GE

Technical Publication

Vivid T8/ Vivid T8 Pro

Basic Service Manual

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Product Information

This Manual covers the software version of R1.x.x for Vivid T8/ Vivid T8 Pro ultrasound system.

GE

GE Medical Systems, a General Electric Company, going to market as GE
Manufacturer:
GE Medical Systems (China) Co., Ltd.
No. 19, Changjiang Road
WuXi National Hi-Tech Development Zone
Jiangsu, P.R. China 214028
TEL: +86 510 85225888; FAX: +86 510 85226688
www.gehealthcare.com

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Pages	Revision	Pages	Revision
Front	Rev. 03	Chapter 6	Rev. 03
Front matter	Rev. 03	Chapter 7	Rev. 03
TOC	Rev. 03	Chapter 8	Rev. 03
Chapter 1	Rev. 03	Chapter 9	Rev. 03
Chapter 2	Rev. 03	Chapter 10	Rev. 03
Chapter 3	Rev. 03	Index	Rev. 03
Chapter 4	Rev. 03	Rear Cover	Rev. 03
Chapter 5	Rev. 03		

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Important precautions

Translation policy

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-Br)

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 TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVISO (PT-pt)

ESTE MANUAL DE ASSISTÊNCIA ESTÁ DISPONÍVEL APENAS 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 TENTE EFECTUAR REPARAÇÕES NO EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO PREVIAMENTE ESTE MANUAL.**
- **A INOBSERVÂNCIA DESTE AVISO PODE RESULTAR EM FERIMENTOS NO TÉCNICO DE ASSISTÊNCIA, OPERADOR OU PACIENTE EM CONSEQUÊNCIA DE CHOQUE ELÉCTRICO, PERIGOS DE ORIGEM MECÂNICA, BEM COMO DE OUTROS TIPOS.**

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 HAFA 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 TÉTO VÝSTRAHY MŮŽE DOJÍT ÚRAZU ELEKTRICKÁM PROUDEM PRACOVNÍKA POSKYTOVATELE SLUŽEB, OBSLUŽNÉHO PERSONÁLU NEBO PACIENTŮ VLIVEM ELEKTRICKÉHOP 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 ANGĻU VALODĀ.

- **JA KLIENTA APKALPES SNIEDZĒJAM NEPIECIEŠAMA INFORMĀCIJA CITĀ VALODĀ, NEVIS ANGĻU, 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 CLIENȚI NECESITĂ O ALTĂ LIMBĂ DECÂT CEA ENGLEZĂ, ESTE DE DATORIA CLIENTULUI SĂ FURNIZEZE O TRADUCERE.
- NU ÎNCERCAȚI SĂ REPARAȚI ECHIPAMENTUL DECÂT ULTERIOR CONSULTĂRII ŞI 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.
- НЕСОБЛЮДЕНИЕ УКАЗАННЫХ ТРЕБОВАНИЙ МОЖЕТ ПРИВЕСТИ К ТОМУ, ЧТО СПЕЦИАЛИСТ ПО ТЕХОБСЛУЖИВАНИЮ, ОПЕРАТОР ИЛИ ПАЦИЕНТ ПОЛУЧАТ УДАР ЗЛЕКТРИЧЕСКИМ ТОКОМ, МЕХАНИЧЕСКУЮ ТРАВМУ ИЛИ ДРУГОЕ ПОВРЕЖДЕНИЕ.

ПРЕДУПРЕЖДЕНИЕ
(BG)

ТОВА СЕРВИЗНО РЪКОВОДСТВО Е НАЛИЧНО САМО НА АНГЛИЙСКИ ЕЗИК.

- АКО ДОСТАВЧИКЪТ НА СЕРВИЗНИ УСЛУГИ НА КЛИЕНТ СЕ НУЖДАЕ ОТ ЕЗИК, РАЗЛИЧЕН ОТ АНГЛИЙСКИ, ЗАДЪЛЖЕНИЕ НА КЛИЕНТА Е ДА ПРЕДОСТАВИ ПРЕВОДАЧЕСКА УСЛУГА.
- НЕ СЕ ОПИТВАЙТЕ ДА ИЗВЪРШВАТЕ СЕРВИЗНО ОБСЛУЖВАНЕ НА ТОВА ОБОРУДВАНЕ, ОСВЕН ВСЛУЧАЙ, ЧЕ СЕРВИЗНОТО РЪКОВОДСТВО Е ПРОЧЕТЕНО И СЕ РАЗБИРА.
- НЕСПАЗВАНЕТО НА ТОВА ПРЕДУПРЕЖДЕНИЕ МОЖЕ ДА ДОВЕДЕ ДО НАРАНЯВАНЕ НА ДОСТАВЧИКА НА СЕРВИЗНИ УСЛУГИ, НА ОПЕРАТОРА ИЛИ ПАЦИЕНТА ВСЛЕДСТВИЕНА ТОКОВ УДАР, МЕХАНИЧНИ ИЛИ ДРУГИ РИСКОВЕ.

UPOZORENJE
(SR)

OVAJ PRIRUČNIK ZA SERVISIRANJE DOSTUPAN JE SAMO NA ENGLESKOM JEZIKU.

- AKO KLIJENTOV SERVISER ZAHTEVA JEZIK KOJI NIJE ENGLESKI, ODGOVORNOST JE NA KLIJENTU DA PRUŽI USLUGE PREVOĐENJA.
- NEMOJTE POKUŠAVATI DA SERVISIRATE OPREMU AKO NISTE PROČITALI I RAZUMELI PRIRUČNIK ZA SERVISIRANJE.
- AKO NE POŠTUJETE OVO UPOZORENJE, MOŽE DOĆI DO POVREĐIVANJA SERVISERA, OPERATERA ILI PACIJENTA UZROKOVANOG ELEKTRIČNIM UDAROM, MEHANIČKIM I DRUGIM OPASNOSTIMA.

OPOZORILO (SL)

TA SERVISNI PRIROČNIK JE NA VOLJO SAMO V ANGLEŠČINI.

- **ČE PONUDNIK SERVISNIH STORITEV ZA STRANKO POTREBUJE NAVODILA V DRUGEM JEZIKU, JE ZA PREVOD ODGOVORNA STRANKA SAMA.**
- **NE POSKUŠAJTE SERVISIRATI OPREME, NE DA BI PREJ PREBRALI IN RAZUMELI SERVISNI PRIROČNIK.**
- **ČE TEGA OPOZORILA NE UPOŠTEVATE, OBSTAJA NEVARNOST ELEKTRIČNEGA UDARA, MEHANSKIH ALI DRUGIH NEVARNOSTI IN POSLEDIČNIH POŠKODB PONUDNIKA SERVISNIH STORITEV, UPORABNIKA OPREME ALI PACIENTA.**

UPOZORENJE (HR)

OVAJ SERVISNI PRIRUČNIK DOSTUPAN JE SAMO NA ENGLESKOM JEZIKU.

- **AKO KLIJENTOV SERVISER ZAHTIJEVA JEZIK KOJI NIJE ENGLESKI, ODGOVORNOST KLIJENTA JE PRUŽITI USLUGE PREVOĐENJA.**
- **NEMOJTE POKUŠAVATI SERVISIRATI OPREMU AKO NISTE PROČITALI I RAZUMJELI SERVISNI PRIRUČNIK.**
- **AKO NE POŠTUJETE OVO UPOZORENJE, MOŽE DOĆI DO OZLJEDE SERVISERA, OPERATERA ILI PACIJENTA PROUZROČENE STRUJNIM UDAROM, MEHANIČKIM I DRUGIM OPASNOSTIMA.**

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.**

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

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

Omission and errors

If there are any omissions, errors or suggestions for improving this documentation, contact the GE 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:

GE Medical Systems (China) Co., Ltd.
No. 19 Changiang Road
Wuxi National Hi-Tech Dev. Zone
Jiangsu
P.R.China 214028

GE employees should use TrackWise to report service documentation issues.

These issues will then be in the internal problem reporting tool and communicated to the writer.

Service Safety Considerations

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

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

For a complete review of all safety requirements, refer to Chapter 1 in the Service Manual.

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Table of Contents

Chapter 1

Introduction

This chapter describes important issues related to safely servicing the Ultrasound system. The service provider must read and understand all the information presented here before installing or servicing the units.

Overview

Contents in this chapter

Manual Overview

This manual provides installation and service information for the Vivid T8/ Vivid T8 Pro Ultrasound system. It is divided in ten chapters as shown below.

This manual is for Vivid T8 and Vivid T8 Pro.

Contents in this manual

The manual is divided into ten chapters.

In the beginning of the manual, before chapter 1, you will find the *Revision overview*, the *Important precautions* including *Translation policy*, *Damage in transportation*, *Certified electrical contractor statement*, *Omission & errors*, *Service safety considerations* and *Legal notes*, and the *Table of Contents* (*TOC*).

An Index has been included after Chapter 10.

Table 1-1: Contents in this manual

Chapter number	Chapter title	Description
1.	Introduction	Contains a content summary and warnings.
2.	Site preparations	Contains pre-setup requirements for the Vivid T8/ Vivid T8 Pro.
3.	System Setup	Contains setup procedure with procedure checklist for the system.
4.	General Procedures and Functional Checks	Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5.	Components and Functions (Theory)	Contains block diagrams and functional explanations of the electronics.

Table 1-1: Contents in this manual (Continued)

Chapter number	Chapter title	Description
6.	Service Adjustments	Contains instructions on how to make any available adjustments to the Vivid T8/ Vivid T8 Pro.
7.	Diagnostics/ Troubleshooting	Provides procedures for running diagnostic or related routines for the Vivid T8/ Vivid T8 Pro.
8.	Replacement procedures	Provides disassembly procedures and reassembly procedures for all changeable FRU.
9.	Renewal Parts	Contains a complete list of replacement parts for Vivid T8/ Vivid T8 Pro.
10.	Care & Maintenance	Provides periodic maintenance procedures for Vivid T8/ Vivid T8 Pro.
N/A	Index	A quick way to the topic you're looking for.

Typical users of the Proprietary Service Manual

- GEHC Service Personnel (setup, maintenance, etc.)
- GEHC Online Center Personnel
- Licensed Hospital's Service Providers

Vivid T8/ Vivid T8 Pro models covered by this manual

Table 1-2: Vivid T8/ Vivid T8 Pro Model Designations

Model Number	Description	System SW
5421435	English version Vivid T8	R1.x.x
5498519	English version Vivid T8 with Articulation Arm	R1.x.x
5498522	Chinese version Vivid T8	R1.x.x
5498521	Chinese version Vivid T8 with Articulation Arm	R1.x.x
5498524	Korean version Vivid T8	R1.x.x
5498523	English version Vivid T8 Pro	R1.x.x

NOTE: When not otherwise specified, the contents of this manual applies to all Vivid T8/ Vivid T8 Pro models.

Important conventions

Conventions used in book

Important conventions, used in this document, are described next.

Model designations

This manual covers the Vivid T8/ Vivid T8 Pro Ultrasound systems listed in:

‘Vivid T8/ Vivid T8 Pro models covered by this manual’ on *page 1-5*.

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.

Safety precaution messages

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

- DANGER
- WARNING
- CAUTION

d  DANGER

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

w  WARNING

Warning is used to indicate the presence of a hazard that can cause severe personal injury and property damage if instructions are ignored.

c  CAUTION

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

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

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

Standard hazard icons

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

Table 1-3: Standard hazard icons

	ELECTRICAL
	MECHANICAL
	RADIATION
	LASER
	HEAT
	PINCH

NOTE: Even if a symbol isn’t used on the product or in this manual, it may be included for your reference.

Standard Icons that indicate that a special procedure is to be used

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

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

Avoid Static Electricity	Tag and Lock Out	Wear Eye Protection
		
Hand Protection	**Foot Protection**	**Wear Eye Protection**
		

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

Product icons

It is important to refer to the current revision of the Ultrasound system's User Manual for a full list of product labels prior to servicing the system.

Labels locations

It is important to refer to the current revision of the Ultrasound system's User Manual for a full list of product labels prior to servicing the system.

Safety considerations

Contents in this section

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.

Human Safety

- Operating personnel must not remove the system covers.
- Servicing should be performed by authorized personnel only.

Only personnel who have participated in a Vivid T8/ Vivid T8 Pro Training Seminar are authorized to service the equipment.

d DANGER

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

w WARNING

If the covers are removed from an operating Vivid T8/ Vivid T8 Pro, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shutdown mode.

Human Safety (continued)

WARNING

Because of the limited access to cabinets and equipment in the field, placing people in awkward positions, GE has limited the lifting weight for one person in the field to 16 KG (35 LBS). Anything over 16 KG (35 LBS) requires 2 people.

WARNING

Have two people available to deliver and unpack the Vivid T8/ Vivid T8 Pro.

Attempts to move the Ultrasound system considerable distances or on an incline by one person could result in injury or damage or both.

WARNING

Explosion Warning

DO NOT operate the equipment in an explosive atmosphere. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

WARNING

DO NOT substitute parts or modify equipment

Because of the danger of introducing additional hazards, ONLY install GE approved parts. DO NOT perform any unauthorized modification of the equipment.

WARNING

Ensure that the Ultrasound system is turned off and unplugged

Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation. The white light on the OP panel ON/OFF button will turn off.

Ultrasound system components may be energized. Always refer to the Ultrasound system's Proprietary Service Manual for LOTO warnings and cautions

Human Safety (continued)

WARNING

Risk of electrical shock, Ultrasound system must be turned off and disconnected from power source. Cord must be controlled at all times.

Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation. The white light on the OP panel on/off button will turn off.

Ultrasound System components may be energized. Always refer to the Ultrasound system's Proprietary Service Manual for LOTO warnings and cautions

WARNING

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

WARNING

Beware of possible sharp edges on all mechanical parts. If sharp edges are encountered, the appropriate PPE should be used to reduce the risk of injury.

WARNING

Wear all PPE including gloves as indicated in the chemical MSDS.

Mechanical safety

WARNING

While the software install procedure is designed to preserve data, you should save any patient data, images, system setups to removable media or hardcopy before doing a software upgrade.

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. **Do NOT** use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

WARNING

Never use a probe that has fallen to the floor. Even if it looks OK, it may be damaged.

WARNING

When the Ultrasound system is raised for a repair or moved along any incline, use extreme caution since it may become unstable and tip over.

CAUTION

Take extra care when moving the system.

The Vivid T8/ Vivid T8 Pro weighs approximately 65 kg (144 lbs) or more, depending on installed peripherals, when ready for use. To avoid possible injury and equipment damage when transporting from one area of use to another:

- Be sure the pathway is clear.
- Limit movement to a slow careful walk.
- Use two or more persons to move the equipment on inclines or long distance.

CAUTION

Before you move or transport the Ultrasound system, make sure to lock the LCD monitor arm firmly and flip down the monitor to prevent damage to the Ultrasound system.

Mechanical safety (continued)

CAUTION

To avoid injury when you move the LCD monitor and the monitor arm, do not put your finger, hand, or object on the joint of the monitor or the monitor arm.

CAUTION

Ensure that nobody touches the console arm when moving the operator panel.

CAUTION

Do not move the Ultrasound system if the Operator Panel is in unlocked position.

CAUTION

Do not transport Vivid T8/ Vivid T8 Pro in a vehicle without locking the casters (wheels) and securing it as described in chapter 4.

CAUTION

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

CAUTION

Use safety shoes when doing work where there is any chance of foot injury.

Mechanical safety (continued)

CAUTION

Use protective gloves when working with sharp edges or when directed to wear PPE during a removal/replacement procedure.

CAUTION

Be careful not to pinch any of the cables.

NOTE: Special care should be taken when transporting the Ultrasound system in a vehicle:

- Before transporting, place the system in its special storage case.
- Lock the wheels (brake)
- Ensure that the system is firmly secured while inside the vehicle.
- Secure 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.

Electrical safety

Safe practices

Follow these guidelines to minimize shock hazards whenever you are using the Ultrasound system:

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

Connecting a Vivid T8/ Vivid T8 Pro to the wrong voltage level will most likely destroy it.

Probes

Follow these guidelines before connecting a probe to the Ultrasound system:

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

Peripherals

Refer to the Patient Safety Environment section of the User's Manual for peripheral isolation information.

Dangerous procedure warnings

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

d DANGER

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

w WARNING

If the covers are removed from an operating Vivid T8/ Vivid T8 Pro, some metal surfaces may be warm enough to pose a potential heat hazard if touched, even while in shutdown mode.

w WARNING

Explosion Warning

DO NOT operate the equipment in an explosive atmosphere. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

w WARNING

DO NOT substitute parts or modify equipment

Because of the danger of introducing additional hazards, ONLY install GE approved parts. DO NOT perform any unauthorized modification of the equipment.

w WARNING

SHUT DOWN FORCEDLY OR PLUG IN/OUT ACDC INVALID MAY CAUSE THE DAMAGE OF SYSTEM FILES.

Lockout/Tagout (LOTO) requirements

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

To apply Lockout/Tagout (LOTO):

1. Plan and prepare for shutdown.
2. Shutdown the equipment.
3. Isolate the equipment.
4. Remove/disconnect the battery, if present.
5. Apply Lockout/Tagout Devices.
6. Control all stored and residual energy.
7. Verify isolation.

All potentially hazardous stored or residual energy is relieved.

WARNING

Energy Control and Power Lockout for Vivid T8/ Vivid T8 Pro.

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

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

Ultrasound System components may be energized.

Returning probes and repair parts

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

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

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

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

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

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

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

EMC, EMI and ESD

What is 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 interference from its environment or when the device produces unacceptable levels of emission to its environment. 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 of 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.

CE Compliance

Vivid T8/ Vivid T8 Pro 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 of the Ultrasound system's User's Manual.

NOTE: For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, clamps, are in good condition, 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.

Electrostatic discharge (ESD) prevention

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

WARNING

Risk of electrical shock, Ultrasound system must be turned off. Avoid all contact with electrical contacts, conductors and components. Always use non-conductive handles designed for the removal and replacement of ESD sensitive parts. All parts that have the potential for storing energy must be discharged or isolated before making contact.

Customer assistance

Contact information

If this equipment does not work as indicated in this service manual or in the user manual, or if you require additional assistance, please contact the local distributor or appropriate support resource, as listed below.

Before you call, identify the following information, and acquire image (Alt+D) to send to the Customer Care team:

1. System ID serial number.
2. Software version.
3. Date and time of occurrence.
4. Sequence of events leading to issue.
5. Is the issue repeatable?
6. Imaging mode, probe, preset/application.
7. Media brand, speed, capacity, type.
8. Save secondary image capture, cine loop, 4D multi-volume loop.

NOTE: Restart the application before resuming clinical scanning.

Phone numbers for Customer Assistance

Table 1-5: Phone numbers for Customer Assistance

LOCATION	PHONE NUMBER	
USA GE Healthcare - GE Medical Systems 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	Phone:	1-800-668-0732
Latin America	Service Application Support	1-800-321-7937 1-262-524-5698
Europe (OLC-EMEA) GE Ultraschall Deutschland Gmbh & Co. KG 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) 2122-8024-31
Online Services Ultrasound Asia	Phone: • Australia • China • India • Japan • Korea • Singapore	 +(61) 1-800-647-855 +(86) 800-810-8188 +(91) 1800-425-8025 +(81) 42-648-2940 +(82) 2620 13585 +(95) 6277-3444

System manufacturer

Table 1-6: System manufacturer

MANUFACTURER	PHONE NUMBER	FAX NUMBER
GE Medical Systems (China) Co., Ltd. No.19 Changjiang Road WuXi National Hi-Tech Development Zone Jiangsu P.R.China 214028	+86 510 85225888	+86 510 85226688

Authorized Representative

Table 1-7: Authorized Representative

AUTHORIZED REPRESENTATIVE	TELEPHONE / FAX NUMBER
The location of the CE marking is shown in the Safety chapter of the User manual. **EC REP** Authorized EU Representative/European registered place of business: GE Medical Systems Information Technologies GmbH (GEMS IT GmbH) Munzinger Strasse 5, D-79111 Freiburg, GERMANY	+49 761 45 43 -0 / +49 761 45 43 -233

Chapter 2

Site Preparations

This chapter provides the information required to plan and prepare for the setup of an Ultrasound system. Included are descriptions of the facility and electrical needs to be met by the purchaser of the units.

Overview

Contents in this chapter

General Ultrasound system requirements

Contents in this section

Ultrasound system environmental requirements

If the Ultrasound system is very cold or hot

When unpacking the Ultrasound system, allow the temperature of the Ultrasound system to stabilize before powering up. The following table describes guidelines for reaching operational temperatures from storage or transport temperatures.

If the Ultrasound system is very cold or hot, do not turn on its power until it has had a chance to acclimate to its operating environment.

Table 2-1: System Acclimation Time Chart

Degree C	-4.5	-2	0.5	3	40	42.5	45	47.5	50	55	60
Degree F	23.9	28.4	32.9	37.4	104	108.5	113	117.5	122	131	140
hours	3	2	1	0	0	1	2	3	4	6	8

Environmental specifications for Ultrasound system

The system should be operated, stored, or transported within the parameters outlined below. Either its operational environment must be constantly maintained or the unit must be turned off.

Table 2-2: System Environmental Requirements

	Operational	**Storage**	**Transport** (<16hrs.)
Temperature	3° - 40°C 38° - 104°F	-5° - 50°C 23° - 122°F	-5° - 50°C 23° - 122°F
Humidity	30 - 80% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Ensure that the probe face temperature does not exceed the normal operation temperature range.

The Vivid T8/ Vivid T8 Pro system and probe connector is not waterproof. Do not expose the device to water or any kind of liquid.

Cooling

The cooling requirement for a console Ultrasound system with monitor and on board peripherals, is up to 3800 BTU/h. This figure does not include cooling needed for lights, people, or other equipment in the room.

NOTE: Each person in the room places an additional 300 BTU/h demand on the cooling system.

Lighting

Bright light is needed for Ultrasound system installation, updates and repairs. However, operator and patient comfort may be optimized if the room light is subdued and indirect. 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.

Electrical requirements

General requirements

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

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 system is only a conduit.

Electrical requirements for the Ultrasound system

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

Table 2-3: Electrical Specifications for Vivid T8/ Vivid T8 Pro system

Voltage	Tolerance	Power Consumption	Frequency
100-240 VAC	±10%	Max. 400VA	50/ 60HZ

Site circuit breaker

Power outage may occur. The Vivid T8/ Vivid T8 Pro requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you do not have any other equipment operating on the same circuit.

It is recommended that the branch circuit breaker for the Ultrasound system be readily accessible.

POWER OUTAGE MAY OCCURE.

The Vivid T8/ Vivid T8 Pro requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have any other equipment operating on the same circuit.

Site power outlets

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

Unit power plug

If the Ultrasound system arrives without a power plug, or with the wrong plug, you must contact your GE dealer or the installation engineer must supply what is locally required.

Power stability requirement

Table 2-4: Power stability requirement

IEC 61000-4-11 Voltage dips, short interruptions and voltage variations on mains supply	< 5%T (> 95% dip) for 0.5 cycle;	< 5%T (> 95% dip) for 0.5 cycle;	Mains power quality should be that of a typical commercial or hospital environment.
	40%T (60% dip) for 5 cycles;	40%T (60% dip) for 5 cycles;	
	70%T (30 dip) for 25 cycles;	70%T (30 dip) for 25 cycles;	
	< 5%T (>95% dip) for 5 sec	< 5%T (>95% dip) for 5 sec	

EMI limitations

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

Possible EMI sources should be identified before the Ultrasound system is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. Some of these sources include:

- medical lasers
- scanners
- cauterizing guns
- computers
- monitors
- fans
- gel warmers
- microwave ovens
- light dimmers
- mobile phones
- in-house wireless phones (DECT phones)
- wireless computer keyboard and mouse
- air conditioning system
- High Frequency (HF) surgery equipment
- general AC/DC adapters

The presence of a broadcast station or broadcast van may also cause interference.

See: ‘EMI prevention/abatement’ on *page 2-10* for EMI prevention tips.

EMI prevention/abatement

Table 2-5: EMI prevention/abatement

EMI RULE	DETAILS
Be aware of Radio Frequency sources	• Keep the Ultrasound system at least 5 meters (15 feet) 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.
Ground the Ultrasound system	Poor grounding is the most likely reason an Ultrasound system will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, Radio Frequency gaskets, covers, cores	• After you finish repairing or updating the Ultrasound system, replace all covers and tighten all screws. • Any cable with an external connection requires a magnet wrap at each end. • Install all covers. Loose or missing covers or Radio Frequency gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken Radio Frequency gaskets	If more than 20% or a pair of the fingers on an Radio Frequency gasket are broken, replace the gasket. Do not turn on the Ultrasound system until any loose metallic part is removed.
Do not place labels where Radio Frequency gaskets touch metal	Where applicable, never place a label where Radio Frequency gaskets meet the Ultrasound system. Otherwise, the gap created will permit Radio Frequency leakage. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly route peripheral cables	Where applicable, do not allow cables to lie across the top of the Card Rack or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. Attach the monitor cables to the frame.

Probes environmental requirements

Operation, storage and transport temperatures for probes

Probes should be operated, stored, or transported within the parameters outlined below.

CAUTION

Ensure that the probe face temperature does not exceed the normal operation temperature range.

Table 2-6: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	3° - 40°C 38° - 104°F	-5° - 50°C 23° - 122°F	-5° - 50°C 23° - 122°F
Humidity	30 - 80% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

CAUTION

Check the room temperature before you use the probe.

CAUTION

Ensure that the probe face temperature does not exceed the normal operation temperature range.

NOTE: Refer to Table 2-1 on page 2-3 to determine the needed settlement time.

Time and manpower requirements

Site preparation takes time. Begin site preparation checks as soon as possible, if possible, six weeks before delivery, to allow enough time to make any changes.

Facility needs

Contents in this section

Purchaser responsibilities

The work and materials needed to prepare the site is the responsibility of the purchaser. Delay, confusion, and waste of manpower can be avoided by completing pre-installation work before delivery. Purchaser responsibility includes:

- Procuring the materials required
- Completing the preparations before delivery of the Ultrasound system
- Paying the costs for any alterations and modifications not specifically provided in the sales contract

NOTE: All electrical installations that are preliminary to the positioning of the equipment at the site prepared for the equipment must be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, 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 only utilize qualified personnel to perform electrical servicing on the equipment.

The desire to use a non–listed or customer provided product or to place an approved product further from the Ultrasound system than the interface kit allows, presents challenges to the installation team. To avoid delays during installation, such variances should be made known to the individuals or group performing the installation at the earliest possible date (preferably prior to the purchase).

The ultrasound suite must be clean prior to delivery of the Ultrasound system. Carpet is not recommended because it collects dust and creates static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact Ultrasound system reliability.

Required facility needs

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

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.

Required facility needs (continued)

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.

- Dedicated single branch power outlet of adequate amperage meeting all local and national codes which is located less than 2.5 m (8 ft.) from the unit's proposed location
- Door opening is at least 76 cm (30 in) wide
- Proposed location for unit is at least 0.5m (1.5 ft.) from the wall for 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.
- Power outlets for test equipment within 1 m (3.2 ft.) of Ultrsound system.
- Clean and protected space to store probes (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

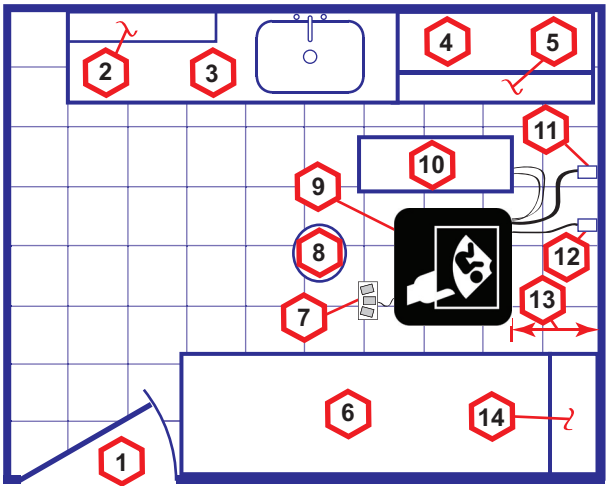
For the amperage requirements, see: 'Electrical requirements' on *page 2-6*.

Desirable features

- Door is at least 92 cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Sink with hot and cold water
- Receptacle for bio–hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and equipment
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet ordered by GE for its software and proprietary manuals

Minimal floor plan suggestion

CSI 8x10



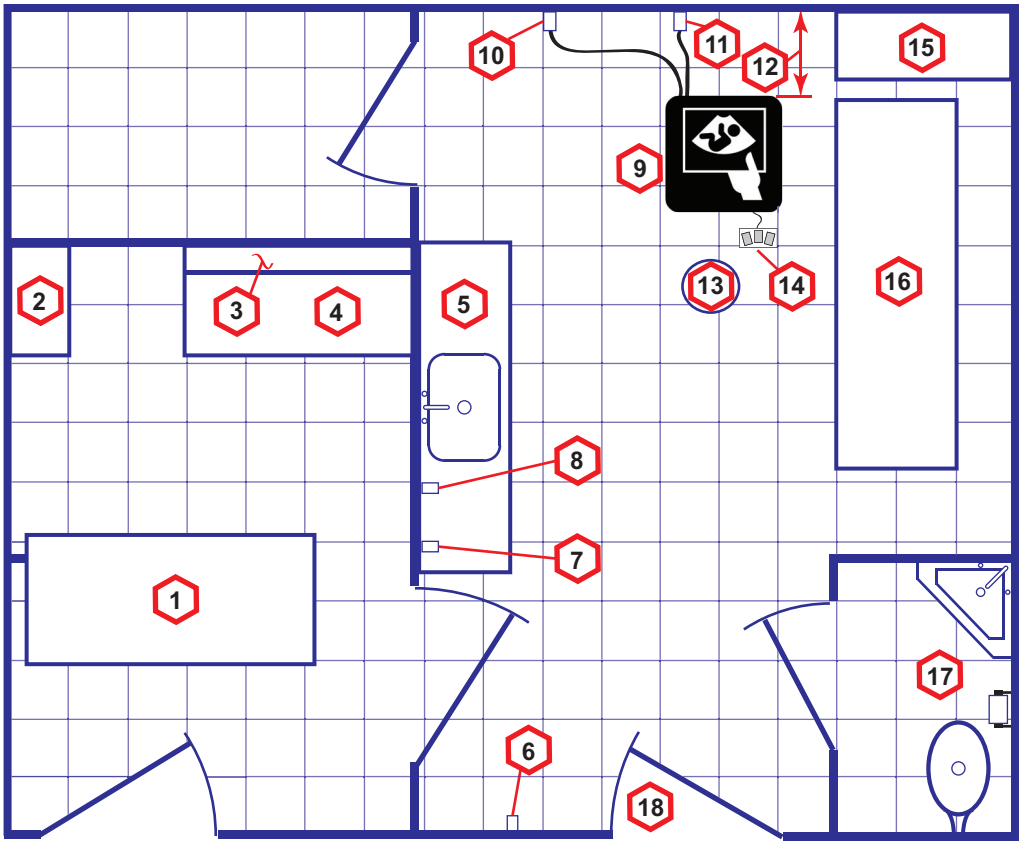
Scale:
Each square equals one square foot (app. 31 x 31 cm)

1. Door – at least 762 mm (30 inches)
2. Film Viewer
3. Counter Top, Sink with hot and cold water and Supplies Storage
4. Linen Supply
5. Probes/Supplies
6. Examination Table – 1930 x 610 mm (76 x 24 inches)
7. Footswitch
8. Stool
9. Ultrasound system
10. External Peripherals
11. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
12. Network Interface
13. 457 mm (18 inches) distance of Ultrasound system from wall or objects
14. GE Cabinet for Software and Manuals

Figure 2-1. Minimal floor plan, 2.5 m x 3 m (8 by 10 foot)

Recommended floor plan suggestion

CSI 14x17

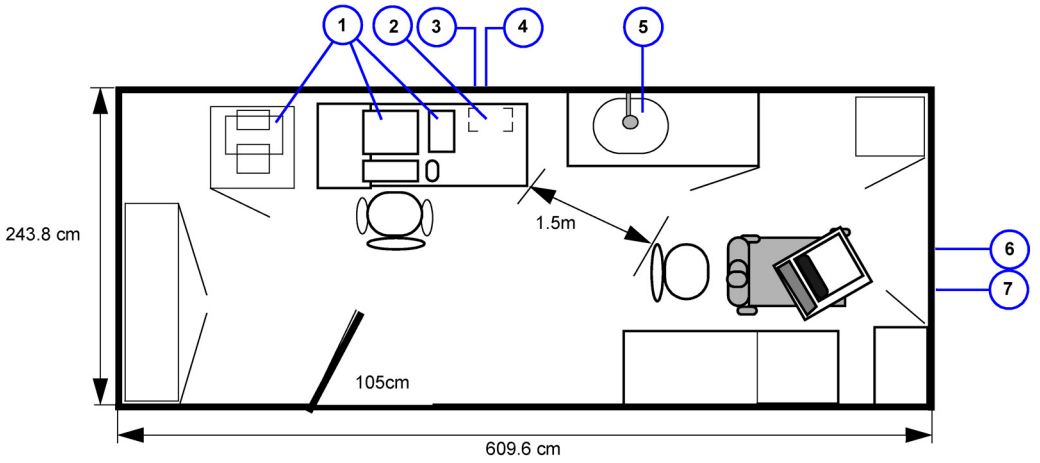


Scale: Each square equals one square foot (app. 31 x 31 cm)

1. Secretaries or Doctors Desk
2. File Cabinet
3. Film Viewer
4. Counter Top
5. Counter Top and Sink with hot and cold water
6. Overhead Lights Dimmer - Dual Level Lighting (bright and dim)
7. Emergency Oxygen
8. Suction Line
9. Ultrasound system
10. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
11. Network Interface
12. 457 mm (18 inches) distance of Ultrasound system from wall or objects
13. Stool
14. Footswitch
15. Storage for Linens and Equipment
16. Examination Table – 1930 x 610 mm (76 x 24 inches)
17. Lavatory and Dressing Room
18. Door – at least 762 mm (30 inches)

Figure 2-2. A 14 by 17 foot recommended floor plan

Suggested floor plan, Ultrasound system, and EchoPAC PC in same room



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

Figure 2-3. Suggested Room with EchoPAC PC workstation and Ultrasound Scanner

Networking setup requirements

Stand alone Ultrasound system (without network connection)

None.

Scanner connected to hospital's network

Supported networks:

100/1000 Mbit Ethernet/DICOM network (option)

InSite requirements

InSite requires an Ethernet connection via:

- 100/1000 Mbit Interface

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.

DICOM option setup requirements

To configure the Ultrasound system to work with other network connections, the site's network administrator must provide information to complete the form "Worksheet for DICOM Network Information". Ensure that there are no spaces in any field of the form.

See:

Entries must include:

- A host name, local port number, AE Title, IP address and Net Mask for the Ultrasound system.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.
- The host name, IP address, port and AE Title for each device the site wants connected to the Ultrasound system for DICOM APPLICATION INFORMATION. A field for the make (manufacturer) and the revision of the device, is also included. This information may be useful for error solving.

DICOM option setup requirements (continued)

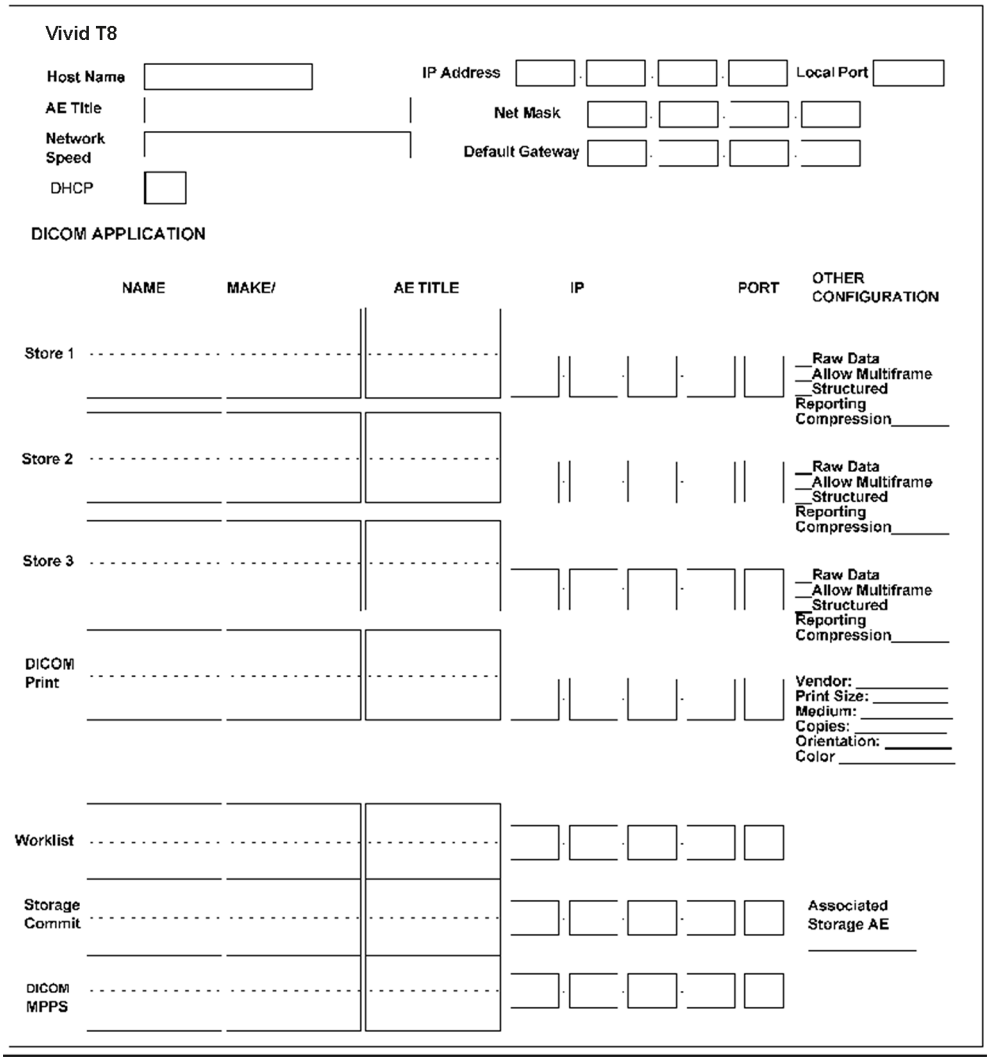


Figure 2-4. Worksheet for DICOM Network Information

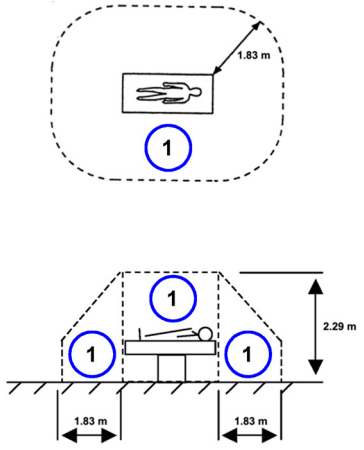
Environmental Dangers

Commercial devices such as laser cameras, printers, VCRs and external monitors, usually exceed allowable leakage current limits and, when plugged into separate AC outlets, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets, or providing the device with extra protective earth, will be required in order to meet UL60601-1 and IEC60601-1 / IEC60601-1-1 standards for electrical leakage.

Patient Vicinity UL60601-1 (USA)

2.12.20DV (UL60601-1:2003)

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



1. Patient environment

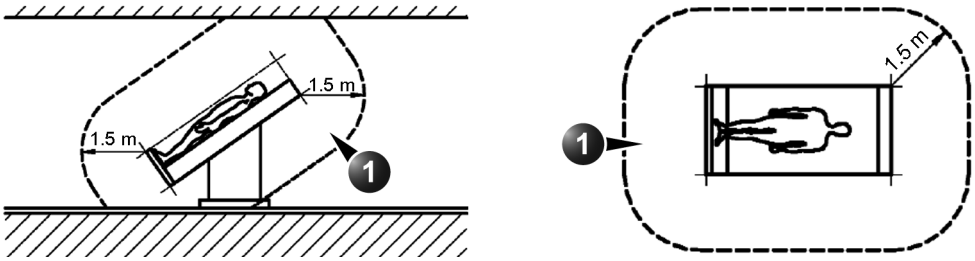
Patient Environment IEC60601-1 and ANSI AAMI ES60601-1

Sub Clause 3.79 and figure A.9 (IEC60601-1:2005 and ANSI AAMI ES60601-1:2005)

Such an area is an environment in which medical diagnosis, monitoring or treatment is carried out. It is very difficult to attach unique dimensions to the PATIENT ENVIROMENT.

In practice a distance of 2,5 m (8.2 ft.) above the floor on which the medical personnel stand and a horizontal distance of 1,5 m (4.9 ft.) have justified themselves as indicative of the dimensions of the Patient Environment.

The patient environment/vicinity will be depicted as a dashed line in this procedure. See example below.



1. Patient environment

Figure 2-5. Patient environment

Chapter 3

System Setup

This chapter contains information needed to install Vivid T8/ Vivid T8 Pro system.

Included is a procedure that describes how to receive and unpack the equipment and how to file a damage or loss claim.

How to prepare the facility and unit of the actual installation, and how to check and test the unit, probes, and external peripherals for electrical safety are also included in this procedure.

Overview

Contents in this chapter

Setup reminders

Average setup time

- Unpacking the Vivid T8/ Vivid T8 Pro: 20 minutes
- Set up Vivid T8/ Vivid T8 Pro options: 15 minutes
- DICOM Network Configuration: 30 minutes or more, depending on the configuration
- Install Insite: 0.5 hour

The Vivid T8/ Vivid T8 Pro installation and functional checkout will take approximately 1 hour. Vivid T8/ Vivid T8 Pro consoles with optional equipment may take slightly longer.

Setup warnings

WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DON'T TOUCH THE ULTRASOUND SYSTEM!

To prevent electrical shock, connect the unit to a properly grounded power outlet. **DO NOT** use a three to two prong adapter. This defeats safety grounding.

DO NOT wear the ESD wrist strap when you work on live circuits and more than 30 V peak is present.

DO NOT operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.

Setup warnings (continued)

1. 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.

NOTE: *For information regarding packing labels, refer to LABELS ON PACKAGE.*

2. After being transported, the unit may be very cold or hot. If this is the case, allow the unit to acclimate before you turn it on. It requires one hour for each 2.5°C increment it's temperature is below 3°C or above 40°C.

Equipment damage possibility. Turning the system on without acclimation after arriving at site may cause the system to be damaged.

If the Ultrasound system is very cold or hot, do not turn on its power until it has had a chance to acclimate to its operating environment.

The following table describes guidelines for reaching operational temperatures from storage or transport temperatures.

Table 3-1: System Acclimation Time Chart

Degree C	-4.5	-2	0.5	3	40	42.5	45	47.5	50	55	60
Degree F	23.9	28.4	32.9	37.4	104	108.5	113	117.5	122	131	140
hours	3	2	1	0	0	1	2	3	4	6	8

Setup warnings (continued)

CAUTION

Operator Manual(s)

The User Manual(s) should be fully read and understood before operating the Vivid T8/ Vivid T8 Pro and kept near the Ultrasound system for quick reference.

CAUTION

Acoustic Output Hazard

Although the ultrasound energy transmitted from the Vivid T8/ Vivid T8 Pro probe is within AIUM/NEMA standards, avoid unnecessary exposure. ultrasound energy can produce heat and mechanical damage.

Receiving and unpacking the equipment

Purpose of this section

This section describes how to receive and unpack Vivid T8/ Vivid T8 Pro.

Contents in this section

Warnings for receiving and unpacking

GENERIC CRT VERSION

CAUTION

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

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

CAUTION

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

The Tilt indicator

Overview

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

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

Table 3-2: Tilt Watch

Description	Illustration
Tilt Watch	

Receiving the Vivid T8/ Vivid T8 Pro

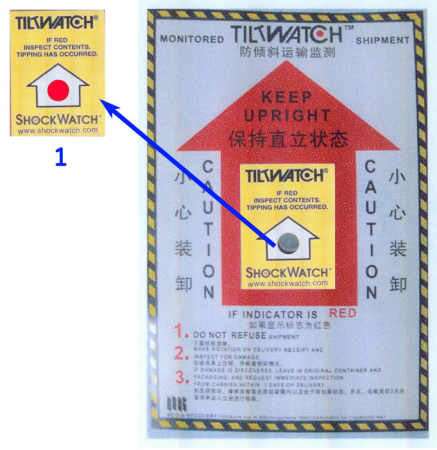
Overview

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

Examine all packages

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

Table 3-3: Examine all packages

Step	Task	Illustrations
1.	Is damage apparent? • If **YES**; continue with the instructions in 'Damage in transportation' on *page 3-11*. • If **NO**; continue with the next step.	
2.	Is the Tilt Indicator red colored inside the middle of the indicator? • If **YES**: The Tilt Indicator has been activated. Continue with the instructions in 'Damage in transportation' on *page 3-11* before you continue with the next step. • If **NO**: continue with the next step.	 1 - Red Color
3.	Continue with the instructions in 'Unpacking the Vivid T8/ Vivid T8 Pro' on *page 3-12*.	

Position of the Tilt indicator

The Tilt indicator has been attached to the transportation box as illustrated in the figure below.

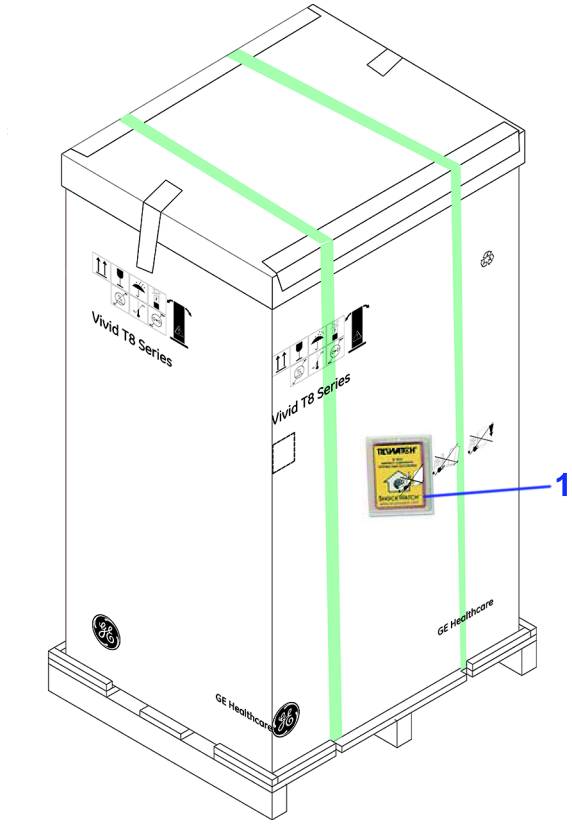


Figure 3-1. Tilt indicator

1. Tilt Indicator

NOTE: Before cutting the straps, check Tilt Tag to make sure it has not been triggered. If damaged, report it to the carrier. If not, then cut the straps around the crate.

If Tilt Indicator has triggered or is missing

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

An activated tilt indicator label does not indicate if the package was simply “Tipped” (laid down with no impact shock) or “Tipped Over” (free fall, with an impact shock). Using both shock indicator labels and tilt indicator labels will help identify if a Tip Over impact shock occurred.

Table 3-4: Tilt Indicator has triggered or is missing

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

Damage in transportation

Follow this procedure if damage is apparent:

1. Write “Damage In Shipment” on ALL copies of the freight or express bill **BEFORE** delivery is accepted or “signed for“ by a GE representative or hospital receiving agent.
2. Report the damage to the carrier.
   - Whether noted or concealed, damage **MUST** be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier.
   - A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

Vivid T8/ Vivid T8 Pro transportation box label

The Vivid T8/ Vivid T8 Pro transportation box label is located at the front of the transportation box.

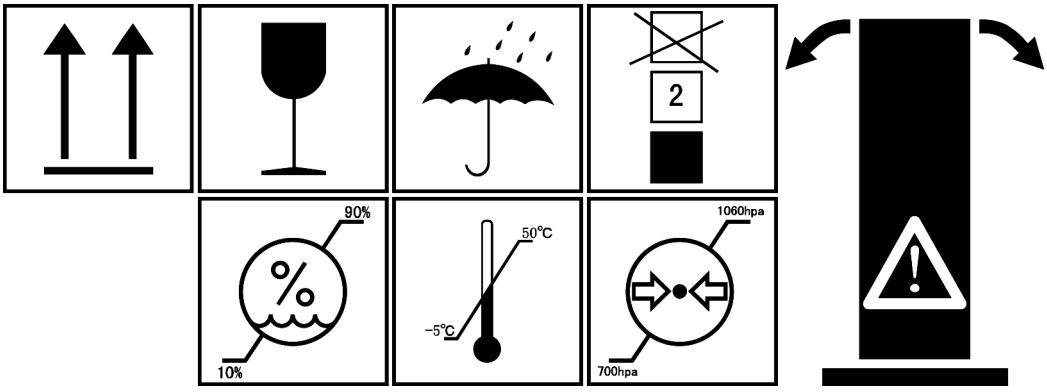


Figure 3-2. Vivid T8/ Vivid T8 Pro transportation box label 1

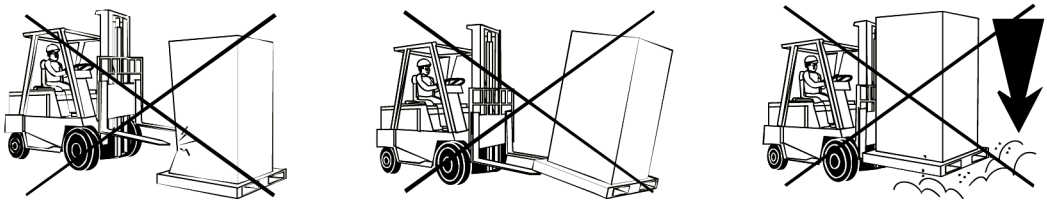


Figure 3-3. Vivid T8/ Vivid T8 Pro transportation box label 2

Unpacking the Vivid T8/ Vivid T8 Pro

When a new system arrives, check that any components are not damaged and are not in short supply. If shipping damage or shortage occurs, contact the address shown in Chapter 1.

CAUTION

Please carefully unpack the system, and do not dispose the package of Vivid T8/ Vivid T8 Pro, so that it can be reused for service.

NOTE: Please check the Vivid T8/ Vivid T8 Pro console is well assembly after unpacking the system.

Table 3-5: Unpacking the Vivid T8/ Vivid T8 Pro

Step	Description	Corresponding Graphic
1	Tear the stop open mark.	
2	Cut the two packing straps around the crate. *Note: To avoid injury, with one hand holding the strap clasp when cutting the strap.*	

Table 3-5: Unpacking the Vivid T8/ Vivid T8 Pro

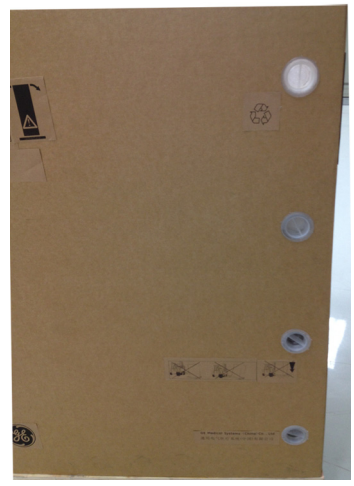
Step	Description	Corresponding Graphic
3	Remove the top cover.	
4	Open the four plastic locks. *Note: Rotate the inside plastic lock counterclockwise to remove it and then remove the outside lock.*	 
5	Remove the outside shipping box.	

Table 3-5: Unpacking the Vivid T8/ Vivid T8 Pro

Step	Description	Corresponding Graphic
6	Remove the dust bag from the unit.	
7	Remove the clear plastic (wrapped around the Vivid T8/ Vivid T8 Pro) from the unit. *Note: To avoid damaging the unit, please use a pair of scissors instead of the knife.*	

Table 3-5: Unpacking the Vivid T8/ Vivid T8 Pro

Step	Description	Corresponding Graphic
6	Remove the foams beside the LCD monitor and the front wheels.	
8	Cut the packing straps around the four wheels. Note: To aviod injury, lock the wheels before cutting the packing straps.	

Table 3-5: Unpacking the Vivid T8/ Vivid T8 Pro

Step	Description	Corresponding Graphic
10	Unlock the wheels, and then hold the control panel at the front side to move the system until the front two wheels on the ground.	
11	With one hand hold the control panel and the other hand hold the ear handle, move the whole system on the ground.	
12	Remove all the covers and foams from the unit.	

Moving into Position

Please refer to User Manual on how to move the system.

Packing the Equipment

Please pack Vivid T8/ Vivid T8 Pro in the reverse order of unpacking.

Packing materials - recycling information

The packing materials for Vivid T8/ Vivid T8 Pro are recyclable:

- The Transportation Box is made of spruce or similar material. (“PHYTOSANITARY CERTIFICATE” included in all shipments to The People's Republic of China.)
- Lever lockings (hinges) are made of zinc plated steel.
- The inner reinforcements are made of Ethafoam (Polyethylene foam).
- The plastic foil is made of LDPE (Low Density Polyethylene).

Preparing for setup

Verify customer order

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

Physical inspection

Verify that the system arrived intact (visual inspection).

If the system has been damaged, please refer to ‘Damage in transportation’ on *page i-11* in the beginning of this manual.

EMI protection

The Vivid T8/ Vivid T8 Pro 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.

See ‘EMI limitations’ on *page 2-9* for more information about EMI protection.

Completing the setup

Purpose of this section

This section describes how to complete the installation of Vivid T8/ Vivid T8 Pro.

Contents in this section

System specifications

System requirements verification

- Verify that the site meets the requirements listed in Chapter 2.

  (See: 'Facility needs' on *page 2-12*.)
- Verify that the specifications below don't conflict with any on-site conditions.

Physical dimensions

Table 3-6: Physical dimensions of Vivid T8/ Vivid T8 Pro

Height	Width	Depth	Depth
1250	700	900	mm
49.3	27.6	35.5	Inches

Console Weight

- Weight: approx. 65 kg (144 lbs)

Electrical specifications

WARNING

Connecting a Vivid T8/ Vivid T8 Pro to the wrong voltage level will most likely destroy it.

Verification of the system's voltage setting

Verify that the mains voltage specified for the Vivid T8/ Vivid T8 Pro is available on-site.

Refer to the latest revision of the User Manual for a full list of product labels.

Electrical specifications for Vivid T8/ Vivid T8 Pro

In the table below, the electrical specifications for Vivid T8/ Vivid T8 Pro includes monitor and on board peripherals.

Table 3-7: Electrical specifications for Vivid T8/ Vivid T8 Pro

Part Number	Description	Voltage	Tolerances	Power consumntion	Frequency
5421435	English version Vivid T8	100-240V	±10%	Max.400VA	50/60 Hz
5498519	English version Vivid T8 with Articulation Arm				
5498522	Chinese version Vivid T8				
5498521	Chinese version Vivid T8 with Articulation Arm				
5498524	Korean version Vivid T8 with Articulation Arm				
5498523	English version Vivid T8 Pro				

Connections on the I/O Rear Panel

NOTE: Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC60950 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC60601-1. Everybody who connects additional equipment to the signal input part or signal output part of Vivid T8/ Vivid T8 Pro, configures a medical system, and is therefore responsible that the Ultrasound system complies with the requirements of the valid version of IEC60601-1. If in doubt, consult the technical service department or your local representative for GE Healthcare.

Connect Ethernet

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

The connector is located on the rear side of Vivid T8/ Vivid T8 Pro.

Connect USB Flash Drive

NOTE: USB Flash Drive approved for Vivid T8/ Vivid T8 Pro are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Drive will compromise this verification, and may cause interference on Vivid T8/ Vivid T8 Pro itself, or on other electronic devices.

For approved models, please refer to Chapter 9.

Insert the USB Flash Drive in one of the USB ports on the Vivid T8/ Vivid T8 Pro.

Connecting probes

Please refer to User Manual on how to connect/disconnect a probe.

Powering the system

Please refer to User Manual on how to power the system.

System Configuration

Purpose of this section

This section describes how to configure the Vivid T8/ Vivid T8 Pro.

Contents in this section

Vivid T8/ Vivid T8 Pro configuration

For complete instructions, refer to the lastest revision of the Vivid T8/ Vivid T8 Pro Basic User Manual, Chapter 16.

Information includes Entering Location, Adjusting Date and Time, Selecting User interface Language, Selecting Online Manual Language, Slelecting Unites of Measure.

Peripherals Installation

Overview

This section describes how to install and configure the peripherals validated for the Vivid T8/ Vivid T8 Pro.

About the operation check-out of peripherals, See ‘Peripheral checks’ on *page 4-34 for more information.*

Table 3-8: Vivid T8/ Vivid T8 Pro Peripherals

Description	Weight (kg)	Power	Control	Model
B/W USB Printer			USB port	Sony UP-D897MD Printer
B/W USB Printer			USB port	Sony UP-D711MD Printer
Color USB Printer			USB port	Sony UP-D25MD Printer
Officejet 100 Printer			USB port	HP Officejet 100 Printer
3-Pedal Footswitch			USB port	MKF 2-MED GP26
USB Stick			USB port	SanDisk USB Stick
USB2.0 HDD			USB port	USB HDD 1T
ECG			ECG Port	ECG Cable

Furnished materials

This section describes the materials furnished with the Peripherals and with the system.

Retain the original carton and packing materials in case transport is needed in the future.

- B/W USB Printer

Table 3-9: Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	Sony UP-D897 MD Printer	1	
2	Paper Roll	1	
3	USB cable	1	

- Color USB Printer

Table 3-10: Materials furnished with Color USB Printer

Item	Description	Quantity	Note
1	Sony UP-D25MD Printer	1	
2	Paper Roll	1	
3	AC Power Cord (local purchase)	1	
4	USB cable	1	

- Digital Printer

Table 3-11: Materials furnished with B/W Printer

Item	Description	Quantity	Note
1	HP Officejet 100 Printer	1	
2	Paper Roll	1	
3	USB cable	1	

- USB Stick

Table 3-12: Materials furnished with USB Stick

Item	Description	Quantity	Note
1	SanDisk USB Stick	1	
2	Paper Roll	1	
3	USB cable	1	

Furnished materials (continued)

- USB 2.0 HDD

Table 3-13: Materials furnished with the USB 2.0 HDD

Item	Description	Quantity	Note
1	USB 2.0 HDD	1	
2	USB Cable	1	

- 3 Pedal Footswitch

Table 3-14: Materials furnished with the Footswitch

Item	Description	Quantity	Note
1	Footswitch	1	

Peripherals Installation Instructions

Sony UP-D711MD Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack B/W Printer.

Installation Procedure

NOTE: The printer driver is customized for the Vivid T8/ Vivid T8 Pro at the factory; you do not need to change the settings.

1. Place the device in a suitable place.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet.
4. Connect the printer to the USB port, then turn on the printer.

Figure 3-4. Connect UP-D711MD to Vivid T8/ Vivid T8 Pro

Installation Procedure (continued)

5. Press **F2 (Config)** on the Control Panel.
6. Select **Connectivity**-> **Additional Outputs**, select the appropriate print key (Print1 or Print2) from the Button section.

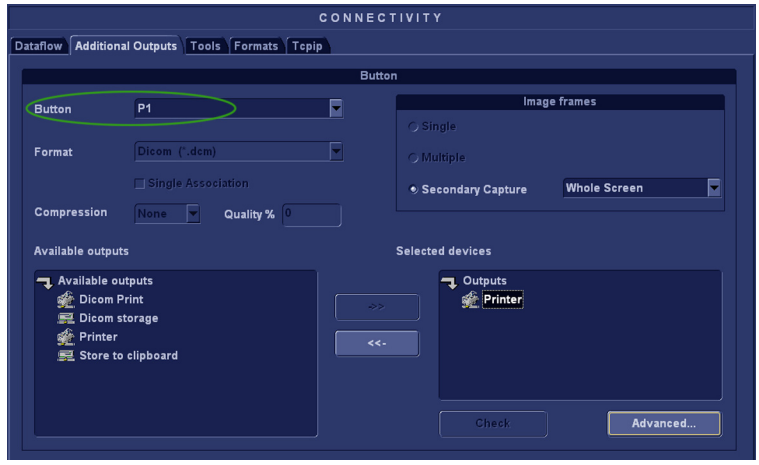


Figure 3-5. Connectivity->Addtional Outputs

7. Select **Printer** from the Selected Devices menu, and then select **Advanced**.

NOTE: After selecting the printer, the field turns Black.

NOTE: If Printer is not in the selected Devices menu, select it from the Available Devices in the left column and press “>>” to move to the selected Devices column.

Figure 3-6. Selected Devices

Installation Procedure (continued)

8. Select **Configure**.

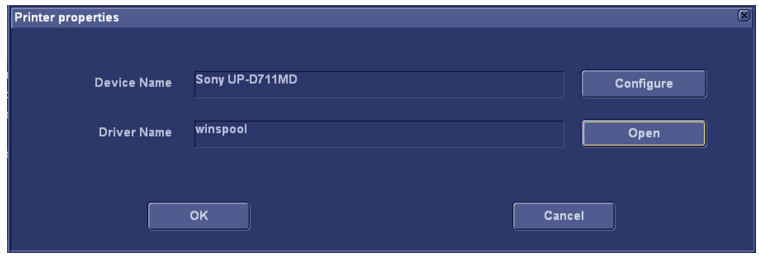


Figure 3-7. Printer Properties

9. Select Sony UP-D711MD from the Name pull-down menu, then select **OK**.

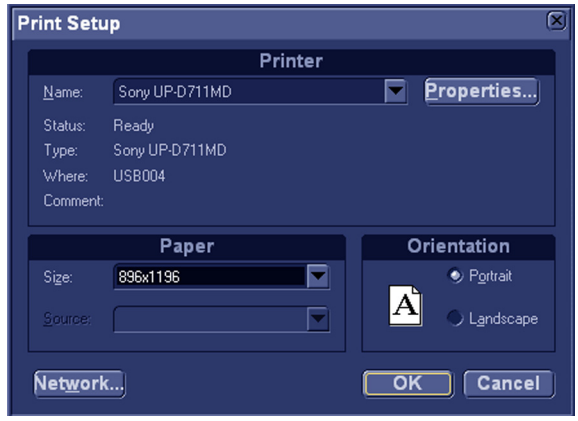


Figure 3-8. Print Setup

10. Select **OK**.

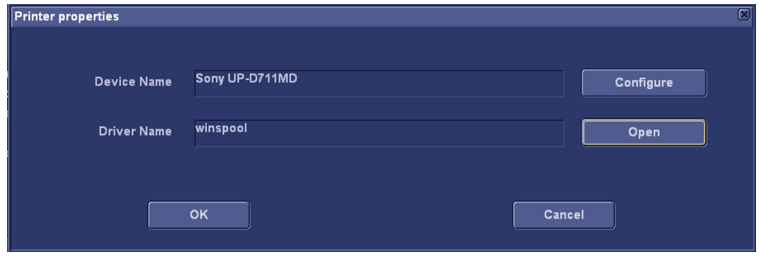


Figure 3-9. Printer Properties

Sony UP-D25MD Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the Sony UP-D25MD Printer.

Installation Procedure

1. Place the device in a suitable place.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet, then turn on the printer.
4. Connect USB cable to Vivid T8/ Vivid T8 Pro isolated USB port.

Figure 3-10. Color Printer connection

Installation Procedure (continued)

5. Press **F2 (Config)** on the Control Panel.
6. Select **Connectivity**-> **Additional Outputs**, select the appropriate print key (Print1 or Print2) from the Button section.

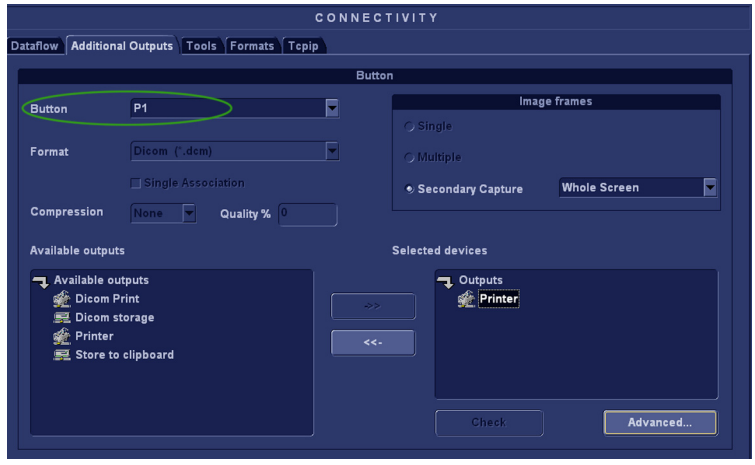


Figure 3-11. Connectivity->Addtional Outputs

7. Select **Printer** from the Selected Devices menu, and then select **Advanced**.

NOTE: After selecting the printer, the field turns Black.

NOTE: If Printer is not in the selected Devices menu, select it from the Available Devices in the left column and press “>>” to move to the selected Devices column.

Figure 3-12. Selected Devices

Installation Procedure (continued)

8. Select **Configure**.

Figure 3-13. Printer Properties

9. Select Sony UP-D25MD from the Name pull-down menu, then select **OK**.

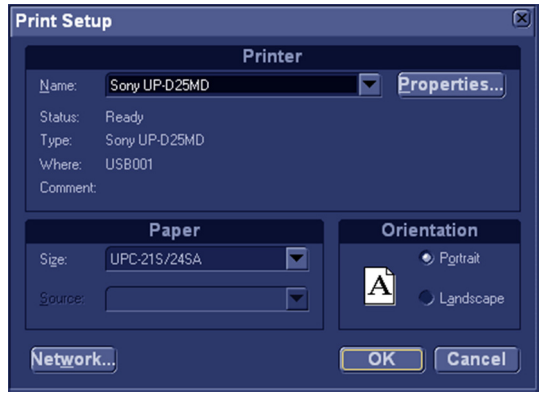


Figure 3-14. Print Setup

10. Select **OK**.

Figure 3-15. Printer Properties

HP Officejet 100 Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the HP Officejet 100 Printer.

Installation Procedure

1. Place the device in a suitable place.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet, then turn on the printer.
4. Connect USB cable to Vivid T8/ Vivid T8 Pro isolated USB port.

Figure 3-16. HP Officejet 100 connection

5. Refer to the Connectivity configure steps of ‘Sony UP-D711MD Printer Installation’ on *page 3-26*.

UP-D897 Printer Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the UP-D897 Printer.

Installation Procedure

1. Place the device in a suitable place.
2. Connect the USB Cable on the Printer.
3. Connect the power cord with the AC output in the wall outlet, then turn on the printer.
4. Connect USB cable to Vivid T8/ Vivid T8 Pro isolated USB port.

Figure 3-17. UP-D897 connection

5. Refer to the Connectivity configure steps of ‘Sony UP-D711MD Printer Installation’ on *page 3-26*.

Footswitch Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the Footswitch.
2. Ensure no physical damage.

Installation Procedure

1. Connect the Footswitch to the USB port on the Vivid T8/ Vivid T8 Pro system.

Figure 3-18. Connect Footswitch to the system

Footswitch Installation (continued)

Configuring Footswitch

Footswitch supports these configurations: No Function, Select, Image Store, Cursor, Pointer, Previous Cycle, next Cycle, Freeze, 2D, Color, Print, Print Alt., Rec/Pause.

Enter **Config (F2) -> Imaging -> Application** to configure the Footswitch functions.

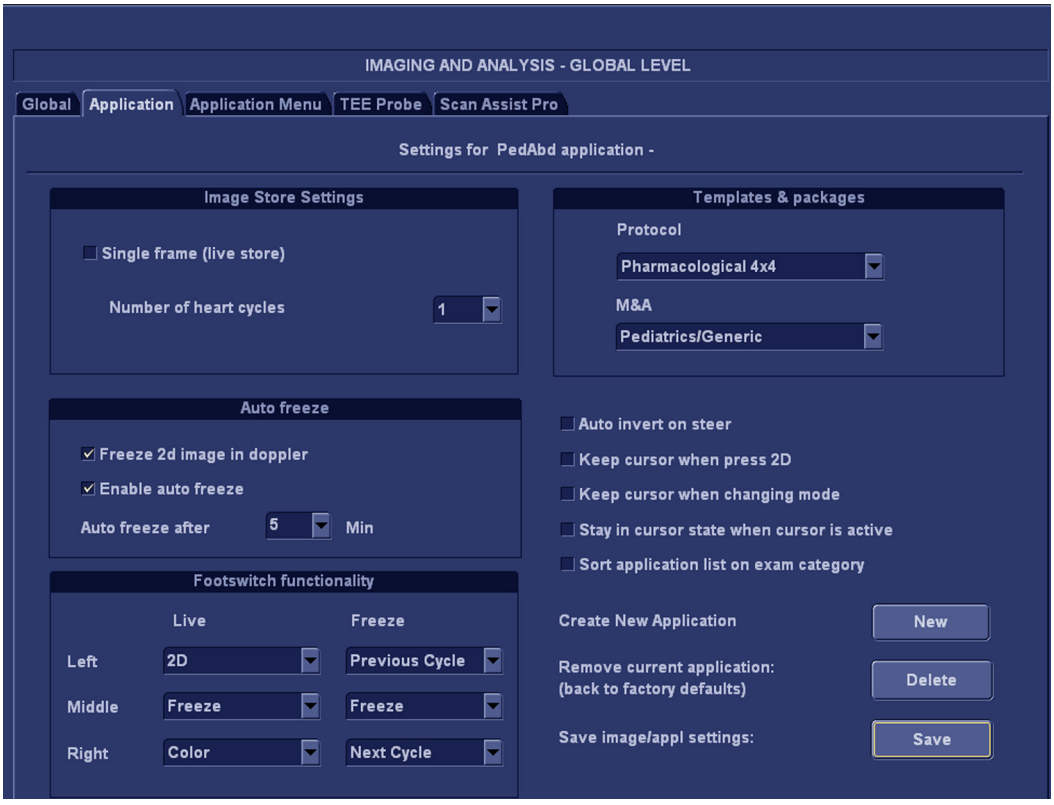


Figure 3-19. Configuring Footswitch Functions

USB2.0 HDD Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the USB2.0 HDD.
2. Ensure no physical damage.

Installation Procedure

1. Connect the USB2.0 HDD to the USB port on the Vivid T8/ Vivid T8 Pro system.

Figure 3-20. Connect HDD to the system

ECG Installation

Tools

No special tools needed.

Manpower

One person 5 min.

Preparations

1. Unpack the ECG.
2. Ensure no physical damage.

Installation Procedure

1. Connect the ECG to the ECG cable on the Vivid T8/ Vivid T8 Pro system.

Figure 3-21. Connect ECG to the system

Connectivity setup

TCP/IP Screen

1. Press ***F2*** on the control panel and login as admin, refer to ‘Logging on to Vivid T8/ Vivid T8 Pro as “ADM”’ on *page 4-10* .
2. Select **Connectivity** on the screen.
3. Select **TCP/IP** tab, the screen gives an overview of the network settings for Vivid T8/ Vivid T8 Pro.

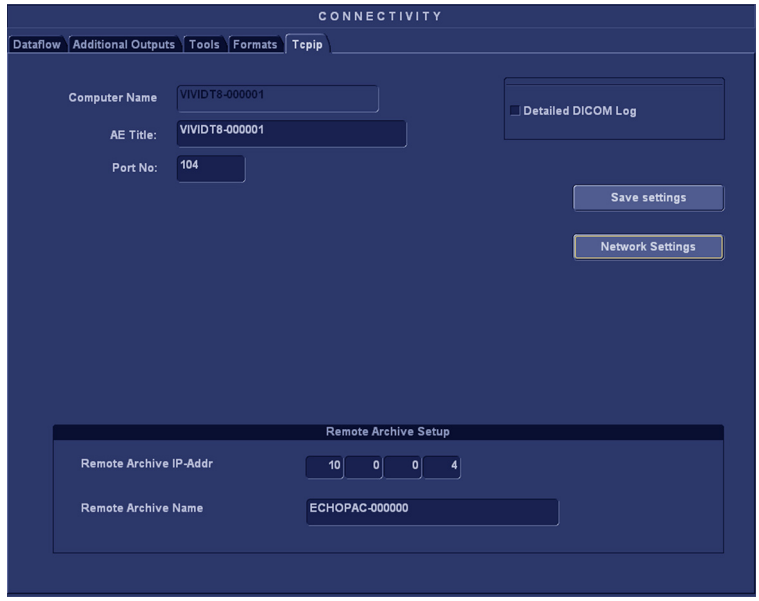


Figure 3-22. TCP/IP Screen

- Computer Name/AE Title: For Vivid T8/ Vivid T8 Pro, it is of this form: VIVIDX-00NNNN, NNNN is the system’s serial number.
- Port No: default number is 104.
- Detailed DICOM Log: selected to turn on Detailed DICOM Log. It will be turned off after the system restart.

TCP/IP Screen (continued)

- Saving Settings: Select to archive any changes that have been done to the TCP/IP Settings.
- Network Settings: Select to change the system's IP settings.
- Remote Archive Setup:

  Default Setup: Remote Archive IP-Addr: 10.0.0.4

  Remote Archive Name(The name of the PC or Server with the remote archive): ECHOPAC7-000001

Changing the AE title and/or Port Number

1. To change **AE Title** and/or **Port No**, edit the respective fields.

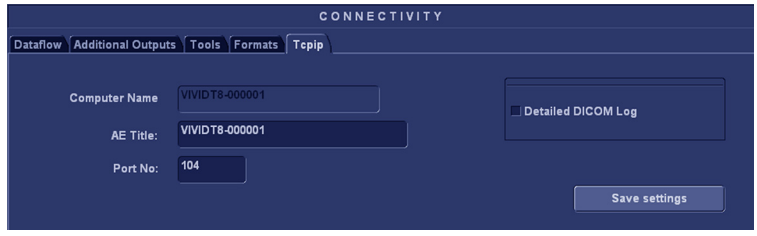


Figure 3-23. AE Title/Port No

2. Select **Save settings** to store your changes. This will bring up a new warning screen.

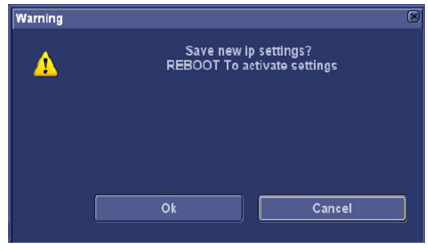


Figure 3-24. Warning Message

3. Select **OK** to save your changes or **Cancel** to return without saving any changes.
4. Reboot the system to activate the settings or continue with other TCPIP setup tasks.

Network setup

For network connection setup, See ‘Network Configuration’ on *page 7-12 for more information.*

Setup connection to a DICOM server

Vivid T8/ Vivid T8 Pro is configured to work with DICOM servers in a network environment. Images are first saved on the local image butter on the system. At the end of the examination the images are sent to the DICOM server via a DICOM spooler and to the local database, depending on dataflows.

To connect to the DICOM server, the following information has to be entered in the system.

- The DICOM server IP address
- The DICOM server port number
- The DICOM server AE title (the server application's name)

Setup connection to a DICOM server (continued)

1. Press ***Config (F2)*** on the control panel and log on as administrator.
2. Select **Connectivity** and then select **Dataflow** tab.
3. Select the arrow to the right for the **Name** field to list all dataflows in a pull-down menu and select the dataflow **DICOM Server**.

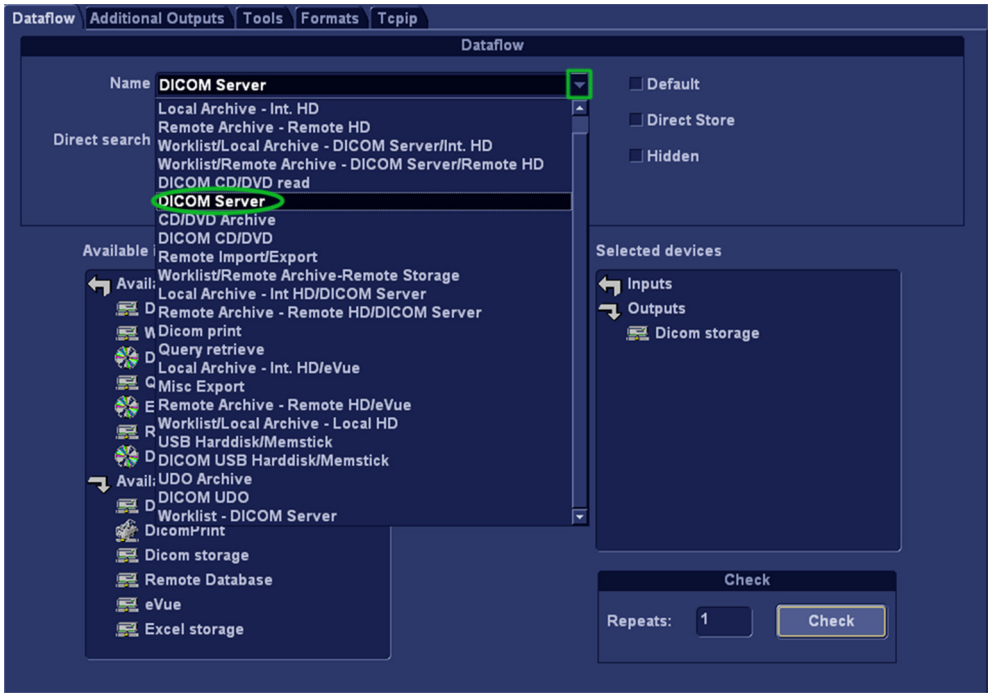


Figure 3-25. Select Dataflow

- If **Direct Store** is enabled, the image will go to the DICOM server immediately after it is acquired.

NOTE: *Make sure the DICOM server is capable of keeping the connection during an examination.*

- If **Hidden** is enabled, the dataflow will be invisible in the **Search/Create Patient** screen. Uncheck **Hidden** to display the dataflow in the **Search/Create Patient** screen.

Setup connection to a DICOM server (continued)

4. Select **Dicom storage** in the **Selected devices**, and then select **Properties** to display the Properties dialog.

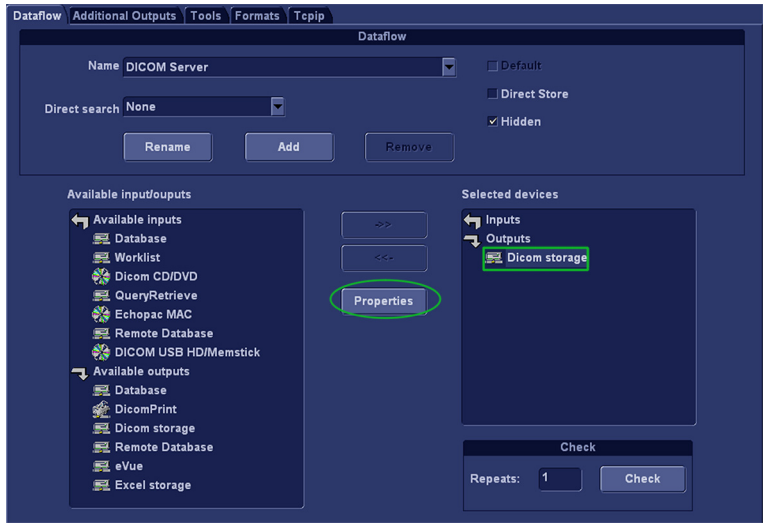


Figure 3-26. DICOM Server

5. Select the **IP-address** down-arrow to choose the DICOM Server from the pull-down menu.

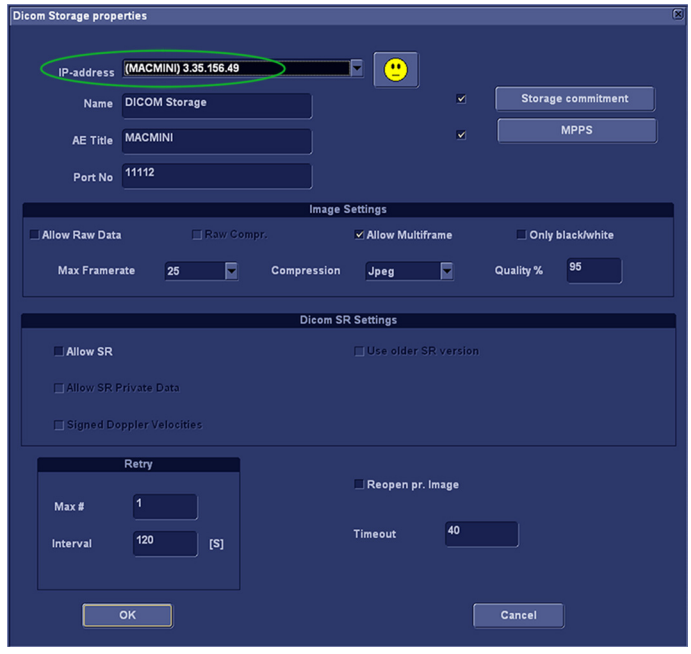


Figure 3-27. DICOM Server's Proprerties dialog

Setup connection to a DICOM server (continued)

6. 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.

Figure 3-28. Select <Modify>

   b. Select the server that need to modify from the **IPs** dialog and then select **Modify**.

Figure 3-29. Select the server to modify

   c. Edit the **Name** and/or the **IP address** of the server.

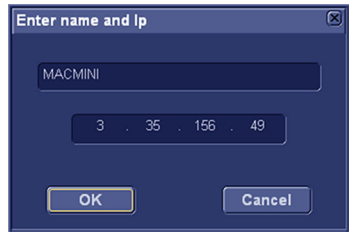


Figure 3-30. Edit Name and/or Ip address

   d. Select **OK** to save the new settings and close the dialog.

      Select **Cancel** to close the dialog and return to the **DICOM Properties dialog**.

Setup connection to a DICOM server (continued)

7. In **DICOM Server's Properties dialog**,
   - Enter the DICOM server **AE Title**. This entry is case sensitive and must match exactly.
   - Enter the DICOM server **Port No** (Port Number).

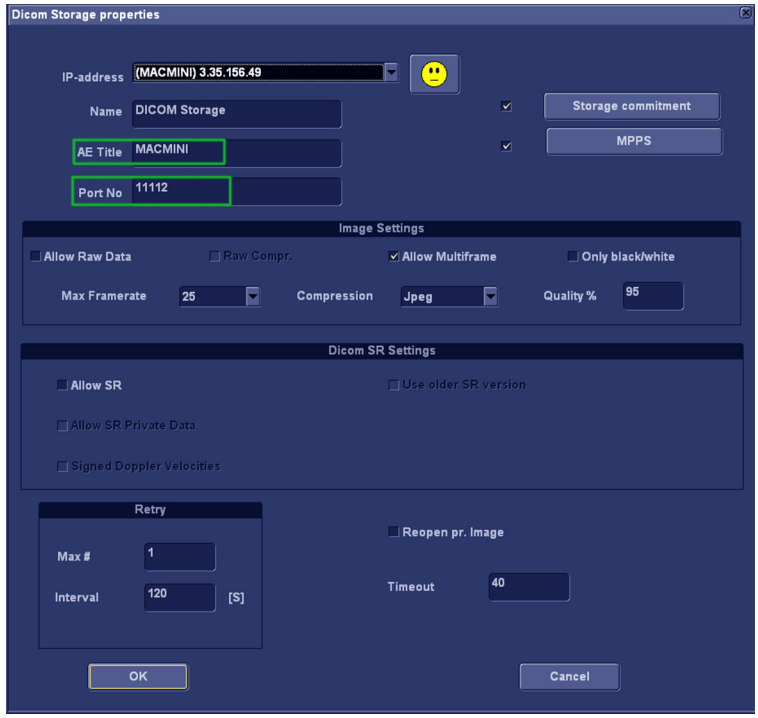


Figure 3-31. DICOM Server's Properties dialog

Select **OK** to close the DICOM properties dialog and save the changes.

Setup connection to a DICOM server (continued)

CAUTION

In Image Settings, setting compression to None may lead to very long transfer time and loops larger than 500s frames will be trucated. In case it happens, a warning is displayed on the screen.

The pull-down menu gives these chioces:

- Jpeg - JPEG/JPG compression (Default). JPEG is not lossless.
- None - (un-compressed data with huge files)

NOTE: *If you are using compression None, it is strongly advised to reduce Frame Rate to 25 or 30 to avoid truncating loops.*

- Rle - Run Length Encoding. This is lossless compression.
- Quality % - Set the wanted quality %. Default value is 95%.

  If files are stored with a quality lower than 95% they will occupy less space, but loose some quality.

NOTE: *Setting the quality % too low may add too much artifacts to the images that they cannot be used for diagnosis.*

If files are stored with a quality above 95%, the files will grow much larger without almost no quality change.

Figure 3-32. DICOM SR Settings

- **Allow SR**

  If SR is enabled, all M&A that is supported by DICOM is sent to the DICOM server (in a seperate job).
- **Allow SR Private Data**

  By default, this function is disabled. It is intended for receivers that can handle “Private Data”, such as CA-1000.
- **Signed Doppler Velocities**

  It is disabled by default. It means that signs for Doppler Velocities are removed in the DICOM SR.

Setup connection to a DICOM server (continued)

- **Retry**

  Max# - The number of times the software will try to connect if the connection doesn't succeed the first time(s).

  Interval - The interval in seconds between each attempt to connect.

- **Timeout**

  adjust the time-out setting.

  The retry settings can be used to make jobs retry on bad networks. There is no need to set retries for moblie (off-line) use.

Setup connection to a DICOM server (continued)

- Storage Commitment

  If enable Storage Commitment, check the check-box and select **Storage Commitment**. In the dialog, enter IP address, Name, AE Ttitle and port Number.

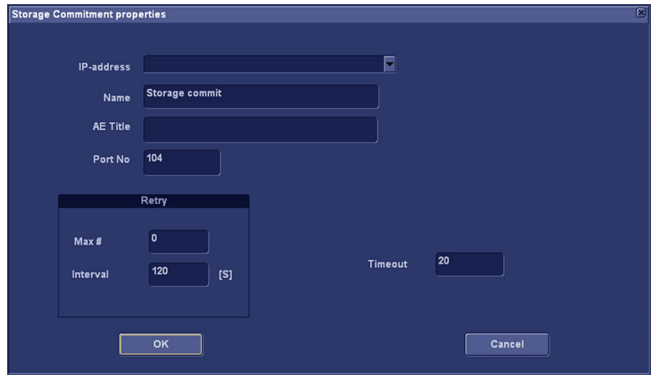


Figure 3-33. Storage Commitment Properties

- MPPS

  If enable MPPS, check the check-box and select **MPPS**. In the dialog, enter IP address, Name, AE Ttitle and port Number.

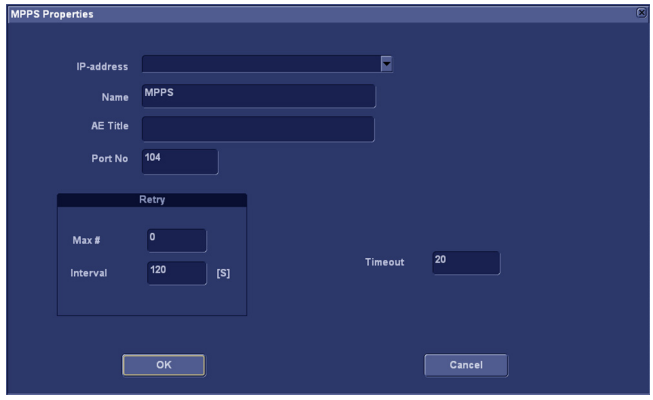


Figure 3-34. MPPS Properties

Verify the Network Connection to a Device

Follow the steps below to do a First Test (TCP-IP Ping) of the connection:

1. Highlight the device to be verified and select **Properties**.

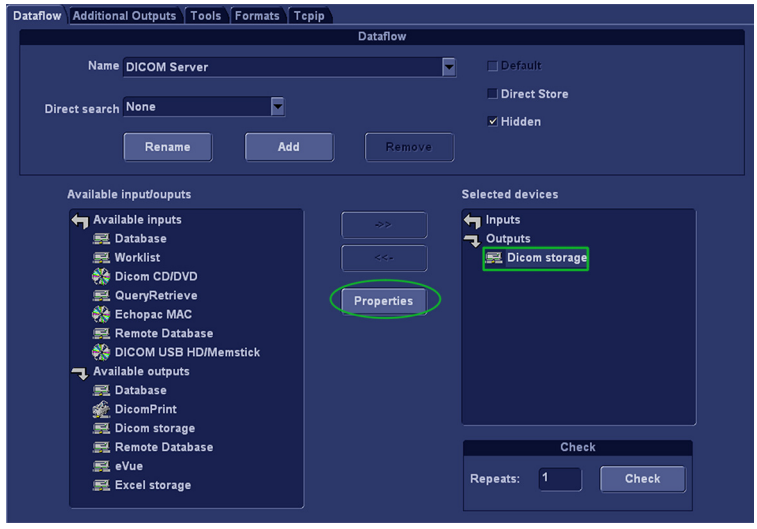


Figure 3-35. DICOM Server Properties dialog

2. Select the **"Smily"** button to **Ping** the server.

NOTE: *By selecting the "Smily" button, a ping is sent to the remote server to see if it is accessible via the network. It is not a DICOM Echo (DICOM ping), so it does not check AE title or port number.*

Figure 3-36. Ping Check

3. If the network connection to the server is OK, it will be illustrated by a smiling face  .

   A sad smily indicates that the network connection is failing.

   Typical causes:

   - Network cable not connected
   - Configuration erroe(s)

Verify the Connection to a Device

1. Select (highlight) the device you want to verify. Select **Check** to start the verification process of the connection to the device.

NOTE: Only one device can be checked at one time.

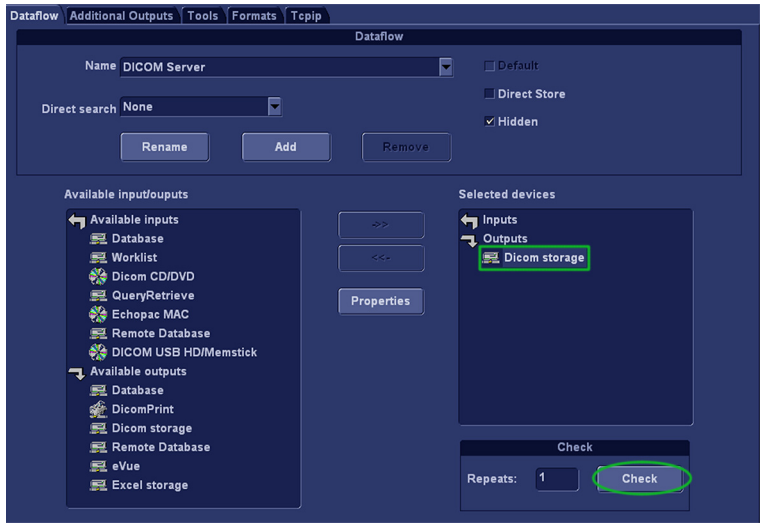


Figure 3-37. Verify the connection

2. The verification process may use some amount of time.

   When done, a check status is displayed.

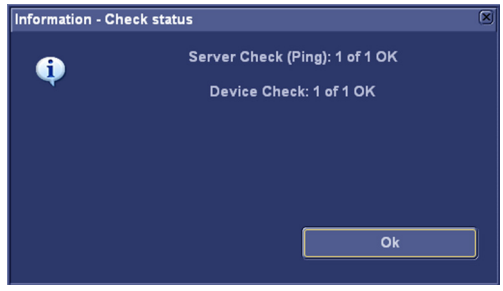


Figure 3-38. Check Status

Verify the Connection to a Device (continued)

Close the warning window, a sign is displayed on the left of the device icon, indicating if the test is passed ( ) or failed ( ).

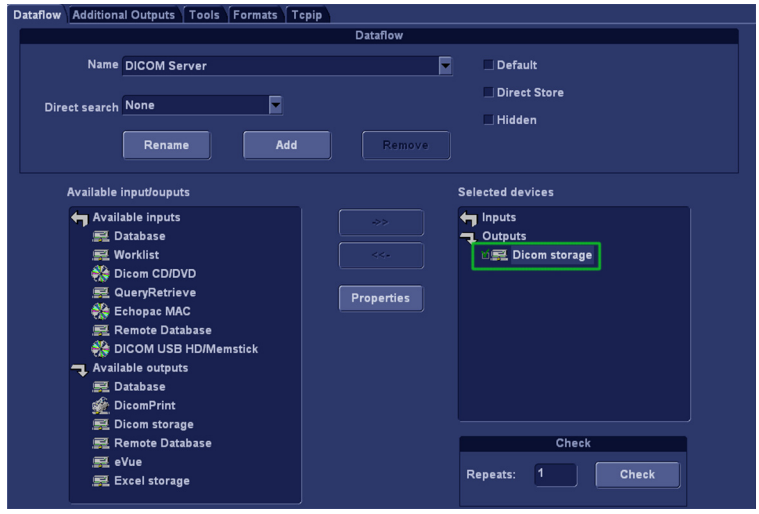


Figure 3-39. Verification Result

DICOM SR

DICOM sTRUCTURED rEPORTING (SR) is a standardized for medical results. Vivid T8/ Vivid T8 Pro supports the specialized form for Adult Echo Ultrasound (TID 5200 Echocardiography Procedure Report) and Vascular Ultrasound (TID 5100 Vascular Ultrasound Procedure Report) for M&A results.

With the DICOM SR support, M&A for an exam can be sent at the end of the exam or when exported from local archive. The destination can be either a server on the network or a removable media (DICOM Media), depending on the DICOM dataflow selected.

TID5200 Echocardiography Procedure Report is senf if the exam contains M&A from category Cardiac/Pediatric (heart) and Vascular/Abdominal categories, two SR documents are sent.

TID5200 Echocardiography Procedure Report and TID 5100 Vascular Ultrasound Procedure Report do not support all M&A results from Vivid T8/ Vivid T8 Pro. They are limited to the following:

- No unassigned measurement.
- Not modifies Simpson or Bullet methods.
- Basic derivations (Average, last, Min and Max), no references between the derived measurements and the ones they were made from.
- Wall Motion Scoring: individual segment scores only according to 16-segment model, no graded hypokinesis (only Hypokinesis is used).

DICOM SR must be activated for each DICOM device.

1. Press ***F2*** on the control panel and log on as admin.
2. Select **Connectivity**-> **Dataflow**, the dataflow sheet is displayed.
3. Select the DICOM dataflow to configure in the Name pull-down menu.

DICOM SR (continued)

4. Select a DICOM storage devicce in the **Selected devices** and then select **Properties**. The Properties window for the selected DICOM storage device is displayed.

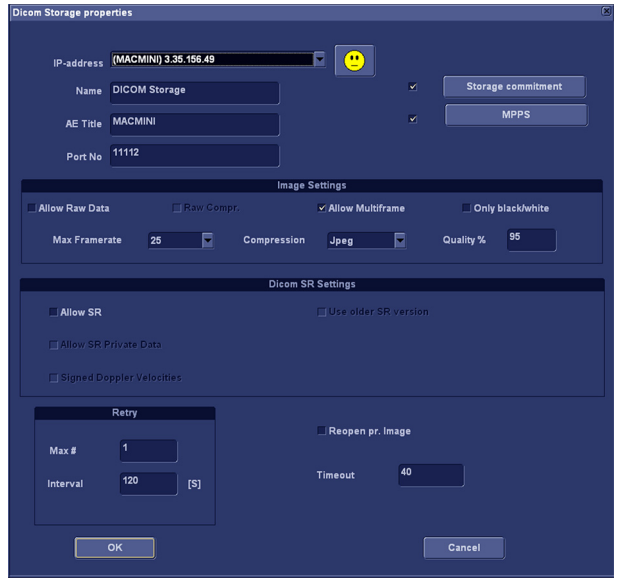


Figure 3-40. DICOM Storage Properties

5. Check the option **Allow SR** to enable DICOM SR.
   - **Allow SR private data**: send the current exam data ina private format. This option is by default unchecked and should only be used with DICOM storage devices that can handle private fata format.
   - **Signed Doppler velocities**: send signed Doppler veloities.
6. Select OK.

Export configuration

The destination for Export of patient records to Excel and MPEGmust be configured prior to use.

Setup on the Remote Share

Required setup on the remote share:

1. Add user/password
2. Set Share permissions
3. Set Security permissions

NOTE: *The User on the remote share must have all rights/controls for the shared folder.*

It is possible to set a secondary user if required by the remote share. For more information, see ‘Configurable Remote Path User’ on *page 3-54* .

Configurable Remote Path User

NOTE: The default User/Password is always used as primary log in credential. No attempt is made to use the secondary user if log in succeeds using the primary.

NOTE: The configurable User/Password is used for all remote paths configurable throughout the system as secondary log in credential.

NOTE: The User on the remote share must have all rights/controls for the shared folder.

Follow these steps to set up a Secondary Remote Path User:

1. Press **F2** on the control panel and log on as administrator if required.
2. Select **Connectivity** -> **Tools**.

   The *Tool* sheet is displayed.

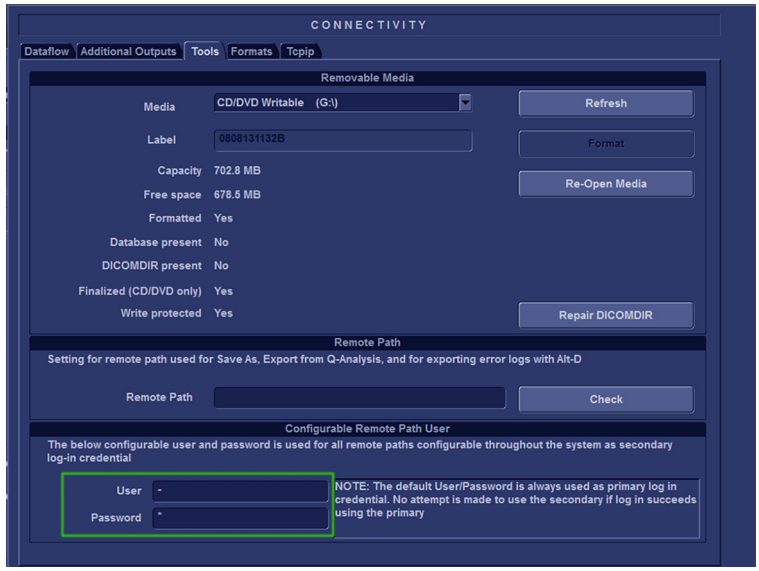


Figure 3-41. The Tools sheet

3. Enter the User and Password in the respective fields.

NOTE: The filed User can either be on the form of username or domain\username.

Display Dataflow screen

To configure the Export function:

1. Press **F2** on the control panel and log on as administrator.
2. Select **Connectivity** -> **Dataflow**.
   The *Dataflow* sheet is displayed.
3. Select the dataflow **Misc. Export** in the *Name* pull-down menu.

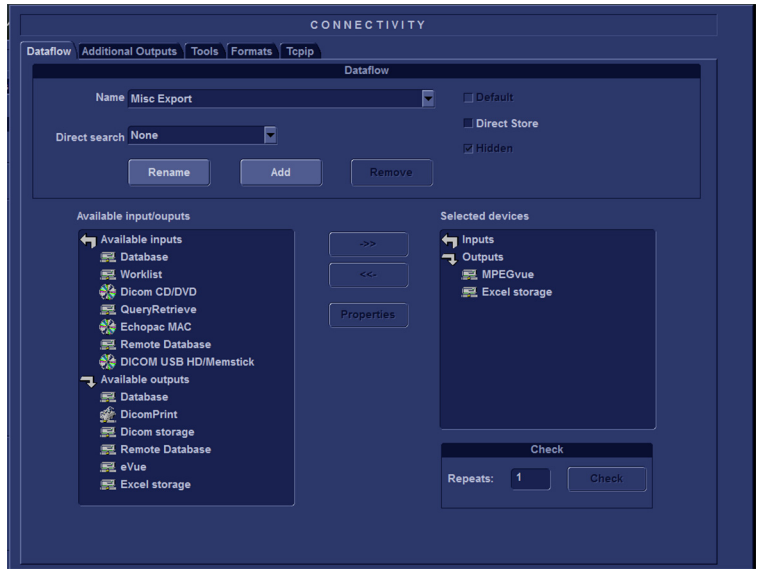


Figure 3-42. The Dataflow sheet

Export to Excel

1. Select the **Excel storage** device in the *Selected devices pane* and press **Properties**.

   The *Excel properties* window is displayed.

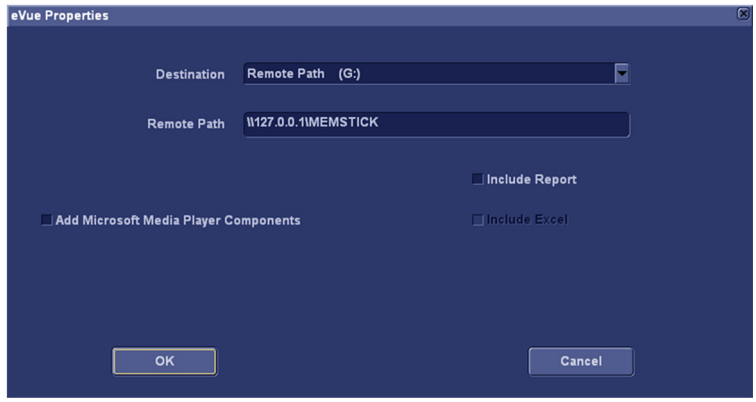


Figure 3-43. The Excel properties window

2. Select a network volume remote path as the destination in the *Destination* pull-down menu.

NOTE: *Remote paths of network volumes must be entered once in the Remote path field before they can be selected from the Destination pull-down menu. See 'Export configuration' on page 3-53 for more information.*

3. Select **OK** and press **Config**.

Export to MPEGVue configuration

1. Select the **eVue** device in the *Selected devices pane* and press **Properties**.

   The *eVue properties* window is displayed.

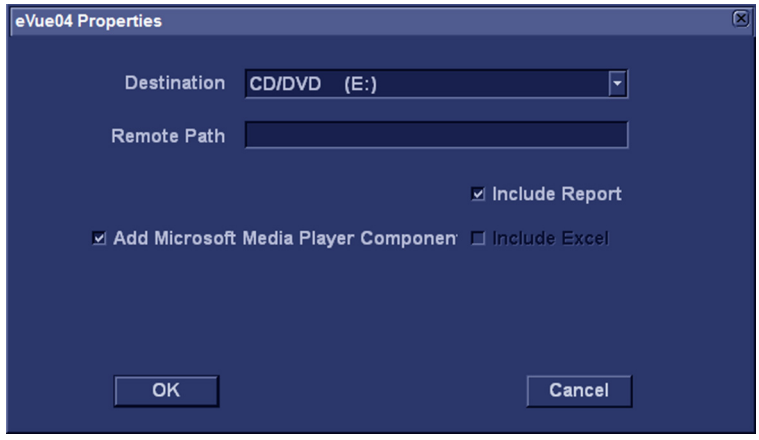


Figure 3-44. The MPEGVue properties window

2. Select a removable media or a network volume remote path as the destination in the *Destination* pull-down menu.

NOTE: *Remote paths of network volumes must be entered once in the Remote path field before they can be selected from the Destination Pull-down menu.*

3. Check the options as required.
4. Select **OK** and press **Config**.

eVue setup

1. Press **F2** on the control panel and log on as administrator.
2. Select **Connectivity** -> **Dataflow**.
   The *Dataflow* sheet is displayed.
3. Select the dataflow **Local Archive - Int. HD/eVue** in the Name pull-down menu.

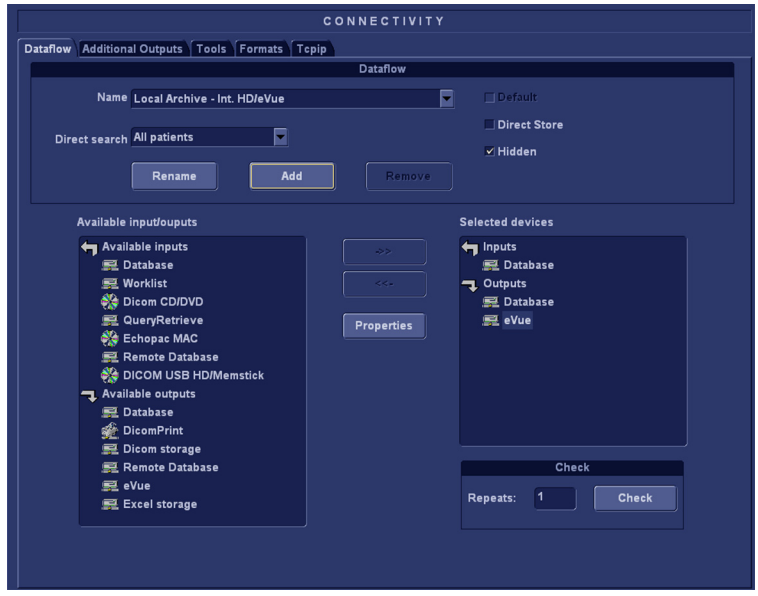


Figure 3-45. eVue dataflow

4. Select **eVue** device in the **Selected devices column** and select **Properties**. The eVue properties window is displayed.

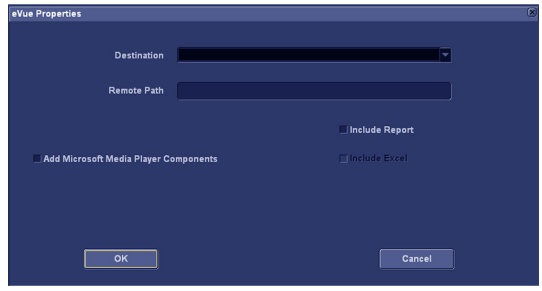


Figure 3-46. eVue Properties

eVue setup (continued)

5. Select a removable media or a network volume remote path as the destination in the *Destination* pull-down menu.

NOTE: Remote paths of network volumes must be entered once in the Remote path field before they can be selected from the Destination Pull-down menu.

6. Check the options as required.
7. Select **OK** and press **Config**.

Create a new dataflow

Overview

It is possible to make new dataflows by combining the predefined settings. The table below describes the legal combination of inputs and outputs in a dataflow.

Table 3-15: Allowed combination of inputs and outputs in a dataflow

	No Output	Database	Remote Database	DICOM Storage	Database+ DICOM Storage	Remote Database+ DICOM Storage
Database		X			X	
Remote Database			X			X
DICOM Worklist				X		
DICOM CD Read	X					
DICOM USB device Read	X					
Query/ Retrieve	X					
Worklist/ database		X			X	
Worklist/ remote database			X			X
No input device				X		

Create new dataflow with Worklist and DICOM Storage

1. Press ***F2*** on the control panel.
2. Select **Connectivity**->**Dataflow** to display the dataflow screen. Select **Add** to start the creation of a new dataflow.

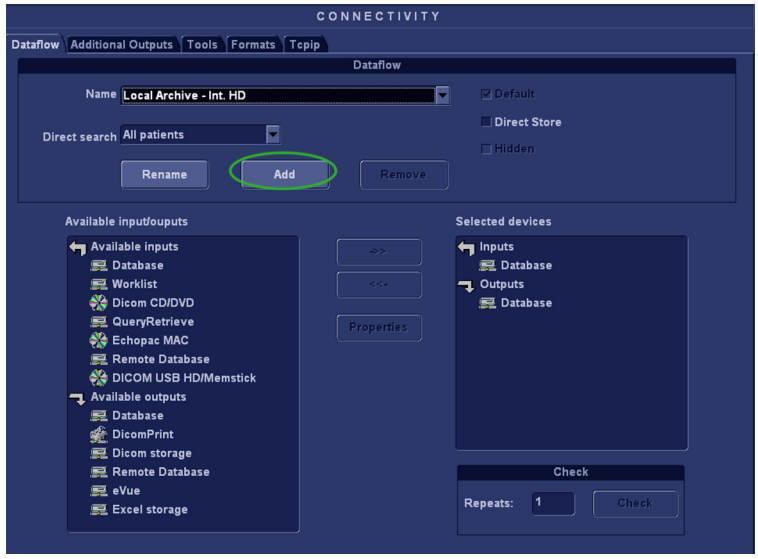


Figure 3-47. Connectivity-> Dataflow

3. It brings up the **Enter new name** dialog. Enter a name, e.g. **Worklist-DICOM Storage**, and then select **OK**.

Figure 3-48. Enter New Name

Create new dataflow with Worklist and DICOM Storage (continued)

4. Select **Worklist** in the **Available inputs** column, and then select **->>**.

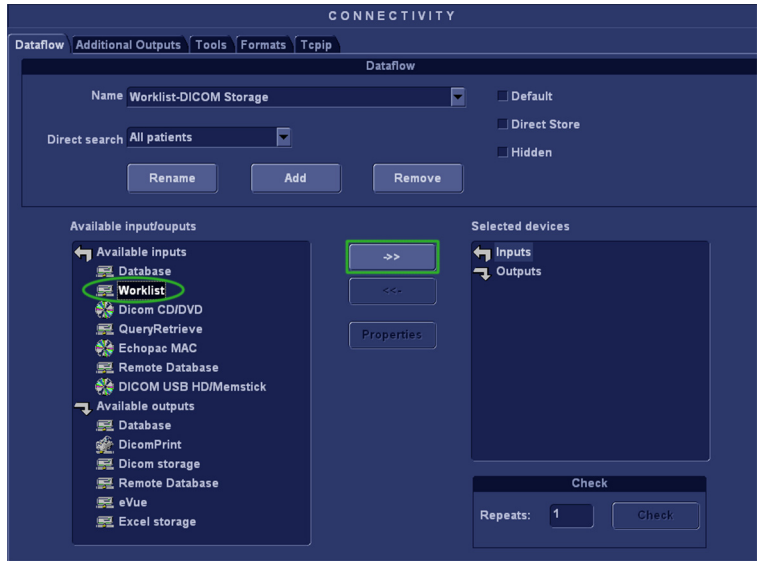


Figure 3-49. Add Input

5. In the pop-up Worklist properties window, configure the worklist's IP address, AE title and Port number and other necessary information.

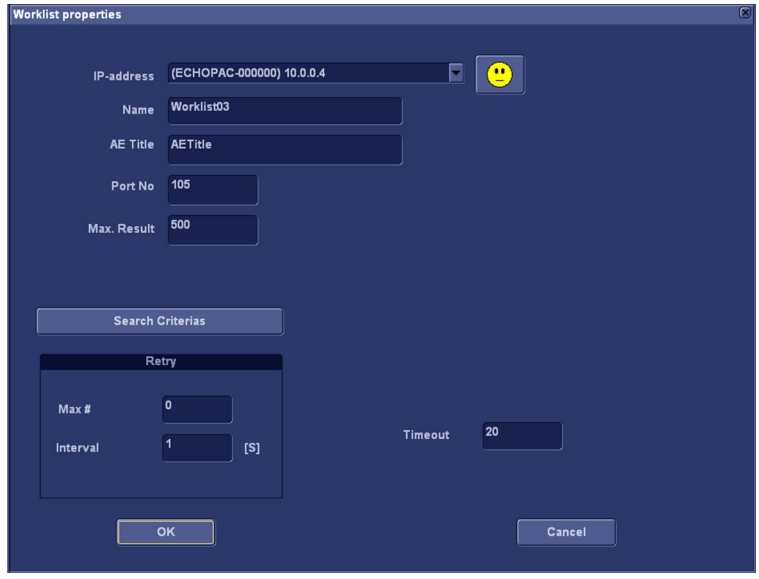


Figure 3-50. Worklist Properties

Create new dataflow with Worklist and DICOM Storage (continued)

6. Select **DICOM storage** in the **Available outputs** column, and then select **->>**.

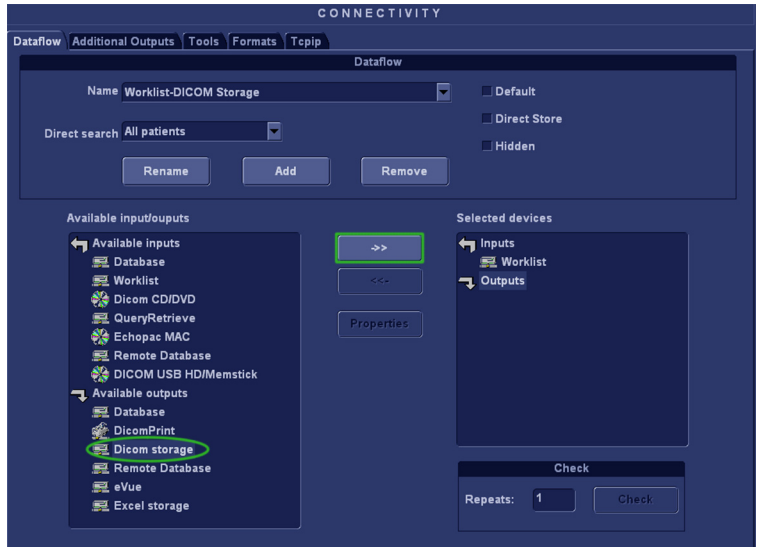


Figure 3-51. Connectivity

7. In the pop-up DICOM storage properties window, configure the worklist's IP address, AE title and Port number and other necessary information.

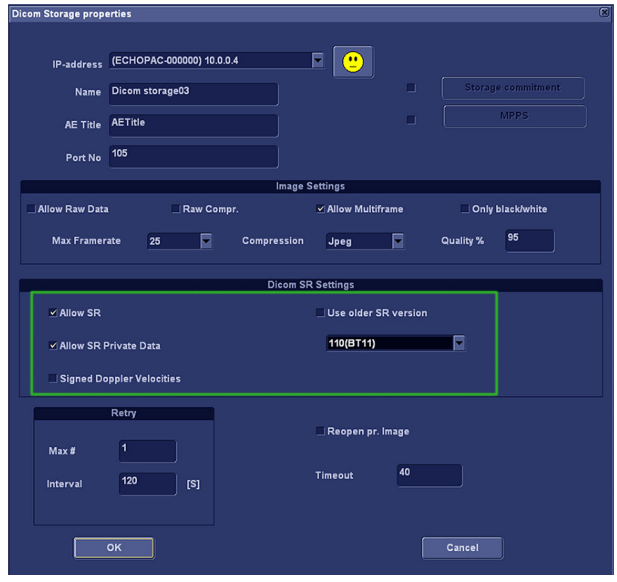


Figure 3-52.

Create new dataflow with Worklist and DICOM Storage (continued)

*NOTE: If the site has intergrated EchoPAC PC and CA-1000, enable **Allow SR** and **Allow SR Private Data**. **Signed Doppler Velocities** is disabled by default. This means that signs for Doppler Velocities are removed in the DICOM SR.*

8. If this dataflow should be the default at start-up, enable **Default** for the dataflow.

Query/Retrieve Setup

The Query/Retrieve function makes it possible to search and retrieve DICOM data from a DICOM server for further analysis on the Vivid T8/ Vivid T8 Pro.

NOTE: You may have to set up Vivid T8/ Vivid T8 Pro as a destination on the server.

Query/Retrieve Setup on Vivid T8/ Vivid T8 Pro

1. Press **F2** on the control panel and log on as administrator.
2. Select **Connectivity** -> **Dataflow**.
   The *Dataflow* sheet is displayed.
3. Select **Query retrieve** from the Name pull-down menu.

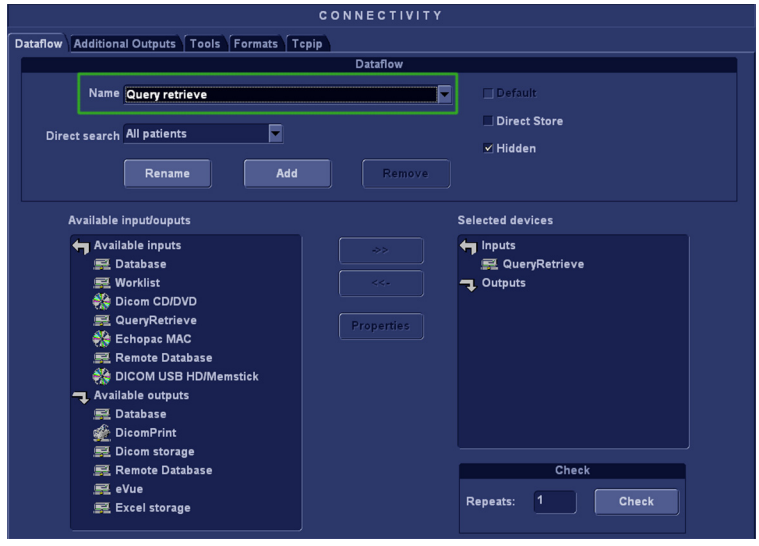


Figure 3-53. Select Query Retrieve

Query/Retrieve Setup on Vivid T8/ Vivid T8 Pro (continued)

4. Select **QueryRetrieve** in the **Selected** column and then select **Properties** to display the Properties dialog.

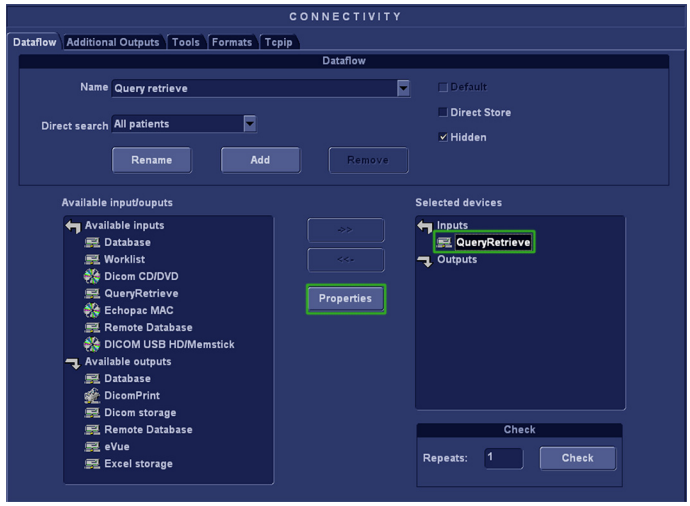


Figure 3-54. Select Properties

5. Select the DICOM Query/Retrieve server from the IP-address pull down menu. In some cases, the server is the same as used for DICOM Storage.

   If the server is missing from the list, select **Modify** from the pull down menu and edit the setup for one of the predefined servers.

   Enter the correct AE Title and Port Number for the DICOM Query/Retrieve server in the respective fields in the Query/ Retrieve screen.

Figure 3-55. Query/Retrieve Properties

Query/Retrieve Setup on Vivid T8/ Vivid T8 Pro (continued)

Follow the steps below to change the Search Criterias parameters:

a. Select **Search Criterias**

Figure 3-56. Search Criterias

b. Select the correct tag from the pull down menu. If needed, type in the value. Then select **Add to List.**

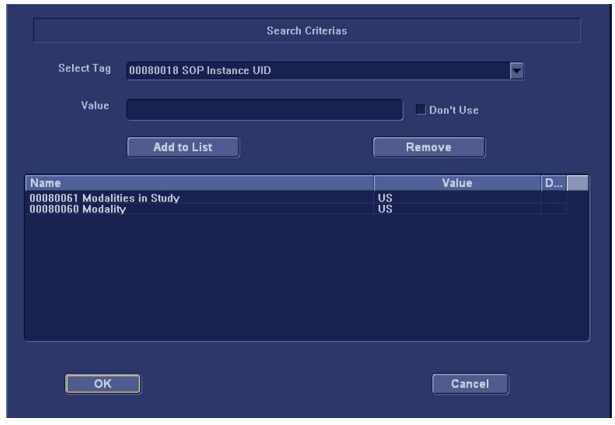


Figure 3-57. Change Search Criterias

c. Select OK to close the window.

Query/Retrieve Verification

1. Follow the steps in ‘Verify the Network Connection to a Device’ on *page 3-47* to verify the TCP/IP connection of the Query/Retrieve Server.
2. Follow the steps in ‘Verify the Connection to a Device’ on *page 3-49* to verify the connection to the Query/Retrieve Server.

Option Setup

Software Option Installation Procedure

NOTE: Not all features described in this section may be available or cleared for sale in all markets. Please contact with your local GE Ultrasound representative to get the latest information.

1. Power on the system.

NOTE: Keep the power cord connection during the installation.

2. After the power-up sequence is complete, press **Config (F2)** on the control panel, and then select **Admin**.

WARNING

For software Option Installation, the operator must login as Administrator.

3. In **System Admin** tab, select **New**.

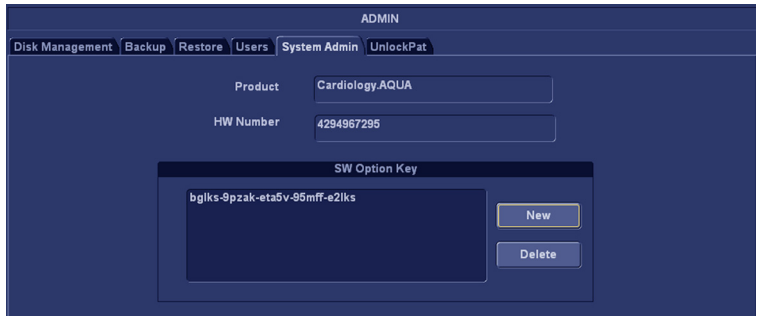


Figure 3-58. New Option Key

Software Option Installation Procedure (continued)

4. In the pop-up screen, input the new key and select **Save**.

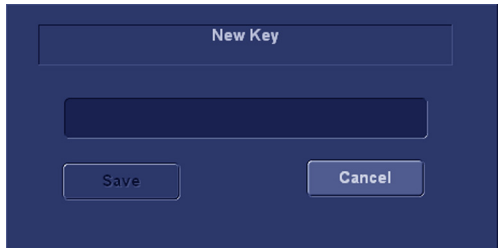


Figure 3-59. Dialog Window

NOTE: There is no need to restart the system after each installation, if several option keys are installed at one time. Select Cancel for the first several times, and select OK after the last installation to activate all the changes.

5. After the system is powered on, check the option status.

   The option status explanation:

   - Permanent: This option is enabled in the system.

6. Exit and check the function of the option installed.

Paperwork after setup

NOTE: During and after setup, the documentation (i.e. CDs with documentation, User Manuals, Installation Manuals, etc.) for the Vivid T8/ Vivid T8 Pro and the peripherals must be kept as part of the original Ultrasound system documentation. This ensures that all relevant safety and user information is available during the operation and service of the complete Ultrasound system.

Contents in this Section

User's Manual(s)

User Check that the correct User Manual(s) for the system and software revision, is included with the installation. Specific language versions of the User Manual may also be available. Check with your GE Sales Representative for availability.

Product Locator Installation Card

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

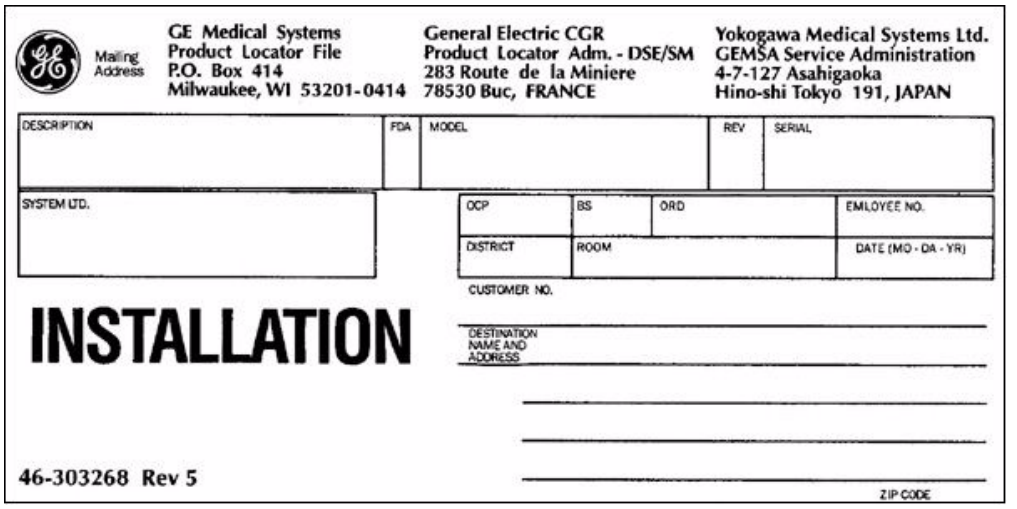


Figure 3-60. Product Locator Installation Card (Example)

Chapter 4

General Procedures and Functional Checks

This chapter provides procedures for quickly checking major functions of the Vivid T8/ Vivid T8 Pro and diagnostics instructions using the built-in service software.

Overview

Purpose of this chapter

This chapter provides procedures for quickly checking major functions of the scanner and diagnostics instructions using the built-in service software.

Contents in this chapter

Special Equipment required

To perform these tests, you'll need any of the sector, linear, or convex probes. (Normally you should check all the probes used on the system).

General procedures

CAUTION

Ultrasound system requires all covers.

Operate this Ultrasound system only when all board covers and frame panels are securely in place. The covers are required for safe operation, good Ultrasound system performance and cooling purposes.

WARNING

Energy Control and Power Lockout for Vivid T8/ Vivid T8 Pro.

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

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

Ultrasound System components may be energized.

Overview

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

Contents in this section

Power ON/Boot Up

Warnings

d  DANGER

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

d  DANGER

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

d  DANGER

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

c  CAUTION

Ultrasound system requires all covers.

Operate this Ultrasound system only when all board covers and frame panels are securely in place. The covers are required for safe operation, good Ultrasound system performance and cooling purposes.

c  CAUTION

Use only power supply cords, cables and plugs provided by or designated by GE Healthcare.

NOTE: Do not cycle the Circuit Breaker ON-OFF-ON in less than five (5) seconds. When turning OFF the Circuit Breaker, the Ultrasound system should de-energize completely before turning the circuit breaker ON.

Connect AC (mains) Power to Vivid T8/ Vivid T8 Pro

Connecting AC Power to the Vivid T8/ Vivid T8 Pro 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 Circuit Breaker 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 near the Circuit Breaker on the rear of the unit.
5. Connect the Power Cable's female plug to the Power Inlet at the rear of the unit.
6. Lock the plug in position with the Retaining Clamp (ACC Clamp).
7. Verify that the Mains Power Circuit Breaker is in OFF position, if not, switch it OFF.
8. Connect the Power Cable's other end (male plug) to a hospital grade mains power outlet with the proper rated voltage, and the unit is ready for Power ON/Boot Up.

Switch ON the AC Power to Vivid T8/ Vivid T8 Pro

1. Switch ON the Mains Power Circuit Breaker at the rear of the unit.

   You should hear a “click” from the relays in the AC Power and the unit is ready to boot.
2. Press once on the **On/Off** key on the Operator Panel to boot the unit.

   During a normal boot, you may observe that:

   a. The unit’s ventilation fan starts on full speed, but slows down after a few seconds (listen to the fan sound).

   b. Power is distributed to the peripherals, Operator Panel (Console), Monitor, Front End Processor and Back End Processor.

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

   d. Back End Processor is turned ON and starts to load the software.

   e. The Start Screen is displayed on the monitor.

   f. A start-up bar indicating the time used for software loading, is displayed on the monitor.

   g. The software initiates and sets up the Front End electronics and the rest of the instrument.

   h. The backlight in the keyboard is lit.

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

NOTE: *Total time used for start-up is typical one and a half minutes or less. If starting after a power loss or a lock-up, the start-up time may be up to four minutes.*

Power off

When you switch off the unit, the system performs an automatic shutdown sequence.

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

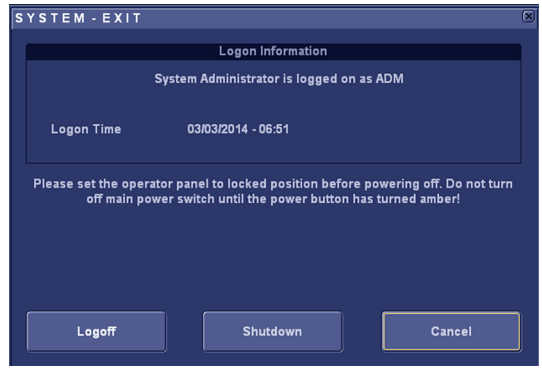


Figure 4-1. System Exit Window

- **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 will shut down. It is recommended to perform a full shutdown at least once a week.

  If the Shutdown button is dimmed, use the key-combination <Ctrl+Alt+Delete> to shut down the unit.

NOTE: To enable the key-combination <Ctrl+Alt+Delete>, the dongle should be connected to the system.

- **Cancel**

  Use this button to exit from the System-Exit menu and return to the previous operation.

Power off (continued)

System shutdown

Disconnect the Mains Power Cable is necessary. *For example:* Relocating the scanner.

DO NOT unplug and/or transport the unit until after the power off sequence has been completed. Failure to do so may result in corrupted patient files.

LCD Monitor position adjustment

Refer to User Manual for LCD Monitor position adjustment.

Logging on to Vivid T8/ Vivid T8 Pro as “ADM”

Select **Utility** tab on the touch screen, then select **Config**.

It will bring up the **Operator Login** dialog where you must log on.

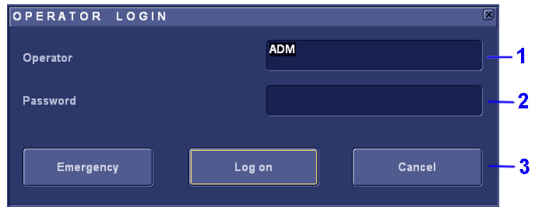


Figure 4-2. Operator Login Window

1. **Operator**: Select the operator.
2. **Password**: Enter Operator’s password (optional).
3. Select the type of Login or Cancel.
    - **Emergency**: Stores data only from current patient examination.
    - **OK**: Standard login.
    - **Cancel**: Cancel login.

As default, two users are defined, USR and ADM.

- USR

If you log on as **USR,** you will have access to do set-up tasks that a user may need to do during daily use.

As default, no password has been set for **USR**. Just type the name **USR**, and select **Login**.

- ADM

If you log on as **ADM**, you will have access to do general set-up, service adjustments, adjust network and connectivity settings.

As default, the password for **ADM** is **ulsadm** .

Select the name **ADM**, the password (**ulsadm**) and select **Login**.

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

Removable media

Refer to the latest revision of the User Manual to perform the following tasks:

- Using Removable Media
- Labeling Removable Media
- Formatting Removable Media
- Verifying Removable Media

Archiving and loading presets

NOTE: Always save presets before any software reload. This ensures 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 DVD-R disk (or USB memory device) for reloading on the system.

NOTE: Presets should NOT be saved on the same USB memory device (or DVD-R disk) as images. The Archive Menu lists the images but does NOT list the presets stored on a USB memory device (or DVD-R disk).

Archiving Presets to a USB memory device (or DVD-R Disk)

1. Connect the USB memory device to the system's USB port, or insert an empty (blank) DVD-R disk into the DVD-RW.
2. Access to the Config/Admin Menu, and select Backup. The Backup sheet will be shown on the LCD display.

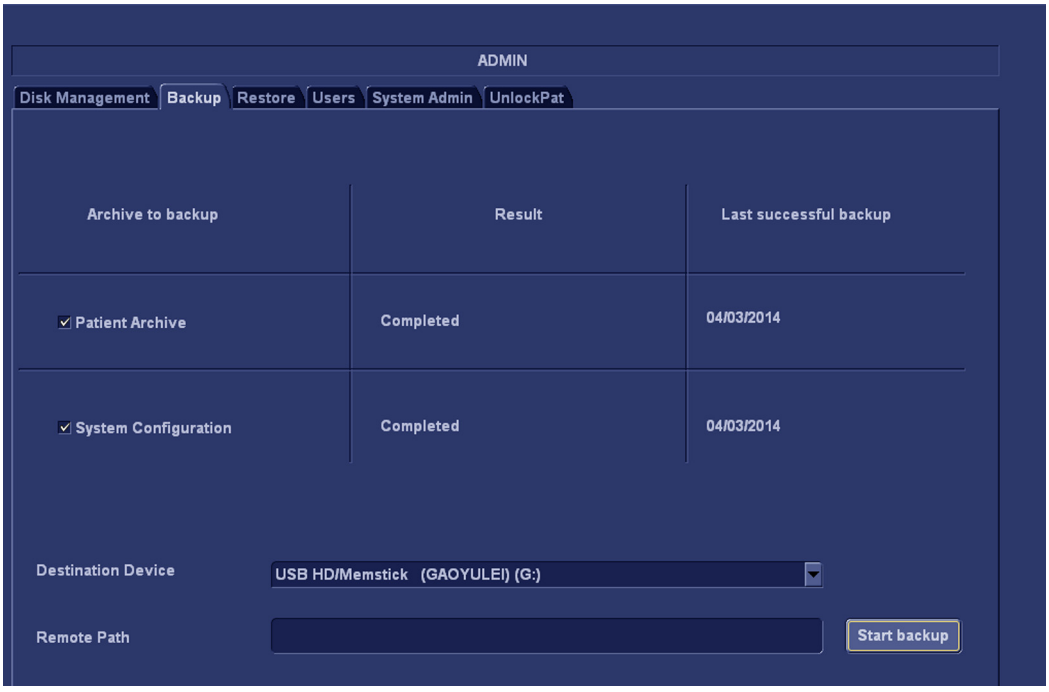


Figure 4-3. Backup Sheet

Archiving Presets to a USB memory device (or DVD-R Disk) (continued)

3. Select the item to Backup.
4. Enter backup destination or browse through the disk to locate the destination.
5. Select Backup. The backup status for each item is displayed on the Result column.

Loading Presets from a USB memory device (or DVD-R)

1. Connect the USB memory device or DVD-R with the archived Presets to the system.
2. Access to the Config/Admin Menu, and select Restore. The Restore sheet will be shown on the LCD display. See Figure 4-3 *on page 4-12*.
3. Select the items needed to be restored.
4. Select Restore. The system performs the restore and restarts.

Data Management

Refer to the latest revision of the Vivid T8/ Vivid T8 Pro User Manual to perform the following tasks:

- Configuring the Disk Management Function
- Setting the Disk Management Schedule
- Configuring Data Management Settings
- Configuringestination Device Setting
- Running the Disk Management Function
- Starting Disk Management Manually

Backup

For more information, refer to the latest revision of the Vivid T8/ Vivid T8 Pro User Manual.

Installation and Setup Procedure for Peripherals

Please refer to ‘Peripherals Installation Instructions’ on *page 3-26*.

Where are the User Manuals and the Service Manual?

Online versions of the User Manuals are available via the help function.

Both the User Manuals and the Service Manual are delivered as PDF files on a CD-ROM. Paper copies may be ordered from GE.

How to display or print the PDF files from the Manual CD?

1. Insert the CD-R disk (CD-ROM) into the CD-drive on a PC or Laptop with Adobe Acrobat Reader.

Do not try to use the Vivid T8/ Vivid T8 Pro to read these files, it will not work!

2. Follow the instructions on the screen to display the manual of choice.
3. Before printing the complete manual, or pages from the manual, select **File > Page Setup**.
4. Select the **paper size** and choose **Portrait**.
5. Select **File > Print** to start printing. In the pop up window, you may choose which pages to print and the number of copies you want to print (usually 1 copy).

Cleaning the Trackball

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

Manpower

One person, 10 minutes,

Tools

- Antistatic brush and/or antistatic vacuum cleaner

Preparations

To get access to the trackball for cleaning, you must must perform the following steps:

1. Power down the system.
2. Disconnect the mains power cable from the wall outlet.

Follow these links if you need more information: See ‘Power off’ on *page 4-8 for more information.*

Clean the Trackball

Dust is often building up behind the ball, so it interferes with the ball rotation and for optical trackballs the light used for sensing. To get access for cleaning, you need to remove the ball.

The ball is held in position by the Dust Gasket.

1. Power off the system.
2. Rotate the dust gasket counterclockwise until it can be removed from the keyboard.

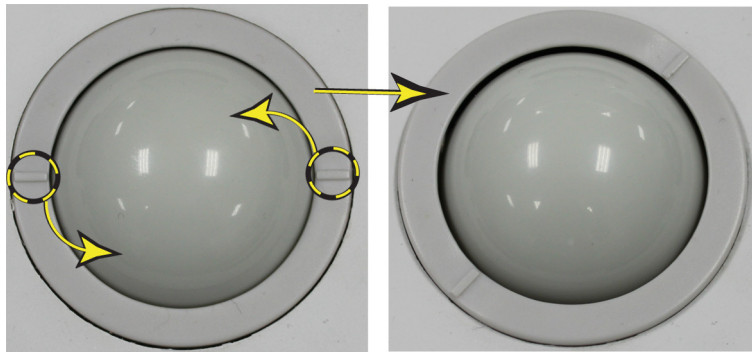


Figure 4-4. Remove the retainer

3. Separate the trackball and the gasket. Wipe off any oil or dust from the trackball, gasket and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and gasket, then put it into the housing and rotate it clockwise until its notches are set in the position.

CAUTION

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Test the Trackball

Power up the and test that the trackball now works as intended.

Functional checks

Overview

In this section, the functional checks for are described. Functional checks are used to verify that the product works as intended. Functional checks may also be used during troubleshooting.

Contents in this Section

Preparation

Turn on power to Vivid T8/ Vivid T8 Pro. For detailed description, See ‘Power ON/Boot Up’ on *page 4-5 for more information.*

Basic Controls

Operator Panel

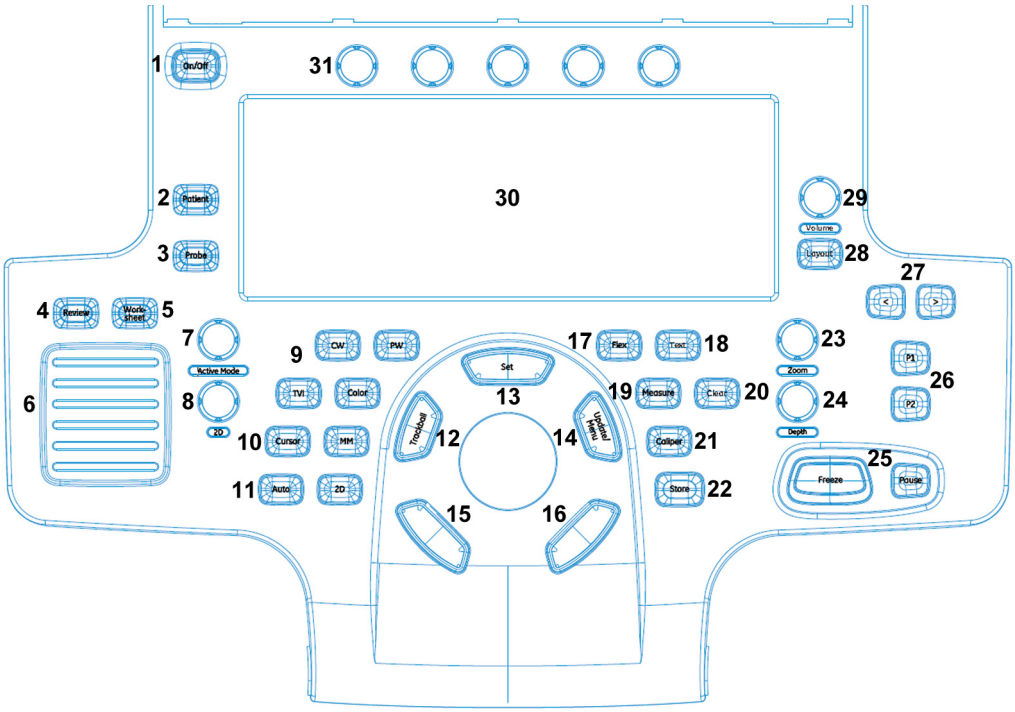


Figure 4-5. Control Panel Map

1. Power On/Off Switch
2. Patient Key
3. Probe Key
4. Image Review
5. Worksheet
6. TGC Sliders
7. Active mode
8. 2D mode
9. Scan mode Controls
10. Cursor Key
11. Auto
12. Trackball
13. Set key
14. Update/Menu key
15. User Defined key
16. User Defined key
17. Flex key
18. Text key
19. Measurement
20. Clear key
21. Caliper key
22. Store key
23. Zoom
24. Depth
25. Freeze and Pause key
26. P1 and P2 print keys
27. Left/Right key
28. Layout key
29. Volume
30. AN keyboard
31. Rotary buttons

Touch panel

The Touch panel enables the access of context specific controls. The mode/function specific controls are organized in tabbed folders. Within each folder several pages may be accessed. Only the folders available in the current state are displayed and can be accessed by pressing the corresponding folder tab on the Touch panel.

At the bottom of the Touch panel, there are five combination rotary/push buttons. The functionality of these rotaries changes, depending upon the currently-displayed folder/page.

Performance Tests

Test Phantoms

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

2D Mode (B mode) Checks

Introduction

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

2D Mode Screen Example

Preparations

- Connect one of the probes.
- Turn ON the scanner.

  The 2D Mode is displayed (default mode).

Adjust the 2D mode controls

Press **2D** on the Operator Panel to access 2D mode.

These Image Controls are used to optimize the 2D picture. Verify that all the listed controls are working as intended:

- Use Gain and TGC controls to optimize the overall image together with the Power control.
- Use Depth to adjust the range to be imaged.
- Use Focus to center the focal point(s) around the region of interest.
- Use Frequency (move to higher frequencies) or Frame rate (move to lower frame rate) to increase resolution in image.
- Use Frequency (move to lower frequency) to increase penetration.
- Use the **Reject** control to reduce noise in the image.
- Use the DDP control to optimize imaging in the blood flow regions and make a cleaner, less noisy image.
- Use **UD Clarity** (Cardiac) or **UD Sp. Re.** (non-cardiac) to reduce image speckle. Extra care must be taken to select the optimal Speckle reduction level, as too much filtering of speckle can mask or obscure desired image detail.
- Use **Adaptive reject** (Cardiac) to reduce near field haze and blood pol artifact without diluting tissue appearance of moving structures.

M Mode Checks

Introduction

M-Mode Screen Example

Preparations

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

  The 2D Mode window is displayed (default mode).
- Press **MM** on the Operator panel to bring up an M-Mode picture on the screen.

  Use the trackball to position the cursor over the required area of the image.

Adjust the M Mode controls

These Image Controls are used to optimize the M mode picture. Verify that all the listed controls are working as intended:

- Adjust **Horizontal sweep** to optimize the display resolution.

  Adjust **Gain** and TGC controls to adjust the range to be imaged.

  Use the **Frequency** (move to higher frequencies) or the **Frame rate** control (move to lower frame rate) to increase resolution in image.

  Use the **Frequency** (move to lower frequency) to increase penetration.

  Adjust **Focus** to move the focal point(s) around the region of interest in the M-Mode display.

  Adjust **Dynamic range** to optimize the useful range of incoming echoes to the available grey scale.

  Adjust **Compress** and **Edge Enhance** to further optimize the display.

  Adjust **Reject** to reduce noise while taking care not to eliminate significant low-level diagnostic information.

Color Mode Checks

Introduction

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

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

Preparations

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

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

Select Color 2D Mode

1. From an optimized 2D image, press **Color.**
2. Use the trackball to position the ROI frame over the area to be examined.
3. Press **Select**. The instruction **Size** should be highlighted in the trackball status bar. Use the trackball to adjust the dimension of the ROI.

Adjust the Color 2D Mode controls

- Adjust the **Active mode gain** to set the gain in the color flow area.

Adjust **Scale** to the highest setting that provides adequate flow detection.

NOTE: The scale value may affect FPS, Low Velocity Reject, and Sample Volume.

Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.

Adjust **Variance** to detect flow disturbances.

Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows.

Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

NOTE: Frequency setting may affect FPS, SV and Low Velocity Reject.

Adjust **Power** to obtain an acceptable image using the lowest setting possible.

NOTE: The Power setting affects all other operating modes.

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

- Use **Invert** to reverse the color assignments in the color flow area of the display.

Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.

Use **Baseline** to emphasize flow either toward or away from the probe.

Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area. Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

Select Color M Mode

1. Select M Mode.
2. Use the trackball to position the ROI frame over the area to be examined.
3. Press **Select**. The instruction **Size** should be highlighted in the trackball status bar. Use the trackball to adjust the dimension of the ROI.

Adjust the Color M Mode controls

- Adjust the Active mode gain to set the gain in the color flow area.

  Adjust **Scale** to the highest setting that provides adequate flow detection.

NOTE: *The scale value may affect FPS, Low Velocity Reject, and Sample Volume.*

Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.

Adjust **Variance** to detect flow disturbances.

Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows

Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

NOTE: *NOTE: Frequency setting may affect FPS, SV and Low Velocity Reject.*

Adjust **Power** to obtain an acceptable image using the lowest setting possible.

NOTE: *The Power setting affects all other operating modes.*

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

- Use **Invert** to reverse the color assignments in the color flow area of the display.

  Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.

  Use **Baseline** to emphasize flow either toward or away from the probe.

  Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area. Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

PW/CW Doppler Mode Checks

Introduction

PW and CW Doppler are used to measure velocity (most often in blood).

Doppler mode can be done with a special pencil probe or with an ordinary probe. By using an ordinary probe, you can first bring up a 2D picture for navigation purpose and then add PW/CW Doppler.

Preparations

- Connect one of the probes to the scanner.
- See 'Probe/Connectors Check' on *page 4-31* for info about connecting the probes.

  For available probes, see 'Probe' on *page 9-6*: .
- Turn ON the scanner

  The 2D Mode window is displayed (default mode).
- If needed, adjust the Display's Brightness and Contrast setting.

  Press **PW** or **CW** to start Pulsed Wave Doppler (PW) or Continuous Wave Doppler (CW).

  Use the trackball to select the Area of Interest (Sample Volume) in PW or direction of interest in CW.

Adjust the PW/CW Doppler Mode controls

Adjust the **Active mode gain** to set the gain in the spectral Doppler area.

- Adjust **Low velocity reject** to reduce unwanted low velocity blood flow and tissue movement.

  In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows.

  Adjust the **Compress** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.

  Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.

  Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

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

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

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

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

Use the **Horizontal sweep** to optimize the sweep speed.

To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace.

Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.

Use **Angle correction** to steer the ultrasound beam to the blood flow to be measured.

Tissue Velocity Imaging (TVI) Checks

Introduction

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

Preparations

- Connect one of the probes, to the scanner's left-most probe connector.
- See 'Probe/Connectors Check' on *page 4-31* for info about connecting the probes.

  For available probes, see 'Probe' on *page 9-6*:
- Turn ON the scanner.

  The 2D Mode window is displayed (default mode).
- If needed, adjust the Display's Brightness and Contrast setting.

Press **TVI**.

Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.

Press **Select**. The instruction Size should be highlighted in the trackball status bar.

NOTE: *If the trackball control pointer is selected, press **trackball** to be able to select between Position and Size controls.*

Use the trackball to adjust the dimension of the ROI.

Adjust the TVI Controls

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the **Scale** value.

NOTE: The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.

TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

NOTE: PW will be optimized for Tissue Velocities when activated from inside TVI.

Basic Measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Check Distance and Tissue Depth Measurement

1. Press **Measure** once to display an active caliper.
2. Move the trackball to position the active caliper at the start point (distance) or the most anterior point (tissue depth).
3. Press **Set** to fix the start point.
4. The system fixed the first caliper and displays a second active caliper.
5. Move the trackball to position the second active caliper at the end point (distance) or the most posterior point (tissue depth).
6. Press **Set** to complete the measurement. The system displays the distance or tissue depth value in the measurement results window.

*NOTE: To toggle between active calipers, rotate **Cursor Select** button.*

Probe/Connectors Check

NOTE: Probes can be connected at any time, whether the unit is ON or OFF.

To connect a Probe

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cable.
3. Put the porbe in the probe holder.

CAUTION

DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.

4. Hold the probe connector vertically with the cable pointing upward.
5. Slide the connector lock to the left (unlocked position).
6. Align the connector with the probe port and carefully push into place.
7. Slide the connector lock to the right position to secure the probe connector.
8. Carefully position the probe cable in the probe cord holder spot so it is free to move, but not resting on the floor.

CAUTION

TAKE THE FOLLOWING PRECAUTIONS WITH THE PROBE CABELS:

-KEEP AWAY FROM THE WHEELS

-DO NOT BEND

-DO NOT CROSS CABLES BETWEEN PROBES

Table 4-1: Probe and Connectors Checks

Step	Task	Expected Results
1	Select the appropriate connected probe from the probe indicators on the Touch Panel.	The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.
2	Lauch the application. To change application, press ***Probe*** key on the Control Panel.	The selected application starts.
3	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.

Table 4-1: Probe and Connectors Checks

Step	Task	Expected Results
4	Test the probe in each active connector slot.	It will display pictorial data each time.
5	Do a leakage test on the probe, See 'Electrical safety tests' on *page 10-19 for more information.*	It passes the test.
6	Repeat this procedure for all available probes.	

ECG Check

Introduction

The ECG capability on this unit, is intended as use as a trigger for measurements, but can also be viewed on the screen.

Parts needed

- ECG Pads (3 pc)
- ECG Cable Europe Kit (5505585) or US Kit (5505577)

Preparations

None

ECG Check

Table 4-2: ECG Checks

Step	Task	Expected Result(s)
1	Connect the ECG harness to the connector under the control panel.	The unit displays a straight curve along the bottom edge of the image sector on the screen.
2	Connect the three leads to an ECG simulator, or Fasten the three ECG Pads to your body and connect the three leads to respective ECG Pad.	When connecting, the signal on the screen will be noisy. When the connection is completed, a typical clean ECG signal is displayed.

Cineloop Check

Introduction

A cineloop is a sequence of images recorded over a certain time frame. When using ECG the time frame can be adjusted to cover one or more heart cycles. When frozen, the System automatically displays the cineloop boundary markers on either side of the last detected heart cycle.

Preparation

- Connect one of the probes to the scanner.
- See 'Probe/Connectors Check' on *page 4-31* for info about connecting the probes

  For available probes, see 'Probe' on *page 9-6*: .
- Turn ON the scanner. The 2D Mode is displayed (default mode).

Adjust the Cineloop controls

- Press Freeze.

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

  The selected heart beat is played back.
- Press **Freeze** to freeze the cineloop.

  Use the trackball to scroll through the acquisition and find the sequence of interest.
- Adjust **Cycle** select to move from heart beat to heart beat and select the heart cycle of interest.

  Adjust **Num cycles** to increase or decrease the number of heart beats to be played back.

  Adjust **Left marker** and **Right marker** to trim or expand the cineloop boundaries.

Back End Processor checks

- If all the previous tests have been passed successfully, the Back End Processor is most likely OK.

  If the system seems to be operating erratically, please refer to ‘Diagnostics/Troubleshooting’ on *page 7-1*.

Operator Panel Test

- The Operator Panel is tested when the is powered up as part of the start-up scripts, run at every start-up.

  For more info, please refer to ‘Diagnostics/Troubleshooting’ on *page 7-1*.

Peripheral checks

Printer checks

The internal printer is controlled from the **P1** and **P2** keys on the Vivid T8/ Vivid T8 Pro’s Operator Panel.

The factory default is:

- **P1** for the UP-D711MD printer

  P2 for the whole screen secondary capture to clipboard

Turn OFF Power to Vivid T8/ Vivid T8 Pro

See ‘Power off’ on *page 4-8 for more information.*

Mechanical Functions Checks

Operator Panel Movement

Please refer to:

- ‘LCD Monitor position adjustment’ on *page 4-9*

Casters (Wheels) and Brakes Checks

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

Table 4-3: Wheel Characteristics

Wheel	Characteristics
Front and Rear	Swivel and Brake

Power supply test & adjustments

Power Supply Test Procedure

There is no need to do any special tests on the Power Supplies if there don't seems to be a problem that may be related to the Power Supply.

Power Supply Adjustment

There are no adjustments on the power supply. The DC Power is self-regulated. If a voltage is outside the specified range, it means that something is wrong, either with the power supply itself or with a unit connected to that specific power outlet. When an error occur, the power will be turned off immediately.

Application Turnover Check List

Complete these checks before returning the scanner to customer for use:

Software Configuration Checks

Table 4-4: Software Configuration Checks

Step	Task to do	Notes
1	Verify Date and Time is correct.	
2	Verify that Location (Hospital Name) is correct.	
3	Verify Language settings are correct.	
4	Verify assignment of Print Keys.	
5	Verify all of the customer's options are set up correctly.	Demo Option strings turn on

Site Log

Table 4-5: Site Log

DATE	SRVICE PERSON	PROBLEM	COMMENTS

Chapter 5

Components and Functions (Theory)

This chapter explains Vivid T8/ Vivid T8 Pro's system concepts, component arrangement, and subsystem functions.

It also describes the power distribution and the Common Service Desktop interface.

Overview

Contents in this chapter

Block Diagram and Theory

General Information

Vivid T8/ Vivid T8 Pro is an ultrasound imaging scanner.

The system can be used for:

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

Signal flow from the Probe Connector Panel to the Front End, to the Mid Processors and Back End Processor and finally to the LCD and peripherals.

System configuration is stored on a hard disk drive and all necessary software is loaded from the hard disk drive on power up.

Top Console

The Top Console includes a Standby/On switch, a keyboard, different controls for manipulating the picture quality, controls for use in Measure & Analyze (M&A), and loudspeakers for stereo sound output (used during Doppler scanning).

Block Diagram

System Diagram

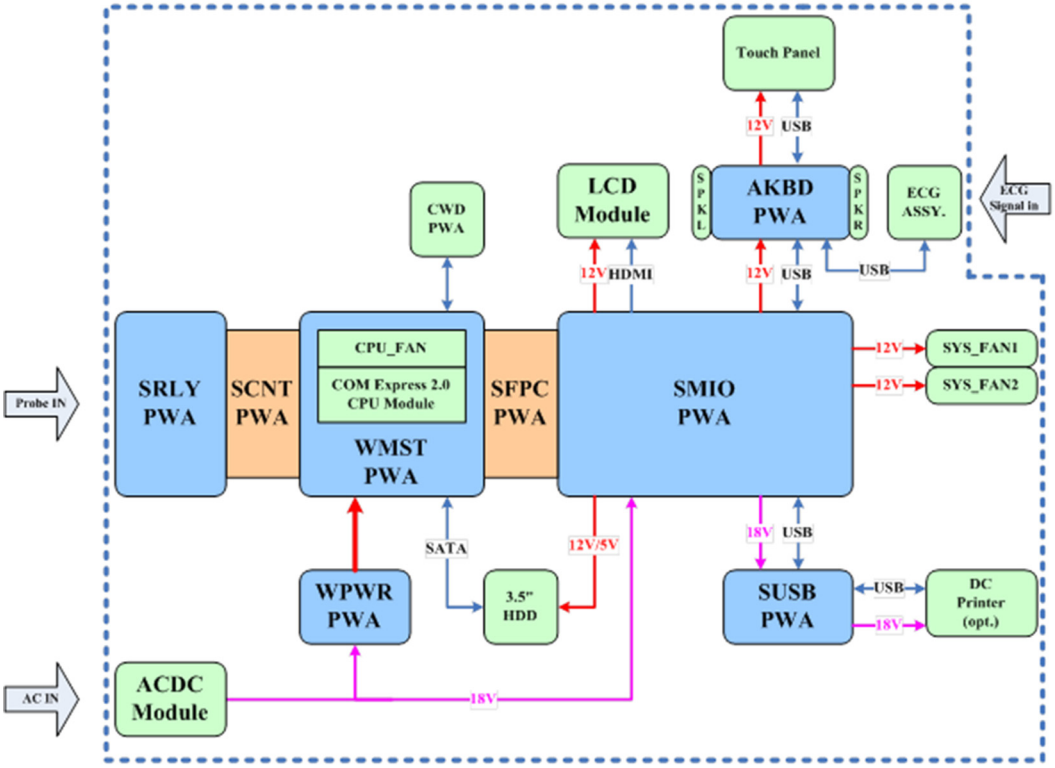


Figure 5-1. Vivid T8/ Vivid T8 Pro System Block Diagram

Introduction

PWMST provides the main control function, 128 channels transmitting/receiving and related signal processing. It is also connects to CWD board.

PMIO board receives MISC signals from PWMST board and make necessary processing. And then, PMIO sends to Rear Panel and KBDTRSF board.

KBDTRSF board receives MISC signals from PMIO board. It males necessary processing and then sends to LCD monitor, touch panel, main KBDboard, SoftKBD board and system speakers.

APSTRSF is a power supply board in Vivid T8/ Vivid T8 Pro, it accepts power from APS module and ACDC adapter. Under the PWMST's control, it generates all kinds of voltages to meet the power requirements of PWMST.

Power Control PWA is assembled in the power box. It provides an interface for AC power input and provides isolated AC power output for the system.

Relay board provides an interface for PWMST and four probes. It transmit/receives signals from PWMST and provides an interface for drive the LED board.

Rear Panel and BNC Board will receive MISC signals from PMIO board and make necessary processing. It provides MISC user interface.

Power Diagram

Overview

The AC Power assy's main tasks are to isolate and output to the DC/DC unit which is inside the system console. The input of AC power pack will be the AC outlet and it's universal, the range is AC 90V-264V, 47-63Hz. And no main power switch located on this power pack.

AC Power

The mains cord has plugs in one side end. A male plug connects to the mains outlet on site.

The mains voltage is routed to the AC power pack through a Circuit Breaker located on the site.

The Circuit Breaker is of the auto fuse type, if for some reason the current grows to high, the switch will automatically break the power.

From the Main Circuit Breaker, the AC power is routed via an Inrush Current Limiter to a internal outlet connector for the Mains Transformer.

Common Service Platform

Introduction

The Service Platform contains a set of software modules that are common to all PC backend ultrasound and cardiology systems. The Common Service Platform will increase service productivity and reduce training and service costs.

Chapter 6

Service Adjustments

This chapter describes how to test and make adjustments to the Vivid T8/ Vivid T8 Pro. You can use these to test the system for errors.

Overview

Contents in this chapter

LCD Monitor adjustments

Purpose of this section

This section describes how to test and adjust the scanner. These tests are optional. You may use them to check the system for errors.

Monitor Adjustments

Please refer to User Manual for how to adjust the LCD Monitor Position, Brightness and Contrast.

Chapter 7

Diagnostics/Troubleshooting

This chapter describes Vivid T8/ Vivid T8 Prohow to setup and run the tools and software that help maintain image quality and system operation. Very basic host, system and board levels are run whenever power is applied. Some Service Tools may be run at the application level.

Overview

Contents in this chapter

Gathering Trouble Data

Overview

There may be a time when it would be advantageous to capture trouble images and system data (logs) for acquisition to be sent back to the manufacturer for analysis. There are different options to acquire this data that would give different results

Collect Vital System Information

The following information is necessary in order to properly analyze data or images being reported as a malfunction or being returned to the manufacturer:

Product Name = Vivid T8/ Vivid T8 Pro

From the **Config (F2) > About** screen:

Applications Software

- Software Version
- Software Part Number

System Image Software

- Image Date
- Image Part Number

Collect a Trouble Image with Logs

If the system should malfunction, press the Alt+D keys simultaneously. This will collect a screen capture of the image monitor, system presets and several log files in a date and time stamped ".zip" file.

NOTE: This function may also be used to make a Print Screen.

This **Alt+D** function is available at all times.

When **Alt+D** is pressed, a menu box appears that allows for:

- a place to enter a description od the issue
- a checkbox to indicate a System lockup
- a chioce to Export a pre-formateed CD-R/DVD-R or save to the Export directory D: drive (for remote viewing through InSite)

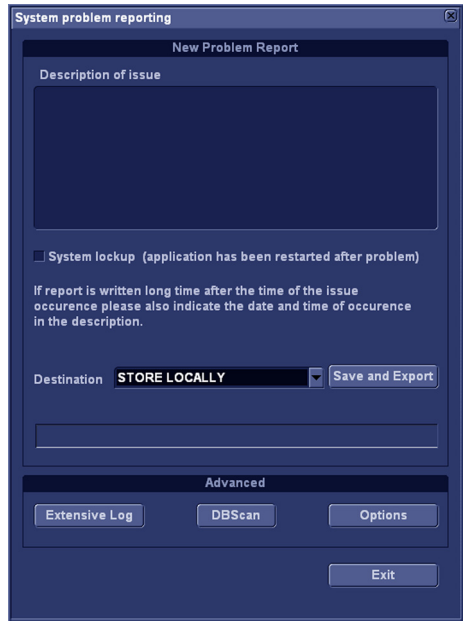


Figure 7-1. Alt+D Dialog Box

Advanced log options

- **Extensive Log** enables the creation of a log file containing addtional information for the selected functionality.
- **Options** enables creation of a log file based on a selected bookmark or for a user configurable time frame. Different type of information can be selected to be part of the log file.

Screen Capture

There may be times when the customer or field engineer will want to capture a presentation on the screen. This is accomplished by first saving the image(s) to the clipboard using a Print Key.

There's no factory default print key to accomplish a secondary screen capture. However, customer may have customize Print Keys or Store key function. Therefore, screen capture should involve the following steps:

1. Check and record any custom settings for the Print/Store button
2. Set the Print/Store button to Whole Screen, Secondary Capture.
3. Capture the required screens to the Hard Disk Drive or DVD-R.
4. Restore the Print/Store button to it's original settings.

Below is an example on how to assign P1 key to screen capture.

Check and Record the P2 Key Function

Check the function of the P2 Key in the event that the customer may have made some custom settings.

1. Press **F2 (Config)** on the Control Panel.
2. Select **Connectivity** from the Utilities Menu.
3. Select the **Addtional Outputs** tab on the Connectivity screen.
4. In the **Button** field, select P2.

   If P2 is not set to Whole Screen, proceed to step 5 to record the customer's customized settings.

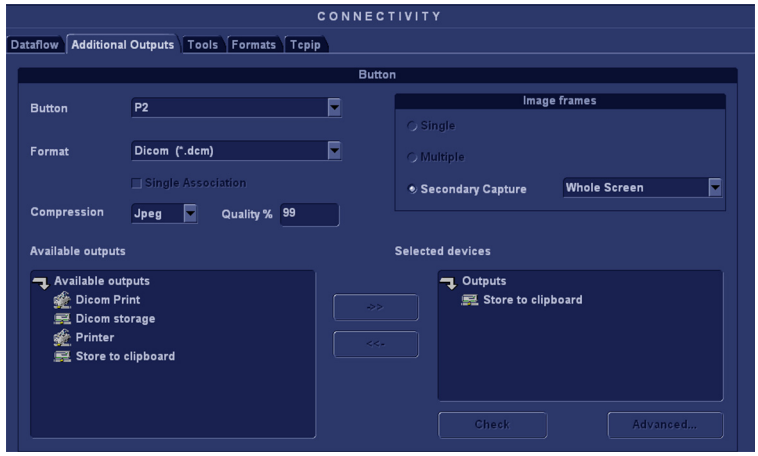


Figure 7-2. Connectivity/Button screen

5. In the Destinations section, record the service that is displayed.
6. In the **Button** section, record the parameters related to the service.

Setting the P2 Key to Screen Capture

If the P2 Key is not set to screen capture:

1. While on the Connectivity screen, with the Buttons tab displayed, go to the *Destinations* list.
2. From the list select **Store to clipboard.** Press [>>] to add the selection to the **Selected devices** section.
3. Ensure that the **Button** section for **Image frames** is set to Whole Screen, secondary Capture and No Image Compression.
4. The P2 Key should now be set up for whole screen capture, sending the screens to the image buffer (clipboard).

Capturing a Screen

The following is a generic process to capture any screen from the scanner:

1. Navigate to and display the image/screen to be captured.
2. Press **P2**. This will place a snapshot of the screen on the “clipboard” displayed at the bottom of the scan image display.

Figure 7-3. Select Image to Capture

Capturing a Screen (continued)

3. Select and highlight the snapshot to be stored.
4. Press ***Update/Menu*** key on the control panel and the system menu is displayed. Select **Save as**.

Figure 7-4. Menu > Save As

5. A Save dialog box will be opened. Choose the archive location to save image on the USB Drive or CD/DVD.

Figure 7-5. Save Dialog Box

Reset the P1 Key to Customer's Functionality

If the customer had programmed the P1 Key to a function other than screen capture, restore that functionality recorded in section 'Check and Record the P2 Key Function' on *page 7-6*. Refer to Figure 7-2 *on page 7-6*.

1. Seclect **Config (F2)** on the control panel.
2. Select Connectivity -> Additional Outputs.
3. In the ***Button*** field, select Print1.
4. In the *Destinations* list, select the service(s) recorded in step 5, Section 'Check and Record the P2 Key Function' on *page 7-6*.
5. In the *Physical Print Buttons* section, select the parameters related to the service recorded in step 6, section 'Check and Record the P2 Key Function' on *page 7-6*.

Common Diagnostics

Utilities

Provides two selections:

- **Disruptive Mode**

  Allows you to enable or disable disruptive mode troubleshooting.

- **System Shutdown**

  Allows for system shutdown from the diagnostic menu. Select to *Restart System* or *Shutdown System.* Also, select to retain Disruptive Mode or Not.

  After submitting to restart or shutdown a confirmation screen gives one last chance to confirm or cancel the request.

Network Configuration

Network Configuration

Wire-LAN Network

1. Connect system with network.
2. Enter **Config (F2)**-> **Connectivity**-> **TCP/IP**, select **Network Settings**.

Figure 7-6. Network Settings

3. Select **Local Area Connection**.

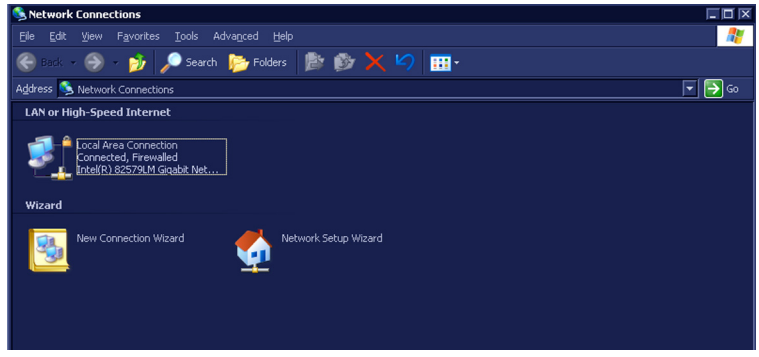


Figure 7-7. Network Conection

Network Configuration (continued)

4. Select **Properties** in the Local Area Connection Status window.

Figure 7-8. Connection Status

5. Select **Internet Protocol (TCP/IP)** from the terms, and then select **Properties**.

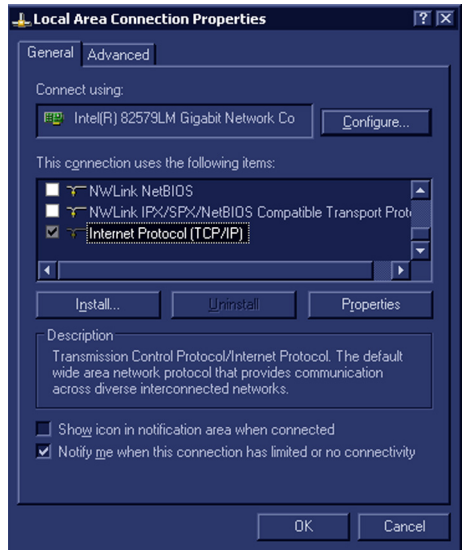


Figure 7-9. TCP/IP Protocol

Network Configuration (continued)

6. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**, and then select **OK**.

*NOTE: If user wants to setup static IP address, input static address in **IP-Address box**, **Subnet Mask** and **Default Gateway box**.*

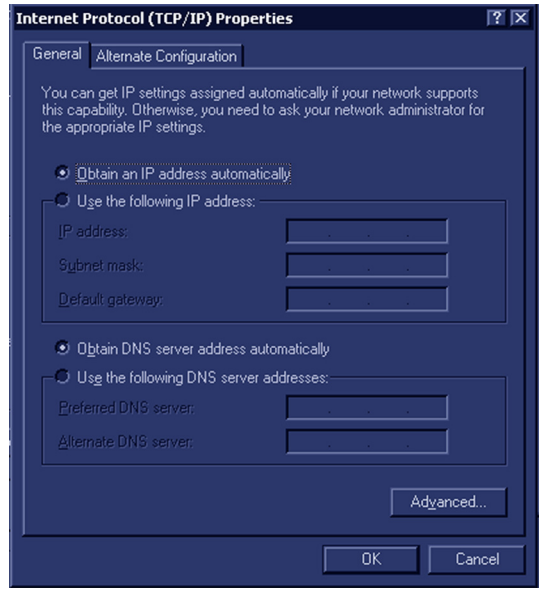


Figure 7-10. IP Address

7. A pop-up window displays, select **OK** to restart the system and activate the changes.

Figure 7-11. Warning Window

8. After the system restarts, the network icon at the bottom of the the screen displays as connected.

Wireless-LAN Network

NOTE: To configure the Wireless-LAN network, the operator msut login as administrator.

1. Connect the wireless adapter in the USB port.
2. Enter **Config (F2)**-> **Connectivity**-> **TCP/IP**, select **Network Settings**.

Figure 7-12. Network Settings

3. Double click **Wireless network Connection**.

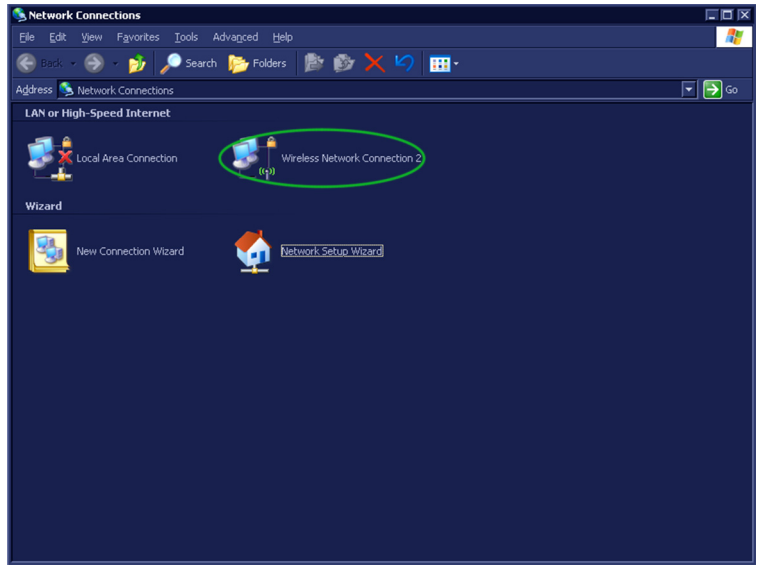


Figure 7-13. Wireless Network Conection

Network Configuration (continued)

4. Select **Properties** in the Wireless Network Connection Status window.

Figure 7-14. Connection Status

5. Choose an available wireless network and select **Connect**.

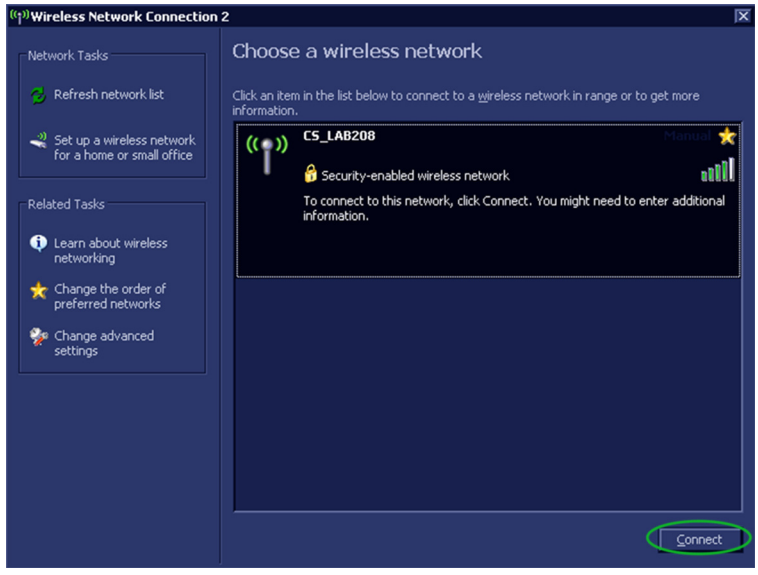


Figure 7-15. Available Network

Network Configuration (continued)

6. Input the network key if required.

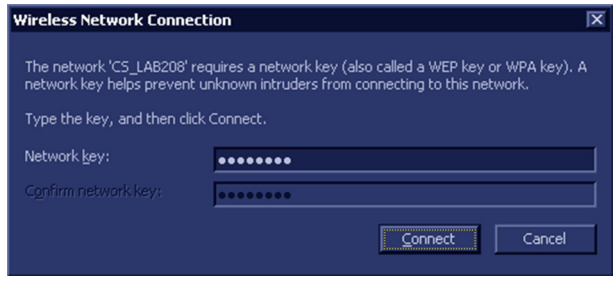


Figure 7-16. Input key

7. The network status is displayed as connected and the system is connected to the network via Wireless-LAN.

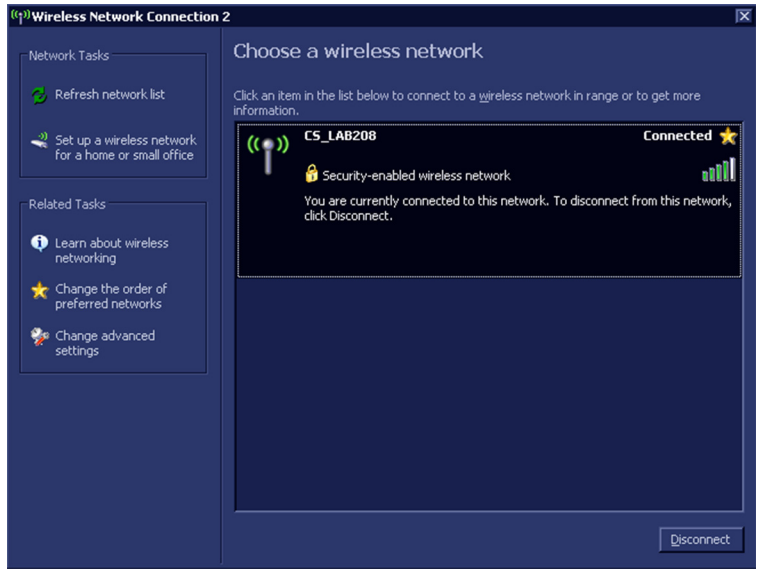


Figure 7-17. Wireless-LAN Connection

Chapter 8

Replacement Procedures

This chapter describes how to remove and install, or replace, modules and subsystems in the Vivid T8/ Vivid T8 Pro. It also includes instructions for installing and re-installing the software.

Overview

Contents in this chapter

Warnings and important information

Warnings

WARNING

Energy Control and Power Lockout for Vivid T8/ Vivid T8 Pro.

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

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

Ultrasound System components may be energized.

WARNING

Because of the limited access to cabinets and equipment in the field, placing people in awkward positions, GE has limited the lifting weight for one person in the field to 16 KG (35 LBS). Anything over 16 KG (35 LBS) requires 2 people.

WARNING

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

NOTE: Use an ESD compatible work space or the ESD-kit during parts replacement.

WARNING

The waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately.

Please contact the manufacturer or other authorized disposal company to decommission your equipment.

Returning/shipping probes and repair parts

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

GE Healthcare policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE Healthcare employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe). The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

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

Disassembly/Re-assembly

Warning and Caution

WARNING

ONLY QUALIFIED SERVICE PERSONNEL SHOULD REMOVE ANY COVERS OR PANELS. ELECTRICAL HAZARDS EXISTS AT SEVERAL POINTS INSIDE. BECOME THOROUGHLY FAMILIAR WITH ALL HAZARDOUS VOLTAGES AND HIGH CURRENT LEVELS TO AVOID ACCIDENTAL CONTACT

CAUTION

Do not wear the ESD wrist strap when you work on live circuits and more than 30V peak is present.

Tools needed for servicing Vivid T8/ Vivid T8 Pro

Table 8-1: Standard tools list for Vivid T8/ Vivid T8 Pro

No	Part Name	Part No.	QTY	Screw Description	Screwdriver Description
1	screw	2159632	2	Screw BH M4x6	Common Phillips Screwdriver
2	screw	2159634	4	Screw BH M4x10 WHT	Common Phillips Screwdriver
3	screw	2327793	135	D2 Screw SJ2836-87 M3x8	Common Phillips Screwdriver
4	screw	2373562	3	Screw M4x10	Common Phillips Screwdriver
5	screw	5138465	10	Screw FH M2.5x5(NL)	Common Phillips Screwdriver
6	screw	5176890	6	Screw DIN965A M4x8	Small Phillips Screwdriver
7	screw	5244775	2	Screw GB T820-2000 M3x8	Common Phillips Screwdriver
8	screw	5342274	4	Inch SScrew #6-32UNC	Common Phillips Screwdriver
9	screw	5439265	246	Screw-M4x10	Common Phillips Screwdriver
10	screw	5445720	12	GB 818-2000 M4x30	Common Phillips Screwdriver
11	screw	2337572	2	Screw FH M3x6	Common Phillips Screwdriver
12	screw	5476381	20	Bolt M8x18 with Washer	6# Inner Hexangular Set
13	screw	5476387	34	Bolt M6x15 with Washer	5# Inner Hexangular Set
14	screw	5476394	5	Bolt M8x30	6# Inner Hexangular Set
15	screw	5476438	14	Bolt M8x36 With Washer	6# Inner Hexangular Set
16	screw	5476440	17	Bolt M6x24 With Washer	5# Inner Hexangular Set
17	screw	5477579	2	Screw_DIN912 M6_20	5# Inner Hexangular Set
18	screw	5490719	4	Screw PM SW4x8	Common Phillips Screwdriver
19	screw	5491747	1	Screw Pan Head M4x4	Common Phillips Screwdriver
20	screw	5491847	2	Hand Screw M2p5x5	by hand

NOTE: Please use the correct Screwdrivers listed in Table 8-1

Overview of Vivid T8/ Vivid T8 Pro

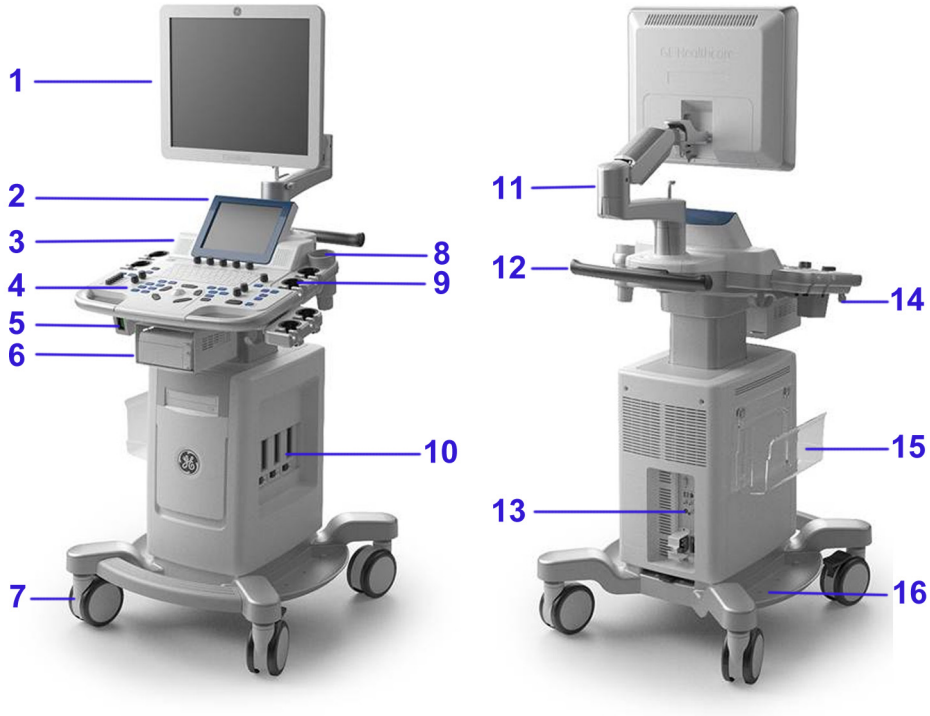


Figure 8-1. System Overview 1

1. LCD Monitor
2. Touch Panel
3. Audio speaker
4. Control panel
5. ECG and USB ports
6. B/W Printer Shelf
7. Wheels
8. Gel holder
9. Probe holder
10. Probe connector ports
11. LCD ARM
12. Rear Handle
13. Rear Panel
14. Probe cable hook
15. Paper Tray
16. Cable Tray

Overview (continued)

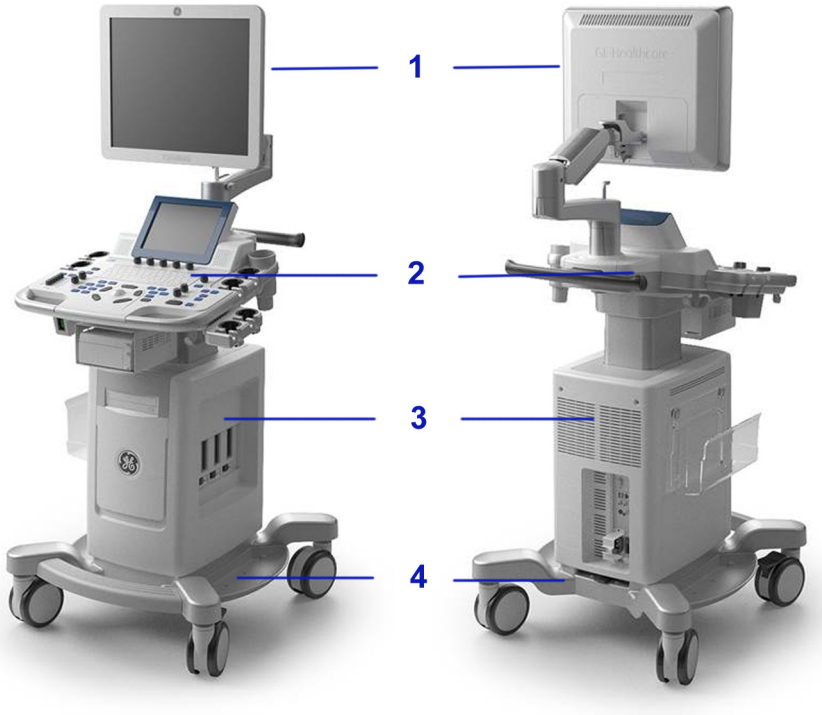


Figure 8-2. System Overview 2

1. LCD Assy
2. Keyboard Assy
3. Body Assy
4. Base Assy

Cleaning the Trackball

DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions.

Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the Ultrasound system (near the power connector).

Follow general guidelines for handling of electrostatic sensitive equipment.

Manpower

One person, 10 minutes,

Tools

- Antistatic brush and/or antistatic vacuum cleaner

Preparations

To get access to the trackball for cleaning, you must must perform the following steps:

1. Power down the system.
2. Disconnect the mains power cable from the wall outlet.

Follow these links if you need more information: See ‘Power off’ on *page 4-8 for more information.*

Clean the Trackball

Dust is often building up behind the ball, so it interferes with the ball rotation and for optical trackballs the light used for sensing. To get access for cleaning, you need to remove the ball.

The ball is held in position by the Dust Gasket.

1. Power off the system.
2. Rotate the dust gasket counterclockwise until it can be removed from the keyboard.

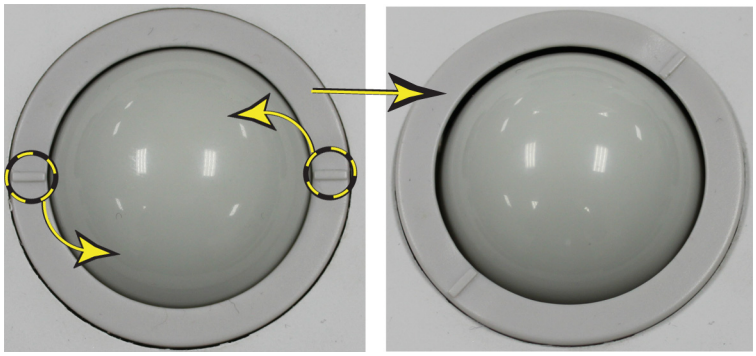


Figure 8-3. Remove the retainer

3. Separate the trackball and the gasket. Wipe off any oil or dust from the trackball, gasket and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and gasket, then put it into the housing and rotate it clockwise until its notches are set in the position.

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Test the Trackball

Power up the and test that the trackball now works as intended.

Cleaning the Air Filter

Manpower

One person, 5 minutes,

Tools

- None

Preparations

To get access to the air filter for cleaning, you must must perform the following steps:

1. Power down the system.
2. Disconnect the mains power cable from the wall outlet.

Follow these links if you need more information: See ‘Power off’ on *page 4-8 for more information.*

Clean the Air Filter

1. Power off the system.
2. Pull out the air filter from the rear panel.

Figure 8-4. Remove the Air Filter

3. Dust the filter with a vacuum cleaner and/or wash it with a mild soapy solution.

   If washed, rinse and dry the filter before re-installation.
4. Pull back the air filter.

Loading the software

Purpose of this section

This section describes how to reinstall software on Vivid T8/ Vivid T8 Pro.

Customer provided prerequisite

- Formatted and labelled media for Images storage.
- Formatted and labelled media for Patient Archive and Presets (User Defined Settings).
- Password for the user ADM.

Data Management - moving all images

CAUTION

An error, or a power loss may occur.

Always backup the Patient Archive and the Presets (System Configurations) before loading the software!

In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from Vivid T8/ Vivid T8 Pro before doing backup of the Patient Database.

Depending on the location set-up, either move the images to a remote server or to removable media like DVD or CD discs.

- Move the images to a remote server or to removable media.

  For instructions, please see “Disk management” in the User Manual/User Guide.

Backing up the Patient Archive and System Configurations

CAUTION

An error, or a power loss may occur.

Always backup the Patient Archive and the Presets (System Configurations) before loading the software!

In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from Vivid T8/ Vivid T8 Pro before doing backup of the Patient Database.

Depending on the location set-up, either move the images to a remote server or to removable media like DVD or CD discs.

- Backup the Patient Archive and System Configurations.

  For instructions, please see “Data Backup and Restore” in the User Manual/User Guide.

Restoring up the Patient Archive and System Configurations

- Restore the Patient Archive and System Configurations.

  For instructions, please see “Data Backup and Restore” in the User Manual/User Guide.

Recording important settings and parameters

Overview

CAUTION

An error, or a power loss may occur.

It is considered to be best practice to always keep a record on paper of the settings for the Vivid T8/ Vivid T8 Pro. Verify if it is current before you start to load software!

Always keep a record of the settings for the Vivid T8/ Vivid T8 Pro on paper. Verify if it is current before starting a software loading! If needed, record the settings.

This subsection includes descriptions for recording data from the following screens:

Loading the System Software

While the software install procedure is designed to preserved data, you should save any patient data, images, system setups and customer presets to CD, DVD, USB Flash Drive, or USB Hard Disk before doing a software upgrade.

NOTE: Before loading the system software, please ensure that the power can be continuously supplied and there is no risk of power cut off during loading procedure.

There is one method to load the system software:

- Load the system software with USB memory stick.

Loading the System Software with USB memory stick

NOTE: While it is believed to be unnecessary, it would not hurt to disconnect the system from the network and remove all transducer.

NOTE: Please ensure AC adapter is connected during system upgrade!

NOTE: Serial number and option key are needed to be input after loading the complete disk. The serial number abd option key MUST be the same as the ones before installation. Please record the serial number and option key before installation.

1. Insert the USB memory stick labeled “System & Application Software” to the system.
2. Properly turn off the scanner by momentarily pressing the *Power On/Off* Switch. In System-Exit window, select **Shutdown** to shutdown the system.

NOTE: If the system will not shutdown normally, hold down the Power On/Off Switch until the light turns off.

3. Power on the system. The system will detect the USB memory stick automatically.

Loading the System Software with USB memory stick (continued)

4. Press any key to continue when below message displays.

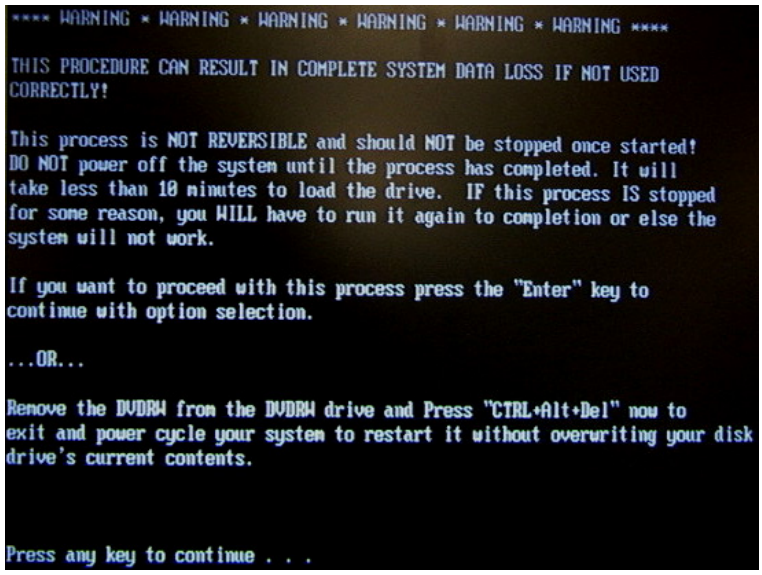


Figure 8-5. Upgrade message

5. Select one of the options for loading the system. Select choice [a] to load the complete disk.

CAUTION

If you select [a], ALL existing software and data will be erased. If backup has not been performed, all data like Patient Database, System Configuration and User Configurations (Customer Presets) will be lost.

- To select [a], the complete disk will be loaded. This option is recommended for application software upgrade.

NOTE: *When to select [a] to load complete disk, please ensure that any patient data on the disk has been backed up.*

- To select [b], only the bootable C: partition is loaded. This option is intended for recovery of a system that will not boot up. It is not recommended for application software upgrade because during upgrade process, the data on the system would possibly be impacted.
- To select [c] to quit system upgrade process.

Loading the System Software with USB memory stick (continued)

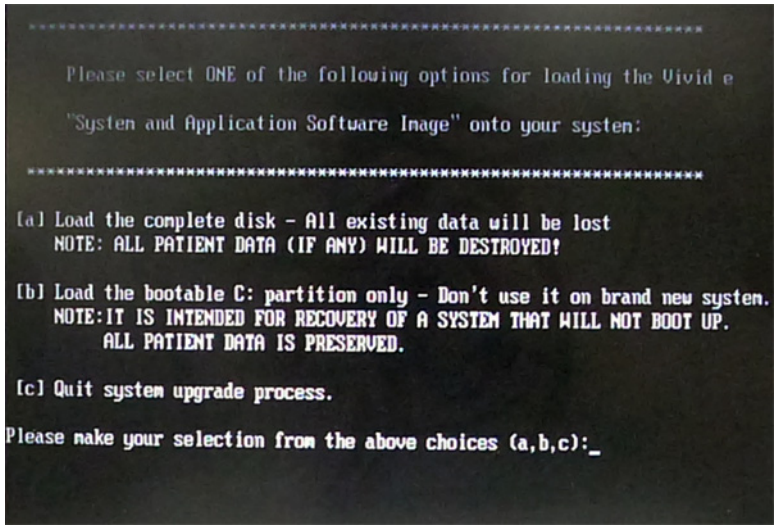


Figure 8-6. System Software load instruction

WARNING

While the software install procedure is designed to preserve data, you should select choice [b] to format disk C only.

Loading the System Software with USB memory stick (continued)

6. System USB memory stick will be loading. Wait for the software installation to complete. (Typical installation time: 5-10 minutes). Status bar on the screen indicates progress.

WARNING *Do not interrupt the software loading at any time.*

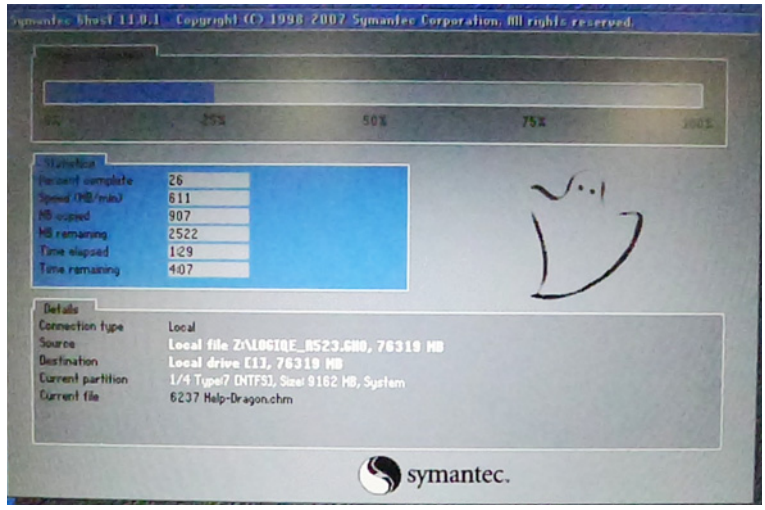


Figure 8-7. Loading status

7. After finish updating system, remove the USB memory stick and press any key to shut down the system.

NOTE: *If you do not remove the USB memory stick, the software system loading process repeats when the system boots up.*

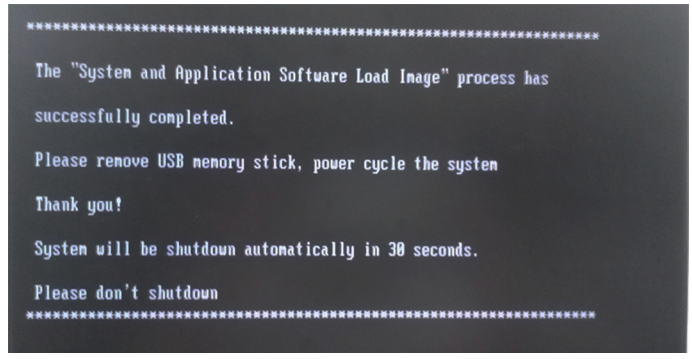


Figure 8-8. System upgrade complete

Software Version check out

Functional Check-out

1. Power on Vivid T8/ Vivid T8 Pro system and wait until system booting to scanning screen.

NOTE: *If selected to load C Disk only when loading the system software, the system will display a screen to restore Computer name before entering the scanning screen.*

2. Press ***Config (F2)*** on the control panel.
3. Select the **About** -> **System version** and check whether the software version is right.

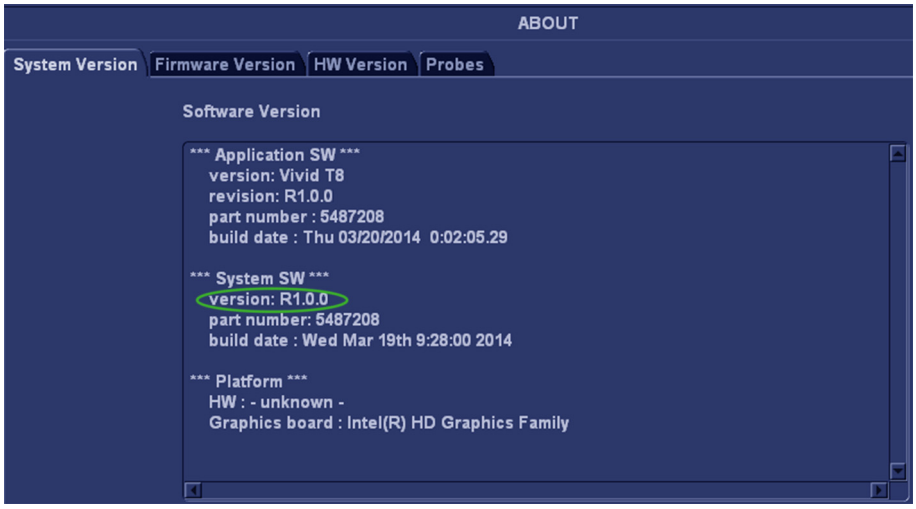


Figure 8-9. Software version

Option Strings Check

NOTE: After the system software loading completion, please check the option strings to ensure that the options are activated and working.

1. Reboot the system.
2. Press ***Config (F2)*** on the control panel.
3. Select **Admin** -> **System Admin**.
4. Ensure that all the installed option keys are displayed and the status of Options are valid.
   - The status “Valid” means the option keys are activated and working.
   - The status “disabled” means the option keys are not activated and not working. Check if the option is installed and if the serial number and option key are correct.

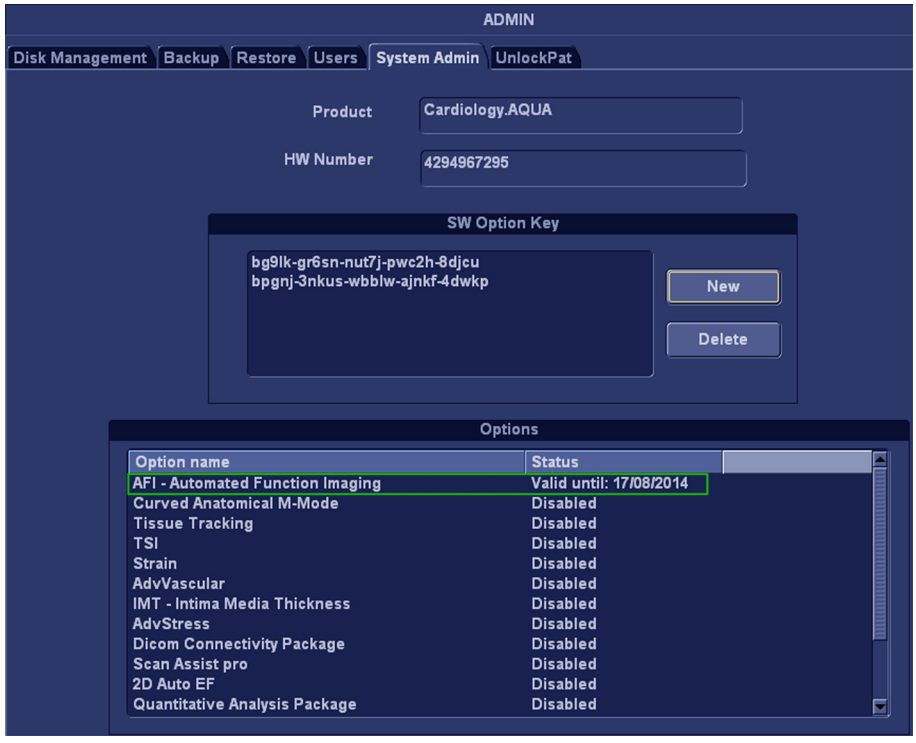


Figure 8-10. Software Option

Probe Recognition Check

NOTE: After the system software loading completion, please check to ensure that the system can recognize the probes.

Plug in the probe. In scanning mode, the probe information is displayed on the **right top** location of the screen. About the probe specification for intended use on Vivid T8/ Vivid T8 Pro.

Plug in at least one of each type of the probes and check if each of the probes is recognized and the probe information is displayed correctly.

Figure 8-11. Probe identification

Peripheral Device Check

Check to ensure that all the peripheral devices work properly.

For instruction of peripheral device check, See ‘Peripheral checks’ on *page 4-34 for more information.*

Reinstall DICOM Devices

Reinstall any DICOM devices used by the customers and check to ensure these DICOM devices work properly.

The instruction about installing DICOM devices is not incorporated in this manual. To access the instruction about installing DICOM devices please refer to another manual **Basic User Manual**. Please use the latest revision of this document.

Chapter 9

Renewal Parts

This chapter lists the renewal parts available for the Vivid T8/ Vivid T8 Pro.

Overview

Contents in this chapter

List of Abbreviations

Table 9-1: List of Abbreviations

ABBREVIATION	DESCRIPTION
3D	THREE DIMENSIONAL
Assy	ASSEMBLY
FRU 1	Replacement part available in part hub
FRU 2	Replacement part available from the manufacturer (lead time involved)
KBD	Keyboard
LCD	Liquid Crystal Display
BnV	Brightness and Volume
TMST	Master Board

Renewal Parts Lists

AC Power Cord

Table 9-2: AC Power Cord

Item	Part Number	Part Name	Quantity	FRU
001	5177123-2	AC Power Cord Europe	1	1
002	5176304-2	AC Power Cord China	1	1
003	5176773-2	AC Power Cord India	1	1
004	5177195-2	AC Power Cord Argentina	1	1
005	5176907-2	AC Power Cord UK	1	1
006	5177153-2	AC Power Cord Denmark	1	1
007	5177154-2	AC Power Cord Switzerland	1	1
008	5177187-3	AC Power Cord Australia	1	1
009	5177146-2	AC Power Cord USA	1	1
010	5400868-2	AC Power Cord Brazil	1	1
011	5176753-2	AC Power Cord Israel	1	1
012	5177126-2	AC Power Cord Japan	1	1

Operator Console Assy

The following figure illustrates what is the front side (1), left side (2), back/rear side (3), right side (4) of the system.

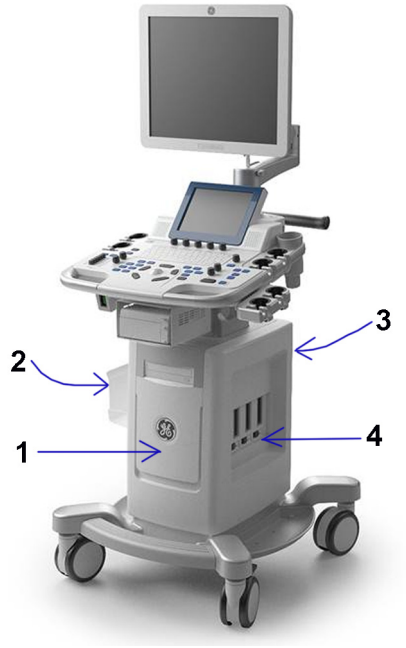


Figure 9-1. Operator Console Assy

Accessories and Cable Kits

Table 9-3: Accessories and Cable Kits

Item	Part Number	Part Name	Qty	FRU
100	5495621-3-S	Vivid T8/Vivid T8 Pro R1.0.2 System and Application Software USB		
101	5487208-5-S	Vivid T8/Vivid T8 Pro R1.0.4 System and Application Software USB		

Probe

Table 9-4: Probes for Vivid T8/Vivid T8 Pro

Item	Part Name	Part Number	Frequency (MHz)	Qty	FRU
200	4C-RS	5451471	1.8 - 6.0	1	1
201	L6-12-RS	5454332	6 - 13	1	1
202	E8C-RS	5454780	4.0 - 11.0	1	1
203	3Sc-RS	5433833	1.3 - 4.0	1	1
204	8C-RS	5434203	4.0 - 11.0	1	1
205	6S-RS	5394465	2.7-8.0	1	1
206	P2D-RS	KE100004	2.0	1	1
207	6Tc-RS	KN100104	2.9 - 8.0	1	1

NOTE: 6Tc-RS is not available in China.

Peripheral

Table 9-5: Peripherals for Vivid T8/Vivid T8 Pro

Item	Part Number	Description	Qty	FRU
ECG cable				
300	2269979	Cable: Main ECG Americas & Japan	1	1
301	2269980	Cable: Main ECG Europe & ROW	1	1
302	2269982	Cable: White Lead Europe & Americas	1	1
303	2269983	Cable: Yellow Lead Europe & Americas	1	1
304	2269982-2	Cable: Green Lead Americas	1	1
305	2269982-3	Cable: Black Lead Americas	1	1
306	2269983-2	Cable: Black Lead Europe & ROW	1	1
307	2269983-3	Cable: Red Lead Europe & ROW	1	1
Footswitch				
308	5338419	Footswitch MKF 2-MED USB GP26	1	1
USB Stick				
309	5168040-4	Sandisk USB Stick 4G	1	1
310	5434317-3	1TB USB mobile HDD	1	1
Printer				
311	5133106-2	Sony UPD25 Color Printer Chinese kit	1	1
312	5133017-2	Sony UPD25 Color Printer USA kit	1	1
313	5133108-2	Sony UPD25 Color Printer European kit	1	1
314	5133109-2	Sony UPD25 Color Printer Japanese kit	1	1
315	5151262	UP-D897MD B/W Printer Chinese kit	1	1
316	5151259	UP-D897MD B/W Printer USA kit	1	1
317	5151261	UP-D897MD B/W Printer European kit	1	1
318	5151263	UP-D897MD B/W Printer Japanese kit	1	1
319	5494719	Sony UP-D711MD B/W Printer with Paper Kit	1	1
320	5494718	Sony UP-D711MD B/W Printer Paper 1 roll	1	1
321	5426594	HP100 Printer Chinese kit	1	1
322	5426595	HP100 Printer European kit	1	1
323	5426596	HP100 Printer Japanese kit	1	1

Table 9-5: Peripherals for Vivid T8/Vivid T8 Pro

Item	Part Number	Description	Qty	FRU
324	5426597	HP100 Printer USA kit	1	1
Biopsy Kit				
325	5160703	4C-RS Biopsy Kit	1	1
326	2398164	E8CS reusable Biopsy Kit	1	1
327	E8385MJ	E8CS Starter Kit	1	1
328	5176499	L6-12-RS Biopsy Kit	1	1
329	5329137	3Sc-RS Biopsy Kit	1	1

Power Cord

Table 9-6: Power Cord for Vivid T8/Vivid T8 Pro

Item	Part Number	Description	Qty	FRU
401	5177123-2	AC Power Cord Europe	1	1
402	5176304-2	AC Power Cord China	1	1
403	5176773-2	AC Power Cord India	1	1
404	5177195-2	AC Power Cord Argentina	1	1
405	5176907-2	AC Power Cord UK	1	1
406	5177153-2	AC Power Cord Denmark	1	1
407	5177154-2	AC Power Cord Switzerland	1	1
408	5177187-3	AC Power Cord Australia	1	1
409	5177146-2	AC Power Cord USA	1	1
410	5400868-2	AC Power Cord Brazil	1	1
411	5176753-2	AC Power Cord Israel	1	1
412	5177126-2	AC Power Cord Japan	1	1

Manuals

Table 9-7: Manuals for Vivid T8/Vivid T8 Pro

Item	Part Number	Description	Qty	FRU
500	5497430-200	Vivid T8/Vivid T8 Pro Manual CD	1	N
501	5487771-100	Vivid T8/Vivid T8 Pro Advanced Reference Manual	1	N
502	5490863-100	Vivid T8/Vivid T8 Pro Basic Service Manual	1	N
503	5503263-100	Vivid T8/Vivid T8 Pro User Guide English version	1	N
504	5487003-100	Vivid T8/Vivid T8 Pro User Manual English version	1	N
505	5487003-101	Vivid T8/Vivid T8 Pro User Manual French version	1	N
506	5487003-106	Vivid T8/Vivid T8 Pro User Manual Spanish version	1	N
507	5487003-108	Vivid T8/Vivid T8 Pro User Manual German version	1	N
508	5487003-111	Vivid T8/Vivid T8 Pro User Manual Italian version	1	N
509	5487003-121	Vivid T8/Vivid T8 Pro User Manual Dutch version	1	N
510	5487003-127	Vivid T8/Vivid T8 Pro User Manual Brazilian Portuguese version	1	N
511	5487003-129	Vivid T8/Vivid T8 Pro User Manual Estonian version	1	N
512	5487003-131	Vivid T8/Vivid T8 Pro User Manual Slovenian version	1	N
513	5487003-140	Vivid T8/Vivid T8 Pro User Manual Japanese version	1	N
514	5487003-141	Vivid T8/Vivid T8 Pro User Manual Simplified Chinese version	1	N
515	5487003-142	Vivid T8/Vivid T8 Pro User Manual Swedish version	1	N
516	5487003-144	Vivid T8/Vivid T8 Pro User Manual Korean version	1	N
517	5487003-145	Vivid T8/Vivid T8 Pro User Manual Russian version	1	N
518	5487003-150	Vivid T8/Vivid T8 Pro User Manual Polish version	1	N
519	5487003-151	Vivid T8/Vivid T8 Pro User Manual Greek version	1	N
520	5487003-153	Vivid T8/Vivid T8 Pro User Manual Hungarian version	1	N
521	5487003-154	Vivid T8/Vivid T8 Pro User Manual Slovakian version	1	N
522	5487003-155	Vivid T8/Vivid T8 Pro User Manual Czech version	1	N
523	5487003-159	Vivid T8/Vivid T8 Pro User Manual Turkish version	1	N
524	5487003-160	Vivid T8/Vivid T8 Pro User Manual Danish version	1	N
525	5487003-161	Vivid T8/Vivid T8 Pro User Manual Norwegian version	1	N
526	5487003-162	Vivid T8/Vivid T8 Pro User Manual Finnish version	1	N

Table 9-7: Manuals for Vivid T8/Vivid T8 Pro

Item	Part Number	Description	Qty	FRU
527	5487003-165	Vivid T8/Vivid T8 Pro User Manual Bulgarian version	1	N
528	5487003-167	Vivid T8/Vivid T8 Pro User Manual Romanian version	1	N
529	5487003-168	Vivid T8/Vivid T8 Pro User Manual Croatian version	1	N
530	5487003-174	Vivid T8/Vivid T8 Pro User Manual Lithuanian version	1	N
531	5487003-175	Vivid T8/Vivid T8 Pro User Manual Latvian version	1	N
532	5487003-176	Vivid T8/Vivid T8 Pro User Manual Serbian version	1	N
533	5487003-177	Vivid T8/Vivid T8 Pro User Manual European Portuguese version	1	N
534	5487003-181	Vivid T8/Vivid T8 Pro User Manual Indonesian version	1	N

Chapter 10

Care and Maintenance

*This chapter describes **Care and Maintenance** on the Ultrasound system and peripherals. These procedures are intended to **maintain the quality** of the Ultrasound **system's performance**. Read this chapter completely and familiarize yourself with the procedures before performing a task.*

Overview

Contents in this chapter

Warnings

d  DANGER

BE SURE TO DISCONNECT THE ULTRASOUND SYSTEM POWER PLUG AND OPEN THE MAIN CIRCUIT BREAKER BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.

c  CAUTION

Practice good ESD prevention. Wear an anti–static strap when handling electronic parts and even when disconnecting/ connecting cables.

c  CAUTION

Do not pull out or insert circuit boards while power is on.

c  CAUTION

Do not operate this Ultrasound system unless all board covers and frame panels are securely in place. System performance and cooling require this.

Why do maintenance

Periodic maintenance inspections

It has been determined by engineering that your Vivid T8/ Vivid T8 Pro does not have any high wear components that fail with use, therefore no Periodic Maintenance inspections are mandatory.

However, some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

Keeping records

It is good business practice that ultrasound facilities maintain records of periodic and corrective maintenance. The Ultrasound Periodic Maintenance Inspection Certificate provides the customer with documentation that the Ultrasound system is maintained on a periodic basis.

A copy of the *Ultrasound Periodic Maintenance Inspection Certificate* should be kept in the same room or near the Ultrasound system.

Quality assurance

In order to gain accreditation from organizations such as the American College of Radiology (USA), it is the customer's responsibility to have a quality assurance program in place for each Ultrasound system. The program must be directed by a medical physicists, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program. Contact GE for coverage and/or price for service.

Maintenance task schedule

How often should maintenance tasks be performed?

The Care and Maintenance task schedule (provided in Table 10-1 *on page 10-6*) specifies how often your Vivid T8/ Vivid T8 Pro should be serviced and outlines items requiring special attention.

NOTE: It is the customer's responsibility to ensure the Vivid T8/ Vivid T8 Pro care and maintenance is performed as scheduled in order to retain its high level of safety, dependability and performance.

Your GE Service Representative has an in-depth knowledge of your Vivid T8/ Vivid T8 Pro and can best provide competent, efficient service. Contact GE for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Care and Maintenance Task Schedule assumes that you use your Vivid T8/ Vivid T8 Pro for an average patient load (10-12 per day) and not use it as a primary mobile Ultrasound system which is transported between diagnostic facilities.

NOTE: If conditions exist which exceed typical usage and patient load, then it is recommended to increase the periodic maintenance frequencies.

Table 10-1: Customer Care Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Clean Probes	•*				* or before each use
Inspect AC Mains Cable			•		Mobile Ultrasound system: Check Weekly
Inspect Cables and Connectors			•		
Clean Console			•		
Clean LCD			•		

Table 10-1: Customer Care Schedule (Continued)

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Console Leakage Current Checks				See Notes	Twice Annually
Peripheral Leakage Current Checks				See Notes	Twice Annually
Surface Probe Leakage Current Checks				See Notes	Twice Annually
Endocavity Probe Leakage Current Checks				See Notes	Quarterly Annually
Surgical Probe Leakage Current Checks				See Notes	Quarterly Annually
Measurement Accuracy Checks				See Notes	Twice Annually
Functional Checks				See Notes	also after corrective maintenance

NOTE: The maintenance may require specialized equipment to complete.

NOTE: The periodic maintenances are not mandatory. The table above is for reference only.

Tools required

NOTE: For a list of required tools for servicing the Vivid T8/ Vivid T8 Pro, refer to chapter 8.

Standard GE tool kit

The following is a description of the “Standard” GE tool kit in the USA. Not all tools are required.

Table 10-2: Overview of GE-1 tool kit contents

Tool ID	Description	Tool ID	Description
9-45358	Pliers Retaining Ring	9-XL9971MM	Xcelite-hex Blade 1.27mm
9-4078	Scribe	9-XL9972MM	Xcelite-hex Blade 1.5mm
9-44572	Wrench Open End 3/8 - 7/16	9-XL9973MM	Xcelite-hex Blade 2 mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9974MM	Xcelite-hex Blade 2.5mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9975MM	Xcelite-hex Blade 3mm
9-45385	Pliers, Arc Joint 7 inch	9-XL9976MM	Xcelite-hex Blade 4mm
9-45378	Pliers, Slip Joint	9-XL9977MM	Xcelite-hex Blade 5mm
9-4518	Pliers, Long Nose, Miniature	9-XL991CM	Handle
9-4518	Pliers, Long Nose, Miniature	C2356E	Screw starter - Kedman Quick Wedge
9-44776	Ignition Wrench Set, 10 pc.	BLBO	Box - 18 Compartment
9-44601	Wrench, Adj., 4 inch	DWL4283T	Box - 5 Compartment
9-4151	Screwdriver, Blade, Stubby	9-41322	Pickup Tool, Claw type
9-41421	Screwdriver, Blade, Pocket clip	9-6757	6 pc Needle File Set
9-41594	Screwdriver, Blade 1/8 in. × 4 in.	9-9487	Utility Knife
9-41581	Screwdriver, Blade 3/16 in. × 4 in.	9-45341	Pliers Vice Grip 10 inch
9-39451	20' Steel Tape, locking Spring load	9-3001	Xacto Pen Knife

Table 10-2: Overview of GE-1 tool kit contents (Continued)

Tool ID	Description	Tool ID	Description
9-GH807	Ratchet, Offset, Slotted	9-HT62002	Solder Aid, Fork and Hook
68-412	Ratchet, Offset, Phillips	9-4099	Mirror, Round, Telescoping
9-GH130	Tapered Reamer	9-GH3001	Steel Rule Decimal 6 inch
9-41584	Screwdriver, slotted 1/4 in. × 6 in.	9-GH300ME	Steel Rule Metric 6 inch
9-4118	Screwdriver, Phillips #2, Stubby	9-XL9920	Xcelite-hex Blade.050 inch
9-41293	Screwdriver, Phillips #0	9-XL9921	Xcelite-hex Blade 1/16 inch
9-41294	Screwdriver, Phillips #1	9-XL9922	Xcelite-hex Blade 5/16 inch
9-41295	Screwdriver, Phillips #2	9-XL9923	Xcelite-hex Blade 3/32 inch
9-46677	Hex Keys, 20 pc., Metric	9-XL9924	Xcelite-hex Blade 1/8 inch
9-34701	1/4 in. Standard Socket set (19 pc)	9-XL9925	Xcelite-hex Blade 5/32 inch
9-43499	1/2 inch Socket 1/4 inch drive	9-XL9926	Xcelite-hex Blade 3/16 inch
9-4355	Flex Spinner	9-XL99764	Xcelite-hex Blade 7/64
9-43523	Breaker	9-XL99964	Xcelite-hex Blade 9/64
9-43531	6 inch Ext.	9-XLM60	Mini-screwdriver kit
9-65283	Case 8.5 in. × 4.5 in. × 2 in. Deep	9-45072	Pliers 6 inch Diagonal
9-46696	Hex Keys	9-XL100X	Wire Stripper/Cutter 5 inch - 100X
9-39829	Torpedo Level, Magnetic	9-XL87CG	Pliers - very fine needle nose-87CG
9-38461	Hammer, Ball Peen, 4 oz.	9-WEWDT-07	Weller-Soldering-Replacement Tip(1)
9-4280	Universal Joint 1/4 inch	9-WS175-E	Wiss - Surgical Scissors
9-WEW60P3	Weller - Soldering Iron, 3 wire	KH174	Hemostat 5 inch Straight
9-WECT5B6	Weller - Soldering Iron Tip	KH175	Hemostat 5 inch curved
9-WEWDP12	Weller - Desoldering Pump	9-Z9480121	Alignment tool (red)
93383	Flashlight Mini-Mag Lite (AAA Bat.)		
9-GH408	Tweezers		
21576	Brush - Bristle		

Table 10-2: Overview of GE-1 tool kit contents (Continued)

Tool ID	Description	Tool ID	Description
9-4516	Pliers 4 1/4 inch Diagonal		

GE-2 tool kit

Table 10-3: Overview of GE-2 tool kit contents

GE-2 Sears Kit (#99034)			
Tool ID	**Description**	**Tool ID**	**Description**
9-45381	Pliers, Arc Joint 9 1/2 inch	9-44067	Socket 1 1/16 in. for 1/2 in. drive
9-45092	Pliers, Linesman 8 1/2 inch	9-42679	Socket 10MM Hex for 1/2 in. drive (2273333)
9-42882	Punch, Pin 3/32 inch	9-44262	Extension 10 inch for 1/2 in. drive (2273405)
9-42884	Punch, Pin 5/32 inch	9-4258	3/8 inch to 1/2 inch Adapter
9-42886	Punch, Pin 1/4 inch	9-34374	3/8 inch Metric Socket Set - 12 PT
9-42973	Cold Chisel 1/2 inch	9-44311	16mm Socket 12 pt.
9-GH77	Center Punch Automatic	9-33485	Metal Socket Tray
9-GH890	File Handle, Adj.	9-33484	Metal Socket Tray
9-31276	File, Round, Bastard 8 inch	9-33484	Metal Socket Tray
9-31277	File, Half Round, Bastard 8 inch	9-52068	Tap and Drill Set
9-31263	File, Flat Mill 8 inch	9-52722	#6 Tap
21045C	Close Quarter Saw	9-52723	#8 Tap
9-44604	Wrench, Adj. 10 inch		High Speed Drill Set
9-41587	Screwdriver 5/16 inch × 8 inch		#36 Drill
9-41586	Screwdriver, Stubby 5/16 inch		#29 Drill
9-GH19512	Countersink 1/2 inch	9-44046	3/8 inch Socket Set
9-44741	12 PC Combination Wrench Set		

Special tools, supplies and equipment used for maintenance

Table 10-4: Overview of tool requirements for periodic maintenance

Tool / kit	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 200 to 240V 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		The safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.
QIQ Phantom	E8370RB	RMI Grayscale Target Model 403GS ***NOTE! The use of a Phantom is not required during Preventive Maintenance. Customer may use it as part of their Quality Assurance Program tests***.
B/W Printer Cleaning Sheet		See printer user manual for requirements
Color Printer Cleaning Sheet		See printer user manual for requirements
Disposable Gloves		

System maintenance

Preliminary checks

The preliminary checks take about 15 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

Table 10-5: System preliminary checks

Step	Item	Description
1.	Ask and Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Paperwork	Fill in the top of Ultrasound Inspection Certificate (see Figure 10-5 *on page 10-32*). Record all probes and Ultrasound system options.
3.	Power up	• Turn the Ultrasound system power on and verify that all fans and peripherals turn on. • Watch the displays during power up to verify that no warning or error messages are displayed. • Where applicable, confirm that the battery is charged. If no AC Input present, use the internal battery.
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the monitor.
6.	InSite	Where applicable, for Warranty and Contract Customers only: • Verify that InSite is functioning properly. • Ensure two-way remote communications.
7.	Review Error Logs	Where applicable, Error Logs can be reviewed via system diagnostics.
8.	Diagnostics	Optional.
9.	Presets	Backup all Customer Presets to an appropriate media.
10.	Image Archive	Back up the Image Archive onto appropriate media.

Functional checks

NOTE: See also Chapter 4

The functional checks take about 60 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

System checks

Table 10-6: System functional checks

Step	Item	Description
1.	B-Mode	Verify basic B-Mode (2D) operation. Check the basic Ultrasound system controls that affect this mode of operation.
2.	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic Ultrasound system controls that affect this mode of operation.
3.	Doppler Modes	Verify basic Doppler operation (PW and CW if available). Check the basic Ultrasound system controls that affect this mode of operation.
4.	M-Mode	Verify basic M-Mode operation. Check the basic Ultrasound system controls that affect this mode of operation.
5.	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
6.	Applicable Software Options	Verify the basic operation of all optional modes such as Contrast. Check the basic Ultrasound system controls that affect each options operation.
7.	Xmit/Recv Elements	Use the Visual Channel Utility on the loop connect to verify that all system xmit/recv channels are functional.
8.	Operator Panel test	Perform the Operator Panel Test Procedure.
9.	Keyboard	Do the interactive keyboard test.
10.	LCD	Verify basic LCD display functions. Refer to Chapter 3 of the User Manual.
11.	Software Menu check	Verify Software Menu display functions. Refer to Chapter 3 of the User Manual.
12.	Peripherals	See: ‘Peripheral checks’ on *page 4-34*.
13.	Measurements	In measurement mode, make distance measurement, get result in result window. Verify the distance by graduate rule. Distance Accuracy should be within ±5%. (Name result from result window Result A, result from graduate rule Result B; Distance Accuracy = (Result B-Result A)/Result A)

Peripheral/option checks

If any peripherals or options are not part of the system configuration, the check can be omitted.

Refer to the User Manual for a list of approved peripherals/ options.

Table 10-7: GE approved peripheral/hardware option functional checks

Step	Item	Description
1.	Media	Verify media drive(s) read/write properlty. Clean if necessary.
2.	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3.	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4.	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5.	ECG	Verify basic operation with customer
6.	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.
7.	DVD	Verify that the DVD is functioning properly. Clean heads and covers if necessary.

Mains cable inspection

Table 10-8: Mains Cable Inspection, As Appropriate

Step	Item	Description
1.	Unplug Cord	Disconnect the mains cable from the wall and Ultrasound system.
2.	Inspect	Inspect it and its connectors for damage of any kinds.
3.	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.

Cleaning

Table 10-9: General Cleaning

Step	Item	Description
1.	Console	Remove the battery. Use a fluid detergent in warm water on a soft, damp cloth to carefully wipe the entire system. Be careful not to get the cloth too wet so that moisture does not enter the console.
2.	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
3.	LCD	Use a soft, non-abrasive folder cloth. Gently wipe the LCD face. DO NOT use a glass cleaner that has a hydrocarbon base (such as Benzene, Methy Alcohol or Methy Ethyl Ketone) on LCD with the filter (anti-glare shield).

Physical inspection

NOTE: These features may not be present on all Ultrasound systems.

Table 10-10: Physical checks

Step	Item	Description
1.	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2.	Scratches & Dents	Inspect the exterior for dents, scratches or cracks. .
3.	Input Power	Refer to: 'Mains cable inspection' on *page 10-14*.
4.	Cables & Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to footswitch assembly and probe strain or bend reliefs.
5.	Shielding & Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
6.	Control Panel	Inspect keyboard and control panel. Note any damaged or missing items.
7.	Control Panel Lighting	Check for proper operation of all operator panel and Freeze Key light.
8.	LCD	Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the LCD arm allows: • swivelling the screen to the left and to the right • folding the screen to the locked position • release and adjustment backwards and forwards • can be adjusted in the up/down positions. Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.
9.	External I/O	Check all connectors for damage.

Table 10-10: Physical checks (Continued)

Step	Item	Description
10.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
11.	Battery	Where applicable, check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal,

Optional Diagnostic Checks

Optionally you can access the diagnostic software as described in Chapter 5 or 7. View the error logs and run desired diagnostics.

View the Log

1. Review the system error log for any problems.
2. Check the temperature log to see if there are any trends that could cause problems in the future.
3. Check the Configuration Log; update if needed.

Probe maintenance

Probe related checks

Table 10-11: System preliminary checks

Step	Item	Description
1.	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
2.	Probes	Thoroughly check the Ultrasound system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins.
3.	Probes	Verify that the Ultrasound system properly recognizes all probes.

Basic probe care

The Ultrasound system user manuals and various probe 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.

Ultrasound probes can be easily damaged by improper handling. See the User Manual and probe care cards 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.

Any evidence of wear indicates the probe cannot be used.

Do a visual check of the probe pins and Ultrasound system sockets before plugging in a probe.

The Interoperative probes often have special considerations and individual probe user manuals. For Interoperative probes also refer to their separate user manuals.

Basic probe cleaning

Refer to the User's Manual for details on probe cleaning.

To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.

Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty.

DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe.

Follow care instructions that came with the probe.

Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

Electrical safety tests

Safety test overview

The electrical safety tests in this section are based on and conform to 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 IEC 60601-1 documents

WARNING

THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 6 MONTHS ACCORDING TO THE REQUIREMENTS OF THE PATIENT SAFETY STANDARD IEC-EN 60601-1. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE SAFETY INSPECTIONS MENTIONED ABOVE.

DANGER

TO MINIMIZE RISK OF ELECTRICAL SHOCK, ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE ELECTRICAL SAFETY INSPECTIONS AND TESTS.

DANGER

TO AVOID ELECTRICAL SHOCK, THE ULTRASOUND SYSTEM UNDER TEST **MUST NOT** BE CONNECTED TO OTHER ELECTRICAL EQUIPMENT. REMOVE ALL INTERCONNECTING CABLES AND WIRES. THE ULTRASOUND SYSTEM UNDER TEST MUST NOT BE CONTACTED BY USERS OR PATIENTS WHILE PERFORMING THESE TESTS.

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.

Safety test overview (continued)

Prior to initiating any electrical test, the Ultrasound system must be visually inspected. Perform the following visual checks:

- Check for missing or loose enclosure covers that could allow access to internal live parts.
- Examine the mains cord, mains plug and appliance inlet for damaged insulation and adequacy of strain relief and cable clamps.
- Locate and examine all associated transducers. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.

Test the system, peripherals and probes for leakage current. Excessive leakage current can cause injury or death in sensitive patients. High leakage current can also indicate degradation of insulation and a potential for electrical failure. Do not use probes or equipment having excessive leakage current.

To minimize the risk that a probe may shock someone the customer should:

- Not use a probe that is cracked or damaged in any way.
- Check probe leakage current:
    - Based on your facilities QA program for surface probes.
    - Based on your facilities QA program for endocavitary probes.
    - whenever probe damage is suspected.

Leakage current limits

WARNING

Energy Control and Power Lockout for Vivid T8/ Vivid T8 Pro.

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

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

Ultrasound System components may be energized.

CAUTION

Compare all safety-test results with safety-test results of previously performed safety tests (e.g. last year etc). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE for further analysis.

The following limits are summarized for IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

Table 10-12: Chassis Leakage Current Limits - Accessible Metal Surface

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
All (Except USA & Canada)	0.1 mA	0.5 mA	0.5 mA	0.5 mA
USA & Canada	0.1 mA	0.3 mA	0.3 mA	0.3 mA

Table 10-13: Type BF Applied Part Leakage Current Limits - Probes Surface

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
All	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

Leakage current limits (continued)

Table 10-14: Type CF Applied Part Leakage Current Limits - ECG Connections

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
All	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

NOTE: **Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.*

The following tests are performed at the factory and should be performed at the site. These tests are: chassis leakage current, and probe leakage current. All measurements are made with an electrical safety analyzer which should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

Table 10-15: Equipment Type and Test Definitions

Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For ultrasound equipment, this includes transducers and ECG leads.	
Type BF	Body Floating or non-conductive ultrasound probes which are marked with the 'man in box' BF symbol. this includes all transducers.	
Type CF	Cardiac Floating or non-conductive intraoperative probes for direct cardiac contact and isolated ECG connections so marked with the 'heart in box' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required test for Type CF applied parts.	

Outlet test - wiring arrangement

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

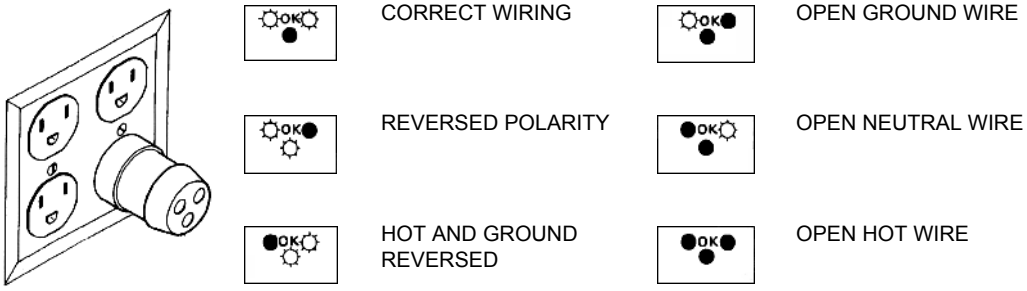


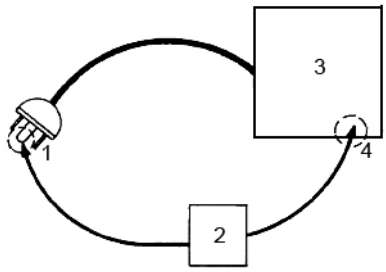
Figure 10-1. Typical alternate outlet tester

NOTE: No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

Grounding continuity

DANGER ELECTRIC SHOCK HAZARD. THE PATIENT MUST NOT BE CONTACTED TO THE EQUIPMENT DURING THIS TEST.

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2** ohms. Reference the procedure in the IEC60601-1.



1. GROUND PIN
2. OHMMETER
3. Vivid T8/ Vivid T8 Pro
4. ACCESSIBLE METAL PART:
   - MONITOR HOUSING
   - PEAR PANEL CONNECTOR
   - ANY CASTER/WHEEL SUPPORT

Figure 10-2. Ground continuity test

Chassis leakage current test

DANGER ELECTRIC SHOCK HAZARD. WHEN THE METER'S GROUND SWITCH IS OPEN, DON'T TOUCH THE ULTRASOUND SYSTEM!.

CAUTION

Equipment damage possibility. Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the Ultrasound system may be damaged.

Generic procedure

The test verifies the isolation of the power line from the chassis. The testing meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading of current.

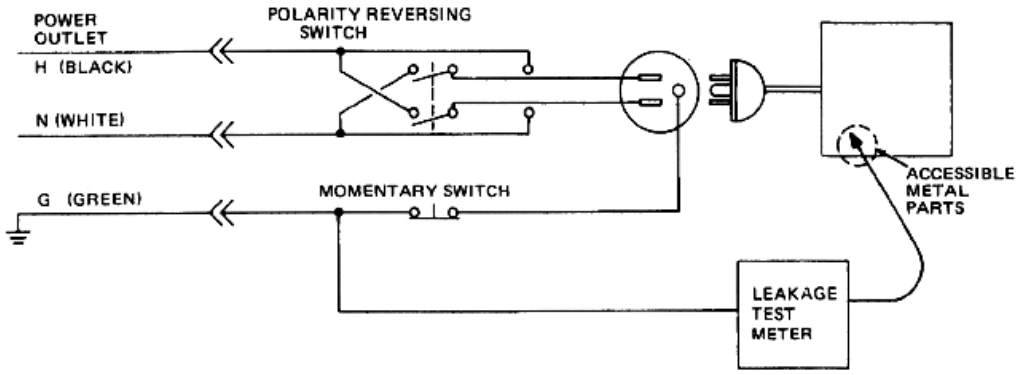


Figure 10-3. Set Up for Chassis Source Leakage Current, IEC 601-1 Clause 19 - Continuos Leakage Currents and Patient, Auxiliary Currents

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is 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 10-12 *on page 10-21*.

Data Sheet for enclosure Source Leakage Current

The test passes when all readings measure less than the value shown in Table 10-12 *on page 10-21*. Record all data on the PM Inspection Certificate.

Table 10-16: Typical Data Sheet for enclosure Source Leakage Current

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Speaker Cover	Test 2 Real Panel Metal Parts	Optional Test 3	Optional Test 4
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				

Probe leakage current test

d  DANGER

DO NOT USE THE PROBE IF THE INSULATING MATERIAL HAS BEEN PUNCTURED OR OTHERWISE COMPROMISED.

INTEGRITY OF THE INSULATION MATERIAL AND PATIENT SAFETY CAN BE VERIFIED BY SAFETY TESTING ACCORDING TO IEC60601-1.

c  CAUTION

Equipment damage possibility. Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the Ultrasound system may be damaged.

Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

NOTE: Some leakage current is expected on each probe, depending on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.

Tools

For needed tools, see: ‘Tools required’ on *page 10-8*.

Generic procedure on probe leakage current

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.

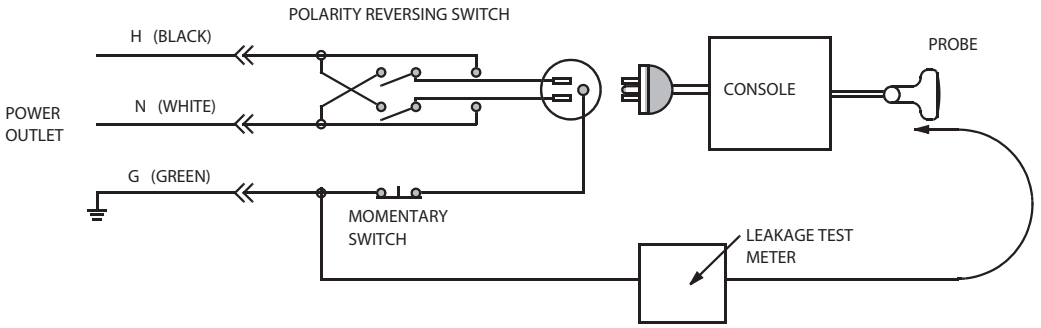


Figure 10-4. Set up for probe leakage current

NOTE: Each probe will have some amount of leakage current, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.

DANGER TO AVOID PROBE DAMAGE AND POSSIBLE ELECTRIC SHOCK, DO NOT IMMERSE PROBES INTO ANY LIQUID BEYOND THE LEVEL INDICATED IN THE PROBE USERS MANUAL. **DO NOT TOUCH THE PROBE, CONDUCTIVE LIQUID OR ANY PART OF THE UNIT UNDER TEST WHILE DOING THE TEST**.

Meter Procedure Using Probe Adapter

Follow the Safety Analyzer tool instruction to test each transducer for leakage current.

The electrical Safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

No Meter Procedure Using Probe Adapter

Follow the Safety Analyzer tool instruction to test each transducer for leakage current.

The electrical Safety Analyzer tool should be calibrated and compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.

Data Sheet for Transducer Source Leakage Current

The test passes when all readings measure less than the values shown in Table 10-13 *on page 10-21*. Record all data on the PM Inspection Certificate.

Table 10-17: Typical Data Sheet For Transducer Source Leakage Current

Transducer Tested:			
Unit Power	**Tester Power Polarity Switch**	**Tester GROUND or NUETRAL 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	

When there's too much leakage current …

AC/DC Fails

Where applicable, check the AC/DC adapter and its cable. Replace a new one if any portion is defective.

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.

Where applicable, 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 leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

Probe Fails

Test the probe in another connector to isolate if the fault lies with the probe or the Ultrasound system. Or Change another probe to confirm if the fail is caused by console.

NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable leakage current for body surface contact probe differs from inter-cavity probe. Be sure to enter the correct probe type in the appropriate space on the check list.

If excessive leakage current 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.

Peripheral Fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Still Fails

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

New Unit

If the leakage current measurement tests fail on a new Ultrasound system and if situation can not be corrected, submit a Safety Failure Report to document the Ultrasound system problem. Remove Ultrasound system from operation.

ECG Fails

Inspect cables for damage or poor connections.

Inspection Paperwork

Ultrasound Inspection Forms

ULTRASOUND 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:

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

Figure 10-5. Ultrasound Inspection Certificate

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

Ultrasound Inspection Forms (continued)

FUNCTIONAL CHECKS

Functional Check (if applicable)	OK? or N/A
B-Mode Function	
Doppler Modes Function	
CF-Mode Function	
M-Mode Function	
Applicable Software Opti ons	
Applicable Hardware Options	
Control Panel	
LCD	
Measurement Accuracy	
GE Approved Peripherals	

PHYSICAL INSPECTION AND CLEANING

Physical Inspection and Cleaning (if applicable)	Inspect	Clean
Console		
LCD		
External I/O		
Cables and Connectors		
GE Approved Peripherals (DVD-RW, Printer)		
Labeling (see User Manual for Labeling)		

COMMENTS:

_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____

Figure 10-6. Functional Checks

ELECTRICAL SAFETY

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct ground &wiring config.)				
Type BF Applied Part Leakage Current Limits- Probe				
enclosure Source Leakage Current - Chassis Leakage Current Limits				
Peripheral 1 Leakage Current				
Peripheral 2 Leakage Current				

PROBES

Probe Number (from previous page)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				

Final Check. All system covers are in place. System scans with all probes as expected.

Accepted by: _____

Figure 10-7. Electrical Safety

Electrical Safety Tests Log

Table 10-18: Electrical safety tests log

Electrical test performed	Max value allowed	Value measured	OK?	Comments
Outlet (correct ground and wiring config.)				
System ground continuity				
Chassis source leakage current - probe				
Chassis source leakage current - wheel				
Chassis source leakage current - monitor				
Patient lead source leakage (lead to ground)				
Patient lead source leakage (lead to lead)				
Patient lead source leakage (isolation)				
Peripheral 1 leakage current				
Peripheral 1 ground continuity				
Peripheral 2 leakage current				

Table 10-18: Electrical safety tests log (Continued)

Electrical test performed	Max value allowed	Value measured	OK?	Comments
Peripheral 2 ground continuity				
Peripheral 3 leakage current				
Peripheral 3 ground continuity				

Table 10-19: Electrical safety tests (probes) log

Probe	Max value allowed	Max value measured	OK?	Comments

Index

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W