Technical Publication

VIVID™ S60 AND VIVID™ S70

Vivid™ S60/S70 Basic Service Manual

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Important Precautions

TRANSLATION POLICY

WARNING

English (EN)

This Service Manual is available in English only.

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

AVERTISSEMENT

Français (FR)

Ce manuel de maintenance est disponible en anglais uniquement.

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

ADVERTENCIA

Español (ES)

Este Manual de servicio está disponible en idioma inglés únicamente.

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

WARNUNG

Deutsch (DE)

Dieses Wartungshandbuch ist nur auf Englisch verfügbar.

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

AVVERTENZA

italiano (IT)

Il presente Manuale di assistenza è disponibile solo in inglese.

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

WAARSCHUWING

Nederlands (NL)

Deze servicehandleiding is alleen beschikbaar in het Engels.

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

ADVERTÊNCIA

Português
(PT-BR)

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

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

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。

日本語
(JA)

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

警告

简体中文
(ZH-CN)

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

VARNING

Svenska
(SV)

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

警告

繁體中文
(ZH-TW)

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

경고

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.

한국어

(KO)

ПРЕДУПРЕЖДЕНИЕ

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

На русском языке

(RU)

OSTRZEŻENIE

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

Polski

(PL)

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά
(EL)

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

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

FIGYELMEZTETÉS

Magyar
(HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

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

VAROVANIE

Slovenčina
(SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

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

VÝSTRAHA

česky

(CZ)

Tato servisní příručka je k dispozici pouze v angličtině.

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

UYARI

Türkçe

(TK)

Servis Kılavuzu yalnızca İngilizce olarak mevcuttur.

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

ADVARSEL

Dansk

(DA)

Denne servicemanual fås kun på engelsk.

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

ADVARSEL

Norsk (NO)

Denne servicehåndboken er bare tilgjengelig på engelsk.

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

VAKAVA VAROITUS

Suomi (FI)

Tämä huolto-opas on saatavana vain englanniksi.

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

ПРЕДУПРЕЖДЕНИЕ

Български (BG)

Настоящото Сервизно ръководство се предлага само на английски език.

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

AVERTISMENT

Română

(RO)

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

UPOZORENJE

Hrvatski

(HR)

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

ĮSPĖJIMAS

Lietuvių k.

(LT)

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

BRĪDINĀJUMS

Latviski

(LV)

Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.

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

UPOZORENJE

Srpski

(SR)

Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.

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

AVISO

Português (Portugal)

(PT-PT)

Este manual de assistência está disponível apenas em inglês.

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

ПОПЕРЕДЖЕННЯ

Українська (UK)

Цей посібник із технічного обслуговування доступний лише англійською мовою.

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

PERINGATAN

Bahasa Indonesia (ID)

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

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

คำเตือน

ไทย (TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

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

CẢNH BÁO

Tiếng Việt (VI)

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

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

ЕСКЕРТУ

Қазақ тілінде (KK)

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

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

BABALA

Tagalog (TL)

Available lamang sa Ingles ang Manwal ng Serbisyong ito.

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

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write "Damage In Shipment" on ALL copies of the freight or express bill BEFORE delivery is accepted or "signed for" by a GE representative or hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14-day period.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT - FOR USA ONLY

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

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

OMISSIONS & ERRORS

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

Mail the information to:

Service Documentation,

GE Vingmed Ultrasound AS
P.O.Box: 141
3191 HORTEN
NORWAY

GE employees should use Post-Market Quality Management (PQM) to report service documentation issues.

SERVICE SAFETY CONSIDERATIONS

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

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

For a complete review of all safety requirements, see the Chapter 1 Safety Considerations section in the Service Manual.

LEGAL NOTES

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Revision History

Revision	Date	Reason for change
1	21. AUG. 2017	Initial release of Basic Service Manual for software v202

List of Effected Pages (LOEP)

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	1	4-1 to 4-42	1	10-1 to 10-30	1
Important Precautions -i to -xvi	1	5-1 to 5-30	1	Back Cover	N/A
TOC	1	6-1 to 6-2	1		
1-1 to 1-30	1	7-1 to 7-8	1		
2-1 to 2-16	1	8-1 to 8-242	1		
3-1 to 3-58	1	9-1 to 9-28	1		

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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™ S60/Vivid™ S70 ultrasound scanner. The service provider must read and understand all the information presented here before installing or servicing a unit.

1-1-2   Contents in this Chapter

Section 1-2
Service Manual Overview

This manual provides setup and service information for the Vivid™ S60/Vivid™ S70 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
Chapter 1	Introduction	Contains a content summary and warnings.
Chapter 2	Site Preparations	Contains pre-setup requirements for the Vivid™ S60/Vivid™ S70 ultrasound scanner.
Chapter 3	System Setup	Contains setup procedure with an setup checklist.
Chapter 4	General Procedures and Functional Checks	Contains functional checks that must be performed as part of the setup, or as required during servicing and periodic maintenance.
Chapter 5	Components and Function (Theory)	Contains block diagrams and functional explanations of the electronic circuits.
Chapter 6	Service Adjustments	Contains instructions on how to make any available service adjustments to the Vivid™ S60/Vivid™ S70 ultrasound scanner.
Chapter 7	Diagnostics/Troubleshooting	Provides instructions for setting up and running diagnostic, troubleshooting and other related routines for the Vivid™ S60/Vivid™ S70 ultrasound scanner.
Chapter 8	Replacement Procedures	Provides removal and installation procedures for replacement of all Field Replaceable Units (FRUs).
Chapter 9	Renewal Parts	Contains a complete list of field replaceable parts for the Vivid™ S60/Vivid™ S70 ultrasound scanner.
Chapter 10	Care and Maintenance	Provides periodic maintenance procedures for the Vivid™ S60/Vivid™ S70 ultrasound scanner.

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

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™ S60/Vivid™ S70 Models Covered in this Manual

This manual covers the Vivid™ S60/Vivid™ S70 models below, updated to software v202:

Table 1-2 Vivid™ S60/Vivid™ S70 Models

PSI Group	Cat No.	Description	PSI Code	GP Code	Kisyu Code	Traced by Siebel
Vivid™ S70	H45041SW	Vivid™ S70 ultrasound imaging scanner	UVS70A	23908A	ES70	Yes
Vivid™ S60	H45041SU	Vivid™ S60 ultrasound imaging scanner	UVS60A	23909A	ES60	Yes

1-2-4   Product Description

1-2-4-1   Overview of the Vivid™ S60/Vivid™ S70 Ultrasound Scanner

The Vivid™ S60/Vivid™ S70 is a compact, phased, linear array ultrasound imaging scanner. Weighing only 75 Kgs (165 lbs), 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70.

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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound units listed in *Vivid™ S60/Vivid™ S70 Models Covered in this Manual* on page 1-3.

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**
		OR

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

NOTE: *The Vivid™ S60/Vivid™ S70 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
		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™ S60/Vivid™ S70 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™ S60/VIVID™ S70 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™ S60/VIVID™ S70 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™ S60/VIVID™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/VIVID™ S70 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™ S60/VIVID™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/VIVID™ S70SCANNER 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™ S60/Vivid™ S70 ultrasound unit 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™ S60/Vivid™ S70 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 IEC60601-1-1, UNLESS THE DEVICES, ACCORDING TO IEC60601-1-1, 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 UL60601-1 and IEC60601-1-1 standards for electrical leakage.*

- **Patient Vicinity UL 60601-1**

  Sub clause 2.12.20DV - D2 Addition

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

- **Patient Environment IEC 60601-1-1**

  Sub clause 2.204

  Such an area is an environment in which medical diagnosis, monitoring or treatment is carried out. It is very difficult to attach unique dimensions to the PATIENT ENVIRONMENT. In practice a distance of 2,5 m (8.2 ft.) above the floor on which the medical personnel stand and a horizontal distance of 1,5 m (4.9 ft.) have justified themselves as indicative of the dimensions of the Patient Environment. The patient environment/vicinity is depicted as a dashed line in this procedure - see the example in Figure 1-1.
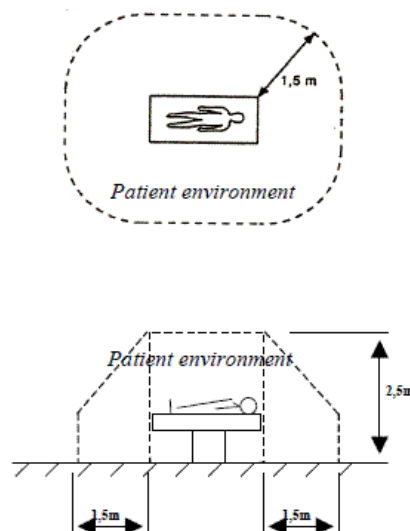
Figure 1-1   Patient Safety Environment

- **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 1-2 have been justified in practice.
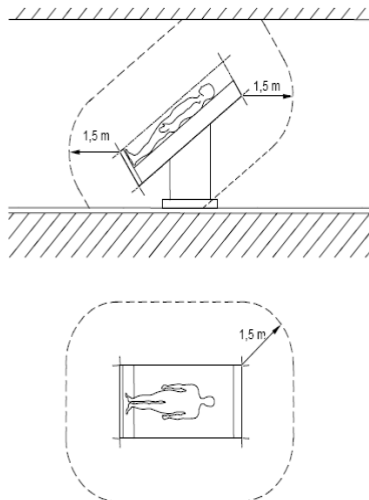
IEC 2431/05

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

Figure 1-2   Example of Patient Environment

1-4-5   Vivid™ S60/Vivid™ S70 Battery Safety (part of P/S)

NOTE: *The Vivid™ S60/Vivid™ S70 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™ S60/ VIVID™ S70 ULTRASOUND SCANNER**

⚠ **WARNING** *The Vivid™ S60/Vivid™ S70 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™ S60/VIVID™ S70 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.

⚠ NOTICE [TAG & LOCKOUT]	ENERGY CONTROL AND POWER LOCKOUT FOR VIVID™ S60/VIVID™ S70. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS: 1.) TURN OFF THE BREAKER. 2.) UNPLUG THE SYSTEM. 3.) MAINTAIN CONTROL OF THE SYSTEM POWER PLUG. 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. 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.

Section 1-7
Product Labels and Icons

The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound unit. For an explanation of label icons and symbols, refer to Table 1-7 on page 1-20.*

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 unit's basic power compliance.

Table 1-5   Rating Label   1 of 2

Item #	Description	Illustration
1.	Rating Label - Vivid™ S60 (100-240V) International (with UDI code and new address)	
2.	Rating Label - Vivid™ S60 (100-240V) International	

Table 1-5   Rating Label (Continued) 2 of 2

Item #	Description	Illustration
3.	Rating Label - Vivid™ S70 (100-240V) International (with UDI code and new address)	
4.	Rating Label - Vivid™ S70 (100-240V) International	

1-7-1-2   General Label

A General Label (Table 1-6) provides details regarding regulatory compliance - as well as warnings and cautions.

Table 1-6   General Label

Item #	Description	Illustration
1.	General Label - International (with new address)	
2.	General Label - International (with EAC, GOST and TÜV SÜD mark)	
3.	General Label - International	

1-7-2   Label Descriptions

The following table shows the labels and symbols that may be found on the Vivid™ S60/Vivid™ S70 ultrasound unit, and provides a description of each label's purpose and location.

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

Label Name	Description	Location
Identification and Rating Plate	Manufacturer's name and address. Date of Manufacture. Model and Serial numbers. Electrical ratings (Volts, Amps, phase, and frequency.	Rear of the system.
	On/Off button **Warning: system shutdown using the On/ Off button does not disconnect the ultrasound unit from mains voltage.** For disconnecting the ultrasound unit from mains voltage after system shutdown, please set the circuit breaker close to the mains inlet to OFF, see: Figure 4-4 on page 4-5.	Control panel
	Equipment Type BF (man in the box symbol), 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. IEC 878-02-03 indicates B Type equipment having a floating applied part.	Rear of the system. Probes.
	Indicates defibrillation-proof Type CF equipment	Above the ECG inlet, ECG connector and surgical probes.
	CE certification mark	Rear of the system.
	Indicates the Vivid™ S60/Vivid™ S70 is a UL-approved system (InMetro Brazil).	Rear of the system.
	TUV Rheinland of North America, Inc. TUV SÜD Classification Lable	Rear of the system (Identification plate)
	This product passed all conformity assessment (approval) procedures that correspond to the requirements of applicable technical regulations of the Customs Union.	Rear of the system.

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

Label Name	Description	Location
	GOST-R Mark: per Law of the Russian Federation No. 184-FZ.	Rear of system.
	Non-ionizing electromagnetic radiation.	Rear of system.
	Alternating current	Various
	Protective earth (ground)	Internal
	Equipotentiality: Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Peripherals.
	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.
	Symbol indicating that the Instructions for Use are supplied in electronic form.	Rear of the system.
	CAUTION - General (is intended to alert the user to refer to the User Manual or other instructions when complete information cannot be provided on the label).	Label on the rear of the system. Also used near the peripherals output power connector.
	CAUTION - Dangerous voltage: (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Various.
	CAUTION - Do not push the unit sideways when the caster wheel brakes are in the locked position. Instability may occur.	Top console (both sides).

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

Label Name	Description	Location
	DO NOT place objects on the surface of the rear of the LCD Panel while folded.	Display rear panel. Rear of the unit (identification plate).
	Waste Electrical and Electronic Equipment (WEEE) Disposal This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of 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.	On the rear of the system.
	Date of manufacture.	Rear of the system.
	Manufacturer's name.	Rear of the system.
REF	Model number.	Rear of the system.
SN	Serial number.	Rear of the system.
UDI	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 the system.
Assembled in XXXXX (XXXXX represents the country name)	Identify the Customs Country of Origin of the materials.	Rear of system.
$\text{R}_\text{X}\,\text{only}$	For USA only: **Caution: Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.**	Rear of the system.
75 kg	Indicates weight of the Vivid™ S60/Vivid™ S70 ultrasound scanner.	Rear of the system.
	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.	Display rear panel.

1-7-3   Vivid™ S60/Vivid™ S70 External Labels

In addition to the labels described in the previous section, an additional label may be found on the Vivid™ S60/Vivid™ S70 ultrasound unit, as described in the following section.

1-7-3-1   GND Label

Indicates the protective earth (grounding) terminal. The GND label (Figure 1-3 below) is located at the rear of the system.

Figure 1-3   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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 and a regular backup is highly recommended.

If the Vivid™ S60/Vivid™ S70 is sent for repair, ensure that any patient information is backed up and erased from the Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/VIVID™ S70 AS REPLACEMENT PARTS FOR INTERNAL COMPONENTS, MAY RESULT IN INCREASED EMISSIONS OR DECREASED IMMUNITY OF THE VIVID™ S60/VIVID™ S70.*

⚠ **WARNING** *THE VIVID™ S60/VIVID™ S70 SHOULD NOT BE USED ADJACENT TO OR STACKED WITH OTHER EQUIPMENT AND THAT IF ADJACENT OR STACKED USE IS NECESSARY, THE VIVID™ S60/VIVID™ S70 SHOULD BE OBSERVED TO VERIFY NORMAL OPERATION IN THE CONFIGURATION IN WHICH IT WILL BE USED.*

1-9-2   CE Compliance

The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 User Manual.*

NOTE: *For EMC Guidance and Manufacturer's Declarations, refer to the tables provided in Electrostatic Discharge (ESD) Prevention on page 1 - 26.*

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™ S60/VIVID™ S70, 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™ S60/Vivid™ S70 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 reproduceable?
- Imaging mode, probe, preset/application.
- Media brand, speed, capacity, type.

NOTE: Save secondary image capture, cine loop, 4D multi-volume loop. *Restart the application before resuming clinical scanning.*

See also:

- Phone Numbers for Customer Assistance on page 1 - 28
- Phone and Fax Numbers for Manufacturer on page 1 - 29

1-10-1-1   Phone Numbers for Customer Assistance

Table 1-8   Phone Numbers for Customer Assistance

LOCATION	PHONE NUMBER	
USA GE Ultrasound Service Engineering 9900 Innovation Drive Wauwatosa, WI 53226	**USCAN** Service: On-site Service Parts OLC Application Support	1-800-437-1171 1-800-558-2040 1-800-321-7937 or 1-262-524-5300 1-800-682-5327 or 1-262-524-5698
Canada	**OLC - USCAN**	1-800-321-7937 1-800-668-0732
Latin America	**LATAM** Service Application Support	+1-262-524-5300 +1-262-524-5698
EMEA Ultrasound Europe GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	**OLC - EMEA** Support Phone Support Fax	+49 (0)212 2802 - 652 +49 (0)212 2802 - 431
APAC	**Online Services Ultrasound Asia** ANZ Service Support Australia Japan Korea Singapore	1800 647 855 +(61) 1-800-659-465 +(81) 42-846-9008 +(82) 1544-6119 +(65) 6277-3444
China	Phone	+(86) 800-810-8188 +(86) 400-812-8188 +(86) 10-6788-2652
India Wipro GE Healthcare Pvt. Ltd. 4, Kadugodi Industrial Area Bangalore - 560 067 India	Phone	+(91) 1-800-425-8025 +(91) 1-800-425-7255 +(91) 1-800-102-7750

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 Medical Systems, Israel Ltd. Nativ Ha'or Street no. 1 3508510 Haifa ISRAEL	+972-4-8519555	+972-4-8519500

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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™ S60 or Vivid™ S70 ultrasound unit. 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.

Section 2-2
Console Requirements

2-2-1 Unit Environmental Requirements

Table 2-1 Environmental Requirements

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 — 70%	700 — 1060 hPa
Transport	-20 — +60°C (-4 — 140°F))	10 — 70%	700— 1060 hPa

NOTE: *The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound unit 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™ S60/Vivid™ S70 ultrasound unit; 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™ S60/Vivid™ S70 Power Requirements

Electrical specifications for the Vivid™ S60/Vivid™ S70 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.

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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound scanner is fully compliant with the following standard: EN/IEC 60501-1-2 sections 36.202.1j, 7a(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™ S60/Vivid™ S70 ultrasound unit 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 2-3   EMI Prevention/ Abatement

EMI Rule	Details
Ground the unit.	Poor grounding is the most likely reason an ultrasound unit 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 2-4   Probe Operation and Storage Temperatures

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

Note: System and electronic probes are designed for storage temperatures of -20° to +50° 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 2-5 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 unit.

- 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 unit.

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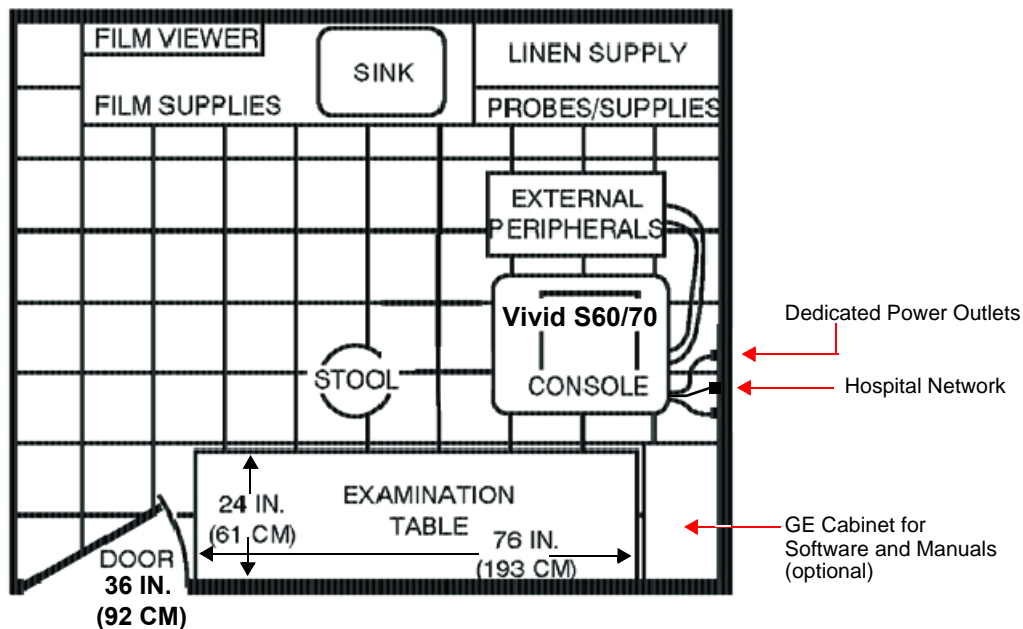
Figure 2-1   Recommended Floor Plan 4.3m x 5.2m (14 ft x 17 ft)

2-3-3-2   Minimal Floor Plan Suggestion

1.   Sink   4.   Ethernet Connector   8.   GE cabinet for software and
2.   Linens   5.   Power outlet   manuals (optional)
3.   Probes / supplies   6.   Stool   9.   Examination table
                             7.   Ultrasound system   10. Door (76 cm)
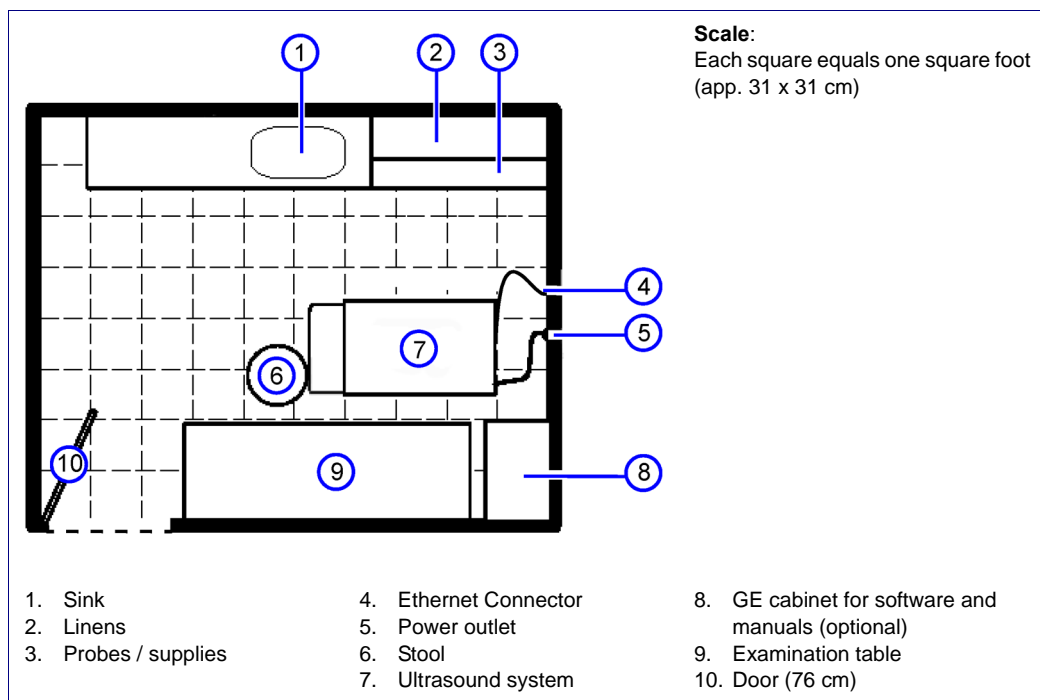
Figure 2-2   Minimal Floor Plan - 2.5 m x 3 m (8 x 10 ft)

2-3-3-3   Recommended Floor Plan Suggestion

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

1. Secretaries or Doctors Desk
2. File Cabinet
3. Film Viewer
4. Counter Top
5. Counter Top and Sink with hot and cold water
6. Overhead Lights Dimmer - Dual Level Lighting (bright and dim)
7. Emergency Oxygen

8. Suction Line
9. Ultrasound system
10. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
11. Network Interface
12. 457 mm (18 inches) distance of Ultrasound system from wall or objects
13. Stool

14. Footswitch
15. Storage for Linens and Equipment
16. Examination Table – 1930 x 610 mm (76 x 24 inches)
17. Lavatory and Dressing Room
18. Door – at least 762 mm (30 inches)

Figure 2-3   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

1. EchoPAC workstation parts   4. 3x mains power outlets   7. Ethernet network wall outlet
2. UPS   5. Hot and Cold water
3. Ethernet network wall outlet 6. Dedicated mains power
                                      outlet
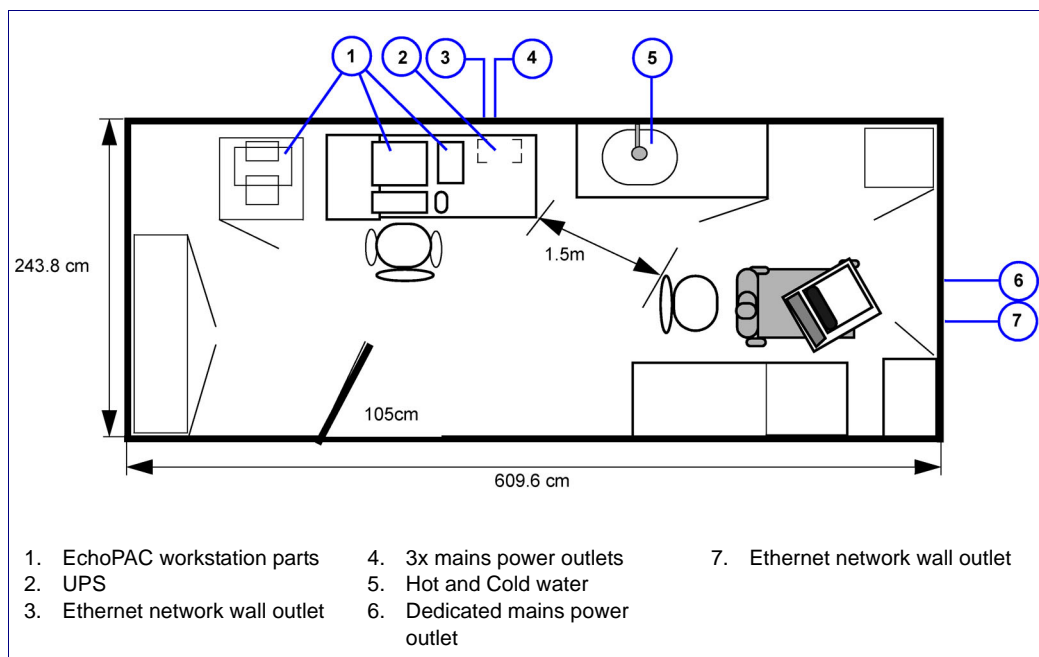
Figure 2-4   Suggested Floor Plan with Workstation and Ultrasound System in Same Room

2-3-4   Networking Pre-Installation Requirements

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

None.

2-3-4-2   Unit Connected to Hospital's Network

Supported networks:

- Wireless LAN
- 10/100/1000 Mbit Ethernet

2-3-4-3   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.

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

To configure the Vivid™ S60/Vivid™ S70 ultrasound unit 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™ S60/Vivid™ S70 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

Site System Information

Site:

Dept:

Floor:

Room:

Comments:

Vivid™ S60/
Vivid™ S70
SN:

Type:

REV:

CONTACT INFORMATION

Name	Title	Phone	E-Mail Address

TCP/IP Settings

Scanner IP Settings

Name - AE Title:

IP Address:

Subnet Mask:

Default Gateway:

Remote Archive Setup
(Echo Server/GEMNet Server/EchoPac PC)

Name - AE Title:

IP Address:

Subnet Mask:

Default Gateway:

Server Name:

Remote DB User Name:

Services (Destination Devices)

	Device Type	Manufacturer	Name	IP Address	Port	AE Title
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Figure 2-5   Connectivity Installation Worksheet

Vivid™ S60/Vivid™ S70

Host Name [   ]   Local Port [   ]   IP Address [   ] . [   ] . [   ] . [   ]

AE Title [   ]   Net Mask [   ] . [   ] . [   ] . [   ]

ROUTING INFORMATION

Destination
IP Addresses   **GATEWAY IP Addresses**

Default [   ] . [   ] . [   ] . [   ]

ROUTER1 [   ] . [   ] . [   ] . [   ]   [   ] . [   ] . [   ] . [   ]
ROUTER2 [   ] . [   ] . [   ] . [   ]   [   ] . [   ] . [   ] . [   ]
ROUTER3 [   ] . [   ] . [   ] . [   ]   [   ] . [   ] . [   ] . [   ]

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 2-5   Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound unit. 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.

Section 3-2
Setup Reminders

3-2-1   Average Setup Time

The Vivid™ S60/Vivid™ S70 setup and functional checkout will take approximately one hour; Vivid™ S60/Vivid™ S70 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	

3-2-2   Setup Warnings

1.) The Vivid™ S60/Vivid™ S70 ultrasound scanner weighs 75 Kgs (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 3-7.

3-2-2-1   System Acclimation Time

Following transport, the Vivid™ S60/Vivid™ S70 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^{o}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™ S60/Vivid™ S70 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 (35LB.) 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™ S60/ Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 ultrasound unit.

The Vivid™ S60/Vivid™ S70 ultrasound unit, 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™ S60/Vivid™ S70 Scanner with Peripherals on page 3 - 8
- Unpacking the Vivid™ S60/Vivid™ S70 Scanner on page 3 - 8

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-sealable 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.

3-3-2   **Overview** (cont'd)

Before unpacking the unit

- Inspect the carton for visible damage.
- Inspect the *Drop and Tilt* indicators (on the ShockWatch and TiltWatch labels, respectively) for evidence of accidental shock or tilting during transit (damage incident) - refer to Figure 3-1.

NOTE: *The use of the Drop Indicator (with the ShockWatch label) was discontinued in 2016.*

Drop indicators turn *Red*

Tilt indicators turn *Red*
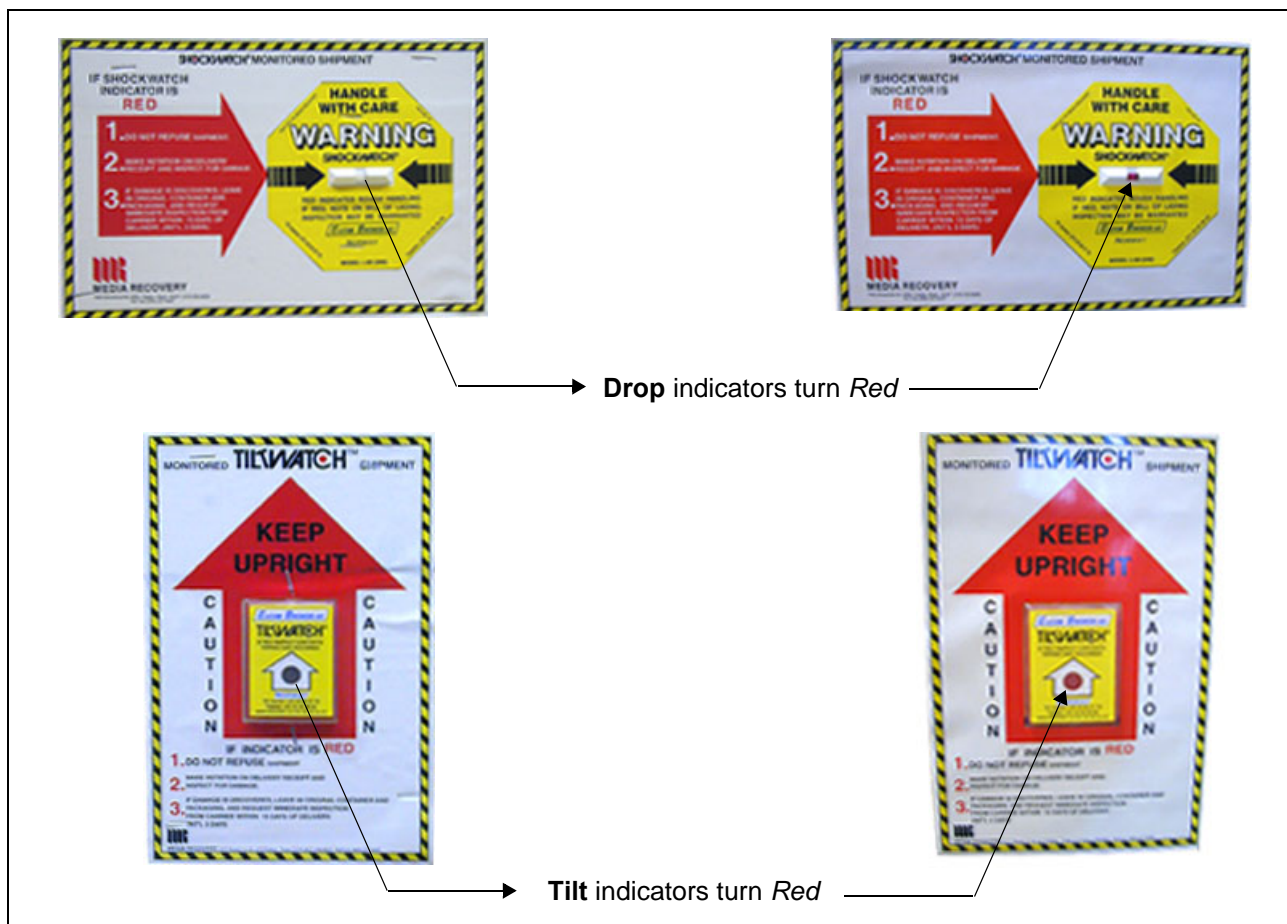
Figure 3-1   Drop and Tilt Indicators

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

If the carton is damaged, or if either the Drop or 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 and/or Drop indicators show* damage incident.
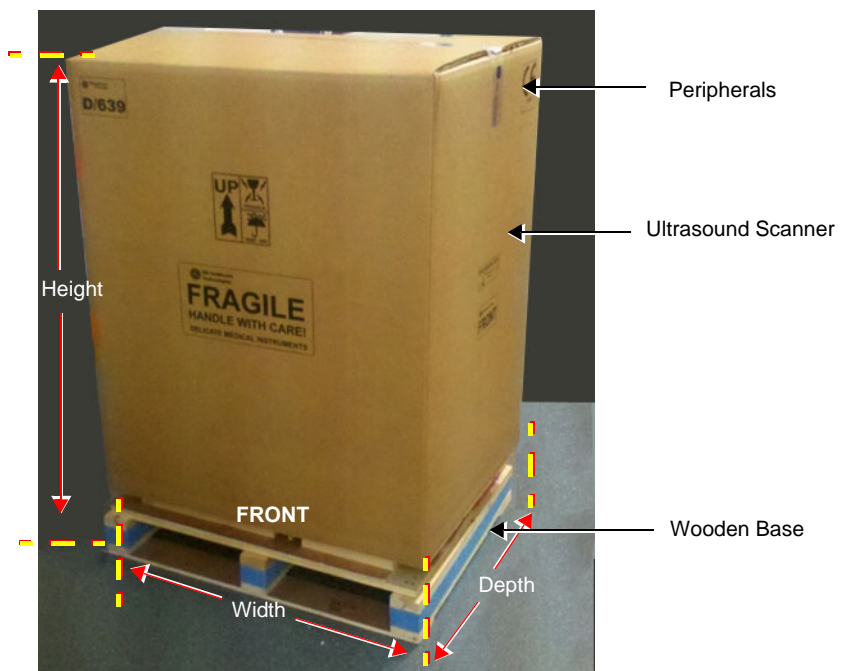
Note: Weight = 105 Kgs (231 lbs)

- Height: 140 cm (55 inch)
- Width: 73 cm (29 inch)
- Depth: 87 cm (34 inch)

Figure 3-2   Shipping Carton - Vivid™ S60/Vivid™ S70 with Peripherals

Table 3-3   Shipping Cartons - Dimensions and Weights

Description	Height	Width	Depth	Weight[a]
Vivid™ S60/Vivid™ S70 scanner with peripherals and accessories	157 cm 62 ins	73 cm 29 ins	87 cm 34 ins	105 kgs 231 lbs
Vivid™ S60/Vivid™ S70 scanner only	119 cm 47 ins	73 cm 29 ins	87cm 34 ins	95 kgs 209 lbs

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

Figure 3-3   Additional Labels on Shipping Carton

3-3-3   Unpacking the Cardboard Shipping Carton

As previously described, the Vivid™ S60/Vivid™ S70 ultrasound unit 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

3-3-3-1   Unpacking the Vivid™ S60/Vivid™ S70 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-sealable 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 - 13.

6.) Continue with unpacking the main cardboard shipping carton that contains the scanner, as indicated in Unpacking the Vivid™ S60/Vivid™ S70 Scanner on page 3 - 8.

3-3-3-2   Unpacking the Vivid™ S60/Vivid™ S70 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.
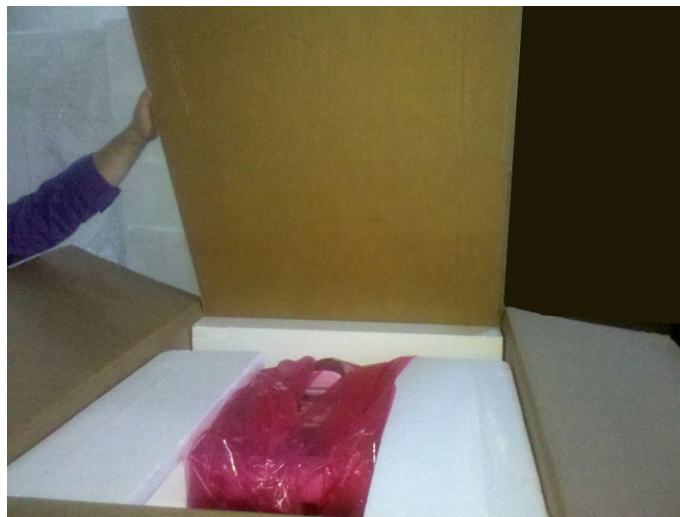
Note: Picture for illustration only

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).

Wheeling Ramp
(in upright position)

Guide Rail

Wooden Base
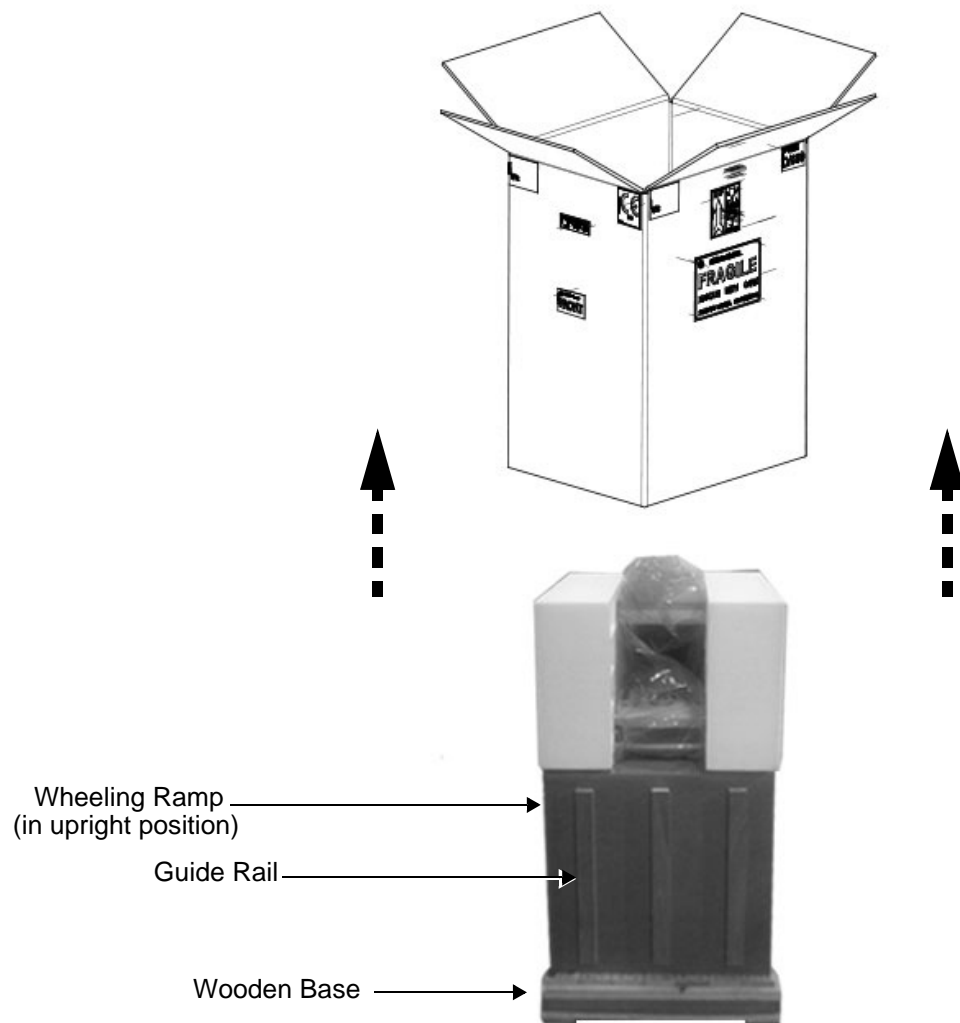
Figure 3-5   Wheeling Ramp in Upright Position

Note: The front side of the carton is re-inforced 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 - 13.

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 3-10.

Foam Support

Foam Support
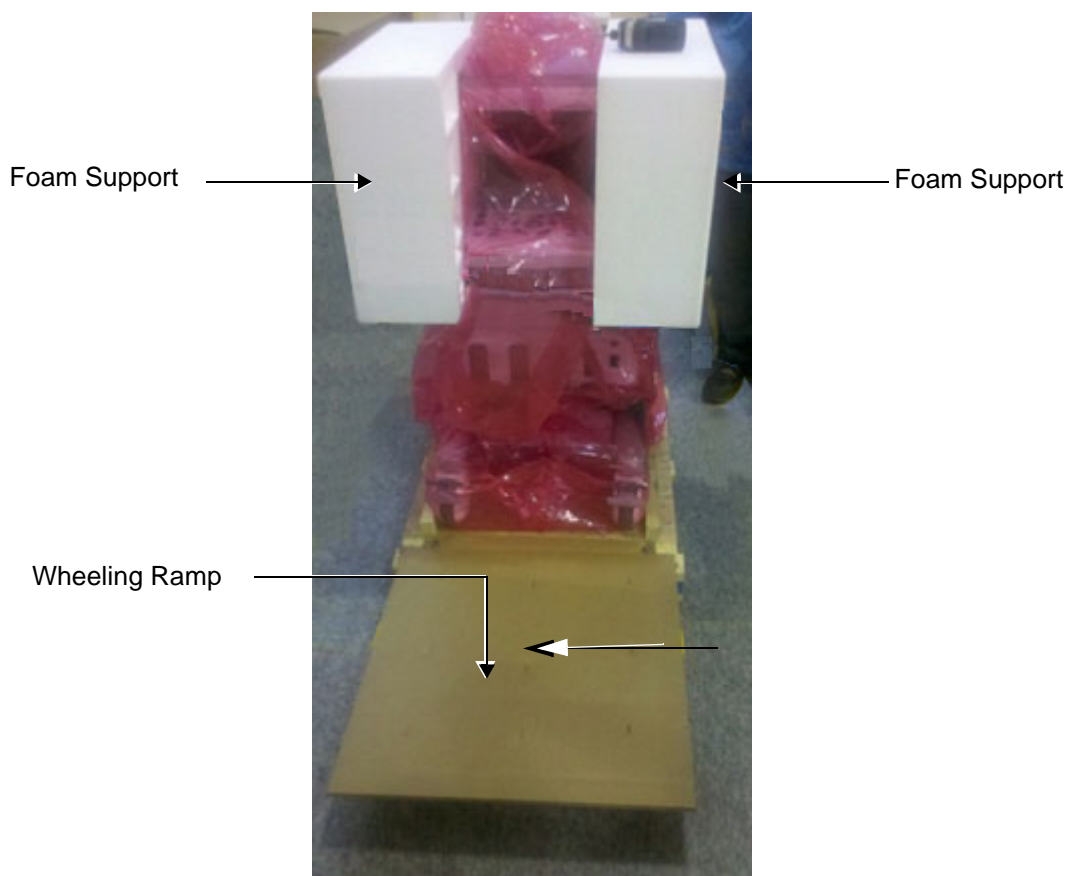
Wheeling Ramp

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.
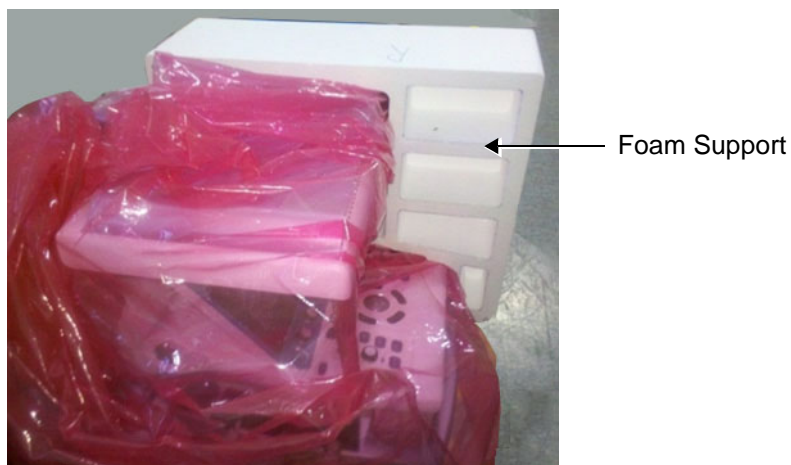
Foam Support

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).

Locking brake

Silica gel bags

Anti-static nylon on floor

Note: Picture for illustration only
(image does not show Touch Screen)
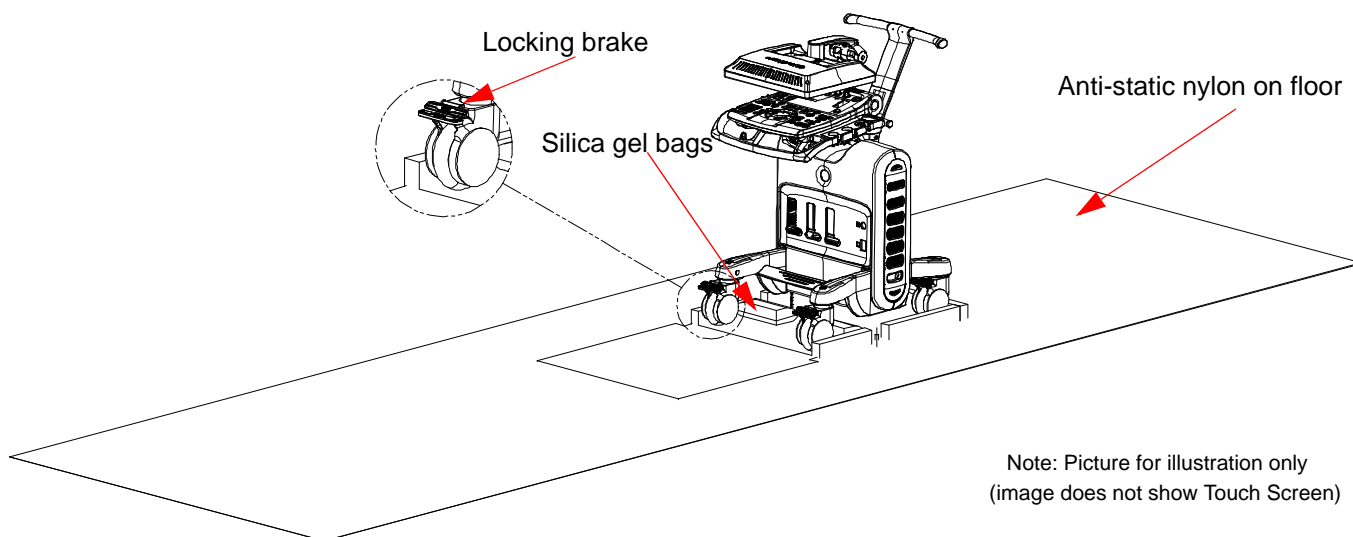
Figure 3-8   Locking Wheel Brake

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™ S60/Vivid™ S70 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 - 12.

⚠ **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   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.

3-3-4-1   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™ S60/VIVID™ S70SCANNER TO INCORRECT VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.*
CONNECT THE SYSTEM ONLY IN ACCORDANCE WITH THE VOLTAGE INDICATED ON THE PRODUCT LABEL.

3-3-5   EMI Protection

The Vivid™ S60/Vivid™ S70 Ultrasound Unit 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 3-56.

3-4-3-1   Damage Inspection Checklist
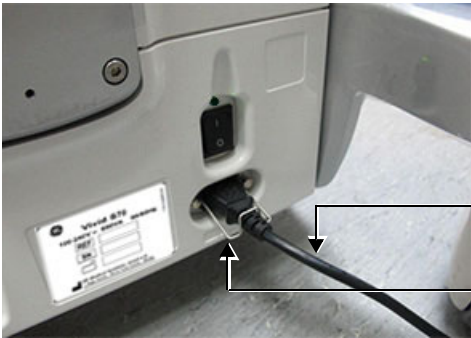
Visually inspect the contents of the shipping carton for damage. If any parts are damaged or missing, contact an authorized GE Service Representative.

A *Damage Inspection Checklist* for the Vivid™ S60/Vivid™ S70 portable ultrasound scanner is provided in Table 3-4 below.

Table 3-4   Damage Inspection Checklist - Vivid™ S60/Vivid™ S70 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 3-4   Damage Inspection Checklist - Vivid™ S60/Vivid™ S70 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	Check the power cord for cuts, loose hardware, tire marks, exposed insulation, or any deterioration. Verify continuity. 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. AC cable Clamp securing AC cable
	15	Plastic Clamp	Secure the cable to the back of the system using the plastic clamp provided. AC cable secured with plastic clamp
	16	Front Castors	Check that the front castors can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) *down* on each. Ensure that the wheels are locked and there is no movement in any direction.
	17	Rear Castors	Check that the front castors can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) *down* on each. Ensure that the wheels are locked, unable to swivel *left* or *right*, and that there is no movement *forwards* or *backwards*.

3-4-3-2   Front View of the Vivid™ S60/Vivid™ S70 Ultrasound Unit
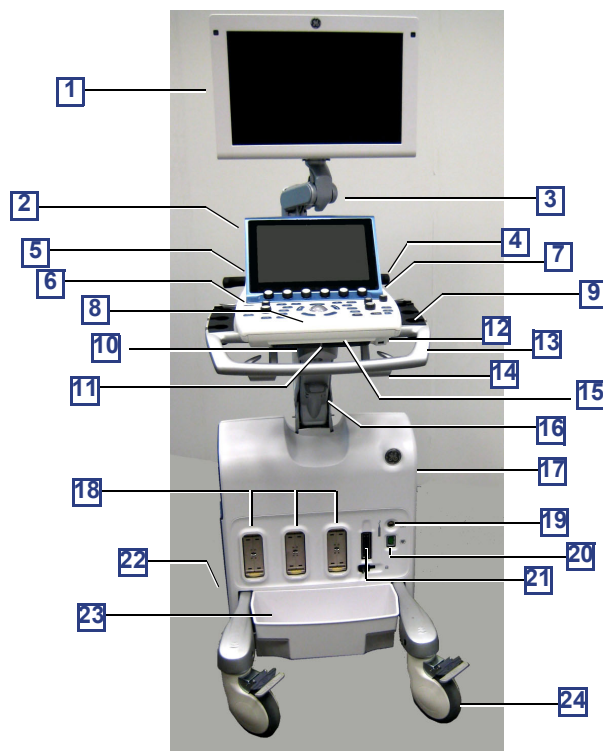
Figure 3-9   Front View of the Vivid™ S60/Vivid™ S70 Ultrasound Scanner

#	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 Subwoofer: Air flow is via a built-in filter on the side cover, for system air cooling. A subwoofer 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 unit 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 Ultrasound Unit
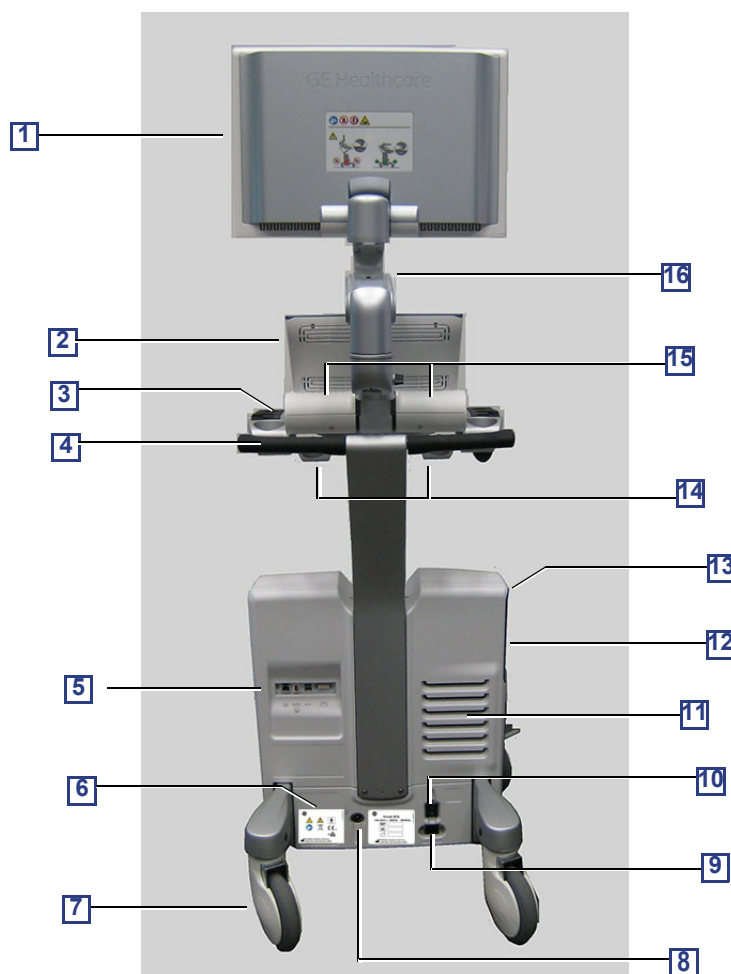
Figure 3-10   Vivid™ S60/Vivid™ S70 Rear View

#	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 Figure 3-11).	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™ S60/Vivid™ S70 ultrasound unit rear panel showing external peripheral/accessory connectors.
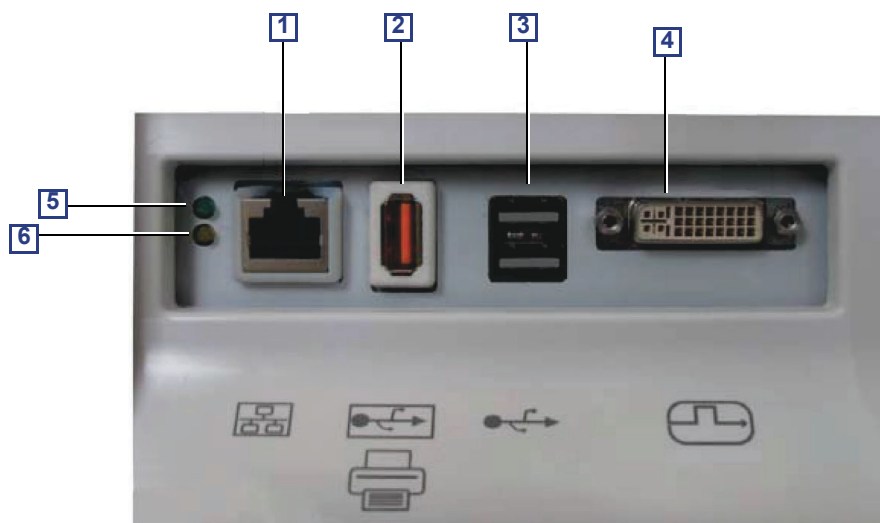
Figure 3-11   View of the Vivid™ S60/Vivid™ S70 Peripheral/Accessory Connector Panel

   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 [DVDI-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 3-5   Physical Dimensions of ultrasound system with Monitor and Peripherals
in Transportation Position**

Height	Width	Depth	Unit
104	75	77	cm
40.95	29.50	30.30	Inches

3-5-2-3   Mass with Monitor and Peripherals

Table 3-6   Mass of Vivid™ S60/Vivid™ S70 with Monitor, without Probes and Peripherals

Model	Mass [KG]	Mass [LBS]
ultrasound system	75	165

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 3-7   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 the valid version of the system standard IEC60601-1-1. 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 the valid version of IEC60601-1-1. 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 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.
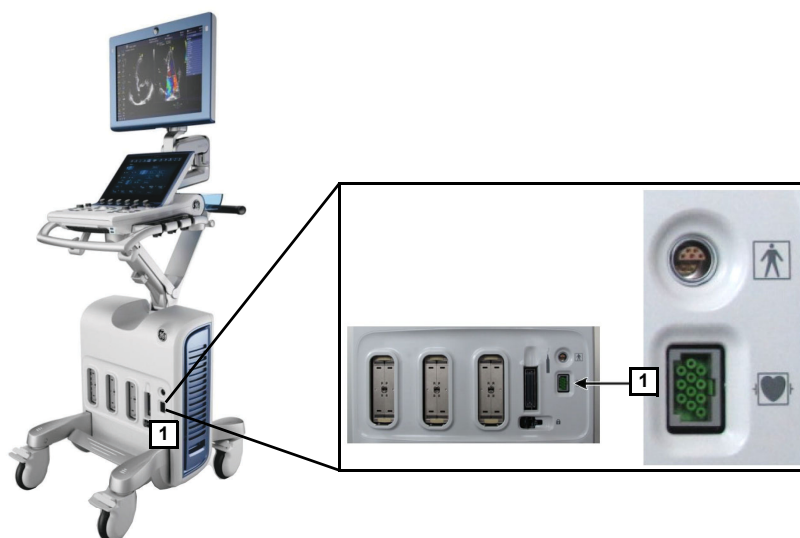
1. ECG

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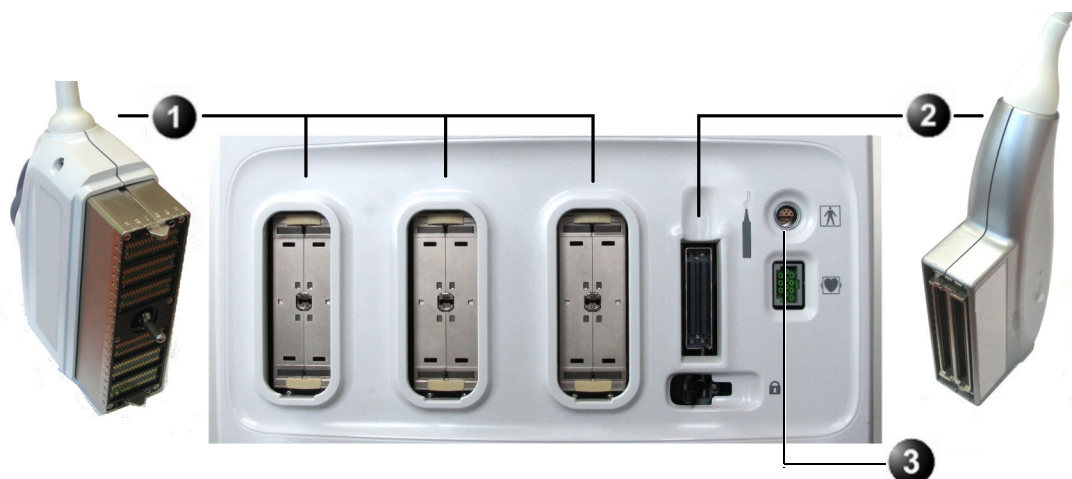
1. DLP Connectors
2. RS Connector
3. Pencil Probe Connector

Figure 3-13   Probe Connectors on Vivid™ S60/Vivid™ S70 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.

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.

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.

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.

For cleaning instructions, see the *User Manual*.

3-5-7   Power on/Boot up

For procedure, see: .

3-5-8   Power Shut Down

For procedure, see: .

3-5-9   Complete Power Down

For procedure, see: .

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   Contents in this Sub-section

3-6-2-2   Select System Settings Screen

1) Select **Config** (**F2**) and log on as **adm.**

2) Select **System** and then select **Settings**, if needed.

The Settings screen is displayed.
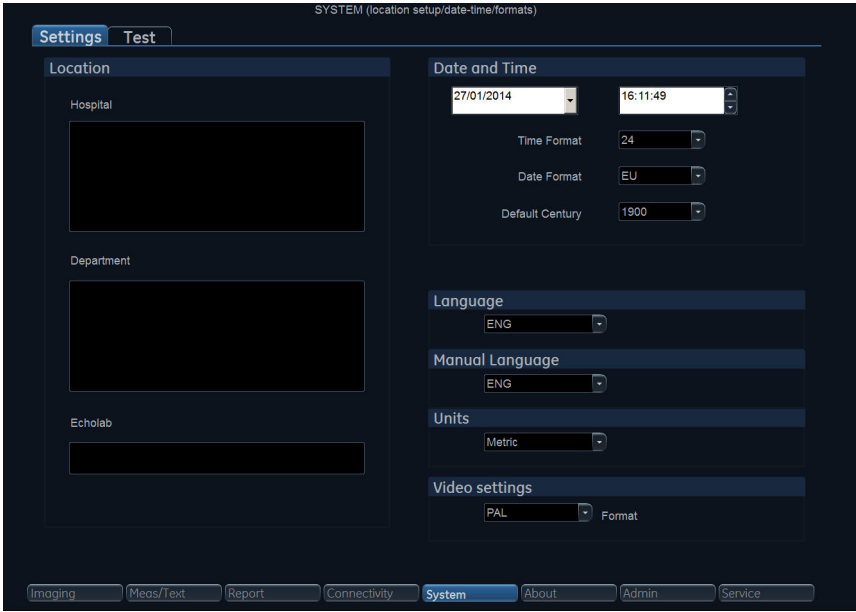
Figure 3-14   Settings Screen

3-6-2-3   Enter Location
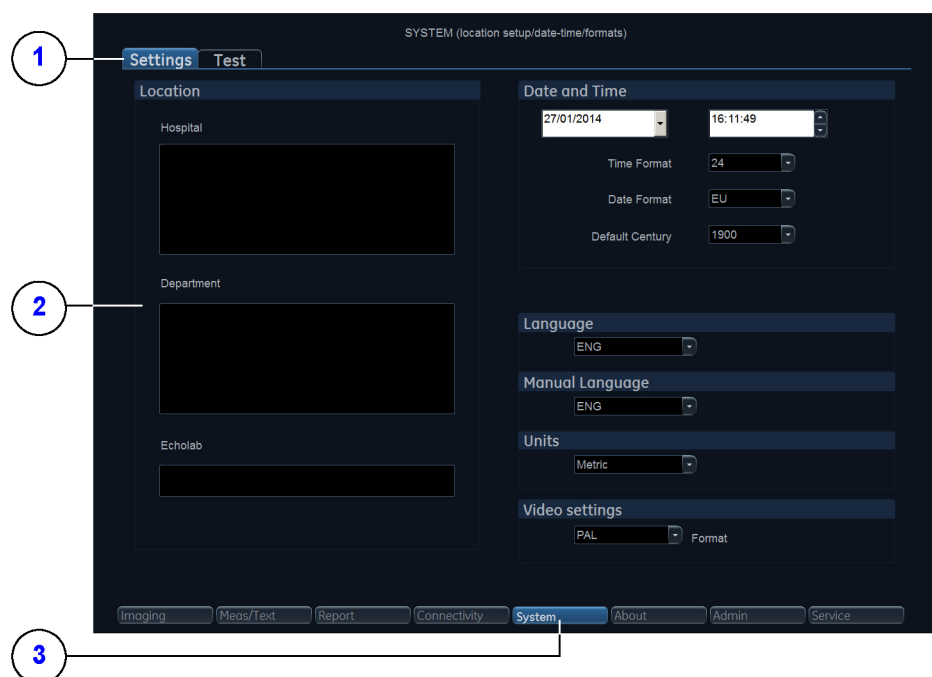
1. Settings
2. Location
3. System

Figure 3-15   Enter Location

Table 3-8   Enter Location

STEP	TASK	EXPECTED RESULT(S)
1.	Select the **Hospital** field and type the name of the hospital (max 64 characters).	After restart: • The 24 first characters of this name are displayed on the scanning screen's title bar. • All 64 are displayed on the image properties on saved images.
2.	Select the **Department** field and type the name of the department (max 64 characters).	After restart: • This name will be displayed on the image properties on saved images
3.	Select the **Echolab** field and type the name.	After restart: • This name will be displayed on the image properties on saved images

3-6-2-4   Adjust Date and Time
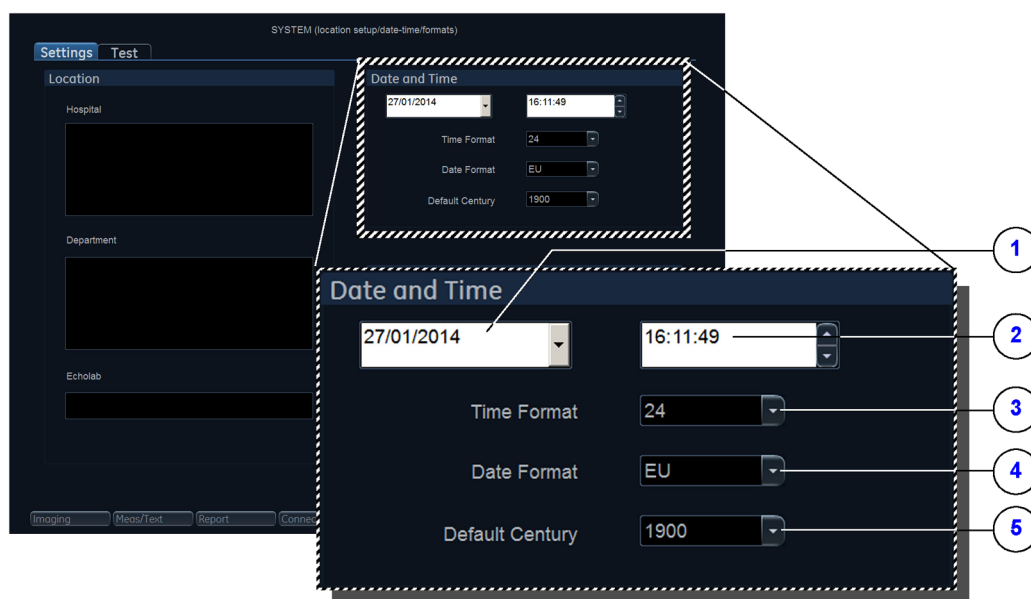
1. Date
2. Time
3. Time Format
4. Date Format
5. Default Century

Figure 3-16   Date and Time Adjustments

Table 3-9   Date and Time Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	• Open the **System** (Configuration) Window, • Select **Settings**, if needed.	The **Settings** window is displayed.
2.	Select the preferred **Date Format**, see (d) in Figure 3-19. • DD = Date (two digits) • MM = Month (two digits) • YYYY = Year (four digits)	• **EU**: the European/International "DD.MM.YYYY" format is used • **US**: the American "MM.DD.YYYY" format is used
3.	Select the preferred **Time Format**, see (3) in the figure.	• **24**: the 24 hour format is used • **12**: the 12 AM/PM hour format is used
4.	Adjust the **date**, see (1) in the figure.	**New date** is displayed
5.	Adjust the **time**, see (2) in the figure.	**New time** is displayed
6.	Select **Default Century** (1900, 2000 or None), see (5) in the figure.	• **1900:** • the number 19 is automatically displayed when entering the year in the patient date of birth. • To edit century, press BACKSPACE twice. • **2000**: • the number 20 is automatically displayed when entering the year in the patient date of birth. • To edit century, press BACKSPACE twice. • **None**: • the four digits have to be typed when entering the year in the patient date of birth. • The selected setting will be used as soon as the unit has been restarted.

3-6-2-5   Select Language for User Interface and Online Manuals
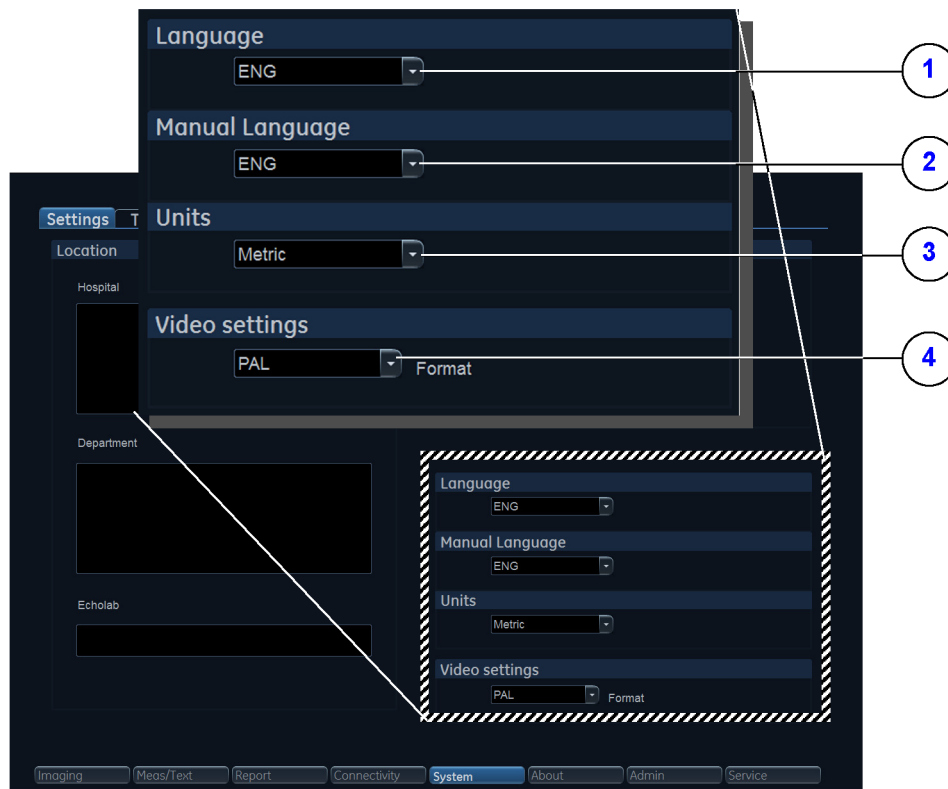
Figure 3-17   Select Language, Units and Video Format

Table 3-10   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.	See Table 3-11 on page 3-29	See Table 3-11 on page 3-29
4.	See Table 3-11 on page 3-29	See Table 3-11 on page 3-29

3-6-2-6   Select Units of Measure and Video Format

Table 3-11   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 Figure 3-17 on page 3-28) 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 Figure 3-17 on page 3-28.)	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   Contents in this Sub-section

3-6-3-2   Open Service Screen

1)   Press Config (F2) and log on as adm.

2)   Select Service (lower, right part of window) to view the Service Screen.
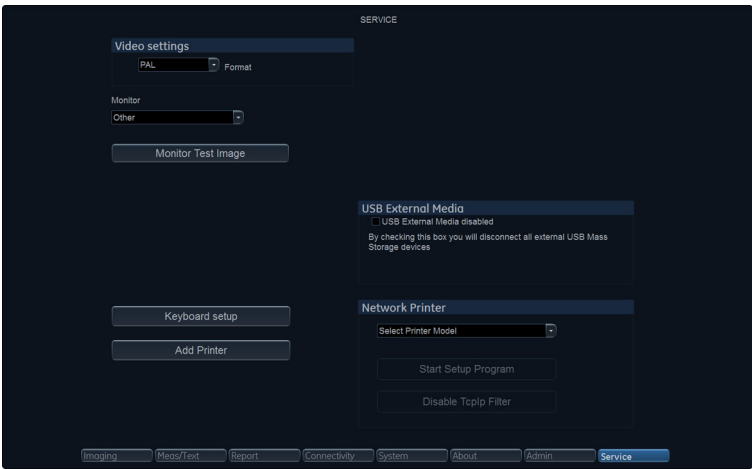
Figure 3-18   Service Screen

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

This selection must correspond to the Video Standard (PAL or NTSC) used at the location.
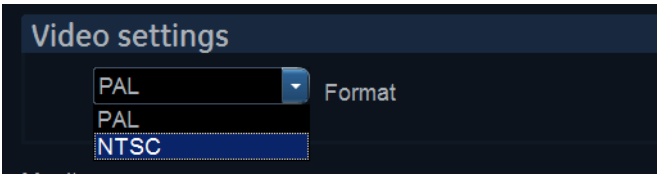
Figure 3-19   Select Video Format

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

3-6-3-4   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 3-12   Select Keyboard
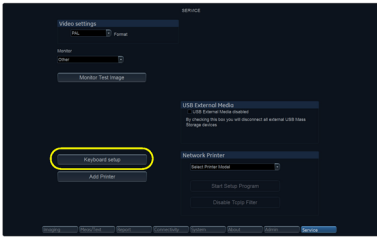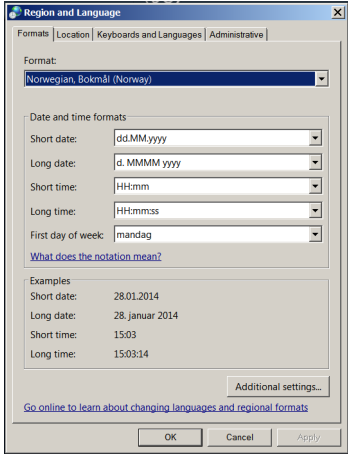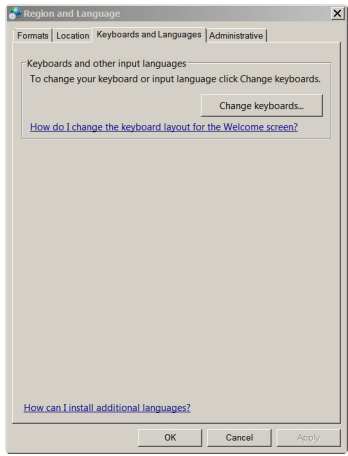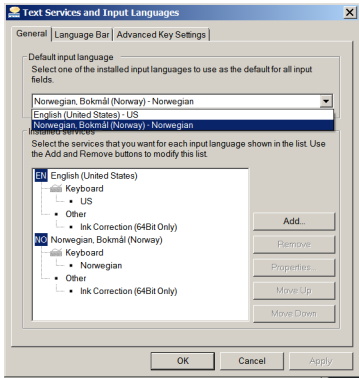
STEP	TASK	EXPECTED RESULT(S)
1.	Select Keyboard Setup to get access to Keyboard Properties.	
2.	Select Keyboards and Languages.	
3.	Select Change Keyboards...	
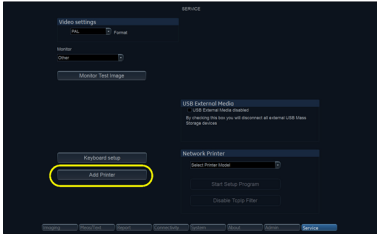
Table 3-12   Select Keyboard (Continued)

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

3-6-3-5   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 3-13   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 - 33

3-6-4   Optional Peripherals/Peripheral Connection

3-6-4-1   Contents in this Sub-section

3-6-4-2   Approved Internal Peripherals

This list covers the internal peripherals available for ultrasound system:

- Monochrome (Black and White) Digital Sony UP_D898 printer

3-6-4-3   Approved External Peripherals

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

3-6-4-4   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

3-6-4-5   External Peripherals for Connection to Ethernet (TCP/IP)

Related information:

-

3-6-4-5-1   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™ S60/Vivid™ S70 system as shown in Figure 3-21.*

Do not connect the M451 printer via the USB port
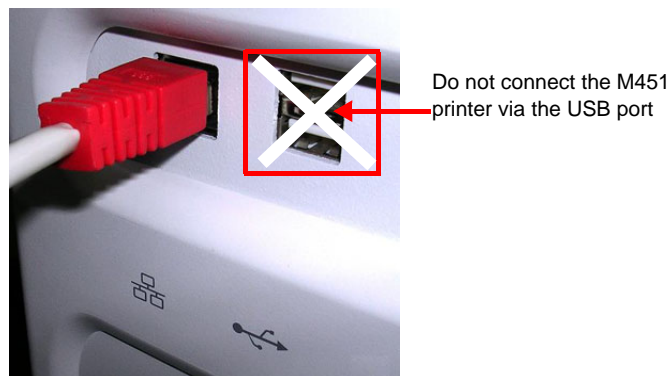
Figure 3-21   Network Cable Connected to Network Port

Installation of the HP Laserjet M451 Color Printer requires configuring the IP addresses for both the Vivid™ S60/Vivid™ S70 system and for the printer. Follow the instructions described below:

-     "Peer-to-Peer" using a cross communication cable between the system and the printer. See Defining the Printer IP Address on page 3 - 35.

Defining the Printer IP Address

The settings for the HP Laserjet M451 Color printer are controlled via the printer's control panel located as shown in Figure 3-22.
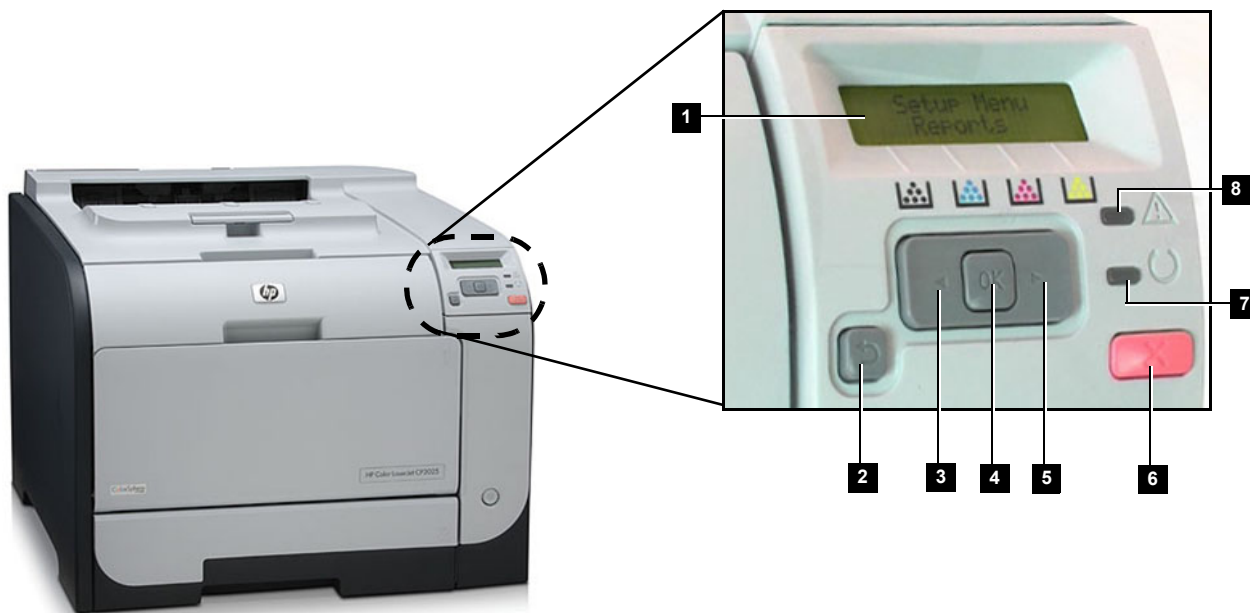
Figure 3-22   Printer Control Panel

NOTE: *For an explanation of the printer's control panel, see the legend in Table 3-14 on page 3-36.*

Table 3-14   Printer Control Panel - Legend to Figure 3-22

#	Description of Controls
1	**Control-panel display**: The display provides information about the printer. Use the menus on the display to establish printer settings.
2	**Back Arrow** (⤺) Use this button for the following actions: • Exit the control-panel menus • Scroll back to a previous menu in a submenu list. • Scroll back to a previous menu item in a submenu list (without saving changes to the menu Item).
3	**Left Arrow** (◄) Use this button to navigate through the menus or to decrease a value that appears on the display.
4	**OK**: Press the **OK** button for the following actions: • Open the control-panel menus. • Open a submenu displayed on the control-panel display • Select a menu item • Clear some errors. • Begin printing in response to a control panel prompt (for example, when the message **OK to print** appears on the control-panel display).
5	**Right Arrow** (►) Use this button to navigate through the menus or to *increase* a value that appears on the display.
6	**Cancel Job (X)**: Press this button to cancel a print job whenever the Attention light is blinking, or to exit the control panel menus.
7	**Ready Light** (green): The Ready light is ON when the printer is ready to print. The light blinks when the printer is receiving print data.
8	**Attention light** (amber): The Attention light blinks when the printer requires user attention.

To configure the printer using the control panel, proceed as follows:

1.) On the printer's control panel, press **OK** (button 4) in Figure 3-22.

2.) Press the **right arrow** on the control panel four times to display "Network config" in the control panel display and press **OK**.

"TCP/IP config" appears in the control panel display.

3.) Press **OK** and on the control panel press the **right arrow**.

"Manual" displays in the control panel window.

4.) Press **OK**.

An IP address displays.

NOTE: *For the following step, use the above guidelines to enter the printer's IP address.*

5.) Using the control panel's left and right arrow buttons, and the OK button, type in the following IP address: **10.0.0.2.**

6.) Press **OK**.

"Yes" is displayed in the control panel.

7.) Press **OK** again.

The Subnet mask displays: 255.0.0.0

8.) Press **OK**.

Default Gateway displays with an IP address.

9.) Set the IP address to: **0.0.0.0.**

10.) Press **OK** twice.

The printer's IP address is now configured.

Defining the Paper Size

1.) From Windows Desktop, navigate to *Printers and Faxes* and select the HP-CP2020 printer.

2.) From the console, press **Update/Menu** and from the context menu select **Properties**.

3.) Select the required settings and click **OK**.

4.) Print a test page to confirm that the printer is properly installed.

3-6-5   Software Options Configuration

3-6-5-1   Contents in this Sub-section

3-6-5-2   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.*

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

Follow these steps to install the Software Option Key:

1) Press **Config** (**F2**) 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.

3-6-5-4   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

ultrasound system can communicate with:

• EchoPAC

• Image Vault

For networks with Image Vault 5 server running on Windows Server 2003 or Windows Server 2008:

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

For instructions, see: "Vivid Raw Data Module (RDCM) Installation Manual", Direction Number IV294001.

• 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** (**F2**) 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.
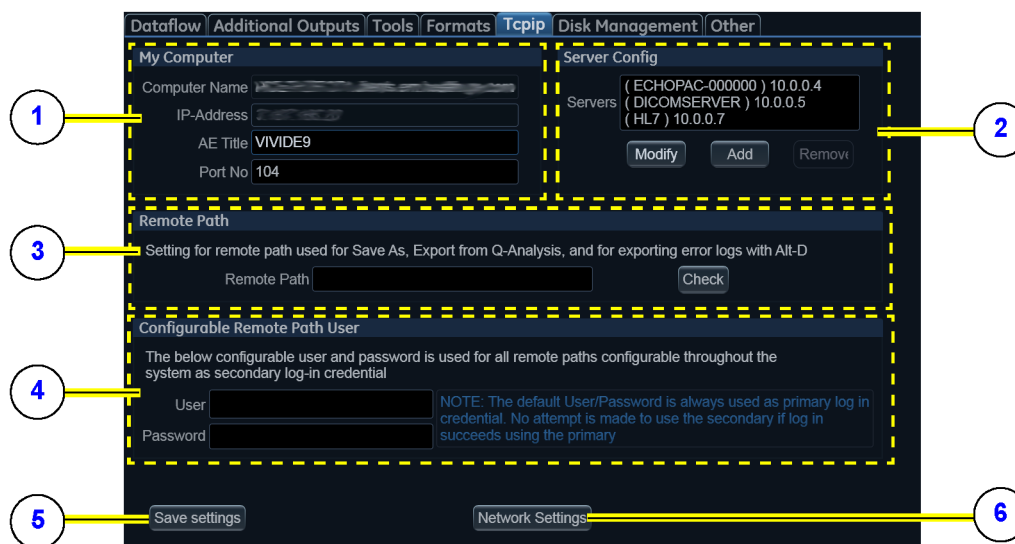
1. **My Computer**:
   • **Computer Name**:
   For ultrasound system, this name is on the form: *VIVIDX-00NNNN*, where "00NNNN" is a number (NNNN is the scanner's serial number).
   • **AE Title**:
   VIVIDEx (where 'x' is the model number)
   • **Port No**:
   Default port number: 104
2. **Server Config**:
   • **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 3-23   TCP/IP Overview Screen for ultrasound system

Related information:

• Logging On to the Vivid™ S60/Vivid™ S70 as "ADM" on page 4 - 8

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

Figure 3-24   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.
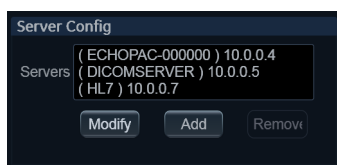
Figure 3-25   Server Config

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.
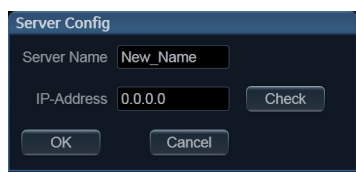
Figure 3-26   Server Config

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
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

The following procedure is used to configure the Vivid™ S60 and Vivid™ S70 for a wireless network environment. This procedure is required for **every** new wireless network.

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

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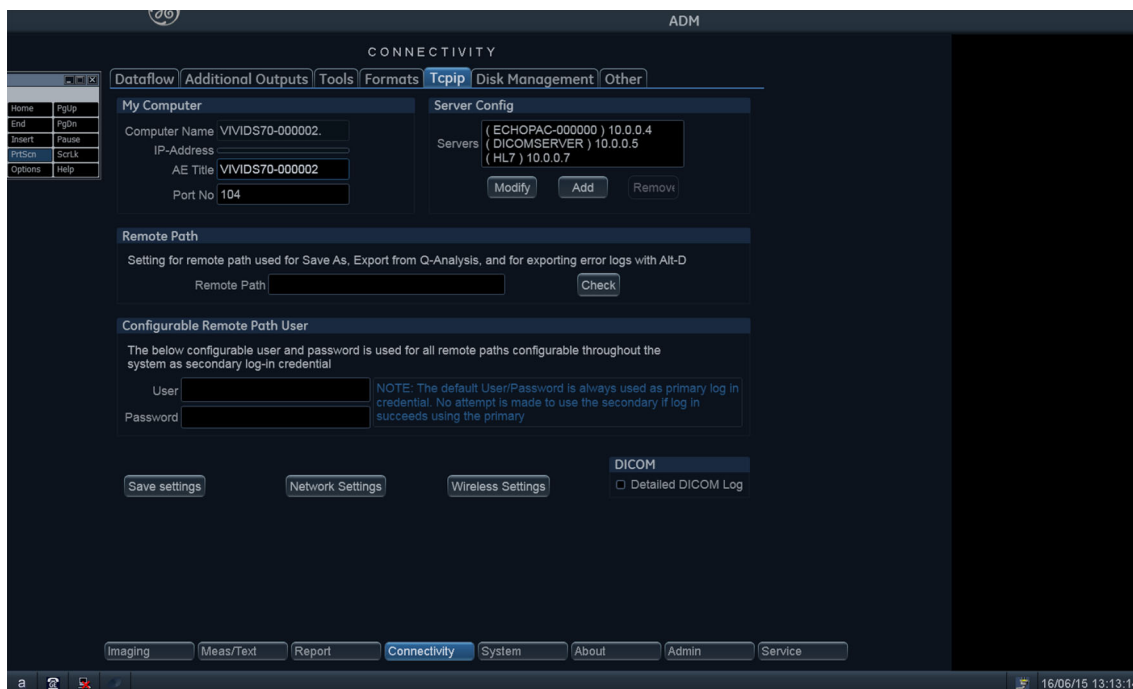
Monitor Display
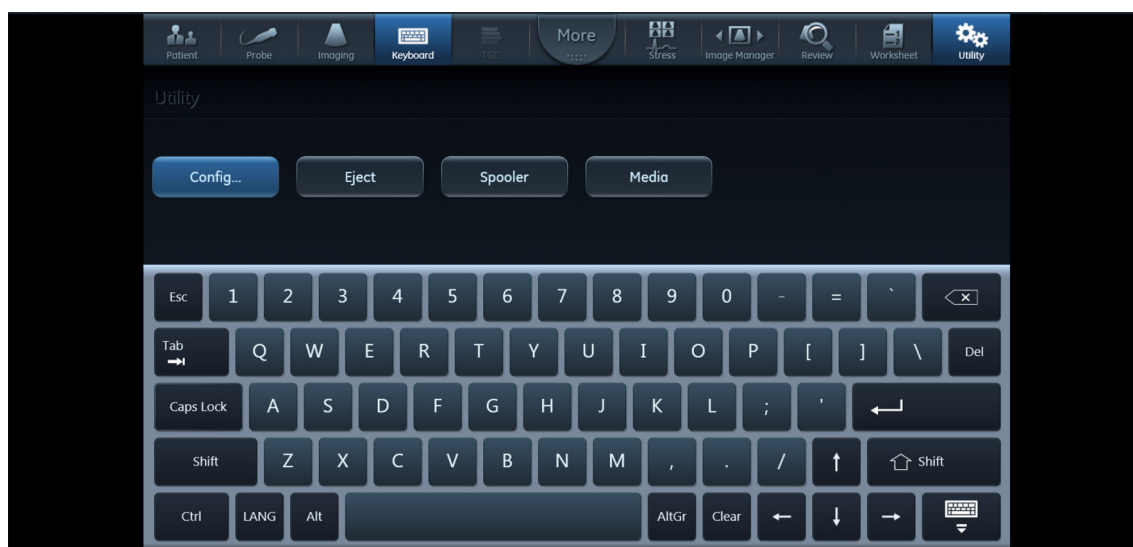
Touch Screen Keyboard

3-8-7-1   Configuring the Wireless Network Adaptor

1.) From the default scanner screen, press **CONFIG** (**F2**) and log on as *Adm*, as described in Logging On to the Vivid™ S60/Vivid™ S70 as "ADM" on page 4 - 8.

2.) Select CONNECTIVITY (lower part of window).

3.) Select the TCP/IP tab.
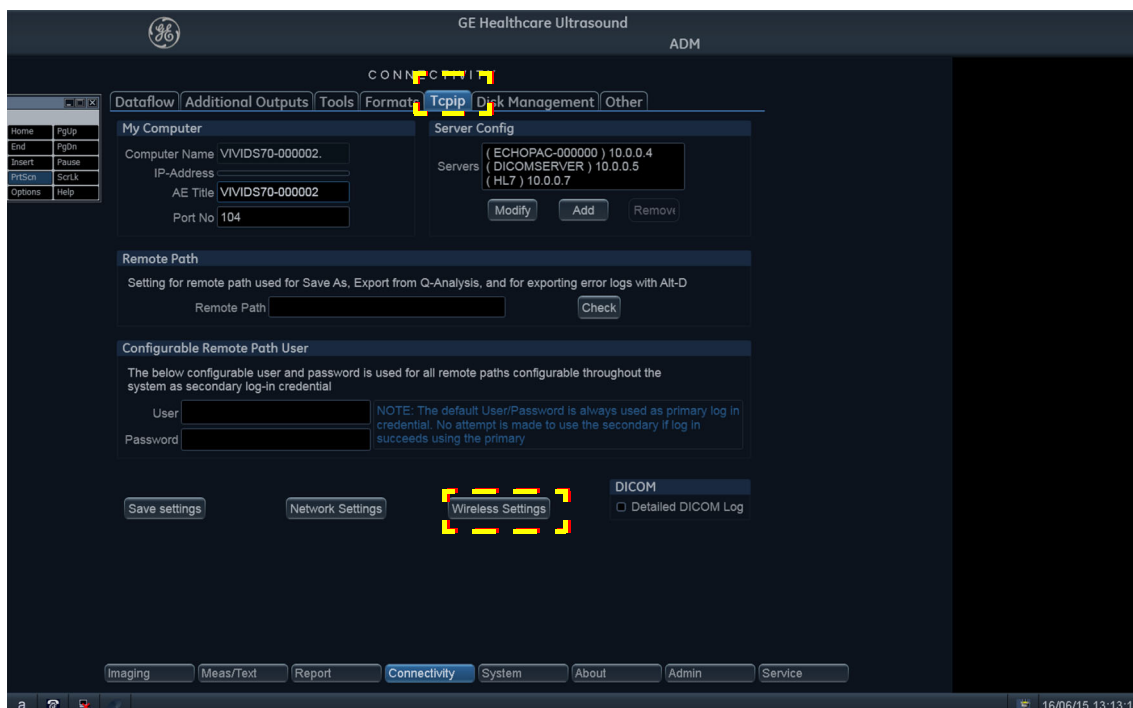
Figure 3-27   Connectivity - TCPIP Tab

4.) Connect a GE-approved Wireless Network adapter to the lower USB socket on the Rear I/O Peripheral/Accessory Connector Panel.

NOTE: In the event that a Wireless Network adapter is not connected, or if the connected Wireless Network adapter is not the correct model, an error message will be displayed - Figure 3-28.
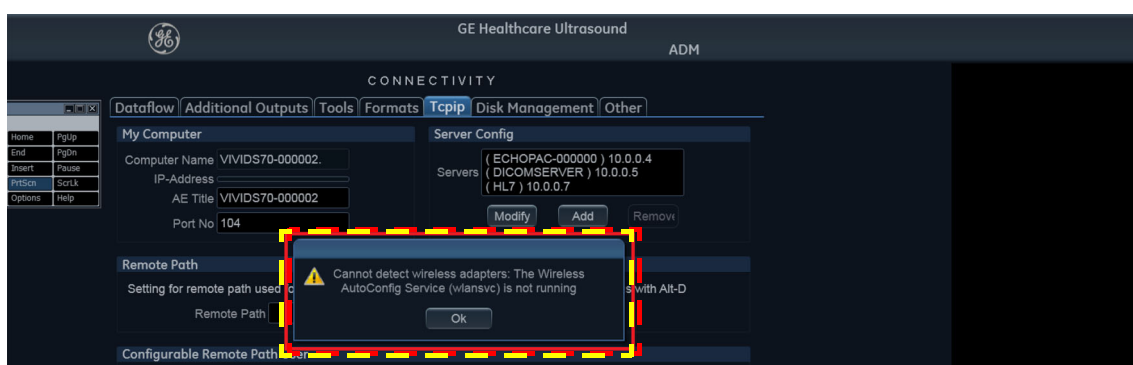
Figure 3-28   Connectivity - Error Message

*Click **OK** to close the message. To continue, connect a GE-approved Wireless Network USB adapter.*

5.) Click the **Wireless Settings** button - see Figure 3-27.

The Welcome screen opens - Figure 3-29.
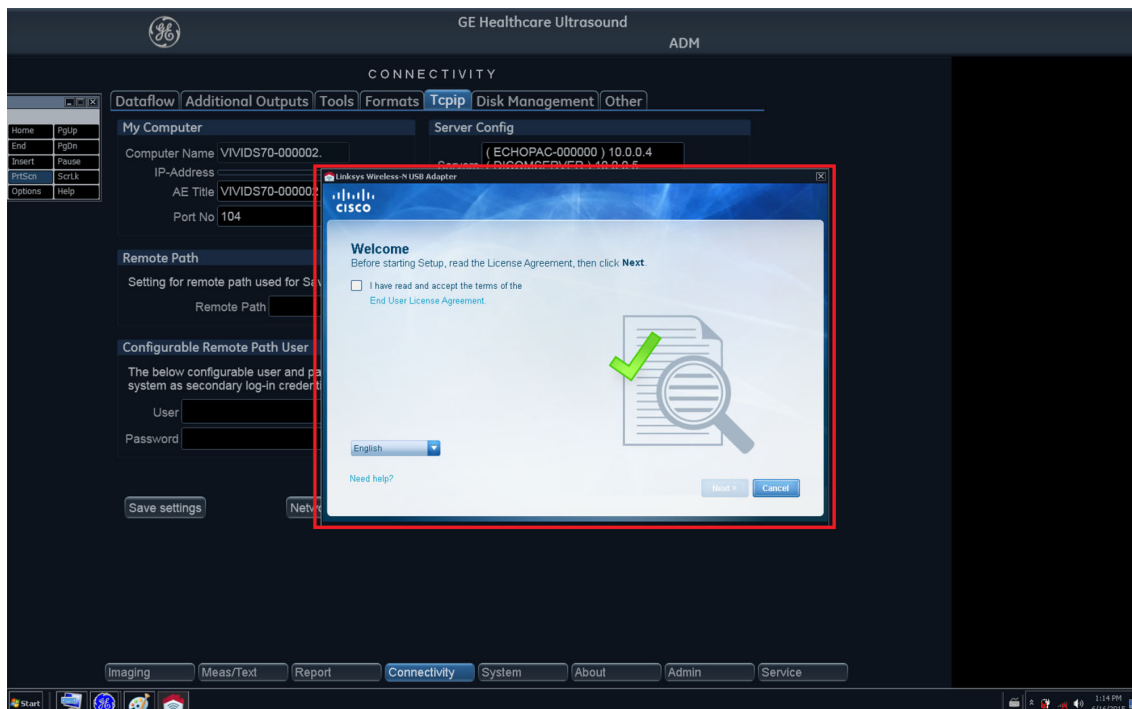
Figure 3-29   Welcome Screen

6.) Mark the checkbox for acceptance of terms, then click **Next**.
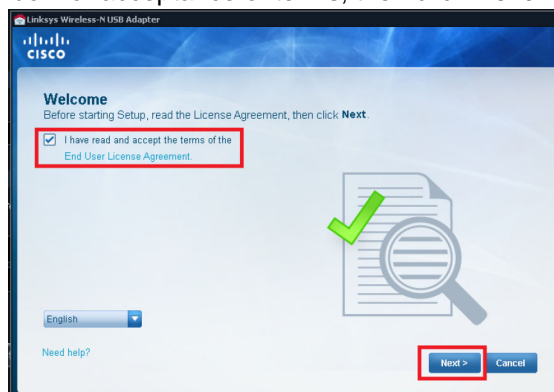
A hardware connection message is displayed:

7.) Check that a GE-approved Wireless Network adapter is connected to the USB port.

The Wireless Network selection window opens - Figure 3-30.
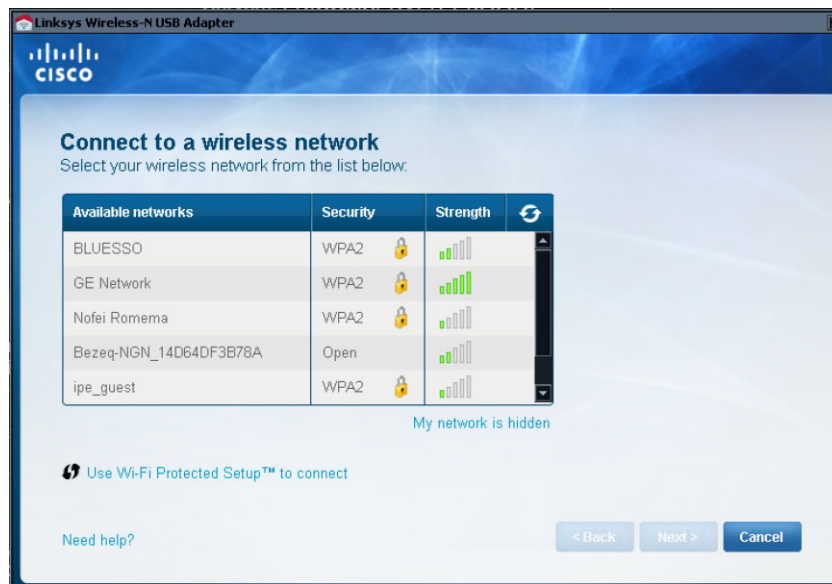
Figure 3-30   Wireless Selection Network Window

8.) Select the desired network from the Available Networks list**,** then click **Next**.

A window is displayed prompting for a Password.

Figure 3-31   Wireless Network Window - Enter Password

9.) Type the correct network password.

NOTE: *In order to see the password that has been typed, activate Display characters. By using the mouse*

cursor to highlight the password, the typed text will be visible:
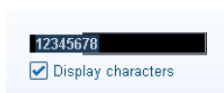
10.) Click **Next**.

The window displays confirmation of successful Wireless Network configuration.
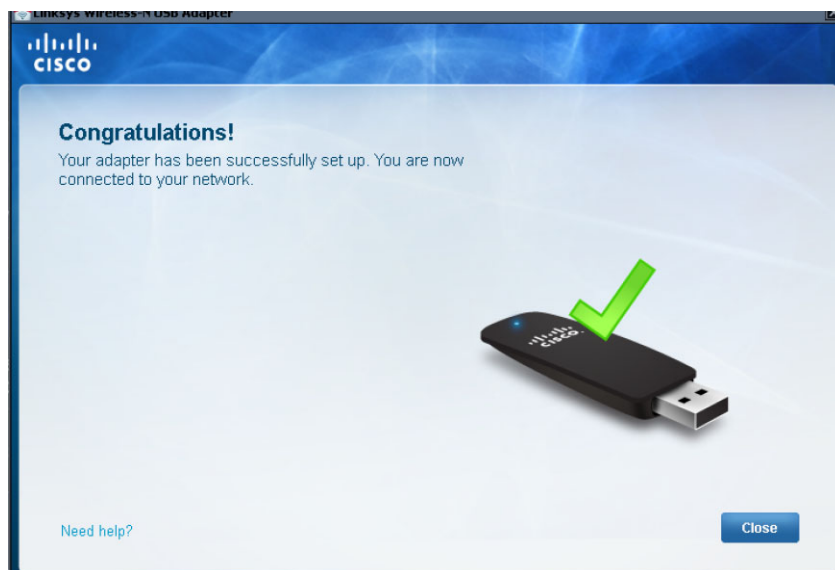
Figure 3-32   Confirmation of Successful Wireless Network Configuration

11.) Click **Close**.

12.) Click on the Network icon in the bottom left corner of the screen.

The Network Status window will open, indicating the status of network connection - see Figure 3-33.
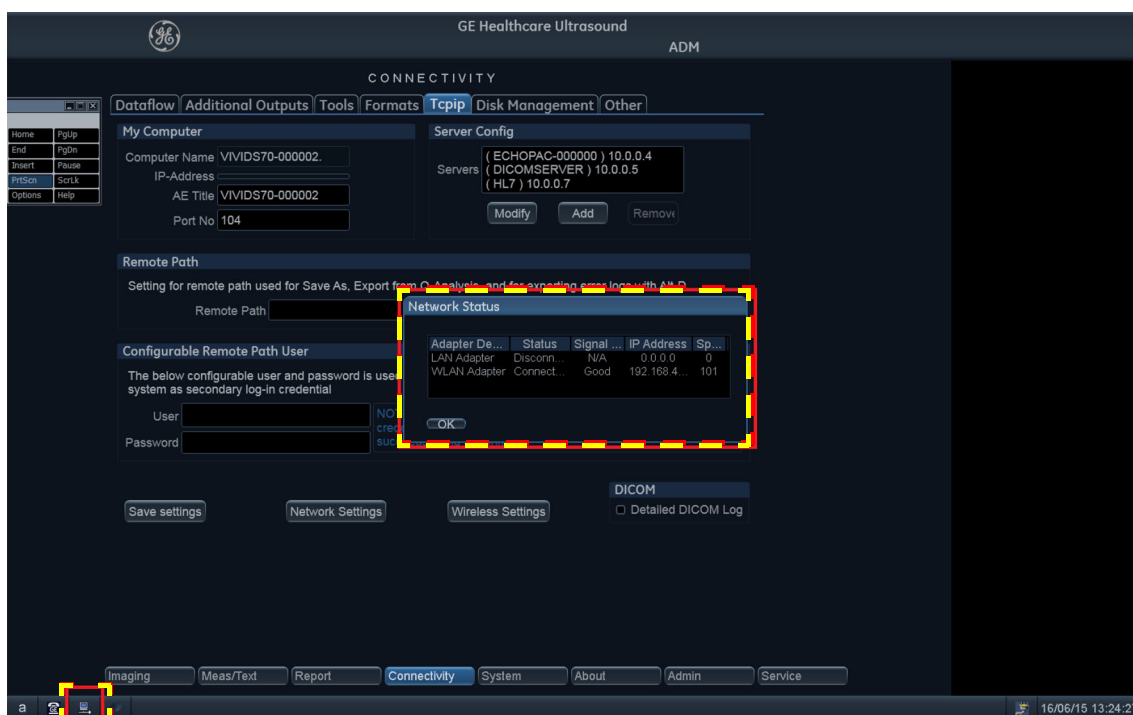
Figure 3-33   Network Status Window

13.) Check that the WLAN Adapter status shows as *Connected* and that the Signal is available.

14.) Click **OK** to close the Network Status window.

NOTE: *The system is now connected to the desired Wireless Network. In future, as long as the same Wireless Network is available, connection will be automatic.*

NOTE: *Whenever connection to a new/different Wireless Network is required, it will be necessary to repeat all procedures steps above.*

Section 3-9
Options Setup

3-9-1   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 - 38.

3-9-2   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.*

3-9-3   USB Flash Card Setup

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

3-9-4   Wireless Network Adaptor

The Wireless Network adaptor should be connected to the lower USB socket on the Vivid™ S60/Vivid™ S70 Rear I/O Peripheral/Accessory Connector Panel.

NOTE: *It is possible to connect the Wireless Network adaptor either once the system is powered ON, or after shutdown.*

All software drivers for the Wireless Network are pre-installed for the designated Wireless Network adaptor only.

⚠ **WARNING** *WHEN CONNECTING PERIPHERALS TO THE VIVID™ S60N/VIVID™ S70N SYSTEM, UNLESS THE PERIPHERAL IS MEDICAL-GRADE EQUIPMENT IT SHOULD BE CONNECTED TO THE ISOLATED USB CONNECTOR.*

⚠ **NOTICE** **IMPORTANT During Stand-by mode, it is NOT recommended to introduce or remove USB devices; this may cause the system to lock-up during the boot-up procedure.**

⚠ **WARNING** *DO NOT ATTEMPT TO USE A DIFFERENT TYPE OF WIRELESS NETWORK ADAPTOR. THE ULTRASOUND SYSTEM IS AN EXTREMELY SENSITIVE AND COMPLEX MEDICAL SYSTEM. ANY UNAUTHORIZED PERIPHERALS MAY CAUSE SYSTEM FAILURE OR DAMAGE!*

3-9-4-1   Wizard for Wireless Communication Setup

Note: The new wizard is intended for all systems with software version 201.46.0 or higher.

Table 3-15   Wizard for Wireless Communication Setup   1 of 3
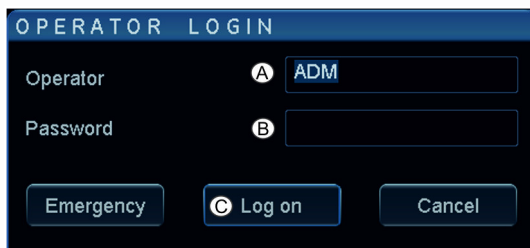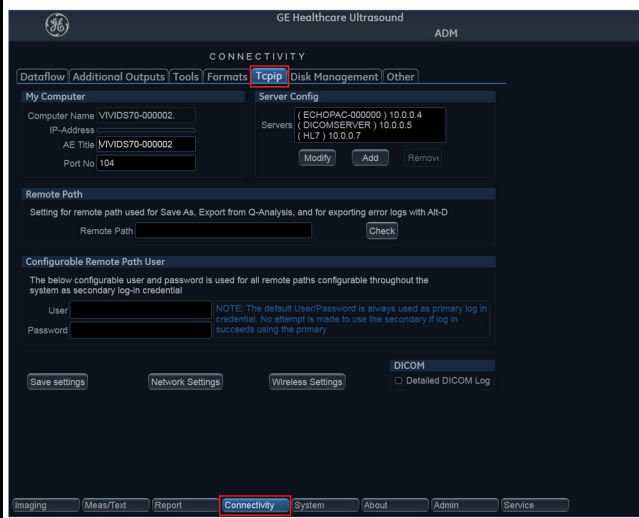
Step	Description	Illustration
1	Turn on the Ultrasound System.	
2	Connect the approved wireless network dongle to the Ultrasound System.	
3	On the touch panel, press **Utility > Config**.	
4	Enter the Operator name (**A**), Password (**B**) and click Log on (**C**).	
5	On the bottom tool bar, click the **Connectivity** button and then select the **Tcpip** tab.	

Table 3-15   Wizard for Wireless Communication Setup (Continued) 2 of 3
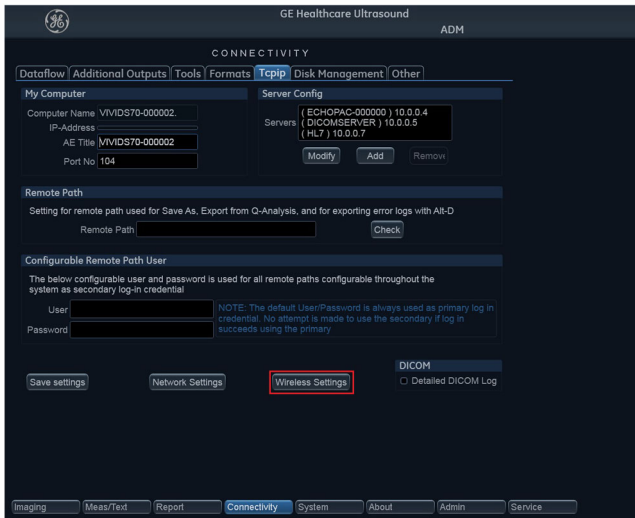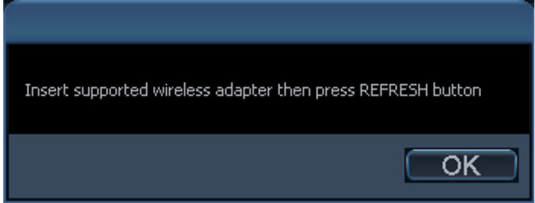
Step	Description	Illustration
6	Click the **Wireless Settings** button.	
	• If the Wireless Network adaptor is not connected, the following dialog box appears.	Insert supported wireless adapter then press REFRESH button OK
	• Click **OK** to close the dialog box, connect the Wireless Network adaptor and click the **Refresh** button to proceed. The **Wireless Network Configuration** window appears with the list of the available wireless networks.	

Table 3-15   Wizard for Wireless Communication Setup (Continued) 3 of 3
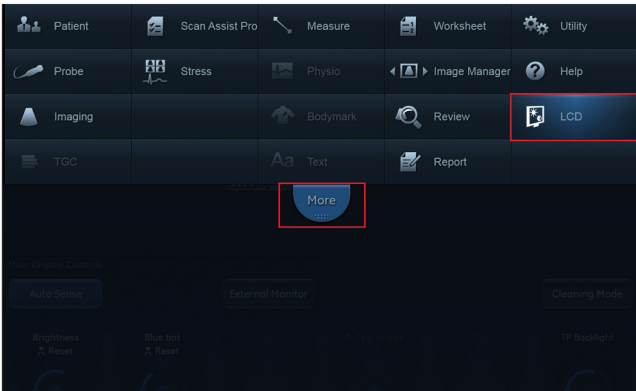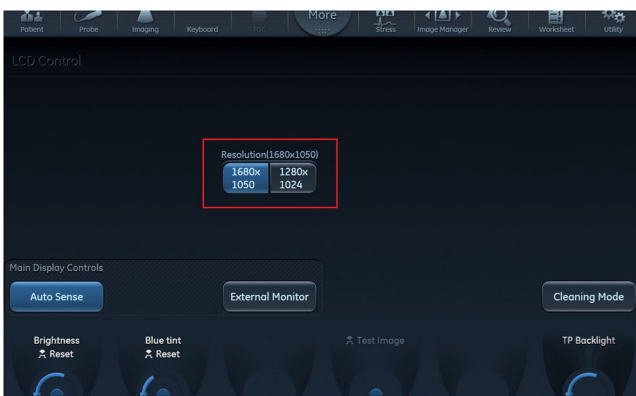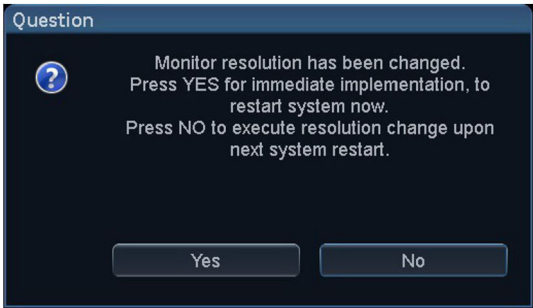
Step	Description	Illustration
7	Click the required wireless network to select it: • If the selected wireless network requires a password, enter the password in the text field that appears and click Connect. Click the eye toggle button to make the password characters either visible or invisible.	
	• If the selected wireless network does not require a password, the connection is automatically performed. If the connection succeeds, the status of the selected wireless network is indicated in green.	
8	¤ Click **Close** to close the **Wifi Configuration** window.	

3-9-5   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 3-16   Adjusting Screen Resolution

Step	Description	Illustration
1	On the touch panel, press **More** to expand the options list and then press **LCD**.	
2	On the **LCD Control** screen, select one of the available resolutions.	
3	Click **Yes** 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™ S60/Vivid™ S70 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.

Figure 3-34   Product Locator Installation Card (Example)

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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	4-16

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: 164L0027
  or
    - 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 S60/Vivid S70.

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/Boot-up

4-2-2-1   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).*

4-2-2-2 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/OF 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™ S60/Vivid™ S70 ultrasound scanner.
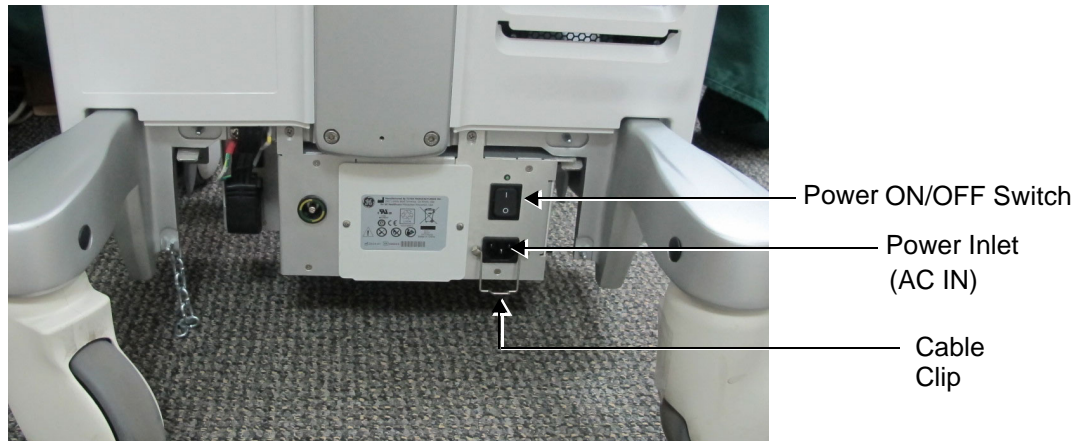
Figure 4-1   Power ON/OFF Switch and Power (AC IN) Socket - Rear Panel

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

Plastic Cable Clamp

Screw
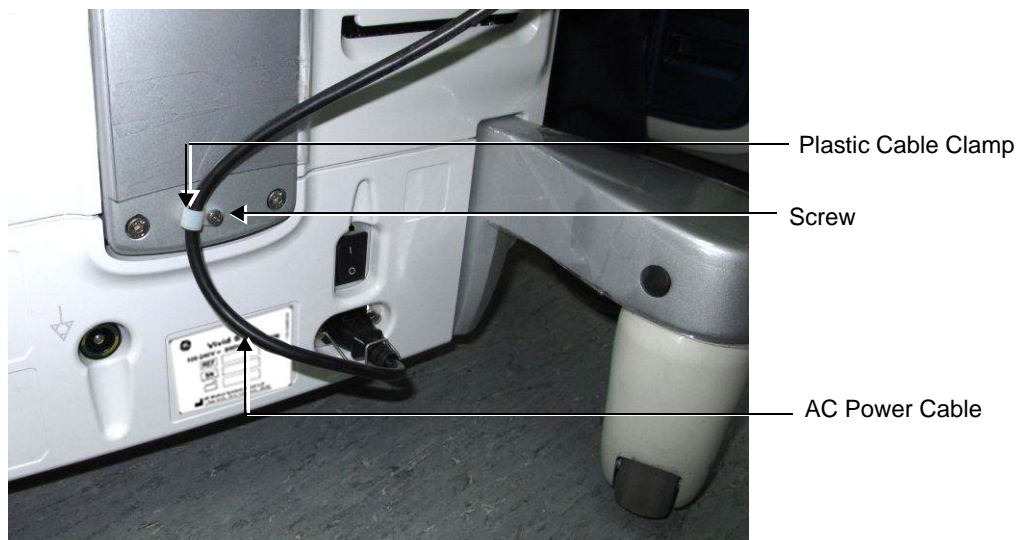
AC Power Cable

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.

4-2-2-3   Switch ON the AC Power to Vivid™ S60/Vivid™ S70

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

LED Illuminated Green

Power ON/OFF Switch in ON Position
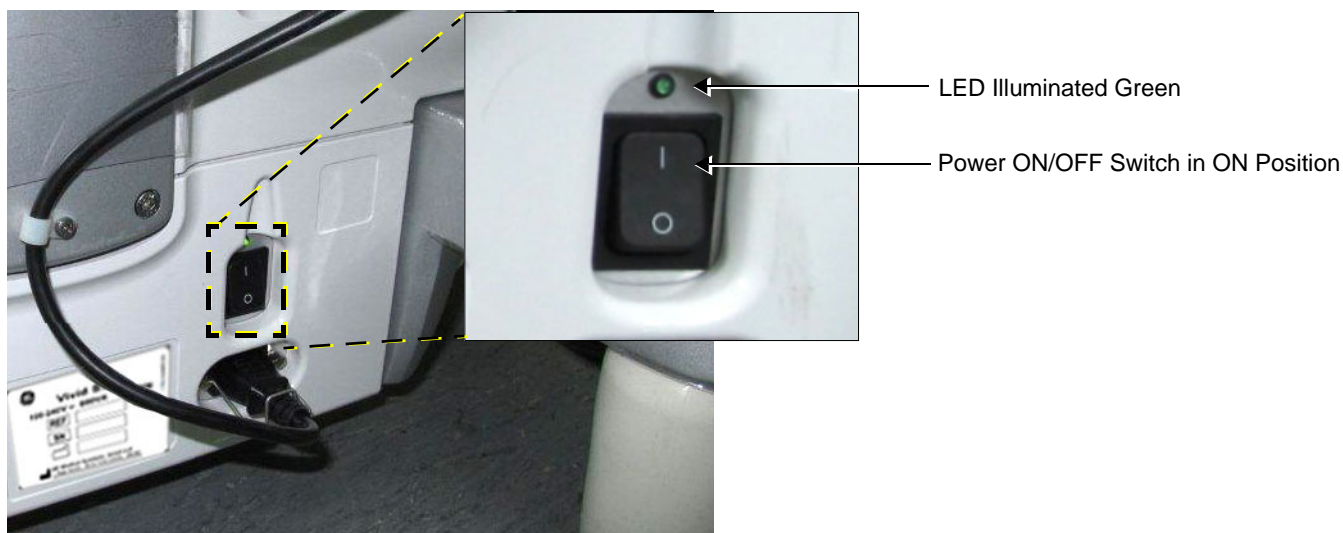
Figure 4-4   AC Power ON

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.
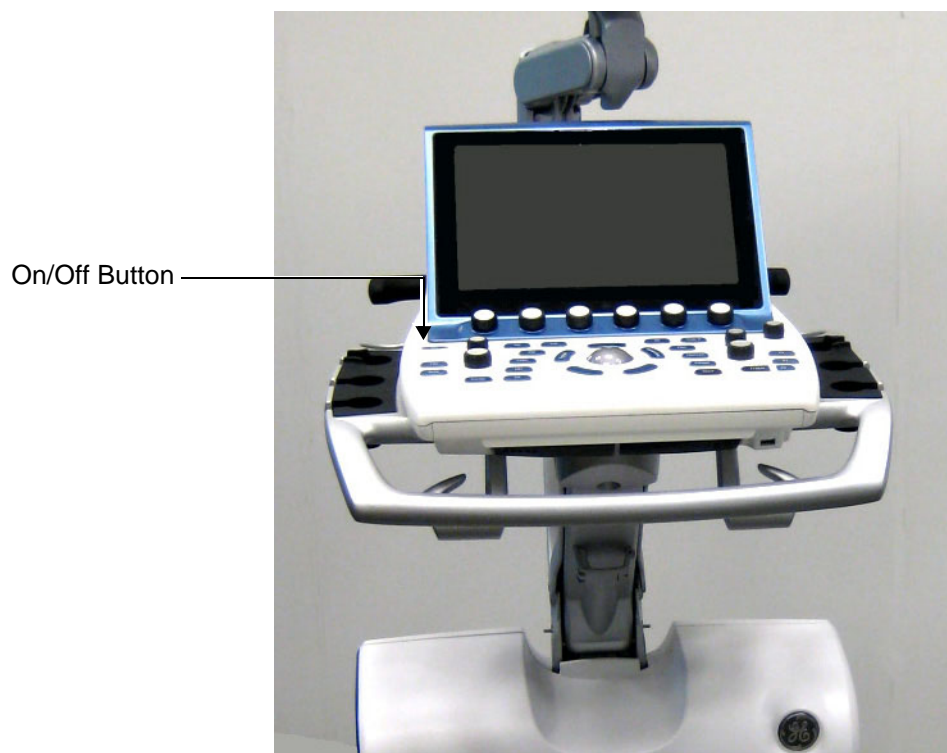
On/Off Button ——

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, Operator 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.) The Start Screen is displayed on the monitor.

        3.) A start-up progress bar indicating the time used for software loading, is displayed.

        4.) The software initiates and sets up the Front-End electronics and the rest of the scanner.

        5.) The Keyboard backlight illuminates.

        6.) As soon as the software has been loaded, either a 2D screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

NOTE: *Total time used for start-up is typically 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.*

4-2-3   Power Shut Down

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

When you switch off the unit, the system performs an automatic shutdown sequence.
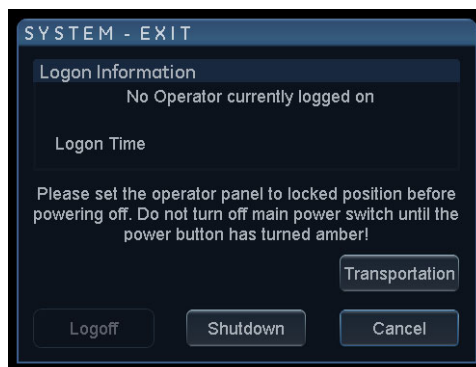
Figure 4-1.   Exit Dialog Window

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.

4-2-4   Logging On to the Vivid™ S60/Vivid™ S70 as "ADM"

4-2-4-1   Introduction

When you need to log on to Vivid™ S60/Vivid™ S70, you may either use the Touch Screen, or the alphanumeric keyboard.

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

1) Select U**tility**. [Utility]

2) Then select **Config…** [Config…]
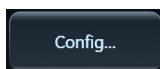
This will bring up the Operator Login dialog where you can log on to Vivid™ S60/Vivid™ S70.

4-2-4-3   Select Config via the Alphanumeric Keyboard

• Press **F2** on the alphanumeric keyboard.

This will bring up the Operator Login dialog where you can log on to Vivid™ S60/Vivid™ S70.

4-2-4-4   The Operator Login dialog

The first time someone log in to Vivid S60/Vivid S70, the Operator field will be blank.
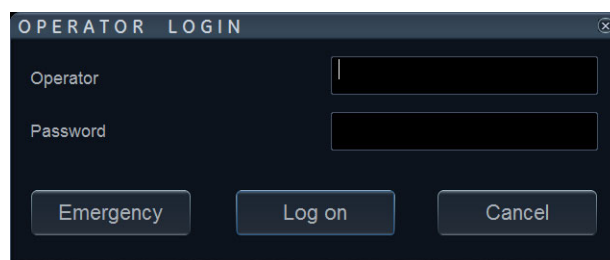
Figure 4-6   Operator Login

As default, two users are defined on Vivid S60/Vivid S70; 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 L**ogin**.

• If you log on as **ADM**, you will have access to do general setup and service adjustments on Vivid S60/Vivid S70.
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.

4-2-4-5   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 S60/Vivid S70 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.
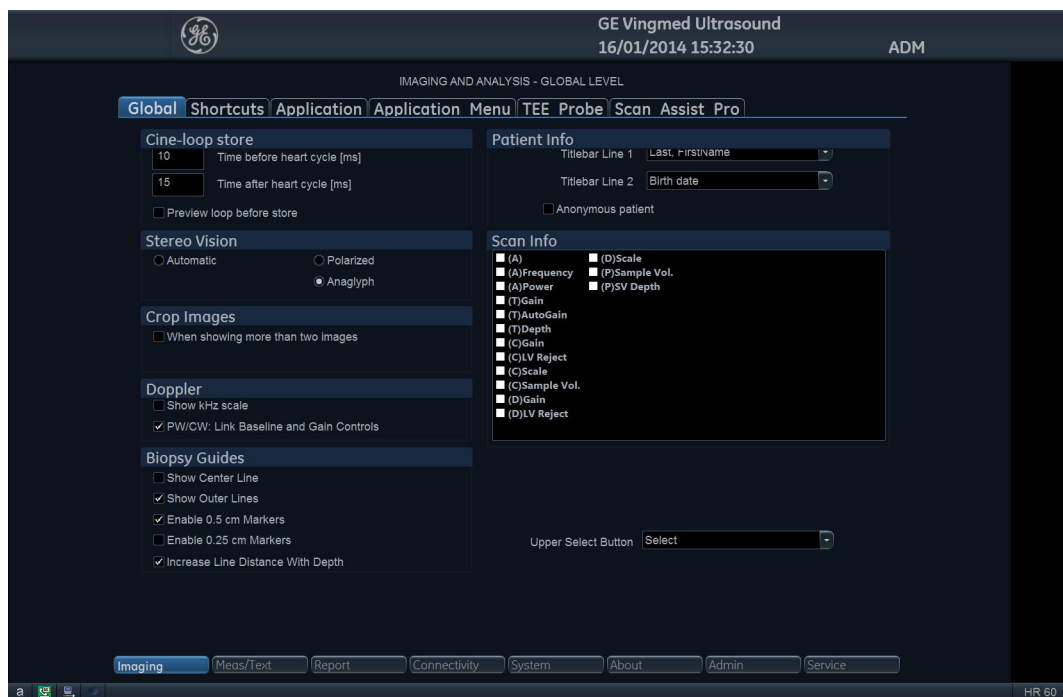
Figure 4-7   Imaging and Analysis - Global Level Window

4-2-5   Data Management

For information, refer to the latest revision of the *Vivid S60/Vivid S70 User Manual*.

4-2-6   Deleting Patient Information

⚠ **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.

4-2-7 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.

4-2-7-1 To Unlock/Lock the LCD Monitor

4-2-7-1-1 To Unlock and Move the LCD Monitor

1) Turn the release knob clockwise to unlock the LCD monitor- Figure 4-9 [**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 4-8).

Figure 4-8   Positioning the LCD Monitor

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

4-2-7-1-2 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.
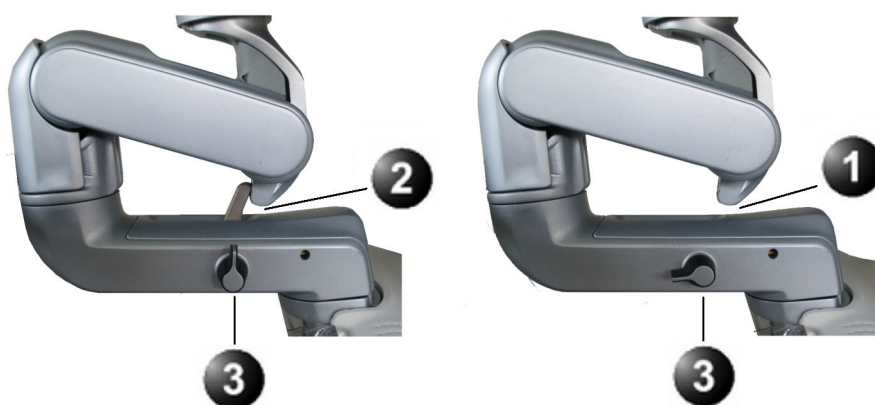
1. Unlocked LCD monitor
2. Locked LCD monitor
3. Release knob

Figure 4-9   LCD Monitor Locking Mechanism

4-2-8   Moving and Transporting the Vivid S60/Vivid S70 Ultrasound Scanner

4-2-8-1   The Casters (Wheels) Control

The pedals located between the front wheels of the Vivid S60/Vivid S70 control the following:

- Swivel and brake on the Front wheels.
- Swivel on the Rear wheels.

Examine the wheels frequently for defects to avoid breaking or jamming.
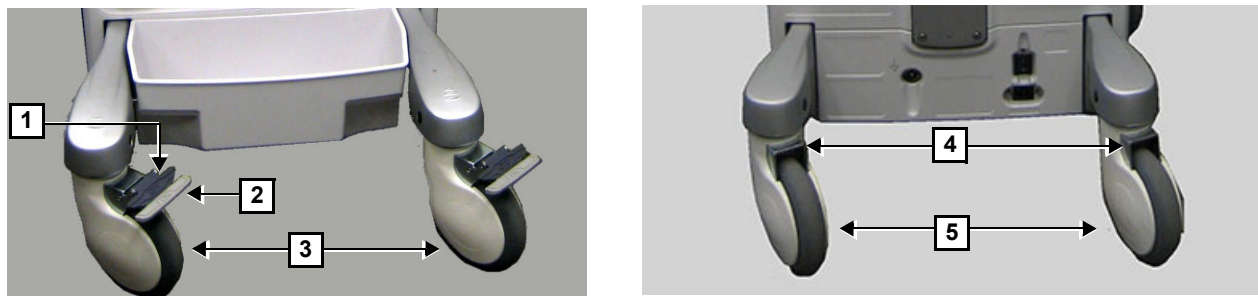
1. Release front wheel brake
2. Lock Front Wheel brake
3. Front wheels
4. Rear wheel swivel
5. Rear wheels

Figure 4-10   Wheels

⚠ **CAUTION**   Use the brakes on the front wheels when preparing to transport the unit, or if parking the system on an incline. Avoid ramp steeper than 10 degrees.

4-2-8-2   To Prepare the Vivid S60/Vivid S70 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 - 11

•   Power Shut Down on page 4 - 7

4-2-8-3   To Ensure Safety while Moving the Vivid S60/Vivid S70

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 - 11

4-2-8-4 Transporting the Vivid S60/Vivid S70 by Vehicle

Take extra care when transporting the Vivid S60/Vivid S70 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 S60/Vivid S70 while it is on the lift, to prevent rolling.
• Do not attempt to hold it in place by hand.
• Cushion the Vivid S60/Vivid S70 and strap the lower part so that it does not break loose.
• Ensure that the Vivid S60/Vivid S70 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 S60/Vivid S70 on page 4 - 13
• LCD Monitor Position Adjustment on page 4 - 11

4-2-8-5 At the New Location

• When the Vivid S60/Vivid S70 is in place at a new location, lock the wheel brakes.

4-2-9   Cleaning the Trackball

The optical trackball is used on Vivid S60/Vivid S70. If dust is interfering with the light in an optical trackball, cleaning is required.

4-2-9-1   When Cleaning is Needed

Follow these steps to clean the trackball:

1) Power OFF the Vivid S60/Vivid S70.

Figure 4-11   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 S60/Vivid S70 and check that the trackball now works as intended.

Section 4-3
Functional Checks

4-3-1   Overview

The functional checks for Vivid™ S60/Vivid™ S70 are described in this section.

Functional checks are used to verify that the Vivid™ S60/Vivid™ S70 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 S60/Vivid S70.

The 2D Mode window is displayed (default mode).
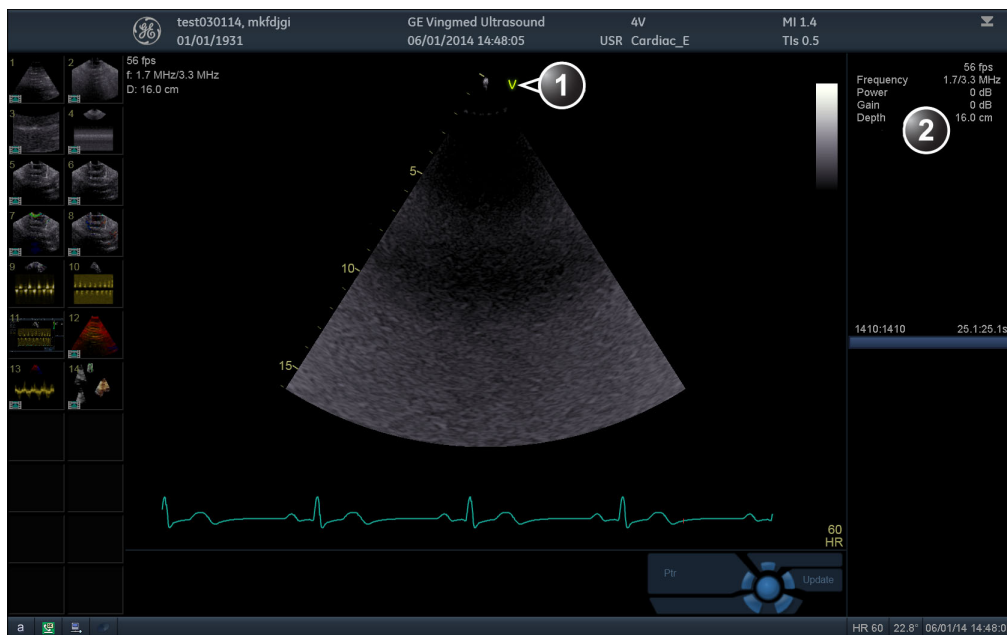
1. Probe orientation marker
2. Parameter window

Figure 4-12   The 2D Screen (Cardiac)

Figure 4-13   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
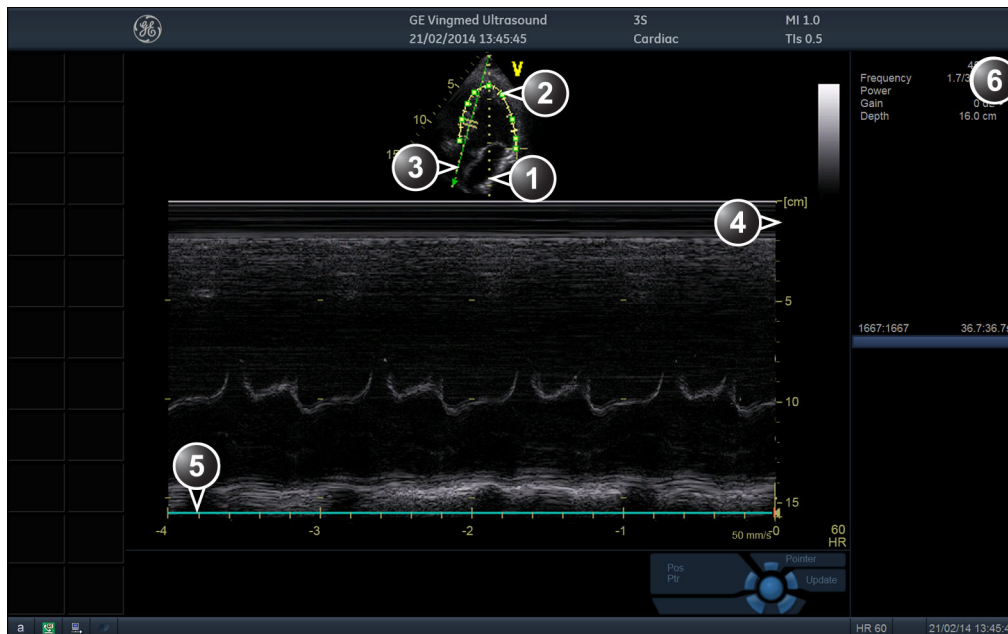
1. Time motion cursor conventional M-Mode
2. Time motion cursor curved anatomical M-Mode
3. Time motion cursor anatomical M-Mode
4. Depth scale
5. Time scale
6. Parameter window

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 4-14   The M-Mode Screen (Composite)
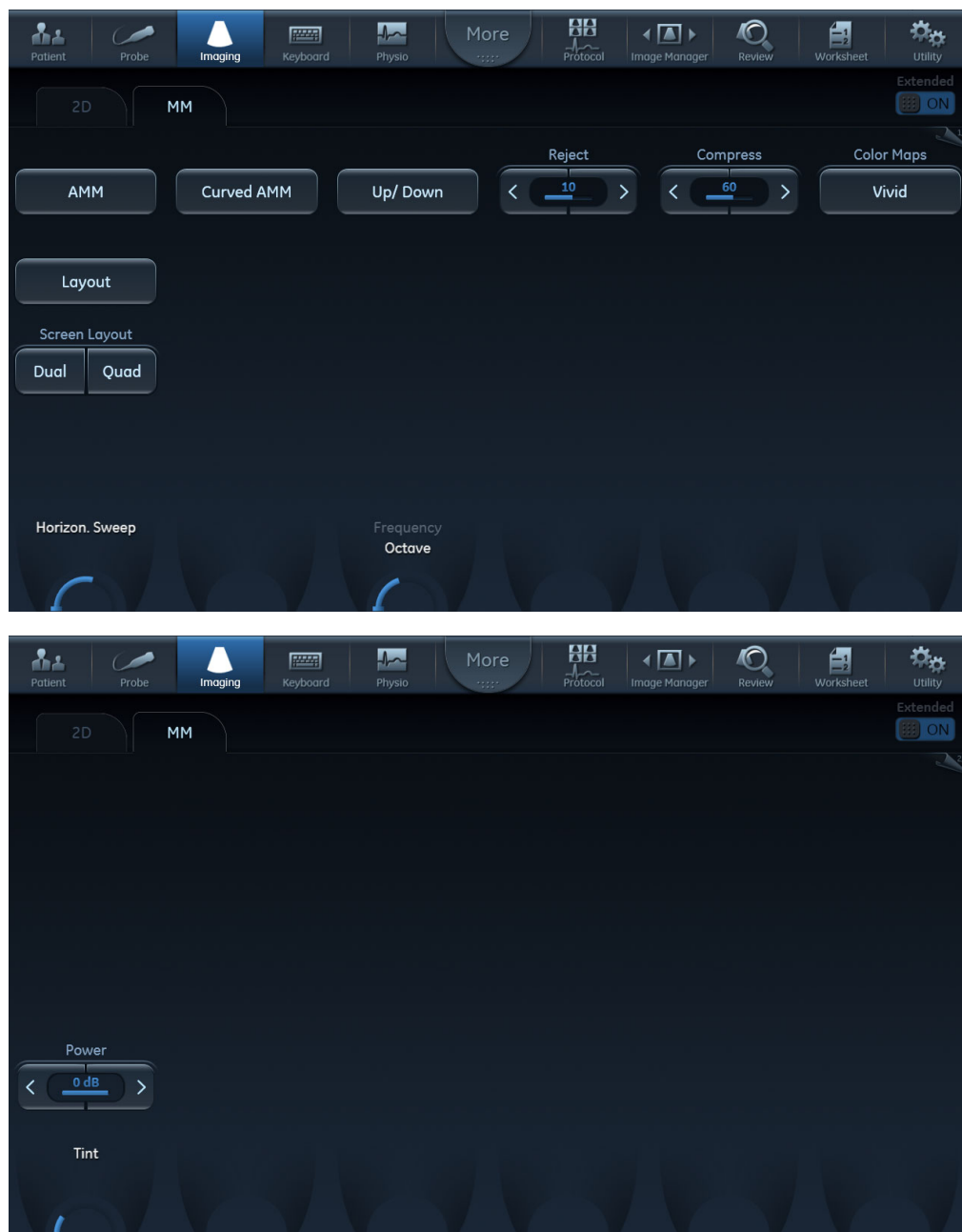
Figure 4-15   M-Mode Touch Panel Page 1 and 2

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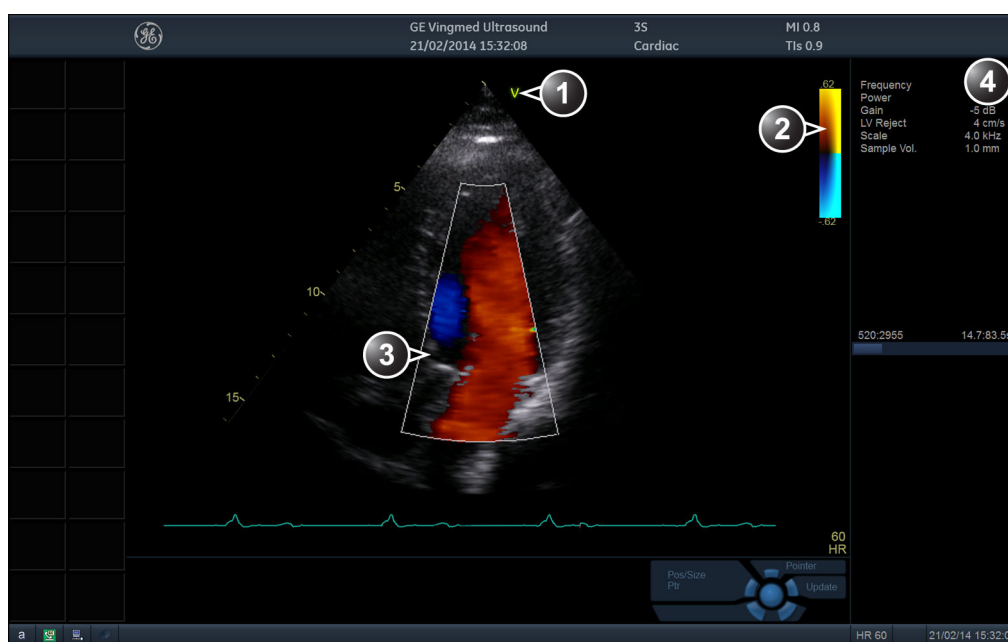
1. Probe orientation marker
2. Color bar
3. Color sector marker
4. Parameter window

Figure 4-16   Color Mode Screen
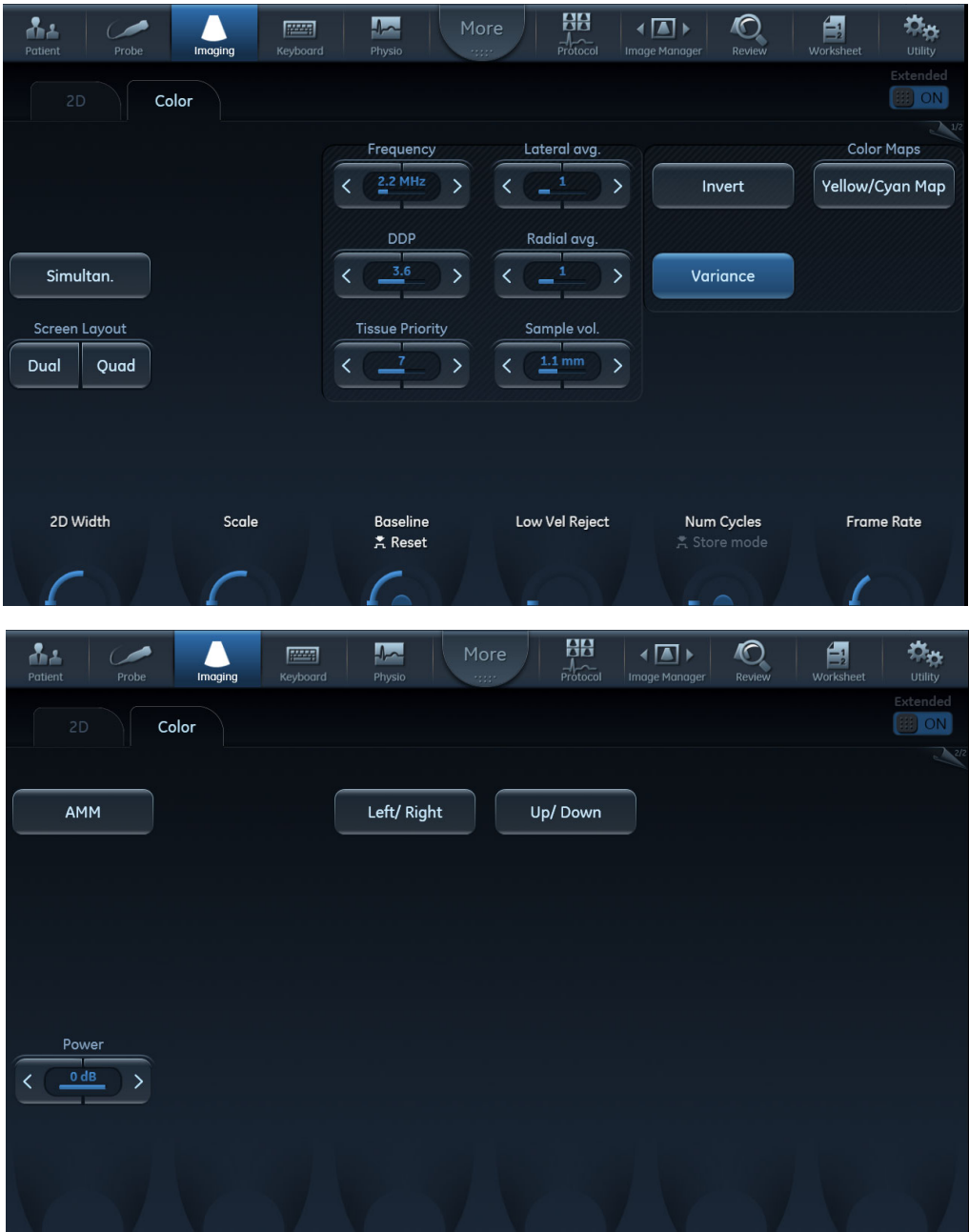
Figure 4-17   Color 2D Touch Panel - Page 1 and 2

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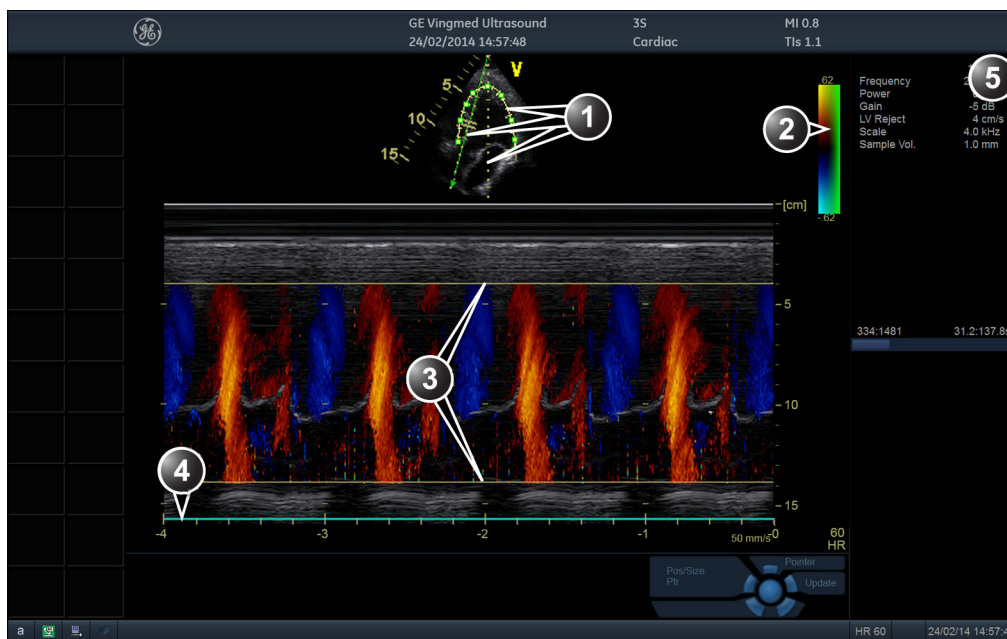
1. Time motion cursors (M-Mode, AMM and Curved AMM)
2. Color bar
3. Flow sector marker
4. Time scale
5. Parameter window

Figure 4-18   Color M-Mode Screen (Composite)

Figure 4-19   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 4-30)
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 4-20   PW/CW Doppler Mode Screen
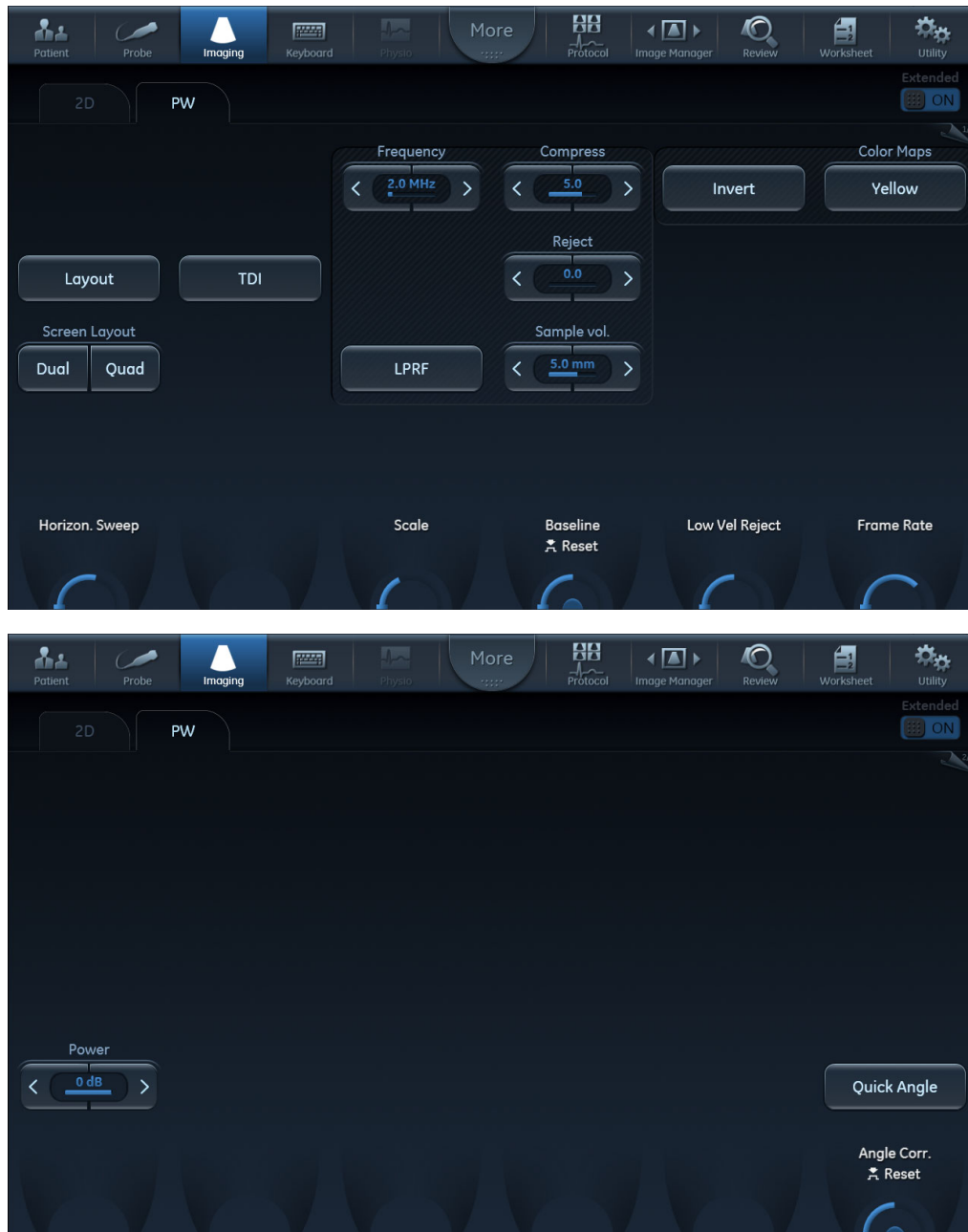
Figure 4-21   PW Doppler Touch Panels - Page 1and 2

Related information:

Refer to the *Vivid S60/Vivid S70 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
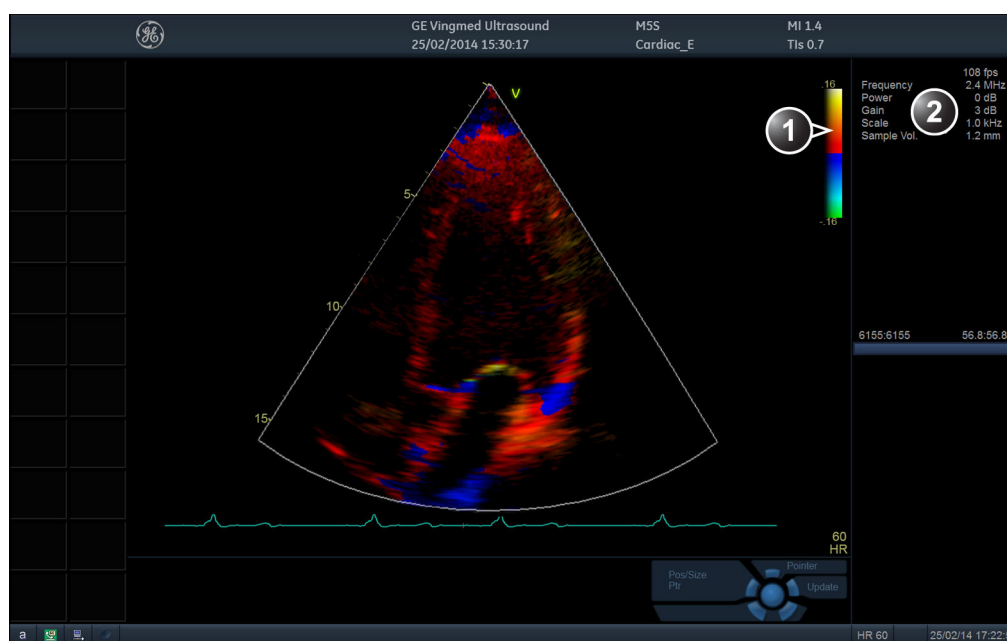
1. TVI color bar
2. Parameter window

Figure 4-22   TVI Mode Screen
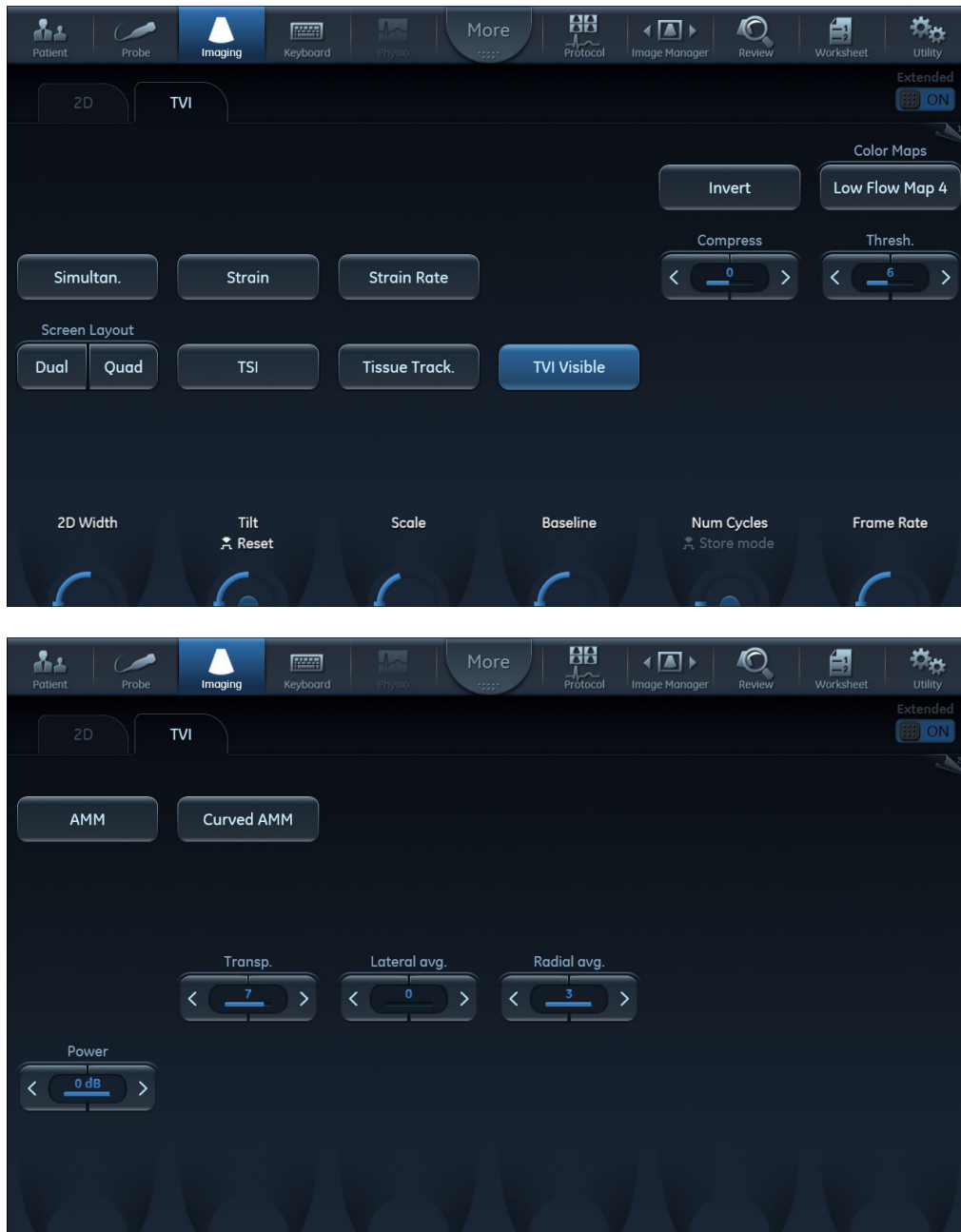
Figure 4-23   TVI Touch Panel - Page 1 and 2

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 **Probe** on the Operator 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	• Trackball to the desired application. • Press **Select** to launch the application. • To change application without changing the current probe, press **Appl.** on the Operator Panel.	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.	

Related information:

- Electrical Safety Tests on page 10 - 15

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 4-24   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   Operator Panel Check

The Operator Panel is automatically checked during Vivid S60/Vivid S70 system start-up.

4-3-13   Peripheral Checks

4-3-13-1   Printer Checks

The internal printer is controlled from the **P1** key on the Vivid S60/Vivid S70's Operator 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 Operator 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.	

4-3-13-2   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.*

4-3-13-3   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.

4-3-13-4   View the Windows Printer Queues

1) Go to **Utility** > **System** > **Peripherals**.

2) Click on **Properties**.

4-3-14   Mechanical Functions Checks

4-3-14-1   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 *upwards*. (It is located on the *right* side below the operator panel).	The *up and down* movement locking mechanism is released, allowing the arm to be raised or lowered.
2	While lifting the release handle, raise the operator panel *upwards*, then *downwards* and make sure it is able to reach its maximum lowest and maximum highest positions.	Ensure that you do not apply too much force to move the operator panel and that the movement is smooth. Ensure that you do not apply too much force to move the release handle and that the movement is smooth. During the movement up and down make sure the image displayed on the monitor does not present any disturbance.
3	Release the up/down handle.	Make sure the arm is locked and no movement is observed when moderate force is applied to the operator panel (*upwards* and *downwards*).
4	Check all positioning capabilities of the Articulated Arm, as illustrated in Figure 5-6 on page 5-9.	Make sure the arm can be moved freely into the illustrated positions.

4-3-14-2   Operator Panel Movement Check

Table 4-6   Operator Panel Movement Check

Step	Task	Expected Result(s)
1	Lift the left/right release handle located on the *left* side of the Operator Panel.	The *left and right* movement locking mechanism is released, allowing the Operator Panel to be swiveled 30 degrees to the right and left from the center position.
2	While lifting the release handle, swivel the operator panel left and right and make sure it is able to reach its maximum left and maximum right positions.	Ensure that you do not apply too much force to move the operator panel and that the movement is smooth. Ensure that you do not apply too much force to move the release handle and that the movement is smooth. During the movement up and down make sure image displayed on monitor does not present any disturbance.
3	Release the left/right handle.	Make sure Operator Panel is locked and no movement is observed when moderate force is applied to the operator panel (*left* and *right*).

4-3-14-3   Monitor Movement Check

Table 4-7   Monitor Movement Check

Step	Task	Expected Result(s)
1	Tilt the monitor *forwards* and *backwards*.	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 - *left* and *right*.	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.

4-3-14-4   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 *right*, *left*, *backwards* and *forwards*.	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) *down* on each front castor wheel to lock the wheels in position. Push and pull the unit *right*, *left*, *backwards* and *forwards*.	Ensure that the wheels are locked and there is no movement in any direction.

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Chapter 5
Components and Function (Theory)

Section 5-1
Overview

5-1-1   Purpose of Chapter 5

This chapter explains Vivid™ S60/Vivid™ S70 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

Section	Description	Page Number
5-1	Overview	5-1
5-2	General Information	5-2
5-3	Vivid™ S60/Vivid™ S70 System Design	5-4
5-4	Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Positioning Capabilities	5-6
5-5	Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Electronic Cage	5-11
5-6	Service Access to the Vivid™ S60/Vivid™ S70 System Modules	5-14
5-7	Top Console with Monitor, Operator Control Panel and Touch Screen	5-16
5-8	Internal and External Input/Output	5-20
5-9	Front End Unit	5-21
5-10	Back End Unit	5-24
5-11	System Power Distribution	5-25
5-12	Cooling System	5-28
5-13	Peripherals	5-29

Section 5-2
General Information

5-2-1   Introduction

The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 system main hardware components are configured as illustrated in Figure 5-1.
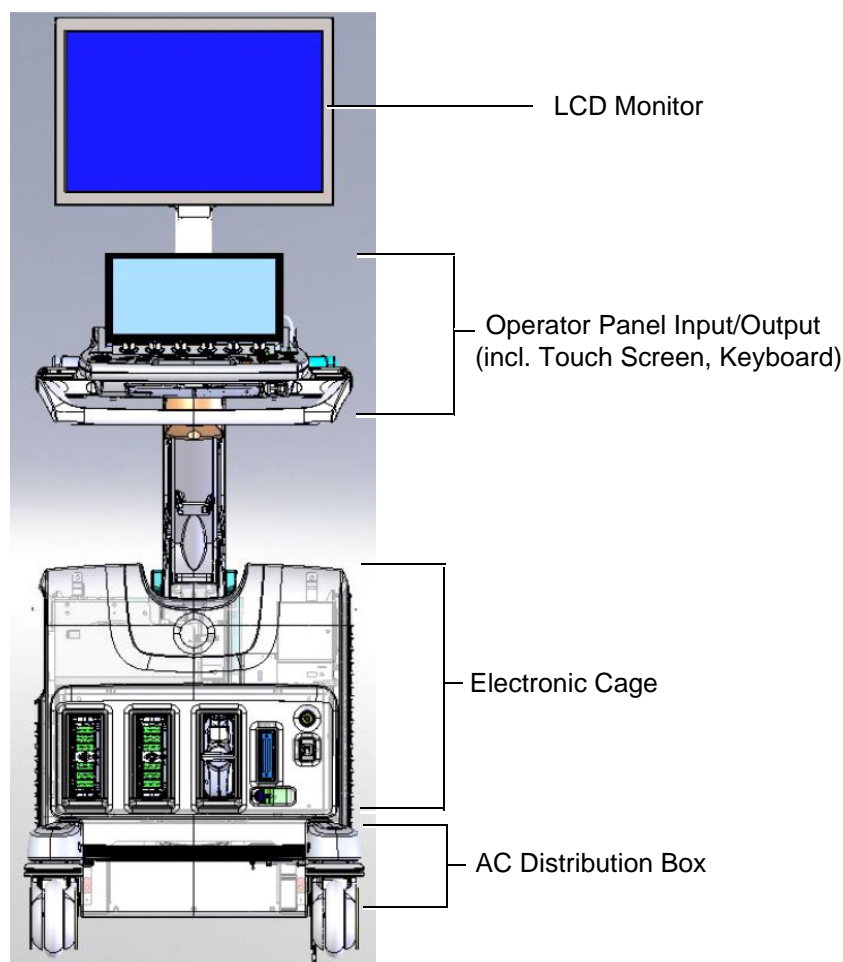
Figure 5-1   Vivid™ S60/Vivid™ S70 System - Configuration of Main Hardware Components

NOTE: *For additional views of the system, see illustrations in Vivid™ S60/Vivid™ S70 System Design on page 5 - 4.*
System operations are initiated by the user via the Operator 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™ S60/Vivid™ S70 system operating modes, refer to the Vivid™ S60/ Vivid™ S70 User Manual.*

The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 system internal electronics are divided into three:

- Front End Unit - see page 5 - 21
- Back End Unit - see page 5 - 24
- System Power Distribution - see page 5 - 25

Vivid™ S60/Vivid™ S70 system internal electronics comprise a single electronic cage (Figure 5-8) 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™ S60/Vivid™ S70 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

User Interface Section

Main Display

Touch Screen

Operator Panel

Main Scanner Section

DVD R/W

B/W Printer

Distribution Panel (BIF)

Scanner Electronic Cage

Patient I/O (ECG and Respiratory)

Power Supply Section

AC Distribution Box and Battery
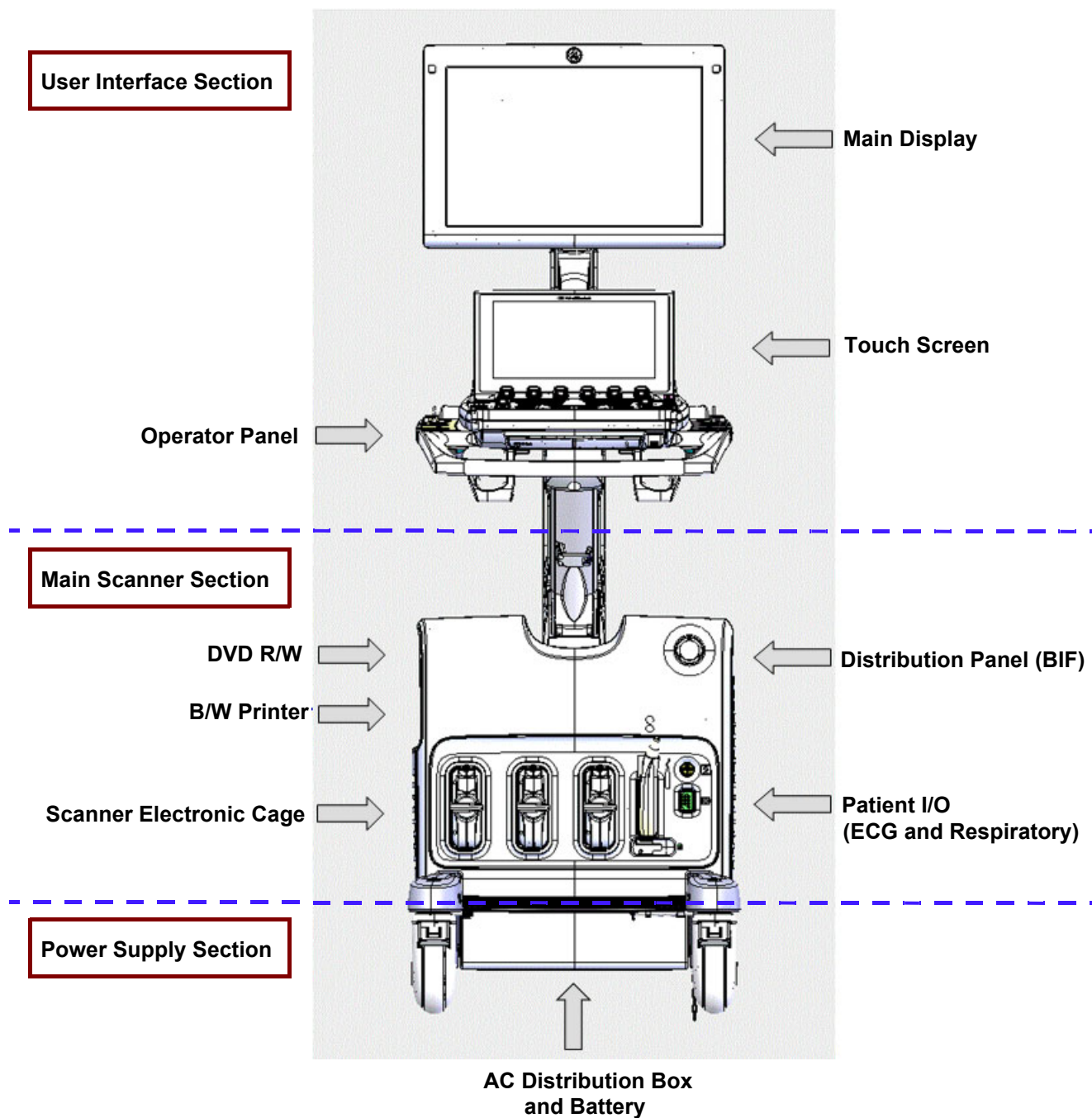
Figure 5-2 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - System Design

5-3-1   User Interface Section

The User Interface section comprises the following modules:

- Operator panel and Speakers
- Main Display
- Touch Screen
- Optional Alphanumeric Keyboard

NOTE: *For details, see Top Console with Monitor, Operator Control Panel and Touch Screen on page 5 - 16*

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

NOTE: *For an explanation and illustrations of the Electronic Cage, see Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Electronic Cage on page 5 - 11.*

For detailed information on individual modules, refer to the following:

- Front End Unit on page 5 - 21
- Back End Unit on page 5 - 24
- Patient I/O Module on page 5 - 23

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

NOTE: *For details, see System Power Distribution on page 5 - 25.*

Section 5-4
Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Positioning Capabilities

5-4-1   System Up and Down Positions
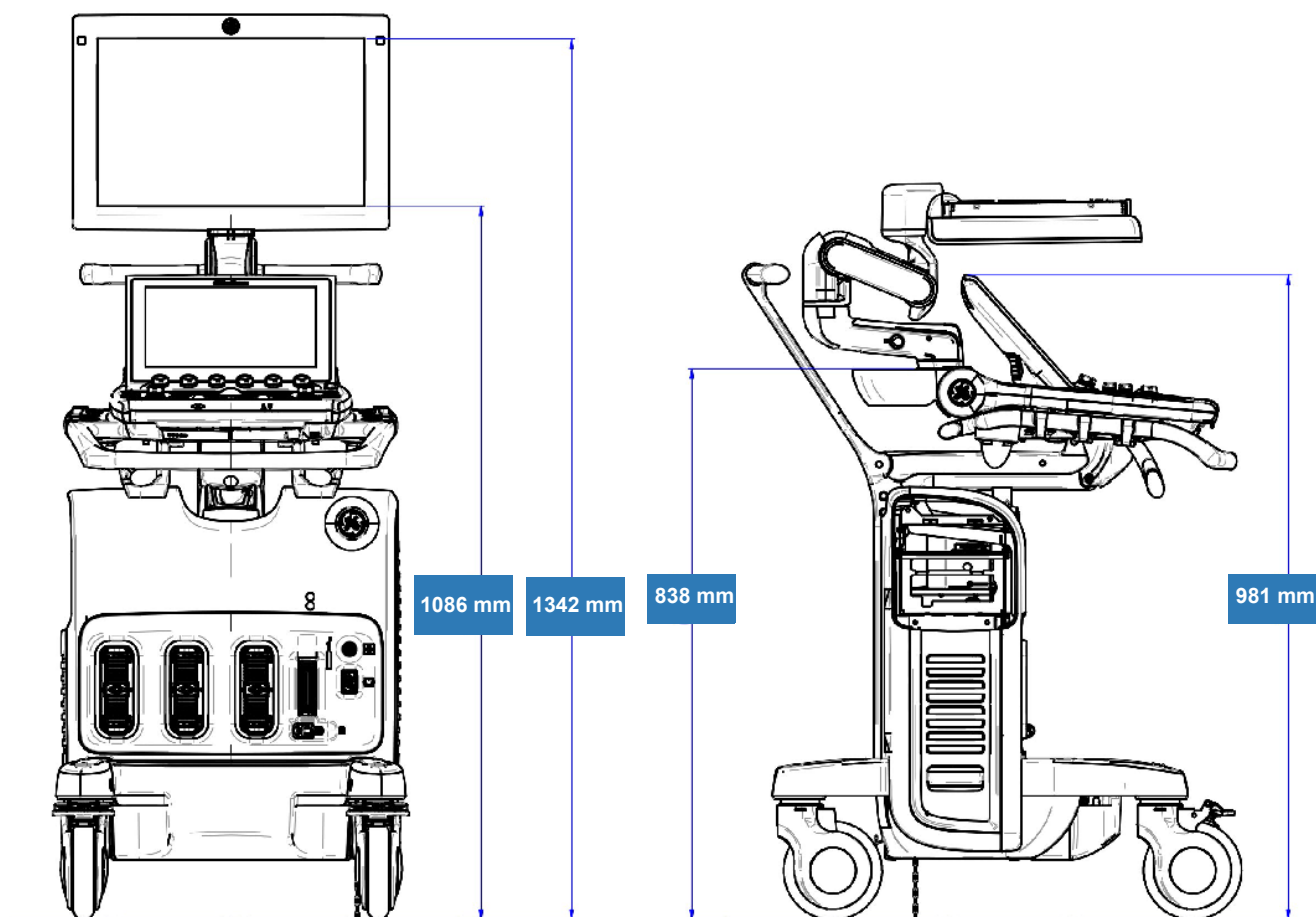
Figure 5-3   Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Up and Down Positions

5-4-2 Upper Section - Positioning Control

UI + 30° Swivel Control

UI Up/Down Control
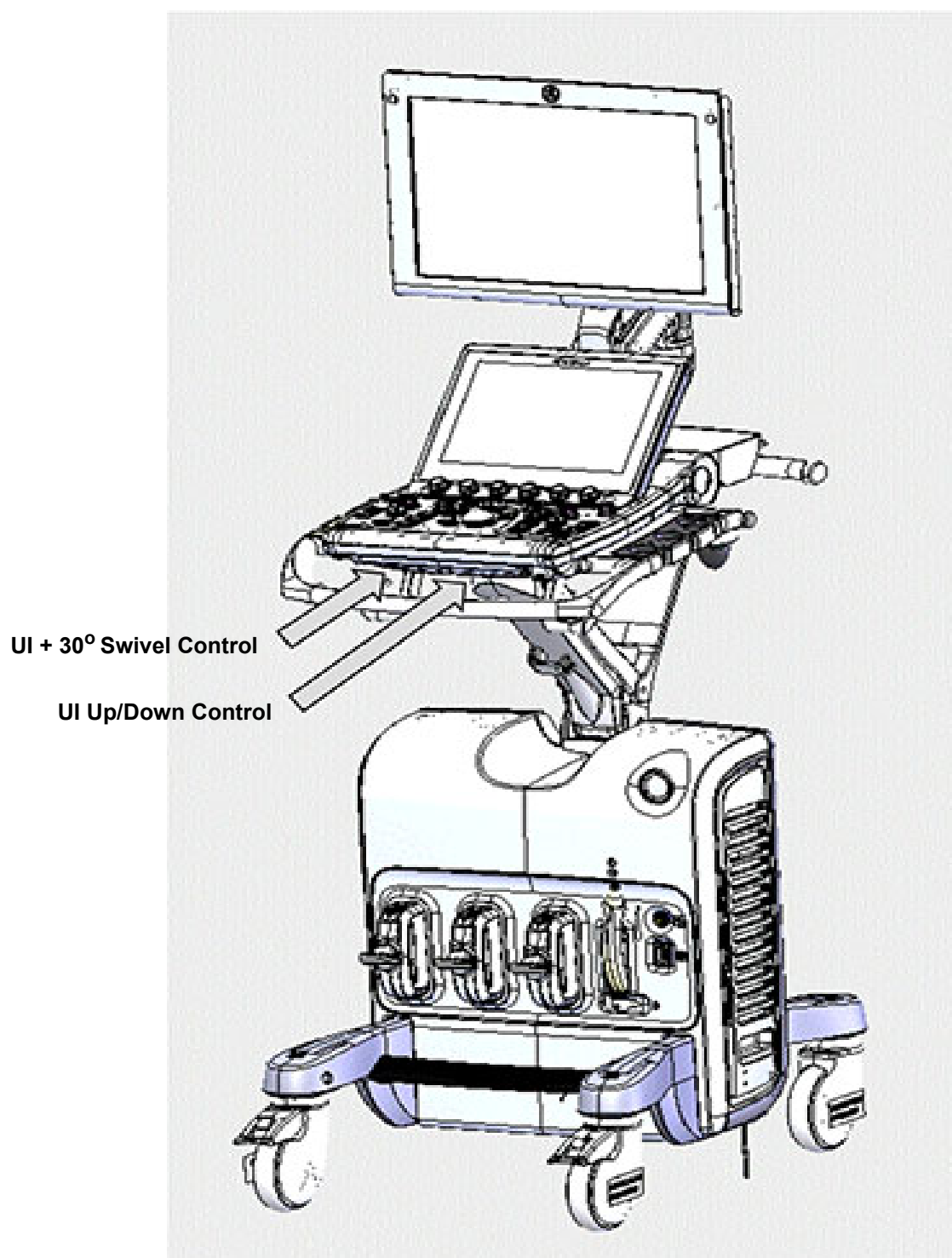
Figure 5-4 Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Upper Section Positioning Control

5-4-3   Main Display - Articulated Arm

**Main Display
Articulated Arm**

**Optional
Alphanumeric
Keyboard**
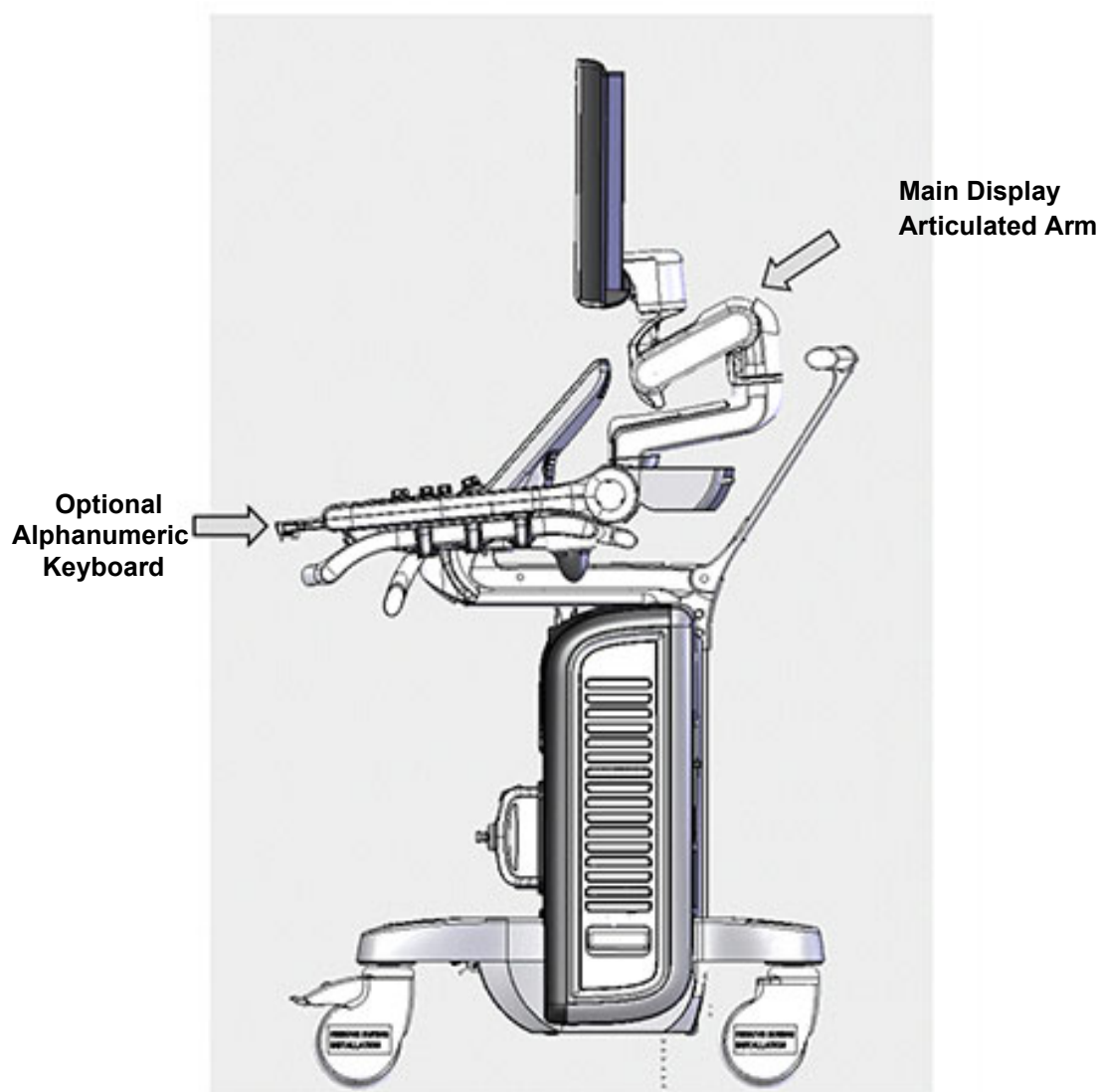
Figure 5-5   Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Side View

5-4-4   Main Display - Positioning Capabilities
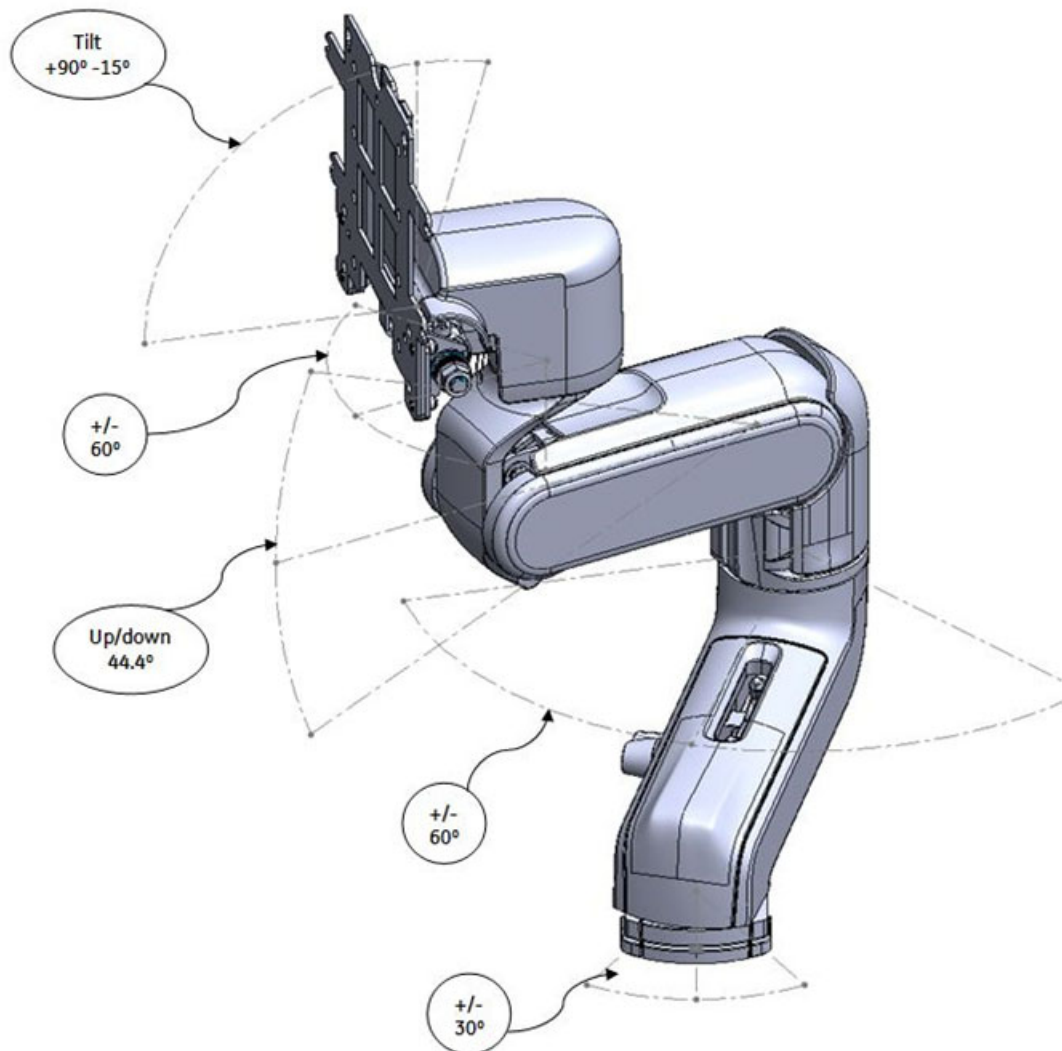
Figure 5-6   Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Main Display Positioning Capabilities

5-4-5 System Positioning for Transportation

Display Arm Lock

1043mm

770mm
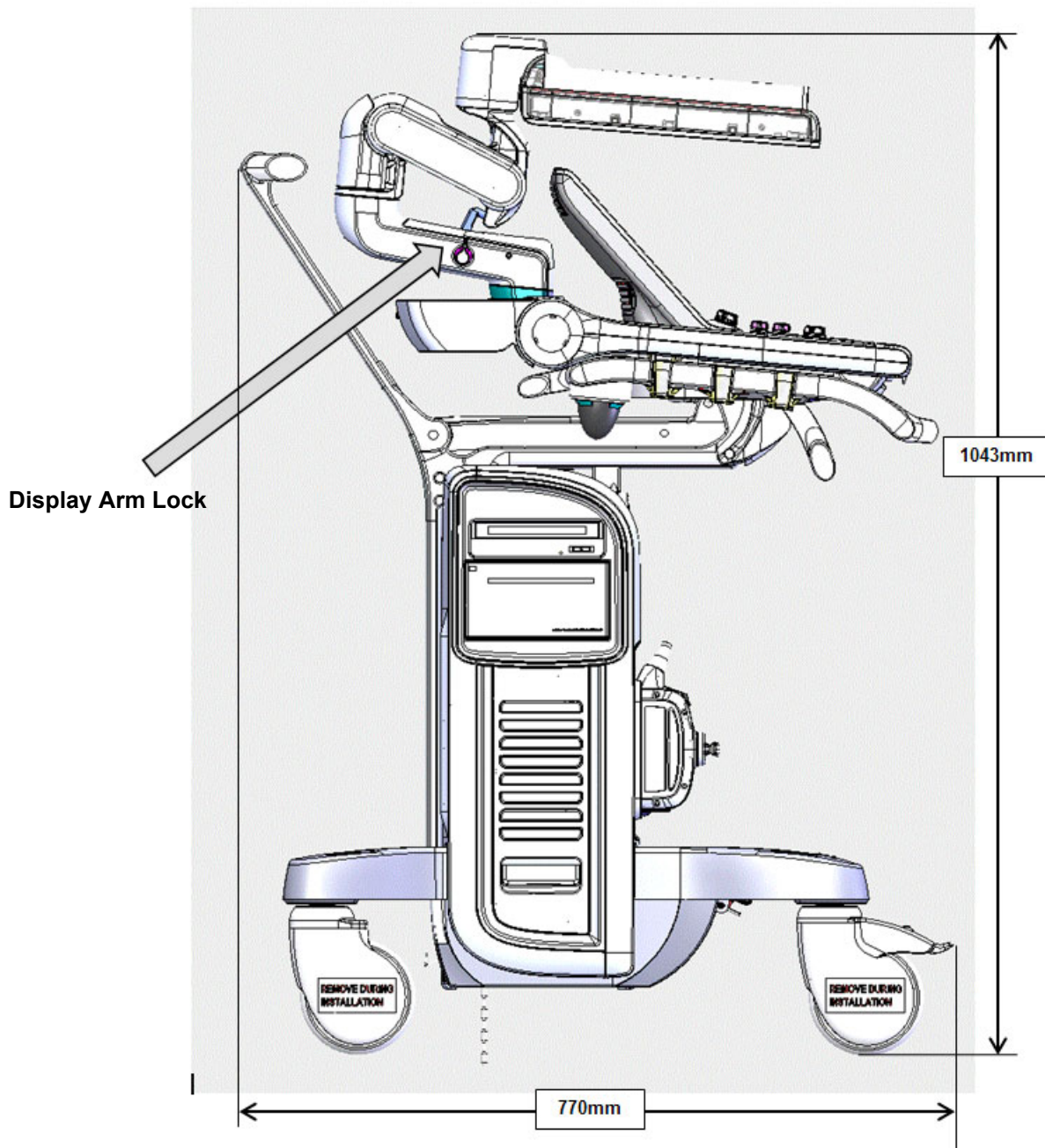
Figure 5-7   Vivid™ S60N/Vivid™ S70N Ultrasound Scanner Positioned for Transportation Mode

Section 5-5
Vivid™ S60N/Vivid™ S70N Ultrasound Scanner - Electronic Cage

5-5-1   Scanner Electronic Cage - Main Assemblies

The Scanner Electronic Cage, specially designed to house the Main Scanner section, has two main assemblies:

- Front End Unit - located in the Electronic Cage door

- Back End Unit - located inside the Electronic Cage cabinet
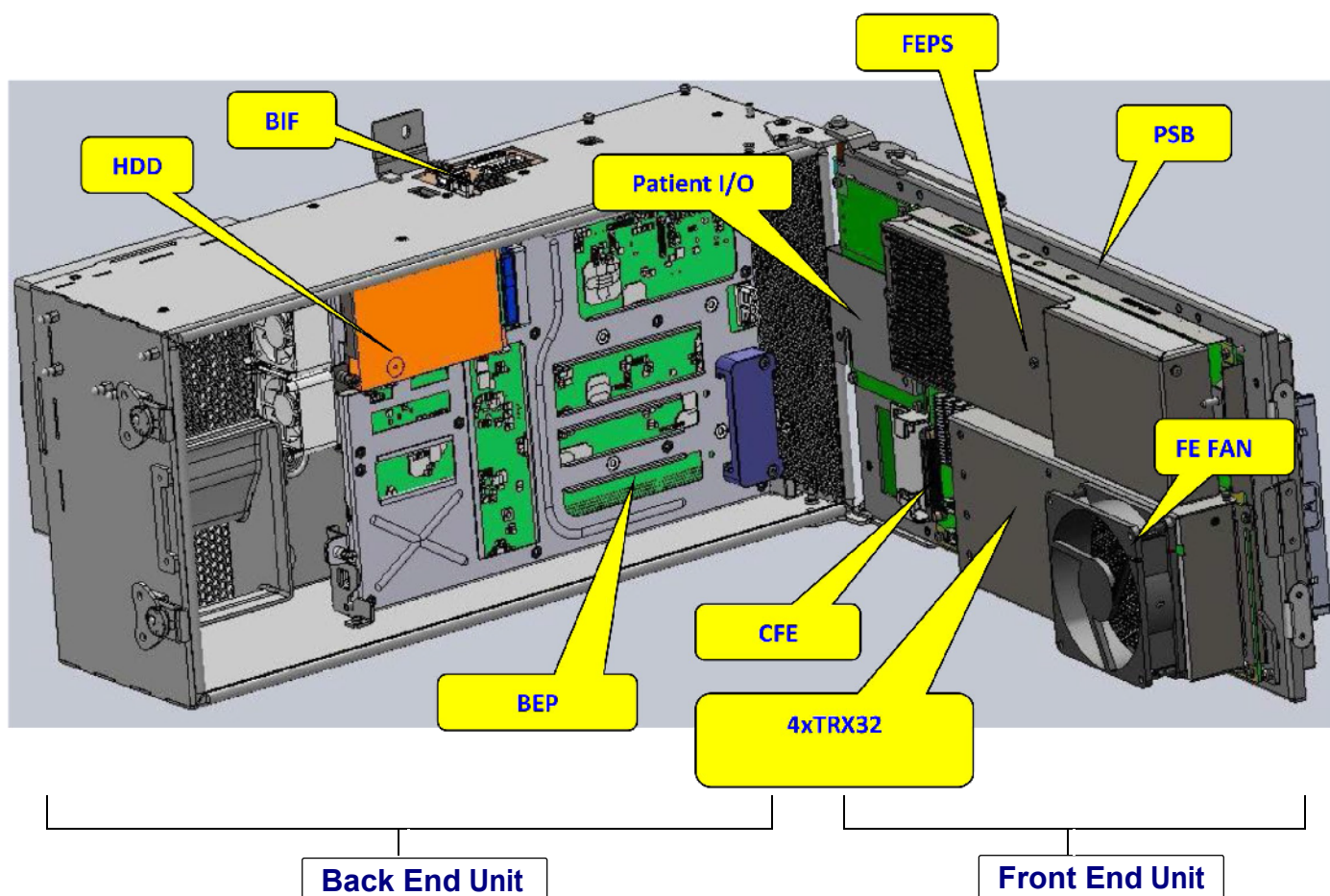
Figure 5-8   Electronic Cage - Internal View

The Vivid™ S60N/Vivid™ S70N Ultrasound Scanner 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.

NOTE: External views of the Scanner Electronic Cage are illustrated in Figure 5-9 through Figure 5-15.
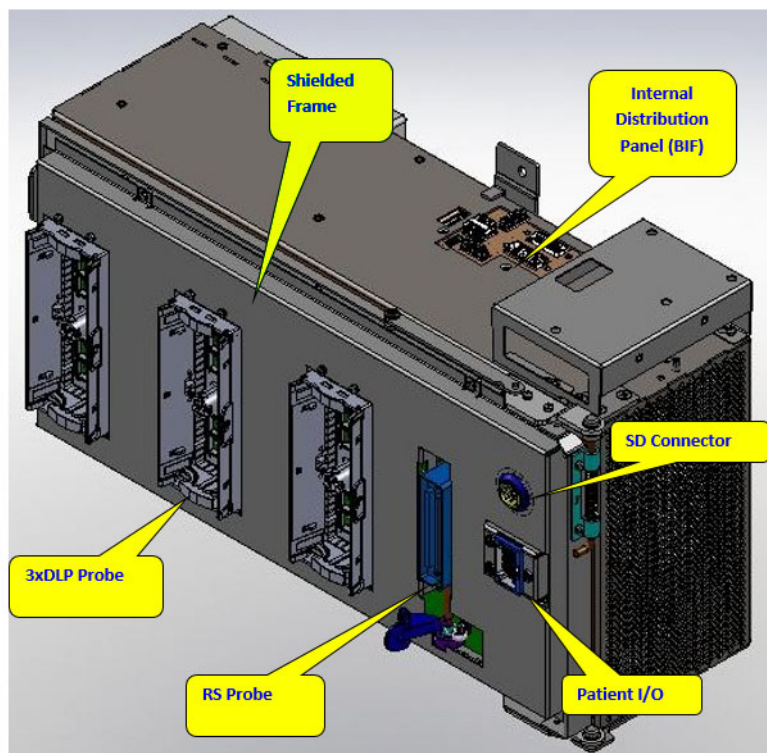
Figure 5-9   Electronic Cage - Front View
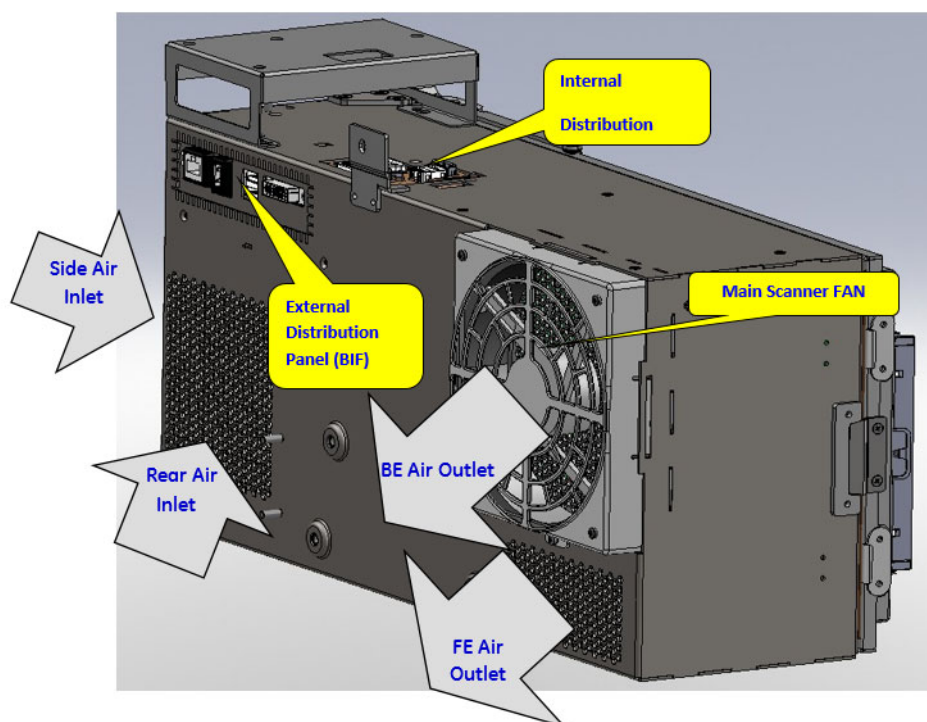
Figure 5-10   Electronic Cage - Rear View
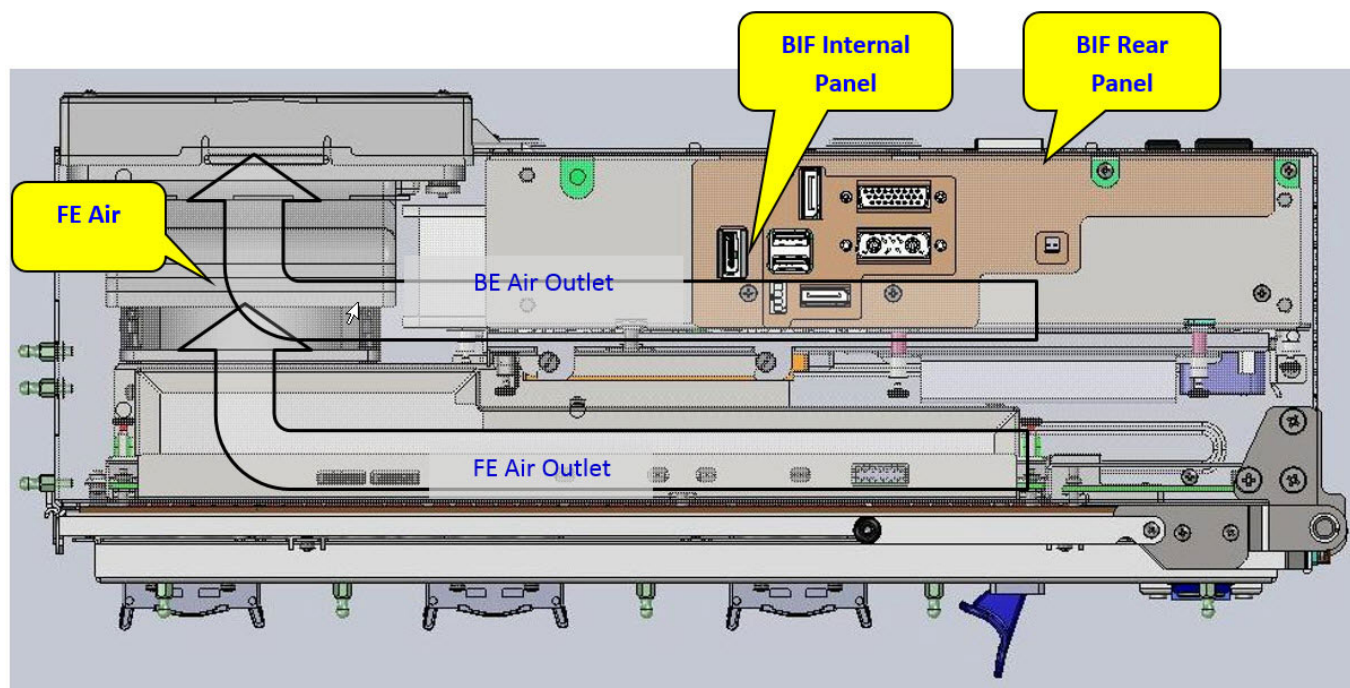
Figure 5-11   Electronic Cage - Top View

Section 5-6
Service Access to the Vivid™ S60/Vivid™ S70 System Modules

5-6-1   Modules Accessed from the Front

Access to the modules in the Electronic Cage (Front End Unit and Back End Unit) is from the front of the system, by opening the Cage door to the right.
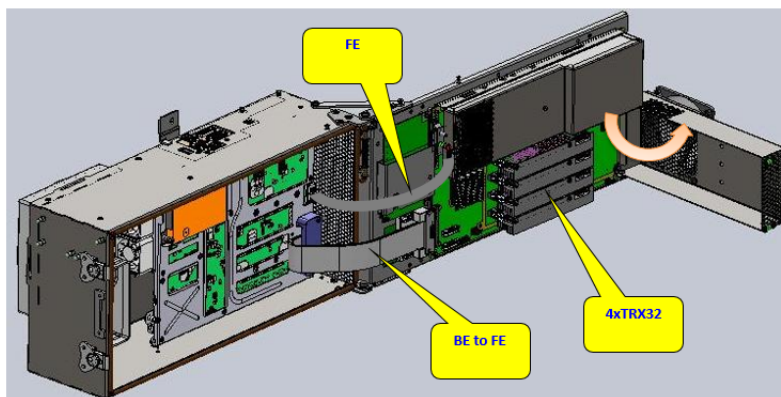
Figure 5-12   Electronic Cage - Access to the Front End Unit

⚠ **WARNING** *WHEN OPENING AND CLOSING THE ELECTRONIC CAGE, TAKE CARE NOT TO DAMAGE THE CABLES CONNECTED TO THE BEP.*

If necessary, the Front End Unit may be dismounted from the cage by lifting it *upwards*, as shown below.
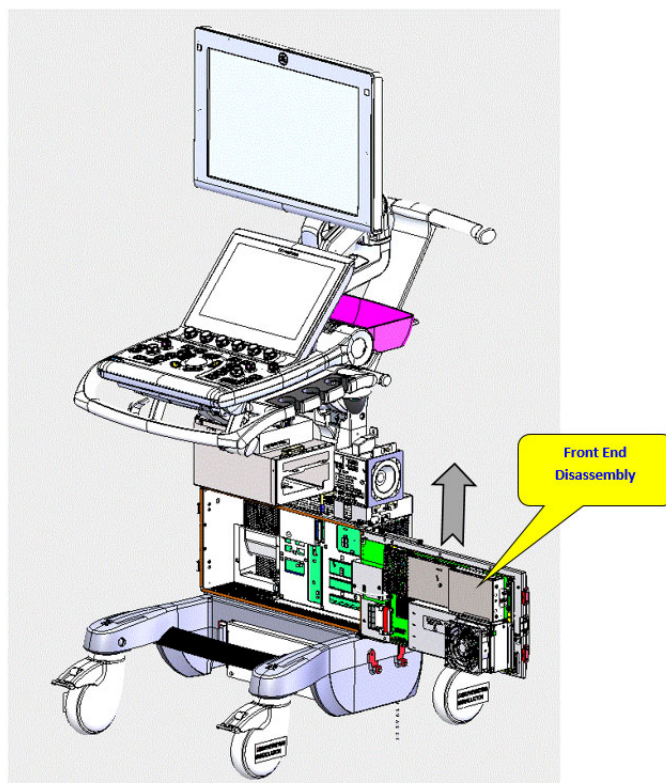
Figure 5-13   Dismounting the Front End Unit from the Electronic Cage
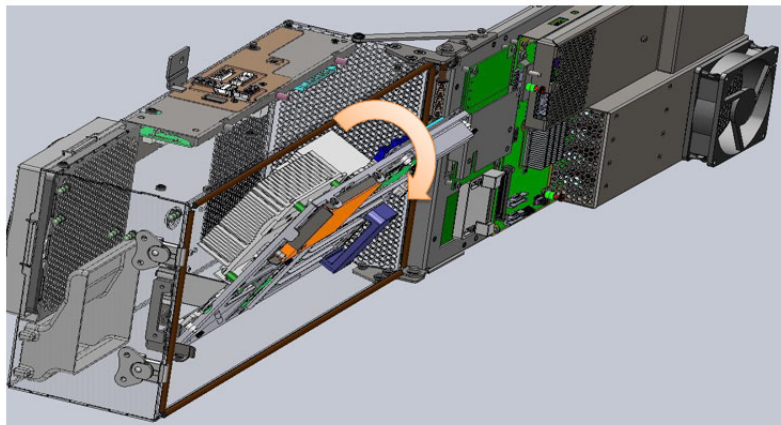
Figure 5-14   Electronic Cage - Access to the Back End Unit

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.
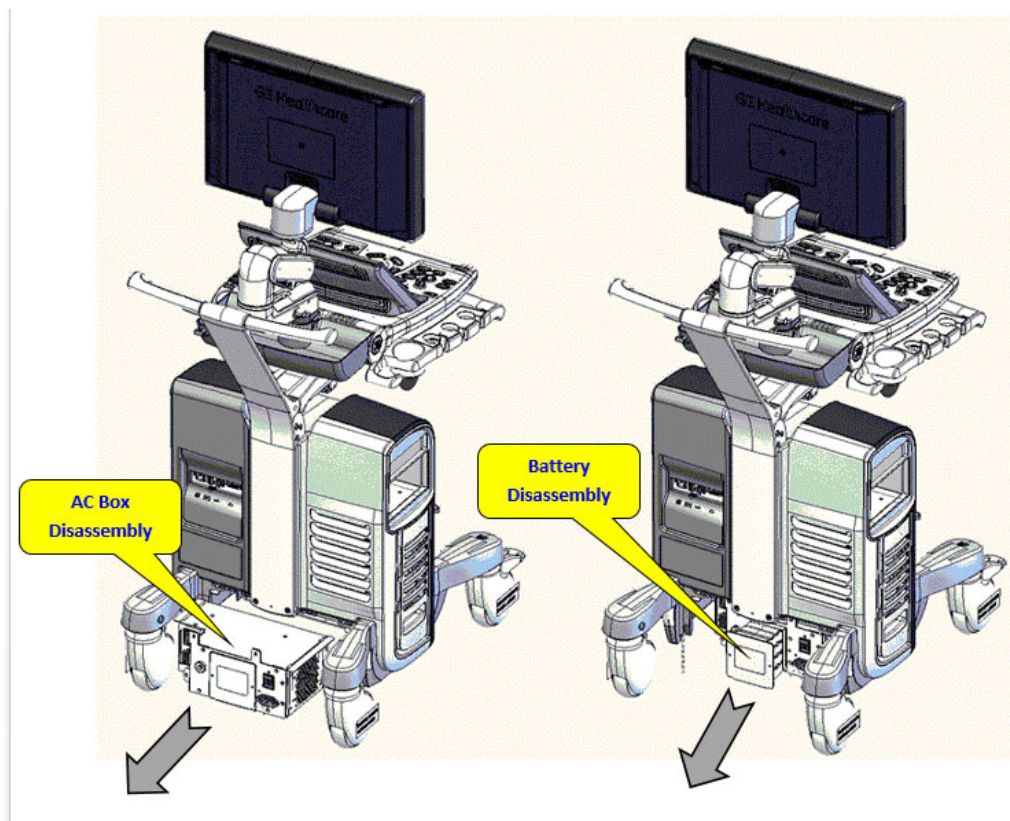
Figure 5-15   Modules Accessed from the Rear

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°

NOTE: *The positioning capabilities of the Main Display are illustrated in Figure 5-6 on page 5-9.*

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™ S60/Vivid™ S70 Operator Control Panel (the OPIO module) comprises the following main components:

- Extended Keyboard
- Touch Screen - LCD multi-touch panel
- Alphanumeric Keyboard (optional)
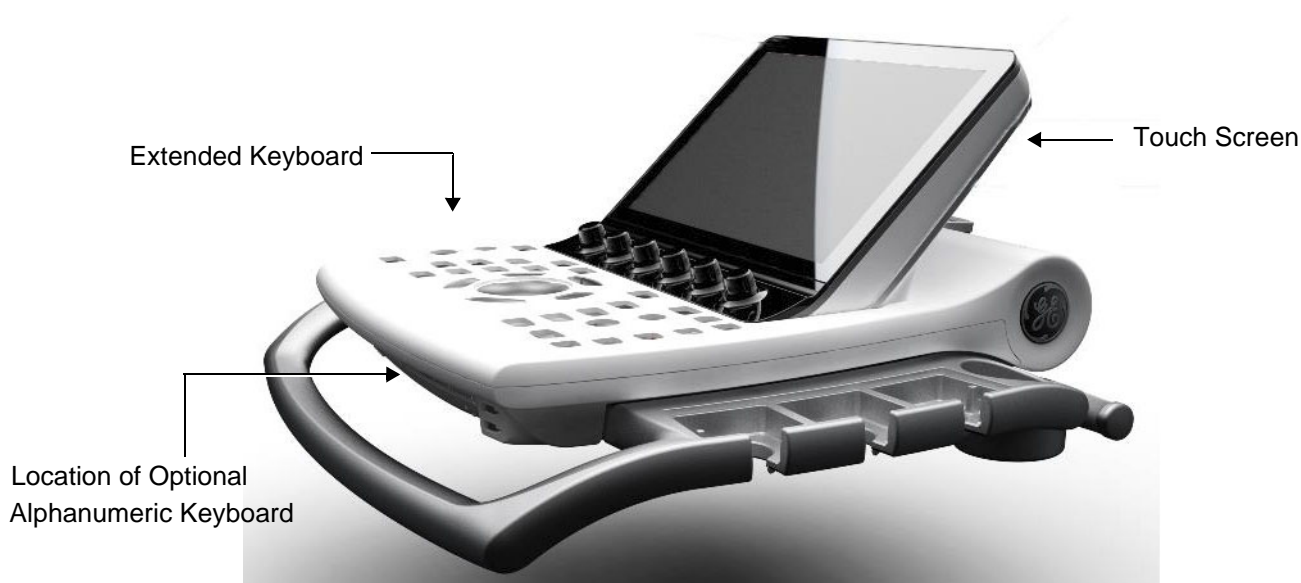
Figure 5-16   Operator Control Panel (without Alphanumeric Keyboard option)

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 Operator 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 5-17 below:
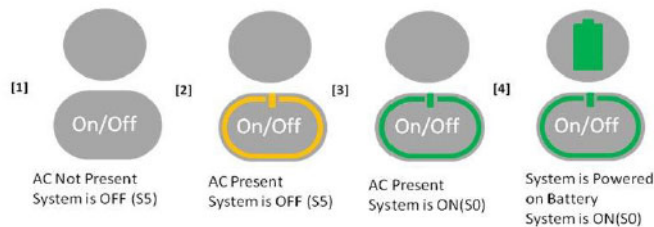
Figure 5-17   Power ON/OFF and Battery Status Indicators

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 5-18   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 operator 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 5-19 shows a view of the Vivid™ S60/Vivid™ S70 ultrasound unit rear panel showing external peripheral/accessory connectors.
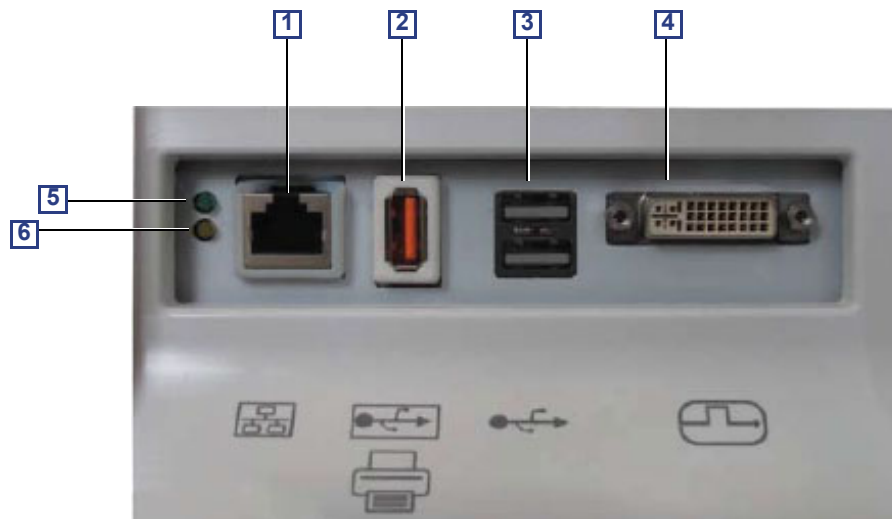
Figure 5-19   View of the Vivid™ S60/Vivid™ S70 Peripheral/Accessory Connector Panel

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 [DVDI-D])

5   LED - Network activity

6   LED - Network activity

Section 5-9
Front End Unit

5-9-1   General Information

The Vivid™ S60/Vivid™ S70 Front End Unit is designed to support the cSound SW beam-forming architecture for 128 channels.

The Front End Unit, located in the door of the Electronic Cage (see Figure 5-20), comprises the following modules:

- **Front End Power Supply (FEPS)**

  See Front End Power Supply (FEPS) on page 5 - 22

- **Control Front End (cFE) Module** - includes four Transmit and Receive Modules (TRX32)

  See Front End (cFE) Board on page 5 - 22 and *Patient I/O Module* on page 5-23.

- **Probe Selector Module (PSB)**

  For interconnection of probes - see *Probe Selection Board (PSB)* on page 5-23

- **Patient I/O Module (PATIO)**

  For a detailed description, see Patient I/O Module on page 5 - 23
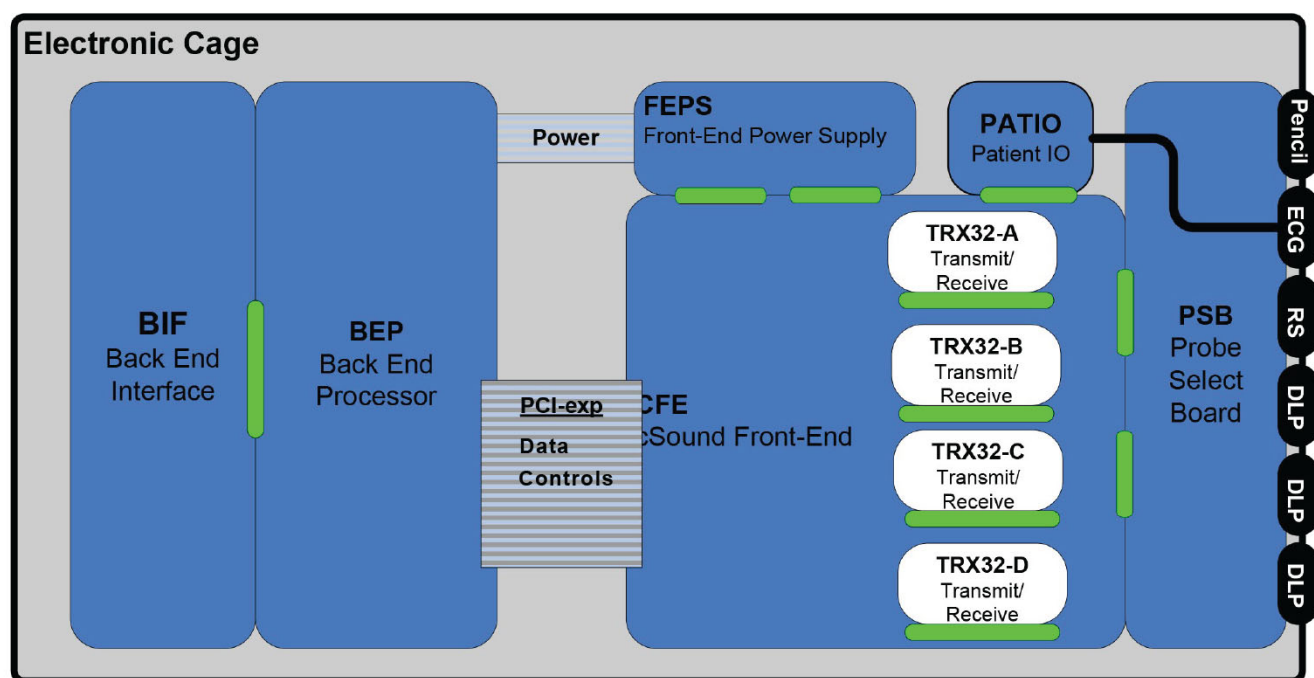
Figure 5-20   Front End Unit - Location of Components in Electronic Cage Assembly

NOTE: For Service Access to the Front End Unit modules, see Modules Accessed from the Front on page 5 - 14.

⚠ **WARNING** *WHEN OPENING AND CLOSING THE ELECTRONIC CAGE ASSEMBLY, TAKE CARE NOT TO DAMAGE THE CABLES CONNECTED TO THE BEP.*

5-9-2   Front End Power Supply (FEPS)

The FEPS Module comprises the following sections:

• Low Voltage Power Supply (LVPS)
• High Voltage Power Supply (HVPS)

5-9-3   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.

5-9-4   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.

5-9-4-1   Pencil Connector

The PSB Pencil Connector supports use of Vivid S5/S6 pencil probes.

5-9-5   Patient I/O Module

5-9-5-1   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

The Vivid™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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).

Section 5-12
Cooling System

5-12-1   General Information

The Vivid™ S60/Vivid™ S70 system has 3 fans for system cooling:

- Back End Processor Fan   - located at the rear of the electronic cabinet.
- Front End Fan   - located on the metal box of the TRX32 Boards (on the cFE).
- AC Distribution Box Fan   - located on the side of the AC Distribution Box.

All fans are controlled and have variable speed.

The cooling requirement for the Vivid™ S60/Vivid™ S70 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 footswich can be connected to one of the USB ports at the rear side of the Vivid S60/Vivid S70.

⚠	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 S60/Vivid S70.

Related information:

*   External Peripherals for Connection to USB on page 3 - 33
*   Color Video Printer Setup on page 3 - 51

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 S60/Vivid S70 may be used.

Related information:

*   See *Chapter 9 -Renewal Parts* for available USB Flash Drives.

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 S60/Vivid S70.

Printers and external servers may be available via the Ethernet network.

5-13-2-5   Network Printers

See: External Peripherals for Connection to Ethernet (TCP/IP) on page 3 - 33.

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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™ S60/Vivid™ S70 ultrasound scanner.

6-1-2   Contents in this Chapter

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
LCD Monitor Adjustments

There are no adjustments required on the Monitor.

Section 6-4
Touch Screen Adjustments

There are no adjustments required on the Touch Screen.

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	Noise Troubleshooting	7-6

Section 7-2
Service Safety Considerations

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

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

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

Section 7-3
Gathering Troubleshooting Data

7-3-1   Purpose of this Section

Trouble images and system data (logs) can be acquired at the device or through remote diagnostics (InSite). These data can be used to perform service at the device, or can be sent back to the manufacturer for analysis.

7-3-2   Contents in this Section

7-3-3   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™ S60/Vivid™ S70

Select Config (F2) > About screen.

- Applications Software
    - Application Software revision
    - Software medium's part number
- System Software
    - System Software revision
    - Software medium's part number

7-3-4   Collect a 'Trouble Image' with Logs

If the system should malfunction, press the **Alt+D** keys simultaneously. This will collect a screen capture of the 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
2. Select if you've had a system lockup (after restart)
3. Select where to store the report
4. Select this button when ready to Save and Export
5. Progress bar
6. See: Advanced Log Options on page 7 - 4.
7. See: Advanced Log Options on page 7 - 4.
8. Exit

Figure 7-1   System Problem Reporting (ALT+D dialog box)

7-3-4-1   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.

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   Contents in this Section

7-4-3   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).

7-4-4   Capture a Screen Image Using the Shortcut

Follow the steps in this procedure to capture a screen image:

1) With the desired image displayed on the screen, press **Ctrl** and **PrtSc** (print screen) keys simultaneously.

2) From the touch panel, select: **Utility > Service > Utilities > Common Utilities > Image Compress & Delete Utilities**.

3) Select the check box for the image(s) you want to save in the D:\export directory.

4) Select **Compress Files**.

A compressed file of the images is stored in D:\export. You may rely on the date and time of the Ctrl+PrtSc procedure to identify the most recent image recorded.

The uncompressed files are stored in: d:\export\service\image.

Section 7-5
Noise Troubleshooting

7-5-1   Purpose of this Section

In this section you will find Noise troubleshooting procedures and hints.

7-5-2   Contents in this Section

7-5-3   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?

7-5-4   Overview of Types of Noise

There are different types of noise. Use the information next to classify the noise and possible cause.

7-5-4-1   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.

7-5-4-2 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 S60/Vivid S70.

- 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.

7-5-4-3 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?

7-5-4-4 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

7-5-4-5 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.

7-5-4-6   Hardware Problems

A hardware issue will typically be an error/malfunction on a card.

7-5-4-7   Software Problems

Check if a newer software version is available. A software update may include noise fixes. If needed, update the software.

7-5-5   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™ S60/Vivid™ S70 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.

7-5-6   Different System

Try another Vivid S60/Vivid S70 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.

7-5-7   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

7-5-8   Disconnect External Cables

Disconnect all external cables (network, all unused probes, ECG leads and verify if the noise disappears.

Chapter 8
Replacement Procedures

Section 8-1
Overview

8-1-1   Purpose of Chapter 8

This chapter provides replacement procedures for Vivid™ S60/Vivid™ S70 system parts, as outlined below.

Table 8-1   Contents in Chapter 8   1 of 4

Table 8-1   Contents in Chapter 8 (Continued) 2 of 4

Table 8-1   Contents in Chapter 8 (Continued) 3 of 4

Table 8-1   Contents in Chapter 8 (Continued) 4 of 4

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

Front View

Rear View
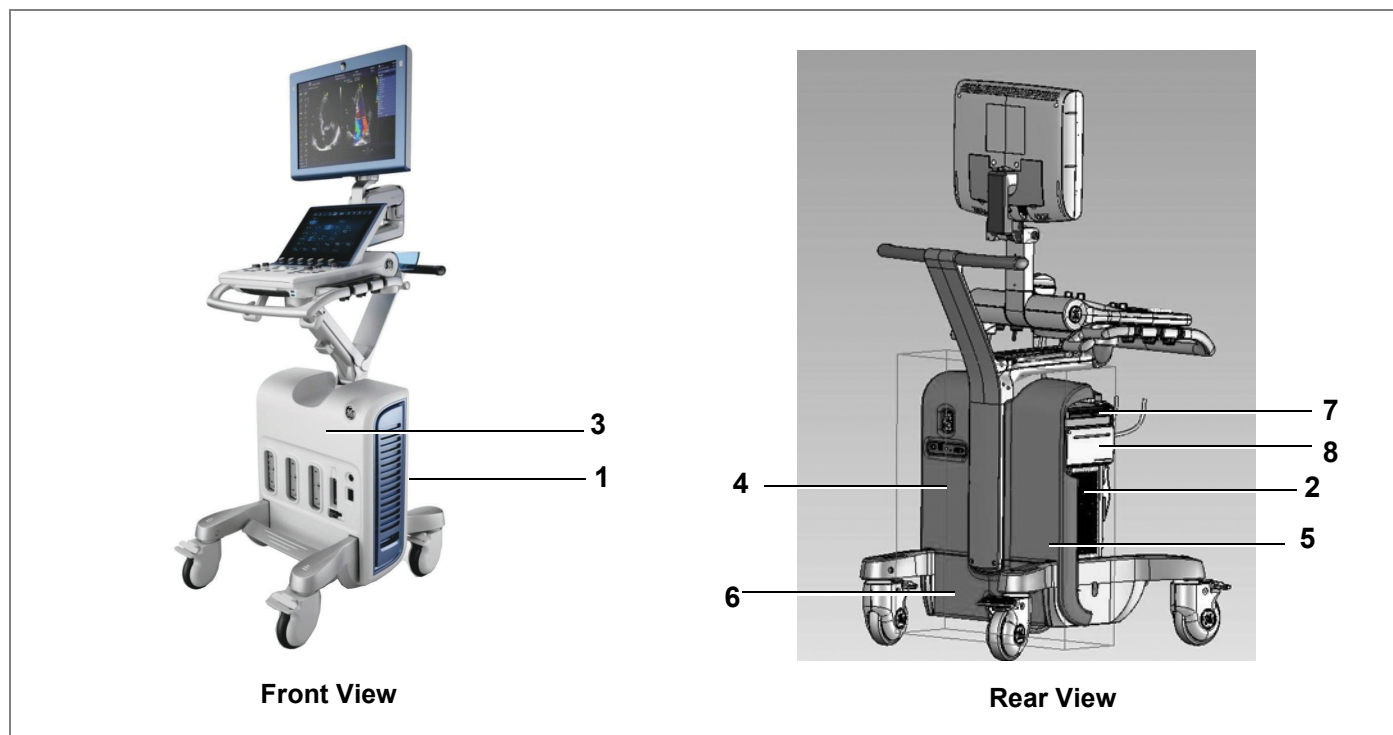
Figure 8-1   Vivid S60/Vivid S70 Ultrasound Unit

Table 8-2   Vivid S60/Vivid S70 Ultrasound Unit 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 - 7.

⚠ **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 8-7.
- Right Side Cover, as described on page 8-10.
- *Either*: DVD Cover, as described on page 8-11
  Or: DVD and Printer Cover, as described on page 8-14
- Front Cover, as described on page 8-16.
- Right Rear Cover, as described on page 8-20.
- Left Rear Cover, as described on page 8-23.
- AC Distribution Box Cover, as described on page 8-29.

Note: The Vivid S60/Vivid S70 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 - 26
- Rear Folder Box Replacement Procedure on page 8 - 27

8-2-1-3 Preparation for Cover Installation

Replacement covers for the Vivid S60/Vivid S70 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 - 8.

Front View   Snap-lock Securing Clips   Air Filter
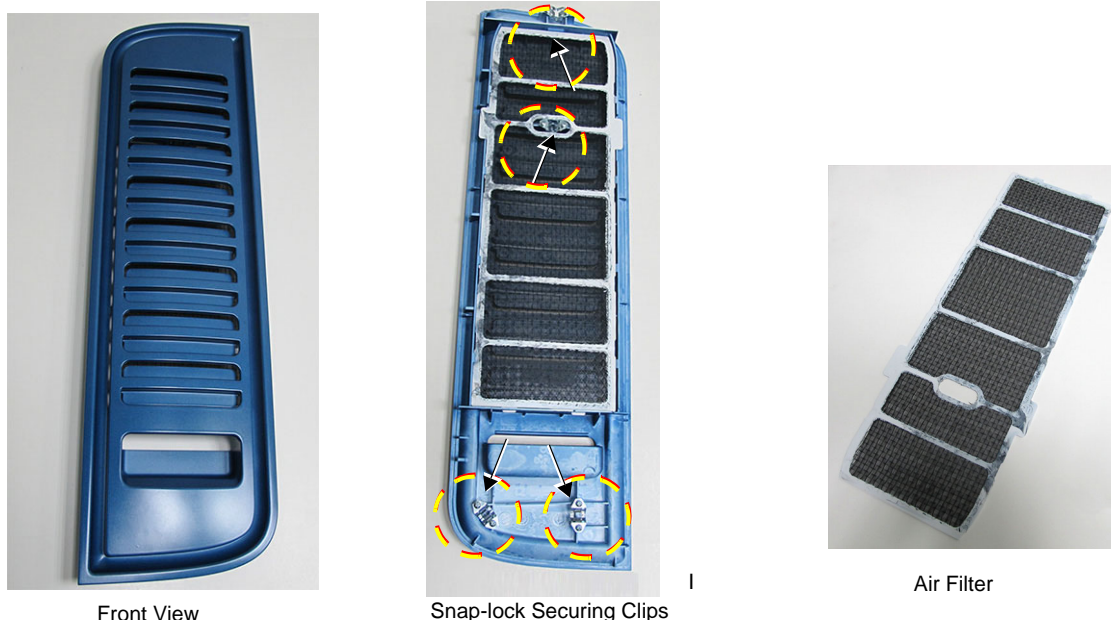
Figure 8-2   Air Inlet (Left Side) Cover - Front and Inside Views

8-2-2-1 Tools

None
FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-2-2 Time Required

5 min

8-2-2-3 Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-2-4 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

8-2-2-5   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.

8-2-2-5-1   Air Filter Replacement Procedure

FRU Part #   *Refer to Table 9-2 on page 9-7.*

1)   Remove the Air Inlet cover from the left side of the system:

-    Air Inlet (Left Side) Cover Removal Procedure

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.
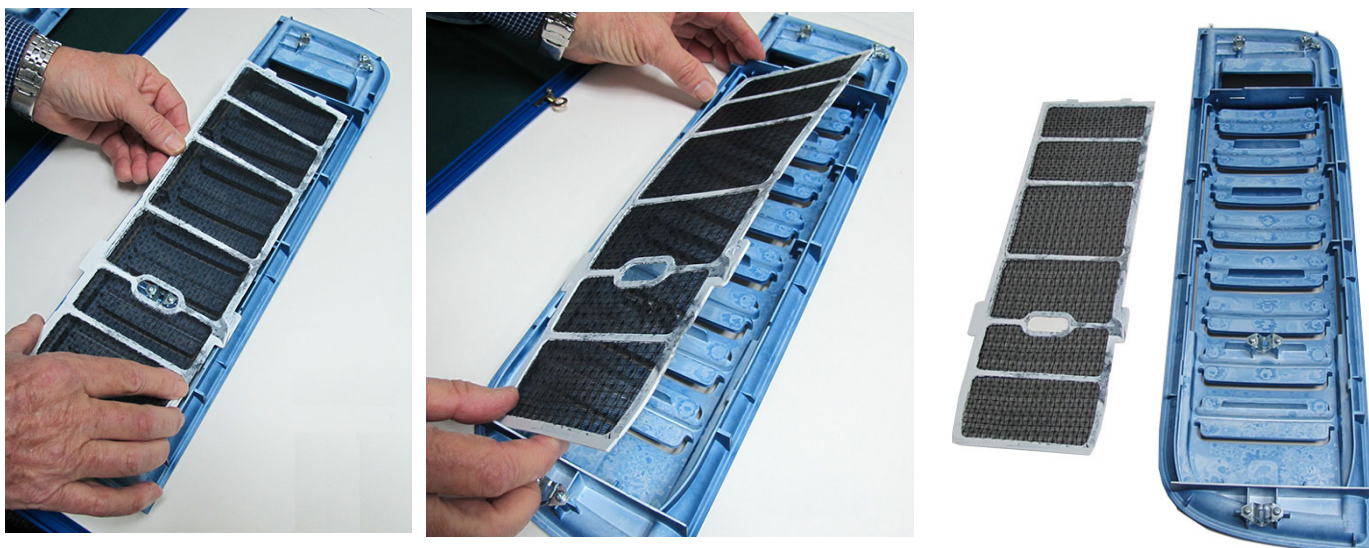
Figure 8-4   Removing the Air Filter from the Air Inlet Cover

8-2-2-5-2   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.

- Air Inlet (Left Side) Cover Installation Procedure

8-2-3   Right Side Cover Replacement Procedure

8-2-3-1   Tools

None

FRU Part #   *Refer to Table 9-2 on page 9-7.*

8-2-3-2   Time Required

5 min

8-2-3-3   Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 7.

8-2-3-4   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).
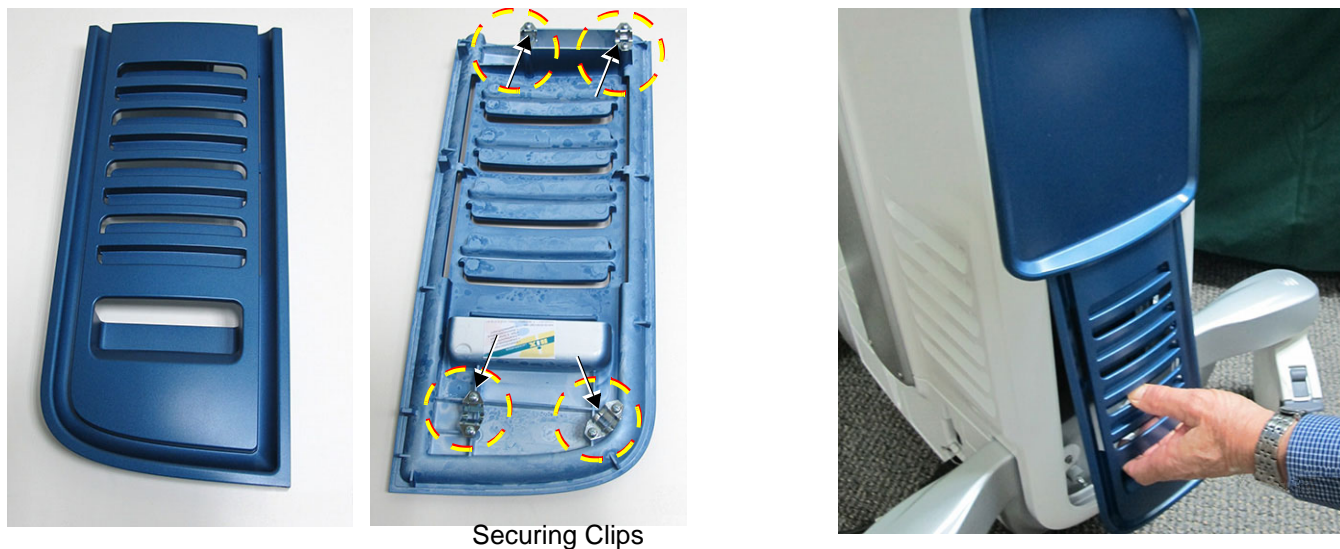
Securing Clips

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.

8-2-3-5   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 8-10.

8-2-4-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-2 on page 9-7.*

8-2-4-2   Time Required

5 min

8-2-4-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-4-4   DVD Cover Removal Procedure

The DVD Cover is shown in Figure 8-6.

1)   Remove the *right side* cover:.

- Right Side Cover Removal Procedure

Grip here...

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.

8-2-4-5   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.

- Right Side Cover Installation Procedure

8-2-5   DVD and Printer Cover Replacement Procedure

8-2-5-1   Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-5-2   Time Required

5 min

8-2-5-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-5-4   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:

   •   Right Side Cover Removal Procedure

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

8-2-5-5   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.

   •   Right Side Cover Installation Procedure

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 8-13 in this case making use of the blank cover.

8-2-6-1   Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-6-2   Time Required

5 min

8-2-6-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-6-4   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:

- Right Side Cover Removal Procedure

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.
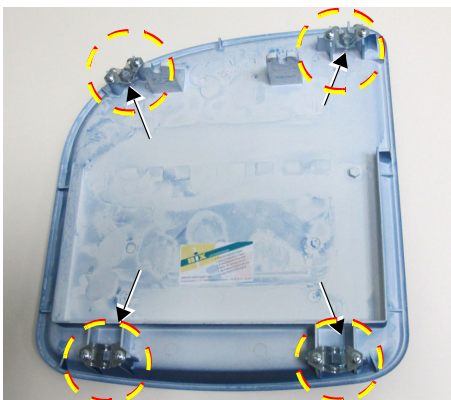
Securing Clips

Figure 8-8   Removing the Blank Cover

8-2-6-5   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.

- Right Side Cover Installation Procedure

8-2-7   Printer Cover Replacement Procedure

8-2-7-1   Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-7-2   Time Required

5 min

8-2-7-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

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 8-13 in this case making use of the printer cover.

8-2-7-4   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:

- Right Side Cover Removal Procedure

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

8-2-7-5   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.

- Right Side Cover Installation Procedure

8-2-8   Front Cover Replacement Procedures

NOTE: *If the RS cable restrainer option is installed, when replacing the Front Cover, it is necessary to also fit the RS cable restrainer assembly. Note that for systems without the RS cable restrainer, when removing the Front Cover, the steps for removing the RS cable restrainer assembly are not applicable.*

8-2-8-1   Tools

Phillips screwdriver

FRU Part #   *Refer to Table 9-2 on page 9-7. (Front Assy Cover)*

8-2-8-2   Time Required

10 min

8-2-8-3   Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 7.

8-2-8-4   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*).

3.) Remove the following covers: *left* side, *right* side, *DVD*.

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11

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.

5.) 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.

Press button
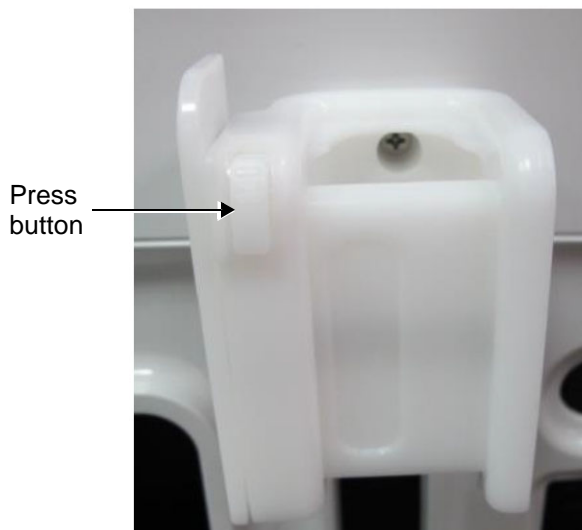
Figure 8-12 Removing the RS Cable Assembly - Front Part

6.) 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

7) 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.) 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.
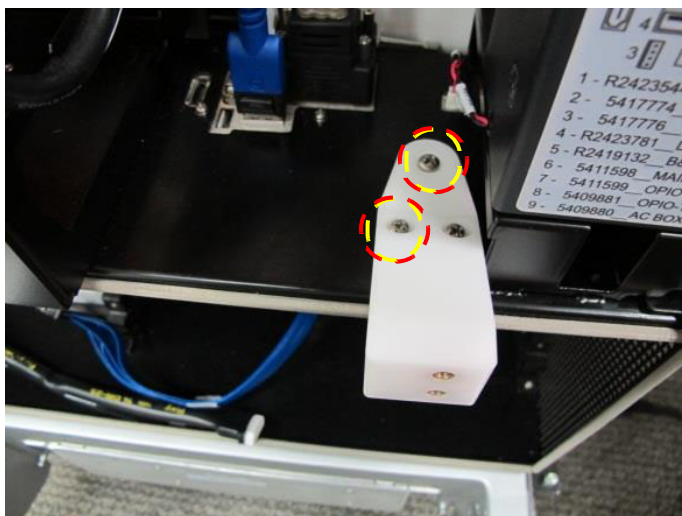
Figure 8-15   Removing the RS Cable Assembly - Rear Part

8-2-8-5   Front Cover Installation Procedure

NOTE: *The RS cable assembly has two parts - front and rear.*

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 8-18.

6) Install the *DVD, right* side and *left* side covers.

- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

8-2-9   Right Rear Cover Replacement Procedure

8-2-9-1   Tools

Phillips-type screwdriver.

FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-9-2   Time Required

10 min

8-2-9-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-9-4   Right Rear Cover Removal Procedure
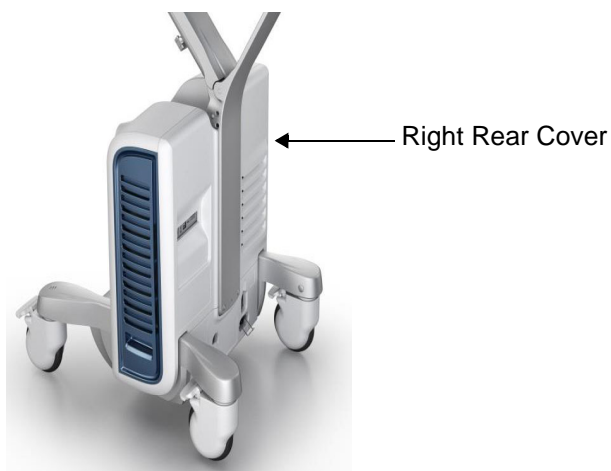
Right Rear Cover

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*.

- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Front Cover Removal Procedure on page 8 - 16
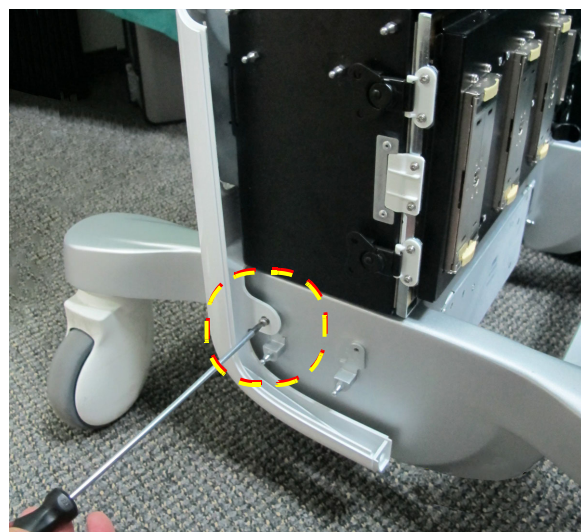
Figure 8-17   Right Rear Cover - Removing Securing Screws

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).

Cutout in Cover
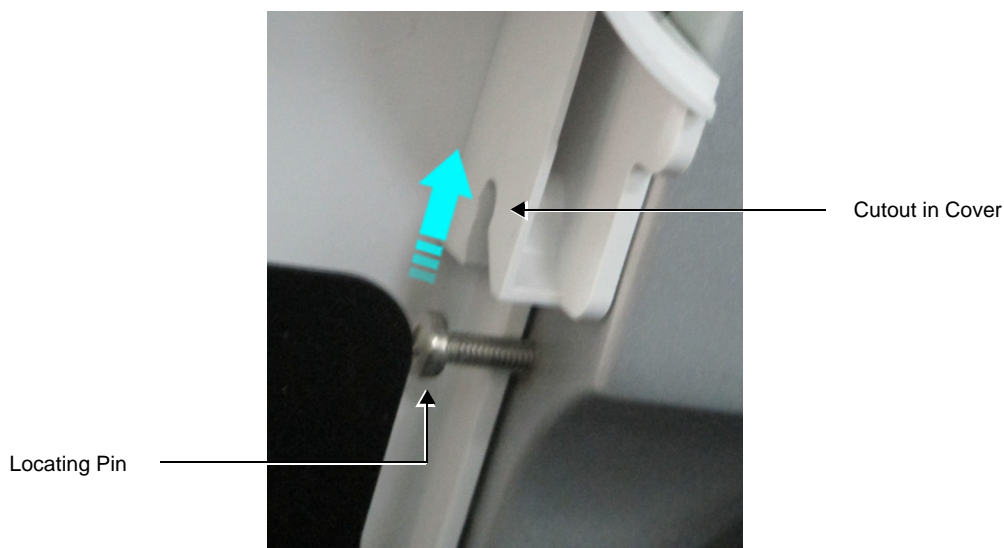
Locating Pin

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

8-2-9-5   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*

- Front Cover Installation Procedure on page 8 - 19
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Removal Procedure on page 8 - 10

6.) Reconnect any peripherals previously connected to the system.

8-2-10   Left Rear Cover Replacement Procedure

8-2-10-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-2 on page 9-7.*

8-2-10-2   Time Required

10 min

8-2-10-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-10-4   Left Rear Cover Removal Procedure
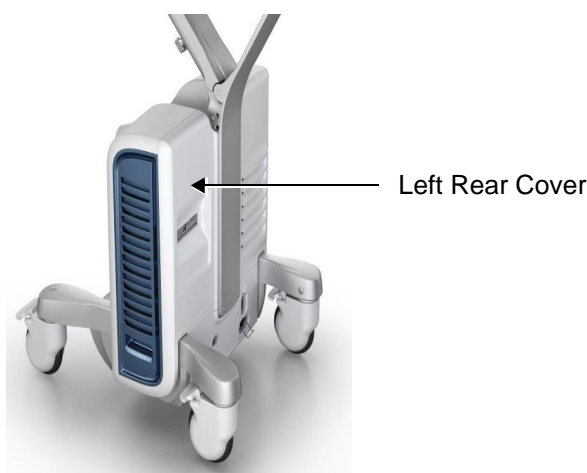
Figure 8-20   Left Rear Cover

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*.

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16
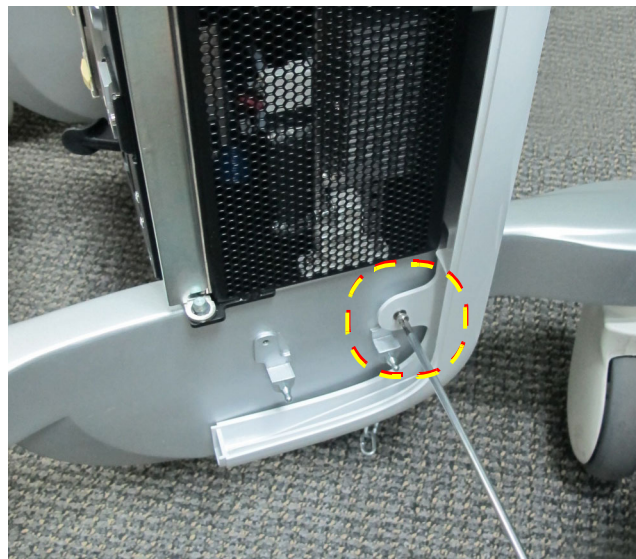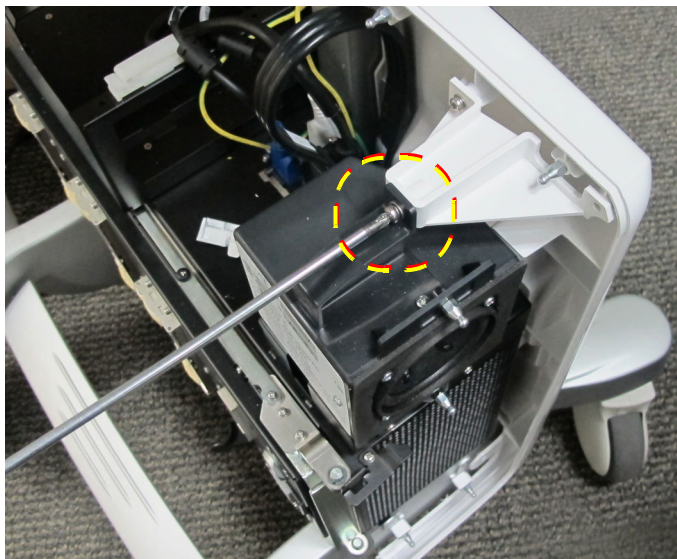
Figure 8-21   Left Rear Cover - Removing Securing Screws

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).

Cutout in Cover
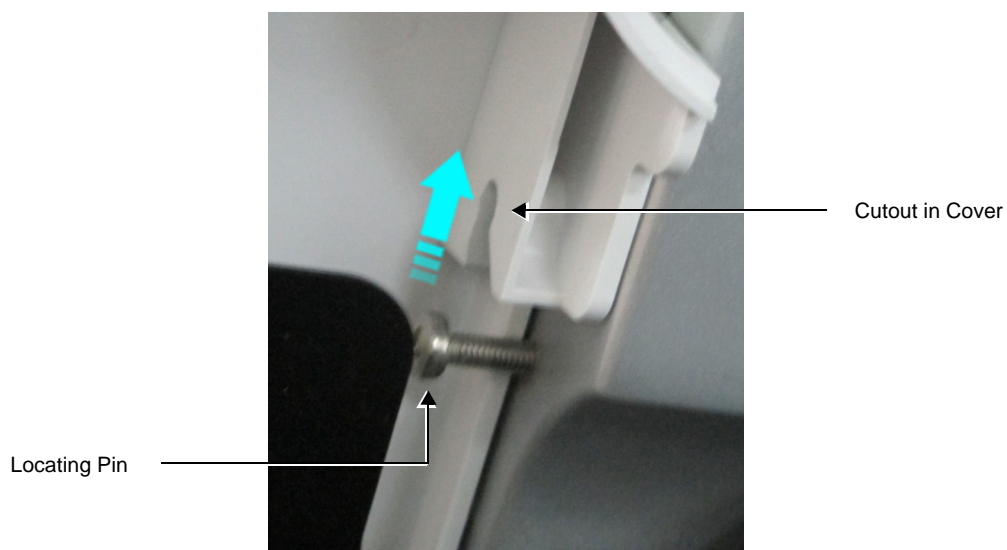
Locating Pin

Figure 8-22   Releasing Top of Cover from Locating Pin

5.) Pull the cover *towards* you, then lift and remove it from the system.
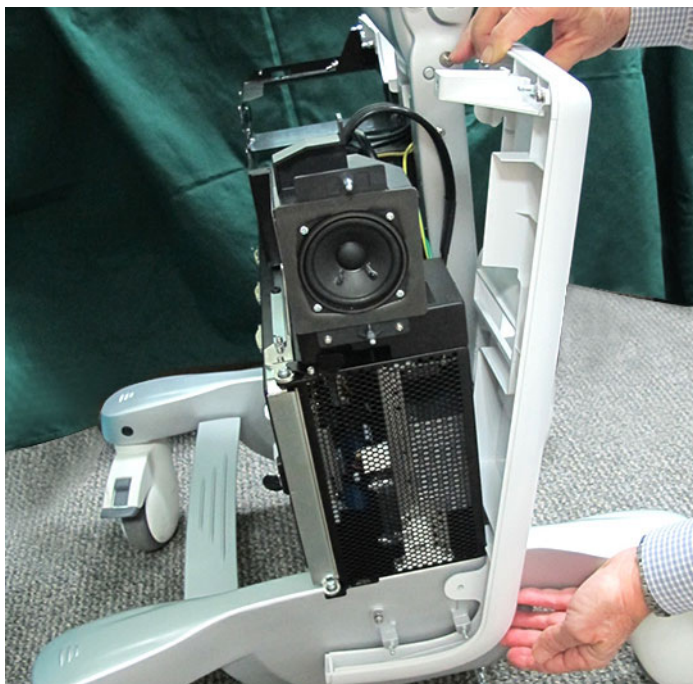
Figure 8-23   Removing the Left Rear Cover

8-2-10-5   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*

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

5.) Reconnect any peripherals previously connected to the system.

8-2-11   OPIO Basket Replacement Procedure

8-2-11-1   Tools

None

FRU Part # *Refer to Table 9-3 on page 9-8.*

8-2-11-2   Time Required

5 min

8-2-11-3   Preparations

Remove all contents from the basket.

8-2-11-4   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.

Securing Clips

Figure 8-24   Removing the OPIO Basket

8-2-11-5   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

FRU Part #   *Refer to Table 9-3 on page 9-8.*

8-2-12-2   Time Required

5 min

8-2-12-3   Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-12-4   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.

Plastic Hook

Supporting Pin
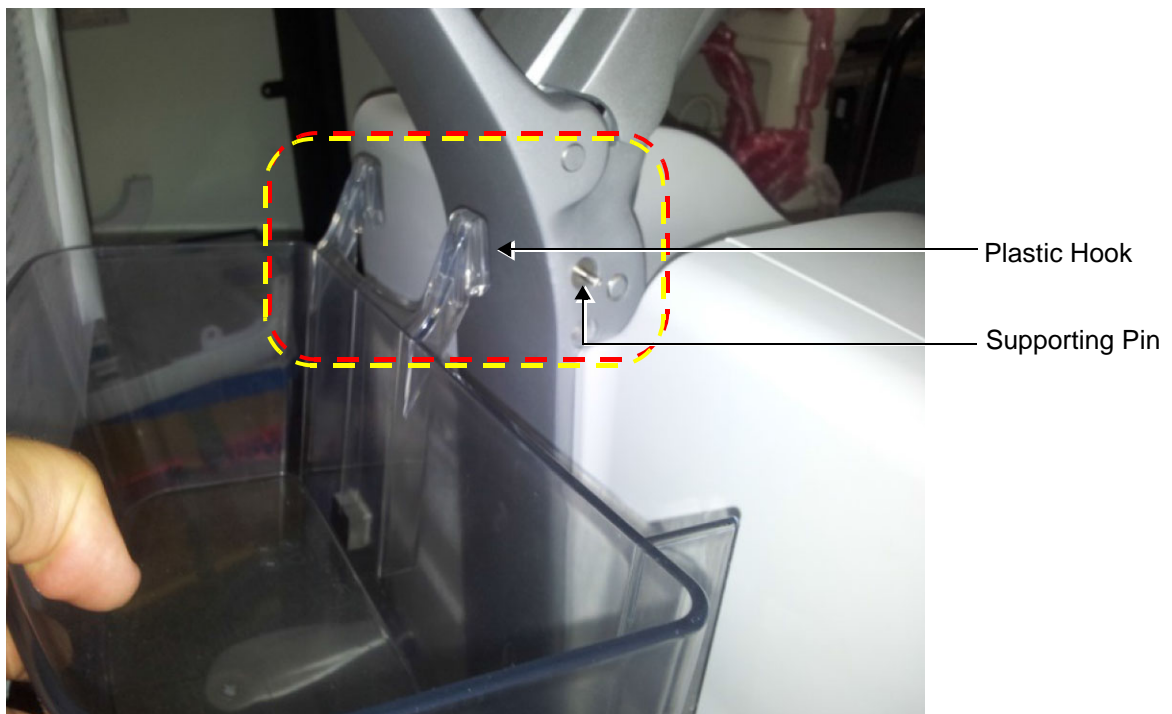
Figure 8-26   Releasing the Rear Folder Box from the Support Column

8-2-12-5   **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
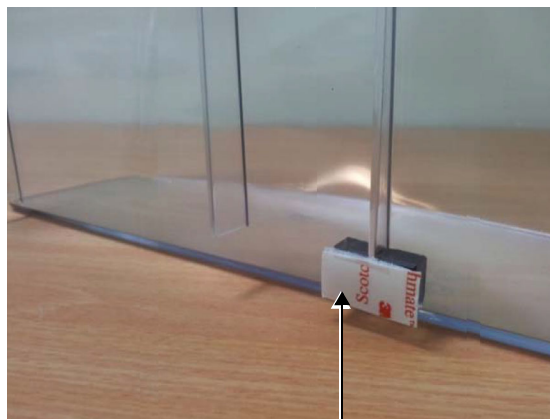
Protective Strip

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 S60/Vivid S70Support 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

FRU Part # *Refer to Table 9-2 on page 9-7.*

8-2-13-2 Time Required

5 min

8-2-13-3 Preparations

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-2-13-4 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.

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).
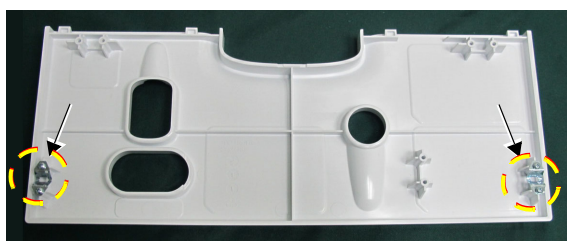
Securing Clips
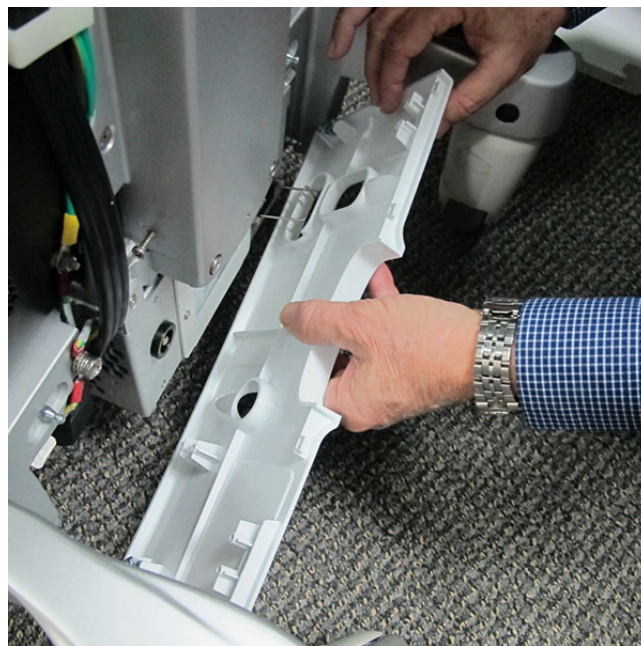
Figure 8-30   Removing the AC Distribution Box Cover

8-2-13-5   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

FRU Part #   *Refer to Table 9-3 on page 9-8.*

8-3-1-2   Time Required

15 min

8-3-1-3   Preparation

1.) Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

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.

8-3-1-4   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.

8-3-1-4　　　　　　**Remove the 21.5 inch Monitor** (cont'd)
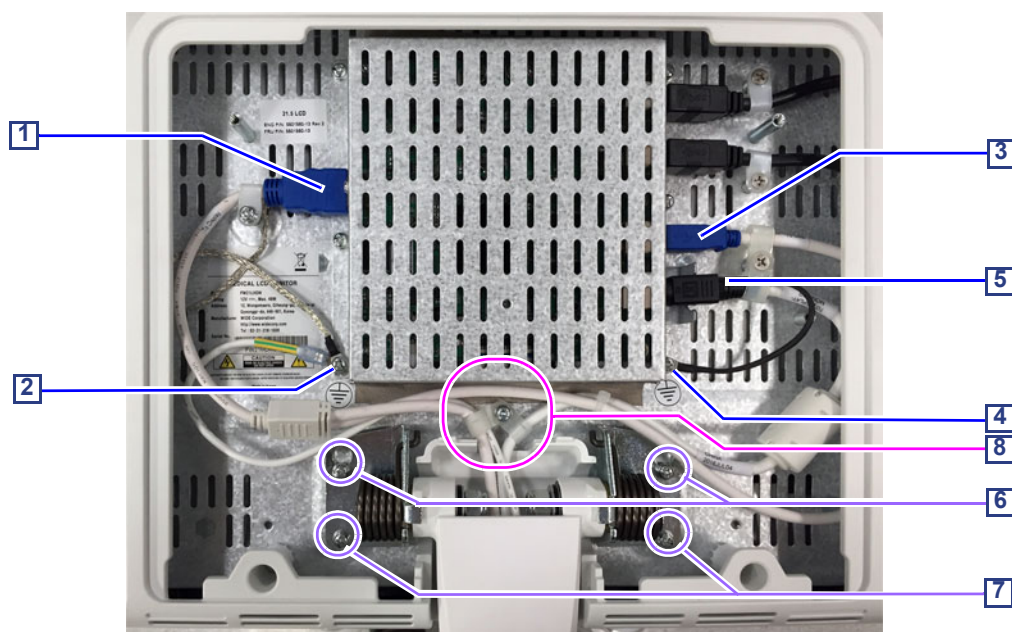
1 - BIF-to-Display: HDMI
2 - Ground (from HDMI cable and to Arm)
3 - USB

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.*

8-3-1-5   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 1.3Nm.

5.) Return the two securing screws to the securing bracket and fasten with torque 1.3Nm.

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 19" Monitor Service Cover Replacement Procedure

8-3-2-1 Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-3 on page 9-8.*

8-3-2-2 Time Required

10 min

8-3-2-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-2-4 19" Monitor Service Cover Removal Procedure

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 (Figure 8-34), then lock the articulated arm.

   The system is now in transportation mode (Figure 5-7 on page 5-10).

Figure 8-34 Folding Monitor Face-Down

3.) Remove the two screws on each side of the top of the Service Cover.

Figure 8-35 Removing Screws from Top of Service Cover

4.) Lift the service cover up, carefully releasing it from the 3 securing tabs on each side (Figure 8-36).

Screw   Screw

Securing Tabs   Securing Tabs

Figure 8-36   Removing the Monitor Service Cover

8-3-2-5   19" Monitor Service Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

Note: When positioning the service cover, make sure underlying cables are properly seated and will not become pinched or damaged by the cover.

Note: When replacing the service cover, make sure to order the Service Cover label as well - this is a separate part. For replacement instructions, see the next page: 19" Monitor Service Cover Multi-Caution Label Replacement Procedure.

8-3-3   19" Monitor Service Cover Multi-Caution Label Replacement Procedure

Note: The Monitor Service cover is supplied without a multi-caution label. When replacing the Monitor Service cover, it is necessary to order the Service Cover and in addition, the multi-caution label (which is a separate part, see below).

8-3-3-1   Tools

No special requirements

FRU Part # *Refer to Table 9-4 on page 9-10*

8-3-3-2   19" Monitor Service Cover Multi-Caution Label Removal Procedure

NOTE: *In the event that only the label is damaged (i.e. the Service Cover is not being replaced), it is necessary to remove the old label from the cover, as described below.*

1) Using a blunt non-metallic instrument, gently raise one corner of the damaged Service Cover label.

2) Carefully peel the label away from the monitor service cover. The label is shown in Figure 8-37.

Figure 8-37   Monitor Service Cover and Multi-Caution Label

8-3-3-3   19" Monitor Service Cover Label Installation Procedure

1) Prior to adhering the label, ensure the outer surface of the Monitor Service Cover 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 Monitor Service Cover ensuring that it is correctly oriented (upright), straight and parallel to the inlaid impression on the Service Cover.

8-3-4 Using a soft, clean cloth, gently press out any air bubbles that might be trapped behind the label.**19"**
Monitor Rear Cover Replacement Procedure

8-3-4-1 Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-3 on page 9-8.*

8-3-4-2 Time Required

15 min

8-3-4-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-4-4 19" Monitor Rear Cover Removal Procedure

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 (Figure 8-34), then lock the articulated arm.

3.) Remove the following covers: *Monitor Service; Monitor Arm Base*:

- 19" Monitor Service Cover Removal Procedure on page 8 - 34

- 19" Monitor Arm Base Cover Removal Procedure on page 8 - 52

4) Remove the 8 screws that secure the Rear Cover to the back of the monitor (Figure 8-38).
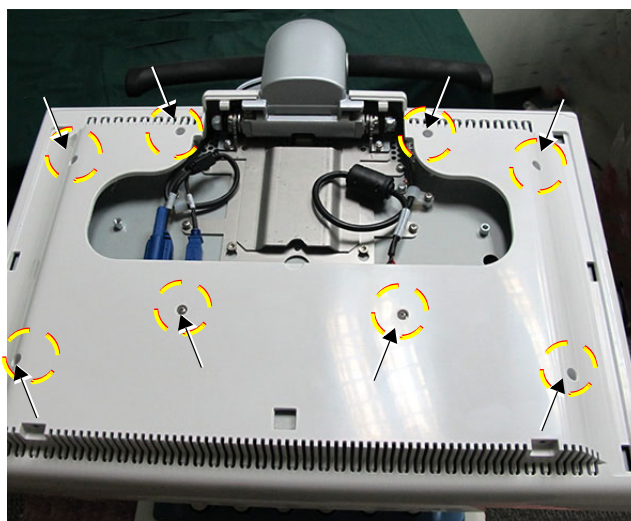
Figure 8-38   Monitor Rear Cover Securing Screws

5)   Disconnect the monitor cables: BIF-to-Display: DVI [**A**]; USB [**B**] and Power-to-Display [**C**].
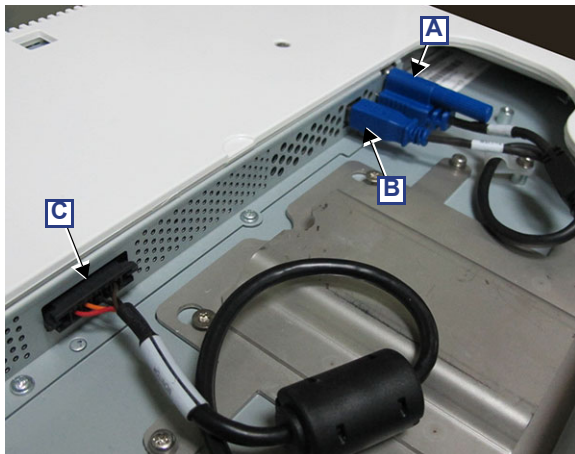
Figure 8-39   Disconnecting Monitor Cables

6.) Remove the screw from each of the two cable-securing clips and release each cable - Figure 8-40.
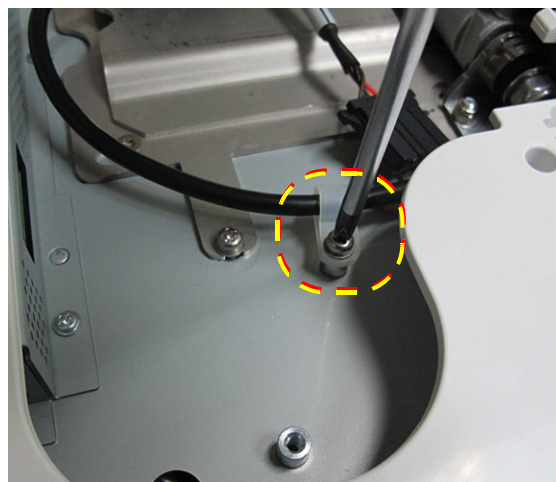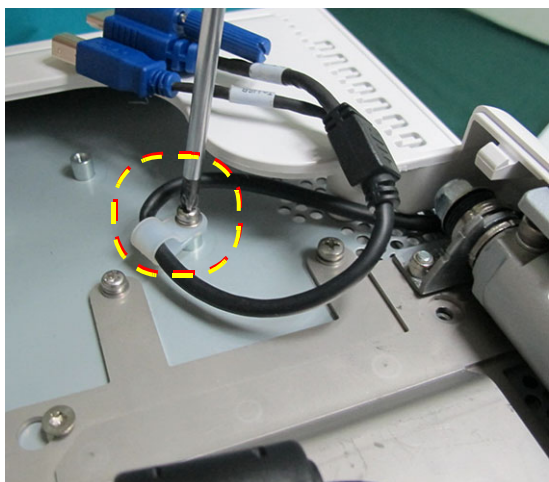
Figure 8-40   Releasing Cable Securing Clips

7.) Using two hands, release the Rear Cover from the snap-lock clips (Figure 8-41, right) by pulling the cover *upwards*.
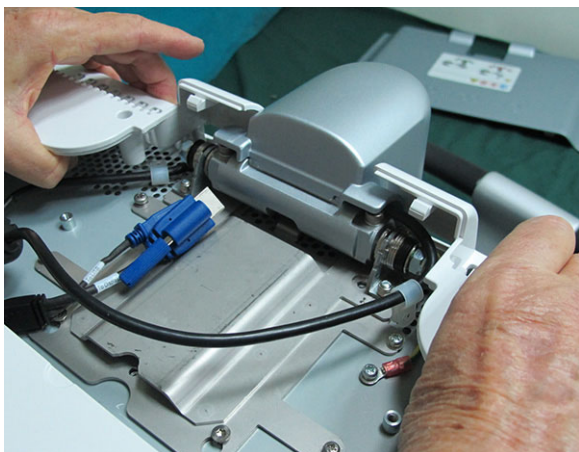
Snap-Lock Clips

Figure 8-41   Releasing the Rear Cover from the Snap-Lock Clips

8.) Tilt the cover backwards and continue to lift *upwards* until fully released from the rear of the monitor Figure 8-42, then remove.
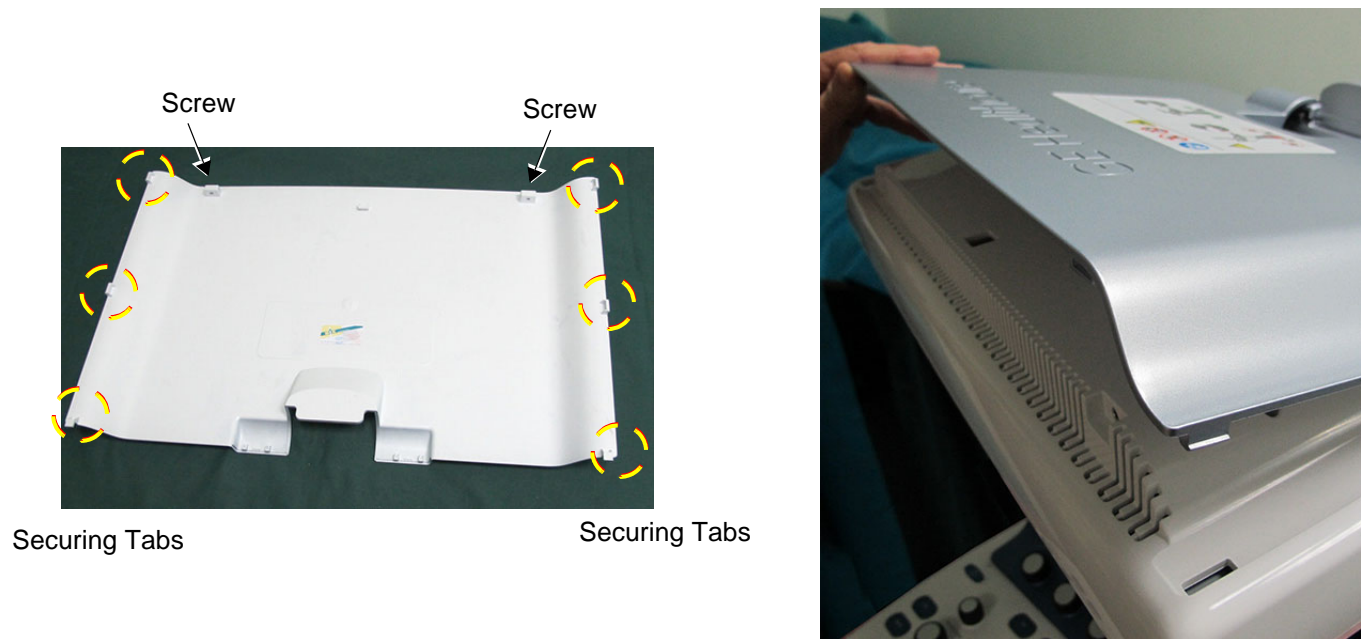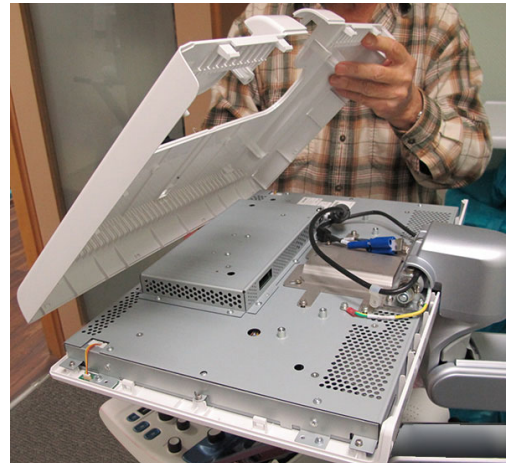

Figure 8-42   Removing the Monitor Rear Cover

8-3-4-5   19" Monitor Rear Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

Note: When connecting the monitor cables (BIF-to-Display and Power-to-Display) make sure they are routed behind the hinge, as shown in Figure 8-43.
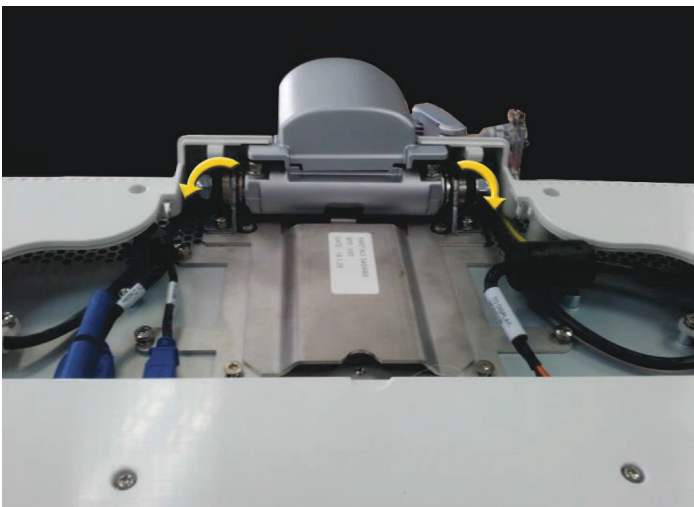
Figure 8-43   Routing the Cables

Note: When positioning and securing the rear cover, make sure underlying cables are properly seated and will not become pinched or damaged by the cover.

8-3-5   19" Monitor Replacement Procedure

8-3-5-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-4 on page 9-10.*

8-3-5-2   Time Required

30 min

8-3-5-3   Preparation

Shut down the ultrasound system, as described in Power Shut Down on page 4 - 7.

8-3-5-4   19" Monitor Removal Procedure

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 (Figure 8-34), then lock the articulated arm.

3) Remove the following monitor covers: *Service, Rear*

   - 19" Monitor Service Cover Removal Procedure on page 8 - 34
   - 19" Monitor Rear Cover Removal Procedure on page 8 - 37

NOTE: *After removing the Monitor Service Cover and Rear Cover, if not installing the replacement Monitor immediately, keep the covers and screws in a safe place as they will be required later for refitting to the new Monitor.*

The back of the monitor (now exposed) is secured to the mechanical platform by 6 screws fastened through an H-shaped securing bracket (shown in Figure 8-44). Additionally, 2 captive screws each fastened through a key-hole slot in the bracket provide further support and also facilitate performance of this procedure by only one person.

Securing Bracket

Captive Screw
in Key-Hole Slot

Captive Screw
in Key-Hole Slot
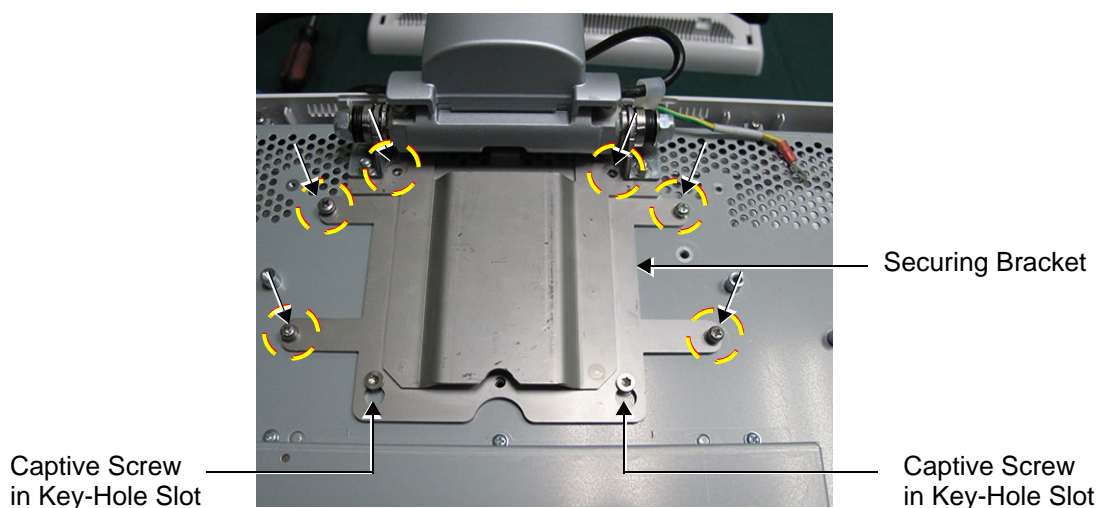
Figure 8-44   Rear View of Monitor and Securing Bracket

4)   Remove the serrated lock washer and screw to release the Ground cable from the back of the monitor - Figure 8-45.
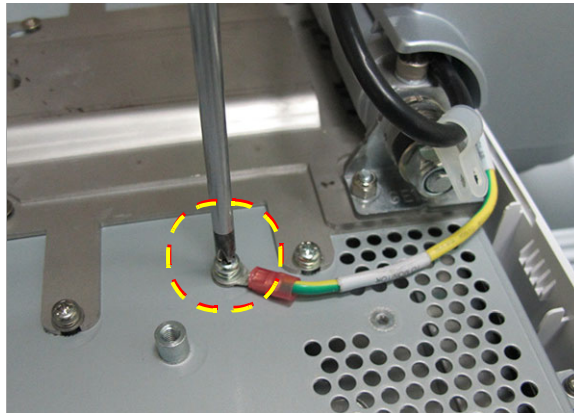
Figure 8-45   Releasing the Ground Cable

5.) Remove the 6 screws that fasten the monitor to the securing bracket - Figure 8-46.
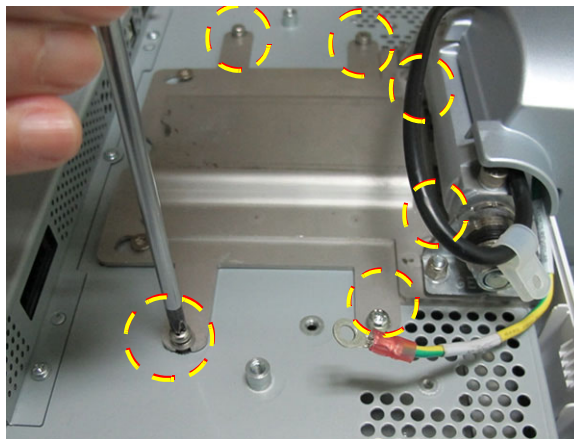
Figure 8-46   Removing the Securing Screws from the Bracket

6)   Hold the monitor with both hands and carefully move it to align the captive screws with the widest part of the key-hole slots - Figure 8-47.
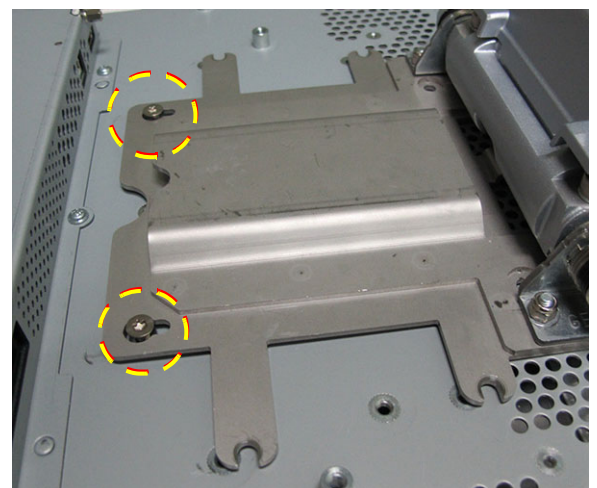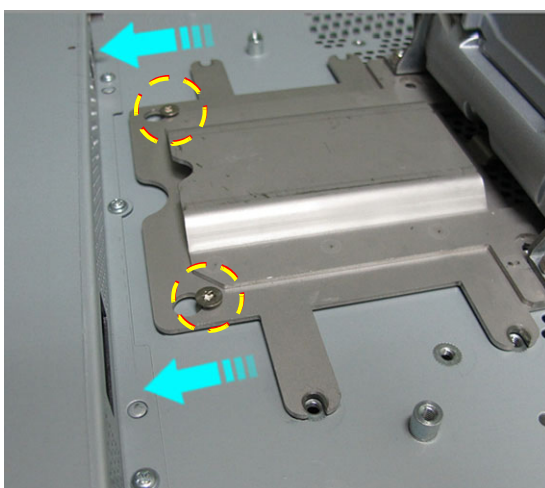
Figure 8-47   Aligning the Captive Screws with the Key-Hole Slot Openings

7.) Remove the monitor from the system by lowering it away from the securing bracket.
Carefully place the monitor face-down on a clean, soft, stable surface - Figure 8-48.
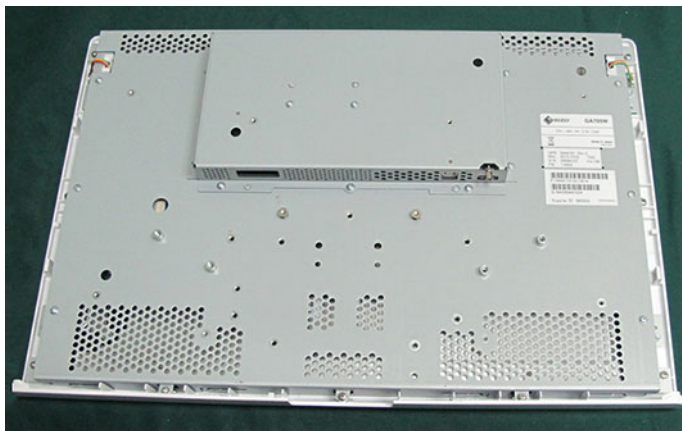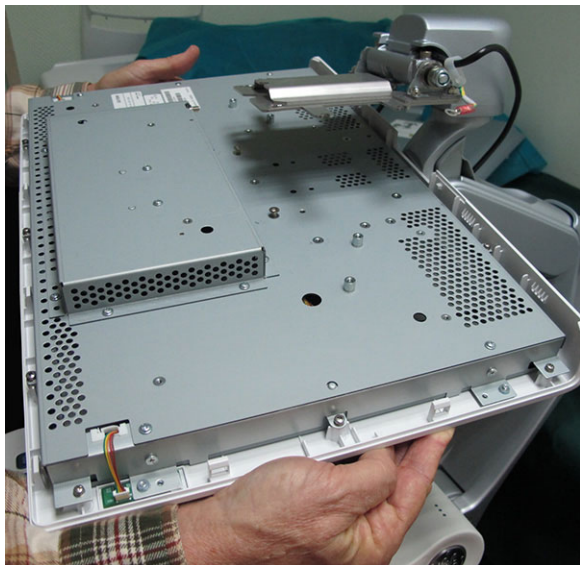
Figure 8-48   Removing the Monitor

8.) Remove the Monitor Front Cover:

   • 19" Monitor Front Cover Removal Procedure on page 8 - 45

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.*

8-3-5-5   **19" Monitor Installation Procedure**

1) Working from the front of the system, make sure the console is in the *maximum down* position and that is aligned in the central position (not pulled to one side or the other).

2.) Install the Monitor Front Cover (previously removed) onto the replacement monitor:

- 19" Monitor Front Cover Installation Procedure on page 8 - 47

3.) Place the monitor in the *face-down* position.

4.) Using two hands, position the monitor beneath the securing bracket, carefully aligning the two captive screws with the two key-hole slot openings (Figure 8-49, left).

5.) Pull the monitor *towards* you until the captive screws are correctly positioned (Figure 8-49, right). While supporting the monitor from below with one hand, tighten the two screws.
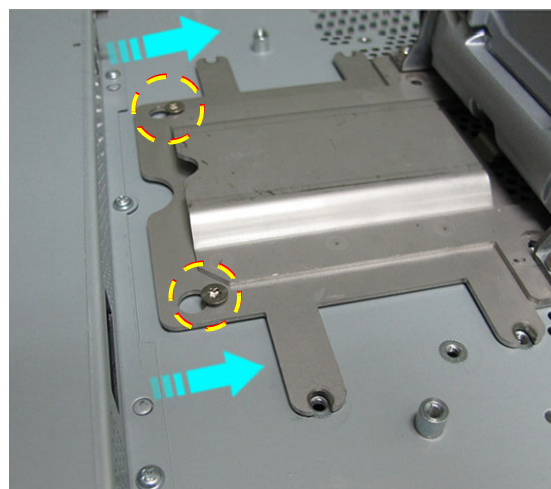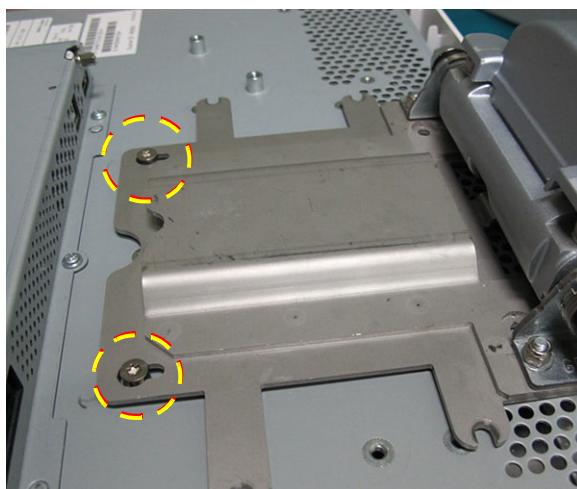
Figure 8-49   Fitting the Monitor to the Securing Bracket

6.) Return the 6 screws to the securing bracket and fasten tightly - Figure 8-46.

7.) Secure the Ground cable - Figure 8-45.

8.) Install the Monitor Rear cover (previously removed):

- 19" Monitor Rear Cover Installation Procedure on page 8 - 39

9.) Position the cables correctly and fasten each of the two cable-securing clips - Figure 8-50.
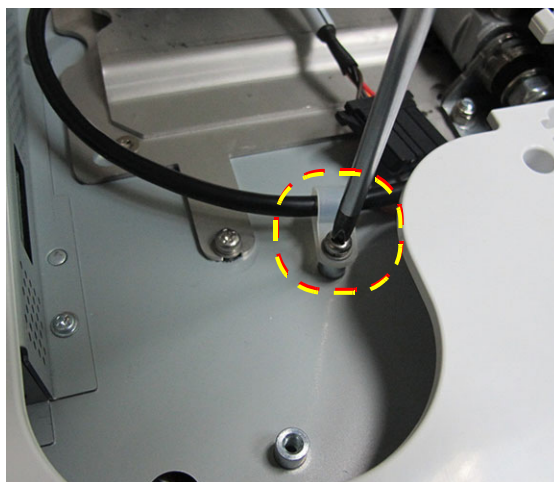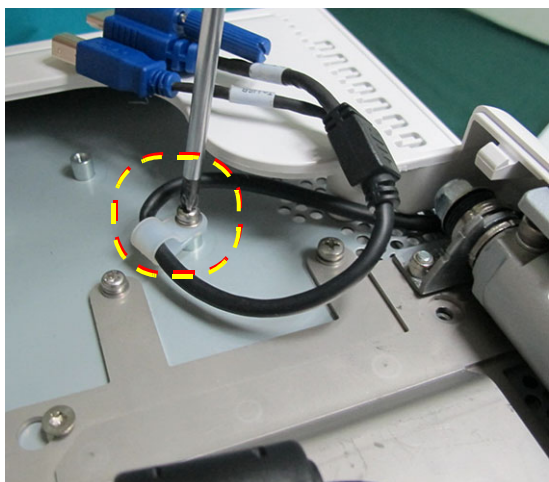
Figure 8-50   Fastening Cable Securing Clips

10) Reconnect the monitor cables (Figure 8-51):
    BIF-to-Display: DVI [**A**]; USB [**B**] and Power-to-Display [**C**].
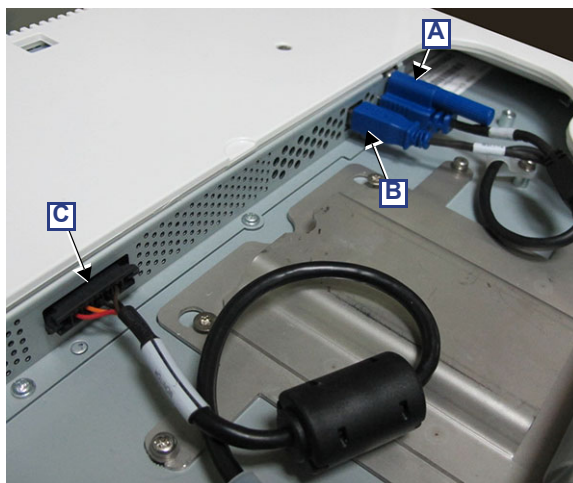
Figure 8-51   Reconnecting Monitor Cables

11.) Install the Monitor Service cover:

➡️   • 19" Monitor Service Cover Installation Procedure on page 8 - 35

NOTE: *When positioning the cover, make sure underlying cables are properly seated and will not become pinched or damaged by the cover.*

12.) For the next stage of the monitor installation procedure, proceed to the instructions for Image Quality Calibration, as described in *Chapter 6 -Service Adjustments*.

8-3-6   19" Monitor Front Cover Replacement Procedure

The Monitor Front cover is supplied without a GE Symbol or Screws Kit. When replacing the Monitor Front cover, it is necessary to order the Front Cover and in addition, the GE Symbol and the Screws Kit (which are separate parts, see below).

8-3-6-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-3 on page 9-8 and Table 9-4 on page 9-10.*

8-3-6-2   Time Required

30 min

8-3-6-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-6-4   19" Monitor Front Cover Removal Procedure

Note: The monitor front cover is secured to the back of the monitor by 12 screws, shown below.
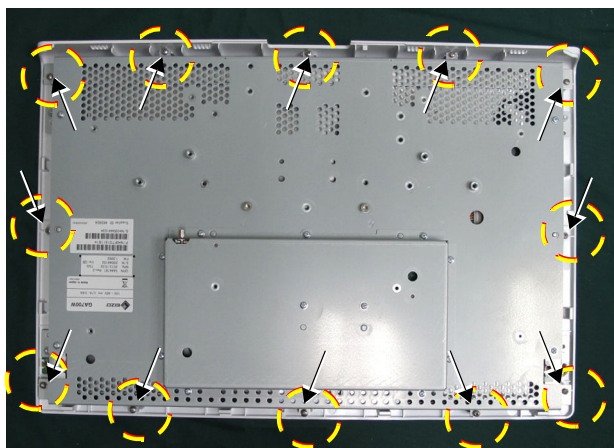
Figure 8-52   Monitor Front Cover Securing Screws

1.) Perform the monitor removal procedure:

• 19" Monitor Removal Procedure on page 8 - 40

2.) Place the monitor face-down on a clean, soft, stable surface.

3.) Remove the 12 securing screws - Figure 8-52.

4.) Lift the monitor up and release it from the front cover - Figure 8-53.
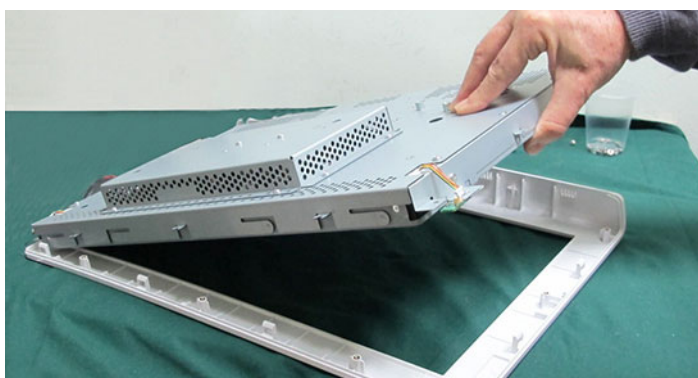
Figure 8-53   Removing the Monitor from the Front Cover

NOTE: *After removing the Front Cover, if not installing the replacement Monitor immediately, keep the cover*

Chapter 8 - Replacement Procedures   **8-45**

and screws in a safe place as they will be required later for refitting to the new Monitor.
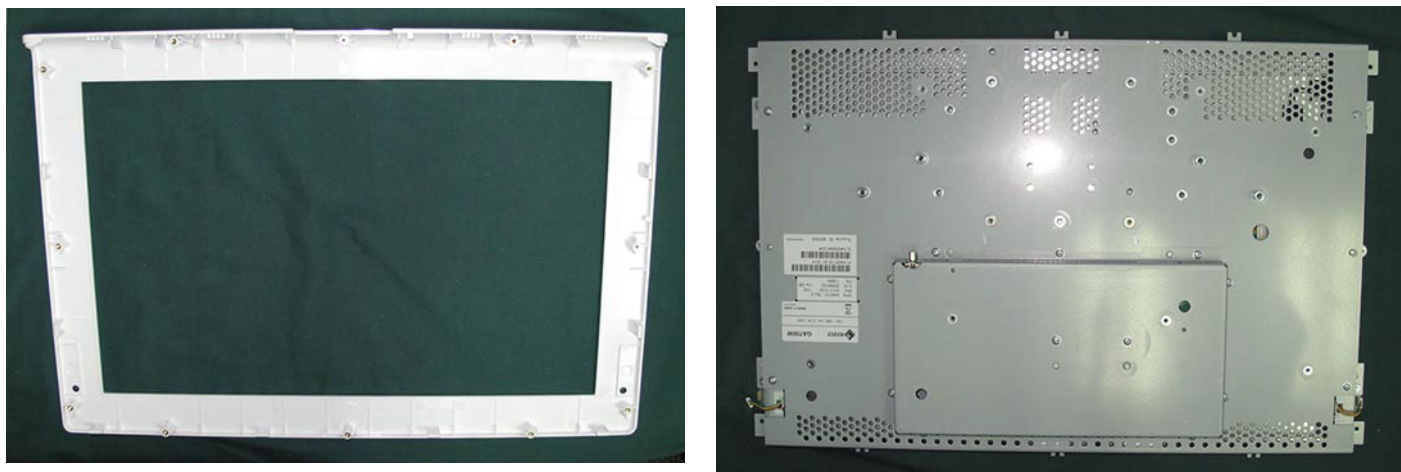
Figure 8-54   Front Cover Removed from the Monitor

8-3-6-5   19" Monitor Front Cover Installation Procedure

    1.) Place the monitor front cover upside down on a clean, soft, stable surface.

    2.) Hold the monitor *face-down* and carefully position it inside the front cover, aligning the top of the monitor with the top of the cover - refer to Figure 8-53.

Note: Make sure the two short flex cables on each side of the monitor are properly seated and connected to their respective sockets (shown below).
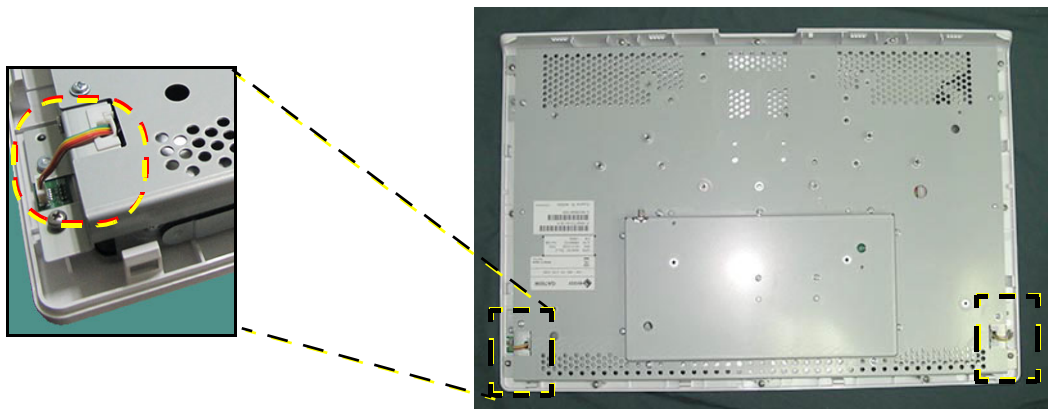
    3.) Fasten the front cover onto the back of the monitor, using the 12 securing screws - Figure 8-52.

    4.) Install the monitor on the ultrasound system:

    5.) Install the GE Symbol on the Monitor Front cover:

8-3-7   19" Monitor Light Sensors Replacement Procedure

The Monitor Light Sensors are located on the monitor's front panel (see Figure 8-55).

Figure 8-55   Location of Monitor Light Sensors on Monitor Front Panel

The procedure requires removing the following monitor covers:

•   Monitor Service Cover
•   Monitor Rear Cover
•   Monitor Front Cover

The above procedures are referenced in *19" Monitor Light Sensors Removal Procedure* section, below.

The procedure applies to both the left and the right Monitor Light Sensors.

8-3-7-1   Tools

Phillips screwdriver

FRU Part #   *Refer to Table 9-6 on page 9-12.*

8-3-7-2   Time Required

30 min

8-3-7-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-7-4   19" Monitor Light Sensors Removal Procedure

1.) Remove the following monitor covers: *Service, Rear, Front*

• 19" Monitor Service Cover Removal Procedure on page 8 - 34

• 19" Monitor Rear Cover Removal Procedure on page 8 - 37

• 19" Monitor Front Cover Removal Procedure on page 8 - 45

2.) Disconnect the monitor light sensors' cables as shown in Figure 8-56.
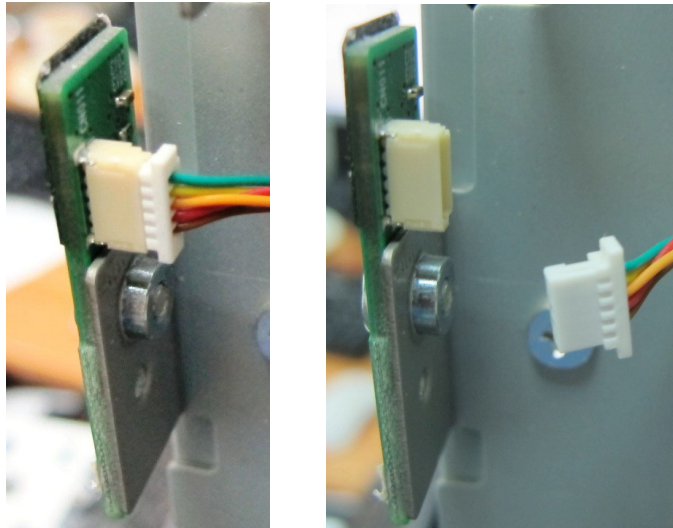
Figure 8-56   Disconnecting Monitor Light Sensor Cables

3.) Remove the left and right light sensors by unscrewing the Light Sensors' securing screws as shown in Figure 8-57.
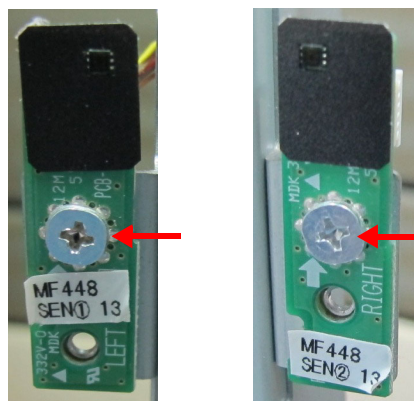
Figure 8-57   Light Sensors - Location of Securing Screws

8-3-7-5   19" Monitor Light Sensors Installation Procedure

1)   Install the replacement Monitor Light Sensors as follows:

   a.) Using the securing screws previously removed, secure each of the light sensors to their respective positions on the monitors panel.

   b.) Connect the cables, previously disconnected, to the light sensors.

2.) Refit the following monitor covers: *Front, Rear, Service*

8-3-8   19" Monitor Front Cover GE Symbol Replacement Procedure

Note: The Monitor Front cover is supplied without a GE symbol. When replacing the Monitor Front cover, it is necessary to order the Monitor Front Cover and in addition, the GE Symbol (which is a separate part, see below).

8-3-8-1   Tools

Blunt instrument.

FRU Part #   *Refer to Table 9-4 on page 9-10.*

The GE symbol is located at the top of the Monitor front panel - Figure 8-58.

Figure 8-58   Location of GE Symbol on Monitor Front Cover

8-3-8-2   19" Monitor Front Cover GE Symbol Removal Procedure

NOTE: *In the event that only the GE symbol requires replacement (i.e. the Monitor Front Cover is not being replaced), it is necessary to remove the old symbol from the cover, as described below.*

1.) Using a blunt instrument, carefully remove the damaged GE symbol from the monitor.

2.) Clean the surface in preparation for affixing the replacement GE symbol.

8-3-8-3   19" Monitor Front Cover GE Symbol Installation Procedure

1) Prior to adhering the GE Symbol, ensure the Monitor Front Cover is clean, dry, and free of particles.

2) Remove the self-adhesive GE Symbol from it's packing.

3) Peel back the plastic protective outer layer from the symbol and remove it to expose the adhesive surface.

4) Carefully place the symbol in the correct position at the top of the Monitor Front Cover ensuring that it is correctly oriented (upright), straight and properly seated in the inlaid impression on the Front Cover.

5.) While supporting the monitor from behind with your hand, apply even pressure to the GE Symbol until secure adhesion is achieved.

8-3-9　　　19" Monitor Arm Base Cover Replacement Procedure

The Monitor Arm Base cover is located below the lower Horizontal Articulated Arm cover - see contextual picture in Figure 8-61.

Lower Horizontal Articulated Arm Cover

Monitor Arm Base Cover
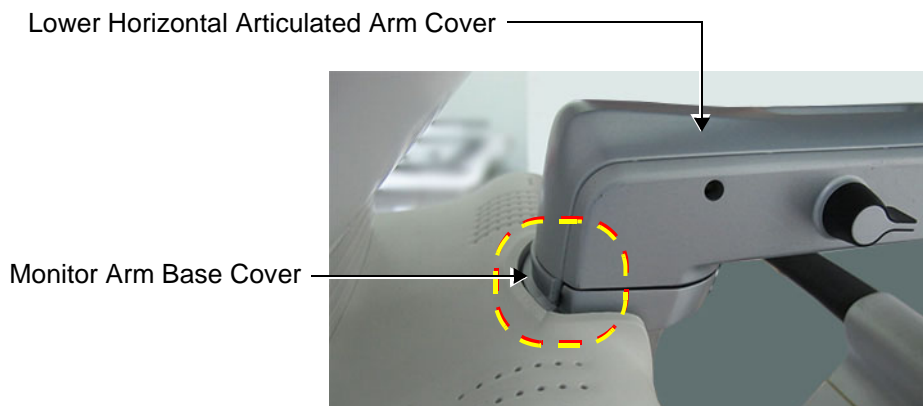
Figure 8-59　Monitor Arm Base Cover - Location

8-3-9-1　　Tools

Use an appropriate flat type screwdriver.

FRU Part #　*Refer to Table 9-3 on page 9-8 (Monitor Arm Base Cover)*

8-3-9-2　　Time Required

10 min

8-3-9-3　　Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-9-4　　19" Monitor Arm Base Cover Removal Procedure

1) Unclip the **lower horizontal Articulated Arm Cover** and lift to remove - see Figure 8-225 below.

Figure 8-60　Removing Lower Horizontal Articulated Arm Cover

2) Use a flat screwdriver to gently release the small plastic **Monitor Arm Base Cover** from the base of the Monitor Arm - Figure 8-61 (left) - then, lift to remove.

Figure 8-61 Removing the Monitor Arm Base Cover

8-3-9-5 **19" Monitor Arm Base Cover Installation Procedure**

1) Place the new Monitor Arm Base Cover in position by sliding it onto the articulated arm taking care that you insert it with the clip facing *upwards* - see Figure 8-61.

2) Return the Lower Horizontal Articulated Arm Cover to its correct position and press until it clicks into place.

8-3-10   Touch Screen Service Cover Replacement Procedure

8-3-10-1   Tools

None.

FRU Part #   *Refer to Table 9-3 on page 9-8 (Touch Panel Back Service Cover)*

8-3-10-2   Time Required

5 min

8-3-10-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-10-4   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 8-62.
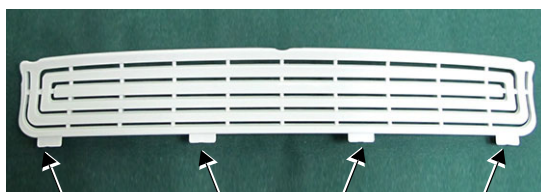
Figure 8-62   Touch Screen Service Cover - Securing Tabs

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 8-62) 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.
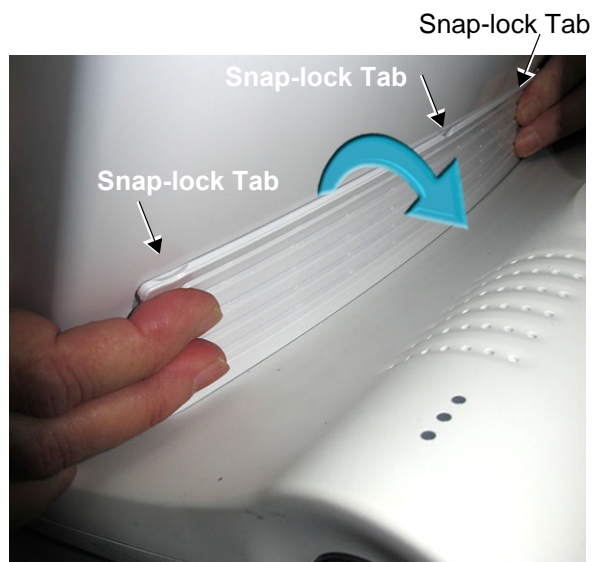
Figure 8-63   Removing the Touch Screen Service Cover

8-3-10-5   Touch Screen Service Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

8-3-11 Touch Screen Rear Cover Replacement Procedure

8-3-11-1 Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-3 on page 9-8.*

8-3-11-2 Time Required

15 min

8-3-11-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-11-4 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 8-62.
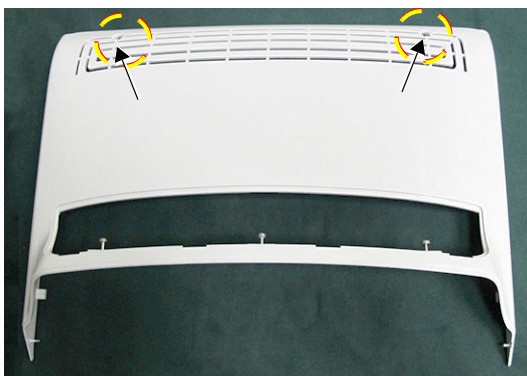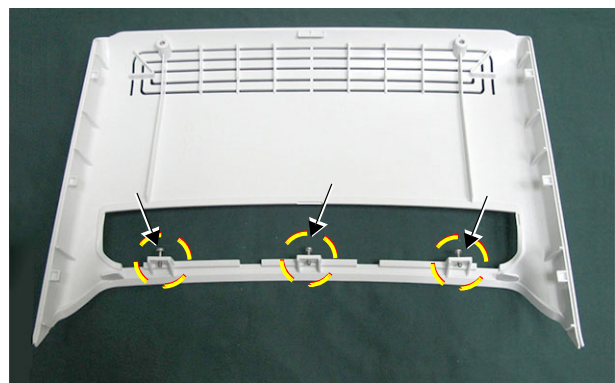
External View   Internal View

Figure 8-64   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 - 54

3.) Remove the 3 securing screws from the base of the cover - Figure 8-65.

Figure 8-65   Removing the Rear Cover (Base) Securing Screws

4.) Remove the 2 screws from the top of the cover - Figure 8-66.

Figure 8-66   Removing the Rear Cover (Top) Securing Screws

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 8-67   Removing the Touch Screen Rear Cover

8-3-11-5   Touch Screen Rear Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

8-3-12   Vivid S60/Vivid S70 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 - 169.

8-3-12-1   Tools

Phillips screwdriver and 7mm socket.

FRU Part #   *Refer to Table 9-6 on page 9-12 (Touch Panel Assembly)*

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 Table 9-6 on page 9-12.

8-3-12-2   Time Required

20 min

8-3-12-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-12-4   Touch Screen 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*:

- • Touch Screen Service Cover Removal Procedure on page 8 - 54
- • Touch Screen Rear Cover Removal Procedure on page 8 - 56

Note: The Touch Screen Panel is fastened to the Touch Screen chassis by 4 screws (2 on each side).

3) Remove the 2 securing screws on both the *left* and *right* sides of the Touch Screen - Figure 8-68.
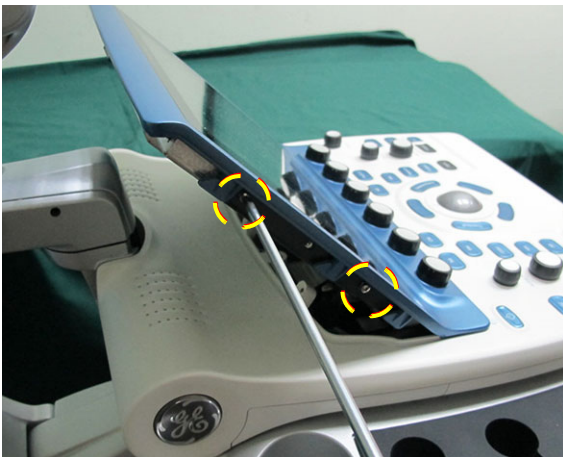
Figure 8-68   Removing the Touch Screen Securing Screws

4.) At the rear of the Touch Screen, disconnect the following two cables:
DP-to-Touch Screen [**A**] and Power-to-Touch Screen [**B**] - shown in Figure 8-69.
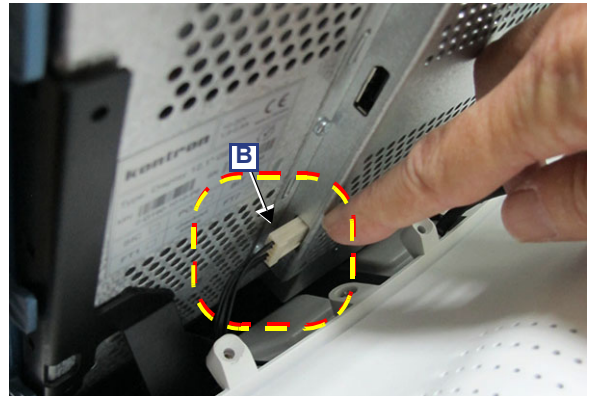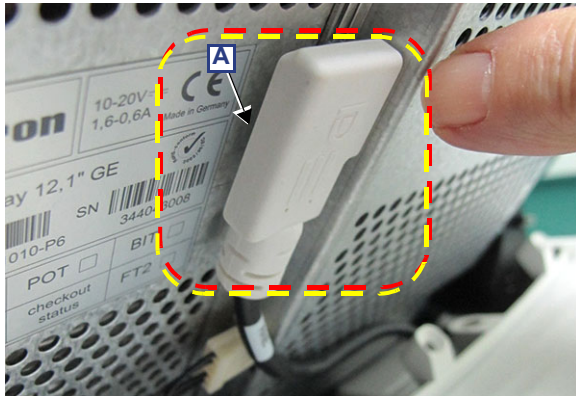
Figure 8-69   Disconnecting the Touch Screen Cables

5.) Using a 7mm socket, disconnect the Ground cable - Figure 8-70.
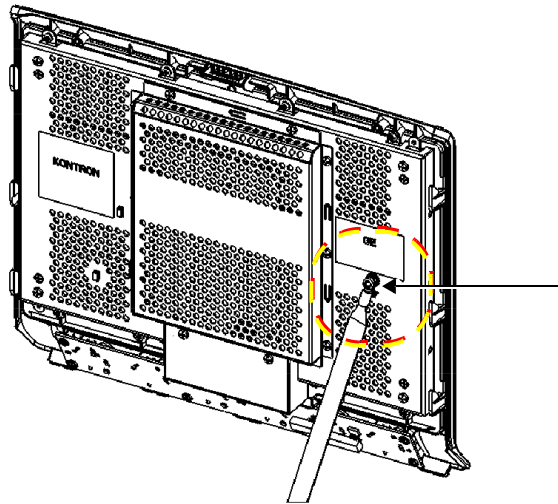
Figure 8-70   Disconnecting the Ground Cable

6.) Tilt the Touch Screen forward away from the chassis, then disconnect the two flex cables:
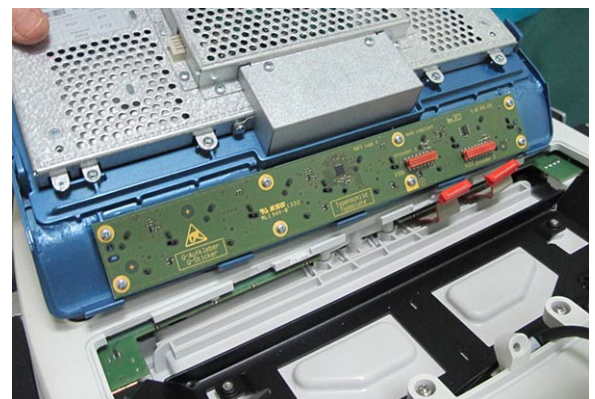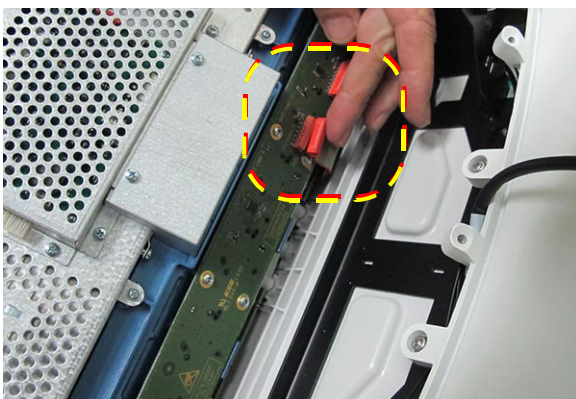
Figure 8-71   Disconnecting the Flex Cables

7.) Lift the Touch Screen off the chassis and remove from the system.

Figure 8-72   Removing the Touch Screen

8.) Carefully lie the Touch Screen face-down on a clean, soft, stable surface - Figure 8-73
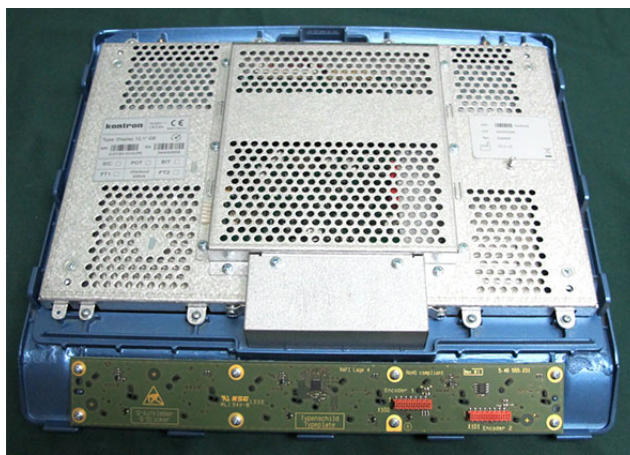
Figure 8-73   Touch Screen Removed

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.*

8-3-12-5   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:

- Touch Screen Rotaries Board Installation Procedure on page 8 - 63

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 2 screw securing holes on each side - Figure 8-68.

4.)   Reconnect the Ground cable - Figure 8-69.

5.)   Reconnect the two Touch Screen cables and make sure to route them as shown in Figure 8-74:
- Power cable *behind* the Touch Screen chassis screw [**A**]
- DP cable in *front* of the Touch Screen chassis screw [**B**]
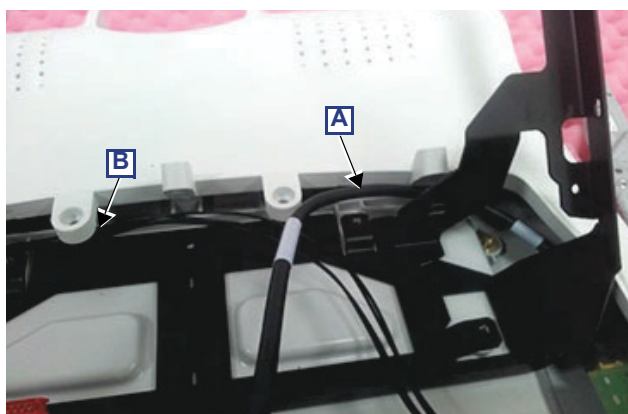
Figure 8-74   Routing and Connecting the Touch Screen Cables

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 8-71. 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 8-68.

9)   Refit the following Touch Screen covers: *rear, service*:

- Touch Screen Rear Cover Installation Procedure on page 8 - 57
- Touch Screen Service Cover Installation Procedure on page 8 - 55

8-3-13   Touch Screen Rotaries Board Replacement Procedure

8-3-13-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-6 on page 9-12.*

8-3-13-2   Time Required

30 min

#### 8-3-13-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-13-4   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*:

- Touch Screen Service Cover Removal Procedure on page 8 - 54
- Touch Screen Rear Cover Removal Procedure on page 8 - 56

3)   Remove the Touch Screen:

- Touch Screen Removal Procedure on page 8 - 58

4.)   Remove the six rotary knobs from the Rotaries Board - Figure 8-76.

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.

6.)   Remove the 8 securing screws from the Touch Screen Rotaries Board - Figure 8-75.
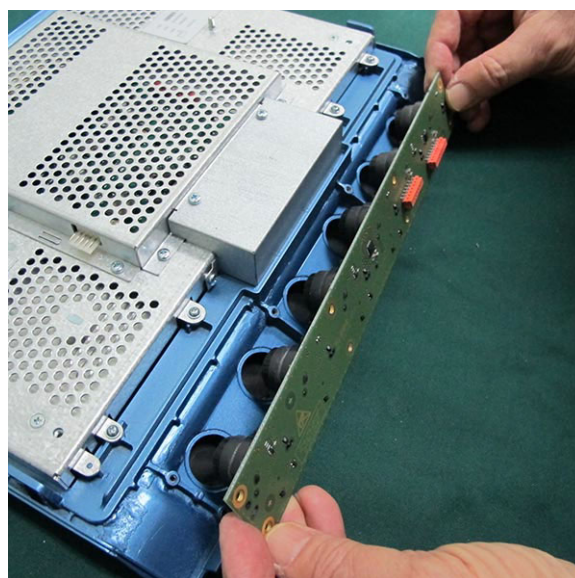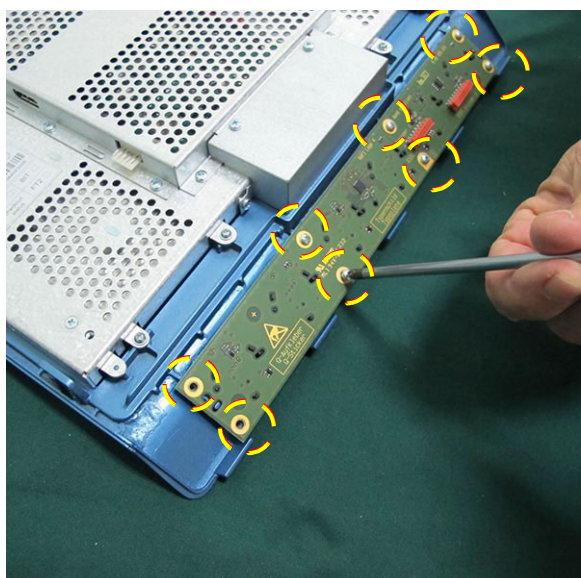
Figure 8-75   Removing the Touch Screen Rotaries Board

7.) Using both hands, lift the Rotaries Board away from the Touch Screen and remove.
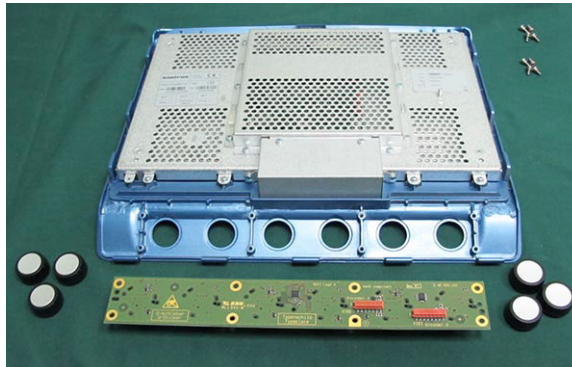
Figure 8-76   Touch Screen and Rotaries Board - Rotary Knobs Removed

8-3-13-5   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).

3.) Install the Touch Screen on the system:

- Touch Screen Installation Procedure on page 8 - 61

4) Refit the following Touch Screen covers: *rear, service*:

- Touch Screen Rear Cover Installation Procedure on page 8 - 57
- Touch Screen Service Cover Installation Procedure on page 8 - 55

5) Fit the six Touch Screen Rotary Knobs:

- Rotary Knob Installation Procedure on page 8 - 78

8-3-14   Operator Panel Keyboard Assembly Replacement Procedure

8-3-14-1   Tools

Phillips screwdriver, flat screwdriver, and a 4 mm Allen key.

FRU Part #   *Refer to Table 9-6 on page 9-12.*

8-3-14-2   Time Required

25 min

8-3-14-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-14-4   Operator 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 - 26).

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 Allen 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 Allen screws on the system's *right* side (arrows marked in the figure indicate the screw locations) as shown in Figure 8-77 below.
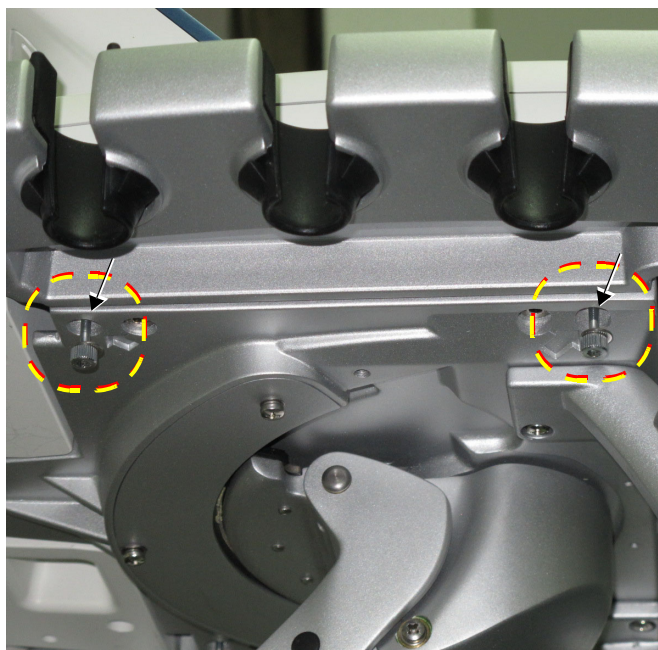
Figure 8-77   Removing the Allen Screws under Keyboard Assembly - Right Side

4) Loosen the two captive Allen screws on the *left* side, as shown in Figure 8-78 below (arrows marked in the figure indicate the screw locations).
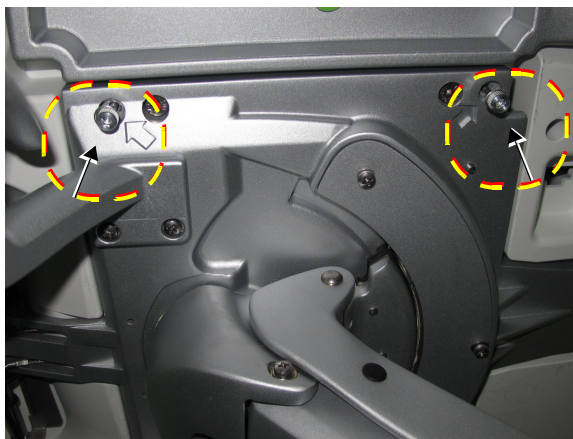
Figure 8-78   Loosening the Captive Allen Screws beneath Keyboard Assembly - Left Side

5) Before proceeding, place some protective sponge beneath the Keyboard Assembly unit to protect it from being damaged during the removal procedure - see Figure 8-79 below.

Figure 8-79   Protective Sponge shown Beneath OPIO

6.) Tilt the keyboard assembly upwards, exposing the three cables connected to the keyboard assembly - see Figure 8-80 below.
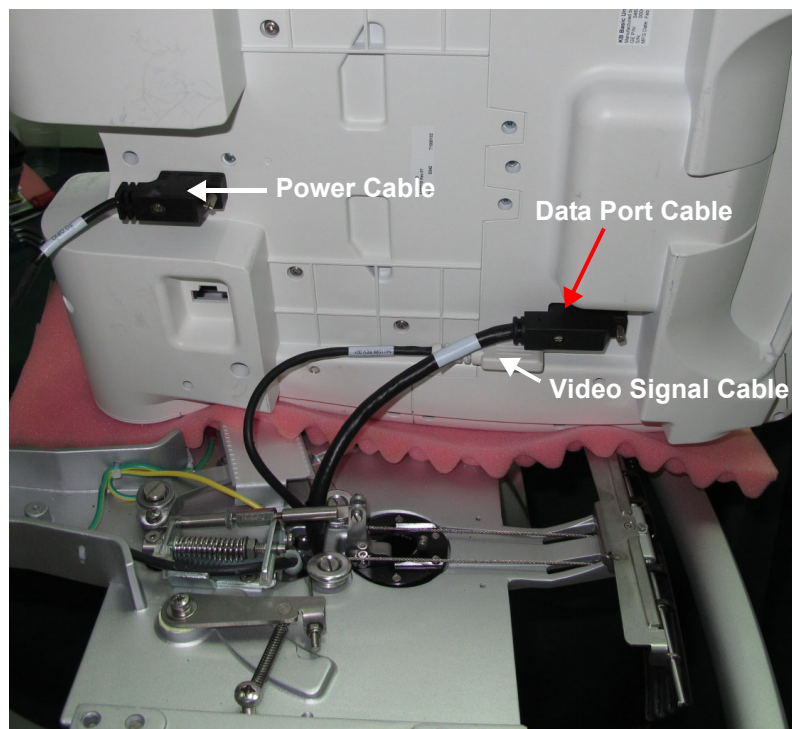
Figure 8-80   Underside of the Keyboard Assembly Showing Cables Connected

7) Using the appropriate screwdriver release the securing screw and unplug the data port cable from the Keyboard Assembly as shown in Figure 8-80, 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 8-80, above.

9) After releasing the three cables, lift the keyboard assembly *upwards* and remove it from the system.
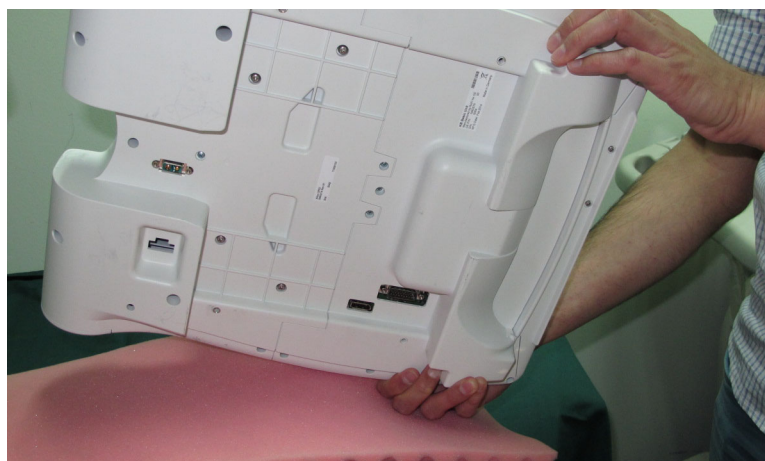
Figure 8-81   Removing the Keyboard Assembly from the System

8-3-14-5   Operator 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 Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64.

4) If used, return the basket to the keyboard interface column (refer to OPIO Basket Installation Procedure on page 8 - 26).

8-3-15   Operator Panel GE Logo 40 mm Replacement Procedure

NOTE: *The Operator Panel is supplied without the GE logos fitted one on each side. When replacing the Operator Panel, it is necessary to order the Operator Panel and in addition, two GE logos (supplied as a separate part, see below).*

One GE logo is located on either side of the Operator Panel as shown in Figure 8-82.

Figure 8-82   GE Logo - Located on Left and Right Side of Operator Panel

8-3-15-1   Tools

No special requirements

FRU Part #   *Refer to Table 9-6 on page 9-12*

8-3-15-2   GE Logo Removal Procedure

NOTE: *In the event that only the GE Logo is damaged (i.e. the Operator 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 Operator Panel.

8-3-15-3   GE 40 mm Logo Installation Procedure

1) Prior to adhering the logo, ensure the outer surface of the Operator 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 Operator Panel.

⚠ **WARNING**   Do not apply pressure to the center of the logo while adhering it to the Operator 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 Operator Panel.

8-3-16   Operator Panel Label Replacement Procedure

NOTE: *The Operator Panel is supplied without the Vivid S60 or Vivid S70 label - these are separate parts. When the OPIO is replaced, order the appropriate label when ordering the OPIO replacement part - see below:*

- The Vivid™ S60 label identifies the 2D scanner
- The Vivid™ S70 label identifies the 4D scanner

8-3-16-1   Tools

Blunt instrument for removing Vivid S60/S70 label from the Operator Panel.

FRU Part # *Refer to Table 9-6 on page 9-12*

8-3-16-2   Operator 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.

8-3-16-3   Operator Panel Label Installation Procedure

1) Prior to adhering the label, ensure the surface of the Operator 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 Operator Panel ensuring that it is correctly oriented (upright), straight and parallel to the inlaid impression on the Operator Panel - see Figure 8-83.

Figure 8-83   Location of Operator Panel Label

5.) Using a soft, clean cloth, gently press out any air bubbles that might be trapped behind the label.

8-3-17   Probe Cup Holders Replacement Procedure

8-3-17-1   Tools
No special requirements

FRU Part # *Refer to Table 9-3 on page 9-8.*

8-3-17-2   Probe Cup Holders Removal Procedure
The probe cup-holders are located on either side of the operator's panel - see - Figure 8-84.

Figure 8-84   Probe Cup Holders

- From beneath the operator's panel, press the gel-cups upwards and remove them.

8-3-17-3   Probe Cup Holders Installation Procedure
- Place a new set of probe-cup holders in their respective positions on the operator's panel.

8-3-18   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 S60/Vivid S70 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).
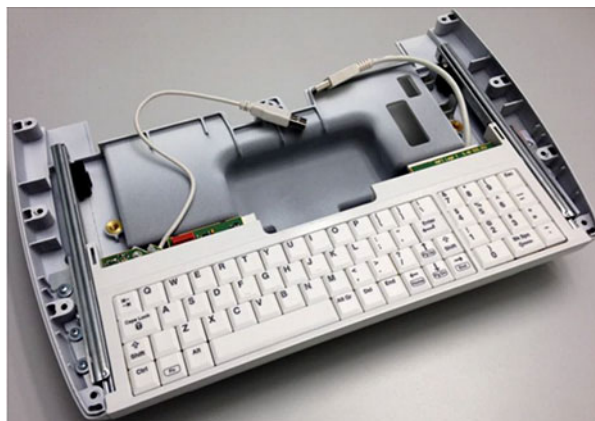
Figure 8-85   Alphanumeric Keyboard/OPIO Bottom Cover Assembly

> ⚠️ **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.
> Refer to Battery Removal Procedure on page 8 - 167.
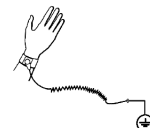
8-3-18-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-7 on page 9-14.*

8-3-18-2   Time Required

30 min

8-3-18-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-18-4   Alphanumeric Keyboard Removal Procedure

1.) Remove the Operator Panel Keyboard Assembly:.

➡️   • Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64

2.) Carefully place the Operator Panel Keyboard Assembly upside-down on a flat, clean, stable surface.

3.) Loosen and remove the 9 Phillips screws that secure the bottom cover in place - see Figure 8-86
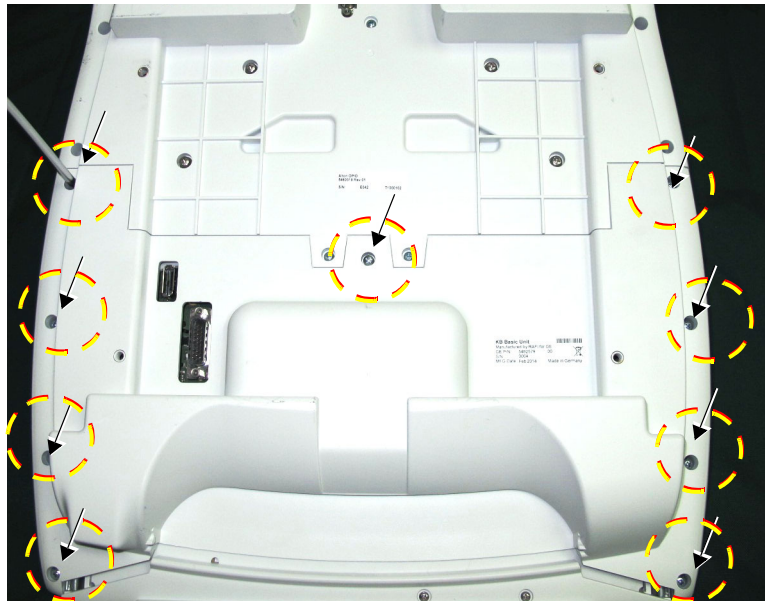
Figure 8-86   Operator Panel Keyboard Assembly - Bottom Cover Securing Screws

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 8-87 (see additional note below).
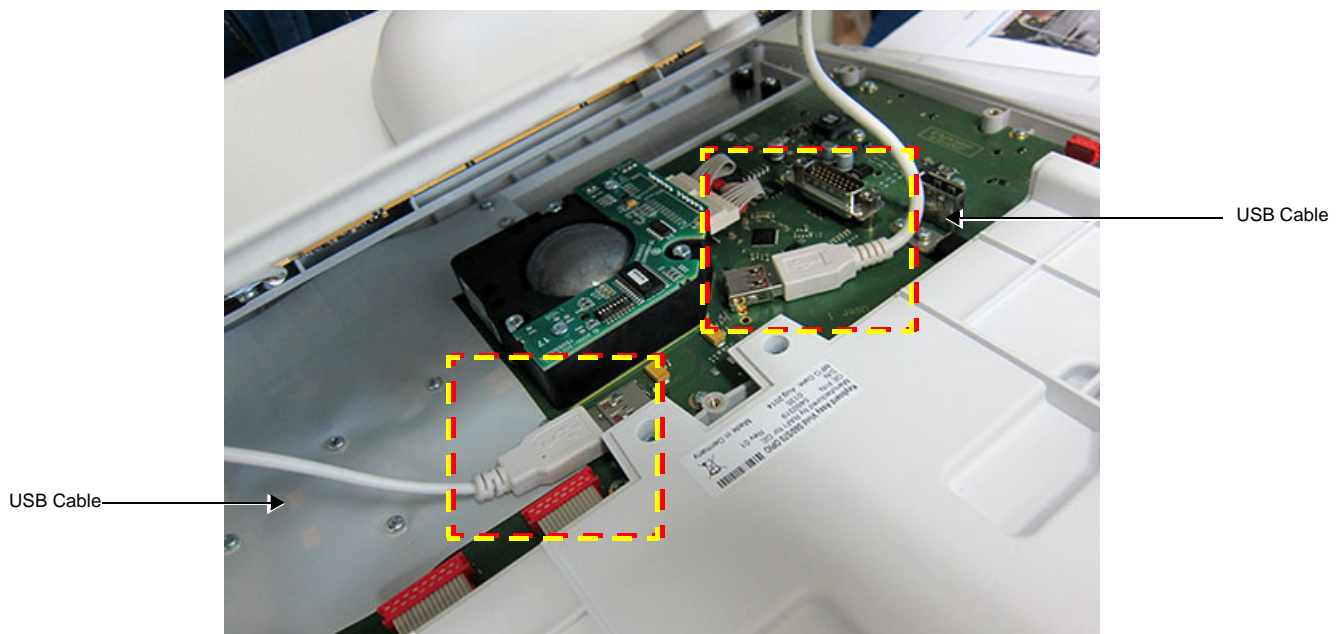
USB Cable

USB Cable

Figure 8-87   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.

5.) Remove the Operator Panel Bottom Cover (with attached AN Keyboard) from the Operator Panel.

Figure 8-88   Operator Panel Keyboard Assembly with AN Keyboard/Bottom Cover Removed

8-3-18-5   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 Operator Panel Keyboard Assembly, carefully reconnect the two USB cables to the side of the trackball as shown in Figure 8-89 below..
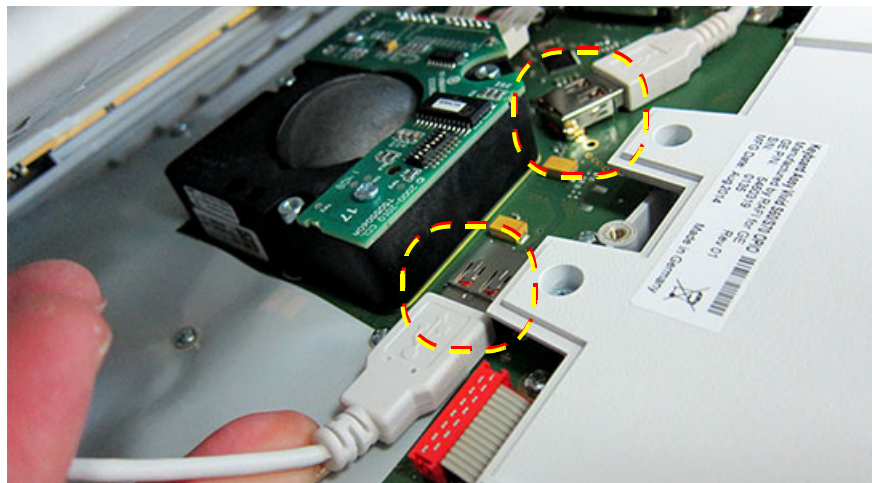
Figure 8-89   Installing Alphanumeric Keyboard/ Bottom Cover on Operator Panel Keyboard Assembly

2.) Place the Bottom Cover in position on the base of the Operator Panel Keyboard Assembly, aligning each of the screw holes.
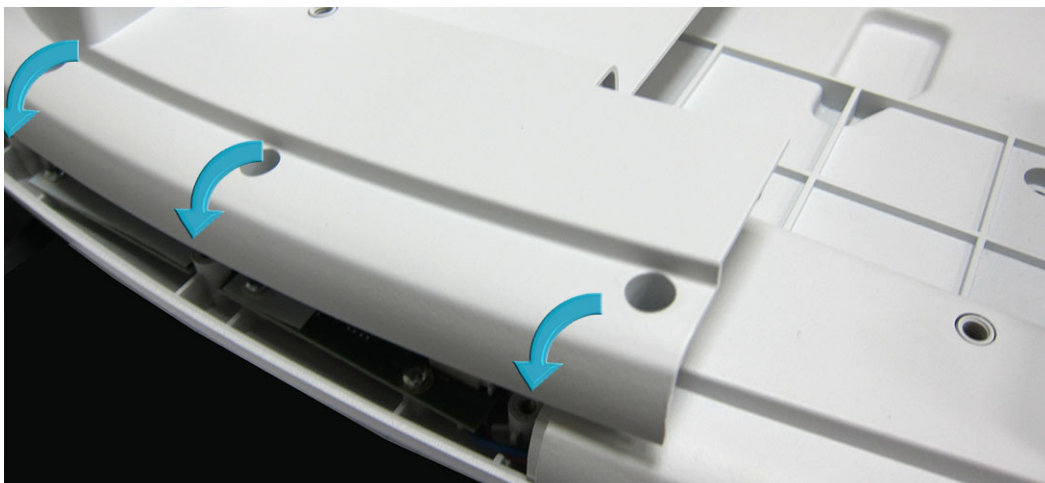
Figure 8-90   Fitting the Bottom Cover onto the Operator Panel Keyboard Assembly Base

3.) Return and fasten the 9 Phillips screws (previously removed) to secure the bottom cover to the keyboard assembly - see Figure 8-86.

4.) Carefully turn the Operator Panel Keyboard Assembly over (right-way-up), then install it on the system:

- Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67

8-3-19 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. Refer to Battery Removal Procedure on page 8 - 167.
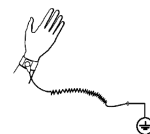
NOTE: *Before performing this procedure, clean the trackball and bowl (since dirt may be the cause of the current fault). Refer to the instructions described in Cleaning the Trackball on page 4 - 15.*

8-3-19-1 Tools

Phillips screwdriver and 5.5 mm nut driver/box spanner.

FRU Part #   *Refer to Table 9-6 on page 9-12.*

8-3-19-2 Time Required

25 min

8-3-19-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-3-19-4 Mechanical Trackball and Housing Removal Procedure

1.) Remove the Keyboard Assembly and place on a flat, clean, stable surface:

➡️   • Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64

2.) Working from the top, remove the trackball ring by turning it *counter-clockwise* (1/4 turn), then lift.

Figure 8-91   Removing the Mechanical Trackball Ring

3.) With one hand, tilt the Keyboard Assembly forward until the trackball falls out into the other hand.

Figure 8-92   Removing the Mechanical Trackball

4.) Carefully turn the Keyboard Assembly over (upside-down).

5.) Remove the Keyboard Bottom Cover:

   • Alphanumeric Keyboard Removal Procedure on page 8 - 71

6.) Disconnect the 2 flex cables - Figure 8-93, left.

7.) Remove each of the 3 hex nuts (5.5 mm) from the Trackball Board and housing - Figure 8-93, right.
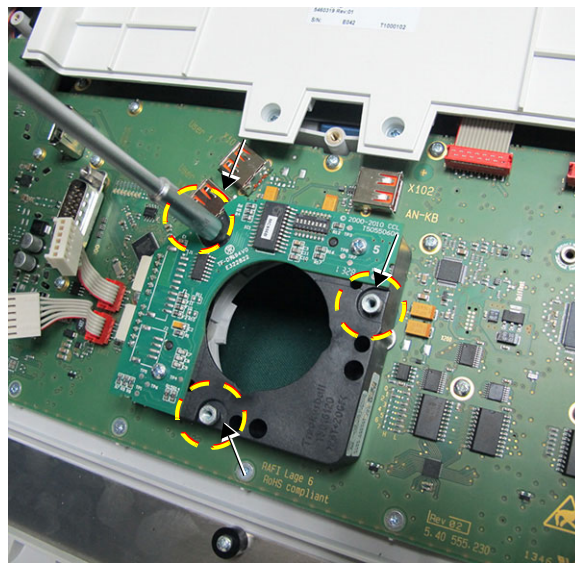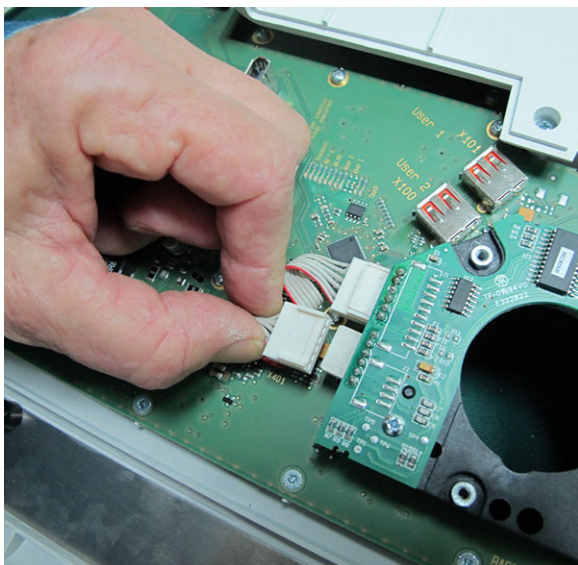
Figure 8-93   Trackball Board and Housing Removal

8.) Lift the Trackball Board and Housing assembly up and remove - Figure 8-94.
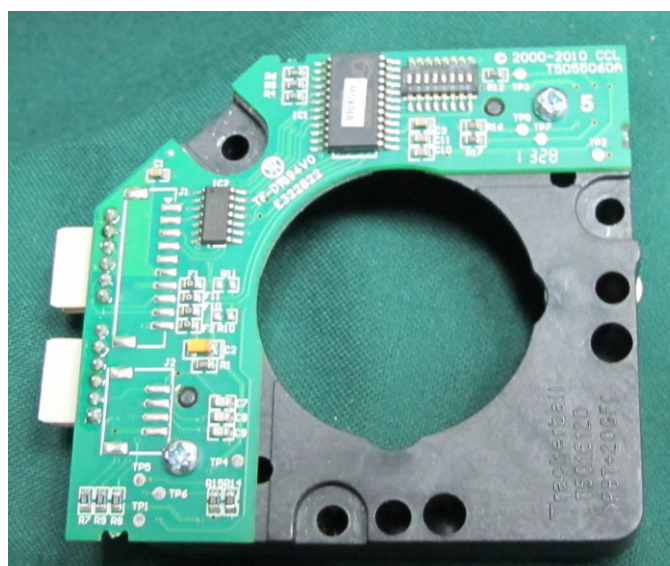
Figure 8-94   Trackball Board and Housing Removed

8-3-19-5   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 8-93).

3.) Secure the Trackball Housing using the 3 **new** nuts supplied with the kit.

4.) Carefully re-connect the 2 cables (previously disconnected) - Figure 8-93, left.

5.) Re-fit the Keyboard Bottom Cover:

- Alphanumeric Keyboard Installation Procedure on page 8 - 73

6.) Install the Keyboard Assembly: on the system.

- Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67

7.) Place the trackball into position in the Operator Panel.

8.) Return the trackball ring and turn to secure the trackball in its housing - Figure 8-91.

9.) Turn ON power to the system.

8-3-20   Rotary Knob Replacement Procedure

NOTE: *The following instructions are applicable to replacement of Rotary Knobs on either on the Operator Panel, or on the Touch Screen. The Knobs Kit contains Rotary Knobs for both.*

8-3-20-1   Tools
None.

FRU Part # *Refer to Table 9-6 on page 9-12.*

8-3-20-2   Time Required
5 min

8-3-20-3   Preparation
None

8-3-20-4   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 8-95 below.

Figure 8-95   Removing a Rotary Knob

8-3-20-5   Rotary Knob Installation Procedure

1.) Carefully place a new Rotary Knob in position on the Operator 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.

8-3-21   Operator Panel Keycaps Replacement Procedure

8-3-21-1   Tools

Use the appropriate flat screwdriver, as indicated in the Keycap replacement procedure.

FRU Part # *Refer to Table 9-6 on page 9-12.*

8-3-21-2   Time Required

5 min

8-3-21-3   Preparation

None

8-3-21-4   Operator 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 Operator Panel.
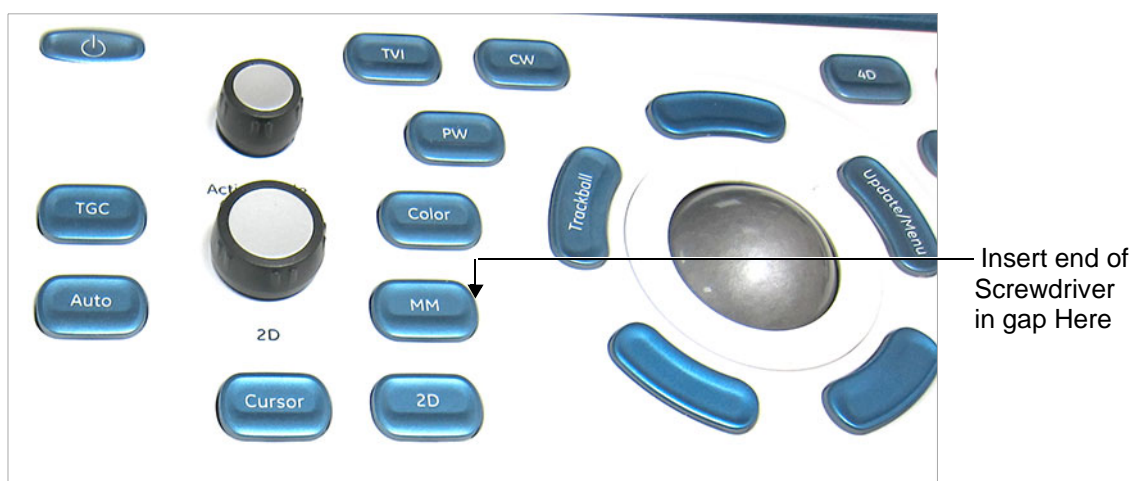
Figure 8-96   Removing Keycap from Operator Panel

2.) Gently lever off the defective Keycap, until it is completely loosened from its base.

3.) Remove the defective Keycap.

8-3-21-5   Operator Panel KeyCap Installation Procedure

1.) Carefully place the appropriate new Keycap in position on the Operator 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.

8-3-22　Alphanumeric Keycaps Replacement Procedure

The Alphanumeric Keyboard is shown in Figure 8-97.
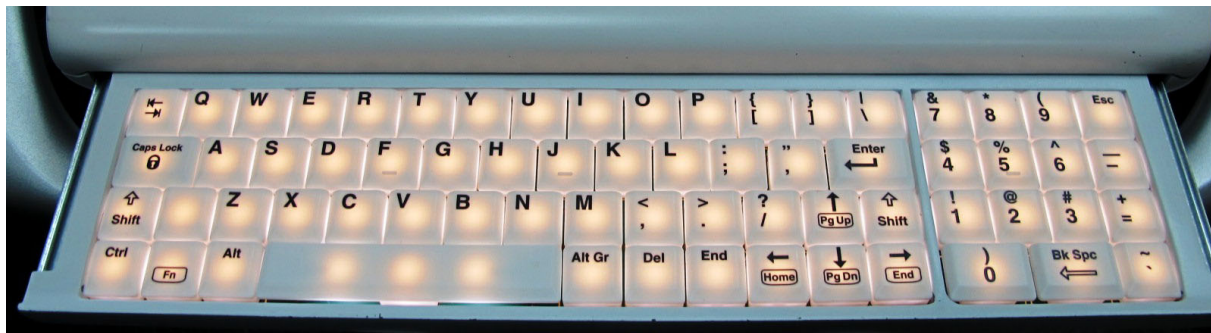
Figure 8-97　Alphanumeric Keyboard

8-3-22-1　Tools

Appropriate flat screwdriver.

FRU Part #　*Refer to Table 9-7 on page 9-14.*

8-3-22-2　Time Required

5 min

8-3-22-3　Preparations

None

8-3-22-4　Alphanumeric Keycap Removal Procedure

- Using a flat screwdriver gently release the defective keycap as shown in Figure 8-98.

Figure 8-98　Alphanumeric Keyboard

8-3-22-5　Keycaps for Operator 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 - Replacement Procedures

8-4-1 Keyboard and Monitor Cable Replacement Procedure

The Vivid S60/Vivid S70 system's communication and power cables extend from the LCD Monitor downwards, along the Articulated Arm Assembly to the Keyboard Interface Assembly, and finally to the Back End Interface Board (BIF). The replacement procedures are carried out in stages, as described in the sub-sections below.

NOTE: *The following stages show the order in which cables are removed:*

* LCD Monitor

* Keyboard assembly/OPIO

* Upper/Lower Arm Assembly

* BIF

8-4-1-1 Tools

Use the appropriate Phillips screwdriver, Allen key, diagonal side cutter, round punch, light hammer.

FRU Part # *Refer to Table 9-16 on page 9-22.*

8-4-1-2 Time Required

120 min.

8-4-1-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-4-1-4 Keyboard and Monitor Cable Removal Procedure

1.) Lock the articulated arm in position and fold the monitor to its maximum face-down position - see Figure 8-99 below.

Figure 8-99 Monitor Locked in Face-Down Position

1) Remove the following covers: *left* side, *right* side, *DVD, front, left rear, right rear.*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16
- Left Rear Cover Removal Procedure on page 8 - 23
- Right Rear Cover Removal Procedure on page 8 - 20

2.) Disconnect the BIF cable lead (two connectors) and the OPIO cable lead from the monitor.

3.) Unscrew the two cable holders as shown in Figure 8-100 below.
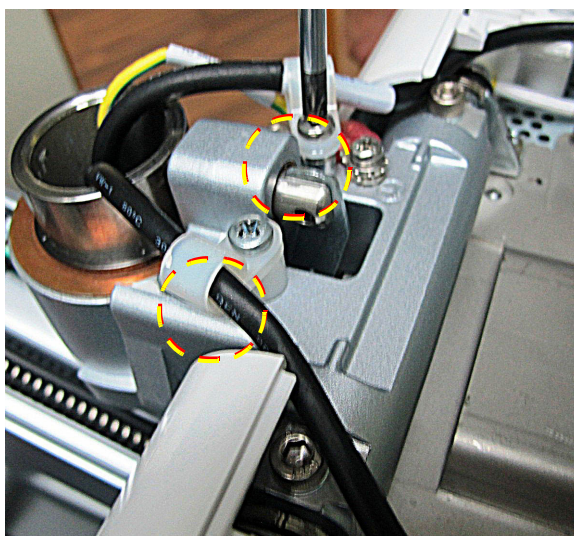
Figure 8-100   Cable Holders Located on Articulated Arm

4.) Release Articulated Arm lock and raise the monitor arm - see left picture Figure 8-101 below.

Figure 8-101   Cutting Tie-wraps on the Articulated Arm

5.) Using side cutters, cut four tie-wraps located on upper articulated arm- see Figure 8-101, right.

Cut four tie-wraps on lower articulated arm - see Figure 8-102 below.
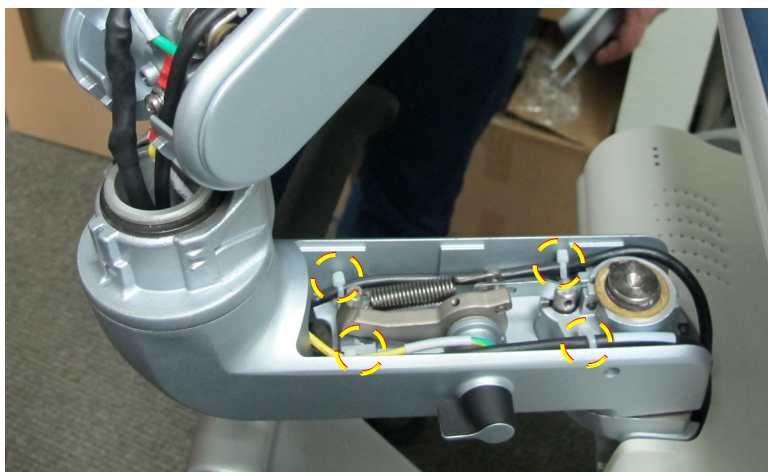
Figure 8-102   Four Tie-wraps on Lower Articulated Arm

6.) Thread the blue "double cable lead" to the BIF through the upper articulated arm joint as shown in Figure 8-103 below.

Figure 8-103   Monitor Cables Threaded Through Arm Aperture

7.) Squeeze the connector clips, then feed the display monitor cable lead to the OPIO through the upper articulated arm joint as shown in Figure 8-104.
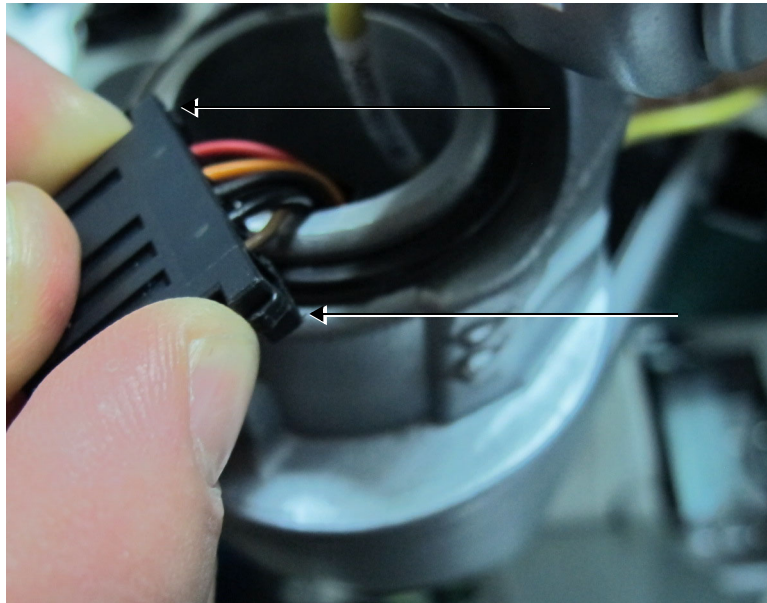
Figure 8-104   Squeeze the Connector Clips and Feed Cable Downwards

8-4-1-4-1   **Removing the Lower Arm**

During this procedure, when removing the lower arm, the OPIO platform should be supported with one hand while the Articulated Arm is lowered onto the system's rear handle.

When performing this task, place protective sponge between the handle and the Articulated Arm as shown in Figure 8-105 below.

Figure 8-105   Protective Sponge Between Articulated Arm and System Handle

1.) Remove the OPI:

• Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64

2.) Remove the lower arm securing screws - on either side of the lower arm - see Figure 8-106.

Figure 8-106   Lower Arm Securing Screws

3.) Using a punch and light hammer, tap out the center pin located below the base of the operator panel and remove completely releasing upper section of the lower arm - Figure 8-107.

Figure 8-107   Remove Securing Pin

4.) Supporting the OPIO platform, place some protective sponge on the system's handle and gently lower the platform down onto the handle - see Figure 8-105 on page 8-84.

5.) Lower the Lower Arm as shown in Figure 8-108 below.
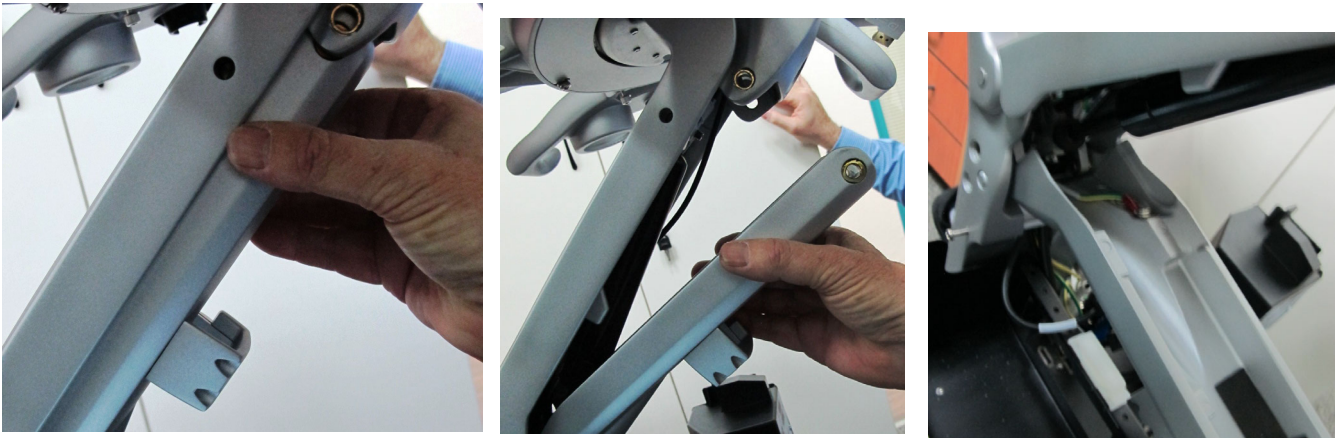
Figure 8-108   Upper Section of Lower Arm

6.) Release lower section of lower arm from main column as follows:

a.) Release two cir-clips on either side of the gas spring - Figure 8-109 below.
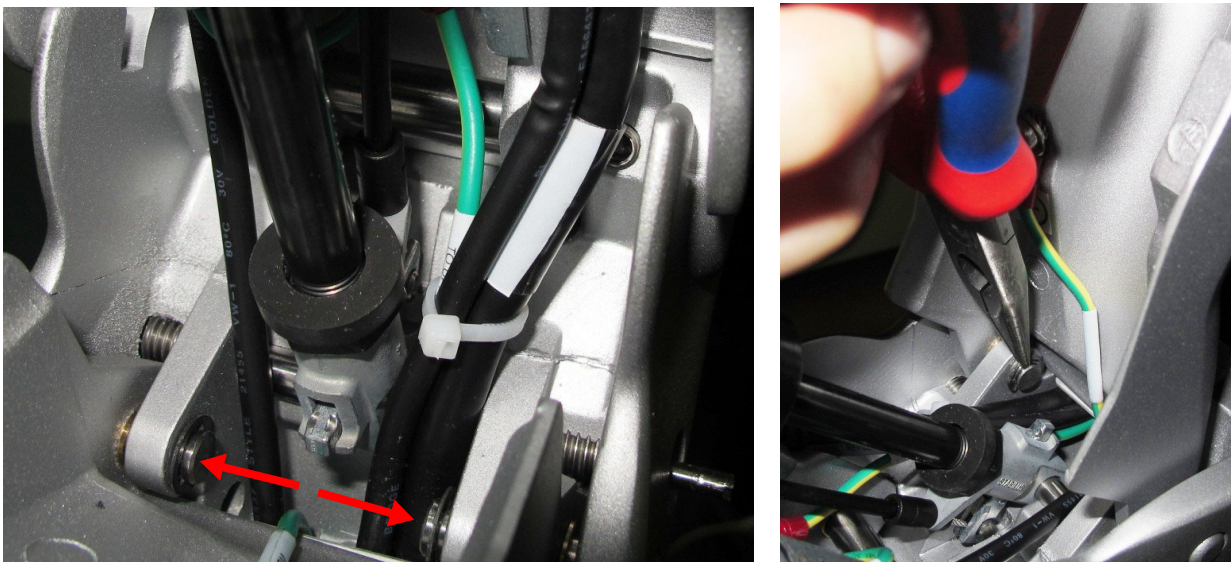
Figure 8-109   Two Cir-clips on Either Side of Gas Spring

b.) After releasing the cir-clips, tap out each securing shaft with a hammer and punch. See Figure 8-110 below..
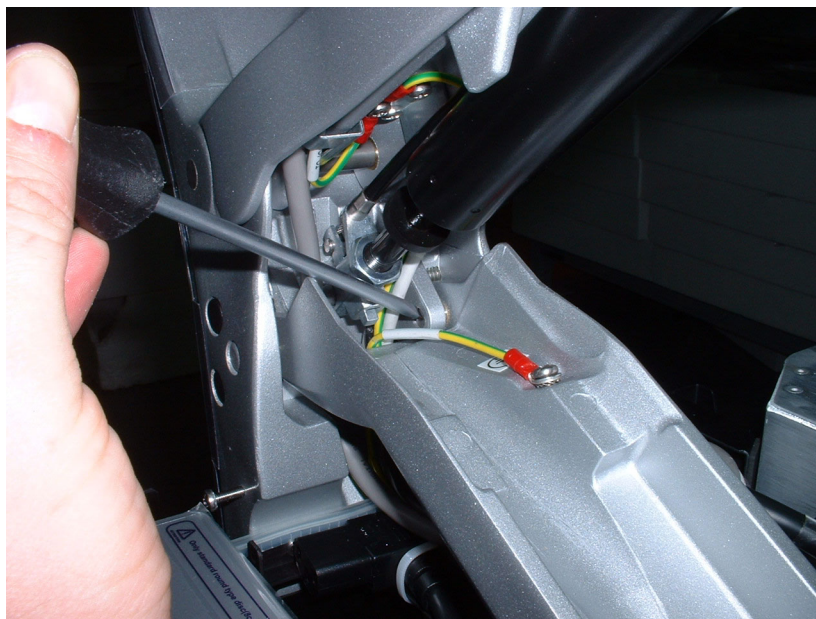
Figure 8-110   Tapping Out the Securing Pin

c.) Disconnect the Ground cable from the lower arm cover and remove the lower arm cover from the system - Figure 8-111 below.

Figure 8-111   Lower Arm Cover Removed from System

7.) Remove white cable supporting bracket - see Figure 8-112 below.
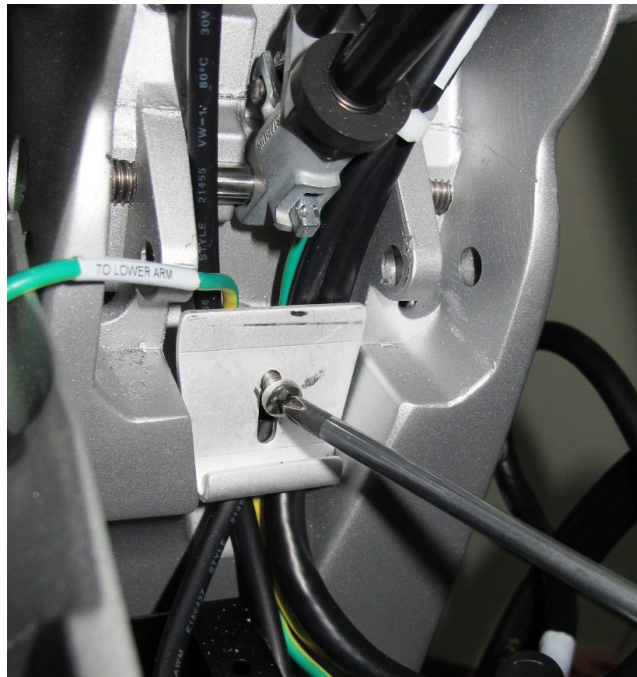
Figure 8-112   White Cable Supporting Bracket

8.) Remove two cable bracket holders - two securing screws in each bracket - one bracket on either side of the gas spring - see Figure 8-113 below.
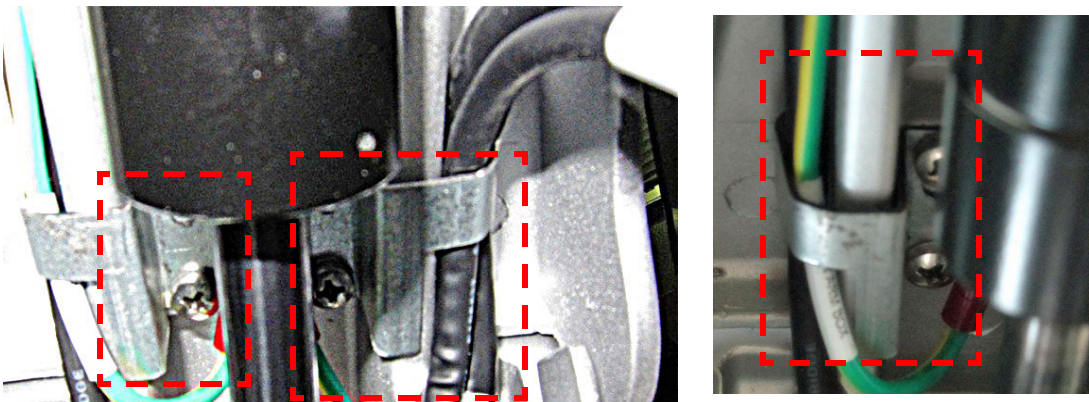
Figure 8-113   Two Cable Brackets On Either Side of the Gas Spring

9.) Remove the cable holder from the upper arm - see Figure 8-114 below.

Figure 8-114   Cable Holder on Upper Section of Lower Arm Cover

NOTE: Before threading the cables through the aperture in the OIPIO platform, the "up-down lever shaft" must be removed from obstructing the cable aperture as shown in - Figure 8-115 below.
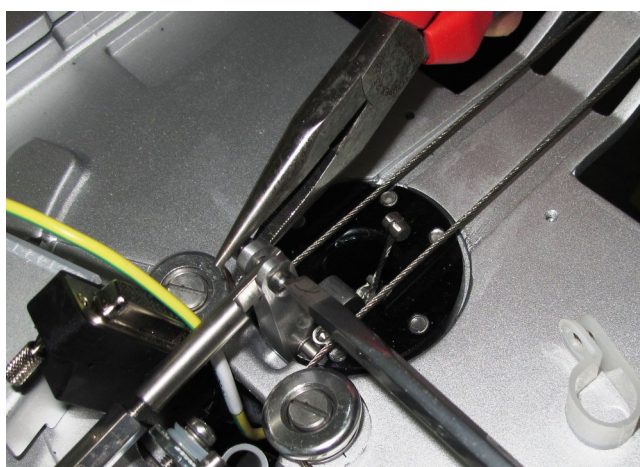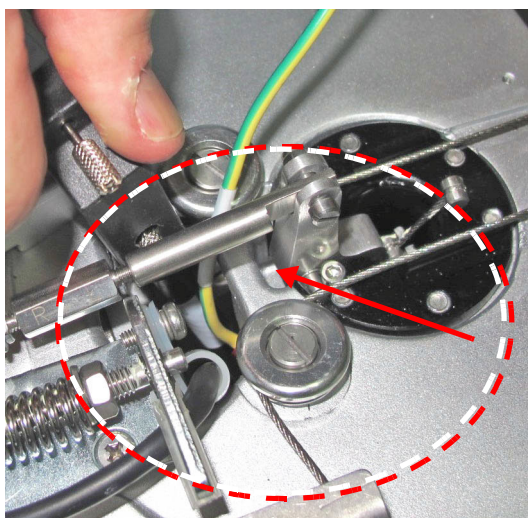
Figure 8-115   Releasing Up-Down Lever Shaft

10.)Remove the "up-down lever shaft" securing screw and move the shaft aside.

11.) Remove the cable securing clip and cut the tie-wraps - see Figure 8-116 below.
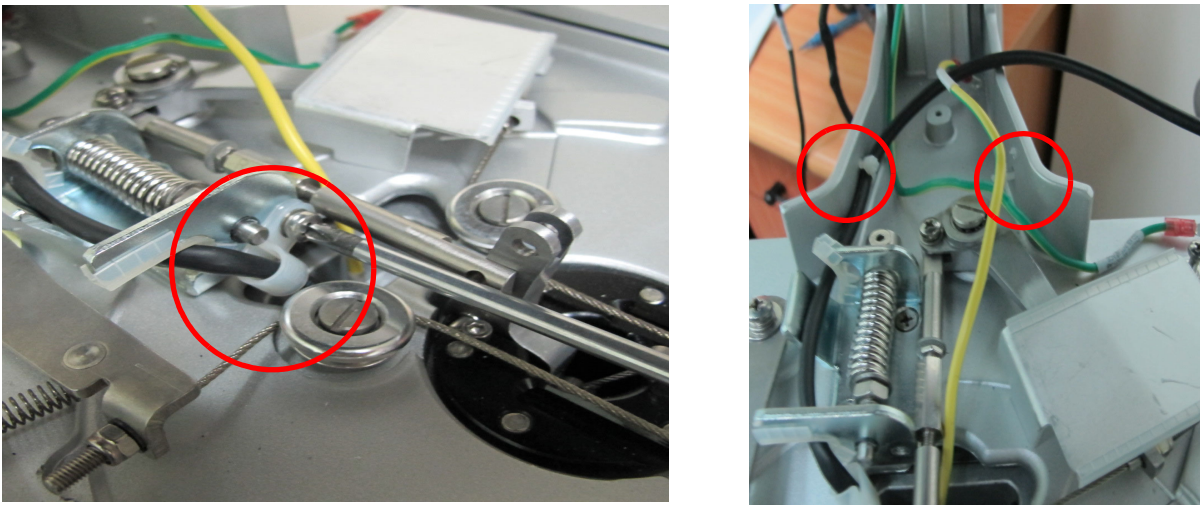
Figure 8-116   Remove Securing Clip and Tie-Wraps on OPIO Platform

12.) Thread the cables through the OPIO platform aperture - see Figure 8-117 below.
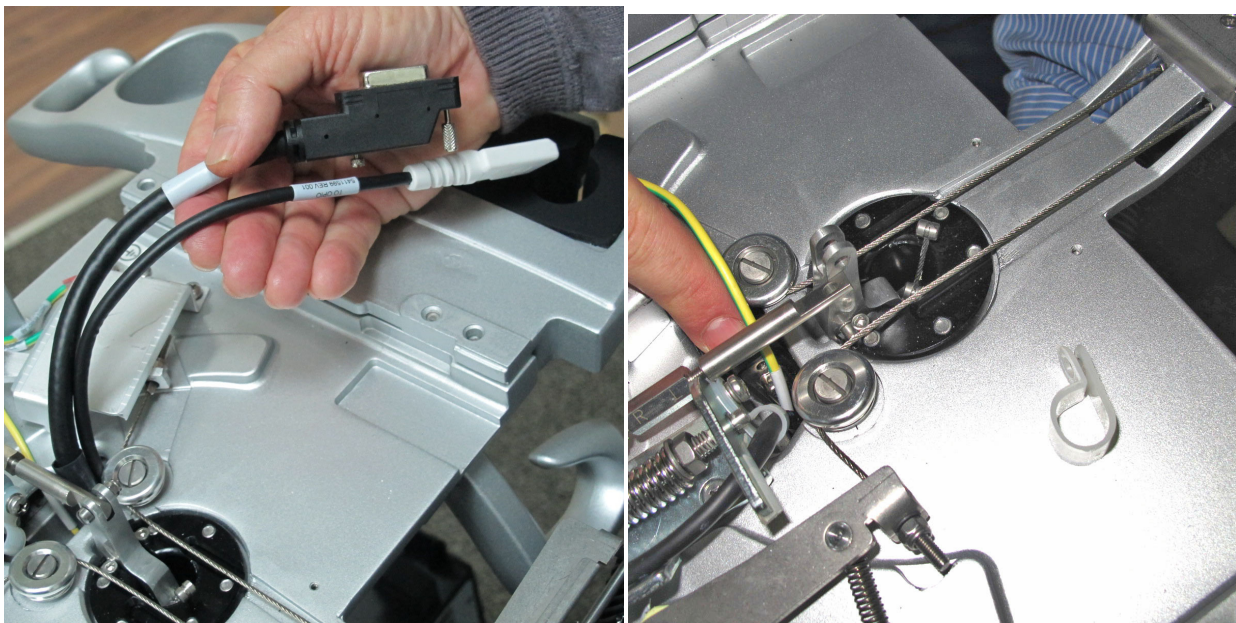
Figure 8-117   OPIO Platform Showing Cables Threaded Through Aperture

13.) Disconnect the following cables from the internal BIF panel and remove them from the system - see Figure 8-118 below:

- OPIO to BIF (white)

- Main Display to monitor (blue)

- OPIO display cable (at rear in Figure 8-118 below):
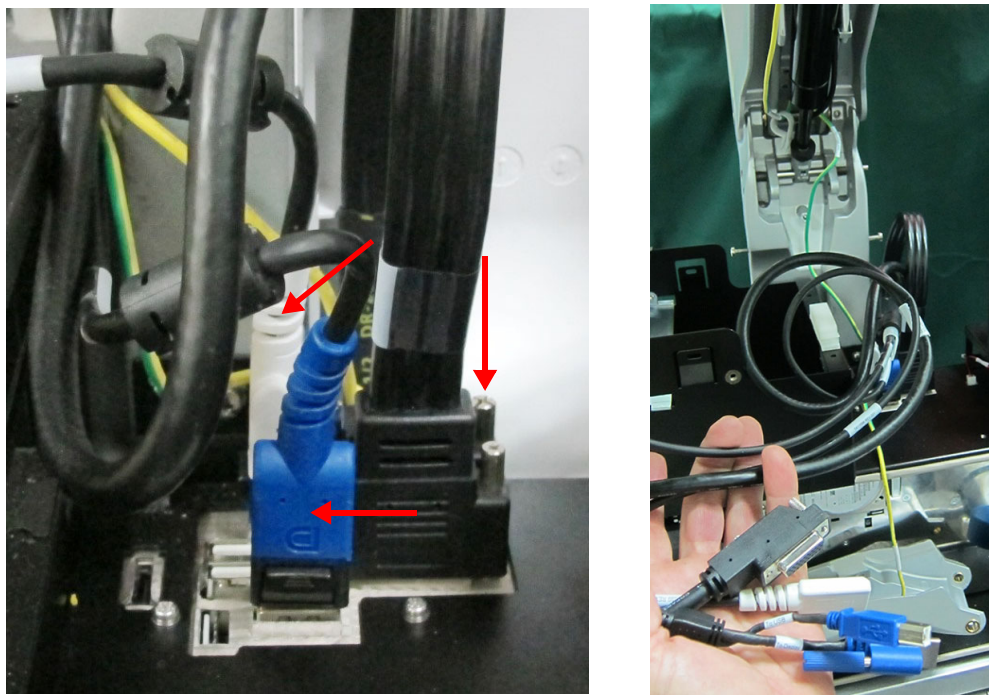
Figure 8-118   Cables Connected to Internal BIF Panel (Left) & Removed (Right)

8-4-1-5   Keyboard and Monitor Cable Installation Procedure

When replacing the cables refer to the context graphic shown in Figure 8-119 below.

NOTE: *The following stages show the order in which cables are installed:*

- LCD monitor
- Keyboard Assembly/OPIO
- Upper/Lower Arm Assembly
- BIF
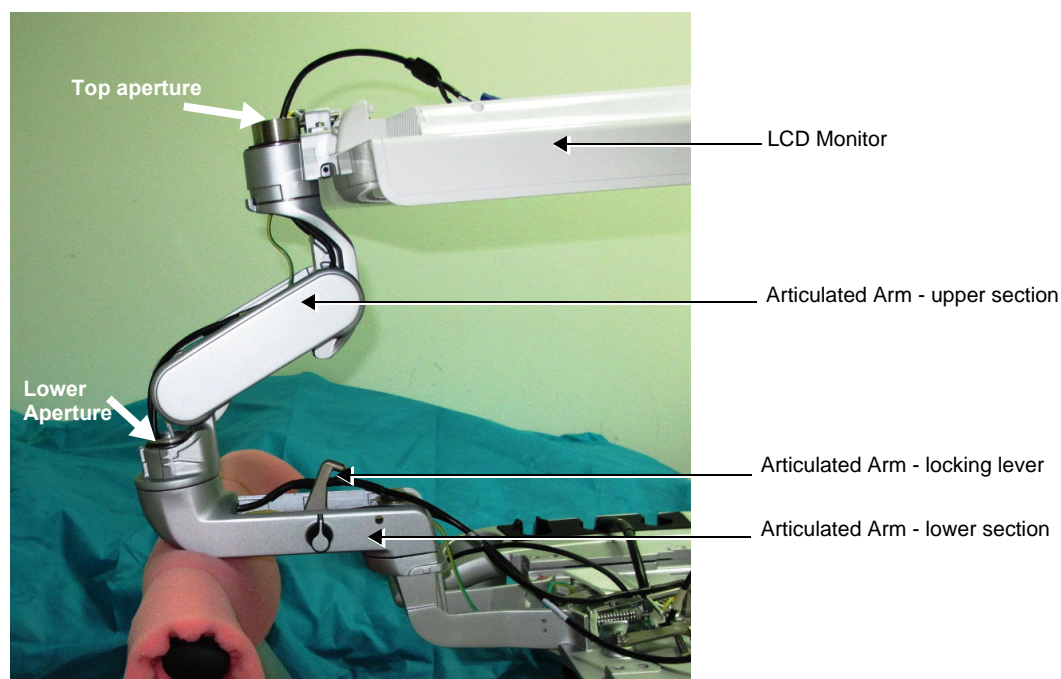
Figure 8-119   Articulated Arm - Context

8-4-1-5-1 Installing the Cables

Start the cable installation procedure as described in the following steps.

1.) Thread the blue main display cable downwards through the top articulated arm aperture and lead the cable through to the lower articulated arm aperture downwards towards the OPIO platform - refer to Figure 8-120 below and Figure 8-121 below.
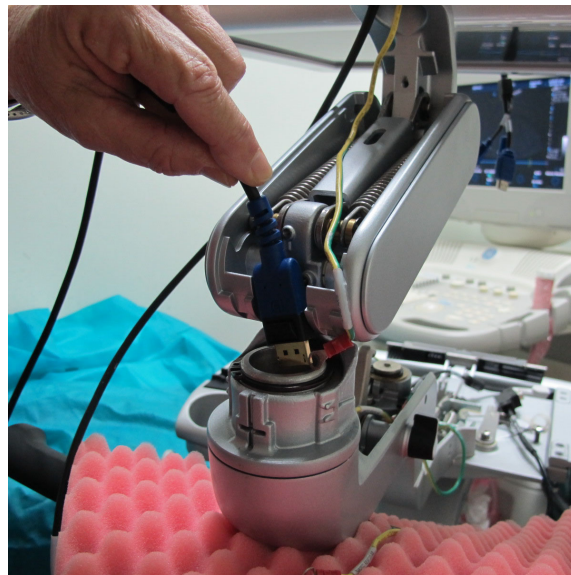
Figure 8-120   Feeding Cables through Top Aperture

2.) Continue and lead the cable's BIF connector through the OPIO aperture towards the Internal BIF Panel as shown in - Figure 8-121 below.
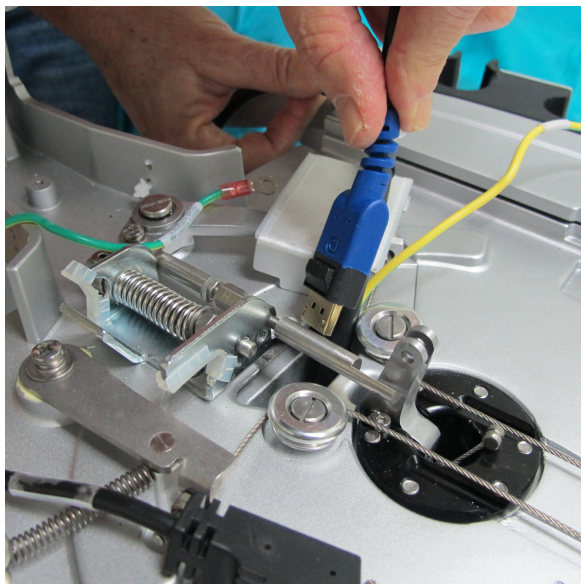
Figure 8-121   Feeding Cables through OPIO Aperture

3.) Thread the "display to OPIO cable" via the base of the lower articulated arm aperture upwards towards the monitor as shown in Figure 8-122 below and Figure 8-123 below.
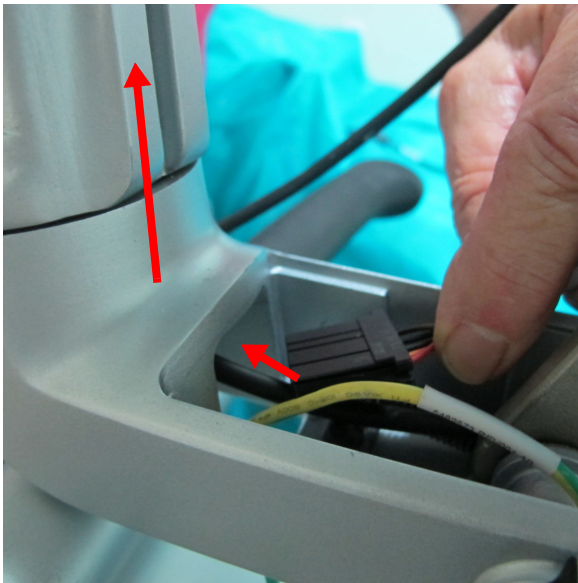
Figure 8-122   Threading the Display to OPIO Cable
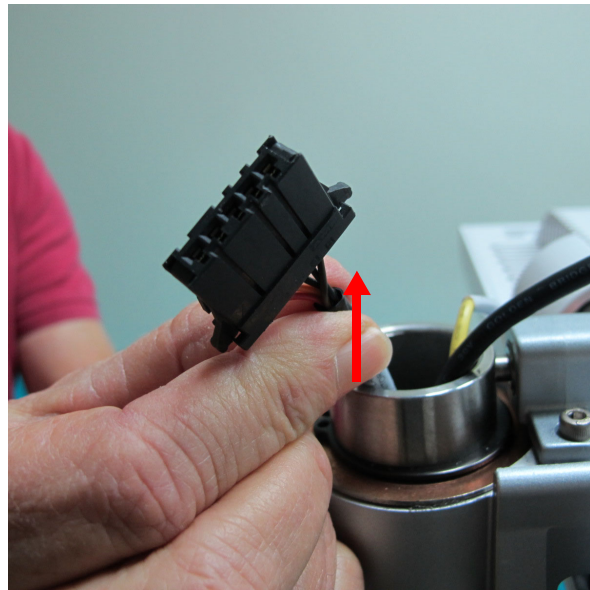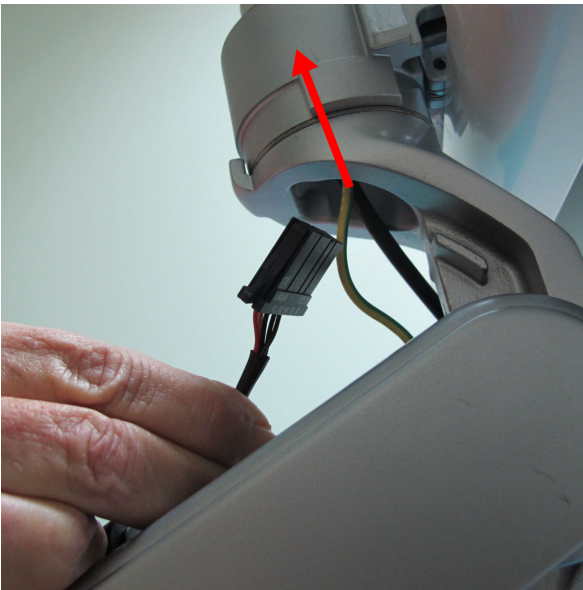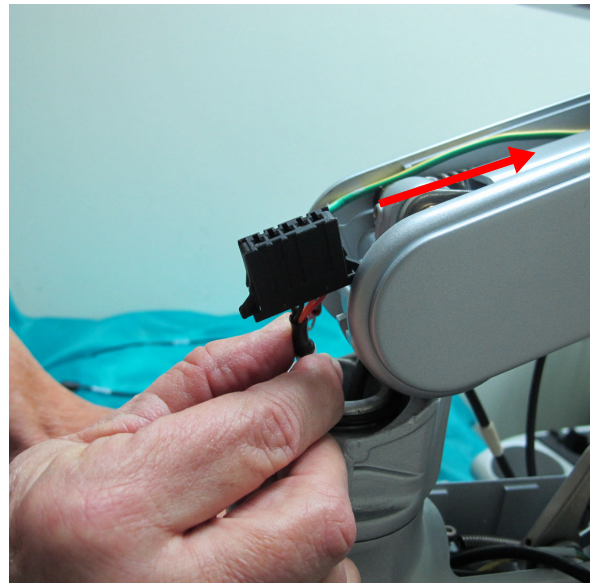
Figure 8-123   Threading the Display to OPIO Cable

4.) Reconnect the two Ground cables previously removed - see Figure 8-124 below.
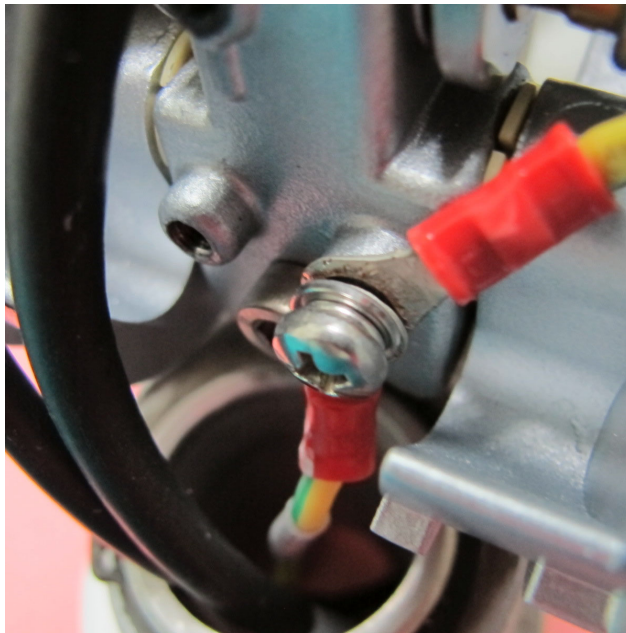
Figure 8-124

5.) Thread the white OPIO to BIF cable through the OPIO platform aperture a in Figure 8-125 below.
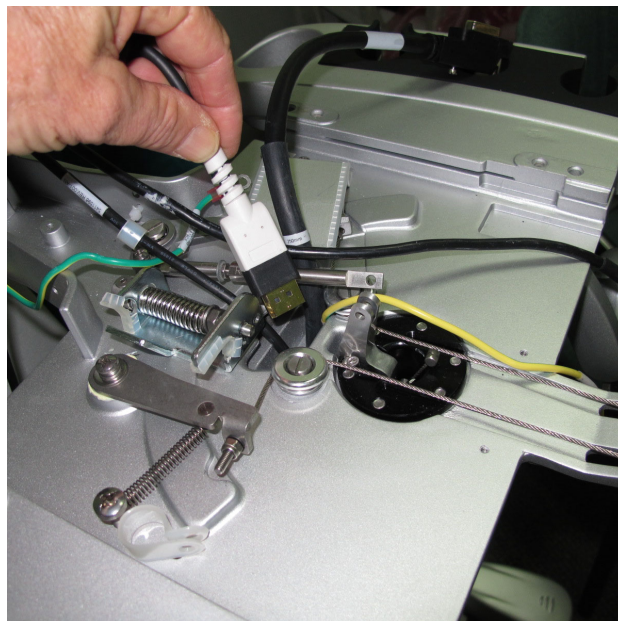
Figure 8-125   White OPIO to BIF Cable

6.) Thread the OPIO to BIF cable from below the OPIO platform to emerge above the platform - see Figure 8-126 below.
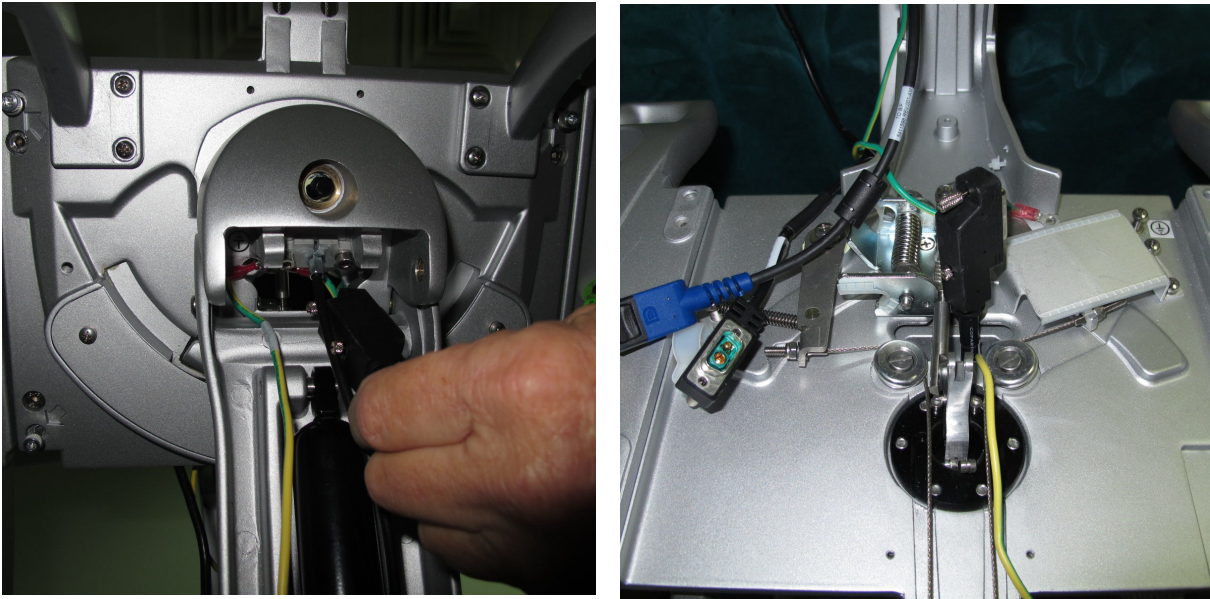
Figure 8-126   Feeding the OPIO-to-BIF Cable through the OPIO Aperture

8-4-1-5-2   Securing the Cable to the Chassis

NOTE: *Once the cables have been laid out throughout the system, the next step is to secure the various cables in position using the cable holders previously removed and replacing the tie-wraps.*

1.) Return the cable tie-wrap to the upper section of the lower arm
    - see Figure 8-116 on page 8-90.

2.) Return the two cable bracket holders - two securing screws in each bracket - one bracket on either side of the gas spring - see Figure 8-113 on page 8-88.

3.) Return the white cable supporting bracket to its position on the central column to secure the cables as shown in Figure 8-112 on page 8-88.

4.) Secure the lower section of the lower arm to its position on the central column and secure it in position by inserting the two securing shafts previously removed - refer to Figure 8-109 on page 8-86.

5.) Secure each shaft in position with the cir-clips previously removed.

6.) Supporting the OPIO platform with one hand, using the shaft previously removed, attach the upper section of the lower arm to the upper arm - refer to Figure 8-107 on page 8-85 and Figure 8-108 on page 8-86.

7.) Return the lower arm securing screws to secure the shaft - refer to Figure 8-106 on page 8-85.

8.) Secure the "up-down shaft" previously released - refer to Figure 8-115 on page 8-89.

9.) Return the OPIO to its position on the OPIO platform as described in Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67.

10.)Secure the cables in the lower section of the articulated arm with tie-wraps as shown in Figure 8-102 on page 8-83.

11.)Continue and secure the cables in the articulated arm as shown in Figure 8-101 on page 8-82.

12.)Return the cable holders on the articulated arm previously removed - refer to Figure 8-100 on page 8-82.

13.)Return the articulated arm service covers to their appropriate locations on the articulated arm.

14.) Connect the BIF cable lead (two connectors) and the OPIO cable lead to the monitor.

15.) Reconnect all the BIF cables previously disconnected from the BIF - refer to Figure 8-118 on page 8-91.

16.) Turn ON power to the system, the perform the functionality checks described in the following section.

8-4-1-5-3   Installing the System Covers

- Refit the following covers: *right rear, left rear, front, DVD, right* side, *left* side

    - Right Rear Cover Removal Procedure on page 8 - 20
    - Left Rear Cover Installation Procedure on page 8 - 25
    - Front Cover Installation Procedure on page 8 - 19
    - DVD Cover Installation Procedure on page 8 - 12
    - Right Side Cover Installation Procedure on page 8 - 10
    - Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

8-4-2   KB to Touch DP Cable Replacement Procedure

8-4-2-1   Tools

Use the appropriate Phillips and flat screwdrivers, Allen keys and diagonal side cutter.

FRU Part # *Refer to Table 9-16 on page 9-22.*

8-4-2-2   Time Required

60 min

8-4-2-3   Preparation

1.) If the OPIO Basket is attached, remove it from the keyboard interface column.
2.) Remove the Operator Panel Keyboard Assembly.
3.) Remove the Touch Screen Service Cover.
4.) Remove the Touch Screen Rear Cover.
5.) Remove the Touch Screen.
6.) Remove the Touch Screen Chassis.

- OPIO Basket Removal Procedure on page 8 - 26
- Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64
- Touch Screen Service Cover Removal Procedure on page 8 - 54
- Touch Screen Rear Cover Removal Procedure on page 8 - 56
- Touch Screen Removal Procedure on page 8 - 58
- Touch Screen Chassis Removal Procedure on page 8 - 170

8-4-2-4   KB to Touch DP Cable Removal Procedure

Disconnect the cable from the KBD panel.
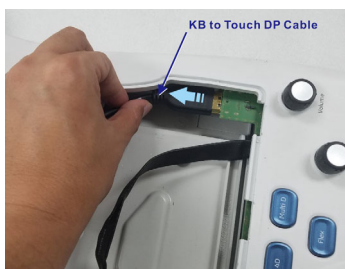
Figure 8-127   Disconnect the KB to Touch DP Cable from the KBD panel

8-4-2-5   Alton KBD TP display Cable (or KB to Touch DP Cable) Installation Procedure

1.) Plug the Alton KBD TP Display Cable into the DP port.
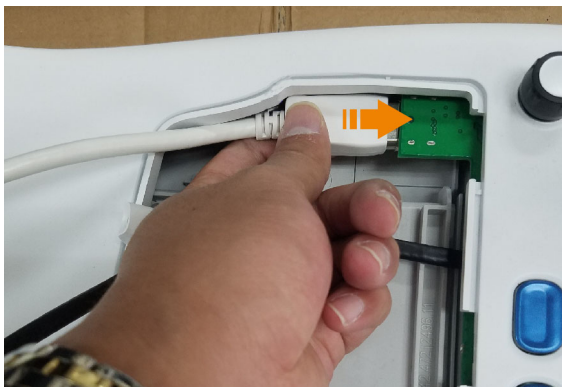
Figure 8-128   Plug the Alton KBD TP Display Cable into the DP port

2.) Perform the procedures previously described in reverse sequence.

3.) Secure cables with new tie wraps.

4.) Turn ON power to the Vivid S60/Vivid S70 ultrasound scanner.

8-4-3   Peripheral Power Output Cable (Printer-to-AC Box) Replacement

8-4-3-1   Tools

Phillips screwdriver

FRU Part # *Refer to Table 9-16 on page 9-22.*

8-4-3-2   Time Required

20 min

8-4-3-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-4-3-4   Peripheral Power Output Cable (Printer-to-AC Box) Removal

1) Remove the following covers: *left side*, *front*, *left rear*:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Front Cover Removal Procedure on page 8 - 16
- Left Rear Cover Removal Procedure on page 8 - 23

2.) Disconnect the Peripheral Power Output Cable (Printer-to-AC Box) from the rear of the printer as shown in Figure 8-129.

Figure 8-129   Peripheral Power Output Cable (Printer-to-AC Box)

3.) Disconnect the system's main power cable from the AC Distribution Box as described in AC Distribution Box Removal Procedure on page 8 - 161.

4.) Unscrew the Ground securing screw as described in AC Distribution Box Removal Procedure on page 8 - 161.

5.) Unplug the Peripheral Power Output Cable (Printer-to-AC Box) from the AC Distribution Box - see Figure 8-130.

Figure 8-130   Printer Cable Plugged into AC Distribution Box

8-4-3-5   Peripheral Power Output Cable (Printer to AC Box) Installation

1) Plug the new Printer-to-AC Box cable into the rear power socket of the printer.

2) Lead the cable towards the AC Distribution Box at the rear of the system and plug it into the AC Distribution Box.

3.) Return the Ground screw cable holder to its position at the rear of the system making sure that the printer cable is **behind** the Ground cables, as shown in Figure 8-131.
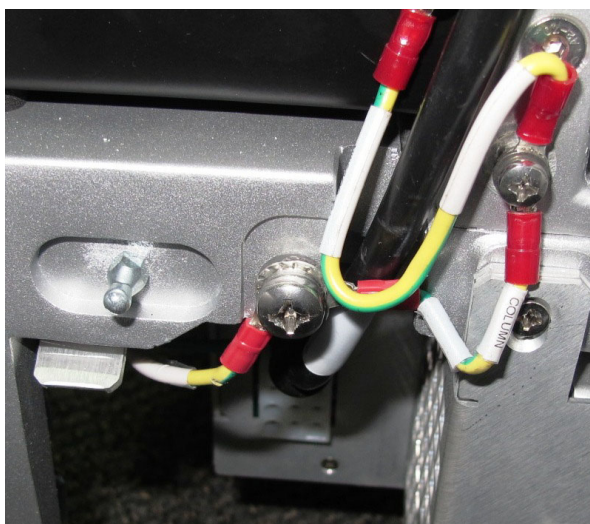
Figure 8-131   Printer-to-AC Box Cable Positioned Behind the Ground Cables

4.) Plug the printer cable into the AC Distribution Box.

5.) Plug the system's main power cable into the AC Distribution Box.

6.) Install the system covers in the reverse order in which these were removed as described in the cable removal procedure above.

7.) Refit the following covers: *left rear, front, left side:*

- Left Rear Cover Installation Procedure on page 8 - 25
- Front Cover Installation Procedure on page 8 - 19
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

8-4-4   Flex HDR (CFE to BEP) Cable Replacement Procedure

8-4-4-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-16 on page 9-22.*

8-4-4-2   Time Required

10 min

8-4-4-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-4-4-4   Flex HDR (CFE to BEP) Cable Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *DVD, front.*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2)   Open the Front End door assembly and secure the cage door using the support arm as described in the Front End Door Assembly Opening and Removal Procedure on page 8 - 105.

3.) Unscrew the two securing screws securing the HDR flex cable bracket located on the BEP as shown in Figure 8-132 below.
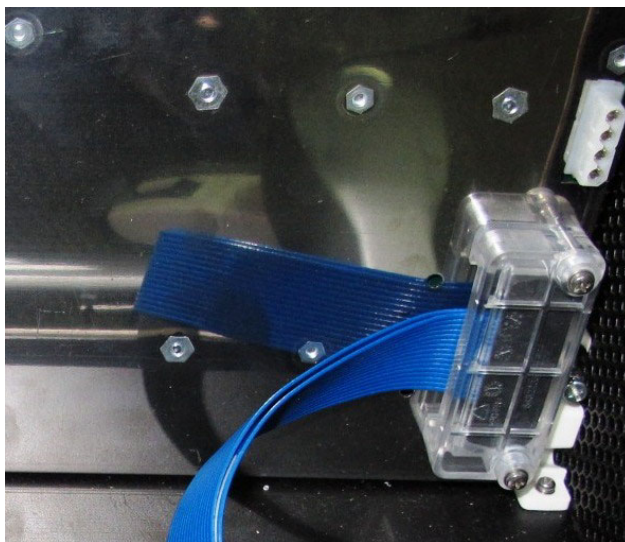
Figure 8-132   HDR Flex Cable Bracket Located on BEP

4.) Disconnect the HDR flex cable from the Cage as described in the Front End Door Assembly Opening and Removal Procedure on page 8 - 105.

5.) Remove the HDR flex cable - see Figure 8-133 below.
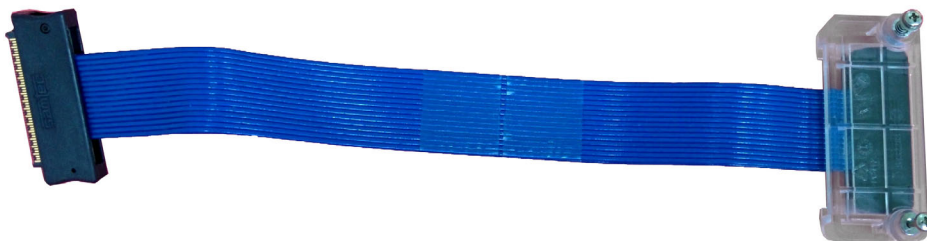
Figure 8-133   HDR Flex Cable

8-4-4-5   Cable Flex HDR (CFE to BEP) Installation Procedure

- Install a new HDR flex cable following the steps in the HDR flex cable removal procedure, in reverse order described above.

Section 8-5
Electronic Cage Components - Replacement Procedures

NOTE: *When replacing Vivid S60/Vivid S70 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.
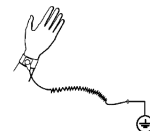
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

8-5-1 Opening and Removing the Front End Door Assembly

8-5-1-1 Tools
Appropriate Phillips screwdriver

8-5-1-2 Time Required
5 min

8-5-1-3 Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-1-4 Front End Door Assembly Opening and Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD, front*.

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2) Open the two fastening latches on the left side of the Front End door assembly and carefully open the cage door. (Figure 8-134).
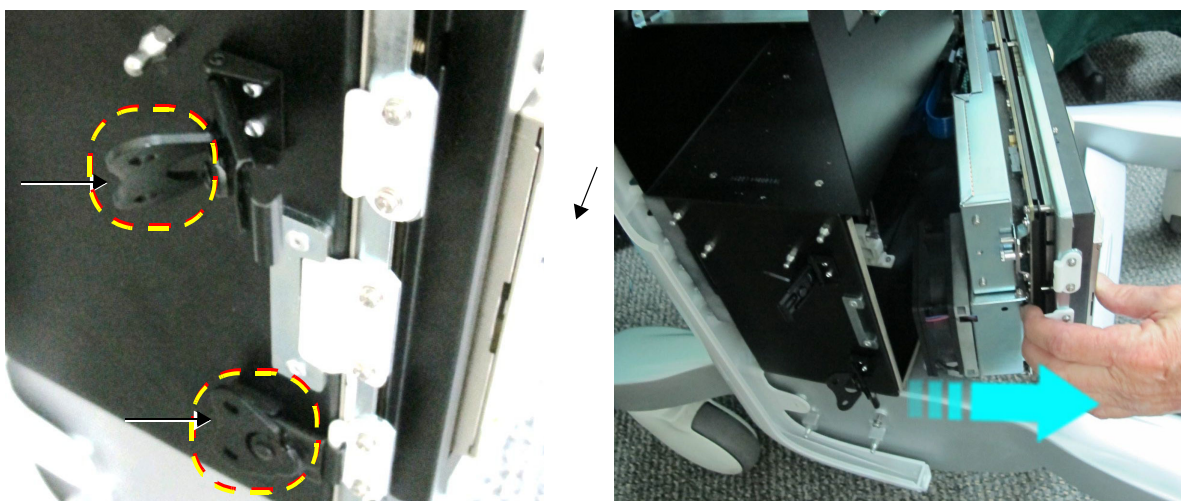
Figure 8-134   Unfastening the Latches and Opening the Cage Door

3.) Secure the cage door by clipping the cage door securing arm to the device chassis - Figure 8-135.
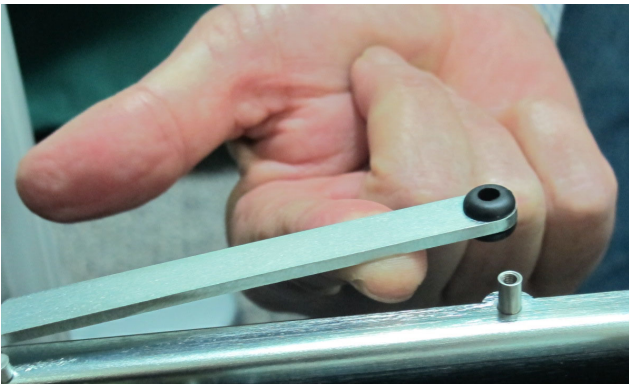
Figure 8-135   Securing the Cage Door with the Securing Arm

4.) Disconnect the BE-to-FEPS cable from the Back End, as shown in Figure 8-136.
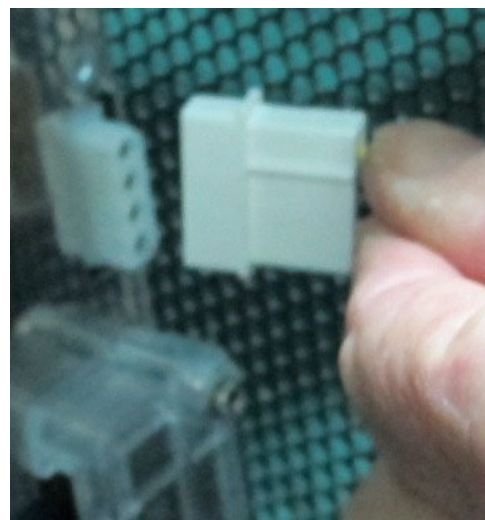
Figure 8-136   Disconnecting BE-to-FEPS Cable from Back End

5.) Remove the HDR flat cable (BE-to-CFE cable), from the CFE as follows:

a.) Loosen the two screws securing the white cable holder bracket (plastic guide) - Figure 8-137.

b.) Slide the bracket to the left and disconnect the cable from the CFE.
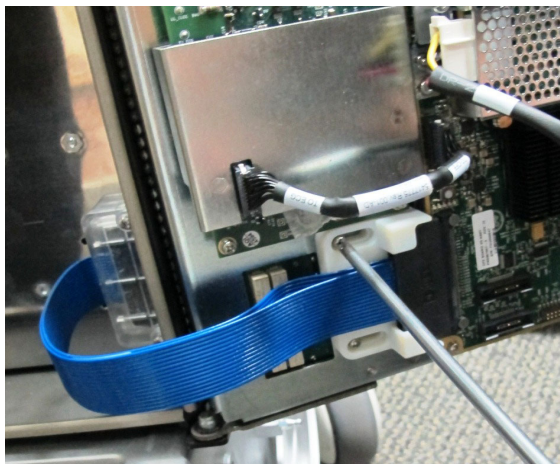
Figure 8-137   Releasing the Retaining Bracket on the CFE

c.) Gently remove the cable from the white retaining bracket to release it - see Figure 8-138.
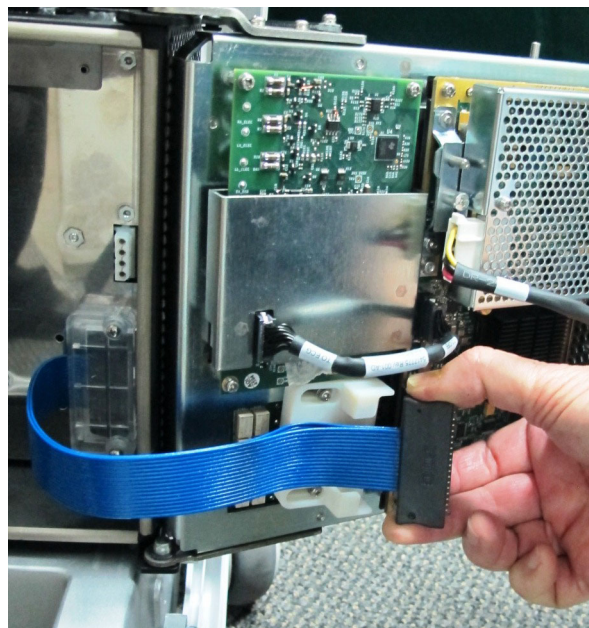
Figure 8-138   Releasing the HDR flat cable from the CFE

6.) Release the cage supporting arm from the device chassis and return it to its location on the cage - see Figure 8-139.
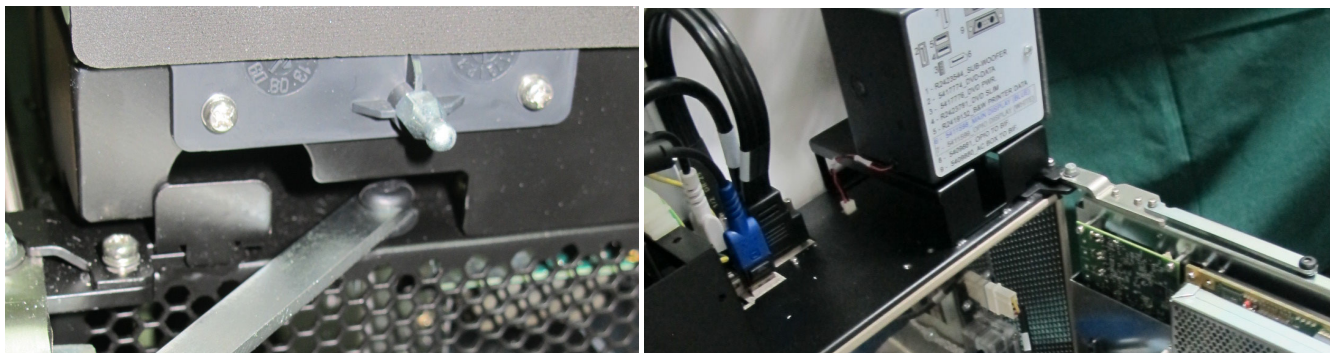
Figure 8-139   Releasing Cage Supporting Arm from Device Chassis

7.) Open the safety-catch on the cage-hinge - see Figure 8-140.
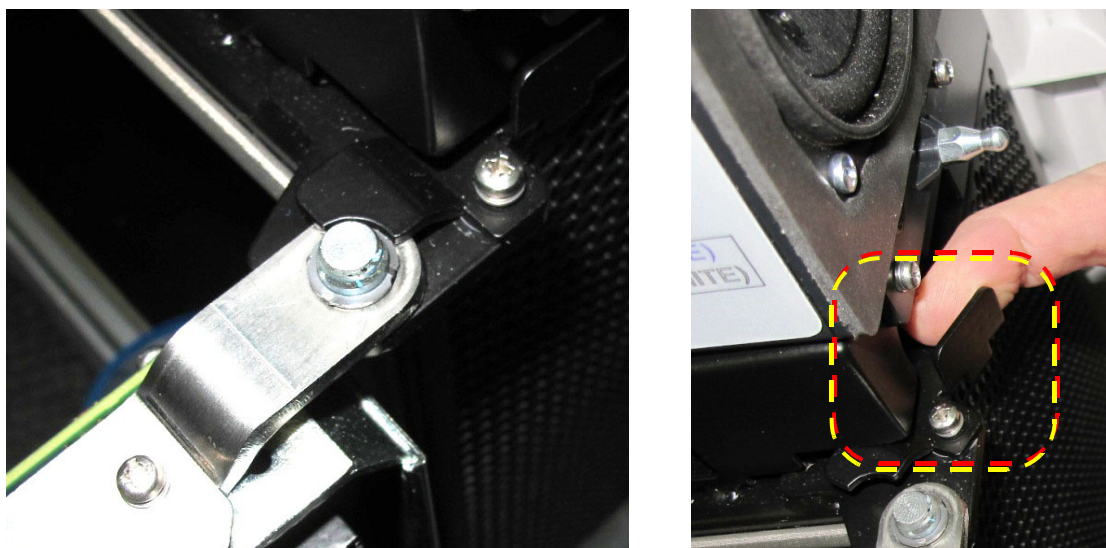
Figure 8-140   Open Safety-Catch on Hinge of Cage Door

8.) Carefully lift the cage *upwards* to free it from the securing hinge (see Figure 8-141) and place it on a clean, stable surface.
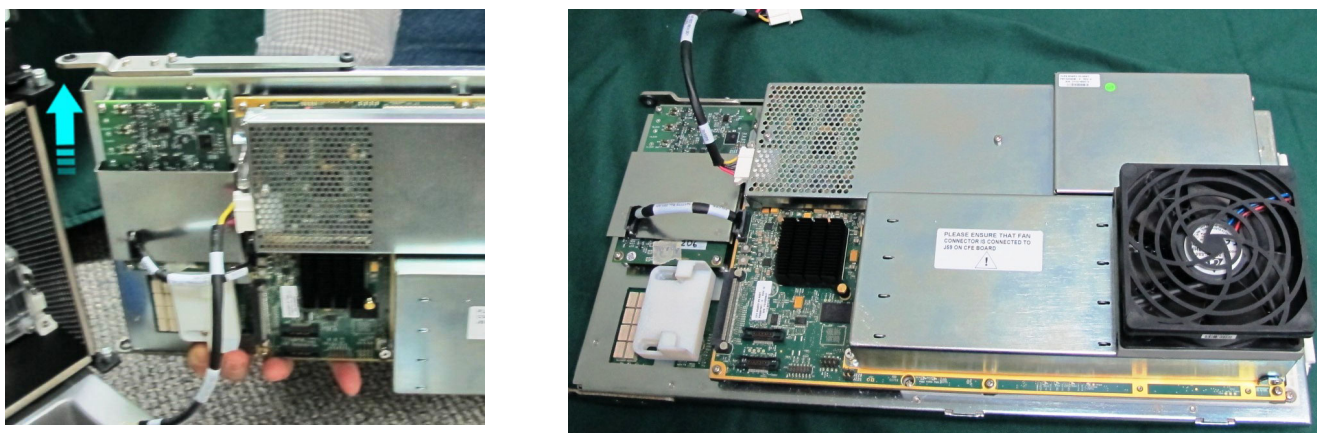
Figure 8-141   Removing the Front End Door Assembly from the Securing Hinge

It is now possible to gain easy access to the components inside the cabinet cage.

⚠ CAUTION		**WHEN PERFORMING LOWER SECTION COMPONENT REPLACEMENT PROCEDURES, AN ESD WRISTSTRAP MUST BE WORN TO PREVENT THE RISK OF ESD CAUSING DAMAGE TO A BOARD.**

8-5-1-5   Front End Door Assembly Closing and Installation Procedure

1.) Carefully lift the Front End Door Assembly into position on the electronic cage, taking care to mount it properly on the securing hinge - refer to Figure 8-141 on page 8-108.

2.) Close the safety-catch on the cage hinge - refer to Figure 8-140 on page 8-108.

3.) Secure the cage door using the cage door securing arm - refer to Figure 8-139 on page 8-108.

4.) Reconnect the VGA Cable to the Back End.

5.) Reconnect the HDR flat cable to the CFE, performing steps in the reverse order that was followed to release it - refer to step 5 on page 8-107.

6.) Reconnect the FEPS cable to the Back End - refer to Figure 8-136 on page 8-106.

7) Release the cage securing arm from the device's chassis and return it to its position on the cage door - refer to Figure 8-139 on page 8-108.

8.) Close the two fastening latches on the left side of the Front End door assembly (Figure 8-134).

9) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Removal Procedure on page 8 - 16
- DVD Cover Removal Procedure on page 8 - 11
- Right Side Cover Removal Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7

10.) Turn ON power to the system.

8-5-2 Cabinet Cage Module Replacement Procedure

8-5-2-1 Tools

Phillips screwdriver and a 3 mm Allen key.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-5-2-2 Time Required

45 mins

8-5-2-3 Preparation

Shut down the Vivid S60/Vivid S70 ultrasound system, as described in Power Shut Down on page 4 - 7.

8-5-2-4 Cabinet Cage Module Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD and Printer, front, right* rear, *left* rear:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD and Printer Cover Removal Procedure on page 8 - 13
- Front Cover Removal Procedure on page 8 - 16
- Right Rear Cover Removal Procedure on page 8 - 20
- Left Rear Cover Removal Procedure on page 8 - 23

2) Remove the *Front End Door Assembly*, *BEP*, and *Sub-Woofer Assembly*:

- Front End Door Assembly Opening and Removal Procedure on page 8 - 105
- BEP Removal Procedure on page 8 - 116
- Sub-Woofer Assembly Removal Procedure on page 8 - 155

3.) Disconnect all cables from the Internal BIF Panel located above the Cabinet Cage Module - see Figure 8-142.
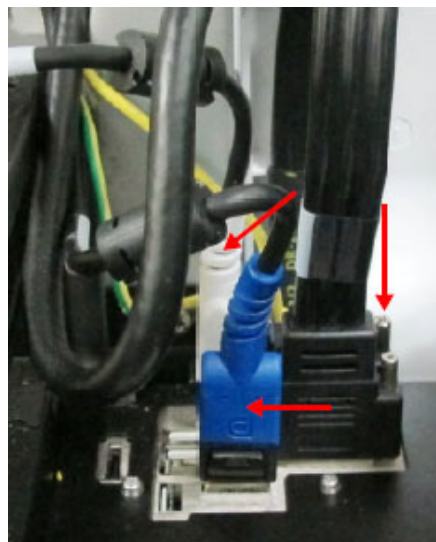
Figure 8-142   Disconnect Cables from Internal BIF Panel

4.) Release the cable tie and the earth securing connector located at the rear of the system.

5.) Remove the *DVD/CD-RW drive*, *Peripherals Console* and the *Fan for Cabinet Cage Assembly*:

- DVD/CD-RW Drive Removal Procedure on page 8 - 237
- Peripherals Console Removal Procedure on page 8 - 217
- Fan for Cabinet Cage Assembly Removal Procedure on page 8 - 158

6.) Using a 3mm Allen key, release the four Cabinet Cage securing screws located at the rear of the system. Then release the screw in the front - see Figure 8-143.
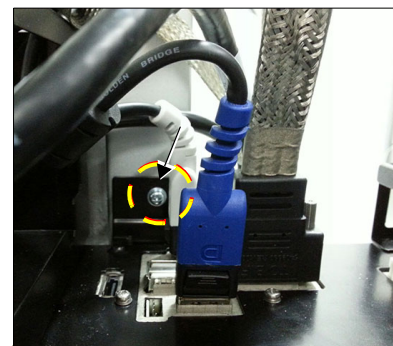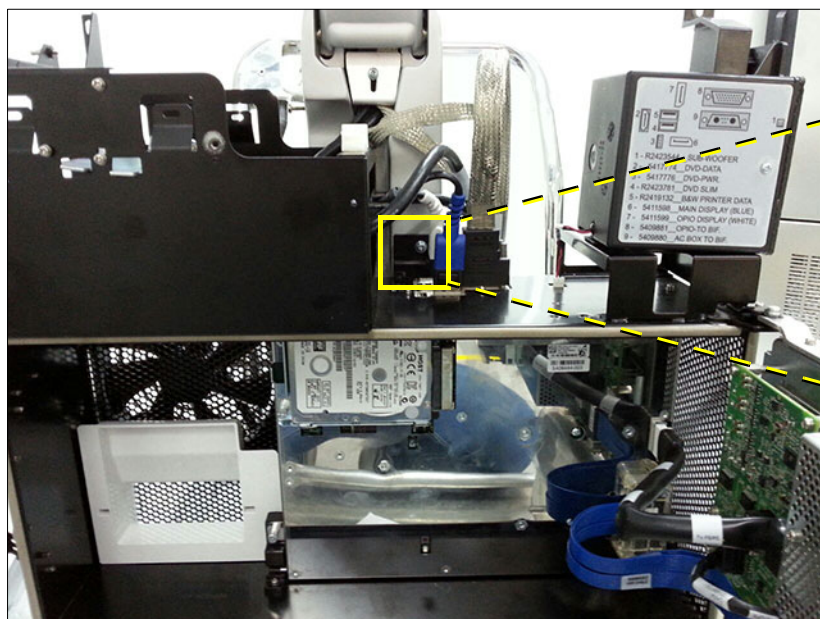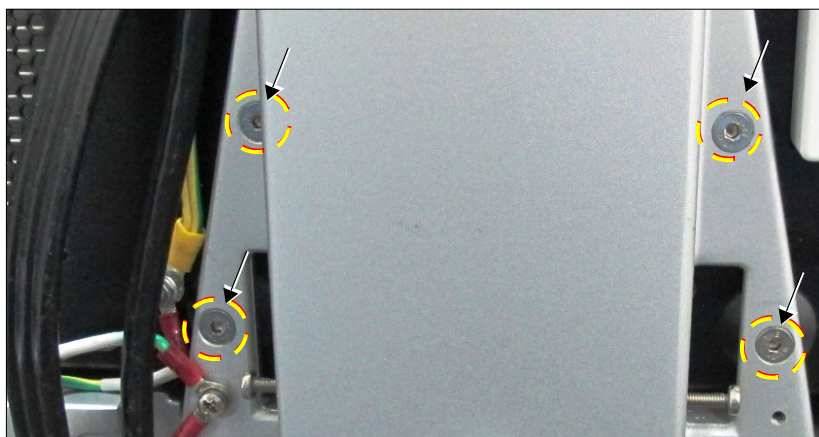
Figure 8-143   Release Cabinet Cage Securing Screws

7.) Remove the Cabinet Cage Module from the system.

8-5-2-5   Cabinet Cage Module Installation Procedure

1.) Position the replacement Cabinet Cage Module on the system chassis and secure it with the five screws previously removed (four at the rear and one in front) - refer to Figure 8-143.

2.) Refit the *Fan for Cabinet Cage Assembly*, *Peripherals Console* and the *DVD/CD-RW drive*:

- Fan for Cabinet Cage Assembly Installation Procedure on page 8 - 159
- Peripherals Console Installation Procedure on page 8 - 218
- DVD/CD-RW Installation Procedure on page 8 - 238

3.) Re-connect the cables (previously disconnected).

4) Refit the *Sub-Woofer Assembly, BEP* and *Front End Door Assembly*:

- Sub-Woofer Assembly Installation Procedure on page 8 - 157
- BEP Installation Procedure on page 8 - 119
- Front End Door Assembly Closing and Installation Procedure on page 8 - 109

5) Refit the covers, previously removed:

- Left Rear Cover Removal Procedure on page 8 - 23\
- Right Rear Cover Removal Procedure on page 8 - 20
- Front Cover Removal Procedure on page 8 - 16
- DVD and Printer Cover Removal Procedure on page 8 - 13
- Right Side Cover Removal Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7

6.) Turn ON power to the system.

8-5-3   Hard Disk Replacement Procedure

⚠️ **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.*

NOTE: When replacing the BEP or Hard Disk, one must either obtain new access codes that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the access codes already registered in the Hard Disk. Only qualified personnel should perform these tasks.

8-5-3-1   Tools

Appropriate flat and Phillips-type screwdrivers, and Hard Disk Duplicator.

FRU Part # *Refer to Table 9-9 on page 9-16.*

8-5-3-2   Time Required

10 minutes

8-5-3-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-3-4   Hard Disk Removal Procedure

1)   Lock the wheels, then remove the following covers: *left* side, *right* side, *DVD, front.*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

Note: A metal plate holder secures the hard disk as shown in Figure 8-144. The plate is used to secure the hard disk firmly in position on the Back End and also serves as a useful hand grip when removing/inserting the hard disk, as described in the following steps.

Metal Securing Plate attached to Hard Disk

Hard Disk

Hard Disk retaining screw

Figure 8-144   Hard Disk with Metal Securing Plate Attached

2) Working from the side of the cage, use a Phillips screwdriver to loosen the retaining screw on the metal securing plate that holds the hard disk in position (as shown in Figure 8-145 below).

Screw

Screwdriver

Figure 8-145   Loosening the Screw on the Metal Securing Plate

3) Grip the metal plate and slide it to the *left* to release the hard disk from the Back End assembly - see Figure 8-146 below.

Figure 8-146   Removing the Hard Disk

8-5-3-5   **Hard Disk Installation Procedure**

NOTE: *When replacing the BEP or Hard Disk, one must either obtain new access codes that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the access codes already registered in the Hard Disk. Only qualified personnel should perform these tasks.*

1) To install the hard disk follow the replacement procedure in reverse order as described above. (Screw: M3. Torque: 0.65 Nm)

2) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Removal Procedure on page 8 - 16
- DVD Cover Removal Procedure on page 8 - 11
- Right Side Cover Removal Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7

3.) Turn ON power to the system.

Note: When a new hard disk arrives from the manufacturer, usually it is partitioned and ready for software installation. Refer to Operating System and/or Application Software Loading Procedures on page 8 - 226 for software installation instructions.

8-5-4   BEP Replacement Procedure

⚠️ **CAUTION**   **BEFORE REPLACING THE BEP, REMEMBER TO PERFORM A FULL INCREMENTAL BACK-UP OF THE ARCHIVE AND USER PRESETS.**

Refer to Operating System and/or Application Software Loading Procedures on page 8 - 226.

NOTE: *It is recommended to replace the BIOS battery once every 2 years.*

⚠️ **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.
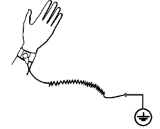
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

NOTE: *After physical replacement of the BEP, it is mandatory to first reinstall the Vivid S60 or Vivid S70 software application. Follow the instructions commencing in step 11 on page 8-232.*

8-5-4-1   Tools

Appropriate Phillips and flat screwdrivers.

FRU Part #   *Refer to Table 9-9 on page 9-16.*

8-5-4-2   Time Required

15 minutes

8-5-4-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-4-4   BEP Removal Procedure

NOTE: *The Back End Processor (BEP) is located in the electronic cage, as shown in Figure 8-147.*

BEP
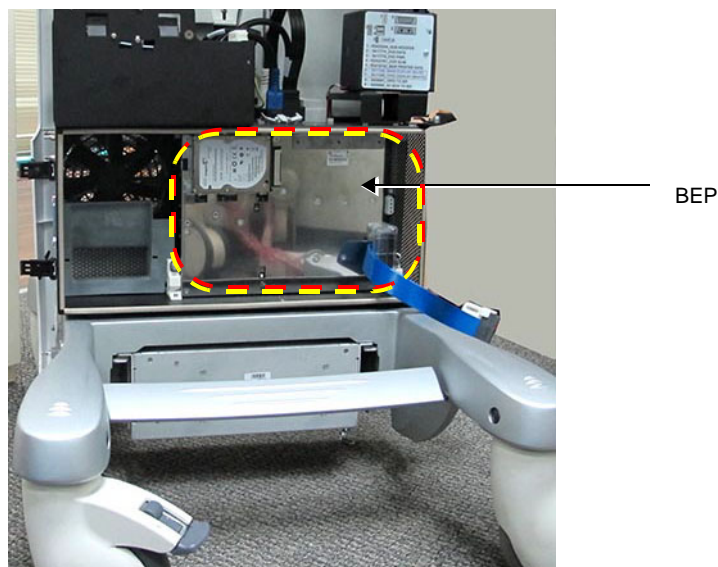
Figure 8-147   Location of BEP in Electronic Cage

1)   Remove the following covers: *left* side, *right* side, *DVD, front*.

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2)   Open the Front End door assembly and secure the cage door using the support arm as described in the Front End Door Assembly Opening and Removal Procedure on page 8 - 105.

3.) Release the HDR flat cable (BE-to-CFE cable) from the Back End.
     Refer to Figure 8-148 below.

4.) Disconnect the BE-to-FEPS cable from the Back End (also shown in Figure 8-148 below).

Disconnect here   BE to FEPS cable
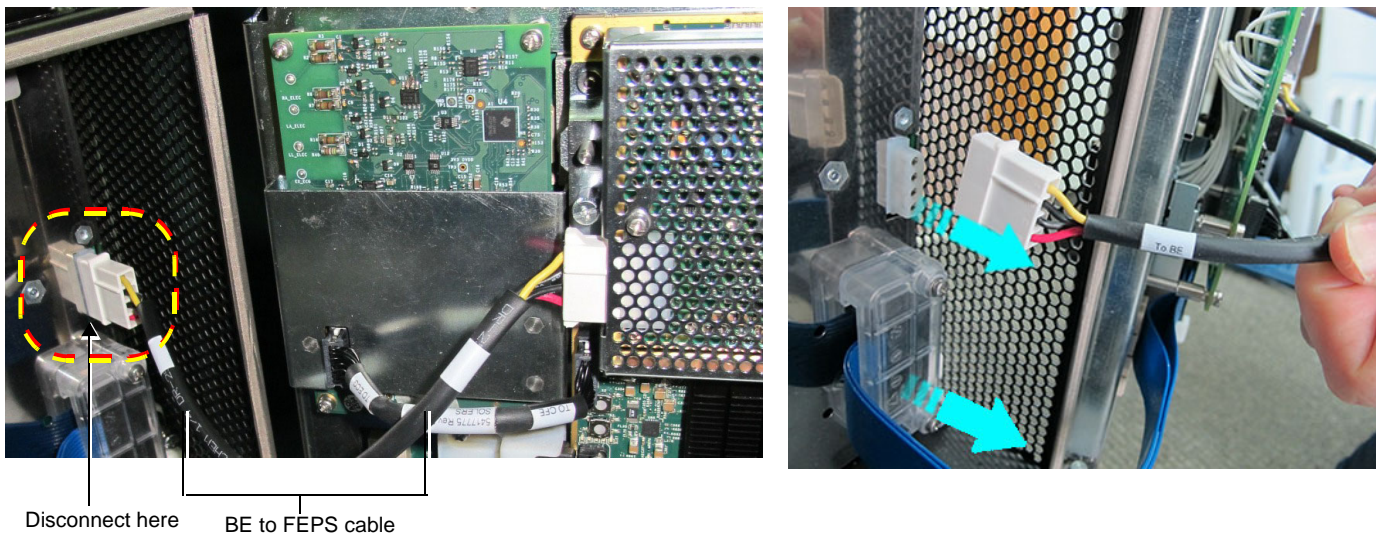
Figure 8-148   Disconnecting BE-to-FEPS Cable from Back End

5.) Remove the Hard Disk:

- Hard Disk Removal Procedure on page 8 - 113

6.) Loosen 5 BEP securing screws - 3 upper screws (top, left in Figure 8-149) and two lower screws (bottom, right).
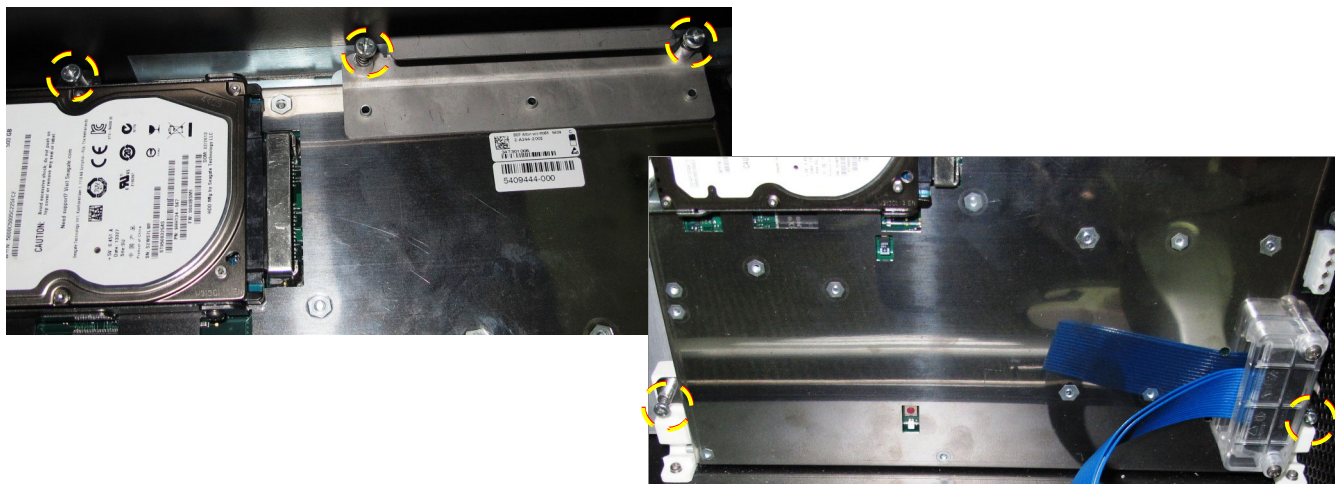
Figure 8-149   BEP Securing Screws

7) Gently pull the BEP assembly *outwards* and *upwards* to remove it from the Cabinet Cage - Figure 8-150.
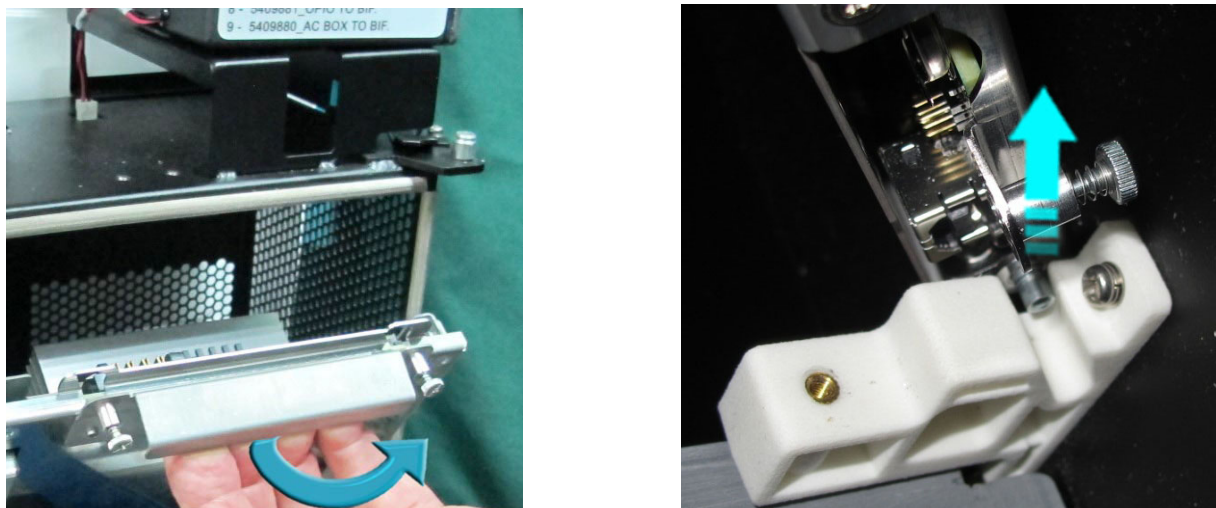
Figure 8-150   Gently Pull the BEP Assembly Outwards
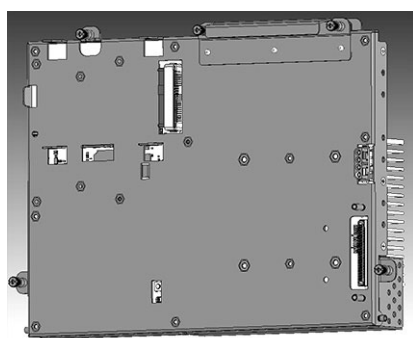
BEP - Front View
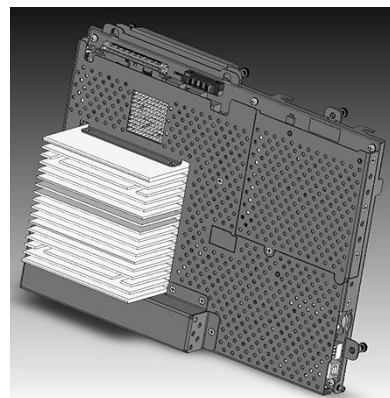
BEP - Rear View

Figure 8-151   BEP Removed

8-5-4-5   BEP Installation Procedure

1) Carefully return the new BEP to the correct position in the cage assembly.

2) Check that the BEP is seated correctly then return and fasten the 5 screws (previously loosened) to secure the BEP on the device's chassis - refer to Figure 8-149 on page 8-118.

3.) Reinstall the Hard Disk:

- Hard Disk Installation Procedure on page 8 - 115

4) Reconnect the BE-to-FEPS cable to the BEP - refer to Figure 8-148.

5.) Reconnect the HDR flat cable BE-to-CFE cable to the BEP.

6) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

7) Turn ON power to the system.

8.) Proceed to the instructions for performing a Vivid S60 or Vivid S70 software installation procedure, commencing with step 11 on page 8-232.

8-5-5 BIOS Battery Replacement

NOTE: *Since the BIOS battery is not available as a spare part (due to shelf life), it should be obtained locally. The battery model is CR2032.*

8-5-5-1 Tools

Use the appropriate Phillips screwdriver.

8-5-5-2 Time Required

1 min

8-5-5-3 Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

⚠️ **CAUTION**   **BEFORE REMOVING THE BEP, REMEMBER TO PERFORM A FULL INCREMENTAL BACK-UP OF THE ARCHIVE AND USER PRESETS.**

For details, refer to the Operating System and/or Application Software Loading Procedures on page 8 - 226.

8-5-5-4 BIOS Battery Removal Procedure

1) Remove the BEP:

- BEP Removal Procedure on page 8 - 116

2) Place the BEP on a clean, secure surface.

Note: The location of the BIOS battery in the BEP is shown in Figure 8-152.
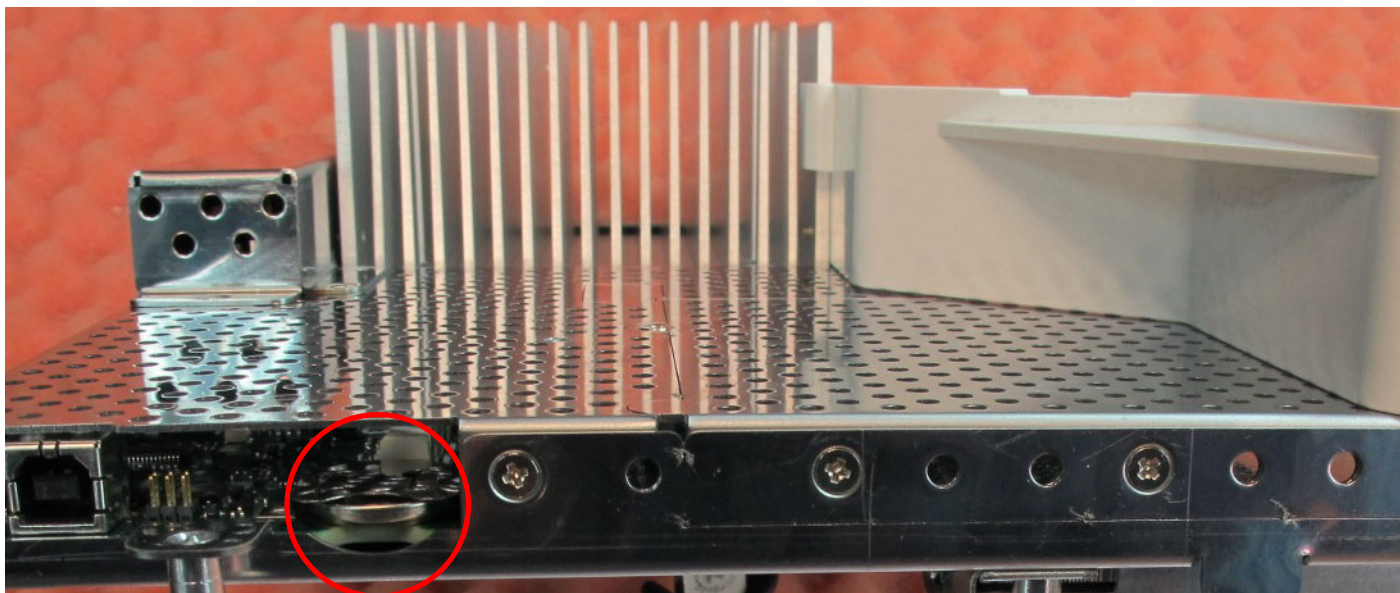
Figure 8-152   Location of BEP BIOS Battery

3.) Using a pliers, carefully remove the battery from the BEP as shown in Figure 8-153 (observe that the positive pole is facing *upwards*).
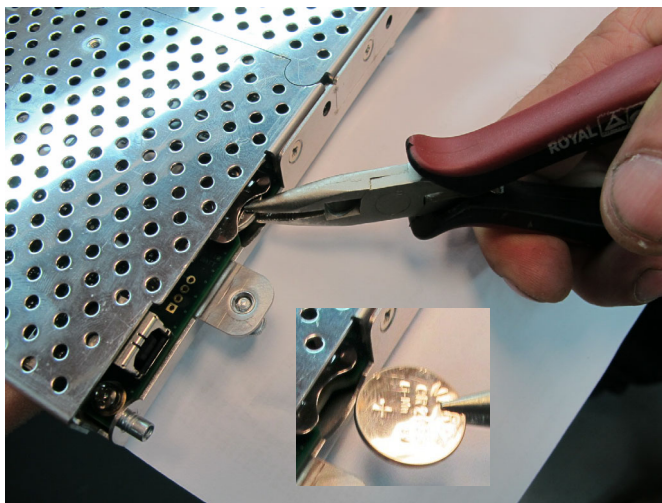
Figure 8-153   Removing the BIOS Battery from the BEP

8-5-5-5   BIOS Battery Replacement Procedure

1.) Insert the replacement BIOS battery in its slot in the BEP.

⚠ **NOTICE** **IMPORTANT - Make sure the positive pole is facing UPWARDS!**

2.) Return the BEP to its location in the Vivid™ S60/Vivid™ S70 scanner cage and complete the BEP installation procedure:

➡ • BEP Installation Procedure on page 8 - 119

3.) Turn ON the system and boot-up.

4.) Adjust to the correct date and time settings - see Adjust Date and Time on page 3 - 26.

8-5-6 Module Memory DDR Replacement Procedure

Note: Both Module Memory DDR circuit boards must be renewed when replacing them.

8-5-6-1 Tools

Appropriate Phillips and flat screwdrivers.

FRU Part # *Refer to Table 9-9 on page 9-16.*

8-5-6-2 Time Required

15 minutes

8-5-6-3 Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-6-4 Module Memory DDR Removal Procedure

The Module Memory DDR is located on the BEP (the obverse side that is not visible when opening the cage door to view the BEP). The front view of the BEP is shown in Figure 8-151 on page 8-118. The BEP has to be removed to access the Module Memory DDR, which is shown in Figure 8-154 below.
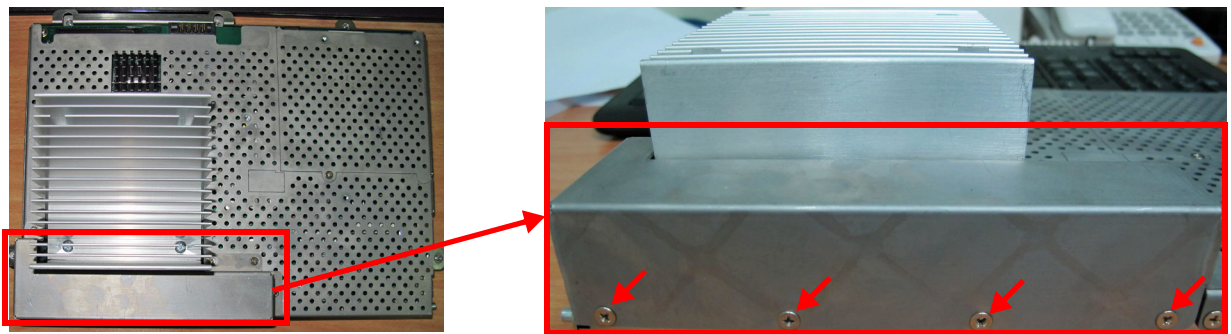
Figure 8-154   Module Memory DDR Replacement

1.) Remove the BEP:

- BEP Removal Procedure on page 8 - 116

2.) Place the BEP on a clean flat work surface with the Module Memory DDR uppermost.

3.) Remove the Module Memory DDR cover by unscrewing 8 screws as indicated in Figure 8-154, above and Figure 8-155.
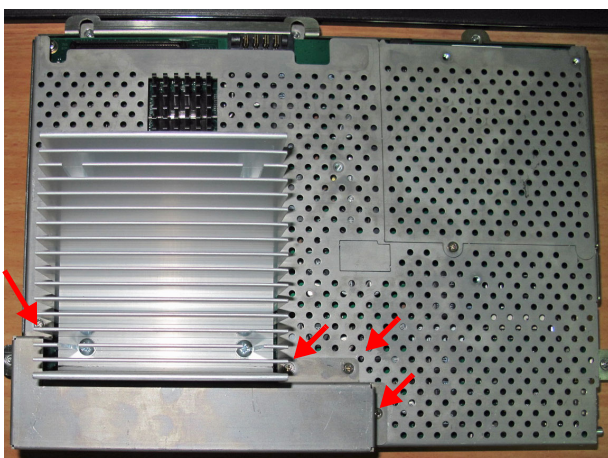
Two HD Module circuit boards shown above after the cover has been removed

Figure 8-155   Removing the Module Memory DDR Cover

4.) Remove the Module Memory DDR circuit boards by pressing firmly downwards on the white securing clips on the left and right sides respectively shown in Figure 8-156.
The circuit boards will be released as the clips open.

Figure 8-156   Removing the Module Memory DDR Circuit Boards

5.) Carefully grip the released circuit board on the left and right sides and slide it evenly upwards away from the base connectors.

6.) Similarly, remove the second circuit board.

8-5-6-5   Module Memory DDR Installation Procedure

1.) Insert the replacement circuit board by sliding it into its appropriate slots - sliding the circuit board gently and evenly downwards.

2.) As the circuit board reaches its "home" position, press firmly downward until the plastic securing clips automatically engage to secure the circuit board.

3.) Repeat step 2 to insert the second circuit board.

4.) Return the Module Memory DDR cover to its position on the BEP and secure it with the 8 screws previously removed.

5.) Reinstall the BEP:

- BEP Installation Procedure on page 8 - 119

6.) Turn ON the system and boot-up.

8-5-7   Plastic Axis Holders for BEP Replacement Procedure

The BEP is located in the Cage and is positioned on two plastic axis holders on the base of the cage - see Figure 8-157.
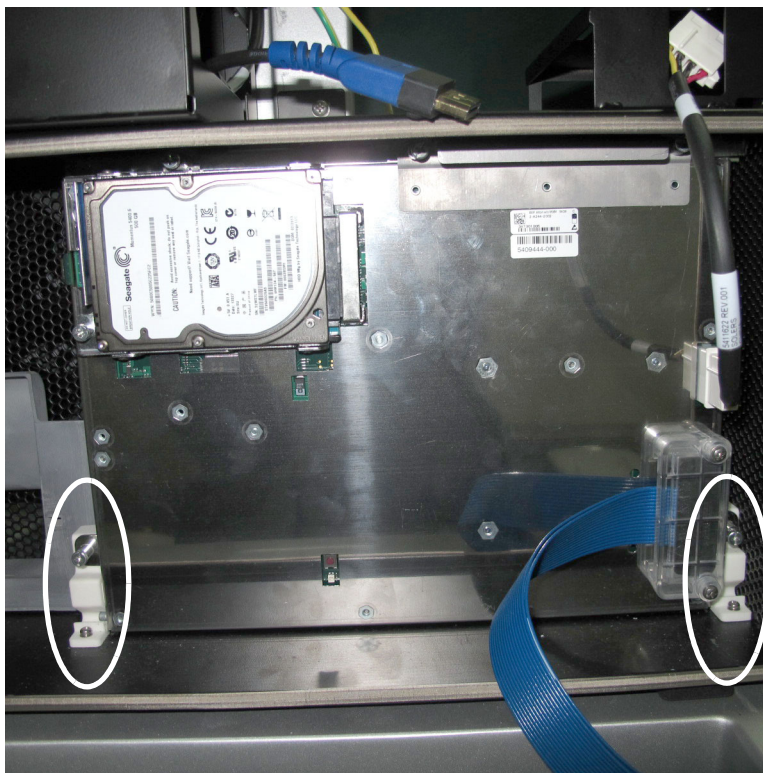
Figure 8-157   Plastic Axis Holders for BEP

8-5-7-1   Tools

Appropriate Phillips and flat screwdrivers.

FRU Part # *Refer to Table 9-9 on page 9-16.*

8-5-7-2   Time Required

15 minutes

8-5-7-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-7-4   Plastic Axis Holders for BEP Removal Procedure

1.) Remove the BEP:

• BEP Removal Procedure on page 8 - 116

2)   Unscrew the Plastic Axis Holders' securing screws and remove the respective axis holders - see Figure 8-158.
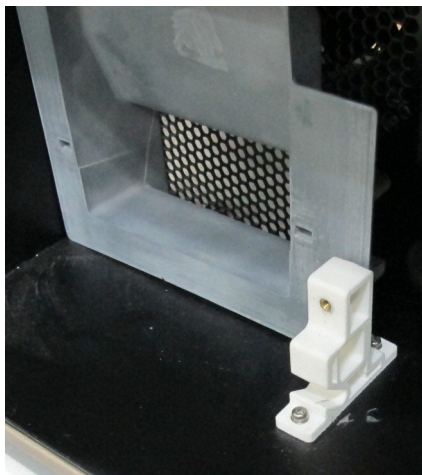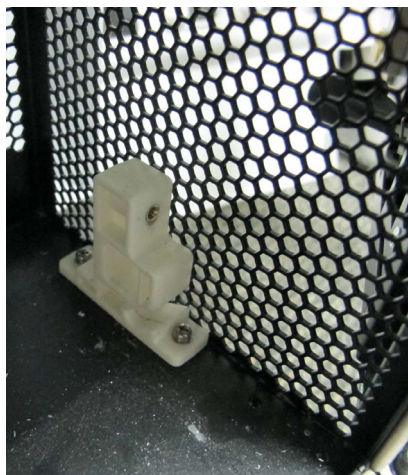
Left axis holder   Right axis holder

Figure 8-158   Left and Right Axis Holders

8-5-7-5   Plastic Axis Holders for BEP Installation Procedure

1.) Install the new plastic axis holders in the reverse order as described in the removal procedure above.

2.) Reinstall the BEP:

3.) Turn ON the system and boot-up.

8-5-8   CPU Partition Replacement Procedure

NOTE: *The CPU partition is located on the rear side of the BEP- see Figure 8-159.*
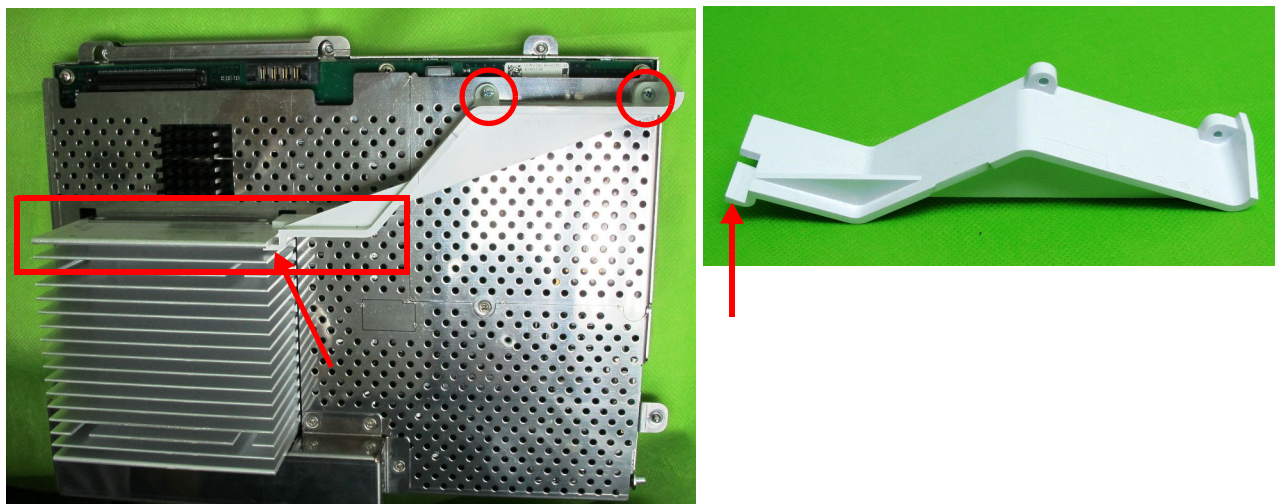
Figure 8-159   CPU Partition on BEP

8-5-8-1   Tools
Appropriate Phillips and flat screwdrivers.

FRU Part #   *Refer to Table 9-9 on page 9-16.*

8-5-8-2   Time Required
20 min

8-5-8-3   Preparations
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-8-4   CPU Partition Removal Procedure
1.) Remove the BEP:

• BEP Removal Procedure on page 8 - 116

2.) Place the BEP on a clean work surface with the CPU Partition facing *upwards*.
3.) Remove the two securing screws (shown in Figure 8-159) that attach the CPU Partition to the BEP.
4.) Gently slide the CPU Partition upwards and remove it from the BEP.

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8-5-8-5   CPU Partition Installation Procedure

1) Install the replacement CPU Partition on the BEP gently sliding it into position so that its edge engages the BEP as shown in the rectangle in Figure 8-159.

2) Secure the CPU Partition with the two securing screws, previously removed.

3.) Re-install the BEP:

- • BEP Installation Procedure on page 8 - 119

4.) Turn ON the system and boot-up.

Chapter 8 - Replacement Procedures
8-127

8-5-9   ECG/Respiratory Module Assembly 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. Refer to Battery Removal Procedure on page 8 - 167.
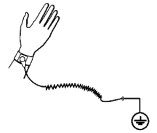
8-5-9-1   Tools

Appropriate Phillips screwdriver.

FRU Part #   *Refer to Table 9-13 on page 9-20.*

8-5-9-2   Time Required

10 mins

8-5-9-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-9-4   ECG/Respiratory Module Assembly Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD, front.*

➡
   - Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
   - Right Side Cover Removal Procedure on page 8 - 10
   - DVD Cover Removal Procedure on page 8 - 11
   - Front Cover Removal Procedure on page 8 - 16

2) Open the Front End door assembly, as follows:

   a.) Open the two fastening latches on the side of the Front End door assembly and carefully open the cage door.

   b.) Secure the cage door with the cage door securing arm - see Figure 8-135 on page 8-106.

NOTE: *The location of the ECG/Respiratory Module Assembly is shown in Figure 8-160.*

ECG

ECG to CFE cable

Screw hidden by cable
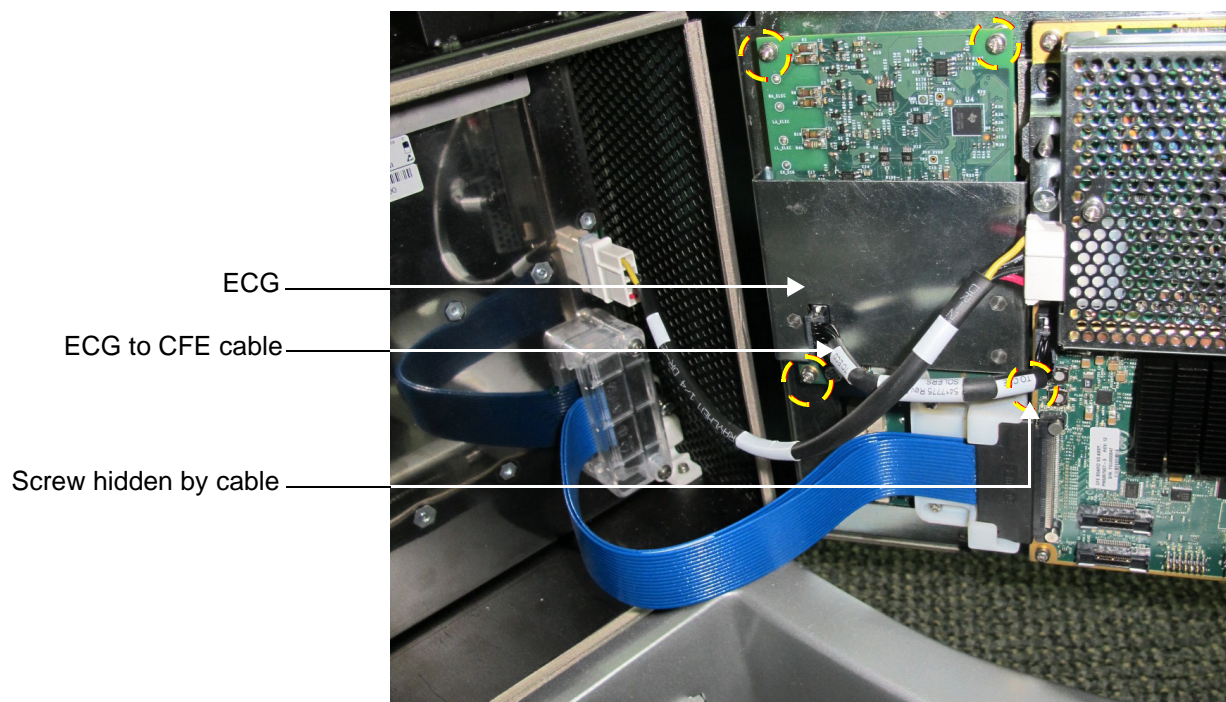
Figure 8-160   Location of ECG/Respiratory Module Assembly

3)   Disconnect the ECG-to-CFE cable - Figure 8-160.

4.) Loosen and remove the four screws that secure the ECG/Respiratory Module to the PSB board, as indicated in Figure 8-160.

Note: Place the screws in a safe place as they will be required for the installation procedure.

5.) Remove the ECG Respiratory Module Assembly as shown in Figure 8-161.

Figure 8-161   Removing the ECG Respiratory Module Assembly

8-5-9-5   ECG/Respiratory Module Assembly Installation Procedure

1)   Position the ECG/Respiratory Module assembly in the Front End door assembly as shown in Figure 8-160 and Figure 8-161.

2)   Follow the ECG/Respiratory Module Assembly removal procedure described above, in reverse order.

3)   Close the Front End door assembly door and fasten the two cage door securing latches.

4)   Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

5.)   Turn ON power to the system.

The system re-boots into Normal Scanning mode.

6.)   Press **Config** and log on as Adm - see Logging On to the Vivid™ S60/Vivid™ S70 as "ADM" on page 4 - 8.

7.)   Select **About**, then activate the **HwVersion** tab.

8.)   Verify that the correct ECG/Respiratory module Part # is displayed, as shown in Figure 8-162.

ECG/Respiratory
Module →

Module Name	Location	Part.no	F.rev	Part rev	S.no	Prototype
AC Box	ACB	5399339	1A	1	C4O3050009	0
Battery	BAT	no component fo...	--	--	--	--
BEP	BEP	5399324	1A		559500024	0
BIF	BIF	5399327	1A		560800085	0
CFE	CFE	5397907-3	3E	19	FGU000826	0
Main Monitor	MainMonitor	5444781-2	--	--	20096044	--
OPIO	OPIO	--	--	--	--	--
PATIO	PATIO_FE	5426159-4	4A	5	123456	0
PSB	PSB	5397909-5	5A	4	GF361400002	0
TOUCHSCREEN	OPIO	5449446	1	--	357535003	--
TRX32 A	TRX1	5407372-5	2A	4	GF361400161	0
TRX32 B	TRX2	5407372-5	2A	4	GF361400179	0
TRX32 C	TRX3	5407372-5	2A	4	GF361400189	0
TRX32 D	TRX4	5407372-5	2A	4	GF361400170	0
FEPS	TXPS	T2424636-3	3A	4	1234456	0

ABOUT — System Version | Firmware Version | HW Version | Probes

Figure 8-162   Hardware Version Verification

8-5-10   Front End Power Supply Replacement Procedure

NOTE: *The Front End Power Supply (FEPS) is also referred to as the HVPS (High Voltage Power Supply).*

⚠️ **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.
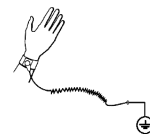
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

8-5-10-1   Tools

Appropriate Phillips screwdriver.

FRU Part # *Refer to Table 9-11 on page 9-18.*

8-5-10-2   Time Required

15 minutes

8-5-10-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-10-4   Front End Power Supply Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *DVD, front.*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2)   Open and remove the Front End door assembly and place it on a stable surface:

- Front End Door Assembly Opening and Removal Procedure on page 8 - 105

3)   Loosen the 2 retaining screws that secure the FEPS to the Front End door assembly and gently lift the plate away from the guide pins located on either side of the FEPS as shown in Figure 8-163.
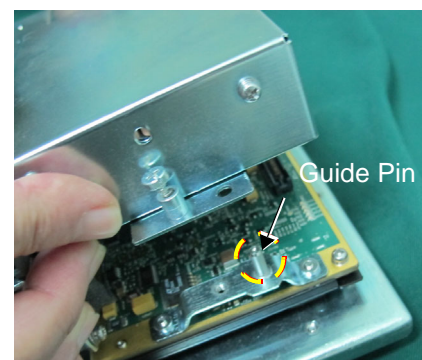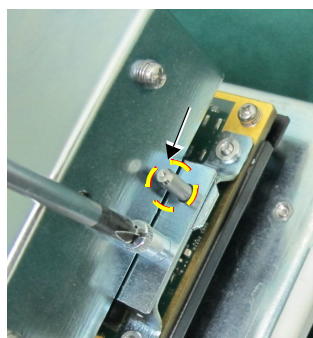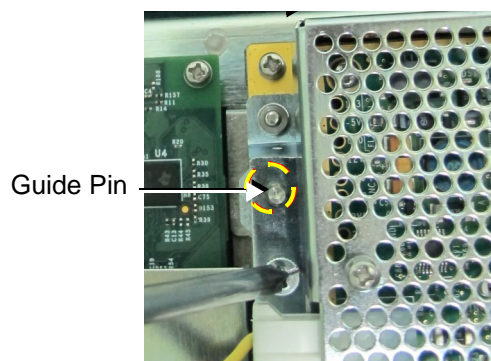
Figure 8-163   Removing the FEPS Metal Cover

4) Using both hands, carefully lift the FEPS *upwards* and remove it from the cage assembly.
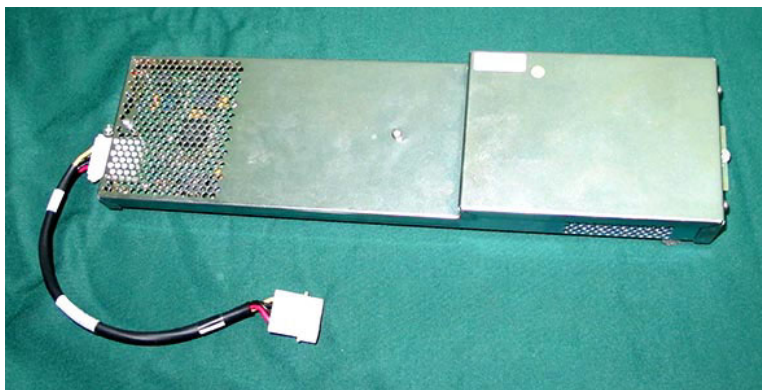
Figure 8-164   Front End Power Supply Removed

8-5-10-5   **Front End Power Supply (FEPS) Installation Procedure**

1) Return a new FEPS to its position on the Front End door assembly - see Figure 8-165 below.
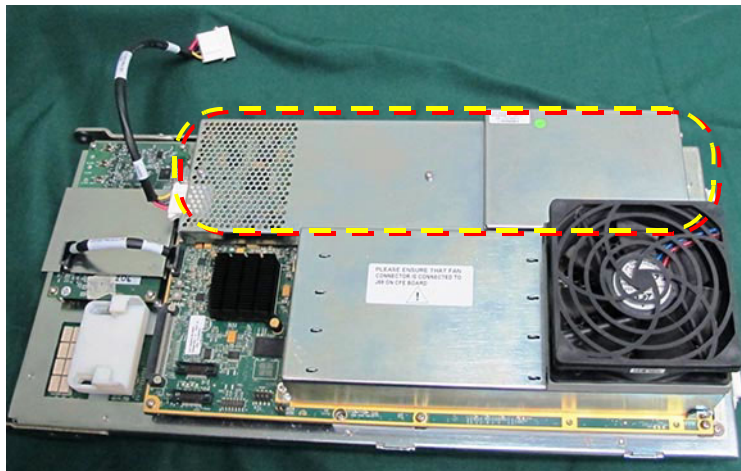
Figure 8-165   FEPS Located on the Front End Door Assembly

2) Follow the FEPS removal procedure step 3, in reverse order.

3) Return the Front End door assembly to the system, reconnect the cables (previously disconnected), close the cabinet cage door and fasten securely with the two latches:

   • Front End Door Assembly Closing and Installation Procedure on page 8 - 109

4) Refit the following covers: *front, DVD, right* side, *left* side

   • Front Cover Installation Procedure on page 8 - 19
   • DVD Cover Installation Procedure on page 8 - 12
   • Right Side Cover Installation Procedure on page 8 - 10
   • Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

5) Turn ON power to the system.

8-5-11   CFE (cFront End) Board 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.
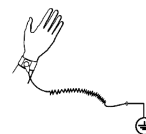
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

NOTE: *After physical replacement of the CFE Board, it is mandatory to first reinstall the Vivid S60 or Vivid S70 software application. Follow the instructions commencing in step 11 on page 8-232.*

8-5-11-1   Tools

Appropriate Phillips screwdriver.

FRU Part #   *Refer to Table 9-10 on page 9-17.*

8-5-11-2   Time Required

15 minutes

8-5-11-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

NOTE: *When replacing the CFE Board, it is necessary to remove the four TRX32 Boards from the defective CFE Board and install them in the replacement CFE Board. This is described in the procedure steps.*

8-5-11-4   CFE Board Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD, front.*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2) Open and remove the Front End door assembly and place it on a stable surface:

- Opening and Removing the Front End Door Assembly on page 8 - 105

3.) Remove the FEPS:

- Front End Power Supply Removal Procedure on page 8 - 131

4.) Disconnect the ECG-to-CFE board cable - see Figure 8-160 on page 8-129.

5.) Loosen and remove 6 CFE Board retaining screws as shown in - Figure 8-166 below.

Figure 8-166   CFE Board showing 6 Retaining Screws

6.) Gently pull the CFE release lever upwards to release the CFE Board and then lift the CFE Board up and away from the Cage assembly - see Figure 8-167 below.
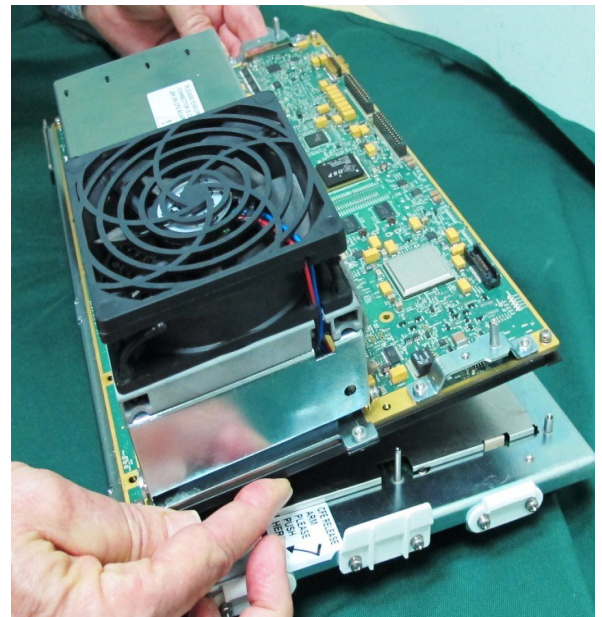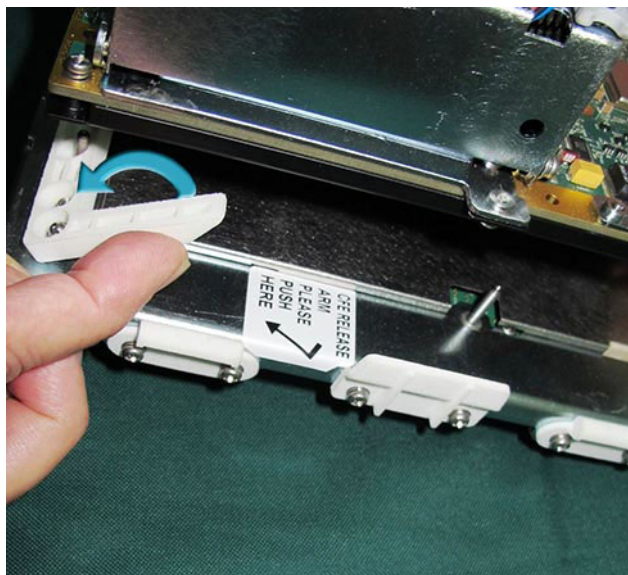
Figure 8-167   CFE Release Lever and Release of CFE Board

7.) Place the CFE Board on a clean stable surface.

NOTE: *Proceed with the following instructions in order to open the TRX32 Box and remove the four TRX32 Boards. These will be required later for refitting into the replacement CFE Board.*

8) Loosen the 2 screws that secure the metal cover of the TRX32 Box; open the cover (Figure 8-168).

Figure 8-168   Opening the Metal Cover of the TRX32 Box

Note: The four TRX32 Boards are each secured in position on the CFE Board by way of a white plastic holder at each end of the TRX32 Board. These are opened by gently pulling them outwards to tilt the holder away from the edge of the Board, as shown in Figure 8-169.
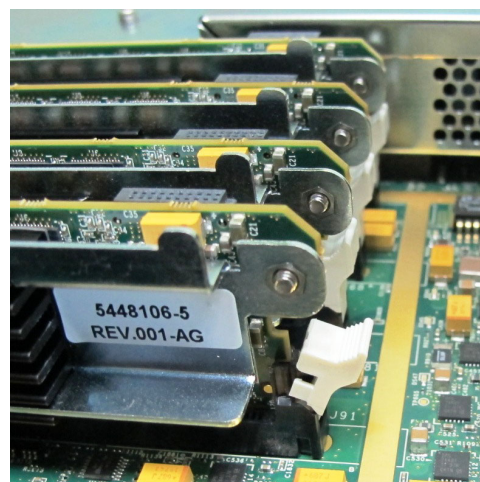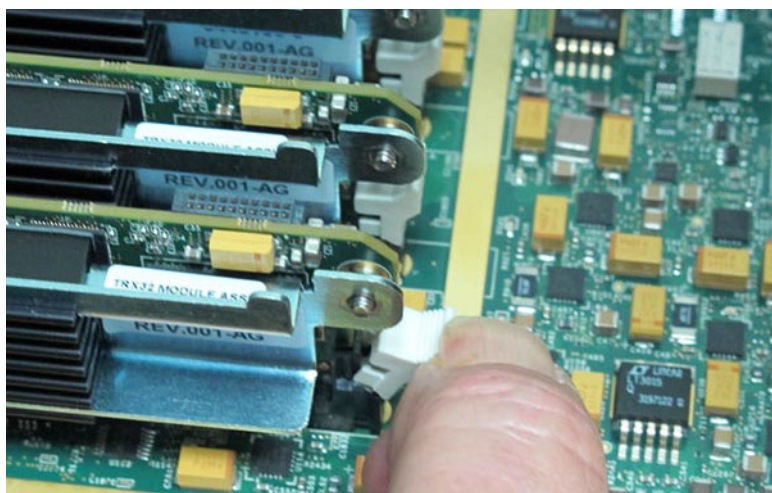
Figure 8-169   TRX32 Boards Secured with Plastic Holders

9.) Open each white plastic holder located on either end of the first TRX32 Board to release the board, then slide the Board *upwards* to remove it.
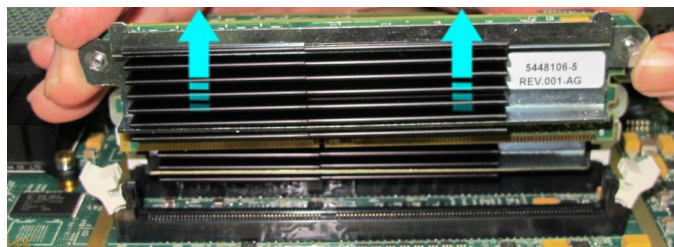
Figure 8-170   Removing a TRX32 Board

10.) Repeat step 9 to remove each of the remaining TRX32 Boards

NOTE: In the event that the replacement CFE Board is not been installed immediately, keep the four TRX32 Boards in a safe place as they will be required later for the installation procedure.

8-5-11-5   **CFE Board Installation Procedure**

1.) Fit the four TRX32 Boards (previously removed) into a new CFE Board.
Refer to TRX32 Boards Installation Procedure on page 8 - 151.

2.) Gently align the new CFE Board on the guide pins located on the base of the Cage
(Figure 8-171 below) and lower the CFE Board into position.
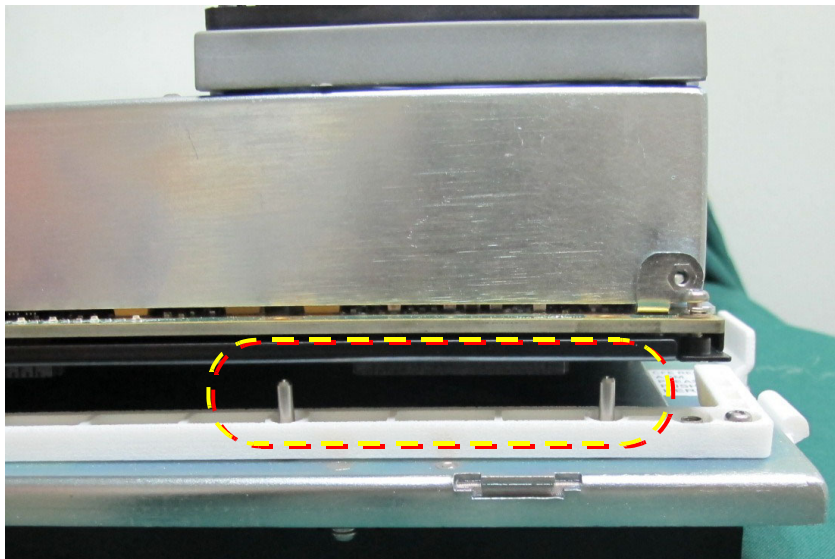
Figure 8-171   CFE Board Aligned on Guide Pins

3.) Return and fasten the 6 retaining screws (previously removed).

4.) Return the FEPS to its position on the CFE board:

- Front End Power Supply (FEPS) Installation Procedure on page 8 - 133

5.) Reconnect the ECG-to-CFE cable to the CFE Board.

6) Return the Front End door assembly to the system, reconnect the cables (previously disconnected), close the cabinet cage door and fasten securely with the two latches:

- Front End Door Assembly Closing and Installation Procedure on page 8 - 109

7.) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

8.) Proceed to the instructions for performing a Vivid S60 or Vivid S70 software installation procedure, commencing with step 11 on page 8-232.

8-5-12   CFE Release Arm Replacement Procedure

8-5-12-1   Tools

Appropriate Phillips screwdriver.

FRU Part # *Refer to Table 9-11 on page 9-18.*

8-5-12-2   Time Required

15 minutes

8-5-12-3   Preparation

Shut the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-12-4   CFE Board Release Arm Removal Procedure

The lever-shaped CFE Release Arm is located on the PSB Board - see Figure 8-172.

Figure 8-172   Location of CFE Release Arm

1) Remove the CFE Board:

- CFE Board Removal Procedure on page 8 - 134

2) Uninstall the CFE Release Arm (Lever) by unscrewing the two securing screws as indicated in Figure 8-172, above.

8-5-12-5   CFE Release Arm Installation Procedure

1) Install a new CFE Release Lever in position on the PSB and secure with the two securing screws previously removed.

2) Refit the CFE Board:

- CFE Board Installation Procedure on page 8 - 137

8-5-13   Plastic Air Sleeve for CFE Replacement Procedure

8-5-13-1   Tools

Appropriate Phillips screwdriver.

FRU Part # *Refer to Table 9-11 on page 9-18.*

8-5-13-2   Time Required

15 minutes

8-5-13-3   Preparation

Shut the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-13-4   Plastic Air Sleeve for CFE Removal Procedure

The Plastic Air Sleeve for CFE is located inside the cabinet cage - see Figure 8-173.

Figure 8-173   Location of Plastic Air Sleeve for CFE

1)   Remove the following covers: *left* side, *right* side, *front, left rear, right rear*:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- Front Cover Removal Procedure on page 8 - 16
- Left Rear Cover Removal Procedure on page 8 - 23
- Right Rear Cover Removal Procedure on page 8 - 20

2.) Open the Cage door.

3.) Working from the rear of the Vivid™ S60/Vivid™ S70 scanner, remove the four plastic air sleeve securing screws - see Figure 8-174.

Figure 8-174   Plastic Air Sleeve Securing Screws (rear of Scanner)

4.) Remove the CFE Plastic Air Sleeve.

8-5-13-5   Air Sleeve for CFE Installation Procedure

1) Position the replacement CFE Plastic Air Sleeve in its location in the cabinet cage.

2) Secure the part with the four securing screws previously removed.

3.) Close the cage door.

4.) Refit the covers previously remove:

8-5-14   PSB (Probe Select Board) Replacement Procedure

NOTE: *When tightening screws,* ***do not over-tighten or use excessive force****.*

⚠️ **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.
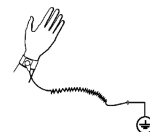
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

NOTE: *The PSB (Probe Select Board), shown in Figure 8-175, forms an integral part of the electronic cage door. The metal framework surrounding the Board incorporates the upper and lower hinges.*

Figure 8-175   Probe Select Board (PSB)

8-5-14-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-10 on page 9-17.*

8-5-14-2   Time Required

15 minutes

8-5-14-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-14-4   PSB Board Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *DVD, front*.

⮕
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2) Open and remove the Front End door assembly and place it on a stable surface:

- • Front End Door Assembly Opening and Removal Procedure on page 8 - 105

3) Remove the CFE Board:

- • CFE Board Removal Procedure on page 8 - 134

4.) Remove the ECG Board:

- • ECG/Respiratory Module Assembly Removal Procedure on page 8 - 128

Removal of the PSB Board is now complete; front and rear views of the stand-alone component are shown in Figure 8-176.
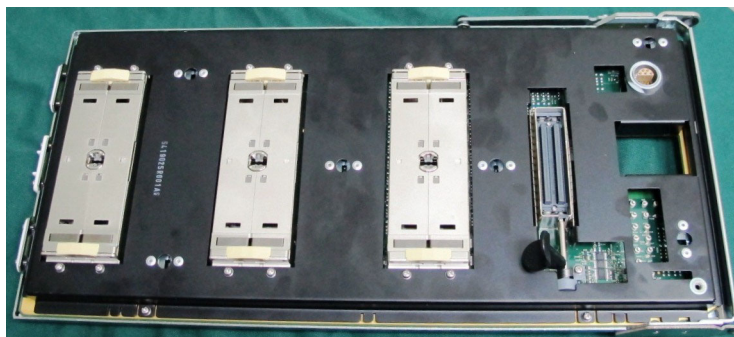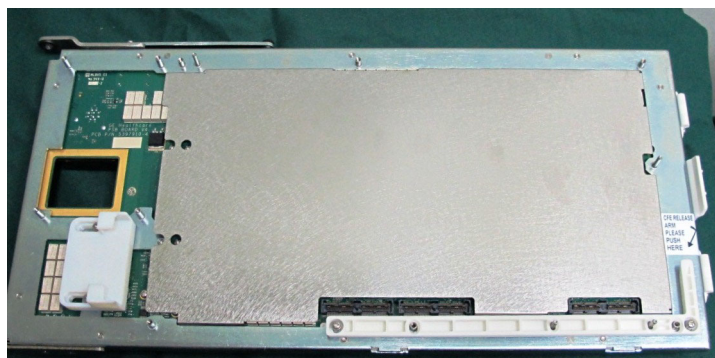
Figure 8-176   PSB Board Removal Complete

8-5-14-5   PSB Board Installation Procedure

1.) Fit the previously-removed components to the new PSB Board.
Refer to the following instructions:

- ECG/Respiratory Module Assembly Installation Procedure on page 8 - 130
- CFE Board Installation Procedure on page 8 - 137

2) Return the Front End door assembly to the system, reconnect the cables (previously disconnected), close the cabinet cage door and fasten securely with the two latches:

- Front End Door Assembly Closing and Installation Procedure on page 8 - 109

3) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

4.) Turn ON power to the system.

8-5-15   BIF (Back End Interface) Board 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.
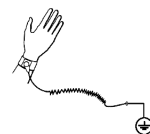
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.

NOTE: *The Back End Interface Board (BIF Board) is located at the top of the electronic cabinet cage, in effect forming the roof of the cage. See Figure 8-177 below.*
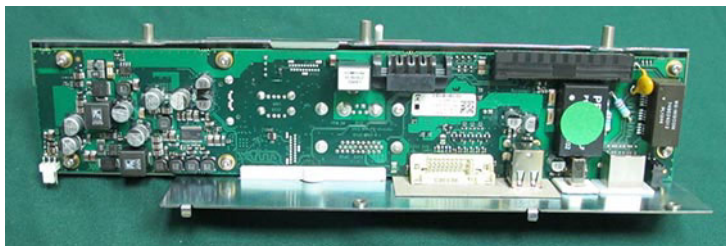
View from Underside
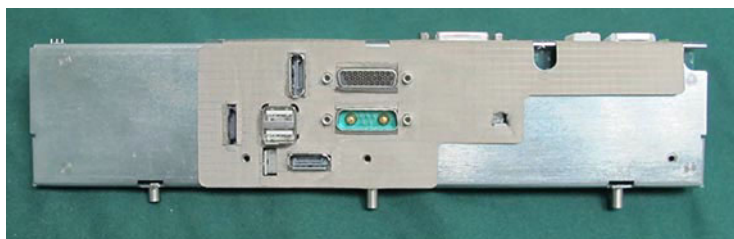
View from Top

Location of BIF Board

Figure 8-177   BIF Board and Location in Electronic Cage

8-5-15-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-9 on page 9-16.*

8-5-15-2   Time Required

30 minutes

8-5-15-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-15-4   BIF Board Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *DVD, front*, *right rear, left rear*:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16
- Right Rear Cover Removal Procedure on page 8 - 20
- Left Rear Cover Removal Procedure on page 8 - 23

2)   Open the Front End door assembly.

3.)   Remove the BEP assembly:

- BEP Removal Procedure on page 8 - 116

4.)   Remove the Sub-Woofer:

- Sub-Woofer Assembly Removal Procedure on page 8 - 155

Note: In the above procedure, the Sub-Woofer cable is disconnected from the BIF Board Figure 8-178 below (**A**).

5.)   Disconnect the system fan cable - see Figure 8-178 (**B**).
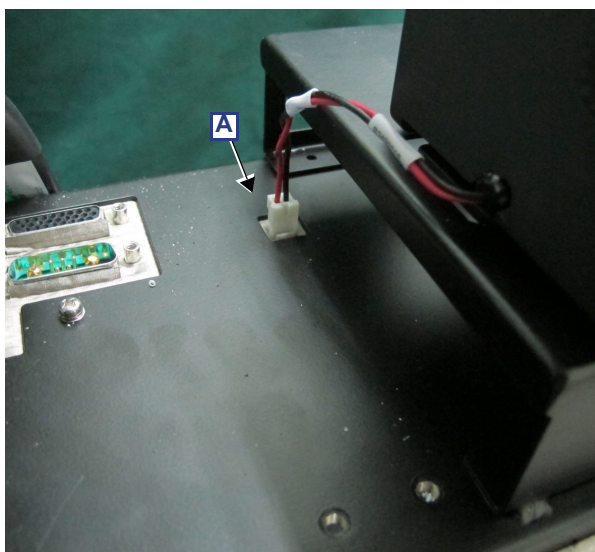
System Fan Cable
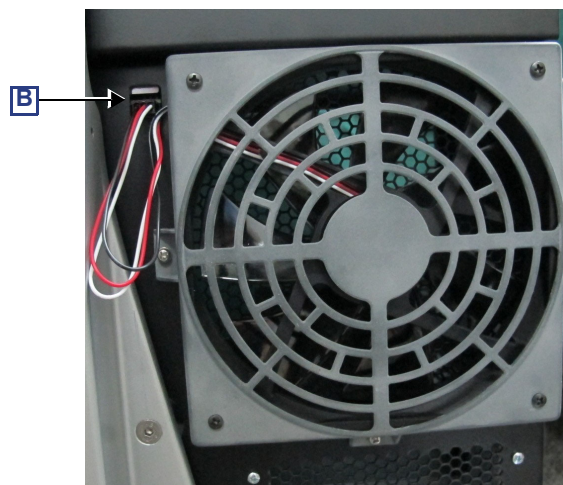
Disconnect Sub-Woofer Cable

Figure 8-178   Disconnecting the Sub-Woofer Cable and System Fan Cable

6.) Disconnect the cables from the Internal Distribution Panel (see Figure 8-179) as follows:

- Main Display (blue) - [**A**]
- AC Box-to-BIF - [**B**]
- OPIO-to-BIF - [**C**]
- OPIO Display (white) [**D**]
- Cable from optional Printer (not illustrated)
- Cable from optional DVD (not illustrated)
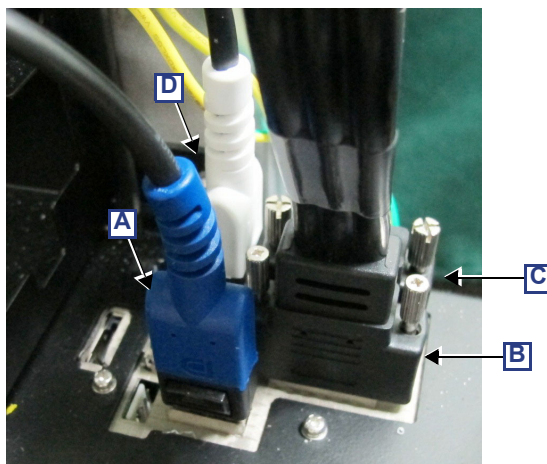
Figure 8-179   Internal Distribution Panel Cables

7.) Remove the 2 BIF Board securing screws from the cabinet at rear of the system - see Figure 8-180.

Figure 8-180   Removing the BIF Board Securing Screws Located at Rear of System

8.) Loosen the 3 BIF Board securing screws located on the top of the cabinet - see Figure 8-181.

Figure 8-181   BIF Board Securing Screws Located on Top of Cabinet

9.) While supporting the BIF Board with one hand, remove the 3 screws; remove the BIF Board from the system - Figure 8-182 below.
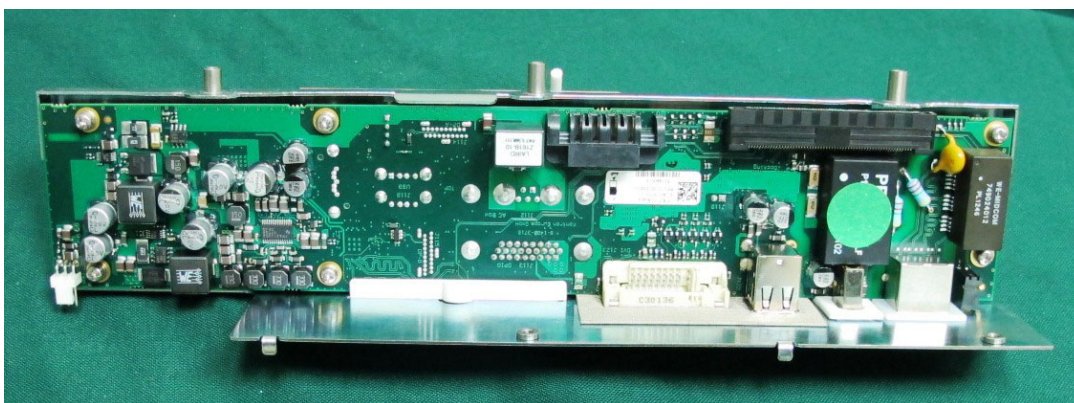
Figure 8-182   BIF Board Removed (View from Internal Side)

8-5-15-5   BIF Board Installation Procedure

1) Return a new BIF Board to its appropriate location in the cabinet cage assembly - refer to Figure 8-177 on page 8-144.

2) Continue the installation by following the steps for the BIF Board removal procedure, in reverse order.

3) Close the Front End door assembly and fasten securely with the two latches.

4) Refit the following covers: *left rear, right rear, front, DVD, right* side, *left* side

- Left Rear Cover Installation Procedure on page 8 - 25
- Right Rear Cover Installation Procedure on page 8 - 22
- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

5.) Turn ON power to the system.

8-5-16   TRx32 Boards 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.
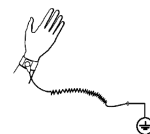
If a battery is present, first remove the battery as it contains stored energy. Refer to Battery Removal Procedure on page 8 - 167.
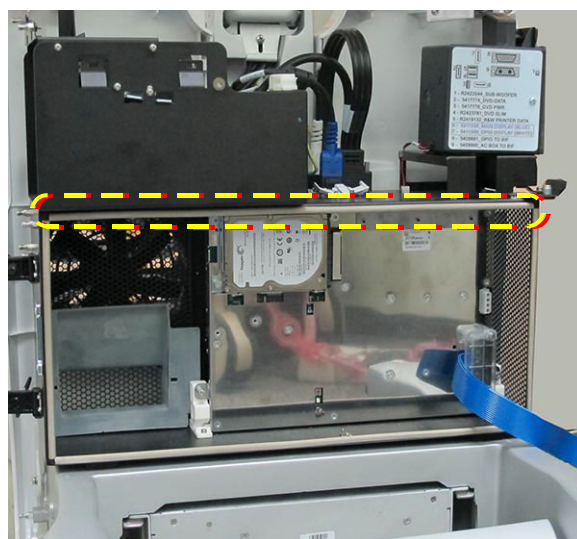
8-5-16-1   Tools

Appropriate Phillips screwdriver.

FRU Part #   *Refer to Table 9-10 on page 9-17.*

8-5-16-2   Time Required

15 minutes

8-5-16-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-16-4   TRX32 Boards Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD, front*.

➡️
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2) Open and remove the Front End door assembly and place it on a stable surface:

➡️
- Front End Door Assembly Opening and Removal Procedure on page 8 - 105

3) Loosen the 2 screws that secure the metal cover of the TRX32 Box, and open the cover. (Figure 8-183 below).

Figure 8-183   Opening the Metal Cover of the TRX32 Box

Note: The four TRX32 Boards are each secured in position on the CFE Board by way of a white plastic holder at each end of the TRX32 Board. These are opened by gently pulling them outwards to tilt the holder away from the edge of the Board, as shown in Figure 8-184.
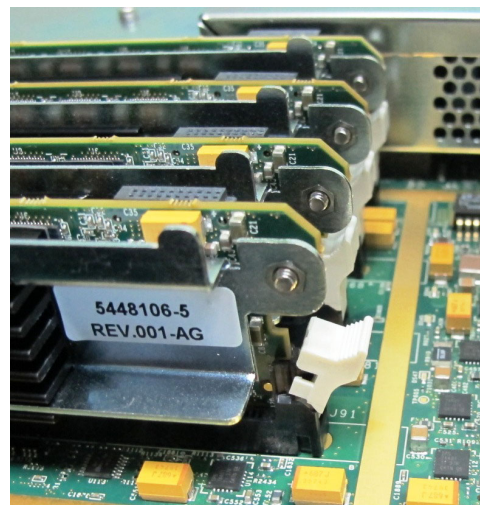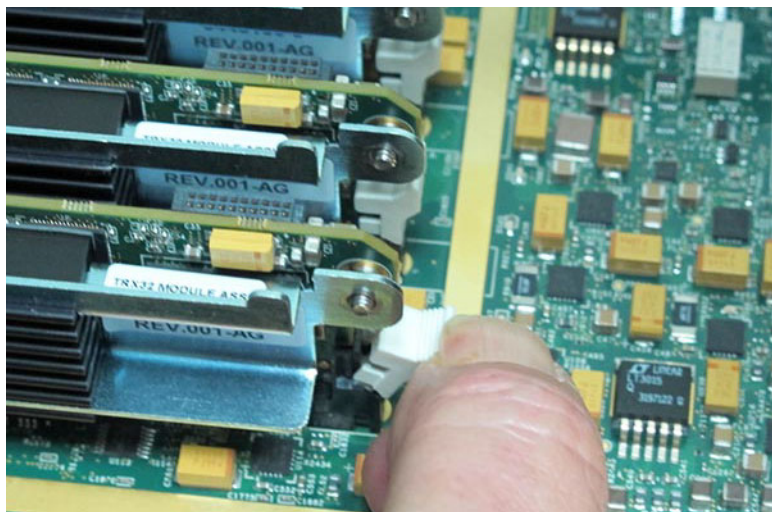
Figure 8-184   TRX32 Boards Secured with Plastic Holders

4.) Open each white plastic holder located on either end of the first TRX32 Board to release the board, then slide the Board *upwards* to remove it.

Figure 8-185   Removing a TRX32 Board

5.) Repeat step 4 to remove each of the remaining TRX32 Boards - Figure 8-186.

Figure 8-186   All TRX32 Boards Removed

8-5-16-5   TRX32 Boards Installation Procedure

NOTE: *This procedure applies to replacement of one or more of the defective boards (TRX32).*

⚠️ **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.
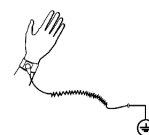
1) Gently slide a new TRX32 Board into the retaining grooves located on the CFE Board, pressing the board firmly downwards until it is in position as shown in Figure 8-187.
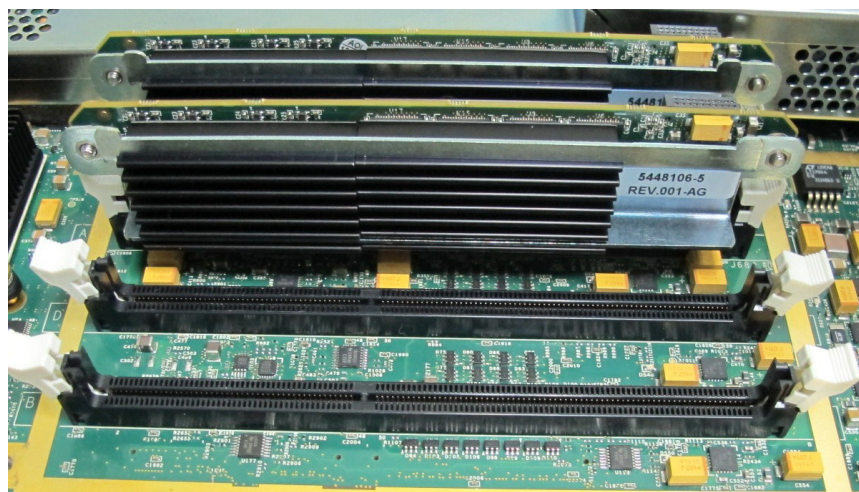
Figure 8-187   TR32X Grooves and Holders on the CFE Board

2) Ensure that the TR32X Board is firmly seated, then press the TRX32 Board firmly downwards allowing the white plastic holder clips to close at each end.

3.) Repeat step 1 and step 2 for each of the other TRX32 Boards.

4.) Close the metal cover and fasten the retaining screws - see Figure 8-183 on page 8-149.

5) Return the Front End door assembly to the system, reconnect the cables (previously disconnected), close the cabinet cage door and fasten securely with the two latches:

- Front End Door Assembly Closing and Installation Procedure on page 8 - 109

6) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

8-5-17   Fan (TRX32 Box) 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. Refer to Battery Removal Procedure on page 8 - 167.
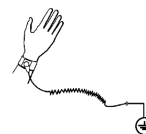
8-5-17-1   Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-12 on page 9-19.*

8-5-17-2   Time Required

15 minutes

8-5-17-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-17-4   Fan (TRX32 Box) Removal Procedure

1) Remove the following covers: *left* side, *right* side, *DVD, front*.

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16

2) Open and remove the Front End door assembly and place it on a stable surface:

- Front End Door Assembly Opening and Removal Procedure on page 8 - 105

3) Loosen the 2 screws that secure metal cover on the TRX32 Box and open the cover, as shown in Figure 8-183 on page 8-149.

4.) Disconnect the fan cable from the CFE Board - Figure 8-188.
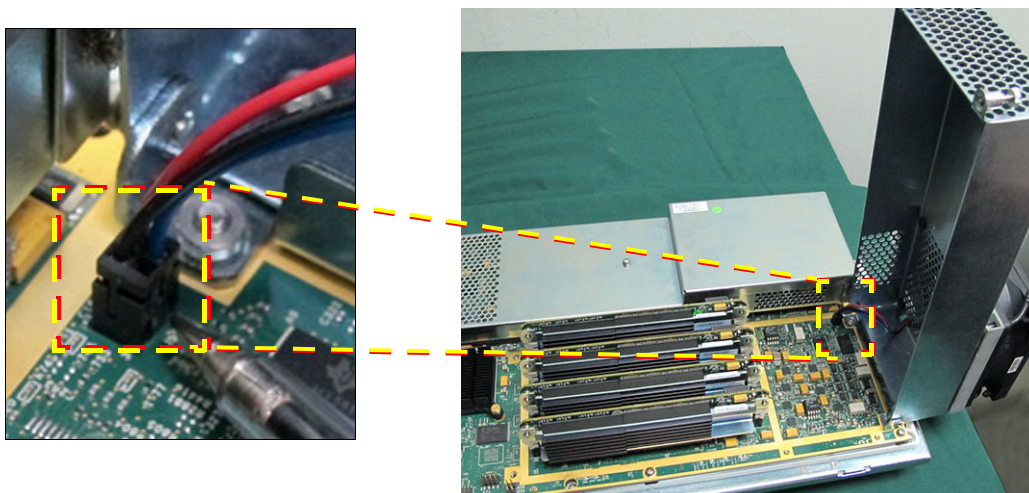
Figure 8-188   TRX32 Box Fan Cable Connected to CFE Board

NOTE: *The fan is secured to the cover of the TRX Box with four rubber holders (grommets) - one at each corner - as shown below.*

5) Cut each of the four rubber grommets and remove them to release the fan (see Figure 8-189).
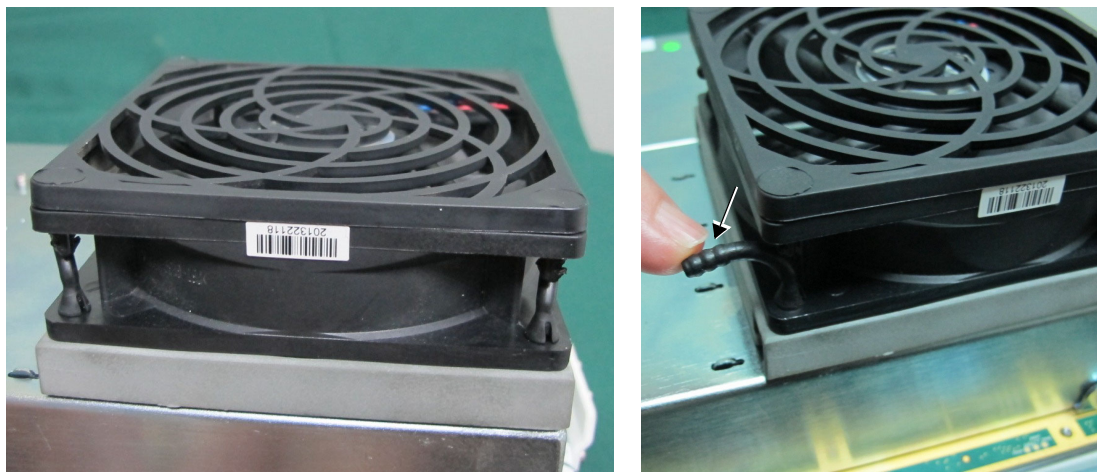
Figure 8-189   Fan Secured to TRX32 Box

8-5-17-5   Fan (TRX32 Box) Installation Procedure

1) Position the new fan on the TRX32 Box cover then thread the fan cable through the top of the cover and lead it through as shown in Figure 8-190 (right).

2) Using the rubber grommets provided, thread each rubber grommet from the inside of the TRX32 Box cover through to the new fan - Figure 8-190 (left) - and pull it through from side of the fan until each grommet is firmly in position securing the fan - see Figure 8-189, above.
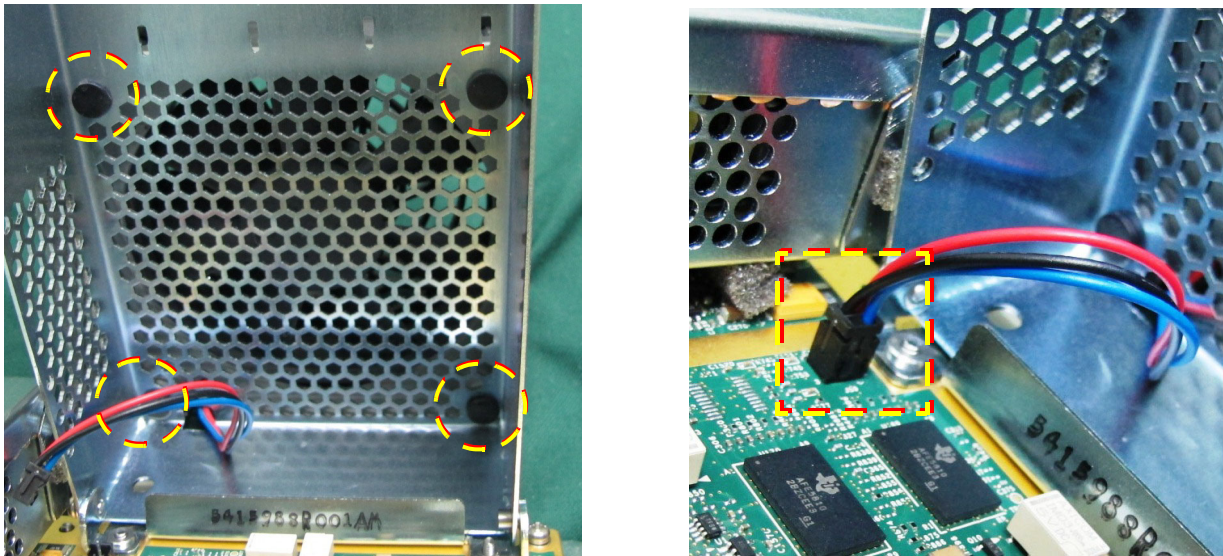
Figure 8-190   TRX32 Cover and Fan Cable

3.) Connect the fan cable to the CFE board - see Figure 8-190, above.

4.) Close the TRX32 Box cover and tighten the securing screws - see Figure 8-183 on page 8-149.

5) Return the Front End door assembly to the system, reconnect the cables (previously disconnected), close the cabinet cage door and fasten securely with the two latches:

- Front End Door Assembly Closing and Installation Procedure on page 8 - 109

6) Refit the following covers: *front, DVD, right* side, *left* side

- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

7.) Turn ON power to the system.

8-5-18   Sub-Woofer Assembly Replacement Procedure

8-5-18-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-12 on page 9-19.*

8-5-18-2   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-18-3   Time Required

20 mins

8-5-18-4   Sub-Woofer Assembly Removal Procedure

NOTE: *The Sub-Woofer is mounted to the roof of the cabinet cage, on the left side of the system - Figure 8-191.*
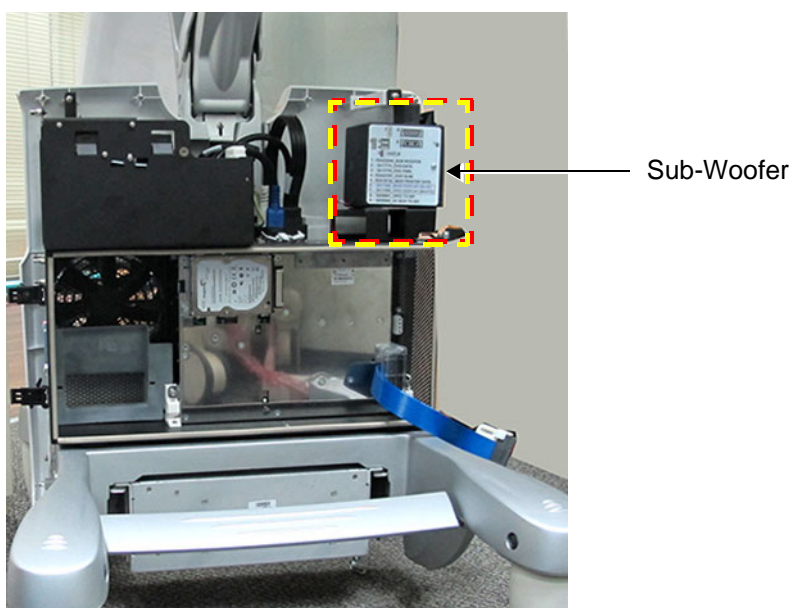
Figure 8-191   Sub-Woofer Assembly - Location

1)   Remove the following covers: *left* side, *right* side, *DVD, front*, *left rear:*

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16
- Left Rear Cover Removal Procedure on page 8 - 23

2) Disconnect the Sub-woofer cable from the connector on the BIF - refer to Figure 8-192.

Disconnect Sub-woofer cable here
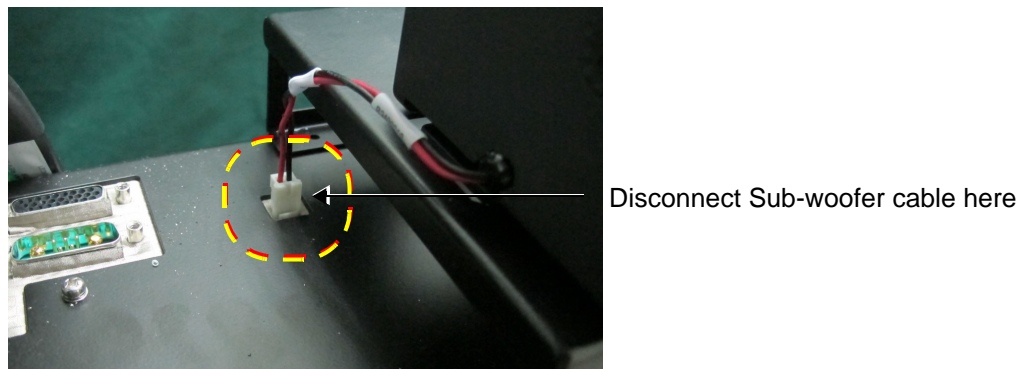
Figure 8-192   Sub-Woofer Cable Connection

3.) Remove the two screws securing the Sub-Woofer to the top of the cabinet cage - Figure 8-193.

Figure 8-193   Loosening the Securing Screws

4) Lift and tilt the Sub-woofer Assembly to release it from the securing tab, then remove it from the cabinet cage - see Figure 8-194.
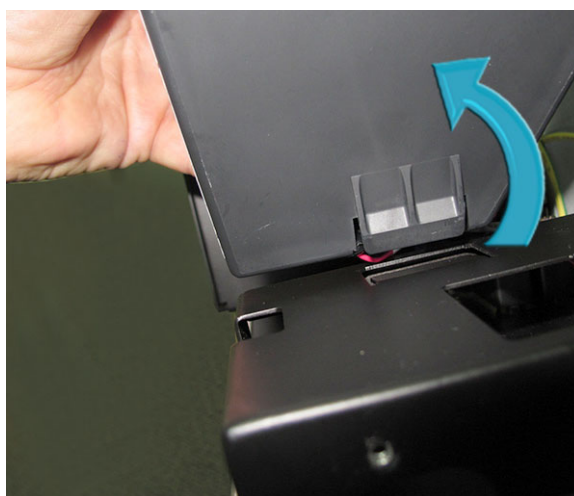
Figure 8-194   Removing the Sub-Woofer Assembly

8-5-18-5   Sub-Woofer Assembly Installation Procedure

1.) Return the replacement Sub-Woofer Assembly (together with the cable attached) to its position on top of the cabinet cage - refer to Figure 8-194.

2.) Secure in position by tightening the two screws (previously removed) - Figure 8-193.

3.) Connect the Sub-woofer cable to the connector on the BIF - refer to Figure 8-192.

4) Refit the following covers: *left rear, front, DVD, right* side, *left* side

- Left Rear Cover Installation Procedure on page 8 - 25
- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

5.) Turn ON power to the system.

8-5-19   Fan for Cabinet Cage Assembly Replacement Procedure

8-5-19-1   Tools
Phillips screwdriver.

FRU Part #   *Refer to Table 9-12 on page 9-19.*

8-5-19-2   Time Required
20 mins

8-5-19-3   Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-19-4   Fan for Cabinet Cage Assembly Removal Procedure
The fan (see Figure 8-195 below) is located at the rear of the scanner.

1)   Remove the following covers: *right* side, *DVD, front*, *right rear:*

- Right Side Cover Removal Procedure on page 8 - 10
- DVD Cover Removal Procedure on page 8 - 11
- Front Cover Removal Procedure on page 8 - 16
- Right Rear Cover Removal Procedure on page 8 - 20

2.) Disconnect the Fan cable as indicated in Figure 8-195 below.
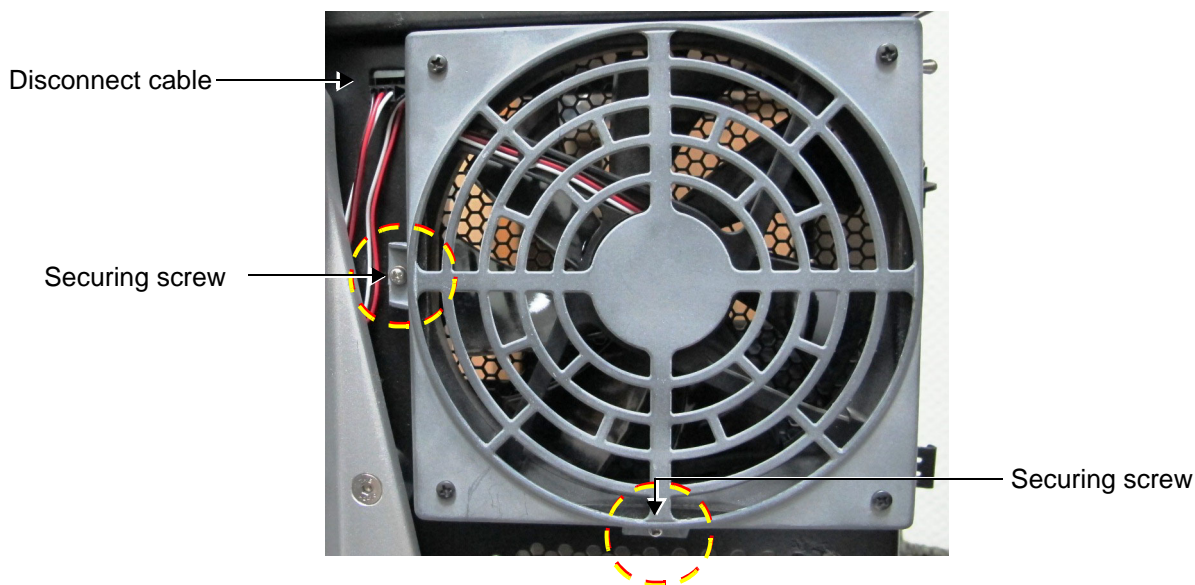
Figure 8-195   Fan for Cabinet Cage Assembly

3.) Loosen and remove the two securing screws as indicated in Figure 8-195, above.

4.) Remove the fan.

8-5-19-5   Fan for Cabinet Cage Assembly Installation Procedure

1) Position the replacement fan in the correct location on the cabinet cage assembly.

2.) Fasten the two securing screws as indicated in Figure 8-195.

3.) Reconnect the Fan cable as indicated in Figure 8-195.

4.) Refit the following covers: *right rear, front, DVD, right side*

- Right Rear Cover Installation Procedure on page 8 - 22
- Front Cover Installation Procedure on page 8 - 19
- DVD Cover Installation Procedure on page 8 - 12
- Right Side Cover Installation Procedure on page 8 - 10

5.) Turn ON power to the system.

8-5-20   BIF Connection Map Label Replacement Procedure

Note: The BIF Connection Map label, is orderable as a separate part.

8-5-20-1   Tools
No special requirements.

FRU Part #   *Refer to Table 9-9 on page 9-16.*

8-5-20-2   Time Required
5 min

8-5-20-3   Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-20-4   BIF Connection Map Label Removal Procedure
The label is located on the sub-woofer -see Figure 8-196.

Figure 8-196   Sub-Woofer Showing Location of BIF Connection Map Label

1.) Using a blunt non-metallic instrument, carefully peel off the existing label.

2.) Clean and prepare the sub-woofer's surface for adhering the replacement label.

8-5-20-5   BIF Connection Map Label Installation Procedure

1.) Remove the self-adhesive replacement label from its packing

2.) Carefully adhere the label to the sub-woofer's surface making sure that it is position straight and parallel to the inlaid impression on the sub-woofer.

8-5-21   AC Distribution Box Replacement Procedure

8-5-21-1   Tools
Flat and Phillips screwdriver.

FRU Part # *Refer to Table 9-8 on page 9-15.*

8-5-21-2   Time Required
45 mins

8-5-21-3   Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-21-4   AC Distribution Box Removal Procedure

NOTE: *The AC Distribution Box is located at the rear of the system - Figure 8-197.*

Figure 8-197   AC Distribution Box Located at Rear of System

1.) Remove the AC Distribution Box cover, then the battery:

- AC Distribution Box Cover Removal Procedure on page 8 - 29
- Battery Removal Procedure on page 8 - 167

2.) Disconnect the Ground cable - Figure 8-198.
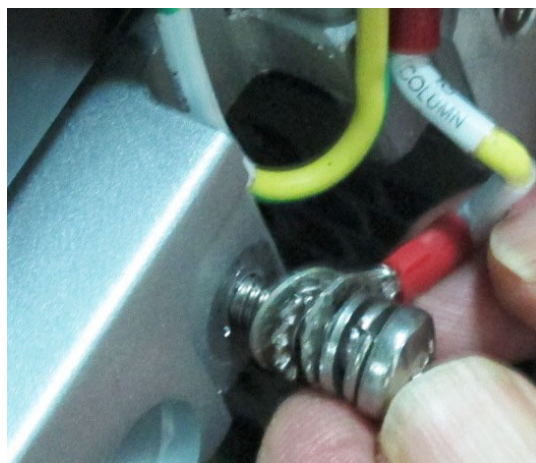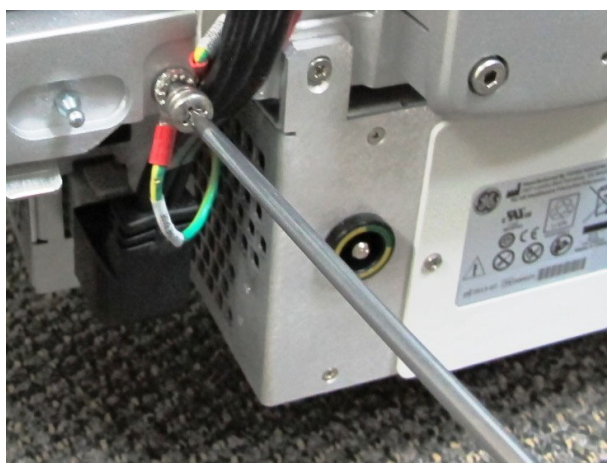
Figure 8-198   Disconnecting the Ground Cable

3.) Unplug the power cable (seen in Figure 8-199) 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
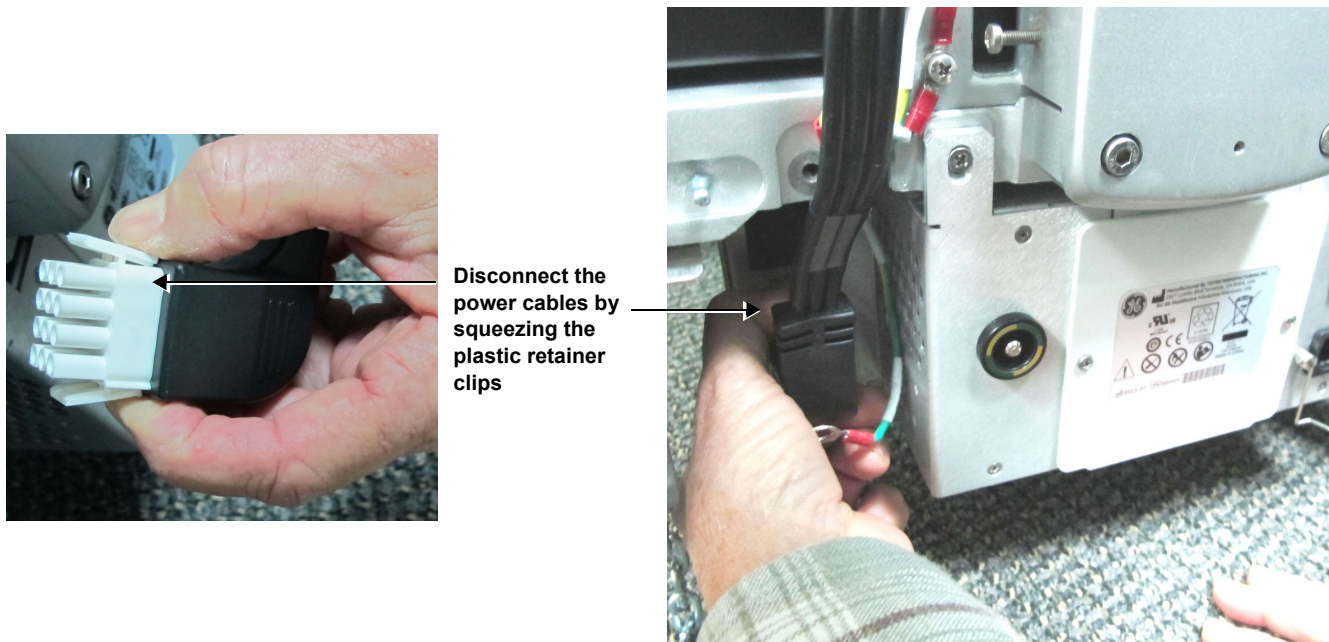
Figure 8-199   Plastic Securing Clips on Power Cables

4.) Unplug the Peripherals power cable (not visible in Figure 8-199).

5.) To remove the AC Box, unscrew the two supporting screws (shown in Figure 8-200 below).
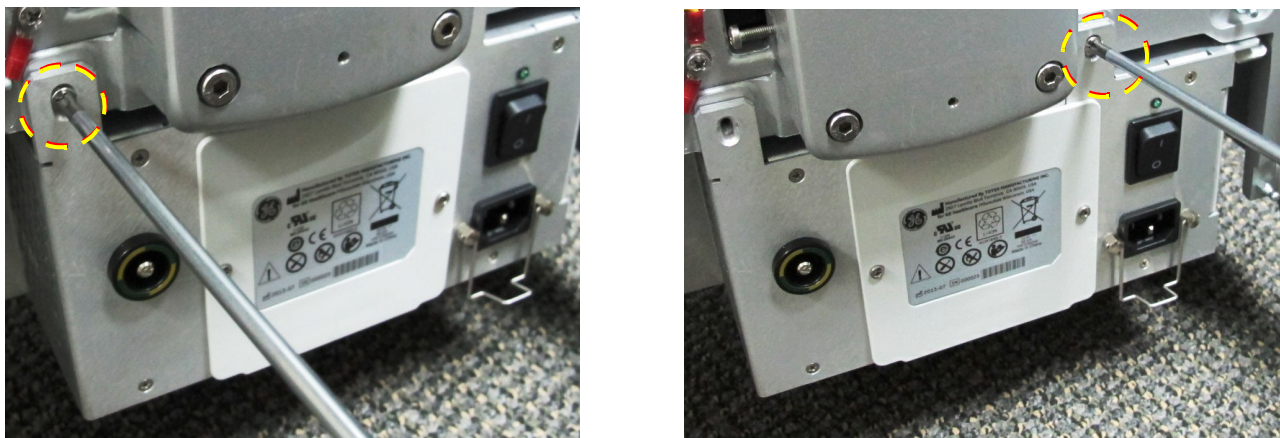
Figure 8-200   AC Box Supporting Screws

6.) Slide the AC Box all the way out until it is completely removed from the system as shown in Figure 8-201 below.
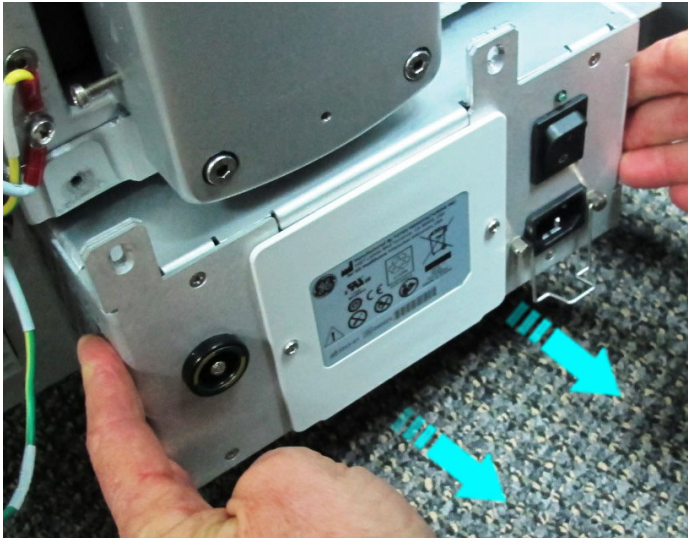
Figure 8-201   Removing the AC Distribution Box

8-5-21-5   AC Distribution Box Installation Procedure

1.) Place a new AC Distribution Box in its position on the system.

2.) Install the new AC Distribution box by performing the removal procedure steps, in reverse order.

3.) Install the Battery, then refit the AC Distribution Box cover:

- Battery Installation Procedure on page 8 - 168
- AC Distribution Box Cover Installation Procedure on page 8 - 30

4.) Turn ON power to the system.

8-5-22   Fan (AC Distribution Box) Replacement Procedure

8-5-22-1   Tools

Phillips screwdriver.

FRU Part #   *Refer to Table 9-12 on page 9-19.*

8-5-22-2   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-22-3   Time Required

10 minutes

8-5-22-4   Fan (AC Distribution Box) Removal Procedure

NOTE: *Access to the Fan is from the right side of the AC Distribution Box -* Figure 8-202.
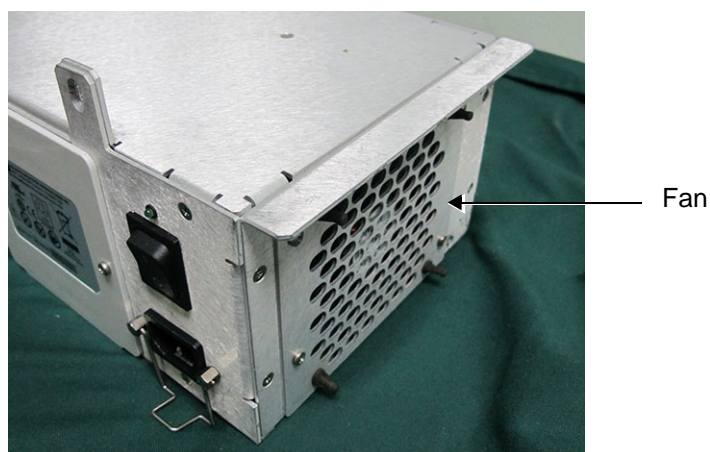
Figure 8-202   AC Distribution Box Fan - Location

1.) Remove the AC Distribution Box and place it on a clean stable surface:

- AC Distribution Box Removal Procedure on page 8 - 161

2.) Remove the 4 Fan securing screws from the side of the AC Box - Figure 8-203 below.
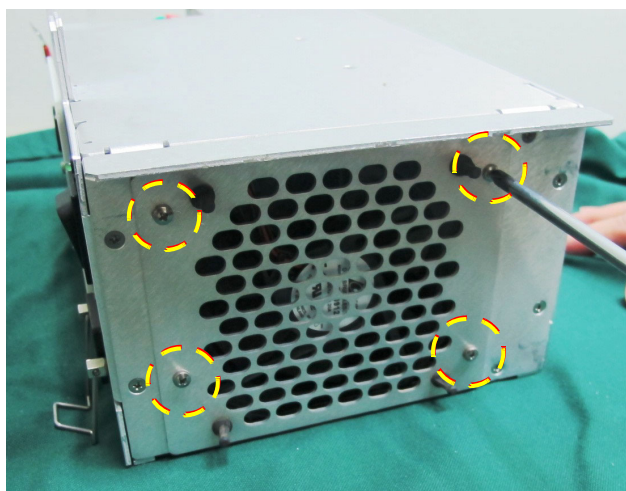
Figure 8-203   AC Box Fan Securing Screws

3.) Carefully withdraw the AC Box Fan and disconnect the fan cable from the connector on the AC Distribution Box - see Figure 8-204 below.
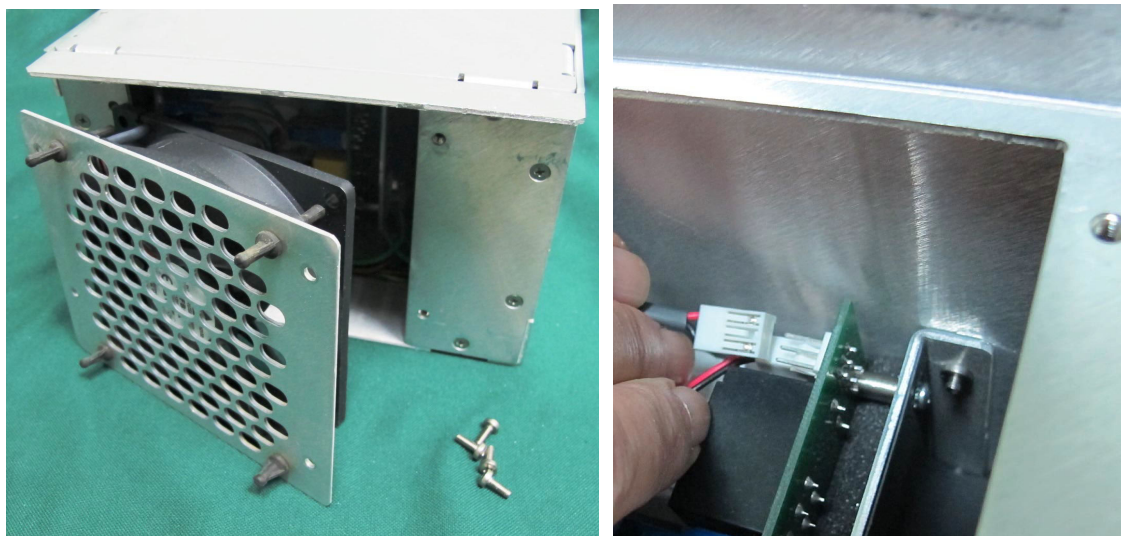
Figure 8-204   Disconnect the Fan Cable from the AC Distribution Box

4.) To remove the fan from its base, stretch one of the flexible rubber securing holders (grommets) and cut it. Then pull it away from the fan's base to remove it - see Figure 8-205 below

5.) Remove the other 3 remaining securing rubber holders.
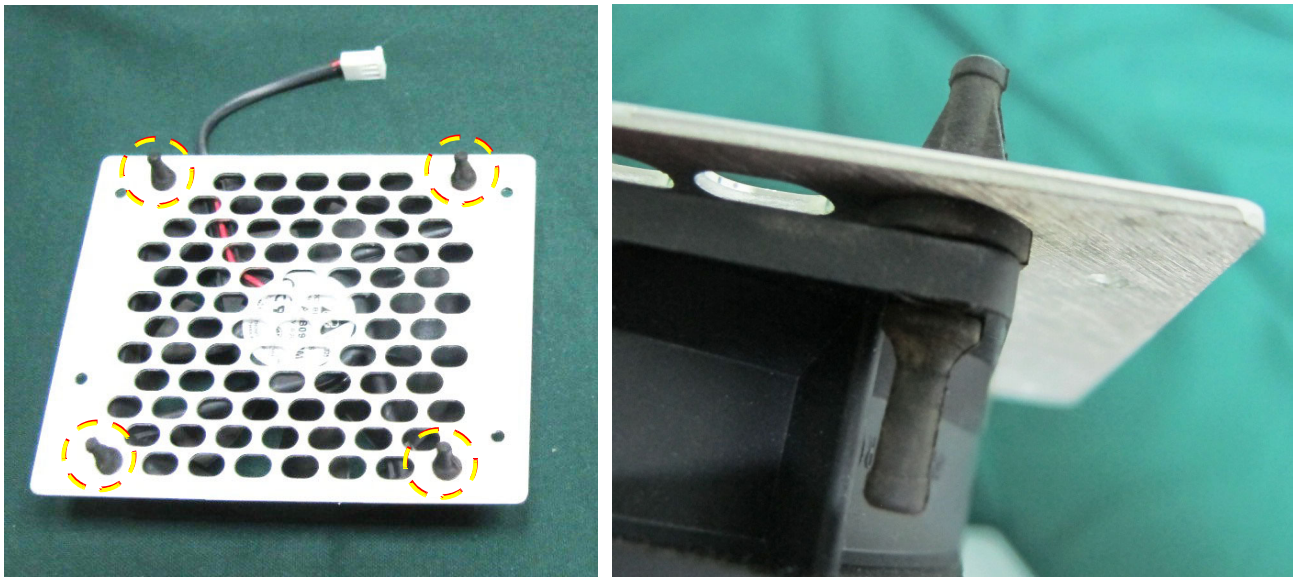
Figure 8-205   Flexible Rubber Holders - Cut and Remove

8-5-22-5   Fan (AC Distribution Box) Installation Procedure

NOTE: *When assembling a new AC Box Fan on the fan base, make use of the replacement rubber holders (kit supplied with the new Fan).*

1.) From the underside of the fan, thread the rubber holder through the aperture on the fan and pass the rubber holder through the aperture on the fan base - Figure 8-205.

2.) Pull the rubber holder through from above the fan base until it fastens the fan securely to the base. Repeat this task using the 3 remaining rubber holders provided.

3.) Connect the fan cable to the connector on the AC Distribution Box - Figure 8-204.

4.) Place the Fan in position then fasten with the 4 securing screws (previously removed) - Figure 8-203.

5.) Install the AC Distribution Box:

• AC Distribution Box Removal Procedure on page 8 - 161

6.) Turn ON power to the system.

8-5-23   Battery Replacement Procedure

8-5-23-1   Tools

Phillips screwdriver.

FRU Part # *Refer to Table 9-8 on page 9-15.*

8-5-23-2   Time Required

1 min

8-5-23-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-5-23-4   Battery Removal Procedure

1.) Remove the AC Distribution Box cover:

- AC Distribution Box Cover Removal Procedure on page 8 - 29

2.) Remove the 2 securing screws from the battery compartment - Figure 8-206 (left).

3)   Slide the battery out of the AC Distribution Box - Figure 8-206 (right).
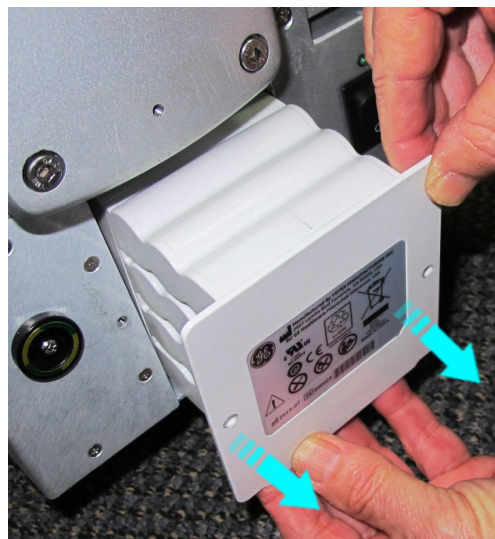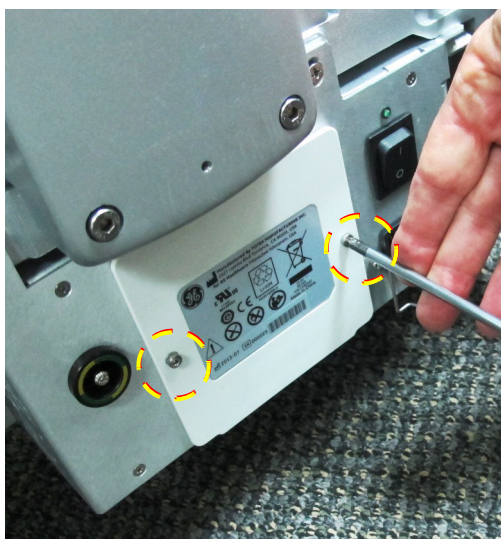
Figure 8-206   Removing the Screw on the Battery Compartment

⚠ **CAUTION** **WHEN REMOVING A DEFECTIVE BATTERY, ENSURE THAT IT IS DISPOSED OF IN ACCORDANCE WITH LOCAL REGULATIONS.**
ALTERNATIVELY, FORWARD IT TO GE FOR PROPER DISPOSAL.

8-5-23-5 Battery Installation Procedure

⚠️ **WARNING** *THE Vivid S60/Vivid S70 BATTERY HAS A SAFETY DEVICE.*
DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERY!

Always observe the precautions listed in Vivid™ S60/Vivid™ S70 External Labels on page 1 - 23.

⚠️ **CAUTION** **USE ONLY BATTERIES APPROVED BY GE AS SUITABLE FOR USE WITH THE Vivid S60/Vivid S70 ULTRASOUND SCANNER**

1) Insert a replacement battery into the battery compartment as shown in Figure 8-207 below.
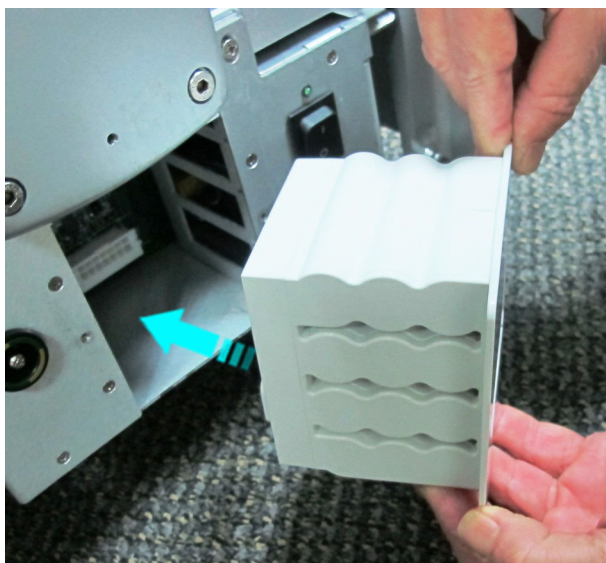
Figure 8-207   Installation of Battery in AC Distribution Box Compartment

2.) Make sure the battery is properly inserted all the way.

3) Return the two securing screws (previously removed) - Figure 8-206.

4) Refit the AC Distribution Box cover:

➡️ • AC Distribution Box Cover Removal Procedure on page 8 - 29

5.) Turn ON power to the Vivid S60/Vivid S70 ultrasound scanner.

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 Operator Panel Replacement

NOTE: *In the event that the Mechanical Assembly Interface Base for the Operator 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 8-208.*
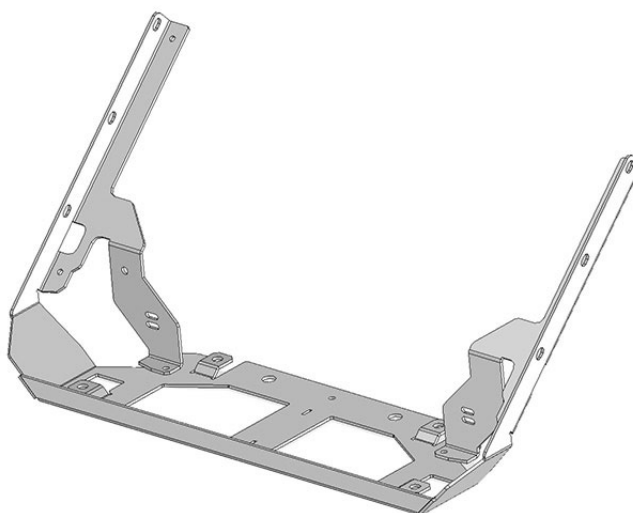
Figure 8-208   Touch Screen Chassis

8-6-4-1   Tools
Phillips screwdriver.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-4-2   Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-4-3   Time Required
45 mins

8-6-4-4   Touch Screen Chassis Removal Procedure

1.) Remove the Touch Screen:

• Touch Screen Removal Procedure on page 8 - 58

2) Unscrew and remove the two securing screws fastening the chassis to the top of the keyboard assembly - shown in Figure 8-209.

Figure 8-209   Removing Securing Screws

3.) Cut the cable securing tie-wraps.

4.) Remove the Operator Panel Keyboard Assembly:

• Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64

5.) From the bottom of the keyboard assembly, unscrew the four screws shown in Figure 8-210.
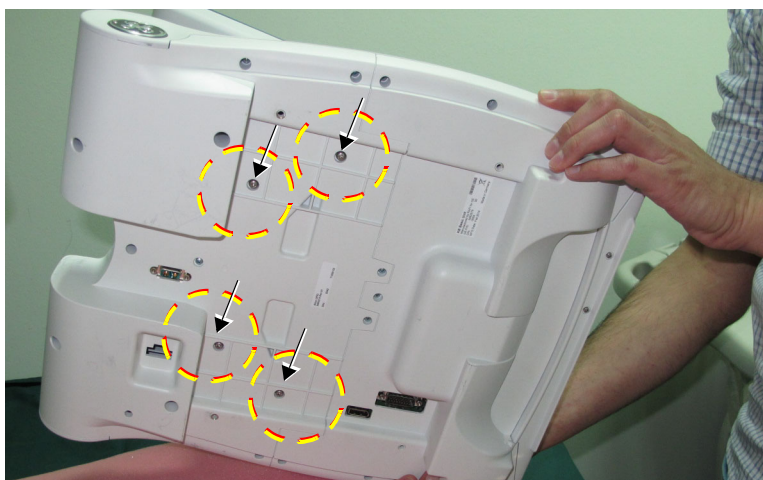
Figure 8-210   Four Screws Securing the Touch Screen Chassis

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 8-209) and lift the chassis upwards to release it from its location.

8-6-4-5   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 S60/Vivid S70 ultrasound scanner.

8-6-5 LCD Arm Alton 21.5in Wide Replacement Procedure

8-6-5-1 Tools

Use the appropriate flat and Phillips type screwdrivers, side cutting pliers and a 5mm Allen key.

FRU Part # *Refer to Table 9-1 on page 9-3 - LCD Arm Alton 21.5in Wide*

8-6-5-2 Time Required

60 min

8-6-5-3 Preparation

1.) Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

2.) Remove the 21.5in Monitor as described in Remove the 21.5 inch Monitor on page 8 - 31.

8-6-5-4 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 8-211 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.
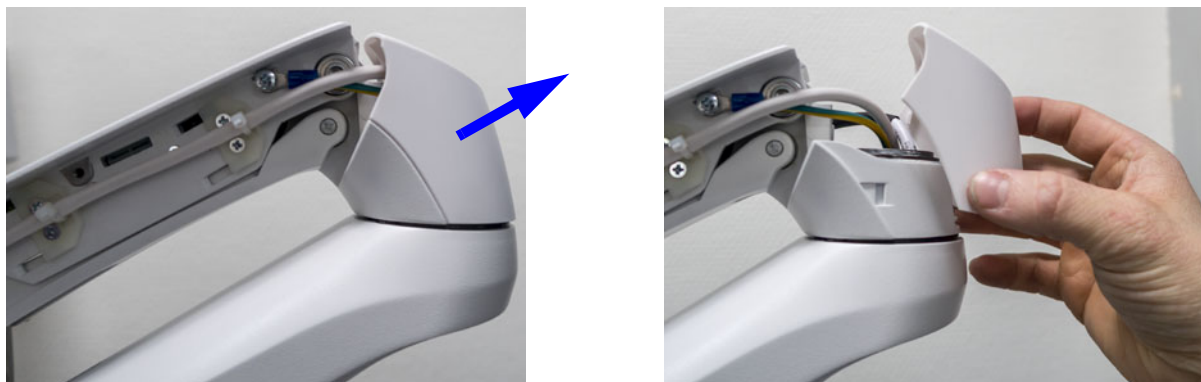
Figure 8-212 Remove the Vertical Service Cover

3.) Remove the screw and the Lower Service Cover.

Figure 8-213   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 8-214   Remove cables

Lift the Arm a little, as illustrated below to ease the removing of the cables from the base of the Arm.

Figure 8-215   Lift the Arm

6.) Remove the Arm.

8-6-5-5 LCD Arm Alton 21.5in Wide Monitor Installation Procedure

1.) Install the Arm by performing the LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 172 in reverse sequence.

8-6-6   LCD Arm Riser for 21.5 inch monitor replacement procedure
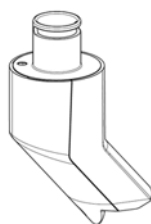
Figure 8-216   LCD Arm Riser for 21.5 inch monitor

8-6-6-1   Tools

Use the appropriate Phillips type screwdrivers, side cutting pliers and a 5mm Allen key.

FRU Part #   *Refer to Table 9-1 on page 9-3. Look for: LCD Arm Riser for 21.5 inch monitor*

8-6-6-2   Time required

90 minutes

8-6-6-3   Preparations

1.) Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

2.) Remove the **21.5in Monitor** as described in Remove the 21.5 inch Monitor on page 8 - 31.

3.) Unscrew and remove the **three fastening screws**. See the illustration below.

4.) Remove the **two covers** from the LCD Arm Riser. See the illustration below.
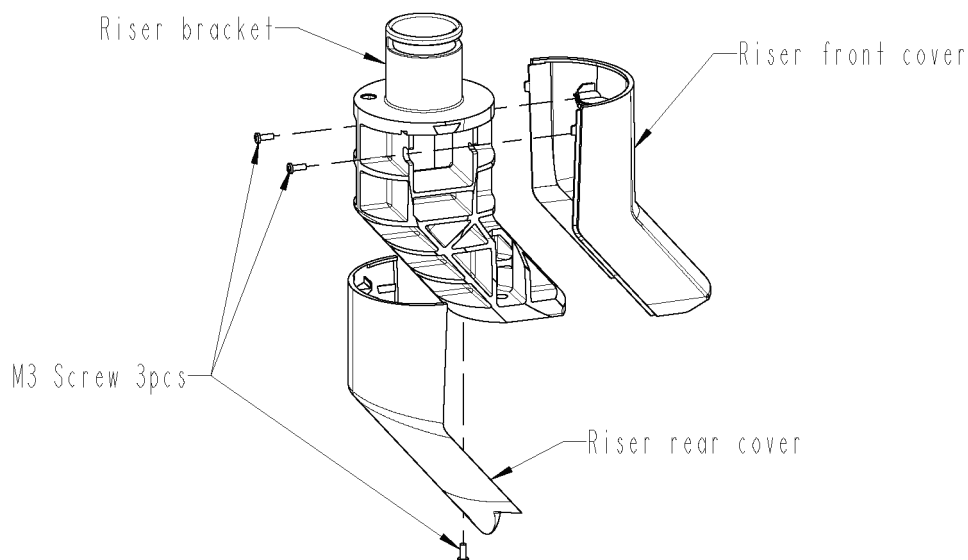
Figure 8-217   Remove the covers from the LCD Arm Riser

5.) Remove the **LCD Arm Alton 21.5in Wide** as described in LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 172.

8-6-6-4   **Removing the LCD Arm Riser**

     1.) Remove **the cables** one by one.

     2.) Unscrew **three screws** and remove the **LCD Arm Riser**.
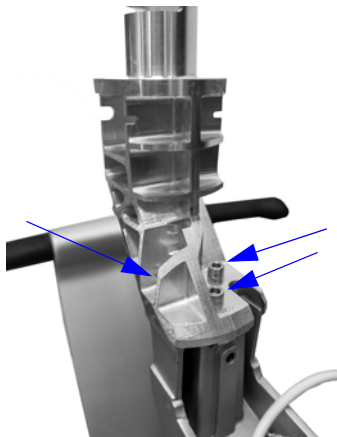
Figure 8-218   Unscrew three screws and remove the LCD Arm Riser

8-6-6-5   **Install the LCD Arm Riser**

Install the **LCD Arm Riser** by performing Removing the LCD Arm Riser on page 8 - 176 in reverse sequence.

Torque:

- The tree M5 screws shall be tightened with Torque: 5.8 Nm +/- 5%.
- The tree M3 screws shall tightened with Torque: 1.3 Nm +/- 5%.

8-6-7   Articulated Arm for 19" Monitor Replacement Procedure

8-6-7-1   Tools

Use the appropriate flat and Phillips type screwdrivers and a 5mm Allen key.

FRU Part #   *Refer to Table 9-1 on page 9-3 - Articulated Arm Assembly*

8-6-7-2   Time Required

60 min

8-6-7-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in
Power Shut Down on page 4 - 7.

8-6-7-4   Articulated Arm for 19" Monitor Removal Procedure

Prior to commencing the Articulated Arm Removal procedure, it is necessary to remove two of the
Monitor covers, then the Articulated Arm covers, then the Monitor Arm Base Cover.

NOTE: *A context picture of the Articulated Arm Covers is shown in Figure 8-219 below. The Monitor Arm Base
cover is located below the lower Horizontal Articulated Arm cover - Figure 8-220.*
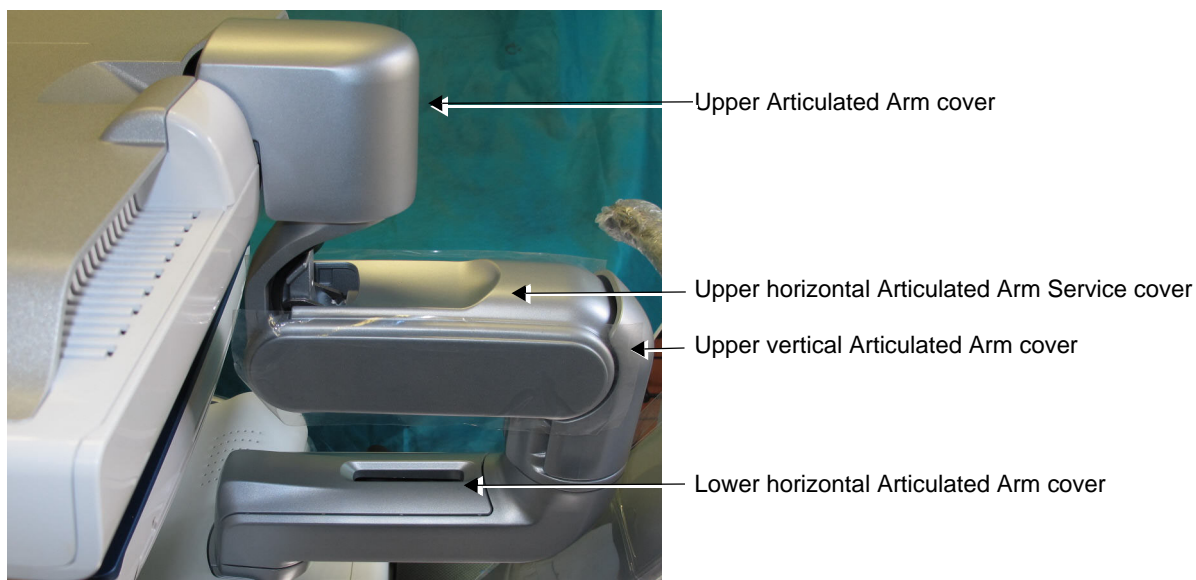
Figure 8-219   Monitor Articulated Arm - Covers
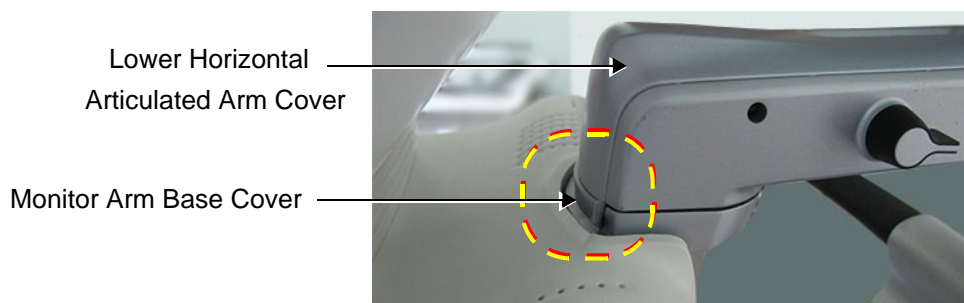
Figure 8-220   Monitor Arm Base Cover - Location

NOTE: *In addition, good work practice and safety require that the monitor is also removed when performing the
Articulated Arm replacement procedure.*

8-6-7-4-1   Procedure Summary

The required procedures are performed in stages, in the following sequence:

- **Covers Removal Procedure**

- **Monitor Removal Procedure**

- **Releasing the Cables**

- **Removing the Articulated Arm for 19" Monitor**

8-6-7-4-2   Covers Removal Procedure

NOTE: *As described in the steps below, covers must be removed in the following sequence:*

     a.) Monitor Service Cover

     b.) Monitor Rear Cover

     c.) Upper Articulated Arm Cover

     d.) Vertical Articulated Arm Service Cover

     e.) Horizontal Articulated Arm Service Cover

     f.) Lower Articulated Arm Cover

     g.) Monitor Arm Base Cover

1)   Remove the following Covers*: Monitor Service; Monitor Rear*

- 19" Monitor Service Cover Removal Procedure on page 8 - 34

- 19" Monitor Rear Cover Removal Procedure on page 8 - 37

2.) Unclip the **Upper Articulated Arm Cover** by pulling it gently up and away from the device (Figure 8-221)**.**

Figure 8-221   Removing Upper Articulated Arm Cover

3.) Unclip the **vertical Articulated Arm Service Cover** by pulling it gently away from the device - see Figure 8-222 below.

Figure 8-222   Removing Vertical Articulated Arm Service Cover

4.) Unclip the **upper horizontal Articulated Arm Service Cover** by pulling it gently upwards - see Figure 8-223 below.
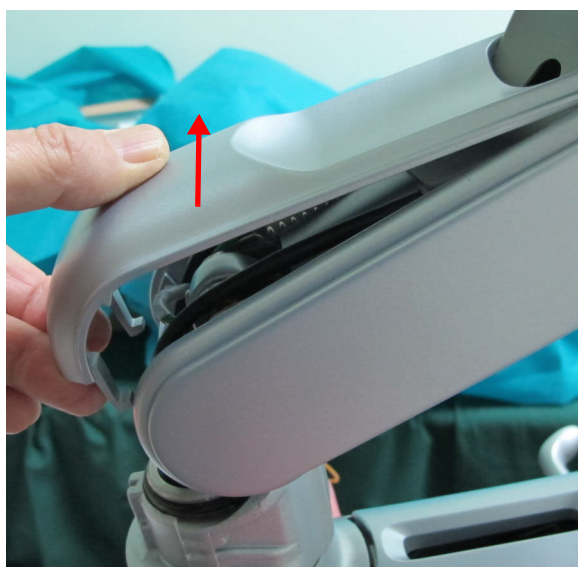
Figure 8-223   Removing Upper Horizontal Articulated Arm Service Cover

5.) Remove the silicone type protective pad by unscrewing the securing screw as shown in Figure 8-224 below.

Figure 8-224   Removing the Protective Pad

6.) Unclip the **lower horizontal Articulated Arm cover** - see Figure 8-225 below.

Figure 8-225   Removing Lower Horizontal Articulated Arm Cover

7.) Remove the following cover*: Monitor Arm Base*

- 19" Monitor Arm Base Cover Removal Procedure on page 8 - 52

This completes the cover removal procedures.

8-6-7-4-3   Monitor Removal Procedure

Refer to the following instructions:

- 19" Monitor Removal Procedure on page 8 - 40

8-6-7-4-4   Releasing the Cables

NOTE: *At this stage, the BIF cable lead (two connectors) and the OPIO cable lead will have been disconnected from the monitor as part of the* 19" Monitor Removal Procedure.

1) Unscrew the two cable holders as shown in Figure 8-226 below.
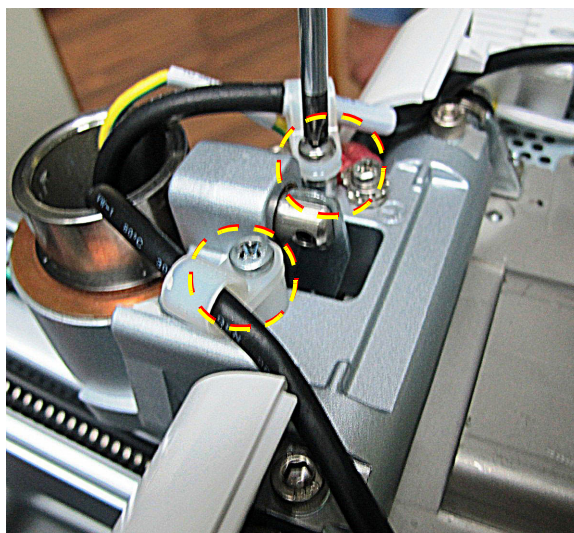
Figure 8-226   Cable Holders Located on Articulated Arm

2.) Release Articulated Arm lock and raise the monitor arm - see left picture Figure 8-227 below.

Figure 8-227   Cutting Tie-wraps on the Articulated Arm

3) Using side cutters, cut four tie-wraps located on upper articulated arm- see Figure 8-101, right.

4.) Cut four tie-wraps on lower articulated arm - see Figure 8-228 below.

Figure 8-228　Four Tie-wraps on Lower Articulated Arm

5.) Thread the blue "double cable lead" to the BIF through the upper articulated arm joint as shown in Figure 8-229 below.
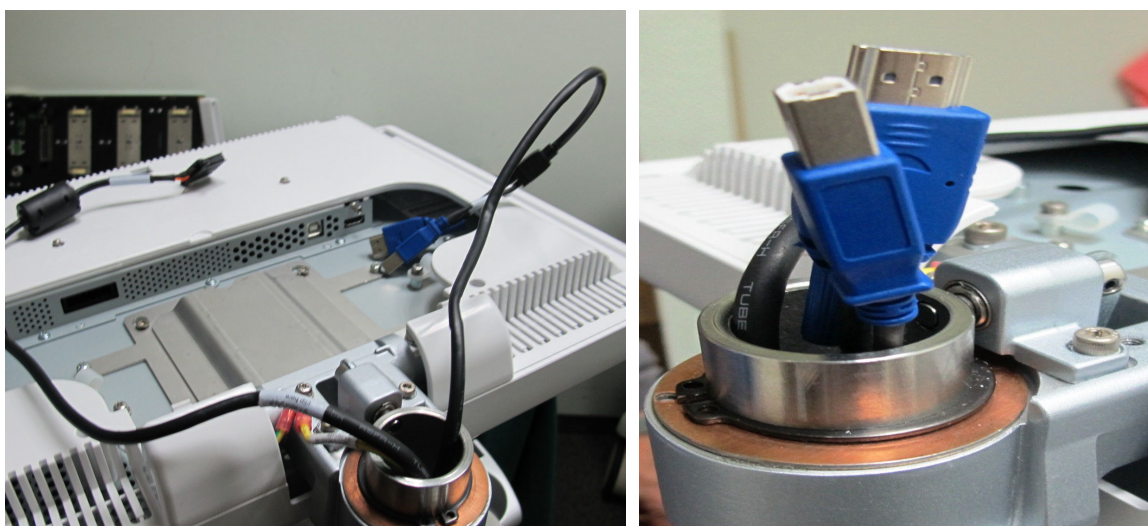
Figure 8-229　Monitor Cables Threaded Through Arm Aperture

6.) Squeeze the connector clips, then feed the display monitor cable to the OPIO through the upper articulated arm joint as shown in Figure 8-230.
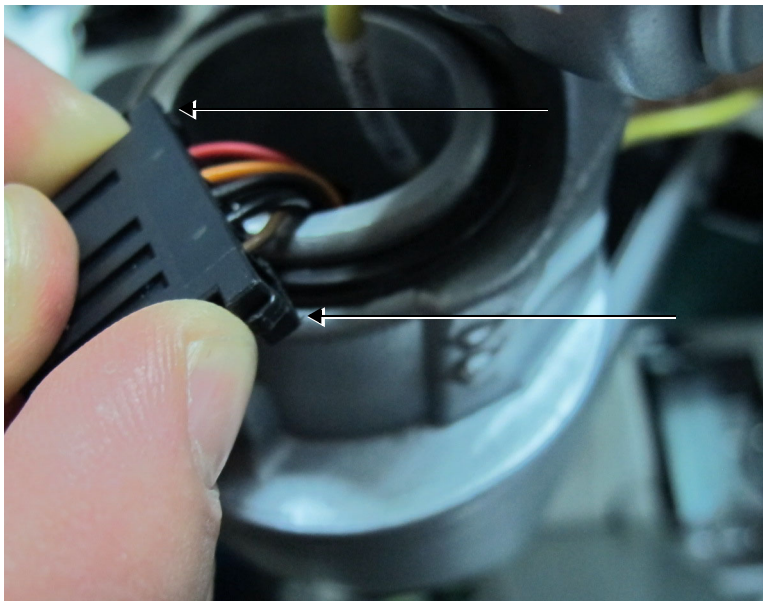
Figure 8-230   Squeeze the Connector Clips and Feed Cable Downwards

7.) Release the video signal cable from the lower articulated arm segment.

8-6-7-4-5   Removing the Articulated Arm for 19" Monitor

NOTE: *Figure 8-231 below shows the general context of the Monitor Arm and work area.*

LCD Monitor

Articulated Arm - upper section

Articulated Arm - locking lever

Articulated Arm - lower section
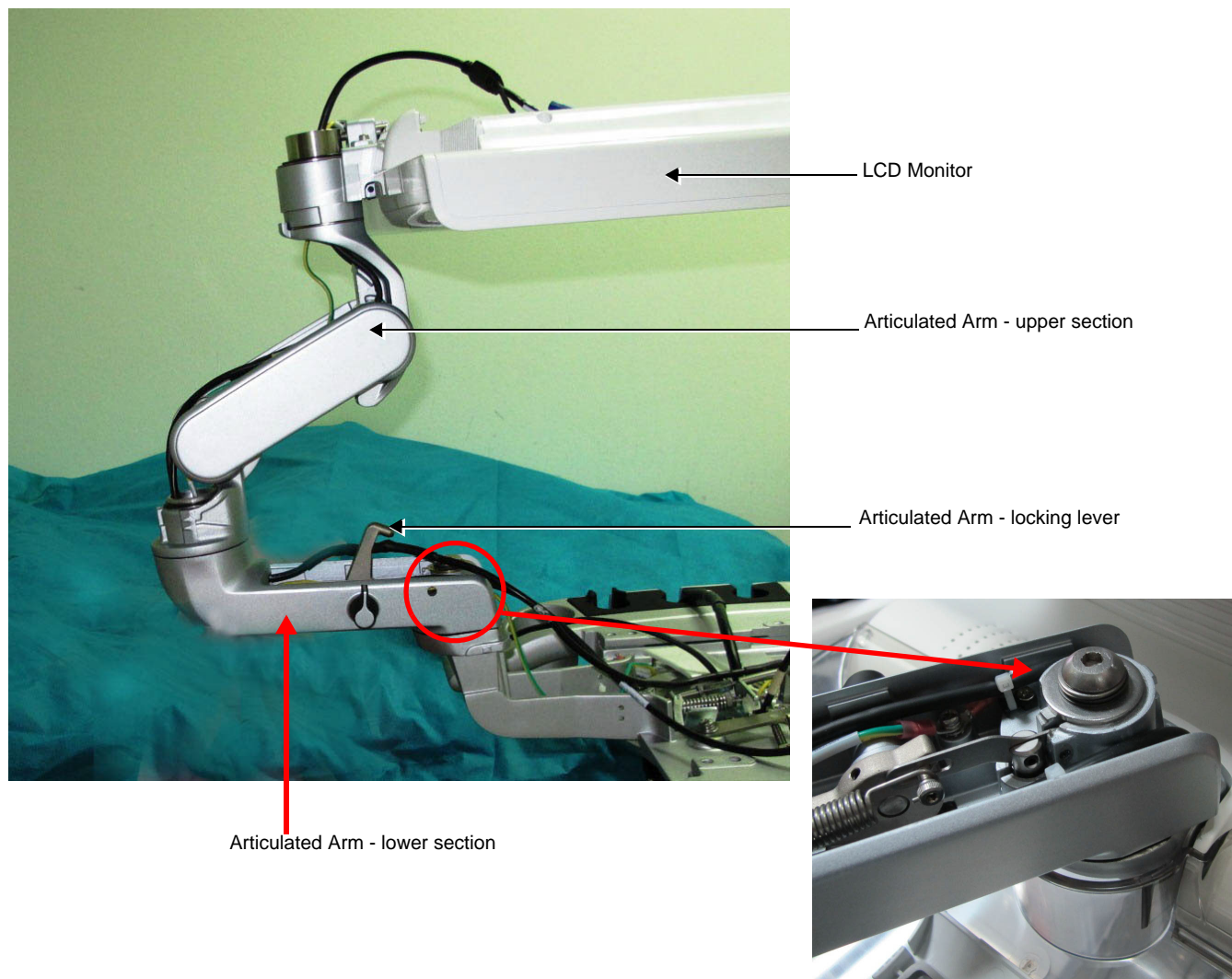
Figure 8-231   Monitor Arm Work Area

1) Using the appropriate Allen key unscrew and remove the articulated arm securing bolt shown in Figure 8-232.

.
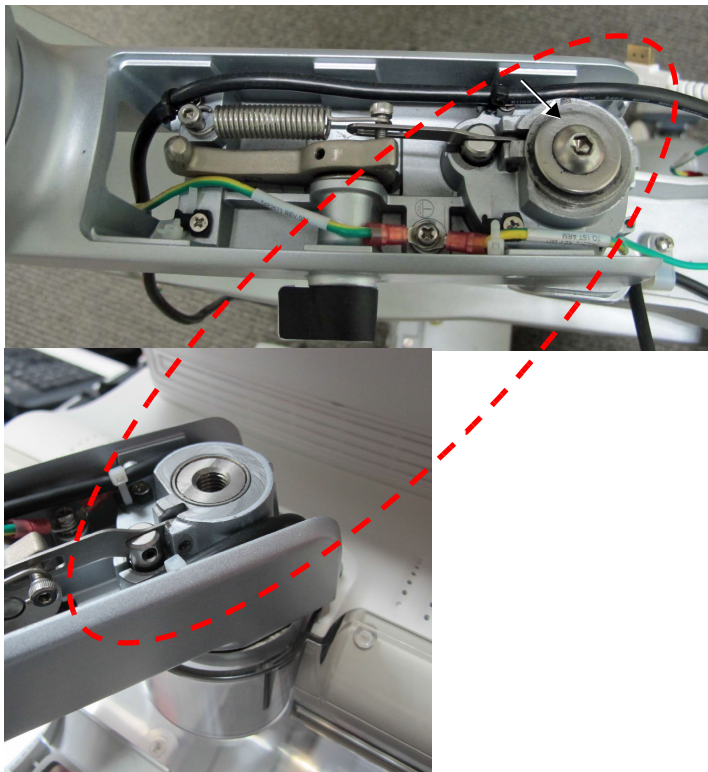
Figure 8-232   Monitor Articulated Arm Securing Bolt (showing washers at right)

2.) To remove the Articulated arm, hold the lower arm section and gently ease the Articulated Arm upwards to remove it from the system - Figure 8-233.
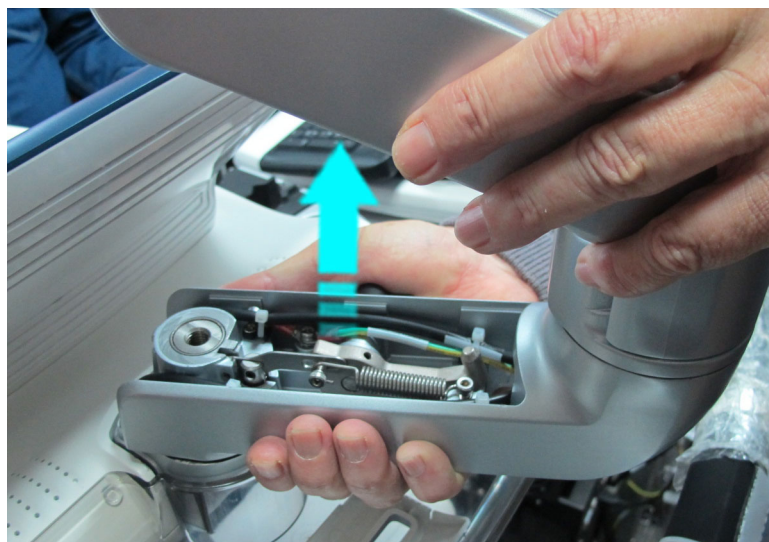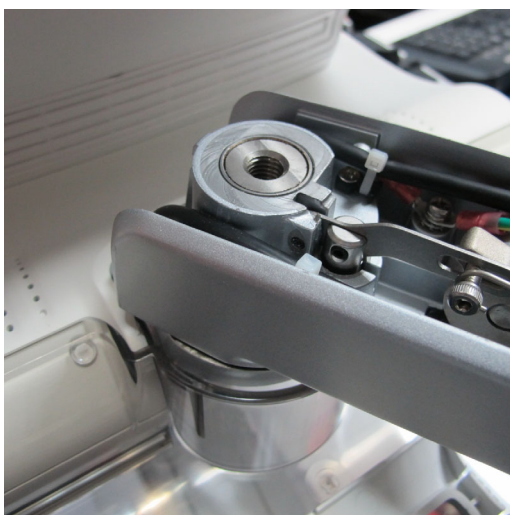
Figure 8-233   Removing the Monitor Articulated Arm

8-6-7-5   Articulated Arm for 19" Monitor Installation Procedure

Note: The new Monitor Articulated Arm for 19" Monitor is supplied with both the video signal cable and the Monitor-to-OPIO cable installed as part of the Articulate Arm assembly.
Before installing the new Articulated Arm, the video signal cable must be removed from the supplied part - since, during the installation procedure, use is made of the previously-installed video signal cable that remained on the scanner.

IMPORTANT Refer to *Keyboard and Monitor Cable Installation Procedure* section, page 8-92 before starting this procedure.

1.) Remove the video signal cable from the new Articulated Arm- see Note above.

2.) Place the new Articulated Arm in position at the correct location on the system - see Figure 8-233 and secure the Articulated Arm with the securing bolt (previously removed).

3.) Route the OPIO cable as described in *Installing the Cables* section, page 8-93.

4.) Route the existing video signal cable to the upper Articulated Arm aperture and then along the Articulated Arm toward the OPIO platform as described in the *Keyboard and Monitor Cable Installation Procedure* section, page 8-92.

5.) Secure the cables to the chassis as described in the *Securing the Cable to the Chassis* section, page 8-96.

6) Refit the Monitor Arm Base Cover:

- 19" Monitor Arm Base Cover Installation Procedure on page 8 - 53

7.) Return the Articulated Arm covers to their appropriate positions on the Articulated Arm.
Follow the steps described in Covers Removal Procedure on page 8 - 178, in reverse order.

8.) Install the Monitor:

- 19" Monitor Installation Procedure on page 8 - 43

9) Refit the following Monitor covers: *rear, service*

- 19" Monitor Rear Cover Installation Procedure on page 8 - 39
- 19" Monitor Service Cover Installation Procedure on page 8 - 35

10.) Turn ON power to the system.

11.) For the next stage of the Monitor Articulated Arm installation procedure, proceed to the instructions for Image Quality Calibration, as described in *Chapter 6 -Service Adjustments*.

8-6-8   Swivel and Up-Down Handle Replacement Procedure

8-6-8-1   Tools
Flat and Phillips screwdrivers as needed.

8-6-8-2   Time Required
60 min

8-6-8-3   Preparation
FRU Part #   *Refer to Table 9-1 on page 9-3 (Swivel Mechanism).*

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-8-4   Swivel and Up-Down Handle Removal Procedure

1) Remove the Operator Panel as described in the Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64.

2) Remove the Probe Shelf as described in the Probe Shelf Removal Procedure on page 8 - 219.

3.) Unscrew the protective metal plate (shown in Figure 8-234) and rotate it upwards 90 degrees.
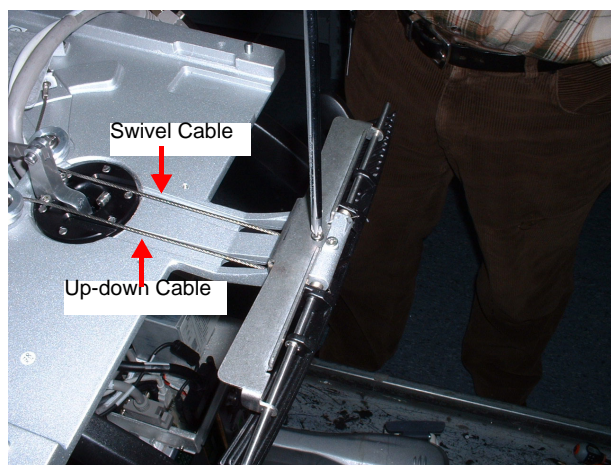
Figure 8-234   Protective Metal Plate Rotated 90 Degrees

4.) Remove the spring clips securing the particular handle to be removed - Figure 8-235.

Up-down Handle

Swivel Handle
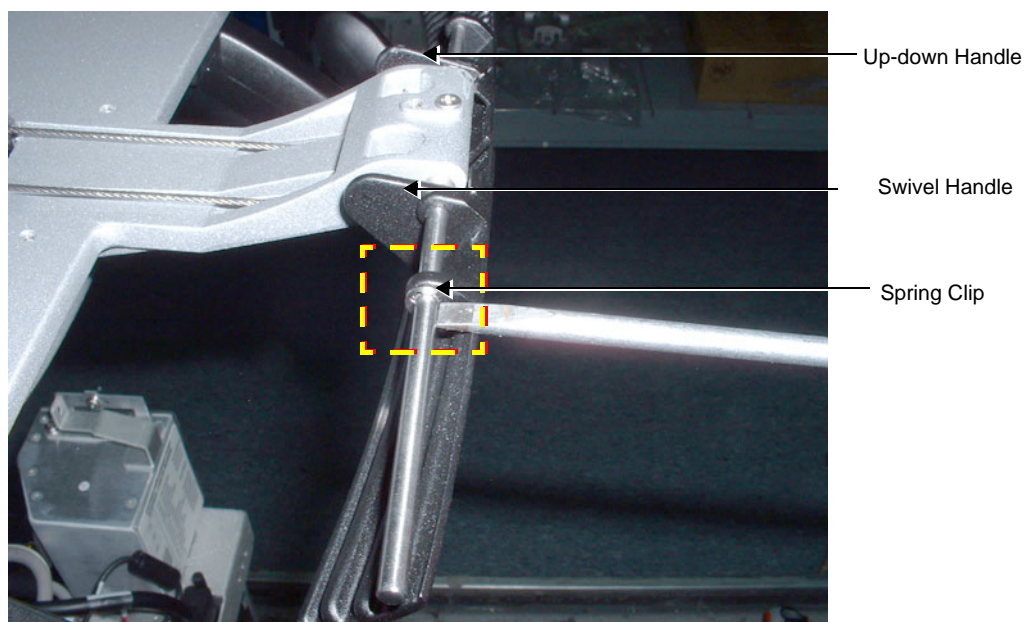
Spring Clip

Figure 8-235   Removing Spring Clip that Secures the Swivel Handle

5.) Release the small spring that presses on the handle to be replaced - Figure 8-236.

Figure 8-236   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 8-237.
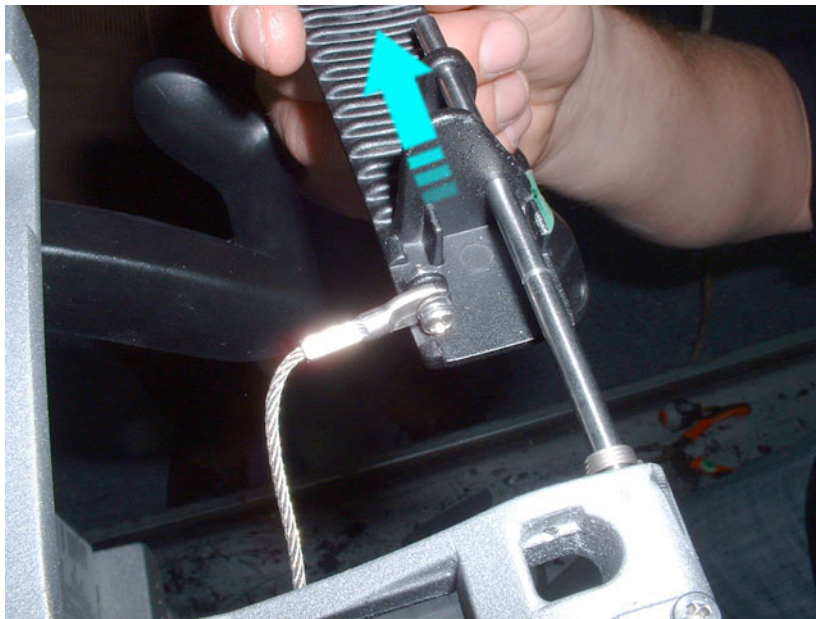
Figure 8-237　Release Cable and Slide Handle Sideways

8-6-8-5　　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 - 219.

5.) Install the Operator Panel as described in the Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67.

6) Lower the console to the *maximum down* position.

7.) Turn ON power to the system.

8-6-9   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 8-3, below.*

Table 8-3   Rear Handle Kit - PN S2424091

P/N	Description	Quantity
R2421749	Left handle	1
R2420760	Right Handle	1
RD9130410	Socket Set Screw Flat Point M4, L10, DIN 913	1
2419072	Package (White Mantle 260X236X63)	1
2418493	Good for stock Label	1

8-6-9-1   Tools

Allen Key 2mm

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-9-2   Time Required

20 min

8-6-9-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-9-4   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.

8-6-9-5   Rear Handle Installation Procedure

    1.) Identify the left and right handle before starting the procedure.
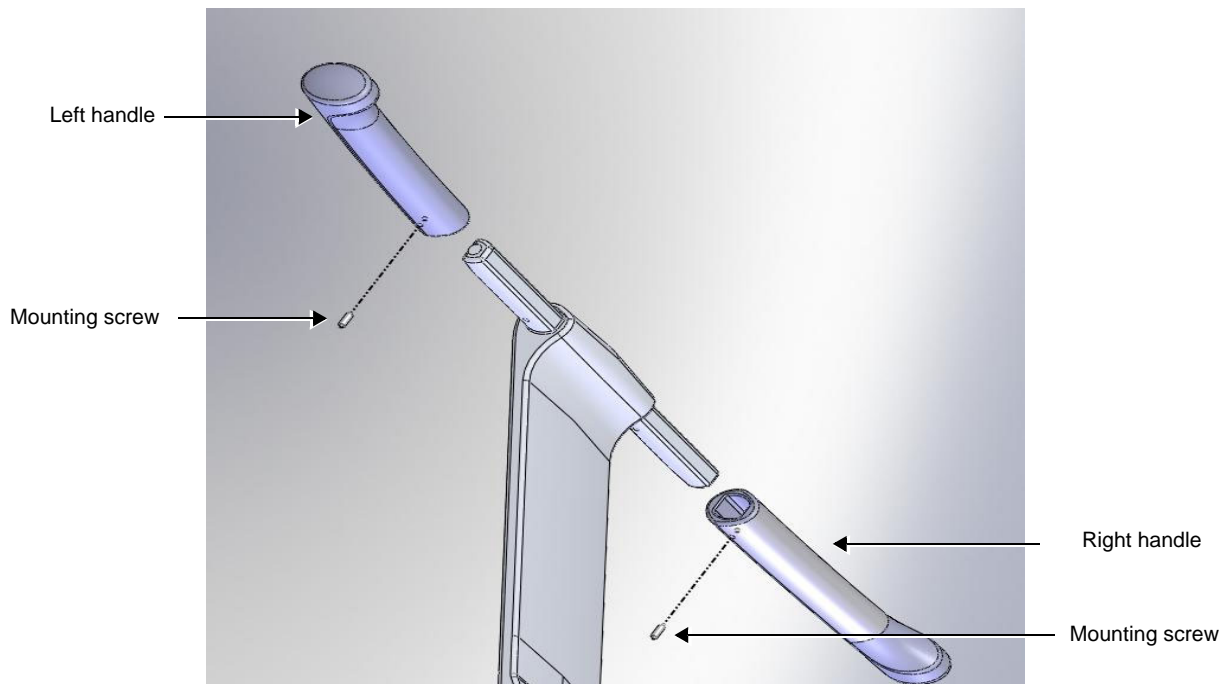
Figure 8-238   Exploded View Showing Rear Handles

    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.

8-6-10   Upper Arm Replacement Procedure

8-6-10-1   Tools

Use the appropriate flat and Phillips type screwdrivers and the appropriate Allen keys.

FRU Part #   *Refer to Table 9-1 on page 9-3.*

8-6-10-2   Time Required

90 min

8-6-10-3   Preparation

Shut down the Vivid™ S60/Vivid™ S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-10-4   Upper Arm Removal Procedure

1)   If the rear tray is attached to the system, remove it before starting the procedure.

2)   Remove the Monitor as described in the 19" Monitor Removal Procedure on page 8 - 40.

3)   Remove the Keyboard Interface Assembly as described in the Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64.

4.)   Remove the Lower Arm Assembly.

5.)   Remove the Joint Assembly.

6.)   Remove the Gas SpringRemove the cables from the Upper Arm.

7.)   Release the locking screw securing the Upper Arm support pin as shown in Figure 8-239.
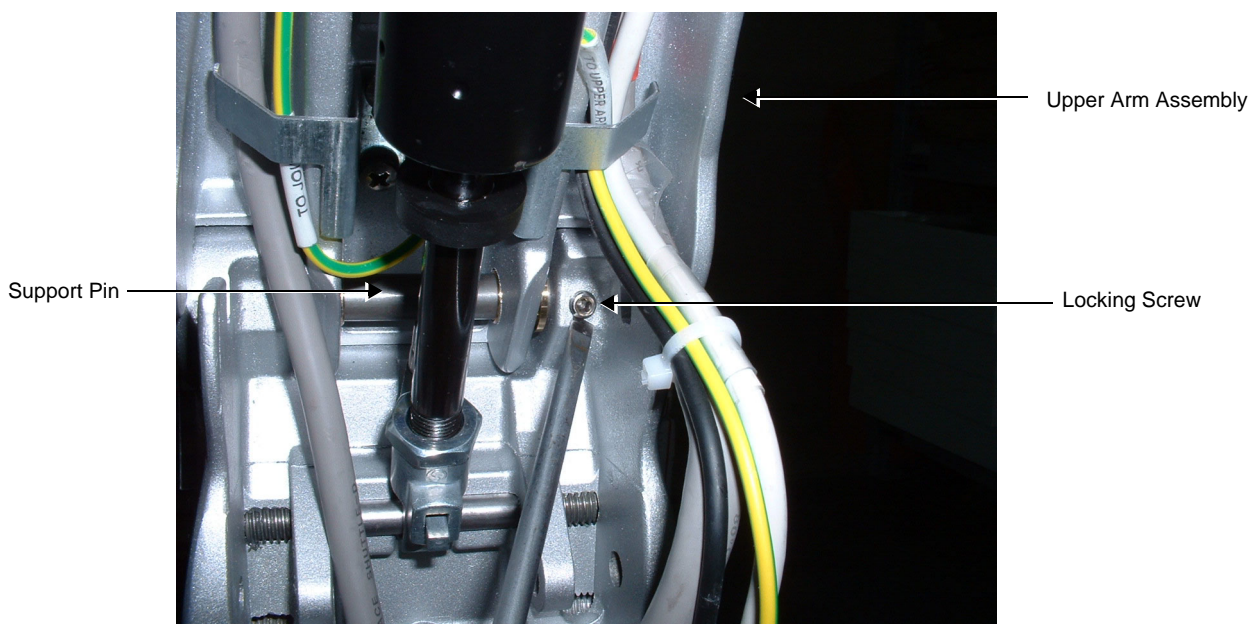
Figure 8-239   Locking Screw Securing Support Pin on Lower Section of Upper Arm

8.) Using a screwdriver, tap out the support pin -

Figure 8-240   Tapping Out the Upper Arm Support Pin

9.) Remove the Upper Arm.

8-6-10-5   Upper Arm Installation Procedure

NOTE: Before installing the Upper Arm, care must be taken when restoring the cables to the Upper Arm assembly. The cables must protrude on either side of the Upper Arm in a specified manner as described below.

1.) Prepare the required cable lengths for installation in the Upper Arm, as described above.

2.) Install the cables in the Upper arm securing them with the appropriate cable holders and clips - see Figure 8-241.

Figure 8-241   Positioning of Cable in Upper Arm

3.) Position the upper Arm in its location on the central column and insert the supporting pin.

4.) Secure the supporting pin with the locking screw.

5.) Install the Gas Spring.

6.) Install the Joint Assembly.

7.) Install the Lower Arm Assembly.

8)   Install the Keyboard Interface Assembly.

9.) Install the Monitor.

10.) Install the Rear Tray, if applicable.

11) Lower the console to the *maximum down* position.

12.) Turn ON power to the system.

8-6-11   Lower Arm Replacement Procedure

8-6-11-1   Tools

Use the appropriate Phillips screwdriver, light hammer and punch.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-11-2   Time Required

60 min

8-6-11-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-11-4   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 operator panel (below the keyboard), as shown in Figure 8-242 below.
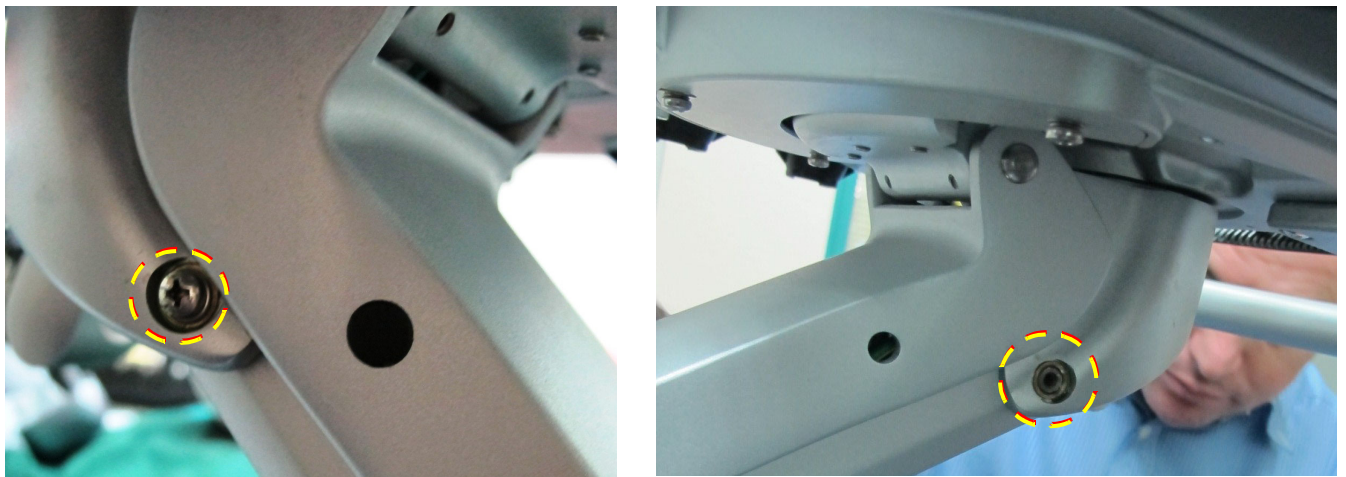
Figure 8-242   Removing Screw on Left Side of Lower Arm

4.) Using a punch and light hammer, tap out the center pin located below the base of the operator panel and remove completely releasing upper section of the lower arm - Figure 8-243.

Figure 8-243   Remove Securing Pin

5.) Lower the Lower Arm as shown in Figure 8-244 below.
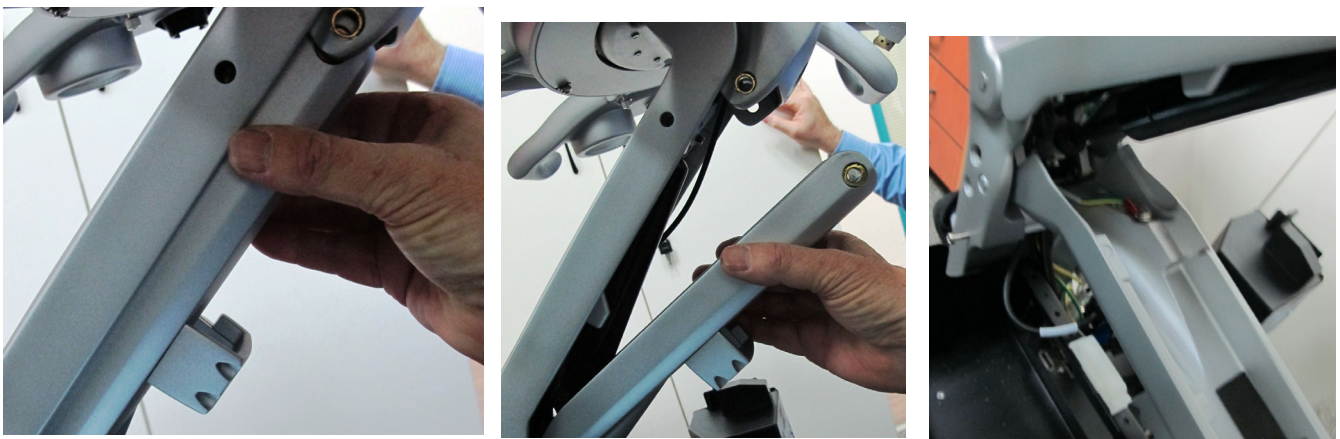
Figure 8-244   Upper Section of Lower Arm

6)   Remove the cir-clips on either side of the lower arm.

Figure 8-245   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 8-246.

Figure 8-246   Removing Securing Pin and Disconnecting Ground Lead

10) Remove the Lower Arm from the system, as shown in Figure 8-247.

Figure 8-247   Removing the Lower Arm

8-6-11-5   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 8-247 on page 8-198.

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 8-246 on page 8-198.

4) Return and fasten the Lower Arm securing pin (previously removed) on the *left* side of the Lower Arm - Figure 8-246 on page 8-198.

5) Lower the console and raise the Lower Arm to insert the upper support pin previously removed - Figure 8-248.
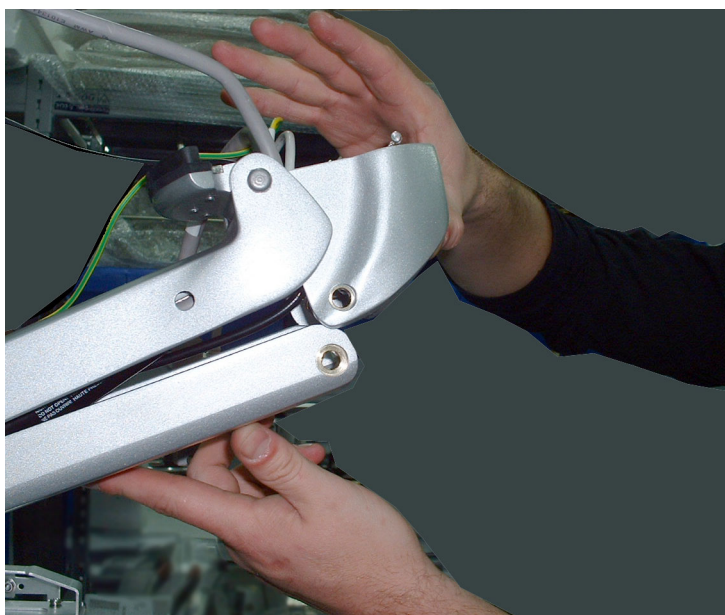
Figure 8-248   Raising Lower Arm to Reconnect with Upper Arm (Console not shown)

6.) While moving the console slightly up and down with one hand, insert the securing pin (previously removed) - refer to Figure 8-244 on page 8-196.

7.) Return and fasten the screws (previously removed from the base of the operator panel - below the keyboard, as shown in Figure 8-242 on page 8-195).

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.

8-6-12   Joint Assembly Replacement Procedure

8-6-12-1   Tools
Use the appropriate flat and Phillips type screwdrivers and the appropriate Allen keys.

FRU Part #   *Refer to Table 9-1 on page 9-3.*

8-6-12-2   Time Required
90 min

8-6-12-3   Preparation
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-12-4   Joint Assembly Removal Procedure

1)   Remove the Monitor as described in the 19" Monitor Removal Procedure on page 8 - 40.

2.)   Remove the Keyboard Assembly as described in the Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64

3)   Remove the Probe shelf as described in the Probe Shelf Removal Procedure on page 8 - 219.

4.)   Remove the Lower Arm as described in the Lower Arm Removal Procedure on page 8 - 195.

5.)   Remove the Keyboard Assembly as described in the Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64.

6.)   Dismantle the Upper Gas Spring Cable Assembly by removing the two securing screws and bracket - Figure 8-249.
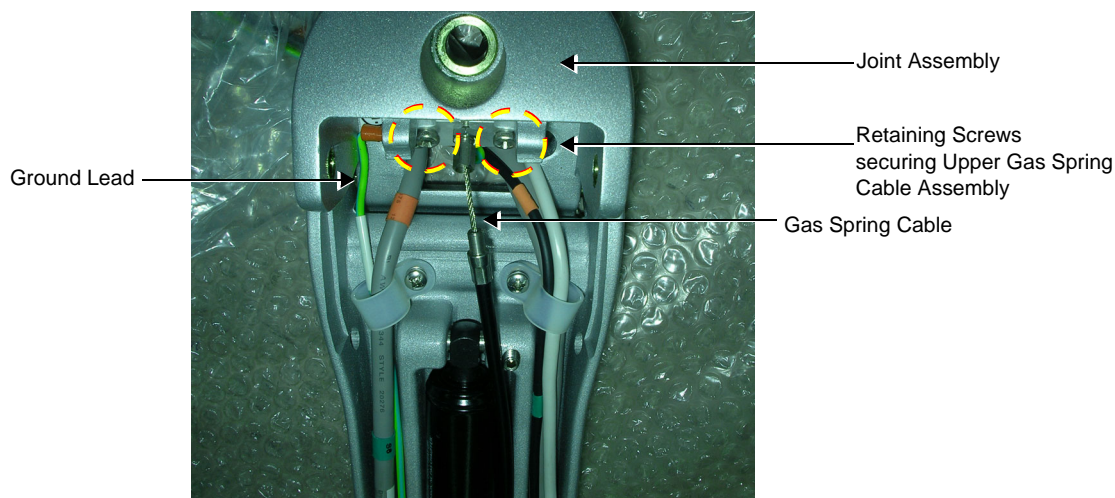
Figure 8-249   Dismantling the Upper Gas Spring Cable Assembly

7.)   Disconnect the Ground lead.

8.) Release the two locking screws that secure the two Joint Assembly supporting pins - Figure 8-250.

Two Joint Assembly Supporting Pins (one on either side)

Locking screws that secure Joint Assembly Pin
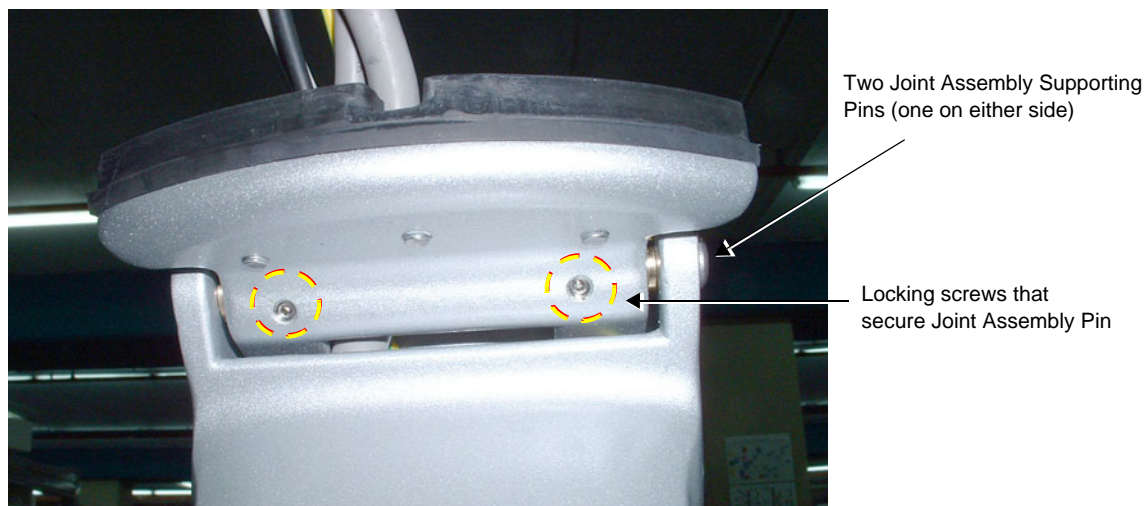
Figure 8-250   Locking Screws Securing the Joint Assembly Supporting Pins

9.) Release the ring clips securing the supporting pins - Figure 8-251.
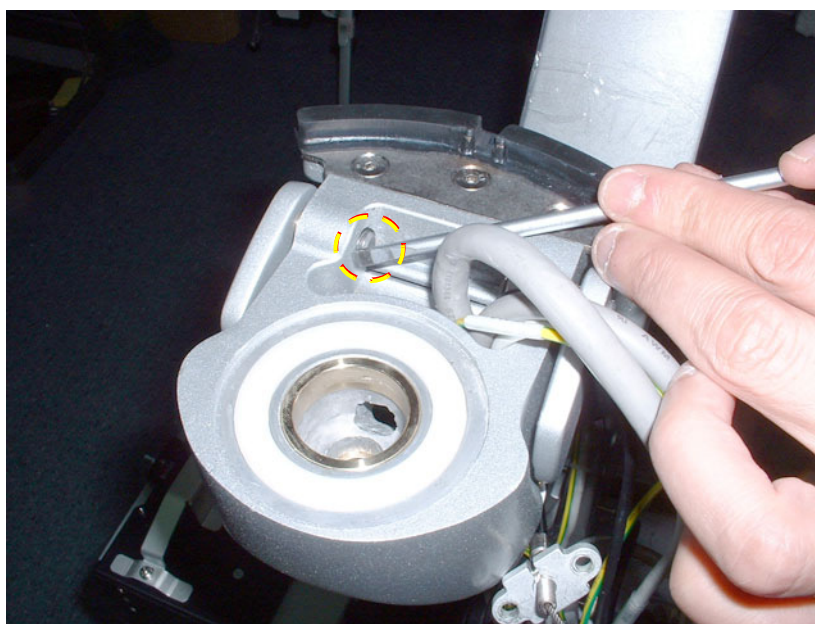
Figure 8-251   Ring Clips Securing Supporting Pins

10.) Using a screwdriver, tap out the supporting pins to release the Joint Assembly - Figure 8-252.

Tap out
Supporting
Pin

Figure 8-252   Removing the Joint Assembly

11.) Release the communication cables from the arm.

12.) Remove the cables by passing them through the Joint Assembly aperture.

13.) Remove the Joint Assembly.

8-6-12-5   Joint Assembly Installation Procedure

1.) Return the Joint Assembly to its location on the Upper Arm and insert the supporting pins.

2.) Secure the support pins by tightening the two locking screws - Figure 8-256.

3.) Return the ring clips to their positions on the supporting pins.

4.) Return the communication cables by passing them through the Joint Assembly aperture.

5.) Return the gas spring cable to its position (see Figure 8-249) with its bracket - the slot in the bracket must face upwards - Figure 8-253.

Slot in Bracket Facing Upwards
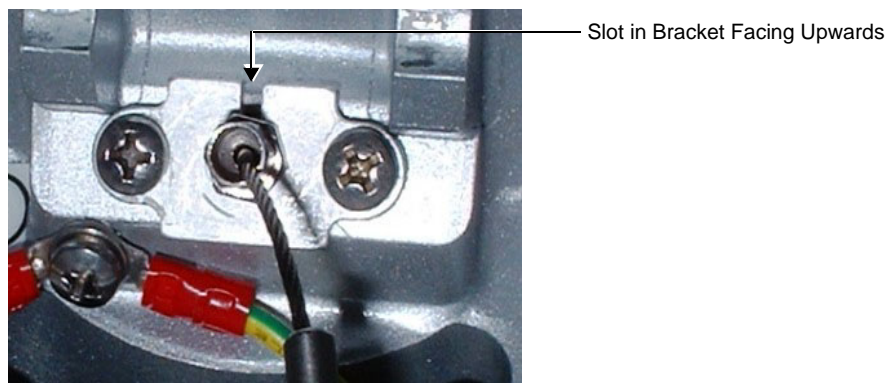
Figure 8-253   Gas Spring Cable Bracket showing Cable Slot

6.) Reconnect the Ground lead.

7.) Return the Keyboard Assembly to its position as described in the Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67.

8.) Install the Lower Arm as described in the Lower Arm Installation Procedure on page 8 - 199.

9.) Install the Probe Shelf as described in the Probe Shelf Installation Procedure on page 8 - 219

10.) Install the Keyboard Assembly as described in the Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67.

11.) Return the Monitor to its position as described in the 19" Monitor Installation Procedure on page 8 - 43.

12) Lower the console to the *maximum down* position.

13.) Turn ON power to the system.

8-6-13   Gas Spring Replacement Procedure

8-6-13-1   Tools

Use the appropriate Phillips screwdriver, light hammer, punch, and 5 mm Allen key.

FRU Part #   *Refer to Table 9-1 on page 9-3.*

8-6-13-2   Time Required

120 min

8-6-13-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-13-4   Gas Spring Removal Procedure

1)   Perform the following removal procedures:

- 19" Monitor Removal Procedure on page 8 - 40 or 21.5" Monitor Replacement Procedure on page 8 - 31
- Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64
- OPIO Basket Removal Procedure on page 8 - 26 (if attached to the system)
- Lower Arm Removal Procedure on page 8 - 195

2)   Unscrew the shaft covering screws located on either side of the main column - see Figure 8-254. .

Figure 8-254   Shaft Covering Screws

3.) Using the 5 mm Allen key, unscrew each locking screw on either side of the support arm - Figure 8-255.

Figure 8-255   Releasing the Securing Screws on Either Side of the Support Arm

4.) Tap out the internal supporting pin using a punch - Figure 8-256.
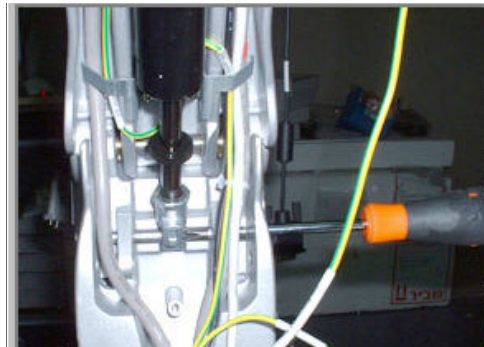
Figure 8-256   Tapping out the Lower Support Pin using a Punch

5.) Similarly, tap out the upper gas spring securing pin and use a screwdriver to support the joint - Figure 8-257.
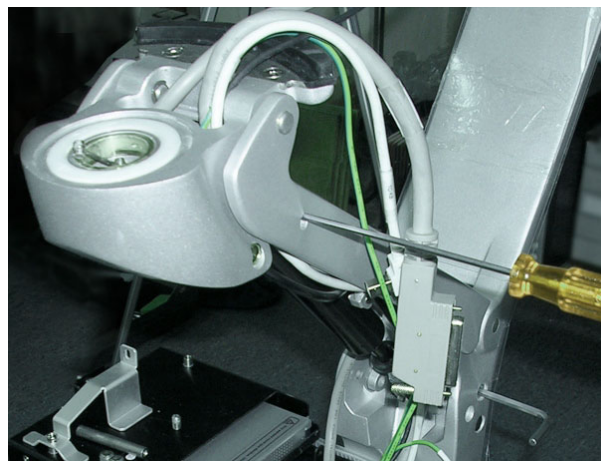

Figure 8-257   Supporting the Upper Gas Spring Bracket with a Screwdriver

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.

8-6-13-5   Gas Spring Installation Procedure

NOTE: *The gas spring is supplied **without** the top connecting bracket - see Figure 8-258.*
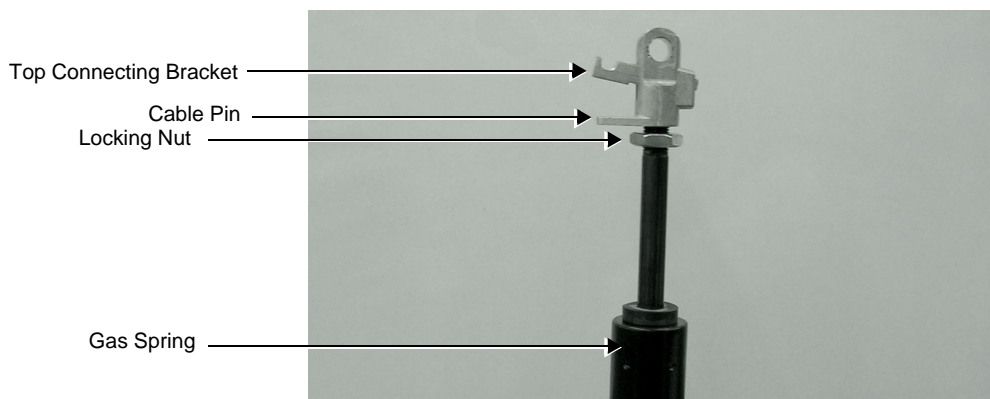
Figure 8-258   Gas Spring with Top Connecting Bracket

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 8-259.
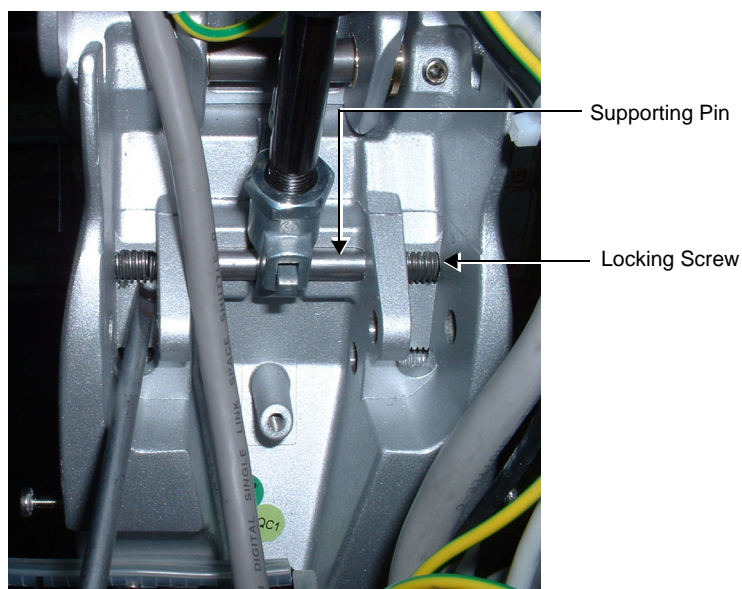
Figure 8-259   Lower Section of Gas Spring showing Connecting Pin and Locking Screws

6.) Insert the supporting pin, threading it through the brackets and the lower gas spring holder, as shown in Figure 8-259.

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:

- LCD Arm Alton 21.5in Wide Monitor Installation Procedure on page 8 - 174
- Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67
- OPIO Basket Installation Procedure on page 8 - 26 (if applicable)
- 19" Monitor Installation Procedure on page 8 - 43 or Install the 21.5" Monitor on page 8 - 33

10.) Turn ON power to the system.

8-6-14　　Articulated Arm Release Module Replacement Procedure

NOTE:　　　*The procedure describes the Articulated Arm Release Lever replacement procedure.*

8-6-14-1　Tools

Appropriate Phillips screwdriver and a 2mm Allen key.

FRU Part #　*Refer to Table 9-1 on page 9-3*

8-6-14-2　Time Required

30 mins

8-6-14-3　Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-14-4　Articulated Arm Release Module Removal Procedure

NOTE:　　　*The Articulated Arm Release Lever is located on the Lower Articulated Arm- see Figure 8-260.*
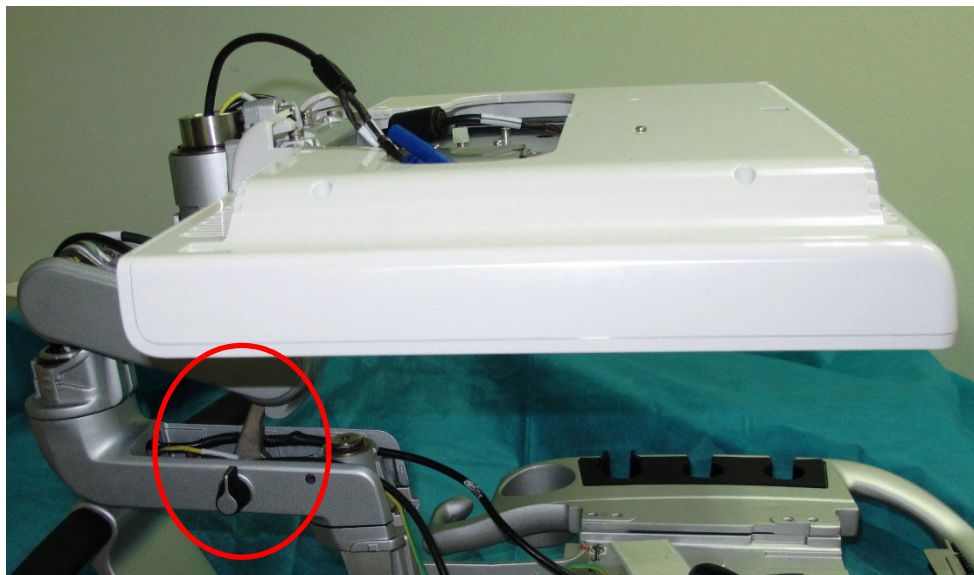
Figure 8-260　Articulated Arm Release Lever (shown with the Arm Cover Removed)

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 8-261.
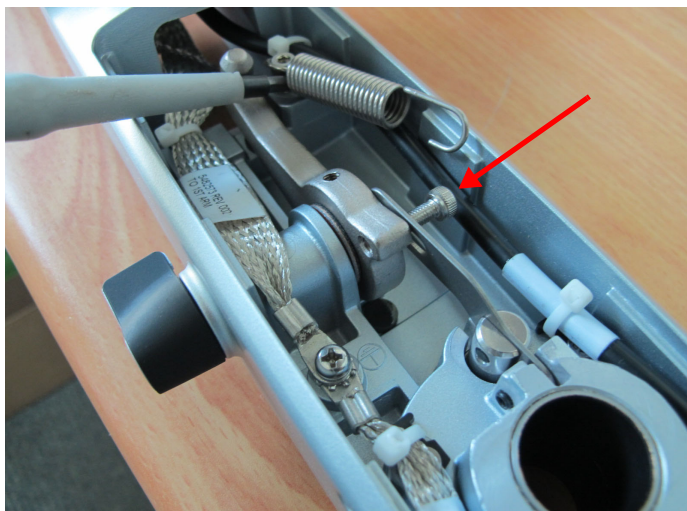
Figure 8-261   Spring Released

4.) Release the metal slide by removing the securing screw - see Figure 8-261.

5.) Using the appropriate Allen key loosen, but do not remove, two release lever locking screws as shown in Figure 8-262.
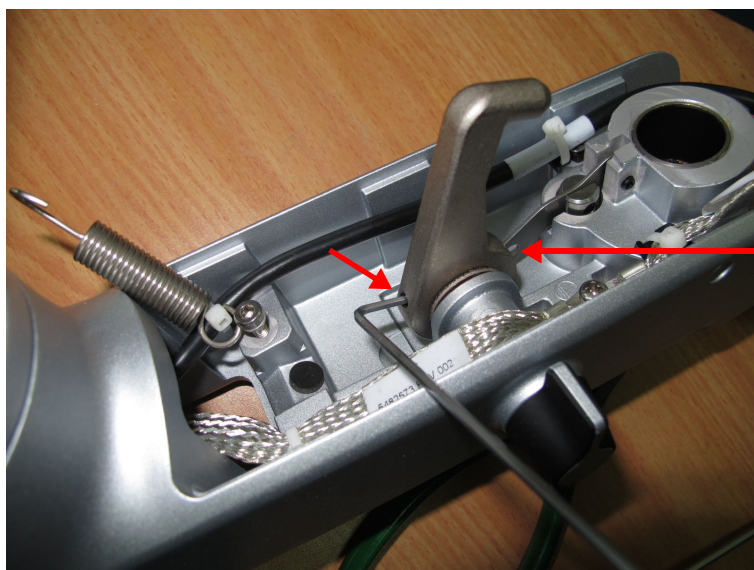
Locking screw not visible in the picture

Figure 8-262   Articulated Arm Locking Lever

6.) Carefully remove the locking lever from the locking knob and remove the washer - see Figure 8-263.
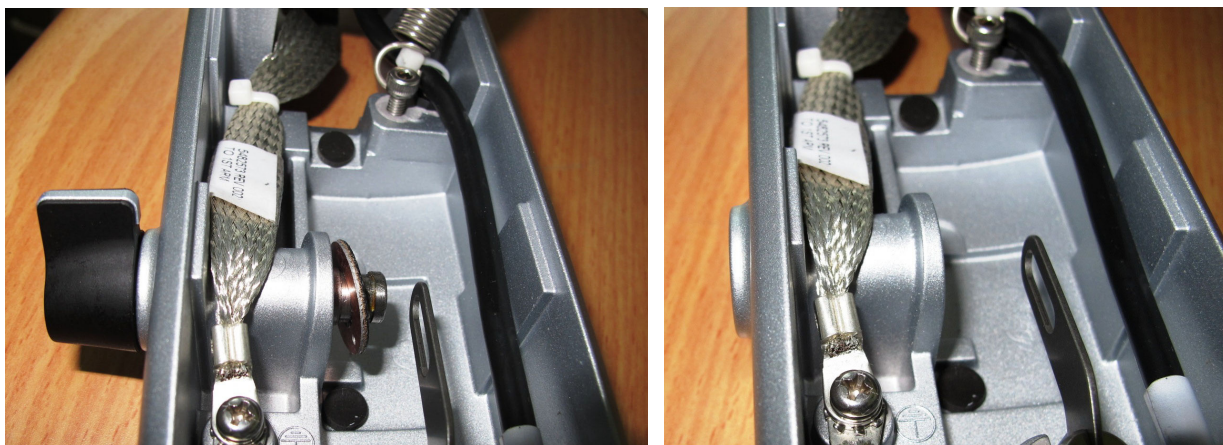
Figure 8-263   Removing the Locking Lever from the Locking Knob

8-6-14-5   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.

8-6-15   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 8-264 and Figure 8-265.
Refer also to the procedure that describes Removing the Articulated Arm for 19" Monitor on page 8 - 184.

The First Axis pin (not visible in the picture) is the connecting joint between the Articulated Arm and the Alton platform
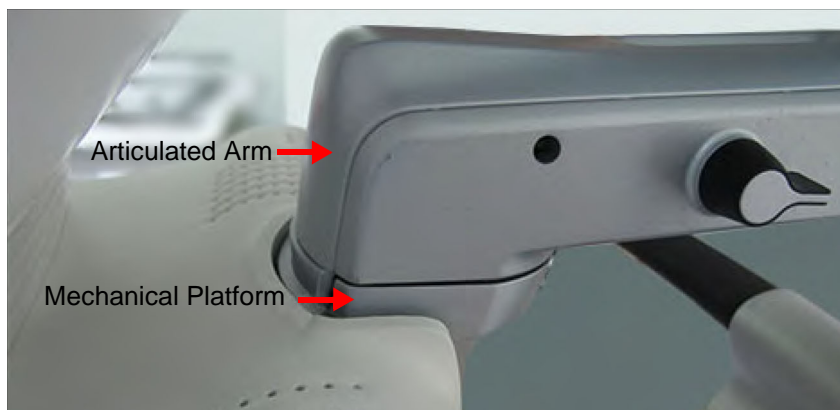
1. First Axis Ring screw
2. First Axis Ring
3. First Axis Pin screw
4. First Axis Pin
5. Mechanical Platform
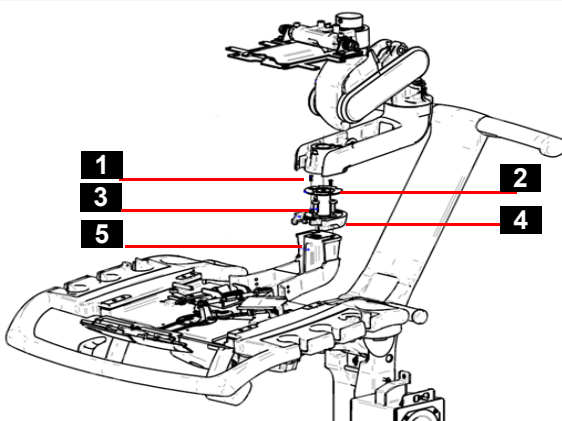
Figure 8-264   Articulated Arm Attached to the Mechanical Platform
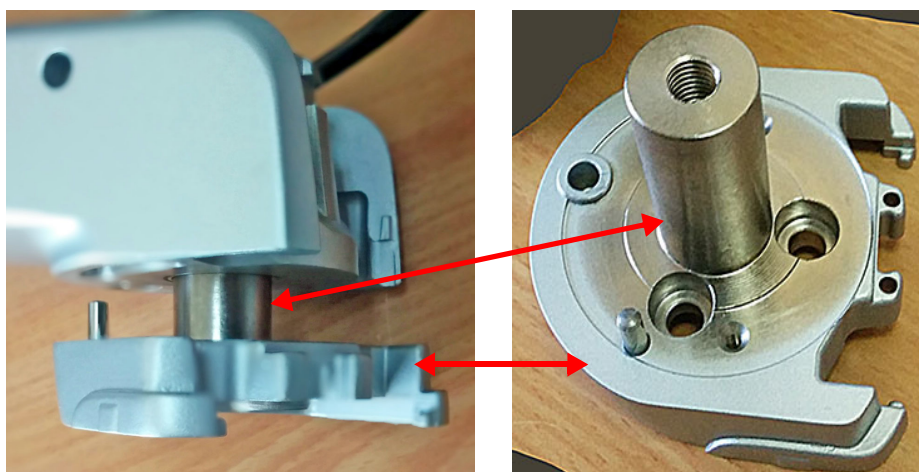
The First Axis Pin shown upright above fits into the Articulated Arm shown on the left

Figure 8-265   First Axis Pin inserted in the Articulated Arm on Left

8-6-15-1   Tools

Appropriate Phillips screwdriver and a 4mm Allen key.

8-6-15-2   Time Required

60 mins

8-6-15-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-15-4   First Axis with Pin Removal Procedure

1) Remove the Monitor Articulated Arm.

2) Remove the First Axis Ring (see also Figure 8-264, above) by releasing the three securing screws (the picture on the left shows the First Axis Ring with the screws already removed - Figure 8-266.

First Axis Ring (black)
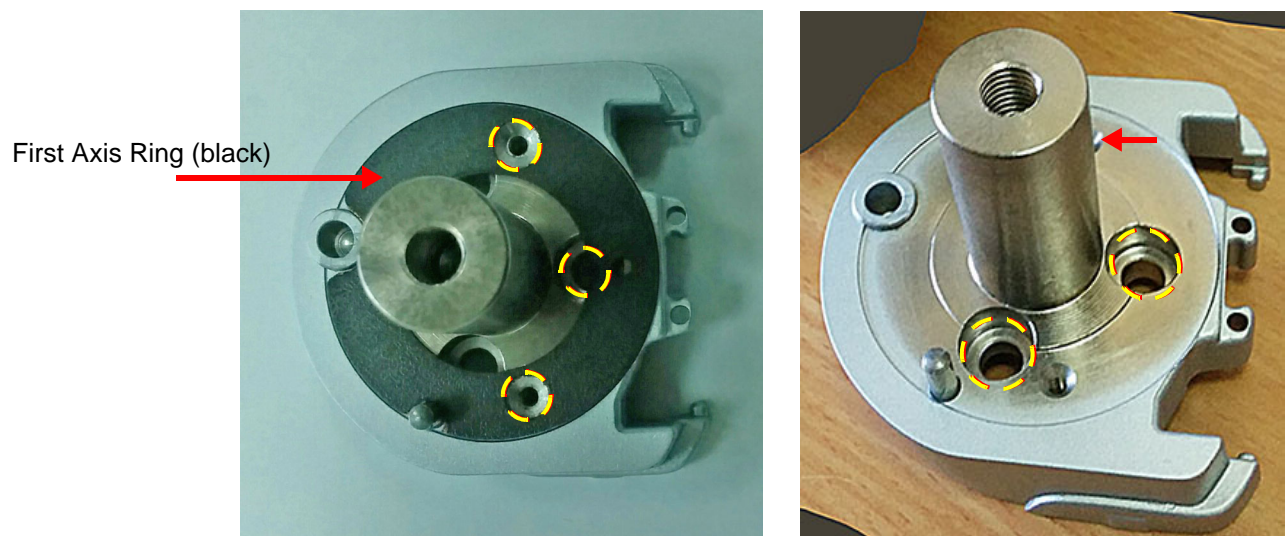
Figure 8-266   First Axis Ring and Securing Screws

3.) To remove the First Axis Pin, unscrew the three securing screws (refer to Figure 8-266). See also Figure 8-264 on page 8-212.

4.) Remove the First Axis Pin from the Mechanical Platform.

8-6-15-5   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.

8-6-16   19" Monitor Interface Kit Replacement Procedure

NOTE: *The procedure describes the replacement procedure for the Monitor Interface Bracket.*

The Monitor Interface bracket is attached to the Articulated Arm - the context is shown in Figure 8-267.

Monitor Interface Bracket

Articulated Arm

Monitor Interface Bracket
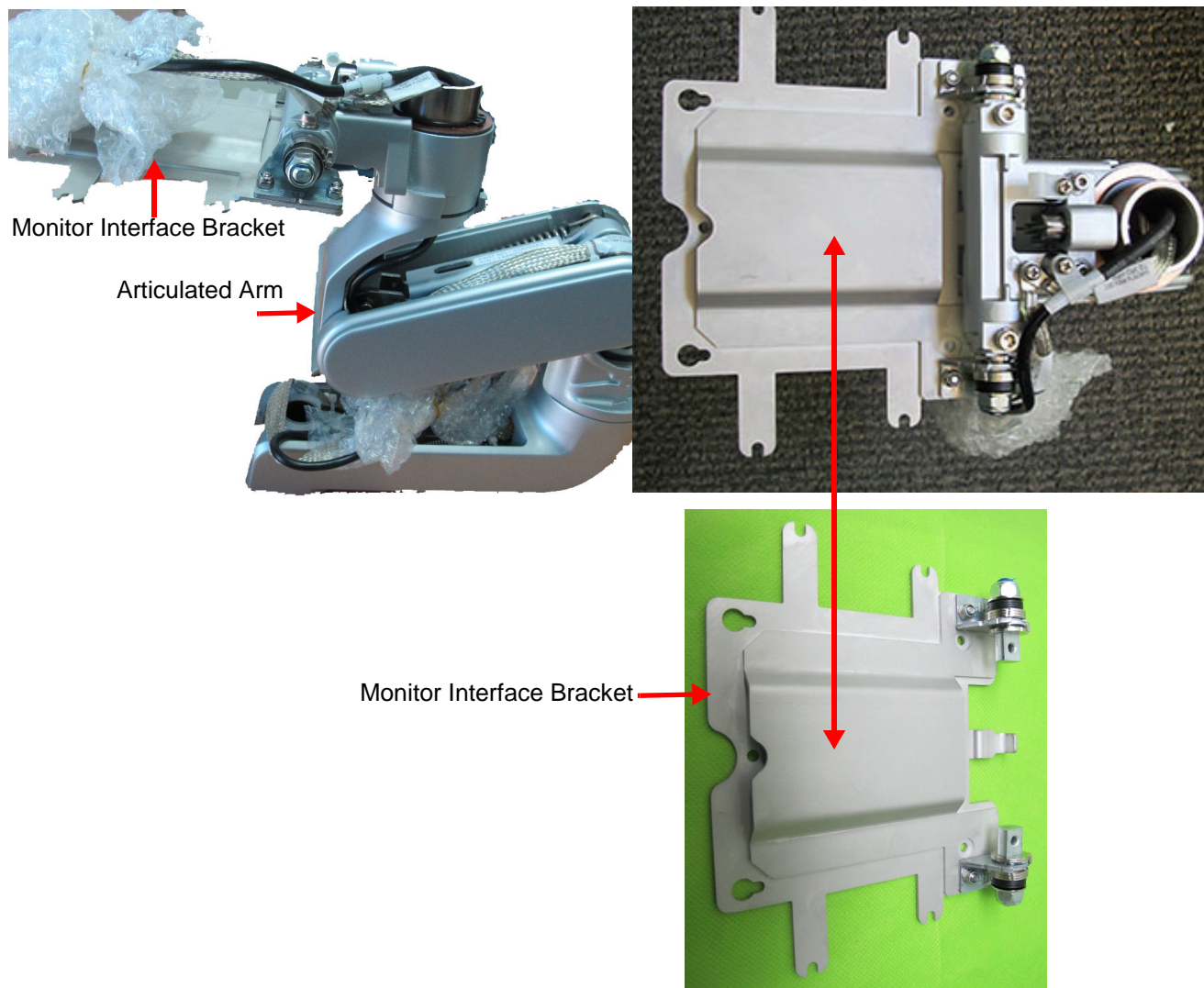
Figure 8-267   Monitor Interface Kit

8-6-16-1   Tools
Appropriate Phillips screwdriver and a 4mm Allen key.

8-6-16-2   Time Required
45 mins

8-6-16-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-16-4   Monitor Interface Kit Removal Procedure

1)   Remove the LCD Monitor.

NOTE: Refer to illustration on left in Figure 8-268.

2)   While supporting the Monitor Interface bracket with one hand, release and remove the retaining
screws (encircled in Figure 8-268).
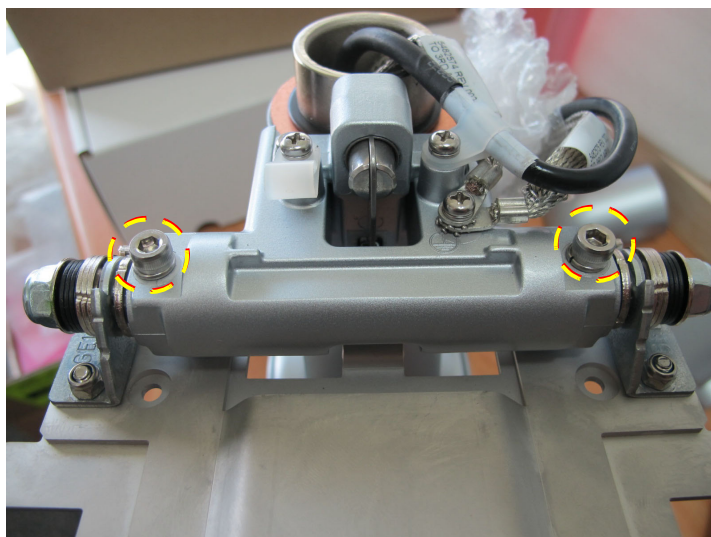
Figure 8-268   Monitor Interface Secured to Articulated Arm

3.) Push the Monitor Interface bracket *down* and out to remove it from its position on the Articulated Arm.

8-6-16-5   Monitor Interface Kit Installation Procedure

1.) Attach the replacement Monitor Interface bracket (see lower illustration in Figure 8-267 on page 8-215)
to the Articulated Arm and secure it with the screws previously removed.

2.) Install the LCD Monitor:

3.) Turn ON power to the system.

8-6-17   Peripherals Console Replacement Procedure

8-6-17-1   Tools

Use the appropriate screwdrivers.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-17-2   Time Required

30 minutes

8-6-17-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-17-4   Peripherals Console Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *front, right* rear, *left* rear:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- Front Cover Removal Procedure on page 8 - 16
- Right Rear Cover Removal Procedure on page 8 - 20
- Left Rear Cover Removal Procedure on page 8 - 23

2.)   Remove the *DVD/CD-RW drive* and the *B&W Printer*:

- DVD/CD-RW Drive Removal Procedure on page 8 - 237
- Black and White Printer Removal Procedure on page 8 - 239

3)   Loosen the 4 retaining screws that secure the peripherals console in position, as shown in Figure 8-269.
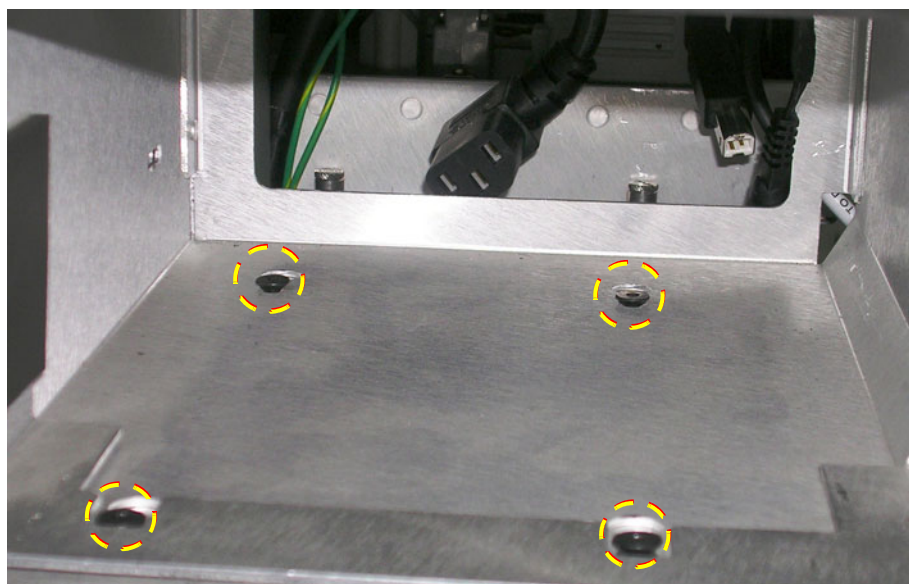
Figure 8-269   Location of Peripherals Console Retaining Screws

4.   Gently slide the peripherals console forward, lift it slightly and then remove it.

8-6-17-5   Peripherals Console Installation Procedure

1. Place the new peripherals console in its position on the system and secure with securing screws previously released - Figure 8-269.

2) Re-install the B&W printer and the DVD/CD-RW drive:

- Black and White Printer Installation Procedure on page 8 - 240
- DVD/CD-RW Installation Procedure on page 8 - 238

3) Refit the covers, previously removed:

- Left Rear Cover Installation Procedure on page 8 - 25
- Right Rear Cover Installation Procedure on page 8 - 22
- Front Cover Installation Procedure on page 8 - 19
- Right Side Cover Installation Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

4.) Turn ON power to the system.

8-6-18   Probe Shelf Replacement Procedure

8-6-18-1   Tools

Use the appropriate screwdriver as indicated in the Probe Shelf Replacement procedure.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-18-2   Time Required

45 min

8-6-18-3   Preparation

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-18-4   Probe Shelf Removal Procedure

1) Remove the Keyboard Assembly as described in the Operator Panel Keyboard Assembly Removal Procedure on page 8 - 64.

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 8-270.

Retaining Screw   Retaining Screw

Figure 8-270   Probe Shelf - Viewed from Below indicating Retaining Screws

3.) Remove the Probe Shelf.

8-6-18-5   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 Operator Panel Keyboard Assembly Installation Procedure on page 8 - 67.

3) Lower the console to the *maximum down* position.

4.) Turn ON power to the system.

8-6-19   Probe Cable Holder Replacement Procedure

8-6-19-1   Tools

Use the appropriate Allen key as indicated in the Probe Cable Holder replacement procedure.

FRU Part # *Refer to Table 9-1 on page 9-3.*

8-6-19-2   Time Required

30 min

8-6-19-3   Preparations

Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-6-19-4   Probe Cable Holder Removal Procedure

1) Raise the console to the *maximum up* position.

2) Working from the front of the system, use an Allen key to unscrew and remove the two screws that fasten the Cable Holder bracket to the Support Arm, as shown in Figure 8-271.

Figure 8-271   Removing the Cable Holder Bracket from the Support Arm

3.) Remove the Cable Holder Bracket.

8-6-19-5   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 Allen key to fasten the screws to secure the Cable Holder firmly in place - refer to Figure 8-271.

3) Proceed to route the probe cables into the correct position, as described in section 8-6-19-5-1 on page 8-221.

8-6-19-5-1   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 8-272. 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.
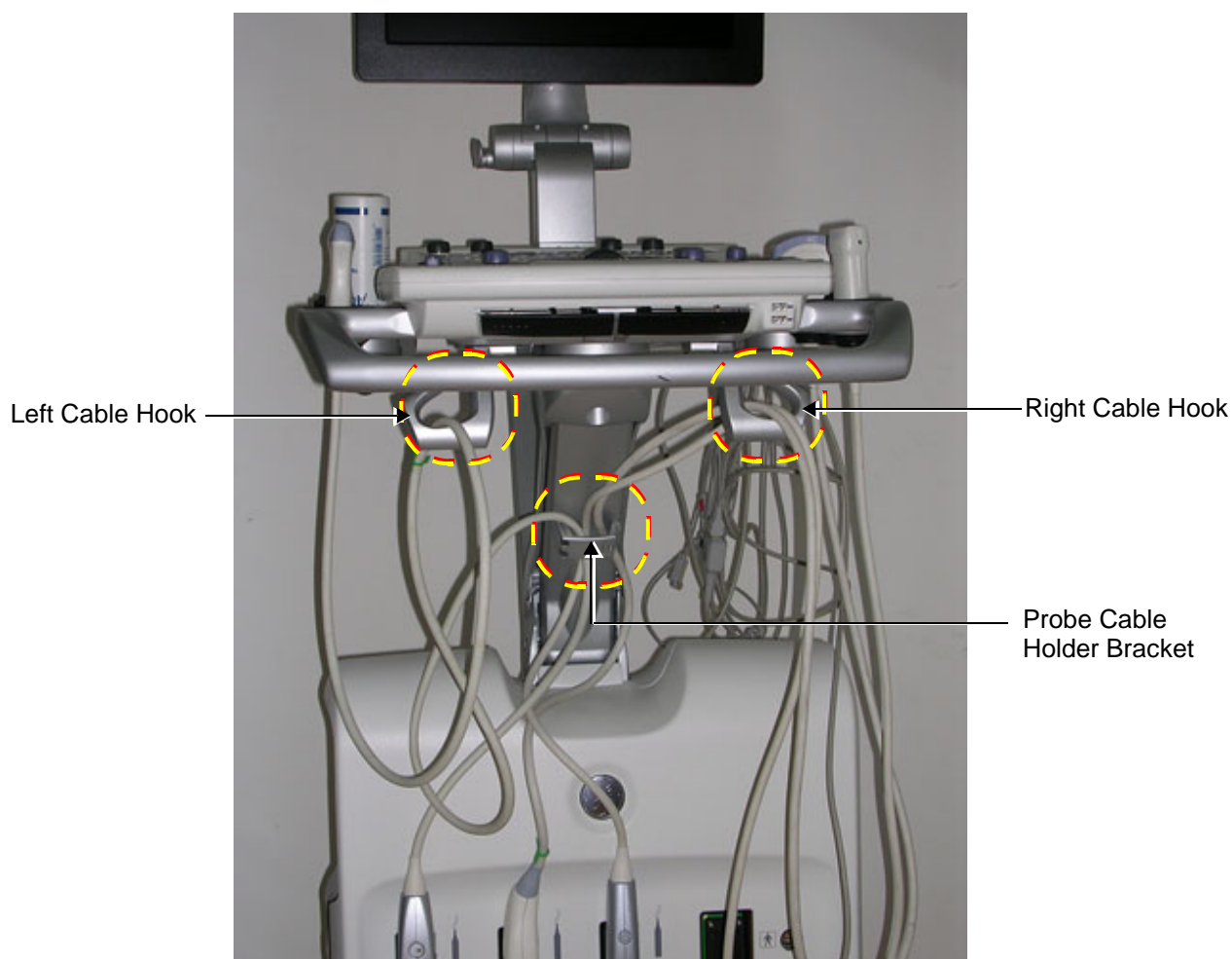
Left Cable Hook

Right Cable Hook

Probe Cable
Holder Bracket

Figure 8-272   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 8-272.

2.)   Open the cable gate (Figure 8-273) on the cable holder and slide the cables into the cable holder.

Figure 8-273   Opening the Cable Gate on Probe Cable Holder

3.) Lead the cables via the right cable hook (Figure 8-272) and make one or two loops to shorten the cable.

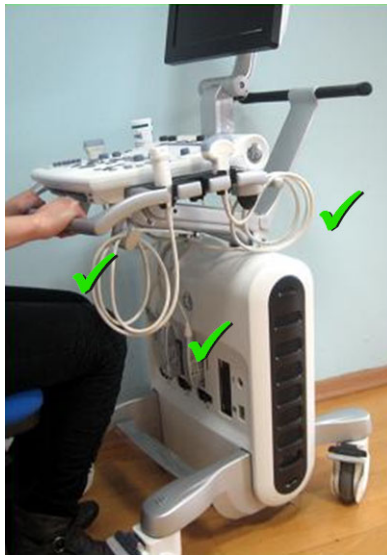4.) Insert the probe in the probe holder as shown in Figure 8-274.

Figure 8-274   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 8-275.

Figure 8-275   AC Power Cable Connected and Routed

NOTE: *Whenever moving the Vivid S60/Vivid S70 scanner, make sure the system is prepared correctly, as shown in Figure 8-276 on page 8-223.*

When moving the system:

Prepare the system as shown in Figure 8-276, with the monitor screen folded *downwards*.
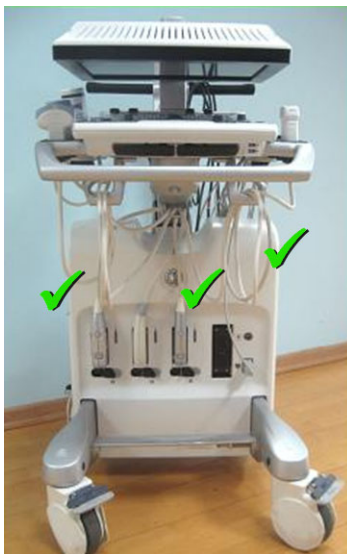

Figure 8-276   Vivid S60/Vivid S70 Scanner and Cables - Ready for Moving

NOTE: *Image for illustration purposes only (pending update).*

7.) Turn ON power to the system.

8-6-20   Brake and Locking Wheels Replacement Procedure

NOTE: *The procedure below is the same whether replacing a Brake Locking Wheel (Front Wheel:) or a Rear Wheel.*

8-6-20-1   Tools
Use the appropriate flat screwdriver and a 6mm Allen key, as indicated in the Brake and Locking Wheels replacement procedure.

FRU Part #   *Refer to Table 9-1 on page 9-3*

8-6-20-2   Time Required
45 min

8-6-20-3   Preparations
Make sure the system is standing securely on a level surface, with the wheels in the locked position.

8-6-20-4   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 8-277.

Figure 8-277   Removing the Screw Cap

2) Using a 6mm Allen key, loosen and remove the screw that secures the wheel shaft in the wheel securing socket.

Figure 8-278   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.

8-6-20-5   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.) Return and fasten the Allen screw (previously removed - see Figure 8-278), making sure the screw is tightened sufficiently to secure the wheel on the chassis. ***Do not over-tighten the screw!***

4) Return the screw cap (previously removed) by snapping it back into position (refer to Figure 8-277)

Section 8-7
Operating System and/or Application Software Loading Procedures

8-7-1   Software Installation Procedures - General Overview

The Vivid S60/Vivid S70 software loading options provide the ability to install the Windows operating system, the Vivid S60/Vivid S70 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 S60/VIVID S70 UNIT. ATTEMPTING TO INSTALL UN-APPROVED SOFTWARE WILL CAUSE IRREVERSIBLE DAMAGE TO HARDWARE AND SOFTWARE!*

⚠ **NOTICE**   IMPORTANT Since neither the System Serial Number or 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 performing a Hard Disk Replacement Procedure), 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 S60/Vivid S70 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**   IMPORTANT Before performing any Vivid S60/Vivid S70 software installation procedure, it is mandatory to backup the Archive. Follow the instructions as described in Preparation for Software Installation Procedures on page 8 - 227.

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 S60/Vivid S70 unit.

8-7-1-1   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 Table 8-4 on page 8-228 and follow the System Software and Application Software Installation Procedures.

8-7-1-2   System Software and/or Application Software Installation

NOTE: *A minimum of **1 hour** is required to install both the Windows operating system and the Application Software. This excludes preparation time, backup etc. and performing functional checks following the installation procedures.*

Throughout the installation processes, the ultrasound system will be unavailable for scanning.

Table 8-4 on page 8-228 provides step-by-step instructions for installation of Windows Operating System Software and the Application Software. However, these procedures may be performed separately, as required.

Follow the installation instructions below, as appropriate:

• both the Windows Operating System Software and the Application Software:step 1

• Windows Operating System ONLY: step 1 through step 10

• Application Software ONLY: step 11.

NOTE: *It is necessary to perform the recommended Functionality Checks after completion of the installation procedures, when installing the following:*

• Windows Operating System Software and the Application Software

• Application Software ONLY

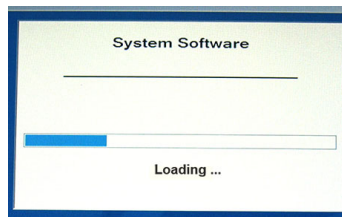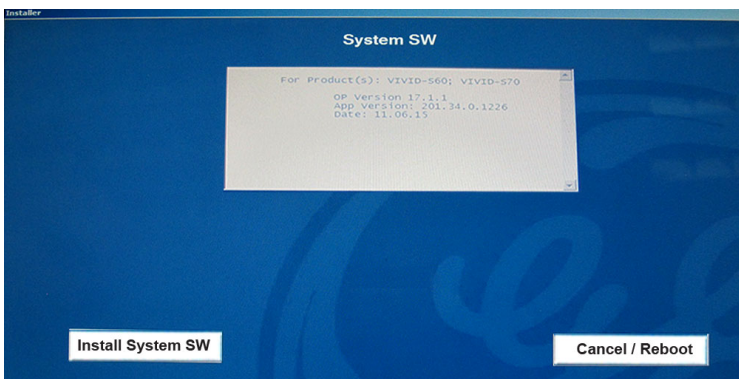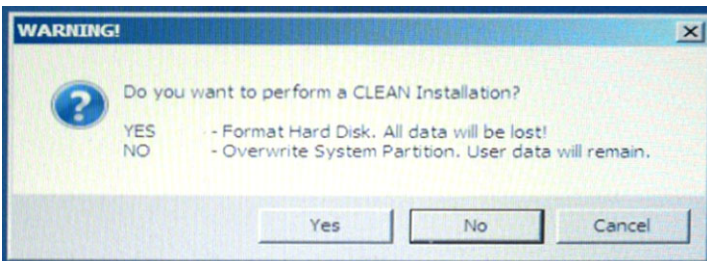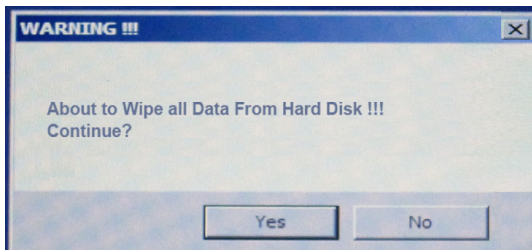**Table 8-4 System Software and Application Software Installation Procedures**

Step	Instruction	Expected Result
NOTE: *Images in this procedure are for reference only. There may be differences or variations, in accordance with different software versions.*		
1.	Plug the Software Installation Media into the USB port on the front of the ultrasound system.	
2.	Press and hold down the <ON/OFF> button for 3 seconds.	The system powers ON and boot-ups from the Software Installation Media. Windows starts and the message "*Windows is loading Files....*" is displayed on the Touch Screen. The System Software *Loading...*message is displayed with a progress bar: When complete, the following is displayed on the Touch Screen: This shows for which product the software is applicable and the versions (operating system/application) and date, prompting you to select the required option.
3.	Click **Install System SW**	A warning dialog box opens:
4.	Click **Yes** to continue. Note: **Yes** = performs a full format of the Hard Disk (complete deletion of operating system and all patient data) **No** = only the operating system (Windows partition) will be deleted; user data will remain	Another warning dialog box opens:

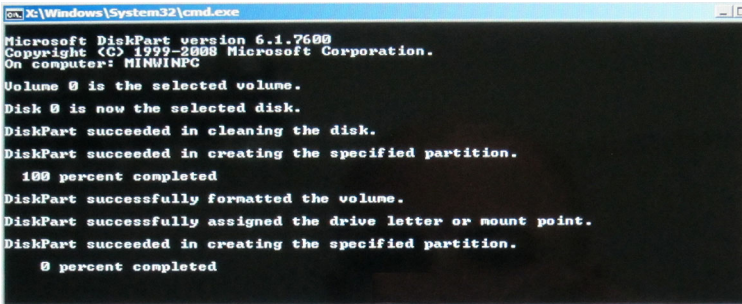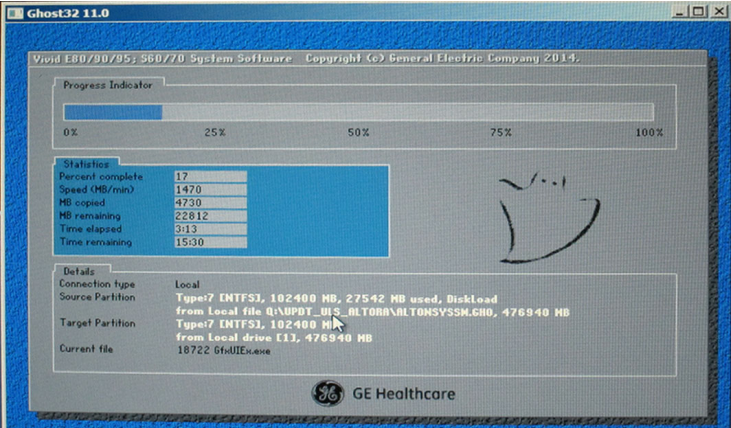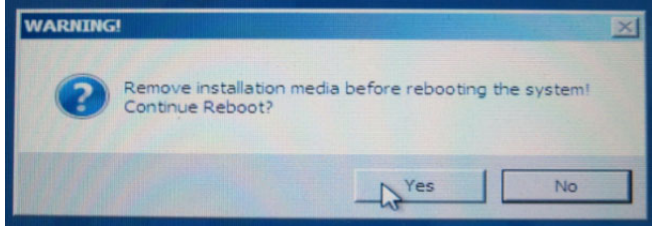**Table 8-4   System Software and Application Software Installation Procedures (Continued)**

Step	Instruction	Expected Result
5.	Click **Yes** to continue. Note: This stage of the procedures takes ~ 30 mins for completion.	The Hard Disk Formatting, Partitioning and Ghosting processes will continue automatically until complete. During these processes, a series of screens, progress bars and status indicators are displayed: When complete, the following warning dialog box opens:

Table 8-4   System Software and Application Software Installation Procedures (Continued)
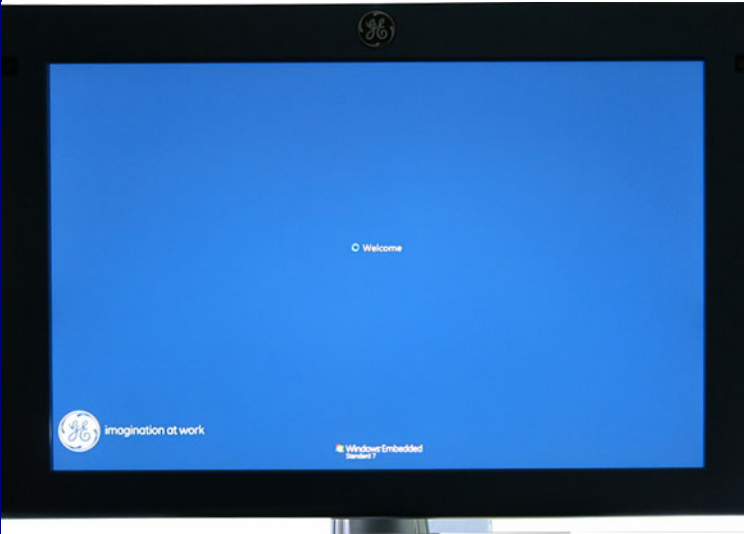
Step	Instruction	Expected Result
6.	Remove the Software Installation Media from the USB port, then click **Yes** to continue. **Important:** **While the screen remains blank, do NOT attempt to use the system or interrupt the installation process!!**	The system performs a reboot. On completion, the Windows icon and message "*Starting Windows*" is displayed on the Touch Screen. A series of setup messages are displayed on the monitor, in the following sequence: "*Setup is starting services*" "*Setup is installing devices*" "*Setup is applying system settings*" "*Setup will continue after restarting your computer*" The system then performs automatic shutdown, then reboots. An additional messages is now displayed on the Monitor: "*Setup is checking video performance*" On completion of the above, the Monitor LCD display will remain blank for ~30 secs The cursor will be visible at the top-left corner of the screen: The Welcome screen is then displayed:

Table 8-4   System Software and Application Software Installation Procedures (Continued)
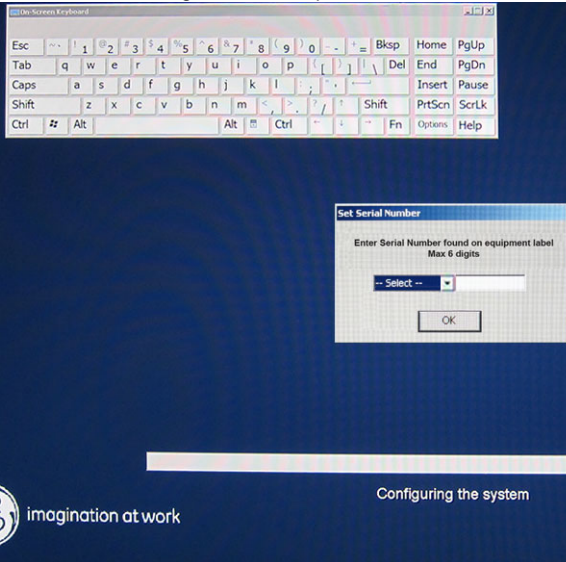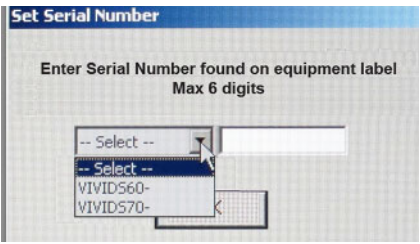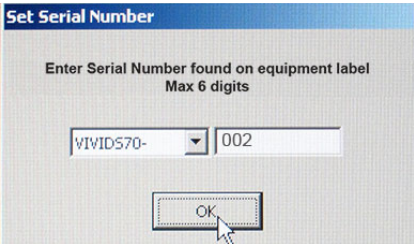
Step	Instruction	Expected Result
		Status messages are now displayed, in this order: *Initializing* *Setting up the System SW* *Configuring the system* When Windows configuration is complete, the Set Serial Number dialog box opens: Configuring the system
7.	Open the pull-down menu and select the correct system type in accordance with the product label: **Vivid™ S60** or **Vivid™ S70** IMPORTANT: **Selecting the wrong system type will result in the Option Key failing to operate!**	
8.	Type the system Serial Number as it appears on the product label attached to the rear of the scanner. Note: Use either the on-screen virtual keyboard or the Alphanumeric keyboard (as preferred) to enter the number in the dialog box.	
9.	Check the number is typed correctly, then click **OK.** Note: If less than 6 digits have been entered, the system will automatically prefix additional zeros, as necessary.	The Confirm Serial Number dialog box opens:

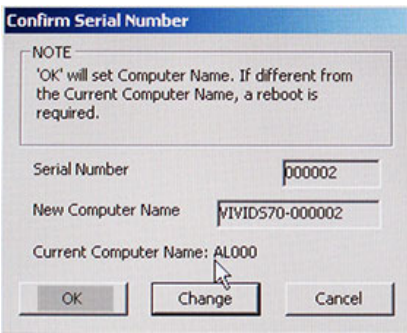**Table 8-4   System Software and Application Software Installation Procedures (Continued)**
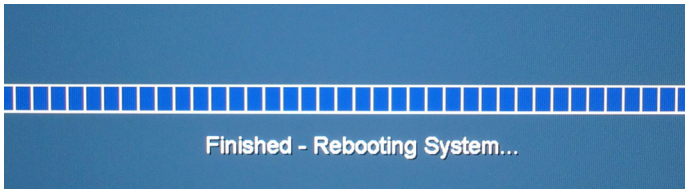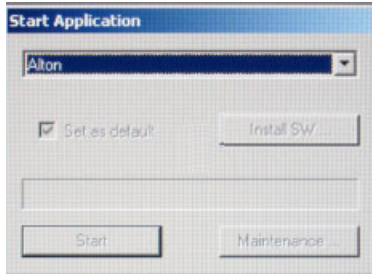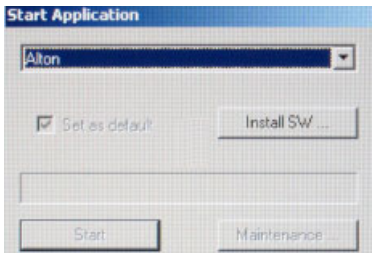
Step	Instruction	Expected Result
10.	Read the displayed information. To accept the New Computer Name, click **OK.** Note: There is an option to Change the Computer name, in the event that it has been entered erroneously. Clicking Cancel will return to the Set Serial Number dialog box.	The dialog box closes. Note: If the New Computer Name is different from the previous name, the system performs automatic shutdown, then reboots - after which the Windows installation continues automatically.
	Note: At this stage, the Vivid™ S60N/Vivid™ S70N ultrasound scanner has an operating system - but no application software has been loaded yet. The buttons in the Start Application dialog box will remain grayed-out until the Software Installation Media containing the Vivid S60/Vivid S70 software application is inserted into the scanner USB port.	The Windows installation continues automatically. A series of progress bars and status messages are displayed in sequence. For example: *Configuring system registry* *Tuning system registry* *Configuring Windows updates* *Installing Intel MEI driver* *Optimizing boot performance (it may take 5-10 mins)* *Optimizing system layout (it may take 5-10 mins)* *Configuring archive* *Configuring monitors etc.* *Finalizing* When the Windows operating system installation is complete, the system performs automatic shutdown, then reboots. The following status message/progress bar is displayed: Finished - Rebooting System... When done, the *Starting Windows* message appears on the Touch Screen; thereafter the Windows OS version logo is displayed on the Monitor. The Start Application dialog box now opens: Start Application — Alton
11.	Insert the Software Installation Media containing the Vivid S60/Vivid S70 software application into the USB port on the front of the scanner. Note: In the dialog box, the Install SW button has now become *enabled*.	Start Application — Alton — Install SW

Table 8-4   System Software and Application Software Installation Procedures (Continued)
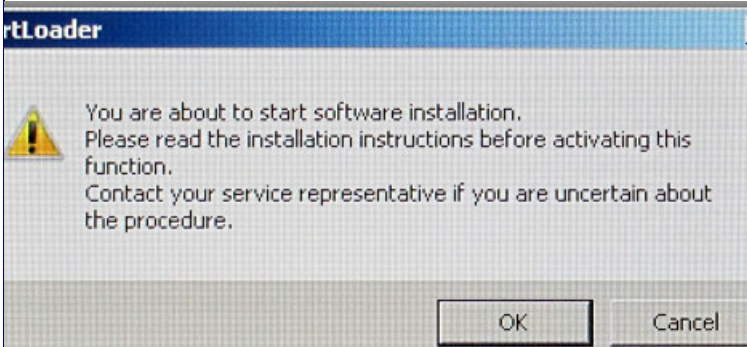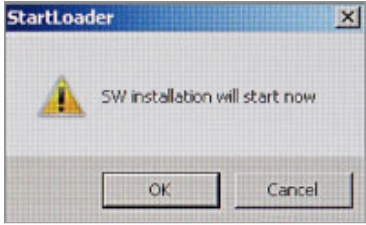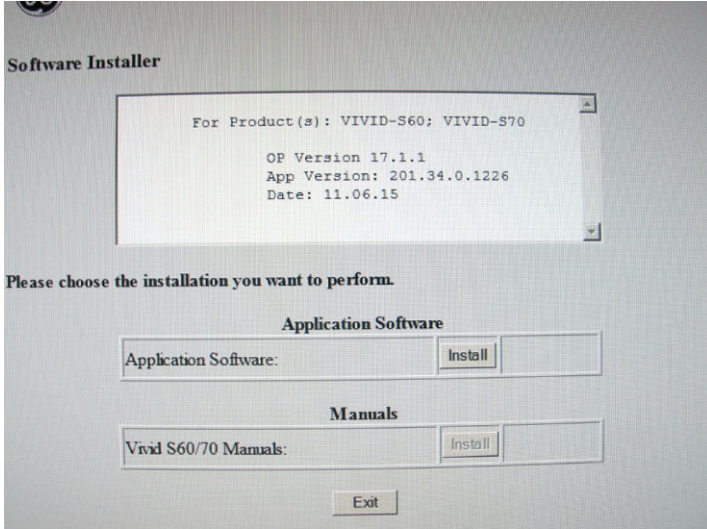
Step	Instruction	Expected Result
12.	Click **Install SW**. Note: Make sure you have read these installation instructions, before proceeding.	The following warning message is displayed: rtLoader You are about to start software installation. Please read the installation instructions before activating this function. Contact your service representative if you are uncertain about the procedure. OK Cancel
13.	Click **OK** to continue.	The following warning message is displayed: StartLoader SW installation will start now OK Cancel
14.	Click **OK** to continue.	The Software Installer window opens showing details of the Application Software for loading: Software Installer For Product(s): VIVID-S60; VIVID-S70 OP Version 17.1.1 App Version: 201.34.0.1226 Date: 11.06.15 Please choose the installation you want to perform. **Application Software** Application Software: Install **Manuals** Vivid S60/70 Manuals: Install Exit

Table 8-4   System Software and Application Software Installation Procedures (Continued)
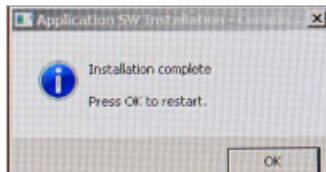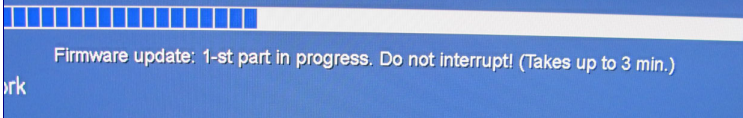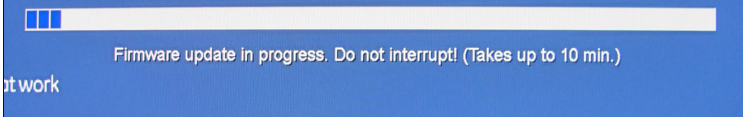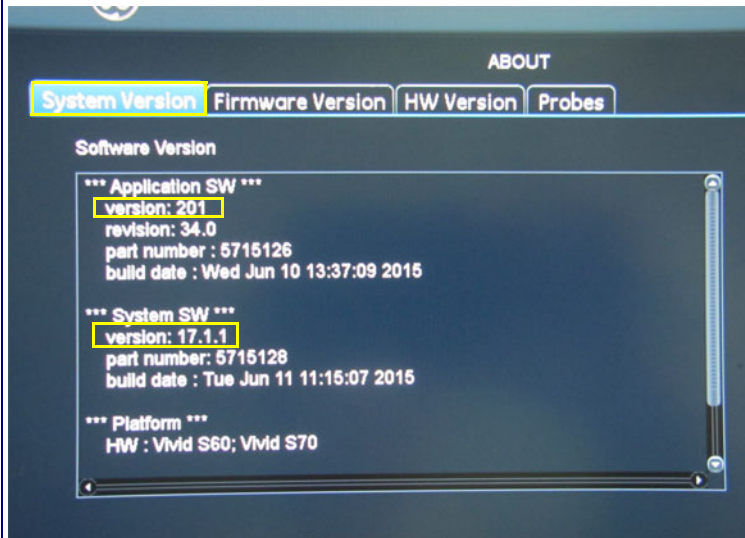
Step	Instruction	Expected Result
15.	Click **Install** to continue. *IMPORTANT* ***DO NOT ATTEMPT TO STOP THE INSTALLATION BEFORE COMPLETION!***	Installation of the SW application commences. A series of progress bars and Status messages are displayed in sequence: *For example: Installing package repository, Copying large files, Please wait, Unpacking SW, Installing new application SW, Installing InSite Exc, Finishing installation, Please wait, Installing drivers, Please wait .....* When installation is complete, the installation complete message is displayed, together with a prompt to restart the computer: Application SW Installation Installation complete Press OK to restart. OK
16.	Click **OK** to continue. When prompted, follow the on-screen instructions.	A message is displayed prompting for removal of the USB Flash Drive.
17.	Remove the Software Installation Media, then click **OK**. Note: The Firmware Update procedure takes up to 10 mins to complete. **DO NOT INTERRUPT THE PROCESS!**	The system shuts down, after which it performs an automatic reboot. On restarting, the system checks the firmware and if necessary performs an update. *Further rebooting may occur again during the firmware update process.* At this time, the following messages may be seen: Firmware update: 1-st part in progress. Do not interrupt! (Takes up to 3 min.) Firmware update in progress. Do not interrupt! (Takes up to 10 min.)
	After completion of system start-up, the SW License dialog box opens, prompting for a valid license key. *Note! The online keyboard was introduced with software version 201.46.0.*	Vivid™ SW LICENSE There is no valid license on this system. Enter a valid key below, or contact your GE sales representative. HW Id 2 OK Cancel

Table 8-4   System Software and Application Software Installation Procedures (Continued)

Step	Instruction	Expected Result
18.	Type the appropriate SW License key (option key). Refer to Preparation for Software Installation Procedures on page 8 - 227. Check the number is entered correctly, then click **OK**.	The dialog box closes; the Vivid™ S60/Vivid™ S70 Startup Screen is displayed, followed by the Scanning screen.
19.	Press **Config**, then click **About** at the bottom of the screen. Select the **System Version** tab.	The system version details are displayed.
20.	Verify the Application Software version corresponds with the System Software version you have installed (check against the label on the Software Installation Media) and that it was correctly installed.	
21.	Restore Patient Archive and System Configuration as per User Manual.	
22.	Install peripherals.	
23.	Restore the settings as recorded under Preparation section 8-7-1-1 on page 8-227. Verify proper Connectivity functionality - refer to Connectivity Setup on page 3 - 40.	

⚠️ **NOTICE** **In the event that the Software Installation Procedure fails, follow the instructions below:**

1) Try to re-install the software.

2) If failure persists, try different software installation media.

3.) If if it still not possible to install the software, this may be indicative of a hardware problem. In this event, contact the OnLine Center for further assistance.

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.

FRU Part #   *Refer to Table 9-20 on page 9-26.*

8-8-1-2   Time Required
20 minutes

8-8-1-3   Preparations
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-8-1-4   DVD/CD-RW Drive Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *front, right* rear, *left* rear:

- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7
- Right Side Cover Removal Procedure on page 8 - 10
- Front Cover Removal Procedure on page 8 - 16
- Right Rear Cover Removal Procedure on page 8 - 20
- Left Rear Cover Removal Procedure on page 8 - 23

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 8-279.

Screws this side not visible in illustration
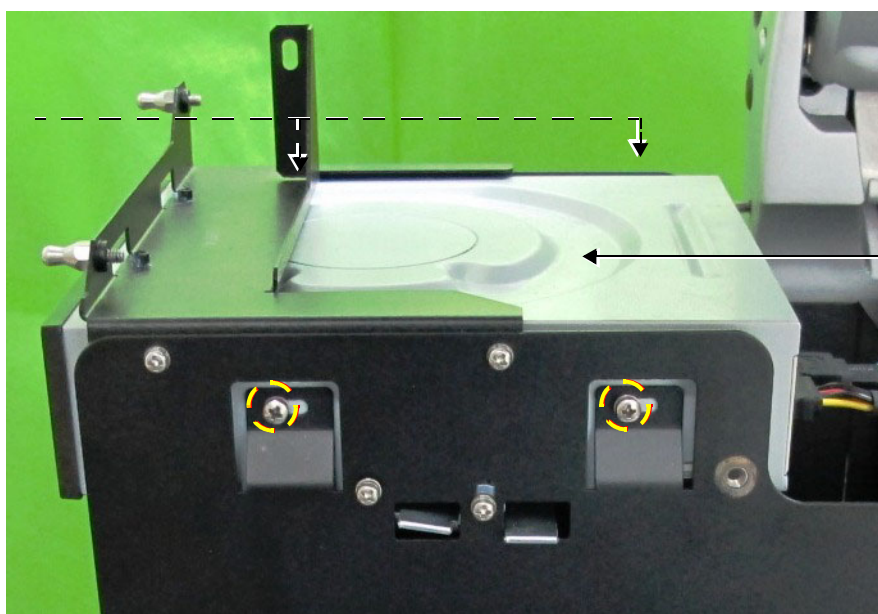
DVD/CD-RW Drive

Figure 8-279   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 8-279.
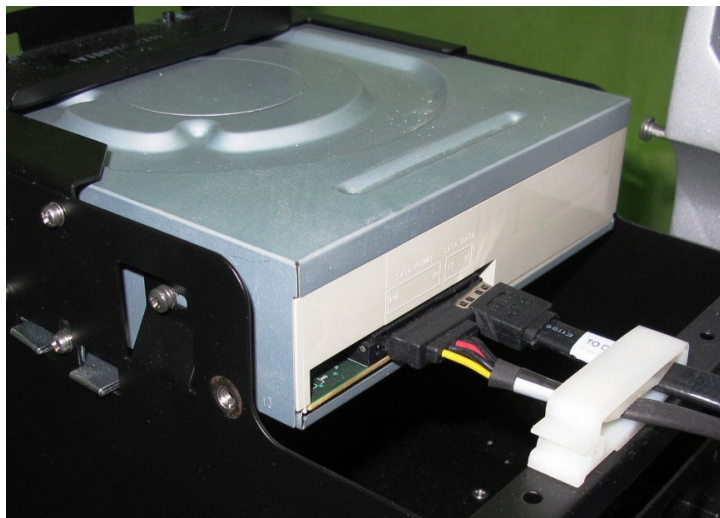
Figure 8-280   Cables Connected at Rear of DVD/CD-RW Drive

4.) Slide the DVD /CD-RW drive out of its compartment.

8-8-1-5   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:

   • Left Rear Cover Installation Procedure on page 8 - 25

   • Right Rear Cover Installation Procedure on page 8 - 22

   • Front Cover Installation Procedure on page 8 - 19

   • Right Side Cover Installation Procedure on page 8 - 10

   • Air Inlet (Left Side) Cover Installation Procedure on page 8 - 8

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 8-281   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.

FRU Part #   Refer to Table 9-20 on page 9-26.

8-8-2-2   Time Required
30 minutes

8-8-2-3   Preparations
Shut down the Vivid S60/Vivid S70 ultrasound unit, as described in Power Shut Down on page 4 - 7.

8-8-2-4   Black and White Printer Removal Procedure

1)   Remove the following covers: *left* side, *right* side, *front, AC Distribution Box*:

   • Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7

   • Right Side Cover Removal Procedure on page 8 - 10

   • Front Cover Removal Procedure on page 8 - 16

   • AC Distribution Box Cover Removal Procedure on page 8 - 29

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 8-282.

Screws this side
not visible in
illustration

Printer securing
screws

Figure 8-282   Screws Securing Black and White Printer in Compartment

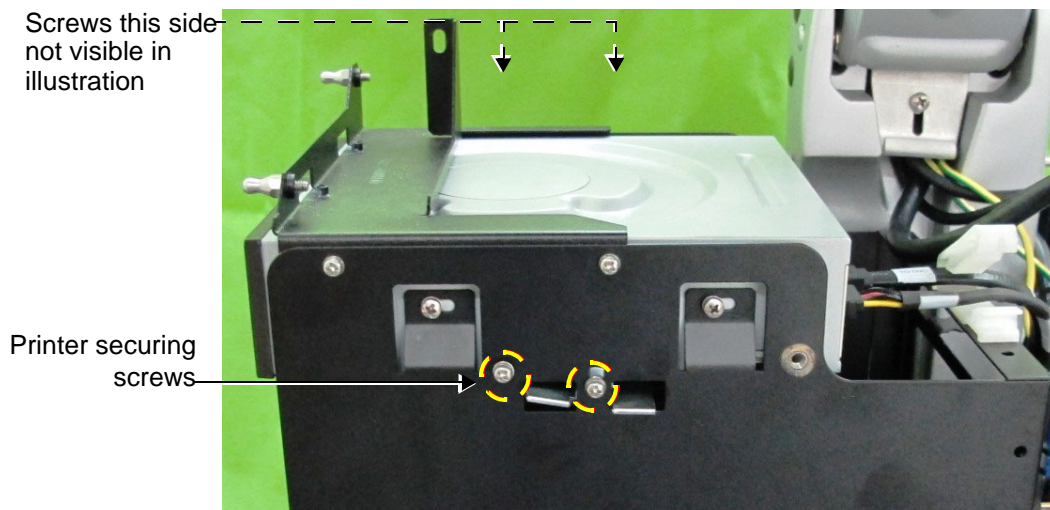3.) Disconnect the USB cable and the power cable from the rear of the Black and White Printer, as shown in Figure 8-283.

Figure 8-283   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.

8-8-2-5   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 8-283.

3.) Tighten the two lower Phillips screws previously released from either side of the Peripherals Console (refer to Figure 8-282). Make sure the printer is firmly secured in position.

4.) Refit the covers previously removed:

- AC Distribution Box Cover Removal Procedure on page 8 - 29
- Front Cover Removal Procedure on page 8 - 16
- Right Side Cover Removal Procedure on page 8 - 10
- Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7

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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™ S60/Vivid™ S70.

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.*

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
- **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

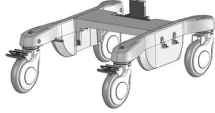Table 9-1   Mechanical Hardware Parts   1 of 4
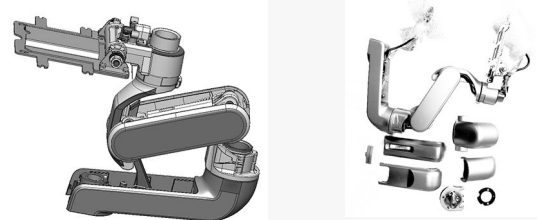
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	
1	Mechanical Assy. Base console	S5507214				RP
2	Column_ Main Support Assy.	S5409464				RP
3	Joint Assy.	S2420695				RP
4	Articulated Arm Assy (with Covers Kit) -- for 19" Monitor	S5409463				
5	LCD Arm Alton 21.5in Wide -- for 21.5" Monitor	5957000-180				RP
6	LCD Arm Riser - Alton -- for 21.5 inch monitor	5737199				RP

Table 9-1   Mechanical Hardware Parts (Continued) 2 of 4
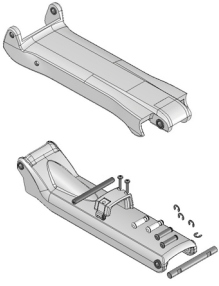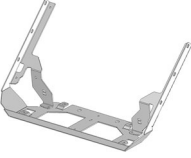
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	
7	Upper and Lower Arm Assy. Kit	S2421633				RP
8	UP-DOWN MECHANISM KIT-VS5_S6	S2424434				RP
9	Swivel Mechanism Service Kit	S2424423				RP
10	Alton Touch Panel Chassis SVC Kit	5750266-S	S5459537			RP
	Chassis_Touch Panel	S5459537		5750266-S or NS5459537		
11	Cover: Silicon Cap for third axis	S5475535				RP
12	Alton main column gas spring SVC kit	5746474-S	S5460989			RP

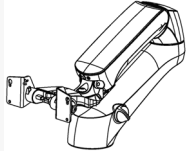Table 9-1   Mechanical Hardware Parts (Continued) 3 of 4
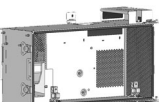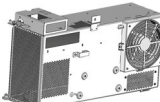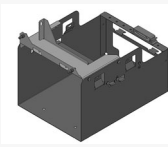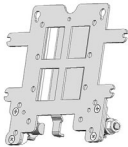
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	
13	Gas Spring FRU	S5460989		5746474-S		RP
14	Gas Spring Cable	S2420834				RP
15	Cabinet Cage Module Front view Rear view	S5418049				RP
16	Peripherals Console Assy	S5422729				RP
17	Cable Routing Kit - Vivid,Ñ¢ S6	5374767-6				
18	Arm release knob module	S5475537				RP
19	First Axis with pin	S5491951				
20	Monitor Interface Kit	S5475531				RP

Table 9-1   Mechanical Hardware Parts (Continued) 4 of 4

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	
21	Sliding ring for first axis	S5476640				
22	Mechanical Assy. -Interface base for operator panel	S5450417				RPc
23	Alton Front Castor SVC kit Note! This caster is installed on the left-hand side on the rear of the console.	5748386-S	S5508380			RPc
24	Wheel_Front_6inch with brake locking	S5508379		5748387-S		RPc
25	Alton Rear Castor SVC kit Note! This caster is used on the right-hand side on the rear of the console and in both the left and the right-hand sides on the front of the console.	5748387-S	S5508379			RPc
26	Wheel_Rear_6inch with free swivel	S5508380		5748386-S		RPc
27	Probe Shelf - Vivid‚Ñ¢ S6	S2421613				RPc
28	Rear Handle Kit	S2424091				RPc
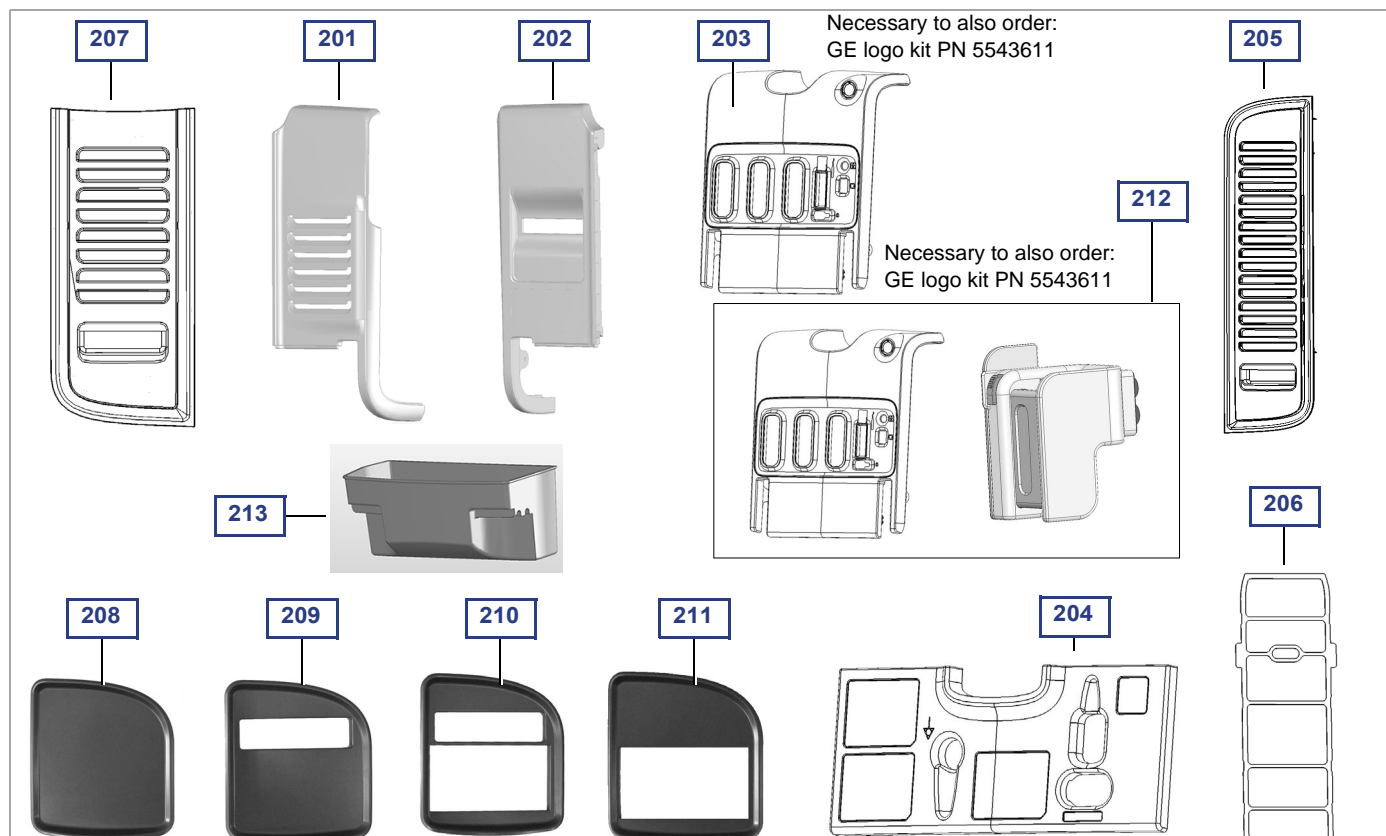
9-3-2   Covers

Figure 9-1   Covers - Diagram 1

Table 9-2   Covers - Diagram 1

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
201	Cover: Rear Right	S5490604				RP	No
202	Cover: Rear Left	S5490603				RP	No
203	Cover: Front Assy. Note: also necessary to order GE logo kit PN 5543611	S5490614				RP	No
204	Cover: AC Box	S5490612				RP	No
205	Cover: Air Inlet - Left Side	S5490611				RP	No
206	Air Filter	S5432149				RP	Yes
207	Cover: Right Side	S5490610				RP	No
208	Cover: Right Side Blank	S5490605				RP	No
209	Cover: DVD Assy.	S5490608				RP	No
210	Cover: DVD and Printer	S5490607				RP	No
211	Cover: Printer assembly	S5490609				RP	No
212	RS Cable Locker Assy. (cable restrainer) Note: also necessary to order GE logo kit PN 5543611	S5534095				RP	No
213	Basket for Probe Cable Management Kit	5555123				RP	No

9-3-2 Covers (cont'd)

Table 9-3 Covers - Diagram 2 1 of 2
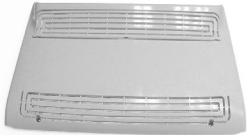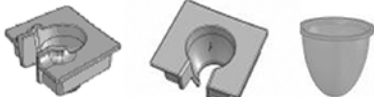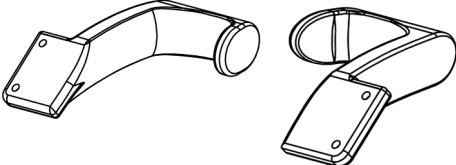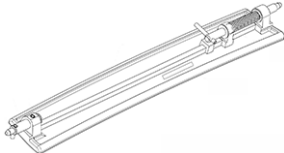
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
221	Cover: Articulated Arm Kit	5490631				
222	Cover: Monitor_Front Note: Also necessary to order: • GE Symbol, PN: S5447688 • Screws Kit, PN: 5490637	S5490514				
223	Cover: Monitor_Rear Note: Also necessary to order Screws Kit PN 5490637	S5438354				
224	Cover: Monitor_Arm base	S5473638				
225	Cover: Monitor_Service Note: Also necessary to order m/caution Label PN NS5496471	S5447216				
226	Alton Touch Panel Rear Cover SVC Kit	5750792-S	S5437448			RP
	Cover: Touch Panel_Rear	S5437448		5750792-S		

Table 9-3   Covers - Diagram 2 (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
227	Alton Touch Panel Back Service Cover SVC Kit	5750793-S	S5453526			
	Cover: Touch Panel_Back Service	S5453526		5750793-S		
228	Label_Multi caution for LCD cover (19" Service Cover)	S5496471				
229	VS5 PROBE INSERTS AND GEL CUPS	S2421615				
230	VS6 PROBE INSERTS AND GEL CUPS	S2421616				
231	Rear box	S5445377				
232	OPIO Basket	S5460993				
233	CABLE HOLDER RIGHT LEFT VS6	S2421632				
234	FOOT REST ASSY	S2420478				

9-3-3   Monitor Parts

9-3-3-1   19" Monitor Parts

Figure 9-2   19" Monitor Parts

Table 9-4   19" Monitor Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
301	LCD only 19"	S5444781				RP
302	Symbol_Monitor_GE	S5447688				RP
303	Screws kit for Monitor	5490637				RP
304	Light sensors - Right and Left Kit	5440990				RP

9-3-3-2   21.5" Monitor Parts
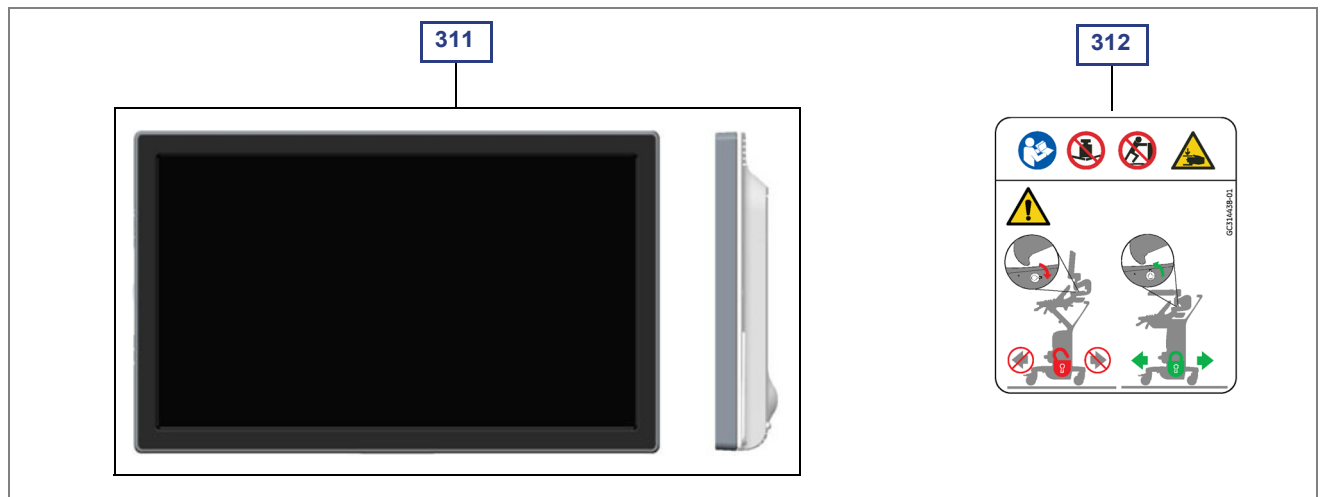
Figure 9-3   21.5" Monitor Parts

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
311	21.5 INCH LCD MONITOR without glass filter (Order the label GC314438 together with the monitor)	5501560-13 or 5501560-15	5501560-13	5501560-15		
312	Warning label monitor 21.5in	GC314438				
313	POWER TO DISPLAY CABLE - WHITE - FOR ERGOTRON ARM - 21,5IN MONITOR	S5737737-01				
314	BIF TO DISPLAY DP CABLE - White	S5737736				
315	GND Cable - 460 mm - White - Yellow_green heat shrink tube on ends - M4 Terminals - service	S5750190-01				

9-3-4   Operator Panel

Table 9-6   Operator Panel   1 of 2

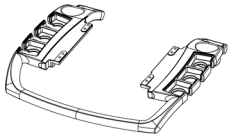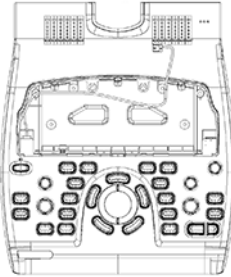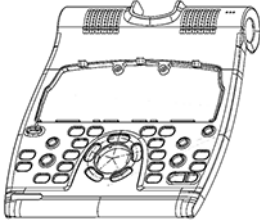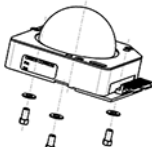| Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
400	Operator Panel Keyboard Assy. Necessary to also order: Operator Panel Label PN: S5508332 (Vivid S60) or PN: S5508332-2 (Vivid S70) GE logo kit PN: 5543611.	S5460319					No
401	OPIO KBD Assy SVC Kit (Without Touch Screen)	5750840-S					No
402	Alton KBD Top Cover SVC Kit	5750258-S					No
403	Alton Functional and Power Keys SVC Kit	5750839-S					No
404	Alton TS Module Svc Kit (Replaces S5449446 when it becomes unavailable)	5750837-S	S5449446				No
	Touch Panel Assy.	S5449446		5750837-S			No

Table 9-6   Operator Panel (Continued) 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
405	Knobs Kit for Operator Panel	5490627				RP	Yes
406	Alton Rotary Keys SVC Kit The kit includes the following parts: - 8 x Big Rotaries Cap Assy - 3 x Small Rotaries Cap Assy - 11 x Knob Spring	5750293-S					Yes
407	Keycaps Kit for Operator Panel	5490616				RP	No
408	Screws Kit for Operator Panel	5490615				N/A	No
409	Touch Screen Rotaries Board	S5482578				RP	No
410	TrackBall Kit FRU	5452843	5434142			RP	No
410	KB Trackball P50 RSPL Kit	5434142		5452843		RP	No
411	Trackball Ring	5661884				RP	No
412	Label-GE Logo 40mm (2 per kit)	5543611				RP	No
413	Label_Vivid S60 for Operator panel	S5508332				RP	No
414	Label_Vivid S70 for Operator panel	S5508332-2				RP	No
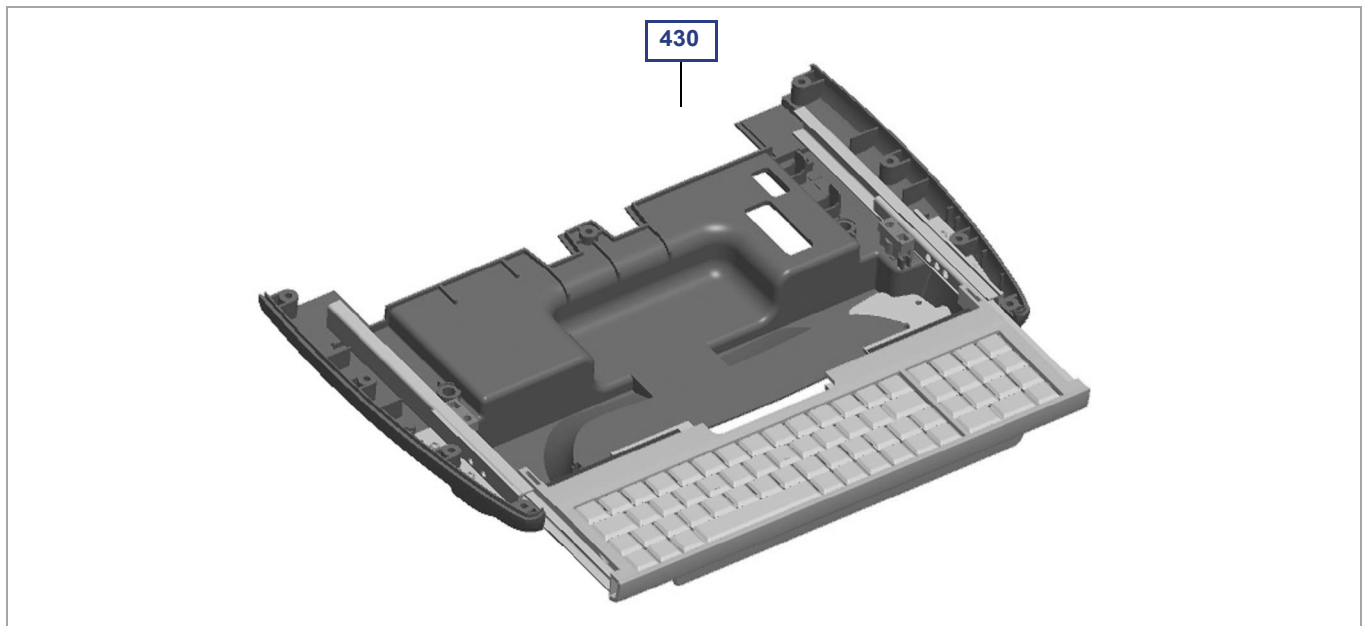
Figure 9-4   Optional Alphanumeric Keyboard

Table 9-7   Optional Alphanumeric Keyboard

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
430	Optional A/N Keyboard Kit (complete with OPIO bottom cover)	5459218				RP	No
431	English A-N Keycaps kit	S5439674				RP	Yes
432	Danish A-N Keycaps kit	S5439674-10				RP	Yes
433	Finnish A-N Keycaps kit	S5439674-11				RP	Yes
434	French A-N Keycaps kit	S5439674-3				RP	Yes
435	German A-N Keycaps kit	S5439674-2				RP	Yes
436	Italian A-N Keycaps kit	S5439674-5				RP	Yes
437	Norwegian A-N Keycaps kit	S5439674-13				RP	Yes
438	Polish A-N Keycaps kit	S5439674-14				RP	Yes
439	Portuguese A-N Keycaps kit	S5439674-6				RP	Yes
440	Russian A-N Keycaps kit	S5439674-9				RP	Yes
441	Spanish A-N Keycaps kit	S5439674-4				RP	Yes
442	Swedish A-N Keycaps kit	S5439674-12				RP	Yes

9-3-5   Power Parts
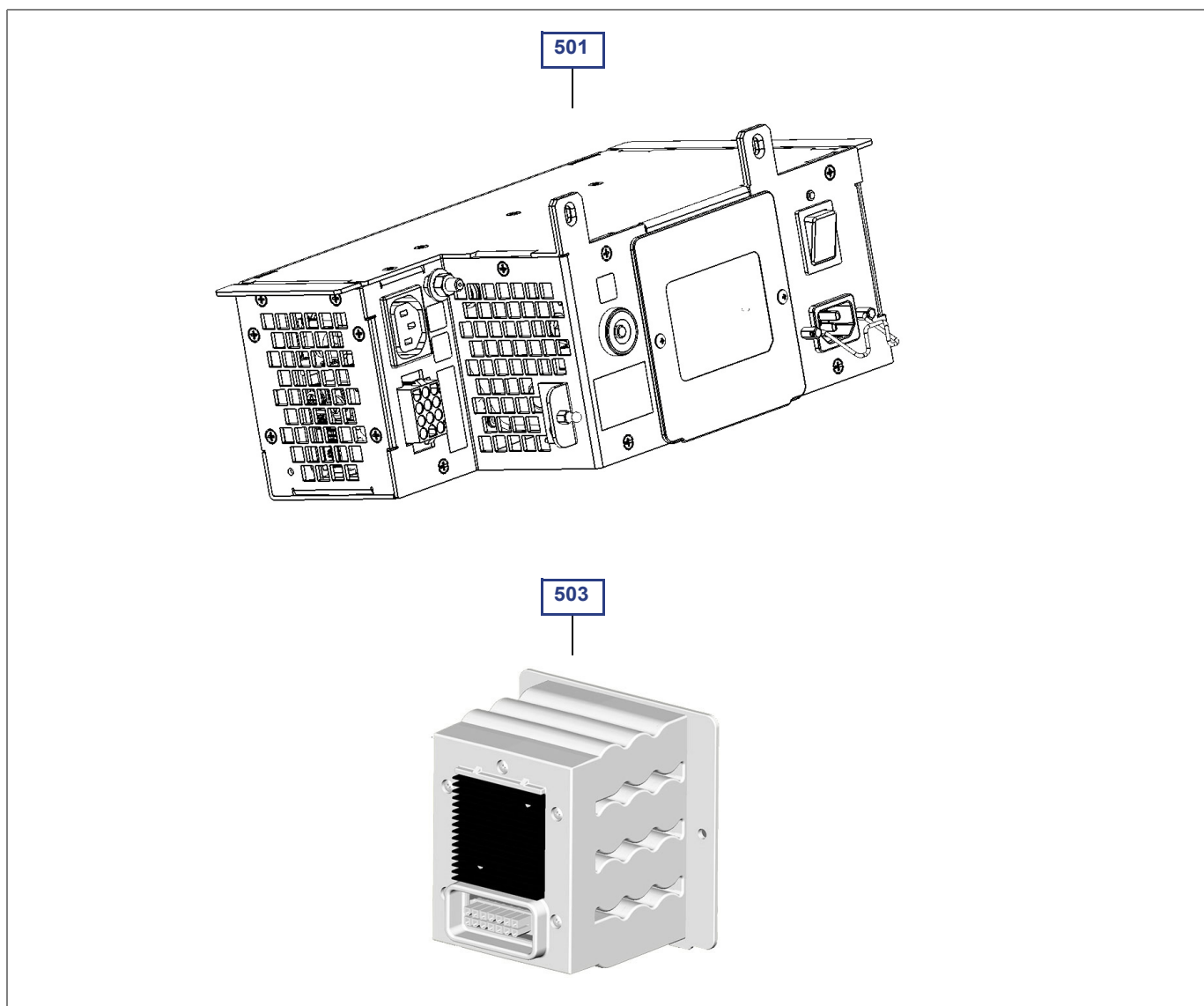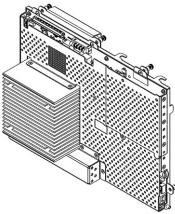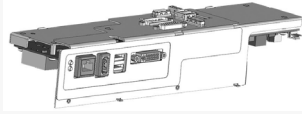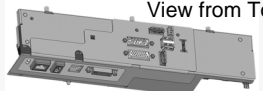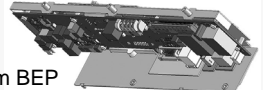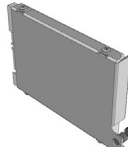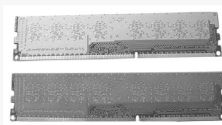
Figure 9-5   Power Parts

Table 9-8   Power Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
501	AC Box module	5750877-S	S5399339			RP	No
		S5399339		5750877-S		RP	No
502	Battery for Scanner	S5399340				RP	Yes
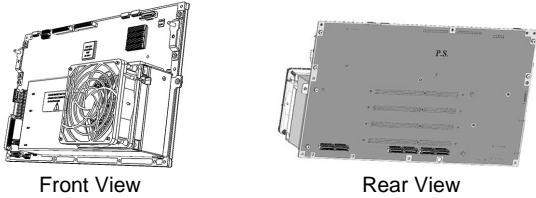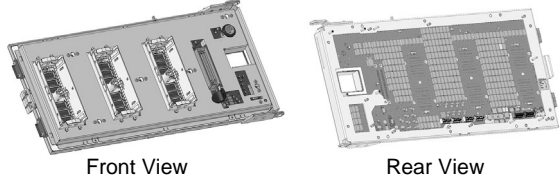
9-3-6   Back End Unit

Table 9-9   Back End Unit

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
601	BEP - Back End Processor module	S5409444		NS5409444		RP
602	BIF- Back End Interface module View from Top View from BEP	S5409443		NS5409443		RP
603	Hard Disk Module	S5416818				RP
604	Module_Memory_DDR	5490633				RP
605	CPU Partition	S5444821				RP
606	Plastic Axis Holders for Back End	S5489199				RP
607	Label_BIF Connection Map	S5453575		NS5453575		RP

9-3-7   Front End Unit

Table 9-10   Front End Unit - Diagram 1

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
651	CFE - cSound Front End module Front View Rear View	S5399322				RP
652	PSB V7 1-Probe selection board 3DLP and 1RS module FRU Front View Rear View	S5399331-7	S5399331			RP
653	PSB 1- Probe Selection Board 3DLP and 1RS module Front View Rear View	S5399331		S5399331-7		RP
654	TRx32 - Transmit Receive 32 Channels module	S5407376		NS5407376		RP
655	Front end full kit assy FRU	S5399337-2				

9-3-7   Front End Unit (cont'd)
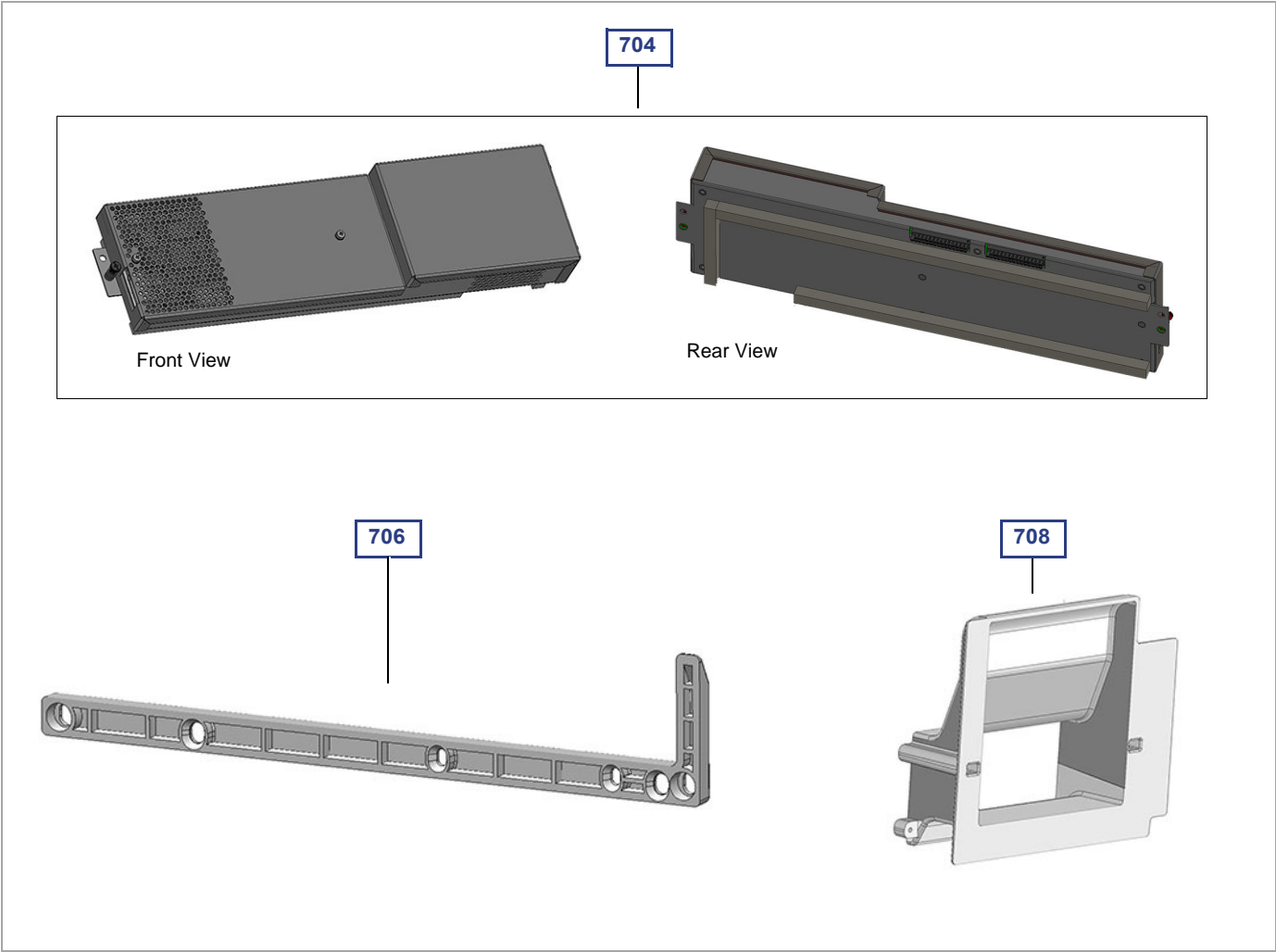
Figure 9-6   Front End Unit - Diagram 2

Table 9-11   Front End Unit - Diagram 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
704	FEPS - Front End Power Supply module	S5409449				
705	Release Arm for CFE	S5430823				
706	Plastic Air sleeve for CFE	S5422608				

9-3-8   Electro Mechanical Parts
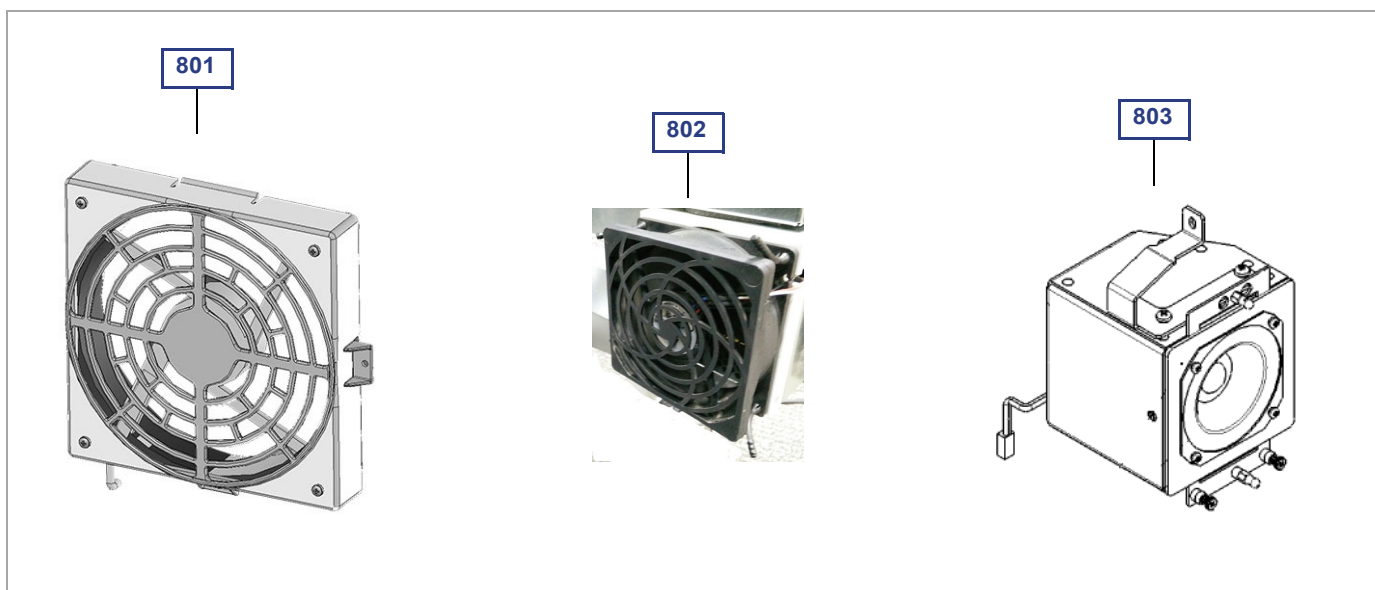
Figure 9-7   Electro Mechanical Parts

Table 9-12   Electro Mechanical Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
801	Fan for Cabinet Cage Assy.	S5418278				🔧
802	Fan kit for TRX32 box	5482884				🔧
803	Sub Woofer Module Assy.	S5620773				🔧

9-3-9   Patient I/O

901

Front View   Rear View
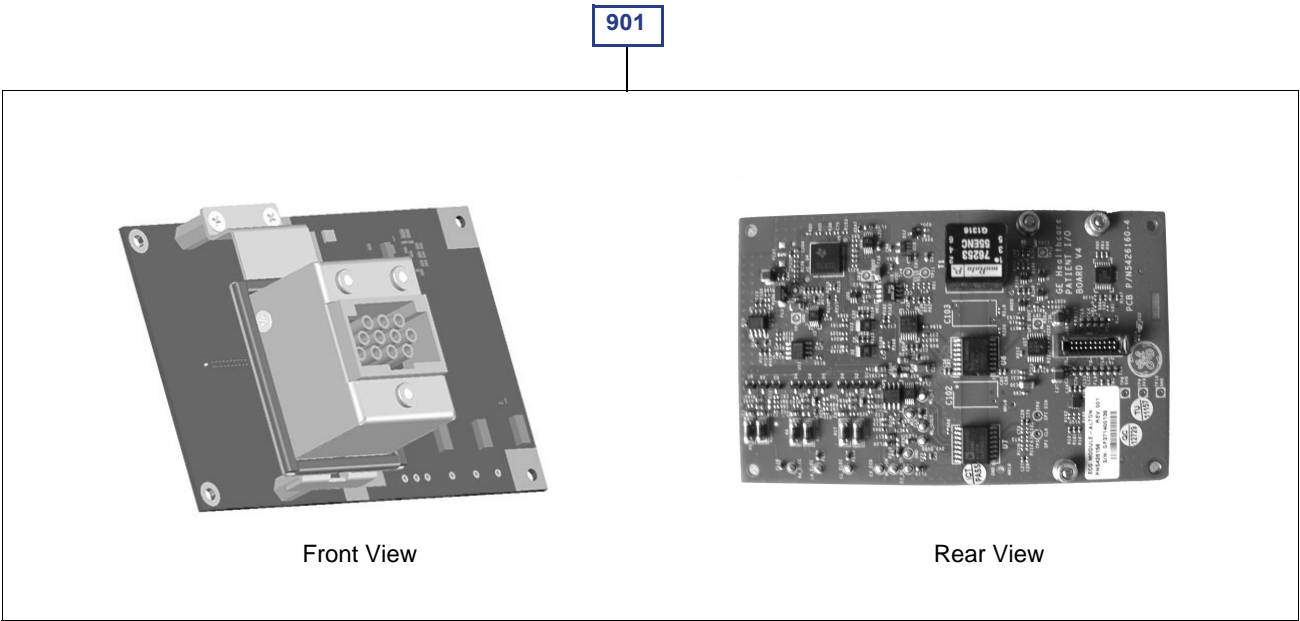
Figure 9-8   Patient I/O

Table 9-13   Patient I/O

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
901	ECG with Respiratory module	S5426156		NS5426156		RPC

9-3-10   Software
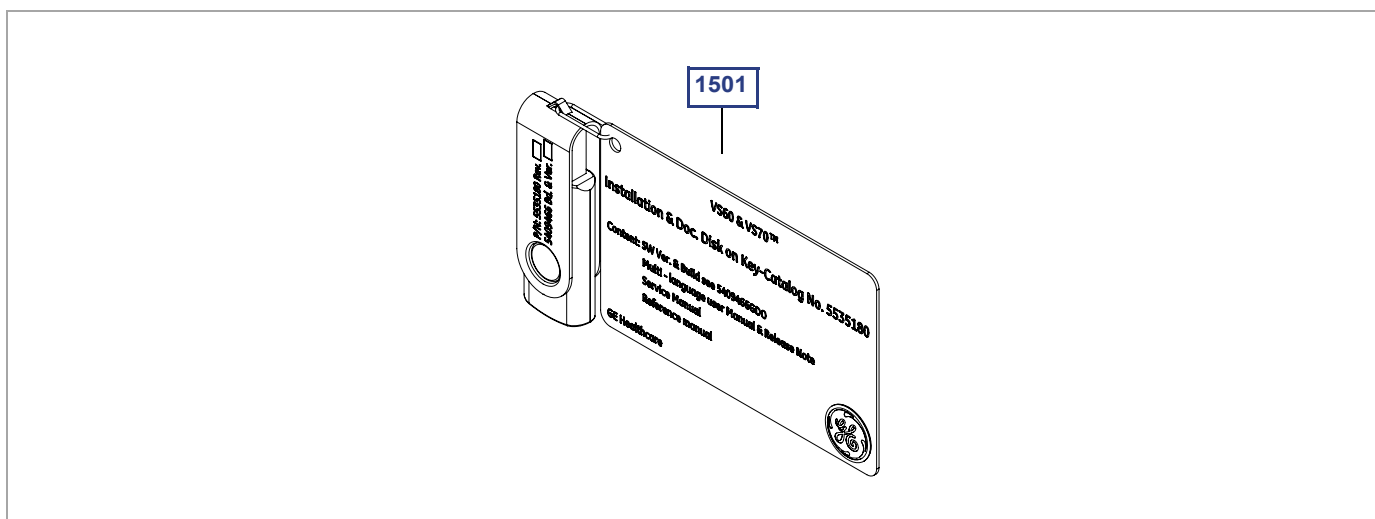
Figure 9-9   Software

Table 9-14   v202 Software (not available in all markets)

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	Vivid S60 S70 v202 SW Service part	BC100520-01				

Table 9-15   v201 Software

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	Vivid S60/S70 SW ver 201.46.0 RSPL kit	S5535180-1				
2	Vivid S60_S70 SW FRU /Software version 201.37.0 Kit)	S5535180				

9-3-11   Cables

9-3-11-1   System Cables
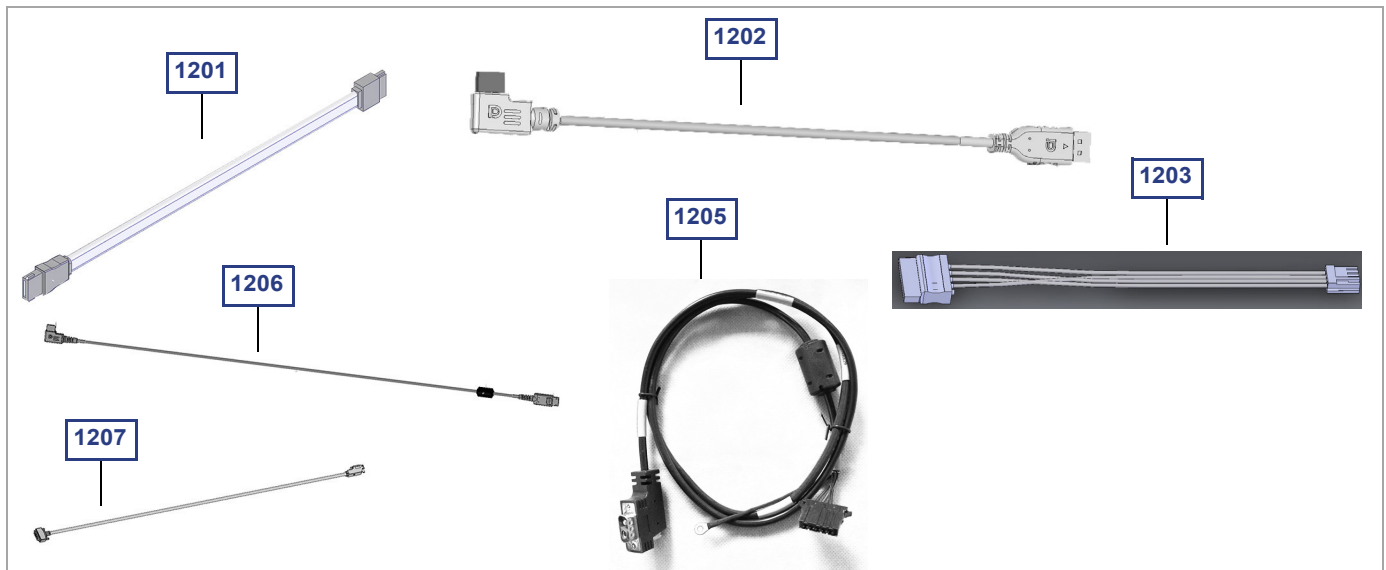
Figure 9-10   System Cables - Diagram 1

Table 9-16   System Cables - Diagram 1

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Repl Proc	Not Compatible With
1201	Cable: Std. SATA Data - BIF to DVD	S5417774				
1202	Cable: KB to Touch DP	S5418229		5746912-S		
1203	Cable: Power to DVD	S5417776				
1204	Cable: BIF to Display DP (For 19 inch monitor)	S5411598				21.5 inch monitor
1205	Cable: Power to Display (For 19 inch monitor)	S5411824		5746912-S		21.5 inch monitor
1206	Cable: BIF to OPIO_Touch DP	S5411599				
1207	Cable: BIF to OPIO FRU	S5409881				
1208	Alton KB to Touch DP Cable SVC Kit	5746912-S	The combination of S5411824 and S5418229			

9-3-11-1   System Cables (cont'd)
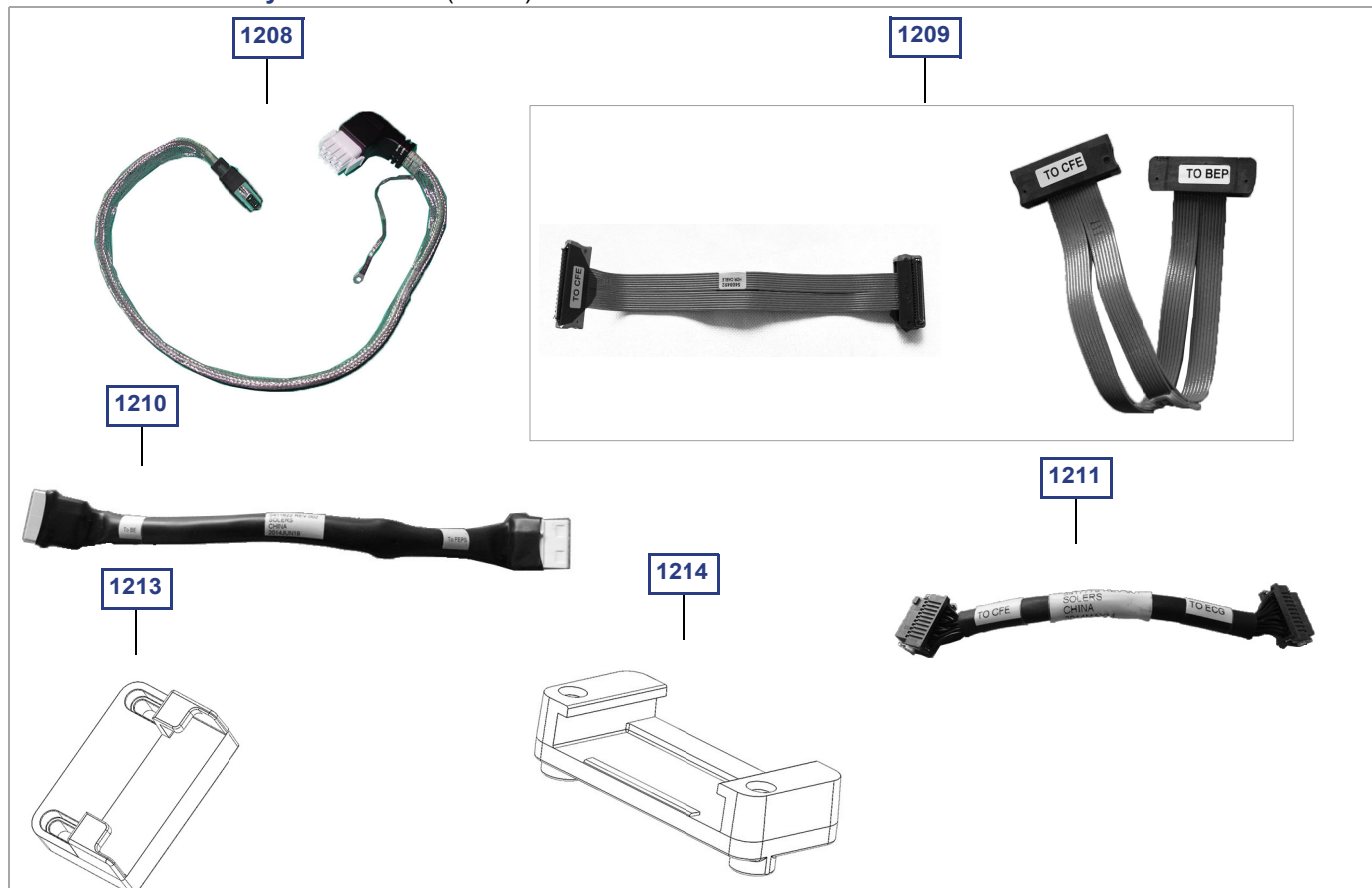
Figure 9-11   System Cables - Diagram 2

Table 9-17   System Cables - Diagram 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1209	Cable: AC Unit to BIF	S5409880			
1210	Cable: Flex HDR	S5408492			
1211	Cable: Printer to AC Unit	S5409882			
1212	Power cable monitor (For 21.5 inch monitor)	S5737737-01			
1213	BIF TO DISPLAY DP CABLE - White - service (For 21.5 inch monitor)	S5737736			
1214	Grounding Cable - Arm to Monitor (For 21.5 inch monitor)	S5750190-01			
1215	Cable: FEPS to BEU PWR	S5411622			
1216	Cable: CFE to ECG	S5417775			
1217	Cable: Multiple GND Kit	5499406			
1218	Plastic cable guide for CFE	S5432232			
1219	Plastic cable guide for BEP	S5432233			

9-3-11-2   System Power Cables

Figure 9-12   System Power Cables

Table 9-18   System Power Cables

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1301	Power Cable Australia	S2414985-5			
1302	Power Cable Britain	S2414985-6			
1303	Power Cable China	S2415383-6			
1304	Power Cable Denmark	S2414985-4			
1305	Power Cable Europe	S2414985-2			
1306	Power Cable Israel	S2414985-7			
1307	Power Cable Japan	S2414985-8			
1308	Power Cable Switzerland	S2414985-3			
1309	Power Cable USA/Canada	S2414985			

9-3-11-3   ECG Cables

Table 9-19   ECG Cables

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	CRU
1350	ECG Ext. cable VS-Service Kit	S2420410				✔
1351	Cable: ECG MARQ. AHA/America	164L0025				✔
1352	Cable: ECG MARQ. IEC / EU+AS	164L0026				✔
1353	Leadwires ECG MARQ. AHA / AMERICA	164L0027				✔
1354	Leadwires ECG MARQ. IEC/EU+AS	164L0028				✔
1355	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				✔
1356	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				✔
1357	Cable_ECG to Nicolay FRU	S5431332				✔

9-3-12   Optional Peripherals

Figure 9-13   Optional Peripherals

Table 9-20   Optional Peripherals

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1401	DVD RW Drive SATA	066E8899				⊡
1402	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) -- Going obsolete	066E3023		066E8922		
	LaserJet Pro M451 220V Printer RSPL Kit	5456780				
1403	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		
1404	Wireless Network Interface USB RSPL Kit	5442405				
1405	USB Sandisk-Cruzer RSPL Kit	5460632				
1406	3 button foot switch Rev1.1	5380960-2				
1407	A6 Color Printer Sony UP-D25MD	066E2956				
1408	SONY UP-D898MD DIGITAL A6 BW PRINTER	5555265				
1409	Epiphan VGADVI Broadcaster	066E8925				
1410	CABLE ETHERNET PATCH 5,00M	070D2950				
1411	ETHERNETH CROSSOVER CABLE 5M	070D2951				

9-3-13   Jigs
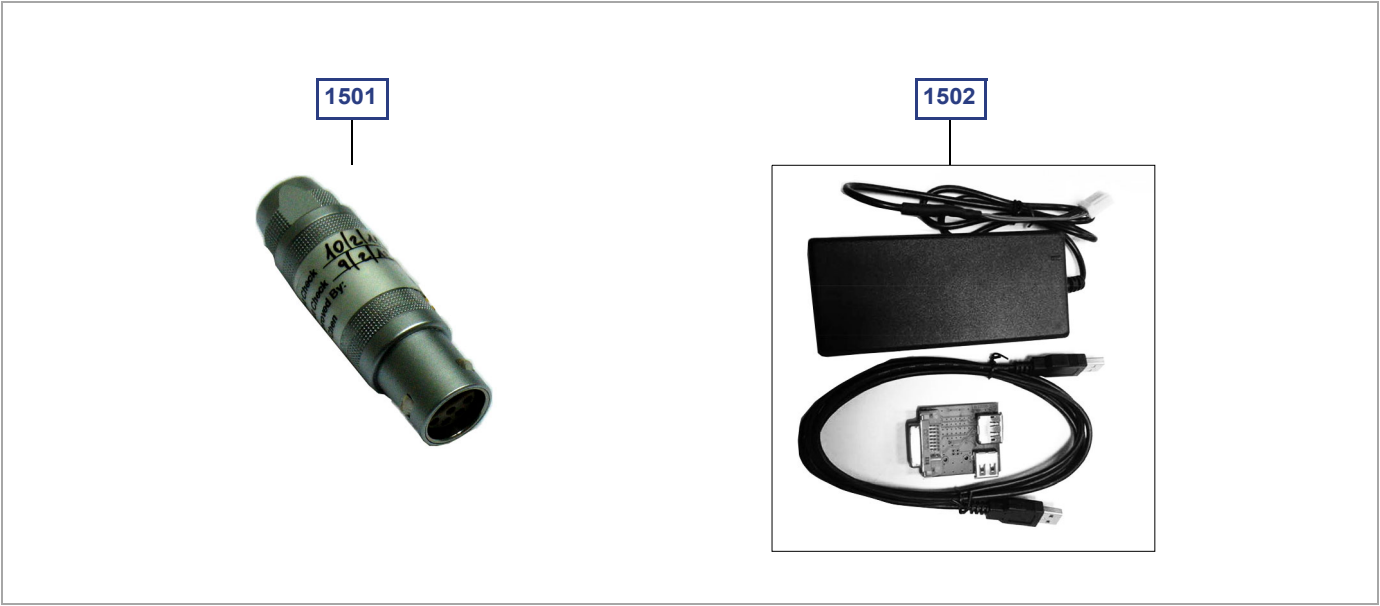
Figure 9-14   Jigs

Table 9-21   Jigs

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1501	PENCIL PROBE JIG-VS5,S6-IB	S2421758		5498103	
	PENCIL PROBE JIG-VS5_S6-IB	5498103	S2421758		
1502	DISPLAY PORT and power ADAPTER JIG FRU	5499567			

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Chapter 10
Care and Maintenance

Section 10-1
Overview

10-1-1   Periodic Maintenance Inspections

Having been determined by engineering that your Vivid™ S60/Vivid™ S70 system has no high-wearing components likely to fail due to use, therefore Periodic Maintenance Inspections are not mandatory.

However, some Customer Quality Assurance Programs may require additional tasks and/or inspections to be performed at periods of frequency different from those listed in this manual.

10-1-2   Purpose of Chapter 10

This chapter describes the Care and Maintenance (PM) procedures for the Vivid™ S60/Vivid™ S70 ultrasound scanner and its 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.

Table 10-1   Contents in Chapter 10

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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.

Section 10-3
Why Perform Maintenance Procedures?

10-3-1   Keeping Records

It is good business practice that ultrasound facilities maintain records of quality checks and corrective maintenance. The *Ultrasound Periodic Maintenance Inspection Certificate* provides the customer with documented confirmation that the Vivid™ S60/Vivid™ S70 ultrasound scanner is maintained on a periodic basis.

A copy of the *Ultrasound Equipment Quality Check* form should be kept in the same room as the ultrasound system, or nearby.

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 of the system must be conducted regularly. The same tests are performed regularly during each period, so that changes can be monitored over time and effective corrective action taken, if required.

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.

10-3-3   Maintenance Task Schedule

The Customer Care & Maintenance Task Schedule (provided in Table 10-2 on page 10-4) 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 Care and Maintenance procedures are performed on the ultrasound system as scheduled in order to retain the high levels of safety, dependability, and system 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 that you do 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 & 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.
Transesphongeal (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 10-4
Tools Required

10-4-1   Tools Required for Servicing the Vivid™ S60/Vivid™ S70

The following tools (TORX bits or drivers) are needed to service the ultrasound scanner.
Screw diameter and standard torque values are also included. If the torque is not indicated with the procedure, hand-tighten the screws/nuts.

Table 10-3 Tools Used for Servicing the Vivid S60/Vivid S70

Item No.	Tool	Size	Torque	Comments
1.	Bit # TX-10	M2.5		
2.	Bit # TX-15	M3	• Use Torque specified in procedure.	
3.	Bit # TX-20	M4	• If the torque is not indicated with the procedure, hand-tighten the screws/nuts.	
4.	Bit # TX-25	M5	• 90 degree "L" are suggested.	
5.	Bit # TX-30	M6	• A full set of 90 degree "L" TORX wrenches are recommended.	
6.	Bit # TX-45	M10		
7.	Socket Set (must include 7mm socket)			
8.	Side cutter (diagonal)	5 or 6 inch		
9.	Flat Blade Driver	3.2 mm		
10.	Flat Blade Driver	4 mm		
11.	Flat Blade Driver	6 mm		
12.	Phillips Driver	PH1		
13.	Phillips Driver	PH2		
14.	Phillips Driver	PH3		
15.	Hex Key	1.5 mm		(Unbrako Key / Allen Key)
16.	Hex Key	2 mm		(Unbrako Key / Allen Key)
17.	Hex Key	2.5 mm		(Unbrako Key / Allen Key)
18.	Hex Key	3 mm		(Unbrako Key / Allen Key)
19.	Hex Key	4 mm		(Unbrako Key / Allen Key)
20.	Hex Key	5 mm		(Unbrako Key / Allen Key)
21.	Hex Key	6 mm		(Unbrako Key / Allen Key)
22.	Hex Key	8 mm		(Unbrako Key / Allen Key)
23.	Hex Key	10 mm		(Unbrako Key / Allen Key)
24.	Hex Key	M12	Rear Casters: 130 Nm	(Unbrako Key / Allen Key)
25.	Nut Driver	5 mm		
26.	Nut Driver	3/16 inch		
27.	Torque Wrench	Up to 130 Nm	Heavy mechanical parts may need a specific torque. Each procedure will indicate the torque needed.	

Section 10-5
System Maintenance

10-5-1   Preliminary Checks

The preliminary checks take approximately 15 minutes to perform. Refer to the *Vivid™ S60/Vivid™ S70 User Manual* whenever necessary.

Table 10-4   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	• Turn the Ultrasound system power ON and verify that all fans and peripherals turn On. • Watch the displays during power up to verify that no warning or error messages are displayed. • Where applicable, confirm that the battery is charged. If no AC Input present, use the internal battery.
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the Monitor and Touch 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™ S60/Vivid™ S70 User Manual* whenever necessary.

10-5-2-1   System Checks

Table 10-5   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	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
6	Applicable Software Options	Verify the basic operation of all optional modes such as Contrast. Check the basic Ultrasound system controls that affect each option's operation.
8	Operator Panel test	Perform the Operator Panel Test Procedure.
9	Keyboard	Do the interactive keyboard test.
10	Touch Panel	Verify basic Touch Panel display functions.
11	Monitor	Verify basic monitor display functions.
12	Peripherals	See: Peripheral/Option Checks 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™ S60/Vivid™ S70 User Manual* for a list of approved peripherals/options.

Table 10-6   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 10-7   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	Mains Cable	Inspect the mains cable and its connectors for any damage.
3	Terminals	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4	Inlet Connector	Verify that the Inlet connector retainer is functional.

10-5-3   Physical Inspection

Table 10-8   Physical Checks

Step	Item	Description
1	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2	Scratches & Dents	Inspect the exterior for dents, scratches or cracks.
3	Covers	Where applicable, verify all covers are secured in place and are properly aligned with other covers. Replace any covers that are damaged.
4	Input Power	Refer to: Mains Cable Inspection on page 10 - 8.
5	External I/O	Check all connectors for damage.
6	Wheels and Brakes	• Where applicable, check all wheels and casters for wear and verify operation of foot brake, to stop the Ultrasound system from moving, and release mechanism. • Where applicable, check all wheel locks and wheel swiveling for proper operation.
7	Control Panel Movement	• Where applicable, verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions. • Where applicable, ensure that the Control panel latches in position as required.
8	Control Panel Lighting	Check for proper operation of all operator panel and TGC lights.
9	LCD	Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the LCD arm allows: • Swiveling the screen to the left and to the right • Folding the screen to the locked position • Release and adjustment backwards and forwards • Can be adjusted in the up/down positions. Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.
10	Monitor Light	Check for proper operation of any monitor lighting, if available.
11	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.
12	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.
13	Control Panel	Inspect alphanumeric keyboard and Operator Panel. Record any damaged or missing items.
14	Probe Holders	Where applicable, inspect the Probe Holders for cracks or damage.
15	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
16	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

Frequent and diligent cleaning of the ultrasound system reduces the risk of spreading infection from person to person, and also helps to maintain a clean working environment.

⚠ **CAUTION** **WHEN PERFORMING CLEANING PROCEDURES, TO PREVENT THE RISK OF SYSTEM DAMAGE, ALWAYS OBSERVE THE FOLLOWING PRECAUTIONS:**

- Use only cleaning materials and solutions as recommended in the procedures described in the Vivid™ S60/Vivid™ S70 User Manual.
- Do not use any solutions or products not listed in the Vivid™ S60/Vivid™ S70 User Manual.
- Never use thinner, benzene, ethanol or methanol alcohol, abrasive cleaners, or other strong solvents, as these may cause damage to the cabinet or LCD panel. Only use isopropyl alcohol, when instructed to do so.
- Do not spray any liquid directly onto the Vivid™ S60/Vivid™ S70 covers, LCD Display or keyboard!
- Do not allow any liquid to drip or seep into the system.
- DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.
- Make sure not to spill or spray any liquid on the controls, into the Vivid™ S60/Vivid™ S70 cabinet, or in the probe connection receptacle.
- Prior to cleaning, turn OFF power to the ultrasound system and disconnect the mains cable.

NOTE: *Refer to the Vivid™ S60/Vivid™ S70 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 10-9   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 Air Inlet (Left Side) Cover Removal Procedure on page 8 - 7. Remove the air filter from the cover, as shown in Figure 8-4 on page 8-8.
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 Air Filter Installation Procedure on page 8 - 9 for air filter installation instructions.

NOTE: *For convenience (or if the air filter is excessively dirty), replacement filters are available. Refer to Table 9-2 on page 9-7 for the air filter replacement part number.*

10-5-5 Probe Maintenance

10-5-6 Probe Related Checks

Table 10-10 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™ S60/Vivid™ S70 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™ S60/Vivid™ S70 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:*
http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

⚠ **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™ S60/Vivid™ S70 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   Probe Cleaning

10-5-9-1   Basic Probe Cleaning

NOTE: *For details on general probe cleaning, refer to the information provided in the Vivid™ S60/Vivid™ S70 User Manual.*

NOTE: *For specific probe cleaning instructions, refer to the individual probe Users Manual (or care card supplied with the probe).*

⚠ **CAUTION**   **FAILURE TO FOLLOW THE PRESCRIBED CLEANING OR DISINFECTION PROCEDURES WILL VOID THE PROBE'S WARRANTY.**
DO NOT SOAK THE PROBE OR WIPE THE PROBE LENS WITH ANY PRODUCT NOT LISTED IN THE Vivid™ S60/Vivid™ S70 USER MANUAL. DOING SO COULD RESULT IN IRREPARABLE DAMAGE TO THE PROBE AND/OR SYSTEM. FOLLOW THE CARE INSTRUCTIONS SUPPLIED WITH THE PROBE.

⚠ **CAUTION**   **TO HELP PROTECT YOURSELF FROM BLOOD-BORNE DISEASES WHEN CLEANING AND HANDLING PROBES, WEAR APPROVED, NON-ALLERGIC DISPOSABLE GLOVES.**

⚠ **WARNING**   *ALWAYS DISINFECT A DEFECTIVE PROBE BEFORE RETURNING IT TO THE MANUFACTURER. BE SURE TO TAG THE PROBE AS BEING DISINFECTED.*

10-5-10   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.*

Section 10-6
Electrical Safety Tests

10-6-1   Overview

The following topics and measurements are covered in this subsection:

10-6-2   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 S60/Vivid S70.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.

Ultrasound System components may be energized.

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.

NOTE: *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.*

The electrical safety tests in this section are based on NFPA 99 Standard 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 planned maintenance (PM) 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 and UL 60601-1) 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.

- 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.

Prior to initiating any electrical test, the Ultrasound system must be visually inspected. Perform the following visual checks:

Equipment 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.

10-6-3   Leakage Current Limits

⚠ **WARNING**   Energy Control and Power Lockout for Vivid S60/Vivid S70.

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 NFPA 99 and IEC 62353 and in some cases are lower than that specified by the standards.

In accordance with these standards, fault conditions like Reverse Polarity of the supply mains and Open Neutral are no longer required for field evaluation of leakage current. 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 or 220-240).

⚠ **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.

Leakage current limits for Vivid ultrasound systems are shown in Table 10-11 for 100-120 Volt and 230-240 Volt mains.

NOTE: *Open Grounding is also known as "Lift Ground".*

Table 10-11   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 (1)
Earth Leakage	On and Off	N/A	0.3
Chassis/Enclosure Leakage	On and Off	Closed	0.1
		Open	0.3
Type BF Applied Parts	On (transmit)	Closed	0.1
		Open	0.5
Type CF Applied Parts	On (transmit)	Closed	0.01
		Open	0.05
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05
(1) UL standard			

Table 10-12   Leakage Current Limits for Ultrasound System Operation on 220-240 Volt Mains

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit in mA (2)	Limit in µA (3)
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
(2) IEC60601 Second Edition				
(3) IEC60601 Third Edition				

Table 10-13   ISO and Mains Applied Limits[a]

Probe Type	Measurement
BF	5.0 mA (5000 µA)
CF	0.05 mA (50 µA)

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/ESI 1993 or IEC 60601 or AS/NZS 3551.*

Table 10-14   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	Body Floating or non-conductive ultrasound probes which are marked with the 'man in box' BF symbol. this includes all transducers and ECG leads.	
Type BF Defib.-Proof	Type BF Applied Part (man in the box with paddle) symbol is in accordance with IEC 60417-5334.	
Type CF	Cardiac Floating or non-conductive 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	Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60878-02-06.	
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.	

10-6-4   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.
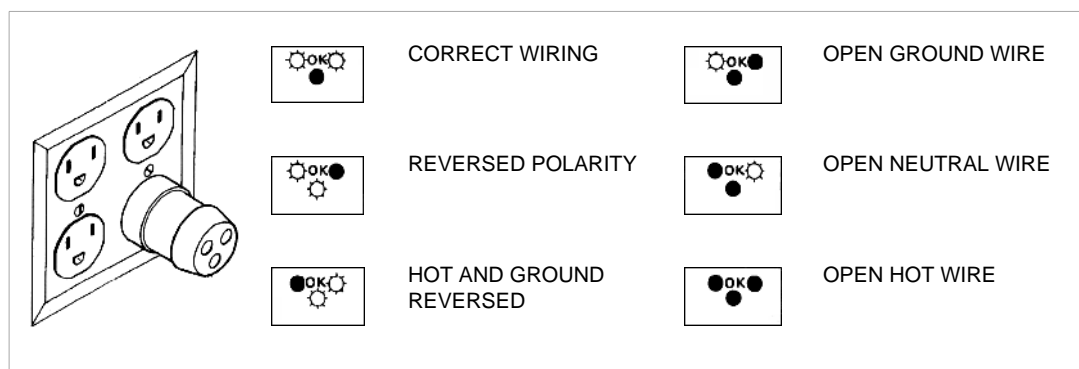
Figure 10-1   Typical Alternate Outlet Test

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.*

10-6-5   Grounding Continuity

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

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

1. Ground Pin
2. Ohmmeter
3. Ultrasound System
4. Accessible Metal Part:
    • Monitor Housing
    • Rear Panel Connector
    • Any Caster/wheel Support
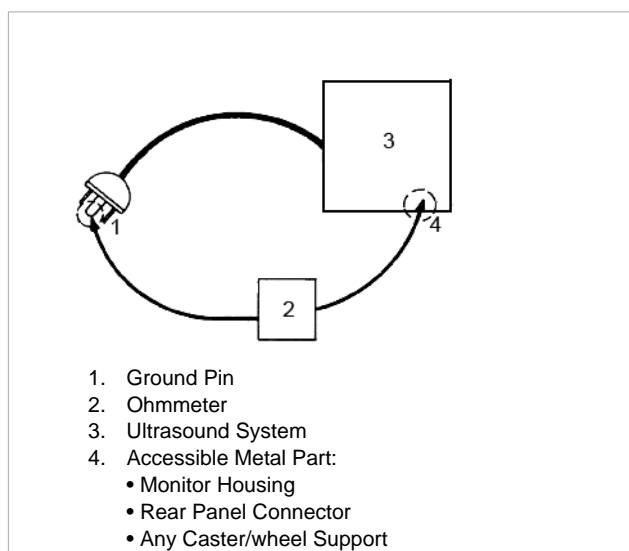
Figure 10-2   Ground Continuity Test

10-6-6   Chassis Leakage Current Test

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

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

10-6-6-1   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 meter 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 10-11 on page 10-17

  or

- Table 10-12 on page 10-17

  as applicable.

Record the highest reading.

10-6-6-2   Generic Procedure

The test verifies the isolation of the power line from the chassis.

The testing meter is connected from accessible metal parts of the case to ground.

Measurements should be made under the test conditions specified in:

- Table 10-11 on page 10-17

  or

- Table 10-12 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 meter.
3.) Connect the meter to an accessible metal surface of the Vivid™ S60/Vivid™ S70 ultrasound system using the cable provided with the meter.
4.) Select the Chassis or Enclosure leakage function on the meter.

NOTE: *For more information, refer to the safety analyzer's user manual.*

5.) Test opening and closing the ground with the Vivid™ S60/Vivid™ S70 ultrasound system ON and OFF as indicated in Table 10-11 on page 10-17 or Table 10-12 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 10-11 on page 10-17
  or

- Table 10-12 on page 10-17
  as Chassis/Enclosure Leakage.

10-6-6-3   Data Sheet for Enclosure/Chassis Leakage Current

Table 10-15 below 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.

NOTE: *Values in italics font are given as examples only.*

Record all data in the Electrical safety tests log.

Table 10-15   Typical Data Format for Recording Enclosure/Chassis Leakage

Unit under test_____		Date of test:_____			
Test Conditions		**Measurement/Test Point Location**			
System Power	**Grounding/ PE**	*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.*

10-6-7   Isolated Patient Lead (Source) Leakage – Lead-to-Ground

⚠ CAUTION	Equipment damage possibility. Never switch the Polarity when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching the polarity using the POLARITY switch. Otherwise, the Ultrasound system may be damaged.

10-6-7-1   Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made under the test conditions specified in:

- Table 10-11 on page 10-17

  or

- Table 10-12 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.

10-6-7-2   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 meter.

3) Connect the ECG cable to the Vivid™ S60/Vivid™ S70 ultrasound system and the Patient leads to the analyzer.

4) Select the Patient lead leakage function on the meter.

5) Test opening and closing the ground with the scanner on and off as indicated in Table 4-6 on page 4-18 or Table 4-7 on page 4-18, as applicable.

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 10-11 on page 10-17

  or

- Table 10-12 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.

1. Ultrasound System
2. Polarity Reversing Switch
3. Power Outlet - Color of Power Outlet Cable:

4. Leakage Test Meter (Ammeter)
5. Accessible Metal Parts
   (chassis - non-earth ground,
   unprotected surface)

USA and Canada:
• **H** - Hot, Black
• **N** - Neutral, White
• **G** - Ground, Green or Green-yellow

Others:
• **H** - Hot, Brown
• **N** - Neutral, Blue
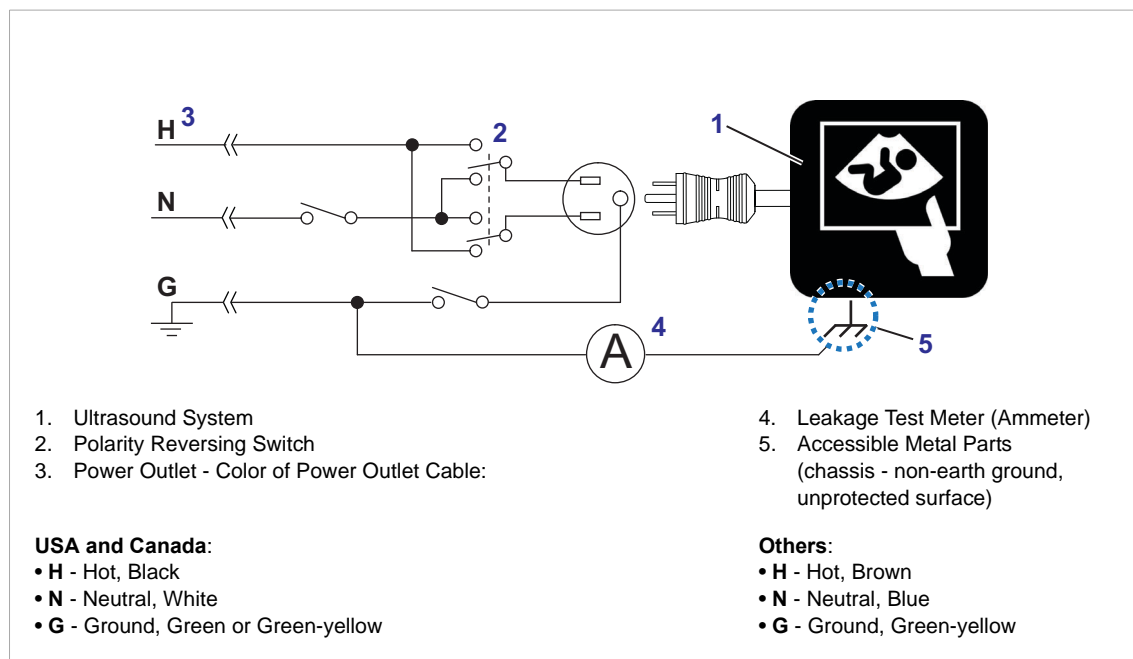• **G** - Ground, Green-yellow

Figure 10-3   Set Up for Test of Earth Leakage Current, UL60601-1/IEC60606-1 Clause 19

10-6-8   Isolated Patient Lead (Source) Leakage – Lead-to-Lead

When using any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551, switch the meter'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 10-11 on page 10-17

  or

- Table 10-12 on page 10-17

  as applicable.

Record the highest leakage current measured.

10-6-8-1   Lead-to-Lead Leakage Test Record

Table 10-16 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 10-11 on page 10-17

  or

- Table 10-12 on page 10-17

  as applicable.

Record all data on the EQC inspection certificate; also known as Patient Auxiliary Current.

1) Connect Safety analyzer to wall AC power outlet.

2) Plug the equipment under the test power cable into the receptacle on the meter'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 meter.

5) Test opening and closing the ground with the ultrasound system ON and OFF, as indicated in Table 10-11 on page 10-17 or Table 10-12 on page 10-17, as applicable.

NOTE: *Refer to the safety analyzer's user manual that will be used to perform the tests.*

Table 10-16   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-LA**	**LA-LL**	**LL-RA**
System Off	open			
System On (Transmit)	open			

10-6-9   Probe Leakage Current Test

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

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

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: *Some leakage current is expected on each probe, depending on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.*

10-6-9-2   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.

This test is also known as Patient Auxiliary Current.

1) Turn the Vivid S60/Vivid S70 **OFF**:

2) Connect Safety analyzer to wall AC power outlet.

3) Set the Safety analyzer's function switch to "Chassis" or "Enclosure Leakage".

4) Plug the Vivid S60/Vivid S70's power cord into the test meter.

5) Plug the Chassis Ground Probe (saline probe) into the test meter's "CHASSIS" connector.

6) Connect the Ultrasound Probe to the Vivid S60/Vivid S70.

7) Immerse the Saline Probe in the Saline Solution.

8) Immerse the face of the Ultrasound Probe (imaging area of the probe) into the saline bath.

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 10-11 on page 10-17, or Table 10-12 on page 10-17, as applicable for every probe.

The test passes when all readings measure less than the stated limits.

10) Keep a record of the results with other hard copies of maintenance data.

NOTE: *Refer to the safety analyzer's user manual that will be used to perform the tests.*

For each combination, the probe must be active to find the worst-case condition.
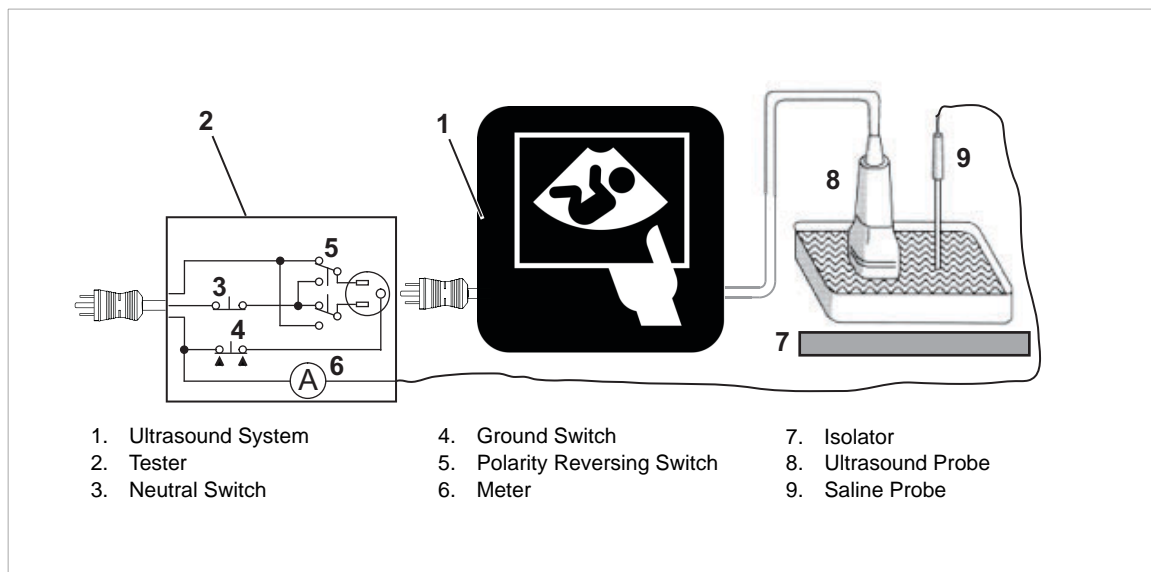
1. Ultrasound System
2. Tester
3. Neutral Switch
4. Ground Switch
5. Polarity Reversing Switch
6. Meter
7. Isolator
8. Ultrasound Probe
9. Saline Probe

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 Meter

NOTE: *Each probe will have some amount of leakage current, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.*

The ultrasound probe's imaging area is immersed in the Saline solution along with a grounding probe from the test meter to complete the current path.

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.*

Follow these steps to test each probe for leakage current:

1) Turn the Vivid S60/Vivid S70 OFF.

2) Plug the Ultrasound system's mains power cord into the test meter, and plug the test meter into the tested AC wall outlet.

3) Plug the Chassis Ground Probe (saline probe) into the test meter's "CHASSIS" connector.

4) Using any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551, switch the meter's function selector to the LEAD-LEAD position (or equivalent function in the device).

5) Connect the ultrasound probe to be tested to the Vivid S60/Vivid S70.

6) Put the saline probe and the ultrasound probe's probe face (imaging area of the probe) into the saline bath.

> ⚡ **DANGER**   TO AVOID PROBE DAMAGE AND POSSIBLE ELECTRIC SHOCK, DO NOT IMMERSE PROBES INTO ANY LIQUID BEYOND THE LEVEL INDICATED IN THE PROBE USERS MANUAL. **DO NOT TOUCH THE PROBE, CONDUCTIVE LIQUID OR ANY PART OF THE UNIT UNDER TEST WHILE DOING THE TEST**.

7) Power ON the Vivid S60/Vivid S70.

8) After the Vivid S60/Vivid S70 has completed the boot process, select the probe to be tested so it is the active probe.

9) Depress the LIFT GROUND rocker switch and record the highest current reading.

10) Follow the test conditions and test limits described in:

    •   Table 10-11 on page 10-17

        or

    •   Table 10-12 on page 10-17

        as applicable for every probe.

    The test passes when all readings measure less than the stated limits.

11) Keep a record of the results with other hard copies of maintenance data using Table 10-17 on page 10-28.

> ⚠ **CAUTION**   Equipment damage possibility. Never switch the Polarity or the status of the 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 leakage meter to avoid possible power supply damage.

    Table 10-17 shows a typical format for recording ultrasound probe source leakage current. Measurements should be recorded for each probe under the set of test conditions specified in:

    •   Table 10-11 on page 10-17

        or

    •   Table 10-12 on page 10-17

        as applicable.

NOTE: *Values in italics font are given as examples only.*

12) Record all data on the Inspection Certificate.

Table 10-17 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				
off	open				
on	closed				
on	open				

10-6-9-3   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:

A typical test setup for TEE probes could be as indicated in .
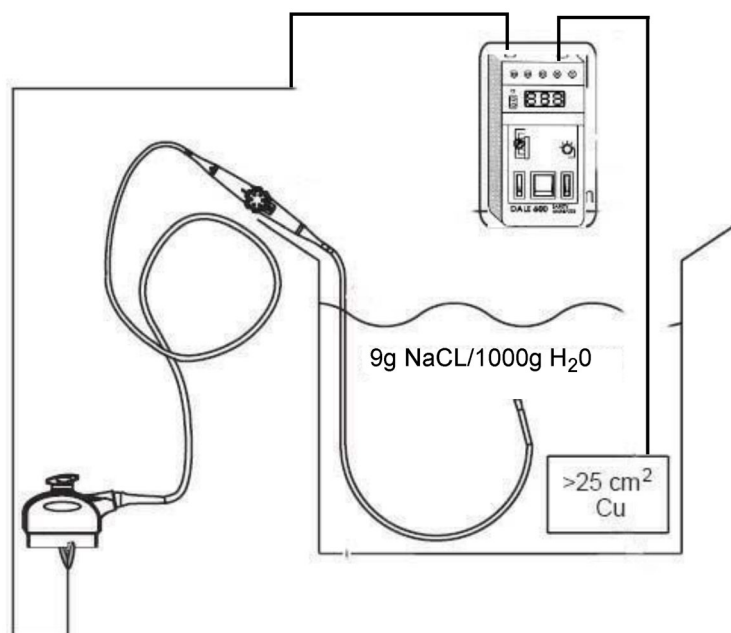
Figure 10-7   TEE Probe Leakage Isolation (Sink) Current Test

⚠️ **WARNING**   The handle of the TEE probes must <u>not</u> be immersed.

The test passes when the reading measure less than the values in:

- Table 10-13 on page 10-18.

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