Technical Publication

VIVID™ S60N AND VIVID™ S70N

Basic Service Manual

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Manufacturer:
GE Vingmed Ultrasound AS
Strandpromenaden 45
3191 Horten
NORWAY
Tel: (+47) 3302 1100 Fax: (+47) 3302 1350

Important Precautions

TRANSLATION POLICY

English (EN)

WARNING

This Service Manual is available in English only.

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

Français (FR)

AVERTISSEMENT

Ce manuel de maintenance est disponible en anglais uniquement.

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

Español (ES)

ADVERTENCIA

Este Manual de servicio está disponible en idioma inglés únicamente.

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

WARNUNG

Deutsch (DE)

Dieses Wartungshandbuch ist nur auf Englisch verfügbar.

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

AVVERTENZA

italiano (IT)

Il presente Manuale di assistenza è disponibile solo in inglese.

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

WAARSCHUWING

Nederlands (NL)

Deze servicehandleiding is alleen beschikbaar in het Engels.

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

ADVERTÊNCIA

Português (PT-BR)

Este Manual de Manutenção está disponível apenas em Inglês.

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

HOIATUS!

Eesti (ET)

Service Manual (Hooldusjuhend) on saadaval ainult ingliskeelsena.

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

OPOZORILO

Slovenščina (SL)

Ta servisni priročnik je na voljo samo v angleščini.

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

警告

日本語 (JA)

このサービスマニュアルは英語版のみ提供されています。

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

警告

简体中文 (ZH-CN)

本维修手册仅提供英文版。

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

VARNING

Svenska (SV)

Den här servicehandboken finns endast på engelska.

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

警告

繁體中文 (ZH-TW)

此服務手冊僅推出英文版。

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

경고

한국어 (KO)

이 서비스 설명서는 영어로만 제공됩니다.

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

ПРЕДУПРЕЖДЕНИЕ

На русском языке (RU)

Данное руководство по обслуживанию доступно только на английском языке.

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

OSTRZEŻENIE

Polski (PL)

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

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

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά (EL)

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

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

FIGYELMEZTETÉS

Magyar (HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

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

VAROVANIE

Slovenčina (SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

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

VÝSTRAHA

česky (CZ)

Tato servisní příručka je k dispozici pouze v angličtině.

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

UYARI

Türkçe (TK)

Servis Kılavuzu yalnızca İngilizce olarak mevcuttur.

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

ADVARSEL

Dansk (DA)

Denne servicemanual fås kun på engelsk.

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

ADVARSEL

Norsk (NO)

Denne servicehåndboken er bare tilgjengelig på engelsk.

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

VAKAVA VAROITUS

Suomi (FI)

Tämä huolto-opas on saatavana vain englanniksi.

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

ПРЕДУПРЕЖДЕНИЕ

Български (BG)

Настоящото Сервизно ръководство се предлага само на английски език.

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

AVERTISMENT

Română (RO)

Acest manual de service este disponibil doar în engleză.

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

UPOZORENJE

Hrvatski (HR)

Ovaj servisni priručnik dostupan je samo na engleskom jeziku.

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

ĮSPĖJIMAS

Lietuvių k. (LT)

Šis priežiūros vadovas galimas tik anglų kalba.

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

BRĪDINĀJUMS

Latviski (LV)

Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.

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

UPOZORENJE

Srpski (SR)

Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.

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

AVISO

Português (Portugal) (PT-PT)

Este manual de assistência está disponível apenas em inglês.

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

ПОПЕРЕДЖЕННЯ

Українська (UK)

Цей посібник із технічного обслуговування доступний лише англійською мовою.

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

PERINGATAN

Bahasa Indonesia (ID)

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

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

คำเตือน

ไทย (TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

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

CẢNH BÁO

Tiếng Việt (VI)

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

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

ЕСКЕРТУ

Қазақ тілінде (KK)

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

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

BABALA

Tagalog (TL)

Available lamang sa Ingles ang Manwal ng Serbisyong ito.

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

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.**

DANGER **Do not attempt to disassemble or alter any part of the Ultrasound system including the probe, the AC/DC adapter and accessories.**

Disassembly or modification may result in electrical shock.

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

TRADEMARKS

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Revision History

Revision	Date (YYYY-MM-DD)	Reason for change
1	2019-06-07	Initial version of manual.
2	2020-10-01	Updated content. Added description for eDelivery.

List of Effected Pages (LOEP)

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	2	3-1 to 3-70	2	8-1 to 8-208	2
Important Precautions -i to -xvi	2	4-1 to 4-44	2	9-1 to 9-28	2
TOC	2	5-1 to 5-30	2	10-1 to 10-34	2
1-1 to 1-30	2	6-1 to 6-4	2	Back Cover	N/A
2-1 to 2-16	2	7-1 to 7-18	2		

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CHAPTER 1
Introduction

CHAPTER 2
Site Preparations

CHAPTER 3
System Setup

CHAPTER 4
General Procedures and Functional Checks

CHAPTER 5
Components and Function (Theory)

CHAPTER 6
Service Adjustments

CHAPTER 7
Diagnostics/ Troubleshooting

CHAPTER 8
Replacement Procedures

CHAPTER 9
Renewal Parts

CHAPTER 10
Care and Maintenance

Chapter 1
Introduction

Section 1-1
Overview

1-1-1 Purpose of Chapter 1

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

1-1-2 Contents in this Chapter

Section 1-2
Service Manual Overview

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

1-2-1 Contents in this Service Manual

The service manual is divided into ten chapters.

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

Table 1-1 Contents in this Service Manual

CHP NUMBER	TITLE	DESCRIPTION
Chapter 1	Introduction	Contains a content summary and warnings.
Chapter 2	Site Preparations	Contains pre-setup requirements for the Vivid™ S60N/ Vivid™ S70N 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™ S60N/Vivid™ S70N ultrasound scanner.
Chapter 7	Diagnostics/ Troubleshooting	Provides instructions for setting up and running diagnostic, troubleshooting and other related routines for the Vivid™ S60N/ Vivid™ S70N 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™ S60N/Vivid™ S70N ultrasound scanner.
Chapter 10	Care and Maintenance	Provides periodic maintenance procedures for the Vivid™ S60N/ Vivid™ S70N ultrasound scanner.

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

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

This manual is intended for the following categories of users:

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

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

Table 1-2 Vivid™ S60N/S70N Models

Product	Cat No.	Part Number	Description
Vivid S70N v204 CHN	H45601TP	BC000800	Vivid™ S70N ultrasound imaging scanner
Vivid S70N v204 NOR	H45601TR	FR000800	Vivid™ S70N ultrasound imaging scanner
Vivid S60N v204 CHN	H45601TQ	BC000810	Vivid™ S60N ultrasound imaging scanner
Vivid S60N v204 NOR	H45601TS	FR000810	Vivid™ S60N ultrasound imaging scanner

1-2-4 Product Description

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

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

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

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

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

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

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

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

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

Section 1-3
Important Conventions

1-3-1 Conventions Used in this Manual

1-3-1-1 Model Designations

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

1-3-1-2 Icons

Pictures, or icons, are used wherever they will reinforce the printed message. The icons, labels and conventions used on the product and in the service information are described in this chapter.

1-3-1-3 Safety Precaution Messages

Various levels of safety precaution messages may be found on the equipment and in the service information. The different levels of concern are identified by a flag word that precedes the precautionary message. Known or potential hazards to personal are labeled in one of three ways:

- DANGER
- WARNING
- CAUTION

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

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

WARNING ***Warning is used to indicate the presence of a hazard that may cause severe personal injury or substantial property damage if instructions are ignored.***

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

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

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

1-3-2 Standard Hazard Icons

Important information will always be preceded by the exclamation point ⚠ contained within a triangle, or the symbols for “Danger”, “Warning” or “Caution”, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could cause harm. Even if a symbol isn’t used in this manual, it may be included for your reference.

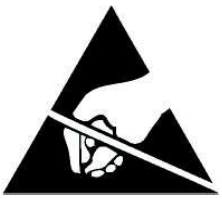
Table 1-3 Standard Hazard Icons

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	**HEAT**	**PINCH**
		 OR 

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

NOTE: The Vivid S60N/Vivid S70N system has no unintended or motorized moving parts that could cause pinching; all moving parts are mechanically operated by the user.
Pay attention to move such parts carefully (e.g. monitor 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 S60N/Vivid S70N Training Seminar are authorized to service the equipment.

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

DANGER **Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing and adjusting.**

DANGER **Do not attempt to disassemble or alter any part of the Ultrasound system including the probe, the AC/DC adapter and accessories.**

Disassembly or modification may result in electrical shock.

WARNING ***If the covers are removed from an operating VIVID S60N/VIVID S70N system, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shut down mode.***

WARNING ***Because of the limited access to cabinets and equipment in the field, placing people in awkward positions, ge has limited the lifting weight for one person in the field to 16 kg (35 lbs). Anything over 16 kg (35 lbs) requires 2 people.***

WARNING ***Have two people available to deliver and unpack the VIVID S60N/VIVID S70N system. attempts to move the unit considerable distances or on an incline by one person could result in injury or damage or both.***

WARNING ***Use all personal protection equipment (PPE) such as gloves, safety shoes, safety glasses, and kneeling pad, to reduce the risk of injury.***

WARNING ***Explosion Warning***

Do not operate the equipment in an explosive atmosphere. operation of any electrical equipment in such an environment constitutes a definite safety hazard.

WARNING ***Do not substitute parts or modify equipment***

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the equipment.

WARNING ***When the top console is in its locked position, the gas shock is compressed and stores mechanical energy. During normal operation, the top console, the weight of the monitor and the mechanical force of the gas shock are in balance. Take care if/when you activate this gas shock. Personal injury can occur after the panel is removed and the shock pressure is released. Take care when you repair the elevation assembly.***

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

CAUTION **Use safety shoes when doing work where there is any chance of foot damage.**

CAUTION **Use Protective Gloves when drilling and cutting.**

1-4-3 Mechanical Safety

DANGER **WHENEVER THE UNIT IS TO BE MOVED ALONG ANY INCLINE, USE EXTREME CAUTION. MAKE SURE THAT THE VIVID™ S60N/S70N SCANNER AND ALL PERIPHERALS ARE SECURELY MOUNTED IN PLACE BEFORE ATTEMPTING TO MOVE IT.**

DANGER ***ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.***

DANGER ***NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.***

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.***

CAUTION **The Vivid™ S60N/Vivid™ S70N ultrasound scanner weighs 75kg (165 lbs.) or more, depending on carry-on peripherals when ready for use.**
Care must be used when moving the unit or replacing its parts. Failure to follow the precautions listed could result in injury, uncontrolled motion and costly damage.
Always:

- **Use two people when moving on inclines or lifting more than 16 kg (35 lbs)**
- **Use the handle to move the system**
- **Be sure the pathway is clear**
- **Use slow, careful motions**
- **Do not let the system strike walls or door frames**
- **When moving the system on inclines, make sure that the Vivid S60N/Vivid S70N scanner and all peripherals are securely mounted in place before attempting to move the scanner.**
- **The rear handle should only be used for pushing the system. Do NOT use it for pulling the ultrasound scanner (in any direction) as this may cause the system to become unstable in the event of colliding with obstacles.**

WARNING ***The system should not be moved with the operating panel extended. position the operating panel in its centered and locked position. Lower the operating panel as much as possible before moving the system. See 5-4-5 "System Positioning for Transportation" on page 5-11 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 5-4-5 "System Positioning for Transportation" on page 5-11 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 5-11 illustrating system in Transportation Mode.*

CAUTION DO NOT TRANSPORT THE VIVID S60N/VIVID S70N SYSTEM IN A VEHICLE WITHOUT LOCKING THE CASTERS (WHEELS)
See Figure 5-7 on page 5-11 illustrating system in Transportation Mode.

WARNING *EQUIPMENT DAMAGE COULD RESULT IF SPECIAL CARE IS NOT TAKEN WHEN TRANSPORTING THE VIVID S60N/VIVID S70N SYSTEM IN A VEHICLE.*
See Figure 5-7 on page 5-11 illustrating system in Transportation Mode.

ALWAYS:

- Eject any media from the media storage devices DVD, MOD (if installed).
- Ensure that monitor is in folded and locked position.
- Ensure that the Vivid S60N/Vivid S70N system is well prepared and packed in its original packaging before transporting. Special care must be taken to correctly position the packing material, using all screws and brackets.
  For further information, refer to Chapter 3 - System Setup.
- Place the probes in their carrying case.
- Secure the system in an full down position and lock the wheels (brake).
- Ensure that the Vivid S60N/Vivid S70N system is firmly secured while inside the vehicle.
- Secure the system with straps or as directed otherwise to prevent motion during transport.
- Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds, and erratic stops or starts.

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

1-4-4 Electrical Safety

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

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

The power outlet used for this equipment should not be shared with other types of equipment. Both the system power cable and the power connector must meet international electrical standards.

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

1-4-4-1 Probes

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

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

Follow these guidelines before connecting a probe to the scanner:

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

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

1-4-4-2 Peripherals

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

WARNING ***Environmental Dangers***

All devices meeting IEC/EN 62368-1 or IEC/EN 60950-1 must be kept outside the patient environment as defined in IEC/EN 60601-1 Clause 16, unless the devices, according to IEC/EN 60601-1 Clause 16, are equipped with the following:

A) Additional fixed earth protection

or:

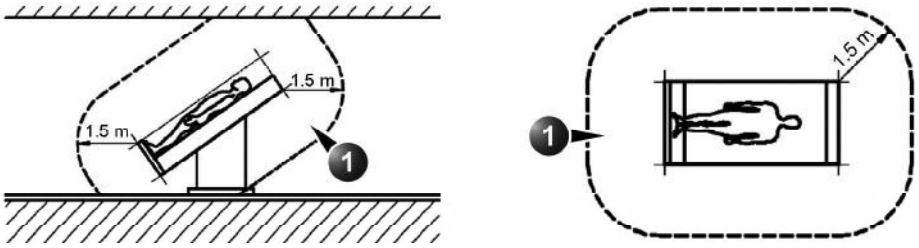
B) An extra isolating transformer

WARNING ***Commercial devices such as laser cameras, printers, VCRs and external monitors, usually exceed allowable leakage current limits and, when plugged into separate AC outlets, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets, or the provision of extra protective earth for the device, is required in order to meet IEC/EN 60601-1 Clause 16 standards for electrical leakage.***

1-4-4-2-2 Patient Environment IEC/EN 60601-1

Sub Clause 3.79 and figure A.9 from IEC/EN 60601-1

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



1. Patient environment

Figure 1-1 Example of Patient Environment

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

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

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

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

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

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

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

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

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

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

1-4-6 Patient Data Safety

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

Section 1-5
Dangerous Procedure Warnings

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

DANGER 

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing and adjusting.

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.

DANGER

Do not attempt to disassemble or alter any part of the Ultrasound system including the probe, the AC/DC adapter and accessories.

Disassembly or modification may result in electrical shock.

WARNING

If the covers are removed from an operating VIVID S60N/VIVID S70N system, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shut down mode.

WARNING 

Explosion warning

Do not operate the equipment in an explosive atmosphere.

Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

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.

	ENERGY CONTROL AND POWER LOCKOUT FOR VIVID™ S60N/S70N. 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™ S60N/Vivid™ S70N ultrasound scanner comes equipped with product labels and icons. These represent pertinent information regarding the operation of the unit.

1-7-1 Universal Product Labels

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

1-7-1-1 System Rating Label

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

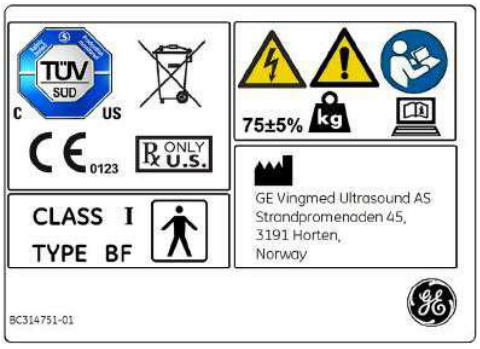
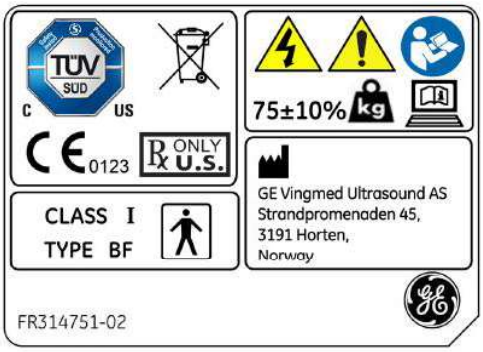
Table 1-5 Rating Label

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

1-7-1-2 General Label

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

Table 1-6 General Label

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

1-7-2 Label Descriptions

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

Table 1-7 Label Icons and Symbols - Description and Location, sheet 1 of 5

Label	Purpose	Location	Standard
Identification Plate	Manufacturer's name and address Model Device Listing/Certification Labels	Rear	N/A - by GE Healthcare
	On/Off button **Warning: System shutdown using the On/Off button does not disconnect the ultrasound system from mains voltage.** For disconnecting the ultrasound system 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	IEC 60417-5010
	Equipment Type BF, in which protection against electric shock does not rely on basic insulation only. Provides additional safety precautions such as double insulation or reinforced insulation, because there is no provision for protective earthing or reliance upon installation conditions.	Probes / Rear of system.	IEC 60417-5333
	Defibrillator-proof Type CF equipment	ECG connector	IEC 60417-5336
	Indicates that the product is in compliance with all relevant European Directives and under surveillance by Notified Body 0123.	Rear of system	N/A - by certification body
	For USA only: **Caution: Federal law restricts this device to sale by or on the order of a physician.**	Rear of system.	N/A- by GE Healthcare
	TÜV SÜD Classification Label.	Rear of the system.	N/A- by certification body

Table 1-7 Label Icons and Symbols - Description and Location, sheet 2 of 5

Label	Purpose	Location	Standard
	Mark name: "Eurasian Conformity" mark; the single conformity mark for circulation of products on the markets of member- states of Customs Union. Mark meaning: This product passed all conformity assessment (approval) procedures that correspond to the requirements of applicable technical reguations of the Customs Union.	Rear of the system.	N/A- by certification body
	GOST-R Mark: per Law of the Russian Federation No. 184-FZ.	Rear of system.	N/A- by certification body
	Non-ionizing electromagnetic radiation.	Rear of system.	IEC 60417-5140
	Alternating current	Various	IEC 60417-5032
	Protective earth (ground)	Internal	IEC 60417-5019
	Equipotentiality: Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Peripherals.	IEC 60417-5021
	Follow instructions for use. Read and understand all instructions in the User's Manual before attempting to use the ultrasound system.	Rear of the system.	ISO 7010-M002
	Symbol indicating that the Instructions for Use are supplied in electronic form.	Rear of system.	ISO 7000-1641
	CAUTION - Dangerous voltage: Used to indicate electric shock hazards.	Rear of system. Various.	ISO 7010-W012

Table 1-7 Label Icons and Symbols - Description and Location, sheet 3 of 5

Label	Purpose	Location	Standard
	Attention - Consult accompanying documents: Alerts the user to refer to the user documentation when complete information cannot be provided on the label.	Various.	ISO 7010-W001
	The system is not designed for use with flammable anesthetic gases.	Rear of system	N/A- by GE Healthcare
	CAUTION - Do not push the system sideways when casters are in break position. Instability may occur.	Top console (both sides).	ISO 7010-P017
	DO NOT place objects on the surface of the rear of the LCD Panel while folded.	Display rear panel.	ISO 7010-P012
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact the manufacturer or other authorized disposal company to decommission your equipment. The disassembly and parts disposition procedure is located on the card cage front cover. To access to the procedure, remove the right side panel.	Rear of system.	EN 50419
	System weight	Rear of system	N/A- by GE Healthcare
	Date of manufacture: The date could be a year, year and month, or year, month and day, as appropriate. See ISO 8601 for date formats.	Rear of system.	ISO 7000-2497
	Manufacturer name and address	Rear of system.	ISO 7000-3082
	Serial number.	Rear of the system.	ISO 7000-2498
	Brand and model identifier	Rear of system.	ISO 7000-3082
	Unique Device Identification (UDI). Every system has a unique marking for identification. Scan or enter the UDI information into the patient health record as required by governing laws.	Rear of system.	N/A - by GE Healthcare

Table 1-7 Label Icons and Symbols - Description and Location, sheet 4 of 5

Label	Purpose	Location	Standard
P/N	Device part number identifier	Rear of system	N/A - by GE Healthcare
Assembled in XXXXX (XXXXX represents the country name)	Identify the Customs Country of Origin of the materials.	Rear of system	N/A - by GE Healthcare
	To indicate the acceptable upper and lower limits of atmospheric pressure for transport and storage.	Package labeling	ISO 7000-2621
	To identify the temperature limits, for example on transport packaging to indicate limits within which the package has to be kept and handled. The temperature values may be shown adjacent to the symbol.	Package labeling	ISO 7000-0632
	To indicate the acceptable upper and lower limits of relative humidity for transport and storage.	Package labeling	ISO 7000-2620
	On transport packaging. To indicate that the items are not to be vertically stacked.	Package labeling	ISO 7000-2402
	On transport packaging. To indicate the correct upright position.	Package labeling	ISO 7000-0623
	On transport packaging. To indicate that the content of the package is fragile and that the package must be handled with care.	Package labeling	ISO 7000-0621
	On transport packaging. To indicate that the package must be handled with care.	Package labeling	N/A
	On transport packaging. To indicate that the package must be kept in dry conditions.	Package labeling	ISO 7000-0626
	TUV Rheinland INMETRO	Rear of system and package labeling	N/A - by certification body

Table 1-7 Label Icons and Symbols - Description and Location, sheet 5 of 5

Label	Purpose	Location	Standard
	Precaution intended to prevent injury that may be caused by the weight of the system if one person attempts to move it considerable distances, or on an incline.	Service documentation	N/A - by GE Healthcare

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

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

1-7-3-1 GND Label

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

Figure 1-2 GND Label

Section 1-8
Returning/Shipping Probes and Repair Parts

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

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

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

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

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

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

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

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

Section 1-9
EMC, EMI, and ESD

1-9-1 Electromagnetic Compatibility (EMC)

Electromagnetic compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings, including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due to interference from its environment, or when the device produces unacceptable levels of emission. This interference is often referred to as radio–frequency or electromagnetic interference (RFI/EMI) and can be radiated through space or conducted over interconnecting power or signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

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

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

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

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

1-9-2 CE Compliance

The Vivid™ S60N/Vivid™ S70N ultrasound scanner conforms to all applicable conducted and radiated emission limits and to immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

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

NOTE: For EMC Guidance and Manufacturer's Declarations, refer to the tables provided in *Electrostatic Discharge (ESD) Prevention on page 1 - 27**.*

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

1-9-3 Electrostatic Discharge (ESD) Prevention

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

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

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

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

1-9-4 General Caution

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

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

Section 1-10
Customer Assistance

1-10-1 Contact Information

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

Prepare the following information before you call:

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

NOTE: Restart the application before resuming clinical scanning.

See also:

- Phone Numbers for Customer Assistance on page 1 - 29
- Phone and Fax Numbers for Manufacturer on page 1 - 30

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

Table 1-8 Phone Numbers for Customer Assistance

LOCATION	NUMBER	
USA GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive (RP-2123) Wauwatosa, WI 53226, USA	Service	TEL: 1-800-437-1171
	Service Parts	TEL: 1-800-558-2040
	Online Center	TEL: 1-800-321-7937
	Application Support	TEL: 1-800-682-5327
		TEL: 1-262-524-5698
Canada	Service	TEL: 1-800-668-0732
	Online Center	TEL: 1-800-321-7937
	Application Support	TEL: 1-262-524-5698
Latin America	Service	TEL: +1-262-524-5300
	Application Support	TEL: +1-262-524-5698
EUROPE Ultrasound Europe GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	Support	TEL: +49 (0) 212 2802 652
		FAX: +49 (0) 212 2802 431
Online Services Ultrasound Africa	Algeria Service Center	TEL: +(213) 2179 1212
	Egypt Service Center	TEL: +(202) 232 28410
Online Services Ultrasound EGM	Saudi Service Center	TEL: +(966) 800 124 3002
	UAE Service Center	TEL: +(971) 800 3646
Asia (Singapore) GE Ultrasound Asia Service Department – Ultrasound 298 Tiong Bahru Road #15-01/06 Central Placa Singapore 168730	Service Department	TEL: +65 6291-8528
		TOLL FREE: 800-101-2882
		FAX: +65 6291-7006
Japan	Online Center	TEL: +81 42-846-9011
		FAX: +81 42-648-2905
Korea	Online Center	TEL: +(82) 1544-6119
China	Technical Support	TEL: +(86) 800-810 8188 TEL: +(86) 400-812 8188
India	Technical Support	TEL: 1-800-425-8025 TEL: 1-800-425-7255 TEL: 1-800-102-7750
ANZ	Online Services	TEL: +61 1800 659 465

1-10-1-2 Phone and Fax Numbers for Manufacturer

Table 1-9 Phone and Fax Numbers for Manufacturer

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

Chapter 2
Site Preparations

Section 2-1
Overview

2-1-1 Purpose of Chapter 2

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

Section 2-2
Console Requirements

2-2-1 Unit Environmental Requirements

2-2-1-1 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 — 95%	700 — 1060 hPa
Transport	-20 — +60°C (-4 — 140°F)	10 — 95%	700— 1060 hPa

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

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

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

2-2-2 Cooling Requirements

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

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

2-2-3 Lighting Requirements

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

2-2-4 Time and Manpower Requirements

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

CAUTION

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

2-2-5 Electrical Requirements

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

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

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

Sites with a mains power system without a defined Neutral:

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

NOTE: Please note that image artifacts can occur, if at any time within the facility, the Ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.

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

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

Table 2-2 Electrical Requirements

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

2-2-5-2 Inrush Current

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

Table 2-3 Inrush Current

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

2-2-5-3 Site Power Outlets

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

2-2-5-4 Mains Power Plug

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

2-2-5-5 Power Stability Requirements

- **Voltage drop-out**

  Max 10 msec

- **Power Transients**

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

2-2-6 EMI Limitations

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

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

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

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

2-2-7 EMI Prevention/Abatement

The following table lists recommendations for preventing EMI:

Table 2-4 EMI Prevention/ Abatement

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

2-2-8 Probe Environmental Requirements

Table 2-5 Probe Operation and Storage Temperatures

	Electronics
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 2-6 on page 2-15.) to verify that all the required steps have been completed.

Purchaser responsibilities include:

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

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

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

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

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

2-3-2 Mandatory Site Requirements

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

- A dedicated “hospital-grade” single branch power outlet of adequate amperage (see Table 2-2 on page 2-3.) that meets all local and national codes and is located less than 2.5 m (8.2 ft) from the unit’s proposed location. Refer to the *Electrical Requirements* section on page 2-3.
- A door opening of at least 0.54 m (1.77 ft) in width.
- The proposed location for the unit is at least 0.2 m (0.67 ft) from the walls, to enable cooling.
- Power outlet and place for any external peripheral are within 2 m (6.5 ft.) of each other with peripheral within 1 m of the unit to connect cables.
- Power outlets for other medical equipment and gel warmer.
- Power outlets for test equipment within 1 m (3.3 ft) of the ultrasound system.
- Clean and protected space for storage of probes (either in their case or on a rack).
- Material to safely clean probes (performed using a plastic container, never metal).
- In the case of a network option:
  - An active network outlet in the vicinity of the ultrasound system.
  - A network cable of appropriate length (regular Pin-to-Pin network cable).
  - An IT administrator who will assist in configuring the unit to work with your local network. A fixed IP address may be required when using DICOM. Refer to the form provided in Figure 2-5 on page 2-13 for network details that are required.

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

2-3-3 Site Recommendations

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

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

2-3-3-1 Recommended Ultrasound Room Layout

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

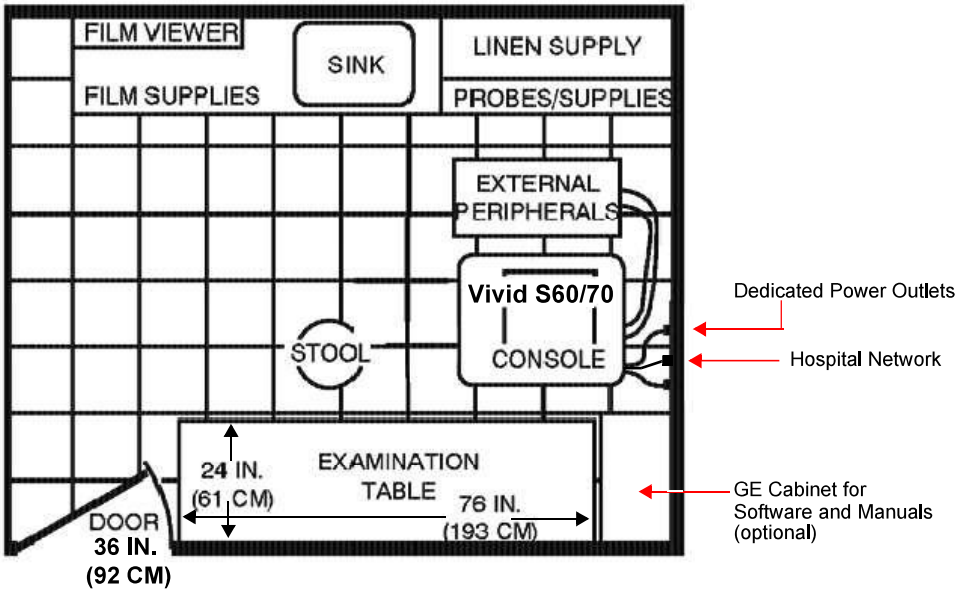
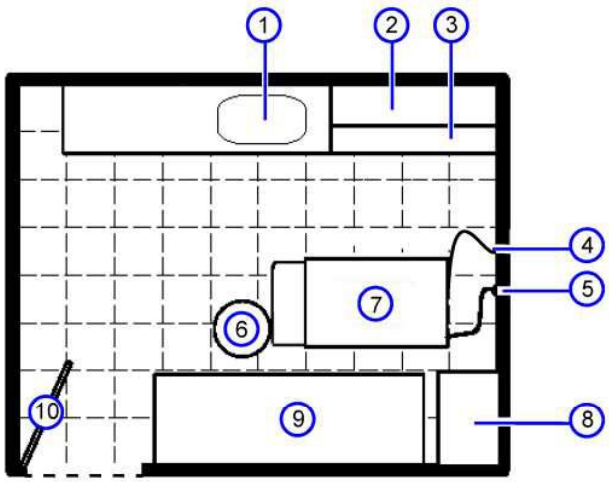


Figure 2-1 Recommended Floor Plan 4.3m x 5.2m (14 ft x 17 ft)

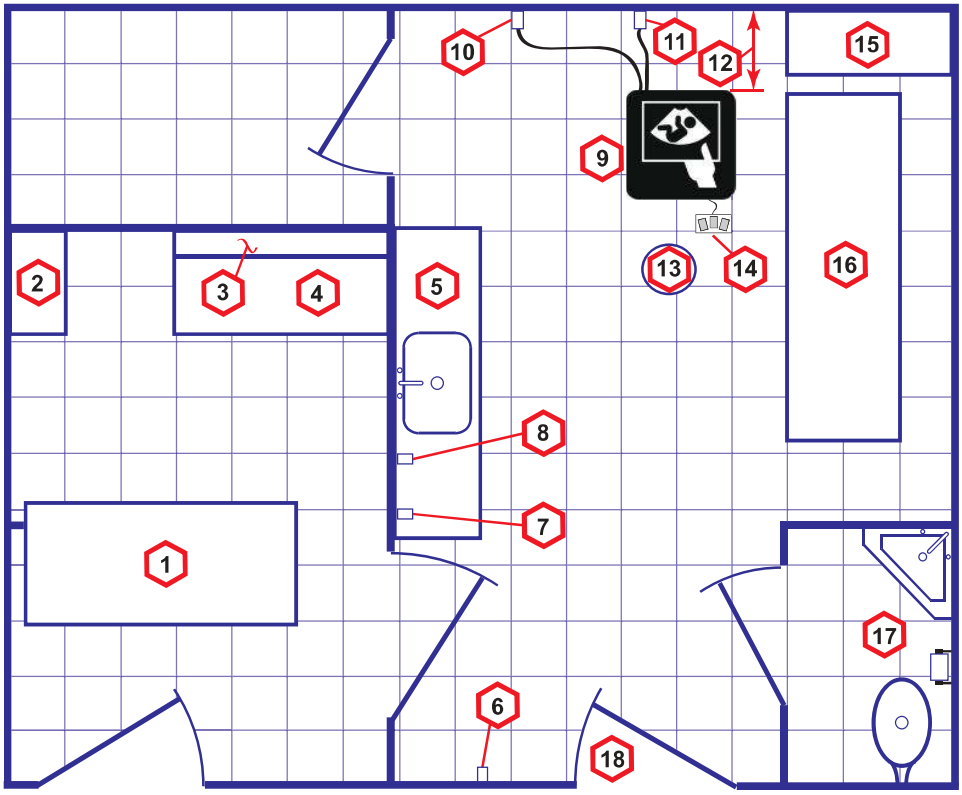
2-3-3-2 Minimal Floor Plan Suggestion



1. Sink
2. Linens
3. Probes / supplies
4. Ethernet Connector
5. Power outlet
6. Stool
7. Ultrasound system
8. GE cabinet for software and manuals (optional)
9. Examination table
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

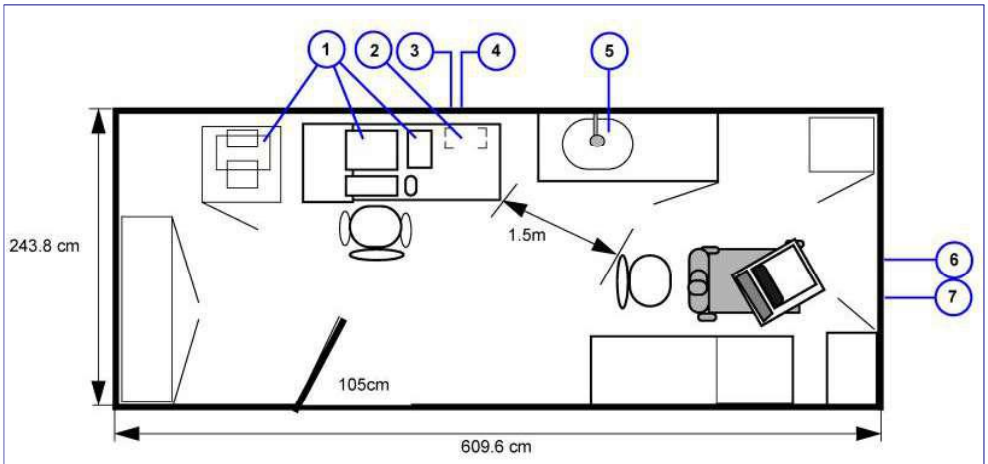


Scale: Each square equals one square foot (app. 31 x 31 cm)

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

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

2-3-4 Networking Pre-Installation Requirements

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

None.

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

Supported networks:

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

2-3-4-3 InSite™ requirements

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

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

2-3-4-4 Purpose of the DICOM Network Function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network. Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues. With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

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

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

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

Section 2-4
Connectivity Installation Worksheet

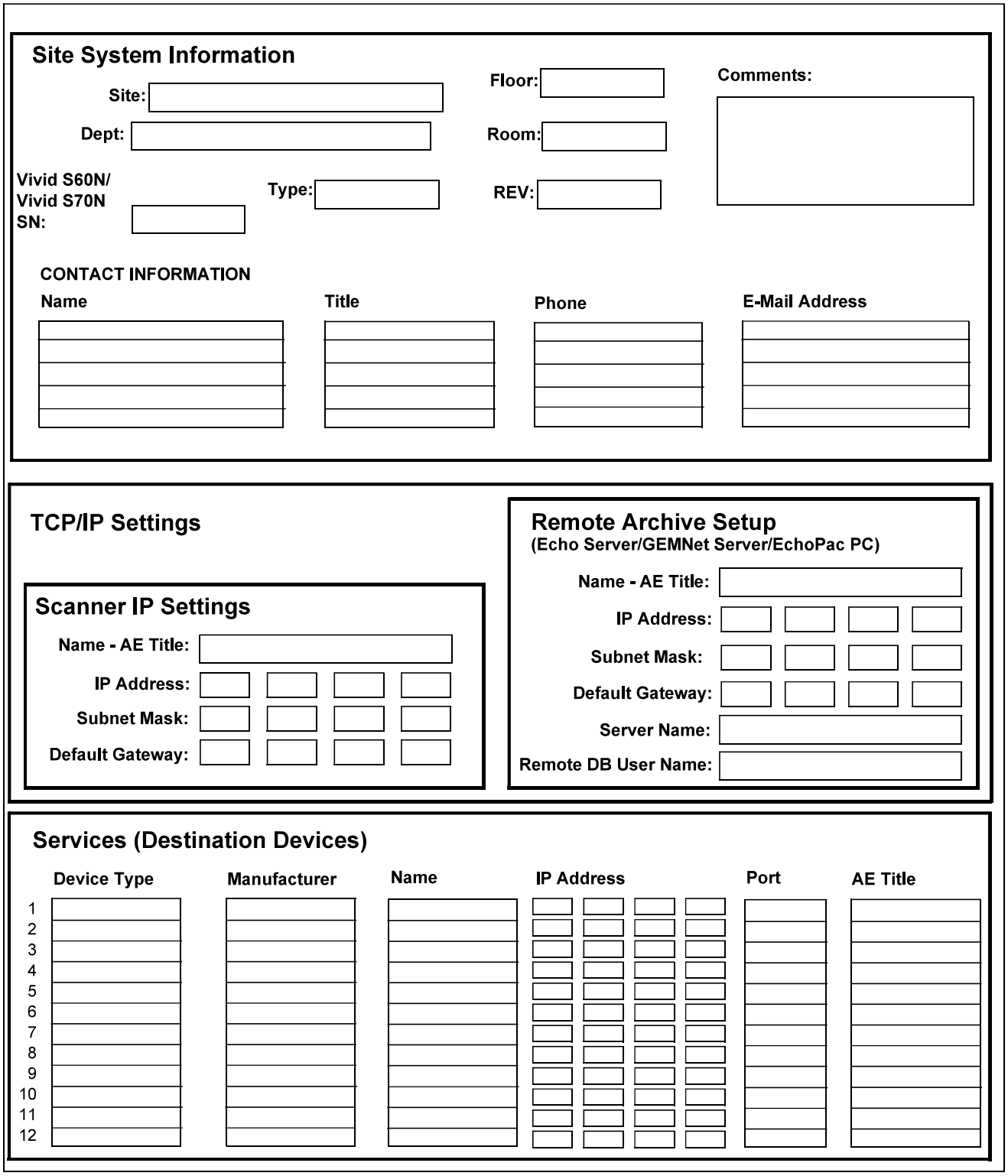


Figure 2-5 Connectivity Installation Worksheet

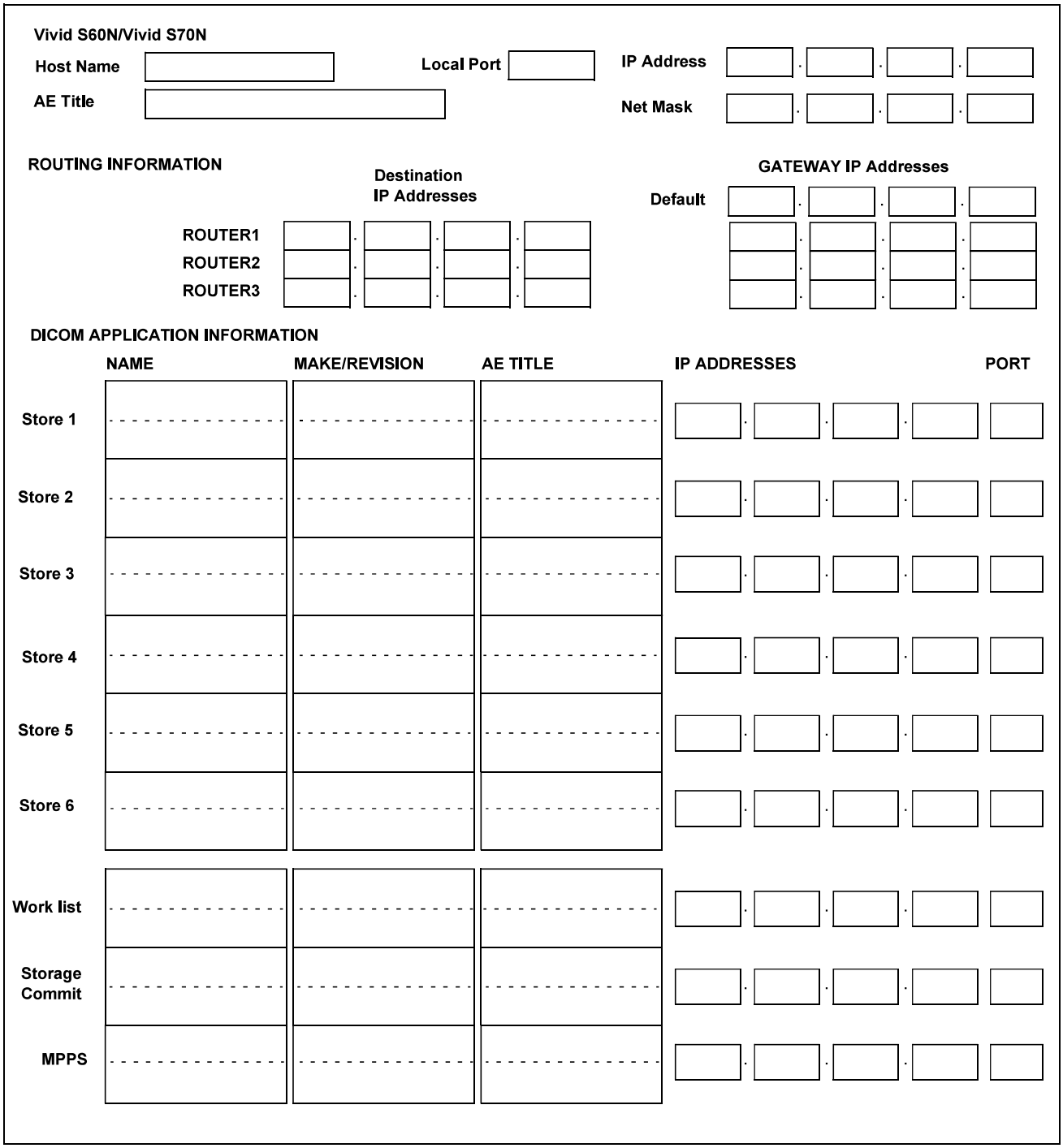


Figure 2-6 Worksheet for DICOM Network Information

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

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

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Chapter 3
System Setup

Section 3-1
Overview

3-1-1 Purpose of Chapter 3

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

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

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

Section 3-2
Setup Reminders

3-2-1 Average Setup Time

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

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

Table 3-1 Average Setup Time

Description	Average Setup Time	Comments
Unpacking the scanner	30 minutes	
Installing the scanner	4 hours or more	depending on the configuration
DICOM Option (connectivity)	2 hours or more	depending on the configuration
Installing InSite	30 minutes	
Encrypting the patient data	Up to several hours	While the system is undergoing encryption, it will not be available for use. It is highly recommended to perform disk encryption overnight or when the system is not needed for use for an extended period of time.

3-2-2 Setup Warnings

The Vivid S60N/Vivid S70N ultrasound scanner weighs 75 kg (165 lbs), without add-ons/peripherals. Two people are always required to unpack the system.

NOTE: 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.

3-2-2-1 System Acclimation Time

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

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

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

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

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

3-2-3 Safety Reminders

DANGER **WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DO NOT TOUCH THE UNIT!**

WARNING ***TWO PEOPLE ARE REQUIRED TO UNPACK THE SYSTEM AS IT IS HEAVY. TWO PEOPLE ARE ALWAYS REQUIRED WHENEVER A PART WEIGHING 16KG (35 LB.) OR MORE MUST BE LIFTED.***

CAUTION **IF THE UNIT IS VERY COLD OR HOT, DO NOT TURN ON POWER TO THE UNIT UNTIL IT HAS HAD SUFFICIENT TIME TO ACCLIMATE TO ITS OPERATING ENVIRONMENT.**

CAUTION **TO PREVENT ELECTRICAL SHOCK, CONNECT THE UNIT TO A PROPERLY GROUNDED POWER OUTLET.**

DO NOT USE A THREE-PRONG TO TWO-PRONG ADAPTER, AS THIS DEFEATS SAFETY GROUNDING.

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

CAUTION **DO NOT OPERATE THE UNIT UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE, TO ENSURE OPTIMAL SYSTEM PERFORMANCE AND COOLING. (WHEN COVERS ARE REMOVED, EMI MAY BE PRESENT).**

WARNING

ACOUSTIC OUTPUT HAZARD
ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE Vivid S60N/ Vivid S70N PORTABLE ULTRASOUND SCANNER IS WITHIN AIUM/NEMA STANDARDS AND FDA LIMITATIONS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.

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

Section 3-3
Receiving and Unpacking the Equipment

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

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

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

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

3-3-2 The Tilt indicators

3-3-2-1 Overview

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

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

Figure 3-1 Tilt indicator

3-3-2-2 If Tilt Indicator has triggered or is missing

The purpose of the tilt indicator label is to alert people handling a product that it is sensitive to tipping and it must remain upright at all times. It is basically an active “Up Arrow” that changes color if the package is tipped 89 degrees or more from horizontal. These labels can be false activated if tipped less than 89 degrees, and shocked or vibrated at the same time. This event does occur, but is considered uncommon. If a package is received with an activated tilt indicator label, there is high degree of certainty it tipped 89 degrees or more from horizontal during shipment.

An activated tilt indicator label does not indicate whether the package was simply “Tipped” (laid down with no impact shock) or “Tipped Over” (free fall, with an impact shock).

Table 3-3 Tilt Indicator has triggered or is missing

Step	Task
1	**If the Tilt Indicator is missing:** Note on the shipping papers at the time of receipt that the Tilt Indicator label is missing. **If the Tilt Indicator has triggered:** Note on the shipping papers at the time of receipt that the Tilt Indicator label was activated.
2	Inspect the product for possible concealed damage.

3-3-2-3 Position of the Tilt Indicators

The Tilt indicators have been attached to the transportation box as illustrated in the example below.

NOTE: The position of the Tilt Indicators varies depending on the package used.

NOTE: The illustrations are examples only; indicators actually supplied may be different from those illustrated.

Figure 3-2 Tilt indicators position (example)

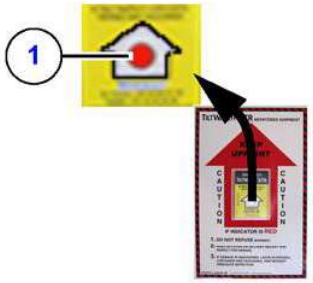
NOTE: Before cutting the straps, check the Tilt indicators to make sure they have not been triggered. If damaged (or missing), refer to: Table 3-3 "Tilt Indicator has triggered or is missing" on page 3-7.

3-3-3 Receiving the Vivid S60N/Vivid S70N

3-3-3-1 Examine all packages

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

Table 3-4 Examine all packages

Step	Task	Illustration
1	Is damage apparent? • If **YES**; continue with the instructions in Damage in transportation on page 3 - 8. • If **NO**; continue with the next step.	
2	Is the Tilt Indicator red colored inside the middle of the indicator? • If **YES**: The Tilt Indicator has been activated. Continue with the instructions in Damage in transportation on page 3 - 8 before you continue with the next step. • If **NO**: continue with the next step.	 **1 - Red Color**
3	Continue with the instructions in Unpacking the Vivid S60N/Vivid S70N on page 3 - 10.	

3-3-3-2 Damage in transportation

Follow this procedure if damage is apparent:

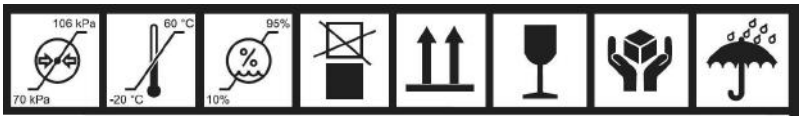
1.) Write “Damage in Shipment” on **ALL** copies of the freight or express bill **BEFORE** delivery is accepted or “signed for” by a GE representative or hospital receiving agent.

2.) Report the damage to the carrier.

- Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier.
- A transportation company will not pay a claim for damage if an inspection is not requested within this 14-day period.

3-3-3-3 Transportation box icons

Label used on package from Norway



Labels used on packages from China

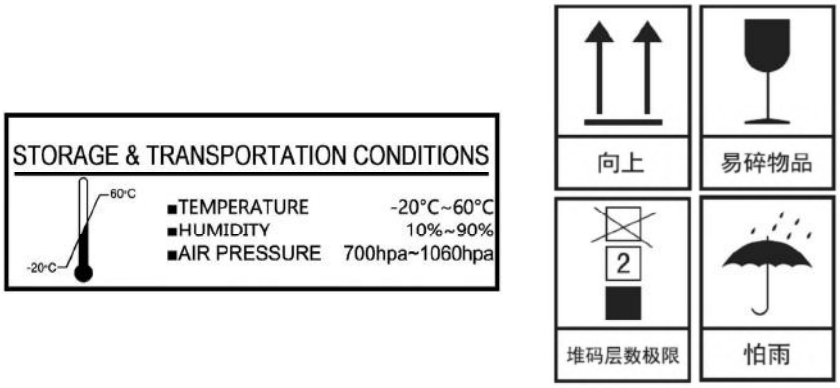


Figure 3-3 Additional Labels on Shipping Carton

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

3-3-4-1 Overview

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

Different shipping packages are in use for the shipment of Vivid S60N/Vivid S70N:

- shipping package, used for systems shipped from China
- shipping package, used for systems shipped from Norway

3-3-4-2 Unpacking the shipping package from China

3-3-4-2-1 Part List

Table 3-5 Part List for Ocean shipping package

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

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

3-3-4-2-2 Unpacking instruction - shipping package from China

Table 3-6 Unpacking instruction - shipping package from China, sheet 1 of 5

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

Table 3-6 Unpacking instruction - shipping package from China, sheet 2 of 5

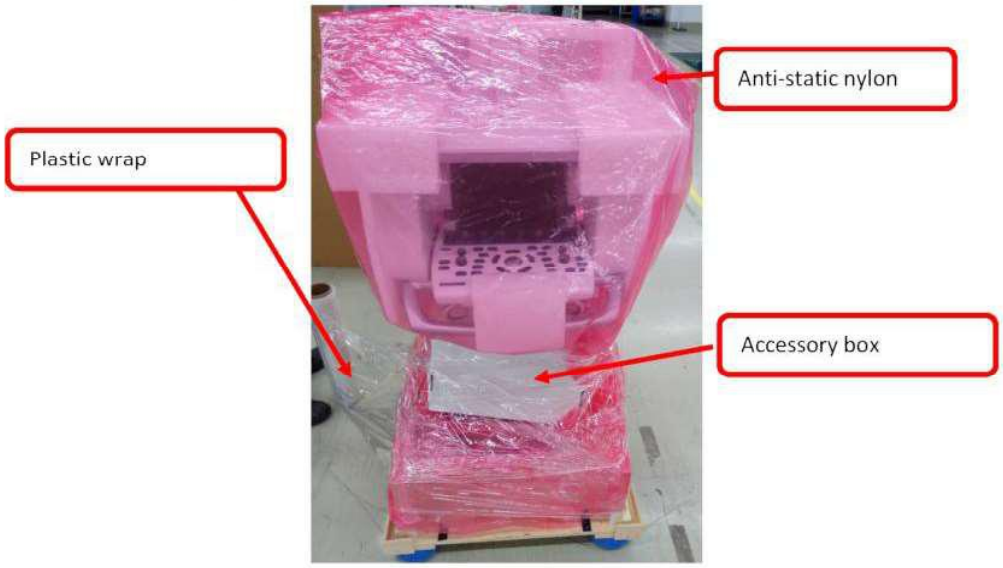
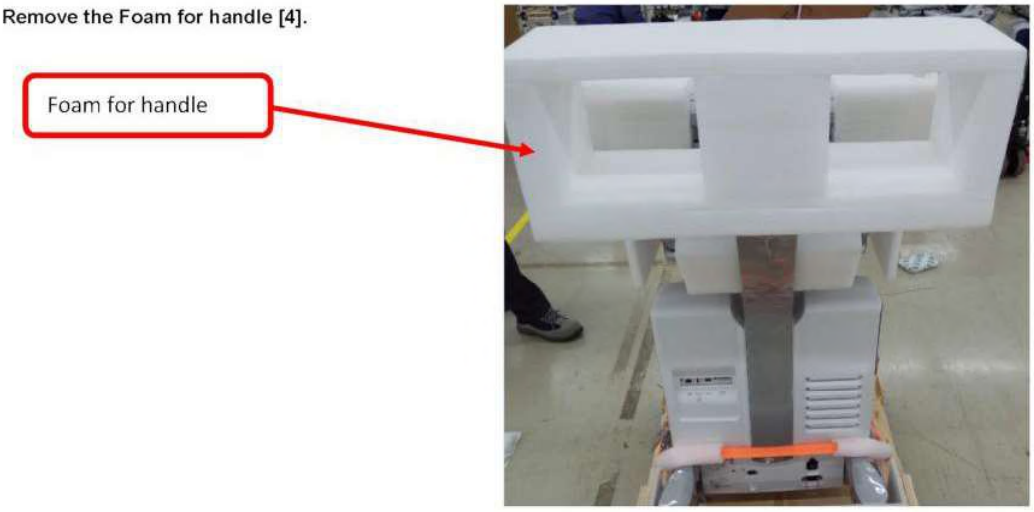
3.	Remove the plastic wrap, set aside the accessory box, and remove the anti-static nylon [10].  Figure 3-1
4.	Remove the Foam for handle [4]. 

Table 3-6 Unpacking instruction - shipping package from China, sheet 3 of 5

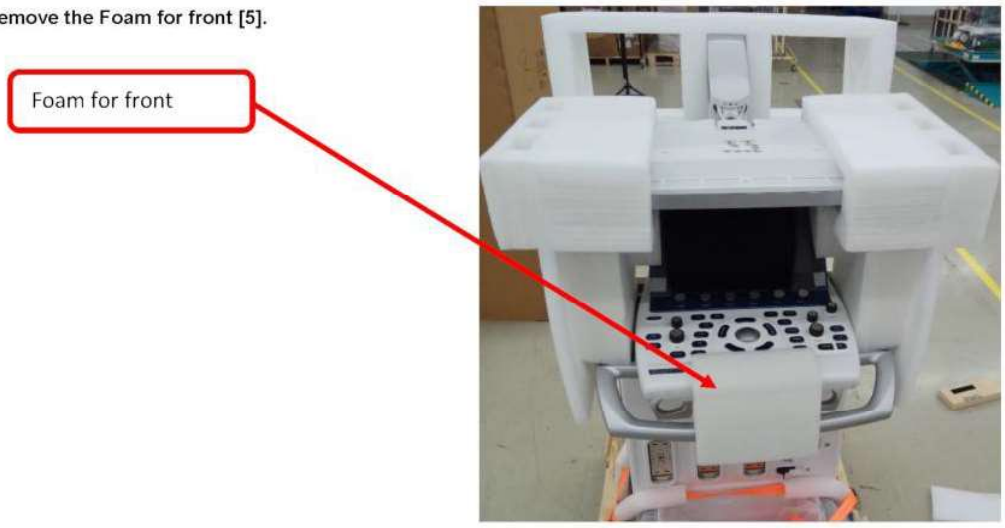
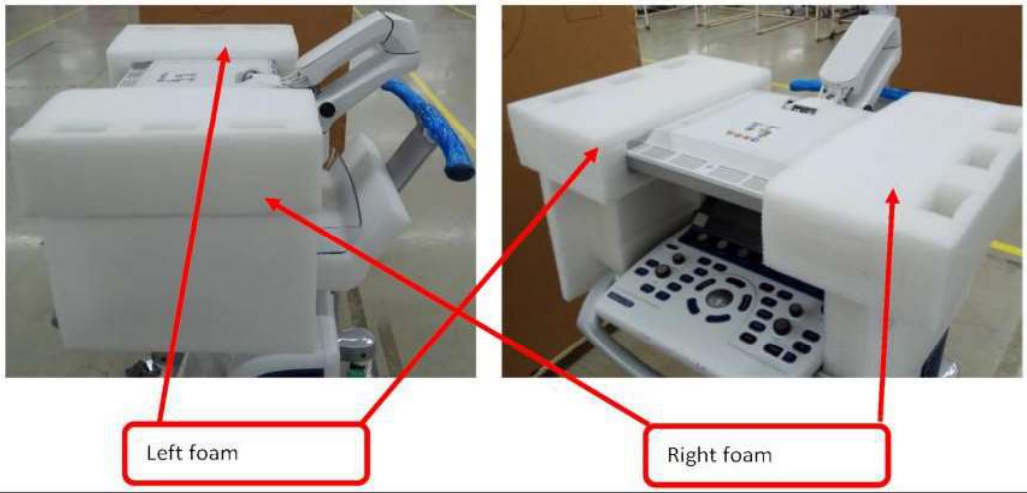
5.	Remove the Foam for front [5]. 
6.	Remove the Left foam [6] and Right foam [7]. 

Table 3-6 Unpacking instruction - shipping package from China, sheet 4 of 5

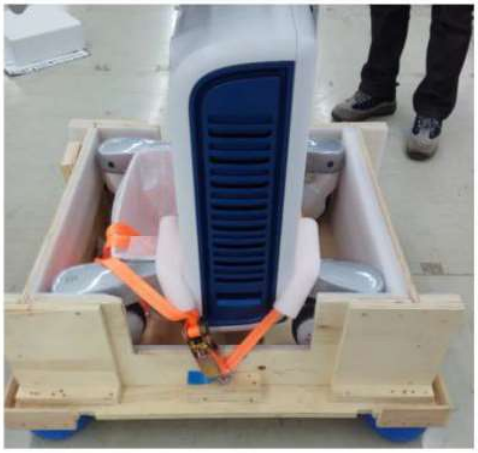
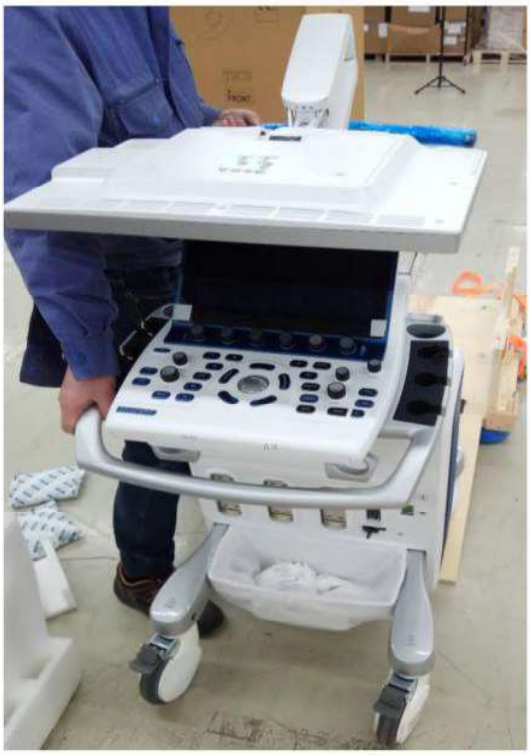
7.	Remove the Foam for plastic [8]. 
8.	Loosen the ratchet tightening belt [15] and detach it from the Pallet [1]. Unthread the 4x Foam tube [11].  

Table 3-6 Unpacking instruction - shipping package from China, sheet 5 of 5

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

3-3-4-3 Unpacking the shipping package from Norway

Table 3-7 Unpacking the shipping package from Norway, sheet 1 of 4

Step	Task	Illustration
1.	Cut the straps around the crate.	
2.	Remove the top cover.	
3.	Remove the accessory box.	
4.	Remove the side covers.	

Table 3-7 Unpacking the shipping package from Norway, sheet 2 of 4

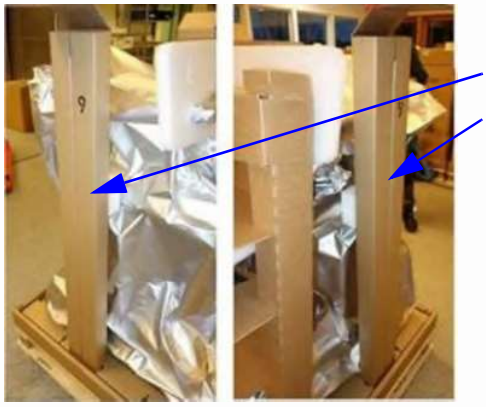
Step	Task	Illustration
5.	• Install the two exit ramp bases on the exit ramp (the rear plate). • Fold the complete exit ramp down.	
6.	Remove the left and right support.	

Table 3-7 Unpacking the shipping package from Norway, sheet 3 of 4

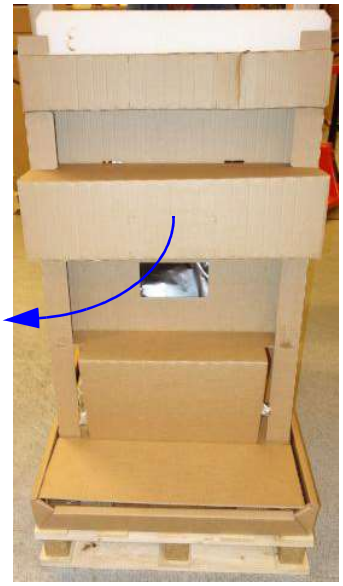
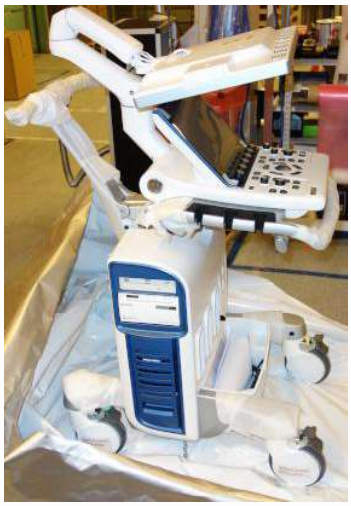
Step	Task	Illustration
7.	Remove the front protection.	
8.	Remove the monitor protection.	
9.	Pull corner of vacuum sealed bag away from unit and use scissors to remove the corner and allow air to enter the bag.	

Table 3-7 Unpacking the shipping package from Norway, sheet 4 of 4

Step	Task	Illustration
10.	Pull the bag well away from the unit and use scissors along the bag sealing lines to open the bag.	
11.	Move the bag as much as possible out of the way to prepare for unloading.	
12.	Unlock the casters (wheels).	
13.	Ensure that the ramp is installed and ready for use.	
14.	***Warning: Two persons are needed for this task!*** Carefully move the ultrasound system down the ramp, with rear end first.	
15.	• Assemble the empty transportation box and place all the filling inside the box before you close it. • Close the box, and store it for possible future use.	

3-3-4-3-1 Packing materials / recycling information - package from Norway

Table 3-8 Packing parts - package from Norway, sheet 1 of 2

Item	Description	QTY.	Material *)	Illustration	Weight
1.	Export pallet 1200 x 800	1	D		13 kg
2.	Complete base	1	A		7 kg
3.	Complete column left and right	2	A		1.4 kg
4.	Support for monitor	1	C		115 g
5.	Part not used.	NA	NA	NA	NA
6.	Complete front protection	1	B		1.15 kg
7.	Exit ramp	1	A		1.8 kg
8.	Frame	2	A		6.2 kg
9.	Exit ramp base	2	A		55 g

Table 3-8 Packing parts - package from Norway, sheet 2 of 2

Item	Description	QTY.	Material *)	Illustration	Weight
10.	Box for accessories	1	A		55 g
11.	Top cover 1140 x 755 x 150	1	A		1.45 kg
12.	Support plate, used to keep Front Protection in place if there are few or none probes included.	1	A		200 g
13.	Protectors for Top Cover	2	A		330 g
14.	Aluminum bag	1	E		
	) Material Type:	*A:*	*BB34bc with varnish C9068*		
		B:	*BB27c with varnish C9068*		
		C:	*PE foam, Stratocell*		
		D:	*Wood ISPM15*		
		E:	*Aluminum*		

3-3-5 Physical Inspection

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

If the ultrasound system has been damaged, please refer to:
DAMAGE IN TRANSPORTATION on page - xiii in the beginning of this manual.

3-3-5-1 System Voltage Settings

Verify that the system voltage requirements meet the available voltage on site, refer Electrical Requirements on page 2 - 3.

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

3-3-6 EMI Protection

The Vivid S60N/Vivid S70N ultrasound system has been designed to minimize the effects of Electro Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

Section 3-4
Preparing for Setup

3-4-1 Verifying Customer Order

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

3-4-2 Physical Inspection

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

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

3-4-3 Component Inspection

After verifying that all the required parts are included in the shipping crate, inspect the system components using the checklist supplied below. In addition, ensure that all the labels described in *Chapter 1 - Introduction* are present, accurate and in good condition, and enter the serial number printed on the main label into the system installation details card, as described in *Paperwork After Setup* on page 3-70.

3-4-3-1 Damage Inspection Checklist

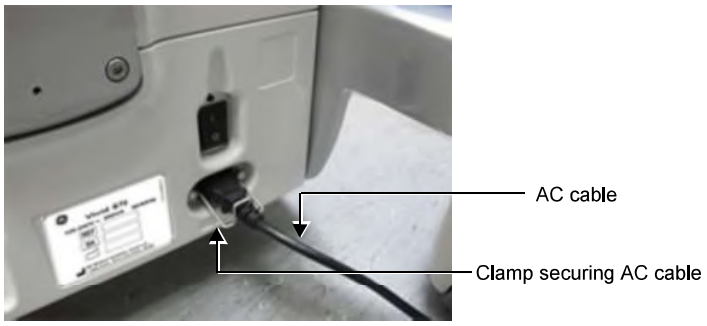
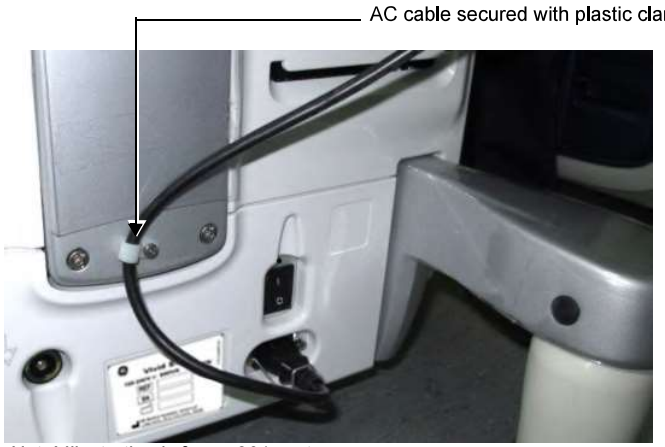
Visually inspect the contents of the shipping carton for damage. If any parts are damaged or missing, contact an authorized GE Service Representative.

A *Damage Inspection Checklist* for the Vivid S60N/Vivid S70N portable ultrasound scanner is provided in Table 3-9 below.

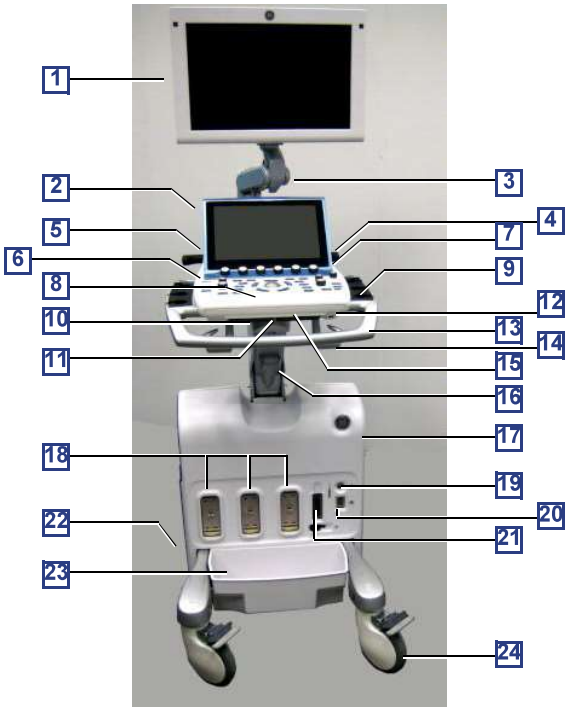
Table 3-9 Damage Inspection Checklist - Vivid S60N/Vivid S70N Systems

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

Table 3-9 Damage Inspection Checklist - Vivid S60N/Vivid S70N Systems (Cont'd)

✓	Step	Item	Recommended Procedure
	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.
	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.  *Note! Illustration is for a v201 system.*
	15	Plastic Clamp	Secure the cable to the back of the system using the plastic clamp provided.  *Note! Illustration is for a v201 system.*
	16	Front Casters	Check that the front casters can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) *down* on each. Ensure that the wheels are locked and there is no movement in any direction.
	17	Rear Casters	Check that the front casters can roll and swivel, and can be placed in the locked position by pressing the foot brake (lower lever) *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 S60N/Vivid S70N ultrasound system

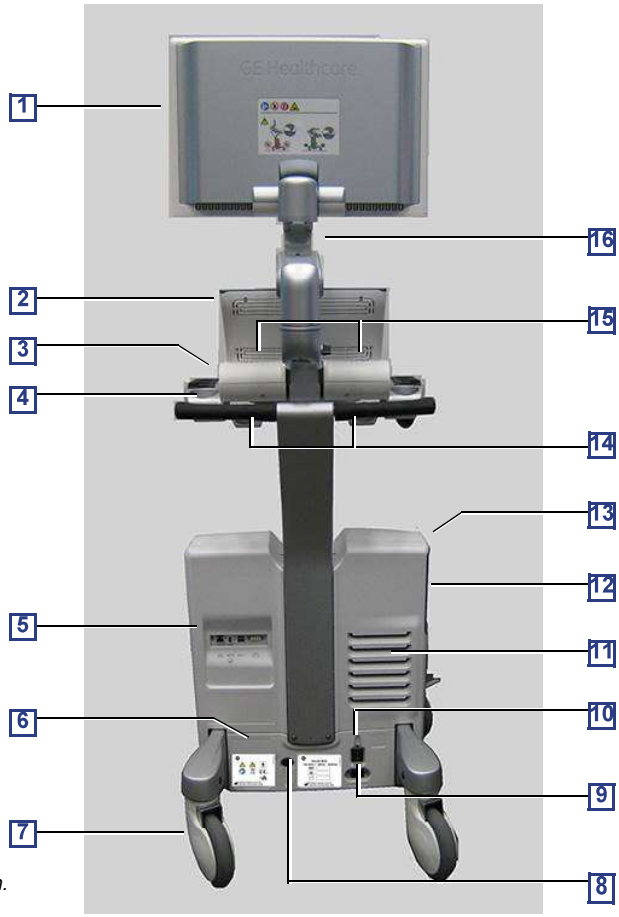


Note! Illustration is for a v201 system.

Figure 3-4 Front View of the Vivid S60N/Vivid S70N Ultrasound Scanner

#	Item	#	Item
1	Display Monitor: Tilts *up* and *down* and swivels *left* and *right*.	13	Front handle
2	Touch Screen: Mounted in a fixed position behind the Control Panel at a convenient angle for viewing.	14	Probe-cable hooks
3	Monitor Articulated Arm. Includes Release pin that enables locking of the monitor in the 90 degree position.	15	Pull-out Alphanumeric Keyboard (optional)
4	Rear Handle	16	Up/down “Flex-Fit” Arm
5	OPIO Basket: Holds paper and other utensils, as required.	17	Air inlet and Sub-woofer: Air flow is via a built-in filter on the side cover, for system air cooling. A sub woofer speaker provides superb sound.
6	ON/OFF: Power ON/OFF knob enables the user turn ON the system (when power is connected and the system is either in Shutdown or Standby mode).	18	Probe Connectors (PDT type)
7	Speakers: Two loudspeakers provided for Doppler sound.	19	Doppler Pencil Probe Connector
8	Control Panel: Contains the buttons used to operate the ultrasound system and the alphanumeric keyboard (optional).	20	ECG Cable Connector: Provides External ECG input connection to an ECG monitor device outlet, or direct patient three-contact ECG lead connection. Important: Do not use the Vivid 7 ECG cable with the Vivid S60N/Vivid S70N system.
9	Probe and gel holders: Provides a safe, rubber-cushioned resting place for probes. (Both sides of the Control Panel).	21	Probe Connector (RS type for TEE probe).
10	Control Panel swivel release handle: Enables locking of the control panel in position; swiveling it left or right.	22	Rear Caster Wheel: Enables locking of swivel motion, or free rolling and swiveling.
11	Control Panel up/down release handle: Enables locking of the control panel in position, or changing the location of the arm by moving it upwards and away from the user, or downwards and away from the system. Provides leg room for the user who may then be seated beside system.	23	Probe-cable management tray (removable). Note: should be used only for small-footprint items of a total weight not exceeding 1 Kg (2.2 lbs).
12	Front USB port (USB 2.0).	24	Front Caster Wheel: Enables full-locking of swivel motion, or free rolling and swiveling.

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



Note! Illustration is for a v201 system.

Figure 3-5 Vivid S60N/Vivid S70N Rear View

#	Item	#	Item
1	Display Monitor - rear	9	Main power input socket (AC IN); fitted with a safety spring for securing AC power cable.
2	Touch Screen - rear	10	Power ON/OFF switch - provides power to the scanner
3	Gel Holders: Provides convenient storage for US Gel bottles. Holders are situated on either side of the control console.	11	Ventilation port
4	Rear Handle: used to pull/push the scanner and place it in the desired position.	12	Black/White Video Printer (optional)
5	Rear I/O Peripheral/Accessory Connector Panel: Provides ports for LAN, Insulated USB, Dual USB and DVI, (see Figure 3-6).	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 3-6 shows a view of the Vivid S60N/Vivid S70N ultrasound system rear panel showing external peripheral/accessory connectors.

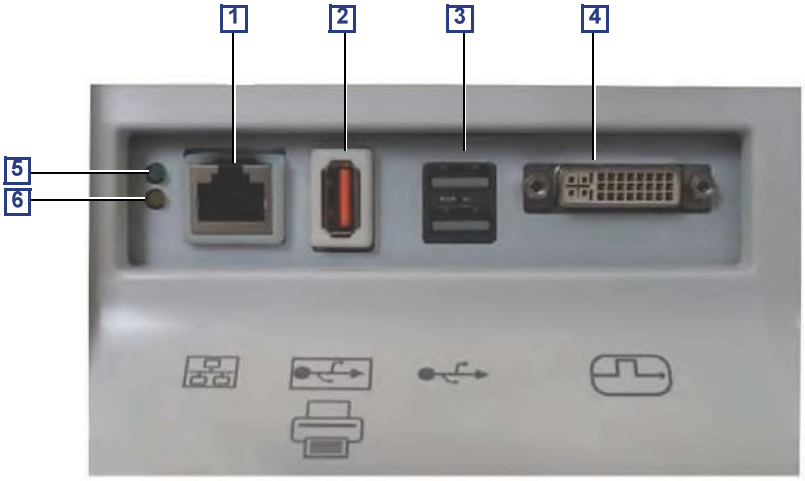


Figure 3-6 View of the Vivid S60N/Vivid S70N Peripheral/Accessory Connector Panel

1. Ethernet LAN connector — 1000 Base-TX Ethernet IEEE 802.3
2. Isolated USB connector (USB 1.0 only)
3. Dual USB connector (USB 2.0)
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.
- Verify that the specifications below do not conflict with any on-site conditions.

3-5-2-2 Physical Dimensions

Table 3-10 Physical Dimensions of ultrasound system with Monitor and Peripherals in Transportation Position

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

3-5-2-3 Mass with Monitor, without Probes and Peripherals

Table 3-11 Mass of Vivid™ S60N/S70N with Monitor, without Probes and Peripherals

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

3-5-2-4 Acoustic Noise Level

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

3-5-3 Electrical Specifications

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

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

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

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

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

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

Table 3-12 Electrical Specifications for all Vivid S60N/Vivid S70N models

Voltage	100-230 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/EN standards (e.g. IEC/EN 62368 or IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore, all complete configurations shall comply with system requirements of Clause 16 of IEC/EN60601-1. Everybody who connects additional equipment to the signal input part or signal output part of ultrasound system, configures a medical system, and is therefore responsible that the ultrasound system complies with the requirements of Clause 16 of IEC/EN 60601-1. If in doubt, consult the technical service department or your local representative for GE.

3-5-4-1 Connect Ethernet

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

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

3-5-4-2 Connect USB Flash Card

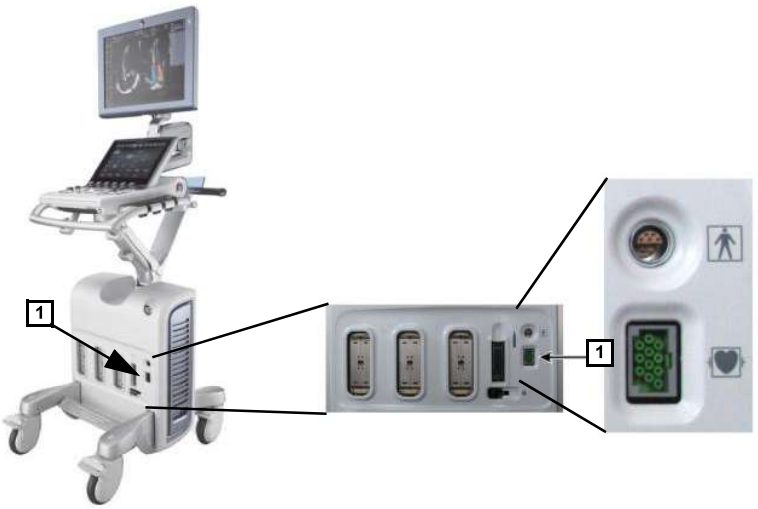
NOTE: USB Flash Cards approved for ultrasound system are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Cards will compromise this verification, and may cause interference on ultrasound system itself, or on other electronic devices.

For approved models, please refer to *Chapter 9*.

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

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

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



1.) ECG

Figure 3-7 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.

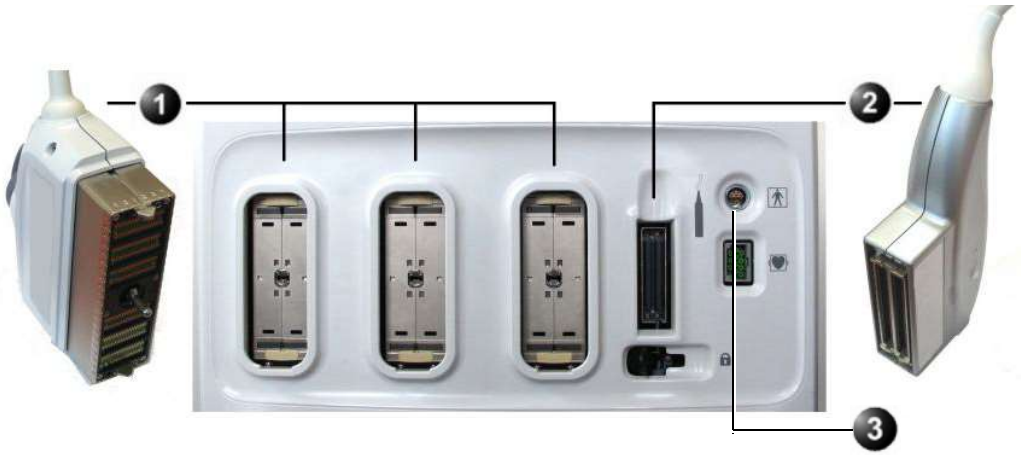
3-5-6 Connecting Probes

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 3-8 Probe Connectors on Vivid S60N/Vivid S70N Front Panel

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

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

3-5-6-2 Connect a Probe

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

CAUTION **Do not allow the probe head to hang freely. Excessive impact to the probe will result in irreparable damage.**

CAUTION **To prevent probe connector pins damage, or PCB board damage, do not use excessive force when connecting the probes.**

CAUTION **Keep the probe cables away from the wheels.**
Do not bend the probe cables.
Do not cross cables between probes.

Connecting a probe

Follow these steps to connect a probe:

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

3-5-6-3 Disconnect Probes

Follow these steps to disconnect probes, as applicable:

- **DLP Probes**

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

NOTE: For cleaning instructions, see the User Manual.

- **RS Probes**

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

NOTE: For cleaning instructions, see the User Manual.

- **Pencil Probes**

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

NOTE: For cleaning instructions, see the User Manual.

3-5-7 Power on/Boot up

For procedure, see: Power ON/Boot-up on page 4 - 3.

3-5-8 Power Shut Down

For procedure, see: Power Shut Down on page 4 - 8.

3-5-9 Complete Power Down

For procedure, see: Complete Power Down on page 3 - 34.

Section 3-6
Configuration

3-6-1 Purpose of this Section

This section describes how to configure the ultrasound system.

3-6-2 Ultrasound System Configuration

3-6-2-1 Select System Settings Screen

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

The Settings screen is displayed.

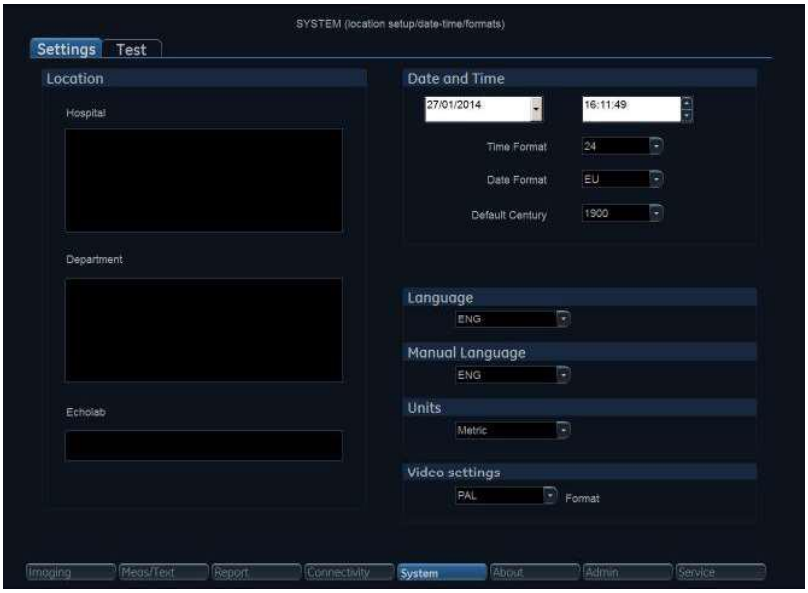
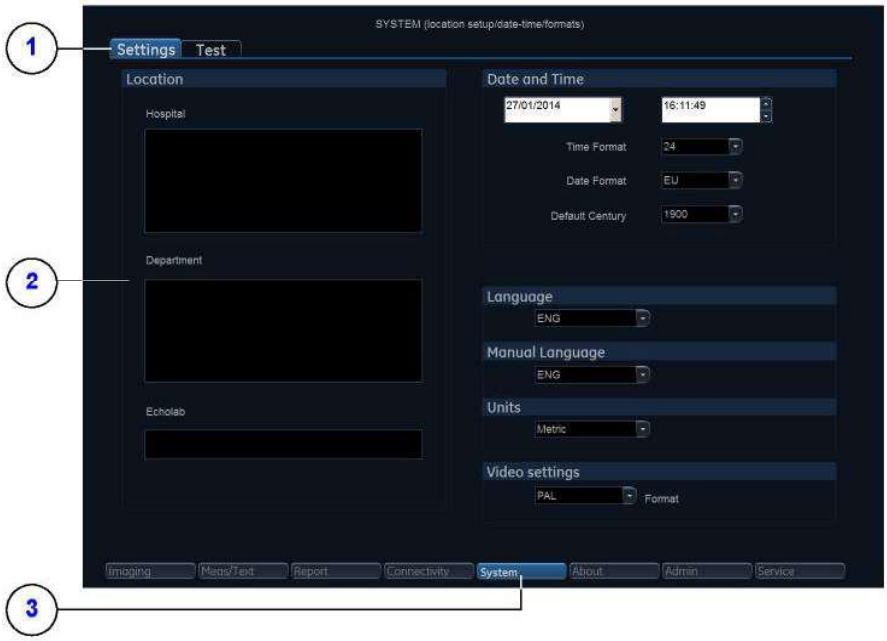


Figure 3-9 Settings Screen

3-6-2-2 Enter Location



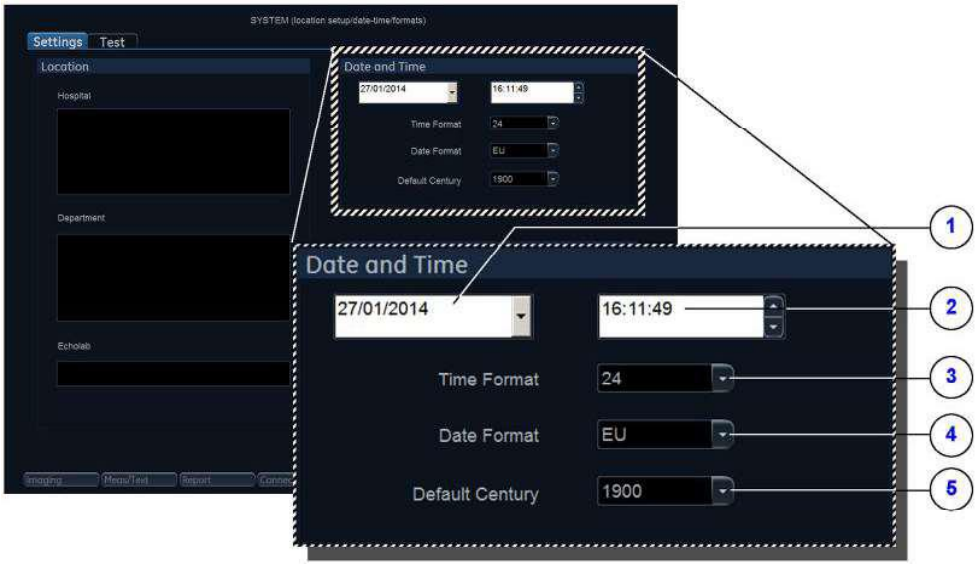
1. Settings
2. Location
3. System

Figure 3-10 Enter Location

Table 3-13 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

3-6-2-3 Adjust Date and Time



1. Date
2. Time
3. Time Format
4. Date Format
5. Default Century

Figure 3-11 Date and Time Adjustments

Table 3-14 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 (4) in Figure 3-11. • 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 Figure 3-11.	• **24**: the 24 hour format is used • **12**: the 12 AM/PM hour format is used
4.	Adjust the **date**, see (1) in Figure 3-11.	**New date** is displayed
5.	Adjust the **time**, see (2) in Figure 3-11.	**New time** is displayed

Table 3-14 Date and Time Adjustments (Cont'd)

STEP	TASK	EXPECTED RESULT(S)
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.

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

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

For instructions, see: 4-2-4 "Install the On-board User Manuals" on page 4-10.

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

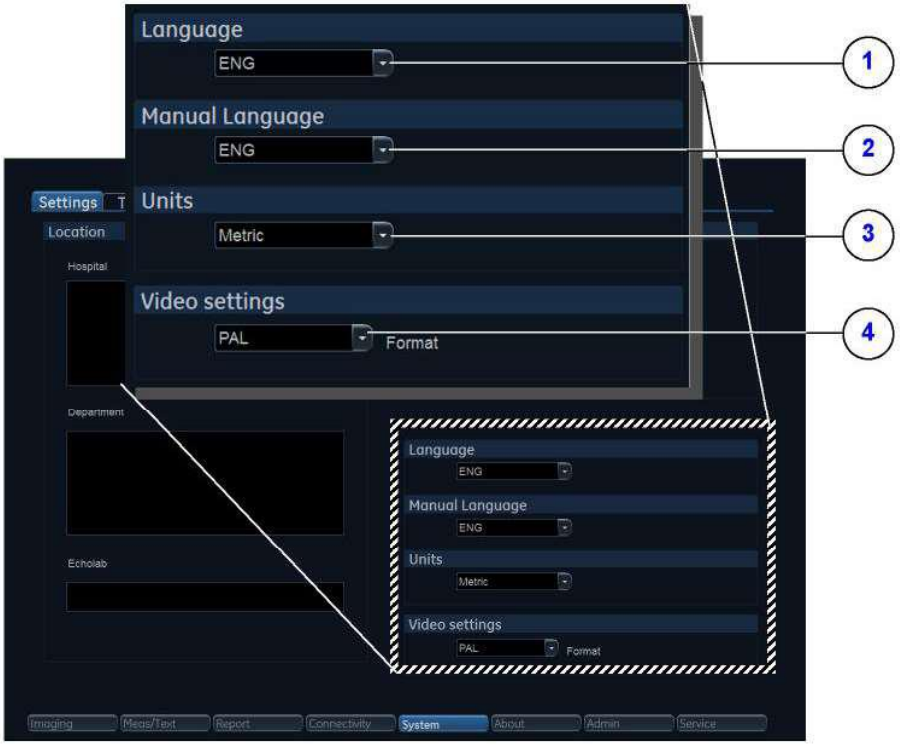


Figure 3-12 Select Language, Units and Video Format

Table 3-15 Select Language for User Interface and Online Manuals

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

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

Table 3-16 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 3-12 on page 3-39) 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 3-12 on page 3-39.)	The selected video format will be used as soon as the unit has been restarted.

3-6-3 Service Screen Setup

3-6-3-1 Open Service Screen

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

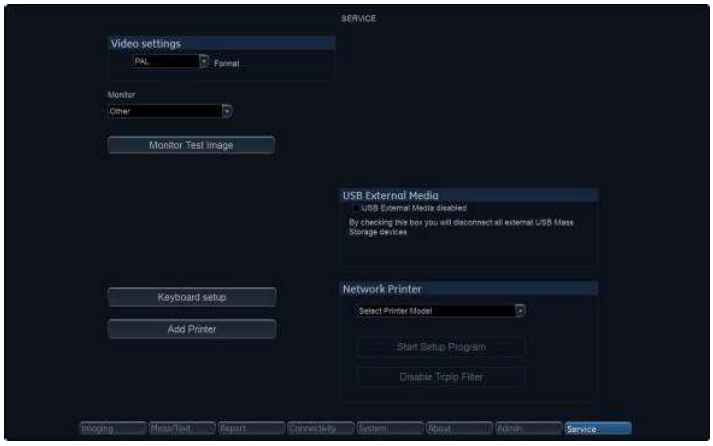


Figure 3-13 Service Screen

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

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

Figure 3-14 Select Video Format

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

3-6-3-3 Alphanumeric Keyboard Configuration

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

Table 3-17 Select Keyboard

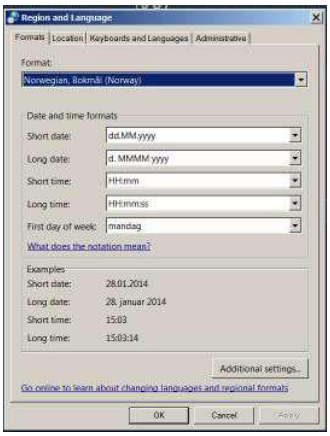
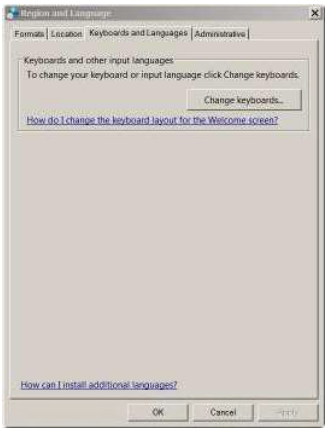
STEP	TASK	EXPECTED RESULT(S)
1.	Select Keyboard Setup to get access to Keyboard Properties.	
2.	Select Keyboards and Languages.	
3.	Select Change Keyboards...	

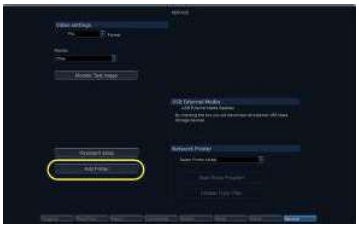
Table 3-17 Select Keyboard (Cont'd)

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

3-6-3-4 Add Printer

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

Table 3-18 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 - 44

3-6-4 Optional Peripherals/Peripheral Connection

3-6-4-1 Approved Internal Peripherals

This list covers the internal peripherals available for ultrasound system:

- Monochrome (Black and White) Digital Sony UP_D898 printer

3-6-4-2 Approved External Peripherals

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

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

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

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

Related information:

- Optional Peripherals on page 9 - 26

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

Figure 3-15 HP Laserjet M451 Color Printer

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

*NOTE: When connecting the printer's network cable, ensure that it is connected to the **network port** at the rear of the Vivid™ S60N/S70N system as shown in Figure 3-16*

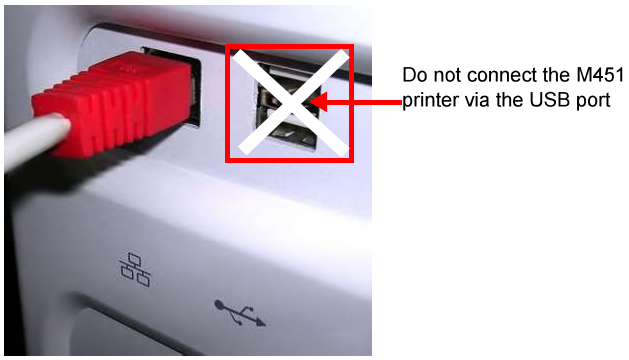


Figure 3-16 Network Cable Connected to Network Port

3-6-5 Software Options Configuration

3-6-5-1 Software Option Introduction

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

The Software Option Key is specific for each unit.

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

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

Follow these steps to install the Software Option Key:

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

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

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

3-6-5-3 Remote Check and Configurations

Contact the Online Center for InSite checkout.

Section 3-7
Connectivity Overview

3-7-1 Physical Connection

There are several possible connection methods, as outlined below.

3-7-2 Stand-alone ultrasound system

No network connection needed.

3-7-3 "Sneaker Net" Environment

No network connection needed.

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

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

Either of these situations may apply:

- Direct Cable Connection from ultrasound system to a workstation via a Crossover Cable.

  You will only need a Crossover Cable for network (TCP/IP) use to connect the two units this way.

  a.) Connect one end of the crossed network cable to the network connector on the ultrasound system.

  b.) Connect the other end to the network connector to the Workstation.

- Connection via a Peer-to-Peer network.

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

- Connection via Hospital Network.

  You will need one network cable to connect the ultrasound system to a wall jack on the hospital's network.

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

You will need one network cable.

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

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

Section 3-8
Connectivity Setup

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

3-8-1 Introduction

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

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

3-8-2 Compatibility

The ultrasound system can communicate with:

- EchoPAC
- Image Vault

  For networks with an Image Vault 5 server:

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

  For instructions, see the RDCM installation manual:

  - Direction Number IV294006-1EN
- Other units via DICOM

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

3-8-3 Select TCP/IP Screen

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

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

Figure 3-17 TCP/IP Overview Screen for ultrasound system

Related information:

- Logging On to the Vivid S60N/Vivid S70N as "ADM" on page 4 - 9

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

Figure 3-18 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 3-19 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 3-20 Server Config: Add Server

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

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

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

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

Possible reasons:

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

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

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

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

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

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

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

  Possible reasons:

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

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

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

Follow these steps to Delete a server from the list:

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

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

2) Select Remove.

3-8-6 Save the New Settings

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

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

2) Restart ultrasound system to activate the changes.

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 - 46.

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.

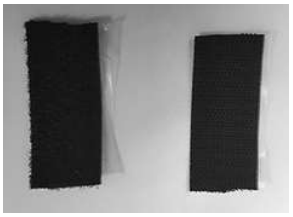
3-9-3 USB Flash Card Setup

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

3-9-4 Wireless Network Configuration

3-9-4-1 Content in the Netgear Wireless Interface USB Adapter A6210 kit

Table 3-19 Content in the Netgear Wireless Interface USB Adapter A6210 kit

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

3-9-4-2 Connecting the wireless USB adapter A6210 kit to Vivid S60N/Vivid S70N

For content in the kit, see:
3-9-4-1 "Content in the Netgear Wireless Interface USB Adapter A6210 kit" on page 3-53.

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

- Connect the USB-dock from kit to rear I/O USB port and attach docking to either left or right topside plastic cover. Connect the wireless network adapter to docking.
  See section 3-9-4-3 "Connect the adapter using the USB-docking" on page 3-54 for instructions (Preferred option).
- Connect wireless network adapter directly into rear I/O USB-port.
  See section 3-9-4-4 "Connect the adapter directly to the USB-port" on page 3-55 for instructions (Secondary option).
  Be aware that connecting adapter directly in rear USB-port may limit connection to other nearby ports, due to size of adapter.

3-9-4-3 Connect the adapter using the USB-docking

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

1.) Attach the Velcro tape strips to USB-docking and plastic cover:

a.) Attach one piece of Velcro tape to the underside of the USB-dock.

b.) Attach the other piece on the left or right side of plastic cover. Ensure that the Velcro tape is placed so it only covers front plastic cover, tape on plastic cover must also be placed as close to the right/left edge as possible, to avoid conflict with upper UI. See Figure 3-21 below for guidance:

Figure 3-21 Placement of Velcro tape

3-9-4-3 Connect the adapter using the USB-docking (cont'd)

2.) Insert the wireless network adapter into the USB-dock, place the dock onto the Velcro strip on plastic cover to fasten it. Connect docking USB-port to rear I/O USB-port on the ultrasound system. See Figure 3-22 below for guidance:

Figure 3-22 Placement/Connection wireless network adapter

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

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

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

- Connect the wireless network adapter directly into rear I/O USB-port. See Figure 3-23 below for guidance:

Figure 3-23 Connecting wireless network adapter to rear USB-port

3-9-4-5 Install the wireless network label on Vivid S60N/Vivid S70N

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

- Install the label below the I/O ports on the rear of the Vivid S60N/Vivid S70N as shown in Figure 3-24 below:

Figure 3-24 Placement of wireless network Label on Vivid S60N/Vivid S70N

3-9-4-6 Wireless Network Configuration - Vivid S60N/Vivid S70N

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

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

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

Figure 3-25 Monitor Display

Figure 3-26 Touch Screen Keyboard

3-9-4-7 Configuring the Wireless Network Adapter

1.) From the default screen on the ultrasound system, press **CONFIG (F2)** and log on as **Adm**. (Refer to Chapter 4 in the service manual for detailed instructions on logging in as Adm.)

2.) Select **Connectivity** (lower part of window).

3.) Select the **TCP/IP** tab.

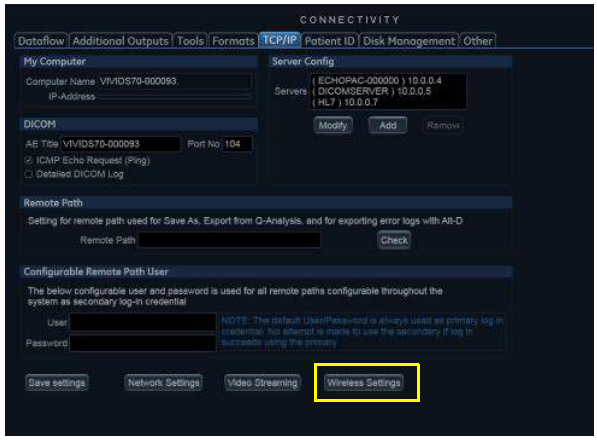


Figure 3-27 Connectivity - TCPIP Tab

4.) Connect a GE-approved wireless network adapter to the lower USB socket on the Rear I/O Peripheral/Accessory Connector Panel. See section 3-9-4-2 for instructions on how to connect the wireless network adapter to the ultrasound system.

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

3-9-4-7 Configuring the Wireless Network Adapter (cont'd)

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

Figure 3-28 Wireless Settings Main Screen

6.) Either double-click or select the network you want to connect to, and press the **Connect** button. If this is the first time you attempt to connect to the network, a dialog will pop up on screen asking you to configure the network setting - See Figure 3-29.

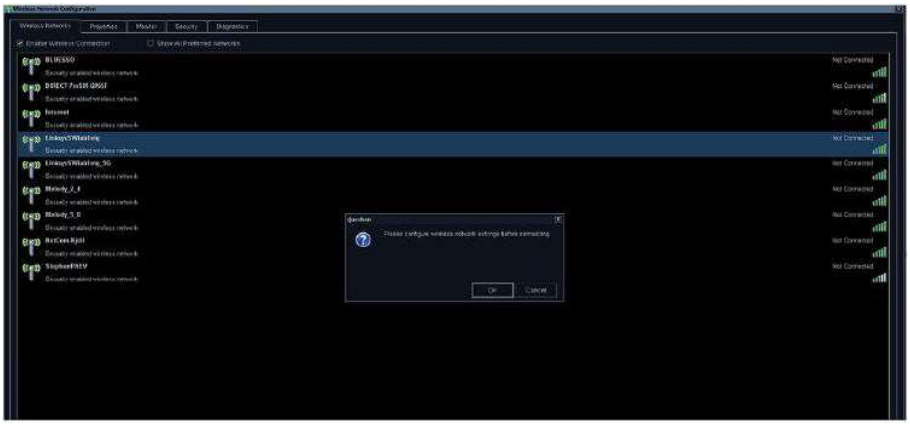


Figure 3-29 First Time Connection Dialog

3-9-4-7 Configuring the Wireless Network Adapter (cont'd)

7.) Press **OK** in the dialog window.
A new window for setting up your connection will open - See Figure 3-30.

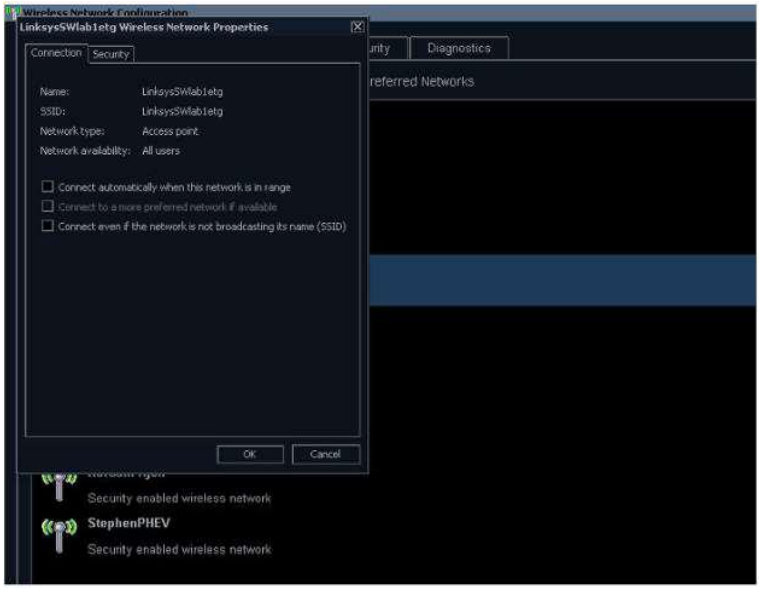


Figure 3-30 Network Settings Window - Connection

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

3-9-4-7 Configuring the Wireless Network Adapter (cont'd)

9.) Setup security options in the **Security** tab of connection setup dialog - See Figure 3-31.

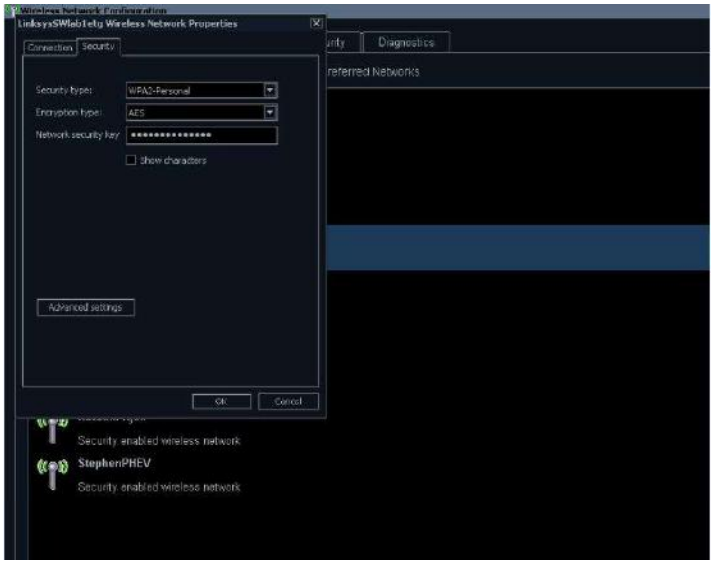


Figure 3-31 Network Settings Window - Security

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

a.) First go to LDAP config, see Figure 3-32.

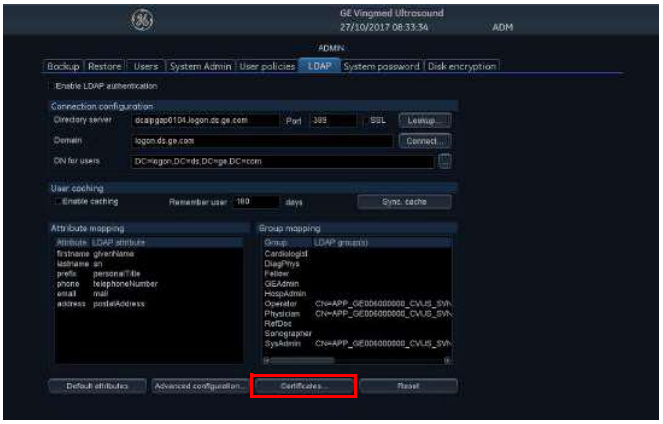


Figure 3-32 LDAP config screen

3-9-4-7 Configuring the Wireless Network Adapter (cont'd)

b.) Then click on the Certificates… button to open the Certificate dialog, see Figure 3-33. This dialog is a standard Certificate Manager dialog.

NOTE: Please call for assistance from your GE Service representative if you need to add a certificate from a USB memory stick.

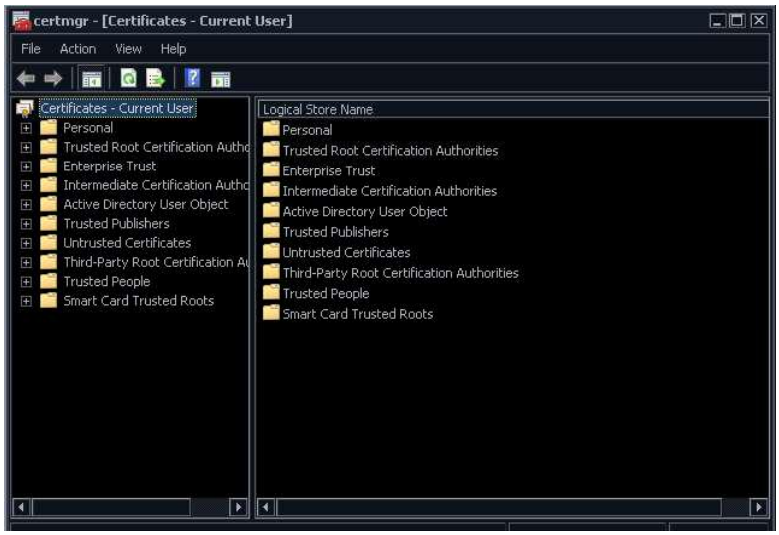


Figure 3-33 Certificate dialog

11.) After you have finished setting up your connection press **OK**.
The system will then try to establish a connection to your network. A dialog will be shown on screen while this is in progress - See Figure 3-34.

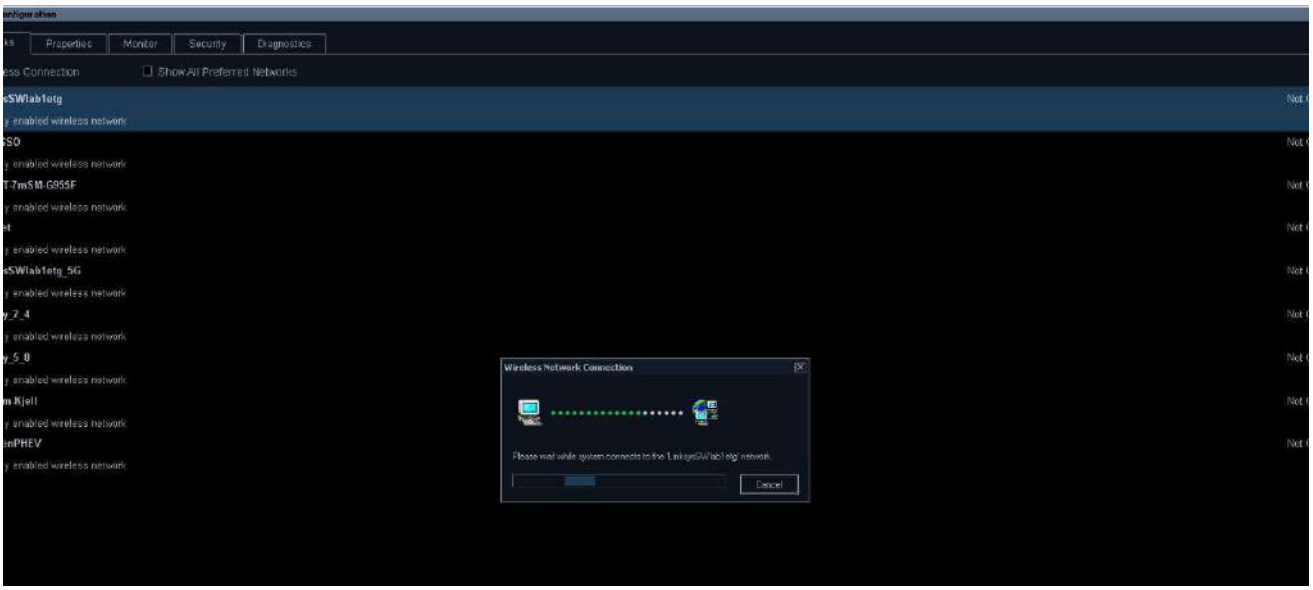


Figure 3-34 Connecting To Network Dialog

3-9-4-7 Configuring the Wireless Network Adapter (cont'd)

12.) Once a connection has been established you will see the status **Connected** in the **Wireless Settings** page, next to the network you have connected to.
All network connections that are configured will also be displayed with a star icon, see Figure 3-35.

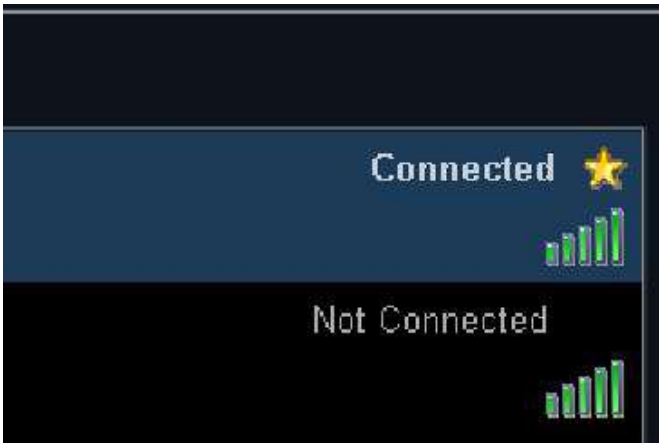


Figure 3-35 Connection Established

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

3-9-4-8 Wireless settings - Other Options

3-9-4-8-1 Reconfigure already configured network

To reconfigure an already configured network you can delete the configuration and reconfigure according to 3-9-4-7 "Configuring the Wireless Network Adapter" on page 3-58. To delete configuration for a network, select the network in the list and press the **Delete Settings** button - see Figure 3-36.

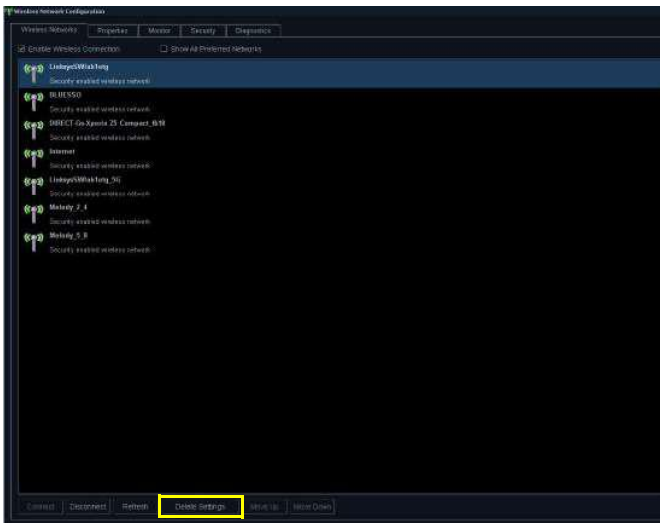


Figure 3-36 Delete Network Settings

It is also possible to edit the configuration for a network without deleting your settings. All configured networks are listed in the **Security** tab in the **Wireless Settings** window. Select the network for which you want to edit configuration and press **Customize** button - See Figure 3-37.

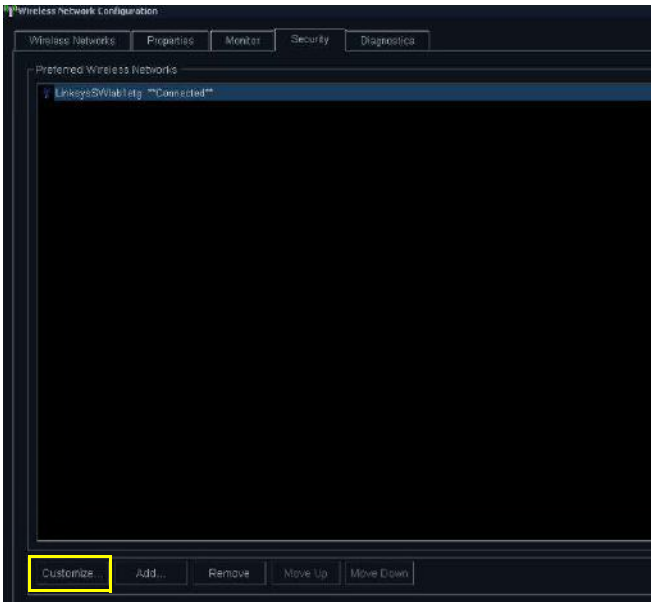


Figure 3-37 Customize Network Settings

3-9-4-8 Wireless settings - Other Options (cont'd)

The window shown in Figure 3-38 and Figure 3-39 will open and you can edit your previously stored settings.

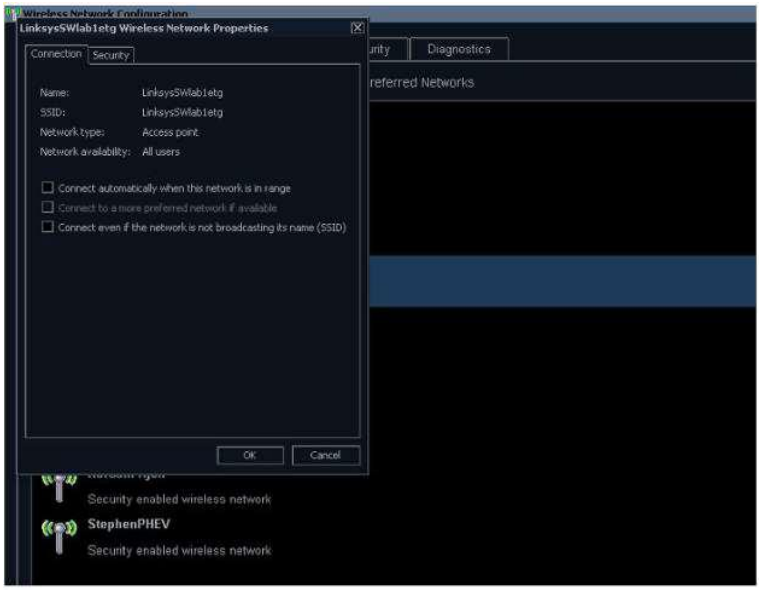


Figure 3-38 Network Settings Window - Connection

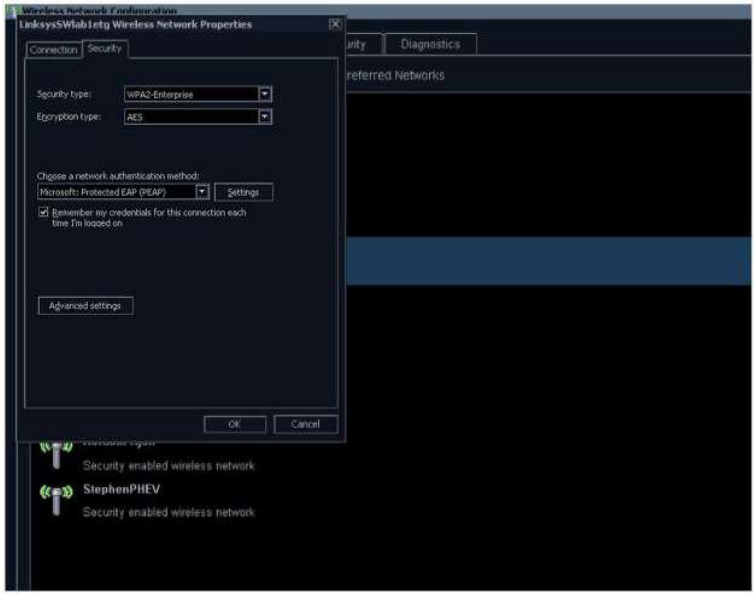


Figure 3-39 Network Settings Window - Security

3-9-4-9 Properties

The **Properties** tab shows some basic status information, including connection status, IP address, connected network etc. It is also possible to view all available networks and some signal information for them by pressing **Available Channels…** button, see Figure 3-40.

Figure 3-40 Properties Window - Available Channels

3-9-4-10 Monitor

The **Monitor** tab shows an error log, see Figure 3-41.

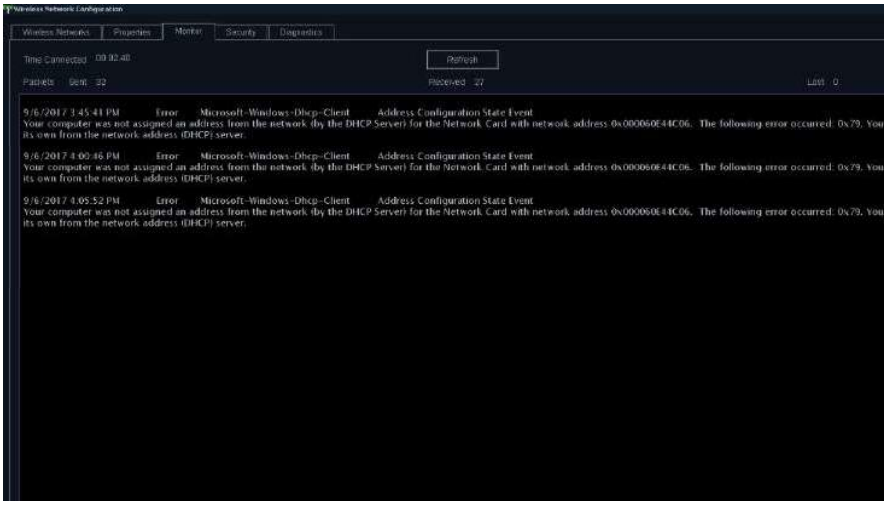


Figure 3-41 Monitor Window - Error Log

3-9-4-11 Diagnostics

The **Diagnostics** tab lets you run a test to check if your connection is working correctly, see Figure 3-42.

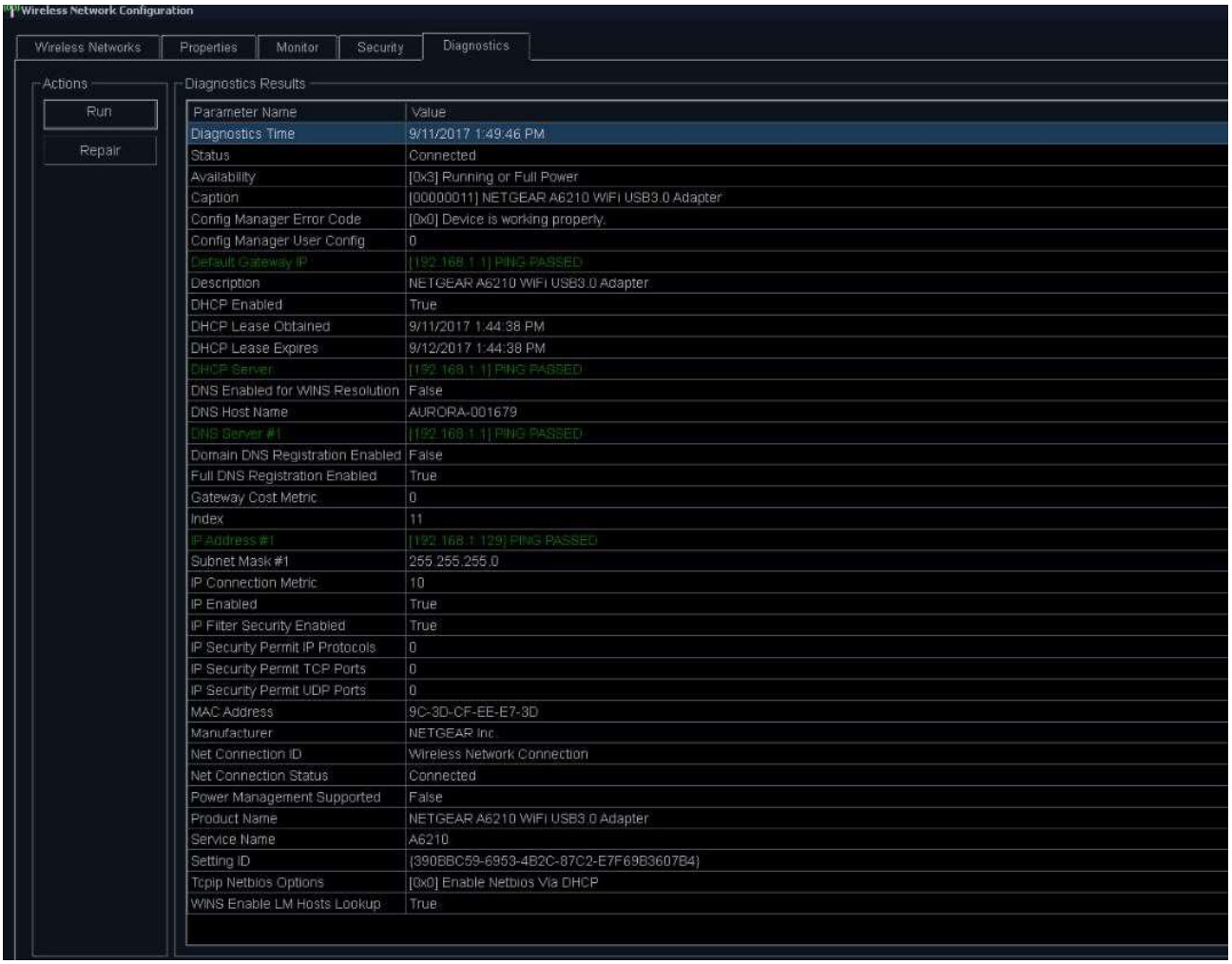


Figure 3-42 Diagnostic Window

3-9-5 Installation and set up of the View-X function

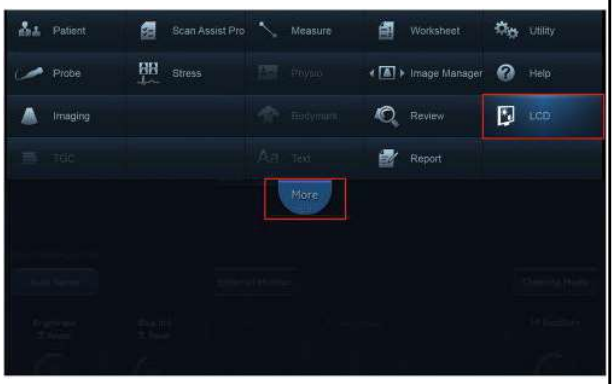
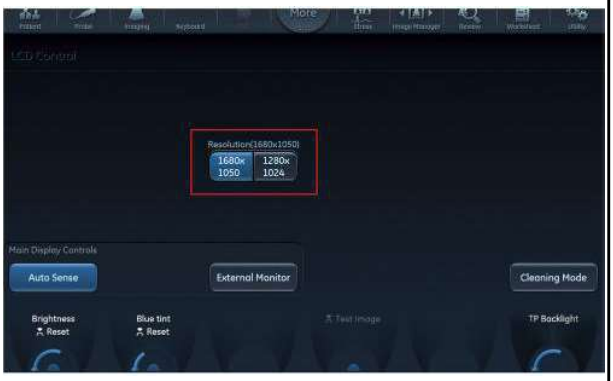
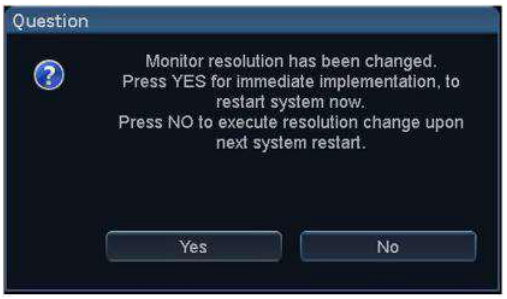
Installation of the View-X function is described in the “Epiphan DVI Broadcaster Installation Manual”, Direction Number: GC294481.

3-9-6 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 3-20 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™ S60N/S70N is ready for use after the system has been configured successfully in accordance with the information provided in Chapter 3 - System Setup (this chapter).

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

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

3-10-3 Product Locator Installation Card

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

From the factory, a sheet with five Product Locator cards for transportation and one for Installation are included.

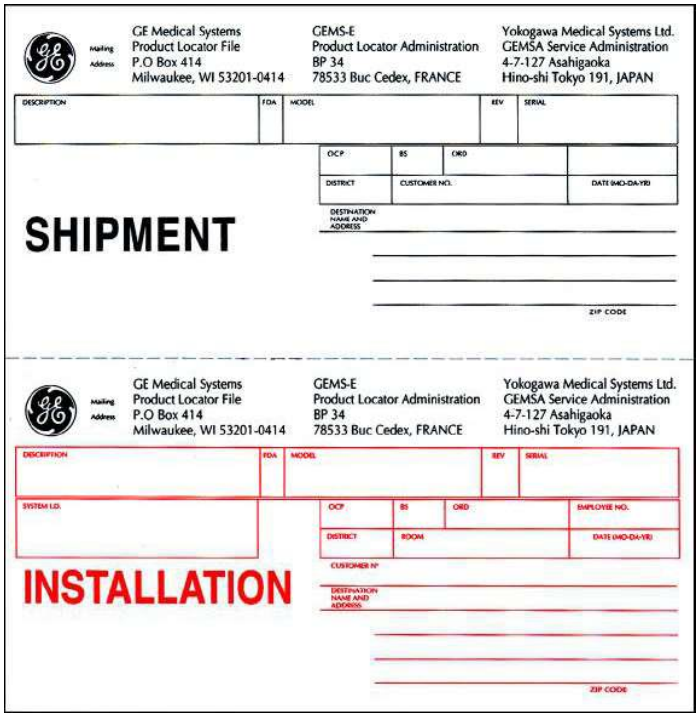


Figure 3-43 Product Locator Installation Card (Example)

Chapter 4
General Procedures and Functional Checks

Section 4-1
Overview

4-1-1 Purpose of Chapter 4

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

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

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

Table 4-1 Contents in Chapter 4

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 S60N/Vivid S70N.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.
6. Remove/disconnect the battery, if present.

Ultrasound System components may be energized.

4-2-1 Overview

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

4-2-2 Power On-Off

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

4-2-2-1-1 Warnings

DANGER 

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

DANGER 

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

DANGER 

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

CAUTION **THE ULTRASOUND SYSTEM REQUIRES ALL COVERS.**

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

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

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

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

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

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

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

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

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

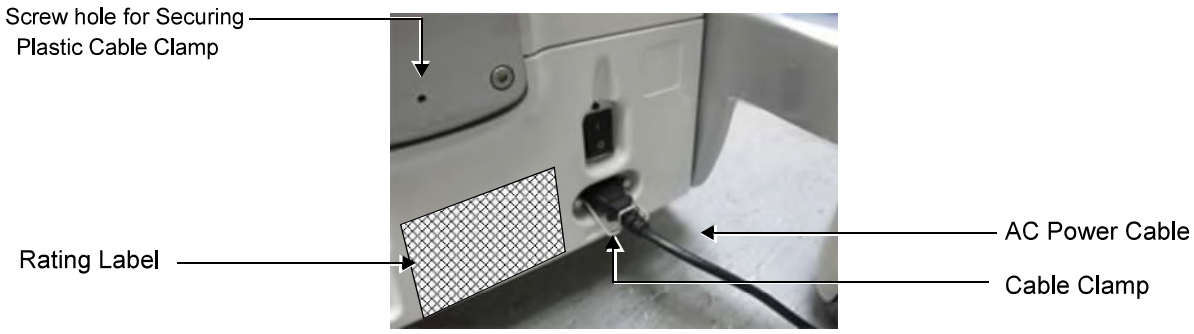


Figure 4-2 AC Power Cable Connected - Rear Panel

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

7.) Proceed as follows:

a.) Loosen the screw to open the plastic cable clamp (see Figure 4-3).

b.) Route the AC power cable *upwards* and through the clamp.

c.) Screw the plastic cable clamp into position on the support column (see below), carefully tightening the screw sufficiently to secure the cable firmly in the clamp.
Take care not to over-tighten the screw, or damage the cable!

Plastic Cable Clamp and Screw

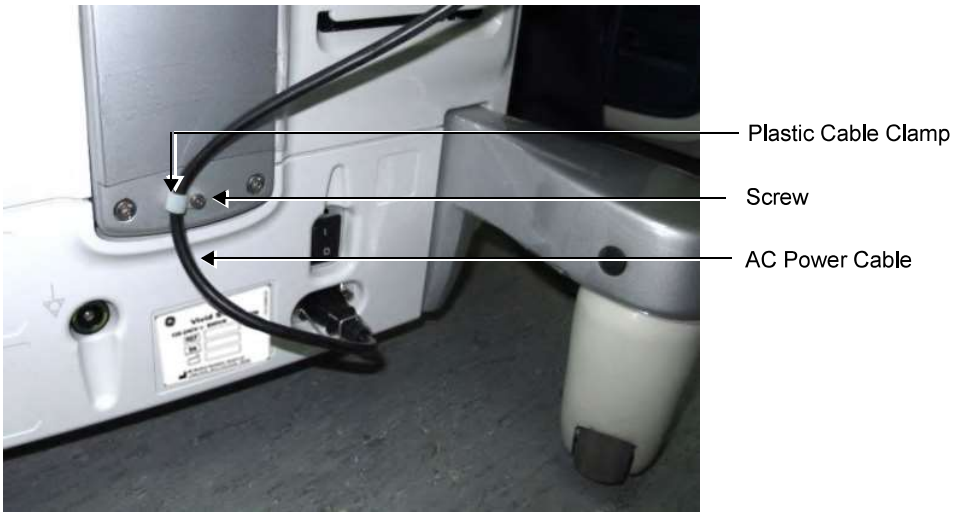


Figure 4-3 AC Power Cable Secured with Plastic Cable Clamp

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

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

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

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

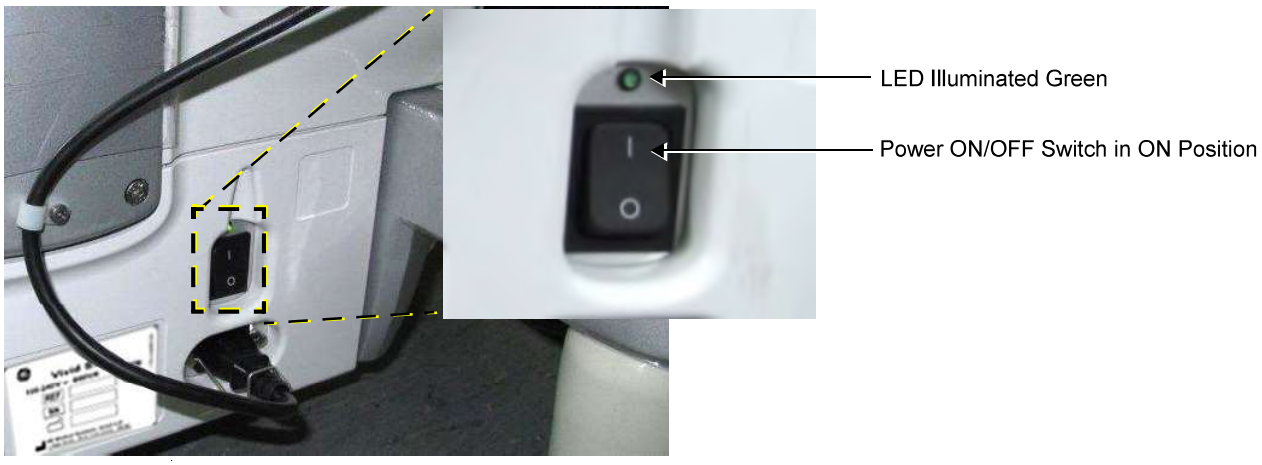


Figure 4-4 AC Power ON

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

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

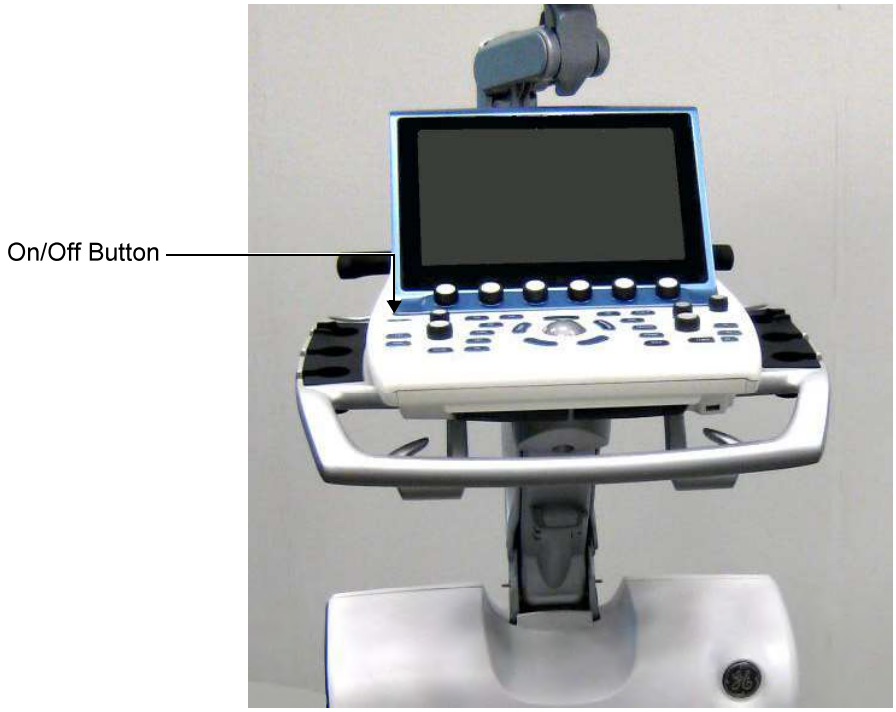


Figure 4-5 On/Off Button on Control Panel

During normal boot-up, you may observe that:

a.) The unit's ventilation fans start on full speed, but slow down after a few seconds (listen to the fan sound).

b.) Power is distributed to the peripherals, Operating Panel (control panel), Monitor, Front-End Processor and Back-End Processor.

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

1.) Back-End Processor is turned ON and starts to load the software.

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

Figure 4-6 Warning - Disk encryption is not enabled

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

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

3.) The Start Screen is displayed on the monitor.

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

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

6.) The Keyboard backlight illuminates.

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

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

4-2-2-2 Power Shut Down

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

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.

4-2-3 Logging On to the Vivid S60N/Vivid S70N as "ADM"

4-2-3-1 Introduction

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

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

1) Select U**tility**. 

2) Then select **Config…** 

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

4-2-3-3 The Operator Login dialog

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

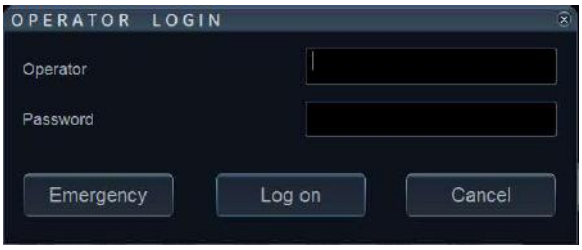


Figure 4-7 Operator Login

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

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

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

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

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

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

Follow these steps to log on as ADM:

1) Select (or type) the name **ADM** in the Operator field.

2) Type the current password.

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

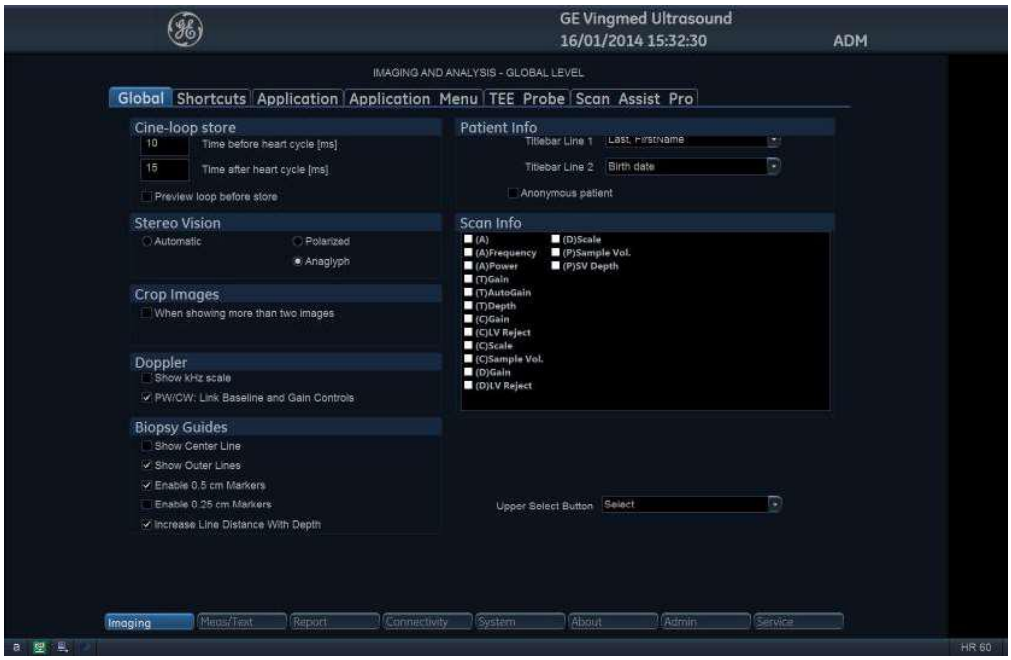


Figure 4-8 Imaging and Analysis - Global Level Window

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

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

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

1.) Restart the ultrasound system.

2.) When the Windows logo appears, insert the User Manuals UFD.
The Start Application screen appears.

3.) Select **Install SW**.

4.) Follow the on-screen instructions to install the on-board user manuals.

5.) After the installation, restart the system and verify that the on-board user manual can be displayed.

4-2-5 Changing Passwords

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

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

1.) Press **Utility/Config** on the Touch panel and log on as ADM.

2.) Select the **Admin** category and **Users** subgroup.

The *Users* sheet is displayed.

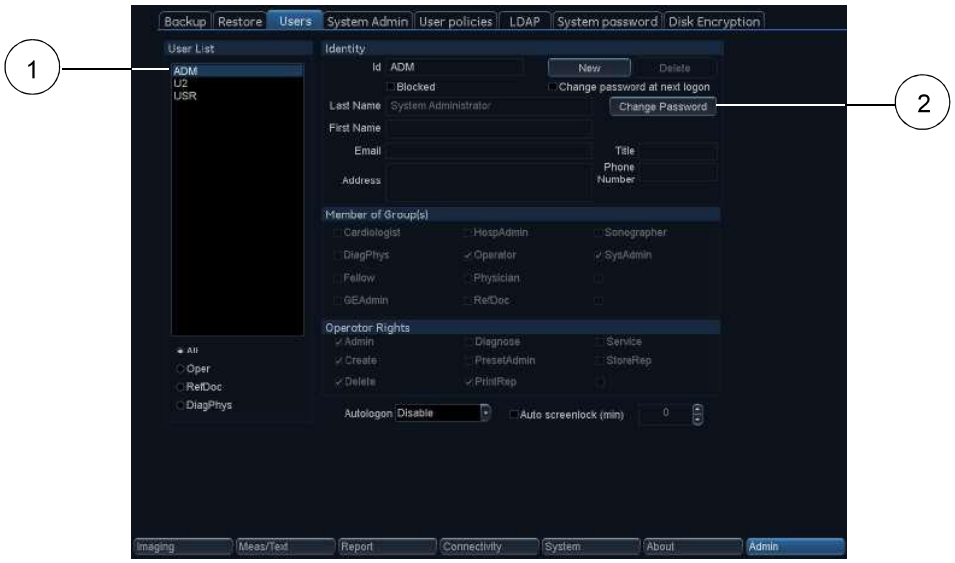


Figure 4-9 The Users sheet

3.) Select the user **ADM** (1) in the **User List**.

4.) Select **Change Password** (2).

Figure 4-10 Change Password dialog

5.) Type the new password in the **New password** field and re-type it in the **Confirm password** field.

6.) Select **OK** to confirm the change.

4-2-5-2 Changing the UEFI Password

For instructions, see: 4-2-6-2 "UEFI password" on page 4-12.

4-2-6 Security setup

4-2-6-1 Introduction

The privacy and security capabilities for Vivid S60N/Vivid S70N are described in:

- software v204: see Direction Number GC092863-1EN

4-2-6-2 UEFI password

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

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

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

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

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

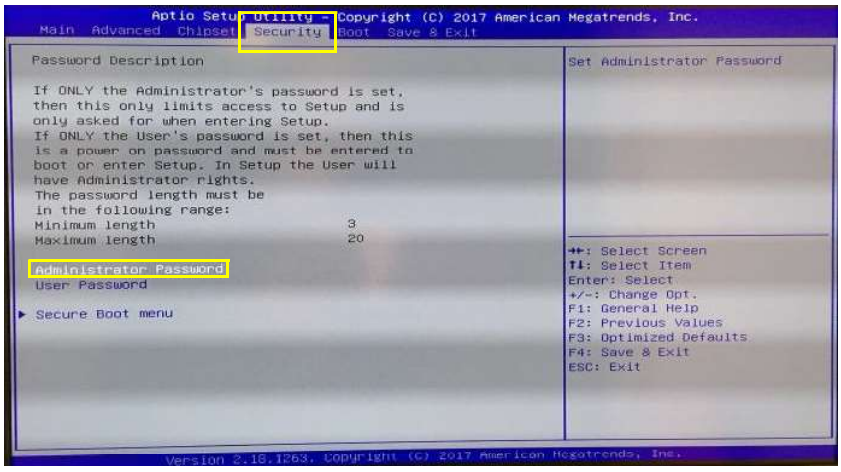


Figure 4-11 Security tab

6.) Select “Administrator Password”.

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

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

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

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

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

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

4-2-6-3 Whitelisting

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

4-2-7 Data Management

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

4-2-8 Deleting Patient Information (PHI)

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

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

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

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

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

4-2-9 LCD Monitor Position Adjustment

The LCD monitor position can be adjusted for easy viewing.

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

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

4-2-10-1 To Prepare the Vivid S60N/Vivid S70N to be Moved

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

Related information:

- LCD Monitor Position Adjustment on page 4 - 15
- Power Shut Down on page 4 - 8

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

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

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

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

CAUTION Avoid ramps that are steeper than 10 degrees.

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

Related information:

- LCD Monitor Position Adjustment on page 4 - 15

4-2-10-3 Transporting the Vivid S60N/Vivid S70N by Vehicle

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

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

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

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

Related information:

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

4-2-10-4 At the New Location

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

4-2-11 Cleaning the Trackball

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

4-2-11-1 When Cleaning is Needed

Follow these steps to clean the trackball:

1) Power OFF the Vivid S60N/Vivid S70N.

Figure 4-12 Removing Top Locking Plate and Rubber Dust Filter Ring

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

CAUTION

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

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

Don't apply much force to the trackball.

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

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

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

Section 4-3
Functional Checks

4-3-1 Overview

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

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

The functional checks may also be used during troubleshooting.

4-3-2 Performance Checks

4-3-2-1 Test Phantoms

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

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

4-3-3-1 Introduction

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

4-3-3-2 Preparations

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

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

1. Probe orientation marker
2. Parameter window

Figure 4-13 The 2D Screen (Cardiac)

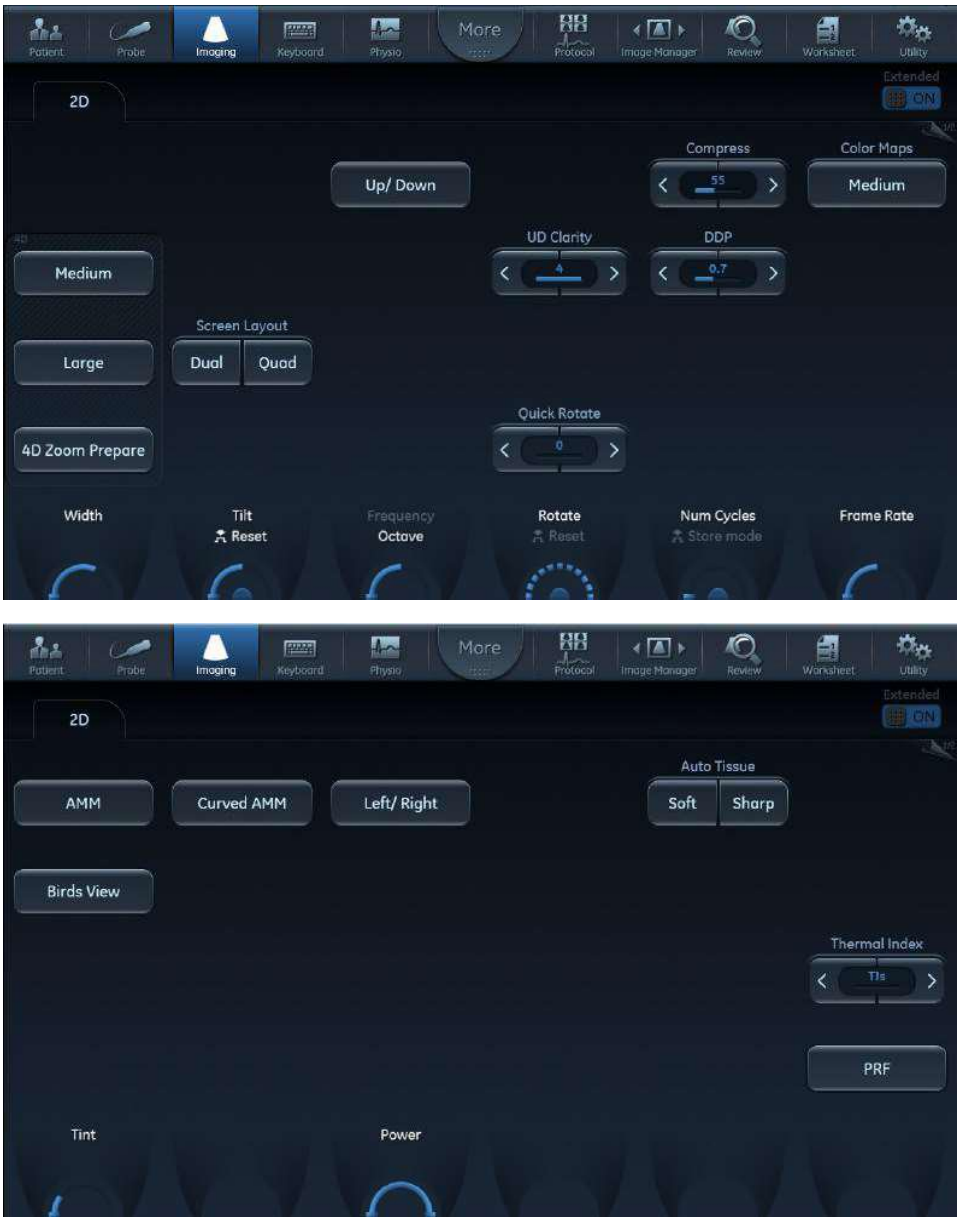


Figure 4-14 2D Touch Panel (4D Probe Live) Page 1 and 2

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 4-15 The M-Mode Screen (Composite)

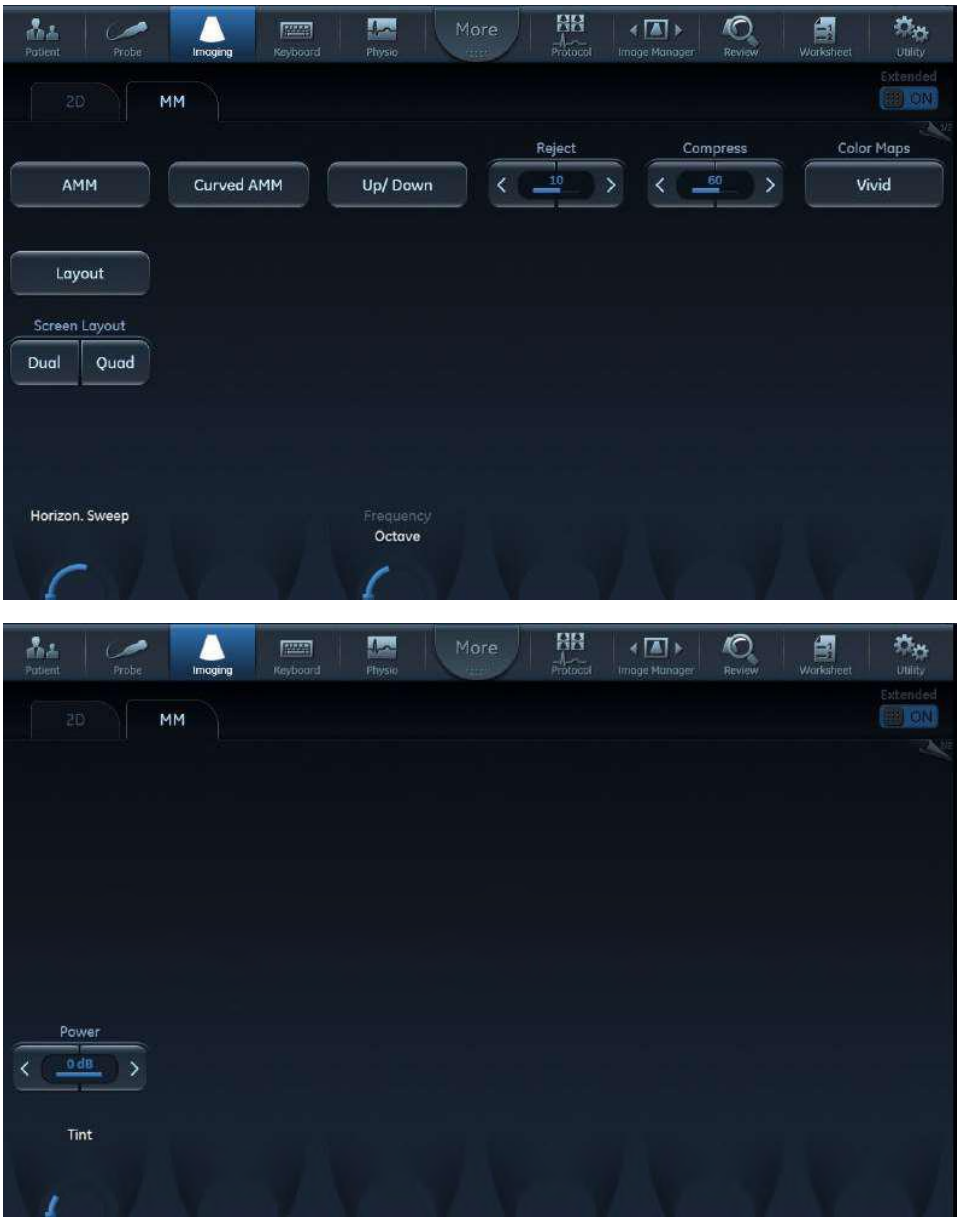


Figure 4-16 M-Mode Touch Panel Page 1 and 2

This unit has three types of M-Mode:

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

Conventional M-Mode can be combined with Color Mode.

4-3-4-2 Preparations

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

   The 2D Mode window is displayed (default mode).
3) Press **MM** on the Operating Panel to bring up an M-Mode picture on the screen.
4) Use the trackball to position the cursor over the required area of the image.

4-3-4-3 Using M-Mode

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

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

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

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

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

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

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

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

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

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

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

4-3-4-4 Optimizing M-Mode

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

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

4-3-5 Color Mode Checks

4-3-5-1 Introduction

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

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

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

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

Figure 4-17 Color Mode Screen

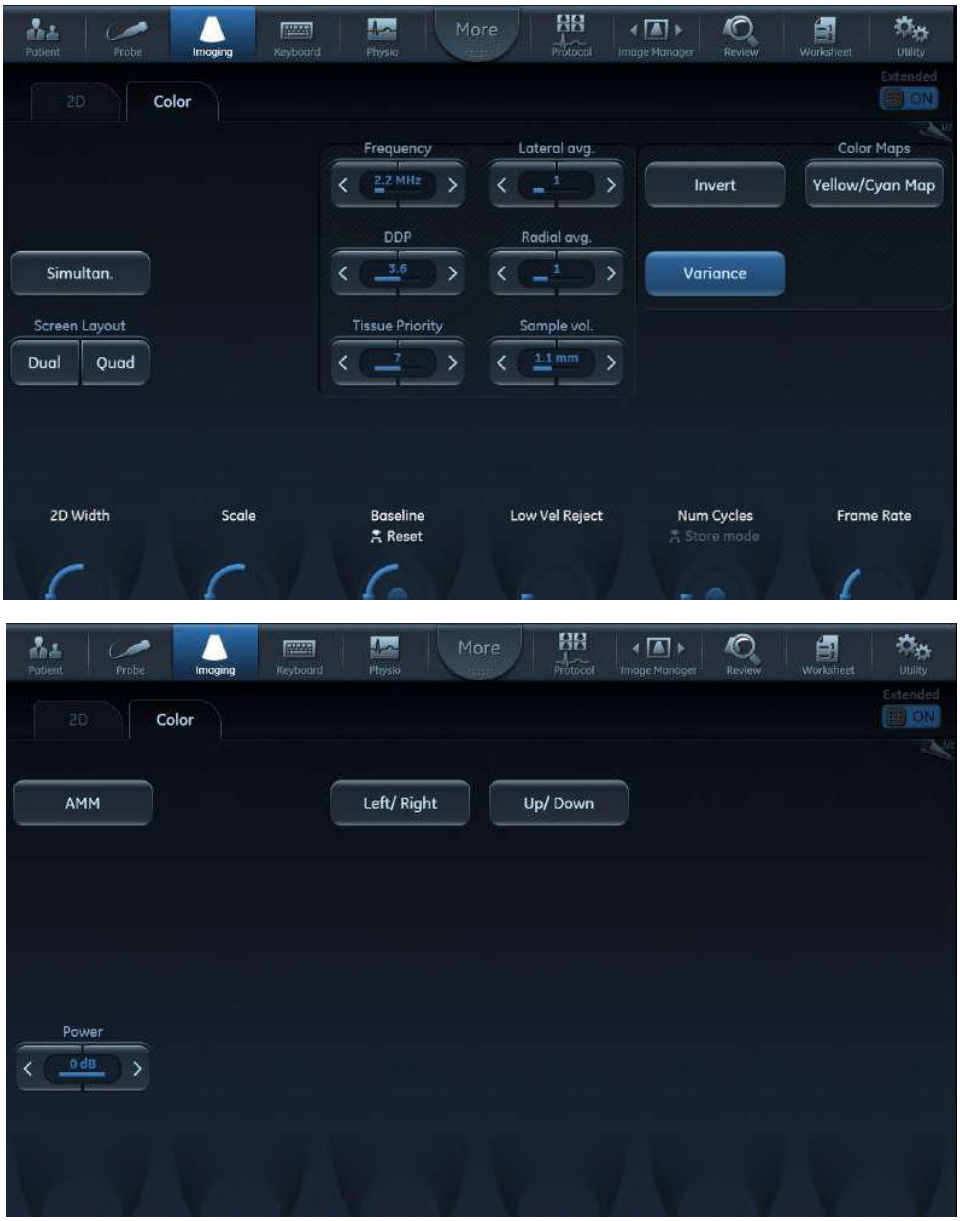
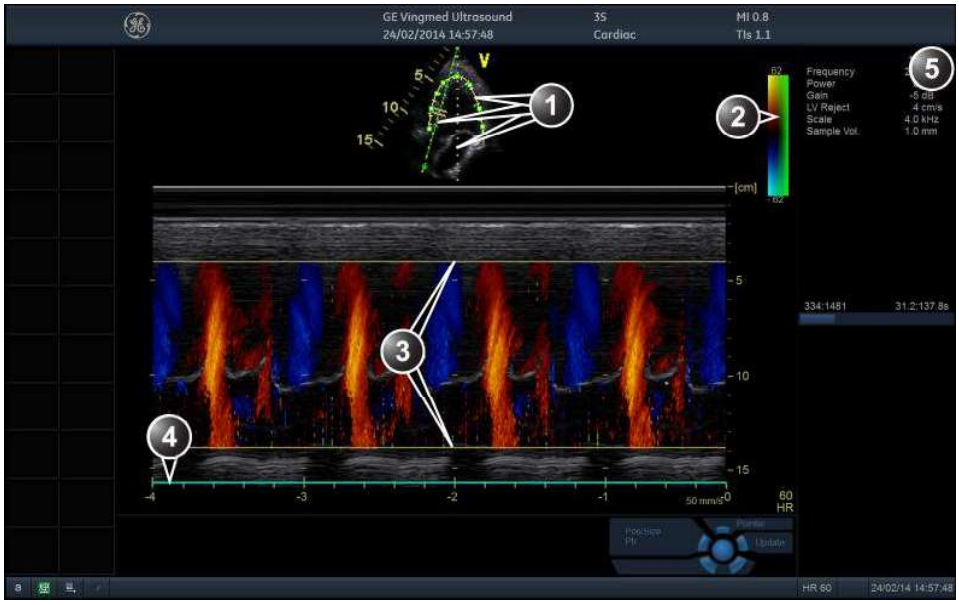


Figure 4-18 Color 2D Touch Panel - Page 1 and 2

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 4-19 Color M-Mode Screen (Composite)

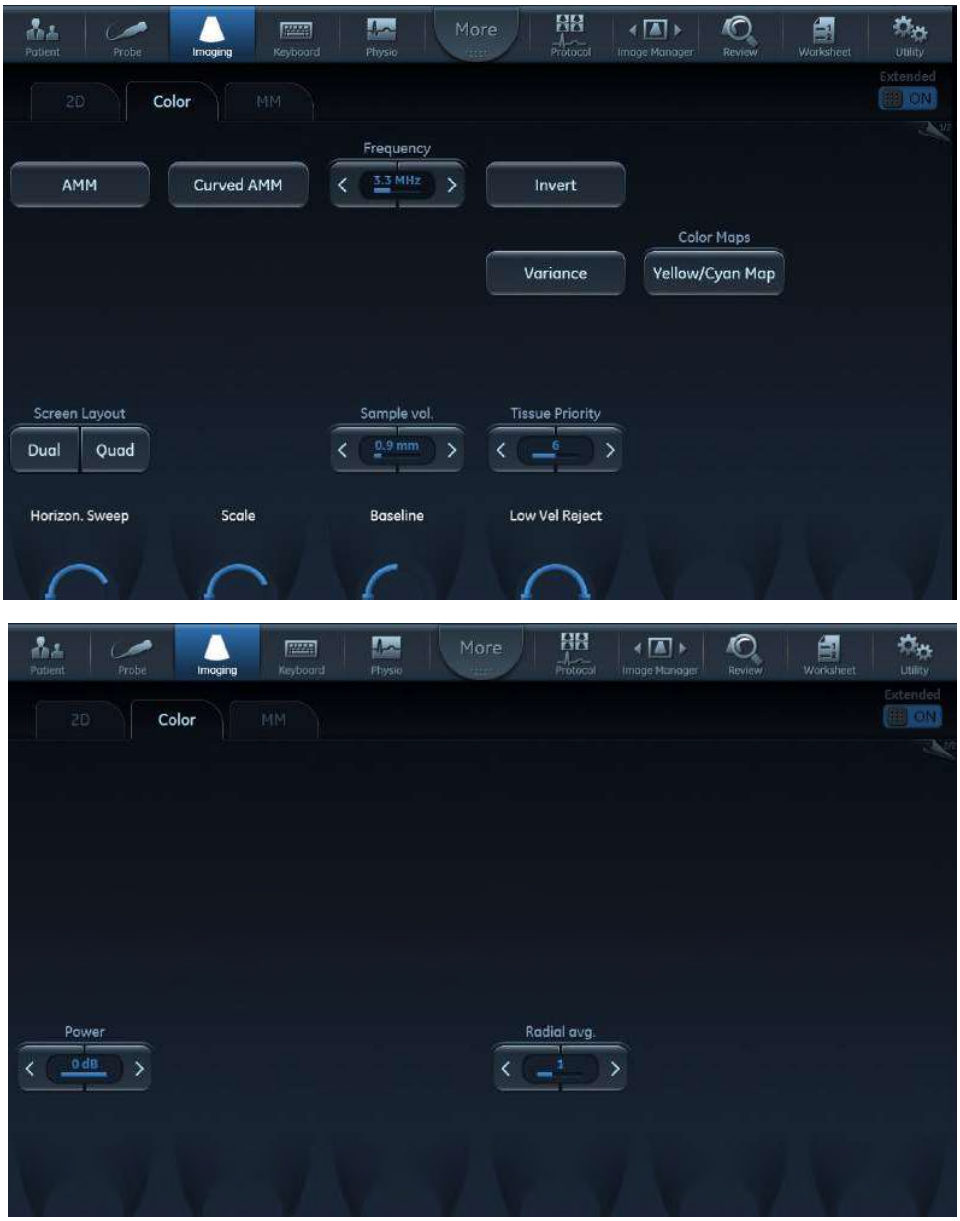


Figure 4-20 Color M-Mode Touch Panel - Page 1 and 2 (Color Controls)

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 Page4-33)
8. Parameter window

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

Figure 4-21 PW/CW Doppler Mode Screen

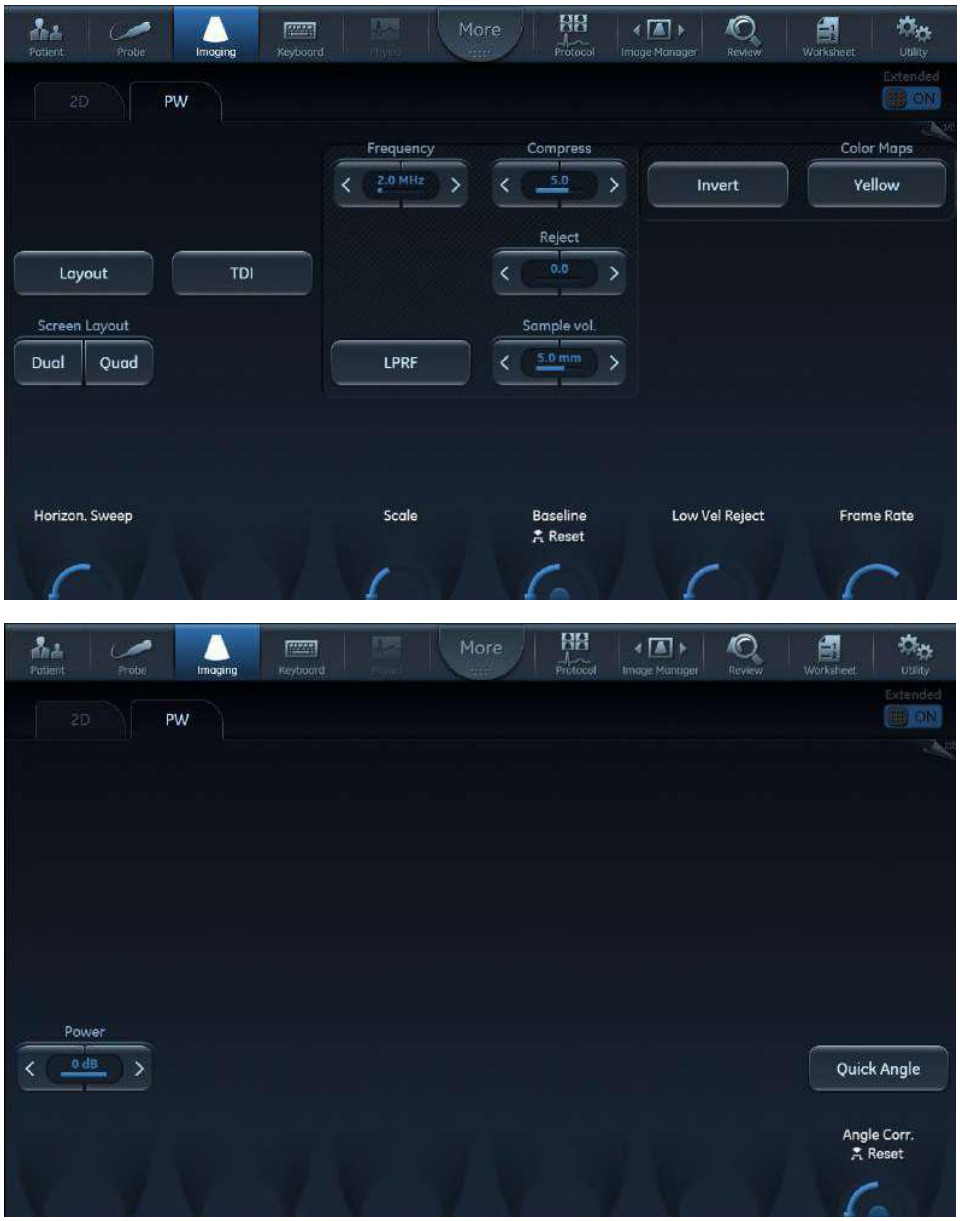


Figure 4-22 PW Doppler Touch Panels - Page 1and 2

Related information:

Refer to the *Vivid S60N/Vivid S70N User Manual*.

4-3-6-3 Using PW/CW Doppler Modes

4-3-6-3-1 Alternative 1

1) Press **PW** or **CW**. A scanning screen is displayed with a Doppler cursor on the 2D mode image and a Doppler spectrum in the lower part of the screen.
2) Use the trackball to position the Doppler cursor line and in PW the sample volume location over the area of interest.
3) In PW, adjust the **Sample Volume**.

NOTE: Sample Volume adjustment may affect the Scale, Frame rate and LV rej. settings.

4-3-6-3-2 Alternative 2

1) Press **Cursor** on the control panel. A cursor line is displayed on the 2D image.
2) Select the cursor type on the Touch panel.
3) With the trackball adjust the position of the cursor line.
4) Press **PW** or **CW**.

4-3-6-4 Optimizing PW/CW Doppler Modes

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the PW/CW modes display:

- Adjust the **Active mode gain** to set the gain in the spectral Doppler area.
- Adjust **Low velocity reject** to reduce unwanted low velocity blood flow and tissue movement.
- In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows. Adjustment of the Sample volume may affect the PRF (Nyquist limit) settings.
- Adjust the **Compress** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.
- Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.
- Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

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

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

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

CAUTION **Use all noise reduction controls with care. Excessive application may obscure low level diagnostic information.**

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

- Use the **Horizontal sweep** to optimize the sweep speed.
- To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace. Velocity range directly controls the pulse repetition frequency, which is responsible for the setting of the Nyquist limit (the ability to detect maximum velocity without aliasing).
- Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.

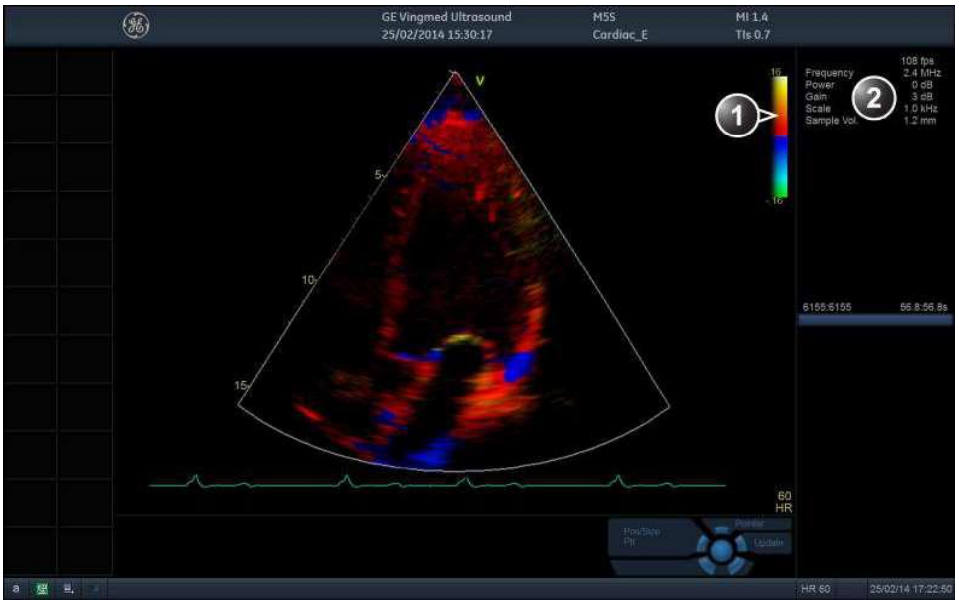
- Use **Quick angle** and **Angle correction** to steer the ultrasound beam to the blood flow to be measured (Not typically required during cardiac studies).
- Adjust **LPRF** (PW Doppler mode only) to toggle between high and low Pulse Repetition Frequency (PRF). When the Doppler PRF is raised beyond a certain limit, more than one Doppler gate is displayed on the screen.
- Press **Auto** on the Control panel to activate Automatic Spectrum Optimization (ASO). ASO is used to automatically adjust baseline and scale of the PW/CW spectrum to optimize the spectral display. It will avoid the display of a folded spectrum and stretch the spectrum vertically as large as possible. ASO optimization is not continuous but performed instantaneously each time **Auto** is pressed.

4-3-7 Tissue Velocity Imaging (TVI) Checks

4-3-7-1 Introduction

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

4-3-7-2 TVI Overview



1. TVI color bar
2. Parameter window

Figure 4-23 TVI Mode Screen

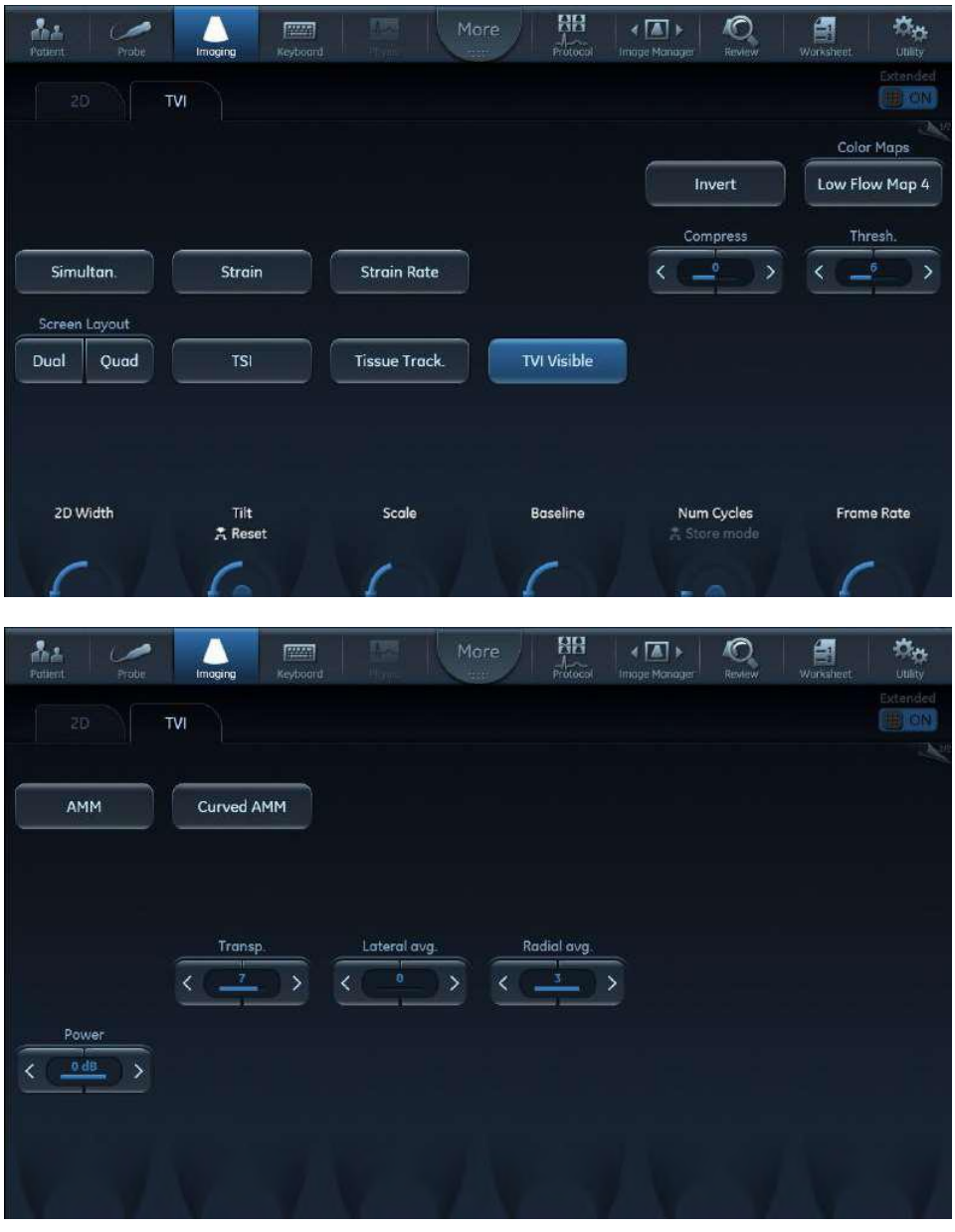


Figure 4-24 TVI Touch Panel - Page 1 and 2

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 Operating Panel.	A list of the connected probes will pop up on the screen.
2	If not already selected, use the trackball to select the desired probe.	An application menu for the desired probe is listed on the screen.
3	• Trackball to the desired application. • Press **Select** to launch the application. • To change application without changing the current probe, press **Appl.** on the Operating 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.	

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)
2. Current frame
3. Right marker (cineloop end)
4. Cine speed

Figure 4-25 Cineloop Display

4-3-10-2 Preparation

1) Connect one of the probes to the scanner.
2) Turn ON the scanner. The 2D Mode window is displayed (default mode).

4-3-10-3 Using Cineloop

4-3-10-3-1 Selection of a Cineloop

1) Press **Freeze**.

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

2) Press **2D Freeze**.

   The selected heart beat is played back.

3) Press **2D Freeze** to freeze the cineloop.
4) Use the trackball to scroll through the acquisition and find the sequence of interest.
5) Adjust **Cycle select** to move from heart beat to heart beat and select the heart cycle of interest.
6) Adjust **Num cycles** to increase or decrease the number of heart beats to be played back.
7) In Freeze, press **Set left** or **Set right** to set the corresponding cineloop boundary to the current frame.
8) Adjust **Left marker** and **Right marker** to trim or expand the cineloop boundaries.
9) Press **2D Freeze** to run the cineloop and **Img. Store** to store the cineloop or **Freeze** to return to live scanning.

NOTE: Cineloop storage can be configured to store heart cycles with additional time before and after the R-wave and to display a preview before storage.

4-3-10-3-2 Adjustment of Cineloop Playback

- Use the trackball or adjust **Speed** to increase or decrease the speed of the cineloop playback.

  The speed factor (%) is displayed on the right side of the ECG.

4-3-11 Back End Processor Checks

If all the previous checks have been passed successfully, the Back End Processor is fully functional.

NOTE: If the system seems to be operating erratically, refer to Chapter 7 in this manual.

4-3-12 Operating Panel Check

The Operating Panel is automatically checked during Vivid S60N/Vivid S70N system start-up.

4-3-13 Main OLED/LCD Screen Check

Verify that the image does not include any;

- white dots
- noise stripes
- flickering
- color shade(s) (red or otherwise)

4-3-14 External Monitor Check

Verify that the image displayed on the Main Screen is also displayed on the external monitor.

4-3-15 Peripheral Checks

4-3-15-1 Printer Checks

The internal printer is controlled from the **P1** key on the Vivid S60N/Vivid S70N's Operating Panel.

Table 4-4 outlines the steps for performing Printer checks.

Table 4-4 Printer Checks

Step	Task	Expected Result(s)
1	When scanning in 2D Color Mode, press Freeze to stop image acquisition.	Image scanning stops with the last picture on the screen.
2	Press P1 on the Operating Panel	The image displayed on the screen is printed on the assigned printer.
3	Check if the print quality on the pictures from both printers are of expected quality.	

4-3-15-2 Windows Print Test Page

This checks that the printer is correctly installed and hooked up at the Windows level.

1) Open the Printers folder, either from Start > Settings > Printers or from Utilities > System > Printers.
2) Right-click on a printer and select Preferences.
3) Select Print Test Page (this will send a print to the printer bypassing all of the Scanner software).
4) Observe the printed page.

   If the page prints out, the problem you are looking for is probably a configuration issue in windows, or configuration issue in Utilities > Connectivity.

   If the page prints out from Windows, there could not be a problem within Windows. In this event, you will see an incomplete print out of the test page.

   If the page does not print out, there probably is a cabling issue, or a printer configuration issue in Windows.

NOTE: For the Sony small-format printers, you will see an incomplete Test Page printed out. This is normal.

4-3-15-3 Setup and Check a Printer Service

1) Select Utility > Connectivity

   If you get a pop-up asking you to log on, select ADM.

   Type the current password.

2) Select the Service tab.

3) In the combo box “Select Service to Add” select “Standard Print” and click on Add.

4.) In the right pane Properties “Combo Box” select the printer you wish to check. Set any other parameters you desire.

5) In the left pane “Properties” Enter a name that describes the printer and configuration you just selected in the right pane.

6) Select the Button tab.

7) Select one of the “Physical Print Buttons” that you want to configure.

8) In the right pane click on the service name you just created in the Services Tab.

9) Click on the “>>” button. This will place this service in the PrintFlow View for the printer button you selected.

10) Click on Save.

You have now configured a printer service and attached it to a print button.

Now you can check the printer by pressing the Print button you just configured.
If you configured it for 1 row and 1 column, each time you press the Print button, you will get a print sent to the printer.

If you configured some other combination of rows or columns, you will have to push the printer button multiple times before a print is sent to the printer.

If the image does not print, check the configuration to verify that you have it set up correctly.

4-3-15-4 View the Windows Printer Queues

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

2) Click on **Properties**.

4-3-16 Mechanical Functions Checks

4-3-16-1 Monitor Articulated Arm Movement Check

Table 4-5 Monitor Articulated Arm Movement Check

Step	Task	Expected Result(s)
1	Lift the up/down release handle *upwards*. (It is located on the *right* side below the Operating 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 Operating 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 Operating 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 Operating Panel (*upwards* and *downwards*).
4	Check all positioning capabilities of the Articulated Arm, as illustrated in Figure 5-6 on page 5-10.	Make sure the arm can be moved freely into the illustrated positions.

4-3-16-2 Operating Panel Movement Check

Table 4-6 Operating Panel Movement Check

Step	Task	Expected Result(s)
1	Lift the left/right release handle located on the *left* side of the Operating Panel.	The *left and right* movement locking mechanism is released, allowing the Operating Panel to be swiveled 30 degrees to the right and left from the center position.
2	While lifting the release handle, swivel the Operating Panel left and right and make sure it is able to reach its maximum left and maximum right positions.	Ensure that you do not apply too much force to move the Operating 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 Operating Panel is locked and no movement is observed when moderate force is applied to the Operating Panel (*left* and *right*).

4-3-16-3 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.

4-3-16-4 Front Wheel Function Check

Table 4-8 Brakes Function Check (Front Castor Wheels)

Step	Task	Expected Result(s)
1	Release the wheel lock (upper lever) on each front castor wheel by pushing the lever labeled OFF. Push and pull the unit *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.

Chapter 5
Components and Function (Theory)

Section 5-1
Overview

5-1-1 Purpose of Chapter 5

This chapter explains Vivid S60N/Vivid S70N system concepts, component arrangement, and sub-system functions. It also describes the power distribution system, the cabling system and probes.

Table 5-1 Contents in Chapter 5

Section 5-2
General Information

5-2-1 Introduction

The Vivid S60N/Vivid S70N system is a compact ultrasound scanner that can be used with both phased array and linear array ultrasound probes and Doppler (Pencil) probes.

Weighing only 75 kg (165 lb), the Vivid S60N/Vivid S70N is extremely versatile and - depending upon the installed software - can be used for various imaging modes. These include:

- 2D Gray Scale and 2D Color Flow imaging
- 4D imaging
- M-Mode Gray Scale imaging
- Color M-Mode
- Doppler
- Different combinations of the above modes

The Vivid S60N/Vivid S70N system main hardware components are configured as illustrated in Figure 5-1.

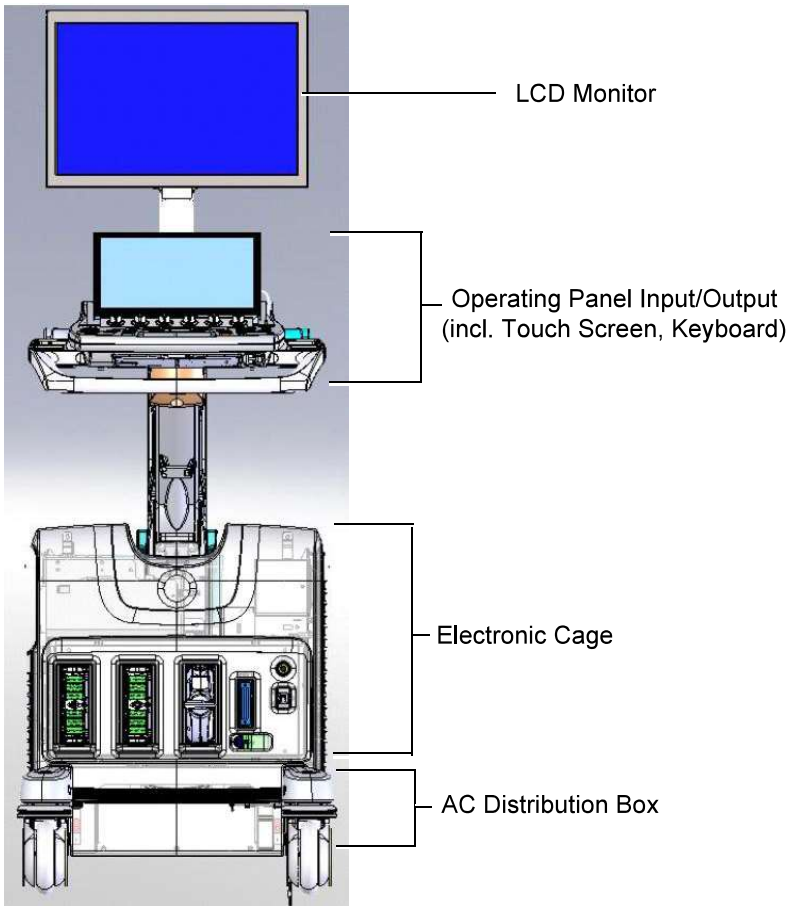


Figure 5-1 Vivid S60N/Vivid S70N System - Configuration of Main Hardware Components

NOTE: For additional views of the system, see illustrations in:
Vivid™ S60N/S70N System Design on page 5 - 5.
System operations are initiated by the user via the Operating Panel (that has ultrasound-specific buttons, mode-dependent softkey buttons and an optional alphanumeric keyboard), and the Touch Screen.

NOTE: For a detailed description of Vivid S60N/Vivid S70N system operating modes, refer to the Vivid S60N/ Vivid S70N User Manual.

The Vivid™ S60N/Vivid™ S70N ultrasound scanner has a software beam-forming system.

Signal flow from the Probe Connector Panel, to the Front End (FE) Electronics, and to the Back End Unit, are finally displayed on the monitor and peripherals.

In addition, the Vivid S60N/Vivid S70N system enables acquisition of external ECG signals. The ECG/Respiratory module, which supports acquisition of three bipolar ECG channels (leads I, II, III), is incorporated in the cabinet cage assembly to provide ECG signals to synchronize cardiac ultrasound image acquisition.

5-2-1-1 System Configuration and Software

System configuration is stored on a hard disk drive inside the Back End Unit.

At power up, all necessary software is loaded from the hard disk.

5-2-1-2 Electronics

The Vivid S60N/Vivid S70N system internal electronics are divided into three:

- Front End Unit - see page 5 - 22
- Back End Unit - see page 5 - 23
- System Power Distribution - see page 5 - 24

Vivid S60N/Vivid S70N system internal electronics comprise a single electronic cage that contains both the Front End Unit and the Back End Unit. The Interconnecting signals and power distribution between the two sections are routed internally via two cables; boards are connected directly to each other. All the interconnections to the monitors, operator keyboard and peripherals are via the Backend Interface Board (BIF) which is fully shielded for EMC/EMI purposes.

5-2-1-3 Typically Power Consumption

NOTE: The Electrical Requirements for VIVID S60N/VIVID S70N are listed in:
2-2-5 "Electrical Requirements" on page 2-3.

The typical power consumption for Vivid S60N/Vivid S70N is displayed in the table below

Table 5-2 Typical power consumption for Vivid S60N/Vivid S70N

Description	Power Consumption	Comments
Power Consumption - Standby	6.5 Watt	Yellow LED on power button
Power Consumption - Operational Mode	240 Watt	Scanning in B-mode with M5Sc
Power Consumption - Basic load	215 Watt	Freeze mode
Power Consumption - Full load	245 Watt	Triplex mode of M5Sc

Section 5-3
Vivid™ S60N/S70N System Design

The design of the Vivid S60N/Vivid S70N comprises three main sections (illustrated in Figure 5-2):

- User Interface
- Main Scanner
- Power Supply - also named the AC Distribution Box

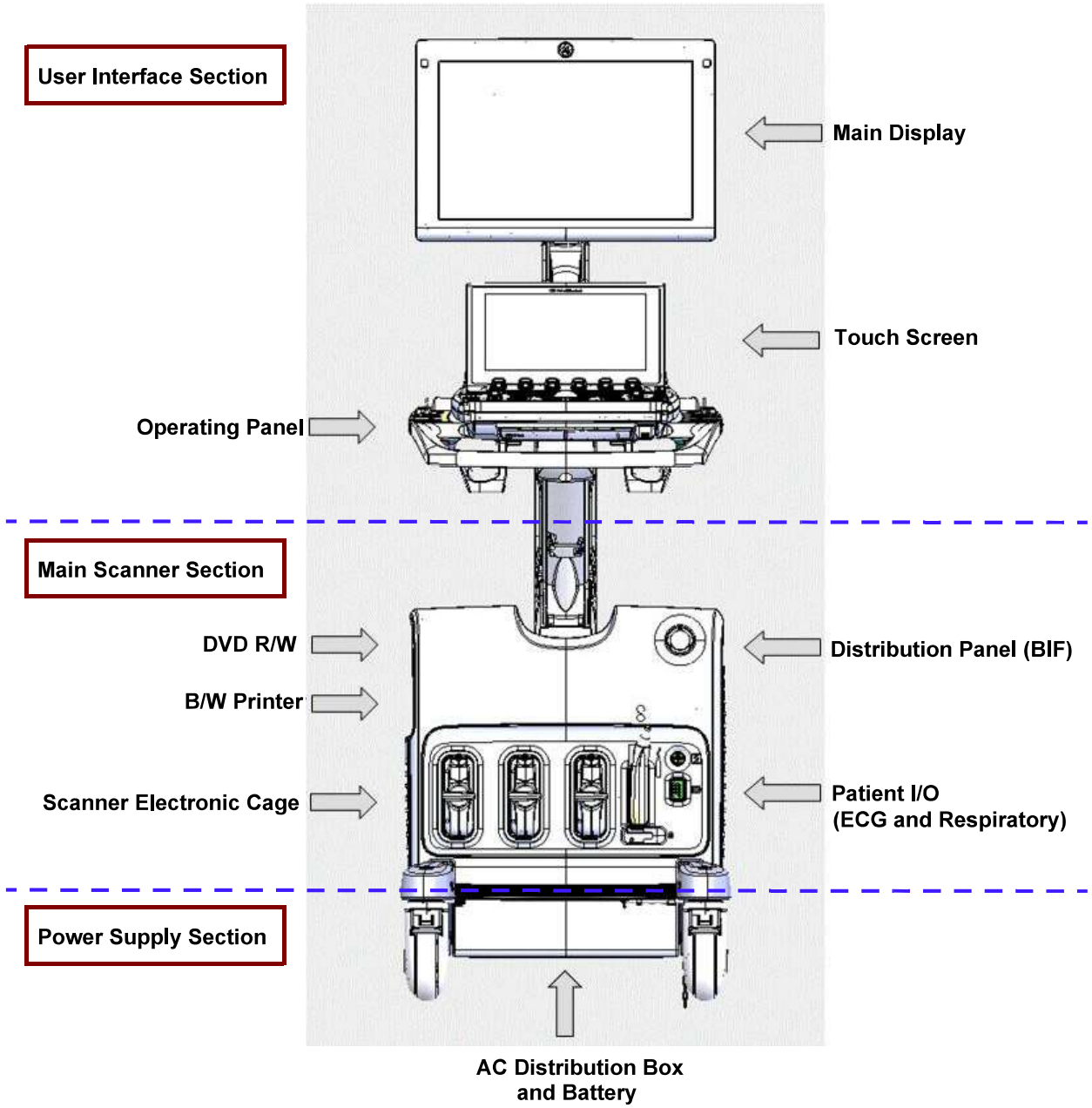


Figure 5-2 Vivid S60N/Vivid S70N - System Design

5-3-1 User Interface Section

The User Interface section comprises the following modules:

- Operating Panel and Speakers
- Main Display
- Touch Screen
- Optional Alphanumeric Keyboard

5-3-2 Main Scanner Section

The Main Scanner section comprises the Scanner Electronic Cage, that includes the following modules:

- Front End Unit
- Back End Unit
- Patient I/O Module
- Sub-Woofer
- Rear Interface Panel
- Optional DVD-RW
- Optional B/W Printer

5-3-3 Power Supply Section

The Power Supply section comprises the following modules:

- Main AC/DC 18v supply
- B/W Printer AC power control
- Battery Charger
- Optional Battery

Section 5-4
Positioning Capabilities

5-4-1 System Up and Down Positions

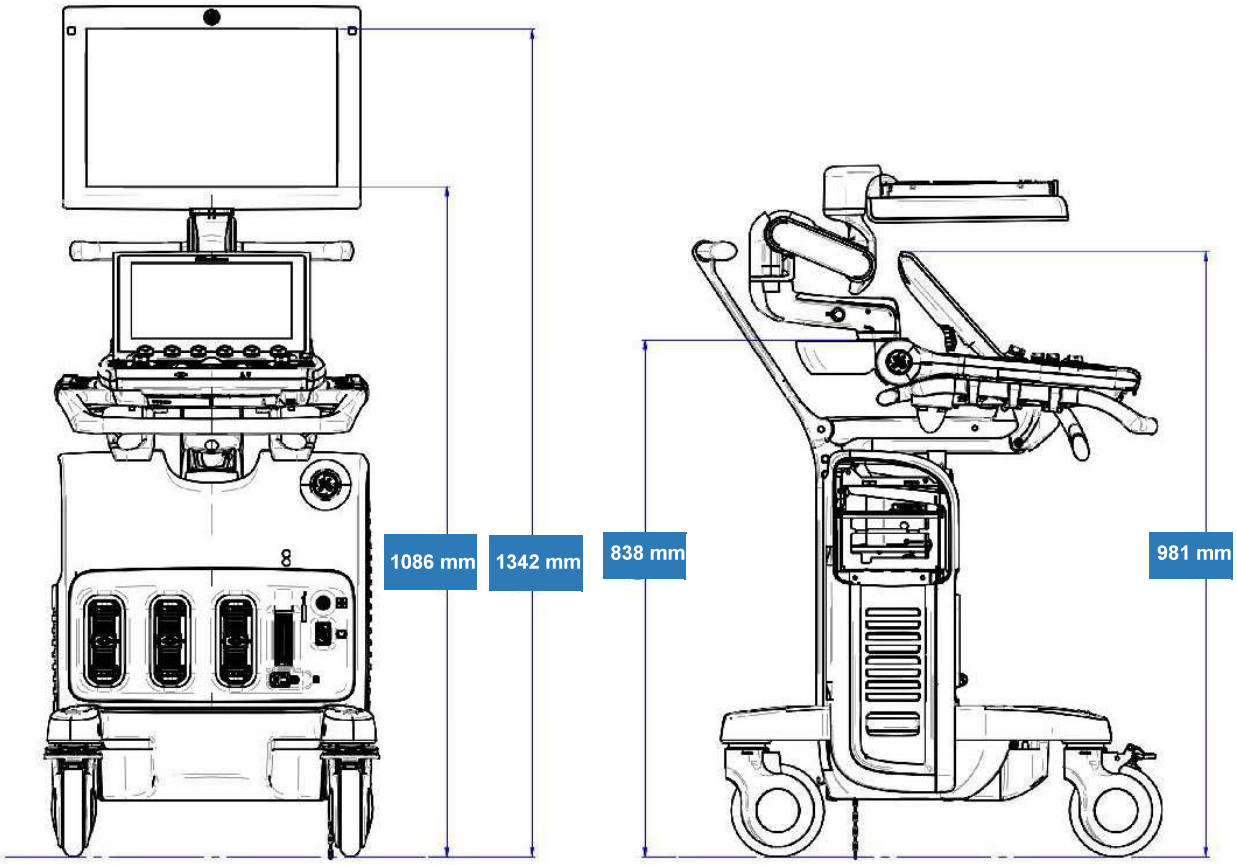


Figure 5-3 Up and Down Positions

5-4-2 Upper Section - Positioning Control

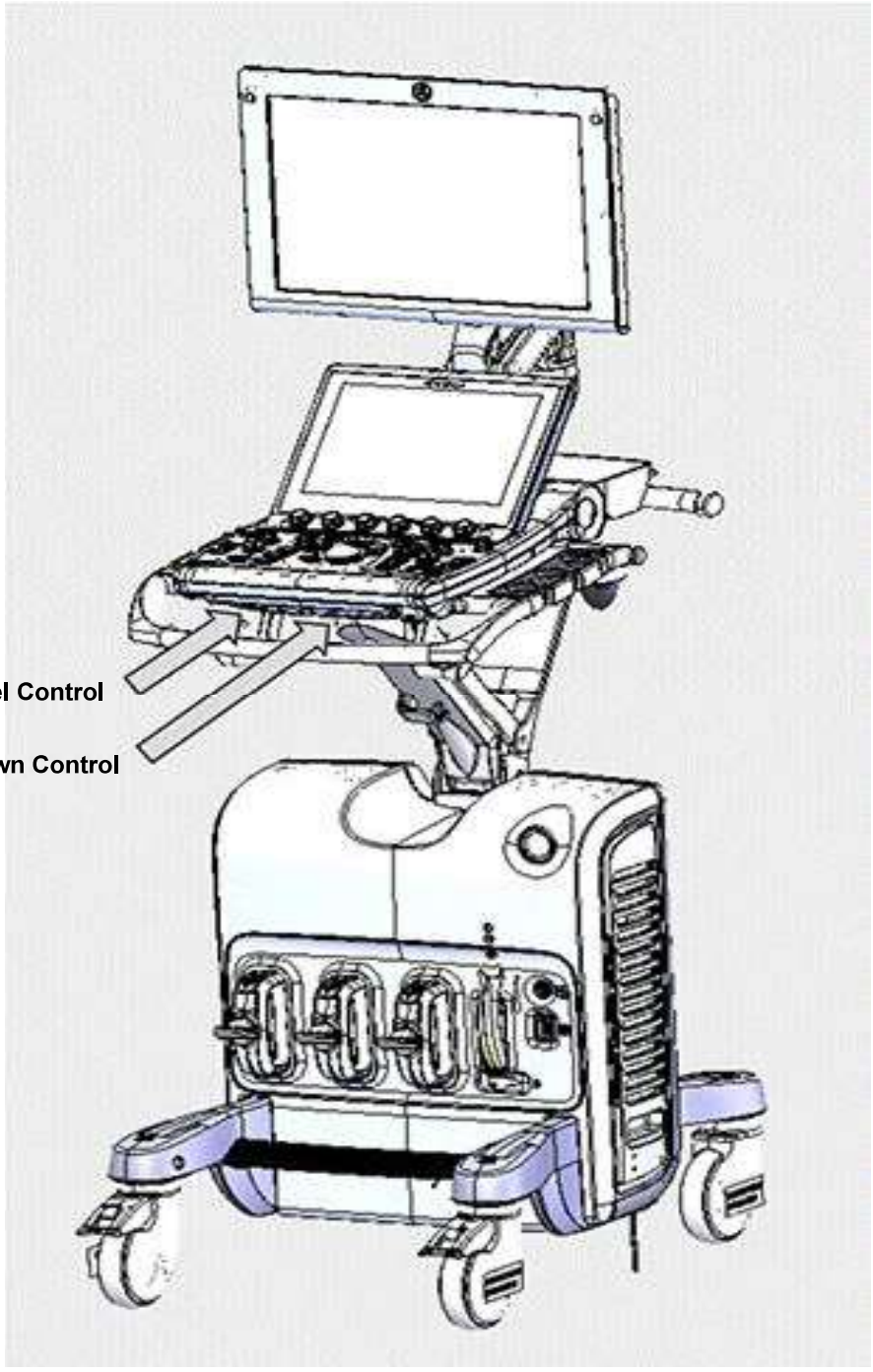


Figure 5-4 Upper Section Positioning Control

5-4-3 Main Display - Articulated Arm

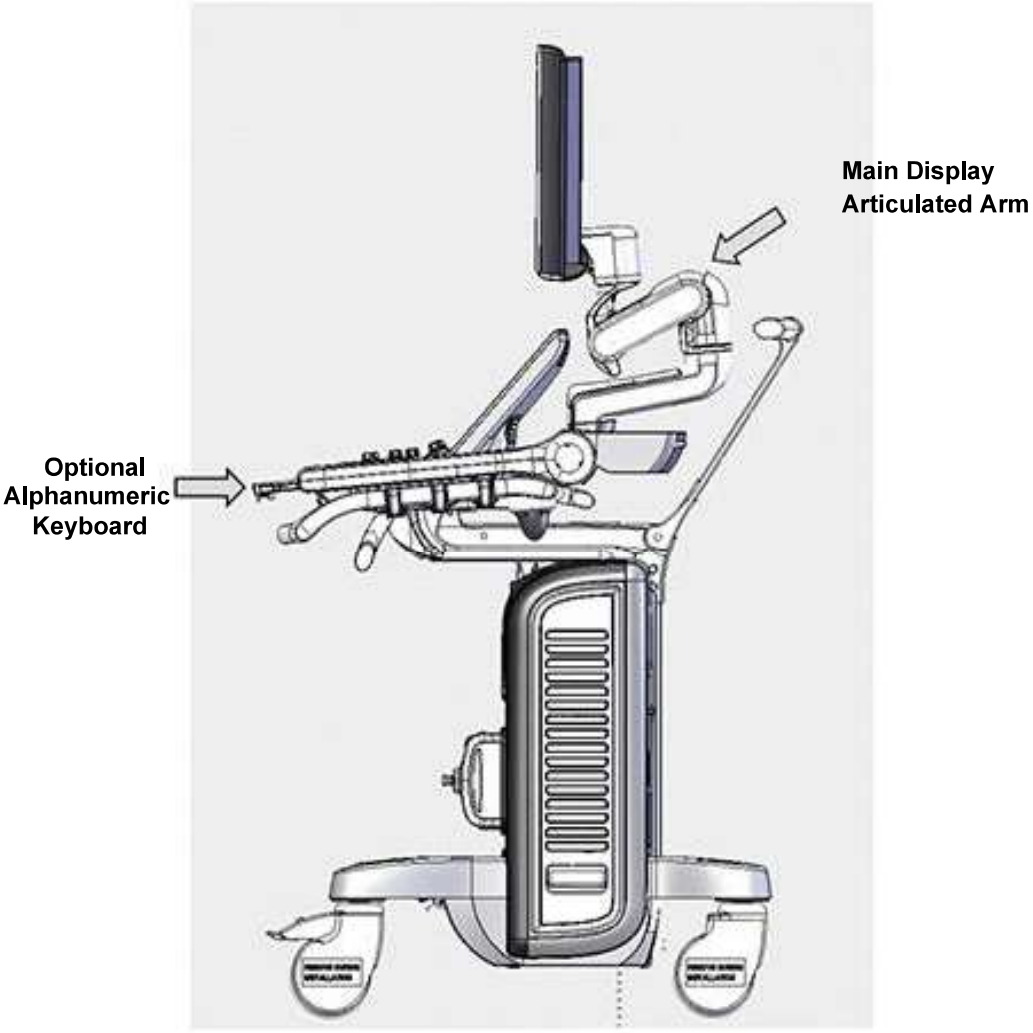


Figure 5-5 Side View

5-4-4 Main Display - Positioning Capabilities

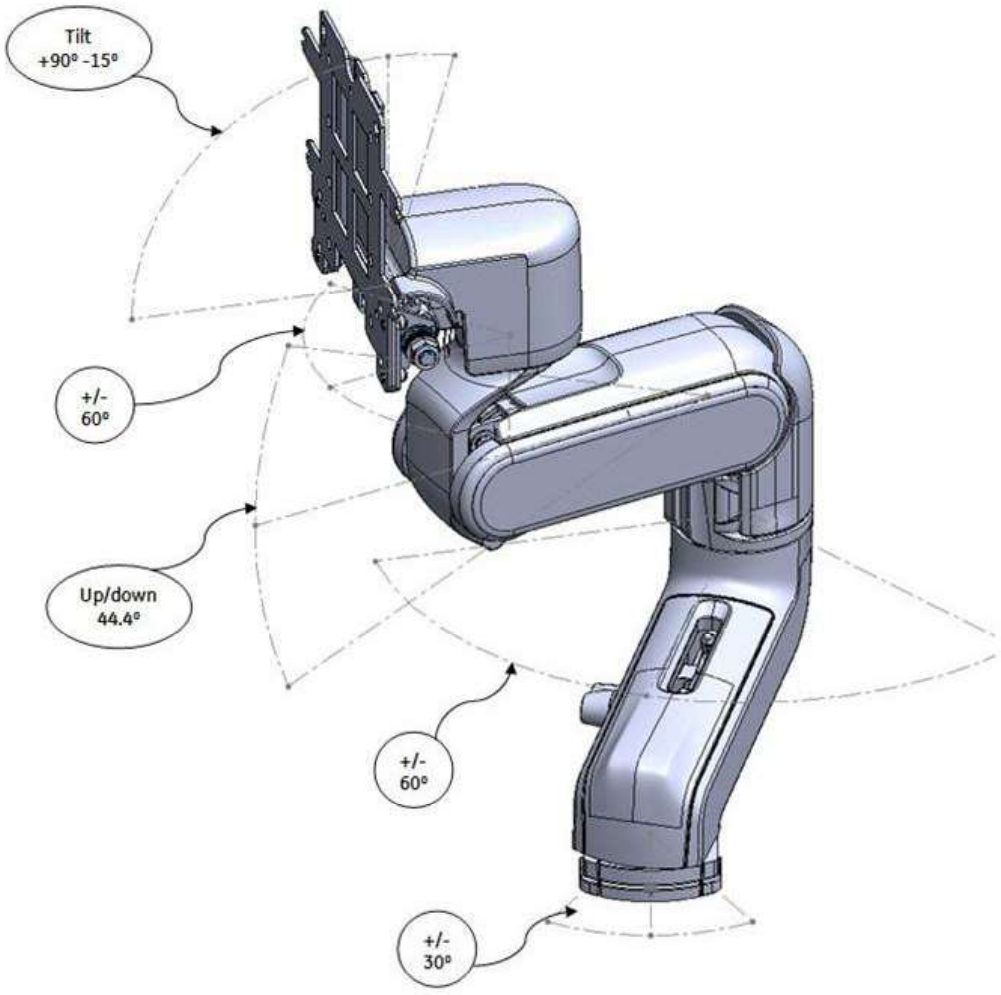


Figure 5-6 Main Display Positioning Capabilities

5-4-5 System Positioning for Transportation

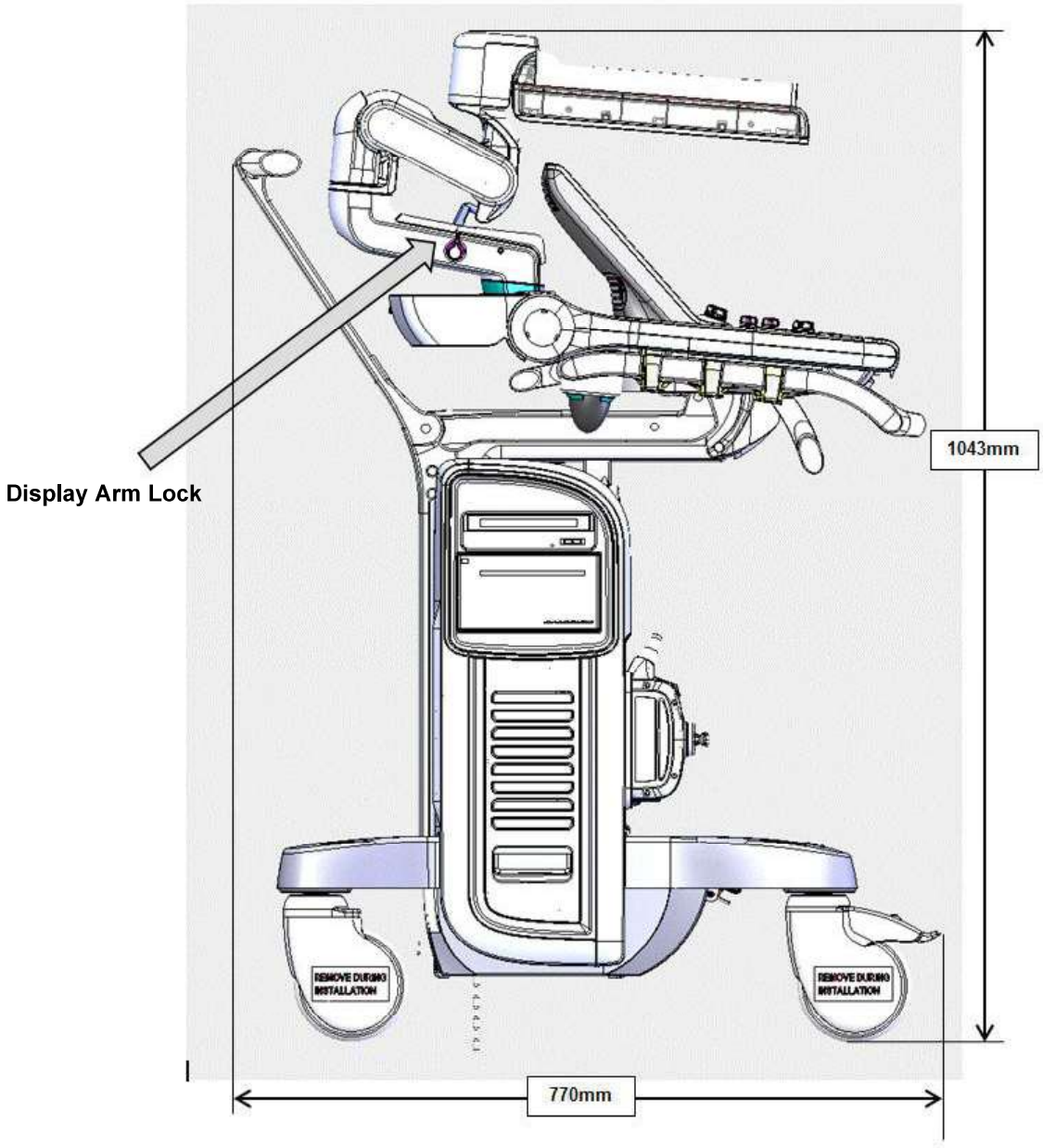


Figure 5-7 Position for Transportation Mode

Section 5-5
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:

- Electronic Cage door
- Electronic Cage cabinet

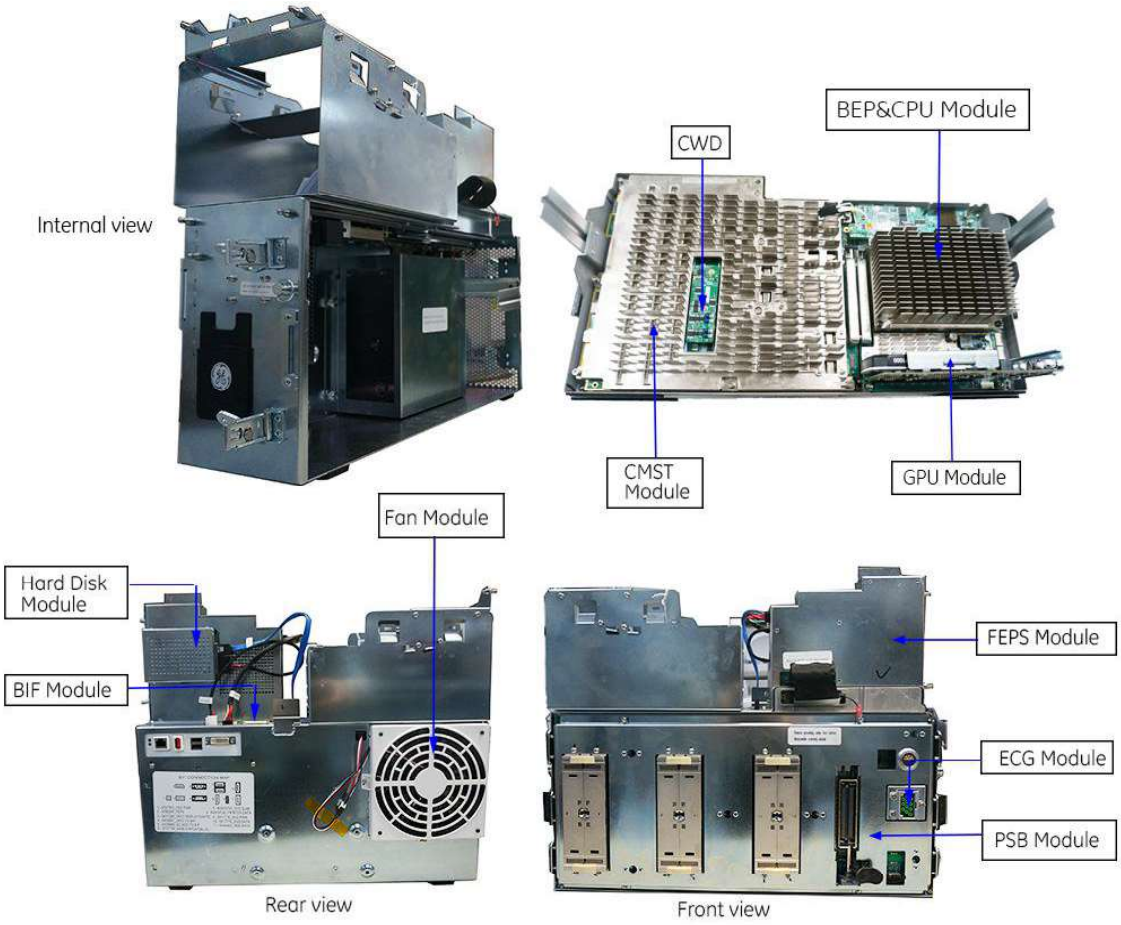


Figure 5-8 Electronic Cage - Internal View

The architecture is based on the cSound software beam-forming architecture. In this architecture, the data acquired from the ultrasound channels is transferred from the Front End to the Back End; the Beam forming is done by the Back End software.

5-5-1 Scanner Electronic Cage - Main Assemblies (cont'd)

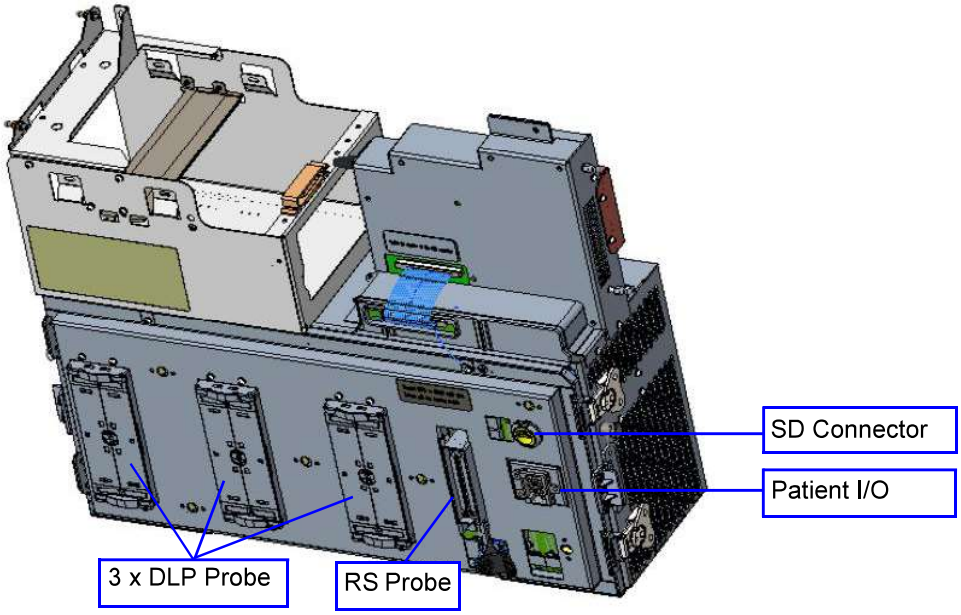


Figure 5-9 Electronic Cage - Front View

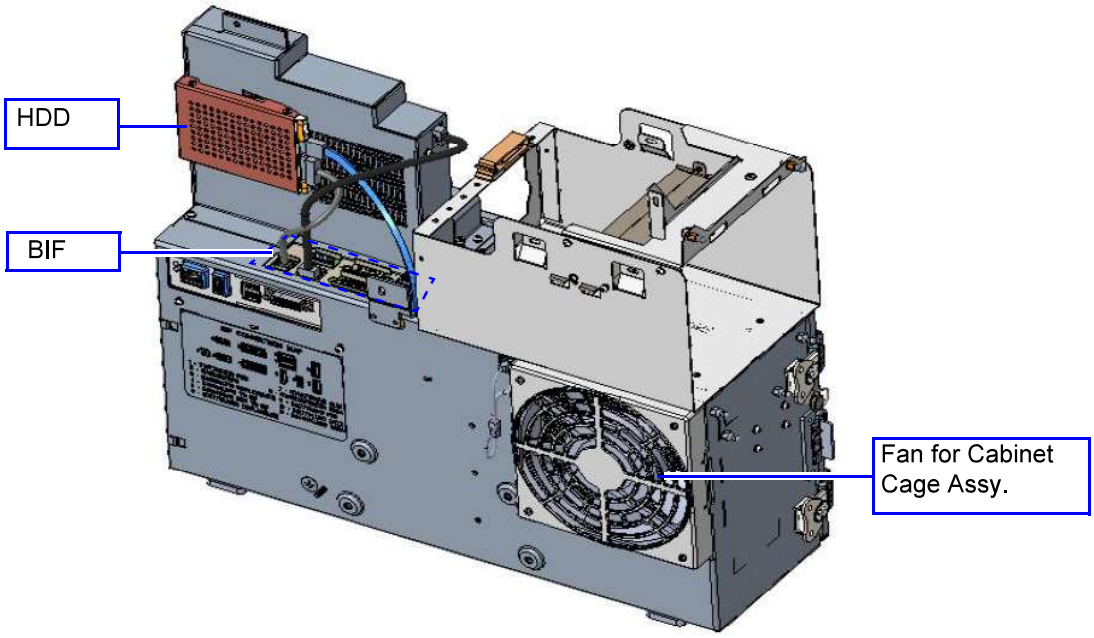


Figure 5-10 Electronic Cage - Rear View

5-5-1 Scanner Electronic Cage - Main Assemblies (cont'd)

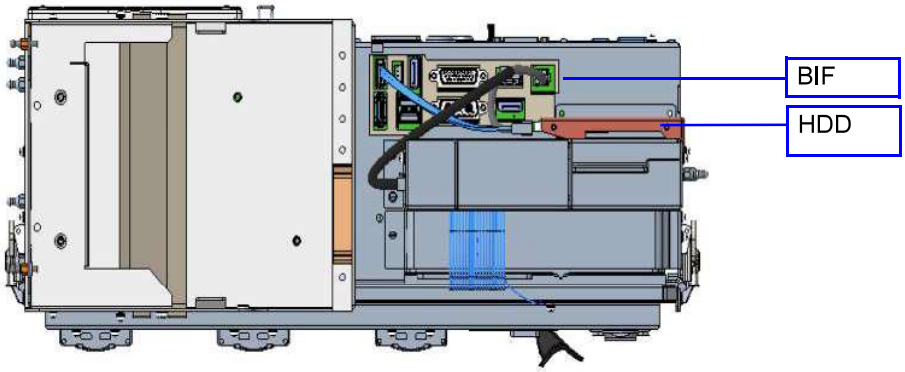


Figure 5-11 Electronic Cage - Top View

Section 5-6
Service Access to the Vivid S60N/Vivid S70N 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 and removing the Cage door.

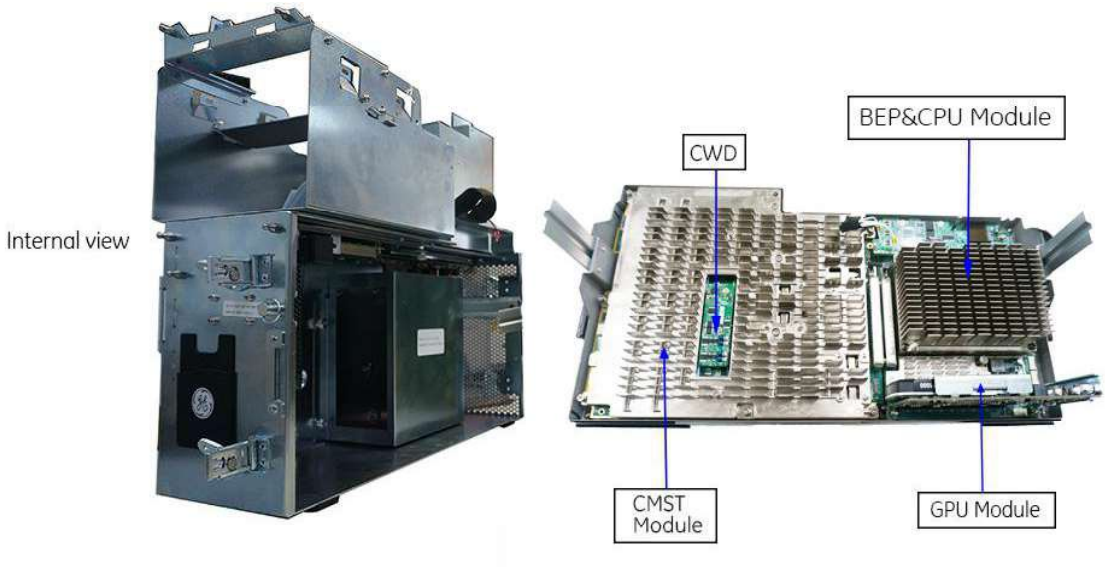


Figure 5-12 Electronic Cage - Access to the Electronics

5-6-2 Modules Accessed from the Rear

Access to the AC Box and Battery is from the rear of the system, by removal of the Lower Rear Cover.

The Main Cage FAN is also accessed from the rear, by removal of the Upper Rear Cover.

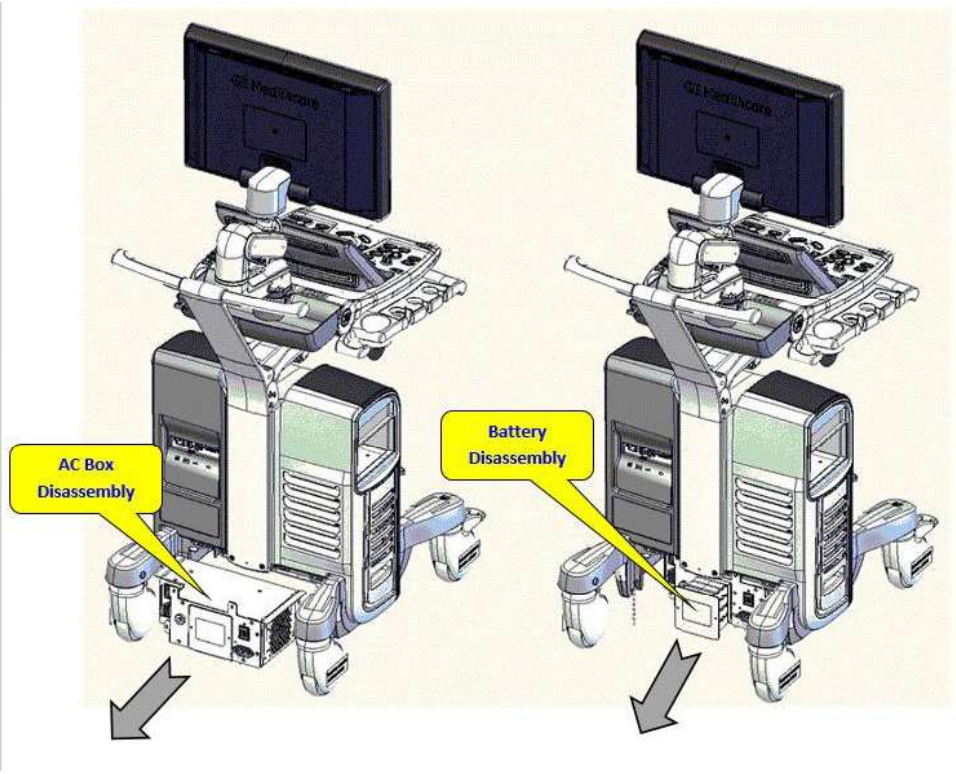


Figure 5-13 Modules Accessed from the Rear

Section 5-7
Top Console with Monitor, Operator Control Panel and Touch Screen

5-7-1 Monitor (Main Display)

The display monitor is a super-wide 19" or 21.5" LCD screen.

To facilitate comfortable positioning for the operator, the height of the Main Display can be adjusted as required. Figure 5-3 on page 5-7 shows the Vivid S60N/Vivid S70N in the *up* and *down* positions.

For optimal viewing, the screen angle is adjustable; tilting may be between +90^{o} and -15^{o}

In order to optimize the display settings, a light-sensing device (ambient light sensors) located on each side of the Monitor is used for measuring the ambient light. This data is processed by the main CPU which adapts the display setting, accordingly.

5-7-2 Operator Control Panel and Speakers

The Vivid S60N/Vivid S70N Operator Control Panel (the OPIO module) comprises the following main components:

- Extended Keyboard
- Touch Screen - LCD multi-touch panel
- Alphanumeric Keyboard (optional)

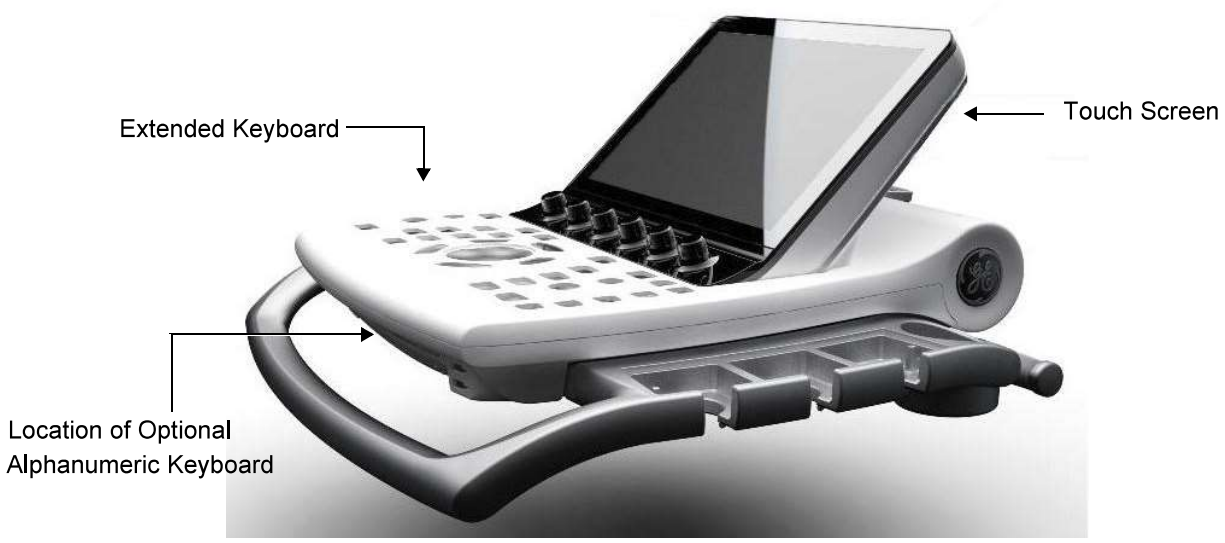


Figure 5-14 Operator Control Panel (without Alphanumeric Keyboard option)

5-7-2 Operator Control Panel and Speakers (cont'd)

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 of the Main Monitor
- EEPROM - for retaining the module information (such as, serial number and revision number)

5-7-2-1 Keyboard and Operating Panel Components

5-7-2-1-1 Power ON/OFF Button and Power Status LEDs

The various states of Power ON/OFF and Battery indication status are illustrated in Figure 5-16 below:

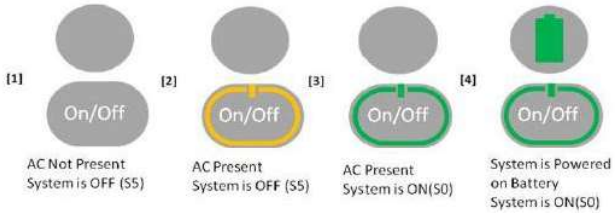


Figure 5-16 Power ON/OFF and Battery Status Indicators

5-7-2-2 Optional Alphanumeric Keyboard

The Alphanumeric Keyboard (A/N KB), which has physical keys, is mounted in a drawer under the Extended Keyboard.

When the A/N KB is not installed (basic configuration), a blank cover is mounted in order to hide the mounting area. This cover is removed when assembling the unit.

A/N KB communication is transferable via an internal dedicated USB cable to the OPIO.

Figure 5-17 Alphanumeric Keyboard

5-7-2-3 Extended Keys (Buttons)

The Extended Keyboard has 24 buttons (Extended Keys) that are backlit in two colors, as follows:

- White light - for visibility in the dark
- Green light - indicates activity

5-7-3 Touch Screen

The 12" Touch Screen, located above the Operating Panel, is a multi-touch module comprising the following main components:

- LCD Panel
- LCD Controller
- Multi-Touch Surface
- Multi-Touch Controller
- Glass Layer

Section 5-8
Internal and External Input/Output

The Vivid™ S60N/Vivid™ S70N ultrasound scanner has a connection panel (located at the rear of the electronic cage) that can host the connections illustrated below.

Figure 5-18 shows a view of the Vivid S60N/Vivid S70N ultrasound system rear panel showing external peripheral/accessory connectors.

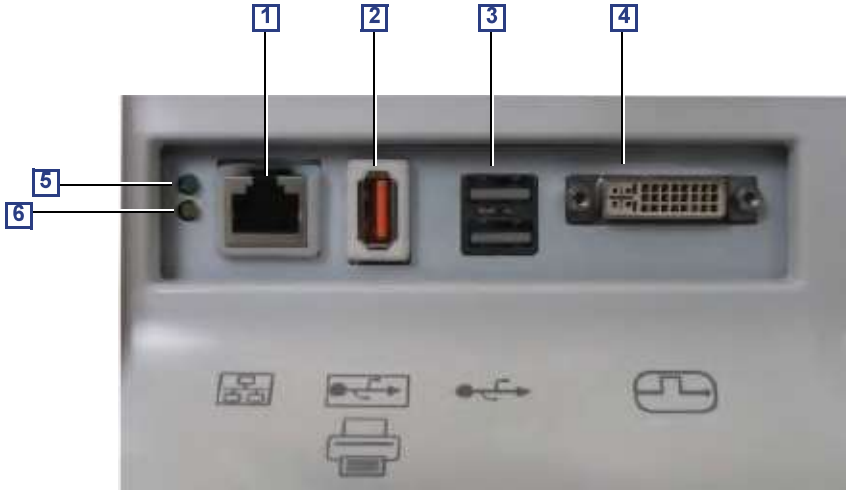


Figure 5-18 View of the Vivid S60N/Vivid S70N Peripheral/Accessory Connector Panel

1. Ethernet LAN connector — 1000 Base-TX Ethernet IEEE 802.3
2. Isolated USB connector (USB 1.0 only)
3. Dual USB connector (USB 2.0)
4. DVI-D Display OUT connector (DVI-I type with digital output only [DVI-D])
5. LED - Network activity
6. LED - Network activity

Section 5-9
Front End Unit

5-9-1 General Information

The Front End Unit, located in the door of the Electronic Cage (see Figure 5-19) comprises the following modules:

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

  See Front End Power Supply (FEPS) on page 5-23.
- **Minicsound MST (CMST) board** includes the transmit and receive circuits

  See CMST board 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.

5-9-2 Components in the Electronic Cage Assembly

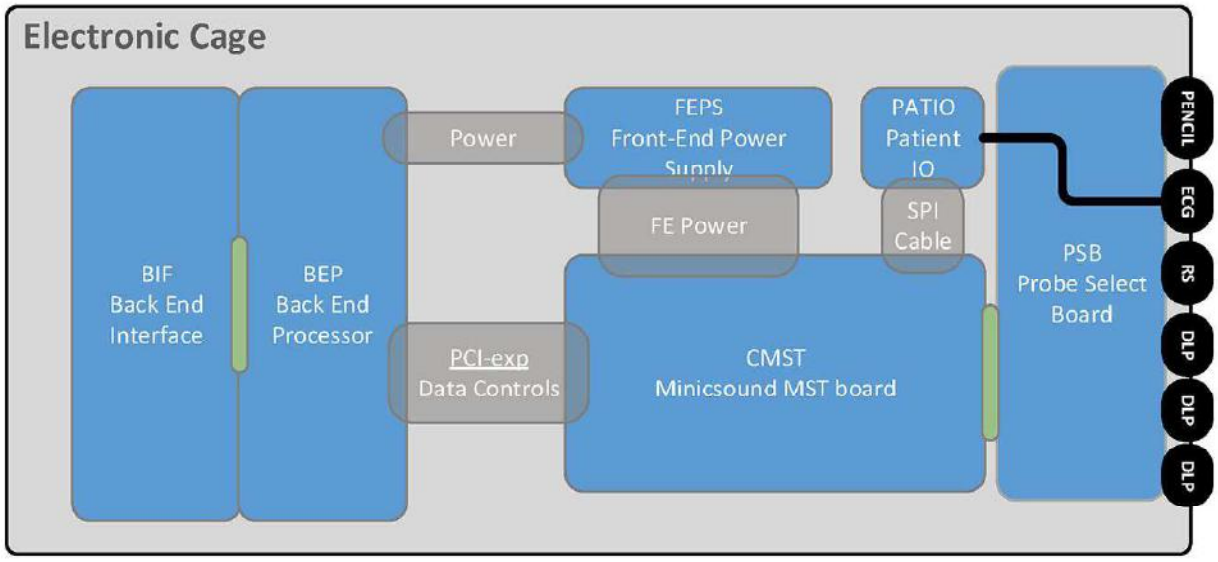


Figure 5-19 Location of Components in Electronic Cage Assembly

5-9-3 Front End Power Supply (FEPS)

The FEPS Module comprises the following LVPS and HVPS sections:

- Low Voltage Power Supply (LVPS)
  consists of Switching Regulated Fixed Voltage supplies, and is controlled by the PM FPGA on the BEP.
- High Voltage Power Supply (HVPS) - contains two THV units with variable voltage control:
  - THV0 unit that supplies positive and negative voltages that could be set from 0v to ±90v
  - THV1 unit that supplies positive and negative voltages that could be set from 0v to ±70v

5-9-4 CMST board

The CMST board generates the transmit pulses that are sent via the PSB to the ultrasound probe.

Ultrasound echos, received from the ultrasound probe, via the PSB, to the CMST are converted from analog to digital and forwarded to the Back End Processor.

5-9-5 Probe Selection Board (PSB)

The Probe Selection Board (PSB) enables acquisition and processing of signals from and to probes connected to the front panel.

The main purpose of the PSB is to select the active probe and transfer the probe data to the CMST Board. The PSB provides a mechanical and electrical interface for 3 DLP probes, a single RS probe and a single pencil probe.

5-9-5-1 Pencil Connector

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

5-9-6 Patient I/O Module

5-9-6-1 Patient I/O (PATIO) Module - Functional Description

The PATIO module is part of the basic system configuration, and is responsible for the acquisition of the ECG and Respiratory Analog signal inputs.

Section 5-10
Back End Unit

5-10-1 Introduction

The Back End Unit (BEU), which supports the operation of the Vivid™ S60/Vivid™ S70 ultrasound unit and is the main controller for the system, comprises the following modules:

- Back End Processing (BEP) Module
- Back End Interface (BIF) Module
- Hard Disk Drive

Section 5-11
System Power Distribution

5-11-1 Introduction

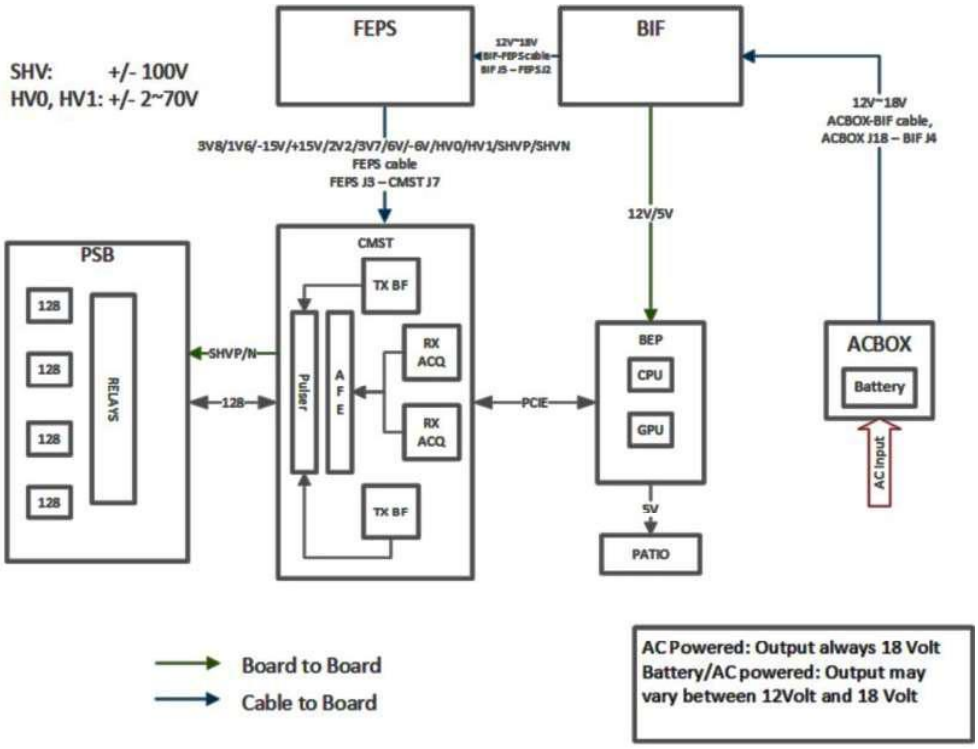


Figure 5-20 Power Distribution

The Vivid S60N/Vivid S70N system power distribution consists of the following modules:

- An Isolated AC/DC Power supply to all System modules (18V/400W) called the AC Box Unit (AC Distribution Box).
- Optional Battery that supplies Power to the system in the event of AC power failure (12-16.8V 150W).
- Non-Isolated AC Power supply to Integrated B/W Printer

5-11-2 System Power Management

The System Power Management is responsible for operating the system in different power states, in accordance with the power condition and User request.

5-11-3 Rechargeable Battery Pack

The rechargeable Battery pack is a smart battery device acting as a UPS and communicating with the Vivid S60N/Vivid S70N system over the SMBus.

The Battery pack contains protection circuitry, and a fuel gauge IC with internal memory to store pack configuration information, measurement calibration, coefficients, manufacturer's information, and chemistry data.

NOTE: The Battery prevents uncontrolled system shut-down in the event of power loss, or if there is a need to transport the system without having complete Power Off/On cycle.
In addition, the Battery enables fast return to scanning when AC power is resumed.

NOTE: The system cannot scan while AC power is not present.

5-11-3-1 Battery - General Safety Guidelines

The lithium ion rechargeable battery provides a backup mechanism to the Vivid S60N/Vivid S70N system whenever an AC power source is not available. The battery module is supplied with a lithium ion rechargeable battery pack (GPA) installed in the battery bay, as standard.

The Vivid S60N/Vivid S70N has built-in charger functionality and switches automatically from battery operation to AC operation and *vice versa*.

When shutting down the system, leave the main power cable connected to keep the battery fully charged.

NOTE: Before removing or inserting the Battery, perform system shut-down and disconnect the AC power cable from the Vivid S60N/Vivid S70N.

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

5-12-1-1 Vivid S60N/Vivid S70N system fans

The system has one fan (Main Fan) for system cooling. It is controlled by software and has variable speed. In addition it has the AC Distribution Box Fan, located on the side of the AC Distribution Box.

5-12-1-2 Cooling Requirements

The cooling requirement for the Vivid S60N/Vivid S70N with monitor and on board peripherals, is up to 2000 BTU/h. This figure does not include cooling needed for lights, people, or other equipment in the room.

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

Section 5-13
Peripherals

5-13-1 Internal Peripheral

5-13-1-1 Black & White Digital Graphic Printer

The B/W Printer, available as an option, is located on the *right* side of the Vivid S60N/Vivid S70N.

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 S60N/Vivid S70N.

CAUTION To avoid damage of the cable, keep the cable away from the wheels.

Disconnect the footswitch before moving the ultrasound system.

5-13-2-2 External Color Printer (option)

A color video printer can be connected to the USB port on the rear of the Vivid S60N/Vivid S70N.

5-13-2-3 USB Flash Drive (USB Flash Card) (option)

Due to the EMC requirements, only USB Flash Cards tested for use with Vivid S60N/Vivid S70N may be used.

5-13-2-4 Ethernet

Ethernet (TCP/IP) is connected to the I/O panel (BEP I/O board) on the rear of the Vivid S60N/ Vivid S70N.

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

Section 5-14
Service Desktop

The Service Desktop is an interface that provides access to system information, status and diagnostics. The Service Desktop has different content or views depending on the access level. The access level is determined by the user profile as well as the service options enabled on the Vivid™ S60N and Vivid™ S70N.

- Basic view is the standard view, restricted only by the user through the user profile settings. Administrator default user has access to the Service Desktop. Any user with "local Service access" in their user profile can have access to this view.
- Class C view is the view enabled by the service options purchased.
  - Service Advanced
  - Service Expert (requires Service Advanced)
  - Service Pro (requires Service Advanced)

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Chapter 6
Service Adjustments

Section 6-1
Overview

6-1-1 Purpose of Chapter 6

This chapter explains that there are no service adjustments required on a Vivid™ S60N/ Vivid™ S70N ultrasound scanner.

6-1-2 Contents in this Chapter

Section 6-2
Power Supply Adjustments

There are no adjustments on the power supply.

The DC Power is self-regulated.

If a voltage is outside the specified range, it means that something is wrong, either with the power supply itself or with one (or more) of the units connected to that specific power outlet.

When an error occurs, the power will be turned OFF immediately.

Section 6-3
Monitor Adjustments

There are no service adjustments required on the monitor.

The User can adjust Contrast & Brightness, to accommodate user preference for gray-scale visualization under variable ambient light conditions.

6-3-1 Using monitor adjustment touch panel controls

1.) Activate the main menu on the touch panel.

2.) Tap the **LCD setup tab**. The touch-panel will display several screen adjustments controls.

These screen controls allow the user to optimize the screen settings.

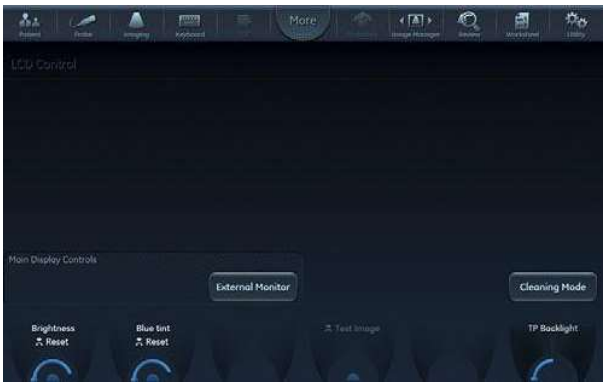

Figure 6-1 LCD adjustment utility

6-3-1-1 Brightness Rotary

This is the main control to adjust screen brightness to compensate for different ambient light.

In a totally dark room it is recommended to set brightness down all the way.

6-3-1-2 External screen button

Activate this button when connecting the system to an external display. It will allow you to optimize Contrast / Brightness and blue-tint to suit the particular external display.

NOTE: At this state, a rotary selector will appear allowing to optimize for the monitor type used: sRGB, GSDF or CRT.

When the button is de-activated, the previous settings that were optimized for the internal display will be restored.

6-3-1-3 External Monitor Output Resolution Adjustment

For instructions to adjust the resolution on an external monitor, refer to: External Monitor Output Resolution Adjustment on page 3-69.

Section 6-4
Touch Panel adjustments

There are no service adjustments required on the Touch Screen.

The touch panel setup screen contains a rotary controller to adjust the brightness of touch panel.

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Chapter 7
Diagnostics/ Troubleshooting

Section 7-1
Overview

7-1-1 Purpose of Chapter

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

Table 7-1 Contents in Chapter 7

Section 7-2
Service Safety Considerations

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

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

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

Section 7-3
Gathering Troubleshooting Data

7-3-1 Purpose of this Section

Problem images and system data (logs) can be acquired at the Ultrasound system or through service remote connectivity. Use this data to perform service at the Ultrasound system, or to send it back to the manufacturer for analysis.

7-3-2 Collect Vital System Information

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

Product Name = Vivid S60N or Vivid S70N

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

Under **Application Software**, record:

- Software Version
- Software Revision
- Software Part Number
- Build Name
- Build View
- Build Date

Under **System Software**, record:

- System Software Part Number
- System Software Date

7-3-3 Collecting a screen capture with logs

If the system should malfunction, simultaneously press the **Alt+D** keys. This will collect a screen capture of the monitor, system presets and several log files in a date and time stamped ".zip" file.

NOTE: This function may also be used to make a Print Screen (screen dump).

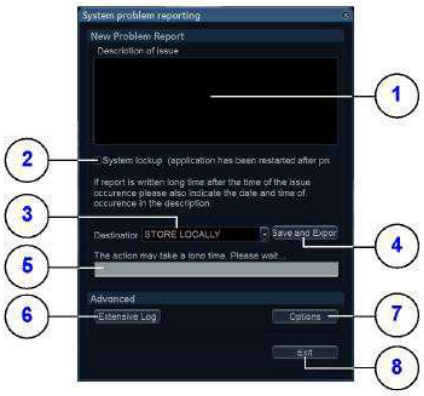
The Alt+D function is available at all times.

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

- a place to enter a description of the issue
- a check box to indicate a System lockup
- a choice to Export to a pre-formatted removable media or save to the Export directory D: drive (for remote viewing through InSite).

*NOTE: You **MUST** select one of the available devices as the destination device if it is to be different than the default Export directory on the hard drive.*

The screen capture is a bitmap which eliminates the possibility of artifacts from compression.



1. Type description of issue here
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)

7-3-3-1 Advanced Log Options

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

Section 7-4
Screen Captures

7-4-1 Purpose of this Section

To capture screen images that can be used for diagnostic and troubleshooting purposes.

7-4-2 Ctrl+PrintScreen Shortcut

A Ctrl+PrintScreen shortcut is available for quickly capturing the image displayed on the system. Images captured using this shortcut are saved in the D:\export directory using both the JPEG (.jpg) and raw DICOM (.dcm) formats.

The InSite connection will have access to the export folder on the “D:” drive to retrieve these images. This feature will allow the customer to quickly and easily acquire images that can then be viewed by the Online Centre (OLC).

7-4-3 Collecting a screen capture with logs

If the Ultrasound system malfunctions, simultaneously press the **Alt+D** keys. Alt+D is available at all times and collects a screen capture of the image monitor, user-defined presets, and these logs:

- Keyboard Shadow Log (protected information)
- Error Logs
- Crash Log (protected information)
- Vital Product Data
- DICOM Logs
- Windows Event Logs
- Windows Modem Log
- Diagnostic Logs
- Service Logs

7-4-3 Collecting a screen capture with logs (cont'd)

Figure 7-2 ALT+D Dialog Box

When **Alt+D** is pressed, a dialog box opens. Enter the following information:

- System ID serial number
- Software version
- System date and time of occurrence
- Sequence of events leading to issue
- Whether the issue is repeatable
- Imaging mode, probe, preset/application
- Media brand, speed, capacity, and type
- To authorize the collection of protected information, check **Include Protected Information, requires Admin privileges.** If this box is checked, the system creates two log files with the following format name:
  - log_<SN>_<DATE>_<TIME>_DB.zip
  - log_<SN>_<DATE>_<TIME>_ProtectedInfo_DB.zip

  Where <SN> is the serial number, <DATE> is the date in format YYMMDD and <TIME> is the time in format HHMMSS.
- To include a duration, check **Time Duration** and select a duration from the pull-down.
- Under **Destination**, select a storage media or Service directory for remote viewing.
- Click the **Store** button.

*NOTE: To save to a CD/DVD or USB Flash Drive, you **MUST** select CD/DVD Recordable or USB drive as the destination device, otherwise the data is written to the default Export/Service directory on the hard drive. The Export/Service directory is only used for remote service and is not intended for images or report storage use.*

For a CD/DVD, the Ultrasound system automatically formats an un-formatted disk, gathers logs and writes it out to the disk.

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

Double check the media that you made to ensure it contains the file.

7-4-3 Collecting a screen capture with logs (cont'd)

7-4-3-1 Mark log files

If a customer is experiencing issues during operation, mark the issue by pressing **Alt+1** or **Alt+2** when the event occurs. When **Alt+1** or **Alt+2** is pressed, a marker is placed in the log to aid analysis.

7-4-3-2 Trouble image without patient information

To collect a trouble image you need to enable **Transfer Images (captured without patient information) to GE** under **ADMIN > System Admin**.

To collect the image, press the **P1** key (copy to hard drive). This places an unidentified .jpeg image in the D:\Log\DL folder. This folder will be transferred to the back office if a transfer is scheduled.

To collect logs using **Gather Logs**, the image or images will be captured in the log collection Zip file and will be deleted from the D:\Log\DL folder.

7-4-4 Capturing network logs to use for troubleshooting

Use the **Network Capture** utility to capture network logs. Once the logs are captured and extracted from the system, use Microsoft Message Analyzer to convert the output, and then Wireshare (or some other network sniffer) to analyze it.

To troubleshoot network capture logs:

1.) On the Vivid™ S60N and Vivid™ S70N, run the **Network Capture** utility to generate .etl and .cab files for analysis.

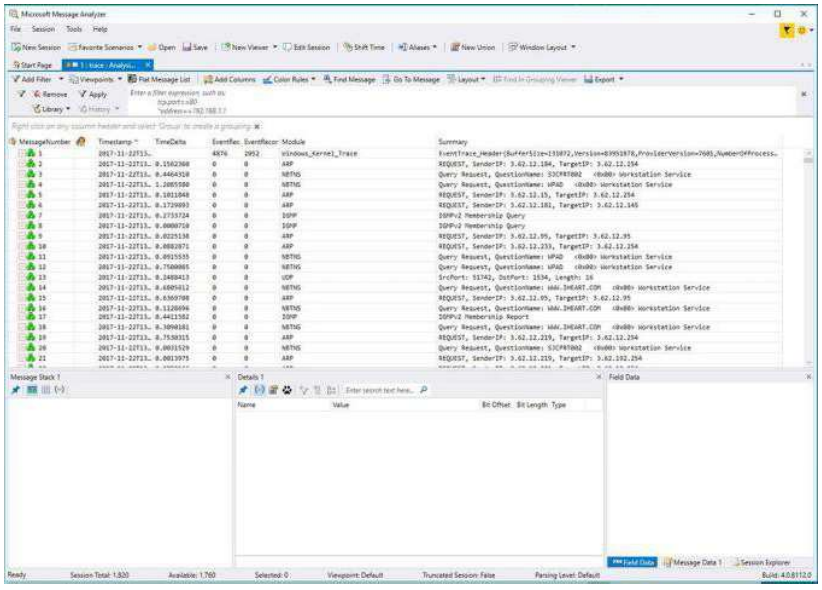
2.) Locate the .etl file at D:\Service.

3.) Transfer these files to a laptop.

4.) On the laptop, download Microsoft Message Analyzer (if not already done).

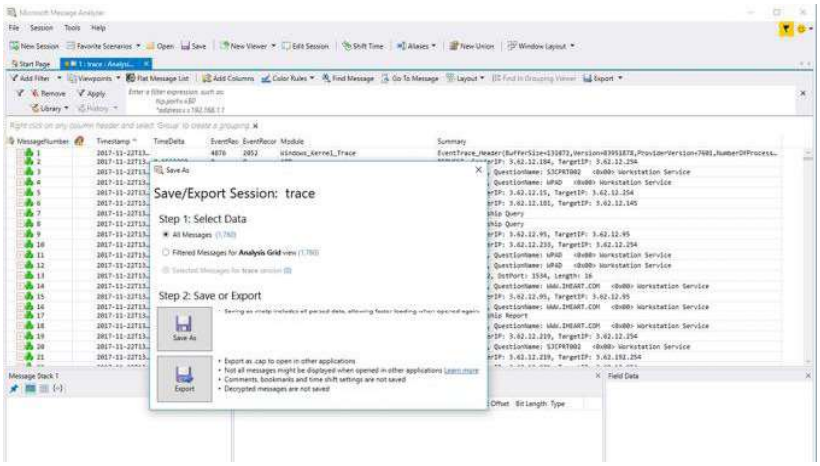
5.) In Microsoft Message Analyzer, open the .etl file.

If the DICOM connection is encrypted, you will not be able to see the contents of the packets. Microsoft Message Analyzer does not have a plug-in to decode DICOM packets.



7-4-4 Capturing network logs to use for troubleshooting (cont'd)

6.) To export the .etl file to .cab, select **File > Save As** and then select **Save As** or **Export**.



If the network capture was of a wireless connection, Microsoft Message Analyzer creates a .pcap file that does not have any of the packets and is probably useless.

7.) Use Wireshark or some other third-party network sniffer to examine the cab file.

Section 7-5
Service desktop

7-5-1 Purpose of this section

This section describes the features of the Service desktop. These are the different levels of access to the Service desktop:

- Service Basic access (Class A) – a user locally logged into the machine with Local Service Access privilege. This level provides limited access to Service desktop widgets and utilities.
- Service Expert, Pro, and Advanced access (Class C) Local – Depending on the purchase level, includes an option string to control access.
- GE Service access (Class M) and an SSA key. For users with local Service Access privileges, this level provides unrestricted access to all Service desktop widgets and utilities.
- Remote access – a user remotely accessing the Vivid™ S60N and Vivid™ S70N. This level provides unrestricted access to all Service desktop widgets and utilities. Disruptive mode is limited to the user access privileges to Remote Service Access.

7-5-2 Disruptive mode

Disruptive mode is a way to control interruptions to operation of the Vivid™ S60N and Vivid™ S70N. Disruptive mode is required whenever service performs a function that may disrupt a normal scan. Activating Disruptive mode results in a red message displayed on the task bar. This message indicates that the Vivid™ S60N and Vivid™ S70N needs to be restarted once the service activity is complete. The message remains until the Vivid™ S60N and Vivid™ S70N is restarted. This prevents patient scanning while the Vivid™ S60N and Vivid™ S70N is not operating at an optimal status. For example, running a diagnostic may leave the Vivid™ S60N and Vivid™ S70N in a state that is not good for imaging.

Specifically, Disruptive mode is required to run diagnostics, clean presets, and reset the patient database, and turn on Virtual Console Observation (VCO).

- When Disruptive mode is On, all service functionality on the Service desktop is allowed but user operation of the Vivid™ S60N and Vivid™ S70N may be limited.
- When Disruptive mode is Off, some service functionality on the Service desktop is not available and user operation of the Vivid™ S60N and Vivid™ S70N is normal.

Additionally, the ability to enable Disruptive mode depends on the logged in user.

- Local user – a user locally logged into the machine will be able to set the Vivid™ S60N and Vivid™ S70N to Disruptive mode or allow a Disruptive mode request from a remote user through the Service desktop. The local user must have Authorize Remote Service Access to allow Disruptive mode. If the local user does not have this right, the remote user's request will be automatically denied.
- Remote user – a user remotely accessing the Vivid™ S60N and Vivid™ S70N will not be able to automatically switch Disruptive mode to On. The logged in user (user actually logged on to the Vivid™ S60N and Vivid™ S70N) needs to have the ability to grant remote access. The logged in user will be notified through a dialog box and asked to allow Disruptive mode.

NOTE: Change Password and Disk Defragment are not available for the remote user whether Disruptive mode is On or Off.

7-5-3 Licenses

With Service Basic Access (Class A), these are the available options:

- HOME
- Utilities
  - Change Password
  - Data Transfer
  - Delete Files
  - Gather Logs
  - Network Capture
  - SSA License
  - Third Party Licenses
- Options
- Agent Configuration

With Service Advanced (Class C), these are the available options:

NOTE: With a Class C license, options display according to these purchased level of access.

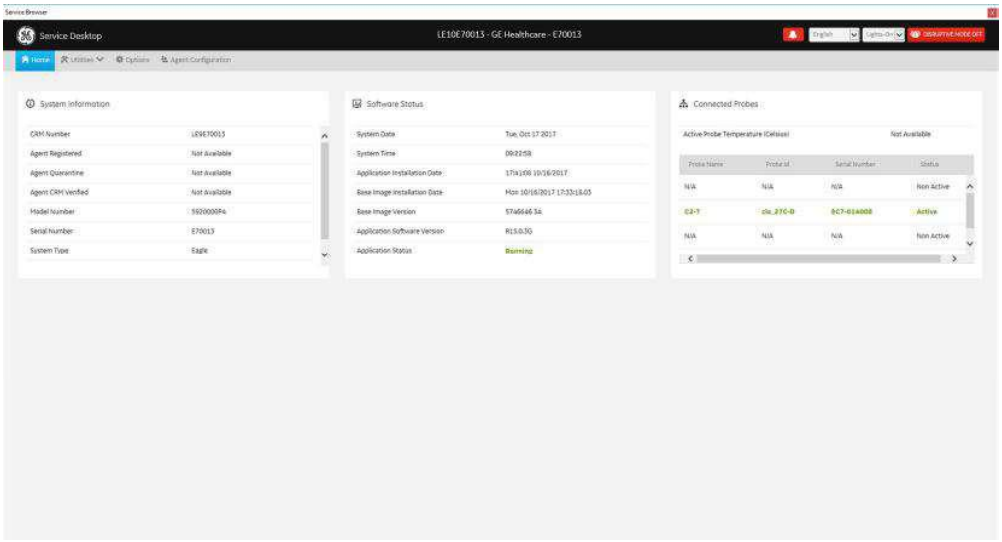
- HOME
- Diags
- DICOM
- Utilities
  - Change Password
  - Checkpoints (Not available on VSxx)
  - Data Transfer
  - Delete Files
  - Disk Defragment (Not available on VSxx)
  - Disruptive Mode Utility (Not available on VSxx)
  - Gather Logs
  - Network Capture
  - SSA License
  - System Shutdown (Not available on VSxx)
  - Third Party Licenses
  - Virtual Console Observation (Not available on VSxx)
- Options
- Agent Configuration

With Service Advanced plus Service Expert (Class C), the Clean Userdefs, Reset Patient Database, and Software Reload utilities are added to the Service Advanced options listed.

With Service Advanced and Service Expert plus Service PRO (Class C), the probe assessment tool (cPAT) diagnostic is added to the Service Advanced and Service Expert options listed.

7-5-4 Home

Figure 7-3 Home with Class A Access (example)



7-5-4-1 System Information

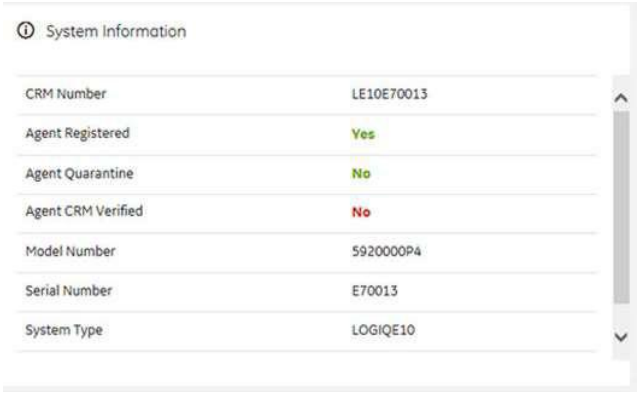
System Information displays general information about the Vivid™ S60N and Vivid™ S70N. When the Vivid™ S60N and Vivid™ S70N has been successfully configured with the back office, these elements will have the corresponding values:

- **Agent Registered** will be **Yes**
- **Agent Quarantine** will be **No**
- **Agent CRM Verified** will be **Yes**

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

To access **System Information**, navigate to **Utility > Service** > **Home**.

Figure 7-4 System Information



7-5-4-2 Software Status

Use **Software Status** to view general information about the software installed on the Ultrasound system.

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

To access **Software Status**, navigate to **Utility > Service** > **Home**.

Figure 7-5 Software Status

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

Table 7-2 Software Status

Element	DESCRIPTION
System Date	Current date in the format <day>, <month> <date> <year>.
System Time	Local time based on the last time the system desktop was refreshed in the format <hh:mm:ss>.
Application Installation Date	Date the application software was installed. The application software includes the Vivid™ S60N and Vivid™ S70N product-specific software.
Base Image Installation Date	Date the base image software was installed. The base image software includes the Windows operating system and other supporting software.
Base Image Version	Version number of the base image software.
Application Software Version	Version number of the application software.
Application Status	Status of the application. Valid values are: • Running • Stopped

7-5-4-3 Resolve Agent Quarantine

Resolve Agent Quarantine is available on the Service Desktop. **Resolve Agent Quarantine** allows you to move the Vivid Sxx out of quarantine after an agent update.

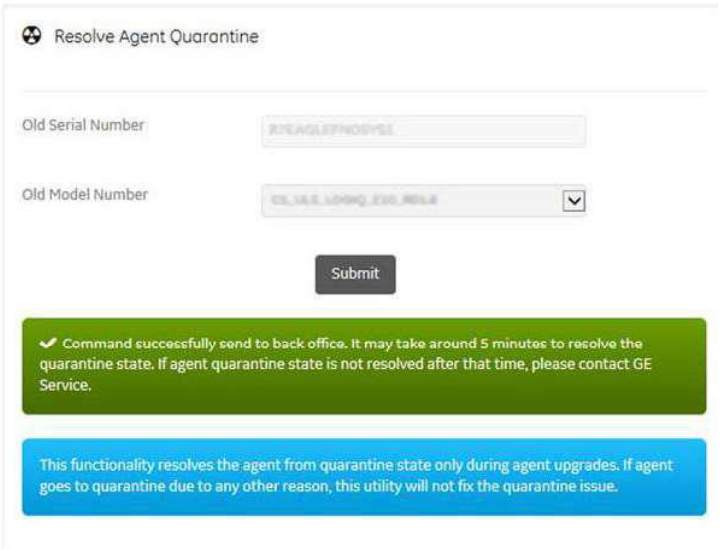


Figure 7-6 Resolve Agent Quarantine - Submit

Figure 7-7 Resolve Agent Quarantine - No Quarantine

To resolve a quarantine in Agent Configuration:

1.) From **Utility (second page) > Service > Utilities**, select **Resolve Agent Quarantine**.
2.) View the information in **Old Serial Number** and **Old Model Number**.
3.) If the information is correct, select **Submit**.

7-5-4-4 Data Transfer

Data Transfer provides a way to do the following:

- View information about past transfers of (APM) information.
- Set up automatic/scheduled transfer of allowed data files from the Vivid Sxx to the server.
- Manually transfer allowed data files from the Vivid Sxx to the server.

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

To access **Data Transfer**, open **Service Desktop** and select **Utilities > Data Transfer**.

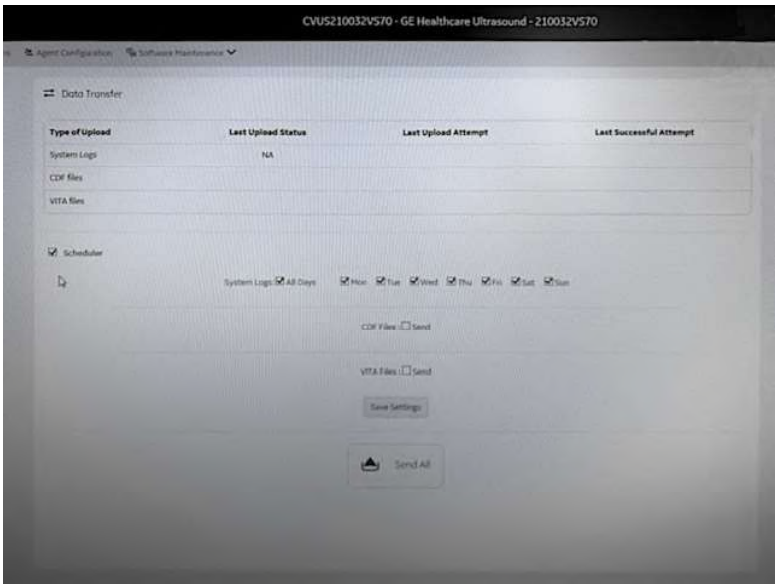


Figure 7-8 Data Transfer

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

Table 7-3 Data Transfer

Element	DESCRIPTION
Type of Upload	Type of log file. For example, **System Logs** are incrementally transferred when automatic transfer is enabled. To enable automatic transfer, navigate to **System Admin** and, under **Service**, check **Enable Automatic Request for Service.**
Upload Permission	Not Used for Vivid Sxx.
Last Upload Status	Whether the last log file upload was successful or not.
Last Upload Attempt	Date and time the last log file upload was attempted.
Last Successful Upload	Date and time the last log file was successfully uploaded.
Scheduler	When selected, enables the related day selections. For example, **All Days**, **Monday**, and **Tuesday.**
Save Settings	Saves the information.
Send All	Manually send the selected log files to the server.

Section 7-6
Noise Troubleshooting

7-6-1 Purpose of this Section

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

7-6-2 Introduction

Before you start troubleshooting the noise, you should read the following subsections:

- EMI Limitations on page 2 - 4
- EMI Prevention/Abatement on page 2 - 5
- Overview of Types of Noise - see below

When talking to the customer, try to gather as much information as possible about the conditions when the noise appear:

Is the noise present...

… all the time?

… after some time of use? (After how long time?)

… at special times of the day (or night)? When?

… at all locations in the hospital, or only in one room/area?

… from time to time, no special pattern of time is observed?

7-6-3 Overview of Types of Noise

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

7-6-3-1 Noise Picked Up from the Air

Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air.

If picked up by a probe cable, the noise will be coherent -"penlight noise" pointing down in the picture - due to the fact that the noise is received on all channels.

- Is it a problem on one probe only?
  Try another probe.
- Is it a problem on one of the probe connectors only?
  Move the ultrasound system to another location and verify any changes.

7-6-3-2 Noise Received via the External Cables

Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the wiring. The noise can enter the system via the mains power cable, probe cable(s) or any other external connected cable(s).

To troubleshoot this type of noise, disconnect cables that are not needed for the basic use of the ultrasound system. Check for any change in the noise each time a cable has been disconnected from the ultrasound system.

- 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 ultrasound system is sharing a power line with other equipment.

7-6-3-3 Intermittent Noise

- Is there any equipment that is turned on and off near the ultrasound system?
- Is the noise present all around the clock or only at special occasions?

7-6-3-4 Self-generated Noise Generated inside the Ultrasound system)

Example: Color Noise in the near field.

- Self generated noise will not change if you touch the ultrasound system or the probe.
- Self generated noise may be due to either:
  - heat problems
  - hardware problems
  - software problems

7-6-3-5 Heat Problems

Heat problems are usually starting when the ultrasound system has been ON for some time.

If the ultrasound system has been used for scanning for some time before the noise appears, it may be due to either heat problems or some software related issues. By doing a restart you may learn some more about the cause.

Select **Ctrl+Alt+R** to restart the back end processor without power-cycling the unit.

- If the noise is present after the restart, the cause is most likely due to heat problems.
- If the noise is gone after the restart, it may be due to either the setup/adjustments of the or a software failure.

Possible causes for heat problems:

- Fan filters need to be cleaned or replaced.
- Room temperatures outside the allowed temperature limits.
- Fans are worn-out.
- Hardware problems.

7-6-3-6 Hardware Problems

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

7-6-3-7 Software Problems

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

7-6-4 Different Power Outlet

Connect the unit to another power outlet and verify if the noise changes or disappear.

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

The Vivid S60N/Vivid S70N will function on voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power in North America, then a center tapped power source is required.

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

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

Sites with a mains power system without a defined Neutral:

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

7-6-5 Different System

Try another Vivid S60N/Vivid S70N ultrasound system at the same location and look for the same noise. If the noise is present on the new system too, the noise is most likely from an external source/ equipment.

7-6-6 Different Location

Move the ultrasound system 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 ultrasound system to:

- another location inside the room
- another room
- another floor

7-6-7 Disconnect External Cables

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

Chapter 8
Replacement Procedures

Section 8-1
Overview

8-1-1 Purpose of Chapter 8

This chapter provides replacement procedures for Vivid S60N/Vivid S70N system parts, as outlined below.

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

Section 8-2
Covers - Replacement Procedures

8-2-1 Overview of Covers

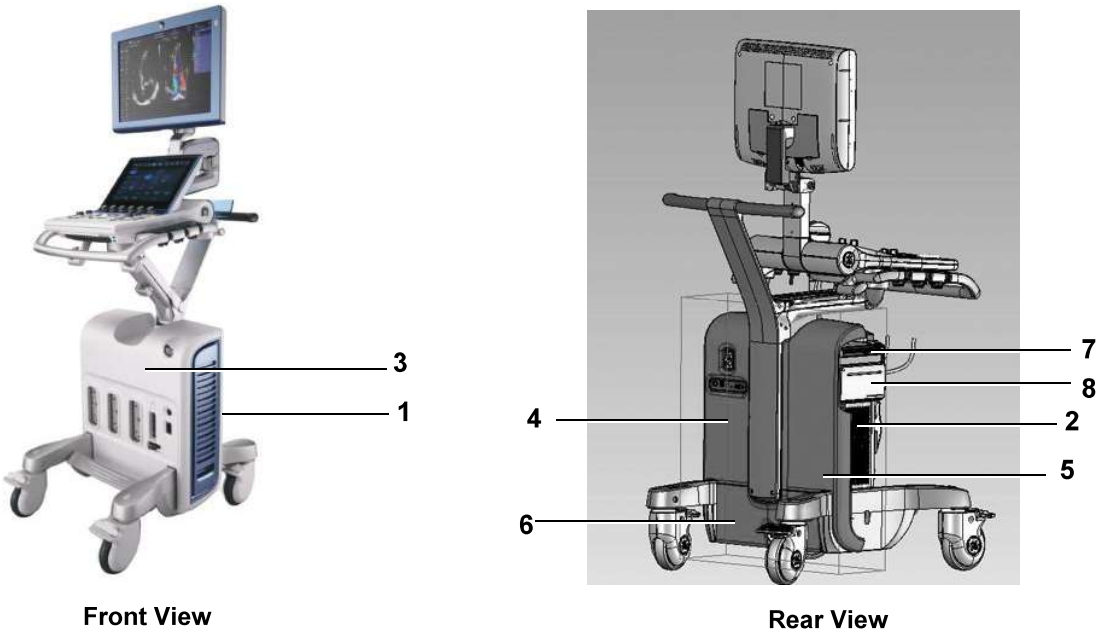


Figure 8-1 Vivid S60N/Vivid S70N Ultrasound System

Table 8-1 Vivid S60N/Vivid S70N Ultrasound System Covers (Figure 8-1)

Label	Item	Label	Item
1	Air Inlet (Left Side) Cover	5	Right Rear Cover
2	Right Side Cover	6	AC Box Cover
3	Front Cover	7	DVD Cover
4	Left Rear Cover	8	DVD and Printer Cover

8-2-1-1 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

DANGER 

ELECTRICAL HAZARDS EXIST AT SEVERAL POINTS IN THE SYSTEM. FAMILIARIZE YOURSELF WITH ALL HAZARDOUS VOLTAGES AND HIGH CURRENT LEVELS BEFORE REMOVING ANY OF THE COVERS.

DANGER 

DO NOT WEAR THE ESD WRIST BAND STRAP WHEN REMOVING PARTS FROM THE POWER SUPPLY UNIT. BEFORE REMOVING ANY PART OF THE POWER UNIT, TURN THE POWER OFF AND DISCONNECT THE POWER CORD.

CAUTION **BEFORE REMOVING CIRCUIT BOARDS, TURN THE POWER OFF AND WEAR THE ESD WRIST BAND STRAP.**

8-2-1-2 Order of Cover Removal

Remove the system covers **in the following order**, *as applicable*:

- Air Inlet (Left Side) Cover, as described on page 8-5.
- Right Side Cover, as described on page 8-8.
- *Either*: DVD Cover, as described on page 8-9
  Or: DVD and Printer Cover, as described on page 8-13
- Front Cover, as described on page 8-17.
- Right Rear Cover, as described on page 8-22.
- Left Rear Cover, as described on page 8-25.
- AC Distribution Box Cover, as described on page 8-32.

Note: The Vivid S60N/Vivid S70N has additional covers on the control console components (Monitor and Touch Screen). Instructions for removal of these covers are described in the relevant replacement procedure sections.

Note: For removal of system accessories, refer to the following procedures:

- OPIO Basket Replacement Procedure on page 8 - 29
- Rear Folder Box Replacement Procedure on page 8 - 30

8-2-1-3 Preparation for Cover Installation

Replacement covers for the Vivid S60N/Vivid S70N are supplied with the required securing screws and ball stud/ball stud receptacles. Before installing a replacement cover, it is necessary to fit these in the appropriate positions. Refer to the illustrations provided in the specific Cover Replacement procedure - for example, AC Distribution Box Cover:.

8-2-2 Air Inlet (Left Side) Cover Replacement Procedure

NOTE: The Air Inlet cover (left side cover) is fastened in position on the side of the system by 4 snap-lock securing clips - see Figure 8-2.

This cover contains an air filter, held in position by securing tabs.
For instructions on replacing the air filter only, see Air Filter Replacement Procedure on page 8 - 7.

Figure 8-2 Air Inlet (Left Side) Cover - Front and Inside Views

8-2-2-1 Tools

None

8-2-2-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-2-3 Air Inlet (Left Side) Cover Removal Procedure

1) Gripping the bottom of the cover, pull it out slightly towards you to release it from the lower securing clips.
2) Hold the cover with another hand and pull the top of the cover out towards you, releasing it from the upper securing clips, then remove it carefully at a horizontal level.

.

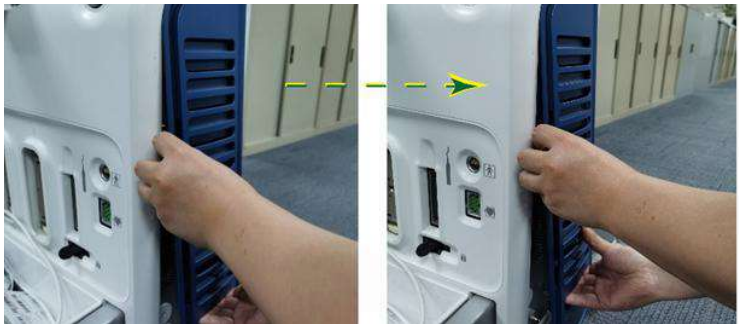


Figure 8-3 Removing the Air Inlet (Left Side) Cover

8-2-2-4 Air Inlet (Left Side) Cover Installation Procedure

1) Return the air inlet side cover to the *left* side of the system, carefully aligning it with the securing clips.
2) Push the top of the cover *upwards* and *inwards*, until clicks into place.
3) Push the bottom of the cover *upwards* and *inwards*, until it clicks into place.
Make sure the cover is correctly seated.

8-2-2-4-1 Air Filter Replacement Procedure

1) Remove the Air Inlet cover from the left side of the system:
2) Lay the cover face-down on a flat, clean surface.
3.) Release the filter from the securing tabs, then lift it up and remove from the cover- Figure 8-4.

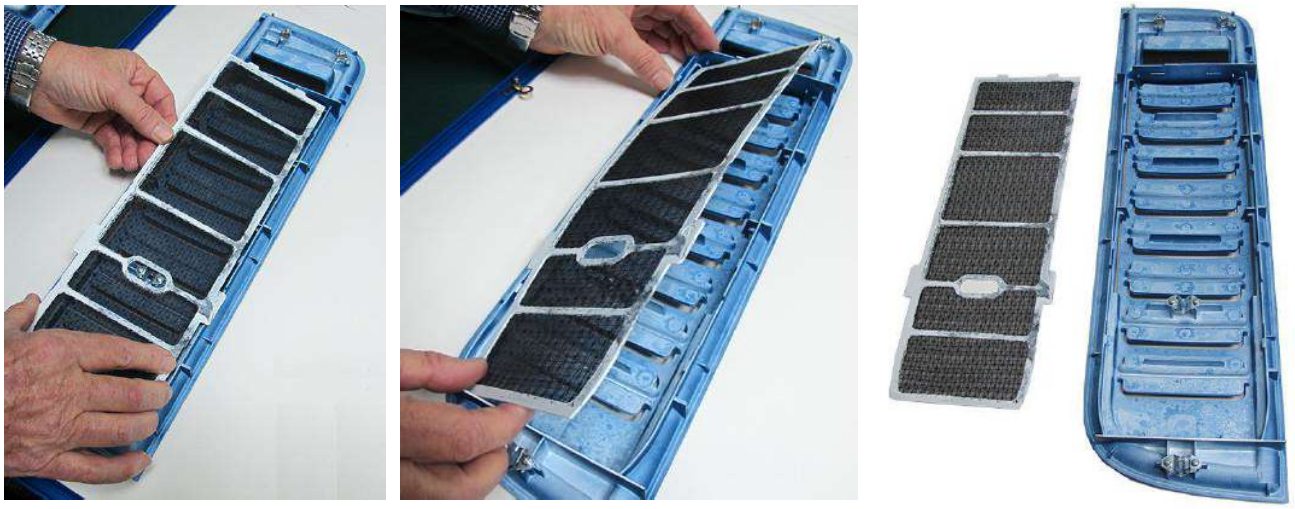


Figure 8-4 Removing the Air Filter from the Air Inlet Cover

8-2-2-4-2 Air Filter Installation Procedure

1) Place a new air filter inside the left cover, carefully aligning the securing tabs with the recesses on the cover.
2.) Make sure the air filter is properly seated in the correct position.
3.) Install the air inlet (*left side)* cover on the system.

8-2-3 Right Side Cover Replacement Procedure

8-2-3-1 Tools

None

8-2-3-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-3-3 Right Side Cover Removal Procedure

Note: The right side cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover - illustrated below.

1) Gripping the recess at the bottom of the cover pull the right side cover out towards you to release it from the snap-lock securing clips (Figure 8-5).

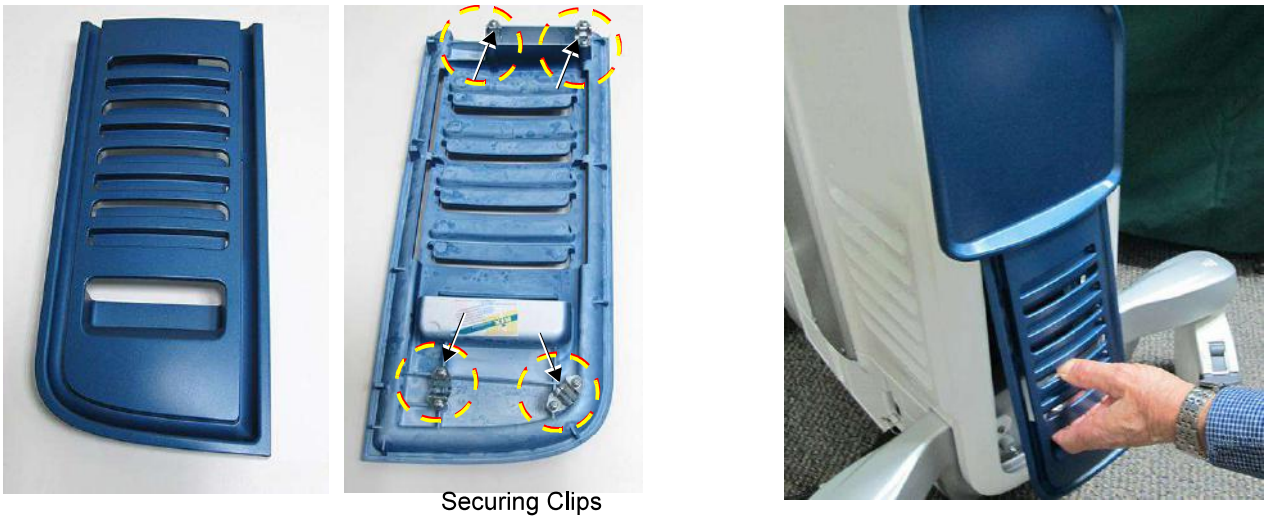


Figure 8-5 Removing the Right Side Cover

2) Pull the top of the cover out *towards* you, releasing it from the upper securing clips.
3) Remove the cover from the system.

8-2-3-4 Right Side Cover Installation Procedure

1) Return the right side cover to the system, carefully aligning it with the securing clips.
2) Holding the recess with one hand, push the top of the cover *upwards* and *inwards* with the other hand, until clicks into place.
3) Push the bottom of the cover *upwards* and *inwards*, until it clicks into place.

8-2-4 DVD Cover Replacement Procedure

Note: The removal and installation procedures for all the peripheral device covers are all very similar. The various covers clip onto the mechanical platform with 4 snap-lock securing clips on the inner side of the cover - the clips are like those illustrated in Figure 8-5 on page 8-8.

8-2-4-1 Tools

Phillips screwdriver.

8-2-4-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-4-3 DVD Cover Removal Procedure

The DVD Cover is shown in Figure 8-6.

1) Remove the *right side* cover:

Figure 8-6 Removing the DVD Cover

2.) Grip the bottom of the DVD cover and pull it towards you to release it from the snap-lock securing clips.

8-2-4-4 DVD Cover Installation Procedure

1) Return the DVD cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
2.) Push the DVD cover until it clicks into position.
3.) Install the *right side* cover.

8-2-5 DVD and Printer Cover Replacement Procedure

8-2-5-1 Tools

Phillips screwdriver.

8-2-5-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-5-3 DVD and Printer Cover Removal Procedure

Note: The DVD and Printer cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover.

1) Remove the *right side* cover:
2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips (Figure 8-30). Remove the cover.

Figure 8-7 Removing the DVD and Printer Cover

8-2-5-4 DVD and Printer Cover Installation Procedure

1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
2.) Push the cover until it clicks in position.
3.) Install the *right side* cover.

8-2-6 Blank Cover Replacement Procedure

Note: The removal and installation procedure for the Blank Cover is the same as that described for the *DVD and Printer Cover Replacement Procedure* section, on page 8-11 in this case making use of the blank cover.

8-2-6-1 Tools

Phillips screwdriver.

8-2-6-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-6-3 Blank Cover Removal Procedure

Note: The Blank cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover - illustrated below.

1) Remove the *right side* cover:

2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips (Figure 8-30). Remove the cover.

Securing Clips

Figure 8-8 Removing the Blank Cover