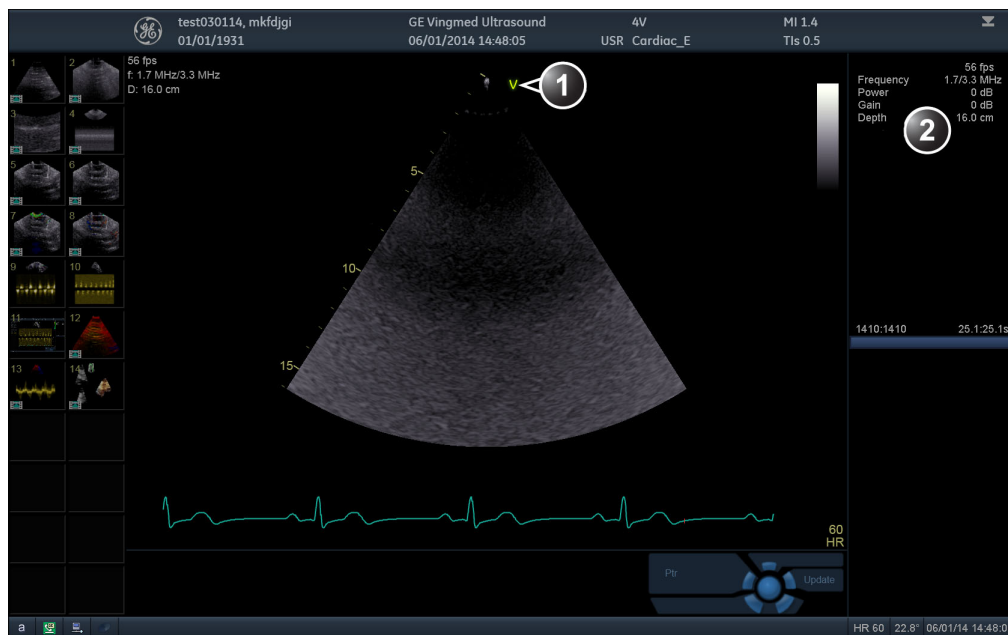
### 4-3-3-1 Introduction

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

### 4-3-3-2 Preparations

- 1) Connect one of the probes.
- 2) Turn ON the Vivid S60N/Vivid S70N.

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



1. Probe orientation marker
2. Parameter window

**Figure 4-15 The 2D Screen (Cardiac)**





Figure 4-16 2D Touch Panel (4D Probe Live) Page 1 and 2

### 4-3-3-3 Adjust the 2D Mode Controls



#### WARNING

Always use the minimum power required to obtain acceptable images in accordance with applicable guidelines and policies.

The following controls can be adjusted to optimize the 2D Mode display:

- Swipe to page 2 on the Touch panel and press either **Soft** or **Sharp** Auto Tissue setting.
  - **Soft:** optimizes the radial and lateral uniformity and brightness of the tissue continuously in real-time.  
The mention “Soft” is displayed on the upper right corner of the image area
  - **Sharp:** further enhances the image display by optimizing the gray scale curve.  
The mention “Sharp” is displayed on the upper right corner of the image area

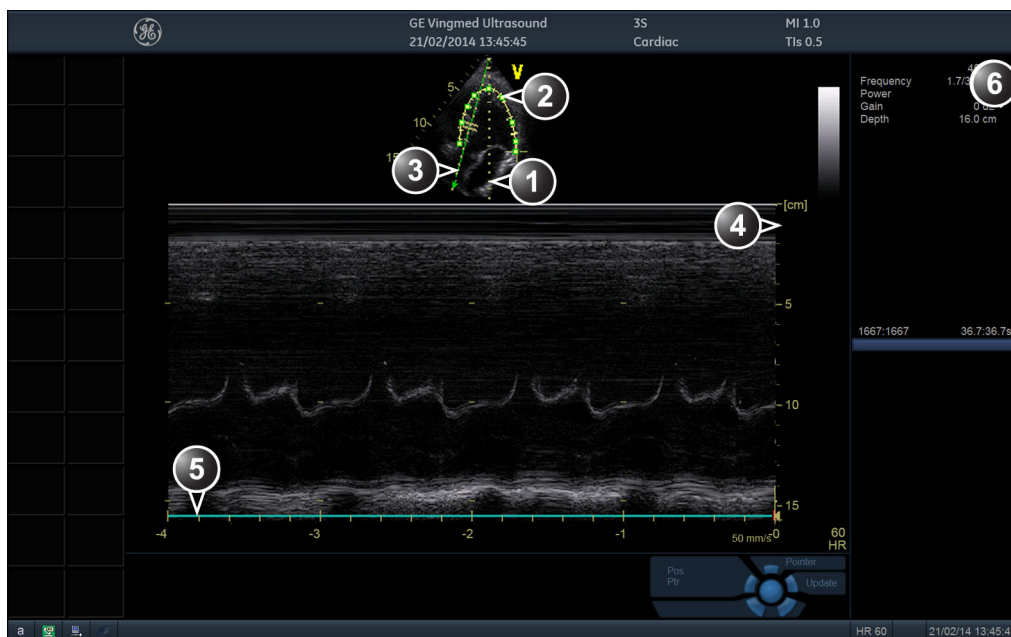
The Auto Tissue setting (Soft or Sharp) can be turned on/off by pressing **Auto** on the Control panel. The last used setting is then applied.

The Auto Tissue settings are only available in live scanning and cannot be turned off when the image is stored.

- If available, press **Virtual Apex** (probe dependent) to improve near field imaging, allowing increased visibility up to the width of the full probe aperture close to the surface.
- Use the **Gain** and **TGC** controls to optimize the overall image.  
Gain increases or decreases the amount of echo information displayed. TGC compensates for depth-related attenuation in the image.
- Use the **Depth** control to adjust the range to be imaged.
- Use the **Frequency** control (move to higher frequencies) or the **Frame rate** control (move to lower frame rate) to increase resolution in image.
- Use the **Frequency** control (move to lower frequency) to increase penetration.
- Use the **Reject** control to reduce noise in the image.
- Use the **DDP** control to optimize imaging in the blood flow regions and make a cleaner, less noisy image.
- Use **UD Clarity** (Cardiac) or **UD Speckle reduce** (non-cardiac) to reduce image speckle. Extra care must be taken to select the optimal Speckle reduction level, as too much filtering of speckle can mask or obscure desired image detail.
- Adjust **Octave** to toggle between fundamental and Harmonic mode.
- Press **Color maps** and select a grey map from the menu on screen.
- If using a 4D probe:
  - Adjust the **Quick Rotate** control on the Touch panel or press **Angle** on the Control panel to rotate the scan plane to predefined angles.
  - Adjust the **Rotate** rotary of the Touch panel to fine tune the angle adjustment.  
A scan plane indicator is displayed showing the angle position of the scan plane.

## 4-3-4 M Mode Checks

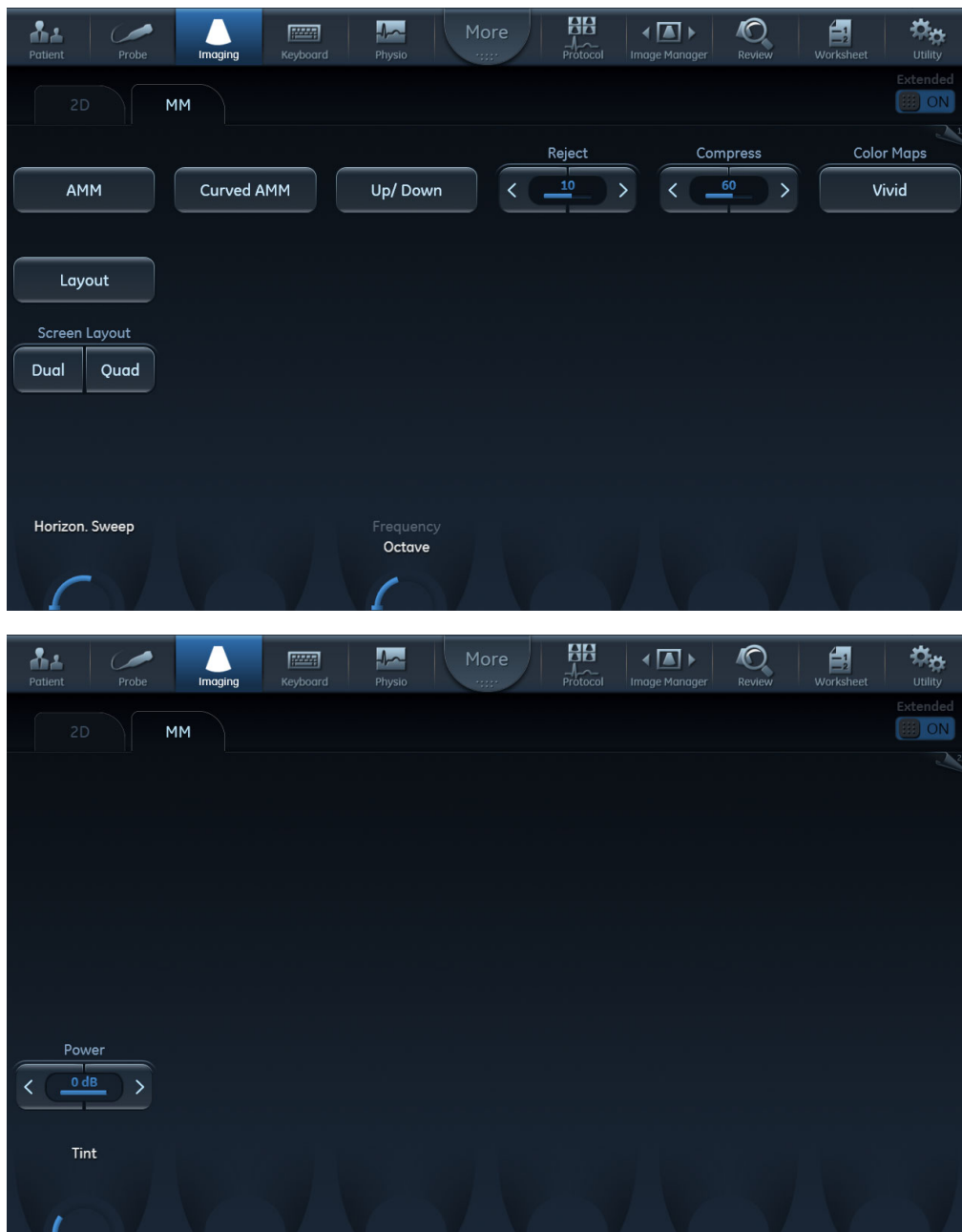
### 4-3-4-1 M-Mode Overview



1. Time motion cursor conventional M-Mode
2. Time motion cursor curved anatomical M-Mode
3. Time motion cursor anatomical M-Mode
4. Depth scale
5. Time scale
6. Parameter window

*Note:* The sweep speed information displayed in the bottom right corner of the image represents the user selected sweep speed and should be used only as a reference to confirm that the image was acquired at the selected sweep speed. It is not to be used for measurements or analysis. This is not an absolute value, but simply a reference number. Users performing studies using standardized protocols may find this sweep speed information useful for reading studies from other institutions.

**Figure 4-17 The M-Mode Screen (Composite)**



**Figure 4-18 M-Mode Touch Panel Page 1 and 2**

This unit has three types of M-Mode:

- Conventional M-Mode (MM): displays a distance/time plot of a cursor line in the axial plane of the 2D-image.
- Anatomical M-Mode (AMM): displays a distance/time plot from a cursor line, which is independent from the axial plane. AMM is available in greyscale, color, TVI, Tissue Tracking, Strain rate and Strain modes.
- Curved Anatomical M-Mode (CAMM): displays a distance/time plot from a free-drawn cursor line. CAMM is available in greyscale, color, TVI, Tissue Tracking, Strain rate and Strain modes.

Conventional M-Mode can be combined with Color Mode.

#### 4-3-4-2 Preparations

- 1) Connect one of the probes, to the scanner's left-most probe connector.
- 2) Turn ON the scanner.  
*The 2D Mode window is displayed (default mode).*
- 3) Press **MM** on the Operating Panel to bring up an M-Mode picture on the screen.
- 4) Use the trackball to position the cursor over the required area of the image.

#### 4-3-4-3 Using M-Mode

##### 4-3-4-3-1 Conventional M-Mode

- 1) To access M-Mode from any other scan mode, press **MM** on the control panel.
- 2) Use the trackball to position the cursor over the required area of the image.
- 3) Press **Freeze**.
- 4) Use the trackball to scroll through the data acquired.

##### 4-3-4-3-2 Anatomical M-Mode

- 1) In M-Mode or 2D-Mode Freeze, press **AMM** on the Touch panel.

**NOTE:** *Anatomical M-Mode can also be used with previously acquired digitally stored 2D images. More than one heart cycle should be stored if performing M-Mode in post processing.*

- 2) Use the trackball (assigned function: *Pos*) to position the cursor over the required area of the image.
- 3) Press **Trackball** to allow free rotation of the solid full-length cursor line throughout the 2D image (trackball assigned function: *Angle*).
- 4) Rotate the solid cursor line to the desired direction.

##### 4-3-4-3-3 Curved Anatomical M-Mode

- 1) In M-Mode, press **Curved AMM**.
- 2) Use the trackball (assigned function: *Pos*) to position the starting point of the time motion curve.
- 3) Press **Select** to anchor the starting point of the time motion curve.
- 4) Use the trackball to position the next point of the time motion curve.
- 5) Press **Select** to anchor the point of the time motion curve.
- 6) Repeat [step 4](#) and [step 5](#) up to draw a complete time motion curve.

**NOTE:** *The time motion curve can be edited by following the curve back to the desired point and redraw.*

- 7) On the last point, press **Select** twice to terminate the curve.

**NOTE:** *To edit the time motion curve, select a point, move it to a new position and press **Select**.*

#### 4-3-4-4 Optimizing M-Mode

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the M-Mode display:

- Adjust **Horizontal sweep** to optimize the display resolution.
- Adjust **Gain** and **TGC** controls to adjust the range to be imaged.
- Use the **Frequency** (move to higher frequencies) or the **Frame rate** control (move to lower frame rate) to increase resolution in image.
- Adjust **Dynamic range** to optimize the useful range of incoming echoes to the available greyscale.
- Adjust **Compress** to further optimize the display.
- Adjust **Reject** to reduce noise while taking care not to eliminate significant low-level diagnostic information.

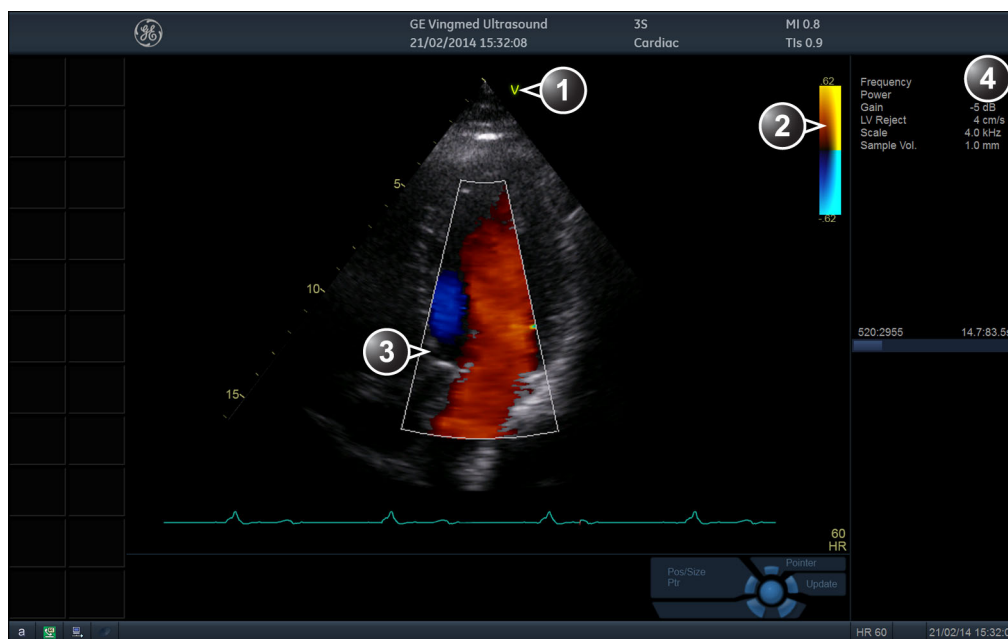
### 4-3-5 Color Mode Checks

#### 4-3-5-1 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.

#### 4-3-5-2 Color 2D Mode Overview



1. Probe orientation marker
2. Color bar
3. Color sector marker
4. Parameter window

Figure 4-19 Color Mode Screen

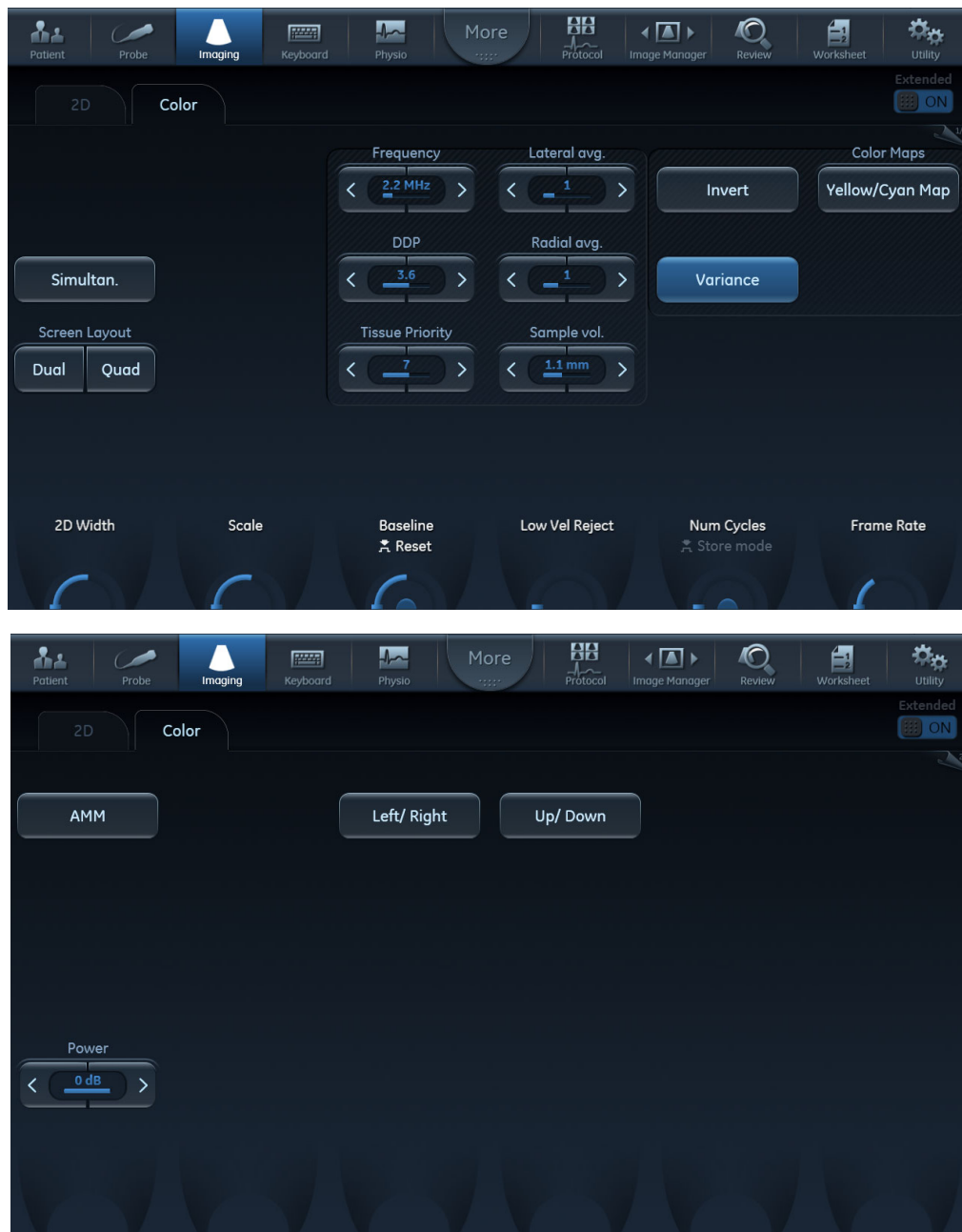
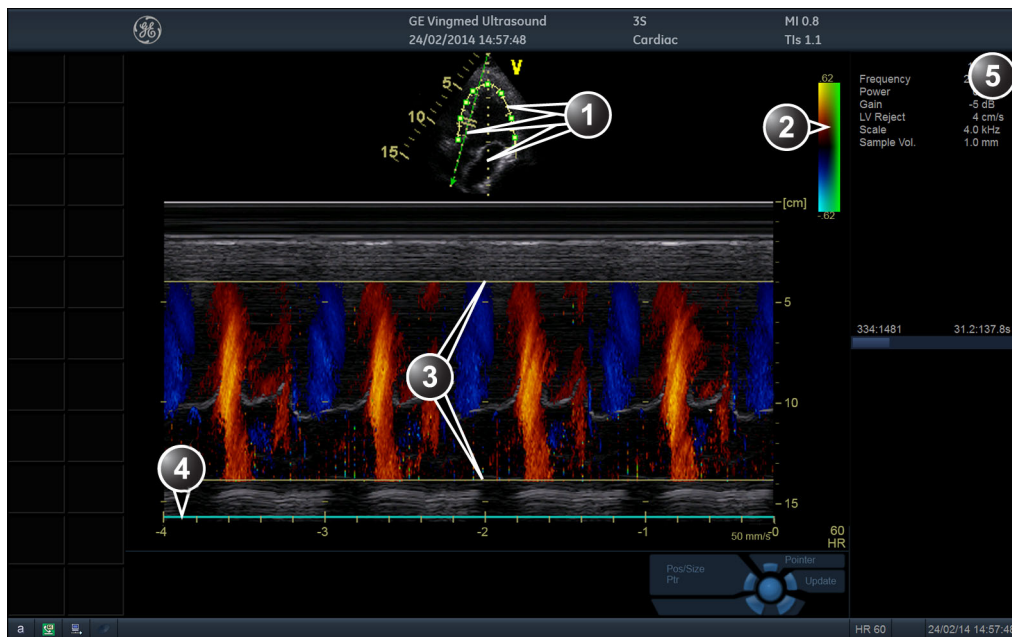


Figure 4-20 Color 2D Touch Panel - Page 1 and 2

## 4-3-5-3 Color M-Mode Overview



1. Time motion cursors (M-Mode, AMM and Curved AMM)
2. Color bar
3. Flow sector marker
4. Time scale
5. Parameter window

Figure 4-21 Color M-Mode Screen (Composite)



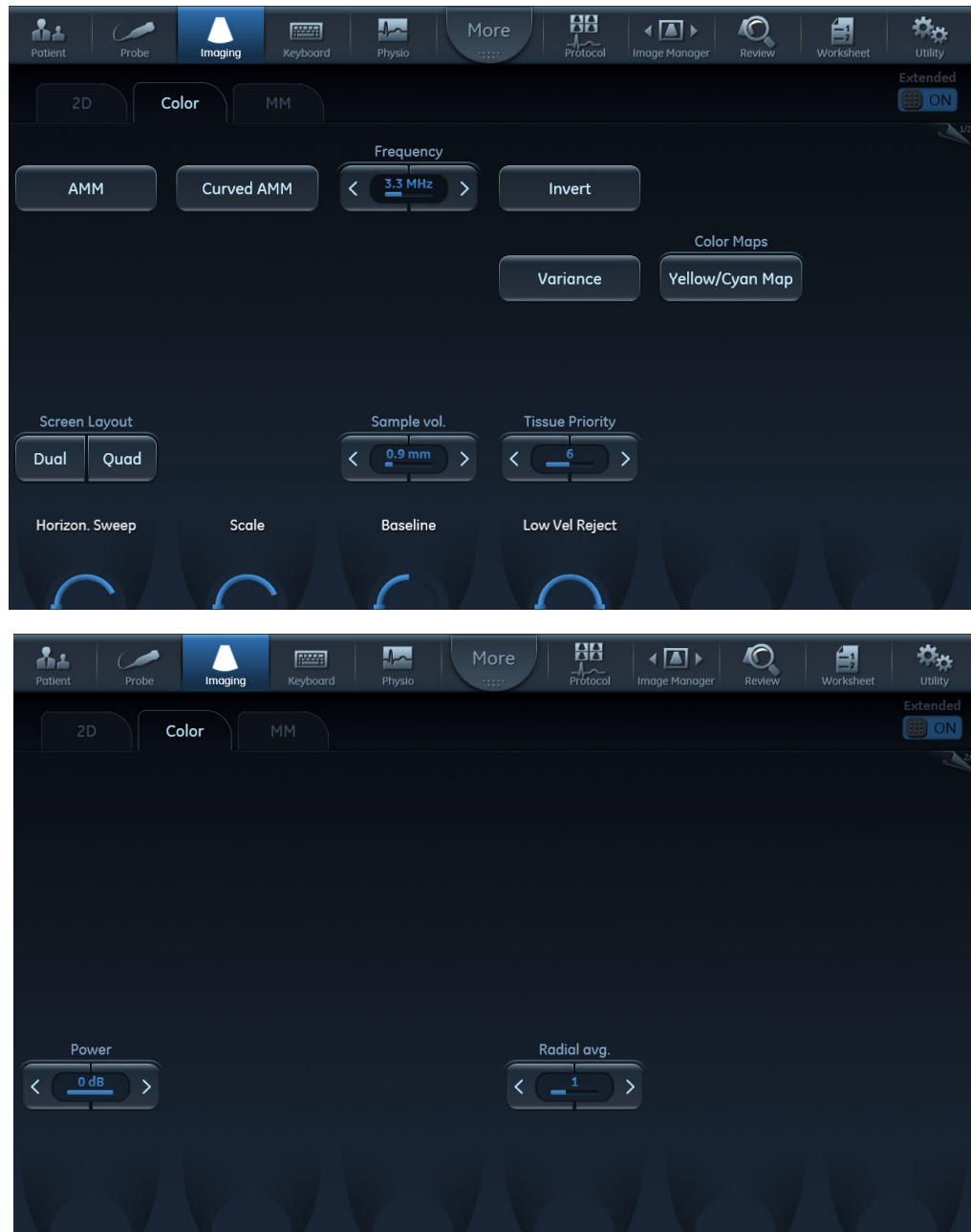


Figure 4-22 Color M-Mode Touch Panel - Page 1 and 2 (Color Controls)

**4-3-5-4 Using Color Mode****4-3-5-4-1 Color 2D**

- 1) From an optimized 2D image, press **Color**.
- 2) Use the trackball (assigned function: *Pos*) to position the ROI frame over the area to be examined.
- 3) Press **Select**. 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.*

- 4) Use the trackball to adjust the dimension of the ROI.

**4-3-5-4-2 Color M-Mode**

- 1) From M-Mode press **Color**.
- 2) Use the trackball (assigned function: *Pos*) to position the color area in the M-Mode display.
- 3) Press **Select**. 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.*

- 4) Use the trackball to adjust the dimension of the color area.

## 4-3-6 PW/CW Doppler Mode Checks

### 4-3-6-1 Introduction

PW and CW Doppler modes 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/CW Doppler.

### 4-3-6-2 PW and CW Doppler Overview



1. Sample volume (PW only)
2. Angle correction marker
3. Velocity scale
4. Low velocity reject
5. Nyquist velocity
6. Doppler baseline
7. Frequency scale (configurable, see Page 4-33)
8. Parameter window

*Note:* the sweep speed information displayed in the bottom right corner of the image represents the user selected sweep speed and should be used only as a reference to confirm that the image was acquired at the selected sweep speed. It is not to be used for measurements or analysis. This is not an absolute value, but simply a reference number. Users performing studies using standardized protocols may find this sweep speed information useful for reading studies from other institutions.

**Figure 4-23 PW/CW Doppler Mode Screen**

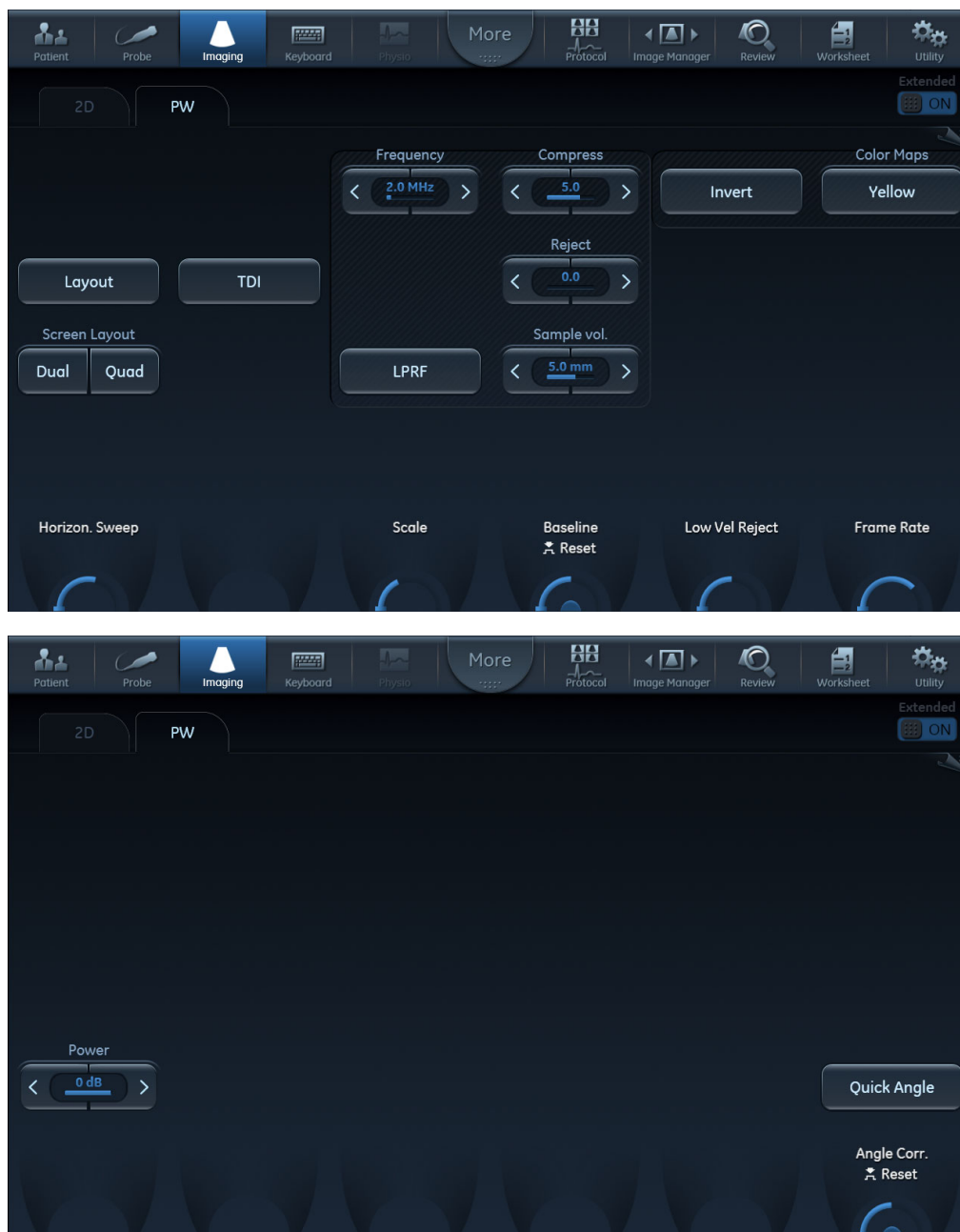


Figure 4-24 PW Doppler Touch Panels - Page 1 and 2

**Related information:**

Refer to the *Vivid S60N/Vivid S70N User Manual*.

### 4-3-6-3 Using PW/CW Doppler Modes

#### 4-3-6-3-1 Alternative 1

- 1) Press **PW** or **CW**. A scanning screen is displayed with a Doppler cursor on the 2D mode image and a Doppler spectrum in the lower part of the screen.
- 2) Use the trackball to position the Doppler cursor line and in PW the sample volume location over the area of interest.
- 3) In PW, adjust the **Sample Volume**.

**NOTE:** *Sample Volume adjustment may affect the Scale, Frame rate and LV rej. settings.*

#### 4-3-6-3-2 Alternative 2

- 1) Press **Cursor** on the control panel. A cursor line is displayed on the 2D image.
- 2) Select the cursor type on the Touch panel.
- 3) With the trackball adjust the position of the cursor line.
- 4) Press **PW** or **CW**.

### 4-3-6-4 Optimizing PW/CW Doppler Modes

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the PW/CW modes display:

- Adjust the **Active mode gain** to set the gain in the spectral Doppler area.
- Adjust **Low velocity reject** to reduce unwanted low velocity blood flow and tissue movement.
- In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows. Adjustment of the Sample volume may affect the PRF (Nyquist limit) settings.
- Adjust the **Compress** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.
- Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.
- Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

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

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

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



#### CAUTION

**Use all noise reduction controls with care. Excessive application may obscure low level diagnostic information.**

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

- Use the **Horizontal sweep** to optimize the sweep speed.
- To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace. Velocity range directly controls the pulse repetition frequency, which is responsible for the setting of the Nyquist limit (the ability to detect maximum velocity without aliasing).
- Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.

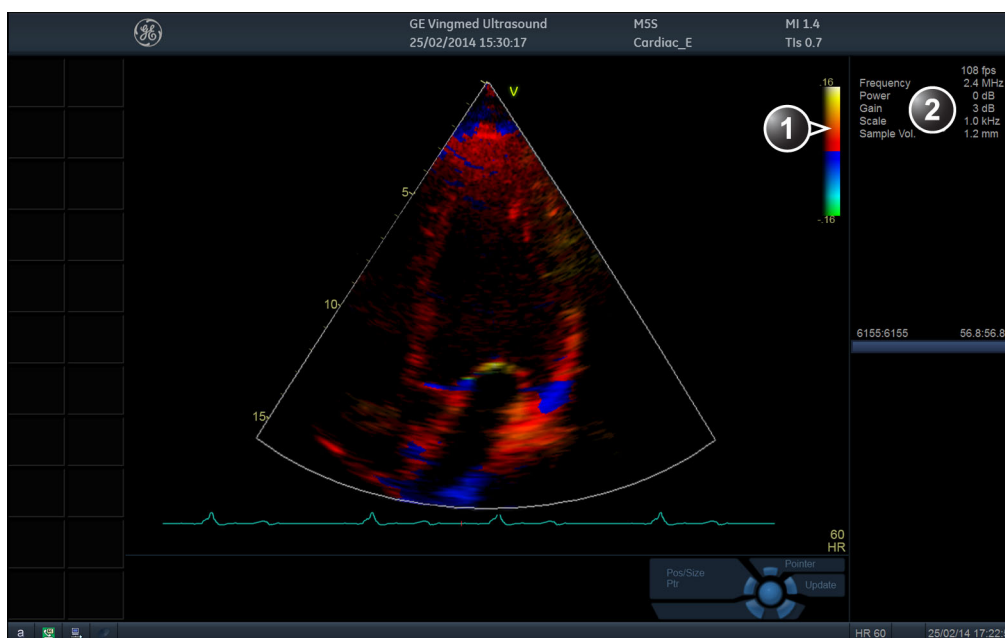
- Use **Quick angle** and **Angle correction** to steer the ultrasound beam to the blood flow to be measured (Not typically required during cardiac studies).
- Adjust **LPRF** (PW Doppler mode only) to toggle between high and low Pulse Repetition Frequency (PRF). When the Doppler PRF is raised beyond a certain limit, more than one Doppler gate is displayed on the screen.
- Press **Auto** on the Control panel to activate Automatic Spectrum Optimization (ASO). ASO is used to automatically adjust baseline and scale of the PW/CW spectrum to optimize the spectral display. It will avoid the display of a folded spectrum and stretch the spectrum vertically as large as possible. ASO optimization is not continuous but performed instantaneously each time **Auto** is pressed.

## 4-3-7 Tissue Velocity Imaging (TVI) Checks

### 4-3-7-1 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.

### 4-3-7-2 TVI Overview



1. TVI color bar
2. Parameter window

Figure 4-25 TVI Mode Screen

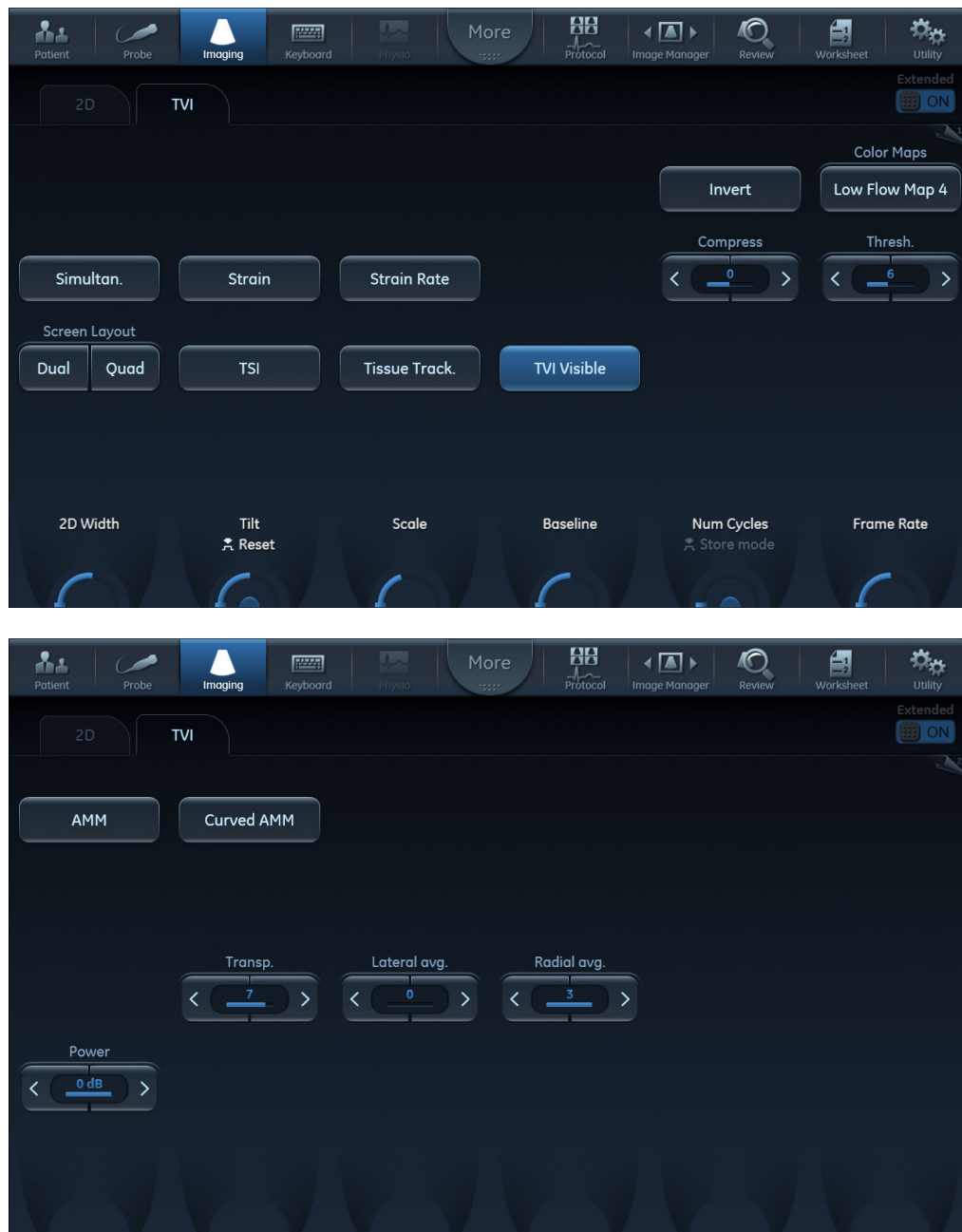


Figure 4-26 TVI Touch Panel - Page 1 and 2

**Tissue Velocity Imaging (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 greyscale imaging during one or several cardiac cycles with high temporal resolution.

**4-3-7-3 Using TVI**

- 1) While in 2D mode press **TVI** on the control panel.
- 2) Use the trackball (assigned function: *Pos*) to position the ROI frame over the area to be examined.
- 3) Press **Select**. 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.*

- 4) Use the trackball to adjust the dimension of the ROI.

**4-3-7-4 Optimizing TVI**

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the TVI display:

- 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.*



**4-3-8 Probe/Connectors Check**

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

**CAUTION**

Take the following precautions with the probe cables:

- Keep away from the wheels.
- Do not bend.
- Do not cross cables between probes.

**Table 4-2 Probe and Connectors Checks**

Step	Task	Expected Result(s)
1	Press <b>Probe</b> on the Operating Panel.	A list of the connected probes will pop up on the screen.
2	If not already selected, use the trackball to select the desired probe.	An application menu for the desired probe is listed on the screen.
3	<ul style="list-style-type: none"> <li>• Trackball to the desired application.</li> <li>• Press <b>Select</b> to launch the application.</li> <li>• To change application without changing the current probe, press <b>Appl.</b> on the Operating Panel.</li> </ul>	The selected application starts.
4	Verify no missing channels.	All channels are functioning.
5	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
6	Check the probe in each active connector slot.	It will display pictorial data each time.
7	Do a leakage test on the probe.	It passes the test.
8	Repeat this procedure for all available probes.	

## 4-3-9 ECG Check

### 4-3-9-1 Introduction

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

### 4-3-9-2 Parts Needed

- ECG Harness, P/N:16L0026 + P/N:16L0028
  - ECG Pads, (3 pc)
- or*
- ECG simulator

### 4-3-9-3 Preparations

None

### 4-3-9-4 ECG Check

**Table 4-3 ECG Checks**

Step	Task	Expected Result(s)
1	Connect the ECG harness to the connector on the front of the system.	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.

## 4-3-10 Cineloop Check

### 4-3-10-1 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



- |                                 |                                |
|---------------------------------|--------------------------------|
| 1. Left marker (cineloop start) | 3. Right marker (cineloop end) |
| 2. Current frame                | 4. Cine speed                  |

**Figure 4-27 Cineloop Display**

### 4-3-10-2 Preparation

- 1) Connect one of the probes to the scanner.
- 2) Turn ON the scanner. The 2D Mode window is displayed (default mode).

### 4-3-10-3 Using Cineloop

#### 4-3-10-3-1 Selection of a Cineloop

- 1) Press **Freeze**.

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

- 2) Press **2D Freeze**.

*The selected heart beat is played back.*

- 3) Press **2D Freeze** to freeze the cineloop.

- 4) Use the trackball to scroll through the acquisition and find the sequence of interest.

- 5) Adjust **Cycle select** to move from heart beat to heart beat and select the heart cycle of interest.

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

- 7) In Freeze, press **Set left** or **Set right** to set the corresponding cineloop boundary to the current frame.

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

- 9) Press **2D Freeze** to run the cineloop and **Img. Store** to store the cineloop or **Freeze** to return to live scanning.

**NOTE:** *Cineloop storage can be configured to store heart cycles with additional time before and after the R-wave and to display a preview before storage.*

#### 4-3-10-3-2 Adjustment of Cineloop Playback

- Use the trackball or adjust **Speed** to increase or decrease the speed of the cineloop playback.  
*The speed factor (%) is displayed on the right side of the ECG.*

### 4-3-11 Back End Processor Checks

If all the previous checks have been passed successfully, the Back End Processor is fully functional.

**NOTE:** *If the system seems to be operating erratically, refer to [Chapter 7](#) in this manual.*

### 4-3-12 Operating Panel Check

The Operating Panel is automatically checked during Vivid S60N/Vivid S70N system start-up.

**4-3-13 Main OLED/LCD Screen Check**

Verify that the image does not include any;

- white dots
- noise stripes
- flickering
- color shade(s) (red or otherwise)

**4-3-14 External Monitor Check**

Verify that the image displayed on the Main Screen is also displayed on the external monitor.

**4-3-15 Peripheral Checks****4-3-15-1 Printer Checks**

The internal printer is controlled from the **P1** key on the Vivid S60N/Vivid S70N's Operating Panel.

Table 4-4 outlines the steps for performing Printer checks.

**Table 4-4 Printer Checks**

Step	Task	Expected Result(s)
1	When scanning in 2D Color Mode, press Freeze to stop image acquisition.	Image scanning stops with the last picture on the screen.
2	Press P1 on the Operating Panel	The image displayed on the screen is printed on the assigned printer.
3	Check if the print quality on the pictures from both printers are of expected quality.	

**4-3-15-2 Windows Print Test Page**

This checks that the printer is correctly installed and hooked up at the Windows level.

- 1) Open the Printers folder, either from Start > Settings > Printers or from Utilities > System > Printers.
- 2) Right-click on a printer and select Preferences.
- 3) Select Print Test Page (this will send a print to the printer bypassing all of the Scanner software).
- 4) Observe the printed page.

If the page prints out, the problem you are looking for is probably a configuration issue in windows, or configuration issue in Utilities > Connectivity.

If the page prints out from Windows, there could not be a problem within Windows. In this event, you will see an incomplete print out of the test page.

If the page does not print out, there probably is a cabling issue, or a printer configuration issue in Windows.

**NOTE:** For the Sony small-format printers, you will see an incomplete Test Page printed out. This is normal.

**4-3-15-3 Setup and Check a Printer Service**

- 1) Select Utility > Connectivity

If you get a pop-up asking you to log on, select ADM.

Type the current password.

- 2) Select the Service tab.
- 3) In the combo box "Select Service to Add" select "Standard Print" and click on Add.
- 4.) In the right pane Properties "Combo Box" select the printer you wish to check. Set any other parameters you desire.
- 5) In the left pane "Properties" Enter a name that describes the printer and configuration you just selected in the right pane.
- 6) Select the Button tab.
- 7) Select one of the "Physical Print Buttons" that you want to configure.
- 8) In the right pane click on the service name you just created in the Services Tab.
- 9) Click on the ">>" button. This will place this service in the PrintFlow View for the printer button you selected.
- 10) Click on Save.

You have now configured a printer service and attached it to a print button.

Now you can check the printer by pressing the Print button you just configured.

If you configured it for 1 row and 1 column, each time you press the Print button, you will get a print sent to the printer.

If you configured some other combination of rows or columns, you will have to push the printer button multiple times before a print is sent to the printer.

If the image does not print, check the configuration to verify that you have it set up correctly.

**4-3-15-4 View the Windows Printer Queues**

- 1) Go to **Utility > System > Peripherals**.
- 2) Click on **Properties**.

## 4-3-16 Mechanical Functions Checks

### 4-3-16-1 Monitor Articulated Arm Movement Check

Table 4-5 Monitor Articulated Arm Movement Check

Step	Task	Expected Result(s)
1	Lift the up/down release handle <i>upwards</i> . (It is located on the <i>right</i> side below the Operating Panel).	The <i>up and down</i> movement locking mechanism is released, allowing the arm to be raised or lowered.
2	While lifting the release handle, raise the Operating Panel <i>upwards</i> , then <i>downwards</i> and make sure it is able to reach its maximum lowest and maximum highest positions.	<p>Ensure that you do not apply too much force to move the Operating Panel and that the movement is smooth.</p> <p>Ensure that you do not apply too much force to move the release handle and that the movement is smooth.</p> <p>During the movement up and down make sure the image displayed on the monitor does not present any disturbance.</p>
3	Release the up/down handle.	Make sure the arm is locked and no movement is observed when moderate force is applied to the Operating Panel ( <i>upwards</i> and <i>downwards</i> ).
4	Check all positioning capabilities of the Articulated Arm, as illustrated in <a href="#">Figure 5-6</a> on page 5-9.	Make sure the arm can be moved freely into the illustrated positions.

### 4-3-16-2 Operating Panel Movement Check

Table 4-6 Operating Panel Movement Check

Step	Task	Expected Result(s)
1	Lift the left/right release handle located on the <i>left</i> side of the Operating Panel.	The <i>left and right</i> movement locking mechanism is released, allowing the Operating Panel to be swiveled 30 degrees to the right and left from the center position.
2	While lifting the release handle, swivel the Operating Panel left and right and make sure it is able to reach its maximum left and maximum right positions.	<p>Ensure that you do not apply too much force to move the Operating Panel and that the movement is smooth.</p> <p>Ensure that you do not apply too much force to move the release handle and that the movement is smooth.</p> <p>During the movement up and down make sure image displayed on monitor does not present any disturbance.</p>
3	Release the left/right handle.	Make sure Operating Panel is locked and no movement is observed when moderate force is applied to the Operating Panel ( <i>left</i> and <i>right</i> ).

**4-3-16-3 Monitor Movement Check****Table 4-7 Monitor Movement Check**

Step	Task	Expected Result(s)
1	Tilt the monitor <i>forwards</i> and <i>backwards</i> .	Ensure that you do apply some force to move the monitor. During movement some friction should felt.  During the movement, make sure the image displayed on the monitor does not present any disturbance.
2	Tilt the monitor sideways - <i>left</i> and <i>right</i> .	Ensure that you do apply some force to move the monitor. During movement some friction should felt.  During the movement, make sure the image displayed on the monitor does not present any disturbance.

**4-3-16-4 Front Wheel Function Check****Table 4-8 Brakes Function Check (Front Castor Wheels)**

Step	Task	Expected Result(s)
1	Release the wheel lock (upper lever) on each front castor wheel by pushing the lever labeled OFF. Push and pull the unit <i>right, left, backwards</i> and <i>forwards</i> .	Ensure that the wheels move freely in all directions. Check the wheels for wear and tear, and replace if necessary.
2	Press the foot brake (lower lever) <i>down</i> on each front castor wheel to lock the wheels in position. Push and pull the unit <i>right, left, backwards</i> and <i>forwards</i> .	Ensure that the wheels are locked and there is no movement in any direction.



# Chapter 5

## Components and Function (Theory)

### Section 5-1 Overview

#### 5-1-1 Purpose of Chapter 5

This chapter explains Vivid S60N/Vivid S70N system concepts, component arrangement, and sub-system functions. It also describes the power distribution system, the cabling system and probes.

**Table 5-1 Contents in Chapter 5**

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<b>5-3</b>	Vivid™ S60N/Vivid™ S70N System Design	5-4
<b>5-4</b>	Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Positioning Capabilities	5-6
<b>5-5</b>	Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Electronic Cage (v203)	5-11
<b>5-6</b>	Service Access to the Vivid S60N/Vivid S70N System Modules	5-14
<b>5-7</b>	Top Console with Monitor, Operator Control Panel and Touch Screen	5-16
<b>5-8</b>	Internal and External Input/Output	5-20
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## Section 5-2 General Information

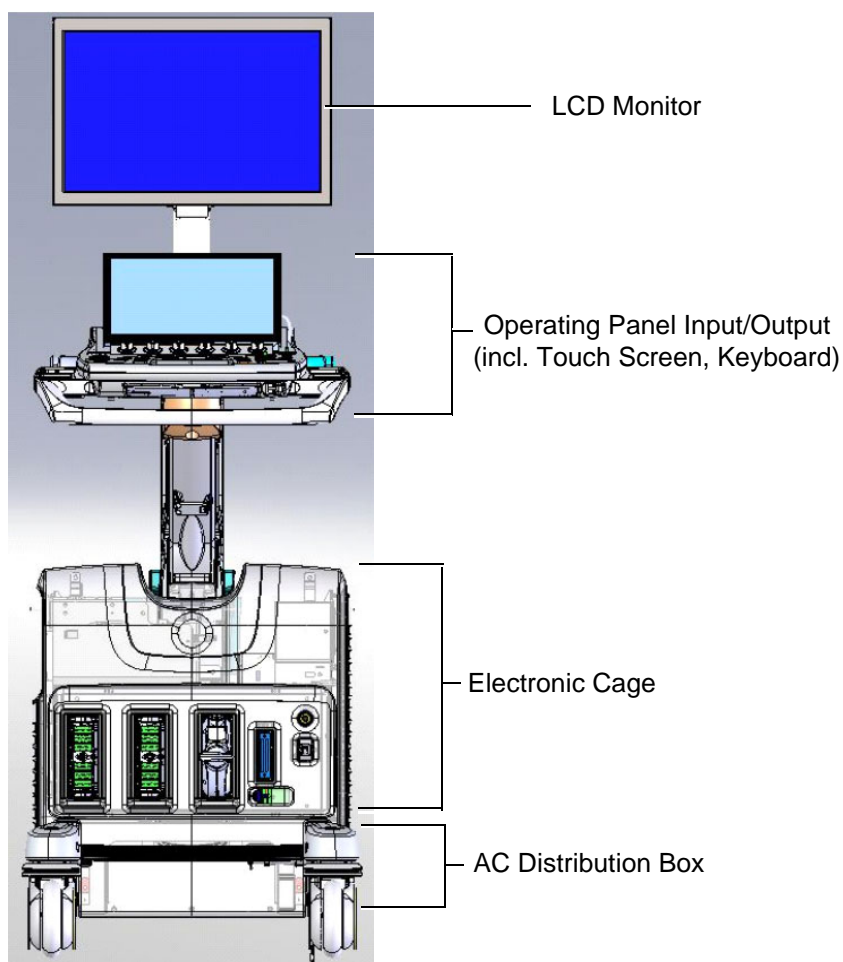
### 5-2-1 Introduction

The Vivid S60N/Vivid S70N system is a compact ultrasound scanner that can be used with both phased array and linear array ultrasound probes and Doppler (Pencil) probes.

Weighing only 75 kg (165 lb), the Vivid S60N/Vivid S70N is extremely versatile and - depending upon the installed software - can be used for various imaging modes. These include:

- 2D Gray Scale and 2D Color Flow imaging
- 4D imaging
- M-Mode Gray Scale imaging
- Color M-Mode
- Doppler
- Different combinations of the above modes

The Vivid S60N/Vivid S70N system main hardware components are configured as illustrated in [Figure 5-1](#).



**Figure 5-1 Vivid S60N/Vivid S70N System - Configuration of Main Hardware Components**

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**NOTE:** For additional views of the system, see illustrations in:  
[Vivid™ S60N/Vivid™ S70N System Design](#) on page 5 - 4.  
System operations are initiated by the user via the Operating Panel (that has ultrasound-specific buttons, mode-dependent softkey buttons and an optional alphanumeric keyboard), and the Touch Screen.

**NOTE:** For a detailed description of Vivid S60N/Vivid S70N system operating modes, refer to the *Vivid S60N/Vivid S70N User Manual*.

The Vivid™ S60N/Vivid™ S70N ultrasound scanner has a software beam-forming system.

Signal flow from the Probe Connector Panel, to the Front End (FE) Electronics, and to the Back End Unit, are finally displayed on the monitor and peripherals.

In addition, the Vivid S60N/Vivid S70N system enables acquisition of external ECG signals. The ECG/Respiratory module, which supports acquisition of three bipolar ECG channels (leads I, II, III), is incorporated in the cabinet cage assembly to provide ECG signals to synchronize cardiac ultrasound image acquisition.

#### 5-2-1-1 System Configuration and Software

System configuration is stored on a hard disk drive inside the Back End Unit.

At power up, all necessary software is loaded from the hard disk.

#### 5-2-1-2 Electronics

The Vivid S60N/Vivid S70N system internal electronics are divided into three:

- [Front End Unit](#)
- [Back End Unit](#)
- [System Power Distribution](#)

Vivid S60N/Vivid S70N system internal electronics comprise a single electronic cage that contains both the Front End Unit and the Back End Unit. The Interconnecting signals and power distribution between the two sections are routed internally via two cables; boards are connected directly to each other. All the interconnections to the monitors, operator keyboard and peripherals are via the Backend Interface Board (BIF) which is fully shielded for EMC/EMI purposes.

## Section 5-3

### Vivid™ S60N/Vivid™ S70N System Design

The design of the Vivid™ S60N/Vivid™ S70N ultrasound scanner comprises three main sections (illustrated in Figure 5-2):

- User Interface
- Main Scanner
- Power Supply - also named the AC Distribution Box

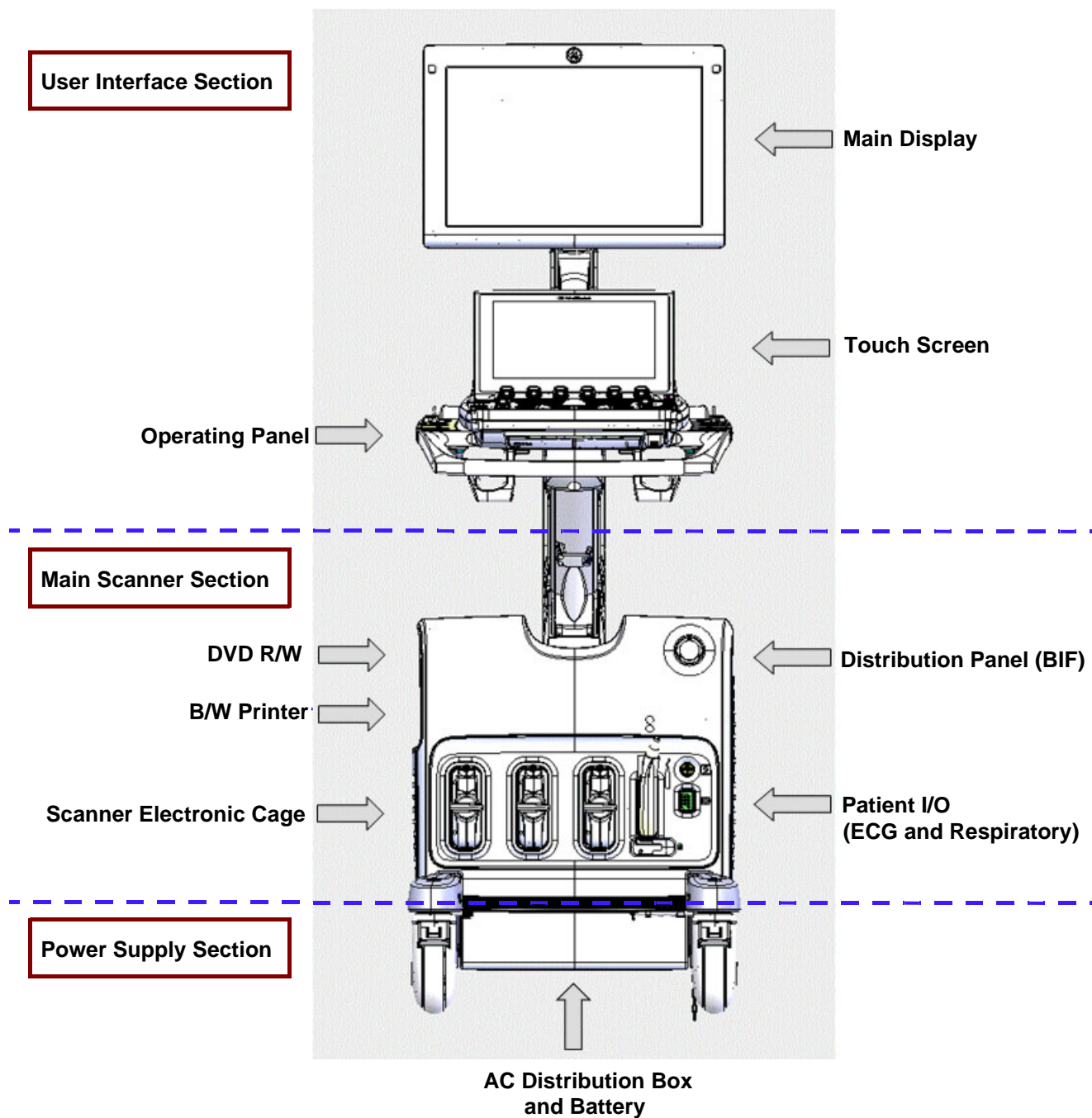


Figure 5-2 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - System Design

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### **5-3-1 User Interface Section**

The User Interface section comprises the following modules:

- Operating Panel and Speakers
- Main Display
- Touch Screen
- Optional Alphanumeric Keyboard

### **5-3-2 Main Scanner Section**

The Main Scanner section comprises the Scanner Electronic Cage, that includes the following modules:

- Front End Unit
- Back End Unit
- Patient I/O Module
- Sub-Woofer
- Rear Interface Panel
- Optional DVD-RW
- Optional B/W Printer

### **5-3-3 Power Supply Section**

The Power Supply section comprises the following modules:

- Main AC/DC 18v supply
- B/W Printer AC power control
- Battery Charger
- Optional Battery

## Section 5-4

### Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Positioning Capabilities

#### 5-4-1 System Up and Down Positions

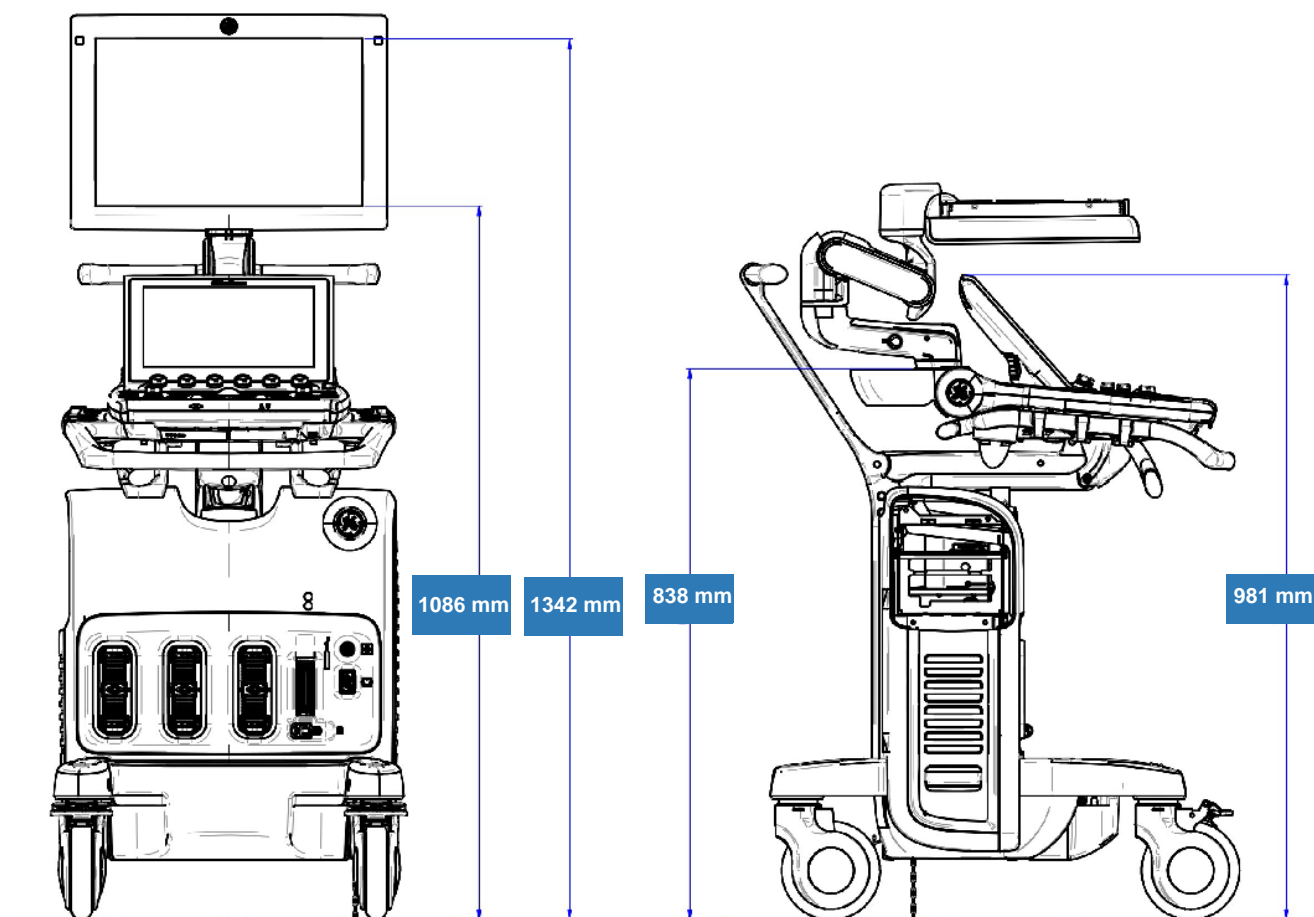


Figure 5-3 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Up and Down Positions

## 5-4-2 Upper Section - Positioning Control

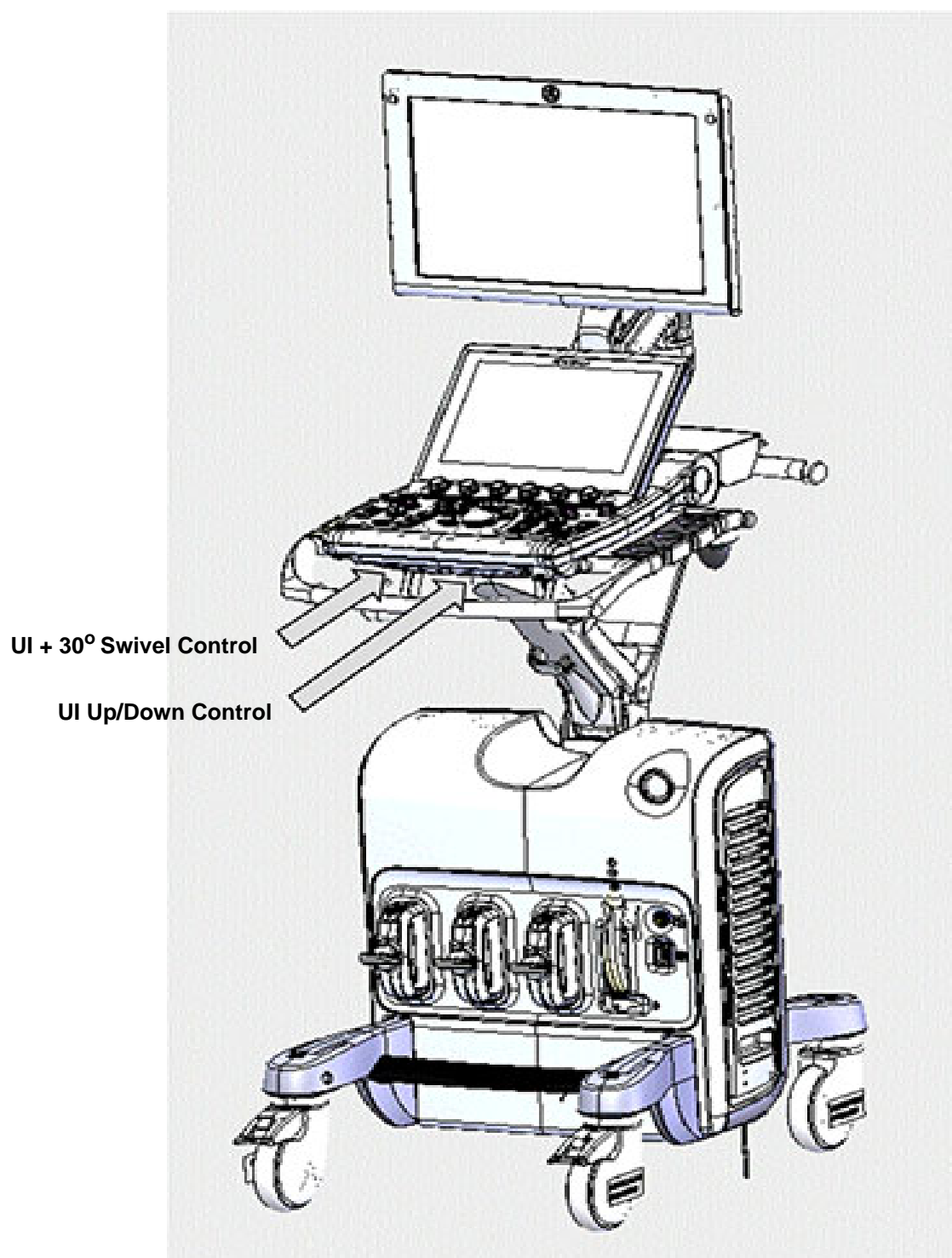


Figure 5-4 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Upper Section Positioning Control

### 5-4-3 Main Display - Articulated Arm

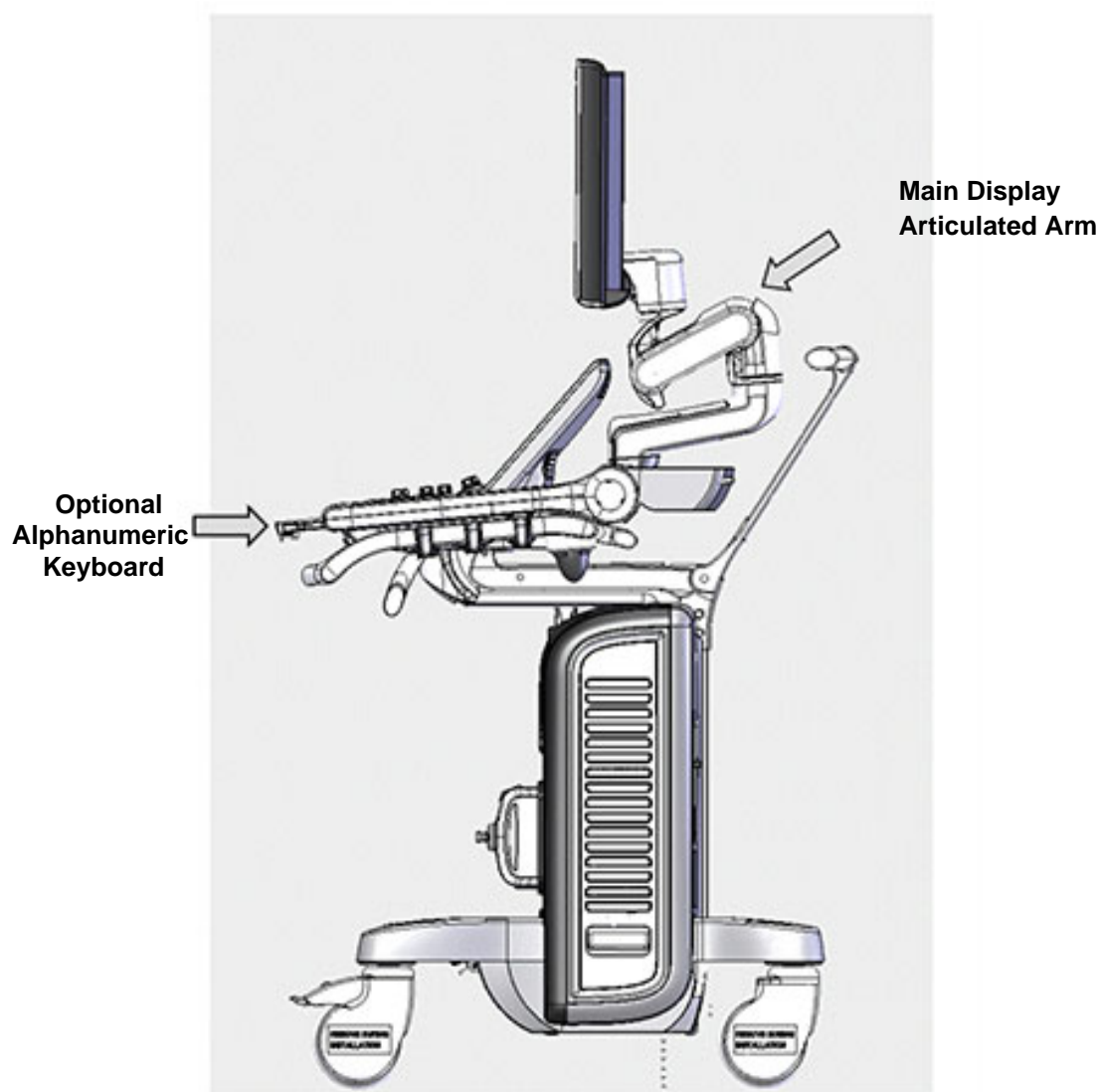


Figure 5-5 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Side View



#### 5-4-4 Main Display - Positioning Capabilities

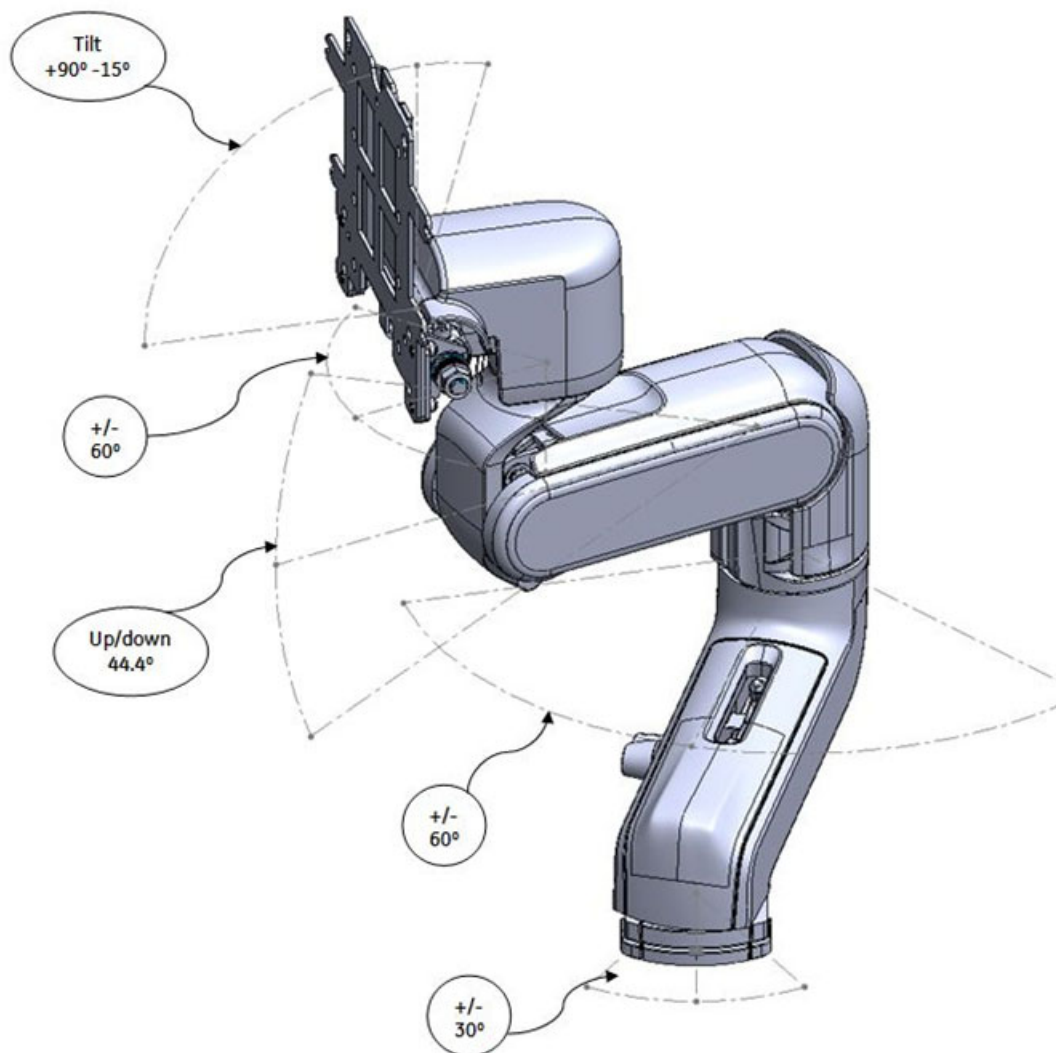


Figure 5-6 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Main Display Positioning Capabilities

## 5-4-5 System Positioning for Transportation

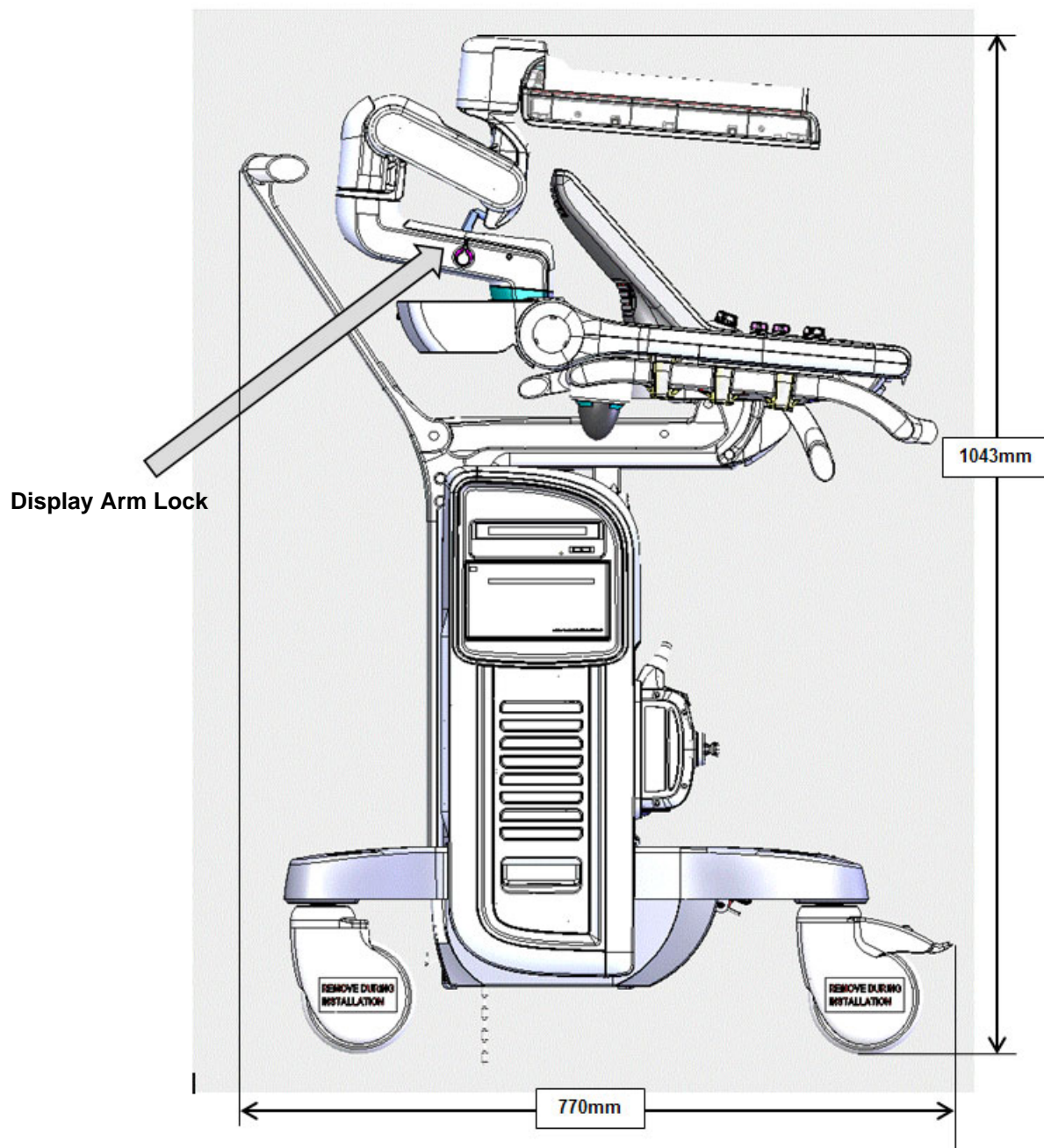


Figure 5-7 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner Positioned for Transportation Mode

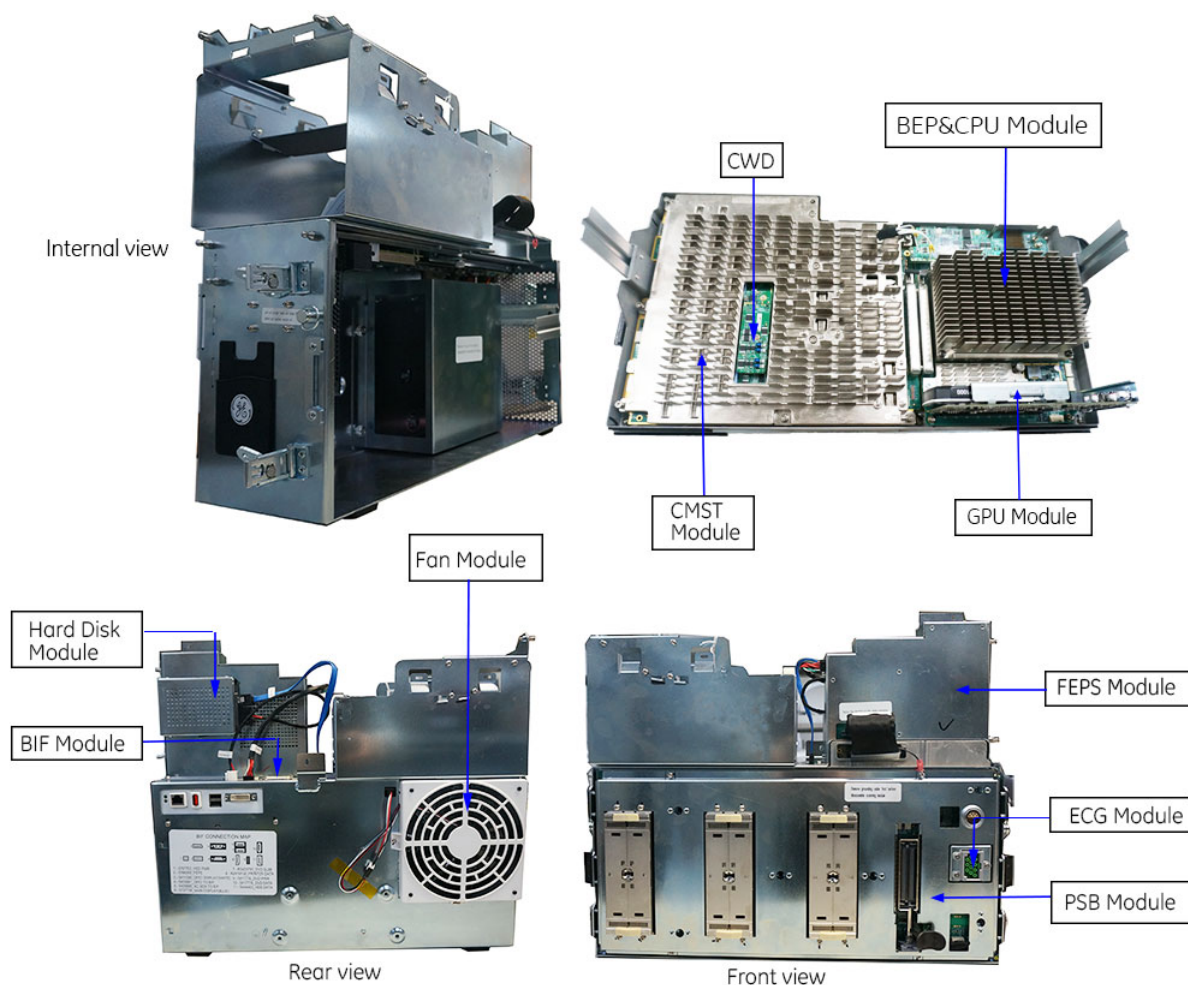
## Section 5-5

### Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Electronic Cage (v203)

#### 5-5-1 Scanner Electronic Cage - Main Assemblies (v203)

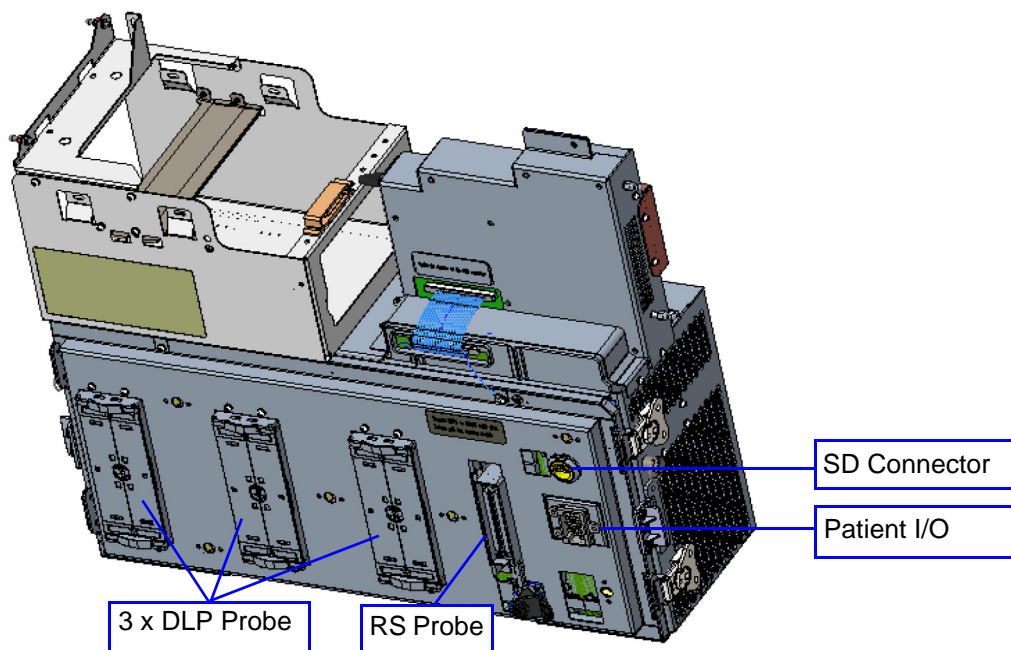
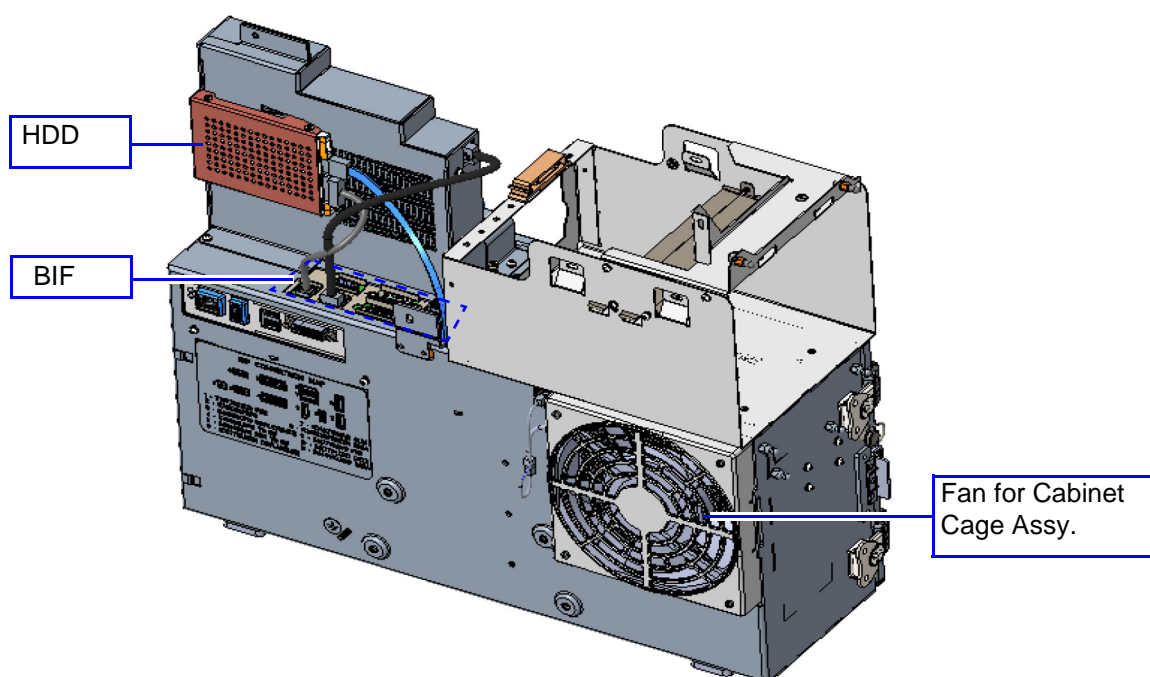
The Scanner Electronic Cage, specially designed to house the Main Scanner section, has two main assemblies:

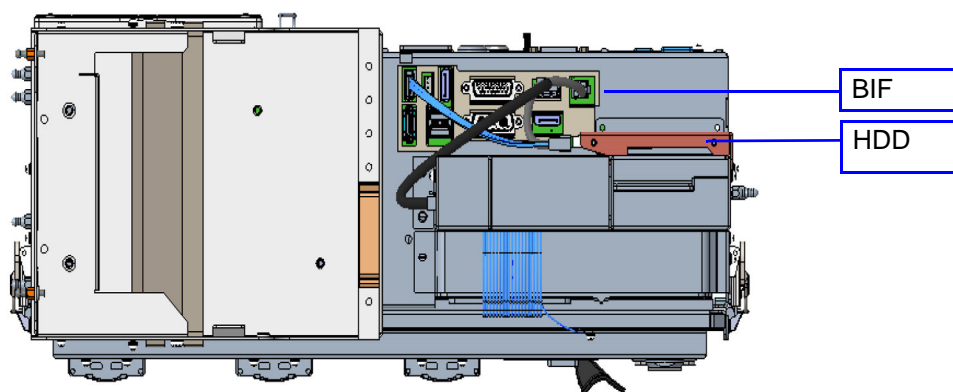
- Electronic Cage door
- Electronic Cage cabinet



**Figure 5-8 Electronic Cage (v203) - Internal View**

The Vivid™ S60N/Vivid™ S70N Ultrasound Scanner (v203) architecture is based on the software beamforming cSound architecture. In this architecture, the data acquired from the ultrasound channels is transferred from the Front End to the Back End; the Beam forming is done by the Back End software.

**5-5-1 Scanner Electronic Cage - Main Assemblies (v203) (cont'd)****Figure 5-9 Electronic Cage (v203) - Front View****Figure 5-10 Electronic Cage (v203) - Rear View**

**5-5-1 Scanner Electronic Cage - Main Assemblies (v203) (cont'd)**

**Figure 5-11 Electronic Cage (v203) - Top View**



## Section 5-6

### Service Access to the Vivid S60N/Vivid S70N System Modules

#### 5-6-1 Modules Accessed from the Front (v203)

Access to the modules in the Electronic Cage (Front End Unit and Back End Unit) is from the front of the system, by opening and removing the Cage door.

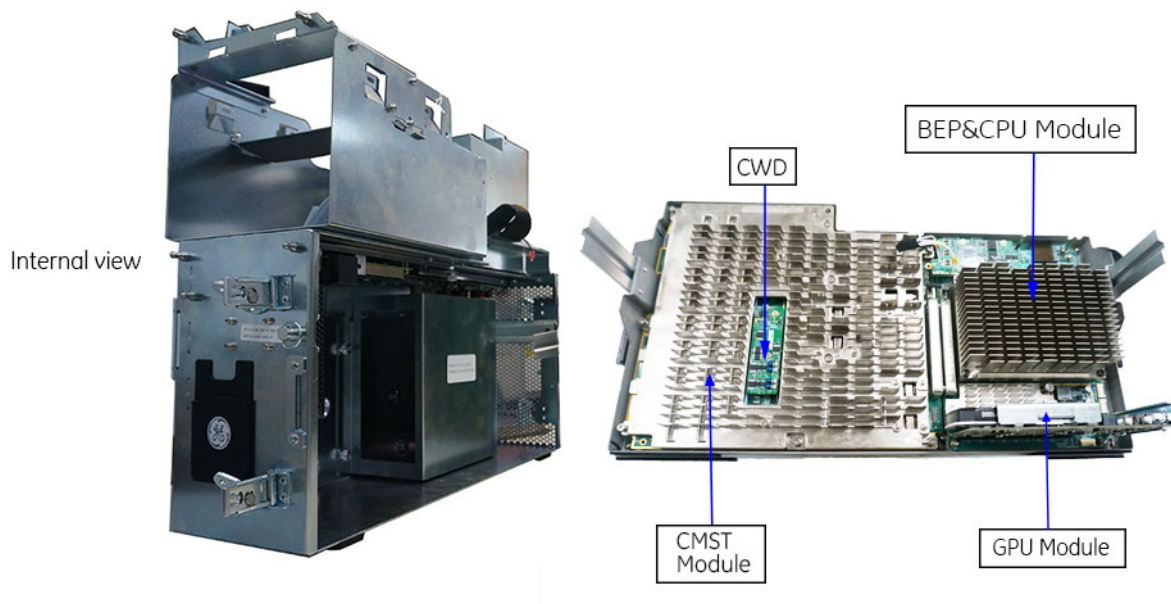


Figure 5-12 Electronic Cage - Access to the Electronics (v203)

### 5-6-2 Modules Accessed from the Rear

Access to the AC Box and Battery is from the rear of the system, by removal of the Lower Rear Cover.

The Main Cage FAN is also accessed from the rear, by removal of the Upper Rear Cover.

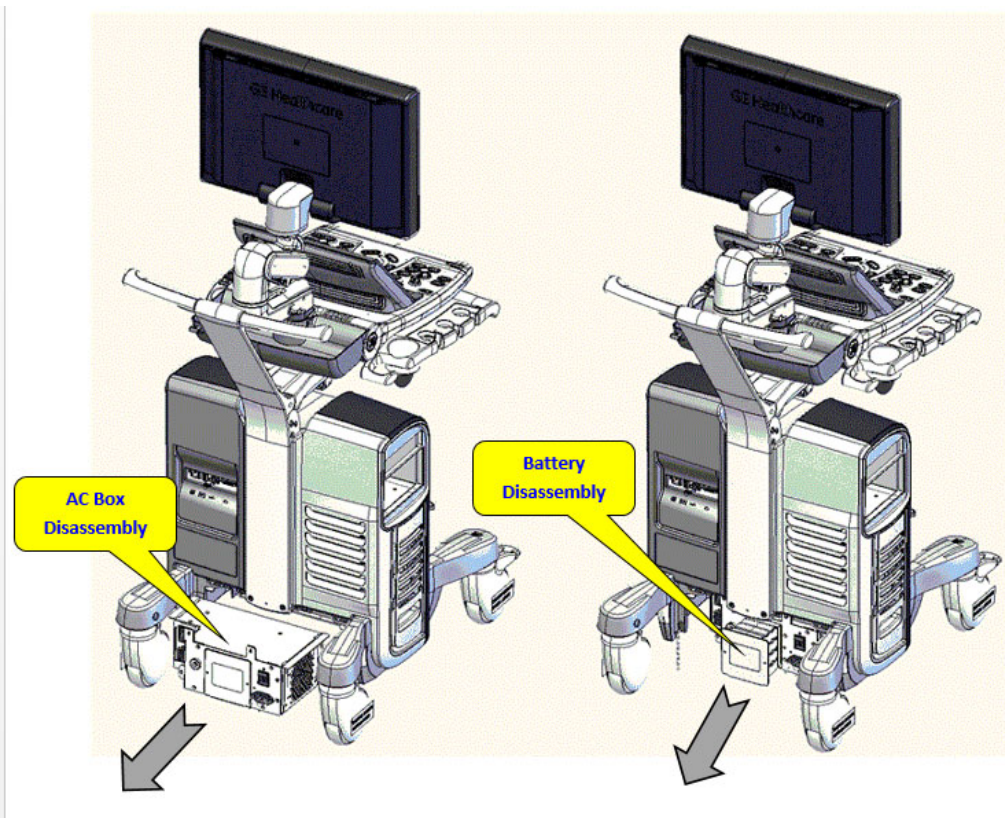


Figure 5-13 Modules Accessed from the Rear

## Section 5-7

### Top Console with Monitor, Operator Control Panel and Touch Screen

#### 5-7-1 Monitor (Main Display)

The display monitor is a super-wide 19" or 21.5" LCD screen.

To facilitate comfortable positioning for the operator, the height of the Main Display can be adjusted as required. Figure 5-3 on page 5-6 shows the Vivid™ S60N/Vivid™ S70N ultrasound scanner in the *up* and *down* positions.

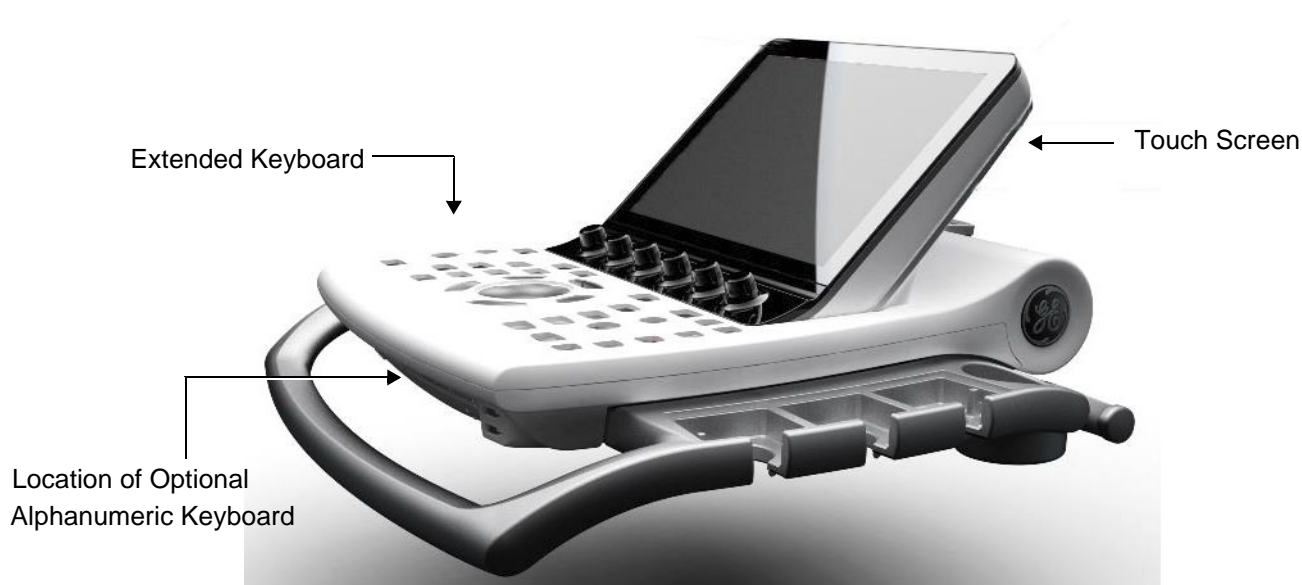
For optimal viewing, the screen angle is adjustable; tilting may be between +90° and -15°

In order to optimize the display settings, a light-sensing device (ambient light sensors) located on each side of the Monitor is used for measuring the ambient light. This data is processed by the main CPU which adapts the display setting, accordingly.

#### 5-7-2 Operator Control Panel and Speakers

The Vivid S60N/Vivid S70N Operator Control Panel (the OPIO module) comprises the following main components:

- Extended Keyboard
- Touch Screen - LCD multi-touch panel
- Alphanumeric Keyboard (optional)



**Figure 5-14 Operator Control Panel (without Alphanumeric Keyboard option)**

Contained within the Operator Control Panel are the following:

- Set of 24 hard-buttons and 11 rotaries (the Extended Keyboard)
- One 2" trackball
- Electronics and cables for the operation of the Touch Screen Module (Power, DP & USB)
- Set of 2 stereo speakers
- On/Off button (with one Status LED); one Battery Status LED

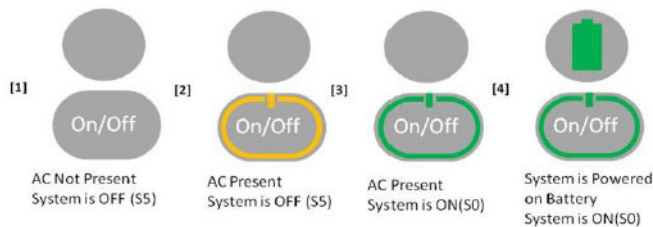


- USB 2.0 port (for use by user).
- 3 x Error LEDs (for system diagnostic purposes)
- Alphanumeric keyboard with physical keys (optional).
- Output connector for the powering the Main Monitor
- EEPROM - for retaining the module information (such as, serial number and revision number)

## 5-7-2-1 Keyboard and Operating Panel Components

### 5-7-2-1-1 Power ON/OFF Button and Power Status LEDs

The various states of Power ON/OFF and Battery indication status are illustrated in [Figure 5-16](#) below:



**Figure 5-16 Power ON/OFF and Battery Status Indicators**

### 5-7-2-2 Optional Alphanumeric Keyboard

The Alphanumeric Keyboard (A/N KB), which has physical keys, is mounted in a drawer under the Extended Keyboard.

When the A/N KB is not installed (basic configuration), a blank cover is mounted in order to hide the mounting area. This cover is removed when assembling the unit.

A/N KB communication is transferable via an internal dedicated USB cable to the OPIO.



Figure 5-17 Alphanumeric Keyboard

### 5-7-2-3 Extended Keys (Buttons)

The Extended Keyboard has 24 buttons (Extended Keys) that are backlit in two colors, as follows:

- White light - for visibility in the dark
- Green light - indicates activity

### 5-7-3 Touch Screen

The 12" Touch Screen, located above the Operating Panel, is a multi-touch module comprising the following main components:

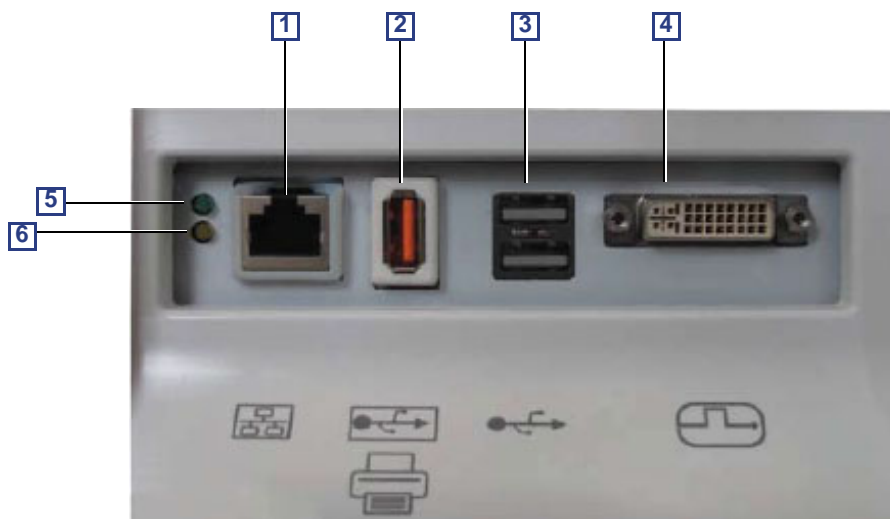
- LCD Panel
- LCD Controller
- Multi-Touch Surface
- Multi-Touch Controller
- Glass Layer

## Section 5-8

### Internal and External Input/Output

The Vivid™ S60N/Vivid™ S70N ultrasound scanner has a connection panel (located at the rear of the electronic cage) that can host the connections illustrated below.

Figure 5-18 shows a view of the Vivid S60N/Vivid S70N ultrasound system rear panel showing external peripheral/accessory connectors.



**Figure 5-18 View of the Vivid S60N/Vivid S70N Peripheral/Accessory Connector Panel**

- 1 Ethernet LAN connector — 1000 Base-TX Ethernet IEEE 802.3
- 2 Isolated USB connector (USB 1.0 only)
- 3 Dual USB connector
- 4 DVI-D Display OUT connector (DVI-I type with digital output only [DVI-D])
- 5 LED - Network activity
- 6 LED - Network activity

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## Section 5-9

### Front End Unit

#### 5-9-1 General Information

The Front End Unit, located in the door of the Electronic Cage (see [Figure 5-19](#) (v203)) comprises the following modules:

- **Front End Power Supply (FEPS)**
- **Minicsound MST (CMST) board (v203)** - includes the transmit and receive circuits
- **Probe Selector Module (PSB)**
- **Patient I/O Module (PATIO)**

## 5-9-2 Components in the Electronic Cage Assembly

Two Electronic Cage assemblies are in use:

- For ultrasound systems with software v203, see: [Figure 5-19](#)

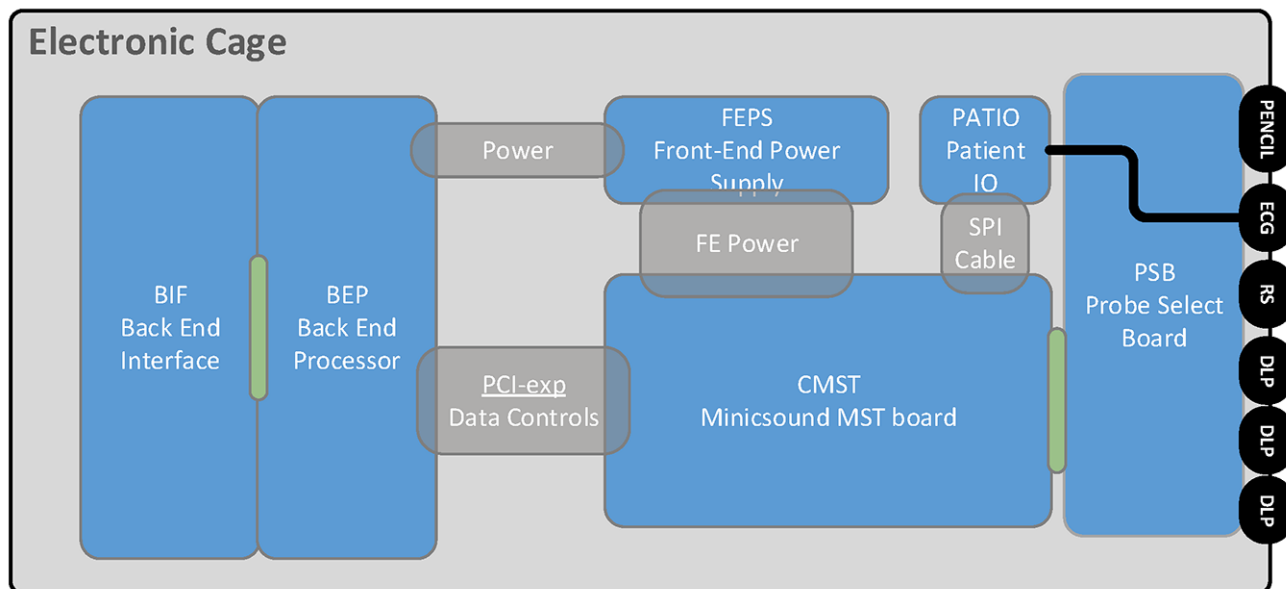


Figure 5-19 Location of Components in Electronic Cage Assembly - v203

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**5-9-3 Front End Power Supply (FEPS)**

The FEPS Module comprises the following sections:

- Low Voltage Power Supply (LVPS)
- High Voltage Power Supply (HVPS)

**5-9-4 Front End (cFE) Board**

The function of the cFE interface is to transmit/receive all the channels data signals to/from the four TRX32 boards assembled on the cFE board. In addition, it contains all the control and status lines required for HV MUX Setup, Probe selection and reading Probe status and information.

**5-9-5      Probe Selection Board (PSB)**

The Probe Selection Board (PSB) enables acquisition and processing of signals from and to probes connected to the front panel.

The main purpose of the PSB is to select the active probe and transfer the probe data to the cFE Board. The PSB provides a mechanical and electrical interface for 3 DLP probes, a single RS probe and a single pencil probe.

**5-9-5-1      Pencil Connector**

The PSB Pencil Connector supports use of pencil probes.

**5-9-6      Patient I/O Module****5-9-6-1      Patient I/O (PATIO) Module - Functional Description**

The PATIO module is part of the basic system configuration, and is responsible for the acquisition of the ECG and Respiratory Analog signal inputs.



## Section 5-10

### Back End Unit

#### 5-10-1 Introduction

The Back End Unit (BEU), which supports the operation of the Vivid™ S60/Vivid™ S70 ultrasound unit and is the main controller for the system, comprises the following modules:

- Back End Processing (BEP) Module
- Back End Interface (BIF) Module
- Hard Disk Drive

## Section 5-11 System Power Distribution

### 5-11-1 Introduction

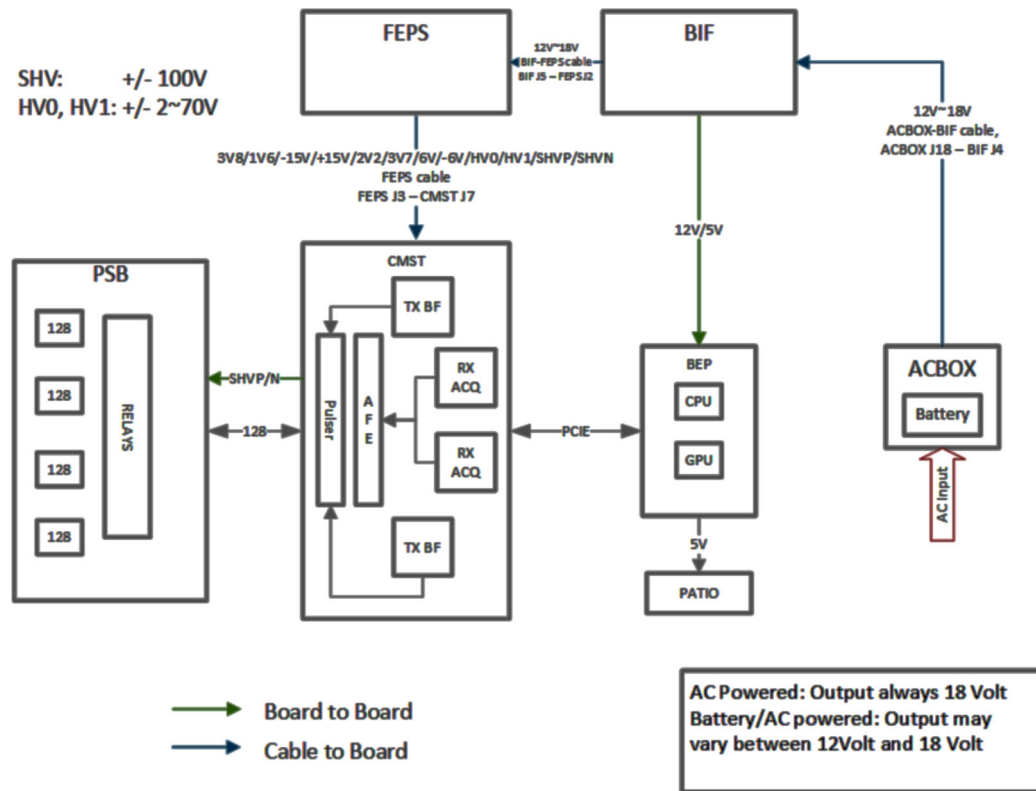


Figure 5-20 Power Distribution (R3 system illustrated)

The Vivid S60N/Vivid S70N system power distribution consists of the following modules:

- An Isolated AC/DC Power supply to all System modules (18v/400W) called the AC Box Unit (AC Distribution Box).
- Optional Battery that supplies Power to the system in the event of AC power failure (12-16.8v 150W).
- Non-Isolated AC Power supply to Integrated B/W Printer

---

## 5-11-2 System Power Management

The System Power Management is responsible for operating the system in different power states, in accordance with the power condition and User request.

## 5-11-3 Rechargeable Battery Pack

The rechargeable Battery pack is a smart battery device acting as a UPS and communicating with the Vivid™ S60N/Vivid™ S70N Ultrasound Scanner system over the SMBus.

The Battery pack contains protection circuitry, and a fuel gauge IC with internal memory to store pack configuration information, measurement calibration, coefficients, manufacturer's information, and chemistry data.

**NOTE:** *The Battery prevents uncontrolled system shut-down in the event of power loss, or if there is a need to transport the system without having complete Power Off/On cycle.  
In addition, the Battery enables fast return to scanning when AC power is resumed.*

**NOTE:** *The system cannot scan while AC power is not present.*

**5-11-3-1 Battery - General Safety Guidelines**

The lithium ion rechargeable battery provides a backup mechanism to the Vivid S60N/Vivid S70N system whenever an AC power source is not available. The battery module is supplied with a lithium ion rechargeable battery pack (GPA) installed in the battery bay, as standard.

The Vivid S60N/Vivid S70N has built-in charger functionality and switches automatically from battery operation to AC operation and *vice versa*.

When shutting down the system, leave the main power cable connected to keep the battery fully charged.

**NOTE:** *Before removing or inserting the Battery, perform system shut-down and disconnect the AC power cable from the Vivid™ S60N/Vivid™ S70N ultrasound scanner.*

**NOTE:** *The lithium ion technology used in the system's battery is significantly less hazardous to the environment than the lithium metal technology used in some other batteries.*

**NOTE:** *The battery is designed to be replaced every 2 years.*

 **CAUTION THE BATTERY IS DESIGNED TO WORK WITH VIVID™ S60N/VIVID™ S70N SYSTEMS ONLY. ONLY USE THE BATTERIES AUTHORIZED BY GE.**

- Do **not** disassemble or alter it. Charge the batteries only when the ambient temperature is between 0 °C and 65 °C (32 °F and 149 °F) and discharge the batteries between -10 °C and 55 °C (14 °F and 131 °F).
- Do **not** short-circuit the battery by directly connecting the battery terminals with metal objects.
- Do **not** heat the battery or incinerate.
- Do **not** expose the battery to temperature over 60 °C (140 °F). Keep it away from fire and other heat sources.
- Do **not** charge the battery near a heat source, e.g. fire or heaters.
- Do **not** leave the battery in direct sunlight.
- Do **not** pierce the battery with a sharp object, hit it, or step on it.
- Do **not** use a damaged battery. Do not solder a battery.
- Do **not** connect the battery to an electrical outlet.
- Do **not** immerse the battery in water or allow it to get wet.
- Do **not** put the battery into a microwave oven or pressurized container. If the battery leaks or emits an odor, remove it from all possible flammable sources.
- If the battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, recharging or storage, immediately remove it and stop using it.
- If you have any questions about the battery, consult GE or your local representative.

**Recommended storage conditions of battery pack:**

**Short term** (less than one month): 0 °C (32 °F) to 50 °C (122 °F)

**Long term** (more than three months): 10 °C (50 °F) to 35 °C (95 °F).

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## Section 5-12

### Cooling System

#### 5-12-1 General Information

##### 5-12-1-1 Vivid S60N/Vivid S70N system with software v203

The system has one fan (Main Fan) for system cooling. It is controlled by software and has variable speed. In addition it has the AC Distribution Box Fan, located on the side of the AC Distribution Box.

All fans are controlled by software and have variable speed.

##### 5-12-1-2 Cooling Requirements

The cooling requirement for the Vivid S60N/Vivid S70N with monitor and on board peripherals, is up to 2000 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.*

## Section 5-13 Peripherals

### 5-13-1 Internal Peripheral

#### 5-13-1-1 Black & White Digital Graphic Printer

The B/W Printer, available as an option, is located on the *right* side of the Vivid™ S60N/Vivid™ S70N ultrasound scanner.

### 5-13-2 External Peripherals

#### 5-13-2-1 Footswitch

A three-button, wired footswitch can be connected to one of the USB ports at the rear side of the Vivid S60N/Vivid S70N.

**CAUTION**

To avoid damage of the cable, keep the cable away from the wheels.

Disconnect the footswitch before moving the ultrasound system.

#### 5-13-2-2 External Color Printer (option)

A color video printer can be connected to the USB port on the rear of the Vivid S60N/Vivid S70N.

#### 5-13-2-3 USB Flash Drive (USB Flash Card) (option)

Due to the EMC requirements, only USB Flash Cards tested for use with Vivid S60N/Vivid S70N may be used.

#### 5-13-2-4 Ethernet

Ethernet (TCP/IP) is connected to the I/O panel (BEP I/O board) on the rear of the Vivid S60N/Vivid S70N.

Printers and external servers may be available via the Ethernet network.

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## Section 5-14

### Service Desktop - v203

The Service Desktop is an interface that provides access to system information, status and diagnostics. The Service Desktop has different content or views depending on the access level. The access level is determined by the user profile as well as the service options enabled on the Vivid™ S60N and Vivid™ S70N.

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

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# Chapter 6

## Service Adjustments

### Section 6-1 Overview

**6-1-1      Purpose of Chapter 6**

This chapter explains that there are no service adjustments required on a Vivid™ S60N/Vivid™ S70N ultrasound scanner.

**6-1-2      Contents in this Chapter**

Power Supply Adjustments ..... 6-2

Monitor Adjustments. .... 6-2

Touch Panel adjustments ..... 6-3

## Section 6-2 Power Supply Adjustments

There are no adjustments on the power supply.

The DC Power is self-regulated.

If a voltage is outside the specified range, it means that something is wrong, either with the power supply itself or with one (or more) of the units connected to that specific power outlet.

When an error occurs, the power will be turned OFF immediately.

## Section 6-3 Monitor Adjustments

There are no service adjustments required on the monitor.

The User can adjust Contrast & Brightness, to accommodate user preference for gray-scale visualization under variable ambient light conditions.

### 6-3-1 Using monitor adjustment touch panel controls

- 1.) Activate the main menu on the touch panel.
- 2.) Tap the **LCD setup tab**. The touch-panel will display several screen adjustments controls. These screen controls allow the user to optimize the screen settings.

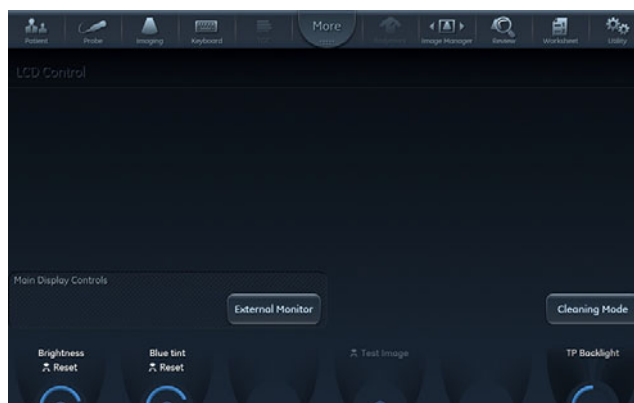


Figure 6-1 LCD adjustment utility

#### 6-3-1-1 Brightness Rotary

This is the main control to adjust screen brightness to compensate for different ambient light.

In a totally dark room it is recommended to set brightness down all the way.

**6-3-1-2 External screen button**

Activate this button when connecting the system to an external display. It will allow you to optimize Contrast / Brightness and blue-tint to suit the particular external display.

*NOTE: At this state, a rotary selector will appear allowing to optimize for the monitor type used: sRGB, GSDF or CRT.*

When the button is de-activated, the previous settings that were optimized for the internal display will be restored.

**6-3-1-3 External Monitor Output Resolution Adjustment**

For instructions to adjust the resolution on an external monitor, refer to: [External Monitor Output Resolution Adjustment](#) on page 3-73.

## Section 6-4 Touch Panel adjustments

There are no service adjustments required on the Touch Screen.

The touch panel setup screen contains a rotary controller to adjust the brightness of touch panel.

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# Chapter 7

## Diagnostics/ Troubleshooting

### Section 7-1 Overview

#### 7-1-1 Purpose of Chapter




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

**Table 7-1** Contents in Chapter 7

Section	Description	Page Number
7-1	Overview	7-1
7-2	Service Safety Considerations	7-2
7-3	Gathering Troubleshooting Data	7-3
7-4	Screen Captures	7-5
7-5	Service desktop	7-9
7-6	Noise Troubleshooting	7-27

## Section 7-2

### Service Safety Considerations

-  **DANGER** DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.
-  **WARNING** *IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID S60N/VIVID S70N SYSTEM, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.*
-  **WARNING** *USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.*

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## Section 7-3

### Gathering Troubleshooting Data

#### 7-3-1 Purpose of this Section

Problem images and system data (logs) can be acquired at the Ultrasound system or through service remote connectivity. Use this data to perform service at the Ultrasound system, or to send it back to the manufacturer for analysis.

#### 7-3-2 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 = Vivid S60N or Vivid S70N

##### Software v203:

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

Under **Application Software**, record:

- Software Version
- Software Revision
- Software Part Number
- Build Name
- Build View
- Build Date

Under **System Software**, record:

- System Software Part Number
- System Software Date

### 7-3-3 Collecting a screen capture with logs

If the system should malfunction, simultaneously press the **Alt+D** keys. This will collect a screen capture of the 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 (screen dump).

The 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 of the issue
- a check box to indicate a System lockup
- a choice to Export to a pre-formatted removable media or save to the Export directory D: drive (for remote viewing through InSite).

**NOTE:** You **MUST** select one of the available devices as the destination device if it is to be different than the default Export directory on the hard drive.

The screen capture is a bitmap which eliminates the possibility of artifacts from compression.



- |   |   |
|---|---|
| 1. Type description of issue here                       | 5. Progress bar   |
| 2. Select if you've had a system lockup (after restart) | 6. See: <a href="#">Advanced Log Options on page 7 - 4.</a> |
| 3. Select where to store the report                     | 7. See: <a href="#">Advanced Log Options on page 7 - 4.</a> |
| 4. Select this button when ready to Save and Export     | 8. Exit   |

**Figure 7-1 System Problem Reporting (ALT+D dialog box)**

#### 7-3-3-1 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.



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## Section 7-4 Screen Captures

### 7-4-1 Purpose of this Section

To capture screen images that can be used for diagnostic and troubleshooting purposes.

### 7-4-2 Ctrl+PrintScreen Shortcut

A Ctrl+PrintScreen shortcut is available for quickly capturing the image displayed on the system. Images captured using this shortcut are saved in the D:\export directory using both the JPEG (.jpg) and raw DICOM (.dcm) formats.

The InSite connection will have access to the export folder on the "D:" drive to retrieve these images. This feature will allow the customer to quickly and easily acquire images that can then be viewed by the Online Centre (OLC).

### 7-4-3 Collecting a screen capture with logs (v203)

If the Ultrasound system malfunctions, simultaneously press the **Alt+D** keys. Alt+D is available at all times and collects a screen capture of the image monitor, user-defined presets, and these logs:

- Keyboard Shadow Log (protected information)
- Error Logs
- Crash Log (protected information)
- Vital Product Data
- DICOM Logs
- Windows Event Logs
- Windows Modem Log
- Diagnostic Logs
- Service Logs

## 7-4-3 Collecting a screen capture with logs (v203) (cont'd)



Figure 7-2 ALT+D Dialog Box

When **Alt+D** is pressed, a dialog box opens. Enter the following information:

- System ID serial number
- Software version
- System date and time of occurrence
- Sequence of events leading to issue
- Whether the issue is repeatable
- Imaging mode, probe, preset/application
- Media brand, speed, capacity, and type
- To authorize the collection of protected information, check **Include Protected Information, requires Admin privileges**. If this box is checked, the system creates two log files with the following format name:
  - log\_<SN>\_<DATE>\_<TIME>\_DB.zip
  - log\_<SN>\_<DATE>\_<TIME>\_ProtectedInfo\_DB.zip

Where <SN> is the serial number, <DATE> is the date in format YYMMDD and <TIME> is the time in format HHMMSS.

- To include a duration, check **Time Duration** and select a duration from the pull-down.
- Under **Destination**, select a storage media or Service directory for remote viewing.
- Click the **Store** button.

**NOTE:** To save to a CD/DVD or USB Flash Drive, you **MUST** select CD/DVD Recordable or USB drive as the destination device, otherwise the data is written to the default Export/Service directory on the hard drive. The Export/Service directory is only used for remote service and is not intended for images or report storage use.

For a CD/DVD, the Ultrasound system automatically formats an un-formatted disk, gathers logs and writes it out to the disk.

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

Double check the media that you made to ensure it contains the file.

## 7-4-3 Collecting a screen capture with logs (v203) (cont'd)

### 7-4-3-1 Mark log files

If a customer is experiencing issues during operation, mark the issue by pressing **Alt+1** or **Alt+2** when the event occurs. When **Alt+1** or **Alt+2** is pressed, a marker is placed in the log to aid analysis.

### 7-4-3-2 Trouble image without patient information

To collect a trouble image you need to enable **Transfer Images (captured without patient information) to GE** under **ADMIN > System Admin**.

To collect the image, press the **P1** key (copy to hard drive). This places an unidentified .jpeg image in the D:\Log\DL folder. This folder will be transferred to the back office if a transfer is scheduled.

To collect logs using **Gather Logs**, the image or images will be captured in the log collection Zip file and will be deleted from the D:\Log\DL folder.

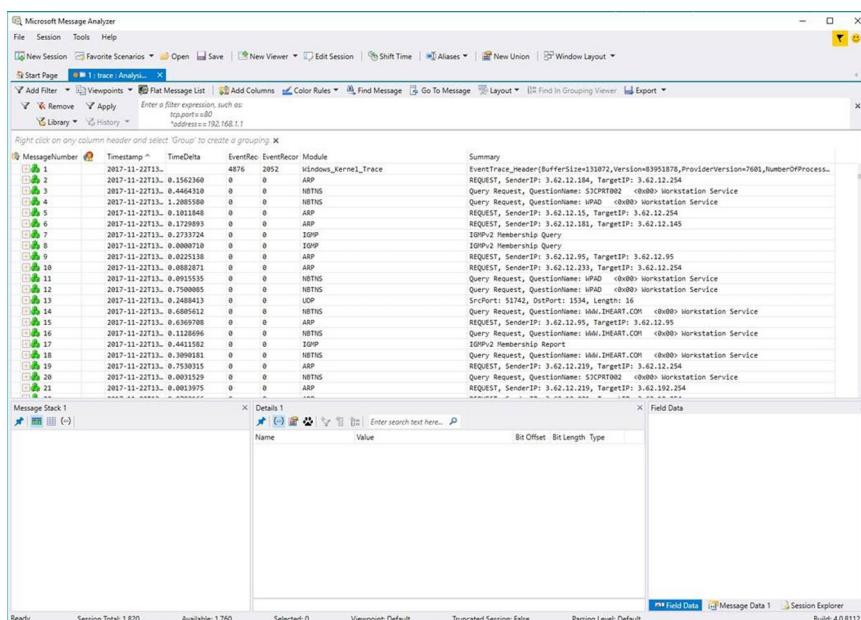
## 7-4-4 Capturing network logs to use for troubleshooting (v203)

Use the **Network Capture** utility to capture network logs. Once the logs are captured and extracted from the system, use Microsoft Message Analyzer to convert the output, and then Wireshark (or some other network sniffer) to analyze it.

**To troubleshoot network capture logs:**

- 1.) On the Vivid™ S60N and Vivid™ S70N, run the **Network Capture** utility to generate .etl and .cab files for analysis. For more information, see ["Network Capture" on page 7-24](#).
- 2.) Locate the .etl file at D:\Service.
- 3.) Transfer these files to a laptop.
- 4.) On the laptop, download Microsoft Message Analyzer (if not already done).
- 5.) In Microsoft Message Analyzer, open the .etl file.

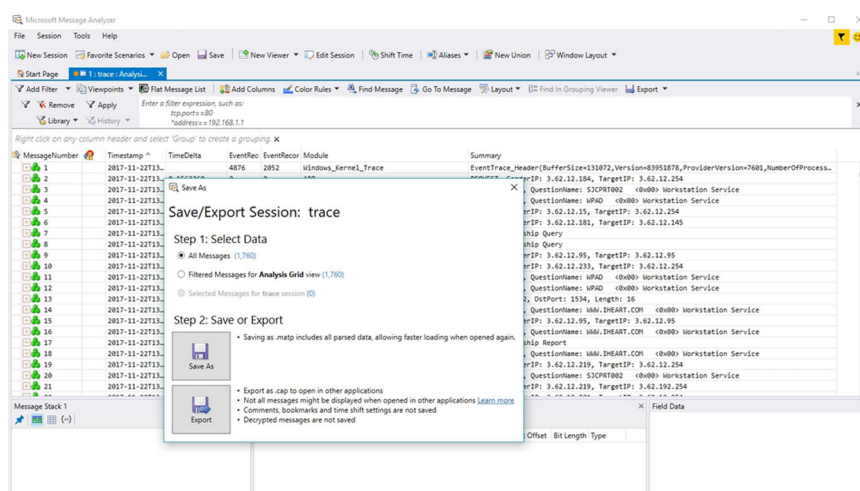
If the DICOM connection is encrypted, you will not be able to see the contents of the packets. Microsoft Message Analyzer does not have a plug-in to decode DICOM packets.



## 7-4-4

## Capturing network logs to use for troubleshooting (v203) (cont'd)

6.) To export the .etl file to .cab, select **File > Save As** and then select **Save As** or **Export**.



If the network capture was of a wireless connection, Microsoft Message Analyzer creates a .pcap file that does not have any of the packets and is probably useless.

7.) Use Wireshark or some other third-party network sniffer to examine the cab file.

---

## Section 7-5

### Service desktop

#### 7-5-1 Purpose of this section

This section describes the features of the Service desktop. These are the different levels of access to the Service desktop:

- Service Basic access (Class A) – a user locally logged into the machine with Local Service Access privilege. This level provides limited access to Service desktop widgets and utilities.
- Service Expert, Pro, and Advanced access (Class C) Local – Depending on the purchase level, includes an option string to control access.
- GE Service access (Class M) and an SSA key. For users with local Service Access privileges, this level provides unrestricted access to all Service desktop widgets and utilities.
- Remote access – a user remotely accessing the Vivid™ S60N and Vivid™ S70N. This level provides unrestricted access to all Service desktop widgets and utilities. Disruptive mode is limited to the user access privileges to Remote Service Access.

## 7-5-2 Disruptive mode (v203)

Disruptive mode is a way to control interruptions to operation of the Vivid™ S60N and Vivid™ S70N. Disruptive mode is required whenever service performs a function that may disrupt a normal scan. Activating Disruptive mode results in a red message displayed on the task bar. This message indicates that the Vivid™ S60N and Vivid™ S70N needs to be restarted once the service activity is complete. The message remains until the Vivid™ S60N and Vivid™ S70N is restarted. This prevents patient scanning while the Vivid™ S60N and Vivid™ S70N is not operating at an optimal status. For example, running a diagnostic may leave the Vivid™ S60N and Vivid™ S70N in a state that is not good for imaging.

Specifically, Disruptive mode is required to run diagnostics, clean presets, and reset the patient database, and turn on Virtual Console Observation (VCO).

- When Disruptive mode is On, all service functionality on the Service desktop is allowed but user operation of the Vivid™ S60N and Vivid™ S70N may be limited.
- When Disruptive mode is Off, some service functionality on the Service desktop is not available and user operation of the Vivid™ S60N and Vivid™ S70N is normal.

Additionally, the ability to enable Disruptive mode depends on the logged in user.

- Local user – a user locally logged into the machine will be able to set the Vivid™ S60N and Vivid™ S70N to Disruptive mode or allow a Disruptive mode request from a remote user through the Service desktop. The local user must have Authorize Remote Service Access to allow Disruptive mode. If the local user does not have this right, the remote user's request will be automatically denied.
- Remote user – a user remotely accessing the Vivid™ S60N and Vivid™ S70N will not be able to automatically switch Disruptive mode to On. The logged in user (user actually logged on to the Vivid™ S60N and Vivid™ S70N) needs to have the ability to grant remote access. The logged in user will be notified through a dialog box and asked to allow Disruptive mode.

**NOTE:** *Change Password and Disk Defragment are not available for the remote user whether Disruptive mode is On or Off.*

## 7-5-3 Color statuses

Throughout the Service desktop, colors indicate the following:

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

---

## 7-5-4 Licenses (v203)

With Service Basic Access (Class A), these are the available options:

- HOME
- Utilities
  - Change Password
  - Data Transfer
  - Delete Files
  - Gather Logs
  - Network Capture
  - SSA License
  - Third Party Licenses
- Options
- Agent Configuration

With Service Advanced (Class C), these are the available options:

*NOTE: With a Class C license, options display according to these purchased level of access.*

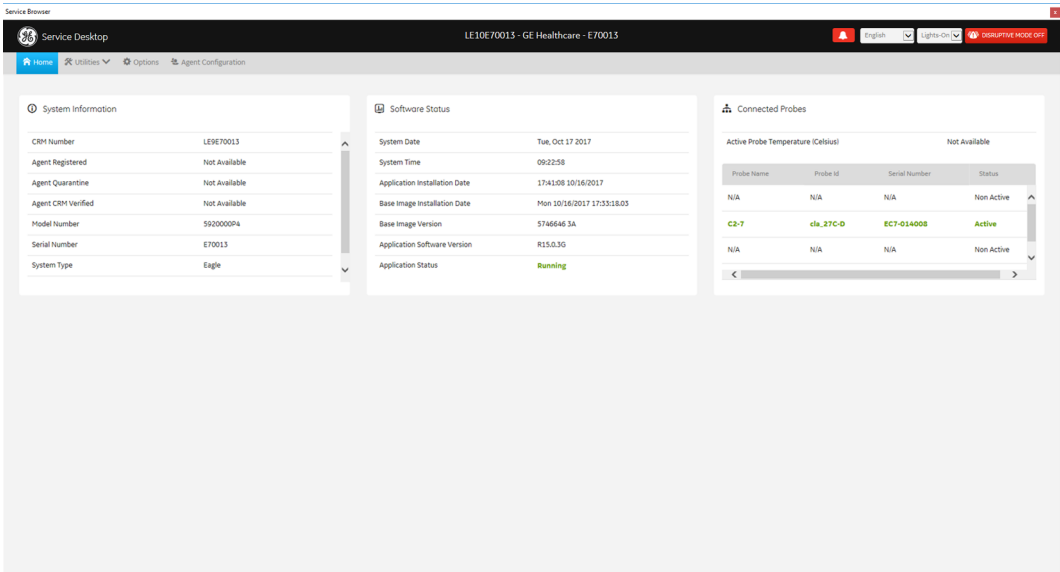
- HOME
- Diags
- DICOM
- Utilities
  - Change Password
  - Checkpoints
  - Data Transfer
  - Delete Files
  - Disk Defragment
  - Disruptive Mode Utility
  - Gather Logs
  - Network Capture
  - SSA License
  - System Shutdown
  - Third Party Licenses
  - Virtual Console Observation
- Options
- Agent Configuration

With Service Advanced plus Service Expert (Class C), the Clean Userdefs, Reset Patient Database, and Software Reload utilities are added to the Service Advanced options listed.

With Service Advanced and Service Expert plus Service PRO (Class C), the probe assessment tool (cPAT) diagnostic is added to the Service Advanced and Service Expert options listed.

7-5-5 Home (v203)

Figure 7-3 Home with Class A Access (example)





## System Information

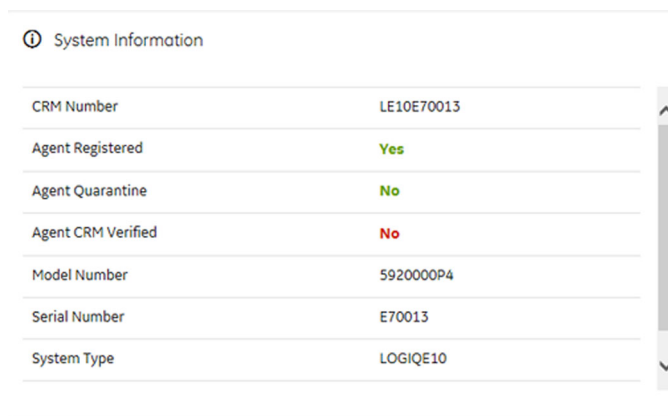
**System Information** displays general information about the Vivid™ S60N and Vivid™ S70N. When the Vivid™ S60N and Vivid™ S70N has been successfully configured with the back office, these elements will have the corresponding values:

- **Agent Registered** will be **Yes**
- **Agent Quarantine** will be **No**
- **Agent CRM Verified** will be **Yes**

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

To access **System Information**, navigate to **Utility > Service > Home**.

**Figure 7-4 System Information**



The screenshot shows a web interface titled "System Information" with an information icon. Below the title is a table with the following data:

CRM Number	LE10E70013
Agent Registered	Yes
Agent Quarantine	No
Agent CRM Verified	No
Model Number	S920000P4
Serial Number	E70013
System Type	LOGIQE10

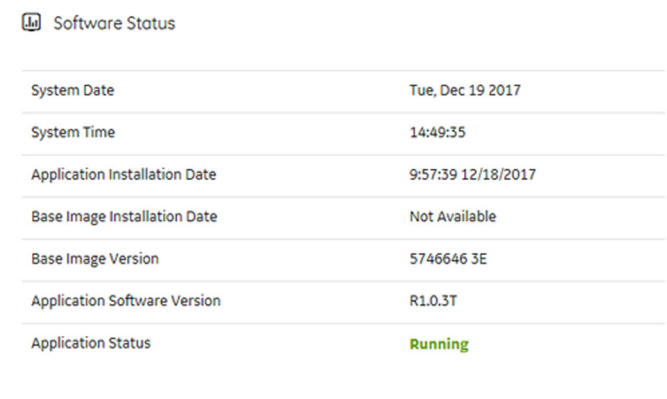
## Software Status

Use **Software Status** to view general information about the software installed on the Ultrasound system.

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

To access **Software Status**, navigate to **Utility > Service > Home**.

**Figure 7-5 Software Status**



Software Status	
System Date	Tue, Dec 19 2017
System Time	14:49:35
Application Installation Date	9:57:39 12/18/2017
Base Image Installation Date	Not Available
Base Image Version	5746646 3E
Application Software Version	R1.0.3T
Application Status	Running

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

**Table 7-2 Software Status**

Element	DESCRIPTION
System Date	Current date in the format <day>, <month> <date> <year>.
System Time	Local time based on the last time the system desktop was refreshed in the format <hh:mm:ss>.
Application Installation Date	Date the application software was installed. The application software includes the Vivid™ S60N and Vivid™ S70N product-specific software.
Base Image Installation Date	Date the base image software was installed. The base image software includes the Windows operating system and other supporting software.
Base Image Version	Version number of the base image software.
Application Software Version	Version number of the application software.
Application Status	Status of the application. Valid values are: <ul style="list-style-type: none"> <li>Running</li> <li>Stopped</li> </ul>

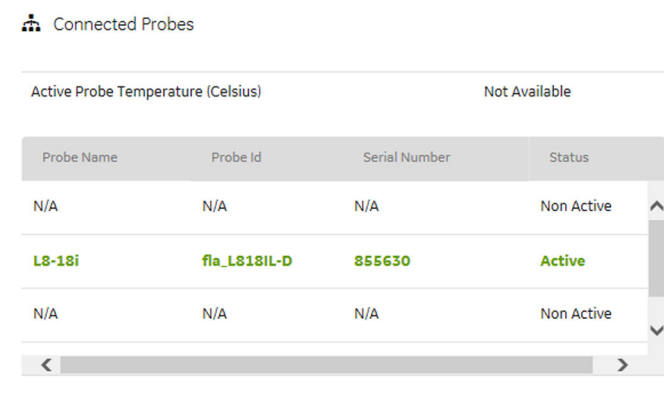
## Connected Probes

**Connected Probes** shows probes connected to the Vivid™ S60N and Vivid™ S70N. The order on the user interface is top down matching the left-to-right order on the Vivid™ S60N and Vivid™ S70N.

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

To access **Connected Probes**, navigate to **Utility > Service > Home**.

**Figure 7-6 Connected Probes**



Connected Probes			
Active Probe Temperature (Celsius)		Not Available	
Probe Name	Probe Id	Serial Number	Status
N/A	N/A	N/A	Non Active
L8-18i	fla_L818iL-D	855630	Active
N/A	N/A	N/A	Non Active

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

**Table 7-3 Connected Probes**

Element	DESCRIPTION
Active Probe Temperature (Celsius)	When available, temperature of the active probe. Not all probes report temperature. The most common probe to report temperature is the TEE probe.
Probe Name	Name of the probe connected to the Vivid™ S60N and Vivid™ S70N.
Probe ID	Identifier of the probe connected to the Vivid™ S60N and Vivid™ S70N.
Serial Number	Serial number of the probe connected to the Vivid™ S60N and Vivid™ S70N. If the serial number of the probe is not available, then <b>N/A</b> displays.
Status	Statuses of the probe connected to the Vivid™ S60N and Vivid™ S70N. Valid values are: <ul style="list-style-type: none"> <li>Active</li> <li>Non Active</li> </ul>

**7-5-6 Utilities**

**Utilities** configurations vary depending upon the service class.

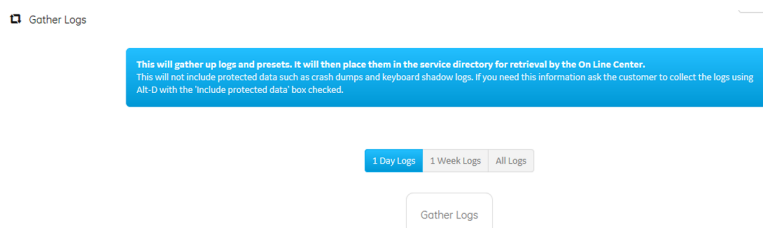
## Gather Logs

**Gather Logs** provides a way to collect system logs and place the log files in the D:\Service directory for retrieval by the online center. These log files do not include protected data such as crash dumps and keyboard shadow logs. The customer can collect logs (including protected data) using Alt+D when Protected Data is checked. Log files are compressed into a .zip file and the file path and name display. If the application software is not running, use the **Gather Logs** shortcut on the Windows desktop.

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

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

**Figure 7-7 Gather Logs**



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

**Table 7-4 Gather Logs**

Element	DESCRIPTION
1 Day Logs	When selected, gathers log files for one day.
1 Week Logs	When selected, gathers log files for one week.
All Logs	When selected, gathers all available log files.
Gather Logs	Select to gather the log files for the selected time period.

### To gather log files:

- 1.) Navigate to **Utility (second page) > Service > Utilities > Gather Logs**.
- 2.) Select one of the following:
  - 1 Day Logs
  - 1 Week Logs
  - All Logs
- 3.) Click **Gather Logs**. In the resulting dialog box, record the location of the log files and click **OK**.
- 4.) When the gather log operation is complete, click the notification icon in the banner to view the location of the log files.



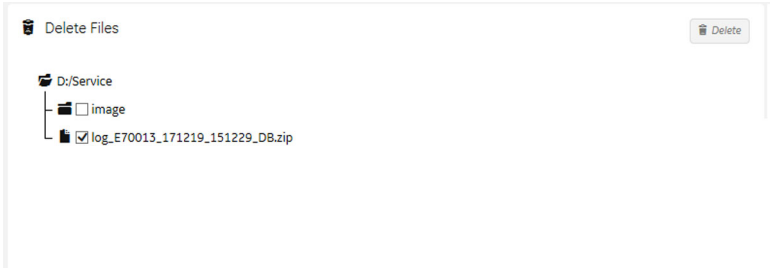
Delete Files

**Delete Files** displays all the files and folders present in the D:\Service folder and allows for their deletion. Deleting unneeded files improves performance and reduces the need to defragment the disk drive.

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

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

Figure 7-8 Delete Files



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

Table 7-5 Delete Files

Element	DESCRIPTION
Delete Files	Displays the files that are available for deletion.
Delete	Deletes the selected files.

To delete files:

- 1.) Navigate to select **Utility (second page) > Service > Utilities > Delete Files**.
- 2.) Under **Delete Files**, select the available folders and files that you want to delete.
- 3.) Click **Delete**.
- 4.) In the resulting dialog box, click **Delete** and then click **OK**.

## Change Password

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



**CAUTION** ***RISK OF LOSING DATA.***

***IF THE PASSWORD IS LOST, GE WILL NOT BE ABLE TO RECOVER OR RESET IT. LOSS OF A PASSWORD MAY RESULT IN THE LOSS OF PATIENT DATA.***

The information on **Change Password** is available to all service class licenses. **Change Password** is not available through a remote connection.

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

**Figure 7-9 Change Password**

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

**Table 7-6 Change Password**

Element	DESCRIPTION
User Type	Type of user for the password reset.
New Password	Password
Confirm Password	Password
Update Password	Select to update the password.
Reset	Select to reset the information.

**To change the password:**

- 1.) Navigate to **Utility (second page) > Service > Utilities > Change Password**.
- 2.) Under **User Type**, select the user.

NOTE: Before changing the GEService password, make sure the Vivid™ S60N and Vivid™ S70N is connected to the network and the agent is configured. The GEService password is used to perform portions of remote service. If the password is changed and the system information is not updated, it may slow down remote service. Both file transfer and SSH depend on the GEService password.

- 3.) In **New Password** and **Confirm Password**, enter the new password.

**CAUTION RISK OF LOSING DATA.**

***GE WILL NOT BE ABLE TO RECOVER OR RESET CHANGED PASSWORDS.  
SECURELY RECORD THE NEW PASSWORD.***

- 4.) Click **Update Password**.
- 5.) When a SVCService user password has been changed, reboot the Vivid™ S60N and Vivid™ S70N to reflect the password change.



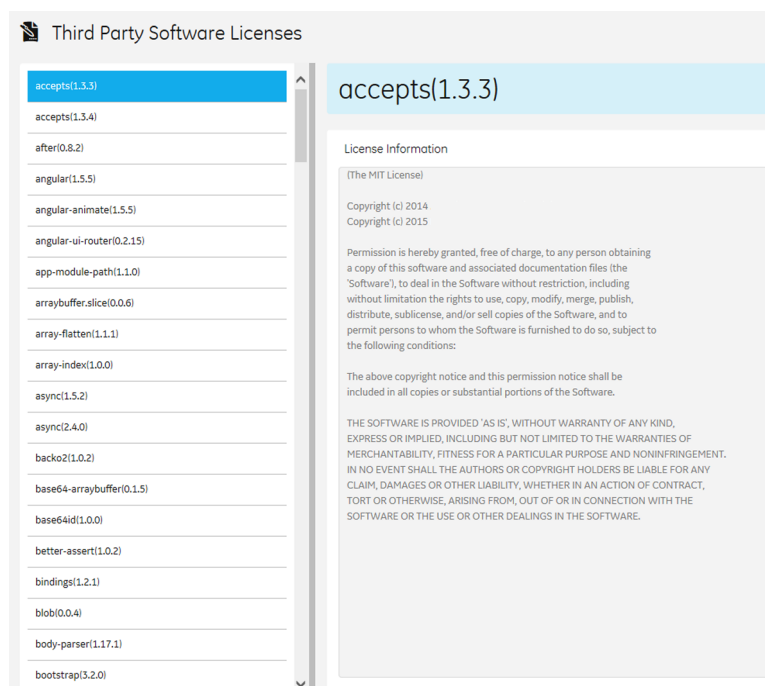
## Third Party Software Licenses

**Third Party Software Licenses** displays the third-party software licenses used as part of the service platform.

The information on **Third Party Software Licenses** is available to all service class licenses.

To access **Third Party Software Licenses**, select **Utility (second page) > Service > Utilities > Third Party Software Licenses**.

**Figure 7-10 Third Party Software Licenses**



## Data Transfer


**Data Transfer** provides a way to do the following:

- View information about past transfers of (APM) information.
- Set up automatic/scheduled transfer of allowed data files from the Vivid™ S60N and Vivid™ S70N to the server.
- Manually transfer data files allowed data files from the Vivid™ S60N and Vivid™ S70N to the server.

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

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

**Figure 7-11 Data Transfer**

 Data Transfer

Type of Upload	Upload Permission	Last Upload Status	Last Upload Attempt	Last Successful Attempt
Never Identifiable Images	No	NA		
Monitoring Logs	Yes	Success	Dec 19, 2017 11:17:41 AM	Dec 19, 2017 11:17:41 AM
System Logs	Yes	Success	Dec 19, 2017 11:17:44 AM	Dec 19, 2017 11:17:44 AM
User Information	No	NA		
System Configurations	Yes	Success	Dec 19, 2017 11:17:45 AM	Dec 19, 2017 11:17:45 AM
User Configurations	Yes	Success	Dec 19, 2017 11:17:46 AM	Dec 19, 2017 11:17:46 AM
Other logs	Yes	Success	Dec 19, 2017 11:17:54 AM	Dec 19, 2017 11:17:54 AM
Windows logs	Yes	Success	Dec 19, 2017 11:18:30 AM	Dec 19, 2017 11:18:30 AM

☒ Scheduler

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

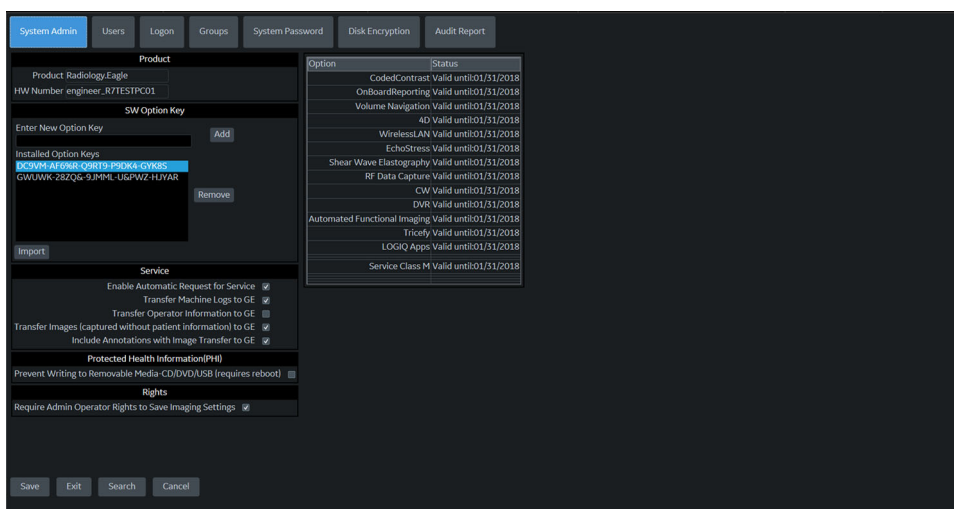
This table shows all the elements available on **Data Transfer** with descriptions.

**Table 7-7 Data Transfer**

Element	DESCRIPTION
Type of Upload	Type of log file. For example, <b>Incremental Logs</b> or <b>Full Logs</b> . <b>Monitoring Logs</b> , <b>System Logs</b> , and <b>Windows Logs</b> are incrementally transferred when automatic transfer is enabled. To enable automatic transfer, navigate to <b>System Admin</b> and, under <b>Service</b> , check <b>Enable Automatic Request for Service</b> .
Upload Permission	Whether the permission to upload the log file is allowed or not.
Last Upload Status	Whether the last log file upload was successful or not.
Last Upload Attempt	Date and time the last log file upload was attempted.
Last Successful Upload	Date and time the last log file was successfully uploaded.
Scheduler	When selected, enables the related day selections. For example, <b>All Days</b> , <b>Monday</b> , and <b>Tuesday</b> .
Save Settings	Saves the information.
Send All	Manually send the selected log files to the server.

**To configure automatic data transfers:**

- 1.) Navigate to **ADMIN > System Admin**.



- 2.) On **System Admin**, configure these settings:
  - **Transfer Machine Logs to GE** – Default is checked
  - **Transfer Operator Information to GE**
  - **Transfer Images (captured without patient information) to GE** – Default is checked.
- 3.) Click **Save**.
- 4.) Navigate to **Utility (second page) > Service > Utilities > Data Transfer**.
- 5.) On **Data Transfer**, select **Scheduler**, and then select the days to perform the data transfer.
- 6.) Click **Save Settings**.
- 7.) To manually perform a data transfer, click **Send All**.

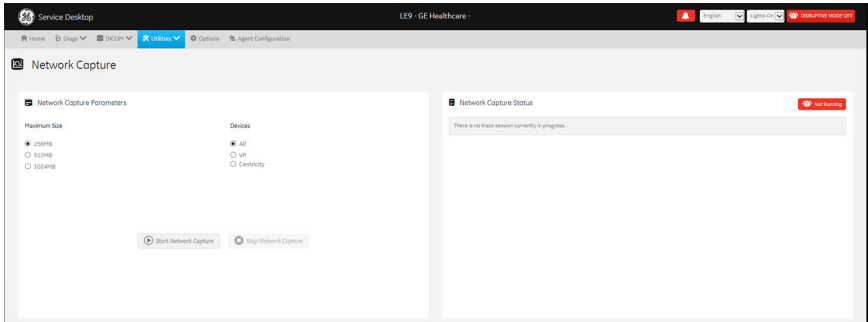
Network Capture

**Network Capture** displays network traffic between the Vivid™ S60N and Vivid™ S70N and configured devices. A network capture outputs two log files: one for main logging with no protected information and another including protected information. These log files are useful when debugging connectivity issues. Because these log files can be large, they are only kept for one week.

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

To access **Network Capture**, select **Utility > Service > Utilities > Network Capture**.

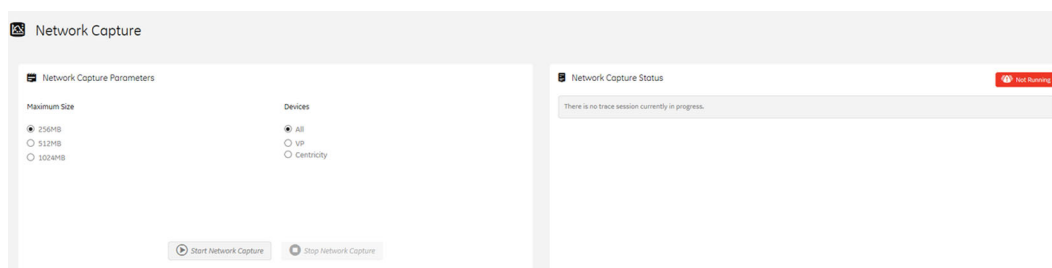
Figure 7-12 Network Capture



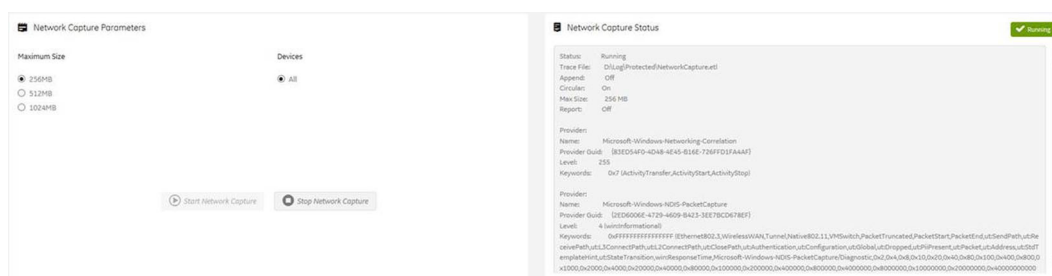
This table shows all the elements available on **Network Capture** with descriptions.

Table 7-8 Network Capture

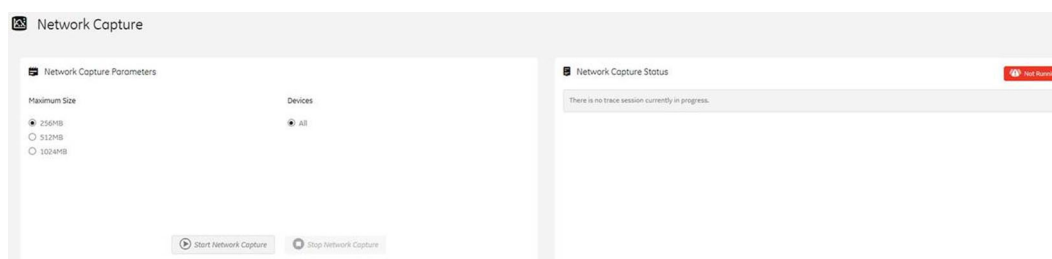
Element	DESCRIPTION
<b>Network Capture Parameters</b>	
Maximum Size	Allowed size of the generated log file. Valid value are: <ul style="list-style-type: none"><li>• 256MB</li><li>• 512MB</li><li>• 1024MB</li></ul>
Devices	DICOM-configured devices for which you want to capture information. If no additional devices are configured, only All will be available.
Start Network Capture	Select to start the process. This causes the network capture to start, enables the <b>Stop</b> button, and updates the <b>Network Capture Status</b> pane and changes the Status to <b>Running</b> .
Stop Network Capture	Select to stop the process.
<b>Network Capture Status</b>	
	Displays information about the status of the network capture. The language setting for this information is set in Windows and not through the Service desktop or Vivid™ S60N and Vivid™ S70N application software.
	Displays the current status of the network capture. Valid values are: <ul style="list-style-type: none"><li>• Not Running</li><li>• Running</li></ul>

**To perform a network capture:****1.) Navigate to Utility > Service > Utilities > Network Capture.****2.) From Network Capture, do the following:**

- Under **Maximum Size**, select the allowed size of the generated log file.
- Under **Devices**, select the DICOM-configured device for which you want to capture information. If no additional devices are configured, only **All** will be available.

**3.) Select Start Network Capture to start the process. This causes the network capture to start, enables the Stop button, and updates the Network Capture Status pane and changes the Status to Running.****4.) Click the Stop button to end data collection. Stopping is a two-step process:**

- Stops the data collection and immediately closes the .etl file.
- Collects additional diagnostic data that may help diagnose network issues. When the file is closed, you see "There is no trace session currently in progress". When the remaining data is collected and the .cab file is closed, you are notified in the banner.



7-5-7 Options

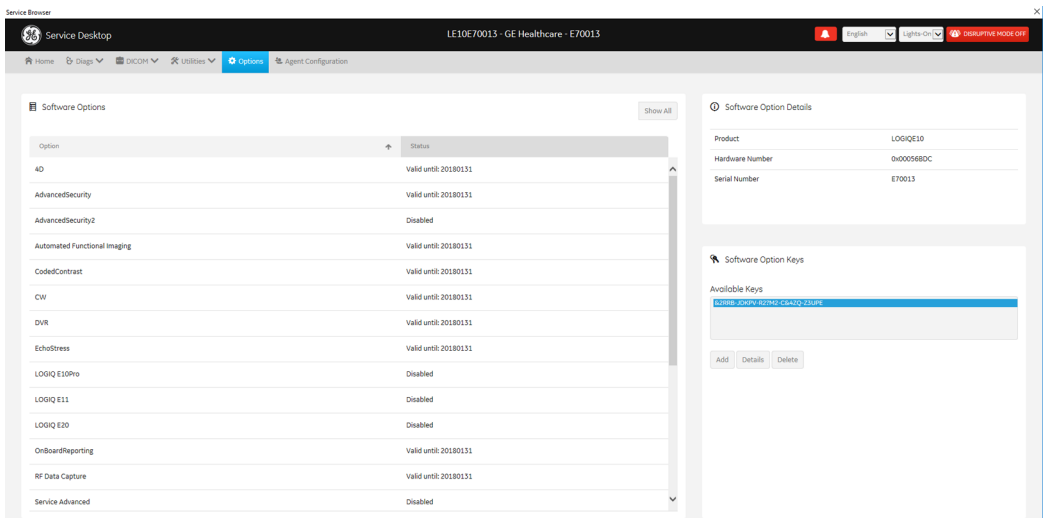
Use **Options** to:

- View software options.
- View software option details.
- Add (or delete) a valid option key, add a duplicate option key, not add an invalid option key, and ask for confirmation before deleting an option key.
- View software option key details. Key details are a list of options that are enabled by a particular key. Under **Available Keys**, highlight the option string, select **Details** and then view the options on the left side of the screen. Press **Show All** to view all of the activated options.

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

To access **Options**, navigate to **Utility > Service > Options**.

Figure 7-13 Options



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

Table 7-9 Options

Element	DESCRIPTION
<b>Software Options</b>	
Option	Software options on the Vivid™ S60N and Vivid™ S70N.
Status	Status of the options on the Vivid™ S60N and Vivid™ S70N.
<b>Software Option Details</b>	
Product	Name of the product.
Hardware Number	Number for the hardware. The hardware number is the hash of the serial number that is used to generate the option key.
Serial Number	Serial number of the Vivid™ S60N and Vivid™ S70N.
<b>Software Option Keys</b>	
Available Keys	List of the option keys installed on the Vivid™ S60N and Vivid™ S70N.

## Section 7-6 Noise Troubleshooting

### 7-6-1 Purpose of this Section

In this section you will find Noise troubleshooting procedures and hints.

### 7-6-2 Introduction

Before you start troubleshooting the noise, you should read the following subsections:

- [EMI Limitations on page 2 - 4](#)
- [EMI Prevention/Abatement on page 2 - 5](#)
- [Overview of Types of Noise](#) - see below

When talking to the customer, try to gather as much information as possible about the conditions when the noise appear:

Is the noise present...

- ... all the time?
- ... after some time of use? (After how long time?)
- ... at special times of the day (or night)? When?
- ... at all locations in the hospital, or only in one room/area?
- ... from time to time, no special pattern of time is observed?

### 7-6-3 Overview of Types of Noise

There are different types of noise. Use the information next to classify the noise and possible cause.

#### 7-6-3-1 Noise Picked Up from the Air

Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air.

If picked up by a probe cable, the noise will be coherent -“penlight noise” pointing down in the picture - due to the fact that the noise is received on all channels.

- Is it a problem on one probe only?  
Try another probe.
- Is it a problem on one of the probe connectors only?  
Move the scanner to another location and verify any changes.

#### 7-6-3-2 Noise Received via the External Cables

Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the wiring. The noise can enter the system via the mains power cable, probe cable(s) or any other external connected cable(s).

To troubleshoot this type of noise, disconnect cables that are not needed for the basic use of the scanner. Check for any change in the noise each time a cable has been disconnected from the Vivid S60N/Vivid S70N.

- Network cable
- Cables to any external peripherals
- ECG cables and other cables connected to the Patient I/O

Verify if the noise change or disappear when the cables are removed.

Often, this type of noise is due to grounding problems in the mains power system or that the scanner is sharing a power line with other equipment.

#### 7-6-3-3 Intermittent Noise

- Is there any equipment that is turned on and off near the scanner?
- Is the noise present all around the clock or only at special occasions?

#### 7-6-3-4 Self-generated Noise Generated inside the Ultrasound system)

Example: Color Noise in the near field.

- Self generated noise will not change if you touch the scanner or the probe.
- Self generated noise may be due to either:
  - heat problems
  - hardware problems
  - software problems

#### 7-6-3-5 Heat Problems

Heat problems are usually starting when the ultrasound system has been ON for some time.

If the ultrasound system has been used for scanning for some time before the noise appears, it may be due to either heat problems or some software related issues. By doing a restart you may learn some more about the cause.

Select **Ctrl+Alt+R** to restart the back end processor without power-cycling the unit.

- If the noise is present after the restart, the cause is most likely due to heat problems.
- If the noise is gone after the restart, it may be due to either the setup/adjustments of the or a software failure.

##### **Possible causes for heat problems:**

- Fan filters need to be cleaned or replaced.
- Room temperatures outside the allowed temperature limits.
- Fans are worn-out.
- Hardware problems.



**7-6-3-6 Hardware Problems**

A hardware issue will typically be an error/malfunction on a card.

**7-6-3-7 Software Problems**

Check if a newer software version is available. A software update may include noise fixes. If needed, update the software.

**7-6-4 Different Power Outlet**

Connect the unit to another power outlet and verify if the noise changes or disappear.

**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.*

*The Vivid S60N/Vivid S70N will function on voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power in North America, then a center tapped power source is required.*

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

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

*Sites with a mains power system without a defined Neutral:*

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

**7-6-5 Different System**

Try another Vivid S60N/Vivid S70N scanner at the same location and look for the same noise. If the noise is present on the new system too, the noise is most likely from an external source/equipment.

**7-6-6 Different Location**

Move the scanner to another location and verify if the noise changes or disappear. This may help you to locate an external noise source.

Try to move the scanner to:

- another location inside the room
- another room
- another floor

**7-6-7 Disconnect External Cables**

Disconnect all external cables (network, all unused probes, ECG leads and verify if the noise disappears.

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# Chapter 8

## Replacement Procedures

### Section 8-1 Overview

#### 8-1-1 Purpose of Chapter 8

This chapter provides replacement procedures for Vivid S60N/Vivid S70N system parts, as outlined below.

8-1	Overview . . . . .	8-1
8-2	Covers - Replacement Procedures . . . . .	8-2
8-3	Control Console Components - Replacement Procedures . . . . .	8-34
8-4	Cables (v203) - Replacement Procedures . . . . .	8-66
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**NOTE:**      *The illustrations provided in this chapter are for illustration purposes only and are subject to change without notice.*

Section 8-2

Covers - Replacement Procedures

8-2-1

Overview of Covers

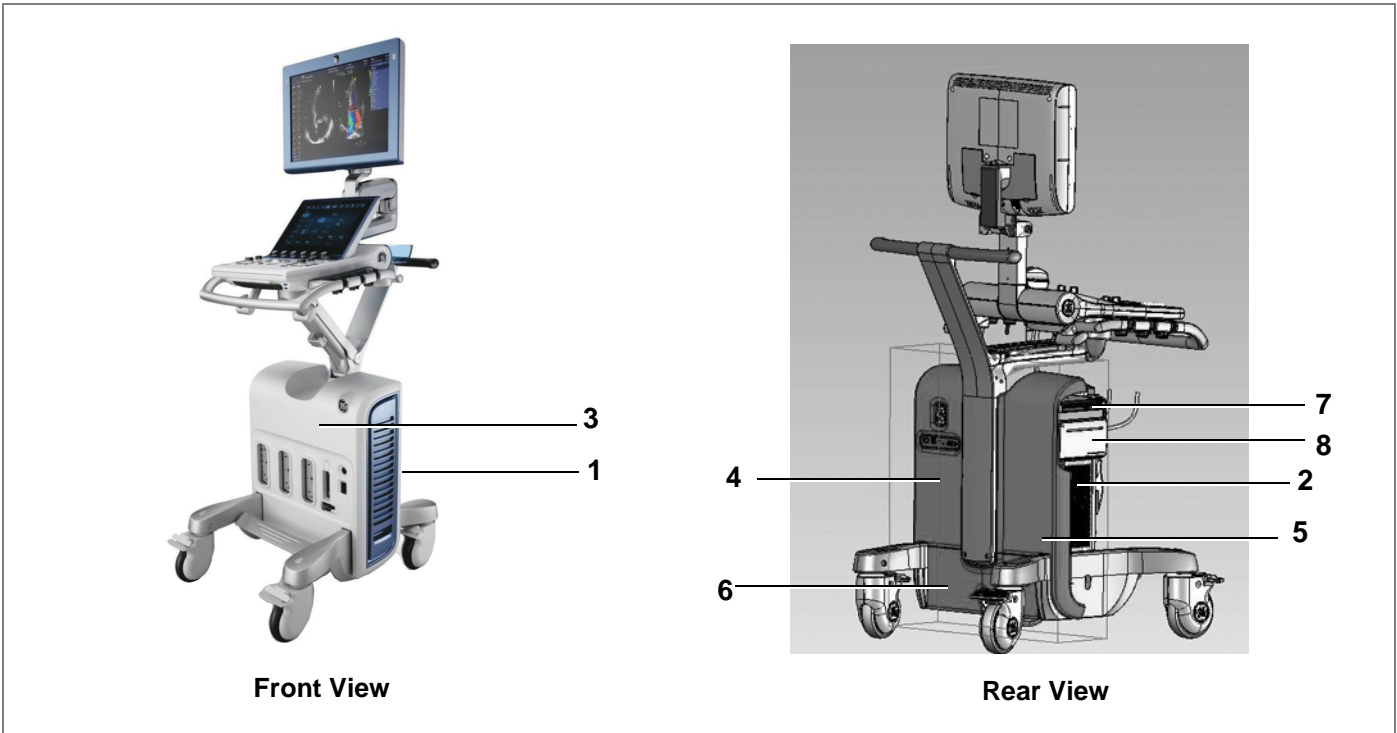


Figure 8-1 Vivid S60N/Vivid S70N Ultrasound System

Table 8-1 Vivid S60N/Vivid S70N Ultrasound System Covers (Figure 8-1)

Label	Item	Label	Item
1	Air Inlet (Left Side) Cover	5	Right Rear Cover
2	Right Side Cover	6	AC Box Cover
3	Front Cover	7	DVD Cover
4	Left Rear Cover	8	DVD and Printer Cover

### 8-2-1-1 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).



**DANGER**



**ELECTRICAL HAZARDS EXIST AT SEVERAL POINTS IN THE SYSTEM. FAMILIARIZE YOURSELF WITH ALL HAZARDOUS VOLTAGES AND HIGH CURRENT LEVELS BEFORE REMOVING ANY OF THE COVERS.**



**DANGER**



**DO NOT WEAR THE ESD WRIST BAND STRAP WHEN REMOVING PARTS FROM THE POWER SUPPLY UNIT. BEFORE REMOVING ANY PART OF THE POWER UNIT, TURN THE POWER OFF AND DISCONNECT THE POWER CORD.**



**CAUTION**

**BEFORE REMOVING CIRCUIT BOARDS, TURN THE POWER OFF AND WEAR THE ESD WRIST BAND STRAP.**

### 8-2-1-2 Order of Cover Removal

Remove the system covers **in the following order**, as applicable:

- Air Inlet (Left Side) Cover, as described on [page 8-5](#).
- Right Side Cover, as described on [page 8-8](#).
- *Either*: DVD Cover, as described on [page 8-9](#)  
Or: DVD and Printer Cover, as described on [page 8-13](#)
- Front Cover, as described on [page 8-17](#).
- Right Rear Cover, as described on [page 8-22](#).
- Left Rear Cover, as described on [page 8-25](#).
- AC Distribution Box Cover, as described on [page 8-32](#).

**Note:** The Vivid S60N/Vivid S70N has additional covers on the control console components (Monitor and Touch Screen). Instructions for removal of these covers are described in the relevant replacement procedure sections.

**Note:** For removal of system accessories, refer to the following procedures:

- [OPIO Basket Replacement Procedure on page 8 - 29](#)
- [Rear Folder Box Replacement Procedure on page 8 - 30](#)

**8-2-1-3 Preparation for Cover Installation**

Replacement covers for the Vivid S60N/Vivid S70N are supplied with the required securing screws and ball stud/ball stud receptacles. Before installing a replacement cover, it is necessary to fit these in the appropriate positions. Refer to the illustrations provided in the specific Cover Replacement procedure - for example, AC Distribution Box Cover:.

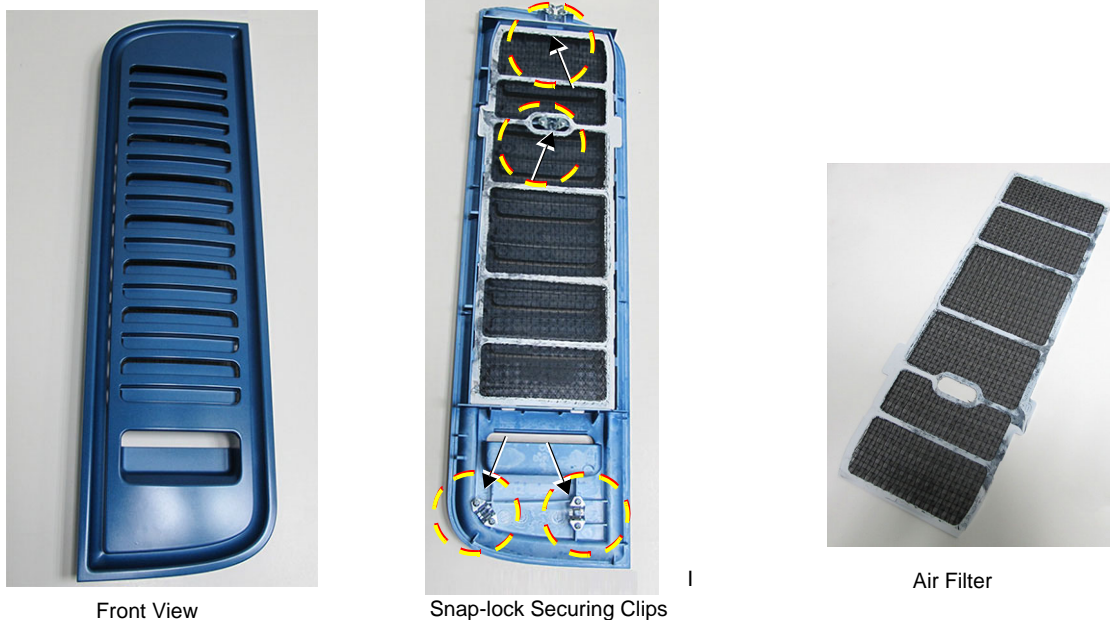


## 8-2-2 Air Inlet (Left Side) Cover Replacement Procedure

**NOTE:** The Air Inlet cover (left side cover) is fastened in position on the side of the system by 4 snap-lock securing clips - see [Figure 8-2](#).

This cover contains an air filter, held in position by securing tabs.

For instructions on replacing the air filter only, see [Air Filter Replacement Procedure on page 8 - 7](#).



**Figure 8-2 Air Inlet (Left Side) Cover - Front and Inside Views**

### 8-2-2-1 Tools

None

### 8-2-2-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

**8-2-2-3 Air Inlet (Left Side) Cover Removal Procedure**

- 1) Gripping the bottom of the cover, pull it out *towards* you to release it from the lower securing clips.
- 2) Pull the top of the cover out *towards* you, releasing it from the upper securing clips, then remove.



**Figure 8-3 Removing the Air Inlet (Left Side) Cover**

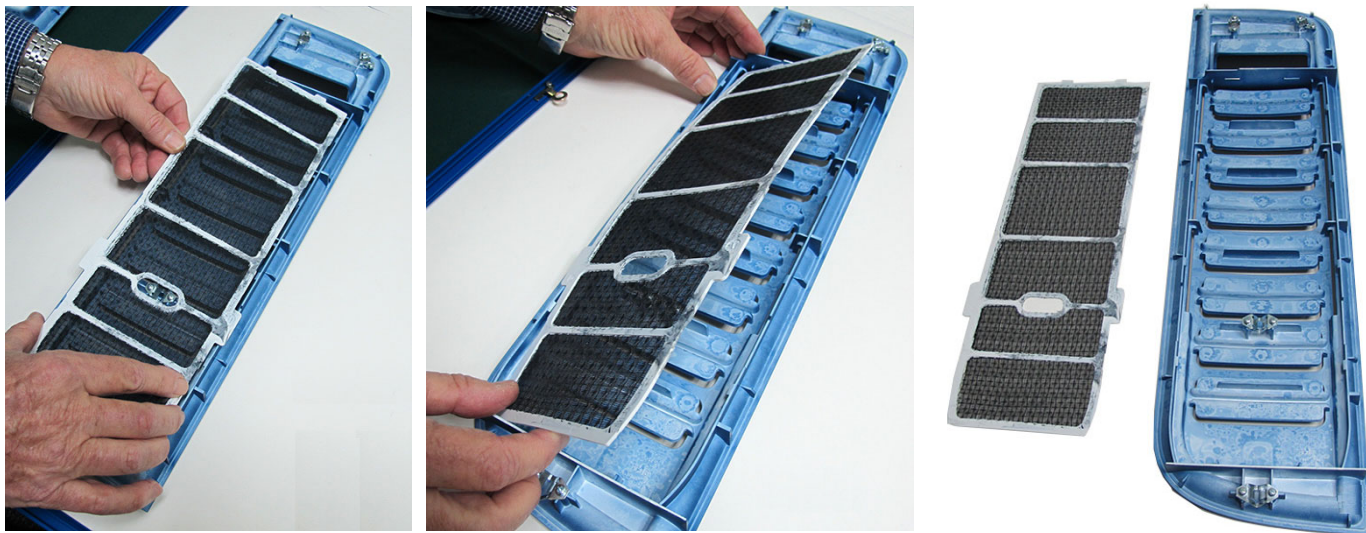
**8-2-2-4 Air Inlet (Left Side) Cover Installation Procedure**

- 1) Return the air inlet side cover to the *left* side of the system, carefully aligning it with the securing clips.
- 2) Push the top of the cover *upwards* and *inwards*, until clicks into place.
- 3) Push the bottom of the cover *upwards* and *inwards*, until it clicks into place. Make sure the cover is correctly seated.



**8-2-2-4-1 Air Filter Replacement Procedure**

- 1) Remove the Air Inlet cover from the left side of the system:
- 2) Lay the cover face-down on a flat, clean surface.
- 3.) Release the filter from the securing tabs, then lift it up and remove from the cover- [Figure 8-4](#).



**Figure 8-4 Removing the Air Filter from the Air Inlet Cover**

**8-2-2-4-2 Air Filter Installation Procedure**

- 1) Place a new air filter inside the left cover, carefully aligning the securing tabs with the recesses on the cover.
- 2.) Make sure the air filter is properly seated in the correct position.
- 3.) Install the air inlet (*left side*) cover on the system.

## 8-2-3 Right Side Cover Replacement Procedure

### 8-2-3-1 Tools

None

### 8-2-3-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-3-3 Right Side Cover Removal Procedure

**Note:** The right side cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover - illustrated below.

- 1) Gripping the recess at the bottom of the cover pull the right side cover out towards you to release it from the snap-lock securing clips ([Figure 8-5](#)).



**Figure 8-5 Removing the Right Side Cover**

- 2) Pull the top of the cover out *towards* you, releasing it from the upper securing clips.
- 3) Remove the cover from the system.

### 8-2-3-4 Right Side Cover Installation Procedure

- 1) Return the right side cover to the system, carefully aligning it with the securing clips.
- 2) Holding the recess with one hand, push the top of the cover *upwards* and *inwards* with the other hand, until clicks into place.
- 3) Push the bottom of the cover *upwards* and *inwards*, until it clicks into place.

## 8-2-4 DVD Cover Replacement Procedure

**Note:** The removal and installation procedures for all the peripheral device covers are all very similar. The various covers clip onto the mechanical platform with 4 snap-lock securing clips on the inner side of the cover - the clips are like those illustrated in [Figure 8-5 on page 8-8](#).

### 8-2-4-1 Tools

Phillips screwdriver.

### 8-2-4-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-4-3 DVD Cover Removal Procedure

The DVD Cover is shown in [Figure 8-6](#).

- 1) Remove the *right side* cover:



**Figure 8-6 Removing the DVD Cover**

- 2.) Grip the bottom of the DVD cover and pull it towards you to release it from the snap-lock securing clips.

**8-2-4-4 DVD Cover Installation Procedure**

- 1) Return the DVD cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
- 2.) Push the DVD cover until it clicks into position.
- 3.) Install the *right side* cover.

---

## 8-2-5 DVD and Printer Cover Replacement Procedure

### 8-2-5-1 Tools

Phillips screwdriver.

### 8-2-5-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-5-3 DVD and Printer Cover Removal Procedure

**Note:** The DVD and Printer cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover.

- 1) Remove the *right side* cover:
- 2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips ([Figure 8-30](#)). Remove the cover.



Figure 8-7 Removing the DVD and Printer Cover

**8-2-5-4 DVD and Printer Cover Installation Procedure**

- 1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
- 2.) Push the cover until it clicks in position.
- 3.) Install the *right side* cover.

## 8-2-6 Blank Cover Replacement Procedure

**Note:** The removal and installation procedure for the Blank Cover is the same as that described for the [DVD and Printer Cover Replacement Procedure](#) section, on page 8-11 in this case making use of the blank cover.

### 8-2-6-1 Tools

Phillips screwdriver.

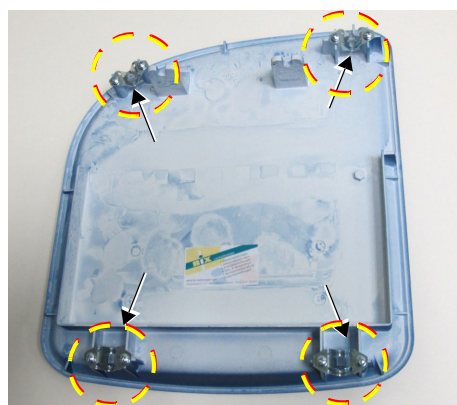
### 8-2-6-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-6-3 Blank Cover Removal Procedure

**Note:** The Blank cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover - illustrated below.

- 1) Remove the *right side* cover:
- 2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips ([Figure 8-30](#)). Remove the cover.



Securing Clips



Figure 8-8 Removing the Blank Cover



**8-2-6-4 Blank Cover Installation Procedure**

- 1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
- 2.) Push the cover until it clicks in position.
- 3.) Install the *right side* cover.



## 8-2-7 Printer Cover Replacement Procedure

### 8-2-7-1 Tools

Phillips screwdriver.

### 8-2-7-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

**Note:** The removal and installation procedure for the printer cover is the same as that described for the [DVD and Printer Cover Replacement Procedure](#) section, on page 8-11 in this case making use of the printer cover.

### 8-2-7-3 Printer Cover Removal Procedure

**Note:** The Printer cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover.

- 1) Remove the *right side* cover:
- 2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips ([Figure 8-30](#)). Remove the cover.



Figure 8-9 Removing the Printer Cover

**8-2-7-4 Printer Cover Installation Procedure**

- 1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
- 2.) Push the cover until it clicks in position.
- 3.) Install the *right side* cover.

## 8-2-8 Front Cover Replacement Procedures

### 8-2-8-1 Tools

Phillips screwdriver

### 8-2-8-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-8-3 Front Cover Removal Procedure

**Note:** The Front Cover is secured to the base of the mechanical platform by a screw through a securing tab on each side of the cover (left and right inner side).



**Figure 8-10 Front Cover - Securing Tabs**

- 1) Remove all probes and ECG cables currently connected to the system.
- 2) Remove the front Basket for probe cable management - (hold with both hands and pull *upwards*).



**8-2-8-3 Front Cover Removal Procedure** (cont'd)

- 3.) Remove the following covers: *left side, right side, DVD.*
- 4) Place the RS probe connector locking mechanism in the *OPEN* (unlocked) position.

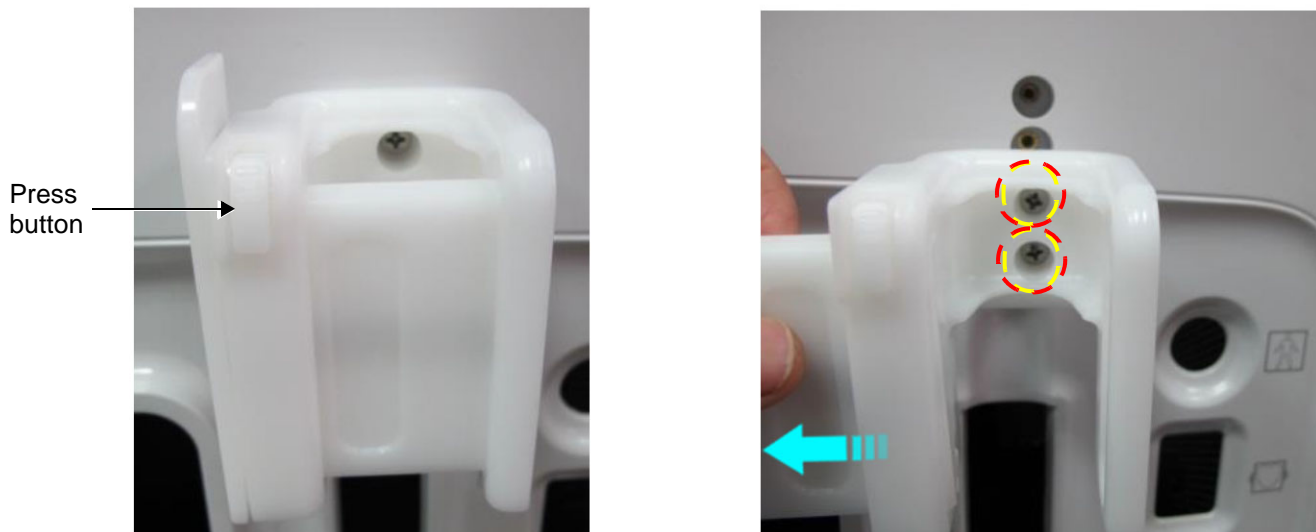


**Figure 8-11 RS Probe Connector Lock - OPEN**

*The locking mechanism is now aligned to clear the aperture in the Front Cover, enabling removal of the cover.*

**8-2-8-3 Front Cover Removal Procedure** (cont'd)

*On the RS cable assembly, press the release button and pull the slider to the side to provide access to the two securing screws. Then, unfasten the two screws and remove the RS cable assembly (front part) - see [Figure 8-12](#).*



**Figure 8-12 Removing the RS Cable Assembly - Front Part**

- 5.) Loosen and remove each of the two screws from the securing tabs (one each side of the cover - *left* and *right* - inner sides) - see [Figure 8-13](#).



**Figure 8-13 Removing Screw from Front Cover Securing Tab**

**8-2-8-3 Front Cover Removal Procedure** (cont'd)

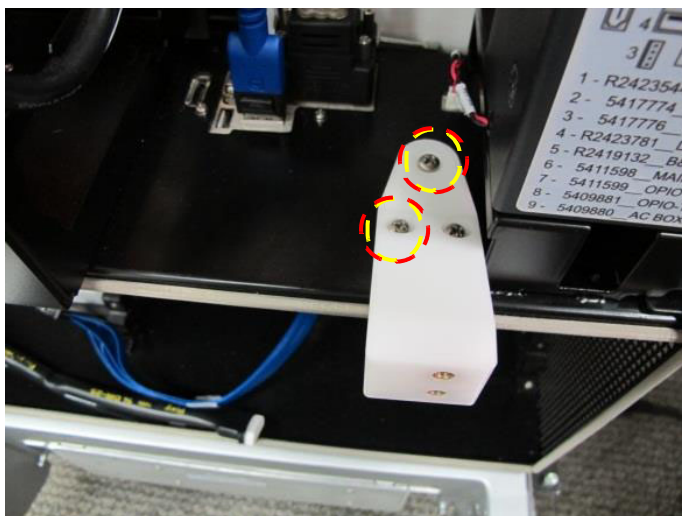
- 6) Working from the front of the system, pull the top of the cover *towards* you then lift the cover straight up over the wheel arches and remove it from the system.



**Figure 8-14 Removing the Front Cover**

**8-2-8-3 Front Cover Removal Procedure** (cont'd)

- 7.) Unfasten the three securing screws shown in [Figure 8-15](#) and remove the rear part of the RS cable assembly from the top of the electronic cage.



**Figure 8-15 Removing the RS Cable Assembly - Rear Part**

**8-2-8-4 Front Cover Installation Procedure**

- 1) Fit the rear part of the RS cable assembly to the top of the electronic cage and secure firmly in position with the three screws - see [Figure 8-15](#).
- 2) Return the front cover to its original position, aligning the lower portion with the base of the mechanical platform. Make sure the wheel arch cutouts are positioned correctly on either side.
- 3) Push the *upper* portion of the cover back into position.
- 4) Return each of the two screws (previously removed) to the securing tabs on either side of the cover and tighten securely.
- 5.) Place the front part of the RS cable assembly in the correct position, then use the two securing screws to fasten it to the rear part. Close the slider. Refer to [Figure 8-13 on page 8-19](#).
- 6) Install the *DVD*, *right* side and *left* side covers.



## 8-2-9 Right Rear Cover Replacement Procedure

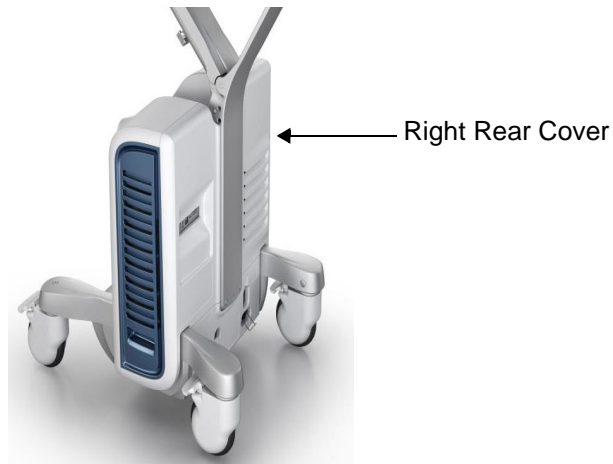
### 8-2-9-1 Tools

Phillips-type screwdriver

### 8-2-9-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-9-3 Right Rear Cover Removal Procedure

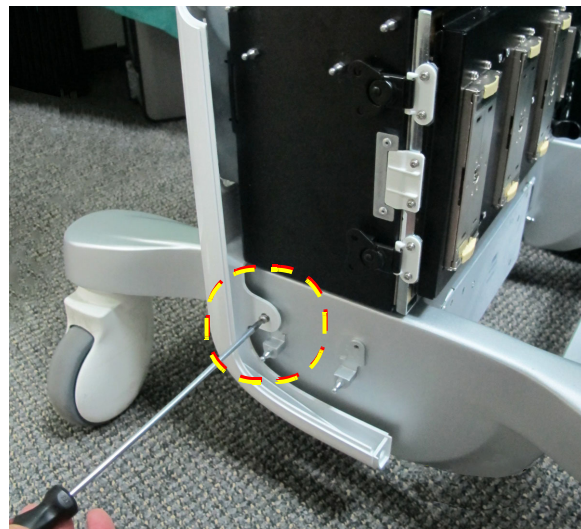
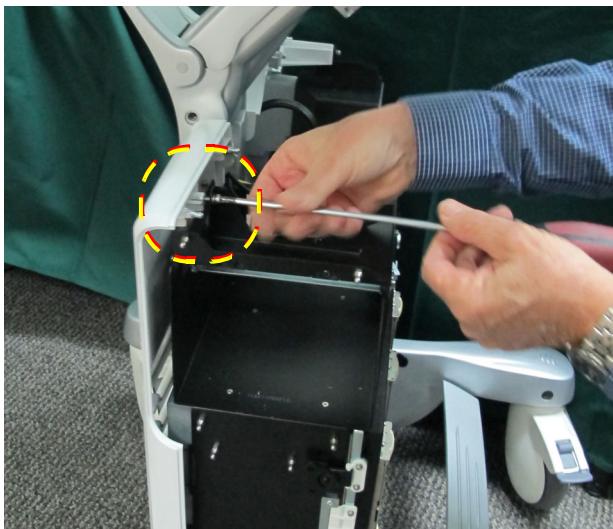


**Figure 8-16 Right Rear Cover**

**Note:** The right rear cover is secured to the base of the mechanical platform by two screws: one at the top of the cover; one through a securing tab on the inner right side of the cover ([Figure 8-17](#)).

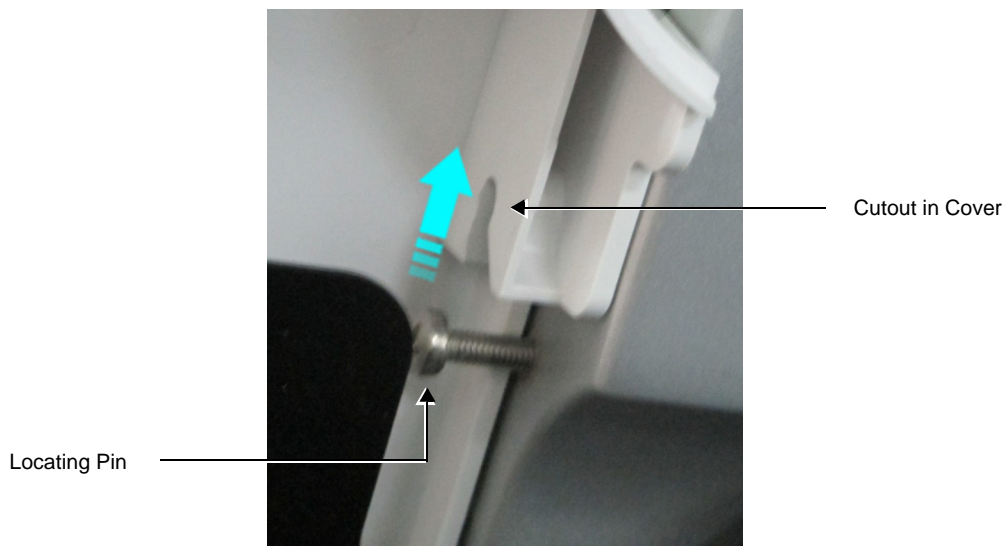
- 1) Disconnect any peripherals currently connected to the system.
- 2) Remove the following covers: *right side, DVD, left side, front*.



**8-2-9-3 Right Rear Cover Removal Procedure (cont'd)**

**Figure 8-17 Right Rear Cover - Removing Securing Screws**

- 3) Remove the screw from the top bracket of the cover (Figure 8-17, left).
- 4.) Remove the screw from the securing tab on the bottom inner right side of the cover (Figure 8-17, right).
- 5) Lift the cover *upwards* and carefully release the top of cover from the locating pin on the side of the mechanical platform (shown in Figure 8-18).



**Figure 8-18 Releasing Top of Cover from Locating Pin**

- 6.) Push the cover up and away from you ([Figure 8-19](#)) and remove from the system.



**Figure 8-19 Removing the Right Rear Cover**

#### **8-2-9-4 Right Rear Cover Installation Procedure**

- 1) Return the right rear cover to its original position at the rear of the system, taking care to tilt it sufficiently so that the lower portion overlaps the system chassis on the right side - [Figure 8-19](#).
- 2) Make sure the cutout in the cover is properly aligned with the locating pin ([Figure 8-18](#)) then push the cover *downwards* to secure it in position.
- 3) Return the screw (previously removed) to the securing tab on the inner right side of the cover and tighten securely - [Figure 8-17](#), right.
- 4) Return the screw (previously removed) to the top bracket of the cover and tighten securely [Figure 8-17](#), left.
- 5) Install the following covers: *front, left side, DVD, right side*.
- 6.) Reconnect any peripherals previously connected to the system.

---

## 8-2-10 Left Rear Cover Replacement Procedure

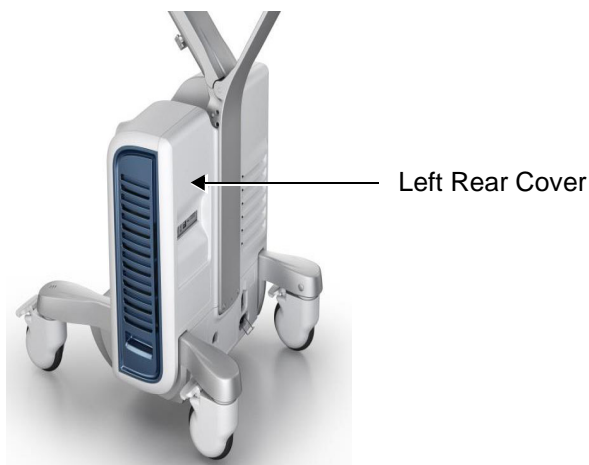
### 8-2-10-1 Tools

Phillips screwdriver.

### 8-2-10-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

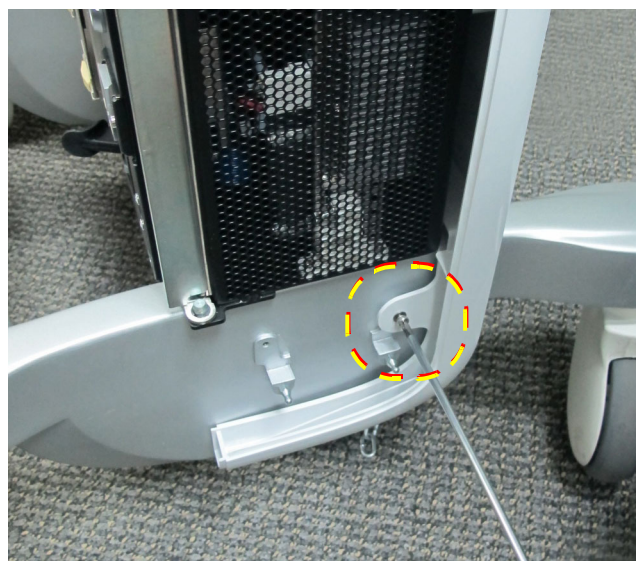
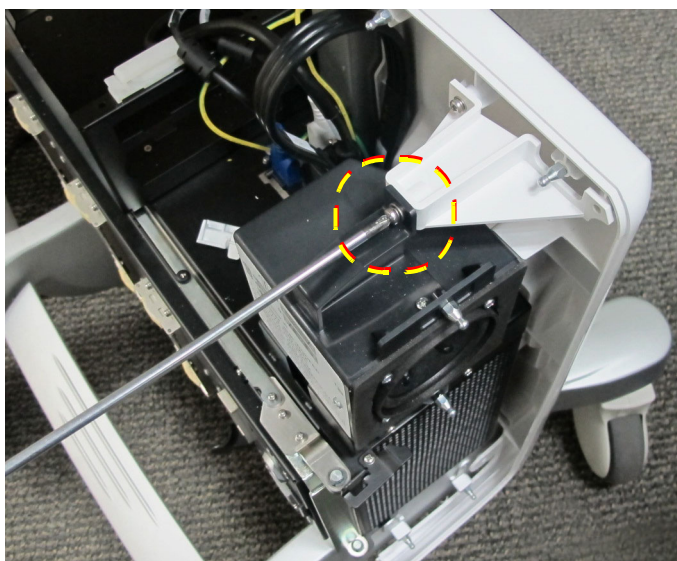
### 8-2-10-3 Left Rear Cover Removal Procedure



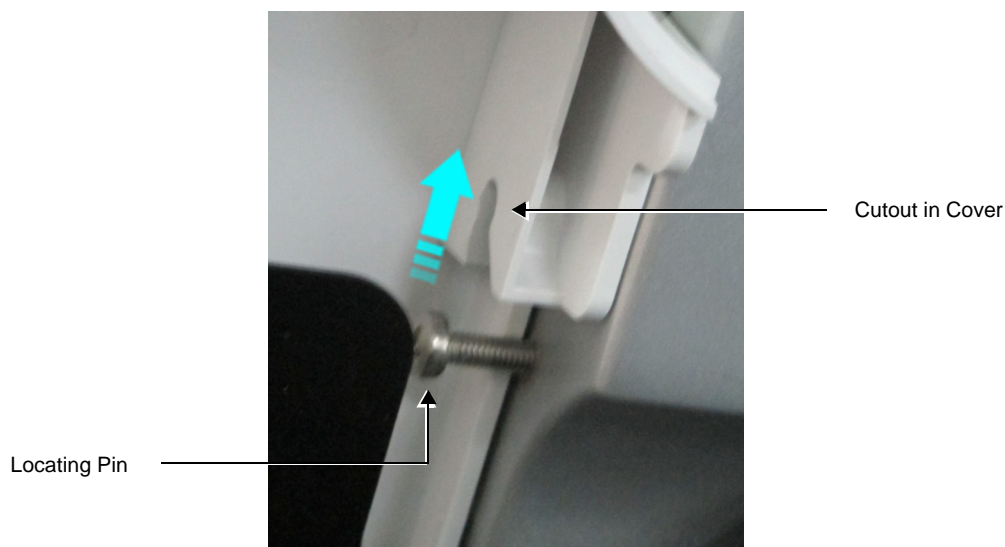
**Figure 8-20** Left Rear Cover

**Note:** The left rear cover is secured to the mechanical platform by two screws: one at the top of the cover; one through a securing tab on the inner right side of the cover ([Figure 8-21](#)).

- 1) Remove the following covers: *left side, right side, DVD, front*.

**8-2-10-3 Left Rear Cover Removal Procedure (cont'd)****Figure 8-21 Left Rear Cover - Removing Securing Screws**

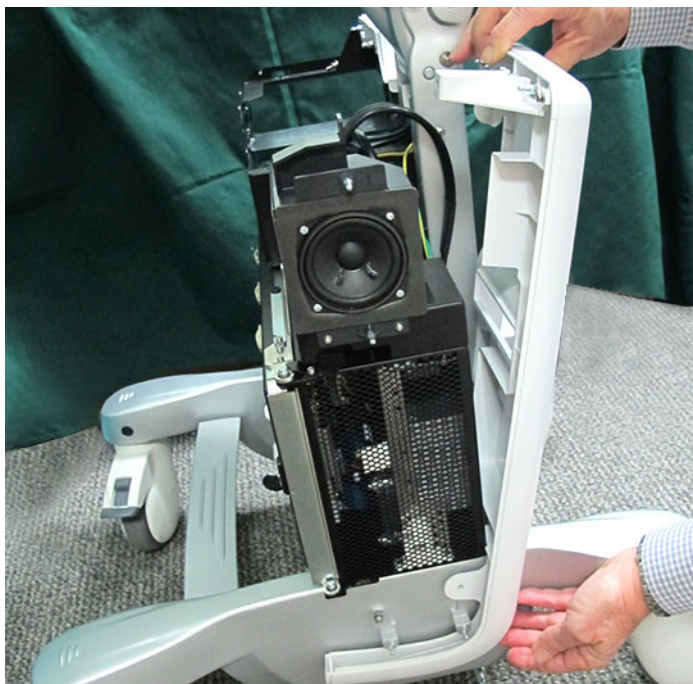
- 2) Remove the screw from the top bracket of the cover (Figure 8-21, left).
- 3.) Remove the screw from the securing tab on the bottom inner left side of the cover (Figure 8-21, right).
- 4) Lift the cover *upwards* and carefully release the top of cover from the locating pin on the side of the mechanical platform (shown in Figure 8-18).

**Figure 8-22 Releasing Top of Cover from Locating Pin**



**8-2-10-3 Left Rear Cover Removal Procedure** (cont'd)

- 5.) Pull the cover *towards* you, then lift and remove it from the system.



**Figure 8-23 Removing the Left Rear Cover**

**8-2-10-4 Left Rear Cover Installation Procedure**

- 1) Return the left rear cover to its original position at the rear of the system, taking care to tilt it sufficiently so that the lower portion overlaps the system chassis on the left side - [Figure 8-19](#).
- 2) Make sure the cutout in the cover is properly aligned with the locating pin ([Figure 8-18](#)) then push the cover *downwards* to secure it in position.
- 3) Return the screw (previously removed) to the securing tab on the inner right side of the cover and tighten securely - [Figure 8-17](#), right.
- 4) Install the following covers: *front, DVD, right side, left side*.
- 5.) Reconnect any peripherals previously connected to the system.

## 8-2-11 OPIO Basket Replacement Procedure

### 8-2-11-1 Tools

None

### 8-2-11-2 Preparations

Remove all contents from the basket.

### 8-2-11-3 OPIO Basket Removal Procedure

- 1) Working from the rear of the system, grip the rear of the basket with both hands.
- 2.) Pull the basket *towards* you to release it from the two snap-lock securing clips - one on either side of the keyboard interface column - see [Figure 8-24](#). Remove the basket.



Figure 8-24 Removing the OPIO Basket

### 8-2-11-4 OPIO Basket Installation Procedure

- 1) Working from the rear of the system, return the basket to its original position on the keyboard interface column.
- 2) Using both hands, carefully push it *inwards* to secure it on the two snap-lock securing clips - one on either side of the column - refer to [Figure 8-25](#).



Figure 8-25 Installing the OPIO Basket



**CAUTION THE BASKET HAS A MAXIMUM CARRYING CAPACITY OF 4 KGS. DO NOT EXCEED THIS LIMIT!**

## 8-2-12 Rear Folder Box Replacement Procedure

### 8-2-12-1 Tools

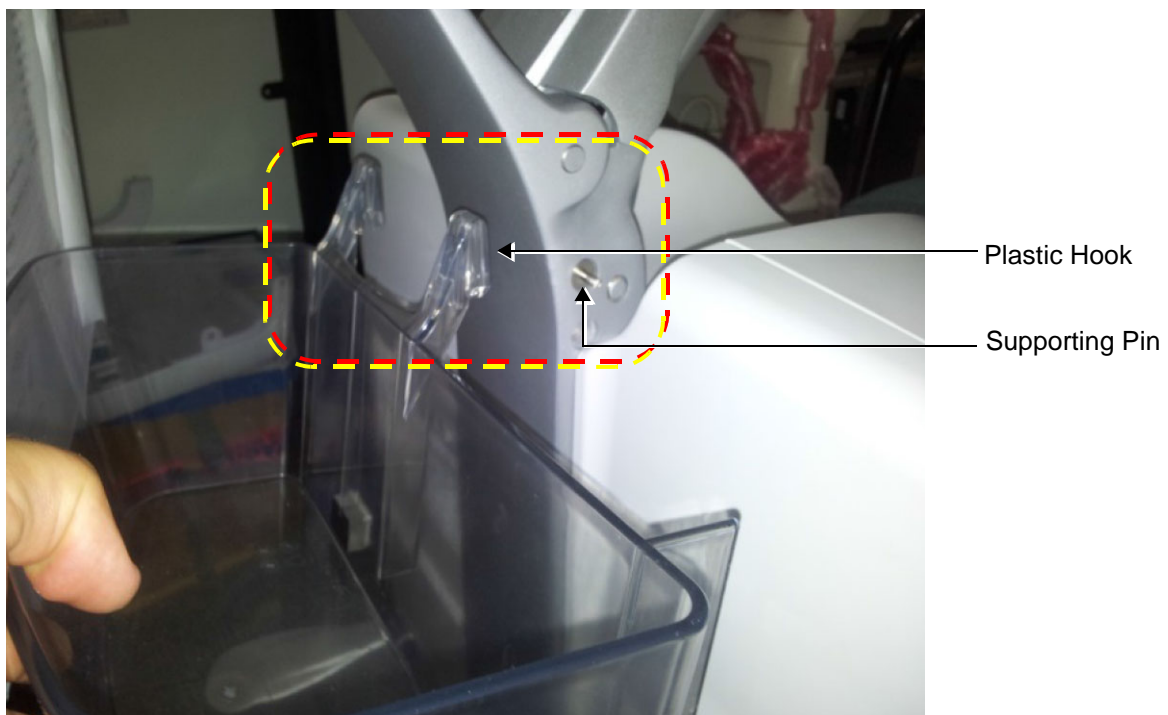
None

### 8-2-12-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-12-3 Rear Folder Box Removal Procedure

- 1) Remove all contents from the folder box.
- 2) Working from the rear of the system, hold the rear folder box with both hands and carefully lift it *upwards* to release the two plastic hooks from the two supporting pins (located one each side of the Support Column - illustrated in [Figure 8-26](#)).
- 3.) Remove the rear folder box.



**Figure 8-26** Releasing the Rear Folder Box from the Support Column

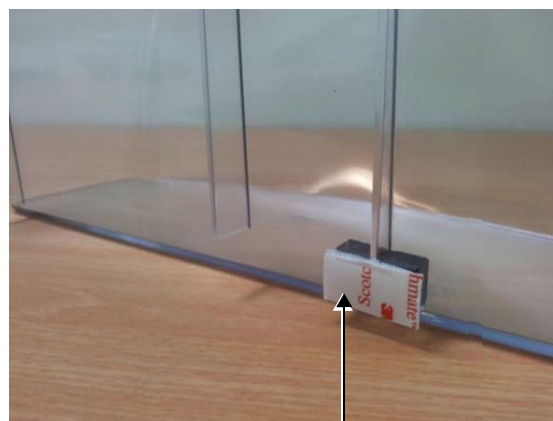


**8-2-12-4 Rear Folder Box Installation Procedure**

- 1) Peel off the protective strip from the adhesive pad located on the rear of the folder box (shown in [Figure 8-27](#)) to expose the adhesive surface.



Adhesive Pad



Protective Strip

**Figure 8-27 Rear Folder Box - Adhesive Pad at Rear**

- 2) Holding the rear folder box with both hands, carefully align it against the rear of the support column, then push it *downwards* to secure the two plastic hooks onto the two supporting pins located each side of the support column- refer to [Figure 8-26](#).
- 3.) Make sure the folder box is correctly positioned then push the adhesive pad against the column to firmly fix the box in position - see [Figure 8-28](#).

**Figure 8-28 Rear Folder Box Installed on Vivid S60N/Vivid S70N Support Column**

**CAUTION** THE FOLDER BOX HAS A MAXIMUM CARRYING CAPACITY OF 2 KGS.  
DO NOT EXCEED THIS LIMIT!

## 8-2-13 AC Distribution Box Cover Replacement Procedure

### 8-2-13-1 Tools

None

### 8-2-13-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-2-13-3 AC Distribution Box Cover Removal Procedure

**Note:** The cover is secured to the base of the mechanical platform by two snap-lock securing clips on the bottom inner side of the cover - illustrated below.

- 1) Working from the rear of the system, raise the AC cable securing clip to the UP position.



**Figure 8-29 Removing the AC Distribution Box Cover**

*The clip is now aligned to clear the aperture in the cover.*

**8-2-13-3 AC Distribution Box Cover Removal Procedure** (cont'd)

- 2.) Grip the bottom of the AC Distribution Box cover and pull it towards you to release it from the lower snap-lock securing clips. Remove the cover ([Figure 8-30](#)).



Securing Clips



**Figure 8-30 Removing the AC Distribution Box Cover**

**8-2-13-4 AC Distribution Box Cover Installation Procedure**

- 1) Return the AC Distribution Box cover to its original position at the rear of the system.
- 2) Position the AC cable securing clip to clear the aperture in the cover ([Figure 8-30](#)).
- 3) Align the bottom of the cover with the two securing clips and push it until it clicks into position.



**Figure 8-31 AC Distribution Box Cover Installed**

## Section 8-3

### Control Console Components - Replacement Procedures

#### 8-3-1 21.5" Monitor Replacement Procedure

##### 8-3-1-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 1.3 Nm +/- 5% for Phillips screws

##### 8-3-1-2 Preparation

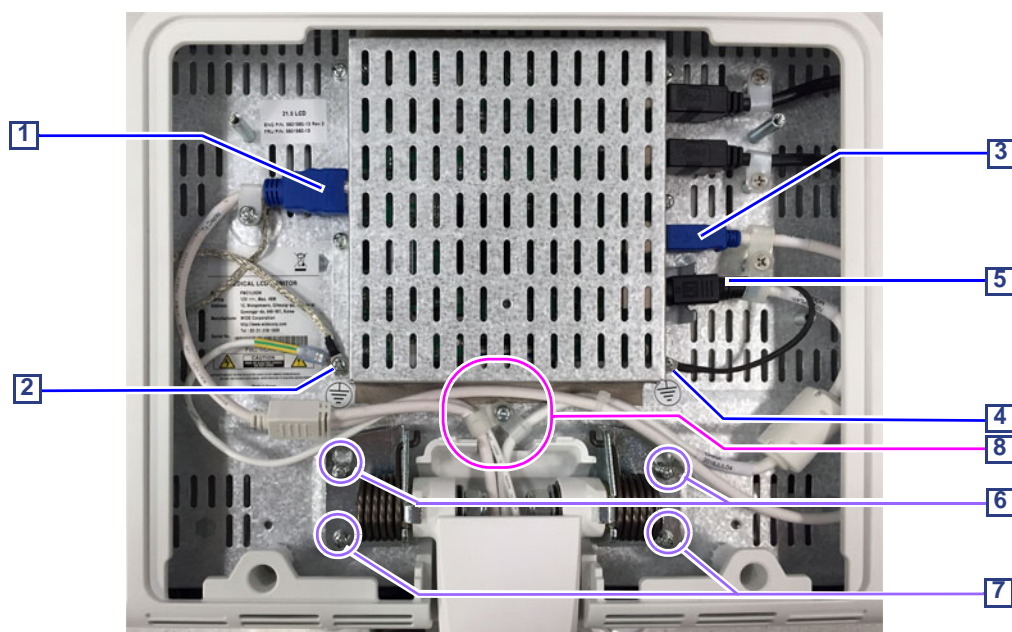
- 1.) Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).
- 1) Lower the console to the *maximum down* position.  
Make sure it is aligned in the central position (not pulled to one side or the other).
- 2.) Fold the monitor forward into the face-down position, then lock the articulated arm.

##### 8-3-1-3 Remove the 21.5 inch Monitor



**Figure 8-32 Monitor Rear Cover's fixing screws**

- 1.) Remove the Monitor's Rear Cover as described below:
  - a.) Remove the two fixing screws ([Figure 8-32](#)).
  - b.) Remove the Monitor's Rear Cover.

**8-3-1-3 Remove the 21.5 inch Monitor (cont'd)**

- 1 - BIF-to-Display: HDMI
- 2 - Ground (from HDMI cable and to Arm)
- 3 - USB

- 4 - Ground (from power cable)
- 5 - Power-to-Display
- 6 - Captive screws
- 7 - Securing screws
- 8 - Screw and P-clamp

**Figure 8-33 Monitor Cables**

- 2.) The cables are secured with P-clamps and screws.  
Disconnect the monitor cables from the monitor as described below:
  - a.) Disconnect the DVI cable, including P-clamp and screw[1].
  - b.) Remove the serrated lock washer and screw to release the Ground cables [2].
  - c.) Disconnect the USB cable, including P-clamp and screw [3].
  - d.) Disconnect the Power cable, including P-clamp and screw [5].
  - e.) Remove the serrated lock washer and screw to release the Ground cable from the Power Cable [4].
  - f.) Remove screw and P-clamp positioned in center of monitor [8] securing two cables plus ground wire from the arm.
- 3.) Remove the two securing screws [7].
- 4.) Loosen the two captive screws [6].
- 5.) Hold the monitor with both hands and carefully move it to align the captive screws with the widest part of the key-hole slots and remove the monitor.  
Carefully place the monitor face-down on a clean, soft, stable surface.

**NOTE:** After removing the Front Cover, if not installing the replacement Monitor immediately, keep the cover and screws in a safe place as they will be required later for refitting to the new Monitor.



**8-3-1-4 Install the 21.5" Monitor**

- 1.) Working from the front of the system, make sure the console is in the *maximum down* position and that it is aligned in the central position (not pulled to one side or the other).
- 2.) Place the monitor in the *face-down* position.
- 3.) Using two hands, position the monitor beneath the securing bracket, carefully aligning the two captive screws with the two key-hole slot openings.
- 4.) Pull the monitor towards you until the captive screws are correctly positioned while supporting the monitor from below with one hand, tighten the two screws with torque 1.3 Nm.
- 5.) Return the two securing screws to the securing bracket and fasten with torque 1.3 Nm.
- 6.) Secure the two ground cables.
- 7.) Plug in the Power cable, the USB cable and the HDMI cable. Refit the P-clamp and the screws for all cables, including the P-clamp in the middle of the screen.
- 8.) Install the Monitor's Rear Cover, and fasten it with the two screws with torque 1.3 Nm.

**NOTE:** *When positioning the cover, make sure underlying cables are properly seated and will not become pinched or damaged by the cover.*

## 8-3-2 Touch Screen Service Cover Replacement Procedure

### 8-3-2-1 Tools

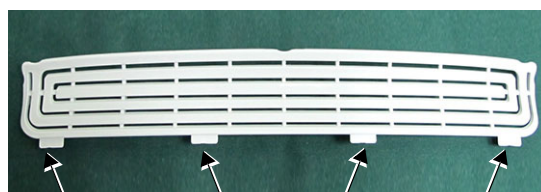
None.

### 8-3-2-2 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

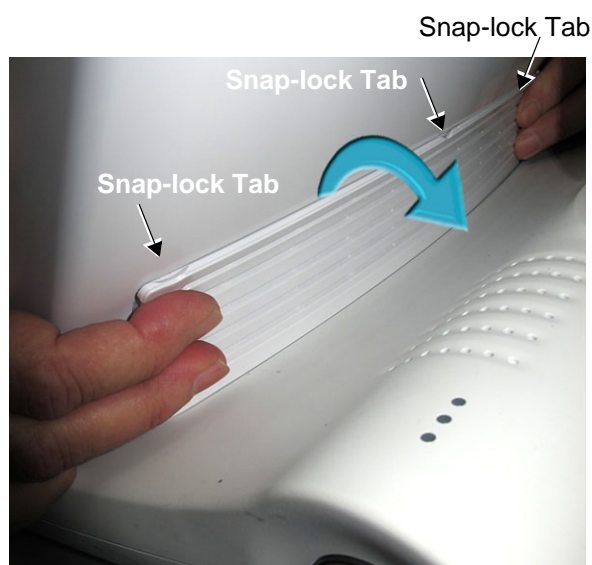
### 8-3-2-3 Touch Screen Service Cover Removal Procedure

**Note:** The Touch Screen Service Cover, located at the lower rear of the Touch Screen, clips into the Touch Screen Rear Cover by way of 4 securing tabs - [Figure 8-34](#).



**Figure 8-34 Touch Screen Service Cover - Securing Tabs**

- 1) Raise the console to the *maximum up* position. Make sure it is aligned in the central position (not pulled to one side or the other).
- 2) Using a flat screwdriver, carefully release the Service Cover snap-lock securing tabs ([Figure 8-34](#)) from the rear of the Touch Screen rear cover.
- 3) Using two hands, lift the service cover slightly to release it from the 4 securing tabs, then pull it forward to remove.



**Figure 8-35 Removing the Touch Screen Service Cover**

### 8-3-2-4 Touch Screen Service Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

### 8-3-3 Touch Screen Rear Cover Replacement Procedure

#### 8-3-3-1 Tools

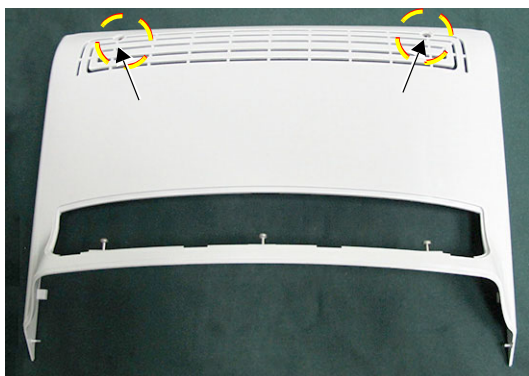
- Phillips screwdriver
- Calibrated Torque tool, 0.56 Nm +/- 5% for M3 Phillips screws

#### 8-3-3-2 Preparation

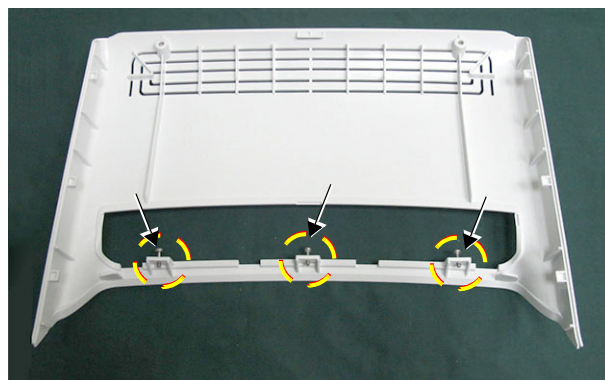
Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

#### 8-3-3-3 Touch Screen Rear Cover Removal Procedure

**Note:** The Touch Screen Rear Cover is fastened to the back of the Touch Screen by 3 screws through securing tabs located on the base of the cover and 2 screws at the top - [Figure 8-34](#).



External View



Internal View

**Figure 8-36 Touch Screen Rear Cover - Securing Tabs and Screws**

- 1) Check the console is raised to the *maximum up* position. Make sure it is aligned in the central position (not pulled to one side or the other).
- 2) Remove the Touch Screen Service Cover:



- [Touch Screen Service Cover Removal Procedure on page 8 - 37](#)



**8-3-3-3 Touch Screen Rear Cover Removal Procedure** (cont'd)

- 3.) Remove the 3 securing screws (M3 x11 mm PAN PHI.) from the base of the cover - [Figure 8-37](#).



**Figure 8-37 Removing the Rear Cover (Base) Securing Screws**

- 4.) Remove the 2 screws (M3 x11 mm PAN PHI.) from the top of the cover - [Figure 8-38](#).



**Figure 8-38 Removing the Rear Cover (Top) Securing Screws**

**8-3-3-3 Touch Screen Rear Cover Removal Procedure** (cont'd)

- 5.) Using two hands, lift the rear cover slightly to release it from the 3 securing tabs, then pull it up and away from the back of the Touch Screen to remove.



**Figure 8-39 Removing the Touch Screen Rear Cover**

**8-3-3-4 Touch Screen Rear Cover Installation Procedure**

Perform the steps described in the removal procedure, in the reverse order.

**Torque:** 0.56 Nm +/- 5%

## 8-3-4 Touch Screen Replacement Procedure

**NOTE:** The procedures below provide instructions for replacement of the Touch Screen. For details on replacing the Touch Screen chassis, refer to [Touch Screen Chassis Replacement Procedure on page 8 - 101](#).

### 8-3-4-1 Tools

- Phillips screwdriver
- 7 mm socket
- Calibrated Torque tool, 1.3 Nm +/- 5% for 7 mm socket
- Calibrated Torque tool, 0.56 Nm +/- 5% for M3 Phillips screws

**NOTE:** When replacing the Touch Screen, if replacement of the Touch Screen Rotaries Board is also required, it is also necessary to order this part (supplied separately). See [9-3-4 "Operating Panel" on page 9-13](#).

### 8-3-4-2 Time Required

20 min

### 8-3-4-3 Preparation

- 1.) Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).
- 2.) If the OPIO Basket is attached, remove it from the keyboard interface column (refer to: [8-2-11 - OPIO Basket Replacement Procedure](#).)

### 8-3-4-4 Touch Screen Removal Procedure

- 1) Working from the front of the system, raise the console to the *maximum up* position. Make sure it is aligned in the central position (not pulled to one side or the other).
- 2) Remove the following Touch Screen covers: *service*, *rear*.

**Note:** The Touch Screen Panel is fastened to the Touch Screen chassis by 4 screws (2 on each side).

- 3) Remove the two securing screws on both the *left* and *right* sides of the Touch Screen - [Figure 8-40](#).

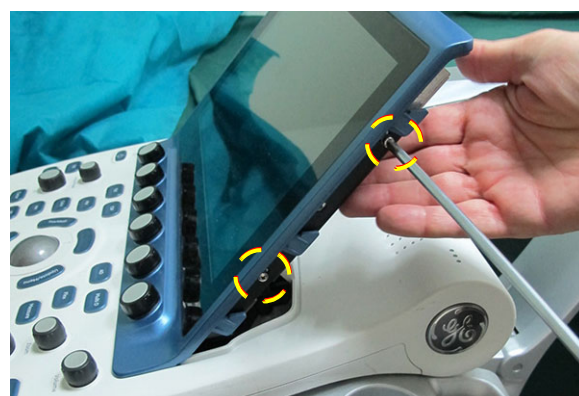
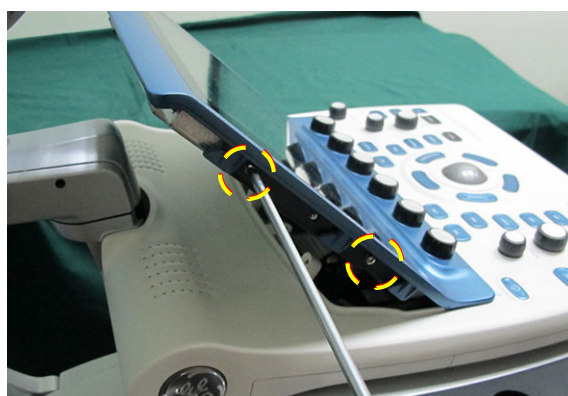
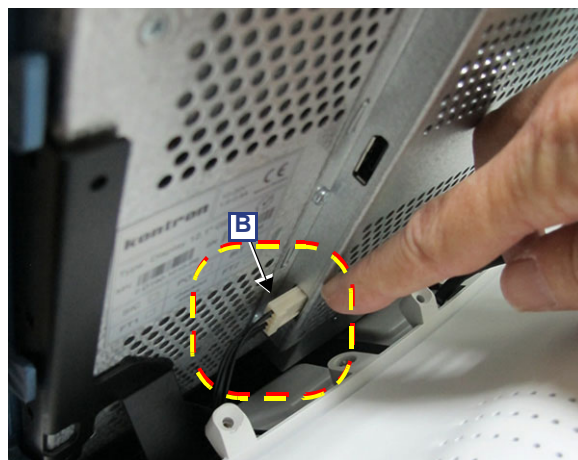
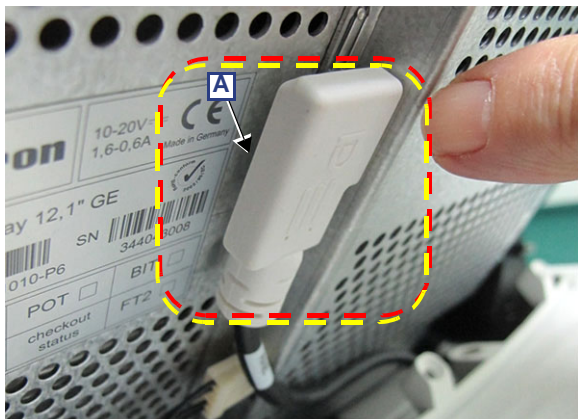


Figure 8-40 Removing the Touch Screen Securing Screws

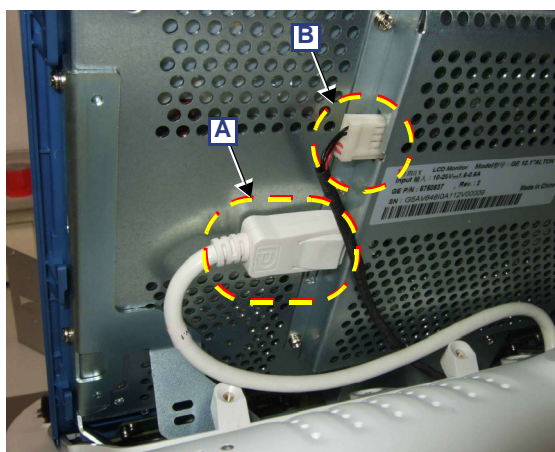
**8-3-4-4 Touch Screen Removal Procedure (cont'd)**

4.) At the rear of the Touch Screen, disconnect the following two cables:

- DP-to-Touch Screen, see: [A] in [Figure 8-41](#) and [Figure 8-42](#).
- Power-to-Touch Screen, see: [B] in [Figure 8-41](#) and [Figure 8-42](#).



**Figure 8-41 Disconnecting the Touch Screen Cables (1st version of Touch Panel)**

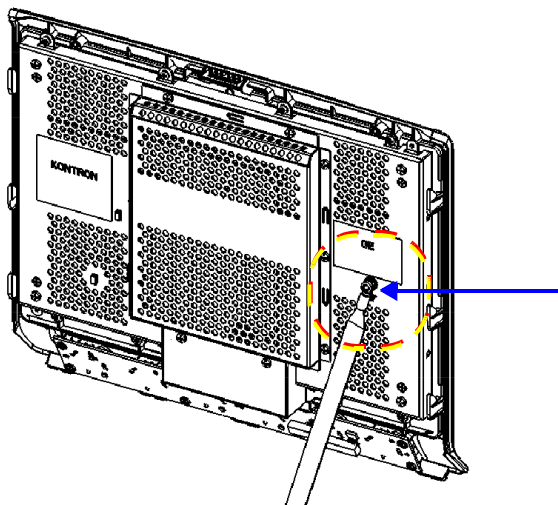


**Figure 8-42 Disconnecting the Touch Screen Cables (2nd version of Touch Panel)**



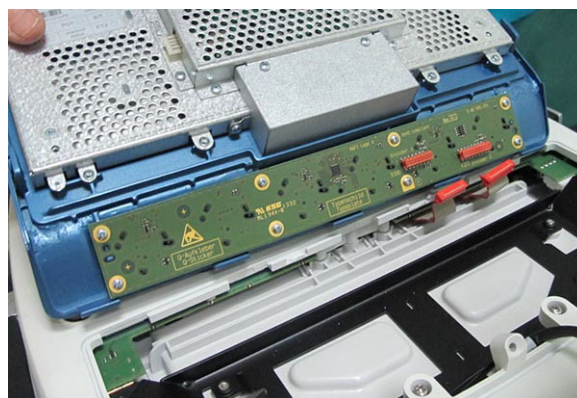
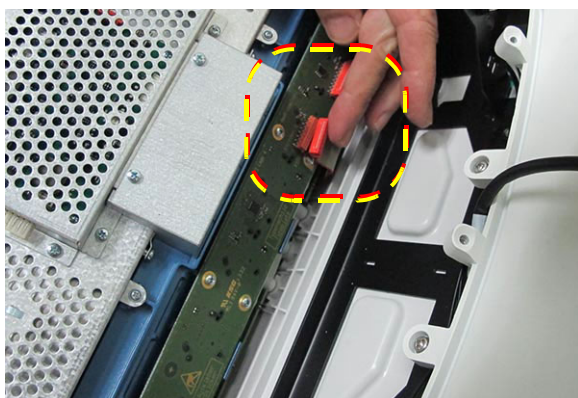
**8-3-4-4 Touch Screen Removal Procedure** (cont'd)

- 5.) Using a 7 mm socket, disconnect the Ground cable - [Figure 8-43](#).



**Figure 8-43 Disconnecting the Ground Cable**

- 6.) Tilt the Touch Screen forward away from the chassis, then disconnect the two flex cables:



**Figure 8-44 Disconnecting the Flex Cables**

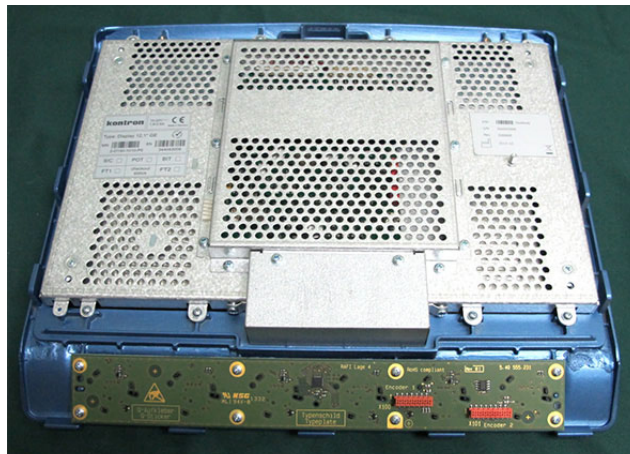
**8-3-4-4 Touch Screen Removal Procedure (cont'd)**

7.) Lift the Touch Screen off the chassis and remove from the system.



**Figure 8-45 Removing the Touch Screen**

8.) Carefully lie the Touch Screen face-down on a clean, soft, stable surface - [Figure 8-46](#)



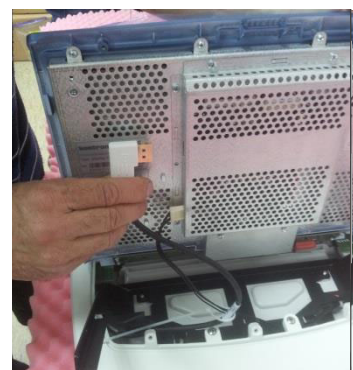
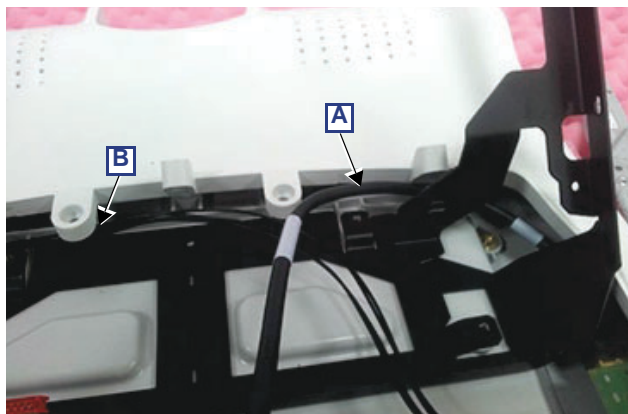
**Figure 8-46 Touch Screen Removed**

9.) Remove the Touch Screen Rotaries Board:

**NOTE:** After removing the Touch Screen Rotaries Board, if not installing the replacement Touch Screen immediately, keep the Rotaries Board and screws in a safe place as they will be required later for refitting to the new Touch Screen.

**8-3-4-5 Touch Screen Installation Procedure**

- 1) Working from the front of the system, make sure the console is in the *maximum up* position and that is aligned in the central position (not pulled to one side or the other).
- 2.) Fit the Touch Screen Rotaries Board (previously removed) onto the replacement Touch Screen:
- 3.) Using two hands, position the base of the Touch Screen on the Touch Screen chassis, placing the base in the grooved channel and aligning the two screw securing holes on each side - [Figure 8-40](#).
- 4.) Reconnect the Ground cable - [Figure 8-43](#).
- 5.) Reconnect the two Touch Screen cables and make sure to route them as shown in [Figure 8-47](#):
  - Power cable *behind* the Touch Screen chassis screw [A]
  - DP cable in *front* of the Touch Screen chassis screw [B]



**Figure 8-47 Routing and Connecting the Touch Screen Cables**

- 6.) Fasten each cable with cable-securing clips.
- 7.) Reconnect the two flex cables to the connectors on the rear of the Touch Screen - [Figure 8-44](#). For easier access to the cable connectors, tilt the Touch Screen forward while connecting the cables.
- 8.) Fasten the 4 screws to secure the Touch Screen to the chassis - [Figure 8-40](#).

**Torque:** 0.56 Nm +/- 5%.

- 9) Refit the following Touch Screen covers: *rear, service*:

## 8-3-5 Touch Screen Rotaries Board Replacement Procedure

### 8-3-5-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 0.56 Nm +/- 5% for Phillips screws

### 8-3-5-2 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

### 8-3-5-3 Touch Screen Rotaries Board Removal Procedure

- 1) Raise the console to the *maximum up* position.  
Make sure it is aligned in the central position (not pulled to one side or the other).
- 2) Remove the following Touch Screen covers: *service, rear*.
- 3) Remove the Touch Screen:
- 4.) Remove the six rotary knobs from the Rotaries Board - [Figure 8-49](#).

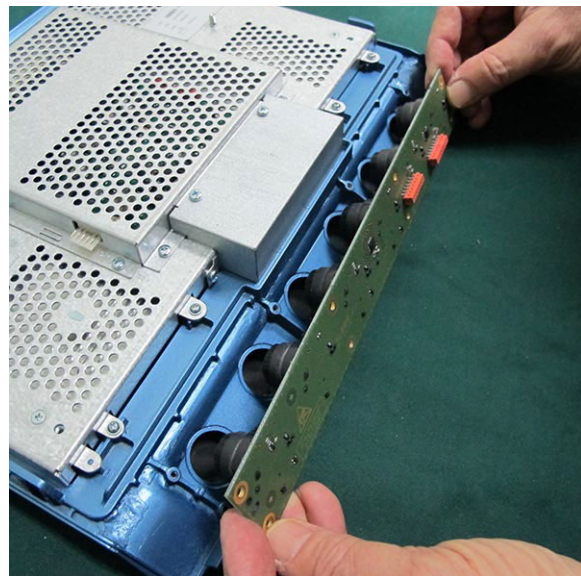
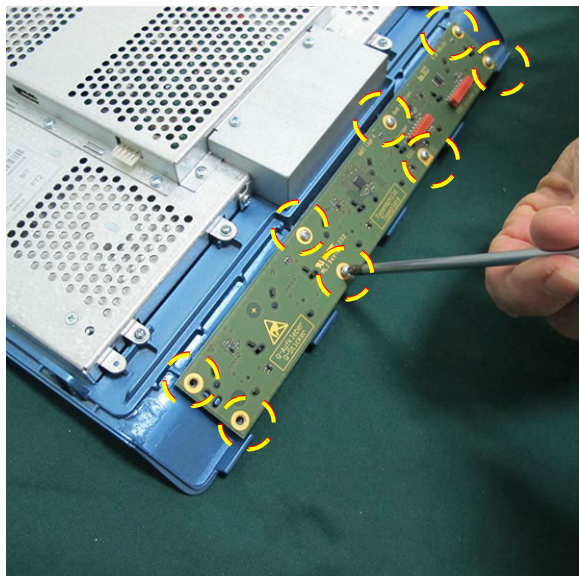
**NOTE:** *After removing the Touch Screen Rotary Knobs, keep them safely, together with the screws, as they will be required for refitting to the new Touch Screen Rotaries Board.*

- 5.) Carefully lay the Touch Screen face-down on a clean, soft, stable surface.



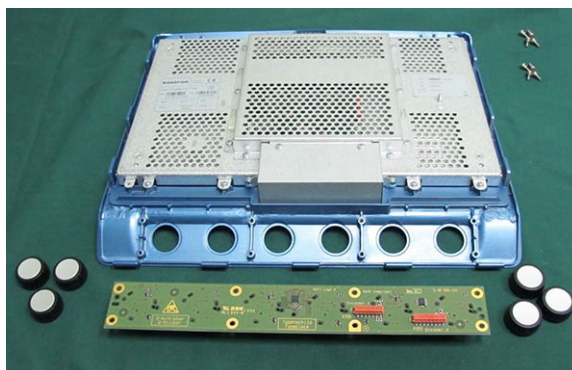
**8-3-5-3 Touch Screen Rotaries Board Removal Procedure** (cont'd)

6.) Remove the 8 securing screws from the Touch Screen Rotaries Board - [Figure 8-48](#).



**Figure 8-48 Removing the Touch Screen Rotaries Board**

7.) Using both hands, lift the Rotaries Board away from the Touch Screen and remove.



**Figure 8-49 Touch Screen and Rotaries Board - Rotary Knobs Removed**

**8-3-5-4 Touch Screen Rotaries Board Installation Procedure**

- 1.) Carefully place the Touch Screen Rotaries Board in position at the rear of the Touch Screen.
- 2.) Fasten securely with the 8 screws (previously removed).

**Torque:** 0.56 Nm +/- 5%.

- 3.) Install the Touch Screen on the system:
- 4) Refit the following Touch Screen covers: *rear, service*:
- 5) Fit the six Touch Screen Rotary Knobs:

## 8-3-6 Operating Panel Keyboard Assembly Replacement Procedure

### 8-3-6-1 Tools

- Phillips screwdriver
- flat screwdriver
- 4 mm Hex key
- Calibrated Torque tool, 1.3 Nm +/- 5% for 4 mm Hex key

### 8-3-6-2 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

### 8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure

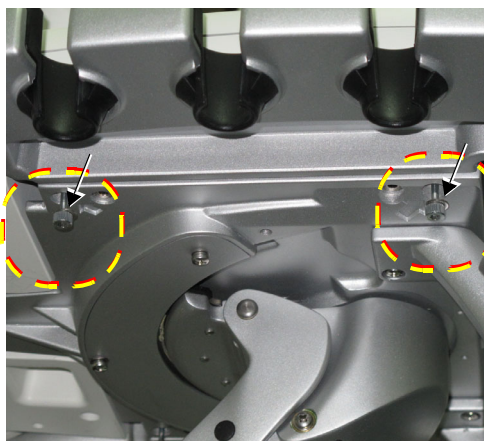
**Note:** If the OPIO Basket is attached, remove it from the keyboard interface column (refer to [OPIO Basket Removal Procedure on page 8 - 29](#)).

- 1) Working from the front of the system, raise the console to the *maximum up* position.
- 2) Make sure that the console is aligned in the central position (not pulled to one side or the other).

**Note:** Adjacent to each of the four Hex screws (two on the left; two on the right) there is an arrow marking the position of the screws for easy identification:



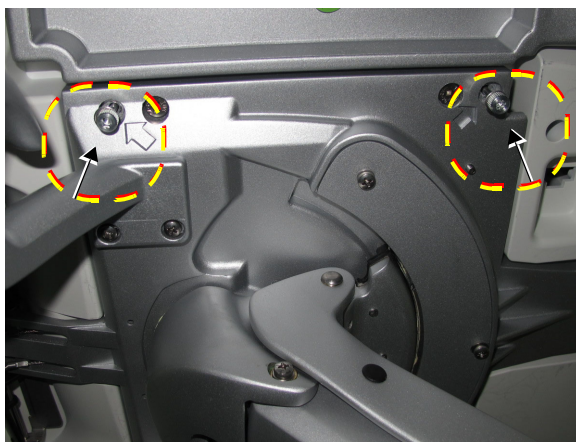
- 3) Working from beneath the keyboard assembly, loosen the two Hex screws on the system's *right* side (arrows marked in the figure indicate the screw locations) as shown in [Figure 8-50](#) below.



**Figure 8-50 Removing the Hex Screws under Keyboard Assembly - Right Side**

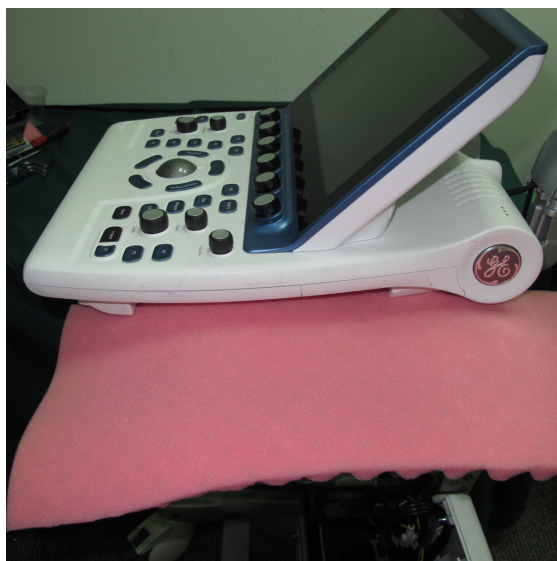
**8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure** (cont'd)

- 4) Loosen the two captive Hex screws on the *left* side, as shown in [Figure 8-51](#) below (arrows marked in the figure indicate the screw locations).



**Figure 8-51 Loosening the Captive Hex Screws beneath Keyboard Assembly - Left Side**

- 5) Before proceeding, place some protective sponge beneath the Keyboard Assembly unit to protect it from being damaged during the removal procedure - see [Figure 8-52](#) below.

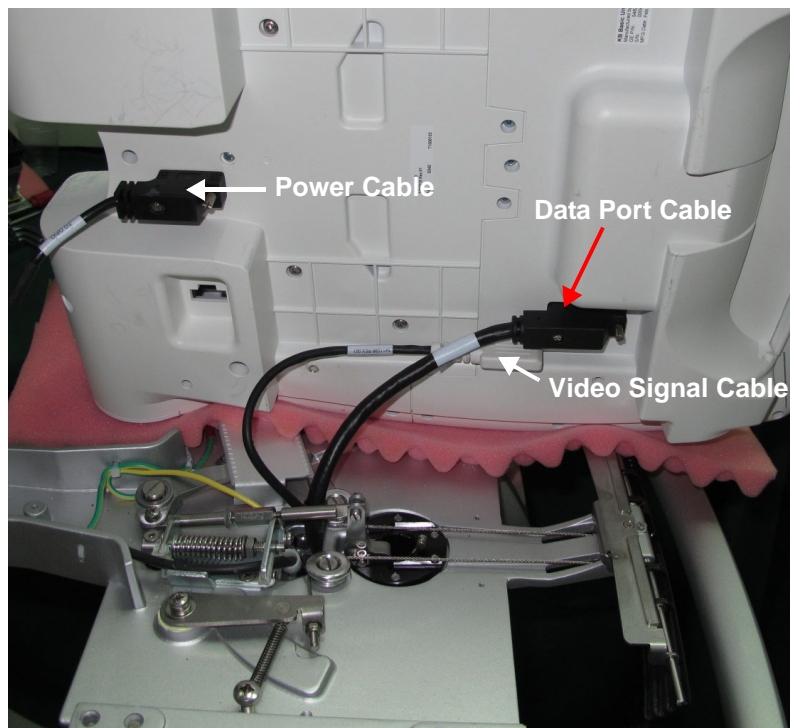


**Figure 8-52 Protective Sponge shown Beneath OPIO**



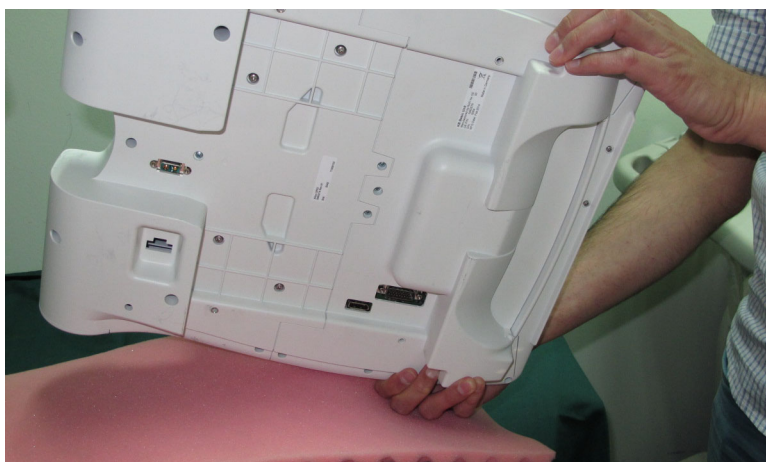
**8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure (cont'd)**

- 6.) Tilt the keyboard assembly upwards, exposing the three cables connected to the keyboard assembly - see [Figure 8-53](#) below.



**Figure 8-53 Underside of the Keyboard Assembly Showing Cables Connected**

- 7) Using the appropriate screwdriver release the securing screw and unplug the Data Port Cable from the Keyboard Assembly as shown in [Figure 8-53](#), above.
- 8.) Unplug the Video Signal cable and using a flat screwdriver, release the securing screw and unplug the power cable from the Keyboard Assembly - see [Figure 8-53](#), above.
- 9) After releasing the three cables, lift the keyboard assembly *upwards* and remove it from the system.



**Figure 8-54 Removing the Keyboard Assembly from the System**

**8-3-6-4      Operating Panel Keyboard Assembly Installation Procedure**

- 1) Working from the front of the system, make sure the console is raised to the *maximum up* position.
- 2) Make sure that the console is aligned in the central position (not pulled to one side or the other).
- 3) Follow the steps for the Keyboard Assembly Removal procedure in *reverse* order, as described in the [Operating Panel Keyboard Assembly Removal Procedure on page 8 - 49](#).

**Torque:** 4 pc. M5x28 captive screws: 1.3 Nm +/- 5%.

- 4) If used, return the basket to the keyboard interface column (refer to [OPIO Basket Installation Procedure on page 8 - 29](#)).

### 8-3-7 Operating Panel GE Logo 40 mm Replacement Procedure

**NOTE:** The Operating Panel is supplied without the GE logos fitted one on each side. When replacing the Operating Panel, it is necessary to order the Operating Panel and in addition, two GE logos (supplied as a separate part, see below).

One GE logo is located on either side of the Operating Panel as shown in [Figure 8-55](#).



Operating Panel - GE Logo Right



Operating Panel - GE Logo Left Side

**Figure 8-55 GE Logo - Located on Left and Right Side of Operating Panel**

#### 8-3-7-1 Tools

#### 8-3-7-2 No special requirements **GE Logo Removal Procedure**

**NOTE:** In the event that only the GE Logo is damaged (i.e. the Operating Panel is not being replaced), it is necessary to remove the old logo from the OPIO, as described below.

- 1) Using a blunt non-metallic instrument, gently raise one edge of the damaged GE logo.
- 2) Carefully prize the logo away from the Operating Panel.

#### 8-3-7-3 **GE 40 mm Logo Installation Procedure**

- 1) Prior to adhering the logo, ensure the outer surface of the Operating Panel is clean, dry, and free of particles.
- 2) Remove the GE logo from it's packing.
- 3) Peel back the plastic protective outer layer from the logo and remove it to expose the adhesive surface.
- 4) Carefully place the logo in position ensuring that the letters are correctly oriented (upright), straight and parallel to the inlaid impression on the side of the Operating Panel.



**WARNING** Do not apply pressure to the center of the logo while adhering it to the Operating Panel as this will damage the part.

- 5.) Carefully applying even pressure around the perimeter of the logo to ensure a firm adhesion.
- 6.) Repeat the above steps to adhere a GE logo to the opposite side of the Operating Panel.

## 8-3-8 Operating Panel Label Replacement Procedure

**NOTE:** The Operating Panel is supplied without the Vivid S60N or Vivid S70N label - these are separate parts. When the OPIO is replaced, order the appropriate label when ordering the OPIO replacement part - see below:

- The Vivid™ S60N label identifies the 2D scanner
- The Vivid™ S70N label identifies the 4D scanner

### 8-3-8-1 Tools

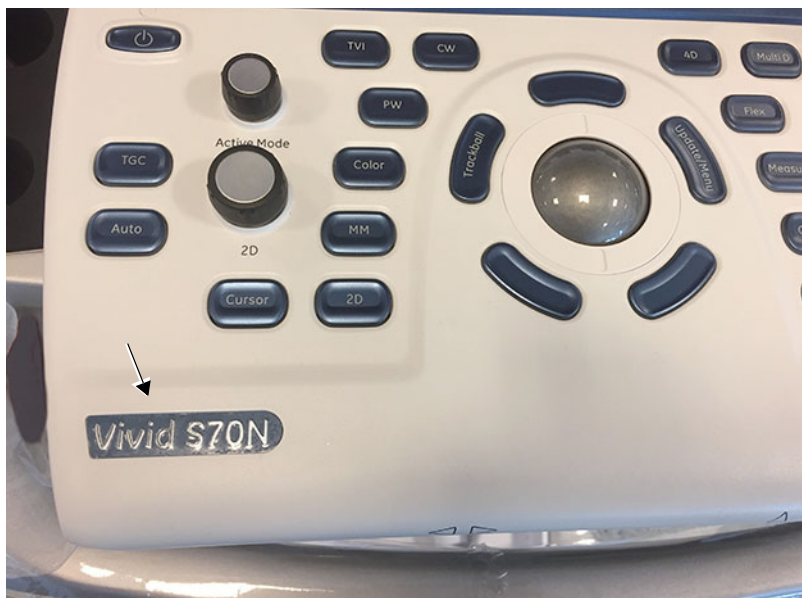
Blunt instrument for removing Vivid S60/S70 label from the Operating Panel.

### 8-3-8-2 Operating Panel Label Removal Procedure

- 1.) Using a blunt instrument carefully remove the existing label from the OPIO panel.
- 2.) Clean the area from where the label was removed and prepare the surface for adhering the replacement label.

### 8-3-8-3 Operating Panel Label Installation Procedure

- 1) Prior to adhering the label, ensure the surface of the Operating Panel is clean, dry, and free of particles.
- 2) Remove the self-adhesive label from it's packing.
- 3) Peel back the plastic protective outer layer from the label and remove it to expose the adhesive surface.
- 4) Carefully place the label in position on the Operating Panel ensuring that it is correctly oriented (upright), straight and parallel to the inlaid impression on the Operating Panel - see [Figure 8-56](#).



**Figure 8-56 Location of Operating Panel Label**

- 5.) Using a soft, clean cloth, gently press out any air bubbles that might be trapped behind the label.



## 8-3-9 Probe Cup Holders Replacement Procedure

### 8-3-9-1 Tools

No special requirements

### 8-3-9-2 Probe Cup Holders Removal Procedure

The probe cup-holders are located on either side of the operator's panel - see - [Figure 8-57](#).



**Figure 8-57 Probe Cup Holders**

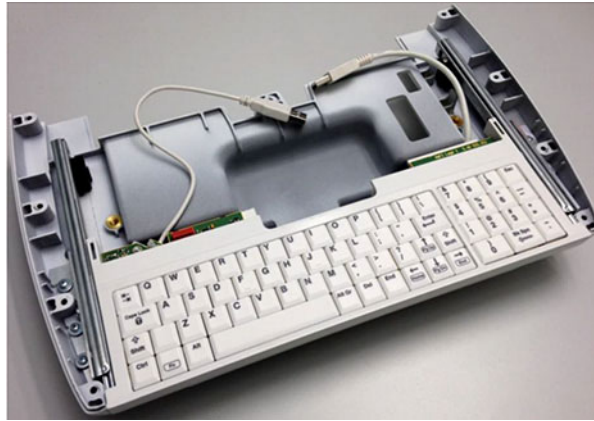
- From beneath the operator's panel, press the gel-cups upwards and remove them.

### 8-3-9-3 Probe Cup Holders Installation Procedure

- Place a new set of probe-cup holders in their respective positions on the operator's panel.

## 8-3-10 Alphanumeric Keyboard Replacement Procedure

**NOTE:** The Alphanumeric Keyboard is supplied as an integral part of the OPIO Bottom Cover. In the event that a Vivid S60N/Vivid S70N ultrasound scanner that previously did not have the Alphanumeric Keyboard option fitted and now requires replacement of the OPIO bottom cover, it is necessary to order and fit the Alphanumeric Keyboard complete with OPIO bottom cover (supplied as one FRU part).



**Figure 8-58 Alphanumeric Keyboard/OPIO Bottom Cover Assembly**

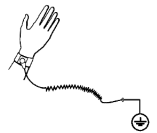


### CAUTION



When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.

If a battery is present, first remove the battery as it contains stored energy.



### 8-3-10-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 1.3 Nm +/- 5% for Phillips bits

### 8-3-10-2 Time Required

30 min

### 8-3-10-3 Preparation

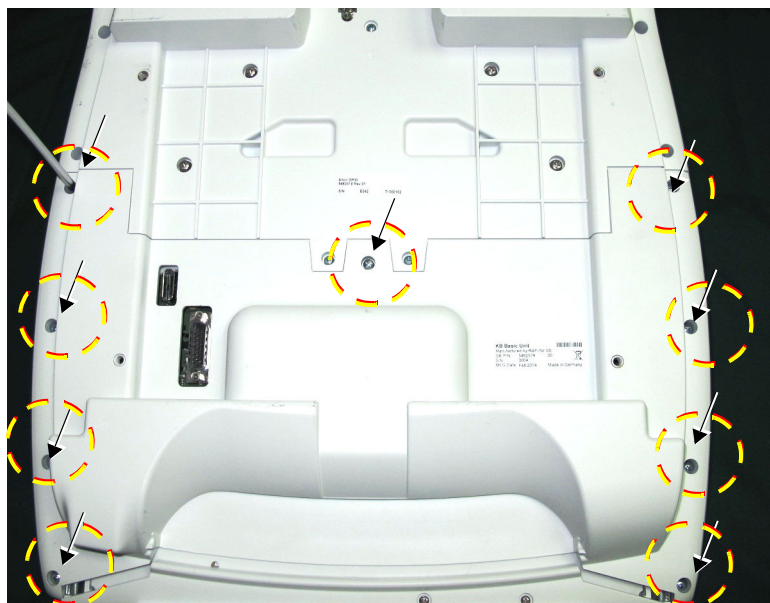
Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

### 8-3-10-4 Alphanumeric Keyboard Removal Procedure

- 1.) Remove the Operating Panel Keyboard Assembly.
- 2.) Carefully place the Operating Panel Keyboard Assembly upside-down on a flat, clean, stable surface.

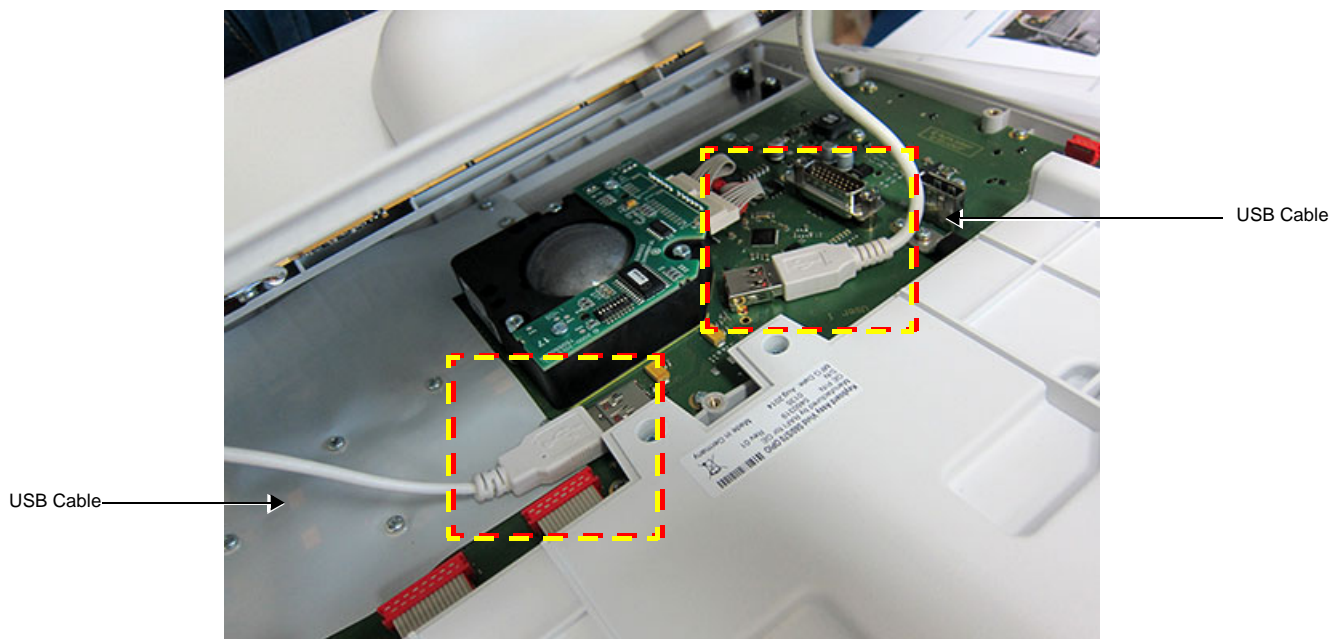
**8-3-10-4 Alphanumeric Keyboard Removal Procedure (cont'd)**

- 3.) Loosen and remove the 9 Phillips screws that secure the bottom cover in place - see [Figure 8-59](#)



**Figure 8-59 Operating Panel Keyboard Assembly - Bottom Cover Securing Screws**

- 4.) Gently lift the bottom cover (see note below) and disconnect the two USB cables from the side of the trackball, as shown in [Figure 8-60](#) (see additional note below).



**Figure 8-60 Location of USB Cables**

**Note:** For systems previously fitted with the Alphanumeric Keyboard option, the AN Keyboard is attached to the bottom cover (integral part).

**Note:** For systems without the Alphanumeric Keyboard option currently installed, there is only one USB cable connected.

**8-3-10-4 Alphanumeric Keyboard Removal Procedure** (cont'd)

- 5.) Remove the Operating Panel Bottom Cover (with attached AN Keyboard) from the Operating Panel.

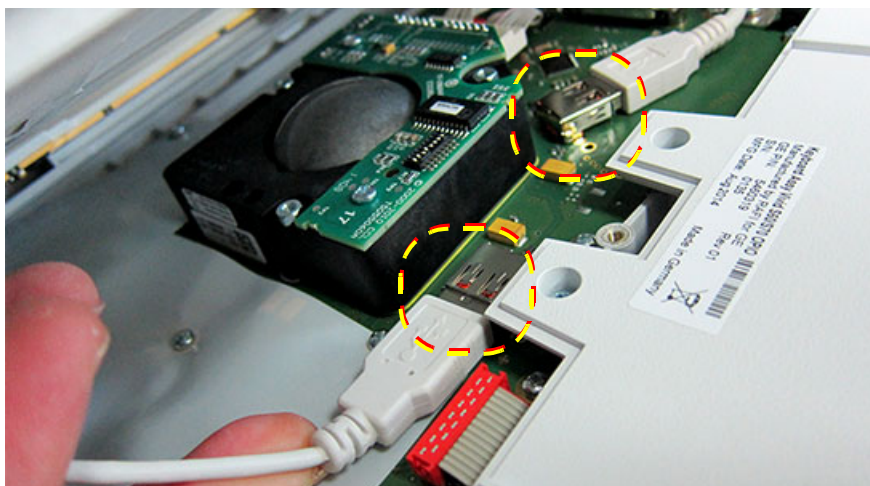


**Figure 8-61 Operating Panel Keyboard Assembly with AN Keyboard/Bottom Cover Removed**

### 8-3-10-5 Alphanumeric Keyboard Installation Procedure

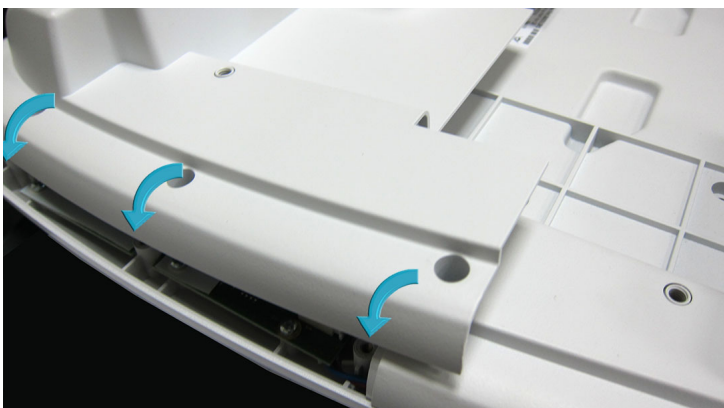
**Note:** Extend the Alphanumeric Keyboard to the *maximum OUT* position before commencing this procedure.

- 1.) Holding the Alphanumeric Keyboard/Bottom Cover close to the Operating Panel Keyboard Assembly, carefully reconnect the two USB cables to the side of the trackball as shown in [Figure 8-62](#) below..



**Figure 8-62** Installing Alphanumeric Keyboard/ Bottom Cover on Operating Panel Keyboard Assembly

- 2.) Place the Bottom Cover in position on the base of the Operating Panel Keyboard Assembly, aligning each of the screw holes.



**Figure 8-63** Fitting the Bottom Cover onto the Operating Panel Keyboard Assembly Base

- 3.) Return and fasten the 9 Phillips screws (previously removed) to secure the bottom cover to the keyboard assembly - see [Figure 8-59](#).

**Torque:** 0.56 [Nm.] +/- 5%.

- 4.) Carefully turn the Operating Panel Keyboard Assembly over (right-way-up), then install it on the system.



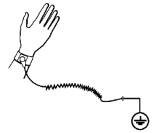
### 8-3-11 Mechanical Trackball and Housing Replacement Procedure



#### CAUTION



When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.



If a battery is present, first remove the battery as it contains stored energy.

**NOTE:** Before performing this procedure, clean the trackball and bowl (since dirt may be the cause of the current fault). Refer to the instructions described in [Cleaning the Trackball on page 4 - 18](#).

#### 8-3-11-1 Tools

Phillips screwdriver and 5.5 mm nut driver/box spanner.

#### 8-3-11-2 Time Required

25 min

#### 8-3-11-3 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in [Power Shut Down on page 4 - 8](#).

#### 8-3-11-4 Mechanical Trackball and Housing Removal Procedure

- 1.) Remove the Keyboard Assembly and place on a flat, clean, stable surface:
- 2.) Working from the top, remove the trackball ring by turning it *counter-clockwise* (1/4 turn), then lift.



Figure 8-64 Removing the Mechanical Trackball Ring

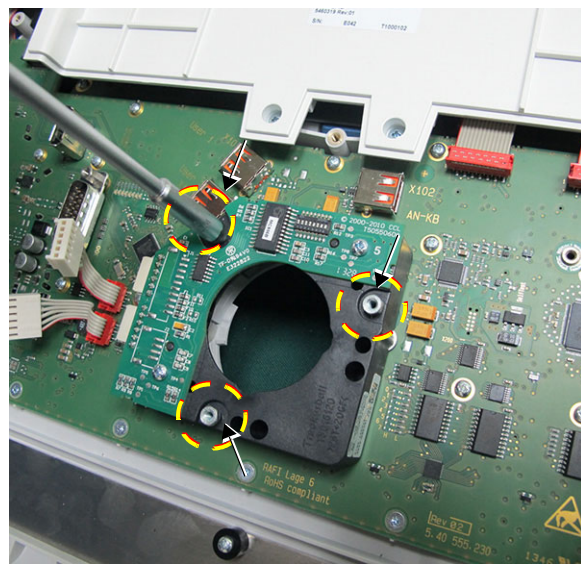
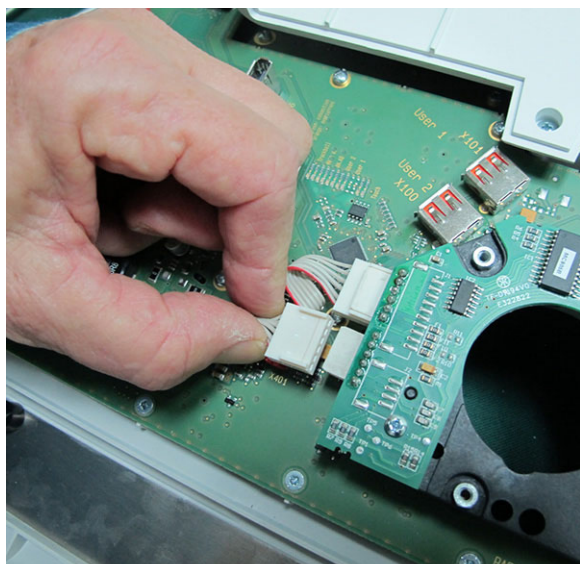
**8-3-11-4 Mechanical Trackball and Housing Removal Procedure** (cont'd)

- 3.) With one hand, tilt the Keyboard Assembly forward until the trackball falls out into the other hand.



**Figure 8-65 Removing the Mechanical Trackball**

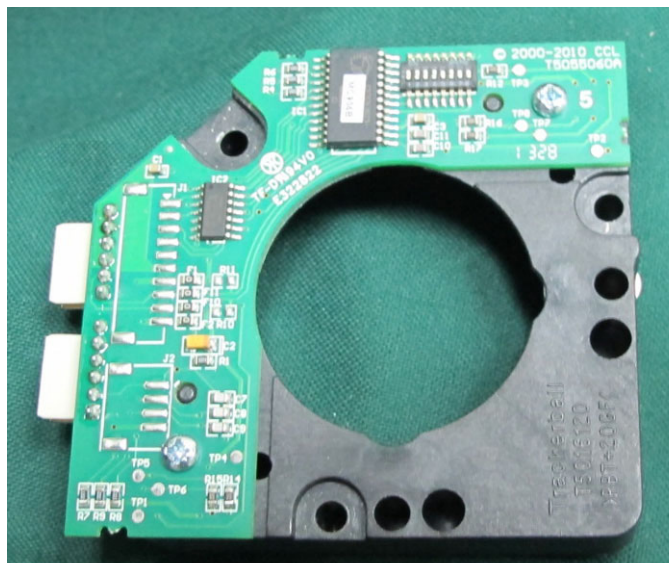
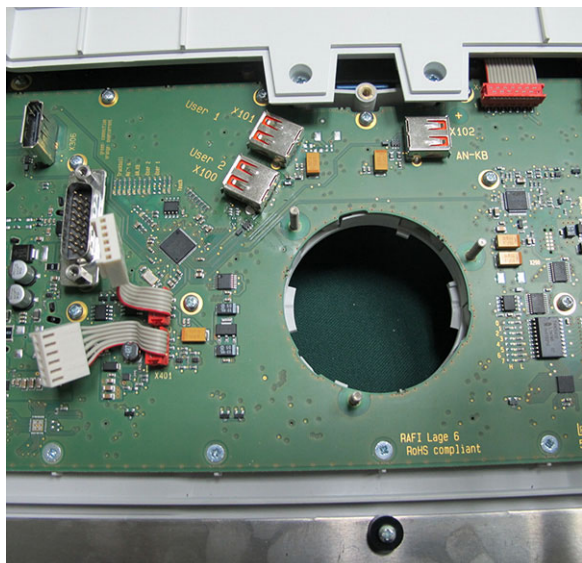
- 4.) Carefully turn the Keyboard Assembly over (upside-down).  
5.) Remove the Keyboard Bottom Cover:  
6.) Disconnect the 2 flex cables - [Figure 8-66](#), left.  
7.) Remove each of the 3 hex nuts (5.5 mm) from the Trackball Board and housing - [Figure 8-66](#), right.



**Figure 8-66 Trackball Board and Housing Removal**

**8-3-11-4 Mechanical Trackball and Housing Removal Procedure** (cont'd)

- 8.) Lift the Trackball Board and Housing assembly up and remove - [Figure 8-67](#).



**Figure 8-67 Trackball Board and Housing Removed**

**8-3-11-5 Mechanical Trackball and Housing Installation Procedure**

- 1.) Place a flat washer on each of the three retaining screws extending from the base board.
- 2.) Carefully place the new Mechanical Trackball Board and Housing in position on the keyboard assembly (refer to [Figure 8-66](#)).
- 3.) Secure the Trackball Housing using the 3 **new** nuts supplied with the kit.
- 4.) Carefully re-connect the 2 cables (previously disconnected) - [Figure 8-66](#), left.
- 5.) Re-fit the Keyboard Bottom Cover:
- 6.) Install the Keyboard Assembly on the system. .
- 7.) Place the trackball into position in the Operating Panel.
- 8.) Return the trackball ring and turn to secure the trackball in its housing - [Figure 8-64](#).
- 9.) Turn ON power to the system.



---

## 8-3-12 Rotary Knob Replacement Procedure

**NOTE:** The following instructions are applicable to replacement of Rotary Knobs on either on the Operating Panel, or on the Touch Screen. The Knobs Kit contains Rotary Knobs for both.

### 8-3-12-1 Tools

None.

### 8-3-12-2 Time Required

5 min

### 8-3-12-3 Preparation

None

### 8-3-12-4 Rotary Knob Removal Procedure

- 1.) Grip the defective knob between your finger and thumb
- 2.) Lift straight up and remove from the control shaft - see [Figure 8-68](#) below.



**Figure 8-68 Removing a Rotary Knob**

### 8-3-12-5 Rotary Knob Installation Procedure

- 1.) Carefully place a new Rotary Knob in position on the Operating Panel (or Touch Screen), taking care to place the plastic alignment pin in the correct location.
- 2.) Gently push the Rotary Knob down until it snaps into position.

## 8-3-13 Operating Panel Keycaps Replacement Procedure

### 8-3-13-1 Tools

Use the appropriate flat screwdriver, as indicated in the Keycap replacement procedure.

### 8-3-13-2 Time Required

5 min

### 8-3-13-3 Preparation

None

### 8-3-13-4 Operating Panel Keycap Removal Procedure

- 1.) Carefully insert the end of a small flat screwdriver in the gap between the Keycap you wish to remove and the surface of the Operating Panel.

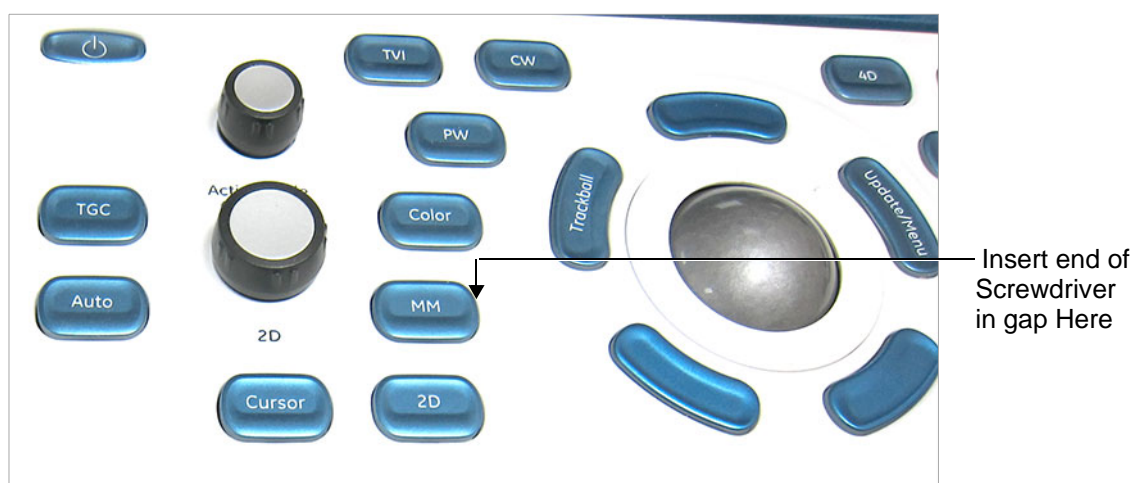


Figure 8-69 Removing Keycap from Operating Panel

- 2.) Gently lever off the defective Keycap, until it is completely loosened from its base.
- 3.) Remove the defective Keycap.

### 8-3-13-5 Operating Panel KeyCap Installation Procedure

- 1.) Carefully place the appropriate new Keycap in position on the Operating Panel, taking care to place the plastic alignment pin in the correct position so that the Keycap is the right way up and reads correctly.
- 2.) Gently push the Keycap down until it snaps into position.

## 8-3-14 Alphanumeric Keycaps Replacement Procedure

The Alphanumeric Keyboard is shown in [Figure 8-70](#).

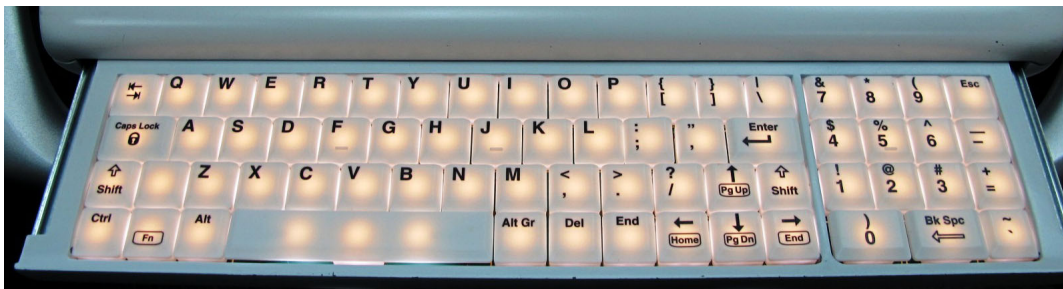


Figure 8-70 Alphanumeric Keyboard

### 8-3-14-1 Tools

Appropriate flat screwdriver.

**FRU Part #** Refer to [Table 9-7](#) on page 9-16.

### 8-3-14-2 Time Required

5 min

### 8-3-14-3 Preparations

None

### 8-3-14-4 Alphanumeric Keycap Removal Procedure

- Using a flat screwdriver gently release the defective keycap as shown in [Figure 8-71](#).



Figure 8-71 Alphanumeric Keyboard

### 8-3-14-5 Keycaps for Operating Panel Installation Procedure

- Return each replacement keycap to its appropriate position on the keyboard by gently pressing the keycap into position ensuring that it is firmly engaged.

## Section 8-4

### Cables (v203) - Replacement Procedures

**8-4-1 Tools**

Common Phillips screwdrivers

**8-4-2 Time Required**

*NOTE: 1 person is required for replacing the cables.*

Table 8-2 Time Required

Cable Name	Part Number	Time (when covers have been removed)
ALTON R2 HDD POWER cable	5767763	2 minutes
FEPS to BIF cable	57662269	2 minutes
STD cable	5444463	2 minutes
FEPS to MST cable	5766268	3 minutes
ALTON R2 PATIO BEP2CMST cable	5777312	3 minutes

### 8-4-3 Removal Procedure

Table 8-3: Removal Procedure for Cables

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Loosen cable connectors (1&2) to remove ALTON R2 HDD POWER cable (5767763).  Loosen cable connectors (3&4) to remove FEPS to BIF cable (57662269).  Loosen cable connectors (5&6) to remove STD cable (5444463).	

Table 8-3: Removal Procedure for Cables (Continued)






No.	Steps	Corresponding Graphic
3.	ALTON R2 HDD POWER cable (5767763).	
4.	FEPS to BIF cable (57662269).	
5.	STD cable (5444463).	
6.	Unscrew the two screws to remove FEPS to MST cable (5766268).	



Table 8-3: Removal Procedure for Cables (Continued)

No.	Steps	Corresponding Graphic
7.	FEPS to MST cable (5766268).	
8.	Remove the scanning module assy from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
9.	Loosen two cable connectors to remove ALTON R2 PATIO BEP2CMST cable (5777312).	
10.	ALTON R2 PATIO BEP2CMST cable (5777312).	

#### 8-4-4 Mounting Procedure

Install the new parts in the reverse order of removal.

## Section 8-5

### Electronic Cage Components Replacement Procedures for mini-cSound (v203)

**NOTE:** When replacing Vivid S60N/Vivid S70N lower section components, after removal of the system covers (left and right sides; front), the Front End door assembly should be removed from the main assembly (to gain access to the internal components) and placed on a stable surface. These steps are described in the procedure below.

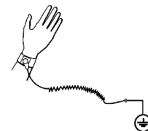


#### CAUTION



When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.

If a battery is present, first remove the battery as it contains stored energy.



8-5-1 Scanner Electronic Cage (Ecage) Replacement (v203)

Purpose: This is a description on how to remove and replace the Scanner Electronic Cage.

8-5-1-1 Tools

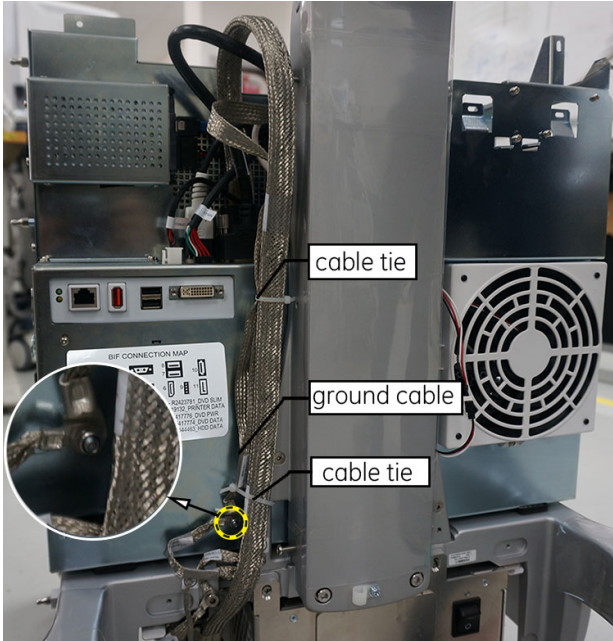
- common Phillips screwdrivers
- diagonal cutter
- 3 mm Hex key
- Calibrated Torque tool, 1.3 Nm +/- 5% for 3 mm Hex key

8-5-1-2 Preparation

- Shut down the system and disconnect the power cord.

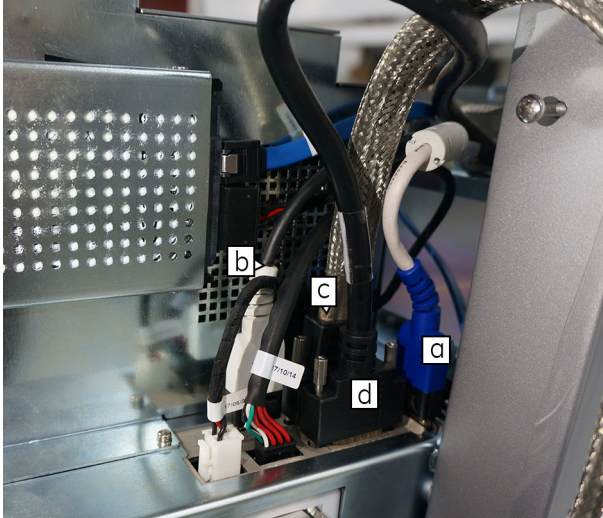
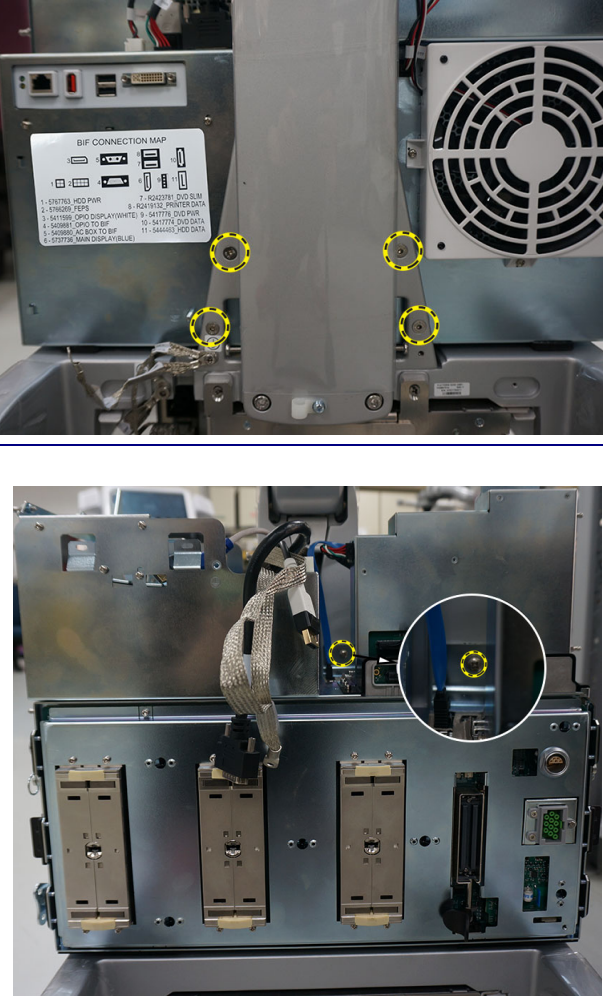
8-5-1-3 Removal Procedure

Table 8-4 Removal Procedure for Scanner Electronic Cage 1 of 2

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers.	
2.	<ul style="list-style-type: none"><li>• Cut and remove the cable tie.</li><li>• Then unscrew the M4 nut to disconnect the ground cable (Column to Electronic Cage GND Copper Strap).</li></ul> <p>Save the nut, the two serrated washers and the flat washer for use during installation.</p>	



**Table 8-4 Removal Procedure for Scanner Electronic Cage (Continued) 2 of 2**

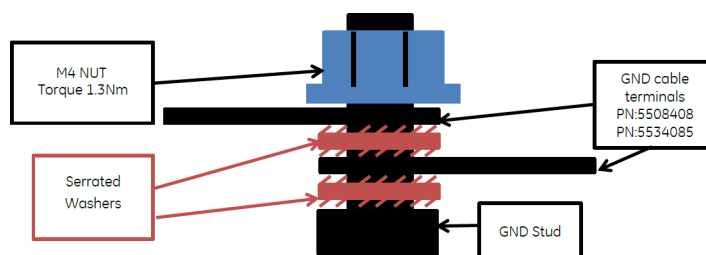
No.	Steps	Corresponding Graphic
3.	Disconnect the four cables from the Ecage. <ol style="list-style-type: none"> <li>Main display (blue)</li> <li>Touch panel</li> <li>AC power cable</li> <li>D-SUB cable</li> </ol>	
4.	Using a 3mm Hex key, release the four securing screws at the rear of the system. Then release the screw in the front.	
5.	Remove the Ecage module from the system.	

**8-5-1-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

- the securing screw on front side (ref. step 4 in the removal procedure): 1.3 Nm +/- 5%.  
Use Loctite 243
- four securing screws on rear side  
(ref. step 4 in the removal procedure): 1.3 Nm +/- 5%. Use Loctite 243
- nut for ground cables (ref. step 2 in the removal procedure): 1.3 Nm +/- 5%

**Installation Details:**

5508408 - Column to Electronic Cage GND Copper Strap

5534085 - Cage to Lower And Upper Arms GND Copper Strap

**Figure 8-72 Grounding Installation Details**

8-5-2      **BEP&CPU Module Replacement (v203)**

Purpose: This is a description on how to remove and replace the BEP&CPU module.

8-5-2-1      **Tools**

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for M3 Phillips screws

8-5-2-2      **Preparation**

- Shut down the system and disconnect the power cord.

8-5-2-3      **Removal Procedure**

Table 8-5:    Removal Procedure for BEP&CPU module

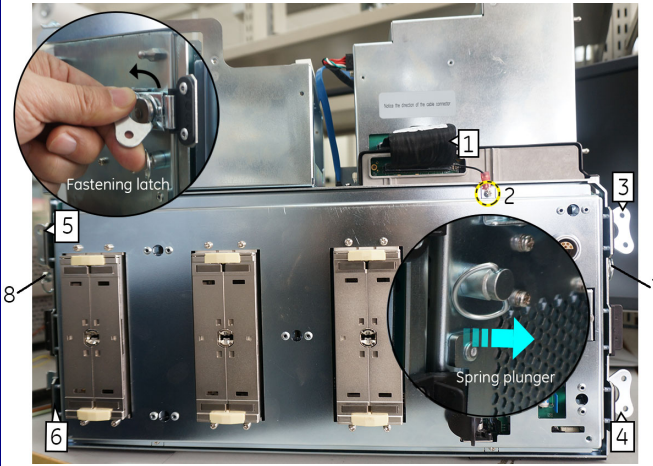
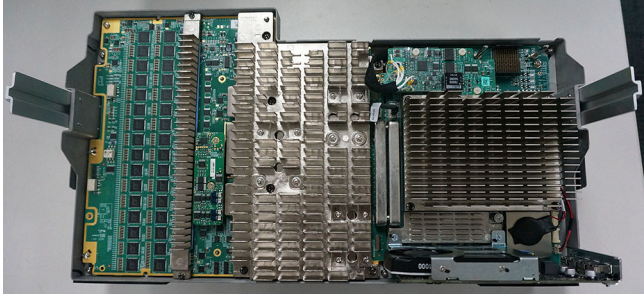
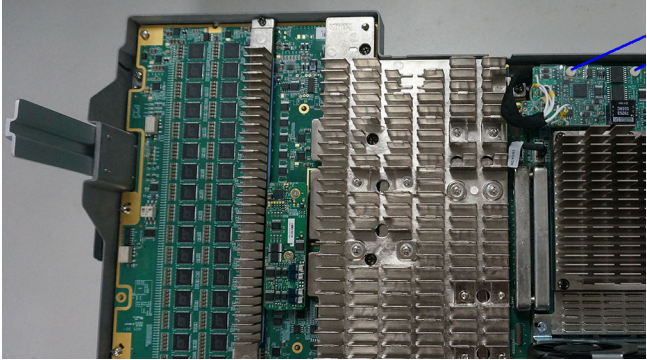
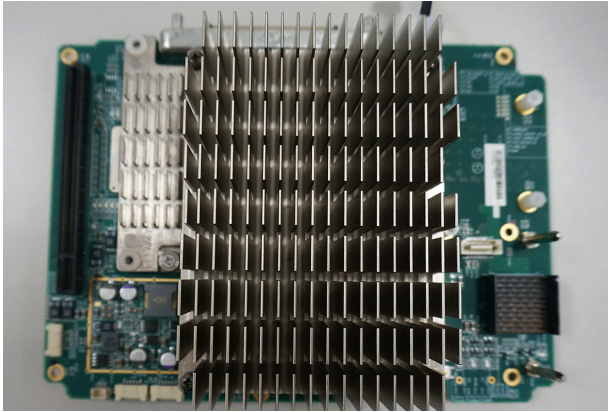
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Unscrew the two screws (1~2) and remove the cable. Then open the four fastening latches (3~6) and pull out the two spring plungers (7~8) on both side of the Ecage Box.	
3.	Carefully remove the scanning module assy from the Ecage and place it on a stable surface.  Note: Always have the ESD wrist strap when performing these procedures.	

Table 8-5: Removal Procedure for BEP&CPU module

No.	Steps	Corresponding Graphic
4.	Unfasten the three plastic screws and remove ECG PWA.	
5.	Unscrew the seven screws. And disconnect the connector. Then carefully remove the BEP&CPU assembly.  Note: Screw 5 is captive screw.	
6.	Remove the GPU module, refer to <a href="#">GPU Module Replacement (v203)</a> on page 8 - 76.	
7.	BEP&CPU module.	



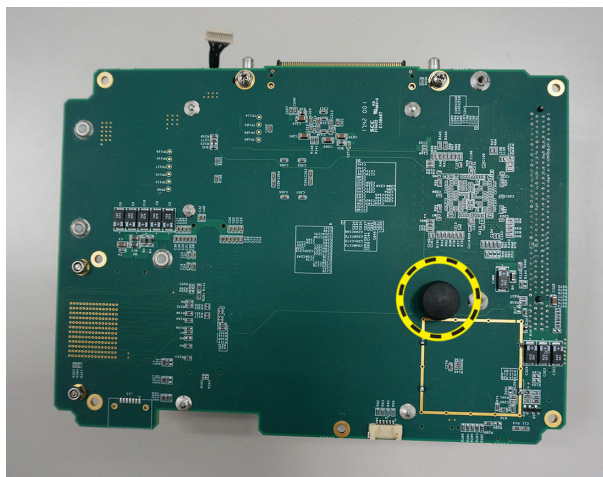
**8-5-2-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

0.6 Nm +/- 5%

**NOTE:** *The black hand screw is used to fix assembly during transportation. Remember to remove the hand screw before installation*



**Figure 8-73 Remove the black hand screw before installation**

**8-5-3 GPU Module Replacement (v203)**

Purpose: This is a description on how to remove and replace the GPU module.

**8-5-3-1 Tools**

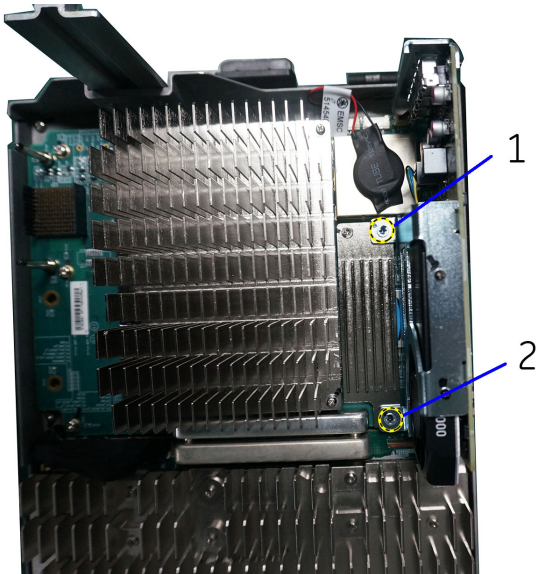
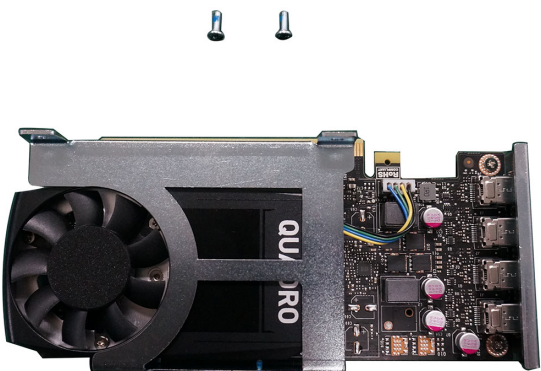
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for M3 Phillips screws

**8-5-3-2 Preparation**

- Shut down the system and disconnect the power cord.

**8-5-3-3 Removal Procedure**

Table 8-6: Removal Procedure for GPU module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage - <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
3.	Unscrew the two screws to remove the GPU module.	
4.	GPU module.	

**8-5-3-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

0.6 Nm +/- 5%

**8-5-4 CMST Module Replacement (v203)**

Purpose: This is a description on how to remove and replace the CMST module.

**8-5-4-1 Tools**

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

**8-5-4-2 Preparation**

- Shut down the system and disconnect the power cord.



## 8-5-4-3 Removal Procedure

Table 8-7: Removal Procedure for CMST module

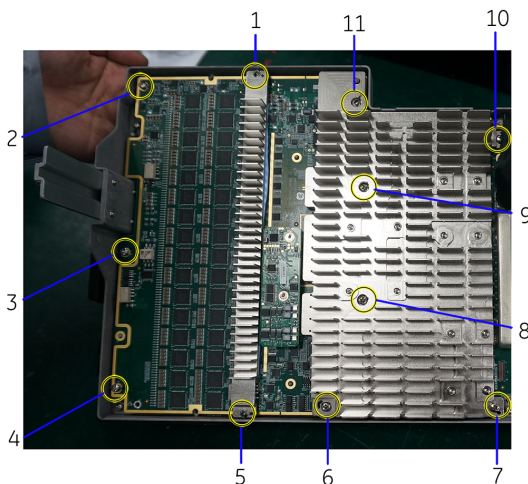
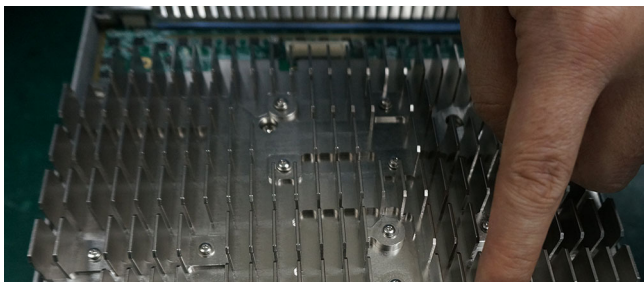
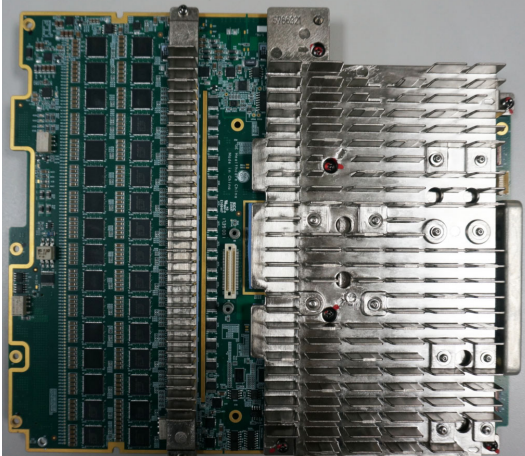
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203) on page 8 - 73</a> .	
3.	Remove the BEP&CPU module, refer to step 4 in <a href="#">BEP&amp;CPU Module Replacement (v203) on page 8 - 73</a> .	
4.	Remove the nine captive screws and disconnect the CMST to BEP cable, then remove the CMST module from the assy.	 

Table 8-7: Removal Procedure for CMST module

No.	Steps	Corresponding Graphic
5.	CMST module (include CWD).	

8-5-4-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%

## 8-5-5 CWD Replacement (v203)

Purpose: This is a description on how to remove and replace the CWD.

### 8-5-5-1 Tools

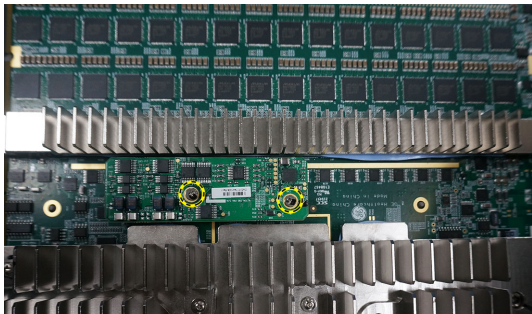
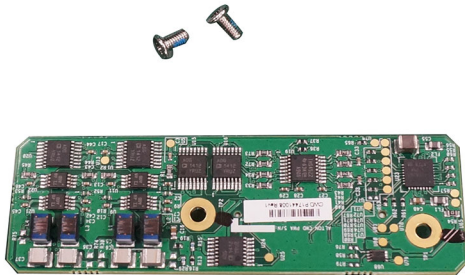
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.4 Nm +/- 5% for M2.5 Phillips screws

### 8-5-5-2 Preparation

- Shut down the system and disconnect the power cord.

### 8-5-5-3 Removal Procedure

Table 8-8: Removal Procedure for CWD module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on <a href="#">page 8 - 73</a> .	
3.	Unscrew two screws, and then carefully remove the CWD.	
4.	CWD	

**8-5-5-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

M2.5 x 5mm: 0.4 Nm +/- 5%

## 8-5-6 ECG Module Replacement (v203)

Purpose: This is a description on how to remove and replace the ECG module.



### 8-5-6-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws
- Calibrated Torque tool, 0.08 Nm +/- 5% for plastic screws

### 8-5-6-2 Preparation

- Shut down the system and disconnect the power cord.

## 8-5-6-3 Removal Procedure

Table 8-9: Removal Procedure for ECG module

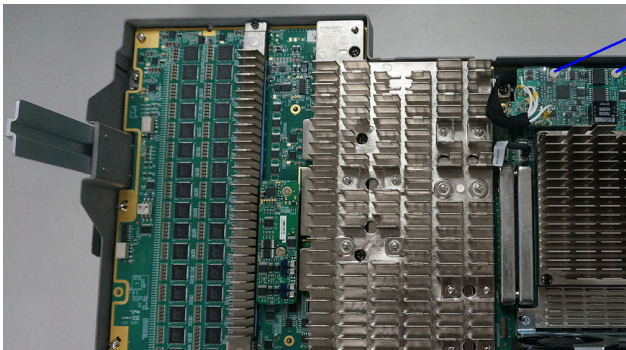
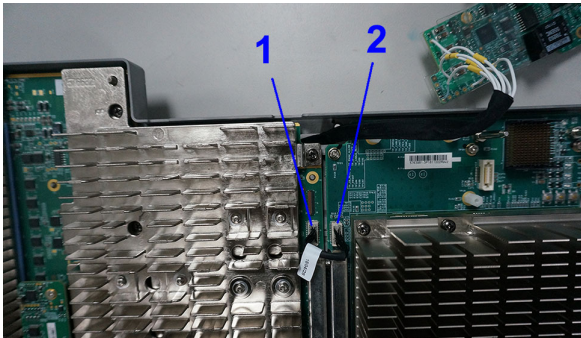

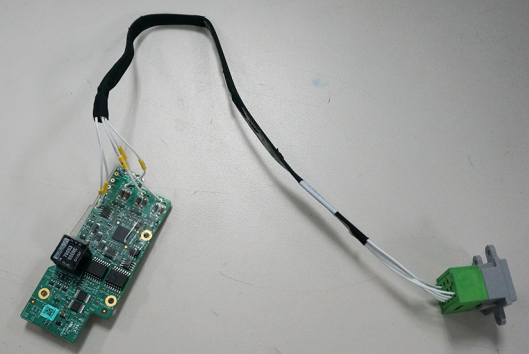
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
3.	Unfasten the three plastic screws.	
4.	Disconnect one of the connectors (1 or 2).	
5.	Remove the BEP&CPU module assy. refer to step 4 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
6.	<ul style="list-style-type: none"> <li>Loosen and remove screw number 1, 2, 5 and 7 that secure the ECG module to the PSB board.</li> <li>Loosen and remove screw number 3, 4 and 6 to remove the ECG connector from the ECG Support.</li> </ul>	
7.	Remove the ECG module.	



Table 8-9: Removal Procedure for ECG module

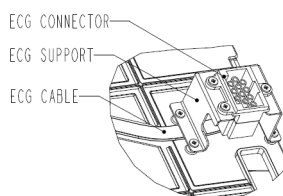
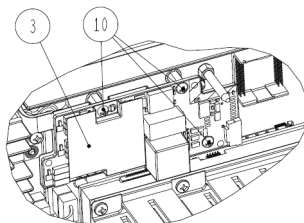
No.	Steps	Corresponding Graphic
8.	ECG Module.	

**8-5-6-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

- Seven screws (for ECG Connector and ECG Support): 0.6 Nm +/- 5%
- Three plastic screws: 0.08 Nm +/- 5%

**Installation Details:****Figure 8-74 Routing of ECG Cable**

3 - ECG Module

10 - Plastic Screw

**Figure 8-75 ECG mounting details**

8-5-7 PSB Module Replacement (v203)

Purpose: This is a description on how to remove and replace the PSB Module.

8-5-7-1 Tools

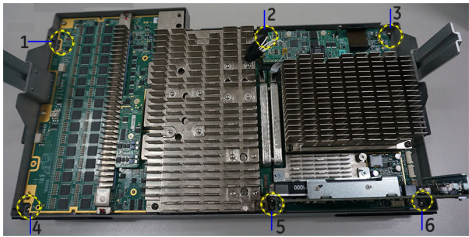

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-7-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-7-3 Removal Procedure

Table 8-10: Removal Procedure for PSB Module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module assy from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
3.	Loosen and remove the six screws.	
4.	Carefully remove the PSB Module.	
5.	PSB Module (front side).	

8-5-7-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%



8-5-8      **Hard Disk Module Replacement (v203)**

Purpose: This is a description on how to remove and replace the Hard Disk Module.

8-5-8-1      **Tools**

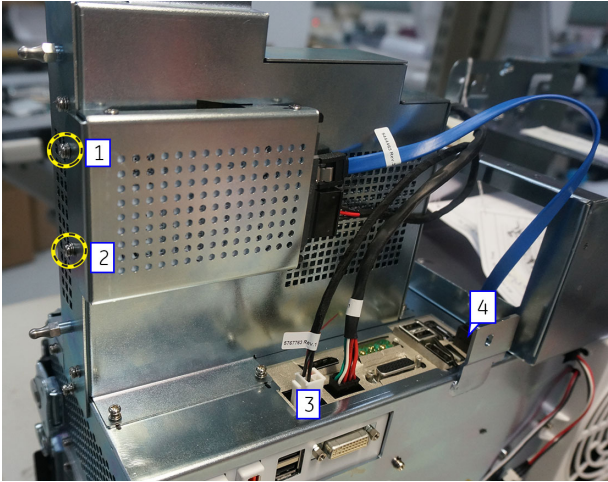

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-8-2      **Preparation**

- Shut down the system and disconnect the power cord.

8-5-8-3      **Removal Procedure**

Table 8-11:      Removal Procedure for Hard Disk Module

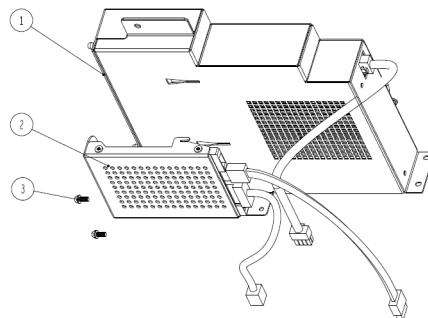
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear.	
2.	Remove the two screws (1,2), and disconnect the two cables (3,4).	
3.	Carefully remove the Hard Disk Module from the Ecage.	
4.	Hard Disk Module.	

**8-5-8-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

0.6 Nm +/- 5%

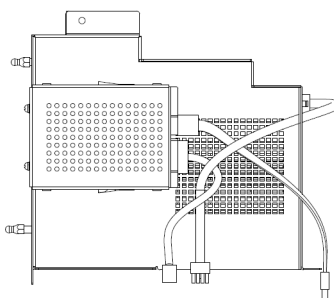
**Installation Details:**

1 - FEPS

2 - Hard Disk Module

3 - Screw M3x6 (2x), 0.6 Nm +/- 5%

**Figure 8-76 HDD and FEPS - Exploded view**



**Figure 8-77 Routing of HDD Cables**

---

## 8-5-9 FEPS Module Replacement (v203)

Purpose: This is a description on how to remove and replace the FEPS Module.

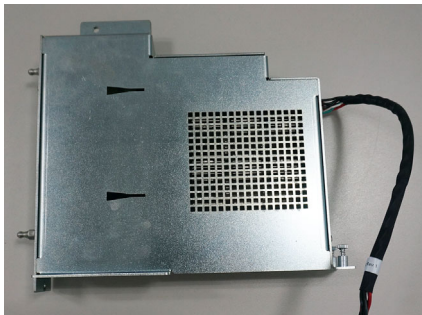


Figure 8-78 FEPS module

### 8-5-9-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

### 8-5-9-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-9-3

Removal Procedure

Table 8-12: Removal Procedure for FEPS Module

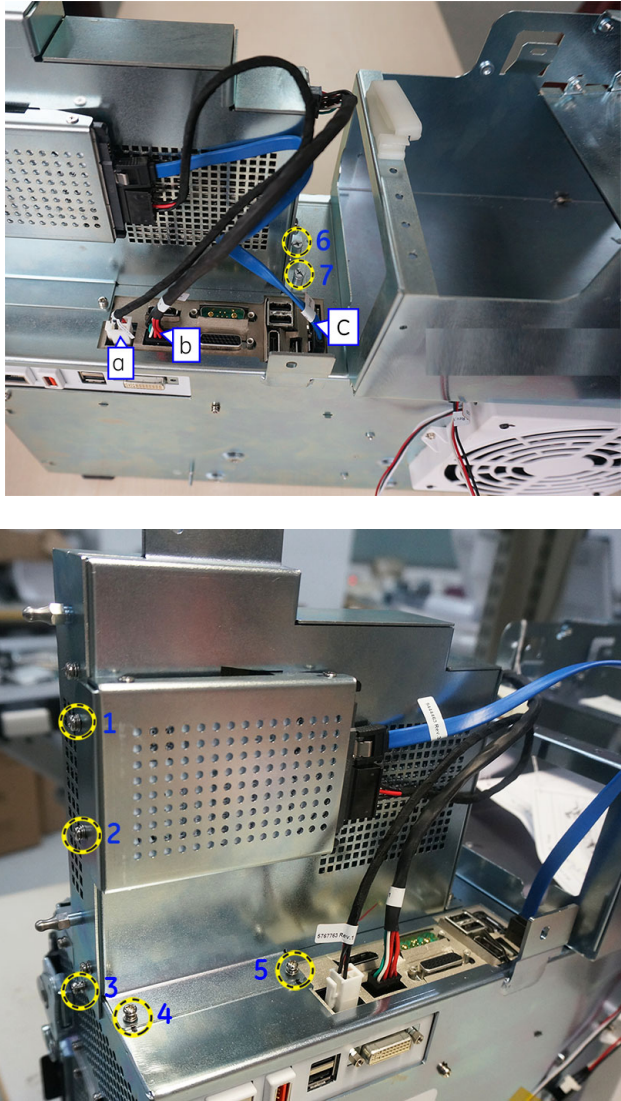
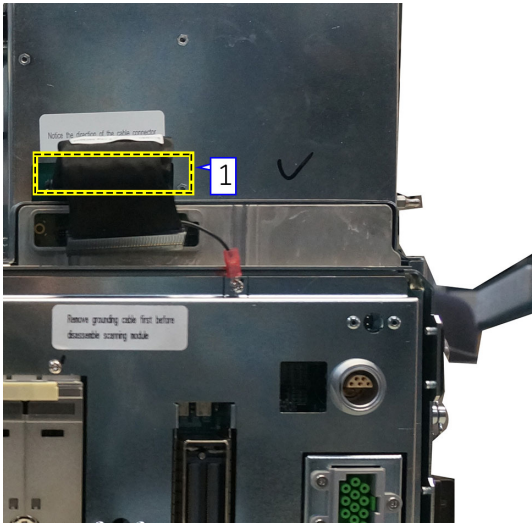
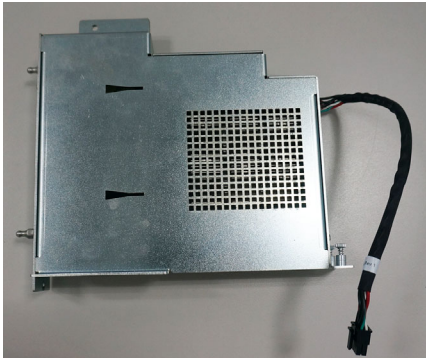
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear.	
2.	Remove the two screws (1,2), and disconnect the two cables (a,c), then remove the Hard Disk module.	
3.	Loosen and remove the 5 screws (3~5) and loosen the captive screws (6, 7). Then remove the cable (b).	

Table 8-12: Removal Procedure for FEPS Module

No.	Steps	Corresponding Graphic
4.	Disconnect the connector.	
5.	Carefully remove the FEPS module.	
6.	FEPS Module.	

8-5-9-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5% for Phillips screws.

8-5-10 Fan Module Replacement (v203)

Purpose: This is a description on how to remove and replace the Fan Module.

8-5-10-1 Tools

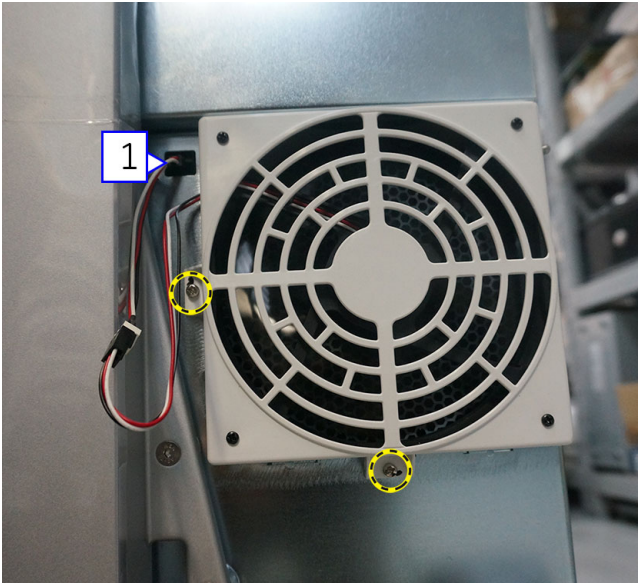
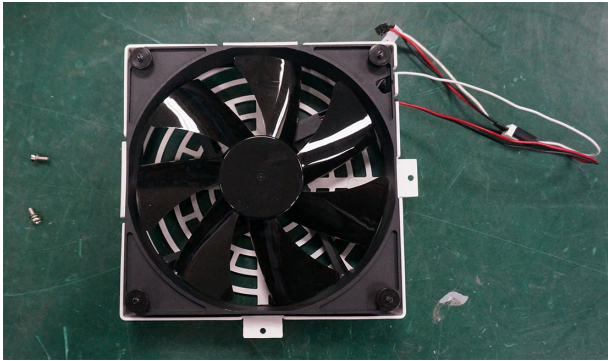
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-10-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-10-3 Removal Procedure

Table 8-13: Removal Procedure for Fan assy

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Loosen and remove the two screws, and then disconnect the cable (1).	
3.	Fan assy.	

---

**8-5-10-4 Mounting Procedure**

Install the new parts in the reverse order of removal.

**Torque:**

0.6 Nm +/- 5%



## 8-5-11 BIF Module Replacement (v203)

Purpose: This is a description on how to remove and replace the BIF module.

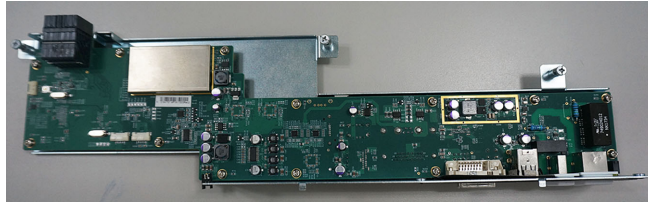


Figure 8-79 BIF module

### 8-5-11-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

### 8-5-11-2 Preparation

- Shut down the system and disconnect the power cord.

### 8-5-11-3 Needed Manpower

- 1 person, 35 minutes



## 8-5-11-4 Removal Procedure

Table 8-14: Removal Procedure for BIF module


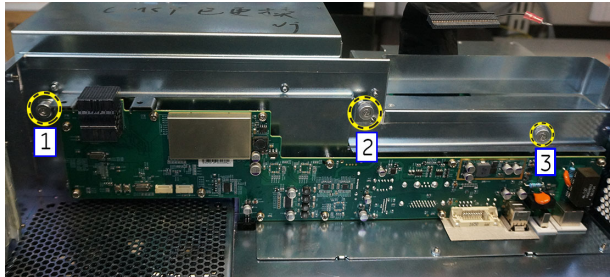
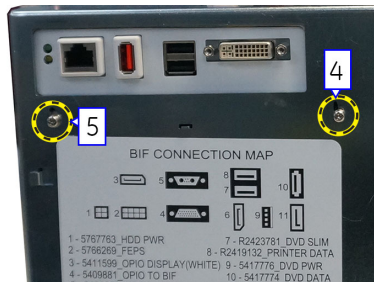
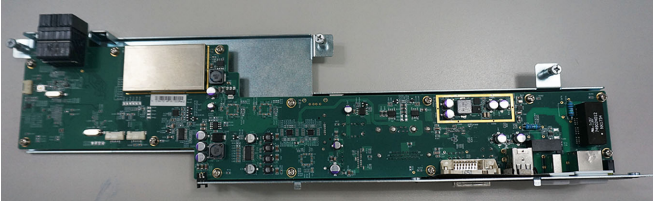
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Disconnect the four cables from the internal distribution panel, refer to step 3 in <a href="#">Scanner Electronic Cage (Ecage) Replacement (v203)</a> on page 8 - 70.	
3.	Disconnect the three cables (a, b, c) from the internal distribution panel, refer to step 2 and step 3 in <a href="#">FEPS Module Replacement (v203)</a> on page 8 - 89.	
4.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in <a href="#">BEP&amp;CPU Module Replacement (v203)</a> on page 8 - 73.	
5.	Loosen and remove the two captives screws, then remove the metal board.	
6.	Disconnect the cable (1), refer to step 2 in <a href="#">Fan Module Replacement (v203)</a> on page 8 - 92.	
7.	Unscrew the three internal captive screws (1-3), and then remove the two external screws (4-5).	 

Table 8-14: Removal Procedure for BIF module

No.	Steps	Corresponding Graphic
8.	BIF Module.	

8-5-11-5 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%

## 8-5-12 AC Distribution Box Replacement Procedure (v203)

### 8-5-12-1 Tools

- Phillips screwdriver.
- Driver or BIT # TX-30 for M6 screws
- Calibrated Torque tool, 1.3 Nm +/- 5%, for Phillips screws
- Calibrated Torque tool, 5.8 Nm +/- 5%, for M6 screws (TX-30)
- Loctite 243

### 8-5-12-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-5-12-3 AC Distribution Box Removal Procedure

**NOTE:** The AC Distribution Box is located at the rear of the system - [Figure 8-80](#).

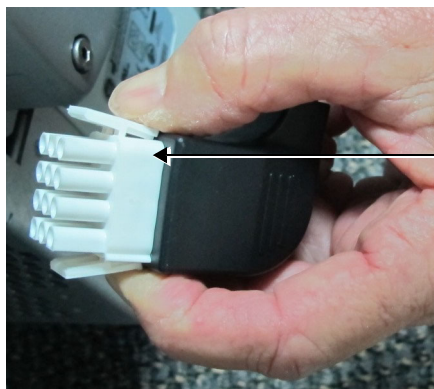


**Figure 8-80 AC Distribution Box Located at Rear of System**

- 1.) Remove the AC Distribution Box cover, then the battery:

**8-5-12-3 AC Distribution Box Removal Procedure** (cont'd)

- 2.) Disconnect the "AC Unit to BIF Cable" (5409880) from the AC Box by squeezing the plastic retainer clips inwards as shown in on the left and pull the connector outwards.



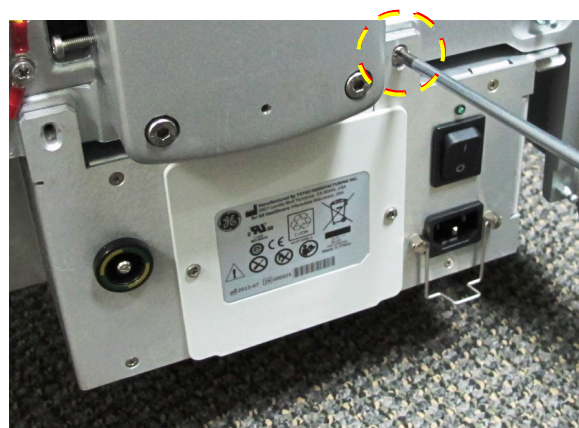
Disconnect the power cables by squeezing the plastic retainer clips

**Figure 8-81 Plastic Securing Clips on Power Cables**

- 3.) Disconnect "Peripheral Power Output Cable" (5409882) from the AC Box.
- 4.) Disconnect "AC Box to Base GND Copper Strap" (5508405) from the AC Box.

Keep the M6 bolt and washers for use during the replacement of the AC Distribution Box.

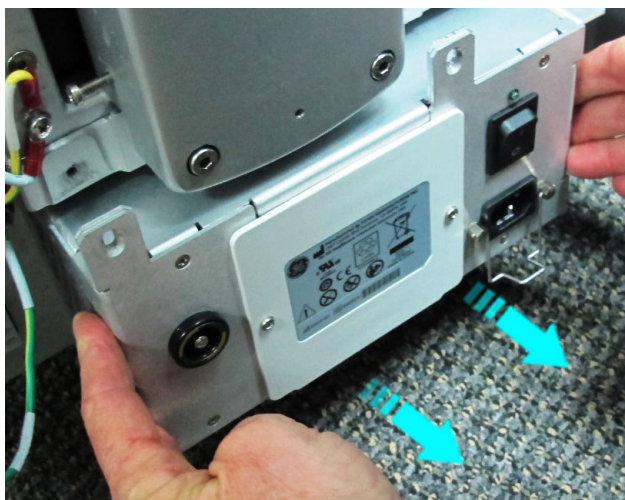
- 5.) To remove the AC Box, unscrew the two supporting screws (shown in [Figure 8-82](#) below).



**Figure 8-82 AC Box Supporting Screws**

**8-5-12-3 AC Distribution Box Removal Procedure** (cont'd)

- 6.) Pull (slide) the AC Box all the way out until it is completely removed from the system as shown in [Figure 8-83](#) below.

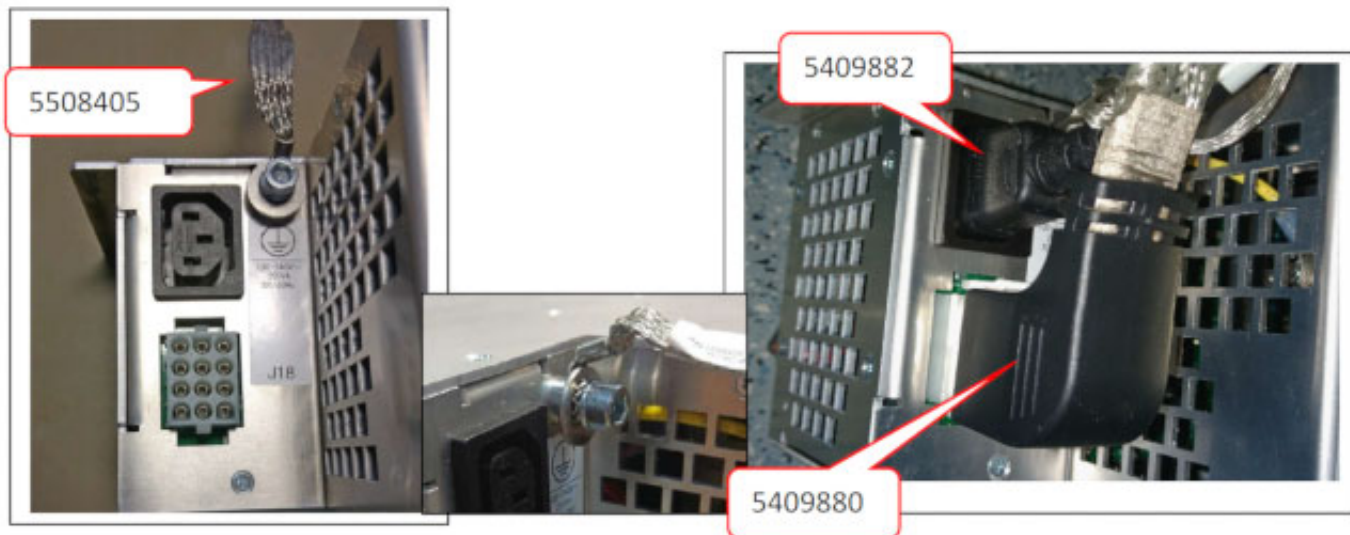


**Figure 8-83** Removing the AC Distribution Box



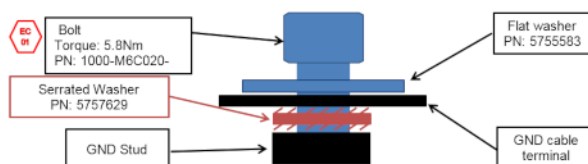
### 8-5-12-4 AC Distribution Box Installation Procedure

- 1.) Slide the (new) AC Distribution Box on to the base console rails from the back side of on the system.
- 2.) Install and tighten the screws. (Tightening torque: 1.3 Nm +/- 5%.)
- 3.) Install the cables as described below the illustration.



**Figure 8-84 Install the cables to the AC Distribution Box**

- a.) Connect "Base to Column GND Copper Strap" (5508405) using M6 screw, serrated and flat washers to the base. (Torque 5.8 Nm.)



**Figure 8-85 M6 screw with GND strap and washers**

- b.) Connect "Peripheral Power Output Cable" (5409882) to the AC Box.
- c.) Connect the "AC Unit to BIF Cable" (5409880) to the AC Box.
- 4.) Install the Battery, then refit the AC Distribution Box cover.

## Section 8-6

### Mechanical Platform Components - Replacement Procedures

#### 8-6-1 Mechanical Assembly Base Console Replacement

**NOTE:** In the event that the Mechanical Base Console requires replacement, contact the OnLine Center for instructions.

#### 8-6-2 Column Main Support Assembly Replacement

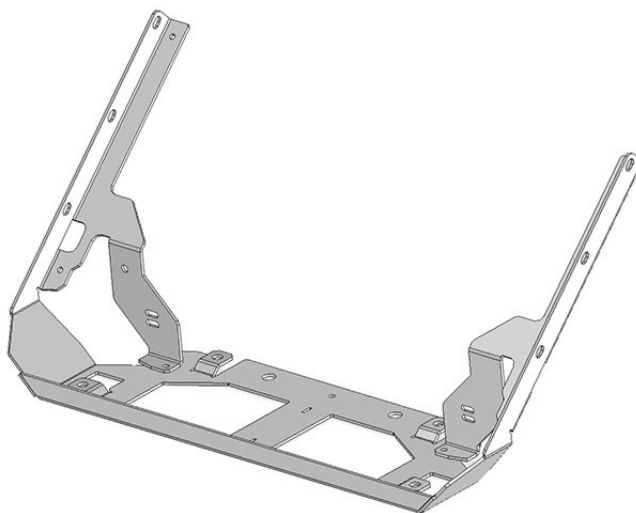
**NOTE:** In the event that the Column Main Support Assembly requires replacement, contact the OnLine Center for instructions.

#### 8-6-3 Mechanical Assembly Interface Base for the Operating Panel Replacement

**NOTE:** In the event that the Mechanical Assembly Interface Base for the Operating Panel requires replacement, contact the OnLine Center for instructions.

#### 8-6-4 Touch Screen Chassis Replacement Procedure

**NOTE:** The Touch Screen Chassis complete with brackets are shown in [Figure 8-86](#).



**Figure 8-86 Touch Screen Chassis**

##### 8-6-4-1 Tools

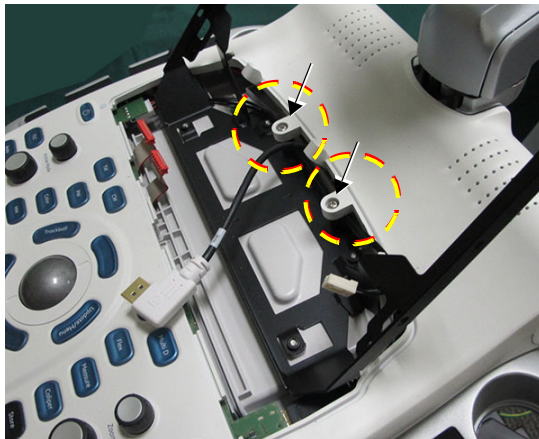
Phillips screwdriver.

##### 8-6-4-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

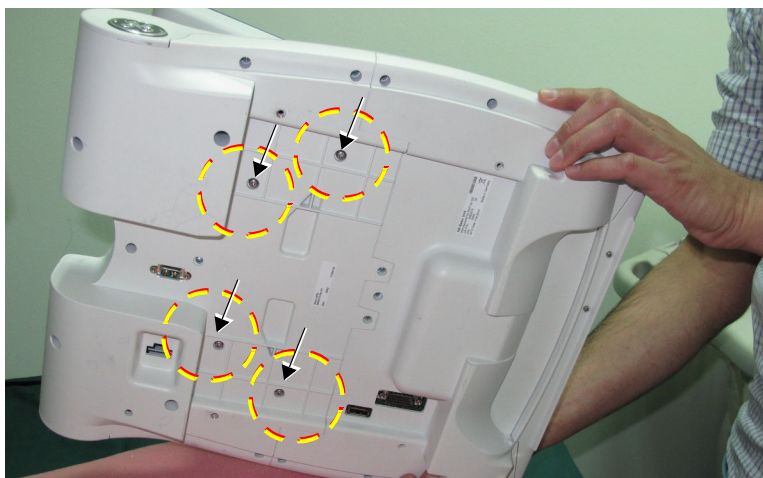
**8-6-4-3 Touch Screen Chassis Removal Procedure**

- 1.) Remove the Touch Screen:
- 2) Unscrew and remove the two securing screws fastening the chassis to the top of the keyboard assembly - shown in [Figure 8-87](#).



**Figure 8-87 Removing Securing Screws**

- 3.) Cut the cable securing tie-wraps.
- 4.) Remove the Operating Panel Keyboard Assembly.
- 5.) From the bottom of the keyboard assembly, unscrew the four screws shown in [Figure 8-88](#).



**Figure 8-88 Four Screws Securing the Touch Screen Chassis**

- 6.) From the top of the keyboard assembly, carefully slide the Touch Screen Chassis Panel out from beneath the two screw plastic flanges (shown in [Figure 8-87](#)) and lift the chassis upwards to release it from its location.



---

**8-6-4-4 Touch Screen Chassis Installation Procedure**

- 1.) Using the replacement Touch Screen Chassis, perform the procedures previously described in reverse sequence.
- 2.) Secure cables with new tie wraps.
- 3.) Turn ON power to the Vivid S60N/Vivid S70N ultrasound scanner.

## 8-6-5 LCD Arm Alton 21.5in Wide Replacement Procedure

### 8-6-5-1 Tools

- Flat type screwdrivers
- Phillips type screwdrivers
- Side cutting pliers
- 5 mm Hex key (or driver)
- Calibrated Torque tool, 1.3 Nm +/- 5% for M3 Phillips screws
- Calibrated Torque tool, 5 mm Hex, 5.8 Nm +/- 5%, for M6 Hex screws
- Loctite 243

### 8-6-5-2 Preparation

- 1.) Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).
- 2.) Remove the 21.5in Monitor as described in [Remove the 21.5 inch Monitor on page 8 - 34](#).

### 8-6-5-3 LCD Arm Alton 21.5in Wide Monitor Removal Procedure

- 1.) Remove the two screws then remove the two Upper Service Covers, one on each side of the upper part of the LCD Arm.



**Figure 8-89 Remove the screw and the Upper Service Cover (one side illustrated)**

- 2.) Remove the Vertical Service Cover. It is clipped on, so it can be removed by applying some force.



**Figure 8-90 Remove the Vertical Service Cover**

- 3.) Remove the screw and the Lower Service Cover.



**Figure 8-91 Remove the Lower Service Cover**

- 4.) Using side cutting pliers, cut the following tie-wraps:
- three tie-wraps in the monitor end of the monitor cable
  - two tie-wraps on each side of the Upper Arm
  - two tie-wraps on each side of the Lower Arm
- 5.) Remove the cables from the Arm.



**Figure 8-92 Remove cables**

Lift the Arm a little, as illustrated below to ease the removing of the cables from the base of the Arm.



**Figure 8-93 Lift the Arm**

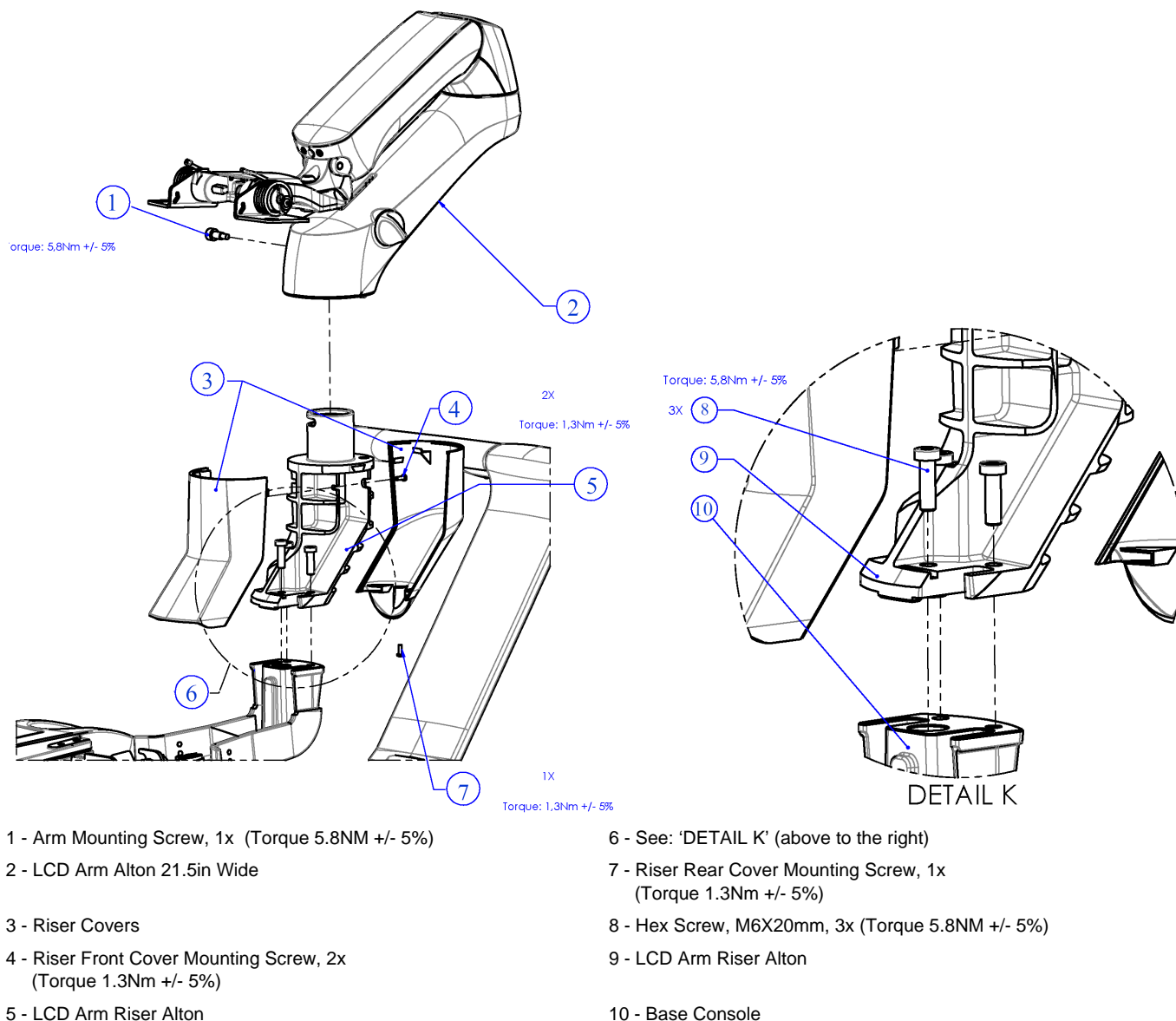
- 6.) Remove the Arm.

**8-6-5-4 LCD Arm Alton 21.5in Wide Monitor Installation Procedure**

- Install the Arm by performing the [LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 104](#) in reverse sequence.

Apply Loctite 243 to the screws before installing.

**Torque: See illustration below:**



**Figure 8-94 LCD Arm Riser and Arm Exploded view**

## 8-6-6 LCD Arm Riser for 21.5 inch monitor replacement procedure



Figure 8-95 LCD Arm Riser for 21.5 inch monitor

### 8-6-6-1 Tools

- Phillips type screwdrivers
- Side cutting pliers
- 5 mm Hex key (or driver)
- Calibrated Torque tool, 1.3 Nm +/- 5% for M3 Phillips screws
- Calibrated Torque tool, 5 mm Hex, 5.8 Nm +/- 5%, for M6 Hex screws
- Loctite 243

### 8-6-6-2 Preparations

- 1.) Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).
- 2.) Remove the **21.5in Monitor** as described in [Remove the 21.5 inch Monitor on page 8 - 34](#).
- 3.) Unscrew and remove the **three fastening screws** used for the covers. See the illustration below.
- 4.) Remove the **two covers** from the LCD Arm Riser. See the illustration below.

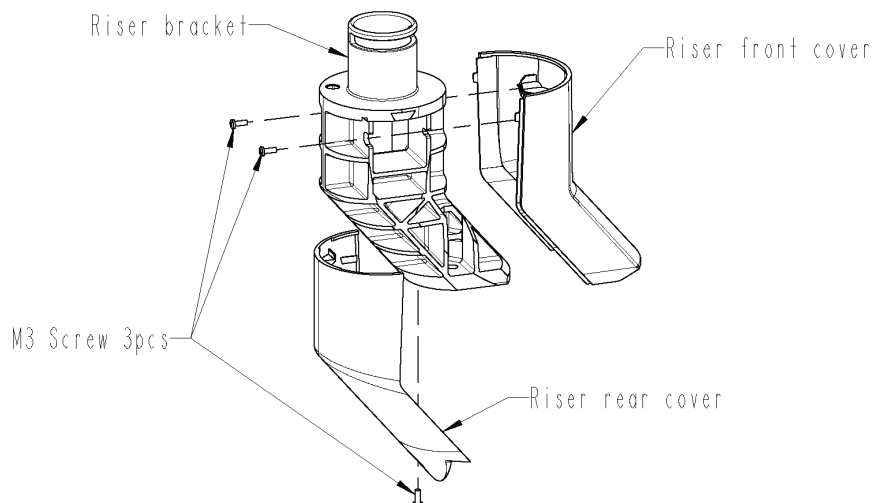
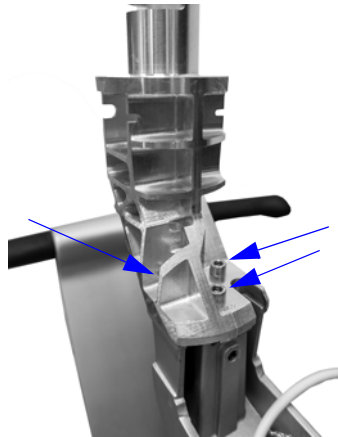


Figure 8-96 Remove the covers from the LCD Arm Riser

- 5.) Remove the **LCD Arm Alton 21.5in Wide** as described in [LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 104](#).

**8-6-6-3 Removing the LCD Arm Riser**

- 1.) Remove **the cables** one by one.
- 2.) Unscrew **three screws** and remove the **LCD Arm Riser**.



**Figure 8-97 Unscrew three screws and remove the LCD Arm Riser**

**8-6-6-4 Install the LCD Arm Riser**

Install the **LCD Arm Riser** by performing [Removing the LCD Arm Riser on page 8 - 108](#) in reverse sequence.

Apply Loctite 243 to the screws before installing.

**Torque:**

- The three M5 screws for the LCD Arm Riser shall be tightened with Torque: 5.8 Nm +/- 5%.
- The three M3 screws for the two covers shall be tightened with Torque: 1.3 Nm +/- 5%.

## 8-6-7 Swivel and Up-Down Handle Replacement Procedure

### 8-6-7-1 Tools

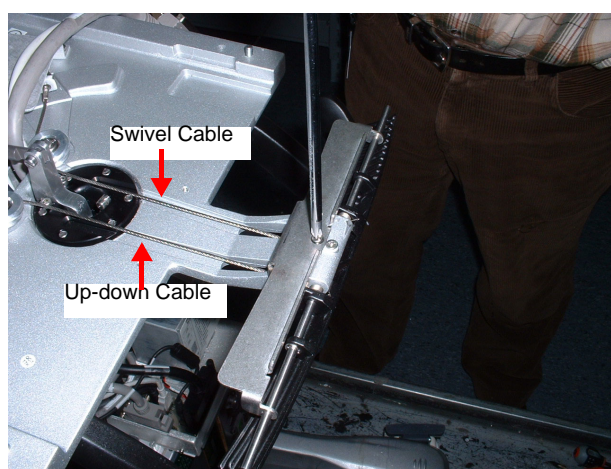
Flat and Phillips screwdrivers as needed.

### 8-6-7-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-7-3 Swivel and Up-Down Handle Removal Procedure

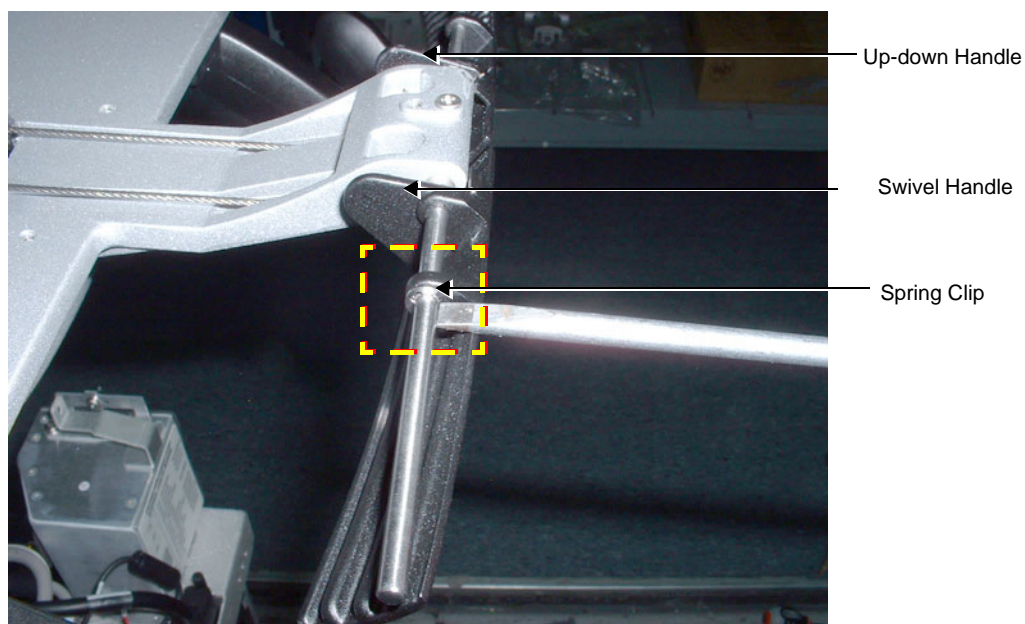
- 1) Remove the Operating Panel as described in the [Operating Panel Keyboard Assembly Removal Procedure on page 8 - 49](#).
- 2) Remove the Probe Shelf as described in the [Probe Shelf Removal Procedure on page 8 - 131](#).
- 3.) Unscrew the protective metal plate (shown in [Figure 8-98](#)) and rotate it upwards 90 degrees.



**Figure 8-98 Protective Metal Plate Rotated 90 Degrees**



- 4.) Remove the spring clips securing the particular handle to be removed - [Figure 8-99](#).



**Figure 8-99 Removing Spring Clip that Secures the Swivel Handle**

- 5.) Release the small spring that presses on the handle to be replaced - [Figure 8-100](#).

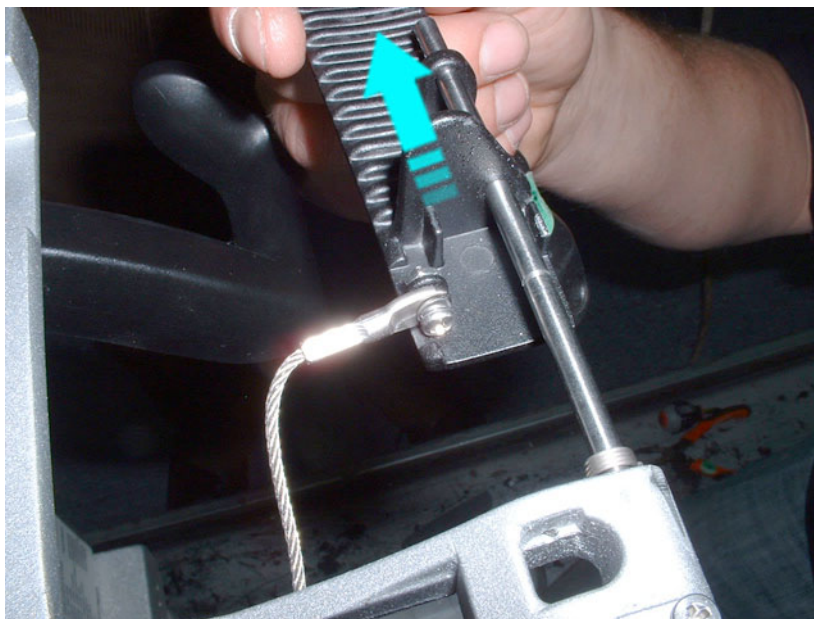


**Figure 8-100 Releasing Spring that Presses on the Handle**

- 6.) Release the tension in the up-down/swivel cables by pressing the cable tension levers *inwards*.



- 7.) Disconnect the up-down/swivel cable from the handle to be replaced and slide the handle sideways to remove it from the supporting shaft - [Figure 8-101](#).



**Figure 8-101 Release Cable and Slide Handle Sideways**

#### **8-6-7-4 Swivel and Up-Down Handle Installation Procedure**

- 1.) Install the appropriate handle on the support shaft.
- 2.) Return spring/s and securing clip/s to secure the handle/s.
- 3.) Return the protective metal plate and secure it with the retaining screw (previously removed).
- 4.) Install the Probe Shelf as described in the [Probe Shelf Installation Procedure on page 8 - 131](#).
- 5.) Install the Operating Panel as described in the [Operating Panel Keyboard Assembly Installation Procedure on page 8 - 52](#).
- 6.) Lower the console to the *maximum down* position.
- 7.) Turn ON power to the system.

## 8-6-8 Rear Handle Replacement Procedure

**NOTE:** When replacing a rear handle, make sure the rear handle kit has been ordered, the contents of which are listed in [Table 8-15](#), below.

**Table 8-15 Rear Handle Kit - PN S2424091**

P/N	Description	Quantity
5392679	HANDLE LEFT	1
5392680	HANDLE RIGHT	1
1041-M4C006-37	Hexagon Socket Set Screws with Flat Point, ISO 4026, M4-0.7, X6mm Long, A2-21H Stainless Steel, Passivate, RoHS Fastener	2

### 8-6-8-1 Tools

Hex key 2mm

### 8-6-8-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

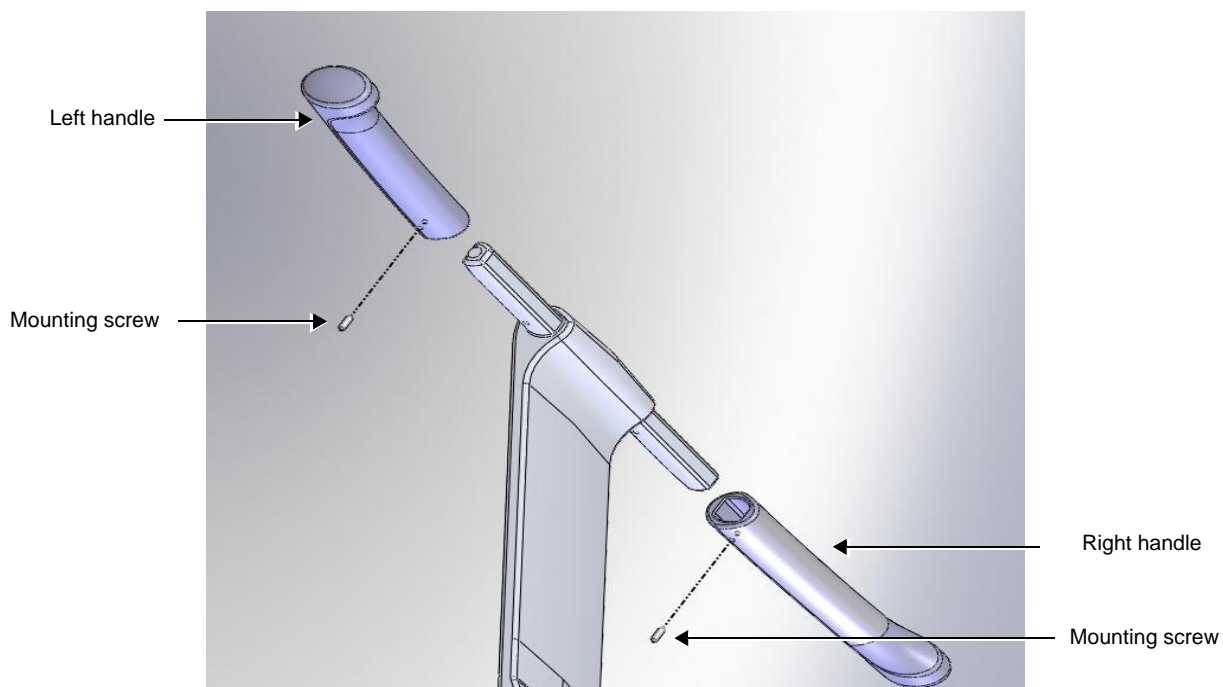
### 8-6-8-3 Rear Handle Removal Procedure

**NOTE:** The rear handles are secured to the aluminum bars with a mounting screw and a small amount of glue. The screw is first released, then a twisting of the handles is required to release the glue before sliding the handle off the aluminum bar. See the instructions below.

- 1.) Using the Socket Set Screw Flat Point, loosen and remove the mounting screw from one of the rear handle.
- 2.) Gently twist the handle to release the glue, then remove the handle from the aluminum bar.
- 3.) Repeat [step 1](#) and [step 2](#) to remove the second handle.

**8-6-8-4 Rear Handle Installation Procedure**

- 1.) Identify the left and right handle before starting the procedure.



**Figure 8-102 Exploded View Showing Rear Handles**

- 2.) Slide the left handle onto the aluminum support bar and then secure it by replacing the mounting screw (previously removed).
- 3.) Repeat [step 2](#) to install the right handle.

## 8-6-9 Lower Arm Replacement Procedure

### 8-6-9-1 Tools

Use the appropriate Phillips screwdriver, light hammer and punch.

### 8-6-9-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-9-3 Lower Arm Removal Procedure

- 1) Working from the front of the system, raise the console to the *maximum up* position.
- 2) Make sure that the console is *aligned* in the central position (not pulled to one side or the other).
- 3.) Loosen and remove the screw that is located at the base of the Operating Panel (below the keyboard), as shown in [Figure 8-103](#) below.

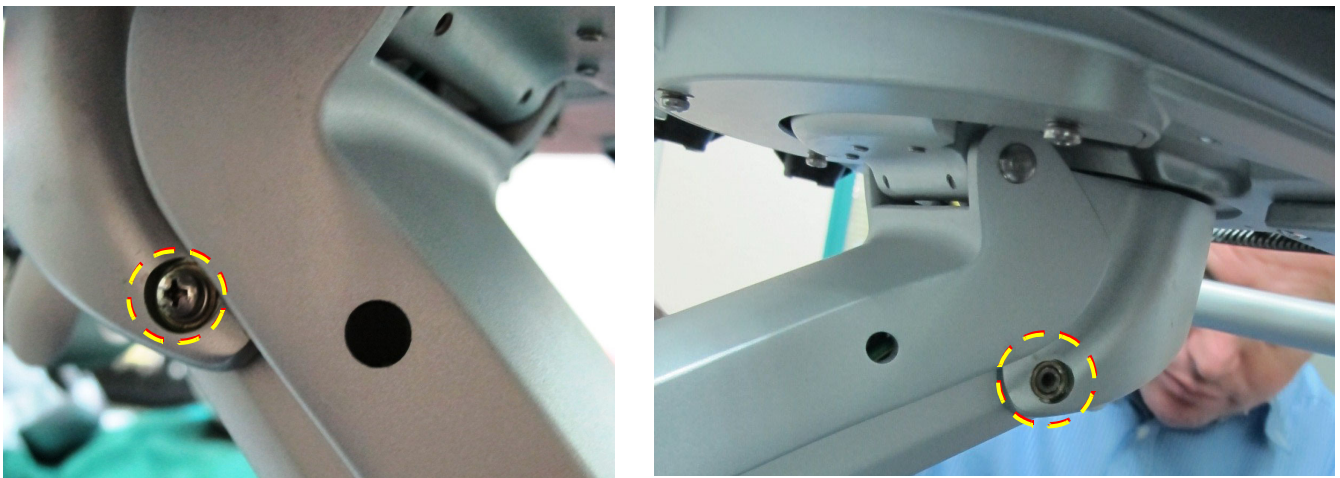


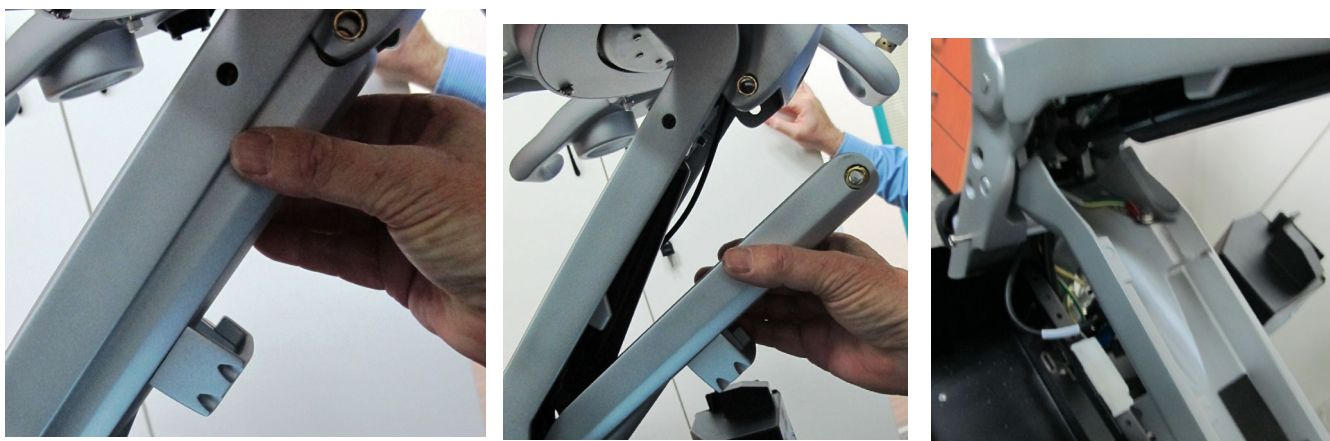
Figure 8-103 Removing Screw on Left Side of Lower Arm

- 4.) Using a punch and light hammer, tap out the center pin located below the base of the Operating Panel and remove completely releasing upper section of the lower arm - [Figure 8-104](#).



**Figure 8-104 Remove Securing Pin**

- 5.) Lower the Lower Arm as shown in [Figure 8-105](#) below.



**Figure 8-105 Upper Section of Lower Arm**



- 6) Remove the cir-clips on either side of the lower arm.



**Figure 8-106 Removing Left Securing Clip from Securing Pin**

- 7) Using a screwdriver, tap out the first securing pin and support the lower arm with the screwdriver in place of the pin.
- 8.) Remove the second securing pin and similarly support the other side of the lower arm with a screwdriver.

- 9.) While supporting the Lower Arm with one hand, use a Phillips screwdriver to disconnect the Ground lead - [Figure 8-107](#).



**Figure 8-107 Removing Securing Pin and Disconnecting Ground Lead**

- 10) Remove the Lower Arm from the system, as shown in [Figure 8-108](#).



**Figure 8-108 Removing the Lower Arm**

**8-6-9-4 Lower Arm Installation Procedure**

- 1) Working from the front of the system, return a new Lower Arm to the appropriate position as shown in [Figure 8-108](#) on page -117.
- 2.) While supporting the Lower Arm with one hand, connect the Ground lead.
- 3) Return and fasten the Lower Arm securing pin (previously removed) on the *right* side of the lower arm - [Figure 8-107](#) on page -117.
- 4) Return and fasten the Lower Arm securing pin (previously removed) on the *left* side of the Lower Arm - [Figure 8-107](#) on page -117.
- 5) Lower the console and raise the Lower Arm to insert the upper support pin previously removed - [Figure 8-109](#).



**Figure 8-109 Raising Lower Arm to Reconnect with Upper Arm (Console not shown)**

- 6.) While moving the console slightly up and down with one hand, insert the securing pin (previously removed) - refer to [Figure 8-105 "Upper Section of Lower Arm" on page 8-115](#).
- 7.) Return and fasten the screws (previously removed from the base of the Operating Panel - below the keyboard, as shown in [Figure 8-103 "Removing Screw on Left Side of Lower Arm" on page 8-114](#)).
- 8) Make sure that the console is *aligned* in the central position (not pulled to one side or the other).
- 9) Lower the console to the *maximum down* position.
- 10.) Turn ON power to the system.



---

## 8-6-10 Gas Spring Replacement Procedure

### 8-6-10-1 Tools

Use the appropriate Phillips screwdriver, light hammer, punch, and 5 mm Hex key.

### 8-6-10-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-10-3 Gas Spring Removal Procedure

- 1) Perform the following removal procedures:
- 2) Unscrew the shaft covering screws located on either side of the main column - see [Figure 8-110](#). .



**Figure 8-110 Shaft Covering Screws**

- 3.) Using the 5 mm Hex key, unscrew each locking screw on either side of the support arm  
- [Figure 8-111](#).



**Figure 8-111 Releasing the Securing Screws on Either Side of the Support Arm**

- 4.) Tap out the internal supporting pin using a punch - [Figure 8-112](#).



**Figure 8-112 Tapping out the Lower Support Pin using a Punch**

- 5.) Similarly, tap out the upper gas spring securing pin and use a screwdriver to support the joint - [Figure 8-113](#).

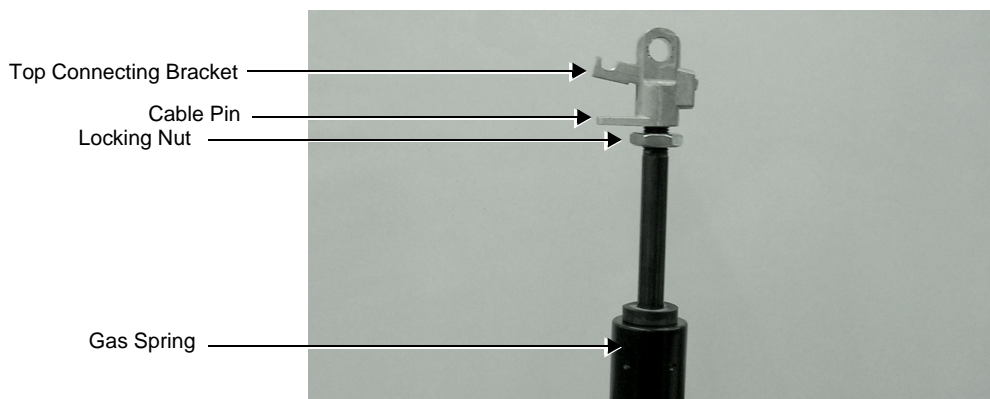


**Figure 8-113 Supporting the Upper Gas Spring Bracket with a Screwdriver**

- 6.) Carefully release the upper end of the gas spring, then the lower end of the gas spring to withdraw the gas spring from its location.  
7.) Remove the gas spring cable from its holder on the gas spring.

**8-6-10-4 Gas Spring Installation Procedure**

**NOTE:** The gas spring is supplied **without** the top connecting bracket - see [Figure 8-114](#).

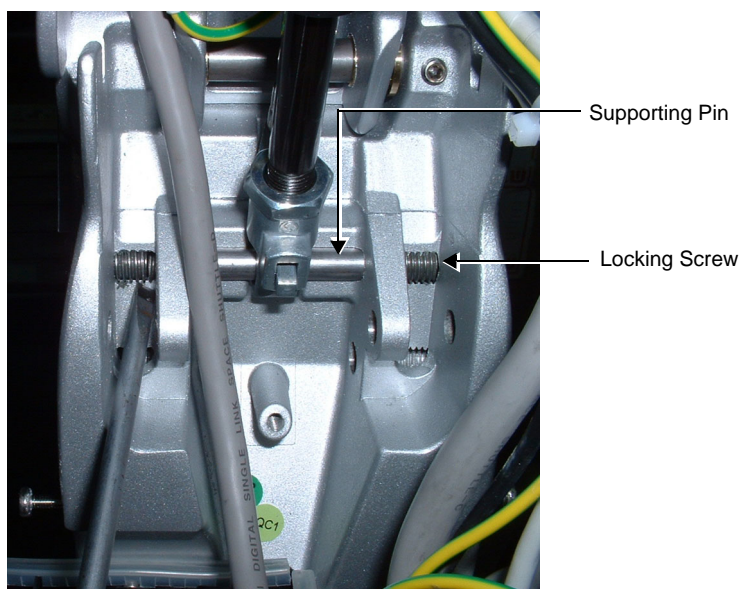


**Figure 8-114 Gas Spring with Top Connecting Bracket**

- 1.) Screw the top connecting bracket (previously removed) onto the gas spring turning it a few turns only.
- 2.) Insert the cable pin into the top connecting bracket and screw the gas spring inwards until it touches the pin.
- 3.) Tighten the locking nut until it firmly locks against the top connecting bracket.
- 4.) Return the gas spring, connecting the top part of the gas spring to the Upper Support Arm and insert the connecting pin previously removed.

**NOTE:** When placing the gas spring cable in the upper arm, be sure to first place the cable uppermost in the Upper Support Arm before returning the gas spring.

- 5.) Position the gas spring cable in the Upper Support arm and connect the lower part of the gas spring at the base of the upper support arm - [Figure 8-115](#).



**Figure 8-115 Lower Section of Gas Spring showing Connecting Pin and Locking Screws**

- 6.) Insert the supporting pin, threading it through the brackets and the lower gas spring holder, as shown in [Figure 8-115](#).
- 7.) Applying Locktite, insert the first locking screw previously removed and screw it in until it just touches the supporting pin.
- 8.) Applying Locktite, return the second screw and tighten firmly - both the screws will now be locked against the supporting pin.
- 9) Perform the following installation procedures:
- 10.) Turn ON power to the system.

---

## 8-6-11 Articulated Arm Release Module Replacement Procedure

**NOTE:** The procedure describes the Articulated Arm Release Lever replacement procedure.

### 8-6-11-1 Tools

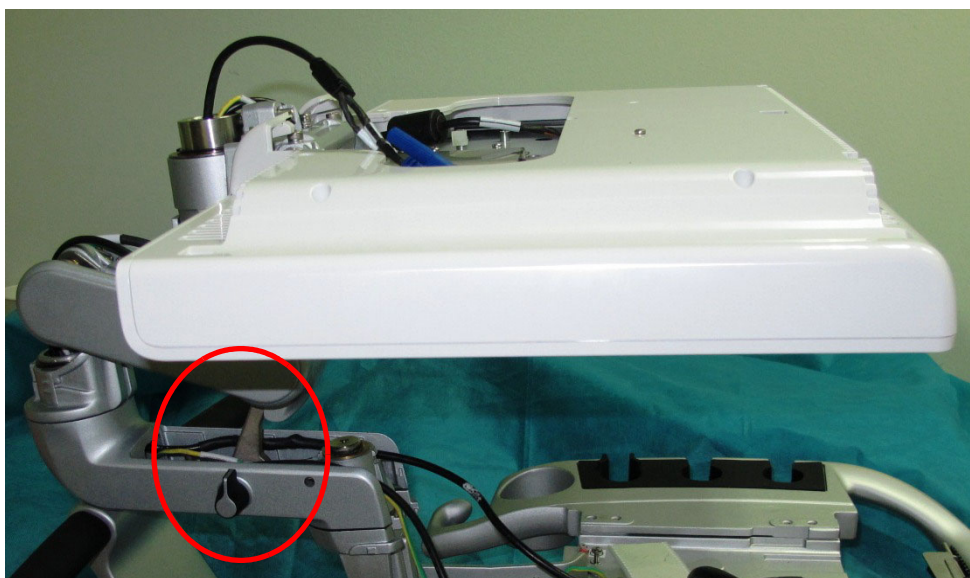
Appropriate Phillips screwdriver and a 2mm Hex key.

### 8-6-11-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-11-3 Articulated Arm Release Module Removal Procedure

**NOTE:** The Articulated Arm Release Lever is located on the Lower Articulated Arm- see [Figure 8-116](#).

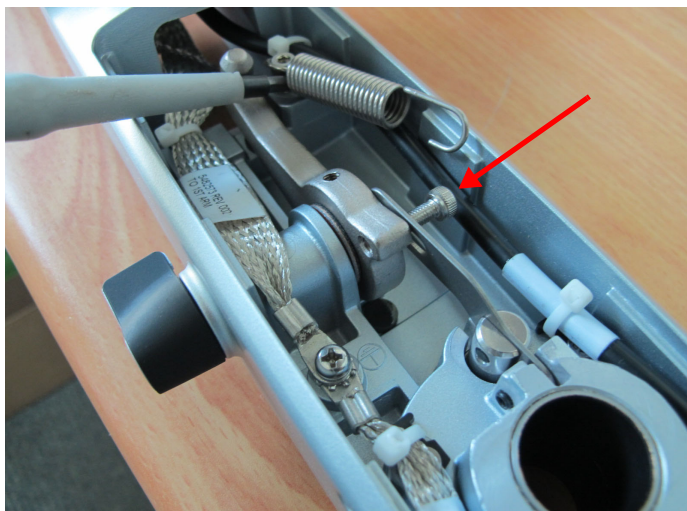


**Figure 8-116** Articulated Arm Release Lever (shown with the Arm Cover Removed)

- 1) Release the Articulated Arm Release lever and raise the Articulated Arm to its *maximum vertical* position.
- 2) Remove the Lower Horizontal Articulated Arm Cover:

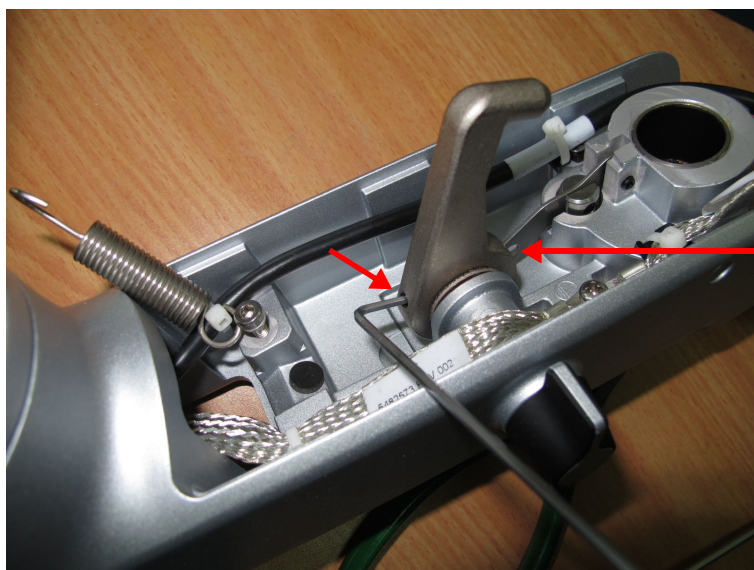


- 3.) Release the spring as shown in [Figure 8-117](#).



**Figure 8-117 Spring Released**

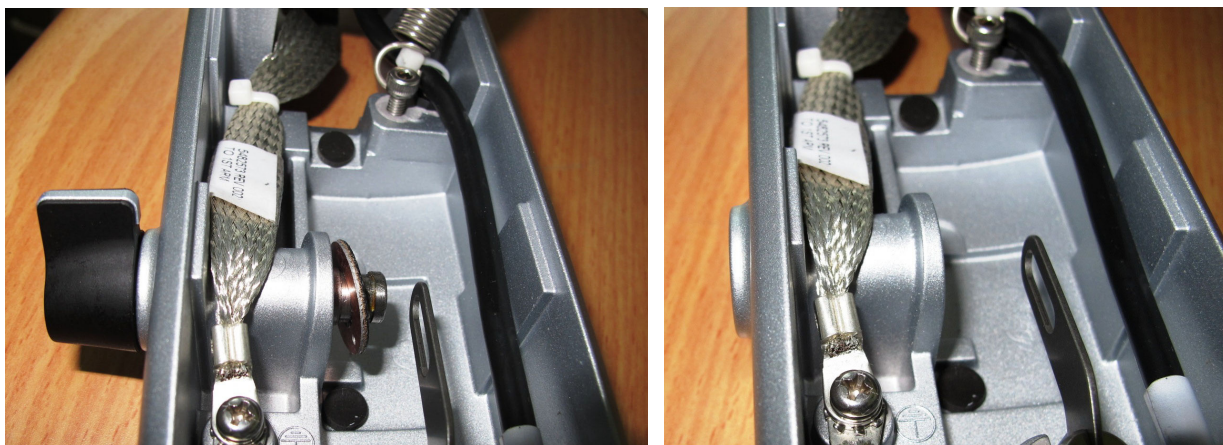
- 4.) Release the metal slide by removing the securing screw - see [Figure 8-117](#).  
5.) Using the appropriate Hex key loosen, but do not remove, two release lever locking screws as shown in [Figure 8-118](#).



Locking screw not visible in the picture

**Figure 8-118 Articulated Arm Locking Lever**

- 6.) Carefully remove the locking lever from the locking knob and remove the washer - see [Figure 8-119](#).



**Figure 8-119 Removing the Locking Lever from the Locking Knob**

#### **8-6-11-4 Articulated Arm Release Module Installation Procedure**

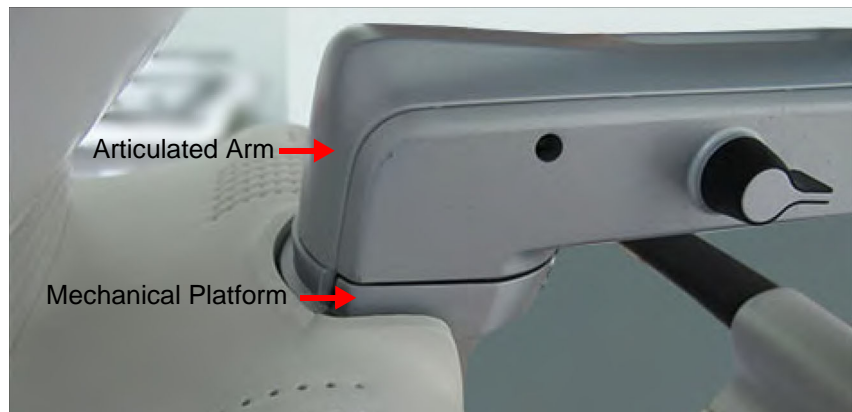
- 1) Install the replacement Articulated Arm release lever by following the steps for removing the lever in the reverse order (described in the removal procedure above).
- 2) Return the Lower Horizontal Articulated Arm Cover to its position on the Articulated Arm. Refer to the following:
- 3.) Turn ON power to the system.

## 8-6-12 First Axis with Pin Replacement Procedure

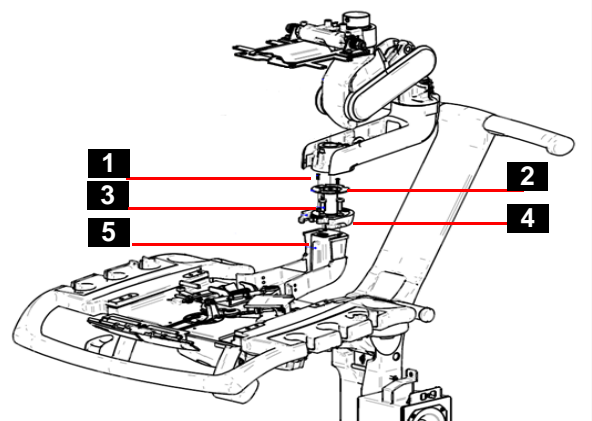
**NOTE:** This procedure also describes the procedure for removing the First Axis Ring.

The Articulated Arm rotates on the First Axis Pin, which serves as the connecting joint between the Articulated Arm and the Mechanical platform - see [Figure 8-120](#) and [Figure 8-121](#).

The First Axis pin (not visible in the picture) is the connecting joint between the Articulated Arm and the Mechanical platform

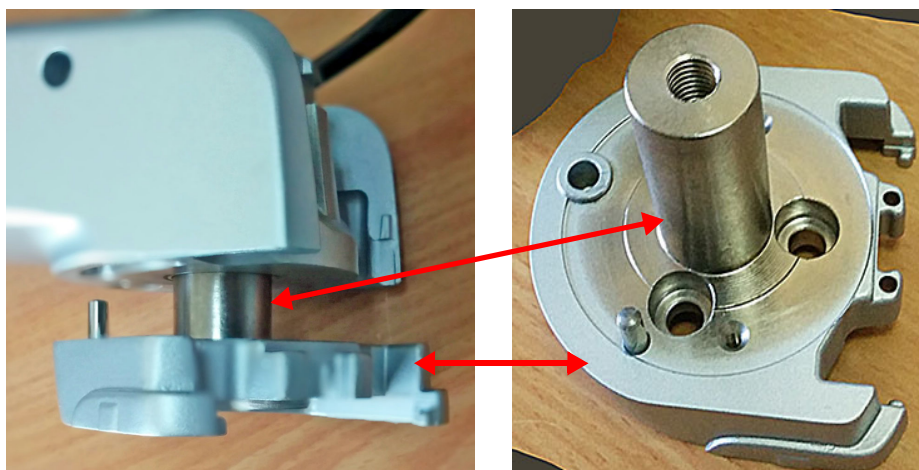


1. First Axis Ring screw
2. First Axis Ring
3. First Axis Pin screw
4. First Axis Pin
5. Mechanical Platform



**Figure 8-120 Articulated Arm Attached to the Mechanical Platform**





The First Axis Pin shown upright above fits into the Articulated Arm shown on the left

**Figure 8-121 First Axis Pin inserted in the Articulated Arm on Left**

**8-6-12-1 Tools**

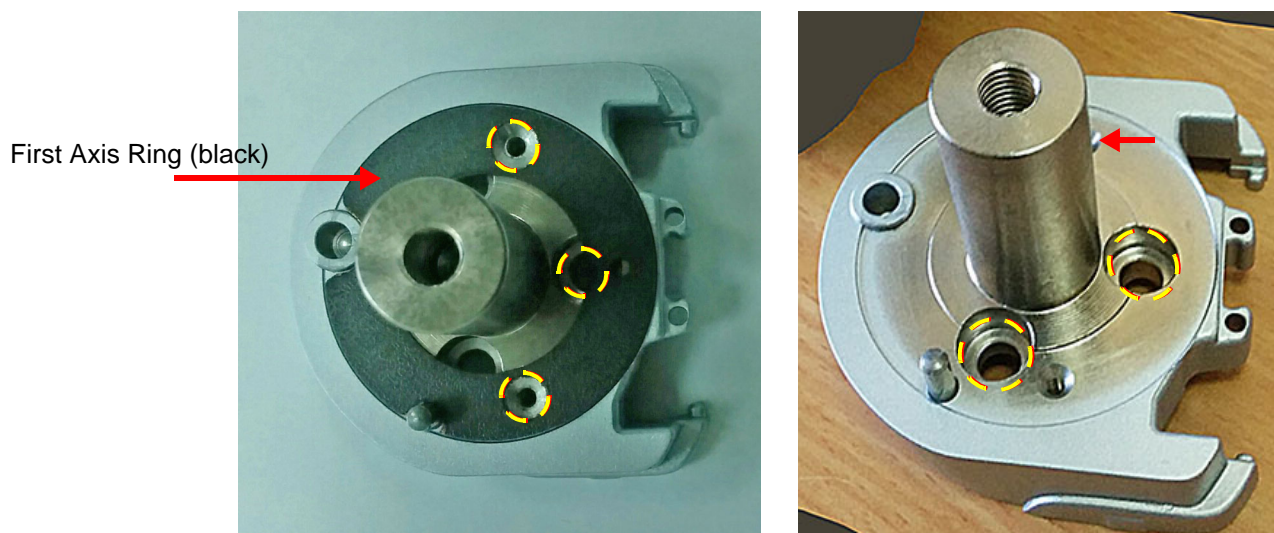
Appropriate Phillips screwdriver and a 4mm Hex key.

**8-6-12-2 Preparation**

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

**8-6-12-3 First Axis with Pin Removal Procedure**

- 1) Remove the Monitor Articulated Arm.
- 2) Remove the First Axis Ring (see also [Figure 8-120](#), above) by releasing the three securing screws (the picture on the left shows the First Axis Ring with the screws already removed - [Figure 8-122](#)).



**Figure 8-122 First Axis Ring and Securing Screws**

- 3.) To remove the First Axis Pin, unscrew the three securing screws (refer to [Figure 8-122](#)). See also [Figure 8-120](#) on page -126.
- 4.) Remove the First Axis Pin from the Mechanical Platform.

**8-6-12-4 First Axis with Pin Installation Procedure**

**Note:** This procedure also describes the procedure for installing the First Axis Ring.

- 1) Install the replacement First Axis Pin on the Mechanical Platform and secure it with the securing screws previously removed.
- 2) Locate the replacement First Axis Ring on the First Axis Pin and secure it with the screws previously removed.
- 3) Re-install the Articulated Arm.
- 4.) Turn ON power to the system.

## 8-6-13 Peripherals Console Replacement Procedure

### 8-6-13-1 Tools

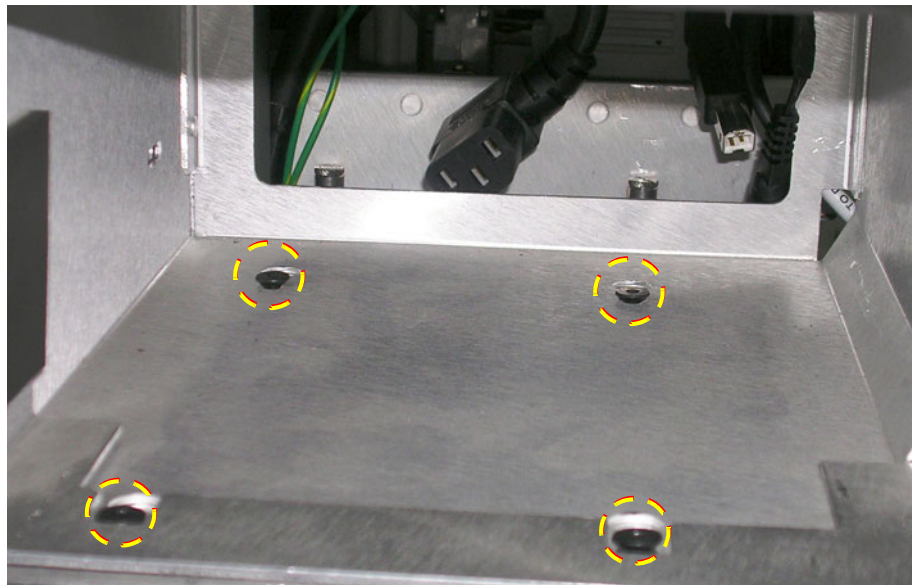
Use the appropriate screwdrivers.

### 8-6-13-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-13-3 Peripherals Console Removal Procedure

- 1) Remove the following covers: *left side, right side, front, right rear, left rear*:
- 2.) Remove the *DVD/CD-RW drive* and the *B&W Printer*.
- 3) Loosen the 4 retaining screws that secure the peripherals console in position, as shown in [Figure 8-123](#).



**Figure 8-123 Location of Peripherals Console Retaining Screws**

4. Gently slide the peripherals console forward, lift it slightly and then remove it.

**8-6-13-4    Peripherals Console Installation Procedure**

1. Place the new peripherals console in its position on the system and secure with securing screws previously released - [Figure 8-123](#).
- 2) Re-install the B&W printer and the DVD/CD-RW drive:
- 3) Refit the covers, previously removed:
- 4.) Turn ON power to the system.

## 8-6-14 Probe Shelf Replacement Procedure

### 8-6-14-1 Tools

Use the appropriate screwdriver.

### 8-6-14-2 Preparation

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-14-3 Probe Shelf Removal Procedure

- 1) Remove the Keyboard Assembly as described in the [Operating Panel Keyboard Assembly Removal Procedure on page 8 - 49](#).
- 2) Working from below, and while carefully supporting the Probe Shelf Holder, remove the 4 retaining screws - two on either side - as seen in [Figure 8-124](#).



**Figure 8-124 Probe Shelf - Viewed from Below indicating Retaining Screws**

- 3.) Remove the Probe Shelf.

### 8-6-14-4 Probe Shelf Installation Procedure

- 1.) Return the Probe Shelf to its location on the Keyboard Interface Assembly and secure it with the 4 retaining screws (previously removed).
- 2.) Install the Keyboard Assembly as described in the [Operating Panel Keyboard Assembly Installation Procedure on page 8 - 52](#).
- 3) Lower the console to the *maximum down* position.
- 4.) Turn ON power to the system.

## 8-6-15 Probe Cable Holder Replacement Procedure

### 8-6-15-1 Tools

Use the appropriate Hex key as indicated in the Probe Cable Holder replacement procedure.

### 8-6-15-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-6-15-3 Probe Cable Holder Removal Procedure

- 1) Raise the console to the *maximum up* position.
- 2) Working from the front of the system, use an Hex key to unscrew and remove the two screws that fasten the Cable Holder bracket to the Support Arm, as shown in [Figure 8-125](#).



**Figure 8-125 Removing the Cable Holder Bracket from the Support Arm**

- 3.) Remove the Cable Holder Bracket.

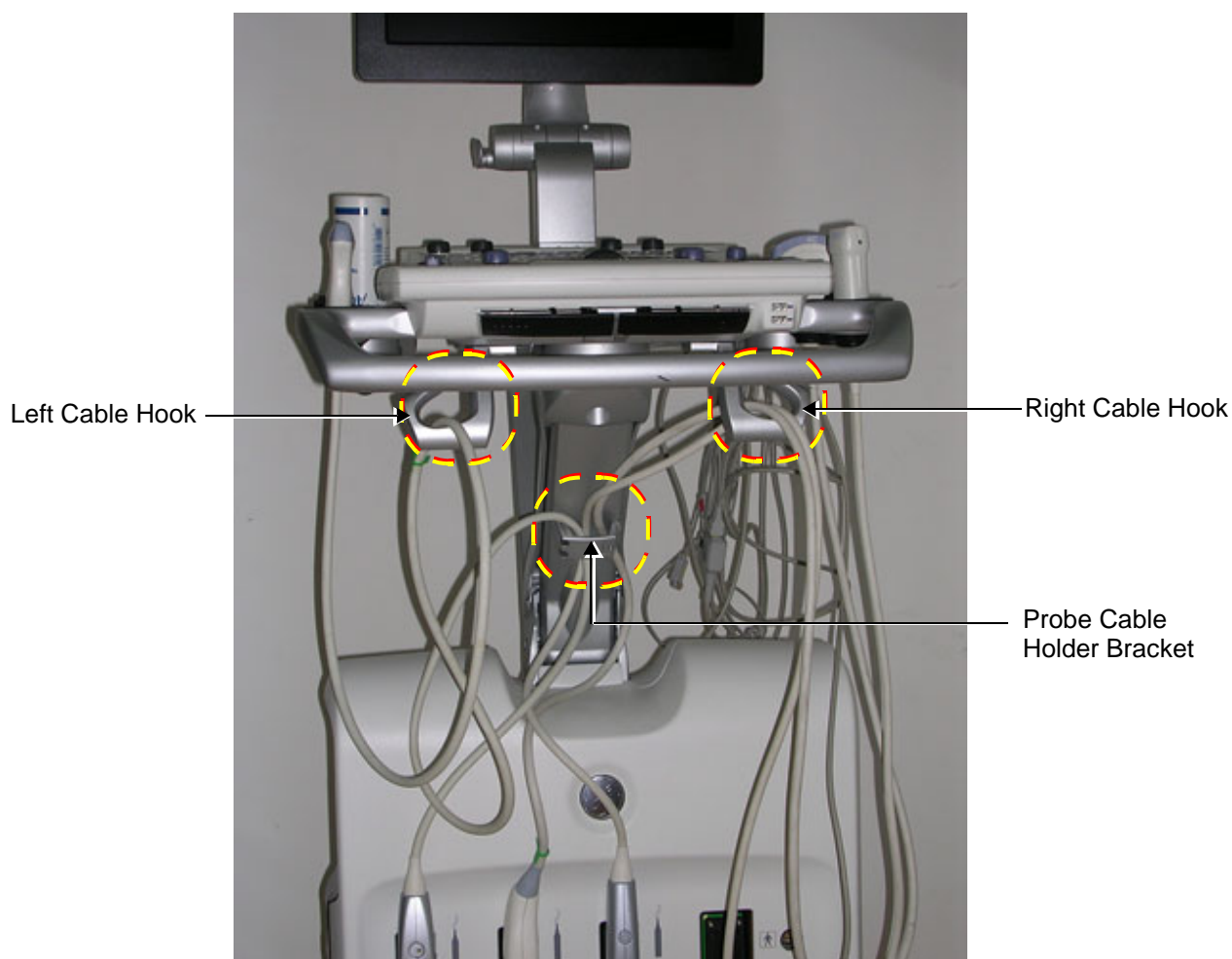
### 8-6-15-4 Probe Cable Holder Installation Procedure

- 1) Working from the front of the system, place the replacement Cable Holder bracket into position on the Support Arm.
- 2) Return the two screws (previously removed) and use an Hex key to fasten the screws to secure the Cable Holder firmly in place - refer to [Figure 8-125](#).
- 3) Proceed to route the probe cables into the correct position, as described in [section 8-6-15-4-1 on page -133](#).



**8-6-15-4-1 Routing the Probe Cables**

When routing the probe cables, it is important to lead the cables upwards from the system's connecting ports as shown in [Figure 8-126](#). Always ensure that the cables do not drag on the floor and are adequately secured by the Probe Cable Holder bracket and *Left* and *Right* Cable Hooks.



**Figure 8-126 Probe Cables Routed Correctly through Probe Cable Holder Bracket and Cable Hooks**

**NOTE:** Image for illustration purposes only (pending update).

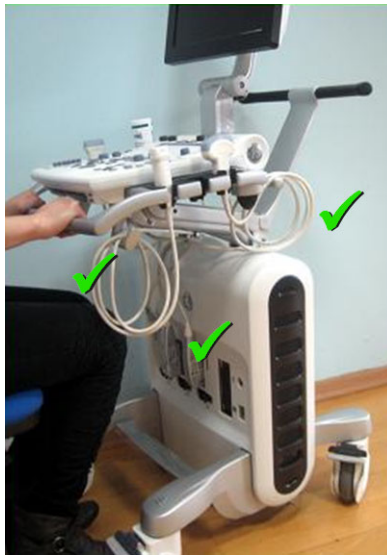
Observe the following practices:

- 1.) Lead the right probe cables upwards and thread them via the left and right cable holders as shown in [Figure 8-126](#).
- 2.) Open the cable gate ([Figure 8-127](#)) on the cable holder and slide the cables into the cable holder.



**Figure 8-127 Opening the Cable Gate on Probe Cable Holder**

- 3.) Lead the cables via the right cable hook (Figure 8-126) and make one or two loops to shorten the cable.
- 4.) Insert the probe in the probe holder as shown in Figure 8-128.



**Figure 8-128 Probe in Probe Holder**

**NOTE:** Image for illustration purposes only (pending update).

- 5.) Similarly, route the left probe cable/s via the cable holder and the left cable hook.
- 6.) Route the AC power cable via the AC Power Cable hook and lead it upwards as shown in Figure 8-129.



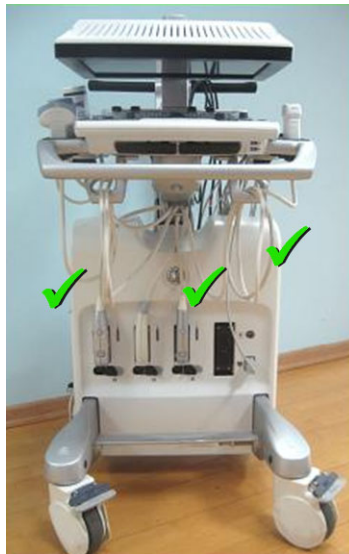
**Figure 8-129 AC Power Cable Connected and Routed**

**NOTE:** Whenever moving the Vivid S60N/Vivid S70N scanner, make sure the system is prepared correctly, as shown in Figure 8-130 on page -135.



***When moving the system:***

Prepare the system as shown in [Figure 8-130](#), with the monitor screen folded *downwards*.



**Figure 8-130 Vivid S60N/Vivid S70N Scanner and Cables - Ready for Moving**

**NOTE:** *Image for illustration purposes only (pending update).*

- 7.) Turn ON power to the system.

## 8-6-16 Brake and Locking Wheels Replacement Procedure

### 8-6-16-1 Introduction

Two different wheel configurations have been delivered on the Vivid S60N/Vivid S70N, depending on when it was produced.

- Initially, the ultrasound systems were delivered with two Brake Locking wheels at the front side of the ultrasound system and two Swivel Locking wheels at the rear side of the ultrasound system.
- Later, a new set of wheels were introduced:
  - one Lock Caster (VS60 and VS70 Lock Caster) on the rear, left side of the Ultrasound system (when viewed from the front of the system)



**Figure 8-131 Lock Caster**

- three Brake Casters (VS60 and VS70 Swivel Rear right Caster), two installed on the front of the Ultrasound system and one installed on the rear, right side of the Ultrasound system (when viewed from the front of the system)



**Figure 8-132 Brake Caster**

**NOTE:** The procedure below is the same whether replacing a Front Wheel or a Rear Wheel.

### 8-6-16-2 Tools

- appropriate flat screwdriver
- 6 mm Hex key
- LOCTITE 243
- Calibrated Torque tool, 12.5 Nm +/- 5% for 6 mm Hex tool

### 8-6-16-3 Preparations

Make sure the system is standing securely on a level surface, with the wheels in the locked position.

**8-6-16-4 Brake and Locking Wheels Removal Procedure**

- 1) Using a flat screwdriver, carefully remove the plastic screw cap covering the securing screw on the inner side of the wheel housing, as shown in [Figure 8-133](#).



**Figure 8-133 Removing the Screw Cap**

- 2) Using a 6mm Hex key, loosen and remove the screw that secures the wheel shaft in the wheel securing socket.



**Figure 8-134 Removing the Securing Screw**

- 3.) Lift the chassis sufficiently to allow the wheel to drop down out of the wheel securing socket.
- 4.) Remove the wheel.

**8-6-16-5 Brake and Locking Wheels Installation Procedure**

- 1) Carefully lift the chassis sufficiently to allow insertion of the replacement wheel shaft into the wheel securing socket.
- 2) Push the wheel shaft all the way up into the socket, then gently lower the chassis to the ground.
- 3.) Apply LOCTITE 243 on screws before tightening.
- 4.) Return and fasten the Hex screw (previously removed - see [Figure 8-134](#)). Remember the washer. Tightening Torque: 12.5 Nm +/-5%
- 5) Return the screw cap (previously removed) by snapping it back into position (refer to [Figure 8-133](#))

## Section 8-7


### Operating System and/or Application Software Loading Procedures

#### 8-7-1 Software Installation Procedures - General Overview

The Vivid S60N/Vivid S70N software loading options provide the ability to install the Windows operating system, the Vivid S60N/Vivid S70N application software - or both - depending on current requirements.

The complete installation procedure can be performed using the Touch Screen only. An on-screen (virtual) keyboard is available whenever text input is required. In addition, the optional A/N Keyboard can be used - or any regular USB keyboard.


 **WARNING** ***DO NOT ATTEMPT TO INSTALL SOFTWARE THAT WAS NOT DESIGNATED FOR YOUR VIVID S60N/VIVID S70N UNIT. ATTEMPTING TO INSTALL UN-APPROVED SOFTWARE WILL CAUSE IRREVERSIBLE DAMAGE TO HARDWARE AND SOFTWARE!***

 **NOTICE** Since neither the System Serial Number nor the Computer Name can be changed after the software installation procedure is completed, it is important to make sure that when prompted, the correct information is inserted during the installation procedure.


When installing the Windows operating system software, in some situations (for example, after replacing the Hard Disk Drive), it is necessary to format the hard disk.

Be aware that this will perform a full format of the Hard Disk and **all patient data will be lost**.

Normally, the Vivid S60N/Vivid S70N system is supplied with the software already installed. In some cases, it is necessary to re-install the software.

 **WARNING** ***WHILE THE SOFTWARE INSTALLATION PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO BACKUP MEDIA BEFORE DOING A SOFTWARE INSTALLATION.***

*NOTE: After performing a software installation, all logs are deleted. It is recommended that these should be recorded should they be needed in the future.*

 **NOTICE** Before performing any Vivid S60N/Vivid S70N software installation procedure, it is mandatory to backup the Archive. Follow the instructions as described in [Preparation for Software Installation Procedures on page 8 - 139](#).

*NOTE: Some configuration (e.g imaging) can not be kept between different software levels.*

*NOTE: If installing a new software revision, ensure that you have the previous software version available, in case the software load fails, and you have to reload the 'old' software.*

If you are upgrading the system software from a previous version, it is necessary to contact your local OTR department to receive an appropriate software password. Make sure you specify the system serial number located on the Vivid S60N/Vivid S70N unit.

## 8-7-2 Preparation for Software Installation Procedures

**NOTE:** *Make sure that the required Software Option keys are available prior to commencing the installation process. Do not use the Software Option keys from a previous system version.*



**CAUTION** **THIS PROCESS FORMATS THE HARD DRIVE (WHEN SELECTION OF THIS OPTION IS APPLICABLE) - MAKE SURE TO SAVE ALL THE REQUIRED PRESETS, SETTINGS AND PATIENT DATA!**



**WARNING** **REMOVE ALL EXTERNAL DEVICES SUCH AS PRINTERS AND USB CONNECTIONS BEFORE STARTING THE UPGRADE PROCEDURE.**

At the site, perform the following steps before you start the upgrade procedure:

- 1.) Perform Disk Management for all database records and select the "Copy" option (for instructions, refer to the User Manual on your Document Media).

**NOTE:** *It is recommended that Disk Management be executed using the "move" option to a network repository.*

- 2.) Perform a full back-up for Patient Archive and System Configuration (for instructions, refer to the User Manual on your Document Media).
- 3.) Write down the following settings as it will be necessary to restore them at the end of the process:
  - TCP/IP address
  - Network printer (if present)
  - Wireless network settings (if present)
  - Trackball speed
  - InSite ExC settings
- 4.) When done, continue to:
  - Software v203: [8-7-3 "System Software and/or Application Software Installation \(v203\)"](#) on [page 8-140](#)

## 8-7-3 System Software and/or Application Software Installation (v203)

### 8-7-3-1 Preparing the Ultrasound system for the software install

- 1.) Disconnect all external USB devices.
- 2.) Insert the Software UFD in one of the USB ports on the ultrasound system.

### 8-7-3-2 Change the BIOS Settings

Before starting the software upgrade, you must adjust the BIOS settings as described below:

- 1.) Power down the ultrasound system.
- 2.) Press and hold **F7** on the alphanumeric keyboard when the ultrasound system starts.

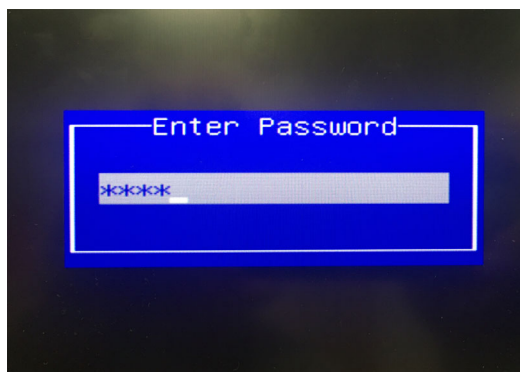


Figure 8-135 Enter the BIOS password

Enter the BIOS password (csound), then press **Enter** on the keyboard.

- 1.) Select **Enter Setup**.

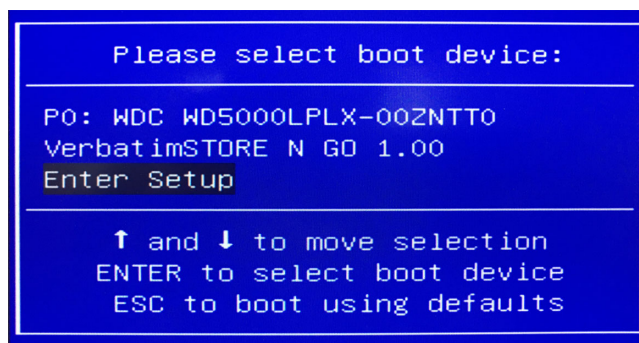
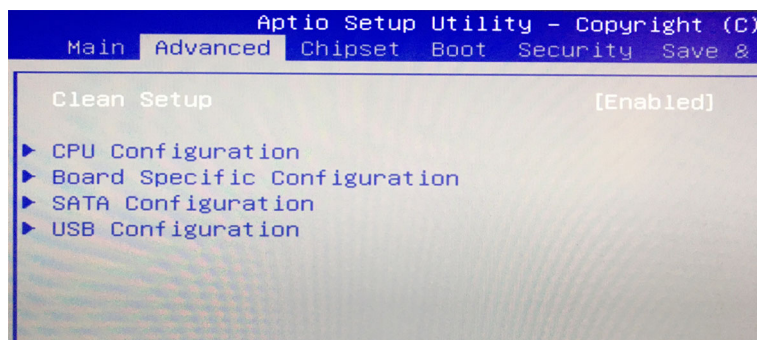


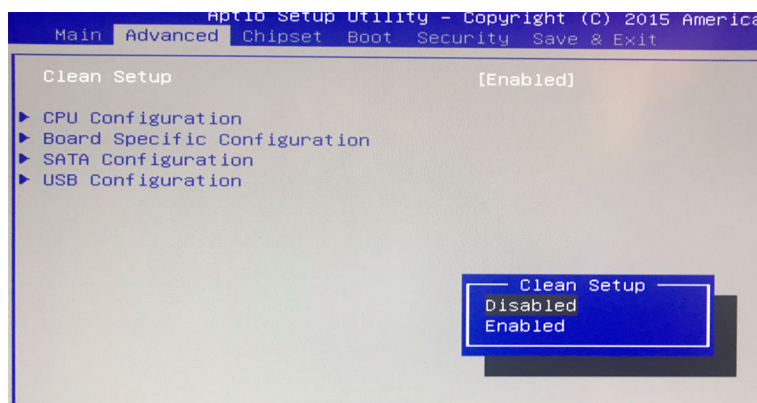
Figure 8-136 Select 'Enter Setup'

**8-7-3-2 Change the BIOS Settings (cont'd)**

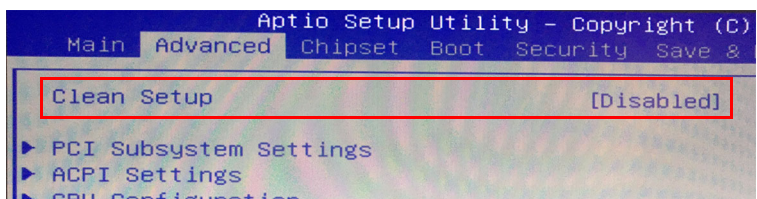
- 1.) Select the **Advanced** tab.

**Figure 8-137 Advanced tab**

- 2.) Press **Enter** to select **Clean Setup**.
- 3.) Select **Disabled**, then hit **ENTER**.

**Figure 8-138 Disable Clean Setup**

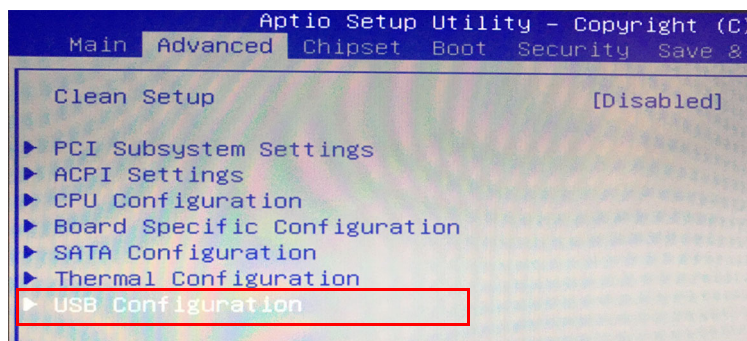
- 4.) Verify that Clean Setup has changed to [Disabled].

**Figure 8-139 Verify that 'Clean Setup' has changed to [Disabled]**



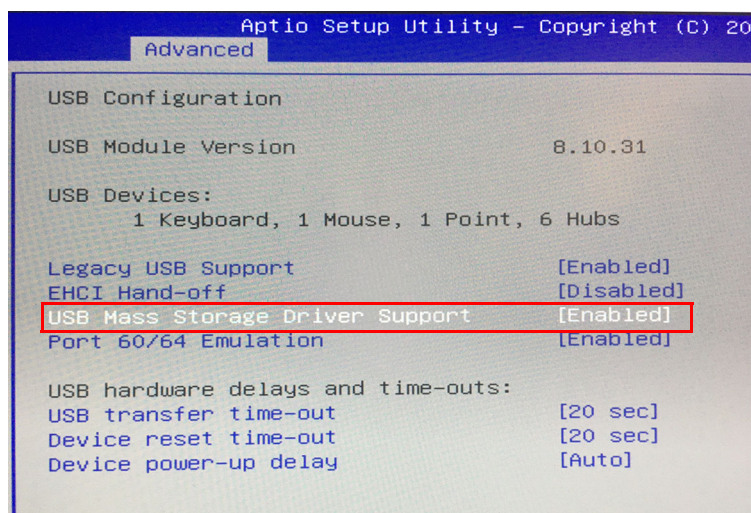
**8-7-3-2 Change the BIOS Settings (cont'd)**

- 5.) From the **Advanced** tab, move down to **USB Configuration** and hit **ENTER** on the keyboard.



**Figure 8-140 Select 'USB Configuration'**

- 6.) Move down to **USB Mass Storage Driver Support** and make sure this is **Enabled**.

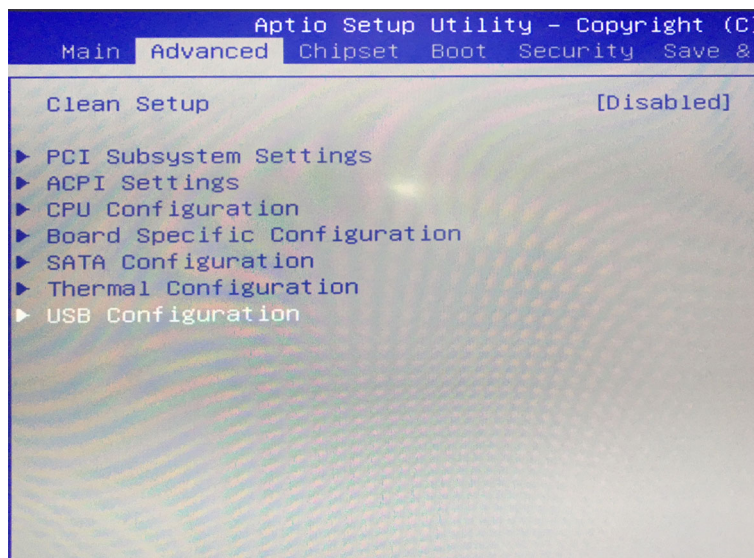


**Figure 8-141 Verify that 'USB Mass Storage Driver Support' is Enabled.**



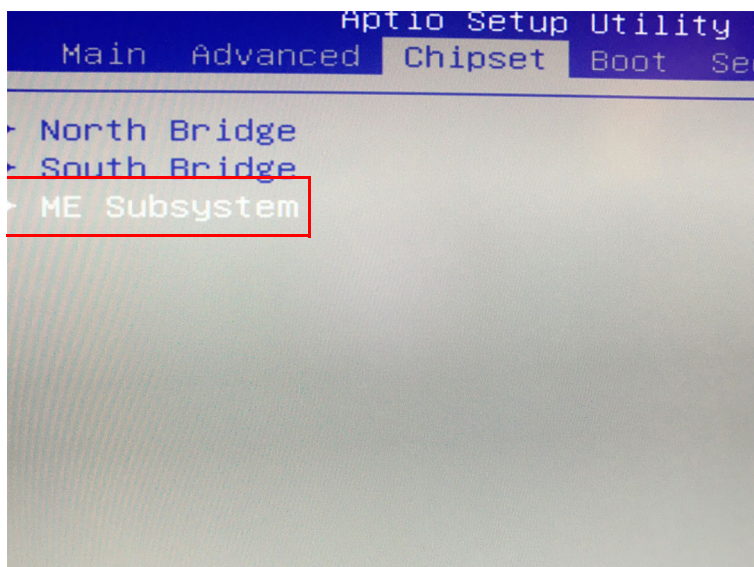
**8-7-3-2 Change the BIOS Settings (cont'd)**

- 7.) Press the **Esc** button to return to the **Advanced TAB**.



**Figure 8-142 Advanced TAB**

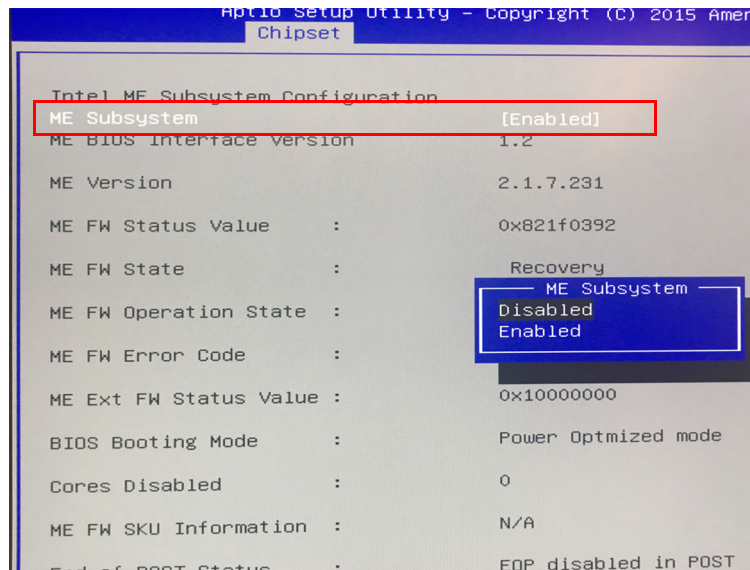
- 8.) Select the **Chipset** tab and scroll down to **ME Subsystem**, then hit **Enter**.



**Figure 8-143 Select ME Subsystem**

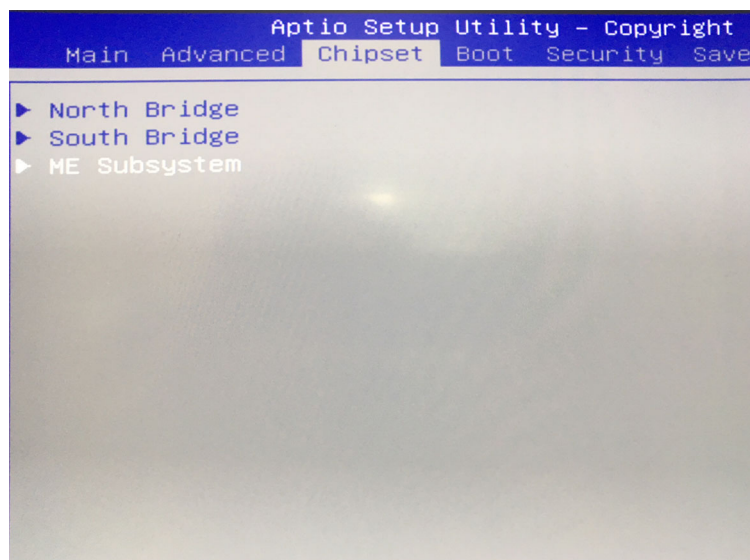
**8-7-3-2 Change the BIOS Settings (cont'd)**

9.) Change the **ME Subsystem** setting to **Disabled**.



**Figure 8-144 Disable ME Subsystem**

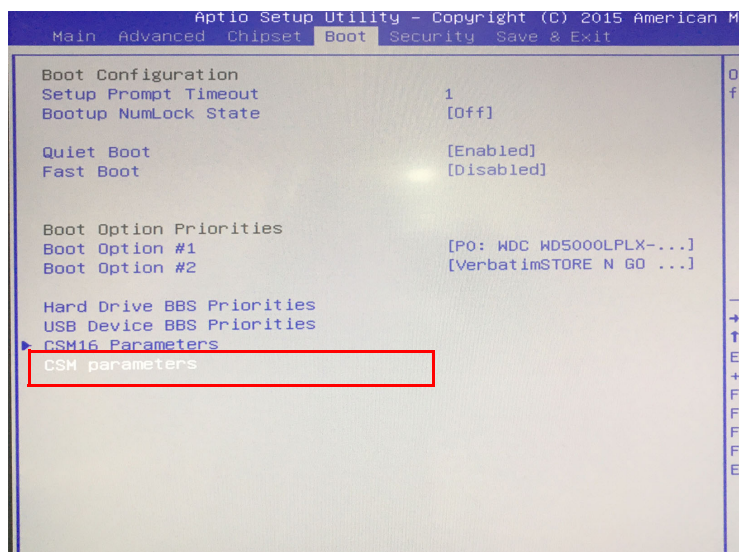
10.) Press the **Esc** button to return to the **Chipset** TAB.



**Figure 8-145 Chipset TAB**

**8-7-3-2 Change the BIOS Settings (cont'd)**

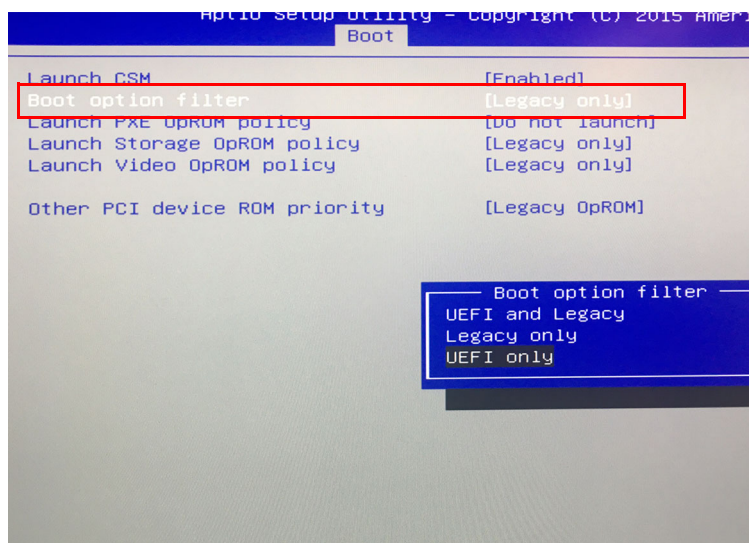
11.) Select the **Boot** tab.



**Figure 8-146 Select CSM Parameters**

12.) Move down to **Csm Parameters** and then hit **Enter**.

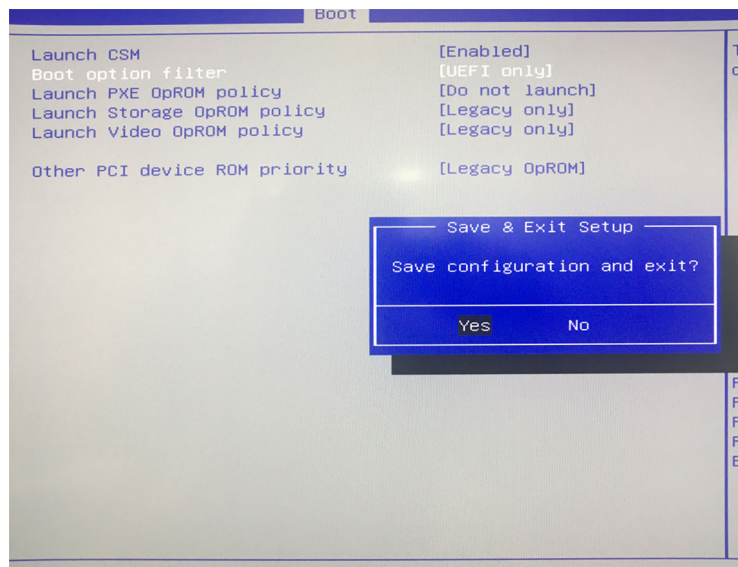
13.) On the subpage, set **Boot option filter** to **UEFI only**.



**Figure 8-147 Select UEFI Only**

**8-7-3-2 Change the BIOS Settings (cont'd)**

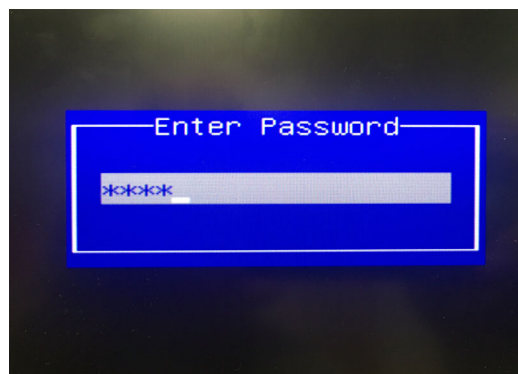
14.) Press **F4**.



**Figure 8-148 Save Configuration and Exit.**

15.) Press **Yes**. The Ultrasound system will reboot.

Press and hold **F7** on the alphanumeric keyboard when the ultrasound system starts.



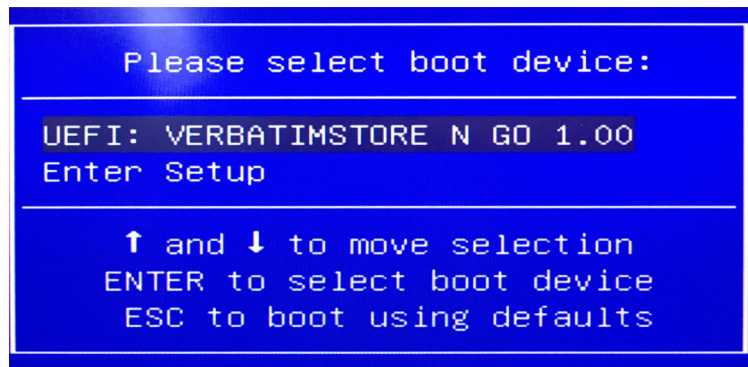
**Figure 8-149 Enter the BIOS password**

Enter the BIOS password (csound), then press **Enter** on the keyboard.



**8-7-3-2 Change the BIOS Settings** (cont'd)

16.) Select the software UFD (here: 'VerbatimSTORE N GO 1.00'), and press **Enter**.



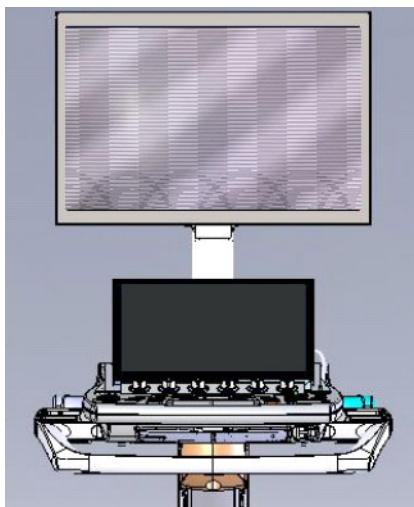
**Figure 8-150 Select the software UFD**

Continue with [Install the System Software from Usb Flash Drive \(UFD\)](#) on page 8 - 148.

**8-7-3-3 Install the System Software from Usb Flash Drive (UFD)**

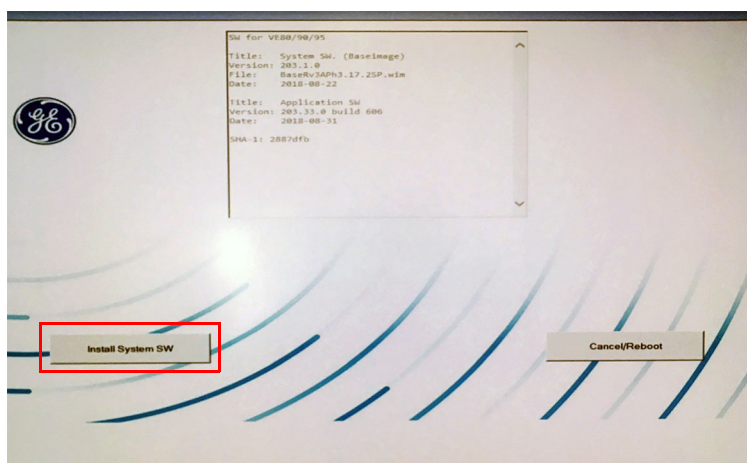
Follow these steps to install the new System Software:

- 1.) Before the graphic has been set up:



**Figure 8-151 Before the graphic has been set up**

- 2.) Select **Install System SW**.



**Figure 8-152 Select 'Install System SW'**

## 8-7-3-3

## Install the System Software from Usb Flash Drive (UFD) (cont'd)

- 3.) A warning is displayed: **Do you want to perform a CLEAN installation?**

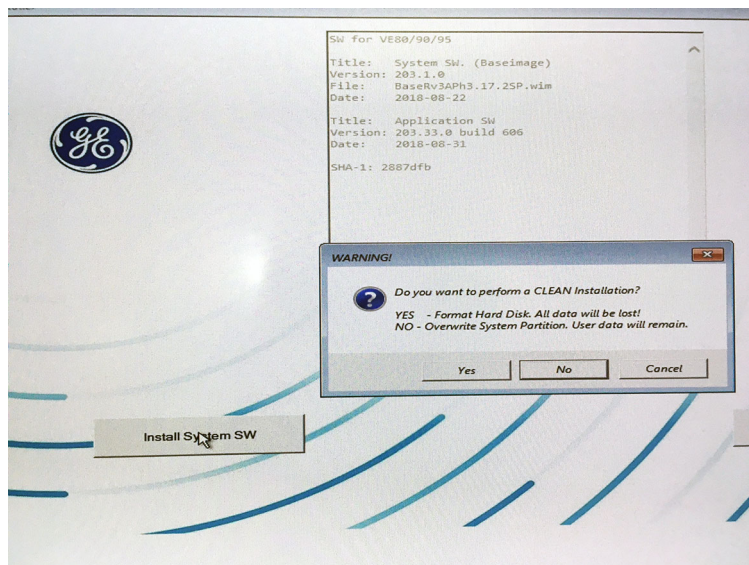


Figure 8-153 Select 'Yes'

- 4.) A new warning is displayed so you can confirm that you want to wipe the HDD.

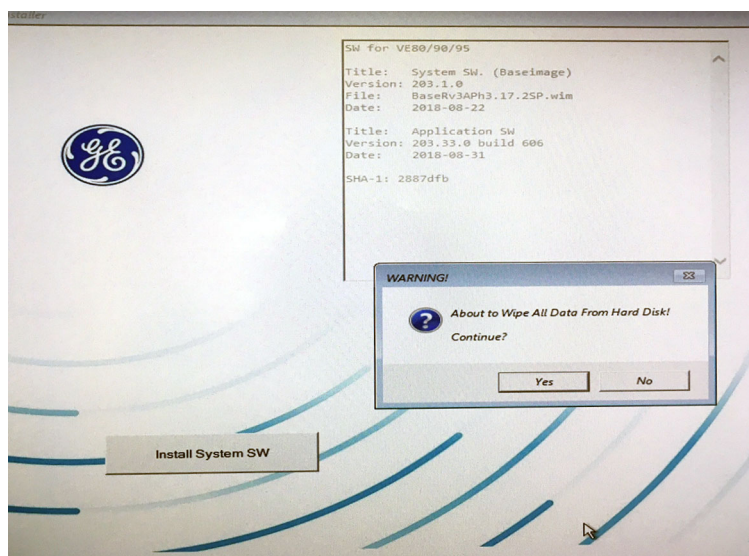
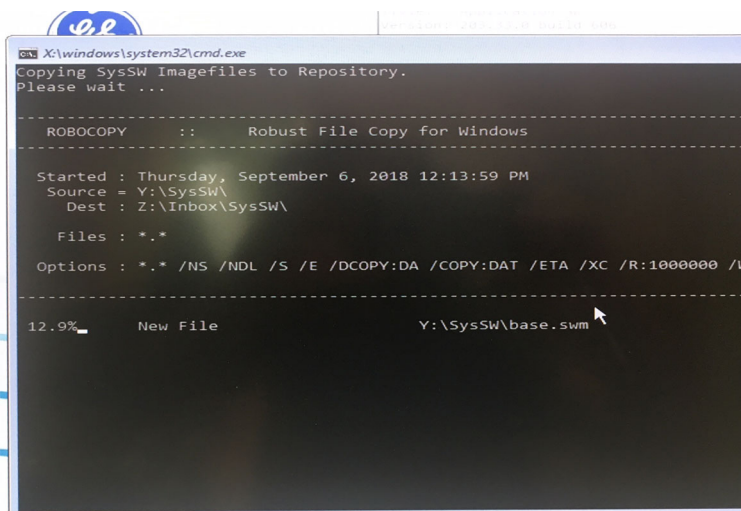


Figure 8-154 OK to wipe all content on HDD?

**8-7-3-3 Install the System Software from Usb Flash Drive (UFD) (cont'd)**

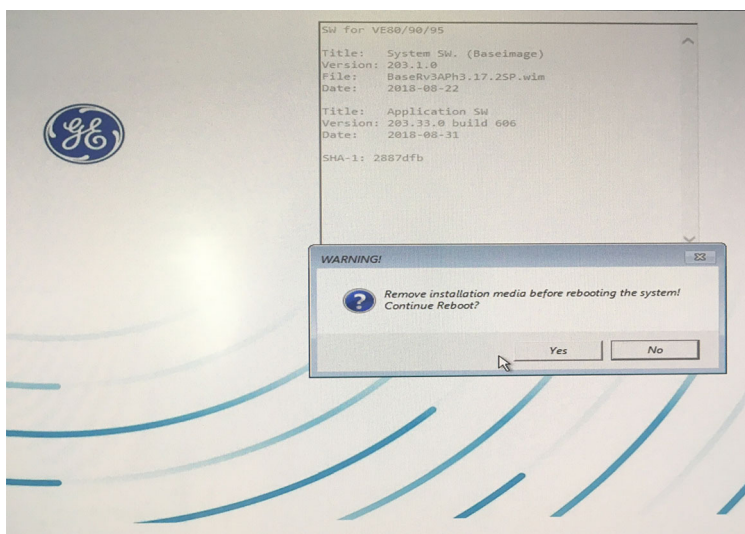
Select **Yes** to continue.



**Figure 8-155 Copying SysSW Imagefiles to Repository**

**Copying SysSW Imagefiles to Repository** starts. This may take approximately 30 minutes.

5.) When ready, the Warning below is displayed on the screen. Remove UFD and select **Yes** to reboot.



**Figure 8-156 Remove UFD and select Yes to reboot.**



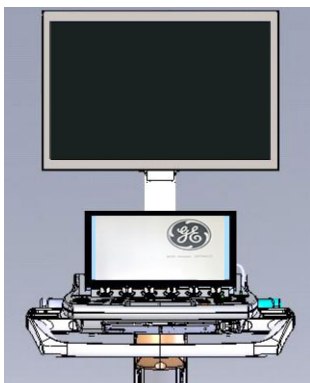
**8-7-3-3 Install the System Software from Usb Flash Drive (UFD) (cont'd)**

- 6.) The BEP continues the boot and should start loading from the software UFD.

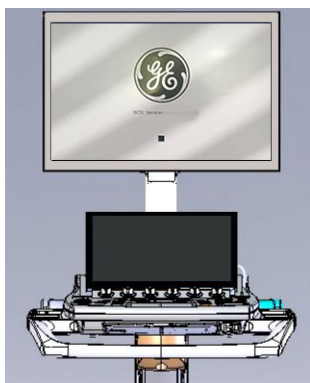
During the start of the boot, the BEP needs some time to configure the screens:



**Figure 8-157 Before screens are configured**



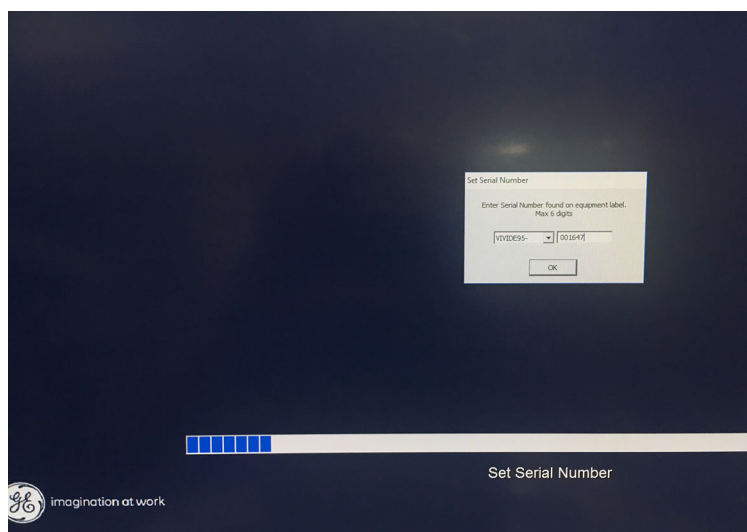
**Figure 8-158 Splash screen displayed on lower screen (Touch Screen)**



**Figure 8-159 Screens have been configured and boot software is loading**

**8-7-3-3 Install the System Software from Usb Flash Drive (UFD) (cont'd)**

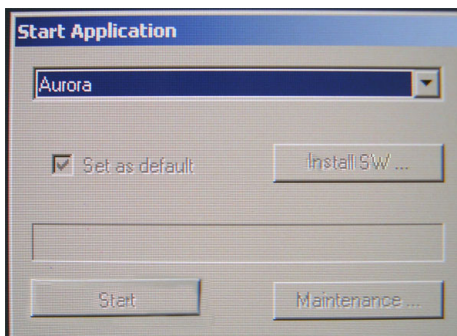
7.) When asked, enter the correct **Serial Number**.



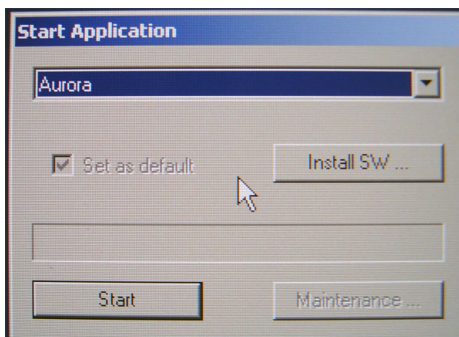
**Figure 8-160 Set Serial Number**

**8-7-3-4 Install the Application Software**

- 1.) Wait for the Start Application dialogue box to appear. It will first be 'grayed out'.

**Figure 8-161 'Grayed out' figure**

- 2.) Insert the Software UFD and click the **Install SW...** button as soon as it becomes active.

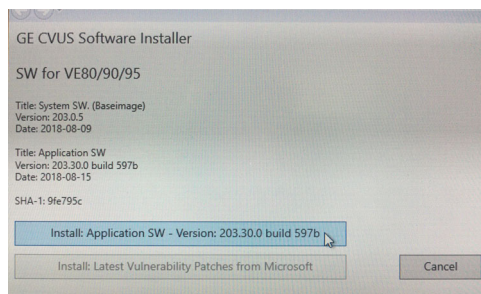
**Figure 8-162 Start Application**

If the 'Install SW...' text does not change from grayed out to clear text, this means that the UFD is not recognized. Re-insert the UFD and check if the UFD is recognized. If this does not solve the problem, power down the ultrasound system completely.

Boot the Ultrasound system and insert the UFD when the dialog box appears and the **Install SW...** text has changed to clear text.

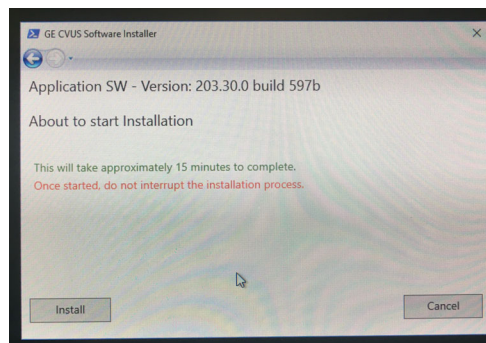
**8-7-3-4 Install the Application Software (cont'd)**

- 3.) Select **OK/OK/Install SW** on the next menus that appear.

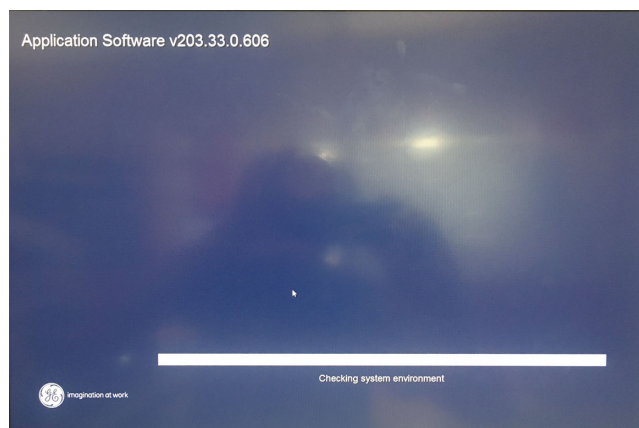


**Figure 8-163 Select 'Install Application Software'**

- 4.) Select **Install Application Software**.  
5.) Read the text and select **Install**, when ready.



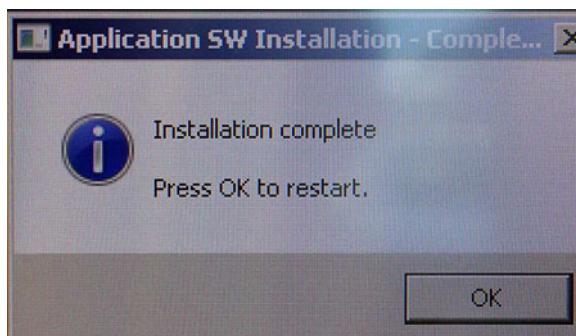
**Figure 8-164 'Once started, do not interrupt the installation process.' (Select 'Install'.)**



**Figure 8-165 Software installation has started**

**8-7-3-4 Install the Application Software (cont'd)**

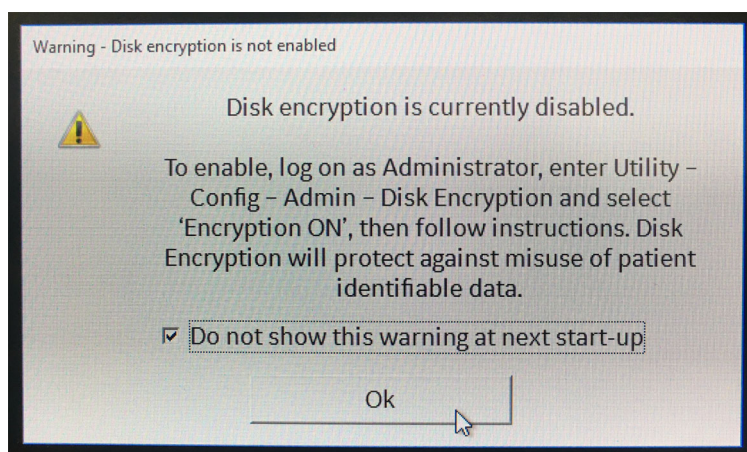
The installation of the application software is complete when the dialog below is displayed.



**Figure 8-166 Installation Complete**

6.) Remove the UFD, then select **OK**.

The ultrasound system will now restart automatically.



**Figure 8-167 Disk encryption is not enabled**

7.) Press **Config (F2)** and log on as **ADM**.

8.) Select **Admin** (lower part of window).

9.) Select the **System Admin** tab.

**8-7-3-4 Install the Application Software** (cont'd)

10.) Select **New** to open the **New Key** dialog where you type the SW Option Key.



**CAUTION** Incorrect Software Option Key entry will result in loss of functionality. If Software Option Key is incorrect, please contact your local GE Service Representative or the Online Center.

11.) Type the **Software Option Key**. It is case sensitive, and you must include the dashes (-) as they are part of the Software Option Key.

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

13.) Restart the Ultrasound System to save and activate the settings and adjustments you have done so far.

**8-7-3-5 Load the MS Security Patches**

Follow these steps to install the MS Security Patches:

1.) With the Software UFD connected, restart the Ultrasound system.

2.) Follow the on-screen instructions.

If the MS Security Patches are not listed, all the needed patches are included in the System Software and you may continue with the next step.

**8-7-3-6 Load the User Manuals**

**NOTE:** *This procedure is required, also for English User Manuals.*

The User Manuals are included on the Manual UFD.

Follow these steps to install the translated user manuals:

1.) Insert the Manual UFD in one of the USB ports on the ultrasound system.

2.) Restart the ultrasound system.

3.) Follow the on-screen instructions.



## Section 8-8 Peripherals - Replacement Procedures

### 8-8-1 DVD/CD-RW Drive Replacement Procedure

#### 8-8-1-1 Tools

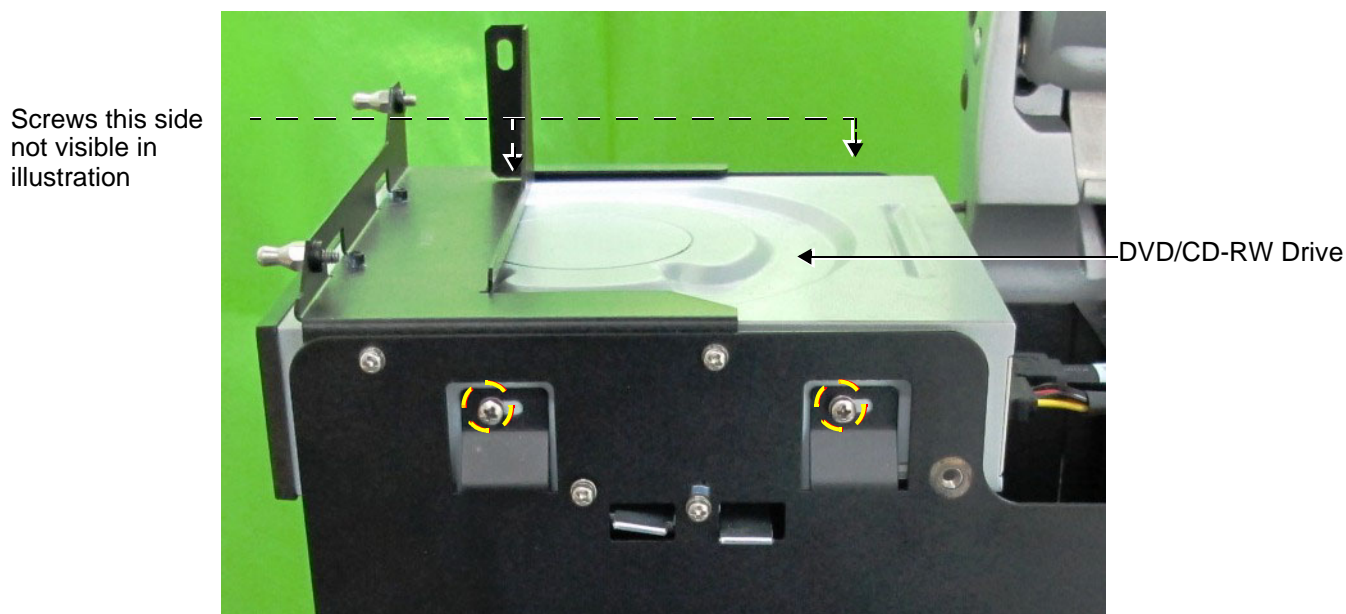
Use the appropriate Phillips-type screwdrivers.

#### 8-8-1-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

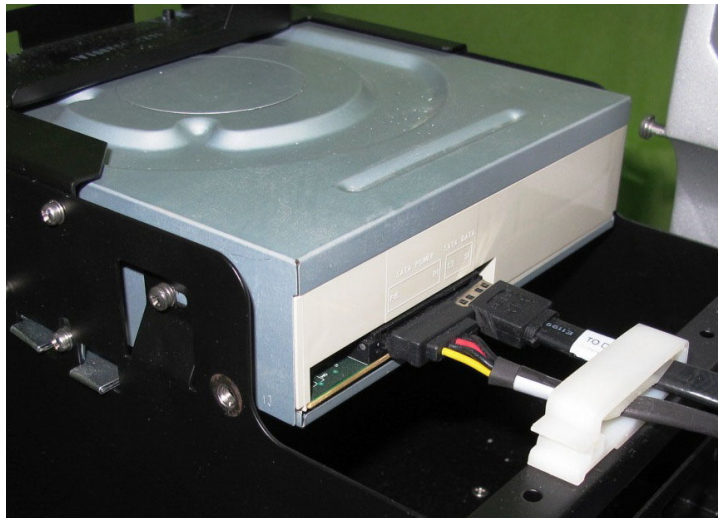
#### 8-8-1-3 DVD/CD-RW Drive Removal Procedure

- 1) Remove the following covers: *left side, right side, front, right rear, left rear*:
- 2.) Loosen and remove the two Phillips screws on either side of the securing panel (that holds the DVD /CD-RW Drive in position), as indicated in [Figure 8-168](#).



**Figure 8-168** Screws Securing DVD/CD-RW Drive in Position

- 3.) Disconnect the SATA DVD cable and the SATA DVD power cable from the rear of the DVD /CD-RW Drive, as indicated in [Figure 8-168](#).



**Figure 8-169 Cables Connected at Rear of DVD/CD-RW Drive**

- 4.) Slide the DVD /CD-RW drive out of its compartment.

#### **8-8-1-4 DVD/CD-RW Installation Procedure**

- 1.) Carefully place the replacement DVD /CD-RW Drive into the Peripheral Console.
- 2.) Connect the new DVD cable as follows:
  - a.) Connect the DVD SATA cable (P/N 5417774) to the DVD and plug it into Port 2 on the BIF.
  - b.) Connect the SATA power cable (P/N 5417776) to the DVD and plug it into Port 3 on the BIF (see the connection map located on the sub-woofer).
- 3.) Refit the covers, previously removed:



## 8-8-2 Black and White Printer Replacement Procedure

**NOTE:** This section describes removal and replacement procedures only. For initial installation and configuration instructions, refer to the information provided in [Chapter 3 - System Setup](#).



**Figure 8-170 Black and White Printer**

**NOTE:** When replacing the Black and White Printer, make sure the correct cover kit has been ordered, if applicable. Refer to [Chapter 9 - Renewal Parts](#) for details.

### 8-8-2-1 Tools

Use the appropriate screwdrivers as indicated in the Black and White Printer replacement procedure.

### 8-8-2-2 Preparations

Shut down the ultrasound system as described in [Power Shut Down on page 4 - 8](#).

### 8-8-2-3 Black and White Printer Removal Procedure

- 1) Remove the following covers: *left side, right side, front, AC Distribution Box*.
- 2.) Loosen the two lower Phillips screws on either side of the Peripherals Console (that secures the Black and White Printer in position), as indicated in [Figure 8-171](#).



**Figure 8-171 Screws Securing Black and White Printer in Compartment**

- 3.) Disconnect the USB cable and the power cable from the rear of the Black and White Printer, as shown in [Figure 8-172](#).



**Figure 8-172 Cables Disconnected from Rear of Black and White Printer**

- 4.) Carefully push the Black and White Printer out of the compartment, while holding it firmly to prevent it from falling.
- 5.) Remove the printer and place it on a flat, stable surface.

#### **8-8-2-4 Black and White Printer Installation Procedure**

- 1.) Carefully place the replacement Black and White Printer into the compartment. Slide it all the way in, making sure it is properly seated against the rear of the compartment.
- 2.) Re-connect the USB cable and the power cable to the rear of the printer - refer to, as indicated in [Figure 8-172](#).
- 3.) Tighten the two lower Phillips screws previously released from either side of the Peripherals Console (refer to [Figure 8-171](#)). Make sure the printer is firmly secured in position.
- 4.) Refit the covers previously removed:

# Chapter 9

## Renewal Parts

### Section 9-1 Overview


#### 9-1-1 Purpose of Chapter 9

This chapter gives you an overview of replacement parts for the Vivid S60N/Vivid S70N.

Table 9-1 Contents in Chapter 9

Section	Description	Comments	Page Number
9-1	<a href="#">Overview</a>		9-1
9-2	<a href="#">List of Abbreviations</a>		9-3
9-3	<a href="#">Renewal Parts Lists and Diagrams</a>		9-4

**NOTE:** In the detailed Parts lists, illustrations are accompanied by FRU names, corresponding Part Numbers and a compatibility matrix.

This Replacement Procedure icon  indicates that a replacement procedure is available and includes a link to the instructions in [Chapter 8 - Replacement Procedures](#).

**NOTE:** The illustrations provided in this chapter are for illustration purposes only and are subject to change without notice.

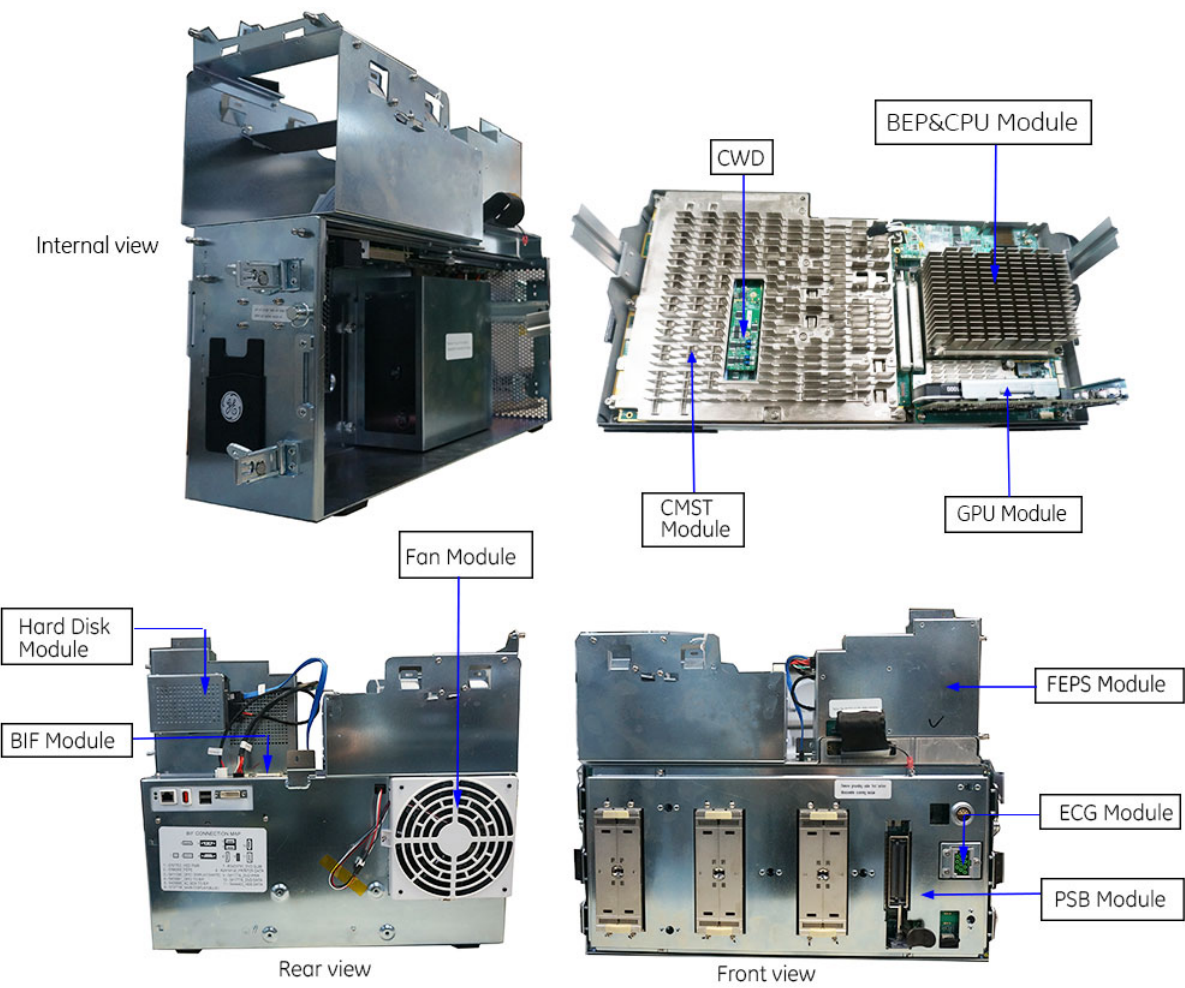


Figure 9-1 Scanner Electronic Cage (R3)

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## Section 9-2

### List of Abbreviations

- **Assy** - Assembly
- **BEP** - Back End Processor
- **BIF** - Back End Interface
- **CFE** - Control Front End
- **CRU** - Customer Replaceable Unit
- **Ctrl** - Control
- **FEP** - Front End Processor
- **FEPS** - Front End Power Supply
- **FRU Y** - Replacement Parts
- **FRU N** - Non Stock Part
- **HDD** - Hard Disk Drive
- **Int** - Internal
- **I/O** - Input/Output
- **LCD** - Liquid Crystal Display
- **OP** - Operating (or Operator) Control Panel
- **PSB** - Probe Selection Board
- **PWA** - Printed Wire Assembly
- **Recv** - Receive
- **TS** - Touch Screen
- **XFRMR** - Transformer

## Section 9-3 Renewal Parts Lists and Diagrams

### 9-3-1 Mechanical Hardware Parts

Table 9-2 Mechanical Hardware Parts 1 of 3

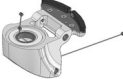

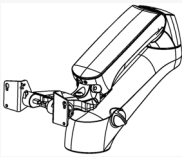







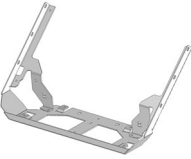

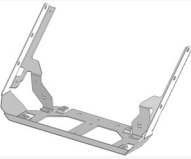

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	Joint Assy. 	S2420695				
2	LCD Arm Alton 21.5in Wide -- for 21.5" Monitor 	5957000-180				
3	LCD Arm Riser - Alton -- for 21.5 inch monitor 	5737199				
4	UP-DOWN MECHANISM KIT-VS5_S6 	S2424434				
5	Swivel Mechanism Service Kit 	S2424423				
6	Alton Touch Panel Chassis SVC Kit 	5750266-S	S5459537, NS5459537			
7	Chassis_Touch Panel FRU 	NS5459537				

Table 9-2 Mechanical Hardware Parts (Continued) 2 of 3





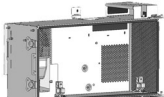
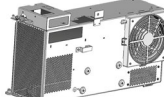

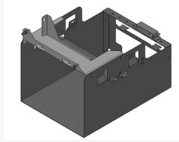















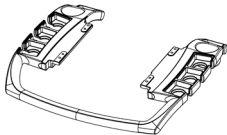



Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
8	Gas Spring FRU 	S5460989		5746474-S		
9	Gas Spring Cable 	S2420834				
10	Cabinet Cage Module  Front view  Rear view	NS5418049				
11	Peripherals Console Assy 	NS5422729				
12	Arm release knob module 	S5475537				
13	First Axis with pin 	S5491951				
14	Sliding ring for first axis 	S5476640				
15	Mechanical Assy. -Interface base for Operating Panel 	NS5450417				

Table 9-2 Mechanical Hardware Parts (Continued) 3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
16	VS60 and VS70 Lock Caster  <i>Note!</i> <i>This caster is installed on the left-hand side on the rear of the console (seen from the front of the console).</i>	5748386-S	S5508380			
17	Wheel_Front_6inch with brake locking 	S5508379				
18	VS60 and VS70 Swivel Rear right Caster  <i>Note! This caster is used on the right-hand side on the rear of the console (viewed from the front of the console) and in both the left and the right-hand sides on the front of the console.</i>	5748387-S				
19	Wheel_Rear_6inch with free swivel 	S5508380		5748386-S		
20	PROBE SHELF VS6 	S2421613				
21	Rear Handle Kit 	S2424091				



## 9-3-2 Covers

Table 9-3 Covers - 1 1 of 3





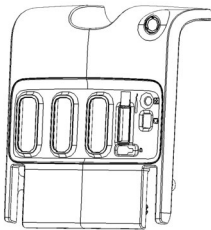

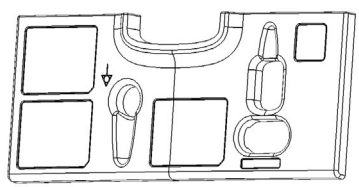



Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
201	Cover: Rear Right 	S5490604					No
202	Cover: Rear Left 	S5490603					No
203	Cover: Front Assy. Note: It is also necessary to order GE logo kit PN 5543611 	S5490614					No
204	Cover: AC Box 	S5490612					No
205	Cover: Air Inlet - Left Side 	S5490611					No

Table 9-3 Covers - 1 (Continued) 2 of 3



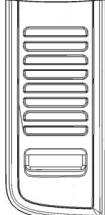









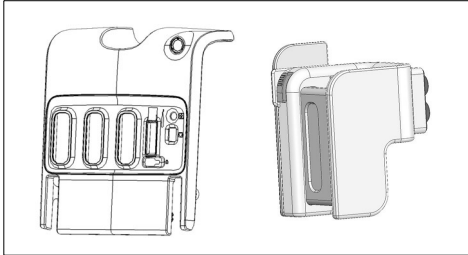

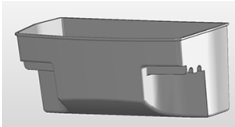

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
206	Air Filter 	S5432149					Yes
207	Cover: Right Side 	S5490610					No
208	Cover: Right Side Blank 	S5490605					No
209	Cover: DVD Assy. 	S5490608					No
210	Cover: DVD and Printer 	S5490607					No
211	Cover: Printer assembly 	S5490609					No

Table 9-3 Covers - 1 (Continued) 3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
212	RS Cable Locker Assy. (cable restrainer) Note: also necessary to order GE logo kit PN 5543611 	S5534095					No
213	Basket for Probe Cable Management Kit 	5555123					No

## 9-3-2 Covers (cont'd)

Table 9-4 Covers - 2 1 of 2

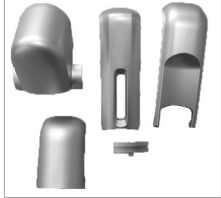






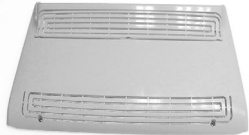







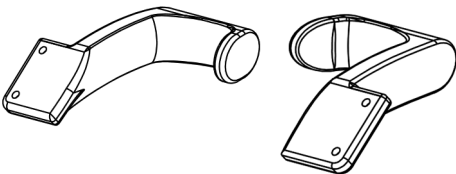

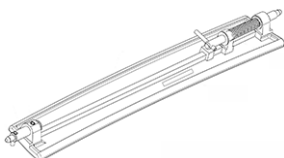
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	Cover: Articulated Arm Kit 	5490631				
2	Cover: Monitor_Front  Note: Also necessary to order: • GE Symbol, PN: • Screws Kit, PN: 5490637	S5490514				
3	Cover: Monitor_Rear  Note: Also necessary to order Screws Kit PN 5490637	S5438354				
4	Cover: Monitor_Arm base 	S5473638				
5	Cover: Monitor_Service  Note: Also necessary to order m/caution Label PN NS5496471	S5447216				
6	Alton Touch Panel Rear Cover SVC Kit 	5750792-S	S5437448			
	Cover: Touch Panel_Rear 	S5437448		5750792-S		





Table 9-4 Covers - 2 (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
7	Alton Touch Panel Rear Cover SVC Kit 	5750793-S	S5453526			
	Cover-Touch panel_Back service FRU 	S5453526		5750793-S		
8	Rear box 	S5445377				
9	OPIO Basket 	S5460993				
10	CABLE HOLDER RIGHT LEFT VS6 	S2421632				
11	FOOT REST ASSY 	S2420478				
12	Screws kit for Monitor FRU	5490637				

## 9-3-3 Monitor Parts

### 9-3-3-1 21.5" Monitor Parts

Table 9-5 21.5" Monitor Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	21.5 INCH LCD MONITOR without glass filter (Order the label GC314438 together with the monitor) 	5501560-13		5501560-15		
	21.5 INCH LCD MONITOR without glass filter (Order the label GC314438 together with the monitor) 	5501560-15	5501560-13			
2	POWER TO DISPLAY CABLE - WHITE - FOR ERGOTRON ARM - 21,5IN MONITOR	S5737737-01				
3	BIF TO DISPLAY DP CABLE - White	S5737736				
4	GND Cable - 460 mm - White - Yellow_green heat shrink tube on ends - M4 Terminals - service	S5750190-01				

## 9-3-4 Operating Panel

### 9-3-4-1 Operating Panel parts - second version

Table 9-6 Operating Panel parts - 2nd version1 of 3

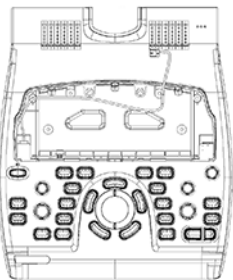

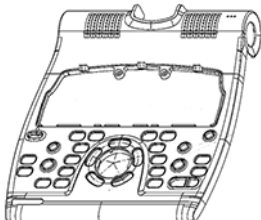

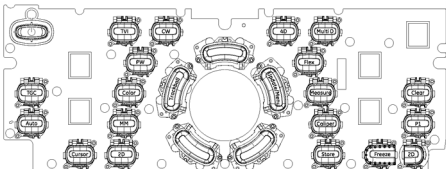






Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	<p>OPIO KBD Assy SVC Kit ((including cable for the Encoder Board) (Without Touch Screen)</p>  <p>Necessary to also order:</p> <ul style="list-style-type: none"> <li>Operator Panel Label: - for Vivid S69N: PN: NS5508332 - for Vivid S70N: NS5508332-2</li> <li>GE logo kit PN: 5543611.</li> </ul>	5750840-S					No
2	<p>Alton KBD Top Cover SVC Kit</p>  <p>Necessary to also order:</p> <ul style="list-style-type: none"> <li>Operator Panel Label: - for Vivid S69N: PN: NS5508332 - for Vivid S70N: NS5508332-2</li> <li>GE logo kit PN: 5543611.</li> </ul>	5750258-S					No
3	<p>Alton Functional and Power Keys SVC Kit</p> 	5750839-S					No
4	Alton Soft KBD PWA SVC Kit (Encoder Board)	5746901-S					No

Table 9-6 Operating Panel parts - 2nd version2 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
5	Alton Touch Screen Module SVC kit (With small holes for the encoders)  Additional Parts needed: <ul style="list-style-type: none"> <li>• 5750840-S OPIO KBD Assy SVC Kit</li> <li>• 5746901-S Alton Soft KBD PWA SVC Kit (Encoder Board)</li> <li>• 5750293-S Alton Rotary Keys SVC Kit</li> <li>• 5746912-S TP Display cable</li> <li>• 5750792-S TS Rear Cover</li> <li>• 5750793-S TS Rear Service Cover</li> </ul>	5778989-S					No
6	Alton Rotary Keys SVC Kit The kit includes the following parts: <ul style="list-style-type: none"> <li>- 8 x Big Rotaries Cap Assy</li> <li>- 3 x Small Rotaries Cap Assy</li> <li>- 11 x Knob Spring</li> </ul> 	5750293-S					Yes
7	Keycaps Kit for Operator Panel 	5490616					No
8	Screws Kit for Operator Panel	5490615				N/A	No
9	Alton Soft KBD PWA SVC Kit 	5746901-S					No
10	Alton trackball SVC kit 	5750826-S					No
11	Trackball Ring 	5661884					No



Table 9-6 Operating Panel parts - 2nd version3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
12	Label-GE Logo 40mm (2 per kit) 	5543611					No
13	Alton Label Vivid S70N SVC Kit 	5791216-S					No
14	Alton Label Vivid S60N SVC Kit 	5791217-S					No

## 9-3-4-2 Optional Alphanumeric Keyboard

Table 9-7 Optional Alphanumeric Keyboard 1 of 2

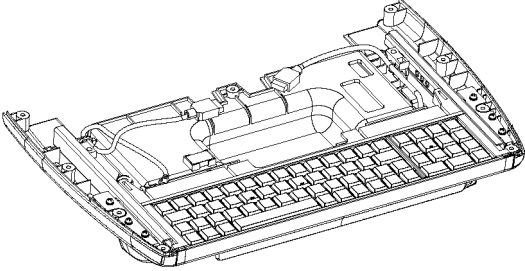







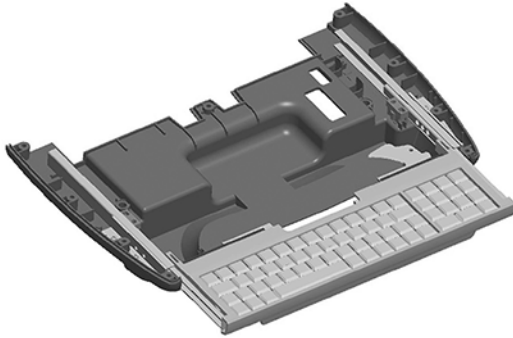













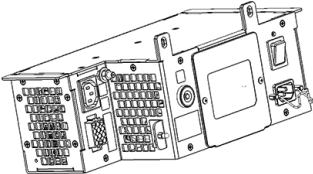





Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	ALTON AN DRAWER - English International with package 	5767065	5459218				No
2	Alton AN Drawer German with package	5767065-2					No
3	Alton AN Drawer French with package	5767065-3					No
4	Alton AN Drawer Spanish with package	5767065-4					No
5	Alton AN Drawer Italian with package	5767065-5					No
6	Alton AN Drawer Portuguese with package	5767065-6					No
7	Alton AN Drawer Russian with package	5767065-7					No
8	Optional A/N Keyboard Kit (complete with OPIO bottom cover) 	5459218		5767065			No
9	English A-N Keycaps kit	S5439674					Yes
10	Danish A-N Keycaps kit	S5439674-10					Yes
11	Finnish A-N Keycaps kit	S5439674-11					Yes
12	French A-N Keycaps kit	S5439674-3					Yes
13	German A-N Keycaps kit	S5439674-2					Yes
14	Italian A-N Keycaps kit	S5439674-5					Yes
15	Norwegian A-N Keycaps kit	S5439674-13					Yes
16	Polish A-N Keycaps kit	S5439674-14					Yes
17	Portuguese A-N Keycaps kit	S5439674-6					Yes
18	Russian A-N Keycaps kit	S5439674-9					Yes

Table 9-7 Optional Alphanumeric Keyboard (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
19	Spanish A-N Keycaps kit	S5439674-4					Yes
20	Swedish A-N Keycaps kit	S5439674-12					Yes

## 9-3-5 Power Parts

Table 9-8 Power Parts

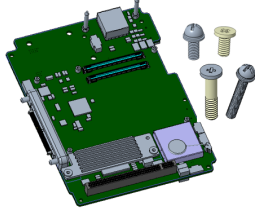

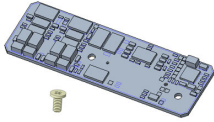


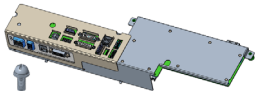

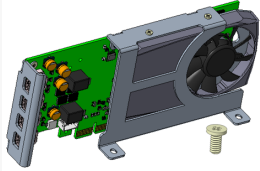

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	AC Box module 	5750877-2-S	5750877-S				No
		5750877-S (Going Obsolete)	S5399339	5750877-2-S			No
		S5399339 (Obsolete)		5750877-S			No
2	Spare part for the battery pack assembly for Alton/ Battery for scanner FRU 	S5399340-2	S5399340				Yes
		S5399340 (Going Obsolete)		S5399340-2			

## 9-3-6 Back End Unit

### 9-3-6-1 Back End Processor (BEP) parts used with software v203

For Front End parts for mini cSound, see: [9-3-7-1 "Front End used with software v203" on page 9-20.](#)

**Table 9-9 Mini cSound Back End Unit**

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	BEP & CPU Module FRU (Refer to illustration and content for S5804145.)	NS5804145	S5804145			
	BEP & CPU Module FRU The kit includes the following parts: <ul style="list-style-type: none"> <li>• BEP Module---1pcs</li> <li>• CPU Module---1pcs</li> <li>• Screw M3x13---1pcs</li> <li>• Screw M3x8---6pcs</li> <li>• Screw M3x8---2pcs</li> <li>• Screw M2.5x20---5pcs</li> </ul> 	S5804145		NS5804145		
2	CWD PWA FRU (Refer to illustration and content for S5764721-2.)	NS5764721-2	S5764721-2			
	CWD PWA FRU The kit includes the following parts: <ul style="list-style-type: none"> <li>• ALTON CWD PWA---1pcs</li> <li>• Screw M2.5x5---2pcs</li> </ul> 	S5764721-2		NS5764721-2		
3	Hard Disk Module FRU (Refer to illustration and content for S5767525.)	NS5767525	S5767525			
	Hard Disk Module FRU The kit includes the following parts: <ul style="list-style-type: none"> <li>• Hard Disk Module---1pcs</li> <li>• Screw M3x8---2pcs</li> <li>• SATA cable</li> <li>• Power cable</li> </ul> 	S5767525		NS5767525		
4	BIF Module FRU (Refer to illustration and content for S5766993.)	NS5766993	S5766993			
	BIF Module FRU The kit includes the following parts: <ul style="list-style-type: none"> <li>• BIF Module Assy ---1pcs</li> <li>• Screw M3x8---2pcs</li> </ul> 	S5766993		NS5766993		
5	GPU Module FRU (Refer to illustration and content for S5778606.)	NS5778606	S5778606			
	GPU Module FRU The kit includes the following parts: <ul style="list-style-type: none"> <li>• GPU Module---1pcs</li> <li>• Screw M3x8---2pcs</li> </ul> 	S5778606		NS5778606		
6	CMOS Battery FRU	NS5145407	S5145407			
	CMOS Battery FRU	S5145407		NS5145407		

## 9-3-7 Front End Unit

### 9-3-7-1 Front End used with software v203

For Back End parts for mini cSound, see: [9-3-6-1 "Back End Processor \(BEP\) parts used with software v203" on page 9-19.](#)

**Table 9-10 Mini cSound Front End Unit 1 of 2**


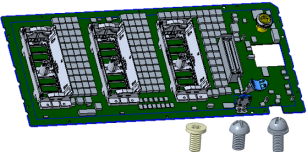

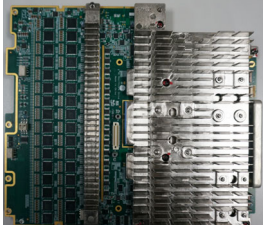
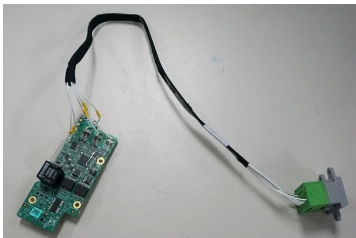


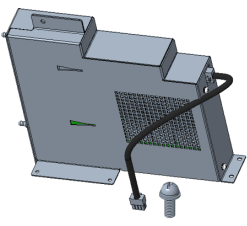

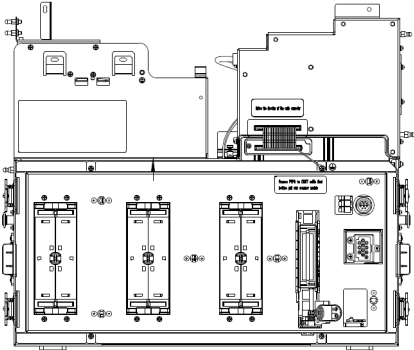
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	PSB Module FRU (Refer to illustration and content for S5766836.)	NS5766836	S5766836			
	PSB Module FRU  The kit includes the following parts: <ul style="list-style-type: none"> <li>• Relay Sub Assy ---1PCS</li> <li>• Screw M3x8---11pcs</li> <li>• 5Plastic Screw M3x5---3pcs</li> <li>• Screw M3x6---3pcs</li> </ul>	S5766836		NS5766836		
2	CMST Module FRU (Refer to illustration and content for S5766838.)	NS5766838	S5766838			
	CMST Module FRU  The following parts are included: <ul style="list-style-type: none"> <li>• CMST Module -- 1pcs</li> <li>• Screw M3x8 -- 9pcs</li> <li>• ALTON R2 PATIO BEP2CMST cable -- 1pcs</li> <li>• Plastic screw M3x6 -- 3pcs</li> <li>• M3 hand spin screw -- 2pcs</li> </ul>	S5766838		NS5766838		

Table 9-10 Mini cSound Front End Unit (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
3	ECG Module FRU (Refer to illustration and content for S5802128.)	NS5802128	S5802128			
	ECG Module FRU  <p>The kit includes the following parts:</p> <ul style="list-style-type: none"> <li>• ALTON ECG Input Cable---1pcs</li> <li>• ECG TO MAT Cable---1pcs</li> <li>• Plastic Screw M3x5---3pcs</li> <li>• Screw M3x8---16pcs</li> <li>• Screw M3x6---3pcs</li> <li>• Plastic standoff--- xx pcs</li> </ul>	S5802128		NS5802128		

## 9-3-8 FEPS and Ecage (v203)

Table 9-11 Mini cSound FEPS and Ecage

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	FEPS Module (Refer to illustration and content for S5767344.)	NS5767344	S5767344			
	FEPS Module FRU   The kit includes the following parts: <ul style="list-style-type: none"> <li>• FEPS Module---1pcs</li> <li>• Screw M3x8---5pcs</li> </ul>	S5767344		NS5767344		
1	Ecage Module FRU (Refer to illustration and content for S5769051.)	NS5769051	S5769051			
	Ecage Module FRU   The kit includes the following parts: <ul style="list-style-type: none"> <li>• Electronic Cage Assy -- 1pcs</li> <li>• LOCK WASHER EXT M4 DIN -- 2pcs</li> <li>• Hexagon Prevailing Torque Nut, M4-0.7, Fastener -- 1pcs</li> <li>• CABLE TIE 140x2.5MM -- 2pcs</li> <li>• Phillips Pan Head Machine Screw, SEMS, M4-0.5, X10mm Long -- 1pcs</li> <li>• Hexagon Socket C-Sunk Head Screw, M5-0.8, X16mm Long -- 4pcs</li> </ul>	S5769051		NS5769051		




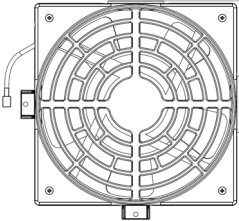
9-3-9

Electro Mechanical Parts

9-3-9-1

Electro Mechanical Parts (v203)

Table 9-12    Electro Mechanical Parts (v203)

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	FAN Module FRU (Refer to illustration and content for S5766826.)	NS5766826	S5766826			
	FAN Module FRU 	S5766826		S5766826		


9-3-10

Software



Figure 9-2 Software







Table 9-13 v203 Software

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	Vivid S60N-S70N Software version 203 Kit	BC100730				

## 9-3-11 Cables

### 9-3-11-1 System Cables (v203)

Table 9-14 System Cables (v203)

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	HDD Power Cable FRU 	NS5767763	S5767763			
2		S5767763		NS5767763		
3	FEPS to BIF Cable FRU 	NS5766269	S5766269			
4		S5766269		NS5766269		
5	STD Cable FRU 	NS5444463	S5444463			
6		S5444463		NS5444463		
7	FEPS to CMST Cable FRU 	NS5766268	S5766268			
8		S5766268		NS5766268		
9	BEP to CMST Cable FRU 	NS5777312	S5777312			
10		S5777312		NS5777312		

## 9-3-11-2 System Power Cables

Table 9-15 System Power Cables 1 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1	POWER CABLE C15M 4,50M AUSTRALIA 	R2415383-7	S2414985-5		
	VS5,S6 POWER CABLE AUSTRALIAN KIT	S2414985-5		R2415383-7	
2	Power Cable C15M 3,00M Brazil 	5405959			
	Brazilian Power and periph. Cables Vivid S5_S6_i_q Cart RSPL Kit Kit with 5405959 and two other cables	5420774			
3	POWER CABLE C15M 4,50M UK 	R2415383-4	2415383-4 S2414985-6		
	VI CART POWER CABLE-UK/HK/SINGAPORE	2415383-4		R2415383-4	
	VS5,S6 POWER CABLE UK KIT	S2414985-6		R2415383-4	
4	POWER CABLE C15M 4,50M CHINA 	R2415383-6	S2415383-6		
	V S5 S6 POWER CABLE CHINA	S2415383-6		R2415383-6	
5	Power Cable C13M 3,00M Denmark 	5439668	S2414985-4		
	VS5,S6 POWER CABLE DANISH KIT	S2414985-4		5439668	

Table 9-15 System Power Cables (Continued) 2 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
6	POWER CORD C15M 3,00M EUROPE 	R2418616	2418616 S2414985-2		
	VI CART PWR CABLE EUROPE	2418616		R2418616	
	VS5,S6 POWER CABLE EURO PLUG	S2414985-2		R2418616	
7	POWER CABLE C15M 4,50M ISRAEL 	R2415383-1	S2414985-7		
	VS5,S6 POWER CABLE ISRAELI	S2414985-7		R2415383-1	
8	POWER CABLE C15M 4,50M JAPAN 	R2415383-5	5497798 and S2414985-8		
	VI CART POWER CABLE-JAPAN	5497798		R2415383-5	
	VS5,S6 POWER CABLE JAPAN (Peripherals Power Cable Japan)	S2414985-8		R2415383-5	
9	POWER CABLE C15M 4,50M SWISS 	R2415383-8	S2414985-3		
	V S5 S6 POWER CABLE SWISS	S2414985-3		R2415383-8	
10	POWER CABLE C15M 4,50M North America 	R2269460-2	S2414985		
	V S5 S6 POWER CABLE USA-CANADA	S2414985		R2269460-2	

Table 9-15    System Power Cables (Continued) 3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
11	<div>POWER CABLE C15M 4,50M INDIA India / South Africa</div> <div></div>	R2421019			

**9-3-11-3 ECG Cables****Table 9-16 ECG Cables**

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	CRU
12	Cable: ECG MARQ. AHA/America	164L0025				✓
13	Cable: ECG MARQ. IEC / EU+AS	164L0026				✓
14	Leadwires ECG MARQ. AHA / AMERICA	164L0027				✓
15	Leadwires ECG MARQ. IEC/EU+AS	164L0028				✓
16	ECG Cable, neo, AHA Multi-Link 3-lead ECG Care cable neonatal DIN, AHA (3.6 m/12ft) Used together with neonatal leads H45571RJ	2017004-001				✓
17	ECG cable, neo, IEC Multi-Link 3-lead ECG Care cable neonatal DIN, IEC (3.6 m/12ft) Used together with neonatal leads H45571RK	2017004-003				✓

## 9-3-12 Optional Peripherals

Table 9-17 Optional Peripherals 1 of 2













Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	DVD RW Drive SATA 	066E8899				
2	Color Laser Printer 220V 					
	Report Printer with network capabilities, either:					
	HP Color LaserJet Pro M452, 220V-240V	066E8922	066E3023			
	HP Laser Jet Pro 400 Color M451 (220V) -- Obsolete	066E3023		066E8922		
	LaserJet Pro M451 220V Printer RSPL Kit -- Obsolete	5456780				
3	Color Laser Printer 110V 					
	Report Printer with network capabilities, either:					
	HP Color LaserJet Pro M452, 110V-127V	066E8923	066E3024			
	HP LaserJet Pro M451 110V Printer RSPL Kit	5438549				
	HP Laser Jet Pro 400 Color M451; 110-120V - Going obsolete	066E3024		066E8922		
4	Aurora Alton Wireless Interface USB Adapter kit Requires software version 202 revision 34.0 or higher. Content in the kit: <ul style="list-style-type: none"> <li>• Netgear A6210 WiFi USB Adapter, including USB-Docking for A6210</li> </ul>  <ul style="list-style-type: none"> <li>• WiFi label</li> <li>• Velcro tape strips for attaching the USB-Docking to the ultrasound system</li> </ul>	GC200539			v201	
5	Wireless Network Interface USB RSPL Kit 	5442405			v202 and higher	
	Introduced for software v201.					






Table 9-17 Optional Peripherals (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
6	USB Sandisk-Cruzer RSPL Kit 	5460632				
7	3 button foot switch Rev1.1 	5380960-2				
8	A6 Color Printer Sony UP-D25MD 	066E2956				
9	SONY UP-D898MD DIGITAL A6 BW PRINTER 	5555265				

## 9-3-13

## Jigs

Table 9-18 Jigs

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1	PENCIL PROBE JIG-VS5,S6-IB 	S2421758		5498103	
	PENCIL PROBE JIG-VS5_S6-IB 	5498103	S2421758		
2	DISPLAY PORT and power ADAPTER JIG FRU 	5499567			

# Chapter 10

## Care and Maintenance

### Section 10-1 Overview

#### 10-1-1 Purpose of Chapter 10

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.

#### 10-1-2 Care and Maintenance

Normal Care and Maintenance is mandatory; it is the responsibility of the customer and includes the following:

- Quality Assurance Program to perform routine quality control testing.

**NOTE:** *Some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.*

- System Maintenance and Checks (Preliminary System, Functional Checks, Peripheral, Cable, Physical Inspection).
- Probe Maintenance
- System Cleaning, including Air Filter Cleaning
- Electrical Safety Testing

**NOTE:** *It has been determined by engineering that your Ultrasound System **DOES NOT** have any high wear components that fail with use. **Therefore, Periodic Maintenance inspections are not mandatory for any Ultrasound system.** Only normal Care and Maintenance is recommended.*

#### 10-1-3 Contents in this chapter

**Table 10-1 Contents in Chapter 10**

10-1	Overview	10-1
10-2	Warnings	10-2
10-3	Why do Maintenance	10-3
10-4	Maintenance Task Schedule	10-4
10-5	System Maintenance	10-6
10-6	Electrical Safety Tests	10-14

## Section 10-2

### Warnings

**DANGER**

**THERE ARE SEVERAL PLACES INSIDE THE CAGE, THE BATTERY, THE AC DISTRIBUTION BOX, AND THE DISTRIBUTION INTERFACE BOARD (DIB) THAT COULD BE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND TO TURN OFF THE POWER ON/OFF SWITCH BEFORE YOU REMOVE ANY PARTS. PROCEED WITH CAUTION WHENEVER POWER IS ON AND COVERS ARE REMOVED.**

**DANGER**

**DO NOT PULL OUT OR INSERT CIRCUIT BOARDS WHILE MAINS POWER TO THE SYSTEM IS ON.**

**CAUTION**

**PRACTICE GOOD ESD PREVENTION. WEAR AN ANTI-STATIC STRAP WHEN HANDLING ELECTRONIC PARTS AND WHEN DISCONNECTING/CONNECTING CABLES.**

**CAUTION**

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

**When covers are removed, EMI may be present.**

**CAUTION**

**To ensure the mutual protection and safety of GE service personnel and our customers, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts a repair. This includes, but is not limited to, decontamination and/or sterilization, depending on the application or use of the medical device.**

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## Section 10-3

### Why do Maintenance

#### 10-3-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of all corrective maintenance and care and maintenance on Ultrasound systems where it is applicable. The Ultrasound Equipment Quality Check form provides the customer with documentation that the Ultrasound system is maintained regularly.

A copy of the *Ultrasound Equipment Quality Check* form should be kept in the same room or near the Ultrasound system.

#### 10-3-2 Quality Assurance

In order to gain accreditation from organizations such as the *American College of Radiology (USA)*, it is the customer's responsibility to have a quality assurance program in place for each Ultrasound scanner. The program must be directed by a medical physicist, the supervising radiologist/physician or appropriate designee.

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

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

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

## Section 10-4

### Maintenance Task Schedule

#### 10-4-1 How often should maintenance tasks be performed?

The [Customer Care & Maintenance Task Schedule](#) (provided in [Table 10-2](#) on page 10-5) specifies how often the ultrasound system should be serviced, and outlines items requiring special attention.

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

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

The service procedures and recommended intervals shown in the [Customer Care & Maintenance Task Schedule](#) assumes that you use your ultrasound system for an average patient load (10-12 patients 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, it is strongly recommended to increase the maintenance frequencies.*

Table 10-2 Customer Care &amp; Maintenance Task Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Per Facility's QA Program	Notes
Clean Probes	●*				* or before each use
Clean Probe Holders	●				
Clean Air Filters		●			More frequently if necessary, depending on the environment
Inspect AC Mains Cable			●		Mobile Ultrasound system: Check Weekly
Inspect Cables and Connectors			●		
Clean Console			●		
Clean Monitor and Touch Panel			●		
Inspect Wheels, Casters, Brakes and Swivel Locks			●		Mobile Unit: Check Daily
Check Operator Panel Movement			●		Mobile Unit: Check Daily
Console Current Leakage Checks				●	Also after corrective maintenance.
Peripheral Current Leakage Checks				●	Also after corrective maintenance.
Surface Probe Current Leakage Checks				●	Also after corrective maintenance.
Endocavity Probe Current Leakage Checks				●	Also after corrective maintenance.
Transesophageal (TEE) Probe Current Leakage Checks				●	Also after corrective maintenance.
Surgical Probe Current Leakage Checks				●	Also after corrective maintenance.
Functional Checks				●	Also after corrective maintenance.

## Section 10-5 System Maintenance

### 10-5-1 Preliminary Checks

The preliminary checks take approximately 15 minutes to perform. Refer to the *Vivid S60N/Vivid S70N User Manual* whenever necessary.

**Table 10-3 System Preliminary Checks**

Step	Item	Description
1.	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Paperwork	Fill in the top of the EQC inspection form. Record all probes and Ultrasound system options.
3.	Power-up	<ul style="list-style-type: none"><li>• Turn the Ultrasound system power ON and verify that all fans and peripherals turn On.</li><li>• Watch the displays during power up to verify that no warning or error messages are displayed.</li><li>• Where applicable, confirm that the battery is charged. If no AC Input present, use the internal battery.</li></ul>
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the Monitor and Touch Screen.
6.	Review Error Logs	Where applicable, Error Logs can be reviewed via system diagnostics.
7.	Presets	Back-up all Customer Presets onto appropriate media.
8.	Image Archive	Back up the Image Archive onto appropriate media.



## 10-5-2 Functional Checks

**NOTE:** Refer also to [Chapter 4 - General Procedures and Functional Checks](#), for additional details about the functional checks described in this section.

The functional checks take approximately 60 minutes to perform. Refer to the *Vivid S60N/Vivid S70N User Manual* whenever necessary.

### 10-5-2-1 System Checks

**Table 10-4 System Functional Checks**

Step	Item (or Mode)	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.	3D Mode	Where applicable, verify basic 3D Mode operation. Check the basic system controls that affect this mode of operation.
6.	Basic Measurements	Check Distance and Tissue Depth Measurement.
7.	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
8.	Applicable Software Options	Verify the basic operation of all optional modes such as Contrast. Check the basic Ultrasound system controls that affect each option's operation.
9.	Transmit/Receive	Verify that all system XMIT/RECV channels are functional, where applicable.
10.	Operator Panel test	Perform the Operator Panel Test Procedure.
11.	Keyboard	Do the interactive keyboard test.
12.	Touch Panel	Verify basic Touch Panel display functions.
13.	Monitor	Verify basic monitor display functions.
14.	Peripherals	See: <a href="#">Peripheral/Option Checks</a> on page 10 - 8.

**10-5-2-2 Peripheral/Option Checks**

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

Refer to the *Vivid S60N/Vivid S70N User Manual* for a list of approved peripherals/options.

**Table 10-5 GE Approved Peripheral/Hardware Option Functional Checks**

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

**10-5-2-3 Mains Cable Inspection****Table 10-6 Mains Cable Inspection, As Appropriate**

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall outlet and from the Ultrasound system.
2	Inspect	Inspect the mains cable and its connectors for any damage.
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	Verify that the Inlet connector retainer is functional.

## 10-5-3 Physical Inspection

**Table 10-7 Physical Checks**

Step	Item	Description
1.	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2.	Scratches & Dents	Inspect the exterior for dents, scratches or cracks.
3.	Covers	Where applicable, verify all covers are secured in place and are properly aligned with other covers. Replace any covers that are damaged.
4.	Wheels and Brakes	<ul style="list-style-type: none"> <li>Where applicable, check all wheels and casters for wear and verify operation of foot brake, to stop the Ultrasound system from moving, and release mechanism.</li> <li>Where applicable, check all wheel locks and wheel swiveling for proper operation.</li> </ul>
5.	Operating Panel Movement	<ul style="list-style-type: none"> <li>Where applicable, verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions.</li> <li>Where applicable, ensure that it latches in position as required.</li> </ul>
6.	Input Power	Refer to: <a href="#">Mains Cable Inspection</a> on page 10 - 8.
7.	Operating Panel	Inspect alphanumeric keyboard and operator panel (operator control panel). Record any damaged or missing items.
8.	External I/O	Check all connectors for damage.
9.	Operating Panel Lights	Check for proper operation of all operator panel and TGC lights.
10.	LCD	<p>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:</p> <ul style="list-style-type: none"> <li>Swiveling the screen to the left and to the right</li> <li>Folding the screen to the locked position</li> <li>Release and adjustment backwards and forwards</li> <li>Can be adjusted in the up/down positions.</li> </ul> <p>Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.</p>
11.	Monitor Light	Check for proper operation of any monitor lighting, if available.
12.	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to probe strain or bend reliefs.
13.	Shielding and Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
14.	Control Panel	Inspect alphanumeric keyboard and Operator Panel. Record any damaged or missing items.
15.	Probe Holders	Where applicable, inspect the Probe Holders for cracks or damage.
16.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
17.	Battery	Where applicable, check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal.

## 10-5-4 Cleaning

### 10-5-4-1 General Cleaning

Refer to the Vivid S60N/Vivid S70N User Manual for cleaning instructions.

### 10-5-4-2 Air Filter Cleaning



**CAUTION** Lock the Ultrasound system's wheels prior to removing/cleaning the air filter. This prevents the system from moving unexpectedly.


**Table 10-8 Air Filter Cleaning - Frequency Varies with Your Environment**


Step	Item	Description
1	Remove Filter Cover	Remove the left side cover from the system, as described in <a href="#">Air Inlet (Left Side) Cover Removal Procedure</a> on page 8 - 6. Remove the air filter from the cover, as shown in <a href="#">Figure 8-4</a> on page 8-7.
2	Clean Filter	The filter can be cleaned in sprinkling water, or it can be dusted with a vacuum cleaner. If the filter is metal, wash and/or vacuum. If the filter is fiber or plastic, vacuum or replace. Dry the filter.
3	Install Filter	Install the clean (and dry) filter. Refer to the <a href="#">Air Filter Installation Procedure</a> on page 8 - 7 for air filter installation instructions.


**NOTE:** For convenience (or if the air filter is excessively dirty), replacement filters are available. Refer to [Table 9-3](#) on page 9-7 for the air filter replacement part number.


## 10-5-5 Probe Maintenance

Refer to the Ultrasound System User Manual, the probe's User Manual/Probe Care Card, or Probe Addendum (p/n 5661328) for probe maintenance, checks, cleaning, and disinfecting instructions.

 **WARNING** *To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.*

 **CAUTION** Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty.  
DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe.  
Follow care instructions that came with the probe.

 **CAUTION** Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

 **CAUTION** Transesophageal and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.

**NOTE:** GE does not substantiate the effectiveness of recommended disinfectant products. Questions regarding efficacy, instructions for use, and proper handling should be directed to the disinfectant manufacturer. GE publishes a list of material-compatible disinfectants (see below and also refer to the GE website at [http://www3.gehealthcare.com/en/Products/Categories/Ultrasound/Ultrasound\\_Probes](http://www3.gehealthcare.com/en/Products/Categories/Ultrasound/Ultrasound_Probes). DO NOT use non-GE-approved disinfectants or products that have not been evaluated by GE for material compatibility. Damages linked to the use of disapproved chemicals are not covered under product warranty or service contract.)

**NOTE:** For details on general probe cleaning, refer to the information provided in the Vivid S60N/Vivid S70N User Manual.

**NOTE:** For specific probe cleaning instructions, refer to the individual probe Users Manual (or care card supplied with the probe).

## 10-5-6 Probe Related Checks

**Table 10-9 Probe Related 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.

### 10-5-7 Probe Handling

All Vivid S60N/Vivid S70N probes are designed and manufactured to provide trouble-free, reliable service. To ensure this, the correct handling of probes is important and the following points should be noted:

- Do not drop a probe or strike it against a hard surface, as this may damage the probe elements and the acoustic lens, or may crack the housing.
- Do not use a cracked or damaged probe. Any evidence of wear indicates the probe must *not* be used. Call your field service representative immediately for a replacement.
- Perform a visual check of the probe pins and system sockets before plugging in a probe
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled with, or to be caught in the wheels of the system.
- Protect the probe when moving the unit.
- Use a soft cloth and warm, soapy water to clean the probe.

**Note:** For detailed information on handling Endocavity probes, refer to the appropriate supplementary instructions for each probe.

### 10-5-8 Basic Probe Care

The *Vivid S60N/Vivid S70N User Manual* and the individual probe manufacturers' 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.

**NOTE:** The most recent, up-to-date information on probes and probe care is available at:  
<https://www.gehealthcare.com/en/products/ultrasound/ultrasound-transducers>



**WARNING** **ANY EVIDENCE OF WEAR ON A PROBE INDICATES THAT IT MUST NOT BE USED. IMPROPER HANDLING MAY EASILY DAMAGE ULTRASOUND PROBES.**

**SEE THE Vivid S60N/Vivid S70N USER MANUAL AND ALSO REFER TO THE PROBE MANUFACTURER'S HANDLING INSTRUCTIONS, 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.**

Always perform a visual check of the probe pins and system sockets before plugging in a probe.

When handling probes, always observe the precautions listed in [Probe Handling](#) on page 10 - 12.

The TEE and Interoperative probes often have special usage considerations; always refer to the individual probe manufacturers' handling instructions/user manual.

---

## 10-5-9 Returning and Shipping of Defective Probes



**WARNING** ***ALWAYS DISINFECT A DEFECTIVE PROBE BEFORE RETURNING IT TO THE MANUFACTURER. BE SURE TO TAG THE PROBE AS BEING DISINFECTED.***



**CAUTION** **TO HELP PROTECT YOURSELF FROM BLOOD-BORNE DISEASES WHEN CLEANING AND HANDLING PROBES, WEAR APPROVED, NON-ALLERGIC DISPOSABLE GLOVES.**

Equipment being returned must be properly clean and free of blood and other potentially infectious contaminants.

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 circumstances should a part or equipment be shipped before being visibly clean and properly disinfected.

The purpose of the regulation is to protect employees in the transportation industry, as well as the persons who will receive and/or open the 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.*

### 10-5-10 Phantoms

The use of a Phantom is not required during Care and Maintenance. Customer may use it as part of their Quality Assurance Program tests.

## Section 10-6 Electrical Safety Tests

### 10-6-1 Safety Test Overview

**DANGER**

TO AVOID ELECTRICAL SHOCK, THE ULTRASOUND SYSTEM UNDER TEST **MUST NOT** BE CONNECTED TO OTHER ELECTRICAL EQUIPMENT. REMOVE ALL INTERCONNECTING CABLES AND WIRES. THE ULTRASOUND SYSTEM UNDER TEST MUST NOT BE CONTACTED BY USERS OR PATIENTS WHILE PERFORMING THESE TESTS.

**WARNING**

To minimize risk of electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.

**WARNING**

Energy Control and Power Lockout for Vivid S60N/Vivid S70N.

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 mains cable from the wall outlet, then from 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**

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.

**CAUTION**

For all instructions in the "Electrical safety tests" section, in the event of using a UPS (uninterrupted power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.



## 10-6-1 Safety Test Overview (cont'd)

The electrical safety tests in this section are based on IEC60601 standard including national deviations for Health Care Facilities and IEC 62353 Medical electrical equipment - Recurrent test and test after repair of medical electrical equipment. These standards provide guidance on evaluating electrical safety of medical devices which are placed into service and are intended for use in normal Care and Maintenance or testing following service or repair activities. They differ somewhat from the standards that are used for design verification and manufacturing tests (e.g., IEC 60601-1 including national deviations) which require a controlled test environment and can place unnecessary stress on the Ultrasound system.

These tests may refer to specific safety analyzer equipment as an example. Always refer to the safety analyzer's user manual that will be used to perform the tests.

Prior to initiating any electrical test, the Ultrasound system must be visually inspected. Perform the following visual checks:

- Check for missing or loose enclosure covers that could allow access to internal live parts.
- Examine the mains cord, mains plug and appliance inlet for damaged insulation and adequacy of strain relief and cable clamps.
- Locate and examine all associated transducers. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.



**WARNING** *Users must ensure that safety inspections are performed whenever damage is suspected and on a regular basis in accordance with local authorities and facility procedures. DO NOT use the Ultrasound system or individual probes which fail any portion of the safety test.*



**CAUTION** For all instructions in this section in case of using a UPS (Uninterrupted Power Supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.



**WARNING** *To minimize the risk and avoid an electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.*



**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.



**CAUTION** 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.

## 10-6-2 Leakage Current Limits



### WARNING

Energy Control and Power Lockout for Vivid S60N/Vivid S70N.

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.

The following acceptance limits and test conditions are summarized from IEC 60601-1/A1:2012 (ed.3.1) including national deviations and IEC 62353:2014 (ed.2) and in some cases are lower than that specified by the standards.

Because the main source of leakage current is the mains supply, there are different acceptance limits depending on the configuration of the mains (100-130 Volt, 220-240 Volt, or 230-240 Volt mains)

**Table 10-10 Leakage Current Limits for Ultrasound System Operation on 100-130 Volt Mains (US/Canada/Japan)**

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit in mA	Limit in $\mu$ A
Earth Leakage	On and Off	N/A	0.3 <sup>(1)</sup>	300 <sup>(1)</sup>
Chassis/Enclosure Leakage	On and Off	Closed	0.1	100
		Open	0.3 <sup>(1)</sup>	300 <sup>(1)</sup>
Type BF Applied Parts	On (transmit)	Closed	0.1	100
		Open	0.5	500
Type CF Applied Parts	On (transmit)	Closed	0.01	10
		Open	0.05	50
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5	5000
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05	50
(1) UL 60601-1 standard				

**NOTE:** Open Grounding is also known as "Lift Ground".

**Table 10-11 Leakage Current Limits for Ultrasound System Operation on 220-240 Volt Mains**

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit in mA	Limit in μA
Earth Leakage	On and Off	N/A	0.3	300
Chassis/Enclosure Leakage	On and Off	Closed	0.1	100
		Open	0.5	500
Type BF Applied Parts	On (transmit)	Closed	0.1	100
		Open	0.5	500
Type CF Applied Parts	On (transmit)	Closed	0.01	10
		Open	0.05	50
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5	5000
Type CF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	0.05	50
Values based on IEC60601				





**Table 10-12 ISO and Mains Applied Limits<sup>a</sup>**

Probe Type	Measurement
BF	5.0 mA (5000 $\mu$ A)
CF	0.05 mA (50 $\mu$ A)

- a. ISO and 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 is in contact with mains voltage

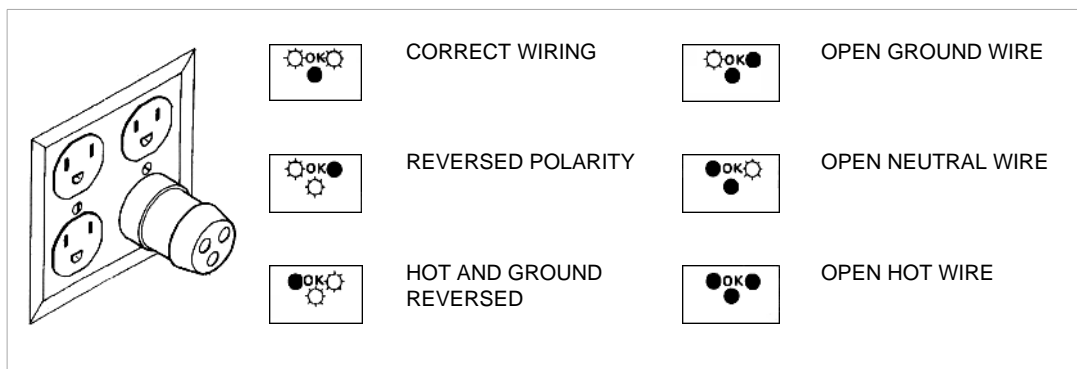
**NOTE:** *Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ES1 1993 or IEC 60601 or AS/NZS 3551, IEC62353 or other relevant national regulation.*

**Table 10-13 Equipment Type and Test Definitions**

Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For ultrasound equipment, this includes transducers, ECG leads and e-TRAX Needle Sensor.	
Type BF	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60417-5333, e.g. ultrasound probes which are marked with the 'man in box' BF symbol.	
Type BF Defib.-Proof	Type BF defibrillation proof Applied Part (man in the box with paddle) symbol is in accordance with IEC 60417-5334, e.g. ECG electrodes which are marked with the 'man in box with paddle' BF symbol.	
Type CF	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60417-5335, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so marked with the 'heart in box' CF symbol.	
Type CF Defib.-Proof	Type CF defibrillation proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60417-5336, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so marked with the 'heart in box with paddle' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required for Type BF and CF applied parts.	

**10-6-3 Outlet Test - Wiring Arrangement - USA and Canada**

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



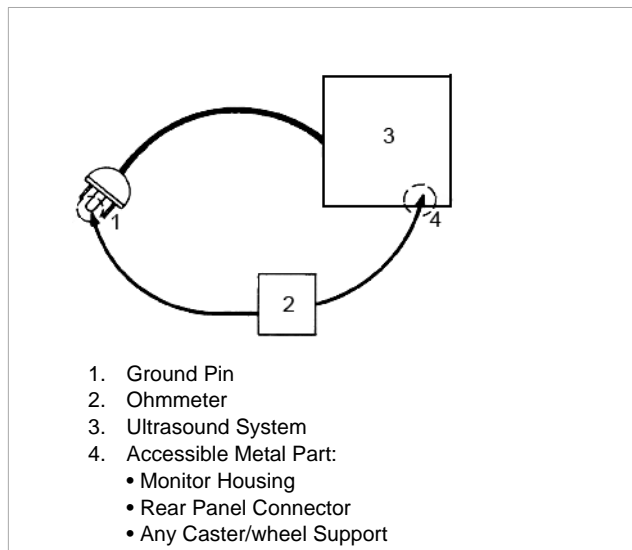
**Figure 10-1 Typical Alternate Outlet Test**

**NOTE:** No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

## 10-6-4 Grounding Continuity

**⚠ DANGER Electric Shock Hazard!**  
**The patient or operator MUST NOT come into contact with 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



**Figure 10-2 Ground Continuity Test**

**⚠ CAUTION Lacquer is an isolation barrier! Measure only on blank accessible metal parts.**

## 10-6-5 Chassis Leakage Current Test

**DANGER**

**Electric Shock Hazard.**

**When the Electrical Safety Analyzer's ground switch is OPEN, DO NOT touch the Ultrasound system!**

**CAUTION**

**Equipment damage possibility.**

**Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.**

### 10-6-5-1 Definition

This test, also known as Enclosure Leakage current test, measures the current that would flow through a grounded person who touches the accessible conductive parts of the equipment during normal and fault conditions.

The test verifies the isolation of the power line from the chassis.

The testing Electrical Safety Analyzer is connected to parts of the equipment, easily contacted by the user or patient.

Measurements should be made under the test conditions specified in:

- [Table 10-10](#) on page 10-16 or
- [Table 10-11](#) on page 10-17 as applicable.

Record the highest reading.

**10-6-5-2 Generic Procedure**

The test verifies the isolation of the power line from the chassis. The testing Electrical Safety Analyzer is connected from accessible metal parts of the case to ground. Measurements should be made under the test conditions specified in:

- [Table 10-10](#) on page 10-16  
or
- [Table 10-11](#) on page 10-17  
as applicable.

Record the highest reading of current.

- 1.) Connect Safety analyzer to wall AC power outlet.
- 2.) Plug the equipment under test power cable into the receptacle on the panel of the Electrical Safety Analyzer.
- 3.) Connect the Electrical Safety Analyzer to an accessible metal surface of the Vivid S60N/Vivid S70N ultrasound system using the cable provided with the Electrical Safety Analyzer.
- 4.) Select the "Chassis" or "Enclosure Leakage" function on the Electrical Safety Analyzer.
- 5.) Test opening and closing the ground with the Vivid S60N/Vivid S70N ultrasound system ON and OFF as indicated in [Table 10-10](#) on page 10-16 or [Table 10-11](#) on page 10-17 as applicable.

**NOTE:** *For more information, refer to the safety analyzer's user manual that will be used to perform the tests."*

The maximum allowable limit for chassis source leakage is shown in:

- [Table 10-10](#) on page 10-16  
or
- [Table 10-11](#) on page 10-17  
as Chassis/Enclosure Leakage.



**10-6-5-3 Data Sheet for Enclosure/Chassis Leakage Current**

Table 10-14 shows a typical format for recording the enclosure/chassis leakage current.

Measurements should be recorded from multiple locations for each set of test conditions.

The actual location of the test probe may vary by Ultrasound system.

Record all data in the Electrical safety tests log.

**NOTE:** *Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353:2007 and IEC 60601-1:2005.*

**Table 10-14 Typical Data Format for Recording Enclosure/Chassis Leakage**

Unit under test_____			Date of test:_____		
Test Conditions		Measurement/Test Point Location			
System Power	Grounding/ PE	Potential equilibrium connector / Rear Panel	Lower Frame	Probe Connector	Main Handle
off	closed				
off	open				
on	closed				
on	open				

**NOTE:** *Values in italics font are given as examples only.*

## 10-6-6 Isolated Patient Lead (Source) Leakage – Lead-to-Ground

**CAUTION**

Equipment damage possibility.

Never switch the Polarity when the Ultrasound system is powered ON.

Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.

### 10-6-6-1 Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The Electrical Safety Analyzer simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the Ultrasound system on and off (per IEC 62353).

For each combination, the operating controls, such as the lead switch, should be operated to find the worst-case condition.

### 10-6-6-2 Generic Procedure

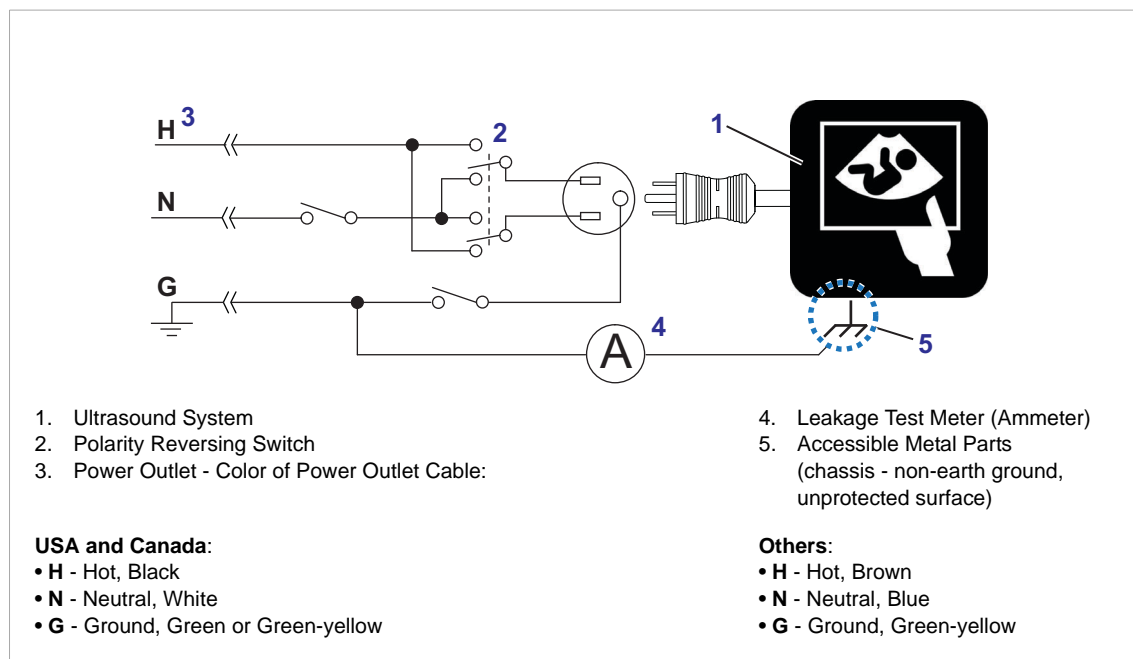
- 1) Connect Safety analyzer to wall AC power outlet.
- 2) Plug the equipment under test power cable into the receptacle on the panel of the Electrical Safety Analyzer.
- 3) Connect the ECG cable to the Vivid S60N/Vivid S70N ultrasound system and the Patient leads to the analyzer.
- 4) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 5) Test opening and closing the ground with the Ultrasound system on and off.

**NOTE:** Refer to the safety analyzer's user manual that will be used to perform the tests.

Measurements should be made under the test conditions specified in:

- [Table 10-10](#) on page 10-16  
or
- [Table 10-11](#) on page 10-17  
as applicable.

For each combination, the operating controls (such as the lead switch) should be operated to find the worst-case condition.



**Figure 10-3 Set Up for Test of Earth Leakage Current, IEC60606-1 Clause 8.7**

## 10-6-7 Isolated Patient Lead (Source) Leakage – Lead-to-Lead

When using any calibrated Electrical Safety Analyzer tool compliant with AAMI/ES1 1993 or IEC 60601 or AS/NZS 3551, switch the Electrical Safety Analyzer's function selector to the LEAD-LEAD position (or equivalent function in the device).

Select and test each of the ECG lead positions (except ALL) on the LEAD selector, testing each to the power and ground condition combinations found in:

- [Table 10-10](#) on page 10-16  
or
- [Table 10-11](#) on page 10-17  
as applicable.

Record the highest leakage current measured.

**NOTE:** *This test is also known as the Patient Auxiliary Current test.*

### 10-6-7-1 Lead-to-Lead Leakage Test Record

[Table 10-15](#) below shows a typical format for recording the patient lead-to-lead leakage current.

Measurements should be recorded from each lead combination under each set of test conditions specified in:

- [Table 10-10](#) on page 10-16  
or
- [Table 10-11](#) on page 10-17  
as applicable.

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1) Connect Safety analyzer to wall AC power outlet.
- 2) Plug the equipment under the test power cable into the receptacle on the Electrical Safety Analyzer's panel.
- 3) Connect the ECG cable to the ultrasound system and the Patient leads to the analyzer.
- 4) Select the Patient lead leakage function on the Electrical Safety Analyzer.
- 5) Test opening and closing the ground with the Ultrasound system on and off.

**NOTE:** *Refer to the safety analyzer's user manual that will be used to perform the tests.*

Keep a record of the results with other hard copies of maintenance data using [Table 10-15](#).

**10-6-7-1 Lead-to-Lead Leakage Test Record** (cont'd)


**NOTE:** *Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353:2007 and IEC 60601-1:2005.*

**Table 10-15 Typical Data Format for Recording Patient Lead-to-Lead Leakage**

Unit under test _____		Date of test: _____		
Test Conditions		Patient Lead or Combination Measured		
System Power	Grounding/PE	RA to LA	LA to LL	LL to RA
Off	open			
Off	closed			
On (Transmit)	open			
On Transmit)	closed			

## 10-6-8 Isolated Patient Lead (Sink) Leakage - Isolation Test

Select the Individual Leads as well as All Lead position since the test is performed with mains applied to all ECG leads at the same time.

 **CAUTION** Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the Ultrasound system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.

### 10-6-8-0-1 Isolated lead (sink) leakage test record

Table 10-17 on page 10-28 shows a typical format for recording the isolated patient lead sink leakage current.

Measurements should be recorded for full lead combination under each set of test conditions specified in:

- Table 10-12 on page 10-18

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1.) Connect the Safety analyzer to a wall AC power outlet.
- 2.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
- 3.) Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
- 4.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 5.) Test with closed ground with the Ultrasound system on and off.

**NOTE:** Refer to the electrical safety analyzer's user manual that will be used to perform the tests.

Keep a record of the results with other hard copies of maintenance data using Table 10-17 on page 10-28.

**NOTE:** Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353:2007 and IEC 60601-1:2005.

**Table 10-16 Typical data format for recording isolated patient lead (sink) leakage**

Unit under test _____		Date of test: _____
Test Conditions		Patient Lead
System Power	Grounding/PE	RA+LA+LL
On	closed	
Off	closed	

**Table 10-17 Typical data format for recording isolated patient lead (sink) leakage**

Unit under test _____			Date of test: _____
Test Conditions			Patient Lead
System Power	Grounding/PE	Limit $\mu$ A	RA+LA+LL
On	closed	50	
Off	closed	50	
On	closed (reversed polarity)	50	
Off	closed (reversed polarity)	50	

## 10-6-9 Probe (Source) Leakage Current Test



**WARNING** *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.*

### 10-6-9-1 Definition

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

**NOTE:** *Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.*

### 10-6-9-2 Generic Procedure on Probe Leakage Current

The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the Ultrasound system and active. This method measures the actual leakage current resulting from the transducer RF drive.

Measurements should be made under the test conditions specified in:

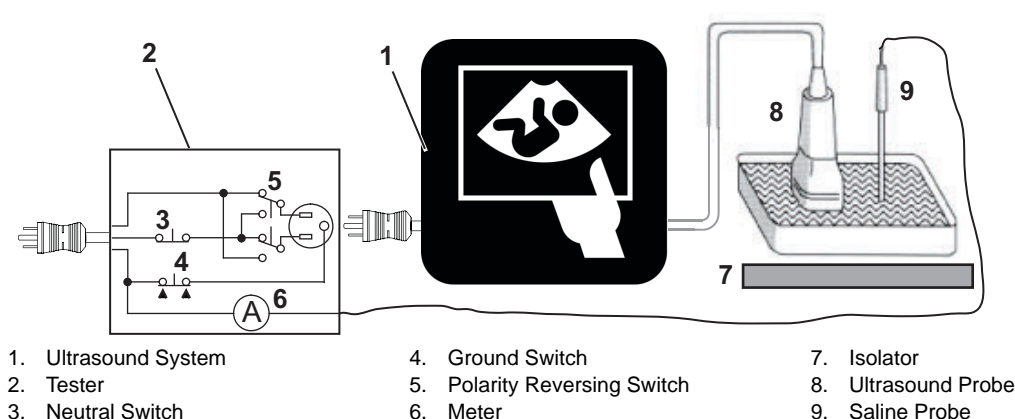
- [Table 10-10](#) on page 10-16 or
- [Table 10-11](#) on page 10-17 as applicable for every probe.

For each combination, the probe must be active to find the worst case condition.

Record all data and keep the record of the results with other hard copies of maintenance data.

**NOTE:** *Saline water pod should be insulated from floor and earth ground.*

**NOTE:** *The Saline solution is a mixture of water and salt. The salt adds free ions to the water, making it conductive. Normal saline solution is 0.9% salt and 99.1% water. If ready-mixed saline solution is not available, a mixture of 1 quart or 1 liter water with 9 or more grams of table salt, mixed thoroughly, will substitute.*



**Figure 10-4 Set Up for Probe Leakage Current**

**NOTE:** Follow manufacturer's recommendations for handling saline solution. Refer to their Material Safety Data Sheet (MSDS) for more information.



**Figure 10-5 Test Set Up with Electrical Safety Analyzer**

This test is also known as Patient Leakage Current.

- 1) Turn the Vivid S60N/Vivid S70N **OFF**:
- 2) Connect the Safety analyzer to wall AC power outlet.
- 3) Set the Safety analyzer's function switch to "Chassis" or "Enclosure Leakage".
- 4) Plug the Vivid S60N/Vivid S70N's power cord into the test Electrical Safety Analyzer.
- 5) Plug the Chassis Ground Probe (saline probe) into the test Electrical Safety Analyzer's "CHASSIS" connector.

**CAUTION** To avoid probe damage and possible electric shock, do not immerse probes into any liquid beyond the level indicated in the probe user's manual.  
**Do not touch the probe, conductive liquid or any part of the Ultrasound system under test while doing the test.**

**CAUTION** Equipment damage possibility.  
**Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.**

- 6) Connect the Ultrasound Probe to the Vivid S60N/Vivid S70N.
- 7) Immerse the Saline Probe in the Saline Solution.
- 8) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.
- 9) Test opening and closing the ground with the scanner on and off.
  - a.) Power ON the ultrasound system.
  - b.) After the ultrasound system has completed the boot process, select the probe to be tested so



it is the active probe.

- c.) Depress the LIFT GROUND rocker switch and record the highest current reading.
- d.) Follow the test conditions and test limits described in [Table 10-10](#) on page 10-16, or [Table 10-11](#) on page 10-17, as applicable for every probe.

10.) Record the highest current reading.

The test passes when all readings measure less than the stated limits.

The actual location of the test probe may vary by Ultrasound system. Measurements should be recorded for each probe under the set of test conditions.

Record all data and keep the record of the results with other hard copies of maintenance data.

**NOTE:** *Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353:2007 and IEC 60601-1:2005.*


**Table 10-18 Typical Data Format for Recording Probe (Source) Leakage**

Unit under test_____		Date of test:_____			
Test Conditions		Probe as measured in saline bath			
System Power	Grounding /PE	<i>4C</i>	<i>i12L</i>	<i>TS</i>	<i>E8C</i>
off	closed				
off	open				
on	closed				
on	open				

**NOTE:** *Values in italics font are given as examples only.*

## 10-6-10 Isolated Probe (Sink) Leakage-Isolation Test

 **WARNING** *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.*

 **CAUTION** Line voltage is applied to the ultrasound probe during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.

Measurements should be recorded for probes and transducers under each set of test conditions specified in:

- Table 10-12 on page 10-18

Record all data and keep the record of the results with other hard copies of maintenance data.

- 1.) Connect the Safety analyzer to an AC wall outlet.
- 2.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
- 3.) Connect the Ultrasound probe to be tested to the Ultrasound system.
- 4.) Immerse the saline probe in the saline solution.
- 5.) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.
- 6.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
- 7.) Test with closed ground with the Ultrasound system on and off.

**NOTE:** *For more information, refer to the safety analyzer's user manual.*

Record all data and keep the record of the result with other hard copies of maintenance data.

**NOTE:** *Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC 62353:2007 and IEC 60601-1:2005.*

**Table 10-19 Typical Data Format for Recording Probe (Source) Leakage**

Unit under test _____		Date of test: _____			
Test Conditions		Probe as measured in saline bath			
System Power	Grounding /PE	4C	i12L	TS	E8C
off	closed				
on	closed				

**NOTE:** *Probe names in italics font are given as examples only.*

**Table 10-20 Typical Data Format for Recording Probe (Source) Leakage**

Unit under test_____			Date of test:_____			
Test Conditions			Probe as measured in saline bath			
System Power	Grounding /PE	Limit $\mu$ A	4C	i12L	TS	E8C
off	closed					
on	closed					
off	open					
on	open					

**10-6-10-1 Mains On Applied Part**

**NOTE:** *Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.*

Mains on applied part is one of the described leakage current tests applicable for probes (Ref: IEC60601-1). This is to be performed with the probe disconnected from the Ultrasound system. Apply mains voltage over the insulation barrier. (Between protective earth on the probe connector, and an electrical anode in saline solution. The patient applied part of the probe is immersed into the saline solution.) Measure current flowing in the circuit. = leakage current.

As a minimum, tests according to IEC60601-1 must be performed once a year. The requirements for Body Floating (BF) have to be applied for TEE and Trans thorax probes bearing the symbol for safety class BF.

The symbol for BF is indicated on the probe connector label below:



**Figure 10-6 GE Probe Connector Label - Example**

Where applicable, a typical test setup of non-TEE Probes can be as illustrated in: [Figure 10-4](#) on page 10-29.

A typical test setup for TEE probes could be as indicated in [Figure 10-7](#) (on the next page).

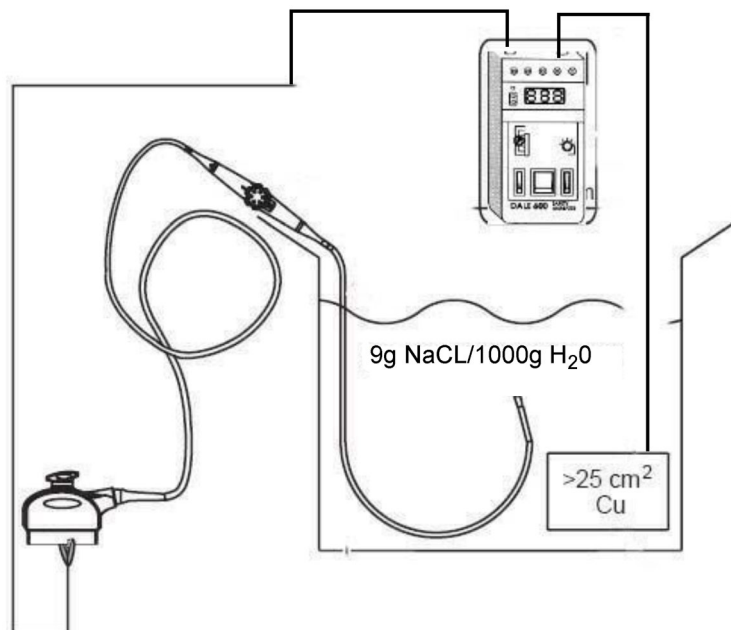


Figure 10-7 TEE Probe Leakage Isolation (Sink) Current Test



**WARNING**

The handle of the TEE probes must not be immersed. For immersion levels, please refer to the User Manual.

**NOTE:** Where applicable, a typical test setup of non-TEE Probes can be as illustrated in: [Table 10-4](#) on page 10-29.

The test passes when the reading measure less than the values in:

- [Table 10-12](#) on page 10-18.

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