

GE Healthcare

Vivid *i* n

Service Manual

Operating Documentation



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Important Precautions

**WARNING
(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
(FR)**

- CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.
- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.

**WARNUNG
(DE)**

- DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO
(ES)

- ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.
- SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEHC SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.
- NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

ATENÇÃO
(PT)

- ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.
- SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENHA TENTADO REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTA AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

AVVERTENZA
(IT)

- IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEHC RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.
- SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.
- NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.

HOIATUS
(ET)

- KÄESOLEV TEENINDUSJUHEND ON SAADAVAL AINULT INGLISE KEELES.
- KUI KLIENDITEENINDUSE OSUTAJA NÕUAB JUHENDIT INGLISE KEELEST ERINEVAS KEELES, VASTUTAB KLIENT TÕLKETEENUSE OSUTAMISE EEST.
- ÄRGE ÜRITAGE SEADMEID TEENINDADA ENNE EELNEVALT KÄESOLEVA TEENINDUSJUHENDIGA TUTVUMIST JA SELLEST ARU SAAMIST.
- KÄESOLEVA HOIATUSE EIRAMINE VÕIB PÕHJUSTADA TEENUSEOSUTAJA, OPERAATORI VÕI PATSIENDI VIGASTAMIST ELEKTRILÖÖGI, MEHAANILISE VÕI MUU OHU TAGAJÄRJEL.

**VAROITUS
(FI)**

- TÄMÄ HUOLTO-OHJE ON SAATAVILLA VAIN ENGLANNIKSI.
- JOS ASIAKKAAN PALVELUNTARJOAJA VAATII MUUTA KUIN ENGLANNINKIELISTÄ MATERIAALIA, TARVITTAVAN KÄÄNNÖKSEN HANKKIMINEN ON ASIAKKAAN VASTUULLA.
- ÄLÄ YRITÄ KORJATA LAITTEISTOA ENNEN KUIN OLET VARMASTI LUKENUT JA YMMÄRTÄNYT TÄMÄN HUOLTO-OHJEEN.
- MIKÄLI TÄTÄ VAROITUSTA EI NOUDATETA, SEURAUKSENA VOI OLLA PALVELUNTARJOAJAN, LAITTEISTON KÄYTTÄJÄN TAI POTILAAN VAHINGOITTUMINEN SÄHKÖISKUN, MEKAANISEN VIAN TAI MUUN VAARATILANTEEN VUOKSI.

**ΠΡΟΕΙΔΟΠΟΙΗΣΗ
(EL)**

- ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ ΔΙΑΤΙΘΕΤΑΙ ΣΤΑ ΑΓΓΛΙΚΑ ΜΟΝΟ.
- ΕΑΝ ΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ ΕΝΟΣ ΠΕΛΑΤΗ ΑΠΑΙΤΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕ ΓΛΩΣΣΑ ΕΚΤΟΣ ΤΩΝ ΑΓΓΛΙΚΩΝ, ΑΠΟΤΕΛΕΙ ΕΥΘΥΝΗ ΤΟΥ ΠΕΛΑΤΗ ΝΑ ΠΑΡΕΧΕΙ ΥΠΗΡΕΣΙΕΣ ΜΕΤΑΦΡΑΣΗΣ.
- ΜΗΝ ΕΠΙΧΕΙΡΗΣΕΤΕ ΤΗΝ ΕΚΤΕΛΕΣΗ ΕΡΓΑΣΙΩΝ ΣΕΡΒΙΣ ΣΤΟΝ ΕΞΟΠΛΙΣΜΟ ΕΚΤΟΣ ΕΑΝ ΕΧΕΤΕ ΣΥΜΒΟΥΛΕΥΤΕΙ ΚΑΙ ΕΧΕΤΕ ΚΑΤΑΝΟΗΣΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ.
- ΕΑΝ ΔΕ ΛΑΒΕΤΕ ΥΠΟΨΗ ΤΗΝ ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΑΥΤΗ, ΕΝΔΕΧΕΤΑΙ ΝΑ ΠΡΟΚΛΗΘΕΙ ΤΡΑΥΜΑΤΙΣΜΟΣ ΣΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ, ΣΤΟ ΧΕΙΡΙΣΤΗ Ή ΣΤΟΝ ΑΣΘΕΝΗ ΑΠΟ ΗΛΕΚΤΡΟΠΛΗΞΙΑ, ΜΗΧΑΝΙΚΟΥΣ Ή ΑΛΛΟΥΣ ΚΙΝΔΥΝΟΥΣ.

**FIGYELMEZTETÉS
(HU)**

- EZEN KARBANTARTÁSI KÉZIKÖNYV KIZÁRÓLAG ANGOL NYELVEN ÉRHETŐ EL.
- HA A VEVŐ SZOLGÁLTATÓJA ANGOLTÓL ELTÉRŐ NYELVRE TART IGÉNYT, AKKOR A VEVŐ FELELŐSSÉGE A FORDÍTÁS ELKÉSZÍTTETÉSE.
- NE PRÓBÁLJA ELKEZDENI HASZNÁLNI A BERENDEZÉST, AMÍG A KARBANTARTÁSI KÉZIKÖNYVBEN LEÍRTAKAT NEM ÉRTELMEZTÉK.
- EZEN FIGYELMEZTETÉS FIGYELMEN KÍVÜL HAGYÁSA A SZOLGÁLTATÓ, MŰKÖDTETŐ VAGY A BETEG ÁRAMÜTÉS, MECHANIKAI VAGY EGYÉB VESZÉLYHELYZET MIATTI SÉRÜLÉSÉT EREDMÉNYEZHETI.

**VIÐVÖRUN
(IS)**

- ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.
- EF ÞJÓNUSTUAÐILI VIÐSKIPTAMANNS ÞARFNAST ANNARS TUNGUMÁLS EN ENSKU, ER ÞAÐ Á ÁBYRGÐ VIÐSKIPTAMANNS AÐ ÚTVEGA ÞÝÐINGU.
- REYNIÐ EKKI AÐ ÞJÓNUSTA TÆKIÐ NEMA EFTIR AÐ HAFI SKOÐAÐ OG SKILIÐ ÞESSA ÞJÓNUSTUHANDBÓK.
- EF EKKI ER FARIÐ AÐ ÞESSARI VIÐVÖRUN GETUR ÞAÐ VALDIÐ MEIÐSLUM ÞJÓNUSTUVEITANDA, STJÓRNANDA EÐA SJÚKLINGS VEGNA RAFLOSTS, VÉLRÆNNAR EÐA ANNARRAR HÆTTU.

**VÝSTRAHA
(CS)**

- TENTO SERVISNÍ NÁVOD EXISTUJE POUZE V ANGLICKÉM JAZYCE.
- V PŘÍPADĚ, ŽE POSKYTOVATEL SLUŽEB ZÁKAZNÍKŮM POTŘEBUJE NÁVOD V JINÉM JAZYCE, JE ZAJIŠTĚNÍ PŘEKladU DO ODPOVÍDAJÍCÍHO JAZYKA ÚKOLEM ZÁKAZNÍKA.
- NEPROVÁDĚJTE ÚDRŽBU TOHOTO ZAŘÍZENÍ, ANIŽ BYSTE SI PŘEČETLI TENTO SERVISNÍ NÁVOD A POCHOPILI JEHO OBSAH.
- V PŘÍPADĚ NEDODRŽOVÁNÍ TĚTO VÝSTRAHY MŮŽE DOJÍT ÚRAZU ELEKTRICKÁM PROUDEM PRACOVNÍKA POSKYTOVATELE SLUŽEB, OBSLUŽNÉHO PERSONÁLU NEBO PACIENTŮ VlivEM ELEKTRICKÉHO PROUDU, RESPEKTIVE VlivEM K RIZIKU MECHANICKÉHO POŠKOZENÍ NEBO JINÉMU RIZIKU.

**ADVARSEL
(DA)**

- DENNE SERVICEMANUAL FINDES KUN PÅ ENGELSK.
- HVIS EN KUNDES TEKNIKER HAR BRUG FOR ET ANDET SPROG END ENGELSK, ER DET KUNDENS ANSVAR AT SØRGE FOR OVERSÆTTELSE.
- FORSØG IKKE AT SERVICERE UdstyRET MEDMINDRE DENNE SERVICEMANUAL ER BLEVET LÆST OG FORSTÅET.
- MANGLENDE OVERHOLDELSE AF DENNE ADVARSEL KAN MEDFØRE SKADE PÅ GRUND AF ELEKTRISK, MEKANISK ELLER ANDEN FARE FOR TEKNIKEREN, OPERATØREN ELLER PATIENTEN.

**WAARSCHUWING
(NL)**

- DEZE ONDERHOUDSHANDLEIDING IS ENKEL IN HET ENGELS VERKRIJGBAAR.
- ALS HET ONDERHOUDSPERSONEEL EEN ANDERE TAAL VEREIST, DAN IS DE KLANT VERANTWOORDELIJK VOOR DE VERTALING ERVAN.
- PROBEER DE APPARATUUR NIET TE ONDERHOUDEN VOORDAT DEZE ONDERHOUDSHANDLEIDING WERD GERAADPLEEGD EN BEGREPEN IS.
- INDIEN DEZE WAARSCHUWING NIET WORDT OPGEVOLGD, ZOU HET ONDERHOUDSPERSONEEL, DE OPERATOR OF EEN PATIËNT GEWOND KUNNEN RAKEN ALS GEVOLG VAN EEN ELEKTRISCHE SCHOK, MECHANISCHE OF ANDERE GEVAREN.

**BRĪDINĀJUMS
(LV)**

- ŠĪ APKALPES ROKASGRĀMATA IR PIEEJAMA TIKAI ANGLŪ VALODĀ.
- JA KLIENTA APKALPES SNIEDZĒJAM NEPIECIEŠAMA INFORMĀCIJA CITĀ VALODĀ, NEVIS ANGLŪ, KLIENTA PIENĀKUMS IR NODROŠINĀT TULKOŠANU.
- NEVEICIET APRĪKOJUMA APKALPI BEZ APKALPES ROKASGRĀMATAS IZLASĪŠANAS UN SAPRAŠANAS.
- ŠĪ BRĪDINĀJUMA NEIEVĒROŠANA VAR RADĪT ELEKTRISKĀS STRĀVAS TRIECIENA, MEHĀNISKU VAI CITU RISKU IZRAISĪTU TRAUMU APKALPES SNIEDZĒJAM, OPERATORAM VAI PACIENTAM.

**ĮSPĖJIMAS
(LT)**

- ŠIS EKSPLOATAVIMO VADOVAS YRA IŠLEISTAS TIK ANGLŲ KALBA.
- JEI KLIENTO PASLAUGŲ TEIKĖJUI REIKIA VADOVO KITA KALBA – NE ANGLŲ, VERTIMU PASIRŪPINTI TURI KLIENTAS.
- NEMĖGINKITE ATLIKTI ĮRANGOS TECHNINĖS PRIEŽIŪROS DARBŲ, NEBENT VADOVAUTUMĖTĖS ŠIUO EKSPLOATAVIMO VADOVU IR JĮ SUPRASTUMĖTE
- NEPAISANT ŠIO PERSPĖJIMO, PASLAUGŲ TEIKĖJAS, OPERATORIUS AR PACIENTAS GALI BŪTI SUŽEISTAS DĖL ELEKTROS SMŪGIO, MECHANINIŲ AR KITŲ PAVOJŲ.

**ADVARSEL
(NO)**

- DENNE SERVICEHÅNDBOKEN FINNES BARE PÅ ENGELSK.
- HVIS KUNDENS SERVICELEVERANDØR TRENGER ET ANNET SPRÅK, ER DET KUNDENS ANSVAR Å SØRGE FOR OVERSETTELSE.
- IKKE FORSØK Å REPARERE UTSTYRET UTEN AT DENNE SERVICEHÅNDBOKEN ER LEST OG FORSTÅTT.
- MANGLENDE HENSYN TIL DENNE ADVARSELEN KAN FØRE TIL AT SERVICELEVERANDØREN, OPERATØREN ELLER PASIENTEN SKADES PÅ GRUNN AV ELEKTRISK STØT, MEKANISKE ELLER ANDRE FARER.

**OSTRZEŻENIE
(PL)**

- NINIEJSZY PODRĘCZNIK SERWISOWY DOSTĘPNY JEST JEDYNIE W JĘZYKU ANGIELSKIM.
- JEŚLI FIRMA ŚWIADCZĄCA KLIENTOWI USŁUGI SERWISOWE WYMAGA UDOSTĘPNIENIA PODRĘCZNIKA W JĘZYKU INNYM NIŻ ANGIELSKI, OBOWIĄZEK ZAPEWNIENIA STOSOWNEGO TŁUMACZENIA SPOCZYWA NA KLIENCIE.
- NIE PRÓBOWAĆ SERWISOWAĆ NINIEJSZEGO SPRZĘTU BEZ UPRZEDNIEGO ZAPOZNANIA SIĘ Z PODRĘCZNIKIEM SERWISOWYM.
- NIEZASTOSOWANIE SIĘ DO TEGO OSTRZEŻENIA MOŻE GROZIĆ OBRAŻENIAMI CIAŁA SERWISANTA, OPERATORA LUB PACJENTA W WYNIKU PORAŻENIA PRĄDEM, URAZU MECHANICZNEGO LUB INNEGO RODZAJU ZAGROŻEŃ.

**ATENȚIE
(RO)**

- ACEST MANUAL DE SERVICE ESTE DISPONIBIL NUMAI ÎN LIMBA ENGLEZĂ.
- DACĂ UN FURNIZOR DE SERVICII PENTRU CLIEȚI NECESITĂ O ALTĂ LIMBĂ DECÂT CEA ENGLEZĂ, ESTE DE DATORIA CLIEȚULUI SĂ FURNIZEZE O TRADUCERE.
- NU ÎNCERCAȚI SĂ REPARAȚI ECHIPAMENTUL DECÂT ULTERIOR CONSULTĂRII ȘI ÎNȚELEGERII ACESTUI MANUAL DE SERVICE.
- IGNORAREA ACESTUI AVERTISMENT AR PUTEA DUCE LA RĂNIREA DEPANATORULUI, OPERATORULUI SAU PACIENTULUI ÎN URMA PERICOLELOR DE ELECTROCUTARE, MECANICE SAU DE ALTĂ NATURĂ.

**ОСТОРОЖНО!
(RU)**

- ДАННОЕ РУКОВОДСТВО ПО ОБСЛУЖИВАНИЮ ПРЕДОСТАВЛЯЕТСЯ ТОЛЬКО НА АНГЛИЙСКОМ ЯЗЫКЕ.
- ЕСЛИ СЕРВИСНОМУ ПЕРСОНАЛУ КЛИЕНТА НЕОБХОДИМО РУКОВОДСТВО НЕ НА АНГЛИЙСКОМ ЯЗЫКЕ, КЛИЕНТУ СЛЕДУЕТ САМОСТОЯТЕЛЬНО ОБЕСПЕЧИТЬ ПЕРЕВОД.
- ПЕРЕД ОБСЛУЖИВАНИЕМ ОБОРУДОВАНИЯ ОБЯЗАТЕЛЬНО ОБРАТИТЕСЬ К ДАННОМУ РУКОВОДСТВУ И ПОЙМИТЕ ИЗЛОЖЕННЫЕ В НЕМ СВЕДЕНИЯ.
- НЕСОБЛЮЖДЕНИЕ УКАЗАННЫХ ТРЕБОВАНИЙ МОЖЕТ ПРИВЕСТИ К ТОМУ, ЧТО СПЕЦИАЛИСТ ПО ТЕХОБСЛУЖИВАНИЮ, ОПЕРАТОР ИЛИ ПАЦИЕНТ ПОЛУЧАТ УДАР ЗЛЕКТРИЧЕСКИМ ТОКОМ, МЕХАНИЧЕСКУЮ ТРАВМУ ИЛИ ДРУГОЕ ПОВРЕЖДЕНИЕ.

**UPOZORNENIE
(SK)**

- TÁTO SERVISNÁ PRÍRUČKA JE K DISPOZÍCII LEN V ANGLIČTINE.
- AK ZÁKAZNÍKOV POSKYTOVATEĽ SLUŽIEB VYŽADUJE INÝ JAZYK AKO ANGLIČTINU, POSKYTNUTIE PREKLADATEĽSKÝCH SLUŽIEB JE ZODPOVEDNOSŤOU ZÁKAZNÍKA.
- NEPOKÚŠAJTE SA VYKONÁVAŤ SERVIS ZARIADENIA SKÔR, AKO SI NEPREČÍTATE SERVISNÚ PRÍRUČKU A NEPOROZUMIETE JEJ.
- ZANEDBANIE TOHTO UPOZORNENIA MÔŽE VYÚSTIŤ DO ZRANENIA POSKYTOVATEĽA SLUŽIEB, OBSLUHUJÚCEJ OSOBY ALEBO PACIENTA ELEKTRICKÝM PRÚDOM, PRÍPADNE DO MECHANICKÉHO ALEBO INÉHO NEBEZPEČENSTVA.

**VARNING
(SV)**

- DEN HÄR SERVICEHANDBOKEN FINNS BARA TILLGÄNGLIG PÅ ENGELSKA.
- OM EN KUNDS SERVICETEKNIKER HAR BEHOV AV ETT ANNAT SPRÅK ÄN ENGELSKA ANSVARAR KUNDEN FÖR ATT TILLHANDAHÅLLA ÖVERSÄTTNINGSTJÄNSTER.
- FÖRSÖK INTE UTFÖRA SERVICE PÅ UTRUSTNINGEN OM DU INTE HAR LÄST OCH FÖRSTÅR DEN HÄR SERVICEHANDBOKEN.
- OM DU INTE TAR HÄNSYN TILL DEN HÄR VARNINGEN KAN DET RESULTERA I SKADOR PÅ SERVICETEKNIKERN, OPERATÖREN ELLER PATIENTEN TILL FÖLJD AV ELEKTRISKA STÖTAR, MEKANISKA FAROR ELLER ANDRA FAROR.

**DİKKAT
(TR)**

- BU SERVİS KILAVUZU YALNIZCA İNGİLİZCE OLARAK SAĞLANMIŞTIR.
- EĞER MÜŞTERİ TEKNİSYENİ KILAVUZUN İNGİLİZCE DIŞINDAKİ BİR DİLDE OLMASINI İSTERSE, KILAVUZU TERCÜME ETTİRMEK MÜŞTERİNİN SORUMLULUĞUNDADIR.
- SERVİS KILAVUZUNU OKUYUP ANLAMADAN EKİPMANLARA MÜDAHALE ETMEYİNİZ.
- BU UYARININ GÖZ ARDI EDİLMESİ, ELEKTRİK ÇARPMASI YA DA MEKANİK VEYA DİĞER TÜRDEN KAZALAR SONUCUNDA TEKNİSYENİN, OPERATÖRÜN YA DA HASTANIN YARALANMASINA YOL AÇABİLİR.

警告
(JA)

このサービスマニュアルには英語版しかありません。

GEHC 以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。

このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。

この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:
(ZH-CN)

本维修手册仅存有英文本。

非 GEHC 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。

未详细阅读和完全了解本手册之前，不得进行维修。

忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

경고
(KO)

- 본 서비스 지침서는 영어로만 이용하실 수 있습니다.
- 고객님의 서비스 제공자가 영어이외 언어를 요구할 경우, 번역 서비스 지침서를 제공하는 것은 고객님의 책임입니다.
- 본 서비스 지침서를 지침했고 이해하지 않는 한은 해당 장비를 수리를 시도하지 마십시오.
- 이 경우에 유해하지 않은 전기쇼크, 기계상의 혹은 다른 위험으로부터 서비스 제공자, 운영자 혹은 환자에게 위험을 가할 수 있습니다.

DAMAGE IN TRANSPORTATION

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

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT - FOR USA ONLY

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

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

OMISSIONS & ERRORS

If there are any omissions, errors or suggestions for improving this documentation, please contact the GE Healthcare Global Documentation Group with specific information listing the system type, manual title, part number, revision number, page number and suggestion details. Mail the information to: Service Documentation, 9900 Innovation Drive (RP-2123), Wauwatosa, WI 53226, USA.

GE Healthcare employees should use the iTrak System to report all documentation errors or omissions.

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	MAY 2005	Initial Release.
2	NOV 2005	Revised Spare Parts List update
3	FEB. 2006	Added new cart and transportation Box
4	JAN. 2007	Removed all traces of Cart and Transportation Box
5	JUL 2009	Updated per BT'09 release.

List of Effected Pages (LOEP)

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	5	3-1 to 3-158	5	8-1 to 8-108	5
Warnings i to x	5	4-1 to 4-30	5	9-1 to 9-16	5
TOC (generated file)	5	5-1 to 5-42	5	10-1 to 10-36	5
1-1 to 1-20	5	6-1 to 6-12	5	Back Cover	N/A
2-1 to 2-12	5	7-1 to 7-20	5		

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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 *i* 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	Important Conventions	1-4
1-3	Safety Considerations	1-6
1-4	Product Labels and Icons	1-10
1-5	EMC, EMI, and ESD	1-16
1-6	Lockout/Tagout (LOTO) Requirements	1-18
1-7	Returning/Shipping Probes and Repair Parts	1-18
1-8	Customer Assistance	1-19

1-1-2 Purpose of Service Manual

This manual provides installation and service information for the Vivid *i* n portable ultrasound scanner, and contains the following chapters:

- [Chapter 1 - Introduction](#)
Contains a content summary and warnings.
- [Chapter 2 - Site Preparations](#)
Contains site requirements for the Vivid *i* 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 for performing service adjustments to the Vivid *i* n portable ultrasound scanner.
- [Chapter 7 - Diagnostics/Troubleshooting](#)
Provides instructions for setting up and running diagnostic, troubleshooting and other related routines for the Vivid *i* 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 *i* n portable ultrasound scanner.
- [Chapter 10 - Care and Maintenance](#)
Provides periodic maintenance procedures for the Vivid *i* n portable ultrasound scanner.

1-1-3 Typical Users of the Service Manual

This manual is intended for the following categories of users:

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

1-1-4 Vivid *i* n Models Covered in this Manual

The Vivid *i* n models documented in this manual is shown in Table 1-2 below.

Table 1-2 Vivid *i* n Models

Model	H-Cat No.	Part Number	Description	Comments
Vivid <i>i</i> n Portable Ultrasound Scanner	H45561AC	FL000110	Laptop-style system	BT'09
	H45551DE	FL000090	Laptop-style system	BT'06

1-1-5 **System History - Hardware and Software Versions**

The Vivid *i 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 *i n* portable ultrasound scanner is based on parallel products in the Vivid™ family. Using the same advanced technology, the innovative features and versatility of the system represent the future of ultrasound scanning.

NOTE: Upgrade options may be available with future versions.

1-1-6 **Purpose of Operator Manual(s)**

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

Section 1-2 Important Conventions

1-2-1 Conventions Used in this Manual

1-2-1-1 Model Designations

This manual covers the Vivid *i* n ultrasound units listed in [Table 1-2 on page 1-2](#).

1-2-1-2 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.

1-2-1-3 Safety Precaution Messages

Various levels of safety precautions are found on the equipment and throughout this service manual. Different levels of severity are identified by one of the following icons which precede precautionary statements in the text.



DANGER: Indicates the presence of a hazard that will cause severe personal injury or death if the instructions are ignored.



WARNING: Indicates the presence of a hazard that can cause severe personal injury and property damage if the instructions are ignored.



CAUTION: Indicates the presence of a hazard that can cause property damage but has absolutely no personal injury risk.

Note: Notes are used to provide important information about an item or a procedure. Be sure to read the notes as the information they contain can often save you time or effort.







1-2-1-4

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 cause harm.




Table 1-3 Standard Hazard Icons

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	HEAT	PINCH
		

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

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

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION
		

Section 1-3 Safety Considerations

1-3-1 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.

1-3-2 Human Safety

Operating personnel must not remove the system covers.

Servicing should be performed by authorized personnel only.

Only personnel who have participated in Vivid *i n* training are authorized to service the equipment.

Local laws may restrict this device for sale or use by or on the order of a physician.

1-3-3 Mechanical Safety



DANGER: WHEN THE VIVID / N SCANNER IS USED WITH A 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 A CART IS TO BE MOVED ALONG ANY INCLINE, USE EXTREME CAUTION. MAKE SURE THAT THE VIVID / N SCANNER AND ALL PERIPHERALS ARE SECURELY MOUNTED ON THE CART BEFORE ATTEMPTING TO MOVE IT.



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



DANGER: NEVER USE A PROBE THAT HAS BEEN SUBJECTED TO MECHANICAL SHOCK OR IMPACT. EVEN IF THE PROBE APPEARS TO BE UNBROKEN, IT MAY IN FACT BE DAMAGED.



CAUTION: The Vivid *i n* portable ultrasound scanner weighs 5kg (11 lbs.) or more, depending on carry-on peripherals, when ready for use.

In addition, the Cart weighs approximately 30kg (66 lbs.), including 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:

- Be sure the pathway is clear
- Use slow and careful motions
- Use two people when moving or lifting more than 16 kg (35 lbs)

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

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 / n scanner is mounted on the Cart and being moved on inclines, make sure that the scanner and all peripherals are securely mounted on the Cart before attempting to move it.



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



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

ALWAYS:

- Eject any disks from the MOD (if installed).
- Ensure that the Vivid / 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 Cart in an upright position and lock the wheels (brake).
- Ensure that the Vivid / n system (and 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.

1-3-4 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.

1-3-4-1 Probes

All the probes for the Vivid *i 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 machine's wheels.

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 *i n* User Manual for detailed probe handling instructions.*

1-3-5 **Dangerous Procedure Warnings**

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



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



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.



DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT

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

Section 1-4 Product Labels and Icons

The Vivid *i n* portable ultrasound scanner comes equipped with product labels and icons. These labels and icons represent pertinent information regarding the operation of the unit.

1-4-1 Product Label Locations

The following diagrams show the label and icons found on the Vivid *i n* ultrasound unit. All the labels and icons are described in [Table 1-5 "Product Icons Vivid i n" on page 1-11](#)

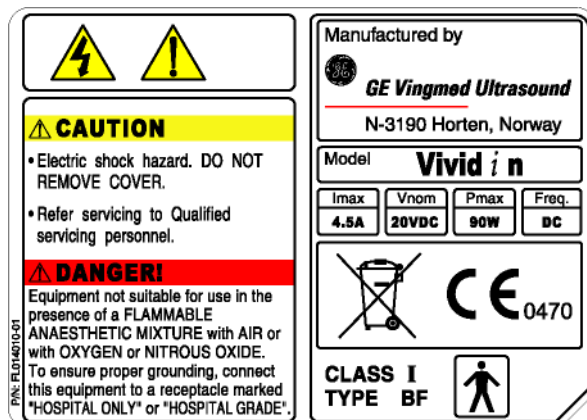


Figure 1-1 Main Label for Vivid *i n*

1-4-2 Label Descriptions

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

Table 1-5 Product Icons Vivid *i n*

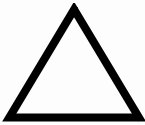











Label Name	Description	Location
Identification and Rating Plate	Manufacturer's name and location. Date of Manufacture. Model and Serial numbers. Electrical ratings (Volts and Amps)	On the base of the unit
Type/Class Label	Used to indicate the degree of safety or protection.	Bottom panel of the adapter
IP Code (IPX1)	Indicates the degree of protection provided by the enclosure per IEC60 529. Cannot be used in operating room environment.	Foot Switch
	"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

Table 1-5 Product Icons Vivid / n

Label Name	Description	Location
	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.
	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.
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 1-9.
	"Protective Earth" Indicates the protective earth (grounding) terminal.	Rear of the 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

1-4-3 Vivid *i n* Battery Safety

NOTE: *The Vivid *i n* portable ultrasound scanner is supplied with a dummy battery case, and a lithium ion battery in the battery bay, as standard.*

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.*



CAUTION: use only batteries approved by GE Healthcare as suitable for use with the Vivid *i n* portable ultrasound scanner.



**WARNING: THE VIVID / 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° 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 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 / 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.



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.

1-4-3 Vivid i n Battery Safety (cont'd)

- 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 i 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:

- The Vivid i n portable ultrasound scanner is supplied from the factory with a dummy battery. When unpacking the unit, **do not discard the dummy battery.**
- When charging the Vivid i 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 i n portable ultrasound scanner.

1-4-4 Vivid i n External Labels

In addition to the labels described in the previous section, additional labels may be found on the Vivid i n ultrasound unit, as described in the following sections:

- *Rating Labels* section, see below.

1-4-4-1 Rating Labels

Indicates the ultrasound unit's basic power compliance and regulatory compliance information

The rating label shown below is located on the base assembly (underneath the ultrasound unit).

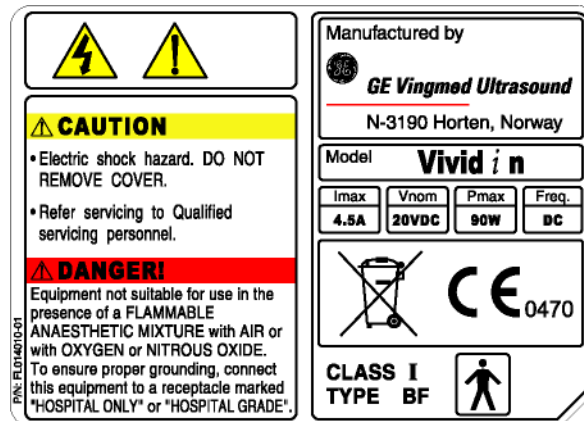


Figure 1-2 Vivid i n Rating Label

Section 1-5 EMC, EMI, and ESD

1-5-1 Electromagnetic Compatibility (EMC)

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

NOTE: *The Vivid i n system should be operated at a distance of more than 15 feet from any magnetic field.*

1-5-2 CE Compliance

The Vivid i 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 i 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.*

1-5-3 Electrostatic Discharge (ESD) Prevention



CAUTION: Do not touch any boards with integrated circuits prior to taking the necessary ESD precautions:

Always connect yourself, via an arm-wrist strap connected to the bottom cover whenever you open the system for maintenance.

Follow general guidelines for handling of electrostatic sensitive equipment.

1-5-4 Standards Used

To fulfill the requirements of relevant EC directives and/or European Harmonized/International standards, the following documents/standards have been used:

Table 1-6 Standards Used

Scope	Standard/Directive
Product safety requirements for Electrical Medical devices Class I, Type BF with CF applied parts (ICE catheter and ECG leads).	IEC 60601-1:1988+A1:1991+A2:1995
	EN 60601-1:1990+A1:1993+A2:1995+A13:1996
	UL 60601-1 (2003)
	C 22.2 601-1 M90 (R2005)
Product safety requirements for Electrical Medical devices- safety requirements for medical electrical systems	IEC 60601-1-1:2000 EN 60601-1-1:2001
Product safety requirements for Electrical Medical devices- Programmable electrical medical systems	IEC 60601-1-4:1996+A1:1999 EN 60601-1-4:1996+A1:1999
Product safety requirements for Ultrasound system	IEC 60601-2-37:2001+A1:2004+A2:2005 EN 60601-2-37: 2001+A1:2005 +A2:2005
Product EMC requirements Group 1. Class A	IEC 60601-1-2:2001+A1:2004 EN 60601-1-2:200+A1:2006
Biological evaluation of medical devices	ISO 10993-1:2003
Particular requirements for the safety of electrocardiograph monitoring equipment (Not for monitoring-only for synchronization with ultrasound)	IEC60601-2-27:1994 EN60601-2-27:1994
General requirements for basic safety and essential performance-Usability	IEC60601-1-6:2004 EN60601-1-6:2004
Patient privacy	HIPPA Safety.

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 1-6 Lockout/Tagout (LOTO) Requirements

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

To apply Lockout/Tagout:

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



NOTICE Energy Control and Power Lockout for Vivid *i* n.

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

- 1.) Turn off the breaker.
- 2.) Unplug the system.
- 3.) Maintain control of the system power plug.
- 4.) Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation.

Beware that parts inside the unit may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

Section 1-7 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.

Section 1-8 Customer Assistance

1-8-1 Contact Information

If this equipment does not work as indicated in this service manual or in the *Vivid i 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 reproduceable?
- 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.

Table 1-7 Phone numbers for Customer Assistance

LOCATION	PHONE NUMBER	
USA GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive Wauwatosa, WI 53226	Service: On-site	1-800-437-1171
	Service Parts	1-800-558-2040
	Application Support	1-800-682-5327 or 1-262-524-5698
Canada		1-800-668-0732
Latin America	Service	1-800-321-7937
	Application Support	1-262-524-5698
Europe (OLC- EMEA) GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	OLC - EMEA Phone: +49 (0)212 2802 - 652 +33 1 3083 1300 Fax: +49 (0) 212 2802 - 431	
Online Services Ultrasound Asia Australia China India Japan Korea Singapore	Phone: +(61) 1-800-647-855 +(86) 800-810-8188 +(91) 1-800-11-4567 +(81) 42-648-2924 +(82) 2620 13585 +(95) 6277-3444	

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Chapter 2

Site Preparations

Section 2-1 Overview

2-1-1 Purpose of Chapter 2

This chapter provides the information required to plan and prepare for the installation of a Vivid i 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	Overview	2-1
2-2	Console Requirements	2-2
2-3	Facility Needs	2-6
2-4	Connectivity Installation Worksheet	2-10

Section 2-2 Console Requirements

2-2-1 Unit Environmental Requirements

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

Table 2-2 Environmental Requirements



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 *i* n ultrasound unit environment is 3500 BTU/hr. This figure does not include the cooling required for lights, people, or other equipment in the room.

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

2-2-3 Lighting Requirements

For system 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 *i* 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 Healthcare 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 i n Power Requirements

Electrical specifications for the Vivid i n system are as follows:

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

Table 2-3 Electrical Requirements

2-2-5-2 Inrush Current

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

Voltage	Inrush Current	
	Console Only	Console with all Peripherals
100 V	4.5 A	9 A
240 V	2.3 A	4.5 A

Table 2-4 Inrush Current

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 i 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 i n ultrasound unit 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:

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.

Table 2-5 EMI Prevention/ Abatement

2-2-7 Probe Environmental Requirements

	Electronics
Operation	10 — 40°C (50 — 104°F)
Storage	-10 — 60°C (14 — 140°F)

Table 2-6 Probe Operation and Storage Temperatures

Note: System and electronic probes are designed for storage temperatures of -10 °C to +60 °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.

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, “Electrical Requirements,” on page 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 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 a 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.

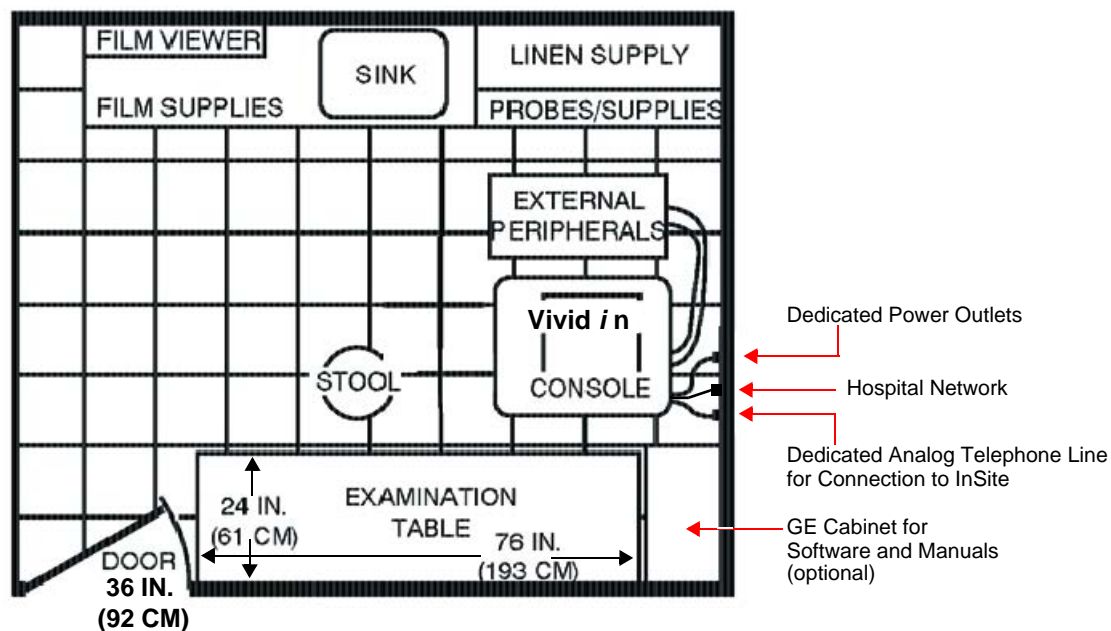


Figure 2-1 Recommended Floor Plan 4.3m x 5.2m (14 ft x 17 ft)

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

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 *i* ultrasound unit to work with other network connections, the network administrator must provide the required information, which should include the following:

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

Section 2-4 Connectivity Installation Worksheet

Site System Information					
Site: <input style="width: 100%;" type="text"/> Dept: <input style="width: 100%;" type="text"/> Vivid / n SN: <input style="width: 50%;" type="text"/> Type: <input style="width: 50%;" type="text"/>	Floor: <input style="width: 100%;" type="text"/> Room: <input style="width: 100%;" type="text"/> REV: <input style="width: 100%;" type="text"/>	Comments: <div style="border: 1px solid black; height: 60px; margin-top: 5px;"></div>			
CONTACT INFORMATION					
Name	Title	Phone	E-Mail Address		
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>		
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>		
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>		
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>		
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>		

TCP/IP Settings	Remote Archive Setup (Echo Server/GEMNet Server/EchoPAC PC)
Scanner IP Settings	Name - AE Title: <input style="width: 100%;" type="text"/>
IP Address: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	IP Address: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>
Subnet Mask: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	Subnet Mask: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>
Default Gateway: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	Default Gateway: <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>
	Server Name: <input style="width: 100%;" type="text"/>
	Remote DB User Name: <input style="width: 100%;" type="text"/>

Services (Destination Devices)						
	Device Type	Manufacturer	Name	IP Address	Port	AE Title
1	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
2	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
3	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
4	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
5	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
6	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
7	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
8	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
9	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
10	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
11	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
12	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/> <input style="width: 25%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>

Figure 2-2 Connectivity Installation Worksheet

Vivid i/n					
Host Name	<input style="width: 90%;" type="text"/>	Local Port	<input style="width: 40%;" type="text"/>	IP Address	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>
AE Title	<input style="width: 240px;" type="text"/>	Net Mask	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>		
ROUTING INFORMATION					
		Destination IP Addresses		GATEWAY IP Addresses	
			Default		
ROUTER1	<input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>		<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	
ROUTER2	<input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>		<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	
ROUTER3	<input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>		<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	
DICOM APPLICATION INFORMATION					
	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Store 2	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Store 3	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Store 4	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Store 5	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Store 6	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Work list	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
Storage Commit	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>
MPPS	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/> . <input style="width: 20%;" type="text"/>	<input style="width: 20%;" type="text"/>

Figure 2-3 Worksheet for DICOM Network Information

2-4-1 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.		

Table 2-7 Vivid / n Pre-Installation Check List

Chapter 3

System Setup

Section 3-1 Overview

3-1-1 Purpose of Chapter 3

This chapter provides instructions for installing the Vivid *i n* ultrasound unit. Before beginning the installation process, an appropriate site must be prepared, as described in [Chapter 2](#). 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.

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 <i>i n</i>	3-5
3-4	Unpacking the Equipment	3-8
3-5	Preparing for Installation	3-12
3-6	Completing the Hardware Installation	3-19
3-7	Configuration	3-47
3-8	Connectivity Setup	3-62
3-9	Storing and Transporting the Unit	3-154
3-10	Completing the Installation Paperwork	3-155

Section 3-2 Installation Reminders

3-2-1 Average Installation Time

The Vivid *i* n installation and functional checkout will take approximately one hour; Vivid *i* 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 *i* n portable ultrasound scanner weighs only 5 Kgs (11 lbs), without options.
- 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.

NOTE: For information on transportation box labels, refer to Figure 3-1 on page 3-4 and Figure 3-3 on page 3-7.

3-2-2-1 System Acclimation Time

Following transport, the Vivid *i* 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 *i* 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!



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).



WARNING: ACOUSTIC OUTPUT HAZARD
ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE VIVID / N IS WITHIN AIUM/NEMA STANDARDS AND FDA LIMITATIONS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.



Note: The Vivid *i 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.




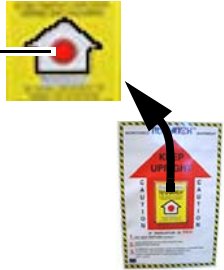
Figure 3-1 Tiltwatch and Shockwatch positions on Transportation Box

Section 3-3 Receiving the Vivid i n

3-3-1 Examin All Packages

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

Table 3-4 Examin All Packages

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

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

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

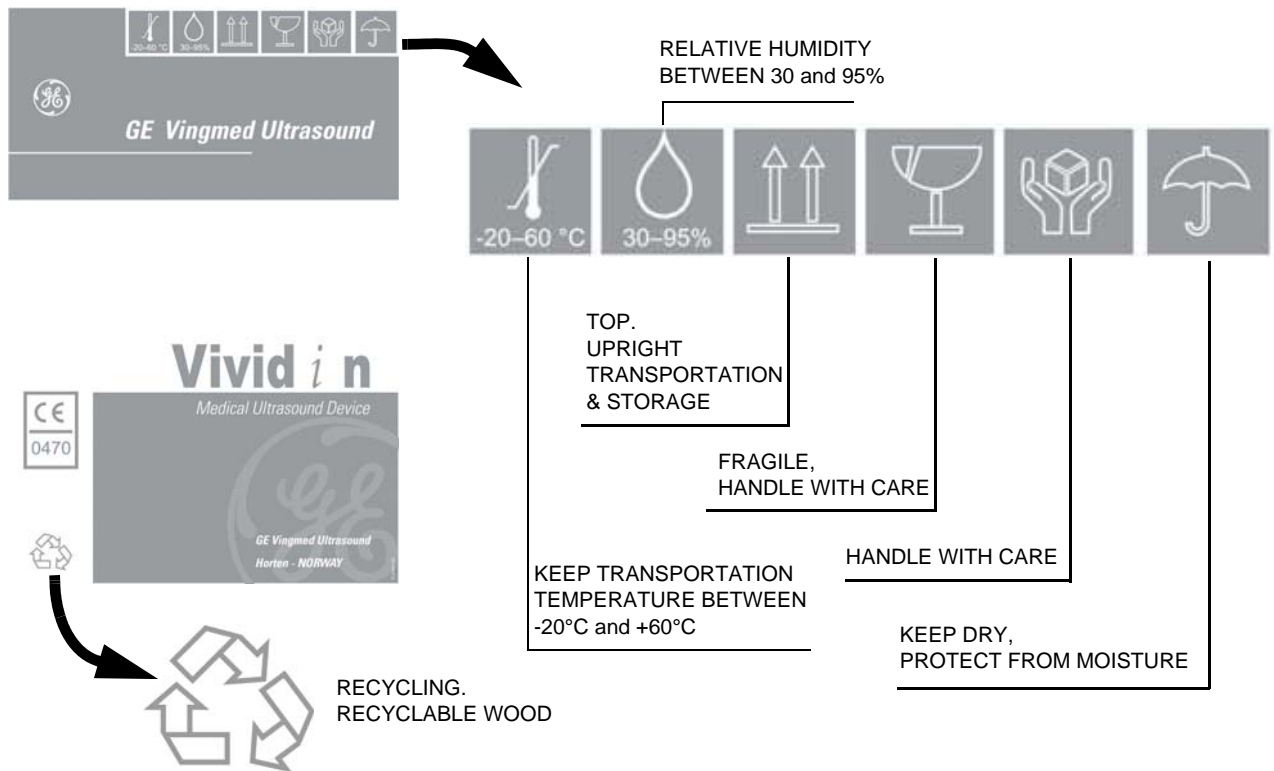


Figure 3-2 Vivid i n Transportation Box Label



Figure 3-3 Label mounted

Section 3-4 Unpacking the Equipment



CAUTION: Please read this section fully before unpacking the Vivid i n ultrasound unit.



Figure 3-4 Shipping Box for the Vivid i n only

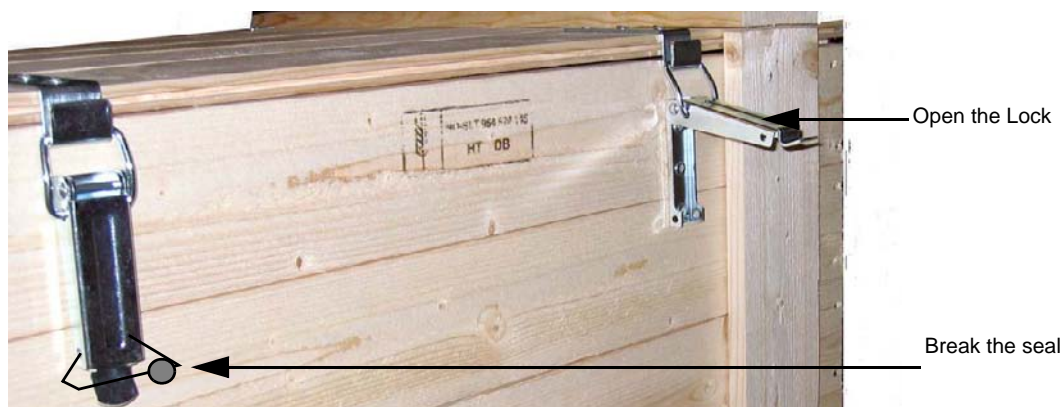


Figure 3-5 To remove the Lid of the Box

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



Figure 3-6 Contents in Transportation box when Lid is removed

Table 3-6 Shipping Carton Dimensions and Weights

Description	Height	Width	Depth	Weight ^a
Vivid i n scanner 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 Examin All Packages

Examin 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 - refer to [Table 3-7 "Damage Inspection Checklist - Vivid i n System" on page 3-13](#).
- 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.
- 8.) Carefully remove the Vivid i n ultrasound unit from the Cardboard box it is delivered in as shown in Figure 3-7 on page 3-10 .



Figure 3-7 Unpacked the Vivid i n.

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 "Verifying the Transportation Box Contents" on page 3-12). 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 Healthcare sales representative. The contact address is shown in 1-8-1 "Contact Information" on page 1-19.



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 i n ultrasound AC adapter and Cart (if applicable) are set to the correct voltage. The Voltage settings are 220-240V AC - (Europe, Latin America, and China).



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

3-4-5 EMI Protection

The Vivid i 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 i 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 Healthcare 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 i 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, make sure the Check List is completed. In the event that any items are missing, contact your local GE Healthcare representative.*

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 i n portable ultrasound scanner, refer to [Section 9-7 "Probes" on page 9-8](#).

3-5-2-1 Probes

The shipping carton will contain the probes that have been ordered with the system.

For a list of probes available for use with the Vivid i n, refer to "Available Probes" on page 3-42.

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 3-155.

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 *i* n is provided in [Table 3-7](#) below.

Table 3-7 Damage Inspection Checklist - Vivid *i* 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.

3-5-3-2 Front and Side View of the Vivid *i* n Ultrasound Unit

Figure 3-8 below shows the Vivid *i* 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 *i* 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 i n Ultrasound Unit

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

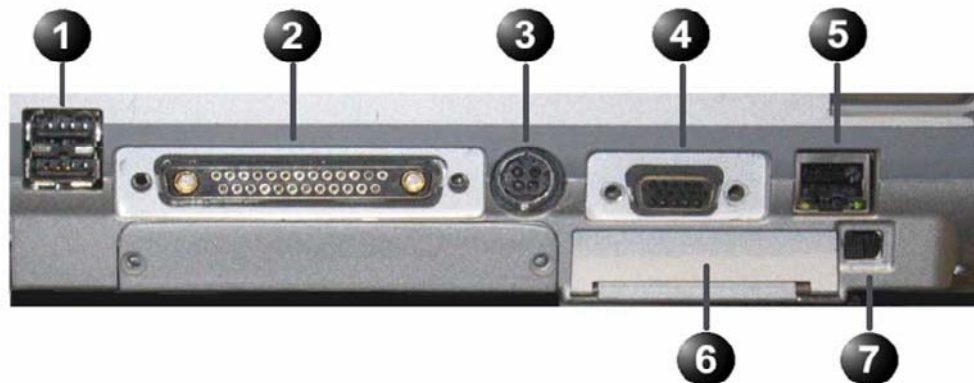


Figure 3-9 View of the Vivid i n Rear Panel

- 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

3-5-4 Connection and Usage of the optional Modo Cart

Please refer to the “Vivid i n Cart, User Manual – Supplement to Vivid i n User manual”,
Direction Number FL092096.

3-5-5 System Voltage Confirmation

3-5-5-1 System Voltage Settings

Verify that the Vivid *i* n is set to the correct voltage.

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

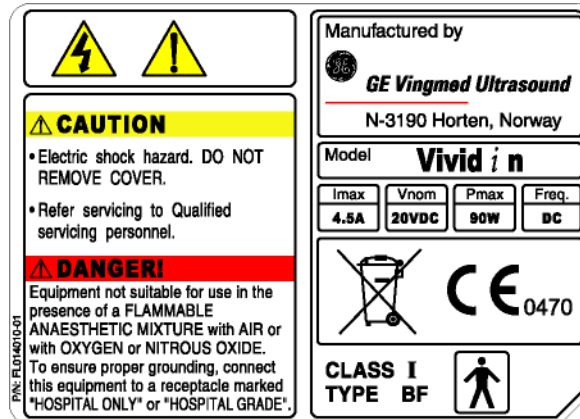


Figure 3-10 Safety Rating Plate - Example



WARNING: CONNECTING THE VIVID / N TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE SCANNER.

3-5-6 Ensuring Protection from EMI

The Vivid *i 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 *i 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.

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.

Table 3-8 EMI Prevention/ Abatement

Section 3-6

Completing the Hardware Installation

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

- Vivid *i* n scanner - connections direct to the system
- Vivid *i* n scanner - connections via USB hub

3-6-1 Connecting Peripherals

3-6-1-1 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.

- **Connection directly to the Vivid *i* n system**

The USB Global modem can be powered via the USB port on the Vivid *i* 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!*

- **Connection via USB hub**

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

3-6-1-2 Wireless Network Adaptor

The Wireless Network adaptor connection is explained below.

- **Connection directly to the Vivid i n system**

The Wireless Network adaptor should be connected to the PC MCIA socket on the Vivid i n rear connectors panel.

You can connect the Wireless Network adaptor either once the system is powered ON, or after shutdown. All software drivers for the Wireless Network are pre-installed for the designated Wireless Network adaptor only. Follow the procedure described in the "Wireless Network Configuration" on page 3-67.



WARNING *Do not attempt to use a different type of Wireless Network adaptor 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!*

3-6-1-3 DVD/CD-RW Drive

NOTE: This procedure describes replacement of the DVD/CD-RW drive.

NOTE: This procedure describes replacement of the DVD/CD-RW drive. The older-type DVD/CD-RW drive (Addonics) is no longer available.

NOTE: For instructions regarding older-type DVD/CD-RW drives (Addonics), refer to Section 3-6-1-4 on page 3-24.



NOTICE IMPORTANT By default, the DVD's AC adaptor provided is not medical grade therefore it is required to disconnect the DVD from the Vivid i n system while scanning a patient. A medical grade AC adaptor may be ordered (P/N 2416318-2) in case there is a need to connect the DVD to the scanner while scanning.



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


IMPORTANT: For BT06 systems, it is not possible to use DVD+R media (only CD-R or DVD-R).



Figure 3-11 Samsung DVD/CD-RW Drive

NOTE: The Samsung DVD-R/RW drive requires BT06 software installation (6.1.0 build 109 or higher) in order to support the media finalization process with the Vivid i n application. However, this drive may be used with a lower software version for the purpose of upgrading the software to the required version. The BT06 software 6.1.0 build 109 Software CD can be obtained by ordering the Vivid i n BT06 SW (M4) CD kit - P/N: 2421595. For instructions, refer to "Software Loading" on page 8-56.

3-6-1-3 DVD/CD-RW Drive (cont'd)

 **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 *i 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 *i n* system for the following purposes:

- To format and label each media before use
- To *export* Exams from the Vivid *i n* system to media
- To *import* Exams from media to the Vivid *i 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 *i n* (P/N 2378958-100). Refer in particular to the *Archive* chapter.

3-6-1-3-1 DVD/CD-RW Drive Replacement on Vivid i n Systems

NOTE: If you are replacing a DVD/CD-RW Drive and the current system software version is below 6.1.0 build 109, refer to the Note on [page 3-21](#).

NOTE: When replacing a DVD/CD-RW Drive on a stand-alone Vivid i n system, it is necessary to order the following parts:

Table 3-9 Parts to be Ordered

Part No	Part Description
2421141-2	Samsung DVD/CD-RW Drive
2421169 ^a	5V Power Supply (medical grade) with universal connector (suitable for the Samsung DVD/CD-RW Drive)

a. the 5V PS is supplied without a power cable; the appropriate cable must also be ordered.



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

- 1.) Connect the 5V power supply output cable to the power port on the Samsung DVD-R/RW drive rear panel.
- 2.) Connect the USB cable (supplied) between the Vivid i n rear panel and the Samsung DVD-R/RW drive rear panel.



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 i 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.

3-6-1-4 DVD/CD-RW Drive (Older Type)

NOTE: This procedure describes replacement of the older-type DVD/CD-RW drive (Addonics) only.



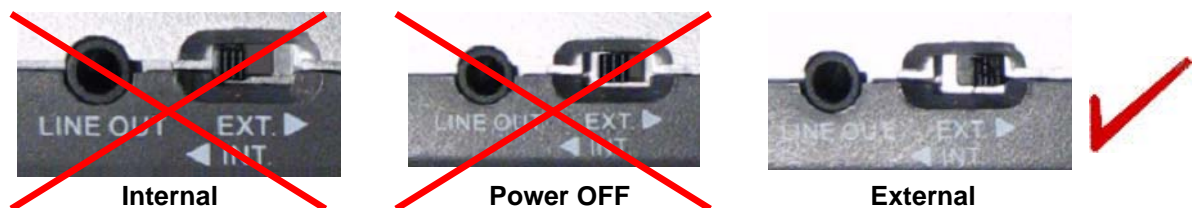
Figure 3-12 DVD/CD-RW Drive

The DVD/CD-RW drive connection in the different scenarios is explained below.

- **No Cart - connection directly to the Vivid / n system or via USB Hub**

The DVD/CD-RW Drive can be connected to either of the USB ports (*upper* or *lower*) on the rear connectors panel.

Note: The DVD/CD-RW power switch on the rear of the DVD must be set in the **External** position, as shown below:



When connecting directly to the system, it is necessary to use the additional power supply supplied with the DVD/CD-RW Drive.

3-6-1-4 DVD/CD-RW Drive (Older Type) (cont'd)

Note: When plugging the DVD's AC adaptor directly into the mains supply, there is no isolation from leakage currents since the USB connector is not isolated. It is therefore necessary to use an isolation transformer to isolate the mains power supplied to the DVD's AC adaptor. **If an isolation transformer is not available, the DVD must be disconnected from the Vivid / n system while scanning a patient.**

The DVD/CD-RW Drive can be connected once the system is powered ON, or after shutdown. All software drivers for the DVD/CD-RW Drive are pre-configured and installed designated to be used with the specific DVD/CD-RW supplied with the system.



WARNING *Do not attempt to use a different type of mass storage device other than the DVD/CD-RW 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!*

3-6-1-5 MOD Drive



-  **NOTICE IMPORTANT** *Do not connect the MOD Drive to the Vivid i 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 3-13 MOD Drive

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

- **Connection directly to the Vivid i 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 i 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 Healthcare.



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!*

- **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.

3-6-1-6 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.

- **Connection directly to the Vivid *i* 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 Healthcare. Other memory sticks may be sensitive to EMC interference - this may affect system performance and/or image quality.

- **Connection via USB hub**

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

3-6-1-7 Connecting the Black & White 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 3-14 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 i 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 3-30.

- **Connection directly to the Vivid i 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 Healthcare.



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 Healthcare. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!

- **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.

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

- "B/W and Color Printer Test" on page 4-23 should be performed

3-6-1-8 Connecting the Digital Color 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 i 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 3-30.



Figure 3-15 Digital Color Printer

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

- **Connection directly to the Vivid i 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 Healthcare.



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

- **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.

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

- "Color Printer Test" on page 4-23

3-6-1-9 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.

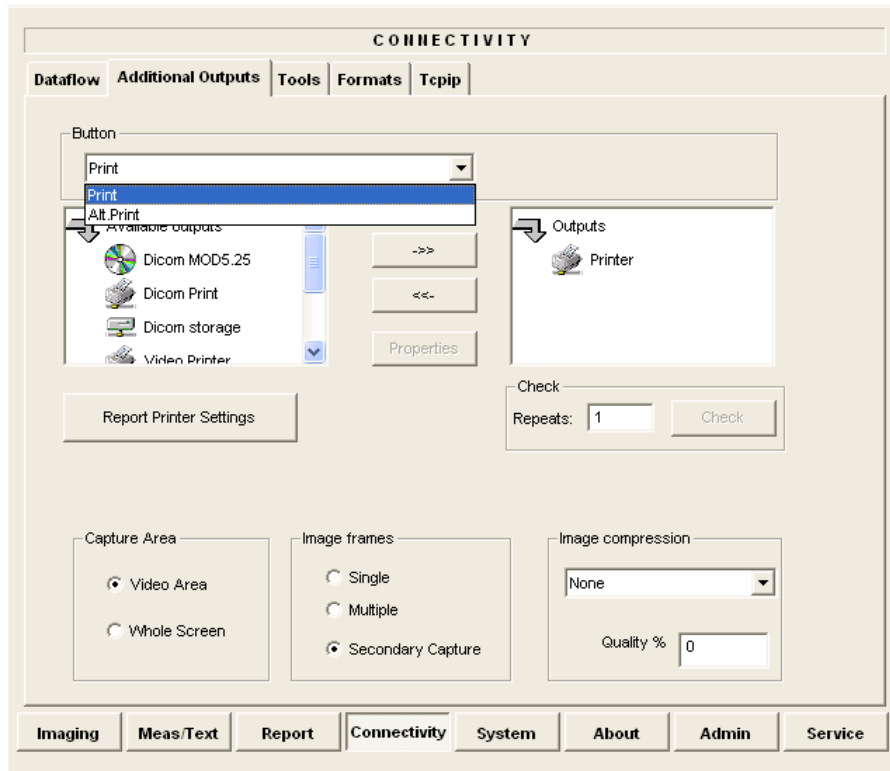




Figure 3-16 Configuring Control Panel Hot Keys for Printing

- 4.) From the Button drop-down menu (see [Figure 3-16](#)), 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 / 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 4-23](#).

3-6-1-10 Connecting the DeskJet Color Printer

-  **NOTICE** **IMPORTANT** *Do not connect the DeskJet Color Printer to the Vivid i 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.

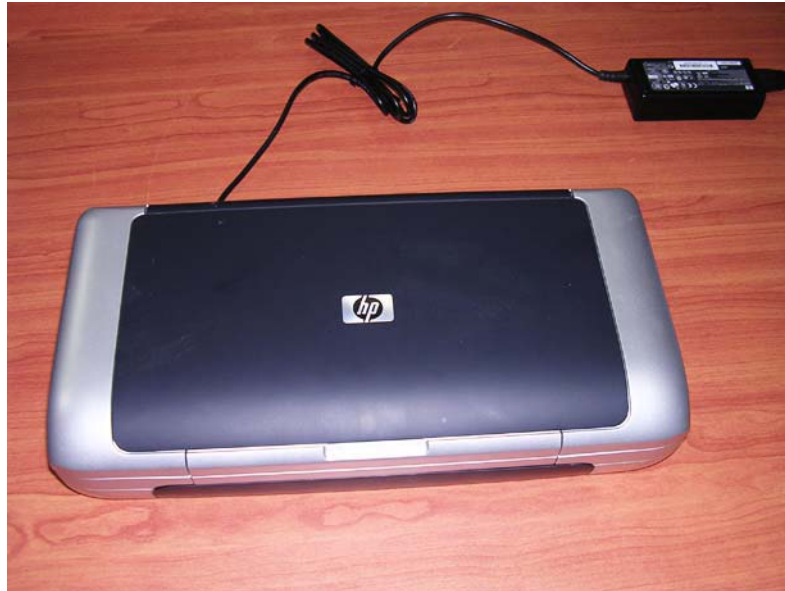



Figure 3-17 DeskJet Color Printer

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 3-57. 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 Healthcare. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

3-6-1-10 Connecting the DeskJet Color Printer (cont'd)

- **Connection directly to the Vivid *i* 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 Healthcare. The ultrasound system is an extremely sensitive and complex medical system. Any unauthorized peripherals may cause system failure or damage!*

- **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.

3-6-1-11 Connecting the VCR



Figure 3-18 Video Cassette Recorder

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

- **Direct Connection to the Vivid *i* 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 *i* 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 3-19](#)) to connect the end of the VGA cable to the Vivid *i* n rear connector panel. Since some VGA plugs have thicker housing, they do not fit properly into the Vivid *i* 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 3-19 VGA Adaptor

- 2) Connect the other end of the VGA cable to the VGA INPUT on the video converter - see [Figure 3-20](#).



Figure 3-20 Video Converter

3-6-1-11 Connecting the VCR (cont'd)

- 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 3-21](#) below.

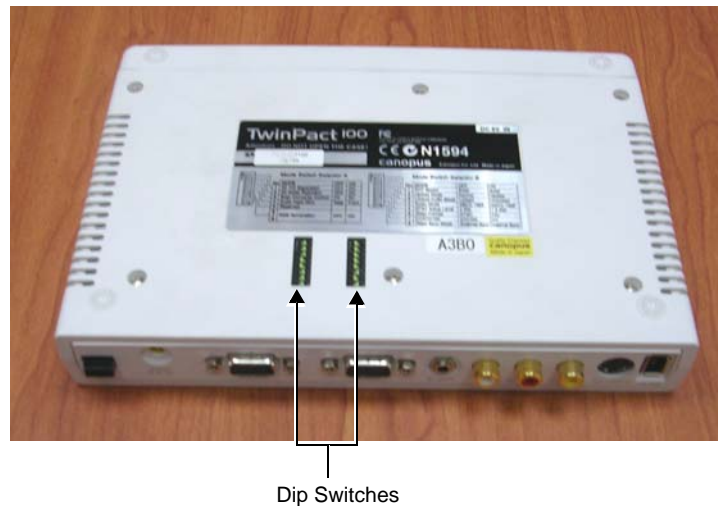


Figure 3-21 Video Converter Dip Switches

- 5.) Follow the manufacturer's guidelines to set the switches to the correct positions, as shown in [Figure 3-22](#) below.

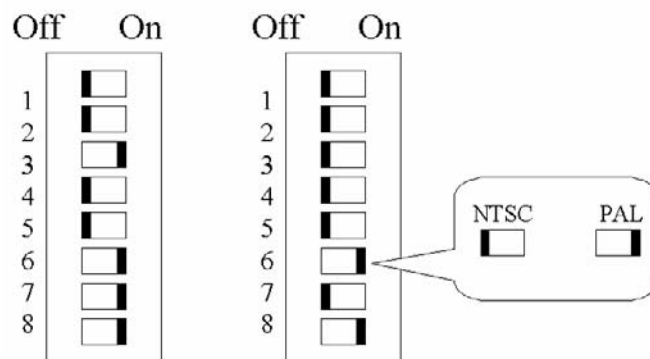


Figure 3-22 Video Converter Dip Switch Positions

3-6-1-11 Connecting the VCR (cont'd)

- 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 *i* n system.

- 7.) Press the **Input Select** button (see Figure 3-20 on page 3-33) 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.

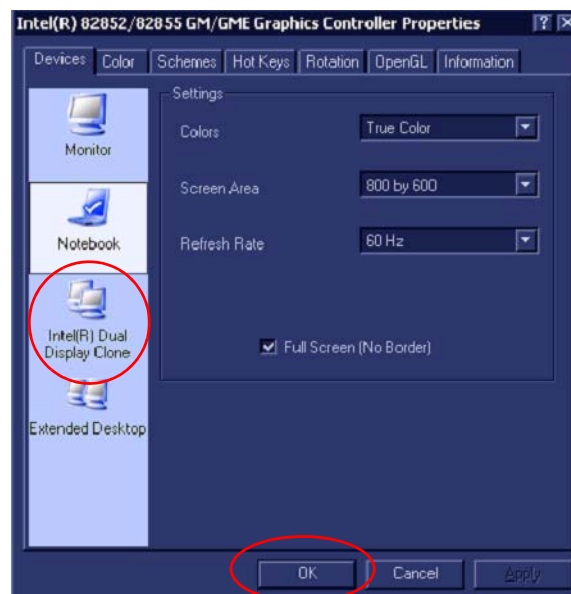


Figure 3-23 Intel® Dual Display Clone

- 9.) Select the **Intel® Dual Display Clone** icon and press **OK** - see [Figure 3-23](#).

3-6-1-11 Connecting the VCR (cont'd)

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 3-24](#).



Figure 3-24 Single Icon

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

The dialog box will be closed and the VGA output will become activated, see [Figure 3-25](#)

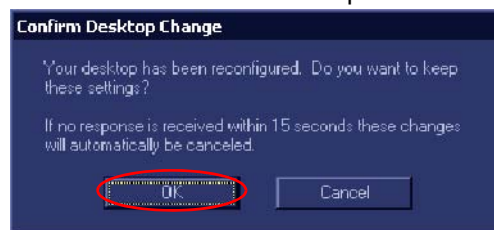


Figure 3-25 Confirm Desktop Change

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.

11.) Proceed to perform the VCR Test on [4-3-2-1 "VCR Test" on page 4-23](#).

3-6-2 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 i 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.

3-6-2-1 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.

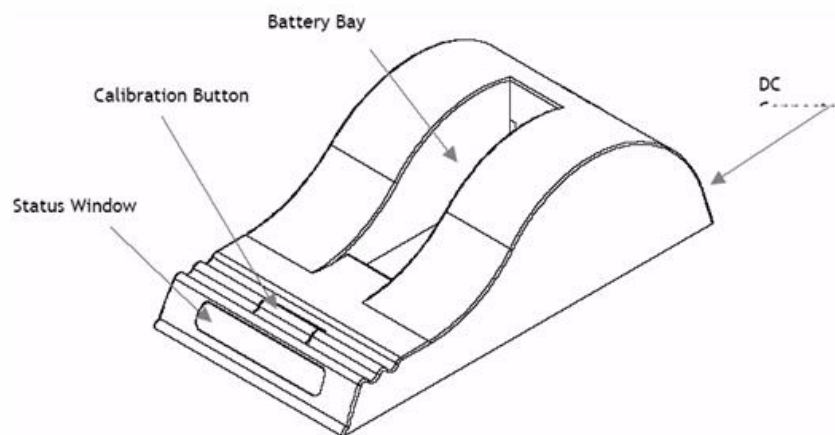


Figure 3-26 Battery Charger Unit







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

3-6-2-2 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 3-26](#)) will provide status information as detailed in [Table 3-10](#) below, and the charger will automatically begin to charge the battery.

Table 3-10 Battery Charger LED Indicators and Status

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

- **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 / n.

3-6-2-3 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 / n.

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.

3-6-3 Connecting Probes

The Vivid *i 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 *i 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.



NOTICE 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 3-27](#)).



Figure 3-27 Probe Connection Locking Lever

3-6-3 Connecting Probes (cont'd)

- 5) Align the connector with the probe port and carefully push into place, as shown in [Figure 3-28](#).



Figure 3-28 Connecting Probe to the Vivid i n

- 6) Press the connector locking lever *upwards* to the full vertical position to lock in place, as shown in [Figure 3-29](#).



Figure 3-29 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.*

3-6-3-1 Available Probes

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

3-6-4 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 3-30](#) below.



Figure 3-30 ECG Cables Connected to the ECG Connector Port



CAUTION: When disconnecting the ECG Cable from the Vivid *i* 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 5-38.

Note: For optimal ECG operation, use only electrodes that meet universal standards - see Table 3-11.



Description	Part No.
Full ECG Cable Kit - AHA (Americas) Black lead (LA) White lead (RA) Green lead (RL)	2418831-2 
Full ECG Cable Kit - IEC (Europe, Asia, ROW) Yellow lead (L) Red lead (R) Black lead (N)	2418832-2 

Table 3-11 ECG Cable Types

3-6-5 Connecting the Unit to a Power Source

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

3-6-5-1 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 the *Electrical Requirements* section, 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.

3-6-5-2 Disconnecting the Ultrasound Unit from the Electrical Outlet




CAUTION: Make sure the system is powered OFF or in standby mode before disconnecting the Vivid / 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 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 / n rear panel.

3-6-6 Switching the System ON/OFF

3-6-6-1 Switching the System ON

- 1) Verify that the ultrasound unit has been connected to the power supply.

-  **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 *i n*).

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.

3-6-6-2 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 3-31](#)). 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 3-31 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 3-7 Configuration

3-7-1 Overview

[Table 3-12](#) below outlines the Vivid / n Configuration procedures described in the relevant sub-sections.

Table 3-12 Configuration Procedures

SUB- SECTION	DESCRIPTION	PAGE NUMBER
3-7-2	Vivid i n Configuration	3-48
3-7-3	Service Screen Set-up	3-52
3-7-4	Configuring Peripherals	3-58
3-7-5	Software Options Configuration	3-61

3-7-2 Vivid / n Configuration

3-7-2-1 Preparations

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

3-7-2-2 Enter Location

Figure 3-32 Hospital and Department Name

Table 3-13 Location Name

Step	Task	Expected Result(s)
1.	Open the Configuration Window, see Preparations . If needed, select SYSTEM .	<i>The System Settings Window is displayed.</i>
2.	Select the Hospital field, see (a) in Figure 3-32 , 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 Figure 3-32 , 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.

3-7-2-3 Date and Time Adjustments

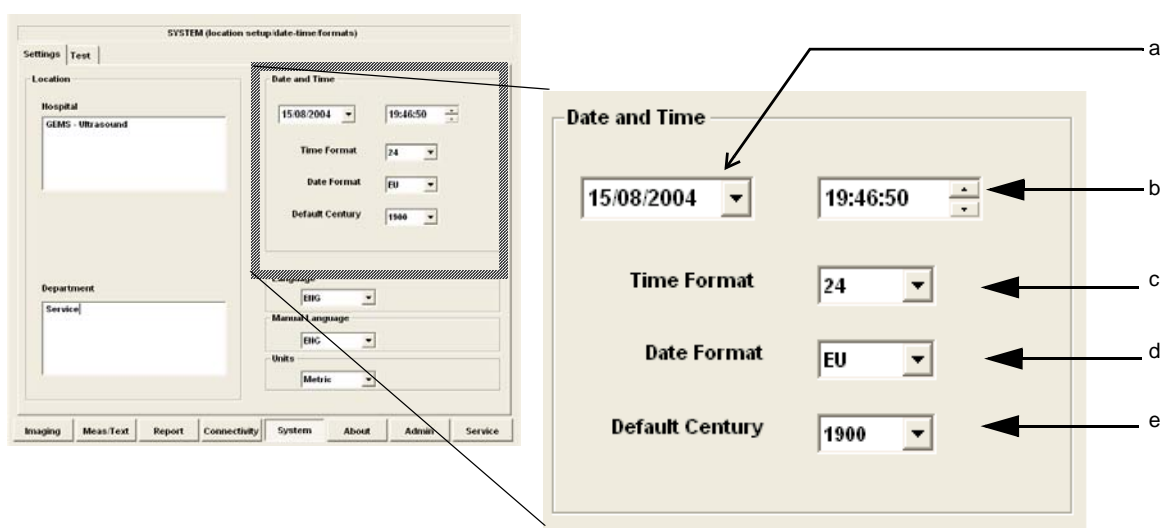


Figure 3-33 Date and Time Adjustments

Table 3-14 Date and Time Adjustments

Step	Task	Expected Result(s)
1.	Open the System (Configuration) Window, see Figure 3-32 on page 3-48 . Select SYSTEM , if needed.	<i>The System Settings Window is displayed.</i>
2.	Adjust the date, see (a) in Figure 3-33.	New date is displayed
3.	Adjust the time, see (b) in Figure 3-33.	New time is displayed
4.	Select the preferred Time Format, see (c) in Figure 3-33.	24 : the 24 hour format is used 12 : the 12 AM/PM hour format is used
5.	Select the preferred Date Format, see (d) in Figure 3-33. DD = Date (two digits) MM = Month (two digits) YYYY = Year (four digits)	EU : the European "DD.MM.YYYY" format is used US : the American "MM.DD.YYYY" format is used
6.	Select Default Century (1900, 2000 or None), see (e) in Figure 3-33.	1900 : the number 19 is automatically displayed when entering the year in the patient date of birth. To edit century, press BACKSPACE twice. 2000 : the number 20 is automatically displayed when entering the year in the patient date of birth. To edit century, press BACKSPACE twice. None : the four digits have to be typed when entering the year in the patient date of birth. The selected setting will be used as soon as the unit has been restarted.

3-7-2-4 Language Selection

The screenshot shows the 'SYSTEM (location setup/date-time/formats)' window. It has two tabs: 'Settings' and 'Test'. The 'Settings' tab is active. The window is divided into two main sections: 'Location' and 'Date and Time'. The 'Location' section has a 'Hospital' field with 'GEMS - Ultrasound' and a 'Department' field with 'Service'. The 'Date and Time' section has a date field set to '15/08/2004', a time field set to '19:46:50', a 'Time Format' dropdown set to '24', a 'Date Format' dropdown set to 'EU', and a 'Default Century' dropdown set to '1900'. Below these are three more dropdown menus: 'Language' (set to 'ENG'), 'Manual Language' (set to 'ENG'), and 'Units' (set to 'Metric'). An arrow points to the 'Language' dropdown menu with the label 'Language'. At the bottom of the window is a row of buttons: 'Imaging', 'Meas/Text', 'Report', 'Connectivity', 'System' (highlighted), 'About', 'Admin', and 'Service'.

Figure 3-34 Language Selection

Table 3-15 Language Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see "Log On to the System as ADM" on page 4-10. Select SYSTEM , if needed.	<i>The System Settings Window is displayed.</i>
2.	Use the Language drop down dialog, see Figure 3-34, 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 - GRE - Greek - DAN - Danish - SWE - Swedish	The selected language will be used as soon as the unit has been restarted.

3-7-2-5 Units of Measure

SYSTEM (location setup/date-time/formats)

Settings | Test

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
EIG

Manual Language
EIG

Units
Metric

Units

Imaging Meas/Text Report Connectivity System About Admin Service

Figure 3-35 Select Units of Measure

Table 3-16 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 3-35) 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.

3-7-3 Service Screen Set-up

3-7-3-1 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

3-7-3-2 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 3-36 below](#).

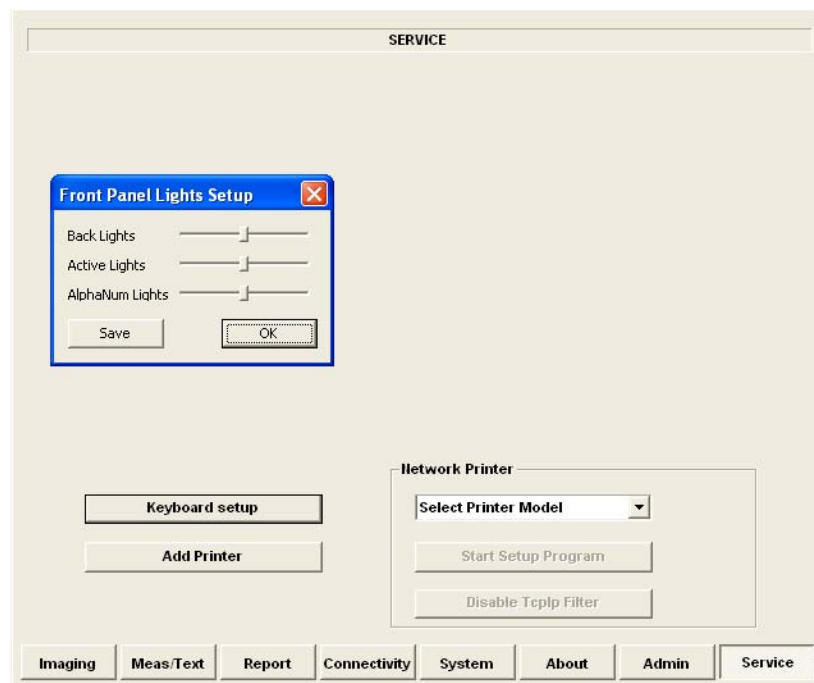
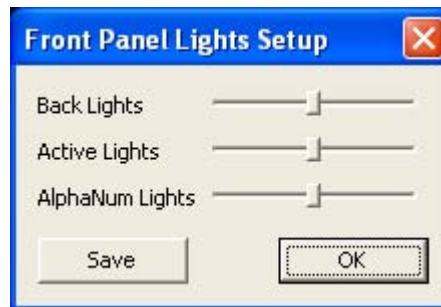


Figure 3-36 Service Screen (Example)

3-7-3-3 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.



Adjust Backlight Intensity
As Required

Figure 3-37 Keyboard Light Intensity Adjustment

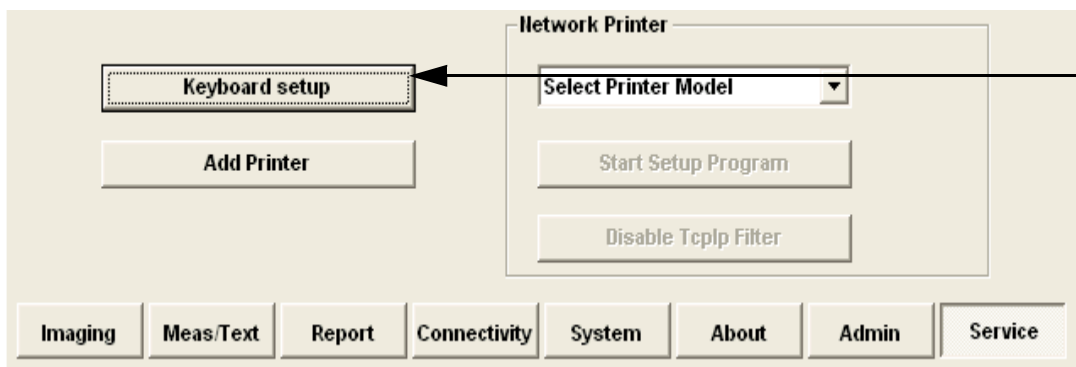
3-7-3-4 LCD Display Adjustment and Calibration

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.

3-7-3-5 Keyboard Setup

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



Select Keyboard setup

Figure 3-38 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.

3-7-3-5-1 Regional Options

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

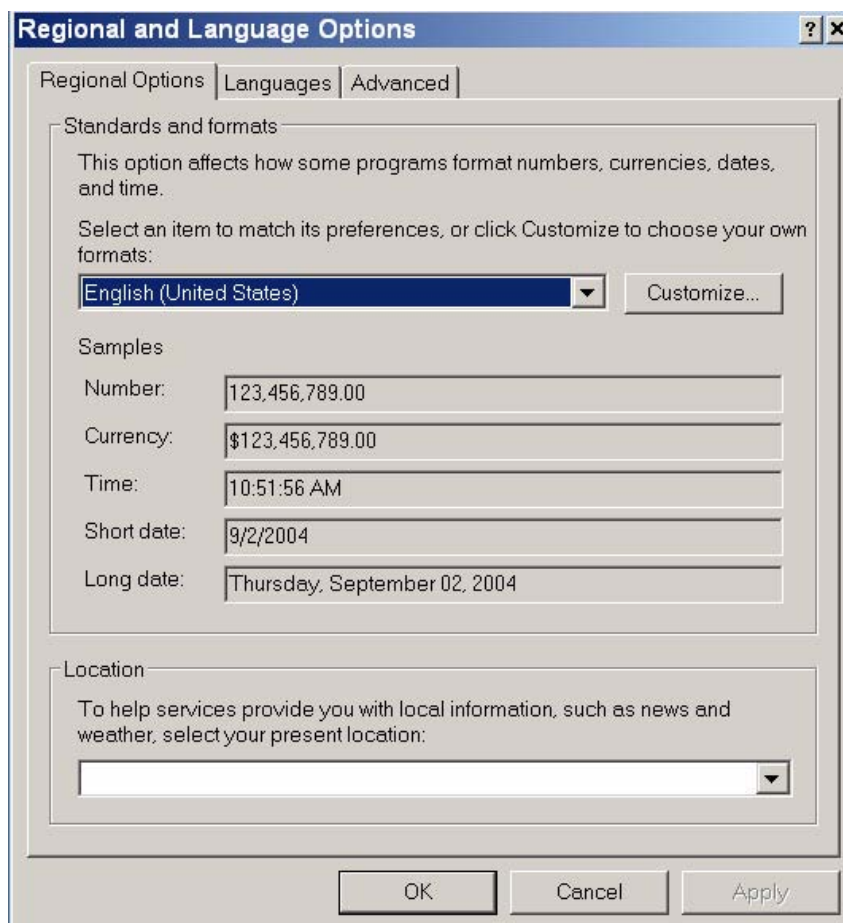


Figure 3-39 Regional Options

3-7-3-5-2 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**.

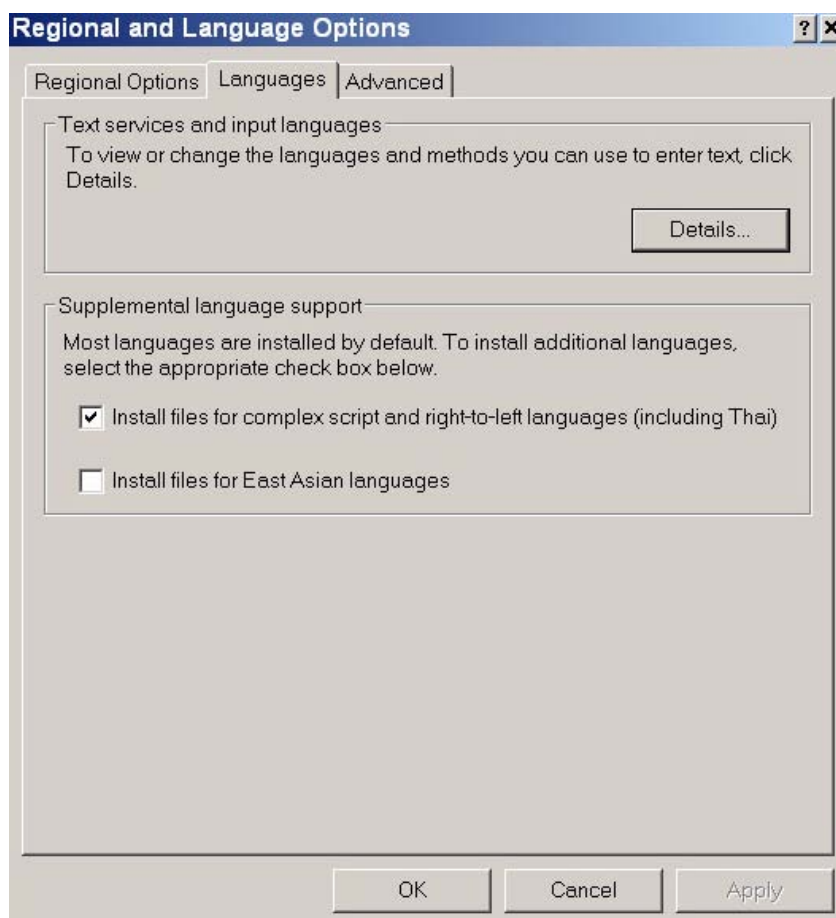


Figure 3-40 Languages

3-7-3-5-3 Advanced

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

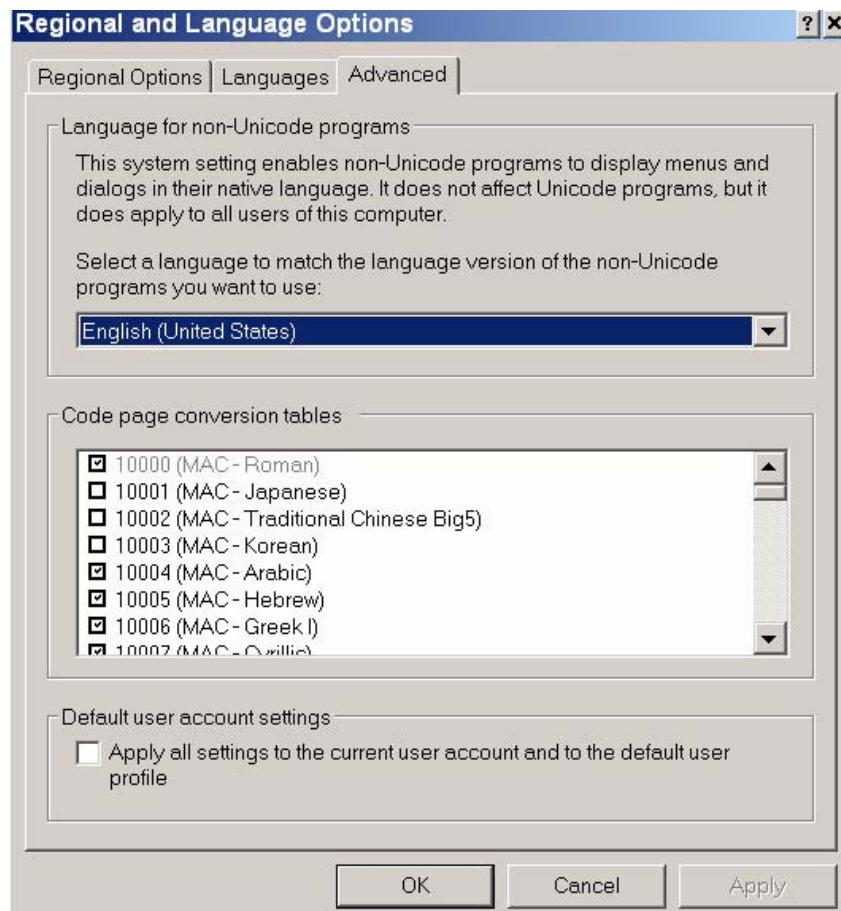


Figure 3-41 Advanced

3-7-3-6 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 Healthcare or the instructions in the respective printer installation manual.

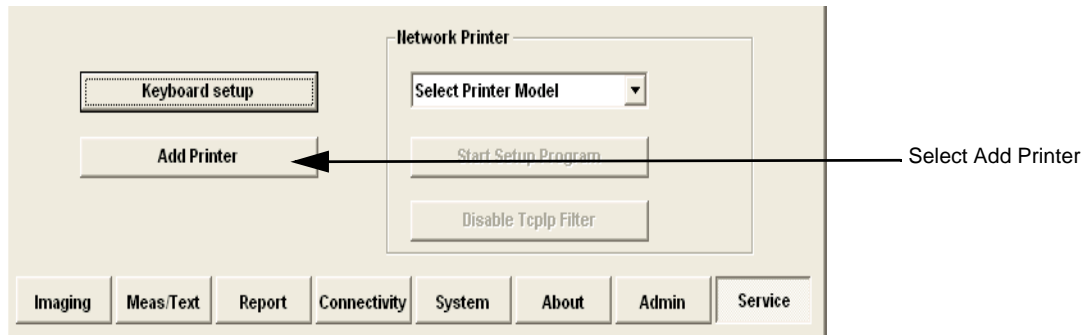


Figure 3-42 Select Add Printer

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



Figure 3-43 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.

3-7-4 Configuring Peripherals

3-7-4-1 Approved Peripherals

The following lists the internal peripherals available for use with the Vivid / n 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).
- 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 / n supports reading of DVD media, but not writing data to DVD.

3-7-4-2 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.

3-7-4-3 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.

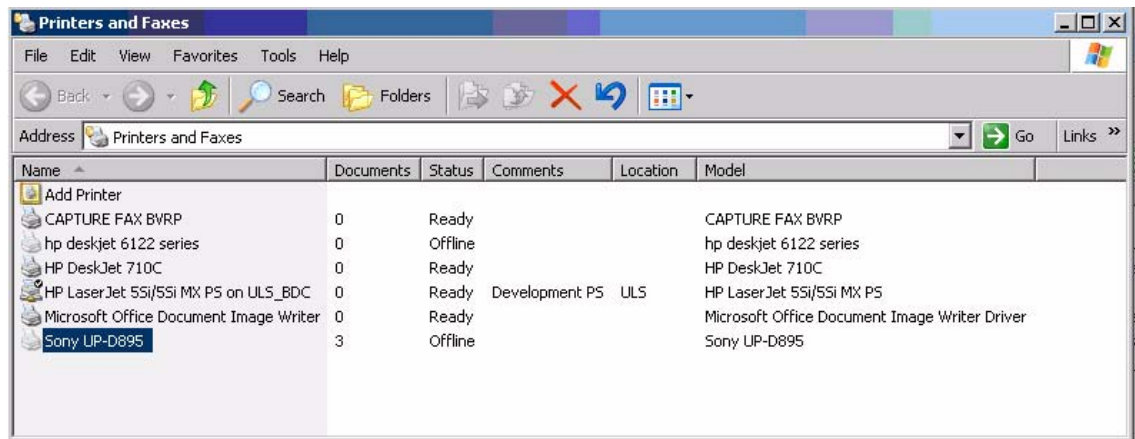


Figure 3-44 Printers and Faxes Window

- 2) Right-click on the destination virtual printer (see Figure 3-44) and select **Open**.

The Virtual Printer Job Queue window is displayed.

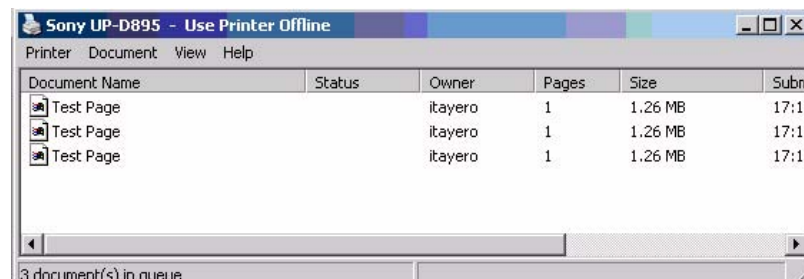


Figure 3-45 Virtual Printer Job Queue Window

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

3-7-4-3 Virtual Printing (Optional) (cont'd)

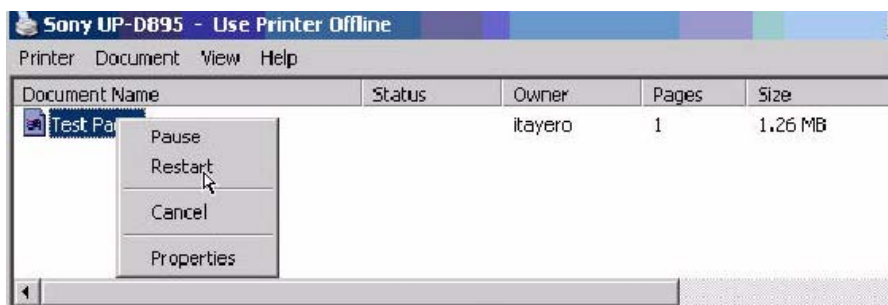


Figure 3-46 Resuming Spooled Print Job

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

3-7-5 Software Options Configuration

3-7-5-1 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 i n.

3-7-5-2 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.

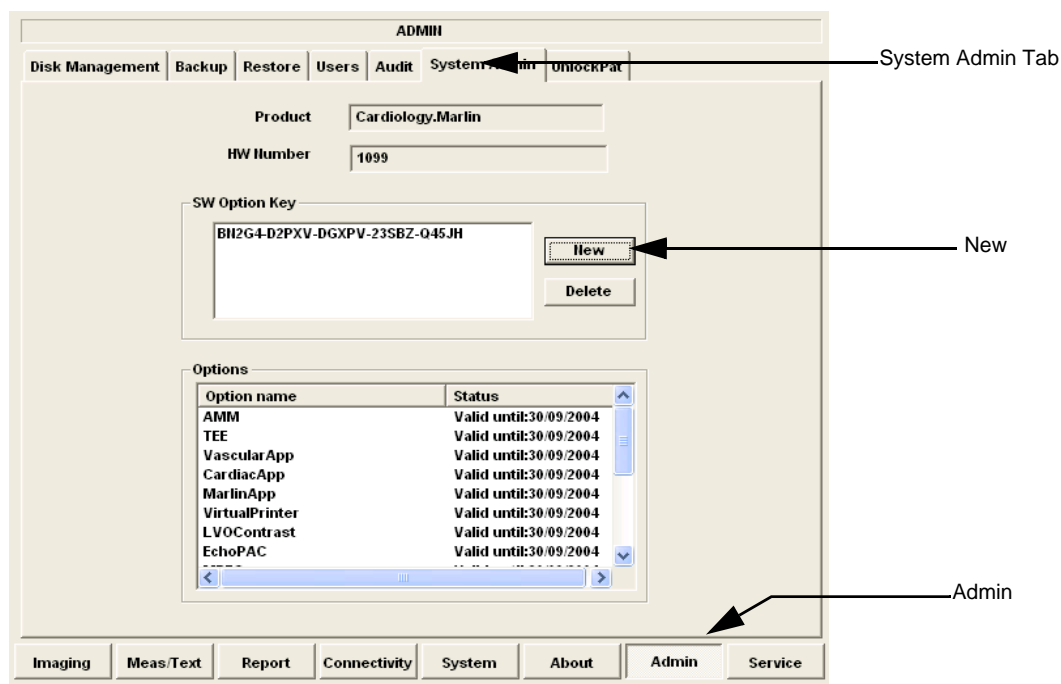


Figure 3-47 System Admin screen

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

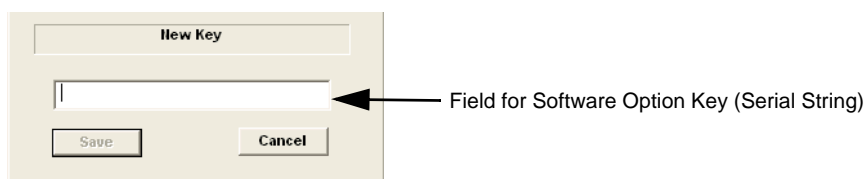


Figure 3-48 Type Software Option Key



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.

3-7-5-3 Remote Check and Configuration

Contact the OnLine Center for InSite Checkout.

Section 3-8 Connectivity Setup

3-8-1 Connectivity Introduction

The Vivid *i 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 *i n* ultrasound unit and other devices in the hospital information system.

The following scenarios are covered:

- A stand-alone Vivid *i n* scanner.
- A Vivid *i 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 *i n* and an EchoPAC PC workstation in a direct connect environment.
- A Vivid *i n* and a DICOM server in a network.
- A Vivid *i 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 *i n* workstation connected to the Hospital Information System (HIS), via the Vivid HL7 Gateway.
- A Vivid *i n* scanner configured for eVue.
Images or loops may be transmitted to a designated PC (“e-Vue PC”) on the network (in compact MPEG format), and will appear at the review PC in almost real time.

3-8-1-1 The Dataflow Concept

Communication between the Vivid *i 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 3-49 on page 3-63](#)).

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 *i 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.

3-8-1-2 Dataflow Naming Convention

The predefined dataflows have descriptive names.

Example: LocalArchive-MOD dataflow

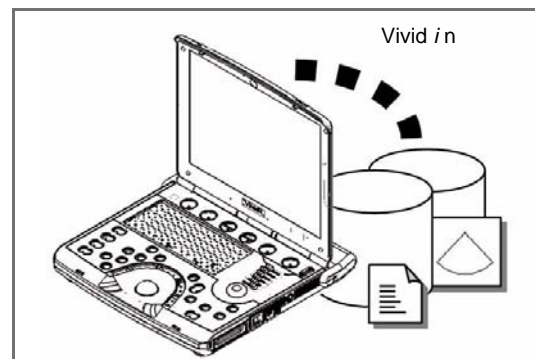
The name indicates that patient data is archived locally in the archive on the internal hard disk and images are stored to an MO disk.

A list of all the predefined dataflows is included in the Vivid *i n*.

3-8-1-3 Dataflow Examples

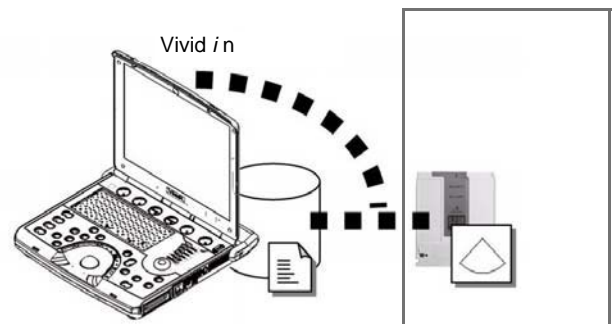
LocalArchive-Int.HD dataflow:

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



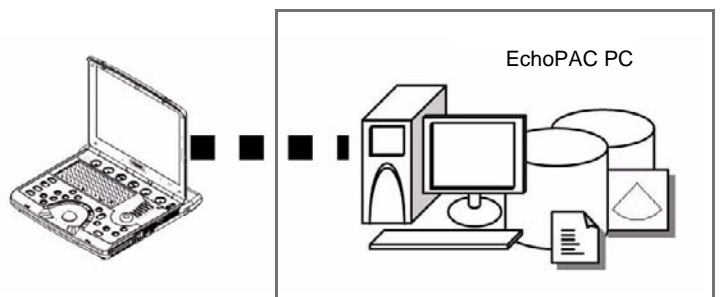
LocalArchive-MOD dataflow:

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.

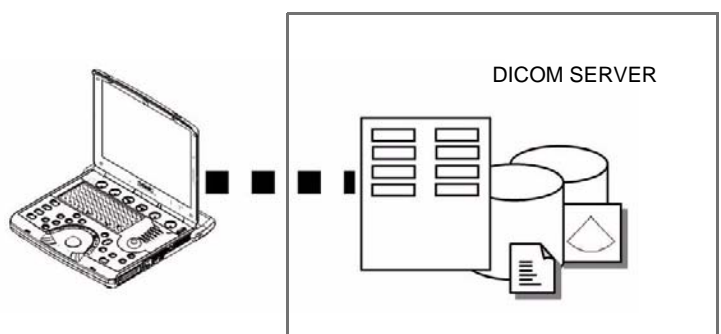


Figure 3-49 Examples of Dataflows

3-8-1-4 Stand-alone Vivid *i 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.

3-8-1-5 “Sneaker Net” Environment

In this scenario, the EchoPAC PC (one or several) is used for review of studies acquired on one or more Vivid *i 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 *i 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.

3-8-1-6 Direct Connection from Vivid *i n* to an EchoPAC PC Workstation

In this configuration, the data is transferred from the Vivid *i 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.

3-8-1-7 Vivid *i n* and a DICOM Server in a Network

In this configuration, the Vivid *i 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.

3-8-2 Physical Connection

3-8-2-1 Ethernet Switch Connections

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



Figure 3-1

Figure 3-50 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 3-17 MDI Button Position Descriptions

3-8-2-2 Local Network Connection to EchoPAC PC Workstation

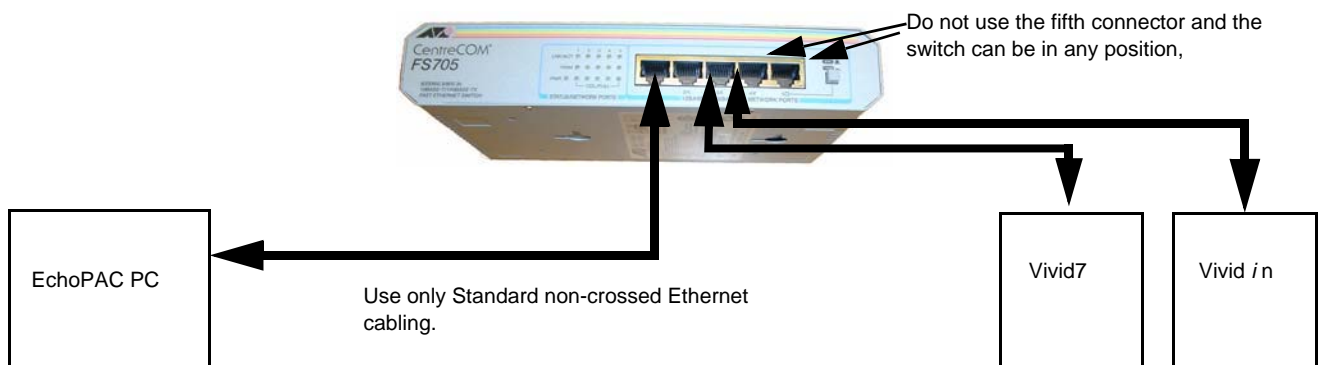


Figure 3-51 Local Network Connection

3-8-2-3 Hospital Network Connection to EchoPAC PC Workstation

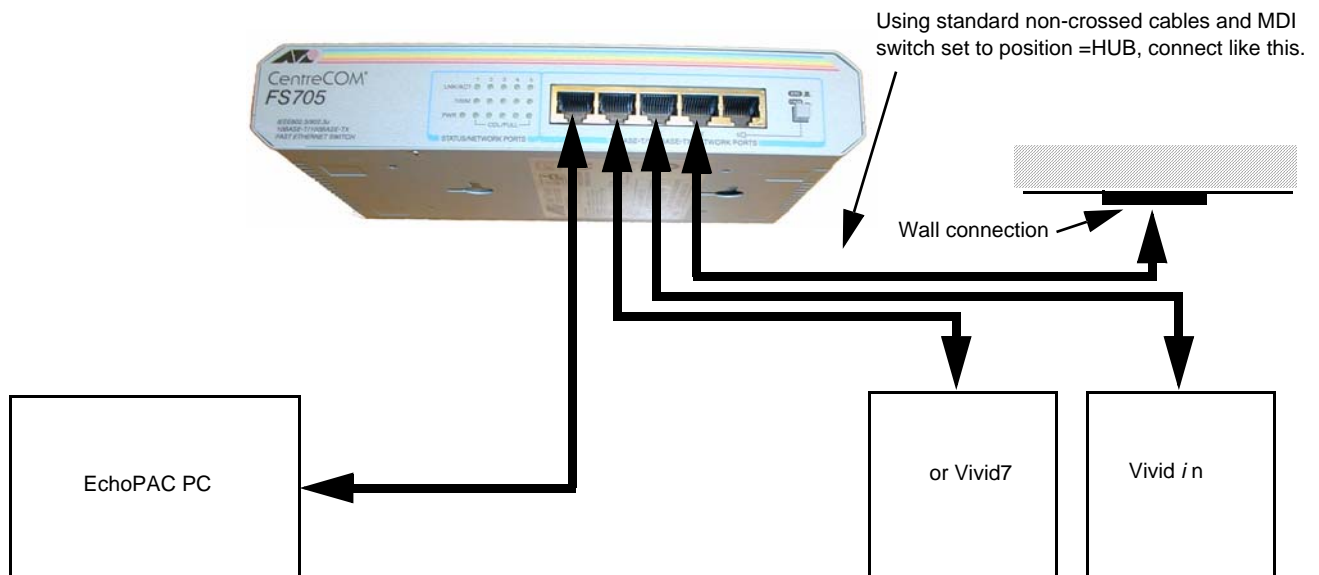


Figure 3-52 Hospital Network Connections

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

3-8-2-4 Wireless Network Configuration

The following procedure is used to configure the Vivid *i* n system for a wireless network environment.

NOTE: Do not use any other type of wireless adaptor other than the Cisco 350 Series WLAN card.

- 1.) PPress **CONFIG** (**F2**) and log on as *Adm*, as described in "Log On to the System as ADM" on page 4-10.
- 2.) Select **CONNECTIVITY** (lower part of window).
- 3.) Select the **TCP/IP** tab.
- 4.) Click the **Advanced Settings** button.

The "Network and Dial-up Connections" dialog box is displayed:

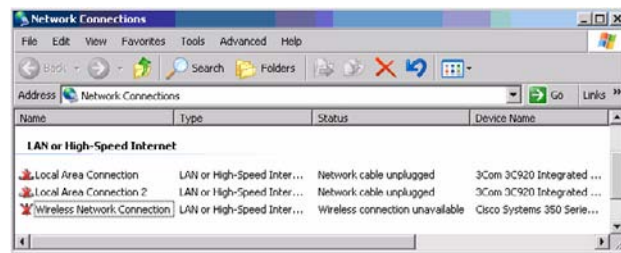
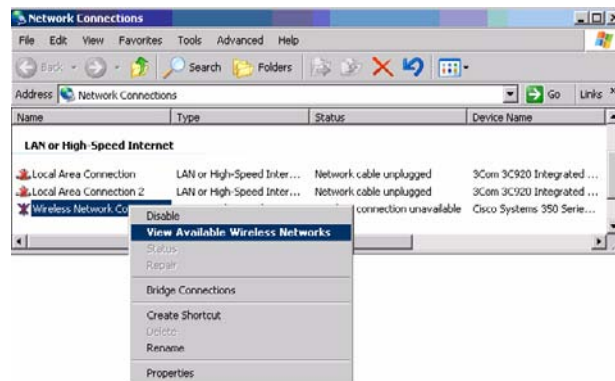


Figure 3-53 Network and Dial-up Connections

- 5.) Select **Wireless Network Connection**, right-click and choose **View Available Wireless Networks** as shown below:



The Wireless Network Connection dialog box is displayed, as shown in Figure 3-54 on page 3-68 .

3-8-2-4 Wireless Network Configuration (cont'd)

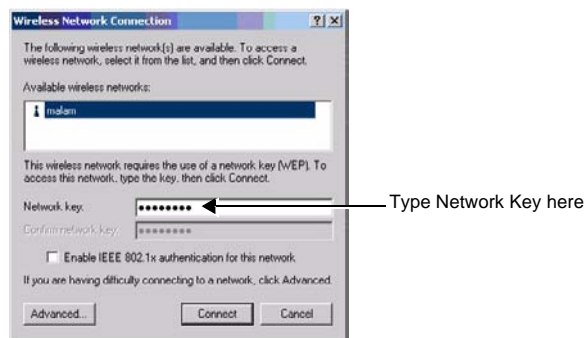


Figure 3-54 Wireless Network Connection Dialog Box

- 6.) Type the Network key (supplied by the Local IT group) in the *Network Key* field and press **Connect**.

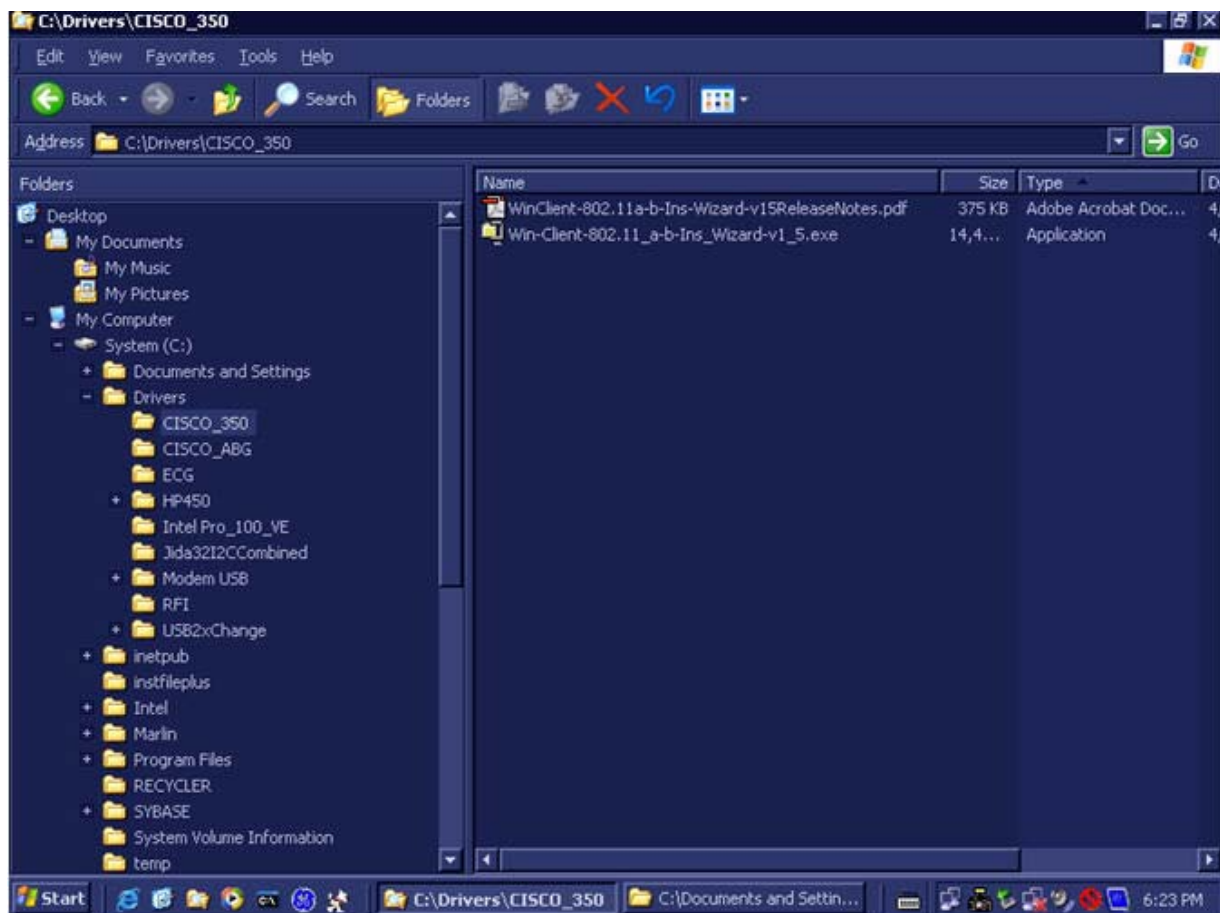


Figure 3-55 CISCO_350 Sub-directory

- 7) .

-
- | | |
|----------------|--|
| 3-8-2-5 | Stand-alone Vivid <i>i n</i>
No network connection needed. |
| 3-8-2-6 | “Sneaker Net” Environment
No network connection needed. |
| 3-8-2-7 | Connection from Vivid <i>i n</i> to an EchoPAC PC Workstation |
-

***Direct Cable Connection from Vivid *i 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 *i 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 ["Ethernet Switch Connections" on page 3-65.](#)

Connection via Hospital Network

You will need one network cable to connect the Vivid *i n* to a wall outlet on the hospital's network.

- | | |
|----------------|--|
| 3-8-2-8 | Connection between a Vivid <i>i n</i> 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 *i 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 *i n* to the Peer-to-Peer Network.

3-8-3 Connectivity Configuration

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

3-8-3-1 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.

3-8-3-2 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 TcpiP).

Computer Name:

For Vivid i 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 i 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 displays the 'CONNECTIVITY' configuration window. At the top, there are tabs: Dataflow, Additional Outputs, Tools, Formats, and TcpiP (selected). The main area contains several input fields and buttons. A red dashed box highlights the 'Computer Name' field (VIVID_I-0000001), the 'AE Title' field (VIVID_I-0000001), and the 'Port No.' field (104). Another red dashed box highlights the 'IP settings' section, which includes 'IP-Address' (10.0.0.4), 'Subnet Mask' (255.255.252.0), and 'Default Gateway' (3.222.23.250). A third red dashed box highlights the 'Remote Archive Setup' section, which includes 'Remote Archive IP-Addr' (10.0.0.3) and 'Remote Archive Name' (ECHO PAC7-000000). On the right side, there are buttons for 'Detailed DICOM Log', 'Save settings', and 'Advanced Settings'. At the bottom, there is a navigation bar with buttons: Imaging, Meas/Text, Report, Connectivity (selected), System, About, Admin, and Service.

Figure 3-56 TCP/IP Set-up Screen for Vivid i n, Overview (Example)

3-8-3-3 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 'IP settings' section contains the following fields:

- Computer Name: VIVID_I-0000001
- AE Title: VIVID_I-0000001
- Port No: 104
- IP-Address: 10, 0, 0, 4
- Subnet Mask: 255, 255, 252, 0
- Default Gateway: 3, 222, 23, 250

The 'Remote Archive Setup' section contains the following fields:

- Remote Archive IP-Addr: 10, 0, 0, 3
- Remote Archive Name: ECHOPAC7-000000

Buttons for 'Save settings' and 'Advanced Settings' are visible on the right. The bottom navigation bar includes 'Imaging', 'Meas/Text', 'Report', 'Connectivity', 'System', 'About', 'Admin', and 'Service'.

Figure 3-57 TCP/IP Set-up for Vivid i n

3-8-3-4 Set the Remote Archive's Network Information

In the Remote Archive Setup area of the screen (see example in [Figure 3-58](#)), 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: ECHOPAC7-000001).

The screenshot shows the 'Remote Archive Setup' section with the following fields:

- Remote Archive IP-Addr: 10, 0, 0, 3
- Remote Archive Name: ECHOPAC7-000001

Figure 3-58 TCP/IP Set-up for Vivid i n

3-8-3-5 Save the New Settings

- 1.) Press SAVE SETTINGS to save the new settings.

Save settings

The screenshot shows the 'CONNECTIVITY' settings window. At the top, there are tabs: Dataflow, Additional Outputs, Tools, Formats, and Tcpip. The 'Tcpip' tab is selected. Below the tabs, there are input fields for 'Computer Name' (VIVID_I-0000001), 'AE Title' (VIVID_I-0000001), and 'Port No.' (104). There is a checkbox for 'Detailed DICOM Log'. Below these is a section for 'IP settings' with fields for 'IP-Address' (10, 0, 0, 4), 'Subnet Mask' (255, 255, 252, 0), and 'Default Gateway' (3, 222, 23, 250). Below the IP settings is a section for 'Remote Archive Setup' with fields for 'Remote Archive IP-Addr' (10, 0, 0, 3) and 'Remote Archive Name' (ECHOPAC7-000000). On the right side of the window, there are two buttons: 'Save settings' and 'Advanced Settings'. An arrow points from the text 'Save settings' on the left to the 'Save settings' button.

Figure 3-59 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 / N system to activate the changes.

3-8-3-6 Configuring the Vivid i n and Network PC for Peer-to-Peer Connection

NOTE: The following steps are performed on the Vivid i n scanner.
The instruction *Select* = trackball to the specific item and press the *Set* button on the control panel.

- 1.) On the Vivid i 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.

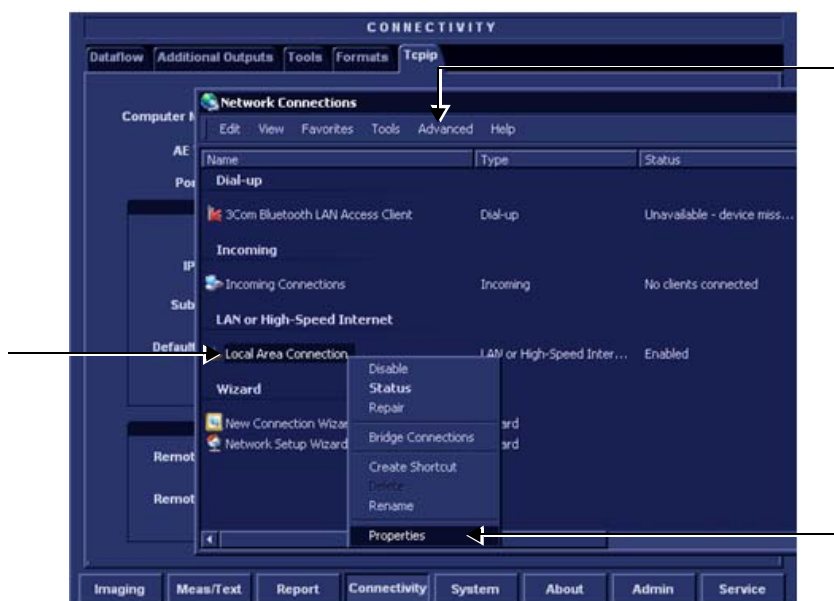


Figure 3-60 Connectivity Dialog Box - TCPIP Advanced Tab

- 5.) Select the **Local Area Connection**, as shown in [Figure 3-60](#).
- 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 3-61 Local Area Connection Properties

3-8-3-6 Configuring the Vivid i n and Network PC for Peer-to-Peer Connection (cont'd)

- 8.) Select **Internet Protocol (TCP/IP)**.
- 9.) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

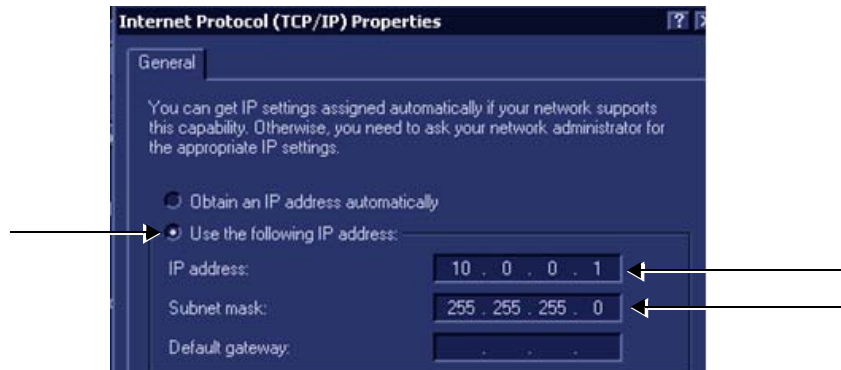


Figure 3-62 Internet Protocol (TCP/IP) Properties

- 10.) Activate the **Use the following IP address** check box.
- 11.) Type in the Vivid i 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 i 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.

3-8-3-6 Configuring the Vivid i n and Network PC for Peer-to-Peer Connection (cont'd)

- 3) Double-click on **Local Area Connection** icon.

The Local Area Connection Properties dialog box opens.

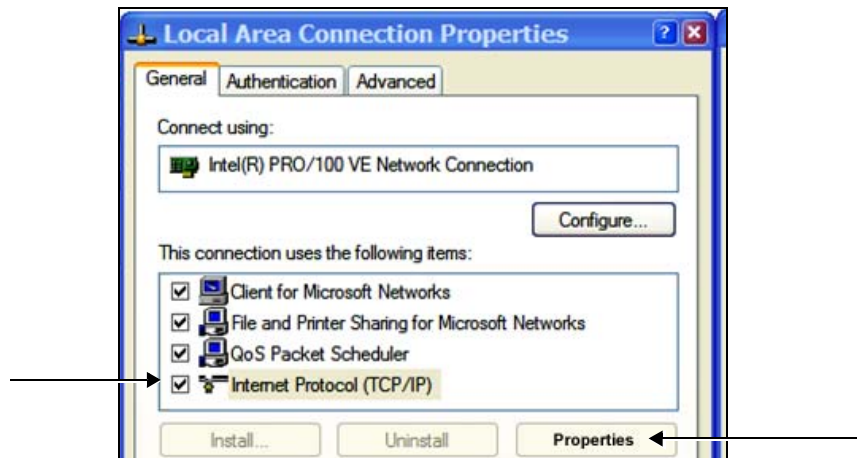


Figure 3-63 Local Area Connection Properties

- 4) Select **Internet Protocol (TCP/IP)**.
- 5) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

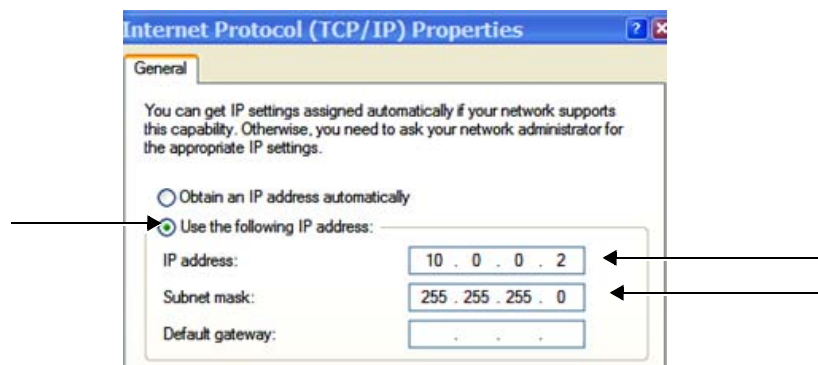


Figure 3-64 Internet Protocol (TCP/IP) Properties

- 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 i 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 i n.

- 9) Click **OK**, close all windows and approve all changes. Return to regular mode.

3-8-3-6 Configuring the Vivid i n and Network PC for Peer-to-Peer Connection (cont'd)

- 10) Connect the Vivid *i 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 *i n* and the network computer are now ready for export, import of files.

Note: One can check the connection by pinging to the Vivid *i 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 *i n* then press <**Enter**>.

If return timing is OK, you have an operating network connection.

3-8-3-7 Configuring the Vivid i n and Network PC for a LAN Connection

NOTE: The following steps are performed on the Vivid i n scanner.
The instruction *Select* = trackball to the specific item and press the *Set* button on the control panel.

- 1.) On the Vivid i 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.

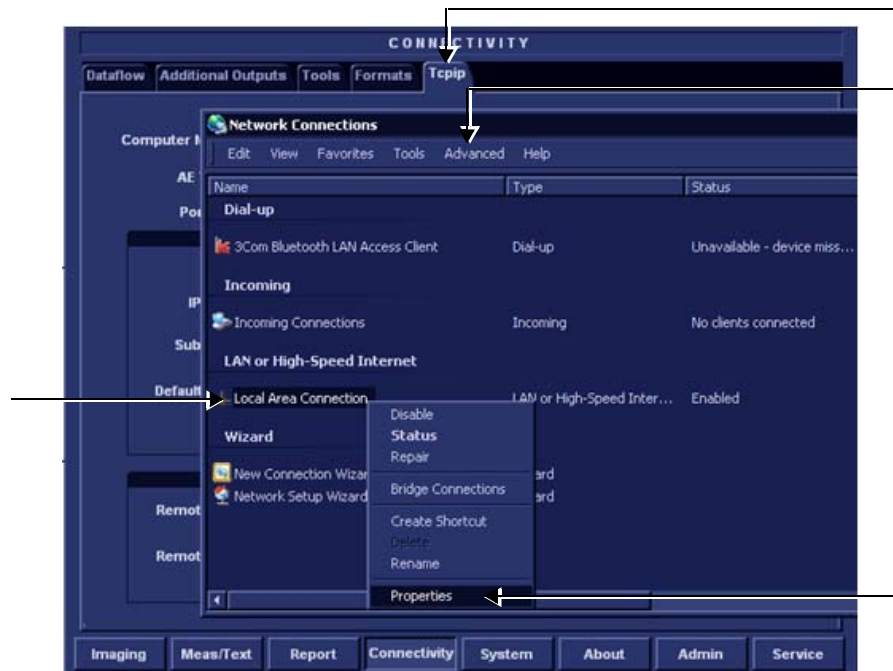


Figure 3-65 Connectivity Dialog Box - TCPIP Advanced Tab

- 5.) Select the **Local Area Connection**, as shown in [Figure 3-60](#).
- 6.) Press the **Menu** button on the control panel.

3-8-3-7 Configuring the Vivid i n and Network PC for a LAN Connection (cont'd)

- 7.) From the drop-down menu, select **Properties**.

The Local Area Connection Properties dialog box opens.



Figure 3-66 Local Area Connection Properties

- 8) Select **Internet Protocol (TCP/IP)**.

- 9) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

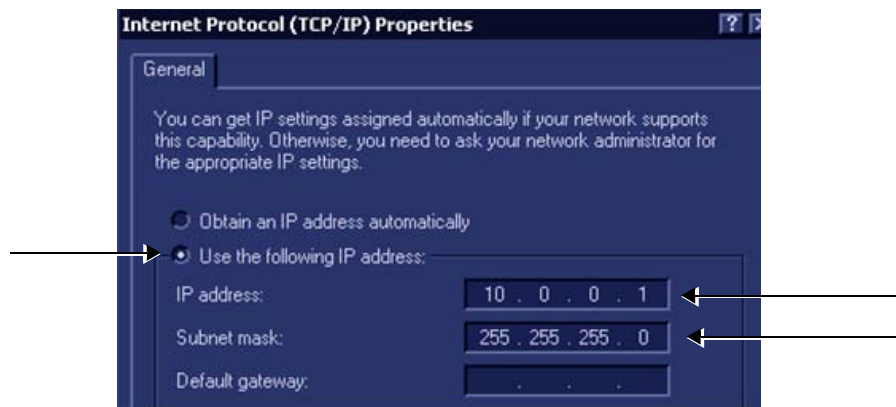


Figure 3-67 Internet Protocol (TCP/IP) Properties

- 10.) Activate the **Use the following IP address** check box.

- 11.) Type in the Vivid i 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 i n.

3-8-3-7 Configuring the Vivid i n and Network PC for a LAN Connection (cont'd)

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.

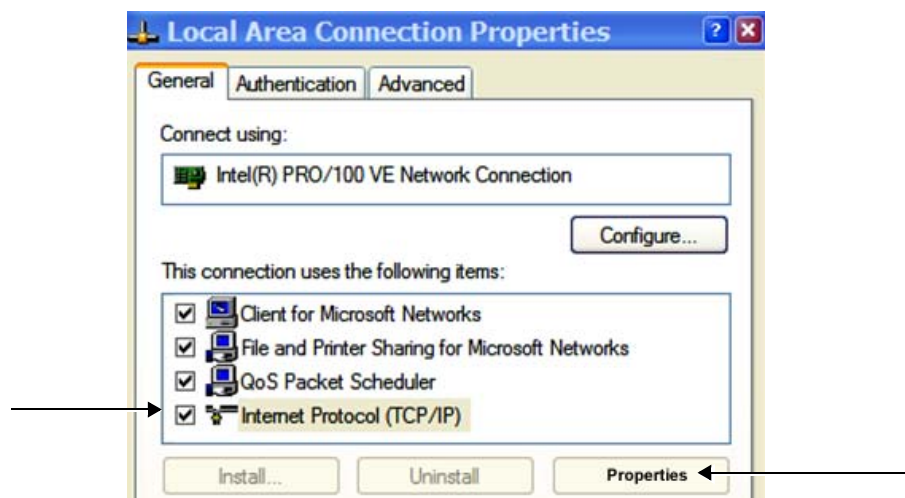


Figure 3-68 Local Area Connection Properties

- 4) Select **Internet Protocol (TCP/IP)**.
- 5) Click the **Properties** button.

The Internet Protocol (TCP/IP) Properties dialog box opens.

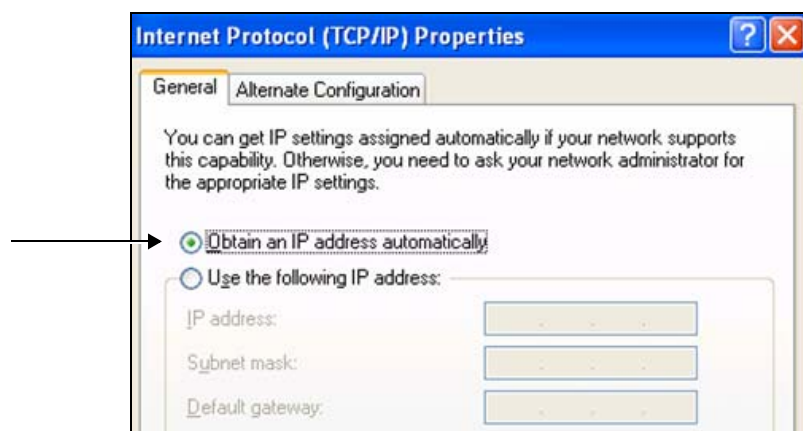


Figure 3-69 Internet Protocol (TCP/IP) Properties

3-8-3-7 Configuring the Vivid i n and Network PC for a LAN Connection (cont'd)

- 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 *i n* and network computer LAN connection using a regular Network cable.

The Vivid *i n* and the network computer are now ready for export, import of files.

Note: One can check the connection by pinging to the Vivid *i 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 *i n* then press **<Enter>**.

If return timing is OK, you have an operating network connection.

3-8-4 Set Up Connection to a DICOM Server in a Network

In this case, the Vivid *i* 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.

3-8-4-1 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.

3-8-4-2 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 3-70](#).

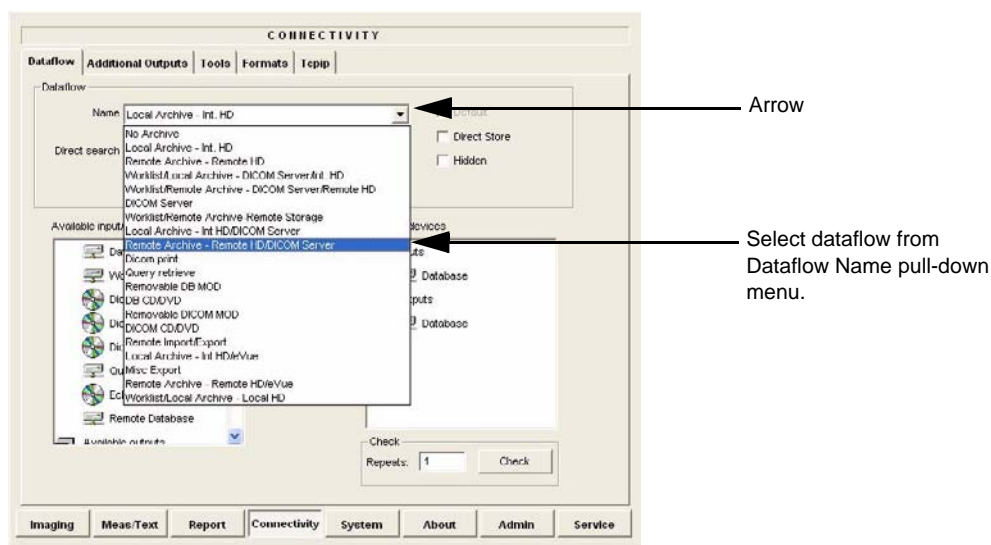


Figure 3-70 Select Dataflow

- 5.) From the Dataflow Name pull-down list, select the dataflow you want to configure - see [Figure 3-70](#).

3-8-4 Set Up Connection to a DICOM Server in a Network (cont'd)

The selected flow is shown, as seen in the example in [Figure 3-71 below](#) (Worklist/Local Archive - DICOM Server/Int. HD).

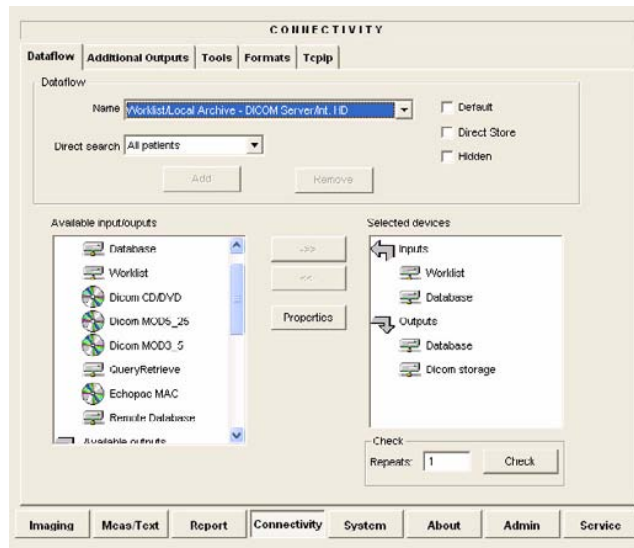


Figure 3-71 Worklist/Local Archive - DICOM Server/Int. HD Flow

- 6.) Select **Worklist** (so it is highlighted) and then select **Properties** to display the Properties dialog.

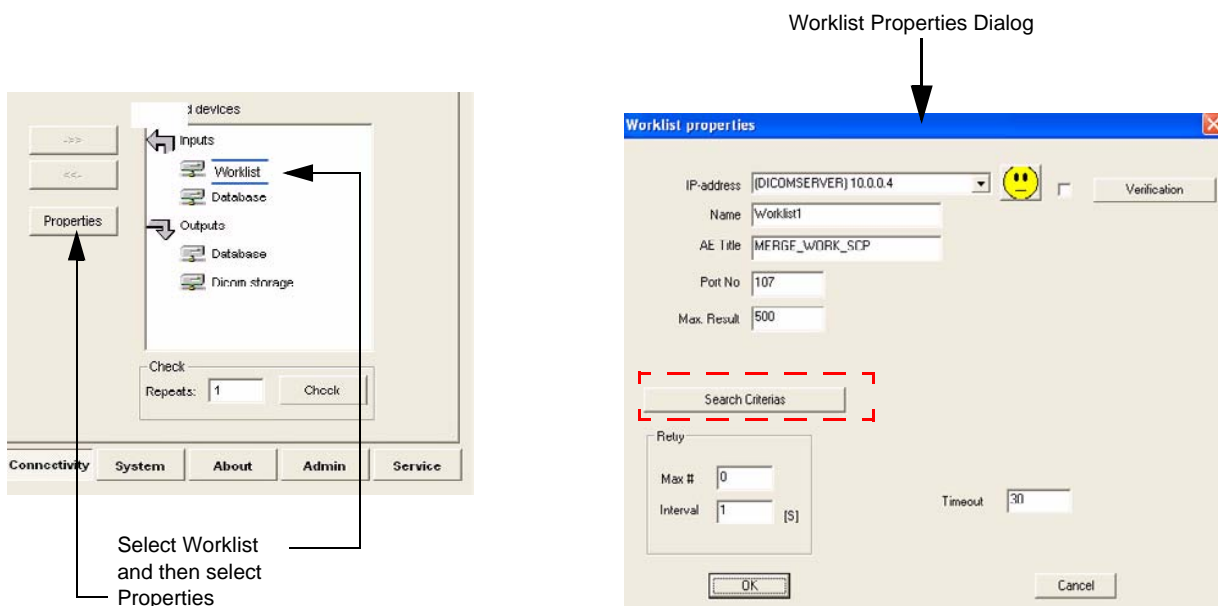


Figure 3-72 Select Worklist Properties Dialog Box

- 7.) Click on "**Search Criterias**" ([Figure 3-72](#)).

The *Search Criterias* window opens ([Figure 3-72](#)).

3-8-4 Set Up Connection to a DICOM Server in a Network (cont'd)

- 8.) Highlight the modality filter in the list and click on **"Remove"** (see [Figure 3-72](#)).

Name	Value	Don't Use
00080060 Modality	EC	<input type="checkbox"/>

Figure 3-73 Search Criterias Window

- 9.) In the Select Tag drop down menu select **"00080060 Modality"**.

3-8-4 Set Up Connection to a DICOM Server in a Network (cont'd)

10.) Type **US** in the Value text box and click on "**Add to List**".

The Search Criterias window is updated (see [Figure 3-73](#)).

The screenshot shows the 'Search Criterias' dialog box. At the top, there is a title bar 'Search Criterias'. Below it, there is a 'Select Tag' dropdown menu with '00080060 Modality' selected. To the right of the dropdown is a small downward arrow. Below the dropdown is a 'Value' text box containing 'US'. To the right of the text box is a checkbox labeled 'Don't Use' which is unchecked. Below the text box are two buttons: 'Add to List' and 'Remove'. Below these buttons 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 3-74 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.

3-8-4 Set Up Connection to a DICOM Server in a Network (cont'd)

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.

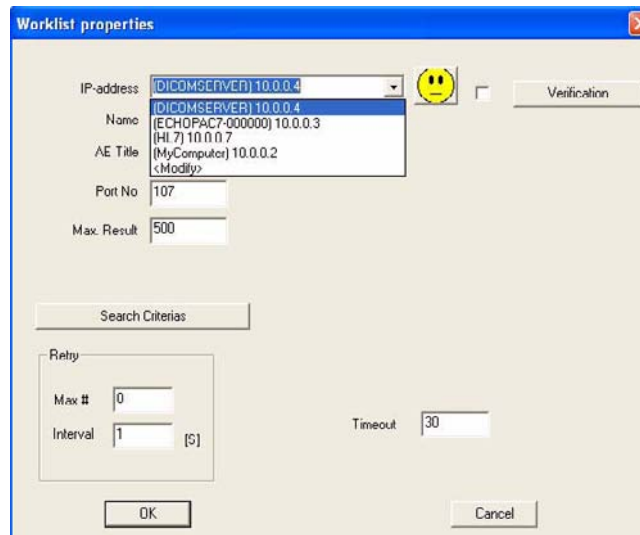


Figure 3-75 DICOM Server's Properties Dialog Box

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.

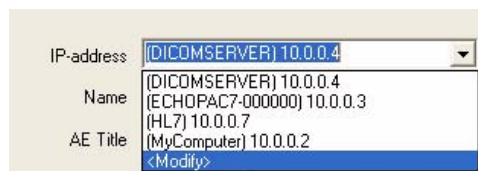


Figure 3-76 Select <Modify>

b.) From the IPs dialog box, select the server you want to modify, then select **Modify**.

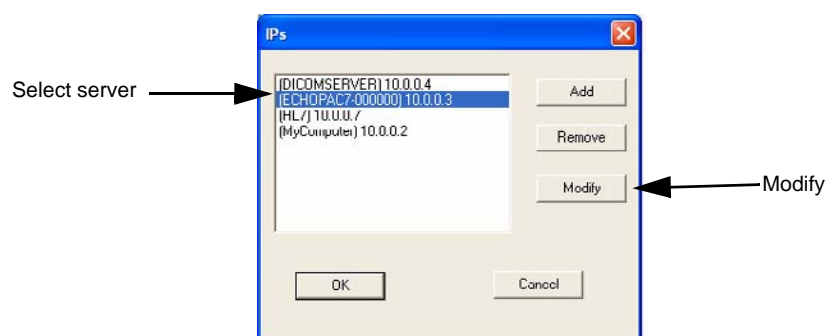


Figure 3-77 Select the Unit to Modify

3-8-4 Set Up Connection to a DICOM Server in a Network (cont'd)

- c.) Edit the name and/or the IP address of the server, see [Figure 3-78](#).

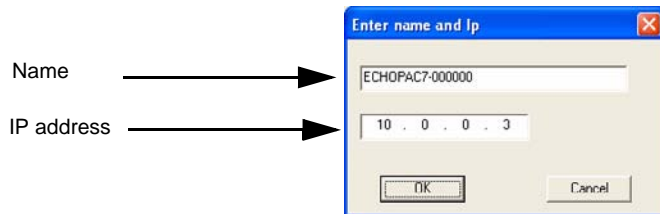


Figure 3-78 Edit Name and/or IP address

- 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.

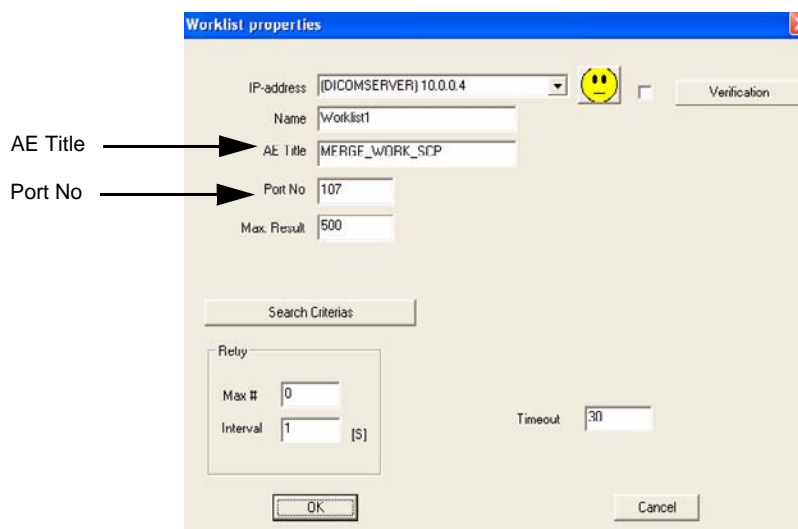


Figure 3-79 DICOM Server's Properties Dialog Box

- 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.

3-8-4-3 Verify the Connection to a Device

- 1.) Select (highlight) the device to which you want to verify the connection.

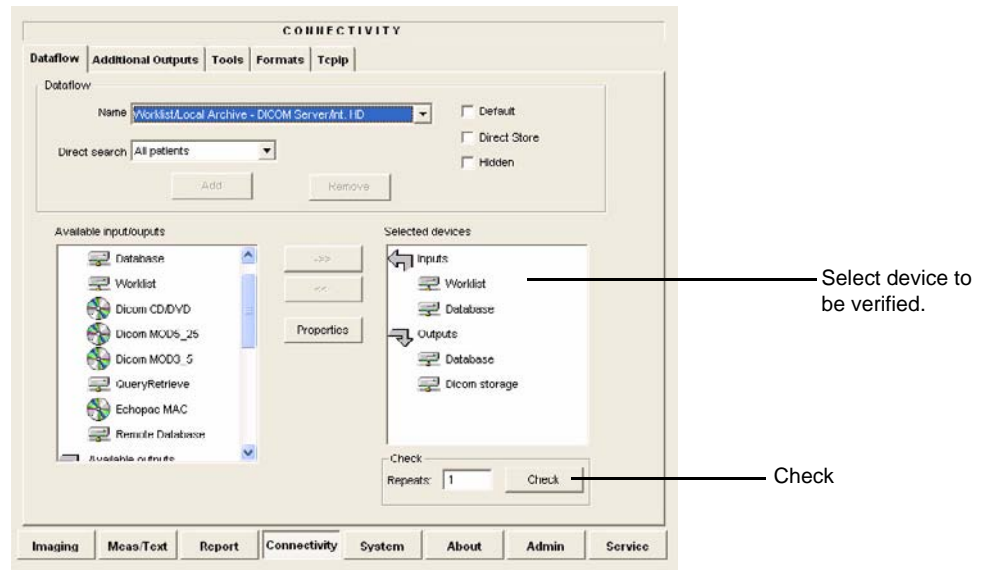


Figure 3-80 Verify Connection to a Device

- 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).

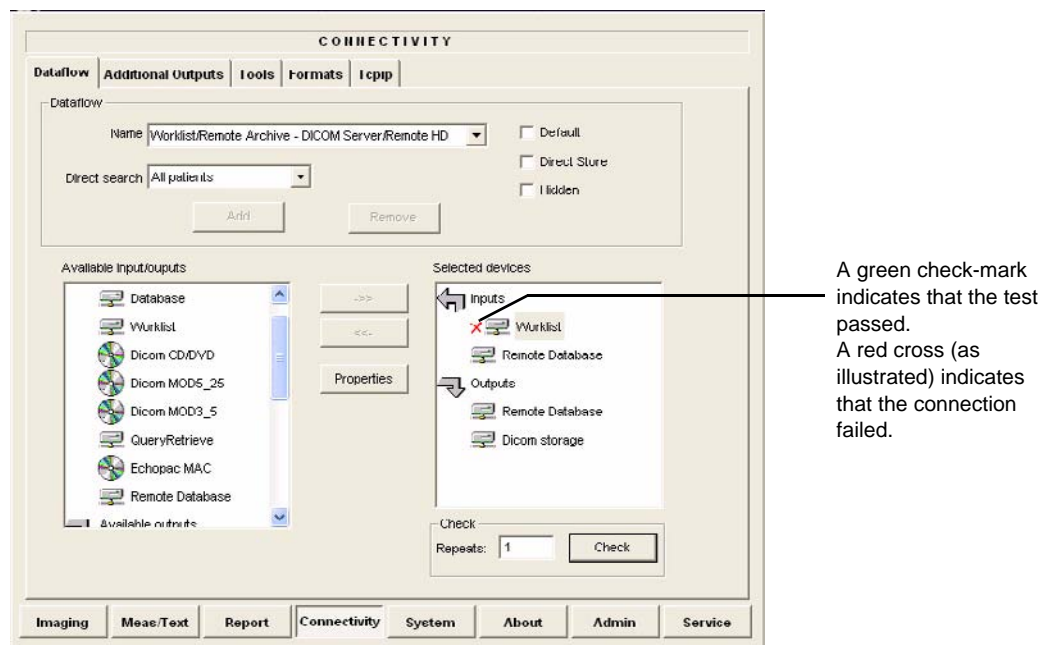


Figure 3-81 Verification Result

3-8-5 Setup Connection to HL7 Server in a Network

3-8-5-1 Introduction

The procedures below describe how to set up the Vivid *i 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.

3-8-5-2 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 *i n* being configured to the Mitra support personnel.

3-8-5-3 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.

3-8-5-3 Configuration of Modality Worklist Services (cont'd)

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 i 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 Criterias* dialog box, select **00400001 Scheduled Station AE Title** from the *Select Tag* pull-down menu.
 - 2.) Enter the Vivid i 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 Criterias* 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**.

3-8-5-3 Configuration of Modality Worklist Services (cont'd)

Test Connectivity with the Vivid HL7 Gateway

The purpose of this test is to verify that the Vivid *i 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 *i 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 *i n*.

Verify that the Vivid *i 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.

3-8-5-3 Configuration of Modality Worklist Services (cont'd)

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 i 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 i n.

3-8-6 Query/Retrieve (Q/R) Setup

3-8-6-1 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 *i n*.

3-8-6-2 Query/Retrieve Setup on the Vivid *i 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 3-84 on page 3-93 .

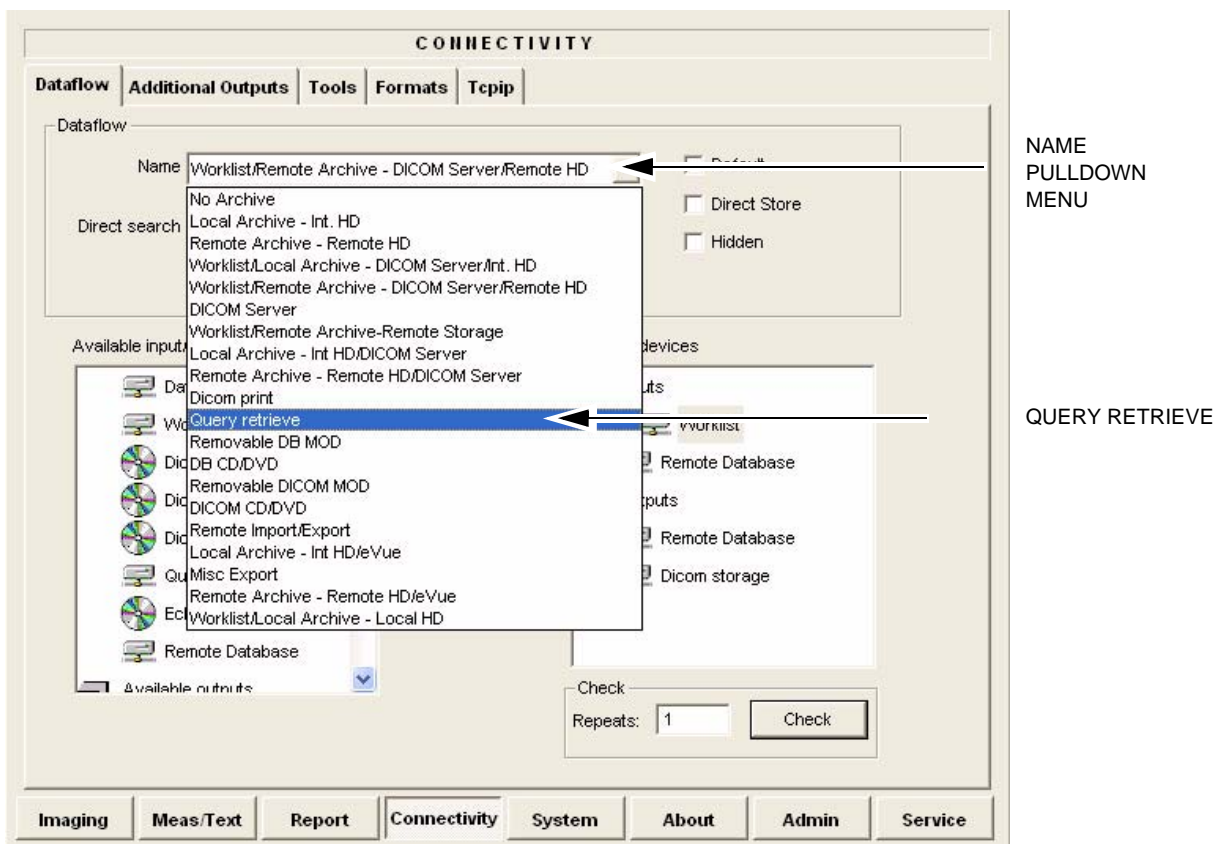


Figure 3-82 Select Query Retrieve

3-8-6-2 Query/Retrieve Setup on the Vivid i n (cont'd)

The selected dataflow (Query/Retrieve), is displayed as shown in [Figure 3-83](#).

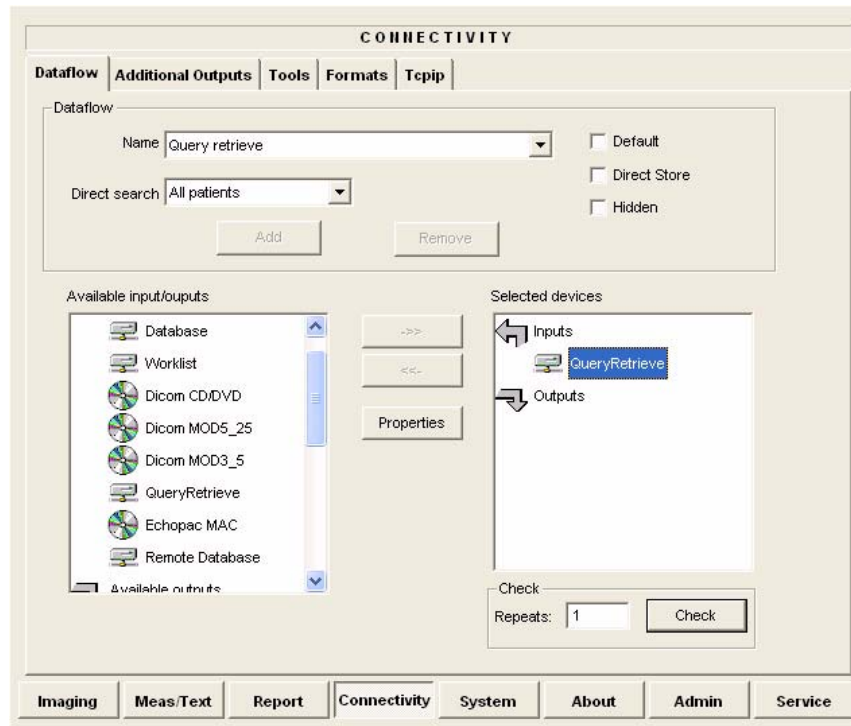


Figure 3-83 Query/Retrieve Workflow

- 5.) Select **QueryRetrieve** so it is highlighted and then select **Properties** to display the Properties dialog box.

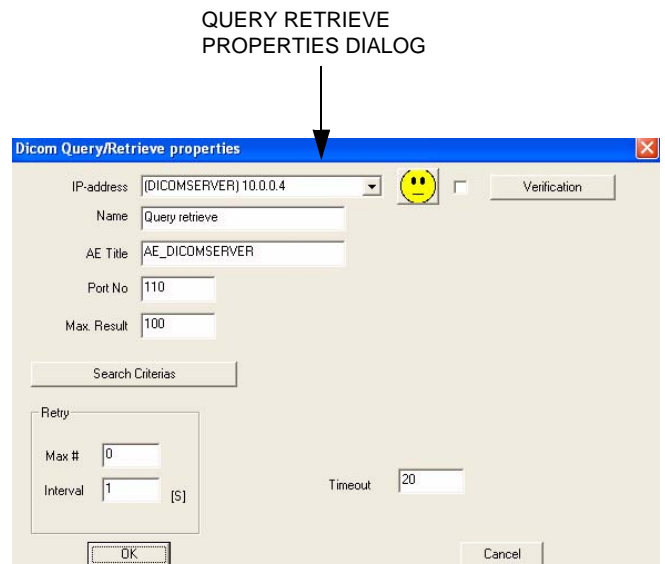
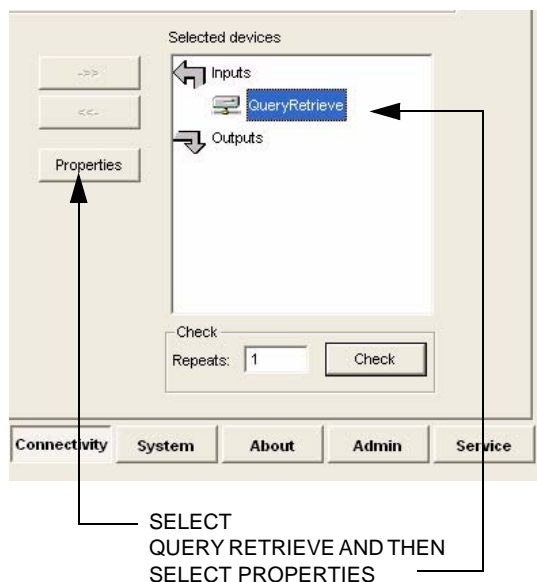


Figure 3-84 Select Query/Retrieve's Properties

3-8-6-2 Query/Retrieve Setup on the Vivid i n (cont'd)

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

OK Cancel

IP-ADDRESS DOWN-ARROW

AE TITLE

PORT NO

Figure 3-85 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.

3-8-6-2 Query/Retrieve Setup on the Vivid i n (cont'd)

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

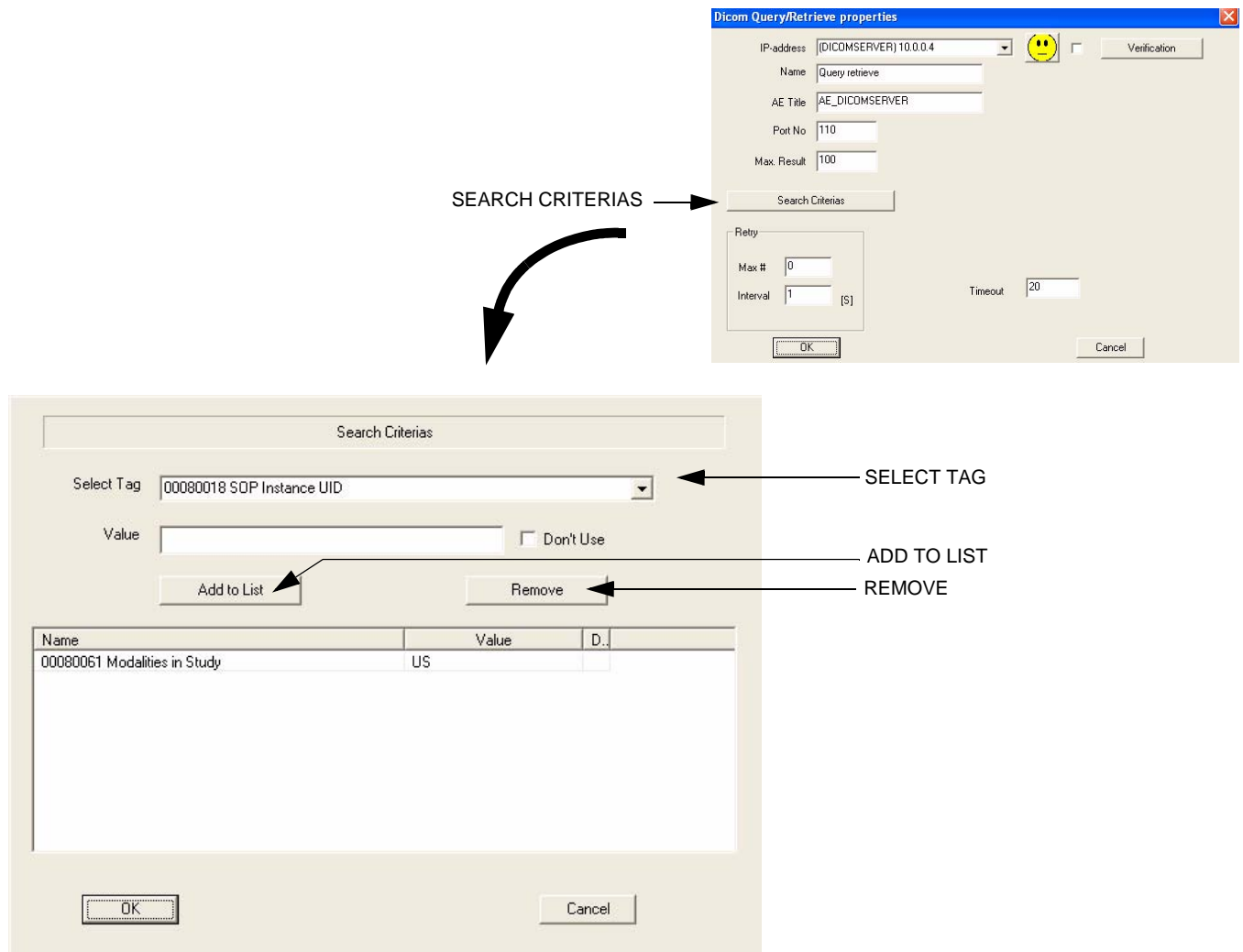


Figure 3-86 Select Search Criterias

- 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.

3-8-6-3 Query/Retrieve Verification

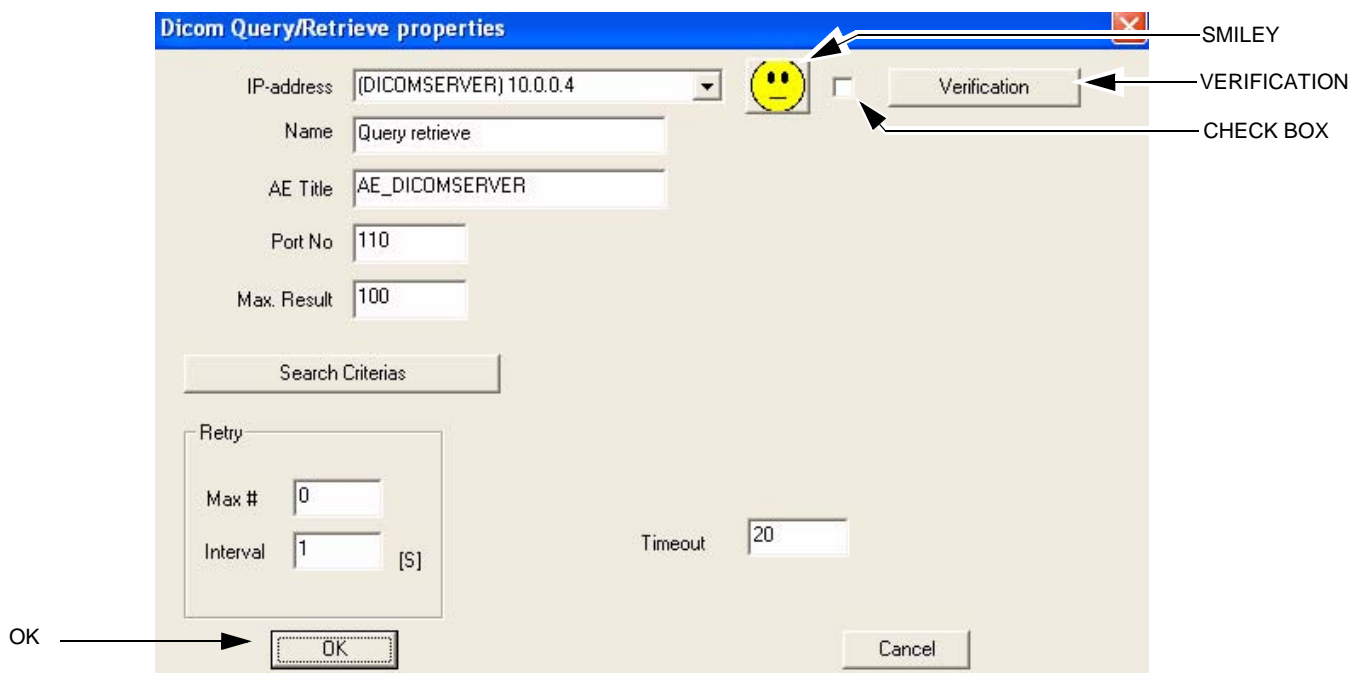


Figure 3-87 DICOM Query/Retrieve Properties

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.

3-8-6-3 Query/Retrieve Verification (cont'd)

Follow the Steps Below to Test the DICOM Query/Retrieve Workflow

NOTE: This check uses both Ping and DICOM Ping.

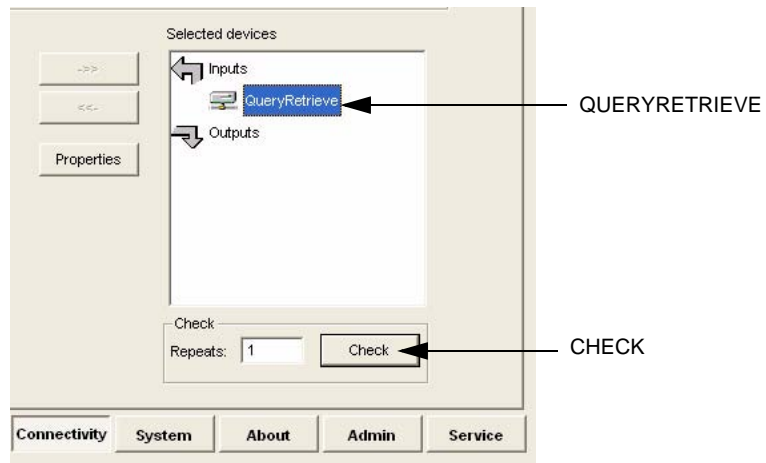


Figure 3-88 Check the DICOM Query/Retrieve Workflow

- 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 3-89](#). Select **OK** to continue. A green check mark to the left of the Selected devices indicates that the test passed successfully.

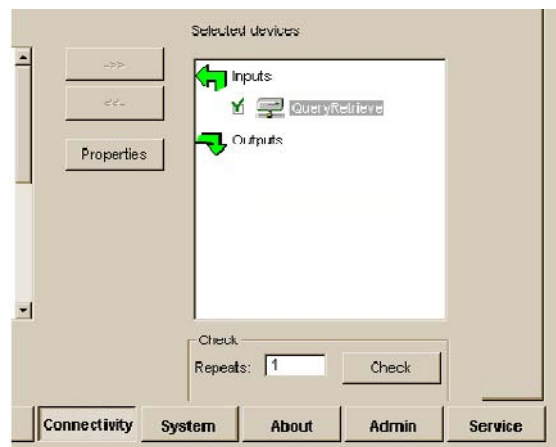


Figure 3-89 Test (Check) Passed

3-8-6-3 Query/Retrieve Verification (cont'd)

- If the test fails, a pop-up warning is displayed, see left illustration in [Figure 3-90](#). Select **OK** to continue. A red "X" to the left of the Selected devices indicates that the test failed.

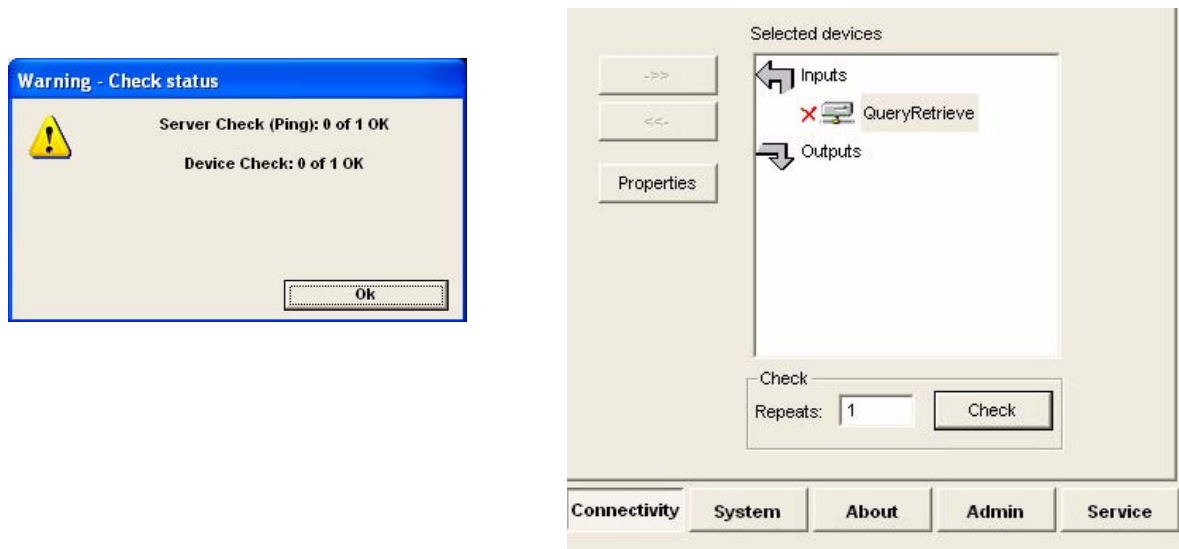


Figure 3-90 Test (Check) Failed

3-8-7 MPEGVue Export Configuration

3-8-7-1 Introduction

The procedures below describe how to set up the Vivid / n 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 / 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.

3-8-7-2 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.

3-8-7-3 Configuring the Vivid *i* 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 3-91](#).

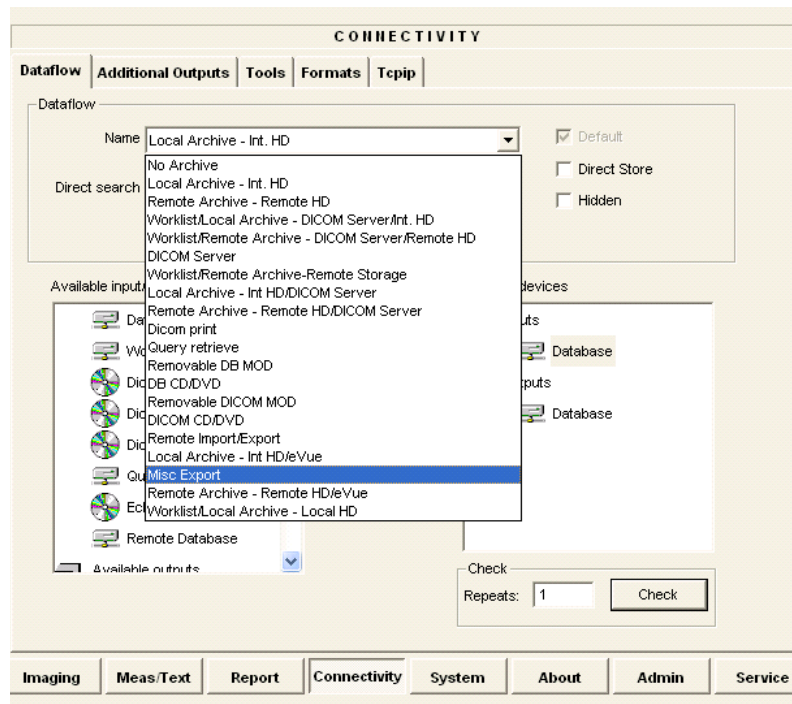


Figure 3-91 Dataflow - Misc Export

3-8-7-3 Configuring the Vivid i n for MPEGVue Export (cont'd)

- 5) From selected output devices, highlight **evue** and then click the **Properties** button - refer to Figure 3-92 on page 3-101 .

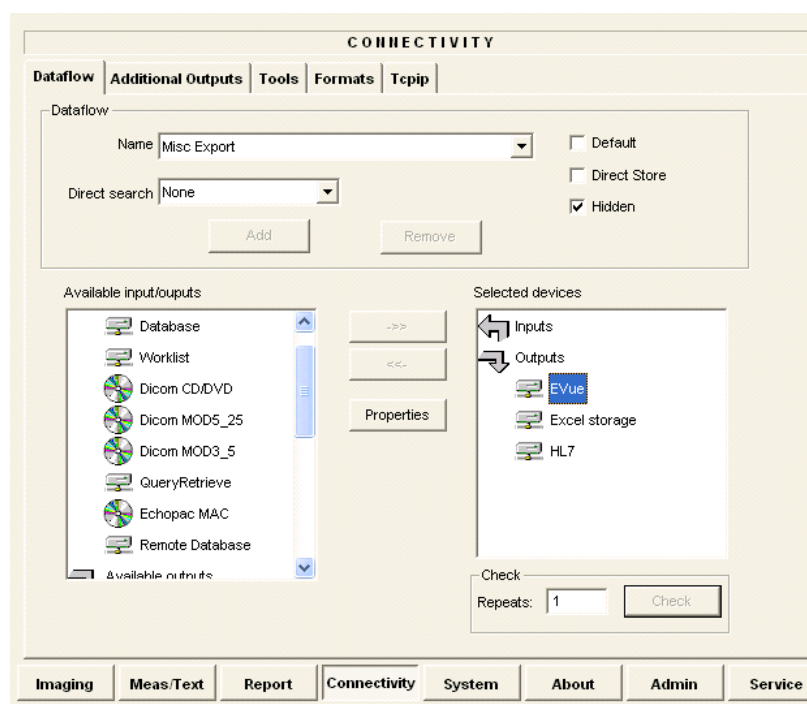


Figure 3-92 eVue Properties

The eVue Properties Dialog box opens:

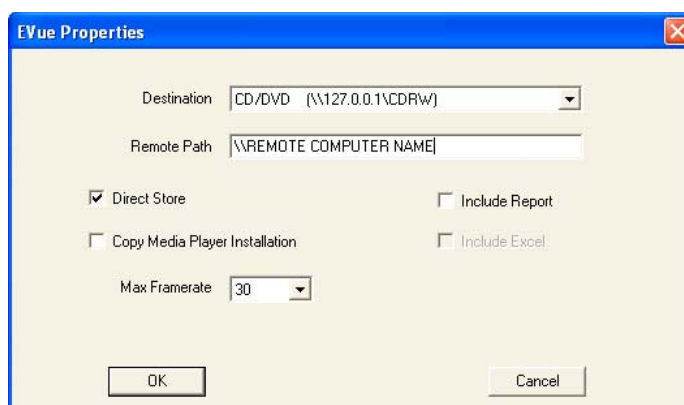


Figure 3-93 eVue Properties Dialog Box

- 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).

3-8-7-3 Configuring the Vivid i n for MPEGVue Export (cont'd)

- 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.

3-8-7-4 Exporting to MPEGVue

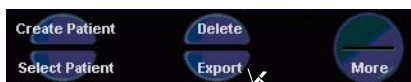
When exporting to MPEGVue, the Media can be one of the following supported types:

- 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 3-94 Export Dialog Box

- 5.) Under Export *To*: select **To MPEGVue** in the combo-box on the right, as shown in [Figure 3-94](#).
- 6.) Click **OK**.

The Patient List screen is displayed with the following header:

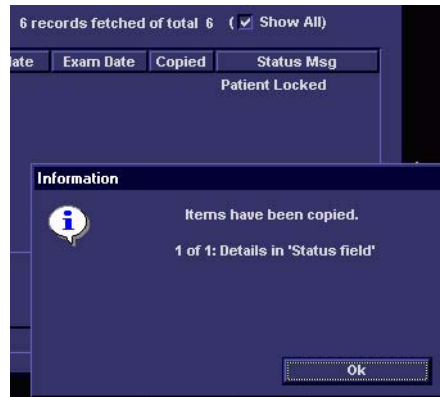


- 7.) Trackball to the required Patient File and select it by pressing SET.
To select more than one Patient File from list, use the <Shift> key together with SET

3-8-7-4 Exporting to MPEGVue (cont'd)

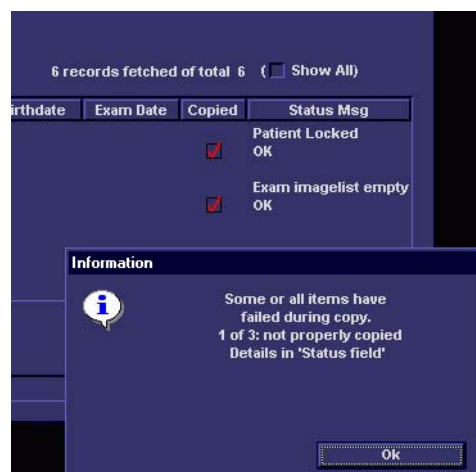
- 8.) When ready, after the required Patients Files have been selected (highlighted,) press the **COPY** button.

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 / 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.



3-8-8 eVue Dataflow Configuration

3-8-8-1 Introduction

It is possible to configure the Vivid / n 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.

3-8-8-2 Preparations

Before configuring the Vivid / 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 / n to send images to that specific e-Vue PC, as described below.

3-8-8-3 Configuring the Vivid *i* 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 *i* n is connected to the Network via cable or wireless.
- 3.) On the Vivid *i* 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 3-95 on page 3-105 .

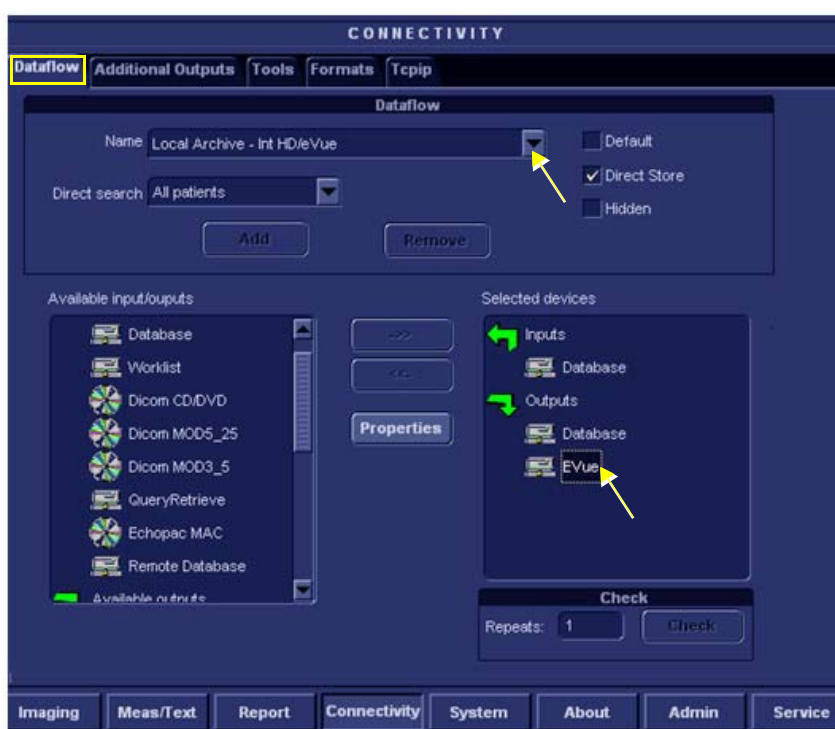


Figure 3-95 Connectivity - Dataflow Tab Selected

- 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 3-95](#)).

3-8-8-3 Configuring the Vivid i n for eVue Dataflow (cont'd)

- 9.) Trackball to the **Properties** button and press **SET**.

The eVue Properties dialog box opens.

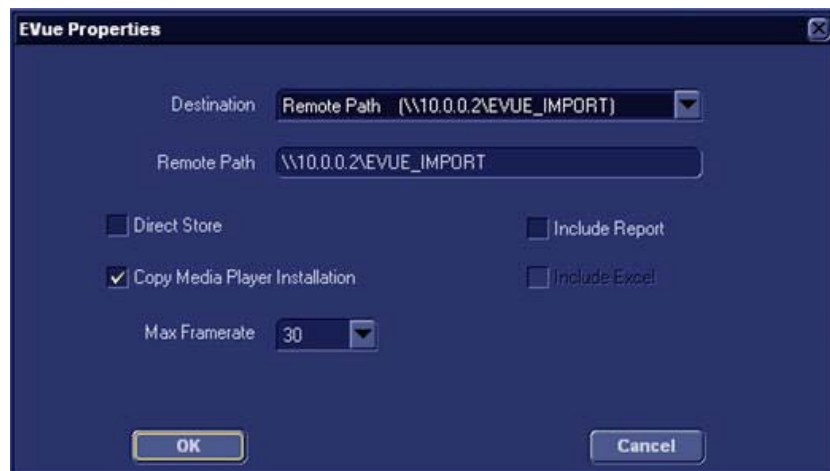


Figure 3-96 eVue Properties Dialog Box

- 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 3-96](#)).
- 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 3-96](#)).
- 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.

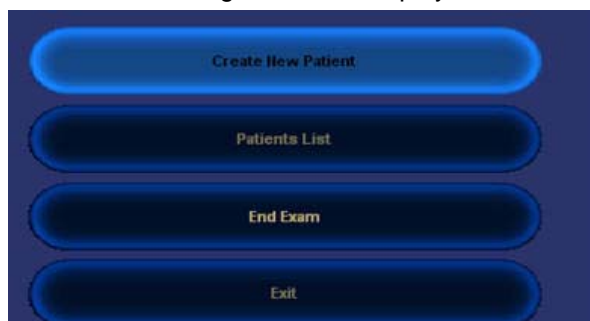
The Vivid i n dataflow is set and ready for export/import of eVue files into a network computer.

From now on, whenever the Vivid i 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".

3-8-8-4 Using eVue

- 1.) On the Vivid / n, in regular scanning mode, press **Patient**.

When the following window is displayed, select **Create New Patient**.



The Search/Create Patient dialog box opens.

Figure 3-97 Search/Create Patient Dialog Box

- 2.) Type the patient's Last Name and ID in the appropriate fields (see [Figure 3-97](#)).
- 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 3-97](#)).
- 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 3-96](#) on page 3-106).

- 6.) To proceed, follow to the instructions as described for "Using MPEGVue Viewer on a Remote PC" on page 3-126.

3-8-9 Using MPEGVue/eVue on a Remote PC

3-8-9-1 Installing MPEGVue on a Remote PC

NOTE: *MPGEGVue player is not compatible with Windows 98.*

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 3-98](#) and [Figure 3-99](#)), 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.

3-8-9-1 Installing MPEGVue on a Remote PC (cont'd)

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.

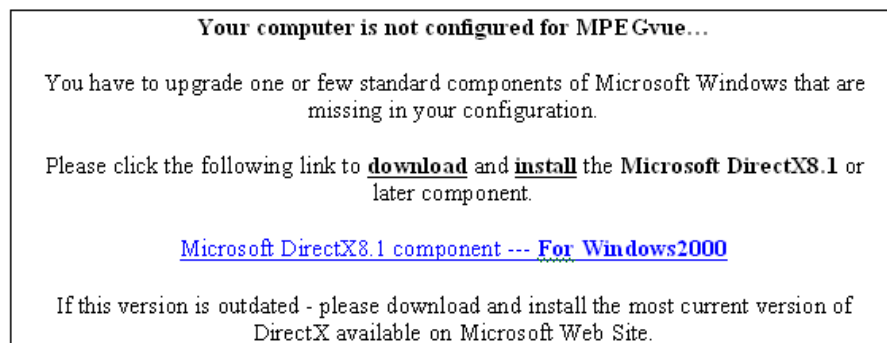


Figure 3-98 Download/Installation Message Examples #1

3-8-9-1 Installing MPEGVue on a Remote PC (cont'd)

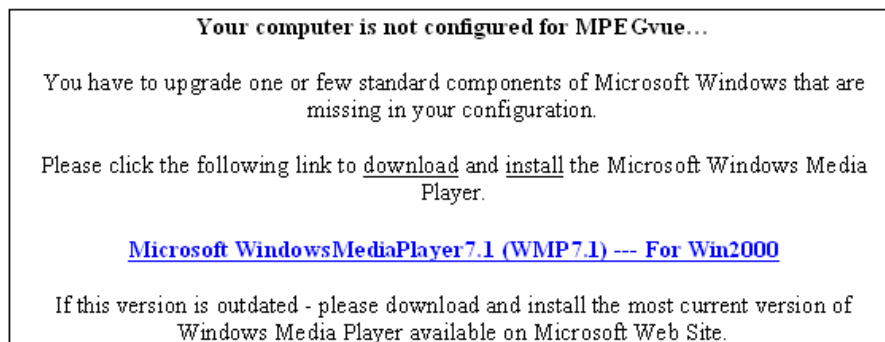
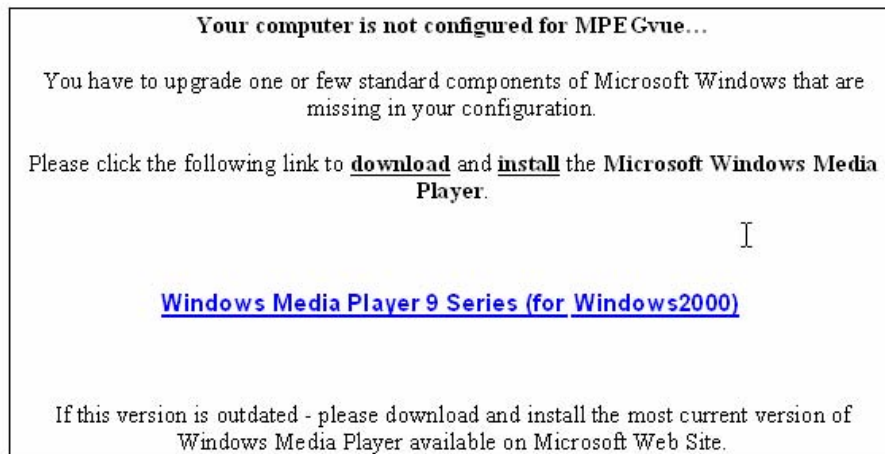


Figure 3-99 Download/Installation Message Examples #2

3-8-9-2 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 3-100 User Accounts Dialog Box

- 3) Select the **Advanced Tab**.

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

- 4) Click on the **Advanced** button.

The Local Users and Groups dialog box opens:

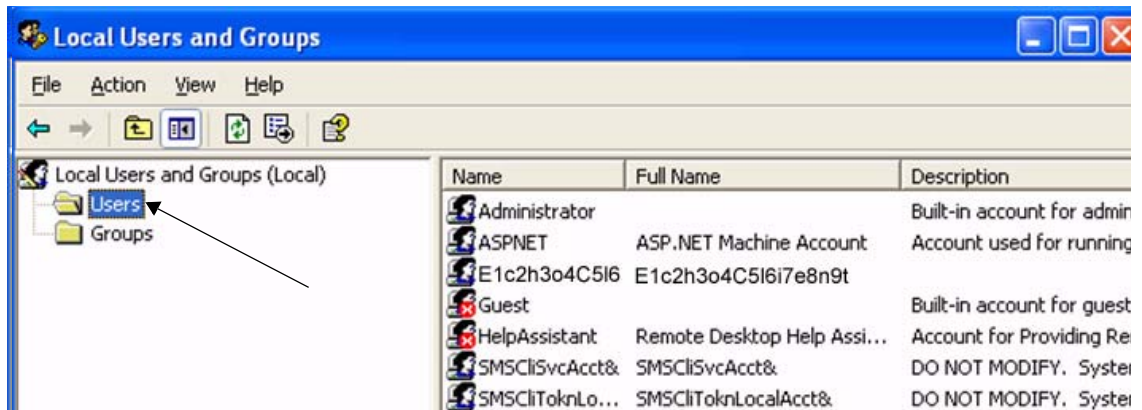


Figure 3-101 Local Users and Groups Dialog Box

- 5.) Select the **Users** folder and right-click to select **New User**.

The New User dialog box opens:

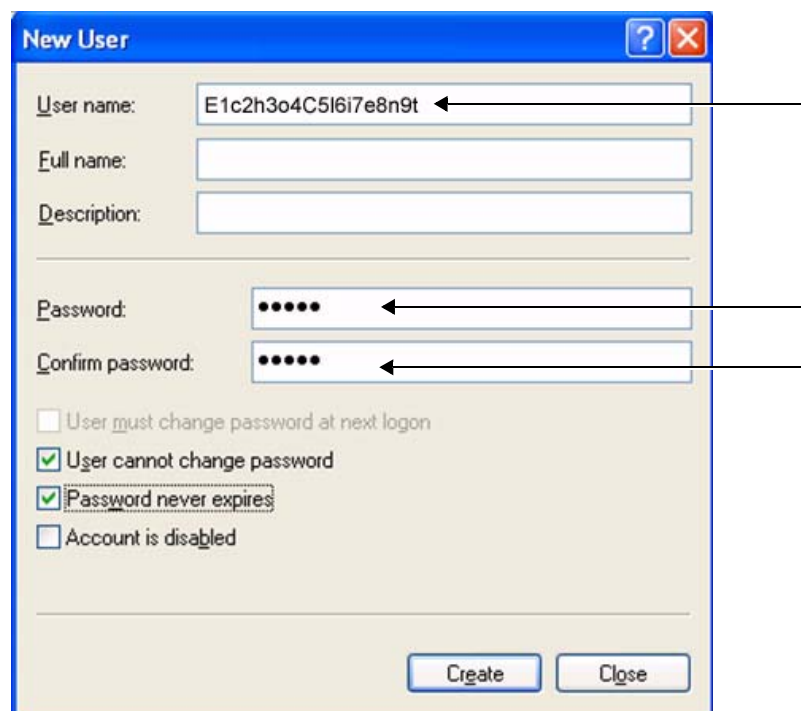


Figure 3-102 New User Dialog Box

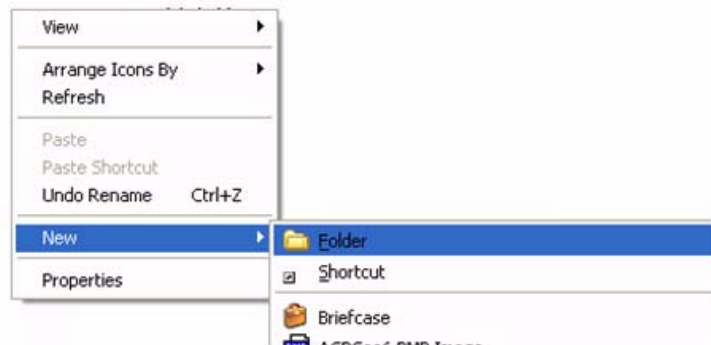
3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

- 6.) Configure a new user account, as follows (see [Figure 3-102](#)):
 - a.) User name: **E1c2h3o4C5l6i7e8n9t**
 - b.) Password: **u1l3t5r7a**
 - 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**:

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

- 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 3-103 on page 3-114 .

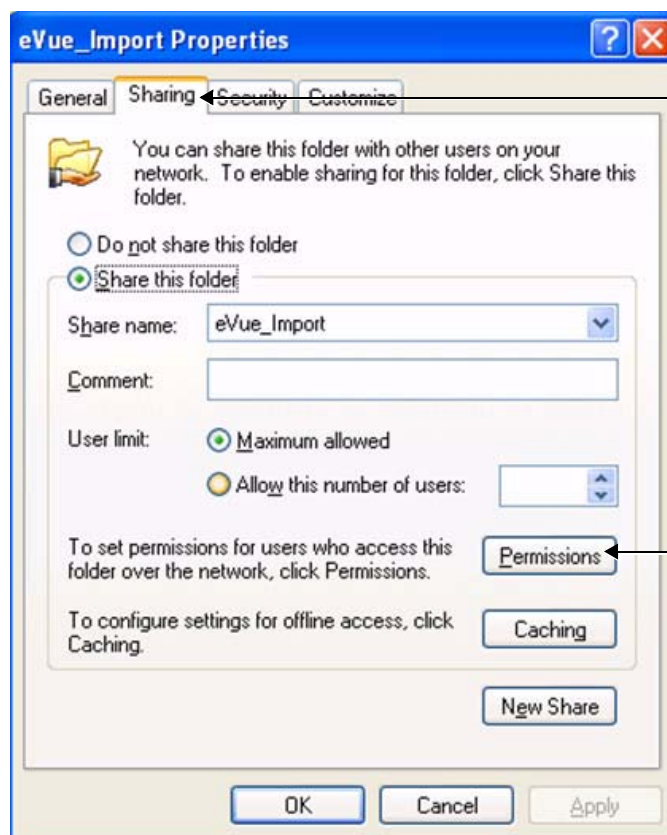


Figure 3-103 eVue_Import Properties Dialog Box

- b.) Select the **Sharing** Tab.

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

c.) Click on the **Permissions** button.

The Permissions for eVue Import dialog box opens:

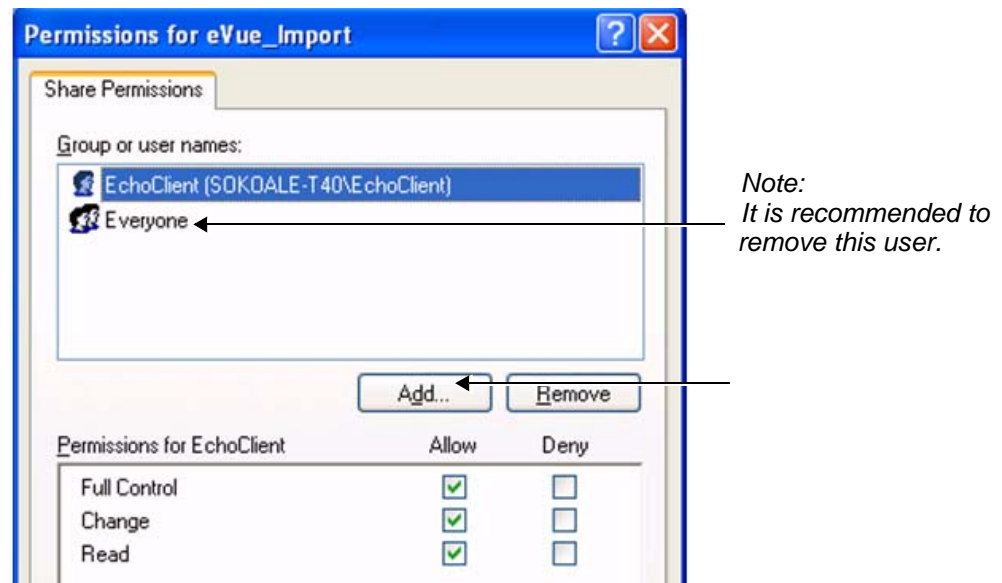


Figure 3-104 Permissions for eVue Import Dialog Box

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:

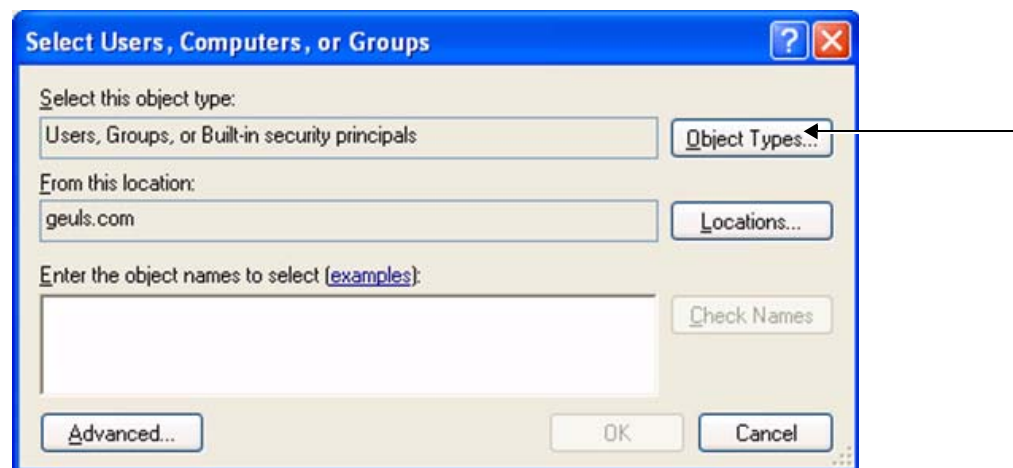
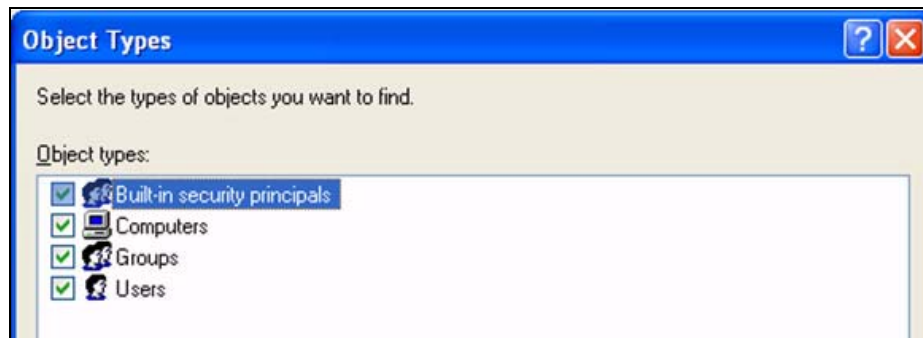


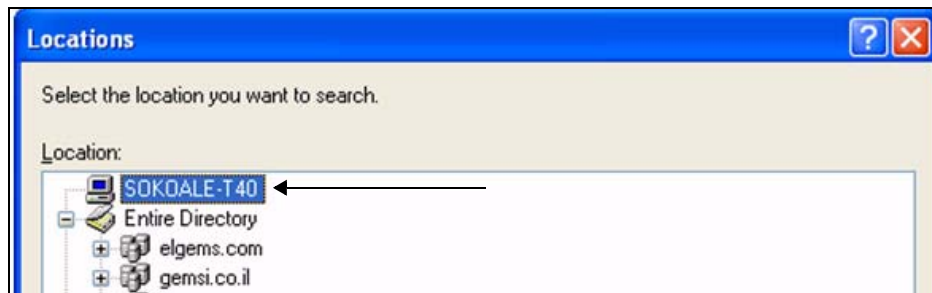
Figure 3-105 Select Users, Computers, or Groups Dialog Box

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

- 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 3-105), 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 **E1c2h3o4C5I6i7e8n9t** in the empty window, as shown in Figure 3-106.

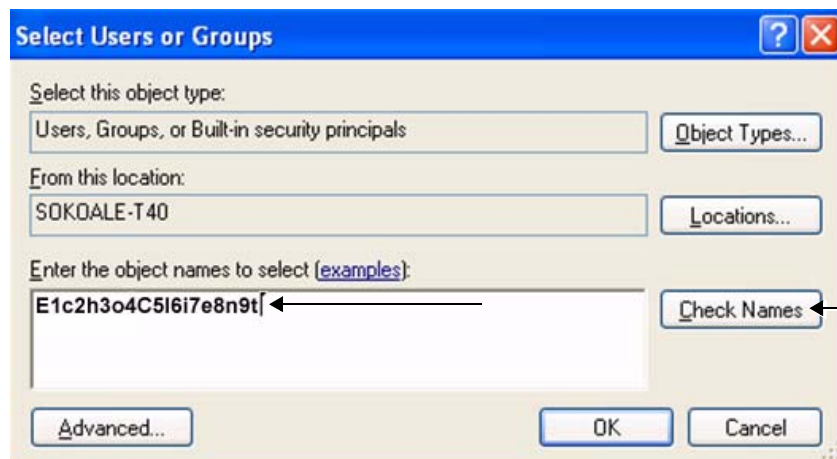
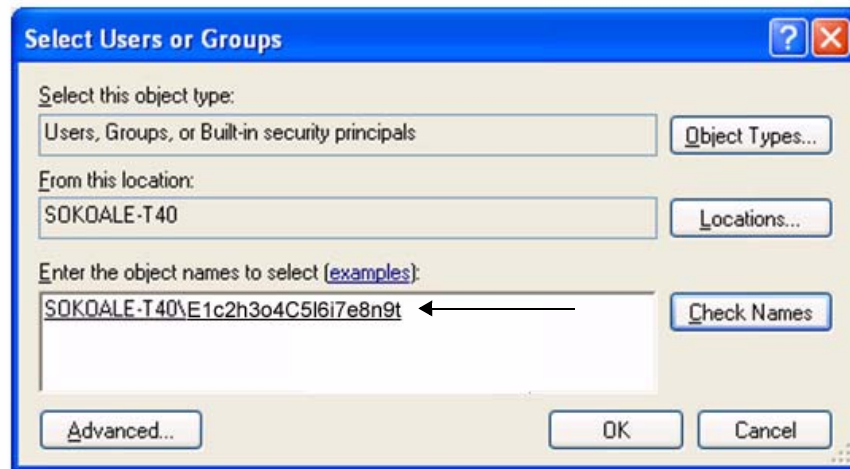


Figure 3-106 Select Users or Groups Dialog Box - Check Names

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

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 **E1c2h3o4C5I6i7e8n9t** from the list (see Figure 3-107).

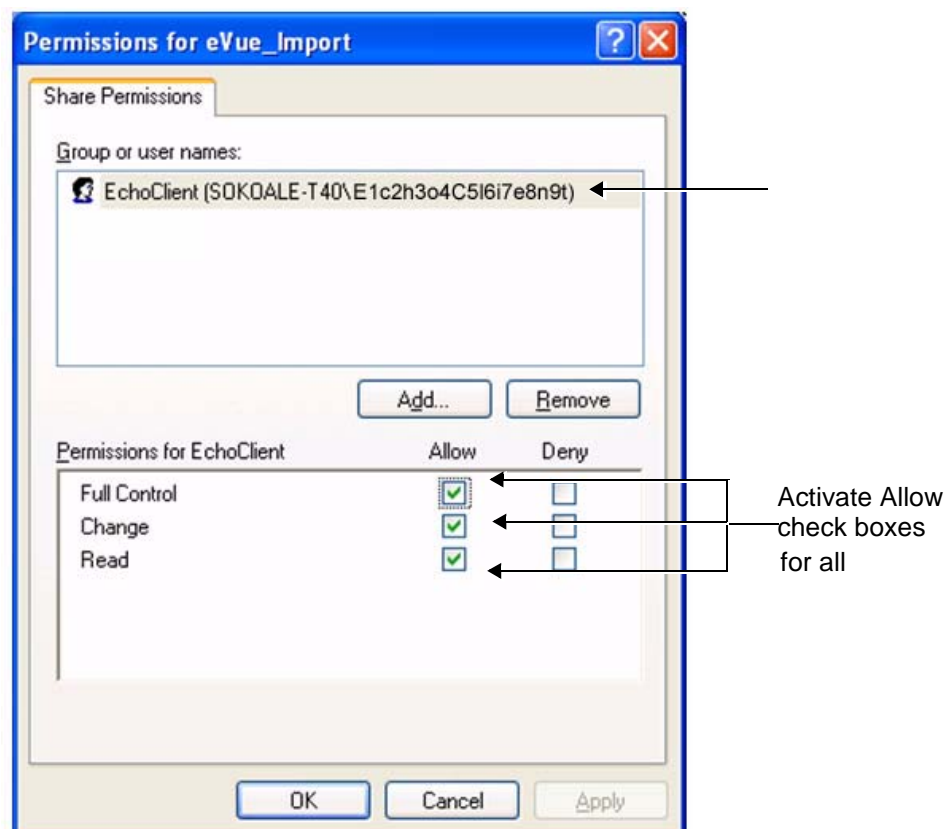


Figure 3-107 Setting Permissions for E1c2h3o4C5I6i7e8n9t

3-8-9-2 Manually Setting the Network PC for eVue Import (cont'd)

- 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.

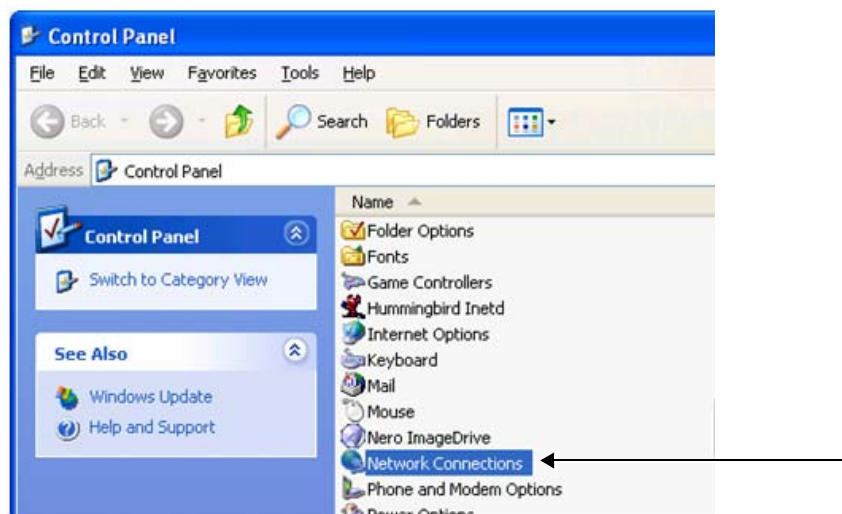
Note: The network computer is now ready to receive files from the Vivid *i n* system. At this stage, set the appropriate path for export of files into the network computer. For example, for eVue, Data Flow or MpegVue export into the network computer using the browsing option to select the appropriate path. For an example of Vivid *i n* dataflow settings, refer to Figure 3-95 on page 3-105 .

3-8-9-3 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

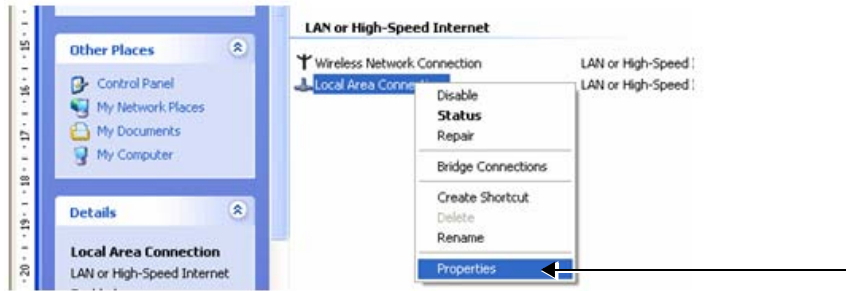
- 1.) On the network computer, access the **Control Panel**, as follows:
 - a.) Press **Start**.
 - b.) Select **Settings**
 - c.) Select **Control Panel** from the Menu.



- 2.) Double-click on **Network Connections** as shown above.

3-8-9-3 Manually Stopping the Firewall on the Network PC (cont'd)

- 3.) Select your network connection and right-click.
- 4.) From the drop-down menu, select **Properties**.



The Local Area Connection Properties dialog box opens:

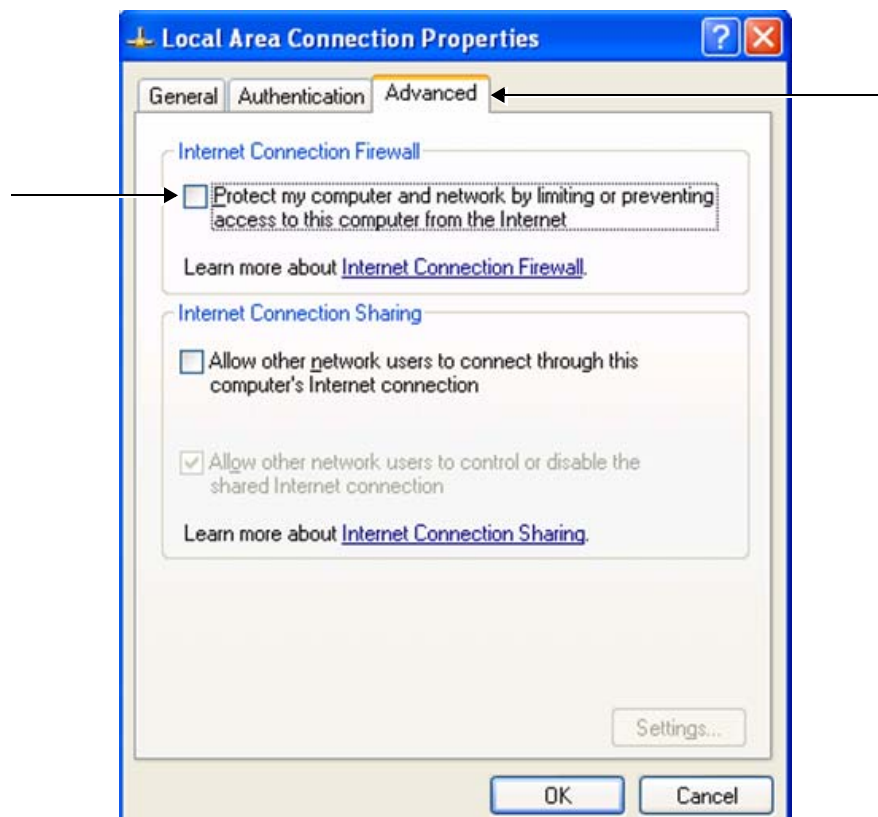


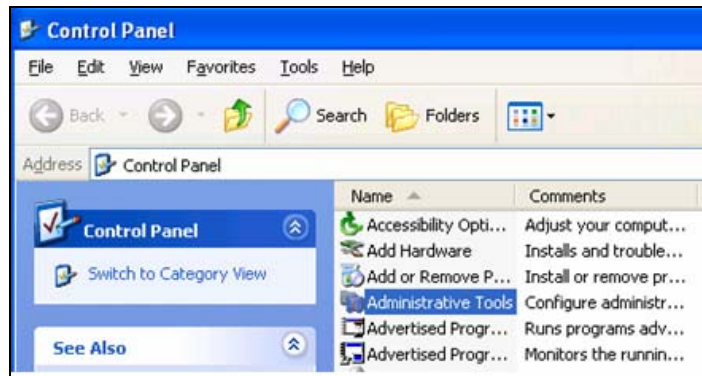
Figure 3-108 Local Area Connection Properties Dialog Box

- 5.) Select the **Advanced** Tab.
- 6.) Uncheck the **Internet Connection Firewall** check box, as shown in Figure 3-108.
- 7.) Click the **OK** button to confirm changes and close all windows.

3-8-9-3 Manually Stopping the Firewall on the Network PC (cont'd)

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:

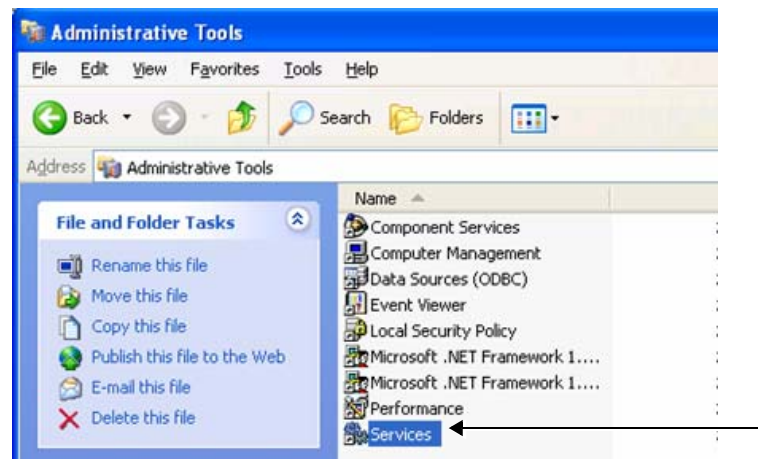


Figure 3-109 Administrative Tools Dialog Box

3-8-9-3 Manually Stopping the Firewall on the Network PC (cont'd)

- 3.) Double-click on **Services**.
- 4.) From the Services dialog box, select your **firewall program** (for example, Black Ice).

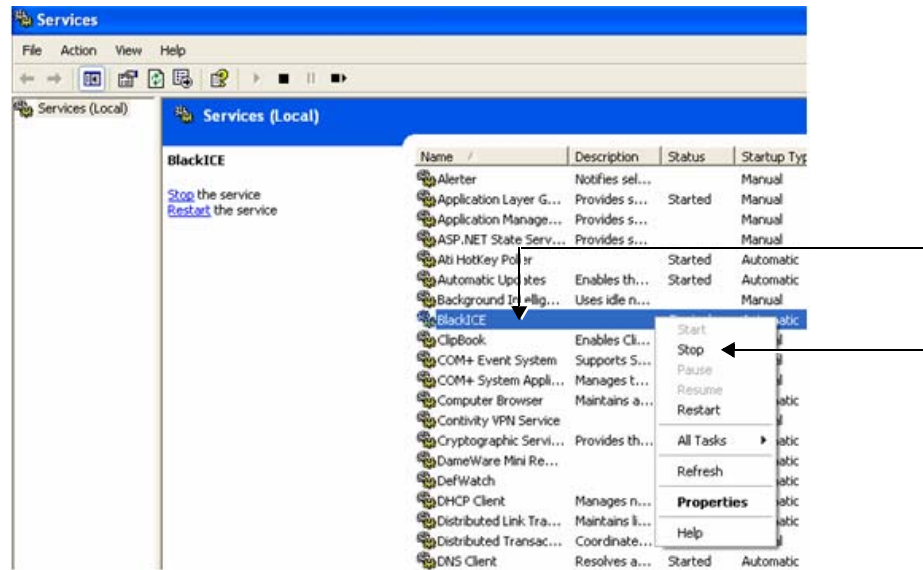
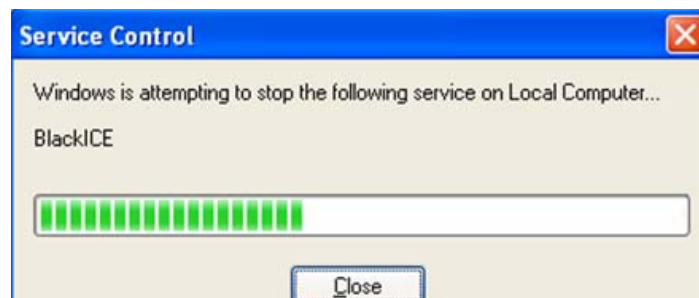


Figure 3-110 Services Dialog Box

- 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 / n system.

3-8-9-3 Manually Stopping the Firewall on the Network PC (cont'd)

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 3-111 Windows Firewall Dialog Box

- 3.) Select the **General** Tab.
- 4.) Enable the **Off** check box (as shown in [Figure 3-111](#)).
- 5.) Press **OK**.
- 6.) Close all windows to return to the scanning screen.

3-8-9-4 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 3-112](#) below.

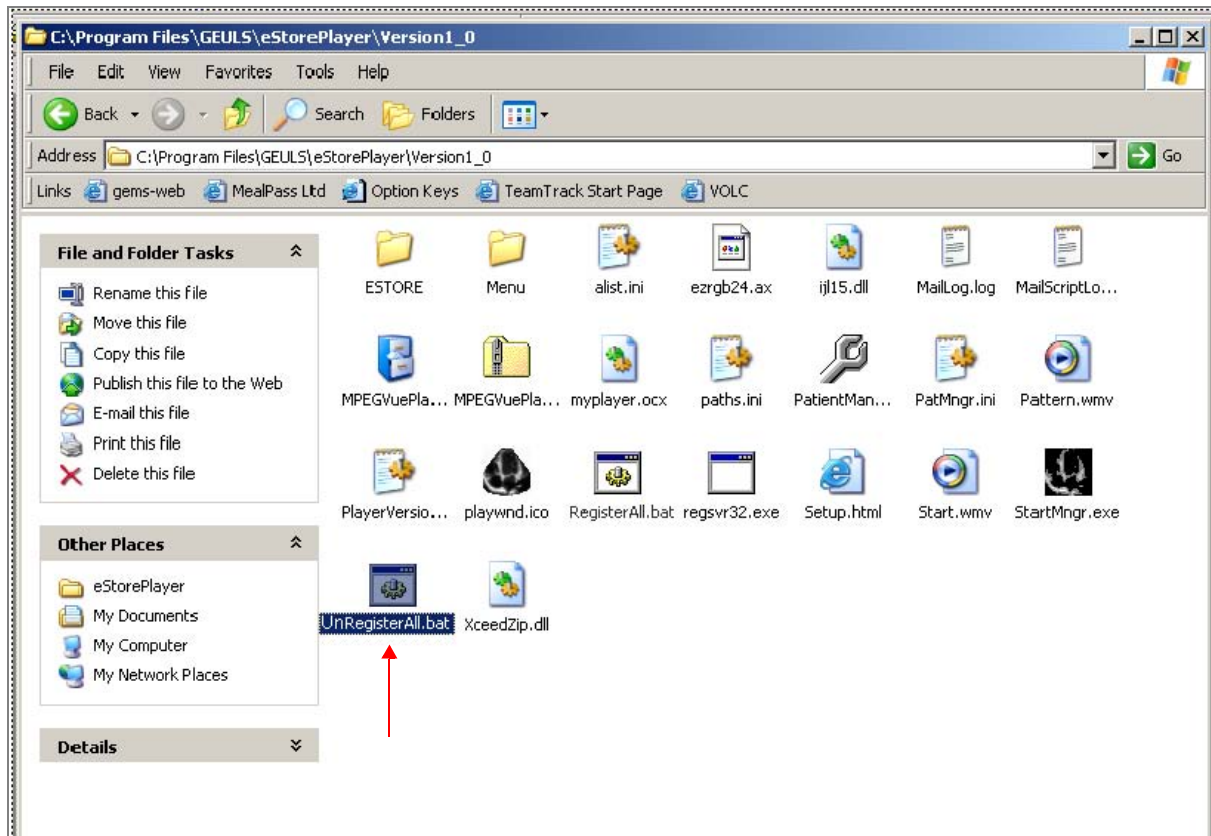


Figure 3-112 Uninstall MPEGvue - Stage 1

3-8-9-4 Un-installing MPEGVue on a Remote PC (cont'd)

- 4.) If two messages are displayed one after another (shown in [Figure 3-113](#) and [Figure 3-114](#)), click the **OK** button on each of them to close the message.

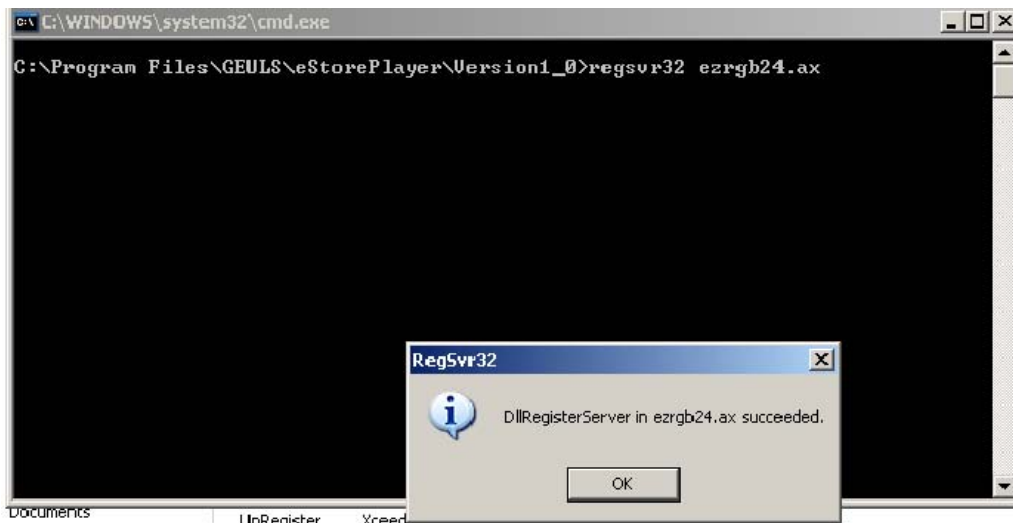


Figure 3-113 Uninstall Message 1

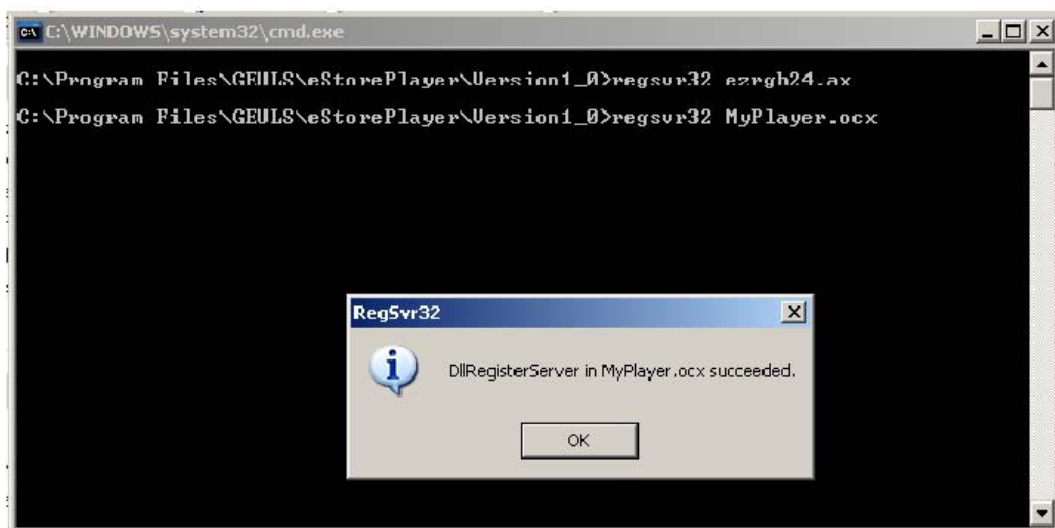


Figure 3-114 Uninstall Message 2

3-8-9-4 Un-installing MPEGVue on a Remote PC (cont'd)

- 5.) From the **C:\Program Files\GEULS\StorePlayer\Version1_0** folder, delete all files, as shown in Figure 3-115 on page 3-125 .

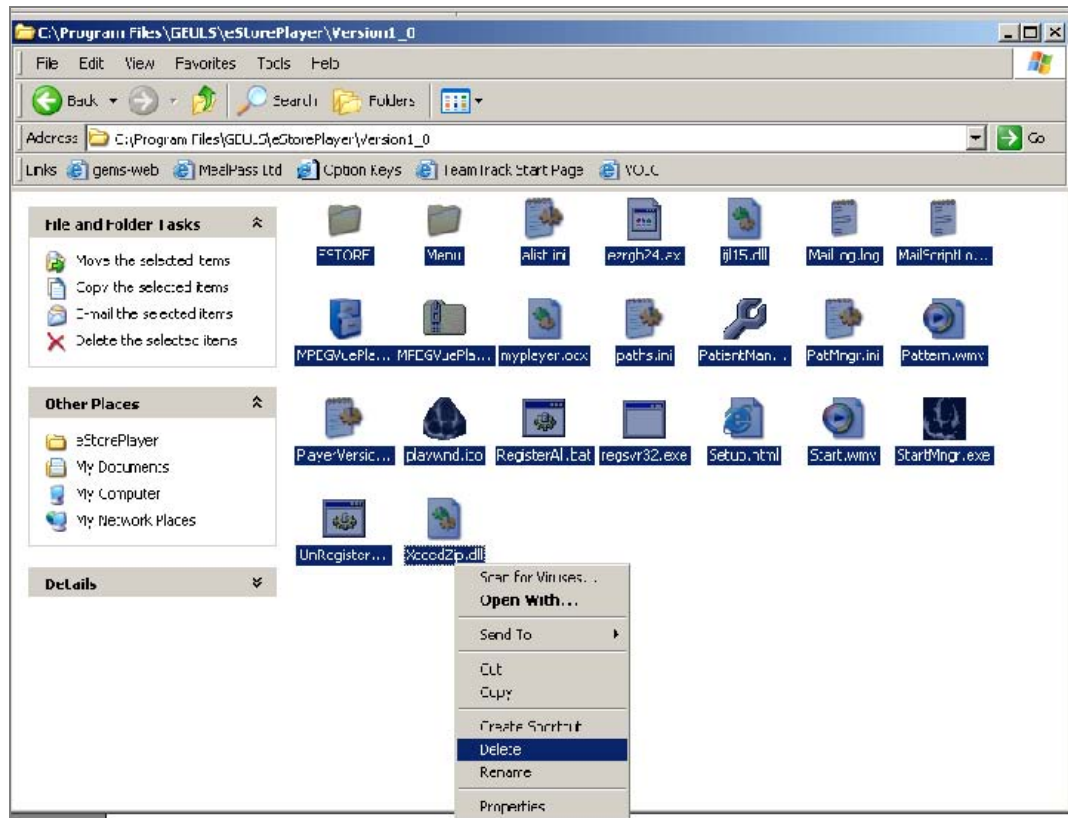


Figure 3-115 Deleting All Files

- 6.) Restart Windows, then confirm that the MPEGVue application is no longer installed.

3-8-9-5 Using MPEGVue Viewer on a Remote PC

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 3-116](#) 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 3-108.

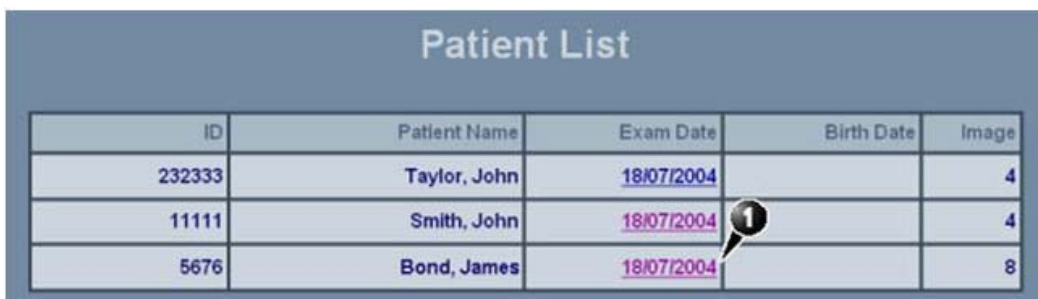
To read MPEGVue exams stored on other media:

- 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 3-116](#) below).

MPEGVue Patient List

The MPEGvue player will always start by showing the Patient List contained in the inserted media (see the example below).



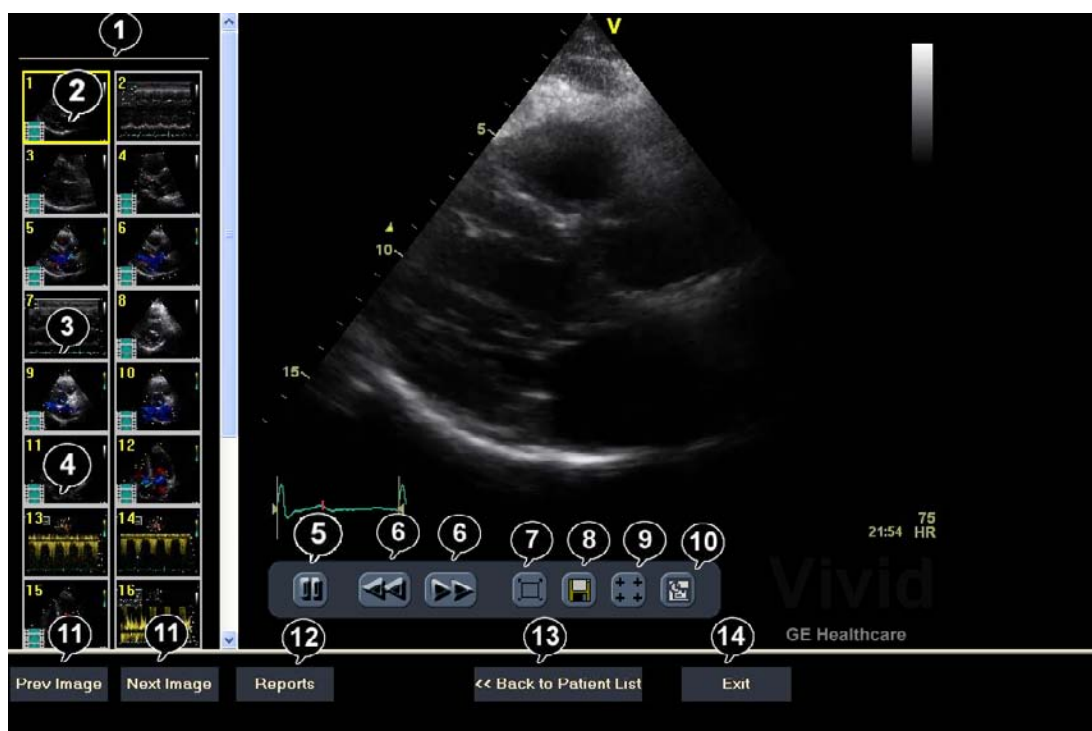
ID	Patient Name	Exam Date	Birth Date	Image
232333	Taylor, John	18/07/2004		4
11111	Smith, John	18/07/2004		4
5676	Bond, James	18/07/2004		8

Figure 3-116 MPEGVue Patient List

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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 3-117](#) 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 3-117 MPEGVue Screen

- 2) Proceed to use the navigation tools described below to select an image and perform the various review functions, as required.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-117](#)), as required.
-

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 3-117](#)) will *freeze* the loop. Clicking on same icon once again will run the loop again.
 - Clicking on the **scrolling** icons (#6 in [Figure 3-117](#)) 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.
-

Selecting a Different Patient

Click on the **Back to Patient List** button (#13 in [Figure 3-117](#)). On the Patient List, click on the **Exam Date** of the required patient.

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 3-117](#)). A Save As... dialog-box will appear, allowing you to select the desired file format in which to save the image.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-117](#)).

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 3-117](#)).
- 2) Perform the measurement.

Note: If the original image contains measurements that were taken and stored on the Vivid *i* 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.

Saved Worksheets

On the Vivid *i* 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.

Reports (.CHM files)

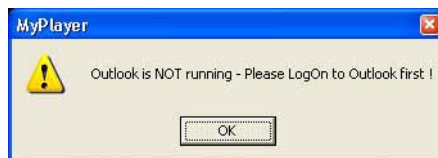
When Reports have been generated and saved on the Vivid *i* n scanner, they will be exported, along with the rest of the MPEGVue exam to the remote PC where they can be reviewed as CHM files.

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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-133, 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 3-135.

- 1) From the MPEGVue Screen, open the examination to be sent and click the **E-mail** button (#10 in Figure 3-117 on page 3-127).

The *E-mail Dialog* box is displayed (see Figure 3-118 on page 3-130).

- 2) Activate the **Send Current Exam** radio button (and if necessary, the **Attach Player Software** check box), as shown in [Figure 3-118](#) below.

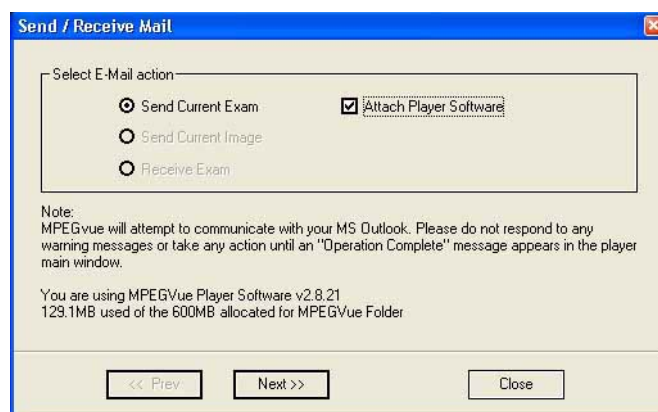


Figure 3-118 E-mail Dialog Box - Sending Current Exam

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 3.) Click **Next**.

The *E-mail address window* is displayed (Figure 3-119 below).

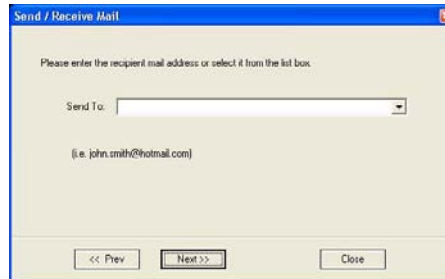


Figure 3-119 E-mail Address Window

- 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:

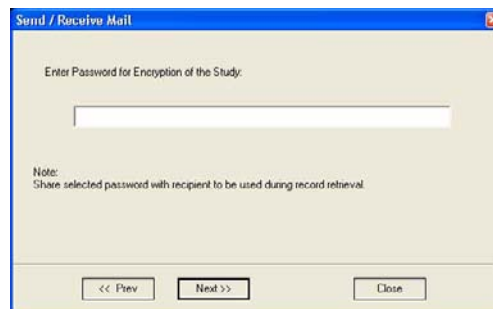


Figure 3-120 Enter Password Window

- 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).

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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:

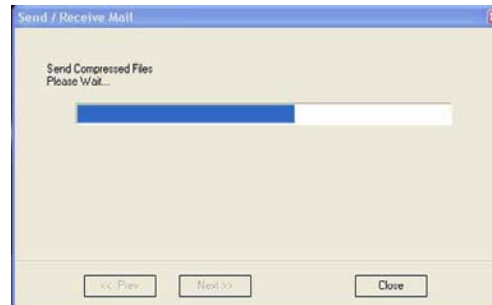


Figure 3-121 Sending Message to Outbox Progress Window

When the operation is complete, a *Confirmation window* is displayed as shown below.



Figure 3-122 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.

Notes: 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-135.

- 1) From the clipboard, select the image to be sent and click the **E-mail** button (#10 in Figure 3-117 on page 3-127).

The *E-mail Dialog* box is displayed.

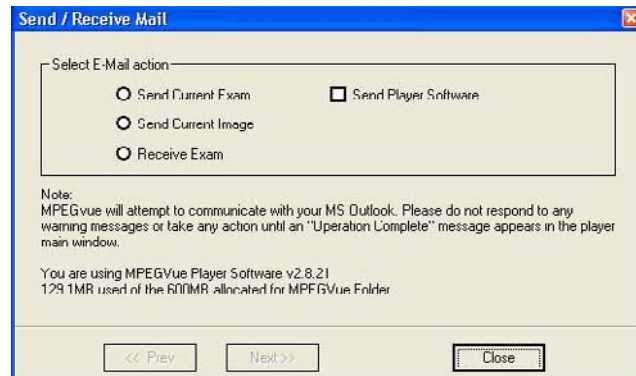


Figure 3-123 E-mail Dialog Box

- 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 3-135.

The *E-mail address window* is displayed.

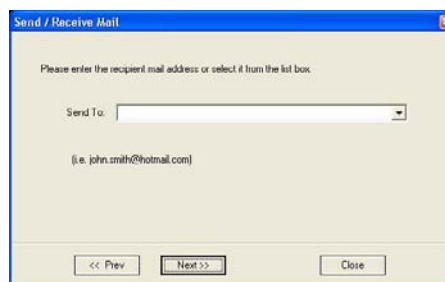


Figure 3-124 E-mail Address Window

- 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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:

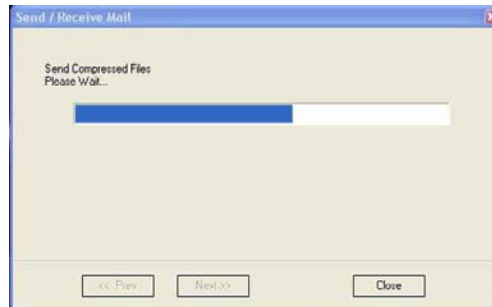


Figure 3-125 Sending Message to Outbox Progress Window

When the operation is complete, a *Confirmation window* is displayed as shown below..



Figure 3-126 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-127 E-mail Dialog Box - Sending Player Software

- 2) Click **Next**.
- 3.) From the Email Address Window (Figure 3-124 on page 3-133), 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 3-121).
When the operation is complete, a Confirmation window is displayed as shown in Figure 3-122.
- 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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.

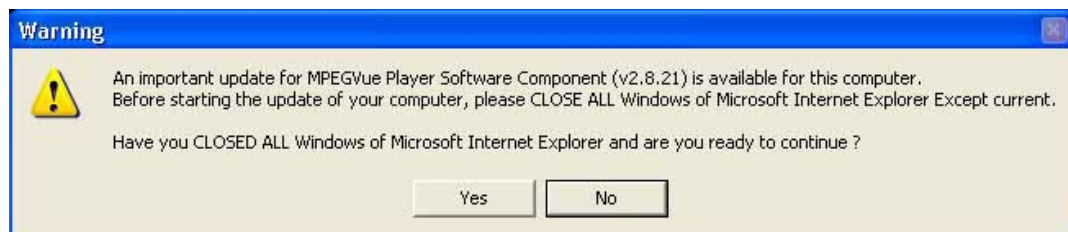


Figure 3-128 Warning Message


When the installation of the MPEGVuePlayer software is complete, the MPEGVue Player Screen is displayed as shown in Figure 3-130 on page 3-138 .

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 3-138.

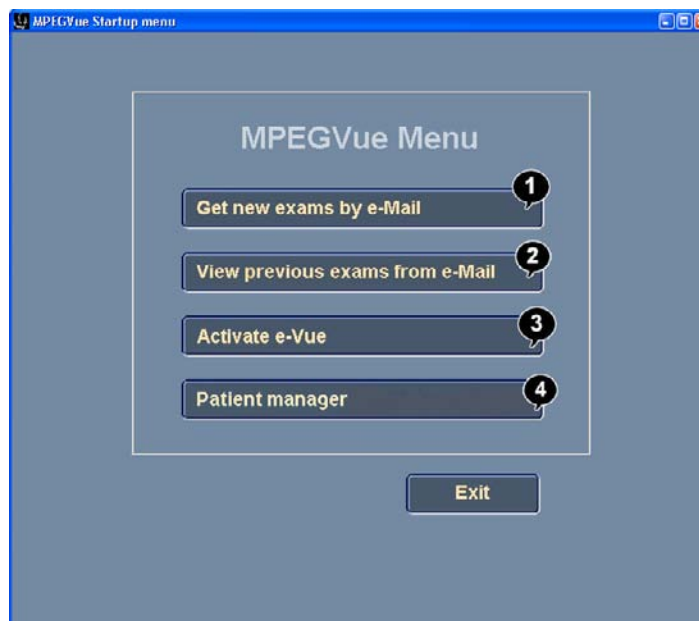
3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-135), 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) ^a |
| 3. | Activates e-Vue - opens Patient List of studies received via export operation ^a |
| 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 3-129 MPEGVue Startup Menu

- 2) Proceed to use the required utility, as described in the procedures below.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-130](#) below.

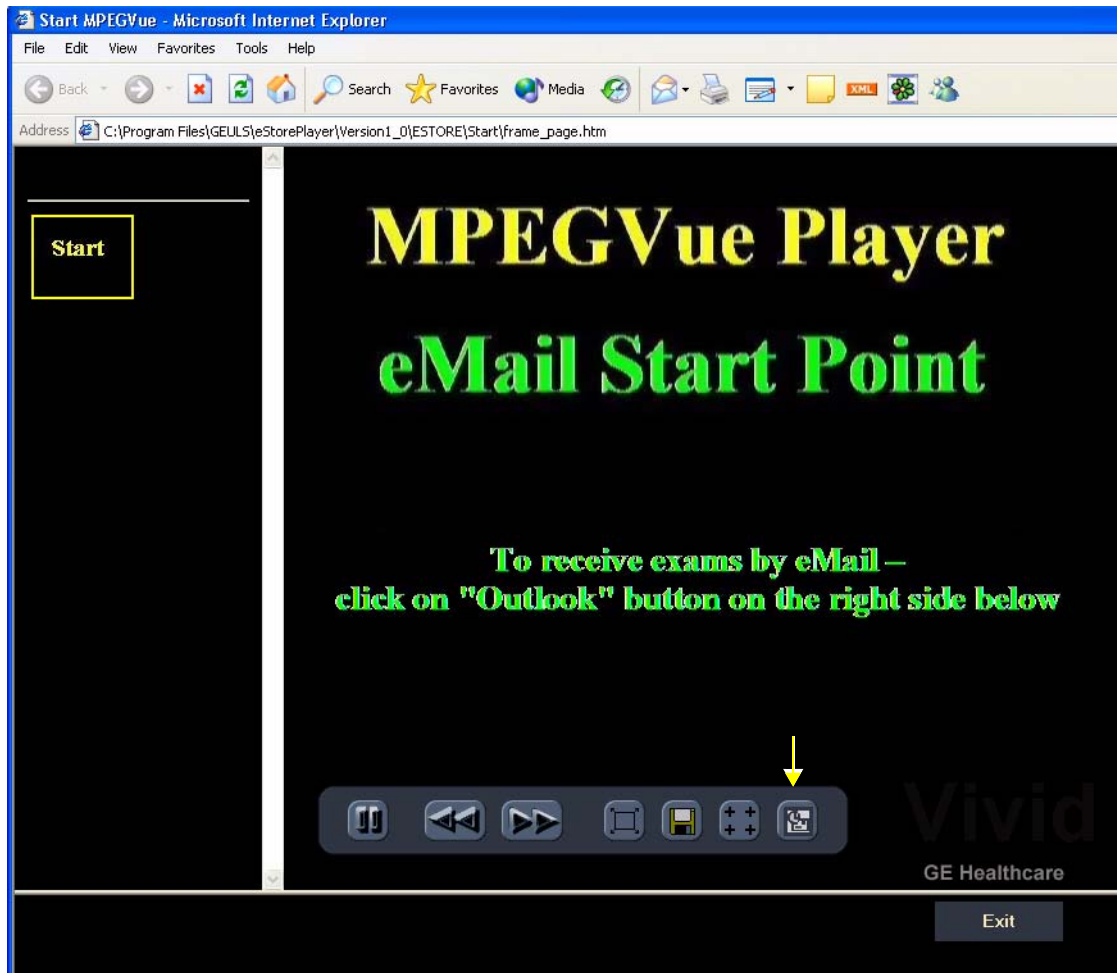


Figure 3-130 Start MPEGVue Screen

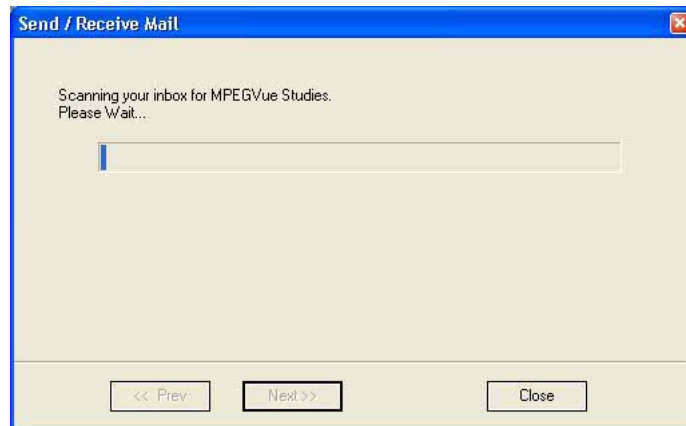
- 2) Click the Outlook **E-mail** button (shown in [Figure 3-130](#)).

The E-mail dialog box is displayed - refer to [Figure 3-123](#) on page 3-133 .

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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 3-131](#) below.

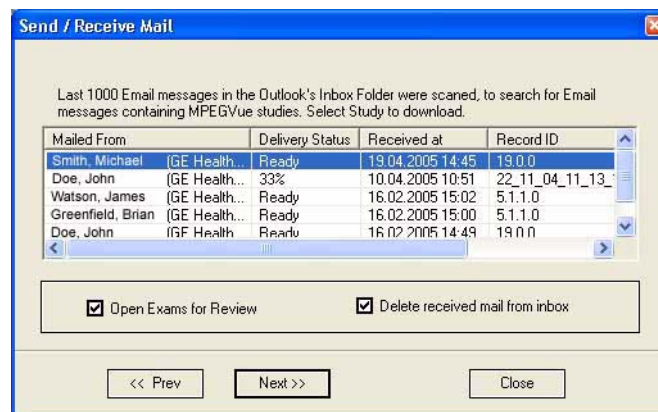


Figure 3-131 List of Studies Found in Inbox

- 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

5.) Click **Next**.

The *Password* window is displayed:.

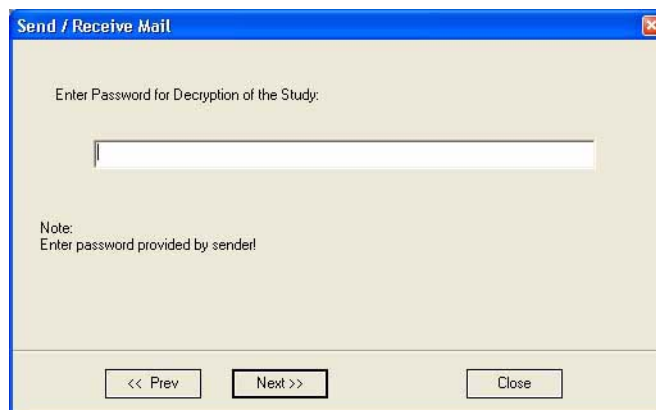


Figure 3-132 Password Window

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 3-133](#) below) showing progress of deletion of messages from the Inbox.

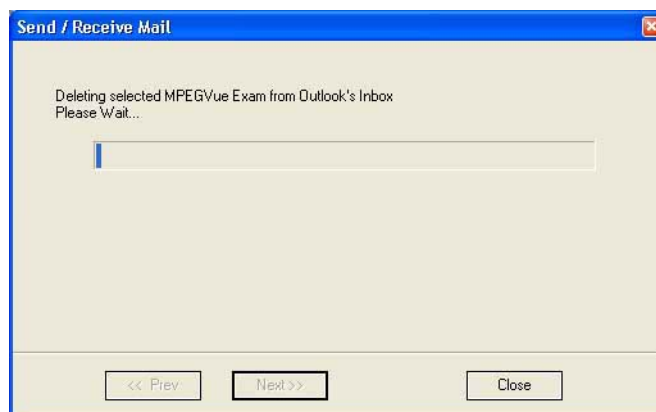
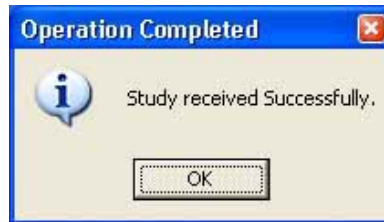


Figure 3-133 Message Showing Exams being Deleted from Inbox

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-134](#) 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 3-134 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.

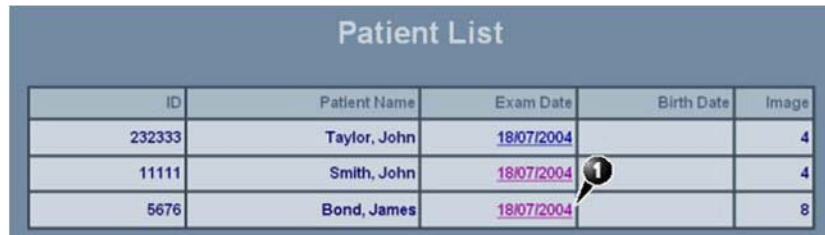
After receiving even one e-mail message out of many that have yet to arrive, simply select the new examination in the MPEGVue Screen. The screen display will show voids or missing thumbnail images in all places relating to the e-mail messages that have not yet arrived.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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:



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 3-135 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 3-117 on page 3-127 .

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 3-135](#), 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 3-117 on page 3-127 .

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)**Using Patient Manager**

- 1) From the MPEGVue Startup Menu, click the **Patient manager** button.

The MPEGVue Patient Manager window opens, as shown below:

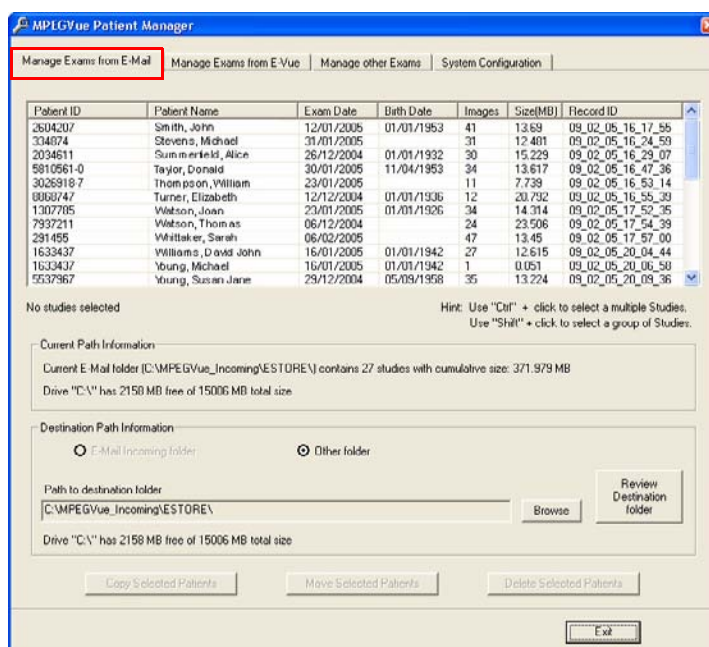


Figure 3-136 MPEGVue Patient Manager Window - Manage Exams from Email Tab

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 3-136](#).

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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- b.) Select the required exam or exams, as shown in [Figure 3-137](#).
(Use Ctrl +click to select more than one study; Shift + click to select a group of studies)

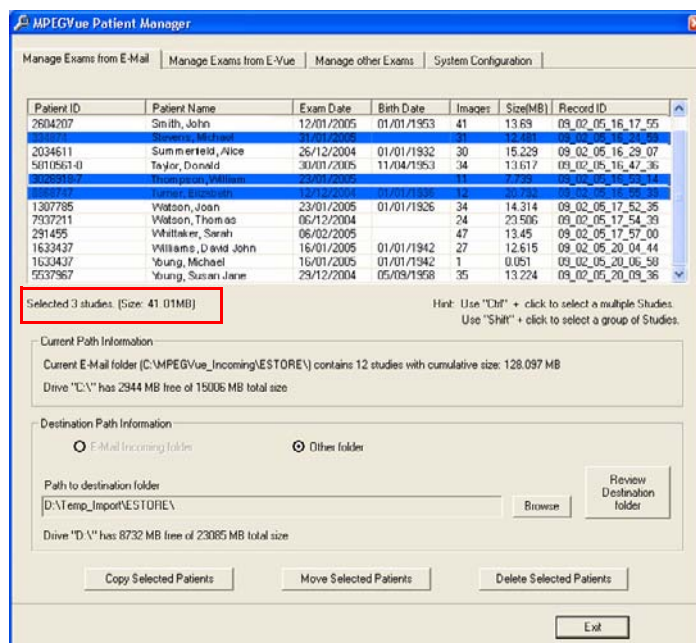


Figure 3-137 Exams Selected

The currently-selected exams are now highlighted in the list and, as shown in [Figure 3-137](#), the cumulative size of the 3 studies is displayed below.

The three study management buttons are now as follows:

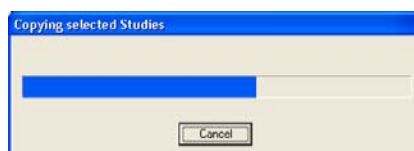
Delete Selected Patients - enabled

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).

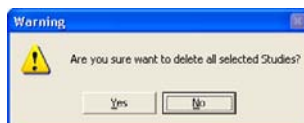
During the copy or move operation, the relevant message and progress bar is displayed:



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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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 3-138](#).

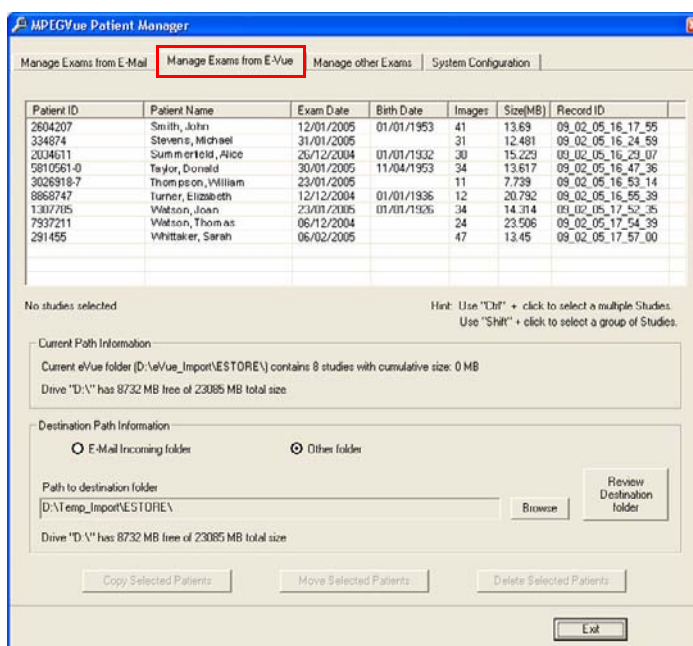


Figure 3-138 MPEGVue Patient Manager Window - Manage Exams from E-VueTab

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 3-144.
c.) **Copy** or **move** the selected exam/s, as required - refer to [step c](#) on page 3-144.
d.) If required, **delete** the selected exam/s - refer to [step d](#) on page 3-145.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

4.) Manage Other Exams, as follows:

- a.) Make sure the Manage Other Exams tab is activated as shown in [Figure 3-139](#).

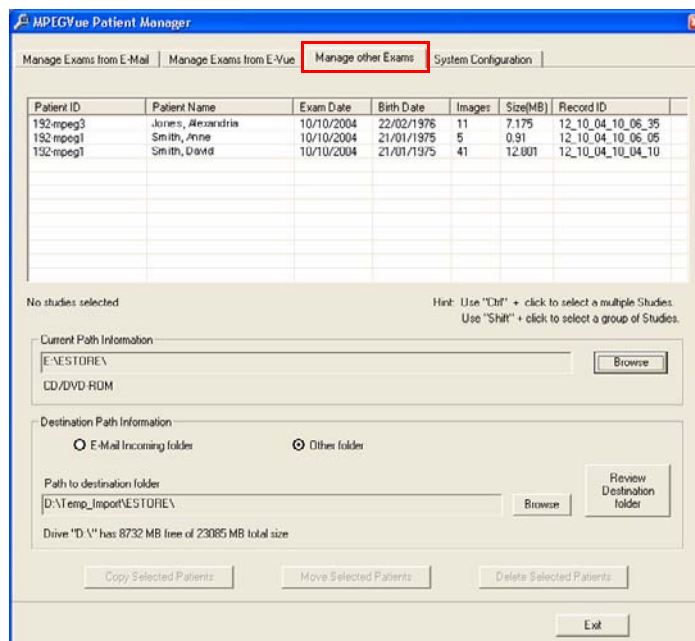


Figure 3-139 MPEGVue Patient Manager Window - Manage Other Exams Tab

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 3-139](#), 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-140](#) 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.

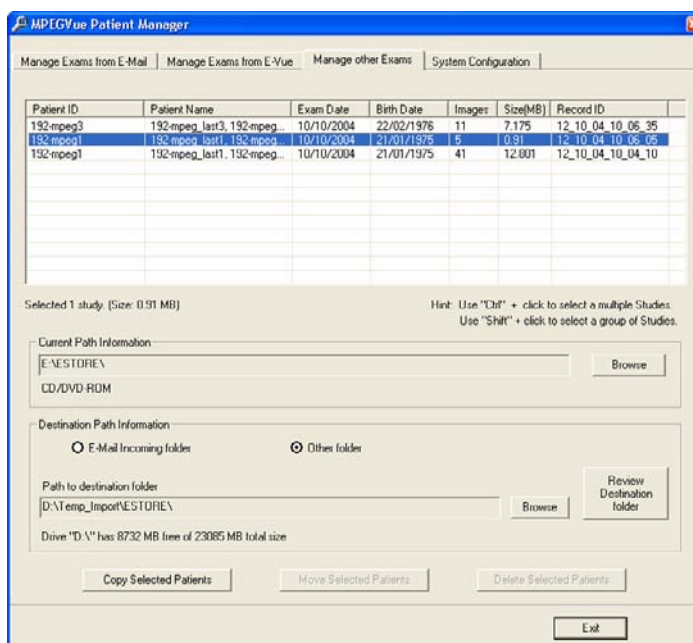
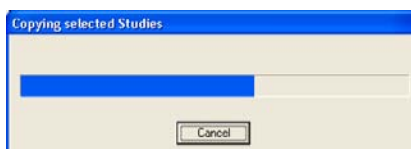


Figure 3-140 Exams Selected for Copying

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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 5.) If required, access the **System Configuration** utility, as follows:
 - a.) Make sure the System Configuration tab is activated as shown in [Figure 3-141](#).

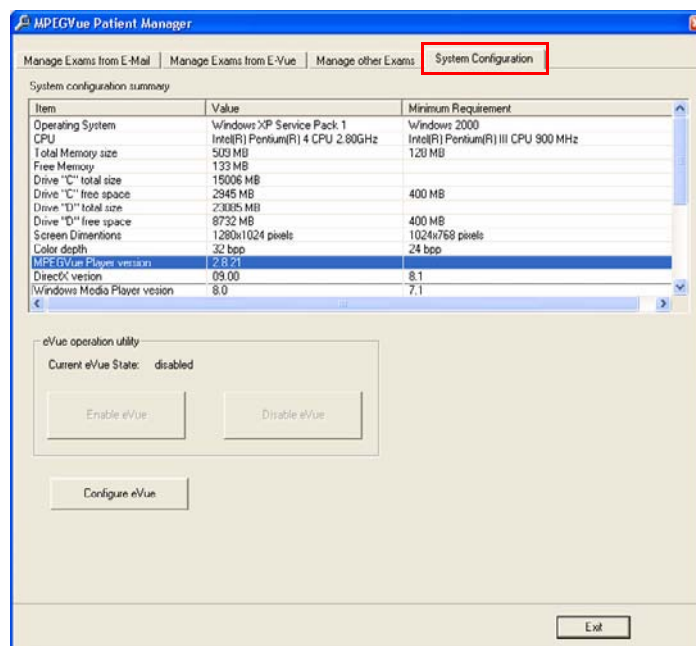


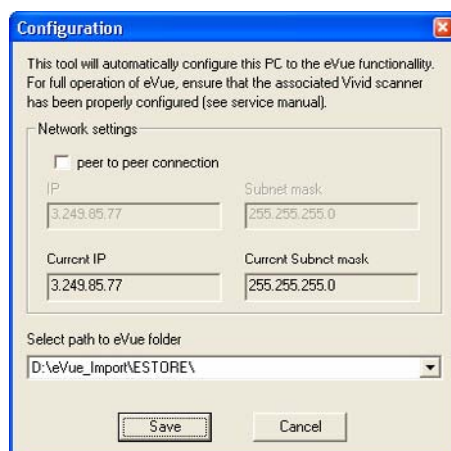
Figure 3-141 MPEGVue Patient Manager Window - System Configuration Tab

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.

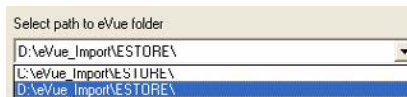
Note: In order to enable eVue operation, it is necessary to first perform the eVue configuration procedure as described in the following step.

- b.) Configure eVue (if required), as follows:
Click the **Configure eVue** button. The Configuration dialog box opens:

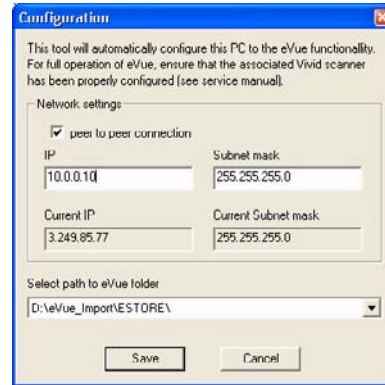


3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-142](#) below.

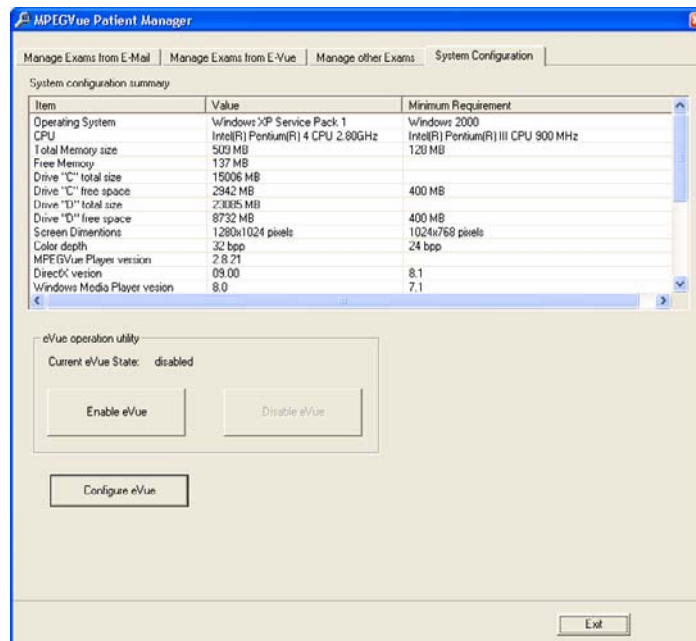



Figure 3-142 System Configuration - Ready to Enable eVue Mode

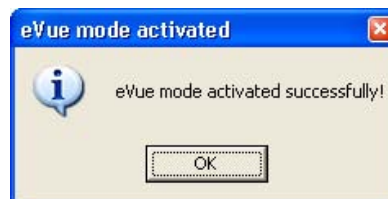
3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

 **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 *i* 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:



3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

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 3-143 on page 3-152 .

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

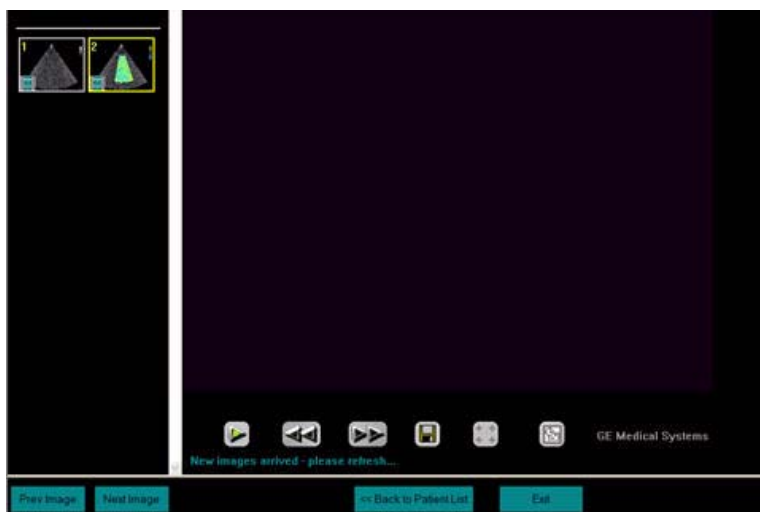


Figure 3-143 Image Review Window

- 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.

3-8-9-5 Using MPEGVue Viewer on a Remote PC (cont'd)

- 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.

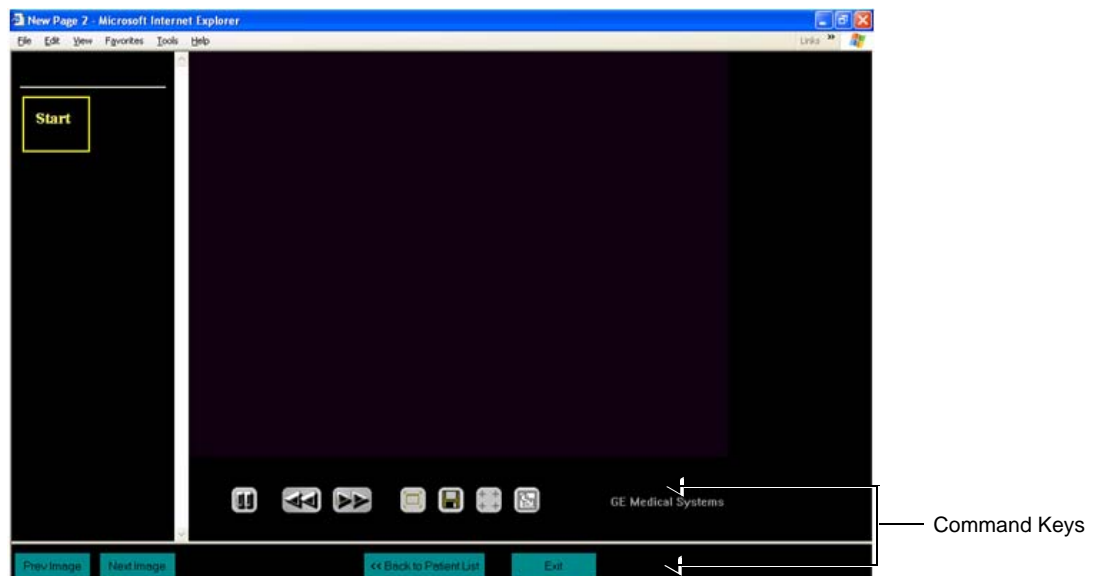


Figure 3-144 MPEGVue Player - Command Keys

Section 3-9

Storing and Transporting the Unit

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..
- When transporting the unit by vehicle, or shipping by air or any other means:
 - Eject the lithium ion battery from the unit and replace it with the dummy battery.
 - Pack the unit in the original packing.
 - 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.

3-9-1 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 / n ultrasound unit in the shipping transportation box for shipment by vehicle, or any other means.

For more details, refer to the appropriate procedure for "Unpacking the Wooden Transportation box" on page 3-10 and follow the instructions in reverse order.

Section 3-10

Completing the Installation Paperwork

NOTE: On completion of a Vivid i n ultrasound scanner installation, it is important to record the relevant System Installation details (see [Table 3-18 below](#)) and Product Locator Installation details (see [Figure 3-145 on page 3-156](#)), for future reference.

3-10-1 System Installation Details

Enter the serial number printed on the main label (refer to the *Product Labels and Icons* section, on page 1-10), and the other relevant system installation details into the following table:

Table 3-18 System Installation Details

System S/N:	
Location:	
Date:	
Customer Name:	
Service Engineer's Name:	
Comments:	

3-10-2 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 3-145 "Product Locator Installation Card \(Example\)" on page 3-156](#).

NOTE: Step 2 may have been completed already by GE personnel.
The Product Locator Installation Card shown in [Figure 3-145 "Product Locator Installation Card \(Example\)" on page 3-156](#) may not be identical to the card(s) provided.

- 3.) Mail the Product Locator Installation Card(s) to the appropriate product center.

Section 3-11 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 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	
SHIPMENT		OCP		BS	ORD		
		DISTRICT		CUSTOMER NO.			DATE (MO-DA-YR)
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					
		GE Medical Systems Product Locator File P.O Box 414 Milwaukee, WI 53201-0414		GEMS-E Product Locator Administration BP 34 78533 Buc Cedex, FRANCE		Yokogawa Medical Systems Ltd. GEMSA Service Administration 4-7-127 Asahigaoka Hino-shi Tokyo 191, JAPAN	
DESCRIPTION		FDA	MODEL		REV	SERIAL	
SYSTEM I.D.		OCP		BS	ORD		EMPLOYEE NO.
		DISTRICT		ROOM			DATE (MO-DA-YR)
INSTALLATION		CUSTOMER NO.					
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					

Figure 3-145 Product Locator Installation Card (Example)

Mail the Product Locator Installation Card(s) to the appropriate product center.

3-11-1 User Manual(s)

Check that the correct Vivid *i* n for the system (and relevant software revision), is included with the installation. Specific language versions of the Vivid *i* n 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.

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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 *i* 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	Overview	4-1
4-2	General Procedures	4-3
4-3	Functional Checks	4-17
4-4	System Turnover Checklist	4-28
4-5	Site Log	4-29

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 (Europe):
 - P/N: 2418832-2
- At least one probe (ideally you should check all the probes used on the system by the site.)

See ["Available Probes" on page 3-42](#), 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 4-11
- [Labeling Removable Media section](#), page 4-13
- [Formatting Removable Media section](#), page 4-13
- [Verifying Removable Media section](#), page 4-14
- [Archiving and Loading Presets section](#), page 4-14

4-2-2 Power ON/Boot-up

4-2-2-1 Connecting Mains Power to the Vivid i 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 the *Electrical Requirements* section, 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 Healthcare.

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. .

4-2-2 Power ON/Boot-up (cont'd)

Follow These Steps to Connect Mains Power to the Unit

Connecting the Vivid / 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 / n.
- 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.

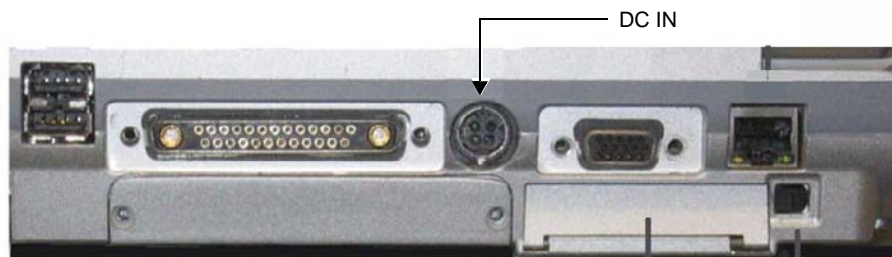


Figure 4-1 Mains Power Connector - Rear Panel

- 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.

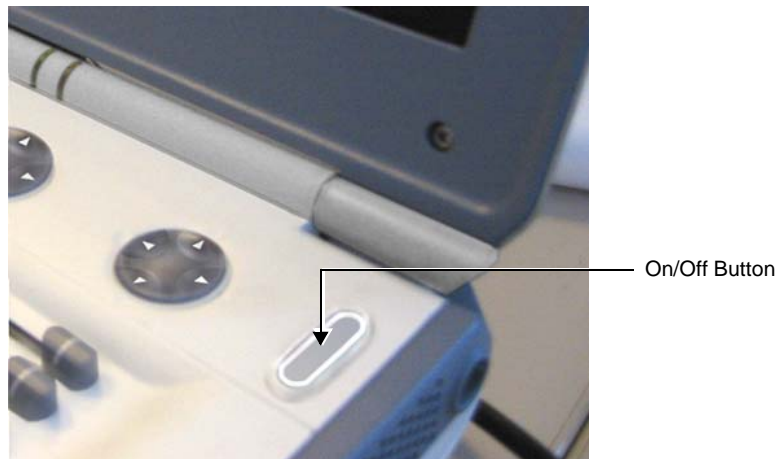


Figure 4-2 On/Off Button on Control Panel

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.

4-2-2-2 Turning the System ON (cont'd)



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.

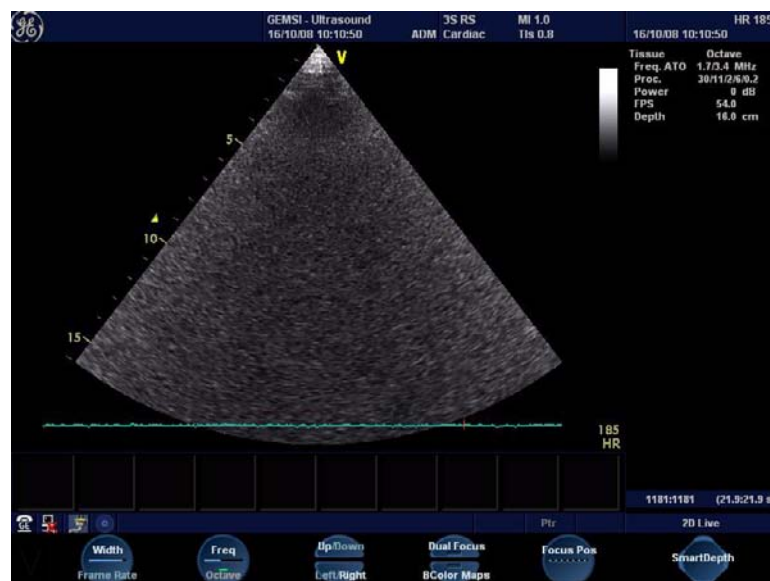


Figure 4-4 2D Screen

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 1 of 2

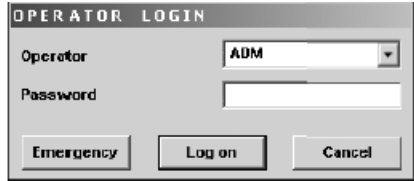


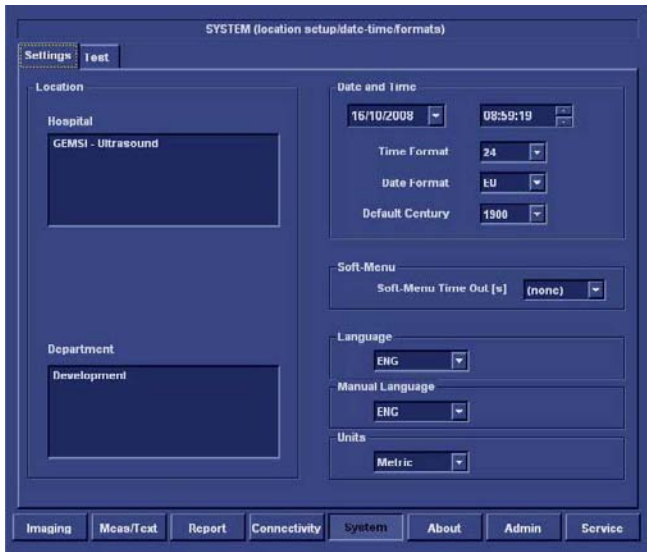
Step	Task	Expected Result(s)
1.	Press Config on the alphanumeric keyboard.	<p>If not already logged on, the Operator Login window is displayed.</p>  <p>Note: The default password is ulsadm</p>
2.	<p>Select the down-arrow to the right of the Operator field to view the Operator pull down list</p> <p>From the factory, these two users are defined without password.</p> <ul style="list-style-type: none"> - adm - usr <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"> - From the factory, the password has been left blank, so you may try to log on without any password. - If the log-on fails, you may try to use the password service. - As a last resort, contact the hospital's network administrator (or person responsible for the ultrasound unit), and ask for the password. <p>The Emergency button stores data only from current patient examination.</p>	
4.	Select Log on .	<p>- If this is the first time the unit is turned on, the "IMAGING AND ANALYSIS - GLOBAL LEVEL" window is displayed.</p> <p>- If another screen was displayed earlier, before logging out or turning unit off, that screen will be displayed.</p> 

Table 4-2 Logging on to the System as ADM (cont'd) 2 of 2

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 *i* n is equipped with a Magneto Optical Disk Drive (MOD Drive) and a DVD/CD-RW Drive.

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 *i* 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 Healthcare.



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.

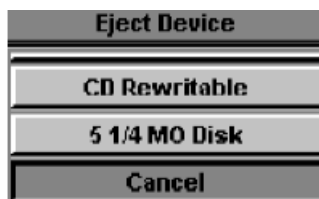


Figure 4-6 Eject Device Menu

- 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 Installing DVD/CD into DVD/CD Drive

NOTE: *IMPORTANT: 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.

4-2-5-5 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: *IMPORTANT: 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 4-12)

- 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

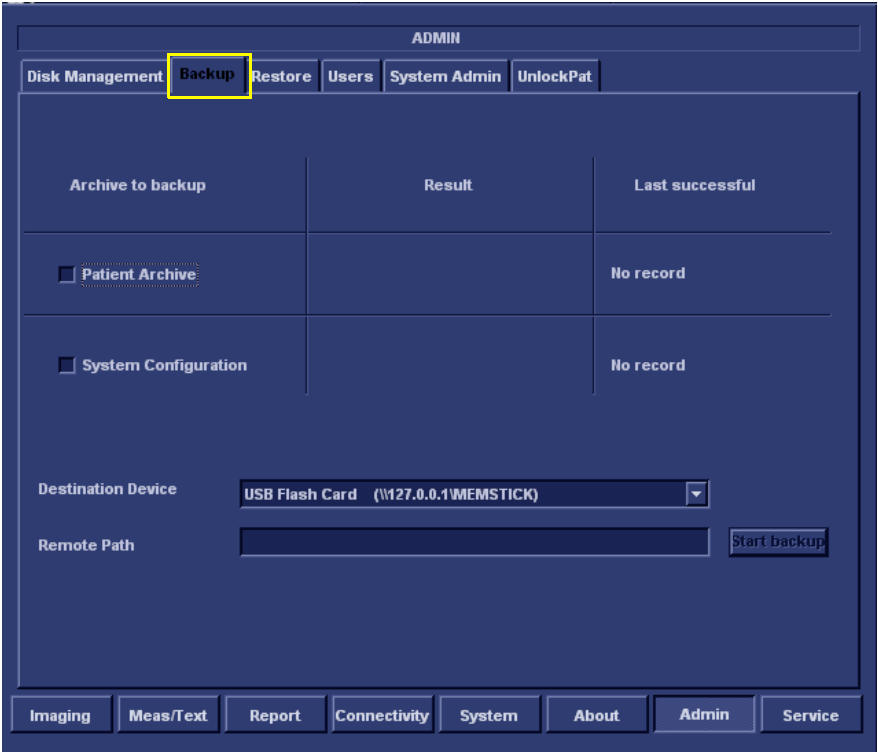
NOTE: *Always save presets before any software reload. This action is necessary to ensure that the presets loaded after the software reload are as up-to-date as possible.*

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.

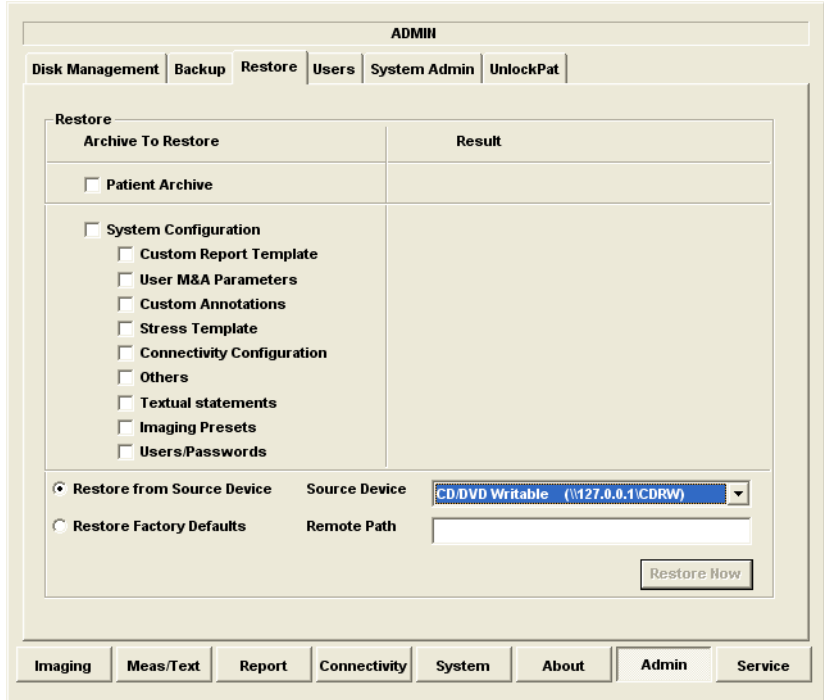
4-2-9-1 Archiving Presets to an MO Disk

Table 4-3 Saving Presets Vivid i n

STEP	TASK	FUNCTION
1.	Insert an empty, formatted MO disk labelled "PRESETS" and marked with Vivid i n's serial number and the date, into the MO Drive. For more information about formatting, see "Formatting Removable Media" on page 4-13.	
2.	Press Config (or F2); select Admin then select Backup .	The Backup window is displayed. 
3.	Enable the User Defined Configuration check box.	
4.	Select the MOD as the Destination.	
5.	Press Backup Now .	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 Vivid i n

STEP	TASK	FUNCTION
1.	Insert the MO disk with the archived presets into the MOD.	
2.	Press Config (or F2); select Admin then select Restore .	<p>The Restore window is displayed.</p> 
3.	Enable the User Defined Configuration check box.	
4.	Select the MOD as the Source.	
5.	Press Restore Now	The Presets are restored to the System.
6.	Press <Alt> + E on the alphanumeric keyboard.	The MO disk is ejected.

Section 4-3 Functional Checks

4-3-1 Basic Controls

4-3-1-1 Alphanumeric Keyboard Test

Table 4-5 Alphanumeric Keyboard Test - Recommended

Step	Task	Expected Result(s)
1	Power-up the System in Normal Scanning Mode	
2	Press Config and select Report	
3	Select the Comment Text 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 Backspace key to delete the text you typed.	

4-3-1-2 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 4-6 External Keyboard Test Vivid / n- Recommended 1 of 3

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 Keyboard Test and press <Start>	The keyboard Test window opens
4	Trackball to Connect and press Set .	
5	Press all extended KB keys one-by-one. Press the Clear 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: a) Move all TGC sliders to the <i>left</i> position	The position value is 0 (+2) for all TGC Sliders
	b) Move all TGC sliders to the <i>right</i> position	The position value is 63(-2) for all TGC Sliders
	c) Move all TGC sliders to the <i>central</i> position	The position value is 31(±2) for all TGC Sliders
7	Perform the ROTARY TEST , 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).

Table 4-6 External Keyboard Test Vivid / n- Recommended (cont'd) 2 of 3

Step	Task	Expected Result(s)
8	Perform the ALPHANUMERIC KEYBOARD BACKLIGHT TEST , as follows: a.) Change the combo box near the Front Panel button to Reset to power up conditions and press the Front Panel button	
	b.) Change the combo box near Front Panel button to Enable transmission and press the Front Panel 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 BUTTON BACKLIGHT TEST , as follows: a.) Change the combo box near the Front Panel button to Reset to power up conditions and press the Front Panel button	
	b.) Change the combo box near Front Panel button to Enable transmission and press the Front Panel button.	
	c.) At the Indicators frame set Indicator – ID to the All position. Select ON and Backlights .	
	d.) Press the Test Software button	All Backlight LEDs except the TGC sliders and the Rotary are seen with same intensity acceptable for the maximum level.
10	Perform the BUTTON ACTIVITY TEST , as follows: a.) Change the combo box near the Front Panel button to Reset to power up conditions and press the Front Panel button	
	b.) Change the combo box near Front Panel button to Enable transmission and press the Front Panel button.	
	c.) At the Indicators frame set Indicator – ID to the All position. Select ON and Activity .	
	d.) Press the Test Software button	All 10 Activity green LEDs and KB backlights are seen with maximal intensity

Table 4-6 External Keyboard Test Vivid / n- Recommended (cont'd) 3 of 3

Step	Task	Expected Result(s)
11	Perform the STATUS INDICATOR TEST , as follows: a.) Check the Battery green check box. Press Set .	Battery green LED is On
	b.) Uncheck the Battery green check box. Check the Battery yellow check box. Press Set	Battery yellow LED is On
	c.) Uncheck the Battery yellow check box. Check the Extern DC green check box. Press Set	Extern DC green LED is On
	d.) Uncheck the Extern DC green check box. Check the Extern DC yellow check box. Press Set	Extern DC yellow LED is On
12	Perform the LID BUTTON TEST , as follows: a.) Press the Diagnostic Info 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 POWER BUTTON TEST , as follows: a.) Press the Diagnostic Info button. Press the Power button.	The status of the Power Button is "Open" and changes to "Closed" when the power button is pressed.
	b.) Press the Disconnect and Close buttons to close the test application.	

4-3-1-3 Trackball Test

Table 4-7 Trackball Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press Config	
3	Under the Connectivity tab, select TCPIP then Advanced Settings	
4	Click on View	
5	In the address bar, type Desktop and press <Enter>	
6	Select My Docs > My Pictures 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).

4-3-1-4 System ID Test

Table 4-8 System ID Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press Config	
3	Under the Connectivity tab, select TCPIP then Computer Name	
4	Make sure the computer name is System ID	
5	Select Advanced Settings	
6	Type Desktop and press <Enter>	
7	Select My Computer and press Menu	
8	From the drop-down menu, select Properties and then select the Computer Name tab.	
9	Make sure the System ID is indicated under the computer description.	The computer description matches the system ID.

4-3-1-5 CW Test

Table 4-9 CW Test - Recommended

Step	Task	Expected Result(s)
1	Boot-up the System in Regular Scanning Mode	
2	Press Alt + Config to enter Diagnostics Mode	
3	From the Diagnostic Test tree, select Front End Test .	
4	Run Full System Test and press Start	PASS
5	Connect the 3S-RS probe to the probe port.	
6	From the Diagnostic Test tree, select Front End Test .	
7	Select TR32 then select TX . Select TXProbeTX Test and press Start	PASS
8	Select MUX Test then select 3S-RS Test and press Start	PASS
9	Select TR32 Test then select RX Test . Select RSTest with 3S-RS and press Start	PASS
10	When done, press the Esc button	

4-3-1-6 Visual Test

Table 4-10 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 4-11 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 "Connecting the VCR" on page 3-33.
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 VCR Record 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 Play 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 4-12 B/W Printer Test - Recommended

Step	Task	Expected Result(s)
1	Scan a phantom or suitable interface in 2D-Mode.	
2	Press the Freeze button.	The image scanning stops with the latest picture frozen on the screen.
3	Press the Print 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 4-13 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 Freeze button.	
3	Press the Print P1 button.	Evaluate the color print quality. Adjust the <i>brightness</i> and/or <i>contrast</i> of the Color printer, if required.

4-3-3 Back End Processor Tests

4-3-3-1 Phono Test (optional)

Table 4-14 Phono Test - Recommended

Step	Task	Expected Result(s)
1	Connect the microphone to the microphone input on the ECG Board. Note that the special Medical Microphone is required.	
2	Use your finger to click (tap) the microphone.	Verify that the waveform on the screen corresponds to the microphone clicks.

4-3-3-2 Magneto Optical Drive (MOD) Test

Table 4-15 MOD Test Vivid / n - 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 SCSI Adaptor Installation 2271149-2INS and MO are displayed.
2	Insert a new MO Media Sony EDM-2300B (2.3G) into the MOD.	
3	Press Ctrl+F11 (or Alt+D) on the keyboard and select <Back End>, <Media Driver> and <MO>, as appropriate.	The UtilMediaApp dialog box is displayed.
4	Select the IsMediaAcces button.	The message Media in drive G is accessible is displayed.
5	Select the EjectMO button.	The message Media is outside is displayed. Check that the media has actually been ejected.
6	Select the LoadMO button.	The message Media is inside is displayed. Check that the media is actually inside.
7	Select the Format button.	The message Media in drive G was formatted successfully is displayed.
8	Select the GetVolInfo button.	The message Media in drive G has following properties: Media Label = MY_LABEL, Media File-System Name = FAT is displayed.
9	Select the Get BTPsector button.	The message The Bytes Per Sector value of media in drive G is 512 is displayed.
10	Select the SetVolLabel1 button.	The message Media Label set to TEST_LABEL1 is displayed.
11	Select the GetVolInfo button.	The message Media in drive G has following properties: Media Label = TEST_LABEL, Media File-System Name = FAT is displayed.

Table 4-15 MOD Test Vivid i n - Recommended

Step	Task	Expected Result(s)
12	Select the Exit button and close the Diagnostic Application.	
13	Press the Archive button on the keyboard.	The <i>Patient List</i> window is displayed.
14	Press the Utilities button on the soft menu.	The <i>General Status</i> window is displayed.
15	Press the Removable Media Utility button.	The <i>Utility</i> window is displayed, showing the message: Free space on Media: 1096 MB.
16	Type the new label (for example, "Side1"), then select the Format button. Confirm "YES" to the warning message.	The message Current Media Name is:SIDE1. Media was formatted successfully is displayed. MO Label: SIDE1, MO STATUS: MOUNTED
17	Select the Eject button.	The message Media Ejected is displayed. MO STATUS: Ejected.
18	Select the OK button to exit the utility.	

4-3-3-3 DVD/CD Writer Test

Table 4-16 DVD/CD Writer Test Vivid i n - Recommended 1 of 2

Step	Task	Expected Result(s)
1	Connect the DVD to the power and to the system (see "DVD/CD-RW Drive" on page 3-21). Connect a probe to the system and power ON the system.	System and DVD connected.
2	Create a new patient for this test. Note: The term " Test Patient " refers to the newly created patient.	The system scan and the name of the " Test Patient " is displayed in the top-left corner of the screen.
3	Holding the probe in the air, press the Record button to start scanning. Continue recording until approximately 20MB of data is acquired.	The progress bar indicates "full with images or movies".
4	Press <Patient> button and then select End Exam from the archive menu.	The following message is displayed: Unsaved image(s). Which do you want to save?
5	Select All .	A progress-bar is displayed showing that the images are being archived.
6	Press <Patient> button and then select Patients List from the archive menu.	The Search/Create Patient window is displayed.
7	Select Test Patient and press Export .	The Export pop-up is displayed.
8	Place a blank DVD media into the DVD/CD device. Note: For information on types of media, see "DVD/CD-RW Drive" on page 3-21.	
9	Select To: CD/DVD Archive and press OK .	A pop-up is displayed with the message: Current media is not formatted. Do you wish to format it?
10	Change the label to TEST-1 and press OK .	A progress bar is displayed.

Table 4-16 DVD/CD Writer Test Vivid / n - Recommended (cont'd) 2 of 2

Step	Task	Expected Result(s)
11	Press Select All and then press Copy .	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 OK to close the message and then press Done .	A progress bar and message are displayed asking you to wait.
13	Press Alt+E and select CD/DVD Writable (H:\) from the menu.	The message Media Ejected is displayed.
14	Remove the DVD from the drive.	
15	Delete the Test Patient that was added for the purpose of this test.	The Test Patient is removed from the patient list.
16	Place the media into the drive and press the Import .	The Export pop-up is displayed.
17	Select CD/DVD Archive on the From: list and press OK .	The following dialog is displayed: IMPORT PATIENT - CD/DVD Archive
18	Press Select All and then press Copy	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 OK to close the message and then press Done .	A progress bar and message are displayed asking you to wait.
19	Press Alt+E and select CD/DVD Writable (H:\) from the menu.	The message Media Ejected is displayed.
20	Remove the DVD from the drive.	
21	Verify that all of the saved exams and images of the Test Patient exist in the database.	The exams and images that were exported and imported for the Test Patient should appear in the database.
22	Select the Test Patient exams and press Delete .	A message is displayed prompting the user to confirm the delete command.
23	Press OK to confirm delete (must confirm three times).	The Test Patient is deleted from patient list.

4-3-3-4 Plug and Scan Test

Table 4-17 Plug and Scan Test - Recommended

	Task	Expected Result(s)
1	Press the On/Off 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 On/Off button LED.
3	Turn ON the system's circuit breaker. Press the On/Off 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 Standby mode.	The system enters <i>Standby</i> mode and stays in this mode. The On/Off button LED is blinking.
5	Turn OFF the system's circuit breaker. Press the On/Off button.	The system enters the <i>Power-OFF</i> state. The On/Off button LED is OFF.

Section 4-4 System Turnover Checklist

Before returning the Vivid *i* 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 4-18](#) below.

4-4-1 Software Configuration Checks

Table 4-18 Software Configuration Checklist

Step	Task	Check
1	Check the date and time settings. Refer to "Date and Time Adjustments" on page 3-49.	
2	Check the language settings. Refer to "Language Selection" on page 3-50.	
3	Ensure that all of the software options are configured correctly. Refer to "Software Options Configuration" on page 3-61.	
4	Ensure that the hospital details are configured correctly. Refer to Table 3-13 on page 3-48 .	
5	Ensure that the VCR is configured as required for the specific site and country. Refer to video converter setup - see Figure 3-20 on page 3-33 .	
6	Ensure that the measurement units are configured as required for the specific site and country. Refer to "Units of Measure" on page 3-51.	
7	Ensure that the connectivity network settings have not been modified and are configured as required for the specific site. Refer to "Set the Scanner's Network Information" on page 3-71.	

Table 4-1: Vivid *i* n Site Log

[illegible]

Chapter 5

Components and Function (Theory)

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 *i* 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	5-1
5-3	Front End Unit	5-5
5-4	Back End Processor	5-19
5-5	External Input/Output (I/O)	5-27
5-6	Power Supply System	5-28
5-7	Monitor and Operator Panel	5-33
5-8	ECG Module	5-38
5-9	Peripherals	5-40
5-10	Cooling System	5-42

Section 5-2 General Information

The Vivid *i* 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 *i* nSystem

The Vivid *i* 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 FGPA technologies).
- Open connectivity using multiple USB ports
- High-performance 15" LCD monitor
- Low profile, backlit keyboard

Vivid *i* 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 *i* 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 *i 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 *i 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 *i n* systems are listed below, and described in detail in this chapter, as follows:

- Front End (FE) Processor - see *Front End Unit* on page 5-5
- Back End Processor (BEP) - see *Back End Processor* on page 5-19
- Internal and external cable interconnections - see *External Input/Output (I/O)* on page 5-27
- Monitor & Keyboard - see *Monitor and Operator Panel* on page 5-33
- Power Supply System - see *Power Supply System* on page 5-28
- Peripherals - see *Peripherals* on page 5-40

For a detailed block diagram of the Vivid *i n* system, refer to Figure 5-2 on page 5-4 .

5-2-3 Vivid / n Systems - Block Diagram

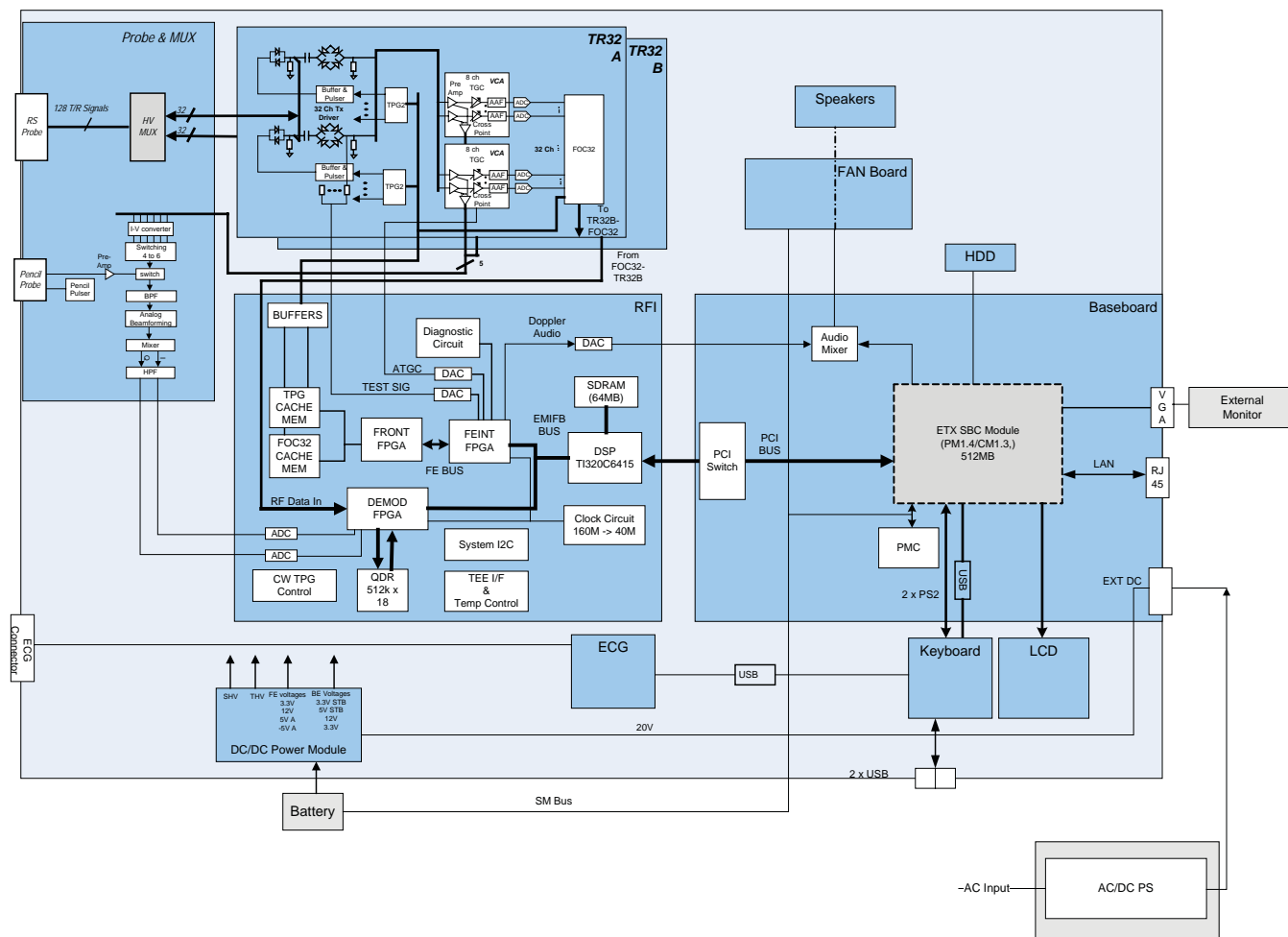


Figure 5-2 Vivid / n System Block Diagram

Section 5-3 Front End Unit

5-3-1 General Information

The Vivid *i* n Front End system (see diagram in Figure 5-4 on page 5-6) 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 5-9.

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 5-13.
- P&M (Probe & MUX Board) - includes CW BF & HVMUX
For a detailed description, see "Probe and MUX (P&M) Board" on page 5-16.

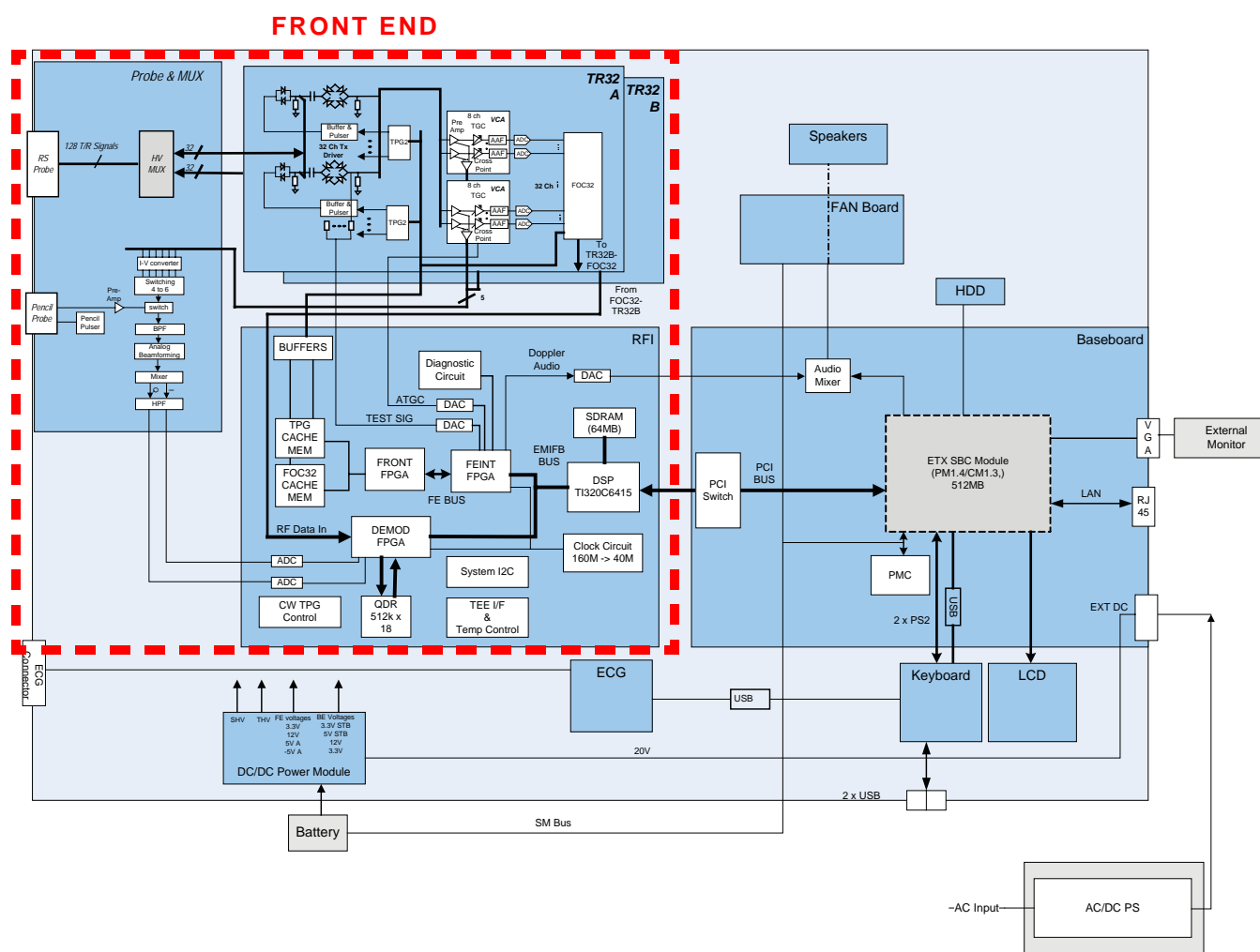


Figure 5-3 Vivid *i* n System Block Diagram showing Location of Front End

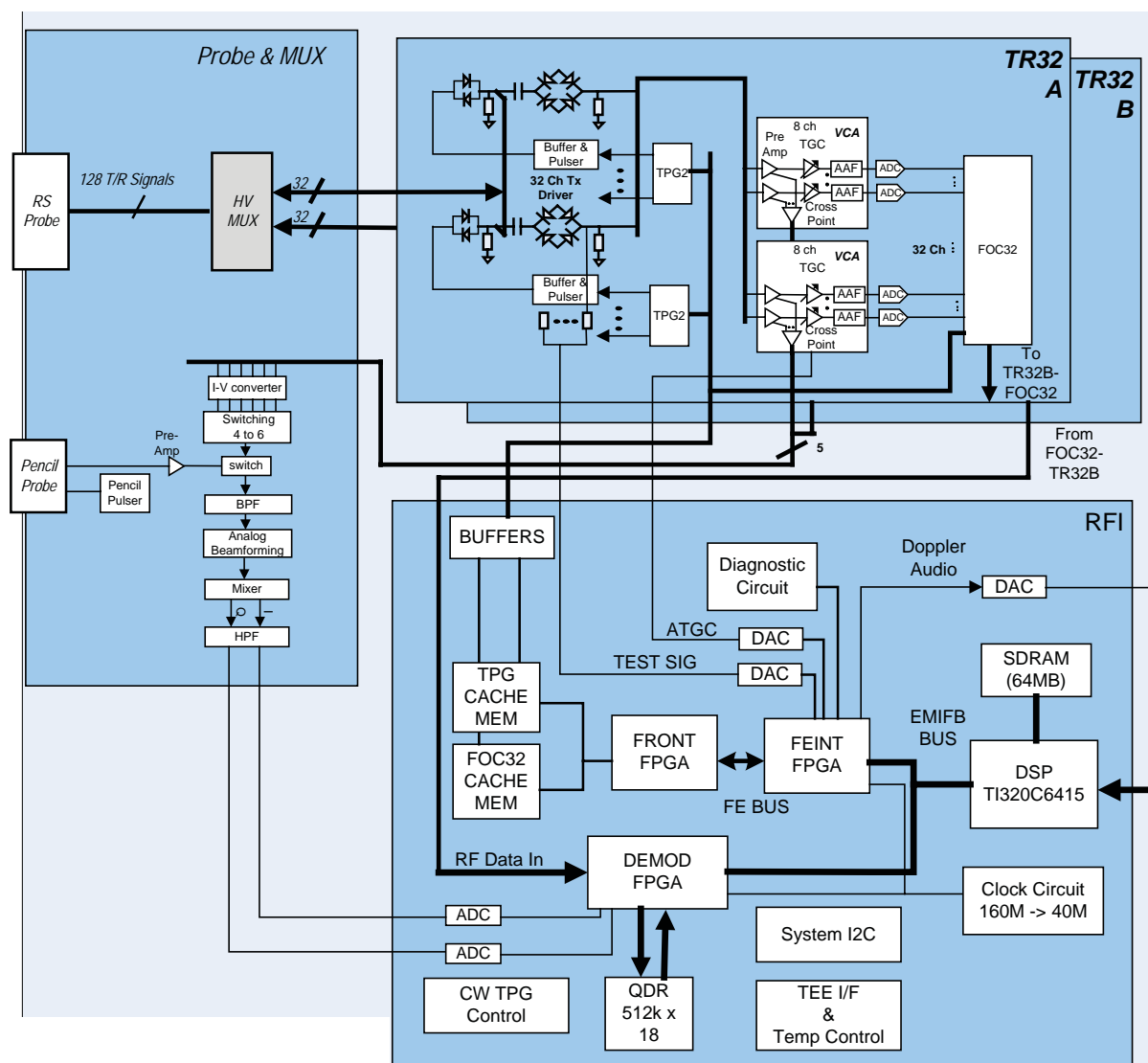


Figure 5-4 Front End - Block Diagram

5-3-3 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](#).

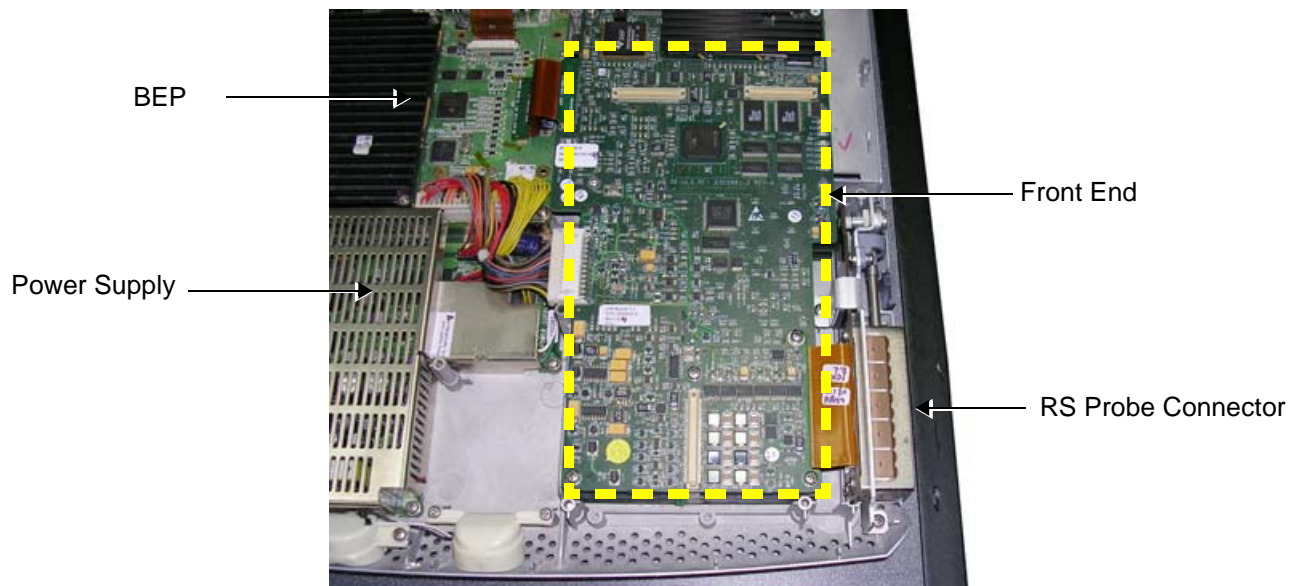


Figure 5-5 Bottom Assembly showing Location of Front End

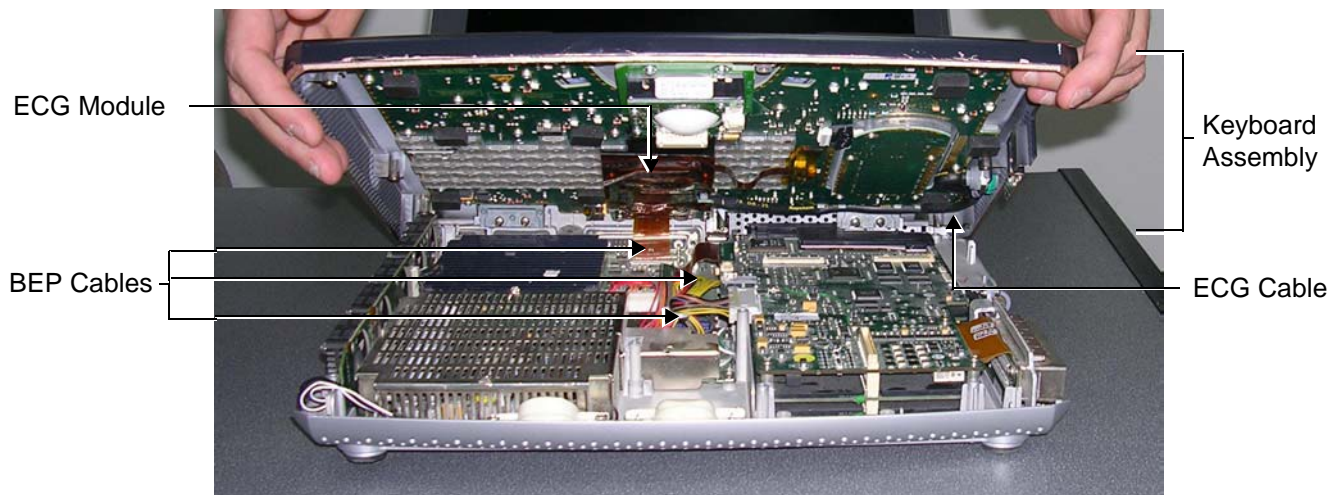


Figure 5-6 Keyboard Assembly in Opened Position



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).

5-3-3 Front End Unit - Location in the System (cont'd)

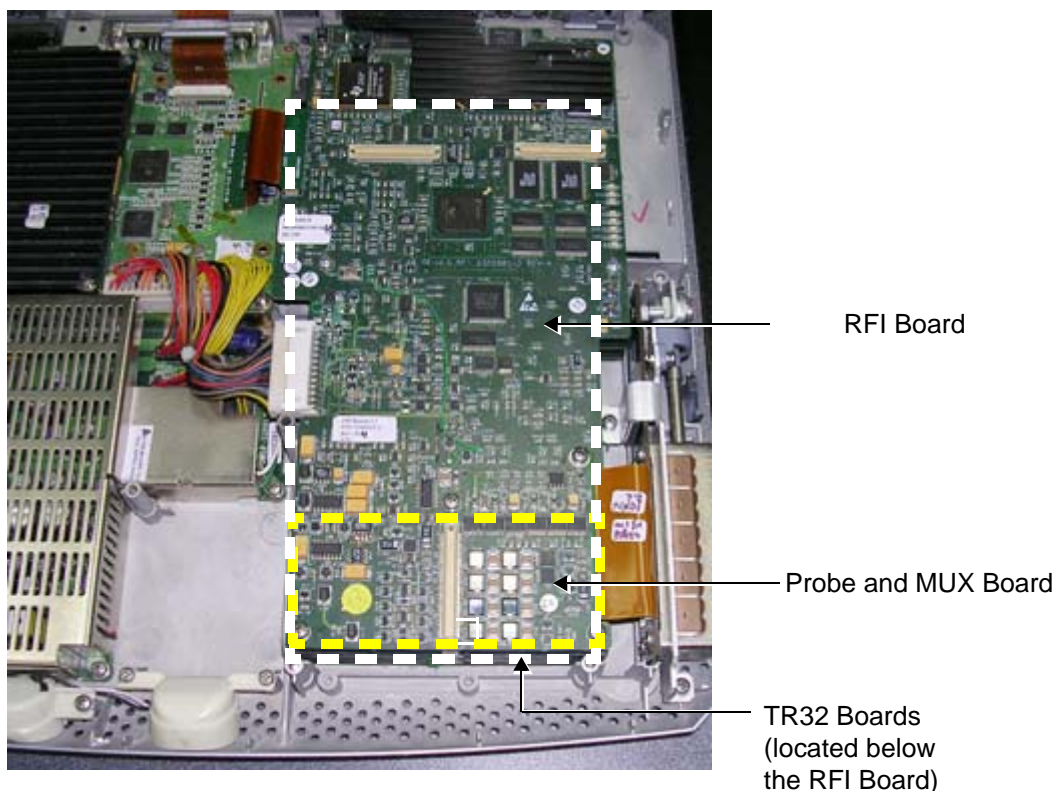


Figure 5-7 Bottom Assembly showing Position of Boards (RFI,TR32, P&M)

5-3-4 RFI Board

The RFI Board combines the following functionalities:

- Front End Control
- Radio Frequency & Tissue Processing
- PCI Bus Interface

5-3-4-1 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

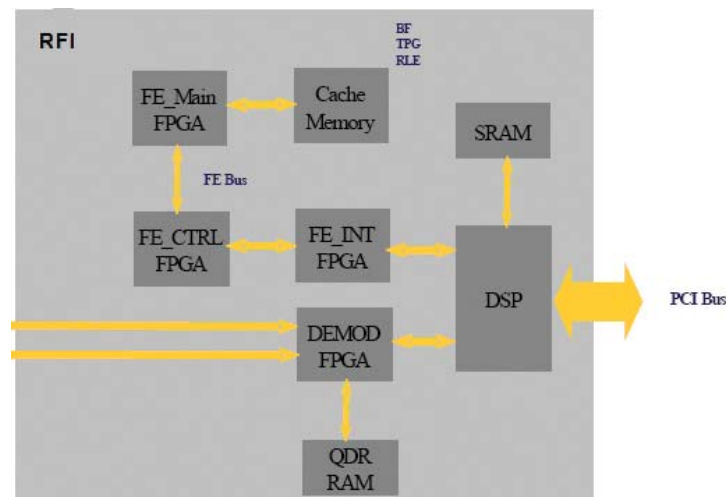


Figure 5-8 RFI Block Diagram

5-3-4-2 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.

5-3-4-3 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.

5-3-4-4 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.

5-3-4-5 PCI Connection

The RFI Board interfaces directly to the PCI bus via the DSP PCI to the local bus bridge.

5-3-4-6 RFI Board Connectors

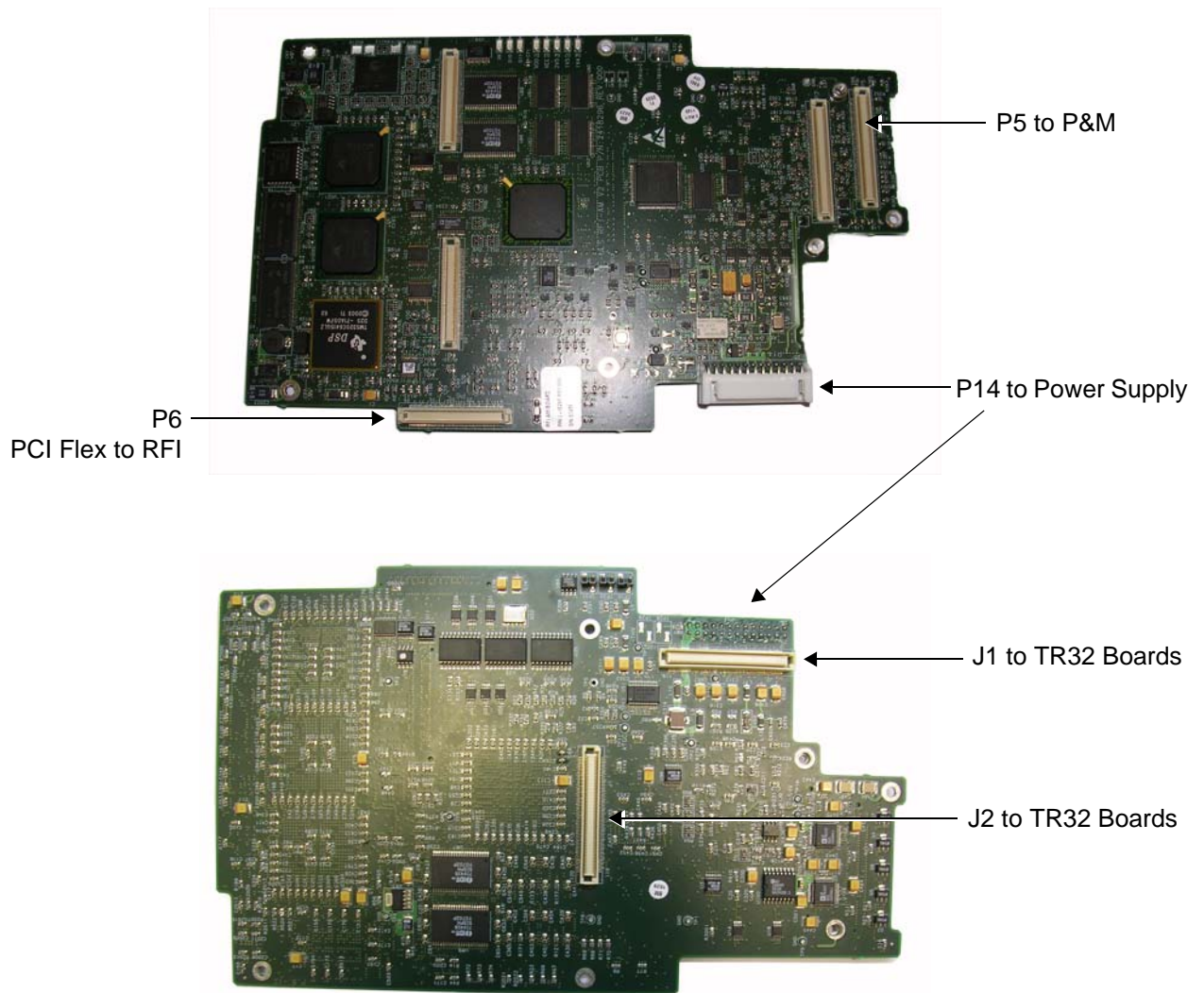


Figure 5-9 RFI Board Connector Locations

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

5-3-4-6 RFI Board Connectors (cont'd)

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

5-3-4-7 Probe Management

5-3-4-7-1 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.

5-3-5 TR32 Boards (Transmitter/Receiver)

5-3-5-1 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

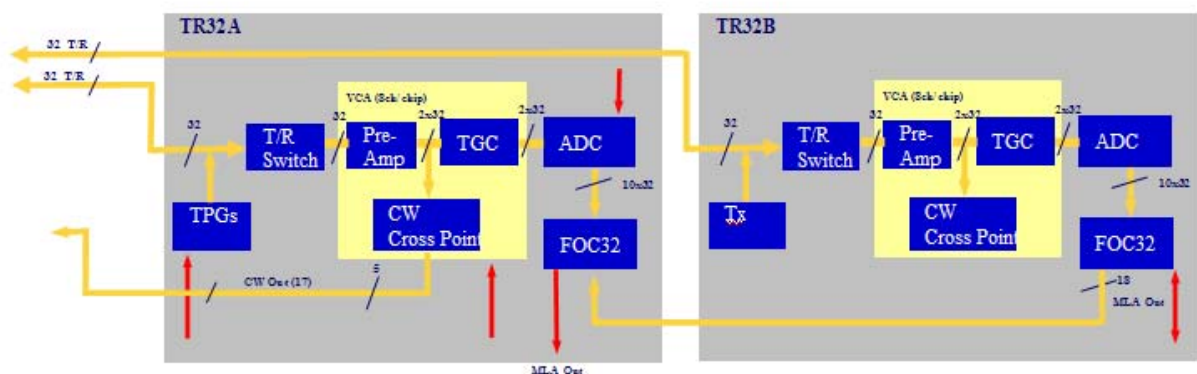


Figure 5-10 TR32 Board Block Diagram

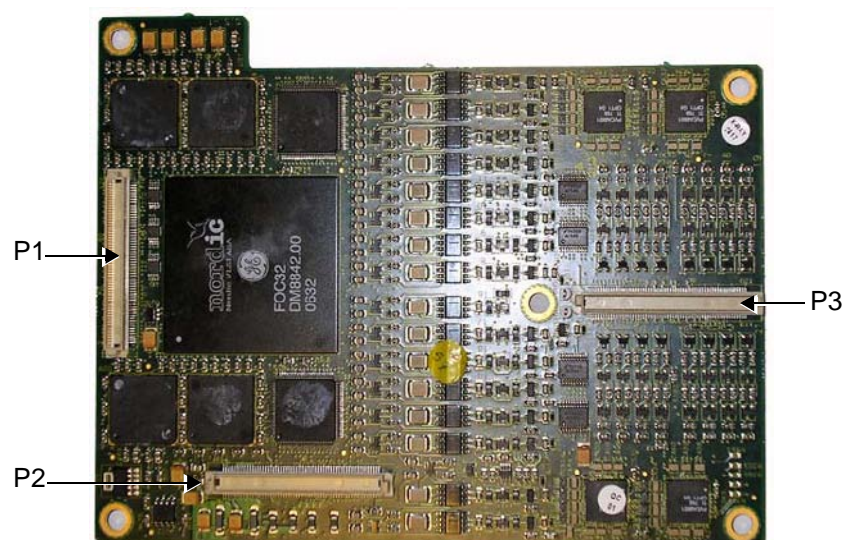


Figure 5-11 Connectors on TR32 Board - Upper View

5-3-5-1 General Description (cont'd)

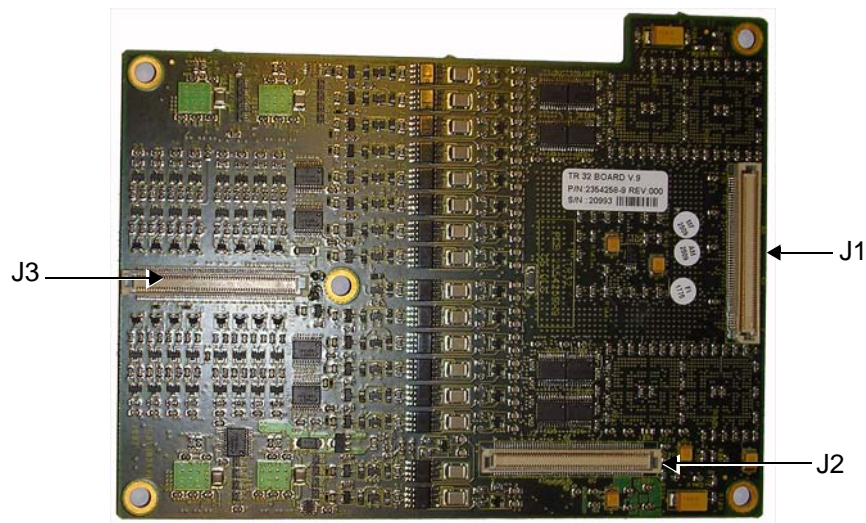


Figure 5-12 Connectors on TR32 Board - Bottom View

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

5-3-5-1 General Description (cont'd)

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.

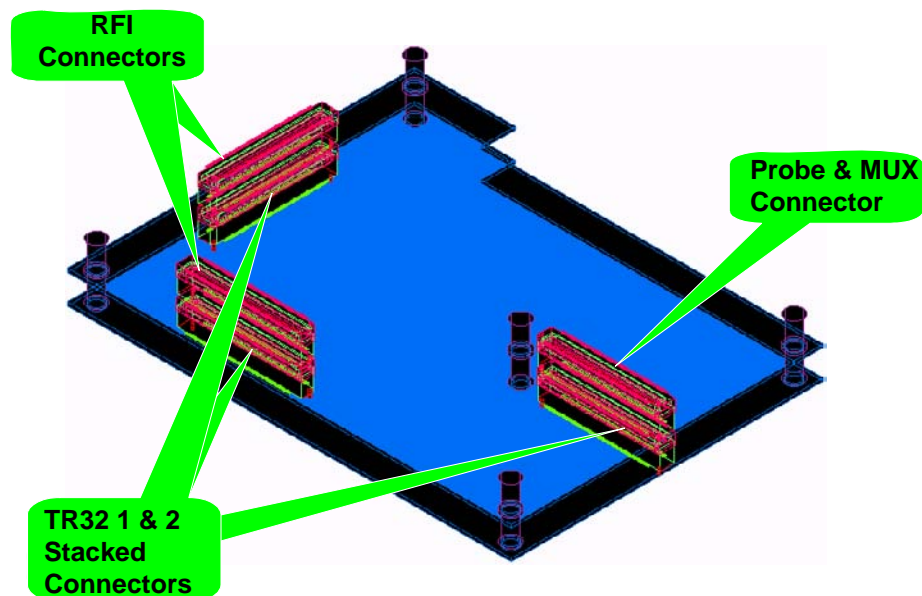


Figure 5-13 TR32 Board - Stacked Connectors

5-3-6 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.

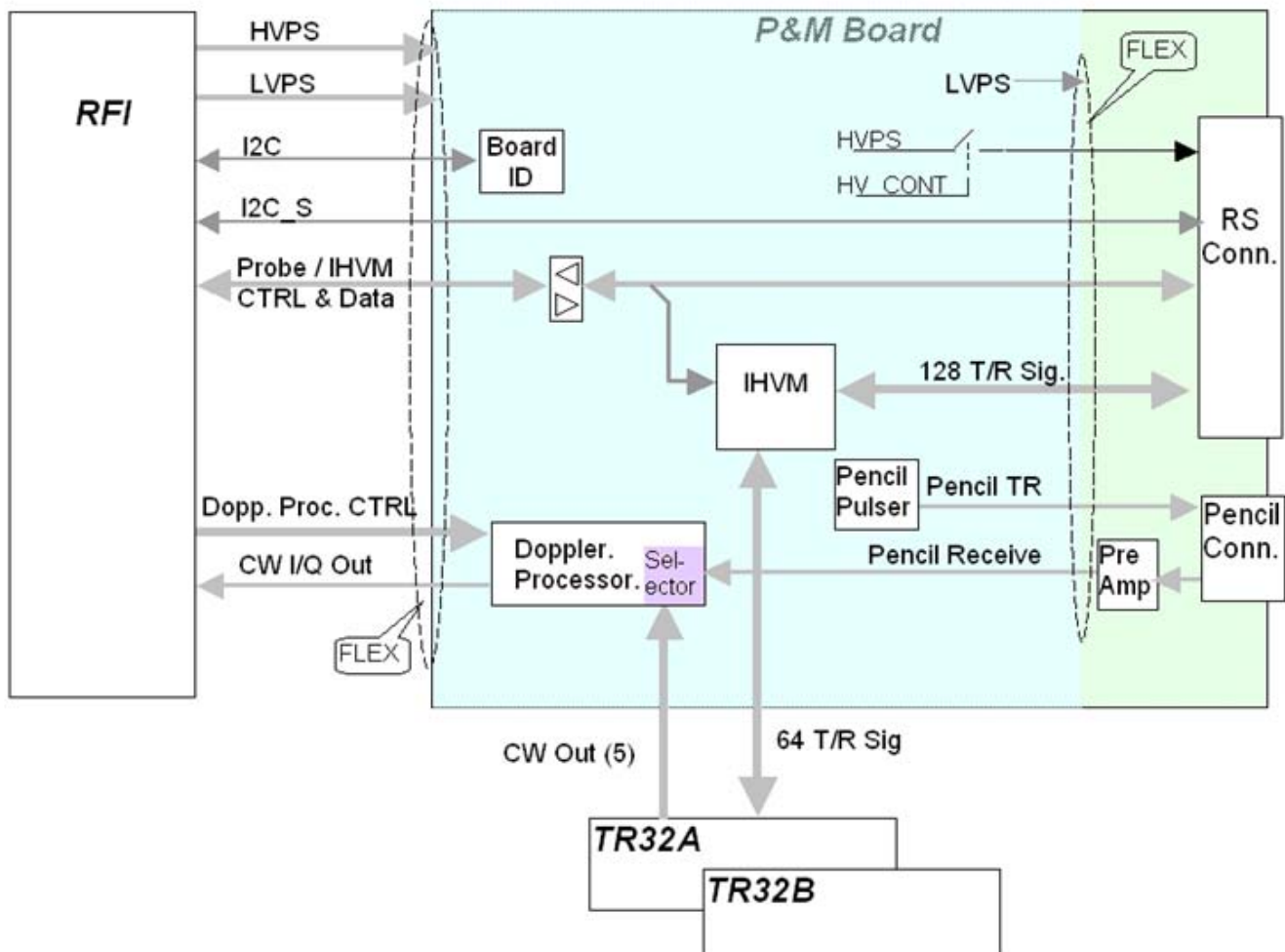


Figure 5-14 Probe and MUX Board - Block Diagram

5-3-6 Probe and MUX (P&M) Board (cont'd)

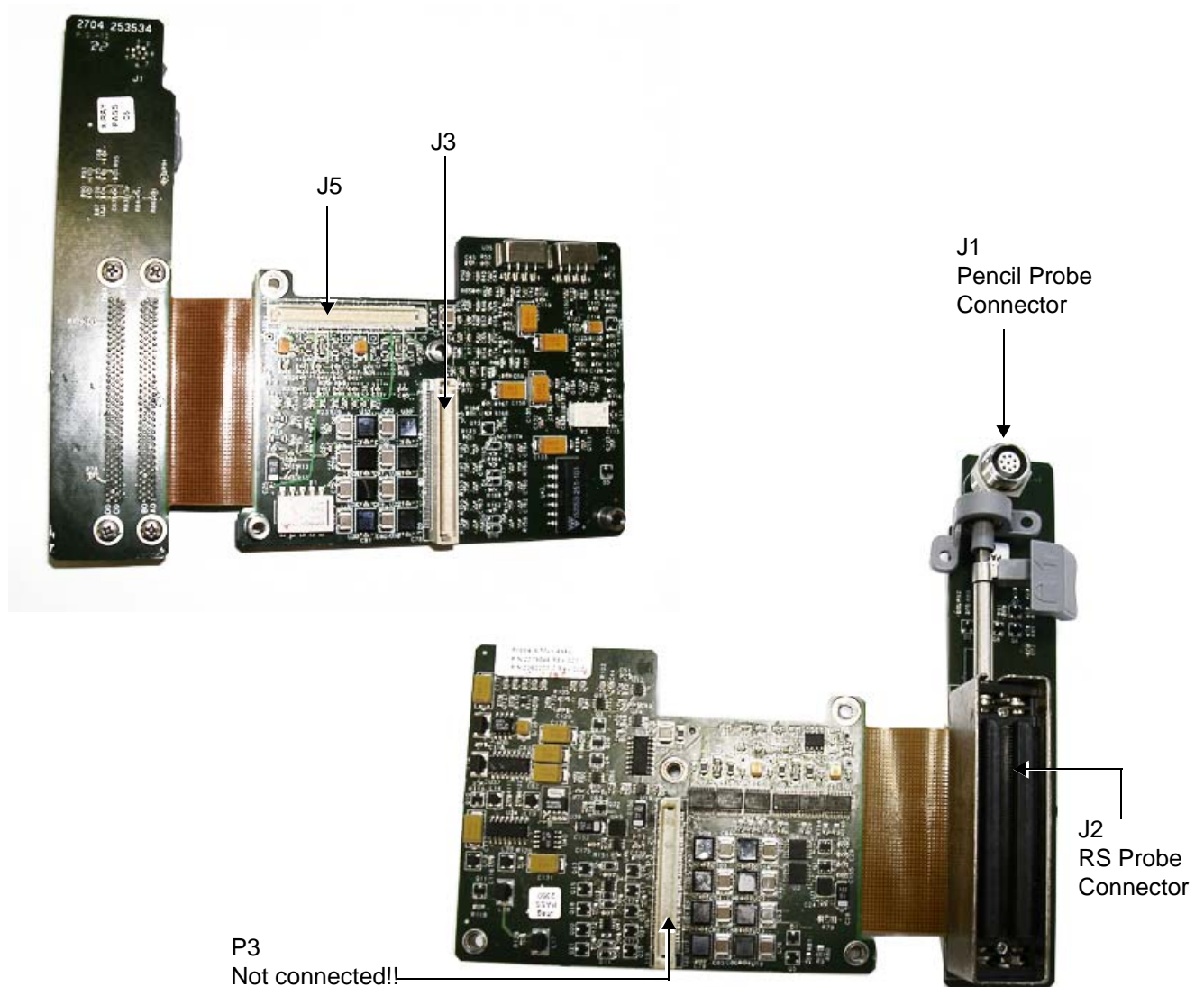


Figure 5-15 Probe and MUX Board Connector Locations

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

5-3-6 Probe and MUX (P&M) Board (cont'd)

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 *i* n ultrasound unit and is the main controller for the system.

A block diagram of the BEP is provided in Figure 5-17 on page 5-20 .

The various components that comprise the Vivid *i* n BEP are described in the following sections:

- "ETX SBC Central Processing Unit (CPU)" on page 5-21.
- "ETX Base Board" on page 5-21.
- "Hard Disk" on page 5-23.
- "Fan Control" on page 5-23
- "RTC Battery" on page 5-23
- "Back End Processor - Location of Components" on page 5-24

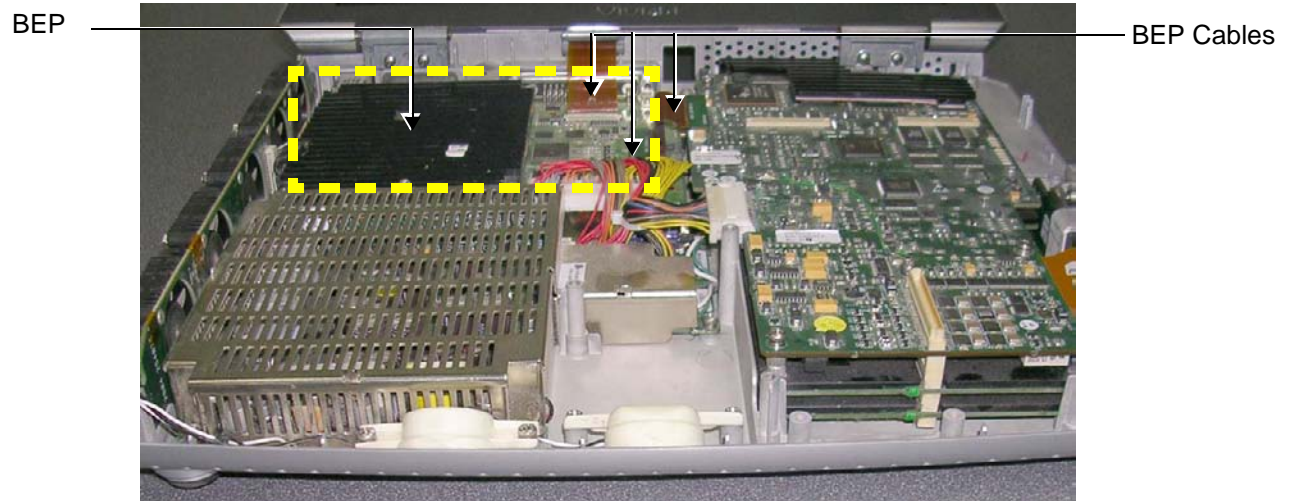
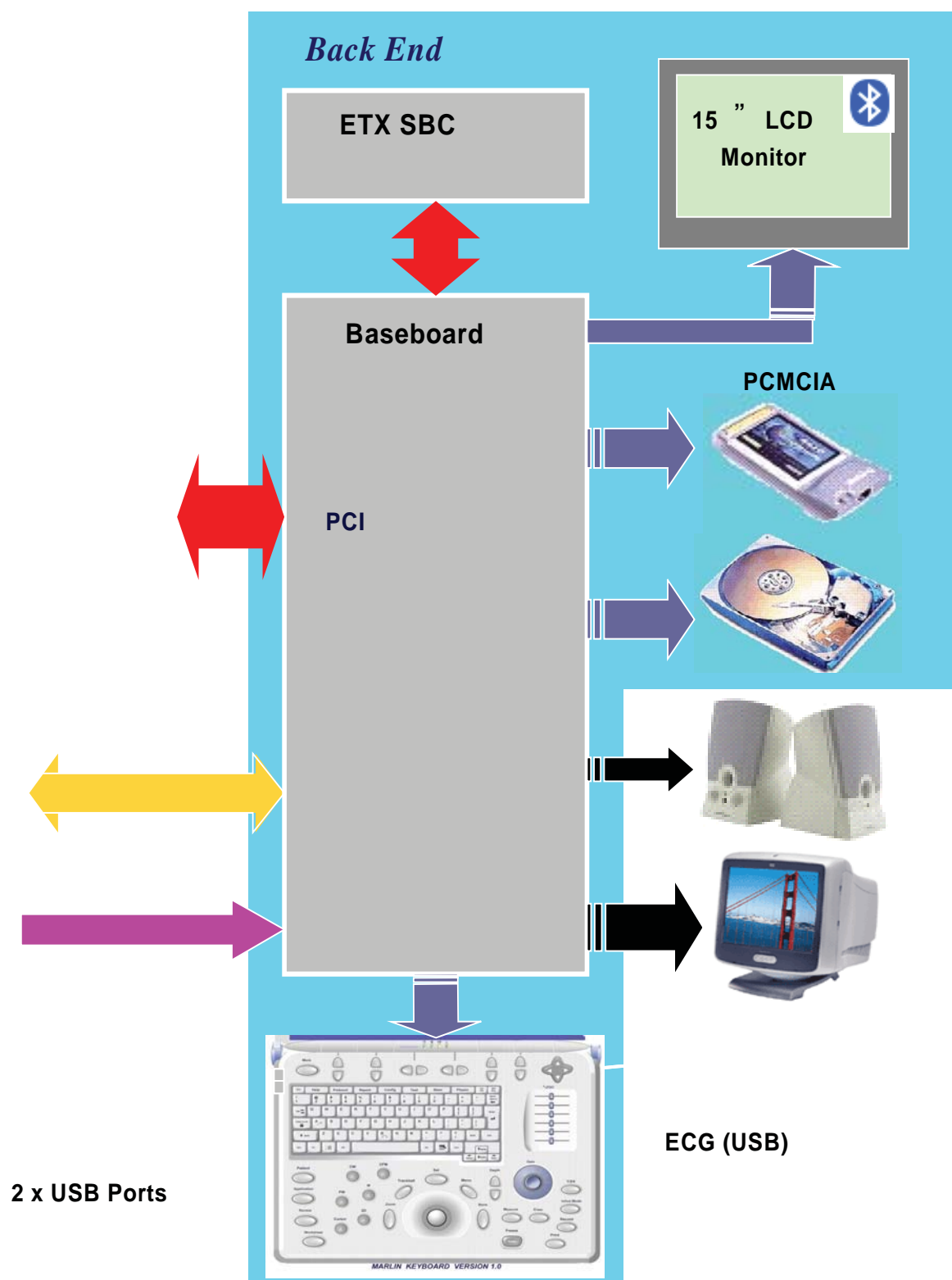


Figure 5-16 Location of BEP in Bottom Assembly



5-4-1 Introduction (cont'd)

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 - 21](#)), 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 / 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 - 21](#)) 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.

5-4-3-1 Overview of ETX Base Board Functions (cont'd)

Refer to Figure 5-21 on page 5-25 for a view of the ETX Base Board showing the location of the various connectors.

Figure 5-18 below shows a block diagram of the high level functions of the ETX Base Board.

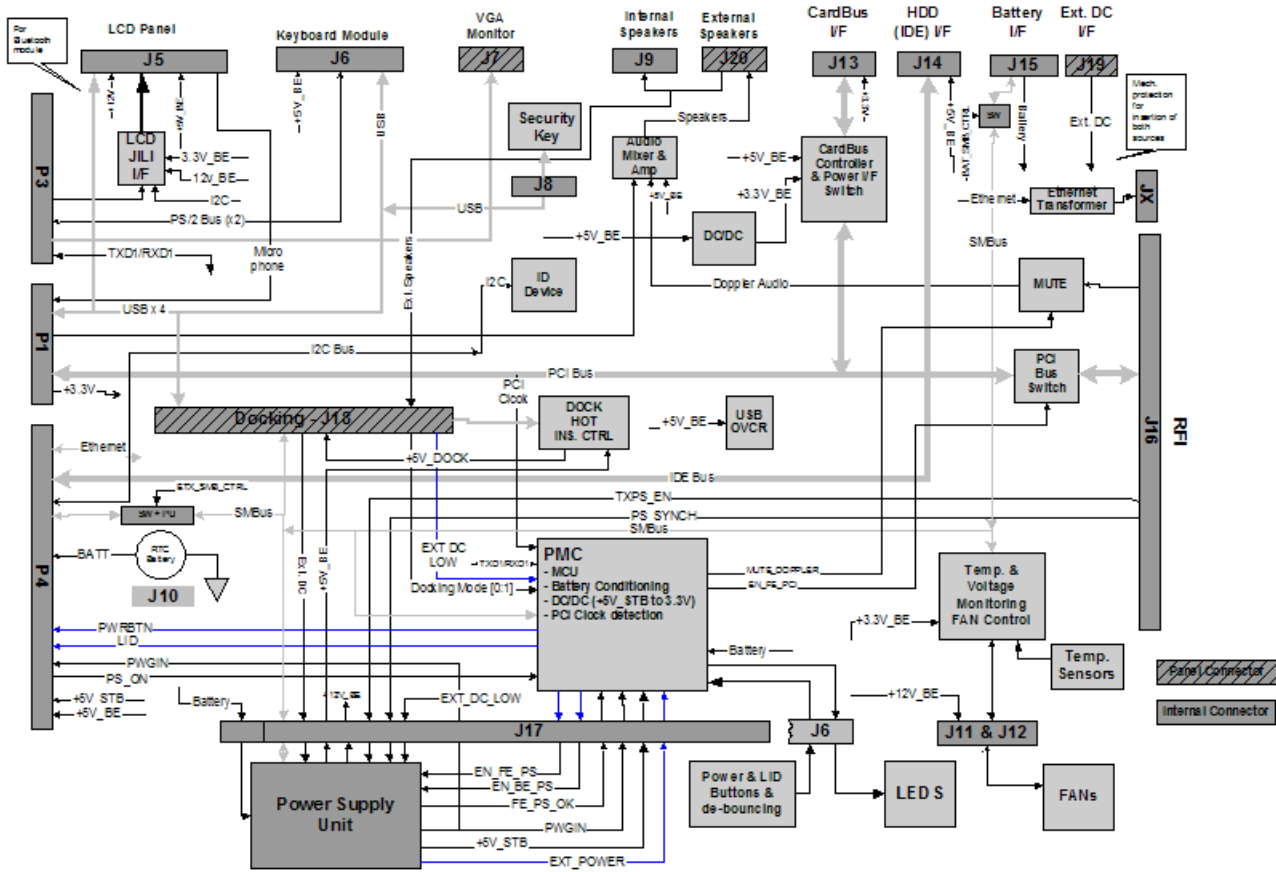


Figure 5-18 ETX Base Board - Block Diagram

5-4-3-2 VGA Interface

The interface to the VGA is via the VGA connector on the rear side of the ETX Base Board. The VGA port is connected to the DIB where VGA signals are converted to DVI and split into three channels to drive the system LCD display (15" or 17", as applicable), external monitor and DVR.

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 / 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 2 GB.
- **D: Drive:** User presets and data. The partition size is 2GB.
- **E: Drive:** Archiving of all images and reports. The partition size is normally 35 GB but this depends upon the size of the hard disk.
- **F: Drive:** Swap file partition. The partition size is 1GB.

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 Battery

The RTC battery provides power to the ETX real-time clock.

NOTE: *The RTC Battery should be replaced every 2 years.*

5-4-7 Back End Processor - Location of Components

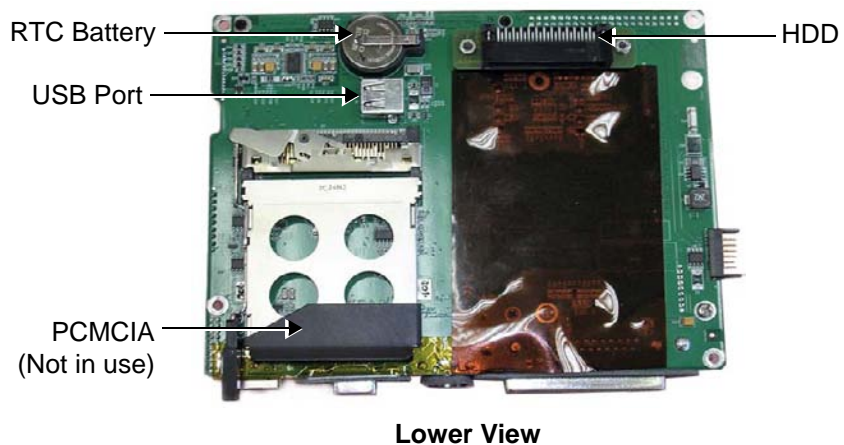
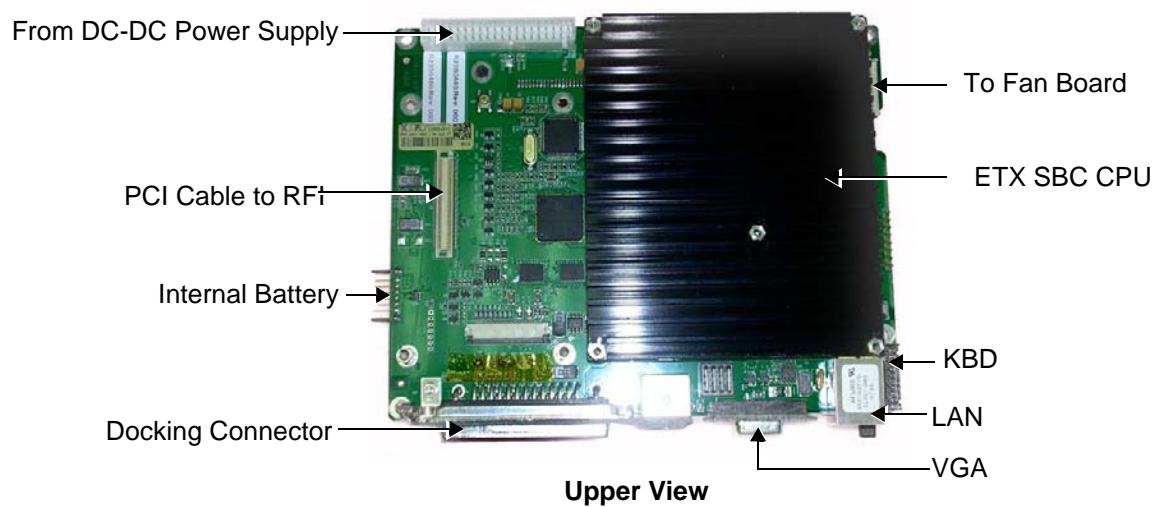


Figure 5-20 Views of the Back End Processor (BEP)

5-4-7-1 BEP Connectors

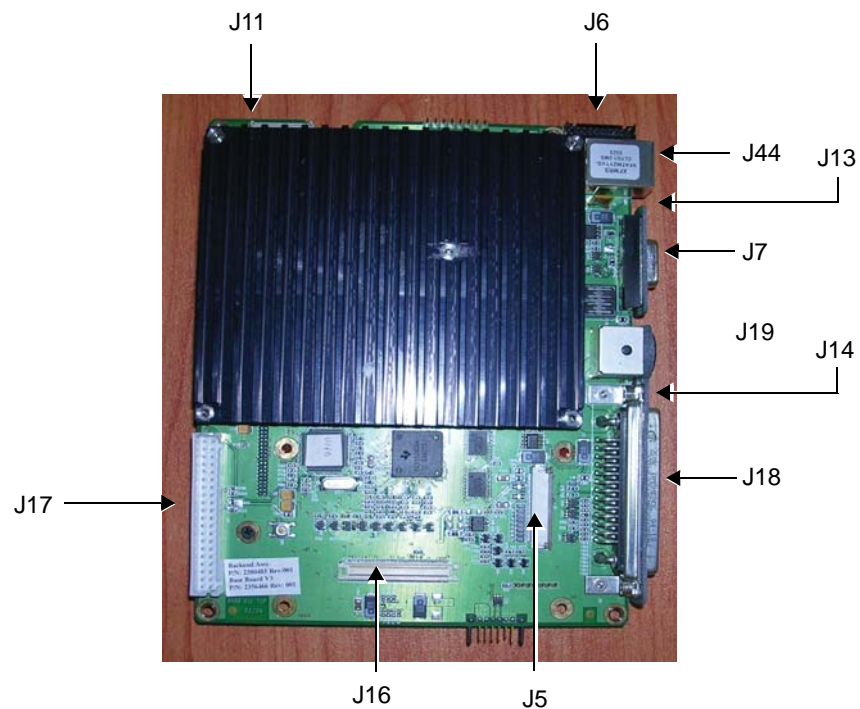


Figure 5-21 Connectors on the BEP

Table 5-9 BEP Connectors

Connector #	Description
J7	VGA
J19	EXT DC INPUT
J18	DOCKING
J20	Speakerphones
J16	RFI
P1:P4 ^a	ETX
J5	LCD PANEL
J6	KEYBOARD
J17	PS UNIT
J14	H.D. Adaptor Card
J15	BATTERY
J13	CARDBUS
J10	RTC Battery
J8	Protection Key
J11:J12	FANS
J9	Speakers

a. All connections to P1, P2, P3 and P4 according to ETX specs.

5-4-7-1 BEP Connectors (cont'd)

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

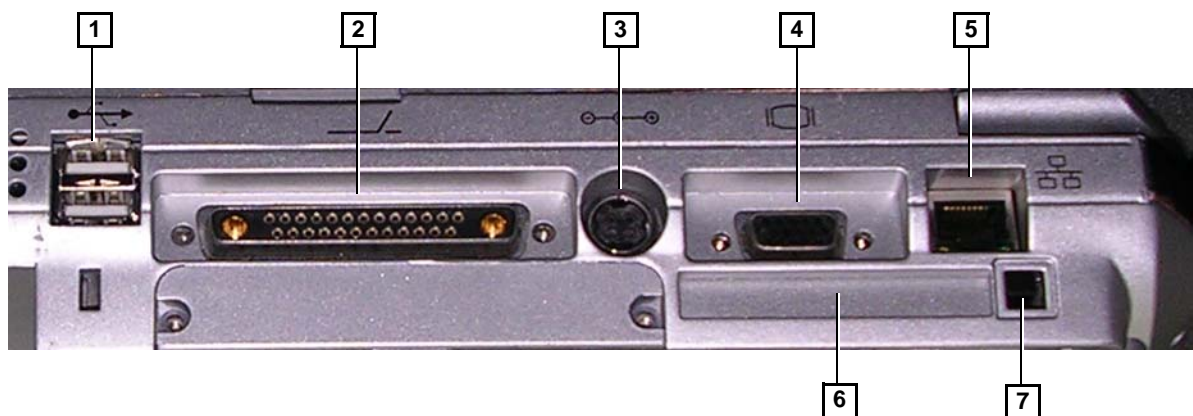
The L/R speakers are mounted on the front side of the bottom assembly. The audio signals are received via a Jx connector connected to the Fan board - see Figure 5-19 on page 5-23 .

Section 5-5

External Input/Output (I/O)

The Vivid *i* 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 *i* nSystem - Rear Panel Connections

Section 5-6 Power Supply System

5-6-1 Electrical Power

The Vivid *i 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)

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.

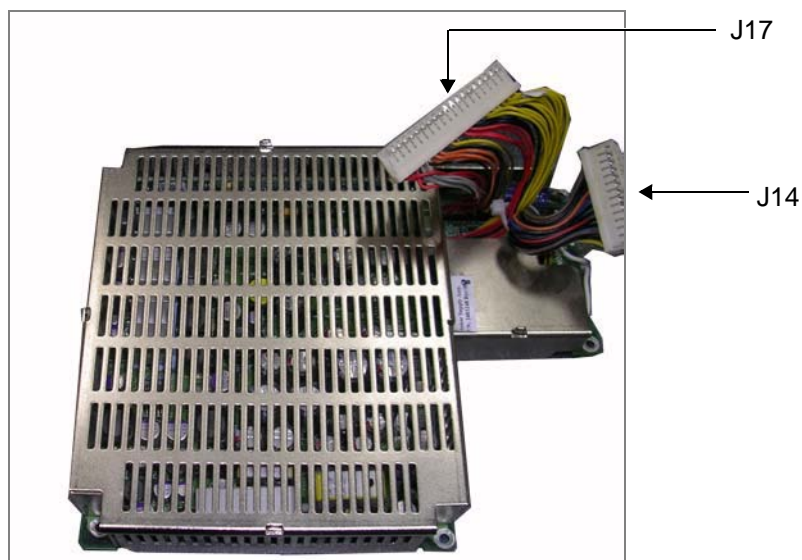


Figure 5-24 DC Source Selector

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 *i* 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 *i* n scanner has built-in charger functionality (see Figure 5-23 on page 5-29) 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 *i* n systems only. Only use the batteries authorized by GE Healthcare.



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 *i* 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.

5-6-6 Recommended storage conditions of battery pack

- Short term (less than one month):0° C (32°F)to50° C (122°F)
- Long term (more than three months):10° C (50° F)to35° 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

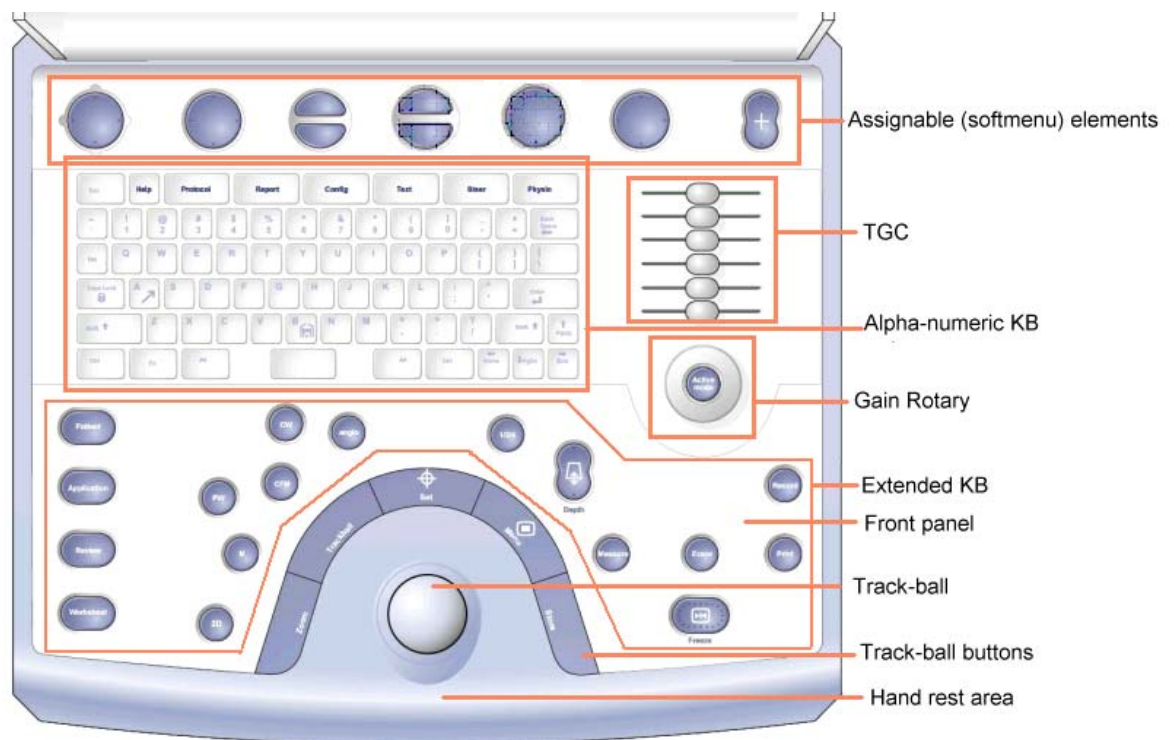


Figure 5-25 Vivid i n System — Keyboard and Operator Panel Layout

5-7-1 Keyboard and Operator Panel (cont'd)

The Vivid *i* 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 section 5-7-2 on page 5-35.

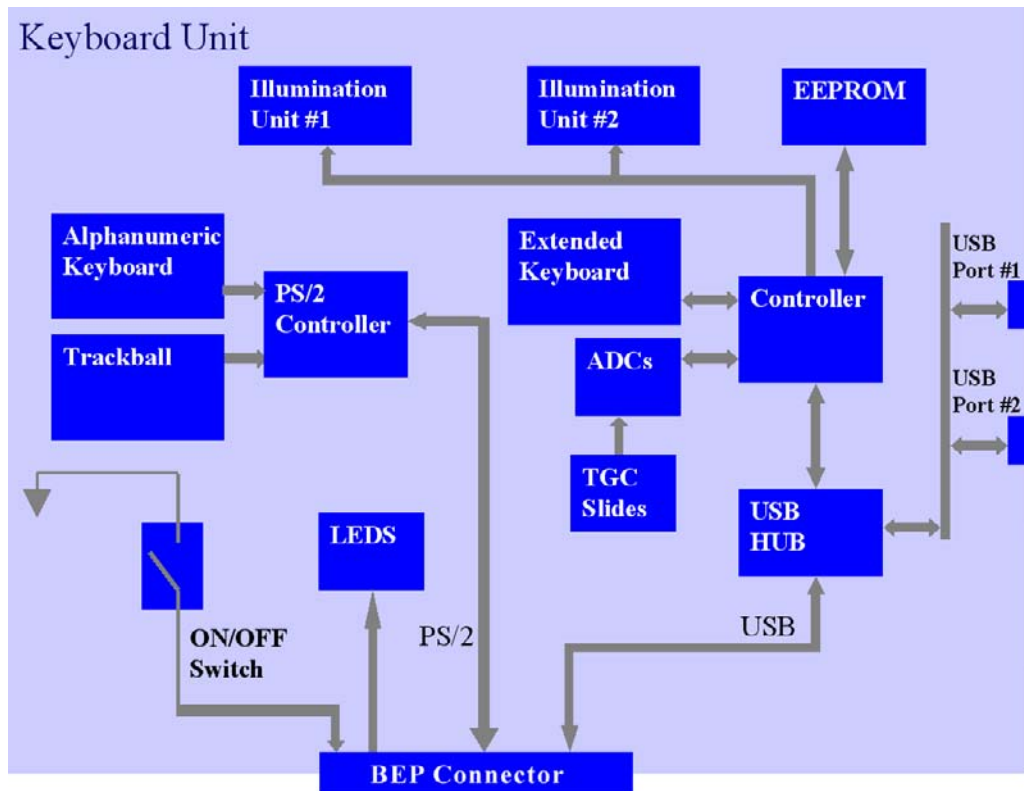


Figure 5-26 Vivid *i* n Keyboard — Block Diagram

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 *i* 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 5-33).

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 *i* 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 Alphanumerical 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

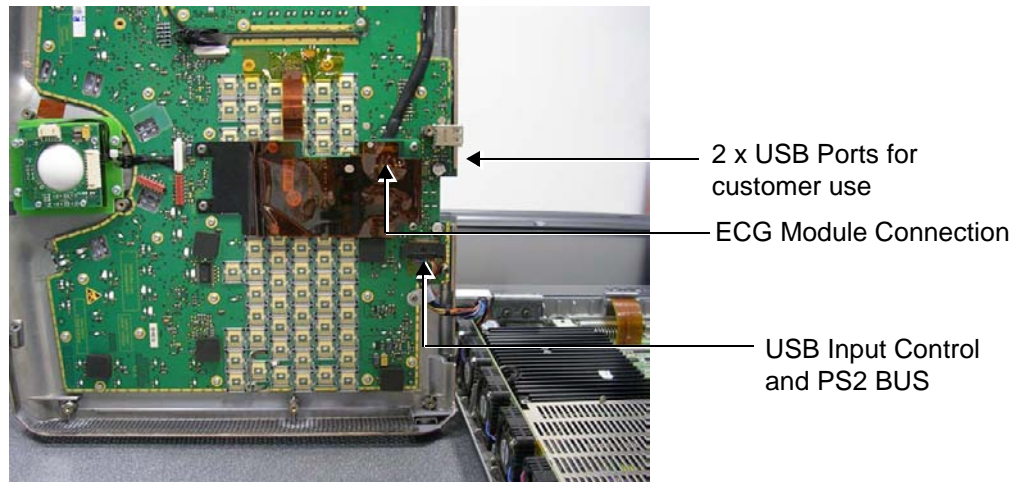


Figure 5-27 Keyboard Module Connectors

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](#).

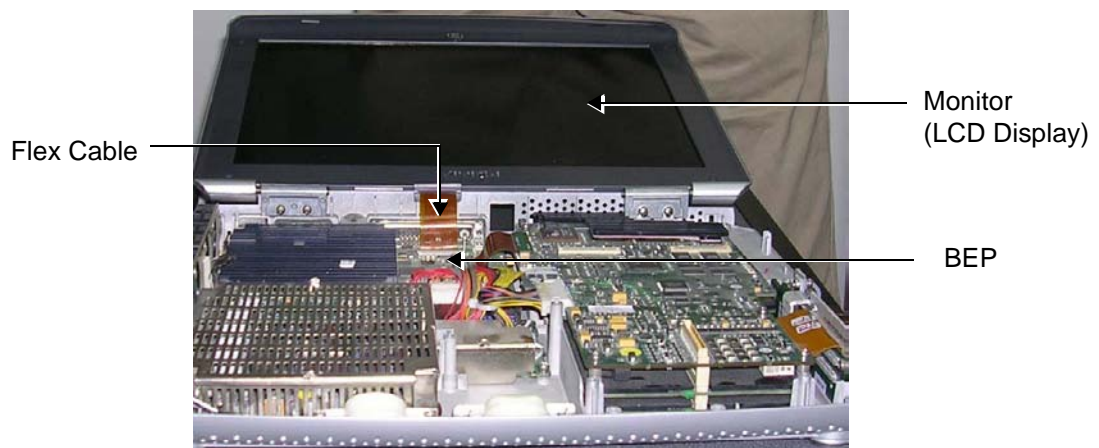


Figure 5-28 LCD Display - Flex Cable Connection to BEP

Section 5-8 ECG Module

5-8-1 Overview

The Vivid *i* 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 5-7). 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.

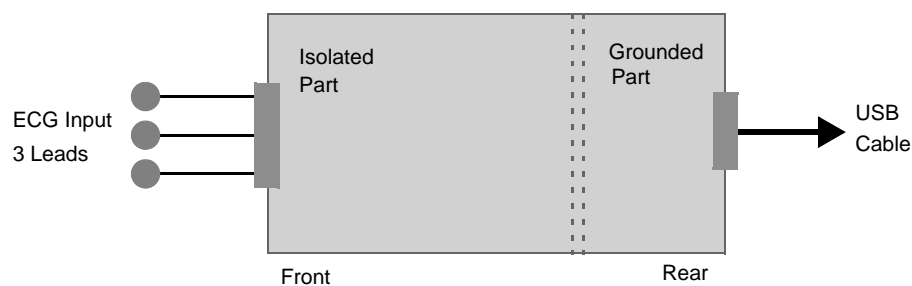


Figure 5-29 ECG Patient I/O Module

A general block diagram of the ECG Patient I/O Module is shown in Figure 5-30 below.

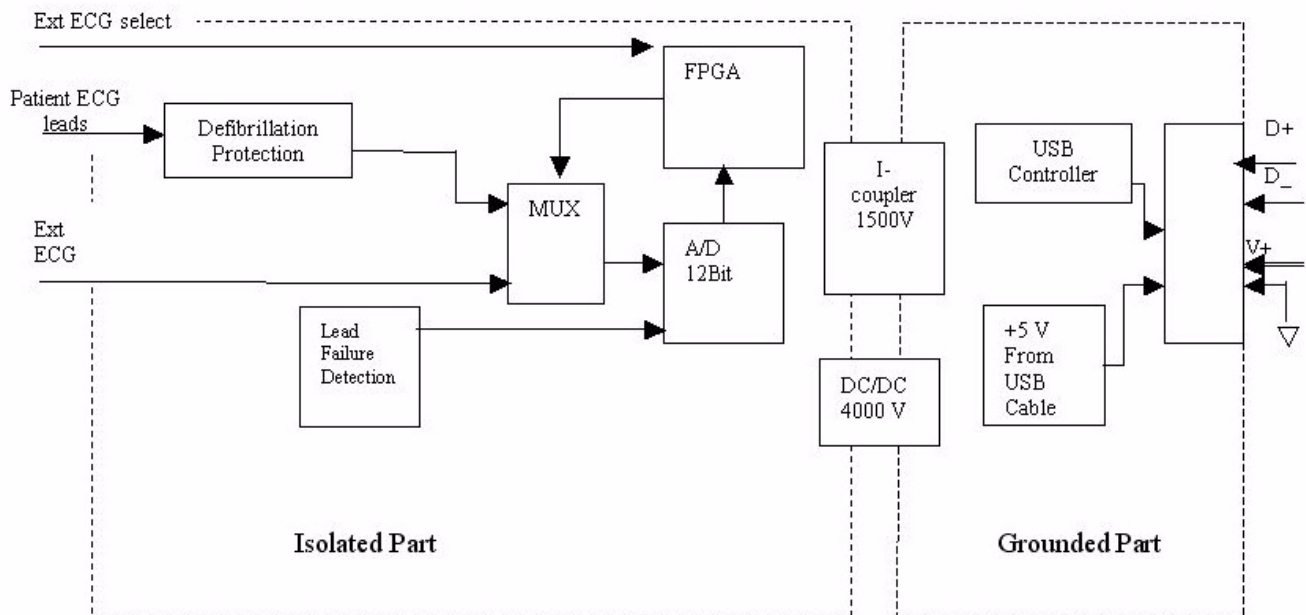


Figure 5-30 ECG Patient I/O Module - Block Diagram

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 *i* 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 Peripherals

5-9-1 Introduction

The following peripherals are used with the Vivid *i* n:

- 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.

5-9-1-1 Printers

5-9-1-1-1 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 *i* n operator panel.

5-9-1-1-2 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 *i* n operator panel.

5-9-1-1-3 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.

5-9-1-2 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.

5-9-1-3 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 *i* 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).

5-9-1-4 Wireless Network Adapter

The Vivid *i n* supports a unique type of Wireless Network Adapter. For details regarding type and installation, refer to "Wireless Network Adaptor" on page 3-20.

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 5-10 Cooling System

5-10-1 General Information

The Vivid *i* 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 5-31](#) below.

The structure of Vivid *i* 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 5-31 Air Flow through the Vivid *i* 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 i n. These tests are optional, and may be used to check the system for errors.

NOTE: There are no voltage adjustments required.

Section 6-2 LCD Display Adjustments and Calibration

Overall low image quality or "shades" visible on the Vivid i 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.



NOTICE LCD Display adjustments should be made in the correct order, as stated in the following procedures.

NOTE: Incorrect calibration of the Vivid i n monitor may also result in less than optimal image quality when reviewing images on a DICOM or EchoPAC station.

Section 6-2 LCD Display Adjustments and Calibration (cont'd)

Access the Calibration Screen (by pressing <CTRL>+<ALT>+<P>), then follow the relevant procedure instructions described below.

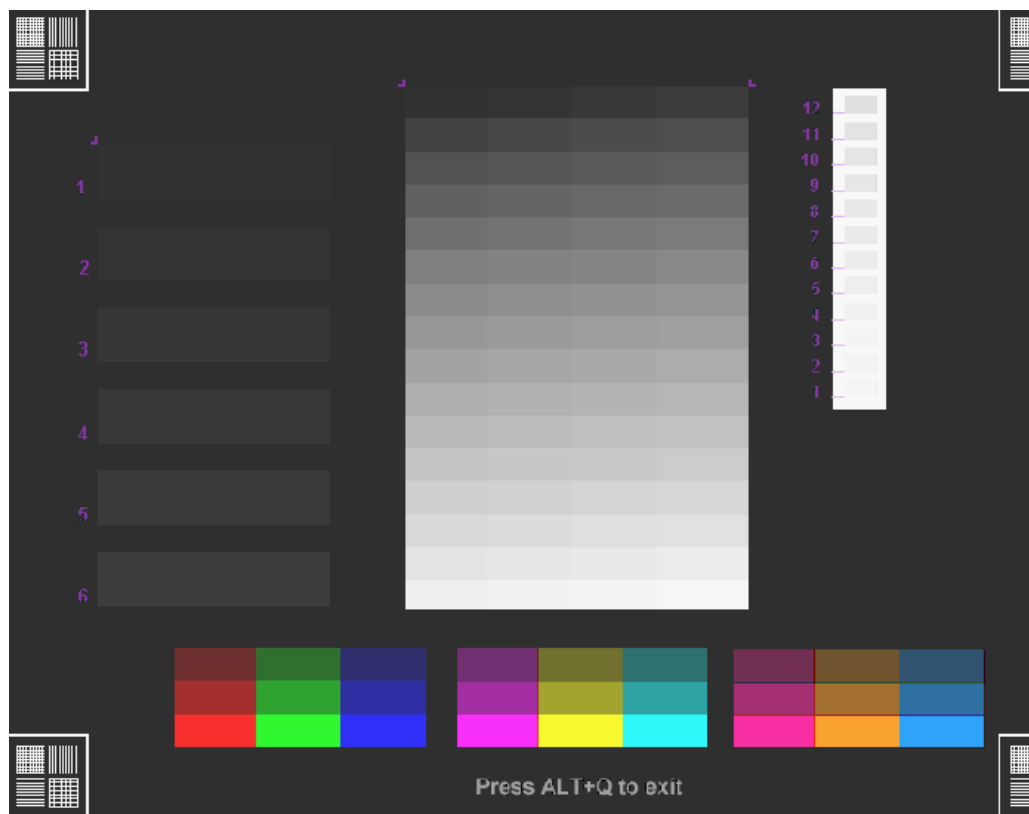


Figure 6-1 LCD Display Calibration Screen

Note: While working with systems with software 4.1.1 build 51 (or above), the Hot keys used to exit the Calibration Screen are: <ALT>+<Q>.

6-2-1 Contrast Adjustment Procedure

- **To adjust the Contrast:** hold down <ALT>:
 - Repeatedly pressing the Steer ← arrow to **decrease** the Contrast.
 - Repeatedly pressing Steer → arrow 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).

6-2-1-1 Brightness Adjustment Procedure

- **To adjust the Brightness:** hold down <ALT>, then use the Pg Up ↑ and Pg Dn ↓ keys, as required.

Repeatedly pressing Pg Dn ↓ will **decrease** the brightness

Repeatedly pressing Pg Up ↑ will **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) and the white bars on the right (numbers 1 through 12) are all visible.

6-2-2 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 "LCD Display Calibration Screen" on page 6-2](#)) may be used for Advanced Settings. (Press **Alt + Q** to access the Test Pattern).

6-2-3 Blue Tint Adjustment Procedure

- **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

Section 6-3

Deactivating the Screen-Saver when using the DVD

All Vivid *i* n BT06 systems with software version 6.1.1 Build 124, have a screen-saver functionality to protect the BOE-Hydis LCD screen. When using the DVD, the system cannot exit from the screen-saver and it is therefore important to disable the screen-saver before using the DVD and reactivate the screensaver only after using the DVD.

- 1.) Before using the DVD, press: "Ctrl + Alt + PgDn" to disable the screen-saver.
- 2.) After using the DVD, restart the system to reactivate the screen-saver.

Section 6-4 Keyboard Adjustments

6-4-1 Backlighting Intensity Adjustment Procedure

To make adjustments to the Keyboard Backlighting intensity, follow the procedure described in [3-7-3-3 "Adjust Keyboard Backlight Intensity" on page 3-53](#).

Section 6-5 Video System Adjustments

6-5-1 Video System Adjustment Procedure

For details on Video System adjustments (PAL or NTSC setup), refer to [Figure 3-21 "Video Converter Dip Switches" on page 3-34](#).

Section 6-6 Beamformer Calibration

For details on Beamformer Calibration adjustments, refer to [Chapter 7 - Diagnostics/Troubleshooting](#).

Section 6-7 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 6-6](#) below.

IMPORTANT: During the Battery Calibration procedure, no scanning can be performed!

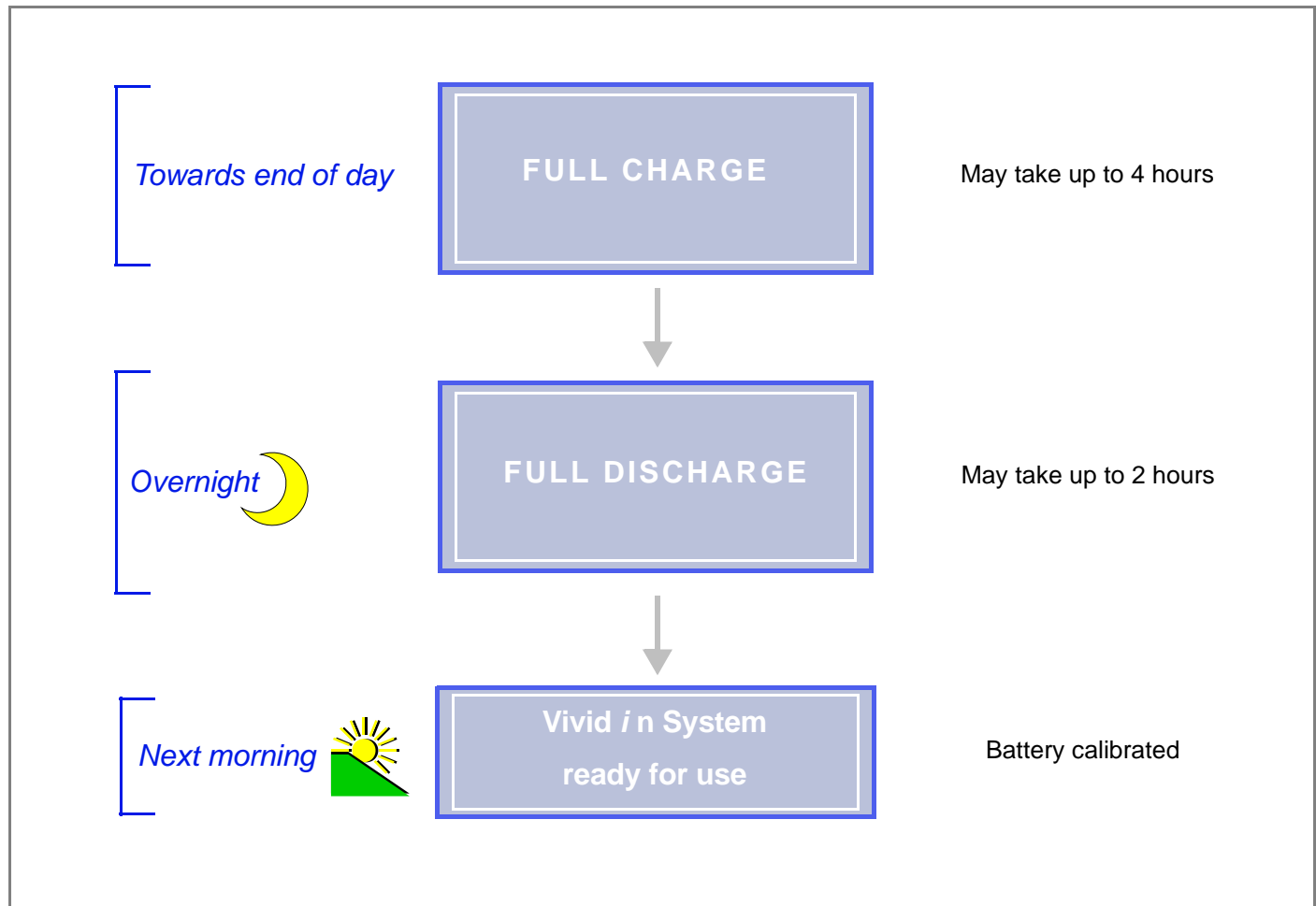


Figure 6-6 Recommendations - Battery Calibration Procedure

Note: For step-by-step instructions, see "Performing the Battery Calibration Procedure" on page 6-8.

6-7-1 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 6-6.*

- 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 6-7.

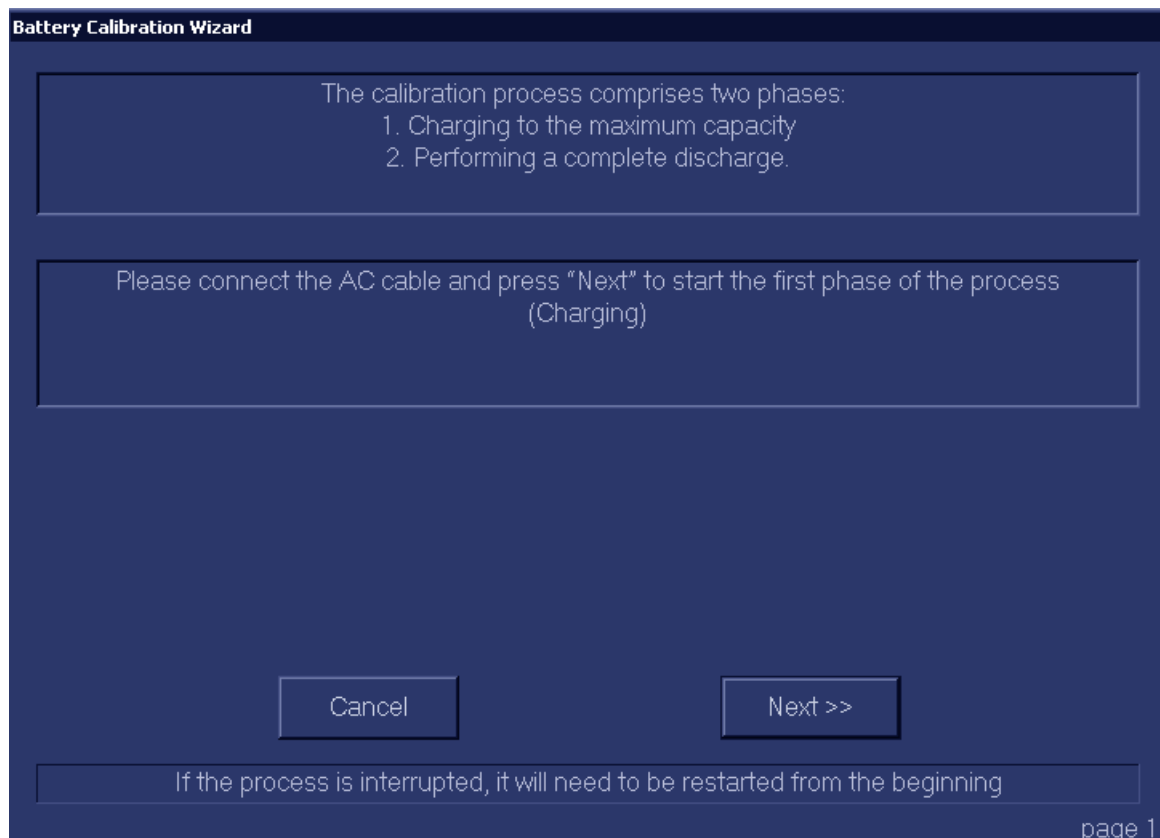


Figure 6-7 Battery Calibration Wizard - Page 1

- 2.) Make sure the AC power cable is connected to the Vivid / 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.

6-7-1 Performing the Battery Calibration Procedure (cont'd)

- 3.) Wait for the confirmation window to be displayed showing that the battery is fully charged.
(See *Battery Calibration Wizard Page 2* in [Figure 6-8](#)).

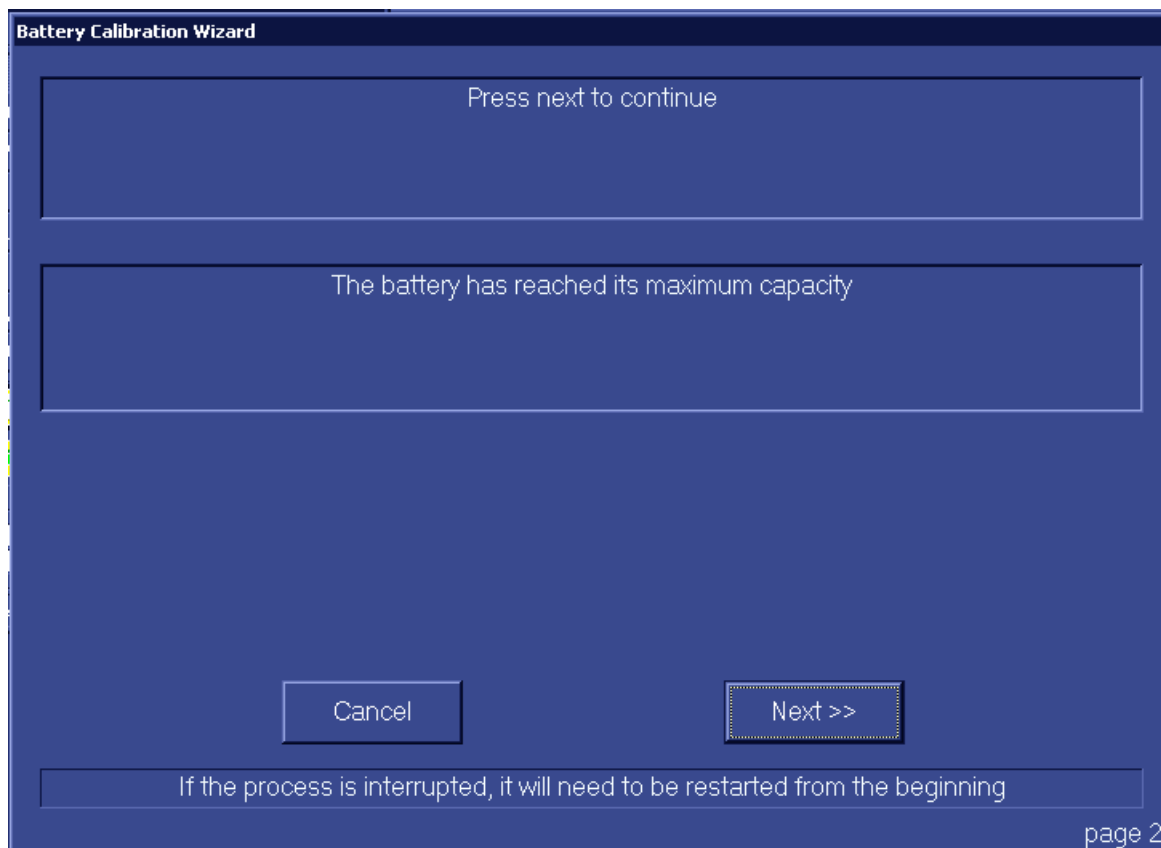


Figure 6-8 Battery Calibration Wizard - Page 2

6-7-1 Performing the Battery Calibration Procedure (cont'd)

- 4.) Click **Next**.

The Battery Calibration Wizard (Page 3) opens - see Figure 6-9 on page 6-10 .

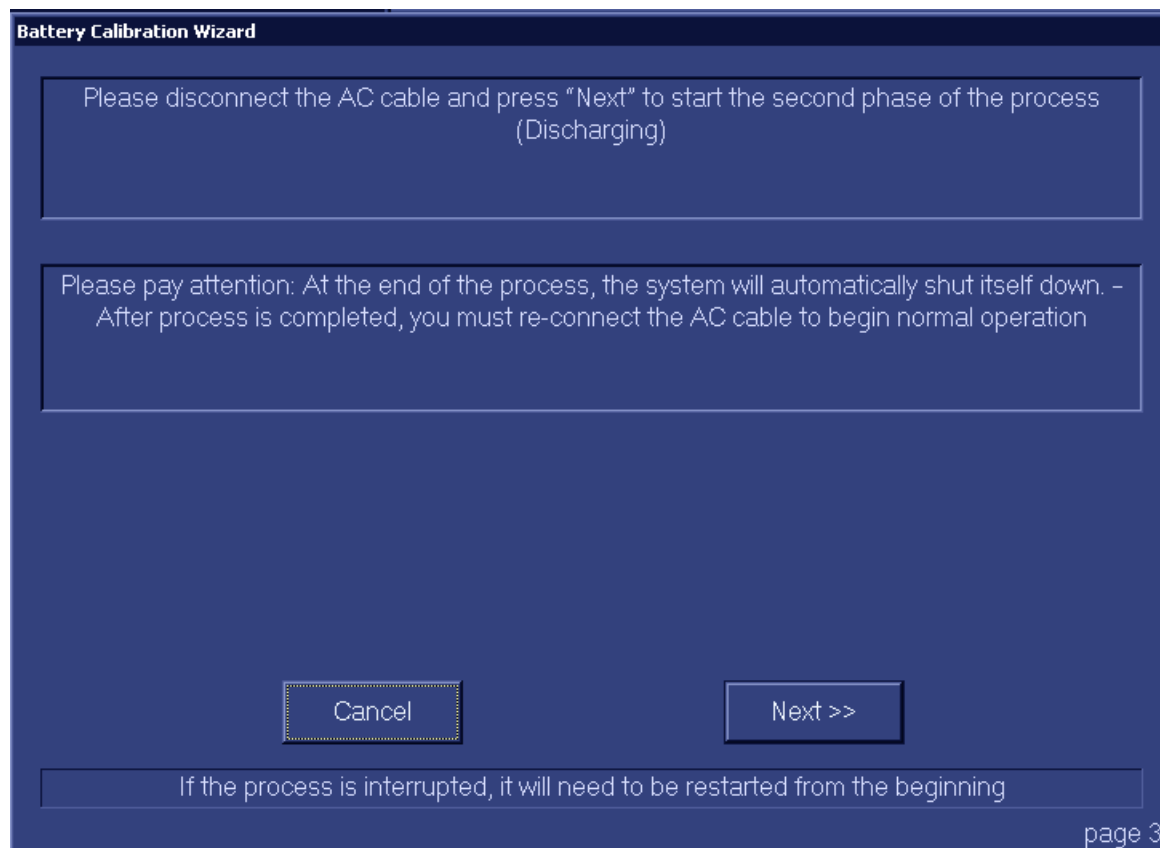


Figure 6-9 Battery Calibration Wizard - Page 3

6-7-1 Performing the Battery Calibration Procedure (cont'd)

- 5.) Disconnect the AC power cable from the Vivid i 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 6-10 on page 6-11 .

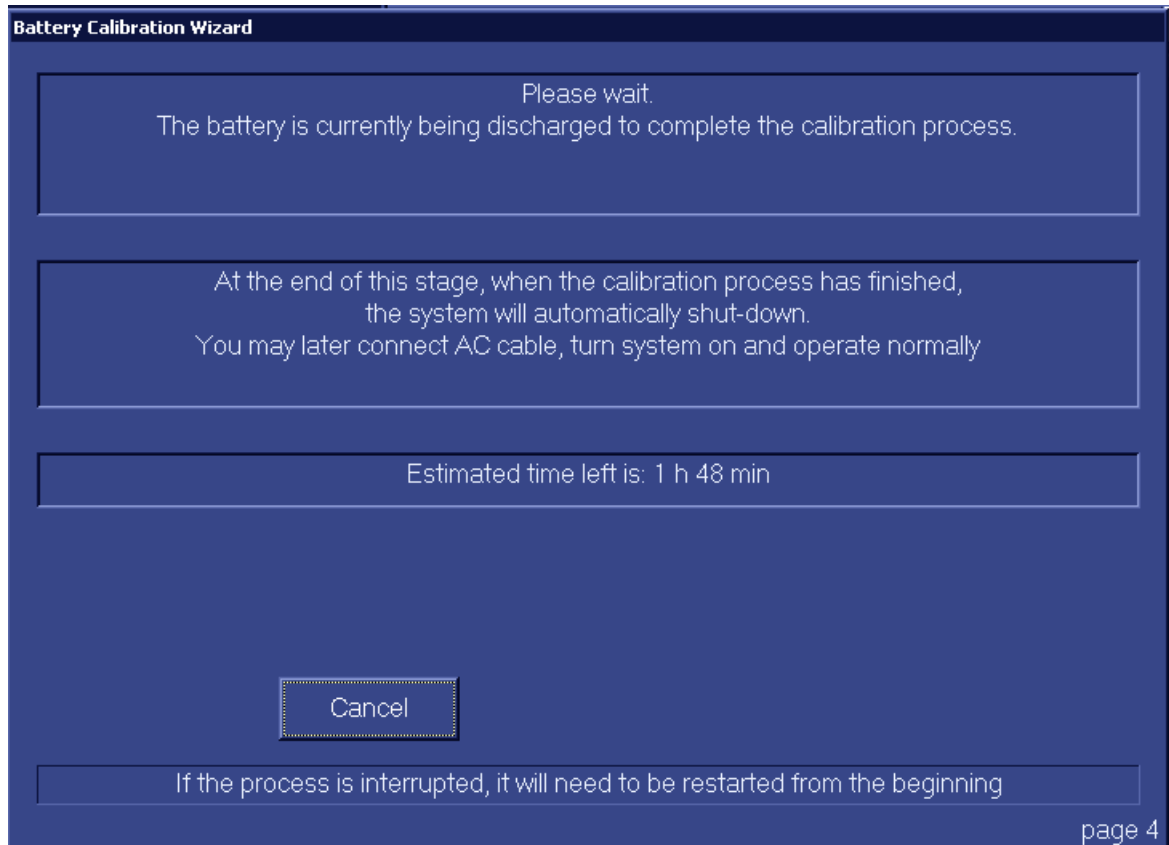


Figure 6-10 Battery Calibration Wizard - Page 3

- 6.) Leave the system overnight to complete the Full Discharge process.

The Vivid i 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.

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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 *i* 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	7-10

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 section 7-3-2-1 on page 7-15.

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:

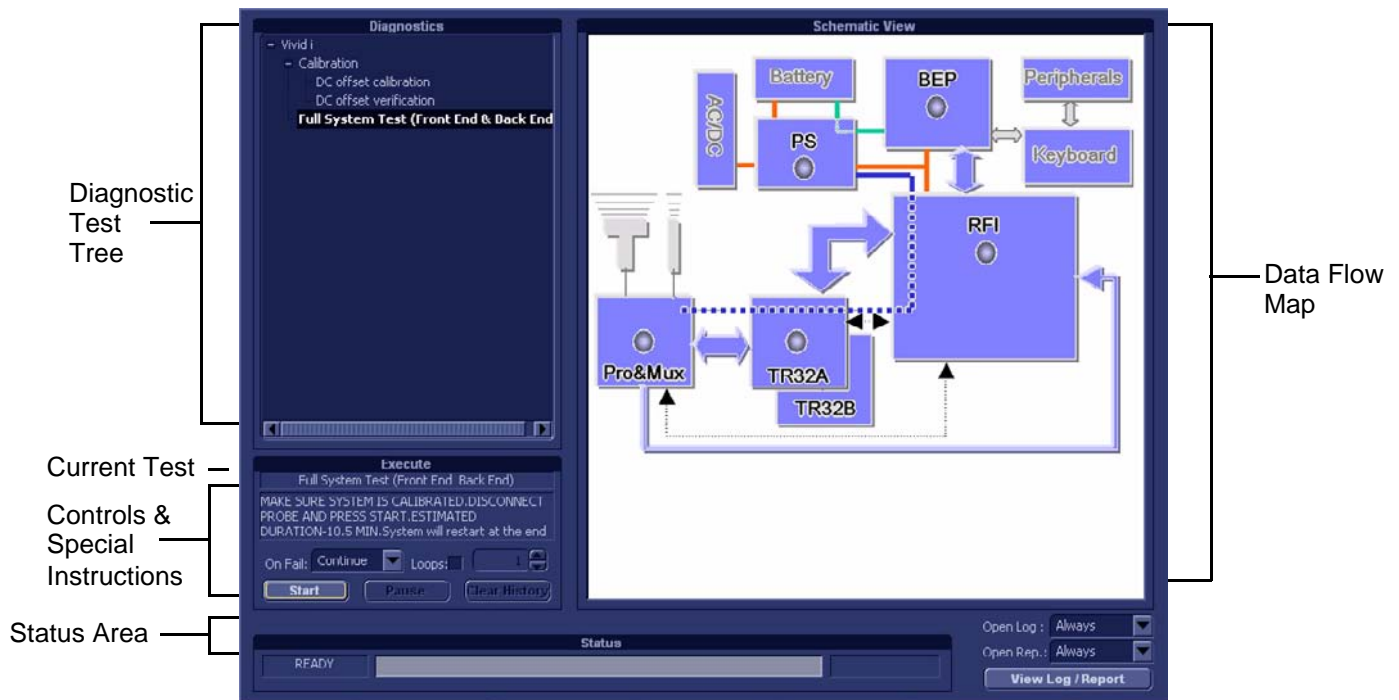


Figure 7-1 Diagnostic Test Window

- 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 7-2-4.
- 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 7-2-3-1.

7-2-3 Accessing the Diagnostic Test Window (cont'd)

The *Diagnostics Test Window* (Figure 7-1) comprises the following areas and menu options:

Table 7-2 Vivid / n Diagnostics Test Window and Menu Options

Option	Description	Comments
Data Flow Map	<p>Displays a schematic view of the Vivid / 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. You are able to select and perform the Vivid / n diagnostic tests by trackballing to the required test (listed in the Diagnostic Test Tree) and pressing Set.</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"> • Light Blue: The selected test will be performed on this component, or group of components. • Light Gray: This component, or group of components will be <i>excluded</i> from the test/s. • Green: All recommended tests for these components have been completed and no problems were identified. • Red: At least one problem was 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.
Diagnostic Test Tree	Displays a menu of diagnostic test sequences and tests available for selection.	
Execute	Displays the name of the currently-selected diagnostic test (or test sequence).	
Controls and Special Instructions	<p>Displays any special instructions for checks required before performing the test. For example, <i>Make sure system is calibrated. Disconnect probe and press Start.</i></p>	<p>The area also includes these controls:</p> <ul style="list-style-type: none"> • a Start/Stop button used to commence a test. After pressing Start, the button may be used to stop a test before completion. • a Pause button used to pause a test before resuming. • a Clear History 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 7-5). • an On Fail combo box - used to select the action required in the event that the test fails (Stop or Continue). • a Loops checkbox. If activated, the test will be repeated for the selected number of loops.
Status Area	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"> • Test status: For example, Ready for test, Executing, or Finished. • Instructions: During the course of a diagnostic test, any instructions to the user are displayed in the Status area. For example, Wait. • Test results: For example, Passed or Failed. <p>The area also includes two progress bars:</p> <ul style="list-style-type: none"> • Progress bar: Shows progress of an individual test (within a sequence of tests). <p>The area also includes:</p> <ul style="list-style-type: none"> • a View Log button used to review the test results. (Enabled only after test execution). Refer to 7-2-3-1.

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 7-2 below](#)) which is displayed in the *upper* right portion of the screen (over the Data Flow Map area).

Table 7-3 Vivid i n Diagnostics Test Window - View Log 1 of 2

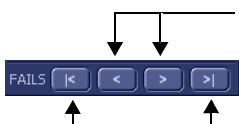
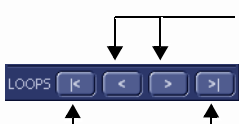
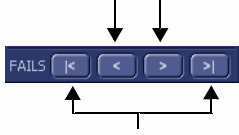
Option	Description	Comments
File	Log file number	
Date	Date test was performed.	
Time	Time test was executed.	
Log File Scroll Bar and Arrows	Enables scrolling through the list of Log Files	
Tests	Displays test sequence log files. Shows a list of the specific diagnostic test/s included in the currently-selected test sequence.	
Result	Lists test results as either PASS or FAIL.	
Loop	Lists name of loop and the sub-tests within the loop	
Date	Date test was performed.	
Tests Scroll Bar and Arrows	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> 
Loops Scroll Bar and Arrows	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> 
Reports	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 Figure 7-2 below).	Double-clicking on a currently-selected report displays that report in the Report window (lower portion of the View Log dialog box) - refer to Figure 7-3 below .

Table 7-3 Vivid / n Diagnostics Test Window - View Log (cont'd) 2 of 2

Option	Description	Comments
Reports Scroll Bar and Arrows	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> 
Erase Button	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).
Exit Button	Closes the <i>View Log</i> dialog box	Returns to the Diagnostic Test window.
Report Window	Lower portion of the View Log dialog box where the the currently-selected report is displayed in a separate window (see the example in Figure 7-2). The displayed <i>Average</i> , <i>Deviation</i> , <i>Max</i> and <i>Min</i> values are dynamically updated.	Visible only after test execution.
Report window Scroll Arrows	Enables scrolling through all channels. Displays the currently-selected channel number. For example, Count: 64	
Close Button	Closes the Report window.	

7-2-3-1 View Log (cont'd)

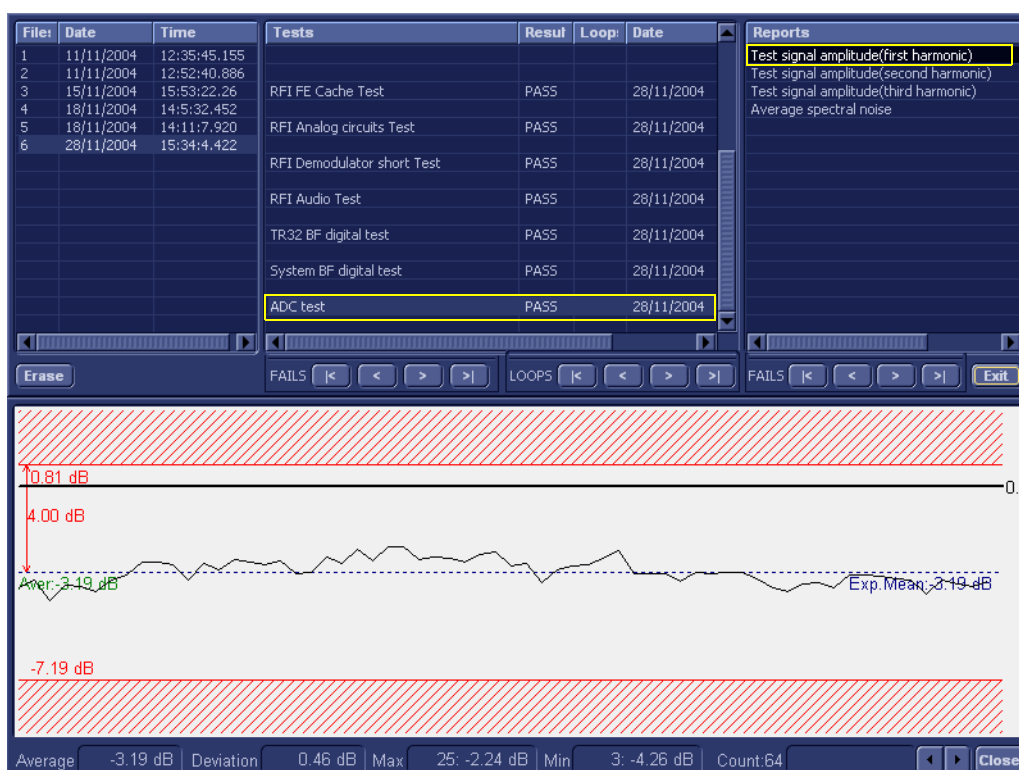


Figure 7-2 View Log Dialog Box

In [Figure 7-2](#) 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 7-3 below](#).

7-2-3-1 View Log (cont'd)

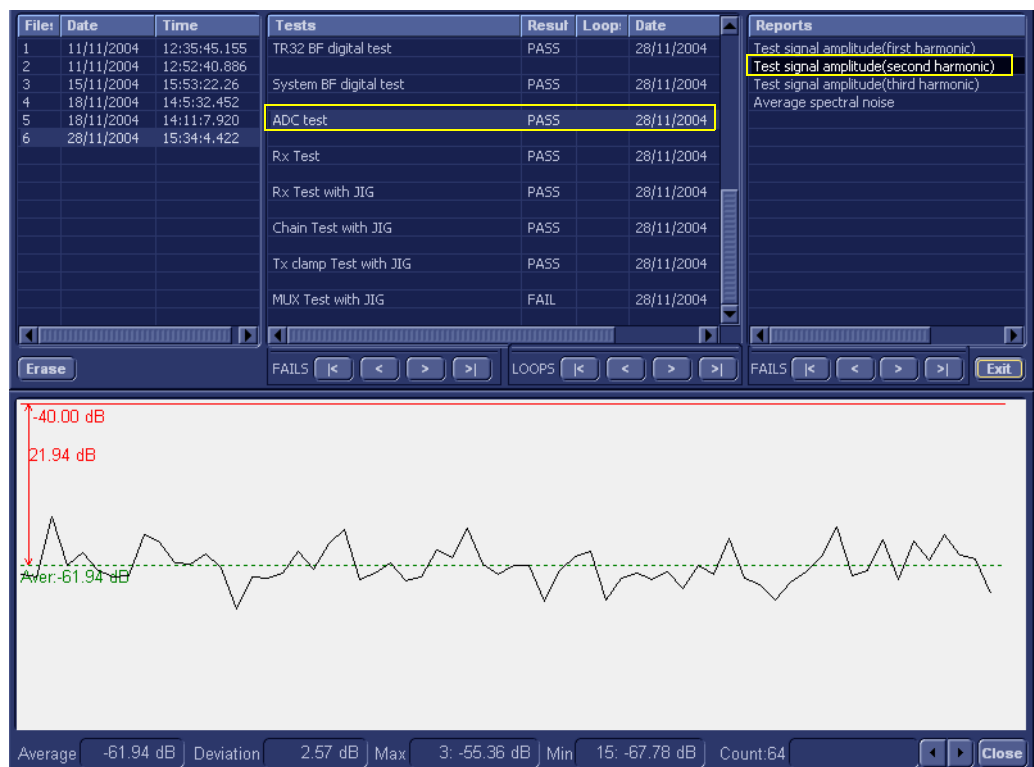


Figure 7-3 ADC Test - Viewing Report (Test Signal Amplitude 2nd Harmonic)

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 7-3](#).

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 7-3-1-1.

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 *i* 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 7-2-4. For instructions on performing each of these tests, refer to the following information:

- "Full System Test (FE and BEP)" on page 7-11

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 7-9.

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 7-4 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:

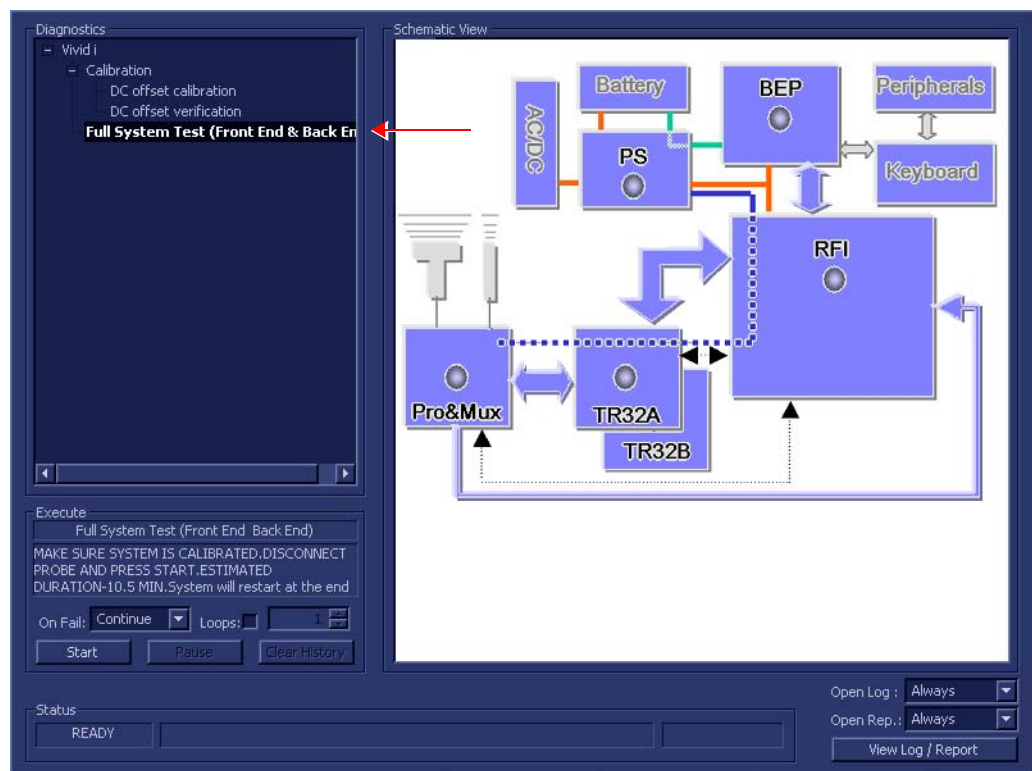


Figure 7-4 Full System (FE and BEP) Test

- 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.



7-3-1-1 Full System Test (FE and BEP) (cont'd)

- 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 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 7-5](#).

7-3-1-1 Full System Test (FE and BEP) (cont'd)

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			

Figure 7-5 View Test Log - Full System Test (BEP and FE)

7-3-1-1 Full System Test (FE and BEP) (cont'd)

- 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 no problems were identified but the problem persists, contact your local GE Healthcare field engineer for assistance.
 - If errors were identified but the results were marginal, perform calibration, as described in "DC Offset Calibration" on page 7-15, and then repeat the test.
 - If errors were identified and the results were not marginal, 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. Contact your local GE Healthcare field engineer 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*.

7-3-2 Calibration Tests

7-3-2-1 DC Offset Calibration

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 Calibration** in the list of *Front End* tests available for selection from the Diagnostic Test Tree (see [Figure 7-6 below](#)) and press **Set**. The DC Offset Calibration 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:

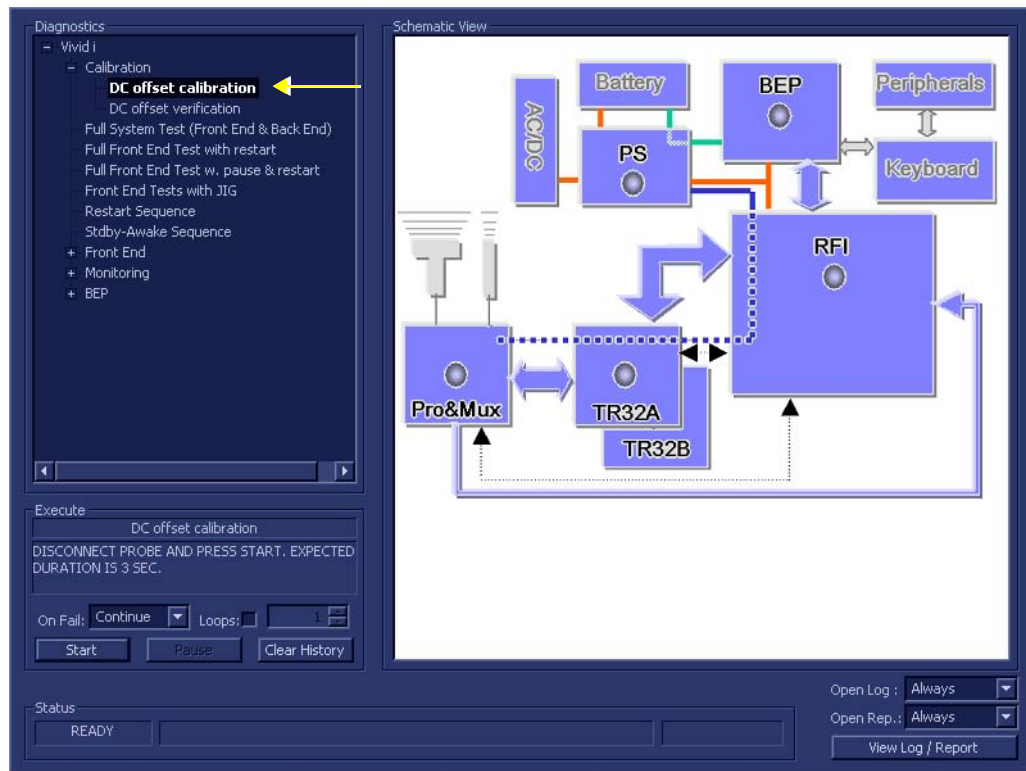


Figure 7-6 DC Offset Calibration Test

- 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.



7-3-2-1 DC Offset Calibration (cont'd)

- 5.) 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 7-7](#).

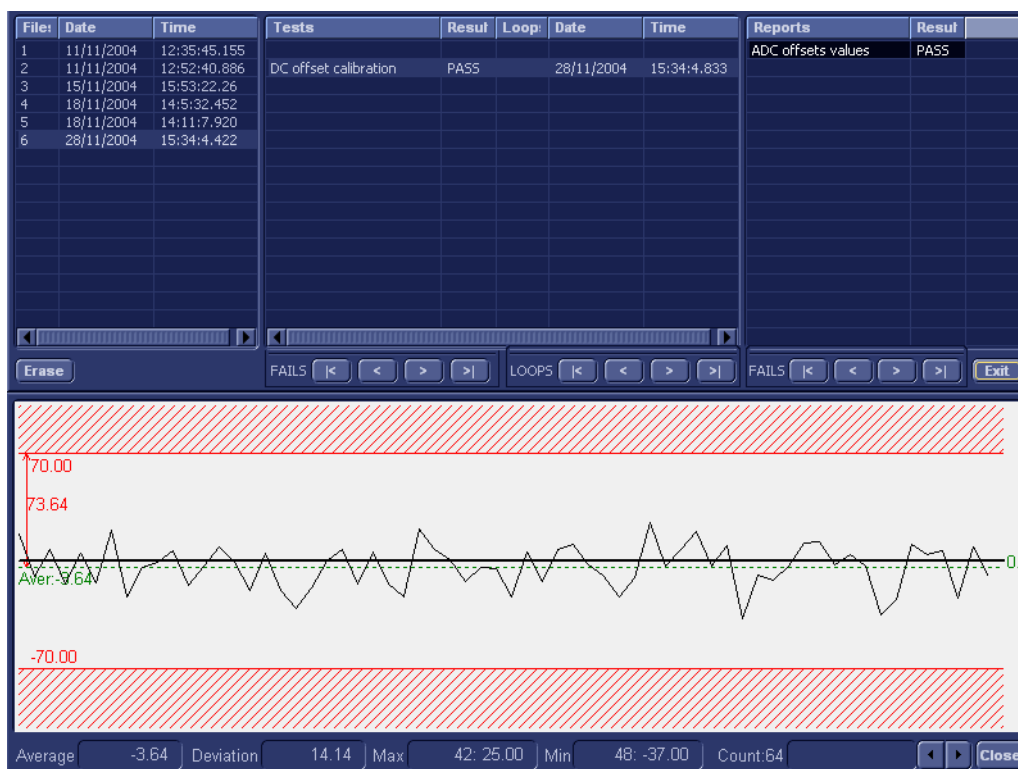


Figure 7-7 View Test Log - DC Offset Calibration

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.

7-3-2-1 DC Offset Calibration (cont'd)

- 8.) Use the scroll arrows at the bottom of the Reports window (see [Figure 7-7](#)) 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 no problems were identified but the problem persists, contact your local GE Healthcare field engineer for assistance.
 - If errors were identified but the results were marginal, perform calibration, as described in "DC Offset Calibration" on page 7-15, and then repeat the test.
 - If errors were identified and the results were not marginal, 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. Contact your local GE Healthcare field engineer 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*.

7-3-2-2 DC Offset Verification

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 7-8 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:

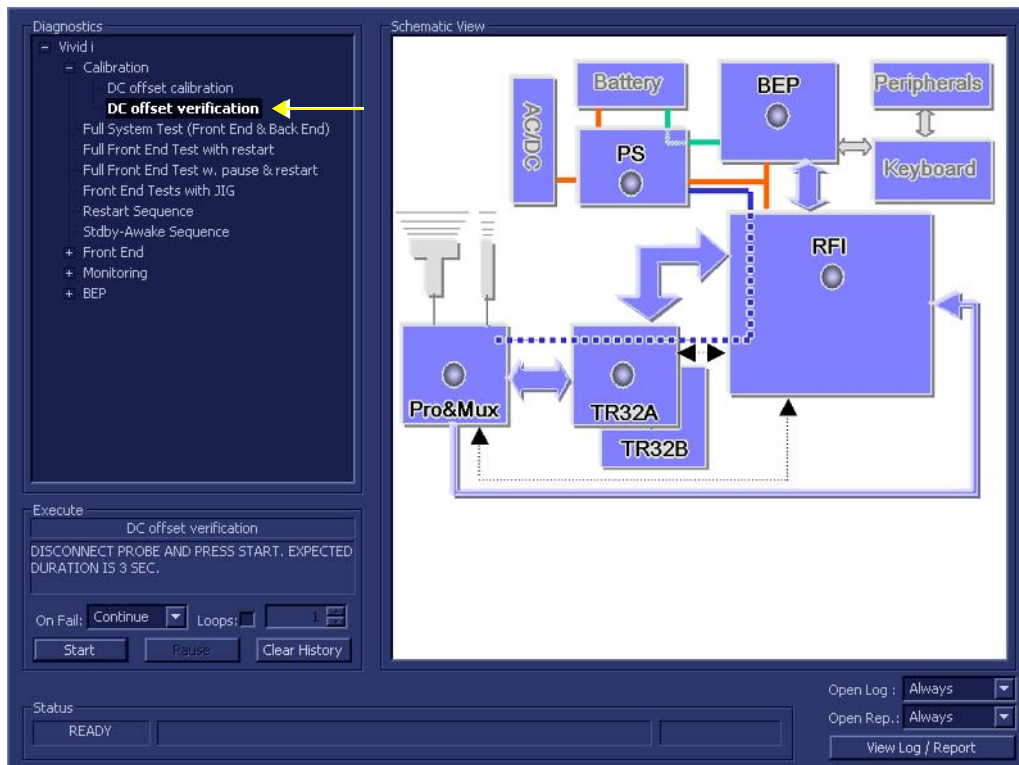


Figure 7-8 DC Offset Verification Test

- 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**.



7-3-2-2 DC Offset Verification (cont'd)

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 7-9](#).

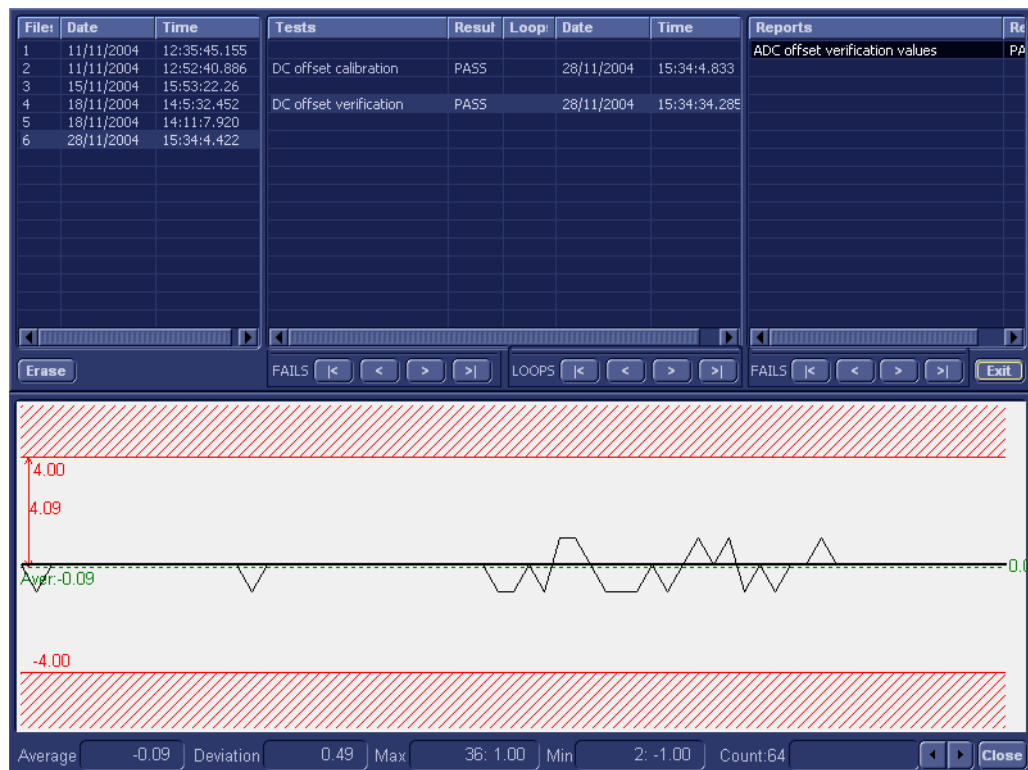


Figure 7-9 View Test Log - DC Offset Verification Test

7-3-2-2 DC Offset Verification (cont'd)

- 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 7-9](#)) 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 no problems were identified but the problem persists, contact your local GE Healthcare field engineer for assistance.
- If errors were identified but the results were marginal, perform calibration, as described in "DC Offset Calibration" on page 7-15, and then repeat the test.
- If errors were identified and the results were not marginal, 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. Contact your local GE Healthcare field engineer 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 ± 10 (instead of ± 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*.

Chapter 8

Replacement Procedures

Section 8-1 Overview

8-1-1 Purpose of Chapter 8

This chapter provides replacement procedures for the Vivid / 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
	Battery Replacement Procedure	8-2
	Hard Disk Replacement Procedure	8-4
	Control Panel and Keyboard Replacement Procedure	8-6
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	LCD Display Cover Hinges Replacement Procedure	8-16
	Bottom Assembly Replacement Procedure	8-20
	LCD Display Frame Replacement Procedure	8-22
8-3	Internal Component Replacement Procedures	8-24
	P&M (Probe and MUX) Board Replacement Procedure	8-24
	TR32 and RFI Boards Replacement Procedure	8-27
	BEP Replacement Procedure	8-33
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8-6	Peripherals	8-99
8-7	Modo Cart Components Replacement	8-101

Section 8-2 External Component Replacement Procedures

8-2-1 Battery Replacement Procedure

8-2-1-1 Tools

None required.

8-2-1-2 Time Required

1 minute

8-2-1-3 Preparations

Shut down the Vivid i n ultrasound unit, as described in [Chapter 3 - System Setup](#).

8-2-1-4 Battery Removal Procedure

- 1) Disconnect the AC adapter and all cables from the Vivid i n.
- 2) Close the Vivid i n LCD cover, making sure both front latches are securely fastened.

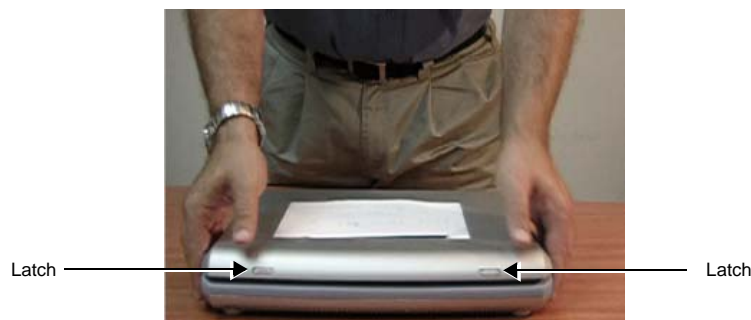


Figure 8-1 Closing Vivid i n LCD Cover

- 3) Carefully turn the Vivid i n over, placing it face down.
- 4.) While holding the Vivid i 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 8-2 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 Healthcare FOR PROPER DISPOSAL.

8-2-1-5 **Battery Installation Procedure**



WARNING: The Vivid *i* n battery has a safety device.
DO NOT ATTEMPT TO DIS-ASSEMBLE OR ALTER THE BATTERY!
Always observe the precautions listed in ["Vivid *i* n Battery Safety" on page 1-13](#).



CAUTION: use only batteries approved by GE Healthcare as suitable for use with the Vivid *i* n

- 1) With the Vivid *i* n lying face down (refer to Figure 8-2 on page 8-2), 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 *i* n over, release the front latches and open the LCD cover.
- 4.) Reconnect the AC adapter and all cables to the Vivid *i* n.
- 5.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Calibration Tests" on page 7-15](#)

8-2-2 Hard Disk Replacement Procedure

8-2-2-1 Tools

Use the appropriate flat and Phillips-type screw drivers as indicated in the Hard Disk replacement procedure.

8-2-2-2 Time Required

10 minutes

8-2-2-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-2-4 Hard Disk Removal Procedure

- 1) Make sure the Vivid *i* 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 8-3](#) below.

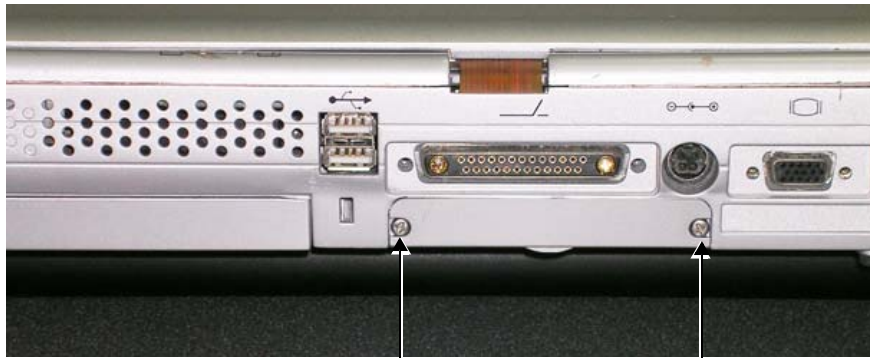


Figure 8-3 Removing the Screws from the Rear Panel

- 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 8-4](#) below.



Figure 8-4 Removing the Hard Disk

8-2-2-5 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 8-4 on page 8-4 .
- 2) Return and fasten the two screws (previously removed) to secure the Hard Disk in position - refer to Figure 8-3 on page 8-4 .

Note: When a new hard disk arrives from the manufacturer, usually it is partitioned and ready for software installation.
Refer to ["Software Loading" on page 8-56](#) for software installation instructions .

Note: IMPORTANT - if **both** the Hard Disk and Back End are being replaced simultaneously, it is necessary to re-configure the LCD type. Refer to the instructions provided in [step 9](#) on page 8-48 through [step 12](#) on page 8-49.

- 3.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

8-2-3 Control Panel and Keyboard Replacement Procedure

8-2-3-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the following Control Panel and Keyboard (and sub-component) replacement procedures.

8-2-3-2 Time Required

10 minutes

8-2-3-3 Preparations

Shut down the Vivid i n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-3-4 Control Panel and Keyboard Removal Procedure

- 1) Place the Vivid i n face down and remove the battery as described in the ["Battery Removal Procedure"](#) on page 8-2.
- 2) Loosen and remove each of the 9 screws that fasten the Control Panel and Keyboard onto the Bottom Assembly, as indicated in [Figure 8-6](#) below.

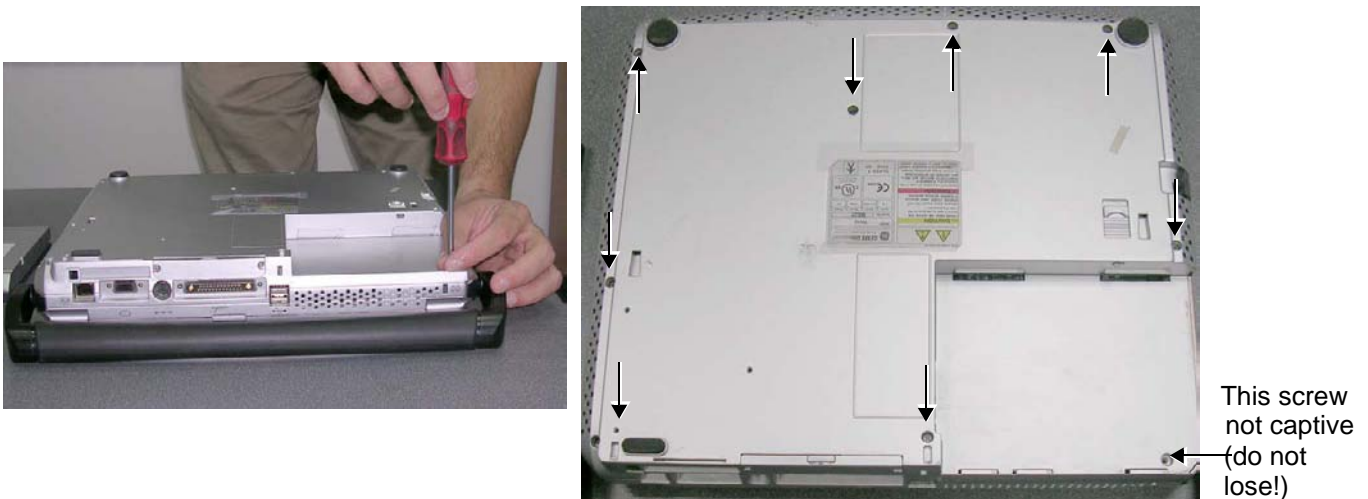


Figure 8-6 Removing the Fastening Screws from the Bottom Assembly

- 3.) Turn the Vivid i n over, release the front latches and open the LCD Display cover.

8-2-3-4 Control Panel and Keyboard Removal Procedure (cont'd)

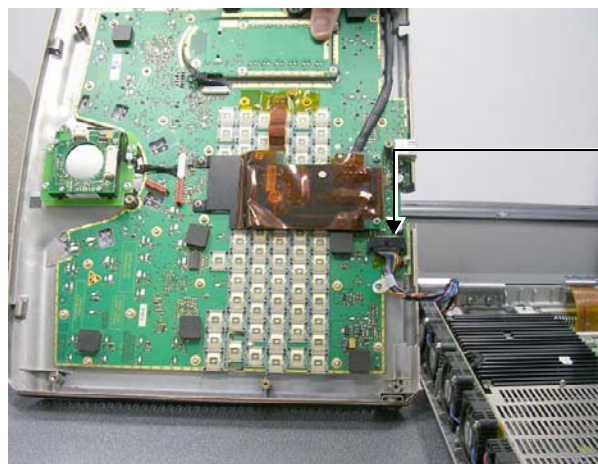
- 4) Carefully lift the Control Panel and Keyboard upwards from the front, then release it from the rear; remove it from the Vivid *i* n and place it next to the system, as shown in [Figure 8-7](#).



Figure 8-7 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.

- 5) 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 8-8](#).



Disconnect here

Figure 8-8 Disconnecting the Control Panel/Keyboard Cable

8-2-3-5 Control Panel and Keyboard Installation 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 i 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 8-8](#), above).
- 2) Carefully lift the Control Panel and Keyboard into position on the Vivid i n (refer to [Figure 8-7](#), 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 i n LCD Display cover, making sure both front latches are securely fastened.
- 4.) Carefully turn the Vivid i 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 8-6](#), above).
- 6.) Re-install the battery as described in the ["Battery Installation Procedure" on page 8-3](#).
- 7) Reconnect the AC adapter and all cables to the Vivid i n.
- 8.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Isolated Patient Lead \(Source\) Leakage – Lead-to-Ground" on page 10-27](#)
 - ["Vivid i nVivid i nIsolated Patient Lead \(Source\) Leakage – Lead-to-Lead" on page 10-28](#)
 - ["Isolated Patient Lead \(Sink\) Leakage - Isolation Test" on page 10-28](#)
 - ["Alphanumeric Keyboard Test" on page 4-17](#)
 - ["External Keyboard Test" on page 4-17](#)
 - ["Trackball Test" on page 4-20](#)
 - ["Calibration Tests" on page 7-15](#)

8-2-3-5-1 Keycap Removal Procedure

- 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 8-9](#) below).
- 3.) Lift off and remove the defective keycap.



Figure 8-9 Keycap Replacement

8-2-3-5-2 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.

8-2-3-5-3 Trackball 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 8-8 on page 8-7 .
- 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 8-10](#) below.



Figure 8-10 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.

8-2-3-5-4 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 8-10](#), above).
- 3) Re-connect the three trackball cable connectors (carefully push them in) to the trackball assembly.

8-2-3-5-5 ATGC Slider Keycap Removal Procedure

- 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 8-11](#) below.



Figure 8-11 ATGC Slider Keycap Replacement

8-2-3-5-6 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.

8-2-3-5-7 ATGC Rotary Knob Removal Procedure

- 1) Carefully place a small flat screw driver between the ATGC Rotary knob and the surface of the keyboard - see [Figure 8-9](#) 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 8-12](#) below.



Figure 8-12 ATGC Rotary Knob Replacement

8-2-3-5-8 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.

8-2-3-5-9 ECG Module Assembly 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 8-8 on page 8-7 .
- 2) Tilt the Control Panel and Keyboard on its side. Disconnect the ECG Module cable from the base of the Control Panel (use a flat screwdriver to loosen the securing nut) - see Figure 8-13 below.

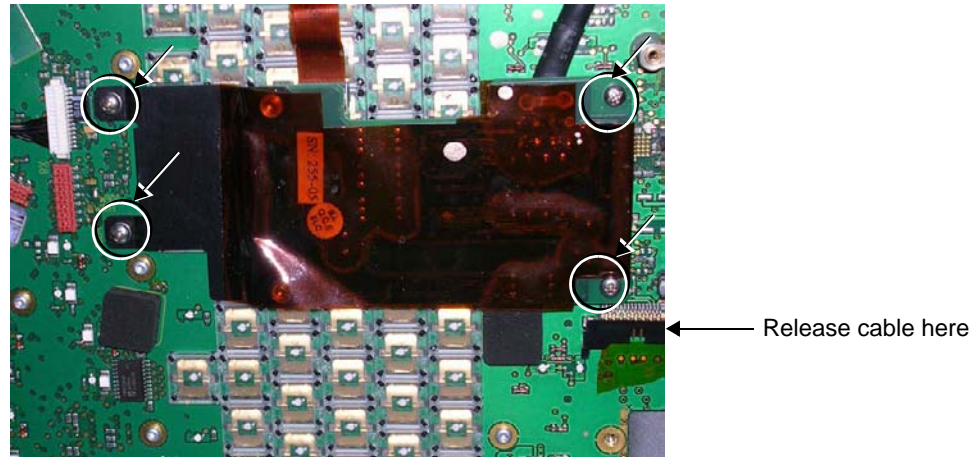


Figure 8-13 ECG Module Assembly Removal

- 3) Loosen and remove the four hex nuts (two on either side of the bracket) that fasten the ECG Module assembly to the base of the Control Panel, as shown in Figure 8-10, above.
- 4.) Carefully remove the ECG module assembly from the base of the Control Panel.

8-2-3-5-10 ECG Module Assembly Installation Procedure

- 1) Carefully tilt the Control Panel and Keyboard on its side.
- 2) Return a new ECG Module assembly to the correct location on the base of the Control Panel.
- 3) Return and fasten the four hex nuts (two on either side of the bracket) to secure the ECG Module assembly to the base of the Control Panel (refer to Figure 8-13, above).
- 4) Re-connect the ECG Module cable to the base of the Control Panel (use a flat screwdriver to tighten the securing nut) - see Figure 8-13, above.

8-2-4 Rear Cover & Latch Assembly Replacement Procedure

8-2-4-1 Tools

None required.

8-2-4-2 Time Required

30 minutes

8-2-4-3 Preparations

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-4-4 Rear Cover & Latch Assembly Removal Procedure

- 1) Disconnect the AC adapter and all cables from the Vivid *i* n.
- 2) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 3) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure" on page 8-22](#).
- 4) Remove the Microphone Assembly as described in the ["Microphone Assembly Removal Procedure" on page 8-54](#).
- 5) Remove the LCD Display; see the ["LCD Display Removal Procedure" on page 8-45](#).
- 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 8-14](#) below.



Figure 8-14 Removing the Hinge Screws

- 7.) Lift the Rear Cover and Latch Assembly away from the Bottom Assembly and remove completely from the system.

8-2-4-5 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 8-14](#)).
- 3.) Return the LCD Display; see the ["LCD Display Installation Procedure" on page 8-47](#).
- 4.) Return the Microphone Assembly as described in the ["Microphone Assembly Installation Procedure" on page 8-55](#).
- 5.) Return the LCD Display Frame as described in the ["LCD Display Frame Installation Procedure" on page 8-23](#).
- 6.) Return the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-8](#).
- 7.) Reconnect the AC adapter and all cables to the Vivid *i n*.
- 8.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Full System Test" on page 7-9](#)

8-2-5 LCD Display Cover Hinges Replacement Procedure

8-2-5-1 Tools

Phillips screwdriver

8-2-5-2 Time Required

30 minutes

8-2-5-3 Preparations

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-5-4 LCD Display Cover Removal Procedure

- 1.) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 2.) Disconnect the LCD Flex ribbon cable from the BEP, as shown in [Figure 8-15](#).
Use a flat screwdriver to carefully release the cable from the connector.

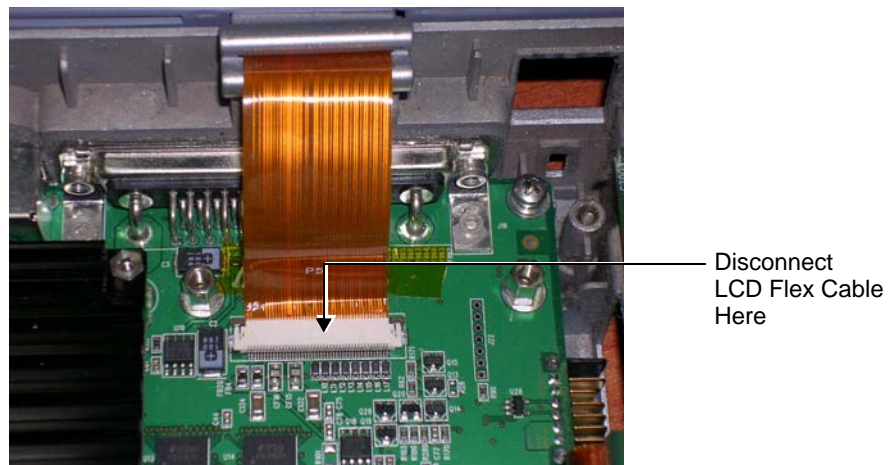


Figure 8-15 LCD Flex Cable Connected to BEP

- 3.) Loosen and remove the 2 screws from each of the LCD hinges, as shown in [Figure 8-16](#).

8-2-5-4 LCD Display Cover Removal Procedure (cont'd)



Figure 8-16 LCD Display Hinges Secured to Base Assembly - Location of Screws

- 4.) Remove the LCD Display Frame, as described in the ["LCD Display Frame Removal Procedure"](#) on [page 8-22](#).
- 5.) Loosen and remove the 2 screws that secure the *left* hinge to the LCD Display cover ([Figure 8-17](#)), then carefully remove the hinge.

8-2-5-4 LCD Display Cover Removal Procedure (cont'd)

- 6.) Loosen and remove the 2 screws that secure the *right* hinge to the LCD Display cover (Figure 8-17), then carefully remove the hinge.

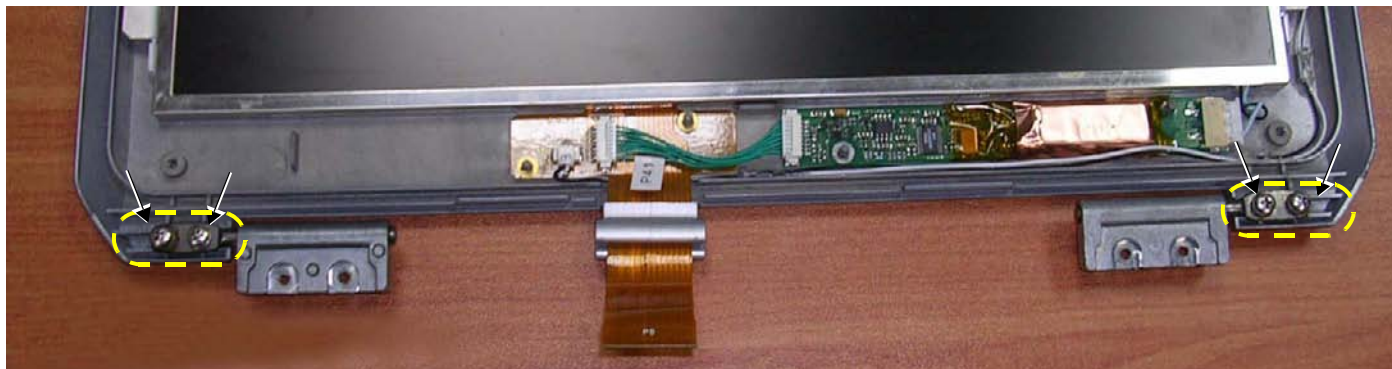


Figure 8-17 Hinges Secured to LCD Display Cover - Location of Screws

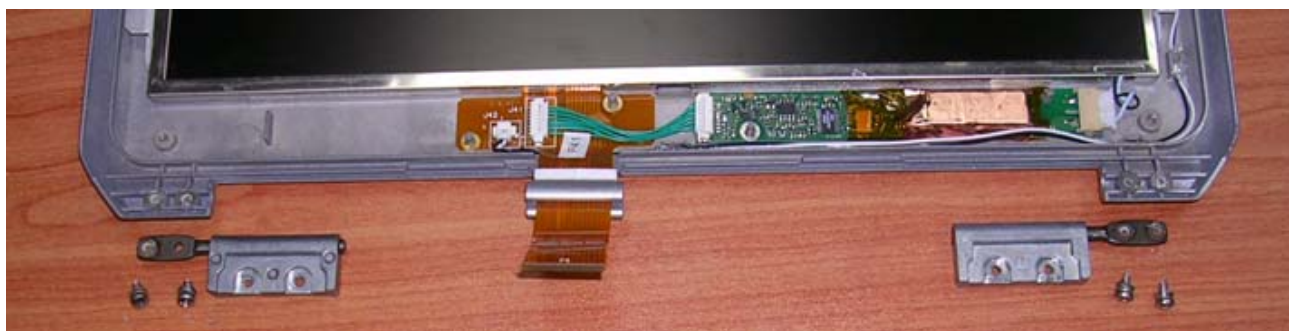


Figure 8-18 Hinges Removed from LCD Display Cover

8-2-5-5 LCD Display Cover Installation Procedure

- 1.) Carefully place a replacement hinge in the correct position on the *right* side of the LCD Display cover (refer to Figure 8-17 on page 8-18). Return and fasten the 2 screws (previously removed) making sure the hinge is properly secured. *Do not over-tighten the screws.*
- 2.) Carefully place a replacement hinge in the correct position on the *left* side of the LCD Display cover (refer to [Figure 8-17](#)). Return and fasten the 2 screws (previously removed) making sure the hinge is properly secured. *Do not over-tighten the screws.*
- 3.) Refit the LCD Display Frame, as described in the ["LCD Display Frame Installation Procedure" on page 8-23](#).
- 4.) 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 - refer to Figure 8-16 on page 8-17 .
Do not over-tighten the screws.
- 5.) Reconnect the LCD flex cable to the BEP (refer to Figure 8-15 on page 8-16).
- 6.) Refit the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-8](#).
- 7.) Close and open the lid a few times to ensure proper closure of the LCD Display cover.
- 8.) Reconnect the AC adapter and all cables to the Vivid i n.
- 9.) Proceed to perform the following functionality test:
 - ["Chassis Current Leakage Test" on page 10-25](#)

8-2-6 Bottom Assembly Replacement Procedure

8-2-6-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the bottom assembly replacement procedures.

8-2-6-2 Time Required

30 minutes

8-2-6-3 Preparations

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-6-4 Bottom Assembly Removal Procedure

- 1) Remove the battery as described in the ["Battery Removal Procedure" on page 8-2](#).
- 2) Remove the hard disk as described in the ["Hard Disk Removal Procedure" on page 8-4](#).
- 3) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 4) Remove the P&M Board as described in the ["P&M \(Probe and MUX\) Board Removal Procedure" on page 8-25](#).
- 5) Remove the TR32 and RFI Boards as described in the ["TR32 and RFI Boards Removal Procedure" on page 8-27](#).
- 6) Remove the BEP as described in the ["BEP Removal Procedure" on page 8-33](#).
- 7) Remove the HVPS as described in the ["HVPS Removal Procedure" on page 8-38](#).
- 8) Remove the fans as described in the ["Fan Removal Procedure" on page 8-41](#).
- 9) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure" on page 8-22](#).
- 10.) 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 8-14 on page 8-14 .
- 11.) Remove the Bottom Assembly from the system.
- 12.) Remove the Vivid *i* n system label from the base of the defective Bottom Assembly (peel off), ready to use on the replacement Bottom Assembly.

8-2-6-5 Bottom Assembly Installation Procedure

- 1) *Adhere the Vivid i n system label (previously removed in [step 12](#) 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 8-14 on page 8-14 .

Note: *Do not overtighten the screws.*

- 4.) Return the LCD Frame as described in the "[LCD Display Frame Installation Procedure](#)" on page 8-23
- 5) Return the fans as described in the "[Fan Installation Procedure](#)" on page 8-43.
- 6) Return the HVPS as described in the "[HVPS Installation Procedure](#)" on page 8-40.
- 7) Return the BEP as described in the "[BEP Installation Procedure](#)" on page 8-36.
- 8) Return the TR32 and RFI Boards as described in the "[TR32 and RFI Boards Installation Procedure](#)" on page 8-32.
- 9) Return the P&M Board as described in the "[P&M \(Probe and MUX\) Board Installation Procedure](#)" on page 8-26.
- 10) Return the Control Panel and Keyboard as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-8.
- 11) Return the hard disk as described in the "[Hard Disk Installation Procedure](#)" on page 8-5.
- 12.) Re-install the battery as described in the "[Battery Installation Procedure](#)" on page 8-3.
- 13.) Proceed to perform the following functionality tests:
 - "[Chassis Current Leakage Test](#)" on page 10-25
 - "[Calibration Tests](#)" on page 7-15
 - "[Full System Test](#)" on page 7-9

8-2-7 LCD Display Frame 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

10 minutes

8-2-7-3 Preparations

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-2-7-4 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 8-19](#) below.



Figure 8-19 Removing the Screw Caps from the LCD Display Frame

- 2) Loosen and remove the four screws ([Figure 8-20](#)).



Figure 8-20 Removing the Securing Screws

8-2-7-4 LCD Display Frame Removal Procedure (cont'd)

- 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 8-21 Removing the LCD Display Frame

8-2-7-5 LCD Display Frame Installation 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 8-21 on page 8-23 .
- 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 8-19 on page 8-22 .
- 4.) Proceed to perform the following functionality test:
 - ["Chassis Current Leakage Test" on page 10-25](#)

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 i n, as shown in Figure 8-7 on page 8-7 .

NOTE: When tightening screws, **do not overtighten or use excessive force.**

CAUTION: 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 (TO THE RIGHT OF 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 i 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 Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 2) Loosen and remove the four screws that secure the P&M Board to the RFI Board, as shown in [Figure 8-22](#).

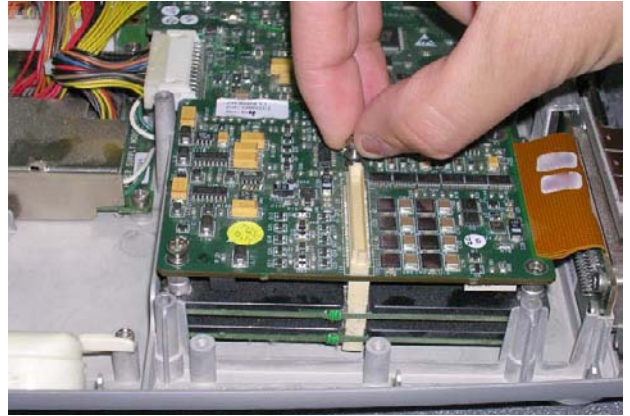
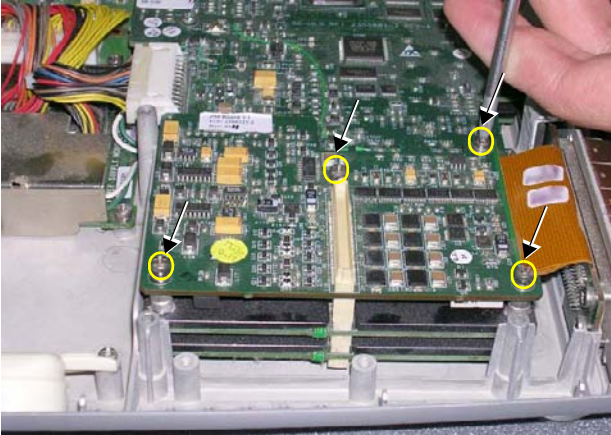


Figure 8-22 Removing the Screws that Secure the P&M Board to the RFI Board

- 3.) Loosen the two screws that fasten the P&M Board to the Bottom Assembly, as shown in [Figure 8-23](#) below.



Figure 8-23 Loosening the Screws from the P&M Board

8-3-1-4 P&M (Probe and MUX) Board Removal Procedure (cont'd)

- 4.) Lift the P&M Board *upwards* away from the Bottom Assembly and remove it completely, as shown in [Figure 8-24](#) below.

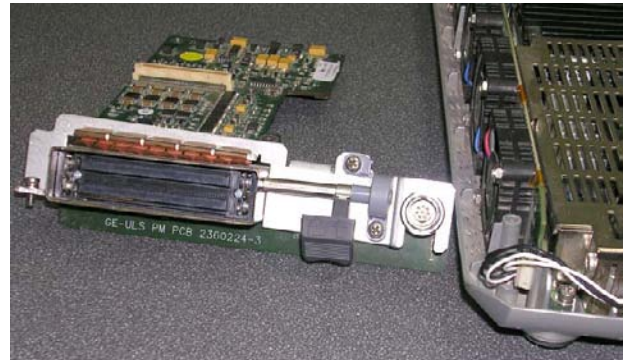


Figure 8-24 Removing the Probe and MUX Board from the Bottom Assembly

8-3-1-5 P&M (Probe and MUX) Board Installation 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 8-24](#) and [Figure 8-23](#), above.
- 2.) Return and fasten the four screws to secure the P&M Board to the RFI Board, as shown in [Figure 8-22](#) on page 8-25 .
- 3.) Return the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-8
- 4.) Proceed to perform the following functionality tests:
 - "[Chassis Current Leakage Test](#)" on page 10-25
 - "[Calibration Tests](#)" on page 7-15
 - "[Full System Test](#)" on page 7-9

8-3-2 TR32 and RFI Boards Replacement Procedure



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 *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-2-4 TR32 and RFI Boards Removal Procedure

- 1) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure"](#) on page 8-6.
- 2) Loosen the eight screws that secure the TR32 and RFI Boards to the Bottom Assembly, as shown in [Figure 8-25](#) below.

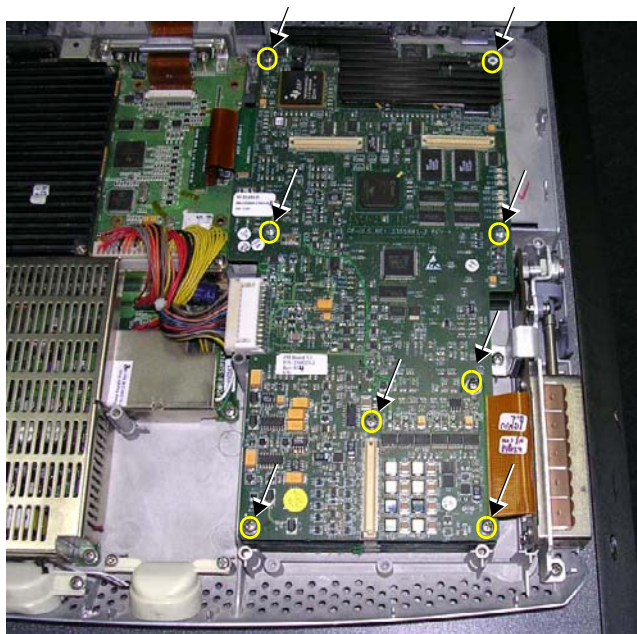


Figure 8-25 Loosen Screws that Secure TR32 and RFI Boards to Bottom Assembly

8-3-2-4 TR32 and RFI Boards Removal Procedure (cont'd)

- 3) Remove the eight screws - see [Figure 8-26](#).



Figure 8-26 Removing the Screws

- 4) Disconnect the PCI cable flex (BEP-to-RFI) from the cable connector on RFI Board as shown in [Figure 8-27](#) below.

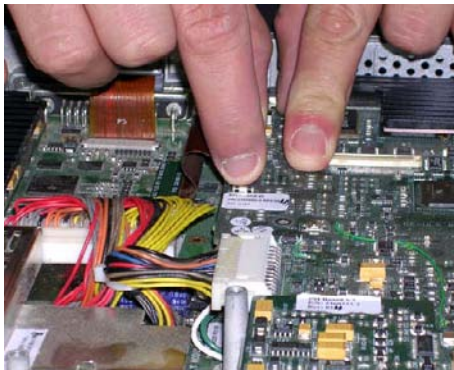


Figure 8-27 Disconnecting the PCI Cable from the RFI Board

8-3-2-4 TR32 and RFI Boards Removal Procedure (cont'd)

- 5) Disconnect each of the two HVPS cables from their sockets on DC Power Supply, as shown in [Figure 8-28](#) below.

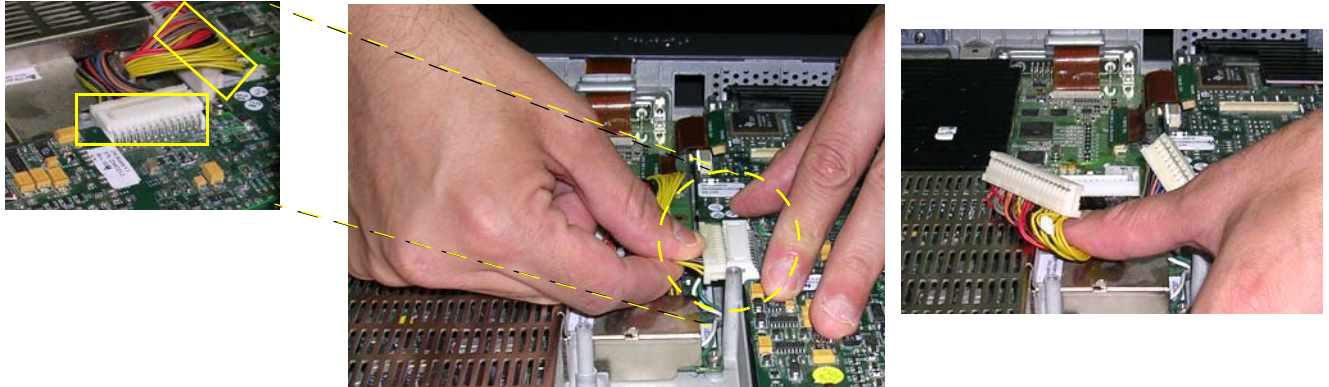


Figure 8-28 Disconnecting the DC Power Supply

- 6) 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 8-30](#) below.
(The RFI and TR32 Boards are seated together in the system as one unit).

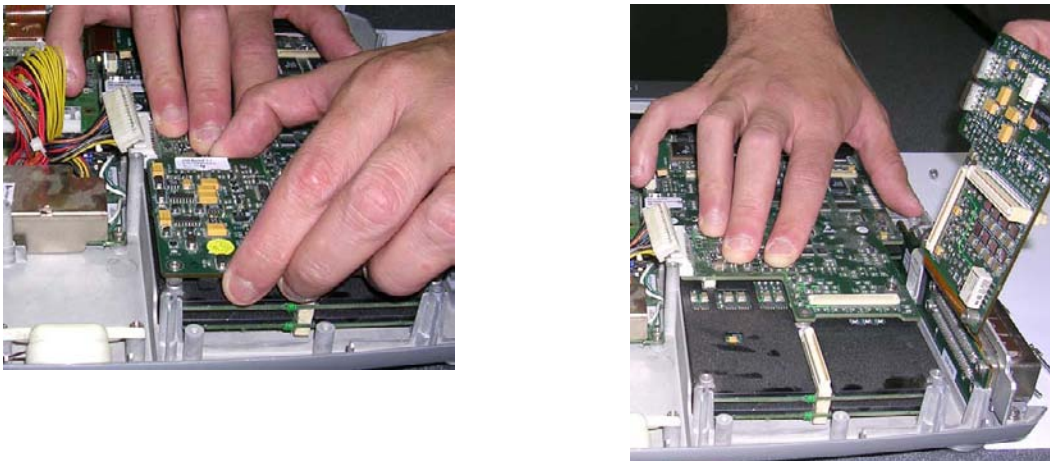


Figure 8-29 Accessing the RFI and TR32 Boards

8-3-2-4 TR32 and RFI Boards Removal Procedure (cont'd)

- 7) Lift the RFI and TR32 Board assembly upwards and remove it from the Bottom Assembly, as shown in [Figure 8-30](#) below

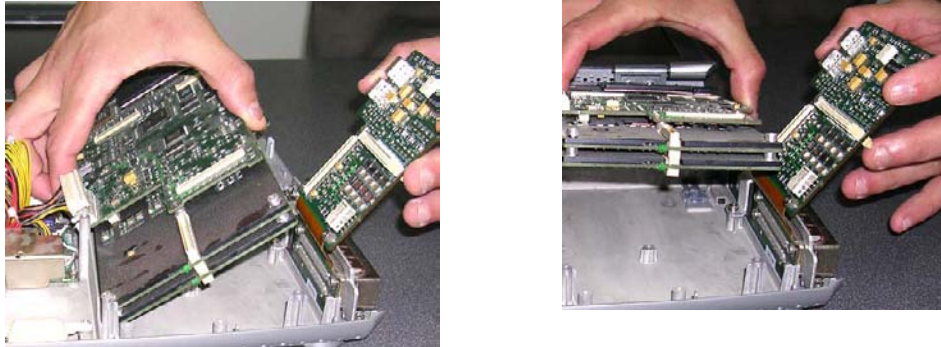


Figure 8-30 Removing the RFI and TR32 Boards from the Bottom Assembly

- 8.) Remove the RFI Board from the TR32 Boards (separate by gently pulling them apart), as shown in [Figure 8-31](#) below.

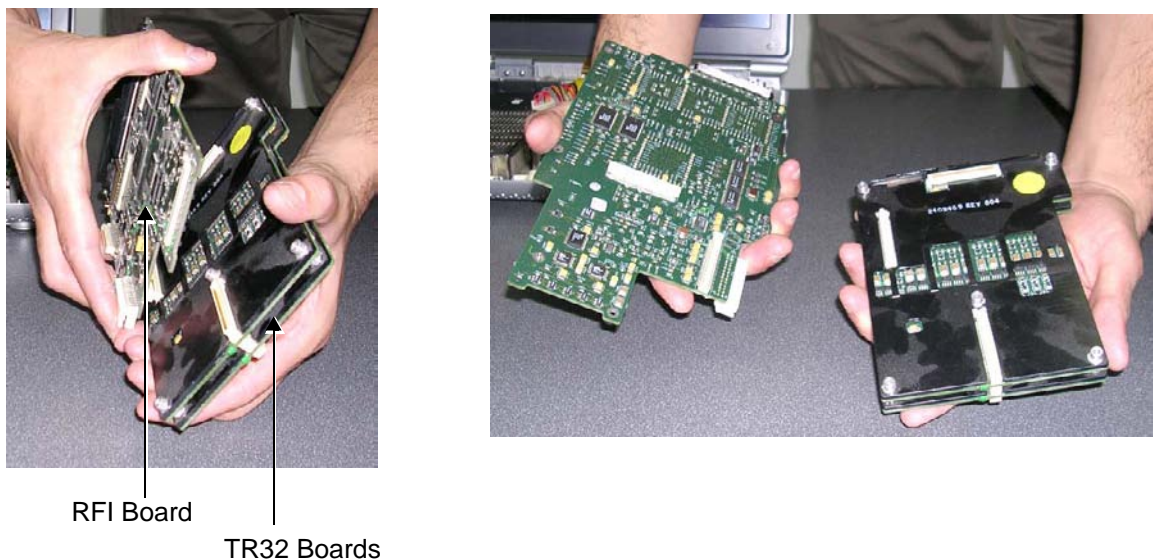


Figure 8-31 Removing the RFI Board from the TR32 Boards

8-3-2-4 TR32 and RFI Boards Removal Procedure (cont'd)

- 9) Separate the two TR32 Boards from each other, as shown in [Figure 8-32](#) below.

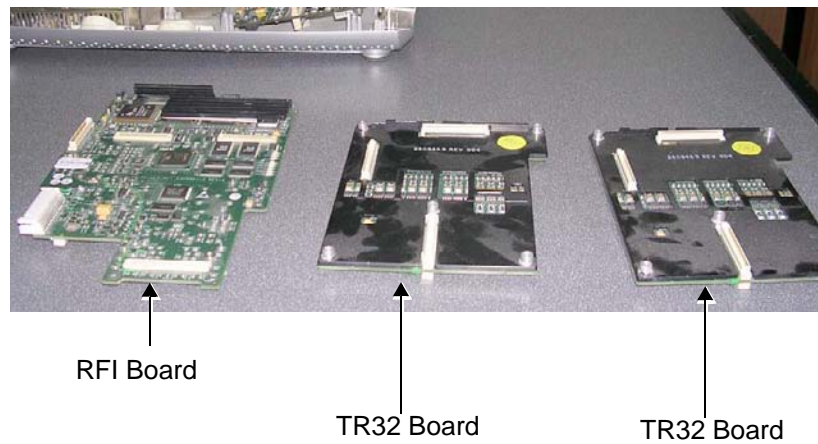
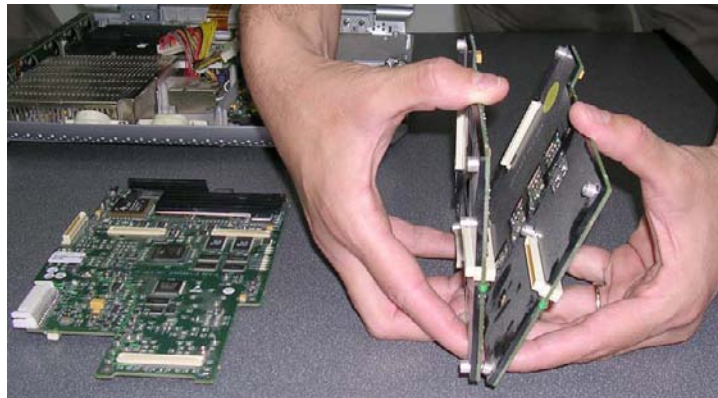


Figure 8-32 Separating the Two TR32 Boards from Each Other

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



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) Re-connect the two TR32 Boards to each other (gently press together as shown in Figure 8-32 on page 8-31).
- 2) Connect the TR32 Boards to the RFI Board (gently press together as shown in Figure 8-31 on page 8-30).
- 3) 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 8-29](#) and Figure 8-30 on page 8-30 .
- 4.) Reconnect each of the two HVPS cables to the DC Power Supply (see Figure 8-28 on page 8-29).
- 5.) Reconnect the PCI cable flex (BEP-to-RFI) to the cable connector on RFI Board (see Figure 8-27 on page 8-28).
- 6.) Return the eight screws and fasten the TR32 and RFI Board assembly firmly in position on the Bottom Assembly (refer to [Figure 8-25](#) and Figure 8-26 on page 8-28).
- 7) Return the Control Panel and Keyboard to its original position, as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-8](#).
- 8.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

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.

For details, refer to the ["Software Installation/Upgrade Procedure Overview" on page 8-56](#).

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 *i 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.
- 2) Make sure the Vivid *i 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 8-2](#).
- 3) Remove the Hard Disk, as described in the ["Hard Disk Removal Procedure" on page 8-4](#).
- 4) Return the Vivid *i n* to the upright position, release the latches and open the LCD Display cover to remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 5) 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 described on the next page (and illustrated in [Figure 8-33](#)).

8-3-3-4 BEP Removal Procedure (cont'd)

- 6) Disconnect BEP cables as follows (refer to [Figure 8-33](#) below):
- Disconnect the LCD Flex ribbon cable (carefully pull back the two connector latches to release).
 - Disconnect the BEP-to-RFI Flex cable.
 - Disconnect the HVPS-to-BEP power cable.
 - Disconnect the Fan/Speaker-to-BEP power cable.

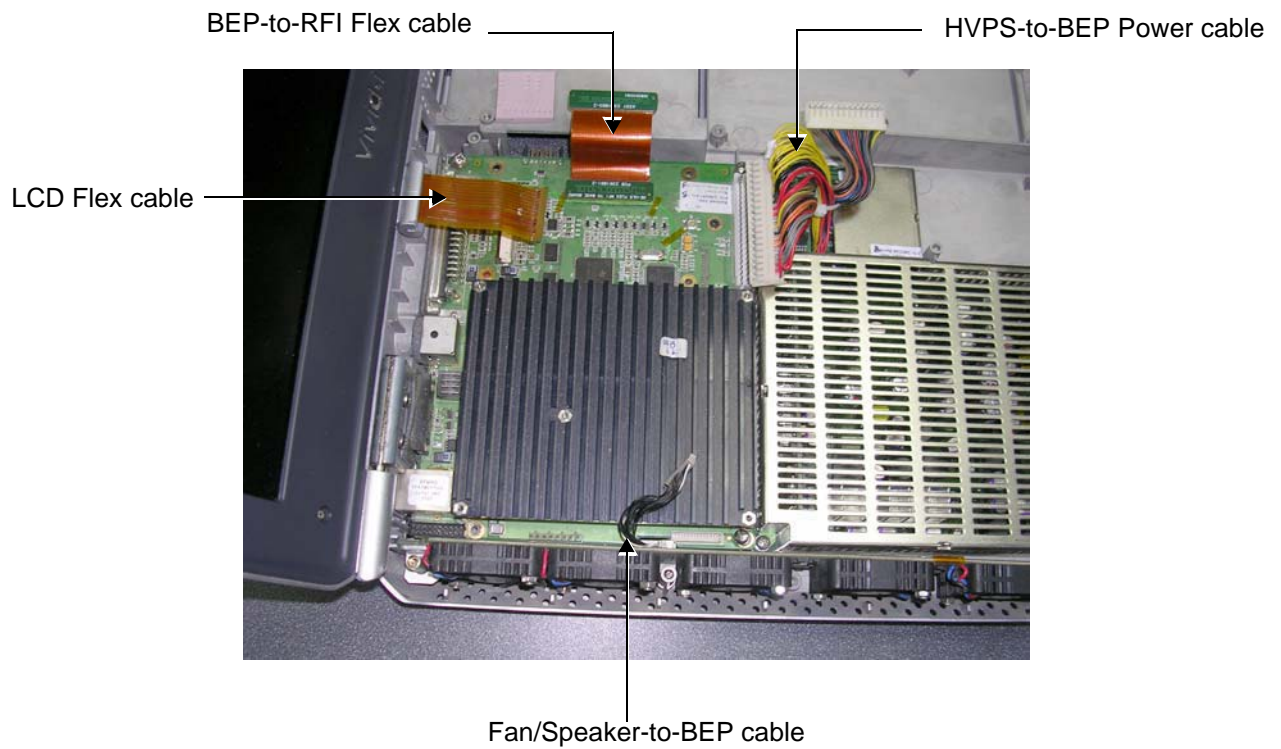


Figure 8-33 Disconnecting Cables from the BEP

8-3-3-4 BEP Removal Procedure (cont'd)

- 7) Unscrew and remove the four screws that secure the BEP to the Bottom Assembly as shown in [Figure 8-39](#) below.

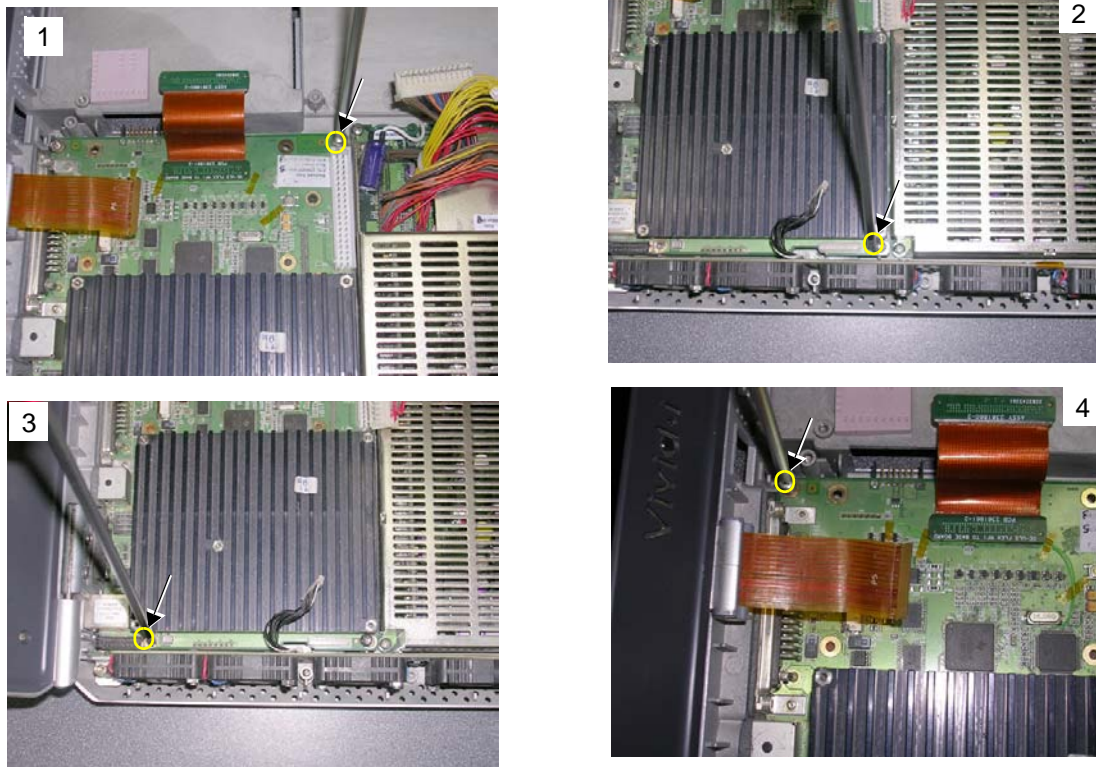


Figure 8-34 Removing the Screws from the BEP

- 8) Using both hands, lift the BEP out of the Bottom Assembly and remove it from the system, as shown in [Figure 8-39](#) below.

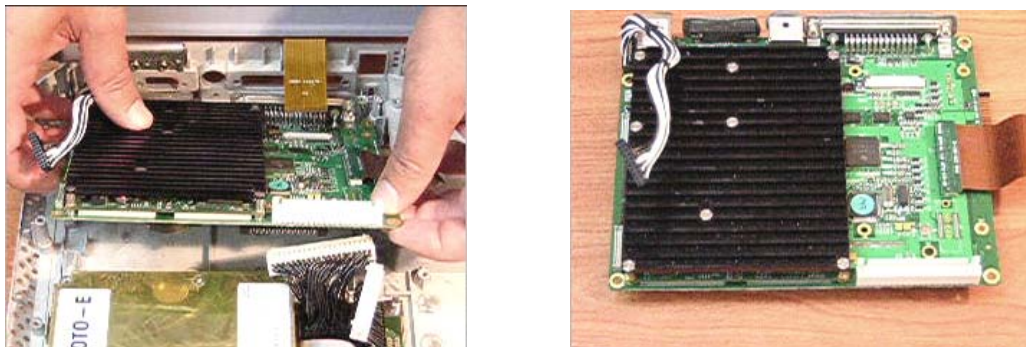


Figure 8-35 Removing the BEP from the Bottom Assembly

8-3-3-5 BEP Installation Procedure

- 1) Carefully return the new BEP to the original position on the Bottom Assembly - refer to Figure 8-35 on page 8-35 .

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 8-34 on page 8-35 .
- 3) Re-connect all the cables to the BEP:

Proceed as follows (refer to Figure 8-33 on page 8-34):

- 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 the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Installation Procedure" on page 8-8.](#)
 - 5) Return the Hard Disk, as described in the ["Hard Disk Installation Procedure" on page 8-5.](#)
 - 6) Make sure the Vivid / 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 8-3.](#)
 - 7.) Make sure there is no T-plug (dongle) or any other peripheral connected to the USB or PCMCIA.
 - 8.) Turn ON the system and boot-up.
 - 9.) Perform the BIOS Update procedure, as described in ["BIOS Firmware Update" on page 8-79.](#)

Note: If **both** the Back End and the Hard Disk are being replaced simultaneously, continue to the next step. If only the Back End is being replaced, skip [step 10](#) and proceed to [step 11](#), below.

- 10) Perform the steps required to burn the LCD type onto the newly-installed Back End, as described in [step 9](#) on page 8-48 through [step 12](#) on page 8-49.
- 11) Perform a complete functional check of the system, as described in [Chapter 4 - General Procedures and Functional Checks.](#)

8-3-3-5 BEP Installation Procedure (cont'd)

12.) Proceed to perform the following functionality test:

- "Chassis Current Leakage Test" on page 10-25
- "Calibration Tests" on page 7-15
- "Full System Test" on page 7-9

8-3-4 HVPS Replacement Procedure

8-3-4-1 Tools

Use the appropriate flat and Phillips-type screw drivers, as indicated in the HVPS replacement procedure.

8-3-4-2 Time Required

15 minutes

8-3-4-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-4-4 HVPS Removal Procedure

- 1) Make sure the Vivid *i* 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 8-2](#).
- 2) Disconnect each of the two Power Supply cables from the DC Power Supply (HVPS-to-BEP and HVPS-to-RFI), as shown below.

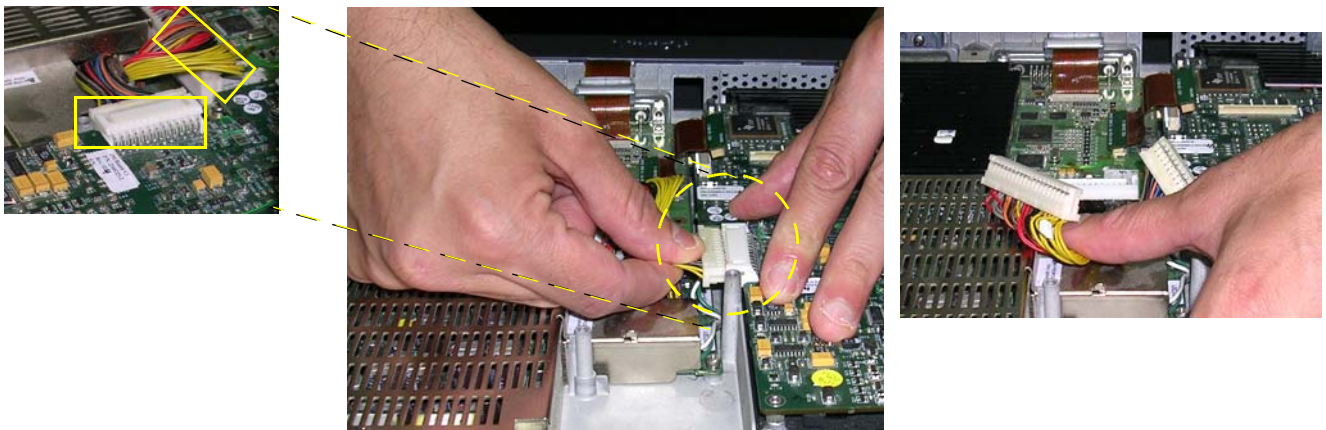


Figure 8-36 Disconnecting the DC Power Supply Cables

8-3-4-4 HVPS Removal Procedure (cont'd)

- 3) Loosen the five screws that secure the DC Power Supply to the Bottom Assembly, as shown in [Figure 8-37](#) below.

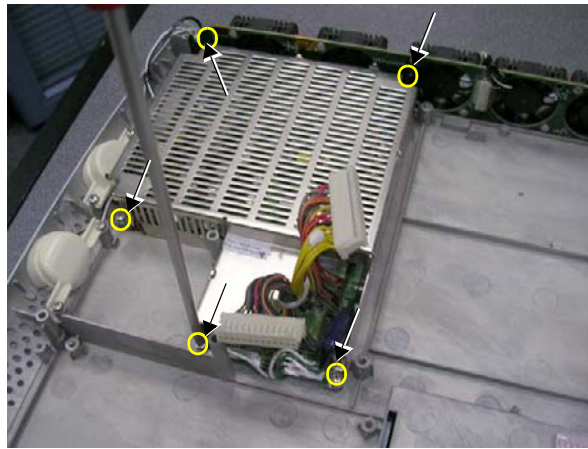


Figure 8-37 Loosening the Screws on the DC Power Supply

- 4) Carefully lift the DC power supply *upwards* and remove it from the Bottom Assembly, as shown in [Figure 8-38](#) below.



Figure 8-38 Removing the DC Power Supply

- 5.) Proceed to perform the following functionality tests:
 - "Chassis Current Leakage Test" on page 10-25
 - "Calibration Tests" on page 7-15
 - "Full System Test" on page 7-9

8-3-4-5 HVPS Installation Procedure

- 1) Return the HVPS to its original position - refer to [Figure 8-38](#), above.
- 2) Return the five screws and fasten the HVPS in position on the Bottom Assembly, as shown in Figure 8-37 on page 8-39 .
- 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 8-36 on page 8-38 .
- 4) Make sure the Vivid / 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 8-3](#).
- 5.) Proceed to perform the following functionality tests:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

8-3-5 Fan Replacement Procedure

8-3-5-1 Tools

Use the appropriate flat and Phillips-type screw drivers, as indicated in the fan replacement procedure.

8-3-5-2 Time Required

15 minutes

8-3-5-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-5-4 Fan Removal Procedure

- 1) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure"](#) on page 8-6.
- 2) Unscrew and remove the two screws that secure the Fan Assembly to the Bottom Assembly as shown in [Figure 8-39](#) below.

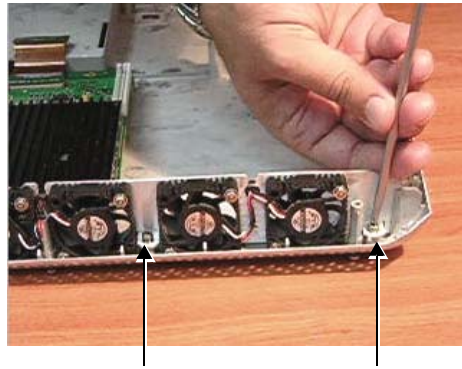


Figure 8-39 Removing the Screws from the Fan Assembly

- 3.) Disconnect the speaker cable from the fan assembly, as shown in [Figure 8-40](#) below

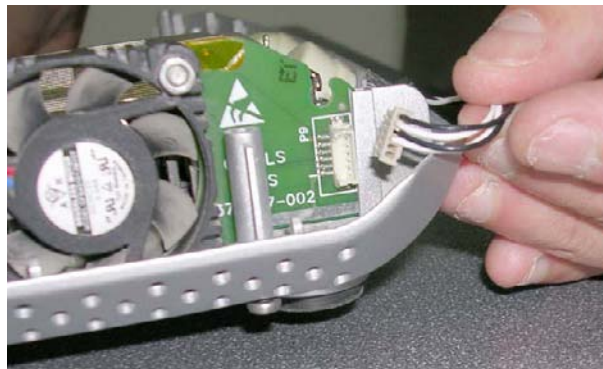


Figure 8-40 Disconnecting the Speaker Cable

8-3-5-4 Fan Removal Procedure (cont'd)

- 4) 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 8-41](#) below.

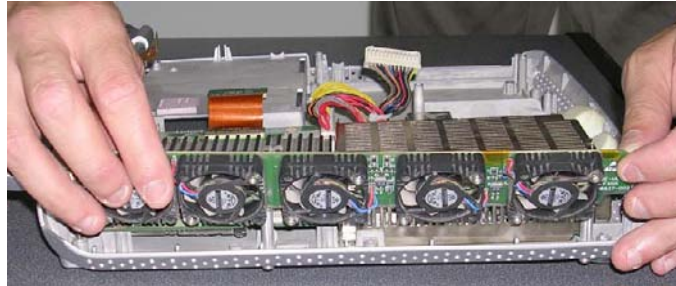


Figure 8-41 Removing the Fan Assembly

- 5) Disconnect the Fan cable from the BEP and completely remove the Fan Assembly from the system, as shown in [Figure 8-42](#) below.

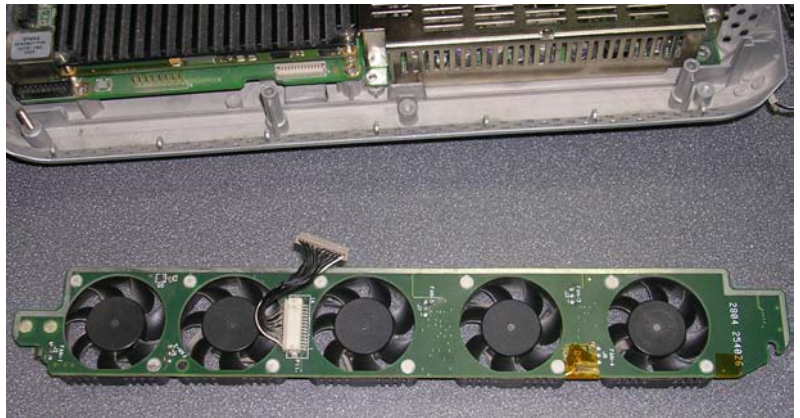
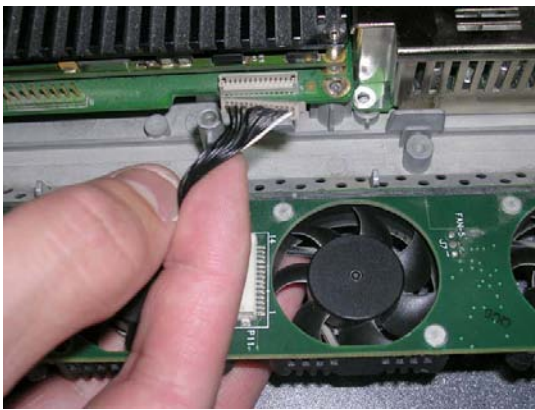


Figure 8-42 Disconnecting the Fan Cable from the BEP

8-3-5-5 Fan Installation Procedure

- 1) Connect the replacement Fan cable to the BEP- refer to [Figure 8-42](#), above.
- 2) Using both hands, carefully mount the replacement Fan Assembly into position on the Bottom Assembly - refer to Figure 8-41 on page 8-42 .
- 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 8-39 on page 8-41 .
- 4.) Reconnect the speaker cable to the fan assembly, as shown in [Figure 8-40](#).
- 5) Return the Control Panel and Keyboard, as described in the "[Control Panel and Keyboard Installation Procedure](#)" on page 8-8.
- 6.) Proceed to perform the following functionality tests:
 - "[Chassis Current Leakage Test](#)" on page 10-25
 - "[Calibration Tests](#)" on page 7-15

8-3-6 Speaker Assembly Replacement Procedure

8-3-6-1 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.

8-3-6-2 Time Required

15 minutes

8-3-6-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-6-4 Speaker Assembly Removal Procedure

- 1) Remove the Control Panel and Keyboard, as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 2) Loosen and remove the two screws on each of the speaker housings (four in total).
- 3) Disconnect the speaker cables from the fan assembly.
- 4) Gently lift the speaker assembly towards you and remove from the system.

8-3-6-5 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:
 - ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

8-3-7 LCD Display Replacement Procedure

8-3-7-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the LCD Display replacement procedure.

8-3-7-2 Time Required

15 minutes

8-3-7-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-7-4 LCD Display Removal Procedure

- 1) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure"](#) on page 8-6.
- 2.) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure"](#) on page 8-22.
- 3.) Loosen and remove the four screws that fasten the LCD Display to the Rear Cover & Latch Assembly, as shown in shown in [Figure 8-43](#) below.



Figure 8-43 Removing the Screws from the LCD Display

8-3-7-4 LCD Display Removal Procedure (cont'd)

- 4.) Disconnect the LCD Flex ribbon cable from the BEP, as shown in [Figure 8-44](#) below.
Use a flat screwdriver to carefully release the cable from the connector.

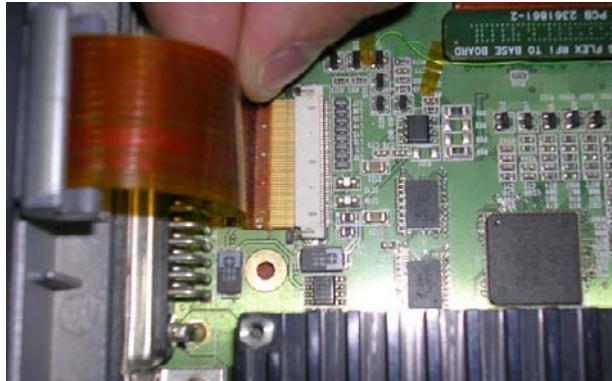


Figure 8-44 Disconnecting the LCD Flex Ribbon Cable

- 5.) Carefully disconnect the microphone from the LCD Flex.
- 6.) Using both hands, carefully lift the LCD Display upwards and remove it from the Rear Cover & Latch Assembly, as shown in [Figure 8-45](#) below.
Take care not to damage the LCD Flex ribbon cable when performing this step.



Figure 8-45 Removing the LCD Display

8-3-7-5 LCD Display Installation Procedure

- 1) Using both hands, carefully lift the replacement LCD Display into position on the Rear Cover & Latch Assembly (refer to [Figure 8-45](#)).
Take care not to damage the LEC Flex ribbon cable when performing this step.
- 2.) Carefully re-connect the microphone to the LCD Flex.
- 3) Use both hands to re-connect the LCD Flex ribbon cable to the BEP - refer to Figure 8-44 on page 8-46 .
- 4) Return and fasten the four screws to secure the LCD Display to the Rear Cover & Latch Assembly (refer to Figure 8-43 on page 8-45).
- 5) Return the LCD Display Frame, as described in the "[LCD Display Frame Installation Procedure](#)" on [page 8-23](#).
- 6) Check that the LCD Display can be tilted *upwards* and *downwards*, and that it holds its set position.
- 7) Return the Control Panel and Keyboard as described in the "[Control Panel and Keyboard Installation Procedure](#)" on [page 8-8](#).
- 8) Boot-up the system into Maintenance Mode.

8-3-7-5 LCD Display Installation Procedure (cont'd)

- 9) From Windows Explorer, go to the directory: **C:\Marlin\Target\bin** (see [Figure 8-46](#) below).

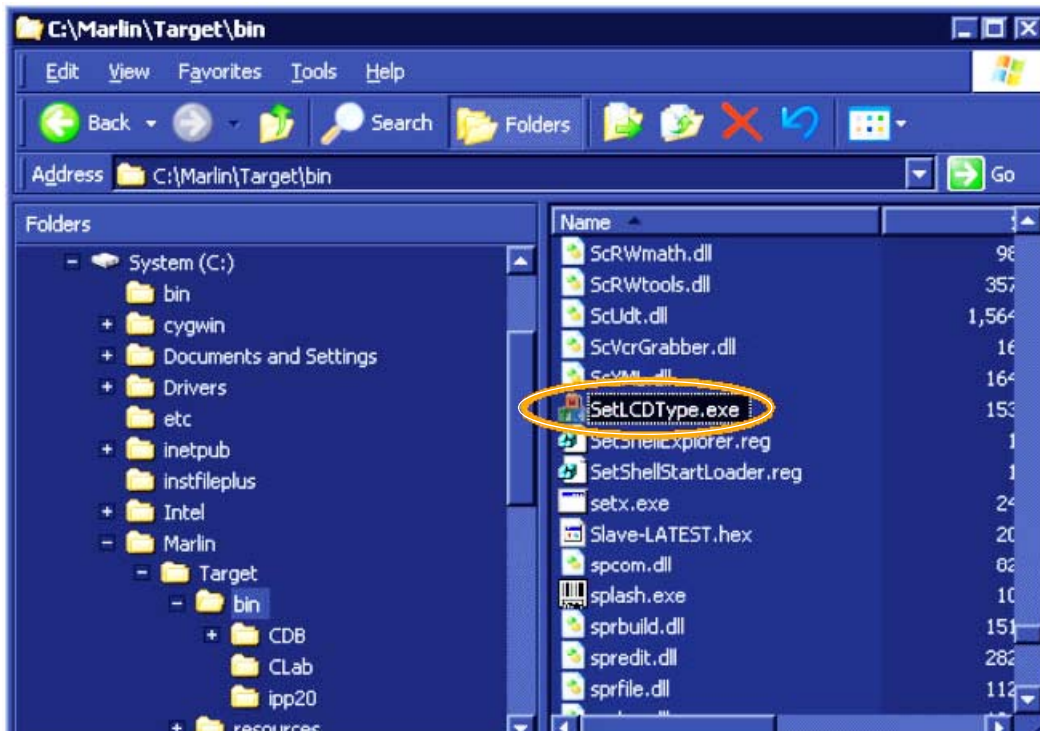


Figure 8-46 Selecting SetLCDType Utility

- 10.) Double-click on **SetLCDType.exe** to run this utility.

The Set LCD Type dialog opens (Figure 8-47):

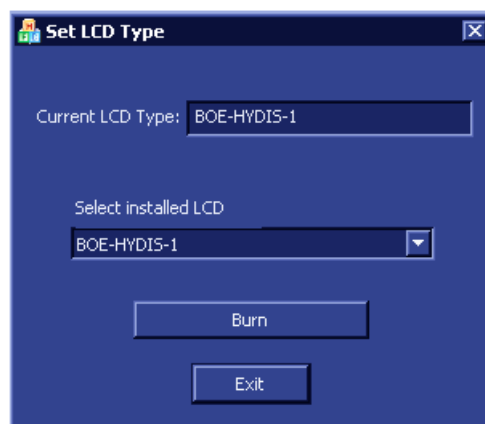


Figure 8-47 Set LCD Type Dialog

8-3-7-5 LCD Display Installation Procedure (cont'd)

- 11) Select the LCD screen type that is installed on the system, as shown in the example below.

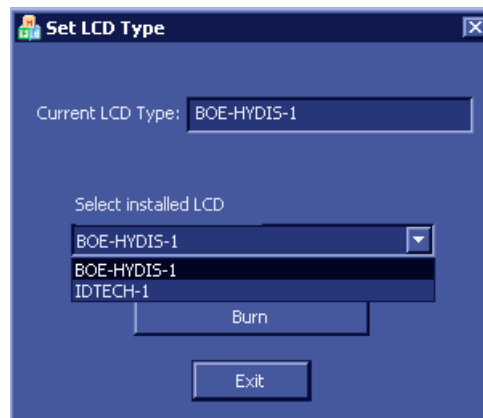


Figure 8-48 Selecting LCD Type Installed on the System

- 12) Click the **Burn** button.

The system is now updated with the new LCD configuration.

- 13) 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](#).
- 14.) Proceed to perform the following functionality tests:
- ["Chassis Current Leakage Test" on page 10-25](#)
 - ["Full System Test" on page 7-9](#)

8-3-8 LCD Flex Cable Replacement Procedure

8-3-8-1 Tools

Use the appropriate Phillips and flat screw drivers, as indicated in the LCD Flex Cable replacement procedure.

8-3-8-2 Time Required

15 minutes

8-3-8-3 Preparation

Shut down the Vivid / n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-8-4 LCD Flex Cable Removal Procedure

- 1) Disconnect the AC cable and battery.
- 2) Remove the Control Panel and Keyboard as described in the ["Control Panel and Keyboard Removal Procedure" on page 8-6](#).
- 3) Remove the LCD Display Frame as described in the ["LCD Display Frame Removal Procedure" on page 8-22](#).
- 4) Remove the LCD Display as described in the ["LCD Display Removal Procedure" on page 8-45](#).

8-3-8-4 LCD Flex Cable Removal Procedure (cont'd)

- 5) Using both hands, carefully lift the LCD Display upwards and remove it from the Rear Cover & Latch Assembly, as shown in [Figure 8-49](#).



Figure 8-49 Removing the LCD Display

NOTE: Take care not to damage the LCD Flex ribbon cable when performing this step.

8-3-8-5 Flex Cable Replacement Procedure

- 1) Remove the kapton tape from the LCD rear panel and disconnect the flex cable - see [Figure 8-50](#).



Figure 8-50 Removing Tape from LCD Rear Panel

- 2) Connect the new flex cable to LCD rear panel connector, as shown in [Figure 8-51](#).

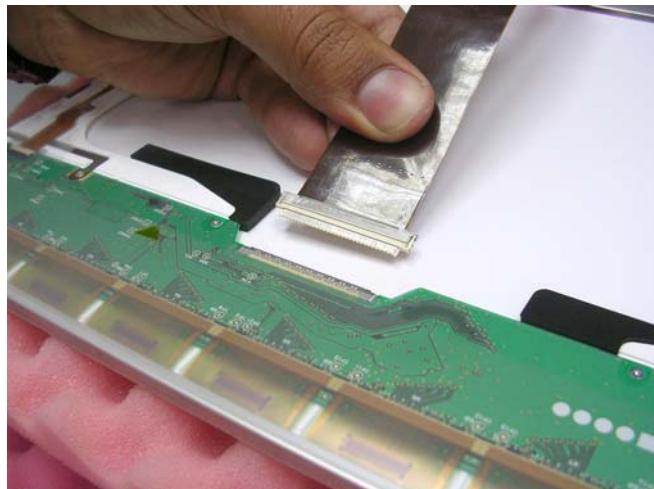


Figure 8-51 Connecting the Flex Cable to the LCD Rear Panel

- 3) Connect the flex cable to the LCD rear panel connector.

8-3-8-5 Flex Cable Replacement Procedure (cont'd)

- 4) Adhere the kapton tape on the LCD rear panel connector, see [Figure 8-52](#).

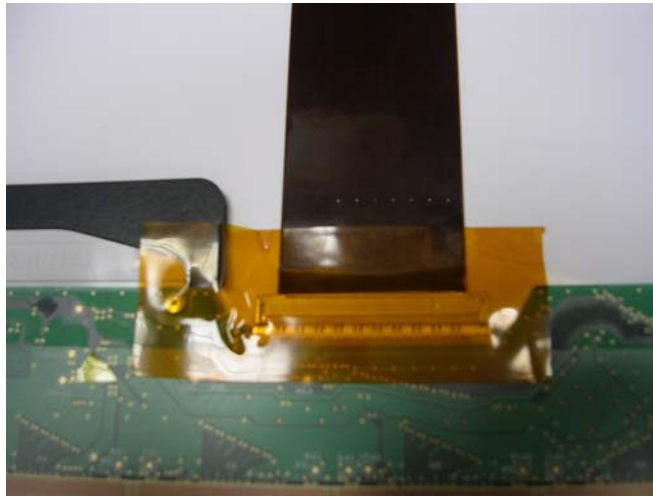


Figure 8-52 Adhering Kapton Tape on the LCD Rear Panel Connector

- 5) Using both hands, carefully lift the LCD Display upwards and install it back to the Rear Cover & Latch Assembly, see [Figure 8-49](#) on [page 8-51](#) .
- 6.) Connect the flex cable to the BEP.
- 7) Return the LCD Display as described in the "[LCD Display Installation Procedure](#)" on [page 8-47](#) .
- 8) Return the LCD Display Frame, as described in the "[LCD Display Frame Installation Procedure](#)" on [page 8-23](#) .
- 9) Check that the LCD Display can be tilted upwards and downwards, and that it holds its set position.
- 10) Return the Control Panel and Keyboard as described in the "[Control Panel and Keyboard Installation Procedure](#)" on [page 8-8](#) .
- 11.) Proceed to perform the following functionality tests:
- "[Chassis Current Leakage Test](#)" on [page 10-25](#)
 - "[Full System Test](#)" on [page 7-9](#)

8-3-9 Microphone Assembly Replacement Procedure

8-3-9-1 Tools

None required.

8-3-9-2 Time Required

10 minutes

8-3-9-3 Preparation

Shut down the Vivid *i* n ultrasound unit, as described in [Chapter 3- System Setup](#).

8-3-9-4 Microphone Assembly Removal Procedure

- 1) Remove the LCD Display Frame as described in the "[LCD Display Frame Removal Procedure](#)" on [page 8-22](#).
- 2) Carefully unclip and release the microphone from the *upper right* side of the LCD display, as shown in [Figure 8-53](#) below.



Figure 8-53 Releasing the Microphone

- 3) Release the microphone cable from its seating in the cable groove that runs along the side and bottom of the LCD Display.

Note: An adhesive rubber channel is fitted inside the groove to hold the cable in place.

- 4.) Disconnect the miniature plug from the cable connector below the LCD Display as shown in [Figure 8-54](#).

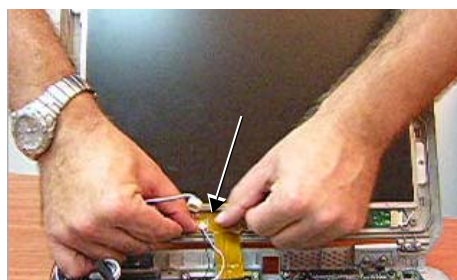


Figure 8-54 Disconnecting the Miniature Plug

- 5.) Remove the Microphone Assembly from the system.

8-3-9-5 Microphone Assembly Installation Procedure

- 1) Using the replacement Microphone Assembly, re-connect the miniature plug to the cable connector below the LCD Display (refer to Figure 8-54 on page 8-54).
- 2) Feed the microphone cable into the cable groove that runs along the side and bottom of the LCD Display.

Note: An adhesive rubber channel is fitted inside the groove to hold the cable in place.

- 3) Clip the microphone into position, making sure it is properly seated on the *upper right* side of the LCD Display (refer to Figure 8-53 on page 8-54).
- 4) Return the LCD Display Frame as described in the ["LCD Display Frame Installation Procedure" on page 8-23](#).
- 5.) Proceed to perform the following functionality tests:
 - Verify that the microphone is functioning.
 - ["Chassis Current Leakage Test" on page 10-25](#)

Section 8-4 Software Loading

8-4-1 Software Installation/Upgrade Procedure Overview

NOTE: When performing a Vivid i n software installation/upgrade procedure, for Vivid i n systems (only) with serial number 3282, and above - and with software level 6.1.0 Build109, and above - it is necessary to first perform the procedure described in ["Vivid i n Software Upgrade from Version BT06 to BT09" on page 8-57](#).

NOTE: For Vivid i n systems, if you are upgrading the system software from version 4.x.x or 6.x.x to version 9.x.x, it may be 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 i n unit.

NOTE: It is recommended to back-up the archive and the settings as described in the Vivid i n, before commencing software installation (or whenever upgrading the software).



NOTICE IMPORTANT It is recommended to store partition C:\ by using the Rollback tool (described in the ["Vivid i nSoftware Roll-back Procedure" on page 8-96](#)) **after** full software installation or upgrade.

WARNING: Do not attempt to install software that was not designated for your Vivid i n unit. Attempting to install un-approved software will cause irreversible damage to hardware and software!

Normally the Vivid i n system is supplied from the manufacturer with the software already installed. In some cases, it is necessary to re-install the software (for example, after replacing the Back-end Processor) by following the software re-installation procedure shown in [Table 8-3 on page 8-62](#).

Note: If this is a first installation, format the hard disk as described in ["Formatting and Partitioning the Hard Disk - Manual Procedure" on page 8-84](#). When done, perform the software installation procedure described in [Table 8-3 on page 8-62](#).

Refer to the following sub-sections, as appropriate:

- ["Vivid i n Software Upgrade from Version BT06 to BT09" on page 8-57](#)
- ["Vivid i n Software Re-Installation/Upgrade" on page 8-62](#)
- ["Setting the BIOS" on page 8-68](#)
- ["BIOS Firmware Update" on page 8-79](#)
- ["Formatting and Partitioning the Hard Disk - Automatic Procedure" on page 8-82](#)
- ["Formatting and Partitioning the Hard Disk - Manual Procedure" on page 8-84](#)
- ["Full Re-ghost and Software Installation" on page 8-88](#)
- ["Installing Software only from DVD" on page 8-90](#)
- ["Installing Software only or Patch" on page 8-95](#)
- ["Vivid i nSoftware Roll-back Procedure" on page 8-96](#)

8-4-1-1 Vivid i n Software Upgrade from Version BT06 to BT09

NOTE: *The software upgrade procedure described below is applicable only to Vivid i n systems with serial number 3282, and above - with software level 6.1.1 Build110, and above.*

If the Vivid i n system is currently running a software version lower than 6.1.1 Build110, do not perform this procedure. In this event, perform the software upgrade procedure to the level described in FMI 76072.

NOTE: *The PMC software is update automatically with the system upgrade, if required.*

NOTE: *If you are upgrading the system software from version 6.x.x to version 9.x.x, it may be 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 i n unit.*

When performing this procedure, backup of the archive is not necessary as this upgrade does not tamper with or affect the patient archive (database). However, it recommended that the Backup procedure is performed on regular basis.

NOTE: *The Vivid i n BT06 to BT09 upgrade software can only be purchased (through the Sales Dept) by the customer, using this ordering number: H45561AY.*

NOTE: *Following the upgrade of software from BT06 software to BT09, an Application Specialist visit is recommended.
Until an Application Specialist has visited the site, it is recommended to use only the factory default presets.*

Kit's Content (H45561AY)

- Software CD
- Manual CD
- Release Notes

8-4-1-1-1 Preparation

NOTE: Make sure that the required Software Option Keys are available prior the upgrade process.

At the site, write down the following Connectivity settings as it will be necessary to restore them at the end of the process:

- TCP/IP address
- ILink settings
- Network printer (if present)
- Wireless network settings (if present)
- All user presets

8-4-1-1-2 Vivid i n Software Upgrade (BT06 to BT09) Procedure

Table 8-2 Vivid i n Software Upgrade (BT06 to BT09) Procedure Vivid i n 1 of 3

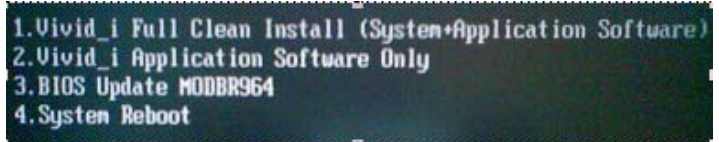
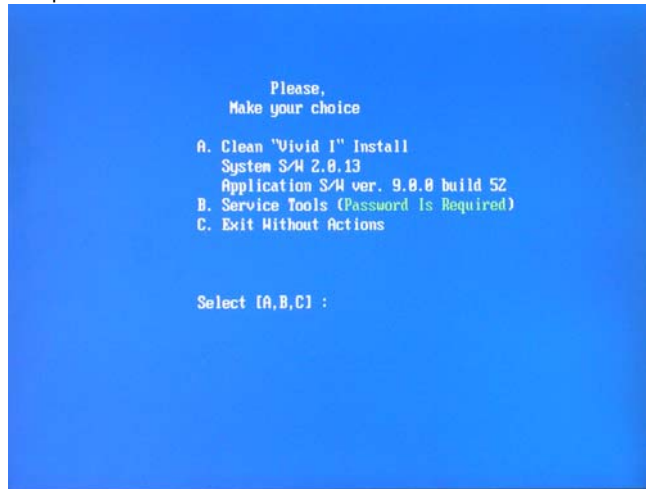
Step	Instruction	Expected Result
1	Perform a complete shutdown of the system	
2	Eject the battery and remove all peripherals currently connected to the system, with the following exceptions: Make sure no peripherals are connected to the USB connectors except the DVD.	
3	If not already connected, connect the DVD\CD-RW to the USB port at the rear of the system and connect power to the DVD\CD-RW drive.	
4	Press the <Eject> button of the DVD\CD-RW drive and remove any media if present.	The DVD\CD-RW drive tray ejects.
5	Insert the DVD containing the full software version (P/ N R2423022) into the DVD-RW drive and close the tray. Press the <Eject> button again.	The DVD\CD-RW drive tray will load the software.
6	Hold down the <ON/OFF> button for three seconds.	The system powers ON and when system boot-up from the DVD is complete, the following message is displayed prompting you to select the required option: 
7	Select option 1. Vivid_i Full Clean Install (System + Application Software)	Wait until the following message is displayed, prompting you to select the required option: 
8	Select option A. Clean "Vivid i" Install System S/W ...	The user is prompted for a password.

Table 8-2 Vivid / n Software Upgrade (BT06 to BT09) Procedure Vivid / n (cont'd) 2 of 3

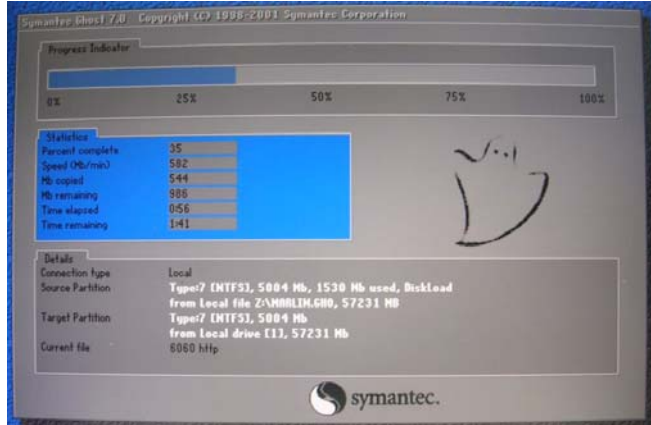
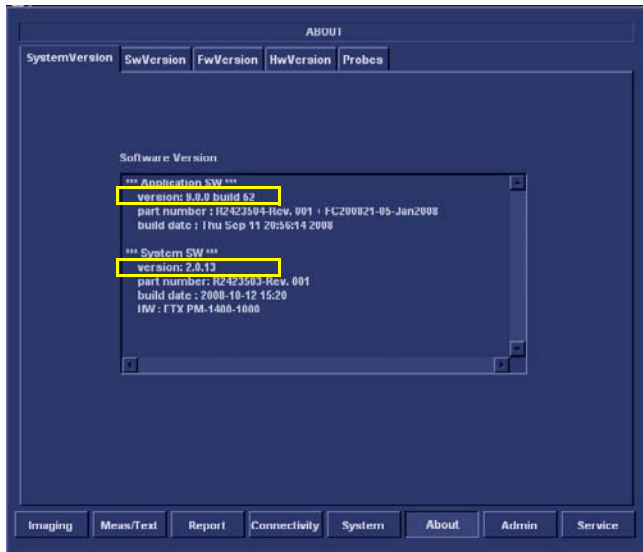
Step	Instruction	Expected Result
9	<p>When prompted, type the following password: geulsservice and press <Enter>.</p> <p>Note: When typing the password, use lower-case letters.</p>	<p>A message is displayed showing the current system ID.</p> <p>The DVD then begins the software installation process and a progress indicator is displayed, as shown below:</p>  <p>This stage of the process takes approximately 5 mins.</p> <p>Note: Do not stop the software installation operation during this process!</p> <p>At the end of the re-ghosting process, a message is displayed on-screen prompting you to press <Eject> and remove the CD, then to press <CTRL + ALT + DELETE> to reboot the system.</p>
10	<p>Press <Eject> and remove the CD.</p> <p>Press <CTRL+ALT+DELETE>.</p>	<p>The Ghosting process continues for approximately 10 minutes. The system automatically loads the application and the system is ready for software option installation.</p>
11	<p>Install software options as described in Chapter 3, section 3-7-5 on page 3-61.</p>	
12	<p>To verify the software version, press Config.</p>	<p>The About screen opens, and from the System Version tab, the installed software version is displayed on the screen</p> 
13	<p>Verify that the software version 9.0.0 Build 52 with System SW version 2.0.13 was correctly installed.</p>	

Table 8-2 Vivid *i* n Software Upgrade (BT06 to BT09) Procedure Vivid *i* n (cont'd) 3 of 3

Step	Instruction	Expected Result
14	Restore the Connectivity settings as recorded in "Preparation" on page 8-58. Verify proper Connectivity functionality - refer to "Connectivity Setup" on page 3-62.	
15	Proceed to perform the following functionality tests: <ul style="list-style-type: none"> • "Software Configuration Checks" on page 4-28 • "Calibration Tests" on page 7-15 • "Full System Test" on page 7-9 	

8-4-2 Vivid i n Software Re-Installation/Upgrade

Table 8-3 Vivid i n Software Re-Installation/Upgrade 1 of 6

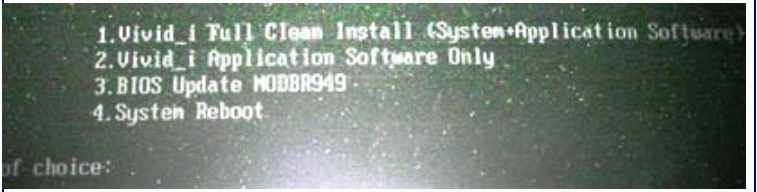
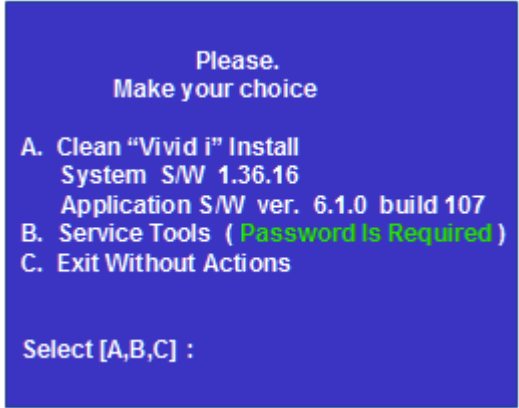
Step	Instruction	Expected Result
1	Eject the battery and remove all peripherals currently connected to the system, with the following exceptions: Make sure no peripherals are connected to the USB connectors except the DVD and the PCMCIA.	
2	Press the <Eject> button of the DVD\CD-RW drive and remove any media if present.	The DVD\CD-RW drive tray ejects.
3	Insert the CD provided with the software kit, and press the <Eject> button again.	The DVD\CD-RW drive tray will load the software CD.
4	Hold down the <ON/OFF> button for 5 seconds to shutdown the system.	The shutdown options are displayed on-screen.
5	Select Full Shutdown .	The system powers down.
6	Hold down the <ON/OFF> button for three seconds.	The system powers ON and when system boot-up from the CD is complete, the following message is displayed prompting you to select the required option: 
7	Select option 1. Vivid_i Full Clean Install (System + Application Software)	Wait until the following message is displayed, prompting you to select the required option: 
8	Select option A. Clean "Vivid i" Install System S/W ...	The user is prompted for a password.

Table 8-3 Vivid i/n Software Re-Installation/Upgrade (cont'd) 2 of 6

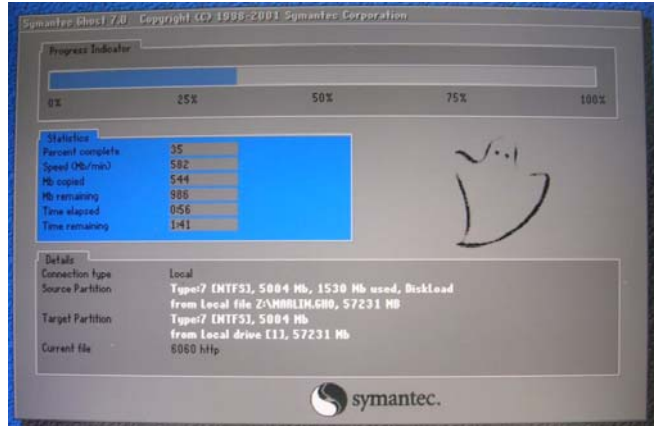


Step	Instruction	Expected Result
9	When prompted, type the following password: geulsservice and press <Enter>. Note: when typing the password, use lower-case letters.	<p>A message is displayed showing the current system ID. The CD then begins the software installation process and a progress indicator is displayed, as shown below:</p>  <p>This stage of the process takes approximately 5 mins. A message is then displayed on-screen prompting you to press <Eject> and remove the CD, then to press <CTRL + ALT + DELETE> to reboot the system.</p>
10	Press <Eject> and remove the CD. Press <CTRL+ALT+DELETE>.	The system re-boots.
11	Follow the on-screen instructions, clicking OK (or Cancel) when prompted.	<p>The machine performs 4 reboots before completing the installation. The installation process will take approximately 15 minutes - DO NOT ATTEMPT TO STOP THE INSTALLATION BEFORE COMPLETION! During this time, the following screens will be displayed (in the order shown):</p>  

Table 8-3 Vivid / n Software Re-Installation/Upgrade (cont'd) 3 of 6


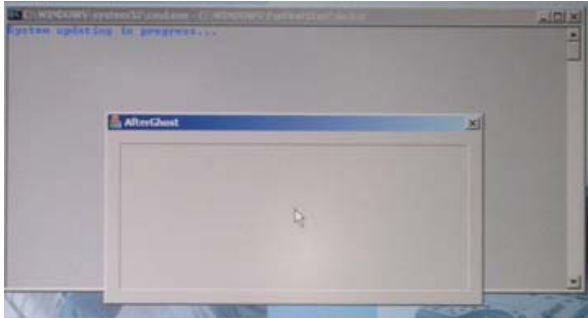
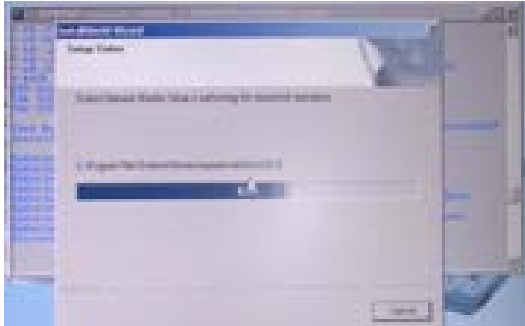
Step	Instruction	Expected Result
11 cont'd		<p>Cont'd.... the following screens will be displayed (in the order shown):</p>   <p>GSP Installation (approx 5 mins):</p>  

Table 8-3 Vivid i n Software Re-Installation/Upgrade (cont'd) 4 of 6

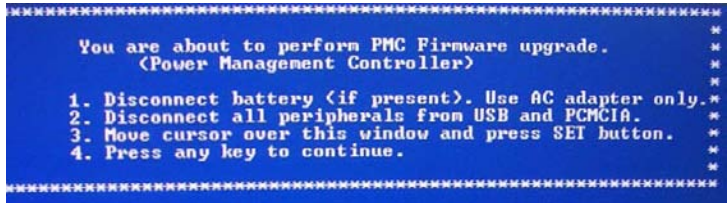

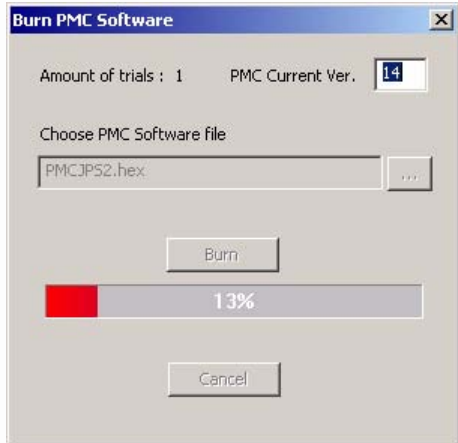
Step	Instruction	Expected Result
11 cont'd		<p>When done, the following PMC Firmware upgrade message is displayed:</p> 
12	<p>Make sure the battery is disconnected. Disconnect all peripherals from the USB and PCMCIA. Move cursor over the displayed window and press the SET button.</p>	<p>The following message is displayed</p> 
13	<p>Press any key to begin the PMC upgrade.</p>	<p>The PMC upgrade commences and the following screen with current PMC version and colored progress bar is displayed:</p>  <p>When done (after several minutes), the screen will turn blank and the fans will continue running.</p>

Table 8-3 Vivid i n Software Re-Installation/Upgrade (cont'd) 5 of 6



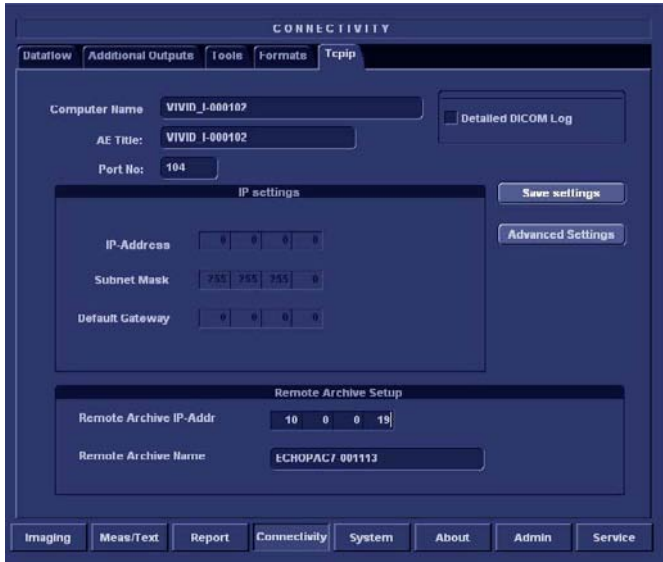
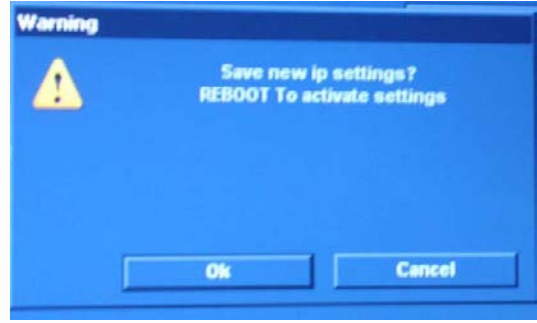
Step	Instruction	Expected Result
14	Power down the system by removing the AC adapter from the rear of the system. Wait 10 seconds, then re-connect the battery and the AC adapter. Boot-up the system by pressing the On/Off button.	<p>If this is a new installation, the system will prompt for the software licence Password, as shown below. Proceed to Step 15.</p>  <p>If not a new installation, there is no prompt for the software licence Password and the boot-up screen is displayed (see below). Proceed to Step 16.</p>
15	Type the password provided for the specific software and approve by clicking OK .	<p>The system will continue to boot-up into <i>Normal Scanning</i> mode:</p> 
16	From the System Configuration window, click the Connectivity tab at the bottom of the window.	The Connectivity dialog box opens.
17	Trackball to the TCPIP tab and press the Set button on the control panel.	<p>Connectivity dialog box - TCPIP tab activated:</p> 

Table 8-3 Vivid / n Software Re-Installation/Upgrade (cont'd) 6 of 6

Step	Instruction	Expected Result
18	Trackball to the Save Settings button and press the Set button on the control panel.	<p>A message is displayed prompting for system re-boot:</p> 
19	Click OK to re-boot the system.	<p>When the installation process is complete, the system will re-boot in regular display mode (Probe Select Screen).</p> <p>Note: If this is a new software version, an adhesive Rating Plate is supplied with the software CD. Adhere the plate in the appropriate position under the Bottom Assembly.</p>
20	<p>Proceed to perform the following functionality tests:</p> <ul style="list-style-type: none"> • "Software Configuration Checks" on page 4-28 • "Calibration Tests" on page 7-15 • "Full System Test" on page 7-9 	

8-4-3 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.

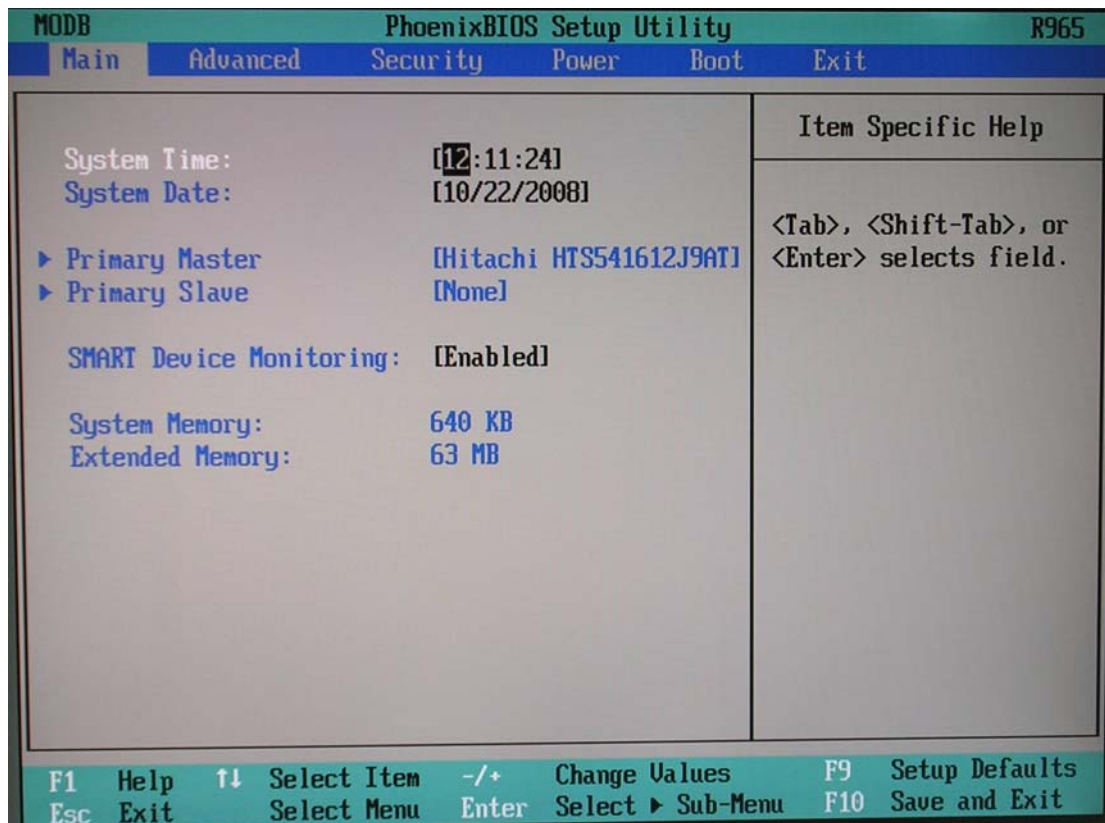


Figure 8-55 BIOS Main Tab

- 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 8-69.](#)

8-4-3-1 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	Figure 8-57 on page 8-70
PCI/PNP Configuration	Figure 8-58 on page 8-70
Memory Cache	Figure 8-60 on page 8-72
I/O Device Configuration	Figure 8-60 on page 8-72
Keyboard Features	Figure 8-61 on page 8-72
Hardware Monitor	Figure 8-62 on page 8-73
Watchdog Settings	Figure 8-63 on page 8-73
Display Control	Figure 8-64 on page 8-74
Miscellaneous	Figure 8-65 on page 8-75

- 1.) From the BIOS main menu (see [Figure 8-55](#)), select the **<Advanced>** menu and press **<Enter>**.

Advanced Chipset Control is highlighted.

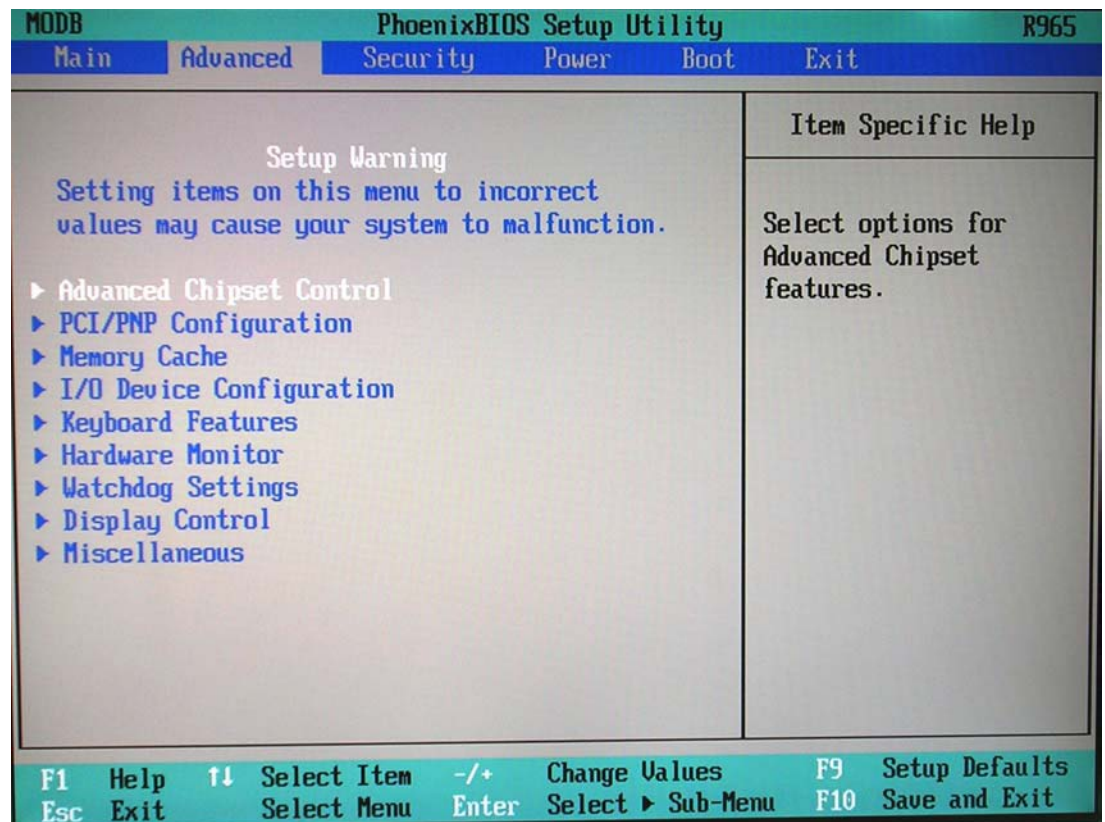


Figure 8-56 BIOS Advanced Parameters Screen

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

- 2) Press <Enter> to access **Advanced Chipset Control** (Figure 8-57).

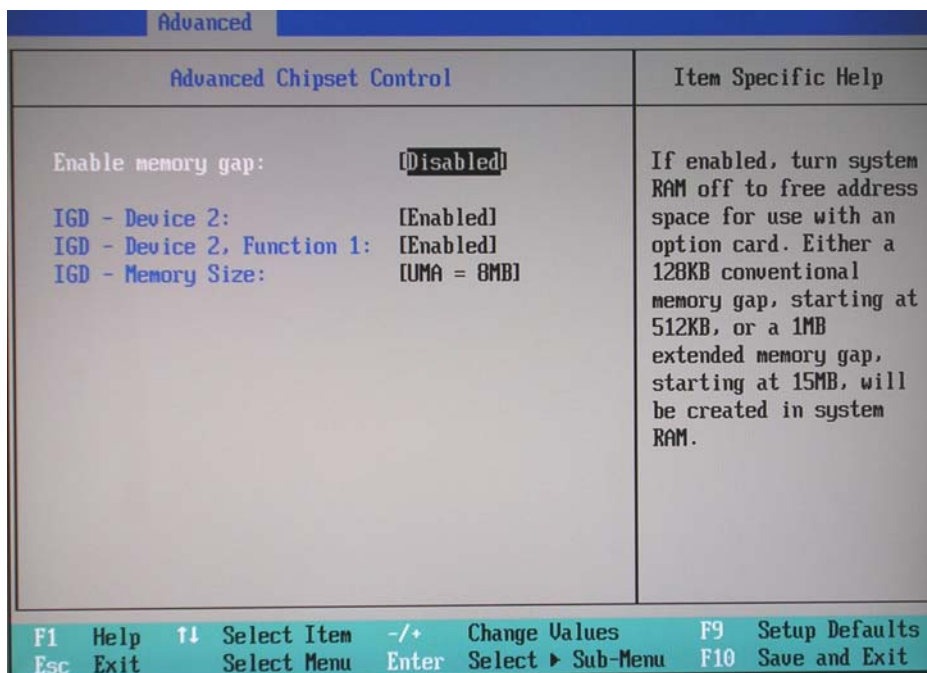


Figure 8-57 BIOS Advanced Chipset Control Parameters

- 3.) Set the parameters for **Enable memory gap**: as shown above in Figure 8-57.
- 4.) Press <Esc> to return to the **Advanced** menu home screen (Figure 8-56).
- 5.) Scroll to **PCI/PNP Configuration** and press <Enter> to open the **PCI/PNP Configuration** screen.

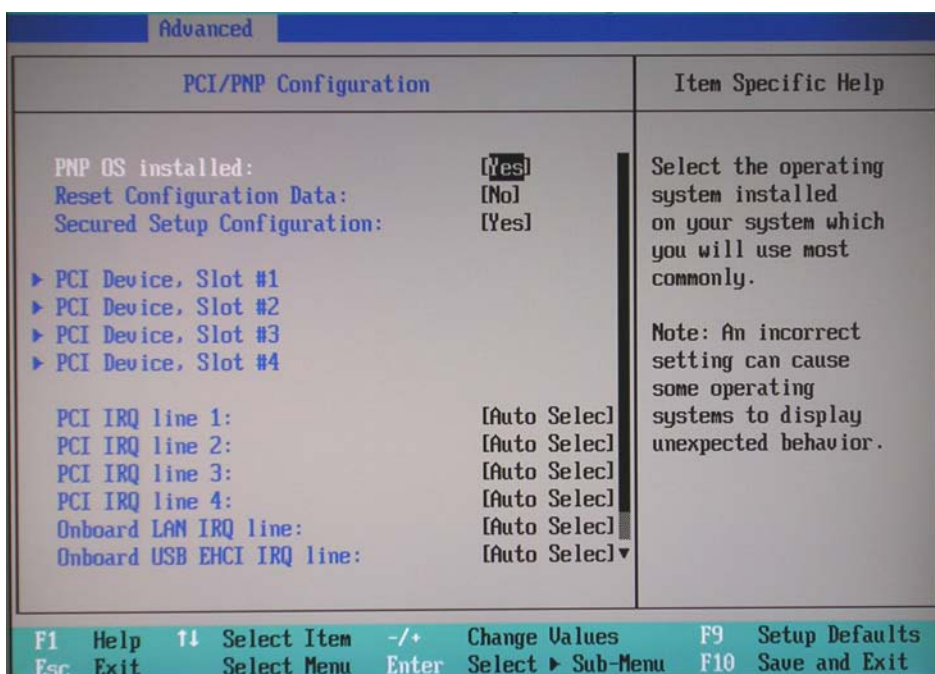


Figure 8-58 BIOS Advanced PCI/PNP Parameters

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

- 6.) Set the parameters in the **PCI/PNP Configuration** screen as shown above in [Figure 8-58](#).
- 7.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).
- 8.) Scroll to **Memory Cache** and press <Enter> to open the **Memory Cache** screen.

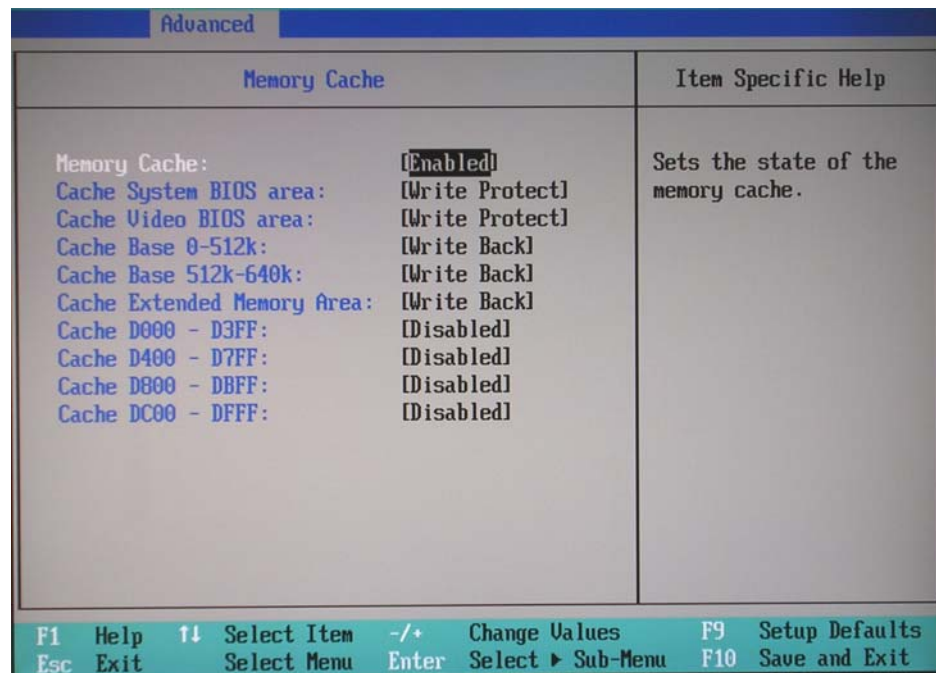


Figure 8-59 BIOS Advanced Memory Cache Parameters

- 9.) Set the parameters in the **Memory Cache** screen as shown above in [Figure 8-59](#).
- 10.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

- 11.) Scroll to **I/O Device Configuration** and press <Enter> to open the **I/O Device Configuration** screen.

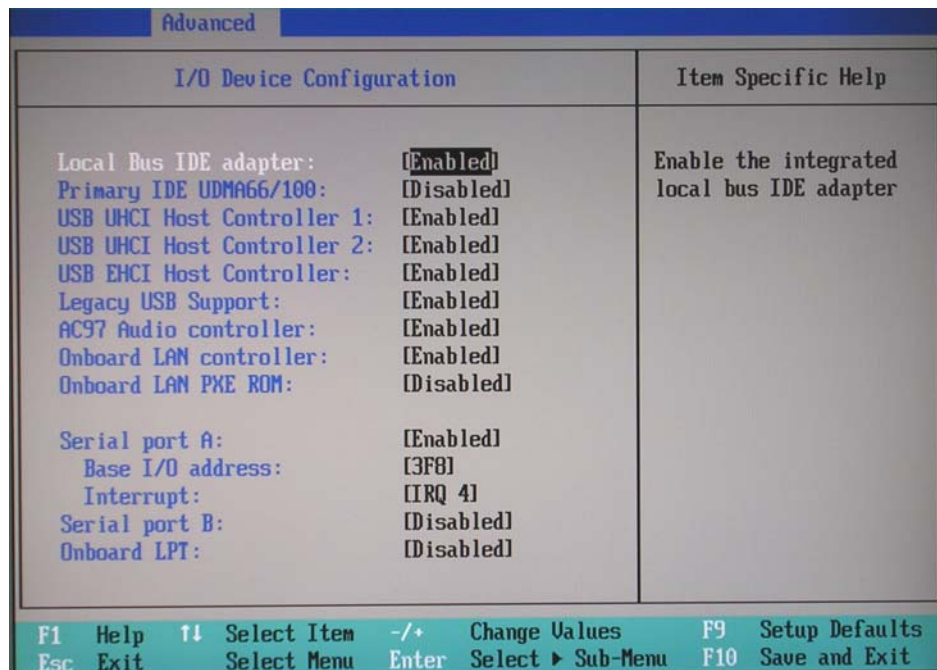


Figure 8-60 BIOS Advanced I/O Device Configuration Parameters

- 12.) Set the parameters in the **I/O Device Configuration** screen as shown above in [Figure 8-60](#).
13.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).
14.) Scroll to **Keyboard Features** and press <Enter> to open the **Keyboard Features** screen.

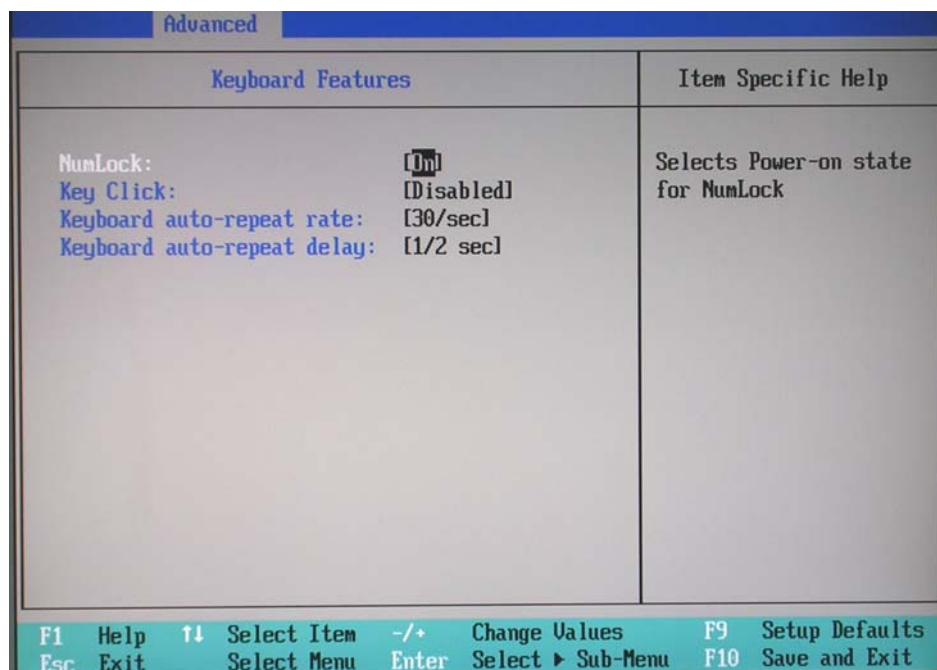


Figure 8-61 BIOS Advanced Keyboard Features Parameters

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

- 15.) Set the parameters in the **Keyboard Features** screen as shown above in [Figure 8-61](#).
- 16.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).
- 17.) Scroll to **Hardware Monitor** and press <Enter> to open the **Hardware Monitor** screen.

Advanced	
Hardware Monitor	Item Specific Help
VCC 3.3V Voltage = 3.32V CPU Core Voltage = 0.99V 5Vsb Voltage = 4.87V Battery Voltage = 3.23V CPU Temperature = +54°C/+129°F	All items on this menu cannot be modified in user mode. If any items require changes, please consult your system Supervisor.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

Figure 8-62 BIOS Advanced Hardware Monitor Parameters

- 18.) Set the parameters in the **Hardware Monitor** screen as shown above in [Figure 8-62](#).
- 19.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).
- 20.) Scroll to **Watchdog Settings** and press <Enter> to open the **Watchdog Settings** screen.

Advanced	
Watchdog Settings	Item Specific Help
Mode: Disabled	Watchdog action
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

Figure 8-63 BIOS Advanced Watchdog Settings

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

- 21.) Set the parameters in the **Watchdog** Settings as shown above in [Figure 8-63](#).
- 22.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).
- 23.) Scroll to **Display Control** and press <Enter> to open the **Display Control** screen.

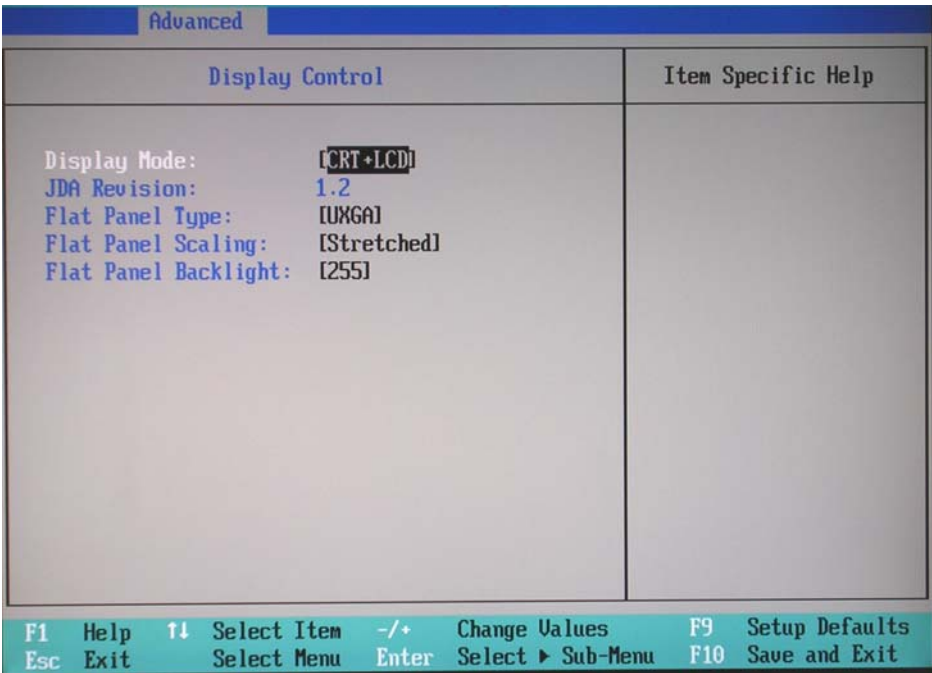


Figure 8-64 BIOS Advanced Display Control Parameters

- 24.) Set the parameters in the **Display Control** screen as shown above in [Figure 8-64](#).
- 25.) Press <Esc> to return to the **Advanced** menu home screen ([Figure 8-56](#)).

8-4-3-1 Setting the BIOS Advanced Parameters (cont'd)

26.) Scroll to **Miscellaneous** and press <Enter> to open the **Miscellaneous** screen.

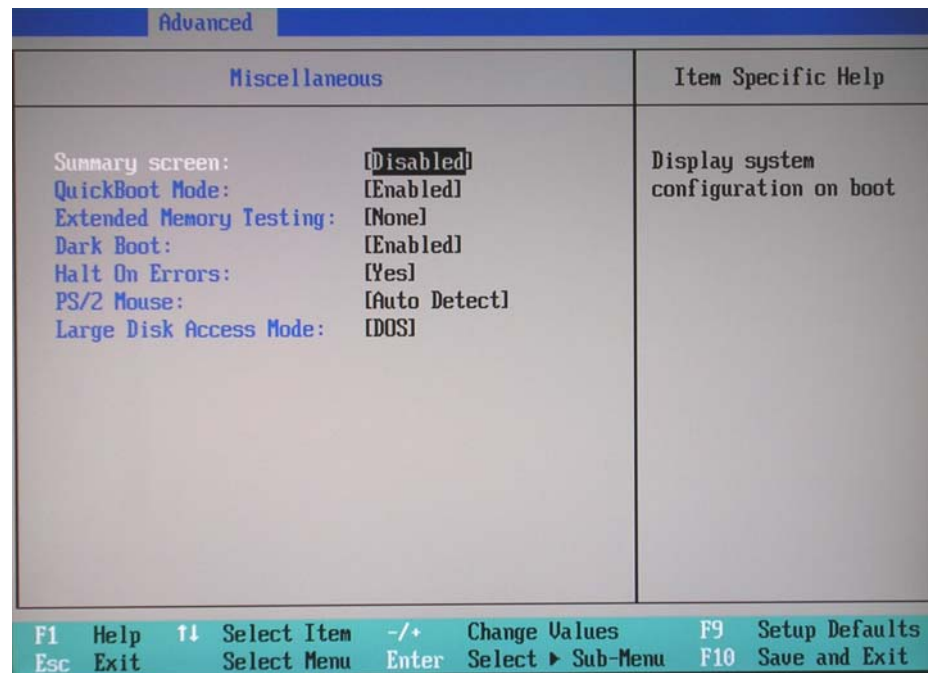


Figure 8-65 BIOS Advanced Miscellaneous Parameters

27.) Set the parameters in the **Miscellaneous** screen as shown above in [Figure 8-65](#).

28.) Proceed to ["Additional BIOS Settings" on page 8-76](#).

8-4-3-2 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 8-66 on page 8-76
Power	Figure 8-67 on page 8-77
Boot	Figure 8-68 on page 8-77

- 1.) From the BIOS main menu (see [Figure 8-55](#)), select the **<Advanced>** menu and press **<Enter>**.
- 2.) Select the **<Security>** menu and press **<Enter>**.

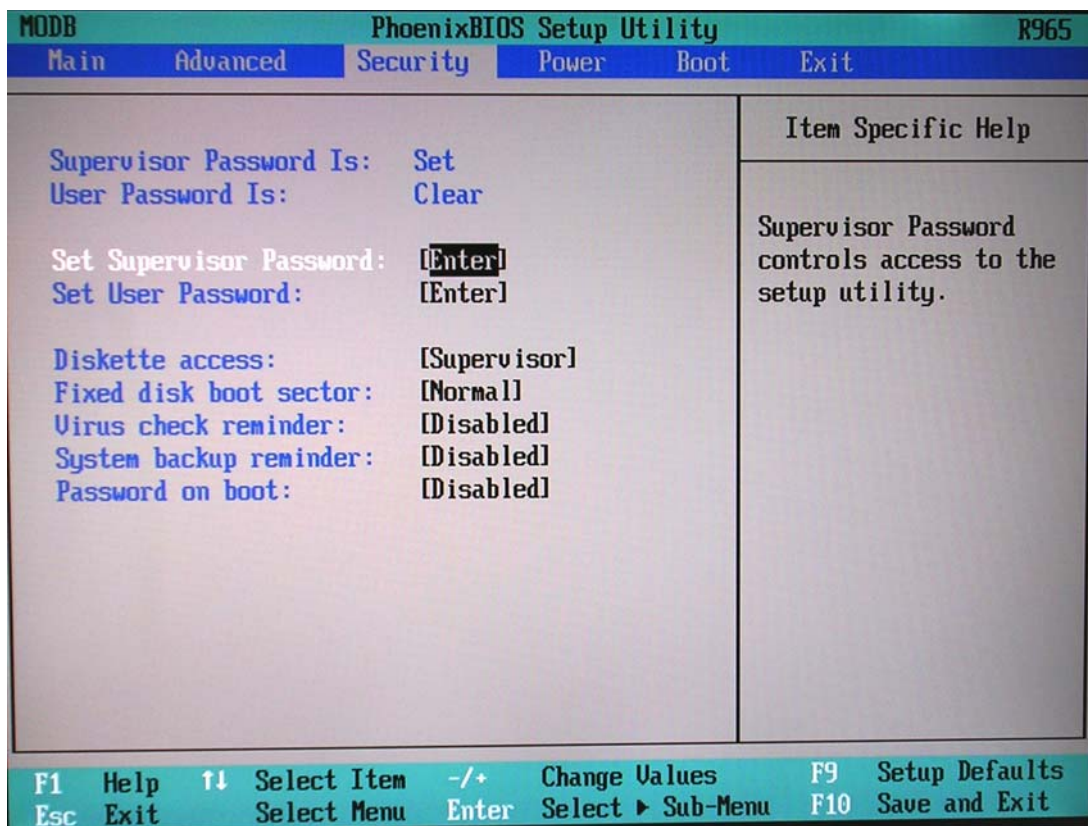


Figure 8-66 BIOS Security Parameters

- 3.) Set the parameters in the **Security** screen as shown above in [Figure 8-66](#).
- 4.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-55](#) on page 8-68).

8-4-3-2 Additional BIOS Settings (cont'd)

- 5.) Select the **<Power>** menu and press **<Enter>**.

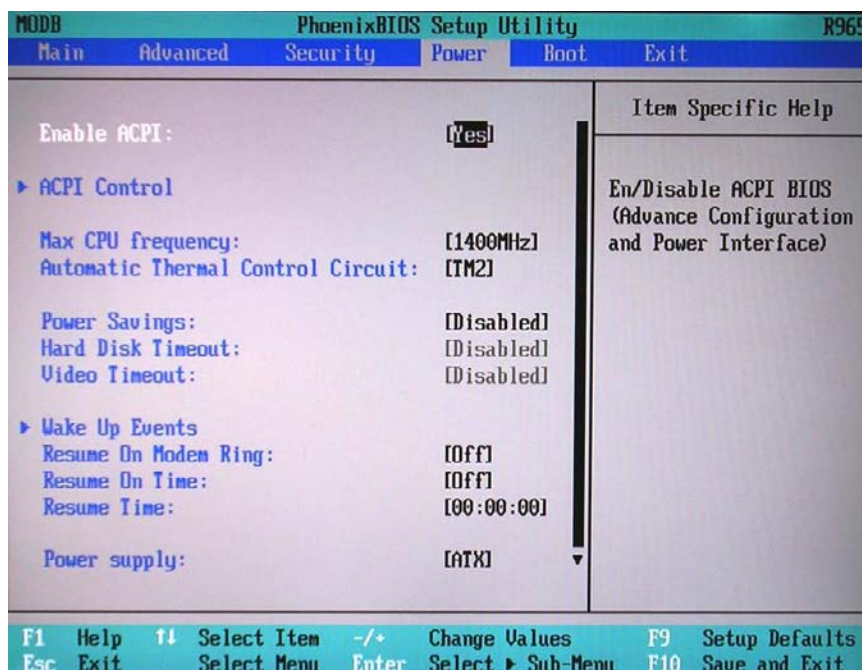


Figure 8-67 BIOS Power Parameters

- 6.) Set the parameters in the **Power** screen as shown above in [Figure 8-67](#).
- 7.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-55](#) on page 8-68).
- 8.) Select the **<Boot>** menu and press **<Enter>**.

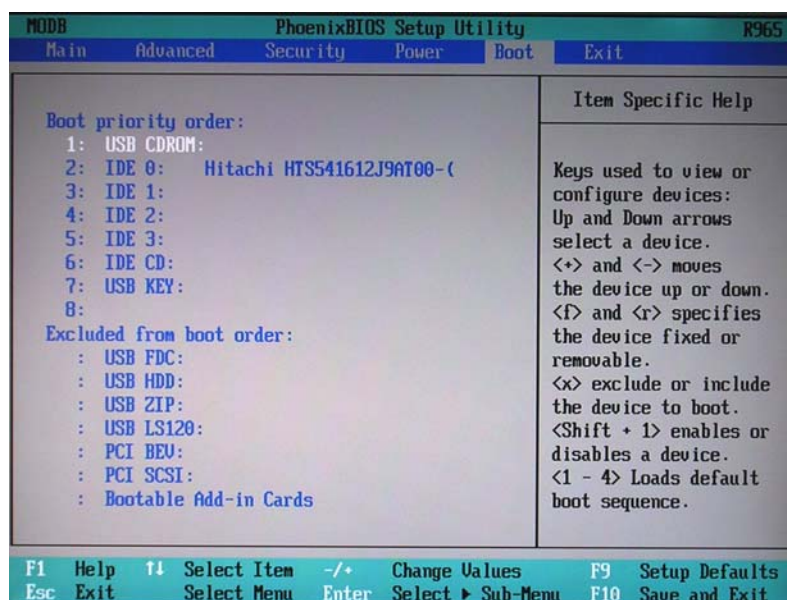


Figure 8-68 BIOS Boot Parameters

- 9.) Set the parameters in the **Boot** parameters screen as shown above in [Figure 8-68](#).
- 10.) Press **<Esc>** to return to the main BIOS screen ([Figure 8-55](#) on page 8-68).

8-4-3-2 Additional BIOS Settings (cont'd)

11) Press <F10> to **Exit Saving Changes** as shown in [Figure 8-69](#).

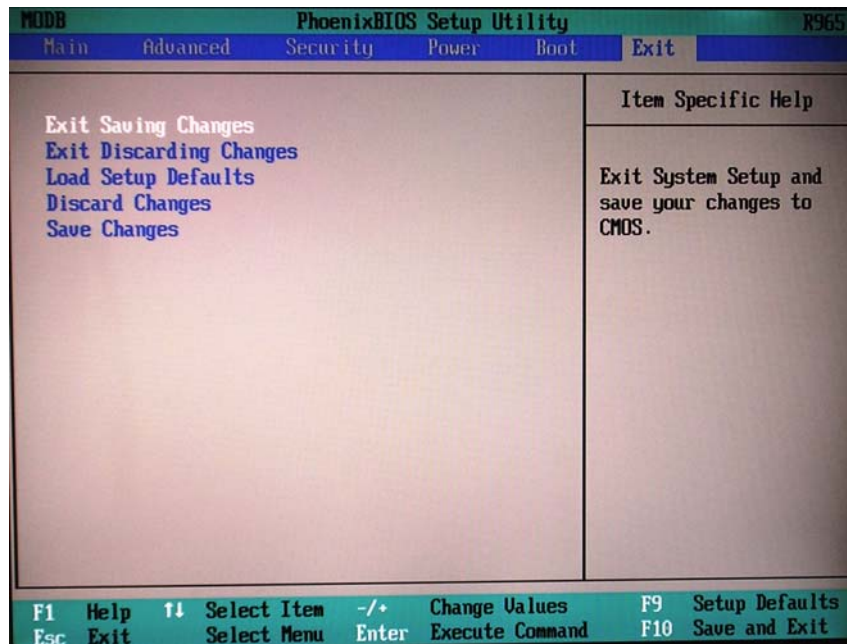


Figure 8-69 BIOS Exit Screen

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 4-28](#)
- ["Calibration Tests" on page 7-15](#)
- ["Full System Test" on page 7-9](#)

8-4-4 BIOS Firmware Update

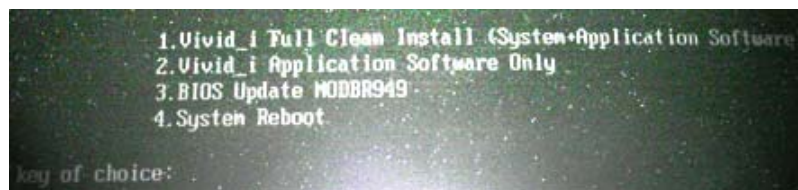


WARNING: When performing this procedure, it is strongly recommended that both AC power and battery power be available to the Vivid i n scanner to prevent causing problems in the Back End in the event of AC power fluctuation or power failure.

In addition, BIOS Firmware Update is a sensitive procedure; allow the process to run to completion without interruption. *Failure to do this could result in unrecoverable damage to the system!*

- 1) Make sure the Vivid i n scanner is connected to both battery and AC power.
- 2) Insert the Vivid i n software installation CD in the DVD\CD-R and close the tray.
- 3) Hold down the ON/OFF button on the control console for 3 seconds.

The system powers ON and when system boot-up from the CD is complete, the following options are displayed in the DOS screen, prompting you to select the required option:



- 4) Select option: **3: BIOS Update MODBR949**

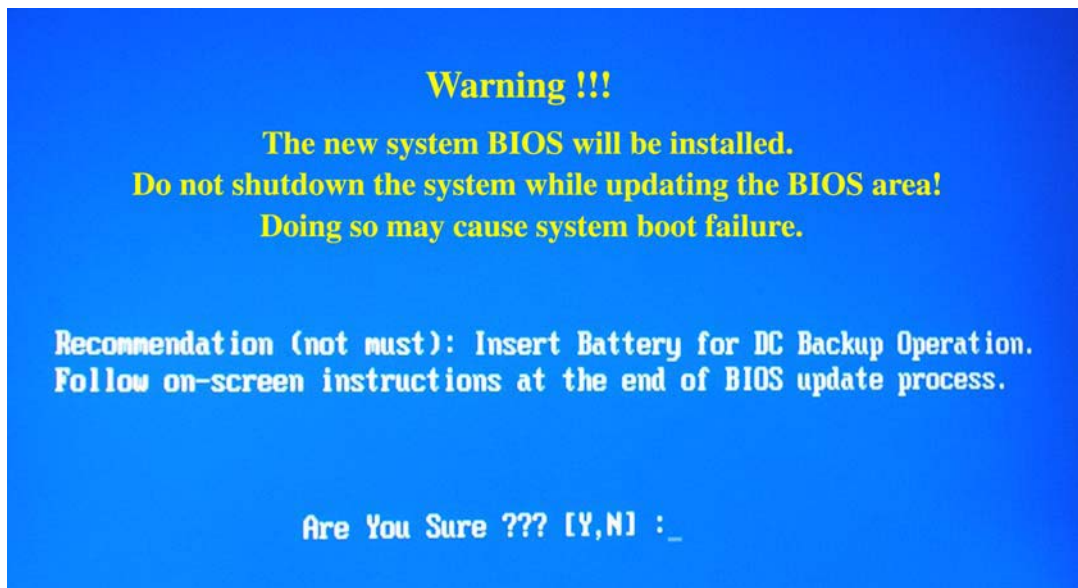
A prompt for password is displayed:



- 5) Type **geulsservice** and press <Enter>.

8-4-4 BIOS Firmware Update (cont'd)

The following screen opens displaying a flashing **Warning** message not to shutdown the system during this procedure:



Note: use of the battery for DC backup during this procedure is also recommended in this screen.

6) To continue, type **Y**.

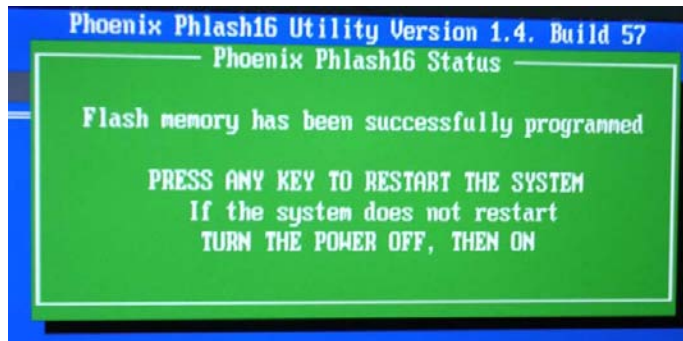
The following screen is displayed, showing the progress of the BIOS update process:



Figure 8-70 BIOS Update in Progress

8-4-4 BIOS Firmware Update (cont'd)

When the BIOS Update process is complete, the following message is displayed:



- 7) Press any key to restart the system.

The boot-up screen is displayed, as shown in Figure 8-71 on page 8-81 .

Note: If the system does not restart, turn the power OFF, then ON. (In the event that the system boot-up screen is not displayed, repeat the procedure, from [step 1](#)).



Figure 8-71 Boot-up Screen after Completion of BIOS Update

- 8.) Proceed to perform the following functionality tests:
- "Software Configuration Checks" on [page 4-28](#)
 - "Calibration Tests" on [page 7-15](#)
 - "Full System Test" on [page 7-9](#)

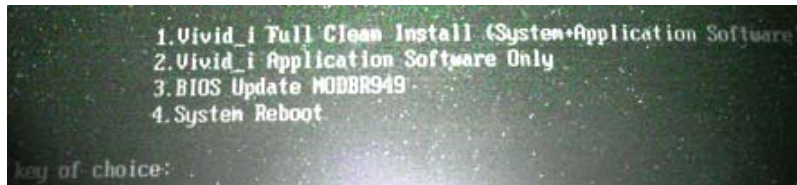
8-4-5 Formatting and Partitioning the Hard Disk - Automatic Procedure



If partition C:\ has been stored by using the Rollback tool described in the [Vivid i nSoftware Roll-back Procedure](#) (see [page 8-96](#)), it will be DELETED after performing the following procedure.

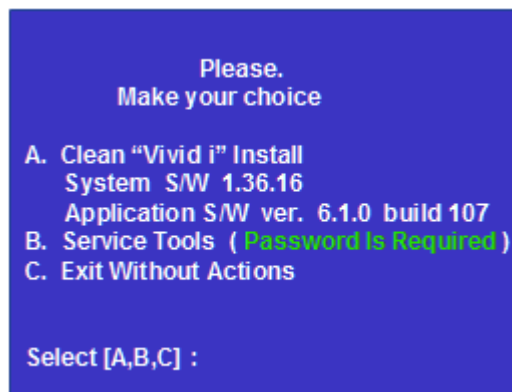
- 1) Connect the DVD\CD-RW drive to the system's USB and connect the power supply of the drive to power outlet.
- 2) Place the GHOST CD inside the DVD\CD-RW Tray and close tray.
- 3) Turn ON power to the system and allow it to boot up from the CD.

A menu will appear prompting for selection of one of four options:



- 4) Select option: **1: Vivid_i Full Clean Install (System + Application Software)**

A menu will appear prompting for selection of the required option:



- 5) Select **"B"** service tools.
- 6) Type in the password **"geulsservice"** and press **<Enter>**.

8-4-5 Formatting and Partitioning the Hard Disk - Automatic Procedure (cont'd)

A menu will appear prompting for selection of one of seven options:



- 7) Select "A" (for BT06 systems) or "B" (for BT09 systems) to format and re-partition the complete hard disk.

Note: Note the system will partition hard disk as follows:

C: = 3GB

D: = 5GB

F: = 1GB

E: = Remaining space (i.e. complete hard-disk size *minus* 9GB for partitions C, D, and F).

IMPORTANT: *Do not stop the operation during this process!*

- 8) When complete, continue with the software installation procedure. Refer to the relevant section.

Note: In the event that the above process fails, one can perform the hard-disk partitioning procedure manually, as described below.

- 9.) Proceed to perform the following functionality tests:
 - ["Software Configuration Checks" on page 4-28](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

8-4-6 Formatting and Partitioning the Hard Disk - Manual Procedure



If partition C:\ has been stored by using the Rollback tool described in the [Vivid i nSoftware Roll-back Procedure](#) (see [page 8-96](#)), it will be DELETED after performing the following procedure.

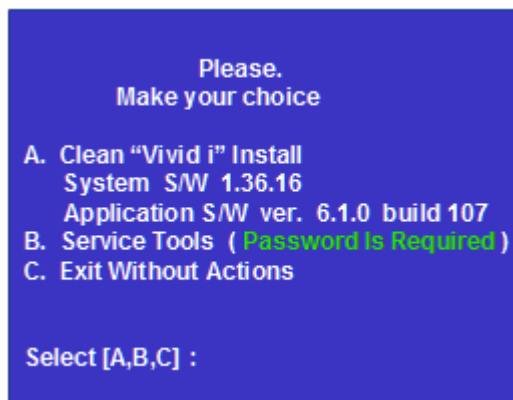
- 1) Insert the Vivid / n software installation CD in the DVD\CD-R and close the tray.
- 2) Hold down the ON/OFF button on the control console for 3 seconds.

The system powers ON and when system boot-up from the CD is complete, the following options are displayed in the DOS screen, prompting you to select the required option:



- 3) Select option: **1: Vivid_i Full Clean Install (System + Application Software)**

A menu will appear prompting for selection of the required option:



- 4) Select option **B Service Tools**.
- 5) When prompted for the password, type **geulsservice** and press <Enter>.

The message "Loading Tools please wait" is displayed, then the *Service Tools Options* menu opens:



8-4-6 Formatting and Partitioning the Hard Disk - Manual Procedure (cont'd)

- 6) Do not select an option, but press **<Ctrl> + C**.
- 7) When the message "EMM386 is running. Available memory is limited to 32MB" is displayed, click **OK**.
- 8) When the message "Terminate batch job (Y/N?)" is displayed, type **Y**.
- 9) At the prompt A:\> type **pqmagic** and press **<Enter>**.

The *Partition Magic* Screen is displayed, as shown below.

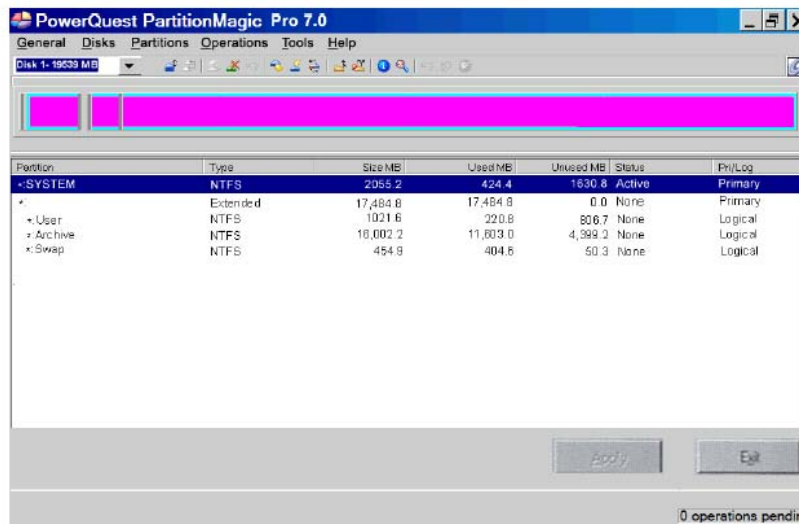


Figure 8-72 Partition Magic Screen

- 10) With the *System* partition selected (highlighted, as shown in Figure 8-72), delete the partition by selecting the **Delete** Tool under the *Operations* menu, as shown in Figure 8-73 below:

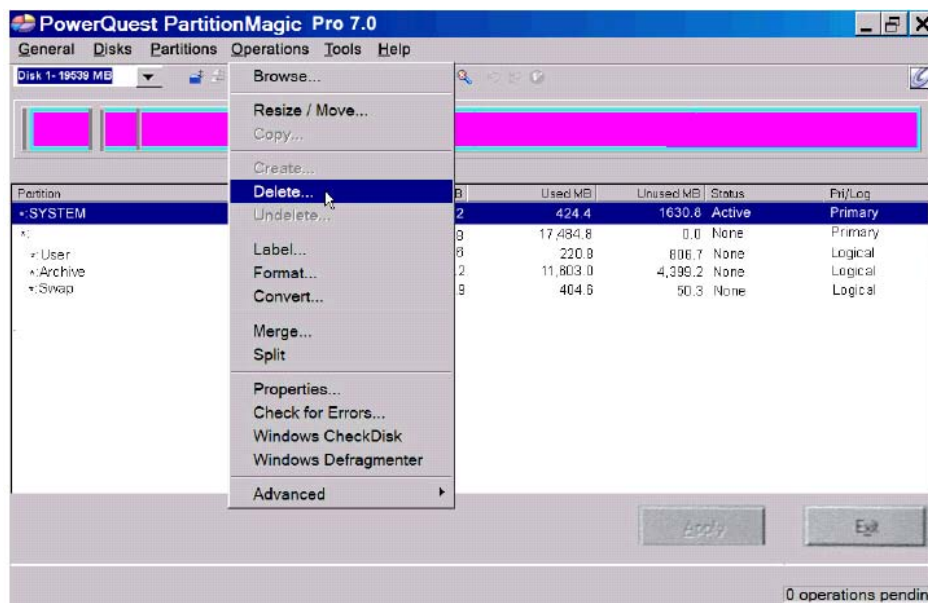
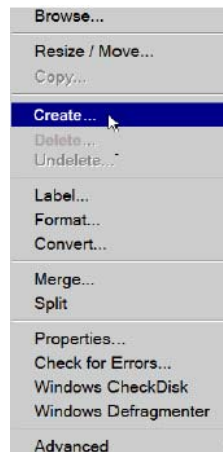


Figure 8-73 Operations Menu

8-4-6 Formatting and Partitioning the Hard Disk - Manual Procedure (cont'd)

- 11) When prompted for confirmation of the deletion, click **OK**.
- 12) Repeat [step 10](#) and [step 11](#) to select and delete each of the remaining partitions in turn, including the partition type *Extended*.

The non-partitioned hard disk will now be shown on the Partition Magic Screen with all disk space listed as *Unallocated* (for example, 19,594.9 MB).
- 13) With *Unallocated* selected (highlighted), create the first partition by selecting the **Create** Tool under the *Operations* menu, as shown below:



- 14) In the dialog box displayed, select the following:
Partition: **Primary Partition**
Partition Type: **NTFS**
- 15) Type the Label as: **SYSTEM**
- 16) Type the size required. This should be at least 3GB (up to 4GB).
- 17) Activate the **Beginning of Unallocated** checkbox.
- 18) When done, click **OK**.

The System partition and allocated space is now listed in the *Partition Magic Screen*.
- 19) With the System partition selected (highlighted), select the **Advanced Tool** under the *Operations* menu.
- 20) In the dialog box displayed, click **Set Active**, then click **OK**.
- 21) When the message "Are you sure you want to change the active partition?" is displayed, click **OK**.
- 22) With **Unallocated** selected in the *Partition Magic Screen*, repeat [step 15](#) and [step 16](#) to create the next partition, using the following:
Partition: **Logical Partition**
Partition Type: **NTFS**
- 23) Type the Label as: **USER**
- 24) Type the size required. This should be at least 5GB (up to 6GB).
- 25) Activate the **Next Unallocated** checkbox.

8-4-6 Formatting and Partitioning the Hard Disk - Manual Procedure (cont'd)

26) When done, click **OK**.

The User partition and allocated space is now listed in the *Partition Magic Screen*.

27) With **Unallocated** selected in the *Partition Magic Screen*, repeat [step 15](#) and [step 16](#) to create the next partition, using the following:

Partition: **Logical Partition**

Partition Type: **NTFS**

28) Type the Label as: **SWAP**

29) Type the size required. This should be 1/2 to 1GB - for example, 1022.6.

30) Activate the **End of Unallocated** check box, then click **OK**.

The Swap partition and allocated space is now listed in the *Partition Magic Screen*.

31) With **Unallocated** selected in the *Partition Magic Screen*, repeat [step 15](#) and [step 16](#) to create the next partition, using the following:

Partition: **Logical Partition**

Partition Type: **NTFS**

32) Type the Label as: **ARCHIVE**

Note: The Archive size will be any remaining space (for example, 14,456.9), therefore *do not type over the value displayed*.

The Archive partition and allocated space is now listed in the *Partition Magic Screen*.

33) Click the **Apply** button at the lower right of the screen.

The Batch progress menu is displayed.

34) When the message "*All operations complete*" is displayed, click **OK**.


35) Click **Exit**.

36.) Proceed to perform the following functionality tests:

- ["Software Configuration Checks" on page 4-28](#)
- ["Calibration Tests" on page 7-15](#)
- ["Full System Test" on page 7-9](#)

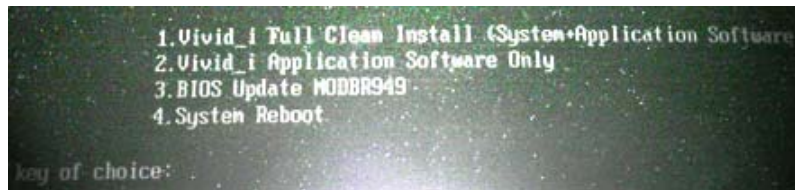
8-4-7 Full Re-ghost and Software Installation

NOTE: During software installation, all peripherals should be removed - including PCMCIA devices (but excluding the DVD\CD-RW drive).

 **NOTICE IMPORTANT** It is recommended to store partition C:\ by using the Rollback tool (described in the "Vivid i nSoftware Roll-back Procedure" on page 8-96) **after** full software installation or upgrade.

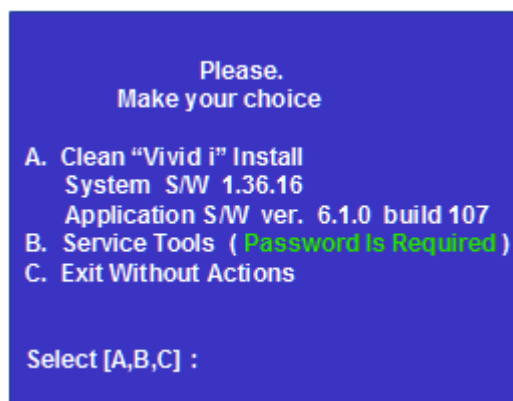
- 1) Connect the DVD\CD-RW to the USB port at the rear of the system.
- 2) Connect power to the DVD\CD-RW drive.
- 3) Place the CD containing the full software version into the DVD\CD-RW drive and close the tray.
- 4) Turn ON the Vivid i n system and allow it to boot-up from the GHOST CD.

The system powers ON and when system boot-up from the CD is complete, the following options are displayed in the DOS screen, prompting you to select the required option:



- 5) If this is first installation, format the hard disk as described in "Formatting and Partitioning the Hard Disk - Automatic Procedure" on page 8-82. When done, proceed to the next step, below.
- 6) Select option: **1: Vivid_i Full Clean Install (System + Application Software)**

A menu will appear prompting for selection of the required option:



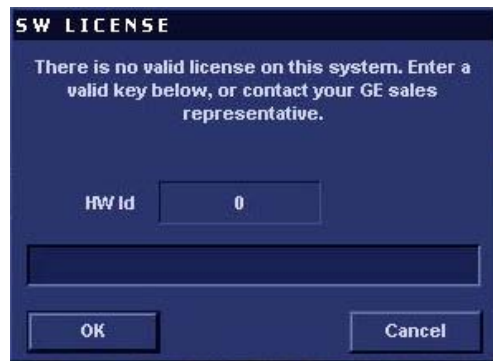
- 7) Select option **A: Install Software**
The system will prompt you to type in the service password.
- 8) Type: **geulsservice** and press <Enter>.
The software ghosting will take approximately 15 minutes.

IMPORTANT: *Do not stop the software installation operation during this process!*

8-4-7 Full Re-ghost and Software Installation (cont'd)

After re-ghosting (requires approximately another 10 minutes), the software installation will be complete. The system will re-start and prompt for the software License Password.


- 9) Type in the password provided for the specific software, and approve by clicking **OK**.



- 10) Restart the system and commence scanning.
- 11.) Proceed to perform the following functionality tests:
- ["Software Configuration Checks" on page 4-28](#)
 - ["Calibration Tests" on page 7-15](#)
 - ["Full System Test" on page 7-9](#)

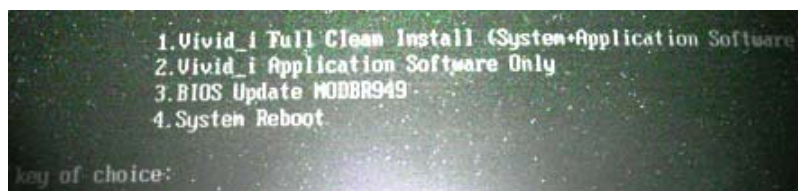
8-4-8 Installing Software only from DVD

NOTE: During software installation, all peripherals should be removed - including PCMCIA devices (but excluding the DVD\CD-RW driver).

 **NOTICE** **IMPORTANT** It is recommended to store partition C:\ by using the Rollback tool (described in the "Vivid i nSoftware Roll-back Procedure" on page 8-96) **after** full software installation or upgrade.

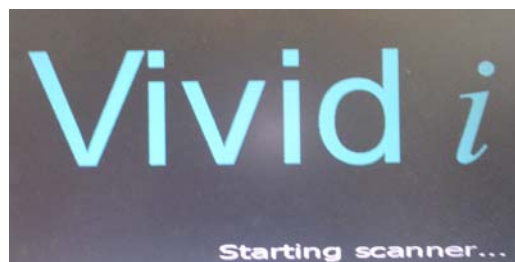
- 1) Connect the DVD\CD-RW to the USB port at the rear of the system.
- 2) Connect power to the DVD\CD-RW drive.
- 3) Place the DVD containing the full software version into the DVD\CD-RW drive and close the tray.
- 4) Turn ON the Vivid i n system and allow it to boot-up from the DVD.

The system powers ON and when system boot-up from the DVD is complete, the following options are displayed in the DOS screen, prompting you to select the required option:



- 5) Press 2 to perform installation of Vivid i n Application Software only from DVD.

The system will continue to boot up and the following screen is displayed.



8-4-8 Installing Software only from DVD (cont'd)

When done, the Start Application screen is displayed, as shown in [Figure 8-74](#).

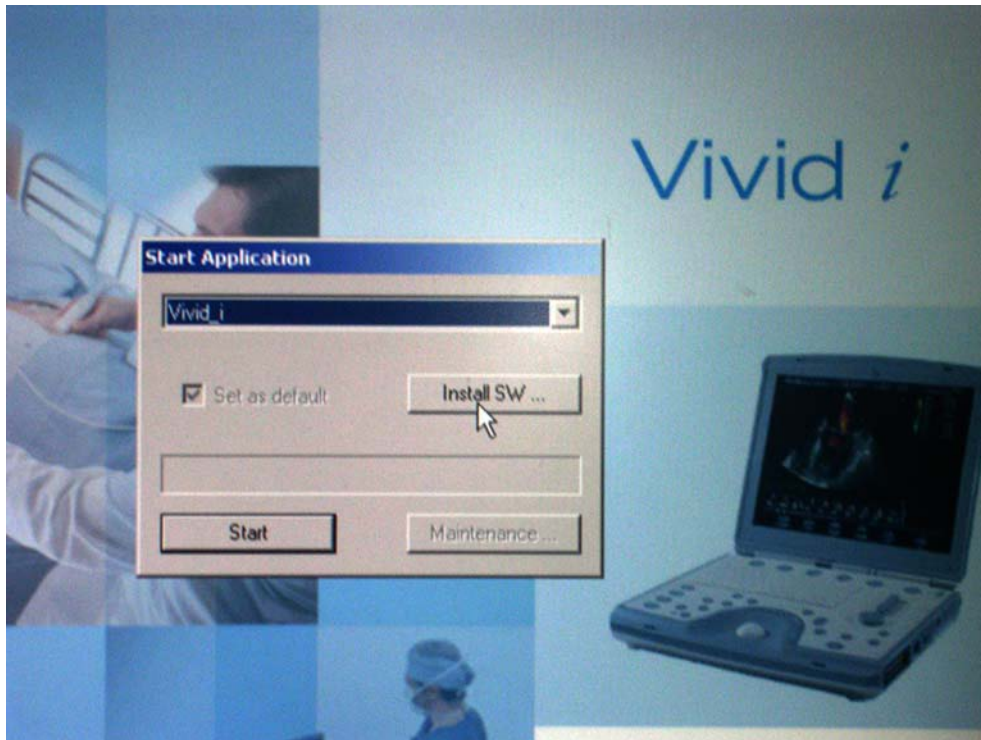


Figure 8-74 Start Application Screen

- 6) Click on **Install Software** and follow the on-screen instructions.
A warning message is displayed, as shown in [Figure 8-75](#).

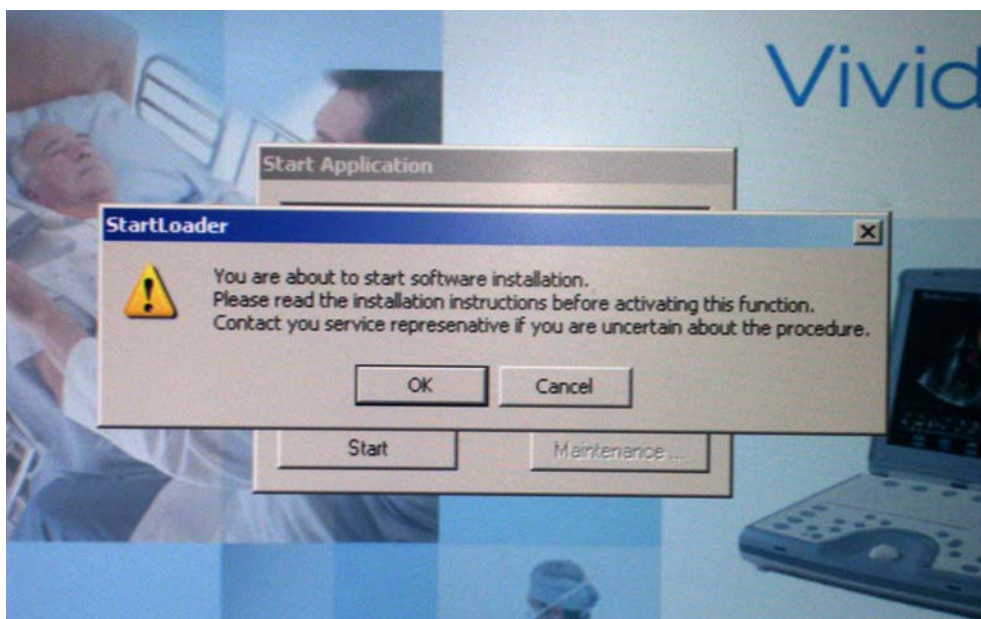
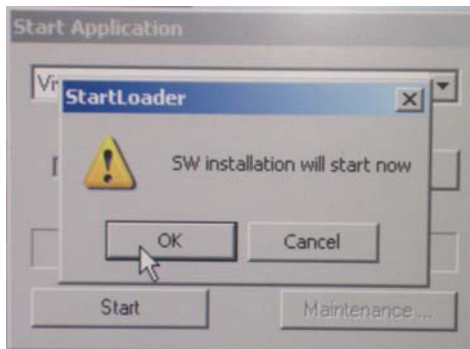


Figure 8-75 Start Software Installation Message

8-4-8 Installing Software only from DVD (cont'd)

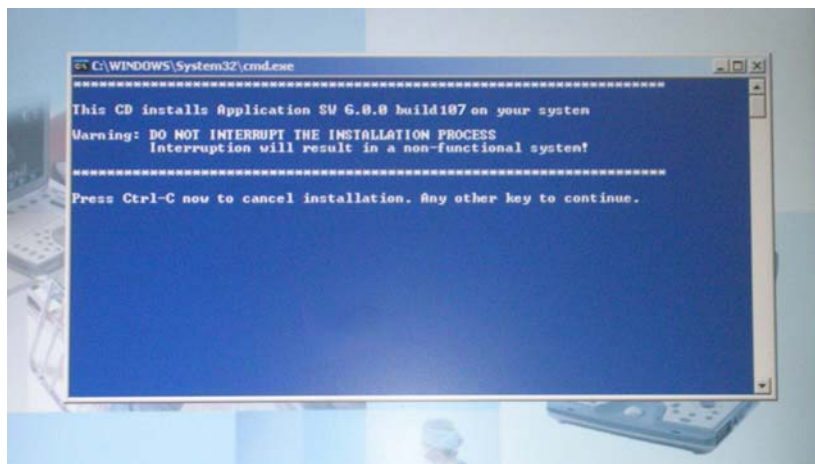
- 7) Click **OK**.

The following message is displayed:



- 8) Click **OK** to continue.

The following warning message is displayed:

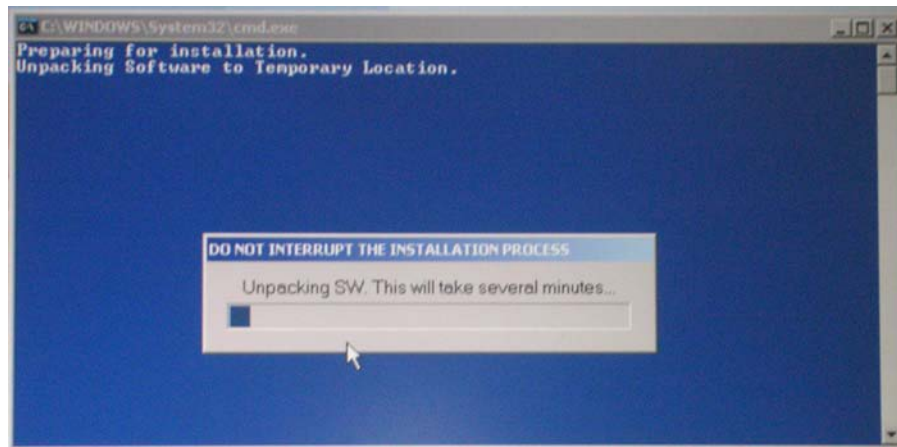


WARNING: DO NOT INTERRUPT THE INSTALLATION PROCESS. Interruption will result in a non-functional system!

8-4-8 Installing Software only from DVD (cont'd)

- 9) Press any key to continue.

Installation commences and the following message is displayed:



When done, the Installation Complete message is displayed:

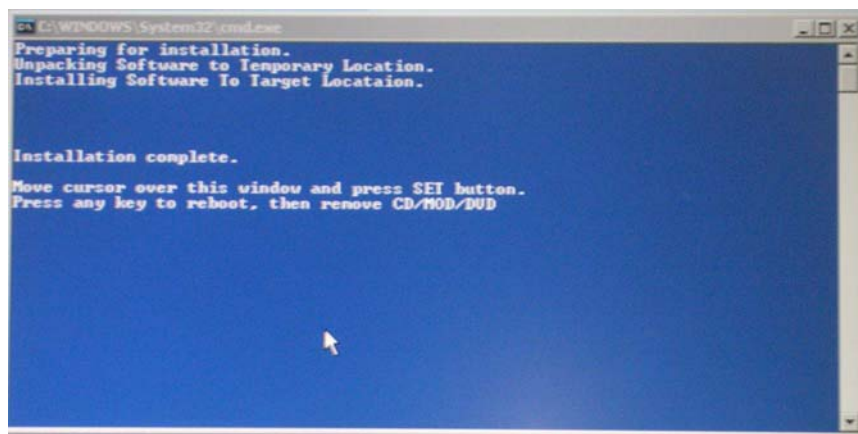


Figure 8-76 Software Installation Complete Message

- 10) Move the cursor over the displayed message window and press the **SET** button.
11.) Press any key to re-boot the system.

The system re-boots into Normal Scanning mode.

8-4-8 Installing Software only from DVD (cont'd)

12.) Press **Config** and then **About**.

The newly-installed software version is now listed under the System Version tab:

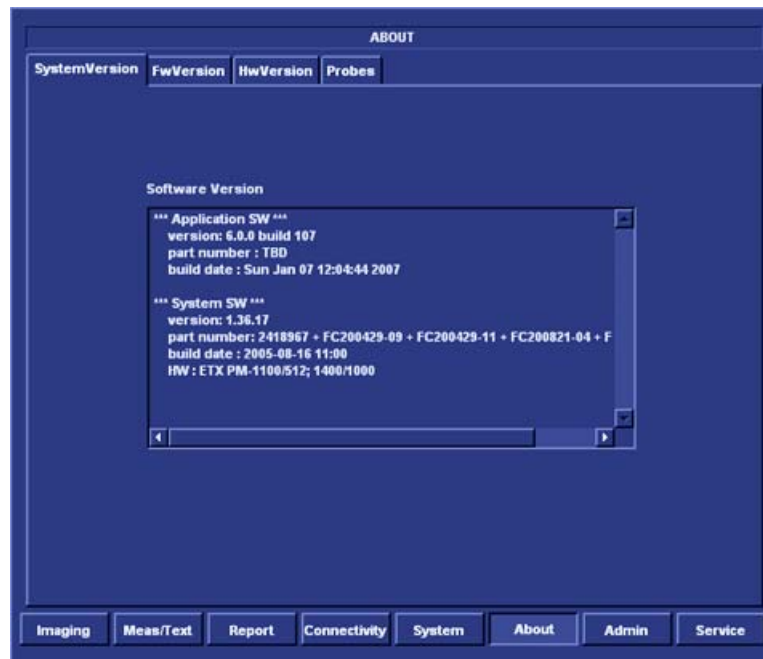


Figure 8-77 Software Version

13.) Remove the DVD from the *DVD\CD-RW* drive and close the tray.

14.) Proceed to perform the following functionality tests:

- "Software Configuration Checks" on page 4-28
- "Calibration Tests" on page 7-15
- "Full System Test" on page 7-9

8-4-9 Installing Software only or Patch



NOTICE IMPORTANT It is recommended to store partition C:\ by using the Rollback tool (described in the "Vivid i nSoftware Roll-back Procedure" on page 8-96) **after** full software installation or upgrade.

- 1) Connect the DVD\CD-RW to the system's USB port.
- 2) Connect the DVD\CD-RW power supply to the mains power.
- 3) Place the *CD with Patch or Software Only* CD into the tray and close.
- 4) Turn ON the system.

During boot-up, system will prompt to install software or continue booting into regular mode.

- 5) Click on **Install Software** and follow the on-screen instructions.
- 6.) When done, the Installation Complete message is displayed (refer to Figure 8-76 on page 8-93).
- 7) Move the cursor over the displayed message window and press the **SET** button.
- 8.) Press any key to re-boot the system.

The system re-boots into Normal Scanning mode.

- 9.) Press **Config** and then **About**.

The newly-installed software version is now listed under the System Version tab (refer to Figure 8-77 on page 8-94).

- 10.) Remove the CD from the DVD\CD-RW drive and close the tray.

- 11.) Proceed to perform the following functionality tests:

- "Software Configuration Checks" on page 4-28
- "Calibration Tests" on page 7-15
- "Full System Test" on page 7-9

8-4-10 Vivid / nSoftware Roll-back Procedure

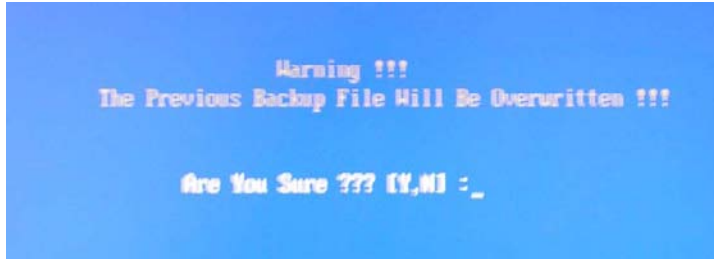
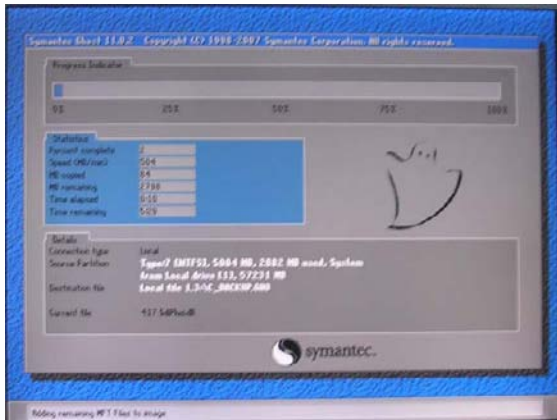

In the event that it is necessary to save and restore the Operating System and Application Software, use the software roll-back (Re-ghost) tool provided, as described in the procedure in Table 8-4.

NOTE: Using the Rollback tool requires the Software Installation CD. Always keep this near the scanner.

Table 8-4 Software Roll-back ProcedureVivid / n 1 of 2

Step	Instruction	Expected Result
1	Eject the battery and remove all peripherals currently connected to the system, with the following exceptions: Make sure no peripherals are connected to the USB connectors except the DVD and the PCMCIA.	
2	Press the <Eject> button of the DVD\CD-RW drive and remove any media if present.	The DVD\CD-RW drive tray ejects.
3	Insert the CD provided with the software kit, and press the <Eject> button again.	The DVD\CD-RW drive tray will load the software CD.
4	Hold down the <ON/OFF> button for 5 seconds to shutdown the system.	The shutdown options are displayed on-screen.
5	Select Full Shutdown .	The system powers down.
6	Hold down the <ON/OFF> button for three seconds.	The system powers ON and when system boot-up from the CD is complete, the following message is displayed prompting you to select the required option: <div data-bbox="858 909 1361 1247" data-label="Text"> <pre> Please, Make your choice A. Clean "Vivid I" Install System S/W 2.0.11 Application S/W ver. 9.0.0 build 36 B. Service Tools (Password Is Required) C. Exit Without Actions Select [A,B,C] :</pre> </div>
7	Select option B. Service Tools .	The user is prompted for a password.
8	When prompted, type the following password: geulsservice and press <Enter>. Note: when typing the password, use lower-case letters.	Wait until the following message is displayed, prompting you to select the required Tools option: <div data-bbox="834 1393 1377 1921" data-label="Text"> <pre> Tools: A. Format Hard Disk BT06 B. Format Hard Disk BT09 C. Write / Read / Check System ID D. PC-Doctor Test Program E. Save Partition "C:\\" To Image F. Restore Partition "C:\\" From Image H. Exit To Main Menu Select [A,B,C,D,E,F,H] : _</pre> </div>

Table 8-4 Software Roll-back ProcedureVivid i n (cont'd) 2 of 2

Step	Instruction	Expected Result
	<p>Select one of the following options, as applicable.</p> <p>E: Save Partition "C:\\" To Image</p> <p>F: Restore Partition "C:\\" From Image</p>	<p>The following Warning is displayed:</p> 
9	To continue, type Y.	<p>A message is displayed showing the current system ID.</p> <p>The CD then begins the software installation process and a progress indicator is displayed, as shown below:</p>  <p>This stage of the process takes approximately 5 mins.</p> <p>A message is then displayed on-screen prompting you to press <CTRL + ALT + DELETE> to reboot the system.</p> 
10	Press <Eject> and remove the CD. Press <CTRL+ALT+DELETE>.	The system re-boots.
11	<p>Proceed to perform the following functionality tests:</p> <ul style="list-style-type: none"> • "Software Configuration Checks" on page 4-28 • "Calibration Tests" on page 7-15 • "Full System Test" on page 7-9 	

Section 8-5

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 *i n*. Ask for removal (delete) of un-necessary patient information, so that the back-up process will require minimal time.

Remind customers that GE Healthcare 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.

8-5-1 Database Merge

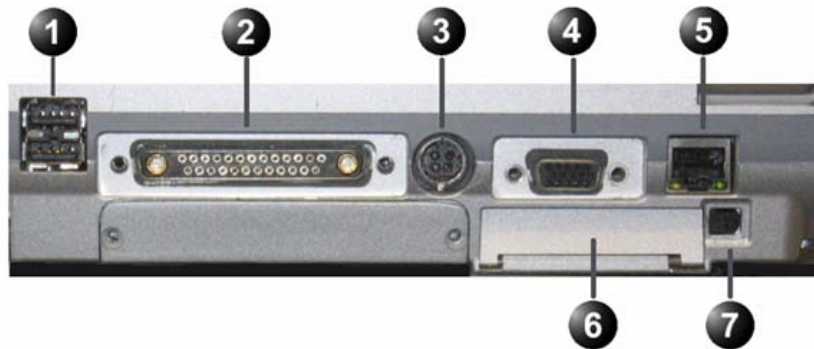
The Database Merge process can be implemented by using the Import/Export functions of the Vivid *i n* system. For details, refer to the Vivid *i n*.

8-5-2 How to Restore User-defined Presets

For details, refer to [4-2-9 "Archiving and Loading Presets" on page 4-14](#).

Section 8-6 Peripherals

NOTE: This section provides references to the installation procedures for the various peripherals used with the Vivid i n. Connection to the system is via one of the USB ports (unless otherwise stated) on the rear panel, as shown in [Figure 8-78](#) below.



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

Figure 8-78 Vivid i n Rear Panel

8-6-1 Connecting and Removing Peripherals

For detailed instructions on connecting peripherals to the Vivid / n, refer to the following procedure, as appropriate.

- ["USB Global Modem" on page 3-19](#)
- ["Wireless Network Adaptor" on page 3-20](#)
- ["DVD/CD-RW Drive" on page 3-21](#)
- ["MOD Drive" on page 3-26](#)
- ["USB Memory Stick" on page 3-27](#)
- ["Connecting the Black & White Printer" on page 3-28](#)
- ["Connecting the Digital Color Printer" on page 3-29](#)
- ["Connecting the DeskJet Color Printer" on page 3-31](#)
- ["Connecting the VCR" on page 3-33](#)

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

- ["Chassis Current Leakage Test" on page 10-25](#)

Section 8-7

Modo Cart Components Replacement

8-7-1 Replace the Probe Holders

8-7-1-1 Manpower

One person, 5 minutes

8-7-1-2 Tools

None

8-7-1-3 Preparations

None

8-7-1-4 Replacing Probe Holders

- Remove the Probe Holder.



Figure 8-79 Remove the Probe Holder

8-7-1-5 Installing Probe Holders

- 1.) Place the new Probe Holder.
- 2.) No test required after this replacement.

8-7-2 Replace the Cable Clips

8-7-2-1 Manpower

One person, 5 minutes

8-7-2-2 Tools

None

8-7-2-3 Preparations

None

8-7-2-4 Removing the Cable Clips

- 1.) Pinch together the Cable Clips.



Figure 8-80 Pinch together the Cable Clips

- 2.) Remove the Cable Clips.

8-7-2-5 Installing the Cable Clips

- 1.) Pinch together the Cable Clips and install it.
- 2.) Install the Cable Clips.
- 3.) No test required after this replacement.

8-7-3 Fuses Replacement

8-7-3-1 Manpower

One person, 10 minutes

8-7-3-2 Tools

Phillips screwdriver 1 and 2

8-7-3-3 Preparations

1.) Power Off/Shutdown the system as described in [4-2-3 "Power Shut Down"](#) on page 4-7.

8-7-3-4 Fuses - Removal Procedure

1.) Open the fuse protection on the rear of the isolation transformer.



Figure 8-81 Open fuse protection on rear of transformer

2.) Pull out the fuse holder and remove the 2 fuses.

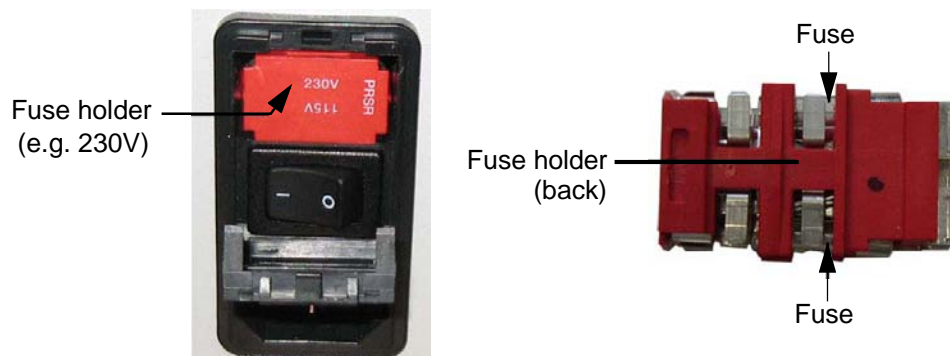


Figure 8-82 Change fuses of isolation transformer

8-7-3-5 Fuses - Installation Procedure

- 1.) Insert 2 new Fuses.
- 2.) Push the fuse holder back into position (correct voltage should be shown in upper line e.g, 230V, see: [Figure 8-82](#), above) and then close protection.
- 3.) Reconnect the mains power cable.
- 4.) Switch on the system, refer: ["Power ON/Boot-up" on page 4-3](#).
- 5.) Do a System Test, refer: ["Full System Test" on page 7-9](#)
- 6.) Switch off the system, refer: ["Power Shut Down" on page 4-7](#)

8-7-4 Replace the Isolation Transformer

8-7-4-1 Manpower

Two persons, 20 minutes

8-7-4-2 Tools

Phillips screwdriver 1 and 2

8-7-4-3 Preparations

- 1.) Power Off/Shutdown the system as described in [4-2-3 "Power Shut Down"](#) on page 4-7.
- 2.) Put away all Peripherals Cables.
- 3.) Disconnect all external USB-devices (e.g., USB printer).
- 4.) With one person one each side of the Modo Cart, hold on to the top and the bottom of the Modo Cart and turn it upside down on a soft ground (e.g. soft foam plastic).

8-7-4-4 Removing the Isolation Transformer

- 1.) Unscrew the screws that fasten the isolation transformer.



Figure 8-83 Remove screws

- 2.) Screw off and disconnect the Ground Cable.

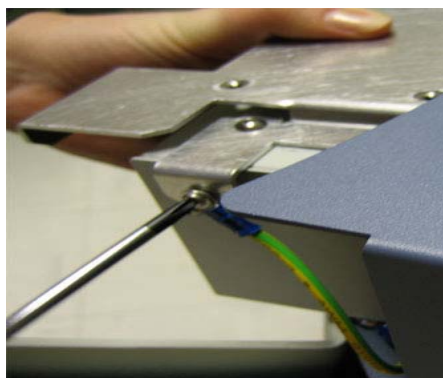


Figure 8-84 Disconnect the Ground Cable

- 3.) Using both hands, carefully remove the Isolation Transformer.

8-7-4-5 Installing the Isolation Transformer

- 1.) Place the new Isolation Transformer and fasten it with the 3 screws.
- 2.) Reconnect the Ground Cable, as shown in [Figure 8-84 on page 8-105](#).
- 3.) With one person on each side turn the Modo Cart upright.
- 4.) Mount and reconnect all peripherals.
- 5.) ["Power ON/Boot-up" on page 4-3](#)
- 6.) ["Full System Test" on page 7-9](#)
- 7.) ["Grounding Continuity \(Systems with Modo Cart only\)" on page 10-23](#)
- 8.) ["Chassis Current Leakage Test" on page 10-25](#)

8-7-5 Replace the Wheels

8-7-5-1 Manpower

Two persons, 20 minutes

8-7-5-2 Tools

Flat wrench 19 mm

8-7-5-3 Preparations

- 1.) Power Off/Shutdown the system as described in [4-2-3 "Power Shut Down" on page 4-7](#).
- 2.) Put away all Peripherals Cables.
- 3.) Disconnect all external USB-devices (e.g., USB printer).
- 4.) With one person one each side of the Modo Cart, hold on to the top and the bottom of the Modo Cart and turn it upside down on a soft ground (e.g. soft foam plastic).

8-7-5-4 Removing the Wheels

- 1.) Screw off the Wheels.
- 2.) Remove the Wheels.

8-7-5-5 Installing the Wheels

- 1.) Place the new Wheel and fasten it.
- 2.) With one person one each side turn the Modo Cart upright.
- 3.) Perform: FRU 8-33-5: Replacement of the Wheels

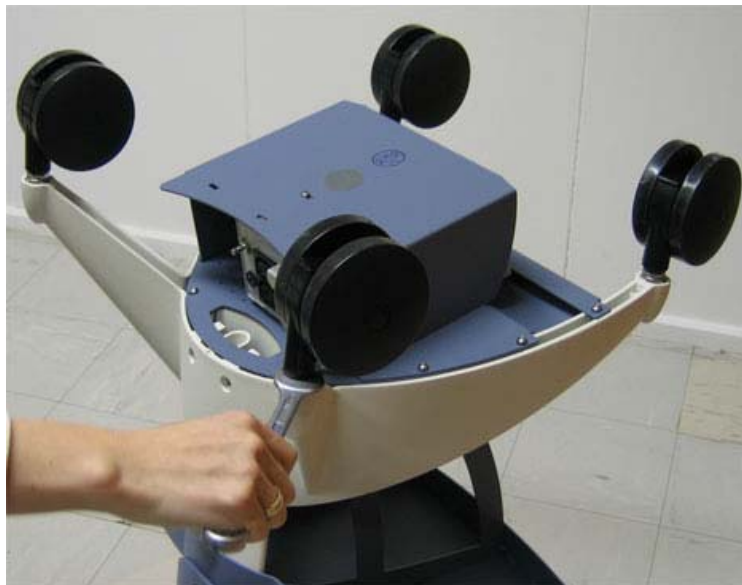


Figure 8-85 Screw off the Wheels



NOTICE Do not lose the washers.

8-7-5-6 Installing the Wheels

- 1.) Place the new Wheel and fasten it.
- 2.) With one person one each side turn the Modo Cart upright.
- 3.) No test required after this replacement.

Chapter 9

Renewal Parts

Section 9-1 Overview

9-1-1 Purpose of Chapter 9

This chapter gives you an overview of replacement parts for the Vivid *i* 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
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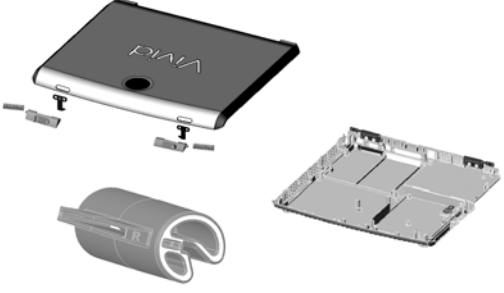
Section 9-2

List of Abbreviations

- | | |
|----------------|---|
| • Assy | - Assembly |
| • BEP | - Back End Processor |
| • Ctrl | - Control |
| • FEP | - Front End Processor |
| • FRU 1 | - Replacement part available in parts hub |
| • FRU 2 | - Replacement part available from the manufacturer (lead time involved) |
| • LCD | - Liquid Crystal Display |
| • Int | - Internal |
| • I/O | - Input/Output |
| • PWA | - Printed Wire Assembly |
| • Recv | - Receive |
| • XFRMR | - 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-I BT09	S2423359	BT'09	1	Y
2.	KEYCAP KIT VIVID-I BT06	2410799	BT'06	1	Y
3.	HINGES concealed 45 MM 52 MM	2381805-2	BT'06 and BT'09	1	Y
4.	Rubber inserts kit	2410804	BT'06 and BT'09	1	Y
5.	Screw Kit	FL200035	BT'06 and BT'09	1	Y
6.	Internal Battery Pack	2378963-2	BT'06. Replaces FL200027 and FL200068	1	Y
7.	Internal Battery Pack (Black)	S2423267	BT'09	1	Y
8.	VI COVER KIT - BT'09	S2423361		1	Y
9.	VIVID I SERVICE - COVER KIT - BT'06	2412825-3		1	Y

Section 9-4 Electronic Parts

Table 9-3 Electronic parts 1 of 2




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Vi Operator Panel w/o ECG (Keyboard Assy) - BT'09	S2423357		1	Y
2.	RoHS Keyboard Assy.Vivid I - BT'06	R2409723		1	Y
3.	Trackball (without bracket)	2405164-2	BT'06 	1	Y
4.	Trackball	S2423360	BT'09	1	Y
5.	Backend assy	R2380485	BT'06 and BT'09	1	Y
6.	DC/DC MODULE (DC Power Supply (LV and HV))	S2403248-4	BT'09. Replaces FL200056 and FL200074 	1	Y
7.	DC/DC MODULE (DC Power Supply (LV and HV))	2416397-2	BT'06 and BT'09	1	Y
8.	AC adaptor wo cable	S2422706	BT'06 and BT'09 	1	Y

Table 9-3 Electronic parts (cont'd) 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
9.	Hard Disk Module	2376515-2	BT'06 and BT'09 Excludes software 	1	Y
10.	LCD Panel Kit	S2420027	BT'06 and BT'09 	1	Y
11.	Hard Disk Duplication Jig	2414958-2	BT'06 and BT'09	1	Y

Section 9-5 Cables

Table 9-4 Cables Vivid i n

Item	Part Name	Part Number	Description	Qty	FRU
1.	Cable: LAN Isolation Box & Cable Kit	2409727	<p>BT'06 and BT'09</p> 	1	1
2.	Cable: ECG Cable - Europe	2418832-2	<p>BT'06 and BT'09 Replaces FL200039 (</p> 	1	1
3.	Cable: External ECG	2413451	<p>BT'06 and BT'09 Replaces FL200054</p> 	1	1
4.	Cable: Vi Power CableContinental Europe 2.5A/250V	2412094-2	BT'06 and BT'09	1	1

Section 9-6 Software

Table 9-5 Software

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Service Software Kit - BT'09	FL200112	Software for Vivid <i>i n</i> - BT'09	1	Y
2.	Service Software Kit - BT'06	FL200075	Software for Vivid <i>i n</i> - BT'06	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	BT'06 and BT'09	1	Y
2.	Probe: 4C - RS	5131629	BT'06 and BT'09	1	Y
3.	Probe: 8C - RS	2354971	BT'06 and BT'09	1	Y
4.	Probe: E8C-RS PROBE TYPE (EXP)	2290777	BT'06 and BT'09	1	Y
5.	Probe: 8L RS	2376127 H40402LT	BT'06 and BT'09	1	Y
6.	Probe: 12L - RS	5154514	BT'06 and BT'09	1	Y
7.	Probe: 3S- RS	2355686 H4000PD	BT'06 and BT'09	1	Y
8.	Probe: 5S - RS	5135960	BT'06 and BT'09	1	Y
9.	Probe: 6S- RS	5198571 H45021RP	BT'09	1	Y
10.	Probe: 7S - RS	2377059 H4000PE	BT'06 and BT'09	1	Y
11.	Probe: 10S - RS	2377040 H4000PF	BT'06 and BT'09	1	Y
12.	Probe: 6T - RS	KN100093 H45531MZ	BT'06 and BT'09 Must have TEE Probe Interface Module (H45021D)	1	Y
13.	Probe: 6Tc - RS	KN100103 H45551ZE	BT'09	1	Y
14.	Probe: 9T - RS	KN100073 H45531YM	BT'06 and BT'09 Must have TEE Probe Interface Module (H45021D)	1	Y
15.	Probe:P2D - RS	2411689 H45021C	BT'06 and BT'09	1	Y
16.	Probe: P6D - RS	2411690 H45021CA	BT'06 and BT'09	1	Y
17.	TEE Probe Adaptor for 6T-RS/9T-RS	FD200127 H45021KP	BT'06 and BT'09	1	Y
18.	Probe: Chain Test Jig	2404597	BT'06 and BT'09	1	Y
19.	Pencil Probe: Jig	2414484	BT'06 and BT'09	1	Y
20.	Probe Holder	S2418520	BT'06 and BT'09	1	Y
21.	3S-RS and M4S-RS Biopsy Kit	E8385MZ	BT'06 and BT'09	1	Y
22.	4C-RS Biopsy Kit	E8385NA	BT'06 and BT'09	1	Y
23.	8L-RS Biopsy Kit	E8385N	BT'06 and BT'09	1	Y
24.	12L-RS Biopsy Kit	H40432LC	BT'06 and BT'09	1	Y
25.	TEE WALL Rack	H45001B	BT'06 and BT'09	1	Y

Table 9-6 Probes(cont'd) 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
26.	Bite Hole Indicator	H45531HS	BT'06 and BT'09	1	Y
27.	TEE Clip-On Bite Guard Adult	H45511EE	BT'06 and BT'09	1	Y
28.	TEE Clip-On Bite Guard Adult OR	H45521CB	BT'06 and BT'09	1	Y
29.	TEE Conventional Bite Guard Pediatric	H45521JG	BT'06 and BT'09	1	Y
30.	TEE Conventional Bite Guard Adult	H45521JH	BT'06 and BT'09	1	Y
31.	Adult TEE Scanhead Protection Cover	H45521CK	BT'06 and BT'09	1	Y
32.	Pediatric TEE Scanhead Protection Cover	H45541RN	BT'06 and BT'09	1	Y


Section 9-8 Peripherals

Table 9-7 Approved Peripherals Vivid / n

Item	Part Name	Part Number	Description	Qty	FRU
1.	Wireless Network Interface - Europe	2417389-2	BT'06 and BT'09	1	Y
2.	PRINTER SONY UP-D897SYN USB2.0 BW	066E0111	BT'06 and BT'09	1	Y
3.	Digital Color Video Printer (Sony UP-D23MD)	H45531XB 066E2958	BT'06 and BT'09	1	Y
4.	HP OfficeJet Pro K5400 Kit	EQ100158	BT'06 and BT'09	1	Y
5.	VCR Mitsubishi HS-MD30000E PAL S-VHS	066E9513	BT'06 and BT'09	1	Y
6.	Video Scan Converter	H45531XE 2412280	BT'06 and BT'09	1	Y
7.	Modem USB	5114058	BT'06 and BT'09	1	Y
8.	USB Flash Card (1GB)	R2422220	BT'06 and BT'09	1	Y
9.	USB Flash Card (512MB)	H45531XG 2411544	BT'06 and BT'09	1	Y
10.	NetGear PCIMCIA Network Card	2417006	BT'06 and BT'09	1	Y
11.	VGA adaptor	2420728	BT'06 and BT'09	1	Y
12.	DVD-RW Samsung T084M/RSBN	S2423870	BT'06 and BT'09 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. Note: Only CD-R or DVD-R media should be used	1	Y
13.	Cable Kit for Samsung DVD T084M/ RSBN	S2423956	To be used with S2423870	1	Y
14.	MO Drive 9.1GB 5.25" Ext	H45021GB 066E0677	BT'06 and BT'09	1	Y
15.	USB-to-SCSI converter	2422175	BT'06 and BT'09 Replaces 2411889	1	Y

Section 9-9 Optional Modo Cart

Table 9-8 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 9-10 Vivid i n Spare Part Kits

Table 9-9 Spare part kits 1 of 3





ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Spare Part Kit 1 Sparepart Kit 1 Vivid i n BT09	FL200114	BT'09 This kit includes: • Back-end Assy - FL200055  • TR32 Board - FL200069 	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: • Back-end Assy - FL200055  • RFI Board - FL200061 	1	Y
3.	Spare Part Kit 2	FL200088	BT'06		

Table 9-9 Spare part kits (cont'd) 2 of 3



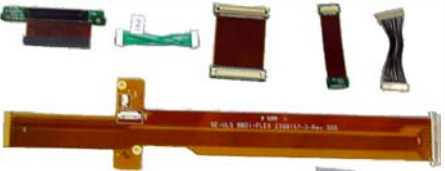



ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
4.	Spare Part Kit 3	FL200111	<p>This kit includes:</p> <ul style="list-style-type: none"> Keyboard assy - FL200059  <ul style="list-style-type: none"> Fans and Speakers Kit - FL200040  <ul style="list-style-type: none"> Cable and Flex kit - FL200037  <ul style="list-style-type: none"> ECG Module Assy , w/Cables - FL200036 	1	Y
5.	Spare Part Kit 3	FL200089	BT'06		
6.	Spare Part Kit 4	FL200116	<p>BT'09</p> <p>This kit includes:</p> <ul style="list-style-type: none"> Back-end Assy - FL200055  <ul style="list-style-type: none"> Probe & Mux Assy - FL200033 	1	Y
7.	Spare Part Kit 4	FL200091	BT'06	1	Y

Table 9-9 Spare part kits (cont'd) 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	Spare Part Kit 5	FL200095-6	BT'09 This kit includes: • Doc CD - FL200117 • SW DVD - FL200112	1	Y
9.	Spare Part Kit 5	FL200095-5	BT'06 This kit includes: • Doc CD - FL200028 • SW CD - FL200103 SW ver. 1.36.19, Appl. SW 6.1.0. build 122 • FL200107 Application SW Patch for Vivid i n	1	Y
10.	VI COVER KIT-BT09	S2423361	BT'09	1	Y
11.	COVER KIT BT06	2412825-3	BT'06	1	Y

Section 9-11 Product Manuals

Table 9-10 Product Manuals - BT'09

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Vivid <i>i</i> n Service Manual	FL091021	This Manual	1	N
2.	Vivid <i>i</i> n Unpack Pack Procedure	FL094023		1	N
3.	BT09 Vivid <i>i</i> n User manual - English	FL092107		1	N
4.	BT09 Vivid <i>i</i> n User manual - French	FL092109		1	N
5.	BT09 Vivid <i>i</i> n User manual - Turkish	FL092118		1	N
6.	BT06 Vivid <i>i</i> n Reference manual - English	FL092108		1	N
7.	Vivid <i>i</i> n Cart User manual - EN FR	FL092096		1	N

Table 9-11 Product Manuals - BT'06

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Vivid <i>i</i> n Service Manual	FL091021	This Manual	1	N
2.	Vivid <i>i</i> n Unpack Pack Procedure	FL094023		1	N
3.	BT06 Vivid <i>i</i> n User manual - English	FL092083		1	N
4.	BT06 Vivid <i>i</i> n User manual - French	FL092084		1	N
5.	BT06 Vivid <i>i</i> n Reference manual - English	FL092094		1	N
6.	Vivid <i>i</i> n Cart User manual - EN FR	FL092096		1	N

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Chapter 10

Care and Maintenance

Section 10-1 Overview

10-1-1 Periodic Maintenance Inspections

Having been determined by GE Healthcare engineers that your Vivid *i 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 *i 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 *i 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

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10-3	Maintenance Task Schedule	10-4
10-4	Tools Required	10-6
10-5	System Maintenance	10-8
10-6	Probe Maintenance	10-15
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10-8	Excessive Current Leakage	10-33
10-9	Vivid <i>i n</i> Inspection Certificates	10-34

10-1-3 Warnings



DANGER: There are several places on the backplane, the AC distribution box, and the DC distribution box that could be dangerous. Be sure to disconnect the system power plug and to open the main circuit breaker before you remove any parts. Proceed with caution whenever power is ON and covers are removed.



DANGER: Do not pull out or insert circuit boards while mains power to the system is ON.



CAUTION: Practice good ESD prevention. Wear an anti-static strap when handling electronic parts and when disconnecting/connecting cables.



CAUTION: Do NOT operate 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.

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 [Vivid i n Inspection Certificates](#) (see [page 10 - 34](#)) provide the customer with documented confirmation that the Vivid i n is maintained on a periodic basis.

Copies of the [Vivid i n Inspection Certificates](#) should be kept in the same room as the Vivid i 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 Healthcare 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 Healthcare 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 10-4](#)) specifies how often the Vivid i 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 i n ultrasound scanner as scheduled in order to retain the high levels of safety, dependability, and system performance.*

Your GE Healthcare Service Representative has an in-depth knowledge of your Vivid i n ultrasound scanning system and can best provide competent, efficient service. Please contact us for details of your nearest GE Healthcare 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 i 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 1 of 2

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.

Table 10-2 Customer Care & Maintenance Task Schedule (cont'd) 2 of 2

Service at Indicated Time	Daily	Weekly	Monthly	Annually	Notes
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.



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 Tools Required

10-4-1 Special Tools, Supplies and Equipment

10-4-1-1 Specific Requirements for Care & Maintenance

Table 10-3 Overview of Requirements for Care & Maintenance Vivid / n 1 of 2

Tool	Part Number	Comments
Digital Volt Meter (DVM)		
Anti Static Kit	46-194427P231 46-194427P279 46-194427P369 46-194427P373 46-194427P370	Kit includes: anti-static mat, wrist strap and cables for 220 to 240 V system 3M #2204 Large adjustable wrist strap 3M #2214 Small adjustable wrist strap 3M #3051 conductive Ground cord
Anti Static Vacuum Cleaner	46-194427P278 46-194427P279	120V 230V
Safety Analyzer	46-285652G1	DALE 600 KIT (or equivalent) for electrical tests
SVHS VCR Cassette	E7010GG E7010GF	60 minutes 120 minutes
SVHS VCR Head Cleaner		See VCR user manual for requirements
3.5 MOD MEDIA	E8381AA E8381AB	Blank 128 M disk Blank 230 M disk
5.25" MOD MEDIA	2277190	Blank 2.3 M disk Blank 5.2 M disk
5.25" MOD Disk Cleaning Kit (Vingmed)	066E0674	Sony MOA-D51
3.5 MOD Media Cleaner	2117811	Cleans the diskettes
5.25 MOD Media Cleaner		Cleans the diskettes
3.5 MOD Head Cleaner Kit	2148392	Cleans the drive heads
5.25 MOD Head Cleaner Kit		Cleans the drive heads
Loctite 242	850752P405	Loctite adhesive
B/W Printer Cleaning Sheet		See printer user manual for requirements
Color Printer Cleaning Sheet		See printer user manual for requirements
Disposable Gloves		

Table 10-3 Overview of Requirements for Care & Maintenance Vivid / n (cont'd) 2 of 2

Tool	Part Number	Comments
System Service Code		Required in order to enter system diagnostics
User Manual	See: Section 9-11 "Product Manuals" on page 9-15	
Service Manual	FL091021	

Section 10-5 System Maintenance

10-5-1 Preliminary Checks

The preliminary checks take approximately 15 minutes to perform. Refer to the Vivid / n whenever necessary.

Table 10-4 System Preliminary Checks

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Fill in the appropriate details at the top of the Vivid i n System Inspection Certificate (see page 10-34). 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.

10-5-2 Functional Checks

The functional checks take approximately 60 minutes to perform. Refer to the Vivid *i n* whenever necessary.

NOTE: Refer also to [Chapter 4-General Procedures and Functional Checks](#), for additional details about the functional checks described in this section.

10-5-2-1 System Checks

Table 10-5 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 ^a	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.
6	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
7	System Diagnostics	Perform the Automatic Test to verify that all boards are functioning according to specifications.
8	Xmit/Recv Elements	Use the Visual Channel Utility on the 10L probe to verify that all system xmit/recv channels are functional.
9	Keyboard Test	Perform the Keyboard Test Procedure to verify that all keyboard controls are OK.
10	LCD Display	Verify basic LCD display functions. Refer to Chapter 3 of the Vivid <i>i n</i> .
11	Measurements	Scan with the system and verify normal operation and picture quality.

a. Some software may be considered as standard, depending upon system model configuration

10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to the Vivid *i* n for a list of approved peripherals/options.

Table 10-6 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)
6	ECG	Verify basic operation with customer.
7	DVD-CDRW	Verify that the DVD-CDRW is functioning properly.
8	MOD	Verify that the MOD is functioning properly.

10-5-3 Input Power Checks

10-5-3-1 Mains Cable Inspection

Table 10-7 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.

10-5-4 Cleaning

10-5-4-1 General Cleaning

Frequent and diligent cleaning of the Vivid / 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 recommended in the procedures described in [Table 10-8 on page 10-12](#).
- Do not use any solutions or products not listed in the Vivid / n.
- Do not spray any liquid directly onto the Vivid / 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 10-8 Vivid / 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. (Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline). Squeeze excess liquid from the cloth/sponge, then wipe down the top, front, back and both sides of the unit. Do not spray any liquid directly onto the unit!</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, dry cloth. If the stain remains, moisten a soft, lint-free cloth with water or a 50-50 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. Do not let any liquid drip into the computer!</p> <p>Be sure to dry the LCD Display before closing the cover.</p>
3	Control Panel and Keyboard	<p>Control Panel:</p> <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 or general purpose disinfectant. (Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline). Squeeze excess liquid from the cloth/sponge, then wipe down the Control Panel. Do not spray any liquid directly onto the Control Panel!</p> <p>Rinse the cloth/sponge with clean running water and wipe the Control Panel again.</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>Keyboard:</p> <p>Clean the keyboard as described (above) for cleaning the Control Panel.</p> <p>Note: In the event that disinfection is required or any stubborn stains remain, absorb a small quantity of isopropyl rubbing alcohol on a soft, dust-free cloth.</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.

10-5-5 Physical Inspection

Table 10-9 Physical Checks Vivid i n

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 Table 10-8 on page 10-12 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 Table 10-8 on page 10-12 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 3-53.
5	Control Panel and Keyboard	Clean the Control Panel and Keyboard as described in Table 10-8 on page 10-12 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 Table 10-8 on page 10-12 . Inspect the Probe Holders for cracks or damage.
7	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.
8	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.
9	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.
10	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.
11	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.
12	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.
13	External I/O	Check all connectors for damage and verify that the labeling is good.
14	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. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal, as listed in "Vivid i n Battery Safety" on page 1-13.

10-5-6 Optional Diagnostic Checks

To complete the periodic maintenance checks, perform the diagnostic tests as described in [Chapter 7 - 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.

Section 10-6 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 *i* N 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.

10-6-1 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.

10-6-2 Probe Handling

All Vivid *i* 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 wheels of the system.
- Protect the probe when moving the unit.
- Use a soft cloth and warm, soapy water to clean the probe.

Note: For detailed information on handling endocavity probes, refer to the appropriate supplementary instructions for each probe.

10-6-3 Basic Probe Care

The Vivid *i n* 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.



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 *i n* 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.

10-6-4 Probe Cleaning

10-6-4-1 Basic Probe Cleaning

NOTE: *For details on general probe cleaning, refer to the information provided in the Vivid *i n*.*

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 *i n*. Doing so could result in irreparable damage to the probe and/or Vivid *i 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.

10-6-4-2 General Probe Cleaning Instructions



WARNING *Do not clean or immerse probes using any of the following products:*

- Acetone
- Ammonium chloride
- Alcohol, ethanol, isopropanol, or methanol
- Bleach
- Detergent
- Hydrogen peroxide
- Iodine
- Para-hydroxybenzoic acid
- Aloe vera, perfume, lanolin, or mineral oil

Do not soak or wipe the probe lens with any product listed above (see Warning). Doing so could result in irreparable damage to the probe. Follow the care instructions supplied with each probe. In order to disinfect or sterilize probes without damaging them:

- Use gas sterilization and legally marked, sterile, pyrogen-free probe sheaths on probes used for surgery.
- Use cold chemical sterilization suitable for plastic medical scanning devices.
- Do not immerse a probe beyond the ridge on its case.
- Avoid cleaning and storage temperatures over 60°C (140°F).



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.

10-6-4-2-1 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.

10-6-4-2-2 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.

10-6-5 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.

GEHC policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEHC 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 10-7 Electrical Safety Tests

10-7-1 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: 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.

Important: When the 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 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

10-7-2 GEHC Current Leakage Limits

The following limits are summarized for NFPA 99 (for USA) and IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

Table 10-13 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 ^a
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 ^a
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.

10-7-3 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.

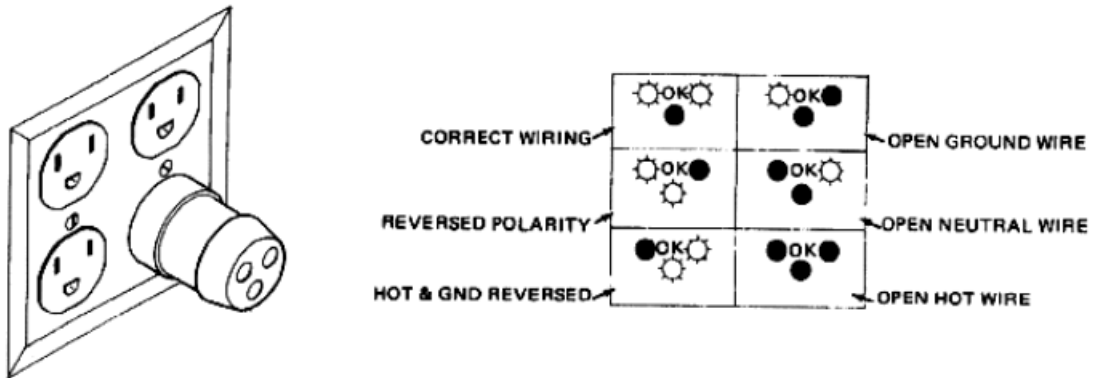


Figure 10-1 Typical Outlet Tester

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.

10-7-4 Grounding Continuity (Systems with Modo Cart only)



CAUTION Electric Shock Hazard!

The patient or operator **MUST NOT** come into contact with equipment during this test.

NOTE: This test is not valid for stand-alone Voluson® i / Voluson® e systems and is only applicable when the Vivid i n portable ultrasound system is mounted on the Modo Cart.

Measure the resistance from the third pin of the attachment plug to exposed metal parts on the Modo Cart.

The ground wire resistance should be less than 0.2 ohms.

Reference the procedure in the IEC 60601-1-1.



Figure 10-2 Ground Continuity Test



CAUTION Lacquer is an isolation barrier! Resistor may be high-impedance!

Measure only on unpainted parts, stated in [Figure 10-2](#), above, above.

10-7-4-1 Meter Procedure

- 1.) Follow these steps to test the ground wire resistance.
- 2.) Turn the Vivid i n unit OFF.
- 3.) Plug the unit into the meter, and the meter into the tested AC wall outlet.
- 4.) Plug the black chassis cable into the meter's "CHASSIS" connector and attach the black chassis cable clamp to an exposed metal part of the Vivid i n unit.
- 5.) Set the meter's "FUNCTION" switch to the RESISTANCE position.
- 6.) Set the meter's "POLARITY" switch to the OFF (center) position.
- 7.) Measure and record the Ground wire resistance.
This should be less than 0.2 Ohms.

10-7-4-2 Dale 600 - Ground Continuity (Systems with Modo Cart)

NOTE: This test is not valid for stand-alone Vivid i n systems and is only applicable when the Vivid i n is mounted on the Modo Cart.

The Dale 600 measures line cord resistance from the third pin of the attachment plug to the meter's Chassis Cable clamp. Test the grounding continuity of the Modo Cart to all exposed metal parts in accordance with the IEC 60601-1-1 procedure as above. Refer to the Dale 600 Instruction Manual for meter self tests and operation. Record measured resistance of the grounding continuity. The ground wire resistance should be less than 0.2 ohm (Use any safety analyzer.)

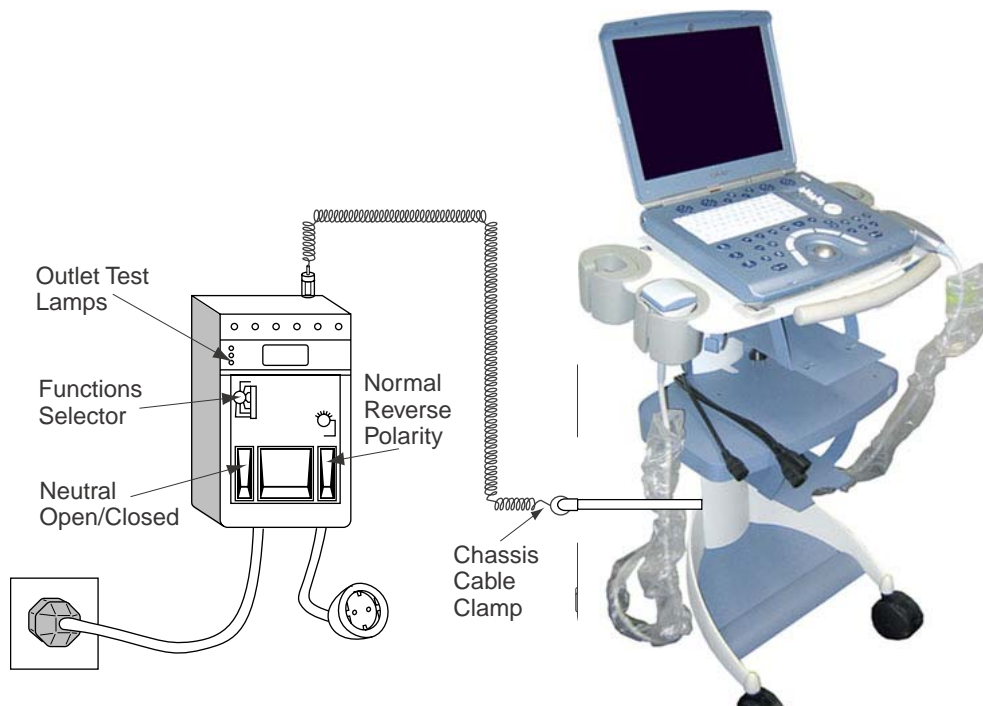


Figure 10-3 Dale 600 Ground Continuity Test

10-7-5 Chassis Current Leakage Test

10-7-5-1 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!

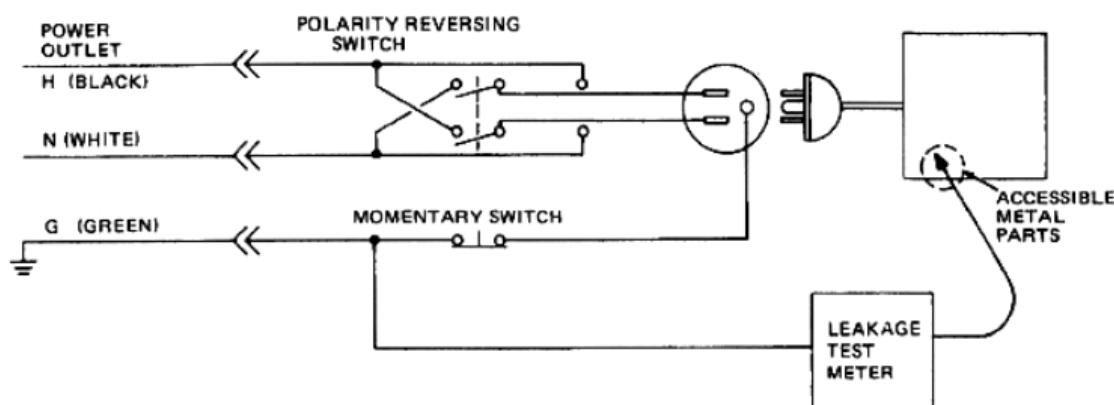


CAUTION: Equipment damage possibility.

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.

10-7-5-2 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 10-4 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](#).

10-7-5-3 Vivid i nVivid i nData 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 on the [Vivid i n System Inspection Certificate](#) (see page 10-34).

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					

10-7-6 Isolated Patient Lead (Source) Leakage – Lead-to-Ground

10-7-6-1 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.

10-7-6-2 Generic Procedure

Measurements should be made with the Ground **Open** and **Closed**, with power line polarity **Normal** and **Reversed**, and with the Vivid *i* 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.

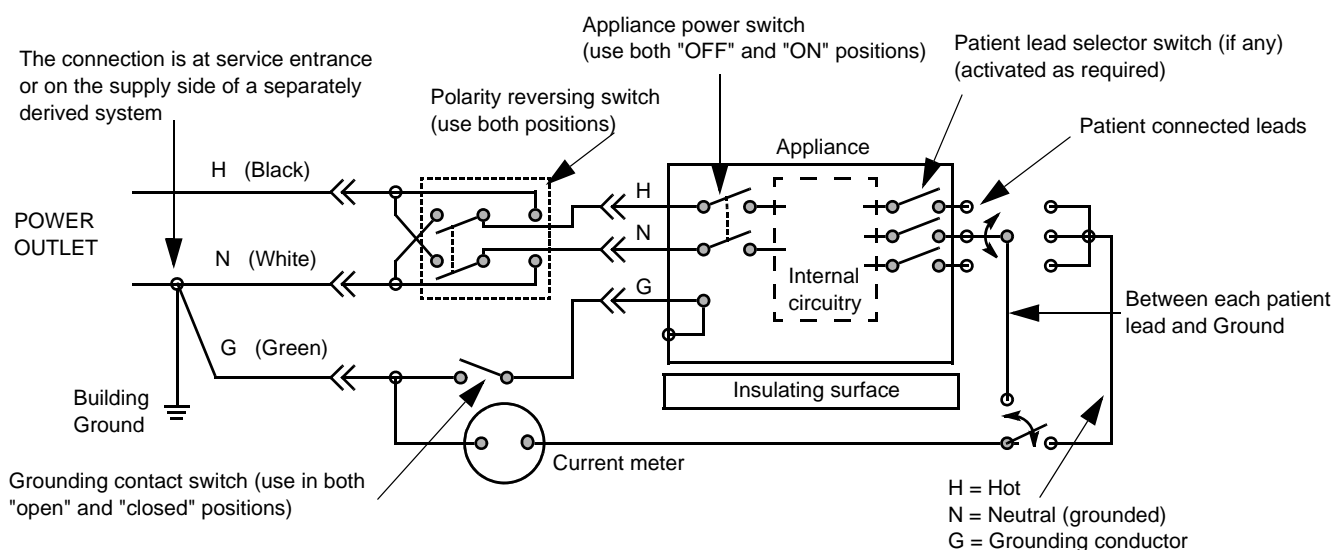


Figure 10-5 Test Circuit for Measuring Non-Isolated Patient Leads

10-7-7 Vivid / nVivid / nIsolated Patient Lead (Source) Leakage – Lead-to-Lead

NOTE: Refer to the procedure in the IEC 60601-1.

10-7-8 Isolated Patient Lead (Sink) Leakage - Isolation Test

NOTE: Refer to the procedure in the IEC 60601-1.



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.

10-7-8-1 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 on the [Vivid i n System Inspection Certificate](#) (see page 10-34).

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 and Patient Lead-to-Lead Current Leakage Test	115V	10uA	10uA
	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					

10-7-9 Probe Current Leakage Test

10-7-9-1 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.

10-7-9-2 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.

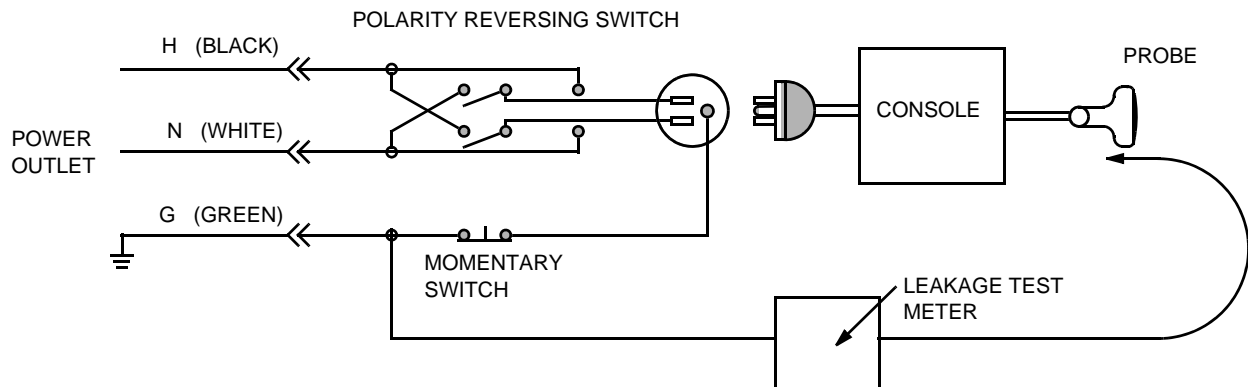


Figure 10-6 Set Up for Probe Current Leakage Test

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.

10-7-9-3 Vivid / nNo Meter Probe Adapter Procedure

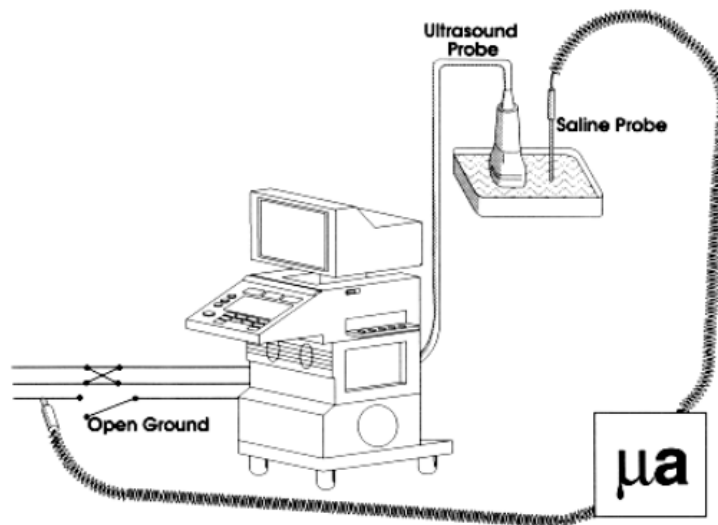


Figure 10-7 Check Without Probe Adapter

Follow these steps to test each transducer for current leakage.

- 1.) Turn the Vivid / 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.

10-7-9-4 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 on the [Vivid i n System Inspection Certificate](#) (see page 10-34).



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 10-8

Excessive Current Leakage

10-8-1 Possible Causes of Excessive Current Leakage

10-8-1-1 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.

10-8-1-2 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.

10-8-1-3 Peripheral Fails

Tighten all Grounds. Ensure star washers are under all Ground studs.

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

10-8-1-4 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.

10-8-1-5 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.

10-8-1-6 ECG Fails

Inspect cables for damage or poor connections.

Section 10-9 Vivid / n Inspection Certificates



Vivid / n System Inspection Certificate

Customer Name:		System ID:		Dispatch Number / Date Performed:		Warranty/Contract/HBS	
System Type		Model Number:		Serial Number:		Manufacture Date:	
Probe 1:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 2:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 3:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 4:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 5:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 6:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 7:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 8:	Frequency:	Scan Format*:		Model Number:		Serial Number:	
Probe 9:	Frequency:	Scan Format*:		Model Number:		Serial Number:	

*Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array, or other

Functional Checks (if applicable)	OK? or N/A	Physical Inspection and Cleaning (if applicable)	Inspect	Clean
B-Mode (2D) Function		Console		
Doppler Mode Function		Monitor		
CF-Mode Function		Touch Panel		
M-Mode Function		Air Filter		
Applicable Software Options		Probe Holders		
Applicable Hardware Options		External I/O		
Control Panel		Wheels, Brakes & Swivel Locks		
Monitor		Cables and Connectors		
Measurement Accuracy		GE-approved Peripherals (VCR, CD-RW, MOD, Printers)		
GE-approved Peripherals				

Comments:



Vivid / n Electrical Safety Inspection Certificate

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct Ground & wiring config.)				
System Ground Continuity				
Chassis Source Current Leakage - Probe				
Chassis Source Current Leakage - Caster				
Chassis Source Current Leakage - CRT				
Patient Lead Source Leakage (Lead-to-Ground)				
Patient Lead Source Leakage (Lead-to-Lead)				
Patient Lead Source Leakage (Isolation)				
Peripheral 1 Current Leakage				
Peripheral 1 Ground Continuity				
Peripheral 2 Current Leakage				
Peripheral 2 Ground Continuity				
Peripheral 3 Current Leakage				
Peripheral 3 Ground Continuity				
PROBES				
Probe Number (from page 10-34)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				
Probe 4:				
Probe 5:				
Probe 6:				
Probe 7:				
Probe 8:				
Probe 9:				

Final Check: All system covers are in place. The Vivid / n system scans with all probes, as expected.

Accepted by:

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