

GE

# Vivid™ q N

## Service Manual

Vivid q N with software version SW 12.x.x (BT'12)

BASIC SERVICE DOCUMENTATION.  
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# Important Precautions

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## TRANSLATION POLICY

### WARNING

English  
(EN)

This Service Manual is available in English only.

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

### AVERTISSEMENT

Français  
(FR)

Ce manuel de maintenance est disponible en anglais uniquement.

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

### ADVERTENCIA

Español  
(ES)

Este Manual de servicio está disponible en idioma inglés únicamente.

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

## WARNUNG

Deutsch  
(DE)

Dieses Wartungshandbuch ist nur auf Englisch verfügbar.

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

## AVVERTENZA

italiano  
(IT)

Il presente Manuale di assistenza è disponibile solo in inglese.

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

## WAARSCHUWING

Nederlands  
(NL)

Deze servicehandleiding is alleen beschikbaar in het Engels.

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



## ADVERTÊNCIA

Português  
(PT-BR)

Este Manual de Manutenção está disponível apenas em Inglês.

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

## HOIATUS!

Eesti  
(ET)

Service Manual (Hooldusjuhend) on saadaval ainult ingliskeelsena.

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

## OPOZORILO

Slovenščina  
(SL)

Ta servisni priročnik je na voljo samo v angleščini.

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

## 警告

- 英語  
(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

- 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

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

## 경고

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

## ПРЕДУПРЕЖДЕНИЕ

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

## OSTRZEŻENIE

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

## ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά  
(EL)

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

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

## FIGYELMEZTETÉS

Magyar  
(HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

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

## VAROVANIE

Slovenčina  
(SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

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

## VÝSTRAHA

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

## UYARI

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

## ADVARSEL

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

## ADVARSEL

Norsk  
(NO)

Denne servicehåndboken er bare tilgjengelig på engelsk.

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

## VAKAVA VAROITUS

Suomi  
(FI)

Tämä huolto-opas on saatavana vain englanniksi.

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

## ПРЕДУПРЕЖДЕНИЕ

Български  
(BG)

Настоящото Сервизно ръководство се предлага само на английски език.

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

## AVERTISMENT

Română  
(RO)

Acest manual de service este disponibil doar în engleză.

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

## UPOZORENJE

Hrvatski  
(HR)

Ovaj servisni priručnik dostupan je samo na engleskom jeziku.

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

## ĮSPĖJIMAS

Lietuvių k.  
(LT)

Šis priežiūros vadovas galimas tik anglų kalba.

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

## BRĪDINĀJUMS

Latviski  
(LV)

Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.

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

## UPOZORENJE

Srpski  
(SR)

Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.

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

## AVISO

Português  
(Portugal)  
(PT-PT)

Este manual de assistência está disponível apenas em inglês.

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



## ПОПЕРЕДЖЕННЯ

Українська  
(UK)

Цей посібник із технічного обслуговування доступний лише англійською мовою.

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

## PERINGATAN

Bahasa  
Indonesia  
(ID)

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

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

## คำเตือน

ไทย  
(TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

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

## CẢNH BÁO

(VI) Tiếng Việt

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

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

## ЕСКЕРТУ

(KK) Қазақ тілінде

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

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

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- Ang pagkabigong maunawaan ang Babalang ito ay maaring maging resulta ng pinsala sa tagabigay ng serbisyo, nagpapagana o pasyente mula sa pagkakakoryente, mekanikal o iba pang peligro.

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

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## 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, revision number, page number and suggestion details.

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P.O.Box: 141  
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NORWAY

GE employees should use TrackWise to report service documentation issues. These issues will then be in the internal problem reporting tool and communicated to the writer.

## SERVICE SAFETY CONSIDERATIONS



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



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

For a complete review of all safety requirements, see the [Safety Considerations](#) section in Chapter 1.

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# Revision History

REVISION	DATE	REASON FOR CHANGE
1	2013 AUG. 12	Initial release of manual.
2	2015 SEP 03	Updated and corrected content.

# List of Effected Pages (LOEP)

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	2	1-1 to 1-28	2	7-1 to 7-148	2
Warnings i to -xvi	2	2-1 to 2-12	2	8-1 to 8-140	2
TOC	2	3-1 to 3-182	2	9-1 to 9-18	2
		4-1 to 4-42	2	10-1 to 10-32	2
		5-1 to 5-48	2	Back Cover	N/A
		6-1 to 6-14	2		

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# Chapter 1

## Introduction

---

### Section 1-1 Overview

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

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

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

Section	Description	Page Number
1-1	Overview	1-1
1-2	Service Manual Overview	1-2
1-3	Important Conventions	1-5
1-4	Safety Considerations	1-7
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1-8	Returning/Shipping Probes and Repair Parts	1-23
1-9	EMC, EMI, and ESD	1-24
1-10	Customer Assistance	1-26

## Section 1-2 Service Manual Overview

This manual provides installation and service information for the Vivid q N portable ultrasound scanner. It contains 10 chapters as outlined in [1-2-1 "Contents in this Service Manual" on page 1-2](#) 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's service documentation, legal information, a revision overview and the Table of Contents (TOC).

- [Chapter 1 - Introduction](#)  
Contains a content summary and warnings.
- [Chapter 2 - Site Preparations](#)  
Contains pre-installation requirements for the Vivid q N portable ultrasound scanner.
- [Chapter 3 - System Setup](#)  
Contains installation procedures and an installation checklist.
- [Chapter 4 - General Procedures and Functional Checks](#)  
Contains functional checks that are recommended as part of the installation procedure, 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 q N portable ultrasound scanner.
- [Chapter 7 - Diagnostics/Troubleshooting](#)  
Provides instructions for setting up and running diagnostic, troubleshooting and other related routines for the Vivid q N portable ultrasound scanner.
- [Chapter 8 - Replacement Procedures](#)  
Provides disassembly and reassembly procedures for all Field Replaceable Units (FRUs).
- [Chapter 9 - Renewal Parts](#)  
Contains a complete list of field replaceable parts for the Vivid q N portable ultrasound scanner.
- [Chapter 10 - Care and Maintenance](#)  
Provides periodic maintenance procedures for the Vivid q N portable ultrasound scanner.

### 1-2-2 Typical Users of the Service Manual (This Manual)

This manual is intended for the following categories of users:

- Hospital service personnel.
- Contractors (some parts of [Chapter 2 - Site Preparations](#)).

---

**1-2-3 Vivid q N Models Covered in this Manual**

**Table 1-2 Vivid q N Model**

Model	H-Cat No.	Part Number	Description	Comments
Vivid q N	H45571ZC	FQ000040	Laptop-style system	BT'12

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

### **1-2-4-1 Overview of the Vivid q N Ultrasound Scanner**

The Vivid q N is a compact, fully portable, phased, linear array ultrasound imaging scanner. Weighing only 5 Kgs (11 lbs), this laptop-style system is extremely versatile and, depending upon the installed software, can be used for a variety of applications.

The Vivid q N ultrasound imaging scanner is similar to the Vivid i n - however, designed to offer additional features including the ability to support use of M4S-RS probes. Also weighing only 5 Kgs (11 lbs), this laptop-style system is extremely versatile and, depending upon the installed software, can be used for a variety of applications.

*NOTE: Upgrade options may be available with future versions.*

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

The Operator Manual(s) should be fully read and understood before operating the Vivid q N 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 q N ultrasound units listed in [Table 1-2 on page 1-3](#).

#### 1-3-1-2 Icons

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

#### 1-3-1-3 Safety Precaution Messages

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

- DANGER
- WARNING
- CAUTION

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



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



**WARNING** **WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY AND 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 AND PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED. EQUIPMENT DAMAGE POSSIBLE.**




**NOTICE** **Notice is used when a hazard is present that can cause property damage but has absolutely no personal injury risk.**

Example: Disk drive may crash.






*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, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm. Even if a symbol isn't used in this manual, it may be included for your reference.







**Table 1-3 Standard hazard icons**

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	HEAT	
		

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

**NOTE:** *The Vivid q N scanner and SafeLock Cart 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. when raising/lowering the SafeLock Cart main shelf).*

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

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION
		 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 system covers.
- Servicing should be performed by authorized personnel only.
- Only personnel who have participated in a Vivid q N Training Seminar are authorized to service the equipment.
- Local laws may restrict this device for sale or use by or on the order of a physician.



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



**WARNING IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID Q N, 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 Q N. ATTEMPTS TO MOVE THE UNIT WHEN MOUNTED ON THE SAFELOCK CART CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.**




---

## 1-4-2 Human Safety (cont'd)

 **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, ONLY INSTALL GE APPROVED PARTS. DO NOT PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.*

 **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.*




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## 1-4-3 Mechanical Safety

-  **WARNING** *WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO A DVD OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE.*
-  **DANGER** **WHEN THE VIVID Q N SCANNER IS USED WITH THE SAFELOCK CART, MAKE SURE THE UNIT IS FIRMLY SECURED IN THE CORRECT POSITION ON THE CART SINCE IT MAY BECOME UNSTABLE AND TIP OVER.**
-  **DANGER** **WHENEVER THE SAFELOCK CART IS TO BE MOVED ALONG ANY INCLINE, USE EXTREME CAUTION. MAKE SURE THAT THE VIVID Q N SCANNER AND ALL PERIPHERALS ARE SECURELY MOUNTED ON THE CART BEFORE ATTEMPTING TO MOVE IT.**
-  **WARNING** *ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.*
-  **DANGER** **NEVER USE A PROBE THAT HAS BEEN SUBJECTED TO MECHANICAL SHOCK OR IMPACT. EVEN IF THE PROBE APPEARS TO BE UNBROKEN, IT MAY IN FACT BE DAMAGED.**
-  **CAUTION** **THE Vivid q N portable ultrasound scanner WEIGHS 5KG (11 LBS.) OR MORE, DEPENDING ON CARRY-ON PERIPHERALS WHEN READY FOR USE. IN ADDITION, THE SAFELOCK CART WEIGHS APPROXIMATELY 40KG (88 LBS.), EXCLUDING PERIPHERALS. 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 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.
  - Whenever the Vivid q N scanner is mounted on the SafeLock Cart and being moved on inclines, make sure that the scanner and all peripherals are securely mounted on the SafeLock cart before attempting to move it.
-  **WARNING** **ALWAYS LOCK THE SAFELOCK CART IN ITS PARKED (LOCKED) POSITION AFTER MOVING THE SYSTEM. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR EQUIPMENT DAMAGE.**

---

## 1-4-3 Mechanical Safety (cont'd)

 **WARNING** *EQUIPMENT DAMAGE COULD RESULT IF SPECIAL CARE IS NOT TAKEN WHEN TRANSPORTING THE VIVID Q N SYSTEM (AND SAFELOCK CART IF APPLICABLE) IN A VEHICLE.*

**ALWAYS:**

- Eject any disks from the MOD (if installed).
- Ensure that the Vivid q N system is well prepared and packed in its original packaging before transporting. Special care must be taken to correctly position the packing material.  
For further information, refer to [Chapter 3 - System Setup](#).
- Place the probes in their carrying case.
- Secure the SafeLock cart in an upright position and lock the wheels (brake).
- Ensure that the Vivid q N system (and SafeLock cart if applicable) 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.

## 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 Q N SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.***

### 1-4-4-1 Probes

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

- Do not drop a probe or strike it against a hard surface, as this may damage the transducer elements, acoustic lens, or housing.
- Do not use a cracked or damaged probe. In this event, call your field service representative immediately to obtain a replacement.
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled, or to be caught in the SafeLock Cart 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 and invasive intracardiac probes, refer to the appropriate supplementary instructions for each probe. In addition, refer to the Vivid q N User Manual for detailed probe handling instructions.*

1-4-4-2 Peripherals

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

 **WARNING ENVIRONMENTAL DANGERS**  
**ALL DEVICES MEETING IEC60950 MUST BE KEPT OUTSIDE THE PATIENT ENVIRONMENT AS DEFINED IN IEC60601-1-1, UNLESS THE DEVICES, ACCORDING TO IEC60601-1-1, ARE EQUIPPED WITH THE FOLLOWING:**  
**A) ADDITIONAL EARTH PROTECTION**  
**OR:**  
**B) AN EXTRA ISOLATING TRANSFORMER**

 **WARNING COMMERCIAL DEVICES SUCH AS LASER CAMERAS, PRINTERS, VCRS AND EXTERNAL MONITORS, USUALLY EXCEED ALLOWABLE LEAKAGE CURRENT LIMITS AND, WHEN PLUGGED INTO SEPARATE AC OUTLETS, ARE IN VIOLATION OF PATIENT SAFETY STANDARDS. SUITABLE ELECTRICAL ISOLATION OF SUCH EXTERNAL AC OUTLETS, OR THE PROVISION OF EXTRA PROTECTIVE EARTH FOR THE DEVICE, IS REQUIRED IN ORDER TO MEET UL60601-1 AND IEC60601-1-1 STANDARDS FOR ELECTRICAL LEAKAGE.**

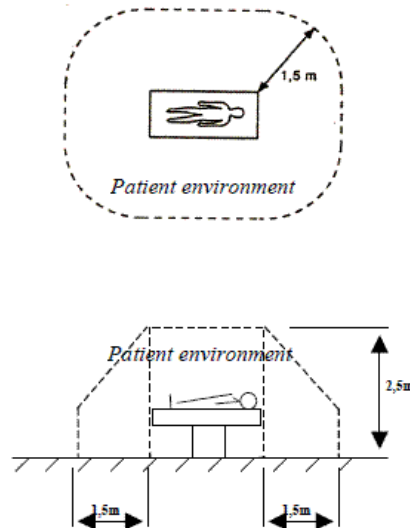
- **Patient Vicinity UL 60601-1**  
**Sub clause 2.12.20DV - D2 Addition**

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



- **Patient Environment IEC 60601-1-1**  
**Sub clause 2.204**

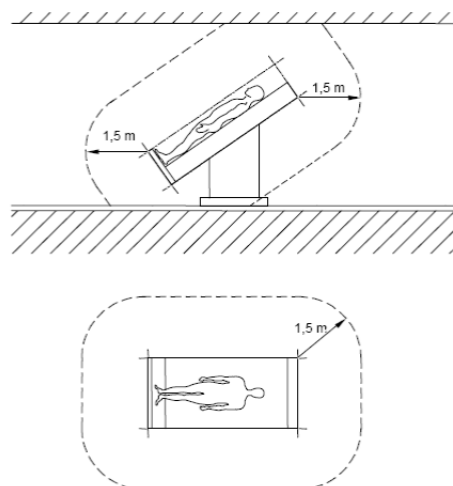
Such an area is an environment in which medical diagnosis, monitoring or treatment is carried out. It is very difficult to attach unique dimensions to the PATIENT ENVIRONMENT. In practice a distance of 2,5 m (8.2 ft.) above the floor on which the medical personnel stand and a horizontal distance of 1,5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



**Figure 1-1 Patient Safety Environment**


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

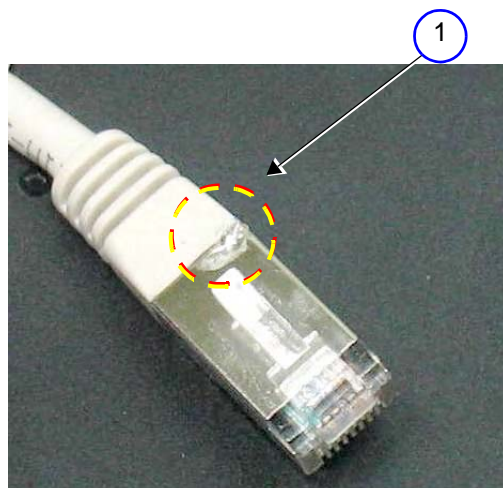
It is difficult for this standard to define dimensions for the volume in which diagnosis, monitoring or treatment occurs. The dimensions for the PATIENT ENVIRONMENT given in [Figure 1-2](#) have been justified in practice.



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

**Figure 1-2 Example of Patient Environment**

-  **CAUTION** When a non-medical peripheral powered from a non-isolated power source is connected to the Vivid q N system using a network cable (RJ45), the cable shielding should NOT be soldered to the LAN connector.
- Refer to [Figure 1-3](#), below.



1. Do NOT use a soldered LAN connector when connecting the scanner directly to a peripheral device.

**Figure 1-3 Example of Soldered LAN Connector**

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## 1-4-5 Vivid q N Battery Safety

The lithium ion battery provides power when an AC power source is not available. Lithium ion batteries last longer than conventional batteries and do not require replacement as often. You can expect one hour of battery life with a single, fully-charged battery.

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 (such as watch batteries). 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.*



**WARNING** ***THE VIVID Q N BATTERY HAS A SAFETY DEVICE.  
DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERY!  
ALWAYS OBSERVE THE FOLLOWING PRECAUTIONS:***

- Charge 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 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 charge the battery near a heat source, such as, a fire or heater.
- 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.



**WARNING** ***IN THE EVENT THAT THE VIVID Q N PORTABLE ULTRASOUND SCANNER WILL NOT BE USED FOR A LONG PERIOD, IT IS NECESSARY TO REMOVE THE BATTERY FROM THE SYSTEM WHILE NOT IN USE.***

## 1-4-5 Vivid q N Battery Safety (cont'd)



**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, recharging or storage, **immediately remove it and stop using it.**
- If you have any questions about the battery, consult your local GE representative.
- Storage of the battery pack:

Short term (less than 1 month): between 0° C (32° F) and 50° C (122° F).

Long-term (more than 3 months): between 10° C (50° F) and 35° C (95° F)

**NOTE:** *When storing a battery pack for more than 6 months, it is necessary to charge the battery pack at least once every 6 months in order to prevent leakage and deterioration in performance (as a result of self-discharging).*

**NOTE:** *When charging the battery for the first time after long-term storage, recover the battery pack to original performance through repeating several cycles of full charging and discharging.*

**NOTE:** *When shipped, the Vivid q N battery is in a state of being approximately 30% charged. Before use, it is necessary to fully charge and discharge the battery pack up to 3 times, in order to utilize Li-Ion smart packs.*

**Important:**

- For Vivid q N portable ultrasound scanners supplied from the factory with a dummy battery, when unpacking the unit, **do not discard the dummy battery.**
- When charging the Vivid q N lithium ion battery on an external charger, since the battery in fact forms one of the four legs of the scanner, removing it will leave the unit standing unbalanced. For this reason, the dummy battery should be kept, so it may be inserted in position to provide stability to the scanner while the lithium ion battery is being charged.
- In addition, use of the dummy battery is recommended during transportation or long-term storage of the Vivid q N portable ultrasound scanner.

## 1-4-6 Patient Data Safety



**DANGER 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.**

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## Section 1-5 Dangerous Procedure Warnings

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



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



**WARNING IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID Q N, 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.**



**WARNING DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT**

**BECAUSE OF THE DANGER OF INTRODUCING ADDITIONAL HAZARDS, ONLY INSTALL GE APPROVED PARTS. DO NOT PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.**

## Section 1-6 Lockout/Tagout (LOTO) requirements

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

To apply Lockout/Tagout (LOTO):

- 1.) Plan and prepare for shutdown.
  - 2.) Shutdown the equipment.
  - 3.) Isolate the equipment.
  - 4.) Apply Lockout/Tagout Devices.
  - 5.) Control all stored and residual energy.
  - 6.) Verify isolation.
- All potentially hazardous stored or residual energy is relieved.



**WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID Q N.*



***WHEN SERVICING PARTS OF THE 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 Vivid q N.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. 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.

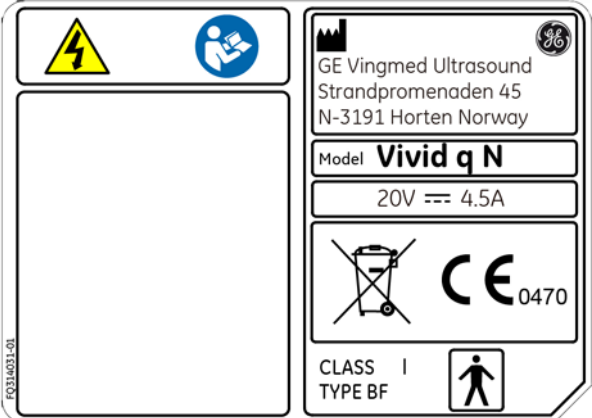
Section 1-7  
Product Labels and Icons

The Vivid q N portable 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

The following diagrams illustrate the labels found on the Vivid q N ultrasound units. For an explanation of label icons and symbols, refer to [Table 1-6 on page 1-20](#).

Table 1-5 Main Label for Vivid q N

DESCRIPTION	ILLUSTRATION
Rating Plate - BT12	

## 1-7-2 Label Descriptions

The following table shows label icons and symbols that may be found on the Vivid q N ultrasound unit and/or SafeLock Cart, and provides a description of each label's purpose and location.

**Table 1-6 Label Icons and Symbols - Description and Location 1 of 3**

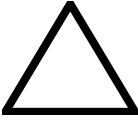






Label Name	Description	Location
Identification and Rating Plate	Manufacturer's name and location. Date of Manufacture. Model and Serial numbers. Electrical ratings (Volts and Amps)	On the base of the unit
Type/Class Label	Used to indicate the degree of safety or protection.	Bottom panel of the adapter
	"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Various.
	"ATTENTION - Consult accompanying documents" is intended to alert the user to refer to the User Manual or other instructions when complete information cannot be provided on the label.	Various.
	"CAUTION - Dangerous voltage" (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Various.
Device Listing/Certification Labels	Laboratory logos or labels that denote conformity with industry safety standards, such as UL or IEC.	On the base of the unit
	Indicates Equipment Type BF applied part for medical equipment. Identifies a BF type applied part complying with IEC 60601-1.	Probe connectors. On the base of the unit
	CE certification mark.	On the base of the unit
	Equipment Type CF IEC 60601-1 indicates equipment having a floating applied part that provides a degree of protection suitable for direct cardiac contact.	Above the ECG inlet, ECG connector and surgical probes.
	Indicates compliance with UL safety standard UL 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.	On the base of the unit



Table 1-6 Label Icons and Symbols - Description and Location (cont'd) 2 of 3









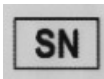

Label Name	Description	Location
	<b>Follow instructions for use.</b> Read and understand all instructions in the User's Manual before attempting to use the ultrasound unit.	Main Label
	Consult instructions for use.	On the base of the unit
	Waste Electrical and Electronic Equipment (WEEE) Disposal This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.	On the base of the unit. On the rear of the SafeLock cart.
CAUTION - This machine weighs...Special care must be used to avoid... 	This precaution is intended to prevent injury that may be caused by the weight of the machine if one person attempts to move it considerable distances or on an incline.	Used in the Service and User Manual which should be adjacent to equipment at all times for quick reference.
"DANGER - Risk of explosion used in..."	The system is not designed for use with flammable anesthetic gases.	See "EXPLOSION WARNING" on page 1-8.
	"Protective Earth" Indicates the protective earth (grounding) terminal.	Rear of the SafeLock cart.
	"Equipotentiality" Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Peripherals
	"ON" indicates the power ON position of the power switch. "Standby" indicates the power stand by position of the power switch. CAUTION This Power Switch DOES NOT ISOLATE Mains Supply.	Adjacent to ON/Standby Switch
	Model number	On the base of the unit
	Serial number	On the base of the unit

Table 1-6 Label Icons and Symbols - Description and Location (cont'd) 3 of 3

Label Name	Description	Location
	Date of manufacture	On the base of the unit

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## Section 1-8

### Returning/Shipping Probes and Repair Parts

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

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

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

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

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

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

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

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

## 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.

### 1-9-2 CE Compliance

The Vivid q N portable 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.

For applicable standards refer to the Safety Chapter in the Vivid q N User Manual.


**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, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
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.

*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.*

## Section 1-10 Customer Assistance

### 1-10-1 Contact Information

If this equipment does not work as indicated in this service manual or in the *Vivid q N 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:

- 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.
- Detailed description of any problem encountered.
- Save secondary image capture, cine loop.
- Where applicable, save the appropriate log files (by pressing <Ctrl F> [or <Alt D>]).  
Remember to save the log files for each day on a separate floppy disk, labelled accordingly.

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

1-10-1-1 Phone numbers for Customer Assistance

LOCATION	PHONE NUMBER	
<b>USA</b> GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive (RP-2123) Wauwatosa, WI 53226, USA	<b>USCAN</b>  Service: On-site: Service Parts: OLC:  Application Support:	1-800-437-1171 1-800-558-2040 1-800-321-7937 or 1-262 524-5300 1-800-682-5327 or 1-262-524-5698
<b>Canada</b>	<b>OLC - USCAN</b>	1-800-321-7937 1-800-668-0732
<b>Latin America</b>	<b>LATAM</b>  Service: Application Support:	+1-262-524-5300 +1-262-524-5698
<b>EUROPE</b> Ultrasound Europe GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	<b>OLC - EUROPE</b>  Support Phone: English/German, all segments Support Fax:	+49 (0) 212 2802 652  +33 1 3083 1300 +49 (0) 212 2802 431
<b>EAGM</b>	<b>OLC - EAGM</b>  Phone: Egypt Service center: UAE Service center:	+49 (0) 212-2802-652 00202 2322 1252 00971 8003646
<b>APAC</b>	<b>Online Services Ultrasound Asia</b>  ANZ - Service Support: Australia: Japan Support Center:  Korea: Singapore:	1800 647 855 +(61) 1-800-659-465 +(81) 42-648-2940 (Phone) +(81)-42-648-2905 (Fax) +(82) 2-1544-6119 +(65) 6291-8528 (Phone) +(65) 6291-7006 (Fax)
<b>China</b>	Phone:	+(86) 800-810 8188 +(86) 400-812 8188 +(86) 10-6788 2652
<b>India</b> Wipro GE Healthcare Pvt. Ltd. 4, Kadugodi Industrial Area, Bangalore - 560 067 India	Phone:	+(91) 1-800-425-8025 +(91) 1-800-425-7255 +(91) 1-800-102-7750

1-10-2 System manufacturer

Table 1-7 System manufacturer

MANUFACTURER	PHONE NUMBER	FAX NUMBER
GE VINGMED ULTRASOUND A/S STRANDPROMENADEN 45 P.O. BOX 141 NO-3191 HORTEN NORWAY	+47 3302 1100	+47 3302 1350

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# Chapter 2

## Site Preparations

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### Section 2-1 Overview

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

This chapter provides the information required to plan and prepare for the installation of a Vivid q N ultrasound unit. Included are descriptions of the electrical and facility requirements that must be met by the purchaser. A worksheet is provided at the end of this chapter (see [Figure 2-2 on page 2-10](#)) to help ensure that all the required network information is available, prior to installation.

**Table 2-1     Contents in Chapter 2**

Section	Description	Page Number
2-1	<a href="#">Overview</a>	<a href="#">2-1</a>
2-2	<a href="#">Console Requirements</a>	<a href="#">2-2</a>
2-3	<a href="#">Facility Needs</a>	<a href="#">2-6</a>
2-4	<a href="#">Connectivity Installation Worksheet</a>	<a href="#">2-10</a>


## Section 2-2 Console Requirements

### 2-2-1 Unit Environmental Requirements

Table 2-2 Environmental Requirements

Requirement	Temperature	Relative Humidity (non-condensing)	Air Pressure
Operational	+10 — +40°C (50 — 104°F)	30 — 85%	700 — 1060 hPa
Storage	-20 — +60°C (-4 — 140°F)	30 — 95%	700 — 1060 hPa
Transport	-10 — +60°C (14 — 140°F)	30 — 95%	700 — 1060 hPa

**NOTE:** The Vivid q N portable ultrasound scanner 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. See “Installation Warnings” on page 3-2.

### 2-2-2 Cooling Requirements

The cooling requirement for the Vivid q N environment is 350 BTU/hr.  
The cooling requirement for the SafeLock Cart environment is ~70 BTU/hr.  
These figures 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 installation, 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. Keep in mind that lighting controls and dimmers can be a source of EMI which could degrade image quality. These controls should be selected to minimize possible interference.

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

Site preparation takes time. Begin pre-installation 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 q N ultrasound unit; at least two people must be available to roll the system down the wheeling ramp. Attempts to move the system considerable distances (or on an incline) by one person alone, could result in personal injury, and/or damage to the system.



## 2-2-5 Electrical Requirements

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

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

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

### Sites with a mains power system without a defined Neutral:

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

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

### 2-2-5-1 Vivid q N Power Requirements

Electrical specifications for the Vivid q N system are as follows:

**Table 2-3 Electrical Requirements**

Adaptor	Input Voltage	Output Voltage	Tolerances	Op. Current	Frequency
AC DC converter	100V AC to 240V AC	20V	±10%	0.5 to 1A	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 2-4 Inrush Current**

Voltage	Inrush Current	
	Console Only	Console with all Peripherals
100 V	4.5 A	9 A
240 V	2.3 A	4.5 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 q N portable ultrasound scanner are supplied with a mains power plug, as standard. In the event that the unit arrives without a power plug, or with the wrong 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 ms.

*NOTE: Only relevant if system is operating without a battery.*

- **Power Transients**

(All applications)

Less than 25% of nominal peak voltage for less than 1 millisecond for any type of transient, including line frequency, synchronous, asynchronous, or aperiodic transients.

#### 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 q N ultrasound units comply with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.

*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.

## 2-2-6 EMI Limitations (cont'd)

The following table lists recommendations for preventing EMI:

**Table 2-5 EMI Prevention/ Abatement**

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

## 2-2-7 Probe Environmental Requirements

**Table 2-6 Probe Operation and Storage Temperatures**

	Electronics
<b>Operation</b>	10 — 40°C (50 — 104°F)
<b>Storage</b>	-10 — 60°C (14 — 140°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-installation work before delivery. Use the Pre-installation Check List (provided in [Table 2-7](#) on page 2-12) 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 installation, the individual or team who will perform the installation should be notified at the earliest possible date (preferably prior to installation), 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.

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## 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 single branch power outlet of adequate amperage (see [Table 2-3 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. See ["Electrical Requirements" on page 2-3.](#)
- A door opening of at least 76 cm (2.5 ft) in width (if using the SafeLock Cart).
- The proposed location for the unit is at least 0.2 m (0.67 ft) from the walls, to enable cooling.
- Power outlet and place for any external peripheral are within 2 m (6.5 ft.) of each other with peripheral within 1 m of the unit to connect cables.
- Power outlets for other medical equipment and gel warmer.
- Power outlets for test equipment within 1 m (3.3 ft) of the ultrasound unit.
- Clean and protected space for storage of probes (either in their case or on a rack).
- Material to safely clean probes (performed using a plastic container, never metal).
- In the case of a network option:
  - An active network outlet in the vicinity of the ultrasound unit.
  - A network cable of appropriate length (regular Pin-to-Pin network cable).
  - An IT administrator who will assist in configuring the unit to work with your local network. A fixed IP address is required. Refer to the form provided in [Figure 2-2 on page 2-10](#) 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 (if using the SafeLock Cart).
- Accessible circuit breaker for a dedicated 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.

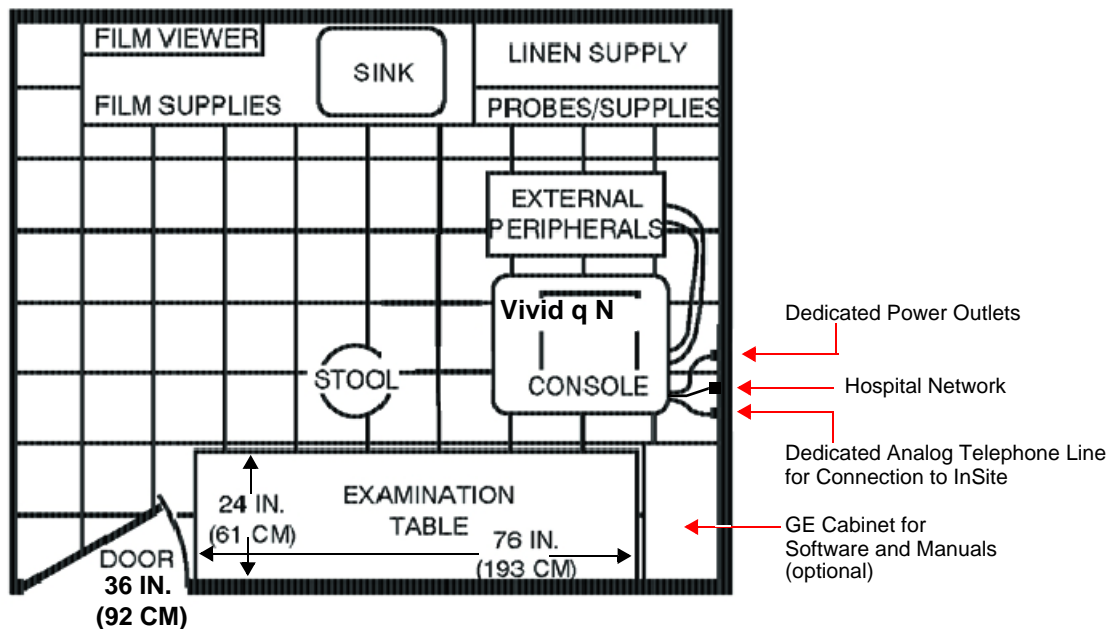


Figure 2-1 Recommended Floor Plan 4.3m x 5.2m (14 ft x 17 ft)



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

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

None.

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

Supported networks:

- Wired LAN
- Wireless LAN



**CAUTION** In order to achieve isolation between the Vivid q N scanner and the hospital network it is mandatory to use a Category 5 LAN cable with non-grounded shielding. (Cable to be supplied by the hospital).

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

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

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

To configure the Vivid q N ultrasound unit to work with other network connections, the network administrator must provide the required information, which should include the following:

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

## Section 2-4 Connectivity Installation Worksheet

<div style="border: 1px solid black; padding: 5px;"> <h3 style="margin: 0;">Site System Information</h3> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Site: <input style="width: 100%;" type="text"/></p> <p>Dept: <input style="width: 100%;" type="text"/></p> <p>Vivid q N <input style="width: 50%;" type="text"/> Type: <input style="width: 50%;" type="text"/></p> <p>(or Vivid q N SN:)</p> </div> <div style="width: 45%;"> <p>Floor: <input style="width: 100%;" type="text"/></p> <p>Room: <input style="width: 100%;" type="text"/></p> <p>REV: <input style="width: 100%;" type="text"/></p> </div> <div style="width: 10%; text-align: center;"> <p>Comments:</p> <div style="border: 1px solid black; height: 60px; width: 100%;"></div> </div> </div> </div>																																																																																																
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Figure 2-2 Connectivity Installation Worksheet

Vivid i n or Vivid q N					
Host Name	<input style="width: 90%;" type="text"/>	Local Port	<input style="width: 90%;" type="text"/>	IP Address	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>
AE Title	<input style="width: 240px; height: 20px;" type="text"/>	Net Mask	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>		
ROUTING INFORMATION					
		Destination IP Addresses		GATEWAY IP Addresses	
			Default		
ROUTER1	<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>		<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
ROUTER2	<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>		<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
ROUTER3	<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>		<input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
DICOM APPLICATION INFORMATION					
	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Store 2	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Store 3	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Store 4	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Store 5	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Store 6	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Work list	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
Storage Commit	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>
MPPS	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/> . <input style="width: 20px; height: 20px;" type="text"/>	<input style="width: 20px; height: 20px;" type="text"/>

Figure 2-3 Worksheet for DICOM Network Information

## 2-4-1 Check List

**Table 2-7 Vivid q N Pre-Installation Check List**

Action	Yes	No
Schedule at least 3 hours for installation of the system.		
Notify installation team of the existence of any variances from the basic installation.		
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.		

# Chapter 3

## System Setup

### Section 3-1 Overview

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

This chapter provides instructions for installing the Vivid q N ultrasound unit. Before beginning the installation process, an appropriate site must be prepared, as described in [Chapter 2 - Site Preparations](#). Once the site has been prepared, installation 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:** As described in *"Installation Acceptance Test Criteria" on page 3-180*, a Vivid q N ultrasound scanner is ready for use after the system has been configured successfully in accordance with the information provided in - System Setup (this chapter).

**NOTE:** Depending on the customer's specific requirements, the Vivid q N portable ultrasound scanner may have been supplied with or without the SafeLock Cart (optional). Where applicable, the installation procedures for each scenario are clearly identified in this chapter.

**Table 3-1 Contents in Chapter 3**

Section	Description	Page Number
3-1	Overview	3-1
3-2	Installation Reminders	3-2
3-3	Receiving the Vivid q N	3-5
3-4	Unpacking the Equipment	3-8
3-5	Preparing for Installation	3-12
3-6	Ensuring Protection from EMI	3-19
3-7	Completing the Hardware Installation	3-20
3-8	Mounting the Vivid q N on the SafeLock Cart (optional)	3-65
3-9	Configuration	3-69
3-10	Connectivity Setup	3-85
3-11	Storing and Transporting the Unit	3-179
3-12	Completing the Installation Paperwork	3-180

## Section 3-2 Installation Reminders

### 3-2-1 Average Installation Time

The Vivid q N installation and functional checkout will take approximately one hour; Vivid q N consoles with optional equipment may take slightly longer.

Once the site has been prepared, the average installation time required is shown in [Table 3-2](#) below.

**Table 3-2 Average Installation Time**

Description	Average Installation Time	Comments
Unpacking the scanner	20 minutes	
Installing the scanner	30 minutes	Time may vary, according to the required configuration
DICOM Option (connectivity)	30 minutes	Time may vary, according to the required configuration

### 3-2-2 Installation Warnings

- 1.) The Vivid q N portable ultrasound scanner weighs only 5 Kgs (11 lbs). (This is the weight of the scanner without any optional accessories). However since the SafeLock Cart weighs approximately 40 kg (88 lbs), two persons are always required to unpack it.
- 2.) There are no operator-serviceable components. To prevent shock, do not remove any covers or panels. Should problems or malfunctions occur, unplug the power cord. Only qualified service personnel should carry out servicing and troubleshooting.

#### 3-2-2-1 System Acclimation Time

Following transport, the Vivid q N 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 35°C.

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

**Table 3-3 Vivid q N System Acclimation Time**

	ALLOWED TRANSPORTATION AND STORAGE TEMPERATURES															OUT OF SPEC!					
°C	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
°F	140	131	122	113	104	96	86	77	68	59	50	41	32	23	14	5	-4	-13	-22	-31	-40
Hrs	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12	14	16	18	20

---

### 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 SafeLock Cart, as it is heavy. Two people are always required whenever a part weighing 19kg (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** To ensure proper grounding, connect this equipment to a receptacle marked "HOSPITAL ONLY" OR "HOSPITAL GRADE".



**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).



**CAUTION** ACOUSTIC OUTPUT HAZARD

ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE VIVID Q N PROBE IS WITHIN AIUM/NEMA STANDARDS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.



**NOTICE** When the SafeLock Cart is connected to the wall outlet and the main circuit breaker is in the ON position, the AC Box Fan is operated, even if the system is turned OFF.

**NOTE:** *The Vivid q N User Manual should be fully read and understood before operating the unit. Keep the manual near the unit for reference.*

## 3-2-4 The Tilt & Shock Indicators

### 3-2-4-1 Overview

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

To make it easier to detection if the handling during transportation has been unproper, a set of Tilt & Shock indicators have been attached to the transportation box.

### 3-2-4-2 Position of the Tilt & Shock Indicators

The Tilt & Shock indicators have been attached to the right side of the transportation box as illustrated in the figure below.



Figure 3-1 Tiltwatch and Shockwatch positions on Transportation Box

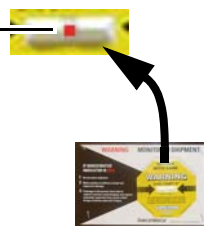
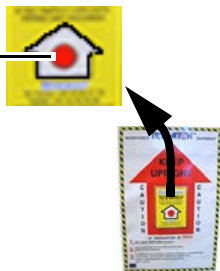


## Section 3-3 Receiving the Vivid q N

### 3-3-1 Examine All Packages

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

**Table 3-4 Examine All Packages**

STEP	TASK	ILLUSTRATIONS
1	Is damage apparent? <ul style="list-style-type: none"> <li>If yes; continue with the instructions in subsection <a href="#">3-3-2 - Damage in Transportation</a>.</li> <li>If no; continue with step 2.</li> </ul>	
2	Is the Shock Indicator red colored inside the middle of the indicator? <ul style="list-style-type: none"> <li>If yes: The Shock Indicator has been triggered. Make a remark on the Post Delivery Checklist about the triggered indicator before you continue with step 2.</li> <li>If no: Continue with step 2.</li> </ul>	RED COLOR 
3	Is the Tilt Indicator red colored inside the middle of the indicator? <ul style="list-style-type: none"> <li>If yes: The Tilt Indicator has been triggered. Make a remark on the Post Delivery Checklist about the triggered indicator and then follow the rest of the instructions in subsection <a href="#">3-3-2 - Damage in Transportation</a>.</li> <li>If no: Continue with the instructions in <a href="#">Section 3-3 - Receiving the Vivid q N</a>.</li> </ul>	RED COLOR 



**WARNING** For Vivid q N portable ultrasound scanners supplied from the factory with a dummy battery, when unpacking the unit, do not discard the dummy battery.

When charging the Vivid q N lithium ion battery on an external charger, since the battery in fact forms one of the four legs of the scanner, removing it will leave the unit standing unbalanced. For this reason, the dummy battery should be kept, so it may be inserted in position to provide stability to the scanner while the lithium ion battery is being charged.

In addition, use of the dummy battery is recommended during transportation or long-term storage of the Vivid q N portable ultrasound scanner.

### 3-3-2 Damage in Transportation

Follow this procedure if damage is apparent, or if any of the Tilt & Drop Indicators show failure:

**Table 3-5 Damage in Transportation**

STEP	TASK
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. <ul style="list-style-type: none"><li>• 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.</li><li>• A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.</li></ul>
3	Report the damage on the Post Delivery Checklist. Specify if the tilt & drop indicators show failure in the "Packing" field on the Post Delivery Checklist.

### 3-3-2-1 Transportation Box Label

The Transportation Box Label is located at the front of the transportation box.



Figure 3-2 Transportation Box Label

### 3-3-2-2 The Vivid q N Transportation Box Label details

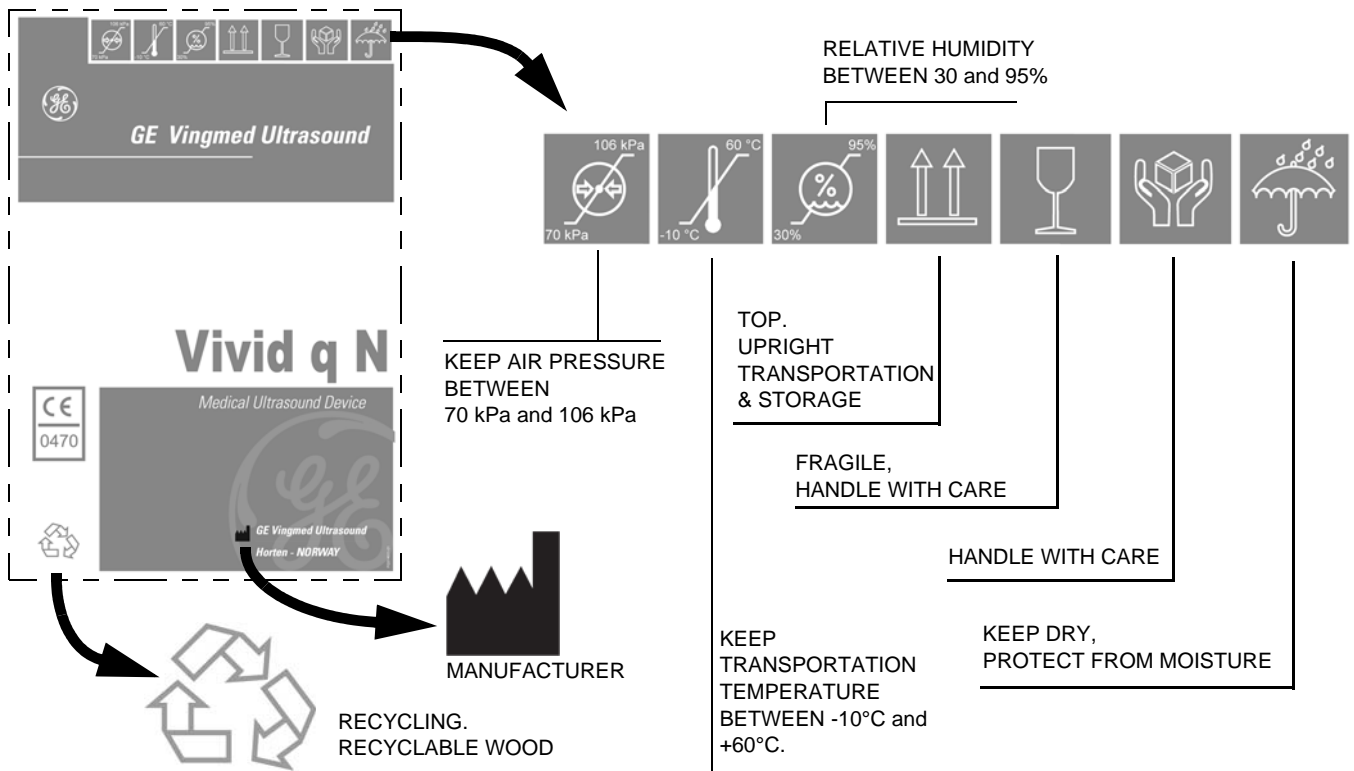


Figure 3-3 Vivid q N Transportation Box Label details

## Section 3-4 Unpacking the Equipment



**CAUTION** Please read this section fully before unpacking the Vivid q N ultrasound unit.



Figure 3-4 Shipping Box for the Vivid q N only

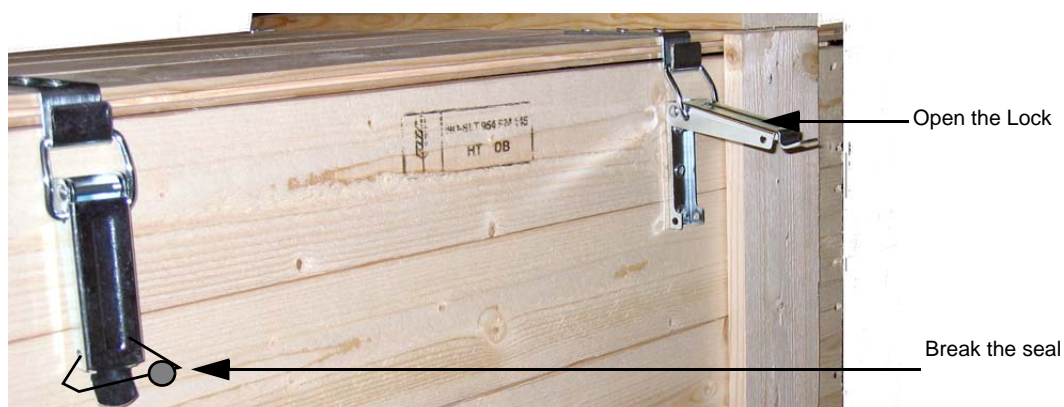


Figure 3-5 To remove the Lid of the Box

## Section 3-4Unpacking the Equipment (cont'd)



Figure 3-6 Transportation box - lid removed

Table 3-6 Shipping Carton Dimensions and Weights

Description	Height	Width	Depth	Weight <sup>a</sup>
Ultrasound system with probes, peripherals and accessories)	85 cm	87 cm	66cm	35 kgs. Empty

a.Weight is approximate and will vary depending on supplied peripherals

### 3-4-1 Examine All Packages

Examine the Transportation box closely at time of delivery, as described in the procedure that follow.

### 3-4-2 Unpacking the Wooden Transportation box

After completing a visual inspection of the Transportation box and *Drop/Tilt* indicators, proceed unpacking as follows:

- 1.) Remove sealers and unlock two locking levers at two sides of the Box as shown in [Figure 3-5 on page 3-8](#)
- 2.) Remove the packing slip (shipping consignment note) detailing the contents of the Transportation Box, keep close to hand and be ready to mark the check list.
- 3.) Remove the surface packing material (paper pad, silica gel, etc.). Continue to remove additional packing material as applicable during the following procedure steps.
- 4.) Carefully remove the box containing the probes.
- 5.) Take out the package containing the following accessories: cables (AD/DC; ECG; Network), Isolation Box, and software CD.
- 6.) Verify the content against the Delivery Note.
- 7.) Remove each of the boxes (one, two, or more, depending on options ordered) containing the peripherals and Vivid q N.
- 8.) Carefully remove the Vivid q N ultrasound unit from the box and place at a flat and stable location- refer to [Figure 3-7 on page 3-10](#).



Figure 3-7 The Vivid q N

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### 3-4-3 Verifying the Transportation box Contents

After unpacking, it is important to verify that all items ordered by the customer have been received (refer to the Delivery Note). Compare all items listed on the packing slip (shipping consignment note) with those received and report any items that are missing, back-ordered, or damaged, to your GE sales representative.



**NOTICE** It is recommended to keep and store the transportation box and all other packing materials in case the unit has to be moved to a different location in the future.  
For warranty purposes, storage of the above is required for one year from date of purchase.

### 3-4-4 Physical Inspection

#### 3-4-4-1 System Voltage Settings

Verify that the Vivid q N AC adapter is set to the correct voltage. The Voltage settings are 220-240V AC.



**WARNING** *Setting the ultrasound components to the wrong voltage setting will most likely destroy the equipment.*

### 3-4-5 EMI Protection

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

## Section 3-5 Preparing for Installation

### 3-5-1 Confirming Customer Order

When preparing for installation of a Vivid q N system, it is important to verify that all items ordered by the customer have been received. Compare all items listed on the packing slip (shipping consignment note) with those received and report any items that are missing, back-ordered, or damaged, to your GE sales representative.

### 3-5-2 Verifying the Transportation Box Contents

The following sections list the contents of the shipping carton that are additional to the Vivid q N. These include external accessories and probes, as well as a regional language support kit, and optional peripherals (as ordered). Ensure that all relevant components are present before completing the installation.

*NOTE: The transportation box contains an **External Accessory Kit and Optional Peripherals Check List**. When checking the contents of the carton, make sure the Check List is completed. In the event that any items are missing, contact your local GE representative.*

#### 3-5-2-1 Probes

The *transportation box* will contain the probes that have been ordered with the system.

For a list of probes available for use with the Vivid q N portable ultrasound scanner, refer to [Section 9-7 "Probes" on page 9-8](#).



### 3-5-3 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 [System Installation Details on page 3-180](#).

#### 3-5-3-1 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 q N portable ultrasound scanner is provided in [Table 3-7](#) below.
- A *Damage Inspection Checklist* for the SafeLock Cart (optional) is provided in [Table 3-8](#) on page 3-14.

**Table 3-7 Damage Inspection Checklist - Vivid q N System**

✓	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	Fans	Verify that the system's cooling fans and peripheral fans are operating.
	6	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.
	7	Covers	Check that all screws are tightly secured in place, that there are no dents or scratches and that no internal parts are exposed.
	8	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.
	9	AC DC System	Check the AC DC unit is not damaged or cracked board and verify that the output cable is properly secured.
	10	Power Cord	Check the power cord for cuts, loose hardware, tire marks, exposed insulation, or any deterioration. Verify continuity. Replace the power cord, as required.

3-5-3-1 Damage Inspection Checklist (cont'd)

Table 3-8 Damage Inspection Checklist - SafeLock Cart (optional)

✓	Step	Item	Recommended Procedure
	1	Probe Holders	Clean the gel wells with warm water and a damp cloth to remove all traces of gel.
	2	Peripheral Power and USB Audio Panels	Check the 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.
	3	Covers	Check that all screws are in place, all chassis and internal covers are installed.
	4	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.
	5	AC System	Check the AC board connectors and the associated cabling for good connection and proper insulation. Verify that the connections are secured.
	6	Power Cord	<p>Check the power cord for cuts, loose hardware, tire marks, exposed insulation, or any deterioration. Verify continuity.</p> <p>Tighten the clamps that secure the power cord to the unit and the outlet plug to the cord. Replace the power cord and/or clamp, as required.</p>  <p>Clamp securing power cord</p>
	7	Front Castors	Check that the front castors can swivel, and can be placed in the locked position by pressing the foot brake lever (lower) <i>down</i> on each castor. Check that the upper lever releases the SafeLock Cart wheel lock on each castor wheel.
	8	Rear Castors	Check that the rear castors can roll and swivel.

### 3-5-3-2 Front and Side View of the Vivid q N Ultrasound Unit

Figure 3-8 below shows the Vivid q N ultrasound unit components that are visible from the *front* and *side* of the ultrasound unit.

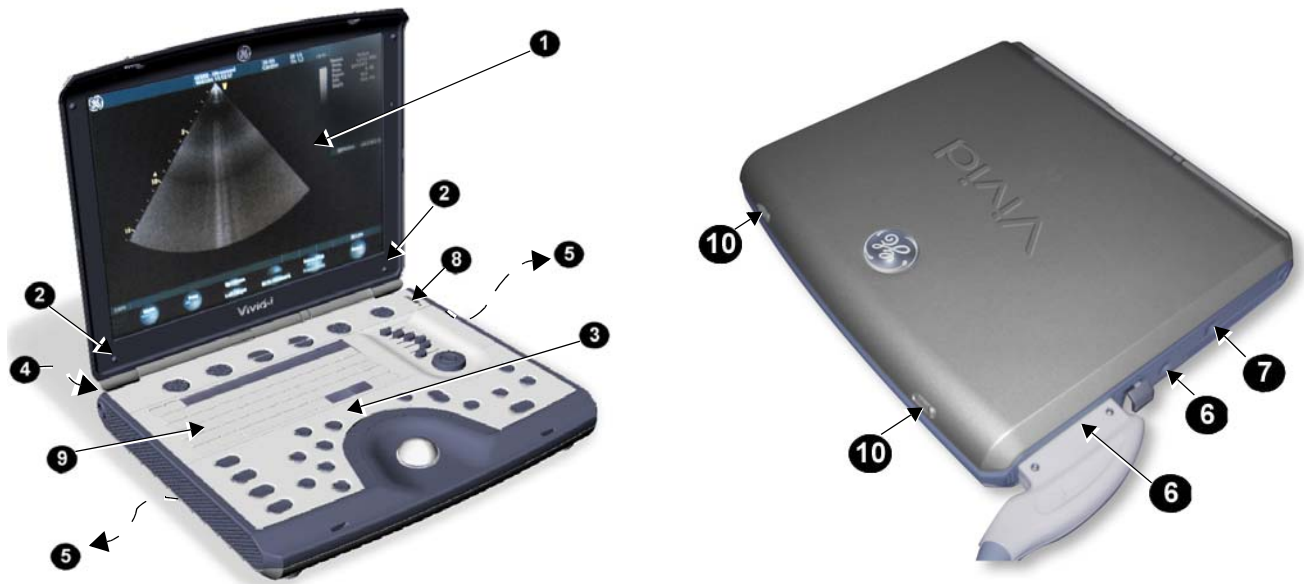
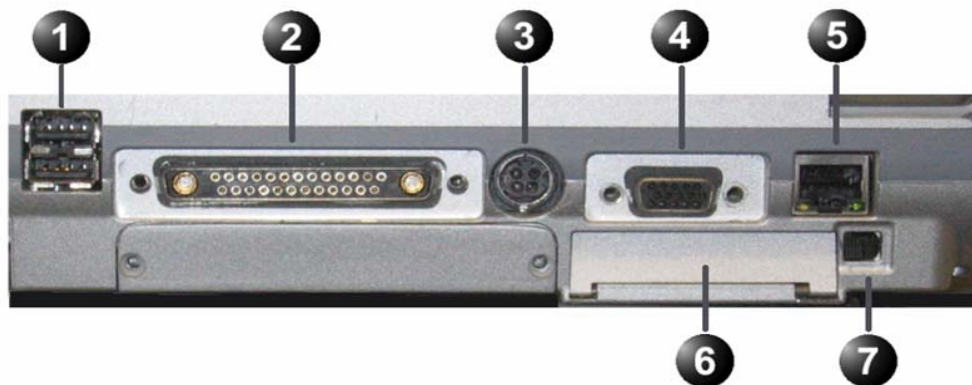


Figure 3-8 Front and Side View of the Vivid q N

- 1 **Display Monitor:** tilts up and down.
- 2 **Speakers:** Two loudspeakers for Doppler sound
- 3 **Control Panel:** Contains the alphanumeric keyboard and the buttons used to operate the ultrasound unit.
- 4 **Rear Handle**
- 5 **Air Vents**
- 6 **Probe Ports:** Two active probe connectors (one for a pencil probe).
- 7 **ECG Connector**
- 8 **ON/OFF Switch**
- 9 **Alphanumeric Keyboard and Operation Button**
- 10 **Release Latch**

### 3-5-3-3 Rear View of the Vivid q N Ultrasound Unit

Figure 3-9 shows a view of the Vivid q N ultrasound unit rear panel and external peripheral/accessory connectors



**Figure 3-9 View of the Vivid q N Rear Panel**

- 1 Two interchangeable USB ports (digital printer, CD-RW and other peripherals)
- 2 Docking connector (currently not in use)
- 3 Port for DC IN (AC Adapter)
- 4 SVGA Output (VCR option or CRT monitor option)
- 5 LAN 10/100 Base-TX Ethernet network connector
- 6 PCMCIA port for PC card.
- 7 Ejection lever for PCMCIA device

3-5-3-4 Vivid q N SafeLock Cart

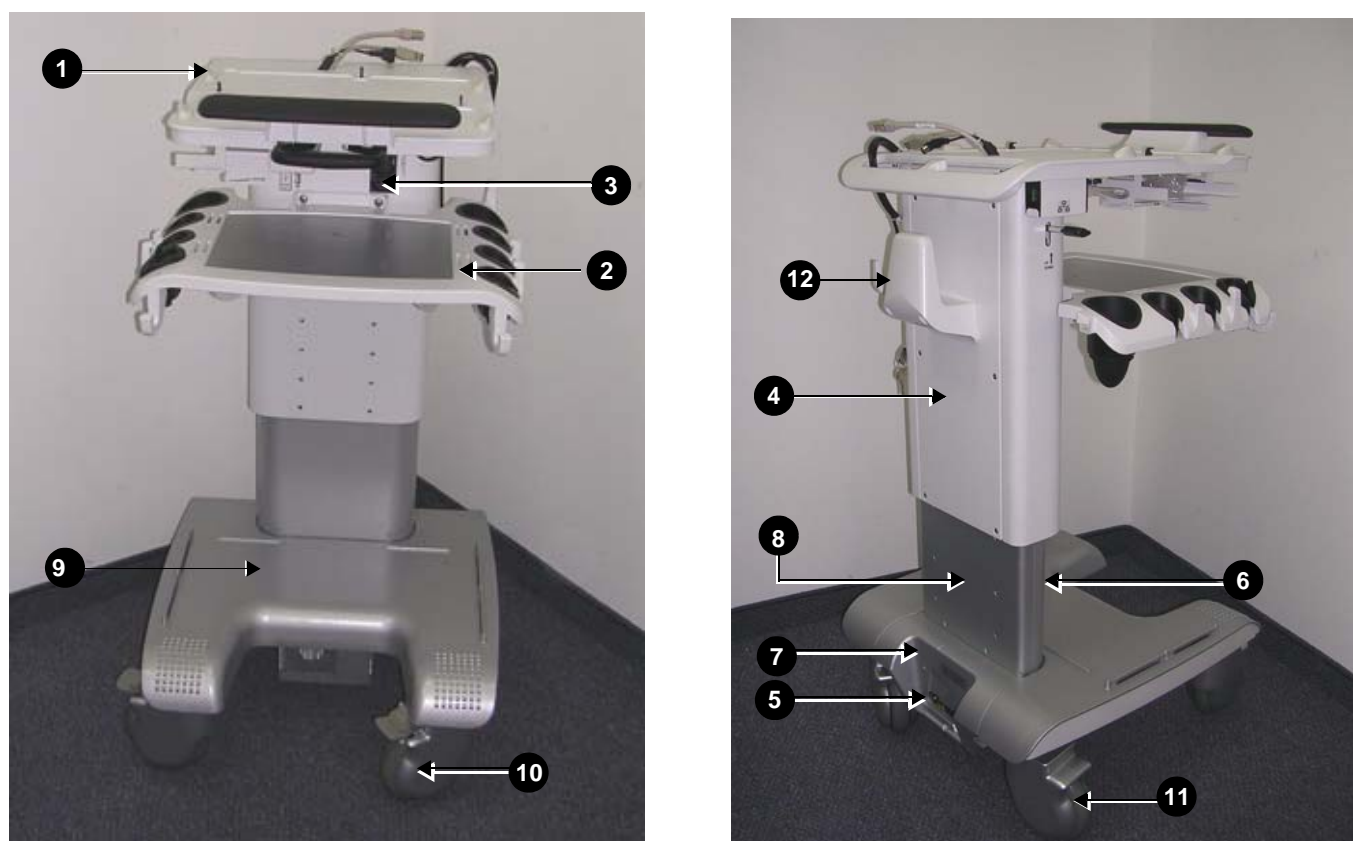


Figure 3-10 Vivid q N SafeLock Cart Components

Table 3-9 Vivid q N SafeLock Cart Components

Label	Item	Label	Item
1	Top Shelf Assembly (with handle)	7	Bottom Cover - Rear (AC Assembly Cover)
2	Probe Shelf (with probe holders)	8	Rear Lower Cover
3	Peripheral Power Outlet	9	SafeLock Cart Bottom Assembly
4	Rear Upper Cover	10	Front Wheels (with locking lever)
5	AC Distribution Assembly (behind cover)	11	Rear Wheels
6	Bottom Cover - Front	12	AC Cable Hook

### 3-5-4 Confirming SafeLock Cart Voltage Configuration

- 1.) Check the safety rating plate located at the rear of the SafeLock Cart, above AC input connector.
- 2.) Remove the bottom cover (rear) from the SafeLock Cart to provide access to the jumper on the AC unit. See [Figure 3-11 below](#).



**Figure 3-11 Jumper on AC Unit**

- 3.) Make sure that the jumper is set to either 100 to 120 V AC or to 220 - 240 V AC, in accordance with the voltage rating shown on the safety rating plate (step 1).

### 3-5-5 System Voltage Confirmation

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

Verify that the **Vivid q N** is set to the correct voltage.

The **Vivid q N** voltage settings are found on the base (underside) of the system.

For illustrations of the label with the voltage setting, see:

- [Table 1-5 "Main Label for Vivid q N" on page 1-19](#)

 **WARNING** CONNECTING THE VIVID Q N TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE SCANNER.

## Section 3-6 Ensuring Protection from EMI

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

Ensure that the system is protected from electromagnetic interference (EMI), as follows:

- Operate the system at least 15 feet away from equipment that emits strong electromagnetic radiation.
- Operate the system in an area enclosed by walls, floors and ceilings comprised of wood, plaster or concrete, which help prevent EMI.
- Shield the system when operating it in the vicinity of radio broadcast equipment, if necessary.
- Do not operate mobile phones or other EMI emitting devices in the ultrasound room.
- Verify that all EMI rules listed in the following table are followed:

**NOTE:** *The Vivid q N ultrasound unit is approved for use in hospitals, clinics and other environmentally qualified facilities, in terms of the prevention of radio wave interference. Operation of the ultrasound unit in an inappropriate environment can cause electronic interference to radios and television sets situated near the medical equipment.*

**Table 3-10 EMI Prevention/ Abatement**

EMI Rule	Details
Ground the unit.	Poor grounding is the most likely reason an ultrasound unit will have noisy images. Check the grounding of the power cord and power outlet.
Be aware of RF sources.	Keep the unit at least 5m (16.4 ft) away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Replace and/or reassemble all screws, RF gaskets, covers and cores.	After you finish repairing or updating the system, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the shield over the front of the card cage. Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken RF gaskets.	If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn on the unit until any loose metallic part is removed and replaced if needed.
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 card cage or hang out of the peripheral bays. Loop any peripheral cable excess length inside the peripheral bays or hang on the hooks provided below the console. Attach the monitor cables to the frame.



## Section 3-7 Completing the Hardware Installation

The hardware installation procedures described in this section provide instructions and information for the possible scenarios, as follows:

- Vivid q N scanner but no SafeLock Cart - connections direct to the system
- Vivid q N scanner with SafeLock Cart
- Vivid q N scanner but no SafeLock Cart - connections via USB hub

**NOTE:** *If required, it is possible to disable access to all Vivid q N scanner USB ports (including the CD/DVD drive) in order to limit system vulnerability. This is implemented from the System Configuration window, via the Service tab.*

Activate the **USB External Media disabled checkbox** (as shown in XREF Figure 3-22 below), then press the **F2** or **Esc** key to save the changes.

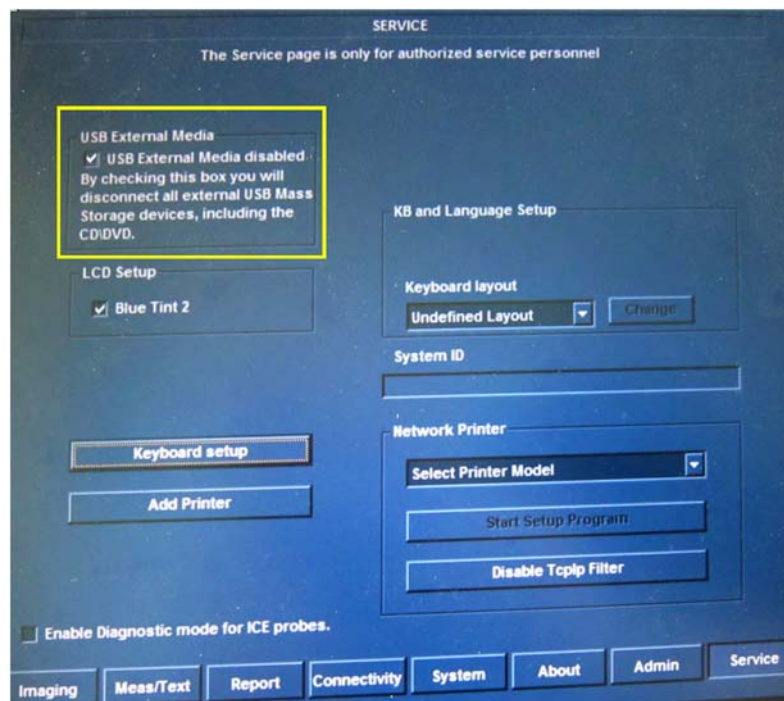


Figure 3-12 Disabling USB External Media

**NOTE:** *After disabling all Vivid q N scanner USB ports, all peripherals that are used by connecting to a USB port (and also the CD/DVD drive) will not be accessible until such time as access to USB External Media is re-enabled - i.e., the USB External Media disabled checkbox (shown above) is unchecked.*



## 3-7-1 Connecting Printers



**WARNING** *WHEN CONNECTING PRINTERS TO THE SYSTEM OR SAFELOCK CART, ONLY MULTIPLE-SOCKET OUTLETS PROVIDED WITH THE SYSTEM ARE TO BE USED FOR SUPPLYING POWER TO EQUIPMENT INTENDED TO FORM PART OF THE SYSTEM.*

### 3-7-1-1 Printer Connection and Configuration - Overview

**NOTE:** *Before connecting a printer to the Vivid q N scanner, refer to the ["Safety and Environmental Guidelines"](#) on page 1-12.*

This section provides information common to all printers approved for use with the Vivid q N ultrasound scanner, as follows:

- [Printer Categories and Outline of Procedure Instructions](#), below.
- ["Configuring Hot Keys to Activate Printing Direct from the Control Panel"](#) on page 3-22.
- ["Configuring Printing Orientation \(Portrait or Landscape\) and Paper Size"](#) on page 3-23.

#### 3-7-1-1-1 Printer Categories and Outline of Procedure Instructions

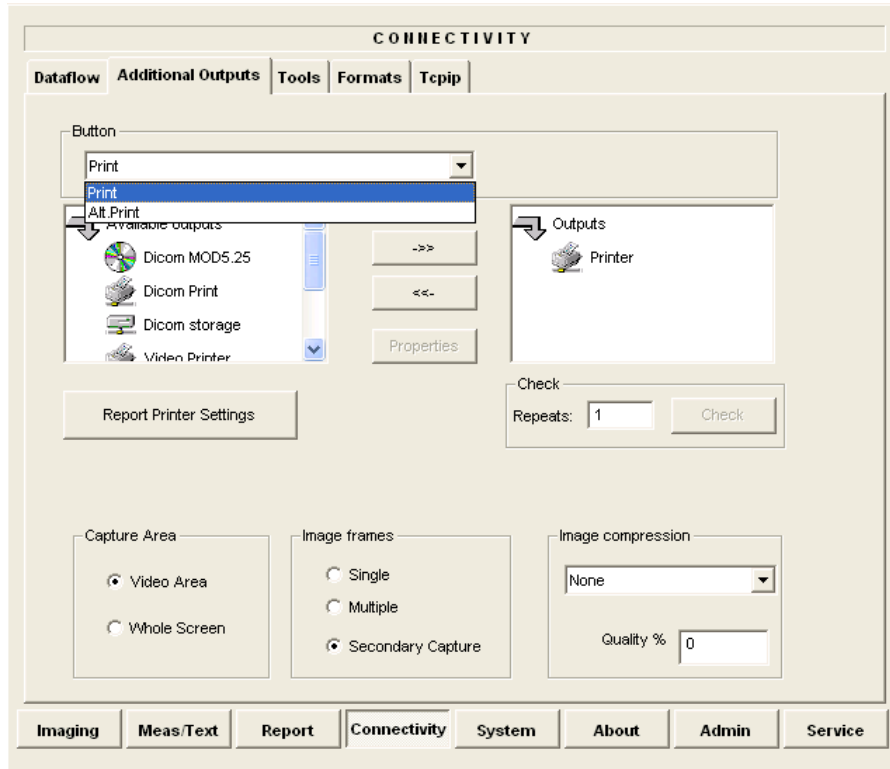
**NOTE:** *The printers approved for use with the Vivid q N system are categorized in [Table 3-11](#) below. Refer to the appropriate instructions for connecting a specific printer, as applicable.*

**Table 3-11 Printer Categories and Connection Procedures**

Printer Category	Connection Procedure
Report Printer (Color)	<ul style="list-style-type: none"> <li>• <a href="#">"HP470 Color Printer"</a> on page 3-26</li> </ul>
Report Printer (Color) with Network Capabilities	<ul style="list-style-type: none"> <li>• <a href="#">"HP Officejet Pro 8000 Color Printer"</a> on page 3-28</li> </ul>
Video Printer (B&W)	<ul style="list-style-type: none"> <li>• <a href="#">"Sony UP-D897 B/W Video Printer"</a> on page 3-29</li> </ul>
Video Printer (Color)	<ul style="list-style-type: none"> <li>• <a href="#">"Sony UP-D25MD Color Video Printer"</a> on page 3-33</li> </ul>
	<ul style="list-style-type: none"> <li>• Sony UP-D23MD Color Video Printer Refer to: <a href="#">"Sony UP-D25MD Color Video Printer"</a> on page 3-33</li> </ul>

### 3-7-1-1-2 Configuring Hot Keys to Activate Printing Direct from the Control Panel

- 1.) Press **Config** (or F2).
- 2.) Select **Connectivity** (in the lower part of window).
- 3.) Select the **Additional Outputs** tab.



**Figure 3-13 Configuring Control Panel Hot Keys for Printing**

- 4.) From the Button drop-down menu (see [Figure 3-13](#)), select to configure either the **Print** button or **Alt+Print** to activate a variety of outputs.
- 5.) Use the *left* or *right* arrows below to add any of the available options (listed on the left) as **Outputs** (listed on right).
- 6.) From the listed **Outputs**, select (highlight) the required output, right-click and select **Properties** to configure the output device accordingly.

Printing may now be activated direct from the Vivid q N Control Panel, using the hot key you have configured for this purpose.

- 7.) Proceed to perform the ["B/W and Color Printer Test"](#) on page 4-24.

### 3-7-1-1-3 Configuring Printing Orientation (Portrait or Landscape) and Paper Size

To change the printing orientation and printing paper size, configure the printer as described below.

To configure printers for portrait/landscape printing, the change must be performed at the Windows operating system level. The user first accesses the system at the Applications level from the Additional Outputs screen. By selecting the Advanced option under Selected Devices, the user accesses the Printer Properties dialog box and proceeds with the configuration procedure as explained below.

An additional procedure is required to configure the Sony UP-D897 Printer. This is described in ["Configuring the Sony UP-D897 Printer" on page 3-30](#).

- 1.) On the system console, press **Config** and select **Connectivity**.
- 2.) From the **Additional Outputs** screen under **Selected Devices**, select **Advanced...**

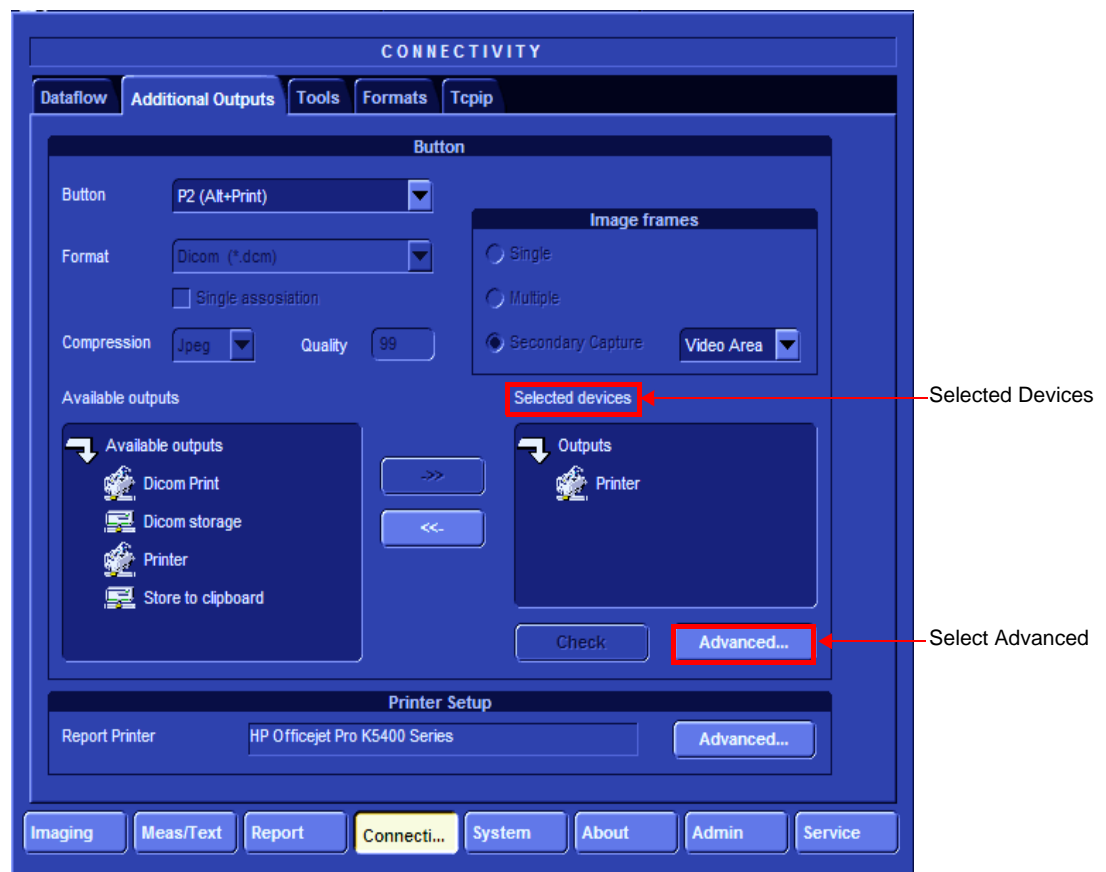
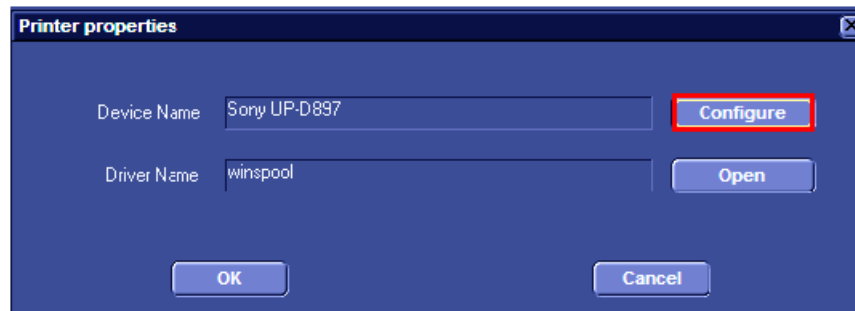


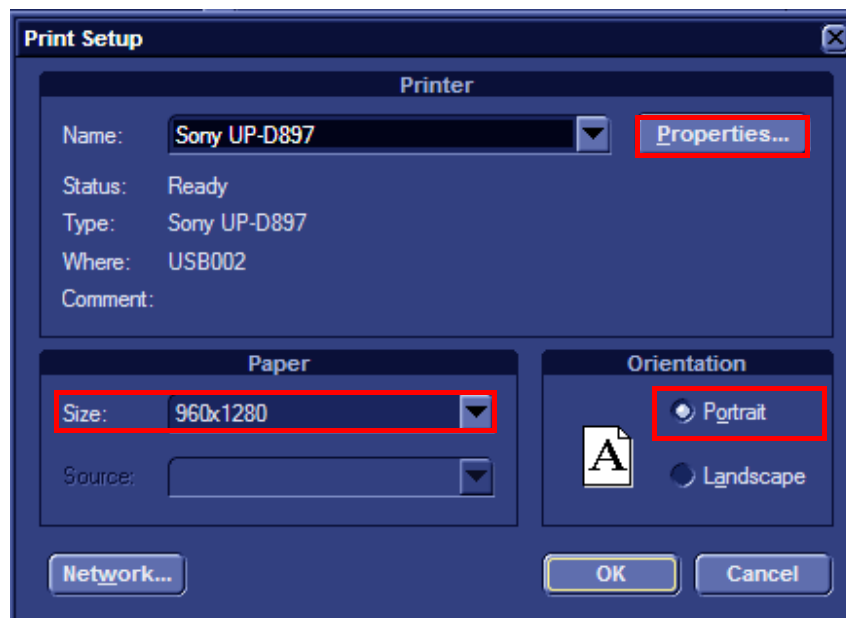
Figure 3-14 Advanced option at Windows level

- 3.) Click **Configure** in the **Printer Properties** dialog to enter Print Setup.



**Figure 3-15 Printer Properties Dialog Box**

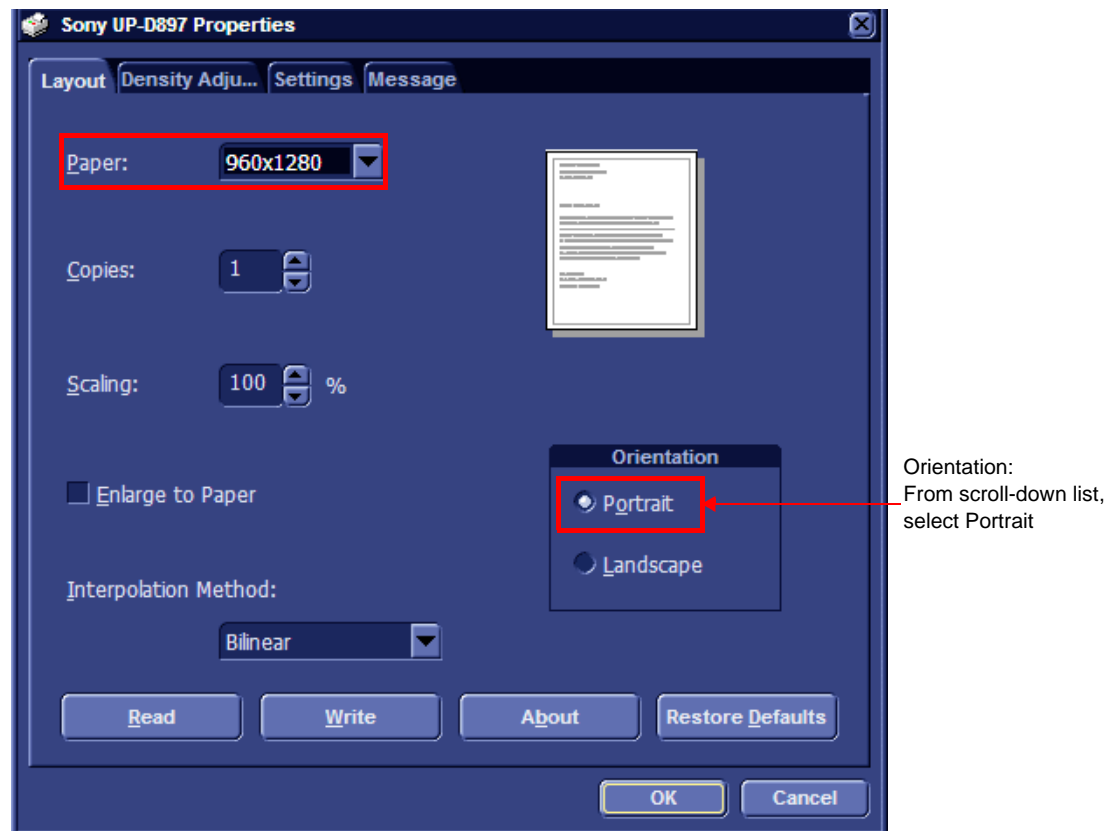
- 4.) In the Orientation area, select **Portrait** or **Landscape** as needed.



**Figure 3-16 Printer Setup**

- 5.) From the Paper Size drop-down list, select the required paper size.

- 6.) Click **Properties**. The printer properties screen opens - [Figure 3-17](#).




**Figure 3-17 Printing Properties - Selecting Orientation**

- 7.) Verify that the selected orientation and paper size are correct.  
8.) Click **OK** twice and then once more to return to the **Advanced Outputs** tab.

3-7-1-2 HP470 Color Printer

 **NOTICE IMPORTANT**  
Do not connect the DeskJet Color Printer to the Vivid q N system while scanning is in progress!

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



**Figure 3-18 DeskJet Color Printer**

The DeskJet Color Printer connection in the different scenarios is explained below.

- Connection via LAN

There are a few DeskJet Color Printers that can be connected to the system via LAN - refer to "[Add Printer](#)" on page 3-80. The DeskJet Color Printer can be connected to an external, non-isolated power source.

 **WARNING** *Do not attempt to use a different type of DeskJet Color Printer (brand or model) other than the DeskJet Color Printer provided by GE. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

**No SafeLock Cart - connection directly to the Vivid q N system**

This only applies to HP 460 models which are supplied pre-installed with the appropriate software drivers. The DeskJet Color Printer can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

When connecting directly to the system it is necessary to use an additional power source. **As a safety precaution, this must be done via an isolation transformer.**

The DeskJet Color Printer can be connected once the system is powered ON, or after shutdown.



**WARNING** *Do not attempt to use a different type of DeskJet Color Printer (brand or model) other than the DeskJet Color Printer provided by GE. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

- **No SafeLock Cart - connection via USB hub**

As stated above. **Safety considerations must be taken into account. The DeskJet Color Printer must be powered via an isolation transformer.** Either USB port may be used to communicate with the device.

- **Vivid q N mounted on SafeLock Cart**

The DeskJet Color Printer may be connected to any of the USB outlets provided on the SafeLock Cart. One must use the additional power source to activate the DeskJet Color Printer. However, this must be powered from the SafeLock Cart itself, via one of the isolated peripheral power outlets provided on the cart.

### 3-7-1-3 HP Officejet Pro 8000 Color Printer

**NOTE:** The HP8000 Color Printer is a Non-Medical device.

**NOTE:** The HP8000 Color Printer can be connected to the Vivid q N LAN only. When using the USB connection, the printer should be connected through an isolated transformer, since the Vivid q NUSB is not isolated.

**NOTE:** When powering the HP8000 Color Printer from the SafeLock Cart, the printer may be used via a USB or LAN connection.



**Figure 3-19 HP Officejet Pro 8000 Color Printer**

#### 3-7-1-3-1 Connecting the HP Officejet Pro 8000 to the Vivid q N Scanner Mounted on the SafeLock Cart

**NOTE:** Follow the installation procedure for mounting the Vivid i/q system on the SafeLock cart, as described in ["Mounting the Vivid q N on the SafeLock Cart \(optional\)"](#) on page 3-65.

**NOTE:** When using the Vivid i/q system mounted on the SafeLock cart, the HP Officejet Pro 8000 printer must be connected to the AC outlet at the rear of the SafeLock cart - see [Figure 3-20](#).

- 1.) Connect the printer to the AC power outlet located at the rear of the SafeLock cart.
- 2.) Plug the SafeLock cart into the mains power supply.
- 3.) Using the USB communications cable, connect the HP Officejet Pro 8000 printer to the Vivid i/q system.



**Figure 3-20 AC Power Cable and USB Cable Connected to SafeLock Cart**

- 4.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Color Printer Test" on page 4-24](#)



3-7-1-4 Sony UP-D897 B/W Video Printer



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



**Figure 3-21 Black and White Printer**

The B/W Printer connection in the different scenarios is explained below.

**NOTE:** After physical connection of the printer to the Vivid q N system, to configure the appropriate hot keys to activate printing direct from the control panel, follow the instructions in ["Configuring Hot Keys to Activate Printing Direct from the Control Panel"](#) on page 3-22.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The B/W Printer can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

When connecting the B/W Printer directly to the system, it is necessary to use an additional power source. **As a safety precaution, this must be done via an isolation transformer.**

The B/W Printer can be connected once the system is powered ON, or after shutdown. All software drivers for the B/W Printer are pre-configured and installed designated to be used with the specific B/W Printer supplied by GE.



**WARNING** **Do not attempt to use a different type of B/W Printer (brand or model) other than the B/W Printer provided by GE Medical Systems. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!**

- **No SafeLock Cart - connection via USB hub**

As stated above. **Safety considerations must be taken into account. The B/W Printer must be powered via an isolation transformer.** Either USB port may be used to communicate with the device.

- **Vivid q N mounted on SafeLock Cart**

The B/W Printer may be connected to any of the USB outlets provided on the SafeLock Cart. You must use the additional power source to activate the B/W Printer. However, this must be powered from the SafeLock Cart itself, via one of the isolated peripheral power outlets provided on the cart.

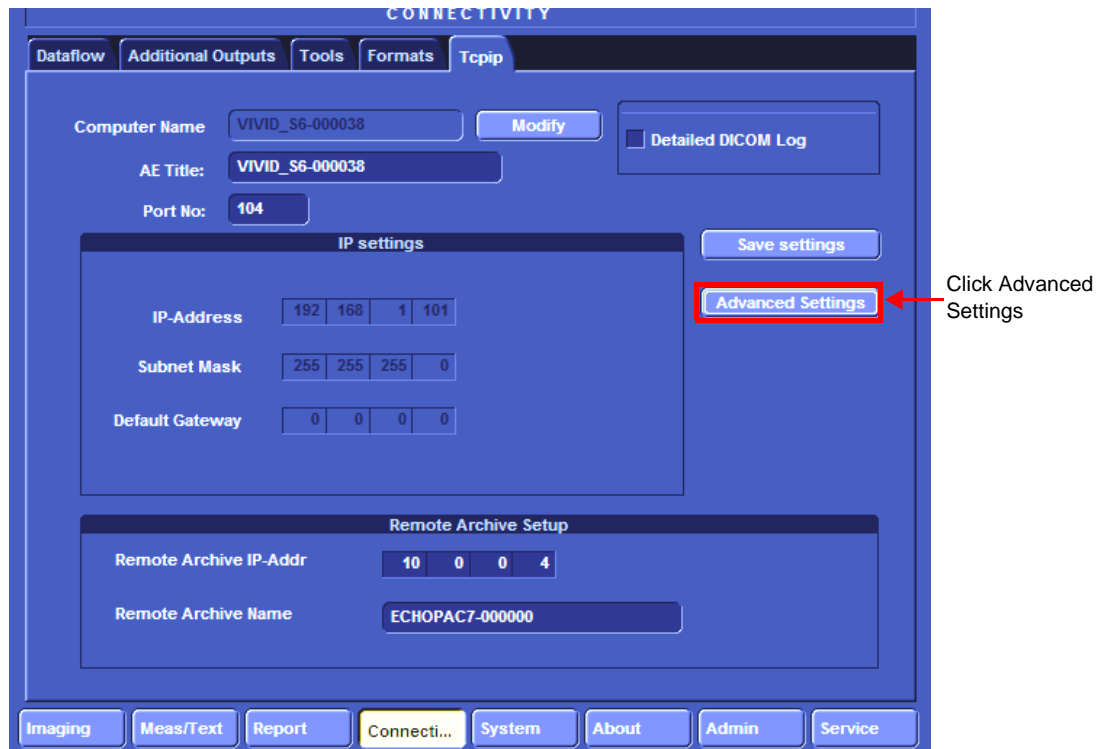
**NOTE:** Once the printer is connected, perform the following functionality check:

- "B/W and Color Printer Test" on page 4-24 should be performed

#### 3-7-1-4-1 Configuring the Sony UP-D897 Printer

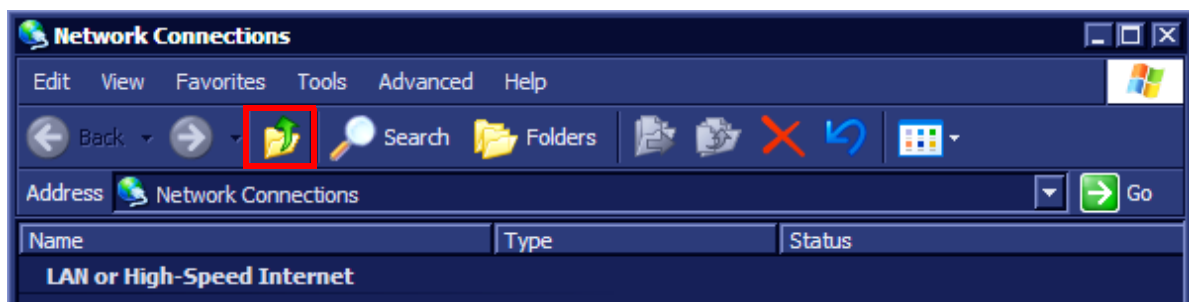
To configure the Sony UP-D897 Printer, the following steps are required:

- 1.) Click the **Tcpip** tab on the Connectivity screen (see Figure 3-14 on page 3-23).
- 2.) Select **Advanced Settings** - see Figure 3-22.



**Figure 3-22 Tcpip screen**

- 3.) The Network Connection screen opens (Figure 3-23). Click the **"Up"** button to open the Windows Control Panel.



**Figure 3-23 Network Connections showing highlighted "Up One Level" button**

- 4.) Navigate to **Printers and Faxes** and double-click **Sony UP-D897** to open the Sony UP-D897 Printer Configuration dialog.

5.) From the menu, select **Printer > Properties**.

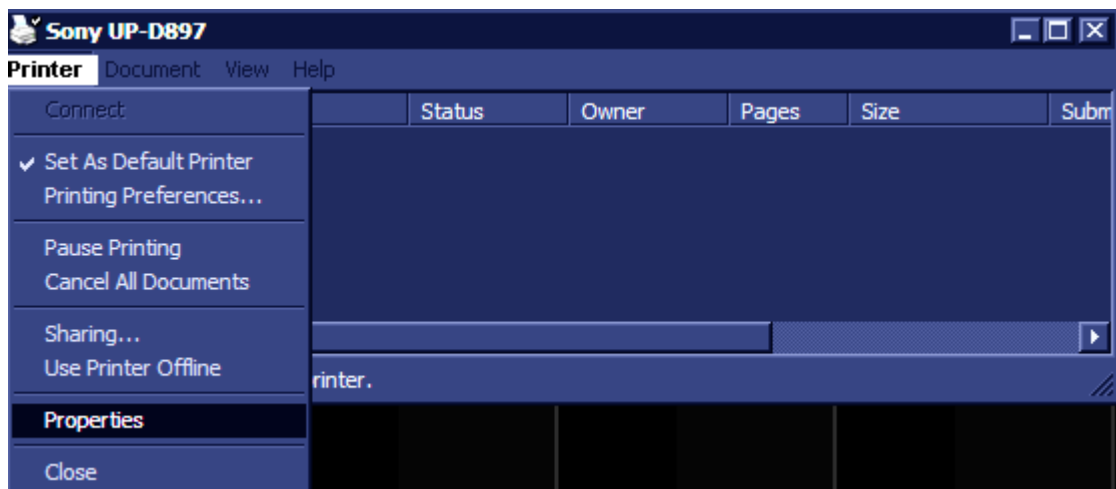


Figure 3-24 Sony UP-D897 printer configuration dialog box

6.) The Sony UP-D897 Properties screen opens. Select **Printing Preferences...**,

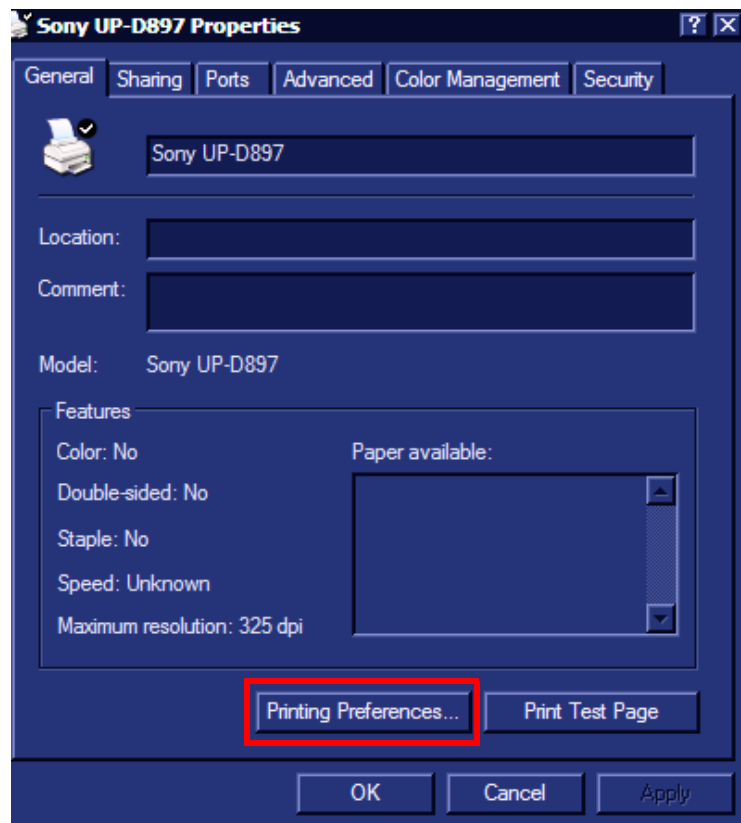
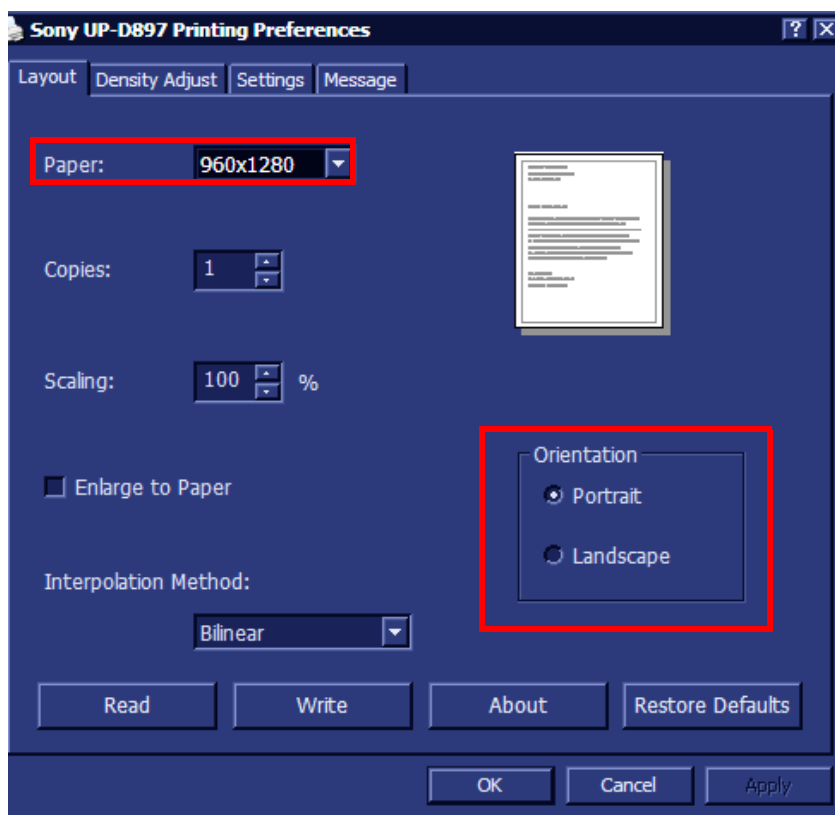


Figure 3-25 Sony UP-D897 Properties Screen

- 7.) From the **Printing Preferences** dialog, under Orientation:
- A.) Under Paper, click the scroll-down arrow and select the required paper size.
  - B.) Under **Orientation**, choose the required printing orientation.



**Figure 3-26 Printing Preferences screen**

- 8.) Click **OK** and return to the Connectivity screen.

3-7-1-5 Sony UP-D25MD Color Video Printer



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

**NOTE:** After physical connection of the printer to the Vivid q N system, to configure the appropriate hot keys to activate printing direct from the control panel, follow the instructions in ["Configuring Hot Keys to Activate Printing Direct from the Control Panel"](#) on page 3-22.



Figure 3-27 Digital Color Printer

The Digital Color Printer connection in the different scenarios is explained below.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The Digital Color Printer can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

When connecting the Digital Color Printer directly to the system, it is necessary to use an additional power source. **As a safety precaution, this must be done via an isolation transformer.**

The Digital Color Printer can be connected once the system is powered ON, or after shutdown. All software drivers for the Digital Color Printer are pre-configured and installed designated to be used with the specific Digital Color Printer supplied by GE.



**WARNING** **Do not attempt to use a different type of Color Printer (brand or model) other than the Color Printer provided by GE. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!**

- No SafeLock Cart - connection via USB hub

As stated above. **Safety considerations must be taken into account. The Digital Color Printer must be powered via an isolation transformer.** Either USB port may be used to communicate with the device.

- Vivid q N mounted on SafeLock Cart

The Digital Color Printer may be connected to any of the USB outlets provided on the SafeLock Cart. One must use the additional power source to activate the Digital Color Printer. However, this must be powered from the SafeLock Cart itself, via one of the isolated peripheral power outlets provided on the cart.

**NOTE:** Once the printer is connected, perform the following functionality check:

- ["Color Printer Test"](#) on page 4-24

## 3-7-2 Connecting Peripherals

 **WARNING** ***WHEN CONNECTING PRINTERS TO THE SAFELOCK CART, ONLY MULTIPLE-SOCKET OUTLETS PROVIDED WITH THE SYSTEM ARE TO BE USED FOR SUPPLYING POWER TO EQUIPMENT INTENDED TO FORM PART OF THE SYSTEM.***


**NOTE:** *All peripherals mounted on the SafeLock Cart must be firmly secured in position using the securing straps supplied with the SafeLock Cart. These straps are fastened through the metal bars located on each side of the cart and serve to hold the peripheral firmly in place.*

*For instructions on mounting the Vivid q N scanner on the SafeLock Cart, refer to "[Mounting the Vivid q N on the SafeLock Cart \(optional\)](#)" on page 3-65.*

Following the connection and removal of peripherals, perform the following functionality tests:

- "[SafeLock Cart - Grounding Continuity](#)" on page 10-22
- "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24

### 3-7-2-1 USB Global Modem

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


The USB Global Modem connection in the different scenarios is explained below.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The USB Global modem can be powered via the USB port on the Vivid q N system with no need for additional power. The modem should be connected to the *lower* USB port on the rear connectors panel.

When connecting the modem, there is no preference as to which cable to connect first. One end of the telephone cable can be connected to the wall outlet and the other side to the modem, followed by connecting one end of the USB cable to the modem and the other side to the *lower* USB port on the rear connectors panel.

All software drivers for the modem are pre-installed for the specific modem type. One must follow the i-Linq configuration procedure to complete the check-out process.

 **WARNING** ***Do not attempt to use a different type of modem either via the PC MCIA or USB ports. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!***

- No SafeLock Cart - connection via USB hub

This is not an approved configuration and, in most cases, will not work and will cause software complications.

- Vivid q N mounted on SafeLock Cart

This is not an approved configuration and, in most cases, will not work and will cause software complications.

---

3-7-2-2 Wireless USB Network Adaptor


 **CAUTION** For network security reasons, when configuring the wireless USB network adaptor on the Vivid q N system, do not use the USB ports on the SafeLock cart.

 **CAUTION** For network security reasons, both USB ports on the Vivid q N system must be configured separately when installing the wireless USB network adaptor.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The installation procedure requires connecting the DVD-CD drive. The procedure includes installing the Compact Wireless-G USB Adaptor software and then the configuration procedure, which is performed via the Windows Network Connections support screens.

For procedure instructions, see "[Wireless USB Network Configuration](#)" on page 3-90.

 **WARNING** *Do not use any other type of wireless adaptor other than the LinkSys WSUB54GC WLAN card. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

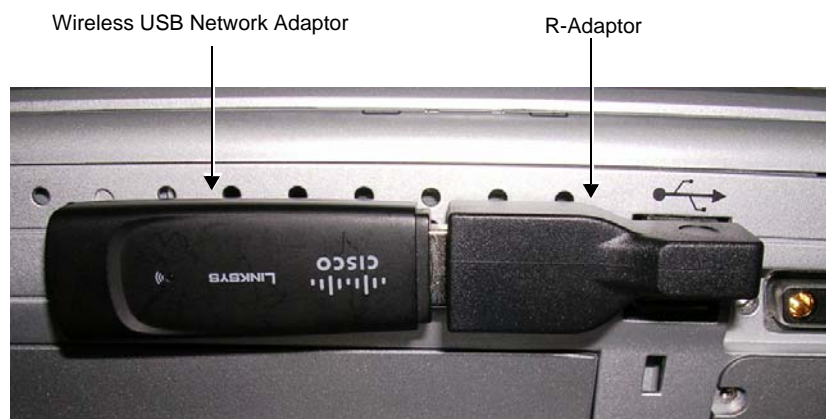


Figure 3-28 Wireless USB Network Adaptor Connected to Rear of Vivid q N Scanner

### 3-7-2-3 DVD/CD-RW Drive

**NOTE:** The procedures in Section 3-7-2-3-1 and 3-7-2-3-2 describe replacement of the Samsung DVD/CD-RW drive (Model SE-TO84M/RSBN).

**NOTE:** .If replacing a new-type Samsung DVD/CD-RW drive (Model SE-TO84M/RSBN) with a new one of the same model, prior to the procedure it is necessary to order the DVD Kit (P/N S2423870 - Table 3-1). Depending on the condition of the existing cables, it also may be necessary to order the Samsung Cable Kit (S2423956) - see Table 3-2.

**NOTE:** If replacing only cables, it is only necessary to order the Samsung Cable Kit (S2423956) - see Table 3-2.

The Samsung DVD SE-TO84M/RSBN Kit (P/N S2423870) includes the following:


**Table 3-1 Samsung DVD SE-TO84M/RSBN Kit (P/N S2423870)**


Part No	Part Description
RS2423870	Samsung DVD SE-TO84M/RSBN
R2423877	DVD Patch CD
2418071INS	Pocket DVD with USB Installation Guide


The Samsung cable kit for DVD SE-TO84M/RSBN (P/N **S2423956**) includes the following:

**Table 3-2 Samsung Cable Kit (S2423956)**

Part No	Country
RS2423951	2 Port USB cable Vivid <i>q</i> N SafeLock Cart
R2423953	5V Medical Grade AC Adaptor
R24123781	DVD to Distribution USB Cable

 **NOTICE** IMPORTANT - the following steps must be performed **in the order stated**.  
(If the USB cable is connected first while power to the Vivid *q* N is ON, the drive will not be recognized. In this event, it will be necessary to re-boot the system).

 **CAUTION** Do not disrupt power to the Samsung DVD-R/RW drive from its AC/DC adapter while the USB cable is connected to the Vivid *q* N system.  
In this event, the system will stop recognizing the CD/DVD drive or any other device connected to this USB port. A complete system re-boot will then be required to make the USB port operational again.

 **NOTICE** IMPORTANT: Use only CD-R, DVD-R or DVD+R media from a reputable vendor and only high-grade media types.





**NOTICE** IMPORTANT - Always follow the safety instructions provided with the Samsung DVD-R/RW drive and supplied by the manufacturer.

The Samsung DVD-R/RW drive, which is designed to operate with the Vivid q N system using the USB port, combines the functions of a DVD or CD recorder, and a DVD or CD player.

This DVD device may be used on the Vivid q N system for the following purposes:

- To format and label each media before use
- To *export* Exams from the Vivid q N system to media
- To *import* Exams from media to the Vivid q N system
- To perform the Database Backup procedure - in order to store back-up copies of patient Exams (data Archive) and also to create free space on the local hard disk.
- To export Exams in MPEGVue mode, whereby the media can be viewed on any external PC
- To load or upgrade system software, and for the use of GE Healthcare Field Engineers when performing various other functions.

**NOTE:** *For more details, refer to the latest version of the Vivid q N User Manual. Refer in particular to the Archive chapter.*

### 3-7-2-3-1 Samsung DVD/CD-RW Drive Replacement on Vivid q N Systems without SafeLock Cart

**NOTE:** This procedure relates to DVD/CD-RW Drive Samsung Model SE-TO84M/RSBN.

#### Removal Procedure

- 1.) To remove the Samsung DVD/CD-RW drive (Model SE-TO84M/RSBN):
  - a.) Disconnect the USB cable that connects the Vivid q N rear panel to the Samsung DVD/CD-RW drive rear panel.
  - b.) Disconnect the 5V power supply output cable from the power port on the Samsung DVD-RW drive rear panel.
- 2.) Remove the Samsung DVD/CD-RW drive from the system.

#### Installation Procedure

- 1.) Unpack the contents of the Samsung Cable Kit (P/N S2423956).
- 2.) Connect the mini USB connector (Figure 3-29) into the mini USB port located at the rear of the replacement Samsung DVD/CD-RW Drive (Figure 3-30).

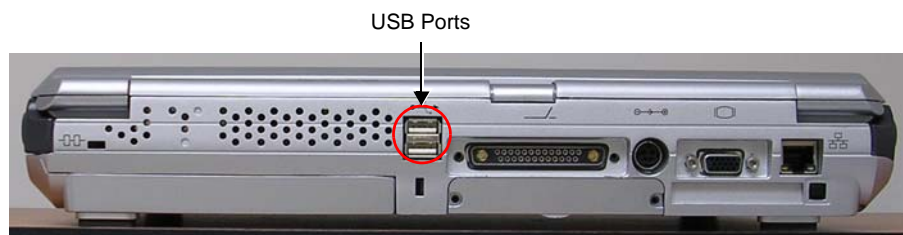


**Figure 3-29 Vivid q N Power Supply with Two USB Connectors**



**Figure 3-30 Mini USB Port on Samsung DVD/CD-RW Drive**

- 3.) Connect the other end of the USB cable to the Vivid q N USB port at the rear of the Vivid q N - see [Figure 3-31](#).



**Figure 3-31 USB Ports Located at Rear of the Vivid q N**

- 4.) Plug the power supply into the mains power supply.
- 5.) Insert the DVD Patch CD R2423877 into the DVD/CD-RW Drive and follow the on-screen instructions to load the software patch.
- 6.) When done, remove the CD from the drive.
- 7.) Perform the following tests:
  - a.) Insert a CD-R disk in the DVD/CD-RW Drive.
  - b.) Eject and remove the CD-R disk to check the eject mechanism functions properly.

**NOTE:** *In the event that problems are experienced when exporting to DVD media, the error message "Failed to finalize media" is displayed. It is therefore recommended to use the Medical Grade 5V Power Supply for DVD Samsung Universal (P/N 2421169) and connect it to the peripheral outlet on the SafeLock Cart, as shown in [Figure 3-32](#).*



**Figure 3-32 Samsung DVD/CD-RW Drive Connected through 5V Power Supply**

### 3-7-2-3-2 DVD/CD-RW Drive Replacement on Vivid q N Systems with SafeLock Cart

**NOTE:** This procedure relates to DVD/CD-RW Drive Samsung Model SE-T084M/RSBN.

---

#### **Removal Procedure**

- 1.) Turn OFF the power to the Vivid q N scanner and switch off the circuit breaker.
- 2.) Disconnect the power from the SafeLock Cart and from the Vivid q N scanner.
- 3.) Disconnect the USB cable from the USB hub located on the SafeLock Cart main column.
- 4.) Disconnect both ends of the 5V power outlet (one end from the SafeLock Cart main column power and the other from the Samsung DVD-R/RW drive rear panel).
- 5.) Release the locking arm (retaining clamp lever) located beneath the specially-designed shelf (DVD-R/RW drive compartment) beneath the upper shelf of the SafeLock Cart (see [Figure 3-33](#)).
- 6.) Slide the Samsung DVD-R/RW drive out of the compartment and remove it from the SafeLock Cart.

---

#### **Installation Procedure**

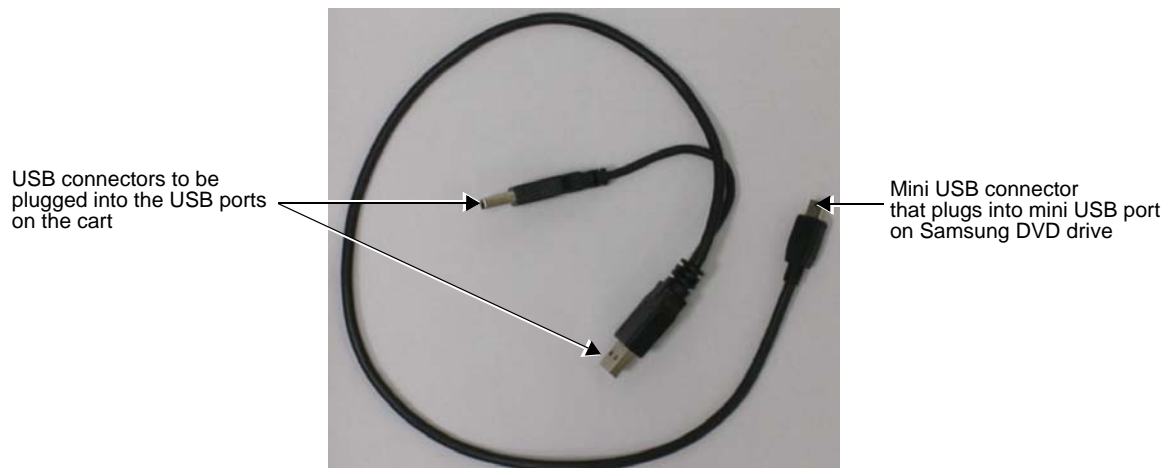
- 1.) Slide the replacement Samsung DVD-R/RW drive into the DVD-R/RW drive compartment located beneath the upper shelf of the SafeLock Cart.
- 2.) Secure it in position by closing the retaining clamp lever - see [Figure 3-33](#).



Retaining Clamp Lever

**Figure 3-33 Retaining Clamp for DVD-R/RW Drive**

- 3.) Using the USB cable for the Samsung DVD-R/RW (see [Figure 3-34](#)), plug the mini USB connector into the mini USB port located at the rear of the Samsung DVD/CD-RW Drive - see [Figure 3-35](#).

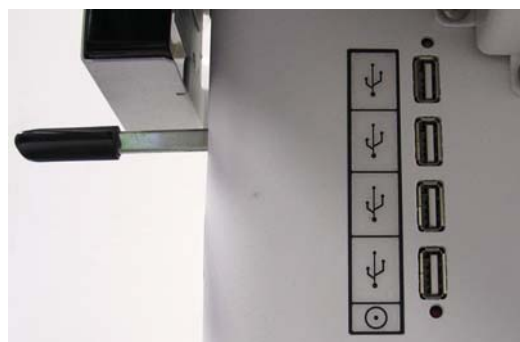


**Figure 3-34 Cable for Installation on Vivid q N Cart**



**Figure 3-35 USB Cable Plugged Into the DVD/CD Drive and the Cart's USB Connectors**

- 4.) Plug the USB connectors into the USB ports located below the upper shelf of the SafeLock Cart - see [Figure 3-35](#) and [Figure 3-36](#).



**Figure 3-36 USB ports Located Below the Support Tray of the Vivid q N Cart**

- 5.) Connect the USB cable located on the SafeLock Cart main column, into the USB port located at the rear of the Vivid q N system ([Figure 3-31 on page 3-39](#)).
- 6.) Re-connect power to the SafeLock Cart and to the Vivid q N system.
- 7.) Switch on the circuit breaker and turn ON power to the Vivid q N system.
- 8.) Perform the following test:
  - a.) Insert a CD-R disk in the DVD/CD-RW Drive.
  - b.) Eject and remove the CD-R disk to check the eject mechanism functions properly.

---

3-7-2-4 MOD Drive



**NOTICE IMPORTANT**

Do not connect the MOD Drive to the Vivid q N system while scanning is in progress!



**NOTICE IMPORTANT**

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



**Figure 3-38 MOD Drive**

The MOD drive connection in the different scenarios is explained below.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The MOD Drive can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel. This connection must be via a USB-to-SCSI adaptor; one side of the adaptor being connected to the Vivid q N USB port, and the other side to the rear of the MOD drive.

When connecting the MOD drive directly to the system, it is necessary to use an additional power source. **As a safety precaution, this must be done via an isolation transformer.**

The MOD Drive may be connected once the system is powered ON, or after shutdown. All software drivers for the MOD Drive are pre-configured and installed designated to be used with the specific MOD drive supplied by GE.



**WARNING** *Do not attempt to use a different type of mass storage device other than the MOD Drive supplied with the system. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

- **No SafeLock Cart - connection via USB hub**


As stated above. **Safety considerations must be taken into account. The MOD Drive must be powered via an isolation transformer.** Either USB port may be used to communicate with the MOD device.




- Vivid q N mounted on SafeLock Cart

The MOD device can be connected to any of the USB outlets provided on the SafeLock Cart. One must use the additional power source to activate the MOD Drive. However, this must be powered from the SafeLock Cart itself, via one of the isolated peripheral power outlets provided on the cart.

### 3-7-2-5 External USB Hard Disk

 **NOTICE IMPORTANT** *Do not connect the External USB Hard Disk to the Vivid q N system while scanning is in progress! This will avoid the risk of causing image artifacts.*


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



**Figure 3-39 External USB Hard Disk**

The External USB Hard Disk can be connected to any of the USB ports on the SafeLock Cart.

One must use the additional power source (supplied with the External USB Hard Disk) to activate the External USB Hard Disk.

 **WARNING** *Do not attempt to use a different type of mass storage device other than the External USB Hard Disk supplied with the system. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

Refer to the *External USB Hard Disk Installation Procedure* section, page 8-136 for instructions on initial configuration and connecting the External USB Hard Disk to the Vivid q N portable ultrasound scanner.



### 3-7-2-6 USB Memory Stick



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

The USB Memory Stick (disk-on-key) connection in the different scenarios is explained below.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The USB Memory Stick may be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

The USB Memory Stick can be connected once the system is powered ON, or after shutdown. All software drivers for the USB Memory Stick are pre-installed on the system. The system is capable of detecting and working with other types of memory sticks. However, it is highly recommended to use the memory stick that is provided and approved by GE. Other memory sticks may be sensitive to EMC interference - this may affect system performance and/or image quality.

- **No SafeLock Cart - connection via USB hub**

As above. If applicable, the USB hub must be powered via the isolation transformer.

- **Vivid q N mounted on SafeLock Cart**

As above.

### 3-7-2-7 Footswitch



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



**Figure 3-40 Footswitch**

The Footswitch (USB) connection in the different scenarios is explained below.

- **No SafeLock Cart - connection directly to the Vivid q N system**

The Footswitch may be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

The Footswitch can be connected once the system is powered ON, or after shutdown. All software drivers for the Footswitch are pre-installed on the system.

- **No SafeLock Cart - connection via USB hub**

As above. If applicable, the USB hub must be powered via the isolation transformer.

- Vivid q N mounted on SafeLock Cart

As above.

**NOTE:** After connecting the Footswitch to the system, define the required functionality settings, as follows:

- 1.) Press **Config** to access the Configuration screen.
- 2.) Select **Imaging**, then activate the **Application** tab - see [Figure 3-41](#).

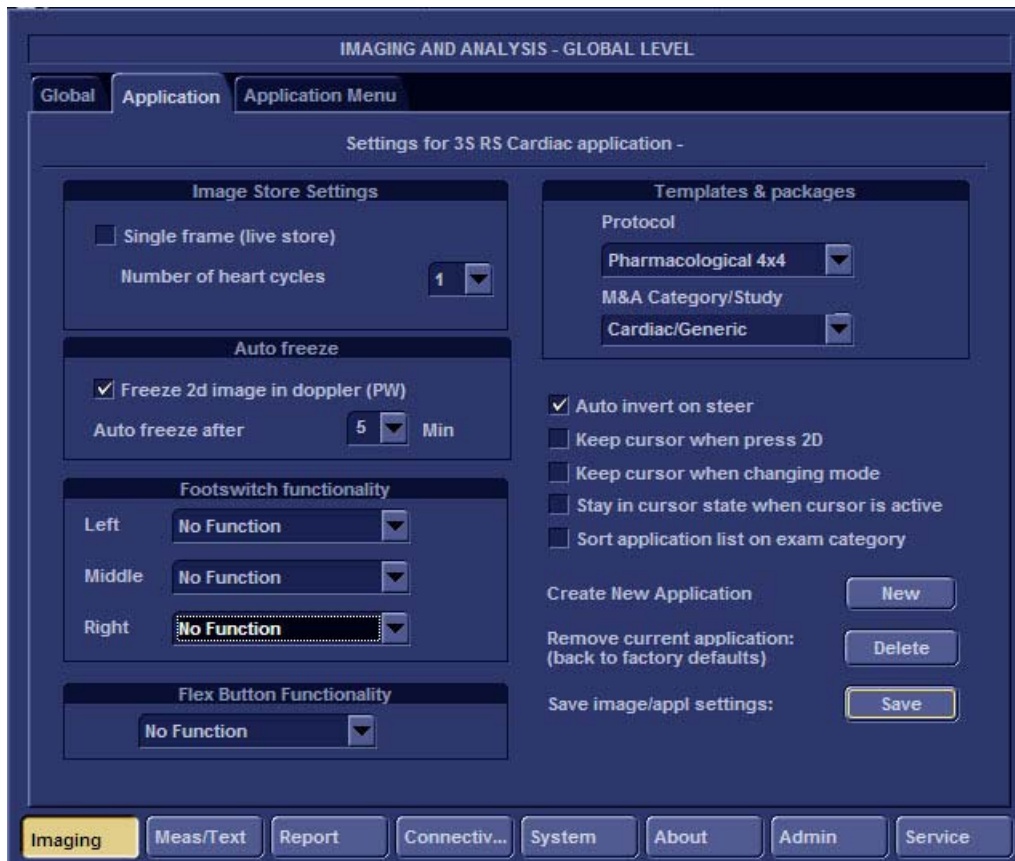


Figure 3-41 Application Tab

- 3.) Using the **Footswitch Functionality** drop-down menus, select the required functionality for the **Left**, **Middle** and/or **Right** Footswitch - see the example in [Figure 3-42](#).

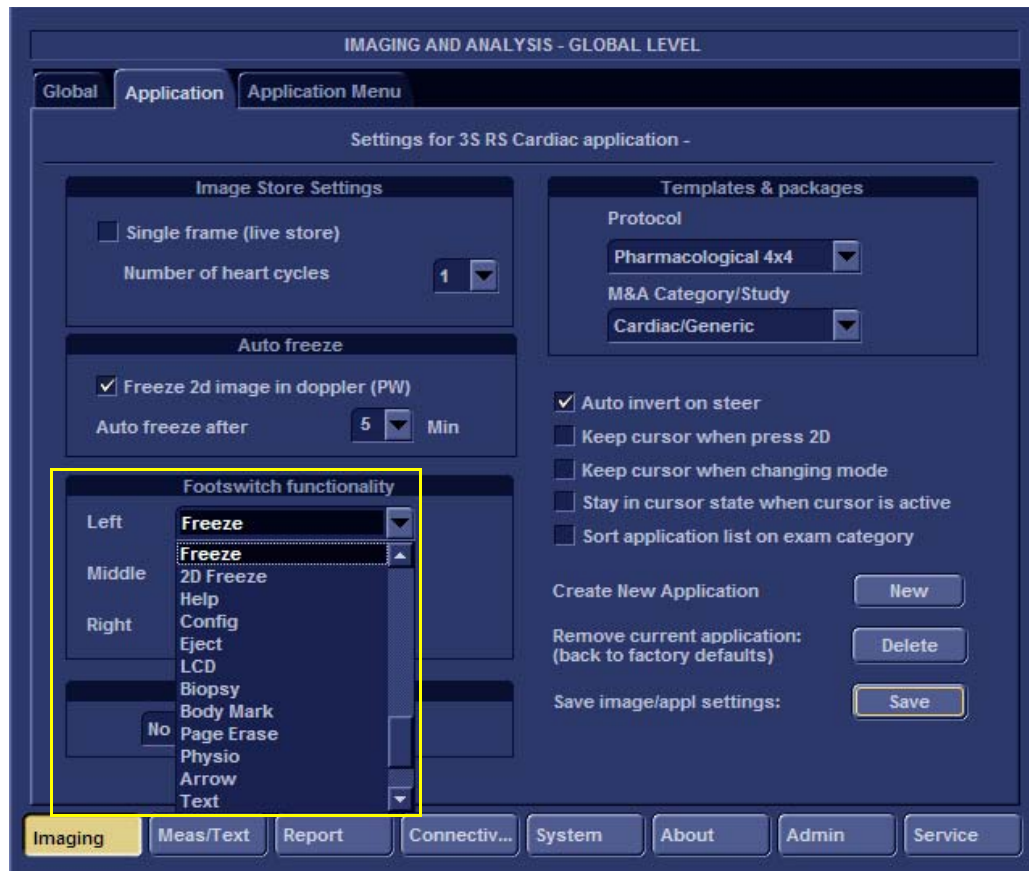


Figure 3-42 Footswitch Functionality Settings

### 3-7-2-8 Connecting the VCR



**Figure 3-43 Video Cassette Recorder**

There are two types of VCR - PAL or NTSC approved by GE Medical Systems. The VCR connection in the different scenarios is explained below.

- **Direct Connection to the Vivid q N System**

A Mitsubishi VCR is used in this configuration - use the type that is suited to your region. The video signal is received through a VGA-to-video converter.

- 1) Connect one end of the VGA cable to the VCR OUTPUT located on the Vivid q N rear connector panel (see note below).

**NOTE:** When performing [step 1](#), it may be necessary to use the VGA adaptor (P/N 2420728 - see [Figure 3-44](#)) to connect the end of the VGA cable to the Vivid q N rear connector panel. Since some VGA plugs have thicker housing, they do not fit properly into the Vivid q N VGA connector socket on the rear panel (because the plug is not centrally aligned within the frame). In this event, use of the VGA adaptor will eliminate the possibility of causing damage to the BEP by the use of unnecessary force.



**Figure 3-44 VGA Adaptor**

- 2) Connect the other end of the VGA cable to the VGA INPUT on the video converter - see [Figure 3-45](#).

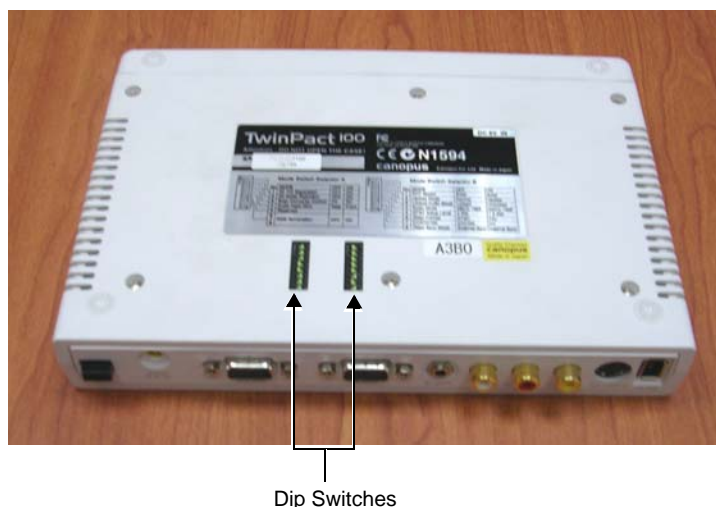


**Figure 3-45 Video Converter**

- 3.) Connect one end of the S-Video cable to the S-Video OUTPUT on the video converter.

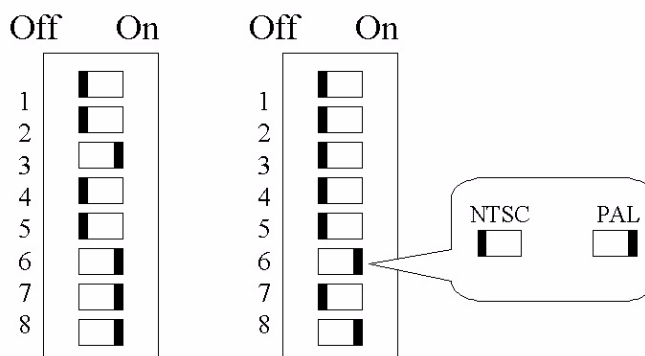
- 4.) Connect the other end of the S-Video cable to the VCR S-Video INPUT at the rear of the VCR.

**NOTE:** Dip switches are located beneath the video converter, as shown in [Figure 3-46](#) below.



**Figure 3-46 Video Converter Dip Switches**

- 5.) Follow the manufacturer's guidelines to set the switches to the correct positions, as shown in [Figure 3-47](#).



**Figure 3-47 Video Converter Dip Switch Positions**

- 6.) When all power and signal cables are connected to the system, VCR, and video converter, proceed as follows (**in the order stated**):
- Press the power ON switch on the VCR.
  - Press the power ON switch on the video converter.
  - Turn ON power to the Vivid q N system.
- 7.) Press the **Input Select** button (see [Figure 3-45 on page 3-48](#)) on the video converter *three* times in order to select VGA Input as your signal source.

The LED located on the video converter front panel will be illuminated, accordingly.

- 8.) Press on the three buttons <CTRL> <ALT> <Page Erase> simultaneously.  
The following screen will appear.

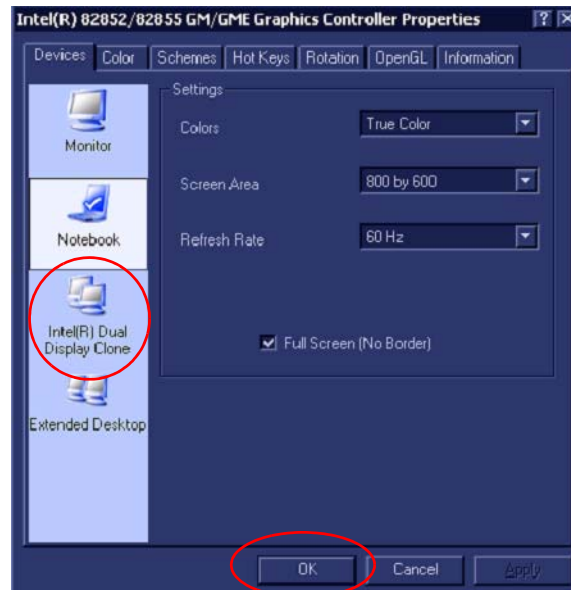


Figure 3-48 Intel® Dual Display Clone

- 9.) Select the **Intel® Dual Display Clone** icon and press **OK** - see [Figure 3-48](#)

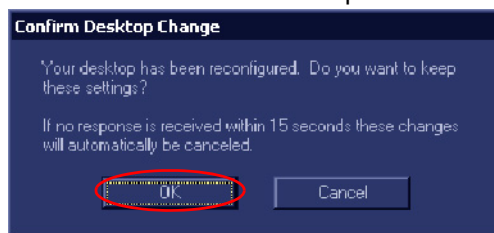
**NOTE:** If the VGA cable is not properly connected to the rear panel, or in the event that the scan-converter device is not switched ON, you may see a single icon displayed, as shown in [Figure 3-49](#).



Figure 3-49 Single Icon

10.) Confirm Desktop Change by clicking **OK**.

The dialog box will be closed and the VGA output will become activated, see [Figure 3-50](#)



**Figure 3-50 Confirm Desktop Change**

**NOTE:** When the VGA cable is disconnected and reconnected while the system is ON, the VGA output is maintained.

**NOTE:** If system is shut-down to standby or Full-shut-down while the VGA device is connected continuously, the VGA output will appear after the system is turned ON

**NOTE:** If the system is shut-down to Standby or Full-shut-down and the VGA device is disconnected, the VGA output will not appear after power is turned ON, and the above procedure will have to be repeated.

- Vivid q N mounted on SafeLock Cart

A Mitsubishi VCR is used in this configuration - use the type that is suited to your region. The VCR must be powered using one of the peripheral power outlets available on the cart. The video signal is received through a VGA-to-video converter, and this must also be powered through one of the peripheral power outlets available on the cart.

It is possible to use a different type of VCR (brand and model). However, it is highly recommended to use a medical-graded VCR as this will ensure that both safety and image quality levels meet universal medical standards.

- 1) Connect one end of the VGA cable to the VGA OUTPUT located on the Vivid q N unit (refer to [Figure 3-9 on page 3-16](#)).
- 2.) Connect the other end of the VGA cable to the VGA input on the video converter.
- 3.) Connect one end of the S-Video cable to the video converter S-Video OUTPUT (refer to [Figure 3-45](#)).
- 4.) Connect the other end of the S-Video cable to the VCR S-Video INPUT at the rear of the VCR.
- 5.) Follow the manufacturer's guidelines to set the video converter dip switches to the correct positions (refer to [Figure 3-47 on page 3-49](#)).
- 6.) When all power and signal cables are connected to the system, VCR, and video converter, proceed as follows (**in the order stated**):
  - a.) Press the power ON switch on the VCR.
  - b.) Press the power ON switch on the video converter.
  - c.) Turn ON power to the Vivid q N system.
- 7.) Press the **Input Select** button (see [Figure 3-45 on page 3-48](#)) on the video converter *three* times in order to select VGA Input as your signal source.

The LED located on the video converter front panel will be illuminated, accordingly.

- 8.) Proceed to perform the "[VCR Test](#)" on [page 4-24](#).



3-7-2-9 Connecting the VGA Splitter



Figure 3-51 VGA Splitter



Figure 3-52 Cables and Bracket for Wall Mounting



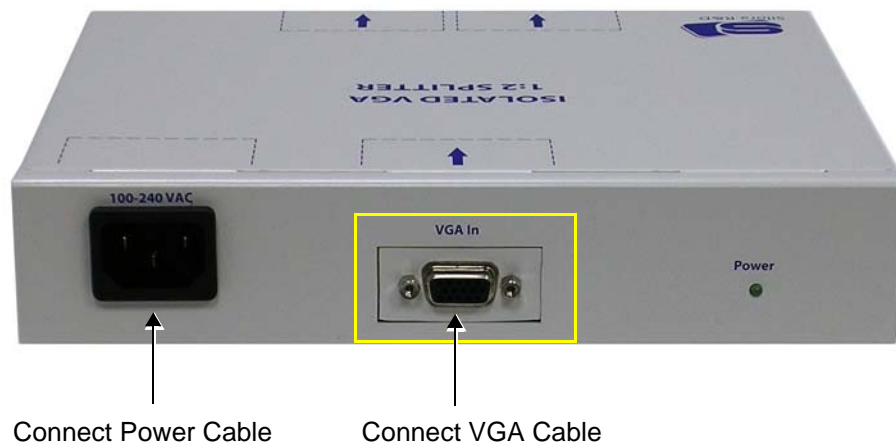
**NOTE:** *Installation of Carto3 and the required VGA splitter (to connect to the Vivid q N) shall be done by the BWI field engineer according to the BWI manuals and instructions.*

**WARNING** To avoid possible electrical shock to user or patient, the Vivid q N should be connected to the Carto3 only by using the Isolated VGA Splitter.

**NOTE:** *Vivid q N-to-Carto3 VGA Cable Installation:  
A GE Field Service Engineer must be present when connecting the VGA cable (top right in Figure 3-52) between the Vivid q N system and the GE Video Splitter/Isolation box.*

- 1.) Connect the VGA cable (Figure 3-52) to the VGA input port at the rear of the VGA splitter (see Figure 3-53 and Figure 3-54).

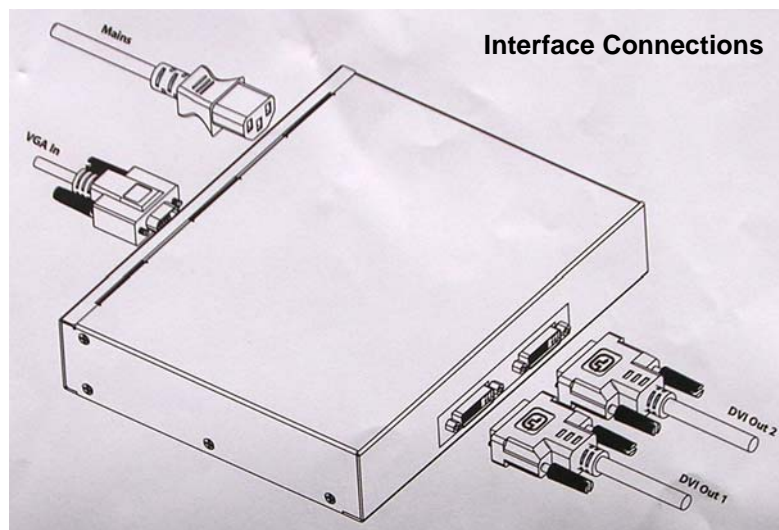
Connect the other end of the cable into the Vivid q N system's VGA output port.



**Figure 3-53 VGA Splitter - Rear View**

- 2.) Plug the VGA Splitter power cable (Figure 3-52) into the power socket on the rear of the VGA Splitter (see Figure 3-53 and Figure 3-54).

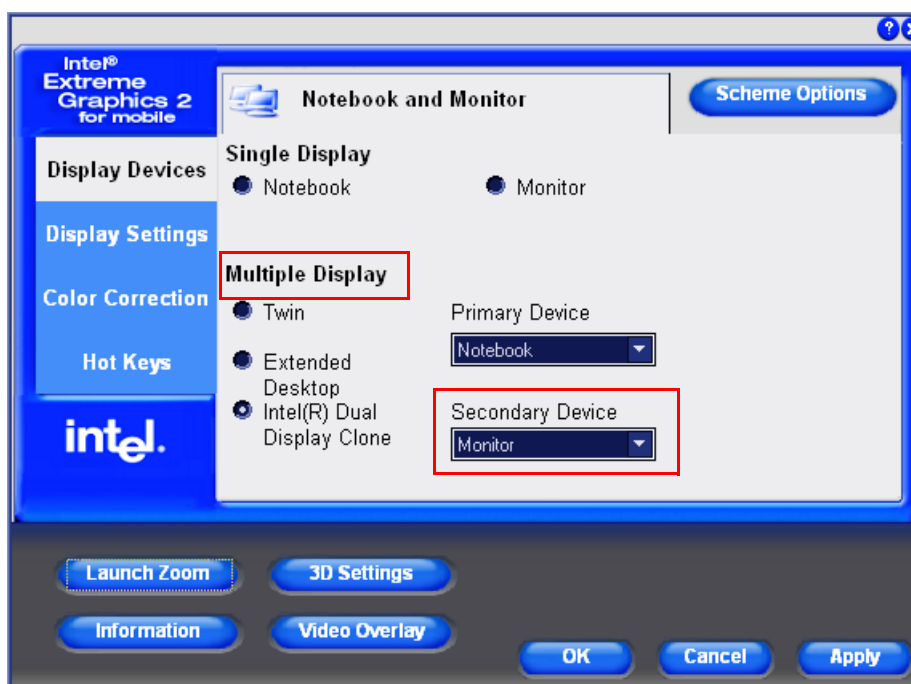
Plug the other end of the power cable into the mains power wall outlet.



**Figure 3-54 Connections to VGA Splitter**

- 3.) Connect the necessary DVI cables (Figure 3-52) to the VGA Splitter DVI output ports (as required for further connection to other DVI devices). Refer to Figure 3-54, above.
- 4.) When connecting the DVI output cable to an external monitor, press **V-Out** on the Vivid q N system console.

The screen shown in Figure 3-55 is displayed:



**Figure 3-55 Selecting Dual Screen Display Option**

- 5.) Under **Multiple Display**, activate the **Intel(R) Dual Display Clone** radio button.  
**Monitor** is now selected as the Secondary Device, as shown in Figure 3-55.

### 3-7-3 Charging the Battery

**NOTE:** *The CH5000GE is a stand-alone desktop smart-battery charger with the added ability to recalibrate the fuel gauge when detected to be out of calibration. The charger is specifically designed to operate with the Vivid q N smart-battery (P/N 2378963-2).*

The charger is supplied in a carton containing the following items:

- CH5000 desktop charger/calibrator
- 24V 2.5A AC-adaptor power supply, universal mains input
- Instruction Manual

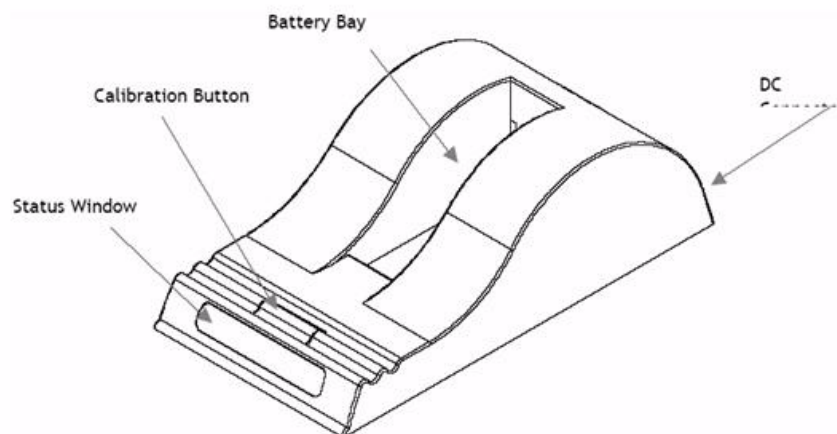


**CAUTION** Always observe the following safety precautions:

- Do not expose the charger or power supply to water or conductive liquids (this is not a sealed case).
- Do not open the charger or power supply case. There are no user-serviceable parts inside.
- Do not cover the fan exhaust or obstruct the airflow, as this will cause overheating.
- Use only the manufacturer's 24V 2.5A power supply.
- Place the charger in a cool location, away from external heat sources.
- During recalibration, the battery connector and base of the charger may become warm.

#### 3-7-3-1 Setting up the Charger

- 1) Place the charger unit on a flat, level surface away from sources of heat and moisture.
- 2) Plug the DC connector from the power supply into the back of the charger.









**Figure 3-56 Battery Charger Unit**

- 3.) Connect the power supply to the mains AC supply, using the cable supplied.

### 3-7-3-2 Charging the Battery

- 1) Place the battery into the battery bay making sure that the 5-way connector is fully seated.

The LEDs in the status window (see [Figure 3-56](#)) will provide status information as detailed in [Table 3-3](#) below, and the charger will automatically begin to charge the battery.

LED Indicator		Status
	Green Flashing	Battery charging
	Green Solid	Battery fully charged
	Blue flashing	Battery in Calibration mode
	Blue Solid	Battery fuel gauge calibrated
	Red Flashing	Battery fuel gauge in need of recalibration
	Red Solid	Error

**Table 3-3 Battery Charger LED Indicators and Status**

- **Recharge Time:**

The time for a full charge from 0% to 100% state of charge is typically 4.5 hours.

- **Recalibration Time**

The recalibration cycle begins by discharging away any residual capacity. Then a calibration charge is delivered to the battery. This is followed by a calibration discharge. Finally the battery is given a regular charge. A calibration cycle will be faster if the battery is fully discharged to begin with.

The recalibration time is approximately 9 hours for an empty battery, and approximately 14 hours for a fully-charged battery.

**NOTE:** *Calibration is initiated each time the button is pressed, so it is not recommended to press the recalibration button part way through the recalibration cycle.*

During the charging procedure, the green LED will be seen flashing.

At the end of this procedure, when the battery is fully charged, the solid green LED will be illuminated in the status window, indicating a fully charged battery.

- 2.) Remove the battery from the charger unit battery bay and install it in the Vivid q N portable ultrasound scanner.

---

### 3-7-3-3 Battery Recalibration

**NOTE:** *For more details on recalibration and an explanation of why it is necessary, refer to [Recalibration](#) on page 5 - 82.*

If the battery is in need of “fuel gauge” recalibration, the red LED will flash upon insertion of the battery. This indicator provides feedback to the user on the accuracy of the fuel gauge and avoids unnecessary battery calibration cycles.

The user has the option to calibrate the fuel gauge and charge the battery, or to only charge the battery. This option is given because a recalibration cycle is longer than a charge cycle.

- 1) To recalibrate the battery, press the calibrate button on the front of the battery charger unit.

No action is required if only a recharge is required, as the charger will automatically begin to charge the battery.

The blue calibration LED will flash to indicate that the battery is undergoing the recalibration cycle.

There may be a short delay before the calibration begins. During calibration the discharge resistors will heat up and the fan will operate to maintain temperature within acceptable limits.

At the end of this procedure, when the battery is fully charged and the battery fuel gauge is calibrated, the solid green and blue LEDs will be illuminated in the status window, indicating a fully charged, fully calibrated battery.

- 2.) Remove the battery from the charger unit battery bay and install it in the Vivid q N portable ultrasound scanner.

**NOTE:** *The most common cause of calibration failure is overheating of the pack during discharge. For this reason, keep the charger away from direct sunlight or heat sources.*


### 3-7-4 Connecting Probes

The Vivid q N ultrasound unit operates with various types of probes that are used for scanning patients, including flat phased, convex and linear electronic array probes. Once connected, the probes can be selected for different applications.

Probe connectors on the Vivid q N unit are as follows:

- Two active probe connectors (one for a pencil probe) on the *right* side of the unit

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.

- 1) Place the probe's carrying case on a stable surface and open the case.
- 2) Inspect the probe socket to verify that it is free of debris.
- 3) Carefully remove the probe and unwrap the probe cord.  
***DO NOT allow the probe head to hang freely. Impact to the probe head could result in irreparable damage.***
- 4) Press the probe connector locking lever *downwards* (refer to [Figure 3-57](#)).



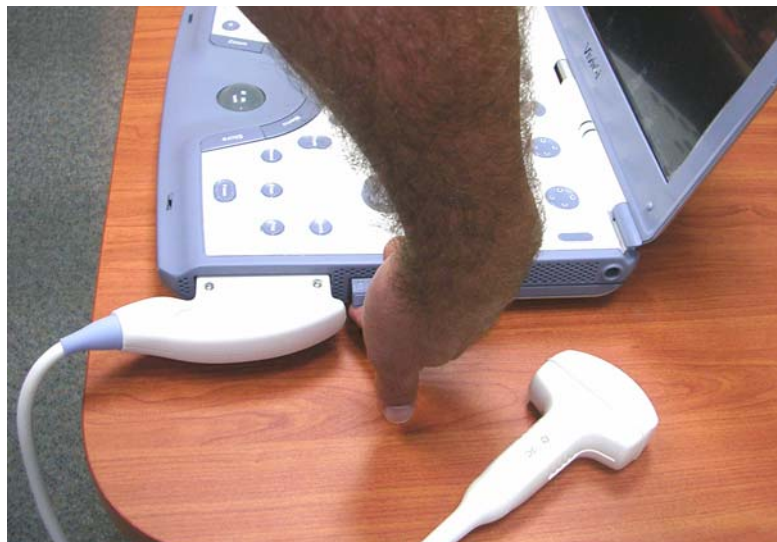
Figure 3-57 Probe Connection Locking Lever

- 5) Align the connector with the probe port and carefully push into place, as shown in [Figure 3-58](#).



**Figure 3-58 Connecting Probe to the Vivid q N**

- 6) Press the connector locking lever *upwards* to the full vertical position to lock in place, as shown in [Figure 3-59](#).



**Figure 3-59 Securing Probe with Locking Lever**

- 7) Carefully position the probe cord so that it is free to move and is not resting on the floor.  
When the probe is connected, it is automatically activated.



**CAUTION Do not bend the probe cable acutely.**

*Fault conditions can result in electric shock hazard. Do not touch the surface of probe connectors which are exposed when the probe is removed. Do not touch the patient when connecting or disconnecting a probe.*

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

**3-7-4-1 Available Probes**

For a list of the available probes, please see: [Section 9-7 "Probes" on page 9-8.](#)



### 3-7-5 Connecting the ECG

**NOTE:** *The ECG may be connected to the system at any time, whether the system is powered ON or OFF.*

- To connect the internal ECG carefully push the end of the cable connector into the ECG connector port (circular-shaped socket on the left side of the system beside the probe connectors), as shown in [Figure 3-60 below](#).



**Figure 3-60 ECG Cables Connected to the ECG Connector Port**




**CAUTION** When disconnecting the ECG Cable from the Vivid q N, **do not pull on the cable directly**. Carefully remove the cable by holding the outer sleeve (closest to the system) while releasing the cable.

The same connector is used both for external and internal ECG. The appropriate ECG cable kit should be ordered when external ECG is to be used.

See also information on Ext-ECG Module Connector provided in ["ECG Module" on page 5-39](#).

**NOTE:** *For optimal ECG operation, use only electrodes that meet universal standards - see [Table 3-4](#).*

**Table 3-4 ECG Cable**


Description	Part No.
Full ECG Cable Kit - IEC (Europe, Asia, ROW)	2418832-2
Yellow lead (L)	
Red lead (R)	
Black lead (N)	

Use of the External Respiratory option is enabled by removal of the ECG Board and installation of the Internal ECG/Respiratory Board. For instructions, refer to the ["ECG/Respiratory Module Assembly Installation Procedure" on page 8-18](#).

**NOTE:** *An External ECG (Respiratory) cable should be available. This is provided by GE (Part # 2413451 - see [Section 9-5 "Cables" on page 9-6](#)). Alternatively, the adaptor supplied with the GE cable may be used to adapt an existing cable - refer to the optional connections for the External Respiratory interface illustrated in [Figure 5-34 on page 5-43](#).*



### 3-7-6 Connecting the Unit to a Power Source

The connection of the Vivid q N ultrasound unit to a power source should be performed by a qualified person who has completed basic Vivid q N System User Training. Use only the power cords, cables and plugs provided by or designated by GE to connect the unit to the power source.

 **CAUTION** Verify compliance with all electrical and safety requirements and check the power cord to verify that it is intact and of hospital-grade before connecting the unit to the power source. Products equipped with a power source (wall outlet) plug should be connected to the fixed power socket that has a protective grounding conductor. Never use an adapter or converter to connect with a power source plug (for example, a three-prong to two-prong converter).

 **DANGER**  **FAILURE TO PROVIDE AN ADEQUATE EARTH CIRCUIT (GROUND) MAY CAUSE ELECTRICAL SHOCK AND SERIOUS INJURY!**

#### 3-7-6-1 Connecting the Ultrasound Unit to the Electrical Outlet

 **DANGER**  **TO AVOID THE RISK OF FIRE, POWER TO THE SYSTEM MUST BE SUPPLIED FROM A PROPERLY RATED OUTLET. IT IS RECOMMENDED TO USE A DEDICATED POWER OUTLET. The power plug should not, under any circumstances, be altered to a configuration rated less than that specified for the current. DO NOT use an extension cord or adaptor plug. Refer to [2-2-5 "Electrical Requirements"](#) on page 2-3 for more details.**

**NOTE:** *It is recommended to connect the AC-DC converter to the ultrasound unit first, before connecting it to the AC wall outlet.*

- 1.) Connect the AC-DC converter to the ultrasound unit.
- 2.) Connect the AC-DC converter to the wall outlet.

---

**3-7-6-2      Disconnecting the Ultrasound Unit from the Electrical Outlet**




**CAUTION** Make sure the system is powered OFF or in standby mode before disconnecting the Vivid q N unit from the electrical outlet and proceed as described in the steps below.

- 1) Power down the unit.
- 2) Unplug the mains power cable connector from the AC input socket on the SafeLock Cart or the AC-DC converter of the system.
- 3) Unplug the mains power cable from the AC wall outlet socket.
- 4.) Unplug the AC/DC power connector from the Vivid q N rear panel.

## 3-7-7 Switching the System ON/OFF

### 3-7-7-1 Switching the System ON

- 1) Verify that the ultrasound unit has been connected to the power supply and that the circuit breaker is ON (if the system is being used on the SafeLock Cart), as described in the *Connecting the Ultrasound Unit to the Electrical Outlet* section, on page 3-62.

 **NOTICE** When AC power is applied to the scanner, the **On/Off** button on the control console illuminates amber, indicating the Back-end Processor is in *Standby* mode.

- 2) Hold down the **On/Off** button on the control panel for 3 seconds. The system automatically performs an initialization sequence which includes the following:
  - Loading the operating system.
  - Running a quick diagnostic check of the system.
  - Detecting connected probes.
- 3) When prompted, log in to the system as appropriate.  
(Refer to the instructions for system login and user security setup as described in the Vivid q N User Manual).

The system first enters 2D-Mode with the probe and application that were last used before the system was shut down. If the probe has been removed since the system was last used, the currently-connected probes and their available applications are displayed and selected by default.

### 3-7-7-2 Switching the System OFF

**NOTE:** *After turning OFF the system, wait at least 10 seconds before turning it on again. The system may not be able to boot-up if power is recycled too quickly.*

The system can be switched OFF in one of three ways, as follows:

- Holding down the **On/Off** button for 3-5 seconds will evoke the display of the System Exit dialog box (see [Figure 3-61](#)). From this, you can either select *Full Shutdown* (click the **Shutdown** button) or choose to place the system in *Standby Mode* (click the **Standby** button).



**Figure 3-61 System Exit Dialog Box**


- Holding down the **On/Off** button for more than 10 secs will cause the system to perform *Emergency Shutdown*. This is not recommended under normal circumstances.
- Closing the lid will place the system in *Standby Mode*.


**NOTE:** *The system will remain in Standby Mode for as long as battery power will allow.*


## Section 3-8

### Mounting the Vivid q N on the SafeLock Cart (optional)


**NOTE:** The Vivid q N portable ultrasound scanner may be mounted on the SafeLock Cart while power to the system is either ON or OFF. When mounting the unit on the cart, it may be necessary to adjust the locking mechanism, as described in 3-8-2 "Adjusting the SafeLock Cart Locking Mechanism" on page 3-68.

 **NOTICE** Only the SafeLock Cart supplied by GE and/or any medical-grade cart which has been approved as suitable for use with the system by GE should be used with the Vivid q N portable ultrasound scanner.

 **NOTICE** The Vivid q N system and the SafeLock Cart should be operated at a distance of more than 15 feet from any magnetic field.

 **NOTICE** When scanning with the Vivid q N portable ultrasound scanner mounted on the SafeLock Cart, the Vivid q N should be connected to the Cart via the USB port.

#### 3-8-1 Mounting the Vivid q N on the SafeLock Cart

 **WARNING** Before mounting the Vivid q N portable ultrasound scanner on the SafeLock Cart make sure there are no foreign objects on the main shelf surface or in front of the locking tooth.

- 1.) Working from the front of the SafeLock Cart, place the Vivid q N scanner flat down on the main shelf (towards the front) then slide it backwards between the sliding guides on either side of the shelf, as shown below.

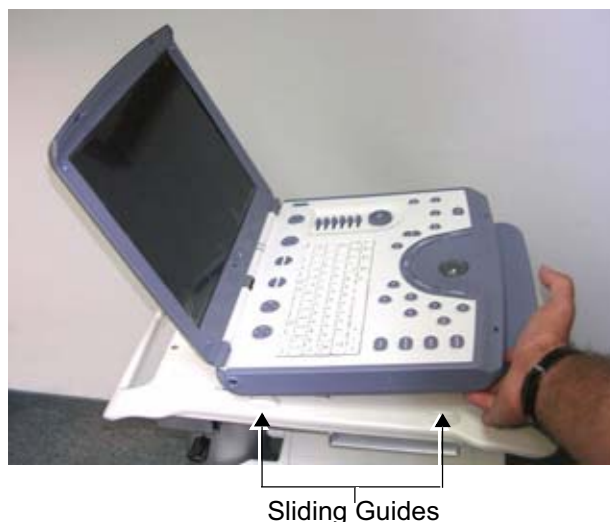


Figure 3-62 Placing the Vivid q N on the SafeLock Cart Main Shelf

### 3-8-1 Mounting the Vivid q N on the SafeLock Cart (cont'd)

- 2.) Push the scanner down and *backwards*, until it locks into place against the locking tooth. An audible click will be heard as the scanner locks into position. There will now be a gap the width of one finger between the SafeLock Cart arm rest and the front of the scanner.



Figure 3-63 Vivid q N Scanner Mounted on SafeLock Cart

- 3.) If necessary, perform the alignment procedure as described in [3-8-2 "Adjusting the SafeLock Cart Locking Mechanism" on page 3-68](#).
- 4.) Connect the LAN Cable from the cart to the LAN connector on the Vivid q N rear panel.



Figure 3-64 Vivid q N Rear Panel

- 5.) Connect the Docking Connector to the rear of the scanner, as shown below.



Figure 3-65 Connecting the Docking Connector to the Rear of Scanner

---

### 3-8-1 Mounting the Vivid q N on the SafeLock Cart (cont'd)

- 6.) Connect the USB Cable from the cart to the USB port on the Vivid q N rear panel ([Figure 3-64 "Vivid q N Rear Panel" on page 3-66](#)). (Use the lower port; the upper port is dedicated for the Bluetooth connector).
- 7.) If necessary, connect the DVD to the USB hub on the cart.



## 3-8-2 Adjusting the SafeLock Cart Locking Mechanism

**NOTE:** *The alignment procedure below is recommended in the event that when mounting the Vivid q N portable ultrasound scanner on the SafeLock Cart, the unit does not lock firmly in position when inserted into the safelocks. Alternatively, if when removing the unit from the Cart, it is difficult to disengage the safelocks.*

- 1.) Working from the left side of the SafeLock Cart, remove the DVD from the DVD/CD-RW device. Working from underneath the main shelf, loosen and remove the four screws (two each side) from the DVD/CD-RW device bracket, then remove the bracket and the device - see [Figure 3-67 on page 3-68](#).

**Note:** only two screws visible in picture

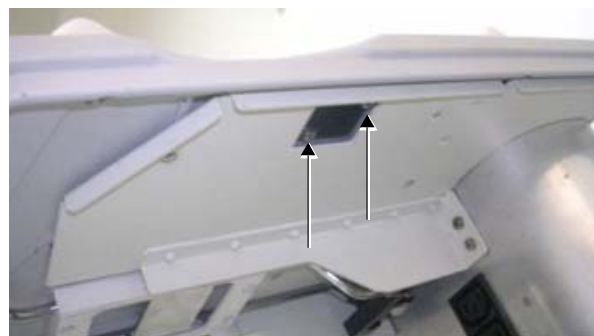


**Figure 3-66 Figure 3-85--DVD/CD Device and Bracket**

- 2.) Working from the underneath the main shelf, use a Phillips screwdriver to loosen the two screws (half turn counter-clockwise) holding the middle locking tooth in position on both the left and right sides of the main shelf, as shown below.



Middle Locking Teeth Viewed from Top of Shelf



Screws Viewed from Beneath Shelf

**Figure 3-67 Figure 3-86--Adjusting the SafeLock Cart Locking Mechanism**

- 3.) Check that the Vivid q N portable ultrasound scanner is locked correctly onto the two rear locking teeth (if not, push the scanner fully back into position until an audible click is heard).
- 4.) Carefully tighten the four screws previously loosened in [step 2](#).
- 5.) Reconfirm that the scanner is firmly locked into position and there is no excess play (movement) between the scanner and the Cart before returning the DVD/CD-RW device and bracket.



---

## Section 3-9 Configuration

### 3-9-1 Overview

[Table 3-5](#) below outlines the Vivid q N Configuration procedures described in the relevant sub-sections.

**Table 3-5 Configuration Procedures**

SUB- SECTION	DESCRIPTION	PAGE NUMBER
<a href="#">3-9-2</a>	<a href="#">Vivid q N Configuration</a>	<a href="#">3-69</a>
<a href="#">3-9-3</a>	<a href="#">Service Screen Set-up</a>	<a href="#">3-75</a>
<a href="#">3-9-4</a>	<a href="#">Configuring Peripherals</a>	<a href="#">3-81</a>
<a href="#">3-9-5</a>	<a href="#">Software Options Configuration</a>	<a href="#">3-84</a>

## 3-9-2 Vivid q N Configuration

### 3-9-2-1 Preparations

Press **CONFIG (F2)** and log on as *Adm* (see "Log On to the System as ADM" on page 4-10).

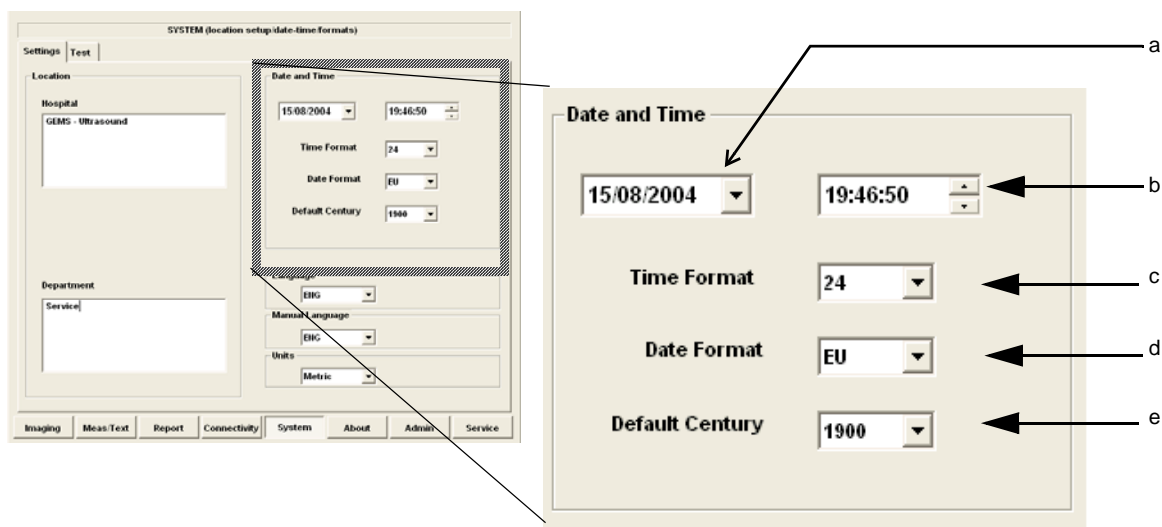
### 3-9-2-2 Enter Location

Figure 3-68 Hospital and Department Name

Table 3-6 Location Name

Step	Task	Expected Result(s)
1.	Open the Configuration Window, see <a href="#">Preparations</a> . If needed, select <b>SYSTEM</b> .	<i>The System Settings Window is displayed.</i>
2.	Select the Hospital field, see (a) in <a href="#">Figure 3-68</a> , and type the name of the hospital (max 64 characters).	The 24 first characters of this name are displayed on the scanning screen's title bar (after restart) All 64 characters are displayed on the image properties on saved images (after restart).
3.	Select the Department field, see (b) in <a href="#">Figure 3-68</a> , and type the name of the department (max 64 characters).	This name will be displayed on the image properties on saved images as soon as the unit has been restarted.

### 3-9-2-3 Date and Time Adjustments



**Figure 3-69 Date and Time Adjustments**

**NOTE:** If the date and time displayed by the system are set to the BIOS default value, it may be necessary to replace the BIOS battery - see ["BIOS Battery Replacement" on page 8-47](#).

**Table 3-7 Date and Time Adjustments**

Step	Task	Expected Result(s)
1.	Open the System (Configuration) Window, see <a href="#">Figure 3-68 on page 3-70</a> . Select <b>SYSTEM</b> , if needed.	The System Settings Window is displayed.
2.	Adjust the date, see (a) in <a href="#">Figure 3-69</a> .	New date is displayed
3.	Adjust the time, see (b) in <a href="#">Figure 3-69</a> .	New time is displayed
4.	Select the preferred Time Format, see (c) in <a href="#">Figure 3-69</a> .	<b>24:</b> the 24 hour format is used <b>12:</b> the 12 AM/PM hour format is used
5.	Select the preferred Date Format, see (d) in <a href="#">Figure 3-69</a> . DD = Date (two digits) MM = Month (two digits) YYYY = Year (four digits)	<b>EU:</b> the European "DD.MM.YYYY" format is used <b>US:</b> the American "MM.DD.YYYY" format is used
6.	Select Default Century (1900, 2000 or None), see (e) in <a href="#">Figure 3-69</a> .	<b>1900:</b> the number <b>19</b> is automatically displayed when entering the year in the patient date of birth. To edit century, press <b>BACKSPACE</b> twice. <b>2000:</b> the number <b>20</b> is automatically displayed when entering the year in the patient date of birth. To edit century, press <b>BACKSPACE</b> twice. <b>None:</b> 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.

### 3-9-2-4 Language Selection




Figure 3-70 Language Selection

Table 3-8 Language Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see <a href="#">"Log On to the System as ADM" on page 4-10</a> . Select <b>SYSTEM</b> , if needed.	<i>The System Settings Window is displayed.</i>
2.	Use the Language drop down dialog, see <a href="#">Figure 3-70</a> , to select your preferred language for the on-screen interface. The following languages are available; - ENG - English - NOR - Norwegian - DEU - German - ITA - Italian - FRA - French - ESP - Spanish - RUS - Russian (after selection, continue to <a href="#">step 3</a> ) - GRE - Greek (after selection, continue to <a href="#">step 3</a> ) - DAN - Danish - SWE - Swedish	The selected language will be used as soon as the unit has been restarted.

**Table 3-8 Language Adjustments (cont'd)**

STEP	TASK	EXPECTED RESULT(S)
3.	<p>For Russian and Greek languages only: Reboot the system and, at the Windows level, navigate to the Control Panel. Select Regional Settings.</p>	<p>The Regional and Language Options dialog box opens:</p> 
4.	<p>Under Standards and formats, in the language field, scroll down to the desired language (e.g. Russian) and click <b>OK</b>. Reboot the system.</p> <p>Note: For the Greek language, only the user interface is supported. It is not possible to input Greek from the keyboard.</p>	<p>The interface and keyboard input will be in Russian.</p>

3-9-2-5      Units of Measure

SYSTEM (location setup/date-time/formats)

SettingsTest

Location

Hospital

GEMS - Ultrasound

Department

Service

Date and Time

15/08/2004

19:46:50

Time Format

24

Date Format

EU

Default Century

1900

Language

EIIG

Manual Language

EIIG

Units

Metric

Imaging

Meas/Text

Report

Connectivity

System

About

Admin

Service

Units

Figure 3-71    Select Units of Measure

Table 3-9      Select Units of Measure

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see "Log On to the System as ADM" on page 4-10. Select <u>SYSTEM</u> , if needed.	<i>The System Settings Window is displayed.</i>
2.	Use the drop down Units dialog (see Figure 3-71) 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.
3.	Restart the scanner.	All the changed settings will be used after the restart.

### 3-9-3 Service Screen Set-up

#### 3-9-3-1 Overview

The Service Screen gives you access to:

- Select Video Format to be used by the VCR
- Select the VCR type
- Adjust LCD Display Contrast and Backlight Intensity
- Keyboard Setups
- Printer Setup
- Disable TCPIP filtering

**NOTE:** *The Disable TCPIP Filtering option should only be used for Troubleshooting procedures, after which it is recommended to return immediately to the TCPIP Filtering enabled state.*

#### 3-9-3-2 Open Service Screen

- 1.) Press **CONFIG (F2)** and log on as Adm, see ["Log On to the System as ADM" on page 4-10](#).
- 2.) Select **SERVICE** to view the Service Screen, see [Figure 3-72 below](#).

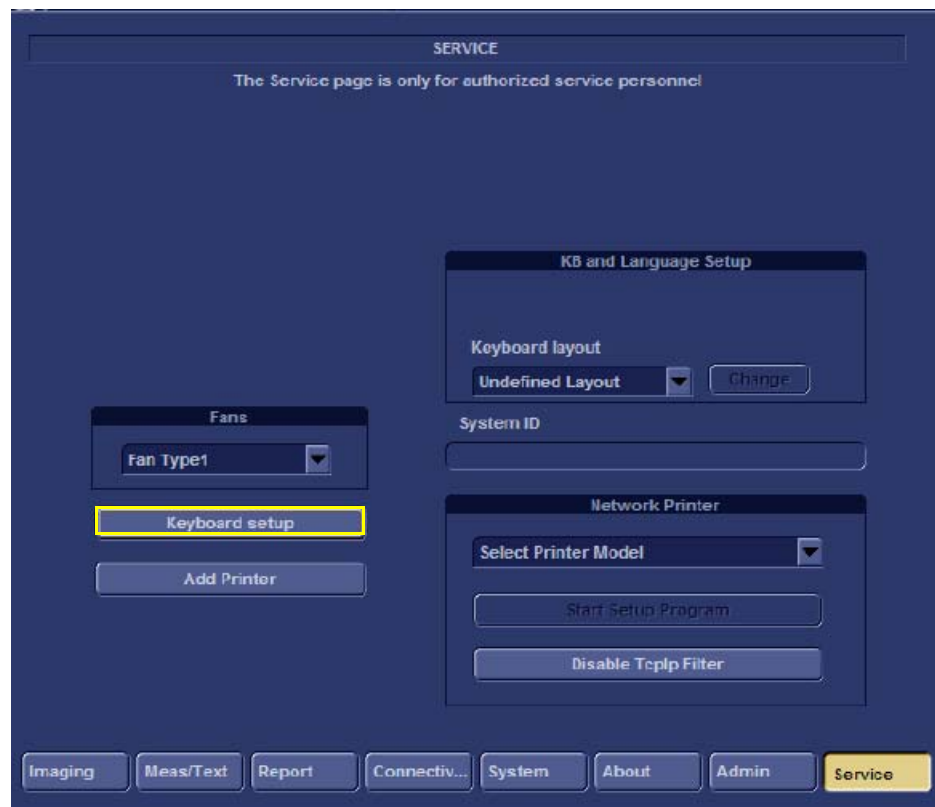


Figure 3-72 Service Screen (Example)

### 3-9-3-3 Adjust Keyboard Backlight Intensity

- Press <CTRL> + L.
- Use the sliders in the *Front Panel Lights Setup* dialog box to adjust **Backlight Intensity** of the Alphanumeric keyboard, Extended ultrasound keyboard, and/or Active keys, as required.

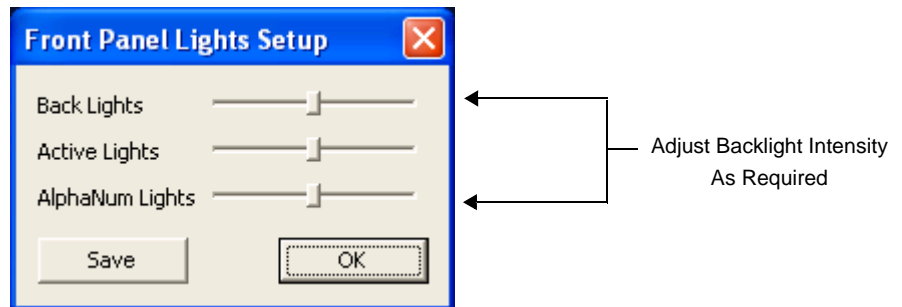


Figure 3-73 Keyboard Light Intensity Adjustment

### 3-9-3-4 LCD Display Adjustment and Calibration

Adjustments may be made to the LCD Display, to control and calibrate the *Contrast*, *Brightness*, and/or *Blue Tint* settings, as required.

For instructions, see ["LCD Display Adjustments and Calibration" on page 6-1](#).

### 3-9-3-5 Keyboard Setup

- 1) Press <F2>, select Service Tab. The Select Keyboard Setup dialog is displayed.

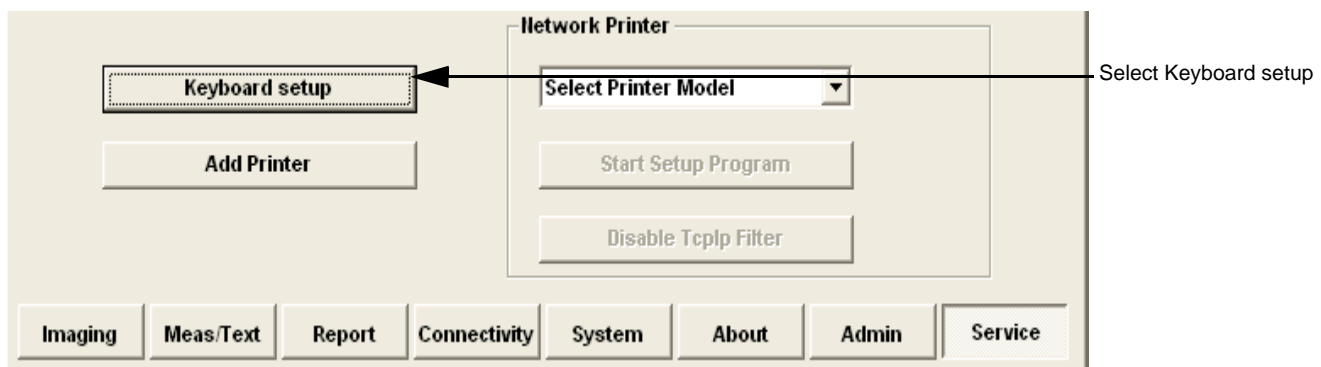


Figure 3-74 Select Keyboard Setup

- 2) Click **Keyboard Setup**.

The Regional and Language Options dialog box is displayed, which has controls for the following, described below:

- Regional Options - affects regional formatting of numbers, dates, times, etc.
- Languages - enables selection of the required language and methods used to enter text.
- Advanced - enables non-Unicode programs to display menus and dialogs in their native language.



3-9-3-5-1 Regional Options

- Select appropriate Format and Location, then click **Apply**.

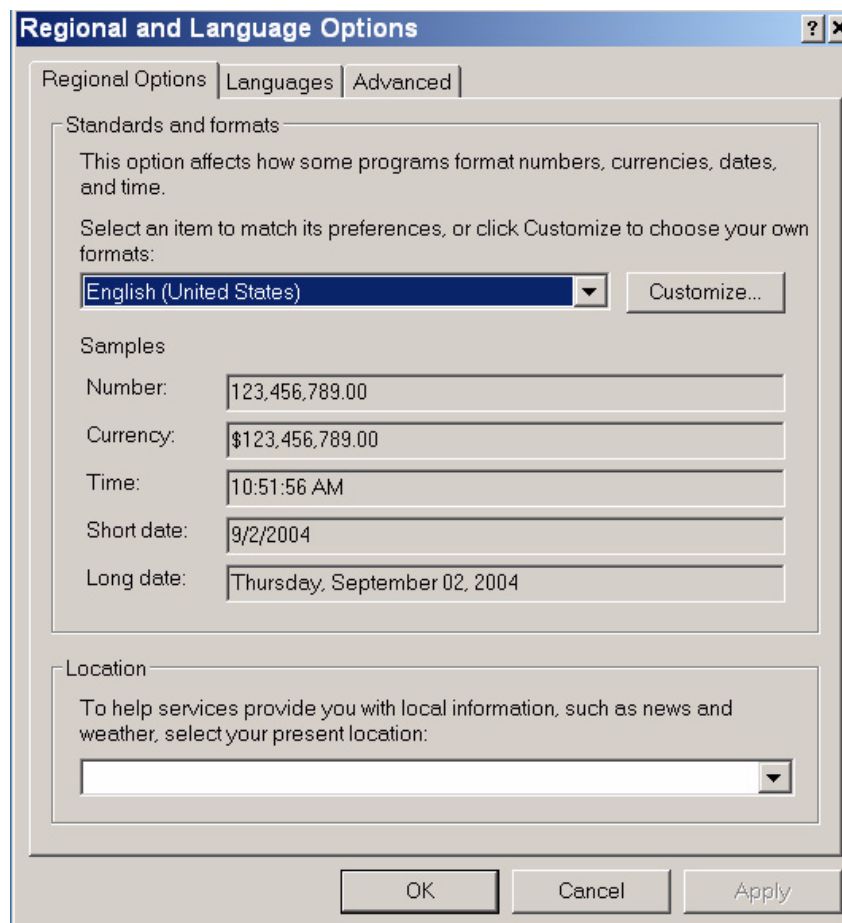


Figure 3-75 Regional Options

### 3-9-3-5-2 Languages

- 1.) Under the Languages tab, click **Details** to select appropriate Language.
- 2.) If necessary, activate applicable Supplemental Language Support check box, then click **Apply**.

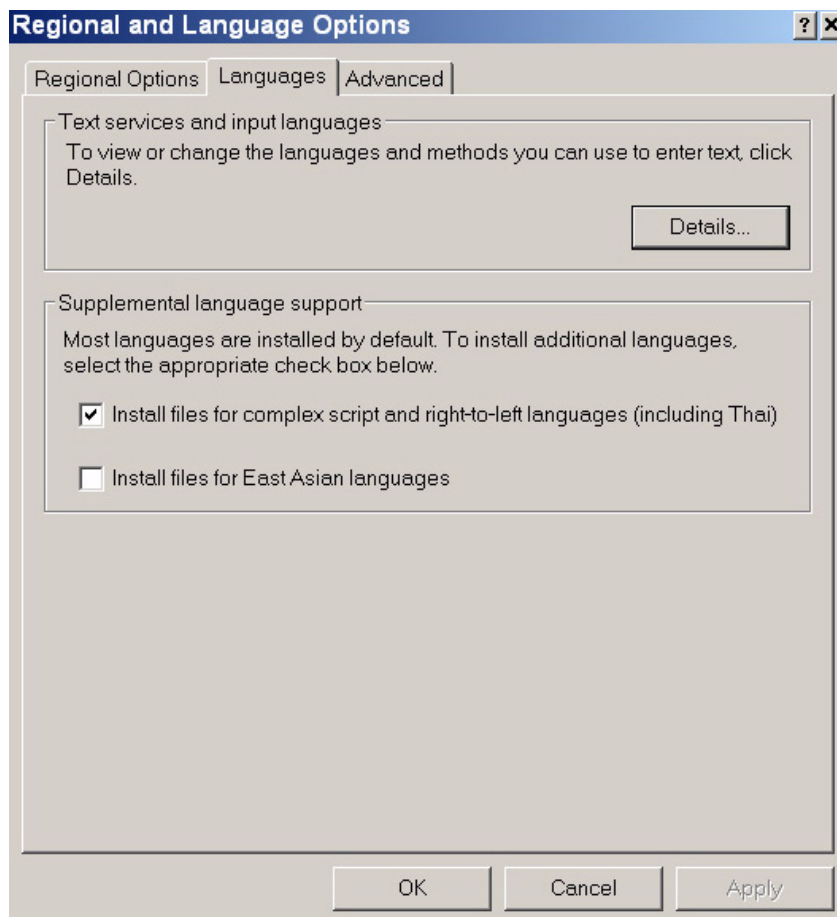


Figure 3-76 Languages

3-9-3-5-3 Advanced

- 1.) Under the Advanced tab, select a language version of the non-unicode programs you want to use, then click **Apply**.

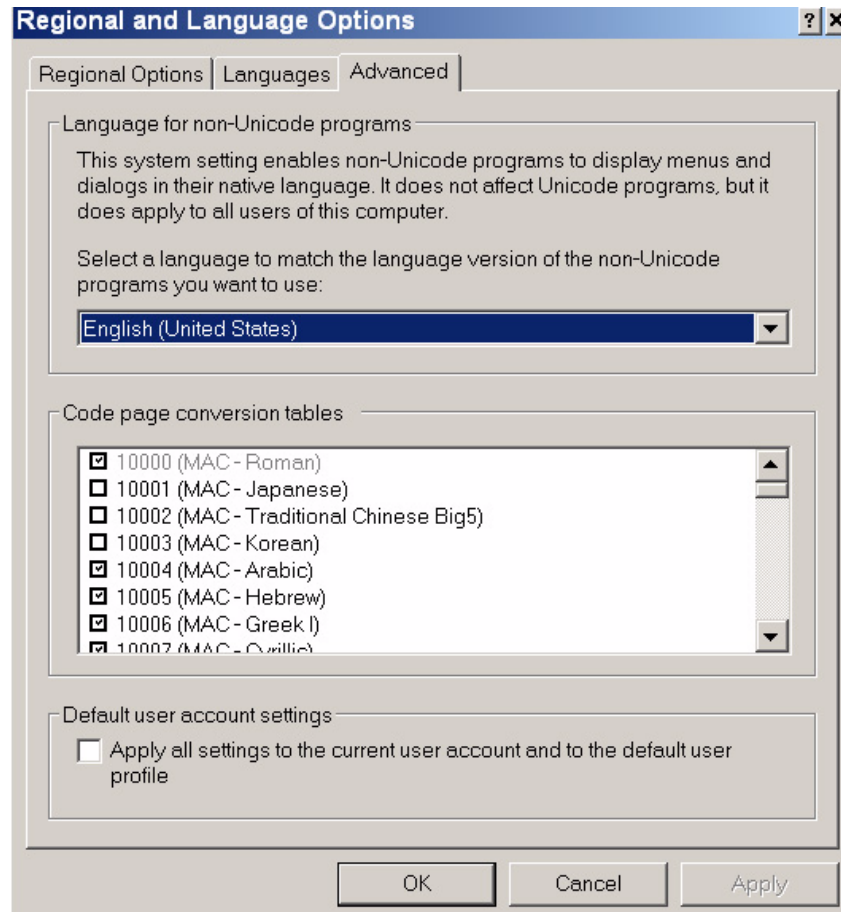
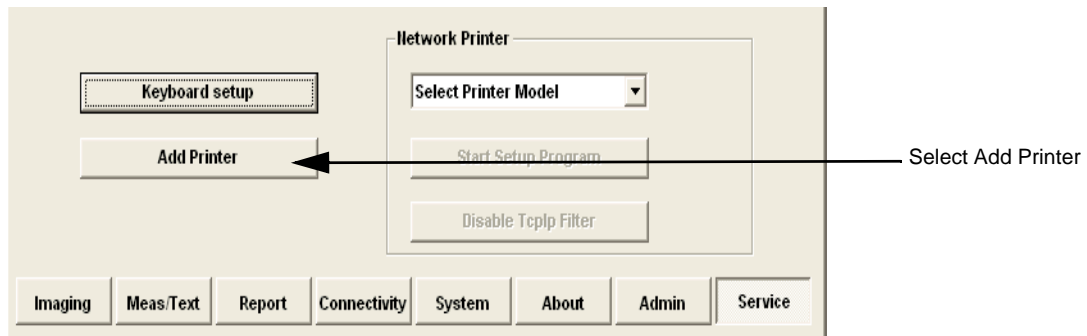


Figure 3-77 Advanced

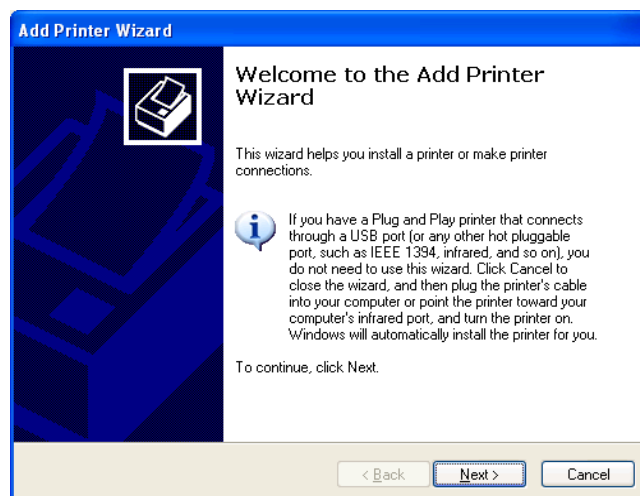
### 3-9-3-6 Add Printer

**NOTE:** This option should not be used by un-authorized personnel. This option will prompt you to the Windows Installation Wizard. Normally, all software drivers are pre-installed and there is no need to use this functionality. In special cases where there is a need, follow the instructions provided by GE Medical Systems or the instructions in the respective printer installation manual.



**Figure 3-78 Select Add Printer**

- 1.) Select ADD PRINTER to start the Add Printer (Installation) Wizard.



**Figure 3-79 Add Printer Wizard**

- 2.) Follow the instructions in the Wizard to install a new printer.
- 3.) When done, perform a full system shutdown, then boot-up the system into *Normal Scanning* mode.  
*Restarting the system allows the changes to take effect.*  
*The newly-added printer is now listed and available for selection.*

---

## 3-9-4 Configuring Peripherals

### 3-9-4-1 Approved Peripherals

The following lists the internal peripherals available for use with the Vivid q N portable ultrasound scanner and details their method of connection:

- Printer - Black & White, digital, Sony (via USB).
- Printer - Color, digital, Sony (via USB).
- VCR - Mitsubishi, both PAL and NTSC versions are available (via VGA to S-Video converter).
- MO Drive (via USB).
- External USB Hard Disk (via USB).  
For detailed instructions on connection to the Vivid q N system, refer to the ["External USB Hard Disk Installation Procedure" on page 8-136](#).
- DVD\CD-R Drive (via USB).
- Printer - Deskjet, HP-450 (via USB).
- Virtual printer (any of the DeskJet printers can be used as virtual printers when the user is in a remote location).



**NOTICE** Vivid q N supports reading of DVD media, but not writing data to DVD.

### 3-9-4-2 Network Peripherals (Optional)

The printers detailed below are connected via Ethernet (TCP/IP Network).

- **Lexmark Color LaserWriter Network Printer.**

The printer is available in the following versions:

- 100 V AC  
**Lexmark C762 Color Printer**
- 110 V AC  
**Lexmark C762 Color Printer**
- 220 V AC  
**Lexmark C762 Color Printer**

Installation of the Lexmark C762 Color Printer is described in the *Lexmark C752N/C762N Color Printer Installation Manual*, Direction Number FC194475.

3-9-4-3 Virtual Printing (Optional)

Virtual printing is not configurable. The functionality of virtual printing provides the ability to print to a specific printer, even though it is not physically connected.

Once the printer has been re-connected again, all the spooled print jobs will be printed out automatically.

Sometimes this feature is device dependent. Therefore, in order to initiate the manual "print of all spooled jobs" process, proceed as described below.

- 1.) Press <ALT> + P.
- The Printers and Faxes window is displayed.

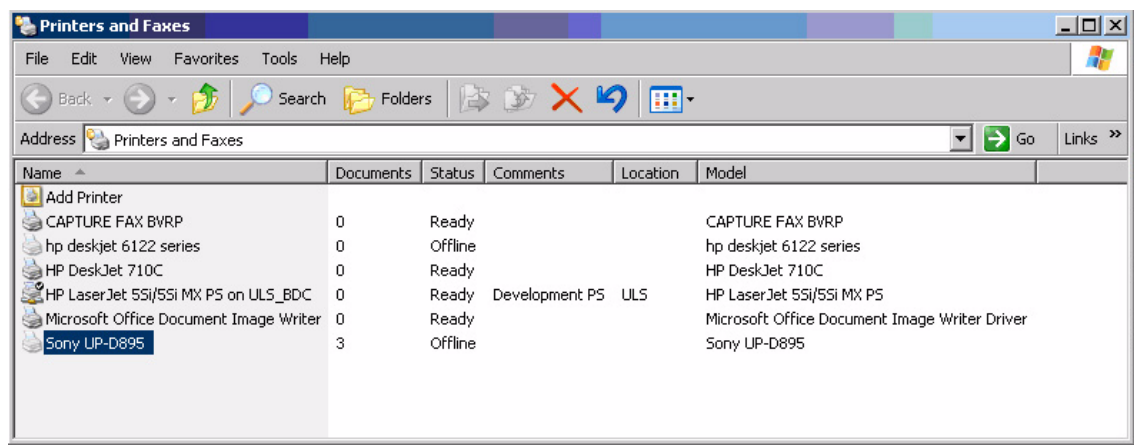


Figure 3-80 Printers and Faxes Window

- 2) Right-click on the destination virtual printer (see Figure 3-80) and select **Open**.
- The Virtual Printer Job Queue window is displayed.

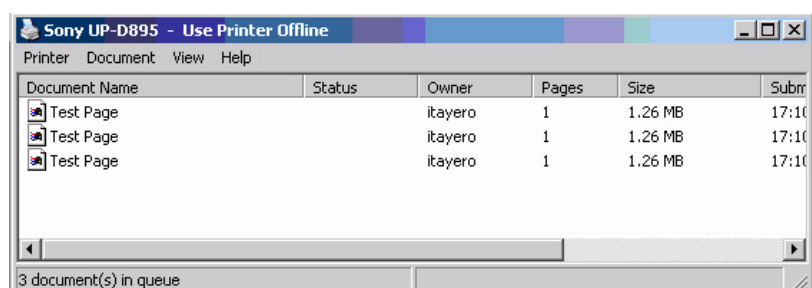
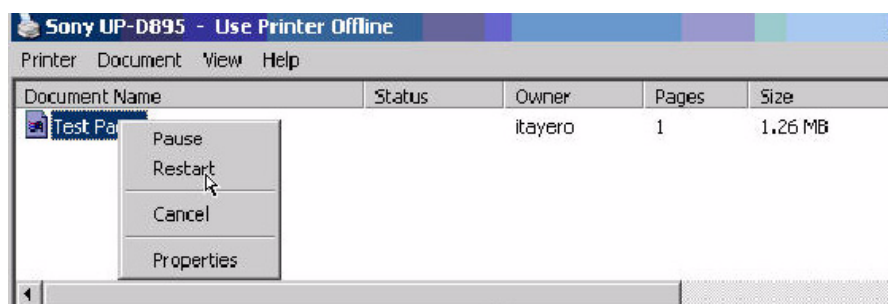


Figure 3-81 Virtual Printer Job Queue Window

- 3.) From the queued Print Jobs, right-click and select **Cancel** to clear any spooled jobs not required.



**Figure 3-82 Resuming Spooled Print Job**

- 4.) Right-click and select **Restart** to resume print job/s for printing, as required

#### 3-9-4-4 Configuration of Peripherals on the SafeLock Cart



**NOTICE** When using Peripherals on the Vivid q N SafeLock Cart, always observe the general guidelines listed below.

##### **General Guidelines**

- 1.) In *Standby* mode, no change should be made to USB-connected devices (regarding location, introduction of new USB device, removal of a currently-connected USB device).
- 2.) USB devices should be connected and/or disconnected **only** in *Full Shutdown* or *Normal Scanning* mode.
- 3.) USB devices should **not** be connected and/or disconnected before completion of tasks assigned to them.
- 4.) Whenever the Vivid q N ultrasound scanner is mounted on the SafeLock Cart, **always** use the **lower** USB port for the Hub.
- 5.) The Vivid q N ultrasound scanner and all connected devices working with scanner should be powered and connected to the SafeLock Cart (**only**)!

For the SafeLock Cart, there are two basic peripheral configurations that are recommended:

##### **Configuration - Recommendation 1**

- DVD always plugged into port 1 of the USB Hub
- MOD always plugged into any port (recommended Port 2)
- HP460 always plugged into any port (recommended Port 3)
- B&W or Color printer (recommended Port 4)

##### **Configuration - Recommendation 2**

- Memory Stick or HP460+Batt plugged directly into the upper USB port on the rear of the Vivid q N ultrasound scanner.

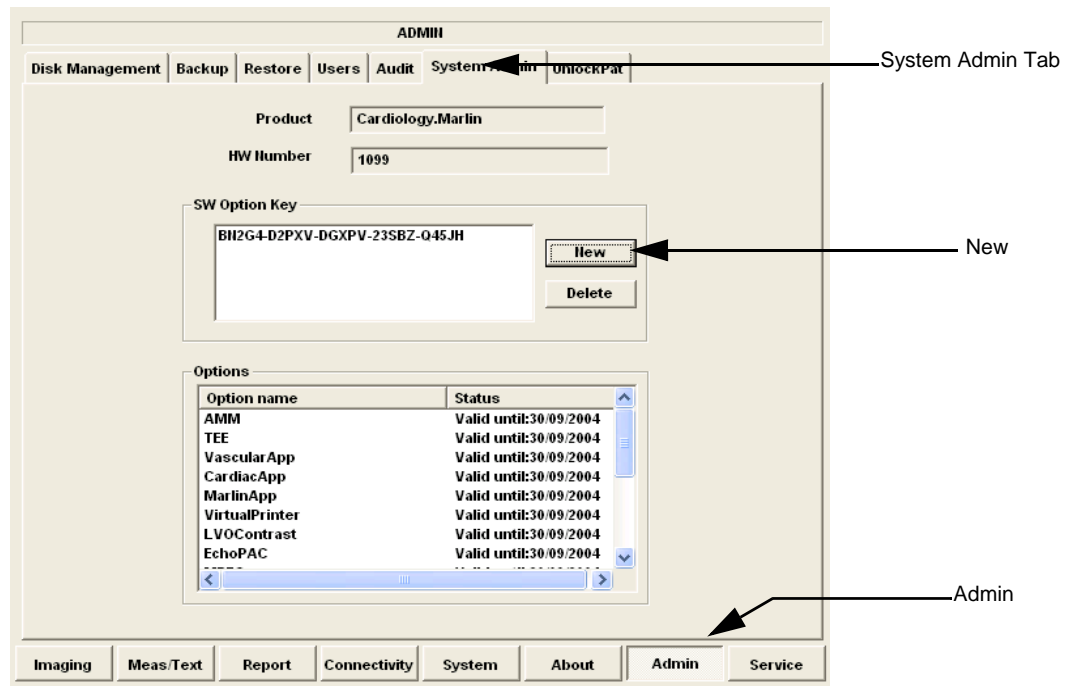
## 3-9-5 Software Options Configuration

### 3-9-5-1 Software Option Installation

A Password (Software Option String) enables a software option or a combination of software options. This password is specific for each Vivid q N.

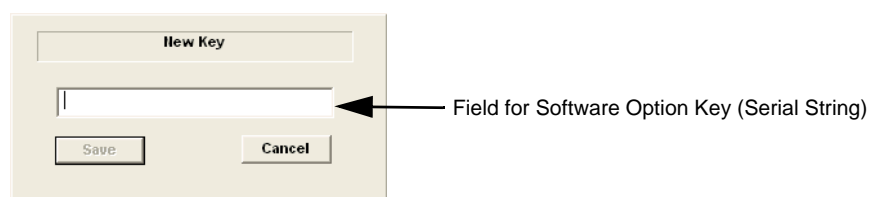
### 3-9-5-2 On-site Configuration

- 1.) Press **CONFIG (F2)** and log on as *Adm* - see "Log On to the System as ADM" on page 4-10.
- 2.) Select **ADMIN** (lower part of window),
- 3.) Select the **SYSTEM ADMIN** tab.



**Figure 3-83 System Admin screen**

- 4.) Select **NEW** to open the New Key dialog where you type the Software Option Key (Serial String).



**Figure 3-84 Type Software Option Key**



**CAUTION** Incorrect password entry will result in loss of system options.  
If password is incorrect, please contact your local GE Service representative.

- 5.) Type the Password (Software Option Key).
- 6.) Press **OK** to save the new setting.
- 7.) Close the Config window.

### 3-9-5-3 Remote Check and Configuration

Contact the OnLine Center for InSite Checkout.



## Section 3-10 Connectivity Setup

### 3-10-1 Connectivity Introduction

The Vivid q N ultrasound unit can be connected to various connectivity devices, such as DICOM devices and EchoPac servers. The following sections describe how to connect the system to a remote archive/work station or a DICOM service, using a TCP/IP connection.

This section describes communication and connection options between the Vivid q N ultrasound unit and other devices in the hospital information system.

The following scenarios are covered:

- A stand-alone Vivid q N scanner.
- A Vivid q N and one or several EchoPAC PC workstations in a “Sneaker Net” environment. (“Sneaker Net” means that you use an MO Disk to move data because no network is available).
- A Vivid q N and an EchoPAC PC workstation in a direct connect environment.
- A Vivid q N and a DICOM server in a network.
- A Vivid q N scanner configured for MPEGVue export to removable media: CD, DVD, or USB Memory stick. (Data can later be viewed on any remote PC).
- A Vivid q N workstation connected to the Hospital Information System (HIS), via the Vivid HL7 Gateway.
- A Vivid q N scanner configured for eVue.  
Images or loops may be transmitted to a designated PC (“e-View PC”) on the network (in compact MPEG format), and will appear at the review PC in almost real time.

#### 3-10-1-1 The Dataflow Concept

Communication between the Vivid q N ultrasound unit and other information providers on the network takes the form of dataflows. Each dataflow defines the transfer of patient information from either an input source to the unit, or from the unit to an output source (see examples in [Figure 3-85 on page 3-86](#)).

Patient information can include demographic data and images, as well as reports and Measurement and Analysis (M&A) data.

A dataflow is a set of pre-configured services. Selecting a dataflow will automatically customize the ultrasound unit to work according to the services associated with this dataflow.

By utilizing dataflows, the user can configure the Vivid q N ultrasound unit to optimally meet the needs of the facility, while keeping the user interface unchanged. Once the dataflow is selected, the actual location of the database is entirely transparent.

#### 3-10-1-2 Dataflow Naming Convention

The predefined dataflows have descriptive names.

*Example:* LocalArchive-MOD dataflow

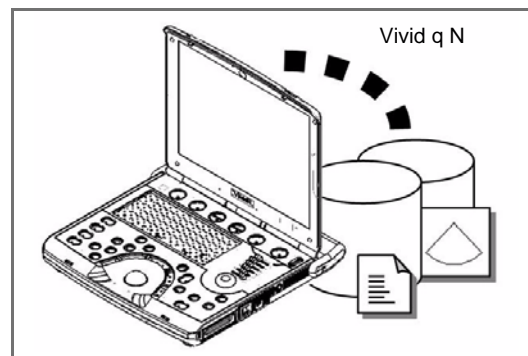
The name indicates that patient data is archived locally in the archive on the internal hard disk and images are stored to an MO disk.

A list of all the predefined dataflows is included in the Vivid q N User Manual.

### 3-10-1-3 Dataflow Examples

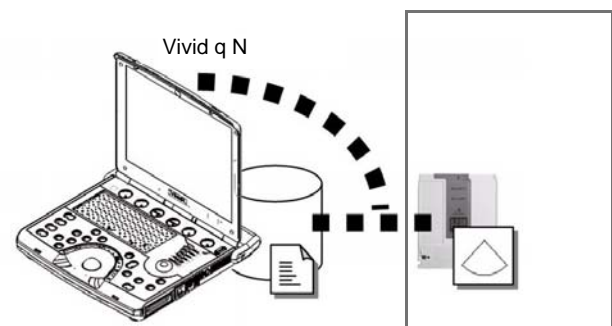
**LocalArchive-Int.HD dataflow:**

The local database is used for patient archiving.  
Images are stored to internal hard drive.



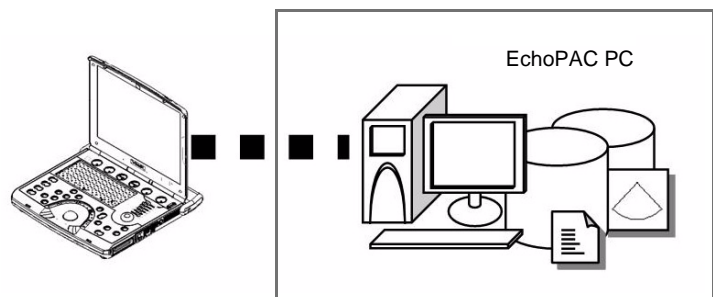
**LocalArchive-MOD dataflow:**

The local database is used for patient archiving.  
Images are stored to a MOD



**RemoteArch-RemoteHD dataflow:**

A remote database is used for patient archiving.  
Images are also stored to a remote archive.



**Worklist/Local Archive-DICOMServer/Int.HD dataflow:**

Search in the DICOM Modality Worklist, the patient found  
is copied into local database.

The patient information and the examination results are  
stored to the local database.

Images are stored to a DICOM server and to an image  
network volume on the local hard drive.

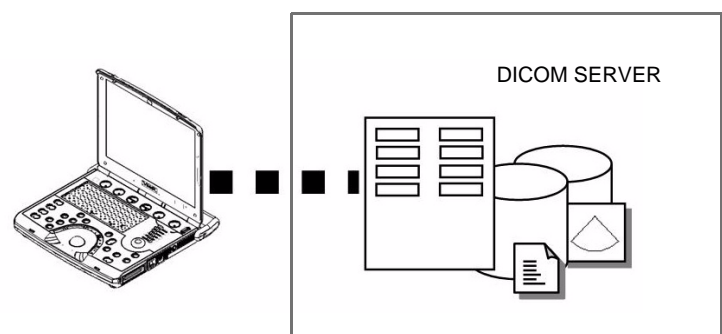


Figure 3-85 Examples of Dataflows

---

**3-10-1-4 Stand-alone Vivid q N**

In this scenario, images will most likely be reviewed from a VCR tape. If digital images are stored, they should be saved directly on a MOD.

**3-10-1-5 “Sneaker Net” Environment**

In this scenario, the EchoPAC PC (one or several) is used for review of studies acquired on one or more Vivid q N scanners without being connected in a network. Images can be stored on the scanner's internal hard drive (recommended) or on a dedicated MOD.

- **Images Stored on Internal Hard Drive**

In this configuration, images are first stored on the Vivid q N scanner's hard drive and then exported from the scanner's hard drive to a sneaker MOD, and finally imported from the sneaker MOD to the EchoPAC PC's internal hard drive.

- **Images Stored on Dedicated MO Disk**

In this configuration, the images are stored directly on a dedicated MOD and imported to the EchoPAC PC's internal hard drive.

**3-10-1-6 Direct Connection from Vivid q N to an EchoPAC PC Workstation**

In this configuration, the data is transferred from the Vivid q N to a dedicated EchoPAC PC Workstation over an Ethernet connection.

The connection may be done in one of three ways:

- with a crossover cable as a Peer-to-Peer Network
- connection via a Local Area Network (LAN) - set up for this special use only.
- connection via the hospital network (Local Area Network - LAN or Wide Area Network - WAN)

The database from the EchoPAC PC is used as the master and images are stored directly to the EchoPAC PC internal hard drive.

In this configuration, the scanner is just an intermediate acquisition unit which, after completion of a study, will not contain any patient information, measurements, or images. The acquisition can be done online or offline.

**3-10-1-7 Vivid q N and a DICOM Server in a Network**

In this configuration, the Vivid q N is configured to work with a DICOM server in a network environment. Usually, this will be the hospital network. Images are first saved on the local image buffer on the scanner. At the end of the examination, the images are sent to the DICOM server via a DICOM spooler. This scenario requires that the scanner is configured to be connected to the DICOM server.

3-10-2 Physical Connection

3-10-2-1 Ethernet Switch Connections

An Ethernet Switch (P/N: 066E0741), is used to connect the Vivid q N system to an EchoPAC PC and a network printer.



Figure 3-86 Ethernet Switch Identifications

Position	Label	Function
	X To PC	To connect an end station or a Server to the Port
	= To HUB	To connect a HUB or another Switch to the Port

Table 3-10 MDI Button Position Descriptions

3-10-2-2 Local Network Connection to EchoPAC PC Workstation

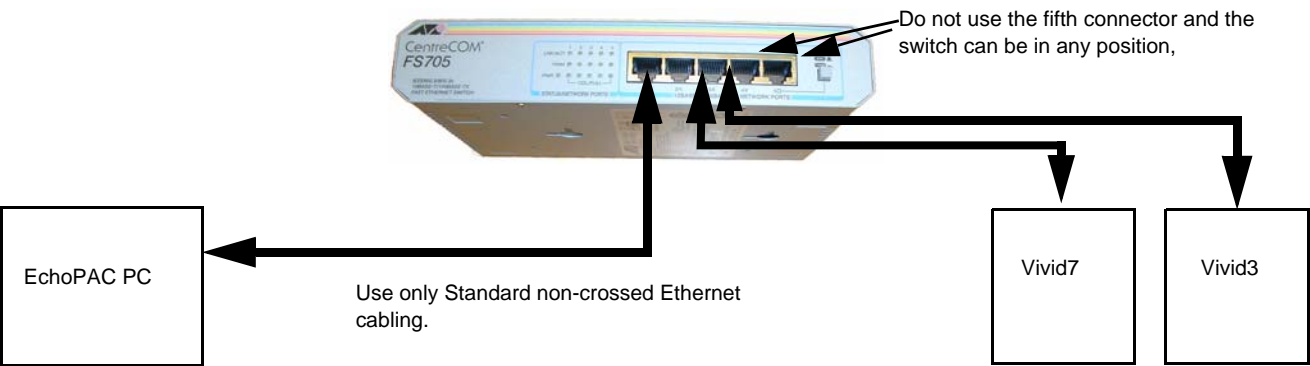
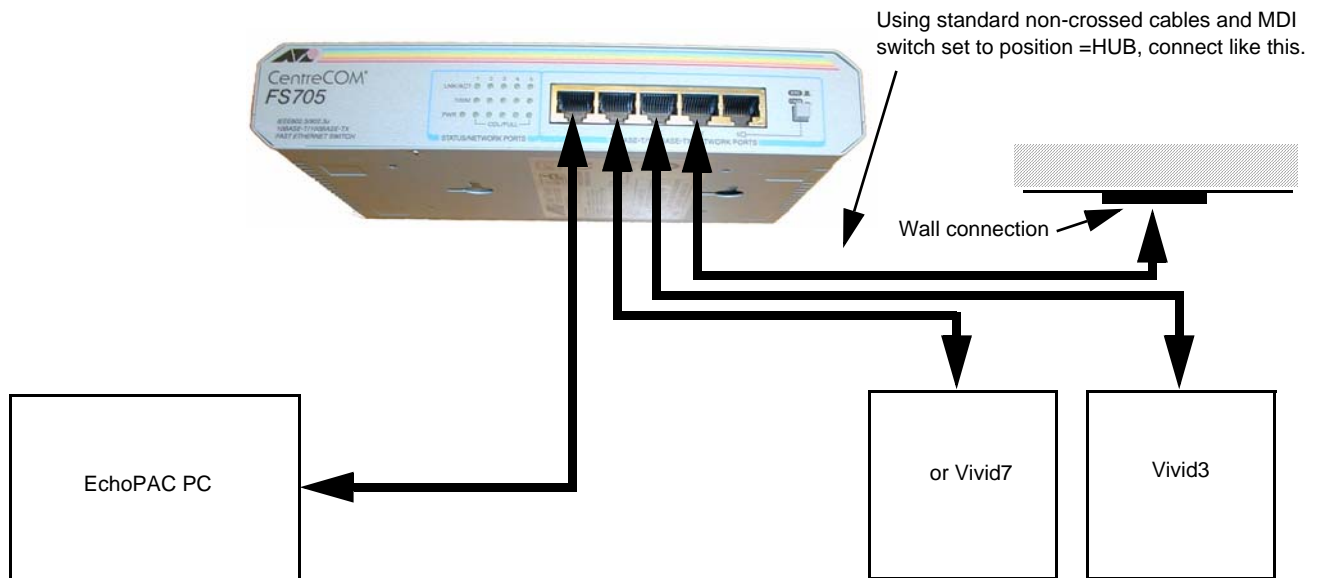


Figure 3-87 Local Network Connection

### 3-10-2-3 Hospital Network Connection to EchoPAC PC Workstation



**Figure 3-88 Hospital Network Connections**

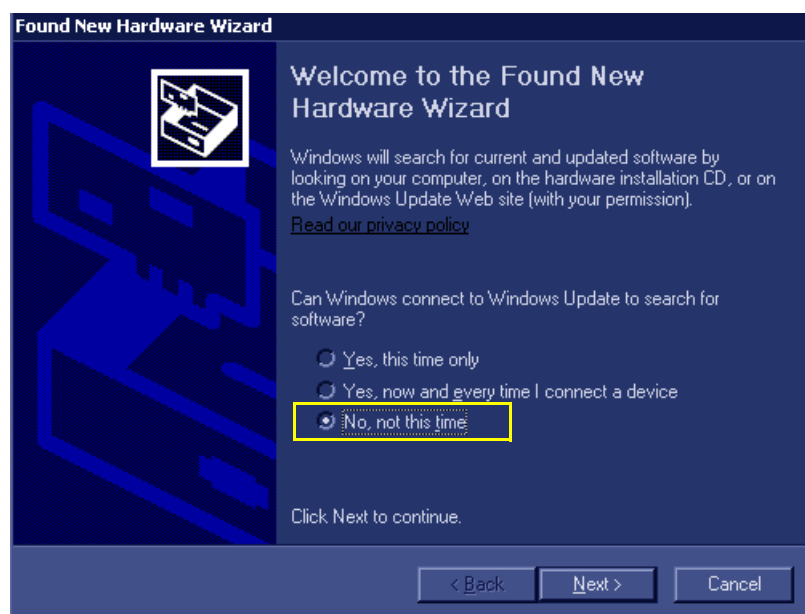
See the EchoPAC PC Service Manual (Part Number EP091298) for details about the EchoPAC PC, and the required set-up procedures.

### 3-10-2-4 Wireless USB Network Configuration

#### 3-10-2-4-1 Installing the Compact Wireless-G Adaptor Software

- 1.) Connect the DVD-CD RW drive to the Vivid q N system as described in [Section 3-7-2-3](#) on page 3-36.
- 2.) Insert the Wireless USB driver P/N 5391287 identified with the GE label in the DVD drive.
- 3.) Boot up the system in maintenance mode and navigate to Windows Explorer.
- 4.) Create a new folder on the system's **D** drive and name it **WIFI DRIVER**.
- 5.) Copy the contents of the disk to the WIFI DRIVER folder.
- 6.) Disconnect the DVD drive from the system.
- 7.) Plug the wireless USB device connected to the R-adaptor into the USB port at the rear of the Vivid q Nsystem. Refer to [Figure 3-28 on page 3-35](#).

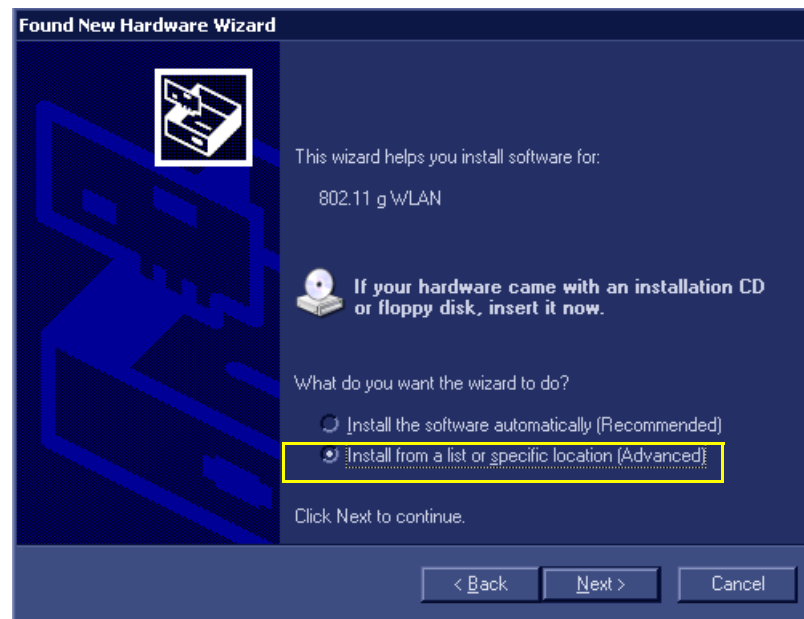
*The New Hardware installation wizard opens, as shown in [Figure 3-89](#).*



**Figure 3-89 New Hardware Installation Wizard**

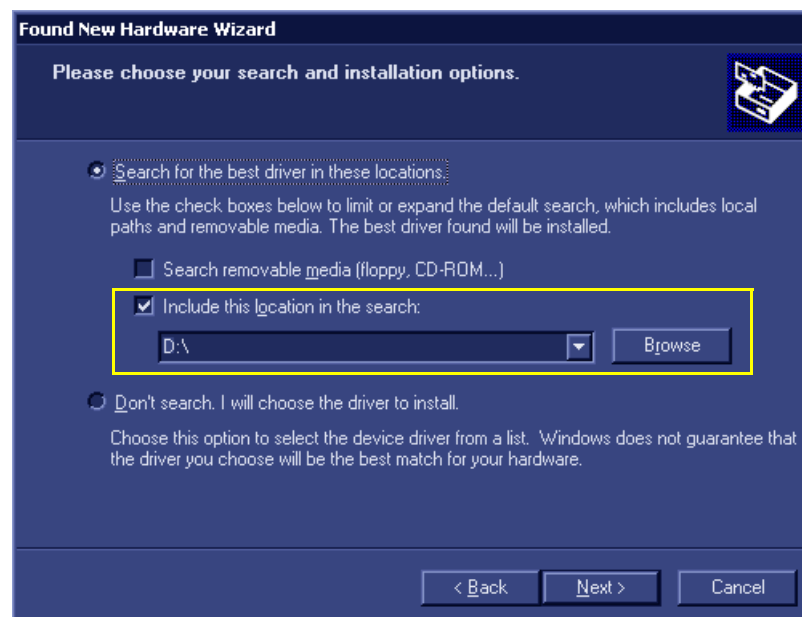
- 8.) Select "**No, not this time**" ([Figure 3-89](#)), and click **Next**.

- 9.) Select "**Install from a list or specific location (Advanced)**" - see [Figure 3-90](#) and click **Next**.



**Figure 3-90 Install from a List or Specific Location**

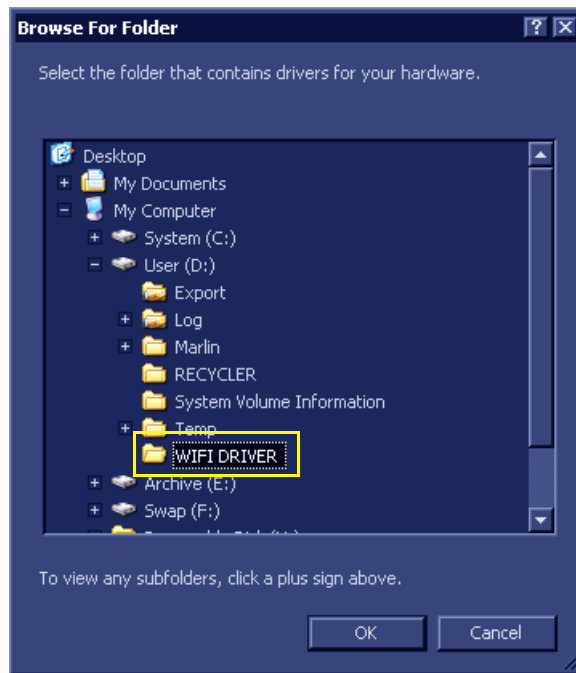
- 10.) Select **Include this location in search** ([Figure 3-91](#)) and browse to "**D:\WIFI DRIVER**" ([Figure 3-92](#)).



**Figure 3-91 Include this Location in Search**

- 11.) Click **Next**.

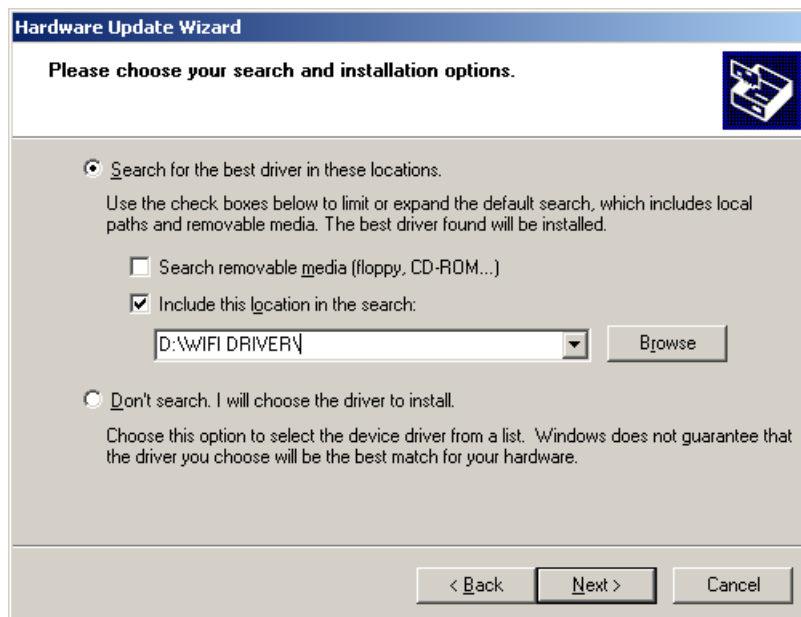
The following screen opens ([Figure 3-92](#)).



**Figure 3-92 WIFI DRIVER Folder**

12.) Select the **WIFI DRIVER** folder, then click **OK**.

*The following screen opens:*



**Figure 3-93 Hardware Update Wizard**

13.) Click **Next**.

*The installation process continues displaying wizard screens until installation is complete.*

14.) Click **Finish**

*The installation process is complete.*



#### 3-10-2-4-2 Configuring the Wireless Adaptor

- 1.) From the default Vivid q N scanner screen, press **Config**. Select the **Connectivity** tab and from the Connectivity screen, click **TCP/IP**.
- 2.) Click **Advanced Settings** to open the Network Connections screen - see [Figure 3-94](#).

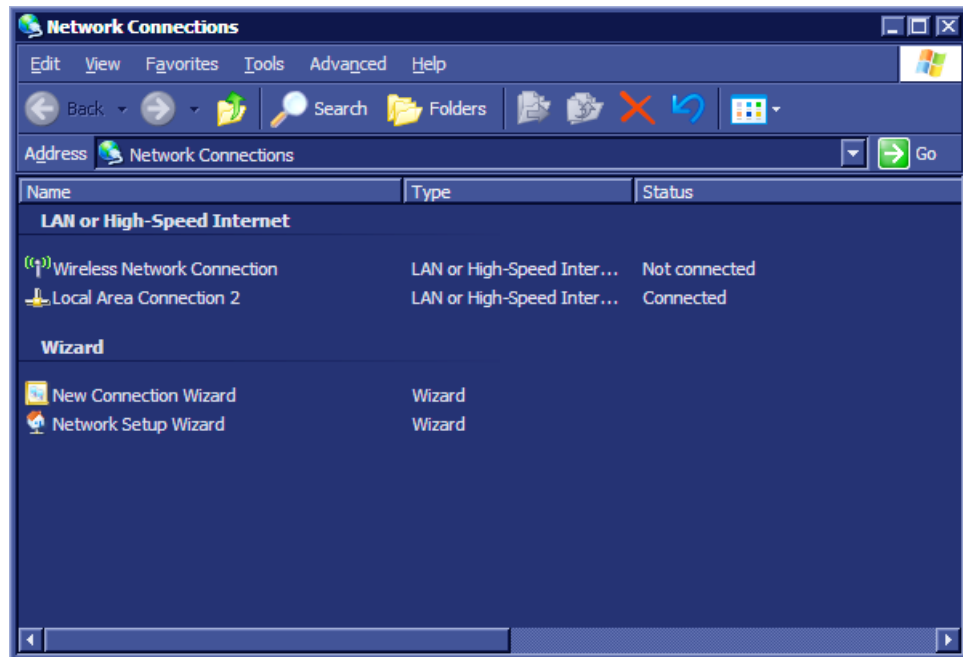
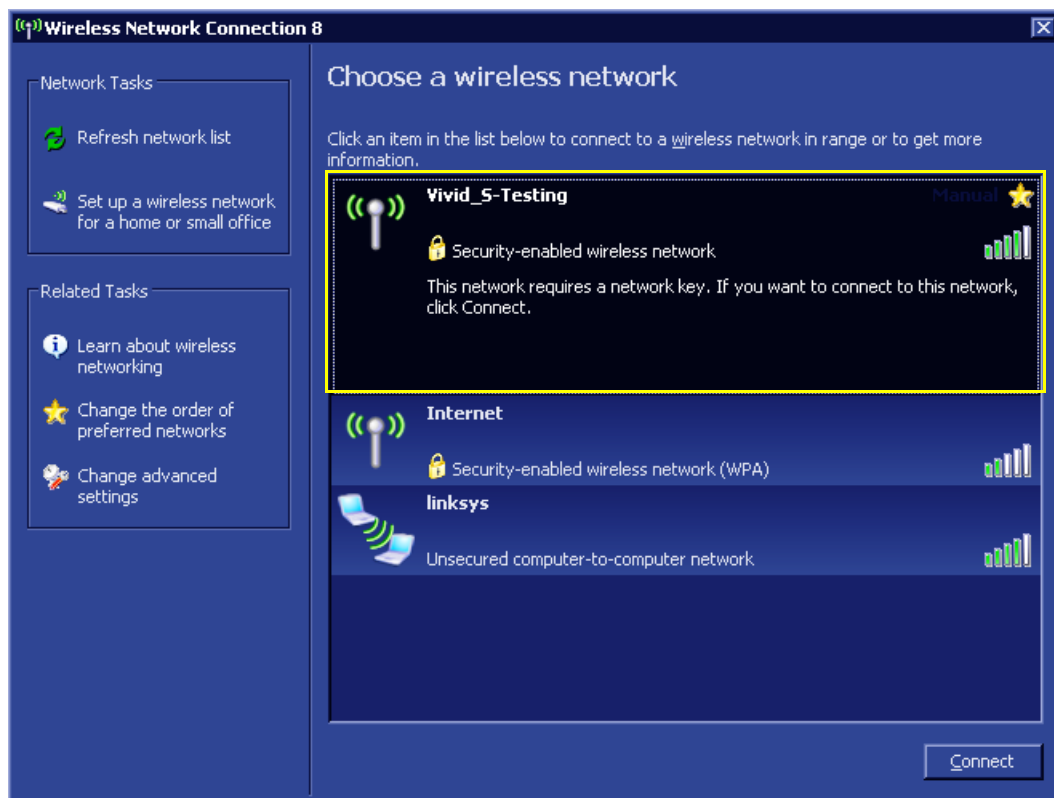


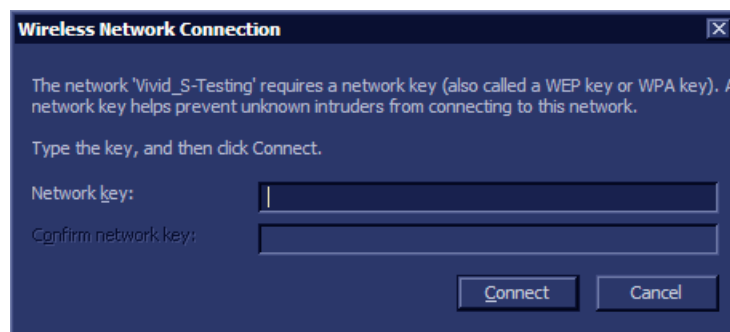
Figure 3-94 Network Connections

- 3.) From the Wireless Network Connection screen navigate to **Wireless Network Connection 8** and double-click to open the *Wireless Network Connection 8* screen - see [Figure 3-95](#).



**Figure 3-95 Wireless Network Connection 8**

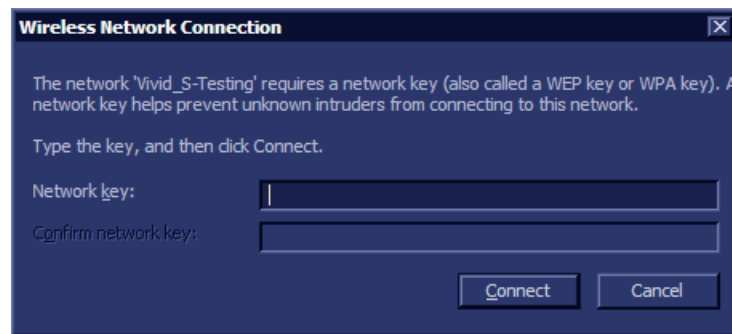
- 4.) Select the appropriate wireless network and click **Connect**.  
(In this example - [Figure 3-95](#) - the wireless network connection is **Vivid\_S-Testing**.)  
*The Wireless Network Connection dialog box opens - see [Figure 3-96](#).*



**Figure 3-96 Wireless Network Connection Dialog Box**

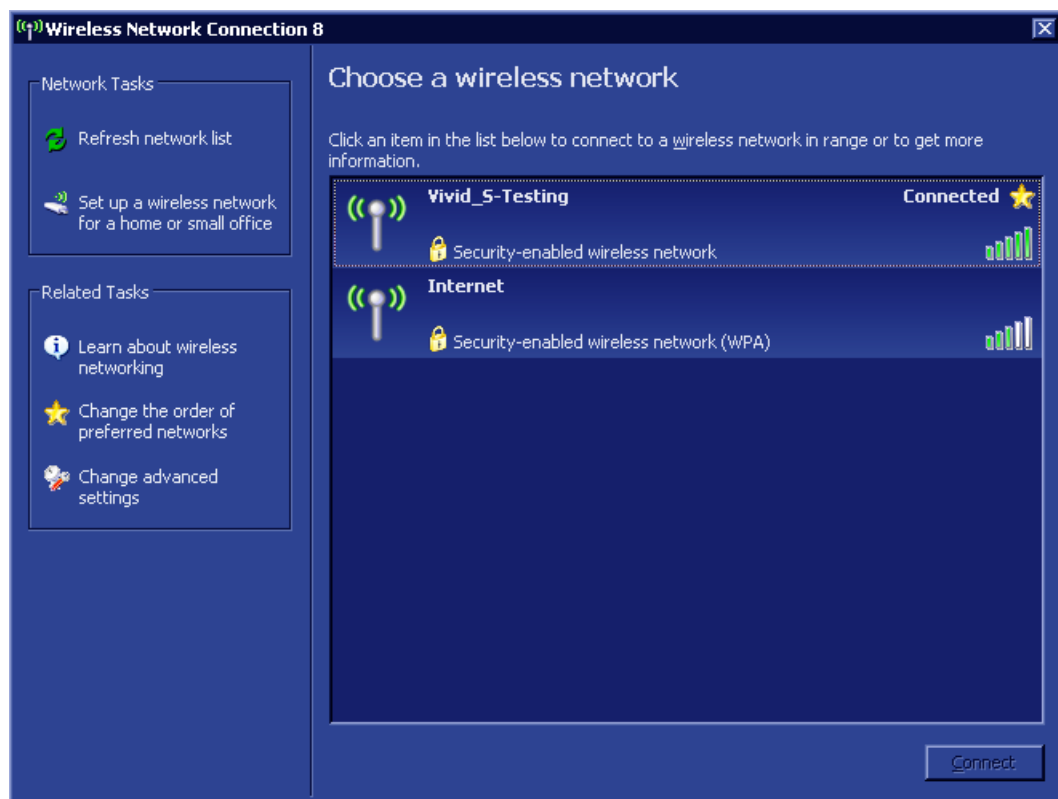
- 5.) Type the required network key in the **Network key** field, then click **Connect**.

The Wireless detection process screen is displayed - [Figure 3-97](#).



**Figure 3-97 Wireless Detection Process**

At the end of the wireless detection process, a message displays on the screen indicating that the wireless adaptor is connected - see [Figure 3-98](#).



**Figure 3-98 Confirmation that Wireless Adaptor is Connected**

- 6.) Return to the instructions for ["Installing the Compact Wireless-G Adaptor Software"](#) on page 3-90 and repeat the entire procedure in order to configure the second USB port.
- 7.) When done, proceed to perform the following functionality tests:
  - ["Wireless USB Network Test"](#) on page 4-25

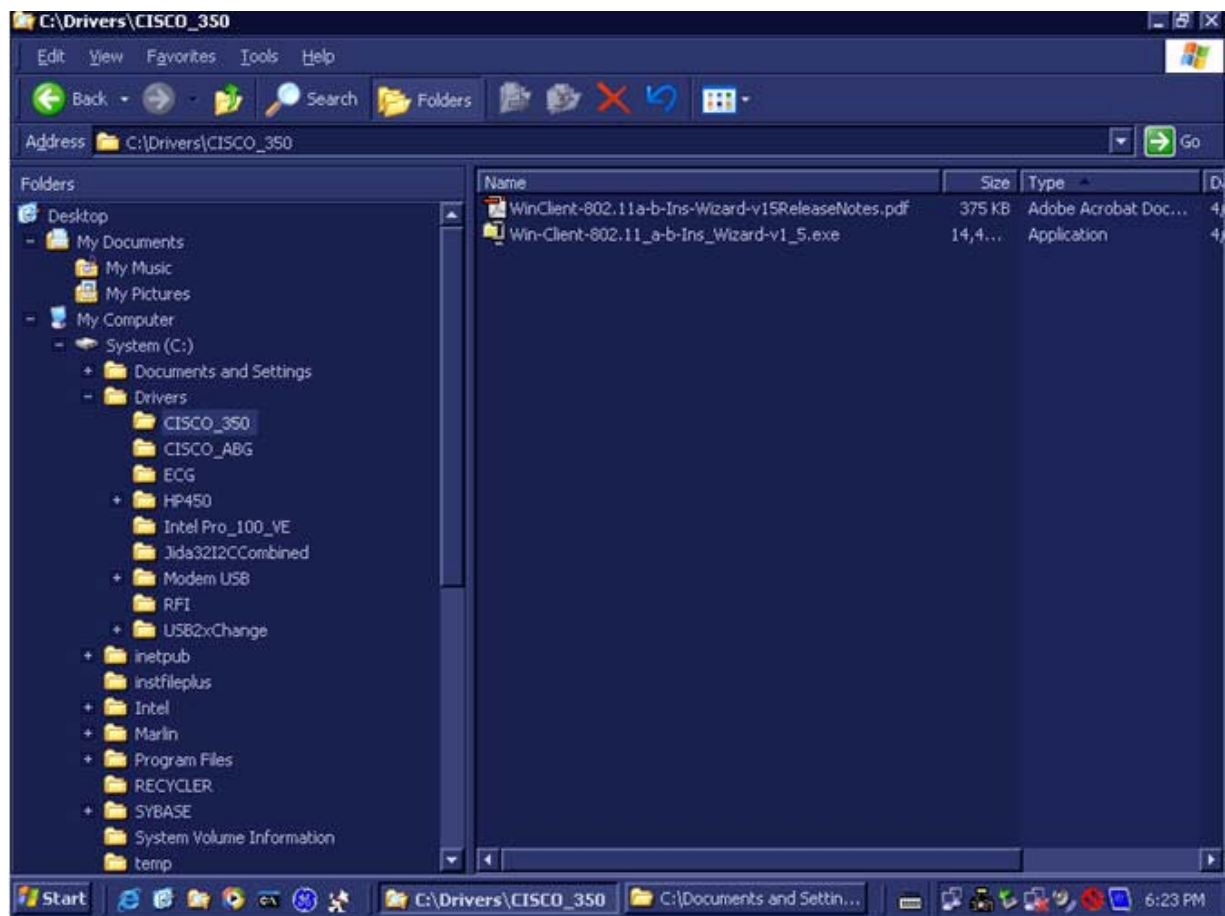


Figure 3-99 CISCO\_350 Sub-directory

- 
- 3-10-2-5 Stand-alone Vivid q N**  
No network connection needed.
- 3-10-2-6 “Sneaker Net” Environment**  
No network connection needed.
- 3-10-2-7 Connection from Vivid q N to an EchoPAC PC Workstation**
- 

***Direct Cable Connection from Vivid q N to an EchoPAC PC Workstation  
via a Crossover Cable***

You will only need a Crossover Cable for network use to connect the two units this way.

- 1.) Connect one end of the Crossover Cable to the network connector on the Vivid q N.
  - 2.) Connect the other end to the network connector to the EchoPAC PC Workstation, see Chapter 3 in the EchoPAC PC Workstation Service Manual.
- 

***Connection via a Peer-to-Peer Network***

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

See [3-10-2-1 "Ethernet Switch Connections" on page 3-88](#).

---

***Connection via Hospital Network***

You will need one network cable to connect the Vivid q N to a wall outlet on the hospital's network.

**3-10-2-8 Connection between a Vivid q N and a DICOM Server on a Network**

You will need one network cable.

- 1.) Connect one end of the cable to the Ethernet connector on the Vivid q N.
- 2.) Connect the other end of the cable to the wall outlet.

If a Peer-to-Peer Network is connected to the hospital's network, you may connect the Vivid q N to the Peer-to-Peer Network.

### 3-10-3 Connectivity Configuration

**NOTE:** If connected to a stand-alone network (Peer-to-Peer network with a Vivid q N scanner, an EchoPAC PC work station and eventually a network printer), you should use default delivery settings.

#### 3-10-3-1 Introduction

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

- Before you can set up the scanner, you need to collect some information. Refer to the ["Worksheet for DICOM Network Information in Figure 2-2 on page 2-10"](#). Typically, the source for this information is the network administrator.
- Follow the steps below to prepare the scanner for use on the network.

#### 3-10-3-2 Select TCP/IP Set-up Screen

- 1.) Press **CONFIG (F2)** and log on as *Adm*, as described in ["Log On to the System as ADM" on page 4-10](#).
- 2.) If not already selected, select **CONNECTIVITY** from the bottom of the screen.
- 3.) Select the TCP/IP TAB (it is named Tcpiip).

##### Computer Name:

For Vivid q N, this name is on the form: *Vivid\_I-00nnnn*, where "00nnnn" is a number (nnnn is the scanner's serial number).

##### IP Settings:

IP Settings area for the Vivid q N scanner.

##### Remote Archive Setup area:

IP settings area for a Remote Archive.  
Example: EchoServer.

##### Default Setup:

Remote Archive IP-Addr: 10.0.0.4

Remote Archive Name: EchoPAC7-000001

The screenshot shows the 'CONNECTIVITY' screen with the 'Tcpiip' tab selected. The screen is divided into several sections:

- Computer Name:** A text field containing 'VIVID\_I-0000001'.
- AE Title:** A text field containing 'VIVID\_I-0000001'.
- Port No.:** A text field containing '104'.
- IP settings:** A section containing:
  - IP-Address:** A field with four segments: 10, 0, 0, 4.
  - Subnet Mask:** A field with four segments: 255, 255, 252, 0.
  - Default Gateway:** A field with four segments: 3, 222, 23, 250.
- Remote Archive Setup:** A section containing:
  - Remote Archive IP-Addr:** A field with four segments: 10, 0, 0, 3.
  - Remote Archive Name:** A text field containing 'ECHOPAC7-000000'.

Buttons on the right include 'Detailed DICOM Log', 'Save settings', and 'Advanced Settings'. At the bottom, there is a navigation bar with tabs: Imaging, Meas/Text, Report, Connectivity (selected), System, About, Admin, and Service.

Figure 3-100 TCP/IP Set-up Screen for Vivid q N, Overview (Example)

### 3-10-3-3 Set the Scanner's Network Information

In the IP settings area of the screen, enter the following:

- 1.) IP Address for scanner. (Default IP Address from factory: 10.0.0.3).
- 2.) Subnet Mask for scanner. (Default Subnet Masks from factory: 255.255.255).
- 3.) IP address for Default Gateway. (Default Gateways from factory IP address: 0.0.0.0).
- 4.) In addition, the scanner's AE Title must be entered in the DICOM server's setup.

The screenshot shows the 'CONNECTIVITY' tab selected. The 'Computer Name' field contains 'VIVID\_I-0000001'. The 'AE Title' field contains 'VIVID\_I-0000001'. The 'Port No.' field contains '104'. The 'IP settings' section has 'IP-Address' set to 10.0.0.4, 'Subnet Mask' set to 255.255.252.0, and 'Default Gateway' set to 3.222.23.250. The 'Remote Archive Setup' section has 'Remote Archive IP-Addr' set to 10.0.0.3 and 'Remote Archive Name' set to 'ECHOPACT-000000'. Buttons for 'Save settings' and 'Advanced Settings' are visible. At the bottom, there are tabs for Imaging, Meas/Text, Report, Connectivity, System, About, Admin, and Service.

Figure 3-101 TCP/IP Set-up for Vivid q N

### 3-10-3-4 Set the Remote Archive's Network Information

In the Remote Archive Setup area of the screen (see example in [Figure 3-102](#)), enter the following:

- 1.) Remote Archive IP address. (Default IP Address from factory: 10.0.0.4).
- 2.) Remote Archive Name. (Default Remote Archive Name from factory: ECHOPACT7-000001).

The screenshot shows the 'Remote Archive Setup' section. The 'Remote Archive IP-Addr' field contains 10.0.0.3. The 'Remote Archive Name' field contains 'ECHOPACT7-000001'. Arrows point from the labels 'IP Address for the remote archive' and 'Computer Name for the remote archive' to the respective fields.

Figure 3-102 TCP/IP Set-up for Vivid q N

### 3-10-3-5 Vivid q N Remote Path Configuration

The Vivid q N Remote Path feature enables the user to define a user name.

### 3-10-3-6 Configuring the Vivid q N Remote Path

**NOTE:** Before starting this procedure, verify that the destination PC / Network has a Shared folder (remote path) with user permissions. Refer to [section 3-10-9-1-1](#) on page 3-137 for creating a new user in the remote PC or network.

**NOTE:** The paths below (refer to [Figure 3-103](#)) are used as follows:

- **Save As PDF Network Path** - used for saving system Reports as PDFs.
- **Remote Path** - used for Save As, Export from Q-Analysis, and for exporting error logs with "Alt + D".

- 1.) From the system keyboard press **Config** and log on as an ADM user with the appropriate password.
- 2.) Click **Connectivity** (from the bottom row of buttons) on the screen and select the **Tools** tab.

The Tools screen opens - see [Figure 3-103](#).

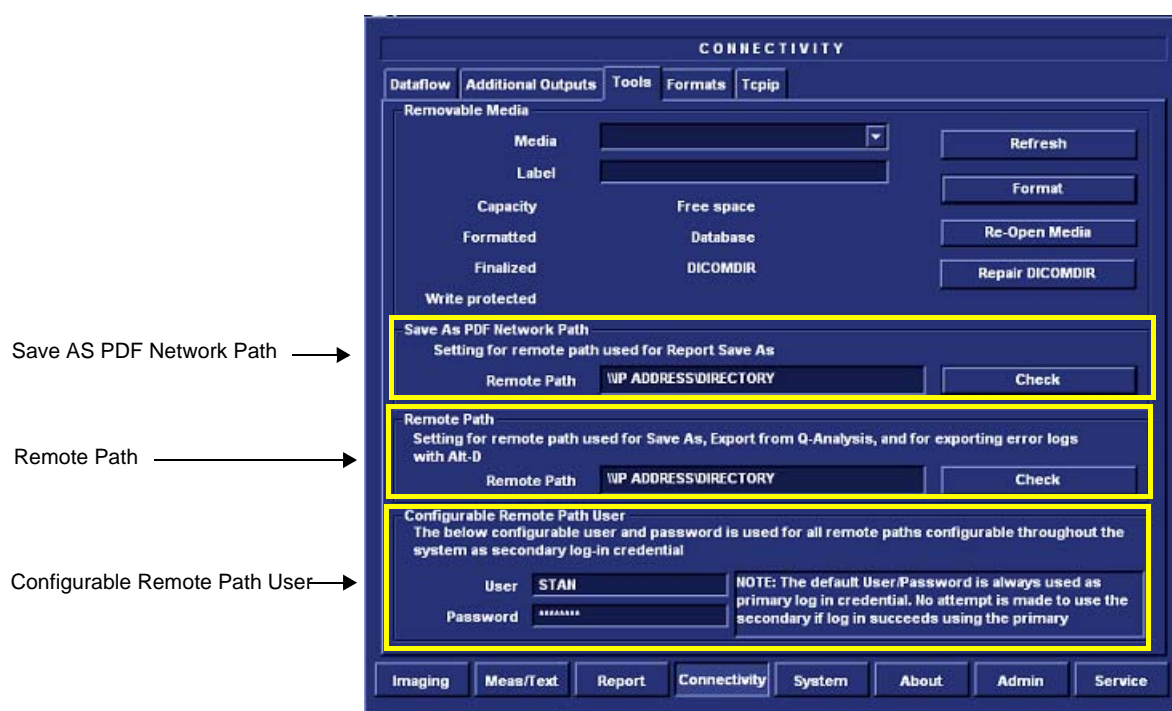


Figure 3-103 Tools Screen

- 3.) Under "Save As PDF Network Path", in the Remote Path field, type the remote path.  
For example, in [Figure 3-103](#) type: \\IP ADDRESS\DIRECTORY, where directory is the name of the shared folder in the destination PC.

- 4.) Click **Check** to verify the connection.

**NOTE:** When clicking the Check button, you might momentarily see a "failed" message that disappears if you click Check a second time. The system will then confirm the setting.

- 5.) Under "Setting for Remote Path used for Save As...", type the remote path as follows:  
**\\IP ADDRESS\DIRECTORY.**



6.) Click **Check** to verify the connection.

### 3-10-3-6-1 Configuring the Repository Remote Path

**NOTE:** *It is possible to configure an additional user name and password for all remote paths. These settings are only used if the system fails to log on the default user and password.*

- Under Configurable Remote Path User (refer to [Figure 3-103](#)), type the desired user name and password, as configured on the destination PC.  
(This is the password usually assigned by the local IT person).

### 3-10-3-7 Save the New Settings

1.) Press SAVE SETTINGS to save the new settings.

**Figure 3-104 Save New TCP/IP settings**

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

2.) Restart the Vivid q N system to activate the changes.

### 3-10-3-8 Configuring the Vivid q N and Network PC for a Peer-to-Peer Connection

**NOTE:** The following steps are performed on the Vivid q N scanner.  
The instruction **Select** = trackball to the specific item and press the **Set** button on the control panel.

- 1.) On the Vivid q N control panel, press the **Config** button.
- 2.) From the System Configuration window, click the **Connectivity** tab at the bottom of the window.  
The Connectivity dialog box opens.
- 3.) Select the **TCPIP Tab**.
- 4.) Trackball to the **Advanced** tab and press the **Set** button on the control panel.

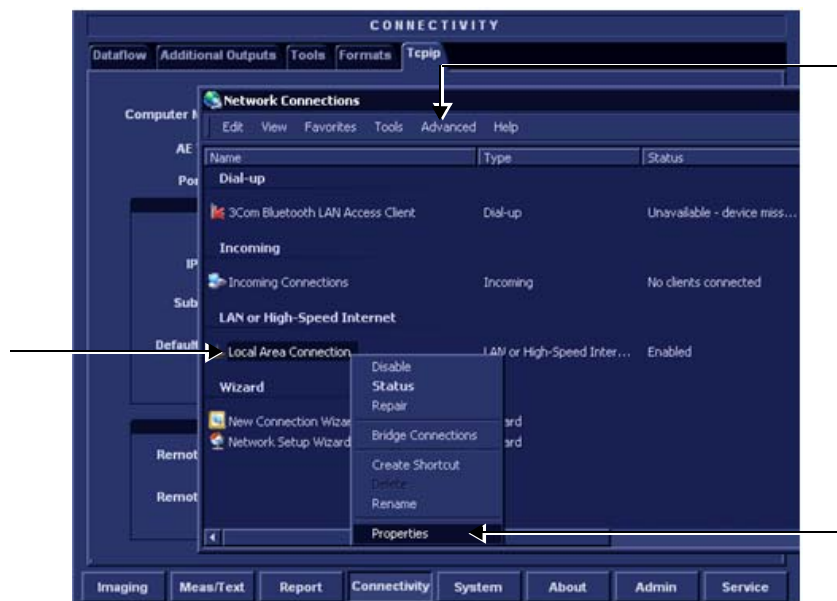


Figure 3-105 Connectivity Dialog Box - TCPIP Advanced Tab

- 5.) Select the **Local Area Connection**, as shown in [Figure 3-105](#).
- 6.) Press the **Menu** button on the control panel.
- 7.) From the drop-down menu, select **Properties**.

The Local Area Connection Properties dialog box opens.



Figure 3-106 Local Area Connection Properties

- 8.) Select **Internet Protocol (TCP/IP)**.
- 9.) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

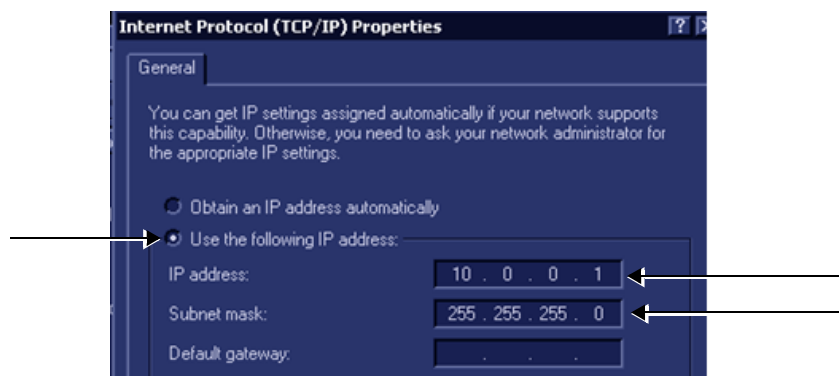


Figure 3-107 Internet Protocol (TCP/IP) Properties

- 10.) Activate the **Use the following IP address** check box.
- 11.) Type in the Vivid q N IP address **10.0.0.1**.

**NOTE:** The IP must be different from the IP address used for network computer.

- 12.) Type in the **Subnet mask 255.255.255.0**.

**NOTE:** The Subnet mask should be the same for both the network computer and the Vivid q N.

- 13.) Click **OK**
- 14.) Press the **Config** button on the control panel to close all windows and return to the regular scanning mode.

**NOTE:** The following steps are performed on the Network Computer.

- 1) On the network computer, access the Control Panel, as follows:

a.) Double-click on **My Computer** icon on desktop.



b.) Double-click on **Control Panel** icon.



2) Double-click on **Network Connections** icon.



3) Double-click on **Local Area Connection** icon.



The Local Area Connection Properties dialog box opens.

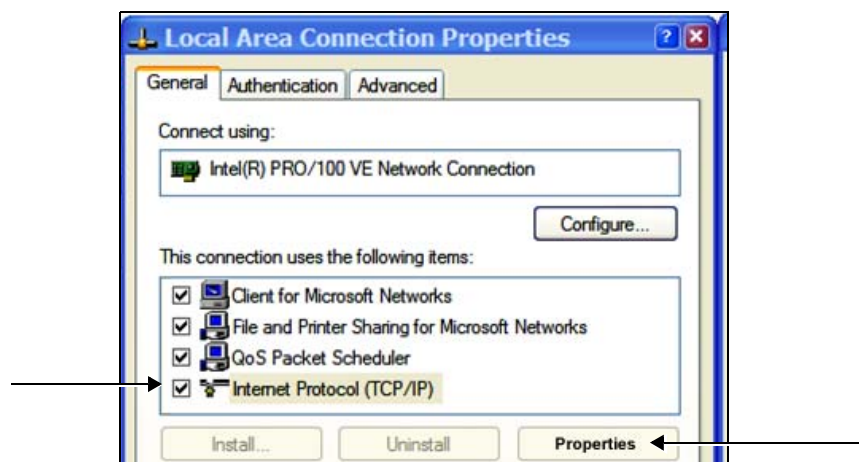


Figure 3-108 Local Area Connection Properties

4) Select **Internet Protocol (TCP/IP)**.

5) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

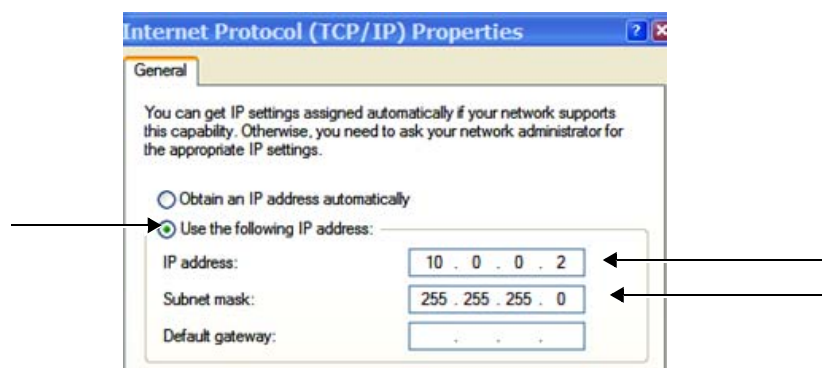


Figure 3-109 Internet Protocol (TCP/IP) Properties

6.) Activate the **Use the following IP address** check box.

7) Type in the network computer's **IP address 10.0.0.2**.

---

*NOTE: The IP address must be different from the one used for the Vivid q N system.*

8) Type in the **Subnet mask 255.255.255.0**.

*NOTE: The Subnet mask should be the same for both the network computer and the Vivid q N.*

9) Click **OK**, close all windows and approve all changes. Return to regular mode.

10) Connect the Vivid q N and network computer LAN connection using a cross over Network cable.  
(Normally with RED connector covers on both sides, cable not longer than 100 meters).

The Vivid q N and the network computer are now ready for export, import of files.

*NOTE: One can check the connection by pinging to the Vivid q N IP, as follows:*

a.) Select **<Start>**, **<Run>**

b.) Type **CMD**, then press **<Enter>**

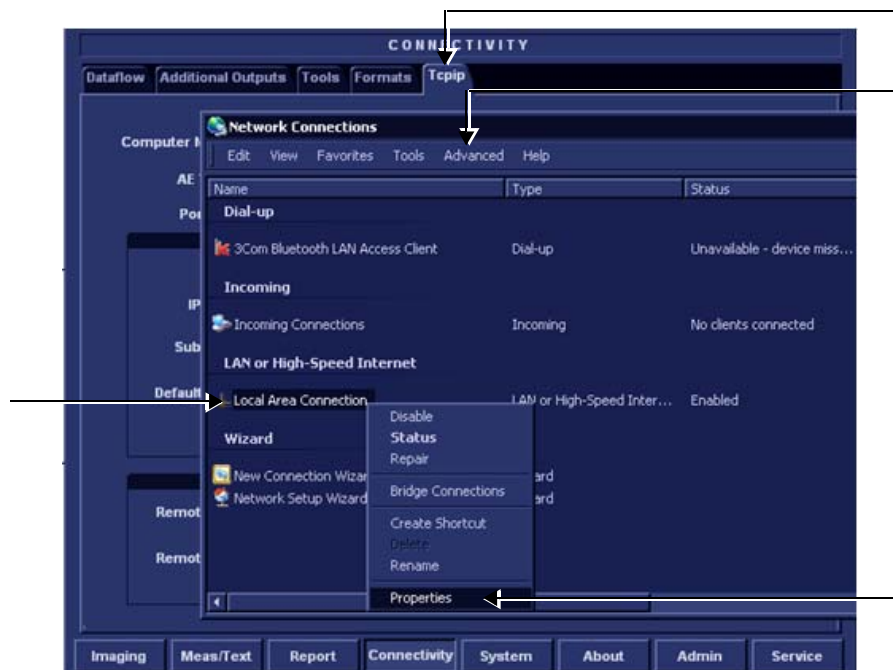
c.) Type **Ping** and **IP 10.0.0.1** for Vivid q N then press **<Enter>**.

If return timing is OK, you have an operating network connection.

### 3-10-3-9 Configuring the Vivid q N and Network PC for a LAN Connection

**NOTE:** The following steps are performed on the Vivid q N scanner.  
The instruction *Select = trackball to the specific item and press the Set button on the control panel.*

- 1.) On the Vivid q N control panel, press the **Config** button.
- 2.) From the System Configuration window, click the **Connectivity** tab at the bottom of the window.  
The Connectivity dialog box opens.
- 3.) Select the **TCPIP Tab**.
- 4.) Trackball to the **Advanced** tab and press the **Set** button on the control panel.



**Figure 3-110 Connectivity Dialog Box - TCPIP Advanced Tab**

- 5.) Select the **Local Area Connection**, as shown in [Figure 3-105](#).
- 6.) Press the **Menu** button on the control panel.
- 7.) From the drop-down menu, select **Properties**.

The Local Area Connection Properties dialog box opens.



Figure 3-111 Local Area Connection Properties

8) Select **Internet Protocol (TCP/IP)**.

9) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

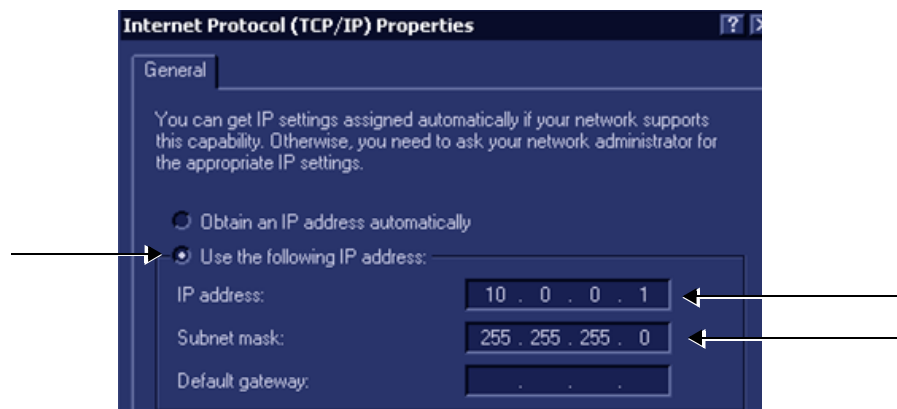


Figure 3-112 Internet Protocol (TCP/IP) Properties

10.) Activate the **Use the following IP address** check box.

11.) Type in the Vivid q N IP address **10.0.0.1** or the one provided by the local network administrator.

*NOTE:* The IP must be different from the IP address used for network computer.

12.) Type in the **Subnet mask 255.255.255.0** or the one provided by the local network administrator.

*NOTE:* The Subnet mask should be the same for both the network computer and the Vivid q N.

13.) Click **OK**

14.) Press the **Config** button on the control panel to close all windows and return to the regular scanning mode.

*NOTE: The following steps are performed on the Network Computer.*

- 1) On the network computer, access the Control Panel, as follows:

- a.) Double-click on **My Computer** icon on desktop.



- b.) Double-click on **Control Panel** icon.



- 2) Double-click on **Network Connections** icon.



- 3) Double-click on **Local Area Connection** icon.



The Local Area Connection Properties dialog box opens.



**Figure 3-113 Local Area Connection Properties**

- 4) Select **Internet Protocol (TCP/IP)**.
- 5) Click the **Properties** button.



The Internet Protocol (TCP/IP) Properties dialog box opens.



**Figure 3-114 Internet Protocol (TCP/IP) Properties**

- 6.) Activate the **Obtain an IP address automatically** check box.
- 7) Click **OK**, close all windows and approve all changes. Return to regular mode.
- 8) Connect the Vivid q N and network computer LAN connection using a regular Network cable.

The Vivid q N and the network computer are now ready for export, import of files.

**NOTE:** One can check the connection by pinging to the Vivid q N IP, as follows:

- a.) Select **<Start>**, **<Run>**
- b.) Type **CMD**, then press **<Enter>**
- c.) Type **Ping** and **IP 10.0.0.1** for Vivid q N then press **<Enter>**.

If return timing is OK, you have an operating network connection.

## 3-10-4 Set Up Connection to a DICOM Server in a Network

In this case, the Vivid q N is configured to work with a DICOM server in a network environment. Images are first saved on the local image buffer on the scanner. At the end of the examination, the images are sent to the DICOM server via a DICOM spooler.

This scenario requires that the scanner is configured to be connected to the DICOM server as described below.

### 3-10-4-1 Overview

To work against the DICOM server, the following information has to be entered in the scanner:

- DICOM server IP address, subnet mask and eventually the gateway.
- DICOM server port number.
- DICOM server AE title (the server application's name).
- Name of Device.

### 3-10-4-2 DICOM Server IP Address Setting on the Scanner

- 1.) Press **CONFIG (F2)** and log on as *Adm*, as described in "Log On to the System as ADM" on page 4-10.
- 2.) Select **CONNECTIVITY** (in the lower part of the window).
- 3.) Select the **DATAFLOW** tab.
- 4.) Select the arrow to the right of the Name field to list all dataflows in a pull-down menu, see Figure 3-115.

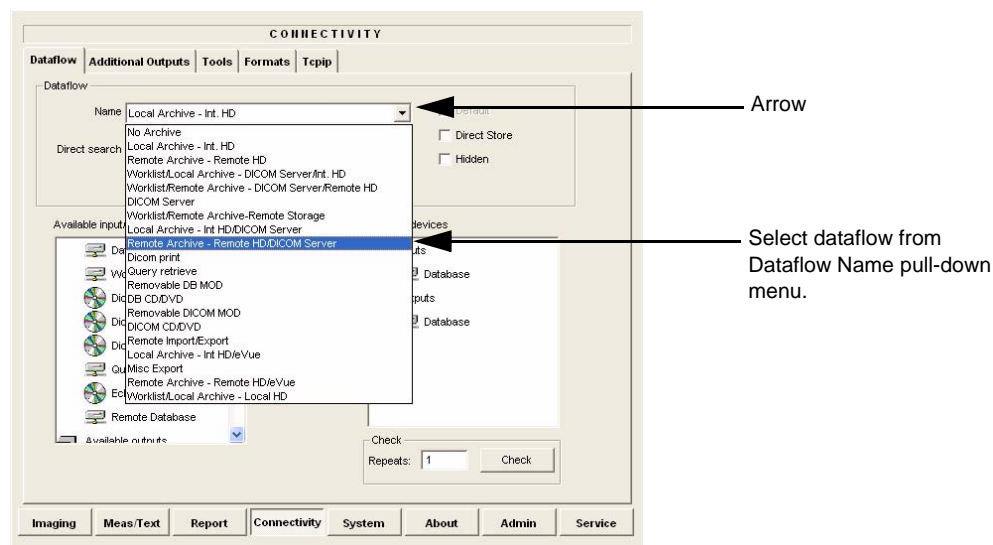
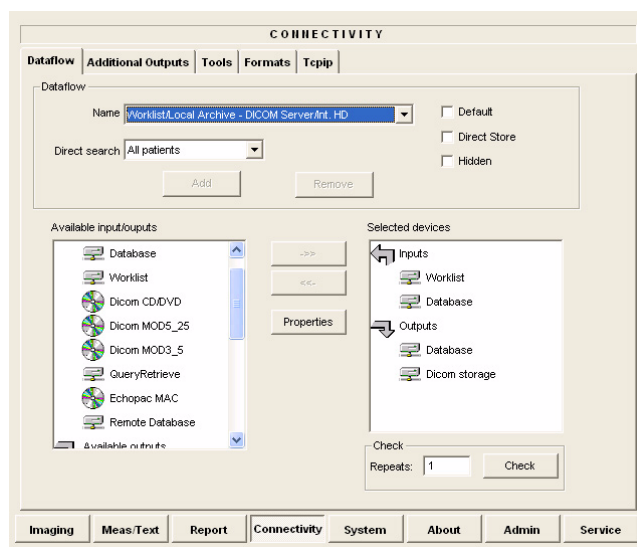


Figure 3-115 Select Dataflow

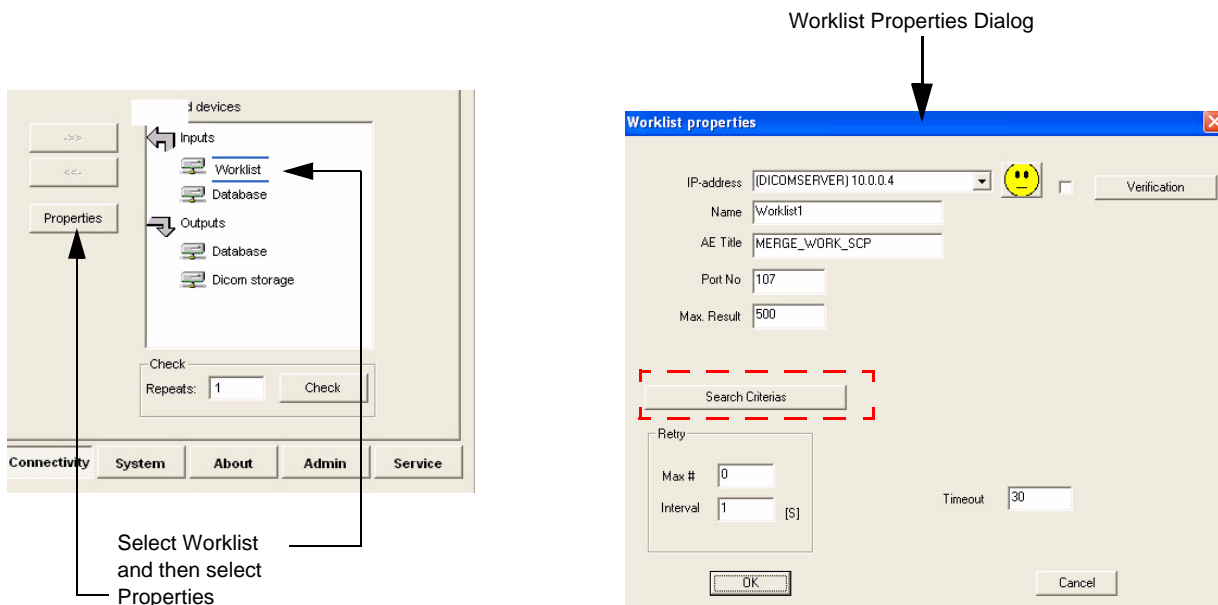
- 5.) From the Dataflow Name pull-down list, select the dataflow you want to configure - see Figure 3-115.

The selected flow is shown, as seen in the example in [Figure 3-116 below](#) (Worklist/Local Archive - DICOM Server/Int. HD).



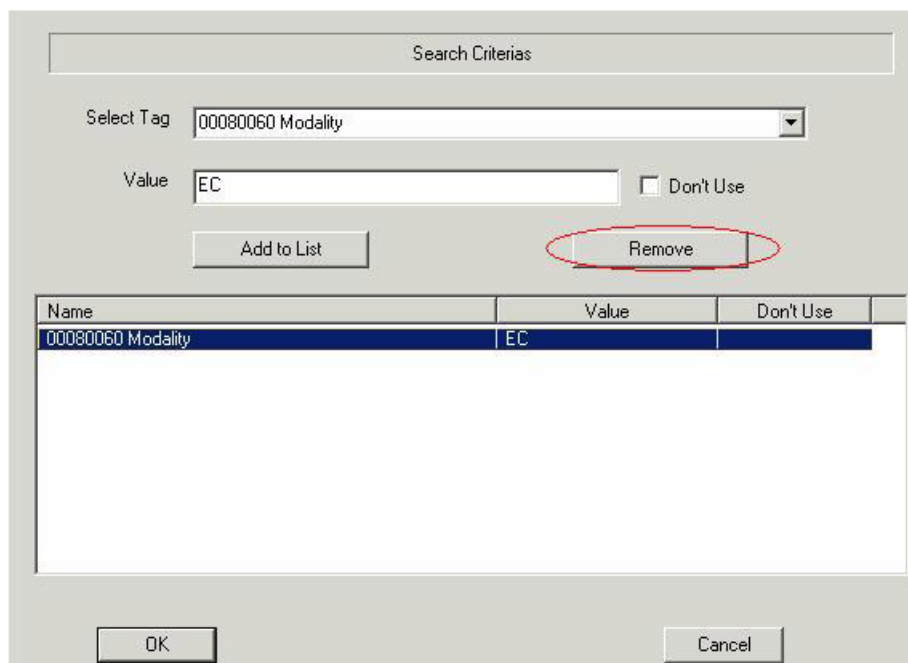
**Figure 3-116 Worklist/Local Archive - DICOM Server/Int. HD Flow**

- 6.) Select **Worklist** (so it is highlighted) and then select **Properties** to display the Properties dialog.



**Figure 3-117 Select Worklist Properties Dialog Box**

- 7.) Click on "**Search Criterias**" (Figure 3-117).  
*The Search Criterias window opens (Figure 3-117).*
- 8.) Highlight the modality filter in the list and click on "**Remove**" (see Figure 3-117).



**Figure 3-118 Search Criterias Window**

- 9.) In the Select Tag drop down menu select "**00080060 Modality**".
- 10.) Type **US** in the Value text box and click on "**Add to List**".

*The Search Criterias window is updated (see [Figure 3-118](#)).*

The screenshot shows a window titled "Search Criterias". At the top is a text box. Below it, there is a "Select Tag" dropdown menu with "00080060 Modality" selected. To the right of the dropdown is a "Value" text box containing "US". To the right of the "Value" text box is a checkbox labeled "Don't Use" which is unchecked. Below these fields are two buttons: "Add to List" and "Remove". At the bottom of the window is a table with three columns: "Name", "Value", and "D..". The table contains one row with "00080060 Modality" in the "Name" column and "US" in the "Value" column. Below the table are two buttons: "OK" and "Cancel".

Name	Value	D..
00080060 Modality	US	

**Figure 3-119 Search Criterias Window - Updated**

- 11.) Click **OK** to close the window.
- 12.) From the *Worklist Properties* Dialog, select the IP-Address down-arrow to choose the Worklist Server from the pull-down menu.

**NOTE:** *It is not possible to change the setting in the IP-Address field by editing it. See description below, starting with step [13](#), to change the setting.*

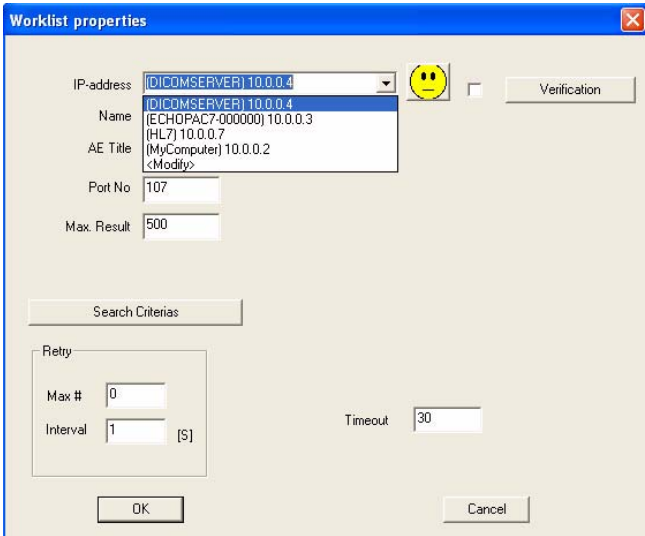


Figure 3-120 DICOM Server's Properties Dialog Box

- 13.) Follow the steps below to change the IP-Address settings:
- a.) From the IP-Address pull-down menu, select **<Modify>** to display the IPs dialog box.

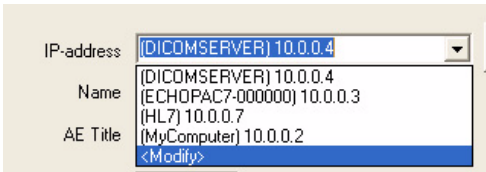


Figure 3-121 Select <Modify>

- b.) From the IPs dialog box, select the server you want to modify, then select **Modify**.

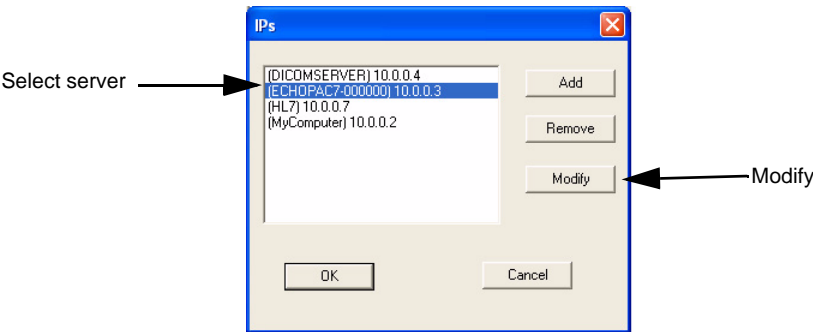
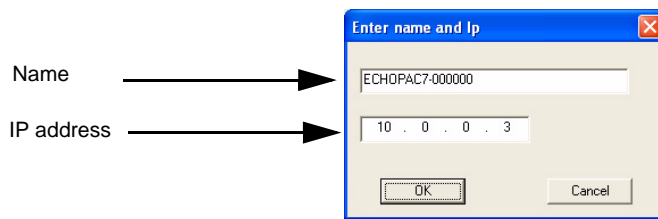


Figure 3-122 Select the Unit to Modify

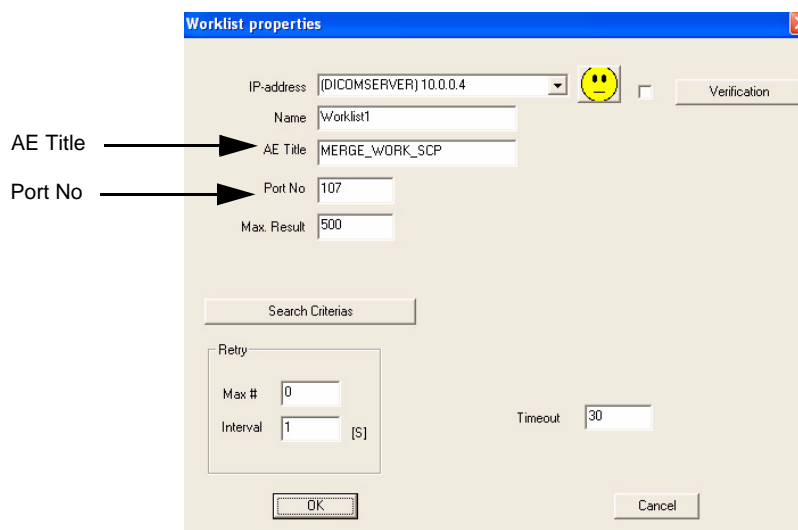
c.) Edit the name and/or the IP address of the server, see [Figure 3-123](#).



**Figure 3-123 Edit Name and/or IP address**

d.) Click **OK** to save the new settings and close the Edit Name dialog box.

e.) Click **OK** to close the IPs dialog to return to the Properties dialog box.



**Figure 3-124 DICOM Server's Properties Dialog Box**

f.) Enter the DICOM server AE Title. This entry is case-sensitive and must match exactly.

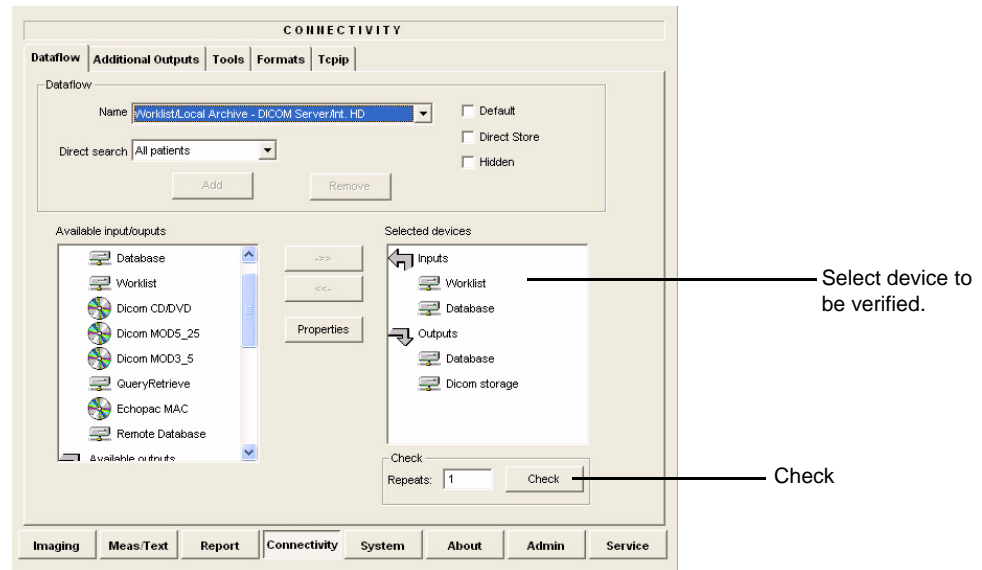
g.) Enter the DICOM server port.

h.) For some DICOM Servers, the default Time-out setting (30) is too low. Change if necessary by typing a new value (seconds).

i.) Click **OK** to close the Worklist Properties dialog box and save the changes.

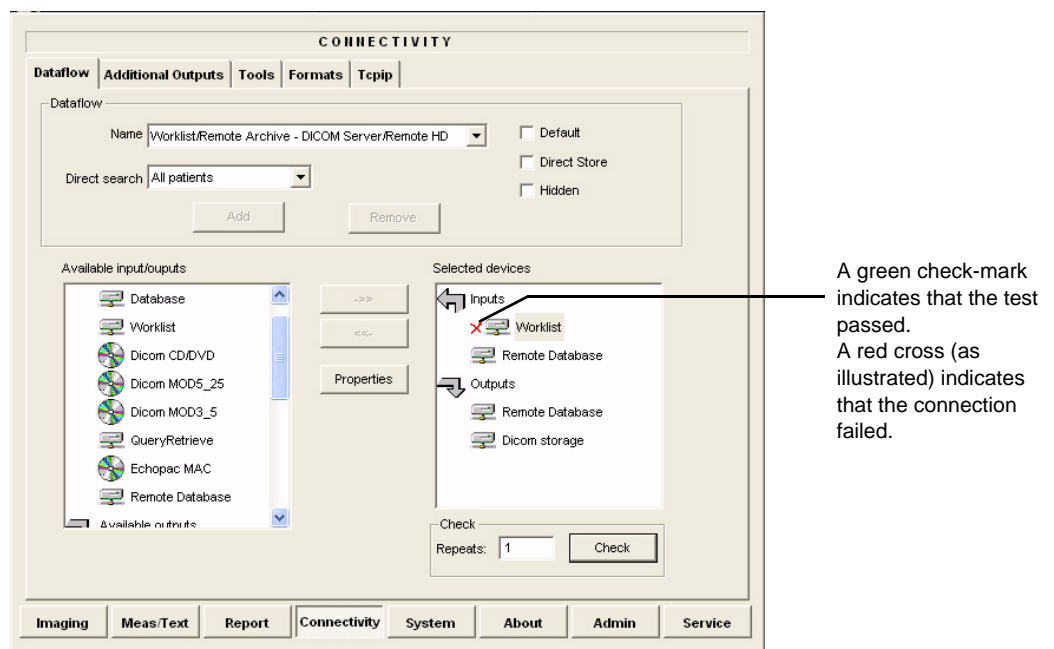
### 3-10-4-3 Verify the Connection to a Device

- 1.) Select (highlight) the device to which you want to verify the connection.



**Figure 3-125 Verify Connection to a Device**

- 2.) Select CHECK to start the connection to the device verification process.  
The verification process may require up to one minutes. When done, a sign (prefix) displayed in front of the listed device indicates whether the test passed (green check-mark) or failed (red X).



**Figure 3-126 Verification Result**



---

## 3-10-5 Setup Connection to HL7 Server in a Network

### 3-10-5-1 Introduction

The procedures below describe how to set up the Vivid q N workstation so it can connect to the Hospital Information System (HIS), via the Vivid HL7 Gateway. By connecting to the HIS, demographic information (i.e. *Patient ID, Name, Gender, etc.*) can be retrieved from the HIS, reducing “double-work” and typing errors. Patient Reports can be sent back to the HIS for storage, together with the rest of the Patient records.

### 3-10-5-2 Preparations

1.) Before you can set up the HL 7 Communication, you need to collect some information:

- The IP address of the Vivid HL7 Gateway
- Port Number used by the Vivid HL7 Gateway (Default port: 3320)

Typically, source for this information is the Mitra support personnel.

The "[Connectivity Installation Worksheet](#)" on [page 2-10](#) can be used for gathering this information.

2.) Provide the computer name of each EchoPAC PC Workstation and Vivid q N being configured to the Mitra support personnel.

### 3-10-5-3 Configuration of Modality Worklist Services

---

#### ***Identify Dataflow to be Used***

- 1.) Identify which dataflow is to be used at the site. If the DICOM Modality Worklist will be used, then the dataflow must include a Worklist service.
- 2.) On the Connectivity screen, select the **Dataflow** tab.
- 3.) From the pull-down menu, select the name of the site's dataflow.
- 4.) In the *Services* section, locate the **Worklist** service.
- 5.) Record the service's name and destination device.

---

#### ***Configure the DICOM Worklist Service***

- 1.) Select the **Services** tab.
- 2.) Select the Worklist destination device from the pull down menu.
- 3.) Enter the IP address of the Vivid HL7 Gateway.
- 4.) Enter a descriptive name in the Name field.  
(Example: Vivid HL7 Gateway. The use of this field is optional).
- 5.) Enter AE Title. Use the Computer Name for the unit you are configuring.
- 6.) Enter Port Number. (Port 3320 is the default, but Mitra may have provided another port number).
- 7.) Set Time-out to 90.
- 8.) Leave the rest of the fields unchanged.

---

#### ***Configure the Search Criterias***

**NOTE:** *This configuration is required.*

- 1.) Click the **Search Criterias** button.
- 2.) Select the criteria **Modality** and click the **Remove** button.
- 3.) Press the **OK** button.

---

### ***Configure Search Criteria: Constrain Query by AE Title***

**NOTE:** *This configuration is optional. It should only be performed if the site is directing orders to the Vivid q N that is scheduled to perform the study.*

Please contact the Mitra support personnel to verify that this step is needed.

- 1.) In the *Search Criteria*s dialog box, select **00400001 Scheduled Station AE Title** from the *Select Tag* pull-down menu.
- 2.) Enter the Vivid q N computer name for the Value.
- 3.) Click the **Add to List** button.
- 4.) Click the **OK** button.

---

### ***Configure Search Criteria: Constrain Query by MRN***

**NOTE:** *This configuration should be performed if the site will need to constrain the Worklist queries by MRN (patient id)*

- 1.) In the *Search Criteria*s dialog box, select **00101000 Other Patient IDs** from the *Select Tag* pull-down menu.
- 2.) Enter a 9 digit number for the Value.
- 3.) Click the **Add to List** button.
- 4.) Click the **OK** button.

---

### ***Assign DICOM Worklist name to Dataflow***

- 1.) Select the Dataflow tab.
- 2.) From the *Dataflow name* pull-down menu, select the Dataflow which will be used.
- 3.) Remove the DICOM Worklist service currently used in the Dataflow.
- 4.) From the *Select Service* pull-down menu, select the **Gateway Modality Worklist** service.
- 5.) Click the **Add** button.
- 6.) Ensure that the service is displaying the value **In** for the Dir parameter and that its role is **Primary**.

---

### ***Test Connectivity with the Vivid HL7 Gateway***

The purpose of this test is to verify that the Vivid q N has connectivity with the Vivid HL7 Gateway.

- 1.) From either the Current or Dataflow view, expand the Dataflow incorporating the Gateway Modality Worklist service.
- 2.) Expand the Gateway destination device.
- 3.) Select the **Gateway Modality Worklist** service.
- 4.) Click the **Check** button.
  - If connectivity was achieved, then a green check should be displayed next to the name of the Gateway's Modality Worklist service.
  - If connectivity was not achieved, then there will be a red X next to the name of the Gateway's Modality Worklist service.

---

### ***Troubleshoot Connectivity with the Gateway***

If connection between the Vivid q N and the HIS failed, the following are typical causes:

- 1.) No network connection.
- 2.) IP address and/or port number was incorrectly entered when configuring the Gateway Modality Worklist service.
- 3.) Mitra support personnel have not yet configured the Gateway to accept Modality Worklist queries from the Vivid q N.

Verify that the Vivid q N computer name matches the value specified for the Gateway Modality Worklist service and that it also matches the value supplied to the Mitra support personnel.

---

### ***Configure the Export to HL7 Path***

- 1.) Enter the configuration screen for the EchoPAC PC.
- 2.) Press the **Connectivity** button.
- 3.) Select the **Tools** tab.
- 4.) In the section labeled *Export Paths*, make the following changes:
  - a.) For the Export To HL7 path, enter the following information:  
\\ < Name or IP Address of the Vivid HL7 Gateway>\POLL\_DIR  
Example: \\Gateway\POLL\_DIR
  - b.) Verify that Text is select for the Export file format.

---

### ***Test Connectivity with the Vivid HL7 Gateway***

- 1.) Start a new study and acquire an image, or use an existing study.
- 2.) In the Measurements mode, make some of the measurements.
- 3.) In the Report screen, create and store a report.
- 4.) In the Patient screen, from the Examination List, select the study in which you created the report.
- 5.) From the *More* pull-down menu, select **HL7 Results**.

If the export was successful, the following message is displayed:

*Export exam status: OK.*

If the export was unsuccessful, the following message (or similar) is displayed:

*Export exam status: Unable to copy file.*

---

### ***Troubleshoot Connectivity with the Vivid HL7 Gateway***

If Connectivity with the Vivid HL7 Gateway failed, the following are typical causes:

- 1.) Path provided in Export to HL7 export path was incorrect.
- 2.) Mitra support personnel did not create the user account for the Vivid q N.
- 3.) The POLL\_DIR directory on the Vivid HL7 Gateway was not shared or the permissions are incorrect. Verify with Mitra support personnel.
- 4.) Domain or other network issue.
- 5.) If Report files (ReportXXX.chm) are not exported to the Vivid HL7 Gateway, then the reports may not have been stored when they were created on the Vivid q N.

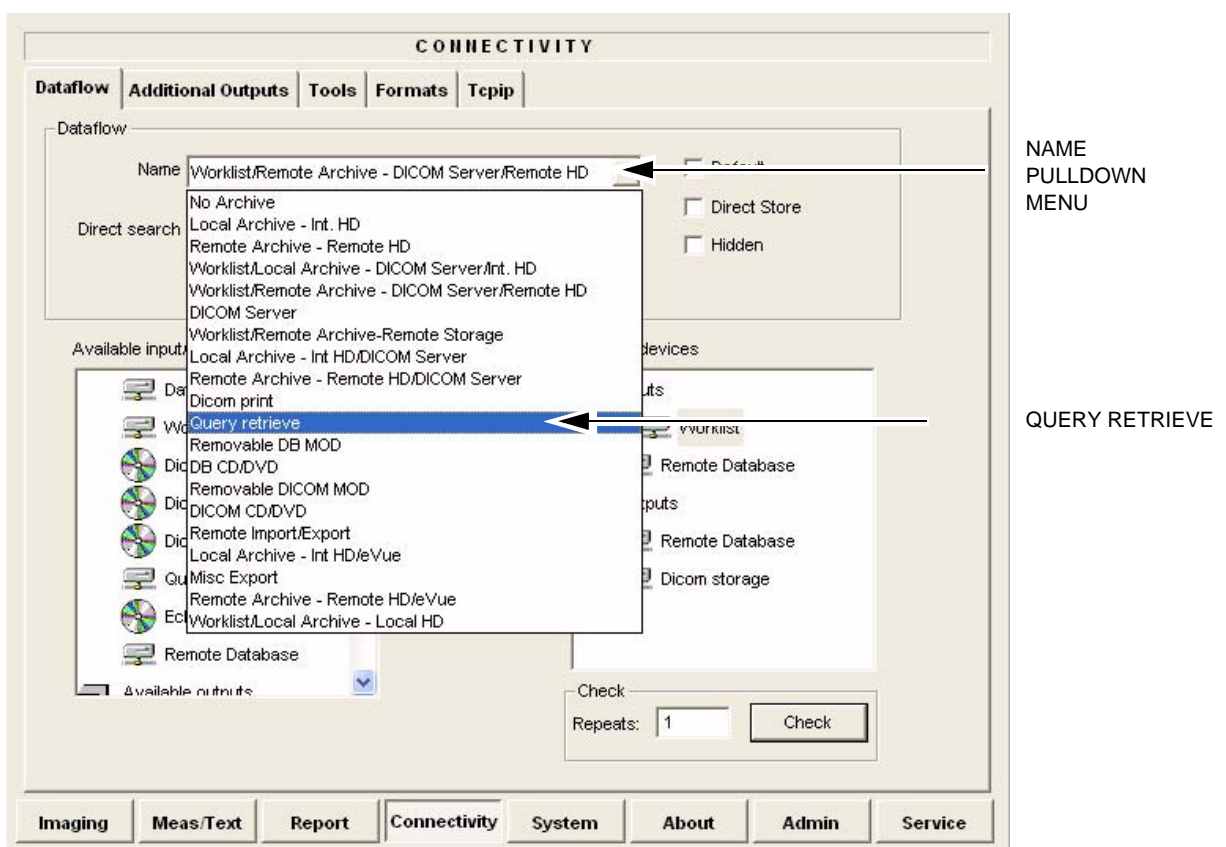
## 3-10-6 Query/Retrieve (Q/R) Setup

### 3-10-6-1 Overview

The Query/Retrieve function makes it possible to search for and retrieve DICOM data from a DICOM server for further analysis on the Vivid q N.

### 3-10-6-2 Query/Retrieve Setup on the Vivid q N

- 1.) Press **CONFIG** (**F2**) and log on as *Adm*, as described in "Log On to the System as ADM" on page 4-10.
- 2.) Select **Connectivity**.
- 3.) Select **Dataflow**.
- 4.) Select **Query Retrieve** from the *Name* pull-down menu - see Figure 3-129 on page 3-121.



**Figure 3-127 Select Query Retrieve**

The selected dataflow (Query/Retrieve), is displayed as shown in Figure 3-128.

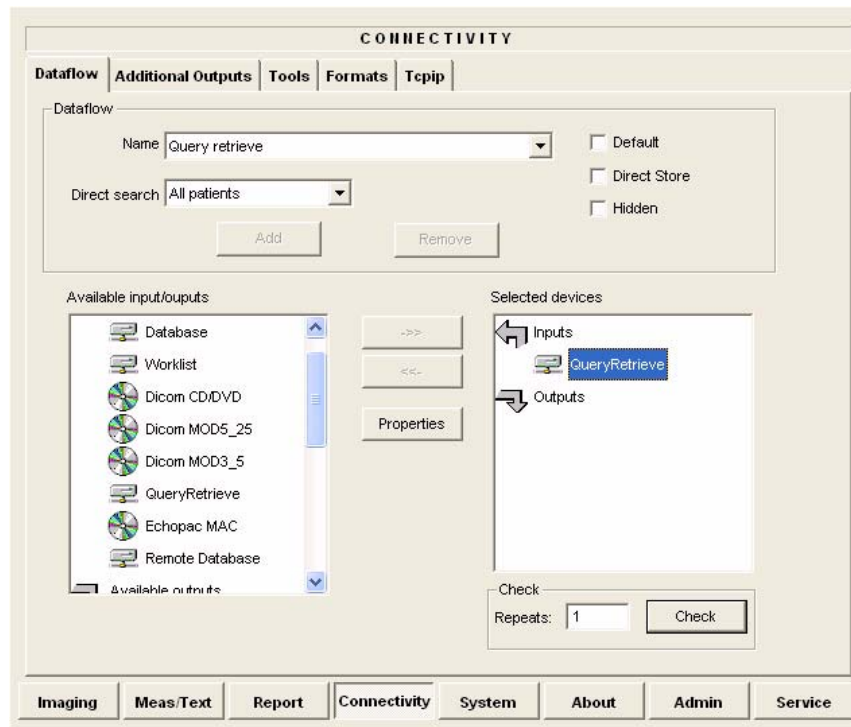
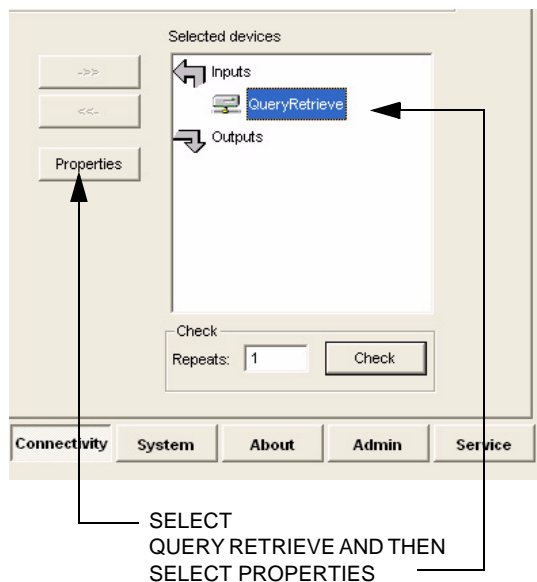


Figure 3-128 Query/Retrieve Workflow

- 5.) Select **QueryRetrieve** so it is highlighted and then select **Properties** to display the Properties dialog box.



QUERY RETRIEVE  
PROPERTIES DIALOG

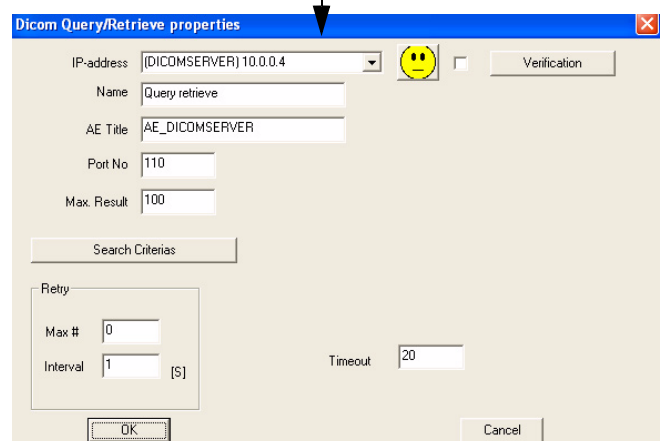


Figure 3-129 Select Query/Retrieve's Properties

Dicom Query/Retrieve properties

IP-address: (DICOMSERVER) 10.0.0.4

Name: Query retrieve

AE Title: AE\_DICOMSERVER

Port No: 110

Max. Result: 100

Search Criterias

Retry

Max #: 0

Interval: 1 [S]

Timeout: 20

Verification

OK

Cancel

IP-ADDRESS DOWN-ARROW

AE TITLE

PORT NO

**Figure 3-130 DICOM Query/Retrieve properties**

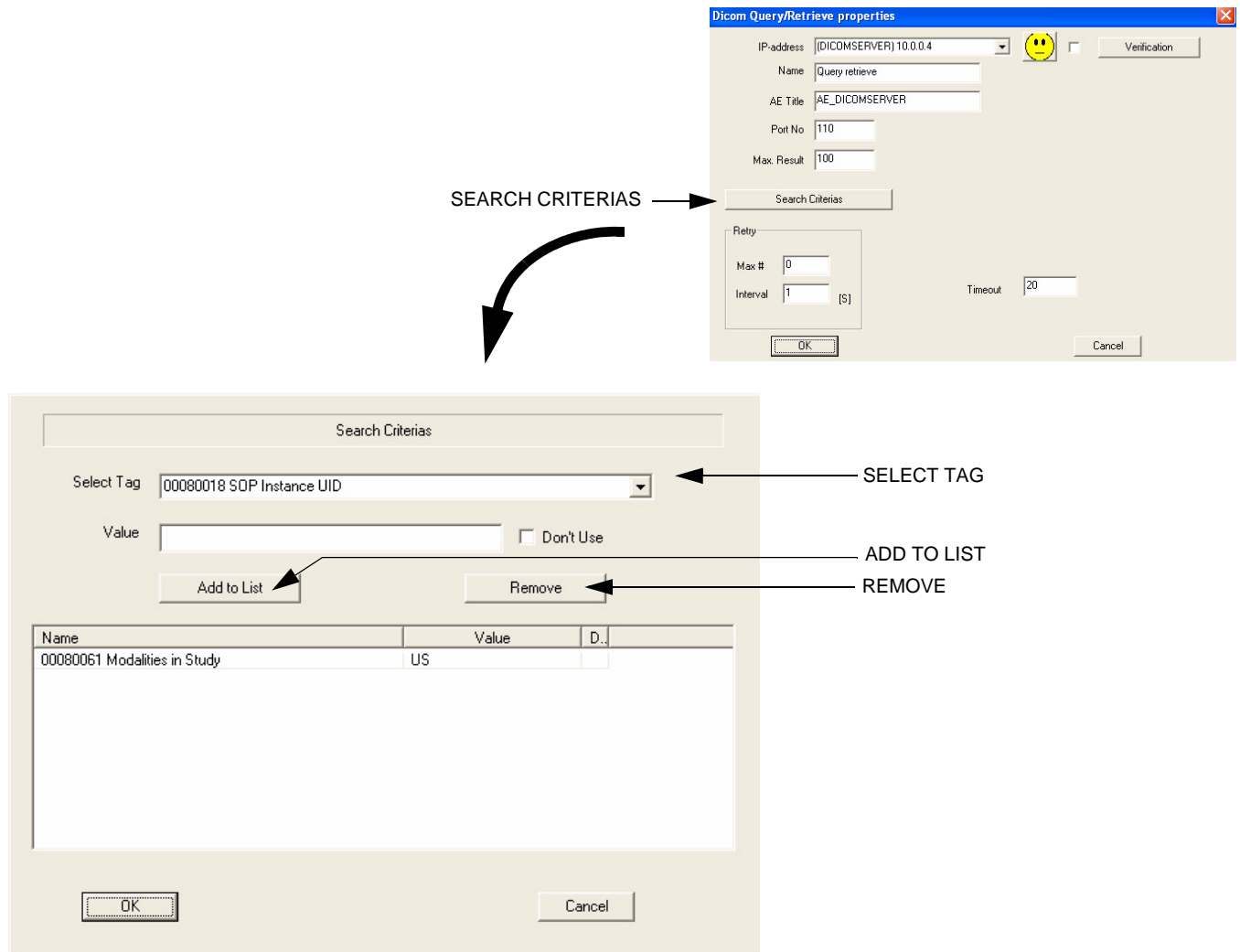
- 6.) Select the IP-address down-arrow to choose the DICOM Query/Retrieve server from the pull-down menu. In some cases, the server to use is the same as used for DICOM Storage.  
If the server to use is missing from the list, select **<Modify>** from the pull-down menu and edit the setup for one of the predefined servers.
- 7.) Enter the correct AE Title and Port Number for the DICOM Query/Retrieve server in the respective fields in the Query/Retrieve screen.

### ***Change Search Criterias***

It is possible to set up special Search Criterias for DICOM Query/Retrieve. In most cases you may leave the Search Criterias as is, and skip this adjustment.

Follow the steps below to change the Search Criterias parameters:

- 1.) Select Search Criterias



**Figure 3-131 Select Search Criterias**

- 2.) Select the correct tag from the *Select Tag* pull-down menu.
- 3.) If needed, type in the value.
- 4.) Select **Add to List**.
- 5.) Click **OK** to close the Search Criterias window.

### 3-10-6-3 Query/Retrieve Verification

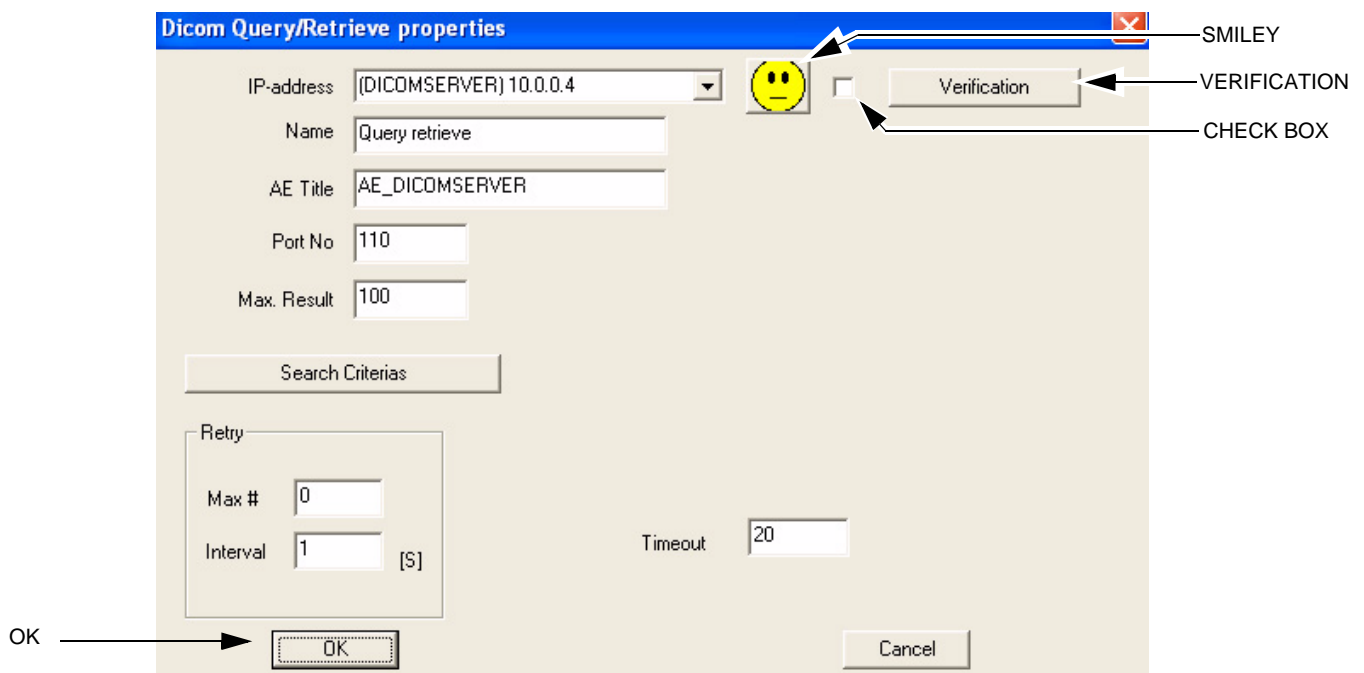


Figure 3-132 DICOM Query/Retrieve Properties

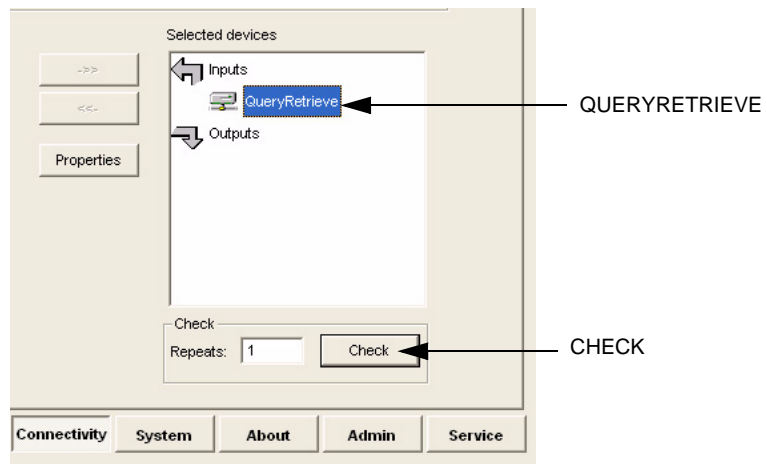
***Follow the Steps Below to do a First Test (Ping) of the Connection***

- 1.) Select the Smiley button to Ping the server.
- 2.) If the network connection to the server is OK, it will be illustrated by a smiling Smiley 😊. A sad Smiley indicates that the network connection is failing.  
*Typical cause:* Network cable not connected.
- 3.) When ready, click **OK** to close the DICOM Query/Retrieve properties and save changes.



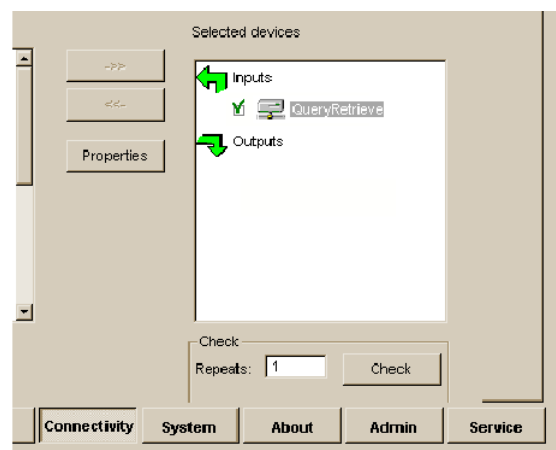
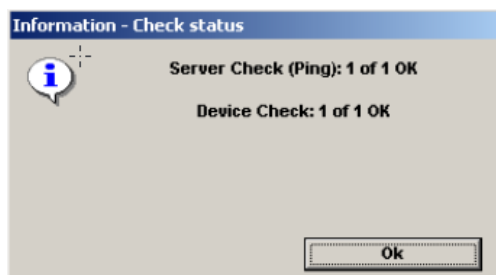
**Follow the Steps Below to Test the DICOM Query/Retrieve Workflow**

**NOTE:** This check uses both Ping and DICOM Ping.



**Figure 3-133 Check the DICOM Query/Retrieve Workflow**

- 1.) Select **QueryRetrieve** from the Selected devices list.
- 2.) Select **Check**.
  - If the test passes, a pop-up dialog is displayed, see left illustration in [Figure 3-134](#). Select **OK** to continue. A green check mark to the left of the Selected devices indicates that the test passed successfully.



**Figure 3-134 Test (Check) Passed**

- If the test fails, a pop-up warning is displayed, see left illustration in [Figure 3-135](#).  
Select **OK** to continue. A red "X" to the left of the Selected devices indicates that the test failed.

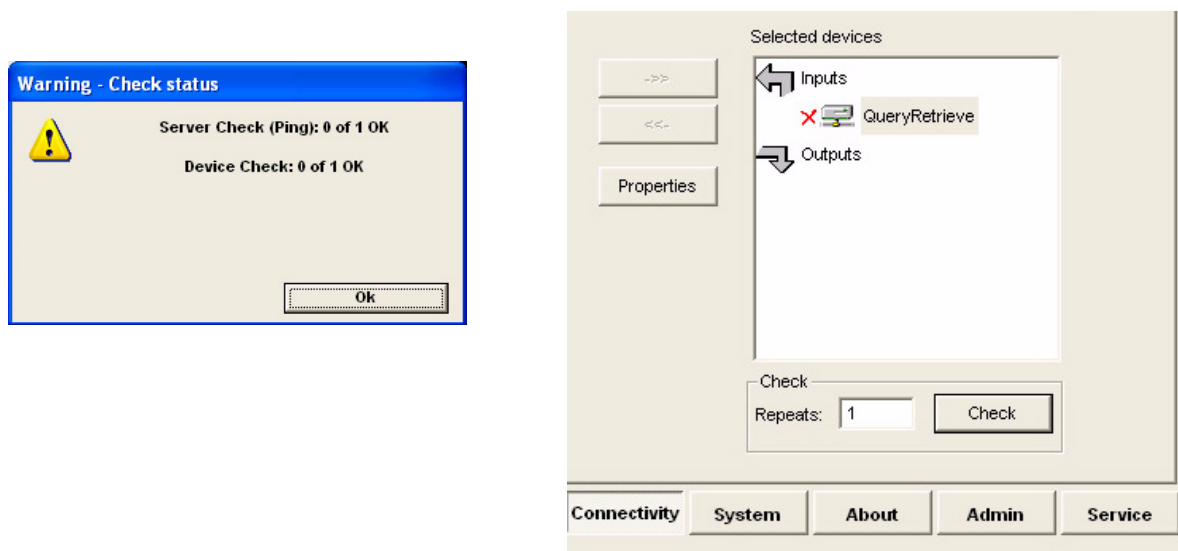


Figure 3-135 Test (Check) Failed

---

## **3-10-7 MPEGVue Export Configuration**

### **3-10-7-1 Introduction**

The procedures below describe how to set up the Vivid q N portable ultrasound scanner for MPEGVue export. This provides the user with the ability to export an entire patient exam into standard supported media (such as, CD, DVD, or USB Memory Stick [disk-on-key]) in standard MPEG or JPG format. The exported exam can later be read on any PC.

Media containing one or several patient exams in MPEGVue format is easily generated on the Vivid q N. When exporting data from the system for this purpose, the exported examination contains files in HTML, MPEG and JPG formats for all of the images in the exam. It also contains measurements and reports generated and saved during the exam; the reports are all saved as files in .CHM format.

Any media generated as MPEGvue also contains an embedded MPEGVue viewer, allowing the user to view it on any PC without having to install any additional software.

The exported exam may be viewed on any PC operating on Windows 2000, 2003, Windows XP or Windows Vista.

This can prove useful in many situations - for example, when sending patient data for a second opinion, for academic lectures, conferences, presentations, *etc.* Another way of using this feature is to directly provide the patient with an MPEGVue disk (CD or DVD) containing, for example, an OB exam.

### **3-10-7-2 Preparations**

Obtain local IP addresses that will allow you to set up the system and the remote computer properly. This information is available from the local system administrator.

### 3-10-7-3 Configuring the Vivid q N for MPEGVue Export

- 1) Press the **Config** (or **F2**) button and log on as *Adm*, as described in ["Log On to the System as ADM" on page 4-10](#).
- 2.) Select **Connectivity**.
- 3.) Select **Dataflow**.
- 4) From the drop-down menu, select **Misc Export** - see [Figure 3-136](#).

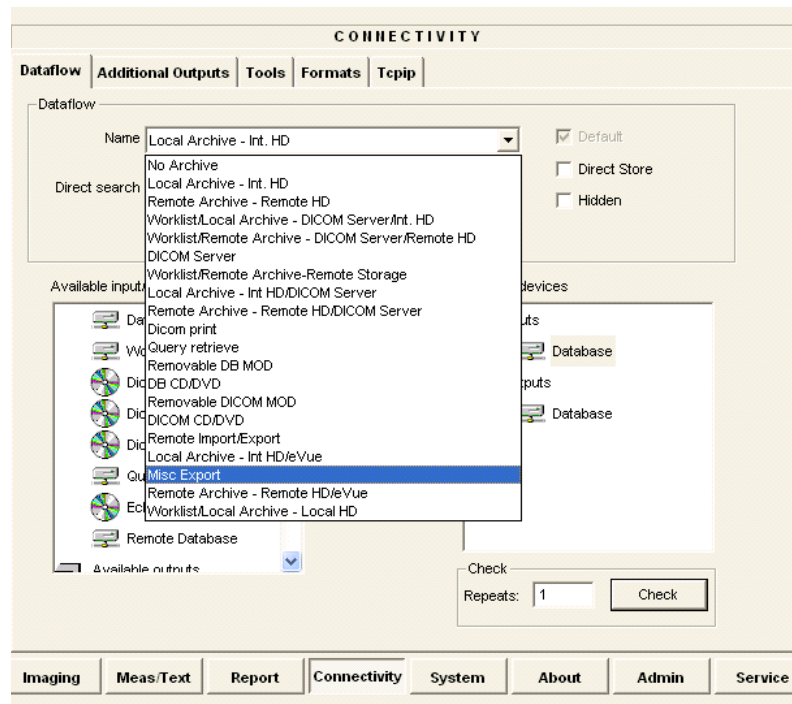
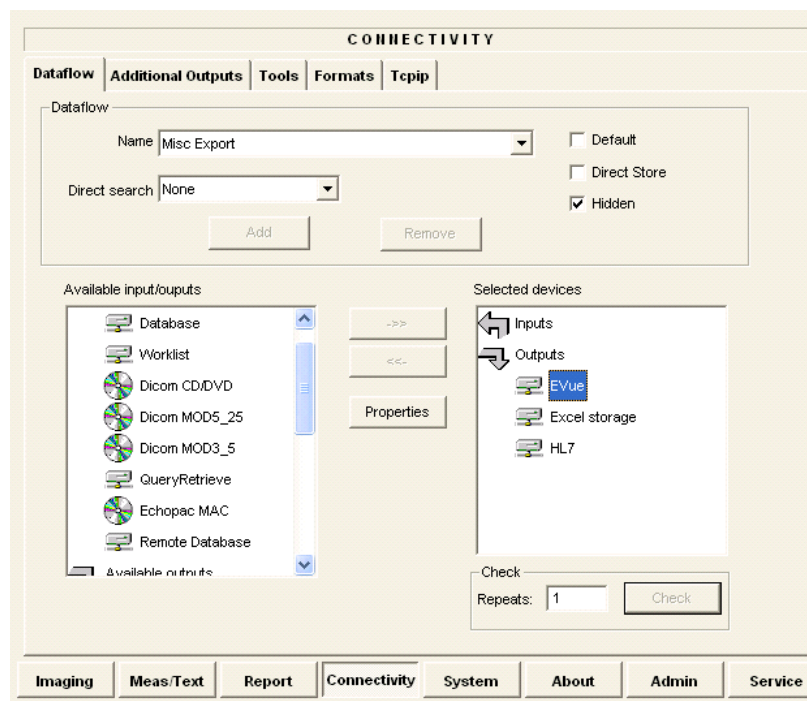


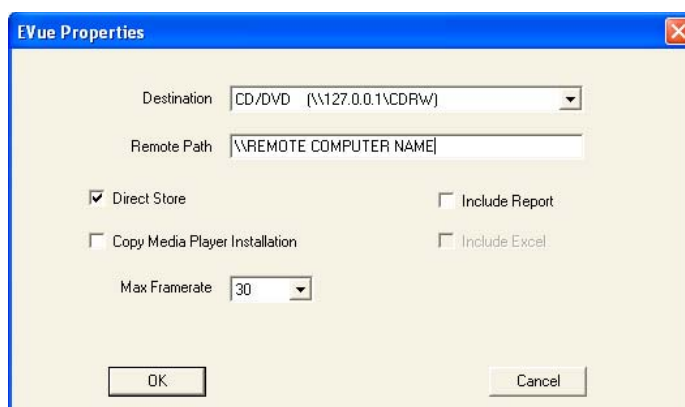
Figure 3-136 Dataflow - Misc Export

- 5) From selected output devices, highlight **evue** and then click the **Properties** button - refer to [Figure 3-137 on page 3-129](#).



**Figure 3-137 eVue Properties**

The eVue Properties Dialog box opens:



**Figure 3-138 eVue Properties Dialog Box**

- 6) In the *Remote Path* field, type in the path to which you want to export MPEGVue (when this feature is used).

**NOTE:** *If the destination is a constant IP, you can type either the remote computer name or the remote computer's ID address in the Remote Path field. After the path has been typed, it is available for selection from the Dataflow Name drop-down menu (or you can select an existing path from this menu).*

- 7) Activate the **Copy Media Player Installation** check box.

**NOTE:** *Step 7 is recommended for the first transfer of MPEGVue files. This step is not needed for Windows XP. After initial transfer of MPEGVue, it is recommended to disable this check box.*

### 3-10-7-4 Exporting to MPEGVue

When exporting to MPEGVue, the Media can be one of the following supported types:

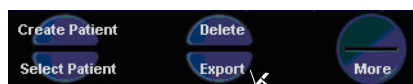
- CD
- MOD
- USB Memory stick (disk-on-key)

- 1.) Insert the required media into the appropriate drive (or USB port), when applicable.
- 2.) From the main screen, trackball to the **Patient** button and press SET.
- 3.) End the current exam (if still open), and select **Patient-List**.

The Patient List will be displayed with the following header:



- 4.) Trackball to the **Export** softkey in the bottom menu shown below and press SET.



The Export dialog box opens.



**Figure 3-139 Export Dialog Box**

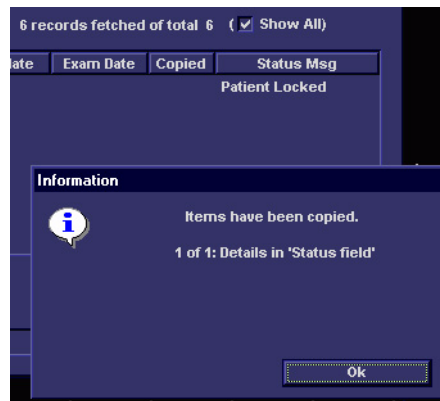
- 5.) Under Export *To*: select **To MPEGVue** in the combo-box on the right, as shown in [Figure 3-139](#).
- 6.) Click **OK**.

The Patient List screen is displayed with the following header:



- 7.) Trackball to the required Patient File and select it by pressing SET.  
To select more than one Patient File from list, use the <Shift> key together with SET
- 8.) When ready, after the required Patients Files have been selected (highlighted,) press the **COPY** button.

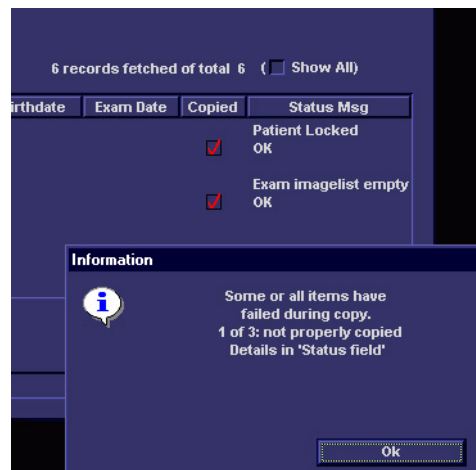
The selected files will be converted and copied into the selected media. When done, the following message is displayed:



9.) If required, click **OK** then select any additional Patient Files for export.

10.) When export complete, click **OK** then remove the media containing the exported MPEGVue data from the Vivid q N system.

**NOTE:** *If any problems occurred with copying the Patient Files during the export process, an error message such as the one below will be displayed, showing the status of each of the transferred Patient Files.*



## 3-10-8 eVue Dataflow Configuration

### 3-10-8-1 Introduction

It is possible to configure the Vivid q N portable ultrasound scanner to allow the user to send images or loops to a remote PC, in almost real time. When pressing Store, the loop will save not only to the local archive (in raw-data format), but will also be transmitted to a designated PC ("e-Vue PC") on the network (in compact MPEG format), and will appear at the review PC within a very short time.

This feature proves very useful in the OR scenario, where consultation with another doctor in the hospital *in real-time* is required.

### 3-10-8-2 Preparations

Before configuring the Vivid q N for eVue dataflow, it is necessary to decide upon a specific PC in the hospital as being the e-Vue PC station. The service technician then configures the Vivid q N to send images to that specific e-Vue PC, as described below.

### 3-10-8-3 Configuring the Vivid q N for eVue Dataflow

- 1.) Verify which PC in the hospital/institute has been designated as the e-Vue station.
- 2.) Make sure the Vivid q N is connected to the Network via cable or wireless.
- 3.) On the Vivid q N scanner, press the **Config** button.

The System Configuration window opens.

- 4.) Click **Connectivity**.

The Connectivity dialog box opens.

- 5.) Select the **Dataflow** Tab, as shown in [Figure 3-140 on page 3-133](#).



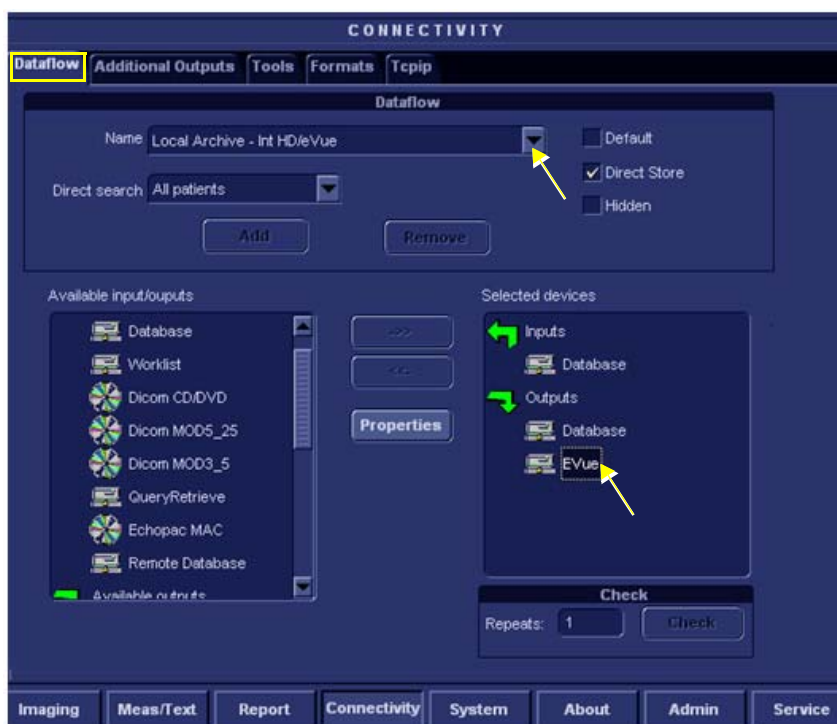


Figure 3-140 Connectivity - Dataflow Tab Selected

- 6.) Click on the **Name** field to access the drop-down menu.
- 7.) From drop-down menu, select the Dataflow named **Local Archive – Int. HD/eVue**.
- 8.) Trackball to the *Selected devices* window and select (highlight) **eVue** (see [Figure 3-140](#)).
- 9.) Trackball to the **Properties** button and press **SET**.

The eVue Properties dialog box opens.

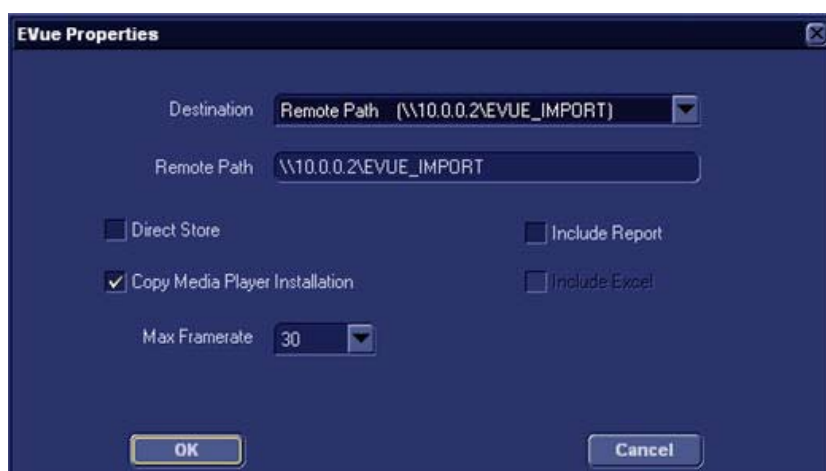


Figure 3-141 eVue Properties Dialog Box

- 10.) Trackball to the *Remote Path* field and type in the IP address and path of the remote computer: **\\10.0.0.2\EVUE\_IMPORT**, or type in the remote computer full name **\\Name\EVUE\_IMPORT** (refer to [Figure 3-141](#)).
- 11.) Trackball to the *Destination* field, open the drop-down menu and select **Remote Path (\\10.0.0.2\EVUE\_IMPORT)**, or the computer name **\\Name\EVUE\_IMPORT** (refer to [Figure 3-141](#)).
- 12.) Activate the **Copy Media Player Installation** check box.

**NOTE:** *Step 12 is recommended for the first transfer of eVue files. This step is not needed for Windows XP. After initial transfer of eVue, it is recommended to disable this check box.*

The Vivid q N dataflow is set and ready for export/import of eVue files into a network computer.

From now on, whenever the Vivid q N is used for scanning and the **Store** button is pressed, another person will be able to view the stored loop on the remote e-Vue PC (after a short transmission time). When new loops arrive, the following message will be displayed at the bottom of the screen: *"New images have arrived - To view please refresh the screen using F5".*

#### 3-10-8-4 Using eVue

- 1.) On the Vivid q N portable ultrasound scanner, in regular scanning mode, press **Patient**.

When the following window is displayed, select **Create New Patient**.



The Search/Create Patient dialog box opens.

The image shows a 'SEARCH / CREATE PATIENT' dialog box. It has input fields for 'Last Name' (Smith), 'First Name', 'Patient ID' (12345), 'Birthdate' (dd/mm/yyyy), 'Age', 'Category' (Cardiac), and 'Sex' (female/male). Below these is a 'Patient List' section showing '0 records fetched of total 25' and a 'Show All' button. A table with columns 'Last Name', 'First Name', 'Patient ID', 'Birthdate', 'Exam Date', 'Img', 'Str', 'Rep', 'Size', and 'Code' is visible. A list of dataflow options is shown, including 'Local Archive - Int. HD', 'Remote Archive - Remote HD', and 'Local Archive - Int HD/eVue'. The 'Dataflow' dropdown is set to 'Local Archive - Int HD/eVue' and the 'Operator' is 'ADM'.

Figure 3-142 Search/Create Patient Dialog Box

- 2.) Type the patient's Last Name and ID in the appropriate fields (see [Figure 3-142](#)).
- 3.) Select the Dataflow you intend to use for this patient's information (in this case, select **Local Archive – Int HD/eVue** as shown in [Figure 3-142](#)).
- 4.) Using the soft key buttons, select CREATE PATIENT.



- 5.) Now start scanning. Each image you would like to store press the STORE button.  
A few seconds after the Store button is pressed, images will be transferred into the remote computer (which was previously set as the destination - refer to [Figure 3-141 on page 3-133](#)).
- 6.) To proceed, follow to the instructions as described for ["Using MPEGVue Viewer on a Remote PC" on page 3-152](#).

## 3-10-9 Using MPEGVue/eVue on a Remote PC

### 3-10-9-1 Installing MPEGVue on a Remote PC

For systems running a software version earlier than 6.1.0 (build 109), the MPEGVue player is not compatible with Internet Explorer 7, therefore, do not upgrade Internet Explorer on your PC to this version. In the event that an upgrade has already been installed, following the instructions for rolling back to Internet Explorer 6 on Windows XP provided on the Microsoft site, as follows:

<http://www.microsoft.com/windows/ie/support/default.msp>

When a DVD/CD containing MPEGVue exams is placed into a DVD/CD drive on a remote PC, it should self-boot within a few seconds and display the Patient List.

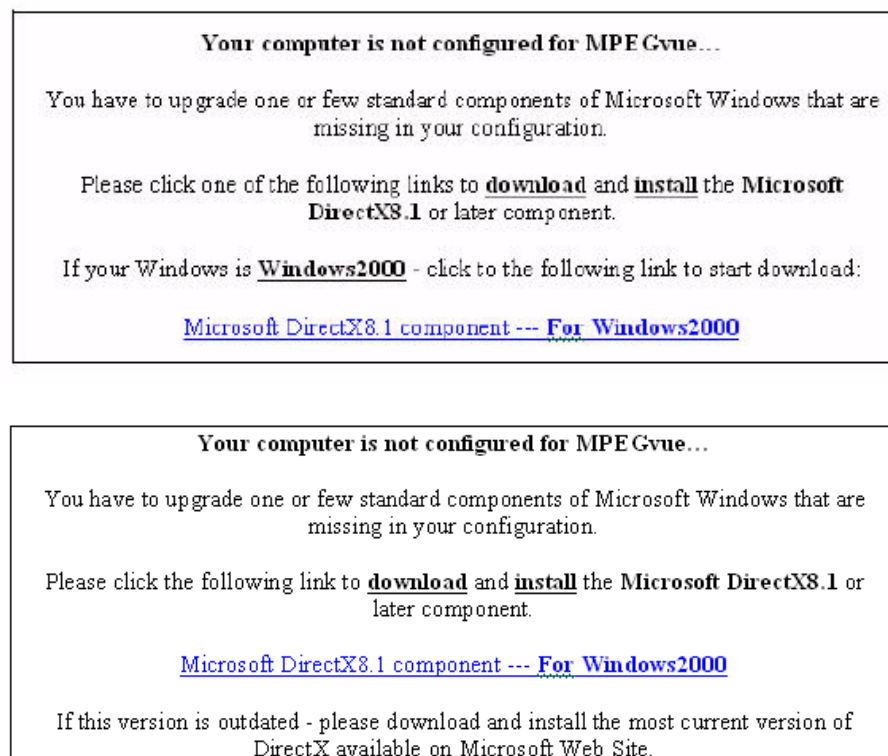
The first time this is done on the remote PC there will be a one-time operation where the MPEGVue program will self-install. If the remote PC operating system is Windows XP the installation is automatic and, when completed, the Patient List on the DVD/CD will be displayed.

In the event that the remote PC operating system is Windows 2000, the auto-installation will display one of the messages shown below (see [Figure 3-143](#) and [Figure 3-144](#)), requesting the user to download and install some drivers.

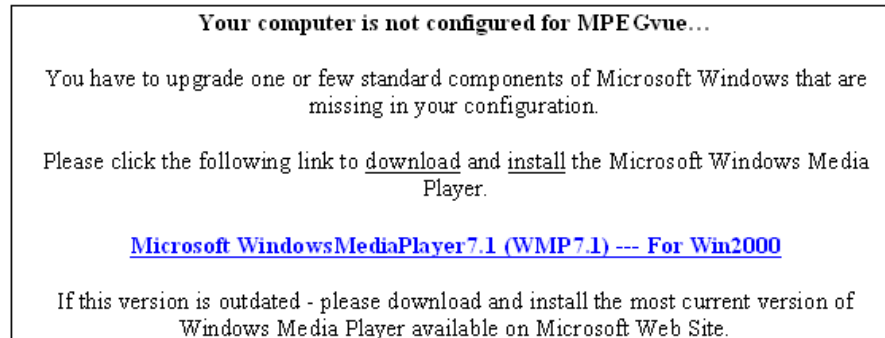
The requested drivers may be downloaded from the Internet, or, if the DVD/CD was pre-configured, those drivers will be located on the MPEGVue DVD/CD itself.

In addition to the above, the installation program will test the configuration of the remote PC and will display a message if any component on the computer is not within the required specifications.

**NOTE:** Only Windows 2000 and later supported.



**Figure 3-143 Download/Installation Message Examples #1**



**Figure 3-144 Download/Installation Message Examples #2**

#### **3-10-9-1-1 Manually Setting the Network PC for eVue Import**

- 1) On the network computer, create a New User by accessing the Control Panel, as follows:

- a.) Double-click on **My Computer** icon on desktop. 

- b.) Double-click on **Control Panel** icon.



- 2) Double-click on **User Accounts** icon.



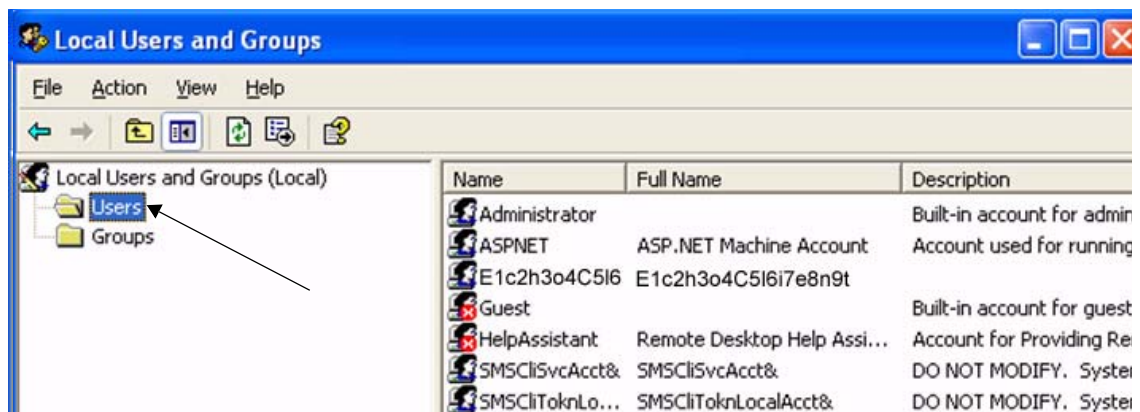
The User Accounts dialog box opens:



**Figure 3-145 User Accounts Dialog Box**

- 3) Select the **Advanced Tab**.
- 4) Click on the **Advanced** button.

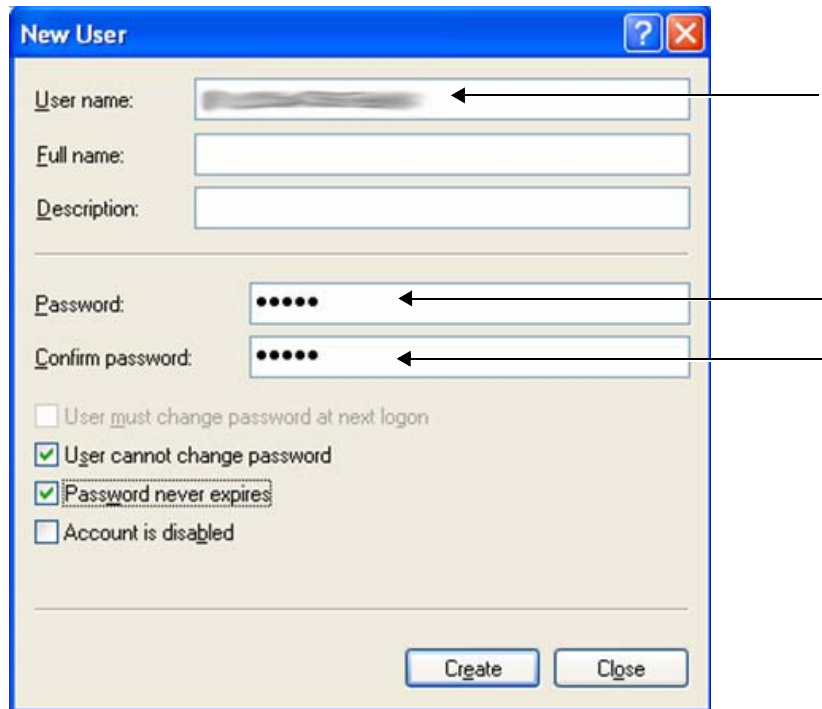
The Local Users and Groups dialog box opens:



**Figure 3-146 Local Users and Groups Dialog Box**

- 5.) Select the **Users** folder and right-click to select **New User**.

The New User dialog box opens:



**Figure 3-147 New User Dialog Box**

- 6.) Configure a new user account, as follows (see [Figure 3-147](#)):
  - a.) User name:
  - b.) Password:
  - c.) Deactivate the **User must change password at next logon** check box.
  - d.) Activate both the **User cannot change password** and **Password never expires** check boxes.
  - e.) Click **Create** (to confirm setting), and **Close**.
  - f.) Close all windows.

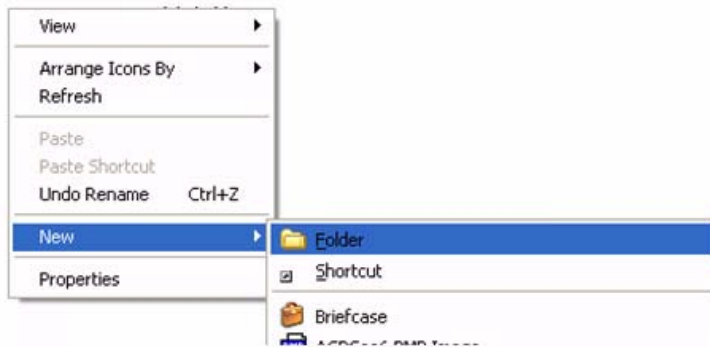
The new user account has been set and is ready for activation.

Create a new folder for import/export and set sharing permissions, by proceeding as follows:

- 7.) On the network computer, double-click on the **My Computer** icon on the desktop.
- 8.) Under My Computer window select **any local drive** for retrieval of data and create a folder for sharing, as follows:
  - a.) Under the selected drive, place the cursor in an empty screen region and right-click the mouse.



b.) Now select **New** and **Folder**, to create a new folder:



*Important: When more than one scanner is used to export with eVue, it is recommended to configure each scanner with its own folder for exporting files.*

c.) Right-click on the New Folder icon and select **Rename**. Rename the folder as **eVue \_Import**:

9.) Setting the Sharing properties for the new folder, as follows:

a.) Right-click on **eVue \_Import** icon and select **Properties**;



The eVue\_Import Properties dialog box opens, as shown in [Figure 3-148 on page 3-141](#).

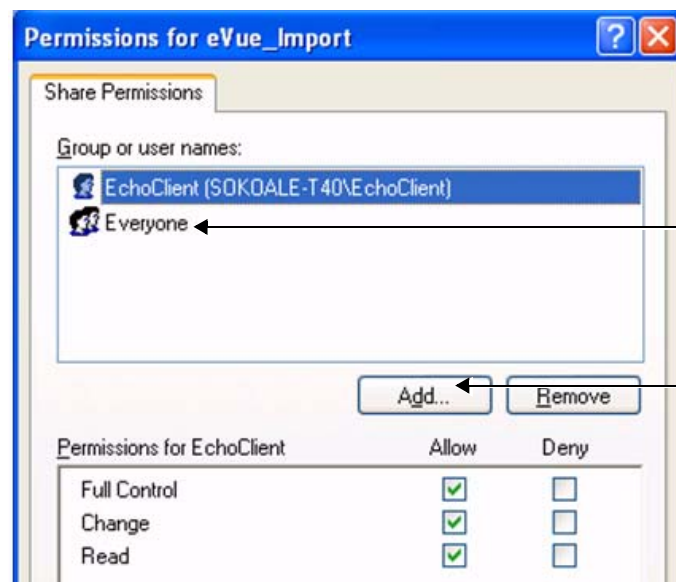




**Figure 3-148 eVue\_Import Properties Dialog Box**

- b.) Select the **Sharing** Tab.
- c.) Click on the **Permissions** button.

The Permissions for eVue Import dialog box opens:



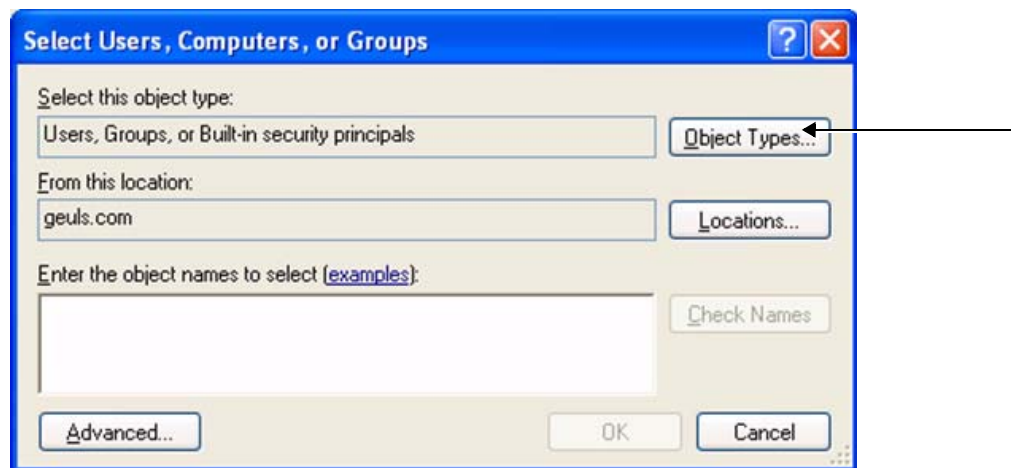
*Note:*  
It is recommended to remove this user.

**Figure 3-149 Permissions for eVue Import Dialog Box**

- d.) Click the **Add** button.

**NOTE:** It is recommended to remove the User **Everyone** from Share Permissions.

The Select Users, Computers, or Groups dialog box opens:

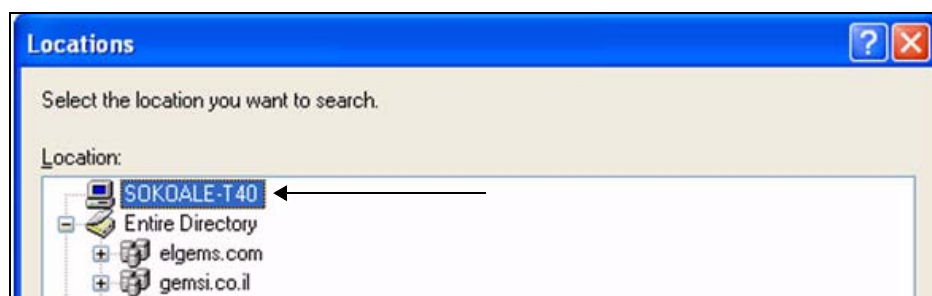


**Figure 3-150 Select Users, Computers, or Groups Dialog Box**

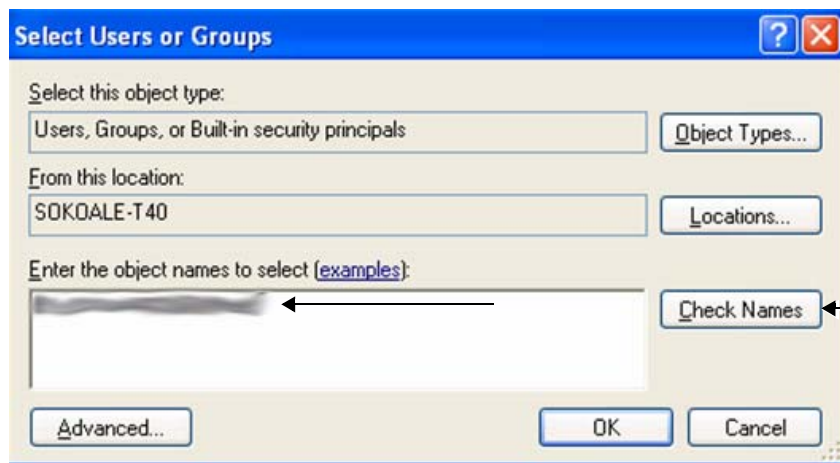
- e.) Click the **Object Types** button.
- f.) From the Object Types dialog box, select **all** to be active (activate all the check boxes, as shown below) and press **OK**.



- g.) From the Select Users, Computers, or Groups dialog box (Figure 3-150), click on the **Locations** button.
- h.) In the Locations dialog box, select your **computer** from the list and press **OK**.



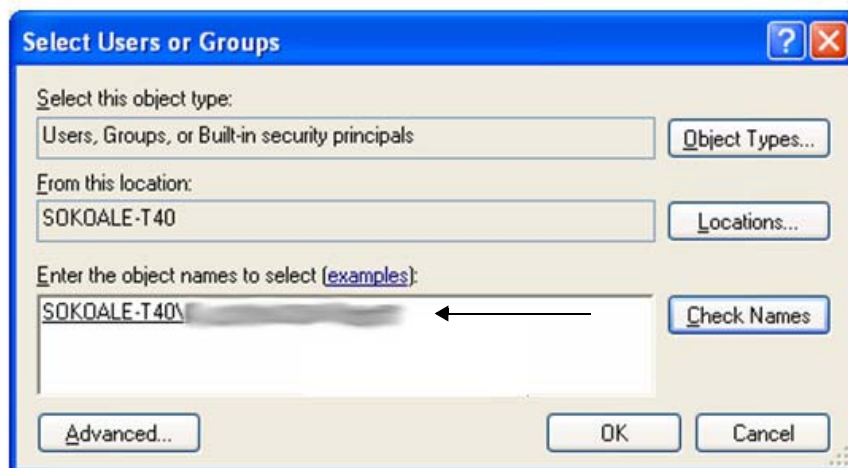
- i.) In the Select Users or Groups dialog box, type the **User Name** in the empty window, as shown in Figure 3-151.



**Figure 3-151 Select Users or Groups Dialog Box - Check Names**

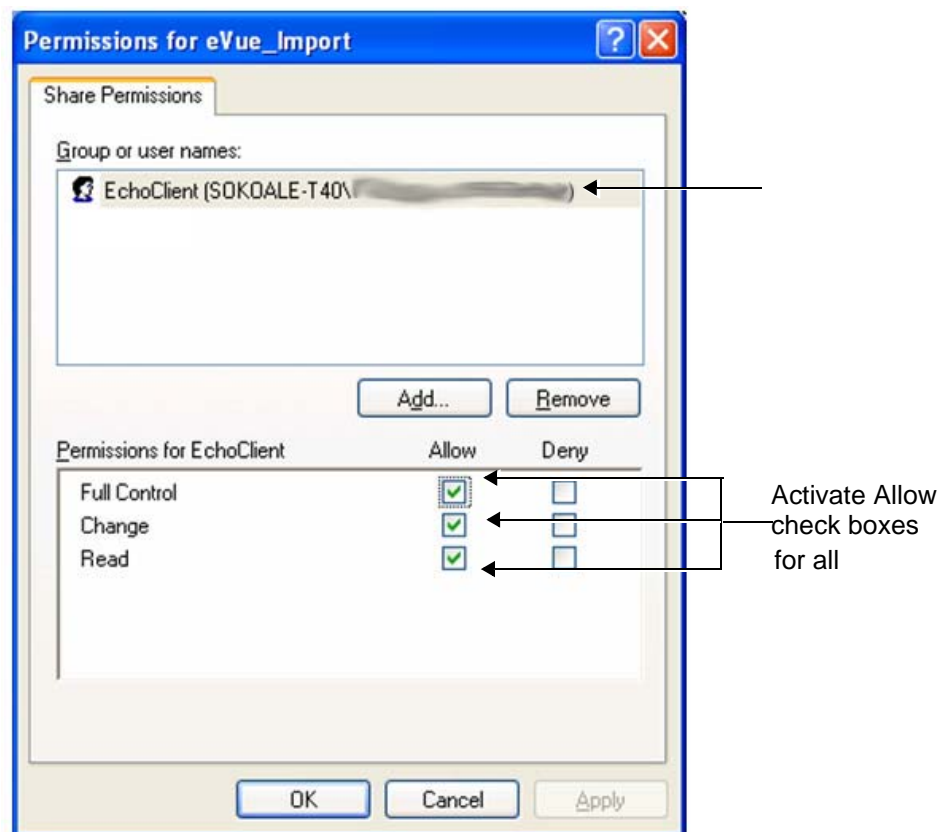
j.) Click the **Check Names** button.

The name and path will be detected by underlining, as shown below.



k.) Now click **OK**.

l.) From the Permission for eVue\_Import dialog box, highlight and select **User Name** from the list (see [Figure 3-152](#)).



**Figure 3-152 Setting Permissions for EchoClient User**

- m.) Activate the *Allow* check boxes for all of the following: **Full Control**, **Change**, and **Read**.
- n.) Click the **OK** button.
- o.) **Close all** windows.

**NOTE:** The network computer is now ready to receive files from the Vivid q N system. At this stage, set the appropriate path for export of files into the network computer. For example, for eVue, Data Flow or MpegVue export into the network computer using the browsing option to select the appropriate path. For an example of Vivid q N dataflow settings, refer to [Figure 3-140 on page 3-133](#).

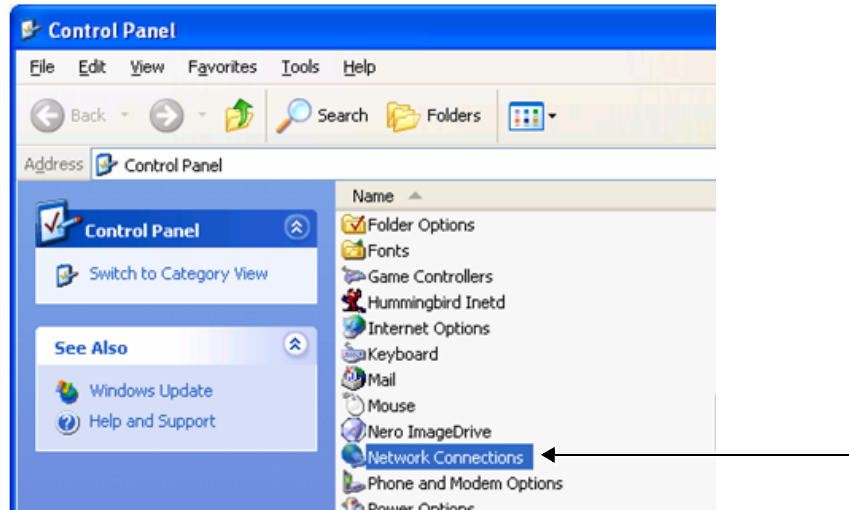
#### 3-10-9-1-2 Manually Stopping the Firewall on the Network PC

**NOTE:** In some cases, it is necessary to stop the firewall to allow functions such as Excel export and eVue to access and load files into the Network Computer. The Firewall can be an external service, or part of the Windows Basic Firewall tools.

#### **Stopping the Windows Firewall**

- 1.) On the network computer, access the **Control Panel**, as follows:
  - a.) Press **Start**.
  - b.) Select **Settings**

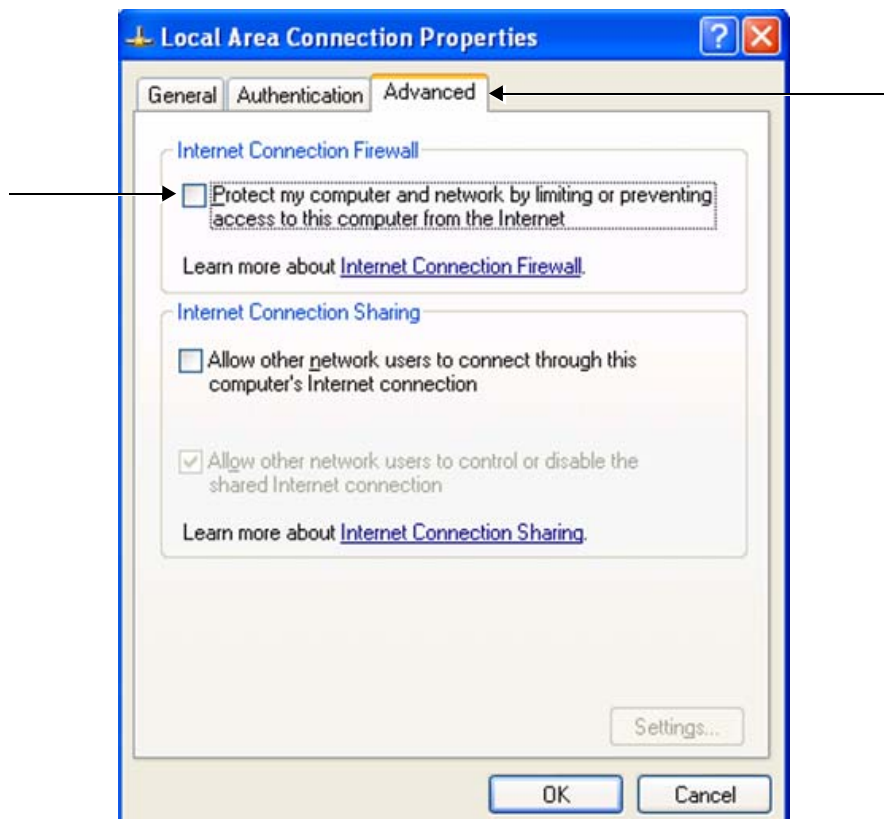
c.) Select **Control Panel** from the Menu.



- 2.) Double-click on **Network Connections** as shown above.
- 3.) Select your network connection and right-click.
- 4.) From the drop-down menu, select **Properties**.



The Local Area Connection Properties dialog box opens:



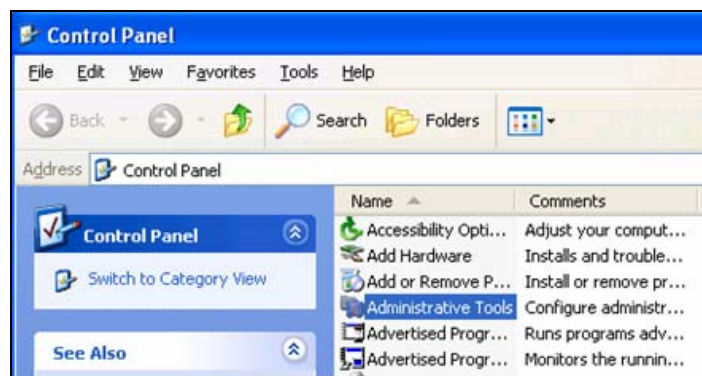
**Figure 3-153 Local Area Connection Properties Dialog Box**

- 5.) Select the **Advanced** Tab.
- 6.) Uncheck the **Internet Connection Firewall** check box, as shown in [Figure 3-153](#).
- 7.) Click the **OK** button to confirm changes and close all windows.

---

### ***Stopping an External Service Firewall***

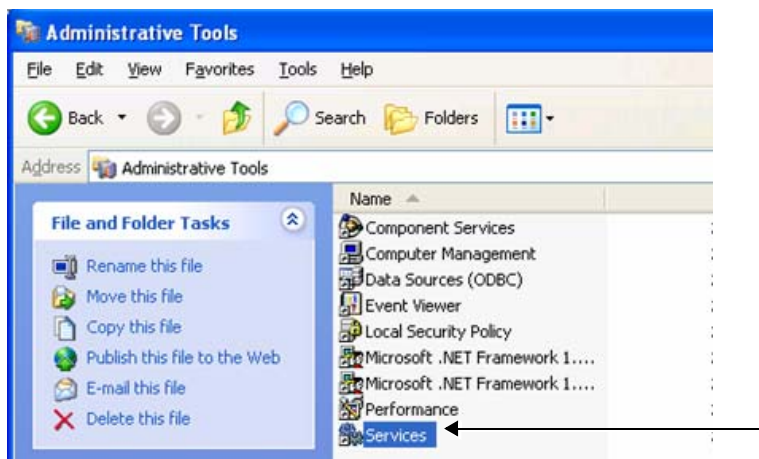
- 1.) On the network computer, access the **Control Panel**, as follows:
  - a.) Press **Start**.
  - b.) Select **Settings**
  - c.) Select **Control Panel** from the Menu



- 2.) Double-click on **Administrative Tools**.

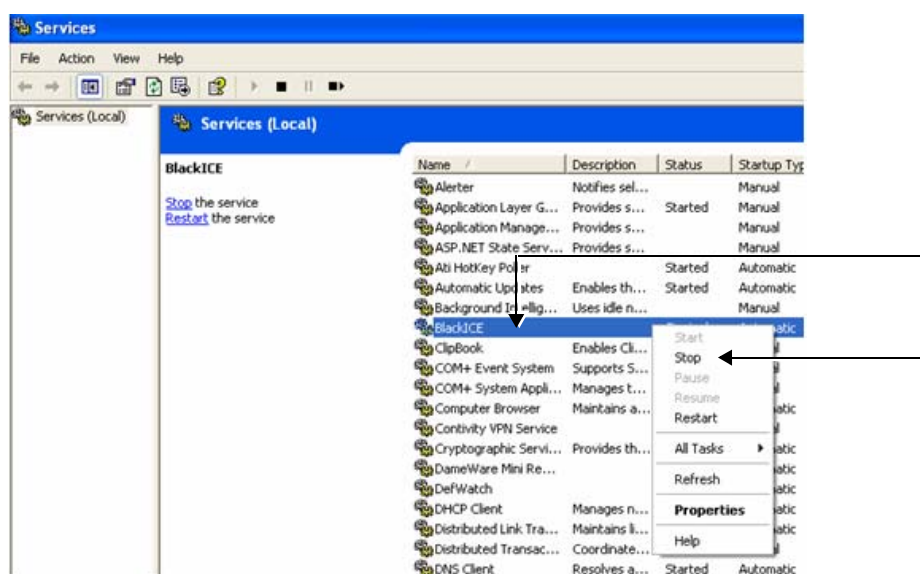


The Administrative Tools dialog box opens:



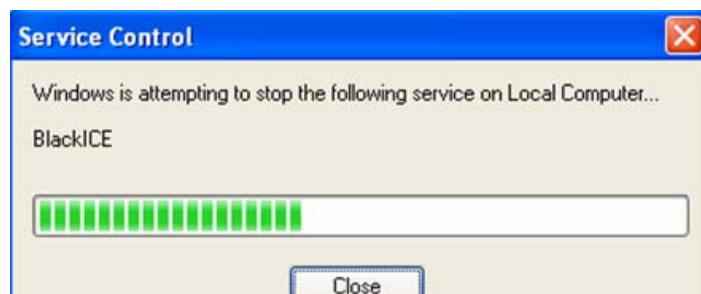
**Figure 3-154 Administrative Tools Dialog Box**

- 3.) Double-click on **Services**.
- 4.) From the Services dialog box, select your **firewall program** (for example, Black Ice).



**Figure 3-155 Services Dialog Box**

- 5.) Right -click and select **Stop** from drop-down menu.
- The following message will be displayed indicating that the Firewall is being stopped.



- 6.) When finished, click **Close**.
- 7.) Now you can try to reconnect the network computer to the Vivid q N system.

### ***Stopping the Firewall on Windows XP Service Pack 2***

- 1.) On the network computer, access the **Control Panel**, as follows:
    - a.) Press **Start**.
    - b.) Select **Settings**
    - c.) Select **Control Panel** from the Menu
  - 2.) Double-click on **Windows Firewall**.
- The Windows Firewall dialog box opens:



**Figure 3-156 Windows Firewall Dialog Box**

- 3.) Select the **General** Tab.
- 4.) Enable the **Off** check box (as shown in [Figure 3-156](#)).
- 5.) Press **OK**.
- 6.) Close all windows to return to the scanning screen.

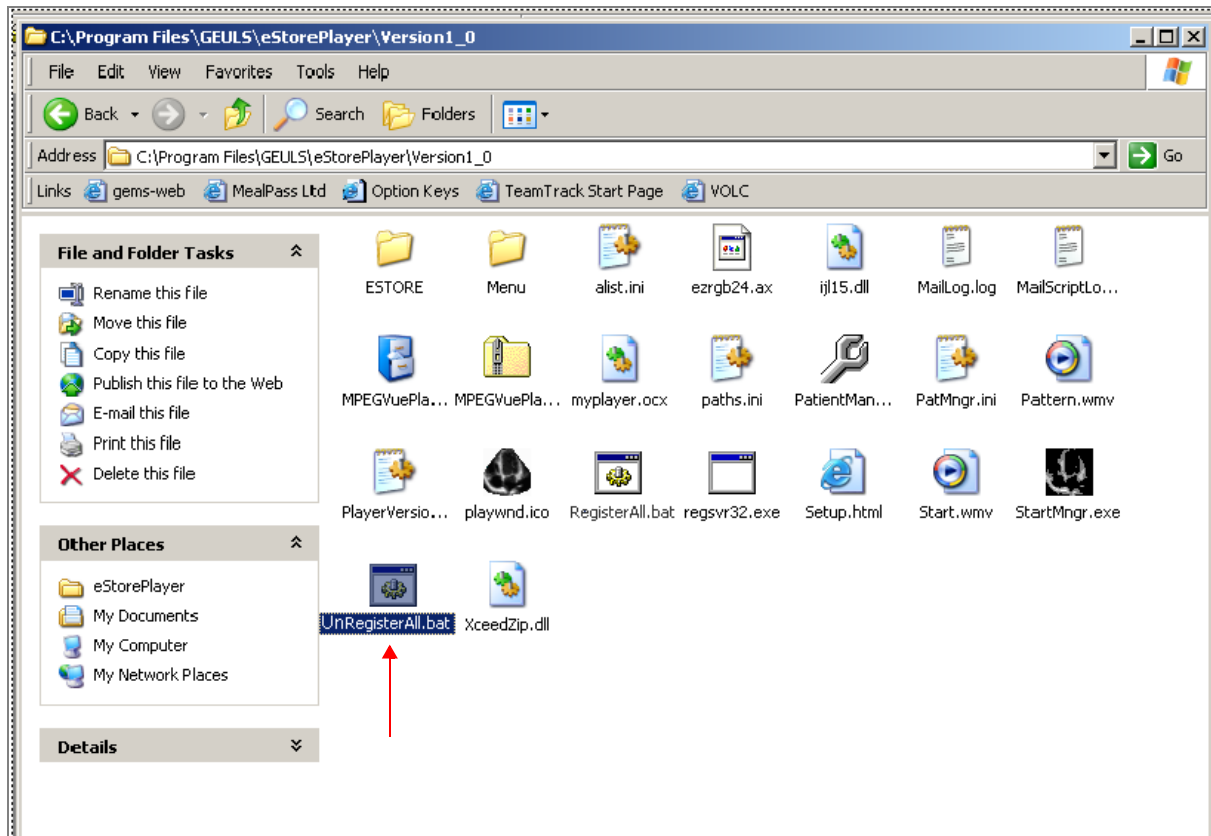


**3-10-9-2 Un-installing MPEGVue on a Remote PC**

- 1.) Log in to Windows with **Administrator** permissions.

**NOTE:** You may need to obtain these from the local IT person.

- 2.) Close all Internet Explorer windows, if open.
- 3.) From the **C:\Program Files\GEULS\eStorePlayer\Version1\_0\** folder, double-click on the **UnRegisterAll.bat** icon, as shown in [Figure 3-157](#) below.



**Figure 3-157 Uninstall MPEGvue - Stage 1**

- 4.) If two messages are displayed one after another (shown in [Figure 3-158](#) and [Figure 3-159](#)), click the **OK** button on each of them to close the message.

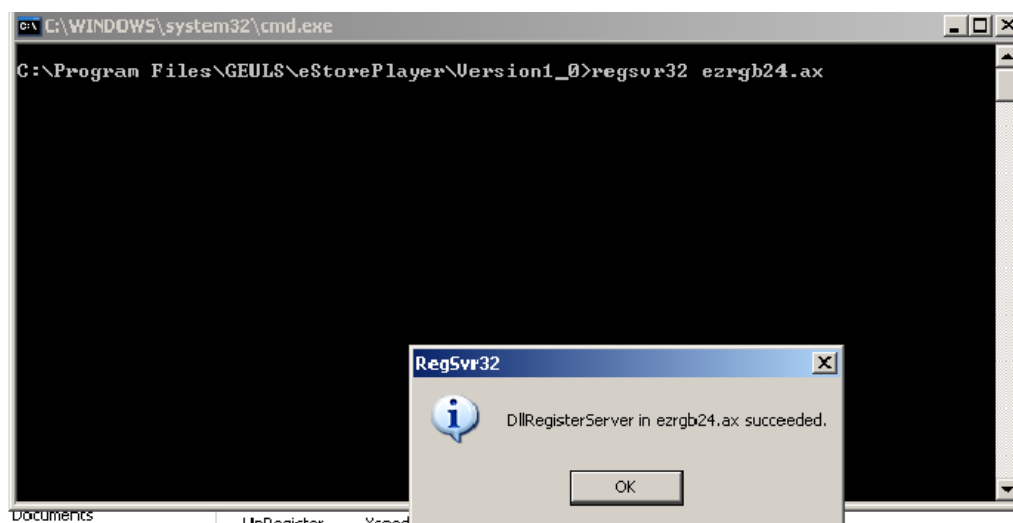


Figure 3-158 Uninstall Message 1

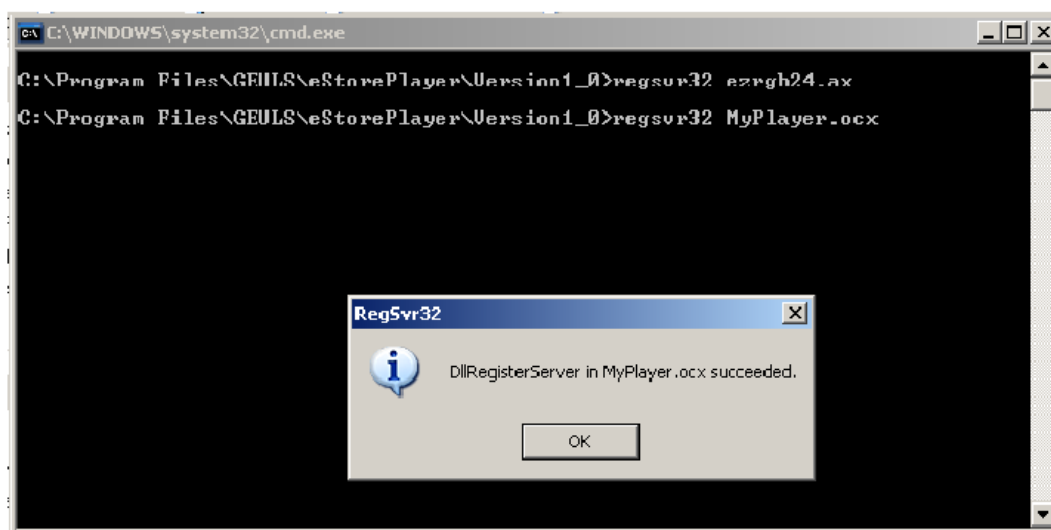


Figure 3-159 Uninstall Message 2

- 5.) From the **C:\Program Files\GEULS\eStorePlayer\Version1\_0\** folder, delete all files, as shown in [Figure 3-160](#) on [page 3-151](#).

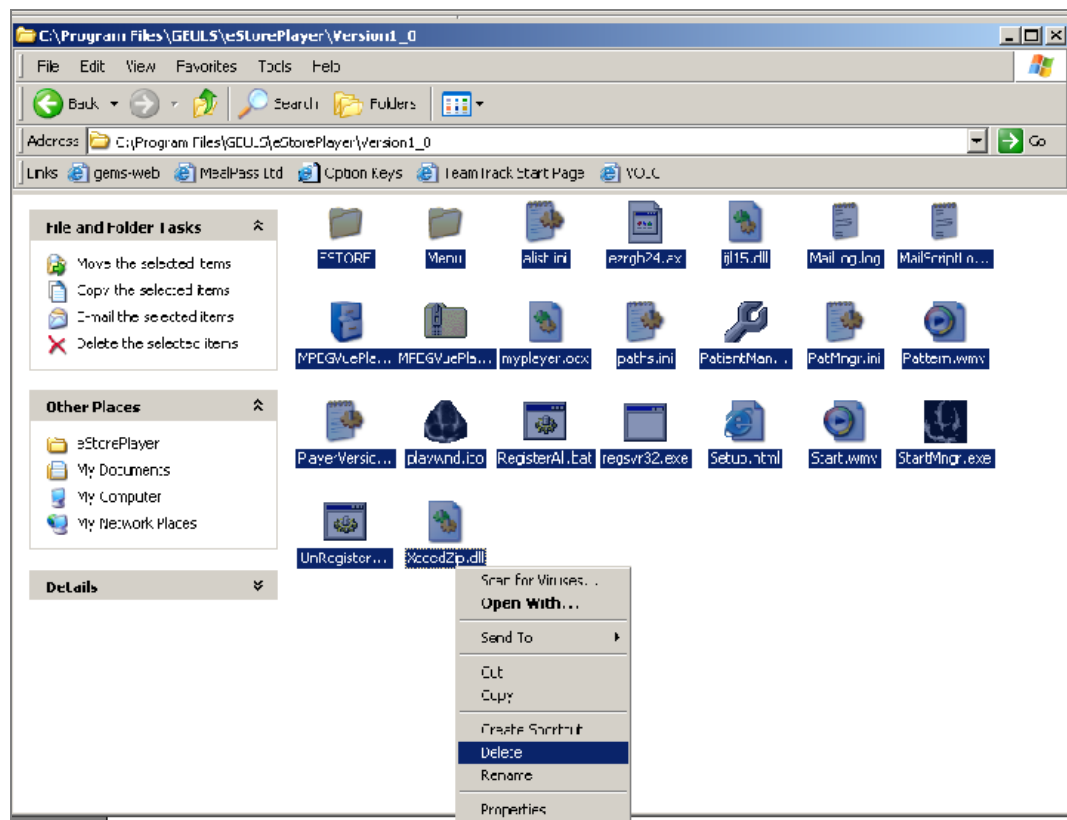


Figure 3-160 Deleting All Files

- 6.) Restart Windows, then confirm that the MPEGVue application is no longer installed.

### 3-10-9-3 Using MPEGVue Viewer on a Remote PC

#### 3-10-9-3-1 Reading an MPEGVue Exam

An MPEG exam can be read on any computer with Windows 2000/XP/2003, provided that DirectX 8.1 (or later) and Windows Media Player 7.1 (or later) are installed.

**NOTE:** *DirectX 9 and Windows Media Player 9 are recommended.*

In addition, the following requirements should be met:

- CPU speed: 900 MHz or faster
- RAM Memory: 128 MB or higher
- Screen resolution: 1024 x 768 pixels (recommended)
- Colors: 24 bit or higher
- The PC should be configured for Auto-play.

**To read an MPEGVue exam stored on a DVD/CD,** proceed as follows:

- Insert the MPEGVue CD in the computer DVD/CD drive.

The *MPEGVue Patient List* is displayed (see [Figure 3-161 below](#)).

**NOTE:** *In the event that the MPEGvue DVD/CD is being run for the first time, the program will self-install the MPEGvue viewer. For more details, refer to "Installing MPEGVue on a Remote PC" on page 3-136.*

**To read MPEGVue exams stored on other media:**

- 1) Insert the media (MOD or Memory stick) containing the MPEGVue exams into the MOD drive (or USB port) on the remote computer.
- 2) Double-click on the file **START\_MPEGVue.bat**.

The *MPEGVue Patient List* is displayed (see [Figure 3-161 below](#)).

#### 3-10-9-3-2 MPEGVue Patient List

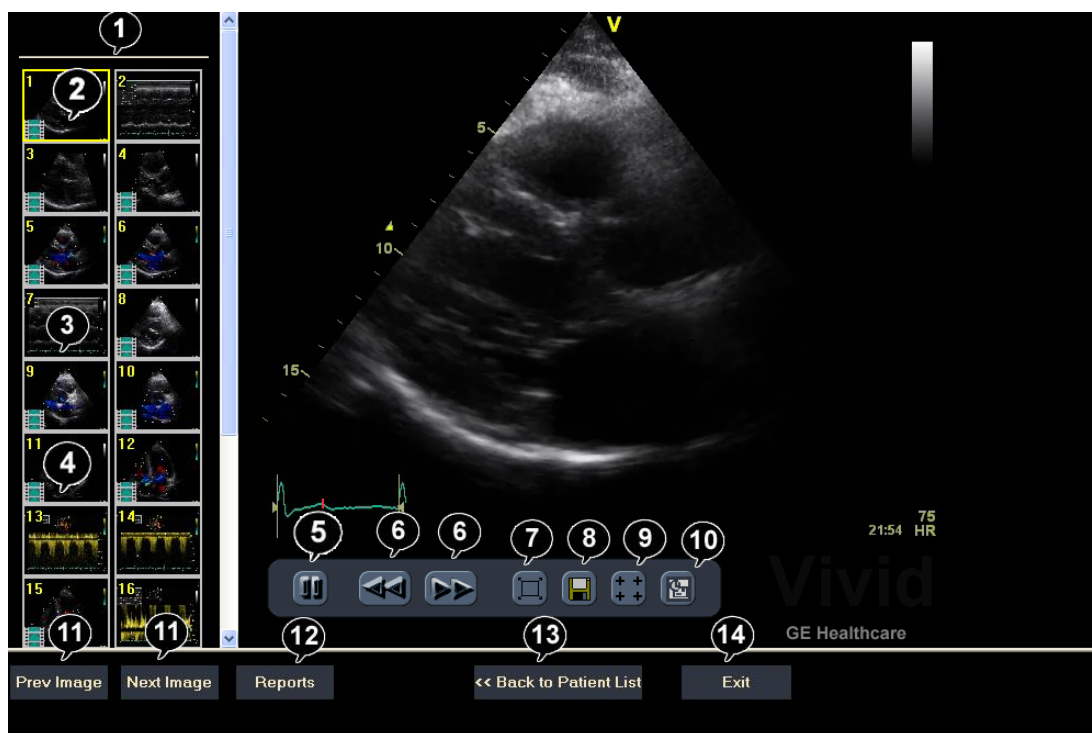
The MPEGvue player will always start by showing the Patient List contained in the inserted media (see the example below).

Patient List				
ID	Patient Name	Exam Date	Birth Date	Image
232333	Taylor, John	18/07/2004		4
11111	Smith, John	18/07/2004		4
5676	Bond, James	18/07/2004		8

Figure 3-161 MPEGVue Patient List

- 1) Click on the required examination **Exam Date** (labelled 1 in the example above) to select and display images of that exam.

The *MPEGVue* screen is displayed as shown in the example in [Figure 3-162](#) below.



1. Clipboard: select the image to display	8. Save image as MPEG or Bitmap file
2. Selected image	9. Measurement tool
3. Single frame image	10. E-mail support
4. Cineloop	11. Display previous/next image
5. Freeze/run cineloop	12. Display reports (button appears only when report is available)
6. Scrolling tool when in Freeze	13. Display the MPEGVue Patient List
7. Full Screen (press any key to return to normal view)	14. Quit MPEGVue Screen

**Figure 3-162 MPEGVue Screen**

- 2) Proceed to use the navigation tools described below to select an image and perform the various review functions, as required.

### 3-10-9-3-3 Selecting an Image

When a thumbnail image is selected for review, the thumbnail image in the clipboard area becomes bounded (highlighted) with a yellow frame. This currently-selected image is also displayed in full size in the MPEGVue Screen view pane.

There are several ways to select a thumbnail image from the clipboard:

- Use the mouse pointer. With the pointer on the required image, click the *left* mouse button to select the image.
- Use the **up** or **down** keyboard arrow to view the *next* or *previous* loop in the exam.
- Click on the **Next Image** or **Previous Image** buttons (#11 in [Figure 3-162](#)), as required.

#### 3-10-9-3-4 Stopping & Running the Cine-Loop

When a loop is selected, it appears on the screen in *Run-Mode*.

There are several ways to stop a loop and view it frame-by-frame:

- Clicking on the **Freeze/Run** icon (#5 in [Figure 3-162](#)) will *freeze* the loop. Clicking on same icon once again will run the loop again.
- Clicking on the **scrolling** icons (#6 in [Figure 3-162](#)) will *stop* the loop, allowing the user to advance *forwards* or *backwards* to the required frame.
- Using the **left / right** arrows - when the loop is in *Run-Mode*, pressing either the **left** or **right** arrows on the PC keyboard will *freeze* the loop. Further pressing the left or right arrows will *advance* the loop frame-by-frame.

#### 3-10-9-3-5 Selecting a Different Patient

Click on the **Back to Patient List** button (#13 in [Figure 3-162](#)). On the Patient List, click on the **Exam Date** of the required patient.

#### 3-10-9-3-6 Exporting Images or Loops from MPEGvue

Using the "Save As..." function, an image may be saved to any of the following file formats:

- .BMP
- .WMV (MPEG4)
- .JPEG

To save an image, click on the diskette icon (#8 in [Figure 3-162](#)). A Save As... dialog-box will appear, allowing you to select the desired file format in which to save the image.

#### 3-10-9-3-7 Performing Measurements on MPEGVue Images

The following measurements can be performed on MPEGVue images:

- Distance and area in 2D images
- Height, time, and slope in M-mode images
- Velocity and time in Doppler modes

##### In a 2D image:

- 1) Select the **Measurement** tool (#9 in [Figure 3-162](#)).

The distance measurement tool is automatically selected.

- 2) Perform the distance measurement.
- 3) To perform an area measurement, right-click on the image and select **Area**. Perform the area measurement.

##### In Other Modes:

- 1) Select the **Measurement** tool (#9 in [Figure 3-162](#)).
- 2) Perform the measurement.

**NOTE:** *If the original image contains measurements that were taken and stored on the Vivid q N scanner, those measurements will appear in the MPEGvue image. In this case, additional measurements cannot be performed on that image.*

**NOTE:** *Currently, the measurement function is not available on DICOM images/loops, any secondary captured screens 3D images, or images with discontinuities.*

### 3-10-9-3-8 Saved Worksheets

On the Vivid q N scanner, it is possible to view the Worksheet and press **Store**. This will generate a still frame showing a snapshot of the Worksheet with the visible measurements on it. This same snapshot will also be visible in the MPEGvue Viewer.

This feature allows users to archive some important measurements into the MPEGvue file.

### 3-10-9-3-9 Reports (.CHM files)

When Reports have been generated and saved on the Vivid q N scanner, they will be exported, along with the rest of the MPEGvue exam to the remote PC where they can be reviewed as CHM files.

When an exam contains Reports, an additional button is displayed on the bottom of the MPEGvue Screen enabling the user to view the Reports of that exam.

### 3-10-9-3-10 Using MPEGVue over E-mail

**NOTE:** To use the MPEGVue over E-mail feature, Microsoft Outlook must be currently running. If not, the following message is displayed prompting the user to first logon to Outlook:



It is possible to send images, loops, or full exams from any eVue PC. An eVue PC is a PC which contains the MPEGvue player and an e-mail client application (e.g. Microsoft Outlook).

The currently-selected image, or the entire examination, can be sent by e-mail as an attachment to one or several regular e-mail messages. Refer to [Sending a Full Examination by E-mail](#) below, or "[Sending an image by E-mail](#)" on page 3-157, as applicable.

The recipient PC of those e-mail messages (where the eVue viewer is installed), will receive the exams and will integrate them into its Patient List, for easy review.

---

### ***Sending a Full Examination by E-mail***

**NOTE:** If this is the first time your recipient is receiving MPEGVue images, it is necessary to attach the MPEGVue Player - refer to the instructions for "[Sending the MPEGVue Player Software by E-mail](#)" on page 3-159.

- 1) From the MPEGVue Screen, open the examination to be sent and click the **E-mail** button (#10 in [Figure 3-162 on page 3-153](#)).

The *E-mail Dialog* box is displayed (see [Figure 3-163 on page 3-156](#)).

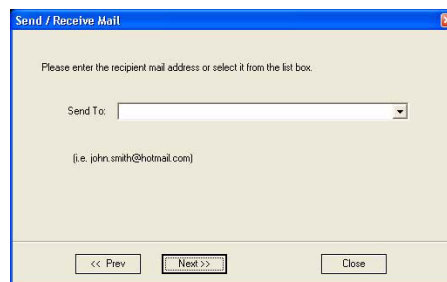
- 2) Activate the **Send Current Exam** radio button (and if necessary, the **Attach Player Software** check box), as shown in [Figure 3-163 below](#).



**Figure 3-163 E-mail Dialog Box - Sending Current Exam**

3.) Click **Next**.

The *E-mail address window* is displayed (Figure 3-164 below).



**Figure 3-164 E-mail Address Window**

4) Select an existing recipient address from the drop-down menu, or type a new address in the **Send To** field.

**NOTE:** Up to 10 addresses can be stored for future selection.

5) Click **Next**.

The user is prompted to enter a password (for encryption of the study) in the window displayed:



**Figure 3-165 Enter Password Window**

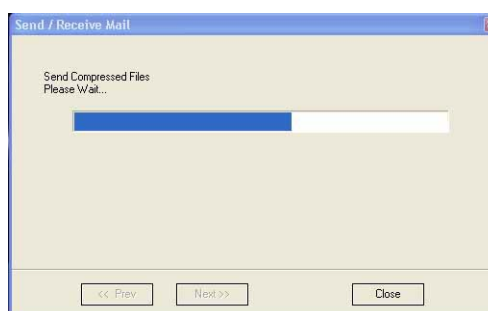


- 6) Type a unique password for the study.

**NOTE:** *The password should be given to the recipient of the e-mail verbally by phone or by other protected means.  
(It is recommended to keep a separate record of passwords used).*

- 7) Click **Next**.

The E-mail (addressed to the selected addressee) with the full examination attached is sent to the Outbox; during this operation a series of progress windows are displayed, as seen in this example:



**Figure 3-166 Sending Message to Outbox Progress Window**

When the operation is complete, a *Confirmation window* is displayed as shown below.



**Figure 3-167 Operation Completed Message**

- 8) Click **OK** to close the message window.
- 9) Check that the e-mail message has been sent from the Outlook Outbox.

**NOTE:** *Examinations sent by E-mail as attachments are compressed, encrypted, and password-protected. If the size of the exam is too large to be sent as a single attachment, it is divided into several zip file attachments sent with several independent E-mails, each less than 1Mbyte in size.*

*The extension of the attached files is **.mpegvue** and can only be opened with the MPEGvue viewer.*

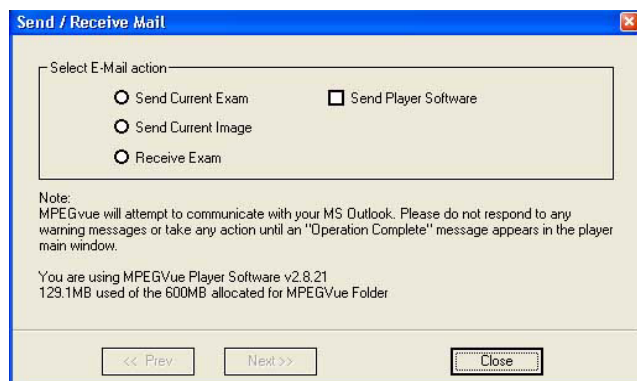
---

### ***Sending an image by E-mail***

**NOTE:** *If this is the first time your recipient is receiving an MPEGVue image, it is necessary to attach the MPEGVue Player - refer to the instructions for ["Sending the MPEGVue Player Software by E-mail"](#) on page 3-159.*

- 1) From the clipboard, select the image to be sent and click the **E-mail** button (#10 in [Figure 3-162 on page 3-153](#)).

The *E-mail Dialog* box is displayed.



**Figure 3-168 E-mail Dialog Box**

- 2) Activate the **Send Current Image** radio button, then click **Next**.

**NOTE:** *If it is necessary to send the MPEGVue Player software to the recipient, first complete this procedure, then proceed to ["Sending the MPEGVue Player Software by E-mail"](#) on page 3-159.*

The *E-mail address window* is displayed.



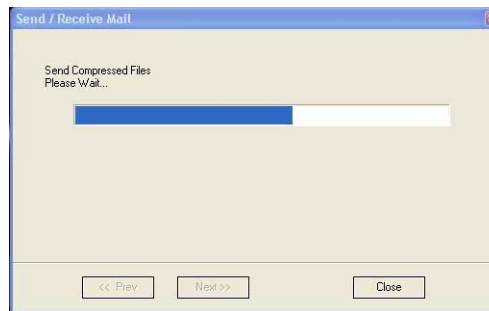
**Figure 3-169 E-mail Address Window**

- 3) Select an existing recipient address from the drop-down menu, or type a new address in the **Send To** field.

**NOTE:** *Up to 10 addresses can be stored for future selection.*

- 4) Click **Next**.

The E-mail (addressed to the selected addressee) with the image is sent to the Outbox; during this operation a progress window is displayed:



**Figure 3-170 Sending Message to Outbox Progress Window**

When the operation is complete, a *Confirmation window* is displayed as shown below..



**Figure 3-171 Operation Completed Message**

- 5) Click **OK** to close the message window.
- 6) Check that the message has been sent from the Outlook Outbox.

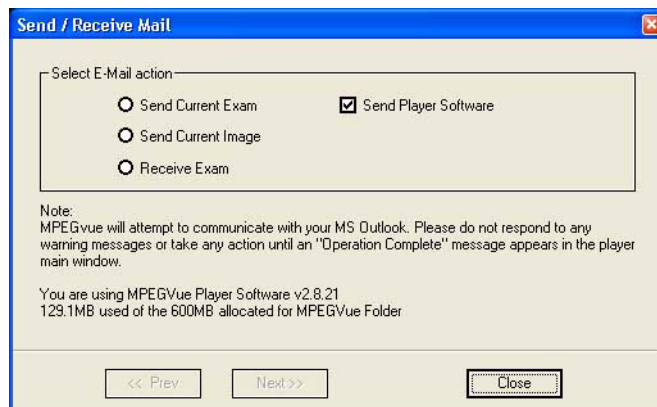
When the message has been sent from the Outbox and received by the E-mail recipient, the image can now be opened in Windows Media Player.

---

#### ***Sending the MPEGVue Player Software by E-mail***

**NOTE:** *This procedure is required once - only the first time your recipient is receiving MPEGVue image/s.*

- 1) From the *E-mail Dialog* box, activate the Send Player Software check box:



**Figure 3-172 E-mail Dialog Box - Sending Player Software**

- 2) Click **Next**.
- 3.) From the Email Address Window ([Figure 3-169 on page 3-158](#)), select the appropriate recipient address from the drop-down menu, or type the address in the **Send To** field.
- 4) Click **Next**.  
The E-mail (addressed to the selected addressee) with the MPEGVue Player software is sent to the Outbox; during this operation a progress window is displayed ([Figure 3-166](#)).  
When the operation is complete, a Confirmation window is displayed as shown in [Figure 3-167](#).
- 5) Click **OK** to close the message window.
- 6) Check that the message has been sent from the Outlook Outbox.

**NOTE:** *When the message has been sent from the Outbox and has arrived at the addressee, the recipient should follow the instructions (included in the body of the email) in order to install the MPEGVue Player.*

#### ***First Time Receipt of MPEGVue Player Software and Images by E-mail***

When a group of messages arrive by e-mail and the user wishes to review the exam by MPEGVue, proceed as follows:

- 1) From Outlook, open the received email message containing the *installation of MPEGVue Player* files (three attachments: MPEGVuePlayer.cab; Start.wmv; Setup.html). Right-click on each attachment and select **Save As** to save them to the **Desktop**.

**NOTE:** *Do not double-click on an attachment.*

- 2) From the desktop, double-click on the



icon.

The following message is displayed:



- 3) When prompted by the Warning message shown below, make sure all Internet Explorer windows are closed except the current window, then click **Yes** to proceed.




**Figure 3-173 Warning Message**

When the installation of the MPEGVuePlayer software is complete, the MPEGVue Player Screen is displayed as shown in [Figure 3-175 on page 3-163](#).

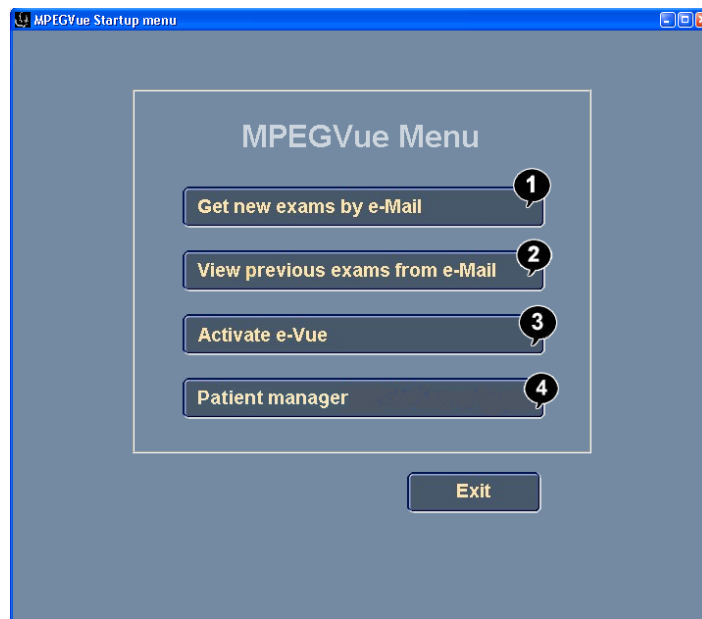
**NOTE:** *At this point, the MPEGVue startup icon is now displayed on the desktop, ready for future use. The user may choose to view the images immediately or later (as preferred). Follow the instructions described in "Get New Exams by E-mail" on page 3-163.*

### 3-10-9-3-11 Managing and Viewing Exams Received

Once the MPEGVue Player software has been installed on a remote computer (as described in ["First Time Receipt of MPEGVue Player Software and Images by E-mail" on page 3-160](#)), the user is able to manage and review images or exams received via email, using the MPEGVue utilities described below.

- 1) From the desktop, double-click on the MPEGVue Startup  icon.

The MPEGVue Startup Menu opens:



1.	Provides access to Outlook Inbox
2.	Opens Patient List (lists only studies received by email) <sup>a</sup>
3.	Activates e-Vue - opens Patient List of studies received via export operation <sup>a</sup>
4.	Enables user to manage patient exams received by email, export or removable media (using copy, move or delete, as applicable)

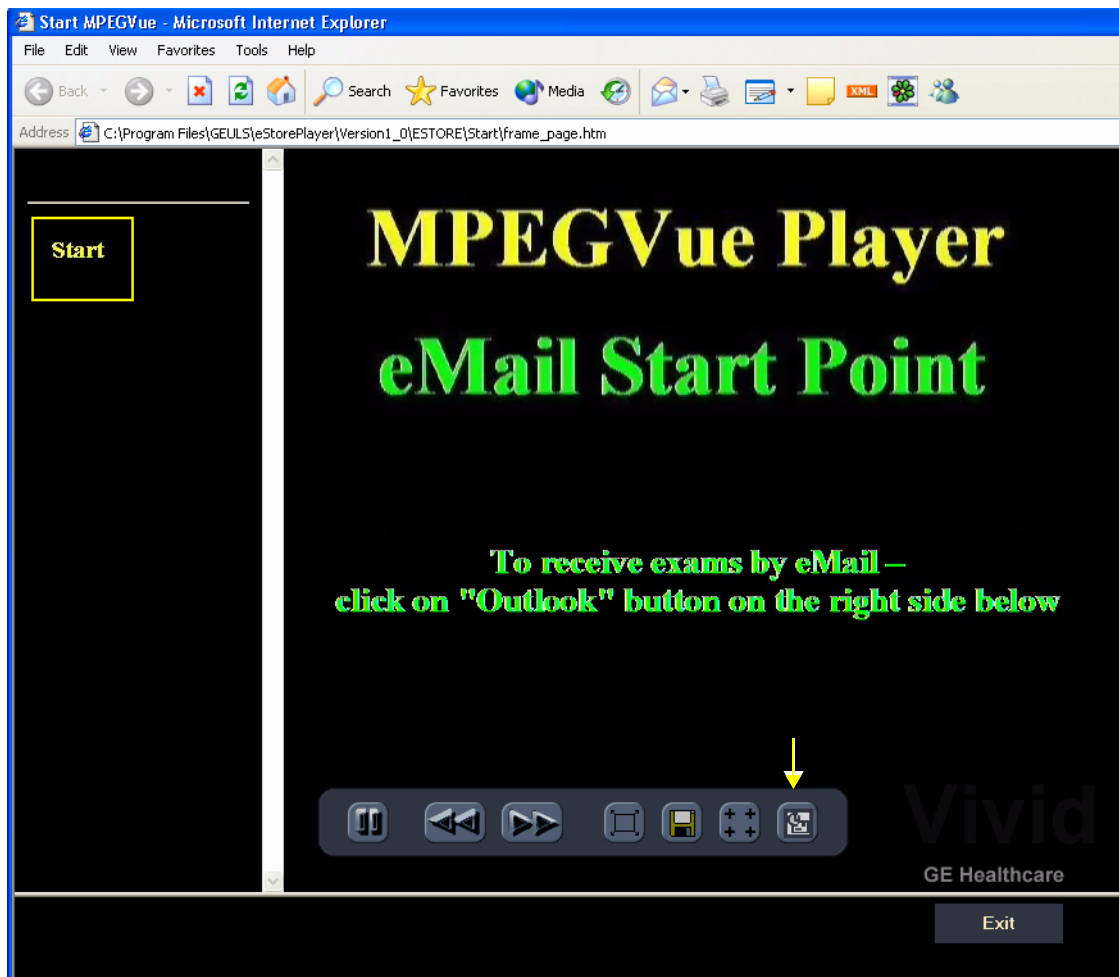
a. button is disabled until images or exams have been received

**Figure 3-174 MPEGVue Startup Menu**

- 2) Proceed to use the required utility, as described in the procedures below.

**3-10-9-3-12 Get New Exams by E-mail**

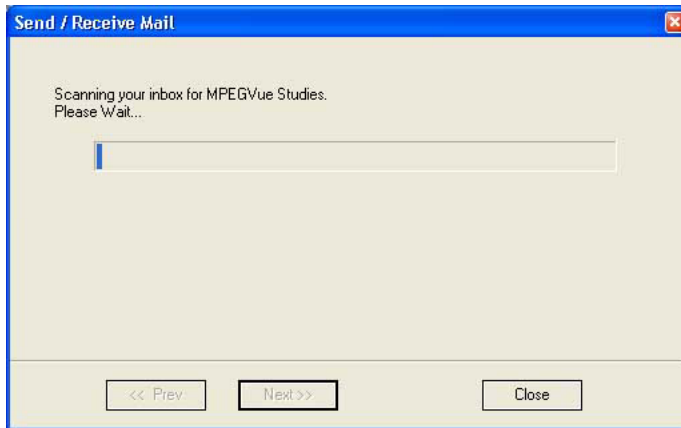
- 1) From the MPEGVue Startup Menu, click on the **Get new exams by email** button.  
The Start MPEGVue screen is displayed, as shown in [Figure 3-175](#) below.



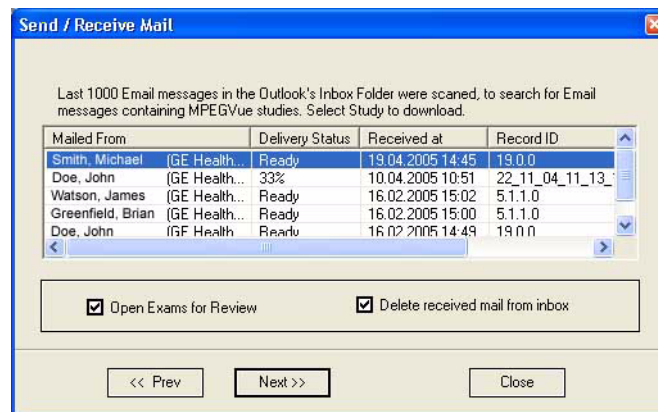
**Figure 3-175 Start MPEGVue Screen**

- 2) Click the Outlook **E-mail** button (shown in [Figure 3-175](#)).  
The E-mail dialog box is displayed - refer to [Figure 3-168](#) on page 3-158.
- 3.) Activate the **Receive Exam** radio button, then click **Next**.

The following message is displayed while the e-mail Inbox is being scanned for studies:



When complete, all studies found in the Inbox are listed in the Found Studies dialog box, as shown in [Figure 3-176 below](#).



**Figure 3-176 List of Studies Found in Inbox**

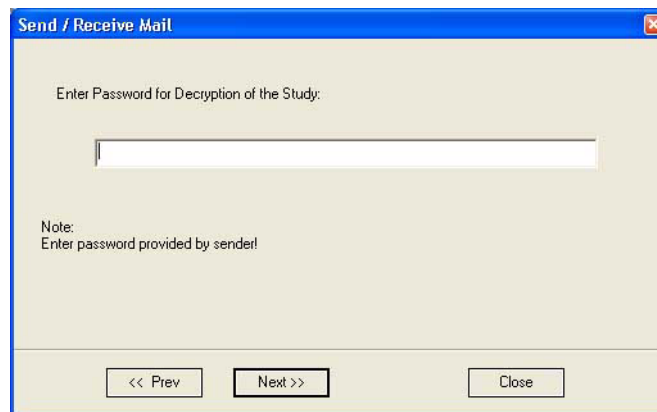
- 4) Select the required Study from the list.

**NOTE:** By default, the **Open Exams for Review** and **Delete Received Mail from Inbox** check boxes are activated.

- 5.) Click **Next**.



The *Password window* is displayed:.



**Figure 3-177 Password Window**

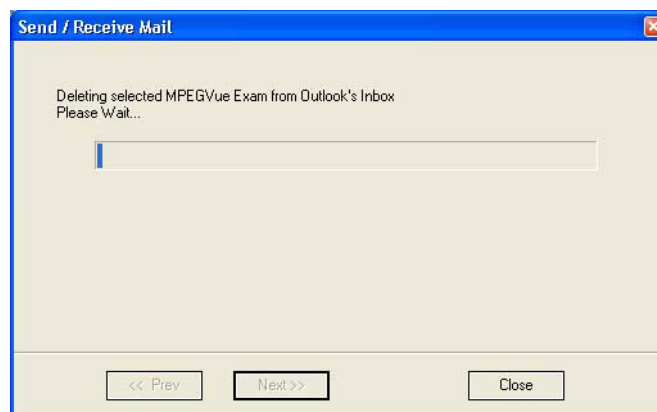
- 6) Enter the same password (for decryption of the study) as that used by the sender of the e-mails.

**NOTE:** *The Password is case-sensitive. In the event that an incorrect password is typed, the user is prompted with a warning message, as shown here. Click **OK** and enter the correct password.*



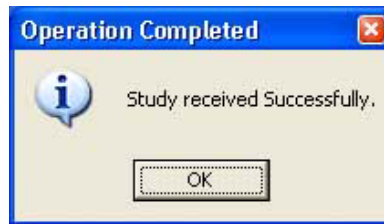
- 7) Click **Next**.

The message *Receiving Selected Messages* is displayed, followed by another message (see [Figure 3-178 below](#)) showing progress of deletion of messages from the Inbox.



**Figure 3-178 Message Showing Exams being Deleted from Inbox**

The E-mail message(s) containing the MPEG examination is deleted from “In-box” of Outlook and is moved to the “Deleted-items” box of Outlook. When done, the following message is displayed:



- 8) Click **OK** to close the message.

The exam is now listed in the MPEGVue Patient List (see [Figure 3-179 below](#)) and is ready for selection and viewing.

Patient List				
ID	Patient Name	Exam Date	Birth Date	Image
232333	Taylor, John	18/07/2004		4
11111	Smith, John	18/07/2004		4
5676	Bond, James	18/07/2004		8

**Figure 3-179 MPEGVue Patient List**

**NOTE:** When viewing the examination which has been received from e-mail, a separate instance of MPEGvue application is opened, dedicated only for one e-mail examination. If you were previously viewing different MPEGvue Patient exams, you will need to switch over to the previous instance of the MPEGvue.

#### ***Receiving and Viewing a Partial Examination***

In the event that the exam is large and a group of e-mails is expected, it is possible to view a partial exam, even before all of the e-mail messages have arrived.

In addition, if an e-mail message is lost or corrupted, the contents of the remainder of the received messages is available for review.

After receiving even one e-mail message out of many that have yet to arrive, simply select the new examination in the MPEGVue Screen. The screen display will show voids or missing thumbnail images in all places relating to the e-mail messages that have not yet arrived.

***View previous exams from E-mail***

- 1) From the MPEGVue Startup Menu, click on the **View previous exams from email** button.

The Patient List is displayed, listing all exams received by email:

Patient List					
ID	Patient Name	Exam Date	Birth Date	Image	
232333	Taylor, John	18/07/2004		4	
11111	Smith, John	18/07/2004		4	
5676	Bond, James	18/07/2004		8	

**Figure 3-180 MPEGVue Patient List**

- 2) Click on the required examination **Exam Date** (labelled 1 in the example above) to select and display images of that exam.

The *MPEGVue screen* is displayed as shown in the example in [Figure 3-162 on page 3-153](#).

***Activate e-Vue***

- 1) From the MPEGVue Startup Menu, click on the **Activate e-Vue** button.

The Patient List is displayed, listing all e-Vue exams received (refer to [Figure 3-180](#), above).

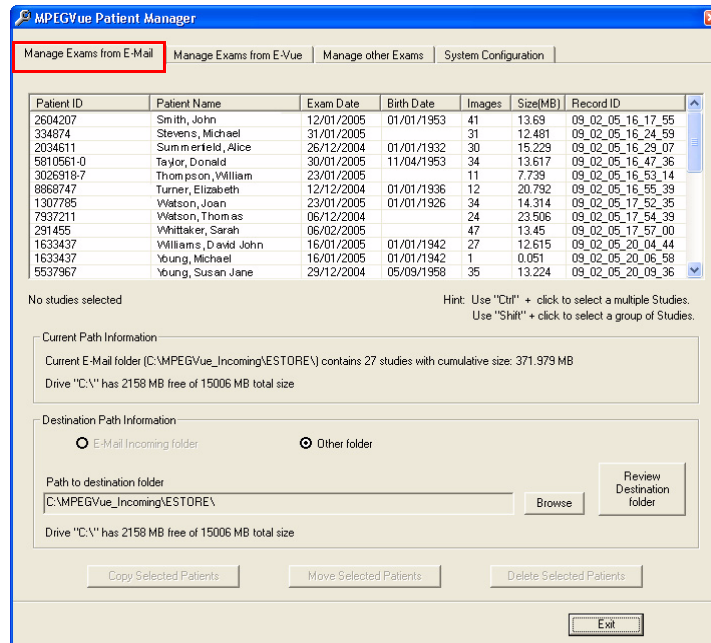
- 2) Click on the required examination **Exam Date** (labelled 1 in the example above) to select and display images of that exam.

The *MPEGVue screen* is displayed as shown in the example in [Figure 3-162 on page 3-153](#).

## Using Patient Manager

- 1) From the MPEGVue Startup Menu, click the **Patient manager** button.

The MPEGVue Patient Manager window opens, as shown below:



**Figure 3-181 MPEGVue Patient Manager Window - Manage Exams from Email Tab**

The MPEGVue Patient Manager window has four tabs that provide access to the following utilities:

- Manage Exams from Email
- Manage Exams from e-Vue
- Manage Other Exams
- System Configuration

**NOTE:** By default, when the MPEGVue Patient Manager window is first opened, the Manage Exams from Email tab is activated.

- 2.) **Manage Exams from Email**, as follows:

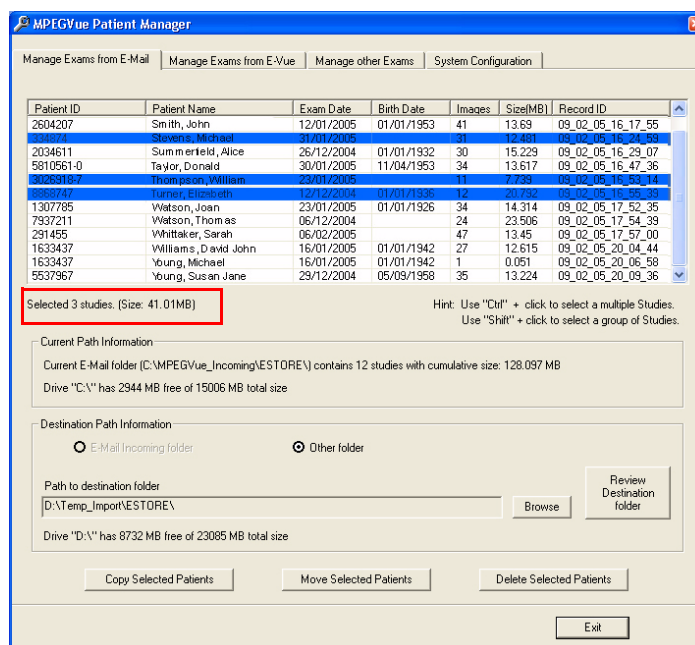
- a.) Make sure the Manage Exams from Email tab is activated as shown in [Figure 3-181](#).

The Patient List displays details - in table format - of all patient exams received by email (*Patient ID, Patient Name, Exam Date, etc.*).

The current path information is displayed below the Patient List as well as number of studies, cumulative size and amount of space available on the drive. By default, the destination path *Other Folder* radio button is enabled.

- b.) Select the required exam or exams, as shown in [Figure 3-182](#).

(Use Ctrl +click to select more than one study; Shift + click to select a group of studies)



**Figure 3-182 Exams Selected**

The currently-selected exams are now highlighted in the list and, as shown in Figure 3-182, the cumulative size of the 3 studies is displayed below.

The three study management buttons are now as follows:

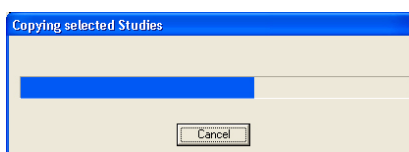
*Delete Selected Patients* - enabled

*Copy Selected Patients* and *Move Selected Patients* - remain disabled until at least one Study has been selected and the Destination Path has been specified (providing the destination is NOT read-only media [such as, CD/DVD-ROM]). Only when *both* these tasks have been performed will these two buttons become enabled.

- c.) To **copy** or **move** the selected exams, first click the Browse button and select the required destination folder, then click the **Copy Selected Patients** or **Move Selected Patients** button as appropriate.

(If necessary, click the Review Destination folder button to review the destination folder Patient List).

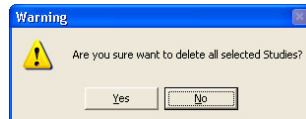
During the copy or move operation, the relevant message and progress bar is displayed:



**NOTE:** When the selected studies have been copied to the destination folder, they will remain listed in the MPEGVue Patient Manager Patient List. However, if they have been moved, they will no longer be listed.

- d.) To **delete** the selected exams, click the **Delete Selected Patients** button.

The user is prompted with the following warning message.

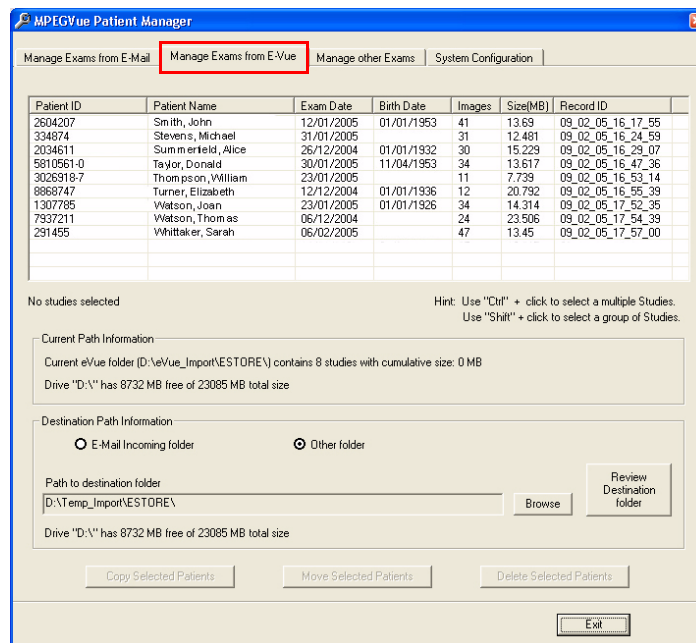


Click **Yes** to confirm the delete command.

**NOTE:** When the selected studies have been deleted, they will no longer be listed in the MPEGVue Patient Manager Patient List.

3.) **Manage Exams from E-vue**, as follows:

- a.) Make sure the Manage Exams from Evue tab is activated as shown in [Figure 3-183](#).



**Figure 3-183 MPEGVue Patient Manager Window - Manage Exams from E-VueTab**

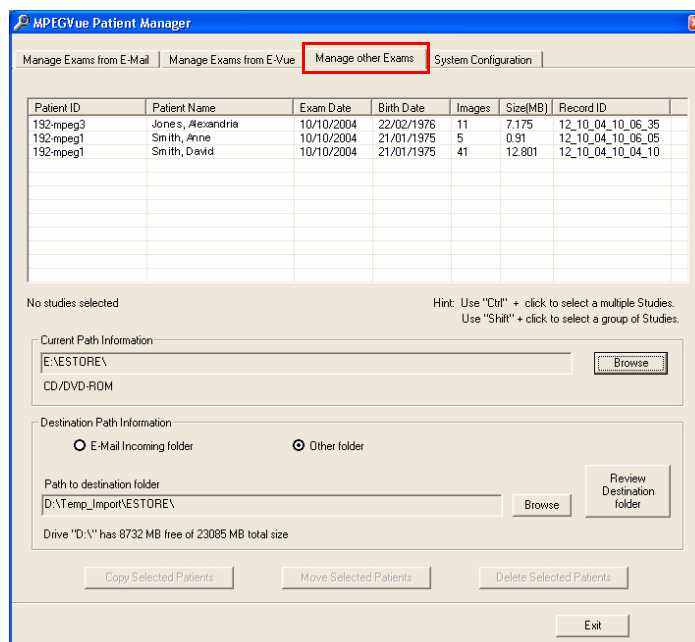
The Patient List displays details - in table format - of all patient exams received via export from E-Vue (*Patient ID, Patient Name, Exam Date, etc.*).

The current path information is displayed below the Patient List as well as number of studies, cumulative size and amount of space available on the drive. By default, the destination path *Other Folder* radio button is enabled.

- b.) Select the required exam or exams - refer to [step b](#) on page 3-168.
- c.) **Copy** or **move** the selected exam/s, as required - refer to [step c](#) on page 3-169.
- d.) If required, **delete** the selected exam/s - refer to [step d](#) on page 3-169.

4.) **Manage Other Exams**, as follows:

- a.) Make sure the Manage Other Exams tab is activated as shown in [Figure 3-184](#).



**Figure 3-184 MPEGVue Patient Manager Window - Manage Other Exams Tab**

**NOTE:** When the Manage Other Exams tab is first activated, the MPEGVue Patient Manager Window opens (by default) with the most recently-selected source directory active (even if the user selected this directory during Copy, Move, or Delete operations performed under another tab). At this stage, no information will be displayed in the Patient List.

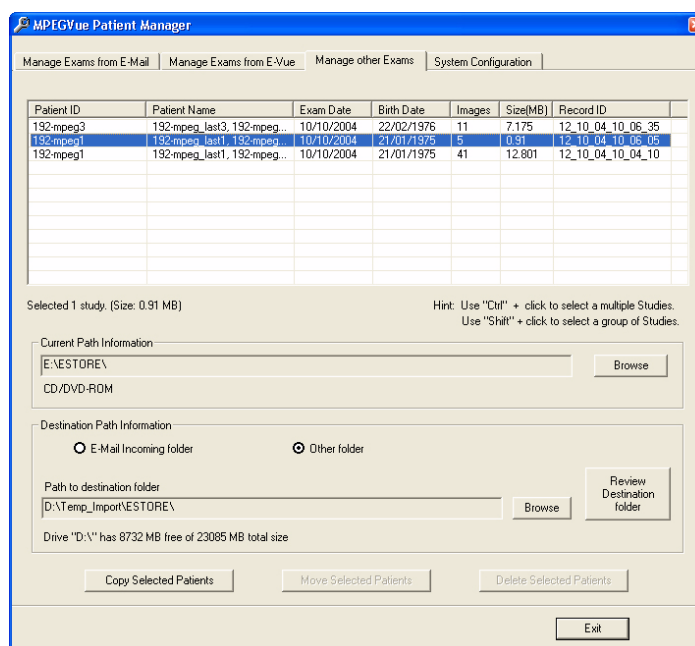
Once the user has specified any source directory that contains MPEGVue studies (these may be located on CD/DVD-ROM, DOK or any local hard drive), exam details are displayed (in table format) in the Patient List. The information shown includes *Patient ID*, *Patient Name*, *Exam Date*, etc. as seen in the example in [Figure 3-184](#), above.

The current path information is displayed below the Patient List together with details of the removable media (e.g., CD/DVD-ROM). By default, the destination path *Other Folder* radio button is enabled; additional information below shows the Path to destination folder.

- b.) Select the appropriate **Current Path Information** - if necessary, click the adjacent **Browse** button and select the correct source directory.  
All patient exams found in the currently-selected source directory are listed in the Patient List.
- c.) Select the appropriate **Path to Destination Folder** - if necessary, click the adjacent **Browse** button and select the required directory.
- d.) From the Patient List, select the required exam/s to be copied.

If the currently-selected source directory is CD/DVD-ROM (read-only media), the *Copy Selected Patients* button is now enabled, as shown in [Figure 3-185](#) below.

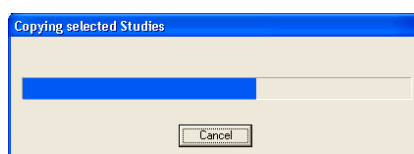
**NOTE:** If the currently-selected source directory is DOK or the local hard drive, the *Delete Selected Patients* and the *Move Selected Patients* buttons are also now enabled.



**Figure 3-185 Exams Selected for Copying**

e.) Click the **Copy Selected Patients** button.

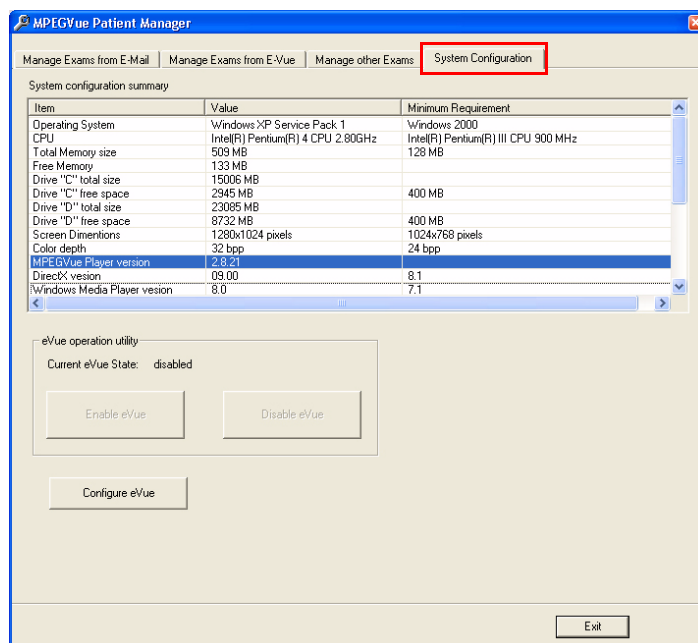
During the copy operation, the following message and progress bar is displayed:



When done, the currently-selected exam/s are available in the destination folder for review.



- 5.) If required, access the **System Configuration** utility, as follows:
  - a.) Make sure the System Configuration tab is activated as shown in [Figure 3-186](#).



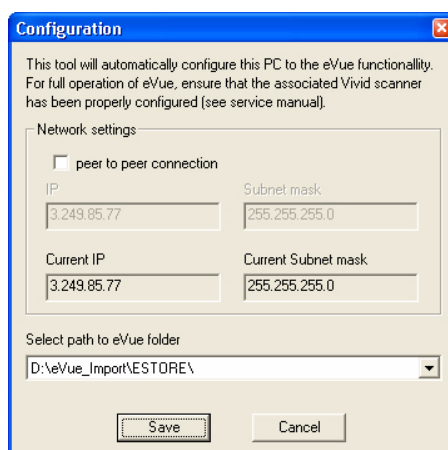
**Figure 3-186 MPEGVue Patient Manager Window - System Configuration Tab**

System Configuration read-only information is displayed (in table format) under the following column headings: *Item*, *Value*, *Minimum Requirements*.

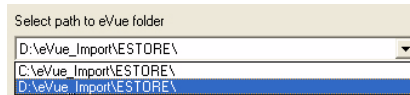
Below this information, the **eVue Operation Utility** buttons enable the user to *enable* or *disable* the eVue mode, as required. An additional button (**Configure eVue**) is used to perform the eVue configuration procedure.

**NOTE:** *In order to enable eVue operation, it is necessary to first perform the eVue configuration procedure as described in the following step.*

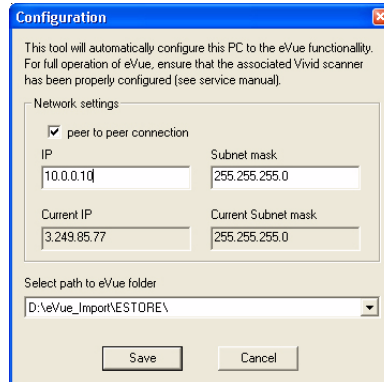
- b.) Configure eVue (if required), as follows:  
Click the **Configure eVue** button. The Configuration dialog box opens:



Select the required eVue folder destination drive:

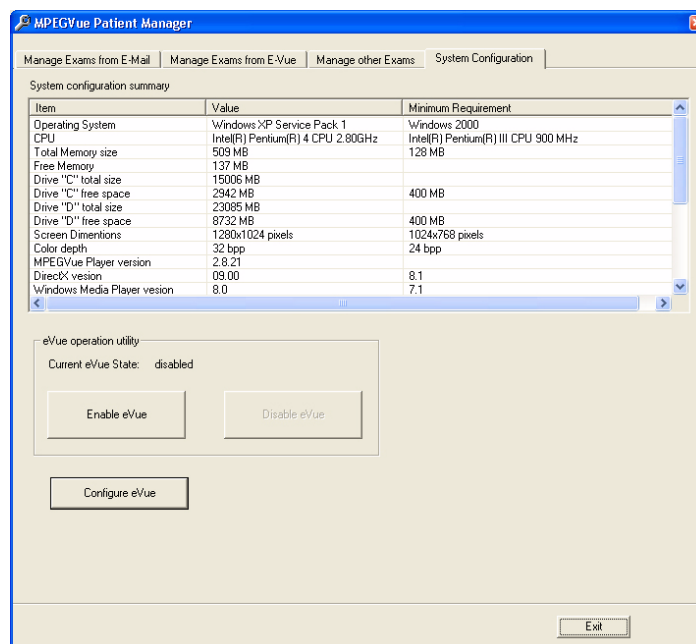


If applicable, enable the **peer-to-peer connection** check box then type the correct current IP address and Subnet mask details:



Click **Save** to save the new configuration.

The Enable eVue button is now active, as shown in [Figure 3-187](#) below.



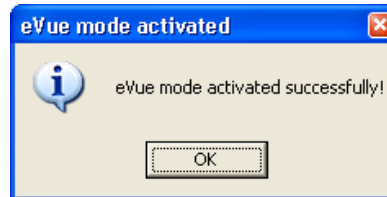
**Figure 3-187 System Configuration - Ready to Enable eVue Mode**



**NOTICE IMPORTANT** To avoid system configuration inconsistencies, before using the **Enable eVue** or **Disable eVue** functions, make sure that your PC is connected to the appropriate network and that all network cables are properly connected. Otherwise, configuration of your PC may become incorrect and the Configuration utility will be unable to execute the *Enable eVue* or *Disable eVue* operations.

In cases of a peer-to-peer connection, before using **Enable eVue** always make sure the two computers (Vivid q N scanner and your PC) are properly configured and connected directly.  
Before using **Disable eVue**, your PC should be connected back to the local network.

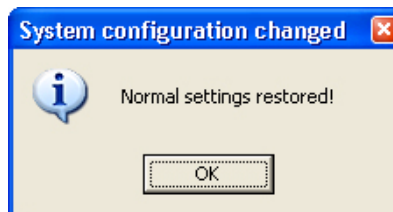
- c.) Click the **Enable eVue** button to activate the eVue operation.  
The following message is displayed:



Click **OK** to close the message.

**NOTE:** *The Disable eVue button is now active.*

- d.) When required, click the **Disable eVue** button to de-activate the eVue operation.  
The following message is displayed:



### 3-10-9-3-13 Using MPEGVue Player

- 1.) On the remote computer, open the media (CD or Memory Stick) containing the MPEGVue files, or the folder which was set as being shared for import of eVue files.
- 2.) On the remote computer, open the folder which was set as being shared for import of eVue files.
- 3.) Double-click on the START\_MpegVue Player icon, as shown below:



**NOTE:** On most computers, when inserting the DVD/CD media with MpegVue files, the MpegVue Player will start automatically (due to the autoplay option of DVD/CD media).

In the event that any updates are required on the remote computer, the program will prompt the user to install the appropriate components, as necessary. (Follow the on-screen instructions).

When done, the Patient List is displayed.

- 4.) From the Patient List, double-click on the required examination **Exam Date** (see the example below) to select and display images of that exam.

Patient List					
ID	Patient Name	Exam Date	Birth Date	Image	
12345	Smith	23/06/2004		3	
49054	Anderson	23/06/2004		6	

The Image Review window opens, displaying thumbnail pictures of all the currently-selected patient's images - see [Figure 3-188 on page 3-177](#).



**Figure 3-188 Image Review Window**

- 5.) From thumbnails mini-pictures (on the left of the screen), select one for review.

The selected image is displayed in the Image Review window.

As new images are transferred to the remote computer, a message is displayed at the bottom of the image currently being reviewed.

- 6.) Press <F5> to refresh the screen.

Additional thumbnail pictures will be displayed accordingly.

**NOTE:** *The MpegVue Player can be used as a regular player, using the Play, Stop, Forward, and Rewind buttons. In addition, the user can forward images by e-mail, save images, and perform measurements, as previously described.*

*The MpegVue Player displays two rows of command keys at the bottom of the screen. If the remote computer is set up to view many Tool Bars, the lower row of the MpegVue command keys might not be visible. Therefore, it is recommended to remove most Tool Bars (by selecting*

*<View> <Tool Bars> and un-checking all tools that are not required) until both lines of command keys are visible, as shown below.*

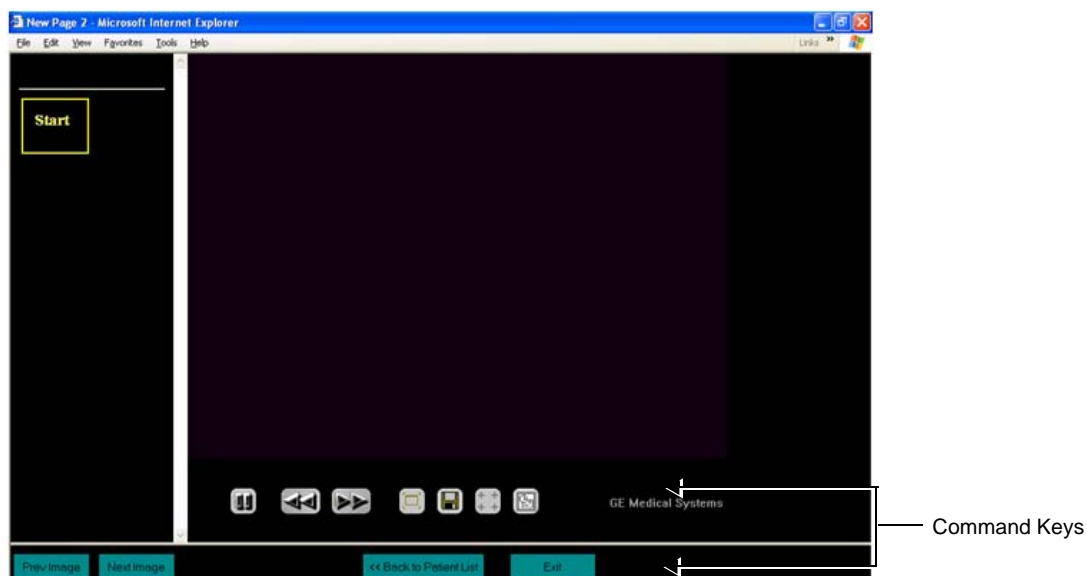


Figure 3-189 MPEGVue Player - Command Keys

## Section 3-11

### Storing and Transporting the Unit

The Vivid q N ultrasound unit mounted on a SafeLock cart weighs up to 45 kg (99 lbs), depending on the configuration. To avoid equipment damage and ensure maximum safety while transporting or moving the unit, the following precautions are recommended:

- Before moving, disconnect all peripheral cables from the system.
- While moving the unit, follow all safety precautions, as described in the *Safety Precautions for Moving the Vivid q N Unit* section, below.
- When transporting the unit by vehicle, or shipping by air or any other means:
  - Eject the lithium ion battery from the unit
  - Pack the unit in the original packing. Refer to the information in ["Receiving the Vivid q N" on page 3-5](#).
  - Follow all safety precautions.
  - Handle with care.
- When reinstalling the unit, always check *both* ends of any cable connections to the system (e.g. peripherals) to ensure cables are properly connected. Confirm that all switches are in the correct position (e.g. the power switch on the DVD/CD-RW device). Allow sufficient system acclimation time, as described in the *System Acclimation Time* section, on page 3-2.

#### 3-11-1 Safety Precautions for Moving the Vivid q N Unit



**CAUTION** Whenever moving the Vivid q N ultrasound unit while mounted on the SafeLock Cart, always observe the following safety precautions:



- 1) Proceed cautiously when crossing door or elevator thresholds. Grasp the front handle grips or the back handle bar, and then push or pull. **DO NOT** attempt to move the unit by pulling its cables or probe connectors.
- 2) Ensure that the unit does not strike walls or door frames.
- 3) Ensure that the pathway is clear.
- 4) Move the unit slowly and carefully.
- 5) Take extra care while moving the unit long distances and on inclines.
- 6) Avoid ramps with an incline of greater than ten degrees to prevent the unit from tipping over. Once the destination is reached, lock the SafeLock Cart front wheel brakes.

#### 3-11-2 Transportation Box and Packaging Materials

Verify that the required packing materials are available. All these materials are required to safely package and transport the Vivid q N ultrasound unit (and SafeLock Cart, if applicable) in the cardboard shipping carton for shipment by vehicle, or any other means.

For more details, refer to the appropriate procedure in [Section 3-4 "Unpacking the Equipment" on page 3-8](#), and follow the instructions in reverse order, or see the Vivid q N Unpacking and Packing Procedure, Direction FL094023. Use the latest revision of the manual.

## Section 3-12

### Completing the Installation Paperwork

**NOTE:** On completion of a Vivid q N ultrasound scanner installation, it is important to record the relevant System Installation details (see [Table 3-11 below](#)) and Product Locator Installation details (see [Figure 3-190 on page 3-181](#)), for future reference.

#### 3-12-1 Installation Acceptance Test Criteria

A Vivid q N ultrasound scanner is ready for use only if the tests and checks described in [Chapter 3 - System Setup](#) (this chapter) and [Chapter 4 - General Procedures and Functional Checks](#) of this Service Manual meet the expected results.

#### 3-12-2 System Installation Details

Enter the serial number printed on the main label (refer to the *Product Labels and Icons* section, on page 1-19), and the other relevant system installation details into the following table:

**Table 3-11 System Installation Details**

System S/N:	
Location:	
Date:	
Customer Name:	
Service Engineer's Name:	
Comments:	

#### 3-12-3 Product Locator Installation

**NOTE:** During and after installation, the documentation (i.e. User Manuals, Installation Manuals...) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user information is available during the operation and service of the complete system.

- 1.) Verify that all details have been entered in the System Installation Details form, as described in the System Installation Details section, above. If this form has not been completed, enter the details now.
- 2.) Locate the Product Locator Installation Card(s) that are affixed to the monitor and to each of the peripherals, and fill in all details on both the front and back of the card(s) - see [Figure 3-190 "Product Locator Installation Card \(Example\)" on page 3-181](#).

**NOTE:** Step 2 may have been completed already by GE personnel.  
The Product Locator Installation Card shown in [Figure 3-190 "Product Locator Installation Card \(Example\)" on page 3-181](#) may not be identical to the card(s) provided.

- 3.) Mail the Product Locator Installation Card(s) to the appropriate product center.



## Section 3-13 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 four Product Locator cards for transportation and one for Installation are included.

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

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

Figure 3-190 Product Locator Installation Card (Example)

Mail the Product Locator Installation Card(s) to the appropriate product center.

### 3-13-1      **User Manual(s)**

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

During and after installation, supplementary documentation (such as, *User Manuals* and *Installation Manuals* for the peripherals) must be kept as part of the original system documentation. This will ensure that all relevant safety and user information is available during the operation and service of the complete system.

---

# Chapter 4

## General Procedures and Functional Checks

---

### Section 4-1 Overview

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

This chapter describes the functional checks that must be performed either as a part of the installation procedure, or as required during servicing and periodic maintenance of the Vivid q N ultrasound scanner.

**Note:** Refer to [Chapter 7 - Diagnostics/Troubleshooting](#) for detailed descriptions of some of the functional checks described in this chapter.

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

Section	Description	Page Number
4-1	<a href="#">Overview</a>	4-1
4-2	<a href="#">General Procedures</a>	4-3
4-3	<a href="#">Functional Checks</a>	4-19
4-4	<a href="#">Image Testing</a>	4-32
4-5	<a href="#">System Turnover Checklist</a>	4-39
4-6	<a href="#">Site Log</a>	4-40

## 4-1-2      **Specific Equipment Required**

- An empty (blank) MO Disk;
  - P/N: 066E0490 (1.3 GB)
  - P/N: 066E0519 (5.4 GB)
  - P/N: 066E0514 (8.6 GB)
- ECG Pads
- ECG Cable:
  - IEC / EUROPE, ASIA, ROW, P/N: 2378938-2
- At least one probe (ideally you should check all the probes used on the system by the site.)

See [Section 9-7 "Probes" on page 9-8](#), for an overview of available probes.

## Section 4-2 General Procedures

### 4-2-1 Overview

Since some general procedures are used more than others, for convenience, all the procedures described in this section are listed below:

- [Power ON/Boot-up section](#), page 4-3
- [Power Shut Down section](#), page 4-7
- [Log On to the System as ADM section](#), page 4-10
- [Using Removable Media section](#), page 4-12
- [Labeling Removable Media section](#), page 4-15
- [Formatting Removable Media section](#), page 4-15
- [Verifying Removable Media section](#), page 4-16
- [Archiving and Loading Presets section](#), page 4-16

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

#### 4-2-2-1 Connecting Mains Power to the Vivid q N Ultrasound Unit



**DANGER TO AVOID THE RISK OF FIRE, POWER TO THE SYSTEM MUST BE SUPPLIED FROM A PROPERLY RATED OUTLET.**

**IT IS RECOMMENDED TO USE A DEDICATED POWER OUTLET. THE POWER PLUG SHOULD NOT, UNDER ANY CIRCUMSTANCES, BE ALTERED TO A CONFIGURATION RATED LESS THAN THAT SPECIFIED FOR THE CURRENT. DO NOT USE AN EXTENSION CORD OR ADAPTOR PLUG. REFER TO [2-2-5 "Electrical Requirements"](#) on page 2-3 FOR MORE DETAILS.**



**DANGER ALWAYS CONNECT THE UNIT 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).**



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



**CAUTION** The 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.**

**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.

**NOTE:** If the unit has been in the OFF condition for an extended period of time, (3 to 5 days or more), the unit may not boot, or may beep when turned on.

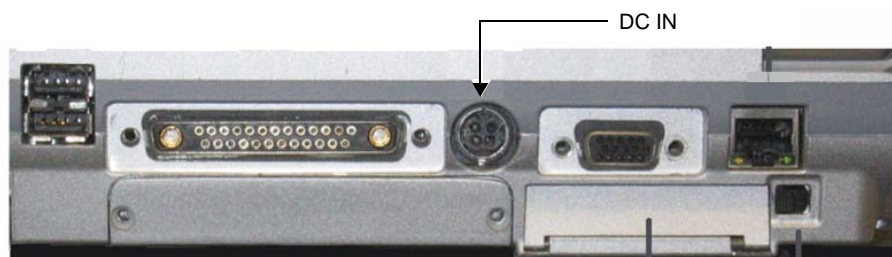
NOTE: If the system cannot boot up, or it boots up with a PS communication error, refer to the instructions for [8-3-4 "BIOS Battery Replacement" on page 8-47](#).

---

***Follow These Steps to Connect Mains Power to the Unit***

Connecting the Vivid q N ultrasound unit involves preliminary checks of the power cord, voltage level and compliance with electrical safety requirements.

- 1) Ensure that the wall outlet is of appropriate type, and that the power 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 base of the Vivid q N portable ultrasound scanner.
- 5.) Connect the Mains Power Cable female plug via the AC Adapter to the Power Inlet (DC IN - refer to [Figure 4-1](#)) at the rear of the unit.



**Figure 4-1 Mains Power Connector - Rear Panel**

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

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

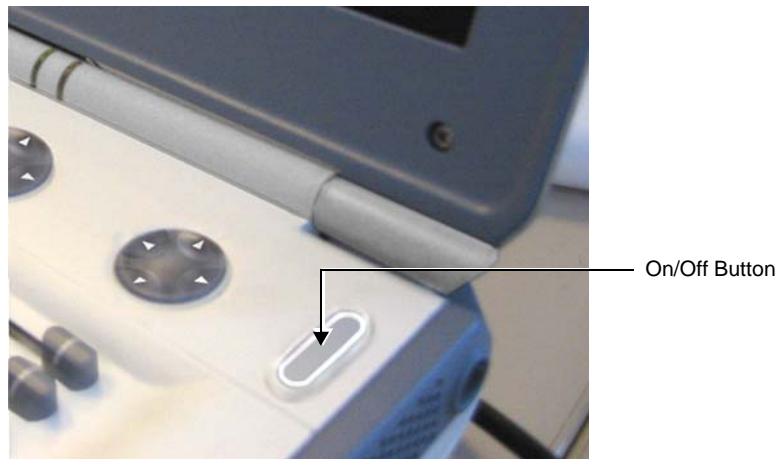
#### 4-2-2-2 Turning the System ON

- 1) Verify that the ultrasound unit has been connected to the mains power wall outlet via the AC connector on the rear of the system (as previously described) and that mains power is turned ON.



**NOTICE** When AC power is applied to the scanner, the **On/Off** button on the control console illuminates amber, indicating the Back-end Processor is in *Standby* mode.

- 2) Hold down the **On/Off** button (Figure 4-2) on the control panel for 3 seconds. The system automatically performs an initialization sequence which includes the following:
  - Loading the operating system.
  - Running a quick diagnostic check of the system.
  - Detecting connected probes.



**Figure 4-2 On/Off Button on Control Panel**

During a normal boot, you may observe that:

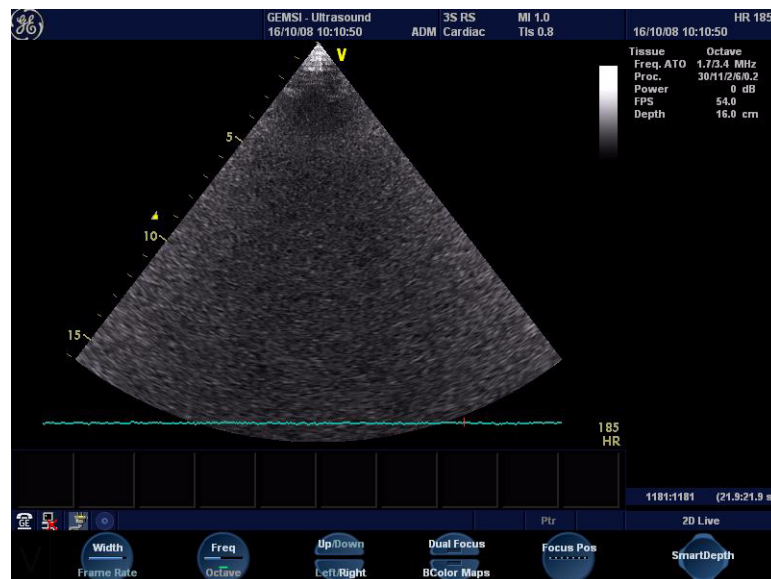
- a.) The unit's ventilation fans starts on full speed, but slow down after a few seconds (listen to the fan noise).
- b.) Power is distributed to the peripherals, Operator Panel (control panel), Monitor, Front-End Processor and Back-End Processor.
- c.) The Back-End Processor and rest of the scanner starts with the sequence listed in the following steps:
  - 1.) Back-End Processor is turned ON and starts to load the software.
  - 2.) The Start Screen (Vivid) is displayed on the monitor.

A start-up progress bar indicating the time used for software loading, is displayed on the monitor, as shown in Figure 4-3.



**Figure 4-3 Start-up Progress Bar for Vivid i n**

- 3.) The software initiates and sets up the Front-End electronics and the rest of the scanner.
- 4.) The Keyboard backlight is lit.
- 5.) As soon as the software has been loaded, a 2D screen is displayed on the monitor, as shown below.



**Figure 4-4 2D Screen**

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



## 4-2-3 Power Shut Down

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

**NOTE:** After turning OFF the system, wait at least 10 seconds before turning it on again. The system may not be able to boot-up if power is recycled too quickly.

The system can be switched OFF in one of three ways, as follows:

- Holding down the **On/Off** button for 3-5 seconds will evoke the display of the System Exit dialog box (see [Figure 4-5](#)). From this, you can either select *Full Shutdown* (click the **Shutdown** button) or choose to place the system in *Standby Mode* (click the **Standby** button). Both these procedures are described in detail below.



**Figure 4-5 System Exit Dialog Box**

- Holding down the **On/Off** button for more than 10 secs will cause the system to perform *Emergency Shutdown*. This is not recommended under normal circumstances.
- Closing the lid will place the system in *Standby Mode*.

**Note:** The system will remain in *Standby Mode* for as long as battery power will allow.

The System - Exit dialog box ([Figure 4-5](#)), used when switching OFF the unit, gives you the choices described below.

- **Standby**  
Use this button to select the Standby mode, allowing a shorter reboot time. Most of the system is powered down, but a certain portion of the unit remains energized. The standby mode allows a shorter re-boot time when the system is used on a daily basis or moved from one place to another.
- **Logoff**  
Use this button to log off the current user.  
The system remains ON and ready for a new user to log on.  
(If the Logoff button is dimmed, it indicates that no user is logged on to the unit at the moment.)
- **Shutdown**  
Use this button to Shut Down the system. The entire system is shut down. It is recommended to perform a full shutdown at least once a week.
- **Cancel**  
Use this button to exit from the System - Exit dialog box and return to the previous operation.

---

4-2-3-1      **Standby Mode**

---

***Follow the steps below to select Standby Mode***

This procedure describes the steps required to power down the unit to Standby mode:

**NOTE:**      *Don't press the On/Off button too long. If you press the button too long (more than 3-4 seconds), a full shutdown is started.*

- 1.) Hold down the **On/Off** button for 3-5 seconds to evoke the display of the System Exit dialog box (see [Figure 4-5 on page 4-7](#)).
  - 2.) Click the **Standby** button to activate Standby mode.
  - 3.) Leave the mains power cable connected to keep the standby battery fully charged.
- 

***Follow steps below if you need to disconnect power cable when unit is in standby mode***

- 1.) Switch OFF the Mains Power from the wall outlet.
- 2.) Disconnect the power cable.

The system will remain in Standby mode for approximately 15 minutes if the standby battery is fully charged. If the system is unplugged for a longer period of time, a full shutdown is automatically performed.

As described above, the battery is automatically charged when the system is plugged to the wall outlet and the power is switched ON. It takes approximately 10 hours to charge a flat battery.

If the system is left in the OFF condition (system unplugged from the wall outlet) for an extended period of time (3 to 5 days or more), the system may not boot up or may beep when turned ON. Should this occur, the system needs to recharge the batteries. This could take 15 minutes to as long as 10 hours, depending on the battery age, system input voltage and system temperature. To eliminate draining the batteries, the system should remain plugged into the wall outlet with the wall outlet power switch in the ON position.

**NOTE:**      *Connect the power cable to the mains power outlet again as soon as possible and at least before you switch on the mains power and press the On/Off button.*

**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.*

---

**4-2-3-2 Complete Power Down**

*NOTE: This function is not available from Standby mode.*

---



***Follow this procedure to perform a complete system power-down***

- 1.) Hold down the **On/Off** button for 3-5 seconds to evoke the display of the System Exit dialog box (see [Figure 4-5 on page 4-7](#)).
- 2.) Select **Shutdown** to do a complete power down of the unit.  
The Back-End Processor will first turn OFF the scanner activity and print the message "*Please wait - Shutdown in progress*" in the LCD display. Then system shut down commences.  
The time required to power down the unit (including the Back-End Processor), may vary from 10 seconds up to approximately 1 minute. The last component that shuts down is the light in the LCD display, indicating that you may continue with the next step.
- 3.) Disconnect the mains power from the wall outlet **only after the fans have stopped**. This will cut power distribution within the unit.  
If the system is still running when you disconnect the mains power, the internal power supply will switch over to the battery power and supply the system with power until either the battery is drained to 30% capacity (invoking shut down), or shutdown has been invoked by the user.

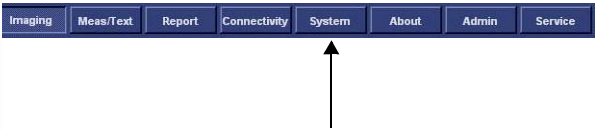
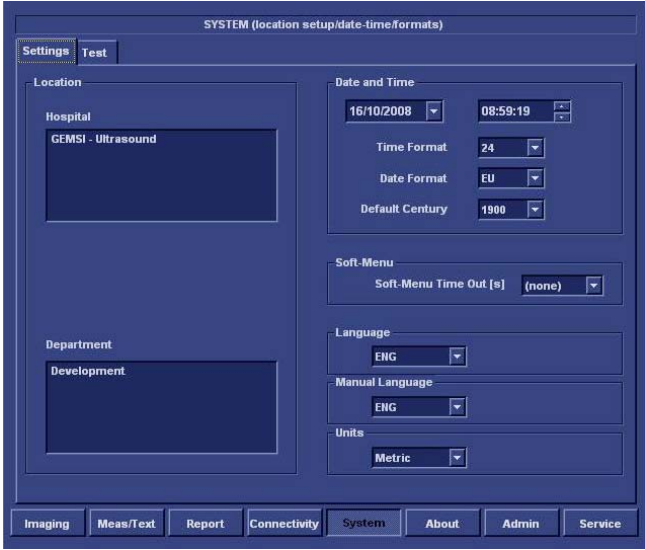
*NOTE: To completely remove power from the system, release and remove the battery.*

## 4-2-4 Log On to the System as ADM

Table 4-2 Logging on to the System as ADM

Step	Task	Expected Result(s)
1.	Press <b>Config</b> on the alphanumeric keyboard.	<p>If not already logged on, the Operator Login window is displayed.</p>  <p>Note: The default password is <b>ulsadm</b></p>
2.	<p>Select the down-arrow to the right of the Operator field to view the Operator pull down list</p> <p>From the factory, these two users are defined without password.</p> <ul style="list-style-type: none"> <li>- adm</li> <li>- usr</li> </ul> <p>It is possible for the administrator (<i>adm</i>) to establish unique passwords for each user, but don't do it now.</p>	
3.	<p>Select the user <i>adm</i>.</p> <ul style="list-style-type: none"> <li>- From the factory, the password has been left blank, so you may try to log on without any password.</li> <li>- If the log-on fails, you may try to use the password <b>service</b>.</li> <li>- As a last resort, contact the hospital's network administrator (or person responsible for the ultrasound unit), and ask for the password.</li> </ul> <p>The Emergency button stores data only from current patient examination.</p>	
4.	Select <b>Log on</b> .	<ul style="list-style-type: none"> <li>- If this is the first time the unit is turned on, the "IMAGING AND ANALYSIS - GLOBAL LEVEL" window is displayed.</li> <li>- If another screen was displayed earlier, before logging out or turning unit off, that screen will be displayed.</li> </ul> 

**Table 4-2 Logging on to the System as ADM (cont'd)**

Step	Task	Expected Result(s)
5.	<p>Select System to access the System Setup window.</p> 	<p>The System Settings window is displayed</p> 
6.	Proceed to select the required settings.	

## 4-2-5 Using Removable Media


### 4-2-5-1 Introduction

Vivid q N is equipped with a Magneto Optical Disk Drive (MOD Drive) and a DVD/CD-RW Drive (as an option from system version BT12).

The MOD Drive can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel. This connection must be via a USB-to-SCSI adaptor; one side of the adaptor being connected to the Vivid q N USB port, and the other side to the rear of the MOD drive.

When connecting the MOD drive directly to the system, it is necessary to use an additional power source. **As a safety precaution, this must be done via an isolation transformer.**

The MOD Drive may be connected once the system is powered ON, or after shutdown. All software drivers for the MOD Drive are pre-configured and installed designated to be used with the specific MOD drive supplied by GE.

 **WARNING** ***Do not attempt to use a different type of mass storage device other than the MOD Drive supplied with the system. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!***

#### 4-2-5-2 Install MO Disk in MO Drive



**NOTICE** Never move the unit with a MO disk in the Magneto Optical Disk Drive because the drive actuator will not be locked and the Magneto Optical Disk Drive could break.

- 1.) Preparations before installing an MO disk in the MOD Drive:
  - a.) The unit must be turned ON and “up and running” before using the MOD Drive
  - b.) Verify the MO disk for loose hardware or damaged labels which could jam inside the MOD Drive.
  - c.) Ensure that the slide switch in one corner of the disk is set so that the disk is write enabled (disk hole closed).
- 2.) Insert the disk into the MO Disk Drive with the label for the side you intend to use, facing up.

#### 4-2-5-3 Eject and Remove MO Disk from MOD Drive



**NOTICE** *Do not eject the MO Disk using the button on front of the MO drive.*

In some cases, the MO Disk is ejected automatically. If not automatically ejected, use the manual ejection method as described in the following steps:

- 1.) Select the **Eject** button on the screen

OR

*Press <Alt> + E on the alphanumeric keyboard to display the Eject Device menu.*

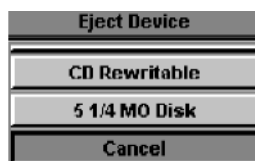


Figure 4-6 Eject Device Menu

- 2.) Select **5 1/4 MO Disk** in the Eject Device menu to eject the MO Disk.
- 3.) Remove the ejected MO Disk from the MO Drive and place it in its cover box for storage in a safe place.

#### 4-2-5-4 Connecting External USB Hard Disk to USB Port

The External USB Hard Disk can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

One must use the additional power source (supplied with the External USB Hard Disk) to activate the External USB Hard Disk.



**WARNING** *Do not attempt to use a different type of mass storage device other than the External USB Hard Disk supplied with the system. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

Refer to [8-7-2-5 "External USB Hard Disk Installation Procedure" on page 8-136](#) for instructions on initial configuration and connecting the External USB Hard Disk to the Vivid q N portable ultrasound scanner.

After connecting the External USB Hard Disk to the system, perform the functional checks described in the [4-3-2-5 "External USB Hard Disk Test" on page 4-27](#).

#### **4-2-5-5 Installing DVD/CD into DVD/CD Drive**

**NOTE:** Use only CD-R, DVD-R or DVD+R media from a reputable vendor and only high-grade media types.

- 1.) Press the Eject button on the right side of the DVD/CD Drive once to open the disk tray.
- 2.) Put a DVD/CD disk into the disk tray with the label side facing up.
- 3.) Press the Eject button once to close the disk tray.

After a few seconds, the disk is available for reading, formatting or writing, depending on the type of disk you used.



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#### 4-2-5-6 Eject and Remove DVD/CD from DVD/CD Drive



**NOTICE** *Do not eject the DVD/CD using the button on front of the DVD/CD Drive.*

In some cases, the DVD/CD media is ejected automatically. If not automatically ejected, use the manual ejection method as described in the following steps:

- 1.) Select the **Eject** button on the screen.

OR

Press **<Alt> + E** on the alphanumeric keyboard to display the Eject Device menu ([Figure 4-6](#)).

- 2.) Select **CD-Rewriteable** in the Eject Device menu to eject the DVD/CD media.
- 3.) Remove the ejected DVD/CD media from the drive and place it in its cover box for storage in a safe place.

#### 4-2-6 Labeling Removable Media

Before you start to format any Removable Media, be sure about what naming convention you will use for labelling.

- Use a logical name and make sure to physically label each Removable Media.
- Verify that each Removable Media is given a unique name. Maximum eleven (11) characters may be used for the label name.
- Remember that MO Disks have two sides, Side A and Side B. Each Side must have a unique name.

Example: MO Disks for storing images may be labeled "IMAGE\_1A" (Side A on MO Disk #1), "IMAGE\_1B (Side B on MO Disk #2), "IMAGE\_2A"...

#### 4-2-7 Formatting Removable Media

This procedure describes how to format an MO Disk or DVD/CD media.

Before you continue, be sure about what naming convention you will use for labelling the Removable Media.

**NOTE:** Use only CD-R, DVD-R or DVD+R media from a reputable vendor and only high-grade media types.

- 1.) Select **Config > Connectivity > Tools**.
- 2.) Select the removable media from the *Tools pop-up menu*.
- 3.) Enter a name for the removable media in the *Label field*.
- 4.) Press **Format**.
- 5.) Wait for display of the *Information window*, indicating that the formatting process is completed.



**NOTICE** *Do not eject the DVD/CD using the button on the DVD/CD drive.*

- 6.) Press **<Alt> + E** on the alphanumeric keyboard to display the Eject Device menu ([Figure 4-6 on page 4-13](#))
- 7.) Select the relevant media.

The selected media is ejected.

## 4-2-8 Verifying Removable Media


- 1.) Insert the removable media to be verified.
- 2.) Select the pre-configured removable media from the **Config > Connectivity > Tools** pop-up menu.
- 3.) Press **Verify**.

The unit starts to verify the DICOM directory on the selected media.

## 4-2-9 Archiving and Loading Presets

**NOTE:** Always save presets before any software reload. This action is necessary to ensure that the presets loaded after the software reload are as up-to-date as possible.

All user presets except changes to *Summary*, *Anatomy*, and *Biometry* pages, can be saved on an MO disk for reloading on the system.

 **NOTICE** Presets should not be saved on the same MO disk as images, because the Archive Menu lists the images but not the presets stored on a MO disk.

### 4-2-9-1 Archiving Presets to an MO Disk

Table 4-3 Saving Presets 1 of 2

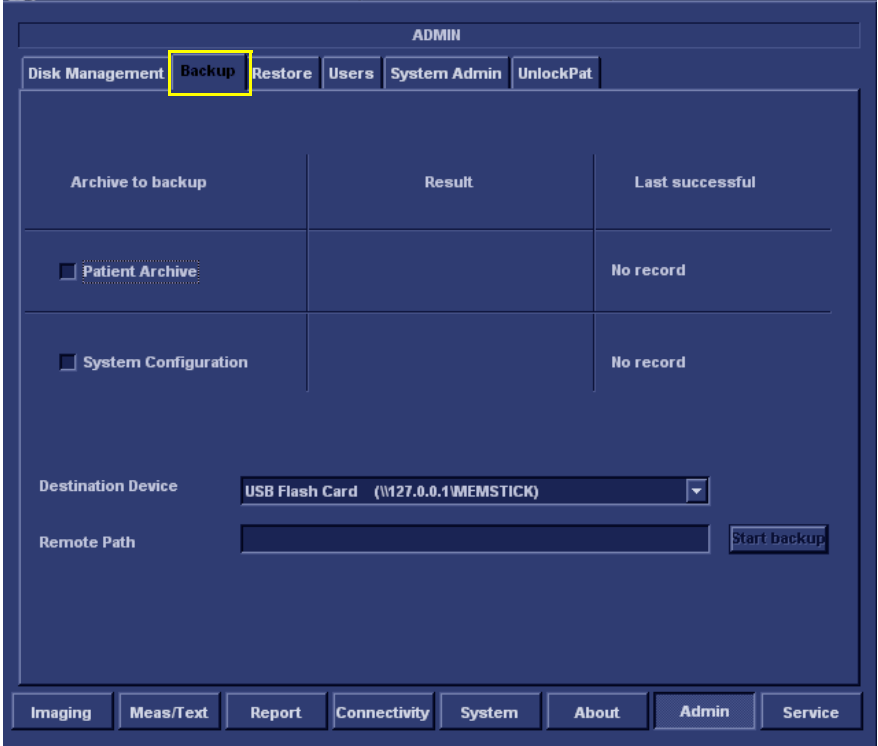
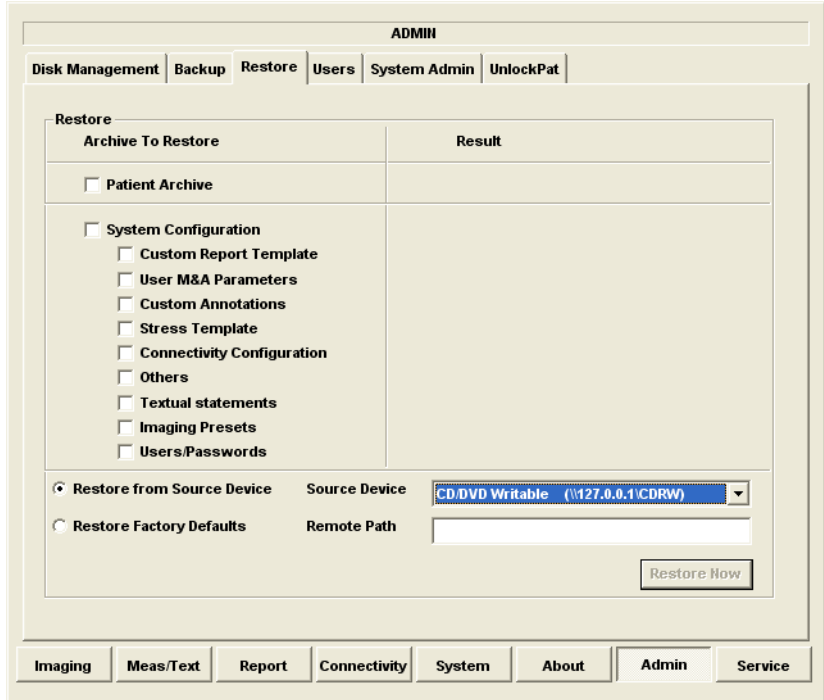
STEP	TASK	FUNCTION
1.	Insert an empty, formatted MO disk labelled "PRESETS" and marked with Vivid q N's serial number and the date, into the MO Drive.  For more information about formatting, see <a href="#">"Formatting Removable Media" on page 4-15</a> .	
2.	Press <b>Config</b> (or <b>F2</b> ); select <b>Admin</b> then select <b>Backup</b> .	<p>The Backup window is displayed.</p> 

Table 4-3 Saving Presets (cont'd) 2 of 2

STEP	TASK	FUNCTION
3.	Enable the <b>User Defined Configuration</b> check box.	
4.	Select the MOD as the Destination.	
5.	Press <b>Backup Now</b> .	A copy of the Presets is saved on the MO disk.
6.	Press <Alt> + E on the alphanumeric keyboard.	The MO disk is ejected.

4-2-9-2 Loading Presets from an MO Disk

Table 4-4 Loading Presets

STEP	TASK	FUNCTION
1.	Insert the MO disk with the archived presets into the MOD.	
2.	Press <b>Config</b> (or <b>F2</b> ); select <b>Admin</b> then select <b>Restore</b> .	<p>The Restore window is displayed.</p> 
3.	Enable the <b>User Defined Configuration</b> check box.	
4.	Select the MOD as the Source.	
5.	Press <b>Restore Now</b>	The Presets are restored to the System.
6.	Press <b>&lt;Alt&gt; + E</b> on the alphanumeric keyboard.	The MO disk is ejected.

## Section 4-3 Functional Checks

### 4-3-1 Basic Controls

#### 4-3-1-1 Bearing Handle Test

Table 4-5 Bearing Handle Test - Recommended

Step	Task	Expected Result(s)
1	Disconnect all power supplies and peripherals.	Verify that no peripherals nor power supplies are connected to the system.
2	Move the handle to the maximum lowest position (beneath the system).	Ensure that the system is standing stable.
3	Open the screen	
4	Close the screen	
5	Move the handle from the maximum lowest position to the maximum upper position.	Verify that the handle is able to reach the maximum lowest and maximum highest positions smoothly.
6	Pick up the system using the handle.	Ensure that the handle is firmly connected to the system.

#### 4-3-1-2 Alphanumeric Keyboard Test

Table 4-6 Alphanumeric Keyboard Test - Recommended

Step	Task	Expected Result(s)
1	Power-up the System in Normal Scanning Mode	
2	Press <b>Config</b> and select <b>Report</b>	
3	Select the <b>Comment Text</b> Tab	
4	Press all Alphanumeric keys one-by-one. To quickly test every key (each letter in the alphabet), type the following sentence: <i>The quick brown fox jumps over the lazy dog</i> Repeat the test, while holding down the Shift key.	As each key is pressed, the corresponding letter is typed on the screen.
5	Use the <b>Backspace</b> key to delete the text you typed.	

### 4-3-1-3 External Keyboard Test

**NOTE:** The External Keyboard test also includes testing of the following components: TGC Sliders, Rotary, Keyboard backlight, Button backlight, and Active Button.

**Table 4-7 External Keyboard Test - Recommended**

Step	Task	Expected Result(s)
1	Power-up the System in Normal Scanning Mode	
2	Press <Alt> F2 to start the diagnostic package.	
3	Highlight the <b>Keyboard Test</b> and press <Start>	The keyboard Test window opens
4	Trackball to <b>Connect</b> and press <b>Set</b> .	
5	Press all extended KB keys one-by-one. Press the <b>Clear</b> soft button to clear the Event window.	The extended KB keys activate properly. Every hit on a key is followed by two rows (Depress/Release).
6	Perform the TGC Slider Test, as follows: d.) Move all TGC sliders to the <i>left</i> position	The position value is 0 (+2) for all TGC Sliders
	e.) Move all TGC sliders to the <i>right</i> position	The position value is 63(-2) for all TGC Sliders
	f.) Move all TGC sliders to the <i>central</i> position	The position value is 31(±2) for all TGC Sliders
7	Perform the <b>ROTARY TEST</b> , as follows: Rotate the rotary (in both directions) and press the button at the center of the rotary.	The rotary is activated properly; pressing on the button will display a row of data for pressing and another row of data for releasing (Depress/Release).
8	Perform the <b>ALPHANUMERIC KEYBOARD BACKLIGHT TEST</b> , as follows: a.) Change the combo box near the <b>Front Panel</b> button to <b>Reset to power up conditions</b> and press the <b>Front Panel</b> button	
	b.) Change the combo box near <b>Front Panel</b> button to <b>Enable transmission</b> and press the <b>Front Panel</b> button.	
	c.) Set the Keyboard Backlight to 255	All Alphanumeric Backlight LEDs are seen with same intensity acceptable for the maximum level.
9	Perform the <b>BUTTON BACKLIGHT TEST</b> , as follows: a.) Change the combo box near the <b>Front Panel</b> button to <b>Reset to power up conditions</b> and press the <b>Front Panel</b> button	
	b.) Change the combo box near <b>Front Panel</b> button to <b>Enable transmission</b> and press the <b>Front Panel</b> button.	
	c.) At the <b>Indicators</b> frame set Indicator – ID to the <b>All</b> position. Select <b>ON</b> and <b>Backlights</b> .	
	d.) Press the <b>Test Software</b> button	All Backlight LEDs except the TGC sliders and the Rotary are seen with same intensity acceptable for the maximum level.

**Table 4-7 External Keyboard Test (cont'd)- Recommended**

Step	Task	Expected Result(s)
10	Perform the <b>BUTTON ACTIVITY TEST</b> , as follows: a.) Change the combo box near the <b>Front Panel</b> button to <b>Reset to power up conditions</b> and press the <b>Front Panel</b> button	
	b.) Change the combo box near <b>Front Panel</b> button to <b>Enable transmission</b> and press the <b>Front Panel</b> button.	
	c.) At the <b>Indicators</b> frame set Indicator – ID to the <b>All</b> position. Select <b>ON</b> and <b>Activity</b> .	
	d.) Press the <b>Test Software</b> button	All 10 Activity green LEDs and KB backlights are seen with maximal intensity
11	Perform the <b>STATUS INDICATOR TEST</b> , as follows: a.) Check the <b>Battery green</b> check box. Press <b>Set</b> .	Battery green LED is On
	b.) Uncheck the <b>Battery green</b> check box. Check the <b>Battery yellow</b> check box. Press <b>Set</b>	Battery yellow LED is On
	c.) Uncheck the <b>Battery yellow</b> check box. Check the <b>Extern DC green</b> check box. Press <b>Set</b>	Extern DC green LED is On
	d.) Uncheck the <b>Extern DC green</b> check box. Check the <b>Extern DC yellow</b> check box. Press <b>Set</b>	Extern DC yellow LED is On
12	Perform the <b>LID BUTTON TEST</b> , as follows: a.) Press the <b>Diagnostic Info</b> button.	
	b.) Place the test upper cover magnet close to the Alphanumeric Keyboard Escape button.	The status of the Lid switch is “Open” and changes to “Closed” after the magnet was placed.
13	Perform the <b>POWER BUTTON TEST</b> , as follows: a.) Press the <b>Diagnostic Info</b> button. Press the <b>Power</b> button.	The status of the Power Button is “Open” and changes to “Closed” when the power button is pressed.
	b.) Press the <b>Disconnect</b> and <b>Close</b> buttons to close the test application.	

4-3-1-4 Trackball Test

Table 4-8 Trackball Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press <b>Config</b>	
3	Under the <b>Connectivity</b> tab, select <b>TCPIP</b> then <b>Advanced Settings</b>	
4	Click on <b>View</b>	
5	In the address bar, type <b>Desktop</b> and press <Enter>	
6	Select <b>My Docs &gt; My Pictures</b> and double-click on one of the pictures to open the Paint application.	
7	From the Paint window, make sure that when moving the trackball you have good control and that the x and y coordinate values (displayed at the bottom of the screen) move digit-by-digit up and down.	Movement is smooth (no jumping) and the trackball has no "dead" areas (i.e., when the trackball is moved there are no areas in which no changes are seen).

4-3-1-5 System ID Test

Table 4-9 System ID Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press <b>Config</b>	
3	Under the <b>Connectivity</b> tab, select <b>TCPIP</b> then <b>Computer Name</b>	
4	Make sure the computer name is System ID	
5	Select <b>Advanced Settings</b>	
6	Type <b>Desktop</b> and press <Enter>	
7	Select <b>My Computer</b> and press <b>Menu</b>	
8	From the drop-down menu, select <b>Properties</b> and then select the <b>Computer Name</b> tab.	
9	Make sure the System ID is indicated under the computer description.	The computer description matches the system ID.



4-3-1-6 CW Test

Table 4-10 CW Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press <b>Alt + Config</b> to enter Diagnostics Mode	
3	From the Diagnostic Test tree, select <b>Front End Test</b> .	
4	Run <b>Full System Test</b> and press <b>Start</b>	PASS
5	Connect the 3S-RS probe to the probe port.	
6	From the Diagnostic Test tree, select <b>Front End Test</b> .	
7	Select <b>TR32</b> then select <b>TX</b> . Select <b>TXProbeTX Test</b> and press <b>Start</b>	PASS
8	Select <b>MUX Test</b> then select <b>3S-RS Test</b> and press <b>Start</b>	PASS
9	Select <b>TR32 Test</b> then select <b>RX Test</b> . Select <b>RSTest with 3S-RS</b> and press <b>Start</b>	PASS
10	When done, press the <b>Esc</b> button	

4-3-1-7 Visual Test

Table 4-11 Visual Test - Recommended

Step	Task	Expected Result(s)
1	Insert 3S-RS probe.	
2	Increase the gain to see the homogenous noise.	The probe ID is 3S-RS. No strikes or artefacts are present.

## 4-3-2 Peripherals

### 4-3-2-1 VCR Test

**Table 4-12 VCR Test - Recommended**

Step	Task	Expected Result(s)
1	Connect a Mitsubishi 9600 VCR and video converter to the system, restart the system and load an SVHS cassette.	Verify that you follow all the procedure instructions described in <a href="#">"Connecting the VCR" on page 3-48</a> .
2	Connect an external monitor to the VCR S-Video or Video output.	
3	Connect a 3S-RS probe. Reset the VCR counter and press the <b>VCR Record</b> button.	Verify that the recording indicator (red dot) is displayed on the VCR and the tape counter is running on the VCR.
4	Activate CW Mode and record 2 minutes of heart scanning or a similar effect using a phantom.	Record 2 minutes of CW scanning.
5	Stop recording and rewind the cassette. Press the <b>Play</b> button on the VCR.	The recorded Image is played back.
6		Verify that in CW Mode both the <i>left</i> and <i>right</i> audio channels are working, and that the played-back audio is similar to the recorded audio in both the <i>left</i> and <i>right</i> speakers, when applicable.

### 4-3-2-2 B/W and Color Printer Test

**Table 4-13 B/W Printer Test - Recommended**

Step	Task	Expected Result(s)
1	Scan a phantom or suitable interface in 2D-Mode.	
2	Press the <b>Freeze</b> button.	The image scanning stops with the latest picture frozen on the screen.
3	Press the <b>Print</b> button.	Evaluate the print quality. Adjust the <i>brightness</i> and/or <i>contrast</i> of the B/W printer, if required. The image displayed on the screen is printed on the B/W or color printer, depending upon the key assignment configuration.

### 4-3-2-3 Color Printer Test

**Table 4-14 Color Printer Test - Recommended**

Step	Task	Expected Result(s)
1	Scan a blood vessel in 2D-Mode or a phantom simulating a similar CFM effect, then activate CFM to see color.	
2	Press the <b>Freeze</b> button.	
3	Press the <b>Print P1</b> button.	Evaluate the color print quality. Adjust the <i>brightness</i> and/or <i>contrast</i> of the Color printer, if required.

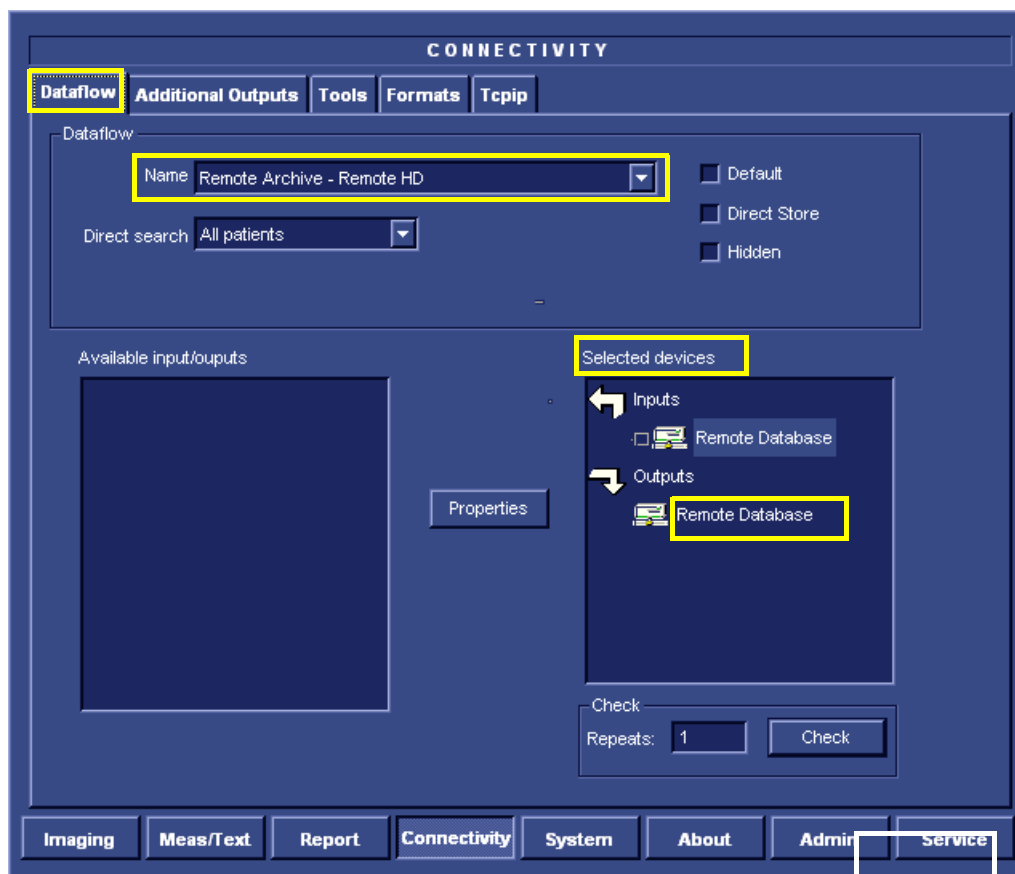
#### 4-3-2-4 Wireless USB Network Test

**NOTE:** When the Wireless Network USB Adaptor is installed in a new system, the functionality is verified as described in ["Configuring the Wireless Adaptor" on page 3-93](#).

**NOTE:** When the Wireless Network USB Adaptor is installed in a system that is already configured, proceed as described below.

##### 4-3-2-4-1 Wireless USB Network Functionality Test

- 1.) With the system up and running, press **Config**.
- 2.) Click **Connectivity** and select **Dataflow** - see [Figure 4-7](#).



**Figure 4-7 Dataflow showing “Remote Database” as the Selected Device**

- 3.) From the Dataflow **Name** field scroll-down list ([Figure 4-7](#)), select a dataflow that the user works with in day-to-day operations.
- 4.) Under **Selected devices** ([Figure 4-7](#)), select the appropriate device.
- 5.) Click **Check**.

*The Information - Check Status box opens - [Figure 4-8](#).*

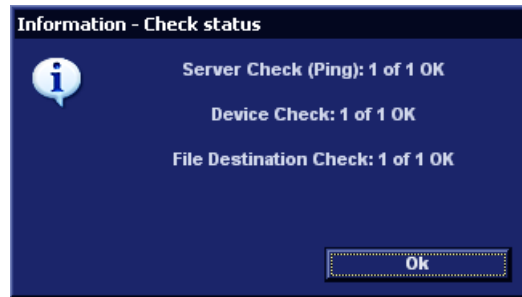


Figure 4-8 Information - Check Status Box

- 6.) Click **OK**.

*The system displays the Dataflow screen indicating that the device check has been successfully performed as indicated by the green confirmation tick - see [Figure 4-9](#).*

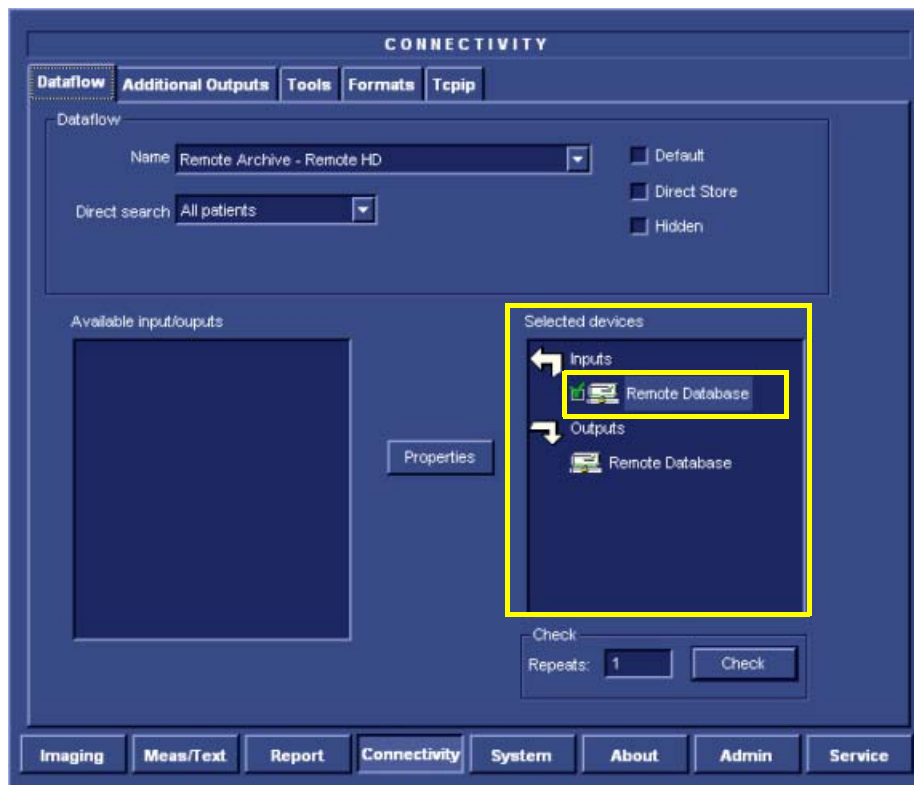


Figure 4-9 Selected Device "Remote Database" showing Successful Check

- 7.) Under Selected Devices ([Figure 4-9](#)), proceed to the next device (in this example "Remote Database" that is under "Outputs"), click **Check** and proceed as before.
- 8.) Continue this procedure until all selected devices have been verified.

#### 4-3-2-5 External USB Hard Disk Test

**NOTE:** If the External USB Hard Disk is not currently connected to the system, refer to [8-7-2-5 "External USB Hard Disk Installation Procedure"](#) on page 8-136 for configuration instructions.

**Table 4-15 External USB Hard Disk Test**

Step	Task	Expected Result(s)
1	Check the External USB Hard Disk status light indicators.	Refer to <a href="#">Figure 8-146 on page 8-137</a> .
2	Create a dummy patient file on the Vivid q N scanner. Save several images in the patient file.	
3	Export the images to the External USB Hard Disk.	
4	Delete the dummy patient file (including images) from the Vivid q N database.	The deleted patient file and images are no longer listed.
5	Import the dummy patient file and images from the External USB Hard Disk.	The patient file is now listed in the Vivid q N database.
6	Open the patient file and check that the images are available for review.	The newly-imported images are displayed correctly on the Vivid q N scanner.
7	Delete the dummy patient file (including images) from the Vivid q N database.	The deleted patient file and images are no longer listed.

### 4-3-3 SafeLock Cart Functional Tests

**NOTE:** *In the event that when mounting the Vivid q N portable ultrasound scanner on the SafeLock Cart, the unit does not lock firmly in position when inserted into the safelocks (or, if when removing the unit from the Cart, it is difficult to disengage the safelocks), it is necessary to perform the alignment procedure as described in 3-8-2 "Adjusting the SafeLock Cart Locking Mechanism" on page 3-68.*

#### 4-3-3-1 Main Shelf Movement Test

**Table 4-16 Main Shelf Movement Test - Recommended**

Step	Task	Expected Result(s)
1	Lift the release handle located on the <i>left</i> side of the SafeLock Cart <i>upwards</i> .	The locking mechanism of the up and down movement is released, allowing the main shelf to be raised.
2	While lifting the release handle, raise the shelf upwards and make sure it is able to reach its maximum height.	Ensure that you do not apply too much force to move the main shelf and that the shelf movement is smooth.
3	Press the release handle down, while pushing the main shelf back <i>downwards</i> to return it to its lowest position.	The main shelf returns to its lowest position.

#### 4-3-3-2 Brakes Function Test

**Table 4-17 Brakes Function Test (SafeLock Cart - Front Castor Wheels) - Recommended**

Step	Task	Expected Result(s)
1	Release the wheel lock (upper lever) on each front castor wheel by pulling it <i>upwards</i> . 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) <i>down</i> 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.

## 4-3-4 Back End Processor Tests

### 4-3-4-1 Magneto Optical Drive (MOD) Test

Table 4-18 MOD Test - Recommended

Step	Task	Expected Result(s)
1	Restart the system performing a full shutdown and bootup, as described in "Power ON/Boot-up" on page 4-3.	During the boot-up process, verify that the messages <b>SCSI Adaptor Installation 2271149-2INS</b> and <b>MO</b> are displayed.
2	Insert a new MO Media Sony EDM-2300B (2.3G) into the MOD.	
3	Press <b>Ctrl+F11</b> (or <b>Alt+D</b> ) on the keyboard and select <Back End>, <Media Driver> and <MO>, as appropriate.	<b>The UtilMediaApp</b> dialog box is displayed.
4	Select the <b>IsMediaAcces</b> button.	The message <b>Media in drive G is accessible</b> is displayed.
5	Select the <b>EjectMO</b> button.	The message <b>Media is outside</b> is displayed. Check that the media has actually been ejected.
6	Select the <b>LoadMO</b> button.	The message <b>Media is inside</b> is displayed. Check that the media is actually inside.
7	Select the <b>Format</b> button.	The message <b>Media in drive G was formatted successfully</b> is displayed.
8	Select the <b>GetVolInfo</b> button.	The message <b>Media in drive G has following properties: Media Label = MY_LABEL, Media File-System Name = FAT</b> is displayed.
9	Select the <b>Get BTPsector</b> button.	The message <b>The Bytes Per Sector value of media in drive G is 512</b> is displayed.
10	Select the <b>SetVolLabel1</b> button.	The message <b>Media Label set to TEST_LABEL1</b> is displayed.
11	Select the <b>GetVolInfo</b> button.	The message <b>Media in drive G has following properties: Media Label = TEST_LABEL, Media File-System Name = FAT</b> is displayed.
12	Select the <b>Exit</b> button and close the Diagnostic Application.	
13	Press the <b>Archive</b> button on the keyboard.	The <i>Patient List</i> window is displayed.
14	Press the <b>Utilities</b> button on the soft menu.	The <i>General Status</i> window is displayed.
15	Press the <b>Removable Media Utility</b> button.	The <i>Utility</i> window is displayed, showing the message: <b>Free space on Media: 1096 MB.</b>
16	Type the new label (for example, "Side1"), then select the <b>Format</b> button. Confirm "YES" to the warning message.	The message <b>Current Media Name is:SIDE1. Media was formatted successfully</b> is displayed. MO Label: SIDE1, MO STATUS: MOUNTED
17	Select the <b>Eject</b> button.	The message <b>Media Ejected</b> is displayed. MO STATUS: Ejected.
18	Select the <b>OK</b> button to exit the utility.	

4-3-4-2 DVD/CD Writer Test

Table 4-19 DVD/CD Writer Test - Recommended

Step	Task	Expected Result(s)
1	Connect the DVD to the power and to the system (see <a href="#">"DVD/CD-RW Drive" on page 3-36</a> ). Connect a probe to the system and power ON the system.	System and DVD connected.
2	Create a new patient for this test. <b>Note:</b> The term " <b>Test Patient</b> " refers to the newly created patient.	The system scan and the name of the " <b>Test Patient</b> " is displayed in the top-left corner of the screen.
3	Holding the probe in the air, press the <b>Record</b> button to start scanning. Continue recording until approximately 20MB of data is acquired.	The progress bar indicates "full with images or movies".
4	Press <b>&lt;Patient&gt;</b> button and then select <b>End Exam</b> from the archive menu.	The following message is displayed: <b>Unsaved image(s). Which do you want to save?</b>
5	Select <b>All</b> .	A progress-bar is displayed showing that the images are being archived.
6	Press <b>&lt;Patient&gt;</b> button and then select <b>Patients List</b> from the archive menu.	The <b>Search/Create Patient</b> window is displayed.
7	Select <b>Test Patient</b> and press <b>Export</b> .	The <b>Export</b> pop-up is displayed.
8	Place a blank DVD media into the DVD/CD device. <b>Note:</b> For information on types of media, see <a href="#">"DVD/CD-RW Drive" on page 3-36</a> .	
9	Select <b>To: CD/DVD Archive</b> and press <b>OK</b> .	A pop-up is displayed with the message: <b>Current media is not formatted. Do you wish to format it?</b>
10	Change the label to <b>TEST-1</b> and press <b>OK</b> .	A progress bar is displayed.
11	Press <b>Select All</b> and then press <b>Copy</b> .	Copying begins and the progress bar displays copying status. At the end, a message confirms the number of items copied. Details are displayed in the Status field.
12	Press <b>OK</b> to close the message and then press <b>Done</b> .	A progress bar and message are displayed asking you to wait.
13	Press <b>Alt+E</b> and select <b>CD/DVD Writable (H:I)</b> from the menu.	The message <b>Media Ejected</b> is displayed.
14	Remove the DVD from the drive.	
15	Delete the <b>Test Patient</b> that was added for the purpose of this test.	The <b>Test Patient</b> is removed from the patient list.
16	Place the media into the drive and press the <b>Import</b> .	The Export pop-up is displayed.
17	Select <b>CD/DVD Archive</b> on the <b>From:</b> list and press <b>OK</b> .	The following dialog is displayed: <b>IMPORT PATIENT - CD/DVD Archive</b>
18	Press <b>Select All</b> and then press <b>Copy</b>	Copying begins and the progress bar displays copying status. At the end, a message confirms the number of items copied. Details are displayed in the Status field.
18	Press <b>OK</b> to close the message and then press <b>Done</b> .	A progress bar and message are displayed asking you to wait.



**Table 4-19 DVD/CD Writer Test (cont'd) - Recommended**

Step	Task	Expected Result(s)
19	Press <b>Alt+E</b> and select <b>CD/DVD Writable (H:\)</b> from the menu.	The message <b>Media Ejected</b> is displayed.
20	Remove the DVD from the drive.	
21	Verify that all of the saved exams and images of the <b>Test Patient</b> exist in the database.	The exams and images that were exported and imported for the <b>Test Patient</b> should appear in the database.
22	Select the <b>Test Patient</b> exams and press <b>Delete</b> .	A message is displayed prompting the user to confirm the delete command.
23	Press <b>OK</b> to confirm delete (must confirm three times).	The <b>Test Patient</b> is deleted from patient list.

#### 4-3-4-3 Plug and Scan Test

**Table 4-20 Plug and Scan Test - Recommended**

	Task	Expected Result(s)
1	Press the <b>On/Off</b> button on the control console for no more than 3 seconds.	The system enters <i>Standby</i> mode.
2	Turn OFF the system's circuit breaker.	The system remains in <i>Standby</i> mode, indicated by the blinking <b>On/Off</b> button LED.
3	Turn ON the system's circuit breaker. Press the <b>On/Off</b> Button.	The system returns quickly to the <i>Power-ON</i> state -less than 30 seconds.
4	Turn OFF the system's circuit breaker. Turn ON the system's circuit breaker after entering to <i>Standby</i> mode.	The system enters <i>Standby</i> mode and stays in this mode. The <b>On/Off</b> button LED is blinking.
5	Turn OFF the system's circuit breaker. Press the <b>On/Off</b> button.	The system enters the <i>Power-OFF</i> state. The <b>On/Off</b> button LED is OFF.

## Section 4-4 Image Testing

This section provides guidelines for the following image testing checks:

- [2D Mode \(B Mode\) Checks](#) - see below
- ["M Mode Checks"](#) on page 4-33
- ["Color Mode Checks"](#) on page 4-34
- ["PW/CW Doppler Mode Checks"](#) on page 4-36
- ["Tissue Velocity Imaging \(TVI\) Checks"](#) on page 4-37
- ["Color Mode Checks"](#) on page 4-34
- ["Probe/Connectors Check"](#) on page 4-38

**NOTE:** For more details, refer to the information provided in the Vivid q N User Manual.

### 4-4-1 2D Mode (B Mode) Checks

#### 4-4-1-1 Introduction

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

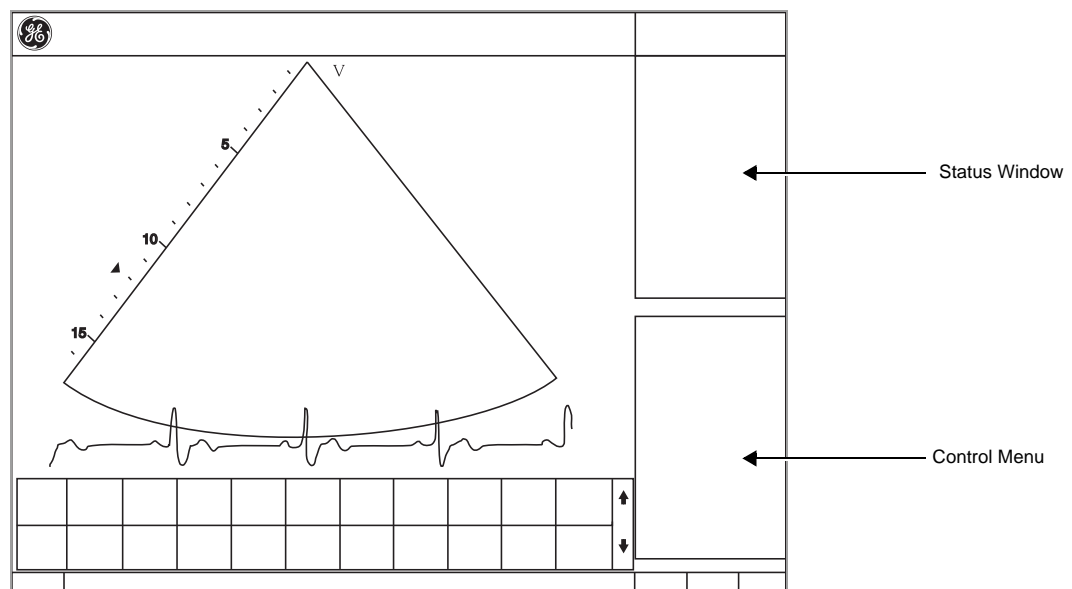


Figure 4-10 2D Mode Screen Example

#### 4-4-1-2 Preparations

- 1.) Connect one of the probes.  
See ["Connecting Probes"](#) on page 3-58 for information about connecting the probes.
- 2.) Turn ON the scanner.  
*The 2D Mode window is displayed (default mode).*

#### 4-4-1-3 Adjust the 2D Mode Controls

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

- 1.) Press **2D** on the Operator Panel to access 2D mode.
- 2.) The following Image Controls are used to optimize the 2D picture.  
Verify that all the listed controls are working as intended:
  - Use **Gain** and **TGC** controls to optimize the overall image together with the **Power** control.
  - Use **Depth** to adjust the range to be imaged.
  - Use **Focus** to center the focal point(s) around the region of interest.
  - Use **Frequency** (move to higher frequencies) or **Frame rate** (move to lower frame rate) to increase resolution in image.
  - Use **Frequency** (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.
  - Use **Adaptive reject** (Cardiac) to reduce near field haze and blood pool artifact without diluting tissue appearance of moving structures.

#### 4-4-2 M Mode Checks

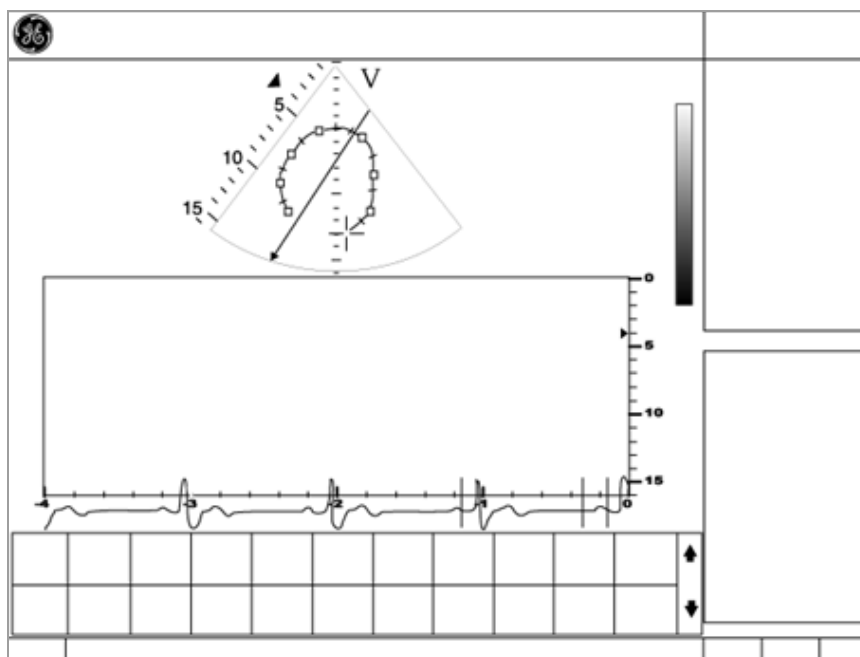


Figure 4-11 M- Mode Screen Example

#### 4-4-2-1 Preparations

- 1.) Connect one of the probes.  
See ["Connecting Probes" on page 3-58](#) for information about connecting the probes.
- 2.) Turn ON the scanner.  
*The 2D Mode window is displayed (default mode).*
- 3.) Press **MM** on the Operator panel to bring up an M-Mode picture on the screen.
- 4.) Use the trackball to position the cursor over the required area of the image.

#### 4-4-2-2 Adjust the M Mode Controls

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

- Adjust **Horizontal sweep** to optimize the display resolution.
- Adjust **Gain** and **TGC** controls to adjust the range to be imaged.
- Use the **Frequency** (move to higher frequencies) or the **Frame rate** control (move to lower frame rate) to increase resolution in image.
- Use the **Frequency** (move to lower frequency) to increase penetration.
- Adjust **Focus** to move the focal point(s) around the region of interest in the M-Mode display.
- Adjust **Dynamic range** to optimize the useful range of incoming echoes to the available grey scale.
- Adjust **Compress** and **Edge Enhance** to further optimize the display.
- Adjust **Reject** to reduce noise while taking care not to eliminate significant low-level diagnostic information.

#### 4-4-3 Color Mode Checks

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

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

- 1.) Connect one of the probes to the scanner's left-most probe connector.  
See ["Connecting Probes" on page 3-58](#) for information about connecting the probes.
- 2.) Turn ON the scanner.  
*The 2D Mode window is displayed (default mode).*

##### 4-4-3-3 Select Color 2D Mode

- 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.

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

- Adjust the **Active mode gain** to set the gain in the color flow area.
- Adjust **Scale** to the highest setting that provides adequate flow detection.

---

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

- Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.
- Adjust **Variance** to detect flow disturbances.
- Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows
- Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

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

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

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

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

- Use **Invert** to reverse the color assignments in the color flow area of the display.
- Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.
- Use **Baseline** to emphasize flow either toward or away from the probe.
- Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area.  
Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

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

- 1.) Select M Mode (see: ["M Mode Checks" on page 4-33](#)).
- 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.

#### 4-4-3-6 Adjust the Color M Mode Controls

- Adjust the **Active mode gain** to set the gain in the color flow area.
- Adjust **Scale** to the highest setting that provides adequate flow detection.

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

- Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.
- Adjust **Variance** to detect flow disturbances.
- Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows.
- Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

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

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

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

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

- Use **Invert** to reverse the color assignments in the color flow area of the display.
- Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.
- Use **Baseline** to emphasize flow either toward or away from the probe.
- Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area. Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

## 4-4-4 PW/CW Doppler Mode Checks

### 4-4-4-1 Introduction

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

Doppler mode can be used 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 purposes and then add PW/CW Doppler.

### 4-4-4-2 Preparations

- 1.) Connect one of the probes to the scanner.  
See ["Connecting Probes" on page 3-58](#) for information about connecting the probes.
- 2.) Turn ON the scanner  
*The 2D Mode window is displayed (default mode).*
- 3.) If needed, adjust the Display's Brightness and Contrast setting.
- 4.) Press **PW** or **CW** to start Pulsed Wave Doppler (PW) or Continuous Wave Doppler (CW).
- 5.) Use the trackball to select the Area of Interest (Sample Volume) in PW or direction of interest in CW.

### 4-4-4-3 Adjust the PW/CW Doppler Mode Controls

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.
- 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.*

- 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.
- Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.
- Use **Angle correction** to steer the ultrasound beam to the blood flow to be measured.

## 4-4-5 Tissue Velocity Imaging (TVI) Checks

### 4-4-5-1 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.

### 4-4-5-2 Preparations

- 1.) Connect one of the probes, to the scanner's left-most probe connector.  
See ["Connecting Probes" on page 3-58](#) for information about connecting the probes.
- 2.) Turn ON the scanner  
*The 2D Mode window is displayed (default mode).*
- 3.) If needed, adjust the Display's Brightness and Contrast setting.
- 4.) Press **TVI**.
- 5.) Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
- 6.) 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.*

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

### 4-4-5-3 Adjust the TVI Controls

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

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

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

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

## 4-4-6 Probe/Connectors Check



CAUTION TAKE THE FOLLOWING PRECAUTIONS WITH THE PROBE CABLES:

- KEEP AWAY FROM THE WHEELS
- DO NOT BEND
- DO NOT CROSS CABLES BETWEEN PROBES

Table 4-21 Probe and Connectors Checks

Step	Task	Expected Result(s)
1.	Press <b>Probe</b> on the Operator Panel.	A list of the connected probes will pop up on the screen.
2.	If not already selected. Use the trackball to select the desired probe.	An application menu for the desired probe is listed on the screen.
3.	Trackball to the desired application Press <b>Select</b> to launch the application. To change application without changing the current probe, press <b>Appl.</b> on the Operator Panel.	The selected application starts.
4.	Verify no missing channels	All channels are functioning.
5.	Verify there are no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
6.	Test the probe in each active connector slot. See <a href="#">"Connecting Probes" on page 3-58.</a>	The screen will display pictorial data each time
7.	Do a leakage test on the probe. See <a href="#">"Electrical Safety Tests" on page 10-19.</a>	The connected probe passes the test.
8.	Repeat this procedure for all available probes.	



## Section 4-5 System Turnover Checklist

Before returning the Vivid q N ultrasound scanner to regular operational use, the System Configuration settings should be checked. In 2D-Mode, press **Config** on the keyboard and check the settings in accordance with those listed or referenced in [Table 4-22](#) below

### 4-5-1 Software Configuration Checks

**Table 4-22 Software Configuration Checklist**

Step	Task	Check
1	Check the date and time settings. Refer to <a href="#">"Date and Time Adjustments" on page 3-71</a> .	
2	Check the language settings. Refer to <a href="#">"Language Selection" on page 3-72</a> .	
3	Ensure that all of the software options are configured correctly. Refer to <a href="#">"Software Options Configuration" on page 3-84</a> .	
4	Ensure that the hospital details are configured correctly. Refer to <a href="#">Table 3-6 on page 3-70</a> .	
5	Ensure that the VCR is configured as required for the specific site and country. Refer to video converter setup - see <a href="#">Figure 3-45 on page 3-48</a> .	
6	Ensure that the measurement units are configured as required for the specific site and country. Refer to <a href="#">"Units of Measure" on page 3-74</a> .	
7	Ensure that the connectivity network settings have not been modified and are configured as required for the specific site. Refer to <a href="#">"Set the Scanner's Network Information" on page 3-99</a> .	

## Section 4-6 Site Log

### Table 4-1: Vivid q N Site Log

[illegible]

Table 4-1: Vivid q N Site Log (cont'd)

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# Chapter 5

## Components and Function (Theory)

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### Section 5-1 Overview

#### 5-1-1 Purpose of Chapter 5

This chapter explains concepts, component arrangement, and sub-system functions for both the Vivid q N systems. It also describes the power distribution system and probes.

**Table 5-1 Contents in Chapter 5**

Section	Description	Page Number
5-1	Overview	5-1
5-2	General Information	5-2
5-3	Front End Unit	5-6
5-4	Back End Processor	5-21
5-5	External Input/Output (I/O)	5-29
5-6	Power Supply System	5-30
5-7	Monitor and Operator Panel	5-34
5-8	ECG Module	5-39
5-9	ECG/Respiratory Module	5-41
5-10	Peripherals	5-46
5-11	Cooling System	5-48

## Section 5-2 General Information

The Vivid q N system is an ultra-light handheld ultrasound scanner that can be used with both phased, linear and curved array ultrasound probes and Doppler (Pedof) probes.

Weighing only 5 kg (11 lb), each system is extremely versatile and - depending upon the installed software - can be used for various imaging modes, such as:

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

### 5-2-1 Introduction



**Figure 5-1 Front and Side View of the Vivid q N System**

The Vivid q N systems are equipped with a highly efficient power supply, resulting in low power consumption and minimal acoustical noise. Among other significant features are the following:

- Integrated, low-power Front End (uses advanced ASIC and FPGA technologies).
- Open connectivity using multiple USB ports
- High-performance 15" LCD monitor
- Low profile, backlit keyboard

Vivid q N systems have a digital beam forming system (incorporated in the Front End) that can handle up to 192 element linear probes using multiplexing.

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

In addition, the Vivid q N systems enable acquisition of the following signals: ECG, and external ECG. The ECG 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. Additionally, other analog inputs from devices such as treadmills are processed.

## 5-2-2 Signal Flow

The two TR32 Boards in the Front-End Processor generate the strong bursts transmitted by the probes as ultrasound into the body. The Transmit bursts are routed from the TR32 Boards via the Probe and MUX Board (P&M), to the ultrasound probe located on the board.

Weak ultrasound echoes from blood cells and body structure are received by the probes and routed via the Probe & MUX Board back to the TR32 Boards. The TR32 Boards amplify these signals, convert them to a digital signal and do the beam forming.

The vector data streams (one per each MLA) generated by the Beam Former are routed to the RFI Board for further processing by the Demodulator FPGA and DSP and then the signals are transferred via the PCI bus to the Back-End Processor where they are converted to video. The video signals are routed to the internal LCD monitor and to the VGA connector located on the back panel for connection of external monitor or VCR (via special adaptor).

### 5-2-2-1 System Configuration and Software

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

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

### 5-2-2-2 Operator Panel

The user initiates system operations via the Operator Panel that has ultrasound-specific buttons, mode-dependent softkey buttons and an alphanumeric keyboard.

### 5-2-2-3 Electronics

Vivid q N internal electronics are divided into three main components:

- Front End (FE) Processor
- Back End Processor (BEP)
- DC/DC Power Supply (DC/DC PS)

For both Vivid q N systems, internal electronics comprise a single card cage that contains both the FEP and the BEP. The interconnecting signals between the two sections are routed internally via a flex board. The power lines from the DC/DC PS are routed internally via two cables, to the BEP and FEP. The video signals are routed from the BEP to the LCD via a flex cable. The interconnection to the operator keyboard is via a dedicated cable. An additional flex connects the ECG module to one of the USB ports located on the keyboard.

The main functional blocks in the Vivid q N systems are listed below, and described in detail in this chapter, as follows:

- Front End (FE) Processor - see [Section 5-3 "Front End Unit" on page 5-6](#)
- Back End Processor (BEP) - see [Section 5-4 "Back End Processor" on page 5-21](#)
- Internal and external cable interconnections - see [Section 5-5 "External Input/Output \(I/O\)" on page 5-29](#)
- Monitor & Keyboard - see [Section 5-7 "Monitor and Operator Panel" on page 5-34](#)
- Power Supply System - see [Section 5-6 "Power Supply System" on page 5-30](#)
- Peripherals - see [Section 5-10 "Peripherals" on page 5-46](#)

For a detailed block diagram of the Vivid q N system, refer to [Figure 5-2 "Vivid q N System Block Diagram" on page 5-5](#).



## 5-2-3 Vivid q N Systems - Block Diagram

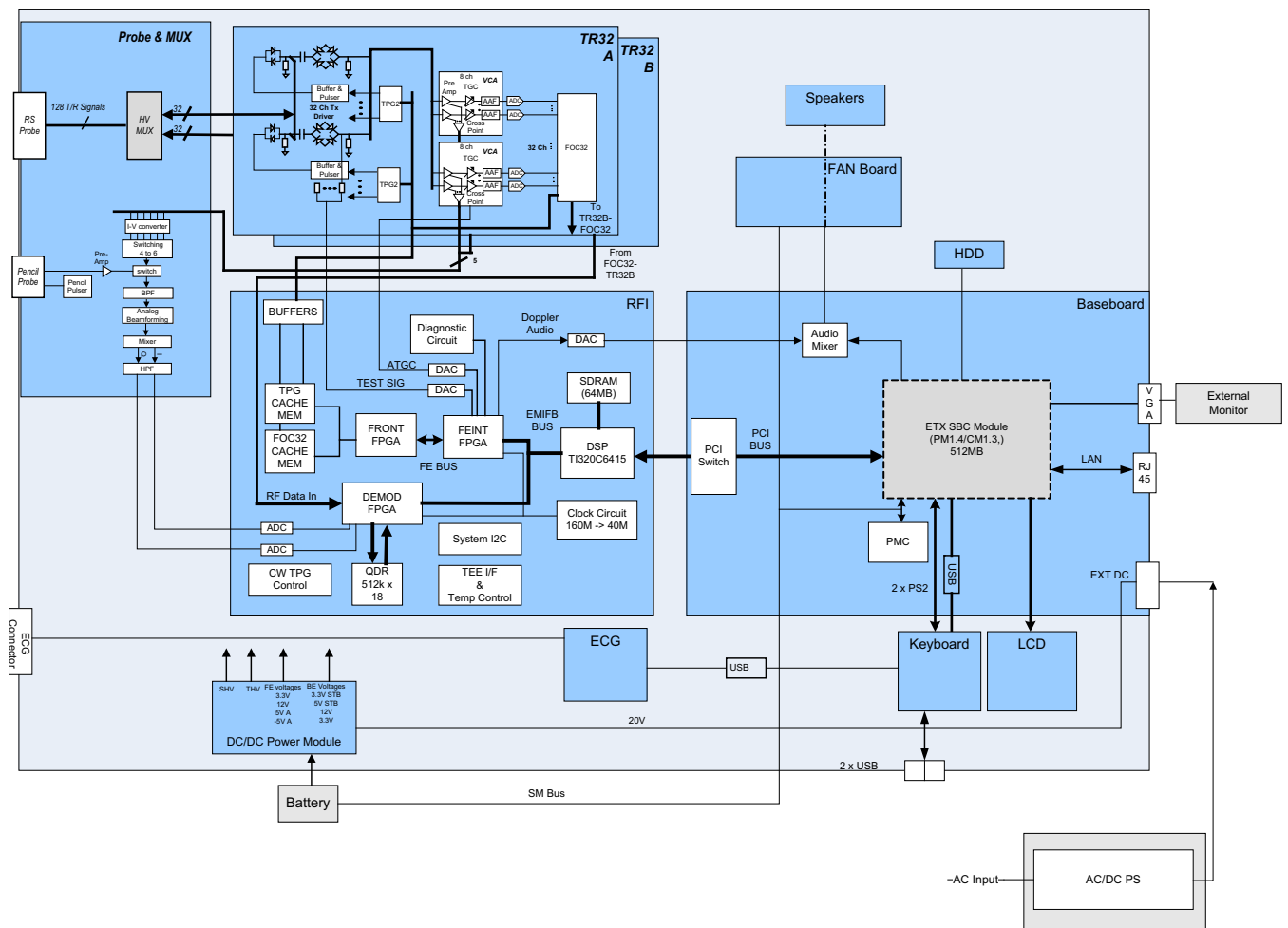


Figure 5-2 Vivid q N System Block Diagram

## Section 5-3 Front End Unit

### 5-3-1 General Information

The Vivid q N Front End system (see diagram in [Figure 5-4 on page 5-8](#)) is divided into two subsystems:

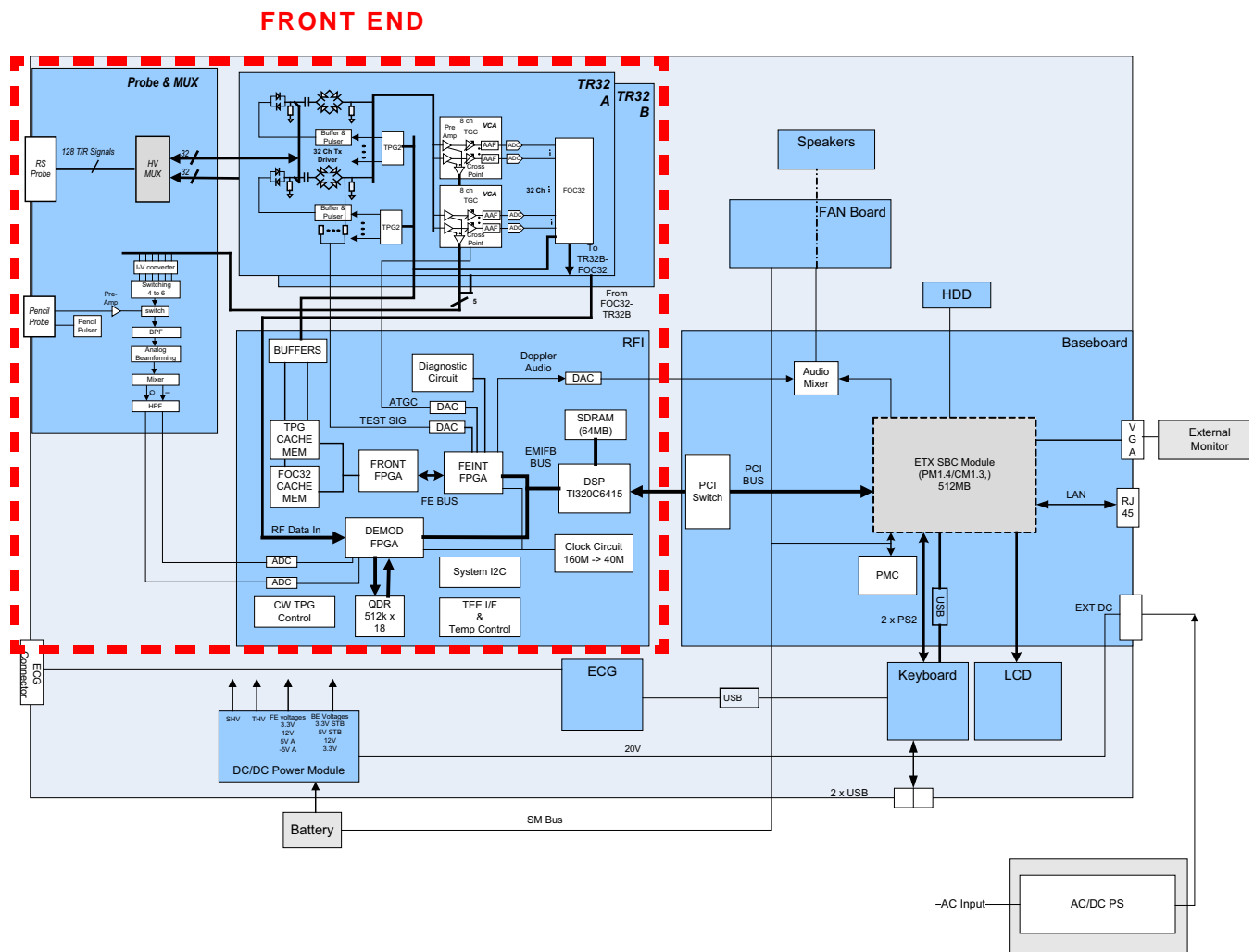
#### 1.) Scanner Subsystem

Consists of the RFI Board (Scan Controller and tissue processing).  
For a detailed description, see *RFI Board* on page 5-11.

#### 2.) Front End Subsystem

Includes the following:

- Two TR32 Boards (each board includes a 32-channel digital Beamformer)  
For a detailed description, see *TR32 Boards (Transmitter/Receiver)* on page 5-15.
- P&M (Probe & MUX Board) - includes CW BF & HVMUX  
For a detailed description, see ["Probe and MUX \(P&M\) Board" on page 5-18](#).



**Figure 5-3 Vivid q N System Block Diagram showing Location of Front End**

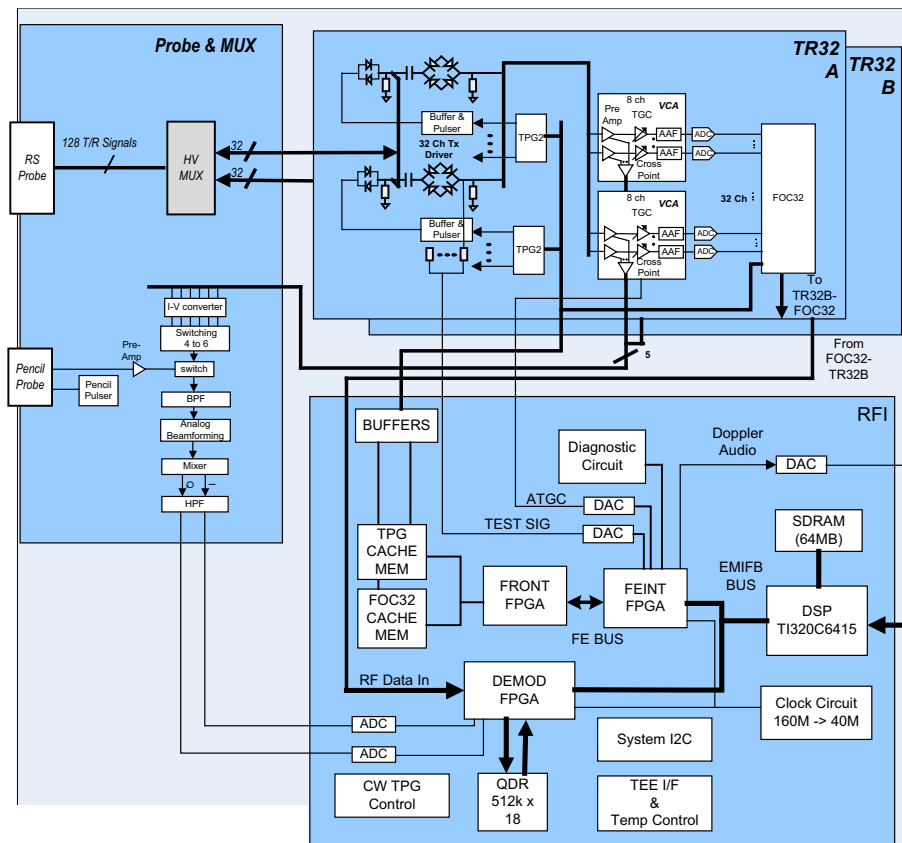


Figure 5-4 Front End - Block Diagram

### 5-3-2 Front End Unit - Location in the System

The Front End unit is located in the Bottom assembly, on the *right* side, as shown in [Figure 5-5](#).

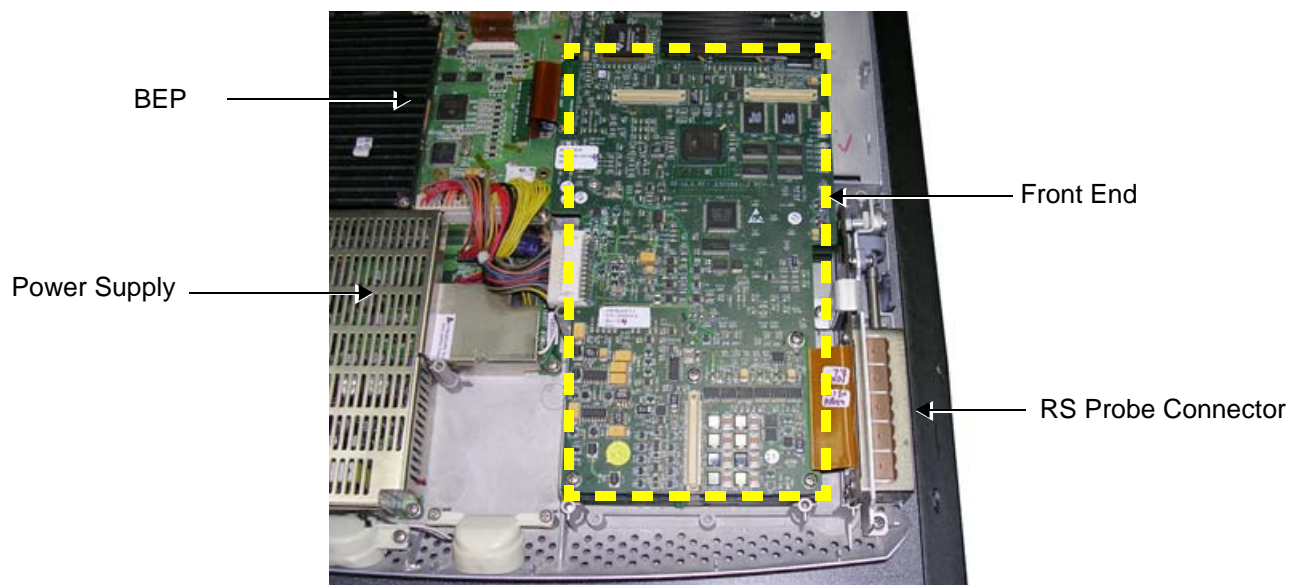


Figure 5-5 Bottom Assembly showing Location of Front End

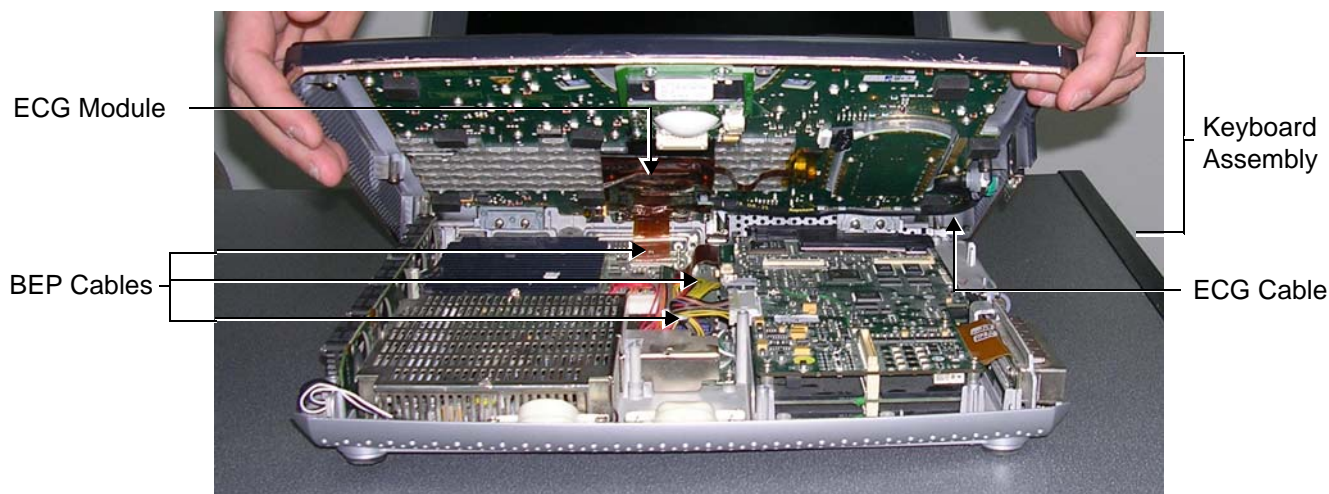


Figure 5-6 Keyboard Assembly in Opened Position



**WARNING** When opening and closing the Keyboard Assembly, take care not to damage the cables connected to the BEP (indicated in [Figure 5-6](#), above).

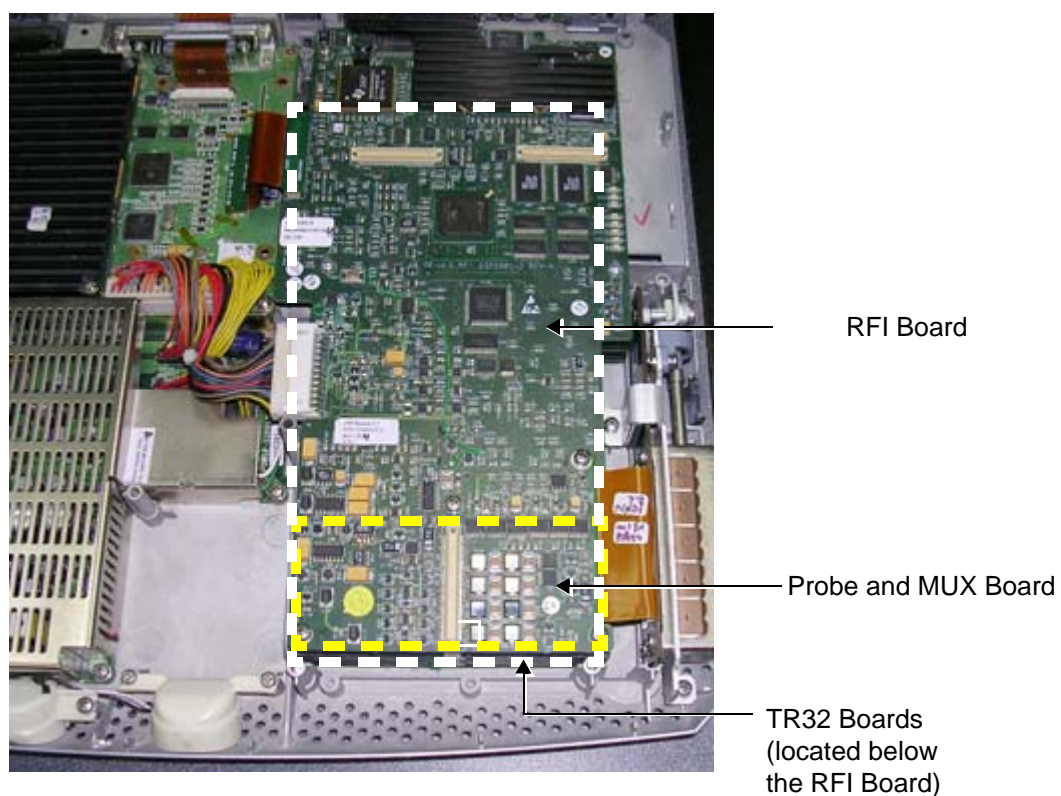


Figure 5-7 Bottom Assembly showing Position of Boards (RFI,TR32, P&M)

### 5-3-3 RFI Board

The RFI Board combines the following functionalities:

- Front End Control
- Radio Frequency & Tissue Processing
- PCI Bus Interface

#### 5-3-3-1 Tasks Performed by the RFI Board

- System Master Clock generator
- Transmitter Control
- ATGC Control
- Receive Focusing Control
- Analog Test Signal Generator
- Tx voltage Enable/Disable
- Probe Sensing
- Control of TR32 and P&M Boards
- Ultrasound data acquisition and processing

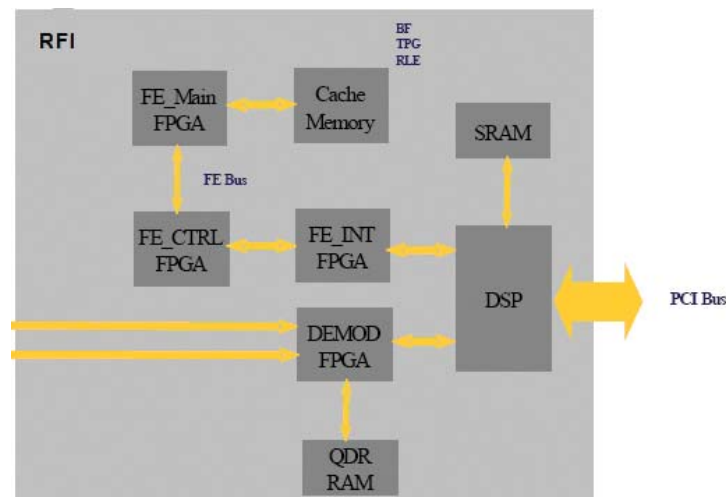


Figure 5-8 RFI Block Diagram

#### 5-3-3-2 Watchdog and Power ON Reset

For safety reasons, a HW watchdog stops ultrasound transmit and resets the DSP if the DSP stops toggling the watchdog inputs.

Once enabled, it is not possible to disable the watchdog unless the board is reset, or power is cycled.

#### 5-3-3-3 Boot-up of DSP and Firmware

When the power is turned ON, the DSP is reset, and all FPGAs are blank. The DSP is connected to PCI directly, and can only boot up with help from the Host.

**5-3-3-4      FPGA Download**

The FPGAs contain no configuration upon power-ON; FGPA Download proceeds as follows:

- 1.) The actual FPGA contents (bit-streams) are written into DSP memory from the Host.
- 2.) The DSP configures serial port 0 to aid configuration.
- 3.) The DSP writes the bit-streams to serial port 0.
- 4.) The DSP verifies that the FPGAs are configured correctly.

**5-3-3-5      PCI Connection**

The RFI Board interfaces directly to the PCI bus via the DSP PCI to the local bus bridge.



5-3-3-6 RFI Board Connectors

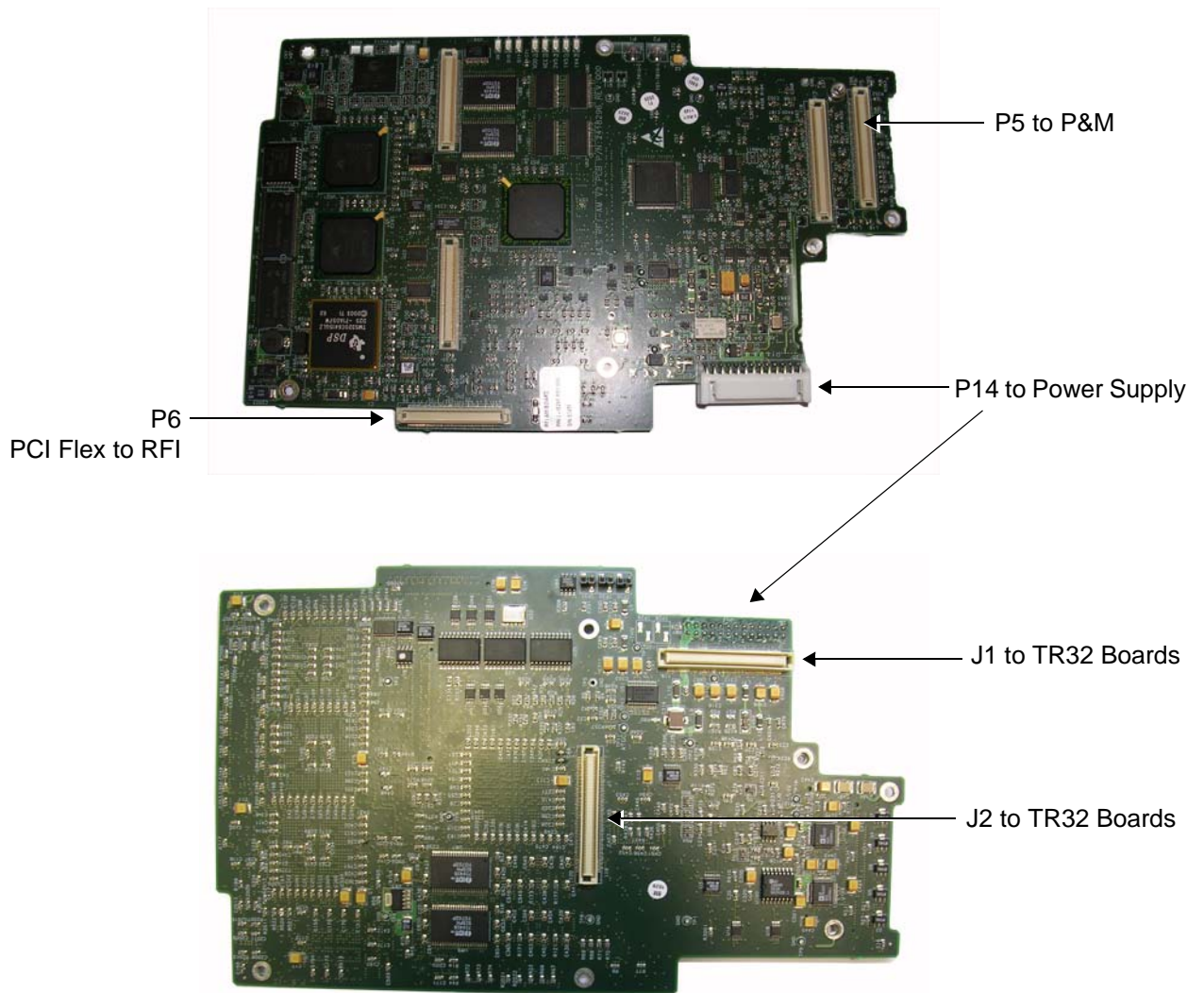


Figure 5-9 RFI Board Connector Locations

Table 5-2 RFI Board Connectors

Connector #	Description
P5	To P&M
P6	PCI Flex to RFI
P14	To power supply
J1	To TR32 Boards
J2	To TR32 Boards

**Table 5-3 RFI Board - Input DC Voltages**

Input	Description	Connector - PIN#	Connected From
+3.3 V	DC voltage from PS	P14 1-4	From PS
HVP_IN	Fixed DC high voltage +80 V	P14-9	From PS
HVN_IN	Fixed DC high voltage -80 V	P14-11	From PS
+THV	Transmit high voltage varies from 0 to +50 V	P14-12	From PS
-THV	Transmit high voltage varies from 0 to -50 V	P14-14	From PS
+5 V_IN	DC voltage from PS	P14-16	From PS
-5 V_IN	DC voltage from PS	P14-20	From PS
+12 V_IN	DC voltage from PS	P14-18	From PS
1.8 V	DC voltage from PS	P1421, 22	From PS

### 5-3-3-7 Probe Management

#### 5-3-3-7-1 Mechanism

The RFI Board performs the following probe management functions:

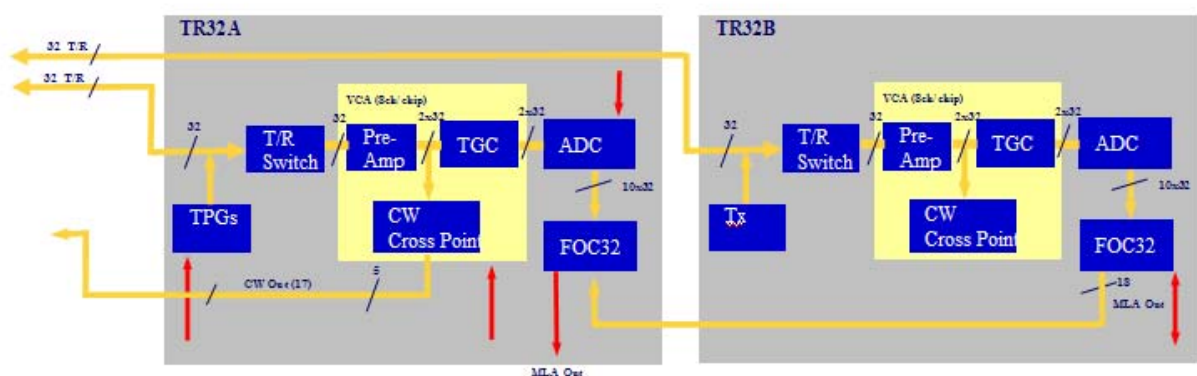
- Controls the selection of a probe connector
- Senses the Probe *type*
- Senses the Scan Plane Angle on TE probes
- Senses the Probe *temperature*
- If the temperature exceeds the *maximum* temperature, the RFI stops scanning and disables Tx voltage.  
The temperature references are set to 41.3 °C and 43.0 °C
- If the temperature reading falls below *minimum* temperature, the RFI stops scanning and disables Tx voltage.  
The minimum temperature references are set to 15 °C. A temperature reading as low as 15 °C indicates a probe temperature-sensing error.

### 5-3-4 TR32 Boards (Transmitter/Receiver)

### 5-3-4-1 General Description

The TR32 has 64 receive channels and is made up of two identical TR32 Boards: *TR32A* and *TR32B* (see [Figure 5-10](#)). Each TR32 Board is a complete 32-channel ultrasound Front End that includes the following features and functions:

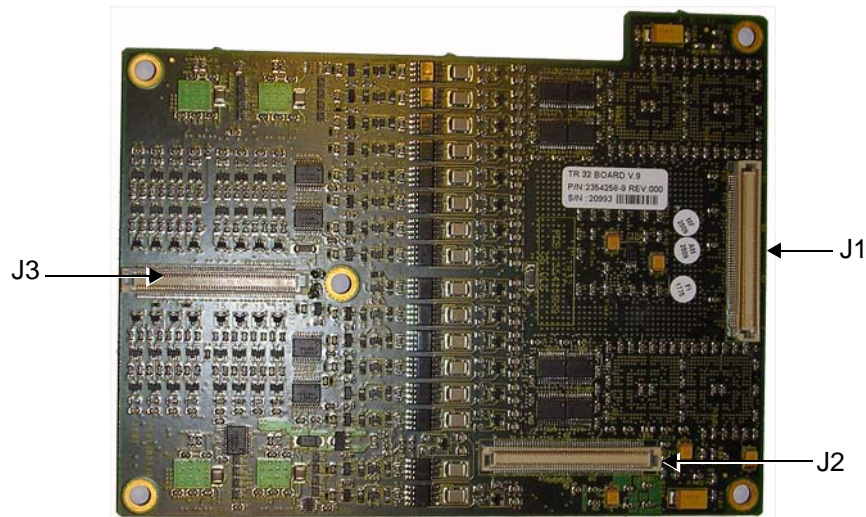
- 32 Transmitters
- 32 receiving channels, T/R switch, Pre-Amp, TGC
- 32 channel Beam Former
- First stage of Analog Beam-Former for CW mode, included in the receive input ASIC
- Clock distribution, starting with input at PECL level



**Figure 5-10 TR32 Board Block Diagram**



**Figure 5-11 Connectors on TR32 Board - Upper View**



**Figure 5-12 Connectors on TR32 Board - Bottom View**

**Table 5-4 TR32 Board Connectors**

Connector #	Description
P1	To RFI Board
P2	To RFI Board
P3	To P&M Board
J1	To lower TR32 Board
J2	To lower TR32 Board
J3	To lower TR32 Board

**Table 5-5 TR32 Board - Input DC Voltages**

Input	Description	Connector PIN#	Connected From
5 VA	DC voltage, distributed via RFI Board "A" indicates analog circuit	J2-80, 81, 82	RFI
1.8 V	DC voltage, distributed via RFI Board	J2 85-96	RFI
3.3 V	DC voltage, distributed via RFI Board	J2 97-110	RFI
-5 VA	DC voltage, distributed via RFI Board. "A" indicates analog circuit	J2 78 79	RFI
TXPSP (High voltage positive)	Transmit high voltage varies from +2.5 to +50 V distributed via RFI Board	J2 69,71,73	RFI
TXPSN (High voltage negative)	Transmit high voltage varies from -2.5 to -50 V distributed via RFI Board	J2 70, 72, 74	RFI

Each TR32 Board has 32 channels and includes a 32-channel Digital Beam Former (consisting of one FOC32 ASIC).

Inputs are 32 probe lines that have gone through aperture selection, performed in the P&M Board. Outputs are MLA0 and MLA1 digital buses from the Beam Former and CW output lines to the Analog CW BF.

The MLA output bus of TR32B is connected to the MLA input bus of TR32A, giving a 64-channel BF on the MLA output.

All required control, memory and clocks for the two TR32 Boards reside in the RFI Board.

The two TR32 Boards are linked together in parallel. The way in which they operate depends upon the probe currently in use, and also on the current type of Transmit/Receive mode.

Transmit/Receive modes can be divided into two types, as shown in the following examples:

- CW Mode
  - half the channels *transmit* signals, and half the channels *receive* signals, simultaneously.
- 2D Mode
  - signals are propagated between the channels; there is a specific time delay between *transmit* and *receive* - data is then interpolated in accordance with the delay, and the image is created.

The TR32 Boards are connected to the RFI Board by stacked connectors, as shown [Figure 5-13 below](#).

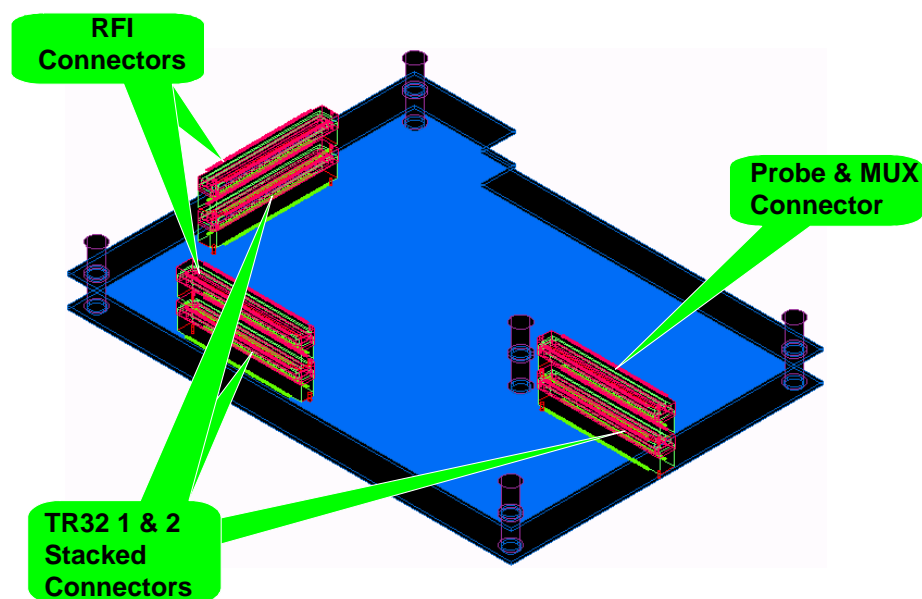


Figure 5-13 TR32 Board - Stacked Connectors



### 5-3-5 Probe and MUX (P&M) Board

The Probe and MUX (multiplexer) Board enables acquisition and processing of signals from and to probes connected to the front panel. The P&M enables up to 64 receive/transmit channels, and performs the following functions:

- Receiving the channels and connecting them to the TR32 Boards
- Probe connectors
- High voltage MUX that selects 64 out of 128 inputs, routed to the TR32 boards
- Pencil's probe Pulser and receive pre-amplifier
- Analog Doppler processor: a signal path for CW mode containing analog Beam Former, Band Pass filter, I/Q base band converter, high pass filter.

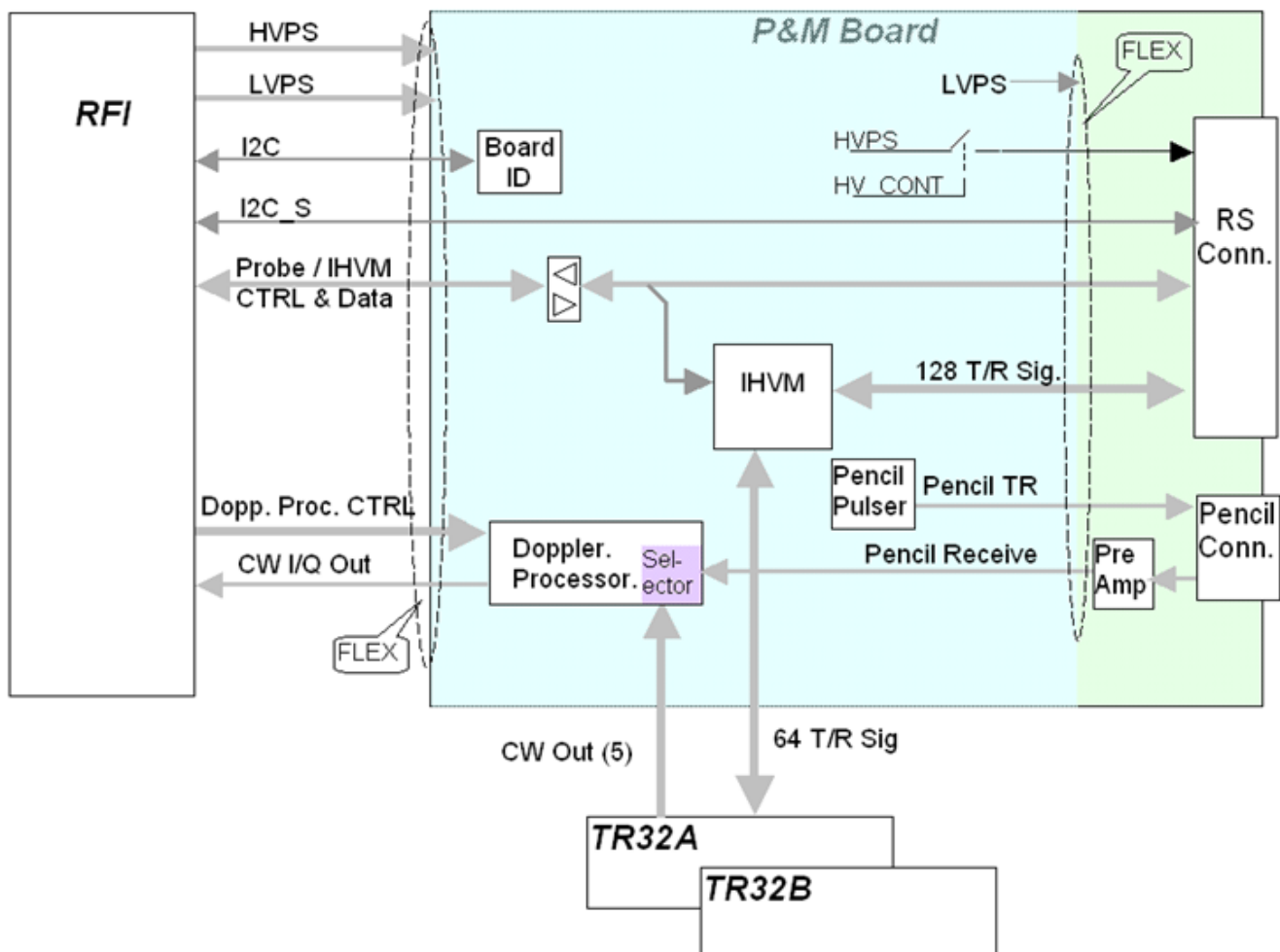
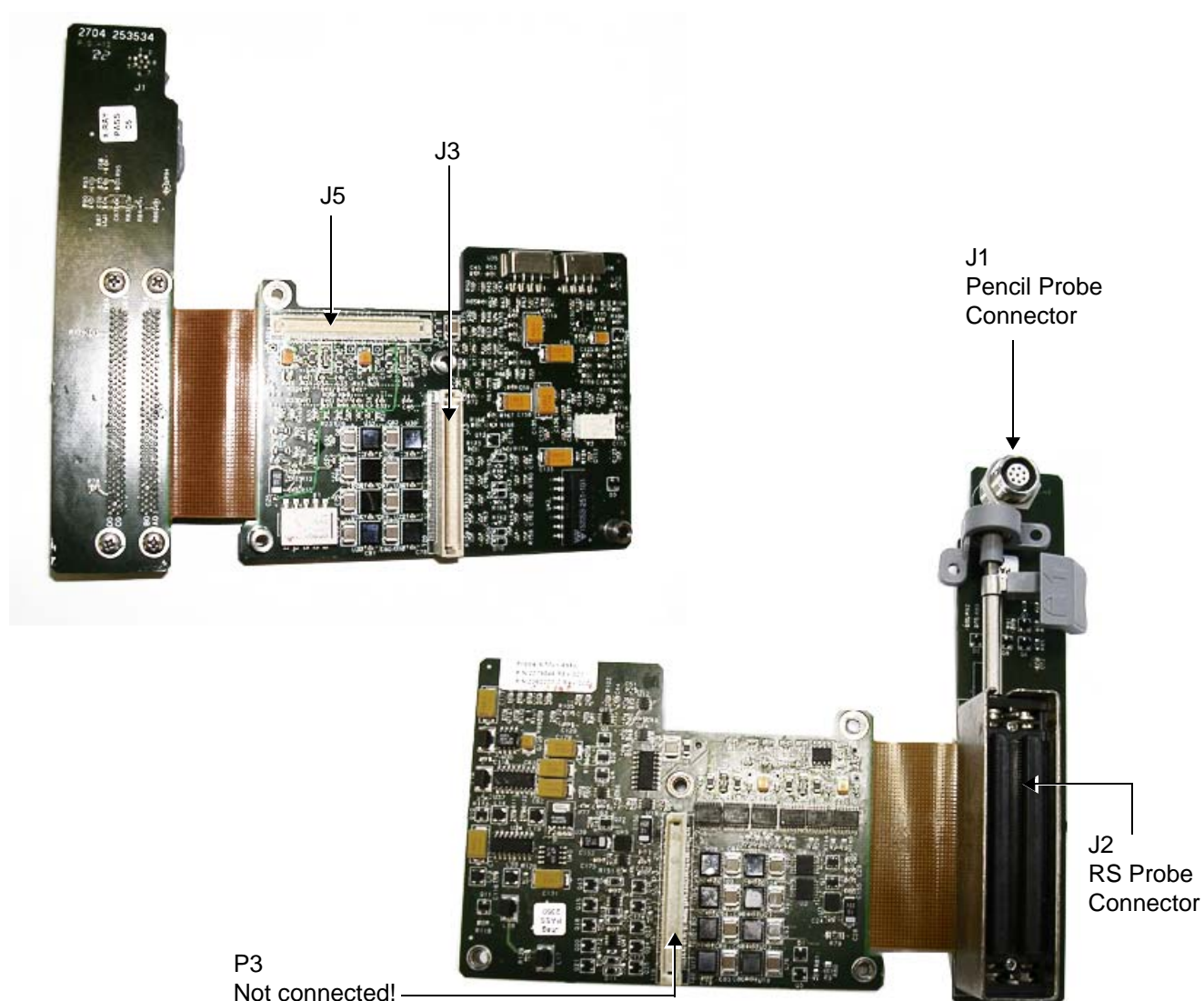


Figure 5-14 Probe and MUX Board - Block Diagram



**Figure 5-15 Probe and MUX Board Connector Locations**

**Table 5-6 Probe and MUX Board Connectors**

Connector #	Description
J1	Pencil Probe Connector
J2	RS Probe Connector
J3	To Upper TR32 Board
J5	To RFI Board

**Table 5-7 P & M Board Input DC Voltages**

Input	Description	Connector - PIN#	Connected From
12 V	DC voltage, distributed in P&M Board	J5-16..21	RFI Board
3.3 V	DC voltage, distributed in P&M Board	J5-5..8	RFI Board
-5 VA	DC voltage, distributed in P&M Board "A" indicates analog circuit	J5-13..15	RFI Board
5 VA	DC voltage "A" indicates analog circuit	J5-9..12	RFI Board
HVPSP	Transmit high voltage varies from +2.5 to +50 V	J5-2	RFI Board
HVPSN	Transmit high voltage varies from -2.5 to -50 V	J5-1	RFI Board



## Section 5-4 Back End Processor

### 5-4-1 Introduction

The Back End Processor (BEP) supports the operation of the Vivid q N ultrasound unit and is the main controller for the system.

A block diagram of the BEP is provided in [Figure 5-17 "Vivid q N Back End Processor - Block Diagram" on page 5-22](#).

The various components that comprise the Vivid q N BEP are described in the following sections:

- ["ETX SBC Central Processing Unit \(CPU\)" on page 5-23](#).
- ["ETX Base Board" on page 5-23](#).
- ["Hard Disk" on page 5-25](#).
- ["Fan Control" on page 5-25](#)
- ["RTC \(BIOS\) Battery" on page 5-25](#)
- ["Back End Processor - Location of Components" on page 5-26](#)

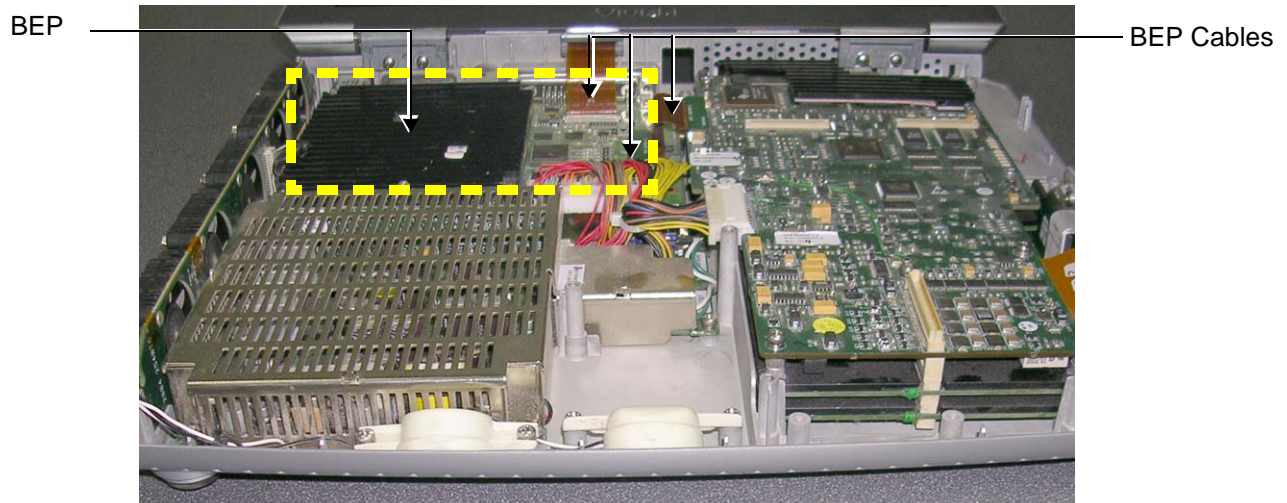


Figure 5-16 Location of BEP in Bottom Assembly

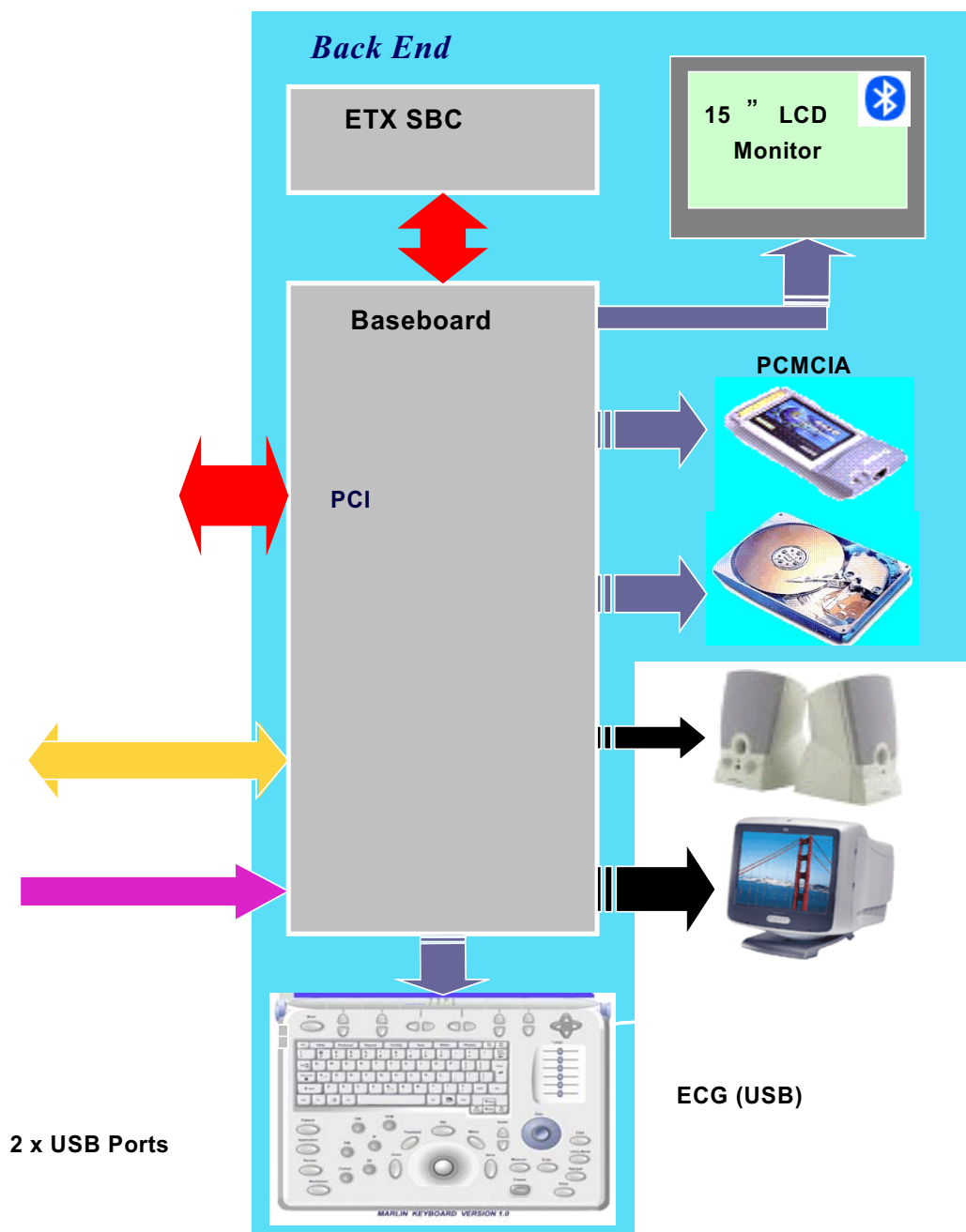


Figure 5-17 Vivid q N Back End Processor - Block Diagram

For reference, a list of abbreviations used in this section is provided in [Table 5-8](#) below.

**Table 5-8 Abbreviations and Definitions**

Abbreviation	Definition
BGA	Ball Grid Array
CS	Component Side
EMC	Electro Magnetic Compatibility
FPGA	Field Programmable Gate Array
HDD	Hard disk drive
MTBF	Mean Time Between Failures
PCI	Peripheral Card Interconnect
PLD	Programmable Logic Device
P&M	Probe and MUX Board
PMC	Power Management Controller
PS	Power Supply

## 5-4-2 ETX SBC Central Processing Unit (CPU)

The ETX SBC Central Processing Unit (CPU), which is mounted on top of the ETX Base Board (see [page 5 - 23](#)), controls and processes the internal Back End Processor operations. In addition, the CPU supports the Front End via the PCI bus.

The CPU utilized in the Vivid q N ultrasound unit is a Pentium -M, 1.4 GHz Processor.

## 5-4-3 ETX Base Board

### 5-4-3-1 Overview of ETX Base Board Functions

The ETX Base Board connects all the peripheral modules to the ETX single board computer. The CPU (see [page 5 - 23](#)) is mounted on top of the ETX Base Board.

The ETX Base Board provides interfaces to the following components:

- HDD
- Front End (RFI) Board
- USB ports
- Docking port, speaker phones and speaker jacks
- Keyboard
- Battery
- VGA
- Fans
- Power supply

The Power Management Controller (PMC), mounted on the ETX Base Board, ensures automatic transition between the various power modes, stable DC condition, and provides power status LED display.

The Docking port, located on the rear panel of the ETX Base Board, provides the connections to the Audio unit on the DIB, discrete control and status lines and 20V-DC power.

Refer to [Figure 5-21 on page 5-27](#) for a view of the ETX Base Board showing the location of the various connectors.

### 5-4-3-2 VGA Interface

### 5-4-3-3 CardBus Interface

Not in use.

#### 5-4-4 Hard Disk

The Hard Disk is the main storage device of the Vivid q N ultrasound unit. The Hard Disk, which is controlled by the CPU via signals from the IDE Bus, is partitioned into four drives, each of which is designated for different operations, as follows:

- **C: Drive:** Execution of the operating system and the software application, and factory presets. The partition size is 5 GB.
- **D: Drive:** User presets and data. The partition size is 5GB.
- **E: Drive:** Archiving of all images and reports. The partition size is the balance of available space on the hard disk.
- **F: Drive:** Swap file partition. The partition size is 1GB.

The following additional partitions are hidden:

- **Grub:** 32MB
- **Repository:**10GB

**NOTE:** When connected to the system, a DVD device or disk-on-key will not necessarily be shown as G drive.

#### 5-4-5 Fan Control

The Fan board holds five fans and is mounted on the left side of the bottom assembly. A special fan speed controller chip is used to control the fans' speed. The Fan Board is connected to the BEP via the Fan cable.

Each Fan has 3 wires: two 12V wires that supply power to the fans; a 3rd wire for sensing the fans' speed.

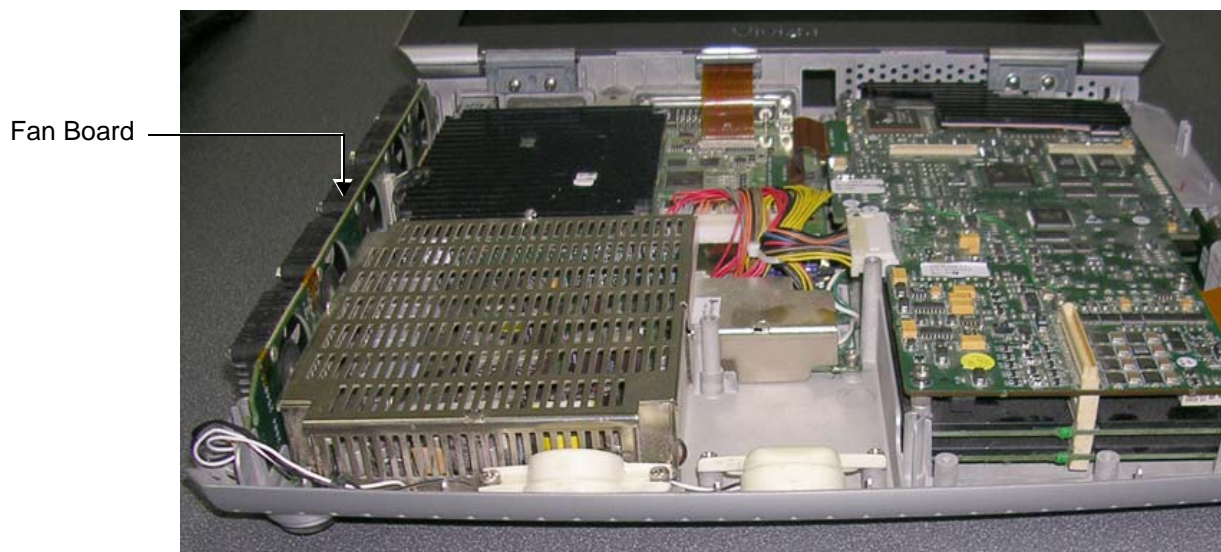


Figure 5-19 Location of Fan Board in the Bottom Assembly

#### 5-4-6 RTC (BIOS) Battery

The RTC (BIOS) battery provides power to the ETX real-time clock.

**NOTE:** The RTC (BIOS) Battery should be replaced every 2 years.  
For instructions, refer to ["BIOS Battery Replacement" on page 8-47](#).

## 5-4-7 Back End Processor - Location of Components

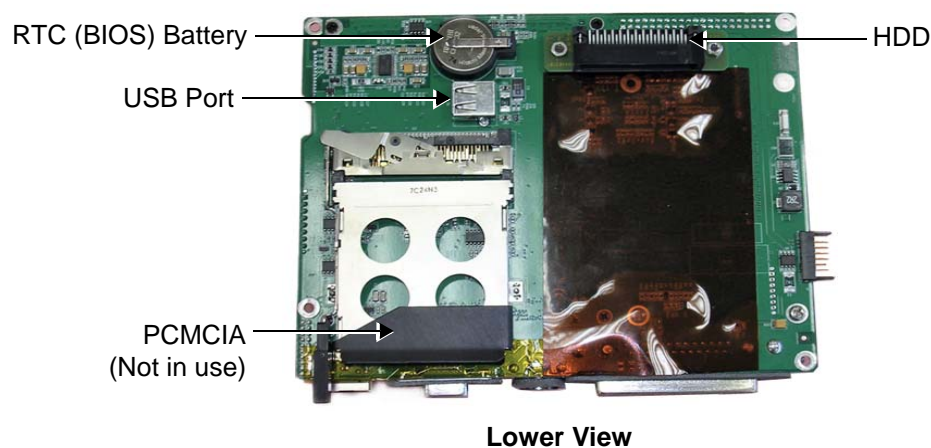
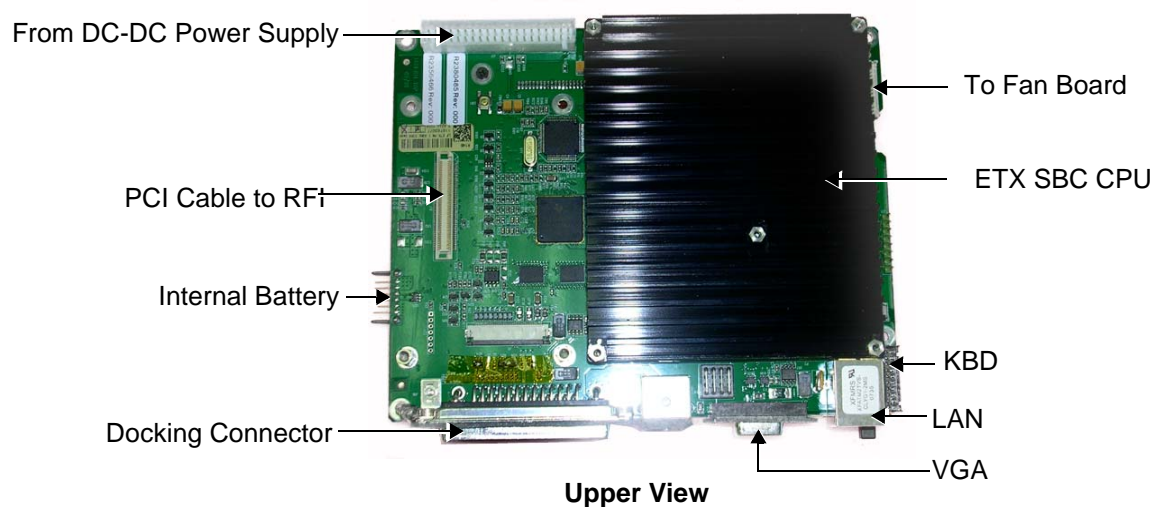


Figure 5-20 Views of the Back End Processor (BEP)



5-4-7-1 BEP Connectors

Figure 5-21 Connectors on the BEP

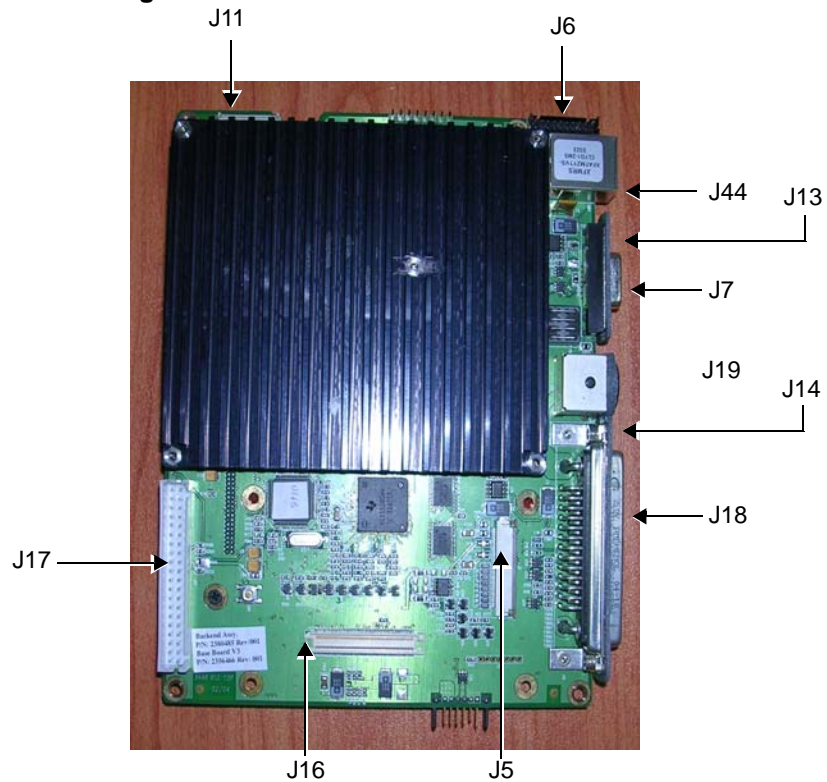


Table 5-9 BEP Connectors

Connector #	Description
J7	VGA
J19	EXT DC INPUT
J18	DOCKING
J20	Speakerphones
J16	RFI
P1:P4*	ETX
J5	LCD PANEL
J6	KEYBOARD
J17	PS UNIT
J14	H.D. Adaptor Card
J15	BATTERY
J13	CARDBUS
J10	RTC (BIOS) Battery
J8	Protection Key
J11:J12	FANS
J9	Speakers

\*) All connections to P1, P2, P3 and P4 according to ETX specs.

**Table 5-10 BEP Input DC Voltages**

Input	Description	Connector - PIN#	Connected From
EXT_DC	20 V DC from PS	J17-1, 2, 3, 4, 5	PS
Battery	Varies from 14 V to 16.7 V DC depending on battery capacity. Distributed via PS.	J17-11, 12, 13, 14, 15	PS
+12 V_BE	DC voltage from PS BE indicates Back End	J17-19	PS
5 V_STB	DC voltage from PS STB indicates Standby	J17-20	PS
+5 V_BE	DC voltage from PS BE indicates Back End	J17-21,22, 23, 24	PS

#### 5-4-8 Left/Right Speakers

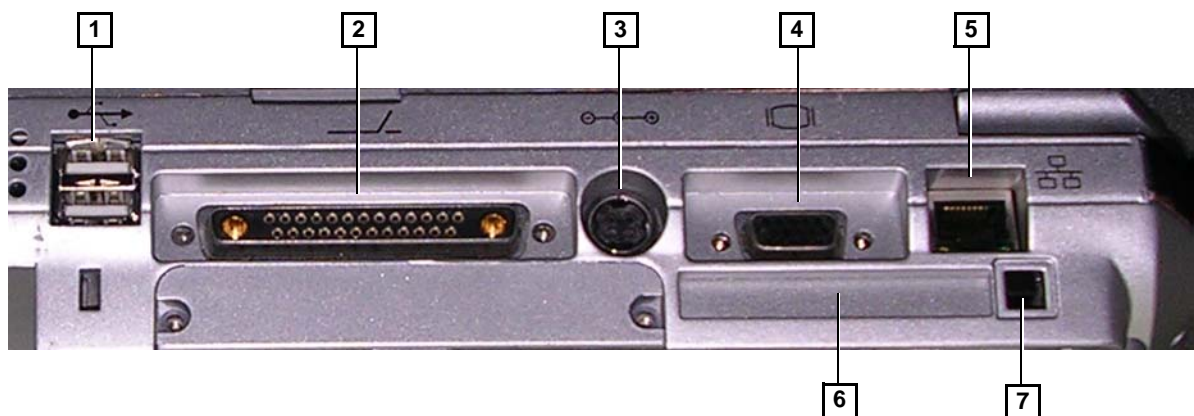
The L/R speakers are mounted on the front side of the bottom assembly. The audio signals are received via a Jx connector connected to the Fan board - see [Figure 5-19 on page 5-25](#).



## Section 5-5 External Input/Output (I/O)

The Vivid q N system rear panel provides a few standard connectors for connecting the following external devices:

- VGA port for connecting external monitor of VGA to S-Video adaptor.
- RJ-45 connector for LAN connection.
- Two USB ports for external peripherals
- 20V DC inlet - main DC power to the system.



Legend:

1. Two interchangeable USB ports (digital printer, DVD-RW/CD-RW and other peripherals).
2. Docking connector.
3. Port for DC IN (AC Adapter).
4. SVGA Output (VCR option or CRT monitor option).
5. LAN 10/100 Base-TX Ethernet network connector
6. PCMCIA port for PC card.
7. Ejection lever for PCMCIA device.

**Figure 5-22 Vivid q NSystem - Rear Panel Connections**

## Section 5-6 Power Supply System

### 5-6-1 Electrical Power

The Vivid q N systems can operate at between 100 and 240 V at 50/60 Hz via an AC/DC converter which supplies a 20 V DC output and 4.5 amps.

### 5-6-2 Introduction

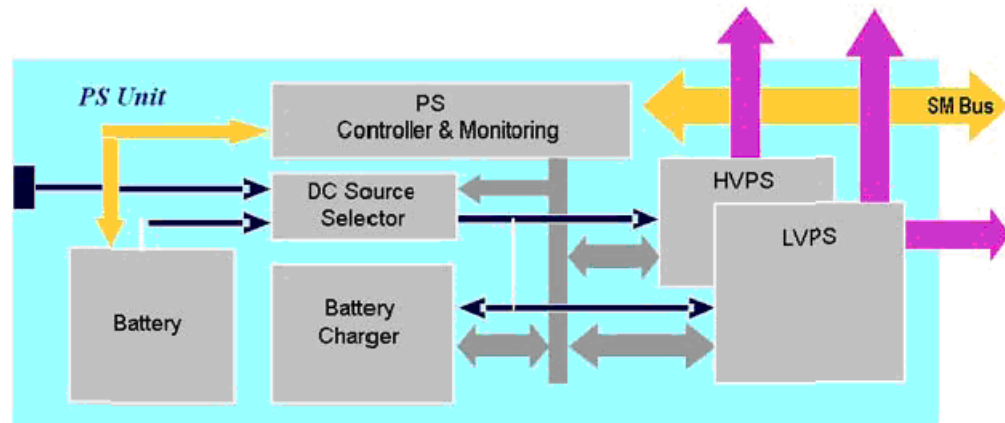
The power system comprises two main building blocks:

- **AC/DC Adaptor** - an external unit connected to the system's rear panel (see [Figure 5-22](#)).
- **DC/DC Power Supply Unit** - located inside and mounted to the bottom assembly, provides the system with both Low Voltage and High Voltage power, and also enables recharging of the battery.
  - The Power Supply Unit controls the following main functions:
    - \* Input switching stage - selects between the external DC source and the internal battery
    - \* Back End Low Voltage power supply (LVPS)
    - \* Standby power supply
    - \* Front End Low Voltage power supply (LVPS)
    - \* Front End High Voltage power supply (HVPS)
    - \* Battery charger controlled by the Power Management controller
    - \* Control circuitry (used for monitoring, charger control and auxiliary functions).
    - \* The PS communicates with the host CPU via the SMBus

### 5-6-3 Power Supply Unit Components

As shown in [Figure 5-23 below](#), the Power Supply Unit comprises the following components:

- Rechargeable Battery
- PS Controller and Monitor
- DC Source Selector
- Battery Charger
- High Voltage Power Supply (HVPS)
- Low Voltage Power Supply (LVPS)



**Figure 5-23 Vivid q N Power Supply Unit Components - Block Diagram**

### 5-6-3-1 Critical Temperature Sensor

The PS Unit includes temperature sensors. When the monitoring application measures the maximum temperature limit or above, it will shut down the system. After the temperature settles down, the PS unit will enable the DC-DC operation.

### 5-6-4 DC Source Selector

This circuitry selects the source of the power. When the AC-to-DC converter input into the system is higher than 18 V, the system will be powered by the AC-to-DC converter. Otherwise, the selector will look for an alternative power source (the battery), expecting to receive between 12 and 16V DC.

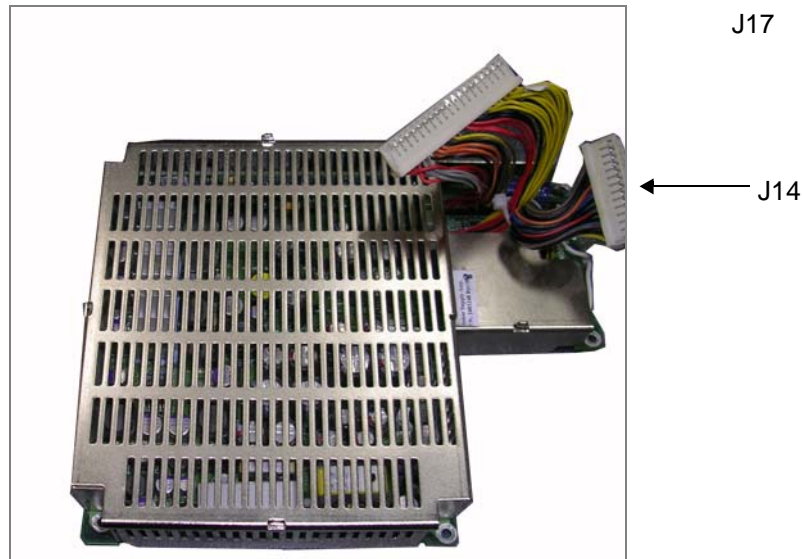


Figure 5-24 DC Source Selector

Table 5-11 DC Source Selector Connectors

Connector #	Description
J14	To RFI
J17	To BEP

### 5-6-5 Rechargeable Battery Pack Assy (GPA)

The lithium ion rechargeable battery provides a backup mechanism to the Vivid q N 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 q N scanner has built-in charger functionality (see [Figure 5-23 on page 5-31](#)) 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:** *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 q N systems only. Only use the batteries authorized by GE.

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



**CAUTION** The battery has a safety device.

- Do **not** disassemble or alter it. Charge the batteries only when the ambient temperature is between 0° and 65° C (32° and 149 °F) and discharge the batteries between -10° and 55° C (14° 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.



**CAUTION** If the Vivid q N portable ultrasound system is not being used for periods of one month or longer, the battery should be removed during lengthy non-use period.



**CAUTION** To avoid the battery bursting, igniting, or fumes from the battery causing equipment damage, observe the following precautions:

- 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 5-7 Monitor and Operator Panel

### 5-7-1 Keyboard and Operator Panel

Figure 5-25 below illustrates the layout of the keyboard and operator panel. The buttons and controls are grouped together for ease of use; the different areas of the keyboard and operator panel include the following:

- Soft menu Keys – part of the Extended Keyboard
- TGC
- GAIN rotary
- Alphanumeric KB
- Extended KB
- Trackball
- Trackball buttons
- Front panel
- Hand-rest area of front-panel

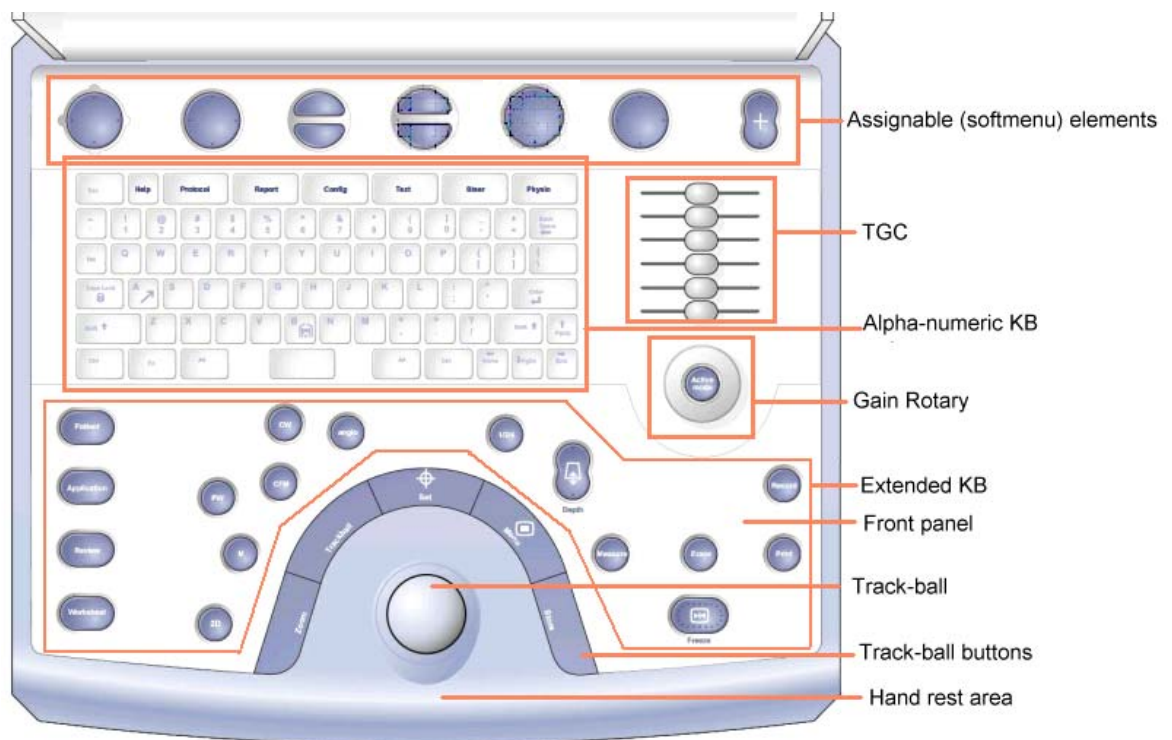


Figure 5-25 Vivid q N System — Keyboard and Operator Panel Layout

The Vivid q N keyboard unit comprise the main user-interactive devices: an alphanumeric keyboard, a 1.5" trackball, and an extended keyboard. In addition, it includes one or more printed circuit boards (PCBs) designed to carry the various electronic components - these include the keyboards' controller, TGC potentiometers, USB Hub, and backlight illumination.

Figure 5-26 below shows a high-level functional block diagram of the keyboard unit. The individual components are described in the *Keyboard and Operator Panel Components* section, page 5-35.

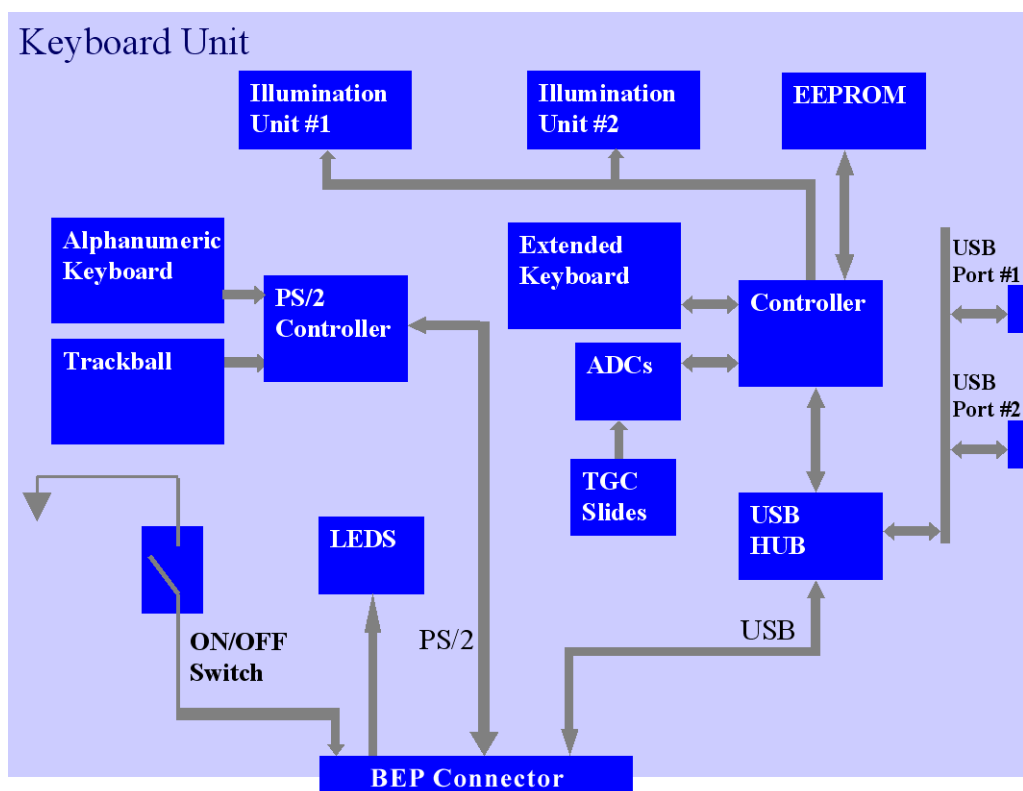


Figure 5-26 Vivid q N Keyboard — Block Diagram

## 5-7-2 Keyboard and Operator Panel Components

### 5-7-2-1 Power ON/OFF Button

The Power On/Off button receives 3.3 V from the BEP. Once shorted, this voltage is routed to the PMC which will activate or perform the appropriate task, as required.

### 5-7-2-2 Alphanumeric Keyboard

The Vivid q N alphanumeric keyboard, with a key arrangement similar to that of a laptop keyboard, is based on the global GE International standard keyboard requirements.

The alphanumeric keyboard has a PS/2 interface and supports all standard alpha-numeric functionality, such as, auto-repeat, standard ASCII output codes, *etc.*

Specially designed, high-quality key caps - together with controllable backlighting - provide a keyboard that is comfortable and easy to use.

The upper row of functional keys (F1 - F11), are clearly identified as being assigned to specific ultrasound functions.

### 5-7-2-3 TGC Sliders

There are six linear Time Gain Compensation (TGC) sliders located to below the alphanumeric keyboard, at the left corner (see [Figure 5-25 on page 5-34](#)).

These keys, that slide horizontally, are used to compensate for depth-related attenuation in an image.

### 5-7-2-4 Gain Rotaries

The Gain Rotaries (which may be rotated or pressed) are located above the TGC Sliders. The lower Gain Rotary is used for 2D Gain and the upper Gain Rotary is used for *Active* mode,

### 5-7-2-5 Extended Keyboard

The Extended keyboard is the ultrasound- specific keyboard which is used to activate the ultrasound system. This keyboard is controlled via the USB hub located on the keyboard PCB.

### 5-7-2-6 Trackball

The Vivid q N operator panel has a 1.5" trackball centrally located above the hand-rest area to provide easy operation.

The trackball has a PS/2 interface and supports a variety of basic PC operations and specific ultrasound controls.

#### 5-7-2-6-1 Trackball Buttons

The buttons surrounding the Trackball (defined as Trackball buttons) can be divided into two groups:

- **Set and Menu Buttons**

These are equivalent to the normal PC mouse left and right click (**Set** = left-click; **Menu** = right-click). The operation of these buttons is supported via the PS/2 Board.

- **Zoom, Trackball, and Store Buttons**

These buttons, even though located beside the trackball, are part of the External Keyboard buttons and not part of the Alphanumeric or regular trackball buttons. The operation of these buttons is supported via the USB hub located on the keyboard.

### 5-7-2-7 Key and Backlight Illumination

The keys on the operator panel are illuminated according to their current status/availability, as follows:

- **Green** - key function is currently *active*.
- **White** - key function is *available* (but not active) in the currently-selected scanning mode and/or options enabled.
- **No illumination** - key is *not available* in the currently-selected scanning mode and/or options enabled.

Three separate backlight illumination functions are provided:

- **On the Alphanumeric Keyboard:**

The complete alphanumeric keyboard has backlit illumination which is controlled by commands coming from the BEP via the USB Hub.

- **On the Extended Keyboard:**

Each key on the extended keyboard has its own backlight illumination which is controlled by the BEP via the USB Hub. Available keys are illuminated.

- **Active Key Backlight:**

Keys which have an On/Off position (enabled/disabled) are illuminated with a green backlight to inform a user of the current state.



#### 5-7-2-8 USB Hub

The USB connection arrives from the BEP. The USB hub drives the following devices:

- Keyboard controller
- Two general-purpose ports  
(current up to 600 mA per port, over-current limit should be used).

#### 5-7-2-9 Power Interface

Power to the keyboard is provided via the BEP keyboard connector.

Two different voltages are supplied to the keyboard:

- 1.) 3V standby for driving the power On/Off and status LEDs.
- 2.) 5V BE (Back End) is used for the remaining circuits.

The keyboard operates with  $\pm 5\%$  voltage deviation on each supply.

The keyboard has current-limiting circuitry (implemented on the BEP), to protect it against excessive current consumption (via the USB and/or short circuits).

#### 5-7-2-10 Keyboard ID

The keyboard PCB contains an EEPROM which stores a variety of information about the keyboard such as, GE part number, manufacturing date, and revision # of the PCB hardware.

The EEPROM size is 1KB.

#### 5-7-2-11 Keyboard Connectors

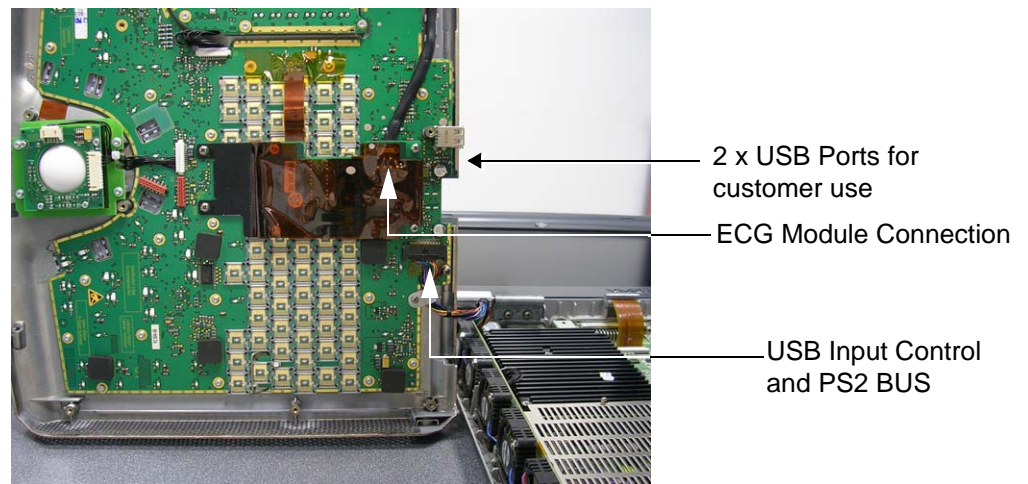
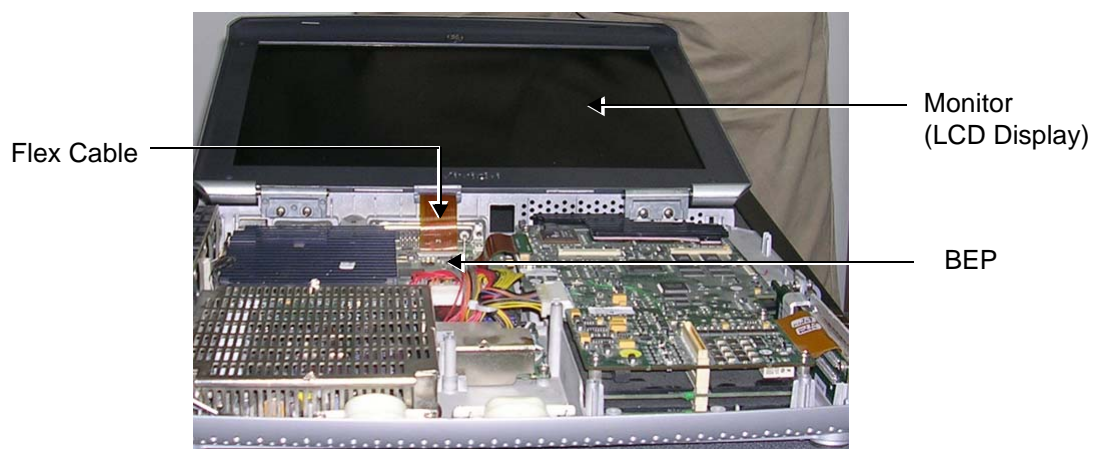


Figure 5-27 Keyboard Module Connectors

5-7-2-12 LCD Display Unit

The display monitor is a 15" LCD and is connected via a flex cable to the BEP, as shown in [Figure 5-28](#).



**Figure 5-28 LCD Display - Flex Cable Connection to BEP**

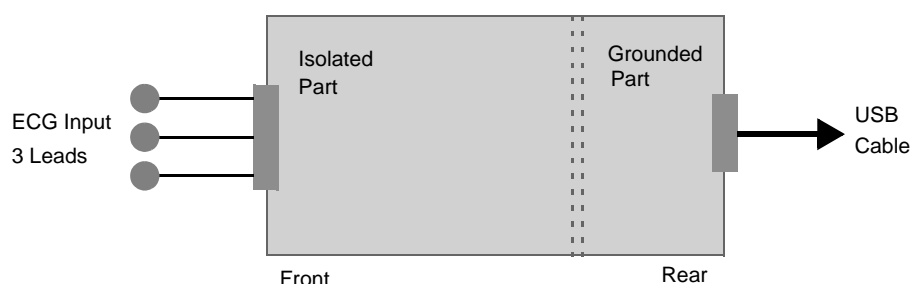
## Section 5-8 ECG Module

### 5-8-1 Overview

The Vivid q N ECG Patient I/O module is designed to enable acquisition of the following signals: ECG and external ECG. The different pins on the ECG input connector are specifically assigned to support either External ECG or Internal ECG:

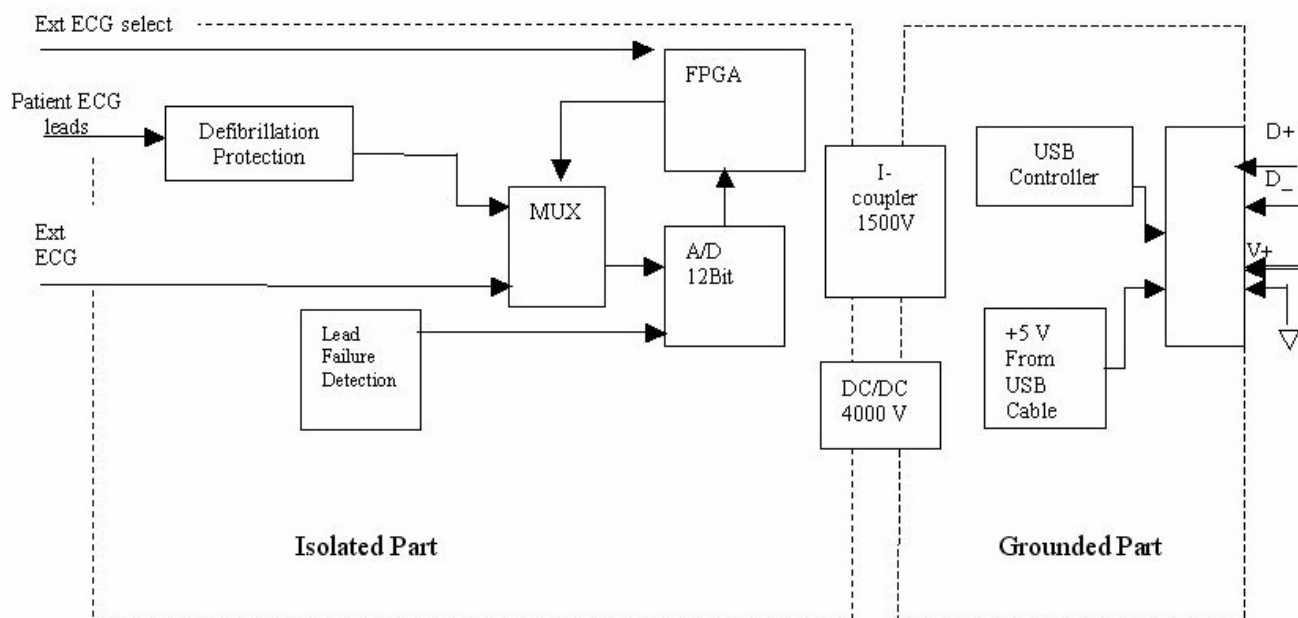
- The Internal ECG module supports acquisition of two bipolar ECG channels: leads I, II.
- The External ECG module supports acquisition of a single bipolar ECG input channel ranging from -1 to +1 volt allowing amplification of 1000. The minimal allowed impedance is 10 M ohm.

The ECG module is located under the keyboard assembly (see [Figure 5-6 on page 5-9](#)). All power and communication is supplied to the ECG module via the USB hub located in the keyboard module as shown in [Figure 5-29 below](#).



**Figure 5-29 ECG Patient I/O Module**

A general block diagram of the ECG Patient I/O Module is shown in [Figure 5-30 below](#).



**Figure 5-30 ECG Patient I/O Module - Block Diagram**

## 5-8-2 ECG Patient I/O Module Specifications

### 5-8-2-1 Power Consumption

The ECG and Ext-ECG modules use 5 V (taken from the USB socket on the host).

Estimation: 80mA for ECG function and 50mA when working with EXT-ECG function.

### 5-8-2-2 Sample Rate

Sampling rate of the ECG signals is: 600 samples/second.

### 5-8-2-3 Bandwidth

The ECG Bandwidth is 0.05 to 150Hz.

## 5-8-3 Isolation

The ECG signals are isolated from the Vivid q N system to comply with IEC601-1 type CF device classification. All leakage and auxiliary currents apply the values listed in [Table 5-12](#) below (taken from table IV in IEC601-1, section 19.3):

**Table 5-12 Leakage and Auxiliary Current Values**

Leakage Current	Normal Condition	Single Fault Condition
Earth leakage current	0.5mA	1mA
Enclosure leakage current	0.1mA	0.5mA
Patient leakage current	0.01mA	0.05mA
Patient auxiliary current	0.01mA	0.05mA

The ECG signals have double, reinforced isolation (B-a) from live parts. Hence, creepage distance and air clearance in the module are 8 mm and 5 mm respectively, to withstand 4000 volts isolation between applied part and grounded part.

The applied parts and enclosure have basic isolation (B-a). Therefore, creepage distance and air clearance in the module are 4 mm and 2.5 mm respectively, to withstand 1500 volts isolation between applied parts and enclosure.

## Section 5-9 ECG/Respiratory Module

The Internal ECG/Respiratory Board enables ECG, Respiratory and External ECG functionality, as explained in Section 5-9-1, below.

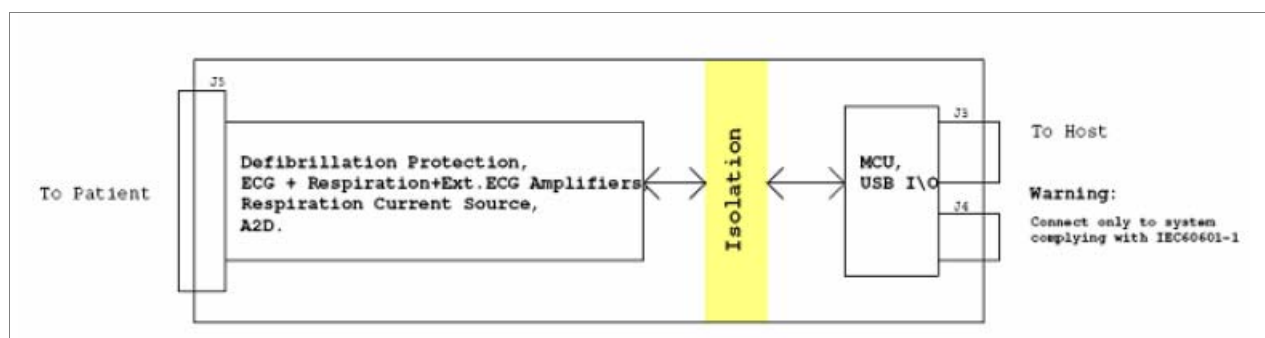
The installation of the Internal ECG/Respiratory Board is prerequisite for using the External ECG/Respiratory Interface, as explained in "Internal ECG/Respiratory Board" on page 5-41.

### 5-9-1 Internal ECG/Respiratory Board

#### 5-9-1-1 Overview

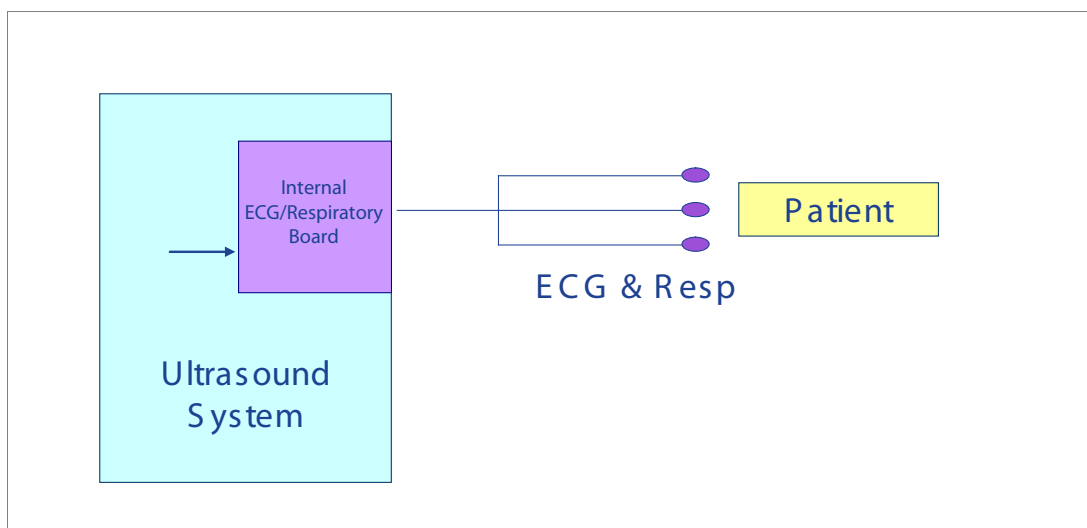
The Vivid q N Internal ECG/Respiratory module is designed to enable acquisition of the following signals: ECG, Respiratory and external ECG.

The Internal ECG/Respiratory Board is located in the cabinet cage assembly (refer to Figure 5-6 on page 5-9). All power and communication is supplied to the ECG module via the USB hub located in the keyboard module as shown in Figure 5-31, below.



**Figure 5-31 ECG/Respiratory Board - Power and Communication**

Connections to and from the Internal ECG/Respiratory Board directly to the patient are illustrated in Figure 5-32, below.



**Figure 5-32 Connection between the Internal ECG/Respiratory Board and the Patient**

5-9-1-2 Specifications

**Table 5-13 Internal ECG/Respiratory Board Specifications - General**

Characteristic	Specification
Ground Isolation	4 kV rms

**Table 5-14 Internal ECG/Respiratory Board Specifications - ECG**

Characteristic	Specification
Patient Cable	3 leads IEC/AHA codes
Input Range (ac)	10 mV peak-to-peak
Input Range (dc)	Up to $\pm 850$ mV
Bandwidth (-3db)	1.98 — 31.2 Hz (for Monitor use only)
Lead Fault Indicator	Yes
A2D resolution	12 bit, 2's complement
Sample Rate	1000

**Table 5-15 Internal ECG/Respiratory Board Specifications - External ECG**

Characteristic	Specification
Input Range (ac)	10 V peak-to-peak
Bandwidth (-3db)	0.8 — 65.5 Hz (65.5 Hz in firmware)
Lead Fault Indicator	Yes
A2D resolution	12 bit, 2's complement
Sample Rate	1000

**Table 5-16 Internal ECG/Respiratory Board Specifications - Respiration**

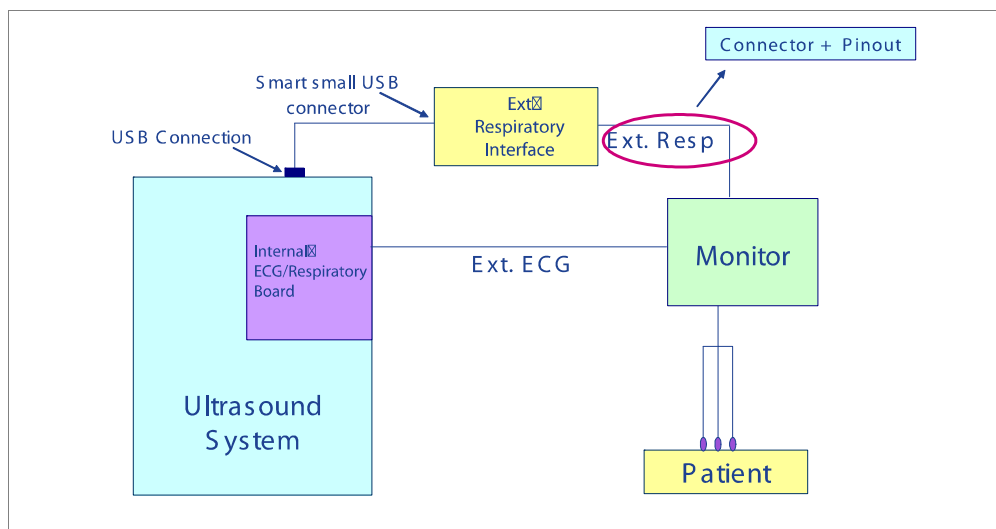
Characteristic	Specification
Excitation signal characteristics	121 $\mu$ A RMS $\pm 5^\circ$ at 55.5 kHz
Base impedance	100 — 1500 Ohm
Impedance dynamic range	10 Ohm peak-to-peak
Bandwidth (-3db)	0.16 — 1.3Hz
Lead Fault Indicator	Yes, Base impedance > 1500 Ohm
A2D resolution	12 bit, 2's complement
Sample Rate	1000

**NOTE:** Respiration function is not recommended for use on paced patients.

## 5-9-2 External ECG/Respiratory Interface

### 5-9-2-1 Overview

Connections to the external monitor are illustrated in [Figure 5-33](#), below.

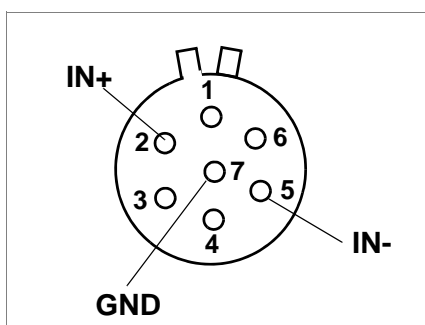


**Figure 5-33 Connections to the External Monitor**

The External ECG/Respiratory Interface module has a maximum 2Vpp (Volt peak-to-peak) input with a maximum frequency of 100Hz. The inputs are differential.

There are three optional connections for the External Respiratory interface (refer to [Figure 5-34](#)), depending on the Respiratory Monitor output type being used, as follows:

- **Option 1 - Monitor with single-ended Positive output**
  - Connect the “signal” lead to pin 2 on the connector
  - Connect the ground shielding to pins 5 and 7 on the connector
- **Option 2 - Monitor with single-ended Negative output**
  - Connect the “signal” lead to pin 5 on the connector
  - Connect the ground shielding to pins 2 and 7 on the connector
- **Option 3 - Monitor with Differential output**
  - Connect the positive “signal” lead to pin 2 on the connector
  - Connect the negative “signal” lead to pin 5 on the connector
  - Connect the ground shielding to pin 7 on the connector



**Figure 5-34 Pin Layout for External Respiratory Interface Connector**

## 5-9-2-2 Specifications

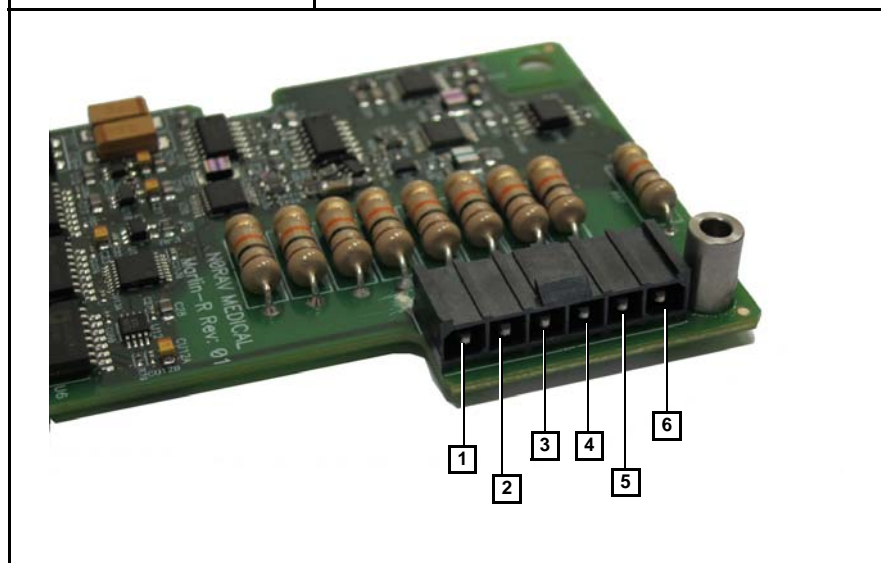
**Table 5-17 External ECG/Respiratory Interface Specifications**

Characteristic	Specification
Input Range (ac)	2v peak to peak
A2D resolution	12 bit ,2's complement
Sample Rate	500 [samples/second]
Ground Isolation	4 kV rms

## 5-9-2-3 Connectors

**Table 5-18 Connector Pin Out J5 (ECG, Respiration, External ECG)**

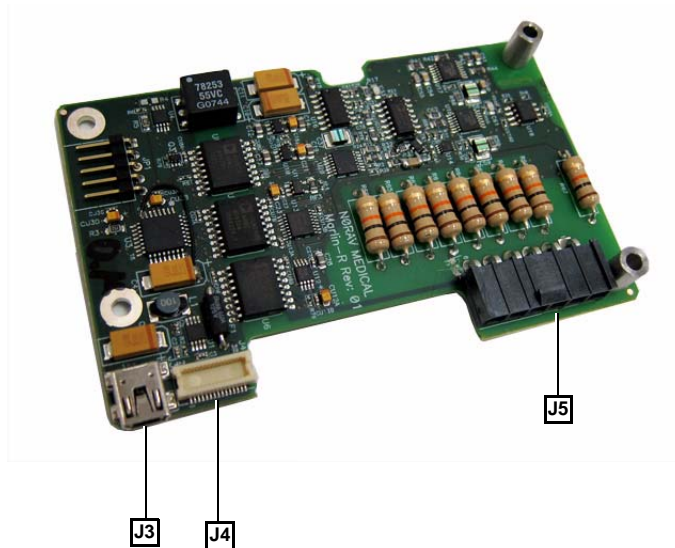
Pin Number	Specification
1	External ECG Input
2	ECG Input, Respiration Input/Output (LL)
3	ECG Input, Respiration Input/Output (RA)
4	ECG Respiration Output (LA)
5	External ECG Select Signal Input (Short to GND on Cable)
6	GND (GND for External ECG or Shield for ECG)





**Table 5-19 Connector Pins Out J3, J4 (USB)**

Pin Number	Specification
J3-1, J4-28, J4-30	VUSB 5V DC Input from USB Bus
J3-2, J4-8	D-, USB differential Data signal
J3-5, J3-shell	D-, USB differential Data signal
J4-1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 2, 4, 6, 10, 12, 14, 16, 20, 22, 24, 26	GND, USB Bus GND



## Section 5-10 Peripherals

### 5-10-1 Introduction

The following peripherals are used with the Vivid q N portable ultrasound scanner:

- Black & White Digital Printer (connected via USB)
- Color Digital Printer (connected via USB)
- Color Inkjet Printer (connected via USB)
- DVD/CD-RW (connected via USB)
- MOD (connected via a SCSI-to-USB converter)
- Wireless Network Adapter (connected via USB)
- VCR connected via a VGA to S-Video adaptor using the VGA output

All peripherals are connected via the external USB ports.

#### 5-10-1-1 Printers

##### 5-10-1-1-1 Black & White Digital Printer

The B&W Digital Printer receives image data and the print command via the USB port which is controlled by the keys **Print** or **Alt+Print** on the Vivid q N operator panel.

##### 5-10-1-1-2 Color Digital Printer

The Color Digital Printer receives image data and the print command via the USB port which is controlled by the keys **Print** or **Alt + Print** on the Vivid q N operator panel.

##### 5-10-1-1-3 Color Inkjet Printer

The Color Inkjet Printer is used to print out reports and exams and is controlled in one of two ways, depending on the system configuration:

- Directly via the USB port
- Via LAN connection

The printing operation to the Color Inkjet Printer is performed by pressing the **Alt+P** keys. Normally, inkjet printers are used to print out Reports but in some cases, also ultrasound images.

#### 5-10-1-2 DVD/CD Reader and CD Writer (DVD/CDR-W)

The DVD/CDR-W is used to back-up images and reports, in a similar way as using the MOD. In addition, the DVD/CDR-W is used as the main source of software upgrades and other service utility operations. Capable of reading all types of CDs including DVD, the DVD/CDR-W is controlled by the BEP via the USB port.

#### 5-10-1-3 Magneto-Optical Drive (MOD)

The MOD is used to back-up images and Reports. The Back up process enables storage of the images and Reports for future review on Vivid q N ultrasound units, or other EchoPac-compatible devices. The MOD is controlled by the CPU via a USB port supported by a USB-to-SCSI converter. Only 2.3 GB media are officially DICOM compatible. Magneto-Optical media of any other size (up to 9.2 GB) may be used for back-up, but will not be compatible with DICOM (even though they will be supported by a variety of GE DICOM reviewing stations such as, EchoPac).

---

**5-10-1-4 Wireless Network Adapter**

The Vivid q N supports a unique type of Wireless Network Adapter. For details regarding type and installation, refer to ["Wireless USB Network Adaptor" on page 3-35](#).

The Wireless Network Adapter provides a mobile network connection to the local area network. The Wireless Network Adapter is supported via the USB port.

## Section 5-11 Cooling System

### 5-11-1 General Information

The Vivid q N cooling system comprises five fans, which are directly controlled through the FAN controller module, by the monitoring application. The fans withdraw air from the system through the side vents, removing the warm air from around the internal components, as shown in [Figure 5-35](#) below.

The structure of Vivid q N internal components has been designed to provide the best thermal conduction, allowing the maximum amount of heat to be removed from the system. It is crucial that the system ventilation access is not blocked; a distance of at least 20 cm from right and left sides of the system should be kept clear. In addition, operating the system in an unclean environment could introduce foreign objects into the unit and create blockage of the airflow, which may eventually cause irreparable damage to the system. There are therefore some minimal environmental conditions that should be provided for optimum operation of the system - for details and recommendations, refer to [Table 2-2](#) on page 2-2.



Figure 5-35 Air Flow through the Vivid q N Ultrasound Scanner

# Chapter 6

## Service Adjustments

### Section 6-1 Overview

#### 6-1-1 Purpose of Chapter 6

This section provides references to the procedures required for testing and adjusting the Vivid q N portable ultrasound scanner. These tests are optional, and may be used to check the system for errors.

**NOTE:** *There are no voltage adjustments required.*

#### 6-1-2 LCD Display Adjustments and Calibration

Overall low image quality or “shades” visible on the Vivid q N LCD Display may be the result of improper monitor calibration. Therefore, adjustments may be made to the *Contrast*, *Brightness*, *Watermark* and/or *Blue Tint*, as required.

**Important:** LCD Display adjustments should be made in the correct order, as stated in the following procedures.

**NOTE:** *Incorrect calibration of the Vivid q N monitor may also result in less than optimal image quality when reviewing images on a DICOM or EchoPAC station.*

Access the Calibration Screen (by pressing <ALT>+<Q>), then follow the relevant procedure instructions described below.

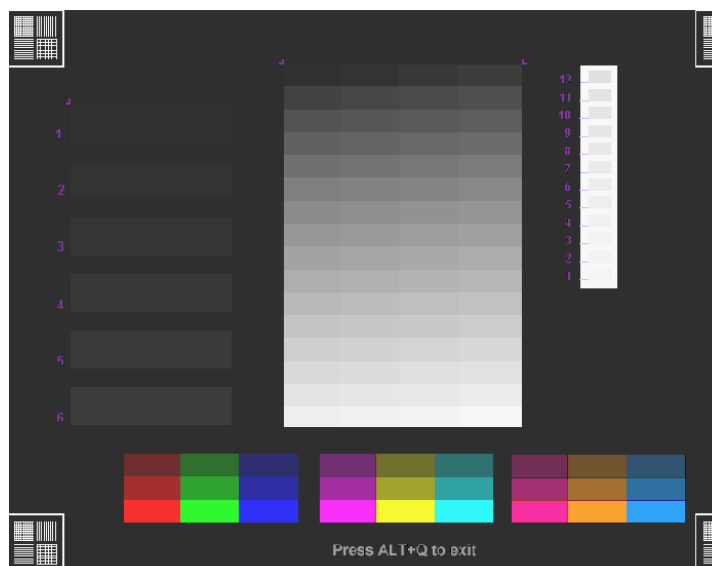


Figure 6-1 LCD Display Calibration Screen

**NOTE:** *The Hot keys used to exit the Calibration Screen are: <ALT>+<Q>.*

### 6-1-2-1 Contrast Adjustment Procedure

- **To adjust the Contrast:** hold down <ALT>:
  - Repeatedly pressing **Steer** ← to **decrease** the Contrast;
  - Repeatedly pressing **Steer** → to **increase** the Contrast.

To assist in making Contrast adjustments, an adjustment bar is displayed below the screen:



Figure 6-2 LCD Display - Contrast Adjustment

**NOTE:** It is highly recommended to set the contrast to maximum. Press <ALT>+<Steer Right> to increase the number of green bars to 7 (maximum).

### 6-1-2-2 Brightness Adjustment Procedure

- **To adjust the Brightness:** hold down <ALT>:
  - Repeatedly press ↓ **Pg Dn** to **decrease** the brightness
  - Repeatedly pressing ↑ **Pg Up** to **increase** the brightness.

To assist in making Brightness adjustments, an adjustment bar is displayed below the screen:



Figure 6-3 LCD Display - Brightness Adjustment

**NOTE:** The screen Brightness is calibrated when the dark blocks on the left (numbers 1 through 6) - see [Figure 6-1](#) - and the white bars on the right (numbers 1 through 12) are all just visible.

### 6-1-2-3 Testing Your Contrast and Brightness Settings

Observe the **V** watermark on the lower part of the monitor beside the soft keys on the screen. The monitor is set to optimal settings when you just **start** seeing the **V**.

V Watermark



Figure 6-4 LCD Display - V Watermark Adjustment

- If you do not see the **V**, the monitor is set too dark.
- If the **V** is clearly visible, the monitor has too much contrast or is set too bright.

The Test Pattern in the Calibration Screen (refer to [Figure 6-1 on page 6-1](#)) may be used for Advanced Settings. (Press Alt + Q to access the Test Pattern).

#### 6-1-2-4 Blue Tint Adjustment Procedure

This will make the white shades shift a bit towards bluish.

- **To adjust the Blue Tint:** hold down <ALT>, then use the < and > keys, as required.  
Repeatedly pressing < will **decrease** the blue tint; repeatedly pressing > will **increase** the blue tint.  
To assist in making blue tint adjustments, an adjustment bar is displayed below the screen:



Figure 6-5 LCD Display - Blue Tint Adjustment

#### 6-1-2-5 Blue Tint “2” Adjustment Procedure

**NOTE:** Systems with BT11 installed software have a Blue Tint “2” option that enables blue tint enhancement. This option can be switched off if preferred by the user.

**NOTE:** This option applies to the following LCD monitor installations:

System:	Vivid i n
Monitor:	BOE HYDIS-1

**NOTE:** On older Vivid i/q systems where the IDTECH-1 monitor is supplied, the Blue Tint “2” option is not applicable.

**NOTE:** The Blue Tint “2” option is incompatible with IDTECH-1/2 monitors, therefore, on these systems, the Blue Tint “2” option must be turned off.

**To identify which monitor is installed on the system:**

- 1.) Log on as Administrator.
- 2.) Press Config > About > and select the **HwVersion** tab.

The monitor type appears under Module Name and the part number indicates the monitor type - see [Figure 6-6](#).

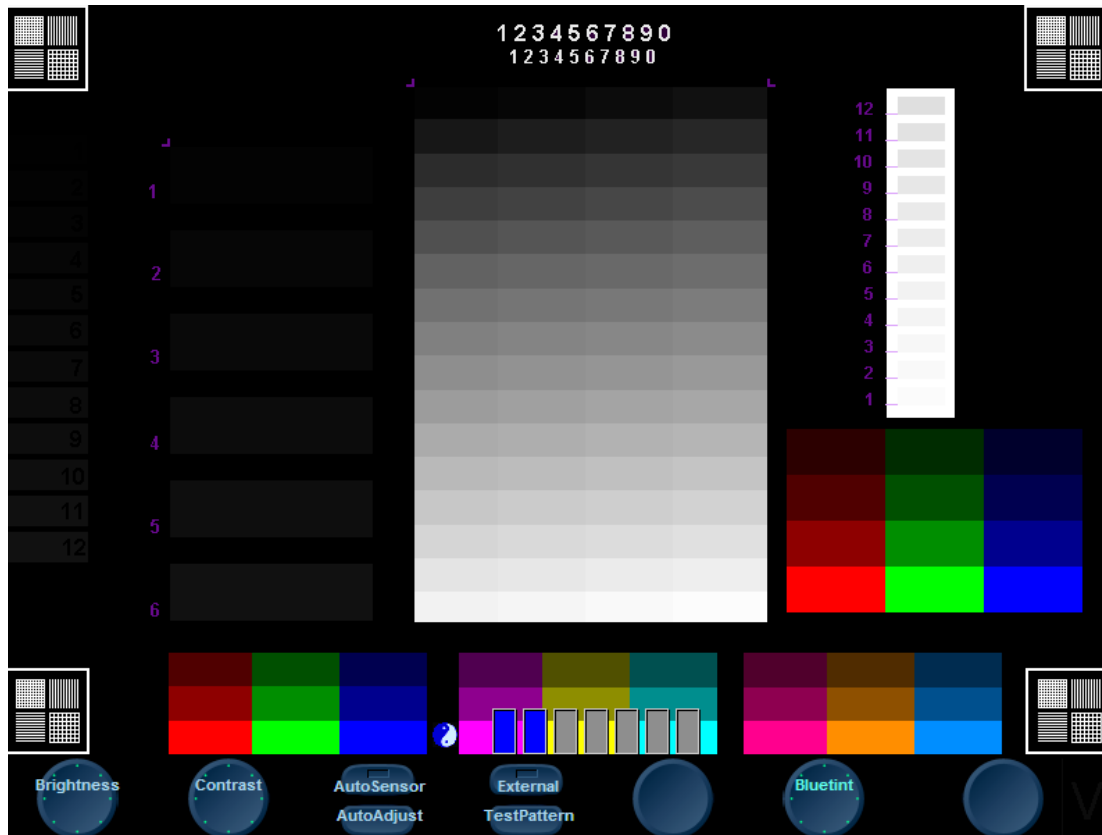
[illegible]

### Figure 6-6 Identifying Monitor Type



### 6-1-2-5-1 Adjusting the Blue Tint

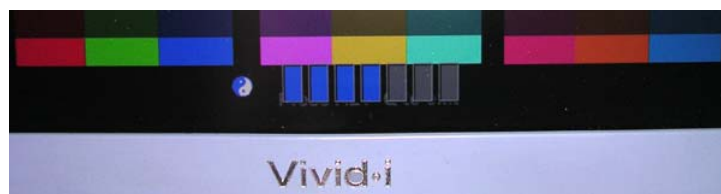
**NOTE:** The default blue tint test pattern is set at two bars - see [Figure 6-7](#).



**Figure 6-7 LCD Display Calibration Screen showing Test Pattern**

- 1.) Press **Alt Q** to access the Display Calibration Screen.
- 2.) To adjust the blue tint: hold down <ALT>, then use the < and > keys, as required.  
Repeatedly pressing < will decrease the blue tint; repeatedly pressing > will increase the blue tint.

**NOTE:** To assist in making blue tint adjustments, an adjustment bar is displayed below the screen - see [Figure 6-8](#).



**Figure 6-8 Blue Tint Adjustment Bar**

- 3.) Press **Alt Q** to exit to the Display Calibration Screen.

6-1-2-5-2 Turning Off the Blue Tint “2” Option

- 1.) Press Config > Service.

*The Service Screen opens - see [Figure 6-9](#)..*

The screenshot displays the 'SERVICE' configuration screen. At the top, a header bar reads 'SERVICE'. Below it, a message states 'The Service page is only for authorized service personnel'. The main area is divided into several sections. On the left, the 'LCD Setup' section is highlighted with a yellow border and contains a checked checkbox for 'Blue Tint 2'. Below this are buttons for 'Keyboard setup' and 'Add Printer'. On the right, the 'KB and Language Setup' section includes a 'Keyboard layout' dropdown menu set to 'Undefined Layout' with a 'Change' button. Below this is a 'System ID' text field. Further down is the 'Network Printer' section, which has a 'Select Printer Model' dropdown menu, a 'Start Setup Program' button, and a 'Disable TcpIp Filter' button. At the bottom left, there is a checkbox for 'Enable Diagnostic mode for ICE probes.' The bottom of the screen features a navigation bar with buttons for 'Imaging', 'Meas/Text', 'Report', 'Connectivity', 'System', 'About', 'Admin', and 'Service'.

**Figure 6-9 Service Screen - LCD Setup**

- 2.) Under *LCD Setup*, de-select Blue Tint “2” to turn off this option.

---

## 6-1-2-6 External Monitor Calibration

**NOTE:** *Terminology in this section:  
Internal Monitor - refers to the Vivid q N system monitor  
External Monitor - refers to an auxiliary monitor (such as, a wall-mounted LCD display in an Operating Room) connected to the Vivid q N system.*

An external monitor can be connected to the Vivid q N system to serve as a secondary external monitor.

Connect the secondary monitor to the Vivid q N system via the VGA port and proceed as described in the following scenarios:

### A.) Scenario A

**The user is able to make separate adjustments to the External Monitor, using the controls on the External Monitor itself:**

- 1.) Using the Vivid q N controls, press **<Alt> + X** and make sure that the **Internal** option is currently selected.
- 2.) Calibrate the Vivid q N monitor as described in sections [6-1-2-1](#) and [6-1-2-2](#) above.
- 3.) After calibrating the Vivid q N monitor, calibrate the External Monitor using the External Monitor's controls.

### B.) Scenario B

**The user prefers to use the External Monitor as the Primary monitor, but does not have access to it and therefore cannot make separate adjustments to it using the controls on the External Monitor itself.**

**Moreover, the calibration preset currently in use on the Vivid q N system is not optimal for the External Monitor.**

In this scenario, adjustments (**Brightness only**) can be made to the External Monitor, using the calibration controls on the Vivid q N system, as described below:

- 1.) Using the Vivid q N controls, choose the External Monitor to be the monitor that will serve as the *primary monitor to be calibrated, as follows:*

Press **<Alt> + X** and select the **External** option.

*You are now in External Monitor mode.*

- 2.) Using the Vivid q N controls, calibrate the External Monitor by making the required Brightness adjustments:

**To adjust the Brightness:** hold down **<ALT>**:

↓  
Repeatedly press **Pg Dn** to **decrease** the brightness

↑  
Repeatedly pressing **Pg Up** to **increase** the brightness.

**NOTE:** *The Contrast adjustment tools are currently disabled.  
For more details on adjusting Brightness, refer to the "[Brightness Adjustment Procedure](#)" on page 6-2.*

**NOTE:** *On completion of Brightness adjustment, the External Monitor calibration is now preset; only this monitor (the primary monitor) will be optimized in this calibration process.*

**IMPORTANT: *Safety Note***

The VGA output of the Vivid q N is a non-isolated output, therefore it may only be connected directly to a medical device.

In cases where the VGA contact is intended to be connected to a non-medical device, it is recommended to implement one of the following solutions:

- 1.) Purchase a standard VGA isolated splitter. Do not use the GE VGA isolated splitter (P/N 5390022) as this has a special pin configuration (dedicated for use with CardioLab/MacLab/Carto).
- 2.) Connect the device to an isolation transformer. Ensure that the device is not connected to another non-medical device which can cause isolation failure through the third device.
- 3.) Power the second device via a medical grade power supply. Ensure that the device is not connected to another non-medical device which can cause isolation failure through the third device.

---

## **6-1-3      Keyboard Adjustments**

### **6-1-3-1      Backlighting Intensity Adjustment Procedure**

To make adjustments to the Keyboard Backlighting intensity, follow the procedure described in ["Adjust Keyboard Backlight Intensity" on page 3-76](#).

## **6-1-4      Configuring Print Orientation**

For information on Print Orientation (Portrait or Landscape), refer to ["Configuring Printing Orientation \(Portrait or Landscape\) and Paper Size" on page 3-23](#).

## **6-1-5      Video System Adjustments**

### **6-1-5-1      Video System Adjustment Procedure**

For details on Video System adjustments (PAL or NTSC setup), refer to [Figure 3-46 on page 3-49](#).

## **6-1-6      Beamformer Calibration**

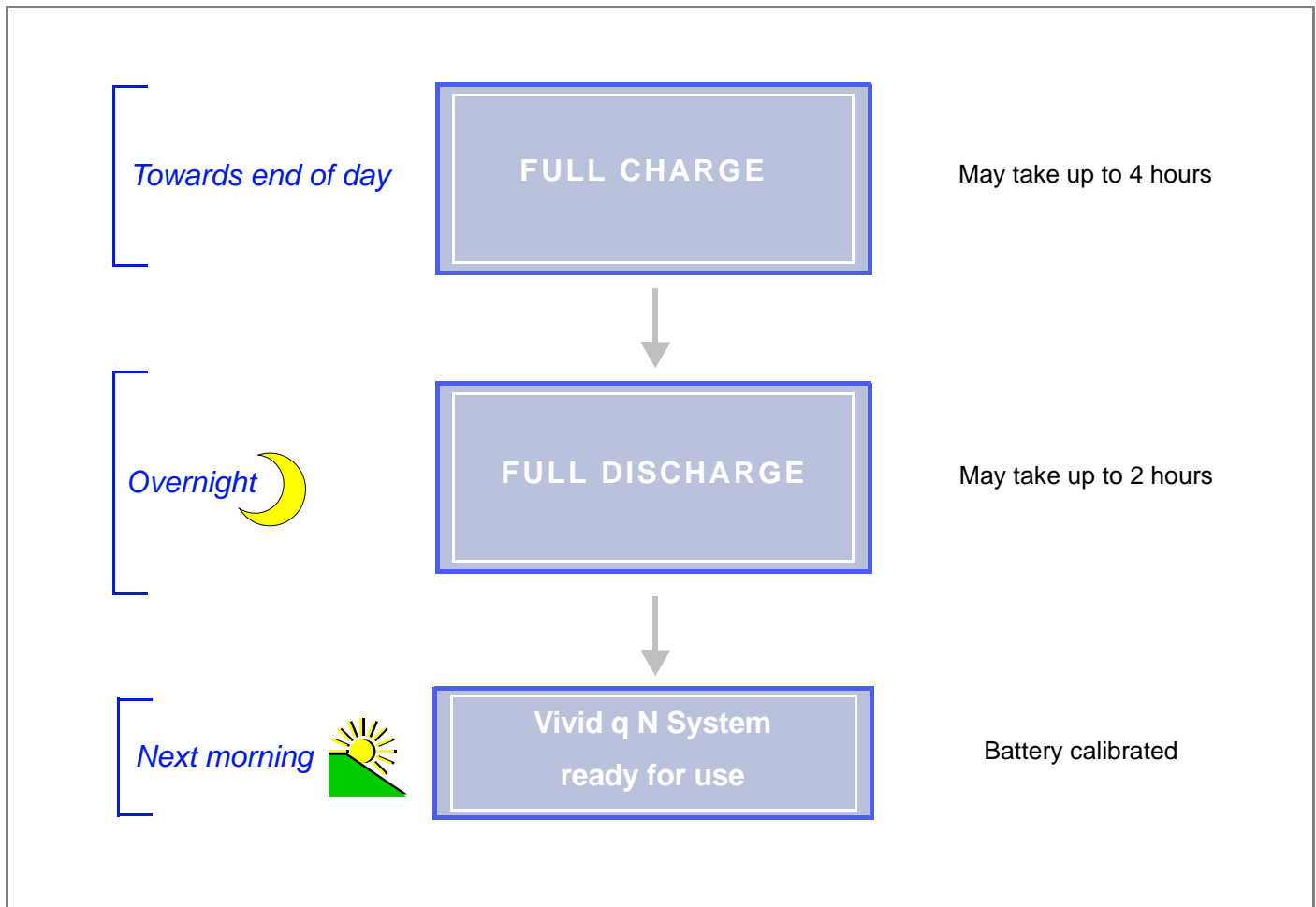
### **6-1-6-1      Beamformer Calibration Procedure**

For details on Beamformer Calibration adjustments, refer to [Chapter 7 - Diagnostics/Troubleshooting](#).

## 6-1-7 Battery Calibration

**NOTE:** It is recommended to perform the Battery Calibration procedure when the battery is fully charged (as much as the system allows) and preferably to commence the procedure towards the end of the working day - then allow it to continue to run automatically, overnight. For details, see [Figure 6-10 below](#).

**IMPORTANT:** During the Battery Calibration procedure, no scanning can be performed!



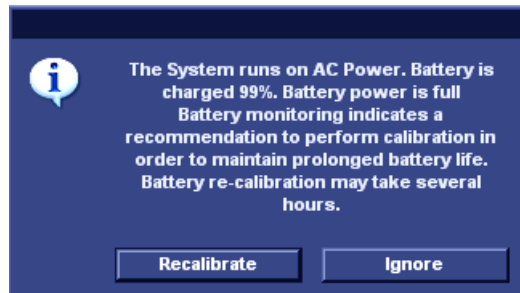
**Figure 6-10 Recommendations - Battery Calibration Procedure**

**NOTE:** For step-by-step instructions, see ["Performing the Battery Calibration Procedure" on page 6-11](#).

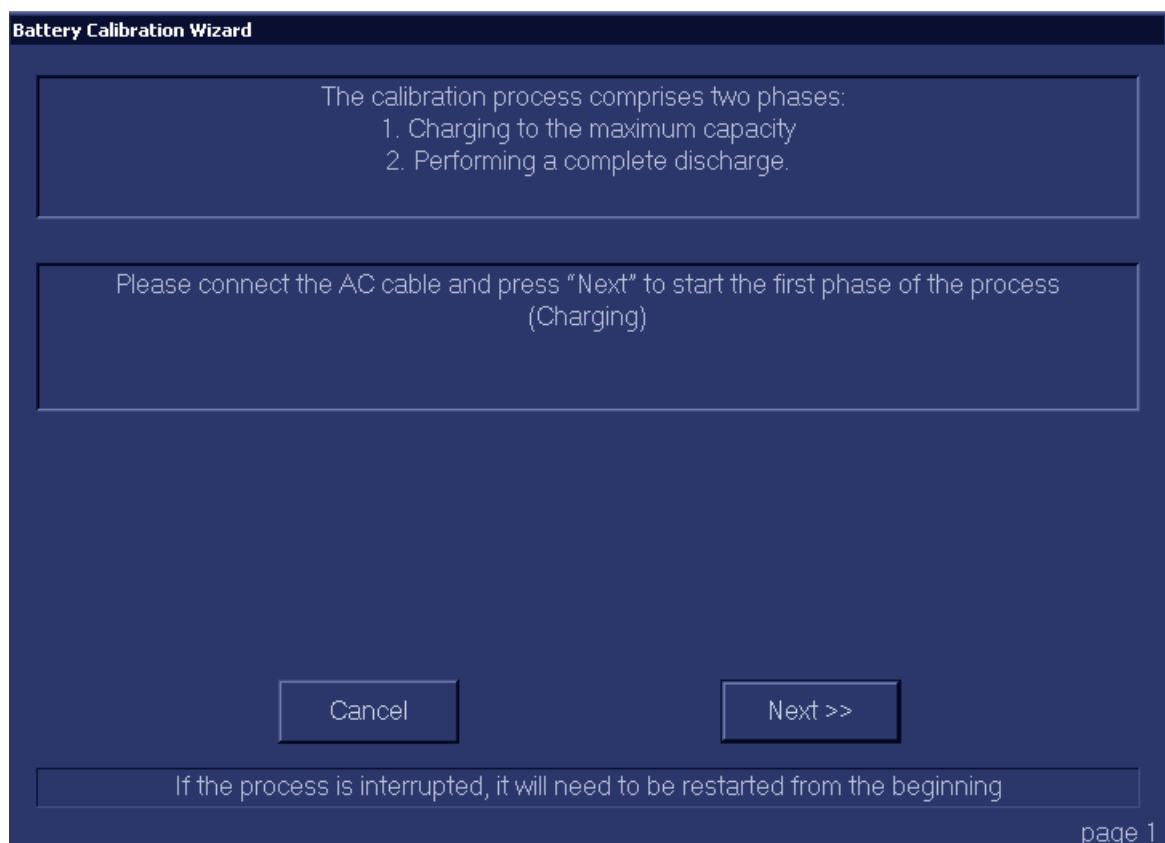
#### 6-1-7-1 Performing the Battery Calibration Procedure

**NOTE:** *It is recommended to commence this procedure towards the end of the working day (when the battery is fully charged) then allow the procedure to be completed overnight, as outlined in Figure 6-10.*

- 1) Click on the battery icon at the bottom of the scanning screen  
OR  
from the message window shown below, click **Recalibrate**.



*The Battery Calibration Wizard (Page 1) opens - Figure 6-11.*

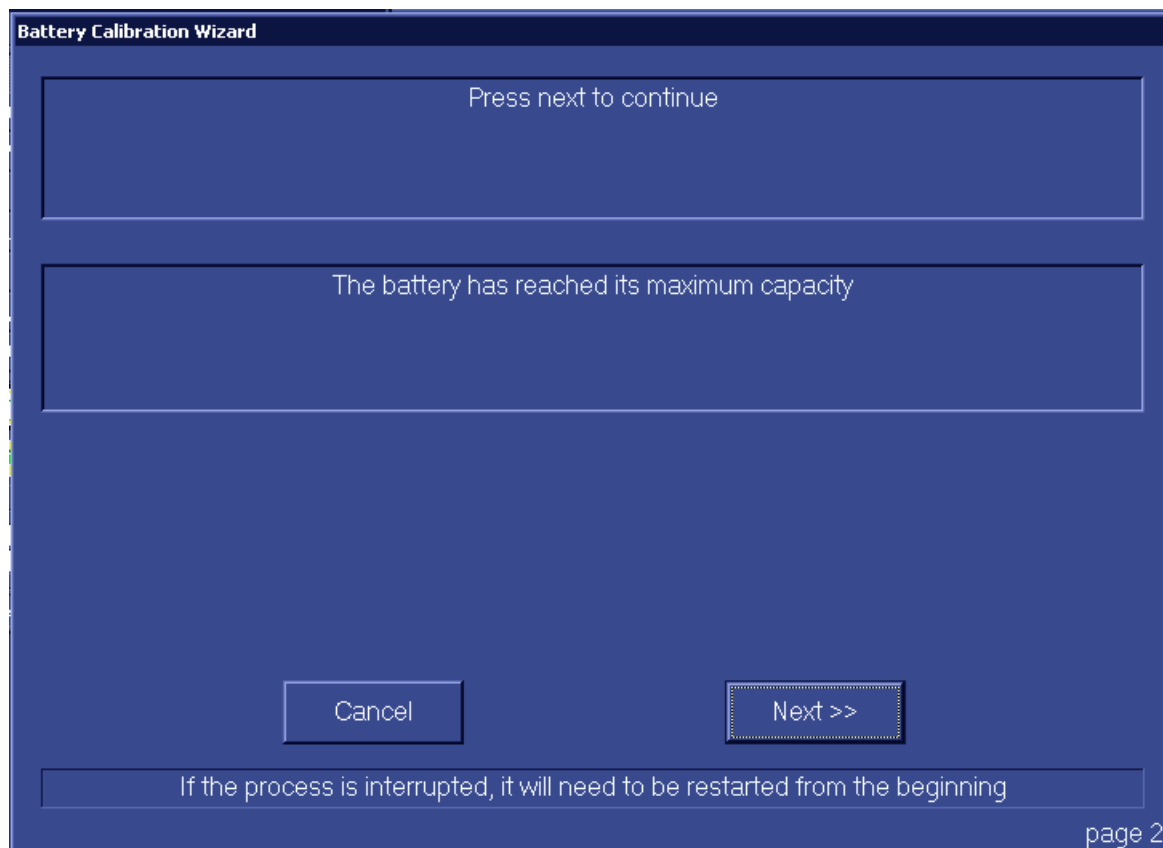


**Figure 6-11 Battery Calibration Wizard - Page 1**

- 2.) Make sure the AC power cable is connected to the Vivid q N, then click **Next** to commence the first stage of the process (Full Charge to maximum capacity).

*This step will fully recharge the battery and may take up to 4 hours.*

- 3.) Wait for the confirmation window to be displayed showing that the battery is fully charged.  
(See *Battery Calibration Wizard Page 2* in [Figure 6-12](#)).

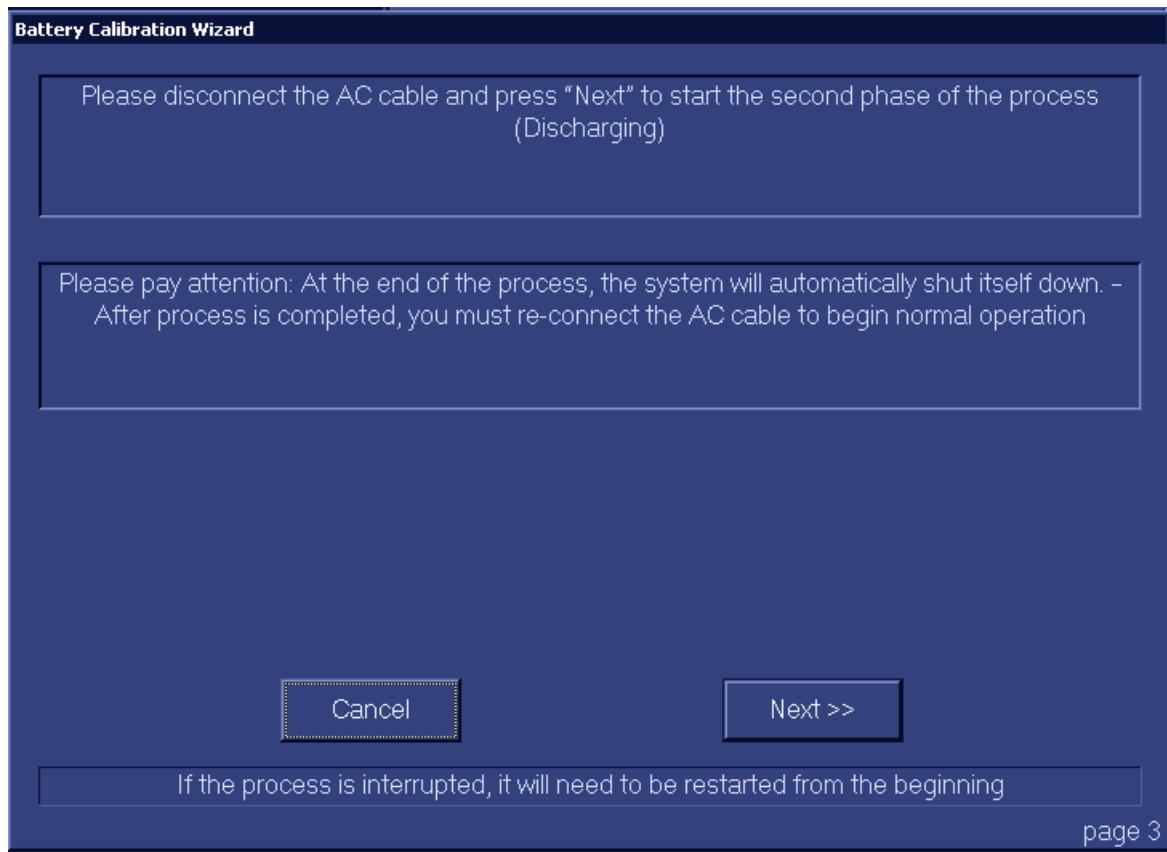


**Figure 6-12 Battery Calibration Wizard - Page 2**

- 4.) Click **Next**.

*The Battery Calibration Wizard (Page 3) opens - see [Figure 6-13 on page 6-13](#).*

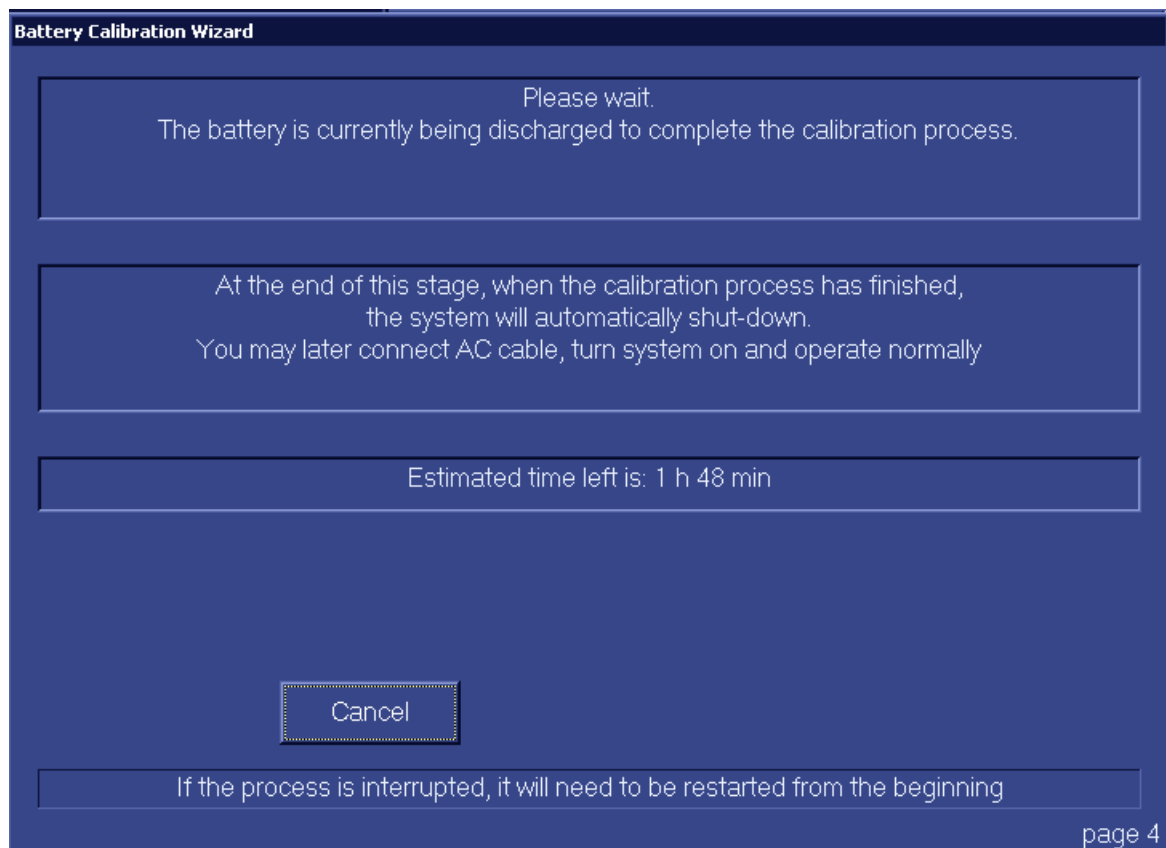




**Figure 6-13 Battery Calibration Wizard - Page 3**

- 5.) Disconnect the AC power cable from the Vivid q N, then click **Next**.

*The second phase of the process (Full Discharge) commences and the Battery Calibration Wizard (Page 3) is displayed as shown in [Figure 6-14 on page 6-14](#).*



**Figure 6-14 Battery Calibration Wizard - Page 3**

- 6.) Leave the system overnight to complete the Full Discharge process.

*The Vivid q N system automatically shuts down at the end of this process; the battery calibration procedure is now complete.*

- 7.) The following morning, re-connect the AC power cable and turn ON power to the system.

**NOTE:** *The system may now be used normally, without any dependence on battery capacity status.*

---

# Chapter 7

## Diagnostics/Troubleshooting

---

### Section 7-1 Overview

#### 7-1-1 Purpose of Chapter

This chapter describes how to set up and run diagnostic tools to locate system problems and failures. The Vivid q N ultrasound unit includes built-in diagnostic tools that can be accessed from the scanner application.

**Table 7-1 Contents in Chapter 7**

Section	Description	Page Number
7-1	Overview	7-1
7-2	Diagnostics	7-2
7-3	Performing Full System Diagnostics	7-19
7-4	Performing Front End (FE) Diagnostics	7-24
7-5	Monitoring Tests	7-86
7-6	Performing Back End Diagnostics on the System	7-108

## Section 7-2 Diagnostics

### 7-2-1 Diagnostic Tools

The diagnostic tools are provided for checking the system which includes the power supply, temperature, fan operation, board functions, Back-end signal processing performance, keyboard operation, peripherals, and so on.

### 7-2-2 Diagnostic Procedure Summary

The diagnostic tools are used to identify and correct problems, as follows:

- When the system boots up, it loads all the required drivers and establishes communication with the Front Board, via the PCI bus. Check the system presets to verify that good unit performance can be achieved.
- When the Back End is operating, you can verify proper voltages and temperatures in the Front End and in the Power Supply. To check the Front End parts, the tests must follow a logical sequence, in order to identify the faulty component. For example, testing communication between the Front End and the Back End begins by testing the RFI board and the PCI bus, before testing all the other boards, *in the following sequence* (as applicable):
  - \* RFI board, TR32 boards, Probe and MUX board
- Many error messages are displayed due to minor changes in calibration that may occur during normal operation. Before performing diagnostic tests, perform calibration, as described in the [DC Offset Calibration section, page 7-25](#). If error messages are displayed after performing calibration, perform the Front End diagnostics described in "[Performing Front End \(FE\) Diagnostics](#)" on page 7-24.

## 7-2-3 Accessing the Diagnostic Test Window

The diagnostic tools are accessed from 2D-Mode by simultaneously pressing **<ALT+Config>** on the alphanumeric keyboard. The *Diagnostic Test* window is displayed, as shown below:

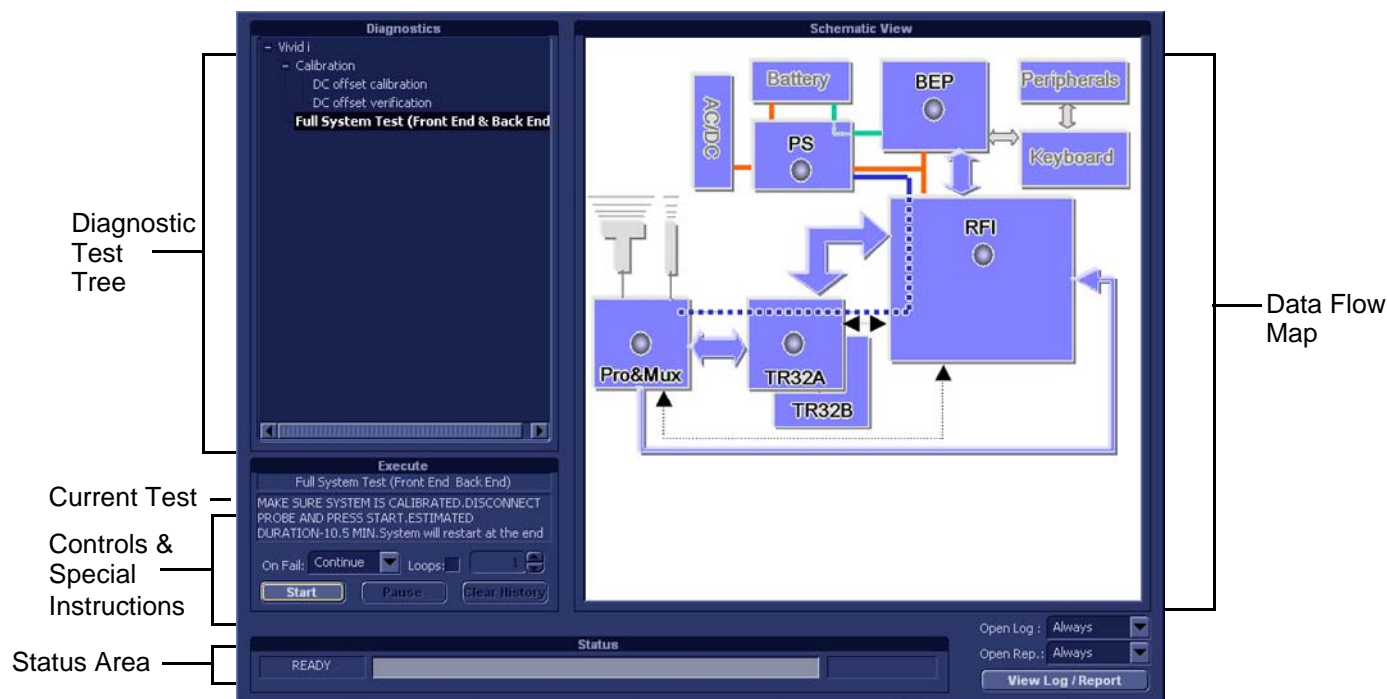


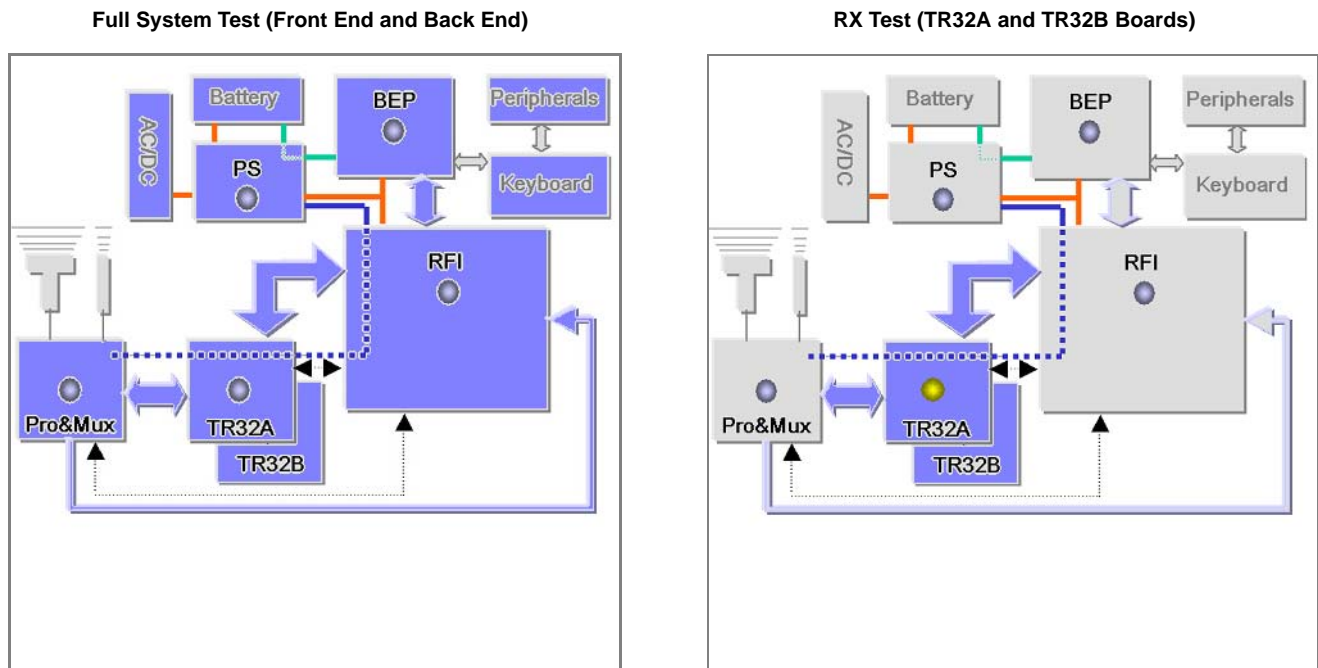
Figure 7-1 Diagnostic Test Window



**NOTICE IMPORTANT** - The user-friendly Diagnostic Test Window displays dynamically-updated information. The Data Flow Map area on the right is designed to provide an instant visual representation of the system components; the color illumination of graphic buttons (light blue; light gray) and status indicators (green; red; yellow) indicates which component, or set of components, is currently undergoing diagnostic testing (see the examples in [Figure 7-2 on page 7-4](#)).

In this way, it is easy to visually follow the test sequence and progress of a specific test. For a detailed explanation of the Diagnostic Test Window, refer to [Table 7-2 on page 7-5](#).

Figure 7-2 Data Flow Map - Graphic Color Illumination of Test-Specific Components and Status Indicators



**NOTE:** For a summary of the various Diagnostic Test Menu options, together with details of the information displayed in different areas of the screen, see [Table 7-2](#) on page 7-4 and Diagnostic Test Window Menu Options section, on page 7-10.

**NOTE:** When performing a specific test for an intermittent problem, it is highly recommended to use the Loop option (use the combo box or type the required number of loops) as appropriate. Looping the test will assist in detecting the problem.

**NOTE:** Once the test has been completed, a log can be viewed, as described in the View Log section, on page 7-6.

The *Diagnostics Test Window* (Figure 7-1) comprises the following areas and menu options:

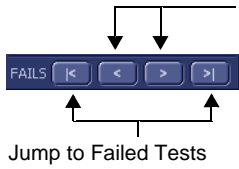
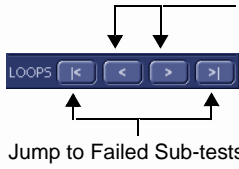
**Table 7-2 Vivid q N Diagnostics Test Window and Menu Options**

Option	Description	Comments
<b>Data Flow Map</b>	<p>Displays a schematic view of the Vivid q N data flow (Data Flow map). The functionality of each button in this area corresponds to that of the test of the same name in the Diagnostic Test Tree.</p> <p>You are able to select and perform the Vivid q N diagnostic tests by trackballing to the required test (listed in the Diagnostic Test Tree) and pressing <b>Set</b>.</p> <p>Note: Double-clicking a button in the Data Flow Map expands the corresponding list of tests (in the Diagnostic Test Tree) available for that component (or group of components).</p>	<p>In the Data Flow map Status Window, status indicators are highlighted by color, indicating the following:</p> <ul style="list-style-type: none"> <li>• <b>Light Blue:</b> The selected test will be performed on this component, or group of components.</li> <li>• <b>Light Gray:</b> This component, or group of components will be <i>excluded</i> from the test/s.</li> <li>• <b>Green:</b> All recommended tests for these components have been completed and no problems were identified.</li> <li>• <b>Red:</b> At least one problem was identified in these components during the performance of the test.</li> <li>• <b>Yellow:</b> The tests executed so far on these components have passed, but not all recommended tests have been performed.</li> </ul>
<b>Diagnostic Test Tree</b>	Displays a menu of diagnostic test sequences and tests available for selection.	
<b>Execute</b>	Displays the name of the currently-selected diagnostic test (or test sequence).	
<b>Controls and Special Instructions</b>	<p>Displays any special instructions for checks required before performing the test. For example, <i>Make sure system is calibrated. Disconnect probe and press <b>Start</b>.</i></p>	<p>The area also includes these controls:</p> <ul style="list-style-type: none"> <li>• a <b>Start/Stop</b> button used to commence a test. After pressing Start, the button may be used to stop a test before completion.</li> <li>• a <b>Pause</b> button used to pause a test before resuming.</li> <li>• a <b>Clear History</b> button used to clear the highlighted status indication in the Data Flow map (schematic view). Note: this button is not used to clear the test sequence log files (refer to Clear Log button in Table 7-3 on page 7-6).</li> <li>• an <b>On Fail</b> combo box - used to select the action required in the event that the test fails (Stop or Continue).</li> <li>• a <b>Loops</b> checkbox. If activated, the test will be repeated for the selected number of loops.</li> </ul>
<b>Status Area</b>	Displays instructions during the test, as well as test status and result messages.	<p>The following messages are displayed:</p> <ul style="list-style-type: none"> <li>• <b>Test status:</b> For example, <b>Ready for test</b>, <b>Executing</b>, or <b>Finished</b>.</li> <li>• <b>Instructions:</b> During the course of a diagnostic test, any instructions to the user are displayed in the Status area. For example, <b>Wait</b>.</li> <li>• <b>Test results:</b> For example, <b>Passed</b> or <b>Failed</b>.</li> </ul> <p>The area also includes two progress bars:</p> <ul style="list-style-type: none"> <li>• <b>Progress bar:</b> Shows progress of an individual test (within a sequence of tests).</li> </ul> <p>The area also includes:</p> <ul style="list-style-type: none"> <li>• a <b>View Log</b> button used to review the test results. (Enabled only after test execution). Refer to <i>View Log</i> section, on page 7-6.</li> </ul>

### 7-2-3-1 View Log

From the *Diagnostics Test Window* (Figure 7-1) the View Log button provides access to the test result information described below. This is shown in the View Log dialog box (see example in Figure 7-3 below) which is displayed in the *upper* right portion of the screen (over the Data Flow Map area)

**Table 7-3 Vivid q N Diagnostics Test Window - View Log 1 of 2**

Option	Description	Comments
<b>File</b>	Log file number	
<b>Date</b>	Date test was performed.	
<b>Time</b>	Time test was executed.	
<b>Log File Scroll Bar and Arrows</b>	Enables scrolling through the list of Log Files	
<b>Tests</b>	Displays test sequence log files. Shows a list of the specific diagnostic test/s included in the currently-selected test sequence.	
<b>Result</b>	Lists test results as either PASS or FAIL.	
<b>Loop</b>	Lists name of loop and the sub-tests within the loop	
<b>Date</b>	Date test was performed.	
<b>Tests Scroll Bar and Arrows</b>	Enables scrolling through the list of Test Log Files.	<p>A test sequence may have up to four reports. Since only one specific test may have failed, the scroll arrows enable jumping directly from one Failed test to the next (i.e., failures only). Alternatively, you can scroll through all the tests (one-by-one).</p> 
<b>Loops Scroll Bar and Arrows</b>	Enables scrolling through the Loops and sub-tests.	<p>A test may have many loops, each of which may have sub-tests. Since only one specific sub-test may have failed, the scroll arrows enable jumping directly from one Failed sub-test to the next (i.e., failures only). Alternatively, you can scroll through all the loops (one-by-one).</p> 



**Table 7-3 Vivid q N Diagnostics Test Window - View Log (cont'd) 2 of 2**

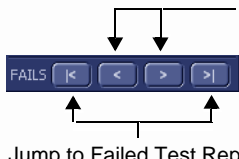
Option	Description	Comments
<b>Reports</b>	Displays the specific report (or list of reports) for the currently-selected test sequence. (shows all OK and failed tests) Certain tests will have more than one report (see the example in <a href="#">Figure 7-3 below</a> ).	Double-clicking on a currently-selected report displays that report in the Report window (lower portion of the View Log dialog box) - refer to <a href="#">Figure 7-4 below</a> .
<b>Reports Scroll Bar and Arrows</b>	Enables scrolling through the list of Reports	<p>A test sequence may have up to four reports. Since only one specific test may have failed, the scroll arrows enable jumping directly from one Failed test report to the next (i.e., failures only). Alternatively, you can scroll through all the reports (one-by-one).</p>  <p>Scroll between reports here</p> <p>Jump to Failed Test Reports</p>
<b>Erase Button</b>	Clears all test sequence log files for that specific (currently selected) test listed in the Tests window (passed and failed tests).	It is <i>not recommended</i> to clear the test sequence log files unless a test failed due to user intervention or as a result of a false alarm. (It is necessary to erase each log file separately).
<b>Exit Button</b>	Closes the <i>View Log</i> dialog box	Returns to the Diagnostic Test window.
<b>Report Window</b>	Lower portion of the View Log dialog box where the currently-selected report is displayed in a separate window (see the example in <a href="#">Figure 7-3</a> ). The displayed <i>Average</i> , <i>Deviation</i> , <i>Max</i> and <i>Min</i> values are dynamically updated.	Visible only after test execution.
<b>Report window Scroll Arrows</b>	Enables scrolling through all channels. Displays the currently-selected channel number. For example, Count: 64	
<b>Close Button</b>	Closes the Report window.	

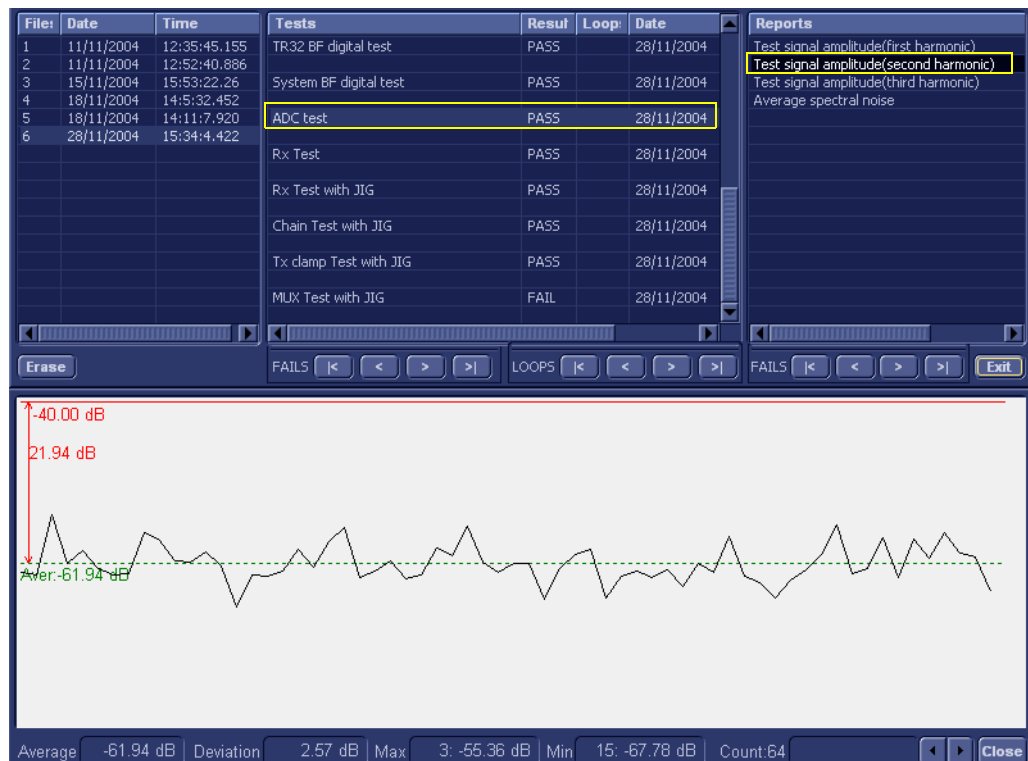
Figure 7-3 View Log Dialog Box



In [Figure 7-3](#) above, the selected report (Test signal amplitude, first harmonic) is displayed in the Report window. When there is more than one report listed, the first report is displayed (by default).

Double-clicking on another report (for example, Test signal amplitude second harmonic), will evoke the display of that report in the Report window as shown in the example in [Figure 7-4](#) below.

Figure 7-4 ADC Test - Viewing Report (Test Signal Amplitude 2nd Harmonic)



**NOTE:** Left and right arrows provided in the View Report window enable scrolling between the different channels.

Left-clicking on a currently-selected channel marks a red square on the report graph, and also evokes the display of the following information relative to that specific point: Average, Deviation (standard deviation from the Average), Max, and Min.

The signal should be within the limits marked in the white area (the dotted line represents the Average), as shown in [Figure 7-4](#).

## **7-2-4 Diagnostic Test Window Menu Options**

The *Diagnostic Test* menu includes the options described below.

### **7-2-4-1 Full System Test**

*NOTE:* The *Full System Test* requires approximately 10 minutes for completion.

#### **7-2-4-1-1 Full System Test (FE and BEP)**

Performs a full sequence of complete Front End and Back End tests (automatically) that do not require user intervention. This is particularly recommended for detecting problems that are intermittent in nature, since a test may be paused at any stage and any detected failures reviewed.

For test procedure instructions, see the *Full System Test (FE and BEP)* section, on page 7-20.

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## 7-2-4-2 Front End Tests

**NOTE:** *The Front End Tests may be performed in any order. However, due to the functional dependencies between each of the Front End boards, it is recommended to perform the tests on the boards in the following order (as described in the Performing Front End (FE) Diagnostics section, on page 7-24):*

- 1.) RFI board
- 2.) TR32 boards
- 3.) PM board

Performing the tests in the proper sequence will help to derive the correct conclusions regarding the source of the problem.

### 7-2-4-2-1 Calibration

- **DC Offset Calibration**

This is used to test proper operation of the Beamformer, and TR32A and TR32B boards. The test generates no signal at the input to the Beamformer and is used to calibrate the system, or to test system calibration in order to check that the current calibration values are valid for the current environment.

For test procedure instructions, see the [DC Offset Calibration section, page 7-25](#).

- **DC Offset Verification**

This test verifies that the calibration saved on the Hard Disk is within acceptable limits.

For test procedure instructions, see the [DC Offset Verification section, page 7-28](#).

### 7-2-4-2-2 RFI Tests

- **Full RFI Test**

The Full RFI Test performs a complete test sequence and includes all the RFI board tests (described below).

For test procedure instructions, see the [Full RFI Test section, page 7-31](#).

- **RFI FE Cache Test**

Tests the cache memory. (The cache memory for the PM, TR32A, TR32B and the RFI boards is located on the RFI board). This test sends a specific pattern into the cache memory and the expected result is to see a predefined pattern as the output from the cache memory.

For test procedure instructions, see the [RFI FE Cache Test section, page 7-34](#).

- **RFI Analog Circuits Test**

This tests the RFI analog circuitry (which is responsible for temperature monitoring and communication with the TEE probe).

For test procedure instructions, see the [RFI Analog Circuits Test section, page 7-37](#).

- **RFI Demodulator Short Test**

This is used to perform a short digital test on the demodulator to make sure that the demodulator on the FPGA is functioning in accordance with the specifications.

For test procedure instructions, see the [RFI Demodulator Short Test section, page 7-40](#).

- **RFI Audio Test**

This tests the audio frequency for Doppler sound (coming from the RFI board to the Back End). During this test - approximately midway on the progress bar - a loud, high-pitched sound will be heard coming from the speakers.

For procedure details, see the [RFI Audio Test section, page 7-43](#).

*NOTE: To conduct a complete audio test of the system, it is also necessary to perform an audio test which is part of the Back End - for details, refer to the [PC Doctor section, page 7-15](#).*

#### 7-2-4-2-3 TR32 Tests

- **Beamformer Tests**

- **TR32 BF Digital Test**

This is an internal test of the Beamformers. Each Beamformer generates an internal test pattern (first on the TR32A board and then on the TR32B board). This test pattern is generated through MLA0 and MLA1 to the RFI.

Therefore, in the first phase of the test, the Beamformer on the TR32A board generates a test pattern signal (while TR32B generates pattern zero).

In the second phase of the test, the Beamformer on the TR32A board generates a test pattern zero - while the BF on the TR32B board generates a test pattern signal.

Both the test patterns are summed and focused on the BF 32A and generated to the RFI demodulator.

For test procedure instructions, see the [TR32 BF Digital Test section, page 7-46](#).

- **System BF Digital Test**

In this test, both Beamformers are generating internal test patterns. The patterns from the BF of the TR 32B board are summed and focused in the BF of the TR32A board. From here, the pattern is generated through MLA0 and MLA1 to the RFI.

For test procedure instructions, see the [System BF Digital Test section, page 7-49](#)

- **ADC Test**

The ADC Test is used to check that 1st harmonic, 2nd harmonic, 3rd harmonic, and background noise are within pre-defined limits.

In this test, a signal is generated from the RFI into the TR switches. For all 64 channels of the system, each signal goes through the following: pre-amplification, filtering, analog-to-digital conversion, and focusing. The test signal is at a frequency of 2 MHz.

For test procedure instructions, see the [ADC Test section, page 7-52](#).

- **Receive (RX) Tests**

- **RX Test**

The RX Test is performed with no probe connected. This is used to check that the signal values at the input to the TR32 board are as expected.

When performing the RX Test, test signals are generated from the RFI, and the results are expected to be of fairly high amplitudes with no distortion of the frequency.

For test procedure instructions, see the [RX Test section, page 7-57](#).

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7-2-4-2-4 PM Tests

- **ACW Test**

- **ACW IQ Symmetry Test**

The ACW (analog CW test) is performed when CW problems are suspected. Checks the symmetry of I and Q signals. Inputs a test signal shifted from the mixer frequency, then calculates the RMS of the I and Q vectors and compares them. The RMS vectors should be lower than the defined limits (shown on the report).

For test procedure instructions, see the [ACW IQ Symmetry Test section, page 7-61](#).

- **ACW Matrix Test**

The ACW (Analog CW) Matrix Test checks the path of all 32 RX channels to all VCA outputs on the TR32B board. A test signal shifted from the mixer frequency is generated and the receive signal amplitude and frequency is then checked. The frequency should be matched to the frequency shift of the input signal (shown on the Test report).

For test procedure instructions, see the [ACW Matrix Test section, page 7-64](#).

- **ACW Delay Range Test**

The ACW (Analog CW) Delay Range Test checks the path of VCA outputs to the Delay taps in all three frequency ranges. The expected results are shown on the Test report.

For test procedure instructions, see the [ACW Delay Range Test section, page 7-68](#).

- **ACW Pre-Mixer Gain Test**

The ACW (Analog CW) Pre-Mixer Gain Test checks the PM Gain level. A test signal shifted from the mixer frequency is generated and the test compares the 0db RMS to the levels of the other Gains. The RMS level is expected to be lower than the selected Gain level (as shown on the Test report).

For test procedure instructions, see the [ACW Pre-Mixer Gain Test section, page 7-72](#).

- **ACW BPF Test**

The ACW (Analog CW) BPF Test is used to check the operation of all the Bend Pass filters. A test signal is shifted from the mixer frequency and then the test checks the filter response. Attenuation of the filters in different frequencies should be within pre-defined limits (shown on the Test report).

For test procedure instructions, see the [ACW BPF Test section, page 7-75](#).

- **ACW HPF Test**

The ACW (Analog CW) HPF Test is used to check the operation of the High Pass Filters (300Hz and 600 Hz). A test signal is shifted from the mixer frequency and then the test checks the filter response. Attenuation of the filters in different frequencies should be within pre-defined limits (shown on the Test report).

For test procedure instructions, see the [ACW HPF Test section, page 7-80](#).

- **Pencil Test**

- **Pencil Rx Test**

When performing the Pencil Rx Test, no probes or jig are connected to the system.

This test is performed to check the receive functions. During this test, signals are transmitted through the circuitry. The received frequency should match the transmitted test frequency, as shown in the Test report.

For test procedure instructions, see the [Pencil Rx Test section, page 7-83](#).

### **7-2-4-3 Monitoring Tests**

#### **7-2-4-3-1 Full System Monitoring Test**

The Full System Monitoring Test performs a full sequence of all monitoring tests (as described below).

For test procedure instructions, see the [Full System Monitoring Test section, page 7-86](#).

#### **7-2-4-3-2 Fixed Voltages Test**

The Fixed Voltages Test is used to check the Power Supply unit and to ensure that voltages are within the pre-defined limits.

For test procedure instructions, see the [Fixed Voltages Test section, page 7-93](#).

#### **7-2-4-3-3 Temperatures Test**

The Temperatures Test is used to check the temperature of the Front End and the Back End. The test reads all the temperature sensors in the system to ensure that the system is operating within the pre-defined temperature limits and that there is no overheating of any components.

For test procedure instructions, see the [Temperatures Test section, page 7-96](#).

#### **7-2-4-3-4 Fans Speed Test**

The Fans Speed Monitoring Test is used to check that the Fan Controller is fully operational and that all five fans operate simultaneously (at the pre-defined speed) to maintain proper cooling and the optimum operating temperature of all Vivid q N system components.

For test procedure instructions, see the [Fans Speed Test section, page 7-99](#).

#### **7-2-4-3-5 Battery Parameters Test**

The Battery Parameters Test is used to check the battery status with regard to the following:

- Battery capacity
- Charging voltage being supplied to the battery (or the voltage being supplied by the battery)
- Source of the power being provided to the system (i.e. external power via the AC/DC or via the battery [indicating the battery is either being charged or discharged]).

For test procedure instructions, see the [Battery Parameters Test section, page 7-102](#).

#### **7-2-4-3-6 Tx Voltages Test**

The TX Voltages Test is used to test the transmit part of the power supply to make sure that the Tx voltage is within expected values.

For test procedure instructions, see the [Tx Voltages Test section, page 7-105](#).



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#### 7-2-4-4 BEP Tests

The BEP Tests are performed to check of the various Back End hardware components, as outlined below. The procedures are described in detail in the *Performing Back End Diagnostics on the System* section, on page 7-108.

##### 7-2-4-4-1 Extended Keyboard Test

The Extended Keyboard Test is used to check proper operation of the External Keyboard components (backlighting, keys, ATGC sliders, etc.)

For test procedure instructions, see the [Extended Keyboard Test section, page 7-108](#).

**NOTE:** For instructions on performing the alphanumeric keyboard test, refer to "[Alphanumeric Keyboard Test](#)" on page 4-19.

##### 7-2-4-4-2 ECG Test

The ECG Test is used to check proper operation of the ECG module, checking the output of the ECG and Phono options and testing for any noise introduction into the ECG signal.

For test procedure instructions, see the [ECG Test section, page 7-112](#).

##### 7-2-4-4-3 PC Doctor

The PC Doctor Tests are divided into two main groups: *Automatic* and *Interactive*. The automatic tests do not require user intervention. The procedure instructions for both groups are provided in the [PC Doctor section, page 7-115](#).

- **Automatic**

- **Full Back End Test without Hard Disk**

This test performs a full system check without a Hard Disk scan. The test sequence includes all automatic tests (excluding the Hard Disk).

For test procedure instructions, see the [Full Back End Test w/o Hard Disk Scan section, page 7-115](#).

- **Full PC Doctor Test (50 min)**

The Full PC Doctor Test requires 50 mins (longer than the Full Test without Hard Drive). This test performs a full system check as well as a Hard Disk scan. The test sequence includes all automatic tests (including the Hard Disk).

For test procedure instructions, see the [Full PC Doctor Test \(50 min\) section, page 7-117](#).

- **CPU Tests**

The CPU Tests are used to perform a variety of CPU checks, as described below.

For test procedure instructions, see the [CPU Tests section, page 7-119](#)

- **CPU Full Test:** Performs a battery of tests on the CPU to ensure that it is working properly. All the remaining tests are performed as part of the CPU Test.
- **CPU Registers:** Tests the CPU Registers using the default test patterns. On 32 bit CPUs, the extended registers are also checked. If errors are detected, the failed registers are listed.
- **CPU Arithmetics:** Tests the proper function of the arithmetic commands ADC, ADD, DEC, DIV, IDIV, IMUL, INC, MUL, SBB and SUB with 16 and 32 bit operands. If errors are detected, the failed commands and operands are listed.

- **CPU String Operations:** Tests the proper operation of the string commands LODS, MOVS, SCAS and STOS with 8, 16 and 32 bit operands. If errors are detected, the failed commands and operands are listed.
- **CPU Logical Operations:** Tests the proper operation of the logical operations AND, NOT, OR and XOR with 16 and 32 bit operands. If errors are detected, the failed operands are listed.
- **CPU Math Registers:** Tests the coprocessor register stack, pointers and commands FLDLZ, FLDPI, FLDLN2, FLDLG2M FLDL2T FLDL2E and FLD1. If errors are detected, the failed steps and commands are listed.
- **CPU Math Commands:** Tests the coprocessor commands FBLD/FBSTP, FLD/FST, FXCH, FCOM, FICOM, FTST, FXAM and FUCOM. If errors are detected, the failed instructions are listed.
- **CPU Transcendental:** Tests the coprocessor transcendental commands F2XM1, FPATAN, FPTAN, FYL2XP1, FCOS, FSIN and FSINCOS. If errors are detected, the failed commands are listed.
- **CPU MMX Arithmetic:** Tests the MXX commands PADD, PSUB, PMUL and PMADD. If errors are detected, the failed commands are listed.
- **CPU MMX Logical:** Tests the MXX commands PAND, PANDN, POR and PXOR. If errors are detected, the failed commands are listed.
- **CPU MMX Shift:** Tests the MXX commands PSLL and PSRL. If errors are detected, the failed commands are listed.
- **CPU MMX Data Transfer:** Tests the MXX commands MOVD and MOVQ. If errors are detected, the failed commands are listed.
- **CPU MMX Misc.:** Tests the MXX commands PCMPEQ, PCMPGT, PACKSS, PACKUS and PUNPCK. If errors are detected, the failed commands are listed.

- **HD Test**

The HD Tests are used to perform a variety of Hard Drive checks, as described below.

For test procedure instructions, see the [HD Test section, page 7-122](#).

- **Hard Drive Full Test (w/o Scan):** Performs a battery of tests to examine the hard drive and ensure that it can perform all its functions. All the remaining tests are performed on the hard drive to ensure that the hard disk controller and the drive mechanism are working correctly. The disk surface itself is also checked. This test may take 3.5 minutes.
- **Hard Drive Linear Seek:** Moves the hard disk drive heads from track 0 to the maximum track one track at a time.
- **Hard Drive Funnel Seek:** Moves the hard disk drive heads in a funnel fashion (from the first track to the last, then to the second track, the second last track, the third track and so on).
- **Hard Drive Surface Scan:** Scans the surface for defects on the hard disk drive.

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- **Memory Test**

The Memory Tests are used to perform a variety of memory checks, as described below.

For test procedure instructions, see the [Memory Test section, page 7-124](#).

- **Full Memory Test:** Uses 18 test patterns to test memory locations. If errors are detected, the address of the block in which the error was detected is shown. During testing, these diagnostics will also look for parity errors and other exceptions. If encountered, these are added to the test log as errors.
- **Memory Pattern Test:** Uses several test patterns to test as much memory as possible.
- **Memory Parity Test:** Checks for parity errors on the memory bus during intensive string transfer operation. If an error is detected, the address of the failed block is displayed.

- **Video Test**

The Video Tests are used to perform a variety of video diagnostic tests, as described below. These tests use 18 test patterns to fill the video buffer, testing your graphics acceleration and text output

For test procedure instructions, see the [Video Test section, page 7-126](#).

- **Full Video Test:** Test the system's video capabilities. This involves testing the memory, testing the graphics acceleration and testing the text output. You can follow the tests being performed on the monitor. This test can be cancelled at any time by pressing <Esc> on the keyboard.
- **Video Memory:** Tests the video memory by filling the video buffer with 18 test patterns, one pattern at a time. These tests fill the entire screen with a single color.
- **Video Data Transfer:** Tests the graphics acceleration part of the video controller. This test fills the screen with black and white concentric squares, and rectangles of various sizes and colors. If errors are detected, the locations of the problems are displayed.
- **Video Text Output:** Prints a text string in random sizes and colors to test the video device driver and video controller.

- **PCI Test**

A Peripheral Component Interconnect (PCI) bus is a fast standard bus that is common in Pentium systems. The PCI Test is performed to ensure that the PCI bus is working up to speed. The motherboard is scanned to verify the configuration space and to ensure that the diagnostics can communicate with the board.

For test procedure instructions, see the [PCI Test section, page 7-128](#).

- **Network Test**

A Network Interface Card (NIC) is a computer circuit board or card that is installed in a computer so that it can be connected to a network. Networks are used by businesses and some home users to connect PCs together so that they can share files and resources. Data travels over a network connection much faster than over standard internet connections.

The PC Doctor Network Test will reveal that a network card is present without a driver installed. These cards are likely to not show up on a PC's list of network cards available for test. This may cause the test to return a result of "not applicable", meaning no network cards were found. The test may detect other issues such as electrical interference (noise), circuitry damage, loose connectors, and crimped or bad network cables.

The Network Test will test DSL or cable internet connections, which operate within a network environment. However, this test does not test the DSL or cable modem used for accessing the Internet. Currently, no PC-Doctor test exists for testing cable or DSL modems.

The Network Communications Test checks if your PC's network card works and if your PC properly communicates over a network. It makes a list of all the remote PCs on the network that the NIC uses and sends information in the form of several "data packets" from the tested PC to the "host" PCs. These "data packets" are then returned by the "host" PCs to the tested PC where the contents of the "data packet" are checked. If too many of the "data packets" fail to get returned or are thrown away because of data corruption, the Network test logs as FAILED.

For test procedure instructions, see the [Network Test section, page 7-130](#).

- **Interactive**

- **Audio Test**

The Audio Test is performed to check for proper operation of the audio system; the following selections are available: *Left Channel*, *Right Channel*, *Both Channels*, and *MIDI*.

For test procedure instructions, see the [Audio Test section, page 7-132](#).

- **Monitor Test**

The Monitor Test is used to perform a variety of monitor diagnostic tests, as described below.

- **Combination Test:** Checks the monitor alignment, color depth and monitor resolution. Four cross hairs are placed in each corner of the screen, as well as RGB spectrum arrays and horizontal and vertical alignment bars.
    - **Solid Color Test:** Tests the panel display on laptops and LCD screens. This test display a solid color on the screen to ensure that all the color pixels are operating correctly.
    - **VESA (Video Electronics Standards Association) Test Patterns:** Checks luminance, geometry and focus. These tests are designed for professional measurement use.

For test procedure instructions, see the [Monitor Test section, page 7-134](#).

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## Section 7-3

### Performing Full System Diagnostics

When performing the automatic Full System Diagnostic tests, it is strongly recommended to start with the **Full System Test (FE and BEP)** - especially if the Vivid q N system shows signs of an intermittent problem. As described in this section, the testing sequence can be paused and restarted at any stage, providing a quick and easy method of reviewing any detected faults.

The different types of Full System Diagnostic Tests are described in detail in the *Diagnostic Test Window Menu Options* section, on page 7-10. For instructions on performing each of these tests, refer to the following information:

- ["Full System Test \(FE and BEP\)" on page 7-20](#)

## 7-3-1 Accessing the Full System Diagnostic Options

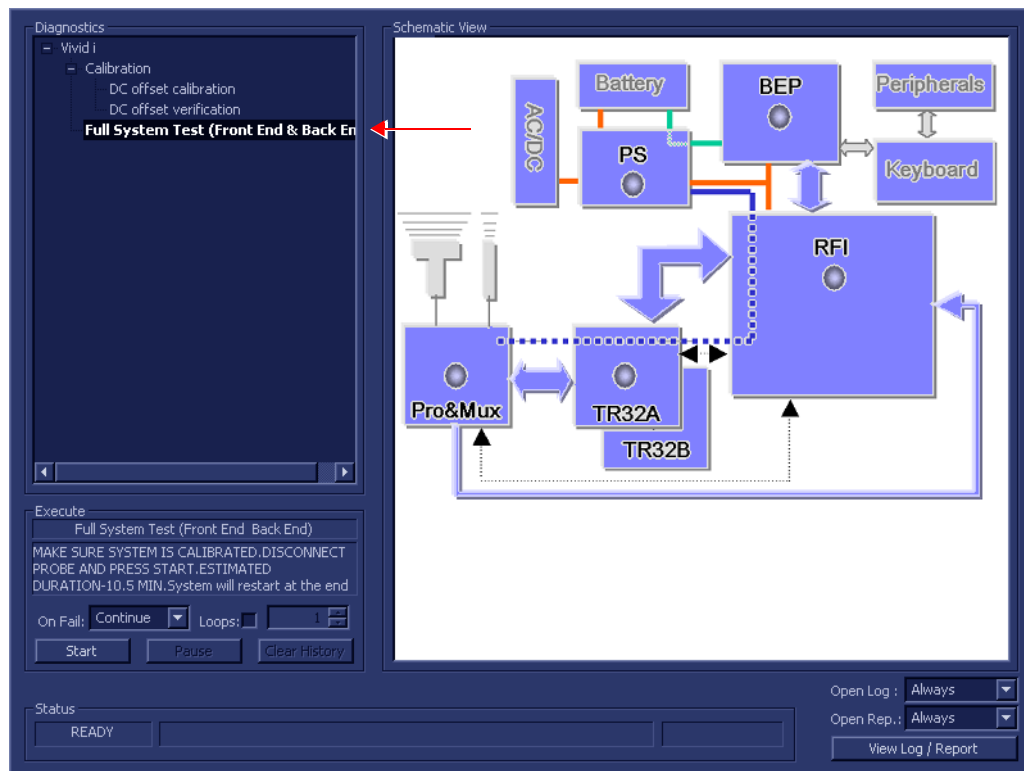
- In 2D-Mode, press **<ALT +Config>** on the alphanumeric keyboard. The *Diagnostic Test* window is displayed, as shown in (Figure 7-1).

### 7-3-1-1 Full System Test (FE and BEP)

**NOTE:** For a description of this test, refer to the "*Full System Test (FE and BEP)*" on page 7-10.

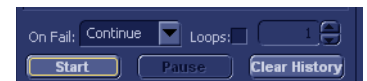
**NOTE:** The *Full System Test (FE and BEP)* performs a full sequence of complete system tests (automatically) and requires approximately 10 minutes for completion.

- In the *Diagnostic Test* window, trackball to **Full System Test (FE and BEP)** in the list of tests available for selection from the Diagnostic Test Tree (see Figure 7-5 below) and press **Set**. The Full System Test (FE and BEP) name is displayed under *Execute*, and all system components are highlighted blue in the Schematic View, as shown below:



**Figure 7-5 Full System (FE and BEP) Test**

- As indicated in the *Special Instructions* area, make sure the system is calibrated and disconnect any probe currently connected to the system.
- Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- Trackball to the **Start** button and press **Set**.



The Automatic Test Sequence commences. While the sequence of automatic testing or the group of tests proceeds, the name of the test currently in progress (Full System Test FE and BEP) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bars in the *Status* area:

---

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full System Test (FE and BEP) sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-6](#).

Figure 7-6 View Test Log - Full System Test (BEP and FE)

File:	Date	Time	Tests	Result	Loop	Reports	Result
1	14/8/2005	14:30:28.552					
2	16/8/2005	10:47:30.475	Full System Test (Front End & Back End)	PASS			
3	16/8/2005	10:55:14.338	Full Front End Test	PASS			
4	22/9/2005	10:43:51.89	Full system Monitoring	PASS			
5	25/9/2005	14:53:23.986	Fixed Voltages	PASS			
6	25/9/2005	15:55:23.539	Temperatures	PASS			
7	26/9/2005	10:8:16.519	Fans Speed	PASS			
			Battery Parameters	PASS			
			DC offset verification	PASS			
			Full RFI Test	PASS			
			RFI FE Cache Test	PASS			
			RFI Demodulator short Test	PASS			
			RFI Analog circuits Test	PASS			
			RFI Audio Test	PASS			
			Digital Tests	PASS			
			TR32 BF digital test	PASS			
			System BF digital test	PASS			
			Analog Tests	PASS			
			ADC test	PASS			
			Rx Test	PASS			
			ACW Tests	PASS			
			ACW IQ Symmetry test	PASS			
			ACW Matrix test	PASS			
			ACW Delay range test	PASS			
			ACW Pre Mixer Gain test	PASS			
			ACW BPF test	PASS			
			ACW HPF test	PASS			
			Pencil Rx Test	PASS			
			ACW Delay range test	PASS			
			ACW Pre Mixer Gain test	PASS			
			ACW BPF test	PASS			
			ACW HPF test	PASS			
			Pencil Rx Test	PASS			
			Full Back End Test w/o HD Scan	PASS			
			CPU Full Test	PASS			
			Registers	PASS			
			Arithmetics	PASS			
			String Operations	PASS			
			Logical Operations	PASS			
			Math Registers	PASS			
			Math Commands	PASS			
			Math Arithmetics	PASS			
			Transcendental	PASS			
			MMX Arithmetics	PASS			
			MMX Logical	PASS			
			MMX Shift	PASS			
			MMX Data Transfer	PASS			
			MMX Misc	PASS			
			HD Full Test w/o Scan	PASS			
			Linear Seek	PASS			
			Random Seek	PASS			
			Funnel Seek	PASS			
			Full Memory Test	PASS			
			Pattern Test	PASS			
			Parity Test	PASS			
			Full Video Test	PASS			
			Video Memory	PASS			
			Data Transfer	PASS			
			Text Output	PASS			
			PCI Test	PASS			
			Network Test	PASS			
			Restart	PASS			

8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.



---

9) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE Medical Systems On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## Section 7-4

### Performing Front End (FE) Diagnostics

**NOTE:** When performing Front End Diagnostic tests, it is strongly recommended to start with the **Full System Test (FE and BEP)** especially if the system shows signs of an intermittent problem. (For details, see ["Full System Test \(FE and BEP\)" on page 7-20](#)).

The Front End diagnostic tests can be initiated manually and may be performed in any order. However, due to the functional dependencies between each of the Front End boards, it is recommended to perform the tests on the boards in the following order:

- 1.) RFI board
- 2.) TR32 boards
- 3.) PM board

Performing the tests in the proper sequence will help to derive the correct conclusions regarding the source of the problem.

As described in this section, the testing sequence can be paused and restarted at any stage, providing a quick and easy method of reviewing any detected faults. For instructions on performing a specific test, refer to the relevant test in the appropriate sub-sections:

- **Calibration Tests**, as described in the *Calibration Tests* section, on page 7-25.
- **RFI Diagnostic Tests**, as described in the *Radio Frequency Interface (RFI) Diagnostic Tests* section, on page 7-31.
- **TR 32 Diagnostic Tests**, as described in the *TR 32 Diagnostic Tests* section, on page 7-46.
- **Probe & MUX Diagnostic Tests**, as described in the *Probe and MUX Diagnostic Tests* section, on page 7-61.

**NOTE:** If the system must be re-booted, do so. Continue testing from the point at which you were required to reboot. If a failure occurs, re-boot the system and test again to verify the outcome of the test.

## 7-4-1 Accessing the Front End Diagnostic Options

- In 2D-Mode, press **<ALT +Config>** on the alphanumeric keyboard. The *Diagnostic Test* window is displayed, as shown in (Figure 7-1).

## 7-4-2 Calibration Tests

### 7-4-2-1 DC Offset Calibration

**NOTE:** For a description of this test, refer to the information provided in "DC Offset Calibration" on page 7-11.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- In the *Diagnostic Test* window, trackball to **DC Offset Calibration** in the list of *Front End* tests available for selection from the Diagnostic Test Tree (see Figure 7-7 below) and press **Set**. The DC Offset Calibration name is displayed under *Execute*; the relevant system components to be tested (in this case, all components) are highlighted light blue in the Schematic View as shown below:

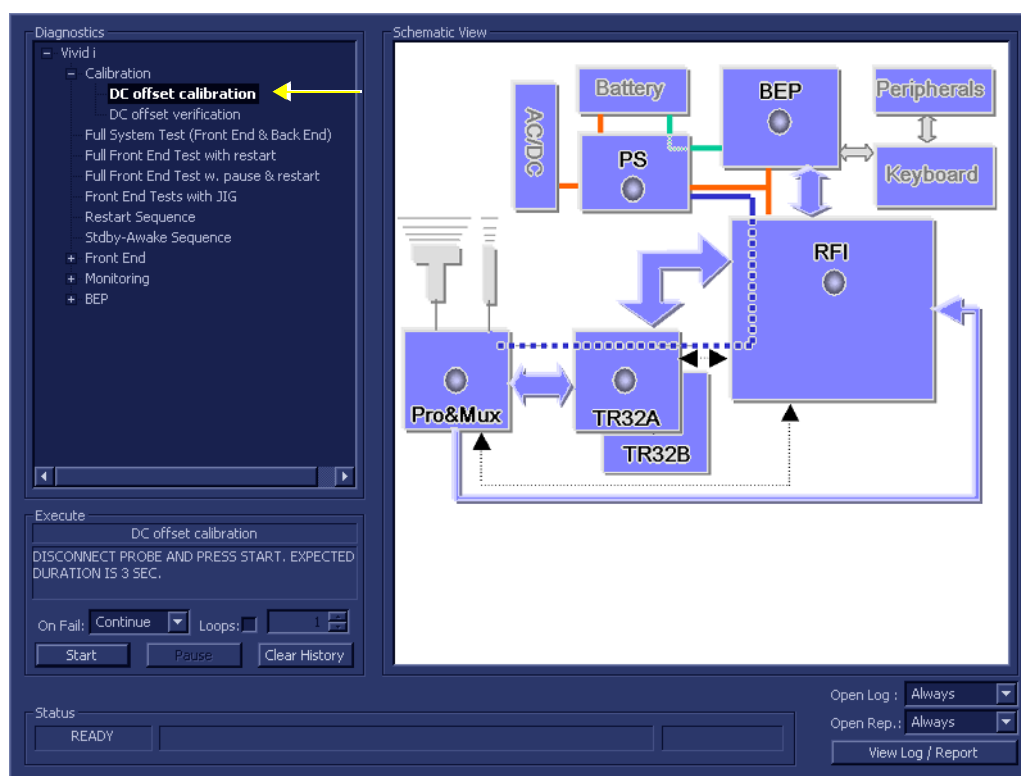


Figure 7-7 DC Offset Calibration Test

- As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- Trackball to the **Start** button and press **Set**.



The DC Offset Calibration Test commences. While the test proceeds, the name of the test currently in progress (DC Offset Calibration) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

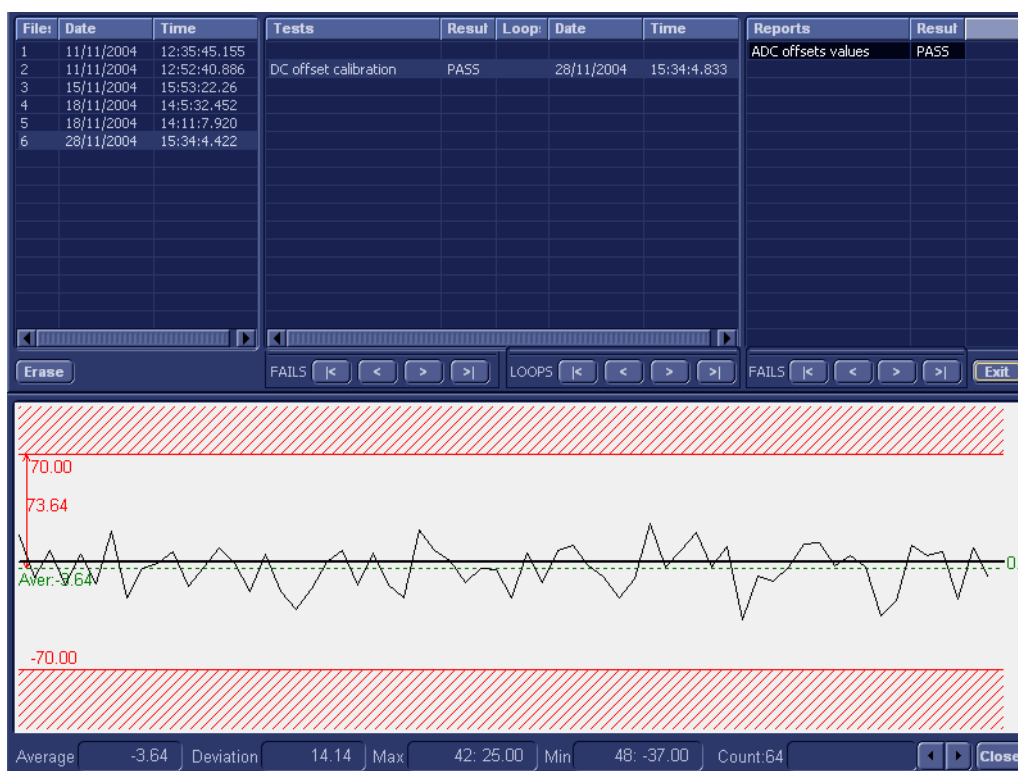
6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the DC Offset Calibration Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing the test performed and showing whether it passed or failed, as shown in the example in [Figure 7-8](#).

**Figure 7-8 View Test Log - DC Offset Calibration**



**NOTE:** There is one test report (ADC Offset values) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 
- 8.) Use the scroll arrows at the bottom of the Reports window (see [Figure 7-8](#)) to scroll through the channels and view the corresponding results.
  - 9) When done, trackball to the **Close** button and press **Set** to close the View Report window.
  - 10) After reviewing the test results, proceed as follows:
    - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
    - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
    - If errors were identified but the results were very close to the upper or lower limits, repeat the [DC Offset Calibration](#) test again and review the newly-acquired results.
    - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE Medical Systems On-Line Center for assistance.
  - 11.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
  - 12.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

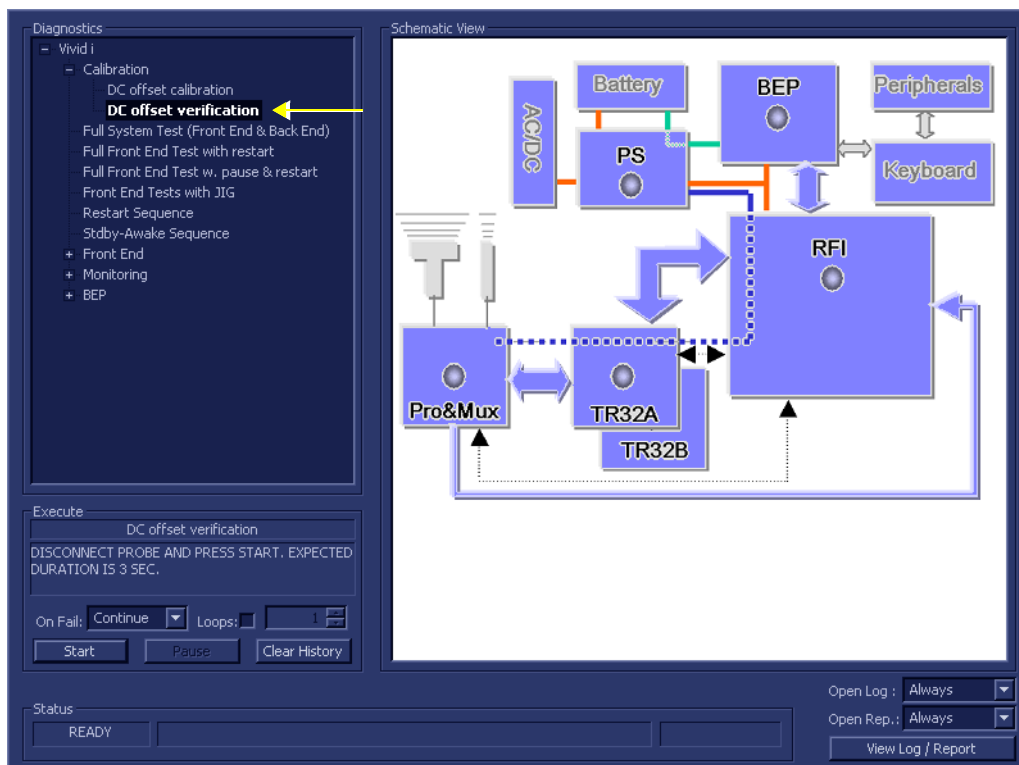
## 7-4-2-2 DC Offset Verification

**NOTE:** For a description of this test, refer to the information provided in ["DC Offset Verification" on page 7-11](#).

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **DC Offset Verification** in the list of tests available for selection from the Diagnostic Test Tree (see [Figure 7-9 below](#)) and press **Set**. The DC Offset Verification name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (PM, TR32 and RFI boards), as shown below:

**Figure 7-9 DC Offset Verification Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.



The DC Offset Verification Test commences. While the test proceeds, the name of the test currently in progress (DC Offset Verification) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

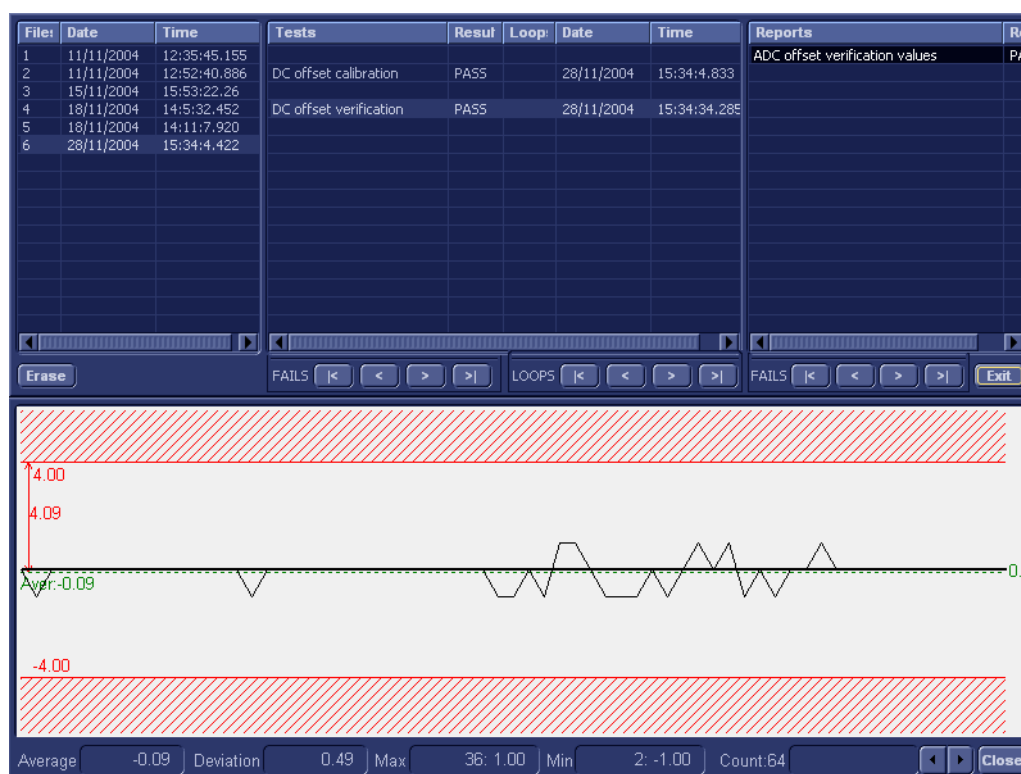
6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the DC Offset Verification Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-10](#).

**Figure 7-10 View Test Log - DC Offset Verification Test**



8.) If necessary, use the scroll bars and/or arrows to scroll through the list of Test results.

**NOTE:** For this test, there is one report (ADC Offset verification values) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

9.) Use the scroll arrows at the bottom of the Reports window (see [Figure 7-10](#)) to scroll through the channels and view the corresponding results.

10) When done, trackball to the **Close** button and press **Set** to close the View Report window.

11) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

**NOTE:** *In the event that the surrounding temperature is above 38°C, the DC Offset Verification Test may fail. Upper/lower test limits of  $\pm 10$  (instead of  $\pm 5$ ) are acceptable.*

12.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

13.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.



## 7-4-3 Radio Frequency Interface (RFI) Diagnostic Tests

### 7-4-3-1 Accessing the RFI Diagnostic Test Options

- Access the *Diagnostic Test* window, as described in the *Accessing the Front End Diagnostic Options* section, on page 7-25.

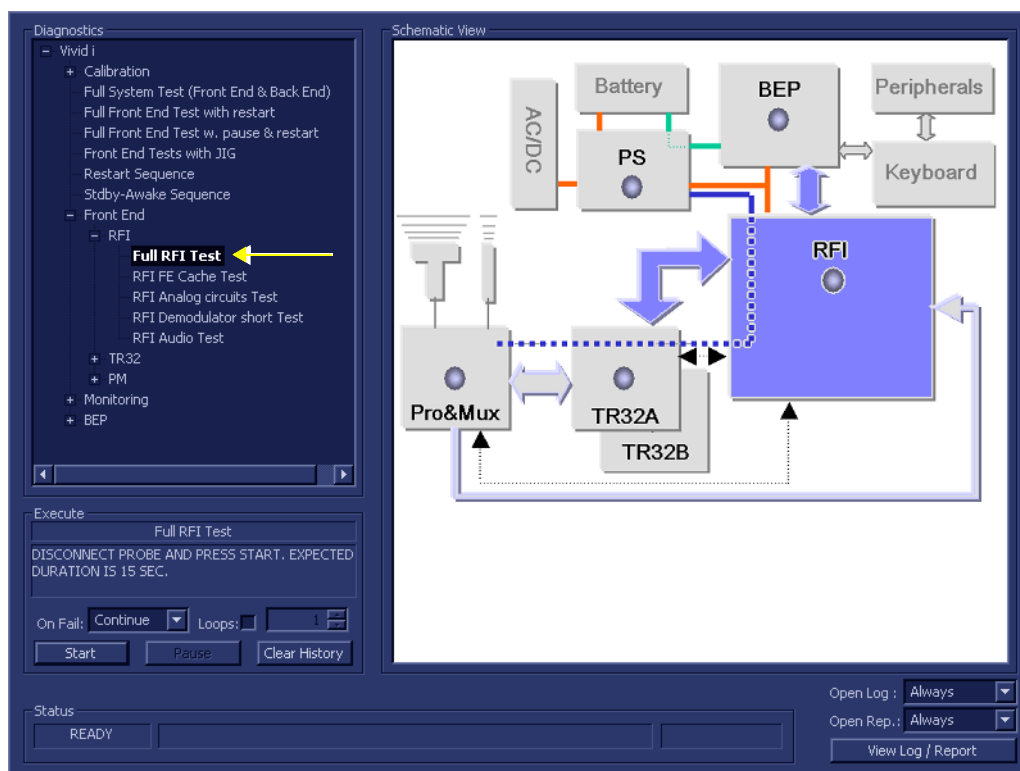
### 7-4-3-2 Full RFI Test

**NOTE:** For a description of this test, refer to the information provided in "*Full RFI Test*" on page 7-11.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- In the *Diagnostic Test* window, trackball to **Full RFI Test** in the list of *RFI* tests available for selection from the Diagnostic Test Tree (see Figure 7-11 below) and press **Set**. The Full RFI Test name is displayed under *Execute*; the relevant system component to be tested is highlighted light blue in the Schematic View (RFI), as shown below:

**Figure 7-11 Full RFI Test**



- As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- Trackball to the **Start** button and press **Set**.

The Full RFI Test commences. While the test proceeds, the name of the test currently in progress (Full RFI Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown

below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. The LED on the RFI status indicator in the Data Flow map will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full RFI Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in the example in [Figure 7-12](#).

**Figure 7-12 View Test Log - Full RFI Test**

File:	Date	Time	Tests	Result	Loop	Date	T	Reports	Result
1	11/11/2004	12:35:45.155							
2	11/11/2004	12:52:40.886	DC offset calibration	PASS		28/11/2004	1		
3	15/11/2004	15:53:22.26							
4	18/11/2004	14:5:32.452	DC offset verification	PASS		28/11/2004	1		
5	18/11/2004	14:11:7.920							
6	28/11/2004	15:34:4.422	Full RFI Test	PASS		28/11/2004	1		
			RFI FE Cache Test	PASS		28/11/2004	1		
			RFI Demodulator short Test	PASS		28/11/2004	1		
			RFI Analog circuits Test	PASS		28/11/2004	1		
			RFI Audio Test	PASS		28/11/2004	1		

8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.

**NOTE:** For the Full RFI test, four tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-12](#). For each currently-selected test (for example, RFI FE Cache Test) the corresponding report is listed in Reports on the right. For details of each report, refer to the following explanations:

- ["View Test Log - RFI Cache Test" on page 7-35](#)
- ["View Test Log - RFI Demodulator Short Test" on page 7-41](#)
- ["View Test Log - RFI Analog Circuits Test" on page 7-38](#)
- ["View Test Log - RFI Audio Test" on page 7-44](#)

9) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

---

10) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

11.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

12.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

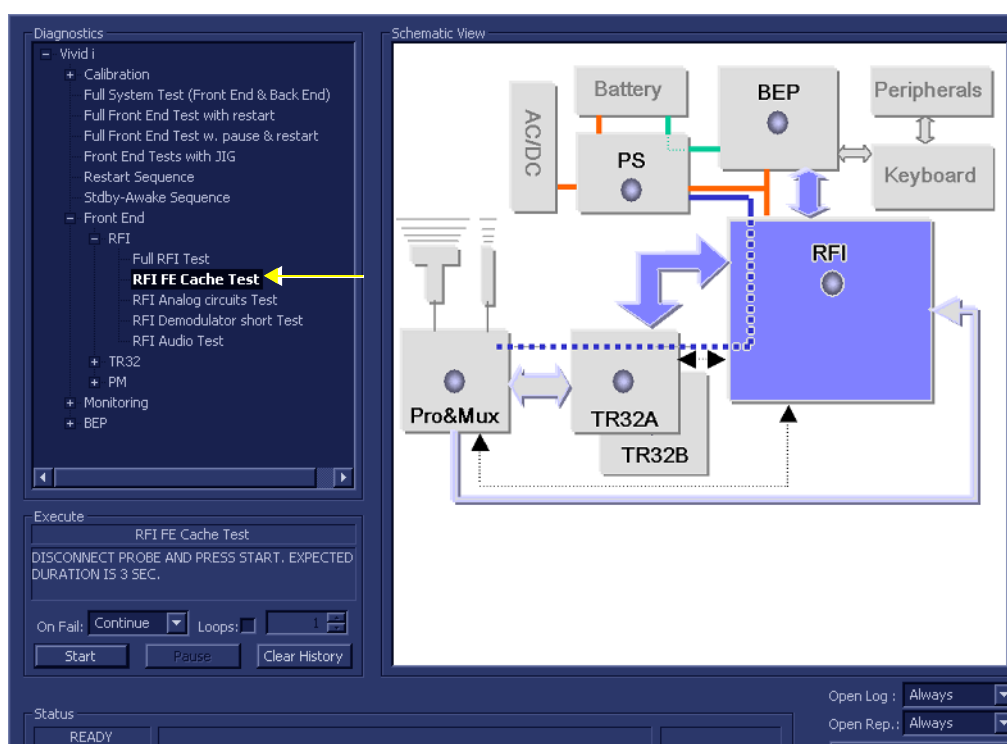
### 7-4-3-3 RFI FE Cache Test

**NOTE:** For a description of this test, refer to the information provided in "RFI FE Cache Test" on page 7-11.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **RFI FE Cache Test** in the list of *RFI* tests available for selection from the Diagnostic Test Tree (see Figure 7-9 below) and press **Set**. The RFI FE Cache Test name is displayed under *Execute*; the relevant system component to be tested remain highlighted light blue in the Schematic View (RFI), as shown below:

**Figure 7-13 RFI FE Cache Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.



The RFI FE Cache Test commences. While the test proceeds, the name of the test currently in progress (RFI FE Cache Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. The LED on the RFI status indicator in the Data Flow map will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 6.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.
- When the RFI FE Cache Test sequence is complete
- the *Diagnostic Test* window displays the Finished message
  - the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-14](#).
- 8.) If necessary, use the scroll bars and/or arrows to scroll through the list of Test results.

Figure 7-14 View Test Log - RFI Cache Test

File:	Date	Time	Tests	Result	Loop	Date	T	Reports	Result
1	11/11/2004	12:35:45.155						FE Cache test report	PASS
2	11/11/2004	12:52:40.886	DC offset calibration	PASS		28/11/2004	1		
3	15/11/2004	15:53:22.26							
4	18/11/2004	14:53:22.452	DC offset verification	PASS		28/11/2004	1		
5	18/11/2004	14:11:7.920							
6	28/11/2004	15:34:4.422	Full RFI Test	PASS		28/11/2004	1		
			RFI FE Cache Test	PASS		28/11/2004	1		
			RFI Demodulator short Test	PASS		28/11/2004	1		
			RFI Analog circuits Test	PASS		28/11/2004	1		
			RFI Audio Test	PASS		28/11/2004	1		
			RFI FE Cache Test	PASS		28/11/2004	1		

Erase		FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
-------	--	-------	---	---	-------	---	---	-------	---	---	------

FE Cache test report											Exit
ATGC RAM - passed Test Generator RAM - passed Front End Bus test - passed BF Cache test - passed TX Cache test - passed TX1 TPG test - passed TX1 Cache -> TPG Transfer Test - passed											

**NOTE:** For this test, there is one report (FE Cache Test report) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 9) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

10) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

11.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

12.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

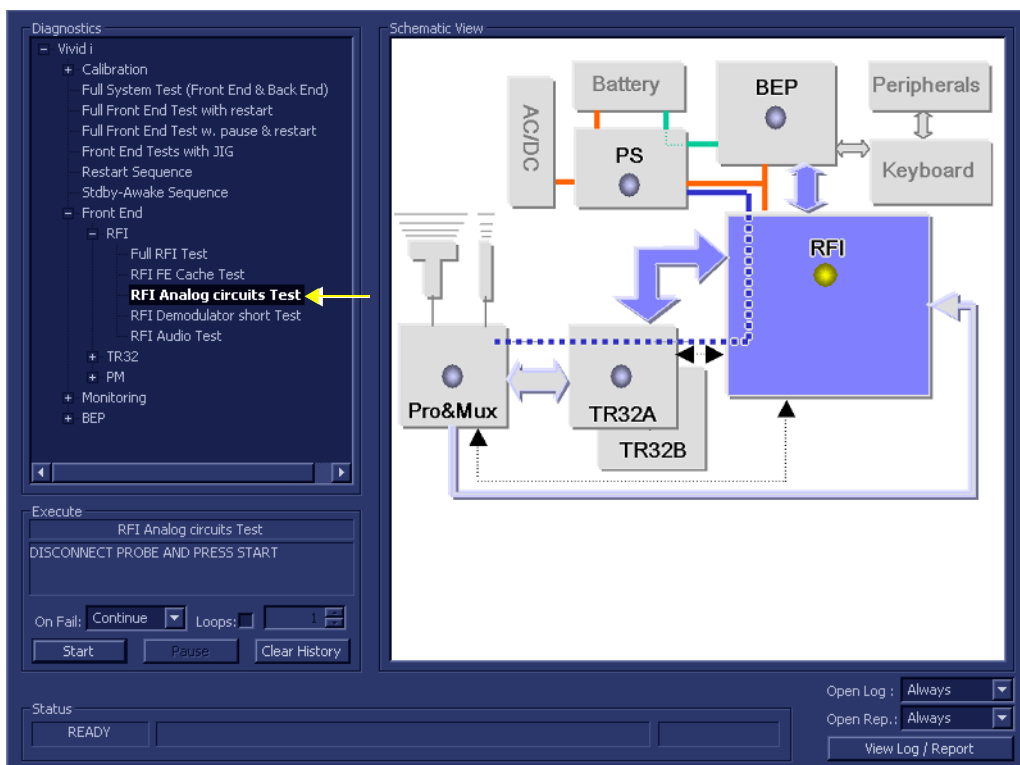
#### 7-4-3-4 RFI Analog Circuits Test

**NOTE:** For a description of this test, refer to the information provided in "RFI Analog Circuits Test" on page 7-11.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **RFI Analog Circuits Test** in the list of *RFI* tests available for selection from the Diagnostic Test Tree (see Figure 7-15 below) and press **Set**. The RFI Analog Circuits Test name is displayed under *Execute*; the relevant system component to be tested are highlighted light blue in the Schematic View (RFI), as shown below:

**Figure 7-15 RFI Analog Circuits Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.



The RFI Analog Circuits Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. The LED on the RFI status indicator in the Data Flow map will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the RFI Analog Circuits Test sequence is complete,

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-16](#).

**Figure 7-16 View Test Log - RFI Analog Circuits Test**

File:	Date	Time	Tests	Result	Loop:	Date	T	Reports	Result
1	11/11/2004	12:35:45.155	DC offset calibration	PASS		28/11/2004	1	Analog circuits test report	PASS
2	11/11/2004	12:52:40.886							
3	15/11/2004	15:53:22.26	DC offset verification	PASS		28/11/2004	1		
4	18/11/2004	14:53:32.452	Full RFI Test	PASS		28/11/2004	1		
5	18/11/2004	14:11:7.920	RFI FE Cache Test	PASS		28/11/2004	1		
6	28/11/2004	15:34:4.422	RFI Demodulator short Test	PASS		28/11/2004	1		
			RFI Analog circuits Test	PASS		28/11/2004	1		
			RFI Audio Test	PASS		28/11/2004	1		
			RFI FE Cache Test	PASS		28/11/2004	1		
			RFI Analog circuits Test	PASS		28/11/2004	1		

Analog circuits test report		Exit
<p>Analog signals - WaveSize=798, PSC0=0, real freq=50062.578125</p> <p>Test ATGC generator passed - atgcvp at min setup is 52 [48-53]</p> <p>Test ATGC generator passed - atgcvn at min setup is 178 [175-184]</p> <p>Test ATGC generator passed - atgcvp at max setup is 180 [175-184]</p> <p>Test ATGC generator passed - atgcvn at max setup is 51 [48-53]</p> <p>Test 37.4 Deg/C (TEE_TEMPOK high) ... passed</p> <p>Test 37.4 Deg/C (t=37.338776 C) ... passed</p> <p>Test low threshold (v=3.705882 V exp. 3.68 V) ... passed</p> <p>Test 42.5 Deg/C (TEE_TEMPOK high) ... passed</p> <p>Test 42.5 Deg/C (TEE_TEMPOK low) ... passed</p> <p>Test 42.5 Deg/C (t=42.351307 C) ... passed</p> <p>Test high threshold (v=3.901961 V exp. 3.89 V) ... passed</p> <p>Test 44.3 Deg/C (TEE_TEMPOK low) ... passed</p> <p>Test 44.3 Deg/C (t=44.415295 C) ... passed</p> <p>Test doppler probe ID (val=174, exp. 174) ... passed</p> <p>Analog signals - passed</p> <p>I2C bus PCF1 - I2C prom not detected in probe connector 0</p> <p>I2C prom not detected in probe connector 1</p> <p>I2C prom not detected in probe connector 2</p> <p>I2C prom not detected in probe connector 3</p> <p>I2C bus PCF1 - passed</p>		

8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.

**NOTE:** For this test, there is one report (*Analog Circuits Test report*) which is listed in *Reports* on the right. By default, this report is displayed in the *Reports* window below ([Figure 7-16](#)). Use the *Report* window scroll bars and/or arrows to scroll through complete report if necessary.

9) When done, trackball to the **Exit** button and press **Set** to close the View Report window.



---

10) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

11.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

12.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

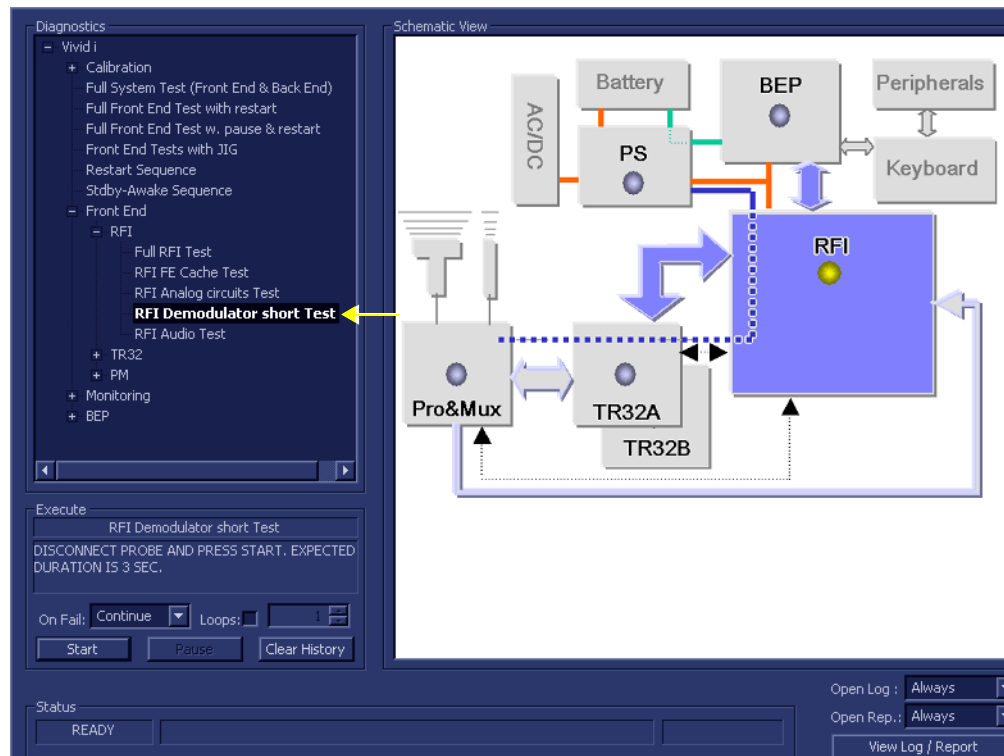
## 7-4-3-5 RFI Demodulator Short Test

**NOTE:** For a description of this test, refer to the information in ["RFI Demodulator Short Test" on page 7-11](#).

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **RFI Demodulator Short Test** in the list of *RFI* tests available for selection from the Diagnostic Test Tree (see [Figure 7-17 below](#)) and press **Set**. The RFI Demodulator Short Test name is displayed under *Execute*; the relevant system component to be tested are highlighted light blue in the Schematic View (RFI), as shown below:

**Figure 7-17 RFI Demodulator Short Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.

The RFI Demodulator Short Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. The LED on the RFI status indicator in the Data Flow map will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 6.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the RFI Demodulator Short Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-18](#).

**Figure 7-18 View Test Log - RFI Demodulator Short Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Re
1	11/11/2004	12:35:45.155	DC offset verification	PASS		28/11/2004	Demodulator Short test report	PA
2	11/11/2004	12:52:40.886						
3	15/11/2004	15:53:22.26	Full RFI Test	PASS		28/11/2004		
4	18/11/2004	14:53:32.452	RFI FE Cache Test	PASS		28/11/2004		
5	18/11/2004	14:11:17.920	RFI Demodulator short Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	RFI Analog circuits Test	PASS		28/11/2004		
			RFI Audio Test	PASS		28/11/2004		
			RFI FE Cache Test	PASS		28/11/2004		
			RFI Analog circuits Test	PASS		28/11/2004		
			RFI Demodulator short Test	PASS		28/11/2004		

Demodulator Short test report	
access test - passed	
version test - DEMOD Version = 0x1784	
CED is NOT installed on this board	
version test - passed	
ROI test (ROI=0.10) - passed	
ROI test wide out (ROI=0.10) - passed	
Processing test (constant TGC) - passed	
Processing test (default) - passed	
Processing test (use_equal) - passed	
Processing test (!swapCoefs) - passed	
Processing test (iDec=4) - passed	
Processing test (iDec=1) - passed	
Processing test (iDec=16) - passed	
Processing test (wide out) - passed	
Processing test (tgc_equal) - passed	
Processing test (cordic) - passed	
Processing test case 1 - passed	
Processing test case 2 - passed	
32 bit fast access - passed	

- 8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.

**NOTE:** For this test, there is one report (Demodulator Short Test report) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below ([Figure 7-18](#)). Use the Report window scroll bars and/or arrows to scroll through complete report if necessary.

- 9) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

10) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

11.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

12.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

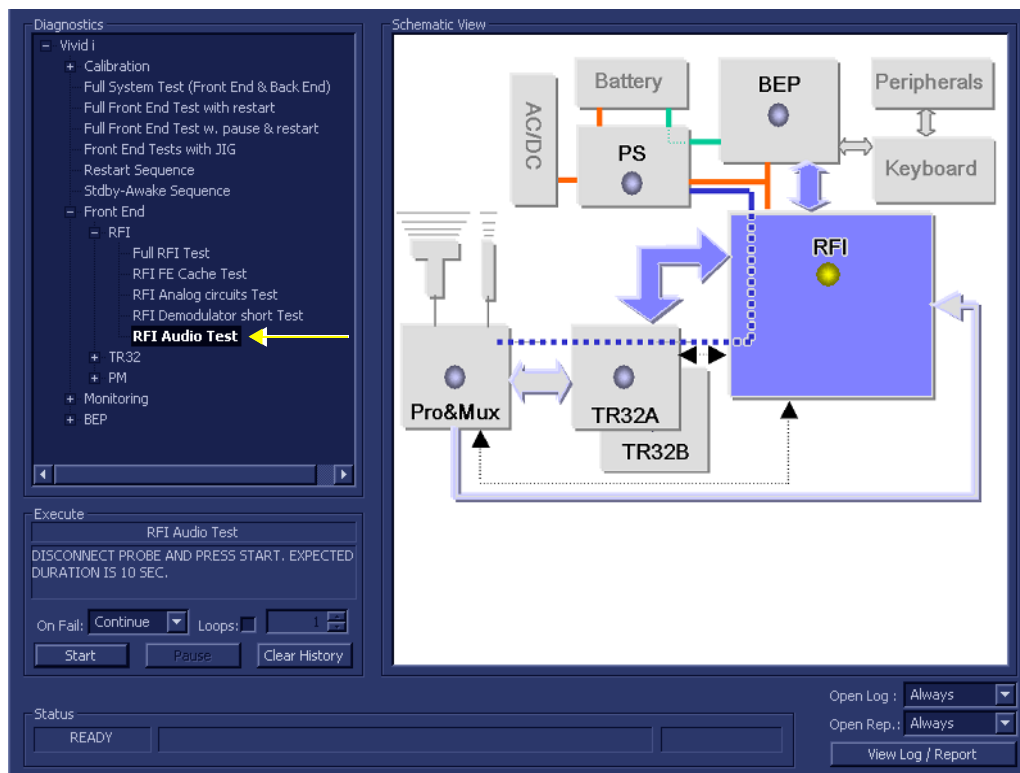
## 7-4-3-6 RFI Audio Test

**NOTE:** For a description of this test, refer to the information provided in ["RFI Audio Test" on page 7-12](#).

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **RFI Audio Test** in the list of *RFI* tests available for selection from the Diagnostic Test Tree (see [Figure 7-9 below](#)) and press **Set**. The RFI Audio Test name is displayed under *Execute*; the relevant system component to be tested is highlighted light blue in the Schematic View (RFI), as shown below:

**Figure 7-19 RFI Audio Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.

The RFI Audio Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:



As the testing sequence progresses, the progress bar will advance to reflect the test progress. The LED on the RFI status indicator in the Data Flow map will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

When the *upper* progress bar reaches approximately midway in the *Status* area, a loud, high-pitched sound will be heard coming from the speakers.

**NOTE:** *If no sound is heard, it is necessary to perform the BEP Audio Test as described in "Audio Test" on page 7-132. In the event this test also fails, the problem is probably in the BEP - refer to "Performing Back End Diagnostics on the System" on page 7-108.*

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the RFI Audio Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-20](#).

**Figure 7-20 View Test Log - RFI Audio Test**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	Full RFI Test	PASS		28/11/2004	Audio test report	PASS
3	15/11/2004	15:53:22.26	RFI FE Cache Test	PASS		28/11/2004		
4	18/11/2004	14:5:32.452	RFI Demodulator short Test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	RFI Analog circuits Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	RFI Audio Test	PASS		28/11/2004		
			RFI FE Cache Test	PASS		28/11/2004		
			RFI Analog circuits Test	PASS		28/11/2004		
			RFI Demodulator short Test	PASS		28/11/2004		
			RFI Audio Test	PASS		28/11/2004		

Audio test report		Exit
All audio signals - passed		

**NOTE:** *For this test, this one report (Demodulator Short Test report) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below, as shown in the example in [Figure 7-20](#).*

- 8) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

## 7-4-4 TR 32 Diagnostic Tests

**NOTE:** The TR32 Diagnostic Tests are used to perform functional testing of both the TR32A and TR32 boards.

### 7-4-4-1 Accessing the TR32 Diagnostic Test Options

- Access the *Diagnostic Test* window, as described in the *Accessing the Front End Diagnostic Options* section, on page 7-25.

### 7-4-4-2 Beamformer Tests

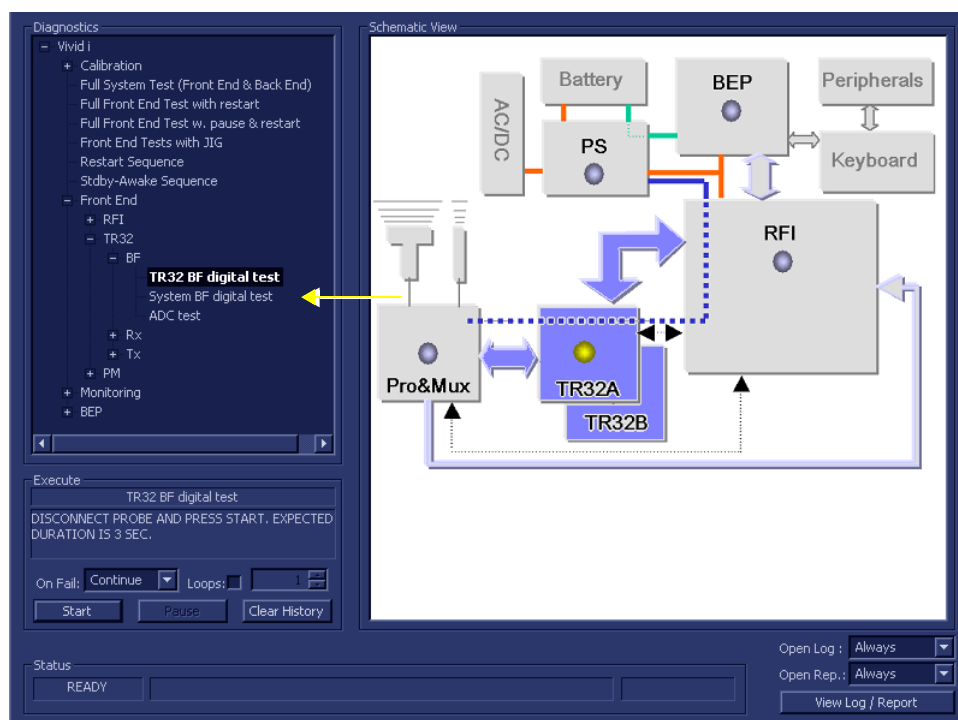
#### 7-4-4-2-1 TR32 BF Digital Test

**NOTE:** For a description of this test, refer to the information in *"TR32 BF Digital Test"* on page 7-12.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- In the *Diagnostic Test* window, trackball to **TR32 BF Digital Test** in the list of TR32, BF tests available for selection from the Diagnostic Test Tree (see [Figure 7-21 below](#)) and press **Set**. The TR32 BF Digital Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (TR32A and TR32B), as shown below:

**Figure 7-21 TR32 BF Digital Test**



- As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.





- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.

The TR32 BF Digital Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area:

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 6.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the TR32 BF Digital Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-22](#).

**Figure 7-22 View Test Log - TR32 BF Digital Test (MLA0)**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	RFI FE Cache Test	PASS		28/11/2004	MLA0 test results	PASS
2	11/11/2004	12:52:40.886	RFI Demodulator short Test	PASS		28/11/2004	MLA1 test results	PASS
3	15/11/2004	15:53:22.26	RFI Analog circuits Test	PASS		28/11/2004		
4	18/11/2004	14:53:32.452	RFI Audio Test	PASS		28/11/2004		
5	18/11/2004	14:11:17.920						
6	28/11/2004	15:34:4.422						
			RFI FE Cache Test	PASS		28/11/2004		
			RFI Analog circuits Test	PASS		28/11/2004		
			RFI Demodulator short Test	PASS		28/11/2004		
			RFI Audio Test	PASS		28/11/2004		
			TR32 BF digital test	PASS		28/11/2004		

Erase		FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
-------	--	-------	---	---	-------	---	---	-------	---	---	------

MLA0 test results											Exit
BF Digital test for channels of TR32-A MLA0 PASSED BF Digital test for channels of TR32-B MLA0 PASSED											

- 8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.

**NOTE:** For this test, there are two reports (MLA0 and MLA1) which is listed in Reports on the right. By default, the MLA0 report is displayed in the Reports window below, showing the results for both the TR32A and TR32B boards ([Figure 7-22](#)).

- 9.) To view the MLA1 test results in the Report window, select MLA1 test results under *Reports*.

The MLA1 report is displayed in the Reports window below:

**Figure 7-23 View Test Log - TR32 BF Digital Test (MLA1)**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	TR32 BF digital test	PASS		28/11/2004	MLA0 test results	PASS
2	11/11/2004	12:52:40.886					MLA1 test results	PASS
3	15/11/2004	15:53:22.26	System BF digital test	PASS		28/11/2004		
4	18/11/2004	14:53:32.452	ADC test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Rx Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Rx Test with JIG	PASS		28/11/2004		
			Chain Test with JIG	PASS		28/11/2004		
			Tx clamp Test with JIG	PASS		28/11/2004		
			MUX Test with JIG	FAIL		28/11/2004		

Eraser FAILS < > >| LOOPS < > >| FAILS < > >| Exit

MLA1 test results Exit

BF Digital test for channels of TR32-A MLA1 PASSED  
BF Digital test for channels of TR32-B MLA1 PASSED

- 10) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

- 11) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

- 12.)Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

- 13.)Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

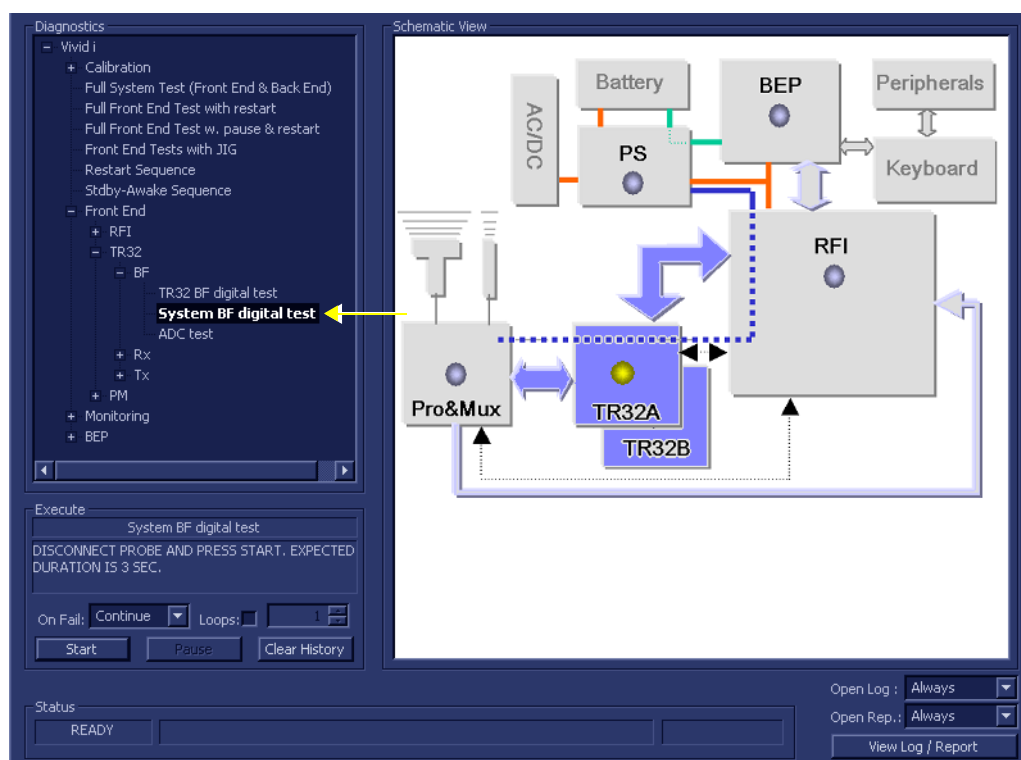
## 7-4-4-2-2 System BF Digital Test

**NOTE:** For a description of this test, refer to the information in "System BF Digital Test" on page 7-12.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **System BF Digital Test** in the list of *TR32, BF* tests available for selection from the Diagnostic Test Tree (see Figure 7-9 below) and press **Set**. The System BF Digital Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (TR32A, TR32B), as shown below:

Figure 7-24 System BF Digital Test



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.

The System BF Digital Test commences. While the test proceeds, the name of the test currently in progress (System BF Digital Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the System BF Digital Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-25](#).

**Figure 7-25 View Test Log - System BF Digital Test (MLA0)**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	RFI Analog circuits Test	PASS		28/11/2004	MLA0 test results	PASS
2	11/11/2004	12:52:40.886	RFI Audio Test	PASS		28/11/2004	MLA1 test results	PASS
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452	RFI FE Cache Test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	RFI Analog circuits Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	RFI Demodulator short Test	PASS		28/11/2004		
			RFI Audio Test	PASS		28/11/2004		
			TR32 BF digital test	PASS		28/11/2004		
			System BF digital test	PASS		28/11/2004		

MLA0 test results		Exit
System BF Digital test MLA0 PASSED		

8.) If necessary, use the scroll bars and/or arrows to scroll through the list of *Test* results.

**NOTE:** For this test, there are two reports (MLA0 and MLA1) which is listed in Reports on the right. By default, the MLA0 report is displayed in the Reports window below ([Figure 7-25](#)).

9.) To view the MLA1 test results, select MLA1 test results under *Reports*.

The MLA1 test results are displayed in the Report Window, as shown below.

Figure 7-26 View Test Log - System BF Digital Test (MLA1)

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	TR32 BF digital test	PASS		28/11/2004	MLA0 test results	PASS
2	11/11/2004	12:52:40.886					MLA1 test results	PASS
3	15/11/2004	15:53:22.26	System BF digital test	PASS		28/11/2004		
4	18/11/2004	14:53:24.452	ADC test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Rx Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Rx Test with JIG	PASS		28/11/2004		
			Chain Test with JIG	PASS		28/11/2004		
			Tx clamp Test with JIG	PASS		28/11/2004		
			MUX Test with JIG	FAIL		28/11/2004		

MLA1 test results

System BF Digital test MLA1 PASSED

10) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

11) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

12.)Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

13.)Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

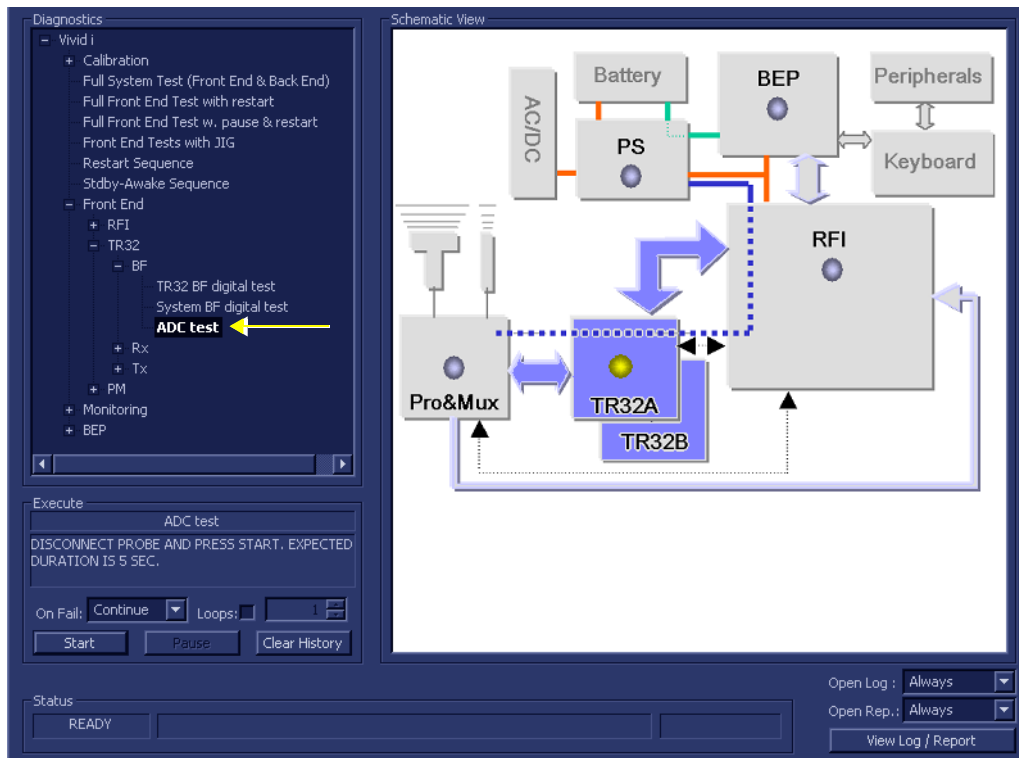
### 7-4-4-2-3 ADC Test

**NOTE:** For a description of this test, refer to the information in "ADC Test" on page 7-12.

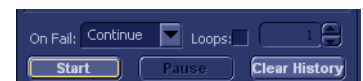
**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **ADC Test** in the list of *TR32, BF* tests available for selection from the Diagnostic Test Tree (see Figure 7-9 below) and press **Set**. The ADC Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (TR32A, TR32B), as shown below:

**Figure 7-27 ADC Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required.  
Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.



The ADC Test commences. While the test proceeds, the name of the test currently in progress (ADC Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

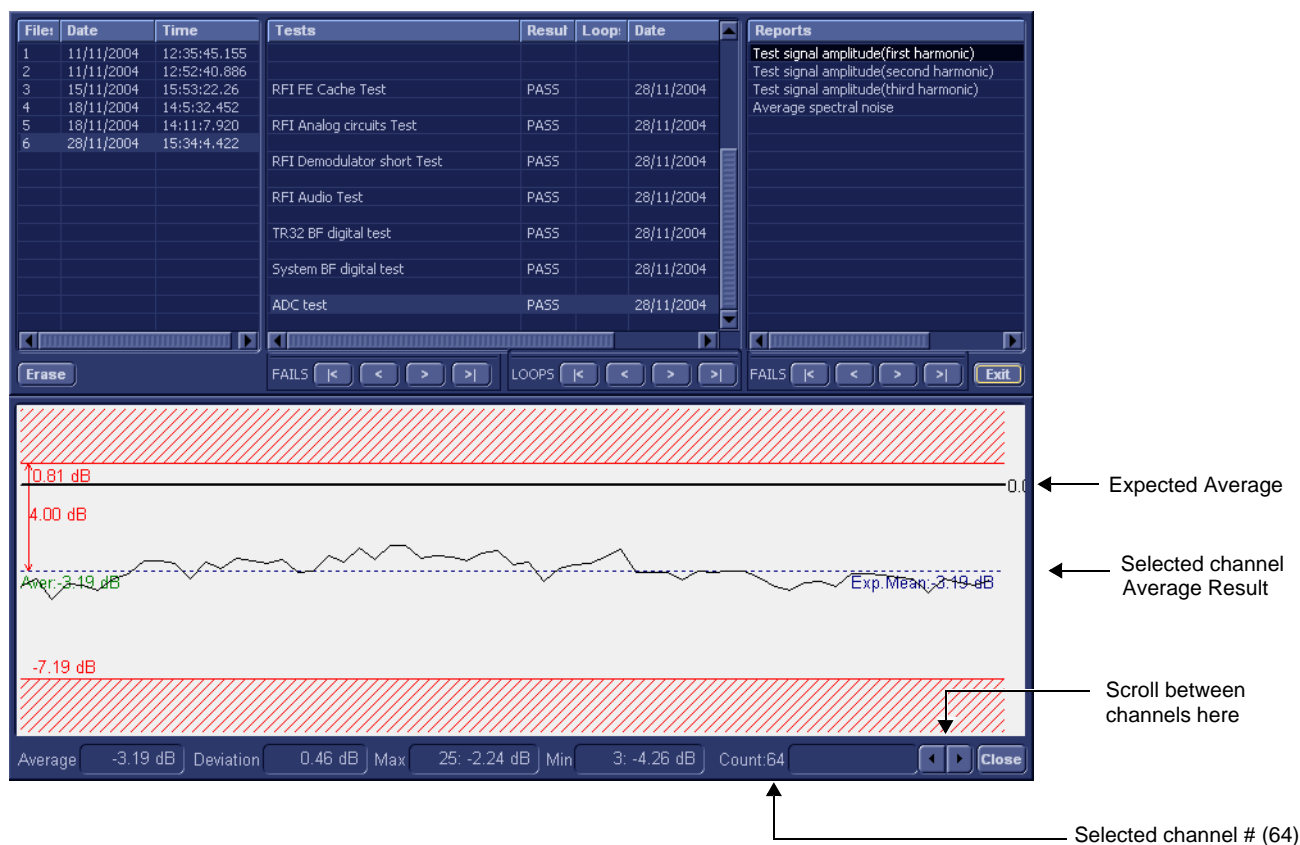
6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ADC Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-28](#).

**Figure 7-28 View Test Log - First Harmonic Report**



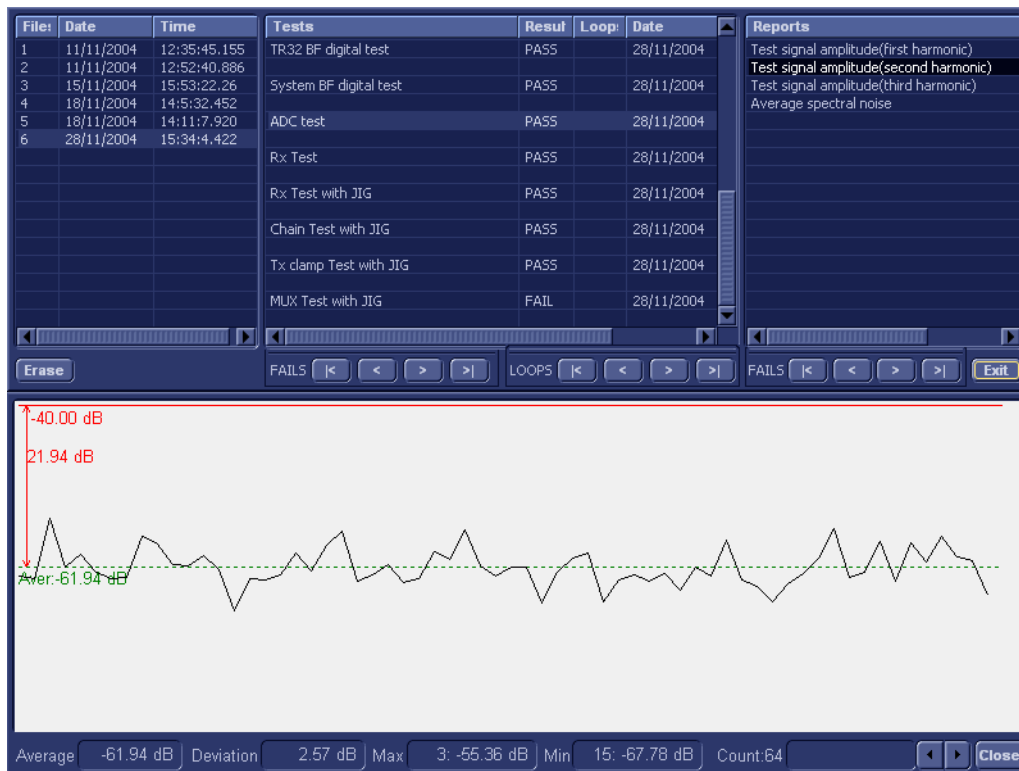
**NOTE:** The ADC test has four test reports which are listed in Reports on the right. By default, the First Harmonic report is displayed in the Reports window below ([Figure 7-28](#)).

**NOTE:** Left and right arrows provided in the View Report window enable scrolling between the different channels. Left-clicking on a currently-selected channel marks a red square on the report graph, and also evokes the display of the following information relative to that specific point: Average, Deviation (standard deviation from the Average), Max, and Min.

The signal should be within the limits marked in the white area (the dotted line represents the Average), as shown in [Figure 7-28](#).

- 8) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 9.) Select the second report (the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-29](#)).

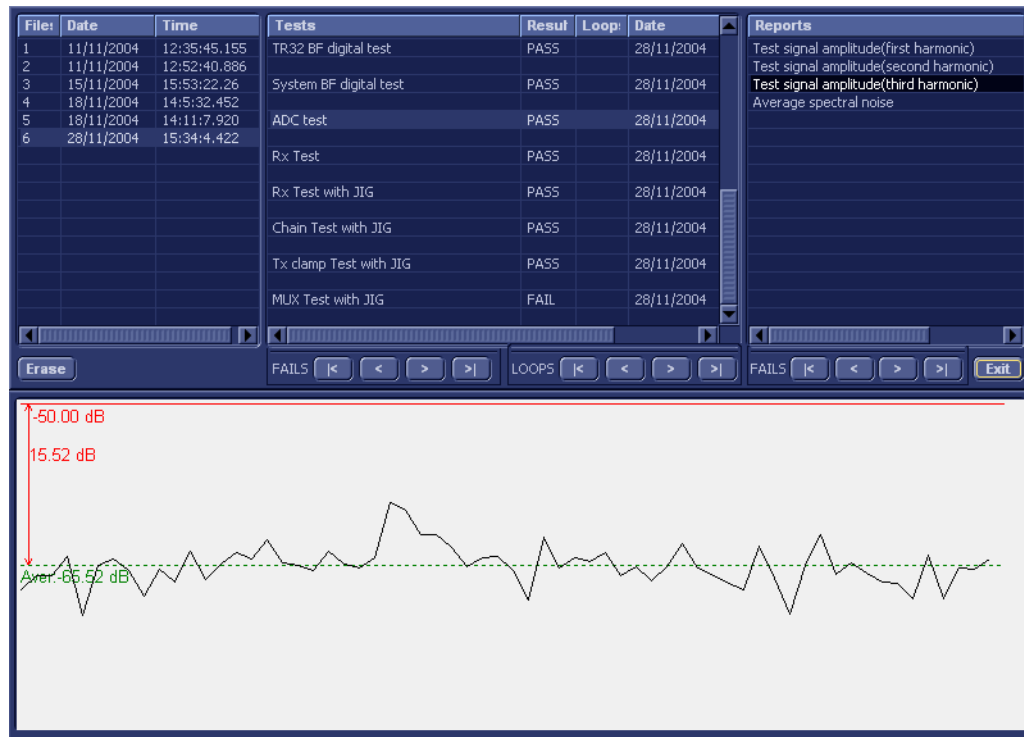
**Figure 7-29 View Test Log - Second Harmonic**



- 10.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 11) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 12.) Select the third report (the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-30](#)).

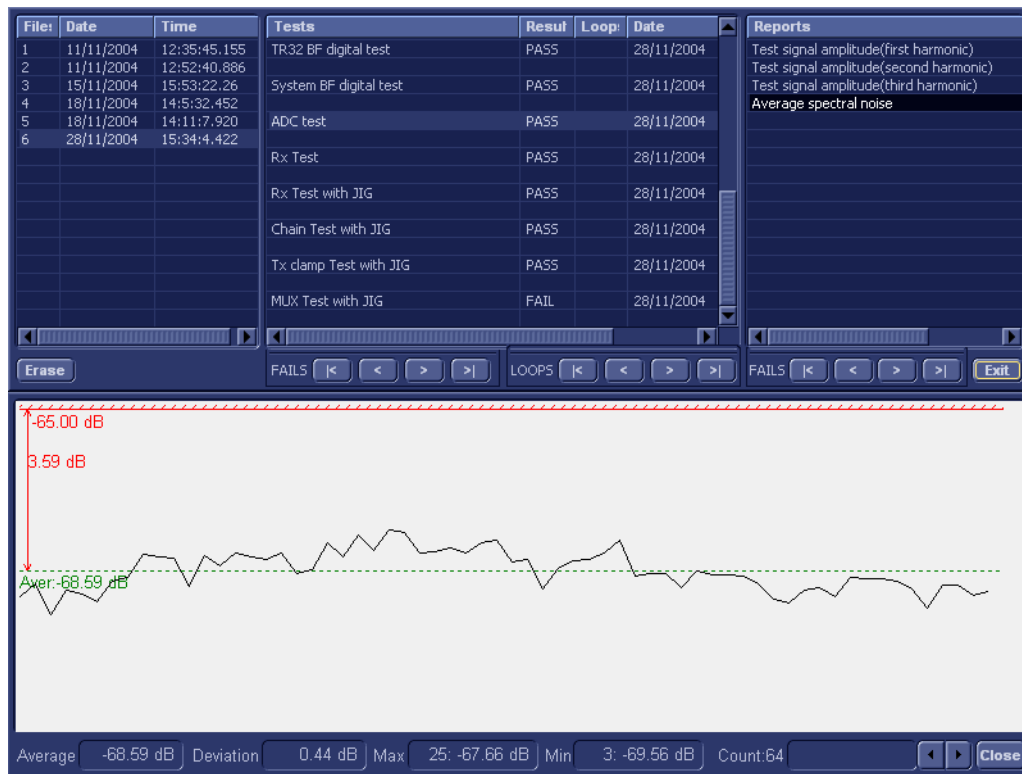


Figure 7-30 View Test Log - Third Harmonic



- 13.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 14.) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 15.) Select the fourth report (the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-31](#)).

Figure 7-31 View Test Log - Average



16.) Use the tools provided to scroll through the channels and view the results, as previously described.

17) When done, trackball to the **Close** button and press **Set** to close the View Report window.

18) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

19.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

20.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## 7-4-4-3 Receive (RX) Tests

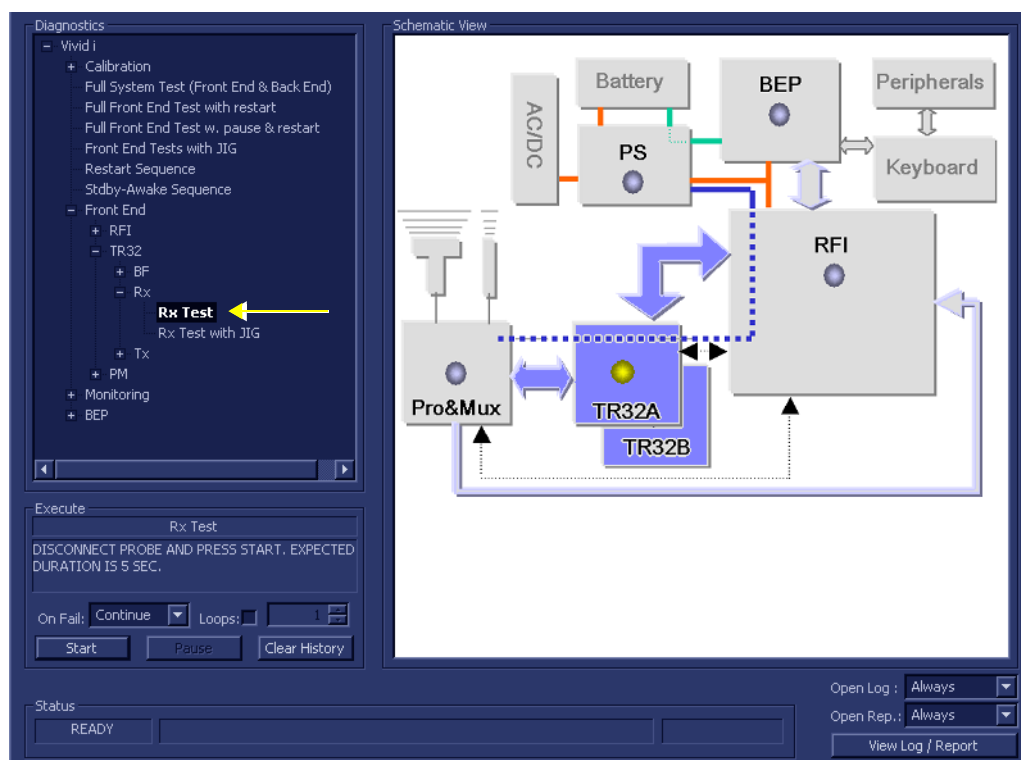
### 7-4-4-3-1 RX Test

**NOTE:** For a description of this test, refer to the information in *"RX Test"* on page 7-12.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **Rx Test** in the list of *RX* tests available for selection from the Diagnostic Test Tree (see [Figure 7-32 below](#)) and press **Set**. The RX Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (TR32A, TR32B), as shown below:

**Figure 7-32 Rx Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.



The Rx Test commences. While the test proceeds, the name of the test currently in progress (Rx Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

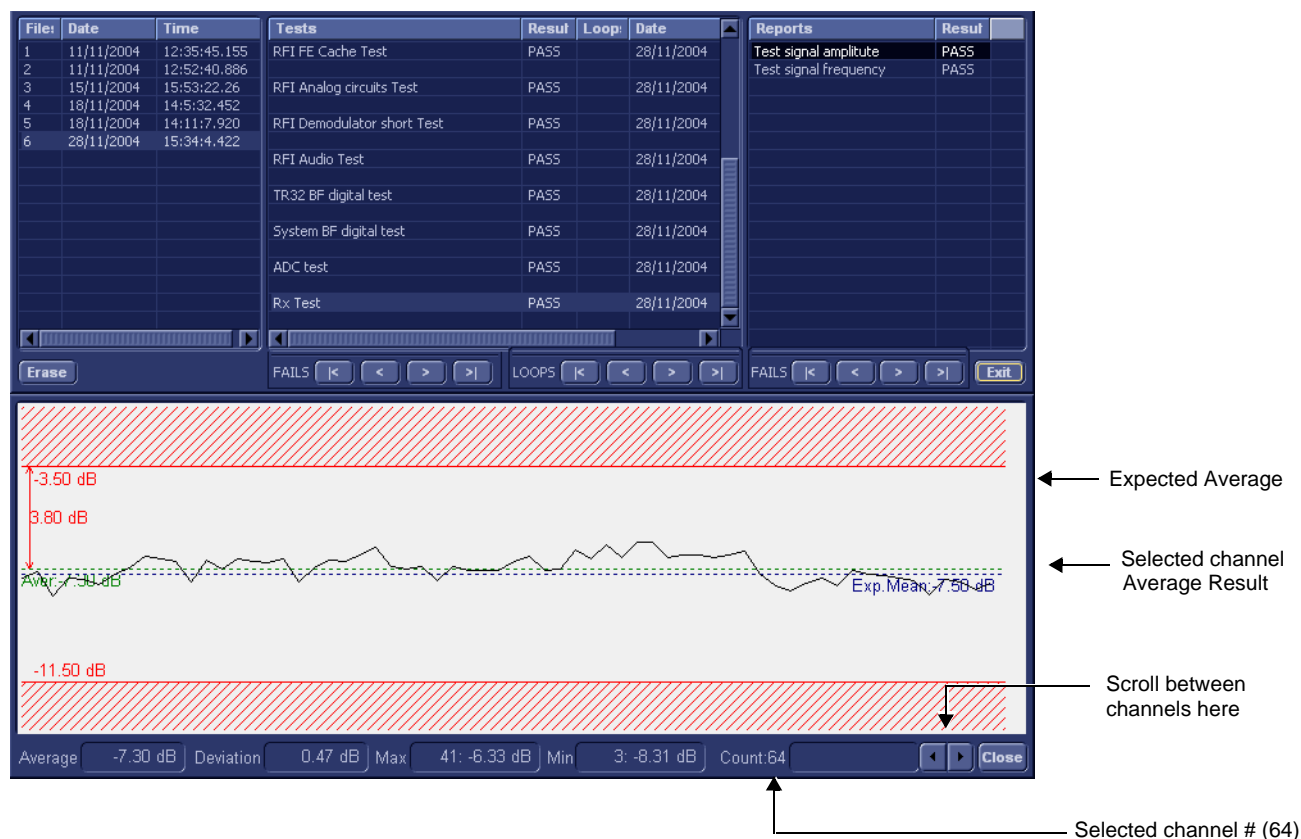
6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Rx Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-33](#).

**Figure 7-33 View Test Log - Rx Test Signal Amplitude**



**NOTE:** The Rx test has two test reports (Test Signal Amplitude and Frequency) which are listed in the Reports window on the right. By default, the Test Signal Amplitude report is displayed in the Reports window below ([Figure 7-33](#)).

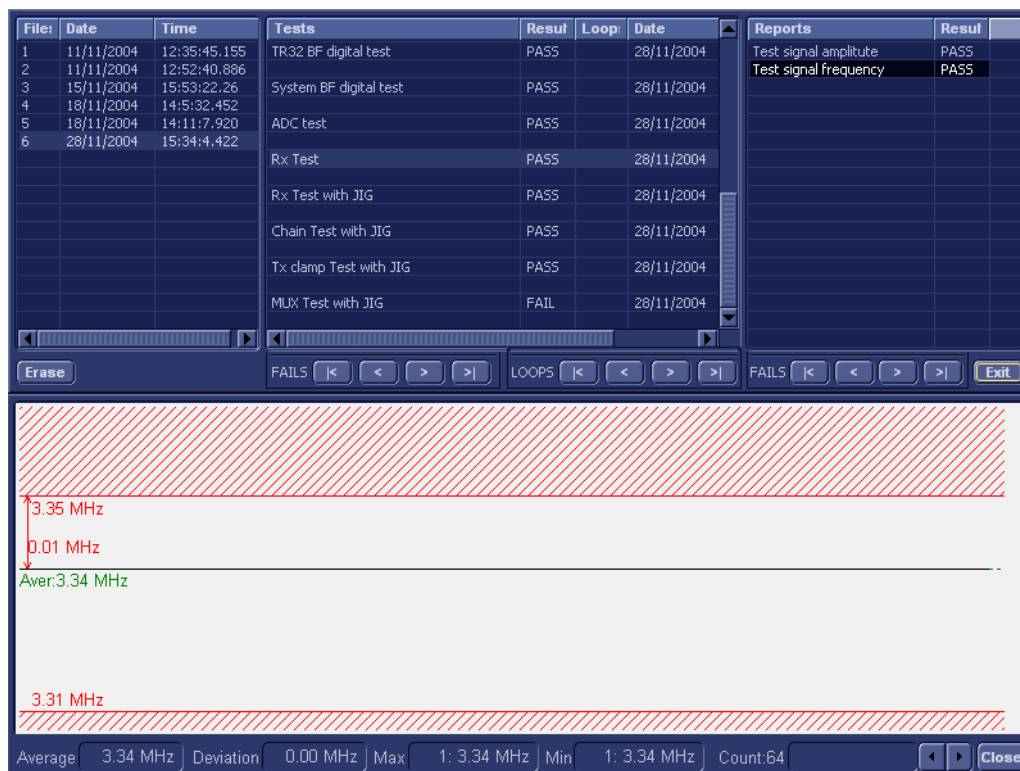
**NOTE:** Left and right arrows provided in the View Report window enable scrolling between the different channels.  
Left-clicking on a currently-selected channel marks a red square on the report graph, and also evokes the display of the following information relative to that specific point: Average, Deviation

(standard deviation from the Average), Max, and Min.

The signal should be within the limits marked in the white area (the dotted line represents the Average), as shown in [Figure 7-33](#).

- 8) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 9) Select the second report (*Frequency*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-29](#).

**Figure 7-34 View Test Log - Rx Test Signal Frequency**



- 10.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 11) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 12) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

- 13.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 14.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-4-5 Probe and MUX Diagnostic Tests

### 7-4-5-1 Accessing the Probe and MUX Diagnostic Test Options

- Access the *Diagnostic Test* window, as described in the *Accessing the Front End Diagnostic Options* section, on page 7-25.

### 7-4-5-2 ACW Test

#### 7-4-5-2-1 ACW IQ Symmetry Test

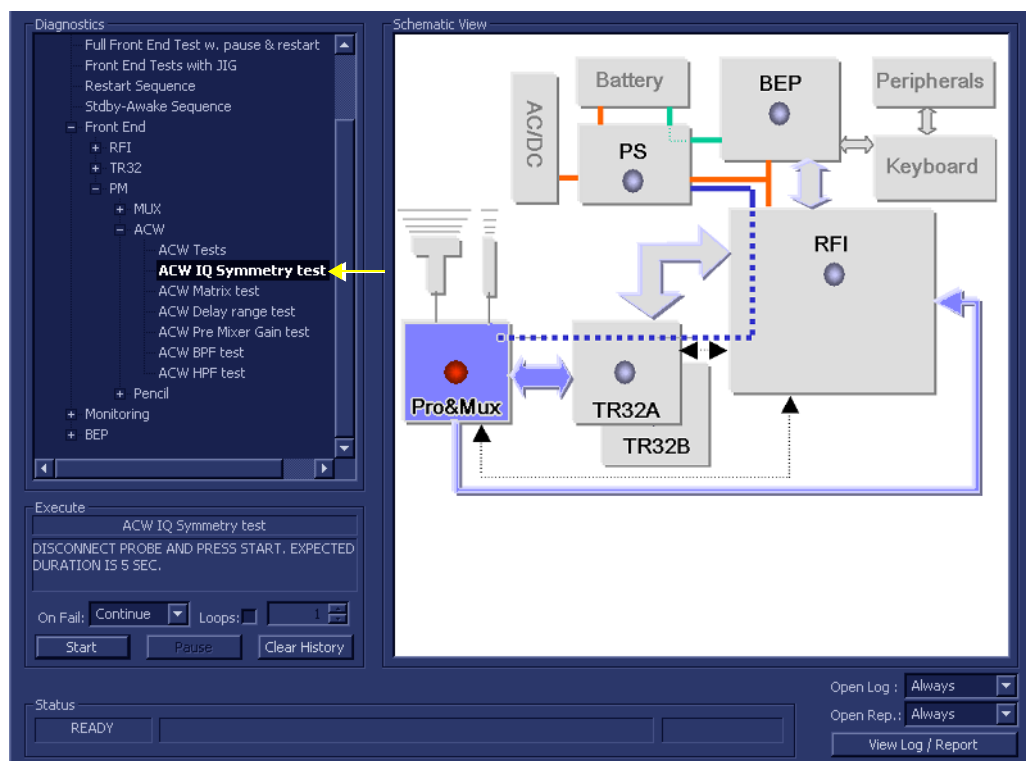
**NOTE:** For a description of this test, refer to the information in "[ACW IQ Symmetry Test](#)" on page 7-13.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

It is necessary to *disable* the Loop option where it should not be used.  
After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in "[DC Offset Calibration](#)" on page 7-25.

- In the *Diagnostic Test* window, trackball to **ACW IQ Symmetry Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see [Figure 7-32 below](#)) and press **Set**. The ACW IQ Symmetry Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-35 ACW IQ Symmetry Test**



- As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.

- The ACW IQ Symmetry Test commences. While the test proceeds, the name of the test currently in progress (ACW IQ Symmetry Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- When the ACW IQ Symmetry Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-36](#).

**Figure 7-36 View Test Log - ACW IQ Symmetry Test**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551	ACW IQ Symmetry test	PASS		1/5/2006	14:12:40.554	ACW IQ symmetry report	PASS

Param Name	Value	Expecetd Range	Pass/Fail
RMSI	75.28db	> 70.00db	- PASS
RMSQ	75.29db	> 70.00db	- PASS
Symmerty	0.17%	< 1.50%	- PASS
I Frequency	8.36khz	[8.37+/-0.02]khz	- PASS
Q Frequency	8.36khz	[8.37+/-0.02]khz	- PASS



---

**NOTE:** *The ACW IQ Symmetry Test test has one test report. By default, this is displayed in the Reports window below ([Figure 7-36](#)).*

- 7) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 8) After reviewing the test results, proceed as follows:
  - Re-boot the system (this is obligatory).
  - Perform calibration, as described in "[DC Offset Calibration](#)" on page 7-25.
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).  
If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).  
  
If the problem still persists, contact the GE On-Line Center for assistance.
- 9.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 10.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

#### 7-4-5-2-2 ACW Matrix Test

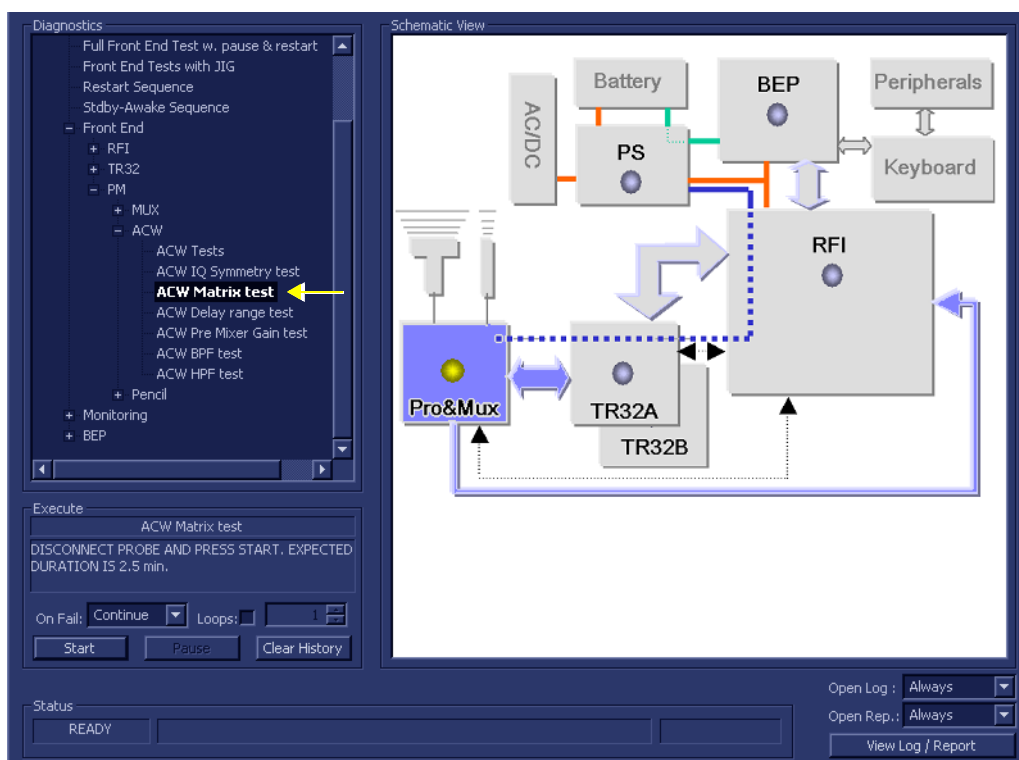
**NOTE:** For a description of this test, refer to the information in "ACW Matrix Test" on page 7-13.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

It is necessary to *disable* the Loop option where it should not be used.  
After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in "DC Offset Calibration" on page 7-25.

- 1.) In the *Diagnostic Test* window, trackball to **ACW Matrix Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see Figure 7-37 below) and press **Set**. The ACW Matrix Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-37 ACW Matrix Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.

The ACW Matrix Test commences. While the test proceeds, the name of the test currently in progress (ACW IQ Symmetry Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

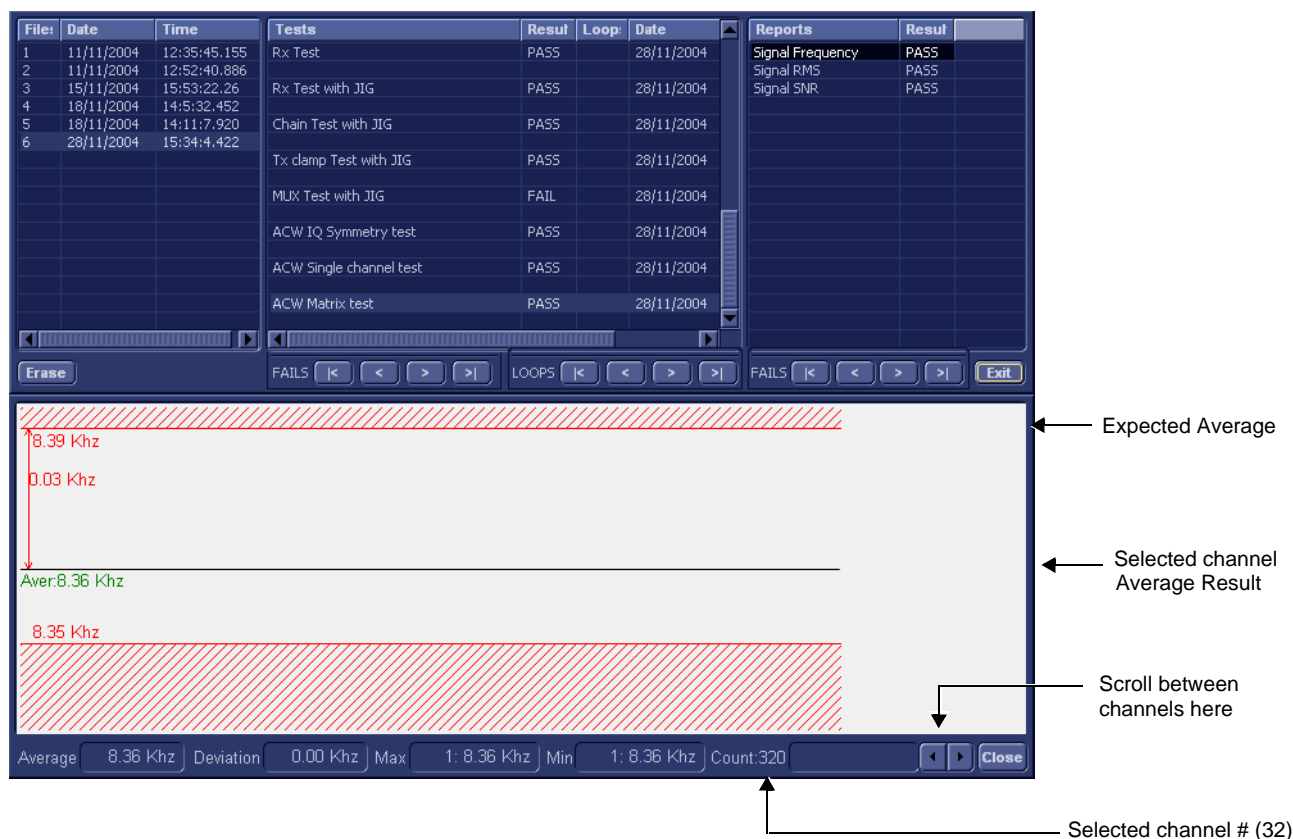
As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ACW Matrix Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-38](#).

**Figure 7-38 View Test Log - ACW Matrix Test - Signal Frequency**



**NOTE:** The ACW Matrix Test test has three test reports (Signal Frequency, Signal RMS, and Signal SNR) which are listed in the Reports window on the right. By default, the Signal Frequency report is displayed in the Reports window below ([Figure 7-38](#)).

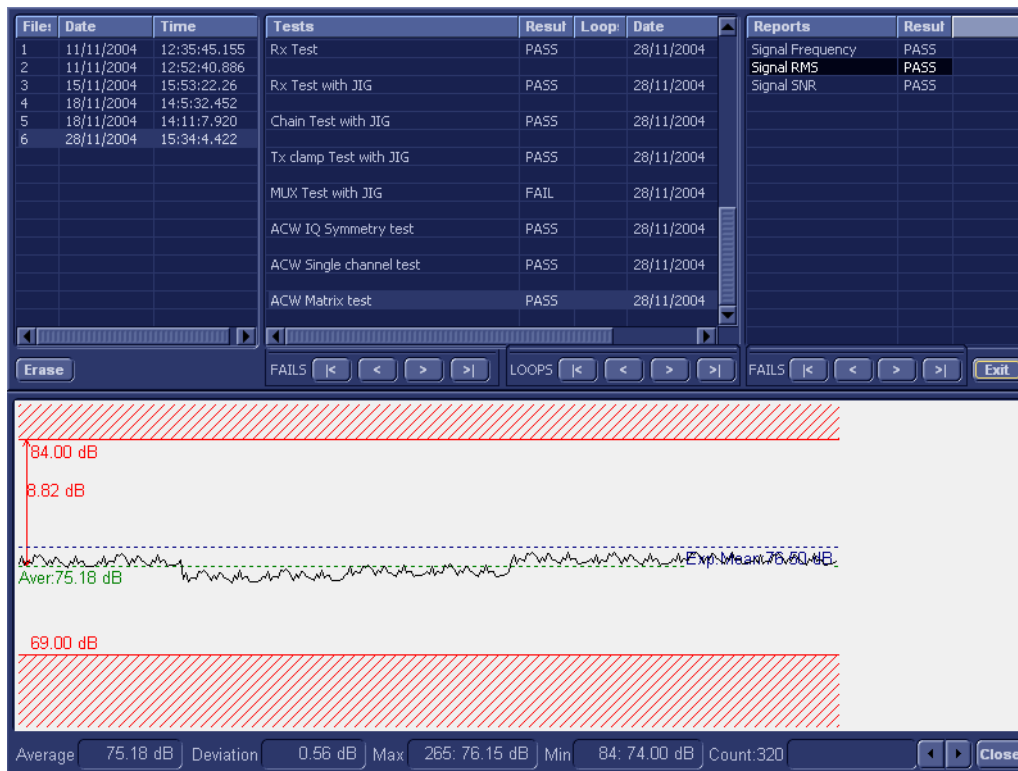
**NOTE:** Left and right arrows provided in the View Report window enable scrolling between the different channels.  
Left-clicking on a currently-selected channel marks a red square on the report graph, and also evokes the display of the following information relative to that specific point: Average, Deviation

(standard deviation from the Average), Max, and Min.

The signal should be within the limits marked in the white area (the dotted line represents the Average), as shown in [Figure 7-38](#).

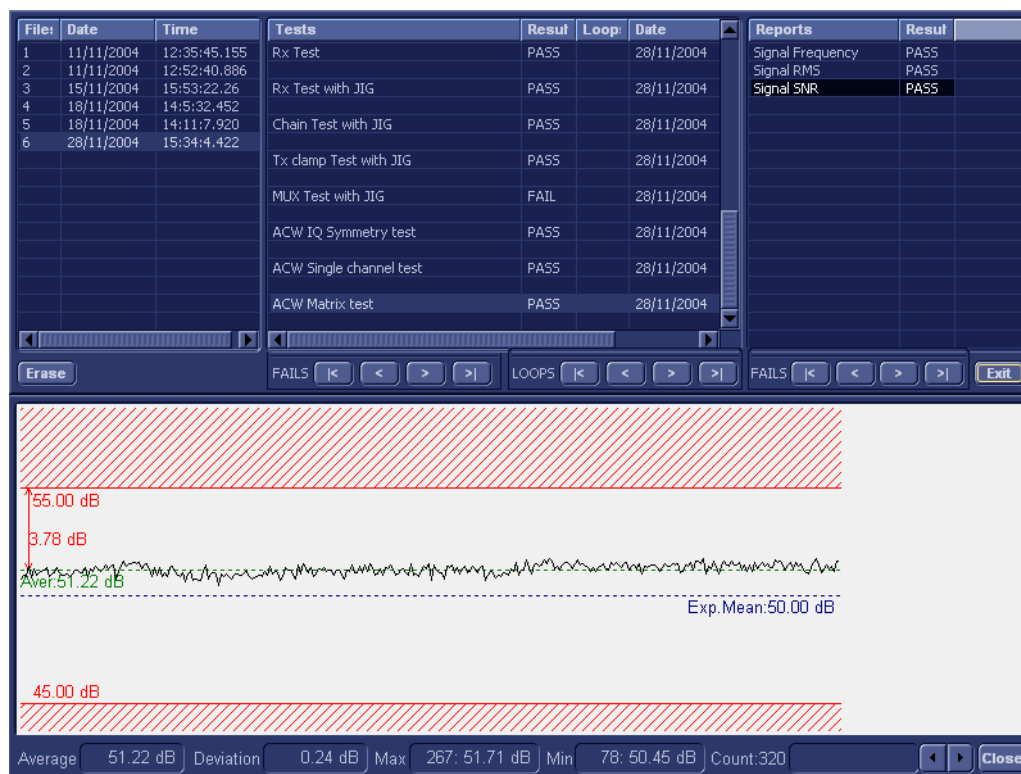
- 7) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 8) Select the second report (*Signal RMS*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-39](#).

**Figure 7-39 View Test Log - ACW Matrix Test - Signal RMS**



- 9.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 10) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 11) Select the third report (*Signal SNR*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-40](#).

Figure 7-40 View Test Log - ACW Matrix Test - Signal SNR



12.) Use the tools provided to scroll through the channels and view the results, as previously described.

13) When done, trackball to the **Close** button and press **Set** to close the View Report window.

14) After reviewing the test results, proceed as follows:

- Re-boot the system (this is obligatory).
- Perform calibration, as described in "DC Offset Calibration" on page 7-25
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

15.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

16.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

### 7-4-5-2-3 ACW Delay Range Test

**NOTE:** For a description of this test, refer to the information in ["ACW Delay Range Test" on page 7-13](#).

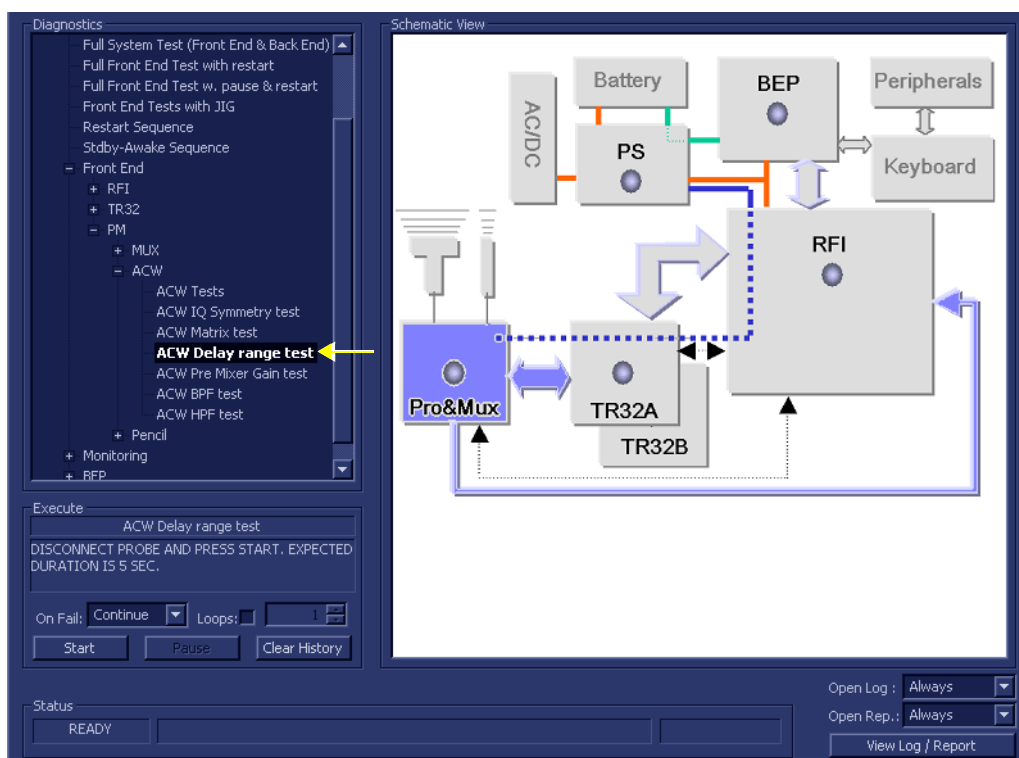
**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

It is necessary to *disable* the Loop option where it should not be used.

After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in ["DC Offset Calibration" on page 7-25](#).

- 1.) In the *Diagnostic Test* window, trackball to **ACW Delay Range Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see [Figure 7-41 below](#)) and press **Set**. The ACW Delay Range Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-41 ACW Delay Range Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.

The ACW Delay Range Test commences. While the test proceeds, the name of the test currently in progress (ACW IQ Delay Range Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

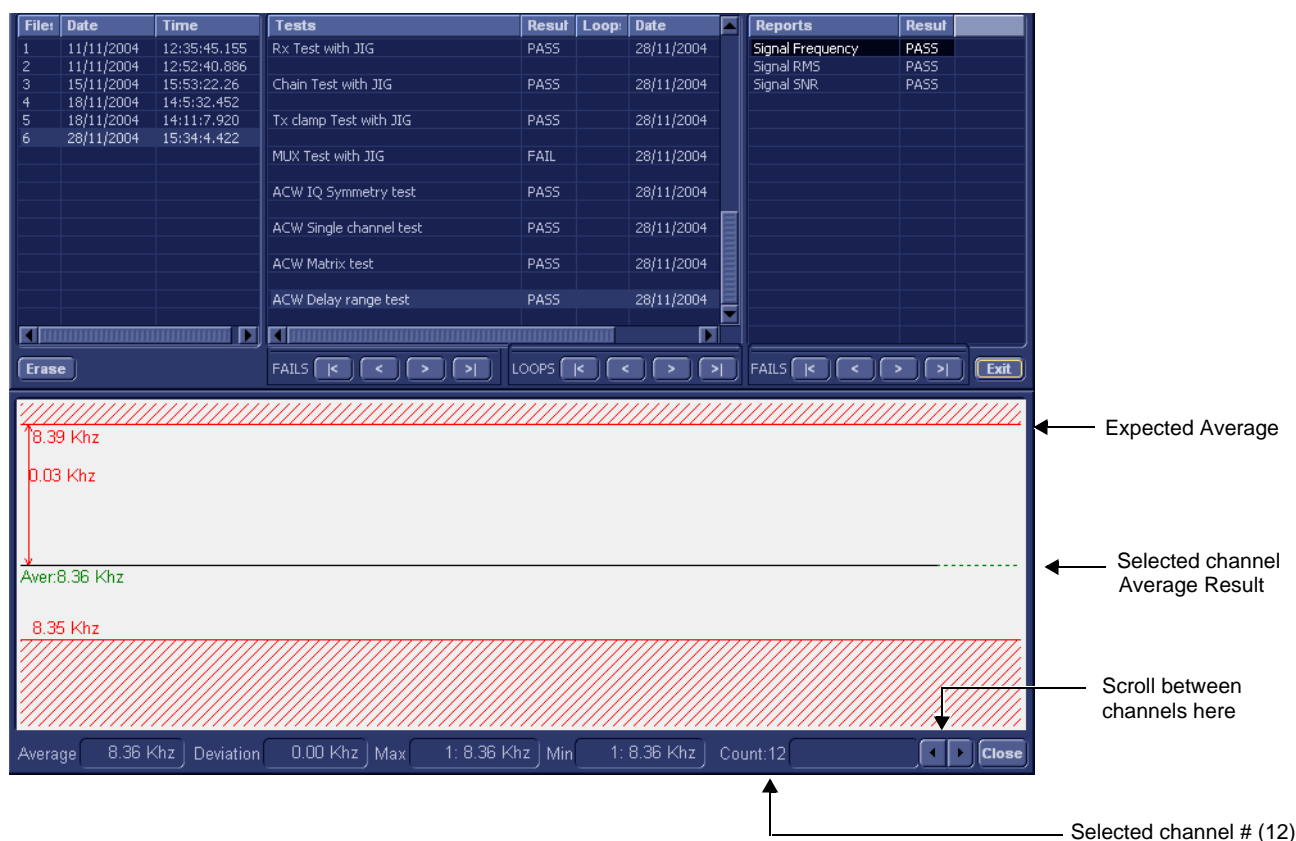
As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ACW Delay Range Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-42](#).

**Figure 7-42 View Test Log - ACW Delay Range Test - Signal Frequency**



**NOTE:** The ACW Delay Range Test test has three test reports (Signal Frequency, Signal RMS, and Signal SNR) which are listed in the Reports window on the right. By default, the Signal Frequency report is displayed in the Reports window below ([Figure 7-42](#)).

**NOTE:** Left and right arrows provided in the View Report window enable scrolling between the different channels.  
Left-clicking on a currently-selected channel marks a red square on the report graph, and also evokes the display of the following information relative to that specific point: Average, Deviation

(standard deviation from the Average), Max, and Min.

The signal should be within the limits marked in the white area (the dotted line represents the Average), as shown in [Figure 7-42](#).

- 7) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 8) Select the second report (*Signal RMS*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-43](#).

**Figure 7-43 View Test Log - ACW Delay Range Test - Signal RMS**



- 9.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 10) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 11) Select the third report (*Signal SNR*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-44](#).



Figure 7-44 View Test Log - ACW Delay Range Test - Signal SNR



12.) Use the tools provided to scroll through the channels and view the results, as previously described.

13) When done, trackball to the **Close** button and press **Set** to close the View Report window.

14) After reviewing the test results, proceed as follows:

- Re-boot the system (this is obligatory).
- Perform calibration, as described in "DC Offset Calibration" on page 7-25.
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

15.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

16.) Press the **<Esc>** button on the keyboard to close the *Diagnostic Test Window*.

#### 7-4-5-2-4 ACW Pre-Mixer Gain Test

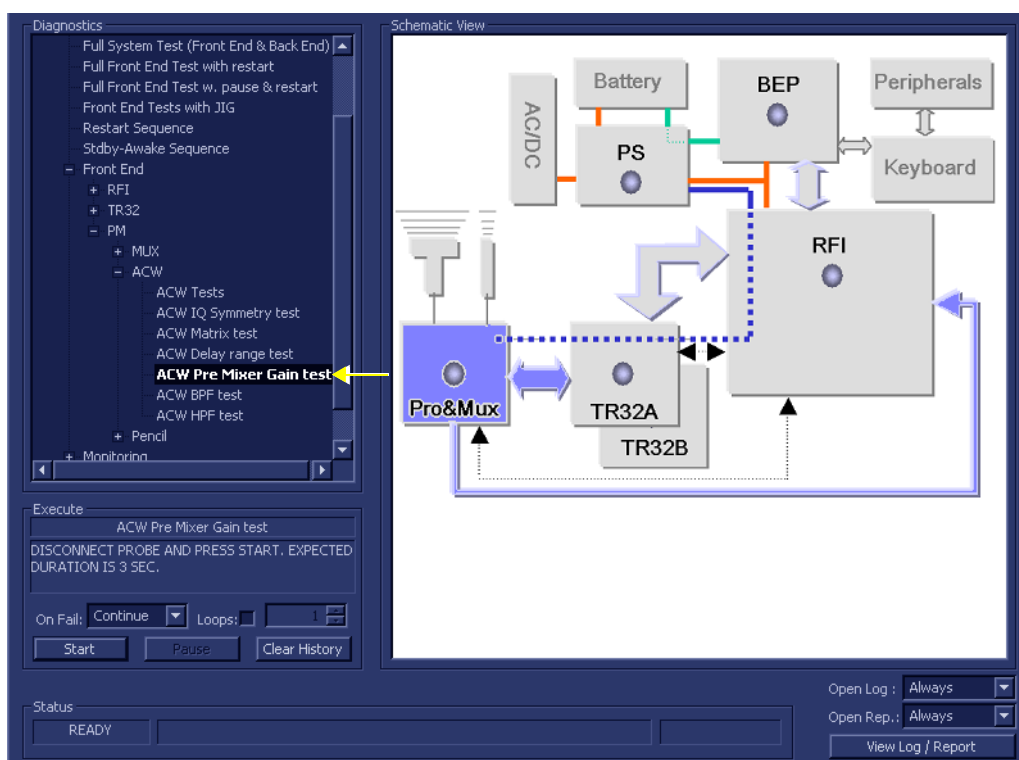
**NOTE:** For a description of this test, refer to the information in "[ACW Pre-Mixer Gain Test](#)" on page 7-13.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

It is necessary to *disable* the Loop option where it should not be used.  
After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in "[DC Offset Calibration](#)" on page 7-25.

- 1.) In the *Diagnostic Test* window, trackball to **ACW Pre-Mixer Gain Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see [Figure 7-45 below](#)) and press **Set**. The ACW Pre-Mixer Gain Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-45 ACW Pre-Mixer Gain Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.

The ACW Pre-Mixer Gain Test commences. While the test proceeds, the name of the test currently in progress (ACW Pre-Mixer Gain Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

5.) At any stage, trackball to the **Pause** button and press **Set**, if required.

6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ACW Pre-Mixer Gain Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-46](#).

**Figure 7-46 View Test Log - ACW Pre-Mixer Gain Test**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551							
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW Pre Mixer Gain report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1		
			ACW Delay range test	PASS		1/5/2006	14:23:30.3		
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		

Param Name	Value	Expected Range	Pass/Fail
Frequency	8.36khz	[8.37+/-0.02]khz	- PASS
Gain1 Ref	-9.82db	> -15.00db	- PASS
Gain2 Diff	-2.25db	[-2.20+/-0.50]db	- PASS
Gain3 Diff	-4.41db	[-4.40+/-0.50]db	- PASS

**NOTE:** The ACW Pre-Mixer Gain Test has one test report. By default, this is displayed in the Reports window below ([Figure 7-46](#)).

7) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

- 8) After reviewing the test results, proceed as follows:
- Re-boot the system (this is obligatory).
  - Perform calibration, as described in ["DC Offset Calibration" on page 7-25](#).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If "Fail" appears in one of the Result columns, the test has failed, even if "Pass" appears in other columns. Repeat the ACW Pre-mixer Gain Test.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).  
If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).  
If the problem still persists, contact the GE On-Line Center for assistance.
- 9.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 10.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

#### 7-4-5-2-5 ACW BPF Test

**NOTE:** For a description of this test, refer to the information in ["ACW BPF Test" on page 7-13](#).

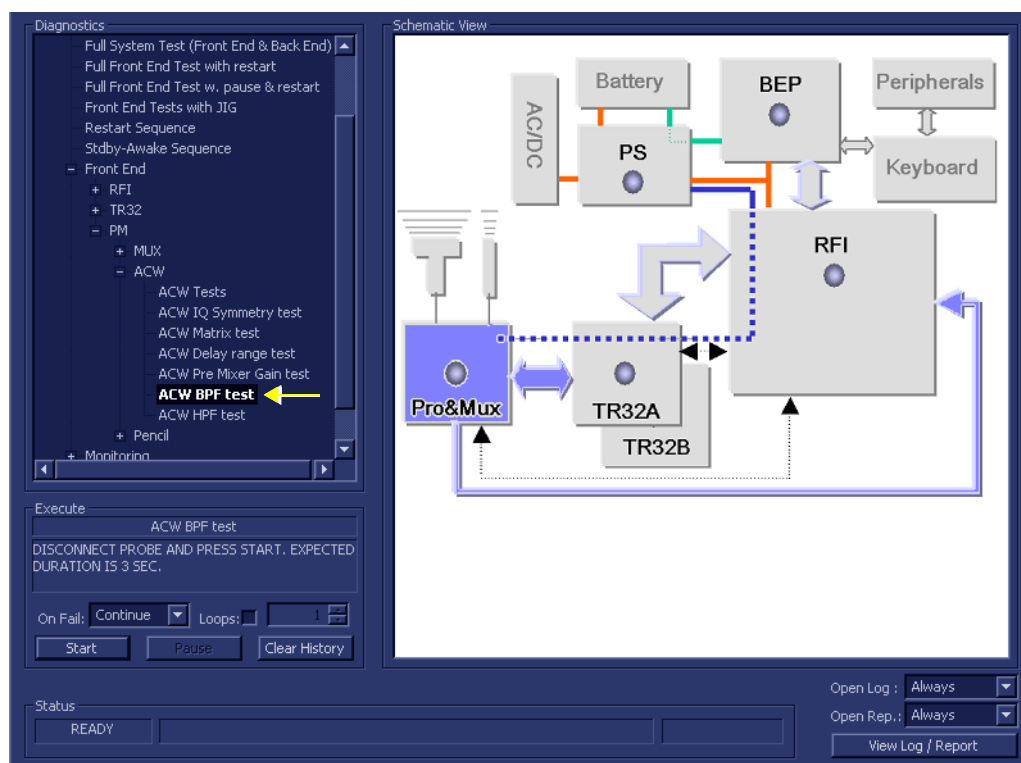
**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!



**NOTICE** It is necessary to *disable* the Loop option where it should not be used. After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in ["DC Offset Calibration" on page 7-25](#).

- 1.) In the *Diagnostic Test* window, trackball to **ACW BPF Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see [Figure 7-47 below](#)) and press **Set**. The ACW BPF Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-47 ACW BPF Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.

The ACW BPF Test commences. While the test proceeds, the name of the test currently in progress (ACW BPF Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ACW BPF Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-48](#).

**Figure 7-48 View Test Log - ACW BPF Test - BPF0**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW BPF0 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW BPF1 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1	ACW BPF2 report	PASS
			ACW Delay range test	PASS		1/5/2006	14:23:30.3	ACW BPF3 report	PASS
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		

Erase	FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
-------	-------	---	---	-------	---	---	-------	---	---	------

ACW BPF0 report					Exit
Frequency	RMS	Diff	Expecetd Diff	Pass/Fail	
2.108Mhz	82.31db	0.00db	0.00db	- PASS	
2.670Mhz	76.00db	-6.31db	< -5.00db	- PASS	
1.670Mhz	77.17db	-5.14db	< -3.50db	- PASS	

**NOTE:** The ACW BPF Test has four test reports (BPF0, BPF1, BPF2, and BPF3) which are listed in the Reports window on the right. By default, the BPF0 report is displayed in the Reports window below ([Figure 7-48](#)).

- 7) When finished reviewing the first report, trackball to the **Exit** button and press **Set** to close the View Report window.
- 8) Select the second report (*BPF1*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-49](#).

Figure 7-49 View Test Log - ACW BPF Test - BPF1

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW BPF0 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW BPF1 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1	ACW BPF2 report	PASS
			ACW Delay range test	PASS		1/5/2006	14:23:30.3	ACW BPF3 report	PASS
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		

- 9.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 10) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 11) Select the third report (*BPF2*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-50](#).

Figure 7-50 View Test Log - ACW BPF Test - BPF2

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW BPF0 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW BPF1 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1	ACW BPF2 report	PASS
			ACW Delay range test	PASS		1/5/2006	14:23:30.3	ACW BPF3 report	PASS
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		

Erase	FAILS	<	<	>	>	LOOPS	<	<	>	>	FAILS	<	<	>	>	Exit
-------	-------	---	---	---	---	-------	---	---	---	---	-------	---	---	---	---	------

ACW BPF2 report					Exit
Frequency	RMS	Diff	Expecetd Diff	Pass/Fail	
3.639Mhz	78.00db	0.00db	0.00db	- PASS	
4.447Mhz	72.67db	-5.34db	< -4.00db	- PASS	
2.356Mhz	71.42db	-6.59db	< -4.00db	- PASS	

- 12.) Use the tools provided to scroll through the channels and view the results, as previously described.
- 13.) When done, trackball to the **Close** button and press **Set** to close the View Report window.
- 14.) Select the fourth report (*Signal SNR*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-51](#).



Figure 7-51 View Test Log - ACW BPF Test - BPF3

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW BPF0 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW BPF1 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1	ACW BPF2 report	PASS
			ACW Delay range test	PASS		1/5/2006	14:23:30.3	ACW BPF3 report	PASS
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		

Erase	FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
-------	-------	---	---	-------	---	---	-------	---	---	------

ACW BPF3 report					Exit
Frequency	RMS	Diff	Expecetd Diff	Pass/Fail	
4.447Mhz	76.06db	0.00db	0.00db	- PASS	
5.717Mhz	67.44db	-8.61db	< -7.00db	- PASS	
3.639Mhz	72.70db	-3.35db	< -1.70db	- PASS	

15.) Use the tools provided to scroll through the channels and view the results, as previously described.

16) When done, trackball to the **Close** button and press **Set** to close the View Report window.

17) After reviewing the test results, proceed as follows:

- Re-boot the system (this is obligatory).
- Perform calibration, as described in ["DC Offset Calibration" on page 7-25](#).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

18.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

19.) Press the **<Esc>** button on the keyboard to close the *Diagnostic Test Window*.

#### 7-4-5-2-6 ACW HPF Test

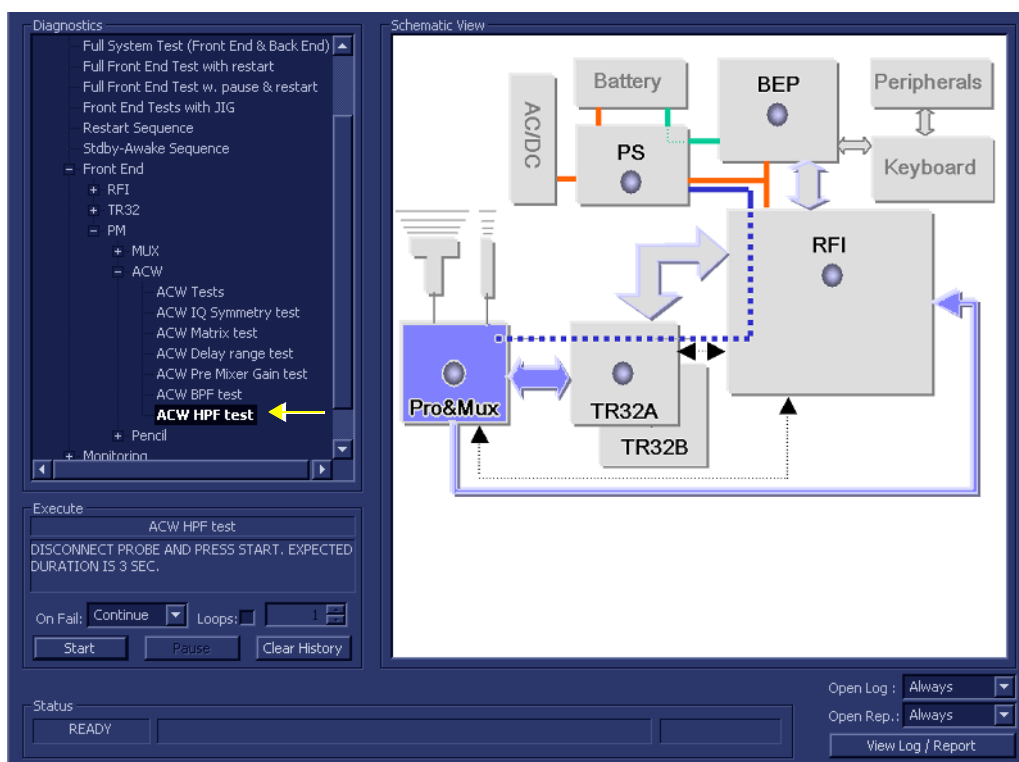
NOTE: For a description of this test, refer to the information in "ACW HPF Test" on page 7-13.

NOTE: When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

**NOTICE** It is necessary to *disable* the Loop option where it should not be used. After performing this test, you must re-boot the system and perform the DC Offset Calibration procedure as described in "DC Offset Calibration" on page 7-25.

- 1.) In the *Diagnostic Test* window, trackball to **ACW HPF Test** in the list of ACW tests available for selection from the Diagnostic Test Tree (see Figure 7-52 below) and press **Set**. The ACW HPF Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

Figure 7-52 ACW HPF Test



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.

The ACW HPF Test commences. While the test proceeds, the name of the test currently in progress (ACW HPF Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

5.) At any stage, trackball to the **Pause** button and press **Set**, if required.

6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the ACW HPF Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-53](#).

**Figure 7-53 View Test Log - ACW HPF Test - 300**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW HPF 300 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW HPF 600 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1		
			ACW Delay range test	PASS		1/5/2006	14:23:30.3		
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		
			ACW HPF test	PASS		1/5/2006	14:30:34.3		

Eraser	FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
--------	-------	---	---	-------	---	---	-------	---	---	------

ACW HPF 300 report					Exit
Frequency	RMS	Diff	Expected Diff	Pass/Fail	
3005.981Hz	86.19db	0.00db	0.00db	- PASS	
305.176Hz	82.14db	-4.05db	[-4.00+/-2.00]db	- PASS	
137.329Hz	71.14db	-15.05db	[-14.50+/-2.00]db	- PASS	

**NOTE:** The ACW HPF Test has two test reports (HPF300 and HPF600) which are listed in the Reports window on the right. By default, the HPF300 report is displayed in the Reports window below ([Figure 7-53](#)).

- 7) When finished reviewing the first report, trackball to the **Exit** button and press **Set** to close the View Report window.
- 8) Select the second report (*HPF600*); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-54](#).

**Figure 7-54 View Test Log - ACW HPF Test - 600**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551						ACW HPF 300 report	PASS
1	1/5/2006	14:20:33.207	DC offset calibration	PASS		1/5/2006	14:20:35.2	ACW HPF 600 report	PASS
			DC offset verification	PASS		1/5/2006	14:20:54.1		
			ACW Delay range test	PASS		1/5/2006	14:23:30.3		
			ACW Pre Mixer Gain test	PASS		1/5/2006	14:24:37.4		
			ACW BPF test	PASS		1/5/2006	14:26:41.8		
			ACW HPF test	PASS		1/5/2006	14:30:34.3		

- 9) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 10) After reviewing the test results, proceed as follows:
  - Re-boot the system (this is obligatory).
  - Perform calibration, as described in ["DC Offset Calibration" on page 7-25](#).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance
- 11.)Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 12.)Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## 7-4-5-3 Pencil Test

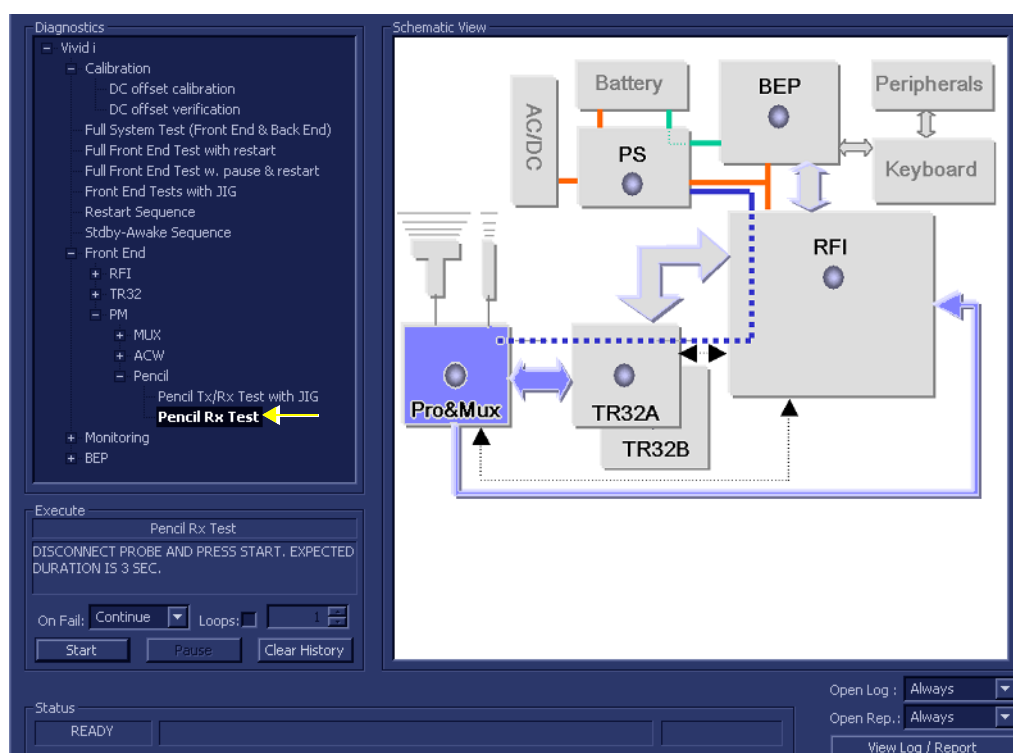
### 7-4-5-3-1 Pencil Rx Test

**NOTE:** For a description of this test, refer to the information in ["Pencil Rx Test" on page 7-14](#).

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) In the *Diagnostic Test* window, trackball to **Pencil RX Test** in the list of *Pencil* tests available for selection from the Diagnostic Test Tree (see [Figure 7-55 below](#)) and press **Set**. The Pencil RX Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (P&M), as shown below:

**Figure 7-55 Pencil RX Test**



- 2.) As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- 3.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 4.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 5.) Trackball to the **Start** button and press **Set**.

The Pencil RX Test commences. While the test proceeds, the name of the test currently in progress (Pencil RX Test) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.



As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 6.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Pencil RX Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-56](#).

**Figure 7-56 View Test Log - Pencil RX Test**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	ACW Single channel test	PASS		28/11/2004	Pencil test report	PASS
2	11/11/2004	12:52:40.886						
3	15/11/2004	15:53:22.26	ACW Matrix test	PASS		28/11/2004		
4	18/11/2004	14:53:22.452						
5	18/11/2004	14:11:17.920	ACW Delay range test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	ACW Pre Mixer Gain test	PASS		28/11/2004		
			ACW BPF test	PASS		28/11/2004		
			ACW HPF test	PASS		28/11/2004		
			Pencil Tx/Rx Test with JIG	PASS		28/11/2004		
			Pencil Rx Test	PASS		28/11/2004		

Param Name	Value	Expected Range	EmptyField	Pass/fail
RMS	71.63db	>70.00db		- PASS
SNR	51.60db	>45.00db		- PASS
Frequency	8.36khz	8.37+/-0.02khz	- PASS	

**NOTE:** The Pencil RX Test has one test report which is listed in Reports on the right and displayed in the Reports window below ([Figure 7-56](#)).

- 8) When finished reviewing the first report, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9) After reviewing the test results, proceed as follows:
- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).

- 
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## Section 7-5 Monitoring Tests

### 7-5-1 Accessing the Monitoring Diagnostic Test Options

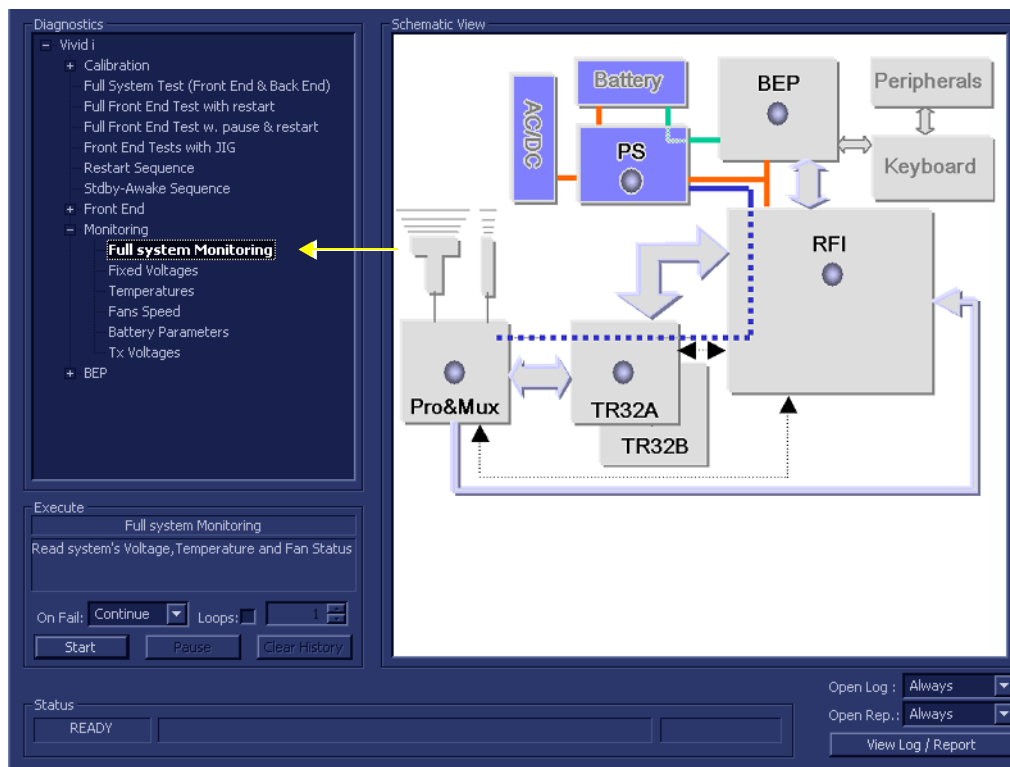
- Access the *Diagnostic Test* window, as described in the *Accessing the Front End Diagnostic Options* section, on page 7-25.

#### 7-5-1-1 Full System Monitoring Test

**NOTE:** For a description of this test, refer to the information in "*Full System Monitoring Test*" on page 7-14.

- In the *Diagnostic Test* window, trackball to **Full System Monitoring Test** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see [Figure 7-57 below](#)) and press **Set**. The Full System Monitoring Test name is displayed under *Execute*; all system components to be tested are highlighted light blue in the Schematic View, as shown below:

**Figure 7-57 Full System Monitoring Test**



- As indicated in the *Special Instructions* area, disconnect any probes currently connected to the system and make sure that nothing is touching the probe connectors.
- Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- Trackball to the **Start** button and press **Set**.



The Full System Monitoring Test commences. While the test proceeds, the name of the test currently in progress (ADC Test) is displayed in the *Execute* field and the current *Loop #* and specific test are



shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

6.) At any stage, trackball to the **Pause** button and press **Set**, if required.

7.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full System Monitoring Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in [Figure 7-58](#).

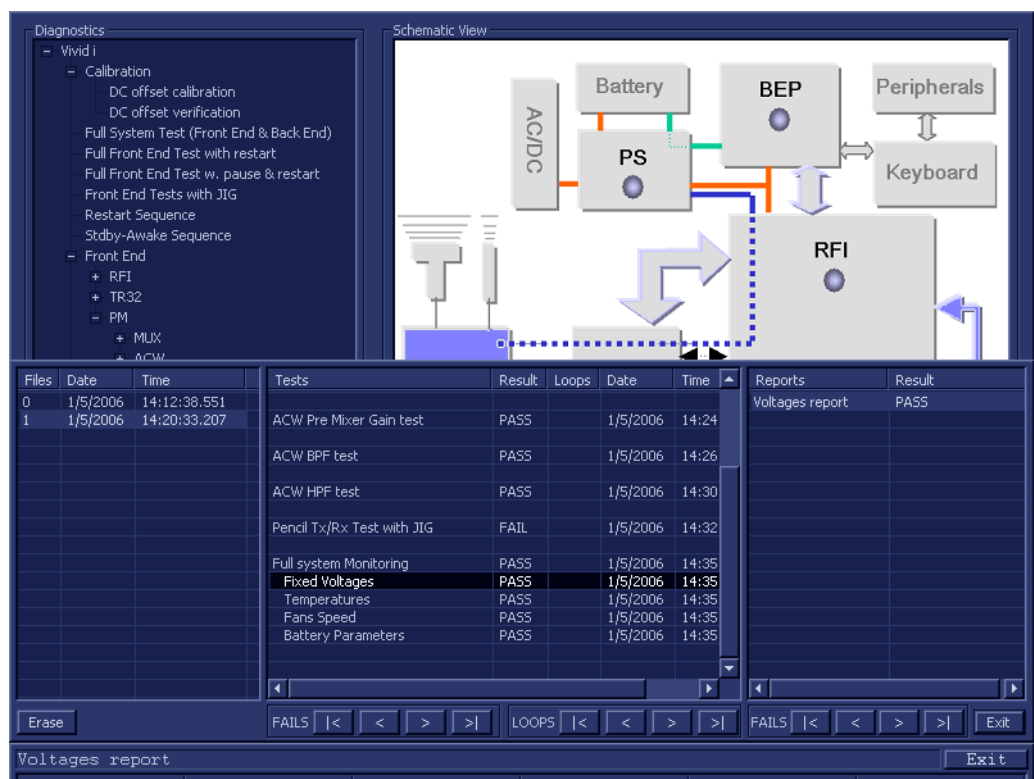
**Figure 7-58 View Test Log - Full System Monitoring Test**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	ACW BPF test	PASS		28/11/2004		
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452	ACW HPF test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920						
6	28/11/2004	15:34:4.422	Pencil Tx/Rx Test with JIG	PASS		28/11/2004		
			Pencil Rx Test	PASS		28/11/2004		
			Full system Monitoring	PASS		28/11/2004		
			Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			Tx Voltages	PASS		28/11/2004		

**NOTE:** The Full System Monitoring Test has five sub-tests (*Fixed Voltages, Temperatures, Fans Speed, Battery Parameters, and Tx Voltages*). These are listed in the *Test* column, as shown in [Figure 7-58](#).

8.) Select the first report (Fixed Voltages); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-59](#).

Figure 7-59 View Test Log - Full System Monitoring Test - Fixed Voltages



- 9.) Check that the sub-test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-59](#).
- 10.) Select the second report (Temperatures); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-60](#).

Figure 7-60 View Test Log - Full System Monitoring Test - Temperatures

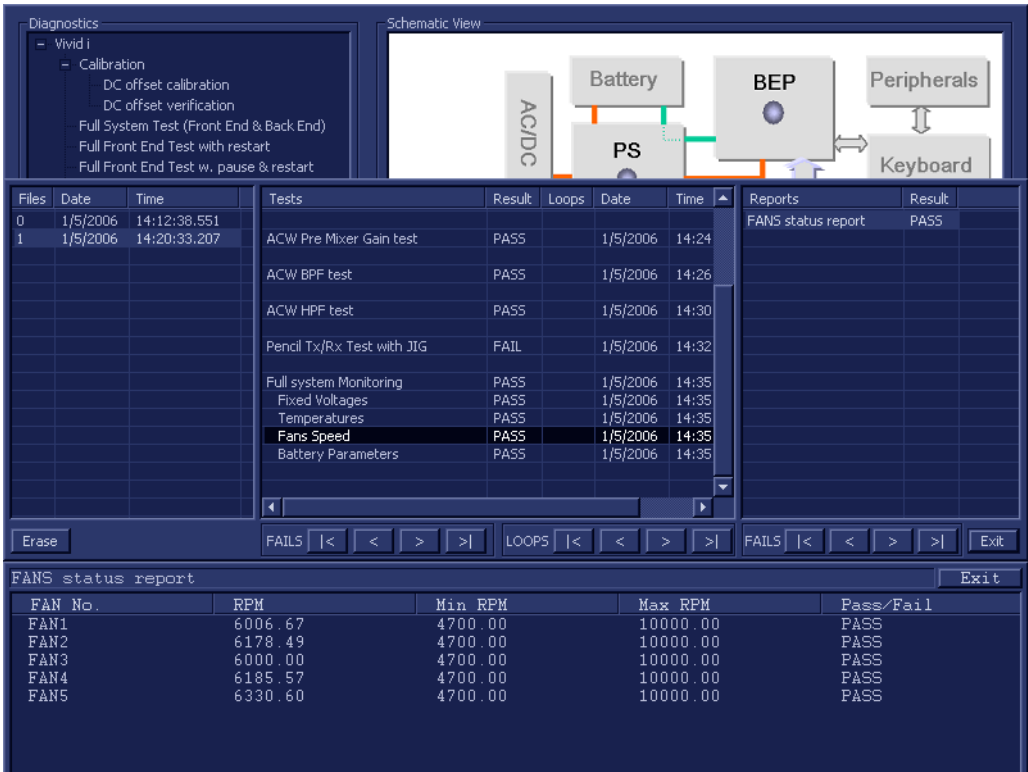
File#	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155					Temperature report	PASS
2	11/11/2004	12:52:40.886	ACW BPF test	PASS		28/11/2004		
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452	ACW HPF test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920						
6	28/11/2004	15:34:4.422	Pencil Tx/Rx Test with JIG	PASS		28/11/2004		
			Pencil Rx Test	PASS		28/11/2004		
			Full system Monitoring	PASS		28/11/2004		
			Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			Tx Voltages	PASS		28/11/2004		

Sensor	Temp[C]	Min Temp[C]	Max Temp[C]	Pass/Fail
Battery	34.45	0.00	55.00	PASS
FAN Cont. Temp.	32.00	0.00	55.00	PASS
ETX-1 Temp.	29.00	0.00	55.00	PASS
ETX-2 Temp.	30.00	0.00	55.00	PASS
Power Supply	33.00	0.00	60.00	PASS
RFI_DEMOD	55.00	0.00	85.00	PASS
RFI_FEITF	44.00	0.00	85.00	PASS
RFI_FEMI	43.00	0.00	85.00	PASS
RFI_LOCAL	40.00	0.00	75.00	PASS
TR32_A	39.00	0.00	75.00	PASS
TR32_B	38.00	0.00	75.00	PASS

- 11.) Check that the sub-test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-60](#).
- 12.) Select the third report (Fans Speed); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-61](#).

Figure 7-61 View Test Log - Full System Monitoring Test - Fans Speed



- 13.) Check that the sub-test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-59](#).
- 14.) Select the fourth report (Battery Parameters); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-62](#).

Figure 7-62 View Test Log - Full System Monitoring Test - Battery Parameters

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	1/5/2006	14:12:38.551							
1	1/5/2006	14:20:33.207	ACW Pre Mixer Gain test	PASS		1/5/2006	14:24	Battery status report	PASS
			ACW BPF test	PASS		1/5/2006	14:26		
			ACW HPF test	PASS		1/5/2006	14:30		
			Pencil Tx/Rx Test with JIG	FAIL		1/5/2006	14:32		
			Full system Monitoring	PASS		1/5/2006	14:35		
			Fixed Voltages	PASS		1/5/2006	14:35		
			Temperatures	PASS		1/5/2006	14:35		
			Fans Speed	PASS		1/5/2006	14:35		
			Battery Parameters	PASS		1/5/2006	14:35		

Erase	FAILS	<	>	LOOPS	<	>	FAILS	<	>	Exit
-------	-------	---	---	-------	---	---	-------	---	---	------

Battery status report					Exit
Sensor Name	Value	Lower Limit	Upper Limit	Pass/Fail	
Capacity [%]	89	0	100	PASS	
Chargnig Voltage [mW]	16688	0	17000	PASS	
Consumed/Supplied current [mA]	0	-8000	5000	PASS	
Cycle Count	161	0	1000	PASS	
Designed capacity [mAh]	6600	0	8000	PASS	
Full charge Capacity [mAh]	6563	0	8000	PASS	
Remaining Capacity [mAh]	5889	0	8000	PASS	
Serial Number	273			PASS	
Firmware Revision	2.0			PASS	
Active Source [0-AC/DC; 1- Batt]	0			PASS	

- 15.) Check that the sub-test passed and that result values are within the pre-defined *Upper* and *Lower* limits, as shown in [Figure 7-62](#).
- 16.) Select the fifth report (Tx Voltages); the report is highlighted in the *Reports* list, and the corresponding results are shown in the Report window below, as shown in [Figure 7-63](#).

Figure 7-63 View Test Log - Full System Monitoring Test - Tx Voltages

File	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	ACW BPF test	PASS		28/11/2004	TX Voltages report	PASS
3	15/11/2004	15:53:22.26	ACW HPF test	PASS		28/11/2004		
4	18/11/2004	14:5:32.452						
5	18/11/2004	14:11:7.920	Pencil Tx/Rx Test with JIG	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Pencil Rx Test	PASS		28/11/2004		
			Full system Monitoring	PASS		28/11/2004		
			Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			<b>Tx Voltages</b>	<b>PASS</b>		<b>28/11/2004</b>		

Voltage Name	Value[V]	Min Limit[V]	Expected[V]	Max Limit[V]	Pass/Fail
THV	-0.03	0.00	0.00	3.00	INVALID

17.) Check that the sub-test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-63](#).

18) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

19) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of that board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

20.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

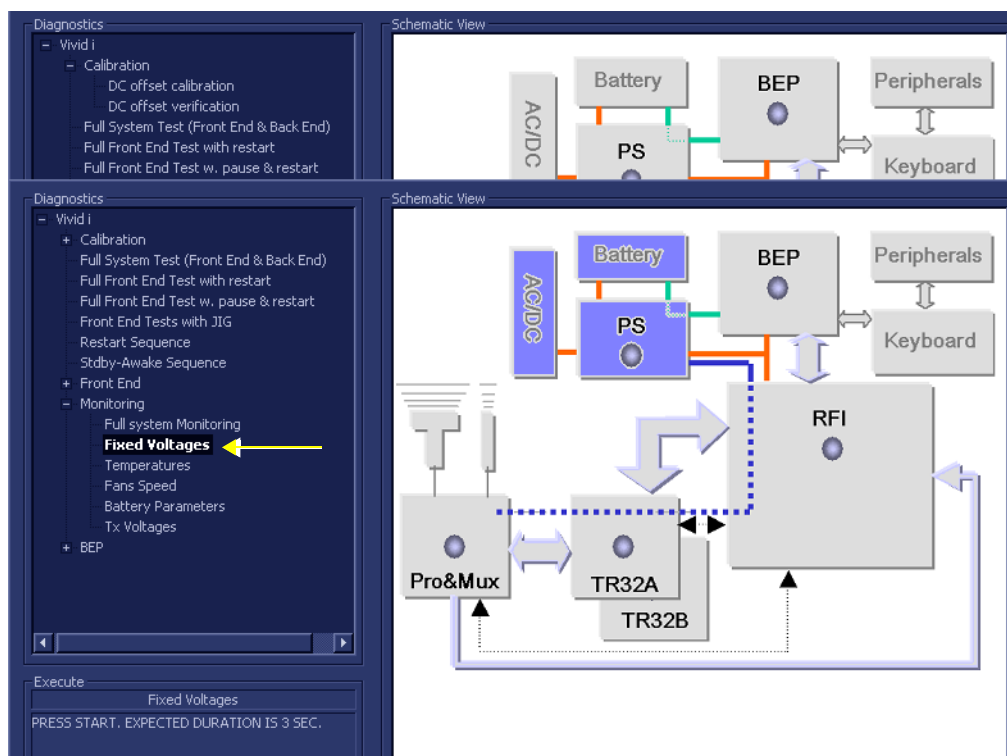
21.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## 7-5-1-2 Fixed Voltages Test

**NOTE:** For a description of this test, refer to the information in "Fixed Voltages Test" on page 7-14.

- 1.) In the *Diagnostic Test* window, trackball to **Fixed Voltages** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see Figure 7-64 below) and press **Set**. The Fixed Voltages Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (AC/DC, Battery, PS), as shown below:

**Figure 7-64 Voltages Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Fixed Voltages Test commences. While the test proceeds, the name of the test currently in progress (Fixed Voltages) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

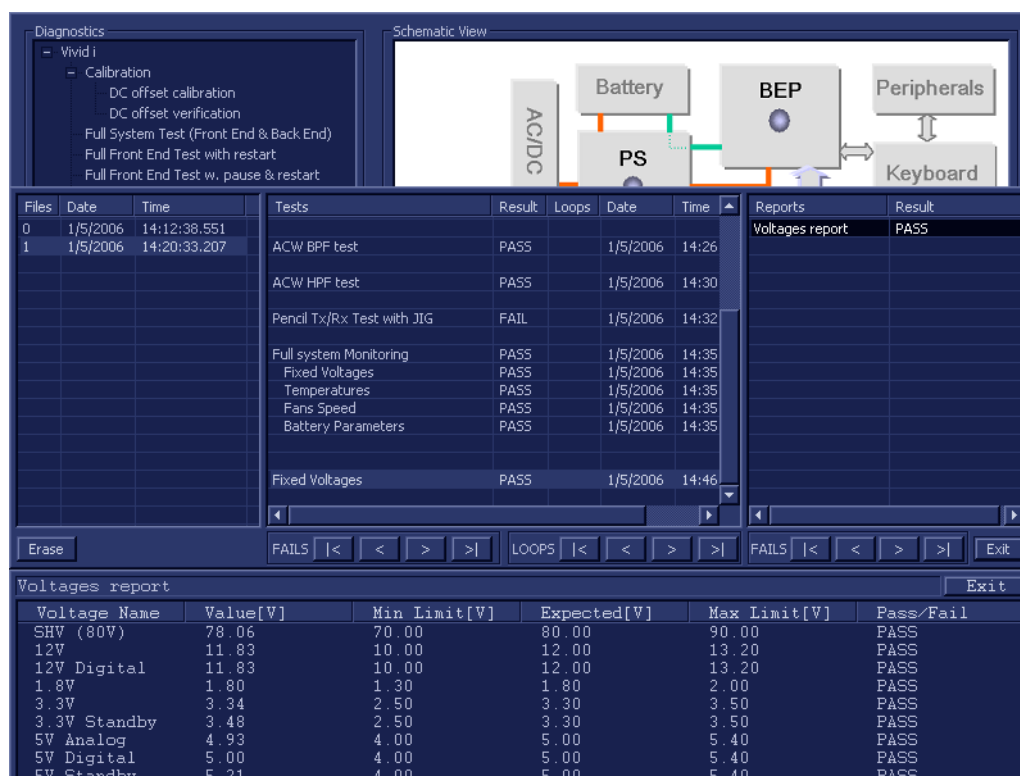
- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Fixed Voltages Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-65](#).

**Figure 7-65 View Test Log - Fixed Voltages Test**



**NOTE:** For this test, there is one report (Voltages) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 7.) Check that the test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-65](#).
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9.) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in "[DC Offset Calibration](#)" on page 7-25, and then repeat the test.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).



If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

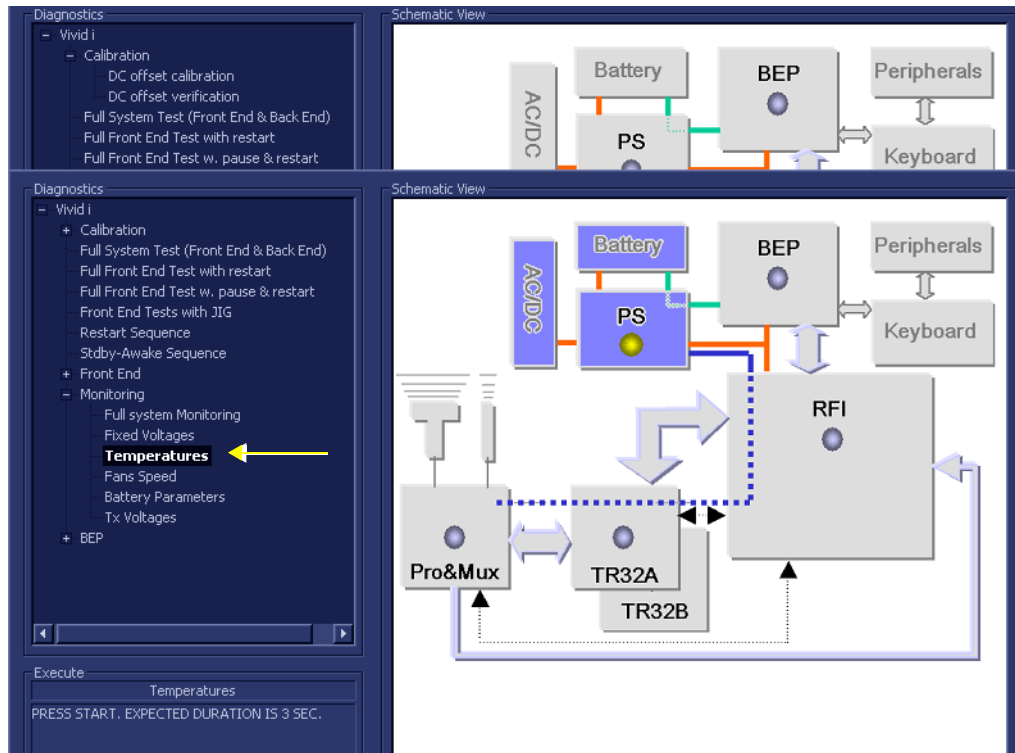
11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-5-1-3 Temperatures Test

**NOTE:** For a description of this test, refer to the information in "Temperatures Test" on page 7-14.

- 1.) In the *Diagnostic Test* window, trackball to **Temperatures** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see Figure 7-66 below) and press **Set**. The Temperatures Test name is displayed under *Execute*; all system components (excluding the P&M) will be tested are highlighted light blue in the Schematic View (all), as shown below:

**Figure 7-66 Temperatures Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Temperatures Test commences. While the test proceeds, the name of the test currently in progress (Temperatures) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Temperatures Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-67](#).

**Figure 7-67 View Test Log - Temperatures Test**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	Pencil Tx/Rx Test with JIG	PASS		28/11/2004	Temperature report	PASS
2	11/11/2004	12:52:40.886						
3	15/11/2004	15:53:22.26	Pencil Rx Test	PASS		28/11/2004		
4	18/11/2004	14:5:32.452						
5	18/11/2004	14:11:7.920	Full system Monitoring	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			Tx Voltages	PASS		28/11/2004		
			Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		

Sensor	Temp[C]	Min Temp[C]	Max Temp[C]	Pass/Fail
Battery	34.45	0.00	55.00	PASS
FAN Cont. Temp.	31.00	0.00	55.00	PASS
ETX-1 Temp.	29.00	0.00	55.00	PASS
ETX-2 Temp.	30.00	0.00	55.00	PASS
Power Supply	33.00	0.00	60.00	PASS
RFI_DEMOD	56.00	0.00	85.00	PASS
RFI_FEITF	44.00	0.00	85.00	PASS
RFI_FEMI	43.00	0.00	85.00	PASS
RFI_LOCAL	40.00	0.00	75.00	PASS
TR32_A	39.00	0.00	75.00	PASS
TR32_B	38.00	0.00	75.00	PASS

**NOTE:** For this test, there is one report (Temperatures) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 7.) Check that the test passed and that result values are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-67](#).
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

9) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

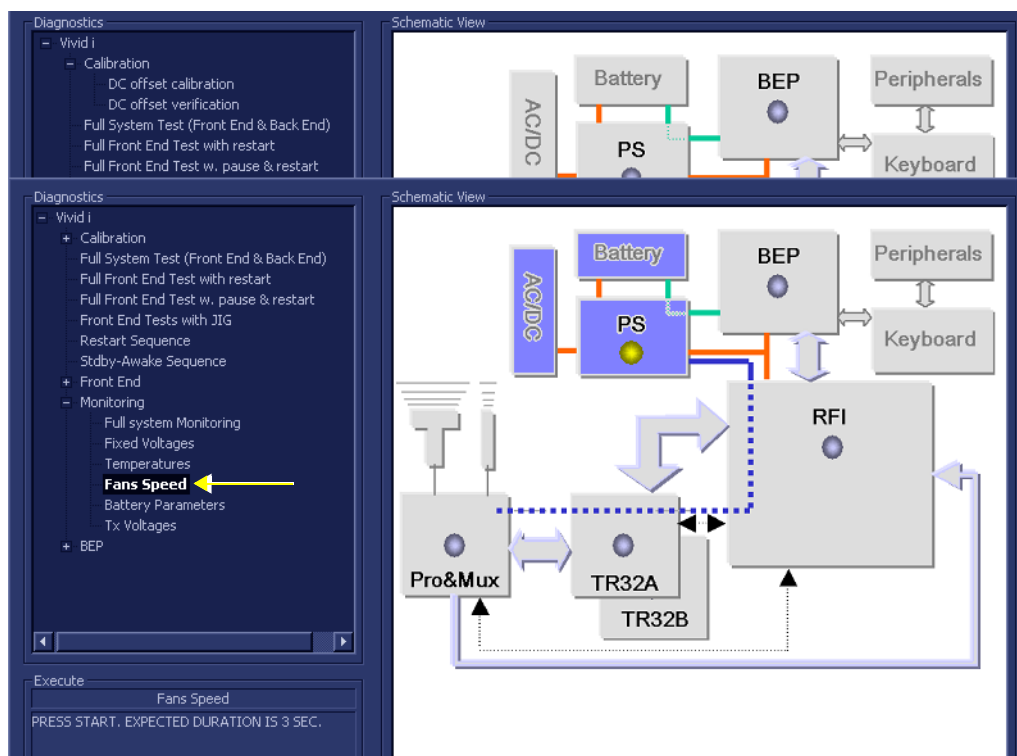
11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-5-1-4 Fans Speed Test

**NOTE:** For a description of this test, refer to the information in "Fans Speed Test" on page 7-14.

- 1.) In the *Diagnostic Test* window, trackball to **Fans Speed** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see Figure 7-68 below) and press **Set**. The Fans Speed Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (AC/DC, Battery, PS), as shown below:

**Figure 7-68 Fans Speed Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Fans Speed Test commences. While the test proceeds, the name of the test currently in progress (Fans Speed) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

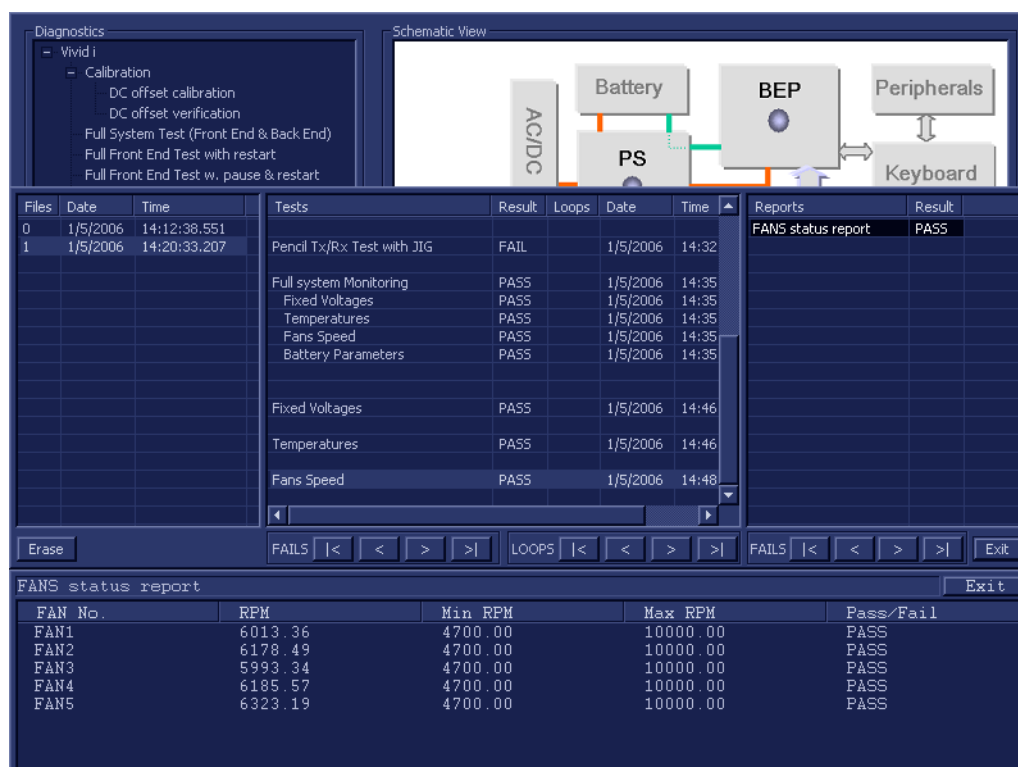
- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Fans Speed Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-69](#).

**Figure 7-69 View Test Log - Fans Speed Test**



**NOTE:** For this test, there is one report (*Fans Status*) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 7.) Check that the test passed and that result values for each fan are within the pre-defined *Max* and *Min* limits, as shown in [Figure 7-69](#).
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9.) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If the test fails, repeat the Fan Speed Test.
  - If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

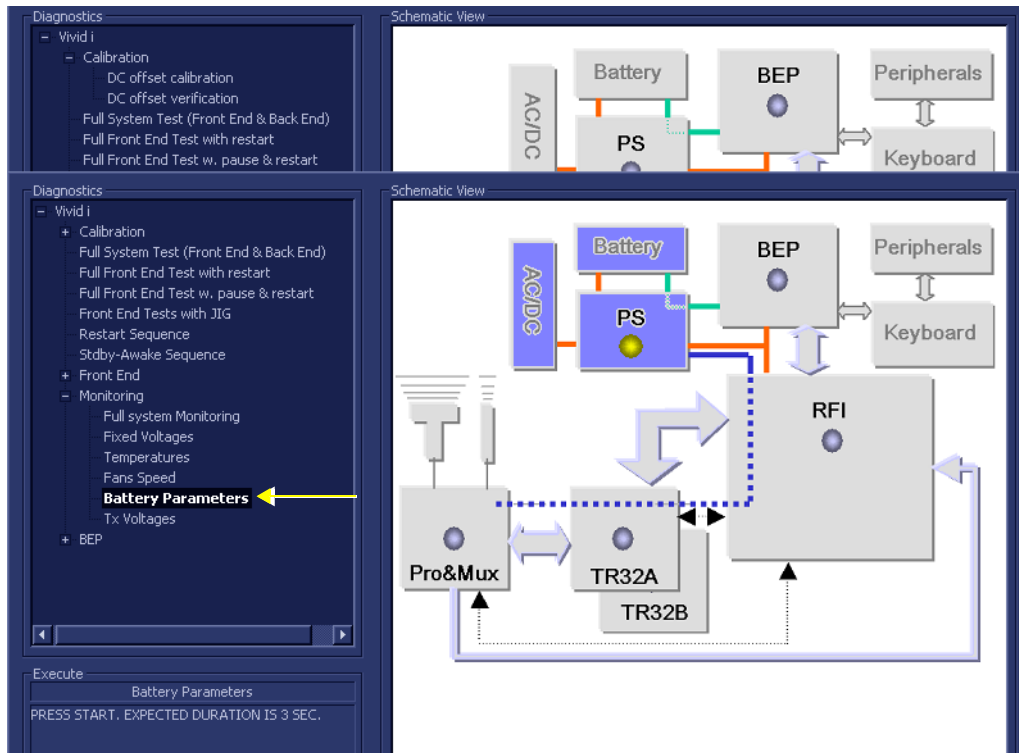
11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-5-1-5 Battery Parameters Test

**NOTE:** For a description of this test, refer to the information in ["Battery Parameters Test" on page 7-14](#).

- 1.) In the *Diagnostic Test* window, trackball to **Battery Parameters** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see [Figure 7-70 below](#)) and press **Set**. The Battery Parameters Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (AC/DC, Battery, PS), as shown below:

**Figure 7-70 Battery Parameters Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Battery Parameters Test commences. While the test proceeds, the name of the test currently in progress (Battery Parameters) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.



As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

5.) At any stage, trackball to the **Pause** button and press **Set**, if required.

6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Battery Parameters Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-71](#).

**Figure 7-71 View Test Log - Battery Parameters Test**

File:	Date	Time	Tests	Result	Loop	Date	Time	Reports	Result
1	14/8/2005	14:30:28.552							
2	16/8/2005	10:47:30.475							
3	16/8/2005	10:55:4.338	Battery Parameters	PASS		26/9/2005	13:16:1.282	Battery status report	PASS
4	22/9/2005	10:43:51.89							
5	25/9/2005	14:53:23.986							
6	25/9/2005	15:55:23.539							
7	26/9/2005	10:8:16.519							
8	26/9/2005	10:35:9.239							
9	26/9/2005	10:46:52.530							
10	26/9/2005	11:5:22.600							
11	26/9/2005	12:6:29.619							
12	26/9/2005	12:13:51.274							
13	26/9/2005	13:15:59.249							

Sensor Name	Value	Lower Limit	Upper Limit	Pass/Fail
Capacity [%]	88	0	100	PASS
Chargnig Voltage [mV]	16364	0	17000	PASS
Consumed/Supplied current [mA]	1371	-8000	5000	PASS
Cycle Count	4	0	1000	PASS
Cycle Count since last calibration	1	0	1000	PASS
Designed capacity [mAh]	6600	0	8000	PASS
Full charge Capacity [mAh]	6531	0	8000	PASS
Remaining Capacity [mAh]	5787	0	8000	PASS
Serial Number	1			PASS
Firmware Revision	2.10			PASS
Active Source [0-AC/DC: 1- Batt]	0			PASS

**NOTE:** For this test, there is one report (Battery Status) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 7.) Check that the test passed and that result values for each sensor are within the pre-defined *Lower* and *Upper* limits, as shown in [Figure 7-71](#).
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9.) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for

assistance.

- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).
- If the test fails again, repeat the Fan Speed Test.

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.)Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

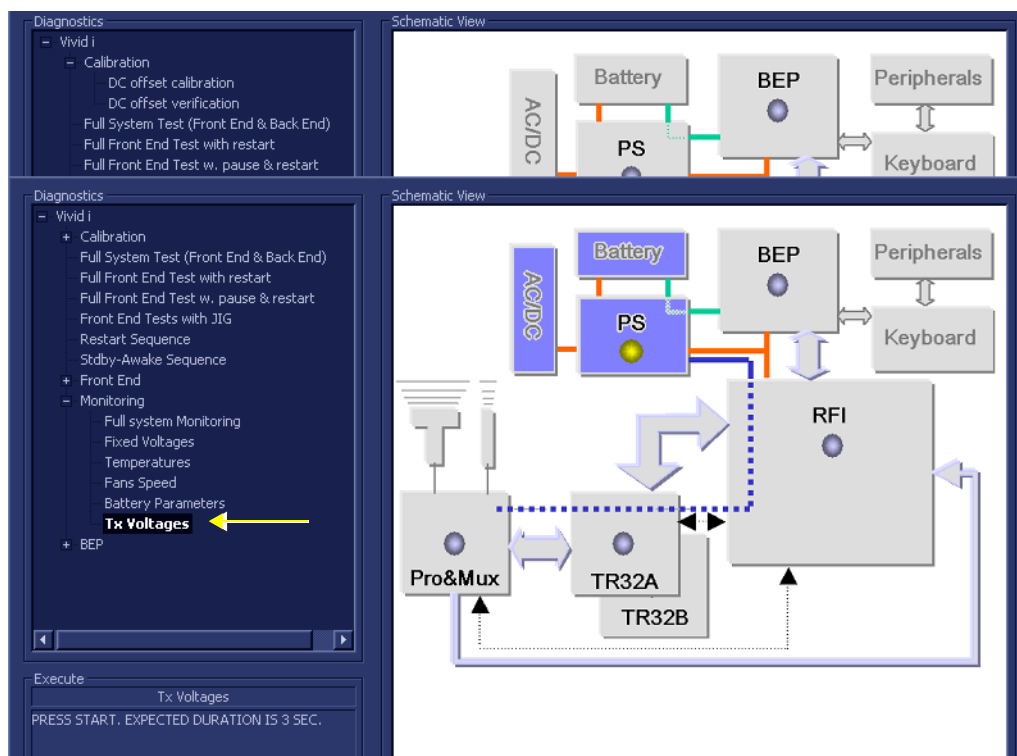
11.)Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-5-1-6 Tx Voltages Test

**NOTE:** For a description of this test, refer to the information in "Tx Voltages Test" on page 7-14.

- 1.) In the *Diagnostic Test* window, trackball to **Tx Voltages** in the list of *Monitoring* tests available for selection from the Diagnostic Test Tree (see Figure 7-72 below) and press **Set**. The Tx Voltages Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (AC/DC, Battery, PS), as shown below:

**Figure 7-72 Tx Voltages Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Tx Voltages Test commences. While the test proceeds, the name of the test currently in progress (Tx Voltages) is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Tx Voltages Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests passed or failed, as shown in the example in [Figure 7-73](#).

**Figure 7-73 View Test Log - Tx Voltages Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Temperatures	PASS		28/11/2004	TX Voltages report	PASS
2	11/11/2004	12:52:40.886	Fans Speed	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	Battery Parameters	PASS		28/11/2004		
4	18/11/2004	14:53:2.452	Tx Voltages	PASS		28/11/2004		
5	18/11/2004	14:11:7.920						
6	28/11/2004	15:34:4.422						
			Fixed Voltages	PASS		28/11/2004		
			Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			Tx Voltages	PASS		28/11/2004		

Voltage Name	Value[V]	Min Limit[V]	Expected[V]	Max Limit[V]	Pass/Fail
THV	-0.03	0.00	0.00	3.00	INVALID

**NOTE:** For this test, there is one report (Tx Voltages) which is listed in the Reports window on the right. By default, this report is displayed in the Reports window below.

- 7.) Check that the test passed and that result values for each fan are within the pre-defined *Max* and *Min* voltage limits, as shown in [Figure 7-73](#).
- 8) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for

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assistance.

- If errors were identified but the results were very close to the upper or lower limits, perform calibration, as described in ["DC Offset Calibration" on page 7-25](#), and then repeat the test.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

11.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## Section 7-6 Performing Back End Diagnostics on the System

The Back End Diagnostics Tests enable you to test the functionality of various Back End hardware components.

**NOTE:** The Back End Diagnostic Tests may be performed independently, regardless of sequence.

### 7-6-1 Accessing the Back End Diagnostic Test Options

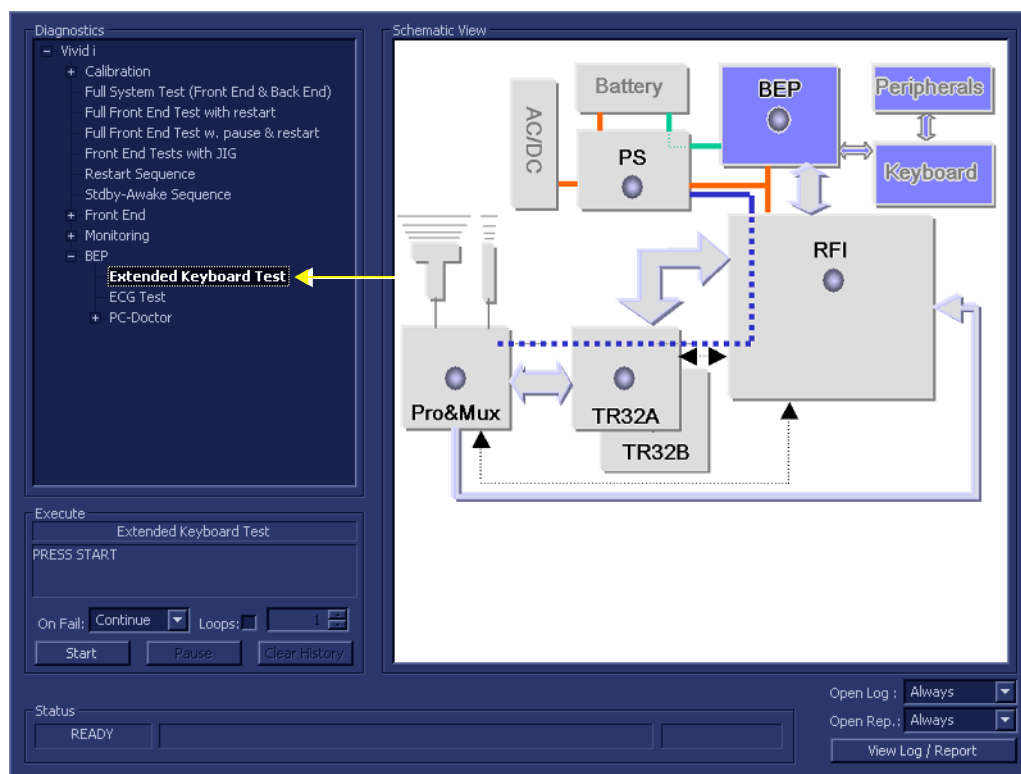
- Access the *Diagnostic Test* window, as described in the *Accessing the Front End Diagnostic Options* section, on page 7-25.

#### 7-6-1-1 Extended Keyboard Test

**NOTE:** For a description of this test, refer to the information in the ["Extended Keyboard Test"](#) on page 7-15.

- In the *Diagnostic Test* window, trackball to **Extended Keyboard Test** in the list of *BEP* tests available for selection from the Diagnostic Test Tree (see [Figure 7-74 below](#)) and press **Set**. The Extended Keyboard Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

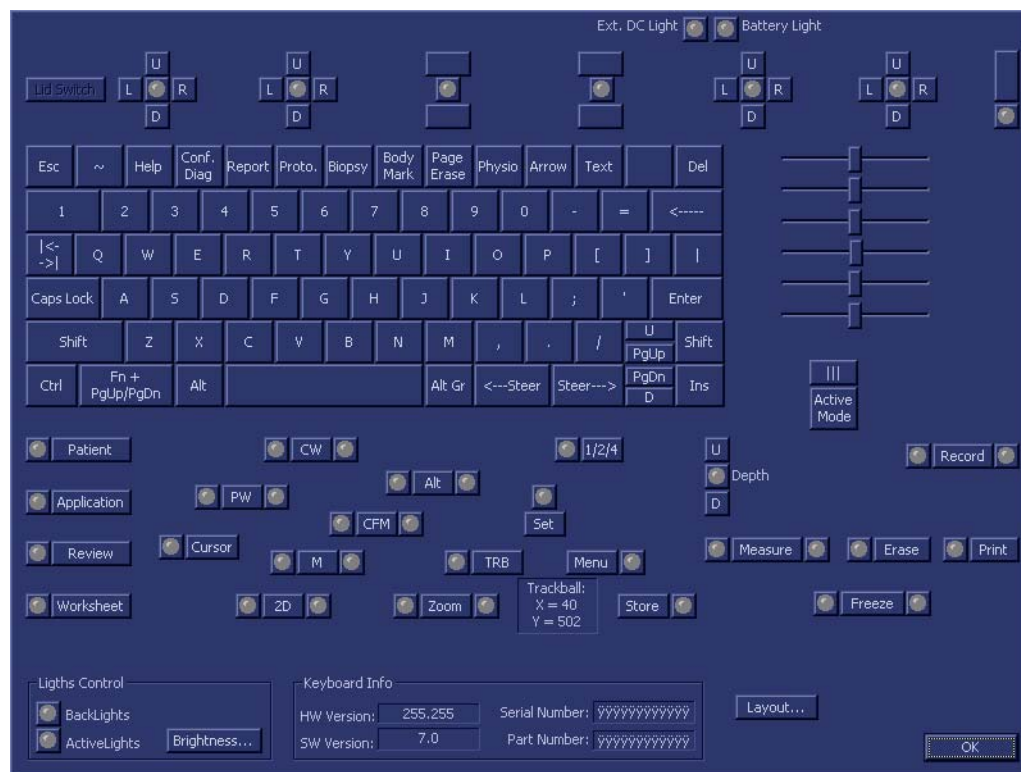
**Figure 7-74 Extended Keyboard Test**



- Trackball to the **Start** button and press **Set**.

The interactive Keyboard Test screen is displayed as shown below, enabling testing of the various external keyboard components.

**Figure 7-75 Extended Keyboard Test Screen**



- 3.) Begin the test by checking the ATCG sliders as follows:
  - a.) Move one of the ATGC sliders while inspecting the result displayed in the Extended Keyboard Test Screen (*right side* - [Figure 7-75](#)).
  - b.) As you move the slider, the corresponding position displayed in the Test Screen will be seen to change, accordingly. Check it is possible to move the slider through its full range. Also, make sure that moving the slider has no influence on any of the other ATGC sliders above or below (i.e., all other sliders remain stationary).
- 4.) Repeat [step 3](#) to test each of the other ATGC sliders.
- 5.) Check all keyboard keys, by pressing each in turn as follows:
  - a.) Press one key; make sure the depressed key is shown as *depressed* in the Test Screen.
  - b.) Release the key; make sure the released key is no longer showing as depressed in the Test Screen.
- 6.) Repeat [step 5](#) to test each of the other keyboard keys.
- 7.) Repeat [step 5](#) to test the following Trackball buttons: **Zoom**, **Trackball**, **Set**, **Update**, and **Store**.
- 8.) Repeat [step 5](#) to check the Soft Menu keys (each in two directions). Make sure that the corresponding movement is shown in the Test Screen.
- 9.) Repeat [step 5](#) to check the Soft Menu Rocker (in each of four directions). Make sure that the corresponding movement is shown in the Test Screen.

10.) Check the Gain rotary as follows:

- a.) When turning the rotary in a *clockwise* direction, each time you hear a click, *right* arrows are displayed in the Test Screen.
- b.) When turning in a *counter-clockwise* direction, each time you hear a click, *left* arrows are displayed in the Test Screen.

**NOTE:** *When performing this step, make sure that a minimum of 32 clicks are heard when turning the Gain rotary in both the clockwise and counter-clockwise directions to ensure that a complete check is performed.*

11.) Check the On/Off button.

- a.) Press the button once; make sure the button is shown as depressed in the Test Screen.
- b.) Release the button; make sure the button is no longer showing as depressed in the Test Screen.

12.) Check the Lights Control (Backlights and Active Lights), as follows:

- a.) trackball to the Active Lights button (under *Lights Control*) and press **Set**. Make sure that all the corresponding LEDs are activated (illuminated green - *Patient, CW, Application, etc.*).  
  
alternatively, check each one (one-by-one) individually.
- b.) trackball to the Backlights button (under *Lights Control*) and press **Set**. Make sure that all the extended keyboard backlighting is correctly illuminated.

13.) Trackball to the Battery Light button (top *right* of Test Screen) and press **Set**. Make sure that all the corresponding LEDs is activated (illuminates green).

14.) Trackball to the Ext DC Light button (top *right* of Test Screen) and press **Set**. Make sure that all the corresponding LEDs is activated (illuminates green).

15) Perform the Trackball Test, as follows:

- a.) Move the trackball; the position of the trackball cursor on the screen is reflected by a change in the displayed X and Y coordinate values.

**NOTE:** *when the trackball cursor is positioned at the extreme top left of the screen:  
X = 0 and Y = 0.*

- b.) As you move the trackball cursor, make sure the coordinate values *increase/decrease* in small steps, without jumping more than two or three digits. If for example, the values increment by steps of 10, this indicates that the trackball operation is faulty (possibly the trackball requires cleaning, or replacement).

16) When done with all the above tests, trackball to the **OK** button and press **Set**.



The View Test Log dialog box is displayed, as shown in [Figure 7-76](#) below.

**Figure 7-76 View Test Log - Extended Keyboard Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Battery Parameters	PASS		28/11/2004		
2	11/11/2004	12:52:40.886	Tx Voltages	PASS		28/11/2004		
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452						
5	18/11/2004	14:11:7.920	Fixed Voltages	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Temperatures	PASS		28/11/2004		
			Fans Speed	PASS		28/11/2004		
			Battery Parameters	PASS		28/11/2004		
			Tx Voltages	PASS		28/11/2004		
			Extended Keyboard Test	PASS		28/11/2004		

Erase
FAILS < > >|
LOOPS < > >|
FAILS < > >|
Exit

17.)Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

18) Proceed as follows:

- If the test passed but the original problem persists, contact your local On-Line Center for assistance.

19.)Press the **<Esc>** button on the keyboard to close the *Diagnostic Test Window*.

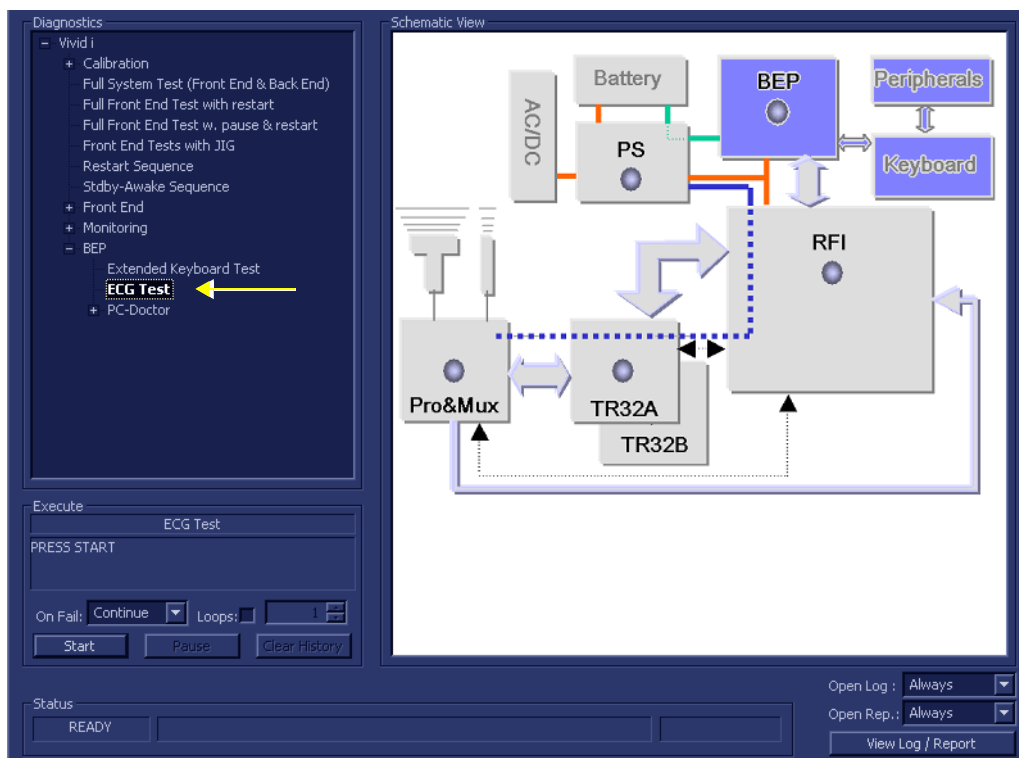
## 7-6-1-2 ECG Test

**NOTE:** For a description of this test, refer to the information in "ECG Test" on page 7-15.

**NOTE:** When performing this test, no probe should be connected to the system and nothing should be touching the probe connectors!

- 1.) Connect the ECG cable to the input on the ECG port on the right side of the Vivid q N scanner.
- 2.) Connect the ECG leads to yourself (as the simulated patient).
- 3.) In the *Diagnostic Test* window, trackball to **ECG Test** in the list of *BEP* tests available for selection from the Diagnostic Test Tree (see Figure 7-77 below) and press **Set**. The ECG Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-77 ECG Test**

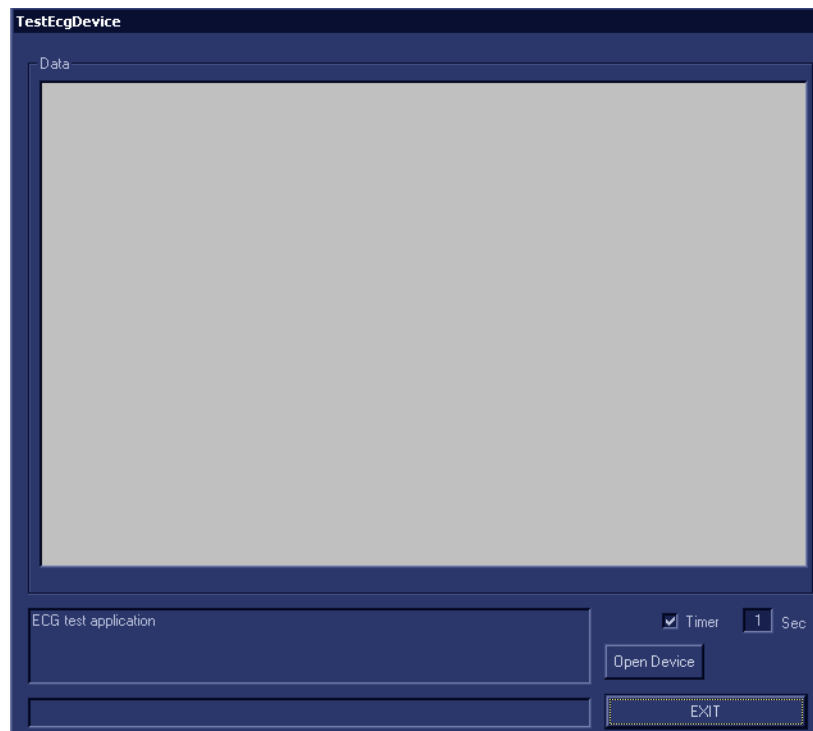


- 4.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 5.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 6.) Trackball to the **Start** button and press **Set**.



The interactive ECG Device Test screen is displayed as shown in Figure 7-78.

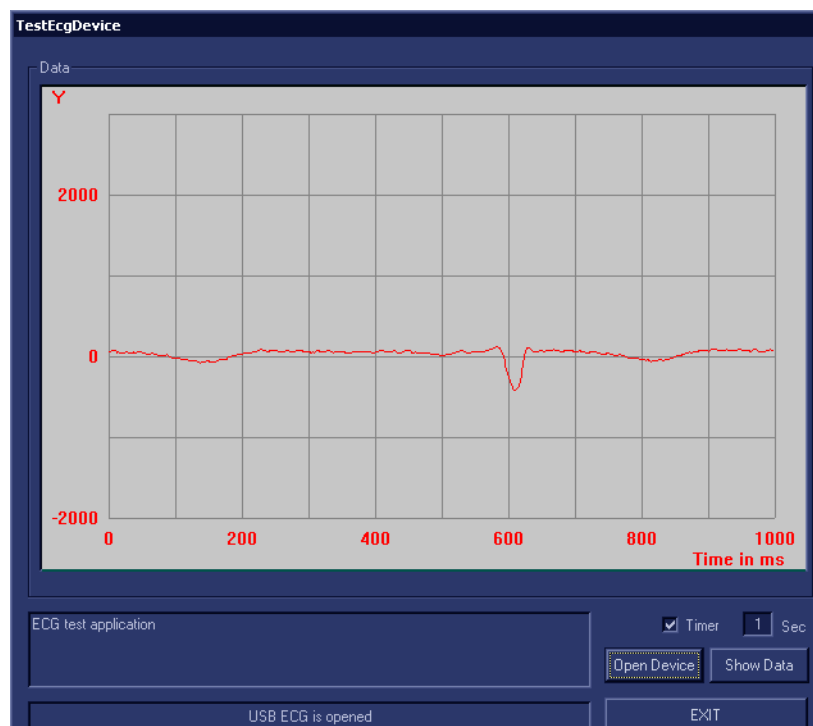
Figure 7-78 ECG Device Test Screen



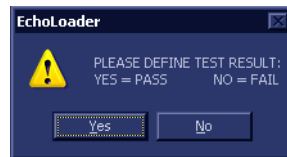
- 7.) Make sure that the resolution scale is set to 1 Sec. (as shown in [Figure 7-78](#), above).
- 8.) Trackball to the **Open Device** button and press **Set**.

The ECG signal is displayed in the Data area, as shown in the example below:

Figure 7-79 Test ECG - Data



- 9.) Verify that a single clear QRS signal is displayed on the screen, as shown in [Figure 7-79](#).
- 10.) When done, trackball to the **Exit** button and press **Set**.
- 11.) When prompted by the following message, select **Yes** or **No** as applicable:



- 12) Proceed as follows:
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- 13.) Press the <Esc> button on the keyboard to close the Diagnostic *Test Window*.

### 7-6-1-3 PC Doctor

**NOTE:** For a complete description of all PC Doctor tests, refer to the information in "PC Doctor" on page 7-15.

This procedures in this section are divided into two groups. Refer to the relevant procedure, as follows:

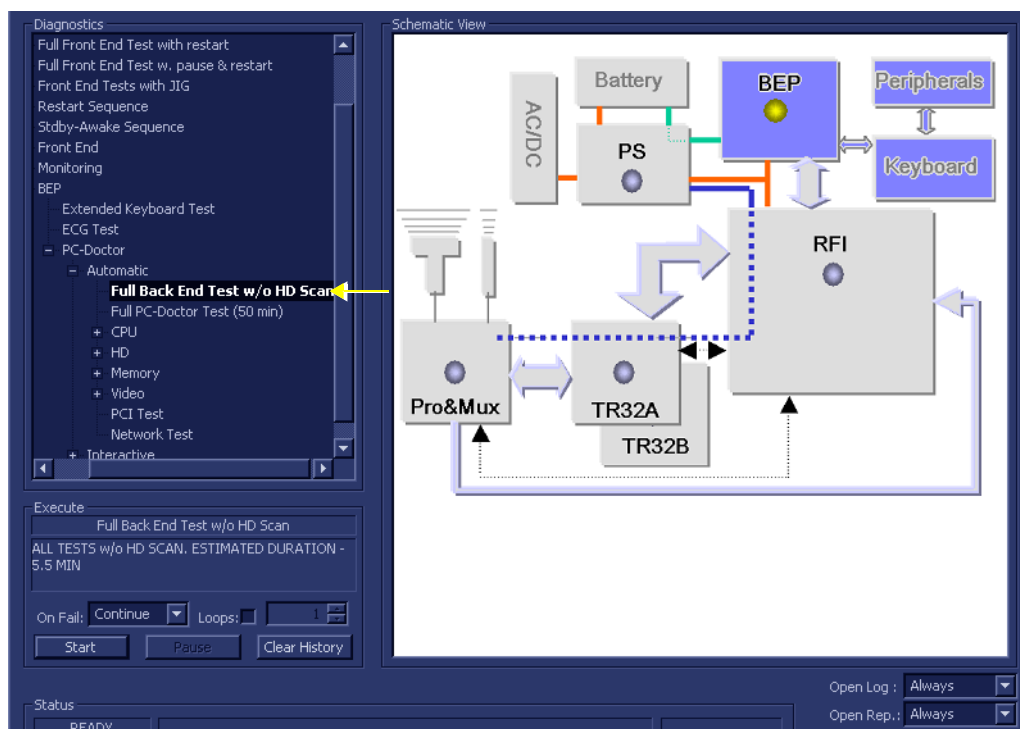
- Automatic Tests
  - Full Back End Test w/o Hard Disk Scan - see below
  - "Full PC Doctor Test (50 min)" on page 7-117
  - "CPU Tests" on page 7-119
  - "HD Test" on page 7-122
  - "Memory Test" on page 7-124
  - "Video Test" on page 7-126
  - "PCI Test" on page 7-128
  - "Network Test" on page 7-130

#### 7-6-1-3-1 Full Back End Test w/o Hard Disk Scan

**NOTE:** For a description of this test, refer to "Full Back End Test without Hard Disk" on page 7-15.

- 1.) In the *Diagnostic Test* window, trackball to **Full Back End Test w/o Hard Disk Scan** in the list of *PC Doctor* tests available for selection from the Diagnostic Test Tree (see Figure 7-80 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-80 Full Back End Test w/o Hard Disk Scan**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required.



Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.

- 4.) Trackball to the **Start** button and press **Set**.

The Full Back End Test w/o Hard Disk Scan commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full Back End Test w/o Hard Disk Scan sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in [Figure 7-81](#).

**Figure 7-81 View Test Log - Full Back End Test w/o Hard Disk Scan**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Full Test w/o HD Scan	PASS		28/11/2004		
2	11/11/2004	12:52:40.886	CPU Full Test	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	Registers	PASS		28/11/2004		
4	18/11/2004	14:5:32.452	Arithmetics	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	String Operations	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Logical Operations	PASS		28/11/2004		
			Math Registers	PASS		28/11/2004		
			Math Commands	PASS		28/11/2004		
			Math Arithmetics	PASS		28/11/2004		
			Transcendental	PASS		28/11/2004		
			MMX Arithmetics	PASS		28/11/2004		
			MMX Logical	PASS		28/11/2004		
			MMX Shift	PASS		28/11/2004		
			MMX Data Transfer	PASS		28/11/2004		
			MMX Misc	PASS		28/11/2004		

**NOTE:** For the Full Back End Test w/o Hard Disk Scan, many tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-81](#). For each currently-selected test (for example, CPU Full Test) the corresponding report is listed in Reports on the right. For details of each report, refer to the explanations provided in ["CPU Tests" on page 7-119](#):

- 7.) Use the scroll bars and/or arrows to scroll through the list of Test results and review the reports, as required.
- 8) When done, trackball to the **Exit** button and press **Set** to close the View Report window.

9) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

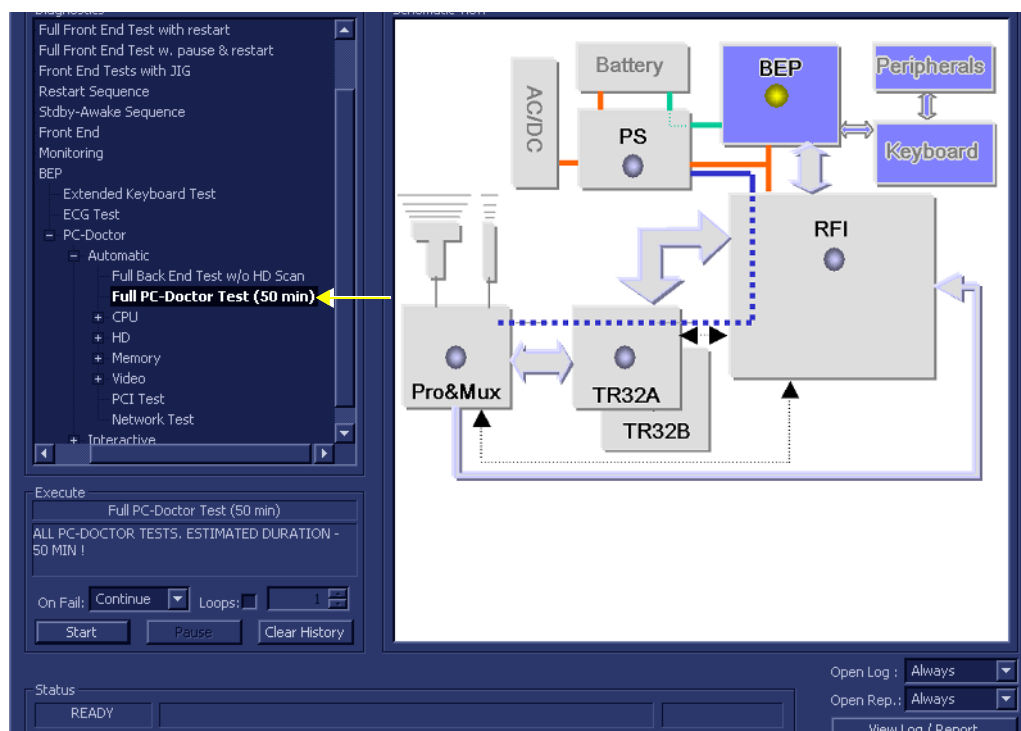
11.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

#### 7-6-1-3-2 Full PC Doctor Test (50 min)

**NOTE:** For a description of this test, refer to the information in ["Full PC Doctor Test \(50 min\)"](#) on page 7-15.

- 1.) In the *Diagnostic Test* window, trackball to **Full PC Doctor Test** in the list of *PC Doctor* tests available for selection from the Diagnostic Test Tree (see [Figure 7-82 below](#)) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-82 Full PC Doctor Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required.  
Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Full PC Doctor Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
  - 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.
- When the Full PC Doctor Test sequence is complete:
- the *Diagnostic Test* window displays the Finished message
  - the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-81](#).

**Figure 7-83 View Test Log - Full PC Doctor Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Full PC-Doctor Test (50 min)	PASS		28/11/2004		
2	11/11/2004	12:52:40.886	CPU Full Test	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	Registers	PASS		28/11/2004		
4	18/11/2004	14:53:32.452	Arithmetics	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	String Operations	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Logical Operations	PASS		28/11/2004		
			Math Registers	PASS		28/11/2004		
			Math Commands	PASS		28/11/2004		
			Math Arithmetics	PASS		28/11/2004		
			Transcendental	PASS		28/11/2004		
			MMX Arithmetics	PASS		28/11/2004		
			MMX Logical	PASS		28/11/2004		
			MMX Shift	PASS		28/11/2004		
			MMX Data Transfer	PASS		28/11/2004		
			MMX Misc	PASS		28/11/2004		

**NOTE:** For the Full PC Doctor Test, many tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-83](#). For each currently-selected test (for example, CPU Full Test) the corresponding report is listed in Reports on the right. For details of each report, refer to the explanations provided in "[CPU Tests](#)" on page 7-119:

- 7.) Use the scroll bars and/or arrows to scroll through the list of *Test* results and review the reports, as required.
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.



9) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.

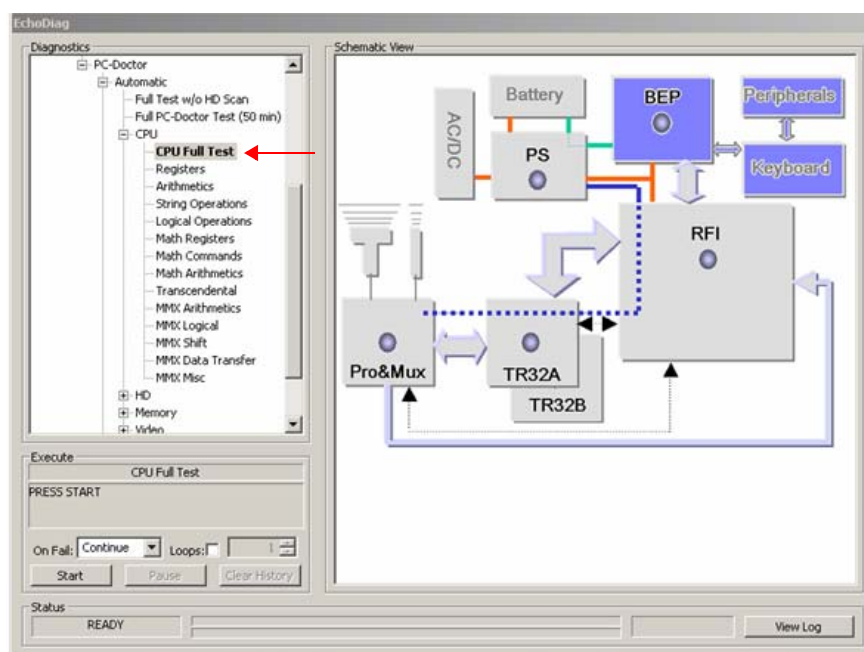
11.) Press the **<Esc>** button on the keyboard to close the *Diagnostic Test Window*.

### 7-6-1-3-3 CPU Tests

**NOTE:** For a description of these tests, refer to the information in ["CPU Tests" on page 7-15](#).

- 1.) In the *Diagnostic Test* window, trackball to **CPU Full Test** in the list of CPU tests available for selection from the Diagnostic Test Tree (see [Figure 7-84 below](#)) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-84 CPU Full Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required.  
Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The CPU Full Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
  - **Red:** Problems were identified in these components during the performance of the test.
  - **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.
- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
  - 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the CPU Full Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-81](#).

**Figure 7-85 View Test Log - CPU Full Test**

File:	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155	CPU Full Test	PASS		28/11/2004		
2	11/11/2004	12:52:40.886	Registers	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	Arithmetics	PASS		28/11/2004		
4	18/11/2004	14:5:32.452	String Operations	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Logical Operations	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Math Registers	PASS		28/11/2004		
			Math Commands	PASS		28/11/2004		
			Math Arithmetics	PASS		28/11/2004		
			Transcendental	PASS		28/11/2004		
			MMX Arithmetics	PASS		28/11/2004		
			MMX Logical	PASS		28/11/2004		
			MMX Shift	PASS		28/11/2004		
			MMX Data Transfer	PASS		28/11/2004		
			MMX Misc	PASS		28/11/2004		

**NOTE:** For the CPU Full Test, many tests are performed in the test sequence; these are listed in the *Tests* window as shown in [Figure 7-83](#). For each currently-selected test (for example, *Registers*) the corresponding report is listed in *Reports* on the right.

- 7.) Use the scroll bars and/or arrows to scroll through the list of *Test* results and review the reports, as required:
  - CPU Registers
  - CPU Arithmetics
  - CPU String Operations
  - CPU Logical Operations
  - CPU Math Registers
  - CPU Math Commands

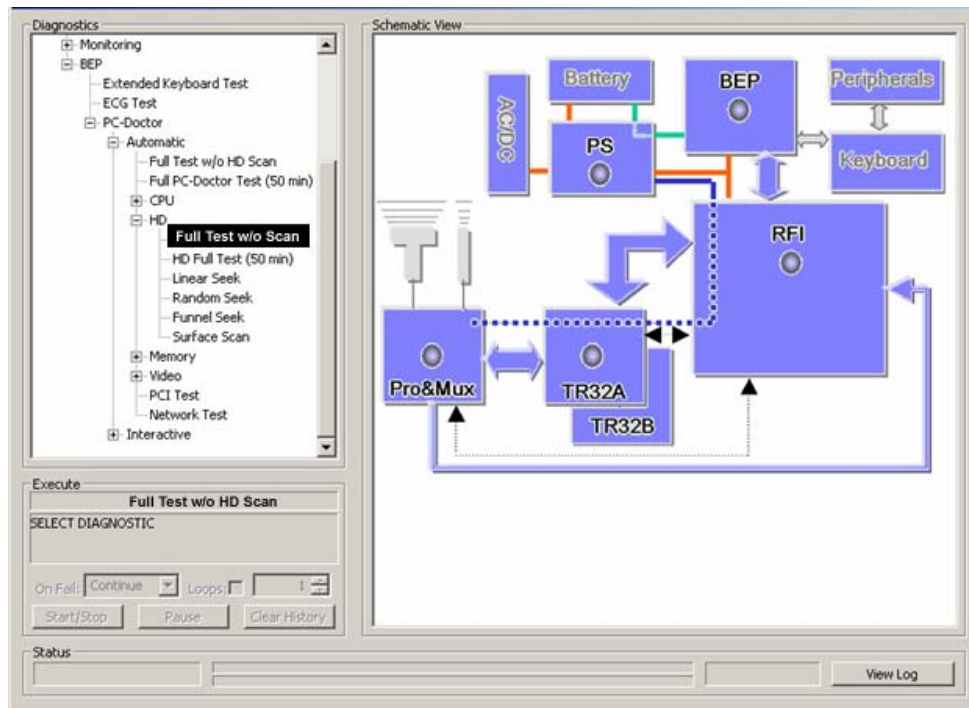
- 
- CPU Transcendental
  - CPU MMX Arithmetic
  - CPU MMX Logical
  - CPU MMX Shift
  - CPU MMX Data Transfer
  - CPU MMX Misc.
- 8) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9) After reviewing the test results, proceed as follows:
- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).
- If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).
- If the problem still persists, contact the GE On-Line Center for assistance.
- 10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 11.) Press the <**Esc**> button on the keyboard to close the *Diagnostic Test Window*.

## 7-6-1-3-4 HD Test

**NOTE:** For a description of these tests, refer to the information in "HD Test" on page 7-16.

- 1.) In the *Diagnostic Test* window, trackball to **Hard Drive Full Test w/o Scan** in the list of *HD* tests available for selection from the Diagnostic Test Tree (see Figure 7-86 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-86 Hard Drive Full Test w/o Scan**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Hard Drive Full Test w/o Scan commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Hard Drive Full Test w/o Scan sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in [Figure 7-87](#).

**Figure 7-87 View Test Log - Hard Drive Full Test w/o Scan**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Transcendental	PASS		28/11/2004		
2	11/11/2004	12:52:40.886	MMX Arithmetics	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	MMX Logical	PASS		28/11/2004		
4	18/11/2004	14:53:32.452	MMX Shift	PASS		28/11/2004		
5	18/11/2004	14:11:17.920	MMX Data Transfer	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	MMX Misc	PASS		28/11/2004		
			Registers	PASS		28/11/2004		
			HD Full Test w/o Scan	PASS		28/11/2004		
			Linear Seek	PASS		28/11/2004		
			Random Seek	PASS		28/11/2004		
			Funnel Seek	PASS		28/11/2004		

**NOTE:** For the Hard Drive Full Test w/o Scan, several tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-87](#). For each currently-selected test (for example, Linear Seek) the corresponding report is listed in Reports on the right.

- 7.) Use the scroll bars and/or arrows to scroll through the list of Test results and review the reports, as required:
  - Linear Seek
  - Random Seek
  - Funnel Scan
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9.) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

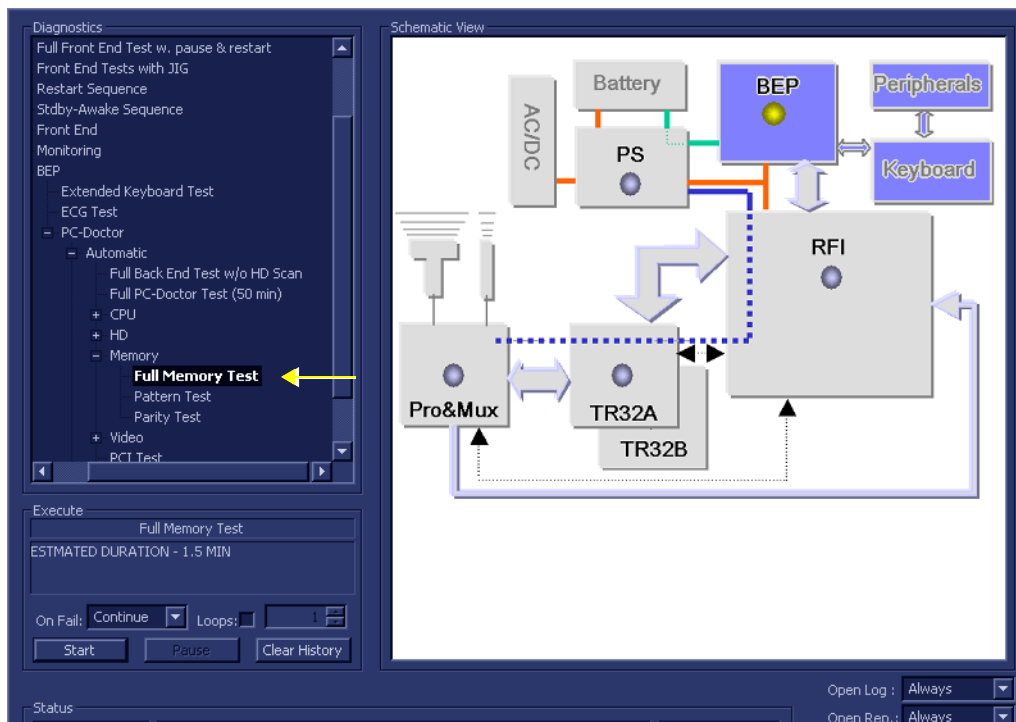
- 10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 11.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

### 7-6-1-3-5 Memory Test

**NOTE:** For a description of these tests, refer to the information in ["Memory Test" on page 7-17](#).

- 1.) In the *Diagnostic Test* window, trackball to **Full Memory Test** in the list of *Memory* tests available for selection from the Diagnostic Test Tree (see [Figure 7-88 below](#)) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-88 Full Memory Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Full Memory Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full Memory Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-89](#).

**Figure 7-89 View Test Log - Full Memory Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	Registers	PASS		28/11/2004		
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452	HD Full Test w/o Scan	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Linear Seek	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Random Seek	PASS		28/11/2004		
			Funnel Seek	PASS		28/11/2004		
			Surface Scan	PASS		28/11/2004		
			Full Memory Test	PASS		28/11/2004		
			Pattern Test	PASS		28/11/2004		
			Parity Test	PASS		28/11/2004		

**NOTE:** For the Full Memory Test, several tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-89](#). For each currently-selected test (for example, Memory Pattern Test) the corresponding report is listed in Reports on the right.

- 7.) Use the scroll bars and/or arrows to scroll through the list of Test results and review the reports, as required:
  - Memory Pattern Test
  - Memory Parity Test
- 8) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).  
If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).  
  
If the problem still persists, contact the GE On-Line Center for assistance.
- 10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 11.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

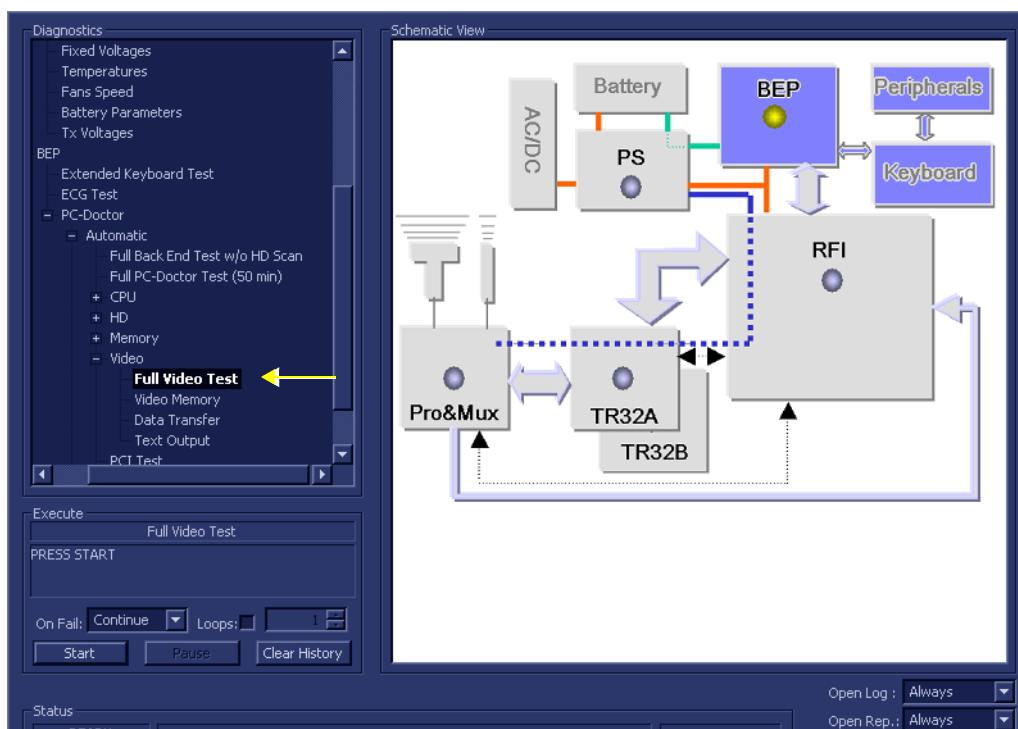


## 7-6-1-3-6 Video Test

**NOTE:** For a description of these tests, refer to the information in "Video Test" on page 7-17.

- 1.) In the *Diagnostic Test* window, trackball to **Full Video Test** in the list of *Video* tests available for selection from the Diagnostic Test Tree (see Figure 7-88 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-90 Full Video Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Full Video Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.



- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.

When the Full Video Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-91](#).

**Figure 7-91 View Test Log - Full Video Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155	Funnel Seek	PASS		28/11/2004		
2	11/11/2004	12:52:40.886						
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:53:32.452	Surface Scan	PASS		28/11/2004		
5	18/11/2004	14:11:7.920						
6	28/11/2004	15:34:4.422	Full Memory Test	PASS		28/11/2004		
			Pattern Test	PASS		28/11/2004		
			Parity Test	PASS		28/11/2004		
			Full Video Test	PASS		28/11/2004		
			Video Memory	PASS		28/11/2004		
			Data Transfer	PASS		28/11/2004		
			Text Output	PASS		28/11/2004		

**NOTE:** For the Full Video Test, several tests are performed in the test sequence; these are listed in the Tests window as shown in [Figure 7-91](#). For each currently-selected test (for example, Video Memory) the corresponding report is listed in Reports on the right.

- 7.) Use the scroll bars and/or arrows to scroll through the list of *Test* results and review the reports, as required:
  - Video Memory
  - Video Data Transfer
  - Video Text Output
- 8.) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 9.) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

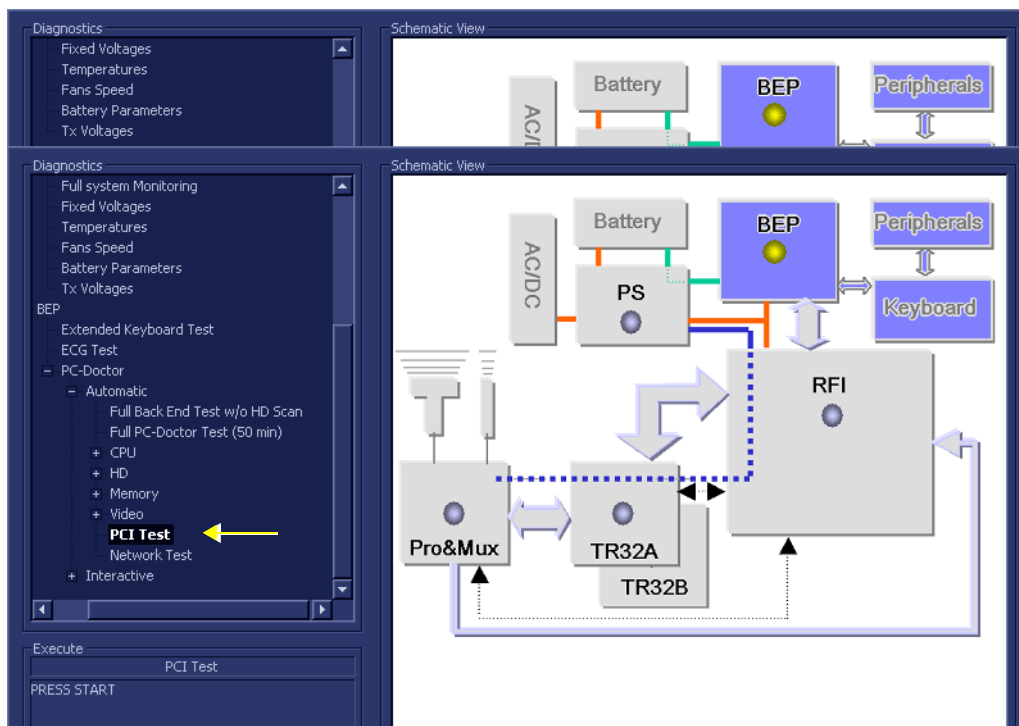
- 10.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 11.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## 7-6-1-3-7 PCI Test

**NOTE:** For a description of this test, refer to the information in "PCI Test" on page 7-17.

- 1.) In the *Diagnostic Test* window, trackball to **PCI Test** in the list of *PC Doctor* tests available for selection from the Diagnostic Test Tree (see Figure 7-92 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-92 PCI Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required. Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The PCI Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
  - 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.
- When the PCI Test sequence is complete:
- the *Diagnostic Test* window displays the Finished message
  - the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-89](#).

**Figure 7-93 View Test Log - PCI Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	Surface Scan	PASS		28/11/2004		
3	15/11/2004	15:53:22.26						
4	18/11/2004	14:5:32.452	Full Memory Test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Pattern Test	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Parity Test	PASS		28/11/2004		
			Full Video Test	PASS		28/11/2004		
			Video Memory	PASS		28/11/2004		
			Data Transfer	PASS		28/11/2004		
			Text Output	PASS		28/11/2004		
			PCI Test	PASS		28/11/2004		

**NOTE:** For the PCI Test, there is one report which is listed in the Tests window as shown in [Figure 7-93](#).

- 7) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 8) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

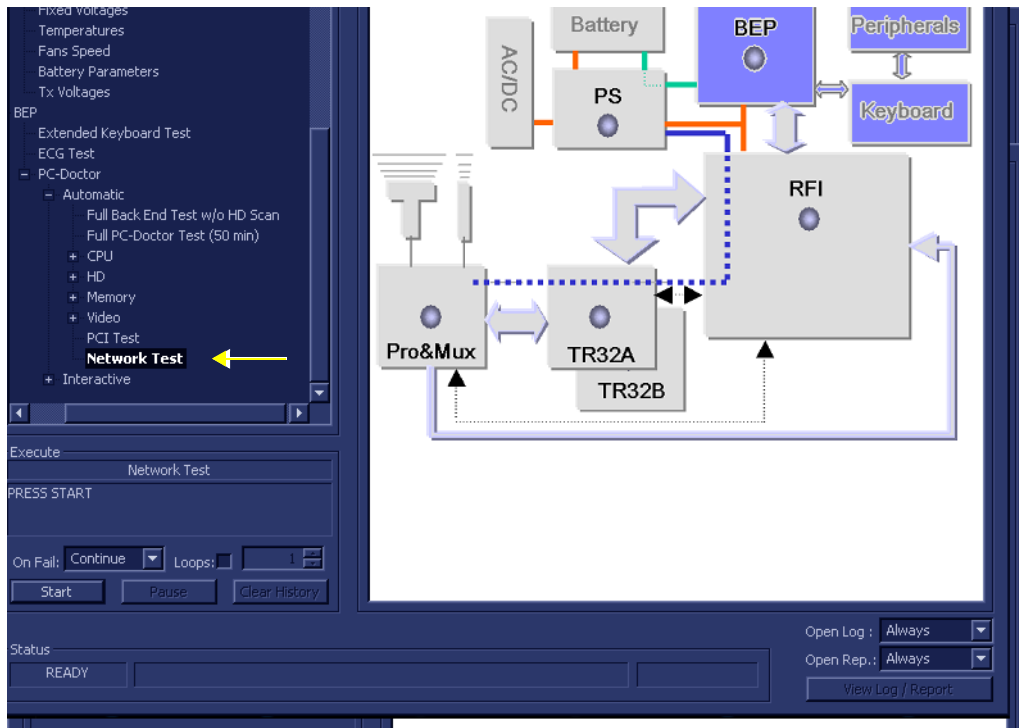
If the problem still persists, contact the GE On-Line Center for assistance.
- 9.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 10.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

## 7-6-1-3-8 Network Test

**NOTE:** For a description of this test, refer to the information in "Network Test" on page 7-17.

- 1.) In the *Diagnostic Test* window, trackball to **Network Test** in the list of *PC Doctor* tests available for selection from the Diagnostic Test Tree (see Figure 7-94 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-94 Network Test**



- 2.) Under the *Special Instructions* area, activate the **Loops** checkbox and select the required number of *Loops* from the combo box.
- 3.) Adjacent to *On Fail*, select either **Stop** or **Continue**, as required.  
Stopping on failure enables you to review a failed test, the moment it fails. Alternatively, you may prefer testing to continue on failure and later you may review the report.
- 4.) Trackball to the **Start** button and press **Set**.



The Network Test commences. While the test proceeds, the name of the test currently in progress is displayed in the *Execute* field and the current *Loop #* and specific test are shown below. The messages *Init Done* and *Please Wait* are displayed beside the progress bar in the *Status* area.

As the testing sequence progresses, the progress bar will advance to reflect the test progress. Status indicators in the Data Flow map corresponding to the various system components will be highlighted in the appropriate color to indicate the current test status, as follows:

- **Green:** All recommended tests for these components have been completed and no problems were identified.
- **Red:** Problems were identified in these components during the performance of the test.
- **Yellow:** The tests executed so far on these components have passed, but not all recommended tests have been performed.

- 5.) At any stage, trackball to the **Pause** button and press **Set**, if required.
- 6.) To resume testing (from the point where you paused), trackball to the **Start** button and press **Set**.  
When the Network Test sequence is complete:
  - the *Diagnostic Test* window displays the Finished message
  - the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-95](#).

**Figure 7-95 View Test Log - Network Test**

File#	Date	Time	Tests	Result	Loop	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886	Full Memory Test	PASS		28/11/2004		
3	15/11/2004	15:53:22.26	Pattern Test	PASS		28/11/2004		
4	18/11/2004	14:5:32.452	Parity Test	PASS		28/11/2004		
5	18/11/2004	14:11:7.920						
6	28/11/2004	15:34:4.422						
			Full Video Test	PASS		28/11/2004		
			Video Memory	PASS		28/11/2004		
			Data Transfer	PASS		28/11/2004		
			Text Output	PASS		28/11/2004		
			PCI Test	PASS		28/11/2004		
			Network Test	PASS		28/11/2004		

**NOTE:** For the Network Test, there is one report which is listed in the Tests window as shown in [Figure 7-95](#).

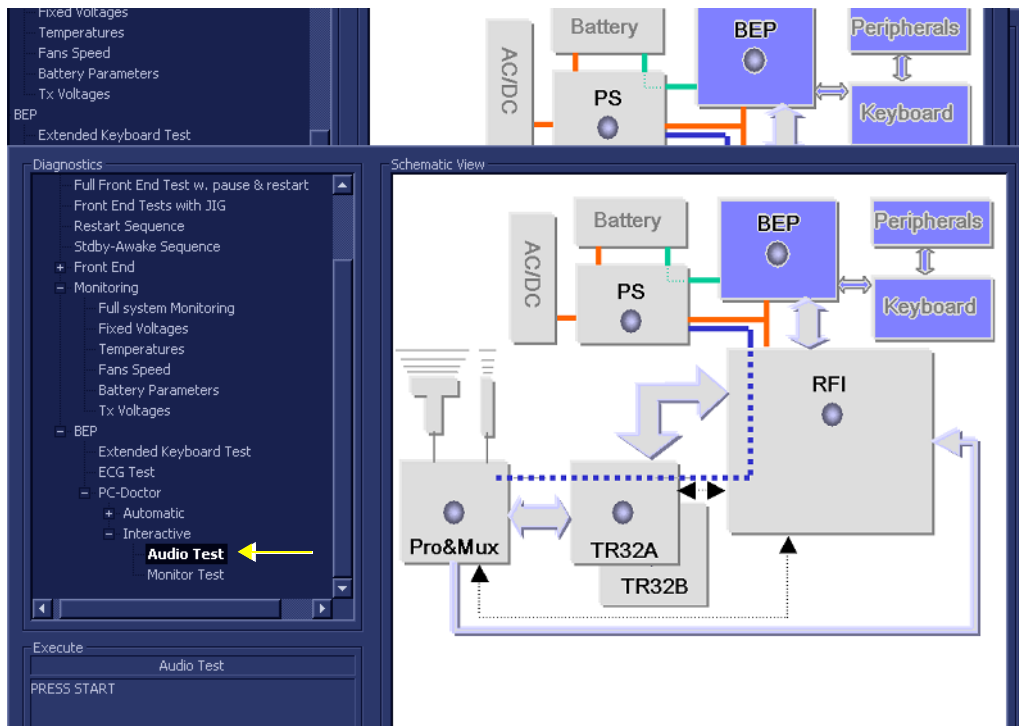
- 7) When done, trackball to the **Exit** button and press **Set** to close the View Report window.
- 8) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).  
If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).  
  
If the problem still persists, contact the GE On-Line Center for assistance.
- 9.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 10.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

### 7-6-1-3-9 Audio Test

**NOTE:** For a description of this test, refer to "Audio Test" on page 7-18.

- 1.) In the *Diagnostic Test* window, trackball to **Audio Test** in the list of *Interactive PC Doctor* tests available for selection from the Diagnostic Test Tree (see Figure 7-96 below) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

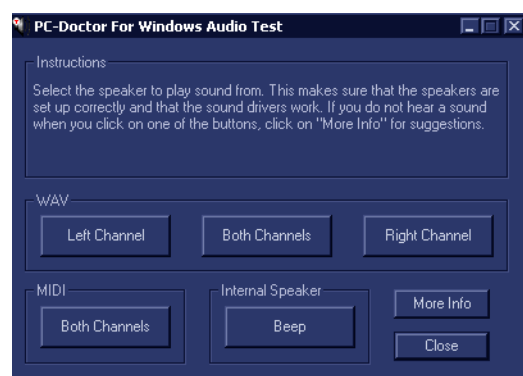
**Figure 7-96 Audio Test**



- 2.) Trackball to the **Start** button and press **Set**.

The interactive PC Dr for Windows Audio Test screen is displayed, as shown in Figure 7-97.

**Figure 7-97 PC Doctor for Windows Audio Test**



- 3.) Trackball to the *Left Channel*, *Right Channel*, *Both Channels* or *Midi* button and press **Set** to select the speaker from which to play sound.

**NOTE:** The Internal Speaker Beep is disabled.

- 4.) Check that the sound produced from the speaker is OK and audible.
- 5.) Repeat [step 3](#) to test the other channels.

**NOTE:** If no sound is heard, trackball to the **More Info** button and press **Set**. Follow the on-screen suggestions provided.

- 6.) When done, trackball to the **Close** button and press **Set** to exit the test.

When the Audio Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-98](#).

**Figure 7-98 View Test Log - Audio Test**

File:	Date	Time	Tests	Result	Loop:	Date	Reports	Result
1	11/11/2004	12:35:45.155						
2	11/11/2004	12:52:40.886						
3	15/11/2004	15:53:22.26	Full Video Test	PASS		28/11/2004		
4	18/11/2004	14:53:22.452	Video Memory	PASS		28/11/2004		
5	18/11/2004	14:11:7.920	Data Transfer	PASS		28/11/2004		
6	28/11/2004	15:34:4.422	Text Output	PASS		28/11/2004		
			PCI Test	PASS		28/11/2004		
			Network Test	PASS		28/11/2004		
			Keyboard Test	PASS		28/11/2004		
			Audio Test	PASS		28/11/2004		

**NOTE:** For the Audio Test, there is one report which is listed in the Tests window as shown in [Figure 7-98](#).

- 7) After reviewing the test results, proceed as follows:
  - If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
  - If the test passed but the original problem persists, contact your local On-Line Center for assistance.
  - If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

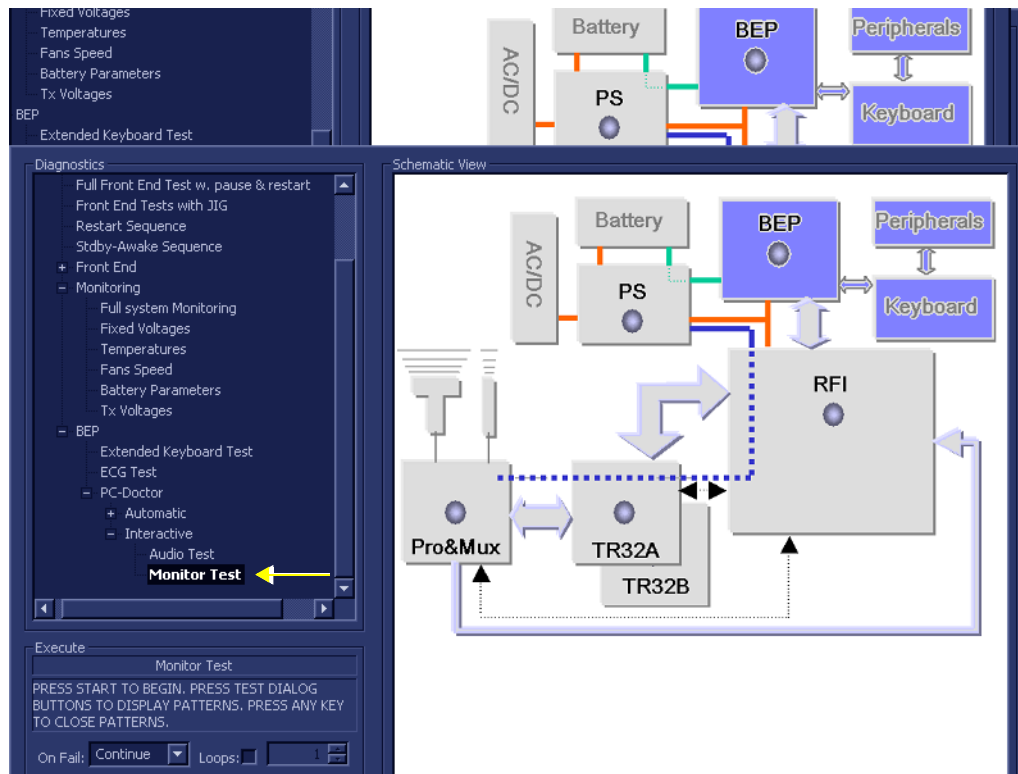
- 8.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 9.) Press the <Esc> button on the keyboard to close the *Diagnostic Test Window*.

### 7-6-1-3-10 Monitor Test

**NOTE:** For a description of the monitor tests, refer to *"Monitor Test"* on page 7-18.

- 1.) In the *Diagnostic Test* window, trackball to **Monitor Test** in the list of *Interactive PC Doctor* tests available for selection from the Diagnostic Test Tree (see [Figure 7-99 below](#)) and press **Set**. The Test name is displayed under *Execute*; the relevant system components to be tested are highlighted light blue in the Schematic View (BEP, Peripherals, Keyboard), as shown below:

**Figure 7-99 Monitor Test**

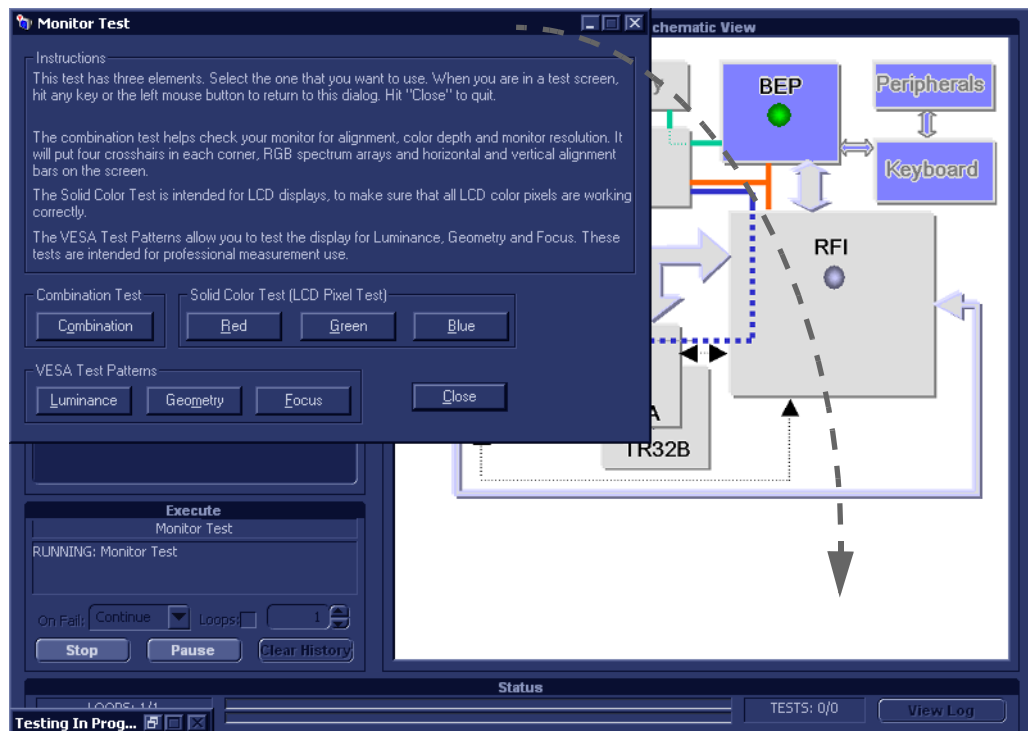


- 2.) Trackball to the **Start** button and press **Set**.

The interactive PC Dr for Windows Monitor Test screen is displayed at the top left of the display screen, as shown in [Figure 7-100](#).



**Figure 7-100 PC Doctor for Windows Monitor Test**



- 3.) Select and drag the Test screen to another region so that the display screen is not obscured.
- 4.) Trackball to the required button (*Solid Color Test: Red, Green or Blue*) and press **Set** to perform the corresponding test.
- 5.) When in the displayed screen, press any key to return to PC Dr for Windows Monitor Test screen.
- 6.) When done, trackball to the **Close** button and press **Set** to exit the test.

When the Monitor Test sequence is complete:

- the *Diagnostic Test* window displays the Finished message
- the View Test Log window opens automatically, listing all tests performed and showing details of which tests and sub-tests passed or failed, as shown in the example in [Figure 7-101](#).

**Figure 7-101 View Test Log - Monitor Test**

Files	Date	Time	Tests	Result	Loops	Date	Time	Reports	Result
0	5/12/2004	12:12:35.253							
1	5/12/2004	12:25:7.84	Audio Test	PASS		6/12/2004	20:38:9.850		
2	5/12/2004	12:33:13.934							
3	5/12/2004	12:57:56.196	Monitor Test	PASS		6/12/2004	20:41:48.74		
4	5/12/2004	13:17:13.420							
5	5/12/2004	19:54:1.425							
6	6/12/2004	19:51:55.862							
7	6/12/2004	20:0:54.807							
8	6/12/2004	20:38:9.350							

Erase

FAILS

<

<

>

>

LOOPS

<

<

>

>

FAILS

<

<

>

>

Exit

**NOTE:** *For the Monitor Test, there is one report which is listed in the Tests window as shown in [Figure 7-101](#).*

7) After reviewing the test results, proceed as follows:

- If no problems were identified, it is recommended to re-boot the system (this is obligatory when prompted).
- If the test passed but the original problem persists, contact your local On-Line Center for assistance.
- If errors were identified (results exceeding acceptable upper or lower limits), verify that all system cables and boards are connected (not misplaced) and functioning properly, as described in [Chapter 5 - Components and Function \(Theory\)](#).

If the problem persists, this indicates that either the specific board you tested is faulty or that another board that supports the operation of this board is faulty. Continue trouble-shooting down to the appropriate board. (If necessary, perform a specific test).

If the problem still persists, contact the GE On-Line Center for assistance.

- 8.) Trackball to the **Exit** button and press **Set** to close the *View Test Log* dialog box.
- 9.) Press the **<Esc>** button on the keyboard to close the *Diagnostic Test Window*.

## Section 7-7

### Automatic Error Log

The Vivid q N automatically logs the software activity, sequences and error messages that occur during normal operation. Each day's activity is compressed into a single daily logger report, with a time stamp appearing in each line of the report. Additional user comments and screen captures, can also be included in the report. Each day's report is saved in the system for 90 days, during which time they can be recalled and saved to disk.

#### 7-7-1 Adding Bookmarks

One of the new features added in version BT06 is the ability to add bookmarks. When a problem occurs during regular use of the system, simply press **< Alt+B >**. This action will insert a "bookmark" into the system failure logs. The message *Log is Bookmarked* will be displayed on the prompt line, as shown in the example in [Figure 7-102](#).

**Figure 7-102 Message Showing Bookmark Added to Log**



The bookmark will allow users to place a time-stamp where a particular problem has occurred, while continuing with their current activity with minimum interruption.

**NOTE:** *The log file bookmark will later make it easy for service engineers to locate the location of the failure logging more precisely.*

#### 7-7-2 Extracting Logs

Whenever log extraction is necessary due to the occurrence of an error that needs to be reported, or any other reason, follow the instructions below:

- 1.) While the system is turned-ON in any mode, press **<ALT + D>** on the alphanumeric keyboard.

The System Problem Reporting dialog opens - see [Figure 7-103 on page 7-138](#).

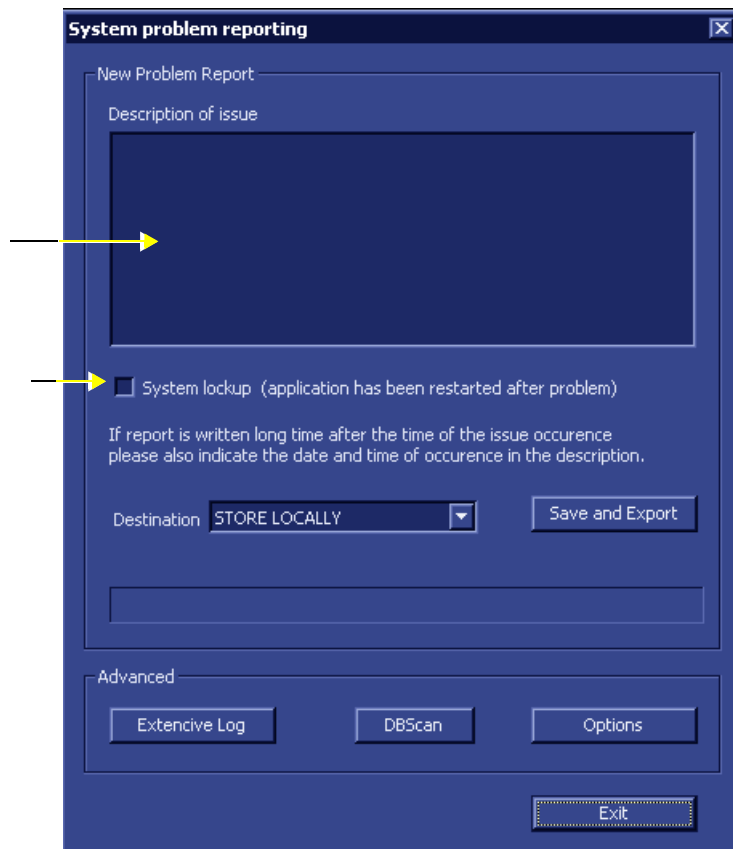
- 2.) In the *Description of Issue* window, type a description of the problem.

Notes should be made regarding the selected probe, the imaging mode and the application that was being used at the time of the malfunction.

If applicable, try to describe the button or key-pushing sequence that immediately preceded the problem.

If applicable, activate the System Lockup checkbox.

Figure 7-103 System Problem Reporting Dialog



3.) If use of the Advanced features is required, proceed to the following instructions, as applicable:

- ["Enabling Extensive Logging" on page 7-141](#)
- ["Advanced Options" on page 7-143](#)
- ["DB Scan" on page 7-146](#)

After the required advanced features have been selected, continue with [step 4](#) and [step 5](#), below.

4.) From the *Destination* drop-down menu, select the required export destination (DVD/CD or Memory Stick) then click **Save and Export**.

A Zip file (named "logfile\_<date>\_<time>.zip") is copied onto the selected removable media.

**NOTE:** *Previously, users were required to save log files before exporting them. With version BT06, these two operations are performed as one step.*

When selecting DVD/CD as the export destination, first make sure that the DVD/CD has been formatted. For details, see ["Formatting a DVD/CD" on page 7-139](#).

5.) When done, click the **Exit** button.

The System Problem Reporting dialog closes.

6.) Press **<Ctrl>+E** to eject the media.

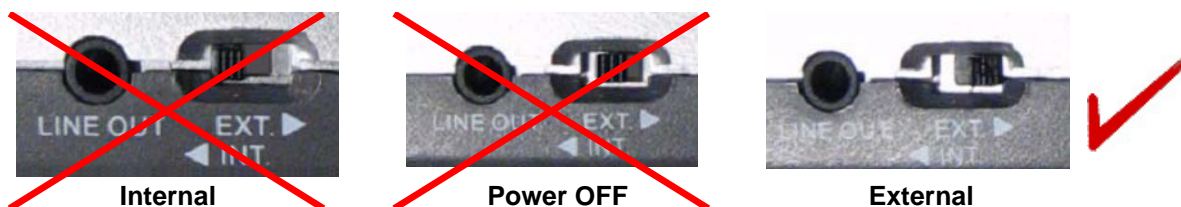
### 7-7-2-1 Formatting a DVD/CD

Prior to exporting logs or any data onto a DVD/CD, the media must be formatted, as described below.

#### To Format a DVD/CD:

- 1.) Connect the DVD/CD-RW media drive to the USB port and make sure the DVD/CD-RW power switch on the rear of the drive is set in the **External** position, as shown in [Figure 7-104](#), below.

**Figure 7-104 Power Switch in External Position**



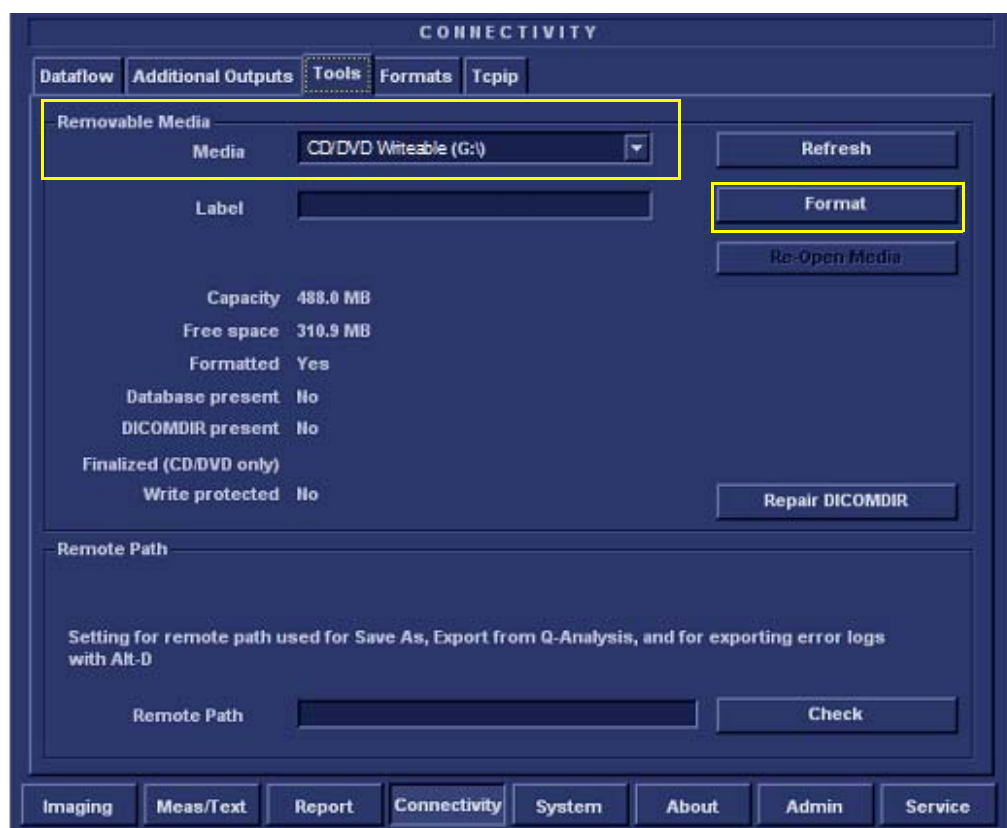
- 2.) Insert the blank DVD/CD media into the DVD/CD-RW drive tray.



**NOTICE IMPORTANT:** Use only CD-R, DVD-R or DVD+R media from a reputable vendor and only high-grade media types.

- 3.) On the Vivid q N system, press the **<Config>** key.
- 4.) Select the **Connectivity** Tab and activate the **Tools** Tab.
- 5.) Under *Removable Media*, select the media type **CD/DVD Writeable** from the Media drop-down menu, as shown in [Figure 7-105](#).

**Figure 7-105 Connectivity - Tools - Removable Media**



- 6.) Click the **Format** button.

When DVD/CD formatting is complete, a formatting successful message is displayed together with details of the DVD/CD capacity.

## 7-7-2-2 Enabling Extensive Logging

**NOTE:** In some cases, the user may need to activate the Extensive Logging feature. This will allow the system to record logs in a more detailed format, specifically addressing an issue of suspected failure.

As shown in [Figure 7-106 on page 7-142](#), checkboxes provided in the Extensive Logging dialog enable the user to activate the appropriate failure category (any one or more; any combination) to collect more information regarding particular functionality.

[Table 7-4](#) provides recommendations for activating a specific Extensive Log category.

**Table 7-4 Extensive Log Categories and Failure Scenarios**

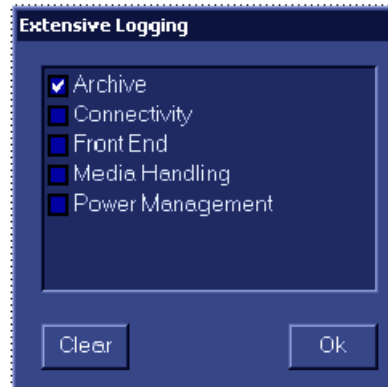
Extensive Log Category	Type of Failure
Archive	Loss of patient information or images
	System lock-up due to database corruption
	Display of message warning that the archive is corrupted
	Any suspicion that there may be a problem with the archive
Connectivity	Network is not set up correctly
	Losing network connection
	Problems connecting to a DICOM server (or Reviewing Station)
	Problems with workflow
Front End	Impaired image quality
	Probe not detected
	System boots-up into Fake Mode (no Front End detected)
	Noise, artifacts, etc.
Media Handling	System Lock-up when using removable media (MOD, DVD/CD, Disk-on-Key)
	Removable media corrupted during back-up or export
	Removable media not detected
Power Management	Image not sufficiently intense
	Battery charging failed
	System boot-up fails intermittently
	System lock-up during mid-process

- 1.) Perform [step 1](#) and [step 2](#) on page 7-137.
- 2.) Click the **Extensive Log** button (refer to [Figure 7-103 on page 7-138](#)).

The Extensive Logging dialog opens - see [Figure 7-106](#), below.

- 3.) Flag the appropriate checkboxes to activate the categories for which detailed analysis is required (refer to the recommendations in [Table 7-4](#)).

**Figure 7-106 Extensive Logging Dialog**



**NOTE:** *The impact of activating a checkbox would be to generate larger, detailed log files. After usage, make sure to return to the default settings (unflagged) to conserve the size of the log files. After 7 days, the system will automatically return to the default settings.*

- 4.) When done, click **OK**.  
The Extensive Logging dialog closes.



### 7-7-2-3 Advanced Options

- 1.) From the System Problem Reporting dialog (Figure 7-103 on page 7-138), click the **Options** button.  
The Advanced Export Options screen opens as shown in Figure 7-107.

**NOTE:** The Advanced Export Options allows you to:

- a.) Control the size of log files.
- b.) Specify some optional attachments to be added to the log files.

**Figure 7-107 Advanced Export Options Dialog**

- 2.) Proceed to select the appropriate settings, as described below.

#### 7-7-2-3-1 Setting the Log File Ranges

**NOTE:** By default, the log files may be very large as they are not limited by time/date. The user is able to limit the size/timeframe of the log files by choosing the required settings, as described below.

- 1.) Activate the **Export Logs Using** checkbox, as shown in Figure 7-107, above.
- 2.) Proceed to set the required *Log Range*, as follows:

*Either:*

Activate the **Time Range** radio button, then use the *From:/To:* drop-down lists to define the required time range.

*Or:*

Activate the **Bookmark** radio button, then select the required Bookmark from the drop-down list of bookmarks.

*This will export log files which are limited to the range of 1 hour before through 1 hour after the selected bookmark.*

### 7-7-2-3-2 Setting the Log File Attachments

**NOTE:** In the Advanced Export Options dialog, from the lower area (labelled **Attach** - see [Figure 7-107 on page 7-143](#)) users may flag the different items they may wish to attach to the log files (or alternatively disable the checkboxes for those not required). [Table 7-5](#) outlines the different categories of information that may be attached to a log file.

**Table 7-5 Attachment Categories and Recommendations for Use**

Category	Type of Information and Recommended Use
<b>Diagnostic Reports</b>	Should be used whenever a diagnostic test has failed and it is necessary to forward the information to GE for analysis.
<b>Crash and Memory Dumps</b>	Useful for any type of memory crash or system lock-up problem.
<b>Keyboard Strokes Log</b>	Shows the keyboard strokes that were recorded by the system - may be useful in detection of a specific error.
<b>Windows Logs</b>	Contains the Windows operating system logs - supports the application operation.
<b>Sniffer Logs</b>	Applicable if the Network Sniffer Log has been used.
<b>Data Base Folder</b>	Provides more Archive information. Useful for loss of patient information and/or analysis of database, archive, or back-up problems.
<b>D: and E: File Listing</b>	Lists all file names and locations in the hard disk drives: <b>D</b> and <b>E</b> . Useful in the event of loss of patient information, missing images, lock-up problems, etc.
<b>Connectivity Report</b>	Provides details on the connectivity configuration. Recommended to include this whenever any type of connectivity problem arises.
<b>"Upload to GE" Tool</b>	Enables the user to export the log directly to GE for analysis. For details, see <a href="#">"Sending Log Files to GE" on page 7-145</a> .
<b>DBScan</b>	Log files created when performing a scan of the database contain useful information regarding the integrity of the database.

- 1.) Make sure the required Log File Ranges are set, as previously described.
- 2.) Under **Attach**, use the checkboxes provided to flag the required attachments, as appropriate.

**NOTE:** Clicking the *Restore Defaults* button returns to the default setting whereby all checkboxes in the left column are flagged and all on the right are disabled, as shown [Figure 7-107](#).

- 3.) When done, from the *Destination* drop-down menu, select the required export destination (CD or Memory Stick) then click **Save and Export**.

A Zip file (named "logfile\_<date>\_<time>.zip") is copied onto the selected removable media.

**NOTE:** Previously, users were required to save log files before exporting them. With version BT06, these two operations are performed as one step.

When selecting DVD/CD as the export destination, first make sure that the DVD/CD has been formatted. For details, see ["Formatting a DVD/CD" on page 7-139](#).

When export is completed, a message is displayed saying (number of) reports successfully exported.

- 4.) Click OK to close the window.
- 5.) When export completed, press <Ctrl>+E to eject the media.

**7-7-2-3-3 Sending Log Files to GE**

After exporting logs (with the **Upload To GE Tool** attachment) to the selected media (i.e.DVD/CD or Memory Stick), the media contains the zipped log file along with the binary (**UploadLog.exe** and other attachments) files that perform the upload of all exported files to the GE ftp site.

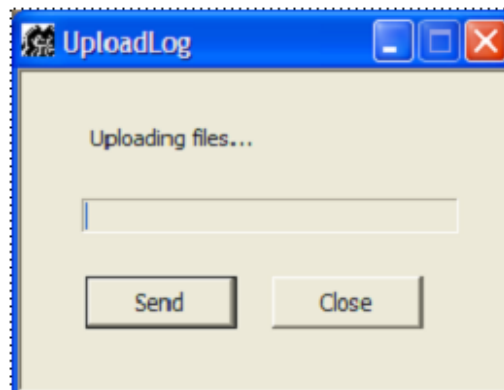
**NOTE:** *Successful upload of logs to the GE ftp site can only be achieved when the designated PC is connected to the Internet and when all security measures (such as, firewalls) taken at the local network do not prevent the utility from performing the upload.*

**To Perform the Upload Procedure:**

- 1.) Place the media in any Windows-based PC and run the **UploadLog.exe**.

The Upload Log dialog is displayed:

**Figure 7-108 Uploading Log Files**

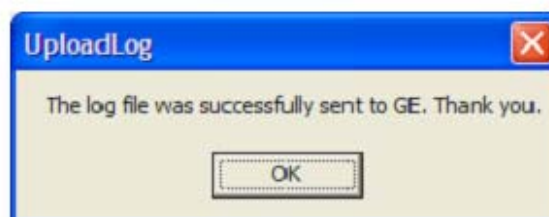


- 2.) Click **Send**.

The upload process commences and the progress bar advances.

When the upload process finishes, the following message is displayed:

**Figure 7-109 Upload Successful Message**



- 3.) Click **OK**.

- 4.) Observe the progress bar completion, as shown in [Figure 7-110](#).

**Figure 7-110 Upload Complete**



- 5.) Click **Close** to terminate and exit the Upload utility.  
6.) Inform the local GE personnel that you have uploaded files to the GE ftp site.

**NOTE:** *In the event that the upload process fails, check your local network security settings to make sure that they did not prevent the upload. Otherwise, contact GE personnel.*

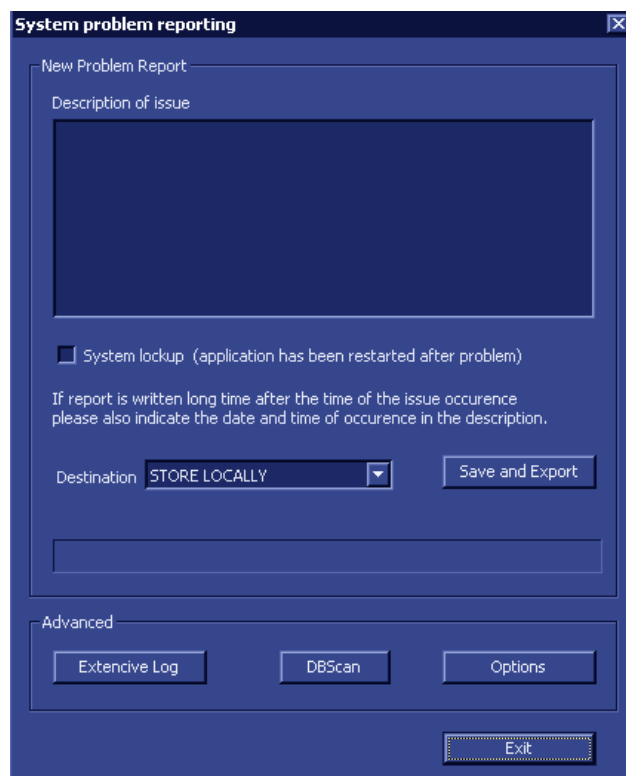
#### 7-7-2-4 DB Scan

##### To Perform the Database Scan Procedure:

- 1.) Press **<ALT> + D**.

*The System Problem Reporting dialog opens:.*

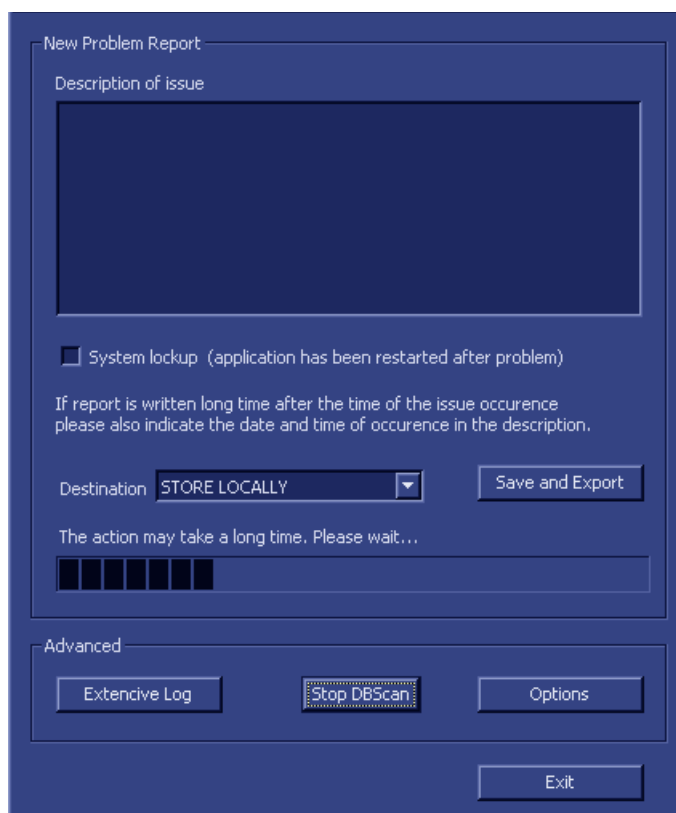
**Figure 7-111 System Problem Reporting - Advanced**



2.) Under *Advanced*, click on the **DBScan** button.

*The Database Scanning procedure commences, and a progress bar is displayed together with the message: The action may take a long time. Please wait.....*

**Figure 7-112 Database Scanning Procedure in Progress**



*During this procedure, a log file which contains information about the integrity of the database will automatically be created and stored in the **Logs** directory (in the folder name **Log**).*

*If required, this log file may be sent as an attachment when exporting log files. For more details, see ["Setting the Log File Attachments" on page 7-144](#).*

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# Chapter 8

## Replacement Procedures

### Section 8-1 Overview

#### 8-1-1 Purpose of Chapter 8

This chapter provides replacement procedures for the Vivid q N system parts, as outlined below.

**Table 8-1 Contents in Chapter 8**

Section	Description	Page Number
8-1	Overview	8-1
8-2	External Component Replacement Procedures	8-2
	Bearing Handle Replacement Procedure	8-2
	Battery Replacement Procedure	8-4
	Hard Disk Replacement Procedure	8-6
	Control Panel and Keyboard Replacement Procedure	8-10
	Rear Cover & Latch Assembly Replacement Procedure	8-20
	LCD Display Cover Hinges Replacement Procedure	8-22
	Bottom Assembly Replacement Procedure	8-25
	LCD Display Frame Replacement Procedure	8-27
8-3	Internal Component Replacement Procedures	8-29
	P&M (Probe and MUX) Board Replacement Procedure	8-29
	TR32 and RFI Boards Replacement Procedure	8-32
	BEP Replacement Procedure	8-40
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	DC-to-DC Power Supply Replacement Procedure	8-48
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## Section 8-2 External Component Replacement Procedures

### 8-2-1 Bearing Handle Replacement Procedure

*NOTE:* The term "Bearing Handle" relates to the Vivid q N portable carrying handle.

#### 8-2-1-1 Tools

Use the appropriate flat and Phillips-type screw drivers as indicated in the Bearing Handle replacement procedure.

#### 8-2-1-2 Time Required

10 minutes

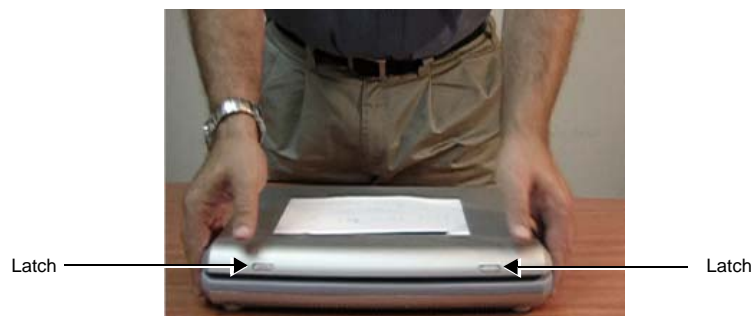
#### 8-2-1-3 Preparations

None

#### 8-2-1-4 Bearing Handle Removal Procedure

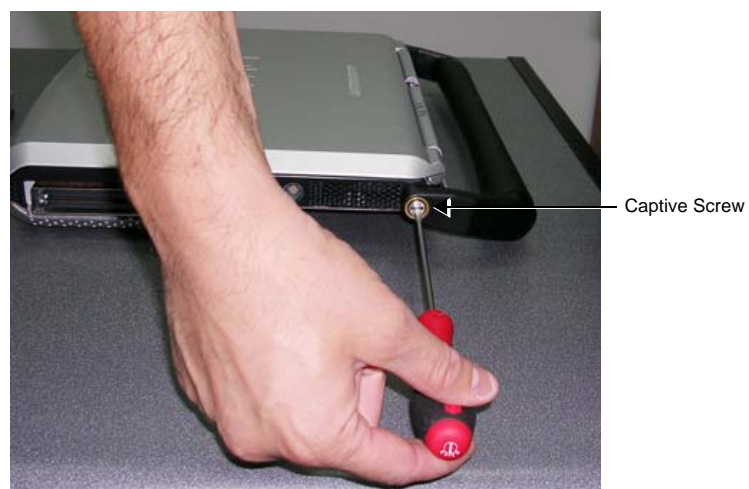
1) Close the Vivid q N LCD cover, making sure both front latches are securely fastened ([Figure 8-1](#)).

**Figure 8-1 Closing Vivid q N LCD Cover**



2.) Release the captive screw on either side of the Bearing Handle (there are two screws that secure the handle in position), by turning 1/4 turn in a *counterclockwise* direction ([Figure 8-2](#)).

**Figure 8-2 Releasing the Bearing Handle Captive Screw**





- 3.) Using both hands, pull the Bearing Handle slightly apart to release it from the system.
- 4.) Remove the Bearing Handle.

**Figure 8-3 Bearing Handle Removed**



#### **8-2-1-5 Bearing Handle Installation Procedure**

- 1) Place a new Bearing Handle in position, using both hands to pull the Bearing Handle slightly apart in order to slot the ends into the handle holes on the Vivid q N casing.
- 2.) Carefully fasten each captive screw on either side of the Bearing Handle to secure the handle in position, by turning 1/4 turn in a *clockwise* direction.

**NOTE:** *When tightening the captive screws, do not use excessive force do not apply more than 1/4 turn; overtightening will damage the screw thread.*

- 3.) Proceed to perform the ["Bearing Handle Test" on page 4-19.](#)

## 8-2-2 Battery Replacement Procedure

### 8-2-2-1 Tools

None required.

### 8-2-2-2 Time Required

1 minute

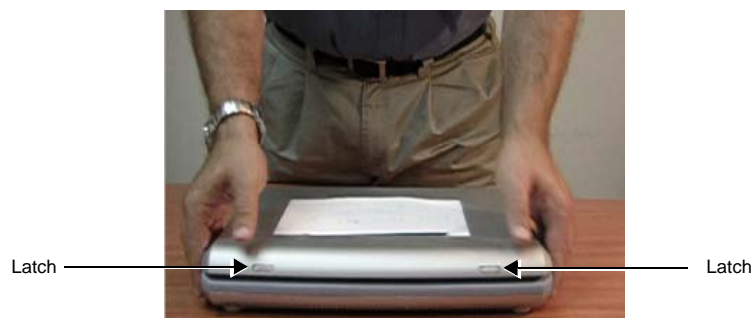
### 8-2-2-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-2-2-4 Battery Removal Procedure

- 1.) Disconnect the AC adapter and all cables from the Vivid q N portable ultrasound scanner.
- 2.) Close the Vivid q N LCD cover, making sure both front latches are securely fastened.

**Figure 8-4 Closing Vivid q N LCD Cover**



- 3.) Carefully turn the Vivid q N over, placing it face down.
- 4.) While holding the Vivid q N steady, pull the locking latch away from the battery and slide the battery sideways out of the battery compartment to remove it completely from the system.

**Figure 8-5 Sliding the Battery out of the Battery Compartment**



**NOTE:** When removing A defective batterY, ensure that it IS disposed of in accordance with local regulations. Alternatively, forward IT to GE for proper disposal.

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8-2-2-5 Battery Installation Procedure



**WARNING** *THE VIVID Q N BATTERY HAS A SAFETY DEVICE.  
DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERY!  
ALWAYS OBSERVE THE PRECAUTIONS LISTED IN "Vivid q N Battery Safety" on page 1-15.*



**CAUTION** Use only batteries approved by GE as suitable for use with the Vivid q N portable ultrasound scanner

- 1) With the Vivid q N lying face down (refer to [Figure 8-5 on page 8-4](#)), hold the unit steady with one hand while sliding the battery sideways into the battery compartment.
- 2.) Make sure the battery is properly inserted all the way, before pushing the locking latch to the closed position.
- 3.) Turn the Vivid q N over, release the front latches and open the LCD cover.
- 4.) Reconnect the AC adapter and all cables to the Vivid q N portable ultrasound scanner.
- 5.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Battery Parameters Test" on page 7-102](#)

## 8-2-3 Hard Disk Replacement Procedure

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

**NOTE:** *When replacing the BEP or Hard Disk, one must either obtain new system options that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the system options already registered in the Hard Disk. Only qualified personnel should perform these tasks.*

### 8-2-3-1 Tools

Use the appropriate flat and Phillips-type screw drivers as indicated in the Hard Disk replacement procedure.

### 8-2-3-2 Time Required

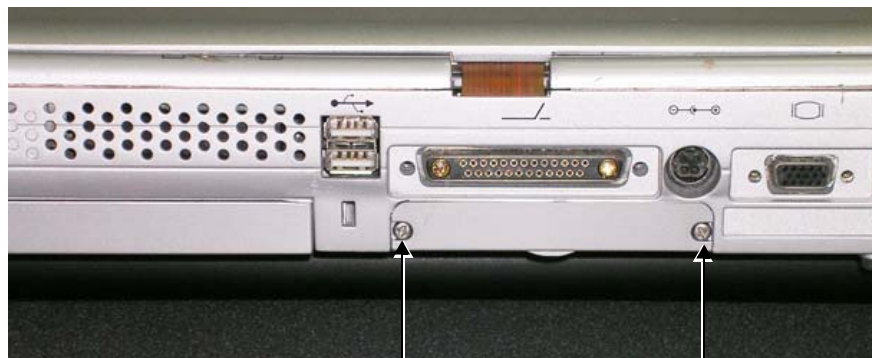
10 minutes

### 8-2-3-3 Preparation

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

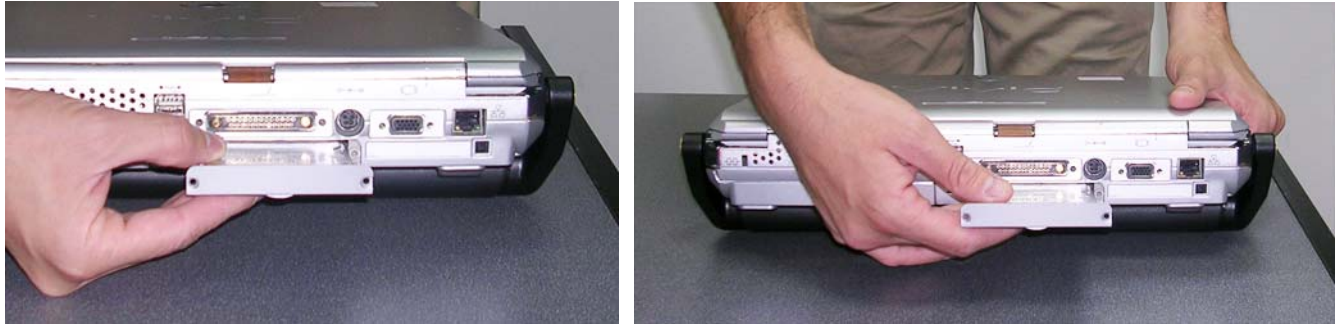
### 8-2-3-4 Hard Disk Removal Procedure

- 1) Make sure the Vivid q N LCD Display cover is securely closed and that the scanner is standing firmly on a flat surface.
- 2.) Working from the rear of the scanner (rear panel), use a small Phillips screwdriver to loosen and remove the two screws that secure the Hard Disk in the hard disk module holder, as shown in [Figure 8-6 below](#).



**Figure 8-6 Removing the Screws from the Rear Panel**

- 3.) With both hands, tilt the rear end of the scanner *upwards* then, holding it steady with one hand, remove the Hard Disk from the system by holding the grip and pulling it straight out of the hard disk module holder, as shown in [Figure 8-7 below](#).




**Figure 8-7 Removing the Hard Disk**


#### 8-2-3-5 Hard Disk Installation Procedure

**NOTE:** When replacing the BEP or Hard Disk, one must either obtain new access codes that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the access codes already registered in the Hard Disk. Only qualified personnel should perform these tasks.

- 1) Place the new hard disk in position in the hard disk module holder - see [Figure 8-7 on page 8-7](#).
- 2.) Return and fasten the two screws (previously removed) to secure the Hard Disk in position - refer to [Figure 8-6 on page 8-6](#).

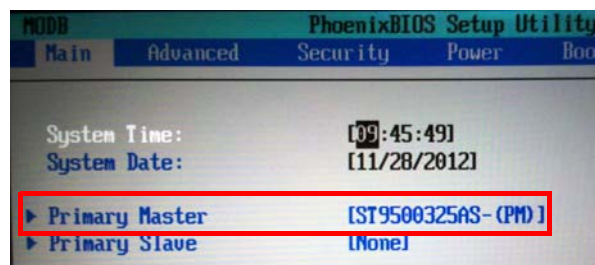
 **NOTICE** If the supplied SATA hard disk is not formatted, a Formatting Utility CD will be supplied as part of the kit - perform the Hard Disk Formatting procedure as described in ["Formatting the Hard Disk" on page 8-8](#).

**NOTE:** The formatting process limits the size of the partition "E:\\" on the hard disk to approximately 120GB.

 **NOTICE** For BT12 systems, use BT12 software media to perform the Hard Disk Formatting procedure.

To identify which hard disk is installed on your system, boot up the system and enter the BIOS configuration as described in ["Setting the BIOS" on page 8-114](#).

The hard disk is identified by the Primary Master: ST9500325AS-(PM) - see [Figure 8-8](#).



**Figure 8-8 BIOS Main Screen**

### 8-2-3-5-1 Formatting the Hard Disk

- 1.) Insert the Format Utility disk into the CD drive and boot up the system.  
The following sequence of screens is displayed:



Copying Files... Please Wait.



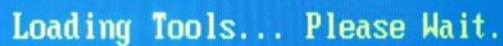
Loading Drivers... Please Wait.



Password: \_

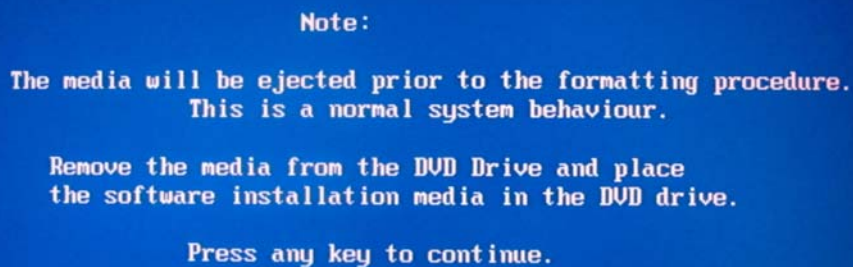
- 2.) Type the password: "geulsservice" and press **Enter**.

*The following message is displayed*



Loading Tools... Please Wait.

*The following window displays:*



**Note:**

The media will be ejected prior to the formatting procedure.  
This is a normal system behaviour.

Remove the media from the DVD Drive and place  
the software installation media in the DVD drive.

Press any key to continue.

- 3.) Press any key.  
*The system ejects the CD.*
- 4.) Remove the CD from the CD drive.
- 5.) Insert the appropriate software installation CD into the CD drive.

*The following options are displayed:*



A. Format Hard Disk BT06 - BT07  
B. Format Hard Disk BT09  
C. Format Hard Disk BT10 - BT12

**NOTE:** *If you need to abort the process at this stage, prior to formatting, do so by pressing the On/Off switch and holding down for a few seconds until the system shuts down.*

- 6.) Select the appropriate formatting action corresponding with your system's software installation.

*The following screen displays:*



- 7.) Select "Y" to continue with the formatting process or "N" to restart the procedure.

*The system will start the formatting procedure and reboot automatically.  
After rebooting, the system will boot from the software installation CD.*

- 8.) Perform a "Full Clean Install" software procedure corresponding to the BT level of your system.
- Refer to the ["Software Upgrade Procedure Overview" on page 8-99](#)

**Note:** IMPORTANT - if **both** the Hard Disk and Back End are being replaced simultaneously, it is necessary to re-configure the LCD type.

- 9.) When done, proceed to perform the following functionality tests:

- ["Software Configuration Checks" on page 4-39](#)
- ["Calibration Tests" on page 7-25](#)
- ["Full System Test" on page 7-10](#)

- 10.) After you have completed the formatting procedure, store the Formatting Utility Disk at the customer's site where it can be accessed for future use.



## 8-2-4 Control Panel and Keyboard Replacement Procedure

### 8-2-4-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the following Control Panel and Keyboard (and sub-component) replacement procedures.

### 8-2-4-2 Time Required

10 minutes

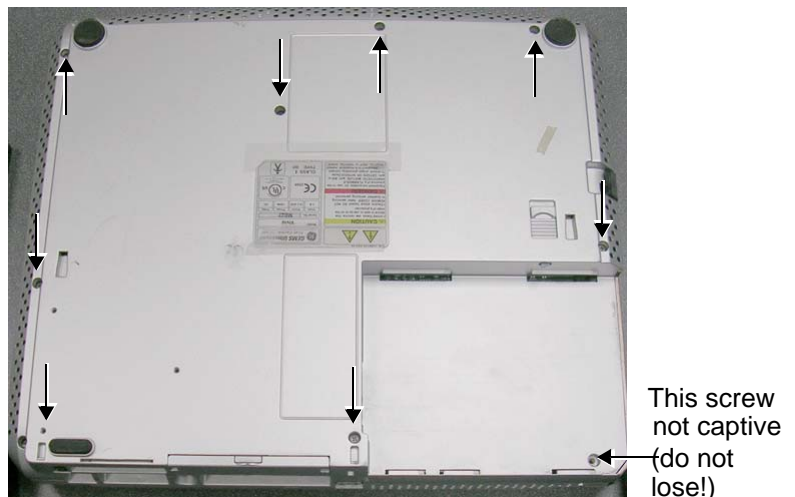
### 8-2-4-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-2-4-4 Control Panel and Keyboard Removal Procedure

- 1.) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2.) Place the Vivid q N portable ultrasound scanner face down and remove the battery as described in the ["Battery Removal Procedure" on page 8-4](#).
- 3.) Loosen and remove each of the 9 screws that fasten the Control Panel and Keyboard onto the Bottom Assembly, as indicated in [Figure 8-14 below](#).

**Figure 8-14 Removing the Fastening Screws from the Bottom Assembly**



- 4.) Turn the Vivid q N over, release the front latches and open the LCD Display cover.
- 5.) Carefully lift the Control Panel and Keyboard upwards from the front, then release it from the rear;



remove it from the Vivid q N and place it next to the system, as shown in [Figure 8-15](#).

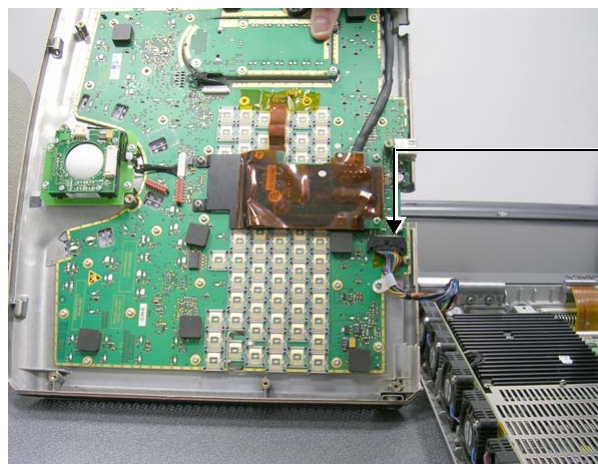
**Figure 8-15 Removing the Control Panel and Keyboard**



**NOTE:** When removing the Control Panel and Keyboard during other replacement procedures, Step 6 will only be required if indicated.

- 6.) Lift the Control Panel and Keyboard up to gain access to the cable connector underneath and disconnect the control panel/keyboard cable from the system as shown in [Figure 8-16](#).

**Figure 8-16 Disconnecting the Control Panel/Keyboard Cable**



Disconnect here

#### 8-2-4-5 Control Panel and Keyboard Installation Procedure

**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [Control Panel and Keyboard Removal Procedure](#).

**NOTE:** When installing the Control Panel and Keyboard during other replacement procedures, Step 1 will only be required if indicated.

- 1) Stand the replacement Control Panel and Keyboard beside the Vivid q N system and tilt it on its side to gain access to the cable connector underneath. Re-connect the keyboard/control panel cable from the system to the cable connector (refer to [Figure 8-16](#), above).
- 2.) Carefully lift the Control Panel and Keyboard into position on the Vivid q N (refer to [Figure 8-15](#), above). Make sure it is properly seated and take care to align the screw holes with those in the Bottom Assembly.
- 3.) Close the Vivid q N LCD Display cover, making sure both front latches are securely fastened.
- 4.) Carefully turn the Vivid q N over, placing it face down.
- 5.) Return and fasten each of the 9 screws that secure the Control Panel and Keyboard onto the Bottom Assembly (refer to [Figure 8-14](#), above).
- 6.) Re-install the battery as described in the ["Battery Installation Procedure" on page 8-5](#).
- 7.) Return the Handle as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 8.) Reconnect the AC adapter and all cables to the Vivid q N portable ultrasound scanner.
- 9.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Isolated Patient Lead \(Source\) Leakage – Lead-to-Ground" on page 10-26](#)
  - ["Isolated Patient Lead \(Source\) Leakage – Lead-to-Lead" on page 10-27](#)
  - ["Isolated Patient Lead \(Sink\) Leakage - Isolation Test" on page 10-27](#)
  - ["Alphanumeric Keyboard Test" on page 4-19](#)
  - ["External Keyboard Test" on page 4-20](#)
  - ["Trackball Test" on page 4-22](#)
  - ["Calibration Tests" on page 7-25](#)

---

#### 8-2-4-5-1 Keycap Removal Procedure

**NOTE:** Replacement Keycaps for the Vivid q N system are supplied as part of the Keycap Kit - Part No. S2423359. (For Scandinavian countries, Part No. 2420372-1).

- 1) Carefully place a small flat screw driver between the keycap you wish to remove and its neighboring keycap.
- 2.) Use the screw driver to gently lever off the defective keycap, until it is completely loosened from its base (see [Figure 8-17 below](#)).
- 3.) Lift off and remove the defective keycap.

**Figure 8-17 Keycap Replacement**



#### 8-2-4-5-2 Keycap Installation Procedure

- 1) Carefully place the appropriate new keycap in position on the keyboard, taking care to place the plastic alignment pin in the correct position so that the keycap is the right way up and reads correctly.
- 2.) Gently push the keycap down until it snaps into position.

#### 8-2-4-5-3 Trackball Removal Procedure

**NOTE:** This section describes the replacement procedure for Trackball Assembly - Part No. S2423360.

- 1) Lift the Control Panel and Keyboard up to gain access to the cable connector underneath and disconnect the keyboard/control panel cable from the system - refer to [Figure 8-16 on page 8-11](#).
- 2.) Tilt the Control Panel and Keyboard on its side and loosen and remove the four screws (two on either side of the bracket) that fasten the trackball assembly to the base of the Control Panel, as shown in [Figure 8-18 below](#).

**Figure 8-18 Trackball Removal**



- 3.) Disconnect the three trackball cable connectors from the trackball assembly (carefully pull them out) and remove the trackball assembly from the Control Panel.

#### 8-2-4-5-4 Trackball Installation Procedure

- 1) Return a new trackball assembly to the correct location on the Control Panel.
- 2.) Carefully tilt the Control Panel and Keyboard on its side and return and fasten the four screws (two on either side of the bracket) to secure the trackball assembly to the base of the Control Panel (refer to [Figure 8-18](#), above).
- 3.) Re-connect the three trackball cable connectors (carefully push them in) to the trackball assembly.

#### 8-2-4-5-5 ATGC Slider Keycap Removal Procedure

**NOTE:** This section describes the replacement procedure for ATGC Slider keycaps (supplied as part of the Keyboard Assembly) - Vivid i n systems: Part No. S423357; Vivid q N systems: Part No. S423358.

- 1) Carefully place a small flat screw driver between the ATGC slider keycap you wish to remove and the surface of the keyboard.
- 2.) Use the screw driver to gently lever off the defective keycap, until it is completely loosened from its base.
- 3.) Lift off and remove the defective keycap - see [Figure 8-19 below](#).

**Figure 8-19 ATGC Slider Keycap Replacement**



#### 8-2-4-5-6 ATGC Slider Keycap Installation Procedure

- 1) Carefully place a new slider keycap in position on the slider base, taking care to place the plastic alignment pin in the correct location.
- 2.) Gently push the slider keycap down until it snaps into position.

#### 8-2-4-5-7 ATGC Rotary Knob Removal Procedure

**NOTE:** This section describes the replacement procedure for ATGC Rotary knob (supplied as part of the Keyboard Assembly) - Vivid i n systems: Part No. S423357; Vivid q N systems: Part No. S423358.

- 1) Carefully place a small flat screw driver between the ATGC Rotary knob and the surface of the keyboard - see [Figure 8-17 below](#).
- 2.) Use the screw driver to gently lever off the defective rotary knob, until it is completely loosened from its base.

- 3.) Lift off and remove the defective knob - see [Figure 8-20 below](#).  
**Figure 8-20 ATGC Rotary Knob Replacement**



#### 8-2-4-5-8 ATGC Rotary Knob Installation Procedure

- 1) Carefully place a new ATGC Rotary Knob in position on the keyboard, taking care to place the plastic alignment pin in the correct location.
- 2.) Gently push the ATGC Rotary Knob down until it snaps into position.



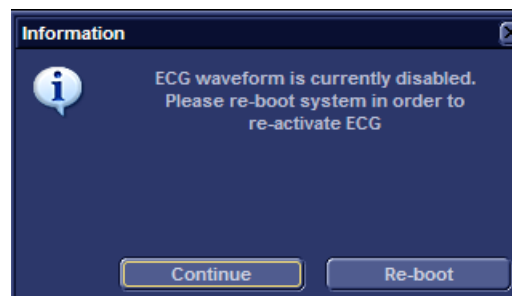
#### 8-2-4-5-9 ECG/Respiratory Module Assembly Removal Procedure

**NOTE:** For Vivid q N systems that previously did not have the Respiratory Option, it is necessary remove the ECG Board from the ECG Module Assembly and replace it with an ECG/Respiratory Board. The preparation and removal procedures below describe the required steps.

##### **Preparation**

- 1) Access the **D:\** directory and delete the file named **traces.res**, as shown below:  
**D:\Marlin\Test\resources\Nemo\acquis\HWConfig\traces.res**

**NOTE:** In the event that the **traces.res** file is not deleted prior to installing the new ECG/Respiratory board, the following error message will later be displayed:



- 2.) Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

##### **Removal Procedure**

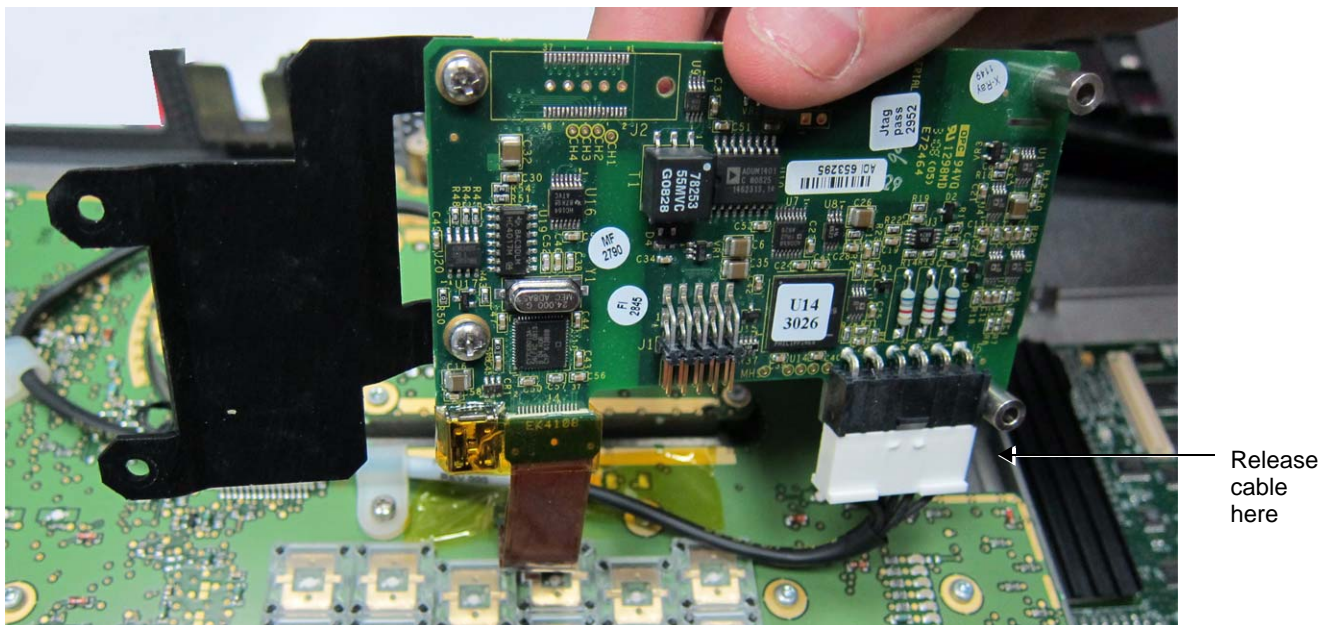
- 1) Lift the Control Panel and Keyboard up to gain access to the cable connector underneath and disconnect the keyboard/control panel cable from the system - refer to [Figure 8-16 on page 8-11](#).
- 2.) Loosen and remove the four screws (two long and two short) on either side of the bracket that fasten the ECG Module assembly to the base of the Control Panel, as shown in [Figure 8-21](#).

**Figure 8-21 ECG Module Assembly Removal**



- 3.) Lift and tilt the ECG Module on its side, then disconnect the ECG Module cable - see [Figure 8-22](#).

**Figure 8-22 Disconnecting the ECG Module Cable**



- 4.) Carefully remove the ECG module assembly (board and bracket) from the base of the Control Panel and place it on a table.
- 5.) Remove the tape from the Flex Cable on the ECG Board and disconnect the Flex Cable.
- 6.) Unfasten the two screws that secure the bracket to the ECG Board and remove the bracket.
- 7.) Fit the bracket to the new ECG/Respiratory Board, ready for the installation procedure.

#### 8-2-4-5-10 ECG/Respiratory Module Assembly Installation Procedure

- 1.) Carefully tilt the Control Panel and Keyboard on its side.
- 2.) Position a new ECG/Respiratory Module assembly in the correct location on the base of the Control Panel.
- 3.) Re-connect the ECG cable - see [Figure 8-22](#), above.
- 4.) Re-connect the Flex Cable (previously removed from the ECG Board) to the new ECG/Respiratory Board.
- 5.) Return and fasten the four screws (two long and two short) on either side of the bracket to secure the ECG/Respiratory Module assembly to the base of the Control Panel (refer to [Figure 8-21 on page 8-17](#)). When performing this step, each long screw is inserted through one of the two standoffs.
- 6.) Install the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on [page 8-12](#).
- 7.) Turn ON power to the system.

*The system re-boots into Normal Scanning mode.*

**NOTE:** *In the event that an error message is displayed prompting for deletion of the traces file, this indicates failure to perform the Preparation procedure prior to installation of the new ECG/Respiratory board. Refer to "[Preparation](#)" on [page 8-17](#).*



- 8.) Press **Config** and log on as Adm - see "Log On to the System as ADM" on page 4-10.
- 9.) Select **About**, then click on the **HwVersion** tab.
- 10.) Verify that the correct ECG/Respiratory module Part # is displayed, as shown in [Figure 8-23](#).

### Figure 8-23 Hardware Version Verification

[illegible]

- 11.) Proceed to perform the following functionality tests:
- "Isolated Patient Lead (Source) Leakage – Lead-to-Ground" on page 10-26
  - "Isolated Patient Lead (Source) Leakage – Lead-to-Lead" on page 10-27
  - "Isolated Patient Lead (Sink) Leakage - Isolation Test" on page 10-27
  - "SafeLock Cart - Grounding Continuity" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "SafeLock Cart - Chassis Current Leakage Test" on page 10-24

## 8-2-5 Rear Cover & Latch Assembly Replacement Procedure

**NOTE:** This section describes the replacement procedure for Rear Cover & Latch Assembly - supplied as part of the Cover Kit (Vivid i n systems Part No. S2423361; Vivid q N systems Part No. S2423362).

### 8-2-5-1 Tools

None required.

### 8-2-5-2 Time Required

30 minutes

### 8-2-5-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-2-5-4 Rear Cover & Latch Assembly Removal Procedure

- 1.) Disconnect the AC adapter and all cables from the Vivid q N portable ultrasound scanner.
- 2.) Remove the Bearing Handle as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 3.) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 4.) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure" on page 8-27](#).
- 5.) Remove the LCD Display.
- 6.) Loosen and remove the two screws on each of the *left* and *right* hinges (attached to the Rear Cover and Latch Assembly), as shown in [Figure 8-24 below](#).

**Figure 8-24 Removing the Hinge Screws**



- 7.) Lift the Rear Cover and Latch Assembly away from the Bottom Assembly and remove completely from the system.

---

**8-2-5-5      Rear Cover & Latch Assembly Installation Procedure**

- 1.) Return the Rear Cover and Latch Assembly to the system and place it in position on the Bottom Assembly, carefully checking that the *left* and *right* hinges are properly aligned.
- 2.) Return and fasten the two screws on each of the *left* and *right* hinges (previously removed - refer to [Figure 8-24](#)).
- 3.) Return the LCD Display; see the ["AUO LCD Display Installation Procedure" on page 8-57](#).
- 4.) Return the LCD Display Frame as described in the ["LCD Display Frame Installation Procedure" on page 8-28](#).
- 5.) Return the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-12](#).
- 6.) Return the Bearing Handle as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 7.) Reconnect the AC adapter and all cables to the Vivid q N portable ultrasound scanner.
- 8.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Full System Test" on page 7-10](#)

## 8-2-6 LCD Display Cover Hinges Replacement Procedure

**NOTE:** This section describes the replacement procedure for the LCD Display Cover hinges **only**. Refer to [Figure 8-64 on page 8-55](#). (Part No. KTZ280195; one pair of hinges).

### 8-2-6-1 Tools

Phillips screwdriver; Loctite 242 glue

### 8-2-6-2 Time Required

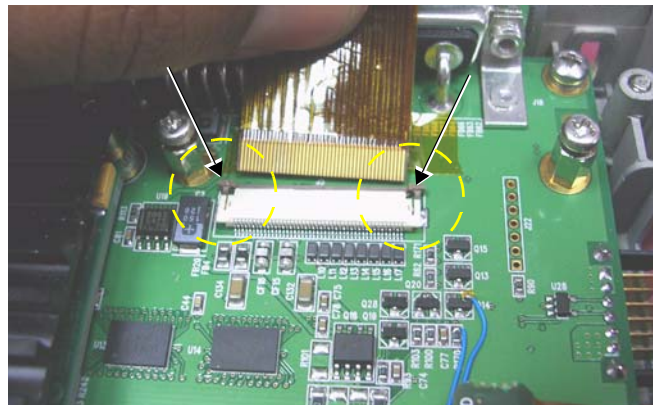
15 minutes

### 8-2-6-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in - *System Setup*.

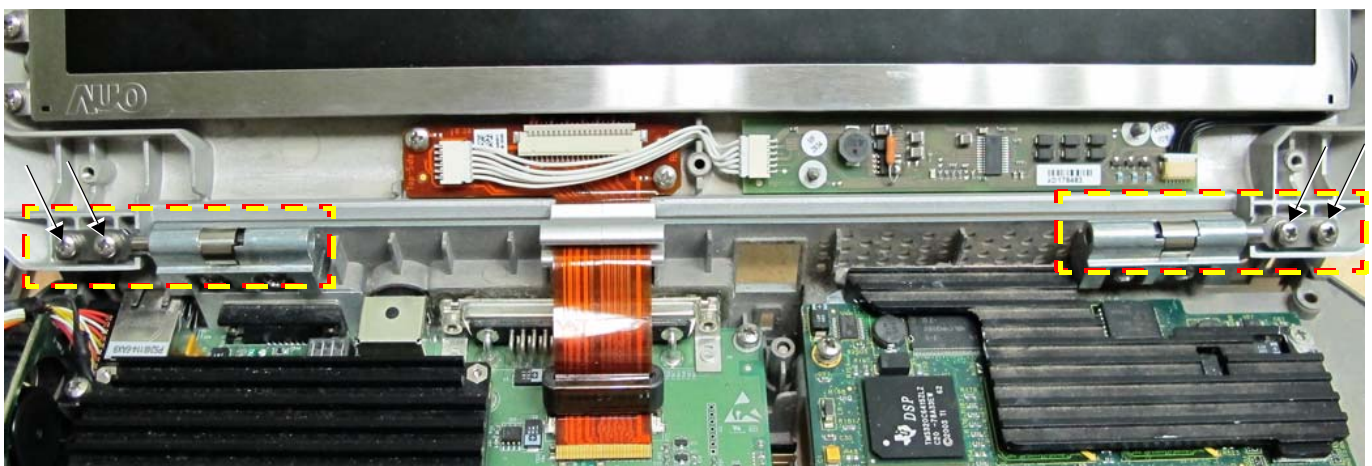
### 8-2-6-4 LCD Display Cover Hinges Removal Procedure

- 1) Remove the bearing handle, as described in the "[Bearing Handle Removal Procedure](#)" on page 8-2.
- 2) Remove the Control Panel and Keyboard as described in the "[Control Panel and Keyboard Removal Procedure](#)" on page 8-10.
- 3.) Slide to open the two connector latches and disconnect the LCD Flex ribbon cable from BEP - [Figure 8-25](#).



**Figure 8-25 Connector Latches**

- 4.) Unscrew and remove the four screws (two on either side - as shown in [Figure 8-26](#)) that secure the Rear Cover and Latch Assembly to the Bottom Assembly.



**Figure 8-26 Rear Cover and Latch Assembly Securing Screws**

- 5.) Detach the Rear Cover and Latch Assembly from the Bottom Assembly and remove.
- 6.) Loosen and remove the 2 screws that secure the *left* hinge to the LCD Display cover, then carefully remove the hinge.
- 7.) Loosen and remove the 2 screws that secure the *right* hinge to the LCD Display cover, then carefully remove the hinge.

#### 8-2-6-5 LCD Display Cover Hinges Installation Procedure

**NOTE:** When installing the replacement hinges, apply a coating of Loctite 242 glue to each of the 8 screws, as and when these are returned to their respective locations.

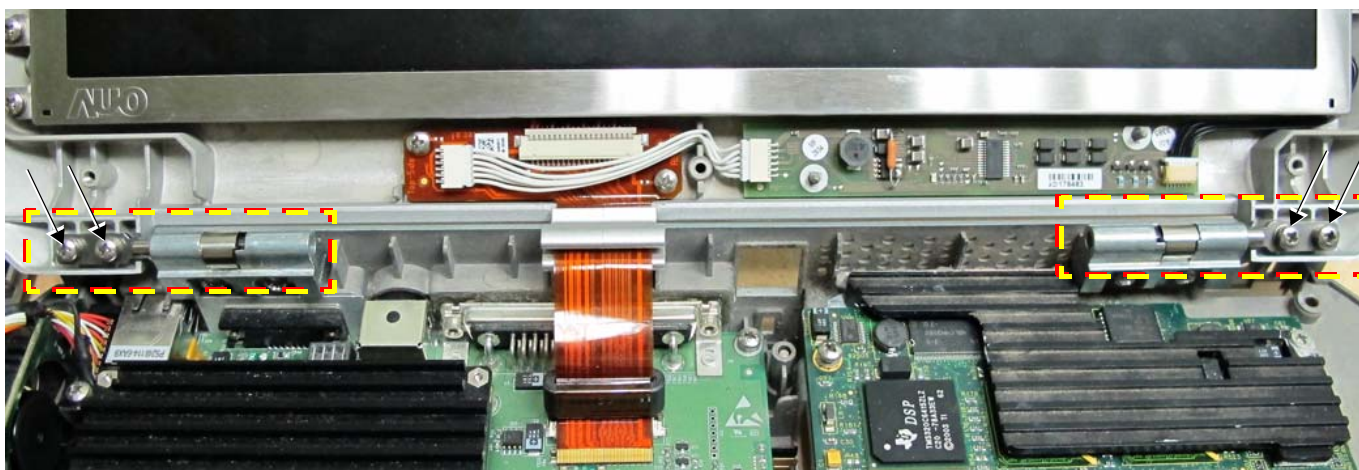


**NOTICE** It is important to properly adjust the alignment of the LCD cover with the Bottom Assembly, before returning the previously-removed parts, as described below.

- 1.) While supporting the LCD Display cover with one hand, carefully place a replacement hinge in the correct position on the *Left* side of the LCD Display cover.
- 2.) Carefully place a replacement hinge in the correct position on the *Right* side of the LCD Display cover.

**NOTE:** The cover has a degree of sideways free play i.e. it can slide from left to right on the hinges' axle. The hinges on the right-hand side must be aligned with the holes in the Bottom Assembly as explained in the next step.

- 3.) Gently maneuver the LCD cover by raising and lowering it while exerting pressure to slide the LCD Display Cover until the hinge holes are aligned with the Bottom Assembly screw holes - see right hinge in [Figure 8-27 on page 8-23](#).
- 4.) On the *Left* hinge: return and fasten the 2 screws (previously removed) to the Bottom Assembly, making sure the hinge is properly secured. *Do not over-tighten the screws*. Refer to [Figure 8-27](#).
- 5.) On the *Right* hinge: return and fasten the 2 screws (previously removed) to the Bottom Assembly, making sure the hinge is properly secured. *Do not over-tighten the screws*. Refer to [Figure 8-27](#).



**Figure 8-27 LCD Display Hinges Secured to Base Assembly - Location of Screws**

- 6.) Check that when closing the LCD Display cover it aligns properly with the Bottom Assembly. If necessary, make further adjustments.
- 7.) Return and fasten the 2 screws (previously removed) to each of the LCD hinges, making sure each hinge is securely fastened to the Base Assembly. *Do not over-tighten the screws*.

- 8.) Reconnect the LCD flex cable to the BEP (refer to [Figure 8-26 on page 8-22](#)).
- 9.) Refit the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-12.
- 10.) Close and open the lid a few times to ensure proper closure of the LCD Display cover.
- 11) Reconnect the AC adapter and all cables to the Vivid q N portable ultrasound scanner.
- 12.) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24



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## 8-2-7 Bottom Assembly Replacement Procedure

### 8-2-7-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the bottom assembly replacement procedures.

### 8-2-7-2 Time Required

30 minutes

### 8-2-7-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in - *System Setup*.

### 8-2-7-4 Bottom Assembly Removal Procedure

- 1) Remove the battery as described in the ["Battery Removal Procedure" on page 8-4](#).
- 2) Remove the bearing handle as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 3) Remove the hard disk as described in the ["Hard Disk Removal Procedure" on page 8-6](#).
- 4) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 5) Remove the P&M Board as described in the ["P&M \(Probe and MUX\) Board Removal Procedure" on page 8-30](#).
- 6) Remove the TR32 and RFI Boards as described in the ["TR32 and RFI Boards Removal Procedure" on page 8-34](#).
- 7) Remove the BEP as described in the ["BEP Removal Procedure" on page 8-40](#).
- 8) Remove the HVPS as described in the ["DC-to-DC Power Supply Removal Procedure" on page 8-48](#).
- 9) Remove the fans as described in the ["Fan Removal Procedure" on page 8-51](#).
- 10) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure" on page 8-27](#).
- 11.) Separate the Bottom Assembly from the LCD Display rear cover by loosening and removing the two screws on each of the *left* and *right* hinges (attached to the Rear Cover and Latch Assembly). Refer to [Figure 8-24 on page 8-20](#).
- 12.) Remove the Bottom Assembly from the system.
- 13.) Remove the *Vivid q N system label from the base of the defective Bottom Assembly (peel off), ready to use on the replacement Bottom Assembly*.

## 8-2-7-5 Bottom Assembly Installation Procedure

- 1) *Adhere the Vivid q N system label (previously removed in [step 13](#) above) to the base of the replacement unit.*
- 2.) Return the new Bottom Assembly to the system.
- 3.) Attach the LCD Display rear cover to the Bottom Assembly, carefully aligning the *left* and *right* hinges (attached to the Rear Cover and Latch Assembly) and returning and fastening the two screws on each side, as shown in [Figure 8-24 on page 8-20](#).

**Note:** *Do not overtighten the screws.*

- 4.) Return the LCD Frame as described in the "[LCD Display Frame Installation Procedure](#)" on page 8-28
- 5) Return the fans as described in the "[Fan Installation Procedure](#)" on page 8-53.
- 6) Return the HVPS as described in the "[DC-to-DC Power Supply Installation Procedure](#)" on page 8-50.
- 7) Return the BEP as described in the "[BEP Installation Procedure](#)" on page 8-44.
- 8) Return the TR32 and RFI Boards as described in the "[TR32 and RFI Boards Installation Procedure](#)" on page 8-38.
- 9) Return the P&M Board as described in the "[P&M \(Probe and MUX\) Board Installation Procedure](#)" on page 8-31.
- 10) Return the Control Panel and Keyboard as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-12.
- 11) Return the hard disk as described in the "[Hard Disk Installation Procedure](#)" on page 8-7.
- 12) Return the bearing handle as described in the "[Bearing Handle Installation Procedure](#)" on page 8-3.
- 13.) Re-install the battery as described in the "[Battery Installation Procedure](#)" on page 8-5.
- 14.) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24
  - "[Calibration Tests](#)" on page 7-25
  - "[Full System Test](#)" on page 7-10
  - "[Image Testing](#)" on page 4-32



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## 8-2-8 LCD Display Frame Replacement Procedure

### 8-2-8-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the bottom assembly replacement procedures.

### 8-2-8-2 Time Required

10 minutes

### 8-2-8-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-2-8-4 LCD Display Frame Removal Procedure

- 1) With the LCD Display in the open (upright) position, use a flat screwdriver to remove the screw cap from each of the four screws that fasten the LCD display frame in position, as shown in [Figure 8-28](#) below.



**Figure 8-28 Removing the Screw Caps from the LCD Display Frame**

- 2.) Loosen and remove the four screws ([Figure 8-29](#)).

**Figure 8-29 Removing the Securing Screws**



- 3.) With the LCD Display in the fully open position, carefully release the LCD display frame from the

securing clips on all four sides, using both hands to release and lift it away from the LCD display.

**Figure 8-30 Removing the LCD Display Frame**



#### 8-2-8-5 LCD Display Frame Installation Procedure

**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [LCD Display Frame Removal Procedure](#).

- 1) With the LCD Display in the fully open position, return the LCD display frame to the correct position and using both hands, press the frame under the securing clips on all four sides to fasten it against the LCD display. Refer to [Figure 8-30 on page 8-28](#).
- 2.) Return and tighten the four screws (previously removed).
- 3.) With the LCD Display in the open (upright) position, return the screw cap to each of the four screws that fasten the LCD frame in position, as shown in [Figure 8-28 on page 8-27](#).
- 4.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

## Section 8-3

### Internal Component Replacement Procedures

**NOTE:** When performing Internal Component Replacement Procedures, generally it is not necessary to disconnect and completely remove the Control Panel and Keyboard from the system. Simply remove it from the Bottom Assembly and lay it next to the Vivid q N portable ultrasound scanner, as shown in [Figure 8-15 on page 8-11](#).

**NOTE:** When tightening screws, **do not overtighten or use excessive force**.



**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, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

#### 8-3-1 P&M (Probe and MUX) Board Replacement Procedure

##### 8-3-1-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the bottom assembly replacement procedures.

##### 8-3-1-2 Time Required

15 minutes

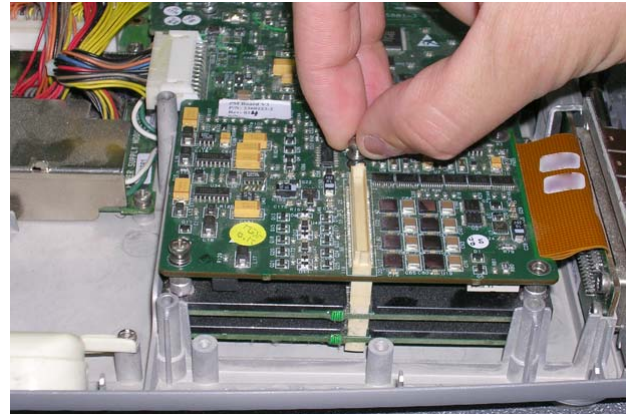
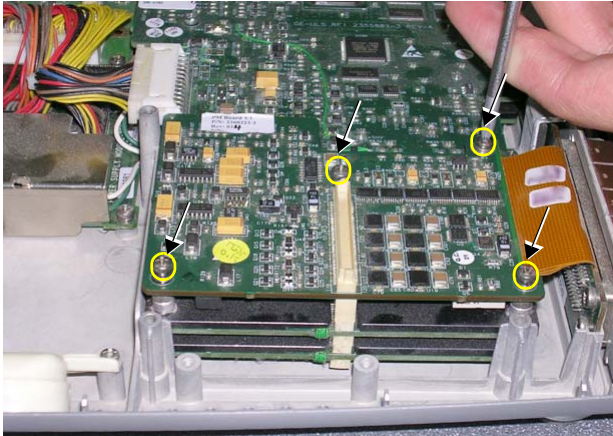
##### 8-3-1-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

#### 8-3-1-4 P&M (Probe and MUX) Board Removal Procedure

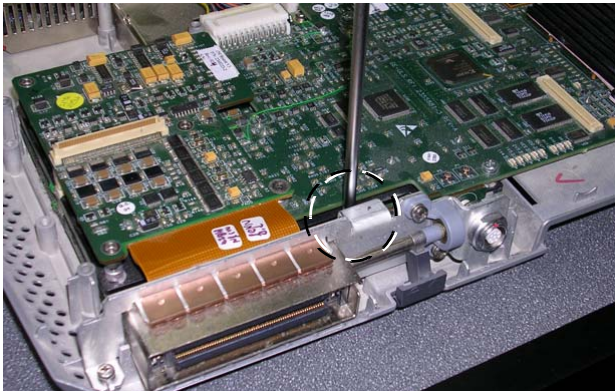
- 1) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 3.) Loosen and remove the four screws that secure the P&M Board to the RFI Board, as shown in [Figure 8-31](#).

**Figure 8-31 Removing the Screws that Secure the P&M Board to the RFI Board**



- 4.) Loosen the two screws that fasten the P&M Board to the Bottom Assembly, as shown in [Figure 8-32 below](#).

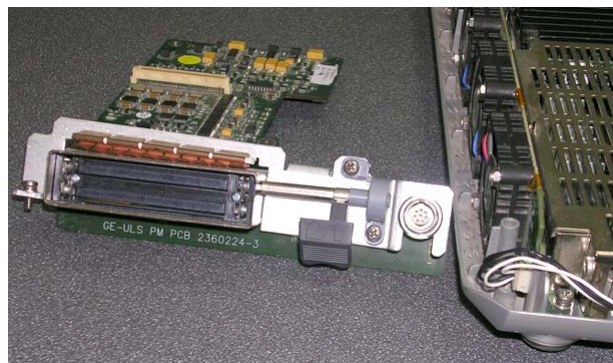
**Figure 8-32 Loosening the Screws from the P&M Board**





- 5.) Lift the P&M Board *upwards* away from the Bottom Assembly and remove it completely, as shown in [Figure 8-33 below](#).

**Figure 8-33 Removing the Probe and MUX Board from the Bottom Assembly**



### 8-3-1-5 P&M (Probe and MUX) Board Installation Procedure

**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [P&M \(Probe and MUX\) Board Removal Procedure](#).



**CAUTION** When installing boards, ESD may cause damage to a board. Always have the ESD hand strip connected to the machine chassis and to your hand.

- 1) Return a new P&M Board to the system, pushing it *downwards* into position on the Bottom Assembly. Make sure it is properly seated before returning and fastening the two screws (previously removed). Refer to [Figure 8-33](#) and [Figure 8-32](#), above.
- 2.) Return and fasten the four screws to secure the P&M Board to the RFI Board, as shown in [Figure 8-31 on page 8-30](#).
- 3.) Return the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-12](#)
- 4.) Return the bearing handle, as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 5.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Full System Test" on page 7-10](#)

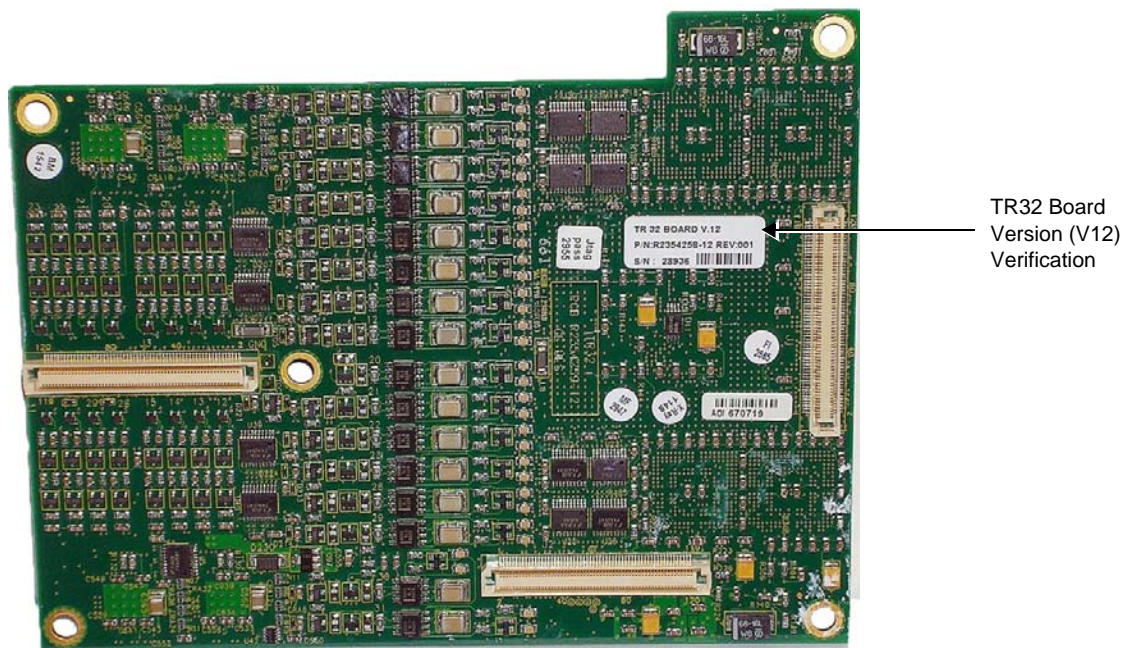
8-3-2 TR32 and RFI Boards Replacement Procedure

- NOTE:

When installing TR32 Boards V12 in systems running BT09 software, after installation ACW Diagnostic Test Results will display erroneously as “Failed”.
- NOTE:

When replacing the TR32 Boards, both boards must be of the **same version**. (A TR32 Board V12 cannot be used with a TR32 Board V7). Always verify this by examining the version number stated on the board, as shown in [Figure 8-34](#), below.

Figure 8-34 TR32 Board Verification (Version 12)



- NOTE:

Before installing the TR32-V12 board, check that the DCDC V4 board (P/N 2403248-4) is already installed. Always verify this by examining the Power Supply DCDC Board version number stated in the About Screen (HwVersion tab), as shown in [Figure 8-35](#), below. If the DCDC V2 is installed, replace it with the DCDC V4 board.

Figure 8-35 DCDC Board Verification (Version 4)

ABOUT					
SystemVersion	SwVersion	FwVersion	HwVersion	Probes	
Module Name	Location	P/N	Revision	S/N	Comment
RFL_AM	RFL_AM	R2418295-2	1	R9104	—
TR32_A	TR32_A	R2354258-12	1	T19835	—
TR32_B	TR32_B	R2354258-12	1	T20252	—
PIB	PIB	R2418272-5	0	P6513	—
PSB	PSB	R2418218-6	4	B4194	—
KBD	KBD	R2418524-0...	0.0	B43100006...	—
BEP	BEP	R2424349	000	55981057	—
BATT	BATT	N/A	48	17637	—
MONITOR	MONITOR	Hitachi17-3	—	0	—
ECG	ECG	R2419018-3	3	11237	—
DIB	DIB	R2419681-4	7	05700	—
POWER_SUPPLY	POWER...	2403248-4	4	02463W	—

DCDC Board Version (V4) Verification



**CAUTION** When removing the boards, ESD may cause damage to a board. Always have the ESD hand strip connected to the machine chassis and to your hand.



**8-3-2-1 Tools**

Use the appropriate Phillips and flat screw drivers, as indicated in the bottom assembly replacement procedures.

**8-3-2-2 Time Required**

15 minutes

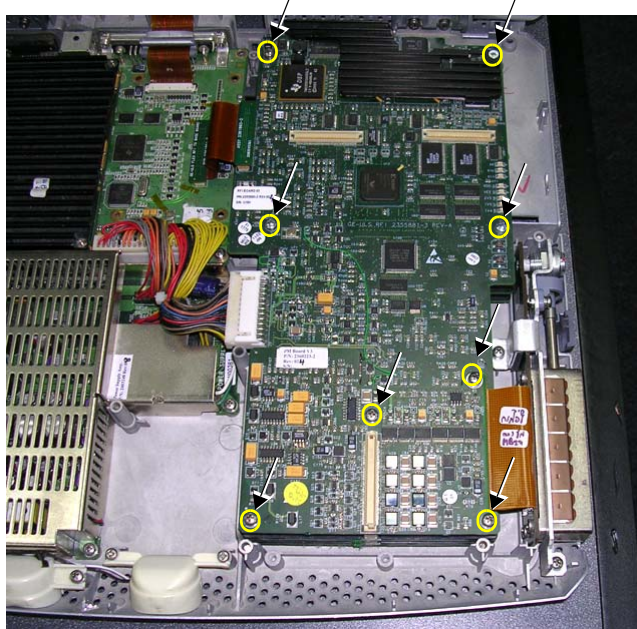
**8-3-2-3 Preparations**

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

#### 8-3-2-4 TR32 and RFI Boards Removal Procedure

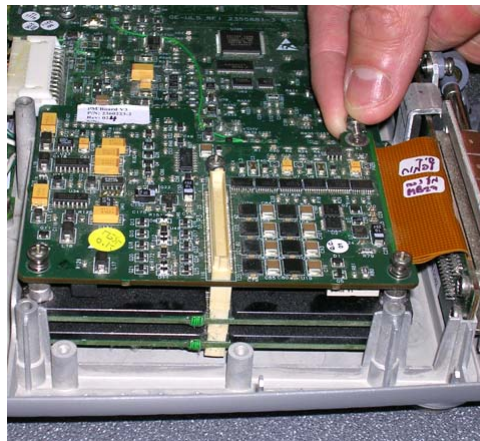
- 1) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 3.) Loosen the eight screws that secure the TR32 and RFI Boards to the Bottom Assembly, as shown in [Figure 8-36 below](#).

**Figure 8-36 Loosen Screws that Secure TR32 and RFI Boards to Bottom Assembly**



- 4.) Remove the eight screws - see [Figure 8-37](#).

**Figure 8-37 Removing the Screws**

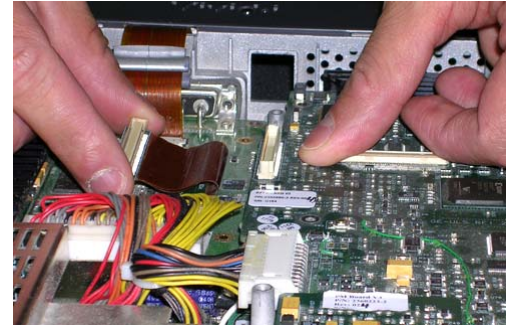
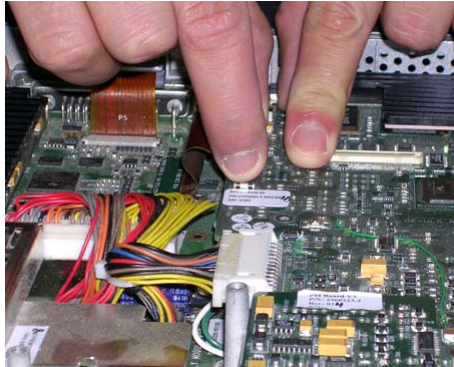


- 5.) Disconnect the PCI cable flex (BEP-to-RFI) from the cable connector on RFI Board as shown in



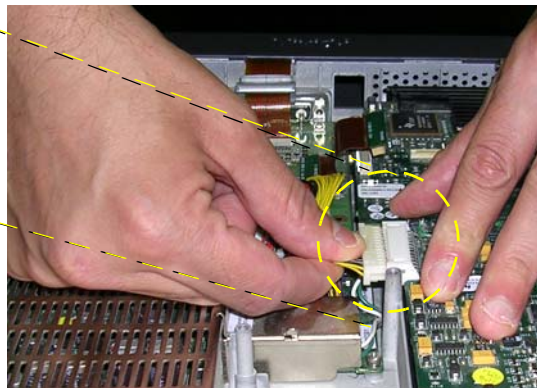
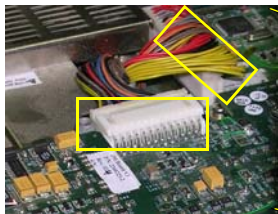
[Figure 8-38 below.](#)

**Figure 8-38 Disconnecting the PCI Cable from the RFI Board**



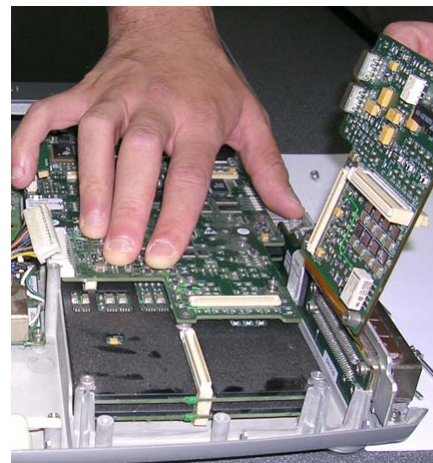
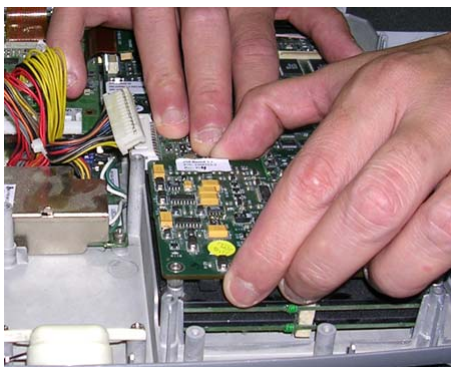
- 6.) Disconnect each of the two HVPS cables from their sockets on DC Power Supply, as shown in [Figure 8-39 below.](#)

**Figure 8-39 Disconnecting the DC Power Supply**



- 7.) Gently lift one side of the P&M Board upwards and hinge it open to gain access to the RFI and TR32 Board assembly beneath, as shown in [Figure 8-41 below.](#)  
(The RFI and TR32 Boards are seated together in the system as one unit).

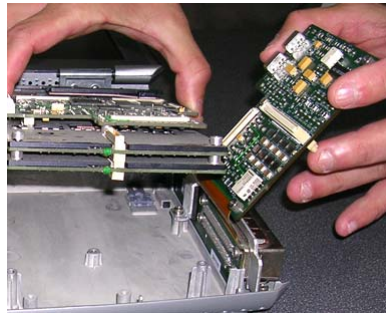
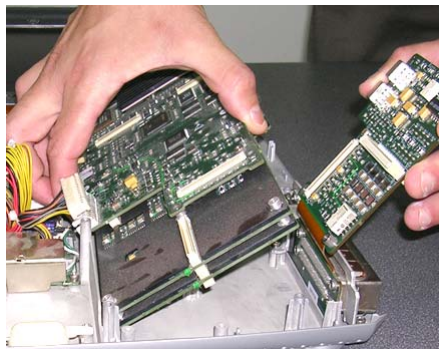
**Figure 8-40 Accessing the RFI and TR32 Boards**



- 8.) Lift the RFI and TR32 Board assembly upwards and remove it from the Bottom Assembly, as shown

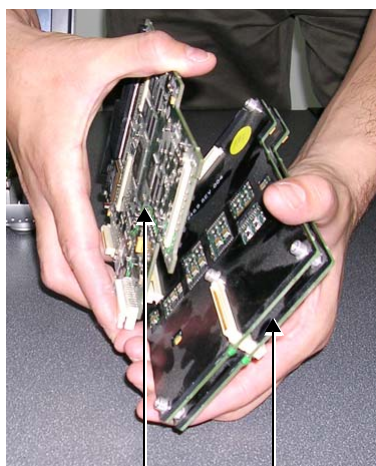
in [Figure 8-41](#) below

**Figure 8-41 Removing the RFI and TR32 Boards from the Bottom Assembly**

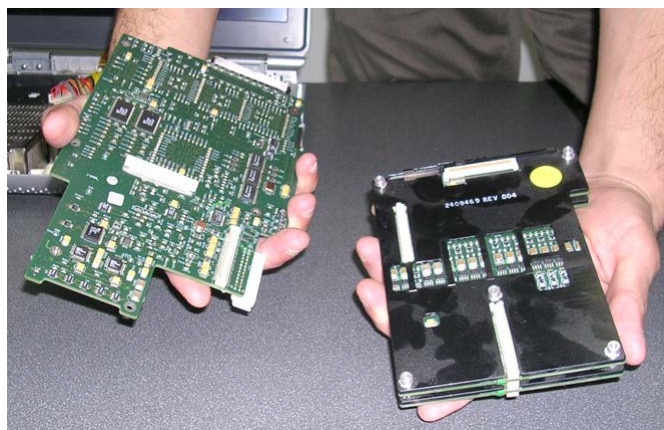


9.) Remove the RFI Board from the TR32 Boards (separate by gently pulling them apart), as shown in [Figure 8-42](#) below.

**Figure 8-42 Removing the RFI Board from the TR32 Boards**



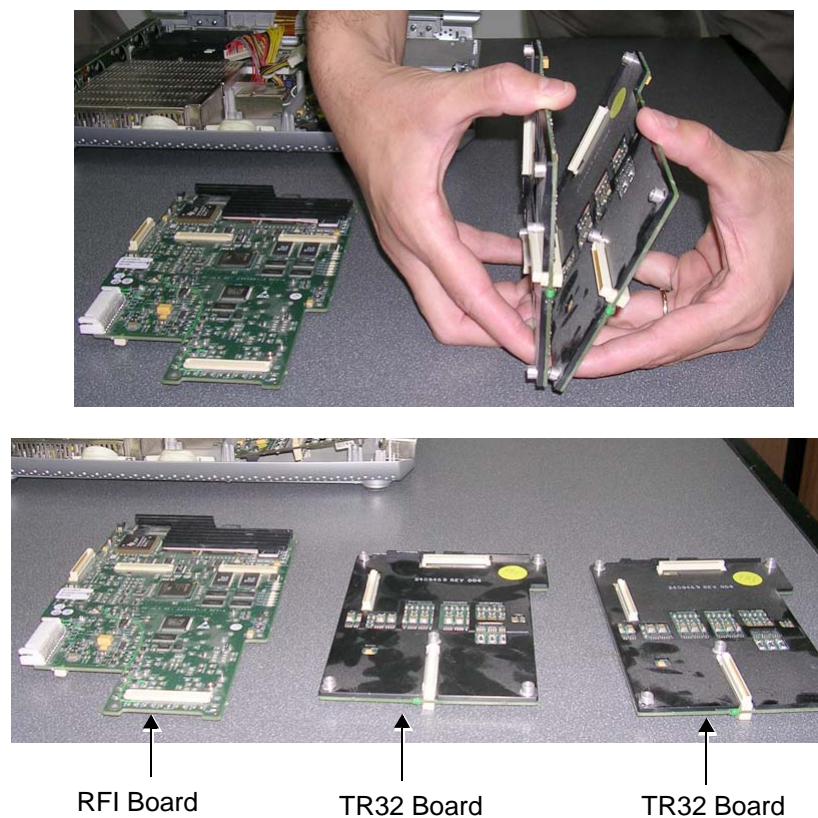
RFI Board    TR32 Boards





10.) Separate the two TR32 Boards from each other, as shown in [Figure 8-43 below](#).

**Figure 8-43 Separating the Two TR32 Boards from Each Other**



**NOTE:** Replace the defective board, as described in the appropriate steps of the following procedure.

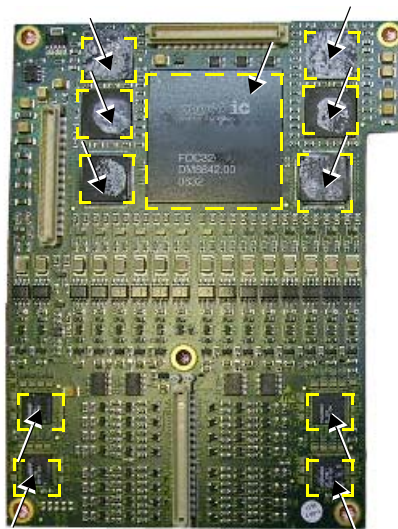
### 8-3-2-5 TR32 and RFI Boards Installation Procedure

**NOTE:** This procedure applies to replacement of one or more of the defective boards (TR32A and/or, TR32B and/or RFI).

**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [TR32 and RFI Boards Removal Procedure](#).

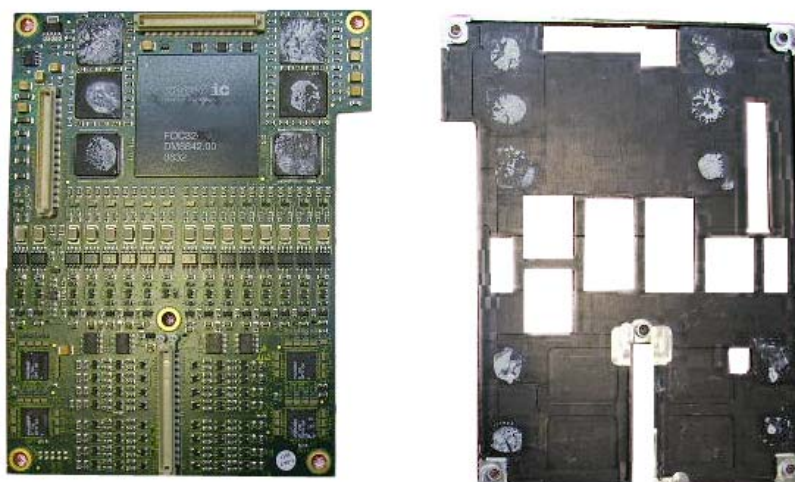
**CAUTION**  **WHEN INSTALLING BOARDS, ESD MAY CAUSE DAMAGE TO A BOARD. ALWAYS HAVE THE ESD HAND STRIP CONNECTED TO THE MACHINE CHASSIS AND TO YOUR HAND.**

- 1) Prepare **each** of the two TR32 Boards, as follows:
  - a.) Apply a small quantity of heat sink paste (Dow Corning® 340 Heat Sink Compound, or similar) to each of the eleven areas shown in [Figure 8-44](#) (marked with arrows).



**Figure 8-44 TR32 Board Showing Areas for Application of Heat Sink Paste**

- b.) Attach the TR32 Board to its respective heat sink pad by placing the heat sink on the TR32 Board (the obverse side of the heat sink is shown in [Figure 8-45](#)).



**Figure 8-45 TR32 Board Shown with Respective Heat Sink Pad**

- 2.) Re-connect the two TR32 Boards to each other (gently press together as shown in [Figure 8-43 on page 8-37](#)).
- 3.) Connect the TR32 Boards to the RFI Board (gently press together as shown in [Figure 8-42 on page 8-36](#)).
- 4.) Return the TR32 and RFI Board assembly to the system, placing it in position on the Bottom Assembly. (While performing this step, gently lift one side of the P&M Board upwards and hinge it open in order to insert the TR32 and RFI Board assembly underneath). Refer to [Figure 8-40](#) and [Figure 8-41 on page 8-36](#).
- 5.) Reconnect each of the two HVPS cables to the DC Power Supply (see [Figure 8-39 on page 8-35](#)).
- 6.) Reconnect the PCI cable flex (BEP-to-RFI) to the cable connector on RFI Board (see [Figure 8-38 on page 8-35](#)).
- 7.) Return the eight screws and fasten the TR32 and RFI Board assembly firmly in position on the Bottom Assembly (refer to [Figure 8-36](#) and [Figure 8-37 on page 8-34](#)).
- 8.) Return the Control Panel and Keyboard to its original position, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-12.
- 9.) Return the bearing handle, as described in the "[Bearing Handle Installation Procedure](#)" on page 8-3.
- 10.) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24
  - "[Calibration Tests](#)" on page 7-25
  - "[Full System Test](#)" on page 7-10

## 8-3-3 BEP Replacement Procedure

 **CAUTION** BEFORE REPLACING THE BEP, REMEMBER TO PERFORM A FULL INCREMENTAL BACK-UP OF THE ARCHIVE AND USER PRESETS.

### 8-3-3-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the BEP replacement procedures.

### 8-3-3-2 Time Required

15 minutes

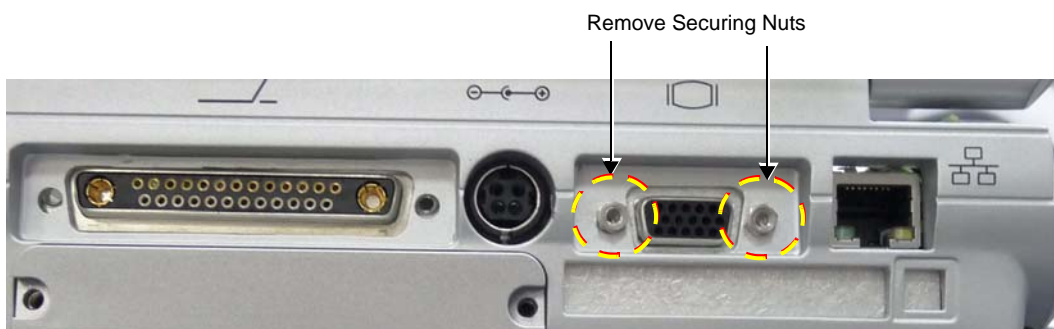
### 8-3-3-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-3-3-4 BEP Removal Procedure

- 1.) Disconnect any peripherals currently connected to the system and make sure there is no T-plug (dongle) or any other peripheral connected to the USB or PCMCIA.
- 2.) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 3.) Make sure the Vivid q N LCD Display cover is securely closed and place the scanner face down. Remove the battery as described in the ["Battery Removal Procedure" on page 8-4](#).
- 4.) Remove the Hard Disk, as described in the ["Hard Disk Removal Procedure" on page 8-6](#).
- 5.) Loosen and remove the two securing nuts (one on each side of the VGA Connector, located on the Vivid q N rear panel), as shown [Figure 8-46](#).

**Figure 8-46 Vivid q N Scanner - Rear View**



- 6.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 7.) Disconnect all the cables from the BEP.

**NOTE:** When replacing the BEP or Hard Disk, one must either obtain new access codes that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the access codes already registered in the Hard Disk. Only qualified personnel should perform these tasks.

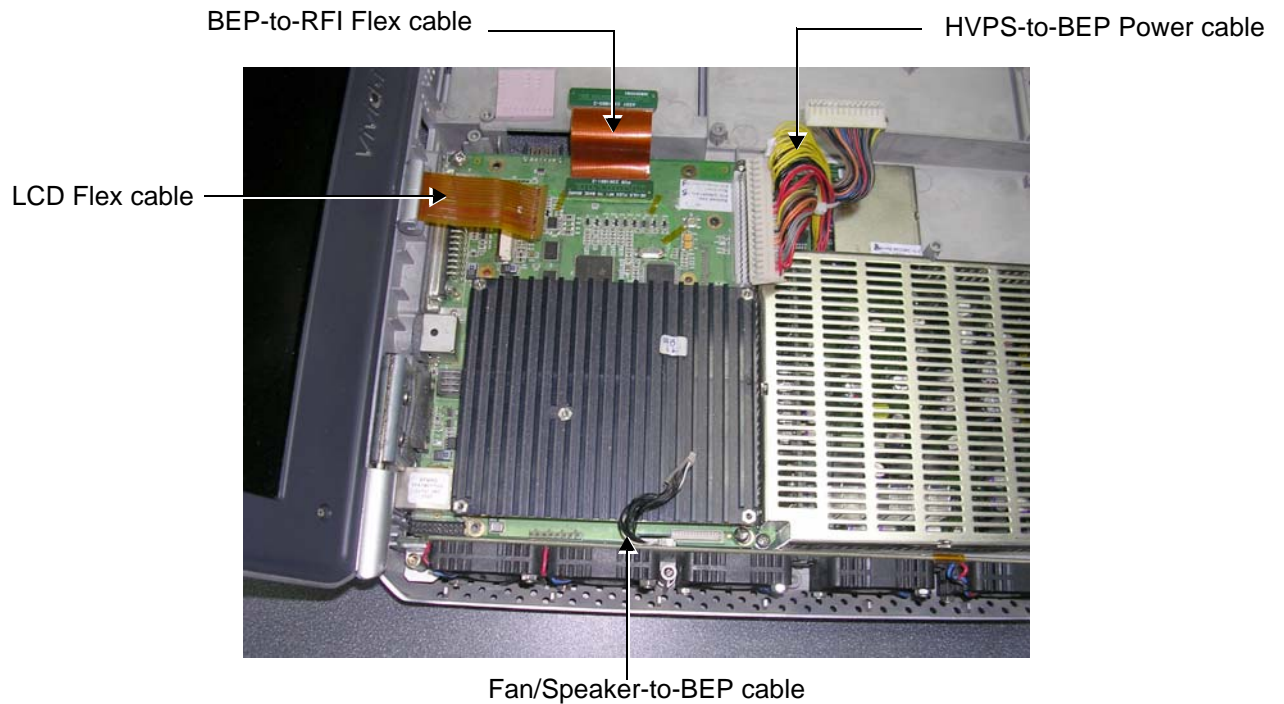
Proceed as follows:

Disconnect BEP cables as follows (refer to [Figure 8-47 below](#)):

- a.) Disconnect the LCD Flex ribbon cable (carefully pull back the two connector latches to release).
- b.) Disconnect the BEP-to-RFI Flex cable.

- c.) Disconnect the HVPS-to-BEP power cable.
- d.) Disconnect the Fan/Speaker-to-BEP power cable.

**Figure 8-47 Disconnecting Cables from the BEP**

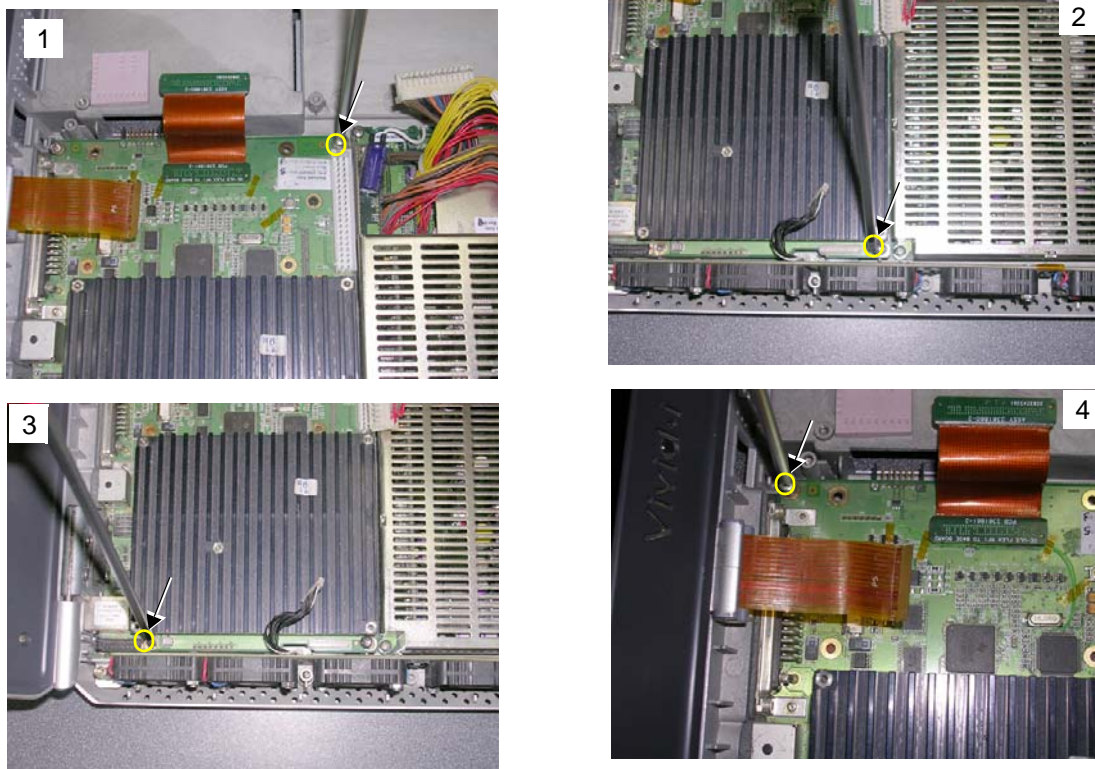


- 8.) Unscrew and remove the four screws that secure the BEP to the Bottom Assembly as shown in



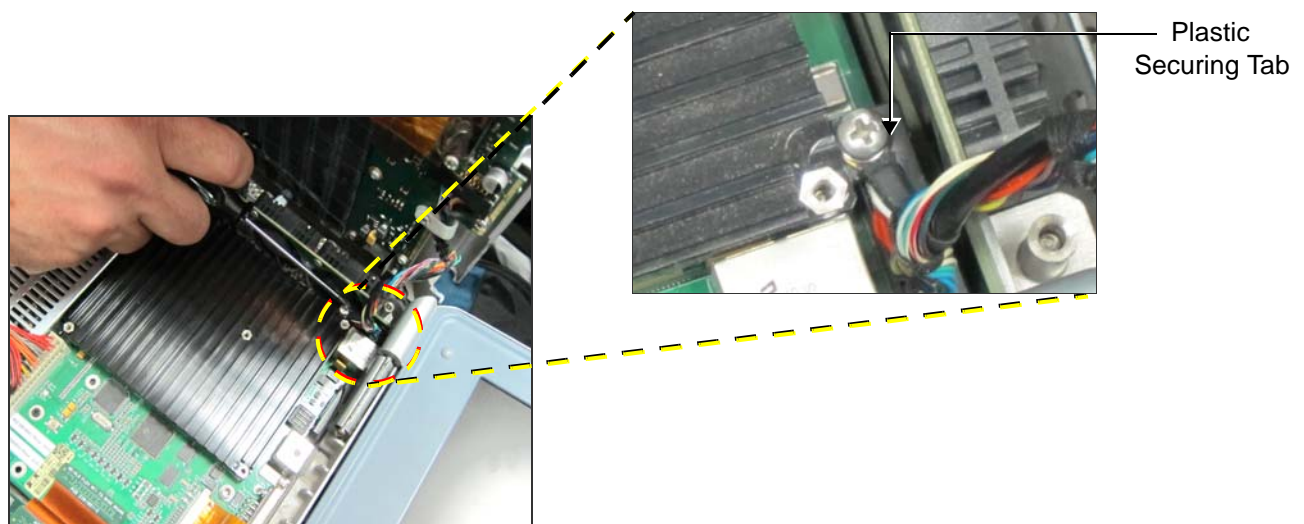
Figure 8-59 below.

Figure 8-48 Removing the Screws from the BEP



**NOTE:** Beneath one of the four screws removed in the previous step, is a small plastic securing tab (illustrated in Figure 8-49) that serves to seat the BEP firmly in position. It is necessary to loosen and release this tab (lift it up using a screw driver if necessary) in order to facilitate complete removal of the BEP.

Figure 8-49 Releasing the Plastic Securing Tab from the BEP

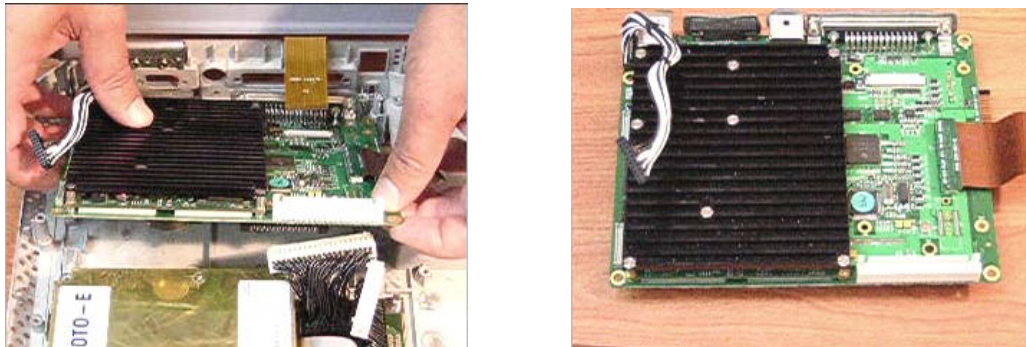


9.) Using both hands, lift the BEP out of the Bottom Assembly and remove it from the system, as shown



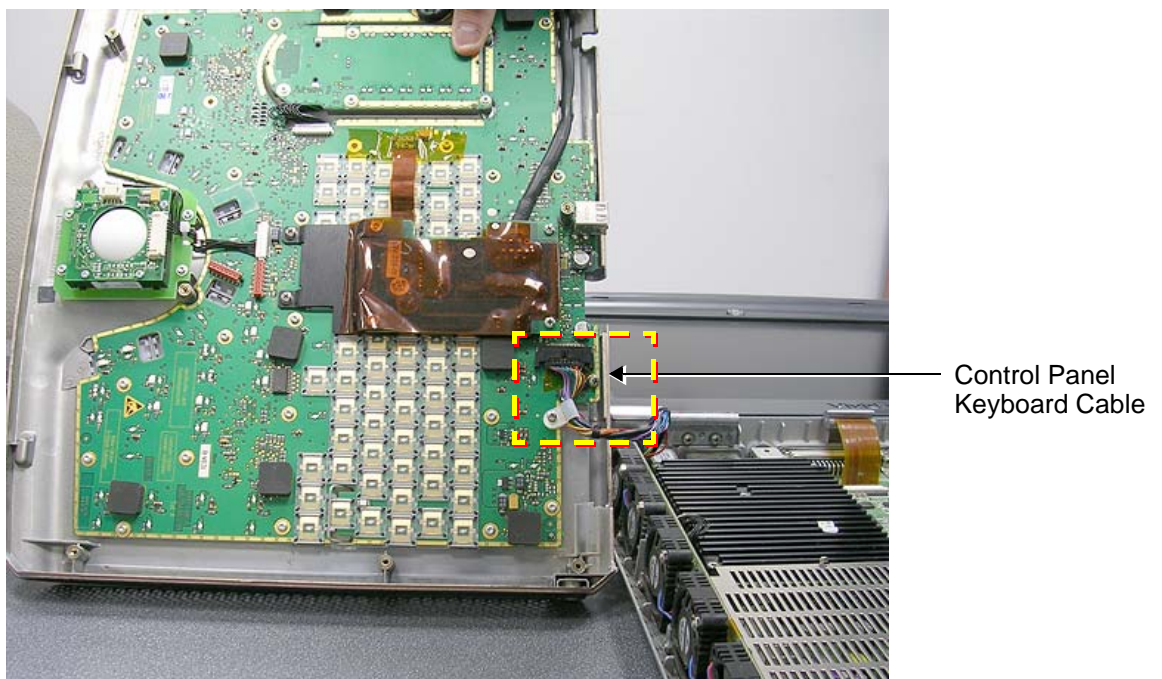
in [Figure 8-59](#) below.

**Figure 8-50 Removing the BEP from the Bottom Assembly**



**NOTE:** When removing the BEP for replacement with the SATA BEP, disconnect the control panel/keyboard cable ([Figure 8-51](#)) from the parallel BEP you have just removed and keep this cable for installing on the SATA BEP.

**Figure 8-51 Control Panel / Keyboard Cable**

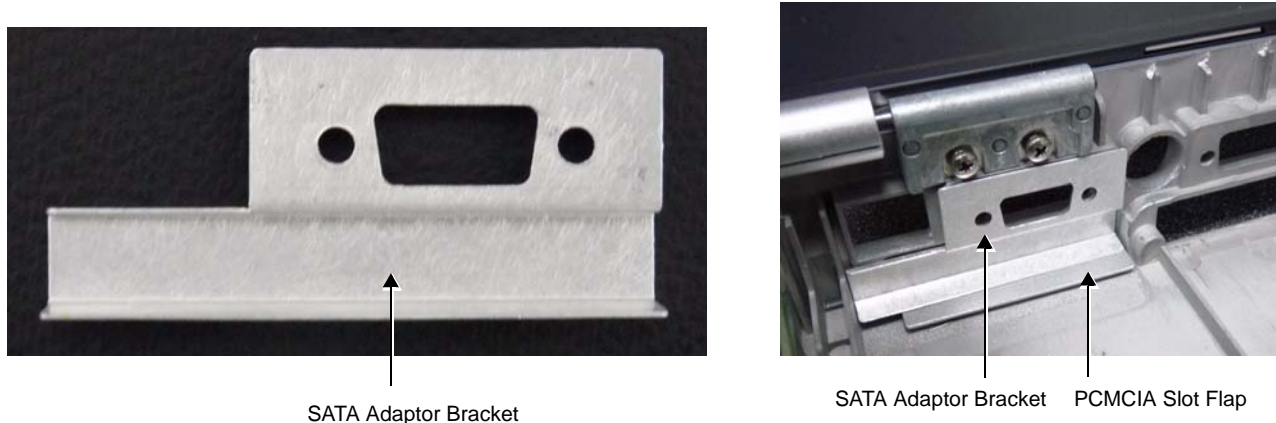


### 8-3-3-5 BEP Installation Procedure

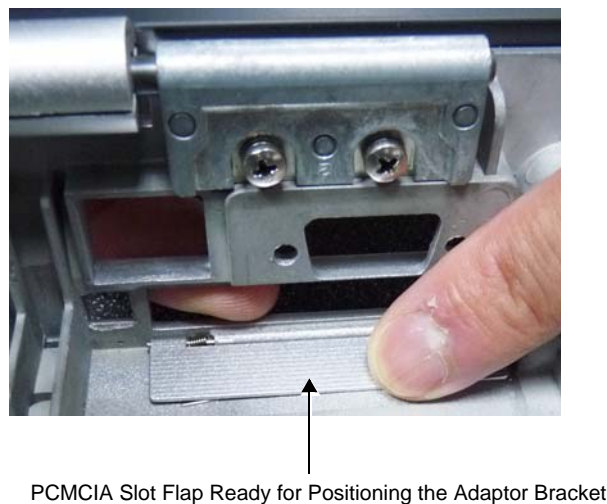
**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [BEP Removal Procedure](#).

**NOTE:** The **SATA BEP** has an adaptor bracket, which is required for its installation. The bracket is shown on the left in [Figure 8-52](#); in the picture on the right, the bracket is shown in position in the Vivid q N scanner. Notice that the bracket sits on the PCMCIA slot-flap, which is pressed open while the adaptor bracket is positioned on the flap itself. To install the adaptor bracket, the flap is pressed open ([Figure 8-53](#)) and the adaptor bracket is placed in position. The procedure is described below.

**Figure 8-52 SATA Adaptor Bracket**



**Figure 8-53 PCMCIA Slot Flap Pressed Open**

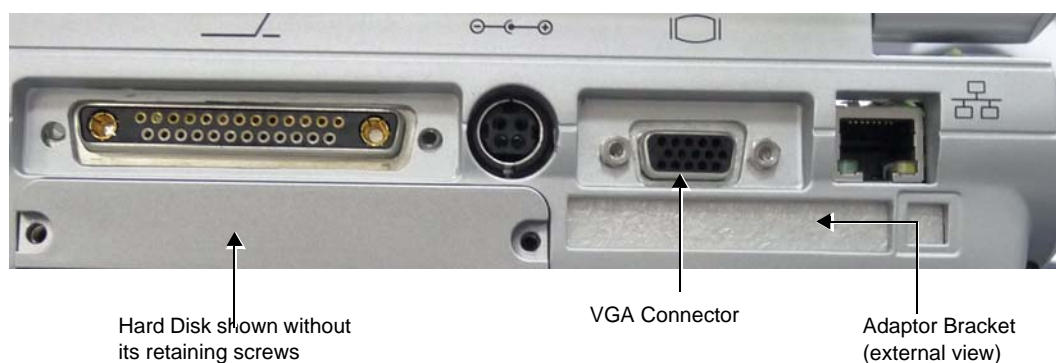


### 8-3-3-5-1 Preparation Procedure

- 1) Press the PCMCIA slot-flap open and hold it down as shown in [Figure 8-53](#).
- 2.) Place the adaptor bracket in position as shown on the right in figure [Figure 8-52](#) and press it firmly against the Vivid q N chassis.

**NOTE:** [Figure 8-54](#) shows a view from the rear of the Vivid q N showing the adaptor bracket closing off the PCMCIA slot.

**Figure 8-54 Rear View of the Vivid q N Scanner after SATA BEP Installation**



- 3.) Connect the control panel/keyboard cable (if previously removed from an ATA BEP; see [Figure 8-51](#)) to the SATA BEP.
- Proceed to install the SATA BEP as described in the next procedure.

### 8-3-3-5-2 BEP Installation

- 1) Carefully return the new BEP to the original position on the Bottom Assembly - refer to [Figure 8-50 on page 8-43](#).

**NOTE:** *When replacing the BEP or Hard Disk, one must either obtain new access codes that will fit the system ID which is programmed on the BEP, or program the BEP system ID to fit the access codes already registered in the Hard Disk. Only qualified personnel should perform these tasks.*

- 2.) Check that the BEP is seated correctly then return and fasten the four screws (previously removed) to secure the BEP to the Bottom Assembly - refer to [Figure 8-48 on page 8-42](#).
- 3.) Re-connect all the cables to the BEP:  
Proceed as follows (refer to [Figure 8-47 on page 8-41](#)):
  - a.) Re-connect the Speaker-to-BEP power cable
  - b.) Re-connect the Fan-to-BEP power cable.
  - c.) Re-connect the HVPS-to-BEP power cable.
  - d.) Re-connect the BEP-to-RFI Flex cable.
  - e.) Re-connect the LCD Flex ribbon cable (carefully push back and secure the two connector latches).
- 4.) Return and fasten the two securing nuts previously removed (one on each side of the VGA Connector, located on the Vivid q N rear panel), as shown [Figure 8-46](#).
- 5.) Return the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-12.
- 6.) Return the Hard Disk, as described in the "[Hard Disk Installation Procedure](#)" on page 8-7.

- 7.) Re-install the battery as described in the ["Battery Installation Procedure" on page 8-5](#).
- 8.) Return the bearing handle as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 9.) Turn ON the system and boot-up.
- 10.) Perform a complete functional check of the system, as described in [Chapter 4 - General Procedures and Functional Checks](#).
- 11.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Full System Test" on page 7-10](#)



## 8-3-4 BIOS Battery Replacement

**NOTE:** Since the BIOS battery is not available as a spare part (due to shelf life), it should be obtained locally. The battery model is CR2032.

### 8-3-4-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the BEP replacement procedures.

### 8-3-4-2 Time Required

15 minutes

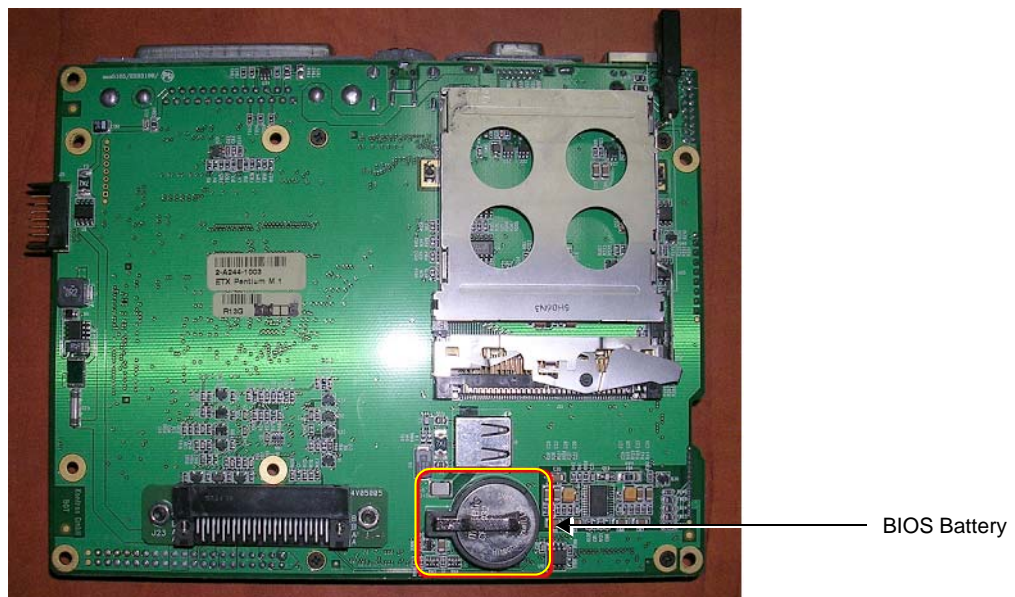
### 8-3-4-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-3-4-4 BIOS Battery Removal Procedure

- 1) Remove the BEP, as described in the ["BEP Removal Procedure"](#) on page 8-40.
- 2.) Take out the BIOS battery located on the bottom of the BEP, as shown in [Figure 8-55](#).

**Figure 8-55 BEP - Location of BIOS Battery**



### 8-3-4-5 BIOS Battery Installation Procedure

**NOTE:** Before proceeding, refer to the ["Preparation Procedure"](#) on page 8-45.

- 1) Fit a new BIOS battery in position on the BEP - refer to [Figure 8-55](#).
- 2.) Re-install the BEP, as described in the ["BEP Installation Procedure"](#) on page 8-44.
- 3.) Turn ON the system and boot-up.
- 4.) Adjust to the correct date and time settings - see ["Date and Time Adjustments"](#) on page 3-71.
- 5.) Proceed to perform the following functionality test:
  - ["Battery Parameters Test"](#) on page 7-102

## 8-3-5 DC-to-DC Power Supply Replacement Procedure

### 8-3-5-1 Tools

Use the appropriate flat and Phillips-type screw drivers, as indicated in the HVPS replacement procedure.

### 8-3-5-2 Time Required

15 minutes

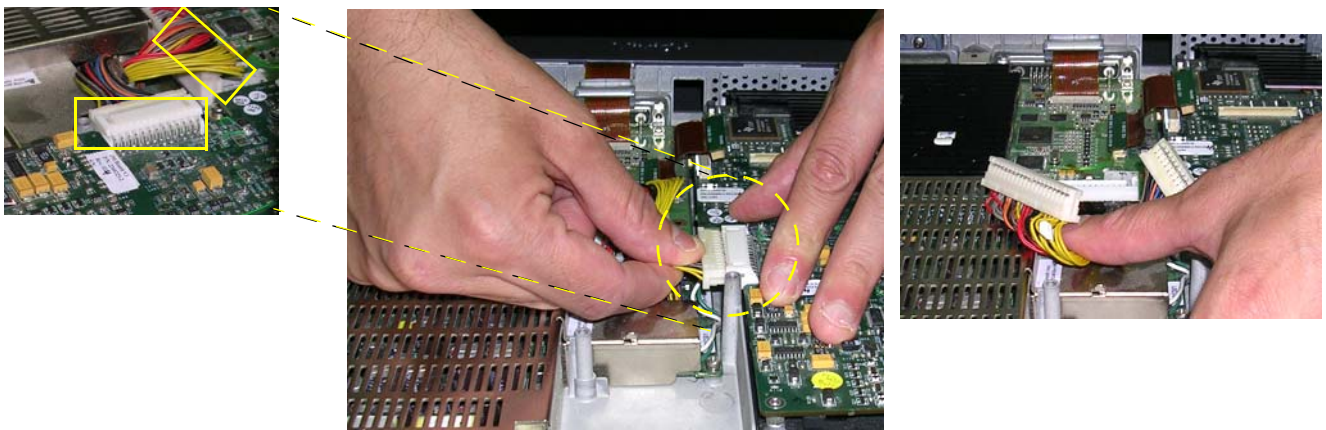
### 8-3-5-3 Preparation

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-3-5-4 DC-to-DC Power Supply Removal Procedure

- 1.) Make sure the Vivid q N LCD Display cover is securely closed and place the scanner face down. Remove the battery as described in the ["Battery Removal Procedure" on page 8-4](#).
- 2.) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 3.) Disconnect each of the two Power Supply cables from the DC Power Supply (HVPS-to-BEP and HVPS-to-RFI), as shown below.

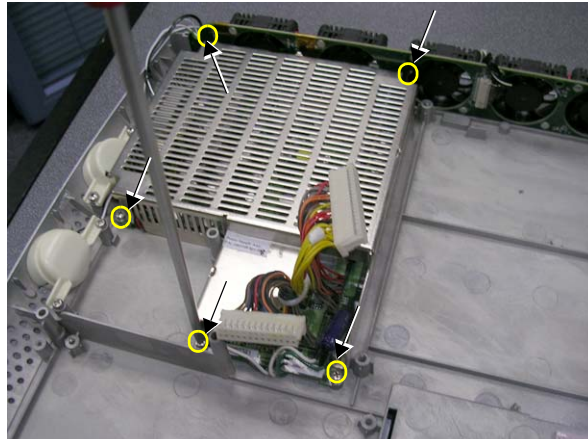
**Figure 8-56 Disconnecting the DC Power Supply Cables**



- 4.) Loosen the five screws that secure the DC Power Supply to the Bottom Assembly, as shown in

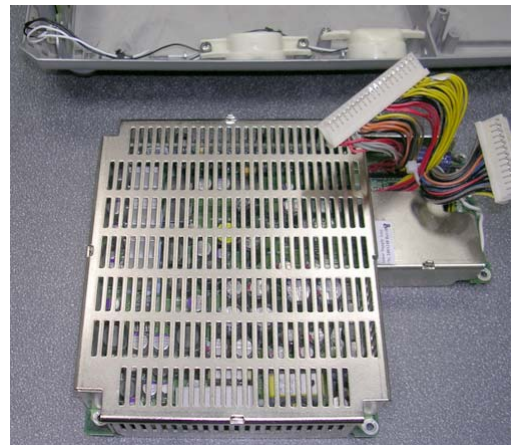
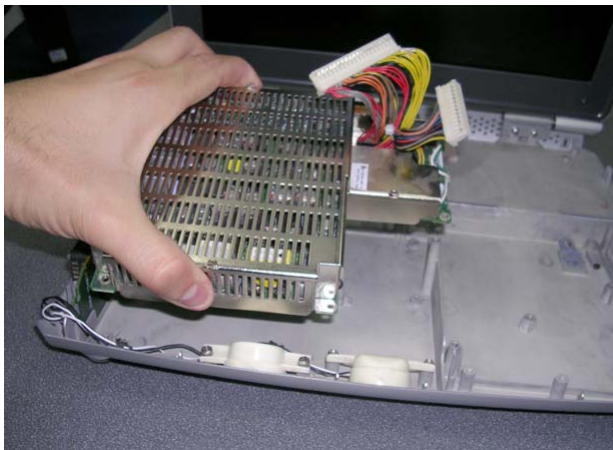
[Figure 8-57 below.](#)

**Figure 8-57 Loosening the Screws on the DC Power Supply**



- 5.) Carefully lift the DC power supply *upwards* and remove it from the Bottom Assembly, as shown in [Figure 8-58 below.](#)

**Figure 8-58 Removing the DC Power Supply**



- 6.) Proceed to perform the following functionality tests:
- ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Full System Test" on page 7-10](#)

### 8-3-5-5 DC-to-DC Power Supply Installation Procedure

**NOTE:** When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [DC-to-DC Power Supply Removal Procedure](#).

- 1.) Return the HVPS to its original position - refer to [Figure 8-58](#), above.
- 2.) Return the five screws and fasten the HVPS in position on the Bottom Assembly, as shown in [Figure 8-57 on page 8-49](#).
- 3.) Reconnect each of the two Power Supply cables to the DC Power Supply (HVPS-to-BEP and HVPS-to-RFI), as shown in [Figure 8-56 on page 8-48](#).
- 4.) Return the bearing handle, as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 5.) Make sure the Vivid q N LCD Display cover is securely closed and place the scanner face down. Re-install the battery as described in the ["Battery Installation Procedure" on page 8-5](#).
- 6.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Full System Test" on page 7-10](#)



## 8-3-6 Fan Replacement Procedure

**NOTE:** This section describes the replacement procedure for the Fan Assembly which is supplied as part of the Fans and Speaker Kit - Part No. 2412826.

### 8-3-6-1 Tools

Use the appropriate flat and Phillips-type screw drivers, as indicated in the fan replacement procedure.

### 8-3-6-2 Time Required

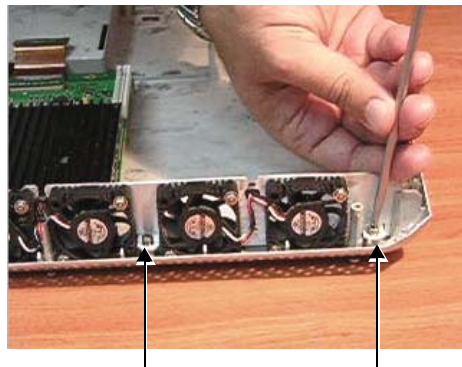
15 minutes

### 8-3-6-3 Preparation

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-3-6-4 Fan Removal Procedure

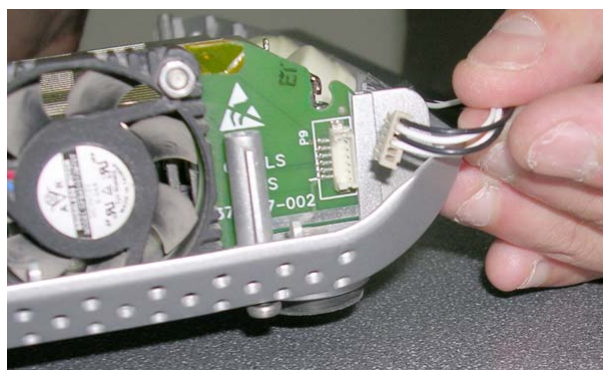
- 1) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 3.) Unscrew and remove the two screws that secure the Fan Assembly to the Bottom Assembly as shown in [Figure 8-59 below](#).



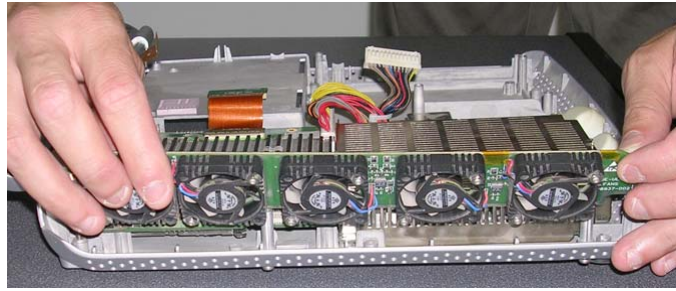
**Figure 8-59 Removing the Screws from the Fan Assembly**

- 4.) Disconnect the speaker cable from the fan assembly, as shown in [Figure 8-60 below](#)

**Figure 8-60 Disconnecting the Speaker Cable**

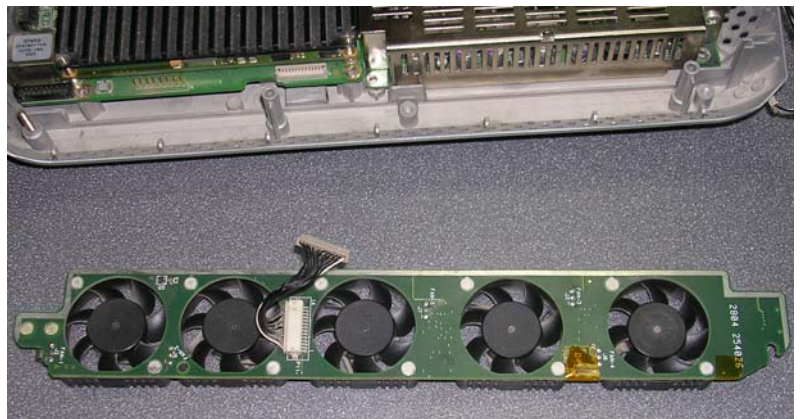
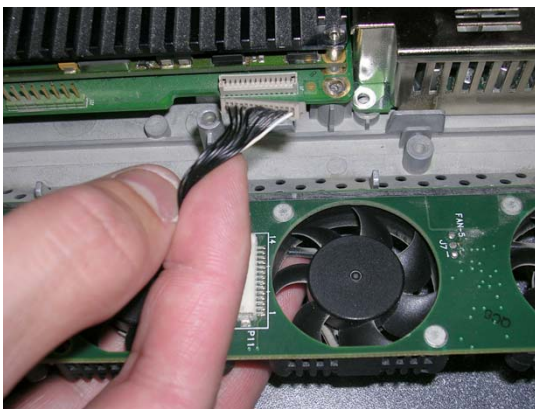


- 5.) Using both hands, lift the Fan Assembly *upwards* from the *front* and then the *rear* to remove it from the Bottom Assembly; lay it down adjacent to the system, ready for the next step as shown in [Figure 8-61 below](#).



**Figure 8-61 Removing the Fan Assembly**

- 6.) Disconnect the Fan cable from the BEP and completely remove the Fan Assembly from the system, as shown in [Figure 8-62 below](#).



**Figure 8-62 Disconnecting the Fan Cable from the BEP**

---

**8-3-6-5 Fan Installation Procedure**

*NOTE: When performing the following installation procedure steps, it may be helpful to review the appropriate movie clips previously referenced in the [Fan Removal Procedure](#).*

- 1) Connect the replacement Fan cable to the BEP- refer to [Figure 8-62](#), above.
- 2.) Using both hands, carefully mount the replacement Fan Assembly into position on the Bottom Assembly - refer to [Figure 8-61 on page 8-52](#).
- 3.) Make sure the Fan Assembly is seated in the correct position. Return and fasten the two screws (previously removed) to secure the Fan Assembly to the Bottom Assembly, as shown in [Figure 8-59 on page 8-51](#).
- 4.) Reconnect the speaker cable to the fan assembly, as shown in [Figure 8-60](#).
- 5.) Return the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-12.
- 6.) Return the bearing handle, as described in the "[Bearing Handle Installation Procedure](#)" on page 8-3.
- 7.) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24
  - "[Calibration Tests](#)" on page 7-25

## 8-3-7 Speaker Assembly Replacement Procedure

**NOTE:** *This section describes the replacement procedure for the Speaker Assembly which is supplied as part of the Fans and Speaker Kit - Part No. 2412826.*

### 8-3-7-1 Tools

Use the appropriate flat and Phillips-type screw drivers, a wire cutter and the appropriate Hex wrench keys as indicated in the speaker replacement procedure.

### 8-3-7-2 Time Required

15 minutes

### 8-3-7-3 Preparation

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-3-7-4 Speaker Assembly Removal Procedure

- 1.) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).
- 3.) Loosen and remove the two screws on each of the speaker housings (four in total).
- 4.) Disconnect the speaker cables from the fan assembly.
- 5.) Gently lift the speaker assembly towards you and remove from the system.

### 8-3-7-5 Speaker Assembly Installation Procedure

- 1.) Return a replacement speaker assembly to the original position, ensuring that the two connection legs of each speaker are facing the two connection legs of the opposite speaker, otherwise an electrical short may occur.
- 2.) Reconnect the speaker cables to the fan assembly.
- 3.) Return and fasten the two screws on each of the speaker housings (four in total), previously removed.
- 4.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Calibration Tests" on page 7-25](#)
  - ["Full System Test" on page 7-10](#)

### 8-3-8 AUO LCD Display Replacement Procedure

**NOTE:** The procedures described in this section are applicable to all Vivid q N BT06 systems with software version 6.2.0 Build 158, and higher.

**NOTE:** The AOU LCD PN5461952 kit is delivered with the LCD monitor assembled in the display frame as an integrated unit.



**Figure 8-63 AUO LCD Display Assembled in Display Frame**

**NOTE:** If replacing an old-type LCD Monitor with an AUO LCD Monitor, it is necessary to uninstall the old-type hinges and install a pair of new-type hinges (P/N KTZ280195), as shown in [Figure 8-64](#).

**NOTE:** Prior to installing the AUO LCD monitor, a replacement DC power supply, P/N 5439596 should be available if this is required. See Note on page [8-58](#).

#### 8-3-8-1 Tools

Use the appropriate Phillips and flat screw drivers, and Loctite 402 glue, as indicated in the AUO LCD Display replacement procedure.

#### 8-3-8-2 Time Required

15 minutes

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

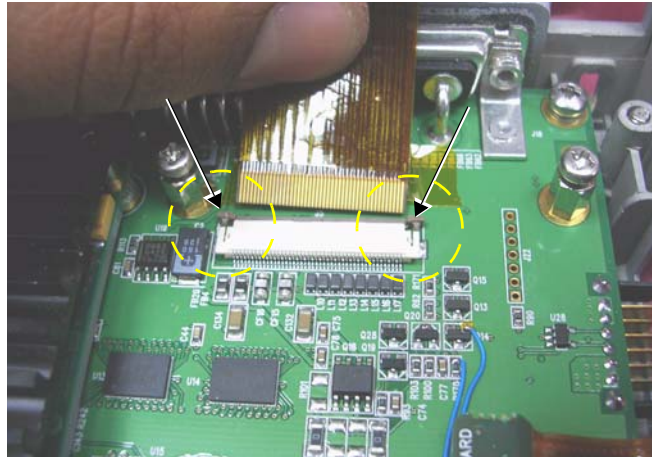
- 1) Make sure all required tools and parts are available.
- 2.) Adhere the appropriate Vivid label onto the new display frame.
- 3.) Remove the display frame from the new AOU LCD Display (to provide access to the hinges).
- 4.) Shut down the Vivid q N ultrasound unit, as described in - [System Setup](#)

#### 8-3-8-4 AUO LCD Display Removal Procedure

- 1) Remove the bearing handle, as described in the ["Bearing Handle Removal Procedure" on page 8-2](#).
- 2) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-10](#).

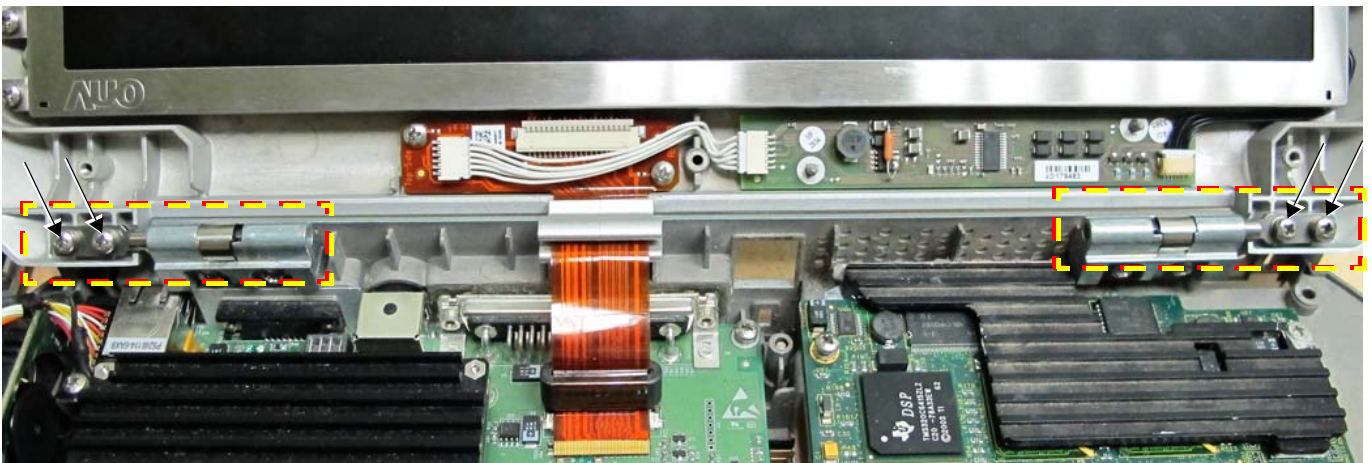


- 3.) Slide to open the two connector latches and disconnect the LCD Flex ribbon cable from BEP - refer to [Figure 8-65](#).



**Figure 8-65 Connector Latches**

- 4.) Unscrew and remove the four screws (two on either side - as shown in [Figure 8-66](#)) that secure the Rear Cover and Latch Assembly to the Bottom Assembly.



**Figure 8-66 Rear Cover and Latch Assembly Securing Screws**

- 5.) Detach the Rear Cover and Latch Assembly from the Bottom Assembly and remove.

### 8-3-8-5 AUO LCD Display Installation Procedure

**NOTE:** When performing this procedure, care must be taken to correctly attach the Display Frame on the Bottom Assembly hinges.

**NOTE:** Prior to inserting the hinge securing screws in their respective locations, apply a coating of Loctite 402 glue to each of the hinge screws (supplied).

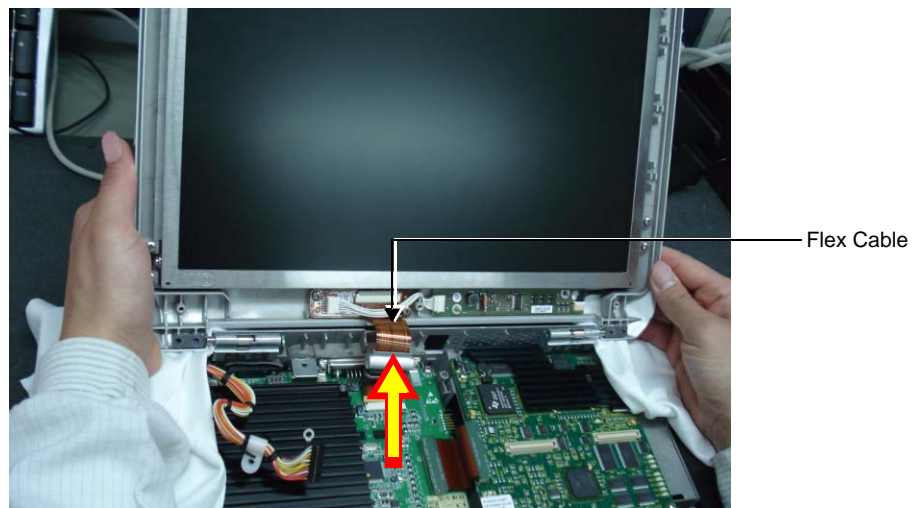
- 1.) Protect the Bottom Assembly with a protective cloth, as shown in [Figure 8-67](#).



**Figure 8-67 Protecting the Bottom Assembly**

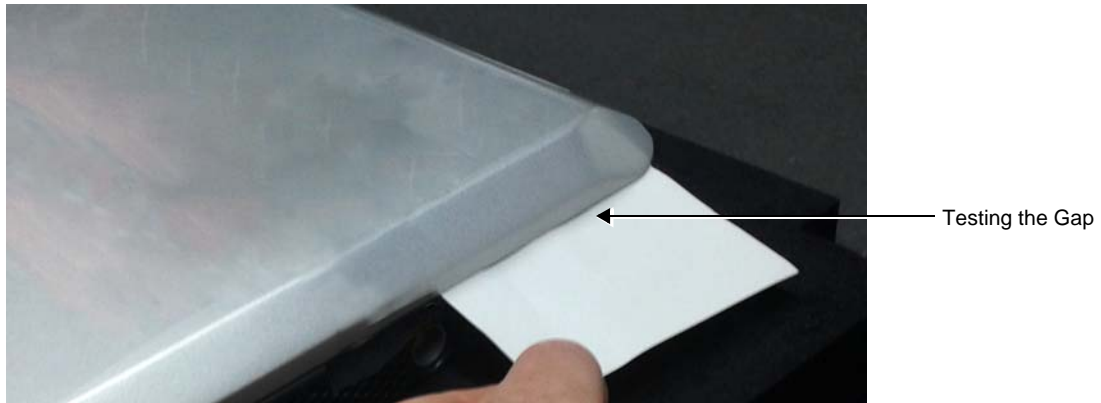
- 2.) Check that there is a coating of Loctite 402 on each of the screw threads.
- 3.) Carefully position the AUO LCD Display Assembly on the Bottom Assembly hinges and secure the LCD Display Assembly in position with the four screws provided - two each side, see [Figure 8-66](#).

**Note:** Check that there is a coating of Loctite 402 on the screw threads, **but do not tighten the screws completely** - see [Figure 8-68](#).



**Figure 8-68 Mounting the AUO LCD Display Assembly onto the Bottom Assembly**

- 4.) Gently pull the LCD display upwards and fully tighten the hinge screws on both the left and right sides of the display.
- 5.) Re-connect the flex cable (indicated in [Figure 8-68](#)).
- 6.) Fit the display frame onto the AOU LCD Display and cover the securing screws with the screw-caps provided.
- 7.) Verify that the Vivid q N lid opens and closes freely and check that there is a "paper-thin" gap between the top rear cover and the keyboard surface as shown in [Figure 8-69](#).



**Figure 8-69 Checking the Gap Between the Vivid q NLid and the Bottom Assembly**

- 8.) Fully tighten the hinge screws.
- 9.) Return the Keyboard Assembly to its location on the Bottom Assembly, as described in ["Control Panel and Keyboard Installation Procedure" on page 8-12](#).
- 10.) Refit the bearing handle, as described in the ["Bearing Handle Installation Procedure" on page 8-3](#).
- 11.) For the final stage of the LCD Display installation procedure, proceed to calibrate the newly-installed LCD Display by making any adjustments required to the *Brightness*, *Contrast* and/or *Blue Tint*, as described in the ["LCD Display Adjustments and Calibration" on page 6-1](#).
- 12.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)
  - ["Full System Test" on page 7-10](#)

**NOTE:** *In the event that the installed AUO LCD monitor flickers after installation, the DC Power Supply should be replaced with a new DC Power Supply, P/N 5439596. Follow the instructions provided in the ["DC-to-DC Power Supply Replacement Procedure" on page 8-48](#).*



### 8-3-9 AUO LCD Flex Cable Replacement Procedure








**NOTE:** In preparation for the procedures below, it is necessary to order the AUO LCD Cable and Flex RSPL Kit as shown in the [Table 8-2](#) below.

**Table 8-2 AUO LCD Cable and Flex RSPL Kit (P/N 5443867) Contents**

Part Description	Quantity
LCD flex (8 bit data cable)	1
Inverter Flex Board cable	1
AUO LCD cable (LCD to LED driver	1
Flex Board	1
LCD backlight Inverter Board	1
Klebeband Kapton tape	2
Display flex cover	1
Ferrite core	1

**NOTE:** For reference, the relevant parts are illustrated in [Table 8-3](#), below:

**Table 8-3 AUO LCD Cable and Flex RSPL Kit - Illustrated Parts**

Part Illustration	Item # as Labeled in Figures and Referenced in Procedures
	1
	2
	3
	4
	5
	6
	7

### 8-3-9-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the AUO LCD Flex Cable replacement procedure.

### 8-3-9-2 Time Required

30 minutes

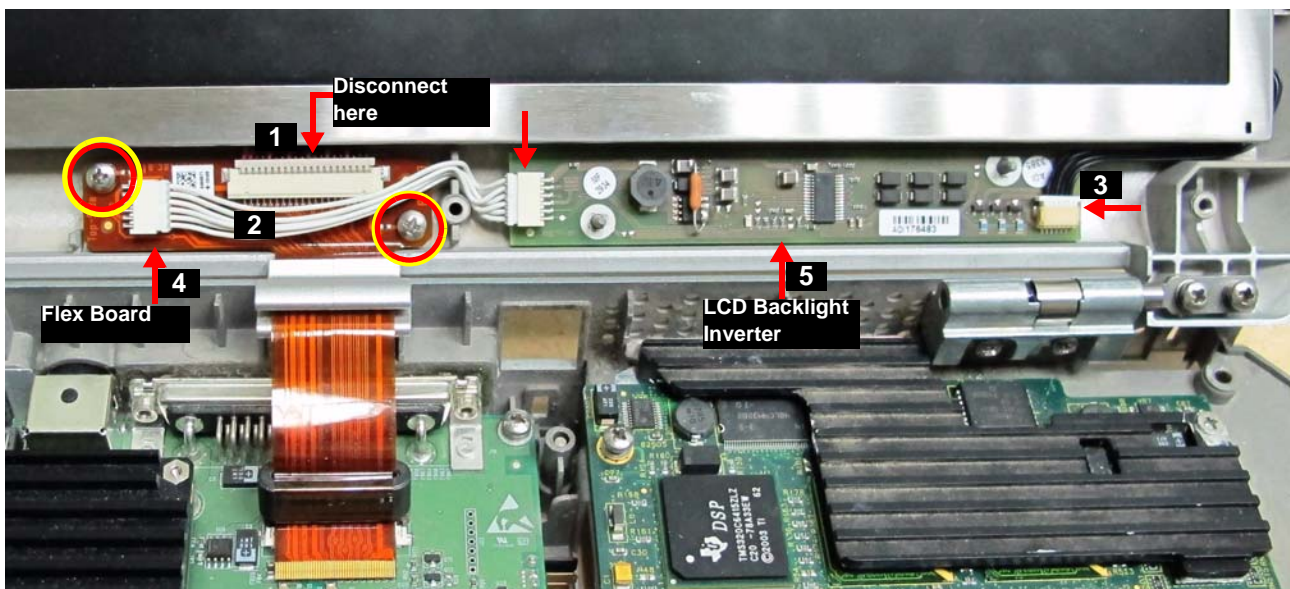
### 8-3-9-3 Preparation

Shut down the Vivid q N ultrasound unit, as described in - *System Setup*.

### 8-3-9-4 AUO LCD Cable and Flex Removal Procedure

**NOTE:** The numbers shown in square brackets correspond to the numbers listed in [Table 8-3](#).

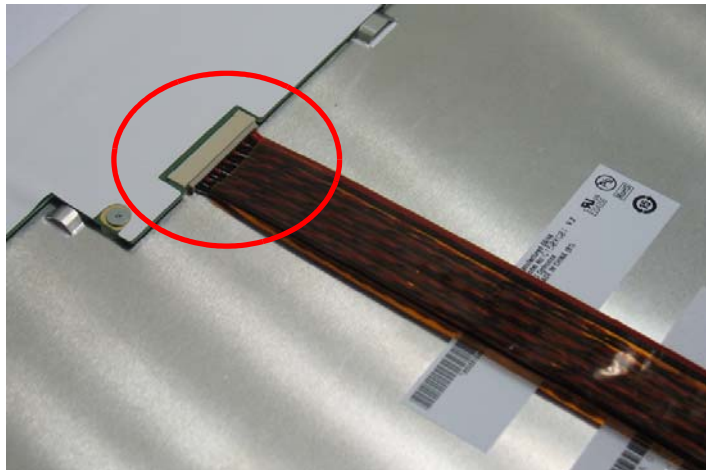
- 1.) Remove the AUO LCD display - refer to the ["AUO LCD Display Removal Procedure"](#) on page 8-55.
- 2.) Disconnect the AUO LCD cable **[3]** from the rear of the LCD panel.
- 3.) Disconnect and remove the flex board **[4]** by unscrewing the two retaining screws encircled in [Figure 8-70](#).



### Figure 8-70 Flex Board and LCD Back Light Inverter Board

- 4.) Disconnect the Inverter Flex Board cable **[2]** from the LCD Backlight Inverter board **[5]**, then disconnect the LCD Back Light Inverter board from the AUO LCD cable **[3]** (arrow at right in [Figure 8-70](#)).
- 5.) Disconnect the Flex Board from the LCD flex **[1]** - [Figure 8-70](#).
- 6.) Gently remove the Flex Board and the LCD Back Light Inverter Board.

- 7.) Disconnect the LCD flex [1] from the rear panel of the LCD Display and remove - [Figure 8-71](#).

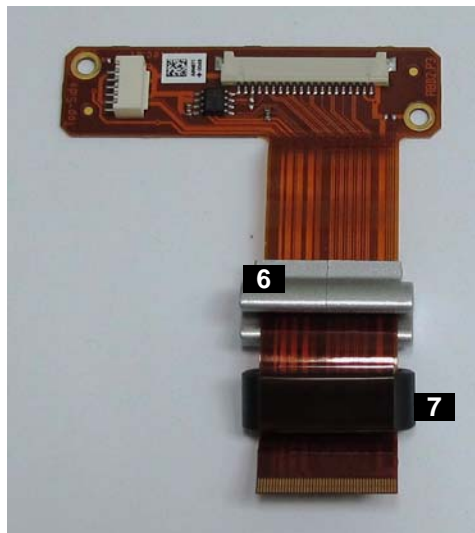


**Figure 8-71 LCD Flex Connected to LCD Rear Panel**

#### 8-3-9-5 AUO LCD Cable and Flex Installation Procedure

**NOTE:** The numbers shown in square brackets correspond to the numbers listed in [Table 8-3](#) on page 8-59.

- 1.) Connect the LCD Flex to the LCD as shown in [Figure 8-71](#).
- 2.) Thread the Flex Board cable through the Display Flex Cover [6] making sure that the Display Flex Cover is correctly orientated as shown in [Figure 8-72](#).



**Figure 8-72 Flex Board Cable Threaded through Flex Board Cover and Ferrite**

- 3.) Thread the Flex Board cable through the ferrite core [7] and secure the ferrite with a strip of Kapton tape - [Figure 8-72](#).
- 4.) Connect the Inverter Flex Board cable [2] to the Flex Board [4], then connect its other end to the LCD Backlight Inverter board [5] - [Figure 8-70](#).
- 5.) Connect the LCD Backlight Inverter board [5] to the AUO LCD cable [3] - [Figure 8-70](#).

**NOTE:** To install the AUO LCD display in the rear cover (the system lid), the flex cable must be prepared by folding as shown in [Figure 8-73](#). Folding the flex cable in this manner enables the LCD panel to lie flat in the lid housing.

- 6.) Fold the LCD flex as shown in [Figure 8-73](#).



Tip: Fold here at +/- 20 cm from right end



**Figure 8-73 LCD flex fold**

- 7.) Connect the LCD flex to the Flex Board.

The sub-assembly parts should now be as shown in [Figure 8-74](#).



**Figure 8-74 Sub-assembly showing Parts Assembled**

- 8.) Place the AUO LCD Display in position in the system's top rear cover (the system lid) - [Figure 8-75](#).



**Figure 8-75 AUO LCD Display located in the Vivid q N Top Rear Cover**

- 9.) Position the LCD Backlight Inverter board on the retaining pins located in the system's rear cover.
- 10.) Secure the Flex Board with the two retaining screws as show in [Figure 8-75](#).
- 11.) Refit the AUO LCD Display in the system's top rear cover as described in the "[AUO LCD Display Installation Procedure](#)" on page 8-57.
- 12.) Check that the LCD Display can be tilted upwards and downwards, and that it holds its set position.
- 13.) Proceed to perform the following functionality tests:
- "[SafeLock Cart - Grounding Continuity](#)" on page 10-22 - only if the Vivid q N system is currently mounted on the SafeLock cart
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24
  - "[Full System Test](#)" on page 7-10


## Section 8-4 SafeLock Cart Components Replacement

*NOTE: This section describes replacement procedures for a new-type SafeLock Cart only.*

 **WARNING THIS EQUIPMENT MUST NOT BE OPERATED WITHIN 15 FEET OF ANY MAGNETIC EQUIPMENT.**

 **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.**

 **WARNING BEFORE REMOVING CIRCUIT BOARDS, TURN THE POWER OFF AND WEAR THE ESD WRIST BAND STRAP.**



## 8-4-1 Overview of SafeLock Cart Replaceable Components

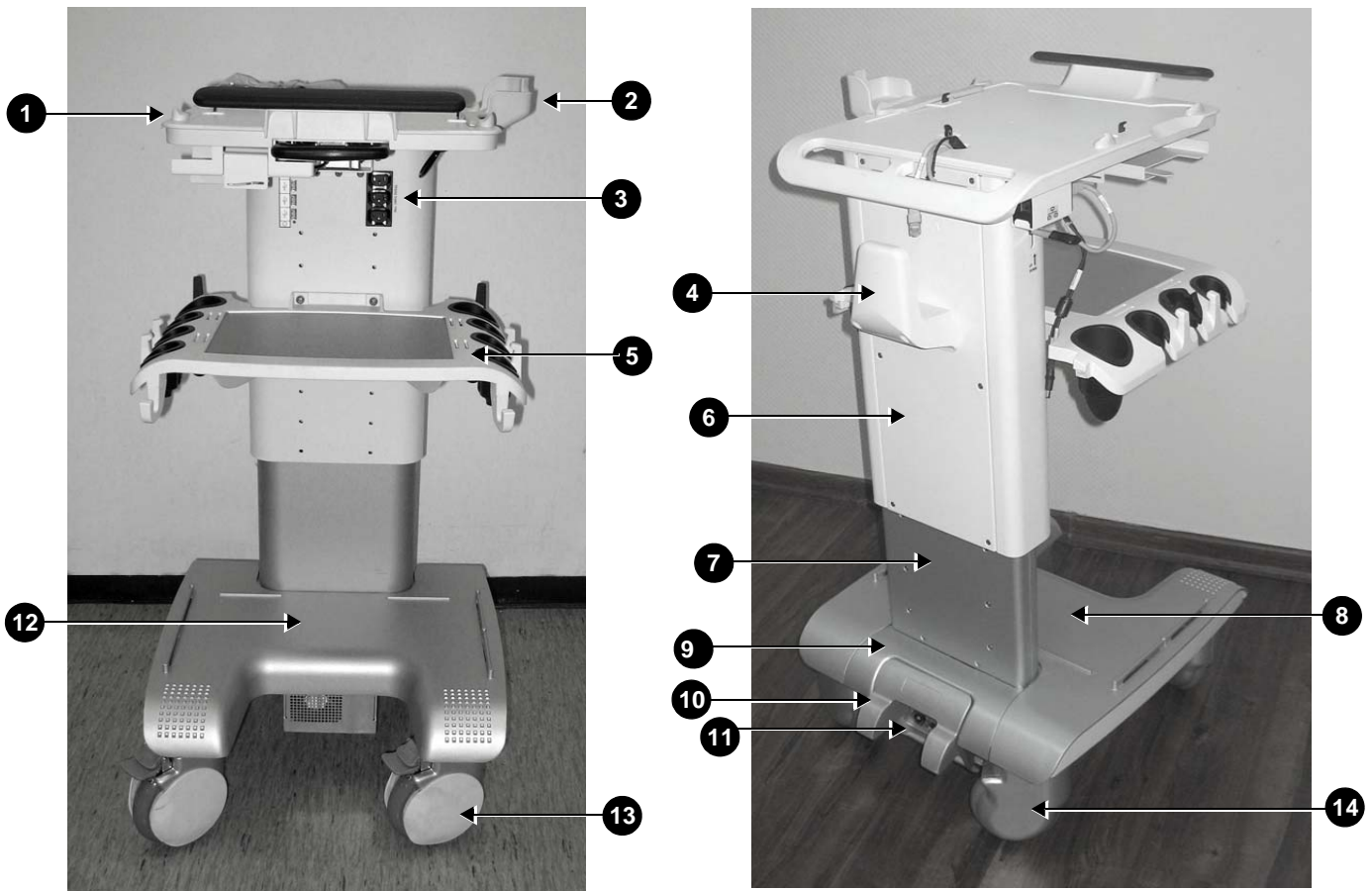


Figure 8-76 Vivid q N SafeLock Cart Components

Table 8-4 Vivid q N SafeLock Cart Components

Label	Item	Label	Item
1	Top Shelf Assembly (with handle)	8	Bottom Cover - Front
2	ECG Cable Protector	9	Bottom Cover - Rear (AC Assembly Cover)
3	Peripheral Power Outlet	10	AC Power Cable Bumper Protector
4	AC Cable Hook	11	AC Distribution Assembly (behind cover)
5	Probe Shelf (with probe holders)	12	SafeLock Cart Bottom Assembly
6	Rear Upper Cover	13	Front Wheels (with locking lever)
7	Rear Lower Cover	14	Rear Wheels

## 8-4-2 Upper Cover (Rear) Replacement Procedure

### 8-4-2-1 Tools

Appropriate Phillips screwdriver.

### 8-4-2-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-2-3 Upper Cover (Rear) Removal Procedure

Remove the retaining screws of the upper rear cover and while supporting the cover with one hand, carefully remove the cover (see [Figure 8-77](#)).

**Figure 8-77 Upper Cover (Rear) Removal**



### 8-4-2-4 Upper Cover (Rear) Installation Procedure

- 1.) Return the cover to the correct position on the rear of the SafeLock Cart (see [Figure 8-77](#)).
- 2.) While holding the cover to prevent it from falling, return and fasten the two upper screws (see [Figure 8-77](#)).
- 3.) Fasten the four remaining screws that secure the upper cover (rear).
- 4.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)



---

## 8-4-3 AC Cable Hook Replacement Procedure

### 8-4-3-1 Tools

Appropriate Phillips screwdriver.

### 8-4-3-2 AC Cable Hook Removal Procedure

From the Upper Cover (rear), unscrew the four AC Cable Hook retaining screws (see [Figure 8-78](#)) and remove the cable hook holder.

**Figure 8-78 AC Cable Hook**



### 8-4-3-3 AC Cable Hook Installation Procedure

- 1.) Position the AC Cable Hook on the Upper Cover (rear) and return and fasten the four retaining screws.
- 2) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

## 8-4-4 AC Power Cable Bumper Protector Replacement Procedure

### 8-4-4-1 Tools

Appropriate Phillips screwdriver and Loctite glue.

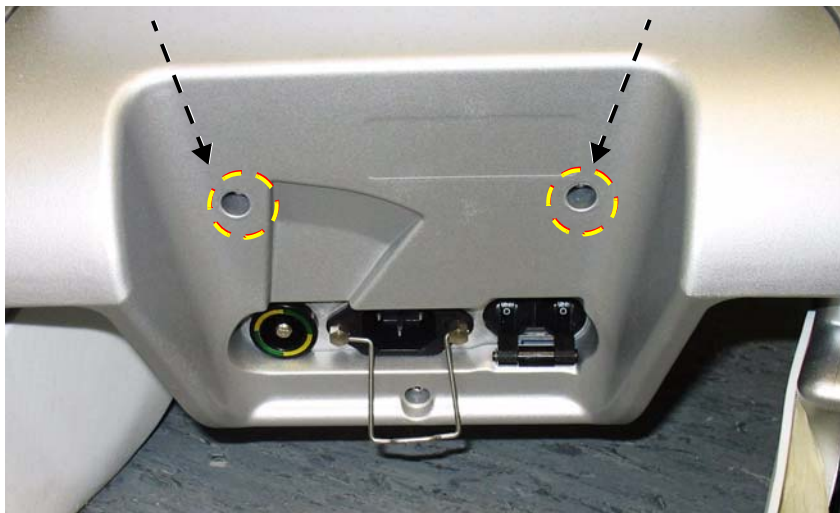
### 8-4-4-2 AC Power Cable Bumper Protector Removal Procedure

- 1) From the rear of the SafeLock Cart, and using two hands, lift the AC Power Cable Bumper Protector *upwards* to release it from the shoulder screws - (refer to [Figure 8-81](#) and [Figure 8-79](#)).
- 2.) Remove the Bumper Protector from the Cart.

### 8-4-4-3 AC Power Cable Bumper Protector Installation Procedure

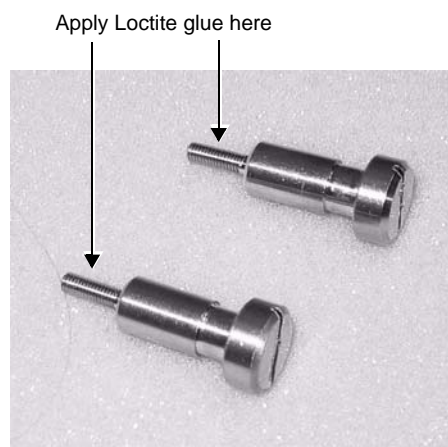
**NOTE:** *If this is a first-time installation of the bumper protector, it is necessary to remove the two existing Phillips screws located on the rear of the SafeLock Cart (AC Cable connection area), as shown in [Figure 8-79](#).*

**Figure 8-79 Screws for Removal on First-time Installation**



- 1.) Apply a little Loctite glue on the threads of each of the two shoulder screws ([Figure 8-80](#)).

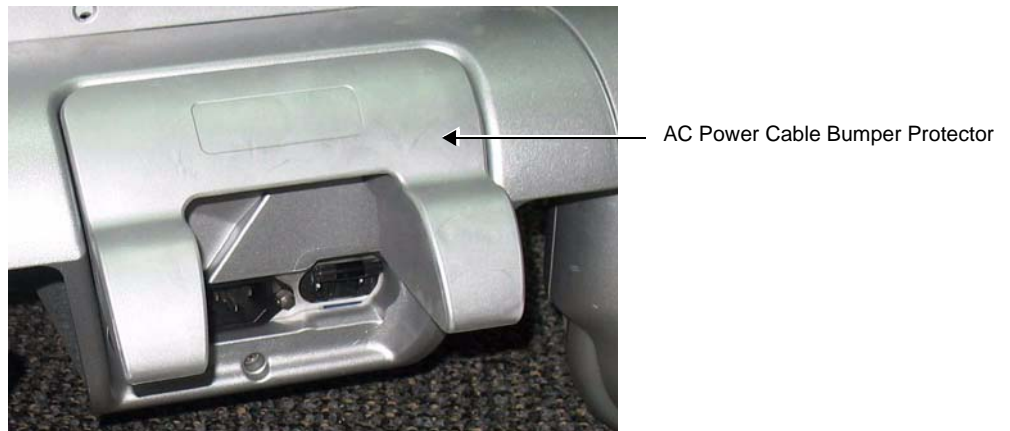
**Figure 8-80 Shoulder Screws**



- 2.) Insert a shoulder screw into each screw hole (refer to [Figure 8-79](#)).

- 3.) Mount the AC Power Cable Bumper Protector onto the shoulder screws by aligning the mounting tabs (ears) with the screws, then pushing the bumper *downwards* until it is seated securely.  
See [Figure 8-81](#).

**Figure 8-81 AC Power Cable Bumper Protector Mounted on SafeLock Cart**



- 4) Proceed to perform the following functionality tests:
- ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

## 8-4-5 ECG Cable Protector Replacement Procedure

### 8-4-5-1 Tools

Appropriate Phillips screwdriver.

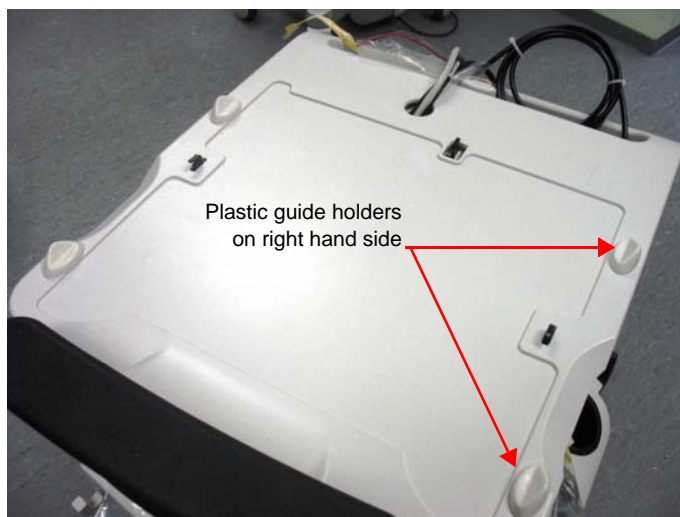
### 8-4-5-2 ECG Cable Protector Removal Procedure

- 1.) While facing the SafeLock Cart (i.e., working from the front of the Cart,) loosen and remove the two screws that secure the ECG Cable Protector to the Top Shelf Assembly (refer to [Figure 8-76 on page 8-65](#)). See [Figure 8-82 below](#).
- 2.) Remove the ECG Cable Protector from the Top Shelf Assembly.

### 8-4-5-3 ECG Cable Protector Installation Procedure

*If this is a first-time installation of the ECG Cable Protector, it is necessary to remove the two plastic guide holders from the Top Shelf Assembly, as shown in [Figure 8-82](#). While facing the SafeLock Cart (i.e., working from the front of the Cart,) these are located on the right side of the SafeLock Cart.*

**Figure 8-82 Removing Plastic Guide Holders from Top Shelf Assembly**



- 1.) Thoroughly clean the surface of the Top Shelf Assembly, in particular the recessed area from where the ECG Cable Protector (or plastic guide holders) were removed.
- 2.) Position the ECG Cable Protector on the Top Shelf Assembly surface, ensuring that the recessed groove on the protector aligns with the groove on the SafeLock Cart, as shown in [Figure 8-83](#).

Figure 8-83 Placing the ECG Cable Protector in Position

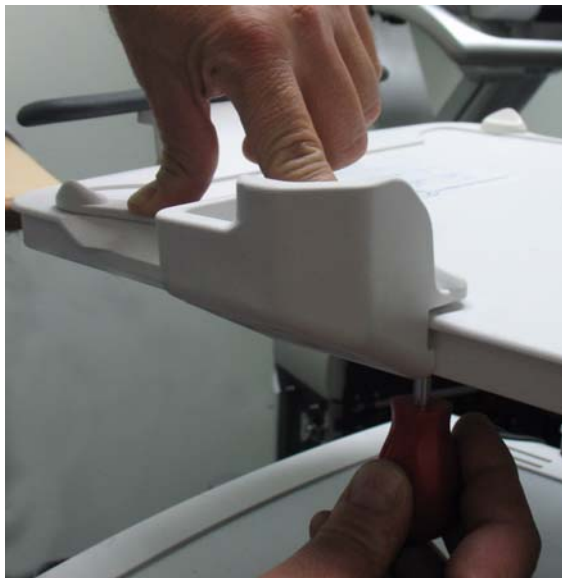


**CAUTION** When placing the ECG Cable Protector in position, take care not to damage the plastic.

**IMPORTANT:** Perform the next steps in the correct order. When securing the ECG Cable Protector, first fasten the rear securing screw, then the front securing screw.

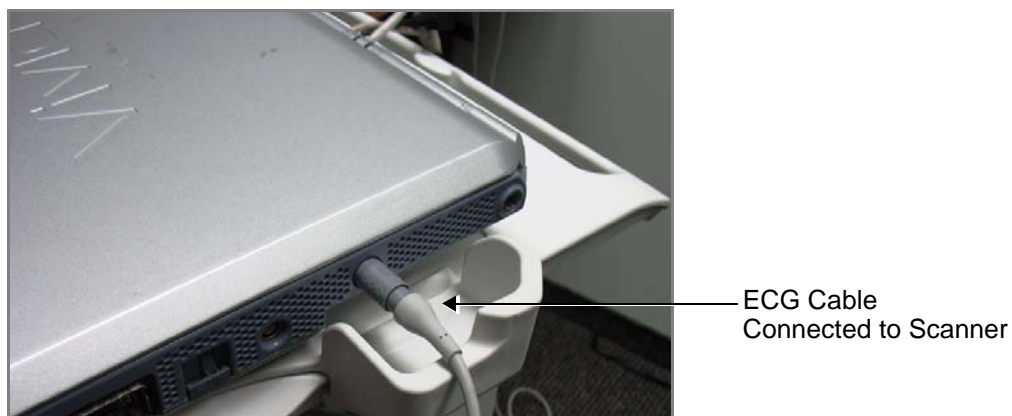
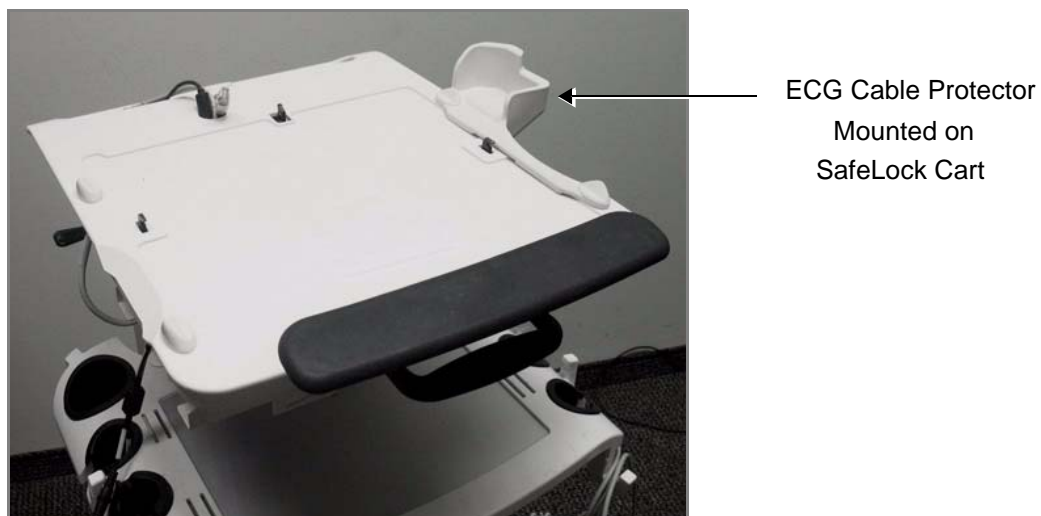
3.) Return and fasten the **rear** securing screw (Figure 8-84), then the **front** securing screw.

Figure 8-84 Fastening the Rear Securing Screw



*Figure 8-85 illustrates the ECG Cable Protector secured in position on the SafeLock Cart.*

**Figure 8-85 ECG Cable Protector Secured on SafeLock Cart**



**ECG Cable Protector as seen when in Use**

- 4) Proceed to perform the following functionality tests:
- ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

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## 8-4-6 Lower Cover (Rear) Replacement Procedure

### 8-4-6-1 Tools

Appropriate Phillips screwdriver.

### 8-4-6-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-6-3 Lower Cover (Rear) Removal Procedure

Remove six retaining screws of the lower cover (rear) and while supporting the cover with one hand, gently remove the cover - see [Figure 8-86](#)).

**Figure 8-86 Lower Cover (Rear) Removal**



### 8-4-6-4 Lower Cover (Rear) Installation Procedure

- 1) Return the cover to the correct position on the rear of the SafeLock Cart - see [Figure 8-86](#).
- 2.) While holding the cover to prevent it from falling, fasten the retaining screws of the lower cover (rear).
- 3) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)



## 8-4-7 AC Distribution Assembly Replacement Procedure

### 8-4-7-1 Tools

Appropriate flat and Phillips screwdrivers and a wire cutter

### 8-4-7-2 Preparation

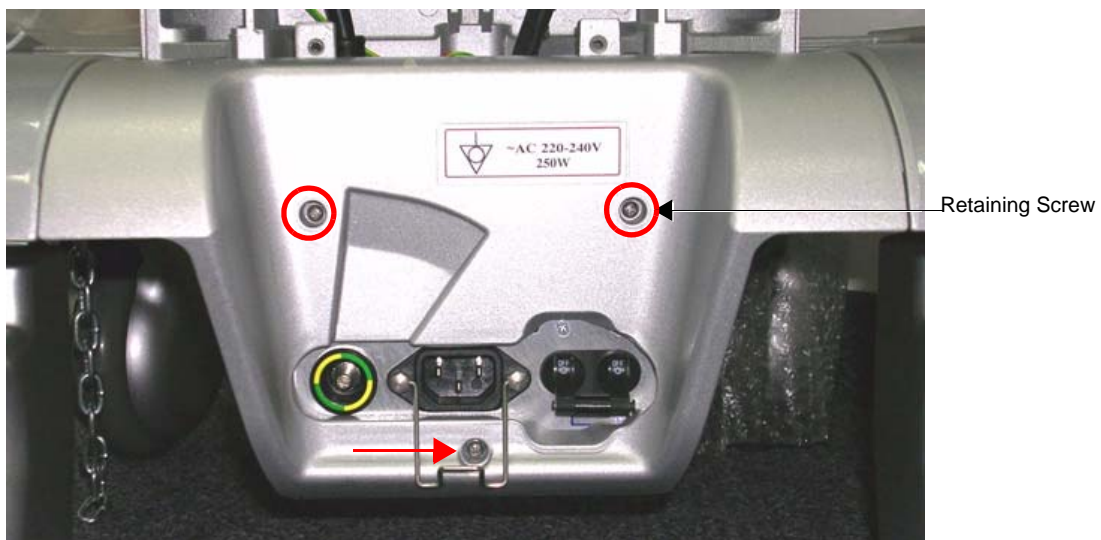
Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-7-3 AC Distribution Assembly Removal Procedure

- 1) Turn OFF power to the SafeLock Cart and disconnect the AC power cable from the AC input assembly at the base of the cart (rear).
- 2) Remove the Upper Cover (Rear), as described in the ["Upper Cover \(Rear\) Removal Procedure"](#) on [page 8-66](#).
- 3) Remove the Lower Cover (Rear), as described in the ["Lower Cover \(Rear\) Removal Procedure"](#) on [page 8-73](#).
- 4) Remove the three retaining screws of the AC Assembly Cover and remove the cover - [Figure 8-87 below](#).

The AC Distribution Assembly is now exposed, as shown in [Figure 8-88](#).

**Figure 8-87 AC Distribution Assembly and Mounting Bracket**

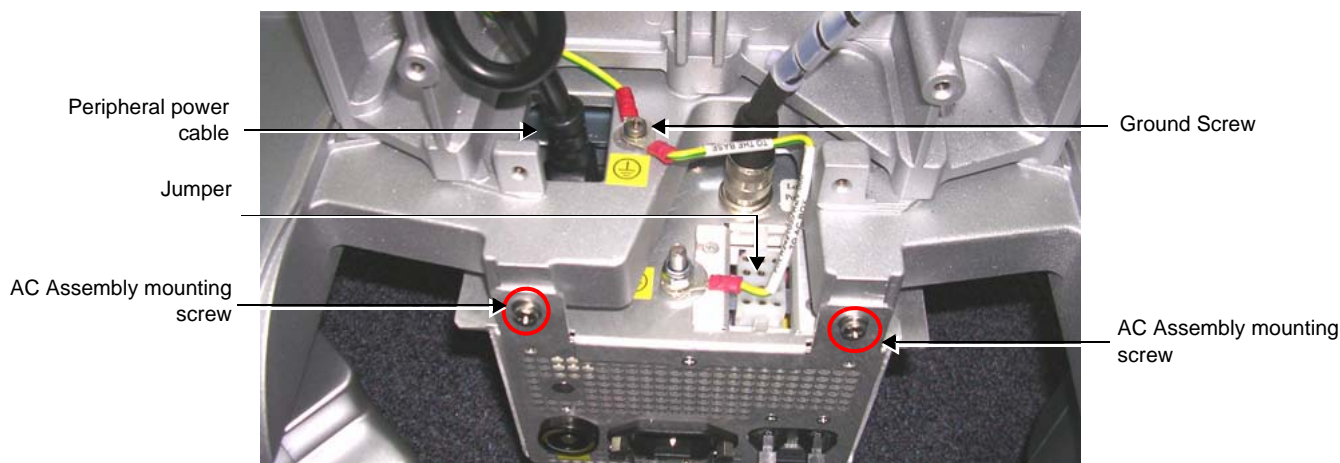


- 5) Cut all cable ties holding the cables in position.
- 6) Unscrew the metal cable fastener from the P1 cable connector (on the *right*) and remove the cable from its socket - see [Figure 8-88](#).
- 7) Disconnect the peripheral power cable from the AC Distribution Assembly - see [Figure 8-88](#).



- 8) Loosen and remove the ground screw fastened to the AC Distribution Assembly - see [Figure 8-88](#).

**Figure 8-88 AC Distribution Assembly and Cable Sockets**



- 9) Loosen and remove the two AC Assembly mounting screws that secure the AC Distribution Assembly to the mounting bracket on the SafeLock Cart chassis - see [Figure 8-88](#).
- 10) Carefully pull the AC Distribution Assembly out towards you and remove it from the SafeLock Cart.

#### 8-4-7-4 AC Distribution Assembly Installation Procedure

- 1) Return the replacement AC Distribution Assembly to its position on the SafeLock Cart chassis and secure it on the mounting bracket using the two screws (previously removed - see [Figure 8-88](#), above).
- 2) Fasten the Ground screw to the AC Distribution Assembly - [Figure 8-88](#), above.
- 3) Reconnect the peripheral power cable to the AC Distribution Assembly - [Figure 8-88](#), above.
- 4) Secure all cables in position with new cable ties.
- 5) Return the AC Assembly cover and fasten the three screws (previously removed).
- 6) Return the Lower Cover (Rear), as described in the "[Lower Cover \(Rear\) Installation Procedure](#)" on [page 8-73](#).
- 7) Return the Upper Cover (Rear), as described in the "[Upper Cover \(Rear\) Installation Procedure](#)" on [page 8-66](#).
- 8) Reconnect the AC power cable to the AC Distribution Assembly at the base of the cart (rear) and turn ON power to the SafeLock Cart.
- 9) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on [page 10-22](#)
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on [page 10-24](#)

## 8-4-8 Peripheral Power Cable Replacement Procedure

### 8-4-8-1 Tools

Appropriate Phillips screwdriver and wire cutters.

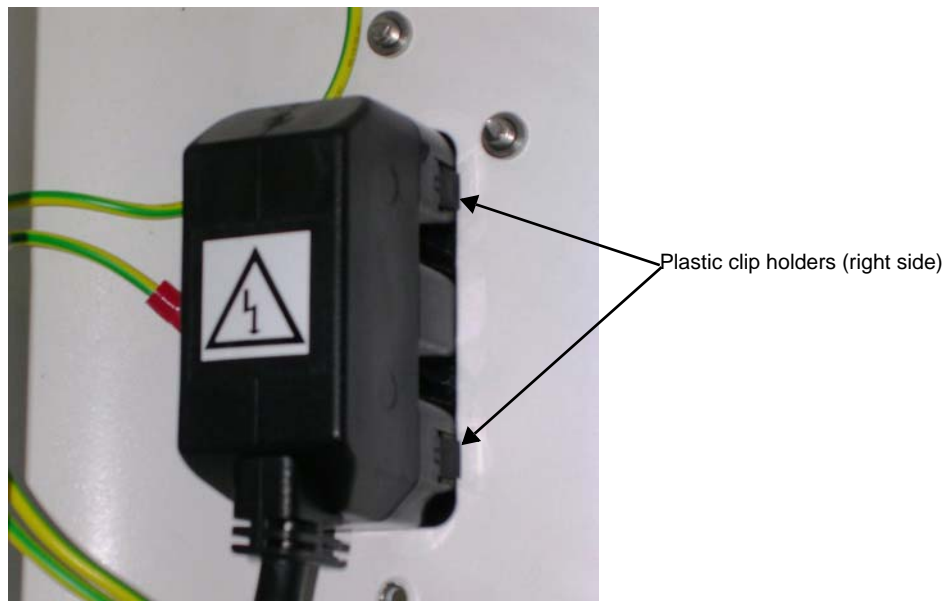
### 8-4-8-2 Preparation

- 1) Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).
- 2.) Remove the Upper Cover (rear) and Lower Cover (rear) of the SafeLock Cart as described in ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#) and ["Lower Cover \(Rear\) Removal Procedure" on page 8-73](#).

### 8-4-8-3 Peripheral Power Cable Removal Procedure

- 1) Disconnect the Peripheral Power cable from the AC Distribution Assembly.
- 2.) Cut any cable ties that secure the cable.
- 3) Disconnect all grounding connections.
- 4) Remove the Peripheral Power socket by squeezing the plastic clip holders inwards (see [Figure 8-89](#)).  
Gently push the power socket inwards to release it.
- 5) Remove the power socket with its cable.

**Figure 8-89 Peripheral Power Socket**

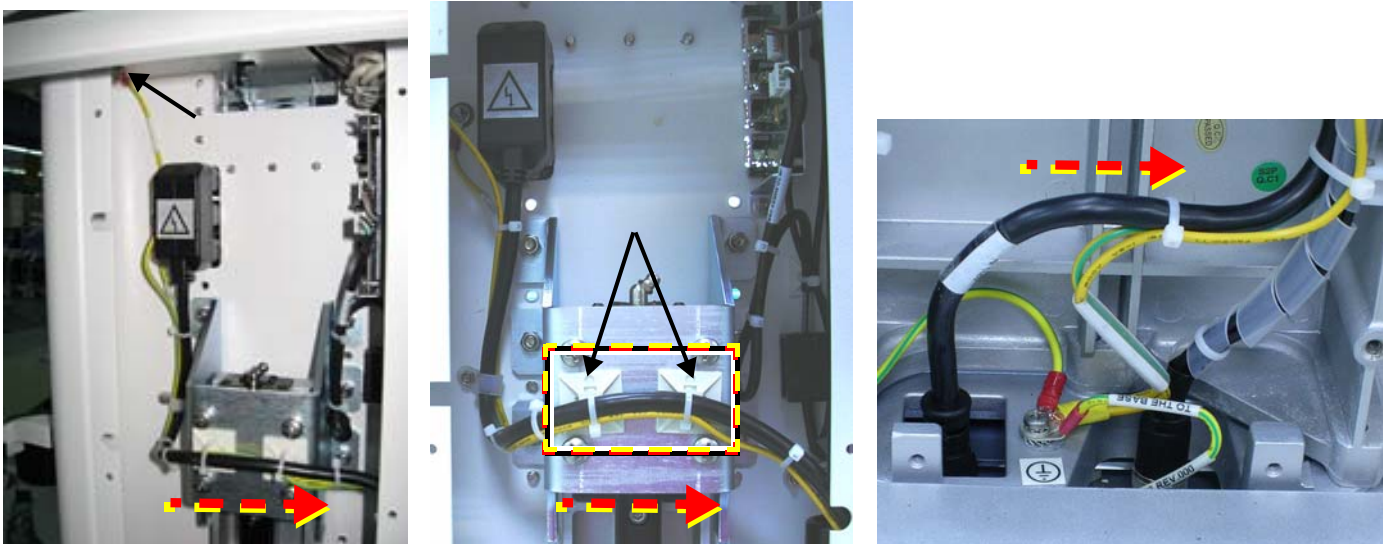


#### 8-4-8-4 Peripheral Power Cable Installation Procedure

Correct routing of the Peripheral AC Outlet cable is shown in [Figure 8-90](#), below.

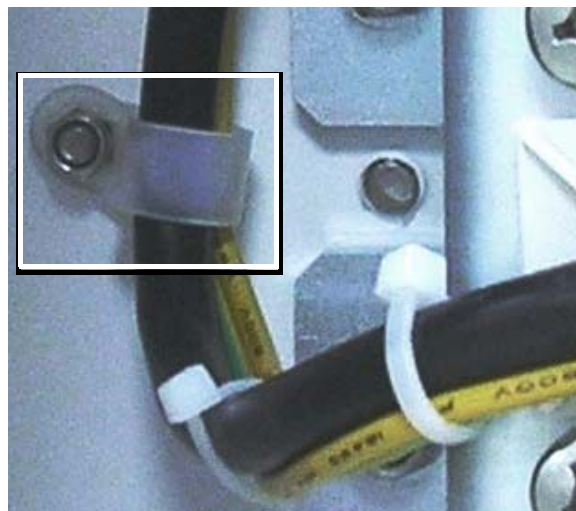
**NOTE:** Before starting the routing procedure adhere two plastic cable holders to the metal linear guide bracket as shown in [Figure 8-90](#) (middle picture).

**Figure 8-90 Routing of Peripheral AC Outlet Cable from Left to Right**



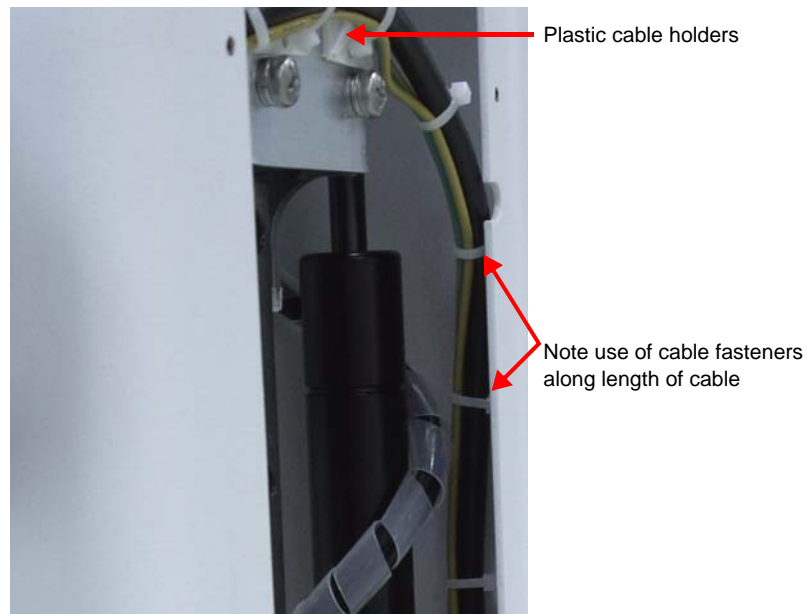
- 1.) Insert the replacement Peripheral Power cable and power socket in position in the SafeLock's Upper Cover (front) (see item 4 in [Figure 8-76](#) page 8-65).
- 2.) With the AC power socket plugged into the cart ([Figure 8-90](#), left picture), connect the ground cable to the body of the cart.
- 3.) Route the Peripheral AC Outlet cable as shown in the middle picture of [Figure 8-90](#).
- 4.) Secure the cable with the cable clamp in the direction shown in [Figure 8-91](#).

**Figure 8-91 Correct Installation of Cable Clamp**



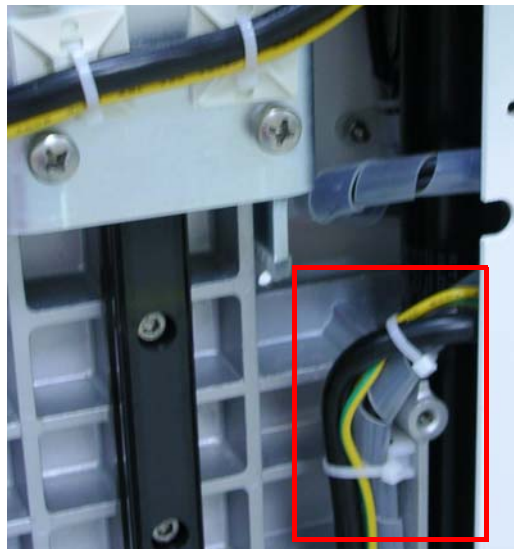
- 5.) Route the cable and the ground cable over the plastic cable holders ([Figure 8-90](#) middle picture) and secure the cables with the tie-wraps.

- 6.) Continue routing the Peripheral AC Outlet cable towards the right hand side of the Rear Upper Cover and *downwards* - [Figure 8-92](#).



**Figure 8-92 Routing of Cable Downwards inside Rear Upper Cover**

- 7.) Fasten the Peripheral AC Outlet cable to the Main Harness cable as shown in [Figure 8-93](#).



**Figure 8-93 Peripheral AC Outlet Cable Fastened to Main Harness Cable**

- 8.) Plug the Peripheral AC Outlet cable into the power supply and connect the Ground lead to the body of the cart - [Figure 8-94](#).



9.) Replace all tie-wraps.

**Figure 8-94 Peripheral AC Outlet and Ground Cable Connected**



10.) Shorten the USB power cable by folding it into a "u" shape and fasten together with tie wraps as shown in [Figure 8-95](#).

**Figure 8-95 USB Power Cable Folded and Fastened with Tie-wraps**



11.) Check that the routing procedure has been implemented correctly: lower the cart's top-shelf and make sure that the cables do not interfere with the movement of the cart's top shelf.

**NOTE:**      *The movement should be smooth and there must be no pinching of the cables.  
Slide the top-shelf up and down a number of times and check that the cables do not disturb the  
up-down movement of the cart's top-shelf - see [Figure 8-96](#).*

**Figure 8-96 Fully-raised (left) and Fully-lowered Positions (right)**



- 12.) Return the Upper Rear Cover as described in Service Manual Direction R2423163-100, Revision 3, Chapter 8, section 8-4-3-4.
- 13.) Return the Upper Cover (rear) and Lower Cover (rear) of the SafeLock Cart as described in "[Upper Cover \(Rear\) Installation Procedure](#)" on page 8-66 and "[Lower Cover \(Rear\) Installation Procedure](#)" on page 8-73.
- 14.) Once more, slide the top-shelf up and down a number of times and check that the movement is smooth and that there is no interference of the cables with the up-down movement of the cart's top-shelf.
- 15) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on page 10-22
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on page 10-24

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## **8-4-9 Main Cable Harness Replacement Procedure**

### **8-4-9-1 Tools**

Appropriate Phillips screwdriver and wire cutters.

### **8-4-9-2 Preparation**

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

Remove the Upper Cover (rear) and Lower Cover (rear) of the SafeLock Cart as described in ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#) and ["Lower Cover \(Rear\) Removal Procedure" on page 8-73](#).

### **8-4-9-3 Main Cable Harness Removal Procedure**

- 1) Disconnect the Main Cable Harness from the AC Distribution Assembly and free the cable so that it does not interfere with the Gas Spring.
- 2.) Cut any cable ties that secure the cable.
- 3) Disconnect the P6 cable and USB connector from the USB board, as shown in [Figure 8-97](#).
- 4) From above the Top Shelf, carefully push the Main Cable Harness Vivid q N power supply cable through the top shelf aperture and gently pull it through from below.
- 5) From below the Top Shelf, carefully push the DVD connectors through the front upper cover.
- 6) Remove the Main Cable Harness from the cart.

### **8-4-9-4 Main Cable Harness Installation Procedure**

- 1) From the Upper Assembly (rear), thread the Main Cable Harness Vivid q N power supply through the Top Shelf aperture.
- 2.) Thread the Main Cable Harness DVD connectors through the aperture of the Upper Assembly (rear).
- 3) Wrap the Main Cable Harness once around the Gas Spring and connect the P6 cable and USB connector to the USB board.
- 4) Connect the Main Cable Harness to the AC Distribution Assembly.
- 5) Replace all cable ties to secure the Main Cable Harness.
- 6) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

## 8-4-10 USB Board Replacement Procedure

### 8-4-10-1 Tools

Appropriate socket wrench

### 8-4-10-2 Preparation

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-10-3 USB Board Removal Procedure

- 1) Turn OFF power to the SafeLock Cart and disconnect the AC power cable from the AC input assembly at the base of the cart (rear).
- 2.) Remove the Upper Cover (Rear), as described in the ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#).
- 3) Disconnect the P6 cable and USB connector from the USB board, as shown in [Figure 8-97](#).

**Figure 8-97 Removing the USB Box Cover**



- 4.) Remove the upper and lower bolts that attach the USB board to the upper frame, as shown in [Figure 8-97](#).
- 5) Remove the USB board from the SafeLock Cart.



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**8-4-10-4 USB Board Installation Procedure**

- 1) Return the replacement USB board to its position on the SafeLock Cart chassis and secure it with the upper and lower bolts previously removed - see [Figure 8-98](#).
- 2) Reconnect the P6 cable to the P6 connector on the USB board.
- 3) Reconnect the USB cable to the USB board.
- 4.) Return the Upper Cover (Rear), as described in the "[Upper Cover \(Rear\) Installation Procedure](#)" on [page 8-66](#).
- 5.) Reconnect the AC power cable to the AC input assembly at the base of the cart (rear) and turn ON power to the SafeLock Cart.
- 6) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on [page 10-22](#)
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on [page 10-24](#)

## 8-4-11 Gas Spring Replacement Procedure

### 8-4-11-1 Tools

Appropriate Phillips screwdrivers, Allen key and open wrench.

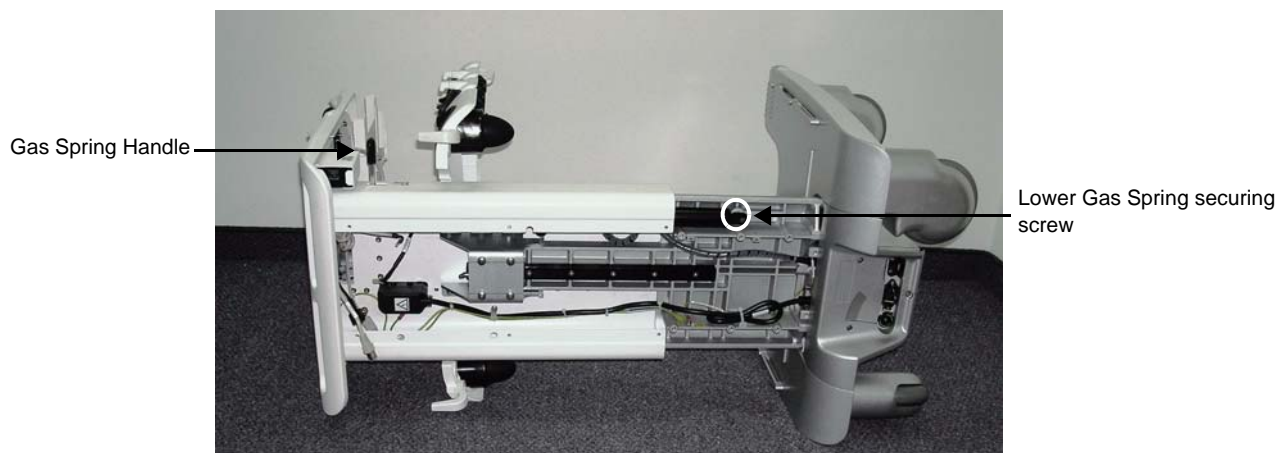
### 8-4-11-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-11-3 Gas Spring Removal Procedure

- 1) Turn OFF power to the SafeLock Cart and disconnect the AC power cable from the AC input assembly at the base of the cart (rear).
- 2.) Remove the Upper Cover (Rear), as described in the ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#).
- 3) Remove the Lower Cover (Rear), as described in the ["Lower Cover \(Rear\) Removal Procedure" on page 8-73](#).
- 4) Disconnect the Main Harness cable from the AC unit, cut both tie clips and free the Main Cable Harness so that it does not interfere with the Gas Spring.
- 5) Gradually raise the Upper Assembly until the lower Gas Spring securing screw is accessible.
- 6) Lie the SafeLock cart on its left side with the Gas Spring release handle uppermost.
- 7) Remove the lower Gas Spring securing screw.

**Figure 8-98 SafeLock Cart shown with Gas Spring Handle Uppermost**



- 8) Remove the Gas Spring by turning it counter-clockwise until it is released from the Gas Spring Handle assembly.

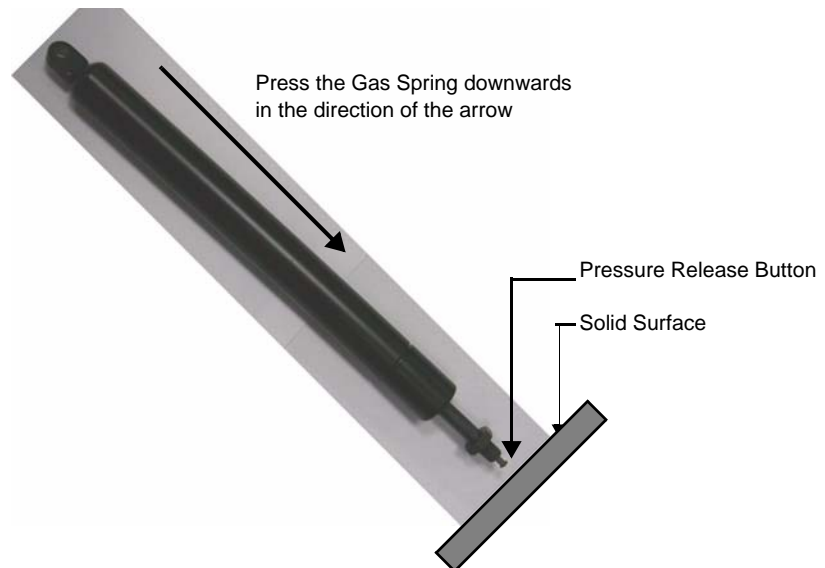
**NOTE:** To remove the Gas Spring handle, unscrew the upper Gas Spring securing screw.

#### 8-4-11-4 Gas Spring Installation Procedure

**NOTE:** When packed, the Gas Spring replacement part is fully extended. The spring must be compressed prior to installation.

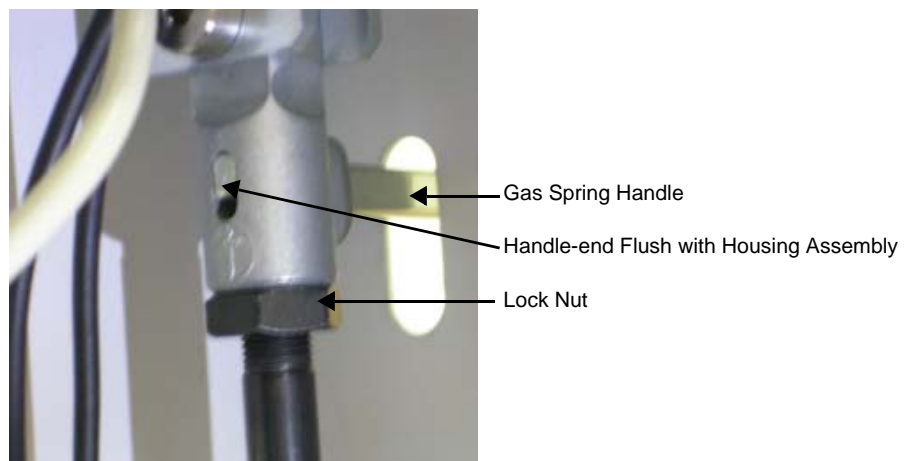
- 1.) Compress the Gas Spring by pressing downwards on the Gas Spring with its pressure release button pressed against a solid surface until the Gas Spring is full compressed.

**Figure 8-99 Compressing the Gas Spring**



- 2) Turn the Gas Spring locking nut counter-clockwise until it rises about a quarter-way upwards on the thread.
- 3) Insert the Gas Spring handle into the Gas Spring Housing Assembly until it is flush with the outer cylindrical surface of the housing assembly.

**Figure 8-100 Gas Spring Holder Inserted Flush with Housing Assembly**



- 4) Attach the Gas Spring to the housing assembly by turning it clockwise until the locking nut makes contact with the housing assembly - see [Figure 8-100](#).

- 5) Align the lower Gas Spring connecting bracket with the SafeLock chassis until it is aligned with the screw aperture on the chassis.

**Figure 8-101 Lower Gas Spring Securing Bracket**



Lower Gas Spring securing  
bracket aligned with  
SafeLock Cart chassis

- 6) Insert the lower Gas Spring connecting screw and tighten it securely.
- 7) Replace the Main Harness cable by coiling it once around the Gas Spring and then reconnect it to the AC unit.
- 8) Secure all cables in position with new cable ties.
- 9) Return the Lower Cover (Rear), as described in the "[Lower Cover \(Rear\) Installation Procedure](#)" on [page 8-73](#).
- 10) Return the Upper Cover (Rear), as described in the "[Upper Cover \(Rear\) Installation Procedure](#)" on [page 8-66](#).
- 11) Proceed to perform the following functionality tests:
  - "[SafeLock Cart - Grounding Continuity](#)" on [page 10-22](#)
  - "[SafeLock Cart - Chassis Current Leakage Test](#)" on [page 10-24](#)

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## 8-4-12 DVD Holder Replacement Procedure

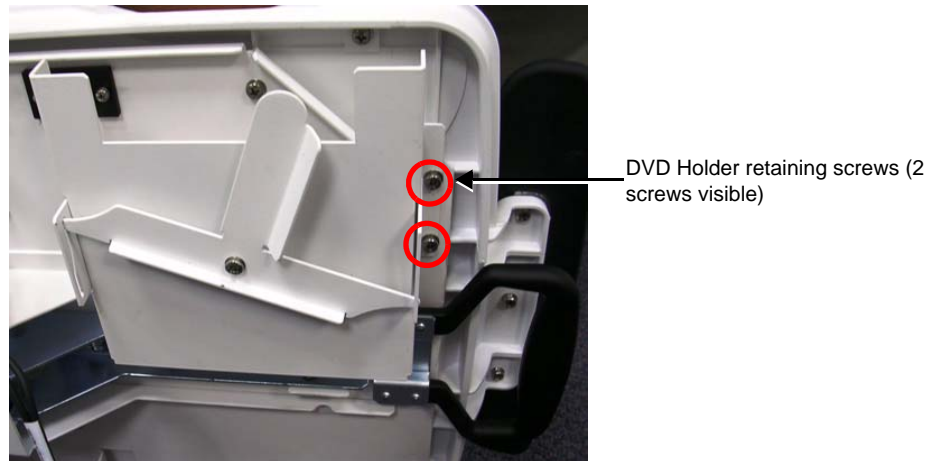
### 8-4-12-1 Tools

Appropriate Phillips screwdriver.

### 8-4-12-2 DVD Holder Removal Procedure

- 1.) From below the Top Shelf, while supporting the DVD Holder with one hand, remove the four retaining screws as shown in [Figure 8-102](#).

**Figure 8-102 DVD Holder Showing Two Retaining Screws**



- 2.) Remove the DVD Holder from the base of the Top Shelf.

### 8-4-12-3 DVD Holder Installation Procedure

- 1.) Working from beneath the Top Shelf, align the replacement DVD Holder in the correct position.
- 2) Return and fasten the four retaining screws as shown in [Figure 8-102](#) to secure the DVD Holder firmly in position.

## 8-4-13 LAN Isolation Box and Holder Replacement Procedure

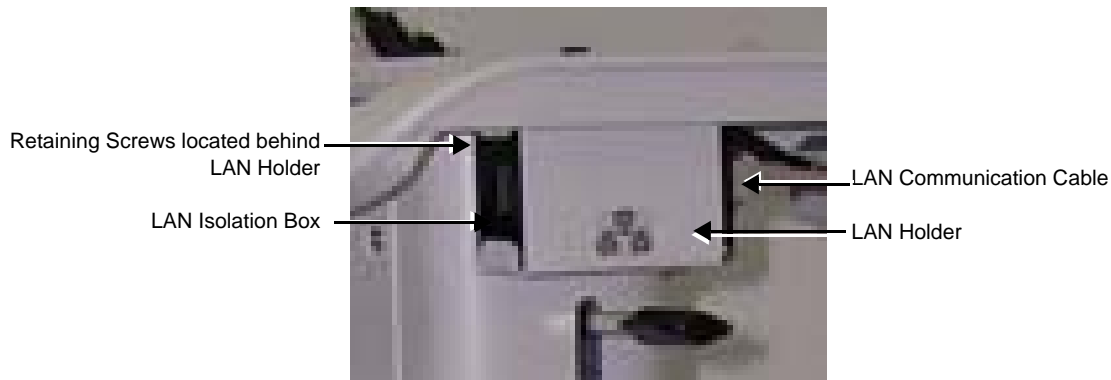
### 8-4-13-1 Tools

Appropriate Phillips screw driver.

### 8-4-13-2 LAN Isolation Box and Holder Removal Procedure

- 1) Disconnect the LAN communication cable.
- 2.) From below the Top Shelf, remove the two LAN Holder retaining screws (see [Figure 8-103](#)) and remove the LAN Holder.

**Figure 8-103 LAN Holder and Isolation Box**



- 3.) Remove the LAN Isolation Box.

### 8-4-13-3 LAN Isolation Box and Holder Installation Procedure

- 1) Position the LAN Isolation Box in the LAN Holder and replace the LAN Holder with the Isolation Box in their appropriate location beneath the Top Shelf.
- 2.) Return and tighten the two retaining screws to secure the LAN Holder.
- 3) Connect the LAN communication cable.

## 8-4-14 Top Shelf Replacement Procedure

### 8-4-14-1 Tools

Appropriate Phillips screwdrivers, Allen key and open wrench.

### 8-4-14-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-14-3 Top Shelf Removal Procedure

- 1) Disconnect the AC adapter and all cables from the Vivid q N portable ultrasound scanner.
- 2.) Disconnect and remove all peripherals from the SafeLock Cart.
- 3.) Remove the Upper Cover (Rear) as described in the ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#).
- 4.) Remove the Lower Cover (Rear) as described in the ["Upper Cover \(Rear\) Removal Procedure" on page 8-66](#).
- 5) Remove the USB board as described in the ["USB Board Removal Procedure" on page 8-82](#).
- 6) Remove the gas spring as described in ["Gas Spring Replacement Procedure" on page 8-84](#).
- 7) Disconnect the two cables (P1 cable and peripheral power cable) from the top of the AC Input Assembly as described in ["AC Distribution Assembly Removal Procedure" on page 8-74](#) (refer to [step 6](#) and [step 7](#)).
- 8) Remove Main Harness, Peripheral power cable and disconnect the LAN cable.
- 9) Remove the six lower screws that retain the top Shelf - see [Figure 8-104](#).
- 10) Remove the two rear screws that retain the top Shelf - see [Figure 8-105](#).
- 11) Carefully remove the top shelf assembly.

**Figure 8-104 Top Shelf - Lower Retaining Screws**



Lower screws retaining the  
Top Shelf - 6 shown

Figure 8-105 Top Shelf - Rear Retaining Screws



#### 8-4-14-4 Top Shelf Installation Procedure

- 1.) Carefully position the Top Shelf on the upper assembly and replace and fasten the rear and lower retaining screws.
- 2.) Replace and reconnect the Main Harness, Peripheral power cable as described in ["AC Distribution Assembly Installation Procedure" on page 8-75](#) and connect the LAN cable.
- 3.) Install the Gas Spring as described in *Gas Spring Removal Procedure* section, page 8-84.
- 4.) Return the USB Box as described in the ["USB Board Installation Procedure" on page 8-83](#).
- 5.) Fasten all cables in position using new cable ties.
- 6.) Return the Lower Cover (Rear) as described in the ["Lower Cover \(Rear\) Installation Procedure" on page 8-73](#).
- 7.) Return the Upper Cover (Rear) as described in the ["Upper Cover \(Rear\) Installation Procedure" on page 8-66](#).
- 8.) Reconnect all required peripherals to the SafeLock Cart.
- 9.) Reconnect the AC adapter and all cables to the Vivid q N portable ultrasound scanner.
- 10.) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)



## 8-4-15 Handrest Replacement Procedure

*NOTE: If required, the main shelf handrest may be replaced separately, as described below.*

### 8-4-15-1 Tools

Appropriate Phillips screwdrivers.

### 8-4-15-2 Preparations

Shut down the Vivid q N ultrasound unit.

### 8-4-15-3 Handrest Removal Procedure

- 1) Remove all peripherals from the Vivid q N portable ultrasound scanner.
- 2.) Working from the *front* of the SafeLock Cart and below the main shelf, loosen and remove the three screws that secure the handrest to the main shelf - see [Figure 8-106 below](#).

**Figure 8-106 Handrest Secured to Main Shelf (viewed from below)**



- 3) Remove the handrest.

### 8-4-15-4 Handrest Installation Procedure

- 1) Install a replacement handrest on the SafeLock Cart's main shelf, making sure the three screw holes are aligned correctly.
- 2.) Return and fasten the three screws (previously removed) to secure the handrest in position.

## 8-4-16 Probe Shelf Assembly Replacement Procedure

**NOTE:** *The probe holders and rails are an integral part of the probe shelf assembly; these components may not be replaced separately.*

### 8-4-16-1 Tools

Appropriate Phillips screw driver.

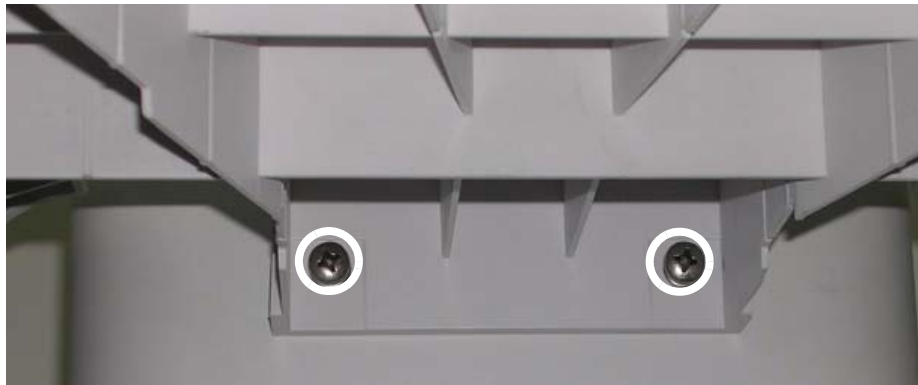
### 8-4-16-2 Preparations

Shut down the Vivid q N ultrasound unit.

### 8-4-16-3 Probe Shelf Assembly Removal Procedure

- 1) Remove all peripherals from the Vivid q N portable ultrasound scanner.
- 2.) Working from the *front* of the SafeLock Cart and underneath the probe shelf assembly, loosen and remove the two lower screws (highlighted), that secure the shelf in position, [Figure 8-107 below](#).

**Figure 8-107 Probe Shelf Assembly - Lower Securing Screws**



- 3.) ***While supporting the shelf with one hand***, loosen and remove the two upper screws (one on either side - see [Figure 8-108](#)); remove the shelf.

**Figure 8-108 Probe Shelf Assembly - Upper Securing Screws**



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**8-4-16-4    Probe Shelf Assembly Installation Procedure**

- 1) Position replacement shelf in the required position on the SafeLock Cart.
- 2.) ***While supporting the shelf with one hand***, return and fasten the two upper screws previously removed.
- 3.) Return and fasten the two lower screws (one on either side), making sure that the shelf is firmly secured in position.
- 4.) Place the required peripheral on the probe shelf assembly.
- 5.) Re-connect all peripherals to the Vivid q N portable ultrasound scanner.
- 6) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

## 8-4-17 Probe Cable Hook Replacement Procedure

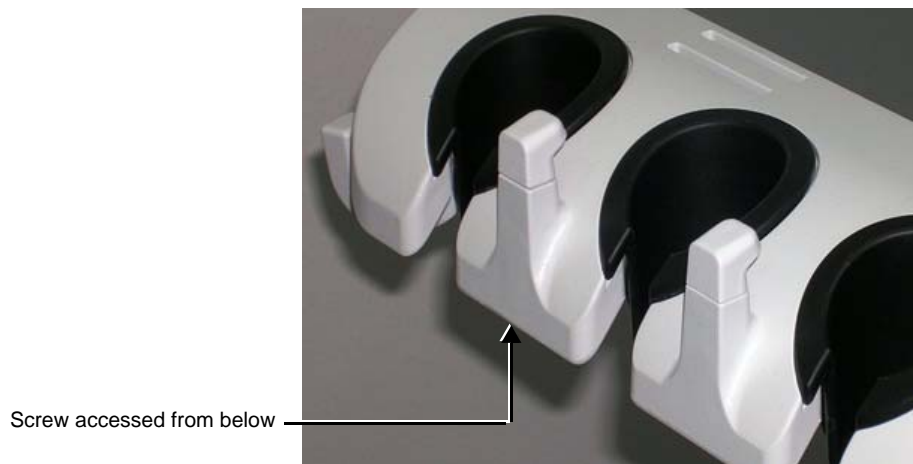
### 8-4-17-1 Tools

Appropriate Phillips screwdriver.

### 8-4-17-2 Probe Cable Hook Removal Procedure

- 1) From below the Probe Shelf, remove the Probe Cable Hook retaining screw (see [Figure 8-109 on page 8-94](#)).
- 2.) Gently pull the Probe Cable Hook upwards to remove it.

**Figure 8-109 Probe Cable Hooks**



### 8-4-17-3 Probe Cable Hook Installation Procedure

- 1) Insert the Probe Cable Hook in its position on the Probe Shelf.
- 2.) From below, return and replace the Probe Cable Hook retaining screw.

---

## 8-4-18 Front Wheel Replacement Procedure

**NOTE:** This section describes the replacement procedure for a SafeLock Cart front wheel. The brake on each front wheel is an integral part of the wheel housing.

### 8-4-18-1 Tools

Appropriate flat screw driver and open wrench.

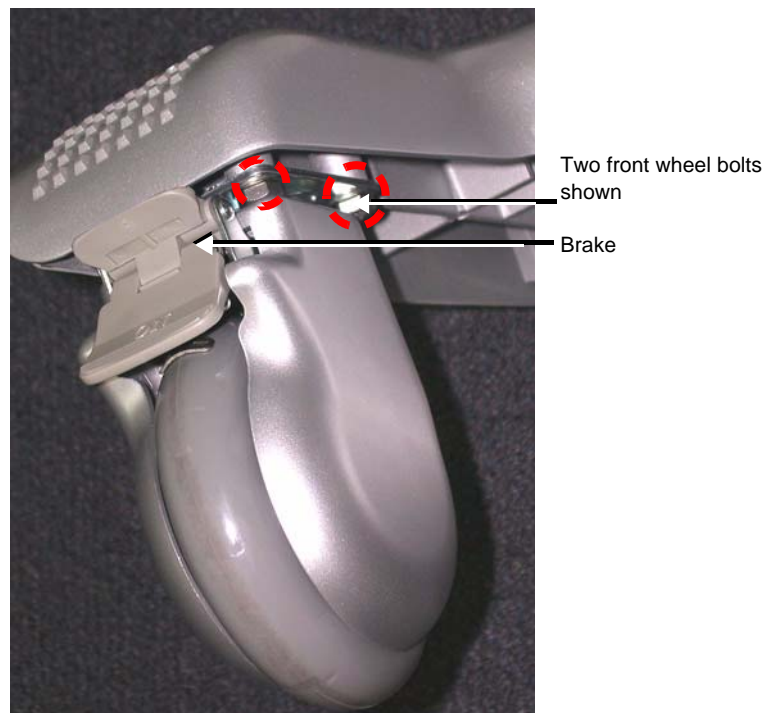
### 8-4-18-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-18-3 Front Wheel Removal Procedure

- 1) Disconnect mains power from the AC adapter.
- 2.) Disconnect the AC adapter and all cables and peripherals from the Vivid q N portable ultrasound scanner.
- 3.) Remove the Vivid q N and all peripherals from the SafeLock Cart.
- 4) Carefully lay the SafeLock Cart on its back.
- 5.) Loosen and remove the four bolts that secure the front wheel to the SafeLock Cart chassis (see [Figure 8-110](#)).

**Figure 8-110 Front Wheel Bolted to SafeLock Cart Chassis**



- 6) Remove the wheel from the SafeLock Cart.

**8-4-18-4 Front Wheel Installation Procedure**

- 1) Place the new front wheel on the SafeLock Cart chassis in the same position as that of the previously removed wheel.
- 2) Return and fasten the four bolts previously removed and make sure that wheel is secured firmly to the chassis.
- 3) Stand the SafeLock Cart upright.
- 4.) Return the Vivid q N and all peripherals to their appropriate positions on the SafeLock Cart.
- 5.) Re-connect the AC adapter and all cables and peripherals to the Vivid q N portable ultrasound scanner.
- 6.) Re-connect mains power to the AC adapter.
- 7) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

---

## 8-4-19 Rear Wheel Replacement Procedure

### 8-4-19-1 Tools

Appropriate flat screw driver and open wrench.

### 8-4-19-2 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-4-19-3 Rear Wheel Removal Procedure

- 1) Disconnect mains power from the AC adapter.
- 2.) Disconnect the AC adapter and all cables and peripherals from the Vivid q N portable ultrasound scanner.
- 3.) Remove the Vivid q N and all peripherals from the SafeLock Cart.
- 4) Carefully lay the SafeLock Cart on its side.
- 5.) Loosen and remove the four bolts that secure the rear wheel to the SafeLock Cart chassis - see [Figure 8-111](#).

**Figure 8-111 Rear Wheel Bolted to SafeLock Cart Chassis**



- 6) Remove the wheel from the SafeLock Cart.

**8-4-19-4 Rear Wheel Installation Procedure**

- 1) Place the new rear wheel on the SafeLock Cart chassis in the same position as that of the previously-removed wheel.
- 2) Return and fasten the four bolts (previously removed - see [Figure 8-111](#)) and make sure that wheel is secured firmly to the chassis.
- 3) Stand the SafeLock Cart upright.
- 4.) Return the Vivid q N and all peripherals to their appropriate positions on the SafeLock Cart.
- 5.) Re-connect the AC adapter and all cables and peripherals to the Vivid q N portable ultrasound scanner.
- 6.) Re-connect mains power to the AC adapter.
- 7) Proceed to perform the following functionality tests:
  - ["SafeLock Cart - Grounding Continuity" on page 10-22](#)
  - ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)



## Section 8-5 Software Loading

### 8-5-1 Software Upgrade Procedure Overview

- NOTE:** *The software installation/upgrade procedure to software version BT12 can be performed on any Vivid q N system currently running software BT11.*
- NOTE:** *For Vivid q N systems with software version BT12, a DVD Drive is an option. BT12 software installation is available only through the USB Flash Drive.*
- NOTE:** *For systems running a software version earlier than BT11, it is necessary to first perform the required software upgrade procedures (in the correct sequential order) up to software version BT11. Then, follow the instructions for "[Vivid q N Software Upgrade Overview](#)" on page 8-100.*
- NOTE:** *For all Vivid q N systems, before upgrading the system software, it is necessary to contact your local OTR department to receive an appropriate software password. Make sure you specify the system serial number located on the base of the Vivid q N unit.*



**NOTICE** The Software Installation/Upgrade procedure cannot be performed when the Vivid q N portable ultrasound scanner is mounted on/connected to the SafeLock Cart.



**WARNING** **THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, HOWEVER, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO STORAGE MEDIA BEFORE DOING A SOFTWARE UPGRADE.**

- NOTE:** *It is recommended to back-up the archive and the settings as described in the Vivid q N User Manual, before commencing software installation (or whenever upgrading the software).*



**NOTICE** During software installation, using CD or DVD, the DVD/CD-RW must be connected directly to the Vivid q N portable ultrasound scanner and not through the SafeLock Cart or USB outlets.




**WARNING** **DO NOT ATTEMPT TO INSTALL SOFTWARE THAT WAS NOT DESIGNATED FOR YOUR VIVID Q N UNIT. ATTEMPTING TO INSTALL UN-APPROVED SOFTWARE WILL CAUSE IRREVERSIBLE DAMAGE TO HARDWARE AND SOFTWARE!**

Normally, the Vivid q N system is supplied from the manufacturer with the software already installed. In some cases, it is necessary to re-install the software.

**Refer to the following sub-sections, as appropriate:**

8-5-1-1	Vivid q N Software Upgrade Overview .....	8-100
8-5-1-2	Vivid q N Software Upgrade/Installation/Reinstallation Procedure - BT11 to BT12 . . .	8-103
8-5-1-3	Loading Latest Version User Manuals .....	8-112
8-5-2	Setting the BIOS. ....	8-114
8-5-3	Formatting and Partitioning the Hard Disk - Automatic Procedure (BT12) .....	8-124

## 8-5-1-1 Vivid q N Software Upgrade Overview

 **NOTICE** Before performing a Vivid q N Software Upgrade from Version BT11 to BT12, it is mandatory to backup the Archive, then format and partition the Hard Disk (due to partitioning changes). Follow the instructions as described in [8-5-1-1-1 "Preparation" on page 8-101](#).

**NOTE:** *The PMC software is automatically updated with the system upgrade.*

**NOTE:** *The Vivid q N BT11 to BT12 upgrade software can only be purchased by the customer through the Sales Dept, using the appropriate ordering number (HCat #), as listed in [Table 8-5](#).*

**Table 8-5 Software BT11 to BT12 Upgrade - Ordering Number**

Hcat #	Description
H45571ZT	BT12 Upgrade

**NOTE:** *Following the software upgrade, an Application Specialist visit is recommended. Until an Application Specialist has visited the site, it is recommended that only the factory default presets be used.*

**NOTE:** *After performing an upgrade, all logs are deleted. It is recommended that these should be recorded should they be needed in the future.*

## 8-5-1-1-1 Preparation

**NOTE:** *Make sure that the required Software Option Keys are available prior to commencing the upgrade process. Do not use the Software Option Keys from the previous BT version.*



**WARNING** *REMOVE ALL EXTERNAL DEVICES SUCH AS PRINTERS AND USB CONNECTIONS BEFORE STARTING THE UPGRADE PROCEDURE.*

At the site, perform the following steps before you start the upgrade procedure:

- 1.) Perform Disk Management for all database records and select the "Copy" option (for instructions, refer to the Vivid q N User Manual on your document media).
- 2.) Perform a full back-up for Patient Archive and System Configuration (for instructions, refer to the Vivid q N User Manual on your document media).
- 3.) Write down the following Connectivity settings as it will be necessary to restore them at the end of the process:
  - TCP/IP address
  - Network printer (if present)
  - Wireless network settings (if present)
  - Trackball speed
  - InSite ExC settings
- 4.) Modify the BIOS settings, as described below in [Modifying BIOS Settings prior to Software Installation](#).
- 5.) Proceed to perform the "Formatting and Partitioning the Hard Disk - Automatic Procedure (BT'12)" on page 8-124.
- 6.) When done, continue to [Table 8-6](#) on page 8-103 and follow the [Vivid q N Software Upgrade/Installation/Reinstallation Procedure - BT11 to BT12](#) step-by-step instructions.

### Modifying BIOS Settings prior to Software Installation

**NOTE:** *This preparation procedure is required to enable system reboot from the USB Flash Drive containing the system software.*

- 1.) Enter the BIOS setup (by performing system shutdown and restart, then pressing F2 when the computer starts).
- 2.) In the BIOS screen, click the **Boot** tab.
- 3.) Change the Boot priority order so that **USB HDD** is second in the list.

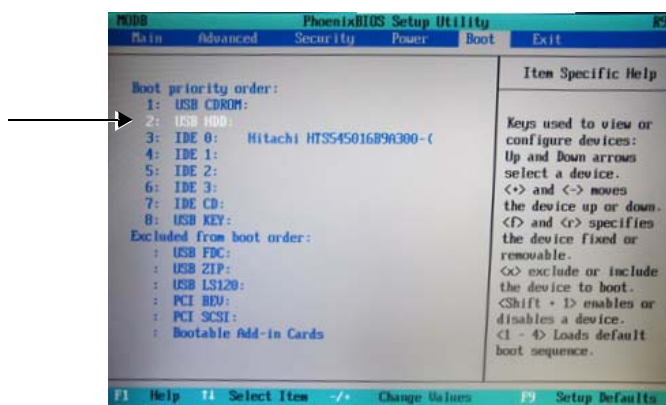
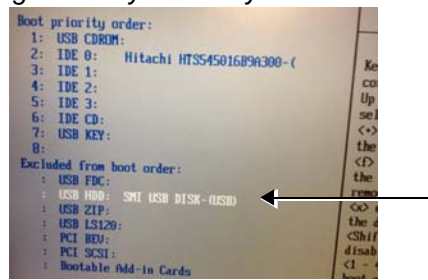
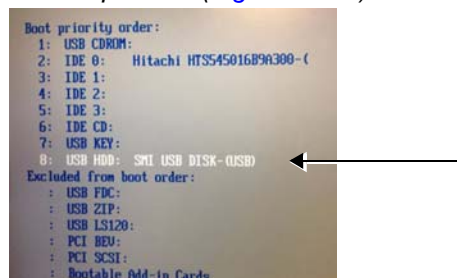


Figure 8-112 Boot Priority Order - USB HDD Second

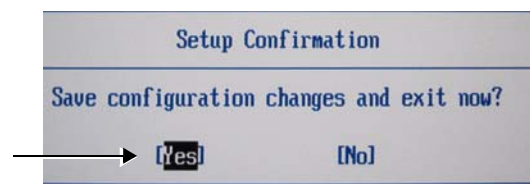
**NOTE:** If USB HDD is in the Excluded menu (as shown below), move it to the Boot priority order list by selecting USB HDD and pressing the x keyboard key.



With USB HDD now listed in Boot priority order (as shown below), promote it to the second position in the list by selecting it, then while pressing and holding <Shift>, repeatedly pressing the + button until USB HDD is in the number 2 position ([Figure 8-112](#)).



- 4.) Click the *Exit* menu and select **Exit Saving Changes**.
- 5.) When prompted, click **Yes** to confirm and exit.



**Figure 8-113 Exiting BIOS Settings and Saving Changes**

- 6.) Return to [step 5](#) on page 8-101 to complete the Preparation procedures.

## 8-5-1-2 Vivid q N Software Upgrade/Installation/Reinstallation Procedure - BT11 to BT12


**NOTE:** A minimum of **1 hour** is required to complete the Software Upgrade/Installation Procedure (excluding preparation time, backup etc. and performing functional tests following the software upgrade/installation).

**Throughout the installation/upgrade processes, the Vivid q N system will be unavailable for scanning.**

**NOTE:** The following upgrade procedure is based on the Vivid i n system. The procedure is the same for the Vivid q N system (displayed screens will of course reflect Vivid q N information).

**NOTE:** During the software installation procedure, it is important to observe the USB Flash Drive connected to the rear panel and make sure the LED is blinking.

**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

Step	Instruction	Expected Result
1.	Perform a complete shutdown of the system.	
2.	Remove the battery and remove all peripherals currently connected to the system. Make sure no peripherals are connected to the USB connectors including the DVD and the PCMCIA.	
3.	Insert the USB Flash Drive containing the full software version and supporting documentation (P/N 5455533) into one of the USB ports on the rear panel.	
4.	On the console, hold down the <ON/OFF> button for three seconds.	<p>The system powers ON and when system boot-up from the USB Flash Drive is complete, the following message is displayed prompting you to select the required option:</p> 
5.	<p>For a Software Upgrade procedure: Make sure the Format Hard Disk procedure has been performed as part of preparation for software loading.</p> <p><i>Note:</i> For a Software Reinstallation procedure, Hard Disk Formatting is optional.</p>	

**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

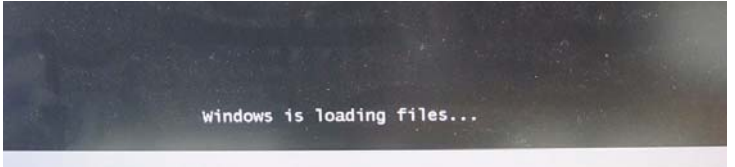
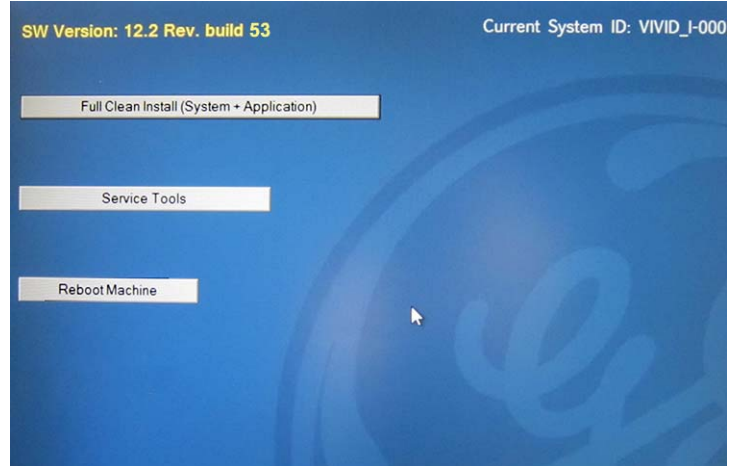
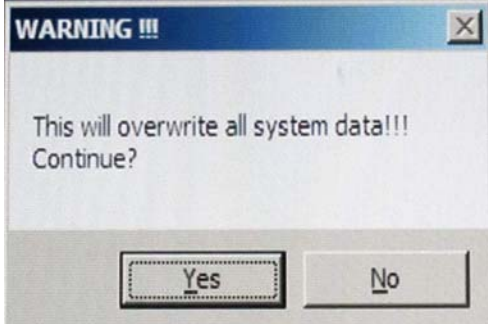
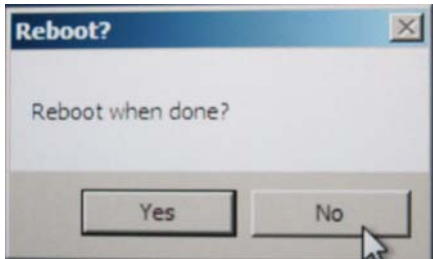
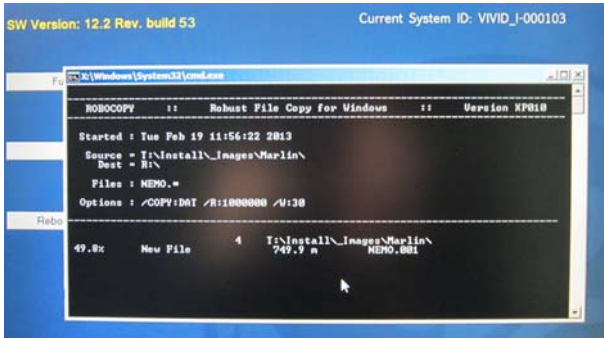
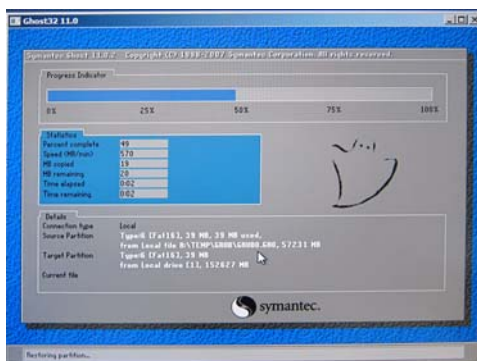
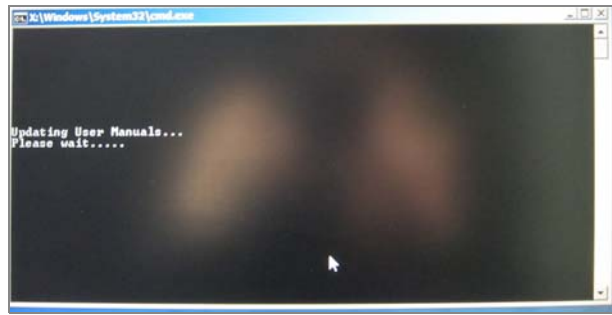
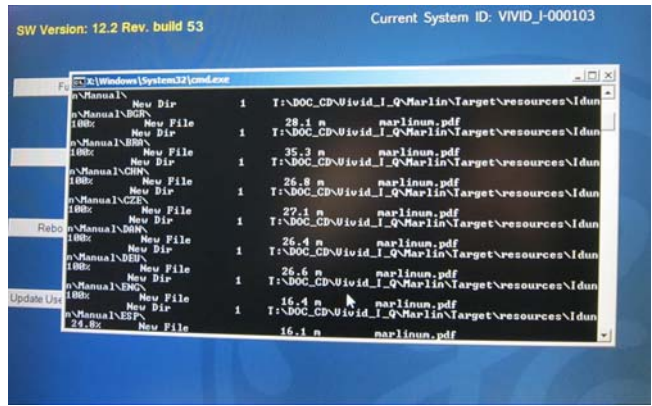
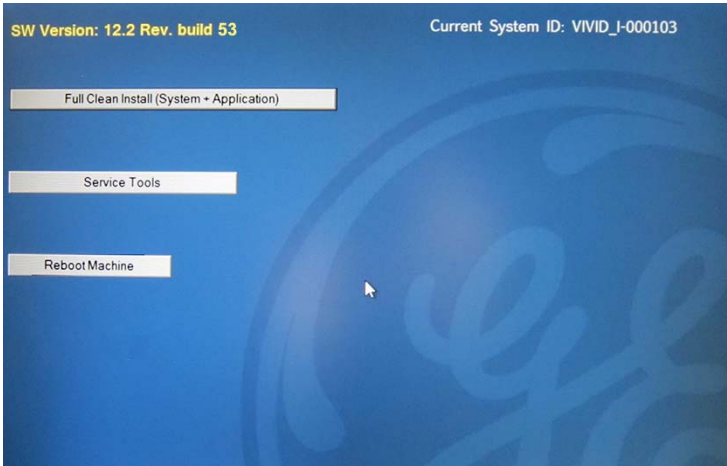
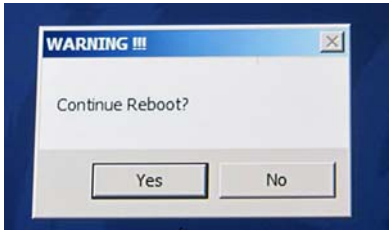

Step	Instruction	Expected Result
6.	<p>Proceed with the Software Installation process by selecting the following option: <b>Load Installation</b></p> <p>then press &lt;Enter&gt;.</p> <p>Note: In the event that the <i>Service Tools</i> option had been selected, you would be prompted for a Password. This would then provide access to the following: <i>Check System ID</i> - shows current system version <i>etc.</i></p> <p><i>InitNetwork</i> - (for future use only) <i>Command Prompt</i> - (for future use only)</p>	<p>File loading commences. While in progress, the following screen is displayed:</p>  <p>When complete (after approximately 10 minutes), the following message is displayed prompting you to select the required option:</p> 
7.	<p>Select the following option: <b>Full Clean Install (System + Application + Documentation)</b></p> <p>then press &lt;Enter&gt;.</p>	<p>The following Warning message is displayed:</p> 
8.	<p>Press [Yes] to continue.</p>	<p>The following message is displayed, providing the option to reboot the system manually (if preferred) when software installation complete:</p> 



Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure

Step	Instruction	Expected Result
9.	<p>Press <b>[Yes]</b> or <b>[No]</b>, as applicable.</p> <p><i>Note: Later, when software installation is complete, the system reboot process will be automatic or manual, in accordance with the option selected in this step.</i></p>	<p>The message window closes; the process of copying files from the Flash Drive to the system repository commences. This requires approximately 2 minutes, during which time a series of screens are displayed, including the following:</p>   <p>User documentation files (User Manual in all languages) are then copied:</p>  

**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

Step	Instruction	Expected Result
		<p>When all files have been copied, the following options are displayed:</p> 
10.	<p>Select the following option: <b>Reboot Machine</b></p> <p>then press &lt;Enter&gt;.</p>	<p>The following Warning message is displayed:</p> 
11.	<p>Press [<b>Yes</b>] to continue.</p>	<p>The following message is displayed:</p> 



**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

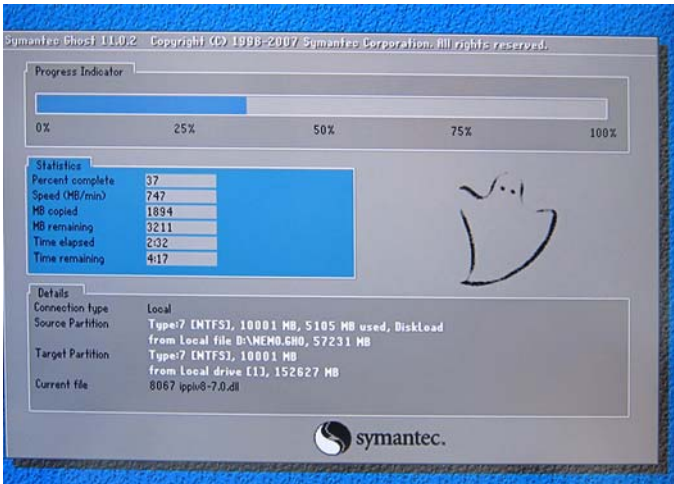


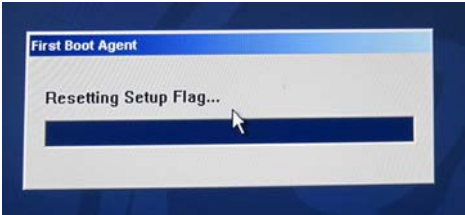
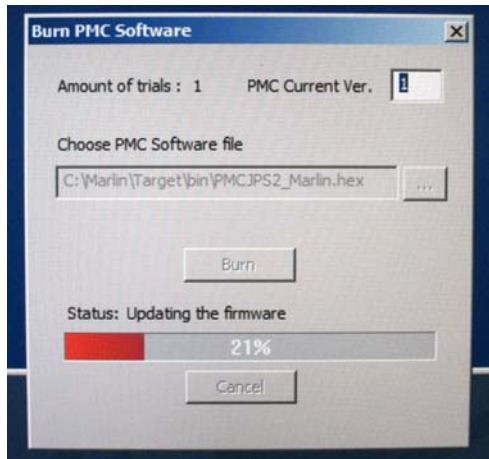

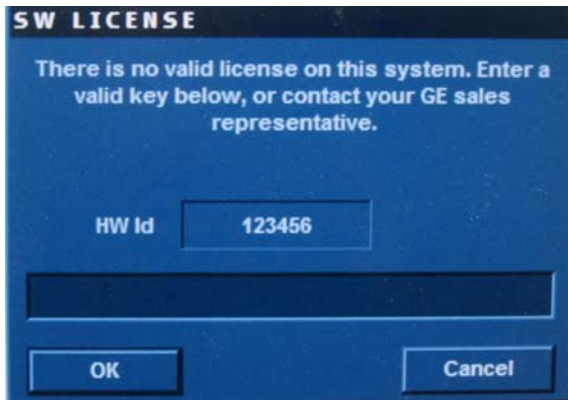
Step	Instruction	Expected Result
12.	<p><b>IMPORTANT.</b> <b>Perform these steps before proceeding!</b></p> <p>a.) Remove the USB Flash Drive from the USB port on the rear panel.</p> <p>b.) Check that no other media is connected to the system (e.g. DVD drive).</p> <p>c.) Press <b>[OK]</b> to continue.</p>	<p>The system reboots and then begins the software installation process. This stage of the process takes approximately 20 minutes, during which time a progress indicator is displayed, as shown in the example below:</p>  <p>A series of progress bars, blank and additional screens are displayed, shown in these examples:</p>   

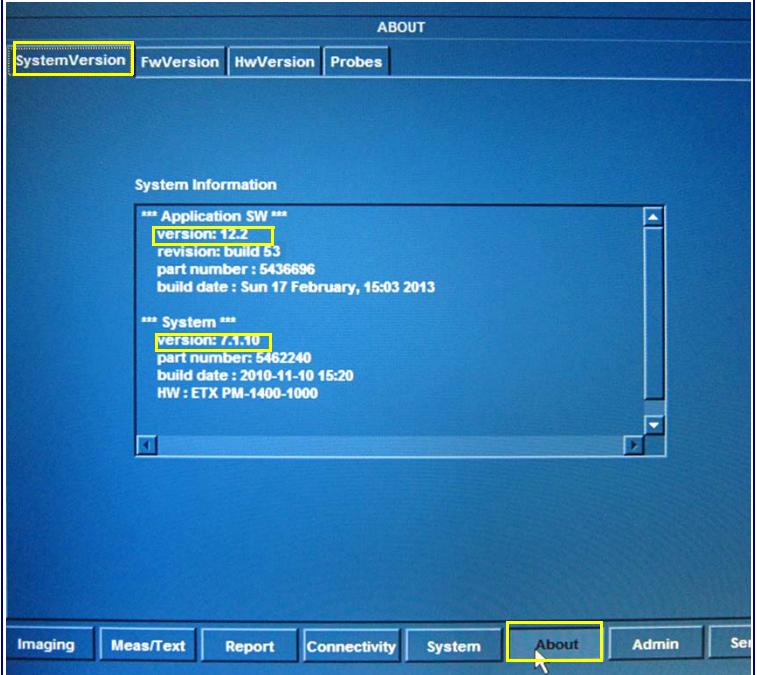
Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure

Step	Instruction	Expected Result
		<p>The system automatically reboots, then displays the following screens</p>   


**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

Step	Instruction	Expected Result
13.	Wait for completion of the installation.	<p>The system performs a number of reboots before completing the installation. During the installation procedure, various screens will be displayed.</p>  <p>Note: The screen shown on the right is displayed for a long time. Although it appears the installation is complete, <b><i>it is still in progress!</i></b></p>  <p><b>DO NOT ATTEMPT TO STOP THE INSTALLATION BEFORE COMPLETION!</b> At the end of the software installation, the Software License dialog box appears.</p> 

**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

Step	Instruction	Expected Result
14.	Type in the option key that you received from the OTR and click <b>OK</b> . <b>Note: Do not use option keys from the previous BT version.</b>	The system will boot-up into Normal scanning mode.
15.	Press <b>Config</b> .	The Operator Logon screen opens.
16.	Type the following to log into the system: <i>Operator: ADM</i> <i>Password: ulsadm</i> Click <b>Logon</b> .	The normal scanning screen is displayed.
17.	To verify the software version, press <b>Config</b> and click <b>About</b> at the bottom of the screen. Select the <b>System Version</b> tab.	The About screen opens, and from the System Version tab, the installed software version is displayed on the screen 
18.	Verify that the software version corresponds with the System SW version you have installed (check against the label on the USB Flash Drive) and that it was correctly installed.	

**Table 8-6 Step-by-Step Vivid q N Software Upgrade/Installation/Reinstallation Procedure**

Step	Instruction	Expected Result
19.	<p>Restore Patient Archive and System Configuration as per user manual.</p> <p><b>Note:</b> When performing "Restore", click <b>Admin</b> at the bottom of the screen, then click the <b>Restore</b> tab. Select "System Configuration" and then de-select "GSP Resources".</p>	
20.	Install peripherals.	
21.	<p>Restore the settings.</p> <p>Verify proper Connectivity functionality - refer to <a href="#">"Connectivity Setup"</a> on page 3-85.</p>	
22.	<p>Proceed to perform the following functionality tests:</p> <ul style="list-style-type: none"> <li>• <a href="#">"Software Configuration Checks"</a> on page 4-39</li> <li>• <a href="#">"Calibration Tests"</a> on page 7-25</li> <li>• <a href="#">"Full System Test"</a> on page 7-10</li> </ul>	



### 8-5-1-3 Loading Latest Version User Manuals

When required, the existing Vivid q N scanner User documentation may be updated by loading the User Manual latest versions from the USB Flash Drive containing the full software version and supporting documentation.

**NOTE:** This procedure is valid for Vivid q N systems running BT12 software later than Build 31.

As described in the procedure below, it is not necessary to reinstall the software since the option is provided to load only the latest version of the User Manuals (in all languages).

**Table 8-7 Loading Latest Version Vivid q N User Manuals**


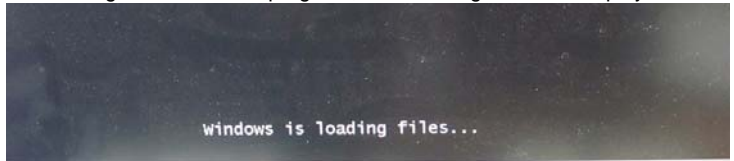
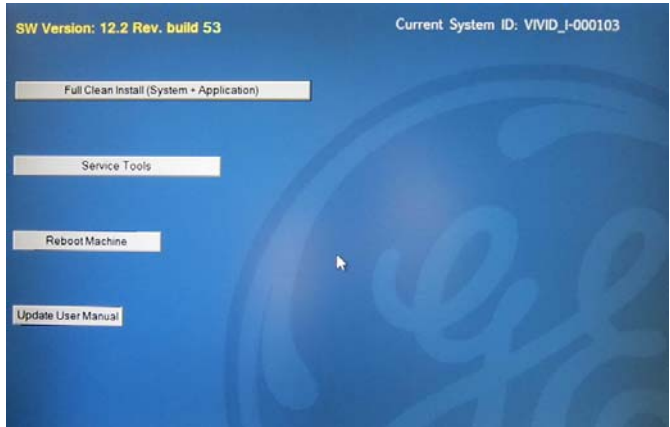
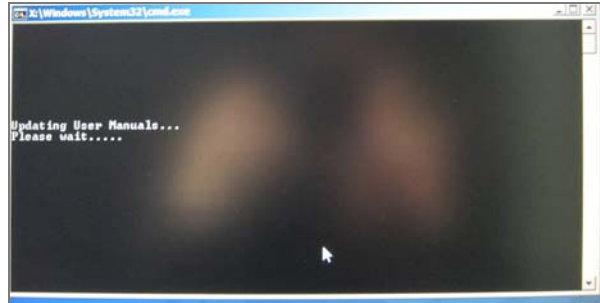
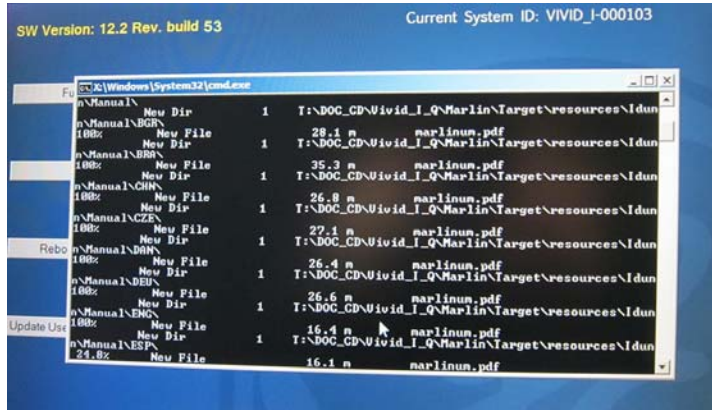

Step	Instruction	Expected Result
1.	Perform a complete shutdown of the system.	
2.	Remove the battery and remove all external devices/ peripherals currently connected to the system.	
3.	Insert the USB Flash Drive containing the full software version and supporting documentation into a USB port on the rear Panel.	
4.	On the console, hold down the <ON/OFF> button for three seconds.	<p>The system powers ON and when system boot-up from the USB Flash Drive is complete, the following message is displayed prompting you to select the required option:</p> 
5.	<p>Select the following option: <b>Load Installation</b></p> <p>then press &lt;Enter&gt;.</p> <p><i>Note:</i> Since the existing User documentation is recognized by the system, an additional button <b>Update User Manual</b> on the right provides the option to load that latest version User Manual (without performing software installation)</p>	<p>File loading starts. While in progress, the following screen is displayed:</p>  <p>When complete (after approximately 10 minutes), the following screen opens:</p> 

Table 8-7 Loading Latest Version Vivid q N User Manuals (cont'd)

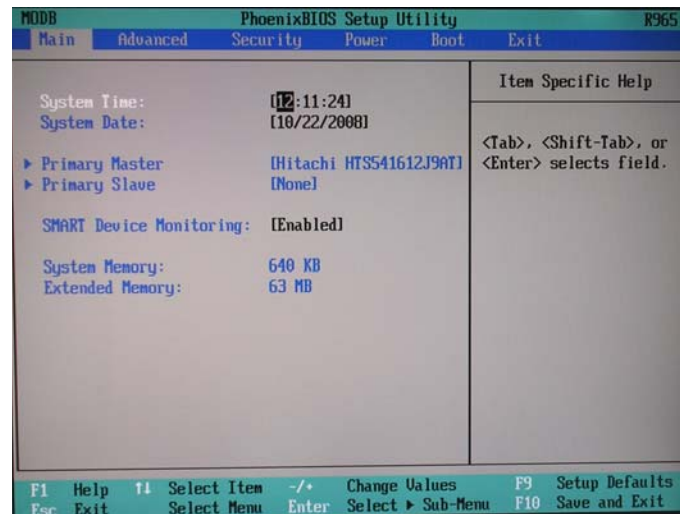
Step	Instruction	Expected Result
6.	<p>Select the following option: <b>Update User Manual)</b></p> <p>then press &lt;Enter&gt;.</p>	<p>The following message is displayed:</p>  <p>During the PDF upload, progress is shown as follows:</p>  <p>When the upload process is complete, the message window closes.</p>
7.	<p>Select the following option: <b>Reboot Machine</b></p> <p>then press &lt;Enter&gt;.</p>	<p>The following message is displayed:</p> 
8.	<p><b>IMPORTANT.</b> <b>Perform these steps before proceeding!</b></p> <p>a.)Remove the USB Flash Drive from the USB port on the rear panel.</p> <p>b.)Check that no other media is connected to the system (e.g. DVD drive).</p> <p>c.)Press [OK] to continue.</p>	<p>The system reboots into normal scanning mode.</p>
9.	<p>Verify the User Manual version corresponds with the version you have installed (check against the label on the USB Flash Drive) and that it was correctly installed.</p>	

## 8-5-2 Setting the BIOS

**NOTE:** This procedure is applicable to both MODBR949 and MODBR929 versions.

- 1.) While booting, press F2 "Config / Diag" on alphanumeric keyboard
- 2.) Type the password "marlin04".
- 3.) Exit and save presets.
- 4.) Select <Exit> section and load "Setup Defaults".
- 5.) Select <Main> section.

**Figure 8-114 BIOS Main Tab**



- 6.) Set correct System Time and System Date. Set Date using next format MM/DD/YYYY
- 7.) Check that IDE Primary Master is detected.
- 8.) Proceed to ["Setting the BIOS Advanced Parameters" on page 8-115.](#)



### 8-5-2-1 Setting the BIOS Advanced Parameters

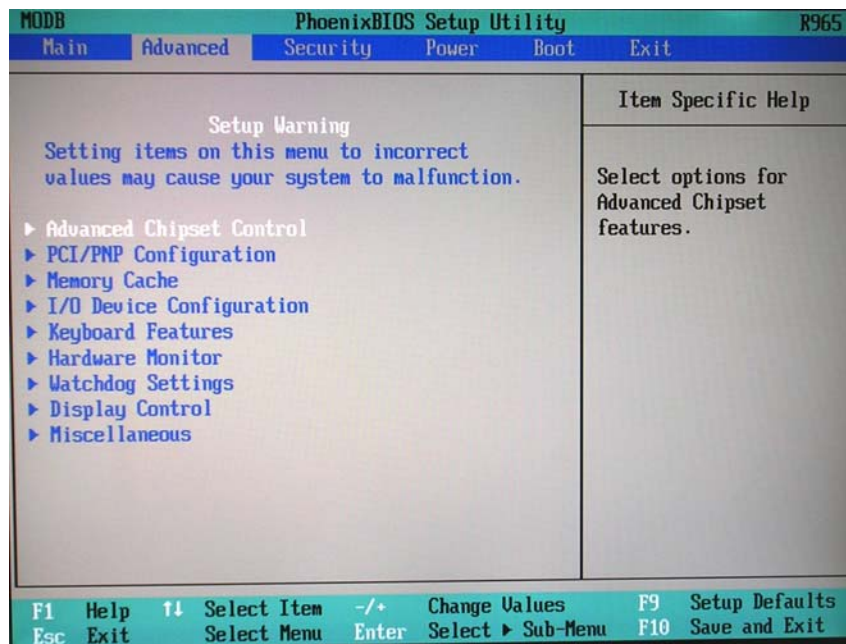
This sections details how the BIOS parameters should be configured. The table below lists the parameters that are shown in this section.

BIOS Parameter	Corresponding Figure
Chipset Control	<a href="#">Figure 8-116 on page 8-116</a>
PCI/PNP Configuration	<a href="#">Figure 8-117 on page 8-116</a>
Memory Cache	<a href="#">Figure 8-119 on page 8-117</a>
I/O Device Configuration	<a href="#">Figure 8-119 on page 8-117</a>
Keyboard Features	<a href="#">Figure 8-120 on page 8-118</a>
Hardware Monitor	<a href="#">Figure 8-121 on page 8-118</a>
Watchdog Settings	<a href="#">Figure 8-122 on page 8-119</a>
Display Control	<a href="#">Figure 8-123 on page 8-119</a>
Miscellaneous	<a href="#">Figure 8-124 on page 8-120</a>

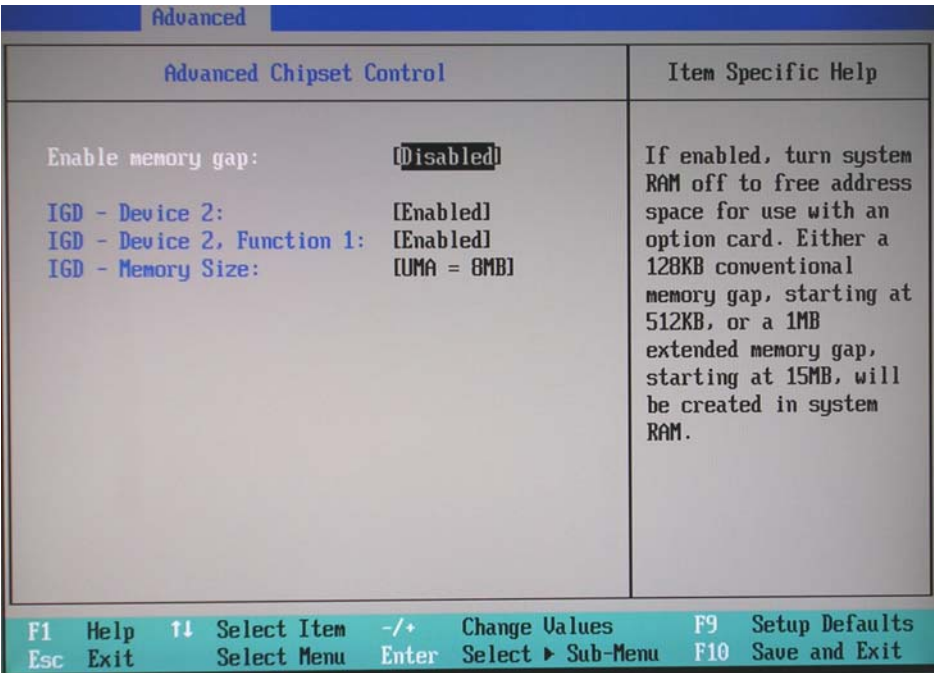
- 1.) From the BIOS main menu (see [Figure 8-114](#)), select the **<Advanced>** menu and press **<Enter>**.

**Advanced Chipset Control** is highlighted.

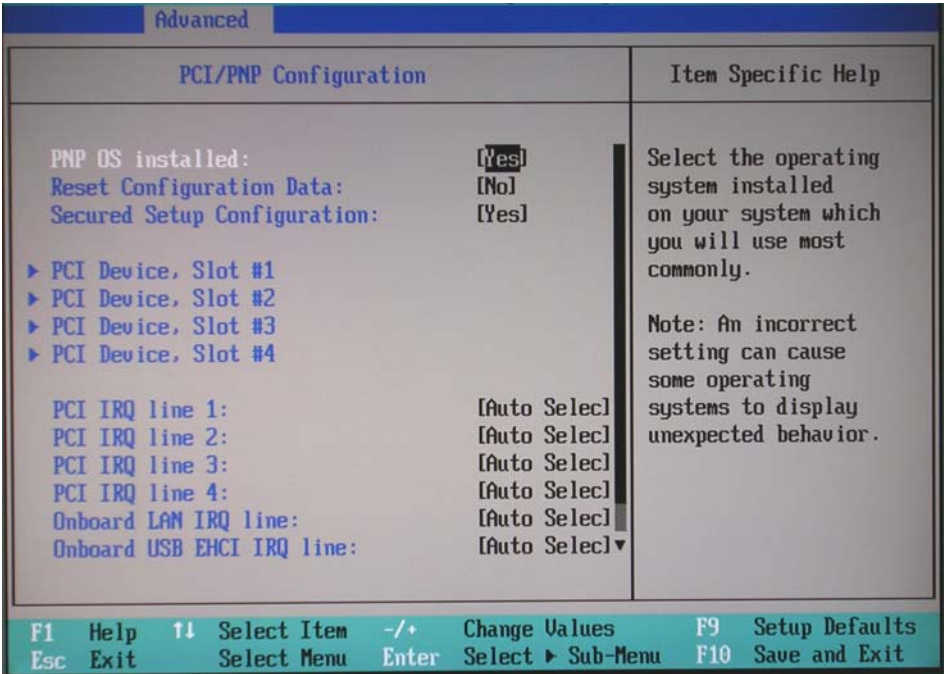
**Figure 8-115 BIOS Advanced Parameters Screen**



- 2.) Press <Enter> to access **Advanced Chipset Control** (Figure 8-116).  
Figure 8-116 BIOS Advanced Chipset Control Parameters



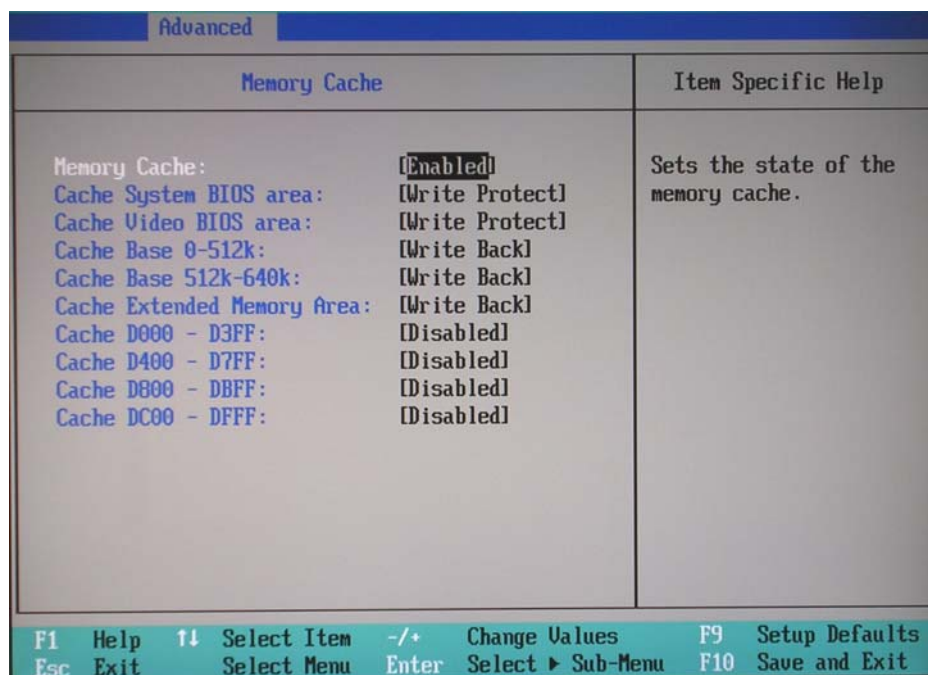
- 3.) Set the parameters for **Enable memory gap:** as shown above in Figure 8-116.  
4.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).  
5.) Scroll to **PCI/PNP Configuration** and press <Enter> to open the **PCI/PNP Configuration** screen.  
Figure 8-117 BIOS Advanced PCI/PNP Parameters



- 6.) Set the parameters in the **PCI/PNP Configuration** screen as shown above in Figure 8-117.  
7.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).

8.) Scroll to **Memory Cache** and press <Enter> to open the **Memory Cache** screen.

**Figure 8-118 BIOS Advanced Memory Cache Parameters**

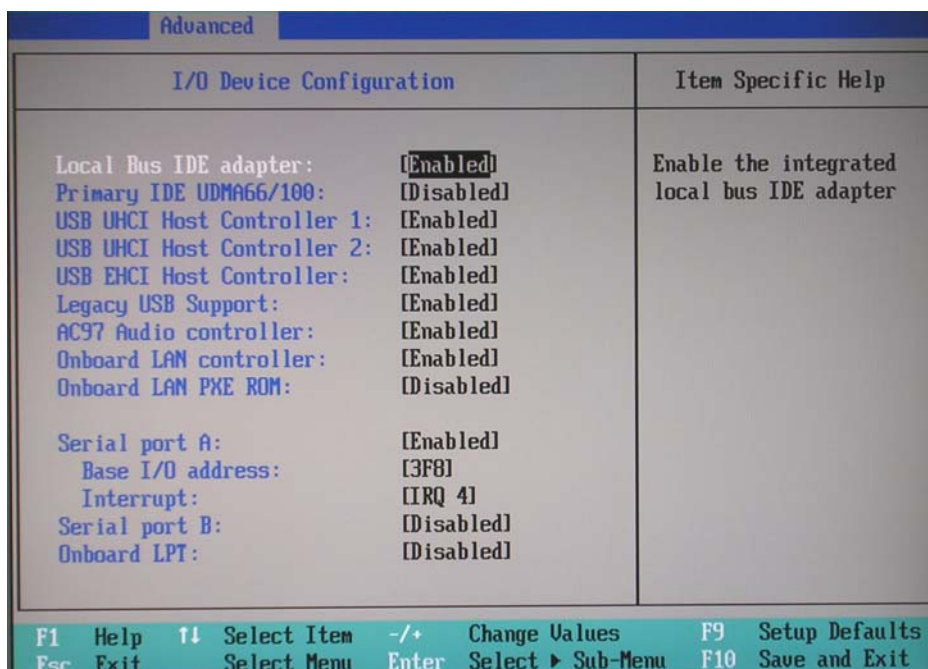


9.) Set the parameters in the **Memory Cache** screen as shown above in [Figure 8-118](#).

10.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-115](#)).

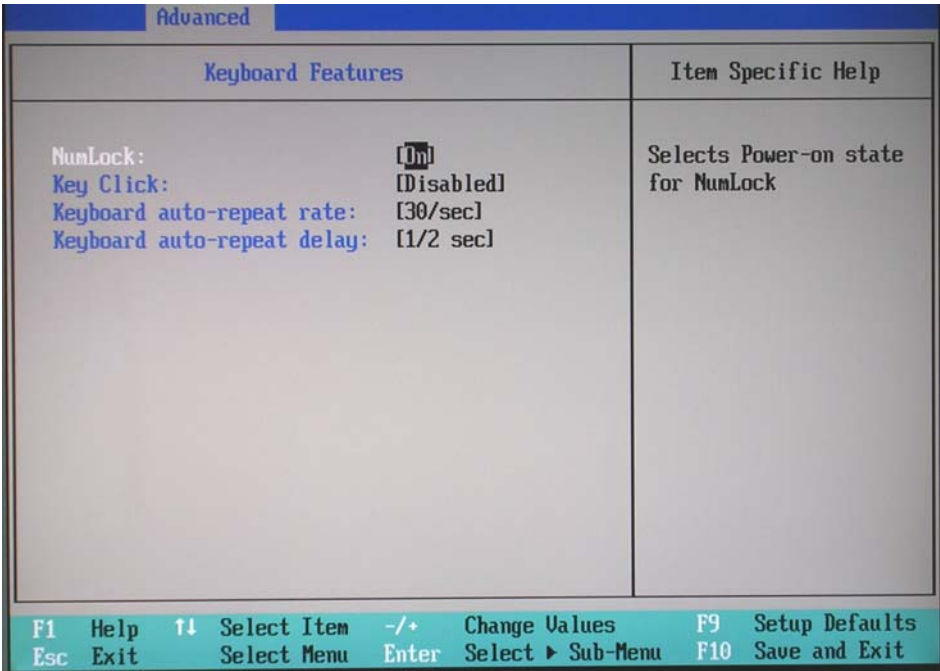
11.) Scroll to **I/O Device Configuration** and press <Enter> to open the **I/O Device Configuration** screen.

**Figure 8-119 BIOS Advanced I/O Device Configuration Parameters**

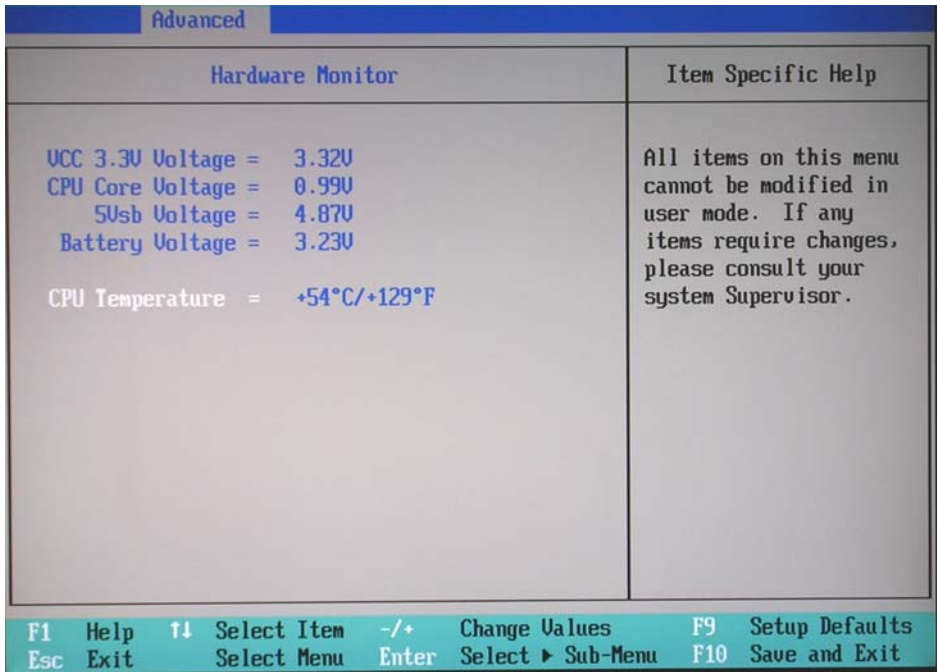


12.) Set the parameters in the **I/O Device Configuration** screen as shown above in [Figure 8-119](#).

- 13.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).
- 14.) Scroll to **Keyboard Features** and press <Enter> to open the **Keyboard Features** screen.
- Figure 8-120 BIOS Advanced Keyboard Features Parameters**



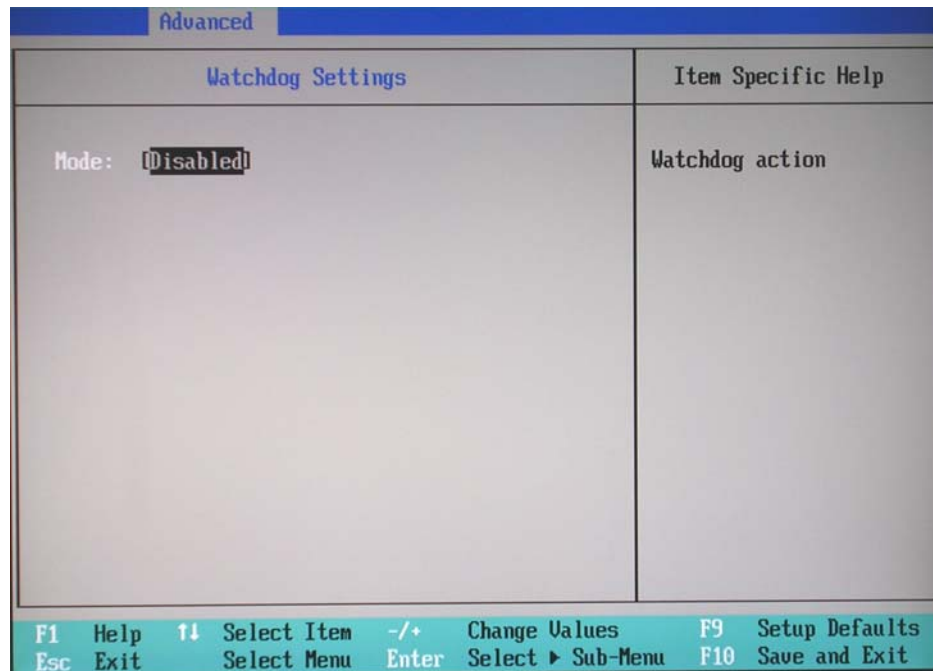
- 15.) Set the parameters in the **Keyboard Features** screen as shown above in Figure 8-120.
- 16.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).
- 17.) Scroll to **Hardware Monitor** and press <Enter> to open the **Hardware Monitor** screen.
- Figure 8-121 BIOS Advanced Hardware Monitor Parameters**



- 18.) Set the parameters in the **Hardware Monitor** screen as shown above in Figure 8-121.

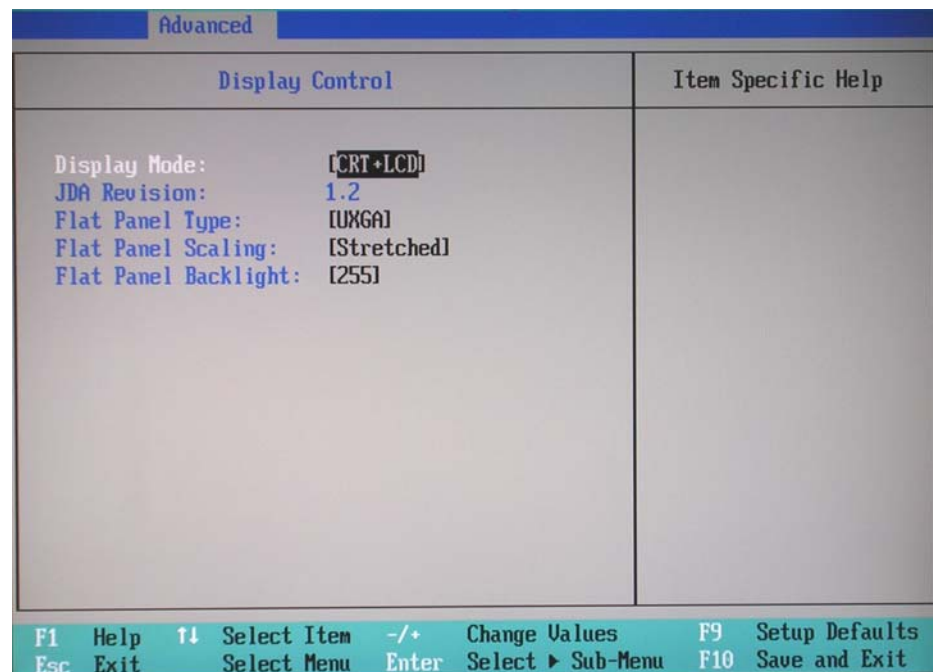
- 19.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).  
20.) Scroll to **Watchdog Settings** and press <Enter> to open the **Watchdog Settings** screen.

Figure 8-122 BIOS Advanced Watchdog Settings



- 21.) Set the parameters in the **Watchdog Settings** as shown above in Figure 8-122.  
22.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).  
23.) Scroll to **Display Control** and press <Enter> to open the **Display Control** screen.

Figure 8-123 BIOS Advanced Display Control Parameters

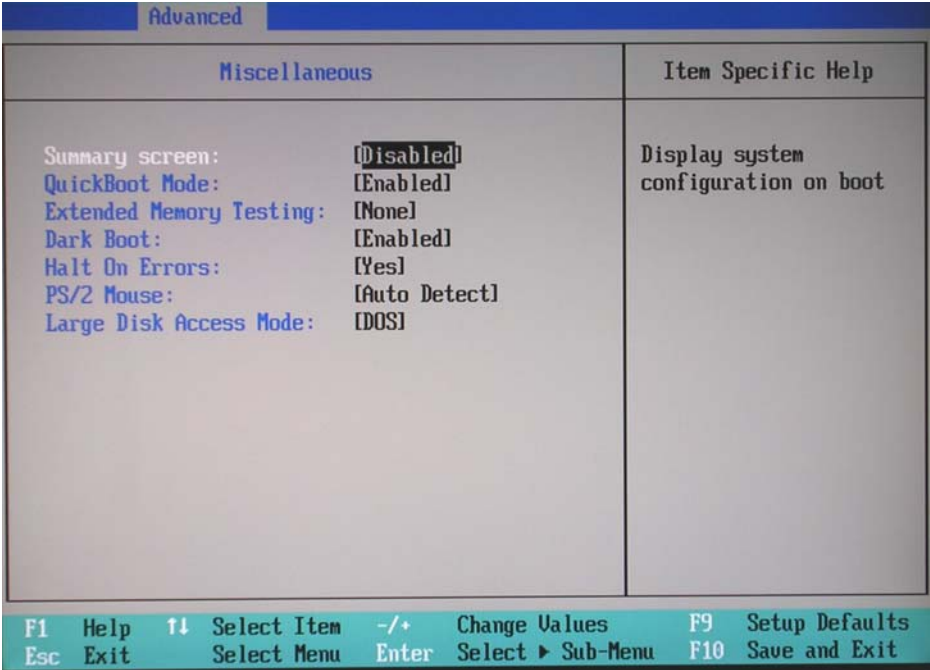


- 24.) Set the parameters in the **Display Control** screen as shown above in Figure 8-123.



- 25.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-115).
- 26.) Scroll to **Miscellaneous** and press <Enter> to open the **Miscellaneous** screen.

Figure 8-124 BIOS Advanced Miscellaneous Parameters



- 27.) Set the parameters in the **Miscellaneous** screen as shown above in Figure 8-124.
- 28.) Proceed to "Additional BIOS Settings" on page 8-121.

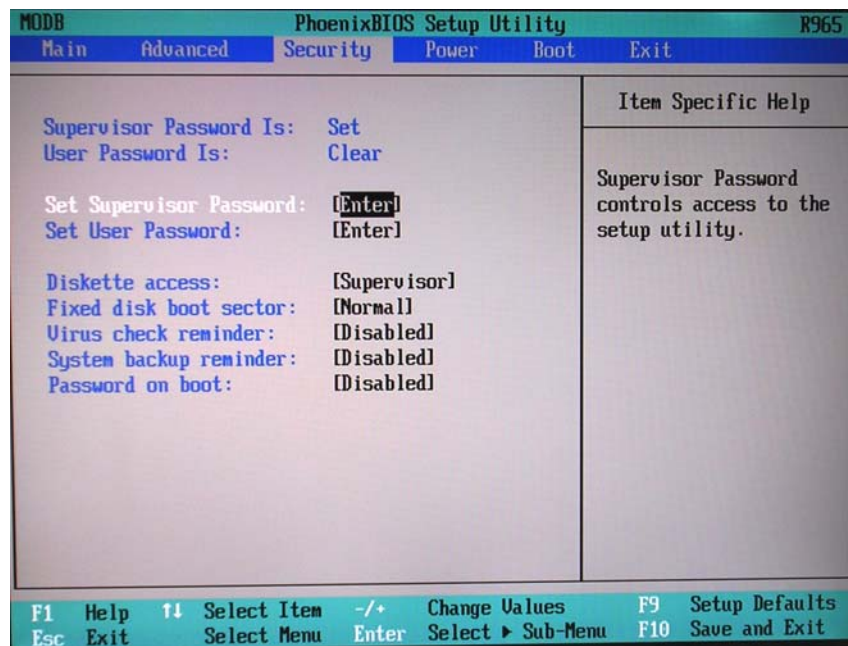
## 8-5-2-2 Additional BIOS Settings

This section details how additional BIOS parameters should be configured. The table below lists the parameters that are shown in this section.

BIOS Parameter	Corresponding Figure
Security	Figure 8-125 on page 8-121
Power	Figure 8-126 on page 8-122
Boot	Figure 8-127 on page 8-122

- 1.) From the BIOS main menu (see [Figure 8-114](#)), select the **<Advanced>** menu and press **<Enter>**.
- 2.) Select the **<Security>** menu and press **<Enter>**.

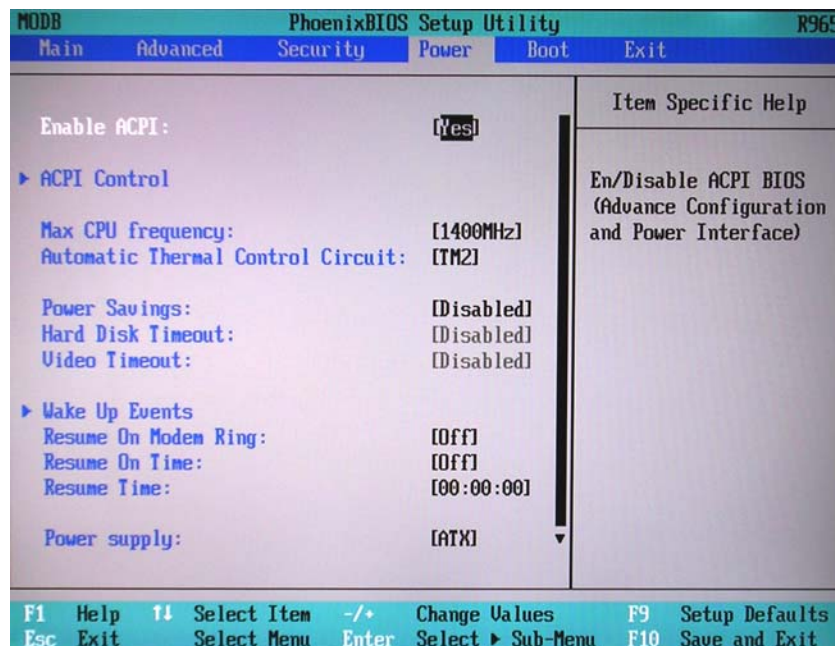
**Figure 8-125 BIOS Security Parameters**



- 3.) Set the parameters in the **Security** screen as shown above in [Figure 8-125](#).
- 4.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-114 on page 8-114](#)).

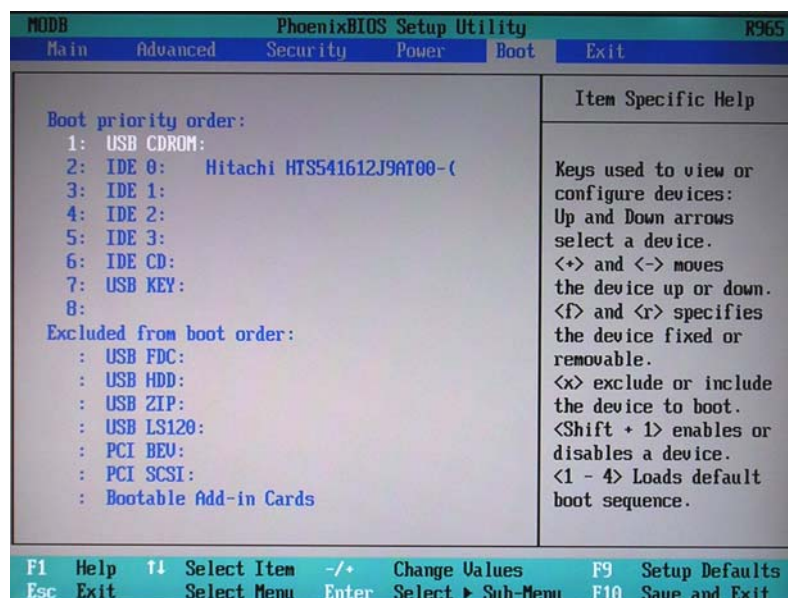
- 5.) Select the **<Power>** menu and press **<Enter>**.

Figure 8-126 BIOS Power Parameters



- 6.) Set the parameters in the **Power** screen as shown above in [Figure 8-126](#).  
 7.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-114 on page 8-114](#)).  
 8.) Select the **<Boot>** menu and press **<Enter>**.

Figure 8-127 BIOS Boot Parameters

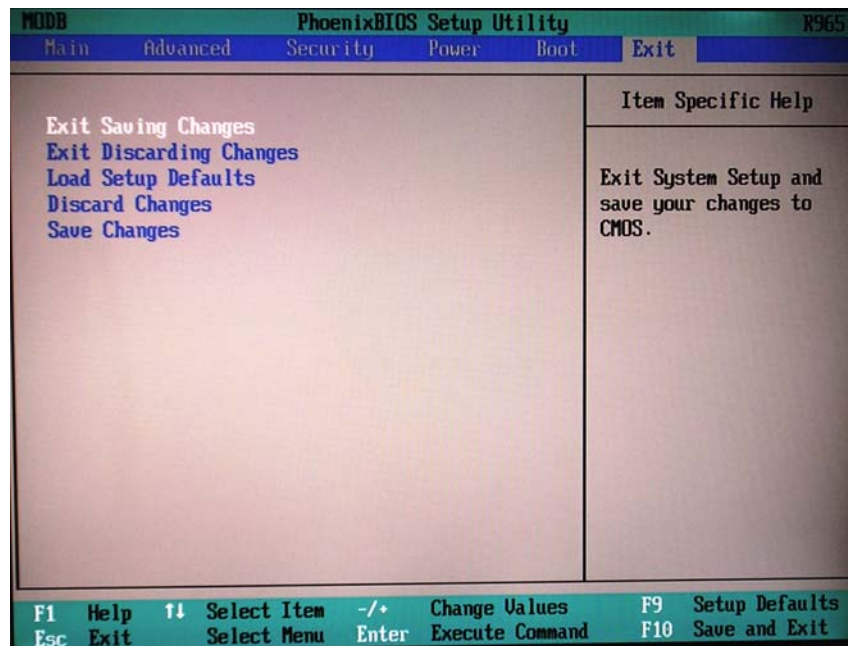


- 9.) Set the parameters in the **Boot** parameters screen as shown above in [Figure 8-127](#).  
 10.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-114 on page 8-114](#)).



11.) Press <F10> to **Exit Saving Changes** as shown in [Figure 8-128](#).

**Figure 8-128 BIOS Exit Screen**



12.) Reboot the system and check that the Supervisor PASSWORD was installed properly.




13.) Proceed to perform the following functionality tests:

- ["Software Configuration Checks" on page 4-39](#)
- ["Calibration Tests" on page 7-25](#)
- ["Full System Test" on page 7-10](#)

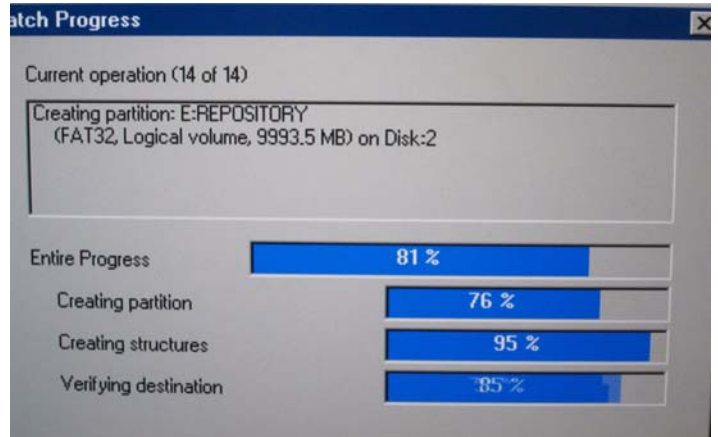

## 8-5-3 Formatting and Partitioning the Hard Disk - Automatic Procedure (BT'12)

**NOTE:** This procedure is applicable to Vivid q N systems running software version BT12.

**Table 8-8 Formatting and Partitioning the Hard Disk - Automatic Procedure 1 of 2**


Step	Instruction	Expected Result
1.	Perform a complete shutdown of the system.	
2.	Remove the battery and remove all peripherals currently connected to the system. Make sure no peripherals are connected to the USB connectors including the DVD and the PCMCIA.	
3.	Insert the USB Flash Drive containing the full software version and supporting documentation (P/N 5455533) into one of the USB ports on the rear panel.	
4.	On the console, hold down the <ON/OFF> button for three seconds.	The system powers ON and when system boot-up from the USB Flash Drive is complete, the following message is displayed prompting you to select the required option: 
5.	Select the following option: <b>Format Hard Disk</b> then press <Enter>.	A short series of screens displays information while information is being read from the Flash Drive. When complete, the following message is displayed: 
6.	Press [Y] to confirm the Hard Disk formatting command.  Note: Pressing [N] would evoke display of the message <i>Press any key to Reboot</i> . After a system reboot, the message show in Step 4 above would be redisplayed.	A short series of screens are displayed. Thereafter, the screen appears blank. After a few minutes, the following message is displayed: 

**Table 8-8     Formatting and Partitioning the Hard Disk - Automatic Procedure (cont'd) 2 of 2**

Step	Instruction	Expected Result
7.	Press [Y] to confirm the Hard Disk formatting command.	<p><i>Hard Disk formatting commences.</i></p> <p>During this process, a visual indication of progress is displayed on the screen:</p>  <p>When Hard Disk formatting is complete, the system automatically reboots. The following options are now displayed:</p> 
8.	Proceed to perform the Software Installation procedure, as described in: "Vivid q N Software Upgrade/Installation/Reinstallation Procedure - BT11 to BT12" on page 8-103.	

## Section 8-6

### Performing a Complete System Back-up

 **NOTICE IMPORTANT:** Contact the customer and request that a full incremental back-up be performed prior to upgrade. If necessary, refer them to the Vivid q N User Manual. Ask for removal (delete) of un-necessary patient information, so that the back-up process will require minimal time.

Remind customers that GE strongly recommends that periodic back-ups of their Archive be performed. This routine back-up process will assure the retention of all the information that is temporarily saved into the local Archive (hard-disk). The permanent Archive is the backed-up Archive on the variety of medias.

**Do not proceed with the upgrade process if a complete incremental back-up process has not been performed.** Contact the On-Line Center to resolve any back-up process issues, before proceeding with the upgrade. Ignore this note if back-up of patient information is not required, as per the customer's instructions.

#### 8-6-1 Database Merge

The Database Merge process can be implemented by using the Import/Export functions of the Vivid q N system, as described in the procedure below.

##### 8-6-1-1 Preparation

- 1.) If not already connected, connect the DVD\CD-RW to the USB port at the rear of the system and connect power to the DVD\CD-RW drive.
- 2.) Press the <Eject> button of the DVD\CD-RW drive to verify that no disc is present in the disk drive.

##### 8-6-1-2 Database Merge Procedure

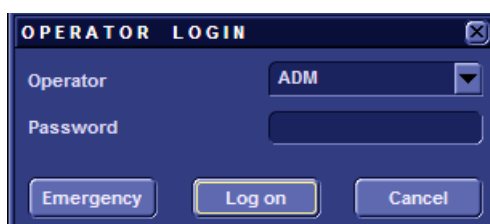
##### 8-6-1-2-1 Running Disk Management

**NOTE:** See *Disk Management in the Vivid i n or Vivid q N User's Manual on your document CD.*

- 1.) Insert media (e.g. CD/DVD) or connect to a network repository.
- 2.) From the keyboard, press the **Config** button.

*The Operator Logon screen opens - see [Figure 8-129](#).*

**Figure 8-129 Operator Logon Screen**



- 3.) In the password field, type the required password.

**NOTE:** *The Operator Logon screen only appears after the first boot up of the system.*

- 4.) Insert media (e.g. CD DVD) or connect to a network repository.
- 5.) Click the **Admin** tab at the bottom of the screen.
- 6.) Click the **Disk Management** tab at the top of the screen - see [Figure 8-130](#).

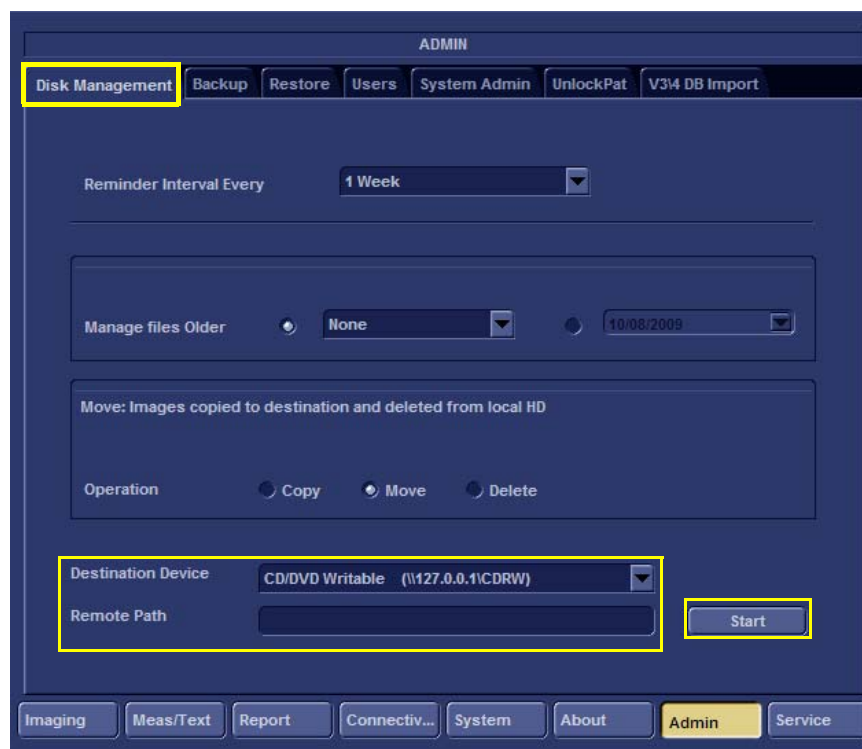
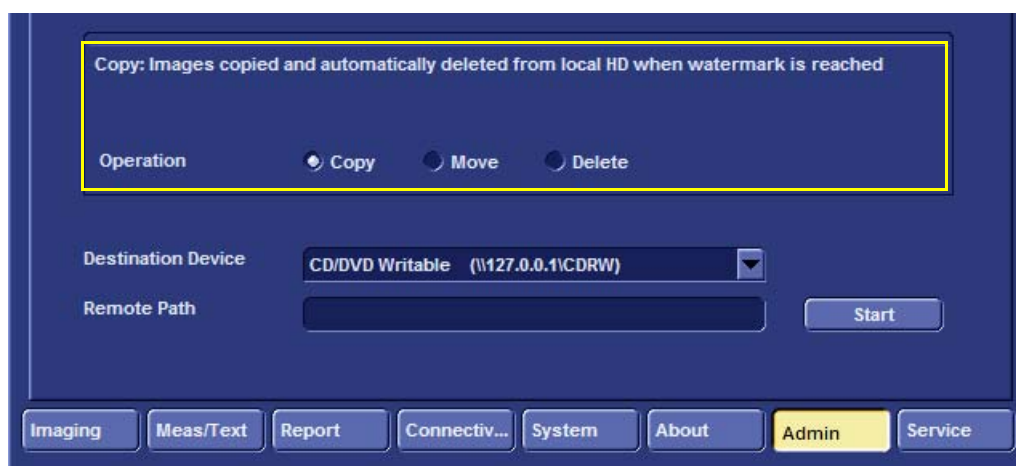


Figure 8-130 Admin Screen

7.) Under Operation, select **Copy** - see Figure 8-131.

Figure 8-131 Copy Images for Export



8.) Under Destination Device (see Figure 8-130), select the required media device.

9.) Click **Start** and follow the on-screen wizard instructions.

*The system stores the images.*

### 8-6-1-3 Running the Export Procedure

1.) Insert the required storage media into the system.

- 2.) From the keyboard, press the **Patient** button.  
The patient menu opens - see [Figure 8-132](#)

**Figure 8-132 Patient Menu**



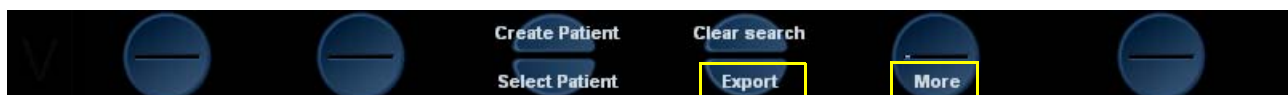
- 3.) From the screen, select the **Patients List**.  
The Search / Create Patient screen is displayed - see [Figure 8-133](#).

Last Name	First Name	Patient ID	Birthdate	Exam Date	Img	Str	Rep	Size	Code
Hayes	Jasmine	c10106	17/05/1991	04/12/2008					
Iolo	gogo	1111111		27/07/2009					
Pollard	Mark	181750	27/02/1988	04/12/2008					
Powell	Emily	c13211	16/03/1994	04/12/2008					
service	ARTIFACT	ROY		28/07/2009					
Smith	Kayla	c5199	04/06/1996	04/12/2008					
tetst	test	test1		10/08/2009					
tttt	tttt	test		27/07/2009					

**Figure 8-133 Search / Create Patient Screen**

- 4.) Click the **Export** soft-key at the bottom of the screen - see [Figure 8-134](#).

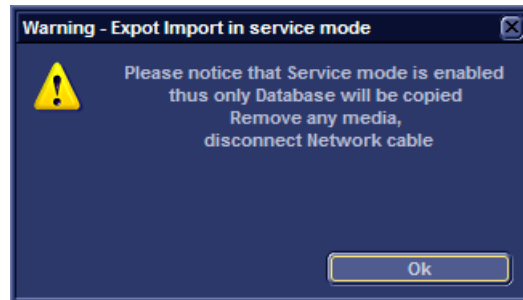
**NOTE:** If the Export button is not displayed, click **More** consecutively until the Export button is displayed:



**Figure 8-134 Export and More Soft-Keys**

The following warning ([Figure 8-135](#)) is displayed to indicate that only the database is exported to the target media.

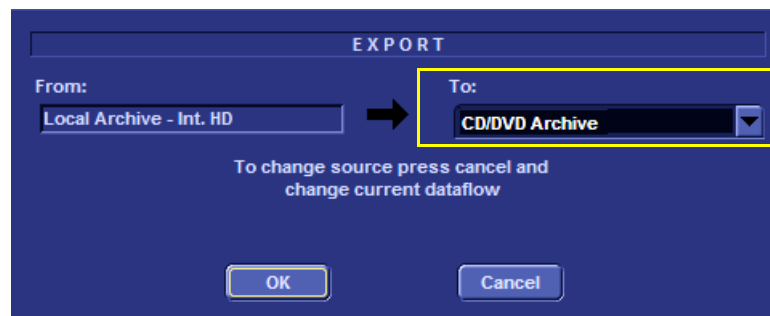
**Figure 8-135 Database Export Warning**



5.) Click **OK**.

The Export screen opens - see [Figure 8-136](#).

**Figure 8-136 Export Screen**



6.) From the Export screen, select the required destination media ([Figure 8-136](#)) and click **OK**.

The Export Patient List screen opens - [Figure 8-137](#).



EXPORT PATIENT - CD/DVD Archive

More

Last Name

Patient ID

First Name

Birthdate

 (dd/mm/yyyy)
 

Age

Sex

☐ female ☐ male

Patient List

8 records fetched

Last Name	First Name	Patient ID	Birthdate	Exam Date	Copied	Status Msg
<input checked="" type="checkbox"/> Hayes	Jasmine	c10106	17/05/1991	04/12/2008		
<input checked="" type="checkbox"/> lolo	gogo	1111111		27/07/2009		
<input checked="" type="checkbox"/> Pollard	Mark	181750	27/02/1988	04/12/2008		
<input checked="" type="checkbox"/> Powell	Emily	c13211	16/03/1994	04/12/2008		
<input checked="" type="checkbox"/> service	ARTIFACT	ROY		28/07/2009		
<input checked="" type="checkbox"/> Smith	Kayla	c5199	04/06/1996	04/12/2008		
<input checked="" type="checkbox"/> tetst	test	test1		10/08/2009		
<input checked="" type="checkbox"/> tttt	tttt	test		27/07/2009		

☐ Delete selected patient(s) after copy
 ☒ Copy Images

Export from

Local Archive - Int. HD

Operator

ADM

Figure 8-137 Export Patient Archive

- 7.) Click the soft-keys at the bottom of the screen consecutively in the following order as the system processes the actions: **Select All**, **Copy**, and **Done** - see [Figure 8-138](#).



Figure 8-138 Soft Keys



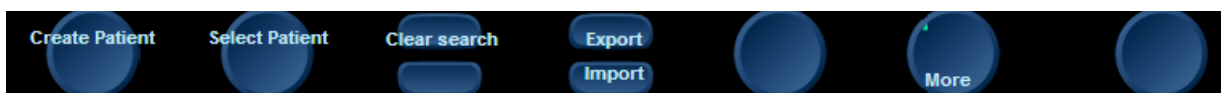
#### 8-6-1-4 Running the Import Procedure

**NOTE:** This procedure is applicable when importing files from various media devices.

- 1.) Log on to the system.
- 2.) Insert the media (where the data in the previous section is stored), into the system.
- 3.) From the keyboard, press the **Patient** button; on the screen, click **Patient List**.

The Search Create Patient screen appears - [Figure 8-133](#).

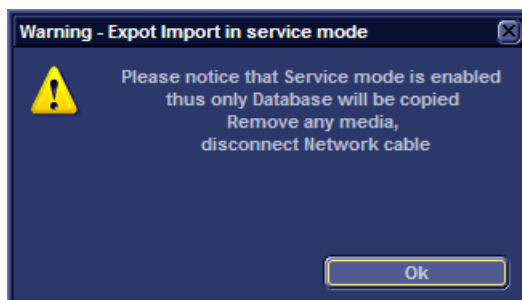
- 4.) Click the **Import** soft-key at the bottom of the screen - see [Figure 8-139](#).



**Figure 8-139 Soft-key Import Button**

**NOTE:** If the **Import** button is not displayed, click **More** consecutively until the **Import** button is displayed.

**NOTE:** A warning is displayed ([Figure 8-141](#)) - to indicate that only the database is imported to the target device.

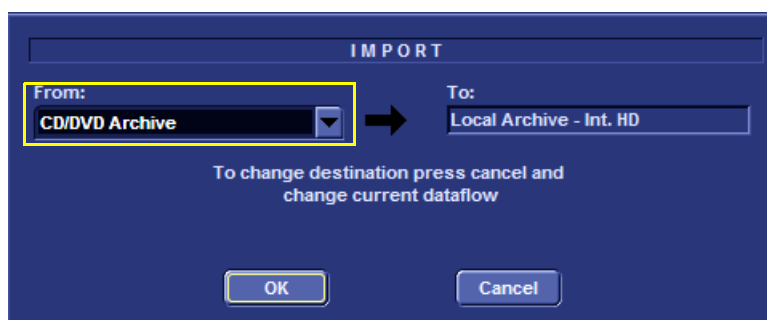


**Figure 8-140 Database Export Import Warning**

- 5.) Click **OK**.

The **Import** screen appears - see [Figure 8-141](#).

**Figure 8-141 Import Screen**



- 6.) Under "From" in the **Import** screen, select the required media source from the drop-down list (see [Figure 8-141](#)).

**NOTE:** If an **Import / Export Conflict** screen displays (this could occur if two separate examinations (this could occur if two separate examinations were saved under the same name), click **OK** and continue.

- 7.) Click the soft keys **Select All**, **Copy**, and **Done**, consecutively in that order as the system processes the actions - see [Figure 8-142](#).



**Figure 8-142 Select All, Copy and Done Buttons**

*NOTE:* Wait while the system processes each action before pressing the next soft-key.

- 8.) Press **Alt + E** to eject the CD.  
9.) Press **2D** on the keyboard to return to the default scanner screen.

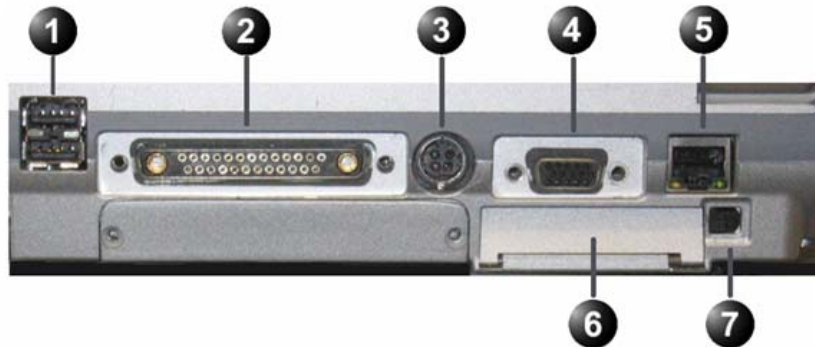
## 8-6-2 How to Restore User-defined Presets

For details, refer to ["Archiving and Loading Presets"](#) on page 4-16.

## Section 8-7 Peripherals

**NOTE:** This section provides references to the installation procedures for the various peripherals used with the Vivid q N portable ultrasound scanner. Connection to the system is via one of the USB ports (unless otherwise stated) on the rear panel, as shown in [Figure 8-143 below](#).

**Figure 8-143 Vivid q N Rear Panel**



1. Two interchangeable USB ports (digital printer, CD-RW and other peripherals).
2. Docking connector
3. Port for DC IN (AC Adapter).
4. SVGA Output (VCR option or CRT monitor option).
5. LAN 10/100 Base-TX Ethernet network connector
6. PCMCIA port for PC card.
7. Ejection lever for PCMCIA device

### 8-7-1 Connecting and Removing Peripherals

For detailed instructions on connecting peripherals to the Vivid q N portable ultrasound scanner, refer to the following procedure, as appropriate.

- ["USB Global Modem" on page 3-34](#)
- ["Wireless USB Network Adaptor" on page 3-35](#)
- ["DVD/CD-RW Drive" on page 3-36](#)
- ["MOD Drive" on page 3-43](#)
- ["External USB Hard Disk" on page 3-44](#)  
For detailed installation and removal instructions, see ["External USB Hard Disk Replacement Procedure" on page 8-135](#)
- ["USB Memory Stick" on page 3-45](#)
- ["Connecting the VCR" on page 3-48](#)

Following the connection and removal of peripherals, perform the following functionality tests:

- ["SafeLock Cart - Grounding Continuity" on page 10-22](#) - only if the Vivid q N system is currently mounted on the SafeLock cart
- ["SafeLock Cart - Chassis Current Leakage Test" on page 10-24](#)

*NOTE:* For details on connecting and configuring printers, refer to ["Connecting Printers" on page 3-21](#).

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## 8-7-2 External USB Hard Disk Replacement Procedure

*NOTE: This procedure is only applicable to Vivid q N systems mounted on the SafeLock Cart*

*NOTE: This section describes removal and replacement procedures, including initial configuration.*

**Figure 8-144 External USB Hard Disk**



### 8-7-2-1 Tools

Appropriate flat screwdriver and open-ended wrench.

### 8-7-2-2 Time Required

15 minutes

### 8-7-2-3 Preparations

Shut down the Vivid q N ultrasound unit, as described in [Chapter 3 - System Setup](#).

### 8-7-2-4 External USB Hard Disk Removal Procedure

*NOTE: Ensure that there is no activity on the drive before you turn it off.  
If power is turned off while files are being written to the drive, the files will be corrupted.*

- 1) Switch OFF the power to the unit.  
The power switch is located at the rear of the unit - see [Figure 8-145 on page 8-136](#).
- 2.) Disconnect the AC Power cable (connected between the power supply and the SafeLock Cart) from the SafeLock Cart AC power outlet.
- 3.) Disconnect the External USB Hard Disk from the USB port on the Vivid q N system.
- 4.) Remove the unit.

*NOTE: If the External USB Hard Disk is filled with data, store it in a safe place and label it with the date, and a note that the drive is full.*

Figure 8-145 External USB Hard Disk - Rear View and Cables



External USB Hard Disk - Rear View

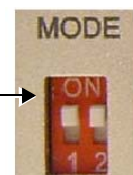


AC/DC Power Converter and Cables

**WARNING** IN THE EVENT THAT THE AC/DC POWER CONVERTER AND CABLES HAVE BEEN SUPPLIED WITH THE POWER IN CABLE PART # 066E0661 (COLOR WHITE), DISCARD THIS CABLE AND DO NOT USE. ORDER THE CORRECT POWER IN CABLE PART # 5400905 (COLOR BLACK).

#### 8-7-2-5 External USB Hard Disk Installation Procedure

- 1.) Connect the USB 2.0 cable to the USB 2.0 socket at the rear of the disk unit.
- 2.) Connect the cable from the power supply to the power connector on the rear of the disk unit.
- 3.) Verify that the volume configuration is set to RAID 1  
The External USB Hard Disk is configured as a mirrored volume (RAID 1).  
This ensures optimal data integrity and immediate access to the data, even if one disk fails.
- 4.) Verify that both MODE switches are set to the ON position as illustrated

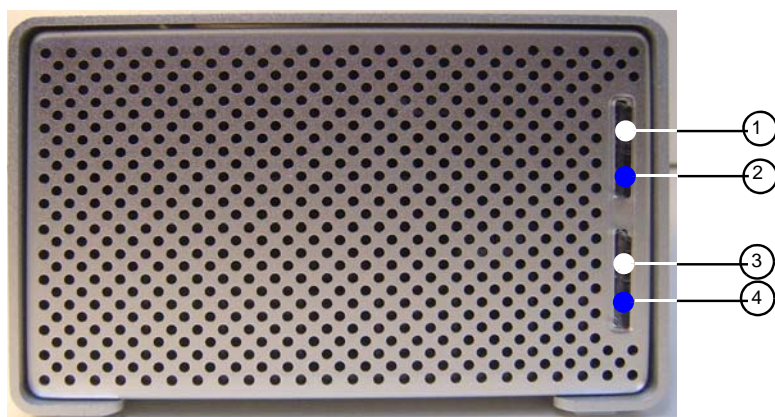


**NOTE:** The total RAID 1 capacity is half the physical capacity of the two drives.



**CAUTION** CHANGING THE VOLUME CONFIGURATION WILL ERASE ALL EXISTING DATA!  
IF THE DRIVE CONTAINS FILES YOU WANT TO SAVE, MOVE THEM TO ANOTHER DRIVE  
BEFORE CHANGING THE SWITCH SETTINGS.

- 5.) Connect the AC power cable from the power supply to the AC power outlet on the SafeLock Cart.
- 6.) Switch ON the power.
- 7.) Study the status light indicators and verify that they function as described in [Figure 8-146](#).



**1. HDD1 connection/power indicator**

Glow white when the hard disk is connected and the drive is powered up. Blinks when building a mirrored RAID if HDD1 is the target disk.

**2. HDD1 status indicator**

Displays the status of the hard disk. See the status indicator color/state chart below.

**3. HDD2 connection/power indicator**

Glow white when the hard disk is connected and the drive is powered up. Blinks when building a mirrored RAID if HDD2 is the target disk.

**4. HDD2 status indicator**

Displays the status of the hard disk. See the status indicator color/state chart below.

**Status Indicator Color and State:**

- Flashing blue - Hard drive is being accessed
- Solid blue - Array is being rebuilt
- Red - Disk failure

**Figure 8-146 External USB Hard Disk - Status Light Indicators**

**8-7-2-6 Changing the Volume Name**

**NOTE:** It is important that the External USB Hard Disk has a unique volume name. The site should choose a naming convention to use for marking this Hard Drive and any future hard drives, in case more than one drive will be needed in the future.

**NOTE:** Only connect one USB storage device (like this External USB Hard Disk) to the Vivid q N scanner at a time.

Follow these steps to set the Volume Name:

- 1) Connect the USB cable from the External USB Hard Disk to a laptop or PC.
- 2.) Power up the External USB Hard Disk.
- 3.) Under My Computer, after a while, the disk will show as a new drive, named **Removable Disk** - refer to [Figure 8-147 on page 8-138](#). (It will be allocated the next available drive letter.)



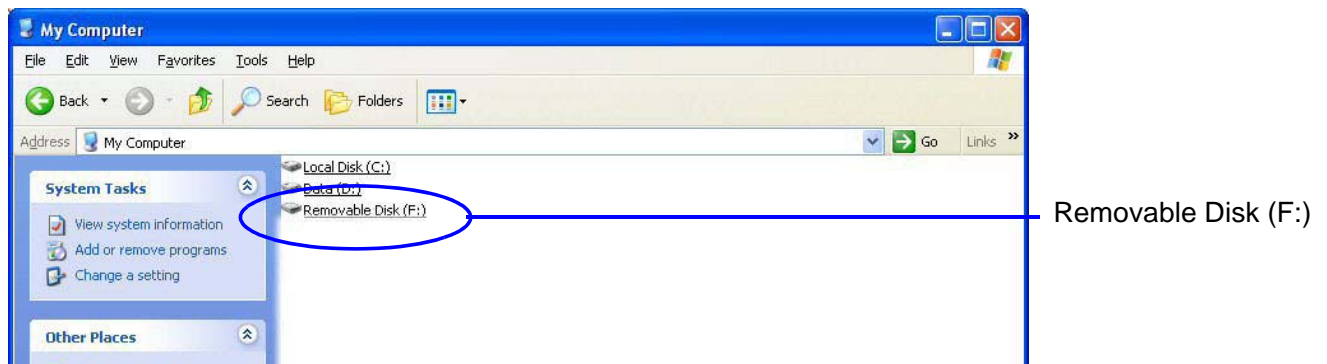


Figure 8-147 Removable Disk Shown under My Computer

- 4.) Right-click the drive name (**Removable Disk**) and select **Rename** from the menu.

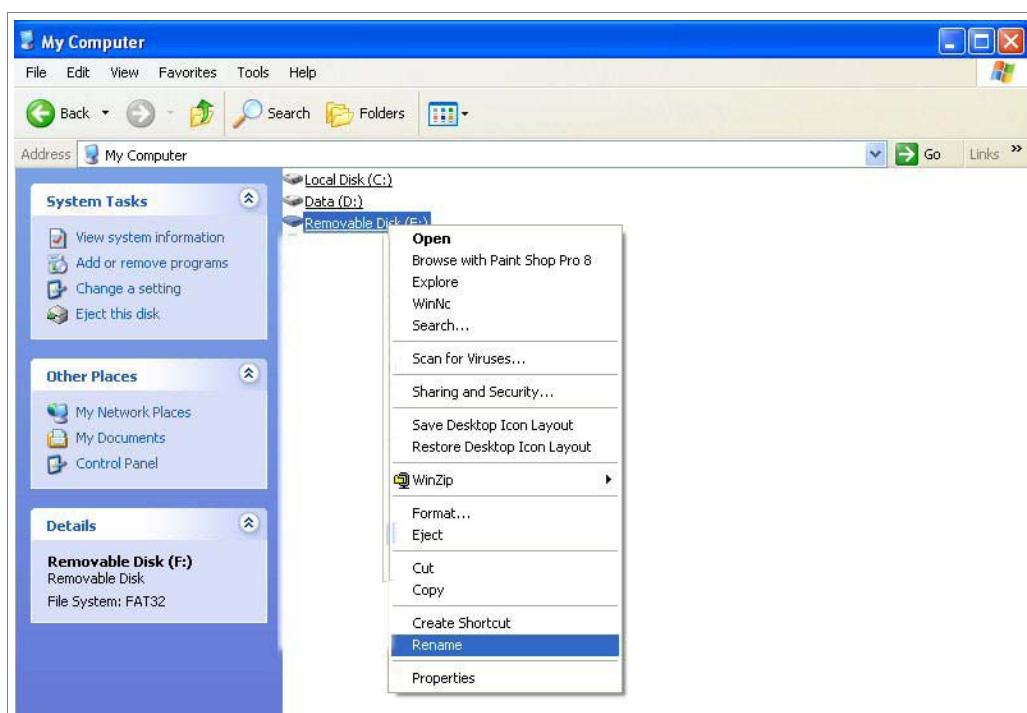


Figure 8-148 Select Rename from the Drop-down Menu

- 5.) Enter the name you have decided to use for the drive.





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**Figure 8-149 Changing the Name**

- 6.) When done, click somewhere outside the name. The name will then be changed.
- 7.) Record the Volume's name on a sticker or a piece of paper and attach it to the drive so that it will be easier to locate the correct drive in the future.
- 8.) Use the "Safely Remove Hardware" tool in the Task Bar before continuing with the next step.
- 9.) Disconnect the USB cable from the laptop or PC.

**8-7-2-7 Connecting the External USB Hard Disk to the Vivid q N Scanner**

- 1) Connect the USB cable to a USB port on the Vivid q N scanner.
- 2) Turn ON power to the Vivid q N ultrasound scanner.
- 3) Under My Computer (refer to [Figure 8-147 on page 8-138](#)), verify that the drive appears for selection.
- 4) Proceed to perform the following functionality tests:
  - ["External USB Hard Disk Test" on page 4-27](#)

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# Chapter 9

## Renewal Parts

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### Section 9-1 Overview

#### 9-1-1 Purpose of Chapter 9

This chapter gives you an overview of replacement parts for the Vivid q N.

**Table 9-1 Contents in Chapter 9**

Section	Description	Page Number
9-1	Overview	9-1
9-2	List of Abbreviations	9-2
9-3	Mechanical Hardware Parts	9-3
9-4	Electronic Parts	9-4
9-5	Cables	9-6
9-6	Software	9-7
9-7	Probes	9-8
9-8	Peripherals	9-10
9-9	SafeLock Cart Parts	9-11
9-10	Optional Modo Cart	9-13
9-11	Spare Part Kits	9-14
9-12	Product Manuals	9-18

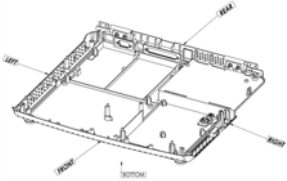
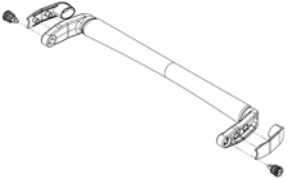
## Section 9-2

### List of Abbreviations

- |                |   |
|----------------|---|
| • <b>Assy</b>  | - Assembly  |
| • <b>BEP</b>   | - Back End Processor  |
| • <b>Ctrl</b>  | - Control   |
| • <b>FEP</b>   | - Front End Processor   |
| • <b>FRU 1</b> | - Replacement part available in parts hub                               |
| • <b>FRU 2</b> | - Replacement part available from the manufacturer (lead time involved) |
| • <b>LCD</b>   | - Liquid Crystal Display  |
| • <b>Int</b>   | - Internal  |
| • <b>I/O</b>   | - Input/Output  |
| • <b>PWA</b>   | - Printed Wire Assembly   |
| • <b>Recv</b>  | - Receive   |
| • <b>XFRMR</b> | - Transformer   |

## Section 9-3 Mechanical Hardware Parts

Table 9-2 Mechanical Hardware Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	KEYCAP KIT VIVID q N BT11	S2423463	BT'11 and higher.	1	Y
2.	Internal Battery Pack	5423275	Replaces: 2378963-2, S2423267, FL200027 and FL200068	1	Y
3.	Vivid q cover kit	S2423362		1	Y
4.	BOTTOM BASIC ASSY. RSPL Kit	5393630	For Vivid q N 	1	Y
5.	HANDLE (BLACK)-VIVID I BT09	S2423363	For Vivid q N 	1	Y

## Section 9-4 Electronic Parts

Table 9-3 Electronic parts 1 of 2





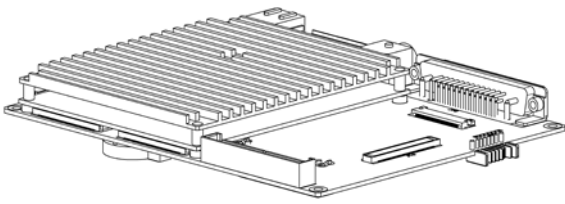
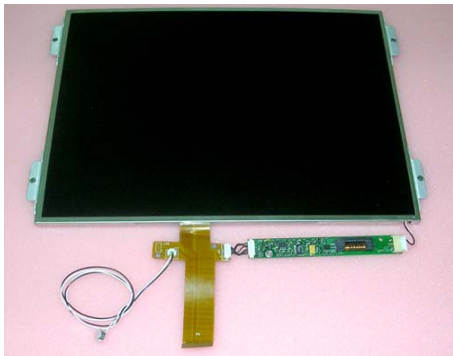
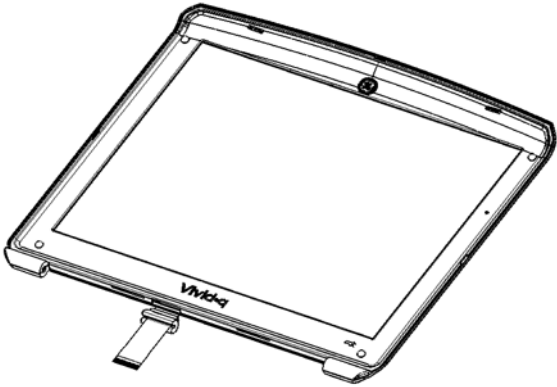
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Vivid q IR KB RSPL Kit	5503081		1	Y
2.	Vq Operator Panel w-o ECG-Keyboard Assy	5376323		1	Y
3.	Trackball	S2423360	BT'09	1	Y
4.	Backend assy	S2424596	SATA BEP SERVICE KIT BT'06 and BT'09 (Replaces: R2380485)	1	Y
5.	DC-DC POWER SUPPLY V4 ASSEMBLY	R2403248-4		1	Y
6.	AC adaptor wo cable	S2422706	BT'06 and BT'09 	1	Y
7.	Hard Disk Module	2376515-2	BT'06 and BT'09 Excludes software 	1	Y

Table 9-3 Electronic parts (cont'd) 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	Vi,q SATA BEP SERVICE KIT	S2424596		1	Y
9.	LCD Panel Kit	S2420027	BT'06 and BT'09 	1	Y
10.	DISPLAY MODULE ASSY-Vivid-q	R2423283		1	Y
11.	ECG Module Assy	N5448727	For Vivid q N. Replaces NR2421861.	1	Y
12.	TR32-v12 Board	N5444671	For Vivid q N Replaces NS2423369	1	Y
13.	Probe and MUX Assy	N5452376	For Vivid q N Replaces N5420885	1	Y
14.	RFI Board	N2418295-2	For Vivid q N	1	Y
15.	Hard Disk Duplication Jig	2414958-2	BT'06 and BT'09	1	Y

## Section 9-5 Cables

Table 9-4 Cables Vivid q N

Item	Part Name	Part Number	Description	Qty	FRU
1.	Cable: LAN Isolation Box & Cable Kit	2409727	BT'06 and BT'09 	1	Y
2.	LEAD WIRE KIT EUROPE YELLOW, RED, GREEN	S2424558	For Vivid q N	1	Y
3.	Cable: ECG Cable - Europe	2418832-2	BT'06 and BT'09 Replaces FL200039 ( 	1	Y
4.	Cable: External ECG	2413451	BT'06 and BT'09 Replaces FL200054 	1	Y
5.	Cable: Vi Power Cable Continental Europe 2.5A/250V	2412094-2	BT'06 and BT'09 	1	Y
6.	RFI TO BB V2 FLEX-VI,Q	R2361860-2	RFI TO BASE BOARD FLEX V2 	1	Y
7.	Cable and Flex kit	2410810		1	Y



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## Section 9-6 Software

Table 9-5     Software

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	SW and Doc disk on key (BT12)	N5444462	Software for Vivid q N - BT'12	1	Y

## Section 9-7 Probes

Table 9-6 Probes 1 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Probe: 3C - RS	2290776 H40402LL		1	Y
2.	Probe: 4C - RS	5131629		1	Y
3.	Probe: 8C - RS	2354971		1	Y
4.	Probe: E8C-RS PROBE TYPE (EXP)	2290777		1	Y
5.	Probe: 8L RS	2376127 H40402LT		1	Y
6.	Probe: 12L - RS	5154514		1	Y
7.	Probe: 3S- RS	2355686 H4000PD		1	Y
8.	Probe: 5S - RS	5135960		1	Y
9.	Probe: 6S- RS	5198571 H45021RP	2.7MHz to 8.0MHz BT'09	1	Y
10.	Probe: 7S - RS	2377059 H4000PE		1	Y
11.	Probe: 10S - RS	2377040 H4000PF		1	Y
12.	Probe: M4S - RS	H40452LH	1.5-3.6 MHz	1	Y
13.	Probe: 9L - RS	H40442LL	4.0–13.0 MHz	1	Y
14.	Probe: 6T - RS	KN100093 H45531MZ	Must have TEE Probe Interface Module (H45021D)	1	Y
15.	Probe: 6Tc - RS	KN100104 H45551ZE	2.9 MHz to 8.0 MHz	1	Y
16.	Probe: 9T - RS	KN100073 H45531YM	Must have TEE Probe Interface Module (H45021D)	1	Y
17.	Probe:P2D - RS	2411689 H45021C		1	Y
18.	Probe: P6D - RS	2411690 H45021CA		1	Y
19.	TEE Probe Adaptor for 6T-RS/9T-RS	FD200127 H45021KP		1	Y
20.	Probe: Chain Test Jig	2404597		1	Y
21.	Pencil Probe: Jig	2414484		1	Y
22.	Probe Holder	S2418520		1	Y
23.	3S-RS and M4S-RS Biopsy Kit	E8385MZ		1	Y
24.	4C-RS Biopsy Kit	E8385NA		1	Y
25.	8L-RS Biopsy Kit	E8385N		1	Y

**Table 9-6 Probes (cont'd) 2 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
26.	12L-RS Biopsy Kit	H40432LC		1	Y
27.	TEE WALL Rack	H45001B		1	Y
28.	Bite Hole Indicator	H45531HS		1	Y
29.	TEE Clip-On Bite Guard Adult	H45511EE		1	Y
30.	TEE Clip-On Bite Guard Adult OR	H45521CB		1	Y
31.	TEE Conventional Bite Guard Pediatric	H45521JG		1	Y
32.	TEE Conventional Bite Guard Adult	H45521JH		1	Y
33.	Adult TEE Scanhead Protection Cover	H45521CK		1	Y
34.	Pediatric TEE Scanhead Protection Cover	H45541RN		1	Y

## Section 9-8 Peripherals

Table 9-7 Approved Peripherals Vivid q N

Item	Part Name	Part Number	Description	Qty	FRU
1.	Wireless Network Interface - Europe	2417389-2		1	Y
2.	SONY UP-D898MD DIGITAL A6 BW PRINTER	5555265		1	Y
3.	PRINTER SONY UP-D897SYN USB2.0 BW	066E0111		1	Y
4.	Digital Color Video Printer (Sony UP-D23MD)	H45531XB 066E2958		1	Y
5.	HP OfficeJet Pro K5400 Kit	EQ100158		1	Y
6.	VCR Mitsubishi HS-MD30000E PAL S-VHS	066E9513		1	Y
7.	Video Scan Converter	H45531XE 2412280		1	Y
8.	Modem USB	5114058		1	Y
9.	USB Flash Card (1GB)	R2422220		1	Y
10.	USB Flash Card (512MB)	H45531XG 2411544		1	Y
11.	NetGear PCIMCIA Network Card	2417006		1	Y
12.	VGA adaptor	2420728		1	Y
13.	DVD-RW Samsung T084M/RSBN	S2423870	Replaces 2421141-2 and 2417993-2. Supplied without power supply. Either use the one already installed on the system, or order the one listed below, as applicable. <b>Note:</b> Only CD-R or DVD-R media should be used	1	Y
14.	Cable Kit for Samsung DVD T084M/RSBN	S2423956	To be used with S2423870	1	Y
15.	MO Drive 9.1GB 5.25" Ext	H45021GB 066E0677		1	Y
16.	USB-to-SCSI converter	2422175	Replaces 2411889	1	Y

## Section 9-9 SafeLock Cart Parts

Table 9-8 SafeLock Cart Parts 1 of 2

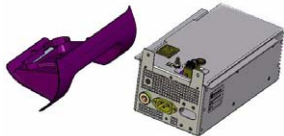


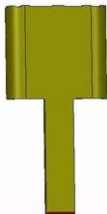
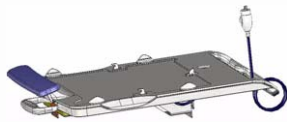

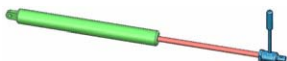

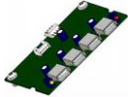




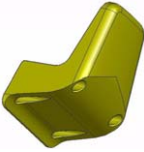







ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	AC Distribution Assy 220V-240V	S2423305		1	Y
2.	Handrest	S2423250		1	Y
3.	Lower Shelf Package assy	S2422977		1	Y
4.	Main Column	S2422975		1	Y
5.	Top Shelf Kit	S2422974		1	Y
6.	Probe Shelf Assy Kit	S2422972		1	Y
7.	Gas Spring	S2423307		1	Y
8.	Lower Shelf Rear Cover Cart Kit	S2422976		1	Y

Table 9-8 SafeLock Cart Parts (cont'd) 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
9.	USB Hub	S2422978		1	Y
10.	Cart Main Cable Harness Kit	S2422980		1	Y
11.	Safety Lock	S2422981		1	Y
12.	Vivid i Cart Gel Holder Cup	S2422982		1	Y
13.	Probe Cable Hooks	S2422983		1	Y
14.	AC Cable Hook	S2422984		1	Y
15.	Pencil Probe Holder Kit	S2422985		1	Y
16.	Pheripherals Power Out Cable	S2422986		1	Y
17.	Vi-Cart Screw Kit	S2423344		1	Y
18.	USB & Network Cables Kit	S2423489		1	Y
19.	5V Med. Grade AC Adapter PSE Kit	S2423131		1	Y

## Section 9-10 Optional Modo Cart

**Table 9-9 Modo Cart - Replacement parts**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Modo Cart (without peripherals)	FL100100	BT'06 and BT'09 Modo Cart incl. isolation transformer, probe and gel holder, peripherals shelves, hand-rest and handles. 	-	Y
2.	Cable Clip M-Cart	KTZ220885	BT'06 and BT'09 Cable Clip M-Cart 	2	Y
3.	Isolation Transformer M-Cart	KTZ220714	BT'06 and BT'09 Isolation Transformer (Power Supply) IMED300WR M-Cart 	1	Y
4.	Probe Holder Kit M-Cart	5183958	BT'06 and BT'09 Probe Holder Kit M-Cart 	1	Y
5.	Front and Rear Wheels M-Cart	KTZ220887	BT'06 and BT'09 Front and Rear Wheels M-Cart 	2	Y
6.	Fuses M-Cart	KTZ196333	BT'06 and BT'09 Fuses (10 pc. 4A/10 pc. 2A) for IMED300WR 	-	Y
7.	Screw Kit	KTZ280045	Various screws	1	Y

## Section 9-11 Spare Part Kits

Table 9-10 Spare part kits 1 of 4



ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Spare Part Kit 1 Spare part Kit 1 Vivid i n BT09	FL200114	BT'09 This kit includes: • Vi_q SATA BEP SERVICE KIT  • TR32 Board	1	Y
1.	Spare Part Kit 1 for Vivid i n BT06	FL200087	BT'06	1	Y
2.	Spare Part Kit 2	FL200115	BT'09 This kit includes: • Vi_q SATA BEP SERVICE KIT  • RFI Board	1	Y
3.	Spare Part Kit 2	FL200088	BT'06	1	Y
4.	RFI BOARD V2-NATURAL	N2418295-2		1	Y
5.	PROBE AND MUX ASSY.-NATURAL	N5393629		1	Y
6.	TR32-V12 Board RSPL Kit - Norway	N5444671		1	Y
7.	FRONTEND ASSY.-Vivid-i,q NATURAL	N2375187-2	INCLUDES: • RFI BOARD V2-NATURAL, • PROBE AND MUX ASSY.-NATURAL, • TR32 BOARD V12-NATURAL-ROHS	1	Y



Table 9-10 Spare part kits (cont'd) 2 of 4



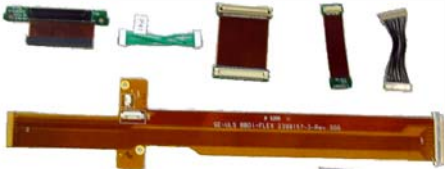

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	SPEAKERS MODULE-VIVID-I	R2378953	For Vivid q N	1	Y
9.	FANS ASSY-VIVID-I	R2376696		1	Y
10.	ECG BOARD V3-Vivid-i,q N-Natural	N2419020		1	Y
11.	Spare Part Kit 3	OBSOLETE	<p>This kit includes:</p> <ul style="list-style-type: none"> <li>• Keyboard assy - FL200059</li> </ul>  <ul style="list-style-type: none"> <li>• Fans and Speakers Kit - FL200040</li> </ul>  <ul style="list-style-type: none"> <li>• Cable and Flex kit - FL200037</li> </ul>  <ul style="list-style-type: none"> <li>• ECG Module Assy, w/Cables - FL200036</li> </ul> 	1	N
12.	Spare Part Kit 3	FL200089	BT'06		

Table 9-10 Spare part kits (cont'd) 3 of 4

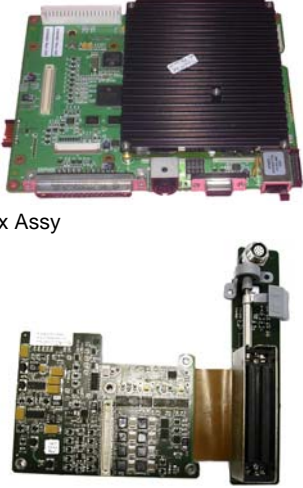
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
13.	Spare Part Kit 4 Vivid i n	FL200116	<p>BT'09 This kit includes:</p> <ul style="list-style-type: none"> <li>• Vi_q SATA BEP SERVICE KIT</li> </ul>  <ul style="list-style-type: none"> <li>• Probe &amp; Mux Assy</li> </ul>	1	Y
14.	Spare Part Kit 4	FL200091	BT'06	1	Y
15.	Spare Part Kit 5	FL200095-6	<p>BT'09 This kit includes:</p> <ul style="list-style-type: none"> <li>• Doc CD - FL200117</li> <li>• SW DVD - FL200112</li> </ul>	1	Y
16.	Spare Part Kit 5	FL200095-5	<p>BT'06 This kit includes:</p> <ul style="list-style-type: none"> <li>• Doc CD - FL200028</li> <li>• SW CD - FL200103</li> <li>SW ver. 1.36.19, Appl. SW 6.1.0. build 122</li> <li>• FL200107</li> <li>Application SW Patch for Vivid q N</li> </ul>	1	Y
17.	VI COVER KIT-BT09	S2423361	<p>This kit includes:</p> <ul style="list-style-type: none"> <li>• BOTTOM BASIC ASSY.- VIVID-I</li> <li>• CARTON PIZA 40X32X5 CM</li> <li>• DISPLAY RIGHT LATCH ASSY</li> <li>• DISPLAY LEFT LATCH ASSY</li> <li>• REAR DISPLAY COVER-VIVID-I</li> <li>• DISPLAY FRONT FRAME ASSY VIVID I</li> <li>• EXTERNAL GE LOGO LABEL (IN GRAY)</li> <li>• DISPLAY SCREW CAP</li> <li>• MAGNET, PERMANENT, 4X20MM</li> <li>• HARD DISK PANEL- VIVID-I</li> <li>• DISPLAY FLEX COVER-VIVID-I</li> <li>GOOD TO STOCK LABEL (RSPL)BT'09</li> </ul>	1	Y

Table 9-10 Spare part kits (cont'd) 4 of 4

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
18.	COVER KIT BT06	2412825-3	This kit includes: • BOTTOM BASIC ASSY.- VIVID-I • DISPLAY RIGHT LATCH ASSY - VIVID I • DISPLAY LEFT LATCH ASSY - VIVID I • REAR DISPLAY COVER-VIVID-I • DISPLAY FRONT FRAME ASSY • DISPLAY SCREW CAP- VIVID-I • MAGNET, PERMANENT, 4X20MM • DISPLAY FLEX COVER-VIVID-I • INTERNAL BATTERY DUMMY CASE ASSY HARD DISK PANEL- VIVID-IBT'06	1	Y

## Section 9-12 Product Manuals

### 9-12-1 Product Manuals - BT'12

**Table 9-11 Product Manuals - BT'12**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Vivid q N Service Manual - BT12	FQ091019	This Manual	1	N
2.	Vivid i n - Vivid q N Unpacking - Packing Procedure	FL094023		1	N
3.	BT'12 Vivid q N User manual - English	FQ092023		1	N
4.	BT'12 Vivid q N User manual - French	FQ092024		1	N
5.	BT'12 Vivid q N User manual - Indonesian	FQ092025			
6.	BT'12 Vivid q N User manual - Russian	FQ092026			
7.	BT'12 Vivid q N User manual - Turkish	FQ092006		1	N
8.	BT'12 Vivid q N Reference manual - English	FQ092007		1	N
9.	Vivid i n SafeLock Cart User manual - EN FR TR	FL092077	English, French and Turkish	1	N
10.	Vivid i n Cart User manual - EN FR	FL092096		1	N

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# Chapter 10

## Care and Maintenance

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### Section 10-1 Overview

#### 10-1-1 Periodic Maintenance Inspections

Having been determined by GE engineers that your Vivid q N system has no high-wearing components likely to fail due to frequent use, no Periodic Maintenance Inspections are mandatory. However, some Customer Quality Assurance Programs may require additional tasks and/or inspections to be performed at periods of frequency different from those listed in this manual.

#### 10-1-2 Purpose of Chapter 10

This chapter describes the Care and Maintenance (PM) procedures for the Vivid q N ultrasound scanner and its peripherals. These procedures are designed to protect your investment in the system, and are intended to **maintain the quality** of system performance.





After delivery and installation of the Vivid q N ultrasound unit, your service representative will contact you to schedule the first of several routine service visits. In addition to routine maintenance by trained Field Service Engineers (FSEs), it is recommended that the procedures described in this chapter be observed as part of your own internal routine maintenance program.

**Table 10-1 Contents in Chapter 10**

Section	Description	Page Number
10-1	Overview	10-1
10-2	Why Perform Maintenance Procedures?	10-3
10-3	Maintenance Task Schedule	10-4
10-4	System Maintenance	10-7
10-5	Probe Maintenance	10-15
10-6	Electrical Safety Tests	10-19
10-7	Excessive Current Leakage	10-32

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## 10-1-3 Warnings

-  **DANGER** THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE ULTRASOUND SYSTEM POWER PLUG AND OPEN THE MAIN CIRCUIT BREAKER BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.
-  **CAUTION** PRACTICE GOOD ESD PREVENTION. WEAR AN ANTI-STATIC STRAP WHEN HANDLING ELECTRONIC PARTS AND EVEN WHEN DISCONNECTING/CONNECTING CABLES.
-  **CAUTION** Do not pull out or insert circuit boards while power is ON.
-  **CAUTION** Do not operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.

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## Section 10-2

### Why Perform Maintenance Procedures?

#### 10-2-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of quality checks and corrective maintenance. The records provide the customer with documented confirmation that the Vivid q N portable ultrasound scanner is maintained on a periodic basis.

Copies of the records should be kept in the same room as the Vivid q N ultrasound scanner, or nearby.

#### 10-2-2 Quality Assurance

In order to gain accreditation from organizations such as the *American College of Radiology (USA)*, it is the customer's responsibility to have a Quality Assurance program in place for each scanner. The program must be directed by a medical physicist, the supervising radiologist/physician or appropriate designee.

Routine Quality Control testing of the system must be conducted regularly. The same tests are performed regularly during each period, so that changes can be monitored over time and effective corrective action taken, if required.

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

Your GE Service Representative can help you with establishing, performing and maintaining records for a Quality Assurance program. Please contact us for details of your nearest GE Service Representative, who will provide a quotation for this service, as required.

## Section 10-3 Maintenance Task Schedule

### 10-3-1 How Often Should Care & Maintenance Procedures be Performed?

The [Customer Care & Maintenance Task Schedule](#) (provided in [Table 10-2](#) on page 10-5) specifies how often the Vivid q N ultrasound scanner should be serviced, and outlines items requiring special attention.

**NOTE:** *It is the customer's responsibility to ensure the Care and Maintenance procedures are performed on the Vivid q N ultrasound scanner as scheduled in order to retain the high levels of safety, dependability, and system performance.*

Your GE Service Representative has an in-depth knowledge of your Vivid q N ultrasound scanning system and can best provide competent, efficient service. Please contact us for details of your nearest GE Service Representative, and/or a quotation for services by our qualified professional FSEs.

The service procedures and recommended intervals shown in the [Customer Care & Maintenance Task Schedule](#) assumes that you use your Vivid q N scanner for an average patient load (10-12 patients per day) and that you do not use it as a primary mobile unit which is transported between diagnostic facilities.

**NOTE:** *If conditions exist which exceed typical usage and patient load, it is strongly recommended to increase the maintenance frequencies.*




**Table 10-2 Customer Care & Maintenance Task Schedule**

Service at Indicated Time	Daily	Weekly	Monthly	Annually	Notes
Clean Probes	●*				* or before each use
Clean Probe Holders	●				
Inspect AC Mains Cable		*	●		*Mobile Unit Check Weekly
Inspect Cables and Connectors			●		
Clean Console			●		
Clean Monitor			●		
Console Current Leakage Checks				●	Also after corrective maintenance, or as required by your facility's QA program.
Peripheral Current Leakage Checks				●	Also after corrective maintenance, or as required by your facility's QA program.
Surface Probe Current Leakage Checks				●	Also after corrective maintenance, or as required by your facility's QA program.
Endocavity Probe Current Leakage Checks					As prescribed in the Probe Manual.
Transesophageal (TEE) Probe Current Leakage Checks					As prescribed in Probe Manual.
Surgical Probe Current Leakage Checks					As prescribed in Probe Manual.
Measurement Accuracy Checks				●	Also after corrective maintenance, or as required by your facility's QA program.
Probe Checks				●	Also after corrective maintenance, or as required by your facility's QA program.
Functional Checks				●	Also after corrective maintenance, or as required by your facility's QA program.

Examine the following on a monthly basis:

- Connectors on cables - for any mechanical defects.
- The entire length of electrical and power cables - for cuts or abrasions.
- Equipment - for loose or missing hardware.
- The keyboard - for defects.
- Brakes - for defective operation.

 **DANGER TO AVOID ELECTRICAL SHOCK HAZARD, DO NOT REMOVE THE PANELS OR COVERS FROM THE MACHINE. THIS SERVICING MUST BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY. FAILURE TO COMPLY, COULD RESULT IN SERIOUS INJURY!**

 **DANGER IF ANY DEFECTS ARE OBSERVED OR ANY SYSTEM MALFUNCTIONS OCCUR, DO NOT OPERATE THE EQUIPMENT. INFORM A QUALIFIED SERVICE ENGINEER IMMEDIATELY.**

## Section 10-4 System Maintenance

### 10-4-1 Preliminary Checks

The preliminary checks take approximately 15 minutes to perform. Refer to the *Vivid q N User Manual* whenever necessary.

**Table 10-3 System Preliminary Checks**

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Note all probes and system options.
3	Power-up	Turn the system power ON and verify that all fans and peripherals turn on. Watch the displays during power up to verify that no warning or error messages are displayed.
4	Probes	Verify that the system properly recognizes all probes.
5	Displays	Verify proper display on the monitor and touch panel.
6	Presets	Back-up all customer presets on a CD-RW.

## 10-4-2 Functional Checks

The functional checks take approximately 60 minutes to perform. Refer to the *Vivid q N User Manual* whenever necessary.

**NOTE:** Refer also to [Chapter 4 - General Procedures and Functional Checks](#), for additional details about the functional checks described in this section.

### 10-4-2-1 System Checks

**Table 10-4 System Functional Checks**

Step	Item	Description
1	B-Mode	Verify basic B-Mode (2D) operation. Check the basic system controls that affect this mode of operation.
2	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic system controls that affect this mode of operation.
3	Doppler Modes	Verify basic Doppler operation (PW and CW if available). Check the basic system controls that affect this mode of operation.
4	M-Mode	Verify basic M-Mode operation. Check the basic system controls that affect this mode of operation.
5	Applicable Software Options <sup>a</sup>	Verify the basic operation of all optional modes such as Multi-Image, 3D, Contrast, Harmonics, Cine, Stress Echo,... etc. Check the basic system controls that affect each the operation of each option.
9	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
10	System Diagnostics	Perform the Automatic Test to verify that all boards are functioning according to specifications.
11	Xmit/Recv Elements	Use the Visual Channel Utility on the 10L probe to verify that all system xmit/recv channels are functional.
12	Keyboard Test	Perform the Keyboard Test Procedure to verify that all keyboard controls are OK.
13	LCD Display	Verify basic LCD display functions. Refer to Chapter 3 of the Vivid q N User Manual.
14	Measurements	Refer to the "Measurement and Analysis" chapter in the Vivid q N User Manual, for measurement accuracy specifications.

a. Some software may be considered as standard, depending upon system model configuration

### 10-4-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to the *Vivid q N User Manual* for a list of approved peripherals/options.

**Table 10-5 GE Approved Peripheral/Hardware Option Functional Checks**

Step	Item	Description
1	VCR	Verify record/playback capabilities of the VCR. Clean heads and covers if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5	InSite/iLinq	Verify that InSite is functioning properly. Ensure two-way remote communications. (Warranty & Contract Customers only)
7	ECG	Verify basic operation with customer.
8	DVD-CDRW	Verify that the DVD-CDRW is functioning properly.
9	MOD	Verify that the MOD is functioning properly.

### 10-4-3 Input Power Checks

#### 10-4-3-1 Mains Cable Inspection

**Table 10-6 Mains Cable Inspection**

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall and system.
2	Mains Cable	Inspect the mains cable and its connectors for any damage.
3	Terminals	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4	Inlet Connector	Verify that the Inlet connector retainer is functional.

## 10-4-4 Cleaning

### 10-4-4-1 General Cleaning

Frequent and diligent cleaning of the Vivid q N ultrasound unit reduces the risk of spreading infection from person to person, and also helps to maintain a clean working environment.



**CAUTION** When performing Cleaning Procedures, to prevent the risk of system damage, always observe the following precautions:


- Use *only* cleaning materials and solutions (such as Isopropyl Alcohol [IPA]) as recommended in the procedures described in [Table 10-7](#) on page 10-11.
- Do not use any solutions or products not listed in the Vivid q N User Manual.
- Do not spray any liquid directly onto the Vivid q N covers, LCD Display or keyboard!
- Do not allow any liquid to drip or seep into the system.
- Prior to cleaning, turn OFF power to the system.



**Table 10-7 Vivid q N System - General Cleaning**

Step	Item	Description
1	LCD Display Cover	<p>On a weekly basis, moisten a soft, non-abrasive folded cloth or sponge with a mild, general purpose, non-abrasive soap and water solution. <b>(Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline).</b> Squeeze excess liquid from the cloth/sponge, then wipe down the top, front, back and both sides of the unit. <b>Do not spray any liquid directly onto the unit!</b></p> <p>Rinse the cloth/sponge with clean running water and wipe the unit surfaces again.</p> <p>Use a dry, soft, lint-free cloth to dry the unit surfaces.</p> <p>Wait for the unit surfaces to dry completely.</p> <p>Note: In the event that disinfection is required or any stubborn stains remain, remove them with a soft, dust-free cloth on which a small quantity of isopropyl rubbing alcohol has been absorbed, as described below for cleaning the Keyboard.</p>
2	LCD Display	<p>On a weekly basis, gently wipe the LCD Display with a dry, soft, lint-free non-abrasive folded cloth.</p> <p>Note: In the event that you see a scratch-like mark on the LCD Display, this may be a stain transferred from the Keyboard or Trackball when the LCD Display Cover was pressed from the outside. Proceed as follows:</p> <p>Wipe or dust the stain gently with a soft, lint-free cloth moistened with water or a 70-30 mixture of isopropyl alcohol and water that does not contain impurities. Wring out as much of the liquid as possible then wipe the LCD Display again. <b>Do not let any liquid drip into the computer!</b></p> <p>Be sure to dry the LCD Display before closing the cover.</p>
3	Control Panel and Keyboard	<p><b>Control Panel:</b></p> <p>On a weekly basis, moisten a soft, non-abrasive folded cloth or sponge with a 70-30 mixture of isopropyl alcohol and water that does not contain impurities. <b>(Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline).</b> Squeeze excess liquid from the cloth/sponge, then wipe down the Control Panel.</p> <p><b>Do not spray any liquid directly onto the Control Panel!</b></p> <p>Use a dry, soft, lint-free cloth to dry the Control Panel.</p> <p>Wait for the Control Panel surface to dry completely.</p> <p><b>Keyboard:</b></p> <p>Clean the keyboard as described (above) for cleaning the Control Panel.</p> <p>Wipe the surface of the keycaps with the cloth, making sure that no liquid drips on or between the keys. Allow to dry.</p>
4	Probe Holders	Clean the probe holders with warm water and a damp cloth to remove all traces of gel (soaking may be required to remove excess gel).
5	MOD	Clean the drive head and media with the vendor-supplied cleaning kit. Advise the user to repeat this often, to prevent future problems. MOD disks must be stored away from dust and cigarette smoke. Do not use alcohol or benzene to clean the MOD cartridge.
6	DVD - CDRW Drive	Clean the drive head and media with the vendor-supplied cleaning kit. Advise the user to repeat this often, to prevent future problems. CDs must be stored away from dust and cigarette smoke. Do not use alcohol or benzene to clean the CD drive.
7	Peripherals	Clean the peripherals in accordance with the respective manufacturer's directions.

10-4-4-2 Disinfection

 **NOTICE IMPORTANT** - To avoid contamination when the system is in use during operations, always cover the keyboard and the monitor with the OR covers provided for this purpose.

The disinfection procedures described in this section should be routinely performed by medical personnel, as shown in [Table 10-8](#). The information is provided in this manual for reference purposes.

**Table 10-8**                      **Routine Disinfection Procedures**

What?	When?	How?	Materials?	Who?
Keyboard and Trackball	Weekly. In event of contamination, clean immediately with a 70:30 mixture of isopropyl alcohol and water.	Switch the system off! Disinfectant with a 70:30 mixture of isopropyl alcohol and water. Never allow liquid to flow into the keyboard!	Use a 70:30 mixture of isopropyl alcohol and water.	Staff users/doctors
Monitor display-surface	Weekly. In event of contamination, clean immediately with a 70:30 mixture of isopropyl alcohol and water.	Clean with dry soft, lint-free cloth. When contaminated with blood or other stains secretions, use a 70:30 mixture of isopropyl alcohol and water.	Soft, lint-free cloth. Disinfect with a 70:30 mixture of isopropyl alcohol and water.	Staff users/doctors
Devices' external surfaces (incl. monitor housing, handle and SafeLock Cart wheels)	Weekly. In event of contamination, clean immediately with a 70:30 mixture of isopropyl alcohol and water.	Clean the washable outer surfaces with a soft, non-abrasive cloth including the SafeLock Cart wheels. Do not use abrasive powder or strong chemicals!	Use a soft, non-abrasive folded cloth or sponge with a mild, general purpose, non-abrasive soap and water solution.	Trained cleaning staff



## 10-4-5 Physical Inspection

**Table 10-9 Physical Checks**

Step	Item	Description
1	Labeling	Verify that all system labeling is present and in readable condition.
2	Scratches and Dents	Inspect the system for dents, scratches or cracks.
3	LCD Display Cover	Clean the LCD Display Cover as described in <a href="#">Table 10-7</a> on page 10-11 Verify ease of <i>up/down</i> movement and make sure that the LCD Display cover holds its set position when open and that there is no play on the mechanism. Check that the cover latches <i>open</i> and <i>lock</i> correctly.
4	LCD Display	Clean the LCD Display as described in <a href="#">Table 10-7</a> on page 10-11 Inspect the LCD Display for scratches and raster burns. Verify proper operation of Contrast and Brightness controls. For details, see "LCD Display Adjustment and Calibration" on page 3-76.
5	Control Panel and Keyboard	Clean the Control Panel and Keyboard as described in <a href="#">Table 10-7</a> on page 10-11 Inspect the Control Panel and Keyboard. Note any damaged or missing items. (Replace faulty components, as required). Verify proper operation of Control Panel backlighting and TGC sliders.
6	Probe Holders	Clean the probe holders as described in <a href="#">Table 10-7</a> on page 10-11. Inspect the Probe Holders for cracks or damage.
7	SafeLock Cart	Check all four SafeLock Cart wheels and castors for wear. Check the brakes on each of the two front wheels. Make sure that pressing the brake locks the wheel, preventing it from swivelling or rolling and therefore stopping movement of the SafeLock Cart. Verify that releasing the brakes allows free movement of the SafeLock Cart. Check the SafeLock Cart <i>raise/lower</i> motion and verify proper operation of the release mechanism.
8	MOD (if option installed)	Clean the drive head and media with the vendor-supplied cleaning kit. Advise the user to repeat this often, to prevent future problems. MOD disks must be stored away from dust and cigarette smoke. Do not use alcohol or benzene to clean the MOD cartridge.
9	DVD- CDRW Drive	Clean the drive head and media with the vendor-supplied cleaning kit. Advise the user to repeat this often, to prevent future problems. CDs must be stored away from dust and cigarette smoke. Do not use alcohol or benzene to clean the CD drive.
10	Cables and Connectors	Check all internal cable harnesses and connectors for wear, and secure connector seating. Pay special attention to probe strain or bend reliefs.
11	Power Cord	Check the power cord for cuts, loose hardware, tire marks, exposed insulation or other deterioration, and 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 clamp, as required.

**Table 10-9 Physical Checks (cont'd)**


Step	Item	Description
12	Shielding and Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems during scanning.
13	Peripherals	Check and clean the peripherals according to the manufacturer's directions. To prevent EMI or system overheating, dress the peripheral cables inside the peripheral cover.
14	External I/O	Check all connectors for damage and verify that the labeling is good.
15	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
16	Battery	Check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Perform the Battery Parameters Test as described in "Battery Parameters Test" on page 7-102. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal, as listed in "Vivid q N Battery Safety" on page 1-15.

#### 10-4-6 Optional Diagnostic Checks

To complete the periodic maintenance checks, perform the diagnostic tests as described in - *Diagnostics/Troubleshooting*.

- Review the system error log for any problems.
- Check the temperature log to see if there are any trends that could cause problems in the future.
- Check voltages, fans and battery.

## Section 10-5 Probe Maintenance

 **WARNING** Any evidence of wear on a probe indicates that it must not be used. Improper handling may easily damage ultrasound probes. See the Vivid q N User Manual and also refer to the probe manufacturer's handling instructions, for more details.

***Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.***

### 10-5-1 Probe Checks

Table 10-10 Probe Checks

Step	Item	Description
1	Probe Holder	Check there are no traces of gel on the probe holders. If any gel present, clean the probe holders with warm water and a damp cloth to remove all traces of gel (soaking may be required to remove excess gel).
2	Probes	Check all the probes for wear and tear on the lens, cable and connector. Look for bent pins on the connector and in the connector socket on the unit. Remove any dust from inside the connector sockets. Verify that the EMI fingers around the probe connector socket housing are intact. Check the probe locking mechanism and probe switch. Perform a visual check of transducer pins and connector sockets before connecting a probe. Verify that the system properly recognizes all probes.

### 10-5-2 Probe Handling

All Vivid q N probes are designed and manufactured to provide trouble-free, reliable service. To ensure this, the correct handling of probes is important and the following points should be noted:


- Do not drop a probe or strike it against a hard surface, as this may damage the probe elements and the acoustic lens, or may crack the housing.
- Do not use a cracked or damaged probe. Any evidence of wear indicates the probe must *not* be used. Call your field service representative immediately for a replacement.
- Perform a visual check of the probe pins and system sockets before plugging in a probe
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled with, or to be caught in the SafeLock Cart wheels.
- Protect the probe when moving the unit.
- Use a soft cloth and warm, soapy water to clean the probe.

**NOTE:** For detailed information on handling endocavity probes, refer to the appropriate supplementary instructions for each probe.

### 10-5-3 Basic Probe Care

The *Vivid q N User Manual* and the individual probe manufacturers' handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

**NOTE:** *The most recent, up-to-date information on probes and probe care is available at:  
[http://www.gehealthcare.com/usen/ultrasound/products/probe\\_care.html](http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html)*

 **WARNING** Any evidence of wear on a probe indicates that it must not be used. Ultrasound probes can be easily damaged by improper handling. See the *Vivid q N User Manual* and also refer to the probe manufacturer's care cards, for more details.

**NOTE:** *Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.*

Always perform a visual check of the probe pins and system sockets before plugging in a probe.

When handling probes, always observe the precautions listed in "Probe Handling" on page 10-15.


The TEE and Interoperative probes often have special usage considerations; always refer to the individual probe manufacturers' handling instructions/user manual.

### 10-5-4 Probe Cleaning


#### 10-5-4-1 Basic Probe Cleaning

**NOTE:** *For details on general probe cleaning, refer to the information provided in the *Vivid q N User Manual*.*


**NOTE:** *For specific probe cleaning instructions, refer to the individual probe Users Manual (or care card supplied with the probe).*


 **CAUTION** Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty. **DO NOT** soak the probe or wipe the probe lens with any product not listed in the *Vivid q N User Manual*. Doing so could result in irreparable damage to the probe and/or Vivid q N system. Follow the care instructions supplied with the probe.

 **CAUTION** To help protect yourself from blood-borne diseases when cleaning and handling probes, wear approved, non-allergic disposable gloves.

 **WARNING** *Always disinfect a defective probe before returning it to the manufacturer. Be sure to tag the probe as being disinfected.*

## 10-5-4-2 General Probe Cleaning Instructions

 **WARNING** *Neurological procedures must NOT be performed on a patient with Creutzfeldt-Jacob disease because probes that have been used for such examinations cannot be adequately sterilized.*

 **WARNING** *Neurological and intraoperative procedures must be performed with the use of legally marketed, sterile, pyrogen-free probe sheaths. Probes used during neurological surgery must NOT be sterilized with liquid chemical sterilants because of the possibility of neurotoxic residue remaining on the probe.*

### 10-5-4-2-1 Cleaning and Sterilizing Probes Used Externally

**Table 10-11 Cleaning & Sterilizing Procedure for Probes Used Externally**


Step	Description
1	To protect yourself from blood-borne diseases, wear approved, non-allergic disposable gloves.
2	Do not immerse the connector or its strain relief in solution. Use ultrasound probe cleaning towels. Wash the probe and probe cable in warm soap and water solution (below 80°F). Use only mild non-abrasive soap.
3	Follow the manufacturer's cold sterilization instructions to disinfect the probe, including concentration and soaking time; 10 minutes is a typical disinfecting period.
4	Follow step 3 for a much longer duration to sterilize the probe; 10 hours is a typical cold chemical sterilization duration.
5	When complete, thoroughly rinse the washed lens in clear water. Apply sterile distilled water for at least 60 seconds. Air dry.
6	Check the lens for cracking and the cable insulation for separation.
7	Store the probe in its carrying case.

### 10-5-4-2-2 Cleaning and Sterilizing Probes Used Internally

**Table 10-12 Cleaning & Sterilizing Procedure for Probes (TEE) Used Internally**

Step	Description
1	To protect yourself from blood-borne diseases, wear approved, non-allergic disposable gloves.
2	Do not immerse the connector or its strain relief in solution. Use ultrasound probe cleaning towels. Wash the probe and probe cable in warm soap and water solution (below 80°F). Use only mild non-abrasive soap.
3	Follow the manufacturer's cold sterilization instructions to disinfect the probe, including concentration and soaking time; 10 minutes is a typical disinfecting period.
4	Follow step 3 for a much longer duration to sterilize the probe; 10 hours is a typical cold chemical sterilization duration.
5	When complete, thoroughly rinse the washed lens in clear water. Apply sterile distilled water for at least 60 seconds. Air dry.
6	Check the lens for cracking and the cable insulation for separation.
7	Store the probe in its carrying case.

## 10-5-5 Returning and Shipping of Defective Probes

 **WARNING** *Always disinfect a defective probe before returning it to the manufacturer. Be sure to tag the probe as being disinfected.*

 **CAUTION** **To help protect yourself from blood-borne diseases when cleaning and handling probes, wear approved, non-allergic disposable gloves.**

Equipment being returned must be properly clean and free of blood and other potentially infectious contaminants.

GE policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstances should a part or equipment be shipped before being visibly clean and properly disinfected.

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

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

## Section 10-6 Electrical Safety Tests

### 10-6-1 Safety Test Overview

The electrical safety tests in this section are based on and conform to NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. They are intended for the electrical safety evaluation of cord-connected, electrically operated, patient care equipment. If additional information is needed, refer to the NFPA 99 (for USA) and IEC 60601-1 documents.



**WARNING** ***THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 12 MONTHS ACCORDING TO THE REQUIREMENTS OF THE PATIENT SAFETY STANDARD IEC-EN 60601-1. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE ABOVE-MENTIONED SAFETY INSPECTIONS.***



**CAUTION** Compare all safety-test results with safety-test results of previously performed safety tests e.g. last year etc. in event of unexplainable abrupt changes of safety-test results, consult experienced authorized service personnel or ge for further analysis.



**CAUTION** To avoid the risk of electrical shock, the unit under test must not be connected to other electrical equipment. Remove all interconnecting cables and wires. The operator and patient must not come into contact with the unit while the tests are being performed.



**CAUTION** Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.

Test the system, peripherals and probes for current leakage.



**WARNING** ***EXCESSIVE CURRENT LEAKAGE CAN CAUSE FATAL INJURY. EXCESSIVE CURRENT LEAKAGE CAN INDICATE DEGRADATION OF INSULATION OR OTHER PART AND COULD POTENTIALLY CAUSE ELECTRICAL FAILURE. DO NOT USE PROBES OR EQUIPMENT THAT HAVE EXCESSIVE CURRENT LEAKAGE.***



**NOTICE** When the SafeLock Cartis connected to the wall outlet and the main circuit breaker is in the ON position, the AC Box Fan is operated - *even if the system power is turned OFF.*

To minimize the risk of a probe causing electrical shock, the customer should observe the following recommendations:

- Do not use a probe that is cracked or damaged in any way

- Check probe current leakage, as shown below:

Probe	Frequency for Checking
Surface	Once per year (or in accordance with QA program)
Endocavitary	Twice per year (or in accordance with QA program)
Any probe	Whenever damage is suspected

**NOTE:** *Because the Vivid q N scanner is operated from low voltage DC (considered extremely safe extra low voltage) and because the transformer is enclosed in plastic parts only (and therefore does not have any accessible metal parts), **when the scanner is not mounted on the SafeLock Cart**, it is not necessary to perform the following safety tests (i.e., they apply only to the SafeLock Cart itself):*

- Chassis Current Leakage Test
- Grounding Continuity Test



## 10-6-2 GE Current Leakage Limits

The following limits are summarized for NFPA 99 (for USA) and IEC 60601-1 Medical Equipment Safety Standards. These limits are GE standards and in some cases are lower than the above standards listed.

**Table 10-13 Chassis Current Leakage Limits - Accessible Metal Surfaces**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
USA	N/A	0.3 mA	0.3 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA

**Table 10-14 Type BF Applied Part Current Leakage Limits  
- Non-Conductive (Floating) Surface and Cavity Probes**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	Mains Applied <sup>a</sup>
USA	0.05 mA	0.05 mA	0.05 mA	0.05 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

a. Mains Applied is the Sink Leakage Test. In this test, mains (supply) voltage is supplied to the part or equipment to determine the amount of current that will pass (sink) to Ground if a patient comes into contact with the part.

**Table 10-15 Type CF Applied Part Current Leakage Limits - Surgical Probes and ECG Connections**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	Mains Applied <sup>a</sup>
USA	0.01 mA	0.05mA	0.05 mA	N/A	0.025 mA
Other	0.01 mA	0.05 mA	0.05 mA	0.05 mA	0.05 mA

a. Mains Applied is the Sink Leakage Test. In this test, mains (supply) voltage is supplied to the part or equipment to determine the amount of current that will pass (sink) to Ground if a patient comes into contact with the part.

### 10-6-3 Outlet Test Wiring Arrangement - USA & Canada

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

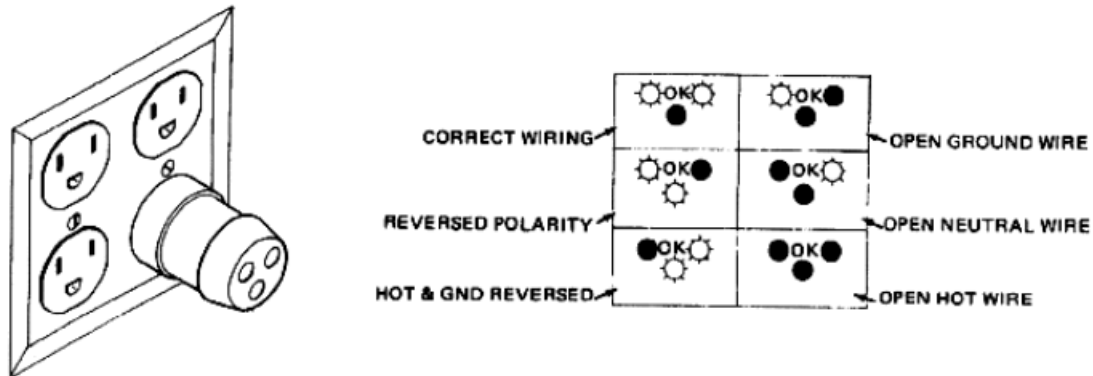


Figure 10-1 Typical Outlet Tester

**NOTE:** No outlet tester can detect the condition in which the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor have been reversed. If later tests indicate high current leakages, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

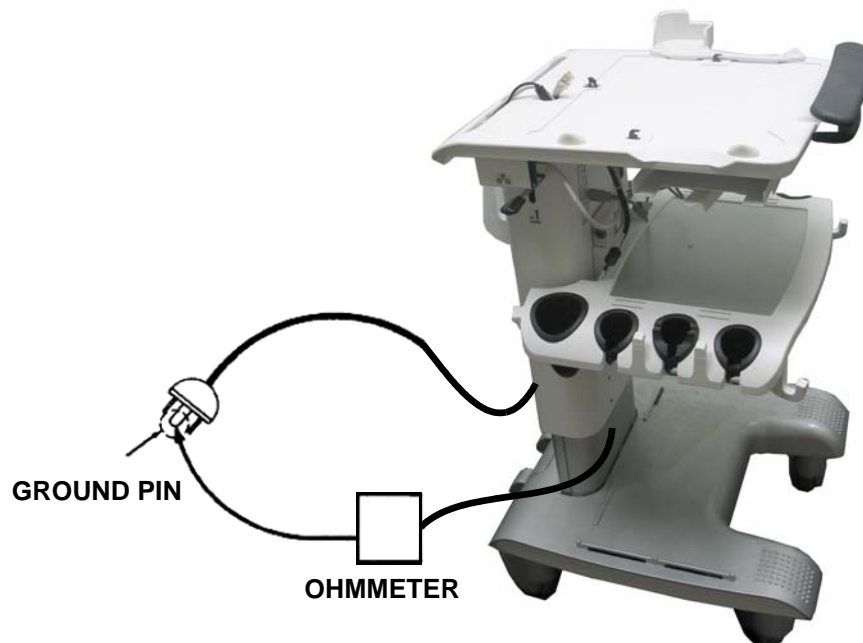
### 10-6-4 SafeLock Cart - Grounding Continuity



**CAUTION Electric Shock Hazard!**  
The patient or operator must not come into contact with the equipment during this test.

**NOTE:** This test is applicable to the SafeLock Cart only. It is not necessary to perform this test on the Vivid q N scanner (for details, refer to the note on [page 10 - 20](#)).

Measure the resistance between the third pin of the attachment plug and any exposed metal parts on the SafeLock Cart. The Ground wire resistance should be less than **0.2 Ohms**. Refer to the procedure in the IEC 601-1.1.



#### ACCESSIBLE METAL PARTS

such as:

- a) Potential Equalization Connector
- b) Rear Panel Connector
- c) Any Caster/Wheel support
- d) Any accessible metal screws on rear side of cart

**Figure 10-2 Ground Continuity Test - SafeLock Cart**

#### 10-6-4-1 Ground Continuity Testing - Generic Procedure

**NOTE:** Follow the steps below to test the Ground wire resistance. If the test passes, there is no safety risk. However, the input power cable should be tested with a substitute Safety Tester.

- 1.) Connect one of the Ohmmeter probes to the tested AC wall outlet cable side (Ground pin).
- 2.) Using the other Ohmmeter probe, touch the exposed metal part of the SafeLock Cart.
- 3) Set the meter **Function** switch to the **Resistance** position.
- 4) Measure and record the Ground wire resistance.  
This should be less than 0.2 Ohms.

**NOTE:** Since very low resistance is measured, the Ohmmeter probe resistance should be subtracted from the reading.

**NOTE:** Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.


## 10-6-5 SafeLock Cart - Chassis Current Leakage Test

### 10-6-5-1 Definition

This test measures the current that would flow in a grounded person who touched accessible metal parts of the bedside station, if the Ground wire should break. The test verifies the isolation of the power line from the chassis.

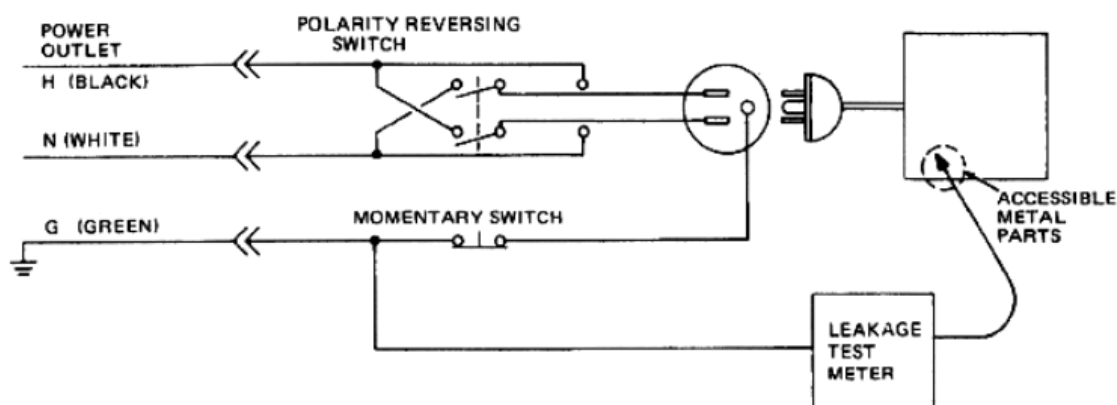
The meter is connected from accessible metal parts of the case to Ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading.

 **DANGER ELECTRIC SHOCK HAZARD.**  
**WHEN THE METER'S GROUND SWITCH IS OPEN, DO NOT TOUCH THE UNIT!**

 **CAUTION** Equipment damage possibility.  
Never switch the polarity and the neutral status when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the Polarity switch and/or the Neutral switch. Otherwise, the unit may be damaged.

### 10-6-5-2 Generic Procedure

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



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

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test be plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to Ground will be indicated in any of the current ranges. The maximum allowable limit for chassis source leakage is shown in [Table 10-13](#) on page 10-21.

**NOTE:** Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

**10-6-5-3 Data Sheet for Chassis Source Current Leakage**

The Chassis Source Current Leakage Test passes when all readings measure less than the values shown in [Table 10-13](#). Record all data.

**Table 10-16 Typical Data Sheet for Chassis Source Current Leakage Test**

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Probe Connector	Test 2 Caster Wheel	Test 3 CRT	Test 4 (Optional)	Test 5 (Optional)
Enter Name of tested peripheral here:							
ON	NORM	OPEN					
ON	NORM	CLOSED					
ON	REV	OPEN					
ON	REV	CLOSED					
OFF	NORM	OPEN					
OFF	NORM	CLOSED					
OFF	REV	OPEN					
OFF	REV	CLOSED					

## 10-6-6 Isolated Patient Lead (Source) Leakage – Lead-to-Ground

### 10-6-6-1 Definition

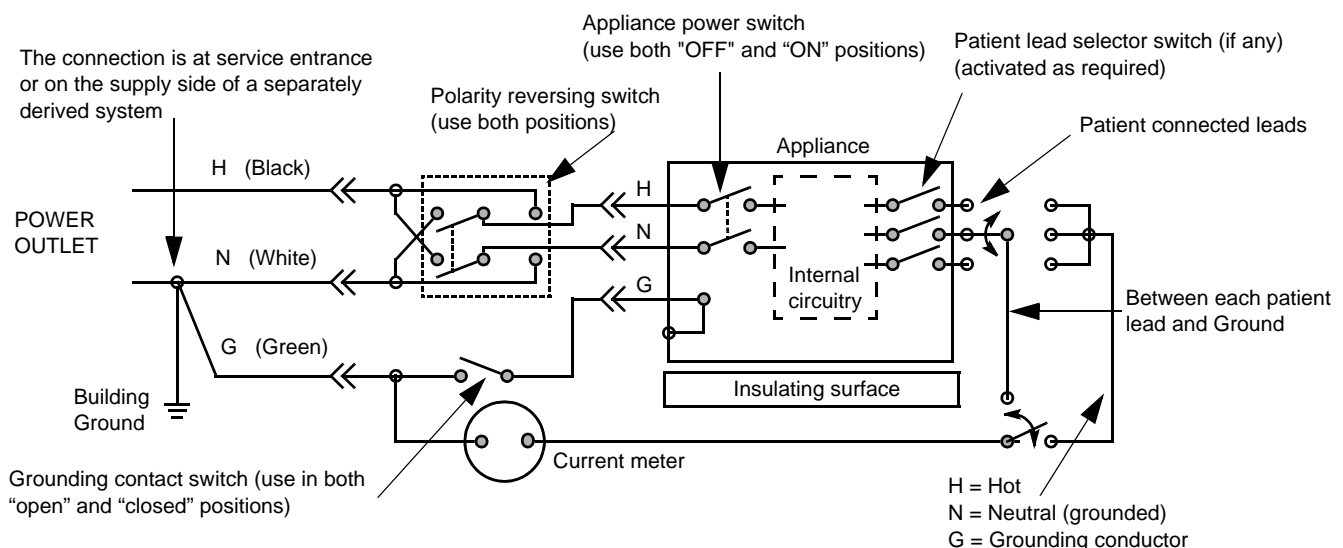
This test measures the current which would flow to Ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made with the Ground *open* and *closed*, with power line polarity *normal* and *reversed*, and with the ultrasound console OFF and ON. For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

**CAUTION** **Equipment damage possibility. To avoid damaging the unit, never switch the polarity and the neutral status when the unit is powered ON. Be sure to turn the unit power OFF before switching them, using the *Polarity* switch and/or the *Neutral* switch.**

### 10-6-6-2 Generic Procedure

Measurements should be made with the Ground **Open** and **Closed**, with power line polarity **Normal** and **Reversed**, and with the Vivid q N unit **ON** and **OFF**. For each combination, the operating controls (such as, the lead switch) should be operated to find the worst case condition.



**Figure 10-4 Test Circuit for Measuring Non-Isolated Patient Leads**

**NOTE:** *Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.*

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### 10-6-7 Isolated Patient Lead (Source) Leakage – Lead-to-Lead

*NOTE: Refer to the procedure in the IEC 60601-1.*

*NOTE: Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ES1 1993 or IEC 60601 or AS/NZS 3551.*

### 10-6-8 Isolated Patient Lead (Sink) Leakage - Isolation Test

*NOTE: Refer to the procedure in the IEC 60601-1.*

*NOTE: Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ES1 1993 or IEC 60601 or AS/NZS 3551.*



**CAUTION** Line voltage is applied to the ECG leads during this test. To avoid the risk of possible electric shock, the system being tested must not be touched by anyone (patient or operator), while the ISO TEST switch is depressed.

*NOTE: It is not necessary to test each lead individually, or power condition combinations, as required in previous tests.*

**10-6-8-1 Data Sheet for ECG Current Leakage**

The test passes when all readings measure less than the values shown in the tables below. Record all data.

**Table 10-17 Maximum Allowance Limit for ECG Lead Leakage Test to Ground**

	AC Power Source	Maximum Allowance Limit	
		GROUND OPEN	GROUND CLOSED
Patient Lead-to-Ground Current Leakage Test	115V	10uA	10uA
and Patient Lead-to-Lead Current Leakage Test	220/240V	500uA	10uA

**Table 10-18 Maximum Allowance Limit for ECG Lead Isolation Sink Test**

	AC Power Source	Maximum Allowance Limit
Patient Lead Isolation Current Test	115V	20uA
	220/240V	5mA

**Table 10-19 Typical Data Sheet for ECG Lead-to-Lead Test**

ECG Power	Tester Polarity Switch	Tester Ground Switch	Tester Lead Selector				
			RL	RA	LA	LL	C
ON	NORM	CLOSED					
ON	REVERSE	CLOSED					
ON	NORM	OPEN					
ON	REVERSE	OPEN					
OFF	NORM	CLOSED					
OFF	REVERSE	CLOSED					
OFF	NORM	OPEN					
OFF	REVERSE	OPEN					



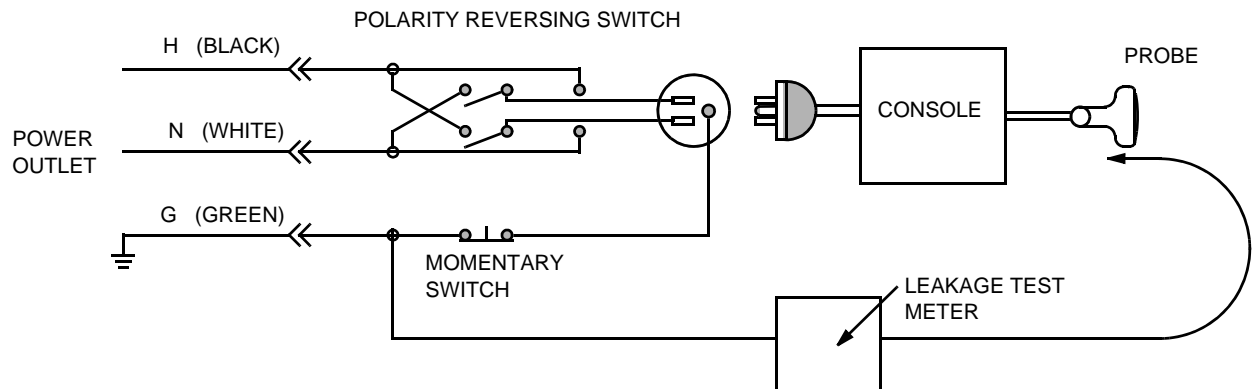
## 10-6-9 Probe Current Leakage Test

### 10-6-9-1 Definition

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

### 10-6-9-2 Generic Procedure

Measurements should be made with the Ground OPEN and CLOSED, with power line polarity *Normal* and *Reversed*, and with the unit OFF and ON. For each combination, the probe must be active to find the worst case condition.



**Figure 10-5 Set Up for Probe Current Leakage Test**

**NOTE:** Each probe will have a certain amount of current leakage, depending on its design. Small variations in probe current leakages are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.

10-6-9-3 No Meter Probe Adapter Procedure

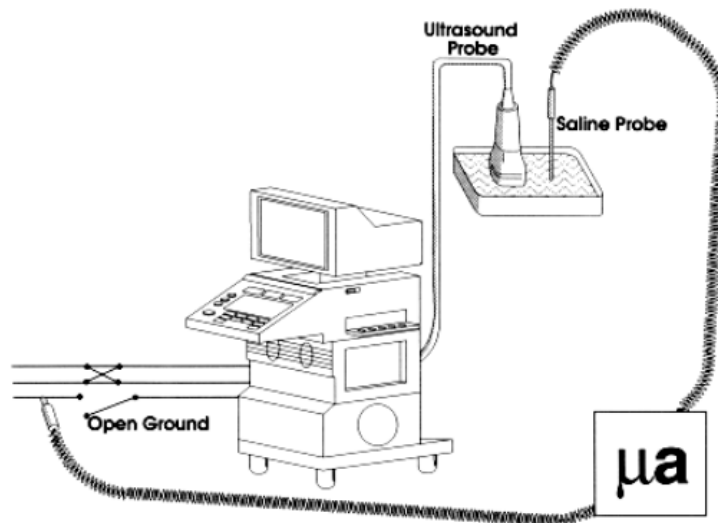


Figure 10-6 Check Without Probe Adapter

Follow these steps to test each transducer for current leakage.

- 1.) Turn the Vivid q N unit OFF.
- 2.) Plug the unit into the test meter, and the meter into the tested AC wall outlet.
- 3.) Plug the external probe into the meter "EXTERNAL" connector.
- 4.) Set the meter's "FUNCTION" switch to EXTERNAL position.
- 5.) Connect the probe for test with the connector of the console.
- 6.) Add the saline probe and the imaging area of the probe into the saline bath.
- 7.) Turn unit power ON for the first part; turn it OFF for the second half.
- 8.) Depress the ISO TEST rocker switch and record the highest current reading.
- 9.) Follow the test conditions described in [Table 10-20](#) for every transducer.
- 10.) Keep a record of the results with other hard copies of Preventive Maintenance data or corrective actions taken.

**10-6-9-4 Data Sheet for Transducer Source Current Leakage**

The test passes when all readings measure less than the values shown in [Table 10-14](#) and [Table 10-15](#). Record all data.



**CAUTION** When power to the unit is ON, never switch the Polarity and the status of Neutral. Be sure to turn OFF power to the unit before switching them, using the POLARITY switch and/or the NEUTRAL switch. Failure to comply with this warning may cause damage to the unit!

**Table 10-20 Typical Data Sheet for Transducer Source Current Leakage Test**

Transducer Tested:			
Unit Power	Tester Power POLARITY Switch	Tester GROUND or NEUTRAL Switch	Measurement
ON	NORM	OPEN	
ON	NORM	CLOSED	
ON	REV	OPEN	
ON	REV	CLOSED	
OFF	NORM	OPEN	
OFF	NORM	CLOSED	
OFF	REV	OPEN	
OFF	REV	CLOSED	

## Section 10-7 Excessive Current Leakage

### 10-7-1 Possible Causes of Excessive Current Leakage

#### 10-7-1-1 Chassis Fails

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

Tighten all Grounds. Ensure star washers are under all Ground studs.

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

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

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

#### 10-7-1-2 Probe Fails

Test the probe in another connector to verify if the fault lies with the probe or the scanner.

*NOTE: Each probe will have some amount of leakage, depending on its design. Small variations in probe current leakages are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable current leakage for body surface contact probes differs from that of inter-cavity probes. Be sure to enter the correct probe type in the appropriate space on the check list.*

If excessive current leakage is slot dependent, inspect the system connector for bent pins, poor connections, and Ground continuity.

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

#### 10-7-1-3 Peripheral Fails

Tighten all Grounds. Ensure star washers are under all Ground studs.

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

#### 10-7-1-4 Still Fails

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

#### 10-7-1-5 New Unit

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

#### 10-7-1-6 ECG Fails

Inspect cables for damage or poor connections.



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