

GE Healthcare

# Voluson® 730Expert

## Service Manual

- Voluson® 730Expert systems with Serial number A09000 onwards
- Voluson® 730Expert systems with Software version SW 3.x.x (BT03)
- Voluson® 730Expert systems that were upgraded to BT03



Part Number: 105899  
Revision: 3

CE<sub>0123</sub>



## ***Important Precautions***

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**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.
- WARTEN SIE DIESES GERÄT NUR, WENN SIE DIE ENTSPRECHENDEN ANWEISUNGEN IM KUNDENDIENST-HANDBUCH GELESEN HABEN UND NACHVOLLZIEHEN KÖNNEN.
- 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 GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, LA TRADUCCIÓN ES RESPONSABILIDAD DEL CLIENTE.
- NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

**ATENÇÃO  
(PT)**

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

**AVVERTENZA  
(IT)**

- IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS 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 TÖLKETEENUSE 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 ÁRAMÚTÉS, MECHANIKAI VAGY EGYÉB VESZÉLYHELYZET MIATTI SÉRÜLÉSÉT EREDMÉNYEZHETI.

**VIÐVÖRUN**  
(IS)

- ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.
- EF ÞJÓNUSTUADILI 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 ELEKTRICKÉHO PROUDU, RESPEKTIVE Vlivem K RIZIKU MECHANICKÉHO POŠKOZENÍ NEBO JINÉMU RIZIKU.

**ADVARSEL  
(DA)**

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

**WAARSCHUWING  
(NL)**

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

**BRĪDINĀJUMS  
(LV)**

- ŠĪ APKALPES ROKASGRĀMATA IR PIEEJAMA TIKAI ANĢĻU VALODĀ.
- JA KLIENTA APKALPES SNIEDZĒJAM NEPIECIEŠAMA INFORMĀCIJA CITĀ VALODĀ, NEVIS ANĢĻU, 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 JEDYNIEM W JĘZYKU ANGIELSKIM.
- JEŚLI FIRMA ŚWIADCZĄCA KLIENTOWI USŁUGI SERWISOWE WYMAGA UDOSTĘPNIENIA PODRĘCZNIKA W JĘZYKU INNYM NIŻ ANGIELSKI, OBOWIĄZEK ZAPEWNIENIA STOSOWNEGO TŁUMACZENIA SPOCZYWA NA KLIENCIE.
- NIE PRÓBOWAĆ SERWISOWAĆ NINIEJSZEGO SPRZĘTU BEZ UPRZEDNIEGO ZAPOZNANIA SIĘ Z PODRĘCZNIKIEM SERWISOWYM.
- NIEZASTOSOWANIE SIĘ DO TEGO OSTRZEŻENIA MOŻE GROZIĆ OBRAŻENIAMI CIAŁA SERWISANTA, OPERATORA LUB PACJENTA W WYNIKU PORAŻENIA PRĄDEM, URAZU MECHANICZNEGO LUB INNEGO RODZAJU ZAGROŻEŃ.

**ATENȚIE  
(RO)**

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

**ОСТОРОЖНО!**  
(RU)

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

**UPOZORNENIE**  
(SK)

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

**VARNING**  
(SV)

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

**DİKKAT**  
(TR)

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

**警告**  
(JA)

このサービスマニュアルには英語版しかありません。

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

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

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

**注意:**  
(ZH-CN)

本维修手册仅存有英文本。

非 GEHC 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。

未详细阅读和完全了解本手册之前，不得进行维修。忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

**경고**  
(KO)

- 본 서씨 지침는 영뵁 만 이용실 수 있씁다 .
- 고크 서씨 제뵁가 영어 이외 언뵁 요할 경우, 번역 서씨를 제뵁는 것은 고크 책임대 .
- 본 서씨 지침를 참췌고 이해지 않는 한은 해당 장뵁 수해뵁 시뵁지 마췌오 .
- 이 경뵁 유뵁지 않뵁뵁 전기쇼크, 기뵁의 혹은 다른 위험부터 서씨 제뵁 , 운뵁 혹은 환제게 위험 가할 수 있씁다 .

## DAMAGE IN TRANSPORTATION - FOR USA ONLY

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

## CERTIFIED ELECTRICAL CONTRACTOR STATEMENT - FOR USA ONLY

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

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# Revision History

Revision	Date	Reason for change
0	September 12, 2003	Initial Release (from Software Version 3.0.x onwards)
1	December 11, 2003	from Software Version 3.0.3 onwards
2	March 08, 2004	from Software Version 3.1.x onwards
3	May 2008	general update, implementaion of new parts, release of Software version 3.1.6

# List of Effected Pages

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	3	<a href="#">Chapter 2 - Site Preparation</a> pages 2-1 to 2-10	3	<a href="#">Chapter 7 - Diagnostics/Troubleshooting</a> pages 7-1 to 7-30	3
Important Precautions (incl. Legal Notes) pages i to ix	3	<a href="#">Chapter 3 - Setup Instructions</a> pages 3-1 to 3-52	3	<a href="#">Chapter 8 - Replacement Procedures</a> pages 8-1 to 8-24	3
Rev History/LOEP page x	3	<a href="#">Chapter 4 - Functional Checks</a> pages 4-1 to 4-44	3	<a href="#">Chapter 9 - Renewal Parts</a> pages 9-1 to 9-36	3
Table of Contents pages xi to xxvi	3	<a href="#">Chapter 5 - Components and Functions (Theory)</a> pages 5-1 to 5-56	3	<a href="#">Chapter 10 - Care &amp; Maintenance</a> pages 10-1 to 10-26	3
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# Chapter 1

## Introduction

### Section 1-1 Overview

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

This chapter describes important issues related to safely servicing the Voluson® 730Expert scanner. The service provider must read and understand all the information presented in this manual before installing or servicing a unit.

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

Section	Description	Page Number
1-1	Overview	1-1
1-2	Important Conventions	1-3
1-3	Safety Considerations	1-7
1-4	Electromagnetic Compatibility (EMC)	1-10
1-5	Customer Assistance	1-11

#### 1-1-2 Purpose of Service Manual

This Service Manual provides installation and service information for the Voluson® 730Expert Ultrasound Scanning System and contains the following chapters:

- 1.) **Chapter 1 - Introduction:** Contains a content summary and warnings.
- 2.) **Chapter 2 - Site Preparation:** Contains pre-installation requirements for the Voluson® 730Expert.
- 3.) **Chapter 3 - Setup Instructions:** Contains installation procedures.
- 4.) **Chapter 4 - Functional Checks:** Contains functional checks that are recommended as part of the installation, or as required during servicing and periodic maintenance.
- 5.) **Chapter 5 - Components and Functions (Theory):** Contains block diagrams and functional explanations of the electronics.
- 6.) **Chapter 6 - Service Adjustments:** Contains instructions on how to make available adjustments to the Voluson® 730Expert.
- 7.) **Chapter 7 - Diagnostics/Troubleshooting:** Provides procedures for running diagnostic or related routines for the Voluson® 730Expert.
- 8.) **Chapter 8 - Replacement Procedures:** Provides disassembly procedures and reassembly procedures for all changeable Field Replaceable Units (FRU).
- 9.) **Chapter 9 - Renewal Parts:** Contains a complete list of field replaceable parts for the Voluson® 730Expert.
- 10.) **Chapter 10 - Care & Maintenance:** Provides periodic maintenance procedures for the Voluson® 730Expert.

### 1-1-3 Typical Users of the Basic Service Manual

- Service Personnel (installation, maintenance, etc.).
- Hospital's Service Personnel
- Contractors (Some parts of Chapter 2 - Pre-Installation)

### 1-1-4 Voluson® 730Expert Models Covered by this Manual

Table 1-2 Voluson® 730Expert Model Designations

GE Part Number	Kretz #	Description
H48621N	-----	Voluson® 730Expert Main Body (BT03)

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

This manual applies to Voluson® 730Expert systems:

- with Serial number A09000 - (onwards)
- with Software version 3.0.x (BT03) installed
- with Software version 3.1.x (BT03) installed
- that were upgraded to BT03 (SW 3.0.x or higher installed)

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

The Operator Manual(s) should be fully read and understood before operating the Voluson® 730Expert and also kept near the unit for quick reference.

## Section 1-2 Important Conventions

### 1-2-1 Conventions Used in Book

#### Icons

Pictures, or icons, are used wherever they 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 are labeled in one of following ways:



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



**WARNING** INDICATES THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY AND PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.



**CAUTION** Indicates the presence of a hazard that will or can cause minor personal injury and property damage if instructions are ignored.



**NOTICE** Equipment Damage Possible

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

*Example:* Disk drive will crash.

**NOTE:** Notes provide important information about an item or a procedure. Information contained in a NOTE can often save you time or effort.

## 1-2-2 Standard Hazard Icons

Important information will always be preceded by the exclamation point contained within a triangle, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could cause harm.



**Table 1-3 Standard Hazard Icons**

ELECTRICAL	MECHANICAL	RADIATION
LASER	HEAT	PINCH

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

**Table 1-4 Standard Icons Indicating a Special Procedure be Used**

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION

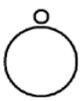
### 1-2-3 Product Icons

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

**Table 1-5 Product Icons**

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
Identification and Rating Plate	Manufacturer's name and address Model and serial numbers Electrical ratings	Rear side of the unit Monitor rear side On each probe
Device Listing/Certification Labels	Laboratory logo or labels denoting conformance with industry safety standards such as UL or IEC.	Rear side of the unit Rear side of the monitor
	Council Directive 93/42/EEC concerning medical devices: The CE mark affixed to the equipment testifies compliance to the directive.	Rear side of the unit on the plug of each probe
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX 1) IP Code (IPX 7)	Indicates the degree of protection provided by the enclosure per IEC 529. IPX 1 and IPX 7 indicates drip proof.	Footswitch Probes
	Equipment Type BF (man in the box symbol) IEC 878-02-03 indicates B Type equipment having even more electrical isolation than standard Type B equipment because it is intended for intimate patient contact.	Probe connectors Front side of the ECG-preamplifier (MAN) Rear of Power Supply
"CAUTION This unit weighs... Special care must be used to avoid..." 	This precaution is intended to prevent injury that may result if one person attempt to move the unit considerable distances or on an incline due to the weight of the unit.	Used in the Service and User Manual which should be adjacent to equipment at all times for quick reference.
	"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Various
	ATTENTION - Consult accompanying documents " is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Rear side of Power Supply
	"CAUTION - Dangerous voltage" (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Rear side of Monitor

Table 1-5 Product Icons (Continued)

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	"Mains OFF" Indicates the power off position of the mains power switch.	Rear of system at mains switch (F1)
	"OFF/Standby" Indicates the power off/standby position of the power switch. <b>CAUTION</b> <b>This Power Switch DOES NOT ISOLATE Mains Supply</b>	Adjacent to On-Off/Standby switch left below the Control panel.
	"Mains ON" Indicates the power on position of the mains power switch.	Rear of system at mains switch (F1)
	ON switch of the isolation transformer for auxiliary devices.	Rear of system at the switch for auxiliary devices (F2)
	OFF switch of the isolation transformer for auxiliary devices.	Rear of system at the switch for auxiliary devices (F2)
	"Protective Earth" Indicates the protective earth (grounding) terminal.	Internal, Rear of Power Supply
	"Equipotentiality" Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Rear of Power Supply
	DANGEROUS ELECTRIC VOLTAGE. Pull the mains plug before opening the unit!	Rear of Power Supply (if "new" version of CPN80-81 is installed)
	Waste Electrical and Electronic Equipment (WEEE) Disposal. This symbol indicates that waste electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.	Rear side of the unit on the plug of each probe (availability depends on delivery status)
	These symbols indicate that at least one of the six hazardous substances of the China RoHS Labelling Standard is above the RoHS limitation. The number inside the circle is referred to as the Environmental Friendly Use Period (EFUP). It indicates the number of years that the product, under normal use, will remain harmless to health of humans or the environment. EFUP = 10 for Short Use Products EFUP = 20 for Medium Use Products	Rear side of the unit on the plug of each probe (availability depends on delivery status)
 LAMP CONTAINS MERCURY, DISPOSE ACCORDING TO STATE/LOCAL LAW <small>KTD100272_2</small>	This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the Touch Panel contain mercury.)	Rear side of the unit on rear side of the Touch Panel (availability depends on delivery status)

## Section 1-3 Safety Considerations

### 1-3-1 Introduction

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture and intended use of the equipment.

### 1-3-2 Human Safety

Operating personnel must not remove the system covers. Servicing should be performed by authorized personnel only. Only personnel who have participated in a Voluson® 730Expert Training are authorized to service the equipment.

### 1-3-3 Mechanical Safety

 **WARNING** ***USE EXTREME CAUTION WHEN ELEVATING THE UNIT, OR IF IT IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE. IT MAY BECOME UNSTABLE WHICH COULD CAUSE THE UNIT TO TIP OVER.***

 **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.***

 **CAUTION** Always lower and center the Operator I/O Panel before moving the scanner.

 **CAUTION** The Voluson® 730Expert weighs 136 kg or more, depending on installed peripherals, (300 lbs., or more) when ready for use.

 Care must be used when moving it or replacing its parts. Failure to follow the precautions listed could result in injury, uncontrolled motion and costly damage.



**ALWAYS:**

- Use the handle to move the system. • Be sure the pathway is clear.
- Use slow, careful motions. • Do not let the system strike walls or door frames.

Two people are required when moving on inclines or lifting more than 16 kg (35 lbs).

 **CAUTION** Keep heat venting holes on the monitor unobstructed to avoid overheating of the monitor.

**NOTE:** *Special care should be taken when transporting the unit in a vehicle:*

- Secure the unit in an upright position and lock the caster wheels (brake).
- DO NOT use the Control Panel as an anchor point.
- Place the probes in their carrying case.
- Eject any DVD, CD or Magneto Optical disk (MOD) from their drive.
- Ensure that the Voluson® 730Expert system is firmly secured while inside the vehicle.
- Prevent vibration damage by driving cautiously.  
*Avoid unpaved roads, excessive speeds, and erratic stops or starts.*

## 1-3-4 Electrical Safety

### 1-3-4-1 Safe Practices

To minimize shock hazard, the equipment chassis must be connected to an electrical ground. The system is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground. If an extension cord is used with the system, make sure that the total current rating of the system does not exceed the extension cord rating.

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 meet international electrical standards.



**WARNING** *CONNECTING A VOLUSON® 730EXPERT SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE SCANNER.*

### 1-3-4-2 Probes

All the probes for the Voluson® 730Expert are designed and manufactured to provide trouble-free, reliable service. To ensure this, correct handling of probes is important and the following points should be noted:

- Do not drop a probe or strike it against a hard surface, as this may damage the transducer elements, acoustic lens, or housing.
- Inspect the probe prior to each use for damage or degradation to the Housing, Cable strain relief, Lens and Seal.
- Do not use a cracked or damaged probe. In this event, call your field service representative immediately to obtain a replacement.
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled, or to be caught in the machine's wheels.
- Never immerse the probe connector or adapter into any liquid.

**NOTE:** *For detailed information on handling probes, refer to the Voluson® 730Expert Basic User Manual and the care card supplied with the probe.*

### 1-3-5 Labels Locations

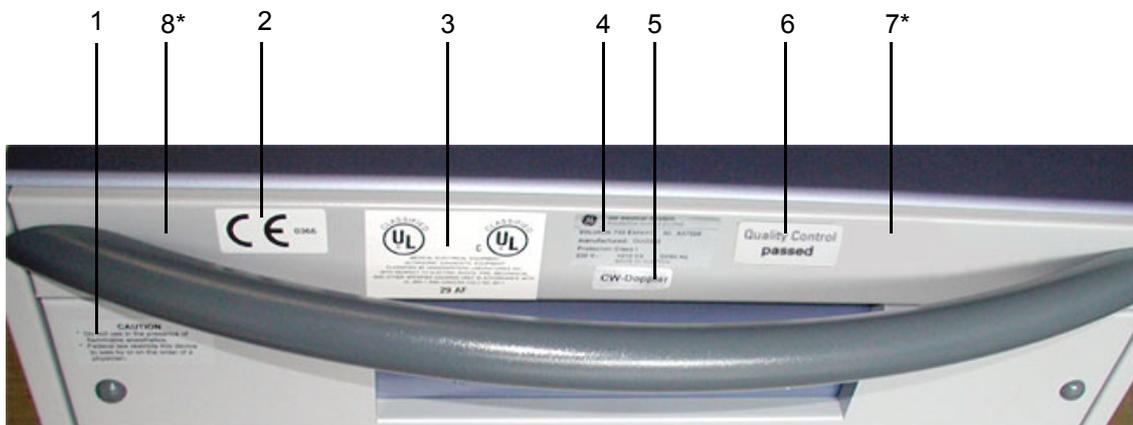


Figure 1-1 Labeling

- 1.) Caution Label
- 2.) CE-Label
- 3.) UL-Label
- 4.) Identification "Main" Label
- 5.) CW-Doppler (only if the CW-Doppler option is installed)
- 6.) Quality Control Label
- 7.) \*place for additional label (e.g., "Hg Vermont label", "Homologation label" for Japan or China only)
- 8.) \*place for Disposal Label (WEEE)

\* availability depends on delivery status of the Voluson® 730Expert system

### 1-3-6 Dangerous Procedure Warnings

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

 **DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT.**



**USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**

 **WARNING EXPLOSION WARNING**

**DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE.  
OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT  
CONSTITUTES A DEFINITE SAFETY HAZARD.**

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

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

### 1-3-7 Lockout/Tagout Requirements (For USA Only)

Follow OSHA Lockout/Tagout requirements to protect service personnel from injuries caused by unexpected energizing or start-up of equipment during service, repair, or maintenance.



**NOTICE** Energy Control and Power Lockout for Voluson® 730Expert.



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

Maintain control of the system power plug

There are no test points to verify isolation, you must wait for at least 20 seconds for capacitors to discharge.

Beware that the Power Supply (CPN), Front End Processor and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

### 1-3-8 Returning/Shipping Probes and Repair Parts

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

GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS 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 and 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 what 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 purpose and must be transported as a hazardous material.*

## Section 1-4 Electromagnetic Compatibility (EMC)

### 1-4-1 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 or signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

For applicable standards refer to Chapter 2 in the Basic User Manual of the Voluson® 730Expert.

## 1-4-2 Compliance

The Voluson® 730Expert unit conforms to all applicable conducted and radiated emission limits and to immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

**NOTE:** *For 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.*

## 1-4-3 Electrostatic Discharge (ESD) Prevention

 **WARNING** *DO NOT touch any boards with integrated circuits prior to taking the necessary ESD precautions:*



- 1.) *When installing boards, ESD may cause damage to a board. ALWAYS connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the system (to the right of the power connector).*
- 2.) *Follow general guidelines for handling of electrostatic sensitive equipment.*

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

## Section 1-5 Customer Assistance

### 1-5-1 Contact Information

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

**NOTE:** *Prepare vital system information (see: [Section 7-2 on page 7-2](#)) before you call:*

- System Type
- System Serial number (also visible on label on back of the system)
- Application Software version
- Backup version
- additional information about installed software

**1-5-1 Contact Information** (cont'd)

**Table 1-6 Phone Numbers for Customer Assistance**

Location	Phone Number	
USA GE Medical Systems Ultrasound Service Engineering 9900 Innovation Drive (RP-2123) Wauwatosa, WI 53226, USA	Service On-site	1-800-437-1171
	Service: Parts	1-800-558-2040
	Applications support	1-800-682-5327 or 1-262-524-5698
	Fax:	1-414-721-4387
Canada		1-800-668-0732
Latin America	Service	1-800-321-7937
	Applications support	1-262-524-5698
Europe GE Medical Systems Kretztechnik GmbH & Co OHG Service Department - Ultrasound Tiefenbach 15 A-4871 Zipf (Austria)	Phone: +43 (0)7682-3800-26  Fax: +43 (0)7682-3800-47	
Asia Support Center - Singapore GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Plaza Singapore 169730	Phone: +65-6291-8528  Fax: +65-6291-7006	
Japan Support Center	Phone: 81-426-48-2944 Fax: 81-426-48-2905	

**1-5-2 System Manufacturer**

**Table 1-7 System Manufacturer**

Manufacturer	Telephone	FAX
GE Medical Systems - Kretztechnik GmbH & Co OHG Tiefenbach 15 A-4871 Zipf Austria	+43-7682-3800-0	+43-7682-3800-47

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# Chapter 2

## Site Preparation

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### Section 2-1 Overview

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

This chapter provides information required to plan and prepare for installation of a Voluson® 730Expert ultrasound unit. Included are descriptions of the facility and electrical needs to be met by the purchaser.

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

Section	Description	Page Number
2-1	Overview	2-1
2-2	General Console Requirements	2-2
2-3	Facility Needs	2-6

## Section 2-2 General Console Requirements

### 2-2-1 Console Environmental Requirements

Table 2-2 Environmental Requirements

Operating Temperature	Operating Humidity	Heat Dissipation	Storage Temperature	Storage Humidity
10 to 40°C (50 to 104°F)	30 to 80% rH non-condensing	3446 BTU pr hour	-10 to 40 °C (14 to 104°F)	< 90% rH non- condensing

 **CAUTION** If the system has been in storage or has been transported, please see the acclimation requirements before powering ON and/or using the system (see: [Section 3-2-2 "Installation Warnings" on page 3-2](#)).

#### 2-2-1-1 Cooling

The cooling requirement for the Voluson® 730Expert is 3446 BTU/hr. 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/hr. demand on the cooling system.*

#### 2-2-1-2 Lighting

Bright light is needed for 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.

### 2-2-2 Electrical 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 system.*

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.

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

**2-2-2-1 Voluson® 730Expert Power Requirements**

**Table 2-3 Electrical Specifications for Voluson® 730Expert**

Voltage	Tolerances	Current	Frequency
100 VAC	±10%	10.10 A	50, 60 Hz (±2%)
110 VAC	±10%	9.20 A	50, 60 Hz (±2%)
115 VAC	±10%	8.80 A	50, 60 Hz (±2%)
130 VAC	±10%	7.80 A	50, 60 Hz (±2%)
230 VAC	±10%	4.40 A	50, 60 Hz (±2%)
240 VAC	±10%	4.20 A	50, 60 Hz (±2%)

Power Consumption nominal 1010 VA including all options.

Mains outlets: Mains socket ST1, ST2, ST3, ST4, ST5 for accessories.

All mains outlets are co-switched by the unit's mains switch via built-in isolation transformer.

Output voltage for: ST1 - ST5: 115V or 230V.

 **CAUTION Modification of voltage setting only by an authorized service person!**  
**The maximum power consumption of equipment (inclusive color video monitor) connected to these outlets must not exceed 350VA!**

**2-2-2-2 Inrush Current**

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

**2-2-2-3 Site Circuit Breaker**

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

 **CAUTION POWER OUTAGE MAY OCCUR.**  
**The Voluson® 730Expert 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.**

**2-2-2-4 Site Power Outlets**

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

**2-2-2-5 Main Power Plug**

The Voluson® 730Expert is supplied with a main power plug, as standard.

In the event that the unit arrives without a power plug, or with the wrong plug, contact your GE dealer. When necessary, the installation engineer will supply the appropriate power plug to meet the applicable local regulations.

### 2-2-3 EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. Ultrasound machines also generate EMI. The Voluson® 730Expert complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.



**NOTICE** Possible EMI sources should be identified before the unit is installed.

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

- medical lasers
- scanners
- cauterizing guns
- computers
- monitors
- fans
- gel warmers
- microwave oven
- light dimmers
- portable phones
- broadcast stations and mobile broadcasting machines

**Table 2-4 EMI Prevention/Abatement**

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

## 2-2-4 Probe Environmental Requirements

Operation: Ambient temperature 18° to 30° C

Storage: -10° to 50° C

**NOTE:** *Temperature in degrees C. Conversion to degrees F = °C (9/5) + 32).*



**NOTICE** SYSTEMS AND ELECTRONIC PROBES ARE DESIGNED FOR STORAGE TEMPERATURES OF -10 TO + 50 degrees C. WHEN EXPOSED TO LARGE TEMPERATURE VARIATIONS, THE PRODUCT SHOULD BE KEPT IN ROOM TEMPERATURE FOR 10 HOURS BEFORE USE.

## 2-2-5 Time and Manpower Requirements

Site preparation takes time. Begin Pre-installation checks as soon as possible. If possible, allow six weeks before delivery, for enough time to make necessary changes.



**CAUTION** Have two people available to deliver and unpack the Voluson® 730Expert. Attempts to move the unit considerable distances or on an incline by one person could result in injury or damage or both.



## 2-2-6 System Specifications

### 2-2-6-1 Physical Dimensions of Voluson® 730Expert

The physical dimensions of the Voluson® 730Expert unit are summarized in [Table 2-5](#). [Table 2-6](#) lists the size of Voluson® 730Expert, with monitor and without on-board peripherals.

**Table 2-5 Physical Dimensions of Voluson® 730Expert**

Height	Width	Depth
142 cm / 55.9 inches	68 cm / 26.8 inches	100 cm / 39.4 inches

### 2-2-6-2 Weight without Monitor and Peripherals

**Table 2-6 Weight of Voluson® 730Expert with Monitor and without other Peripherals**

Model	Weight [kg]	Weight [lbs.]
Voluson® 730Expert	136	300

### 2-2-6-3 Acoustic Noise Output

max. 57dB(A)

### 2-2-6-4 Electrical Specifications

Please refer to [Section 2-2-2-1 "Voluson® 730Expert Power Requirements"](#) on page 2-3.

## Section 2-3 Facility Needs

### 2-3-1 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.

Use the Pre-installation checklist (provided in [Table 2-7](#)) to verify that all needed steps have been taken.

**Table 2-7 Voluson® 730Expert Pre-Installation Check List**

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

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 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 machine. 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 system reliability.

## 2-3-2 Mandatory Site 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 system. 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. 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.*

The following are mandatory site requirements. Additional (optional) recommendations, as well as a recommended ultrasound room layout, are provided in [Section 2-3-3 "Site Recommendations"](#) .

- Door opening is at least 76 cm (30 in) wide.
- Proposed location for unit is at least 0.3 m (1 ft.) from the wall for cooling
- Clean and protected space for storage of probes (either in their case or on a rack).
- Material to safely clean probes (performed using a plastic container, never metal).
- 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.

**NOTE:** *The Voluson® 730Expert has four outlets inside the unit. One is for the monitor and three for on board peripherals.*

In case of network option:

- An active network outlet in the vicinity of the ultrasound unit.
- A network cable of appropriate length (regular Pin-to-Pin network cable).
- An IT administrator who will assist in configuring the unit to work with your local network. A fixed IP address is required. Refer to the form provided at [page 3-50](#) for network details that are required.

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

## 2-3-3 Site Recommendations

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

- Door is at least 90 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

2-3-3-1 Recommended Ultrasound Room Layout

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

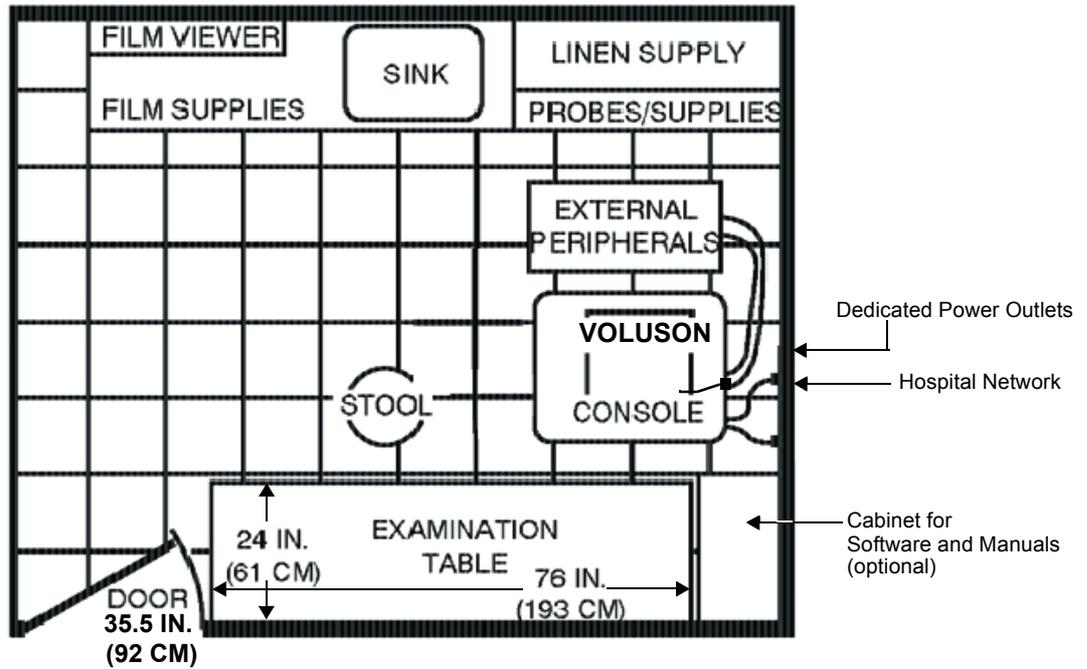


Figure 2-1 Recommended Floor Plan 4.3m x 5.2m (14ft x 17ft)

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

### 2-3-4-1 Purpose of the DICOM Network Function

DICOM (Digital Imaging and Communications in Medicine) services provide the operator with clinically useful features for moving images and patient information over a hospital network.

Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues.

With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

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

To configure the Voluson® 730Expert to work with other network connections, the site's network administrator must provide some necessary information.

To configure the Voluson® 730Expert ultrasound unit to work with other network connections, the network administrator must provide some necessary information.

Use the [Connectivity Setup Worksheet on page 3-50](#) to record required information that must include:

- **Voluson® 730Expert Details:** DICOM network details for the Voluson® 730Expert unit, incl. the host name, local port, IP address, AE title and net mask.
- **Routing Information:** IP addresses for the default gateway and other routers in use at the site.
- **DICOM Application Information:** Details of DICOM devices in use at the site, including the DICOM host name, AE title, DICOM port number and IP addresses.

Installation see: [Section 3-11 "Network IP Address Configuration" on page 3-48](#).

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# Chapter 3

## Setup Instructions

### Section 3-1 Overview

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

This chapter contains information needed to setup the Voluson® 730Expert unit. Included are procedures to receive, unpack and configure the equipment. A worksheet is provided (see: [page 3-50](#)) to help ensure that all the required information is available, prior to setup the system.

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

Section	Description	Page Number
3-1	Overview	3-1
3-2	Set Up Reminders	3-1
3-3	Receiving and Unpacking the Equipment	3-4
3-4	Preparing for Set Up	3-6
3-5	Connection of Auxiliary Devices	3-8
3-6	Completing the Set Up	3-22
3-7	Printer Installation	3-26
3-8	System Configuration	3-41
3-9	Available Probes	3-47
3-10	Software/Option Configuration	3-47
3-12	Connectivity Setup Worksheet	3-50
3-11	Network IP Address Configuration	3-48
3-13	Paperwork	3-51

### Section 3-2 Set Up Reminders

#### 3-2-1 Average Installation Time

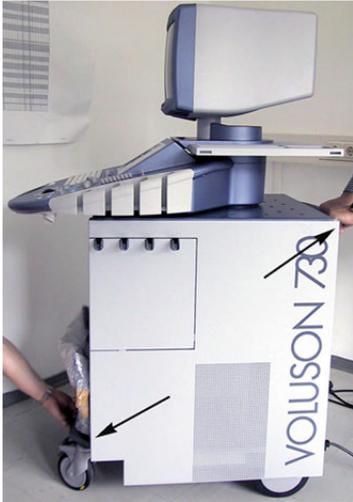
**Table 3-2 Average Installation Time**

Description	Average Installation Time	Comments
Unpacking the scanner	0.5 hours	
Scanner /options / printers	0.5 to 1.5 hours	Dependant on the required configuration
DICOM Option	0.5 - 1.5 hours	Dependant on the configuration amount

### 3-2-2 Installation Warnings

- 1.) Since the Voluson® 730Expert weighs approximately 136 kg (300 lbs.) without options, two people are required to unpack it. Two people are also required for installing any additional items in excess of 16 kg / 35 pounds.(e.g., Monitor).
- 2.) There are no operator serviceable components. To prevent shock, do not remove any covers or panels. Should problems or malfunctions occur, unplug the power cord.  
**Only** qualified service personnel should carry out servicing and troubleshooting.

#### 3-2-2-1 Moving/Lifting the System



When pulling, moving or lifting the system, grasp it only at the rear handle of the trolley and the handle underneath the foot rest.

**! WARNING**

Do **NOT** pull or lift the system with the front handle of the user interface (operator panel).

Figure 3-1 moving or lifting the system

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

After being transported, the Voluson® 730Expert system may be very cold or hot. It requires one hour for each 2.5°C increment it's temperature is below 10°C or above 40°C.

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

Table 3-3 Acclimation Time

°C	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
°F	140	131	122	113	104	96	86	77	68	59	50	41	32	23	14	5	-4	-13	-22	-31	-40
hrs	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12	14	16	18	20

#### 3-2-2-3 Control Panel Position

If weight is placed on the Control Panel (UI) in it's extended position the console could tip over.

**! WARNING** *The system should NOT be moved with the Control Panel (UI) extended. Move the Control Panel to it's centered and locked position. Refer to [Section 6-4 on page 6-5](#).*

**! WARNING** *Monitor mounting mechanism may break if not properly supported (e.g., with packing foam) during transportation.*

3-2-2-4 Brake Pedal Operation

 **WARNING** *REMEMBER: If the front wheels are engaged for transportation, pressing the release brake pedals (brakes on front wheels under the foot rest) once disengages the lock.*

3-2-3 Safety Reminders

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

 **CAUTION** Two people should unpack the unit because of its weight. Two people are required whenever a part weighing 16kg (35 lb.) or more must be lifted.

 **CAUTION** If the unit is very cold or hot, do NOT turn on its power until it has had sufficient time to acclimate to its operating environment.

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

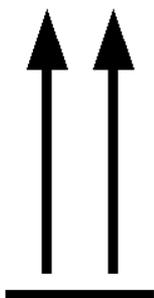
 **CAUTION** Do NOT wear the ESD wrist strap when you work on live circuits and more than 30 V peak is present.

 **CAUTION** Do not use a 20 Amp to 15 Amp adapter on the 120 Vac unit's power cord. This unit requires a dedicated 16 A circuit.

 **CAUTION** DO NOT operate this unit unless all board covers and frame panels are securely in place, to ensure optimal system performance and cooling. (When covers are removed, EMI may be present).

 **CAUTION** **OPERATOR MANUAL(S)**  
 The User Manual(s) should be fully read and understood before operating the Voluson® 730Expert and kept near the unit for quick reference.

 **CAUTION** **ACOUSTIC OUTPUT HAZARD**  
 Although the ultrasound energy transmitted from the Voluson® 730Expert probe is within FDA limits, avoid unnecessary exposure. Ultrasound energy can produce heat and mechanical damage.



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<p><b>ENVIRONMENTAL STORAGE AND SHIPPING CONDITIONS</b></p> <p>-10°C to +40°C                  +14°F to +104°F</p> <p>max. 90% RH no condensation</p> <p>700 to 1060 hPa</p> <p style="text-align: right; font-size: small;">1406116-0</p>
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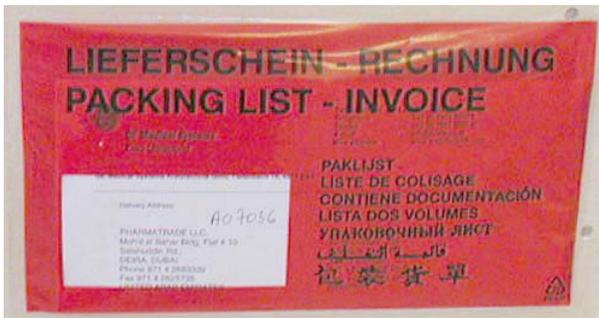
Figure 3-2 Environmental Labels

## Section 3-3 Receiving and Unpacking the Equipment

 **CAUTION** Transport only with forklift or stracker truck.  
During transport pay attention to the point of gravity (“tilt and drop” indicator)!



Have two people available to unpack the Voluson® 730Expert.  
Attempts to move the unit considerable distances or on an incline by one person could result in injury or damage or both.



The envelope with delivery address, packing list and invoice is located on the front panel of the crate.

Check whether delivery is complete (according to packing list) and check visual damage!

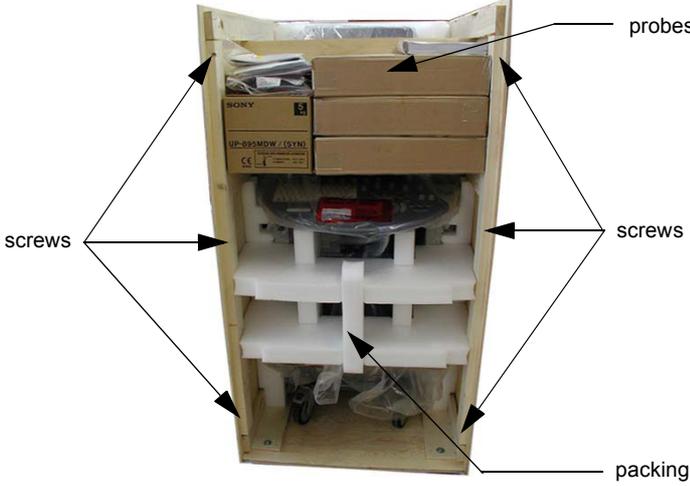
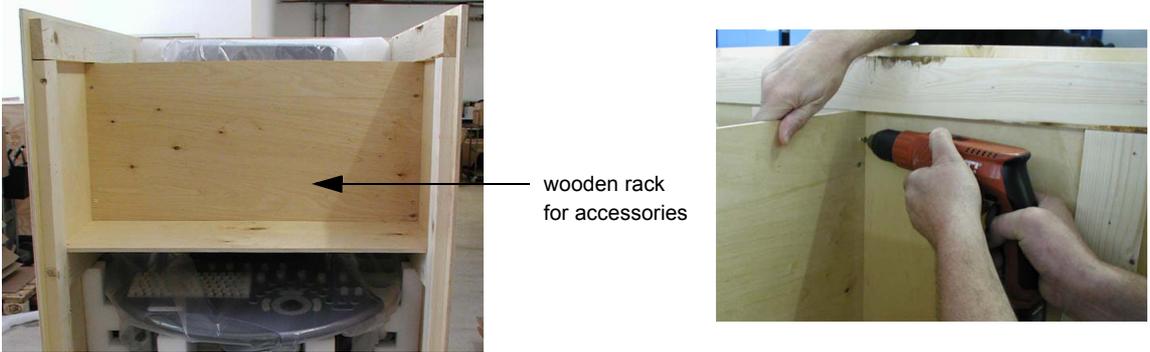
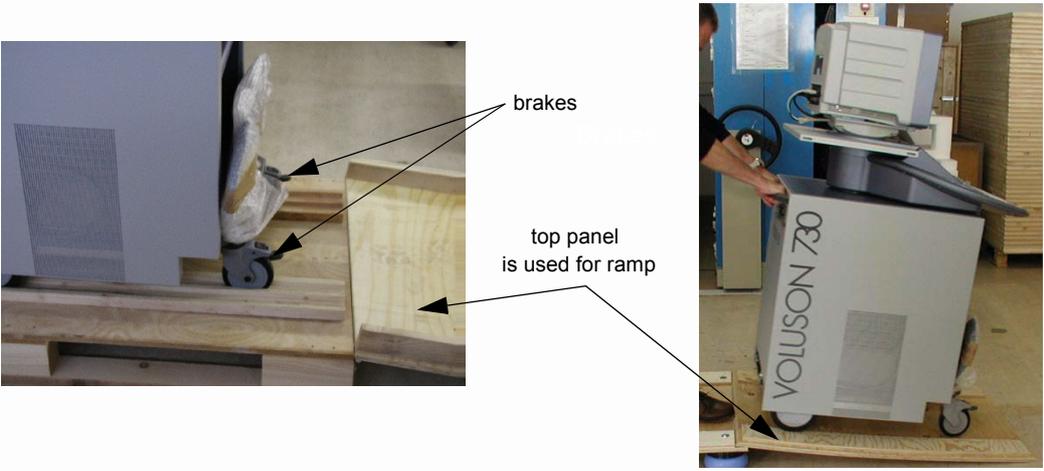
Figure 3-3 envelope at front panel of the crate

 **NOTICE** The device must only be transported in the original packaging!  
Unpack the devices such a way that packaging can be reused.  
A drill with size 20 torx bit and/or a Philips 2 screwdriver will be needed to open the crate.

Table 3-4 Unpacking Procedure

Step	Task
1.	<p>Loosen the screws and remove top panel from crate; top panel is used for the ramp.</p>  <p>center of gravity</p> <p>tilt and drop indicator</p> 

**Table 3-4 Unpacking Procedure**

Step	Task
2.	<p>Open front panel by removing the screws from the side panels. Remove probes and accessories from the wooden box.</p>  <p>probes and accessories</p> <p>screws</p> <p>screws</p> <p>packing</p> <div style="text-align: right;"> <p><b>⚠ WARNING</b></p> <p><b>Do not open side panels prior to removing the front panel! Accessories could drop down and DAMAGE the user interface!</b></p> </div>
3.	<p>Loosen all screws to remove the wooden rack for accessories as well as the left, right and back panel.</p>  <p>wooden rack for accessories</p>
4.	<p>Carefully remove foam packing material and plastic bag from the ultrasound unit and monitor.</p>
<p><b>Caution: Two people are needed in the next step due to the weight of the equipment.</b></p>	
5.	<p>Disengage the brakes and slowly move unit down the ramp (top panel).</p>  <p>brakes</p> <p>top panel is used for ramp</p>
<p><b>Note: Packing crate and material should be stored for future use.</b></p>	

## Section 3-4 Preparing for Set Up

### 3-4-1 Verify Customer Order

- 1.) After unpacking the equipment, it is important to verify that all items ordered by the customer have been received. Compare all items listed on the packing slip (delivery note) with those received.



**NOTICE** It is recommended to keep and store the shipping carton and all other packing materials (including the support foams, anti-static plastic cover, etc.), in case the unit has to be moved to a different location. Unpack the devices such a way that packaging can be reused. For warranty purposes, storage of the above is required for one year from date of purchase.

- 2.) Visually inspect the system components using the following checklist.

**Table 3-5 Damage Inspection Checklist - Voluson® 730Expert System**

✓	Step	Item	Recommended Procedure
	1	Main label	Enter <b>Serial Number:</b> _____ (printed on main label on back of the system)
	2	Console	Verify that the system is switched OFF and unplugged. Clean the console and control panel.
	3	Control Console	Physically inspect the control console for missing or damaged items. After switching on the system, verify the proper illumination of all the control panel buttons.
	4	Probes	Check all probes for wear and tear on the lens, cable, and connector. Look for bent or damaged pins on the connector and in the connector socket on the unit. Verify that the EMI fingers around the probe connector socket housing are intact. Check the probe locking mechanism and probe switch.
	5	LCD Display	Clean the LCD display by gently wiping with a dry, soft, lint-free non-abrasive folded cloth. Inspect the monitor for scratches and raster burn.
	6	Fans	Verify that the system's cooling fans and peripheral fans are operating.
	7	Rear Panel	Check the rear panel connectors for bent pins, loose connections and loose or missing hardware. Screw all the cable connectors tightly to the connector sockets on the panel. Verify that the labeling is in good condition.
	8	Covers	Check that all screws are tightly secured in place, that there are no dents or scratches and that no internal parts are exposed.
	9	Peripherals	Check and clean the peripherals in accordance with the manufacturer's directions. To prevent EMI or system overheating, dress the peripheral cables inside the peripheral cover.
	10	Power Cord	Check the power cord for cuts, loose hardware, tire marks, exposed insulation, or any deterioration. Verify continuity. Replace the power cord, as required.
	11	System Voltage setting	Verify that the Voluson® 730Expert is set to the correct voltage. see: <a href="#">Section 3-4-2 "System Voltage Settings" on page 3-7</a>

**NOTE:** Report any items that are missing, back-ordered, or damaged, to your GE Healthcare - Kretztechnik sales representative. The contact address is shown in [Contact Information on page 1-11](#).

### 3-4-2 System Voltage Settings

Verify that the scanner is set to the correct voltage. The Voltage settings for the Voluson® 730Expert Scanner is found on the identification plate, on the rear of the system.

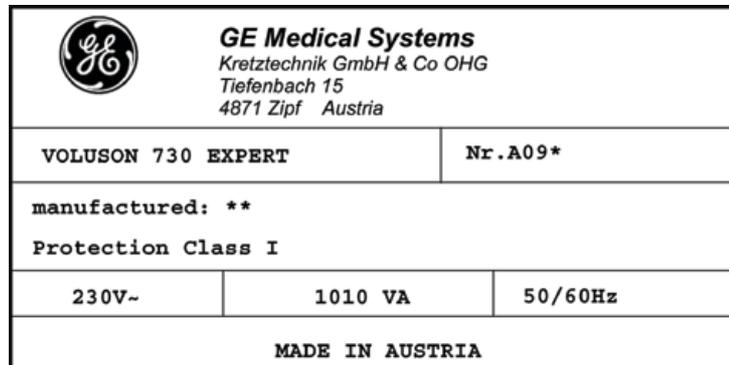


Figure 3-4 Identification Plate



**WARNING** *CONNECTING A Voluson® 730Expert SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE SCANNER.*

### 3-4-3 EMI Protection

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

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

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

The Voluson® 730Expert ultrasound unit is approved for use in hospitals, clinics and other environmentally qualified facilities, in terms of the prevention of radio wave interference. Operation of the ultrasound unit in an inappropriate environment can cause electronic interference to radios and television sets situated near the medical equipment.

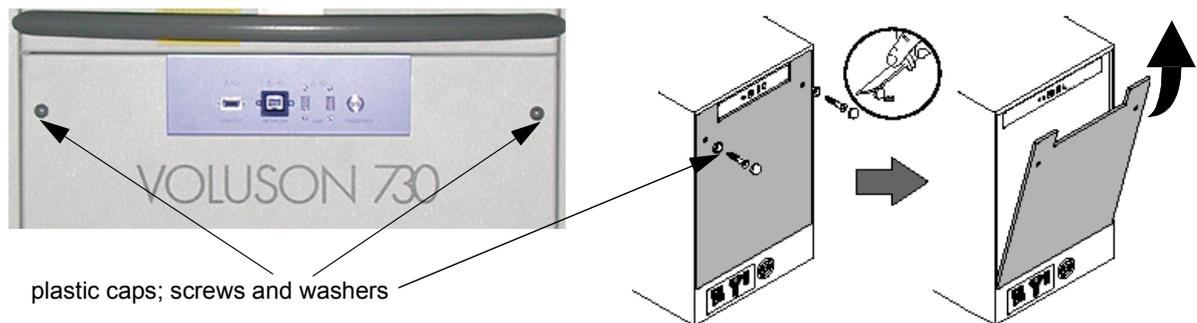
For further details and EMI Prevention/Abatement refer to [Section 2-2-3 "EMI Limitations" on page 2-4.](#)

## Section 3-5 Connection of Auxiliary Devices

### 3-5-1 Preparations

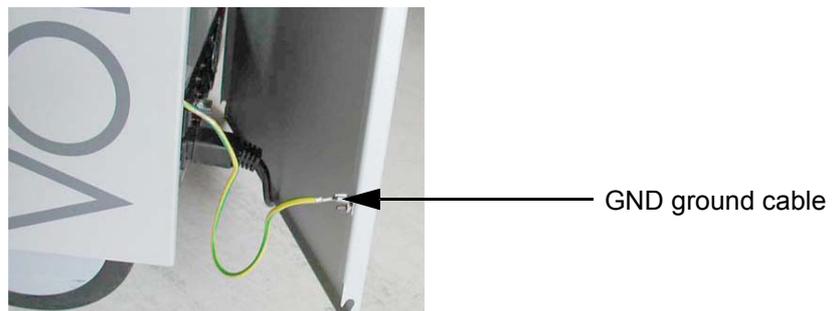
**NOTE:** *Normally the auxiliary devices and peripherals come already installed with the system.*

- 1.) Carefully remove plastic caps using a knife and loosen screws and washers (see: [Figure 3-5.](#))
- 2.) When the cover is loose on top, pull the rear cover out and move upwards.



**Figure 3-5 Remove rear cover plate**

- 3.) Disconnect the GND ground-cable from the back of the rear cover plate.



**Figure 3-6 GND ground-cable**

- 4.) Connect Peripherals according to correct connection scheme described in the following sub-sections (refer to [Table 3-6 on page 3-9.](#))
- 5.) Connect the GND ground-cable at the rear cover plate.
- 6.) Mount rear cover plate, reattach screw and washers and plug-in the caps.

**3-5-1 Preparations** (cont'd)

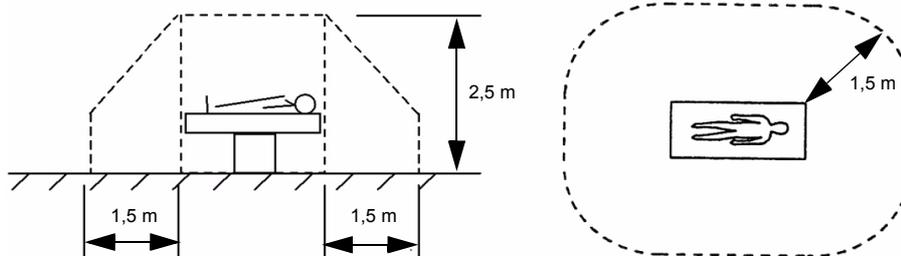
Table 3-6 below outlines Voluson® 730Expert hardware installation procedures described in the sub-sections.

**Table 3-6 Connection Procedures**

Sub-section	Description	Page Number
3-5-2	Monitor Connection	3-10
3-5-3	Foot Switch Connection	3-10
3-5-4	ECG-preamplifier Connection	3-11
3-5-5	Global Modem Connection	3-12
3-5-6	S-VHS Video Recorder Connection	3-13
3-5-7	B/W Video Printer Connection	3-15
3-5-8	Line Printer Connection	3-16
3-5-9	Digital Color Printer Connection	3-17
3-5-10	Bluetooth Printer Connection	3-18
3-5-11	External USB-Devices	3-20

**⚠ WARNING** After each installation, the leakage currents have to be measured according to IEC 60601-1 respectively UL 60601-1.

**⚠ CAUTION** Please observe that some printers may not be medical devices! If the Bluetooth Printer and/or Line Printers are not medical devices, they have to be located outside of the patient environment (according to IEC 60601-1 / UL 60601-1).



### 3-5-2 Monitor Connection

*NOTE:* The monitor comes already installed with the system.

### 3-5-3 Foot Switch Connection



**Figure 3-7 Foot Switch Connection Scheme**

*NOTE:* After physical connection, adjust the Footswitch (Left/Right) as described in [Section 3-7-5 "Remote Control Selection" on page 3-40](#).

### 3-5-4 ECG-preamplifier Connection

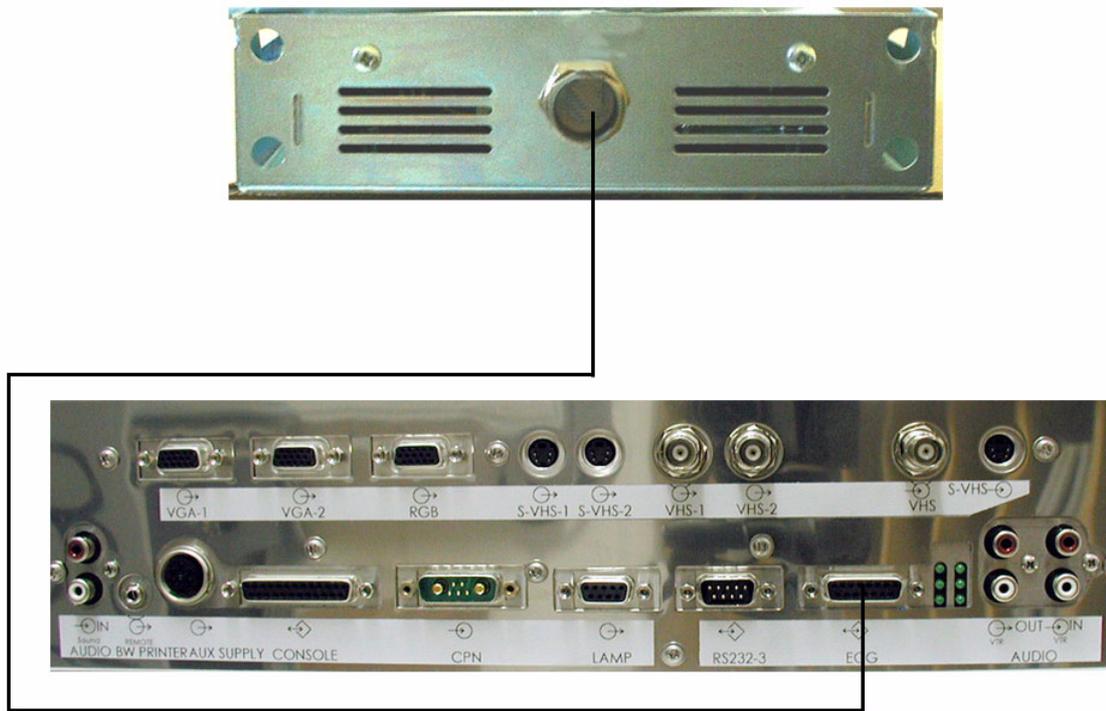


Figure 3-8 ECG Connection Scheme

### 3-5-5 Global Modem Connection

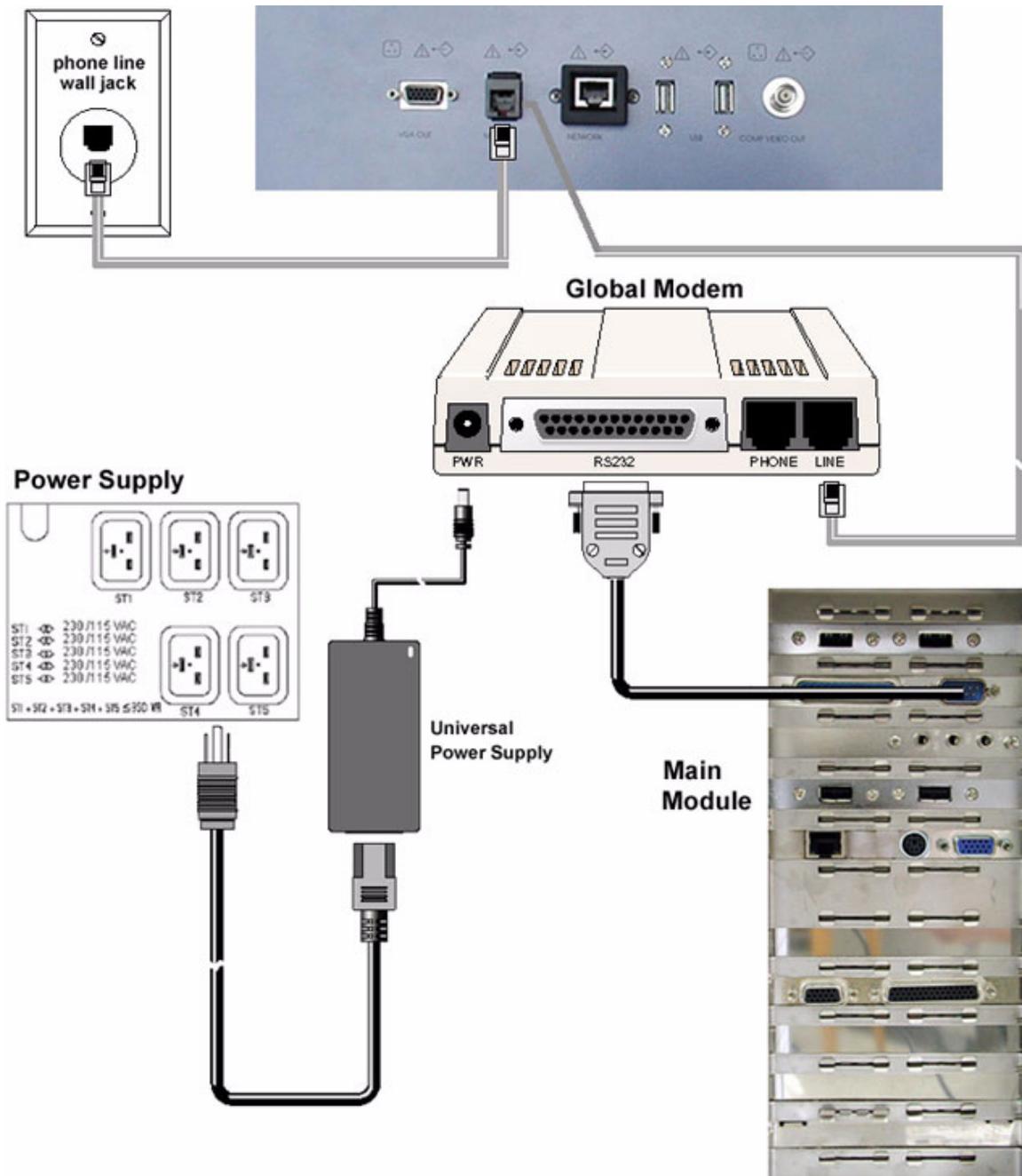


Figure 3-9 Global Modem Connection Scheme

**WARNING** Never install the telephone wiring, or use the modem during an electric storm; there may be a remote risk of electrical shock from lightning.

**CAUTION** Use only the power adapter supplied with the modem and connect it as shown. Use of any other power adapter will void the warranty and could damage the modem.

### 3-5-6 S-VHS Video Recorder Connection

**NOTE:** Please refer to connection scheme belonging to the used VCR type:

- [Section 3-5-6-1 "Mitsubishi HS-MD3000" on page 3-13](#)
- [Section 3-5-6-2 "Sony SVO-9500MD" on page 3-14](#)

#### 3-5-6-1 Mitsubishi HS-MD3000

**NOTE:** There are two types of Mitsubishi HS-MD3000 VCR (PAL and NTSC) approved by GE Healthcare - Kretztechnik. Use the standard VCR type (PAL or NTSC) that is suited to your region.



**CAUTION** ONLY the specific GE - Kretztechnik Version of this video recorder type may be used in connection with the system!

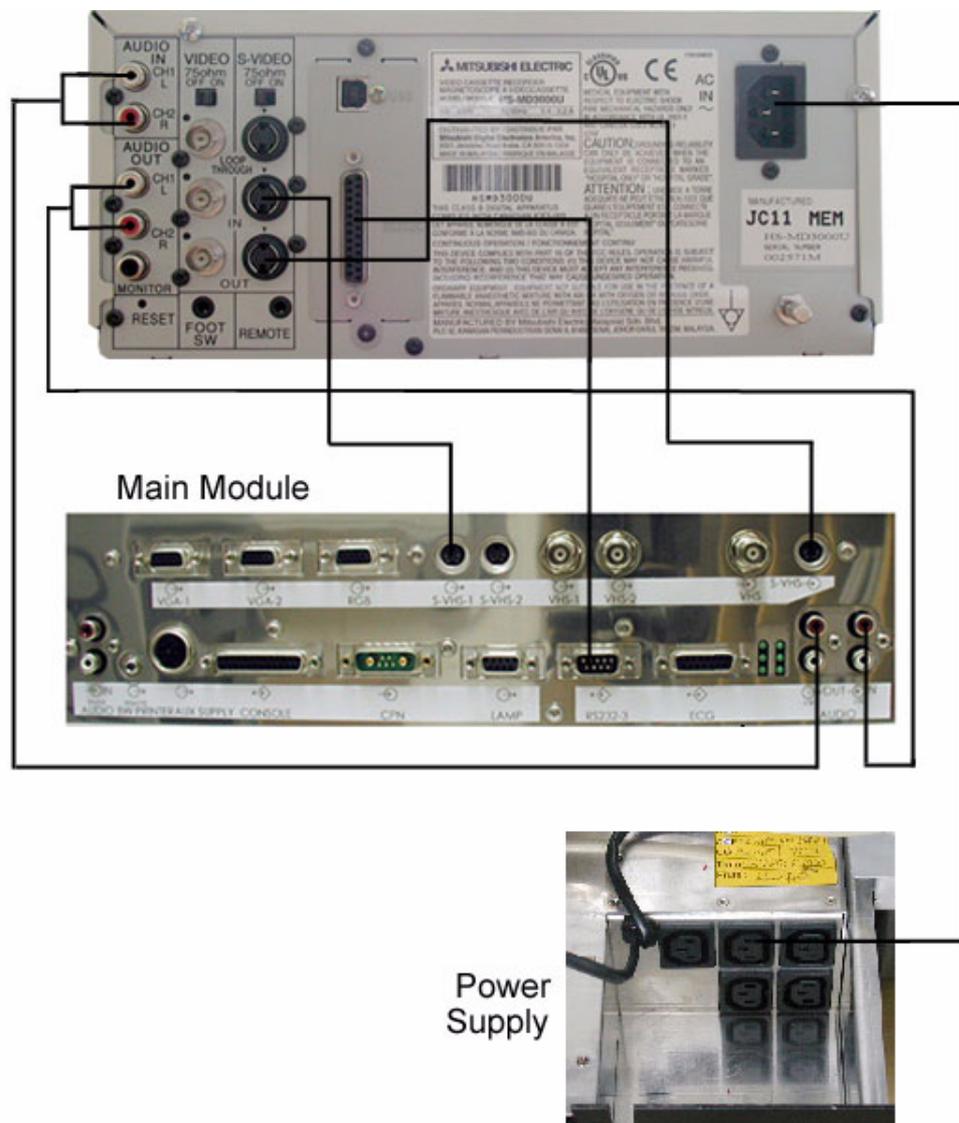


Figure 3-10 Mitsubishi - Video Recorder Connection Scheme



**NOTICE** Please use the proper connection set and remote cable.  
 see: [Section 9-12 "Optional Peripherals and Accessories" on page 9-26.](#)

3-5-6-2 Sony SVO-9500MD

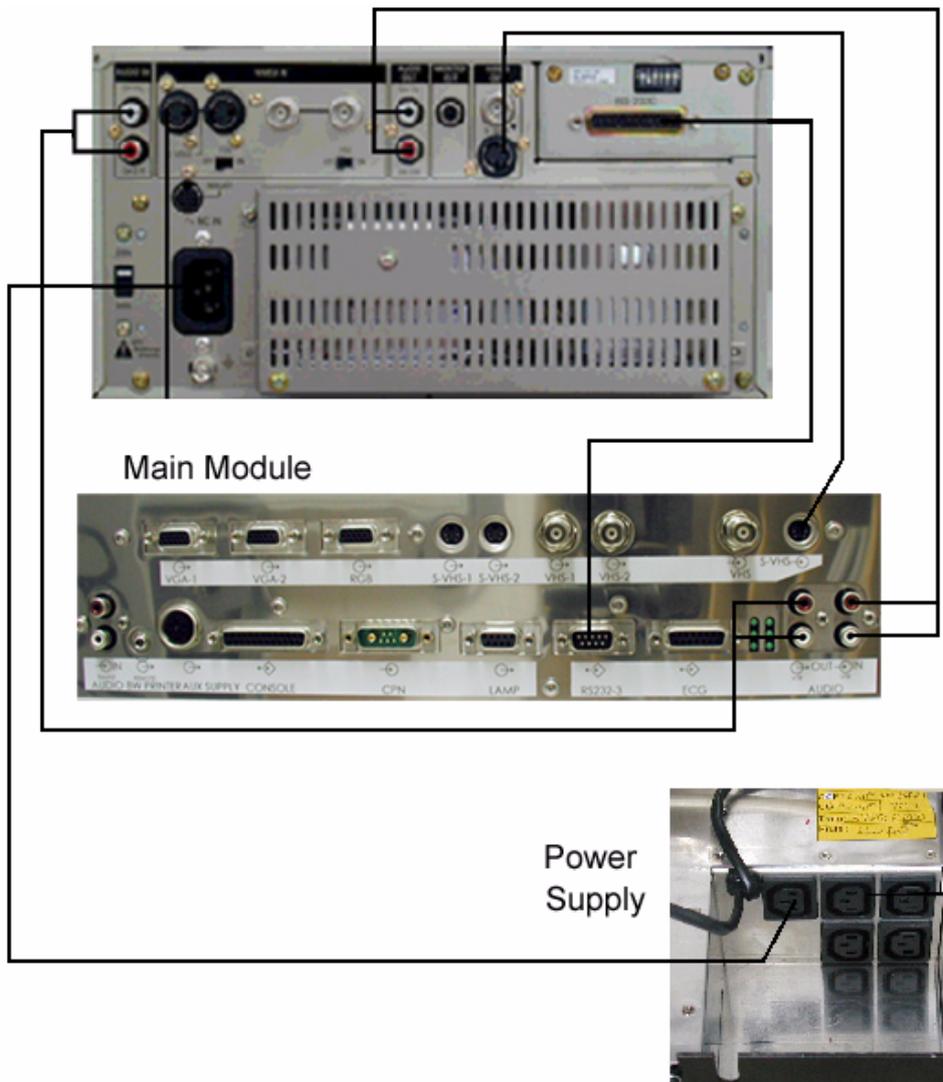


Figure 3-11 Sony - Video Recorder Connection Scheme

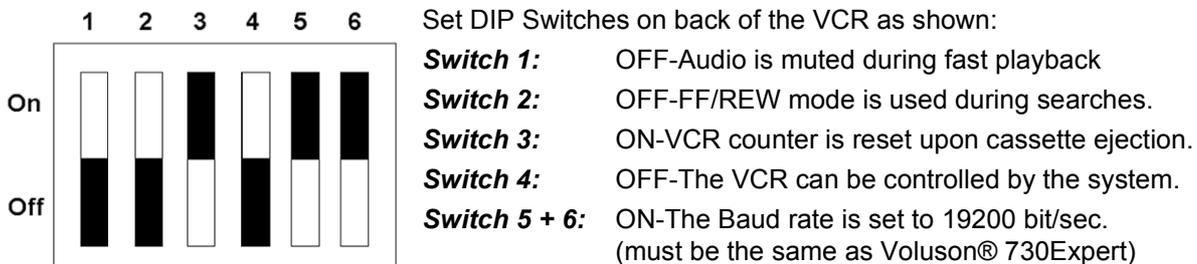


Figure 3-12 DIP Switches

**NOTICE** Please use the proper connection set and remote cable.  
 see: "[Section 9-12 Optional Peripherals and Accessories \(cont'd\)](#)" on page 9-28.

3-5-7 B/W Video Printer Connection

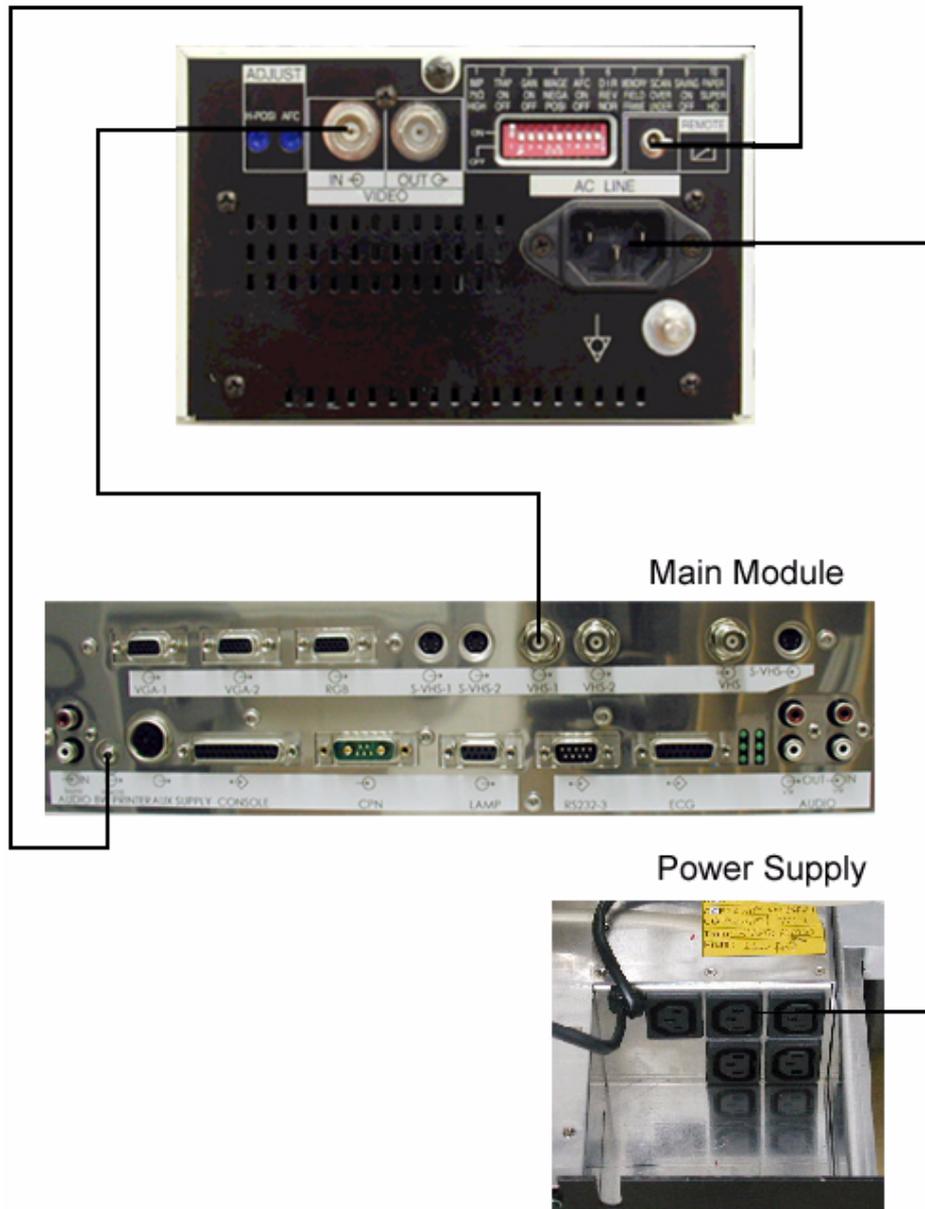
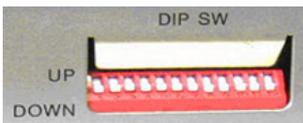


Figure 3-13 B/W Video Printer Connection Scheme



Set DIP Switches on back of the Black/White printer as shown in the image (all DOWN).



**NOTICE** Please use the proper connection set.  
 see: [Section 9-12 "Optional Peripherals and Accessories" on page 9-26.](#)

### 3-5-8 Line Printer Connection

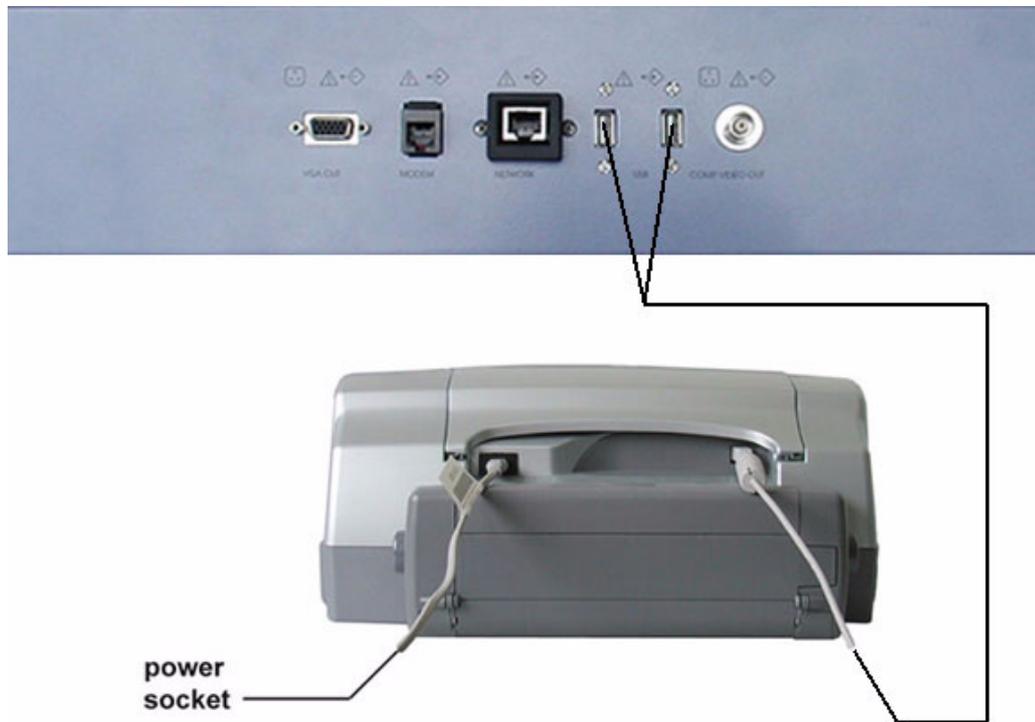


Figure 3-14 Line Printer Connection Scheme

**CAUTION** Please observe that the Line Printer has to be located outside of the patient environment (acc. IEC 60601-1 / UL 60601-1).

**NOTICE** The switch of the printer has to be in ON position before starting the system. Leave printer switch always in the ON position.

**NOTICE** Please use the proper connection set. see: [Section 9-12 "Optional Peripherals and Accessories" on page 9-26.](#)

**NOTE:** For further installation instructions see: [Section 3-7-1 "Installing Line Printer HP 990cxi or HP 995c" on page 3-27.](#)

### 3-5-9 Digital Color Printer Connection

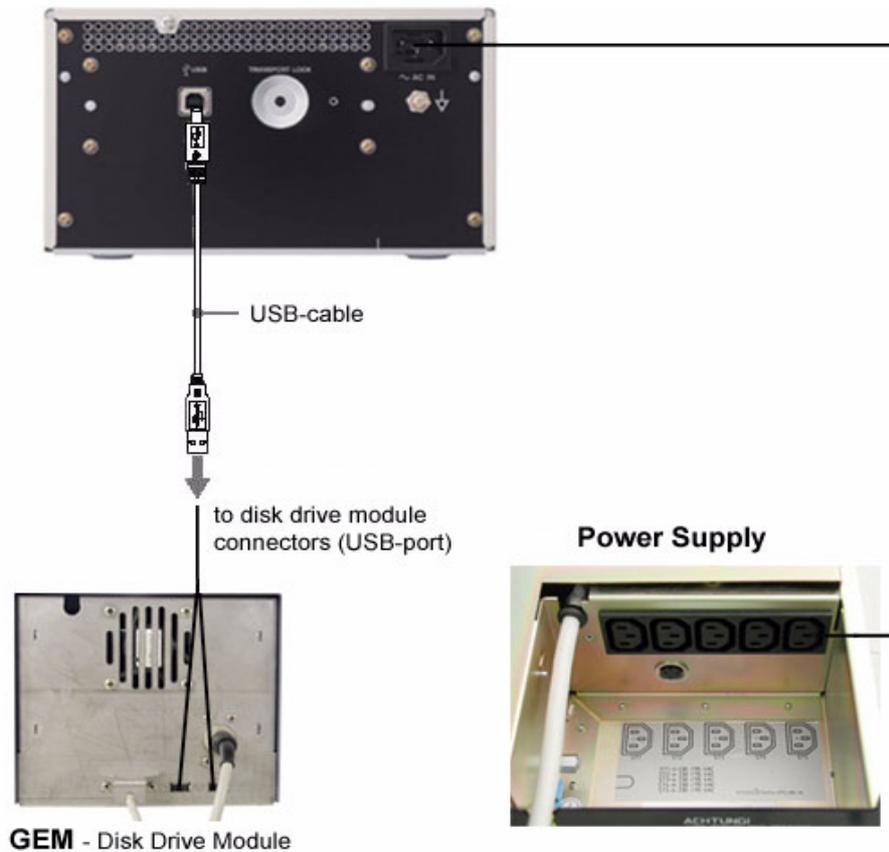


Figure 3-15 Digital Color Printer Connection Scheme

-  **CAUTION** Pay attention to lateral distances. See Instruction Manual of the printer!
-  **CAUTION** The Printer Supply Voltage must be the same as the Output Voltage of the Voluson® 730Expert Power Out Connectors (Power Supply)!
-  **NOTICE** The switch of the printer has to be in ON position before starting the system. Leave printer switch always in the ON position.
-  **NOTICE** Please use the proper connection set. see: [Section 9-12 "Optional Peripherals and Accessories" on page 9-26.](#)
-  **CAUTION** The Sony UP-D23MD printer must never be connected to USB-ports on the SBC backplane. Please use one of the two outlets on the back of the GEM (Disk Drive Module) only.

**NOTE:** For further installation instructions see:  
[Section 3-7-2 "Installing Digital Color Printer Sony UP-D21MD or UP-D23MD" on page 3-29.](#)

### 3-5-10 Bluetooth Printer Connection

**NOTE:** Please refer to connection scheme belonging to the used B/W Printer type:

- [Section 3-5-10-1 "HP 5600/5900 Series" on page 3-18](#)
- [Section 3-5-10-2 "Canon Pixma MP600 / MP610" on page 3-19](#)

#### 3-5-10-1 HP 5600/5900 Series

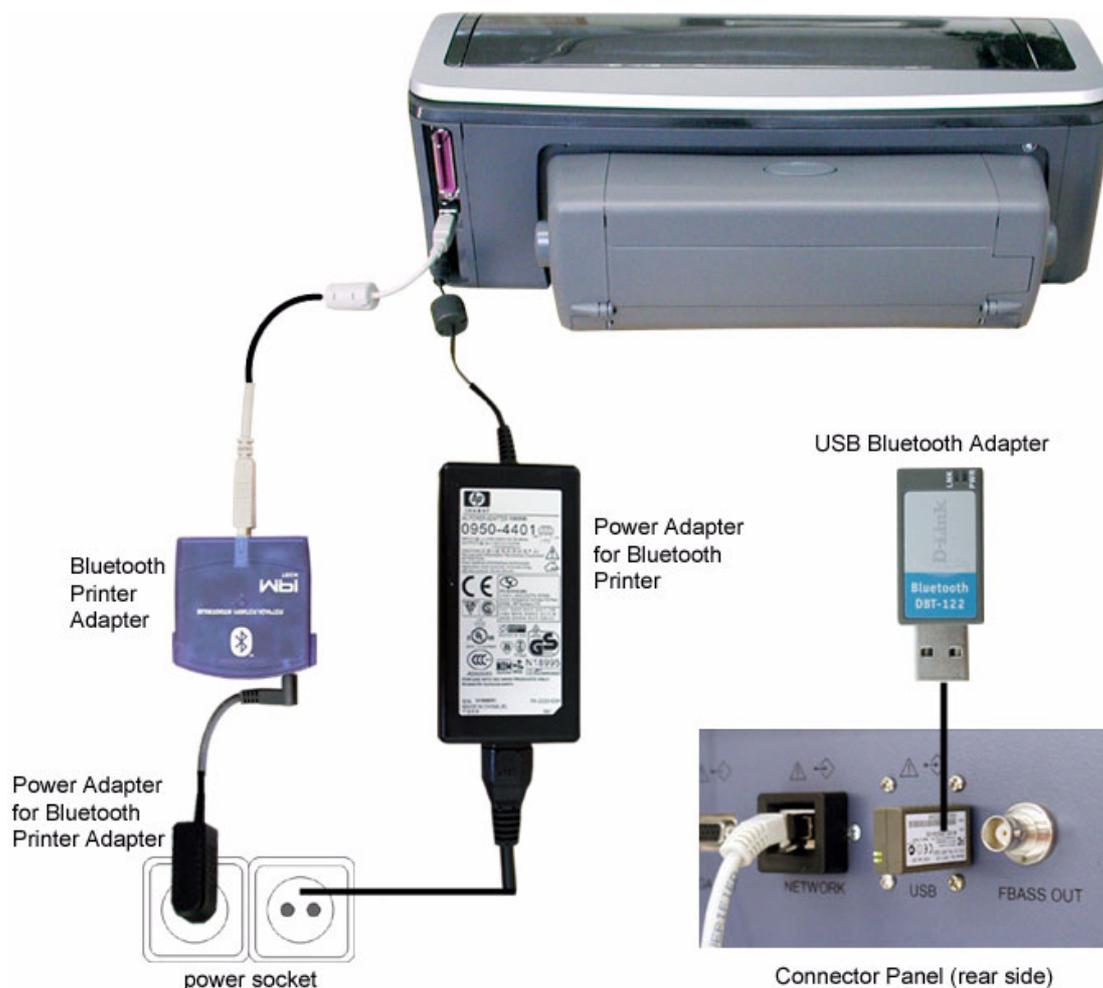


Figure 3-16 HP Bluetooth Printer - Connection Scheme

- CAUTION** Please observe that the complete Bluetooth Printer Assembly has to be located outside of the patient environment (acc. IEC 60601-1 / UL 60601-1).
- CAUTION** The printer being used may not be a medical device. The Bluetooth Printer Set and the Power Supply of the Bluetooth Printer Adapter is also not a medical device. The equipment meets the requirements of the EN60950 Standard.
- NOTICE** The switch of the printer has to be in ON position before starting the system. Leave printer switch always in the ON position.
- NOTICE** Please use the proper Bluetooth Printer Connection set. see: [Table 9-15 "Optional Peripherals and Accessories" on page 9-27](#).

3-5-10-2 Canon Pixma MP600 / MP610

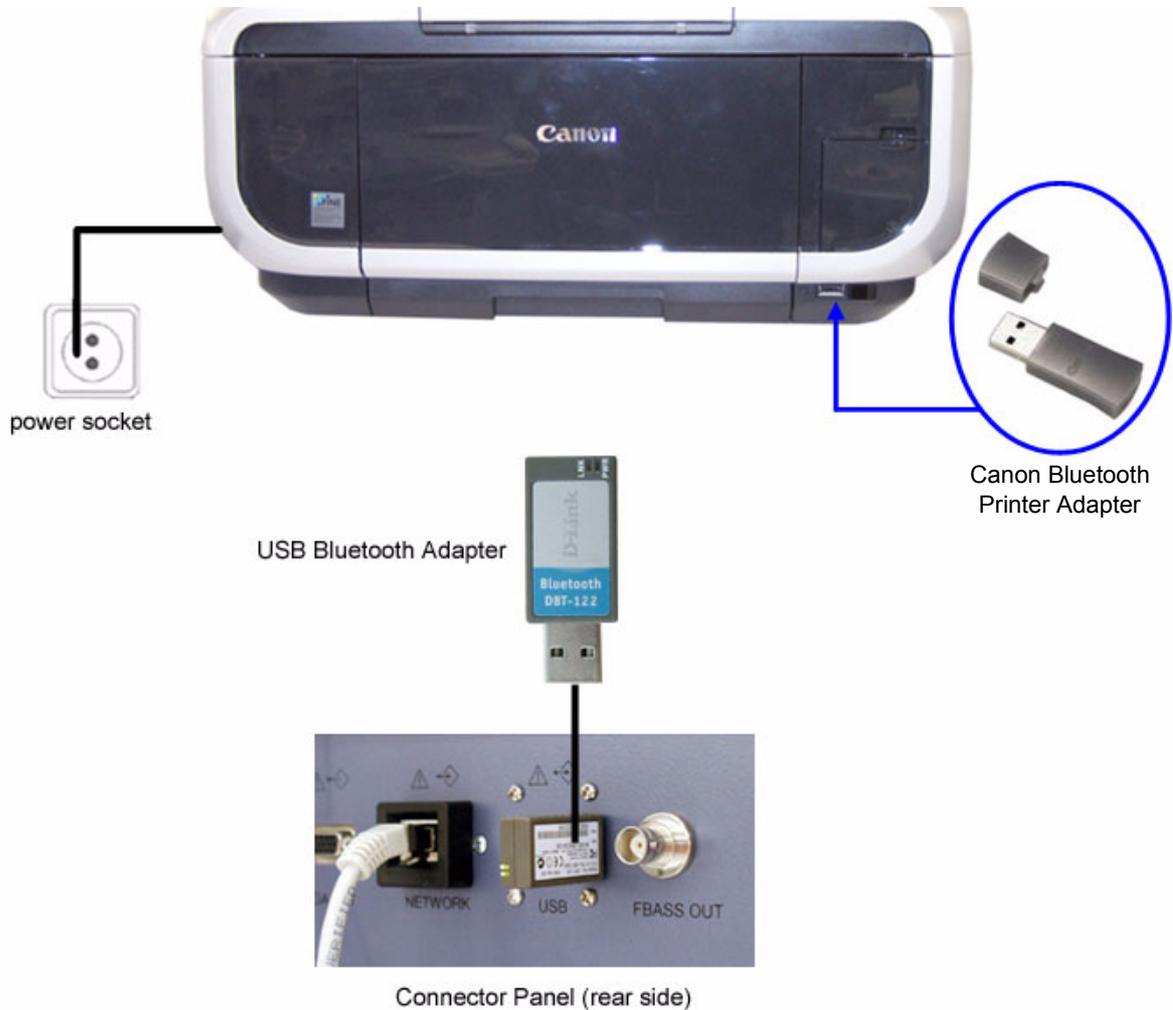


Figure 3-17 Canon Bluetooth Printer - Connection Scheme

- CAUTION** Please observe that the complete Bluetooth Printer Assembly has to be located outside of the patient environment (acc. IEC 60601-1 / UL 60601-1).
- CAUTION** The Printer and the Bluetooth Printer Adapter used may not be a medical device. The equipment meets the requirements of the EN60950 Standard.
- NOTICE** The switch of the printer has to be in ON position before starting the system. Leave printer switch always in the ON position.

### 3-5-11 External USB-Devices

 **WARNING** *Do not connect or disconnect any external USB-devices to or from the system while scanning a patient! The appearing dialogs could distract you from the scan!*

#### 3-5-11-1 External USB-Devices - Connection

When an external USB-storage device (such as a USB-memory stick or external hard disk) is connected to the Voluson® 730Expert system, Windows detects the device and automatically installs a driver. During this process, several dialogs may pop up, starting with the „Found New Hardware“ dialog.



Figure 3-18 Found New Hardware - USB Device

The device is then accessible using the drive letter the system assigned to it.

 **NOTICE** When connecting external USB devices, be sure to execute Safety Directions found in Chapter 2 of the Voluson® 730Expert Basic User Manual.

#### 3-5-11-2 External USB-Devices - Disconnection

Before an external USB-device (e.g., USB-memory stick) can be disconnected, the system has to be informed about the removal of the device! For this purpose the System Setup - **BACKUP** page (see: [Figure 4-22 on page 4-29](#)) has a **STOP USB DEVICES** button.

 **CAUTION** **Unplugging or ejecting USB devices without first stopping them can often cause the system to crash and possibly result in loss of valuable data.**

By clicking the **STOP USB DEVICES** button, the „Unplug or Eject Hardware“ dialog is started. Using this dialog, the USB-devices can be stopped before they are physically disconnected.

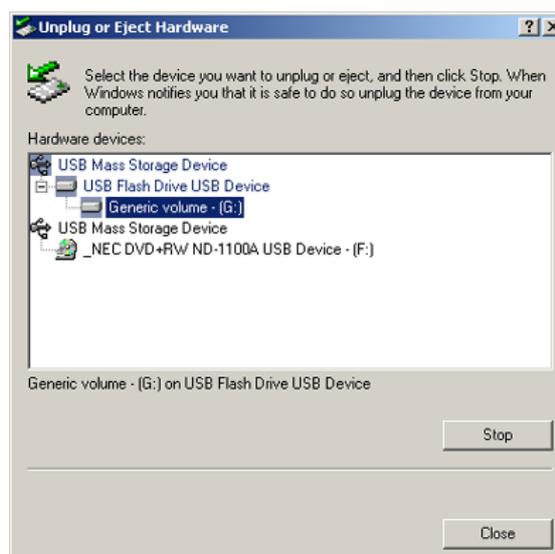


Figure 3-19 Unplug or Eject Hardware

### 3-5-11-2 External USB-Devices - Disconnection (cont'd)

The „Unplug or Eject Hardware“ dialog shows all USB-devices that are connected to the system. On every system is an USB mass storage device, the DVD/CD writer, which has the drive letter (F:). If the system has an optional MO-drive installed as well, it is listed too, and has the drive letter (E:).

To stop the external device, select it and click the STOP button.  
A dialog shows which components will be stopped. To finish the process, click [OK].



Figure 3-20 Stop a Hardware device

Finally, a dialog shows that the device was stopped successfully. The device can now be safely disconnected from the system.



Figure 3-21 Safe to Remove Hardware

By clicking OK, the „Unplug or Eject Hardware“ dialog is active again.

Close this dialog by clicking CLOSE.

Afterwards select OK to reboot the system.



**CAUTION** If the system's DVD/CD writer or (optional) MO-drive was stopped by accident, simply stop the external device as well and reboot the system. During reboot, the DVD/CD writer and the MO-drive will be installed again.

## Section 3-6 Completing the Set Up

### 3-6-1 Connecting the Unit to a Power Source

The connection of the Voluson® 730Expert ultrasound unit to a power source should be performed by a qualified person who has completed basic Voluson® 730Expert System User Training. Use only the power cords, cables and plugs provided by or designated by GE Healthcare - Kretztechnik to connect the unit to the power source.

**CAUTION** Prior to connect the Voluson® 730Expert unit to a power source, verify compliance with all electrical and safety requirements. Check the power cord to verify that it is intact and of hospital-grade. Products equipped with a power source (wall outlet) plug should be connected to the fixed power socket that has a protective grounding conductor. Never use an adapter or converter to connect with a power source plug (e.g., a three-prong to two-prong converter).

**WARNING** The unit's power must be supplied from a separate, properly rated outlet to avoid risk of fire. See [Section 2-2-2-1 "Voluson® 730Expert Power Requirements" on page 2-3](#) for rating information. The power cord should not, under any circumstances, be altered to a configuration rated less than that specified for the current.

**CAUTION** Whenever disconnecting the Voluson® 730Expert system from the electrical outlet, always observe the safety precautions. First unplug the main power cable from the wall outlet socket, then from the unit itself. Remove by pulling on the cable connector - DO NOT pull on the cable.

**CAUTION** The Voluson® 730Expert requires all covers!  
Operate this system only when all board covers and frame panels are securely in place. The covers are required for safe operation, good system performance and cooling purposes.

### 3-6-2 Power On / Boot Up

#### 3-6-2-1 Scanner Power On

- 1.) Connect the Power Cable to the back of the system.
- 2.) Connect the Main Power Cable to a hospital grade power receptacle with the proper rated voltage. Never use an adapter that would defeat the safety ground.
- 3.) **CPN6 only** - Switch ON the Circuit Breaker (F1) and the Power Switch of peripherals (F2).
- 4.) **CPN80-81 only** - Switch ON the Circuit Breaker at the rear of the system.

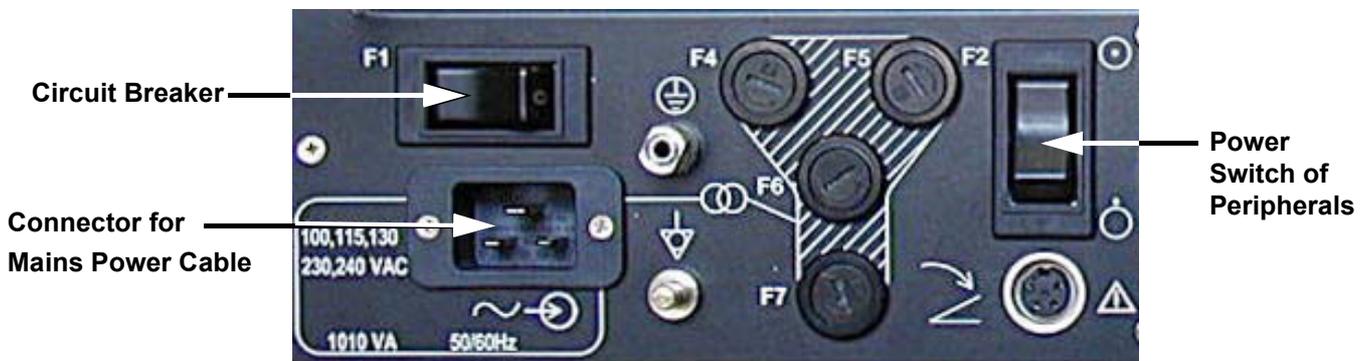
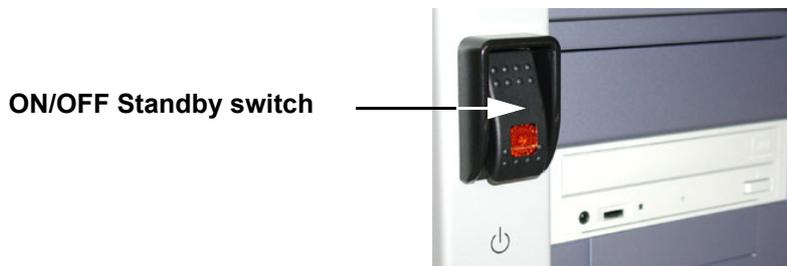


Figure 3-22 Circuit Breaker at rear of system with CPN6 installed

**NOTICE** When AC power is applied to the scanner, the ON/OFF switch on the Control panel is illuminated, indicating that the System (including the Back-end Processor) is in standby mode.

### 3-6-2-2 Back-end Processor Boot Up

Press the **ON/OFF** Standby switch left below the control panel.



**Figure 3-23 ON/OFF Standby Switch**

**NOTE:** *The mains outlet of the system for peripheral auxiliary equipment are commonly switched with the Standby switch. The switch of printers has to be in ON position before starting the system. However, be aware some auxiliary equipment may switch itself to standby mode when Standby power is on (e.g., Color video printer) and must therefore be switched on separately. (CPN6 only - Auxiliary equipment need not to be switched ON/OFF separately if the F2 power switch on the rear of the system is always ON.)*

When the **ON/OFF** Standby switch left below the Control Panel is pressed, the System (including the Back-end Processor) starts and the operating system is loaded which then leads the application software to activate the scanner.

The system automatically performs an initialization sequence which includes the following:

- Loading the operating system.
- Running a quick diagnostic check of the system.
- Detecting connected probes

As soon as the software has been loaded, the system enters 2D-Mode with the probe and application that were used before the system was shut down.

**NOTE:** *Total time used for start-up is about 2 minutes.*

### 3-6-3 Power Off / Shutdown

**NOTICE** After turning off a system, wait at least 10 seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

#### 3-6-3-1 Back-end Processor Power Down

- 1.) Press the **ON/OFF** Standby switch left below the Control Panel. see: [Figure 3-23](#).

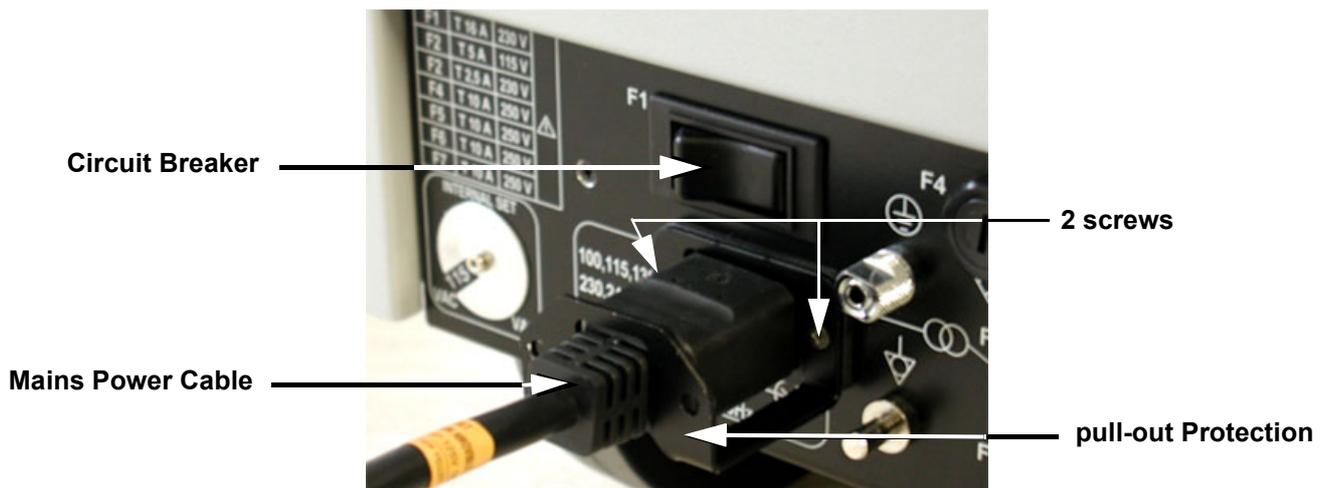
#### 3-6-3-2 Scanner Shutdown

- 1.) Press the **ON/OFF** Standby switch left below the Control Panel.
- 2.) Switch OFF the Circuit Breaker at the rear of the system.

**NOTE:** *The mains outlet of the system for peripheral auxiliary equipment are commonly switched with the Standby switch. So the auxiliary equipment need not to be switched ON/OFF separately.*

**WARNING** **Disconnection of the Main Power Cable is necessary!**  
**For Example: When repairing the system.**

- 3.) After complete power down, unscrew the 2 screws and remove the pull-out protection to disconnect the main power cable from the system or unplug it from the AC wall outlet socket.



**Figure 3-24 Circuit Breaker, Protection and Power Cable on back of Voluson® 730Expert**

- 4.) Press once on the brakes to block the front wheels (brakes on front wheels under the foot rest).
- 5.) Prior to disconnect a probe freeze the image.
- 6.) Disconnect probes. (Turn the probe locking handle counterclockwise and then pull the connector straight out of the probe port.)
- 7.) If required, open the right-hand side door, remove the probe cable from the cable holder and then close the door.

**CAUTION** **DO NOT** disconnect a probe while running (Live Scan “Write” mode)!  
**A software error may occur. In this case switch the unit OFF (perform a reset).**

### 3-6-4 Transducer Connection

Connect a transducer to one of the three rightmost transducer receptacle as follows:

- 1.) Inspect the probe and probe socket to verify that it is free of debris.
- 2.) Ensure that the transducer twist lock lever is at horizontal position.
- 3.) Insert the connector on the receptacle guide pin until it touches the receptacle mating surface.
- 4.) Twist the transducer twist lock lever to vertical position to lock it in place.  
Twist the lever to the horizontal position to disconnect the transducer.
- 5.) Open the right-hand side door, lay the cable into the intended cable holder and close the door.

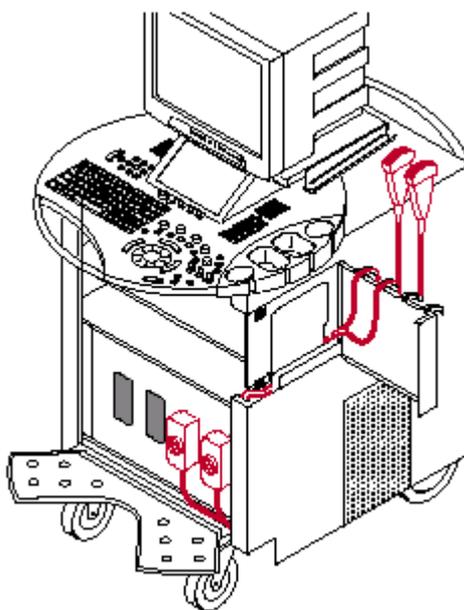


Figure 3-25 Transducer Connection

 **CAUTION** If the cable spout on the right-hand door is missing, don't pull the probe cable. Please insert the spout in the designated place to avoid damage of the probe cable.

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

**NOTE:** Prior to connecting or disconnecting a probe, freeze the image.  
It is not necessary to turn OFF power to connect or disconnect a transducer.

## Section 3-7 Printer Installation

**NOTE:** For Connection schemes refer to [Section 3-5 "Connection of Auxiliary Devices" on page 3-8](#).

For further installation instructions see:

- [Section 3-7-1 "Installing Line Printer HP 990cxi or HP 995c" on page 3-27](#)
- [Section 3-7-2 "Installing Digital Color Printer Sony UP-D21MD or UP-D23MD" on page 3-29](#)
- [Section 3-7-3 "Printer Installation manually" on page 3-31](#)
- [Section 3-7-4 "Adjustment of Printer Settings" on page 3-36](#)



**CAUTION** The Bluetooth Printer Connection set as well as the Color Deskjet printer **MUST NOT** be installed by the user!

For installation please contact your local distributor or GE service representative.

### 3-7-1 Installing Line Printer HP 990cxi or HP 995c

- 1.) Power off/Shutdown the system as described in: [Section 3-6-3 on page 3-24](#).
- 2.) Connect the printer as described on [page 3-8](#) and reinstall the rear cover plate.

**NOTE:** For connection schemes refer to [Section 3-5-8 on page 3-16](#).

 **NOTICE** Do not connect the USB-cable to the printer!

**NOTE:** "Mouse functions" can be performed by using the trackball for moving the cursor.  
"Normal select" (Click) = left/right trackball key; "Opening a context menu" = upper trackball key

- 3.) Turn ON the printer, then switch ON the power of the system and wait till the system has booted.

**NOTE:** The power switch of the printer has to be in ON position before starting the system!

#### 3-7-1-1 Install the HP printer software/driver

Perform the following steps if this printer was never installed on the Voluson® 730Expert!

- 1.) Connect the USB cable to the printer and the system. The windows 'Searching for Drivers ...', 'Found new Hardware ...' and finally the following windows appear.

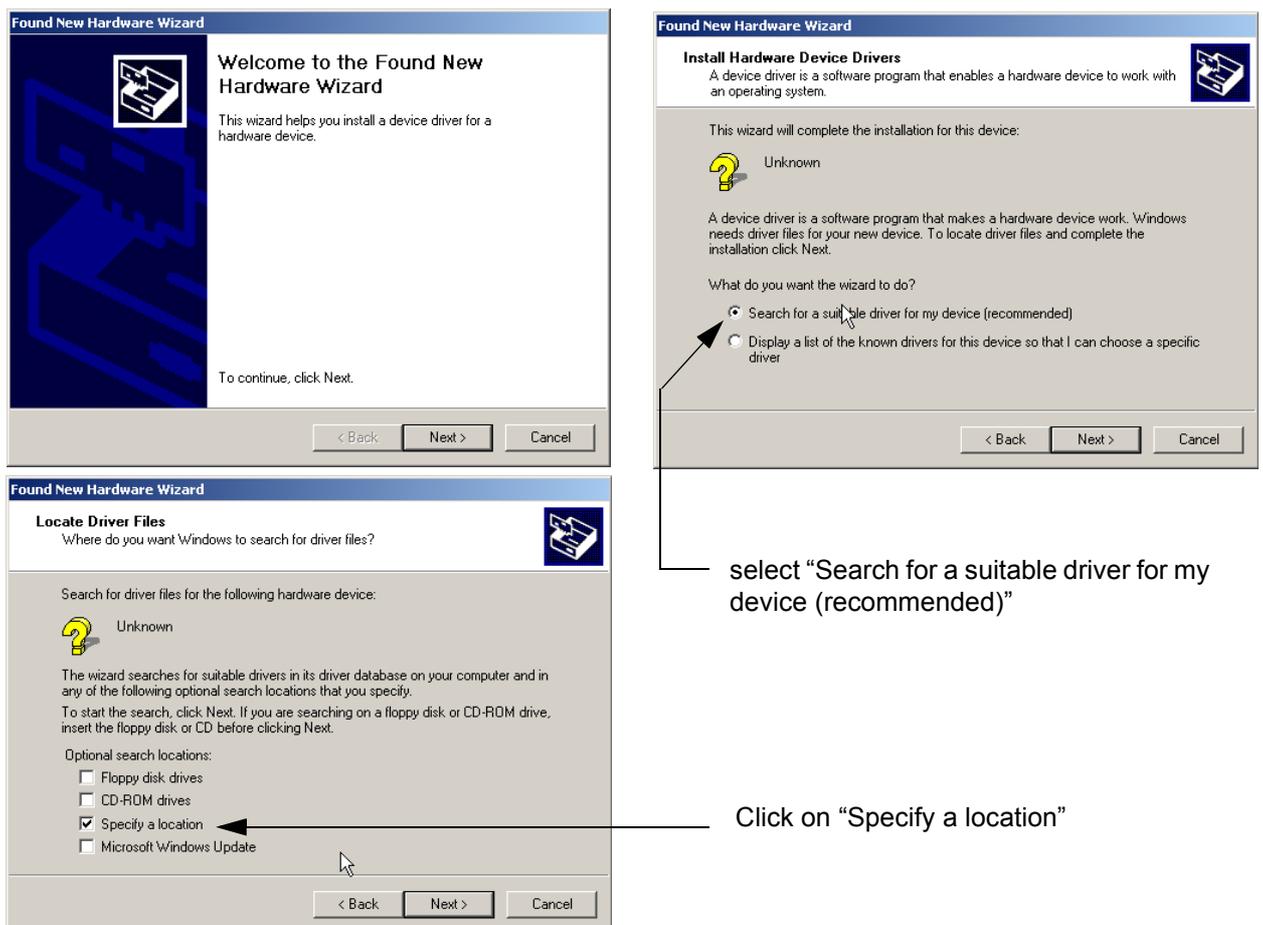


Figure 3-26 Found New Hardware Wizard

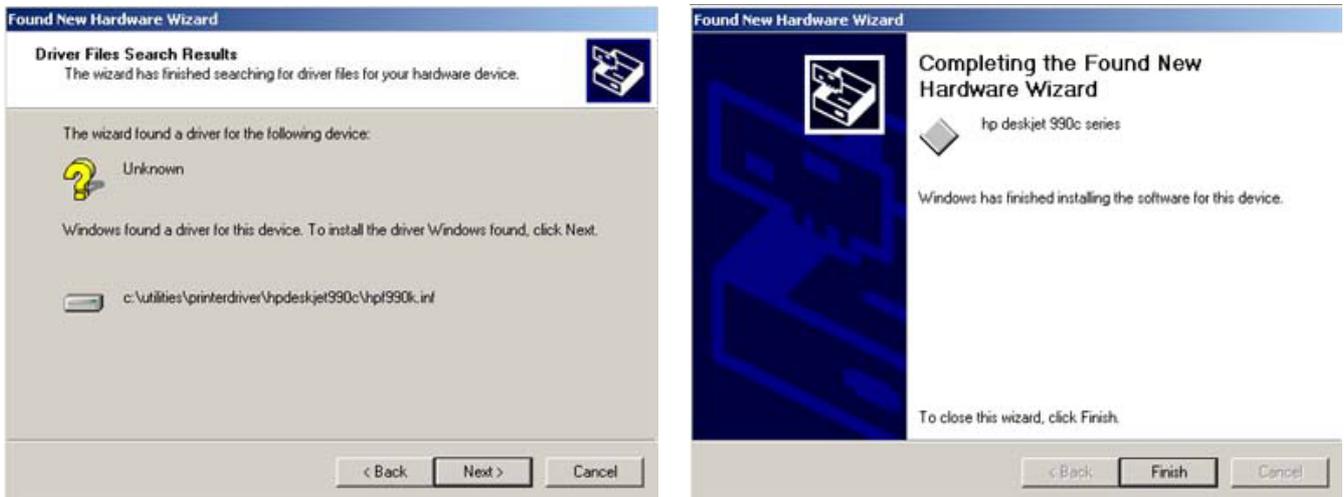
**3-7-1-1 Install the HP printer software/driver (cont'd)**

- 2.) Click the NEXT buttons to start the Hardware Wizard and to locate the driver files.
- 3.) Use the BROWSE button to search the following path on the hard disk (see: [Figure 3-27](#))
  - **C:\Utilities\PrinterDriver\HPDeskjet990c** for HP 990cxi
  - **C:\Utilities\PrinterDriver\HPDeskjet995c** for HP 995c, and then click OK.



**Figure 3-27 Search for Network path on hard disk**

- 4.) Confirm the correct path and click NEXT to install the driver. All necessary files are copied.
- 5.) Confirm the installation by clicking FINISH to close the Hardware Wizard.



**Figure 3-28 Confirm correct path and finish the Installation**

- 6.) Close all open windows and restart the system (turn off and on the system).



**NOTICE** After boot up of the system, verify the correct settings in the printer "Properties", see: [Section 3-7-4 "Adjustment of Printer Settings" on page 3-36](#).

### 3-7-2 Installing Digital Color Printer Sony UP-D21MD or UP-D23MD

- 1.) Power off/Shutdown the system as described in: [Section 3-6-3 on page 3-24](#).
- 2.) Connect the printer as described on [page 3-8](#) and reinstall the rear cover plate.

**NOTE:** For connection schemes refer to [Section 3-5-9 on page 3-17](#).



**NOTICE** Do not connect the USB-cable to the printer!

**NOTE:** "Mouse functions" can be performed by using the trackball for moving the cursor.  
"Normal select" (Click) = left/right trackball key; "Opening a context menu" = upper trackball key

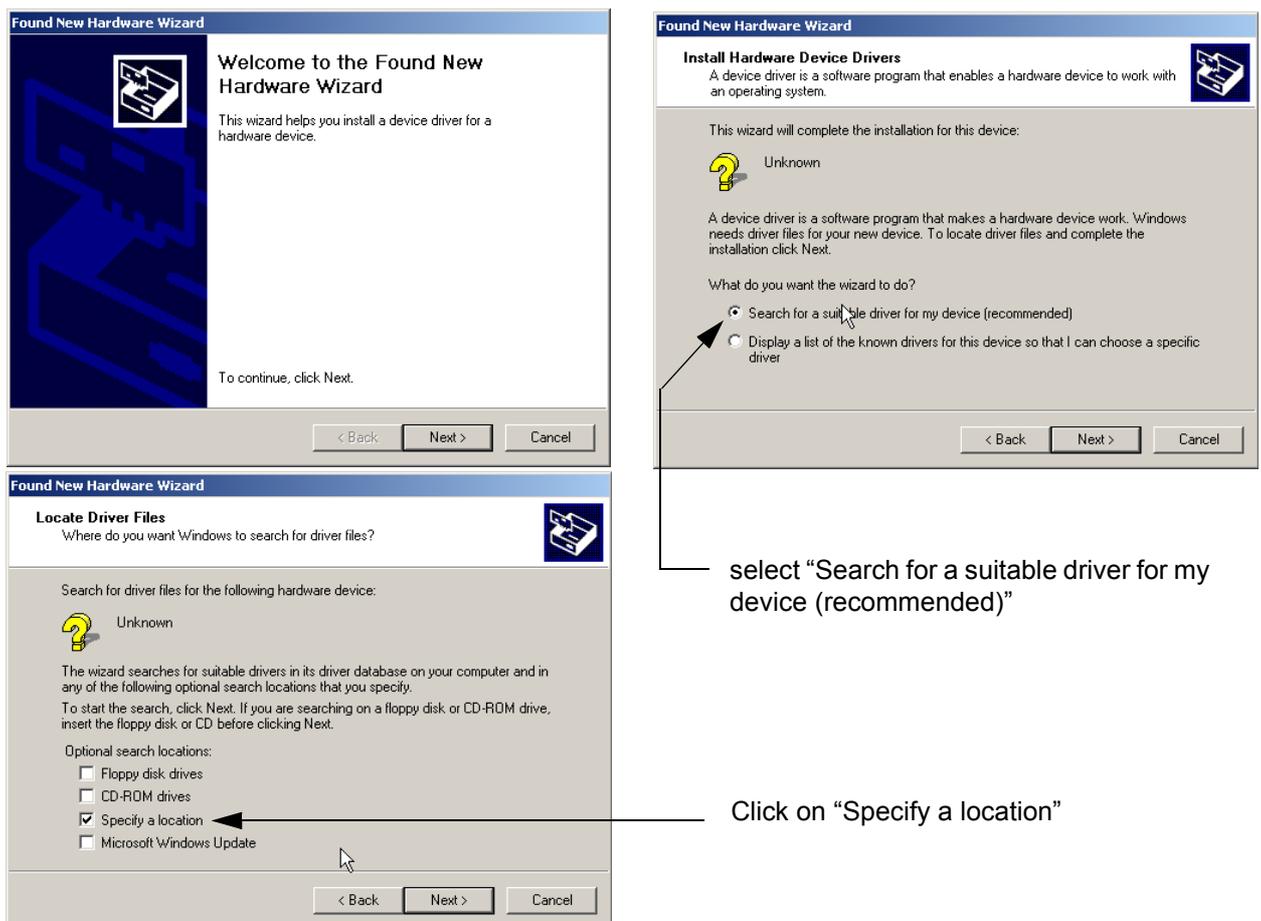
- 3.) Turn ON the printer, then switch ON the power of the system and wait till the system has booted.

**NOTE:** The power switch of the printer has to be in ON position before starting the system!

#### 3-7-2-1 Install the UP-D21MD / UP-D23MD printer software/driver

Perform the following steps if this printer was never installed on the Voluson® 730Expert!

- 1.) Connect the USB cable to the printer and the system. The windows 'Searching for Drivers ...', 'Found new Hardware ...' and finally the following windows appear.



**Figure 3-29 Found New Hardware Wizard**

- 2.) Click the NEXT buttons to start the Hardware Wizard and to locate the driver files.

3-7-2-1 Install the UP-D21MD / UP-D23MD printer software/driver (cont'd)

- 3.) Use the BROWSE button to search the following path (see: [Figure 3-27](#))
  - C:\Utilities\PrinterDriver\SonyUP-D21MD or
  - C:\Utilities\PrinterDriver\SonyUP-D23MD and then click OK.



Figure 3-30 Search for Network path

- 4.) Confirm the correct path and click NEXT to install the driver. All necessary files are copied.
- 5.) The Message: **Digital Signature Not Found** appears. Click YES.
- 6.) Confirm the installation by clicking FINISH to close the Hardware Wizard.

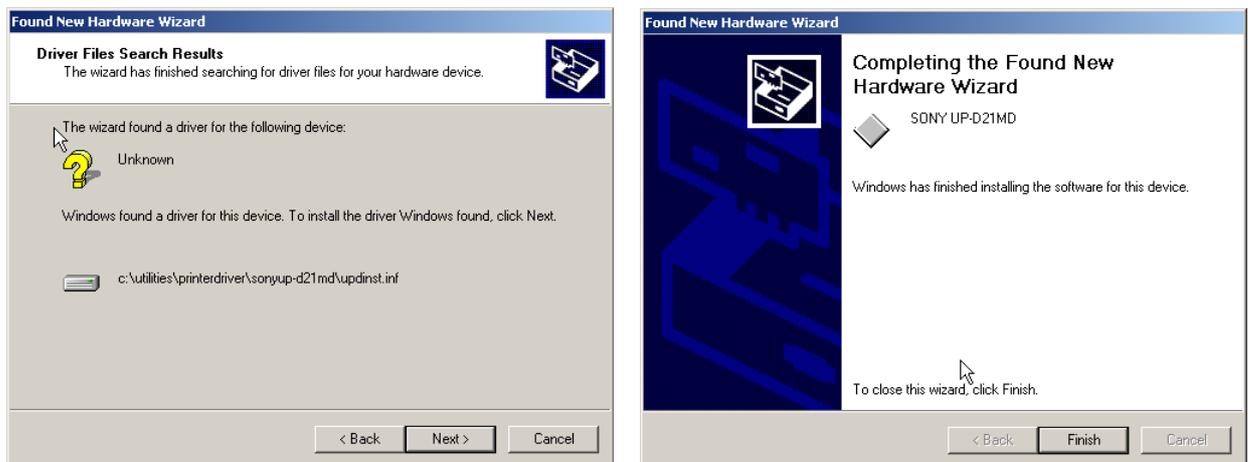


Figure 3-31 Confirm correct path and finish the Installation

- 7.) Close all open windows and restart the system (turn off and on the system).

 **NOTICE** After boot up of the system, verify the correct settings in the printer "Properties", see: [Section 3-7-4 "Adjustment of Printer Settings" on page 3-36.](#)

### 3-7-3 Printer Installation manually

- 1.) On the Touch Panel, press UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the SERVICE page. The “password window” appears automatically.

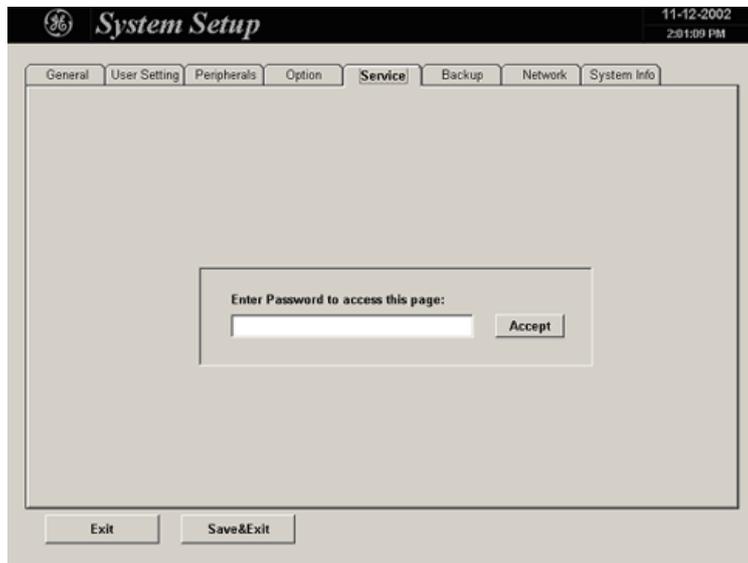


Figure 3-32 System Setup Service page

- 4.) Enter the password **SHE** and click the ACCEPT button to display the Service Tools window.

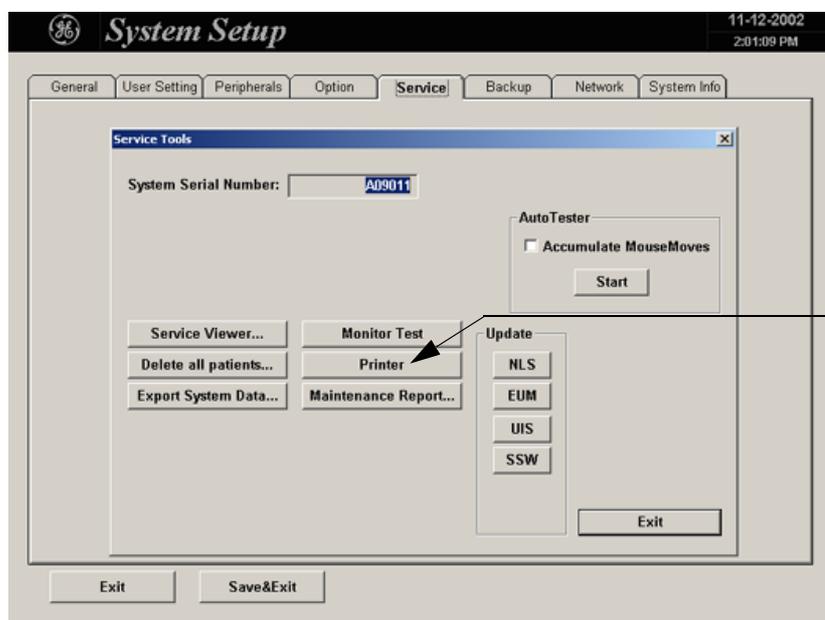


Figure 3-33 Service Tools window

- 5.) Click on the PRINTER button.

### 3-7-3 Printer Installation manually (cont'd)

6.) Click the ADD PRINTER button.

A warning message appears:

Please read this message carefully and click YES if you have skills to do this.

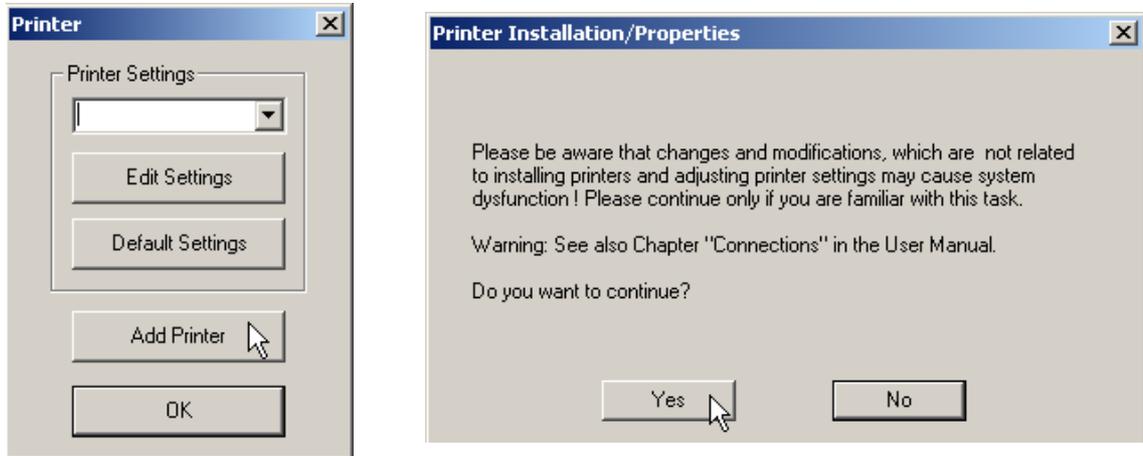


Figure 3-34 Add Printer and Printer Installation/Properties

7.) Click the NEXT button to start the Add Printer Wizard.

8.) Select the 'Local Printer', deselect "Automatically install Plug and Play printer" and then click NEXT.

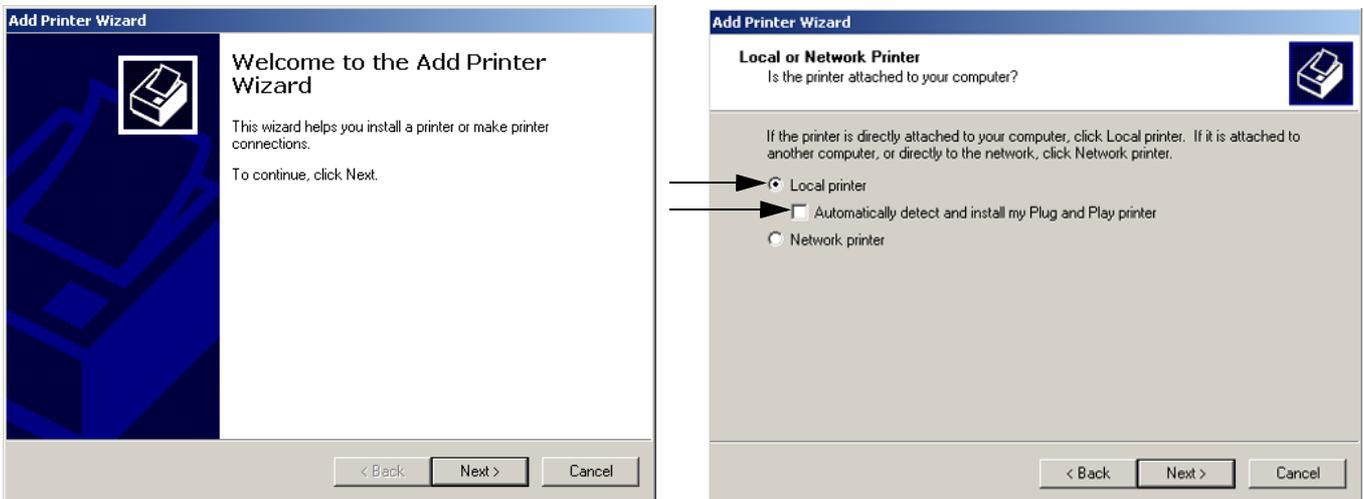


Figure 3-35 Add Printer Wizard

### 3-7-3 Printer Installation manually (cont'd)

9.) Select the corresponding Printer Port (e.g., [Figure 3-36](#) = USB001) and click NEXT.

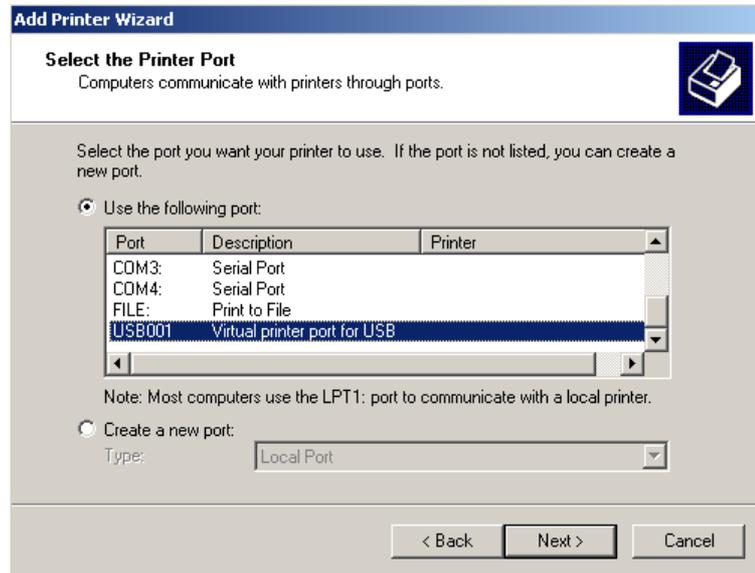


Figure 3-36 Select Printer Port

10.) In the following window select the HAVE DISK button.

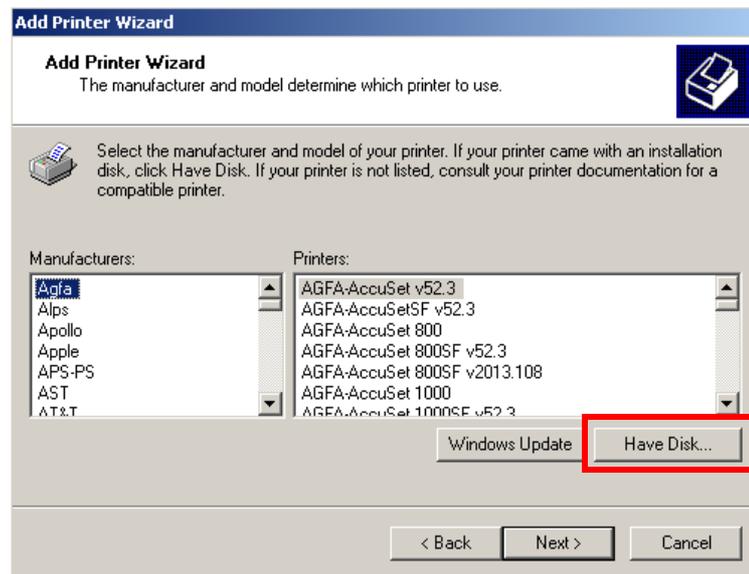
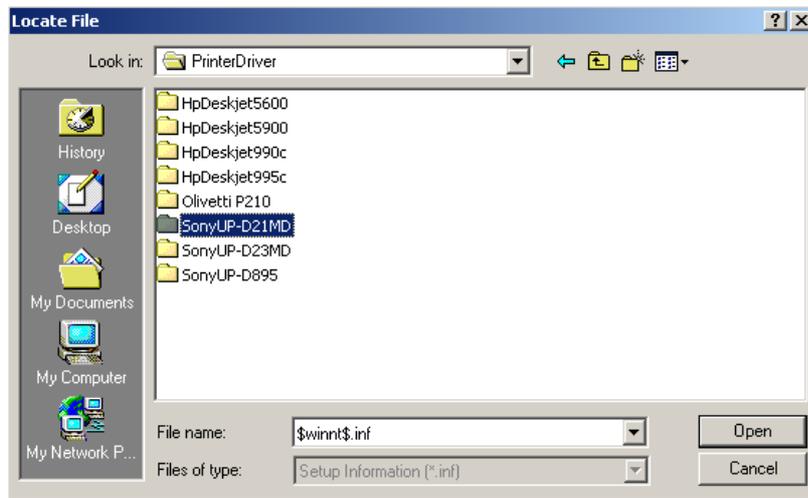


Figure 3-37 Have Disk...

11.) Use the BROWSE button to search the Printer Driver path (**C:\Utilities\PrinterDriver\xxxx**).

### 3-7-3 Printer Installation manually (cont'd)



**Figure 3-38 Select Printer Driver path (C:\Utilities\PrinterDriver\....)**

- 12.) Click OPEN, select the “xxx.inf” file and click OPEN again.
- 13.) Verify the selected Printer Driver path and confirm with OK.

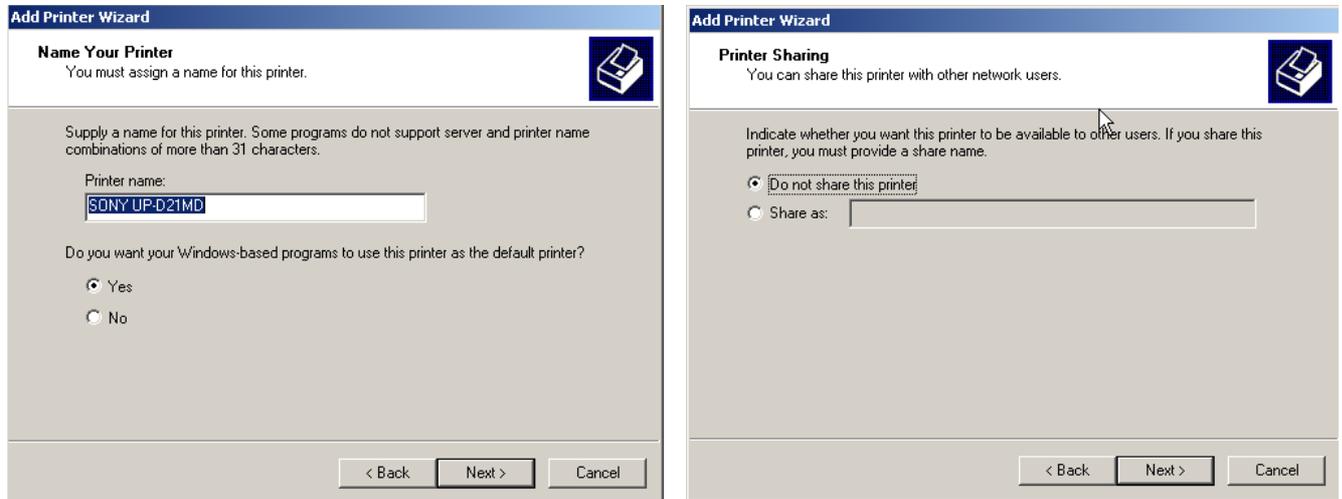


**Figure 3-39 verify selected Printer Driver path**

- 14.) Select the manufacturer and model of your printer and confirm with the NEXT button.

### 3-7-3 Printer Installation manually (cont'd)

15.) Assign a name, decide if the printer should be used as default printer and confirm with NEXT.  
see: [Figure 3-40](#).



**Figure 3-40 Assign name and select Printer Sharing - no**

16.) Select "Do not share this printer" and confirm the "Printer Sharing" window ([Figure 3-40](#)) by clicking NEXT.

17.) The "Complete the Add Printer Wizard" window appears on the screen.



**Figure 3-41 Complete manual Printer Installation**

18.) Complete the manual Printer Installation with the FINISH button.

19.) Close all open windows, close the "System Setup" with SAVE & EXIT and restart the system (turn off and on the system).



**NOTICE** After boot up of the system, verify the correct settings in the printer "Properties", see: [Section 3-7-4 "Adjustment of Printer Settings" on page 3-36](#).

### 3-7-4 Adjustment of Printer Settings

- 1.) After system restart, touch the UTILITIES key, and then SYSTEM SETUP on the Touch Panel.
- 2.) Select the SERVICE page. The “password window” appears automatically.
- 3.) Enter the password **SHE** and click the ACCEPT button.
- 4.) Click on the PRINTER button.
- 5.) Select the desired printer from the pull-down menu and click the EDIT SETTINGS button.
- 6.) Confirm the warning message with the YES button. The “**Printer Properties**” appear.

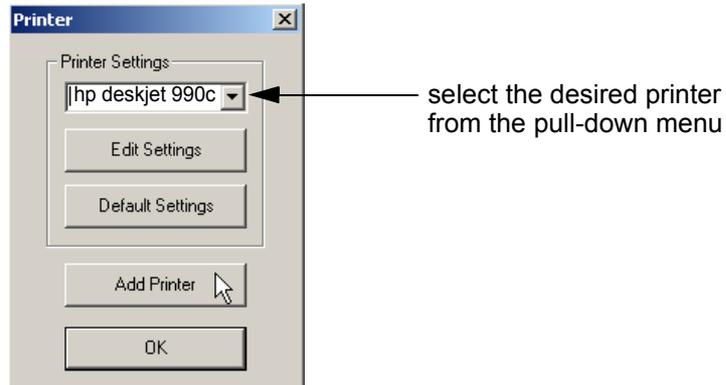


Figure 3-42 Select the desired printer

To adjust the Line printer see: [Section 3-7-4-1 "HP 990cxi / HP 995c - Printer Settings"](#) .

To adjust the Color printer see: [Section 3-7-4-2 "UP-D21MD / UP-D23MD - Printer Settings"](#) .

 **WARNING** *After each printer installation, the leakage currents have to be measured acc. IEC 60601-1 resp. UL60601-1.*

### 3-7-4-1 HP 990cxi / HP 995c - Printer Settings

- 1.) Call up the '**Printer Properties**'; operation see: [Section 3-7-4 "Adjustment of Printer Settings"](#) .
- 2.) Select the **GENERAL** page and click the **PRINTING PREFERENCES...** button.
- 3.) Select the **SETUP** page for adjusting print quality and paper size.  
"Paper type" should be set to 'Automatic'. See left [Figure 3-43](#).
- 4.) Select the **FEATURES** page for adjusting 'Two-Side Printing' if desired.  
"Orientation" must be set to 'Portrait'. See right [Figure 3-43](#).

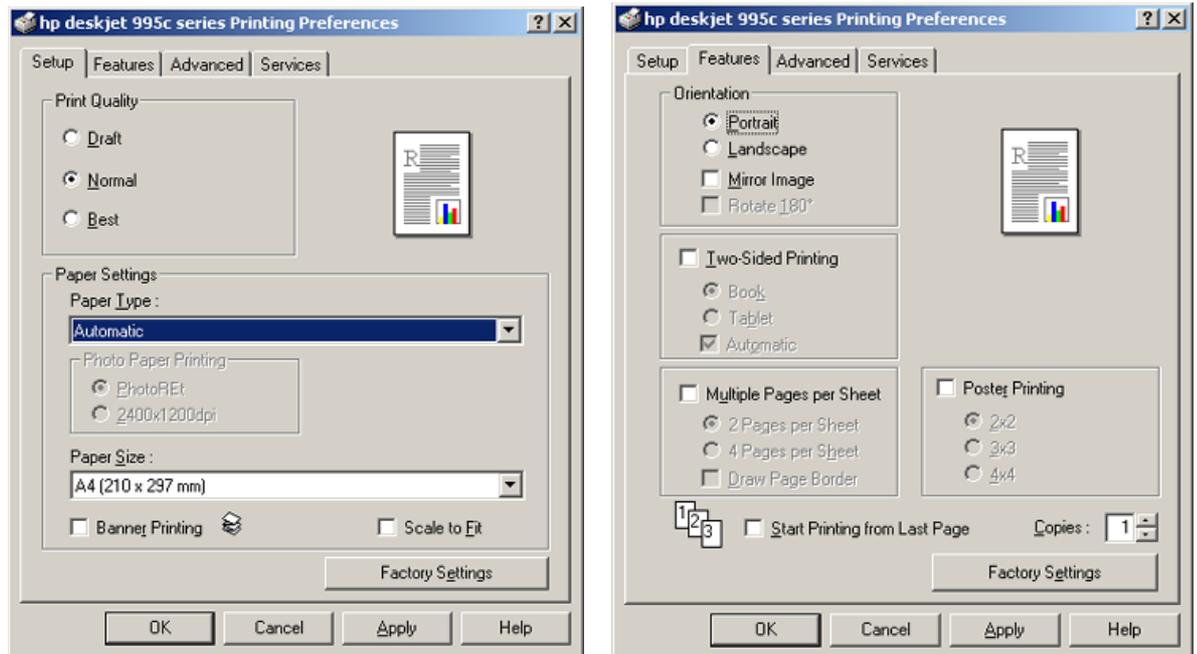


Figure 3-43 HP Printer - Settings

- 5.) For saving the adjusted printer settings click **APPLY** and then **OK**.
- 6.) Select the **PORTS** page and select/verify the correct USB printer port.
- 7.) For saving the adjusted printer settings click **APPLY** and then **OK**.  
Finally close the 'Printers' -window with the close button and exit System Setup with **SAVE&EXIT**.
- 8.) Assign the HP 990cxi / HP 995c printer as Report Printer;  
see: [Section 3-7-5 "Remote Control Selection" on page 3-40](#).
- 9.) Print report page(s) containing measurements.  
For operation see Basic User Manual of Voluson® 730Expert.
- 10.) **Turn off** the system!

### 3-7-4-2 UP-D21MD / UP-D23MD - Printer Settings

1.) Call up the 'Printer Properties'; operation see: [Section 3-7-4 "Adjustment of Printer Settings"](#) .

 **NOTICE** Settings for Paper Size MUST match with the used Paper (large/small) and also the right color ink cartridge has to be used. Otherwise you will get an error message at printing.

2.) Select the **PAPER** page and select:

- Paper Size: **UPC-21L** (large) / UPC-21S (small)
- Orientation: **Landscape** (recommended when using large paper size)
- **High Speed** (check mark on)

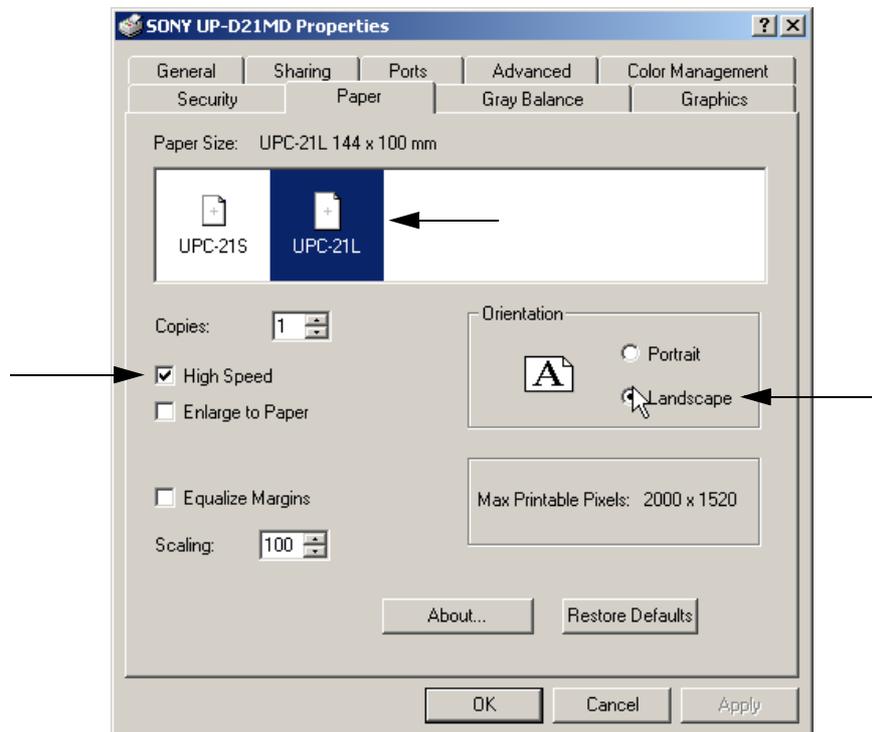


Figure 3-44 Paper page

3-7-4-2 UP-D21MD / UP-D23MD - Printer Settings (cont'd)

- 3.) Select the GRAPHICS page. From the “Color Adjust” pop-up menu select:
  - a.) Color Balance: Cyan = 0; Magenta = 0; Yellow = 0
  - b.) Gamma Select: **Gamma 1**

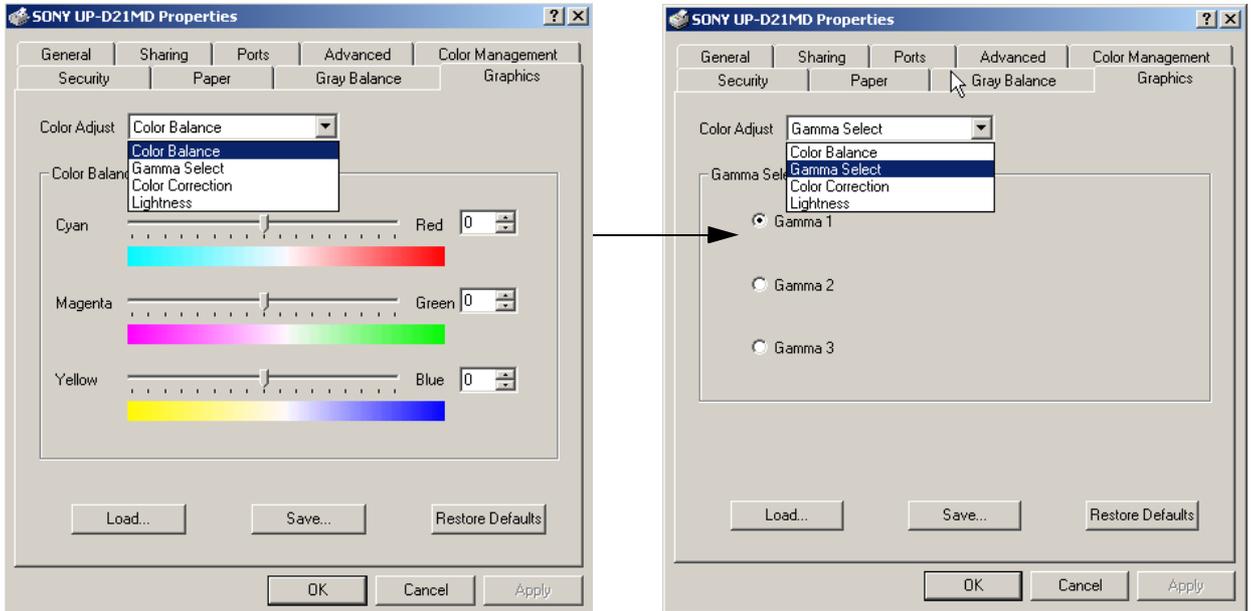


Figure 3-45 Graphics page (Color Balance + Gamma Select)

- c.) Color Correction: set **Printer Hardware Color Correction**
- d.) Lightness: Sharpness = 7 or 8; Dark = 0; Gamma = -12; Light = 8

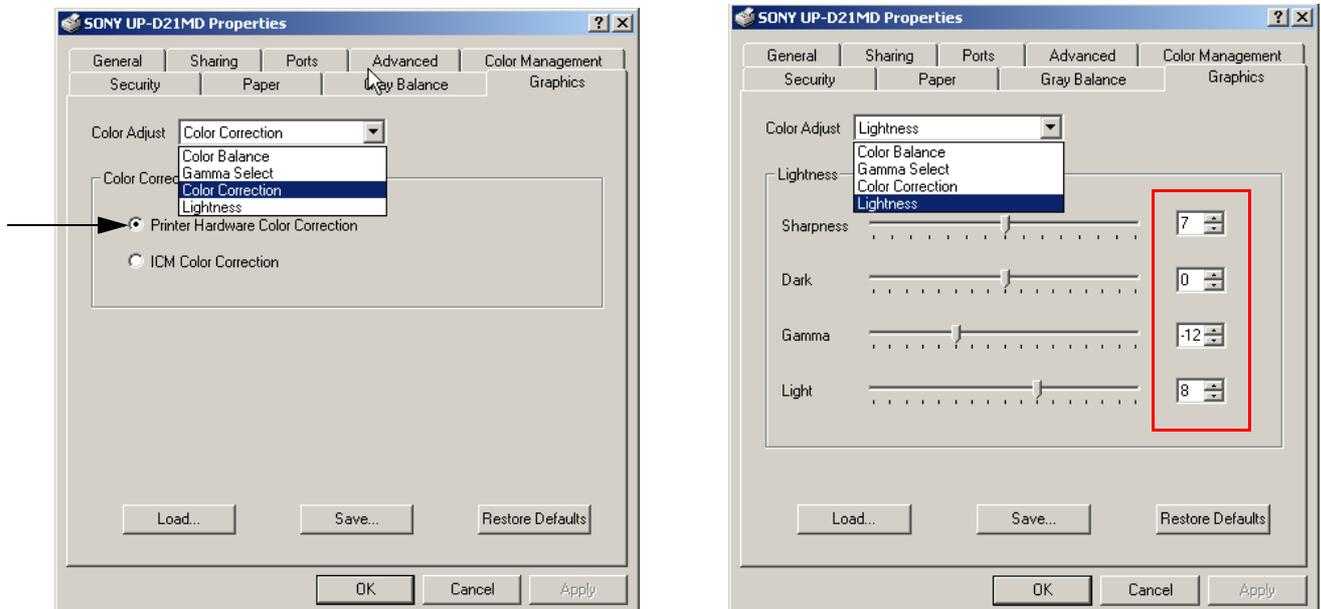


Figure 3-46 Graphics page (Color Correction + Lightness)

- 4.) For saving the adjusted printer settings click APPLY and then OK.  
 Finally close the ‘Printers’-window with the close button and exit System Setup with SAVE&EXIT.
- 5.) Assign the Printer to remote keys **PRINT A** and/or **PRINT B**; see: [Section 3-7-5 on page 3-40](#).

### 3-7-5 Remote Control Selection

To assign an auxiliary device (e.g., printer) to the remote keys **PRINT A** and/or **PRINT B**, or to adjust Foot switch, etc.:

- 1.) On the Touch Panel, touch **UTILITIES**.
- 2.) In the Utilities menu, touch **SYSTEM SETUP** to invoke the setup desktop on the screen.
- 3.) Select the **PERIPHERALS** page.

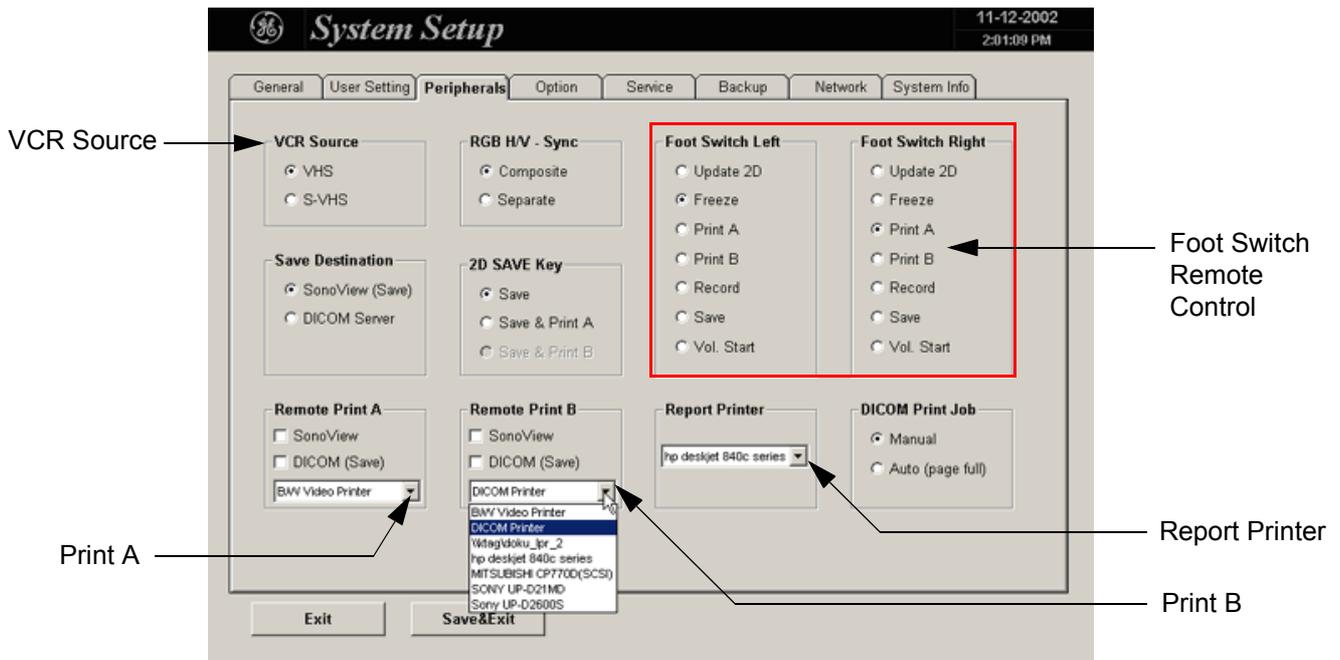


Figure 3-47 Peripherals page

- **Remote Print A:** Select the desired Printer for the remote control **PRINT A** key.
- **Remote Print B:** Select the desired Printer for the remote control **PRINT B** key.

**NOTE:** *Optionally the Remote Control can be done by Foot switches. Therefore select "Print A" or "Print B" in "Foot Switch Left" or "Foot Switch Right" - section.*

- **Report Printer:** Select the desired Report Printer from the drop-down menu.

**NOTICE**  The selected Report Printer is usually used for printing reports and images from Sonoview.

- **Foot Switch Left/Right:** Select desired function of the Foot switch Left and Right. After adjustment, click **SAVE&EXIT** to save Settings and exit System Setup.

## Section 3-8 System Configuration

### 3-8-1 System Setup

Modifications of system parameters are supported by diverse dialog pages and windows on the system setup desktop:

- **General** - Date, Time, Clinic Name, Language, Screen saver, etc.
- **User Settings** - to save User programs, 3D/4D programs, Auto Text, Doppler 2D Refresh, etc.
- **Peripherals** - to adjust assignment of **PRINT** keys, Foot Switch, selection of Save Destination, etc.
- **Option** - shows which options are installed in the system
- **Service** - enter the password to get access to the Service Tools functions
- **Backup** - Save/Load User Settings Only, Save/Load/Delete Full Backup
- **Network** - to set up all DICOM, Sonoview and Network configuration nodes
- **System Info** - shows which Software/Hardware version is installed in the system



**NOTICE** More detailed information pertaining System Setup adjustments is found in the Voluson® 730Expert Basic User Manual; see: [Table 9-17, "System Manuals,"](#) on page 9-29.

#### 3-8-1-1 To invoke the Setup procedure:

- 1.) Touch the **UTILITIES** key on the Touch Panel.
- 2.) Touch the **SYSTEM SETUP** key in the "Utilities" menu to activate the setup desktop screen.

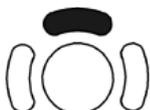
In general operations are done with the trackball and the trackball keys (mouse emulation).



**Trackball** (mouse position):  
positions the pointing device (arrow) on the desktop



**left trackball key** (left mouse button):  
sets, fixates markers and activates pages/buttons etc. marked by the pointing device



**upper trackball key** (right mouse button):  
no function in system desktop



**right trackball key** (left mouse button):  
sets, fixates markers and activates pages/buttons etc. marked by the pointing device

### 3-8-1-2 How to enter Date and Time

Select the GENERAL page in the System Setup see: [Figure 3-48](#).

- 1.) Select the "Date Format" (only one can be active).
- 2.) Click the DATE/TIME button to activate a sub dialog window to enter date, time and time zone.
- 3.) Click the TIME FORMAT button to activate a sub dialog window to choose the preferred time format.
- 4.) Click SAVE&EXIT to save Settings and exit System Setup.

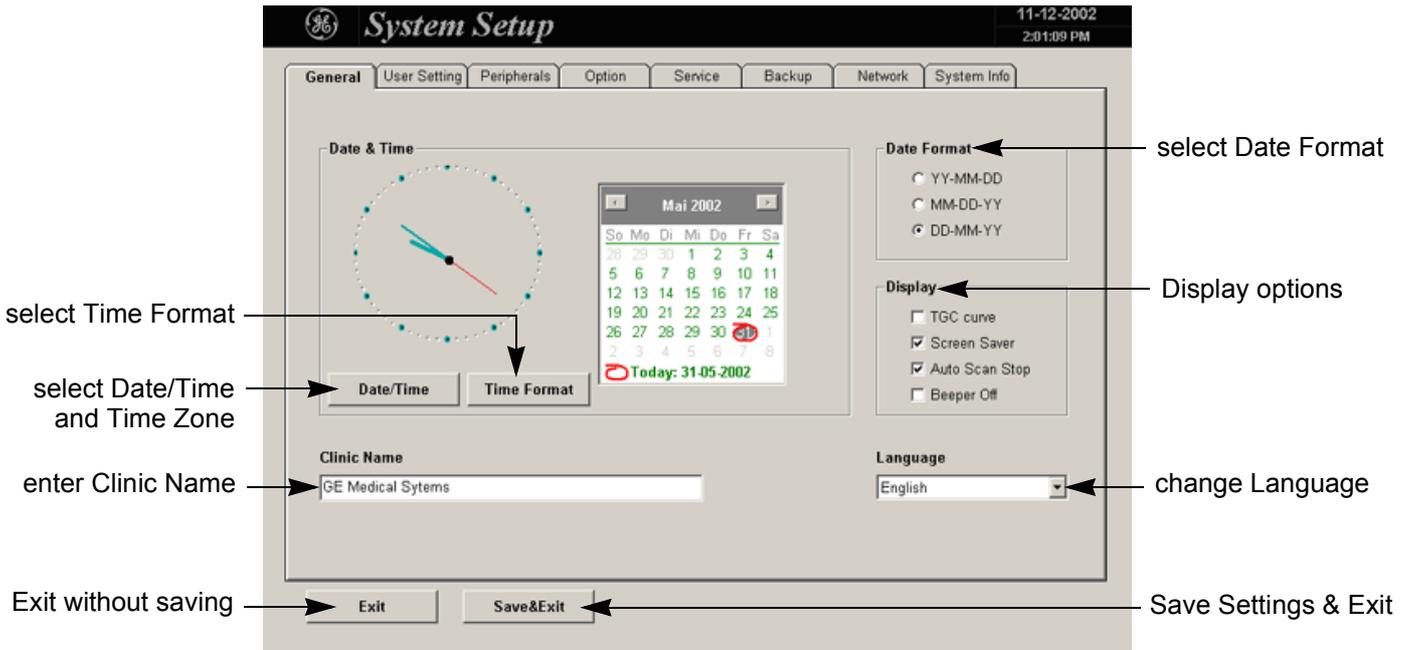


Figure 3-48 System Setup - General page

### 3-8-1-3 How to enter Hospital Name

Select the GENERAL page in the System Setup see: [Figure 3-48](#).

- 1.) Select the text box to enter a new "Clinic Name" with the keyboard.
  - 2.) Click SAVE&EXIT to save Settings and exit System Setup.
- The clinic name will be copied into the Hospital ID in the information header.

### 3-8-1-4 How to change Language

Select the GENERAL page in the System Setup see: [Figure 3-48](#).

- 1.) Select the desired language from the pop-up menu.
- 2.) Click SAVE&EXIT to save Settings and exit System Setup.

**NOTE:** After changing the language the system has to reboot.

### 3-8-1-5 How to change Touch Panel Scheme

Select the USER SETTING page in the System Setup.

- 1.) Select the desired color scheme display of the Touch Panel from the pop-up menu.
- 2.) Click SAVE&EXIT to save Settings and exit System Setup.

### 3-8-2 On-Board Optional Peripherals

Mains outlets: Mains socket ST1, ST2, ST3, ST4, ST5 for accessories.  
 All mains outlets are co-switched by the unit's mains switch via built-in isolation transformer.  
 Output voltage for: ST1 - ST5: 115V or 230V.



**CAUTION** Modification of voltage setting only by an authorized service person!  
 The maximum power consumption of equipment (inclusive color video monitor) connected to these outlets must not exceed 350VA!

**Table 3-7 Approved Peripherals**

Device	Manufacturer	Model	Video Signal
B/W Video Printer	SONY	UP-895MD	NTSC/PAL
Digital Color Video Printer	SONY	UP-D21MD	USB-Port
	SONY	UP-D23MD	USB-Port
Video Cassette Recorder	SONY	SVO-9500MD SVO-9500-MDP	NTSC PAL
	Mitsubishi	HS-MD3000U HS-MD3000E	NTSC PAL
Line Printer	Hewlett Packard	hp deskjet 990cxi	USB-Port
	Hewlett Packard	hp deskjet 995c	USB-Port
Color Deskjet Printer (Bluetooth)	Hewlett Packard	HP 5600 Series	USB-Port (Bluetooth)
	Olivetti	Olivetti Job Jet 210	USB-Port (Bluetooth)
	Hewlett Packard	HP 5940	USB-Port (Bluetooth)
	Canon	Pixma MP600 / MP610	USB-Port (Bluetooth)
Magneto-Optical Drive (MOD)	Fujitsu	MCM3130AP	
Global Modem	Multi-Tech	MT5634ZBA	
ECG Preamplifier		MAN6	
Footswitch		MFT7	

### 3-8-3 External I/O Connection Panel (GES)

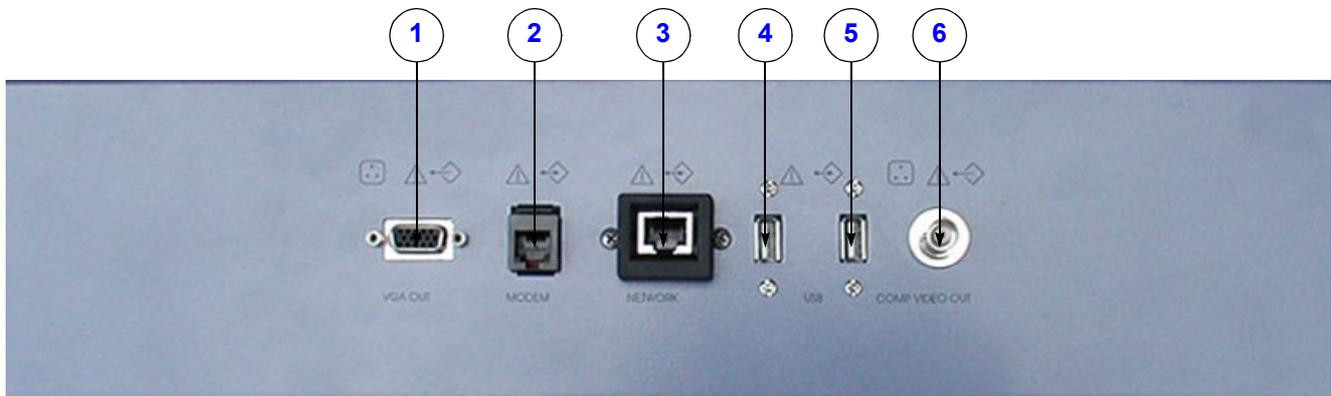


Figure 3-49 External I/O Panel Connectors

Table 3-8 External I/O Connector Descriptions

Item	Connector Name	Table Number	Description		
1	VGA OUT	<a href="#">Table 3-9</a>	print out VGA signal with monitor/printer		
2	MODEM	<a href="#">Table 3-10</a>	RJ-11 with global adapter kit for modem connection		
3	NETWORK	<a href="#">Table 3-11</a>	DICOM input/output twisted pair RJ-45 10/100 megabit/s		
4	USB-1	<a href="#">Table 3-12</a>	USB-2.0 port		
5	USB-2	<a href="#">Table 3-12</a>	USB-2.0 port		
6	COMP VIDEO OUT	<a href="#">Table 3-13</a>	BNC Connector, Color Video Output		

3-8-3-1 External I/O Pin Outs

**Table 3-9 VGA OUT Connector, Sub-D 15 Pin**

Pin No	Output Signal	Description
1	VGA OUT1 R	Red
2	VGA OUT1 G	Green
3	VGA OUT1 B	Blue
4, 9,11,12,15	N/C	N/C
5, 6, 7, 8, 10	GND	GND
13	VGA OUT1 HS	H Sync
14	VGA OUT1 VS	V Sync

**Table 3-10 Modem, RJ-11 Modular 6 Pin**

Pin No	Output Signal	Description
2	TEL L4	Telephone L4
3	TEL L2	Telephone L2
4	TEL L1	Telephone L1
5	TEL L3	Telephone L3
Others	NC	Non-connection

**Table 3-11 Network Connector, RJ45 Modular 8 Pin**

Pin No	Output Signal	Description
1	ETHER TD	Ethernet RD+
2	ETHER TD	Ethernet RD-
3	ETHER RD	Ethernet TD+
6	ETHER RD	Ethernet TD-
Others	NC	Non-connection

**Table 3-12 USB 1, 2 Connectors**

Pin No	Output Signal	Description
1	VCC	USB Power Supply
2	- Data	USB Data (-)
3	+ Data	USB Data (+)
4	GND	USB Power Ground

**Table 3-13 COMP VIDEO OUT Connector**

Pin No	Signal	Description
1 (Center Pin)	Signal	
2 (Coax Pin)	Signal GND	

**Table 3-14 Footswitch Connector (located at Power Supply Module CPN - rear side)**

Pin No	Input Signal	Description
1	Signal GND	
2	right switch	normally open
3	left switch	normally open
4	not connected	not connected

### 3-8-4 Video Specification

Video specifications may be needed to be able to connect laser cameras or other devices to the Voluson® 730Expert.

**Table 3-15 Video Specifications VGA Connector**

Timing Parameter	Value
Visible Resolution	800 x 600
Horizontal Rate [kHz]	47.20
H Total cycle time [µs]	21.20
H Sync width [µs]	1.50
H Back Porch [µs]	2.94
H Active Video Time [µs]	16.15
H Front Porch [µs]	0.616
Horizontal +/-	pos
Vertical Rate [Hz]	75.00
Vertical Total cycle time [ms]	13.30
V Sync Width [ms]	0.170
V Back Porch [ms]	0.276
V Active Video Time [ms]	12.68
V Front Porch [ms]	0.174
Dot Clock [MHz]	49.54

**3-8-4-1 Electrical Specifications on VGA Connector**

- Signal Level: 700 mV at 75 Ohm
- H/V Sync: TTL Level

**Table 3-16 Video Specifications for Composite, Video Connector**

S-Video Output set to: Timing Parameter	PAL 50Hz	NTSC 60Hz
Visible Resolution	800 x 600	800 x 600
Pixel Clock	17.734475 MHz = 4* ft	14.318 MHz = 4* ft
Horizontal Total Line	64µs / 1135 Pixel	63.56µs / 910 Pixel
Horizontal Active Display	50.50µs / 902 Pixel	52.50µs / 752 Pixel
Horizontal Front Porch	1.96µs / 35 Pixel	1.62µs / 23 Pixel
Horizontal Sync Width	4.62µs / 82 Pixel	4.68µs / 67 Pixel
Horizontal Back Porch	6.52µs / 116 Pixel	4.76µs / 68 Pixel
Vertical Total Lines	20ms / 312.50 Lines	16.68ms / 262.50 Lines
Vertical Active Lines	18.18ms / 284 Lines	15.22ms / 239.50 Lines
Vertical Front Porch	256us 4 Lines	381us / 6 Lines
Vertical Sync	160us / 2.50 Lines	190us 7 3 Lines
Vertical Back Porch	1408us / 22 Lines	890us / 14 Lines
Serration Pulses	5	6
Interlaced	yes	yes
Aspect Ratio pixel size	14.75 (H) : 17.734475 (V)	14.75 (H) : 14.318 (V)
Video levels on 75 Ohm:		
white level	1020mV	1020mV
black level	370mV	370mV
blanking level	320mV	320mV
sync level*	20mV	20mV

**Section 3-9  
Available Probes**

See [Chapter 9 - Probes](#), for part numbers to be used when ordering new or replacement service probes.

**Section 3-10  
Software/Option Configuration**

For description refer to:

- [Section 3-8-1 "System Setup" on page 3-41](#)



**NOTICE** More detailed information pertaining System Setup and Measure Setup adjustments is found in the Voluson® 730Expert Basic User Manual, which is available in different languages.

## Section 3-11 Network IP Address Configuration

**NOTE:** Following Information must be provided by customer or hospital engineer before you can start:  
A Station name, AE Title, IP address and Port Number for the Voluson® 730Expert.  
The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.  
Only if necessary (e.g. for Internet access).

- 1.) Touch the UTILITIES key on the Touch Panel once to display the Utilities menu.
- 2.) Select SYSTEM SETUP and open the NETWORK page on the System Setup desktop screen.
- 3.) Click the NETWORK CONFIGURATION button, read the message and confirm with YES.

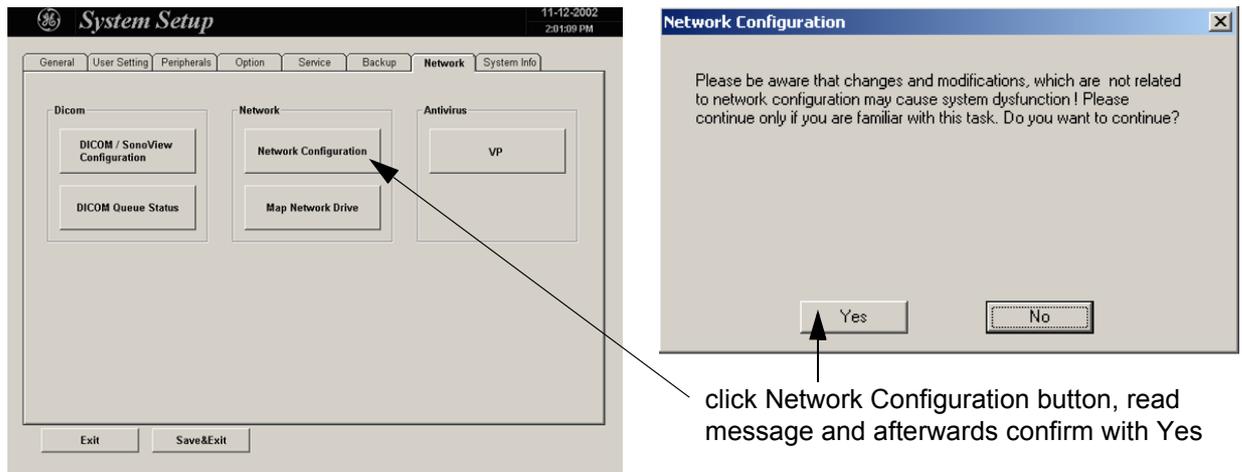


Figure 3-50 Network Configuration

- 4.) The "Internet Protocol (TCP/IP) Properties" dialog page appears.

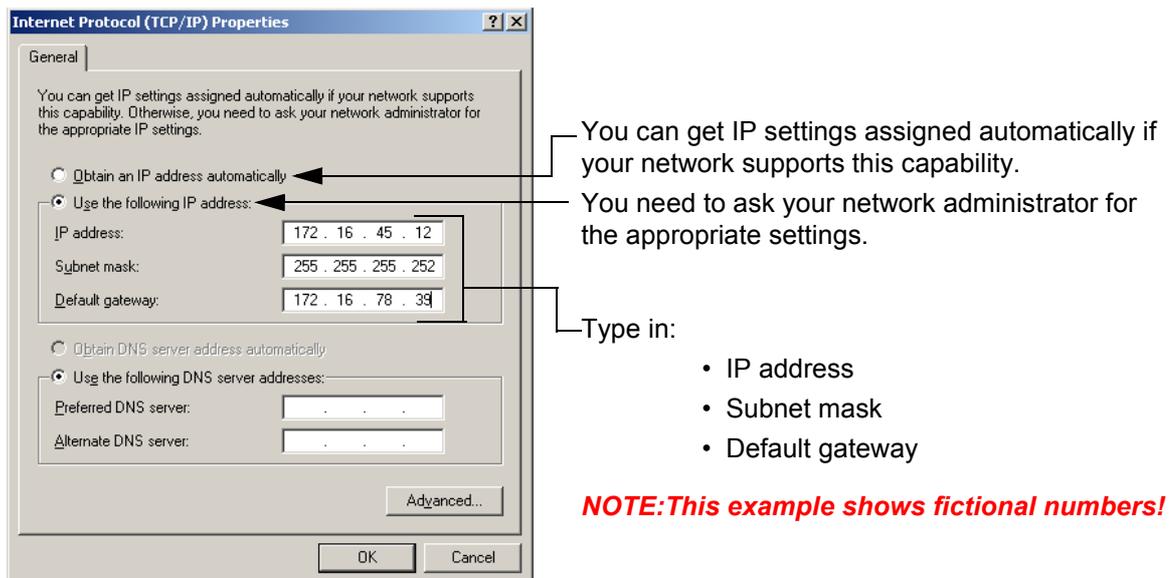
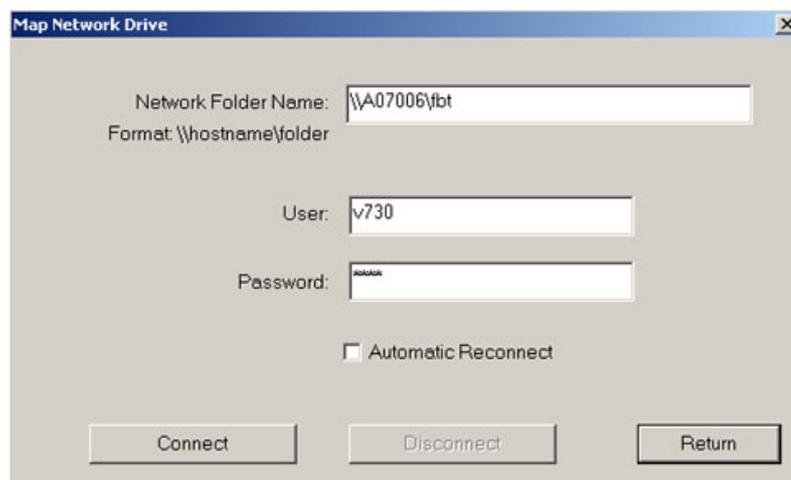


Figure 3-51 Internet Protocol (TCP/IP)

To specify a DICOM Address, follow the instructions of described in the Basic User Manual, Chapter 17 of the Voluson® 730Expert.

### 3-11-1 Map Network Drive

- 1.) Select the MAP NETWORK DRIVE button (in the System Setup - **Network** page, see: [Figure 3-50](#)) to open a dialog where the system can be connected to a shared network drive of another server.



**Figure 3-52 Map Network Drive window**

- 2.) Enter the name of the shared network folder in the „Network Folder Name“ field.
- 3.) Supply a valid user name and a password for this folder.

**NOTE:** *If you check the „Automatic Reconnect“ box, the system tries to establish the connection again when starting up. Otherwise, the connection must be re-established manually after a shutdown or reboot.*

- 4.) Select the CONNECT button to establish the connection to the remote machine. If successful, the DISCONNECT button becomes active.



**NOTICE** If there is an error during the connection, a warning message appears inside the dialog. In this case, please verify the data in the dialog.



**NOTICE** If there already is a connection to the remote server, the CONNECT button is grayed. To change the existing connection, first click on DISCONNECT and then enter the new settings.



**WARNING** *Please make sure that the server you are connecting to is trustworthy and reliable. For details, contact your local system administrator. If you backup Sonoview data to this server, all the patients' demographic data will be copied to this server!*

## Section 3-12 Connectivity Setup Worksheet

Site System Information				
Site: <input style="width: 90%;" type="text"/>	Floor: <input style="width: 85%;" type="text"/>	Comments: <div style="border: 1px solid black; height: 60px; width: 100%;"></div>		
Dept: <input style="width: 90%;" type="text"/>	Room: <input style="width: 85%;" type="text"/>			
Serial #: <input style="width: 15%;" type="text"/> Type: <input style="width: 20%;" type="text"/>	REV: <input style="width: 20%;" type="text"/>			
CONTACT INFORMATION				
Name	Title	Phone	E-Mail Address	
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	

TCP/IP Settings	
Name - AE Title: <input style="width: 95%;" type="text"/>	
<b>IP Settings</b>  IP Address: <input style="width: 95%;" type="text"/> Subnet Mask: <input style="width: 95%;" type="text"/> Default Gateway: <input style="width: 95%;" type="text"/>	<b>Remote Archive Setup</b>  Remote Archive IP: <input style="width: 95%;" type="text"/> Remote Archive Name: <input style="width: 95%;" type="text"/>

Services (Destination Devices)						
	Device Type	Manufacturer	Name	IP Address	Port	AE Title
1	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
2	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
3	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
4	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
5	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
6	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
7	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
8	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
9	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
10	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
11	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
12	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>

## Section 3-13 Paperwork

**NOTE:** During and after installation, the documentation (i.e. User Manual, Installation Manual,...) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user information is available during the operation and service of the complete system.

### 3-13-1 Product Locator Installation

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

		Mailing Address GE Medical Systems Product Locator File P.O. Box 414 Milwaukee, WI 53201-0414			
		DESCRIPTION	FDA	MODEL	REV
PREPARE FOR ORDERS THAT DO NOT HAVE A LOCATOR INSTALLATION REPORT  SYSTEM ID NUMBER		OCP	BS	ORD	DATE (MO-DA-YR)
		DIST-COUNTRY	ROOM	EMPLOYEE NO.	
PRINTED IN USA  INSTALLATION		CUSTOMER NO. DESTINATION - NAME AND ADDRESS _____ _____ _____ _____			
		ZIP CODE			
		_____			
		_____			

Figure 3-1 Product Locator Installation Card

### 3-13-2 User Manual(s)

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.

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# Chapter 4

## Functional Checks

### Section 4-1 Overview

#### 4-1-1 Purpose of Chapter 4

This chapter provides procedures for quickly checking major functions of the Voluson® 730Expert scanner diagnostics by using the built-in service software, and power supply adjustments.

**Table 4-1 Contents in Chapter 4**

Section	Description	Page Number
4-1	Overview	4-1
4-2	Required Equipment	4-1
4-3	General Procedure	4-2
4-4	Functional Checks	4-7
4-5	Backup and Restore Database, Preset Configurations and Images	4-29
4-6	Software Configuration Checks	4-39
4-7	Peripheral Checks	4-40
4-8	Mechanical Function Checks	4-41
4-9	Site Log	4-42



**NOTICE** Most of the information pertaining to this Functional Checks chapter is found in the Voluson® 730Expert Basic User Manual; see: [Table 9-17, "System Manuals," on page 9-29.](#)

### Section 4-2 Required Equipment

- An empty (blank) DVD/CD+(R)W or MO Disk.
- At least one transducer. See ["Probes" on page 9-30](#) for an overview. (normally you should check all the transducers used on the system)

## Section 4-3 General Procedure

 **CAUTION** **SYSTEM REQUIRES ALL COVERS**  
Operate this unit only when all board covers and frame panels are securely in place.  
The covers are required for safe operation, good system performance and cooling purposes.

 **NOTICE** Lockout/Tagout Requirements (For USA only)  
Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the Power Cable on the system.



### 4-3-1 Power On / Boot Up

**NOTE:** After turning off a system, wait at least ten seconds before turning it on again.  
The system may not be able to boot if power is recycled too quickly.

#### 4-3-1-1 Scanner Power On

- 1.) Connect the Power cable to the back of the system.
- 2.) Screw on the pull-out protection of the mains power cable with the 2 screws.
- 3.) Connect the Power cable to an appropriate mains power outlet.
- 4.) Switch ON the Circuit Breaker at the rear of the system.

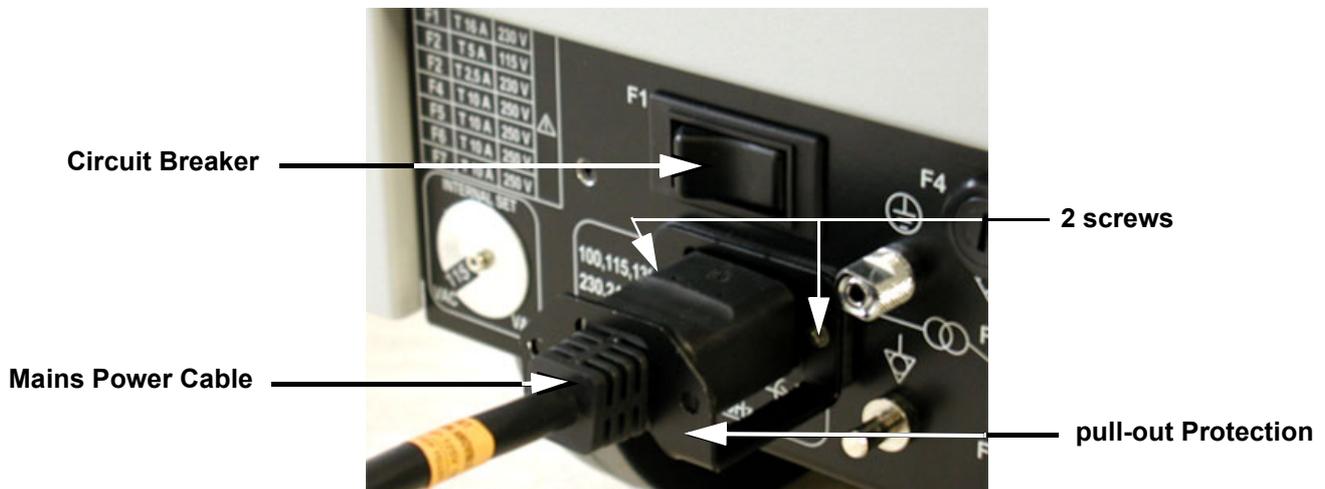


Figure 4-1 Circuit Breaker, Protection and Power Cable on back of Voluson® 730Expert

 **NOTICE** When AC power is applied to the scanner, the **ON/OFF** switch on the Control panel illuminates amber, indicating the System (including the Back-end Processor) is in standby mode.

#### 4-3-1-1 Scanner Power On (cont'd)

- 5.) Press the **ON/OFF** Standby switch left below the Control Panel.

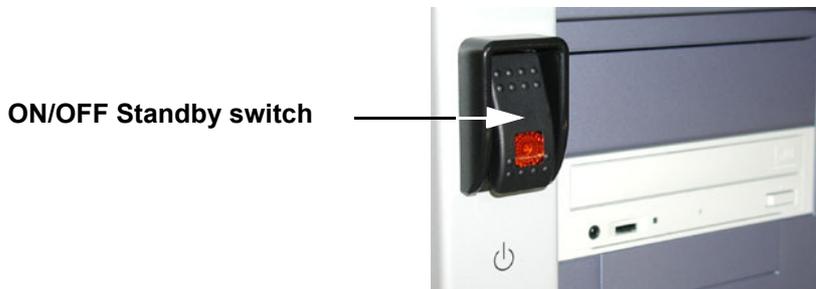


Figure 4-2 ON/OFF Standby Switch

**NOTE:** *The mains outlet of the system for peripheral auxiliary equipment are commonly switched with the Standby switch. So the auxiliary equipment need not to be switched ON/OFF separately.*

When the **ON/OFF** Stand-By switch left below the Control Panel is pressed, the System (including the Back-end Processor) starts and the software code is distributed to initiate the scanner.

As soon as the software has been loaded, the system enters 2D-Mode with the probe and application that were used before the system was shut down. Depending on the BIOS-Version no status messages are displayed during this process. Boot up time is about 2 minutes.

#### 4-3-2 Power Off / Shutdown

 **NOTICE** After turning off a system, wait at least 10 seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

##### 4-3-2-1 Scanner Shutdown

- 1.) Press the **ON/OFF** Standby switch left below the Control Panel.
- 2.) Switch OFF the Circuit Breaker at the rear of the system.

**NOTE:** *The mains outlet of the system for peripheral auxiliary equipment are commonly switched with the Standby switch. So the auxiliary equipment need not to be switched ON/OFF separately.*

 **WARNING** ***Disconnection of the Main Power Cable is necessary!***  
***For Example: When repairing the system.***

- 3.) After complete power down, unscrew the 2 screws and remove the pull-out protection to disconnect the main power cable from the system or unplug it from the AC wall outlet socket. Refer to [Figure 4-1 on page 4-2](#).
- 4.) Press once on the brakes to block the front wheels (brakes on front wheels under the foot rest).
- 5.) Disconnect probes. (Turn the probe locking handle counterclockwise and then pull the connector straight out of the probe port.)

 **CAUTION** **DO NOT** disconnect a probe while running (Live Scan "Write" mode)!  
**A software error may occur. In this case switch the unit OFF (perform a reset).**

## 4-3-3 System Features

### 4-3-3-1 Control Panel

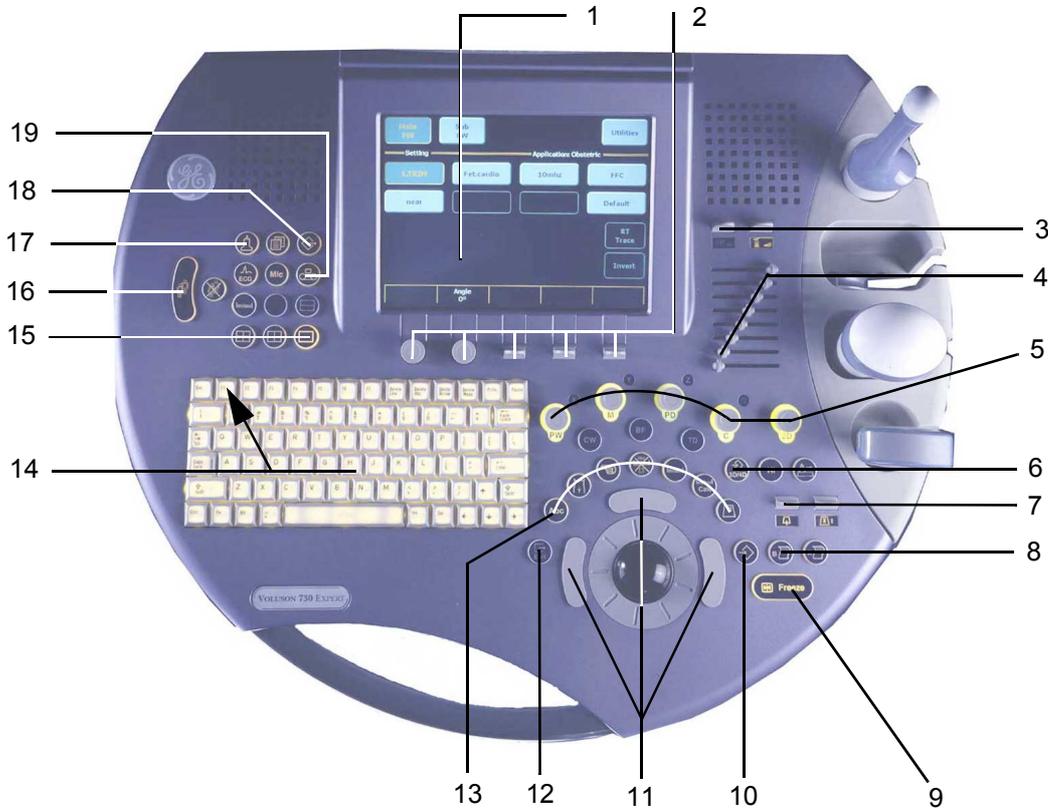


Figure 4-3 Control Panel Tour

- 1.) Touch Panel screen
- 2.) Touch Panel digipot and toggle switch controls
- 3.) Power-, Audio Volume- toggle switch controls
- 4.) TGC - Slider Controls
- 5.) Mode/Gain keys
- 6.) 3D/4D Volume Mode key
- 7.) Depth-, Focus- toggle switch controls
- 8.) Print A-, Print B-Trigger key
- 9.) Freeze / Run key
- 10.) Inter memory key to save to Sonoview or send to DICOM server
- 11.) Trackball and Trackball keys
- 12.) Exit key
- 13.) Annotation and Measurement keys
- 14.) Keyboard and F1 key to invoke the Electronic User Manual (EUM)
- 15.) Screen Format keys
- 16.) Patient Data Entry key
- 17.) Probe key
- 18.) Sonoview (Image Management) key
- 19.) VCR Remote Control key

4-3-3-2 Touch Panel

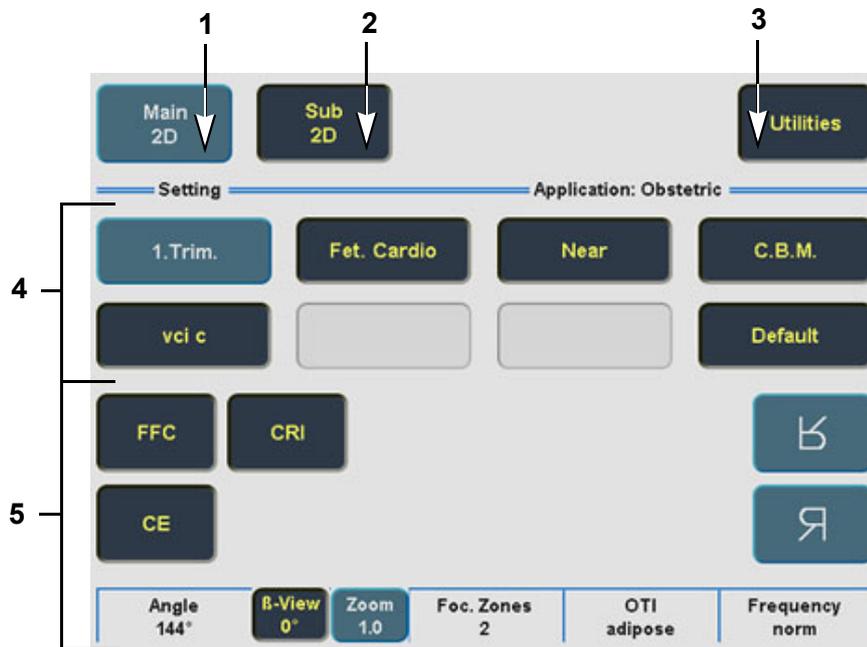


Figure 4-4 Touch Panel - Main Menu

- 1.) Main menu key: to change from one Sub menu to another.
- 2.) Sub menu key: to adjust settings of the selected Scan mode.
- 3.) Utilities key: activates the configuration system. The UTILITIES key is available in each Main menu.
- 4.) Setting window: shows all settings for the active application. The active one is highlighted.
- 5.) Additional functions which are supported by the selected Mode.

**NOTE:** *Different menus are displayed depending on which Touch Panel menu is selected.*

At the bottom of the Touch Panel, there are combination rotary dials/push buttons and flip switch controls. The functionality of these controls changes, depending upon the currently displayed menu. Press the button to switch between controls (as with  $\beta$ -View/Zoom), or rotate the dial to adjust the value.

4-3-3-3 Monitor Display

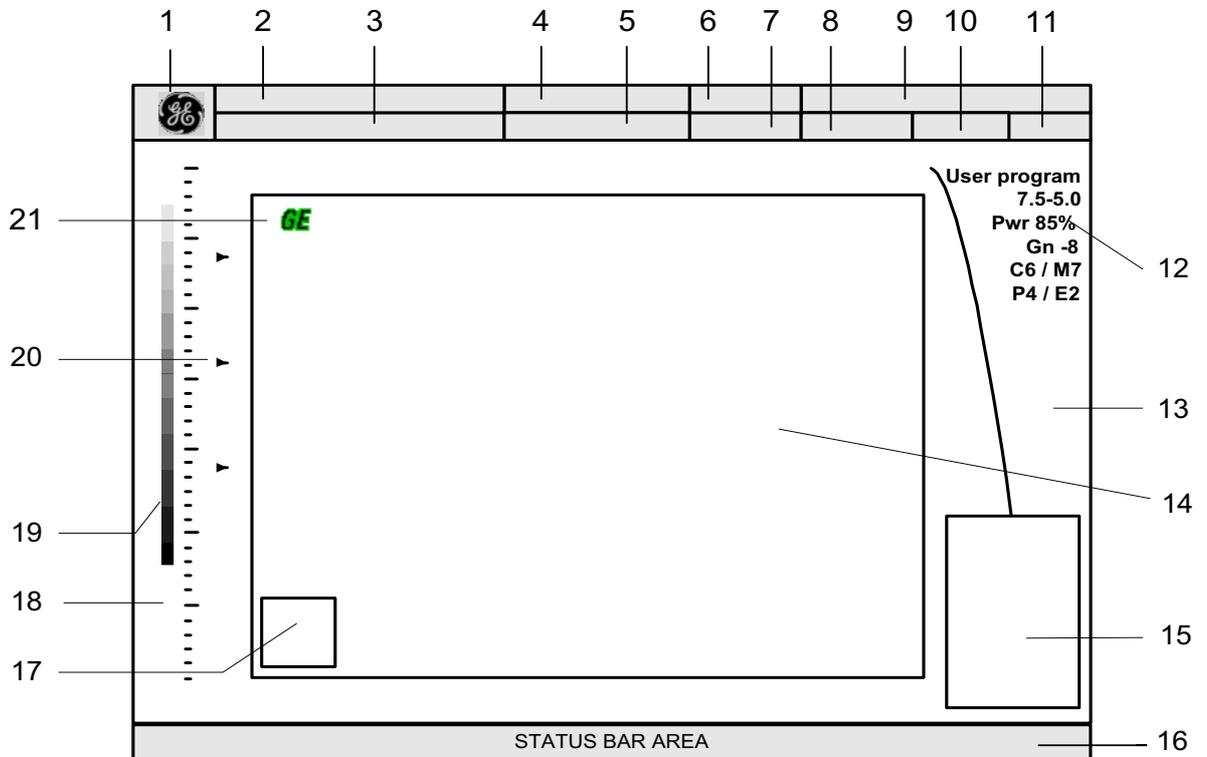


Figure 4-5 Monitor Display Tour

Table 4-2 Monitor Display Features

1. Logo	12. Image Info
2. Patient Name (Last-, First-, Middle Name)	13. TGC curve
3. Patient ID-number ; GA (Gestational Age)	14. Image area
4. Probe / Application	15. Measurement results
5. Depth / Frame rate	16. Status bar area
6. Mechanical Index	17. Body marker
7. Thermal Index	18. Depth scale marker
8. Sonographers Name	19. Gray scale wedge
9. Hospital Name (Identification)	20. Focal zone marker(s)
10. Date	21. Orientation marker
11. Time	

## Section 4-4 Functional Checks

For a basic functional check of the system's different modes, following pages will familiarize you with image optimization for:

- 2D Mode (B Mode), see: [Section 4-4-1 on page 4-8](#)
- Additional (optional) Operating Modes, see: [Section 4-4-2 on page 4-10](#)
  - B-Flow
  - XTD-View
- M Mode, see: [Section 4-4-3 on page 4-11](#)
- Spectral Doppler Modes, see: [Section 4-4-4 on page 4-12](#)
  - PW - Pulsed Wave Doppler
  - CW - Continuous Wave Doppler
- Color Doppler Modes, see: [Section 4-4-5 on page 4-13](#)
  - CFM - Color Flow Mode
  - PD - Power Doppler
  - TD - Tissue Doppler
- Volume Modes, see: [Section 4-4-6 on page 4-15](#)
  - 3D Static
  - 4D Real Time
  - 4D Biopsy
  - VCI - Volume Contrast Imaging (A-Plane, C-Plane)
  - DiagnoSTIC - Fetal Cardio
  - VOCAL

**NOTE:** *Some software may be considered standard depending upon system configuration. If any Modes or Options are not part of the system configuration, the check can be omitted.*

**NOTE:** *Different menus are displayed depending on which Touch Panel Menu and which Mode is selected. Some function keys only appear on the Touch Panel if they are available for the selected probe.*

4-4-1 2D Mode Checks

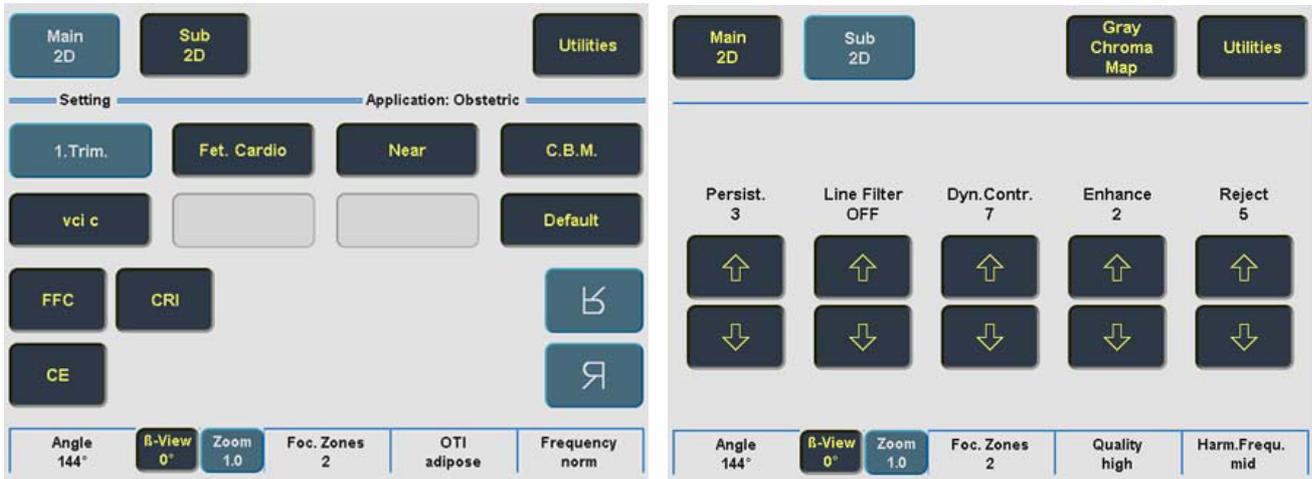


Figure 4-6 2D Main and 2D Sub Menu

Table 4-3 2D Mode Functions

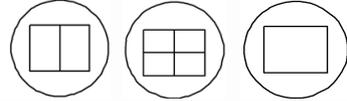
Step	Task	Expected Results
1	2D Mode Gain	Rotate the <b>2D MODE</b> key to adjust the sensitivity (brightness) of the entire image.
2	Transmit Power 	Optimizes image quality and allows user to reduce beam intensity.
3	Focus Depth 	To select the depth position of the actual focus zone(s). Arrows at the left edge of the 2D-Image mark the active focal zone(s) by their depth position.
4	Depth 	Adjusts the depth range of the ultrasound image for the region of interest. The number of image lines and the frame rate are automatically optimized.
5	Screen Format (Dual, Quad) 	Press this keys to change the display Mode from Single to <b>DUAL</b> or <b>QUAD</b> display mode. Press the <b>SINGLE</b> format key or the <b>2D MODE</b> key to change from Dual or Quad to Single display.
6	<b>FFC</b> (Focus and Frequency Composite)	FFC combines a low frequency to increase the penetration and higher frequency to keep a high resolution. It reduces speckle and artifacts in the 2D image.
7	<b>CRI</b> (Compound Resolution Imaging)	Pulses are transmitted not only perpendicularly to the acoustic window, but also in oblique directions. The advantages of CRI are enhanced contrast resolution with better tissue differentiation and clear organ borders.
8	<b>CE</b> (Coded Excitation)	Coded Excitation improves image resolution and penetration in the far field. This allows to use a higher frequency on technically difficult patients.

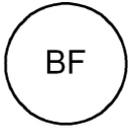
Table 4-3 2D Mode Functions

Step	Task	Expected Results
9	<u>LINEAR / TRAPEZ</u>	Advantage of the Trapezoid Mode: The scan area is very increased in relation to the linear display by steering the ultrasound lines in the border of the probe.
10	Image Orientation	Use the <u>LEFT/RIGHT</u> respectively the <u>UP/DOWN</u> keys on the Touch Panel to alternate the image orientation.
11	<u>ANGLE</u>	Use this control to select a part of interest of the 2D image. The advantage of the decreased field-of-view is an increased 2D frame rate due to the smaller sector width.
12	<u>B-VIEW</u>	This function allows the adjustment of the Volume O-Axis position of 3D probes in 2D Mode. The green line in the displayed symbol indicates the position of the acoustic block.
13	<u>ZOOM</u>	Image magnification (Pan Zoom) in read-/ and write mode.
14	<u>FOC. ZONES</u>	Increases the number of transmit focal zone, so that you can tighten up the beam for a specific area.
15	<u>OTI</u> (Optimized Tissue Imaging)	OTI™ allows to “fine tune” the system for scanning different kinds of tissue.
16	<u>FREQUENCY</u>	To adjust the range of the receive frequency. high resolution / lower penetration, mid resolution / mid penetration, or lower resolution / high penetration
17	<u>GRAY CHROMA MAP</u>	A gray map determines the displayed Brightness of an echo in relationship to its amplitude.
18	<u>PERSIST.</u>	Persistence is a temporal filter that averages frames together. This has the effect of presenting a smoother, softer image. This function is only available if <u>CRI</u> is switched off.
19	<u>CRI FILTER</u>	If this filter is set to “high”, the CRI-image is smoothed. CRI Filter setting “off” leads to a sharper impression of the CRI-image. This function is only available if <u>CRI</u> is switched on.
20	<u>LINE FILTER</u>	The signals of the neighboring pulses are less weighted for the display of the actual pulse which considerably improves the detail lateral resolution and signal-to-noise ratio. This function is only available if <u>CRI</u> is switched off.
21	<u>DYN.CONTR.</u>	Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.
22	<u>ENHANCE</u>	Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M Mode’s edge enhancement affects the M Mode only.
23	<u>REJECT</u>	Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).
24	<u>QUALITY</u>	Control to improve the resolution by reducing the frame rate. Respectively reducing the resolution by increasing the image frame rate.

For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 5, 2D Mode.

## 4-4-2 Additional (optional) Operating Modes

### 4-4-2-1 B-Flow Check



B-Flow On/Off switch

Press the **BF** key to activate/deactivate the B-Flow mode.

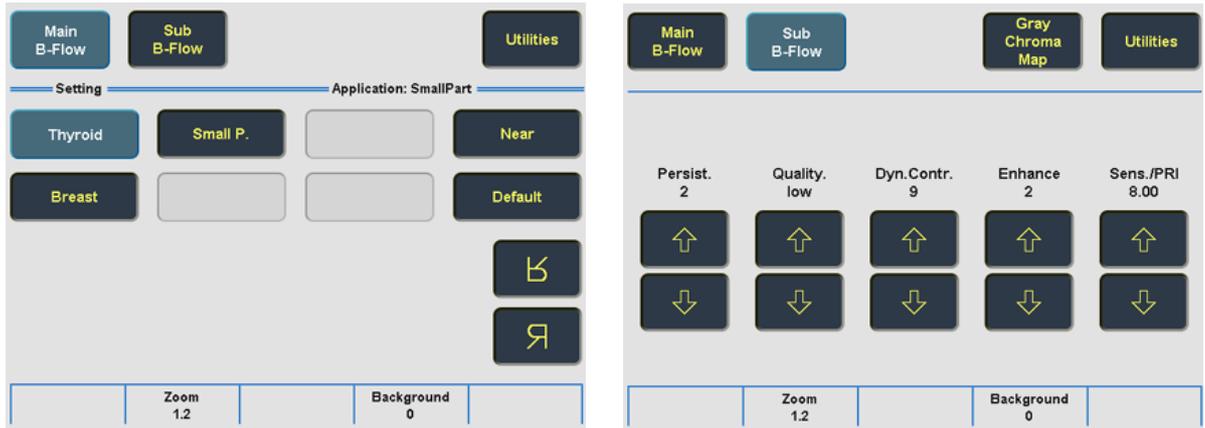


Figure 4-7 B-Flow Main and B-Flow Sub Menu

For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 5.5.

### 4-4-2-2 XTD-View Check



XTD-View On/Off switch

Press the **XTD** key to activate/deactivate the XTD-View mode.

A blue box is displayed at the border of the 2D image.

Start and Stop the XTD-image acquisition with the right trackball key.

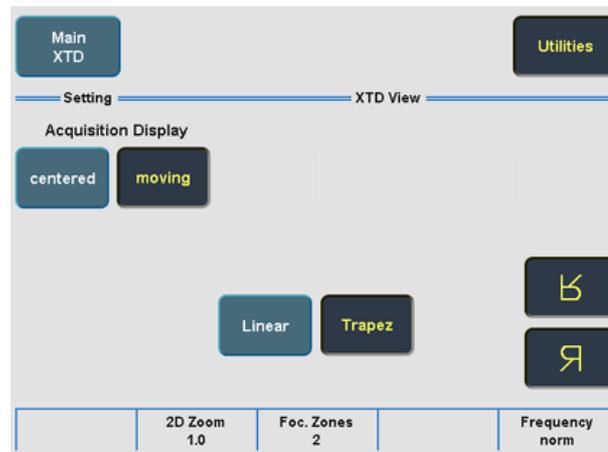


Figure 4-8 XTD-View Main Menu

For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 5.6.

### 4-4-3 M Mode Checks

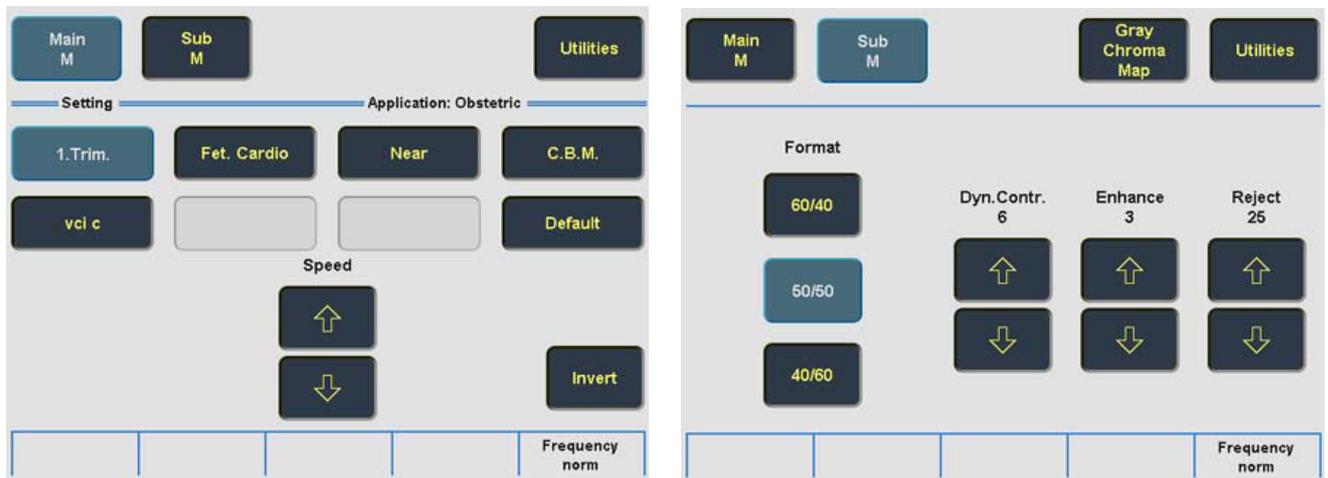


Figure 4-9 M Main and M Sub Menu

Table 4-4 M Mode Functions

Step	Task	Expected Results
1	Cursor Position	Adjust the M Cursor position with the <b>TRACKBALL</b> in the 2D Single image.
2	Activation of M Mode	Press the <b>right or left trackball key</b> to activate both Modes (2D/M).
3	M Mode Gain	Rotate the <b>M MODE</b> key to adjust the sensitivity (brightness) of the entire M image.
4	M Mode Depth	Common with 2D Mode <b>Depth</b> .
5	<b>SPEED</b>	By touching up or down, four different sweep speeds can be selected.
6	<b>INVERT</b>	Invert of the M Mode image. (Function is only available with endovaginal probes.)
7	<b>FREQUENCY</b>	Common with 2D Mode <b>Frequency</b> .
8	<b>FORMAT</b>	For selection of three different ratios of display format.
9	<b>DYN.CONTR.</b>	Dynamic Range enhances a part of the grayscale to make it easier to display pathology.
10	<b>ENHANCE</b>	Due to this function a finer, sharper impression of the image is produced.
11	<b>REJECT</b>	It determines the amplitude-level below which echoes are suppressed (rejected).

For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 6, M Mode.

### 4-4-4 Spectral Doppler Mode Checks

NOTE: Different menus are displayed depending on which Spectral Doppler Mode (PW or CW) is selected.

NOTE: The Continuous Wave Doppler Mode is an Option. The **CW** key is only illuminated if the option is installed and the selected probe is capable for the Continuous Wave Doppler Mode.

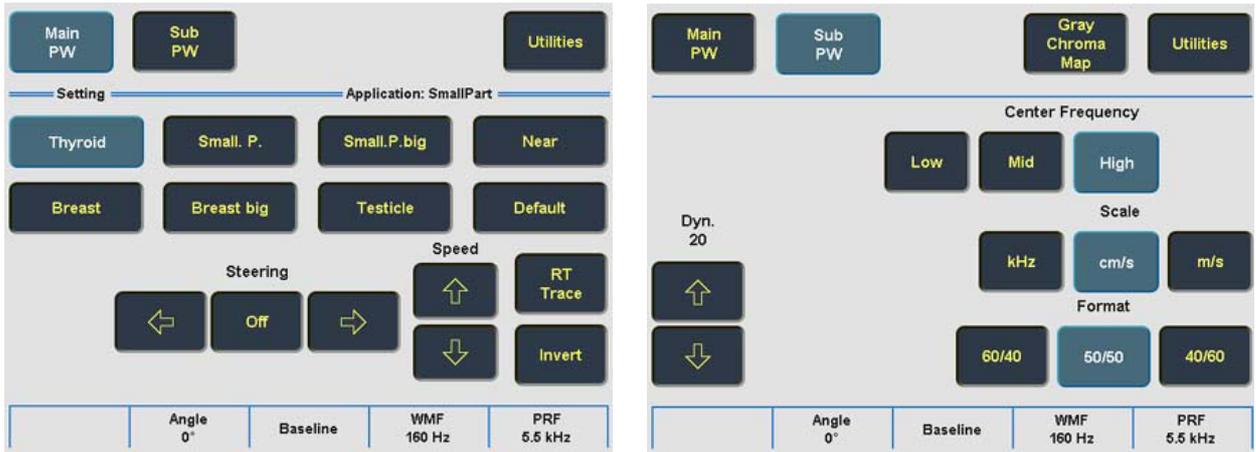


Figure 4-10 PW Main and PW Sub Menu

Table 4-5 Spectral Doppler Mode (PW, CW) Functions

Step	Task	Expected Results
1	Gate Position and Gate Size	Adjust the Gate- Position resp. Size with the <b>TRACKBALL</b> in the 2DSingle image. The <b>upper trackball key</b> changes from Gate position to Gate size.
2	Activation of Doppler Mode	Press the <b>right trackball key</b> to activate the motion display. Press the <b>left trackball key</b> to activate both Modes (B/D).
3	Doppler Gain	Rotate the <b>PW MODE</b> key to adjust the amplification of the entire spectrum.
4	<b>STEERING</b>	The steering function is only available with linear probes.
5	<b>SPEED</b>	By touching up or down, four different sweep speeds can be selected.
6	<b>RT TRACE</b> (Real Time Auto-Trace)	The envelope curve of the Doppler spectrum (maximum velocities) and the corresponding evaluations are automatically displayed on the monitor.
7	<b>INVERT</b>	To invert the Doppler spectrum display in relation to the direction of the flow.
8	<b>ANGLE</b>	The angle cursor can be turned in both directions without stop. By pressing the angle knob repeatedly the angle correction switches from +60° to 0° and to -60°.
9	<b>BASELINE</b>	Adjusting the baseline is possible in read- and write Mode (up/down in 8 steps).
10	<b>WMF</b> (Wall Motion Filter)	Used to eliminate Doppler “noise” that is caused by vessel wall motion.
11	<b>PRF</b>	The Velocity Range display is governed by the pulse repetition frequency (PRF) Exceeding the maximum PRF, the HPRF-Mode is automatically switched on.
12	<b>DYN.</b>	Dynamic Range adjusts the display cutoff of the Doppler analysis waveform.
13	<b>REJECT</b>	Low echo information below the adjusted reject level will not be displayed.
14	<b>CENTER FREQUENCY</b>	It serves for selection of the required transmit frequency.

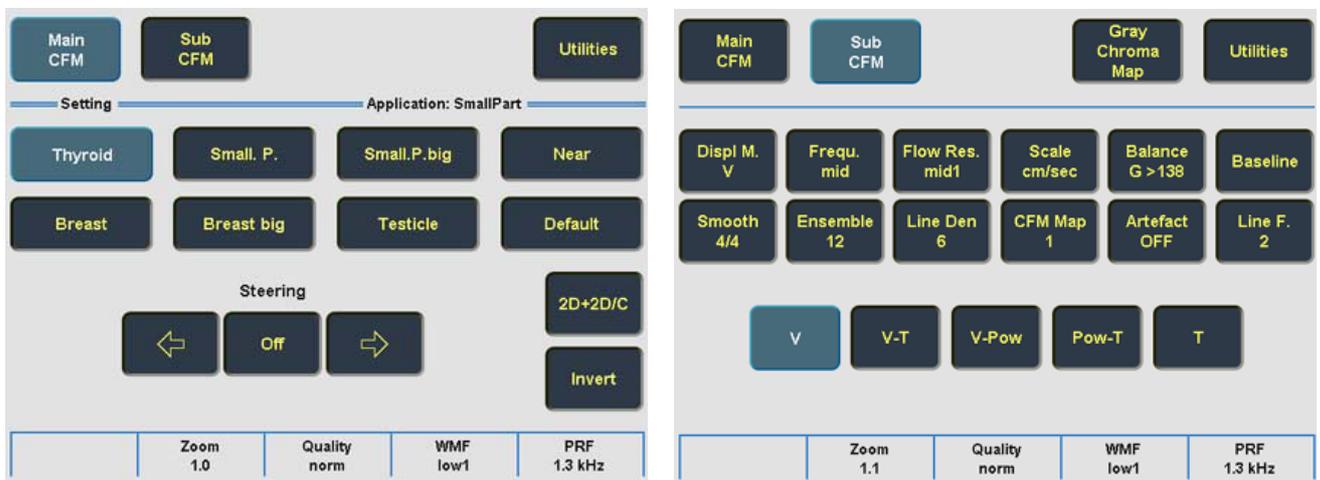
**Table 4-5 Spectral Doppler Mode (PW, CW) Functions**

Step	Task	Expected Results
15	<u>SCALE</u>	To select the displayed measuring unit (in relation to the zero-line).
16	<u>FORMAT</u>	For selection of either one of three formats.

For further details see: Voluson® 730Expert Basic User Manual, Chapter 7, Spectral Doppler Mode.

#### 4-4-5 Color Doppler Mode Checks

*NOTE: Different menus are displayed depending on which Color Doppler Mode (CFM, PD or TD) is selected.*



**Figure 4-11 CFM Main and CFM Sub Menu**

**Table 4-6 Color Doppler Mode (CFM, PD, TD) Functions**

Step	Task	Expected Results
1	Color Box Position and Color Box Size	Adjust the Box- Position resp. Size with the <u>TRACKBALL</u> in the 2DSingle image. The <u>upper trackball key</u> changes from Box position to Box size.
2	CFM Gain PD Gain TD Gain	Rotate the <u>C MODE</u> key to ensure that continuous flow is displayed, where appropriate. Rotate the <u>PD MODE</u> key to adjust the Power Doppler Gain. Rotate the <u>C MODE</u> key to adjust the Tissue Doppler Gain.
3	<u>STEERING</u>	Beam Steering is only possible with linear probes in CFM and PD Mode.
4	<u>2D+2D/C</u> (PD or TD)	Changes the Single image display to two simultaneous half images. The left frame shows only the 2D Mode image. The right frame shows the 2D Mode image with color information.
5	<u>INVERT</u>	The color of the color wedge inverts around the baseline. (impossible in PD Mode)
6	<u>ZOOM</u>	Image magnification (PAN-Zoom) in read- and write mode.
7	<u>QUALITY</u>	Improves the Color Resolution by reducing the image frame rate, respectively vice versa.

**Table 4-6 Color Doppler Mode (CFM, PD, TD) Functions**

Step	Task	Expected Results
8	<u>WMF</u> (Wall Motion Filter)	Used to eliminate Doppler "noise" that is caused by vessel wall or cardiac wall motion. (CFM,PD)
9	<u>PRF</u>	By touching toward up the PRF increases. By touching toward the PRF decreases.
10	<u>THRESHOLD</u>	After <u>FREEZE</u> you can adjust the Color Threshold. It eliminates small color noise or motion artifact signals in the color image. (small number cuts off less signals than a higher setting)
11	<u>DISPL. M</u>	To select the CFM- Display Mode (V; V-T; V-Pow; Pow-T; or T).
12	<u>SMOOTH</u>	To select different filter periods for rising velocity and falling velocity. <u>RISE</u> Filtering of the rise velocity leads to noise suppression. <u>FALL</u> This filter leads for "prolongation" of the display flow.
13	<u>FREQU.</u>	It serves for selection of the Transmit Frequency which also depends on the Color Box position.
14	<u>ENSEMBLE</u>	Controls the number of pulses to constitute one Color- or Power-Doppler line in the display.
15	<u>FLOW RES.</u>	This function controls the axial resolution of color in the display. It adjusts the axial sample depth of color pixels.
16	<u>LINE DEN</u>	Determines the line density within the Color-Box. The lower the line density, the larger the line distance and the size of the color pixels.
17	<u>SCALE</u> (CFM, TD)	The maximum velocities are displayed above and under the color scale in kHz, cm/s or m/s.
18	<u>CFM-MAP</u> (PD, TD)	Provides selectability of the color coding for an optimization of the display of blood flow (similar to the post-processing curves with grayscale 2D scans). After a selection has been made, the color bar displays the resultant map.
19	<u>GENTLY COLOR</u>	Gently means the transition between color and gray scale information. The embedding of the color into 2D Mode is performed smoothly with less colored splashes. To activate the "Gently Color" function, touch the <u>CFM MAP</u> (PD, TD) key in the Submenu.
20	<u>BALANCE</u>	The Balance controls the amount of Color display over bright echoes and helps to confine color within the vessel walls.
21	<u>ARTEFACT</u> (on/off)	Switch on/off the artifact suppression.
22	<u>BASELINE</u>	The baseline shift can be used to prevent aliasing in one flow direction similar to the Doppler baseline shift. There are 8 steps in each direction. (impossible in PD Mode)
23	<u>LINE F.</u>	With "Line Filter" the signals of the neighboring pulses are less weighted for the display of the actual pulse which considerably improves the detail lateral resolution and signal-to-noise ratio.

For further details refer to the Voluson® 730Expert Basic User Manual:

- Chapter 8, CFM Mode (Color Flow Mode)
- Chapter 9, PD Mode (Power Doppler Mode)
- Chapter 10, TD Mode (Tissue Doppler Mode)

## 4-4-6 Volume Mode Checks



**NOTICE** Real Time 4D, RT\_4D\_Biopsy, DiagnoSTIC, VCI and VOCAL are Options.  
If these options are not part of the system configuration, the appendant checks can be omitted.

**NOTE:** Different menus are displayed depending on which Touch Panel menu and which Volume Mode is selected.

**NOTE:** Some function keys only appear on the Touch Panel if they are available for the selected Probe.

### 4-4-6-1 Pre-Volume Mode Functions

**3D/4D**

**3D/4D Mode** → **Static 3D Render**

1. Touch this key to select desired Acquisition- and Visualization Mode.

2. Select Acquisition Mode

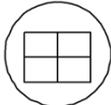
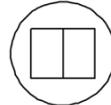
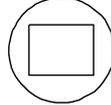
3. Select Visualization Mode

4. Select User Setting

5. Start the Volume Acquisition with the Freeze key resp. the right trackball key.

Figure 4-12 Pre-Volume Mode menus (e.g., Static 3D Render)

Table 4-7 Pre-Volume Mode Functions

Step	Task	Expected Results
1	<b>AQUISITION:</b>	
	• <u>3D STATIC</u>	3D Volume Mode - Static volume acquisition (also in combination with PD, HD-Flow or CFM)
	• <u>4D REAL TIME</u>	Real Time 4D - continuous volume acquisition and parallel calculation of 3D rendered images
	• <u>VCI A-PLANE</u>	Volume Contrast Imaging - improves the contrast resolution and the signal / noise ratio and therefore facilitates finding of diffuse lesions in organs
	• <u>VCI C-PLANE</u>	Volume Contrast Imaging (coronal plane) - improves the contrast resolution and the signal / noise ratio and therefore facilitates finding of diffuse lesions in organs
	• <u>DIAGNOSTIC</u>	The fetal heart or an artery can be visualized in 4D (also in combination with PD, HD-Flow or CFM)
	• <u>4D BIOPSY</u>	Real Time 4D Biopsy - continuous volume acquisition + parallel calculation of 3D rendered images
2	<b>VISUALIZATION:</b>	
	• <u>VOCAL</u>	The basic idea behind VOCAL II is the combination of 3D ultrasound tissue (presented as voxels) and the geometric information of surfaces in a 3D dataset. After definition of contour in 3D space a wide range of functionality is given.
	• <u>NICHE</u>	Parts of the orthogonal sections A, B and C are compiled to a 3D-section aspect. The name "Niche" has been chosen because the aspect shows a quasi spatial cut into the reference image.
	• <u>RENDER</u>	After the 3D acquisition the system switches automatically to the read menu. The selected format will be present on the monitor (e.g., 3D ROI Mode: sectional planes A, B, C + rendered 3D image).
	• <u>SECTIONAL PL.</u>	After the 3D Sectional Planes acquisition the system switches automatically to the read menu. The selected format will be present on the monitor (e.g., A,B,C - Sectional Plane mode).
3		- Quarter size display of Sectional Planes without 3D image <b>or</b> - Quarter size display of Sectional Planes + rendered 3D image ( <u>Note:</u> The display depends on selected Acquisition- and Visualization Mode!)
4		Dual size display of Sectional Planes + rendered 3D image. ( <u>Note:</u> The display depends on selected Acquisition- and Visualization Mode! This format is not possible for Static 3D Acquisition)
5		- Full size display of a the reference image <b>or</b> - Full size display of the rendered 3D image. ( <u>Note:</u> The display depends on selected Acquisition- and Visualization Mode!)
6	Volume Box Position and Volume Box Size	Adjust the Volume Box (ROI) Position resp. Size with the <u>TRACKBALL</u> in the 2D Single image. The <u>upper trackball key</u> to change the Trackball function from Box Position to Box Size.
7	<u>QUALITY</u>	Changes the line density against the acquisition speed (low, mid1, mid2, high1, high2).
8	<u>VOL. ANGLE</u>	To select the Volume Sweep Angle.
9	Start Acquisition	Press the <u>FREEZE</u> key resp. the <u>right trackball key</u> to start the Volume acquisition.

4-4-6-2 Functions after the 3D Acquisition

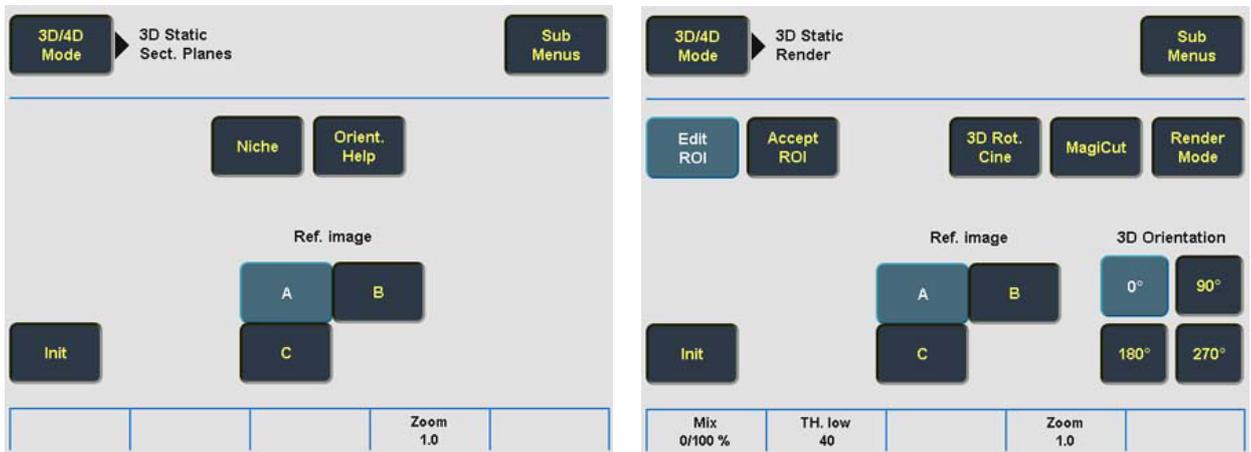
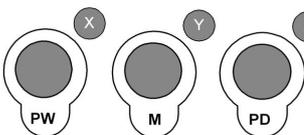
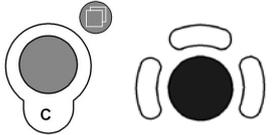


Figure 4-13 3D Static - Sectional Planes and Image Rendering

Table 4-8 Functions after the 3D Acquisition

Step	Task	Expected Results
1		<u>PW MODE</u> rotary control: Rotation about X-axis of the reference image. <u>M MODE</u> rotary control: Rotation about the Y-axis of the reference image. <u>PD MODE</u> rotary control: Rotation about the Z-axis of the reference image.
2		<u>C MODE</u> rotary control: Movement along Z-axis of the reference image. <u>TRACKBALL</u> : Movement along X- and Y-axis of the reference image.
3	<u>NICHE</u>	Parts of the orthogonal sections A, B and C are complied to a 3D section aspect. The aspect shows quasi a spatial cut into the reference image.
4	<u>ORIENT. HELP</u>	Display of orientation help image figure.
5	<u>REF. IMAGE SELECT</u>	To select the Reference image among A, B or C.
6	<u>INIT</u>	Resets the rotations and translations of a volume section to the initial (start) position.
7	<u>3D ORIENTATION</u>	To change the image orientation of the 3D image.
8	<u>ZOOM</u>	The 3D image as well as the sectional planes can be varied by their aspect ratio.
9	<u>MIX</u>	To adjust the mix ratio between two calculated modes.
10	<u>TH. LOW</u>	All color values below the level will be disregarded for calculation of the surface.
11	<u>MAGI CUT</u>	Ability to electronically manipulate the images and cut way "3D artifacts".
12	<u>RENDER MODE</u>	To select the Render Mode (Image Type and Render Algorithm)

4-4-6-3 Sub Menus

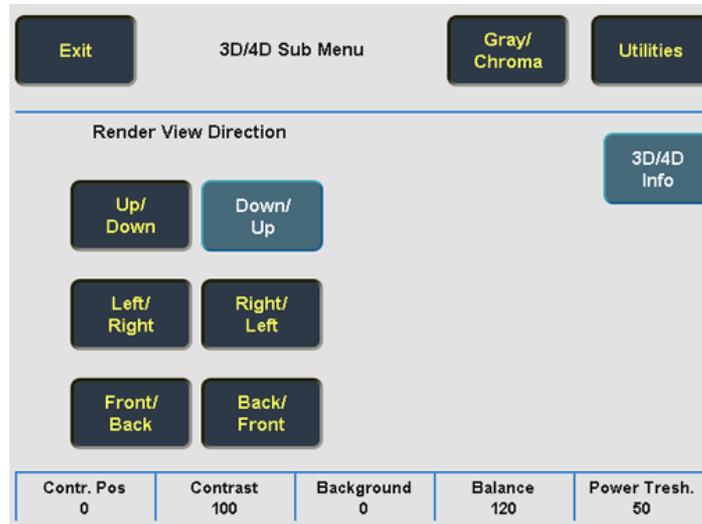


Figure 4-14 3D/4D Sub Menu

Table 4-9 Sub Menus

Step	Task	Expected Results
1	<u>RENDER VIEW DIRECTION</u>	To select the desired Render View Direction. The green line symbolizes the direction of the view. <b>Note:</b> The Render View Direction keys are not available in Static 3D Sectional Planes.
2	<u>GRAY CHROMA MAP</u>	Depending on individual requirements a “harder” or “softer” image can be obtained.
3	<u>CONTR. POS</u>	To set the start point of the gamma curve bending. (Graphic display on screen) <b>Note:</b> This key is not available in Static 3D Sectional Planes mode.
4	<u>CONTRAST</u>	To set the contrast of the bending. (Graphic display on screen) <b>Note:</b> This key is not available in Static 3D Sectional Planes mode.
5	<u>BACKGROUND</u>	Adjusts the contrast of the screen background from dark to bright. <b>Note:</b> This key is not available in Static 3D Sectional Planes mode.
6	<u>BALANCE</u>	Only available if a 3D+CFM or a 3D+PD image is acquired. <b>Note:</b> This key is only available if a 3D+CFM or a 3D+PD image is acquired.
7	<u>POWER TRESH.</u>	Only available if a 3D+CFM or a 3D+PD image is acquired. <b>Note:</b> This key is only available if a 3D+CFM or a 3D+PD image is acquired.
8	<u>3D/4D INFO</u>	On/Off switch to show full or reduced Image Info parameter on screen.

For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 11.

## 4-4-7 Using Cine

### 4-4-7-1 Activating Cine

Press **FREEZE**, then roll the **TRACKBALL** to display the images of the stored sequence one by one.

### 4-4-7-2 Cine-Split Function (Multiple Format)

After **FREEZE** of a sequence in 2D Mode two or four different images of the sequence can be displayed simultaneously in Dual respectively Quad Display Mode.

Move the **TRACKBALL** to display the images of the stored sequence. Use the **FORMAT** keys to change to the next (part of) frozen 2D image sequence to play back the cine memory.

*NOTE:* The Cine-Split function (multiple format) is also possible in 2D Auto Cine mode.

### 4-4-7-3 Activating 2D Auto Cine

- 1.) After Freeze touch the **2D CINE** key on the Touch Panel.
  - 2.) Select the **START IMAGE** of the sequence. The selected image is simultaneously displayed.
  - 3.) Turn the **END IMAGE** digipot to the end of the sequence. The selected image is displayed.
  - 4.) Select the review **SPEED** and the read **ZOOM** factor.
  - 5.) Select the Cine Mode review direction.
  - 6.) To start/stop the Cine Loop playback touch **2D CINE START/STOP**.
- After stopping the sequence, move the **TRACKBALL** to display the images one by one.

### 4-4-7-4 Spectral Doppler- or M Cine Loop

Press **FREEZE**, then roll the **TRACKBALL** to display the Cine / Loop one by one.

The **UPPER TRACKBALL KEY** changes from the 2D Cine to the D Loop (respectively M Loop).

*NOTE:* The active Cine is displayed on the monitor screen: **2D/D(M)-image** or **2D/D(M)-image**.

### 4-4-7-5 Activating 3D Rotation Cine

- 1.) After 3D Volume acquisition touch the **3D ROT. CINE** key on the Touch Panel.
- 2.) Select the Rotation angle with the touch keys or select it manually with the **START IMAGE** and **END IMAGE** rotary controls.
- 3.) Select the Step angle and the Rotation axis.
- 4.) Touch the **CALCULATE CINE SEQUENCE** key to start the calculation.
- 5.) To start/stop the 3D Rotation Cine sequence touch **START/STOP**.

### 4-4-7-6 Activating Volume Cine

- 1.) After Real Time 4D acquisition move the **TRACKBALL** horizontally to display the Volumes of the stored sequence one by one. (Alternative use the **VOL CINE #** control to select the desired volume.) For further details refer to the Voluson® 730Expert Basic User Manual, Chapter 11.6.

### 4-4-7-7 Activating Auto Cine

- 1.) After Real Time 4D acquisition touch the **AUTO CINE** key on the Touch Panel.
- 2.) Select the **START VOLUME** and the **END VOLUME** of the sequence with the rotary controls.
- 3.) Select the Cine Mode direction and the review **SPEED**.
- 4.) To start/stop the Cine sequence touch the **START/STOP** key.

*NOTE:* After stopping a sequence, move the **TRACKBALL** to display the images / volumes one by one.

## 4-4-8 Basic Measurements

**NOTE:** *Different menus are displayed depending on which Mode is selected.*



### General remarks to perform Basic Measurements:

- By pressing the **CALIPER** key on the control panel the Basic Measurement function is switched on.
- Positioning of measurement marks is done with the **TRACKBALL**.
- Entering and storage of measuring marks is done with **SET** (right or left trackball key).
- To change measuring marks before completion press **CHANGE** (upper trackball key).
- The status bar area shows the current function of the trackball.
- To erase measurement results, touch the **DELETE** key on the Touch Panel, press the **CLEAR ALL** key on the control panel or the **DELETE MEAS.** key on the keyboard.
- To exit from Basic measurements touch the **EXIT** key on the Touch Panel, press the **CALIPER** key or the **EXIT** key on the control panel.

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

### 4-4-8-1 Distance and Tissue Depth Measurements (2D and M Mode)

- 1.) Press the **CALIPER** key once.
- 2.) Touch the appropriate item on the Touch Panel. An active cursor appears.
- 3.) To position the active cursor at the start point (distance) or the most anterior point (tissue depth), move the **TRACKBALL**.
- 4.) To fix the start point, press **SET** (the right or left trackball key). The system fixes the first cursor and displays a second active caliper.
- 5.) To position the second active caliper at the end point (distance) or the most posterior point (tissue depth), move the **TRACKBALL**.
- 6.) To complete the measurement, press **SET**. The system displays the distance or tissue depth value in the measurement results window.

Before you complete a measurement:

To toggle between active calipers, press **CHANGE** (upper trackball key).

To erase results, touch the **DELETE** key on the Touch Panel, press the **CLEAR ALL** key on the control panel or the **DELETE MEAS.** key on the keyboard.

**NOTE:** *The **CHANGE** key alternates the control from one cursor to the other.*

**NOTE:** *To exit Basic measurements, touch the **EXIT** key on the Touch Panel, press the **CALIPER** key or the **EXIT** key on the control panel.*

## 4-4-8 Basic Measurements (cont'd)

### 4-4-8-2 Circumference/Area (using Ellipse or Trace) Measurements

- 1.) Press the **CALIPER** key once.
- 2.) Touch the corresponding item on the Touch Panel. An active cursor displays.
- 3.) To position the active cursor, move the **TRACKBALL**.
- 4.) To fix the start point, press **SET** (the right or left trackball key). The system fixes the first cursor and displays a second active caliper.
- 5.) To position the second caliper, move the **TRACKBALL** and press **SET** (Rt. / Lt. trackball key).

**NOTE:** *If you have selected the **2D TRACE** item, the measurement is finished and the area and circumference results appear on the screen.*

- 6.) An ellipse appears the axis of which is defined by these two points. To adjust the width of the ellipse, move the **TRACKBALL**.
- 7.) To toggle between calipers, press **CHANGE** (upper trackball key).
- 8.) To complete the measurement, press **SET** (right or left trackball key). The system displays the circumference and area in the measurement results area.

Before you complete a measurement:

- To erase the ellipse resp. trace and the current data measured, touch **DELETE** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, touch **EXIT** on the Touch Panel, press the **CALIPER** key again or press **EXIT** on the control panel.

### 4-4-8-3 Volume Measurements

- 1.) Press the **CALIPER** key once.
- 2.) Select the appropriate item among **1 DIST.**; **1 ELLIP.**; **3.DIST.**; **1 DIST.+ELLIP.**
- 3.) Perform the measurement(s) using the **TRACKBALL** and **SET** (right or left trackball key). For further details: see 4-4-8-1 and 4-4-8-2.

#### 4-4-8-3-1 3D MultiPlane Measurements

**NOTE:** *This volume measurement is only possible in 3D Mode.*

- 1.) Select the reference image in which the measurement is to be performed (A, B or C).
- 2.) Press the **CALIPER** key once and select the **3D MULTIPLANE** item.
- 3.) Select the first section through the body by rotating the **REF.SLICE** digipot below the Touch Panel or by rotating the **C MODE** digipot. (first section should be set at the edge of the object)
- 4.) Position the start dot of the area which should be surrounded and store it with **SET**.
- 5.) Surround the area with the trackball, then press **SET** (right or left trackball key). The area is calculated and displayed. It may even be "zero". Press the **SET** key twice.
- 6.) Select the next parallel section with the **REF. SLICE** digipot or the **C MODE** digipot, and measure the area.
- 7.) Repeat 5. and 6. until the edge of the measured object is reached.

**NOTE:** *The contour of the measured area is not erased if a new section is adjusted. To call back the measured areas touch the **PREV.** respectively the **NEXT** key on the Touch Panel.*

**NOTE:** *To erase the results, touch the **INIT** key on the Touch Panel.*

## 4-4-8 Basic Measurements (cont'd)

### 4-4-8-4 Velocity Measurements (Spectral Doppler Mode)

**NOTE:** The Spectral Doppler image is displayed based on time (X-axis) and velocity (Y-axis).

#### 4-4-8-4-1 Acceleration Velocity and Velocity Ratio

- 1.) Press the **CALIPER** key once.
- 2.) Select the appropriate item among **D VELOCITY** or **D A/B**.
- 3.) Perform the measurement(s) using the **TRACKBALL** and **SET** (right or left trackball key).

#### 4-4-8-4-2 Average Velocity (Manual Trace)

- 1.) Press the **CALIPER** key once.
- 2.) Touch **D TRACE** on the Touch Panel. A cursor appears on the screen.
- 3.) Move the cursor with the **TRACKBALL** to the start point of the measurement and press **SET** (right or left trackball key) to fix the marker.
- 4.) Trace to the end of the period and press the **SET** key again to fix the mark.  
The measurement results appear on the screen.

Before you complete the measurement:

To readjust the traced line, press **UNDO** (upper trackball key) repeatedly.

**NOTE:** Depending on the setting in the Measure Setup, the envelope curve will be performed with a continuous trace line or by setting points.

#### 4-4-8-4-3 Average Velocity (Auto Trace)

- 1.) Press the **CALIPER** key once.
- 2.) Touch **D AUTO TRACE** on the Touch Panel.  
It traces the Spectral Doppler image automatically and displays the results.
- 3.) Select the **SENSITIVITY** of the envelope curve (to eliminate artifacts).
- 4.) Select the **TRACE MODE** channel of the envelope curve (upper, both, lower).
- 5.) If necessary, select the Angle and the Baseline.
- 6.) Press the right or left trackball key to **FINISH** the measurement.

Before you complete the measurement:

- To readjust the start cycle (vertical yellow line), press **CHANGE** (upper trackball key).  
Press **SET** (right or left trackball key) to fix the line.
- Press the **CHANGE** key again to readjust the end cycle (vertical green line).  
Press **SET** to fix the line.

**NOTE:** The determination of the envelope curve requires a clear and low-noise record of the Doppler spectrum. Otherwise the reliability of the displayed measurement results may not be ensured!

## 4-4-9 Calculations

**NOTE:** Confirm that the patient information is correct and the probe and application are selected properly.



### **General remarks to perform Calculations:**

- By pressing the **CALC** key on the control panel the Calculation function is switched on.
- Positioning of measurement marks is done with the **TRACKBALL**.
- Entering and storage of measuring marks is done with **SET** (right or left trackball key).
- To change measuring marks before completion press **CHANGE** (upper trackball key).
- Depending on the setting in the Measurement Setup, also the **FREEZE** key can be used for confirming the last measuring mark of the currently performed measurement.
- The status bar area shows the current function of the trackball.
- To cancel the measurement of the currently selected item, touch **CANCEL** on the Touch Panel.
- To delete the results of the last measured item, touch **UNDO LAST** on the Touch Panel.
- To delete all measurement results of the selected group from the monitor as well as from the corresponding report, touch the **CLEAR GROUP** key on the Touch Panel.
- All measurement results will be automatically included in the corresponding patient report. (Except Auto Trace measurements; therefore you have to press the right or left trackball key **STORE**.)
- To erase results, press the **DELETE MEAS.** key on the keyboard or press the **CLEAR ALL** key on the control panel.
- To exit from Calculations touch the **EXIT** key on the Touch Panel, press the **CALC** key or press the **EXIT** key on the control panel.

### **4-4-9-1 OB Calculations**

The most of items in the OB Calculations are the measurement of a distance. [see 4-4-8-1](#)

The items that calculate the circumference include HC, AC and FTA. [see 4-4-8-2](#)

In case of AFI you can measure the distances in several images.

The ways for fetal doppler measurements are the same as those of basic velocity measurements.

For details [see 4-4-8-4-2](#) and [4-4-8-4-3](#).

### **4-4-9-2 GYN Calculations**

The ways of the measurement in the GYN Calculations are the same as those of distance [see 4-4-8-1](#) and Spectral Doppler measurements [see 4-4-8-4-2](#) and [4-4-8-4-3](#).

For details, refer to the Voluson® 730Expert Basic User Manual, Chapter 14.5, GYN Calculations.

### **4-4-9-3 Cardiac Calculations**

This system allows measurements in 2D Mode, M Mode, Spectral Doppler Mode and Color Doppler Mode using different items of Cardiac Calculations.

For details, refer to the Voluson® 730Expert Basic User Manual, Chapter 14.7, Cardiac Calculations.

### **4-4-9-4 Vascular Calculations**

The way of Vascular Calculations such as Lt.ICA, Rt. ICA, Lt. CCA, Rt. CCA, Lt. ECA, Rt. ECA and Peripherals are the same.

For details, refer to the Voluson® 730Expert Basic User Manual, Chapter 14.9, Vascular Calculations.

### **4-4-9-5 Report Pages**



Press the Report key on the control panel to view a patient report that contains the results of Calculation Measurements. Any stored patient report can be edited, printed, transferred, saved to Sonoview or sent to DICOM server.

## 4-4-10 Probe/Connectors Usage

### 4-4-10-1 Connecting 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.) DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.
- 4.) Turn the connector locking handle counterclockwise.
- 5.) Align the connector with the probe port and carefully push into place.
- 6.) Turn the connector locking handle clockwise to secure the probe connector.
- 7.) Open the right-hand side door, lay the cable into the intended cable holders and close the door. So it is free to move, but not resting on the floor.

### 4-4-10-2 Activating the probe

- 1.) Press the **PROBE** key to activate the "Probe Select" menu.
- 2.) Select the appropriate probe by touching the corresponding key.
- 3.) Upon selection of an "Application", the programmed user presets appear.
- 4.) Touching a "Setting" key causes loading of the preset.

The probe activates in the 2D Mode, the Touch Panel shows the main menu and the ultrasound image appears on the monitor in write mode (real time display).

### 4-4-10-3 Deactivating the probe

When deactivating the probe, the probe is automatically placed in standby mode (read mode).

- 1.) Press the **FREEZE** key.
- 2.) Gently wipe the excess gel from the face of the probe. (Refer to the Basic User Manual of Voluson® 730Expert for complete cleaning instructions.)
- 3.) Carefully slide the probe around the right side of the keyboard, toward the probe holder. Ensure that the probe is placed gently in the probe holder.

### 4-4-10-4 Disconnecting the probe

Prior to disconnect a probe freeze the image. It is unnecessary to switch the unit off.

 **CAUTION** If a probe is disconnected while running (write mode) a software error may occur. In this case switch the unit OFF (perform a reset).

- 1.) Open the right-hand side door, remove the cable from the cable holder and close the door.
- 2.) Turn the probe locking handle counterclockwise. Pull the probe and connector straight out of the probe port.
- 3.) Carefully slide the probe and connector away from the probe port and around the right side of the keyboard. Ensure the cable is free.

## 4-4-11 Image Management (Sonoview)

For Sonoview - Image Management functionality refer to Chapter 15 in the Basic User Manual of Voluson® 730Expert. It talks about several topics:

- Clipboard
- Sending Exams
- Printing Exams / Images
- Export Exams / Images
- Backup Exams
- Restore the Backup Exams
- DICOM Print / Send
- Verifying and Pinging a Device
- Sending Images via e-mail
- Browsing and Managing an Exam's stored Image
- Connectivity, and Dataflow Concept and Creation
- Configuring Connectivity
- Services (Destinations)
- Input of comments and voice annotations
- Measure Distance and Ellipse
- Buttons
- Views
- DVD/CD+(R)W and MO Erasing/Formatting
- Changing Backup Folder on mapped Network Drive
- etc.

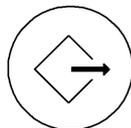


Figure 4-15 Sonoview

## 4-4-12 Using the optional MOD (Magneto-Optical Drive)

 **NOTICE** The MOD (Magneto-Optical Drive) is an Option.

The optional 3.5 inch Magneto-Optical disk drive supports the following medias:

1.3GB; 640MB; 540MB; 230MB and 128MB



Figure 4-16 Magneto-Optical Drive

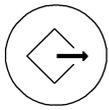
- 1.) Before installing an MO disk in the MOD, check the MO disk for loose hardware or damaged labels which could jam inside the MOD. Also, ensure that the slide switch in one corner of the disk is set so that the disk is write enabled (disk hole closed).
- 2.) Insert the disk into the MOD with the label facing up.

 **NOTICE** **Never move the unit with a disk in the MOD because the drive actuator will not be locked and the MOD could break.**

- 3.) There are different methods to eject a disk from the MOD. Manual ejection methods are listed below in preferred order from best (1) to worst (3).
  - a.) Press the **EJECT** switch on the MOD while system is ON.
  - b.) Press and hold the **EJECT** switch while the system is booting.
  - c.) Mechanical ejection. Insert the end of a paper clip into the hole next to the **EJECT** switch while system power is OFF.

 **NOTICE** **Avoid mechanical ejection whenever possible. Mechanical ejection leaves the actuator unlocked and the MOD susceptible to damage if moved. If forced to use this method, reboot the system, then insert and eject a known good disk using one of the other manual ejection methods.**

4-4-12-1 Formatting Media



To erase/format the backup media, DVD/CD+(R)W or MOD, press the **SONOVIEW** key on the Control panel.

The Sonoview screen appears on the monitor; see: [Figure 4-15 on page 4-25](#).

- a.) Select the “DVD/CD+(R)W and MO Formatting” tool on the left side of the Sonoview screen.
- b.) Insert the medium and select the **DVD/CD+(R)W** or the **MO** icon.

By selecting MO cartridge the unit displays the “MO Disk Formatter” window as shown in [Figure 4-17](#).

- 1.) Select a **Format Type** from the drop down menu. If desired, mark the Low Level Format icon.
- 2.) Click the **START** button to start the formatting process.

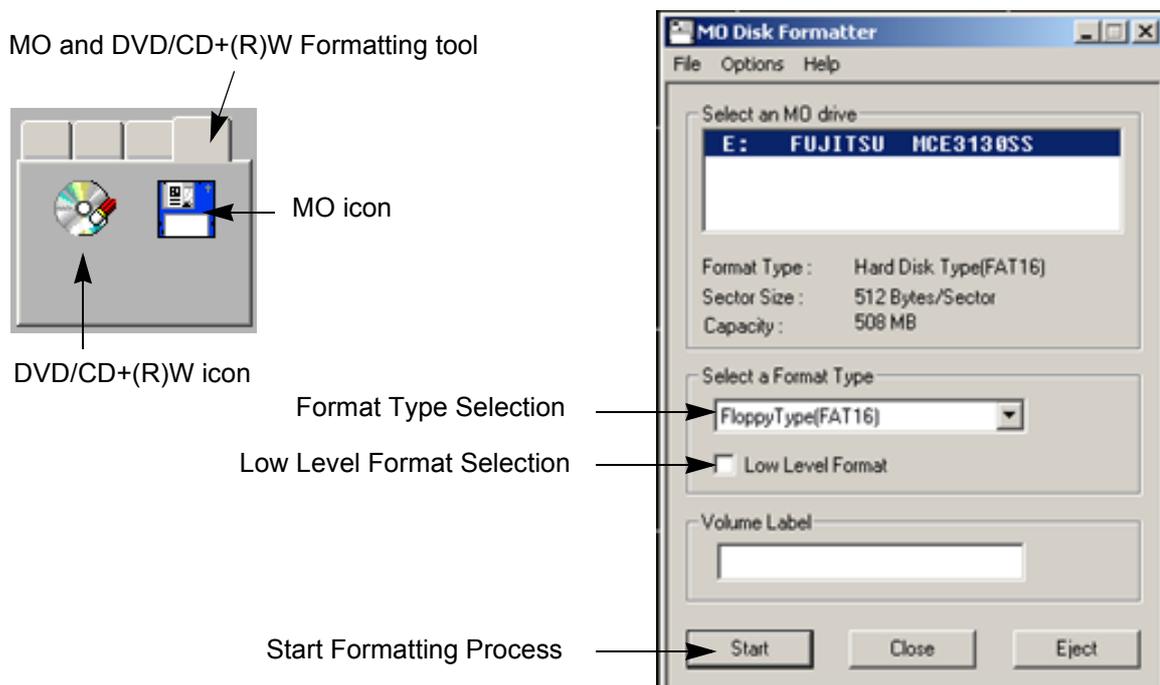


Figure 4-17 MO Disk Formatter Window

- 3.) A message box appears on the screen. Confirm with **OK**.
- 4.) When the formatting has been completed, click **OK** to continue.



Figure 4-18 MO Disk Formatter messages

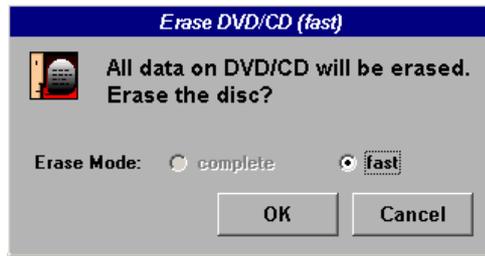
- 5.) Select the **CLOSE** key and touch the **EXIT** key on the Touch Panel to return to the Scan Mode.

#### 4-4-12-1 Formatting Media (cont'd)

By selecting DVD/CD the unit displays the “Erase DVD/CD” window as shown in [Figure 4-19](#).

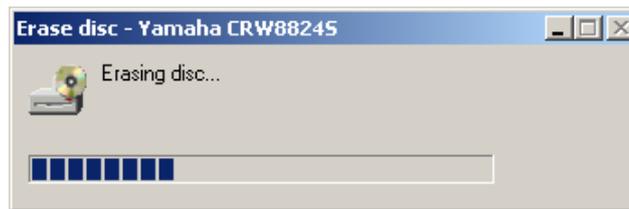
1.) Select the “Erase Mode” and click the [OK] button to start the process.

 **NOTICE** It is highly recommended to use the complete erase mode, to avoid problems with the CD+(R)W! When using a DVD+(R)W, the complete erase mode is not possible.



**Figure 4-19 Erase DVD/CD Window**

2.) During erasing the Ultrasound system displays following message.

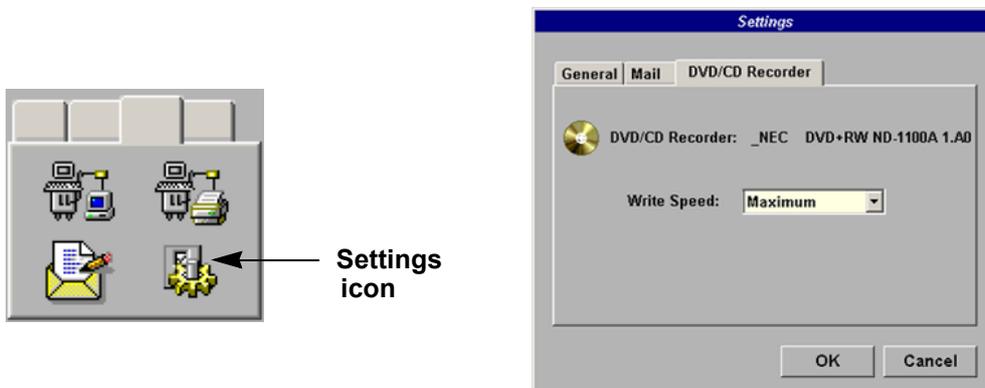


**Figure 4-20 Erasing disk**

3.) Touch the EXIT key on the Touch Panel to return to the Scan Mode.

#### 4-4-12-1-1 Adjusting the Write Speed of the DVD/CD Recorder.

- 1.) Click the SETTINGS icon on the left side of the Sonoview screen.
- 2.) Select DVD/CD RECORDER from the tool bar.



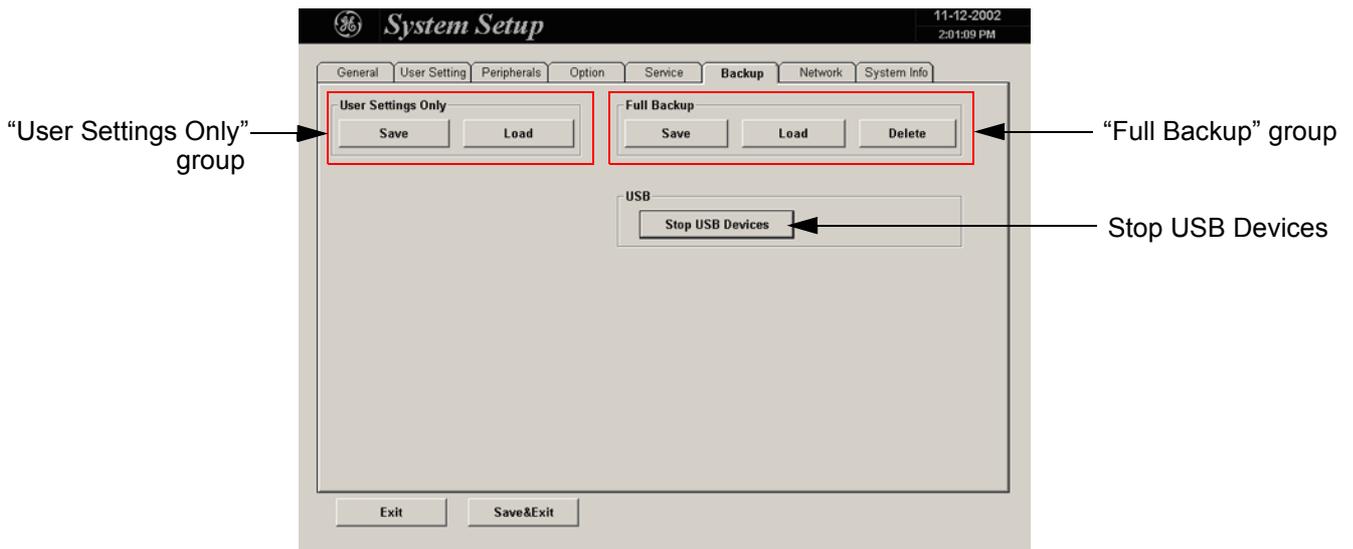
**Figure 4-21 Settings of the DVD/CD Recorder**

3.) Choose the “Write Speed” from the corresponding pop-up menu.

## Section 4-5 Backup and Restore Database, Preset Configurations and Images

 **NOTICE** From Software Version 3.1.x onwards, it is also possible to save/load/delete “Full Backup” data via the System Setup BACKUP page; see: [Figure 4-22](#).

- 1.) On the Touch Panel, touch UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the BACKUP page.



**Figure 4-22 System Setup - Backup page**

The “Backup” page is subdivided in two main groups:

### A.) User Settings Only

- [Section 4-5-1 "Save User Settings Only \(Application Settings\)" on page 4-30](#)
- [Section 4-5-2 "Load User Settings Only \(Application Settings\)" on page 4-31](#)

### B.) Full Backup

- [Section 4-5-3 "Save Full Backup \(Presets, Configurations & Application Settings\)" on page 4-33](#)
- [Section 4-5-4 "Load Full Backup \(Presets, Configurations & Application Settings\)" on page 4-35](#)
- [Section 4-5-5 "Delete Full Backup \(Presets, Configurations & Application Settings\)" on page 4-37](#)

The User Settings and/or Full Backup can be saved to the following destinations:

- D: partition of internal hard disk
- DVD/CD+(R)W
- MOD (if present)
- Mapped Network Drive **Z:**  
see: [Section 3-11-1 "Map Network Drive" on page 3-49](#)
- Any other drive connected to the system (e.g.; an external USB-hard disk)

**Note:** This function is only available in the Full Backup utility.

For further details review: [Section 3-5-11 "External USB-Devices" on page 3-20](#).

 **NOTICE** When connecting external USB devices, be sure to execute Safety Directions found in Chapter 2 of the Voluson® 730Expert (BT03) Basic User Manual.

## 4-5-1 Save User Settings Only (Application Settings)

The User Settings contains:

- Application Settings
  - User Programs
  - Auto Text
  - 3D/4D Programs
- 1.) Insert a DVD/CD+(R)W or MO (Magneto-Optical Disk) into the drive.
  - 2.) On the Touch Panel, touch UTILITIES.
  - 3.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
  - 4.) Select the BACKUP page.
  - 5.) Click the SAVE button of the “User Settings Only” group.

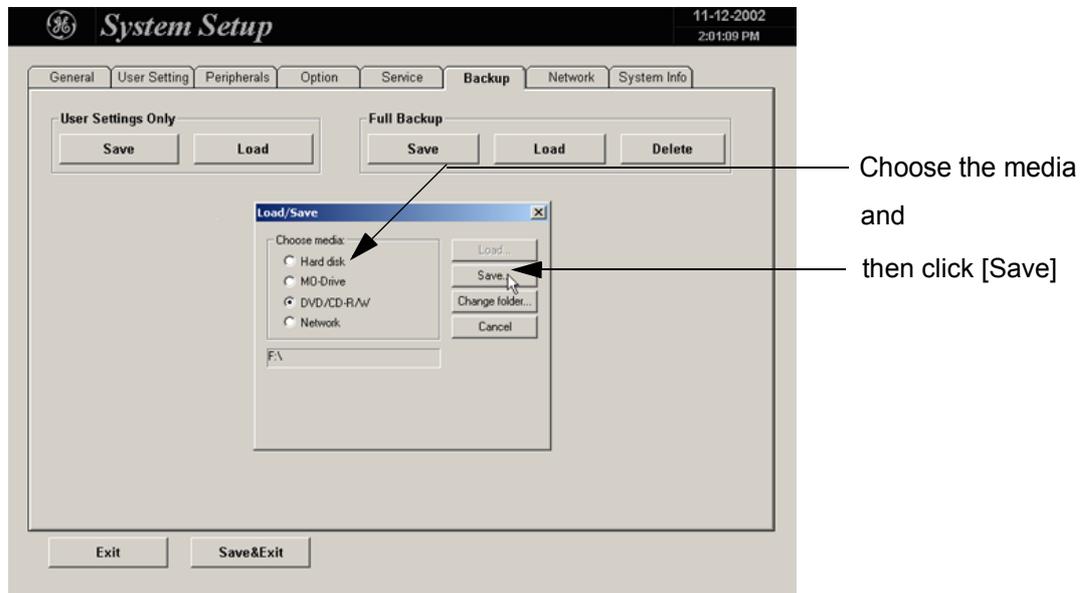


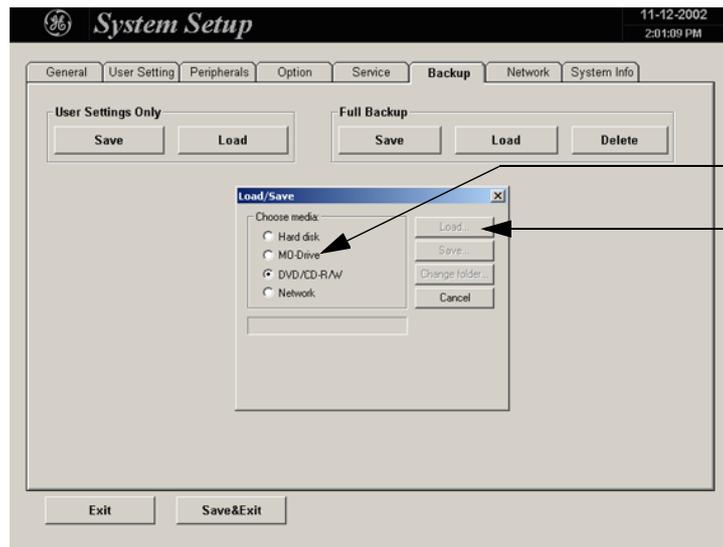
Figure 4-23 User Settings Only - Save window

- 6.) Choose the media (e.g., DVD/CD+RW) and click the SAVE button.
- 7.) Select the NEW FILE... key and enter a file name (without extension).
- 8.) Click the OK key to start the process. When the saving has been completed, click OK.

## 4-5-2 Load User Settings Only (Application Settings)

**CAUTION** The loading procedure overwrites the existing application settings on the local hard drive. Make sure to insert the correct DVD/CD or MO. Additionally you can load the backup from D:\UserSettings.

- 1.) Insert the DVD/CD+(R)W or MO (Magneto-Optical Disk) into the drive.
- 2.) On the Touch Panel, touch UTILITIES.
- 3.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 4.) Select the BACKUP page and click the LOAD button of the “User Settings Only” group.

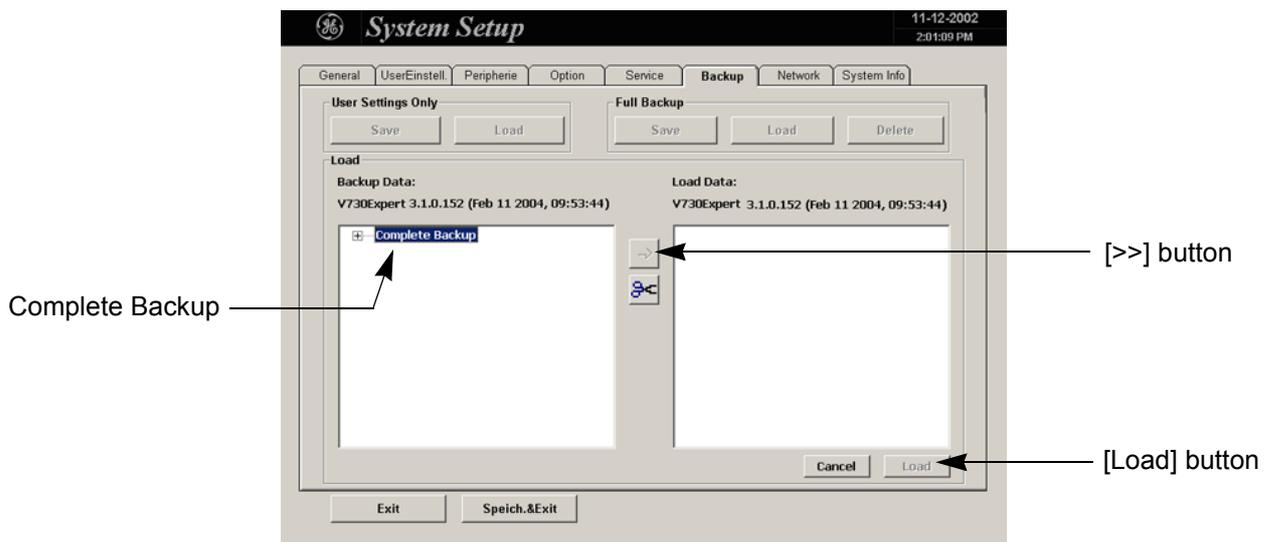


Choose the media and then click [Load]

Figure 4-24 User Settings Only - Load window

- 5.) Choose the media (e.g., DVD/CD+RW) and click the LOAD key.
- 6.) Select the appropriate file and click OK. The “Load Backup Data” window appears.

**NOTICE** It is highly recommend to use Application settings which are adapted for the systems software version!



Complete Backup

[>>] button

[Load] button

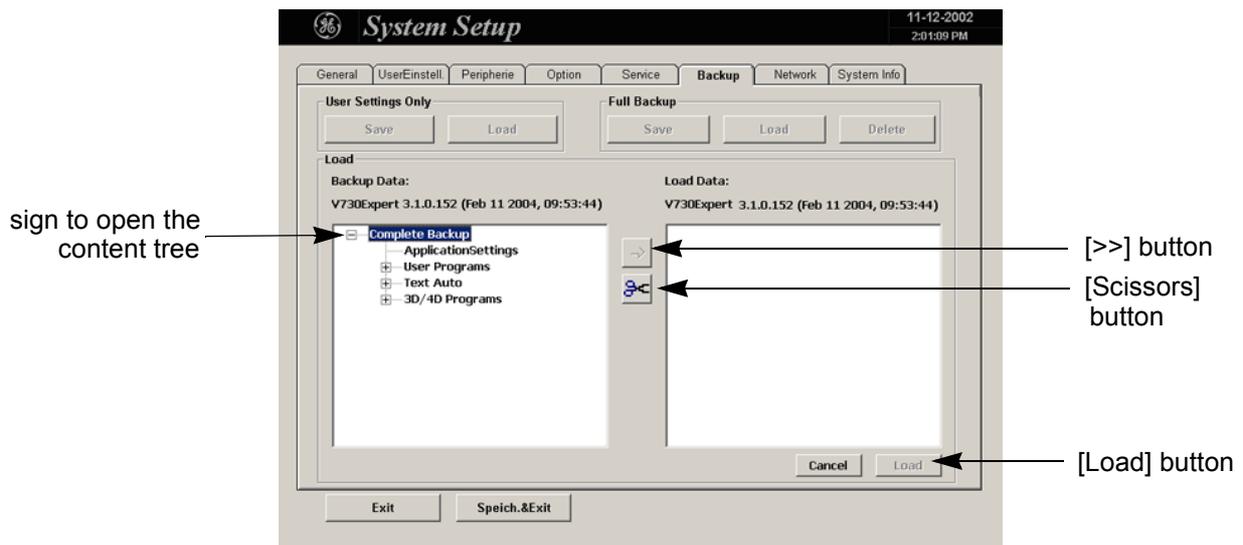
Figure 4-25 Load Backup Data

#### 4-5-2 Load User Settings Only (Application Settings) (cont'd)

- 7.) Select the **Complete Backup** (marked blue; see: [Figure 4-25](#)) and click the  $\gg$  button to copy the Complete Backup into the Load Data field.
- 8.) Click the LOAD button to start the loading procedure of the complete backup into the system.

**NOTE:** Also only parts of a User Settings Only "Backup" can be loaded into the database to overwrite, restore, copy, etc.... the database in the system.

- 1.) Click the  $\pm$  sign to open the content tree.



**Figure 4-26 Load only parts of the Backup**

- 2.) Click the  $\gg$  button to copy the selected item into the Load Data field.

**NOTE:** To return selected items from the Load Data field to Backup Data field select the SCISSORS button.

- 3.) Click the LOAD button to start loading procedure of the selected Backup item into the system.

### 4-5-3 Save Full Backup (Presets, Configurations & Application Settings)

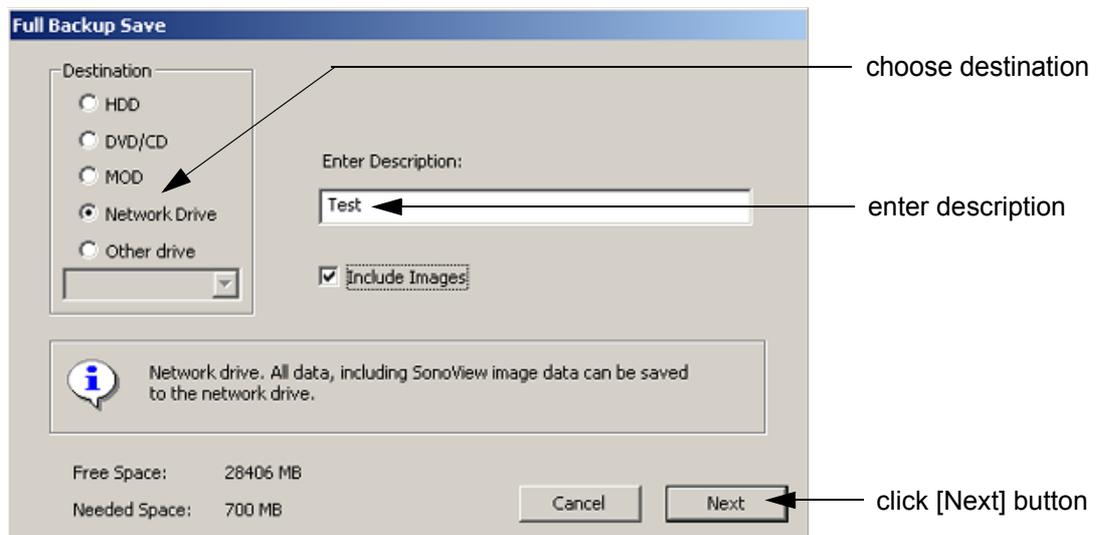
A full backup always contains the following data

- Patient demographic and exam data (database containing the patient data and measurements)
- SonoView image data (**NOT** available when saving to the internal hard disk, DVD/CD or MOD)
- User Settings (databases and files containing gray curves and the user settings.)
- Image transfer settings (DICOM settings e.g., DICOM servers, AE Title, Station Name, etc.)
- Measure Setup Settings (user specific measure settings)
- V730 settings (general settings such as language, time/date format and the enabled options)
- Windows Network Settings (network settings including the computer name)
- Service Platform (state of the service platform)
- VP (additional system data)

 **CAUTION** It is recommended to create a full backup of the settings once a week.

**NOTE:** Always “Full Backup” any presets, configurations and application settings to HDD and/or DVD or MO-disk before upgrading the software and/or application settings. This ensures that if the presets need to be reloaded, will be the same ones the customer was using prior to service.

- 1.) On the Touch Panel, touch UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the BACKUP page and click the SAVE button of the “Full Backup” group.



**Figure 4-27 Full Backup Save**

- 4.) Choose the Destination (e.g., Network Drive).
- 5.) Enter the description of the full backup.
- 6.) If desired and possible (Network Drive and Other drive **only**), activate “Include Images”.

**NOTE:** The “Include Images” option may result in a large amount of data: up to **70 Gigabytes!**

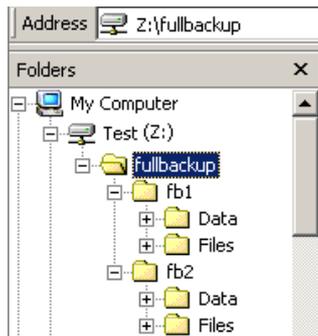
- 7.) Select the NEXT button to start the backup process.  
After copying the data, the Voluson® 730Expert reboots and the application starts again.

### 4-5-3 Save Full Backup (Presets, Configurations & Application Settings) (cont'd)

When the Full Backup is stored on a network drive (to map a network drive see: [Section 3-11-1 "Map Network Drive" on page 3-49](#)), it may be desirable to move the data (e.g., for backup or maintenance).

The backups reside in sub folders of the main "fullbackup" -folder found at the root of the drive. For Example: Backups on the mapped **Network Drive** are below path **Z:\fullbackup**.

The directory structure of the full backup data is as follows:

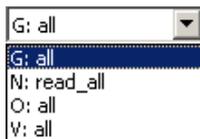


The sub folders have the names *fbX* where *X* is a number (e.g., Z:\fullbackup\fb1).

The data resides within a directory structure within these sub folders. It is possible to move the *fbX* sub folders, even leaving gaps in the numeration sequence.

However, **NO** change **MUST** be made to the contents of the *fbX* folders itself, otherwise the backup data cannot be restored!

Figure 4-28 directory structure of full backup data



If the destination „Other drive“ is selected, the available drives (e.g., external USB-memory stick) can be chosen from the drop down menu.

Figure 4-29 "Other drive" drop down menu



**NOTICE** When the backup is saved to an external USB-device, the system has to be informed about the removal of the hardware. For this purpose every last dialog of "Full Backup Save" and "Full Backup Delete" has a STOP USB DEVICES button (see: [Figure 4-30](#)).



Figure 4-30 Please stop USB Devices before unplugging!

For further details review: [Section 3-5-11 "External USB-Devices" on page 3-20](#).

## 4-5-4 Load Full Backup (Presets, Configurations & Application Settings)



**WARNING** Always backup any data before an upgrade; see: [Section 4-5-3 on page 4-33](#).

*The “Full Backup” loading procedure replaces (overwrites) **ALL** the existing data on the local hard drive of the Voluson® 730Expert system!*



**CAUTION** There are circumstances where it is not possible to load (restore) all the data. The following rules specify these restrictions:

- 1.) Generally, **only** restoring data from an older to a newer software version is possible. Loading a backup into a system that has a lower software version than the system the backup was created on is prohibited.
- 2.) Options can **only** be restored on the same Voluson® 730Expert system within the same major software version.
- 3.) When loading a backup into a system with a software version that has a higher major number (2.x.x -> 3.x.x -> 4.x.x -> 5.x.x), the following items will not be restored:
  - A.) User Settings
  - B.) Options
  - C.) State of the Service Platform (new model type necessary for VOLC)
- 4.) The **user** is **only** allowed to restore data to a different system if and only if the software version on this system is the same as in the backup.
- 5.) The **user** is **only** allowed to restore data onto the same system if and only if the software version on this system is equal or higher than the version in the backup.
- 6.) The **user** is **not** allowed to restore the following items to a different system:
  - A.) Windows Network Settings
  - B.) Options
  - C.) DICOM AE Title
  - D.) DICOM Station Name
  - E.) State of the Service Platform

#### 4-5-4 Load Full Backup (Presets, Configurations & Application Settings) (cont'd)

- 1.) On the Touch Panel, touch UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the BACKUP page and click the LOAD button of the "Full Backup" group.

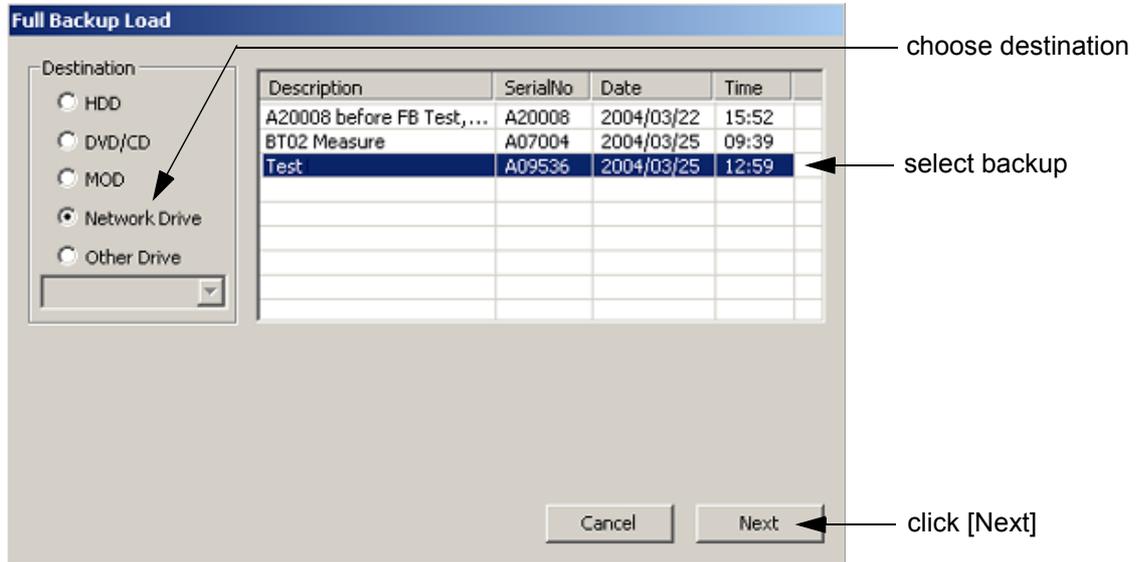


Figure 4-31 Full Backup Load

- 4.) Choose the Destination (e.g., Network Drive).
- 5.) Click on the backup to be restored (additional information is displayed in the table).
- 6.) Select the NEXT button. The following window will be displayed.

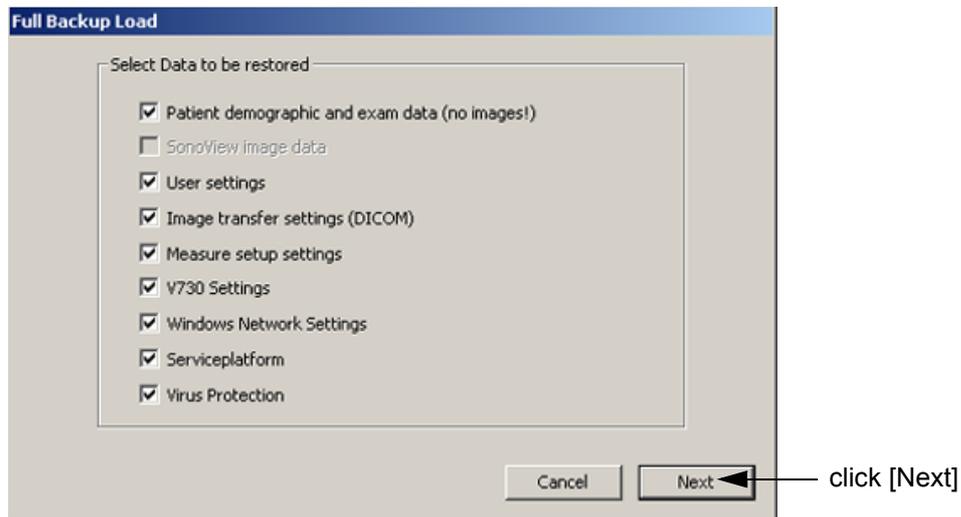


Figure 4-32 Select Data to be restored

- 7.) Select the data to be restored to the Voluson® 730Expert system.

**NOTE:** For description of the check box names review: [A full backup always contains the following data](#)

#### 4-5-4 Load Full Backup (Presets, Configurations & Application Settings) (cont'd)

- 8.) Click the NEXT button and then select YES to start, or NO to cancel the restore procedure.



Figure 4-33 Start Restore Backup now?

**WARNING** When clicking “YES”, the current data on the system will be permanently replaced by the data of the backup and can not be restored!

After restoring the data, the Voluson® 730Expert reboots and the application starts again.

#### 4-5-5 Delete Full Backup (Presets, Configurations & Application Settings)

- 1.) On the Touch Panel, touch UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the BACKUP page and click the DELETE button of the “Full Backup” group.

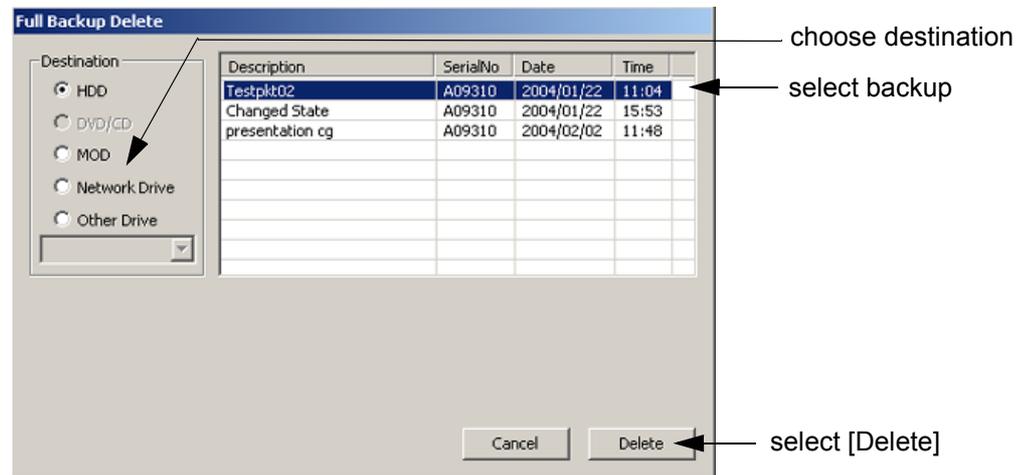


Figure 4-34 Full Backup Delete

- 4.) Choose the Destination (e.g., HDD = Hard disk).
- 5.) Click on the backup to be deleted (additional information is displayed in the table).
- 6.) Select the DELETE button.

**WARNING** There is no “UNDO” function for this action!

### 4-5-6 Archiving Images

- 1.) Press the **SONOVIEW** key on the control panel.
- 2.) Insert the DVD/CD+(R)W or MOD into drive.  
If required, format/erase the media, see [Section 4-4-12-1 "Formatting Media" on page 4-27](#).
- 3.) When you click the **OPEN** button on the upper left side of the screen, a list of all the exams is displayed see [Figure 4-35](#).

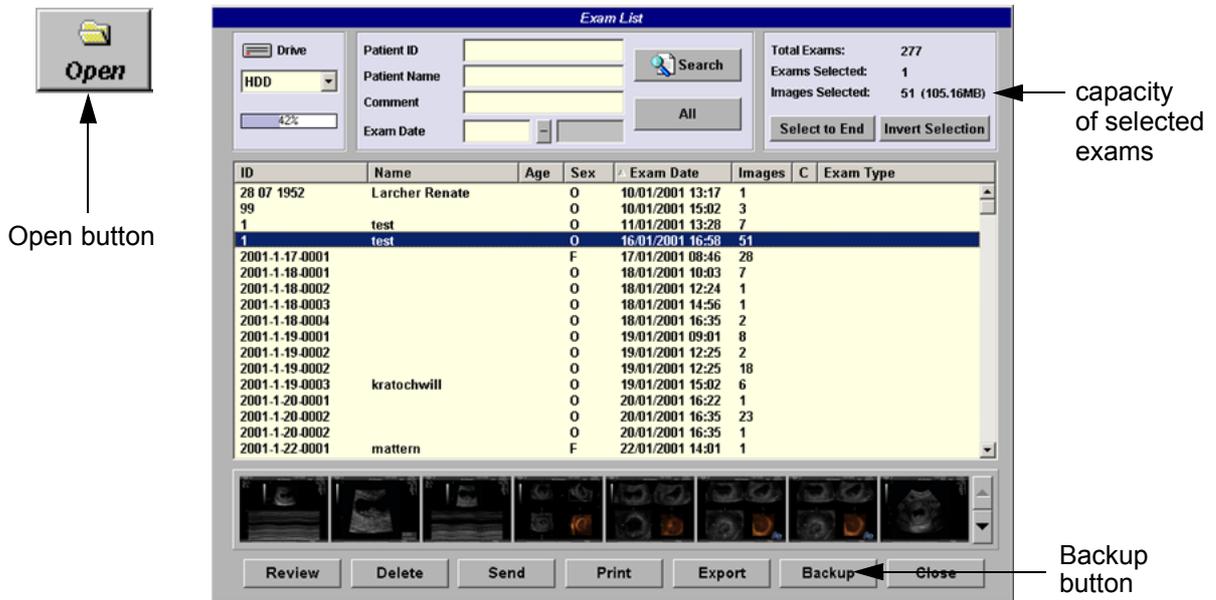


Figure 4-35 Sonoview Screen

- 4.) Select the exam(s) using the **TRACKBALL**, the **CTRL** or **SHIFT** key on the alphanumeric keyboard and the right trackball key **SET**.  
The number of all exams, the number of currently selected exams, the number of images and the capacity of selected images are displayed automatically at the right and upper corner of the exams list.
- 5.) Click the **BACKUP** button.
- 6.) Select the destination for the backup.

**NOTE:** For destination NET perform [Section 3-11-1 "Map Network Drive" on page 3-49](#) first.

- 7.) After finishing the backup, select whether the selected exam(s) is to be deleted or not.

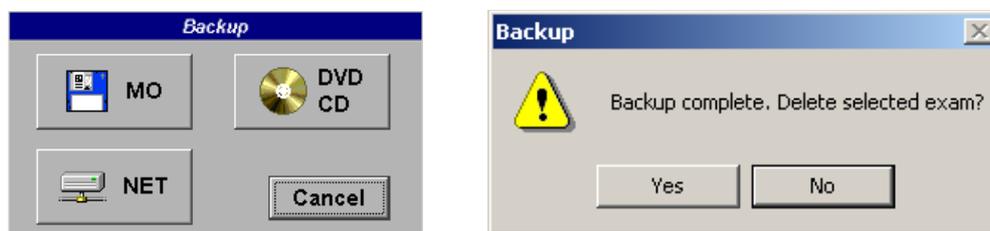


Figure 4-36 Backup windows

**NOTICE** If you select to delete the exam after finishing the backup, it will be absolutely deleted from the hard disk of the ultrasound scanner Voluson® 730Expert!

For further information refer to Chapter 15 in the Basic User Manual of Voluson® 730Expert.

## Section 4-6 Software Configuration Checks

Touch the UTILITIES key, then touch SYSTEM SETUP.  
 The System Setup desktop offers different pages to check:

**Table 4-10 System Setup Checks**

Step	Task	Expected Result(s)
1	General: Check Date and Time setting	Date and Time are correct
2	General: Check that Location (Clinic Name) is correct	Location Name is correct
3	General: Check Language settings	desired Language is displayed
4	User Setting: Check all the User Settings	settings assigned as desired by the customer
5	User Setting: Check Touch Panel Scheme	color scheme display of the Touch Panel assigned as desired by the customer
6	Peripherals: Check assignment of Printer Keys	Print A and Print B keys are assigned as desired by the customer
7	Peripherals: Check assignment of Foot Switch	Foot Switch left and right are assigned as desired by customer
8	Peripherals: Check Save Destination assignment	setting assigned as desired by the customer
9	Peripherals: Check 2D Save key assignment	setting assigned as desired by the customer
10	Peripherals: Check Remote Print A, Remote Print B, Report Printer and DICOM Print Job assignment	settings assigned as desired by the customer
11	Option: Check that all of the options are set up correct	all authorized functions are enabled
12	Network: Check DICOM, Sonoview and Network configuration	setting assigned as desired by the customer

Touch the UTILITIES key, then touch MEASURE SETUP.  
 The Measurement Setup desktop offers different pages to check:

**Table 4-11 Measurement Setup Checks**

Step	Task	Expected Result(s)
1	General: Check "2D Circumference and Area Method"	setting assigned as desired by the customer
2	General: Check "Show Caliper Information Text"	setting assigned as desired by the customer
3	General: Check "Caliper & Measure-Result Font Size"	setting assigned as desired by the customer
4	General: Check "Doppler Manual Trace Mode"	setting assigned as desired by the customer
5	General: Check "Store Measurements"	setting assigned as desired by the customer
6	General: Check "Doppler Trace Display Results"	settings assigned as desired by the customer
7	General: Check "Measure Results Display"	setting assigned as desired by the customer
8	General: Check "On Freeze Event Start..."	setting assigned as desired by the customer
9	OB: Check "Preset Selection"	setting assigned as desired by the customer
10	OB: Check "Pregnancy Weeks"	setting assigned as desired by the customer
11	OB: Check "Ratio Calculations"	settings assigned as desired by the customer
12	OB: Check "GS Measurement Method"	setting assigned as desired by the customer

**Table 4-11 Measurement Setup Checks**

Step	Task	Expected Result(s)
13	OB: Check "Show Author's Name at Measure Menu"	setting assigned as desired by the customer
14	Cardiac: Check "2D Circumference and Area Method"	setting assigned as desired by the customer
15	Cardiac: Check "LV Volume Calculation Method"	setting assigned as desired by the customer

## Section 4-7 Peripheral Checks

Check that peripherals work as described below:

**Table 4-12 Peripheral Checks**

Step	Task to do	Expected Result(s)
1	Press the <b>FREEZE</b> key.	Stop image acquisition.
2	Press the <b>PRINT A</b> or <b>PRINT B</b> key on the Control Panel.	The image displayed on the screen is printed on printer, depending on the key assignment configuration
3	Press the <b>VCR</b> key on the Control Panel twice.	VCR starts recording (REC - will be displayed on the screen)
4	Press the <b>VCR</b> key twice again.	VCR stops recording
5	Press the <b>VCR</b> key on the Control Panel once.	The VCR Remote Control menu is displayed on the Touch Panel.
6	Press <b>RECORD</b> on the Touch Panel.	to start recording: A red dot is displayed in the <i>VCR status area</i> on the <i>Title bar</i> to indicate that recording has begun
7	Press <b>STOP</b> on the Touch Panel.	To Stop recording: The video status icon is changed to (Pause)
8	Press <b>PLAY</b> on the Touch Panel.	To start, Play back an examination
9	Press <b>EXIT</b> on the Touch Panel	to return to the scanning mode
10	Use the <b>assignable keys</b> on the Touch Panel	to perform actions on the recorded session, such as stop, pause, rewind or fast forward. The video status icon is updated accordingly.

### 4-7-1 ECG Check Out

Connect the ECG preamplifier MAN and check:

**Table 4-13 ECG preamplifier Check**

Step	Task	Expected Result(s)
1	Connect the ECG at the Connector on the rear panel of the scanner. Press the <b>ECG</b> key on the control panel to display the "ECG" menu on the Touch Panel.	It will display a curve along the bottom edge of the image sector

### 4-7-2 Power Supply Adjustment

There are no adjustments on the power supplies. 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 component connected to that specific power outlet.

## Section 4-8 Mechanical Function Checks

### 4-8-1 Rotation of the Control Console



**locking lever**  
 for locking and unlocking  
 the control console

Figure 4-37 locking lever under Control Console

Table 4-14 Rotation of the Control Console

Step	Task	Expected Result(s)
1	Pull the locking lever under the Control Console forward, grasp it at the front grip of the user interface and rotate the console.	It is possible to rotate the Control Console up to 30° to the right.

**!** **WARNING** *Do not put your hand between the control console and the main unit when moving the console to the 0° position: Danger of injuries!*

### 4-8-2 Brakes and Direction Locks

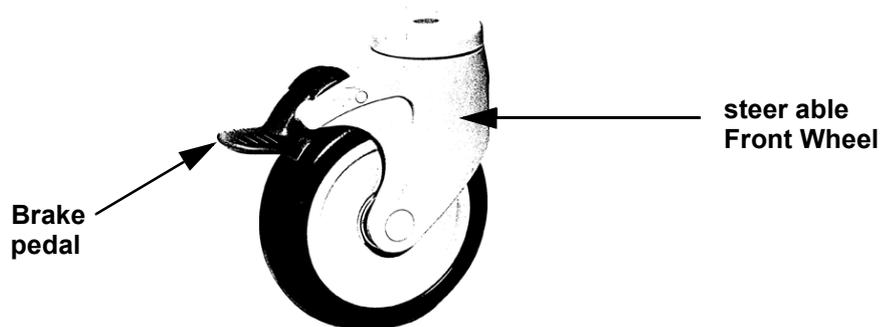


Figure 4-38 Front Wheel with Brake

Table 4-15 Brakes and Direction Lock

Step	Task	Expected Result(s)
1	Flap the foot rest up and press the release brake pedals on the front wheels.	The front wheels are engaged / disengaged for transportation.

## Section 4-9 Site Log

### 4-9-1 Site Log - System (Service Database)

- 1.) On the Touch Panel, press UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the SERVICE page. The “password window” appears automatically.
- 4.) Enter the password **SHE** and click the ACCEPT button to display the Service Tools window.

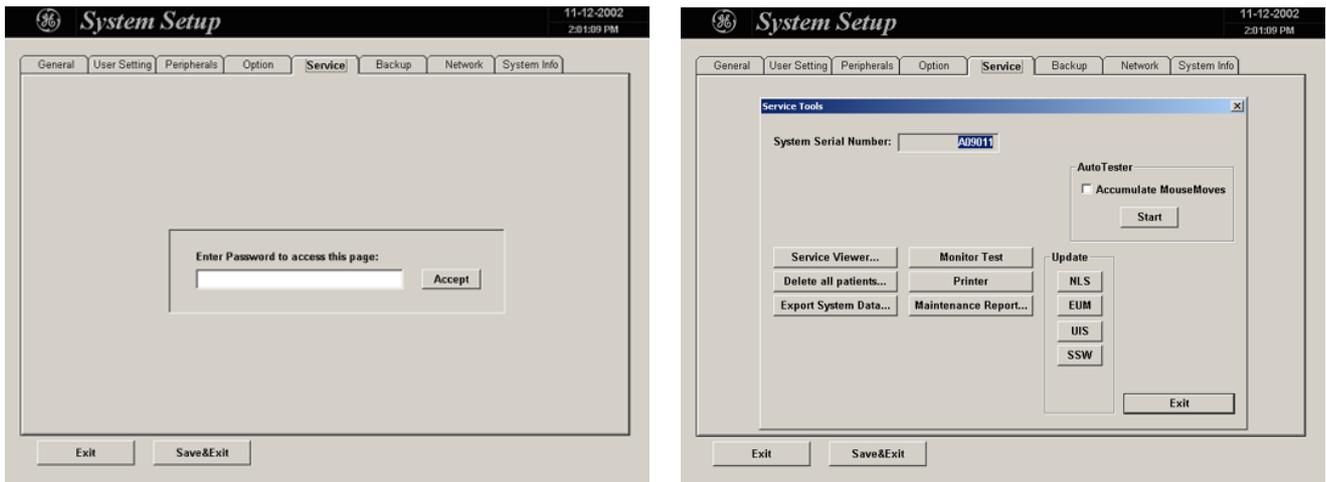


Figure 4-39 System Setup Service page and Service Tools window

- 5.) Click the MAINTENANCE REPORT button. The following message box will be displayed.

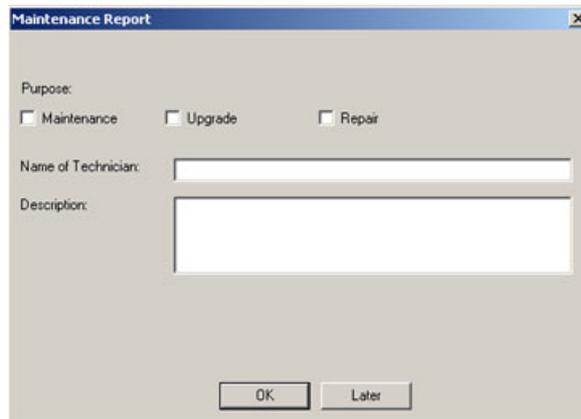


Figure 4-40 Maintenance Report

- 6.) Fill in the requested information and click OK.
- 7.) Click the EXIT button on the Service Tools window and the SAVE & EXIT button on the System Setup Service page.

**NOTE:** After Hardware or Software modifications normally the “Maintenance Report” message box (Figure 4-40) appears automatically on the screen.



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# Chapter 5

## Components and Functions (Theory)

### Section 5-1 Overview

#### 5-1-1 Purpose of Chapter 5

This chapter explains Voluson® 730Expert's system concepts, component arrangement, and subsystem function. It also describes the Power Distribution System (PDS) and probes.

**Table 5-1 Contents in Chapter 5**

Section	Description	Page Number
5-1	Overview	5-1
5-2	General Information	5-2
5-3	Main board Chassis GEF Module	5-20
5-4	FrontEnd Processor	5-21
5-5	BackEnd Processor	5-27
5-6	Internal I/O	5-31
5-7	Top Console	5-34
5-8	Monitor	5-38
5-9	External I/O	5-39
5-10	Peripherals	5-40
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5-13	Air Flow Control	5-48
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5-15	Service Page	5-51

## Section 5-2 General Information

Voluson® 730Expert is a digital beamforming curved-, linear- and phased array ultrasound imaging system. It has provisions for analog input sources like ECG and Phono. A CW-Doppler probe may also be connected and used.

The system can be used for:

- 2D Mode Imaging and additional Operating Modes (B-Flow, XTD-View)
- Color Doppler Imaging (CFM, PD and TD)
- M Mode Imaging
- Doppler (PW, CW)
- 3D Mode and Real Time 4D Imaging
- Different combinations of the above modes

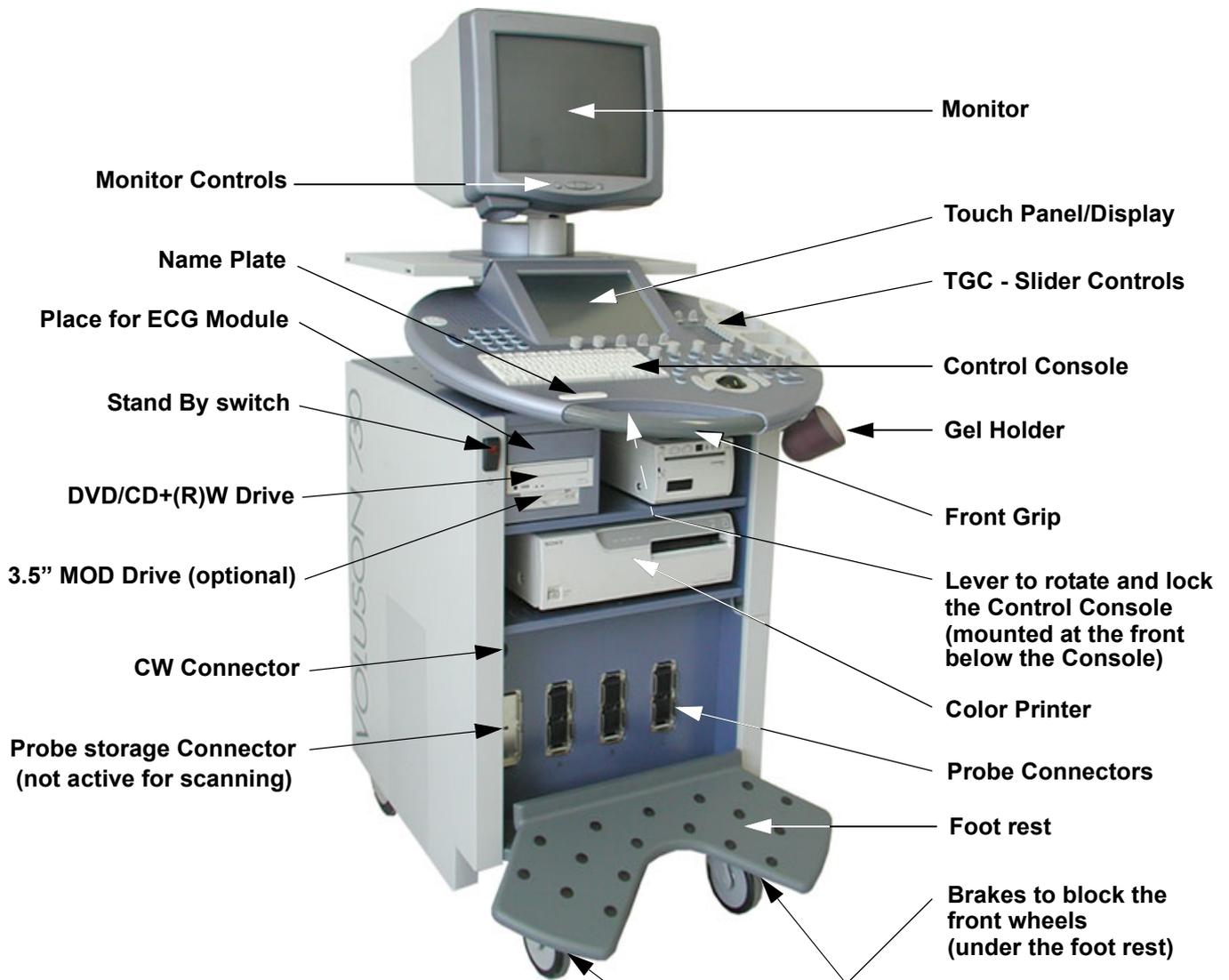


Figure 5-1 Voluson® 730Expert Major Components

## Section 5-2 General Information (cont'd)

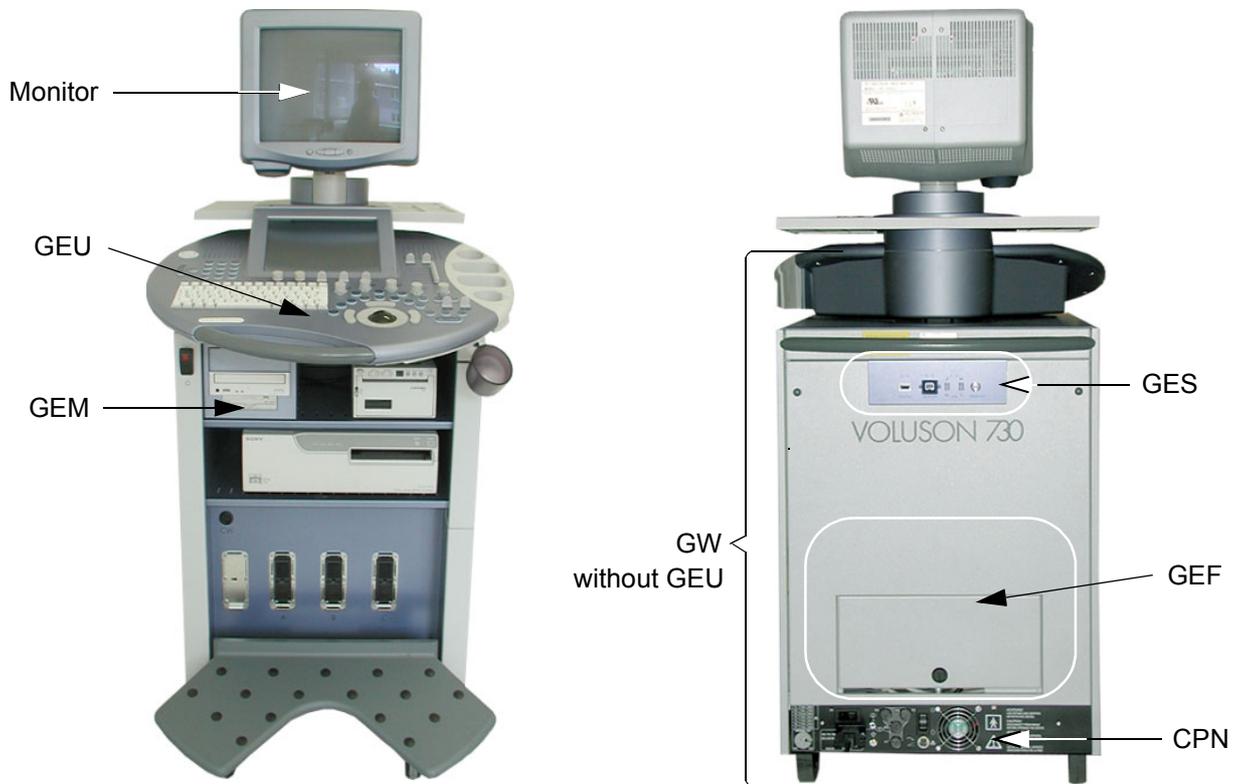
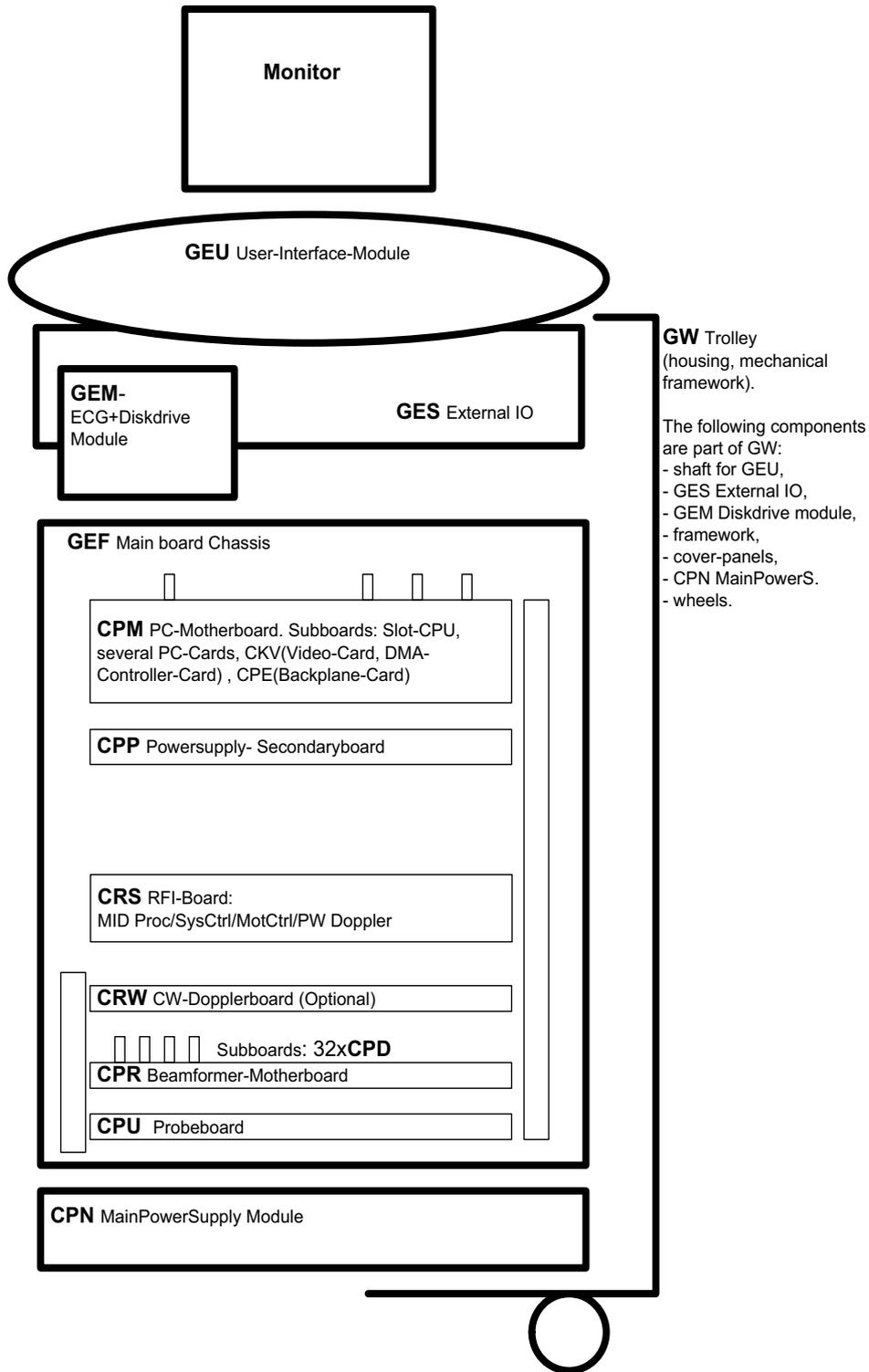


Figure 5-2 Major System Components

### Major System Components:

- GEF: Main Board Chassis: [Section 5-3 on page 5-20](#)
  - Front-End processor [Section 5-4 on page 5-21](#)
  - Back-End processor [Section 5-5 on page 5-27](#)
- GEU: Top Console User interface (System I/O with hard keys, Touch-screen and EL-Display) [Section 5-7 on page 5-34](#)
- MONITOR: [Section 5-8 on page 5-38](#)
- GES: External I/O Connection Module [Section 5-8 on page 5-38](#)
- GEM: Removable Disk drive module (MO-Drive and ECG-preamplifier - optional) [Section 5-10 on page 5-40](#)
- CPN: Primary Power supply and Isolation transformer for the peripherals [Section 5-11 on page 5-41](#)
- GW: System mechanical chassis, stand alone trolley to keep all major components [Section 5-12 on page 5-45](#)

**Section 5-2 General Information** (cont'd)



**Figure 5-3 Basic Block diagram of Voluson® 730Expert**

## Section 5-2 General Information (cont'd)

The Voluson® 730Expert used digital beamforming technology which provides high resolution and high penetration performance. It is a general purpose, mobile, software controlled diagnostic ultrasound scanner. Its function is to acquire ultrasound data and to display the data of different modes. Voluson® 730Expert gives the operator the ability to measure anatomical structures and offers analysis packages that provide information that is used to make a diagnosis by competent health care professionals.

The Calculation and Report function supports 4 application packages:

- Obstetric Calculations
- Gynecology Calculations
- Cardiology Calculations
- Vascular Calculations

The Voluson® 730Expert supports a variety of linear-, curved-, phased array and pencil probes for various clinical applications. Any three probes may be connected at the same time (+ one pencil CW-probe).

Medical application fields include:

- Obstetrics
- Gynecology and Fertility
- Radiology
- Internal Medicine
- Neurology
- Cardiology
- Oncology
- Urology
- Orthopedics
- Pediatrics

The system is designed for follow-up expansion.

In addition to the initial operational settings for each transducer pre-programmed in the system, user-customized parameter settings for each transducer may be inserted by the operator and stored for recall as needed via the system control panel. System configuration is stored on the hard drive and all necessary software is loaded from the hard drive on power up.

Biopsy guidelines are provided on screen to assist in the collection of tissue samples, using biopsy guide adapters offered as an optional accessory.

The system provides the ability to perform remote viewing of images without compression, via DICOM 3.0 compatible output. Management of patient history is possible by "Sonoview" image-filing function. High-resolution images are provided by utilizing a technology called digital dynamic receive focusing.

Signal flow travels from the Probe Connector Panel to the Front End Electronics, to the Back-End Processor, and finally displayed on the monitor and peripherals.

For more detailed explanations of functions and controls refer to the Voluson® 730Expert Basic User Manual.

## 5-2-1 Description of Voluson® 730Expert Operating Modes

### 5-2-1-1 B-Mode or 2D-Mode

B-Mode or 2D-mode is a two-dimensional image of the amplitude of the echo signal. It is used for location and measurement of anatomical structures and for spatial orientation during operation of other modes. In 2D-mode, a two-dimensional cross-section of a three-dimensional soft tissue structure such as the heart is displayed in real time. Ultrasound echoes of different intensities are mapped to different gray scale or color values in the display. The outline of the 2D cross-section may be a rectangle, parallelogram, sector or 360-degree circle, depending on the particular transducer used. 2D-mode can be used in combination with any other mode.

#### 5-2-1-1-1 Tissue Harmonic Imaging (THI) incl. Coded Harmonics

In Tissue Harmonic Imaging, acoustic aberrations due to tissue are minimized by receiving and processing the second harmonic signal that is generated within the insonified tissue. Voluson® 730Expert's high performance THI provides superb detail resolution and penetration, outstanding contrast resolution, excellent acoustic clutter rejection and an easy to operate user interface for switching into THI mode. Coded Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration. It diminishes low frequency amplitude noise and improves imaging technically difficult patients. It may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver and hard-to-visualize fetal anatomy. Coded Harmonics may improve the B-Mode image quality without introducing a contrast agent.

### 5-2-1-2 M-Mode

In M-mode, soft tissue structure is presented as scrolling display, with depth on the Y-axis and time on the X-axis. It is used primarily for cardiac measurements such as valve timing on septal wall thickness when accurate timing information is required. M-mode is also known as T-M mode or time-motion mode. Ultrasound echoes of different intensities are mapped to different gray scale values in the display. M-mode displays time motion information of the ultrasound data derived from a stationary beam. Depth is arranged along the vertical axis with time along the horizontal axis. M-mode is normally used in conjunction with a 2D image for spatial reference. The 2D image has a graphical line (M-line) superimposed on the 2D image indicating where the M-mode beam is located.

### 5-2-1-3 Color Doppler Modes

Color Doppler is used to detect motion presented as a two-dimensional display. There are three applications of this technique:

- Color Flow Mode (C) - used to visualize blood flow velocity and direction
- Power Doppler (PD) - used to visualize the spatial distribution of blood
- Tissue Doppler (TD) - used to visualize tissue motion direction and velocity

#### 5-2-1-3-1 Color Flow Mode

A real-time two-dimensional cross-section image of blood flow is displayed. The 2D cross-section may be presented as a rectangle, parallelogram, trapezoid, sector, or a full circle, depending on the particular transducer used. The 2D cross-section is presented as a full color display, with various colors being used to represent blood flow (velocity, variance, power and/or direction). Often, to provide spatial orientation, the full color blood flow cross-section is overlaid on top of the grayscale cross-section of soft tissue structure (2D echo). For each pixel in the overlay, the decision of whether to display color (Doppler), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft tissue structures and from the red blood cells. Blood velocity is the primary parameter used to determine the display colors, but power and variance may also be used. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures. Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. Color flow can be used in combination with 2D and Spectral Doppler modes as well as with 3D mode.

#### 5-2-1-3-2 Power Doppler

A real-time two dimensional cross-section of blood flow is displayed. The 2D cross-section may be presented as a rectangle, parallelogram, trapezoid, sector, or a full circle, depending on the particular transducer used. The 2D cross-section is presented as a full color display, with various colors being used to represent the power in blood flow echoes. Often, to provide spatial orientation, the full color blood flow cross-section is overlaid on top of the gray scale cross-section of soft tissue structure (2D echo). For each pixel in the overlay, the decision of whether to display color (Doppler power), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft-tissue structures and from the red blood cells. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures.

Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. The power in the remaining signal after wall filtering is then averaged over time (persistence) to present a steady state image of blood flow distribution. Power Doppler can be used in combination with 2D and Spectral Doppler modes as well as with 3D mode.

#### 5-2-1-3-3 Tissue Doppler

The Tissue Color Doppler Imaging is used for color encoded evaluation of heart movements. The TD image provides information about tissue motion direction and velocity.

#### 5-2-1-4 Pulsed (PW) Doppler

PW Doppler processing is one of two spectral Doppler modalities, the other being CW Doppler. In spectral Doppler, blood flow is presented as a scrolling display, with flow velocity on the Y-axis and time on the X-axis. The presence of spectral broadening indicates turbulent flow, while the absence of spectral broadening indicates laminar flow. PW Doppler provides real time spectral analysis of pulsed Doppler signals. This information describes the Doppler shifted signal from the moving reflectors in the sample volume. PW Doppler can be used alone but is normally used in conjunction with a 2D image with an M-line and sample volume marker superimposed on the 2-D image indicating the position of the Doppler sample volume. The sample volume size and location are specified by the operator. Sample volume can be overlaid by a flow direction cursor which is aligned, by the operator, with the direction of flow in the vessel, thus determining the Doppler angle. This allows the spectral display to be calibrated in flow velocity (m/sec.) as well as frequency (Hz). PW Doppler also provides the capability of performing spectral analysis at a selectable depth and sample volume size. PW Doppler can be used in combination with 2D and Color Flow modes.

### 5-2-2 3D Imaging

The Voluson® 730Expert Ultrasound System will be used to acquire multiple, sequential 2D images which can be combined to reconstruct a three dimensional image. These 3D images are useful in visualizing three-dimensional structures, and in understanding the spatial or temporal relationships between the images in the 2D sequence. The 3D image is presented using standard visualization techniques, such as surface or volume rendering.

#### 5-2-2-1 3D Data Collection and Reconstruction

2D gray scale images including Color Flow or Power Doppler information may be reconstructed. The acquisition of volume data sets is performed by sweeping 2D-scans with special transducers (called 3D-transducers) designed for the 2D-scans and the 3D-sweep.

Images are spatially registered, using internal probe position sensing and a position control to ensure geometric accuracy of the 3D data.

2D ultrasound imaging modes are used to view a two dimensional cross-sections of parts of the body. For example in 2D gray scale imaging, a 2 dimensional cross-section of a 3-dimensional soft-tissue structure such as the heart is displayed in real time. Typically, the user of an ultrasound machine manipulates the position and orientation of this 2D cross-section in real time during an ultrasound exam.

### 5-2-2-1 3D Data Collection and Reconstruction (cont'd)

By changing the position of the cross-section, a variety of views of the underlying structure are obtained, and these views can be used to understand a 3-dimensional structure in the body.

To complete survey a 3-dimensional structure in the body, it is necessary to collect 2D images which span a volume containing the structure. One way is to sweep the imaging cross-section by translating it in a direction perpendicular to the cross-section. Another example method is to rotate the cross section about a line contained in the cross section. The Voluson® 730Expert Ultrasound System uses the automated so called C-Scan for the motion perpendicular to automated B-scan. Once a representative set of 2D cross-sections are obtained, standard reconstruction techniques can be used to construct other 2D cross-sections, or to view the collection of the cross-sections as a 3D images.

### 5-2-2-2 3D Image Presentation

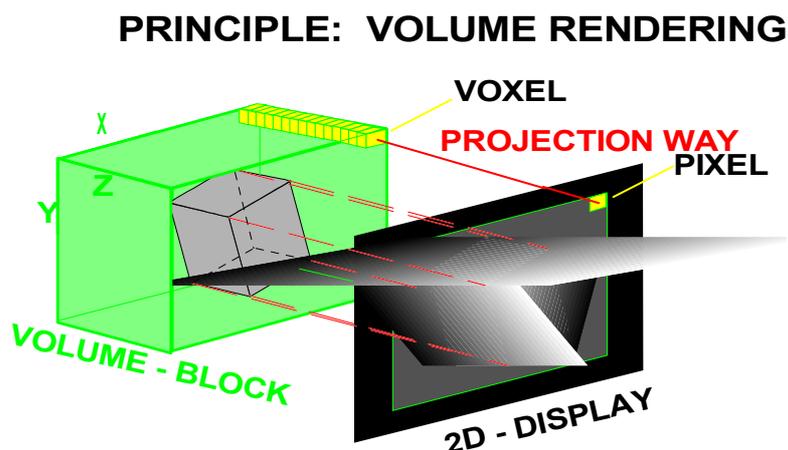
The basic technique for 3D image presentation is to combine the 2D cross –sections into an image which represents how the volume of the data would appear from a particular viewing direction. The mathematics behind this feature is called 3D-rendering. Such combined images are called projections, because the data from the volume is projected onto a flat 2-dimensional surface(e.g. the ultrasound system display.) This technique can be applied to any 2D ultrasound mode.

Several techniques can be used to aid the human observer in understanding the resulting 2D image as a representation of a three-dimensional object. One is to rotate the volume of data, and present the resulting sequence of 2D projections to the observer. The changing direction of observation helps the observer to separate the features in the volume according to their distance from the observer.

### 5-2-2-3 3D Rendering

The 3D (volume) rendering is a calculation process to visualize certain 3D-structures of a scanned volume by means of a 2D-image. The gray value for each pixel of the 2D-image is calculated from the voxels along the corresponding projection path (analyzing beam) through the volume. The render (calculation) algorithm, surface or transparent mode, determines how 3D-structures are visualized.

With the MagiCut function it is possible to cut off “3D artifacts” which hide regions that are of interest for the diagnostic purpose.



5-2-3 Block diagram Voluson® 730Expert

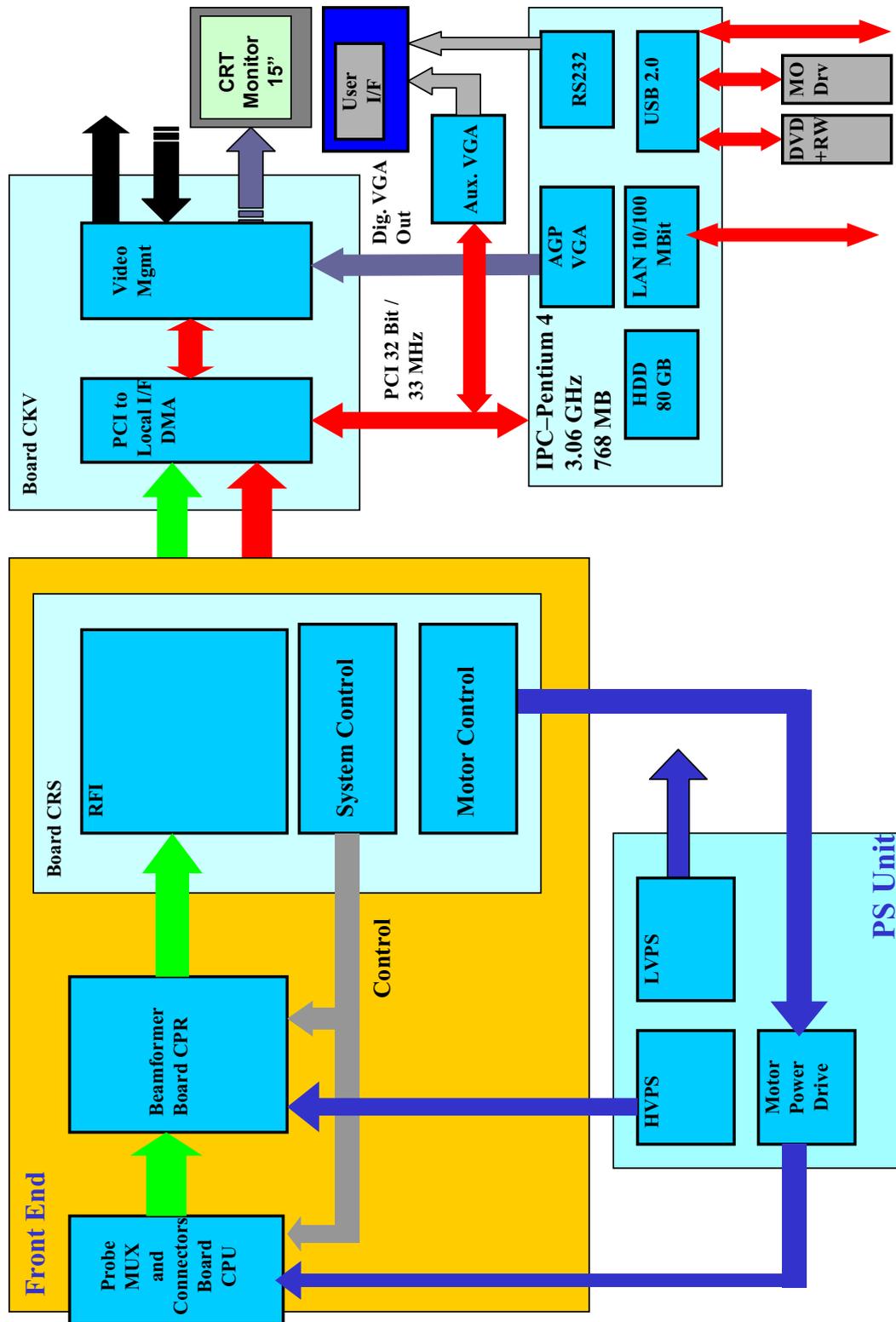


Figure 5-4 Top Level Architecture

5-2-3 Block diagram Voluson® 730Expert (cont'd)

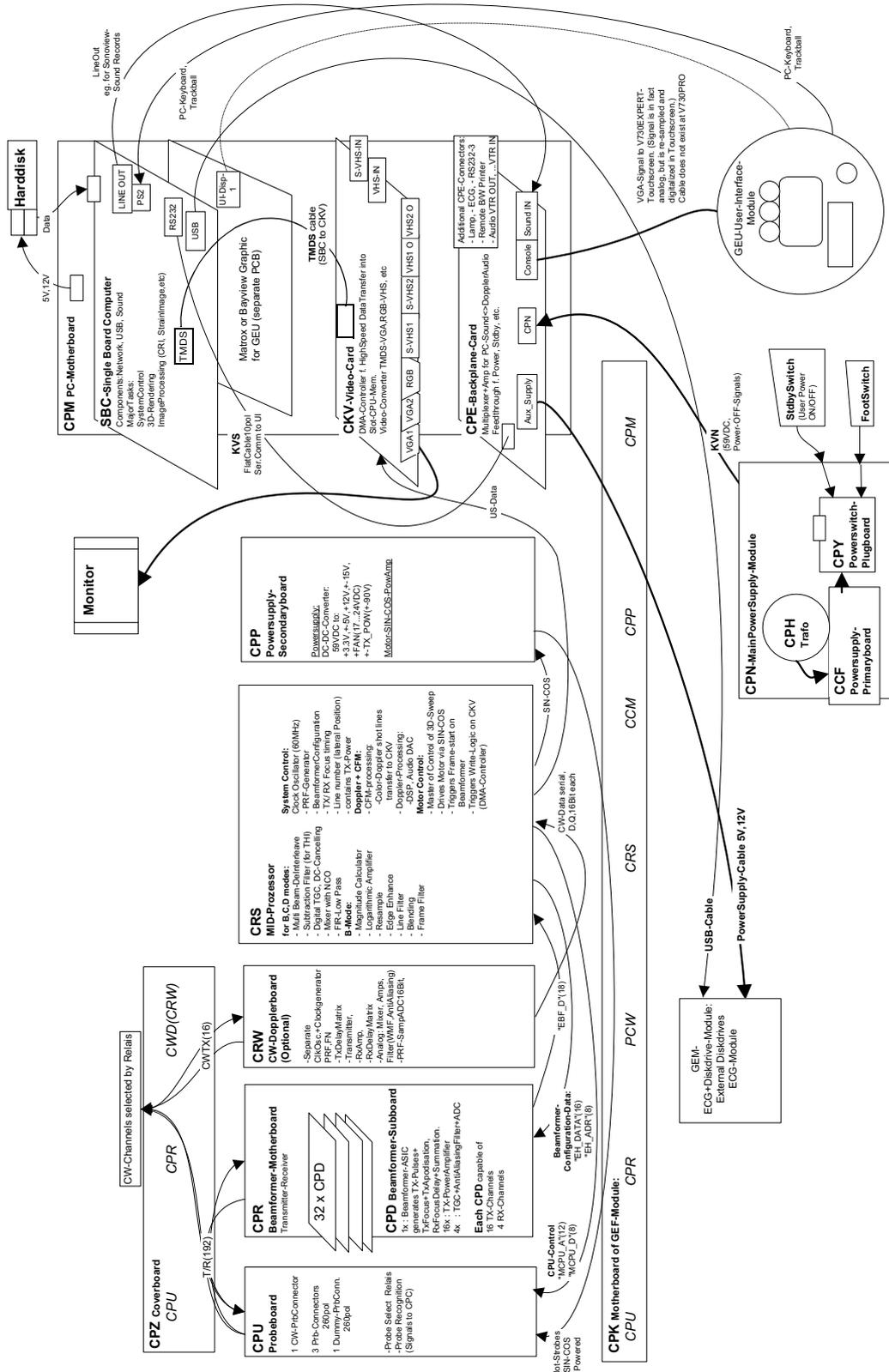


Figure 5-5 Voluson® 730Expert - Block diagram

## 5-2-4 Data Flow Control Description

This section describes the functions of the Voluson® 730Expert Boards vs different Operation Modes.

- CPR - Beam former Board
- CRS - Mid-Processor, System Control and Spectral Doppler Board
- CKV - DMA Controller / Video Management Board  
(CKV-Block diagram) see [Figure 5-15 on page 5-28](#)

### 5-2-4-1 B-Mode

#### 1.) CRS

The CRS contains the Clock-Oszillator(60MHz) and PRF-Generator.

It generates(drives) BF(=Beamformer)-ASIC-Clock(60MHz) and Shot-Trigger for the CPR. Configures CPU (Probe board) and Beamformer (CPD-Subboards on CPR) with TX-Frequ, TX-Focus, RX-Focus, LineNo (lateral Position), TX- Apodisation, RX-Apodisation, Multibeam, etc. CRS also contains the TX-Power-Reference-DAC.

Furthermore it contains Multibeam-DeInterleave, Subtraction Filter (for THI-Mode, see: [Section 5-2-4-1-1 "Special B-Mode Techniques" on page 5-12](#), DigitalTGC, DC-Canceler, Mixer (Part of Demodulator), LowPassFilter, Decimation (Pixel rate Conversion), Magnitude Calculator (Part of Demodulator), Logarithmic Amplifier, Re-Sample, Edge Enhance (Contrast Enhancement through differentiation), LineFilter, Blending (adapting Brightness in order to perfectly combine Nearfield-Frame with Farfield-Frame in FFC-Mode, see: [Section 5-2-4-1-1 "Special B-Mode Techniques" on page 5-12](#), FrameFilter.

Multibeam-DeInterleave means: Incoming Pixel order

shot1**pix1**-shot2**pix1**-shot3**pix1**-shot4**pix1** -  
shot1**pix2**-shot2**pix2**-shot3**pix2**-shot4**pix2**...

is converted to the new order:

**shot1pix1-shot1pix2-shot1pix3.....** - **shot2pix1-shot2pix2-shot2pix3.....**

After DC-cancelling the signal is mixed with RX-Frequency and brought to LF-Spectrum, where the LowPassFilter cuts HF. Mixer and Magnitude-Calculator arrange Complex Demodulation, and Logarithmic Amplifier arrange the conversion from High-Dynamic LinearSignal to the Low-Dynamik(e.g.8Bit) Log-Signal. Several Postprocessing steps (LineFilter, FrameFilter, ReSample, Edge Enhance) enable smooth image quality while keeping contrast high.

#### 2.) CPR

Contains 32 CPD (Beamformer-Subboards).

The CPD consists of Beamformer-ASIC, TX-Amplifier, RX-TGC-Amplifier, Signal-ADC.

Each CPD can support 8 TX-Channels and 4 RX-Channels.

- TX-Channel: ASIC generates TX-Freq through dividing 60MHz by 2,3,4,5,... and TX-Focus.
- RX-Channel: ASIC generates Sample-Clocks for the ADC, manages RX-Focus (Delay and Chain-Adder) and Apodization.

#### 3.) CKV - Direct Memory Access (DMA) section

B-mode-Data from CRS is written via Signal Processor (SP) Channel 0 into SDRAM Fifo Buffer memory. DMA Controller 0 transfers the data into PC main memory where scan conversion is performed per software.

Cine Mode: Reserved area in PC main memory is used.

#### 4.) CKV - Video section

The result is transferred to VGA memory via AGP bus. DVI (Digital Visual Interface) video output signal is connected to CKV, where the analog VGA signals for the monitor and standard video timing outputs are generated.

5-2-4-1-1 Special B-Mode Techniques

- a.) THI =  $\overline{\text{HI}}$  (Tissue Harmonic Imaging incl. Coded Harmonics)  
In one method of THI the RX-Frequency is doubled, so that the radial resolution is increased due to the higher RX-Frequency.  
The second method of THI is pulse-inversion: 2 TX-Beams are shot to the same Tissue-location, one with positive, one with negative polarity. The subtraction of both shots (Subtraction Filter) brings to bear the nonlinear-echo-reflection-properties of the tissue (especially in usage of Contrast-medias), which is very useful with extremely difficult-to-image patients.
- b.) FFC (Frequency and Focus Composite)  
2 or more TX-Beams are shot to the same Tissue-location. The Beams have different TX-foci. By means of Blending (adaption of Brightnesses) they are composed to one whole RX-Line.
- c.) CRI (Compound Resolution Imaging)  
Does not need any special functions of CRS.  
Image is composed of more than one different-direction-steered images. PC-calculated.
- d.) VCI (Volume Contrast Imaging): Does not need any special functions of CRS.  
Image is composed of more than 2 small angle neighbored images. PC-calculated.  
(Only possible with 4D-Probes).

**5-2-4-2 M-Mode**

- 1.) CRS  
see: [5-2-4-1 B-Mode](#)
- 2.) CPR  
see: [5-2-4-1 B-Mode](#)
- 3.) CKV - DMA section  
B-mode-Data from CRS is written via SP0 into SDRAM Fifo Buffer memory.  
DMA Controller 1 transfers the data into PC main memory where scan conversion is performed per software, i.e. the sweep image is generated (scaling and interpolation between lines).  
CineMode: CineMode-Memory is the PC main memory.  
CineMode with ECG: CineMode-Memory for the ECG-Curve is inside PC-Memory.  
Software has to take care that M-Mode-Image and ECG-Curve are placed exactly one upon the other, means: have the same Cine-Shift.
- 4.) CKV - Video section  
see: [5-2-4-1 B-Mode](#)

### 5-2-4-3 D-Mode (Pulsed Wave- and Continuous Wave Doppler)

#### 1.) CRS

- PRF-generator; see: [5-2-4-1 B-Mode](#)
- After DC-cancelling the signal is mixed with RX-Frequency and brought to LF-Spectrum, where the LowPassFilter cuts HF.  
Mixer and Magnitude-Calculator arrange Complex Demodulation.
- Arranges the FFT. D-Mode Data uses the dedicated 8-bit Bus SP1 to the CKV.

#### 2.) CPR

see: [5-2-4-1 B-Mode](#)

#### 3.) CKV - DMA section

D-mode-Data from CRS is written via SP1 into SDRAM Fifo Buffer memory.

DMA Controller 1 transfers the data into PC main memory where scan conversion is performed per software, i.e. the sweep image is generated (scaling and interpolation between lines).

CineMode: CineMode-Memory is the PC main memory.

CineMode with ECG: CineMode-Memory for the ECG-Curve is inside PC-Memory.

Software has to take care that D-Mode-Image and ECG-Curve are placed exactly one upon the other, means: have the same Cine-Shift.

#### 4.) CKV - Video section

see: [5-2-4-1 B-Mode](#)

### 5-2-4-4 D-Mode Autotrace (draws PC-calculated envelope to D-Spectrum) (ECG-Curve is similar to Autotrace-Curve)

#### 1.) CRS

- PRF-generator; see: [5-2-4-1 B-Mode](#)
- After DC-cancelling the signal is mixed with RX-Frequency and brought to LF-Spectrum, where the LowPassFilter cuts HF.  
Mixer and Magnitude-Calculator arrange Complex Demodulation.
- Arranges the FFT. D-Mode Data use the dedicated 8-bit Bus SP1 to the CKV.

#### 2.) CPR

see: [5-2-4-1 B-Mode](#)

#### 3.) CKV - DMA section

D-mode-Data from CRS is written via SP1 into SDRAM Fifo Buffer memory.

PC calculates Autotrace-Curve from D-Mode data.

Cine Mode with Autotrace/ECG: Cine Mode-Memory for the Autotrace/ECG-Curve is inside PC-Memory.

Software has to take care that D-Spectrum and Autotrace/ECG-Curve are placed exactly one upon the other, means: have the same Cine-Shift.

#### 4.) CKV - Video section

see: [5-2-4-1 B-Mode](#)

---

**5-2-4-5 CFM-Mode (Color Flow Mode)**

1.) CRS

- PRF-generator; see: [5-2-4-1 B-Mode](#)
- After DC-cancelling the signal is mixed with RX-Frequency and brought to LF-Spectrum, where the LowPassFilter cuts HF. Mixer and Magnitude-Calculator arrange Complex Demodulation.

2.) CPR

see: [5-2-4-1 B-Mode](#)

3.) CKV - DMA section

see: [5-2-4-1 B-Mode](#)

4.) CKV - Video section

see: [5-2-4-1 B-Mode](#)

**5-2-4-6 3D-Mode (Freezes after 1 volume sweep)**

see: [5-2-4-1 B-Mode](#)

**5-2-4-7 Real Time 4D-Mode (nonstop volume rendering)**

see: [5-2-4-1 B-Mode](#)

**5-2-4-8 CRI-Mode (Compound Resolution Imaging)**

see: [5-2-4-1 B-Mode](#)

**5-2-4-9 VCI-Mode (Volume Contrast Imaging)**

see: [5-2-4-1 B-Mode](#)

**5-2-4-10 Extern-Video-Mode (display Video from Video-Recorder)**

1.) CRS

Not used for Signal-Processing

2.) CPR

Not used for Signal-Processing

3.) CKV - DMA section

Not used for Signal-Processing

4.) CKV - Video section

Analog input from an external video source (YC or CVBS) is converted to a digital RGB data stream by a video decoder. It is mixed with the AGP DVI video output from PC in an overlay unit (Chroma keying mechanism).

Generation of analog VGA signals for the monitor and standard video timing outputs follows this block.

**5-2-4-11 Sonoview write mode (store Image to Sonoview)**

- 1.) CRS  
Not used
- 2.) CPR  
Not used
- 3.) CKV - DMA section  
Not used
- 4.) CKV - Video section  
Not used

## 5-2-5 Description of Software Options

To activate the software options, see [Section 8-8 "Replacement or Activation of Options" on page 8-15](#).

**Table 5-2 Software Options**

	SW-Options	Description
1	Real Time 4D	<a href="#">5-2-5-1 Real Time 4D</a>
2	DICOM	<a href="#">5-2-5-2 DICOM</a>
3	RT_4D_Biopsy	<a href="#">5-2-5-3 Real Time 4D-Biopsy</a>
4	VOCAL	<a href="#">5-2-5-4 VOCAL - Virtual Organ Computer-aided Analysis</a>
5	B-Flow	<a href="#">5-2-5-5 B-Flow</a>
6	XTD-View	<a href="#">5-2-5-6 XTD-View (Extended View)</a>
7	DiagnoSTIC	<a href="#">5-2-5-7 DiagnoSTIC (Spatio-Temporal Image Correlation)</a>
8	CRI	<a href="#">5-2-5-8 CRI - Compound Resolution Imaging</a>
9	VCI	<a href="#">5-2-5-9 VCI - Volume Contrast Imaging</a>

**NOTE:** *Additional options are not yet implemented in the Voluson® 730Expert.*

### 5-2-5-1 Real Time 4D

Real Time 4D mode is obtained through continuous volume acquisition and parallel calculation of 3D rendered images. In Real Time 4D mode the volume acquisition box is at the same time the render box. All information in the volume box is used for the render process. In Real Time 4D mode a "frame rate" of up to 25 volumes/second is possible. By freezing the acquired volumes, size can be adjusted, manipulated manually as known from the Voluson 3D Mode.

### 5-2-5-2 DICOM

Voluson® 730Expert software package providing following DICOM functionality:

- Storage Service Class
- Print Management Service Class
- Modality Worklist Management Service Class

**Sending of reports** - All OB/Gyn measurements can be sent to a PC. Receiving of these reports is supported by ViewPoint workstation "PIA" only. All other workstations can be adapted individually.

### 5-2-5-3 Real Time 4D-Biopsy

For minimal invasive procedures like biopsies, ultrasound is a widely used method to visualize and guide the needle during puncture. The advantage in comparison with other imaging methods is the real-time display, quick availability and easy access to any desired region of the patient. The 4D biopsy allows for real time control of the biopsy needle in 3D multi-planar display during the puncture. The user is able to see the region of interest in three perpendicular planes (longitudinal, transversal and frontal section) and can guide the biopsy needle accurately into the centre of the lesion.

#### 5-2-5-4 **VOCAL - Virtual Organ Computer-aided Analysis**

Diagnosis and therapy of cancer is one of the most important issues in medical care. The VOCAL™- Imaging program is an extension of the 3DView™ software, integrated in the Voluson® sonography systems and also available for PC. It allows completely new possibilities in cancer diagnosis, therapy planning and follow-up therapy control.

**VOCAL™ offers different functions:**

**Volume Calculation** - Manual tracing of contours in three dimensions

**3D Color Histogram** - Automatic calculation of the vascularization

**Shell Imaging** - construction of a virtual shell which covers the entire contour to separately calculate internal tumor vascularization and peripheral vascularization for tumor therapy planning and follow up control.

#### 5-2-5-5 **B-Flow**

B-Flow is especially intuitive when viewing blood flow, for acute thrombosis, parenchymal flow and jets. It helps to visualize complex hemodynamics and highlights moving blood in tissue.

B-Flow is less angle-independent, no velocity aliasing artifacts, displays a full field of view and provides better resolution when compared with Color-Doppler Mode. It is therefore a more realistic (intuitive) representation of flow information, allowing to view both high and low velocity flow at the same time.

#### 5-2-5-6 **XTD-View (Extended View)**

XTD-View provides the ability to construct and view a static 2D image which is wider than the field of view of a given transducer. This feature allows viewing and measurement of anatomy that is larger than what would fit in a single image. XTD-View constructs the extended image from individual image frames as the operator slides the transducer along the surface of the skin in direction of the scan plane. Examples include scanning of vascular structures and connective tissues in the arms and legs.

#### 5-2-5-7 **DiagnoSTIC (Spatio-Temporal Image Correlation)**

With this acquisition method the fetal heart or an artery can be visualized in 4D. It is not a Real Time 4D technique, but a post processed 3D acquisition.

- DiagnoSTIC - Fetal Cardio is only available on RAB & RIC probes in the OB/GYN application.
- DiagnoSTIC - Vascular is only available on the RSP probe in the Peripheral Vascular application.

#### 5-2-5-8 **CRI - Compound Resolution Imaging**

In this special B-mode, beams are transmitted not only perpendicularly to the acoustic window, but also in oblique directions. Between three and nine beams are correlated to form one image line.

The advantages of Compound Resolution Imaging are enhanced contrast resolution with better tissue differentiation and clear organ borders. Also vessel walls and tissue layers are emphasized for easier recognition.

#### 5-2-5-9 **VCI - Volume Contrast Imaging**

Volume Contrast Imaging utilizes 4D transducers to automatically scan multiple adjacent slices and delivers a real-time display of the ROI.

This image results from a special rendering mode consisting of texture and transparency information. VCI improves the contrast resolution and therefore facilitates finding of diffuse lesions in organs.

VCI has more information (from multiple slices) and is of advantage in gaining contrast due to improved signal/noise ratio.

## 5-2-6 Description of Hardware Options

Table 5-3 Hardware Options

	HW-Options	Description
1	CW-Doppler	<a href="#">5-2-6-1 CW - Continuous Wave Doppler</a>
2	ECG Digital Module	<a href="#">5-2-6-2 ECG Preamplifier</a>
3	MOD (Magneto-Optical Drive)	<a href="#">5-2-6-3 MOD (Magneto-Optical Drive)</a>
4	Scan/Freeze Foot switch	<a href="#">5-2-6-4 Scan/Freeze Foot switch</a>
5	Global Modem	<a href="#">5-2-6-5 Global Modem (optional)</a>

### 5-2-6-1 CW - Continuous Wave Doppler

CW Doppler mode provides real time spectral analysis of CW Doppler signals. This information describes the Doppler shifted signal from the moving reflectors in the CW Doppler beam. CW Doppler can be referenced through a small pencil probe or phased array scan head, but it can also be used in conjunction with a 2D image which has an M-line superimposed on the 2D image indicating the position of the Doppler sample volume. For through-the-beamformer CW, this beam is steerable by the operator, and is done by adjusting the location of the M-line. The CW Doppler beam, or M-mode line, can be steered allowing interrogation along an operator-selected line within the image. This option can be upgraded by implementing the CW-Dopplerboard (CRW).

### 5-2-6-2 ECG Preamplifier

MAN6 (internal, digital version)

For details see: [Section 5-10-1-1 "ECG-preamplifier \(MAN6 - optional\)" on page 5-40.](#)

### 5-2-6-3 MOD (Magneto-Optical Drive)

For details see: [Section 5-10-1-3 "Magneto-Optical Drive \(optional\)" on page 5-40.](#)

### 5-2-6-4 Scan/Freeze Foot switch



Footswitch connected to Power Supply-Box (below Main Electronic-Box)

Figure 5-6 Foot-switch Connector (e.g., CPN6)

### 5-2-6-5 Global Modem (optional)

The Multi-Tech global modem is a standard modem that connects to an analog phone line. It provides high-speed data transfers and fax capabilities. Features like remote configuration, callback security, and 2-wire leased line support set it apart from basic desktop modems. In addition, it is approved for use in many countries around the world.

5-2-6-5-1 Location in the Unit



Figure 5-7 Modem (placed on the GEF-box)

5-2-6-5-2 LEDs

The Modem has 10 LEDs on its front.

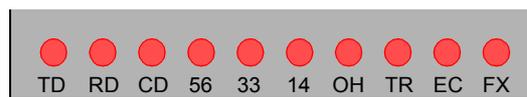


Figure 5-8 LEDs on Modem's Front Panel

Table 5-4 LEDs on Modem

LED Color	Description	Normally State
■ - Red	TD (Transmit Data)	Flashes during use.
■ - Red	RD (Receive Data)	Flashes during use.
■ - Red	CD (Carrier Detect)	ON when detecting a carrier from another modem and during communication. OFF indicates no or broken connection.
■ - Red	56 (56K Mode)	During Power On: Briefly Flashing These LEDs indicates communication speeds above 14 kbs. If one of this LEDs are ON during communication, it will stay ON until the modem is reset or connected the next time. At speeds below 14 kbs, these LEDs are OFF.
■ - Red	33 (V.34 Mode)	
■ - Red	14 (V.32bis Mode)	
■ - Red	OH (Off hook)	ON when dialing, online, or answering a call Flashes if puls dialing Off when modem not in use
■ - Red	TR (Terminal Ready)	ON when the system initializes the modem. It indicates that the modem is ready for an outgoing or incoming call. OFF indicates that communication on the RS232 (COM) port has been broken. The connected (remote) modem will disconnect.
■ - Red	EC (Error Correction (V.42))	ON: Error Correction (V42) is turned ON Blinking: Compression turned ON OFF: Normal operation.
■ - Red	FX (Fax)	Always OFF

## Section 5-3 Main board Chassis GEF Module

The GEF Module contains the Front End processor and the Back End processor and the Secondary Power supply for the full GEF Chassis.  
Additionally GEF Module is the connection point of the internal I/O wiring.

**Front**



**Rear with Internal I/O (Audio Video)**

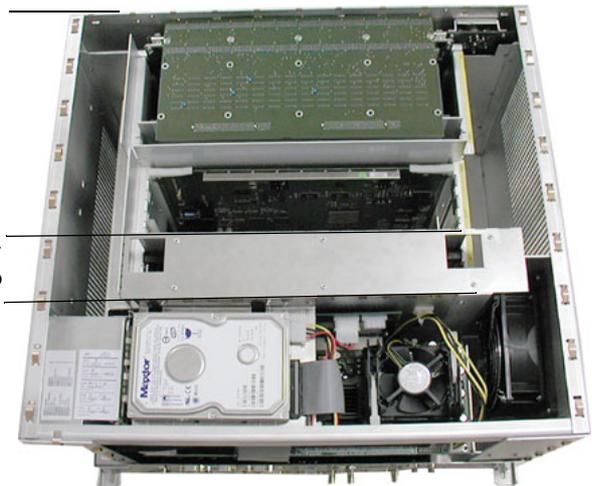


**View from Right  
with Internal I/O (PC-part)**



**Top View**

Front End  
Secondary Power Board - CPP  
Back End



**Figure 5-9 Mechanic of GEF Module**

## Section 5-4 FrontEnd Processor

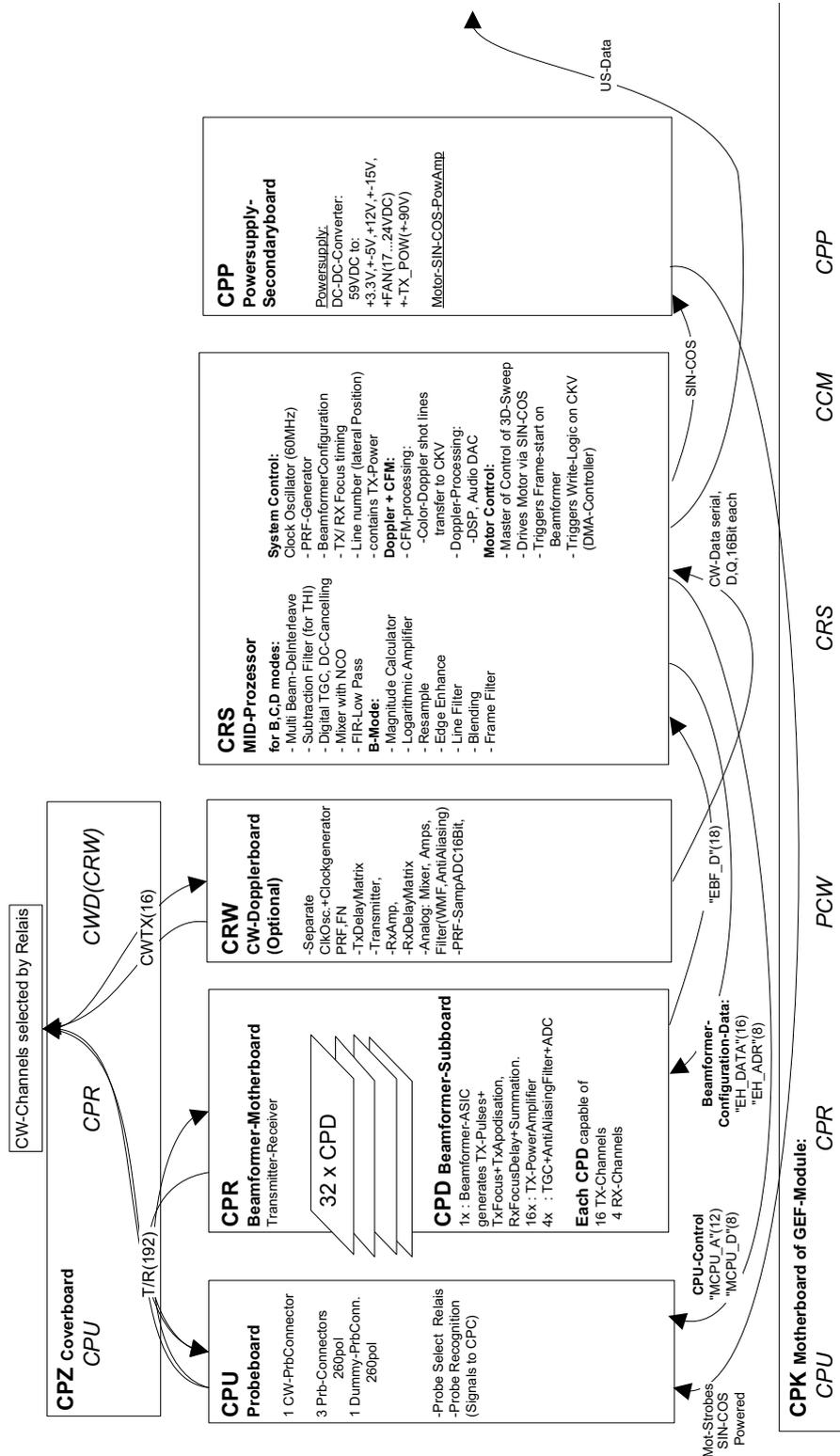


Figure 5-10 Front End Processor - Block diagram

## 5-4-1 FrontEnd - Board Descriptions

### 5-4-1-1 CPU - Probe Connector Board

- 1 CW-Probe Connector
- 3 Probe-Connectors 260pin
- 1 Dummy-Probe Connector 260pin
- Probe Select Relays
- Probe Recognition

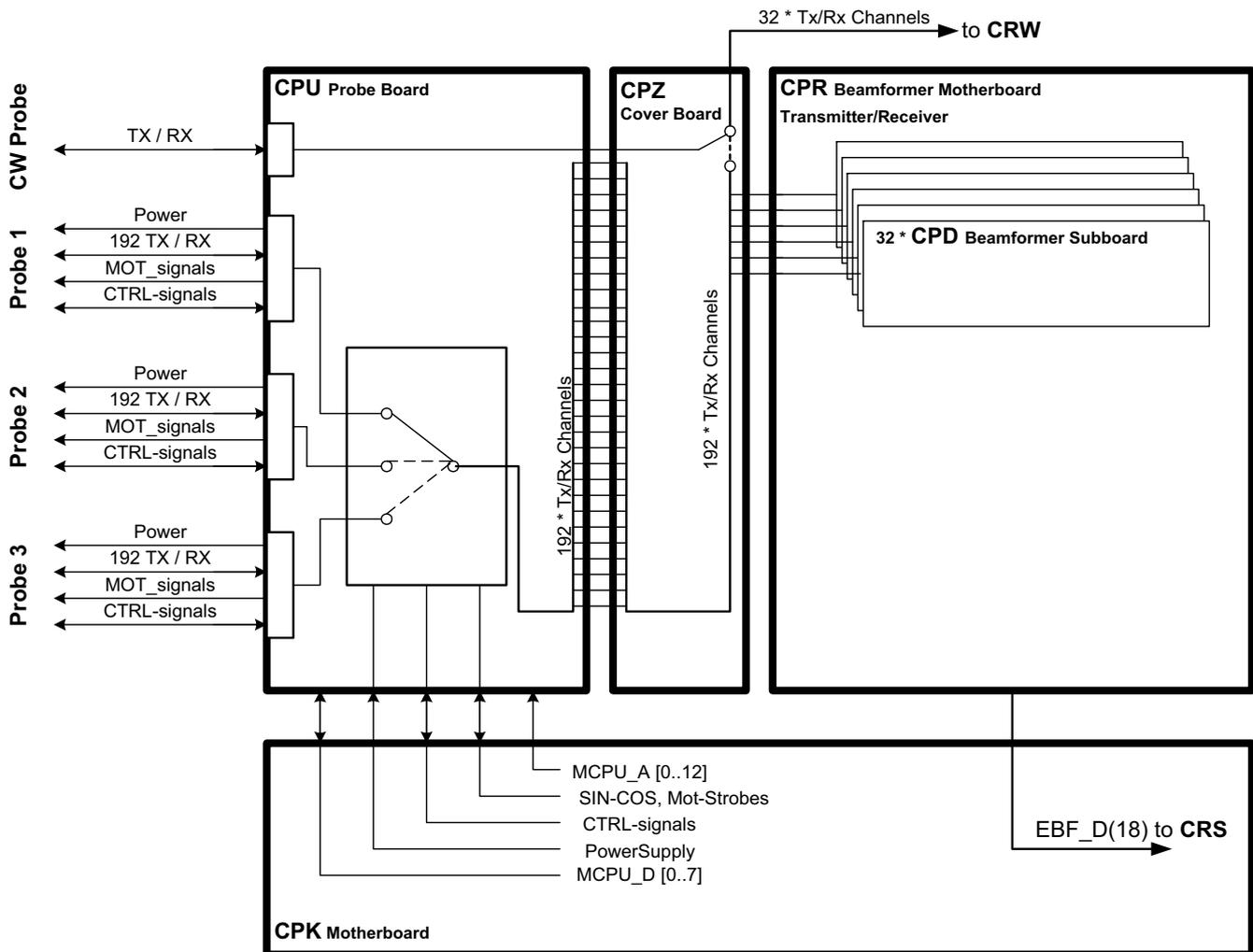


Figure 5-11 CPU + Beamformer (CPR)

### 5-4-1-2 CPR - Beamformer-Motherboard

Transmitter-Receiver (192 transmitter channel used, 128 Receiver channels)

CPR contains 32 pieces of CPD (see: [Section 5-4-1-3 "CPD - Beamformer Sub-board" on page 5-23](#))

5-4-1-3 CPD - Beamformer Sub-board

1x : Beamformer-ASIC  
 generates TX-Pulses + TX-Focus +TX-Apodization, Rx Focus Delay and Summation

16x : TX-Power Amplifier

4x : TGC + Anti Aliasing Filter + Analogue Digital Conversion (ADC)

Each CPD is capable of 16 TX-Channels and 4 RX-Channels

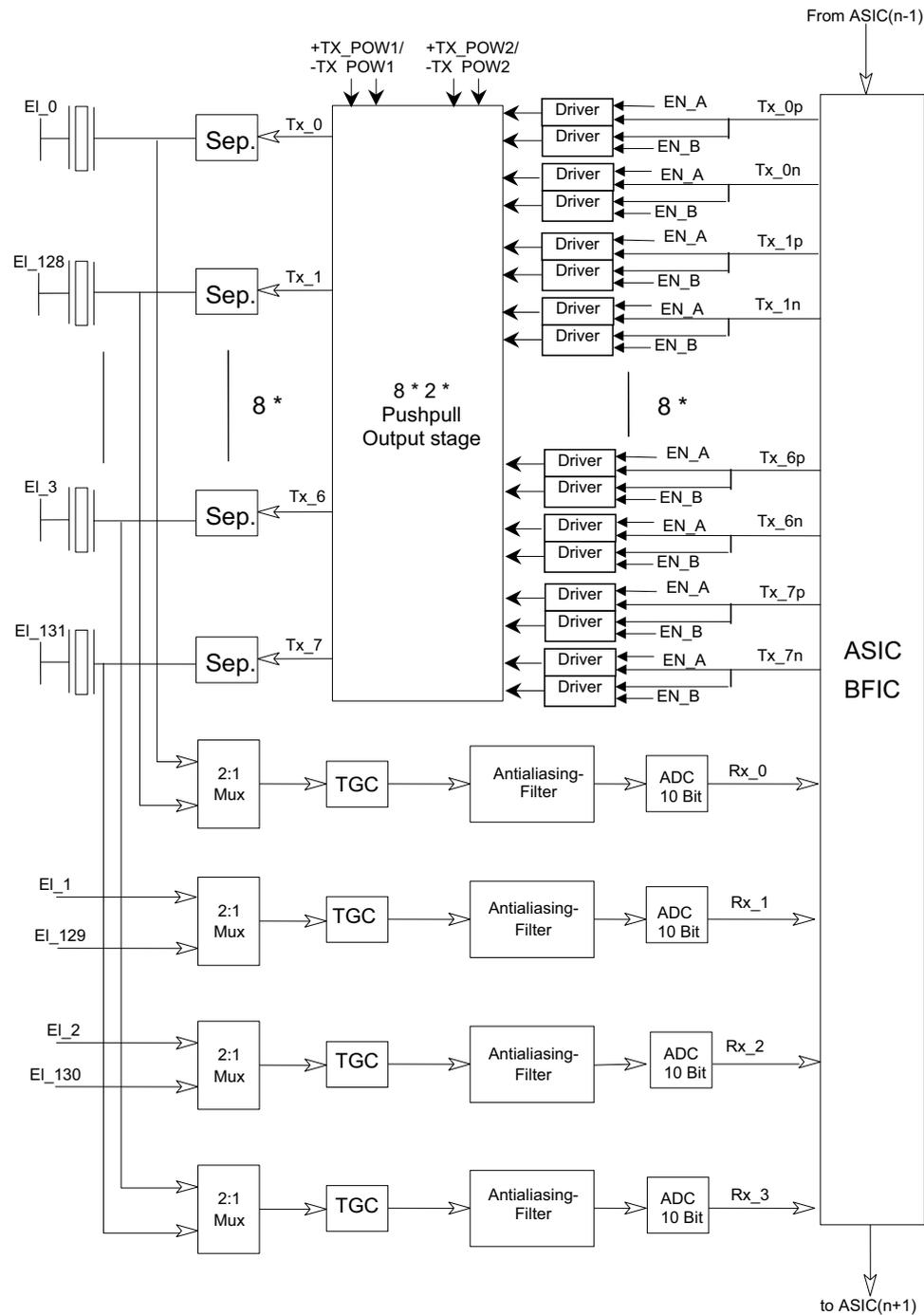


Figure 5-12 Block diagram CPD

**5-4-1-4 CRW - CW-Doppler Board (optional)**

- Separate Clock Oscillator + Clock generator PRF, FN
- TxDelayMatrix
- Transmitter,
- Receiver Amplifiers (RxAmp),
- Receiver Delay matrix (RxDelayMatrix)
- Analogue: Mixer, Amplifier, Filter (WMF, Anti Aliasing)
- PRF-SampADC16Bit,

**5-4-1-5 CPZ - Cover Board**

Transfers the analogue transmitting / receiving signals between the following boards:

- CPU
- CPR
- CRW

192 Transmitter-, 128 Receiver channels, 16 CW-Doppler channels - switched by relays at CPZ

**5-4-1-6 CPK - Motherboard of GEF-Module**

Following boards are direct connected to the CPK:

- CPU - Probe connector Board
- CPR - Beam former Board
- CRW - CW-Doppler Board
- CRS - Signal Processing Board
- CPP - Power Supply Board
- CPM - Motherboard (electrical Signal- and Supply connection between all PC-Plug-In Boards)

#### 5-4-1-7 CRS - Signal Processor Board

##### A.) MID-Processor:

- 1.) For B, C, D modes:
  - Multi Beam-DeInterleave
  - Subtraction Filter (for THI)
  - Digital TGC, DC-Cancelling
  - Mixer with NCO
  - FIR-Low Pass

- 2.) For B mode only:

- Magnitude Calculator
- Logarithmic Amplifier
- Resample
- Edge Enhance
- Line Filter
- Blending
- Frame Filter

##### B.) System Control:

- Clock Oscillator (60MHz)
- PRF (Pulse Repetition Frequency) Generator
- Beamformer Configuration:
  - Tx (transmitting Frequency, TxRx (transmitting/receiving) Focus timing
  - TxRx (transmitting/receiving) Apodization
  - Line number (lateral Position)
  - contains TX-Power-DAC

##### C.) Doppler + CFM:

- 1.) CFM-processing:
  - Color-Doppler shot lines transfer to CKV
- 2.) Doppler-Processing:
  - DSP, Audio DAC
- 3.) Beamformer- Configuration-Data:
  - "EH\_DATA"(16)
  - "EH\_ADR"(8)
  - B-Mode-Data

##### D.) Motor Control:

- Master of Control of 3D-Sweep
- Drives Motor via SIN-COS
- Triggers Frame-start on CPR (Beamformer)
- Triggers Write-Logic on CKV (DMA-Controller)

**5-4-1-8 CPP - Power Supply Secondary Board + Motor Power stage**

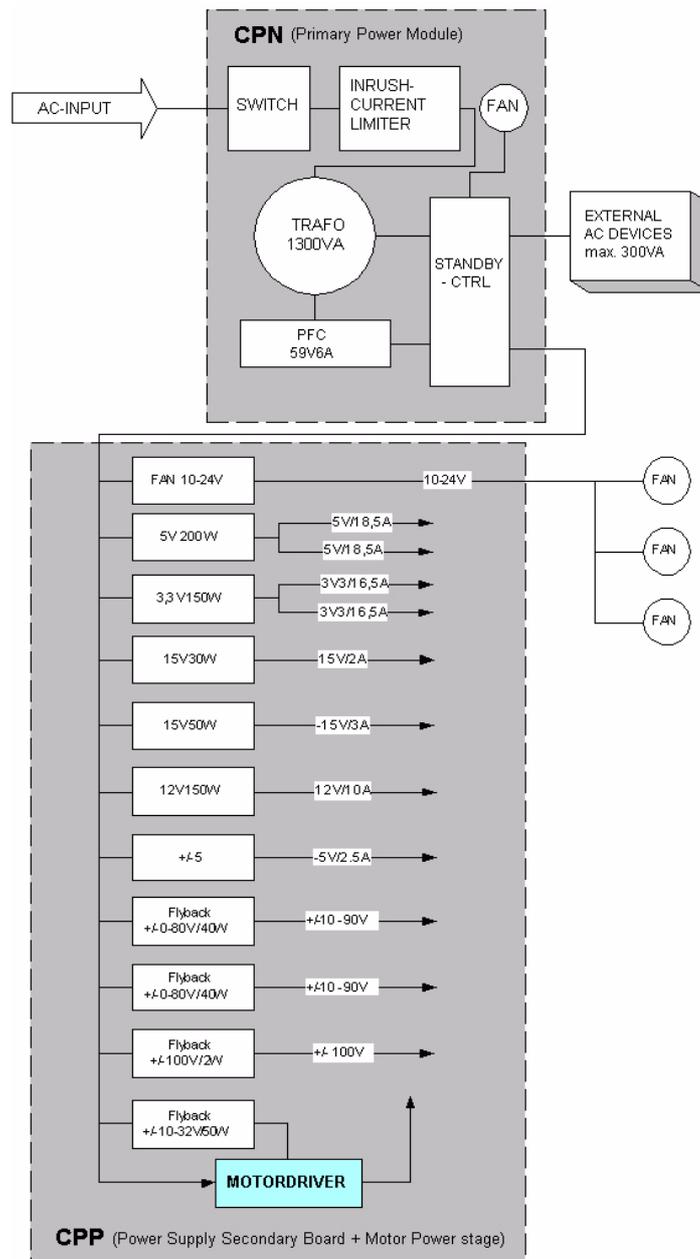
used for Supply of both FrontEnd and BackEnd DC-DC-Converter:

59VDC to following output voltages:

+ 3.3V, +/-5V, +12V, +/-15V,

+ FAN (10 -24V / 15 Watt; adjustable by software)

- +TX\_POW (+/-90V)
- -TX\_POW (+/-90V)
- +TX\_POW2
- -TX\_POW2



**Figure 5-13 Block diagram CPP**

## Section 5-5 BackEnd Processor

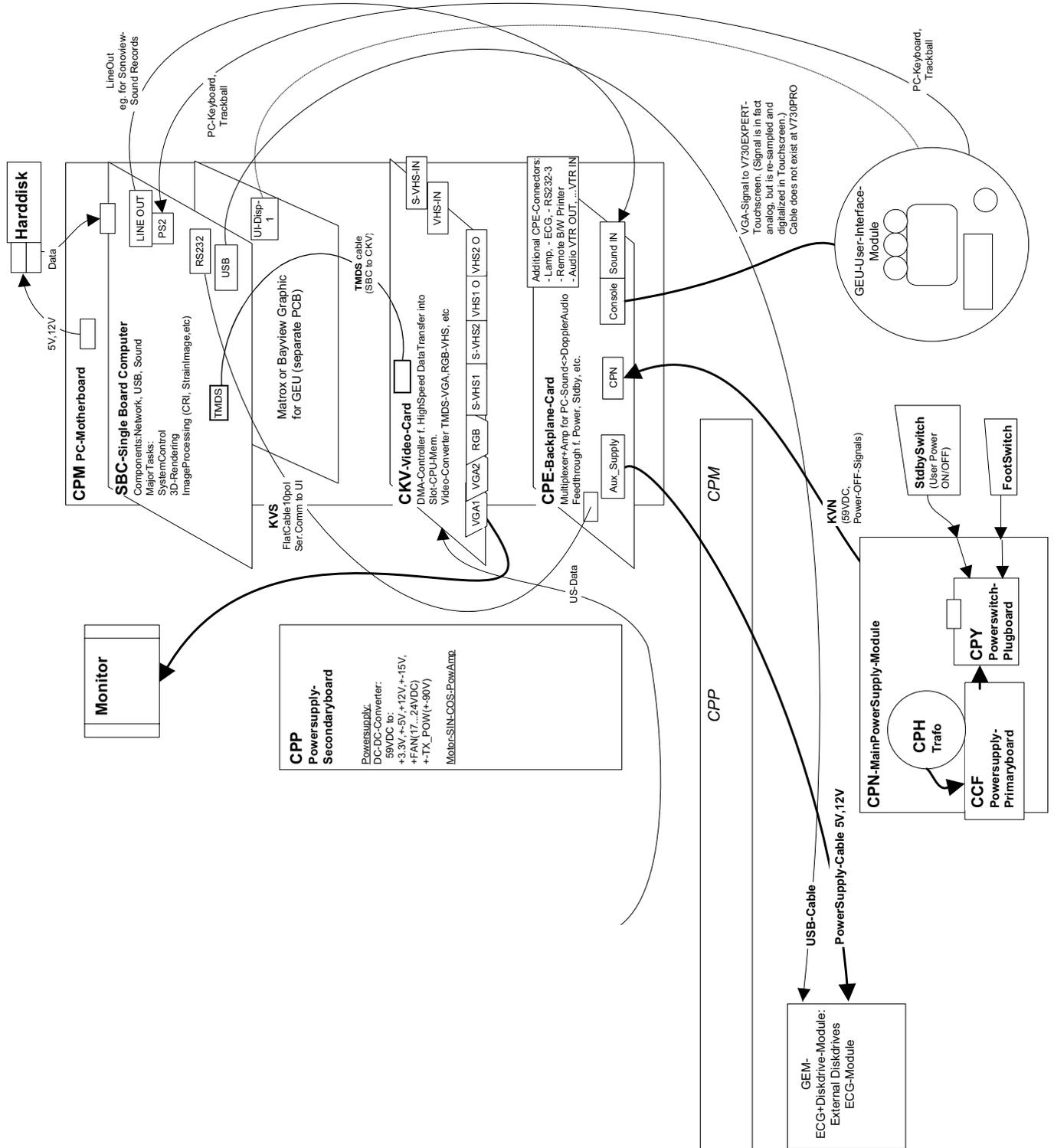
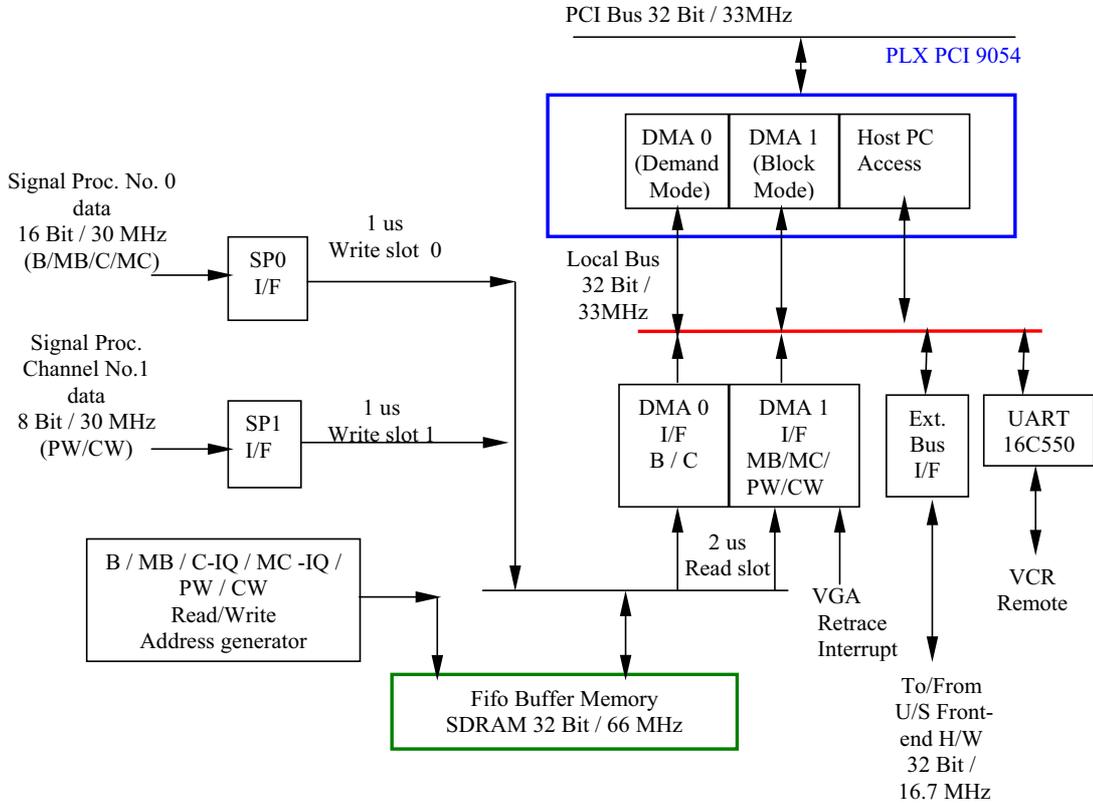


Figure 5-14 BackEnd Processor - Block diagram

5-5-1 Block diagram CKV

DMA Controller



Video I/O

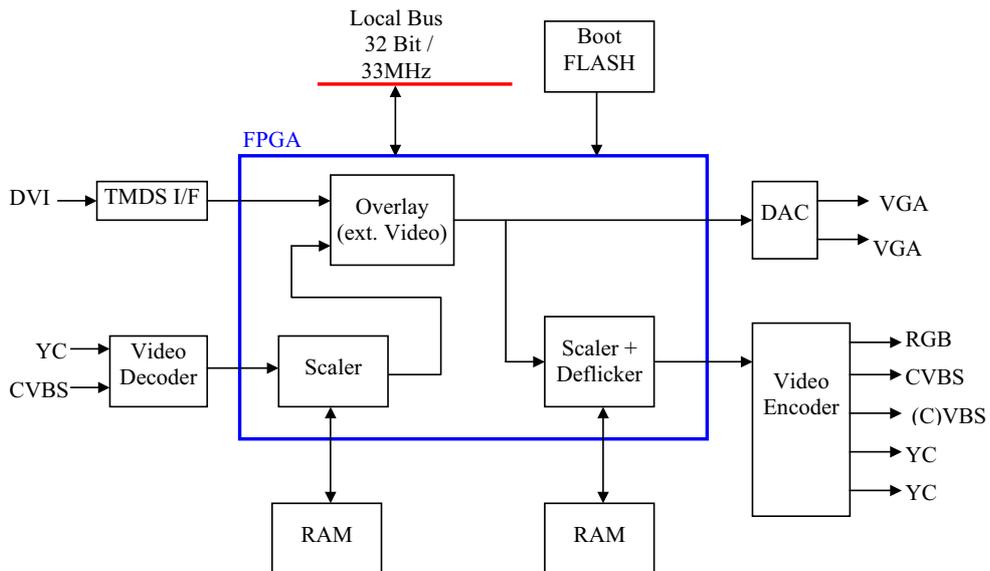


Figure 5-15 Block diagram CKV

## 5-5-2 BackEnd - Board Descriptions

### 5-5-2-1 SBC - Single Board Computer

Built in or external Components:

- AGP VGA
- 100 Mbit LAN
- USB 2.0
- Sound

Major Tasks:

- System Control
- 2D / 3D-Image processing and Rendering
- RS232 (User Interface)
- PS2 (User Interface PC-Keyboard, Mouse as Trackball)
- Control GEM drives (USB)

### 5-5-2-2 PCI VGA Card

Generates Video signal for LCD in User Interface GEU

### 5-5-2-3 CKV - DMA-Controller / Video-Card

- DMA-Controller f. High Speed Data Transfer into Slot-CPU-Memory
- VGA- Output (2 Channels) for the System Main Monitor and external device
- Video-Converter VGA RGB to: VHS, S-VHS, RGB.
- Display External Playback Video and adding Overlay graphics to it.

see also: [Figure 5-15: Block diagram CKV on page 5-28](#)

### 5-5-2-4 Hard Disk Drive

Minimum 80GB; IDE

Stores the system programs and Image filing (patient data, Report files)

### 5-5-2-5 CPE - Back Panel I/O-Card

Multiplexer +Amplifier for PC-Sound<>Doppler Audio

Feed through for DC- Power and signals and for built in Peripherals (User Interface, Disk drive module, ECG, etc.)

### 5-5-2-6 CPM - PC-Motherboard Card

Industrial Standard compatible (PCI) Motherboard

For interfacing between Front End and Back End Processor.

CPE is connected at CPM too.

**5-5-2-7 CPP - Power Supply Secondary Board + Motor Power stage**

used for Supply of both FrontEnd and BackEnd

DC-DC-Converter:

59VDC to following output voltages:

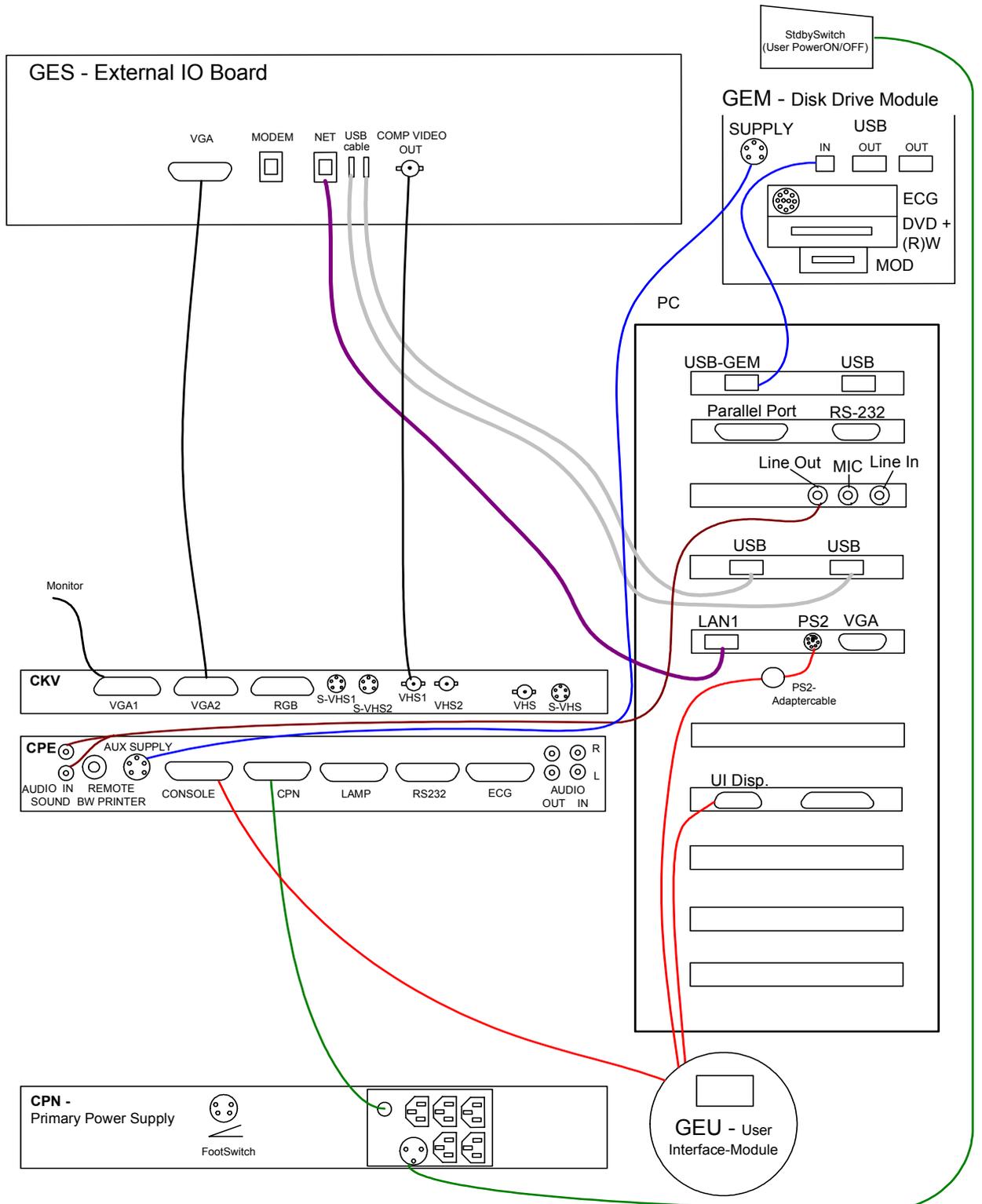
+ 3.3V, +/-5V, +12V, +/-15V,

+ FAN (10 -24V / 15 Watt; adjustable by software)

- +TX\_POW (+/-90V)
- -TX\_POW (+/-90V)
- Motor Sinus2 Powerstage Amplifier
- Motor Cosinus2 Powerstage Amplifier
- +TX\_POW2
- -TX\_POW2

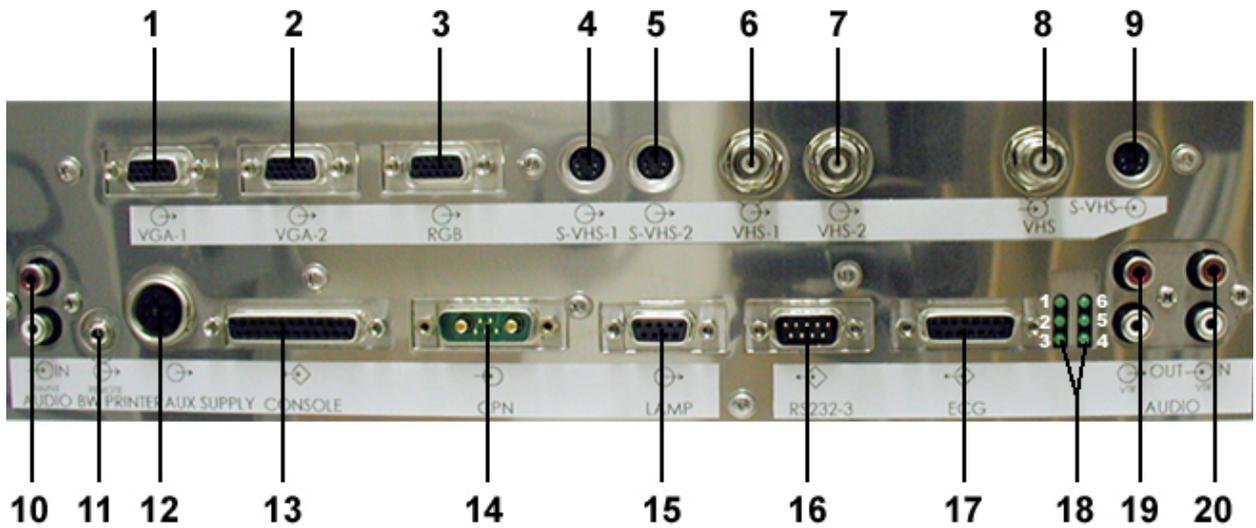
see also: [Section 5-4-1-8 on page 5-26](#)

**Section 5-6**  
**Internal I/O**



**Figure 5-16 Internal I/O**

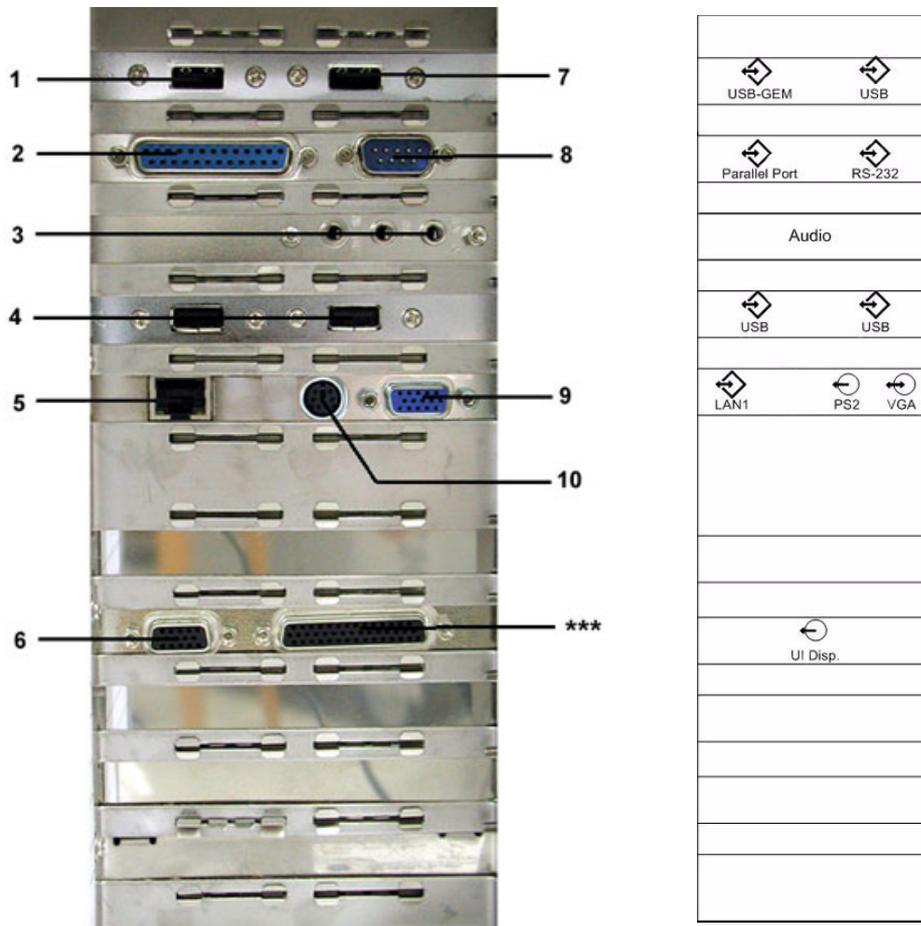
**Section 5-6 Internal I/O (cont'd)**



**Figure 5-17 Connectors on the Main Module of the GEF**

Item	Connector Name	Description
1	VGA1	Connector for the internal color video monitor
2	VGA2	Connector for an external color monitor
3	RGB	Output for color video printer
4	S-VHS 1	S-VHS 1 OUT
5	S-VHS 2	S-VHS 2 OUT
6	VHS 1	Video 1 OUT: 1Vss @ 75 Ohm, PAL ; 1Vss @ 75 Ohm, NTSC
7	VHS 2	Video 2 OUT: 1Vss @ 75 Ohm, CCIR ; 1Vss @ 75 Ohm, FCC
8	VHS	Video IN: 1Vss @ 75 Ohm, PAL / CCIR ; 1Vss @ 75 Ohm, NTSC / FCC
9	S-VHS	S-VHS IN
10	Audio IN Sound	Audio IN R/L Sound
11	Remote BW Printer	Remote control for BW Printer
12	AUX Supply	Power Supply for Module GEM
13	Console	Connector for Console
14	CPN	Connector for Power Supply (CPN) input
15	Lamp	Connector for external lamp
16	RS232-3	Remote control for Video Recorder
17	ECG	Connector for MAN (ECG-preamplifier)
18	-----	Diagnostic LED's (for voltage check; see: <a href="#">Section 7-3-1 on page 7-4</a> ) 1 = +15V ; 2 = -15V ; 3 = Fan ; 4 = +12V ; 5 = +5V ; 6 = +3.3V
19	Audio OUT / VTR	Audio OUT / R/L Video Recorder
20	Audio IN / VTR	Audio IN / R/L Video Recorder

**Section 5-6 Internal I/O (cont'd)**



**Figure 5-18 Connectors on PC-part of the GEF**

Item	Connector Name	Description
1	USB-GEM	Connector for Disk Drive Module GEM
2	Parallel Port	Parallel port for PC-Line Printer
3	Audio	MIC = Connector for Microphone Line-OUT = Connector for Sound card
4	USB	USB port connectors
5	LAN1	Connector for Network twisted pair RJ-45 10/100 megabit/s
6	UI Disp.	Connector for User Interface Display
7	USB	USB port connector
8	RS-232	Connector for Global Modem
9	VGA	no function
10	PS2	Connector for Mouse / Keyboard
***	-----	no function

## Section 5-7 Top Console

The Voluson® 730Expert Operator Control Panel (OCP) consists of the following electronic subassemblies and/or functional components:

- Display/Touch screen module:
  - VGA display – 640x480 pixels
  - Resistive 5-wire analog touch screen
  - Integrated display graphics controller
- Console module:
  - C515 micro controller
  - Atmel micro controller
  - Slide pots TGC with zero raster position)
  - Rotary Encoders with integrated push buttons
  - PS/2 compatible Trackball (2") with standard PC interface
  - PS/2 compatible Qwerty Keyboard with standard PC interface
  - LED indicators with 3 intensity levels (off, 50%,100%)
  - 2 Speaker, used for Doppler and voice replay
- DC/DC Converter:
  - Converts 12V DC input voltage to 5V DC output voltage for supplying UI components

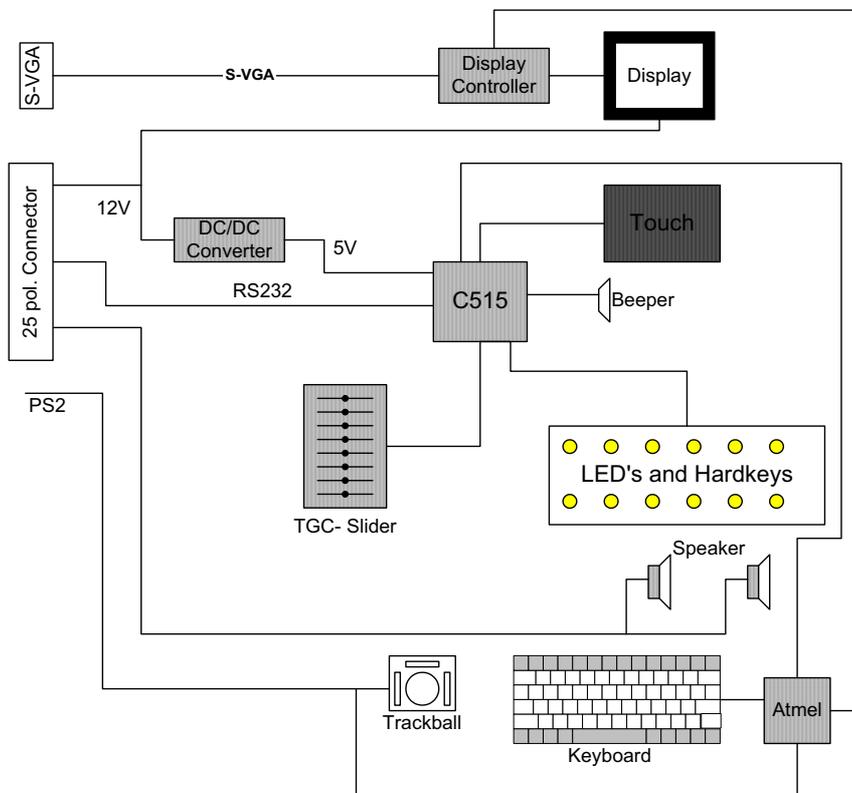


Figure 5-19 Top Console

Section 5-7 Top Console (cont'd)

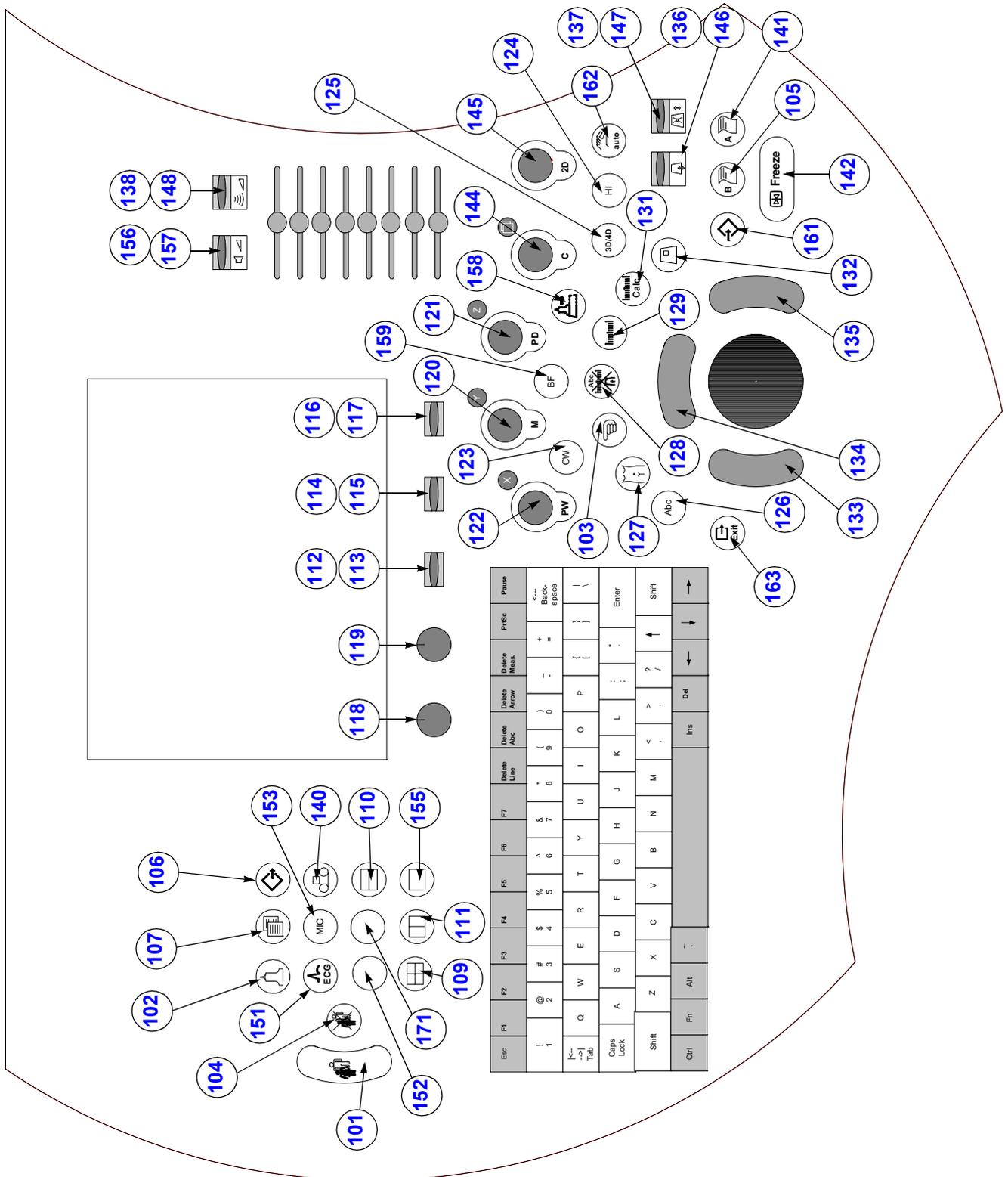


Figure 5-20 Voluson® 730Expert - Control Console

**Table 5-5 Voluson® 730Expert - key codes**

key code	Description	Voluson® 730Expert - Functionality	X	X	X
101	PID (patient identification)	call-up of the patient data entry menu			
102	Probe	call-up of the probe program menu			
103	Indicator	displays a pointer arrow or hand			
104	End Exam	Patient and measurement data are stored in the "Data manager"			
105	Print_b	Remote printer trigger key B			
106	Sonoview	to shift from scan mode to Sonoview			
107	Report	call-up of the Patient report page			
109	Quad Format	Quad-Screen format			
110	Dual Format (V)	Dual-Screen format (vertical distribution)			
111	Dual Format (H)	Dual-Screen format (horizontal distribution) - not yet implemented			
112	Soft3 (Toggle)	UP - Toggle switch function			
113	Soft3 (Toggle)	DOWN - Toggle switch function			
114	Soft4 (Toggle)	UP - Toggle switch function			
115	Soft4 (Toggle)	DOWN - Toggle switch function			
116	Soft5 (Toggle)	UP - Toggle switch function			
117	Soft5 (Toggle)	DOWN - Toggle switch function			
118	Soft_Switch1	Soft_Switch1			
119	Soft_Switch2	Soft_Switch2			
120	Mode_Switch1	M-Mode (Motion mode)			
121	Mode_Switch2	PD-Mode (Power Doppler)			
122	Mode_Switch3	PW-Mode (Pulsed Wave Doppler)			
123	CW	Continuous Wave Doppler			
124	HAR	Harmonic Imaging			
125	3D/4D	Volume Mode			
126	Text	Image documentation - to write onto the screen			
127	Bodymark	Bodymark display - to enter Bodymark symbols			
128	ClrScreen	to clear graphics, measurements and annotations on the screen			
129	Meas_mm	Basic measurements			
131	MeasCalcs	Calculation tables			
132	HR_Zoom	High Resolution Zoom			

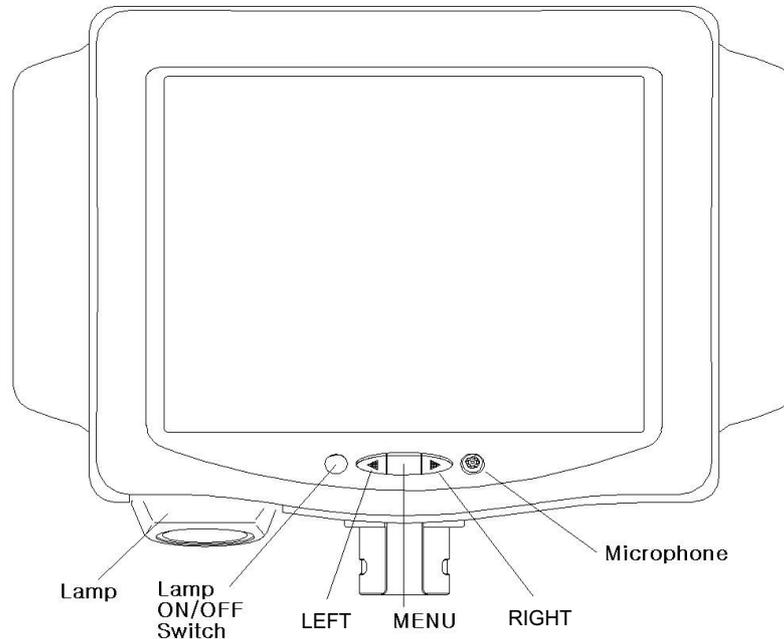
Table 5-5 Voluson® 730Expert - key codes

key code	Description	Voluson® 730Expert - Functionality	X	X	X
133	Trball_b	left trackball key			
134	Trball_a	upper trackball key			
135	Trball_c	right trackball key			
136	B_Depth	UP - penetration depth of the B-image			
137	B_FocDepth	UP - position of the transmitter focus			
138	AcousticPWr	UP - acoustic output (Power)			
140	VtrRec	call-up of the VCR Remote control menu			
141	Print_a	Remote printer trigger key A			
142	Freeze	Read/Write (Freeze/Run)			
144	Mode_Switch4	C-Mode (Color Flow mode)			
145	Mode_Switch5	2D-Mode (B mode)			
146	B_Depth	DOWN - penetration depth of the B-image			
147	B_FocDepth	DOWN - position of the transmitter focus			
148	AcousticPWr	DOWN - acoustic output (Power)			
151	ECG	ECG line ON/OFF			
152		Contrast (at the time being this feature is not yet implemented)			
153	MIC	Microphone			
155	Single Format	Single-Screen format			
156	Speaker Volume	UP - speaker volume			
157	Speaker Volume	DOWN - speaker volume			
158	SieScape	XTD-View (Extended View)			
159	BiFlow	B-Flow			
161	Save Menu	Save Menu - to save/send images (volumes)			
162	OTO	Automatic Optimization			
163	Exit	Exit			
171	UNKNOWN	NOT USED			



**NOTICE** Key codes which are not listed in the table are not available at Voluson® 730Expert.

## Section 5-8 Monitor



### KEY FUNCTION

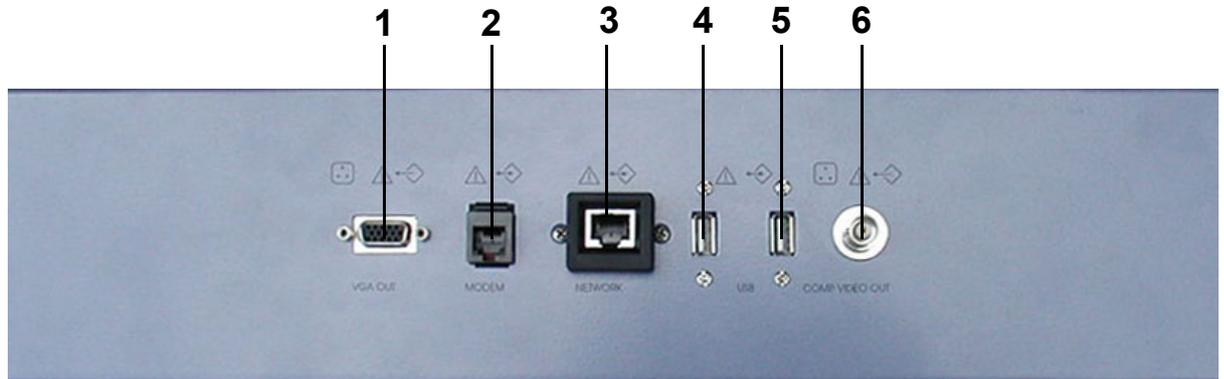
- a. MENU KEY  
This button will enable the On Screen Display.  
This button is also used to select the function in the Main Menu or to save the setting in the Sub Menu. (Push for 3sec)
- b. DECREASE ◀ [LEFT]  
Use this button to move down the OSD selection menu and adjust the attribute of the monitor while in OSD mode. Pressing this button out of the OSD menu allows you to decrease the level of contrast of the display screen.
- c. INCREASE ▶ [RIGHT]  
Use this button to move up the OSD selection menu and adjust the attribute of the monitor while in OSD mode. Pressing this button out of the OSD menu allows you to increase the level of contrast of the display screen.
- d. LAMP ON/OFF  
Lamp ON/OFF S/W
- e. MICROPHONE  
Allows to record voice

**NOTE:** There is no function of microphone.

**Figure 5-21 Monitor Adjustment buttons**

For further details refer to: [Section 6-3 "Monitor Adjustment" on page 6-2.](#)

## Section 5-9 External I/O



**Figure 5-22 External I/O Panel Connectors**

**Table 5-6 External I/O Connector Description**

Item	Connector Name	Description
1	VGA OUT	print out VGA signal with monitor/printer
2	Modem	RJ-11 with global adapter kit for modem connection
3	NETWORK	DICOM input/output twisted pair RJ-45 10/100 megabit/s
4	USB-1	USB-2.0 port
5	USB-2	USB-2.0 port
6	COMP VIDEO OUT	BNC Connector, Color Video Output

## Section 5-10 Peripherals

### 5-10-1 General Information - GEM (Disk Drive Module)

The GEM Module contains the DVD/CD+(R)W Drive.

Additionally the Magneto Optical Drive and the ECG-preamplifier (MAN6) can be installed as an Option.

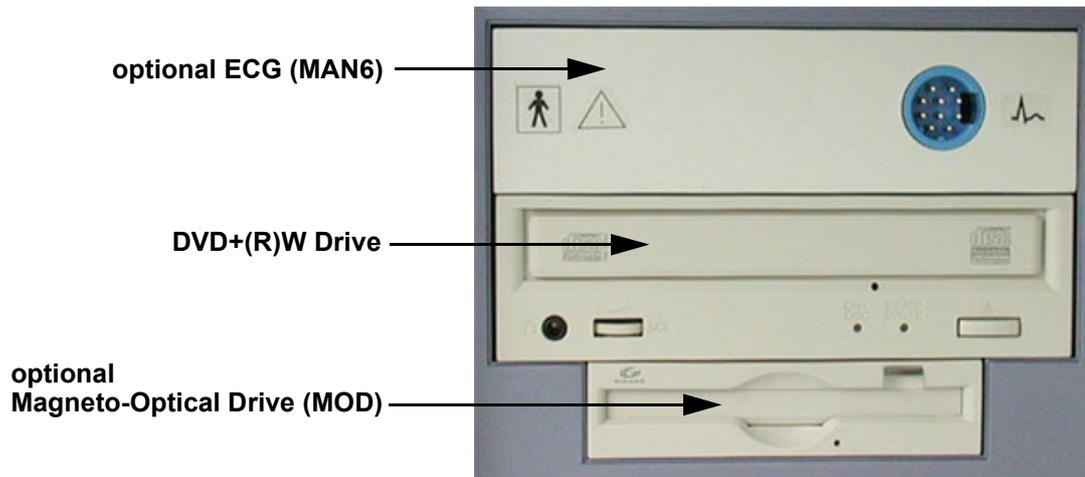


Figure 5-23 GEM incl. optional MOD and ECG

#### 5-10-1-1 ECG-preamplifier (MAN6 - optional)

The ECG-preamplifier is used for acquiring an ECG-signal to be displayed with the ultrasound image. This optional peripheral serves for gaining an ECG-signal to mark the systolic and end diastolic moments in M-Mode and Doppler evaluations.

The ECG-preamplifier must not be used for ECG-diagnostics. It is not intended for use as a cardiac monitor and must not be used for an intraoperative application on the heart.

#### 5-10-1-2 DVD/CD+(R)W Drive

The DVD/CD+(R)W Drive (Writer) is used to backup images and reports. In addition, it is used as the main source of software upgrades and other service utility operations. The DVD/CD+(R)W Drive can read/write CD's and DVD's.

#### 5-10-1-3 Magneto-Optical Drive (optional)

Storage capacity by disk: 1.3GB, 640MB, 540MB, 230MB, 128MB

The MO-Drive allows to read and write any GIGAMO standard 1.3GB disk at twice the liner bit density. Additionally it retains full read/write compatibility with ISO/IEC 3.5 - inch disks ranging from original 128MB to current 640MB.

MO disks are nearly indestructible and immune from the problems that plague magnetic media. MO disks can be rewritten an unlimited number of times.

## Section 5-11 Power Distribution

-  **NOTICE** Power Distribution depends on the currently installed CPN - Primary Power Module.
- [Section 5-11-1 "CPN6 - Primary Power Module" on page 5-41](#)
  - [Section 5-11-2 "CPN80-81 - Primary Power Module" on page 5-43](#)

### 5-11-1 CPN6 - Primary Power Module



Figure 5-24 Primary Power Module - CPN6

#### 5-11-1-1 Mechanical Concept and Overview

The AC Power's main tasks are to supply the various internal subsystems with AC power and to galvanically isolate the scanner from the on site Mains Power System. To reduce inrush current, an inrush current limiter as well as an EMI filter is implemented.

Voltage to peripherals can be configured to either 115 VAC or 230 VAC.

The mains cord has plugs on both ends.

A female plug connects to the scanner and a male plug to the mains outlet on site.

The mains voltage is routed via an EMI filter to the Mains Switch, located on the rear of the system.

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

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

#### 5-11-1-2 Major Functions of CPN6

- Inrush Current limiter
- Power factor correction transformer for Sinus load for the mains voltage
- Power down Circuitry + Standby-Switch
- The CPN6 module generates 57VDC (+/-2V) as an input voltage for the Secondary Power supply of the GEF module.
- The CPN6 module contains also the isolation transformer for the peripherals. (Maximum load: 350VA)

**NOTE:** All DC-supply voltages for built in peripherals are generated in GEF-module not inside CPN6.

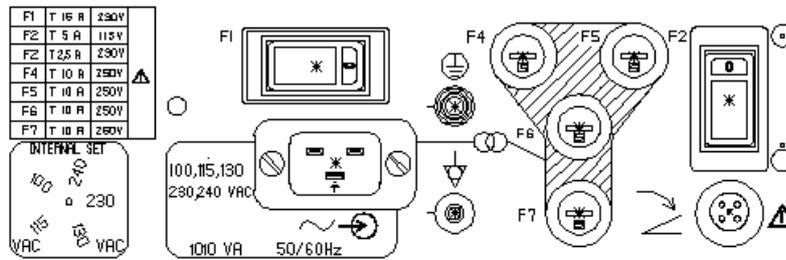
**NOTE:** The system mains supply input voltage can be set to: 110V, 130V, 230V, 240V.  
The output voltages may be set to 115V or 230VAC (independent from the input voltages)

**5-11-1-3 Fuses on Rear Panel (CPN6)**

F1: The main Input voltage is fused by a magnetic Circuit breaker (Rated current 16A) built in the Main Power switch labelled F1

F2: The AC Output voltage (115/230V) is fused by F2 (magnetic Circuit breaker 2.5/5A)

F3, F4, F5, F6: are the fuses for the input voltage for the switching power supplies generating the DC-Supply voltage for the Secondary power supply inside GEF-Module



**Figure 5-25 Fuses of CPN6**

**5-11-1-4 Fuses inside CPN6**

F1 on CCF board: fuses the surge current limiter circuit.

**NOTE:** *If this fuse is blown, the NTC (limiting the surge current will remain hot during system operation and if the system is switched off/on within a few seconds the surge current could be too high. Because of this reason Fuse F1 on CPN Rear Panel or the Hospital circuit fuse could be blown.*

## 5-11-2 CPN80-81 - Primary Power Module



Figure 5-26 Primary Power Module - CPN80-81 (old version)



**Note:** The new version of CPN80-81 has different print layout!  
It shows an electrical hazard icon on the right side (instead of the “Caution” section), indicating:  
**DANGEROUS ELECTRIC VOLTAGE. Pull the mains plug before opening the unit!**

### 5-11-2-1 Mechanical Concept and Overview

The AC Power's main tasks are to supply the various internal subsystems with AC power and to galvanically isolate the scanner from the on site Mains Power System. To reduce inrush current, an inrush current limiter is implemented.

Voltage to peripherals can be configured to either 115 VAC or 230 VAC.

The mains cord has plugs in both ends. A female plug connects to the scanner and a male plug to the mains outlet on site.

From the Mains Power Input module, the AC power is routed via an Inrush Current Limiter to a internal outlet connector for the Mains Transformer.

### 5-11-2-2 Major Functions of CPN80-81

- Inrush Current limiter
- Power factor correction transformer for Sinus load for the mains voltage
- Power down Circuitry + Standby-Switch
- The CPN module generates 57VDC (+/-2V) as an input voltage for the Secondary Power supply of the GEF module.
- The CPN80-81 module contains also the isolation transformer for the peripherals.  
(Maximum load: 350VA) see: Basic User Manual Chapter 23 Technical Data/Information

**NOTE:** All DC-supply voltages for built in peripherals are generated in GEF-module not inside CPN80-81.

**NOTE:** The system mains supply input voltage can be set to: 110V, 130V, 230V, 240V.  
The output voltages may be set to 115V or 230VAC (independent from the input voltages).

### 5-11-2-3 Fuses on Rear Panel (CPN80-81)

F1 + F2: The main Input voltage is fused by two 16 Ampere fuses (rated current 16A) labeled F1 and F2.

F3: The AC Output voltage (115/230V) is fused by either:

- a 1.6 Ampere / 250V fuse for auxiliary output voltage 230 VAC
- a 3.2 Ampere / 250V fuse for auxiliary output voltage 115 VAC

F4: 16 Ampere fuse for the input voltage for the switching power supply generating the DC-Supply voltage for the Secondary power supply inside GEF-Module



Figure 5-27 Fuses of CPN80-81

### 5-11-2-4 Fuses inside CPN80-81

F1 on CCF board: fuses the surge current limiter circuit.

*NOTE: If this fuse is blown, the NTC (limiting the surge current will remain hot during system operation and if the system is switched off/on within a few seconds the surge current could be too high. Because of this reason Fuse F1 on CPN Rear Panel or the Hospital circuit fuse could be blown.*

### 5-11-3 Disk Drive Module (GEM)

The check points for the drives voltages can be found at the AUX Supply connector (= GEM Power connector) on Backpanel of GEF-Box; see: [Section 7-3 "Check Points Voltages" on page 7-4](#).

- MO drive is supplied by +5V only
- DVD/CD drive is supplied by both +5V and +12 V
- Fan on the GEM module needs only 12 V power.

#### 5-11-3-1 Fuses on CPE-Board for Disk Drive Module (GEM)

Description of fuses: 5A / 250V / slow-blow fuse / 5 x 20 mm

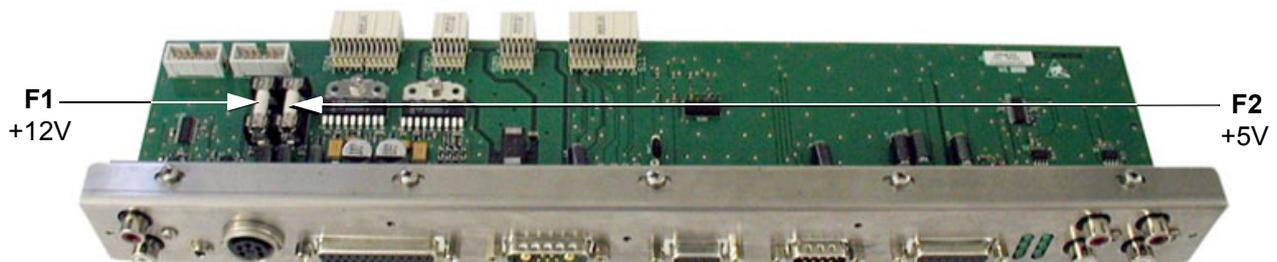


Figure 5-28 fuses for disk drives

## Section 5-12 Mechanical Descriptions

### 5-12-1 Physical Dimensions

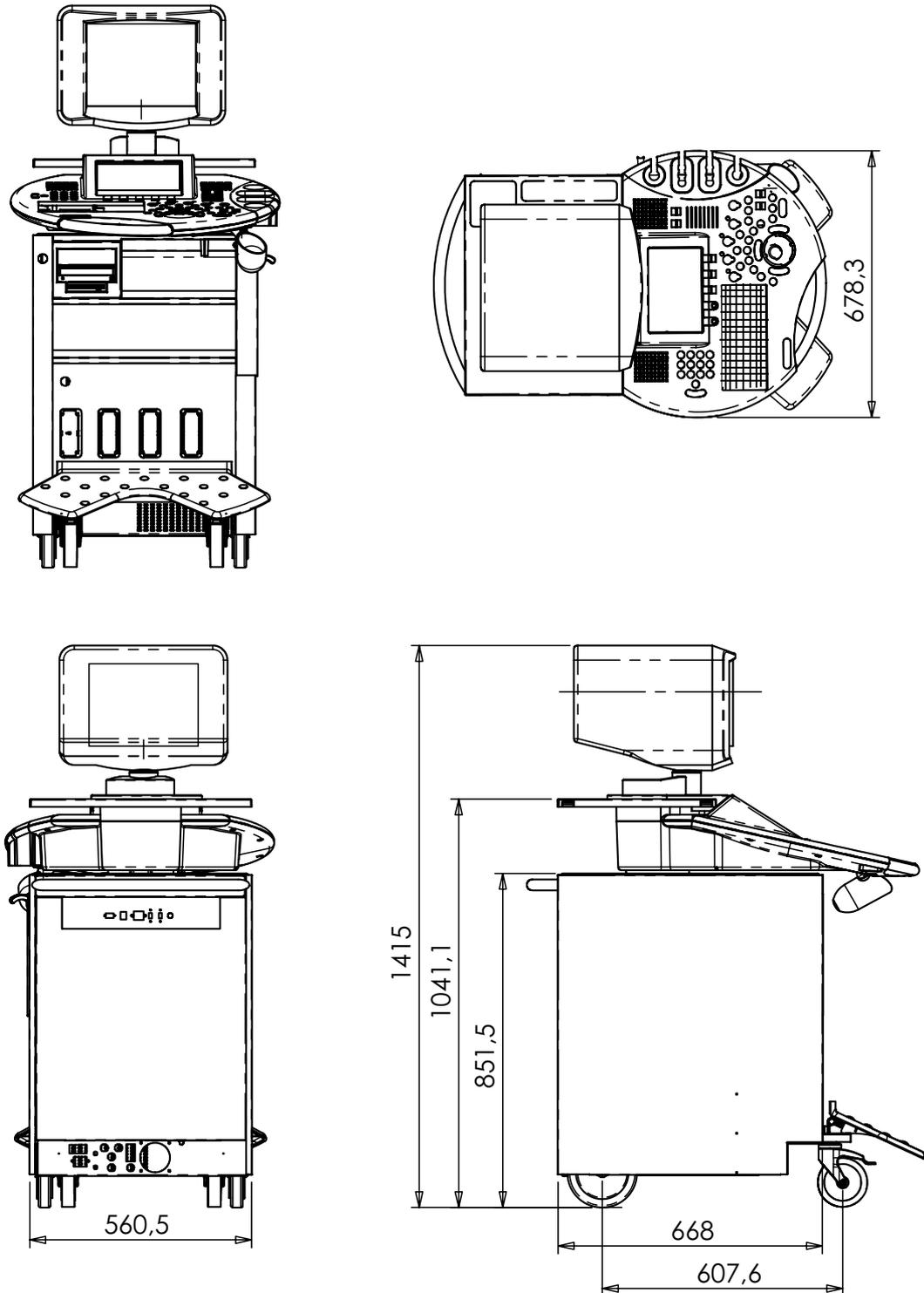


Figure 5-29 Physical Dimensions

### 5-12-2 Monitor

- Tilt: 11° forwards and backwards
- Swivel: +/-90° rotation.

### 5-12-3 Top Console Positioning

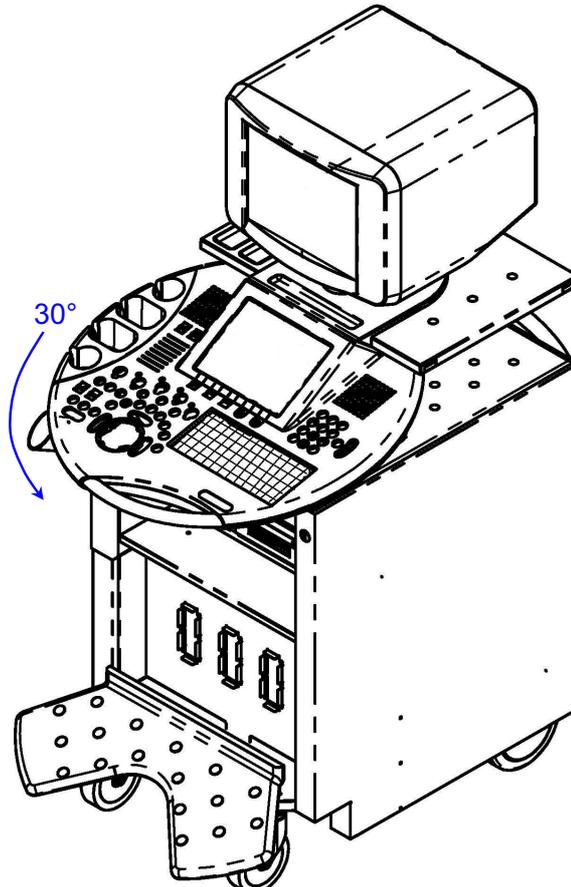


Figure 5-30 Top Console Positioning

### 5-12-4 Rotation of the Control Console

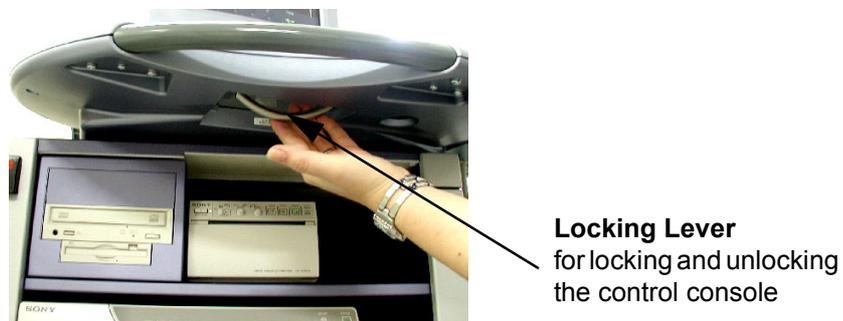


Figure 5-31 Locking lever under Control Console

- Horizontal Access: The control panel offers 30° of horizontal adjustment to the right.

5-12-5 Assembly Drawing GW & GEU & Monitor

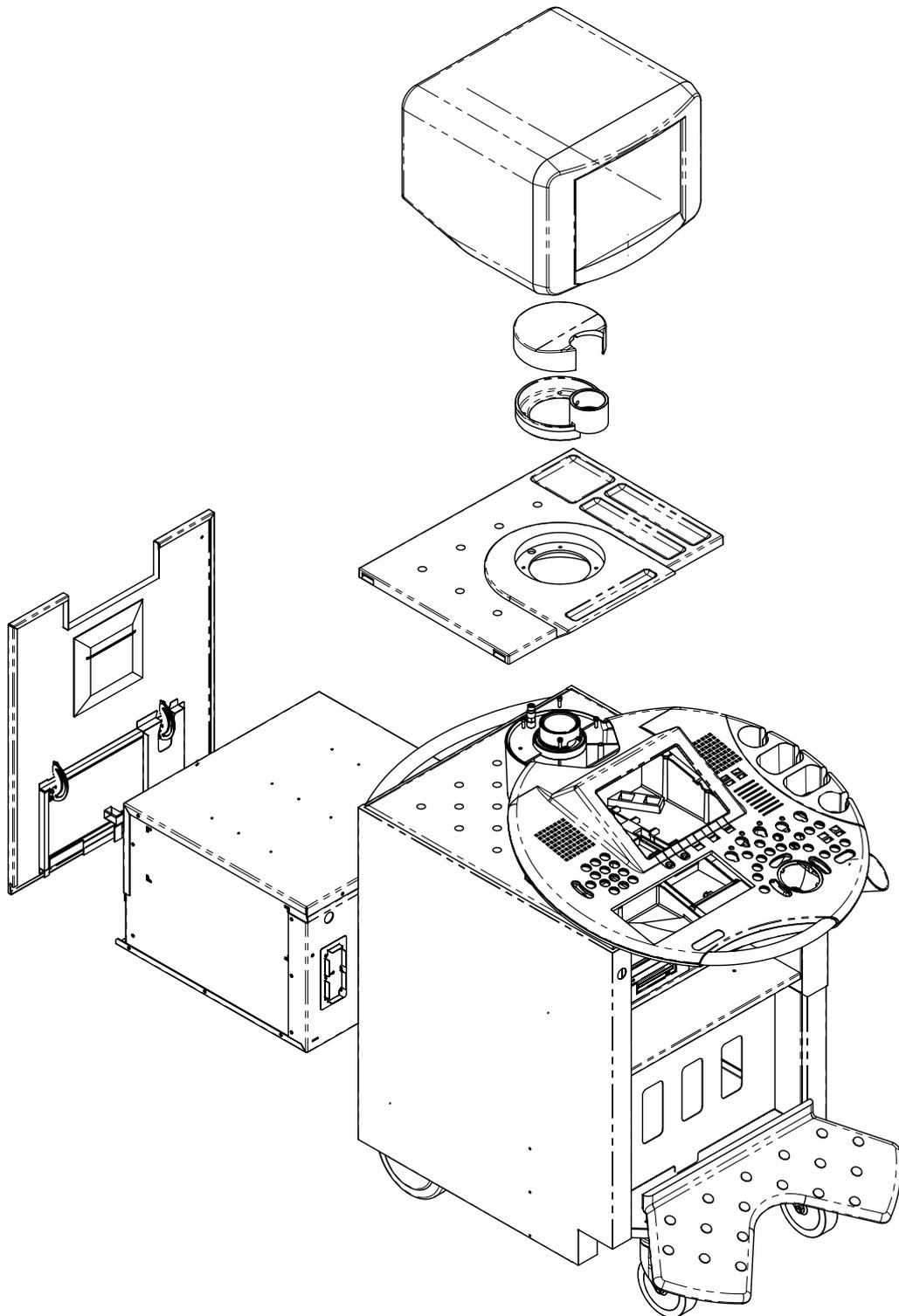


Figure 5-32 Assembly Drawing Voluson® 730Expert

## Section 5-13 Air Flow Control

### 5-13-1 Air Flow Distribution

The fans at the right side of the Main Board Chassis draw air into the scanner, through the filter grid, and pushes it through the card rack.

Air holes in the left and right side of the rack allow the air to move down through the card rack. Air exits the scanner through holes the Main Air Outlet at the left side panel.

#### 5-13-1-1 Air Flow Distribution Overview



Figure 5-33 Console Views



Figure 5-34 Air Flow Control

## Section 5-14 Service Platform

### 5-14-1 Introduction

The Service Platform will increase service productivity and reduce training and service costs. This web-enabled technology provides linkage to e-Services, e-Commerce, and the iCenter, making GE's scanners more *e-enabled* than ever.

The Service Platform contains:

- specific software/hardware test modules, system setup, update, etc. for Voluson systems; see: [Section 5-15 "Service Page" on page 5-51](#).

### 5-14-2 Access / Security

The Service Platform has different access and security user levels. Each user is only granted access to the tools that are authorized for their use.

### 5-14-3 *iLinq* Interactive Platform

Many of the services of the Service Platform come from its integration with *iLinq*.

If an *iLinq* checkout was performed on the Voluson® 730Expert, the [iLinq](#) button is available in the “Utilities” menu on the Touch Panel.

By selecting this button, the Netscape® browser starts the “*iLinq* Home Page”.

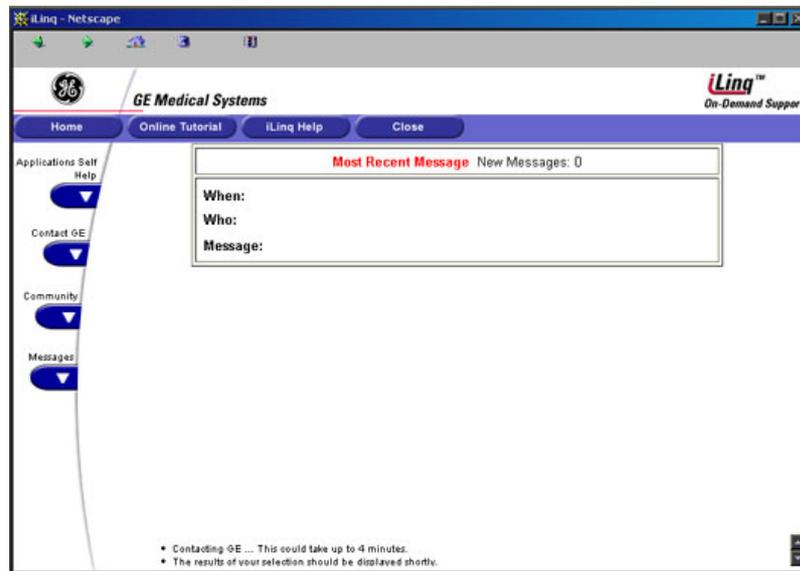


Figure 5-35 *iLinq* Home Page

## Section 5-15 Service Page

### 5-15-1 Introduction

The Service Page contains specific software/hardware test modules, system setup, update, etc. for Voluson systems only.

### 5-15-2 Access / Security

The service page has different access and security user levels. Each user is only granted access to the tools that are authorized for their use.

### 5-15-3 Service Login

- 1.) On the Touch Panel, press UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the SERVICE page. The “password window” appears automatically.

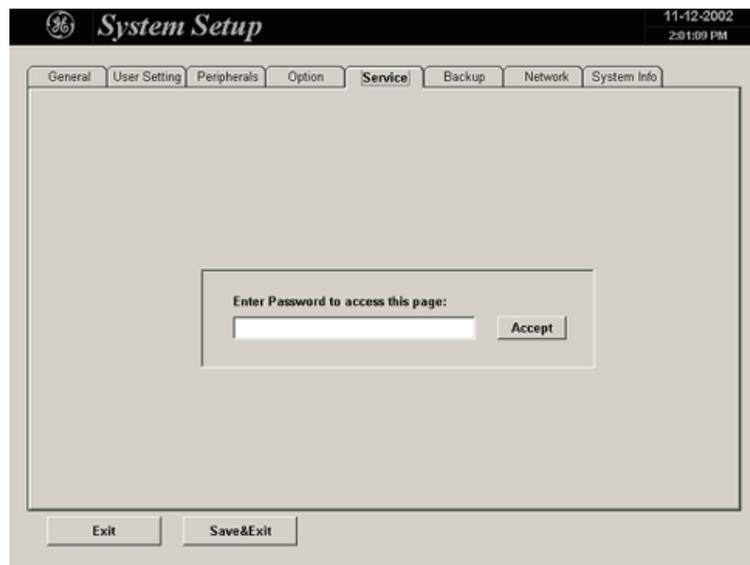


Figure 5-36 System Setup Service page

4.) Enter the password **SHE** and click the ACCEPT button to display the Service Tools window.

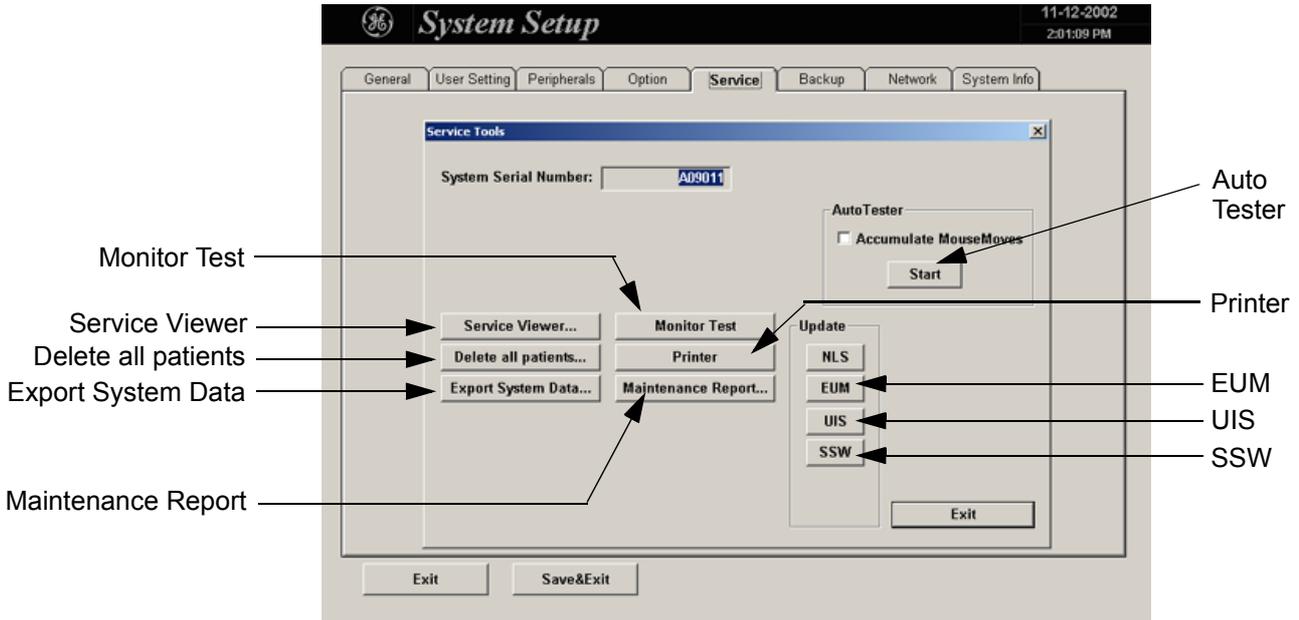


Figure 5-37 Service Tools window

#### 5-15-3-1 Auto Tester

Autotest is a log function of customer activities. It records all user actions (scanning, Touch Panel entries, performing Calculations, review of Patient Reports, etc....). It is possible to save (record) as file on HDD. But also export to DVD/CD or MOD can be done to allow replay of the records on other units.

 **NOTICE** For intermittent problems this file can be requested from the Service Engineer or customer. It is possible to burn this file on DVD/CD+(R)W or to store it on MO-disk.

Operation see: [Section 7-5 "How to use the Auto Tester program" on page 7-7.](#)

### 5-15-3-2 Service Viewer

Provides common information about System Temperature, Probes, Working hours of system components and probes.

- 1.) Select the SERVICE VIEWER button to get access to the E-Service page.



Figure 5-38 Kretztechnik E-Service

### 5-15-3-3 Delete all Patients

- 1.) Click the DELETE ALL PATIENTS button. Following WARNING message appears on the screen.

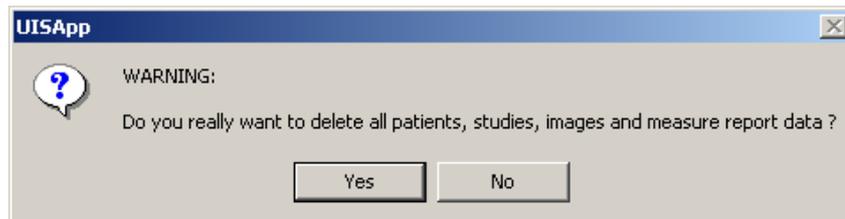


Figure 5-39 Warning message

**⚠ WARNING** *If you select the YES button, all patients data, studies, images and measure report data will be deleted permanently from the hard disk and cannot be recovered!*

### 5-15-3-4 Export System Data

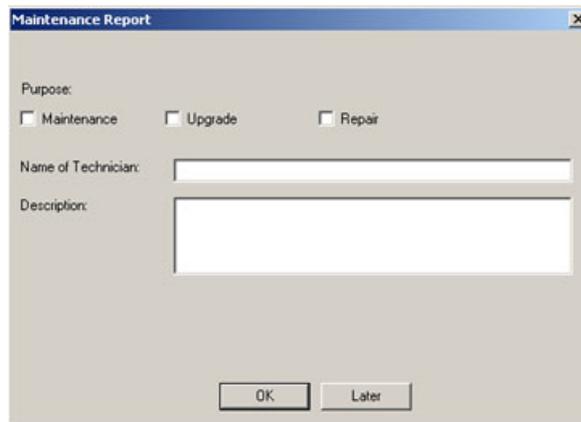
Select the EXPORT SYSTEM DATA button on the "Service Tools" page to export dump-files and text files, the full Service Database informations about probes, boards, Software, Options, Service Actions and the Event Log File to the DVD/CD Drive (or the optional MO Drive).

Operation see: [Section 7-4-2-1 "Export System Data" on page 7-6.](#)

### 5-15-3-5 Maintenance Report

Any modification upgrade and maintenance action should be entered in this report to get a history of all service actions.

- 1.) Click the MAINTENANCE REPORT button. The following message box will be displayed.



Maintenance Report

Purpose:

Maintenance     Upgrade     Repair

Name of Technician:

Description:

OK    Later

**Figure 5-40 Maintenance Report**

- 2.) Fill in the requested information and click OK.
- 3.) Click the EXIT button on the Service Tools window and the EXIT button on the System Setup Service page.

**NOTE:** *After Hardware or Software modifications normally the "Maintenance Report" message box [Figure 5-40](#) appears automatically on the screen.*

### 5-15-3-6 Monitor Test

- 1.) To perform the Monitor test, select the MONITOR TEST button.  
The following message appears on the screen.

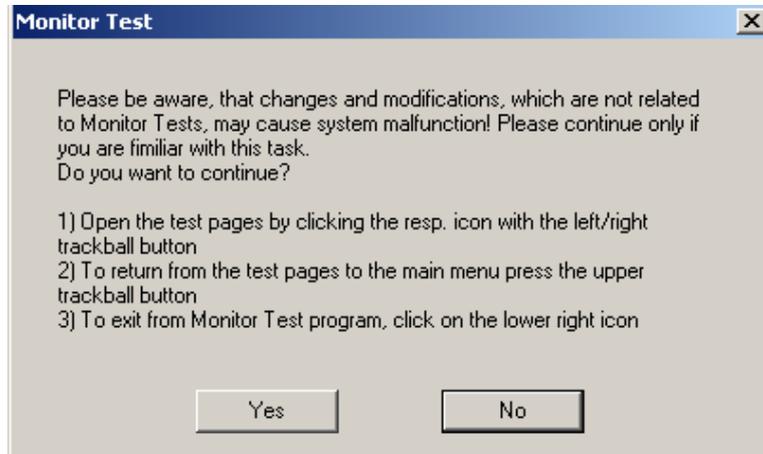


Figure 5-41 Monitor Test - Instructions

- 2.) Read the displayed instructions. Afterwards confirm with YES.  
The Monitor Test main menu appears on the screen.

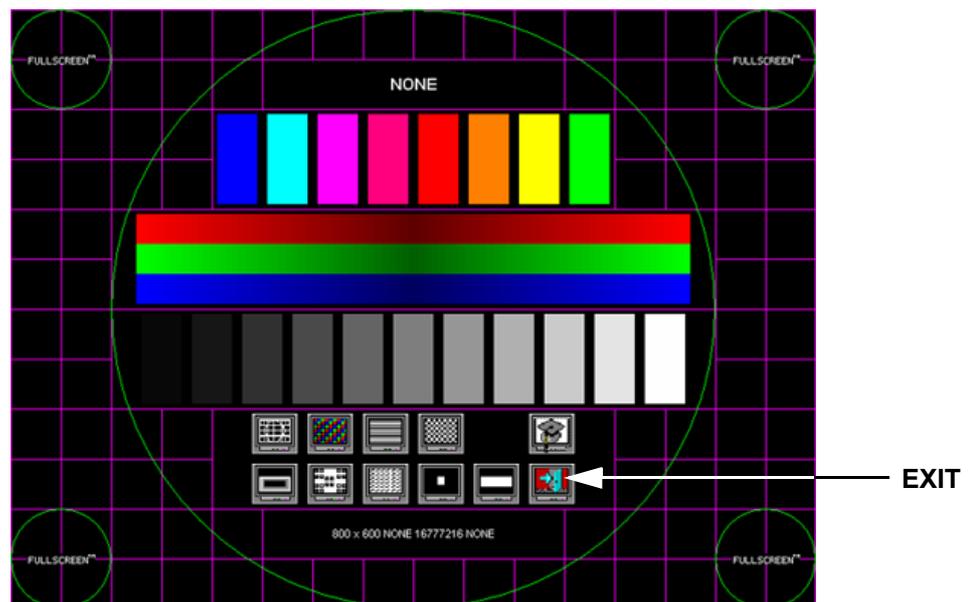


Figure 5-42 Monitor Test - Main menu

- 3.) Open the desired test page: select the respective icon and press the right/left trackball key.
- 4.) To return to the Main menu, press the upper trackball key.
- 5.) To exit the Monitor Test program, click the "Exit" icon.

**5-15-3-7 Printer**

Printer installation is possible without entering the Windows Desktop.  
Operation see: [3-7-3 "Printer Installation manually" on page 3-31.](#)



**WARNING** *Only accessories explicitly recognized and released by the system manufacturer GE Healthcare - Kretztechnik may be used in connection with the system.*

**5-15-3-8 Update**

5-15-3-8-1 NLS

Reserved for loading Native Language Support. Not for use in the field.

5-15-3-8-2 EUM

is for updating the **Electronic User Manual**

Operation see: [Section 8-6 "Electronic User Manual \(EUM\) Upgrade Procedure" on page 8-11.](#)

5-15-3-8-3 UIS

is for updating the Ultrasound Application Software

Operation see: [Section 8-2-5 "Software - Installation Procedure \(via Service Page\)" on page 8-5.](#)

5-15-3-8-4 SSW

is for updating the Service Software

Operation see: [Section 8-5 "Service Platform \(SSW\) Upgrade Procedure" on page 8-9.](#)

# Chapter 6

## Service Adjustments

### Section 6-1 Overview

#### 6-1-1 Purpose of Chapter 6

This chapter describes how to test and adjust the mechanical capabilities of a scanner that may be out of specification. Although some tests may be optional they should only be performed by qualified personnel.

**Table 6-1 Chapter 6 Contents**

Section	Description	Page Number
6-1	Overview	6-1
6-2	Regulatory	6-1
6-3	Monitor Adjustment	6-2
6-4	Control Console, Transport Lock	6-5
6-5	Trackball Adjustment	6-6
6-6	Daylight Saving Time (DST) - New Dates	6-7

### Section 6-2 Regulatory

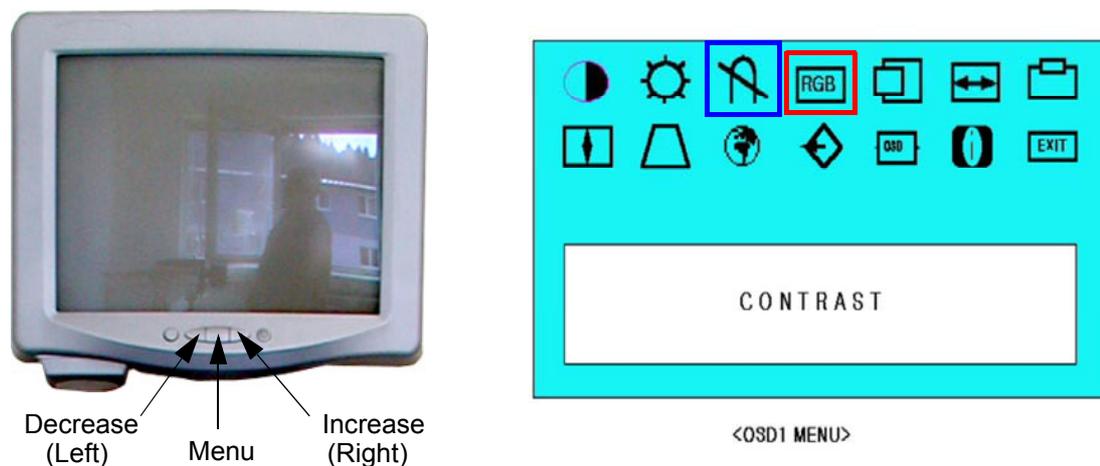
Verify, where applicable, that any regulatory information or tests required by national law are present and accounted for, and any regulatory tests required by national law are performed *and* documented.

## Section 6-3 Monitor Adjustment

The Monitor can be tilted or rotated.

- Tilt angle: up/down 11°
- Rotation angle: right/left 90°

The digital control panel is located at the front of the color monitor. If you are not satisfied with the factory settings, use these controls to program those you prefer in each resolution. Then, these adjusted settings are kept in memory even if you change the resolution or turn off the monitor.



**Figure 6-1 Monitor Adjustment buttons**

- **Menu key:**  
This button will enable the On Screen Display (OSD-instructions). This button is also used to select the function in the Main Menu or to save the settings in the Sub Menu. (Push for approx. 4 sec.)
- **Decrease (Left):**  
Use this button to move down the OSD selection menu and adjust the attribute of the monitor while in OSD menu. Pressing this button out of the OSD menu allows you to decrease the level of contrast of the display screen.
- **Increase (Right):**  
Use this button to move down the OSD selection menu and adjust the attribute of the monitor while in OSD menu. Pressing this button out of the OSD menu allows you to increase the level of contrast of the display screen.

### 6-3-1 Monitor Calibration

The procedure consists of 3 parts:

- 1.) Degauss
- 2.) Color Temp - Calibration
- 3.) Contrast and Brightness
- 4.) Geometry
- 5.) Convergence
- 6.) Color temperature
- 7.) B-Mode Quality

### 6-3-1-1 Degauss

Degaussing refers to the process of removing magnetic-field effects from the monitor. Operation of the monitor within a magnetic field may adversely effect color purity. Degaussing can be used to correct the problem.



**NOTICE** The monitor should automatically degauss itself each time power is applied if you wait at least 10 seconds before you turn power back ON.

- 1.) Press and hold the **MENU** (middle) key on the monitor controls for approximately 4 seconds till the OSD menu appears on the screen.
- 2.) Press the **RIGHT** button 2 times to the DEGAUSS and then press the **MENU** key again to select it.
- 3.) Wait till DEGAUSS is completed.

### 6-3-1-2 Color Temp - Calibration

- 1.) On the Touch Panel, touch **UTILITIES** and then **SYSTEM SETUP**.
- 2.) Select the **SERVICE** page, enter the password **SHE** and click the **ACCEPT** button.
- 3.) Select the **MONITOR TEST** button in the “Service Tools” menu.
- 4.) Confirm the “Monitor Test” message with **YES**.

The Monitor Test main menu appears on the screen.

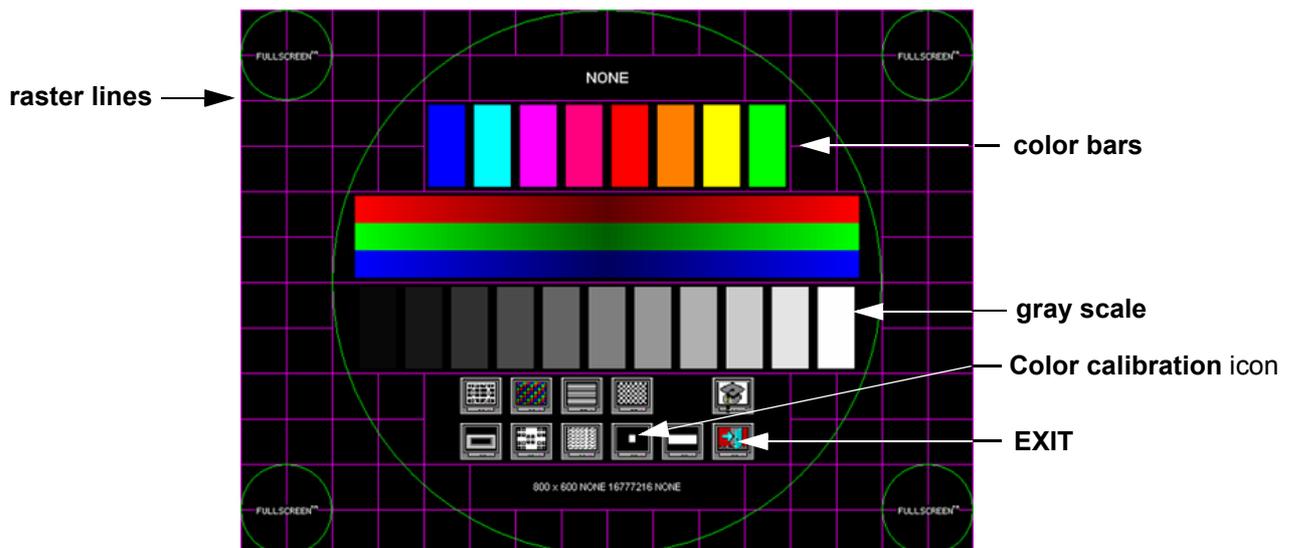


Figure 6-2 Monitor Test - Main menu

- 5.) Select the “Color calibration” icon and press the **right/left trackball** key once (monitor is white).
- 6.) Press and hold the **MENU** (middle) key on the monitor controls for approximately 4 seconds till the OSD menu appears on the screen.
- 7.) Press the **RIGHT** button 3 times to the COLOR TEMP and then press the **MENU** key to select it.
- 8.) Press the **RIGHT** button until CALIBRATION is highlighted and then press the **MENU** key again.

**NOTE:** The calibration cycle will immediately start for Red, Green and Blue. Wait till it's completion message “It has completed...” appears. During the Calibration process do not touch any key.

- 9.) To return to the Main menu, press the **upper trackball** key.
- 10.) To exit the Monitor Test program, touch **EXIT**.

**NOTE:** Contrast and Brightness (see: [Section 6-3-1-3](#)) has to be adjusted after color calibration.

### 6-3-1-3 Contrast and Brightness

Adjusting the monitor's contrast and brightness is one of the most important factors for proper image quality. If these controls are set incorrectly, the Gain, TGC, Dynamic Range and even Acoustic Output may have to be changed more often than necessary to compensate.

The proper setup displays a complete gray scale. The lowest level of black should just disappear into the background and the highest white should be bright, but not saturated.

*NOTE: Typically values for Contrast and Brightness are 70 to 75, depending on the operator!*

- 1.) Press the MENU (middle) key on the monitor controls (= toggle button for contrast and brightness).
- 2.) Adjust the CONTRAST by pressing the LEFT or RIGHT button to decrease/increase the value.
- 3.) Press the MENU key again to toggle to brightness.
- 4.) Adjust the BRIGHTNESS by pressing the LEFT or RIGHT button to decrease/increase the value.

### 6-3-1-4 Geometry

Check the raster lines of the test pattern by referring to [Figure 6-2](#).

Expected results:

- 1.) Squares are not distorted.
- 2.) Raster lines are straight.
- 3.) No keystone and pincushion distortion.
- 4.) Horizontal and vertical width is correct.

### 6-3-1-5 Convergence

Check the color of the raster lines (see: [Figure 6-2](#)).

Expected result:

Raster lines have only one color.

### 6-3-1-6 Color temperature

Check the grey scale and the color bars of the test pattern (see: [Figure 6-2](#)).

Expected results:

- 1.) "White" is displayed **without** a tint (discolor).
- 2.) Colors are displayed correctly.
- 3.) To exit the Monitor Test program, touch EXIT.

### 6-3-1-7 B-Mode Quality

Connect an abdominal probe (AB or RAB), press the PROBE key, select the "Abdomen" application and start the "Default" program. Record a B-Image of the liver.

If there is no abdominal probe, record a B-Image of the Thyroid by using a small parts probe (SP6-12 or SP4-10) and the corresponding program.

Expected result:

Regular and homogenous B-Image without tint.

## Section 6-4 Control Console, Transport Lock

### 6-4-1 Control Console

The control console can be rotated 30° to the right.

When rotating the control console grasp it only the front grip.



**locking lever**  
for locking and unlocking  
the control console

**Figure 6-3 Locking Lever under Control Console**

- 1.) Push the lever under the control console forward.
- 2.) Rotate the console to wanted position.

### 6-4-2 Transport Lock

There is a locking lever for locking and unlocking the control console, mounted at the front below the control console. When preparing the system for transport, the lock has to be engaged in order to secure the console against uncontrolled rotation. The lock catches in when the console is rotated to its center 0° position.

**⚠ WARNING** *Do not put your hand between the control console and the Main unit when moving the console to the 0 position: Danger of injuries!*

## Section 6-5 Trackball Adjustment

Adjustment of the mechanical movement may be necessary to ensure smooth running of the trackball.

- 1.) Remove the outer fixing ring by turning it counterclockwise.

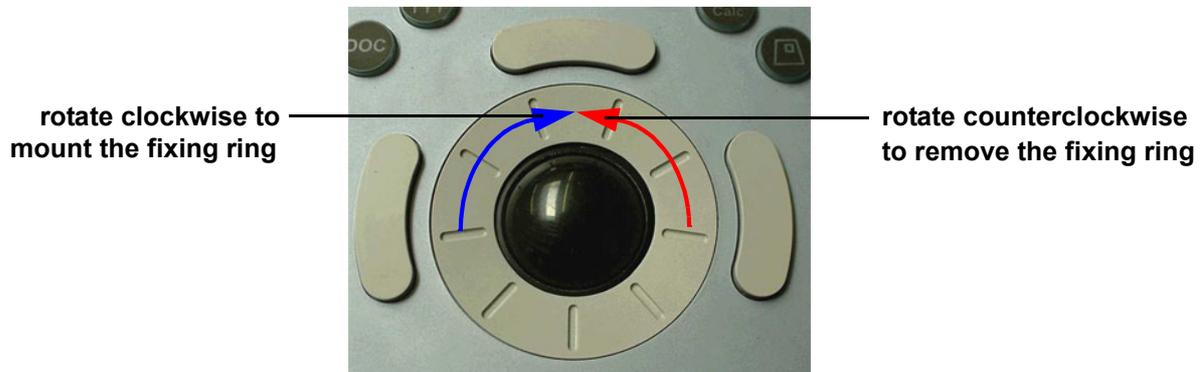


Figure 6-4 Trackball with fixing ring

- 2.) Adjust the trackball for smooth running by rotating the black securing ring.

- CCW: smooth run
- CW: tighten run

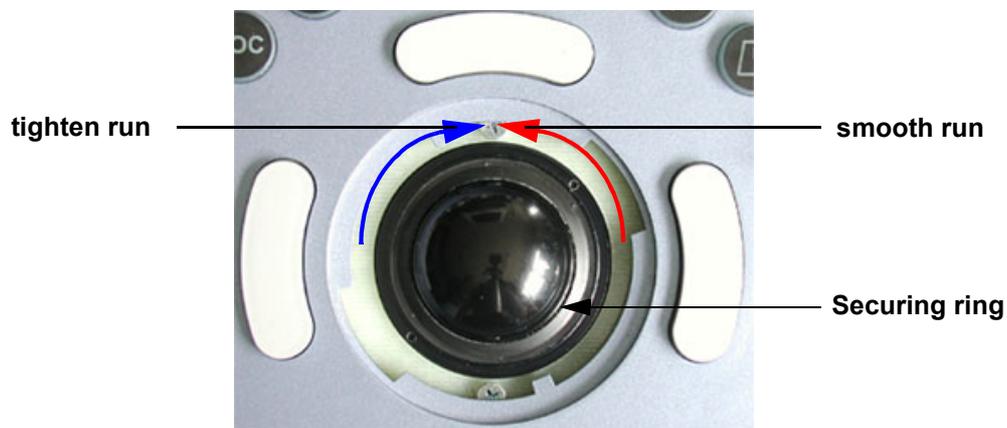


Figure 6-5 Trackball - Securing Ring

 **NOTICE** Avoid tightening of thread caused by improper mounting of securing ring!

- 3.) Mount the outer fixing ring by turning it clockwise. see [Figure 6-4](#).

## Section 6-6 Daylight Saving Time (DST) - New Dates

**Issue:** The automatic Daylight Saving Time feature in Microsoft Windows products may no longer run on the correct date, causing the system's time to be incorrect.

**Cause:** Some countries have changed their start and end dates for Daylight Saving Time (DST). Access Microsoft website <http://support.microsoft.com/kb/928388> to determine if the system's location site is affected.

**Solution:** If the Voluson® 730Expert relies on the automatic DST feature in Microsoft Windows, turn off the feature and then set the correct system time manually at the start of DST and again at the conclusion of DST.

### Procedure:

- 1.) On the Touch Panel, touch UTILITIES.
- 2.) In the Utilities menu, touch SYSTEM SETUP to invoke the setup desktop on the screen.
- 3.) Select the GENERAL page in the System Setup.
- 4.) Click the DATE/TIME button.
- 5.) In the displayed "Date/Time Properties" window select the TIME ZONE tab.
- 6.) Uncheck "Automatically adjust clock for daylight saving changes" check box and then click APPLY (see: left image of [Figure 6-6](#) below).

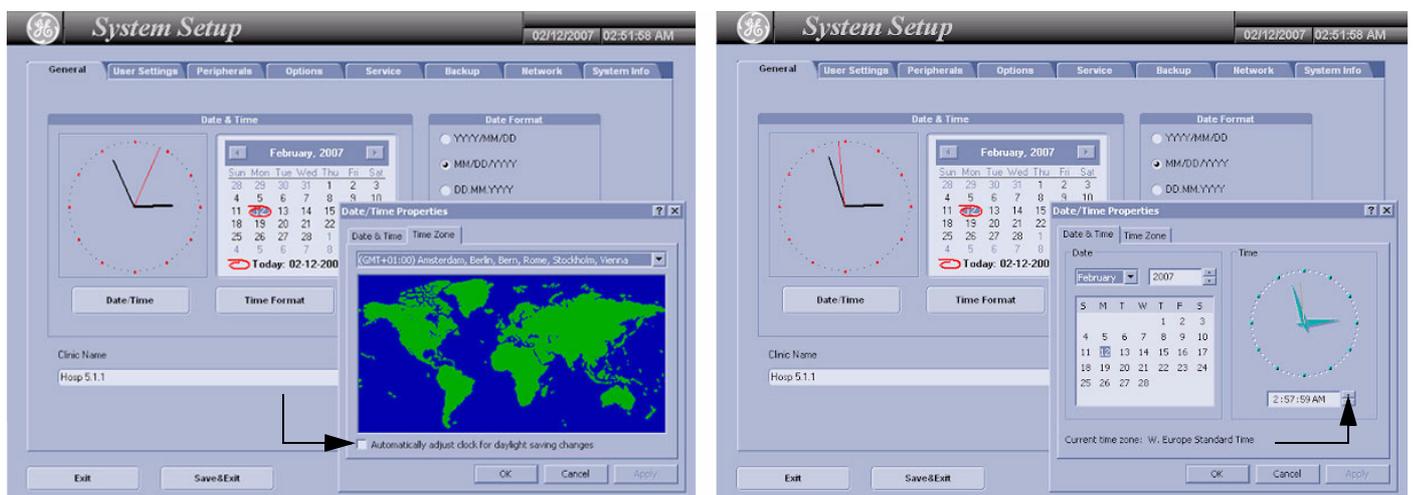


Figure 6-6 Uncheck check box / adjust time

- 7.) Select the DATE / TIME tab in the "Date/Time Properties" window.
- 8.) Set the proper time for the system's location and then click OK (right image of [Figure 6-6](#) above).
- 9.) Click the SAVE&EXIT button to save your changes and exit the System Setup page.  
The System is shutting down automatically and restarts again.

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# Chapter 7

## Diagnostics/Troubleshooting

### Section 7-1 Overview

#### 7-1-1 Purpose of Chapter 7

This section describes how to setup and run the tools and software that help maintain image quality and system operation. Basic host, system, and board level diagnostics are run whenever power is applied. Some Service Tools may be run at the application level.

#### 7-1-2 Overview

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

**Table 7-1 Contents in Chapter 7**

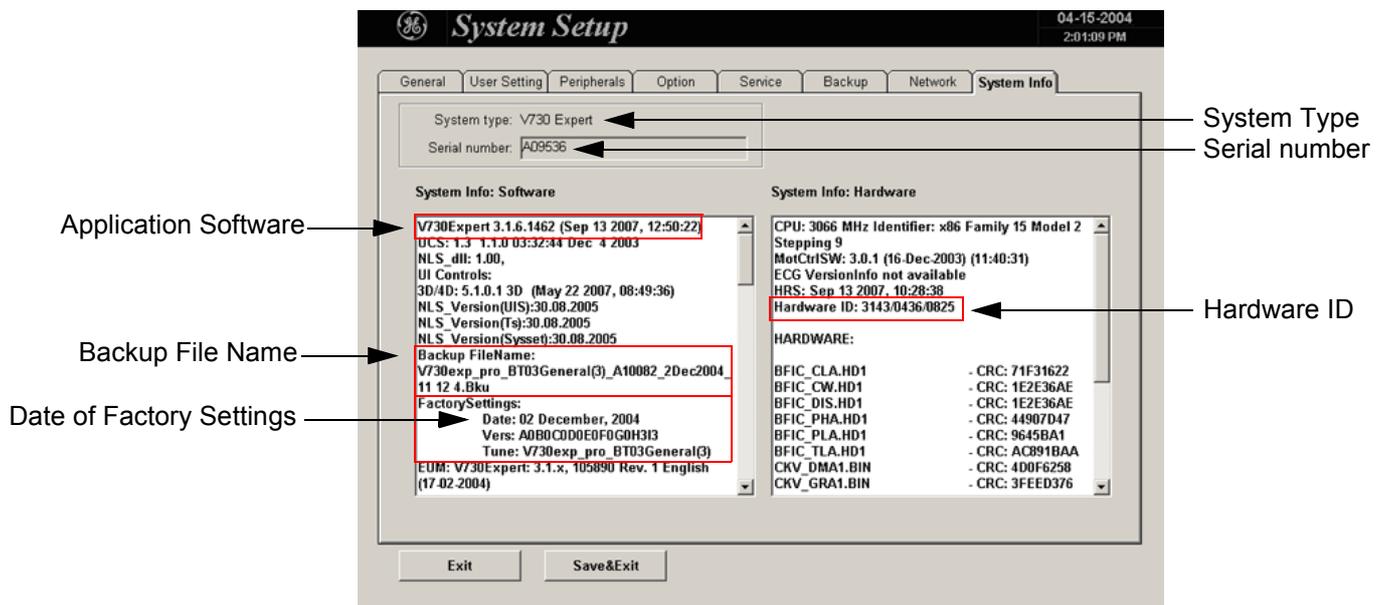
Section	Description	Page Number
7-1	Overview	7-1
7-2	Collect Vital System Information	7-2
7-3	Check Points Voltages	7-4
7-4	Screen Captures and Logs	7-5
7-5	How to use the Auto Tester program	7-7
7-6	Minimum Configuration to Boot/Scan	7-10
7-7	Troubleshooting Trees and Instructions	7-11
7-8	Error Messages	7-21

## Section 7-2 Collect Vital System Information

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

Touch UTILITIES, then SYSTEM SETUP and select the SYSTEM INFO page.

- **System Type**
- **System Serial number** (also visible on label on the back of the system)
- **Application Software version**
- **Backup Version** (File Name)
- **additional information** (e.g., Hardware ID, SLOT\_CPU version, etc.)



Move the scroll bar downwards to review additional information about installed software/hardware.

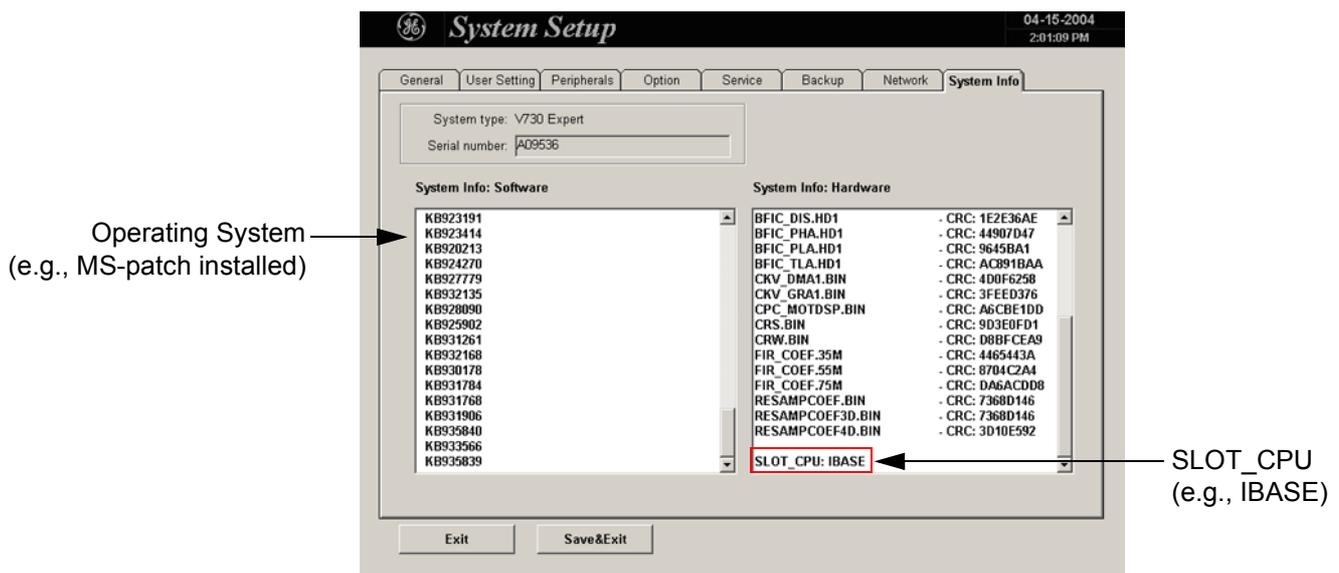


Figure 7-1 System Setup - System Info page

## 7-2-1 Needed Data - in case of System crash or Errors



**NOTICE** In case of a system crash, or errors that are probably software bugs, provide as much detail information as possible before contacting the OLC (On-Line Center).

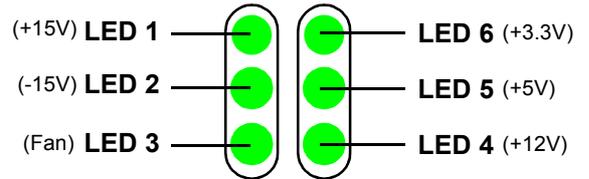
- 1.) Contact person (+ telephone number and/or e-mail address)
- 2.) Vital system data (see: [Figure 7-1 on page 7-2](#))
  - System Type
  - System Serial number (also visible on label on the back of the system)
  - Application Software version
  - Backup Version (File Name)
  - additional information (e.g., Hardware ID, SLOT\_CPU version, etc.)
- 3.) Exact description of fault or error message (dump-file, see: [Figure 7-4 on page 7-6](#))
  - Address
  - Module + (Address)
  - Application Software version
  - Memory Dump number (complete #)
- 4.) If the bug or error is difficult to reproduce, record an Auto Tester file (ending at fault occurrence). (Operation see: [Section 7-5 "How to use the Auto Tester program" on page 7-7](#))

## Section 7-3 Check Points Voltages

### 7-3-1 How to check power



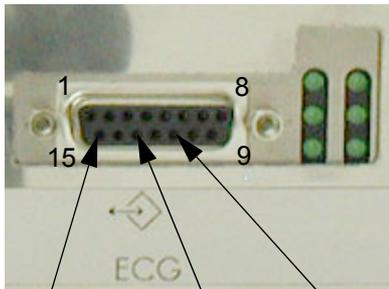
Open the locking, flap the service lid on the back of the Voluson® 730Expert upwards, and check the status of the Diagnostic LED's.



In case of problems, check the above voltages with a Digital Volt Meter (DVM) to Ground.

#### LED 1, 2 and 5

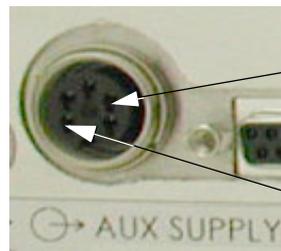
ECG connector on Backpanel of GEF-Box



Pin 15 (+5V)  
 Pin 13 (+15V)  
 Pin 11 (-15V)

#### LED 4

AUX Supply (= GEM Power connector) on Backpanel of GEF-Box



Pin 4 (+5V)  
 Pin 1 (+12V)

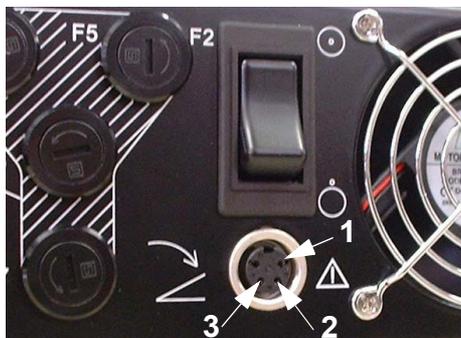
Location of fuses on CPE;  
 see: [Section 5-11-3-1 on page 5-44](#)

Additionally check 59V/DC (Power connection-cable from CPN to GEF)



#### LED 6

Footswitch connector on Power Supply Module (CPN) (Pin 2 and 3 = +3.3V ; Pin 1 = GND)



#### LED orange (at CPN80-81 only)

visual check for 59V:  
 orange LED (at CPN80-81 power supply) is lightening



Figure 7-2 Diagnostic LED's and corresponding voltage check points

## Section 7-4 Screen Captures and Logs

There may be times when the customer or field engineer will want to capture a presentation on the screen so it may be recovered by the OnLine Center.

This is accomplished by saving the image(s):

- A.) to SonoView and export them (as jpg, bmp or tiff ) to DVD/CD+(R)W or MO-disk
- B.) as jpg and bmp to D:\export by pressing the **ALT + P** key on the alphanumeric keyboard

### 7-4-1 Capturing a screen

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

- 1.) Navigate to and display the image/screen to be captured.
- 2.) Press the **SAVE** key and save the image to Sonoview.
- 3.) Select the stored image(s) in Sonoview (Exam List) and export the image(s) to DVD/CD+(R)W or optional MO-Disk (jpg, bmp or tiff).

### 7-4-2 Export Log's and System Data

- 1.) Touch **UTILITIES**, then **SYSTEM SETUP**.
- 2.) Select the **SERVICE** page on the screen. The "password window" appears automatically.
- 3.) Enter the password **SHE** and click the **ACCEPT** button to display the Service Tools window.

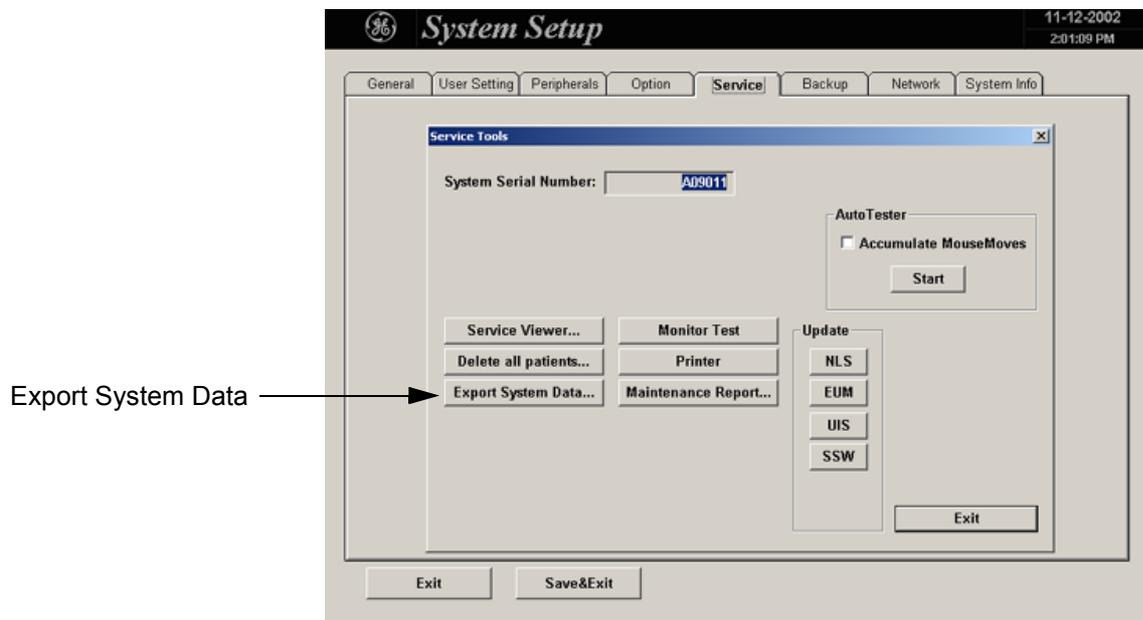
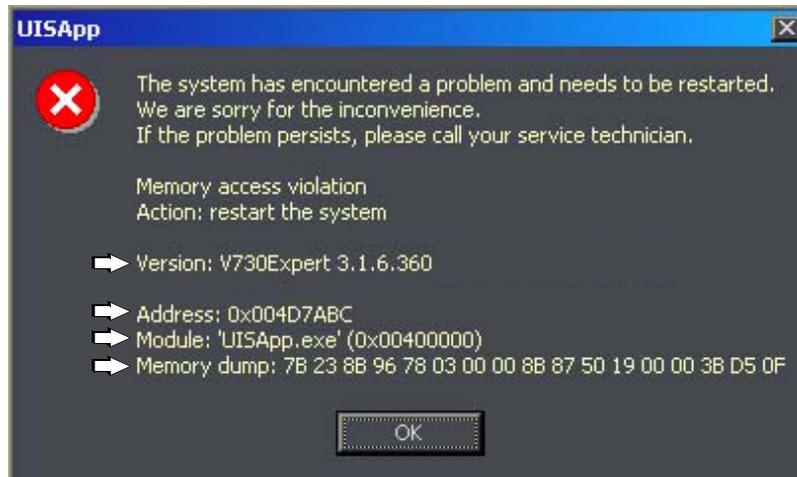


Figure 7-3 Service Tools window

### 7-4-2-1 Export System Data

Every time an error message like [Figure 7-4](#) is produced, a dump-file and a text file containing the error dump and the error message are created in D:\export. Up to 20 dump files are stored there.

important  
dump-file  
informations



**Figure 7-4 system has encountered a problem**

**NOTE:** To deposit this screen as an image file on D:\export, press **ALT + P**.  
For more details see: [Section 7-4 "Screen Captures and Logs" on page 7-5](#).

After clicking on **OK** the system reboots automatically.

By selecting the **EXPORT SYSTEM DATA...** button, these dump-files and text files, the Event Log File, the full Service Database and information about probes, boards, SW, Options and Service Actions can be exported to the DVD/CD Drive (or the optional MO Drive).

## Section 7-5 How to use the Auto Tester program

- 1.) Touch UTILITIES and SYSTEM SETUP on the Touch Panel.
- 2.) Select the SERVICE page on the screen. The “password window” appears automatically.
- 3.) Enter the password **SHE** and click the ACCEPT button to display the Service Tools window.

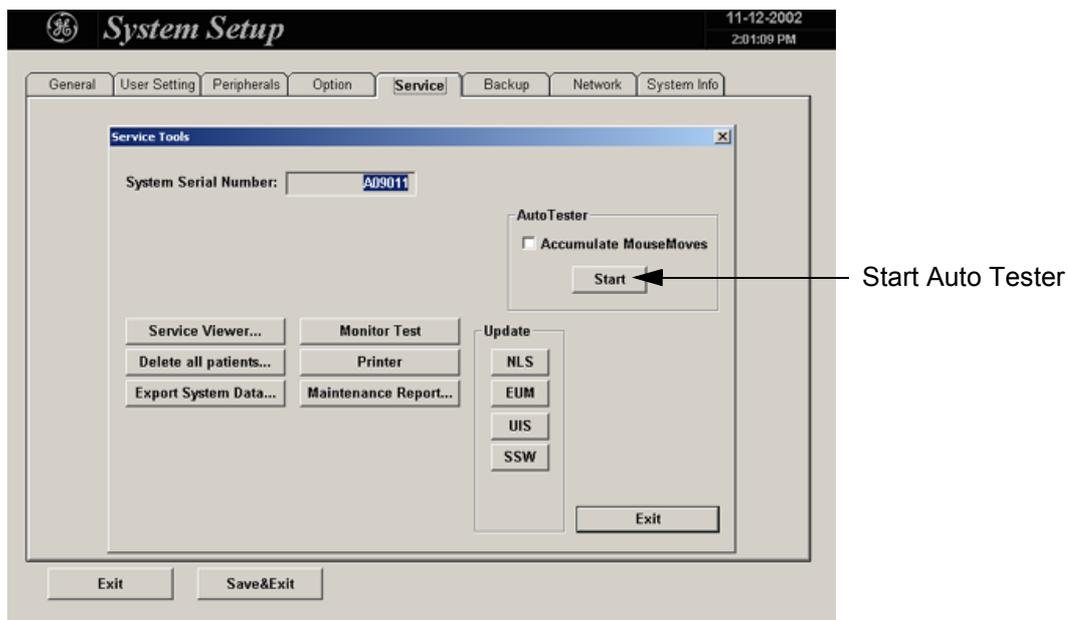


Figure 7-5 Service Tools window

- 4.) Activate the “Auto Tester” program by clicking START.

## Section 7-5 How to use the Auto Tester program (cont'd)

The following message box appears.



Figure 7-6 Message Box

5.) Click OK.

6.) Press the **PAUSE** key on the keyboard.

The Auto Tester window appears, see: [Figure 7-7](#) below.

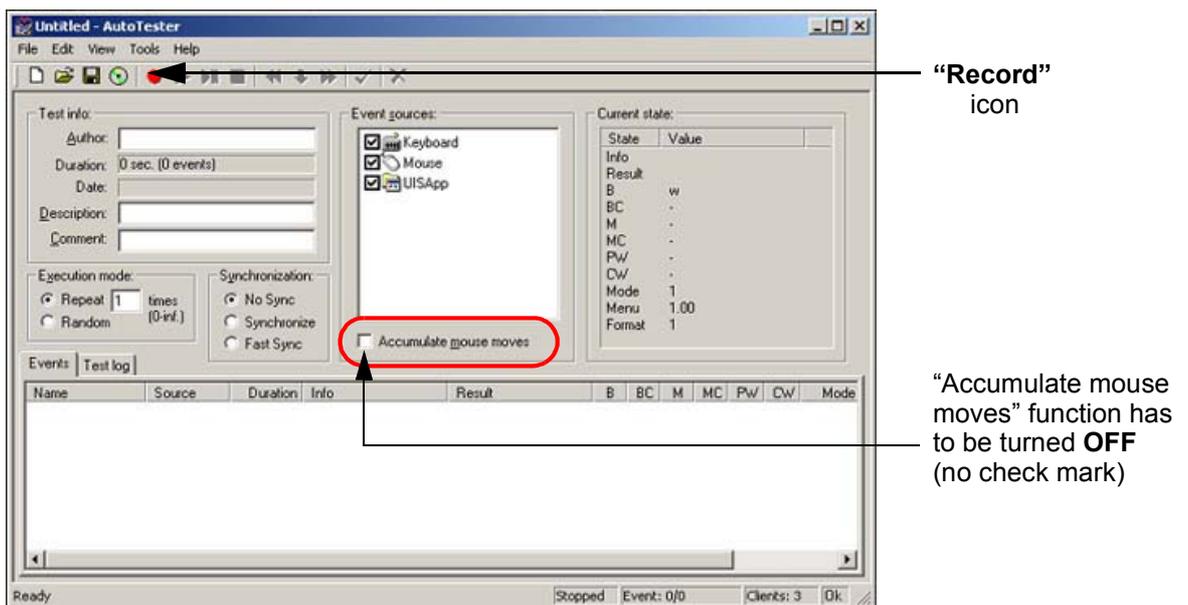


Figure 7-7 Start Auto Tester

**NOTICE** Please check status of the “Accumulate mouse moves” function. It has to be turned **OFF**. i.e., **no check mark** visible!

7.) Activate the “Auto Tester” program by clicking the “Record” icon on the displayed screen.

8.) Start scanning.

You can scan normally and everything will be recorded to the program (up to several hours.)

**NOTE:** *It is important that you are recording the processes where the errors normally occur.*

9.) Stop the program by pressing the **PAUSE** key on the right upper corner of the keyboard.

## Section 7-5 How to use the Auto Tester program (cont'd)

The following screen will appear.

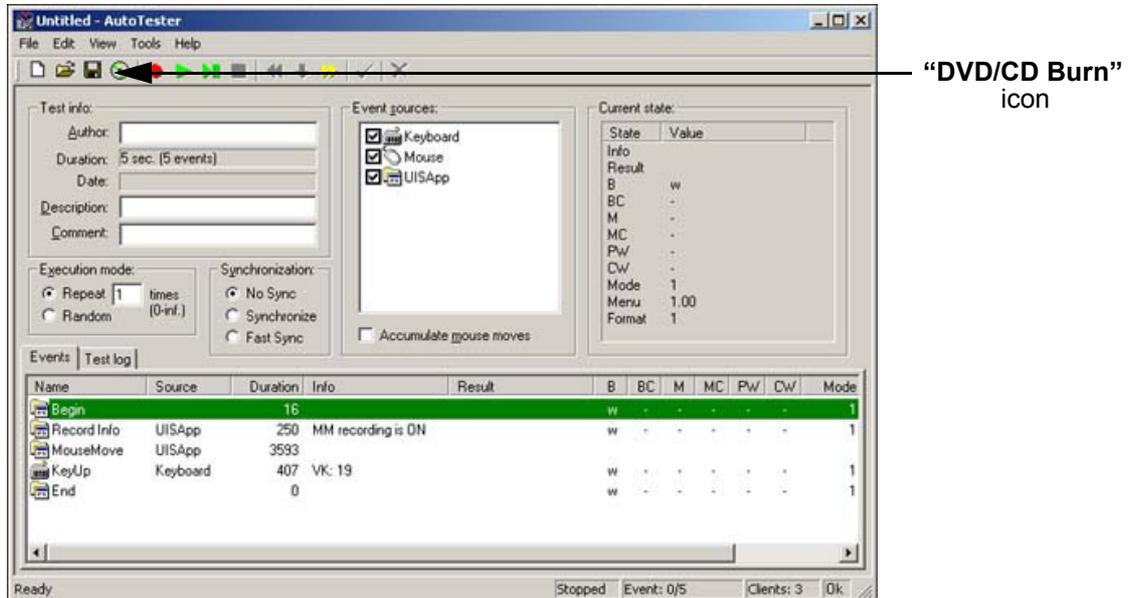


Figure 7-8 Auto Tester Finished

10.) Insert an empty DVD/CD+(R)W in the Drive and select the “DVD/CD Burn” icon.

11.) Enter a Filename.



Figure 7-9 Enter a Filename

12.) After clicking OK, the following message boxes will appear.



Figure 7-10 CD Burn Process

13.) After the DVD/CD write is finished click the OK button and close the “Auto Tester” program.

## Section 7-6 Minimum Configuration to Boot/Scan

### 7-6-1 Minimum Configuration to Scan

Following cables must be connected to scan; see: [Figure 7-11](#)

a.) PS2 (connector for Mouse/Keyboard)

**\* PS2 Adapter is ONLY used, when the currently installed PC-Board is an IBASE Standard Board Computer. If the PC-Board is a Kontron SBC, the PS2 cable (a) has to be connected directly to the PC-part of the GEF-box.**

b.) UI Disp. (connector for User Interface Display)

c.) VGA (Monitor)

d.) Console

e.) CPN (Primary Power Supply)

f.) Standby switch

g.) Monitor (Power Supply)

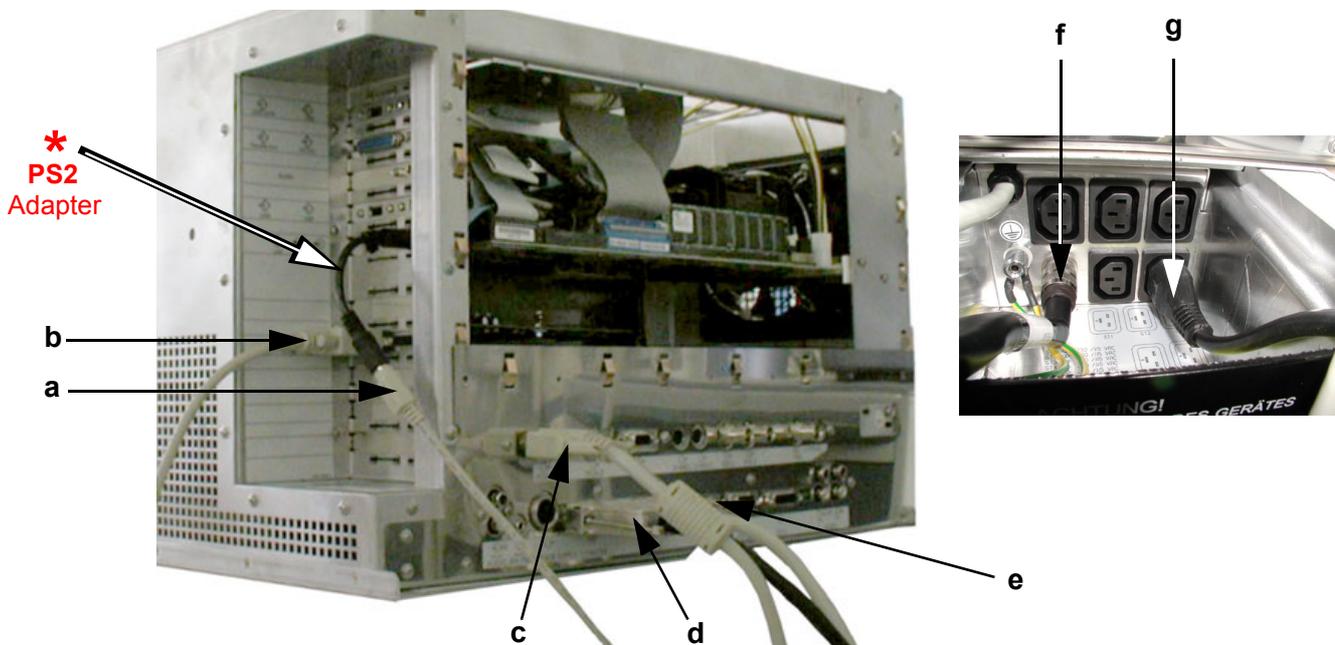


Figure 7-11 cable- minimum configuration (e.g., IBASE PC-Board installed)

Connect mains power cable to the system and to an appropriate mains power outlet.

Connect a probe, boot up the system and start an User program.

## Section 7-7 Troubleshooting Trees and Instructions

### 7-7-1 System does not Power On / Boot Up

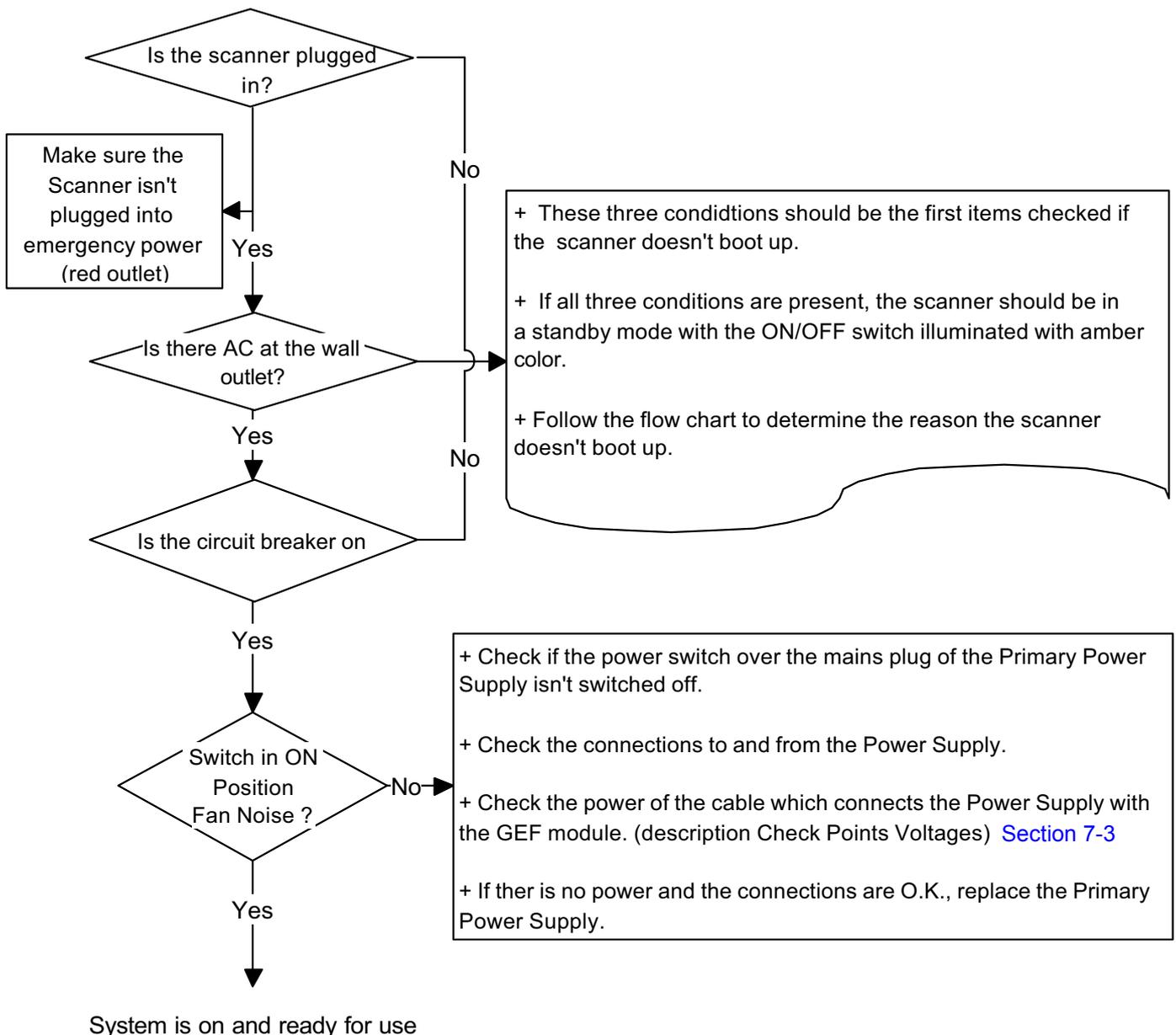


Figure 7-12 System does not Power On / Boot Up

7-7-2 Noise disturbs the Image

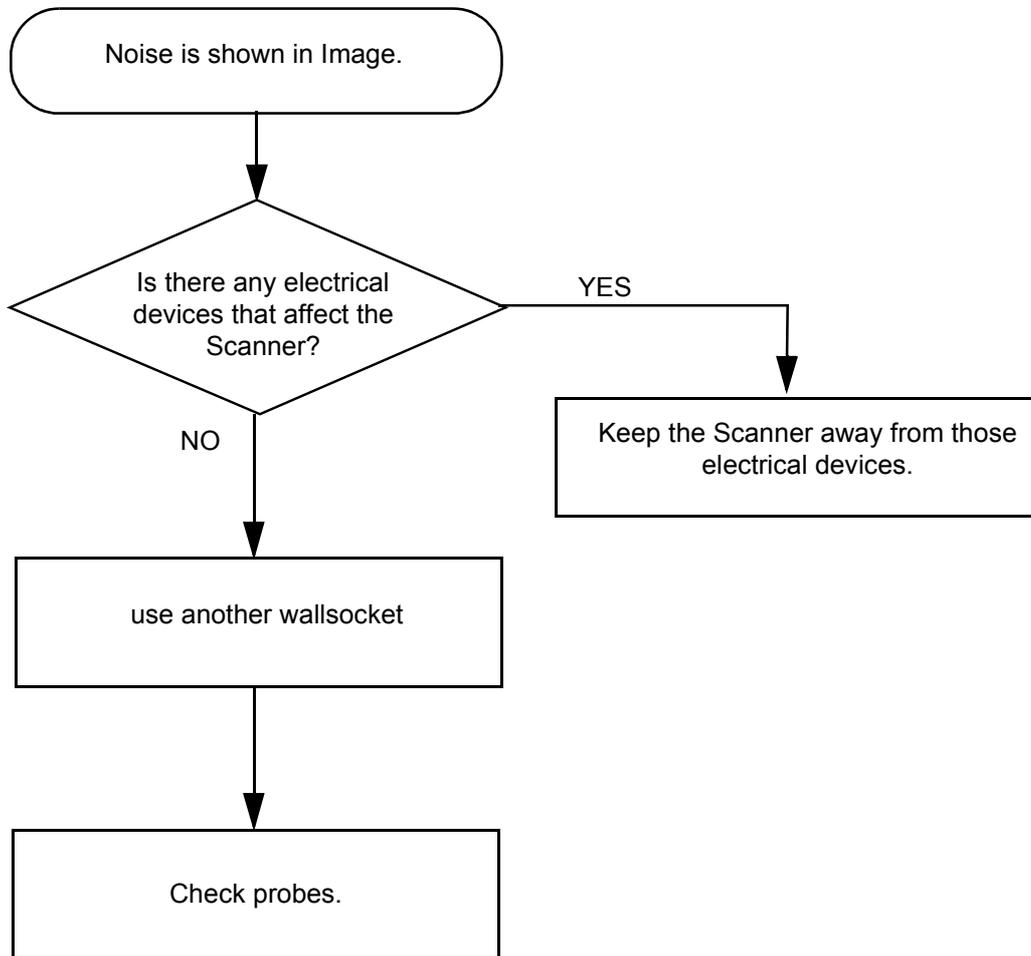


Figure 7-13 Noise disturbs the Image - Troubleshooting

7-7-3 Trackball

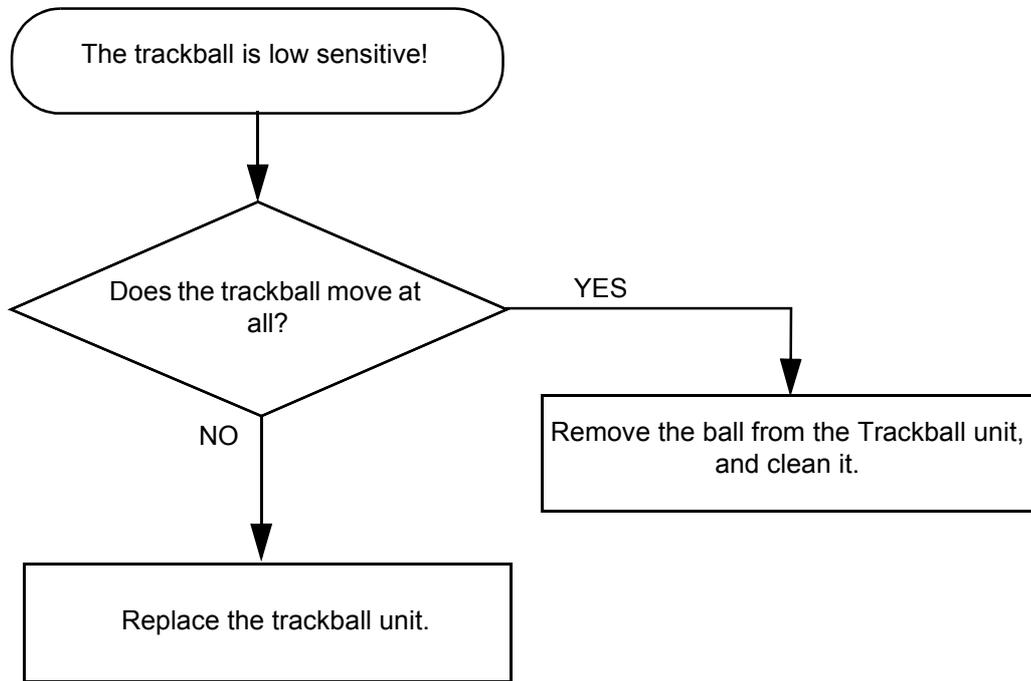


Figure 7-14 Trackball - Troubleshooting

### 7-7-4 System Does Not Power Off / Shutdown

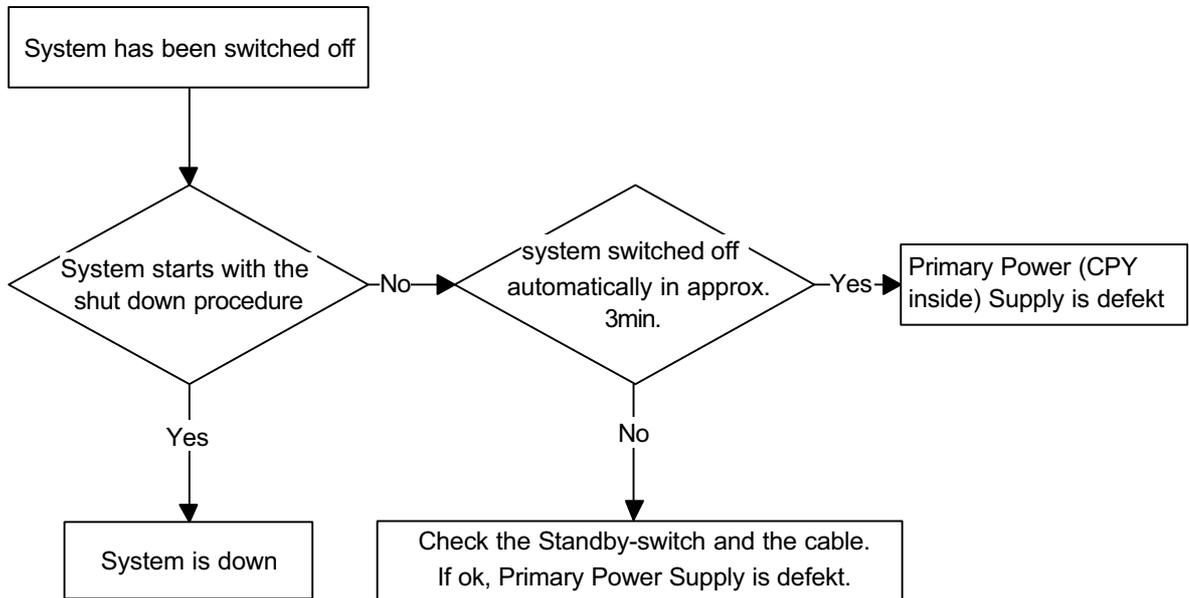


Figure 7-15 Power Off / Shutdown - Troubleshooting

## 7-7-5 Monitor Troubleshooting

Fault symptom	Check these items
No image	Check the power cord is properly connected.
	<b>CPN6 only:</b> Check the Power Switch of Peripherals (F2) on back of system is set to the "ON" position.
	<b>CPN80-81 only:</b> Check the AC output voltage fused by F3 on back of system.
	Check the video cable is properly connected.
	Check no pins of the video cable are bent.
	Check if video is present on backplane.
Color is not uniform	Turn ON the power to activate the Auto-Degauss function.
Colored streaks appear in image	Check for presence of magnetic sources near the monitor. Eliminate the sources and then degauss the monitor.
Screen image is not centered or sized properly	Adjust the picture location, picture size, picture rotation or pincushion distortion.
	Some video modes do not fill the screen to the edge of the monitor. There is no single answer to solve the problem. This phenomenon may occur on higher refresh rates (vertical frequency).
Picture is fuzzy	Adjust the picture contrast and picture brightness. Some SVGA cards having an excessive video output level will cause a fuzzy picture at the maximum contrast level.
	Turn ON the power to activate the Auto-Degauss function.
Video test patterns are not clear, bright, parallel or square	Replace the monitor.



**NOTICE** The monitor should automatically degauss itself each time power is applied if you wait at least 10 seconds before you turn power back ON.

For further details refer to: [Section 6-3 "Monitor Adjustment" on page 6-2.](#)

7-7-6 Unable to Record to VCR

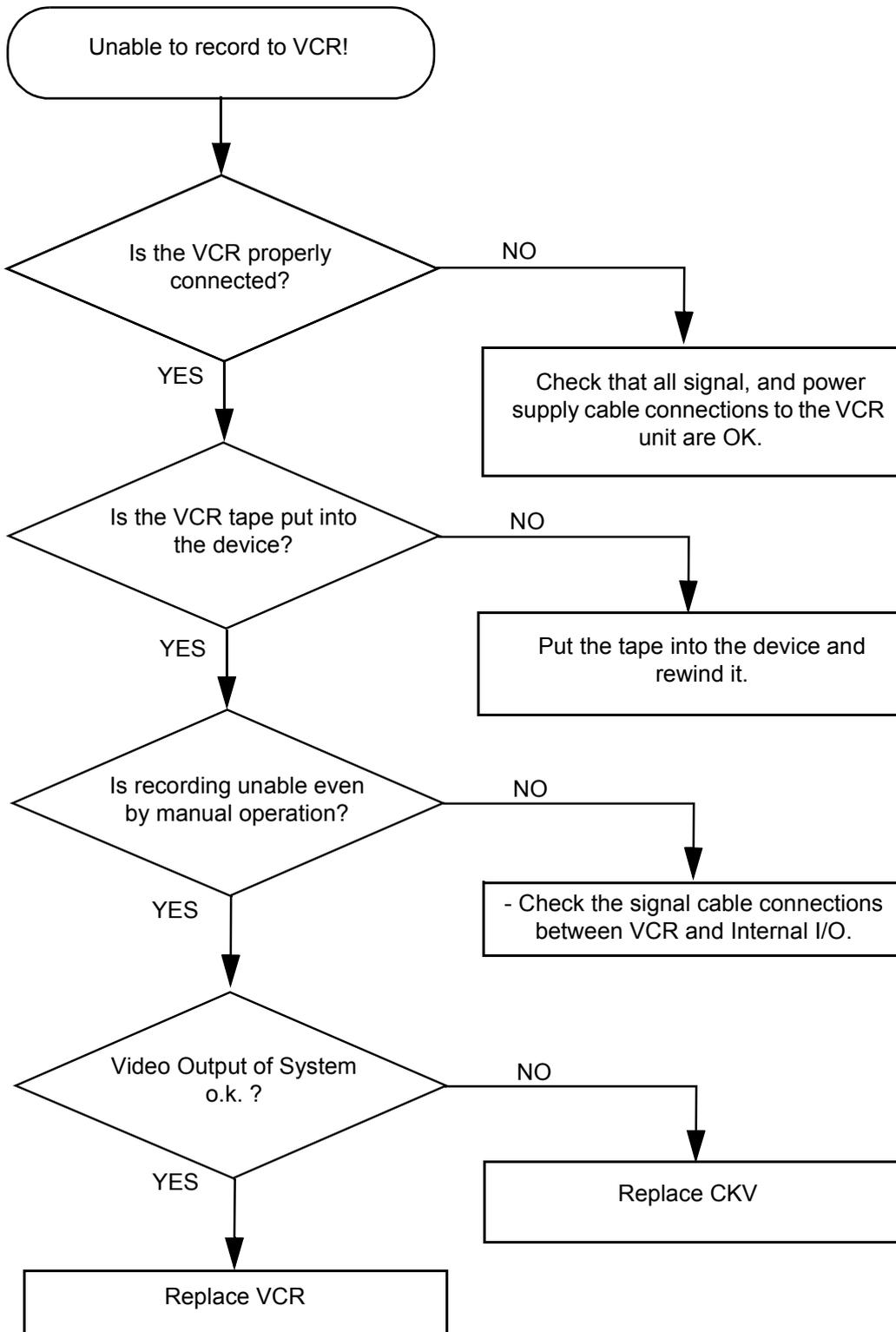


Figure 7-16 VCR - Troubleshooting

7-7-7 Printer Troubleshooting

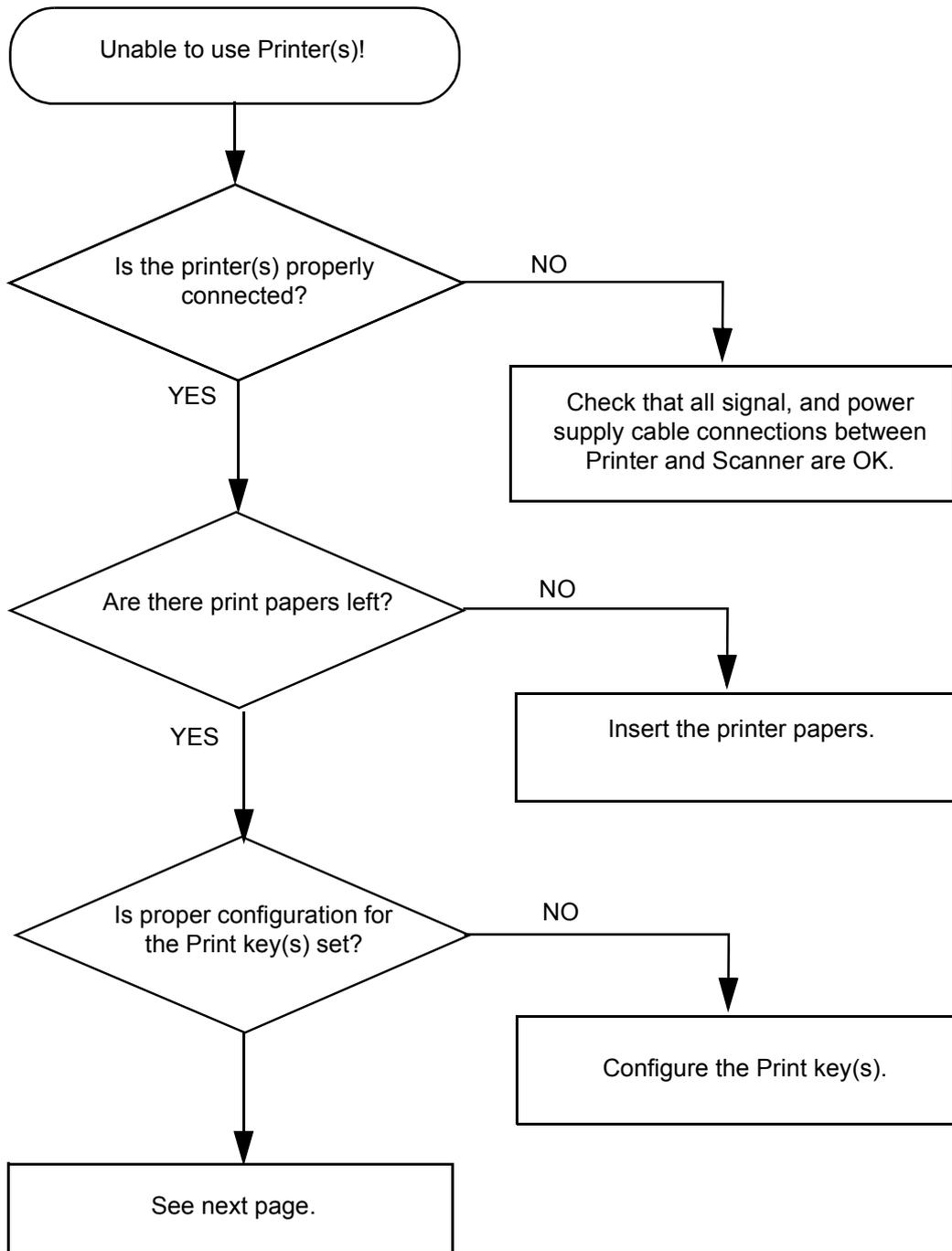


Figure 7-17 Printer - Troubleshooting

7-7-7 Printer Troubleshooting (cont'd)

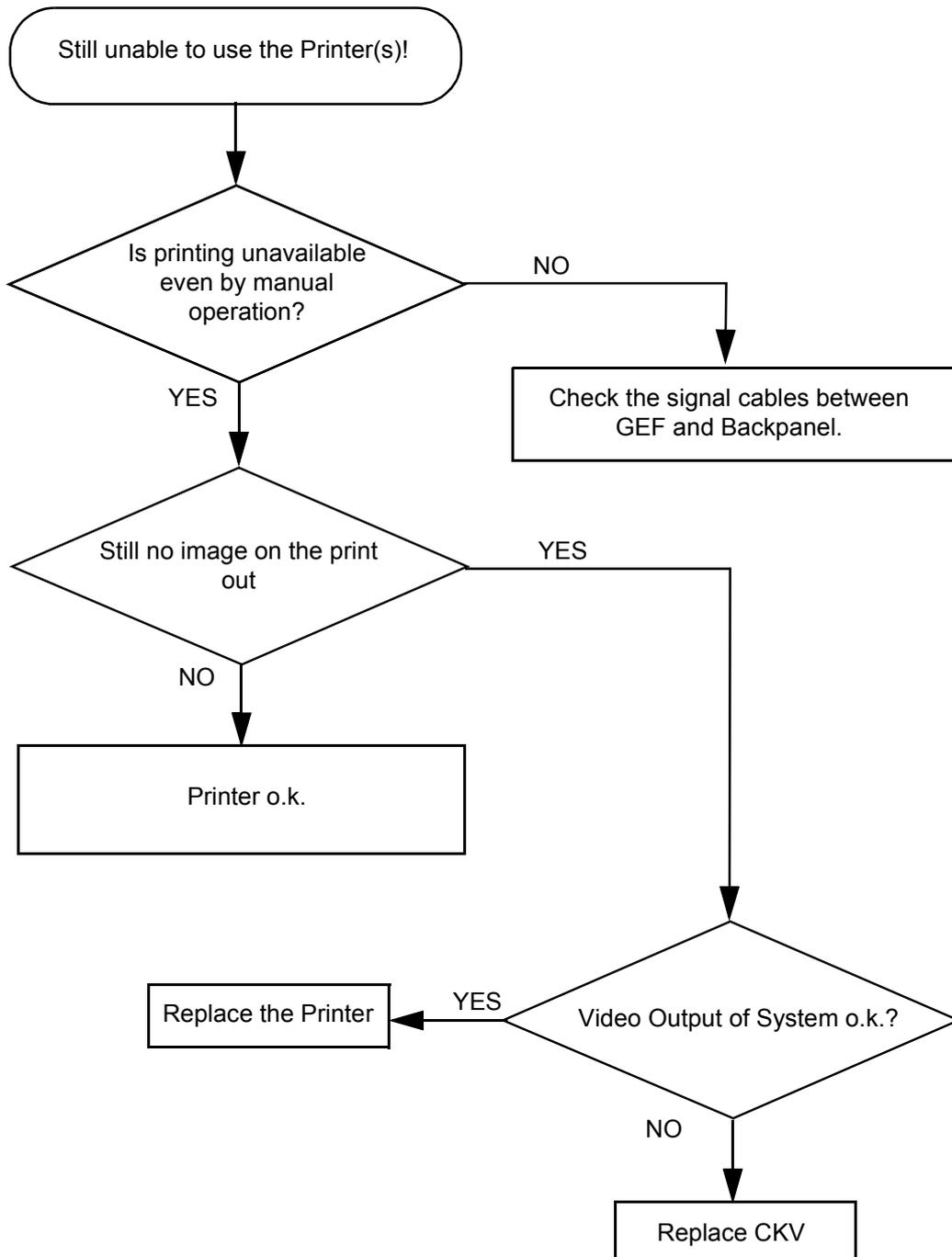


Figure 7-18 Printer Troubleshooting (cont'd)

### 7-7-8 DVD/CD+(R)W Troubleshooting (DVD/CD Drive)

- 1.) Insert an empty DVD/CD+(R)W into the Drive.
- 2.) Enter "Sonoview" by pressing the **SONOVIEW** key on the control panel; see [Figure 7-19](#).
- 3.) Click the "Open" icon to display the list of exams.
- 4.) Select exam(s) and backup them to DVD/CD+(R)W.
- 5.) Choose "DVD/CD" Drive.
- 6.) The images, which you have chosen during backup should be visible.

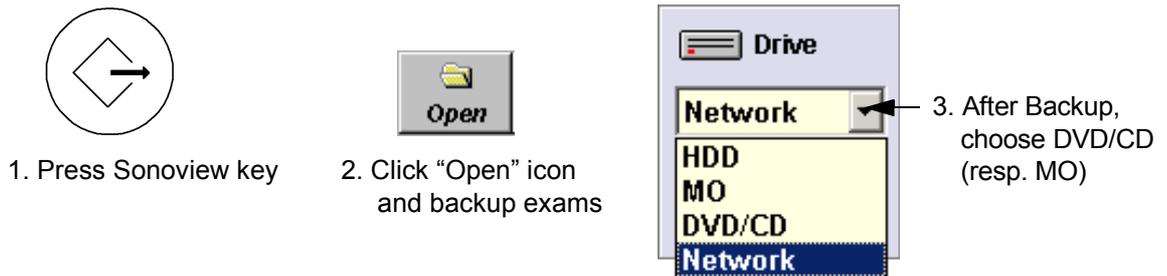


Figure 7-19 To backup exams to DVD/CD+(R)W resp. MO-Disk



**NOTICE** In case of any problems, check status of the Diagnostic LED's and voltages of the AUX Supply connector (= Disk Drive Module power connector) on the backpanel of the GEF-Box; see: [Section 7-3 "Check Points Voltages" on page 7-4](#)

### 7-7-9 MOD Troubleshooting

- 1.) Insert an empty MO into the Drive.
- 2.) Enter "Sonoview" by pressing the **SONOVIEW** key on the control panel; see [Figure 7-19](#).
- 3.) Click the "Open" icon to display the list of exams.
- 4.) Select exam(s) and backup them to MO.
- 5.) Choose "MO" Drive.
- 6.) The images, which you have chosen during backup should be visible.



**NOTICE** In case of any problems, check status of the Diagnostic LED's and voltages of the AUX Supply connector (= Disk Drive Module power connector) on the backpanel of the GEF-Box; see: [Section 7-3 "Check Points Voltages" on page 7-4](#)

## **7-7-10 Network Troubleshooting**

### **7-7-10-1 No Connection to the Network at All**

- 1.) Check that the network cable between the scanner and the wall network is connected and well seated in both ends. (Use a network cable that is known to be OK.)
- 2.) Check the cable between the network-connector on the Back Panel to the LAN-connector on the GEF.
- 3.) Connect a network cable between your Scanner and your PC. Try to ping from the Scanner to the IP address on the PC. If OK, the hardware connection inside the Scanner is OK.

## Section 7-8 Error Messages



**NOTICE** If the problem (error message) still exists after performing the described actions, call technical support.

Error Messages	Actions
3D B_RxLines exceeded!	restart the system
3D B-O_Frames exceeded!	restart the system
3D C_RxLines exceeded!	restart the system
3D C-O_Frames exceeded!	restart the system
530-Probe connected on.....	Disconnect and reconnect the probe. If error remains don't use such a probe.
AcousticUnitType not supported by BF_Interface:	restart the system
Array bounds exceeded	restart the system
Attempt to read Probe-ID from an invalid probe connector.	reboot system.
AVI Save function fails	check the SCSI and the Power cable - restart the machine and try again
B_Enhance Out Of Range	press ok and save this user-setting once again
B_Gain Out Of Range	press ok and save this user-setting once again
B_Reject Out Of Range	press ok and save this user-setting once again
B_TxFocus - not calculated and B_SHOT_PART_ON	restart the system
Backup error while writing. (Error during writing of backup data.)	check storage destination for Full Backup (e.g., DVD/CD not empty, insufficient rights on target Network drive, write protection on MO or USB-drive)
Backup error while verifying. (Checksum mismatch)	repeat backup
BC Ensemble Out Of Range	press ok and save this user-setting once again
BC lines_per_sequenz < 1	restart the system
BC lines_per_sequenz < 2	restart the system
BC_Dynamic Out Of Range	press ok and save this user-setting once again
BC_Gain Out Of Range	press ok and save this user-setting once again
BC_Lines: BC_LineDensity out of limit	restart the system
BCMC_Balance Out Of Range	press ok and save this user-setting once again
bCP_ConvertParameters failed	restart the system
bCP_ProcessIQEnsemblePacket failed	restart the system
bCP_ProcessIQMMModePacket failed	restart the system

Error Messages	Actions
B-DynContrast Out Of Range	press ok and save this user-setting once again
BF: can't set BM RxApod	restart the system
BF: can't set C Rx Apod	restart the system
BF: can't set D RxApod	restart the system
binary file not found	restart the system
Binary path not set	restart the system
BM_Resample: overrun SampleLengthOnLineMem	restart the system
Cannot create instance	restart the system
Cannot read a valid Probe-ID (xxx) from.....	disconnect and reconnect the probe
CANNOT_IMPORT_VOLUME_DATA_TO_3D_DLL	load volume files from other storage medium
Can't create hardware configuration index file in D:\SERVICE	restart the system
Can't detect PCI 9054 (CRS)	restart the system
Can't import session	use a new CDR to write data to CD
Can't open file: .....	restart the system
can't open MotCtrl RS232 Serial connection	restart the system
Can't open: \P a t h \Load_HW.log	restart the system
Can't open: .....	restart the system
Can't open: C:\V730\Distribution\Hardware\pattern.dat.bin	restart the system
can't write XilinxFiles.ini	restart the system
CD write error	use a new CDR
Cine2D_CtrlBlock::vSetState: value of m_GIP_eCineType undefined!!	restart the system
Cine2D_CtrlBlock::vSetState: value of m_pGIP_eR_W_Mode undefined!!	restart the system
Communication thread is dead!	restart the system
ConManager - RC_ConstructGOPs: Memory allocation failed	restart the system
CPF Hardware not found	restart the system
CPS_InterfaceToHW::vSet_VOL_MODE -- incorrect value for ColorDMA_Active	restart the system
CPS_InterfaceToHW::vSet_VOL_MODE -- incorrect value for EndOfFrameInt	restart the system
CPS_InterfaceToHW::vSet_VOL_MODE -- incorrect value for LongLineMemFIFO	restart the system
CPS_InterfaceToHW::vSet_VOL_MODE -- incorrect value for LongLineMemFIFO	restart the system

Error Messages	Actions
CPS_InterfaceToHW::vSet_VOL_MODE -- incorrect value for Mode_4D	restart the system
CtrlMvGrpRepresentations::isInWriteMode not supported for mode nr xx	restart the system
D:\SERVICE\ConfIndexFile is corrupt	restart the system
CW_BaseliPos Out Of Range	press ok and save this user-setting once again
CW_Gain Out Of Range	press ok and save this user-setting once again
CW-hardware doesn't support	pencil probe + CW-Hardware not available->HW problem
CW-HW-PRF == 0	restart the system
CW-TxFrequency == 0	restart the system
CW-TxPower Out Of Range	press ok and save this user-setting once again
Datatype misalignment	restart the system
Delete error (Backup data could not be deleted.)	check storage destination of Full Backup (e.g., DVD/CD, insufficient rights on target Network drive, write protection on MO or USB-drive)
Density Out Of Range	press ok and save this user-setting once again
DFE::Block with openInput	restart the system
Different software error (Backup data was made on another system with a different software version.)	This backup cannot be restored by the user.
Disc full!	use a new CDR for writing data to CD
Display:Rect Region fails	restart the system
Division by zero	restart the system
done is low!	restart the system
Downgrade error (Backup data was made with a software version higher than the installed version.)	load appropriate backup for installed version
DSP - Gamma Corr - Load Data Timeout	restart the system
DSP - HilbertCoeff - Load Data Timeout	restart the system
DSP - Low Pass Coeff - Load Data Timeout	restart the system
DSP - SetFFT_Para - Load Data Timeout	restart the system
DSP - SetWMF_Koeff - Load Data Timeout	restart the system
DSP/MSE:Hanning-Window Load Data Timeout	restart the system
Electronic user manual not installed. Please install.	install Electronic User Manual (EUM) and try it again
End Bandwidth too big	restart the system
End ET too big	restart the system
End frequency too big	restart the system

Error Messages	Actions
Enhance Out Of Range	press ok and save this user-setting once again
Ensemble Out Of Range	press ok and save this user-setting once again
Error in CreateCinImage	try to store again; restart the system
Error in File: ....	restart the system
Error in Select Tx-channel for B-mode	restart the system
Error in Select Tx-channel for C-mode	restart the system
Error in Select Tx-channel for CW-mode	restart the system
Error in Select Tx-channel for PW-mode	restart the system
Error no HW present	restart the system
Error not enough time for BC shot!	restart the system
Error on LoadBootMem Page: xx, Addr: xx	restart the system
Error programming Flashcomplete	restart the system
Error setting state	restart the system
ERROR_MSG_INIT_FAILED	Check connection from US machine to VCR, VCR has power and is on.
ERROR_MSG_NO_ACK	check VCR cables and try again
ERROR_MSG_NO_CASSETTE	put cassette into drive of VCR
ERROR_MSG_NO_RESPONSE	check VCR cables, cassette,... and try again
ERROR_MSG_WRITE_PROTECTED	remove cassette from VCR and put writeable cassette into drive of VCR.
Execute privileged instruction	restart the system
Fallsmooth Out Of Range	press ok and save this user-setting once again
File Could not CRC Check	load volume files from other storage medium
File CRC Error	load volume files from other storage medium
File CRC Missing	load volume files from other storage medium
File Data Missing	load volume files from other storage medium
File Datalength Not Consistent	load volume files from other storage medium
File Decompress Error	load volume files from other storage medium
File Decompress method Unknown	load volume files from other storage medium
File End Error	load volume files from other storage medium
File Execute Error	load volume files from other storage medium
File Memory Missing	load volume files from other storage medium
File Not Found	load volume files from other storage medium

Error Messages	Actions
File Pos	load volume files from other storage medium
File Read Error	load volume files from other storage medium
File Type Unknown	load volume files from other storage medium
File Volume size not consistent	load volume files from other storage medium
FLT: Denormal operand	restart the system
FLT: Divide by zero	restart the system
FLT: Invalid operation	restart the system
FLT: Stack overflow	restart the system
FLT: Underflow	restart the system
FrameUp - TempBuffer: Memory allocation failed	restart the system
GeoDescription3D_TissueCF::operator=: handed over argument is not of same type, dynamic cast failed!!	restart the system
GeoDescriptionMotion Constructor: unknown mode Parameter handed over	restart the system
GeoDescriptionMotion::operator=: handed over argument is not of same type, dynamic cast failed!!	restart the system
GeoDescriptionPWMode::operator=: handed over argument is not of same type, dynamic cast failed!!	restart the system
GeoDescriptionTissueCF Constructor: unknown mode Parameter handed over	restart the system
GeoDescriptionTissueCF::operator=: handed over argument is not of same type, dynamic cast failed!!	restart the system
Hardware doesn't support CW-mode	pencil probe + CW-Hardware not available->HW problem
hardware error on	restart the system
HardwareRelatedSoftware_Windows in write have different ProbeAcousticUnitIDs	disconnect all connected probes and connect them again; if not ok restart the system
HardwareRelatedSoftware_Windows in write have different ProbeScanFuncIDs	disconnect all connected probes and connect them again; if not ok restart the system
IBegrenzer.cpp Bshots TxMultiFocus problem	restart the system
IBegrenzer.cpp Mshots TxMultiFocus problem	restart the system
In the 3D Image Measure is not allowed	change to another format than 3D Fullscreen mode
incorrect VersionByte, xx of xx cycles OK	contact technical support
iSetVideoSource(eVideoIntern) function fails	reboot the system
iSetVideoSource(eVideoIntern) function fails	the system will restart itself by pressing OK
LineFilt Out Of Range	press ok and save this user-setting once again
LP_KoefBlock: SamplePRF too big	restart the system

Error Messages	Actions
M_Gain Out Of Range	press ok and save this user-setting once again
M_Reject Out Of Range	press ok and save this user-setting once again
MC Ensemble Out Of Range	press ok and save this user-setting once again
MC_Balance Out Of Range	press ok and save this user-setting once again
MC_BaseLinePos Out Of Range	press ok and save this user-setting once again
MC_Dynamic Out Of Range	press ok and save this user-setting once again
MC_FallSmooth Out Of Range	press ok and save this user-setting once again
MC_Gain Out Of Range	press ok and save this user-setting once again
MC_RiseSmooth Out Of Range	press ok and save this user-setting once again
M-DynContrast Out Of Range+	press ok and save this user-setting once again
Memory access violation	restart the system
memory allocation error	restart the system
missing BCMCPW_TxFocusData	restart the system
missing BM_TxFocusData	restart the system
missing CW_TxFocusData	restart the system
missing ProbeAcousticUnit, wrong ProbeAcousticUnitID.	restart the system
missing ProbeGeneral data - wrong ProbeID	restart the system
missing ProbeScanFunc - wrong ProbeScanFuncID	restart the system
MotCtrl RS232 communication timeout	restart the system
MotCtrl: No Referenzposition signal!	Confirm the message by pressing the OK button, disconnect and reconnect the active probe and use it again. If the message appears again, usually the probe itself has an defect, so you should contact the service
MotionColor-DSC 1st:Memory allocation failed	restart the system
MotionColor-DSC 2nd:Memory allocation failed	restart the system
Motion-DSC:Memory allocation failed	restart the system
MoveVolumeAxis only supported by RealTime-probes !	look into the System Setup to see the current MotCtrl version and contact technical support
MoveVolumeAxis only supported by RealTime-probes (RRE)	look into the System Setup to see the current MotCtrl version and contact technical support
No CD Writer found	check the connection and the Power cable - plug the cable off and on and try again. (restart the system)
No disc in drive	insert disk, if fails again reboot and try again (with another disk)
Not enough space. (Not enough space on destination to hold the backup data.)	select another destination to save Full Backup

Error Messages	Actions
Overflow	restart the system
Persistence Out Of Range	press ok and save this user-setting once again
Persistence coeff page index too big	restart the system
pGetActualUnitBuffer failed, RepresentationManager is not initialized	restart the system
pGetActualUnitBuffer failed, RepresentationManager is not initialized	restart the system
Please plug off and on probe and try again	plug of and on the probe and try again, plug it on a different probe connector.
PlxMemCheck ERROR	restart the system
pNextUnitCompleted failed, RepresentationManager is not initialized	restart the system
PRF_GeneratorBoundary: BBC Ensemble Limitation out of limit	restart the system
PRF_GeneratorBoundary: BBCPW Ensemble Limitation out of limit	restart the system
Probe Scan Function Not Supplied	restart the system
PW_BaseLinePos Out Of Range	press ok and save this user-setting once again
PW_BurstCalcBlock: UserProgApplication out of range	restart the system
PW_CW_FFT_FactBlock: DSC_ScrollX_Zoom darf nicht kleiner als eins sein!	restart the system
PW_Dynamic Out Of Range	press ok and save this user-setting once again
PW_Reject Out Of Range	press ok and save this user-setting once again
PWCW-DSC:Memory allocation failed	restart the system
PWGain Out Of Range	press ok and save this user-setting once again
ReplayCtrlInterface::vReconnect failed, selected movie group unknown	restart the system
ReplayCtrlInterface::vRunAcquisition failed, selected movie group unknown	restart the system
ReplayCtrlInterface::vSetForAllRepMngrsParams failed, selected movie group unknown	restart the system
RepresentationManager returned NULL write position	restart the system
RepresentationManager: NextChunkGenerated failed, number bytes written!=UnitSize	restart the system
RepresentationManager::vCreate: Dimension unknown, arguments of vSetReplayParams() incorrect!!	restart the system
RepresentationManager::vCreate: Nr. Dim 0 incorrect, see vSetReplayParams() call	restart the system

Error Messages	Actions
RepresentationManager::vCreate: Nr. Dim 1 incorrect, see vSetReplayParams() call	restart the system
RepresentationManager::vCreate: Nr. Dim 2 incorrect, see vSetReplayParams() call	restart the system
RepresentationManager::vResizeBufferLength caused exception, replay buffer is not empty!!	restart the system
Restore error (Error while reading backup data.)	Backup data are probably damaged. Try again or load another backup.
RiseSmooth Out Of Range	press ok and save this user-setting once again
RT_4DTissueFilterBlock:: Storage Error, no dynamic memory for filter operations available!!	restart the system
RT_4DTissueFilterBlock:: storage needed for one filtered volume differs from available Unitsize within replay buffer!!	restart the system
RT_4DTissueFilterBlock::bDIILineFilter call failed!!	restart the system
RT_4DTissueFilterBlock::bDIILineFrameFilter call failed!!	restart the system
RT_4DTissueFilterBlock::DMA Block size and calculated frame size differs!!	restart the system
RT_ColorFlowFilterBlock Constructor: Memory allocation failed	restart the system
RT_ColorFlowFilterBlock::vCheckIQDataSizeAndUpdateTables: Memory allocation failed	restart the system
RT_ColorFlowFilterBlock::vDebugDrawIQDataCurve: Memory allocation failed	restart the system
RT_ConnectionMgr::vAssembleRTSet: no RT_TissueFilterBlock found for TISSUE3D Blocks	restart the system
RT_ECG_Block::bStart ECGInterface failed!!	restart the system
RT_MColorFilterBlock::RT_MColorFilterBlock: Memory allocation failed	restart the system
RT_MColorFilterBlock::vCheckIQDataSizeAndUpdateBuffer: Memory allocation failed	restart the system
RT_MColorFilterBlock::vDebugDrawIQDataCurve: Memory allocation failed	restart the system
RT_MotionMBlock::execute caused exception:: Addr from DMA= xx, ReplayBuffAddr= xx, (Line+Header)Size= xx, blockLength= xx, value i= xx!!	restart the system
RT_PWorCW_Block::replay buffer size smaller than expected	restart the system
RT_PWorCW_Block::execute caused exception:: Addr from DMA= xx, ReplayBuffAddr= xx, (Line+Header)Size= xx, blockLength= xx, line index= xx!!	restart the system
RT_PWorCW_Block::execute: Error, length of DMA block 2 [xx] is not aligned to linesize!!	restart the system
Start Bandwidth too small	restart the system

Error Messages	Actions
Start ET too small	restart the system
Start frequency too small	restart the system
StoragePool: Not sufficient replay storage for B & CF Mode available	restart the system
StoragePool: Not sufficient replay storage for ECG available	restart the system
StoragePool: Not sufficient replay storage for M Mode available	restart the system
StoragePool: Not sufficient replay storage for MC or PW Mode available	restart the system
System detected severe error, please call technical support.	restart the system, call technical support
System detected severe error. Some components like Touch Panel server may not be registered. Please register Touch Panel server and restart.	restart the system, call technical support
The Database UserPrograms Corrupted	restart the system
The Date format not stored properly	close registry, restart, try again
The Handle Unregistered	close registry, restart, try again
The Regesitery not closed	restart the system
Thickness mismatch xx - GIP xx	restart 3D (go to 2D); restart the system
UI_BBC_Wnd::vSet() has an wrong ImageType	restart the system
UI_BBC_Wnd::vSet() will change from eB_Wnd to wrong ImageType	restart the system
UI_BBC_Wnd::vSet() will change from eBBC_Wnd to wrong ImageType	restart the system
UI_Manager::vDestroyWnd: dynamic cast to UI_MMC_Wnd* failed	restart the system
UI_Manager::vDestroyWnd: dynamic cast to UI_PW_Wnd* failed	restart the system
UI_Manager::vHRS_Execute multiple call	restart the system
Unable to save...	restart the system
undefined CW ADC_Clk-Teiler	restart the system
Unknown Error	load volume files from other storage medium
unknown Xilinx-Version	restart the system
unrecordable disc in drive	try again with another disk
Unsupported color mode	restart the system
Verify error (Error while checking backup data.)	Backup data are probably damaged. Try again or load another backup.

Error Messages	Actions
ViewerConMgr::vAssembleCF_DFE: attempt to get ECG_Consumer_2D- or ECG_Draw_2D-Block from ECGViewer Objects failed!!	restart the system
ViewerConMgr::vAssembleM_DFE: attempt to get ECG_Consumer_2D- or ECG_Draw_2D-Block or ECG-CalcHR-Block from ECGViewer Objects failed!!	restart the system
Volume_dB Out Of Range	press ok and save this user-setting once again
WMF_KoefBlock: SamplePRF too big	restart the system
XTD - pucBackScaledBImage: Memory allocation failed	restart the system
XTD - pucDSCBImage: Memory allocation failed	restart the system
XTDTrackballCtrlState::No frame to trackball position found, internal failure!!	restart the system

# Chapter 8

## Replacement Procedures

### Section 8-1 Overview

#### 8-1-1 Purpose of Chapter 8

This chapter contains replacement procedures for different modules and their subsystems.



**NOTICE** The **Manpower**, time and **Tools** indicated in the Sub-sections include all requirements from **Preparations to Installation Procedures**.



**WARNING** *No covers or panels should be removed from the system (high-voltage risk). Service and repairs must only be performed by authorized personal. Attempting do-it-yourself repairs invalidate warranty and are an infringement to regulations and are inadmissible acc. to IEC 60601-1.*



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 for information concerning the decommission of your equipment.

**Table 8-1 Chapter 8 Contents**

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## 8-1-2 Returning/Shipping Probes and Repair Parts

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

GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS 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 and 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.

*The US Department of Transportation (DOT) has ruled that "items what 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 purpose and must be transported as a hazardous material.*

## Section 8-2 Ultrasound Application Software (UIS) Installation Procedure

### 8-2-1 Introduction



**NOTICE** From Software Version 3.0.3 onwards, it is possible to update the Ultrasound Application Software via the UPDATE button in the System Setup SERVICE page; see: [Section 8-2-5 on page 8-5](#).

### 8-2-2 Manpower

One Person, 20 min.

### 8-2-3 Tools

System DVD or Upgrade-CD

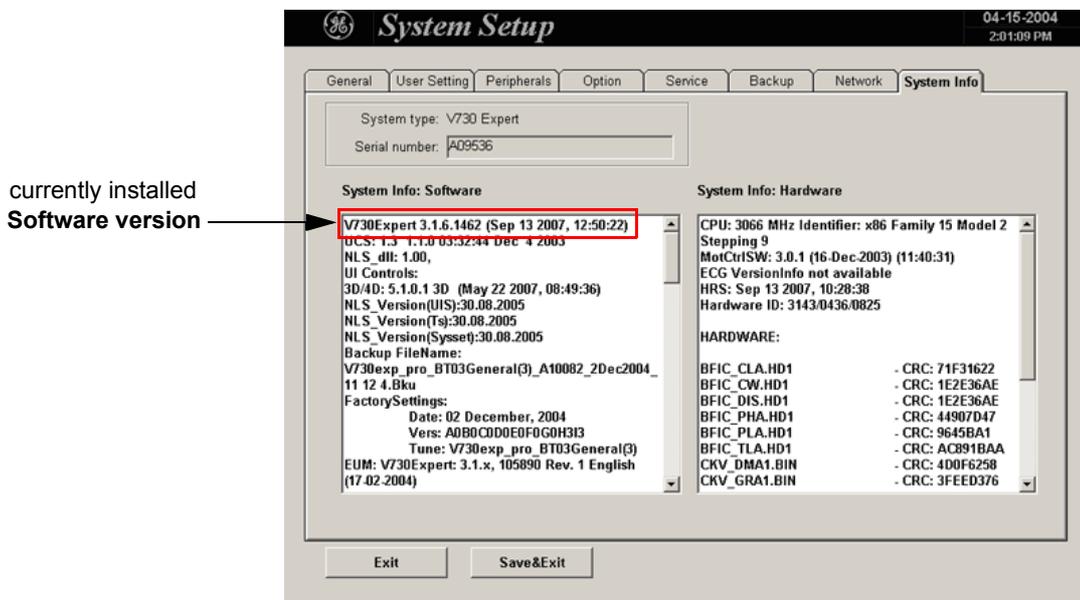
### 8-2-4 Preparations

Before performing the Software Update/Upgrade:

- A.) make sure that all system functions are working correct
- B.) check the current Software Version and installed Options

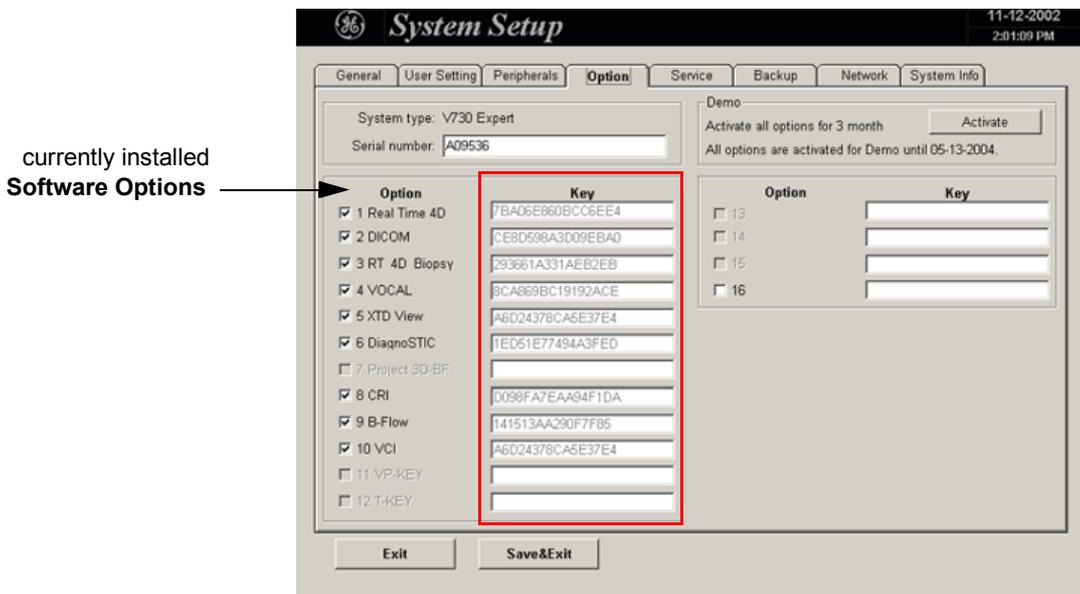
**8-6-3 Preparations** (cont'd)

- 1.) Touch the UTILITIES key on the Touch Panel once to display the Utilities menu.
- 2.) Touch SYSTEM SETUP in the Utilities menu.
- 3.) Select the SYSTEM INFO page on the System Setup desktop screen to see which Software/Hardware version is installed in the unit.



**Figure 8-1 Version check**

- 4.) Select the OPTION page on the System Setup desktop screen to see which Options are installed.



**Figure 8-2 Option page**



**NOTICE** Please print out the OPTION page or write down all the option codes which are shown in the “Key” fields!

### 8-6-3 Preparations (cont'd)

- 5.) Select the NETWORK page on the System Setup desktop screen.
  - a.) Click on the DICOM / SONOVIEW CONFIGURATION button in the NETWORK page.

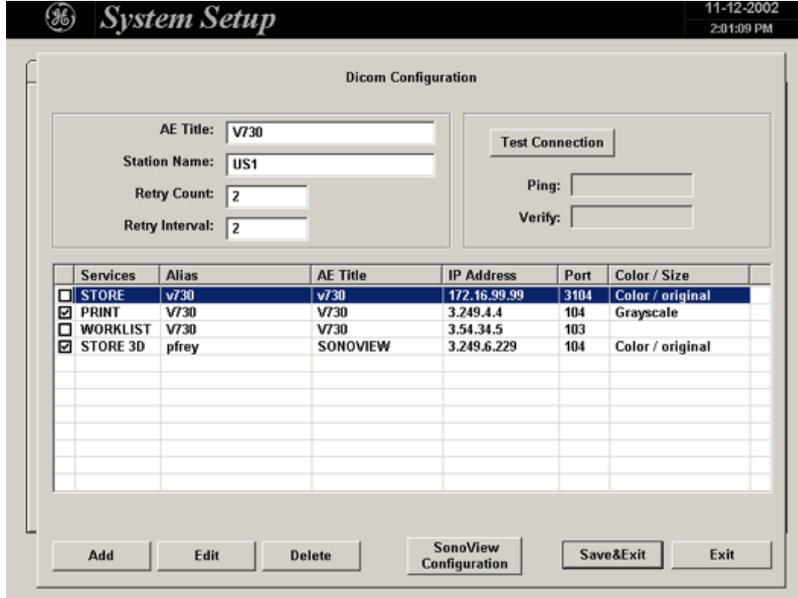
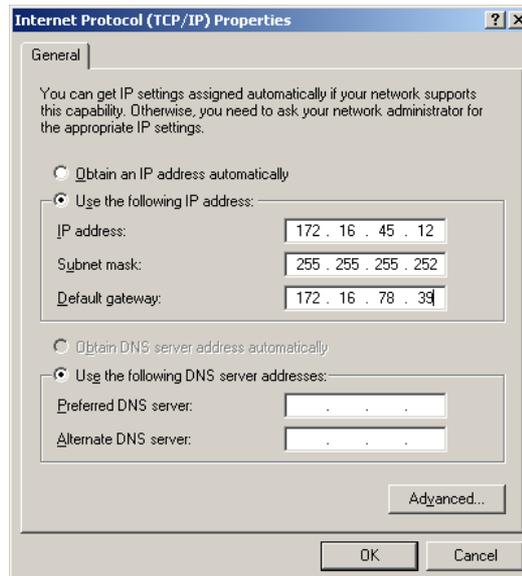


Figure 8-3 DICOM Configuration

 **NOTICE** Please print out the “DICOM Configuration” dialog page or write down the DICOM designations (AE Title, Station name, Retry Count, Retry Interval).

- b.) Click on the NETWORK CONFIGURATION button in the NETWORK page.



**NOTE:**  
This example shows  
fictive numbers!

Figure 8-4 Internet Protocol (TCP/IP)

 **NOTICE** Please print out the “Internet Protocol (TCP/IP) Properties” dialog page or write down the IP settings.

### 8-2-5 Software - Installation Procedure (via Service Page)

- 1.) Insert the System DVD or Upgrade-CD into the drive.
- 2.) Touch UTILITIES and SYSTEM SETUP on the Touch Panel.
- 3.) Select the SERVICE page.



Figure 8-5 System Setup Service

- 4.) Type in the password **SHE** and click ACCEPT.

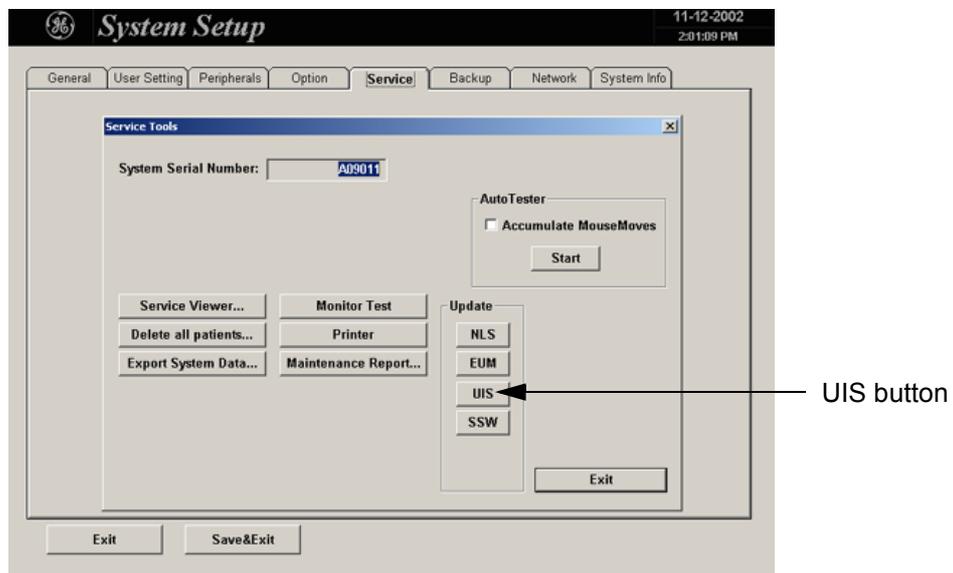


Figure 8-6 Service Tools

- 5.) Click on the UIS button for updating the Ultrasound Application Software.

## 8-2-5 Software - Installation Procedure (via Service Page) (cont'd)

6.) Confirm the following message with YES.

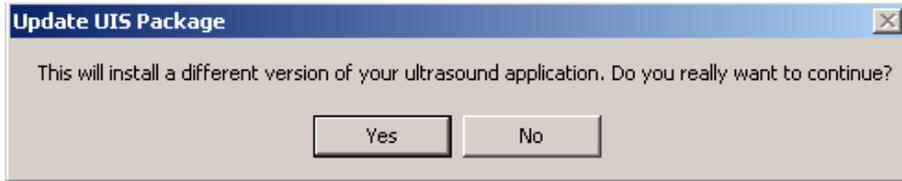


Figure 8-7 Update UIS message

7.) A new window pops up on the screen and the InstallShield starts extracting files.

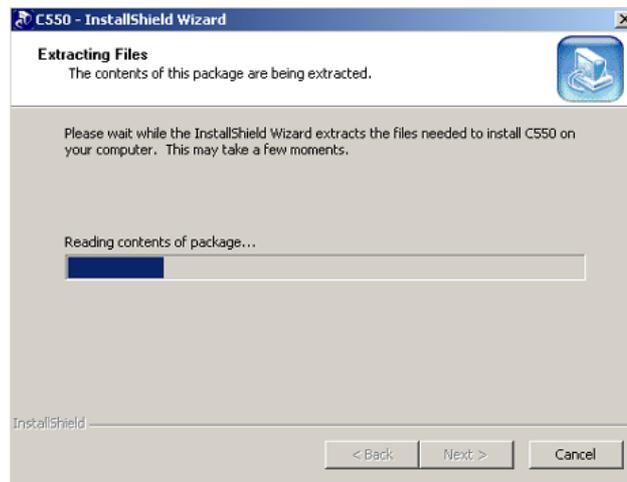


Figure 8-8 Install Shield Wizard - Extracting Files

8.) Click the NEXT button In the “Welcome to Kretz V730 Software Installation” window.

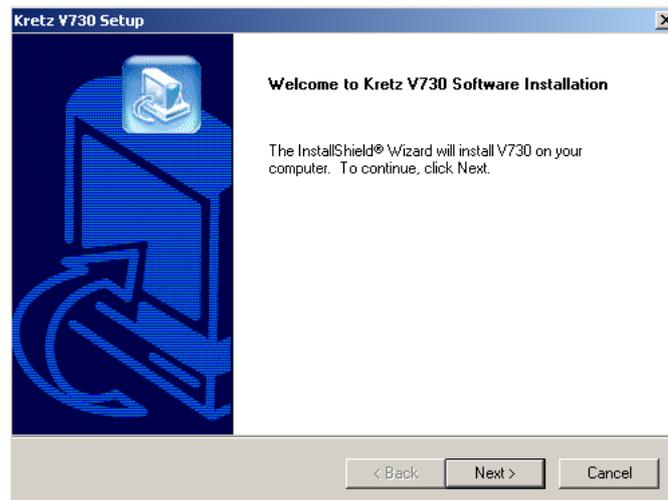
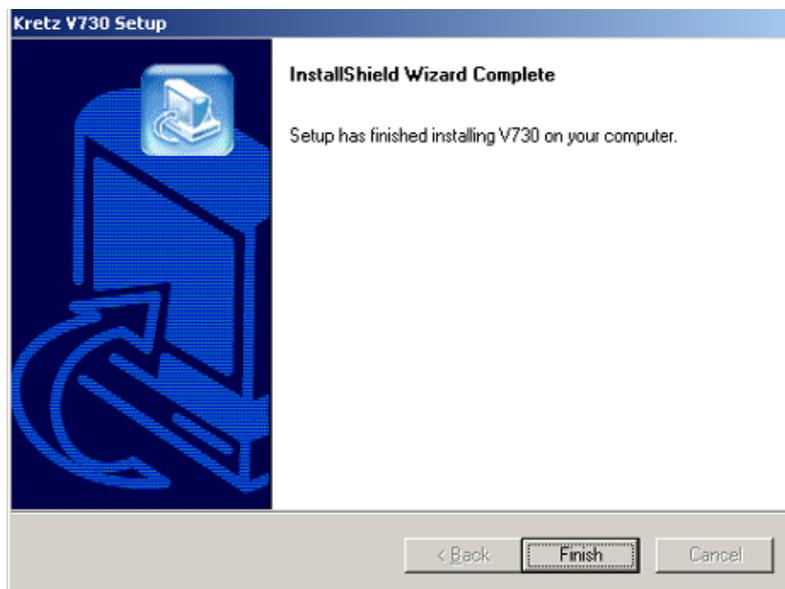


Figure 8-9 Welcome to ... Software Installation

The contents of the Software package are being extracted.

## 8-2-5 Software - Installation Procedure (via Service Page) (cont'd)

9.) Complete the Software installation with the FINISH key.



**Figure 8-10 V730 Software Setup**

The system restarts automatically.

- 10.) If desired, load the appropriate factory settings; see [Section 8-3 on page 8-8](#) or the full backup; see: [Section 8-4 on page 8-8](#).
- 11.) If necessary, update the Service Software (SSW) as described in [Section 8-5 on page 8-9](#).
- 12.) Afterwards update the Electronic User Manual (EUM) as described in [Section 8-6 on page 8-11](#).
- 13.) Perform Software and Functional checks as described in [Section 8-7 on page 8-14](#).

## Section 8-3 User Settings Only (Application Settings) Loading Procedure

### 8-3-1 Introduction

The User Settings contains:

- Application Settings
- User Programs
- Auto Text
- 3D/4D Programs

### 8-3-2 Loading Procedure

see: [Section 4-5-2 "Load User Settings Only \(Application Settings\)" on page 4-31](#)

## Section 8-4 Full Backup (Presets, Configurations & Appl. Settings) Loading Procedure

### 8-4-1 Introduction



**NOTICE** From Software Version 3.1.0 onwards, it is possible to load a **previously** saved "Full Backup" into the Voluson® 730Expert.

The Full Backup contains following data:

- Patient demographic and exam data (database containing the patient data and measurements)
- SonoView image data (**NOT** available when saving to the internal hard disk, DVD/CD or MOD)
- User Settings (databases and files containing gray curves and the user settings.)
- Image transfer settings (DICOM settings e.g., DICOM servers, AE Title, Station Name, etc.)
- Measure Setup Settings (user specific measure settings)
- V730 settings (general settings such as language, time/date format and the enabled options)
- Windows Network Settings (network settings including the computer name)
- Service Platform (state of the service platform)
- VP (additional system data)

### 8-4-2 Loading Procedure

see: [Section 4-5-4 "Load Full Backup \(Presets, Configurations & Application Settings\)" on page 4-35](#)

## Section 8-5 Service Platform (SSW) Upgrade Procedure

### 8-5-1 Manpower

One Person, 10 min.

### 8-5-2 Tools

System DVD or Upgrade CD

### 8-5-3 Upgrade Procedure

- 1.) Insert the System DVD or Upgrade-CD into the drive.
- 2.) Touch the UTILITIES key on the Touch Panel once to display the Utilities menu.
- 3.) Touch the SYSTEM SETUP key to invoke the setup desktop on the screen.
- 4.) Select the SERVICE page.
- 5.) Enter the password **SHE**, and click the ACCEPT.
- 6.) The “Service Tools” menu appears on the screen.

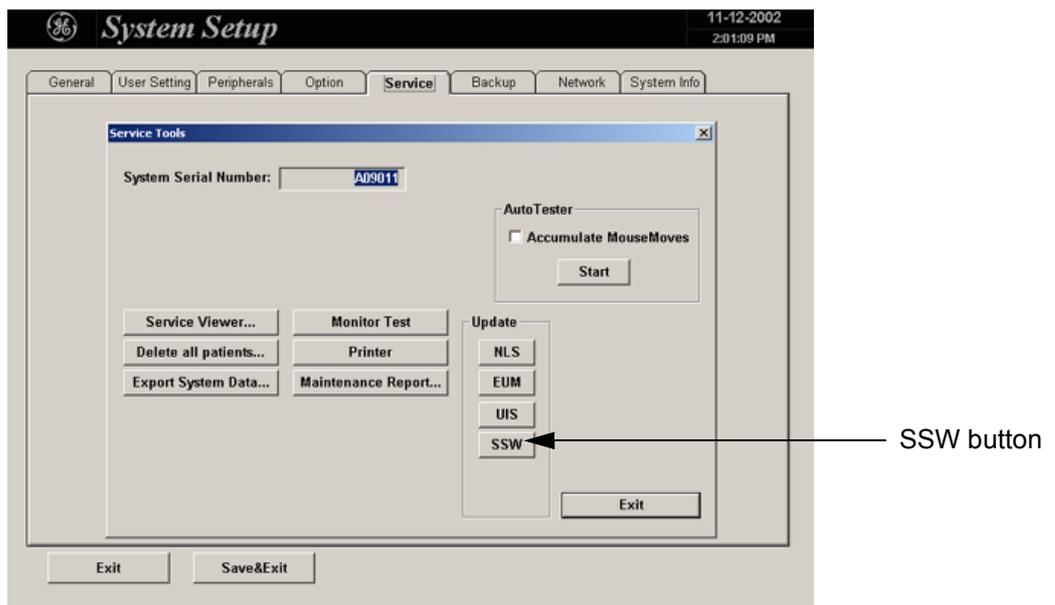


Figure 8-11 Service Tools

- 7.) Click on the SSW button for updating the Service Platform Software.

## Section 8-5 Service Platform (SSW) Upgrade Procedure (cont'd)

- 8.) Select the DVD/CD DRIVE button.
- 9.) Browse for the **install.bat** file and click OK.

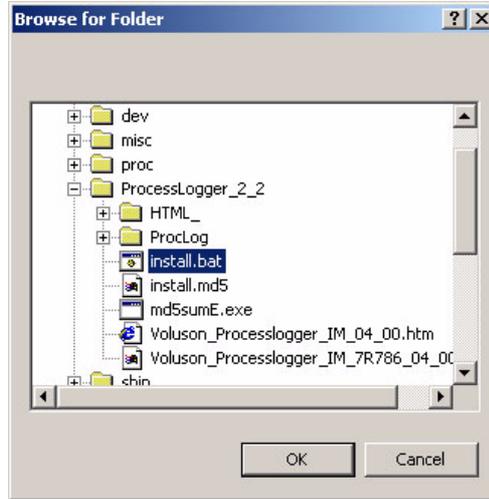


Figure 8-12 Browse for Folder

- 10.) Confirm the following message with YES.

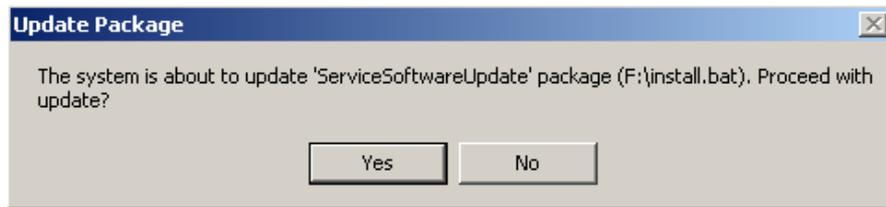


Figure 8-13 Update SSW message

- 11.) A new window pops up on the screen and the InstallShield starts extracting files.

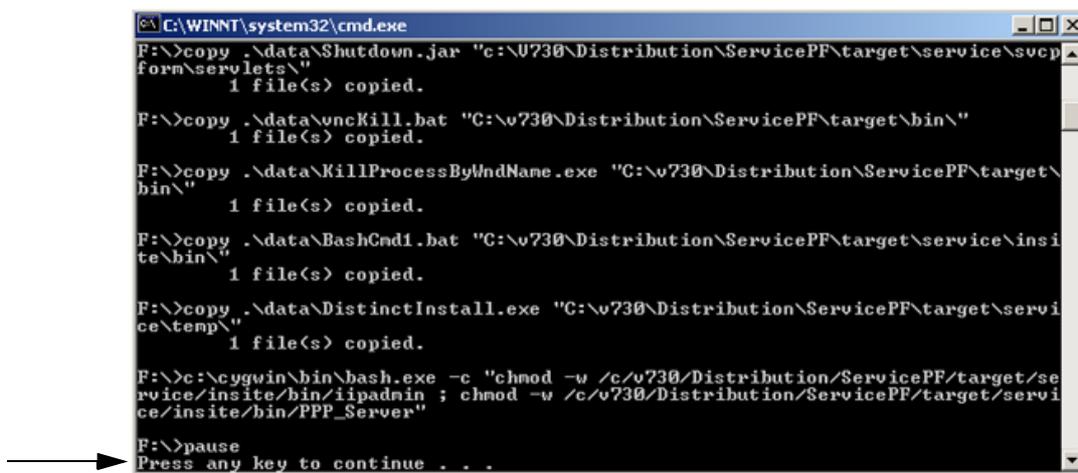


Figure 8-14 Install Shield Wizard - Extracting Files

- 12.) Press any key to continue to finish Service Platform installation procedure.
- 13.) Close the SERVICE page with EXIT and close the "System Setup" with SAVE & EXIT.

## Section 8-6 Electronic User Manual (EUM) Upgrade Procedure

### 8-6-1 Manpower

One Person, 15 min.

### 8-6-2 Tools

System DVD or Upgrade CD

### 8-6-3 Preparations

1.) Restart the system (turn off and on the system).



**NOTICE** The electronic user manual (EUM) **must never** be opened (by pressing the F1 key on the keyboard) after last restart! Even if closed again before installing the new EUM.

2.) Insert the System DVD or Upgrade-CD into the drive.

3.) Touch the UTILITIES key on the Touch Panel once to display the Utilities menu.

4.) Touch the SYSTEM SETUP key to invoke the setup desktop on the screen.

5.) Select the SERVICE page.

6.) Enter the password **SHE**, and click the ACCEPT.

7.) The “Service Tools” menu appears on the screen.

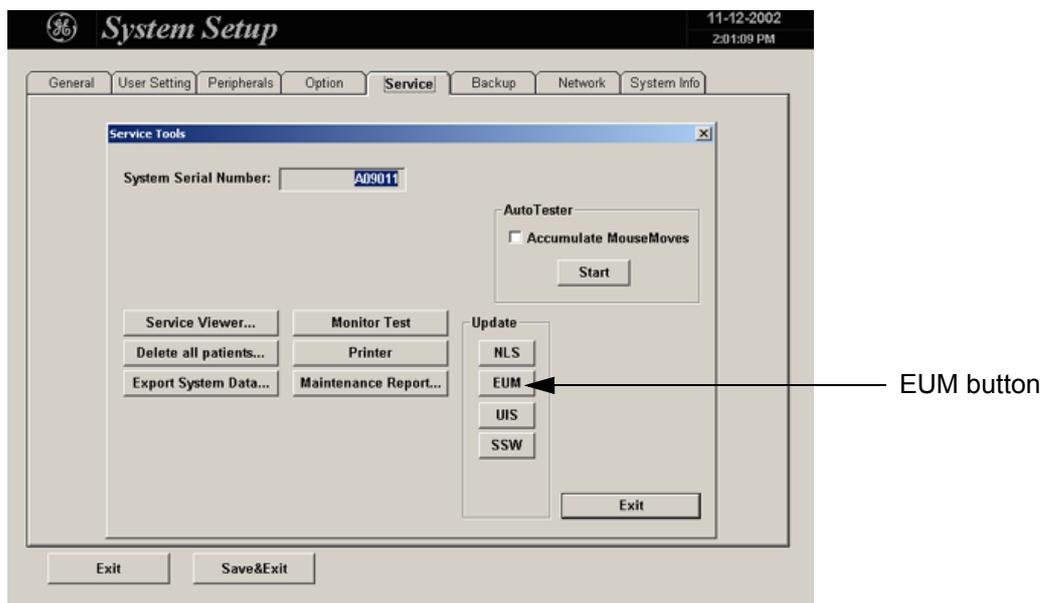


Figure 8-15 Service Tools

## 8-6-4 EUM - Upgrade Procedure

- 1.) Click the EUM button. The “Update Software” dialog appears.
- 2.) Select the DVD/CD DRIVE button.
- 3.) Browse for the **EUMSetup\_en\_V730Expert.exe** file and click OK.

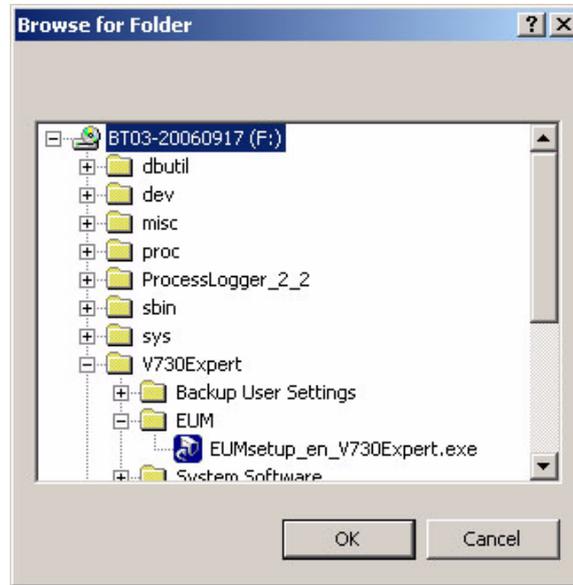


Figure 8-16 Browse for Folder

- 4.) Confirm the following message with YES to proceed the update.

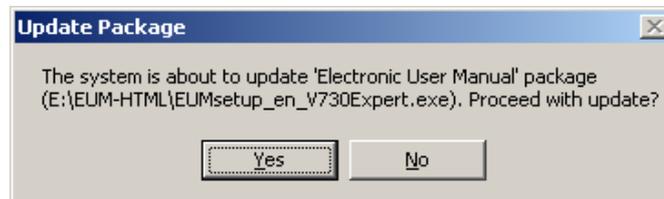


Figure 8-17 Update Package

The contents of this package are being extracted.

- 5.) Confirm the following warning message with OK to proceed the update.

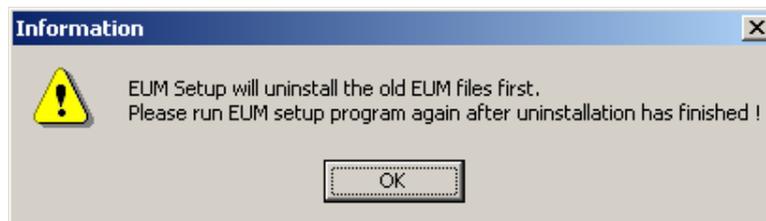


Figure 8-18 confirm warning message

- 6.) Confirm the “Maintenance Complete” message: «InstallShield Wizard has finished performing maintenance operations on V730 Expert User Manual» with the FINISH button.

#### 8-6-4 EUM - Upgrade Procedure (cont'd)

- 7.) Click the EUM button again to install the new EUM.
- 8.) Select the MO DRIVE or the DVD/CD DRIVE button, depending on the storage medium you use.
- 9.) Browse for the **EUMSetup\_en\_V730Expert.exe** file again and click OK.
- 10.) Confirm the following message with YES to proceed the update.  
The contents of this package are being extracted.
- 11.) Follow the instructions of the "InstallShield Wizard" (confirm the message with NEXT ).
- 12.) After successfully installation of the Electronic User Manual, click FINISH to exit the wizard.

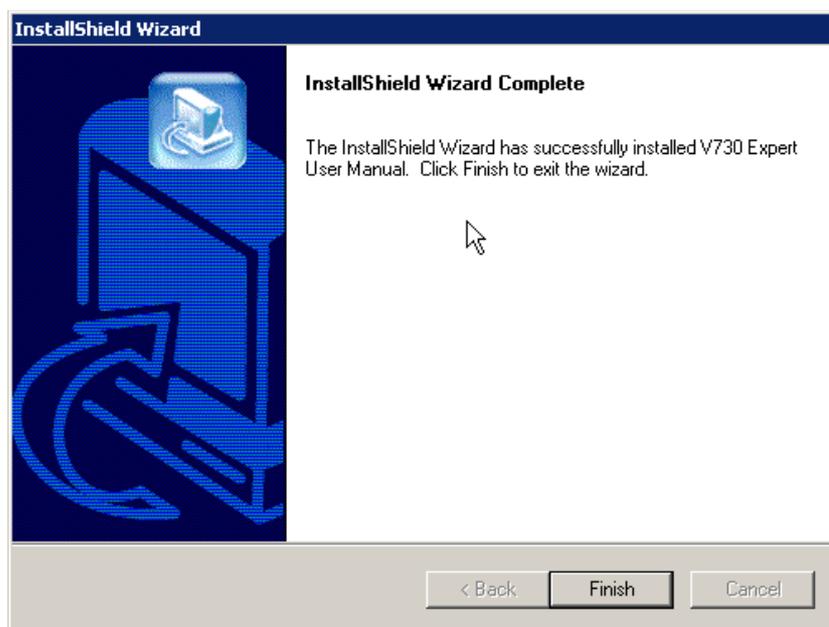
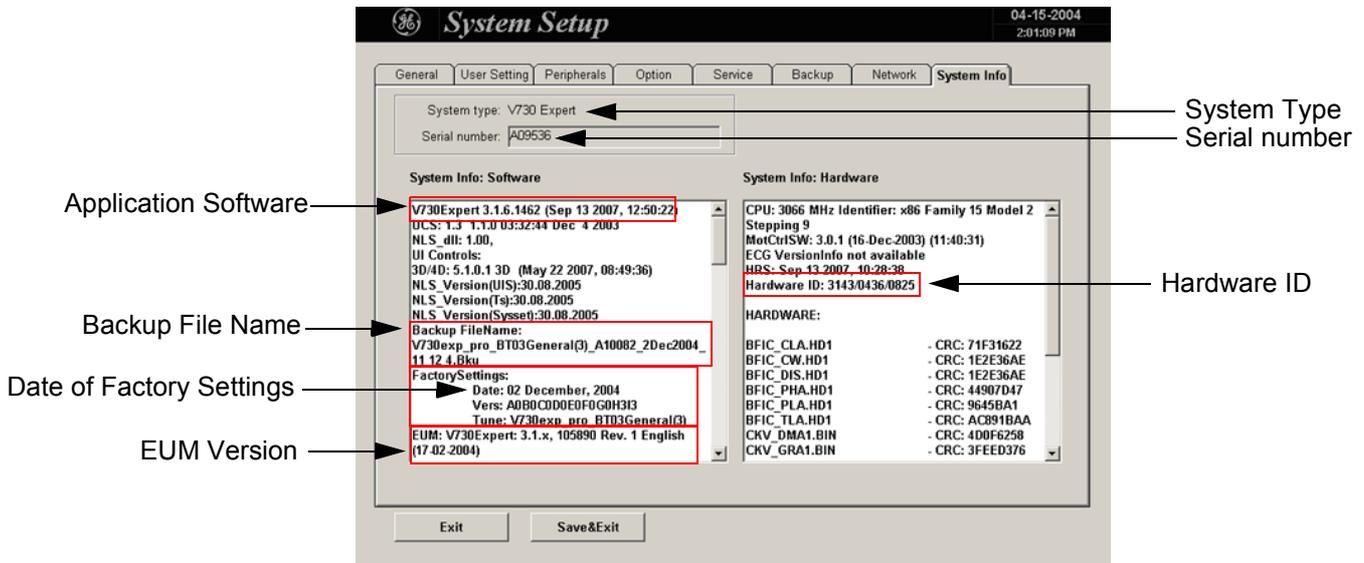


Figure 8-19 Complete Installation

- 13.) Close the SERVICE page with EXIT and close the "System Setup" with SAVE & EXIT.
- 14.) Restart the system (turn off and on the system).
- 15.) After rebooting the system, fill in the requested information into the "System Status Messenger" box and click OK.
- 16.) Press the F1 key on the keyboard to invoke the electronic user manual.
- 17.) Press the EXIT key to exit the EUM.

## Section 8-7 Software and Functional Checks after the Upgrade

- 1.) Press the UTILITIES key on the Touch Panel once to display the Utilities menu.
- 2.) Select SYSTEM SETUP from the Utilities menu.
- 3.) Select SYSTEM INFO to see which Software/Hardware version is installed in the unit.



Move the scroll bar downwards to review additional information about installed software/hardware.

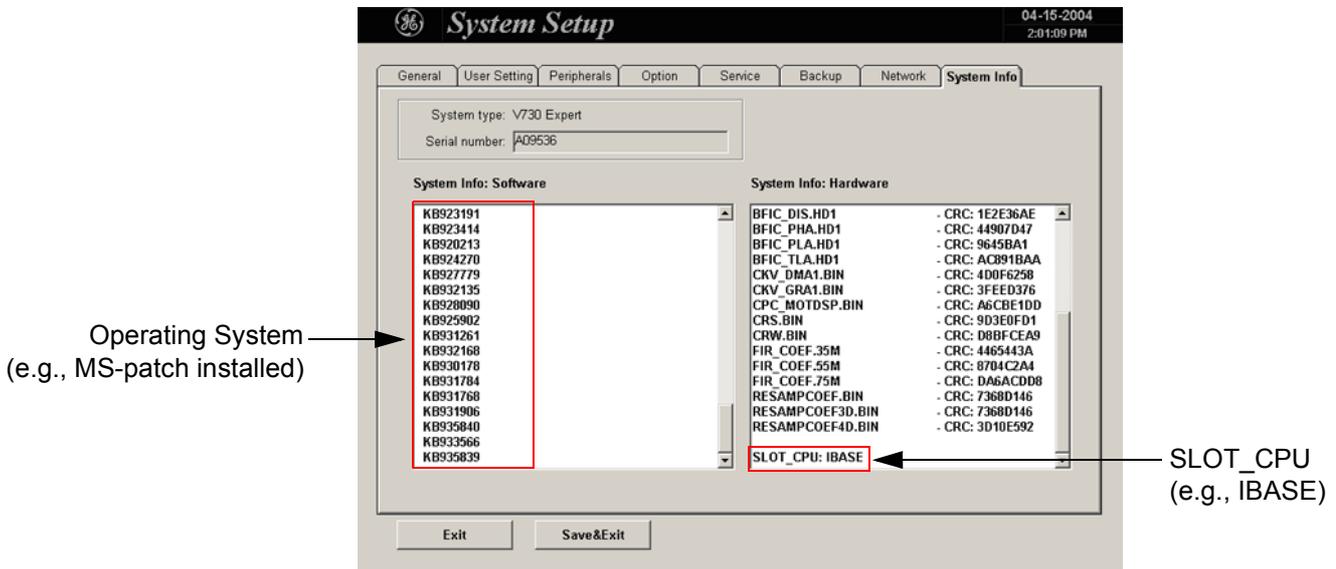


Figure 8-20 System Setup - System Info page

- 4.) Verify the correct settings of the OPTION page; see: [Figure 8-2 on page 8-3](#).  
If necessary, customize the settings according to the printout.
- 5.) Check and (if necessary) match the NETWORK page settings according to the printout:
  - “DICOM Configuration” dialog page; see: [Figure 8-3 on page 8-4](#)
  - “Network Configuration” dialog page; see: [Figure 8-4 on page 8-4](#)
- 6.) Restart the system and perform basic functional checks to ensure that the system is functioning normally.

## Section 8-8 Replacement or Activation of Options

Following Options are available:

- Real Time 4D
- DICOM
- RT\_4D\_Biopsy
- VOCAL
- XTD View
- DiagnoSTIC
- CRI (Compound Resolution Imaging)
- B-Flow
- VCI (Volume Contrast Imaging)

**NOTE:** Additional option fields are not yet implemented in the Voluson® 730Expert.

### 8-8-1 Operation for activating Options

- 1.) Touch the UTILITIES key on the Touch Panel once to display the Utilities menu.
- 2.) Touch the SYSTEM SETUP key to invoke the setup desktop on the screen.
- 3.) Select the OPTION page where you can see which options are installed in the system.

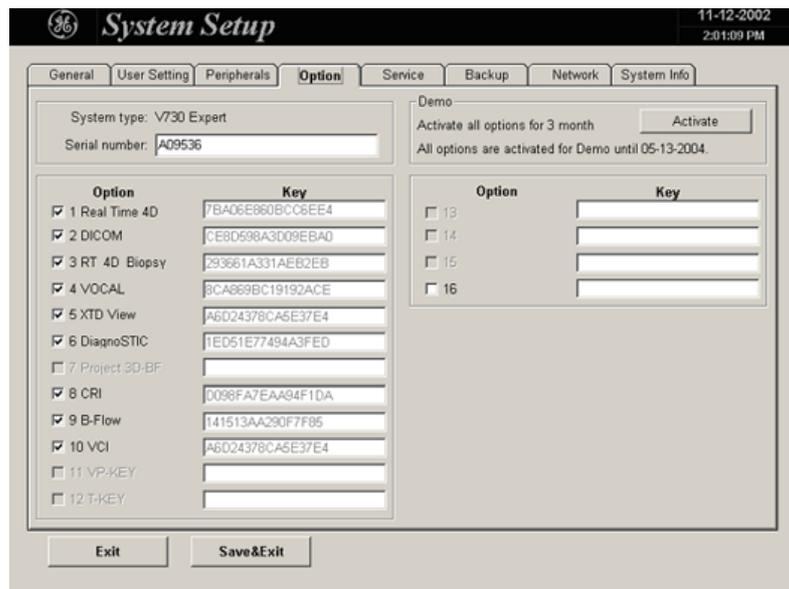


Figure 8-21 Option page in the System Setup

#### 8-8-1-1 Operation for installing an Option:

- 1.) Position and select the option input field you want with the write cursor.
- 2.) Clear/Edit the current number, if one exists.
- 3.) Enter the encrypted serial code or option code with the keyboard.
- 4.) Click the SAVE&EXIT button.  
(The code will be checked and if correct the serial number/option is accepted.)

**NOTE:** After installation of the DICOM option, restart (turn of and on) the Voluson® 730Expert system.

## Section 8-9 Transfer of Patient Database and Images from System-to-System

### 8-9-1 Introduction



**NOTICE** From Software Version 3.1.x onwards, it is possible:  
• to backup Sonoview Image data to a Mapped Network Drive (Z:\)



**WARNING** *Please make sure that the server you are connecting to is trustworthy and reliable. For details, contact your local system administrator. If you backup Sonoview data to this server, all the patients' demographic data will be copied to this server!*

## 8-9-2 Transfer of Patient Database and Images via Sonoview

### 8-9-2-1 Introduction

This section describes how to transfer the complete patient database and images from one system (= "old" system) to another system (= "new" system) via "Network" drive in Sonoview.

Thus in addition, the patient database and images can be shared between different systems within the same network.

**NOTICE** Both systems MUST be capable to BACKUP the Sonoview exams to the mapped network drive (Z:\). This means that both systems have to be:

- a BT'04 or a BT'05/'08
- a BT'03, with at least Software Version 3.1.x installed and/or
- a BT'02, with at least Software Version 2.2.x installed

### 8-9-2-2 Manpower

One Person, time depends on amount of stored images

### 8-9-2-3 Tools

- Mapped Network Drive Z: (see: [Section 3-11-1 "Map Network Drive" on page 3-49](#))

### 8-9-2-4 Backup all Exams of the "old" system

- 1.) On the system (= "old" system) from which the data should be transferred, press the SONOVIEW key on the Control panel.
- 2.) Click on the OPEN icon on the upper left side of the screen and verify that "Drive HDD" is selected.
- 3.) Using the TRACKBALL, and the right trackball key SET, select the first exam of the list.
- 4.) To select all available exams, click on SELECT TO END and then on the BACKUP button.

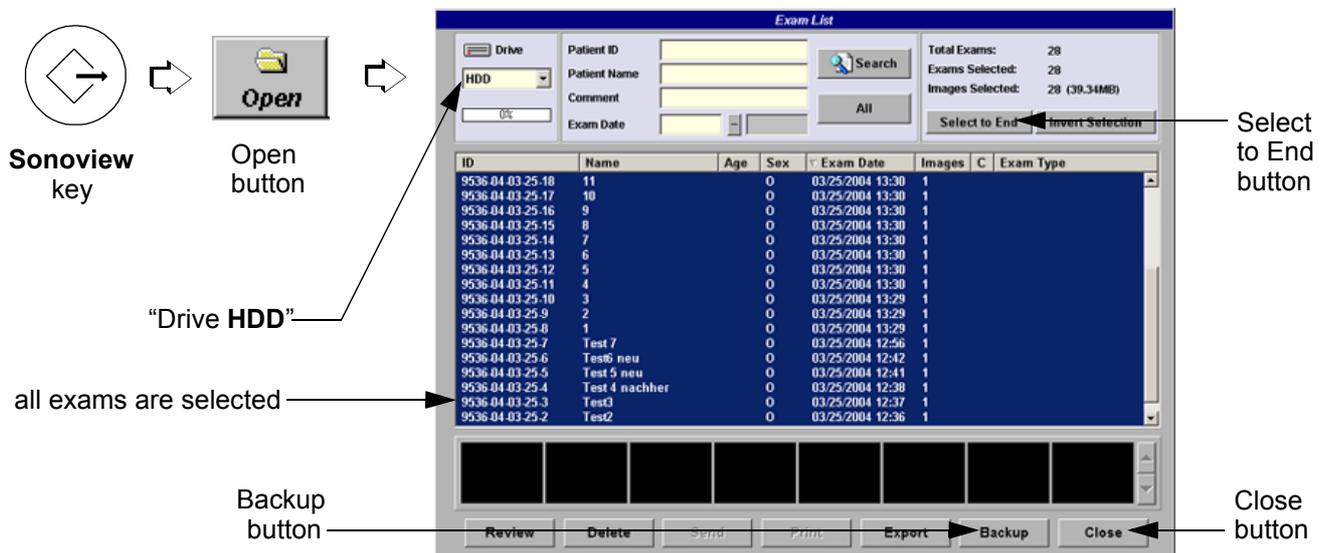


Figure 8-22 Step 1.) to 5.)

- 5.) In the "Backup" window select the destination NET.
- 6.) After finishing the backup, select whether the selected exam(s) is to be deleted or not.

**NOTICE** If you select to delete the exams after finishing the backup, they will be absolutely deleted from the hard disk of the ultrasound scanner Voluson® 730Expert!

**8-9-2-4 Backup all Exams of the “old” system (cont’d)**

- 7.) Click on the close button and then select the SETTINGS icon on the left side of the screen.
- 8.) In the displayed window click on the CHANGE BACKUP FOLDER ON NETWORK DRIVE button. The first line in the dialog (see: [Figure 8-23](#)) displays the name (e.g., serial number A09008) of the “Backup Folder” used for storing data on, and reading data from the network drive.

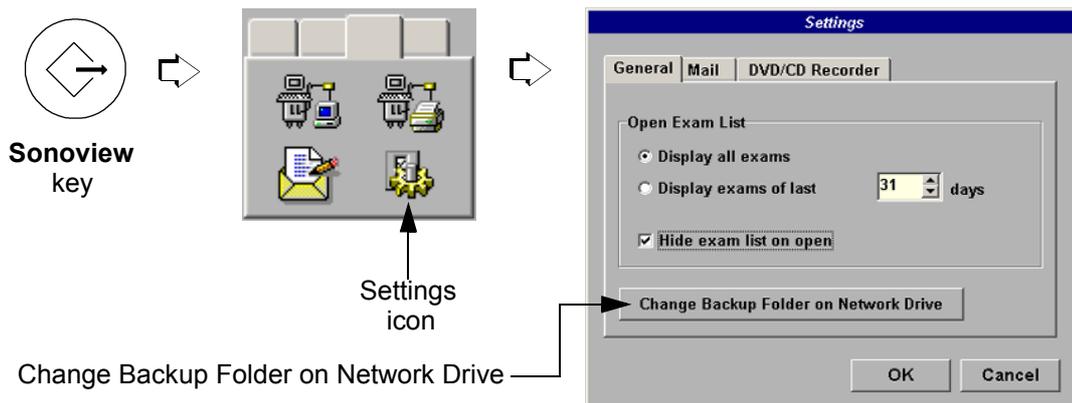


**Figure 8-23 Backup Folder on Network Drive**

- 9.) Notice this name of the “old” system’s Backup Folder (e.g., **A09008**) and then click CANCEL.

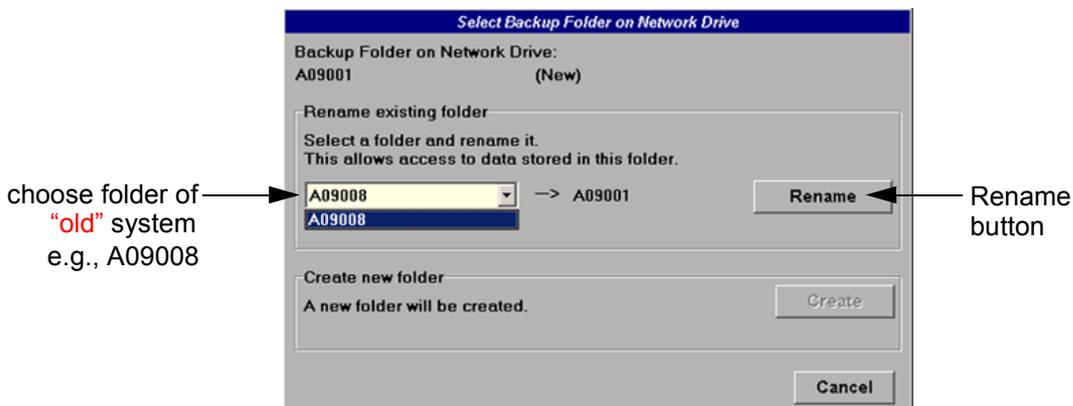
**8-9-2-5 Restore all Exams (of the “old” system) to the “new” system**

- 1.) On the system (= “new” system), that should receive data and images, press the SONOVIEW key on the Control panel.
- 2.) Select the SETTINGS icon on the left side of the screen.
- 3.) In the displayed window click on the CHANGE BACKUP FOLDER ON NETWORK DRIVE button.



**Figure 8-24 Step 1.) to 3.)**

- 4.) Choose folder of the “old” system (e.g., A09008) from the drop-down list and click on RENAME.



**Figure 8-25 Select folder of “old” system and rename it**

8-9-2-5 Restore all Exams (of the “old” system) to the “new” system (cont’d)



**NOTICE** The folder which is selected to be renamed (e.g., A09008, that contains the backup data from a different system - in this case the backup data of the “old” system), it is not copied, but simply renamed. Thus, the same data can be shared between two systems by renaming the respective backup folders to the serial number of the accessing system (in this case the “new” system).

- 5.) Close the “Settings” window with the OK button.
- 6.) Click on the OPEN icon on the upper left side of the screen and choose “Drive **Network**”.
- 7.) Using the TRACKBALL, and the right trackball key SET, select the first exam of the list.
- 8.) To select all available exams, click on the SELECT TO END button.
- 9.) Click on the BACKUP / RESTORE button.

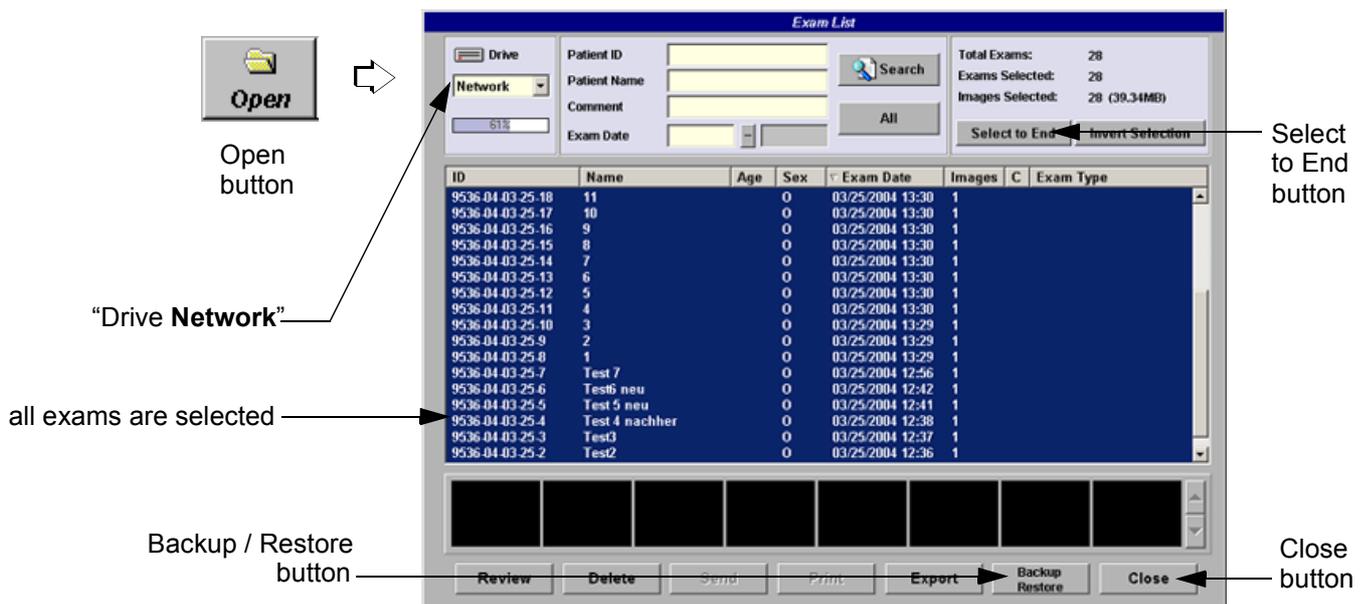


Figure 8-26 Step 5.) to 9.)

- 10.) In the “Backup / Restore” window click on the RESTORE button.



**NOTICE** If an exam is about to be restored that already exists on the hard disk of the “new” system, a dialog shows the Patient Name and Patient ID and asks for the action to be taken.

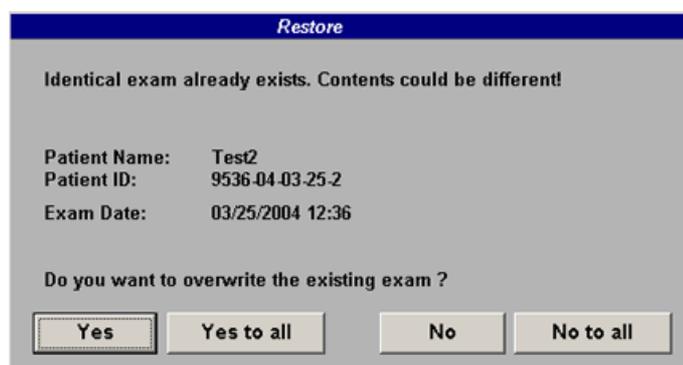


Figure 8-27 Identical exam already exists

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**8-9-2-5 Restore all Exams (of the “old” system) to the “new” system (cont’d)**

11.) Select the desired action:

**Yes** The exam on the hard disk is replaced with the exam in the backup.  
The system will ask again if another identical exam is found during the restore process.

**Yes to all** All identical exams are replaced without further notice.

**No** The exam on the hard disk is **not** replaced by the exam in the backup.  
The system will ask again if another identical exam is found during the restore process.

**No to all** No identical exams are replaced with the exams in the backup.

12.) After finishing the restore, select whether the selected exam(s) is to be deleted or not.



**NOTICE** If you select to delete the exams after finishing the restore, they will be absolutely deleted from the network drive!

## Section 8-10 Replacement of the Monitor Task Lamp

### 8-10-1 Manpower

One person, 15 min.

### 8-10-2 Tools

Philips screwdriver 1 and 2, stubby (length ~30mm)

### 8-10-3 Preparations

1.) Power Off/Shutdown the system; see: [Section 4-3-2 on page 4-3](#).

### 8-10-4 Task Lamp - Removal Procedure

1.) Use the stubby screwdriver and unscrew the 2 screws, which fixes the cover of the task lamp.



task lamp

**Figure 8-28** remove cover of the task lamp

2.) Screw out the task lamp and remove it.

### 8-10-5 Task Lamp - Installation Procedure

1.) Screw in the new task lamp into the lamp socket.

2.) Mount the cover of the task lamp and fix it with the 2 screws.

## Section 8-11 Replacement of the Probe Holder

-  **NOTICE** Replacement of the probe holder depends on the used trolley (GW).
- **GW130**, not to be replaced by the user
  - **GW140**, see: [Section 8-11-1 on page 8-22](#)

### 8-11-1 Replacement of the Probe Holder (at GW140)

#### 8-11-1-1 Manpower

One person, 1 min.

#### 8-11-1-2 Probe Holder - Replacement Procedure

- 1.) Check systems trolley version (refer to [Table 9-3 on page 9-5](#)). It has to be a **GW140**.
- 2.) Remove the probe holder from the bottom housing of the User Interface.
- 3.) Place the new probe holder on the bottom housing.

## Section 8-12 Replacement of the Trackball top fixation ring

### 8-12-1 Manpower

One person, 5 min.

### 8-12-2 Trackball top fixation ring - Replacement Procedure

1.) Remove the fixation ring by turning it counterclockwise.

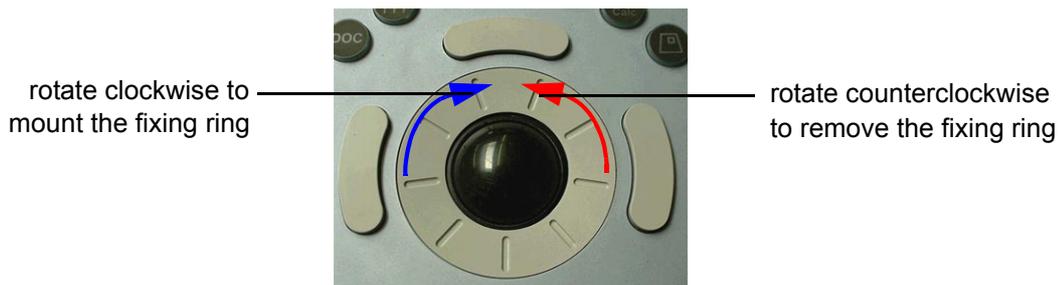


Figure 8-29 Trackball with top fixation ring

2.) Mount the fixation ring by turning it clockwise.

## Section 8-13 Replacement of Digipots and TGC Slider controls

### 8-13-1 Manpower

One person, 5 min.

### 8-13-2 Tools

small-sized slotted screwdriver or tweezers

### 8-13-3 Cap and/or Spring - Replacement Procedure

1.) Remove the cap (for Rotation digipots or for Slider-potentiometer TGC).

2.) Mount the cap (for Rotation digipots or for Slider-potentiometer TGC).

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# Chapter 9

## Renewal Parts

### Section 9-1 Overview

#### 9-1-1 Purpose of Chapter 9

This chapter gives you an overview of Spare Parts available for the Voluson® 730Expert (BT03).

**Table 9-1 Contents in Chapter 9**

Section	Description	Page Number
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9-6	Monitor + Monitor Replacement Parts	9-9
9-7	Disk Drives (GEM)	9-10
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9-9	Main Board Module (GEF)	9-13
	9-9-1 FrontEnd (US-Part)	9-14
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## Section 9-2 List of Abbreviations

- CKV - Video Converter Board
- CPD - Sub-Board on Beamformer (CPR)
- CPE - Motherboard Extension (Backpanel I/O-Card)
- CPK - Motherboard of GEF-Module
- CPM - PC-Motherboard
- CPN - Primary Power Supply Module
- CPP - Power Supply Secondary Board + Motor Power stage
- CPR - Beamformer Motherboard
- CPU - Probe Connector Board
- CPY - Power Switch Board
- CPZ - Cover Board
- CRB - USB to IDE Converter Board
- CRS - Signal Processing Board
- CRW - CW-Doppler Board (optional)
- EUM - Electronic User Manual
- FRU 1 - Replacement part available in parts hub
- FRU 2 - Replacement part available from the manufacturer (lead time involved)
- GEF - Main Board Module (Ultrasound (FrontEnd) and PC-Boards (Backend Processor))
- GEM - Disk Drive module (with or without MO-Drive and MAN)
- GES - I/O-Interface (User accessible)
- GEU - User interface: Keyboard, Touch Panel, EL-Display, TGC Unit
- GW - Console housing (except GEU and GEM)
- HDD - Hard Disk Drive
- MAN - ECG module
- MOD - Magneto Optical Disk
- SBC - Single Board Computer (PC-Board)
- SSW - Service Software (Service Platform)
- UIS - Ultrasound Application Software

## Section 9-3 Parts List Groups



Figure 9-1 Console Views

Table 9-2 Mechanical and user accessible parts

Item	Part Group Name	Table Number	Description
100-	Housing (GW) and additional Console Hardware • Housing (GW) + add.Console Hardware cont'd	Table 9-3 on page 9-5 Table 9-4 on page 9-6	GW -Console housing (except GEU and GEM)
200-	User Interface (GEU Top Console)	Table 9-5 on page 9-8	User interface: Keyboard, Touch Panel, EL-Display, TGC
250-	Monitor + Monitor Replacement Parts	Table 9-6 on page 9-9	Monitor + Monitor replacement parts
300-	Disk Drives (GEM)	Table 9-7 on page 9-10	GEM - Disk Drive module (with or without MAN)
400-	Main Power Module (CPN)	Table 9-8 on page 9-12	CPN - Primary power module
500- 510- 570-	Main Board Module (GEF) • FrontEnd (US-Part) • FrontEnd (US-Part) cont'd • Back Processor (PC-Part)	Table 9-9 on page 9-13 Table 9-10 on page 9-14 Table 9-11 on page 9-15 Table 9-12 on page 9-17	GEF - Main Board Module Ultrasound (FrontEnd)  PC-Boards (Backend Processor)
600-	Options and Upgrades	Table 9-13 on page 9-18	
700-	Miscellaneous Cables	Table 9-14 on page 9-19	
800-	Optional Peripherals and Accessories • Optional Peripherals and Access. cont'd	Table 9-15 on page 9-27 Table 9-16 on page 9-28	Printers, Video Recorder, ECG-Module (MAN), etc.
	System Manuals	Table 9-17 on page 9-29	
900- 906- 920- 930-	Probes • 2D curved array Transducers • 2D linear- and phased array Transducers • Real-Time 4D Volume Probes • CW-Pencil Probes	Table 9-18 on page 9-30 Table 9-19 on page 9-31 Table 9-20 on page 9-32 Table 9-21 on page 9-33	
950	Biopsy Needle Guides	Table 9-22 on page 9-35	

## Section 9-4 Housing (GW) and additional Console Hardware

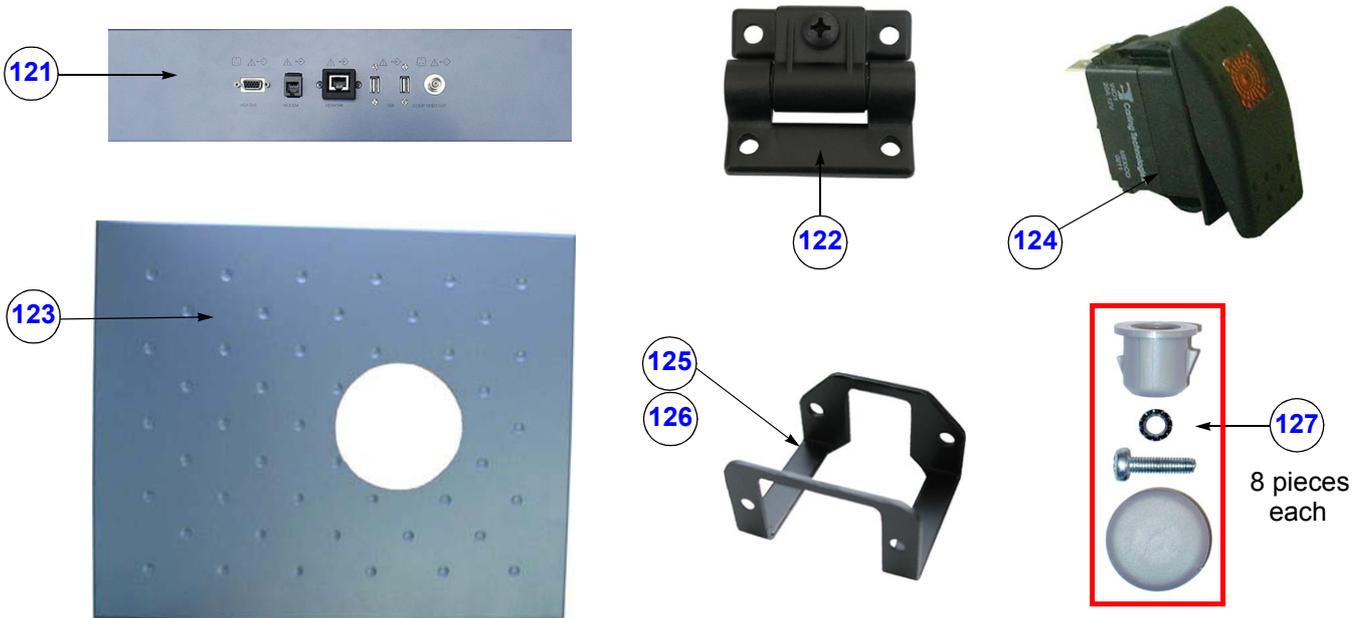


Figure 9-2 Housing (GW)

Table 9-3 Housing (GW)

Item	Part Name	Part Number	Description	Qty	FRU
101	GW130 Trolley Voluson® 730Expert	KTZ154695	Housing with wheels, backpanel with connectors and cables (can be replaced by GW140 - KTZ154734)	1	2
102	Rear Handle for Trolley	KTZ220031	Rear Handle for Trolley	1	1
103	Blind Cap for rear screws	KTZ208109	covers housing screws to make them invisible	2	1
104	Rear Metal Cover Plate	KTZ154699	Rear metal cover plate complete	1	2
105	Side Panel left	KTZ208762	side panel left complete <i>Compatibility:</i> (only used at GW130 - KTZ154695)	1	2
106	Side Panel right	KTZ208763	side panel right complete <i>Compatibility:</i> (only used at GW130 - KTZ154695)	1	2
107	Door for Probe cables	KTZ208737	Through this door the side-panel-right can be opened to place the probe-cables within the housing. (only used at GW130 - KTZ154695)	1	1
108	Cable Guide for Probes	KTZ14M787	Cable Guide for Probes (only used at GW130 - KTZ154695)	4	1
109	Monitor Mounting Plate Voluson® 730Expert	KTZ134110	Monitor mounting plate	1	1
110	Foot rest	KTZ207126	Foot rest	1	1
111	Blind Cap for Wheel	KTZ14M871	Cover for the rear wheels	2	1
112	Rear Wheel (Ø175 mm x 32)	KTZ211081	Rear wheel non-steerable	2	1
113	Steerable Wheel	KTZ211080	Front wheel steerable	2	1
114	GW140 Trolley Voluson® 730Expert	KTZ154734	Housing with wheels, backpanel with connectors and cables (can replace GW130 - KTZ154695) <i>Notice:</i> Guide for Probe cables (KTZ154736) is optional and has to be ordered <b>separately!</b>	1	2
115	Rear Handle for Trolley, silver	KTZ134468	Rear Handle for Trolley, silver colored (can replace KTZ220031)	1	1
116	Rear Metal Cover Plate	KTZ154728	Rear metal cover plate complete (can replace KTZ154699)	1	2
117	Side panel Kit (left an right)	KTZ154735	Side panel Kit (left and right side panel) <i>Compatibility:</i> (only used at GW140 - KTZ154734)	1	2
118	Cap Rubber (8 pcs.)	KTZ154737	Cap Rubber ( <b>set includes 8 pieces</b> ) (only used at GW140 - KTZ154734)	8	1
119	Guide for Probe cables - optional	KTZ154736	Guide for Probe cables - <b>optional</b> (includes 4 hooks and mounting rail); (only used at GW140 - KTZ154734)	1	1
120	Foot rest, silver	KTZ134467	Foot rest, silver colored (can replace KTZ207126)	1	1

**Section 9-4 Housing (GW) and additional Console Hardware (cont'd)**



**Figure 9-3 Additional Console Hardware**

**Table 9-4 Additional Console Hardware**

Item	Part Name	Part Number	Description	Qty	FRU
121	GES8 I/O Connection Panel	KTZ195901	External Rear Panel with electrical Signal- and Supply-Connection-Cables to the V730-Main-Unit (internal) Rear-Panel.	1	1
122	Hinge for Foot rest	KTZ220018	Hinge for Foot rest	2	1
123	Top Cover of Trolley	KTZ208119	Top Cover of Trolley	1	1
124	Standby Switch 24V/15A	KTZ207125	Standby Switch left below the control panel	1	1
125	Pull-out Protection for Mains Power cable (CPN6)	KTZ14B667	Pull-out protection for Mains Power cable (only used at CPN6 - KTZ195905)	1	1
126	Pull-out Protection for Mains Power cable (CPN80-81) incl. screws	KTZ154717	Pull-out protection for Mains Power cable (only used at CPN80-81 - KTZ207486)	1	1
127	Side Panels Mounting Kit	KTZ280046	"odds and ends" side panels mounting kit incl. sockets, lock washers, screws and rubber caps (8 pieces. each) (only used at GW140 - KTZ154734)	-	1

## Section 9-5 User Interface (GEU Top Console)



Figure 9-4 User Interface (GEU)

Table 9-5 User Interface (GEU)

Item	Part Name	Part Number	Description	Qty	FRU
201	Front Handle User Interface	KTZ220039	Voluson® 730Expert Front Handle (only used with GEU80 - KTZ154693)	1	1
202	Front Handle User Interface, silver	KTZ209344	Voluson® 730Expert Front Handle, silver colored (can replace KTZ220039)	1	1
203	Probe Holder Kit V730	KTZ207105	right hand Probe holder part (only used with GEU80 - KTZ154693)	1	1
204	Probe Holder Kit V730, removable	KTZ209346	right hand Probe holder part, removable (can replace KTZ207105)	1	1
205	Trackball Kit V730	KTZ208264	generates X-Y-Coordinates of Trackball-Movements like moving a PC-Mouse	1	1
206	Trackball top fixation ring	KTZ208256	Trackball for top fixation ring	1	1
207	Keytop Kit Voluson® 730Expert	KTZ207558	Keytop Kit Voluson® 730Expert	1	1
208	Caps for Rotation digipots (8 pcs.)	KTZ214798	Caps for Rotation digipots (set includes 8 pieces with premounted brackets)	8	1
209	Caps for TGC Slide-pot. (8 pcs.)	KTZ214818	Caps for TGC Slide-pot. (set includes 8 pieces with premounted brackets)	8	1
210	Alpha-numeric keyboard V730Expert - GEU80 (English)	KTZ208212	Alpha-numeric keyboard for Voluson® 730Expert English <u>Compatibility:</u> can be replaced by KTZ300101, if the Hardkey boards are also exchanged	1	1
211	Alpha-numeric keyboard V730Expert - GEU90 (English)	KTZ300101	Alpha-numeric keyboard for Voluson® 730Expert English (check if special key cap kit is needed; see: Table 9-13 on page 9-18) <u>Compatibility:</u> Can replace KTZ208212, but this board can only be used in combination with Hardkey board KTZ300099. i.e.: It is recommended to order and exchange both boards!	1	1
212	Hardkey Board(s) Voluson® 730Expert - GEU80	KTZ208262	Hardkey Board(s) for Voluson® 730Expert (large board - Part A ; small board - Part B) <u>Compatibility:</u> can be replaced by KTZ300099, if the alpha-numeric keyboard is also exchanged	1	1
213	Hardkey Board(s) Voluson® 730Expert - GEU90	KTZ300099	Hardkey Board(s) for Voluson® 730Expert (large board - Part A ; small board - Part B) <u>Compatibility:</u> Can replace KTZ208262, but this board(s) can only be used in combination with alpha-numeric keyboard. KTZ300101. i.e.: It is highly recommended to order and exchange both boards!	1	1
214	Distance Rod for GEU	KTZ14B596	Distance Rod for GEU	1	1
215	GEU80 User Interface Voluson® 730Expert	KTZ154693	keyboard, trackball, display, special knobs, switches (can be replaced by GEU90 - KTZ154731)	1	1
216	GEU90 User Interface Voluson® 730Expert	KTZ154731	keyboard, trackball, display, special knobs, switches (can replace GEU80 - KTZ154693)	1	1
217	Bottom housing of GEU, painted	KTZ214799	Bottom housing of GEU, painted, without interior	1	1
218	Loudspeaker for Top Console	KTZ208132	Loudspeaker on GEU User Interface	2	1
219	Gel holder (PHG1) complete Voluson® 730Expert	KTZ154666	Gel holder complete PHG1	1	1

## Section 9-6 Monitor + Monitor Replacement Parts



Figure 9-5 Monitor + Monitor replacement parts

Table 9-6 Monitor + Monitor replacement parts

Item	Part Name	Part Number	Description	Qty	FRU
250	Color Monitor 15" Painted	KTZ212115	AY-15CUI Color Image Monitor, lacquered	1	1
251	Monitor Base Cover	KTZ134365	Monitor Foot Cover	1	1
252	Monitor Base Cover, silver	KTZ134474	Monitor Base Cover, silver colored (can replace KTZ134365)		
253	Monitor Mounting Set	KTZ154713	Monitor Mounting Set (fixing part for Monitor) only used with ANY Monitor (KTZ212115)	1	1
254	Set Monitor Front Housing	KTZ208445	Set Monitor Front Housing (incl. cover of task lamp)	1	1
255	Set Monitor Housing	KTZ208446	Set Monitor Housing (left-, right-, and top cover)	1	1
256	Monitor Switch Assembly	2300008	Common part with L5 and L3	1	1
257	Task Lamp	2317347	Common part with L5 and L3	1	1

## Section 9-7 Disk Drives (GEM)

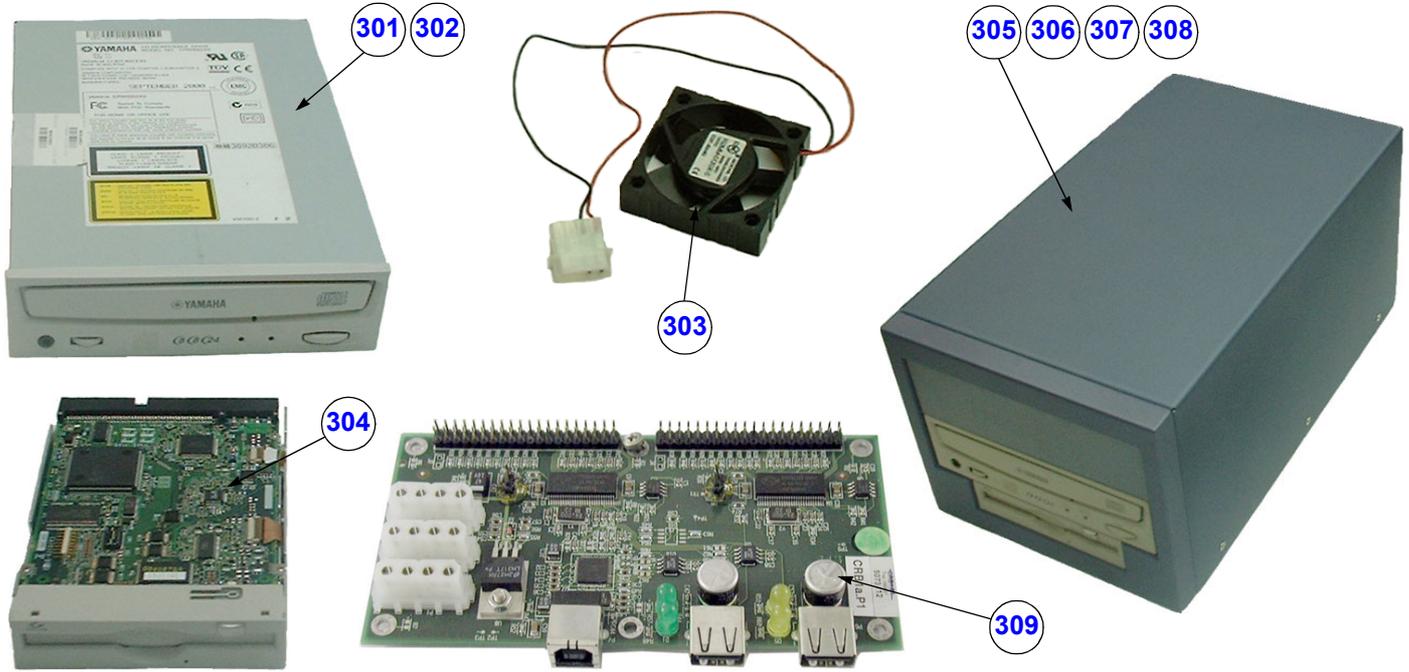


Figure 9-6 Disk Drives (GEM)

Table 9-7 Disk Drives (GEM)

Item	Part Name	Part Number	Description	Qty	FRU
301	Disk Drive IDE DVD+(R)W	KTZ207256	DVD+(R)W Writer internal (no own cabinet)	1	1
302	Disk Drive IDE DVD+(R)W	KTZ207257	DVD+(R)W Writer internal (no own cabinet); can replace KTZ207256; (SW3.1.4 or higher is required)	1	1
303	Fan axial 62 x 62 x 14 mm	KTZ207602	Fan for Air-Cooling of GEM (SCSI-Drive-Module)	1	1
304	Disk Drive IDE MOD 1.3GB internal	KTZ207269	Magneto-Optical-Drive 1.3GB internal (no own cabinet)	1	1
305	GEM10-10A MO-Drive + DVD+(R)W	KTZ195887	MO-Drive and DVD+(R)W	1	2
306	GEM11-11B MO-Drive + DVD+(R)W	KTZ196000	MO-Drive and DVD+(R)W; can replace GEM10 - KTZ195887; (SW3.1.4 or higher is required)	1	2
307	GEM 20A DVD+(R)W	KTZ195962	DVD+(R)W (without MO-Drive)	1	2
308	GEM 21-21B DVD+(R)W	KTZ196001	DVD+(R)W (without MO-Drive); can replace GEM20 - KTZ195962; (SW3.1.4 or higher is required)	1	2
309	CRB1c.P1 USB to IDE Converter Board	KTZ195891	CRB1c.P1 USB to IDE Converter Board	1	1

## Section 9-8 Main Power Module (CPN)



Figure 9-7 Main Power Module (CPN)

**Table 9-8 Main Power Module (CPN)**

Item	Part Name	Part Number	Description	Qty	FRU
401	CPN6 Power Supply Module	KTZ195905	CPN6 Power Supply Module (can be replaced by CPN80-81 - KTZ207486)	1	1
402	CPY3.P3 Power Switch	KTZ195471	Board to switch on and shut down Ultrasound System ( <b>only</b> used with CPN6)	1	1
403	Mains Power switch (F1)	KTZ207733	Mains Power Switch (F1) therm. protected 16A 2 Pol. ( <b>only</b> used at CPN6)	1	1
404	Mains Power Input connector	KTZ207574	Mains Power Input connector ( <b>only</b> used at CPN6)	1	1
405	CPN80-81 Power Supply Module	KTZ207486	CPN80-81 Power Supply Module (can replace CPN6 - KTZ195905)	1	1
406	CPY80.P1 Power Switch	KTZ209338	Board to switch on and shut down Ultrasound System ( <b>only</b> used with CPN80-81 - KTZ207486)	1	1
407	CCF100.P1 Power Primary Board	KTZ209339	Power Primary Board ( <b>only</b> used with CPN80-81 - KTZ207486)	1	1
408	Mains Power switch and Input connector	KTZ209340	Mains Power Switch and Input Connector ( <b>only</b> used at CPN80-81 - KTZ207486)	1	1
409	Fuse 10 Ampere 6.3 x 32	KTZ208239	Electric Current Overflow Protection GEF ( <b>only</b> used at CPN6)	4	1
410	Fuses 16 Ampere 6.3 x 32 (10 pcs.)	KTZ209341	used at primary and secondary side ( <b>only</b> used at CPN80-81 - KTZ207486)	3	1
411	Fuses 3.2 Ampere 6.3 x 32 (10 pcs.)	KTZ209342	fuse for auxiliary power output at 110V setting ( <b>only</b> used at CPN80-81 - KTZ207486)	1	1
412	Fuses 1.6 Ampere 6.3 x 32 (10 pcs.)	KTZ209343	fuse for auxiliary power output at 230V setting ( <b>only</b> used at CPN80-81 - KTZ207486)	1	1
413	KVN2 - Fan for Primary Power Supply	KTZ195440	KVN2 - Fan for Primary Power Supply (CPN)	1	1
414	Pull-out Protection for Mains Power cable (CPN6)	KTZ14B667	Pull-out protection for Mains Power cable ( <b>only</b> used at CPN6 - KTZ195905)	1	1
415	Pull-out Protection for Mains Power cable (CPN80-81) incl. screws	KTZ154717	Pull-out protection for Mains Power cable ( <b>only</b> used at CPN80-81 - KTZ207486)	1	1

## Section 9-9 Main Board Module (GEF)

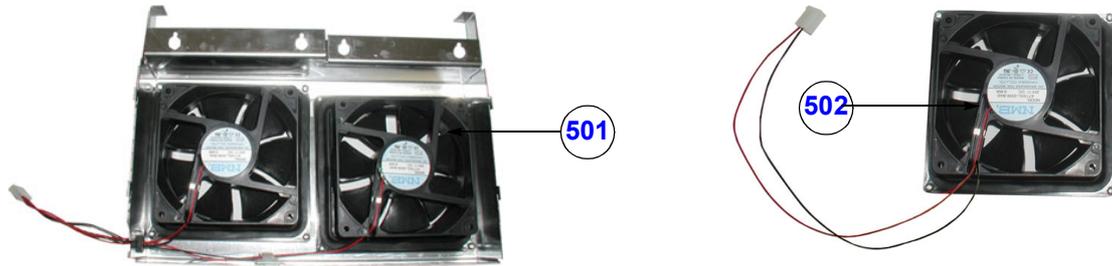


Figure 9-8 Main Board Module (GEF)

Table 9-9 Main Board Module (GEF)

Item	Part Name	Part Number	Description	Qty	FRU
501	Fan for GEF-box (2 fan)	KTZ154678	Fan for GEF-box (2 fan)	1	1
502	Fan for GEF-box (single)	KTZ154679	Fan for GEF-box (single)	1	1

9-9-1 FrontEnd (US-Part)

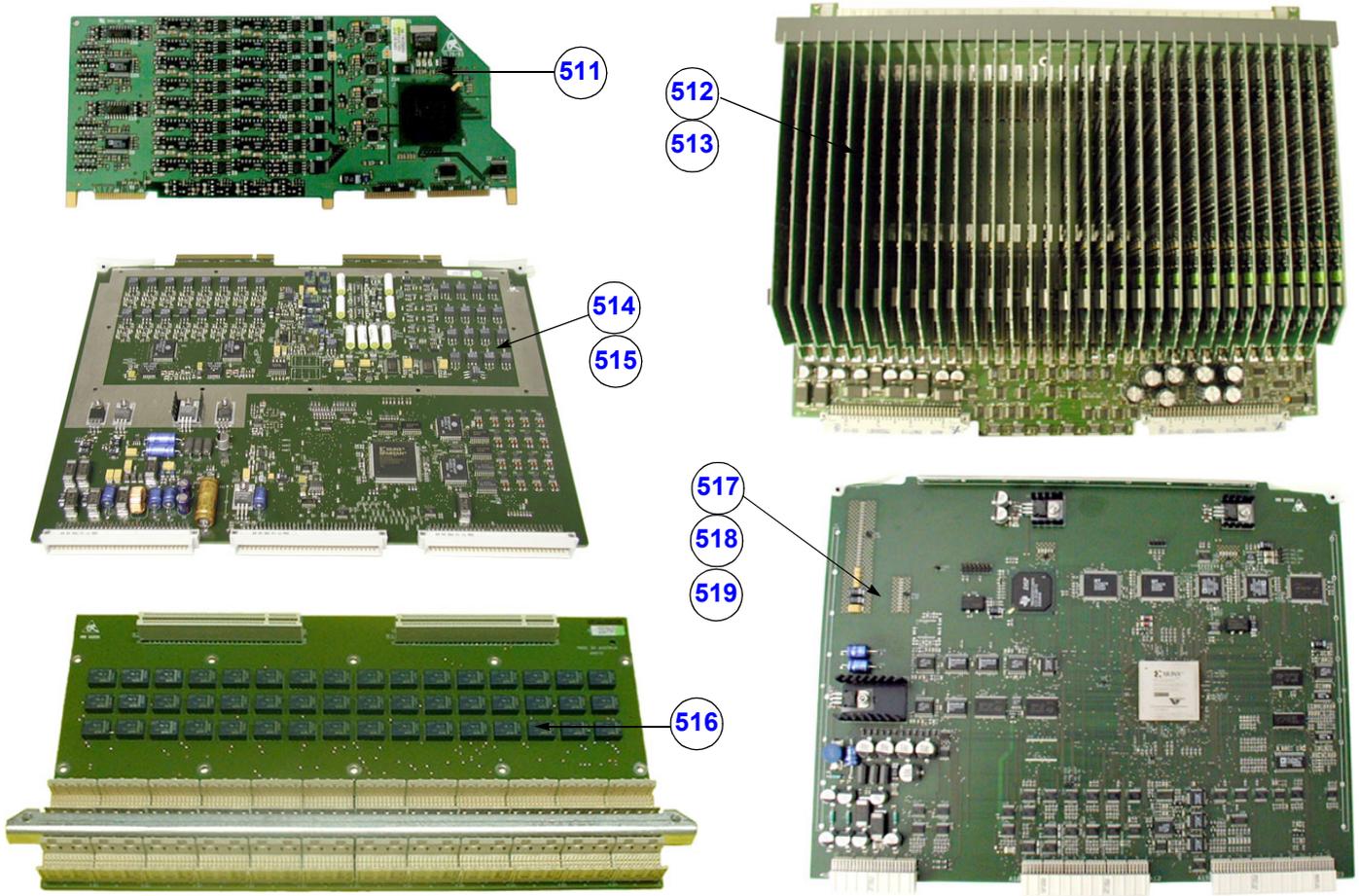


Figure 9-9 FrontEnd (US-Part)

Table 9-10 FrontEnd (US-Part)

Item	Part Name	Part Number	Description	Qty	FRU
511	CPD81.P17 Beam former SUB-Board	KTZ195929	Beam former Sub-board (CPR81.P11 only)	32	1
512	CPR81.P11 Beam former Board	KTZ195904	Beam former Board	1	1
513	CPR82.P12 Beam former Board	KTZ196024	Beam former Board (can replace CPR81 - KTZ195904)	1	
514	CRW2e.P2 CW Doppler Board	KTZ195723	CW-Doppler Board	1	1
515	CRW3.P2 CW Doppler Board	KTZ196086	CW-Doppler Board (can replace CRW2 - KTZ195723)	1	1
516	CPZ50-50a.P3 Cover Board	KTZ195592	electrical signal connection between CPU,CPR and CW-Board; contains Relays for Signal to CW-Board.	1	1
517	CRS4.P3 Signal Processing Board	KTZ195998	Signal Processing Board (replaces CRS2 and CRS3)	1	1
518	CRS4d.P3 Signal Processing Board	KTZ196080	Signal Processing Board (replaces CRS2, CRS3 + CRS4)	1	1
519	CRS5.P3 Signal Processing Board	KTZ196074	Signal Processing Board, can replace all previous versions (CRS2, CRS3, CRS4 and CRS4d)	1	1

9-9-1 FrontEnd (US-Part) (cont'd)

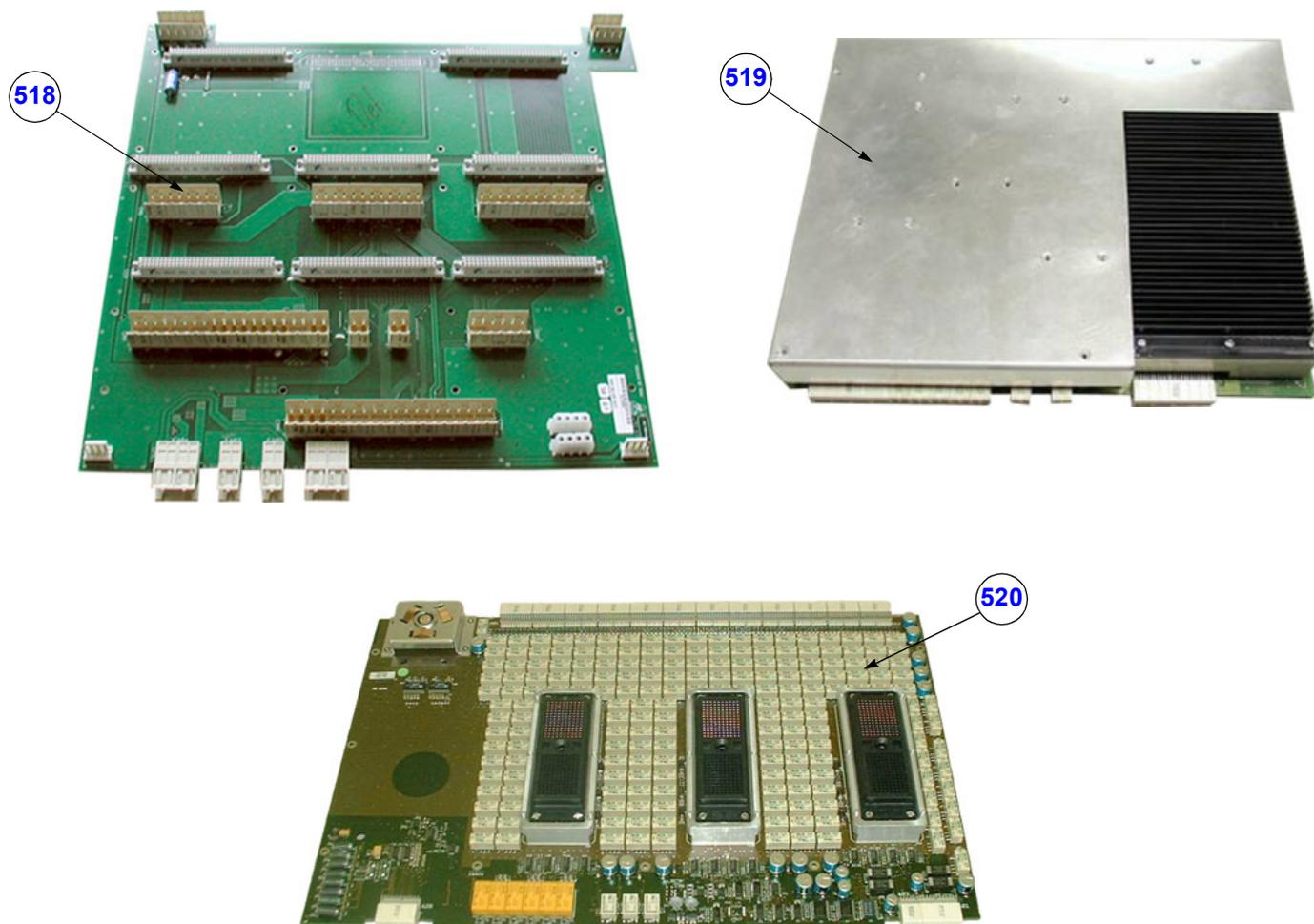


Figure 9-10 FrontEnd (US-Part) cont'd

Table 9-11 FrontEnd (US-Part) cont'd

Item	Part Name	Part Number	Description	Qty	FRU
518	CPK80c.P5 Motherboard V730	KTZ207456	Electrical Signal- and Supply-Connection for all boards including PC-Motherboard (CPM)	1	1
519	CPP81.P2 Power Supply Board	KTZ207274	Power Supply Board Output Power: 900 W	1	1
520	CPU5.P5 Module Board (BYM)	KTZ195636	Probe Connector Board, Module Board	1	1

9-9-2 BackEnd Processor (PC-Part)

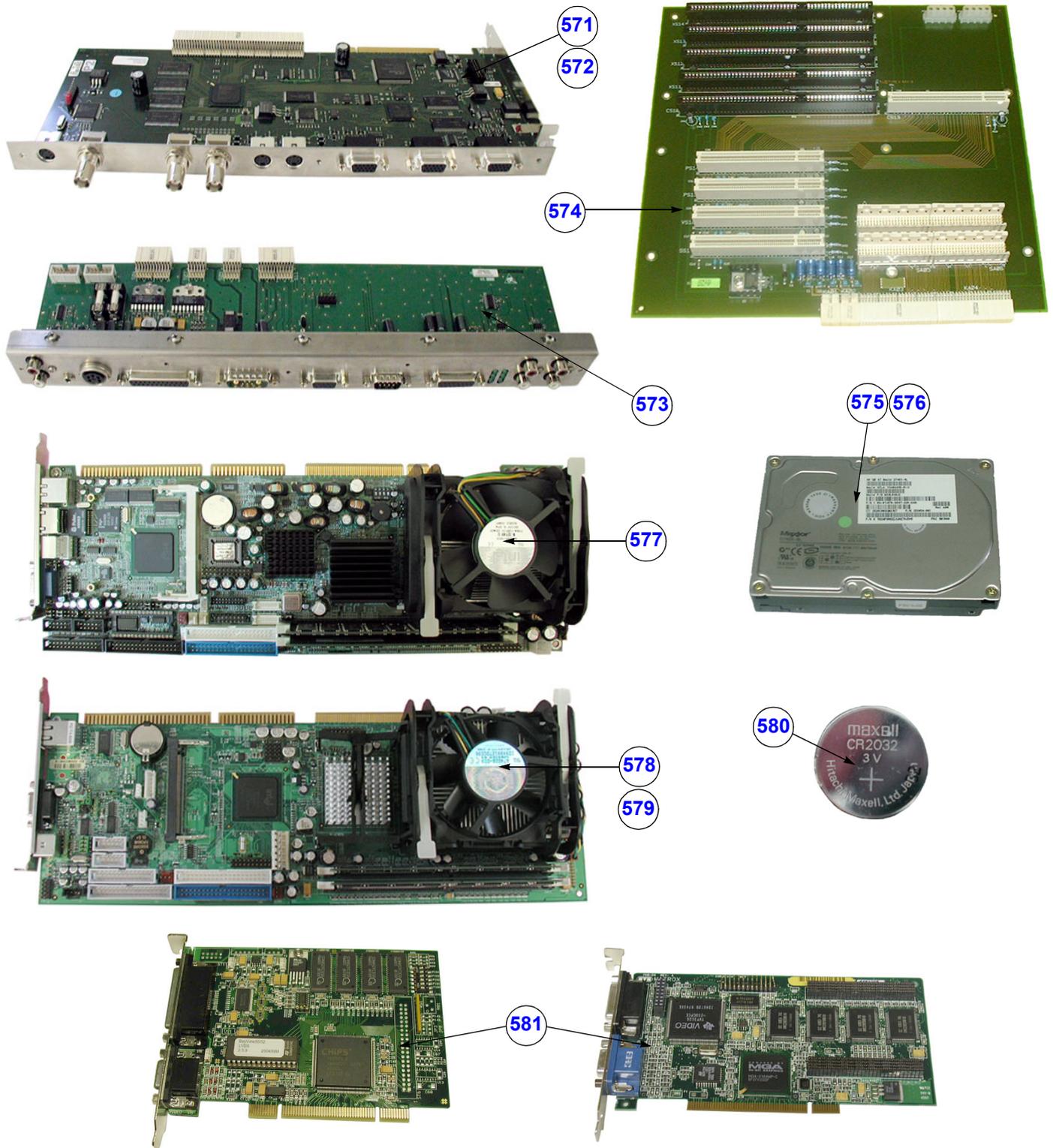


Figure 9-11 Back Processor (PC-Part)

Table 9-12 BackEnd Processor (PC-Part)

Item	Part Name	Part Number	Description	Qty	FRU
571	CKV80.P5 Video management Board	KTZ207273	PC-Video converter Board	1	1
572	CKV81.P6 Video management Board	KTZ207418	PC-Video converter Board (can replace CKV80.P5)	1	1
573	CPE80.P5 Motherboard - Extension	KTZ195902	Motherboard Extension	1	1
574	CPM3.P2 Motherboard	KTZ195699	electrical Signal- and Supply-Connection between all PC-Plug-In-Boards	1	1
575	Hard disk IDE 80GB V730Expert/Pro (BT03)	KTZ208800	Hard disk IDE 80GB; Voluson 730Expert/Pro (BT03) (obsolete - replaced by Universal HDD KTZ196003)	1	1
576	Universal Hard disk for <b>all</b> Voluson 730 (V730, V730Expert and V730Pro) systems	KTZ196003	Universal Hard disk (can replace KTZ208800) System/Boot DVD (see: <a href="#">Table 9-13</a> ) is <b>required</b>	1	1
577	SBC BT'03 *	KTZ208570	Standard Single Board-PC ( <b>IBASE</b> IB820), Pentium-IV replaced by KTZ209332 (requires <b>SW 3.1.1</b> or higher) or KTZ300422 (requires <b>SW 3.1.6</b> or higher)	1	1
578	SBC BT'03K *	KTZ209332	Standard Single Board-PC ( <b>Kontron</b> ), Pentium-IV can replace KTZ208570, but system "C:" image ( <b>SW 3.1.1</b> or higher) <b>MUST</b> be loaded! In this case, System/Boot DVD (see: <a href="#">Table 9-13</a> ) is <b>required</b>	1	1
579	SBC BT'03/'04 K2 *	KTZ300422	Standard Single Board-PC ( <b>Kontron 2</b> ), Pentium-IV ( <b>SW 3.1.6 or higher is required</b> ) can replace KTZ208570 and KTZ209332 <i>Notice:</i> if IBASE (KTZ209332) is replaced, the system "C:" image <b>MUST</b> be loaded! In this case, System/Boot DVD ( <b>SW 3.1.6</b> or higher, see: <a href="#">Table 9-13</a> ) is <b>required</b>	1	1
580	Lithium Battery CR2032 (3V)	KTZ208791	Lithium Battery CR2032 (3V) for SBC-Board	1	1
581	VGA graphic card for User Interface Display	KTZ207170	VGA Graphic card for UI Display (GEU) BayView; Matrox (second source)	1	1

\* The currently installed Single Board Computer (PC-Board) is shown in the System Setup - System Info page;  
see: [Figure 7-1 on page 7-2](#), SLOT\_CPU: **IBASE** or **KONTRON**

## Section 9-10 Options and Upgrades

Table 9-13 Options and Upgrades

Item	Part Name	Part Number	Description	Qty	FRU
601	System/Boot DVD (SW3.1.6) <b>Note:</b> Refer to <b>SN79009</b> , which is the best source for the latest revision.	KTZ196355	bootable DVD for System HDD recovery ( <b>SW3.1.6</b> ) <u>Contents:</u> updated Linux rescue partition, System C: Image (Windows 2000, newest MSPatches, Kontron2 SBC supplied, UISApp, Backup, EUM, Database Repair Tool, etc.	1	1
602	CW-Doppler Upgrade Kit	H48641AA	CW-Doppler Upgrade Kit incl. upgrade instructions ( <b>SW 3.1.1</b> or higher is required)	-	N
603	Real Time 4D Biopsy	H48631P	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
604	Real Time 4D	H48631R	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
605	VOCAL - Volume Calculation	H48631S	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
606	VCI - Volume Contrast Imaging	H48631T	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
607	Interface for DICOM 3 standard	H48631V	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
608	CRI - Compound Resolution Imaging	H48631W	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
609	DiagnoSTIC (Spatio-Temporal Image Correlation)	H48631Z	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
610	B-Flow	H48641A	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
611	XTD-View (Extended View)	H4841B	encrypted Software Option string (password) which is specific for each Voluson® 730Expert ultrasound system	-	N
612	4D View PC Software	H46631J	stand alone PC-Software which can be used to view and work on data produced with Kretztechnik's Voluson® 730Expert Ultrasound system	-	N
613	Key Cap Kit - French	H48651JD	kit includes special native language keys	-	N
614	Key Cap Kit - German	H48651JE	kit includes special native language keys	-	N
615	Key Cap Kit - Italian	H48651JF	kit includes special native language keys	-	N
616	Key Cap Kit - Swedish	KTZ154719 H48651ED	kit includes special native language keys	-	N
617	Key Cap Kit - Danish	KTZ154701 H48651EE	kit includes special native language keys	-	N
618	Key Cap Kit - Norwegian	KTZ154718 H48651EF	kit includes special native language keys	-	N
619	Key Cap Kit - Finnish	KTZ154720 H48651EG	kit includes special native language keys	-	N
620	Key Cap Kit - Spanish	KTZ154704 H48651EH	kit includes special native language keys	-	N

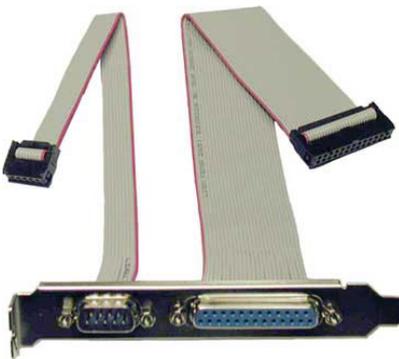


**NOTICE** A sales order has to be obtained for item 602 - 615 (620)!

**Software Options (item 603 - 611):** Once the order has been processed, the option string can be either entered by the customer or Applications support.

## Section 9-11 Miscellaneous Cables

Table 9-14 Miscellaneous Cables

Item	Part Name	Part Number	Description	Qty	FRU
701	Audio Adapter	KTZ208439	<p>Set contains two adapters:</p> <ul style="list-style-type: none"> <li>• Audio Adapter Line-IN/OUT (used in combination with SBC-Board KTZ208570)</li> </ul> 	1	1
			<ul style="list-style-type: none"> <li>• Audio Adapter Line-IN/OUT (used in combination with "KONTRON" SBC-Boards KTZ209332 and/or KTZ300422)</li> </ul> 		
702	Adapter slot parallel serial	KTZ208148	<p>Adapter Parallel port / serial COM1</p> 	1	1
703	Adapter Cable PS2	KTZ208137	<p>Adapter for GEU PS2-cable (only used in combination with SBC-Board KTZ208570)</p> 	1	1

**Table 9-14 Miscellaneous Cables**

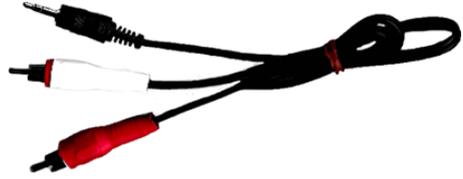
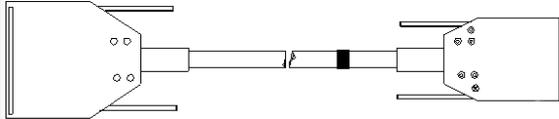
Item	Part Name	Part Number	Description	Qty	FRU
704	Cable HDD Y-Power	KTZ212426	12V/5V-Power Supply-Distributor-Cable (2x) for PC-Component (yellow-black, red-black) 	1	1
705	Power Cable for Harddisk	KTZ212401	Power cable for Harddisk 4pin 230mm 	1	1
706	Cable ATX 12Volt	KTZ212449	HDD power connector to Pentium4 power connector 	1	1
707	Cable Stereo Jack - Chinch	KTZ212074	Cable from PC-Sound-StereoJack to External Rear Panel 	1	1
708	Data Cable HDD ATA66/100	KTZ208147	Data cable for IDE-Hard disk 40pin 	1	1

Table 9-14 Miscellaneous Cables

Item	Part Name	Part Number	Description	Qty	FRU
709	GES8 I/O Connection Panel	KTZ195901	External Rear Panel with electrical Signal- and Supply-Connection-Cables to the Voluson® 730Expert Main-Unit (internal) Rear-Panel. 	1	1
710	KGS10 Cable Power GEM-GEF	KTZ195464	Electrical Power-Supply for Drives (5V/12V) 	1	1
711	KUG5 Remote Cable	KTZ195606	VCR -Remote Control Cable 	1	1
713	KVS2 Cable Serial Interface	KTZ195717	electrical-Signal-Connection between CPS and PIC_MG-Slot-CPU 	1	1
714	KVX1 Network Cable	KTZ212016	Cable from external rear Panel to the Voluson® 730Expert Main-Unit (internal) rear-Panel 1m 	1	1
715	Monitor Power Connection Cable	KTZ212116	Line cord for Supply from Main-Device to Sub-Devices 	1	1

**Table 9-14 Miscellaneous Cables**

Item	Part Name	Part Number	Description	Qty	FRU
716	Modem Data Cable	KTZ212199	Data Cable for (optional) Global Modem 	1	1
717	Modem Power Connection Cable	KTZ212032	Power Connection Cable for (optional) Global Modem 	1	1
718	Power Cord Europe 230V	KTZ212317	Power Cord Europe 230V/240V 	1	1
719	Power Cord Japan (Hosp. grade)	KTZ212448	Power Cord Japan Hospital Grade 	1	1

Table 9-14 Miscellaneous Cables

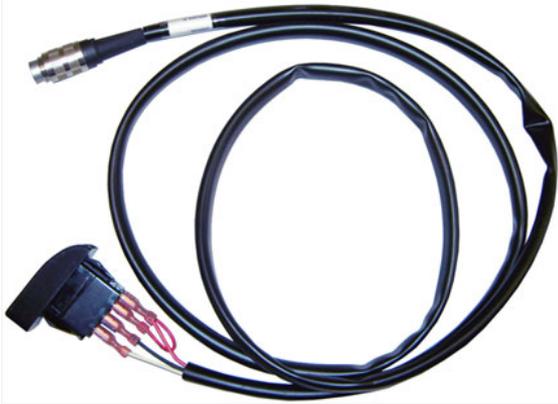
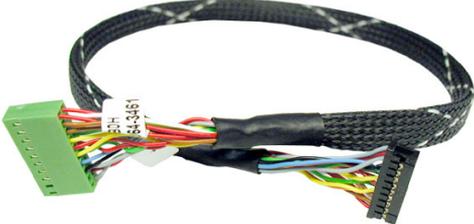
Item	Part Name	Part Number	Description	Qty	FRU
720	Power Cord UK	KTZ212441	Power Cord United Kingdom 240V 	1	1
721	Power Cord USA (Hosp.grade)	KTZ212402	Power Cord USA Hospital Grade 	1	1
722	Power Cord India	KTZ212452	Power Cord India 	1	1
723	Standby Switch Cable	KTZ195514	Standby Switch Cables 	1	1

Table 9-14 Miscellaneous Cables

Item	Part Name	Part Number	Description	Qty	FRU
724	USB to ICP CPU Board	KTZ207029	<p><b>Set contains two parts:</b>                      USB for PC-Slot, Connector on Backpanel.                      Cables are connected to PC-Board.                      Leads the USB-signals to the PC-Backpanel                      (used in combination with SBC-Board KTZ208570)</p> 	2	1
			<p>USB for PC-Slot, Connector on Backpanel.                      Cables are connected to PC-Board.                      Leads the USB-signals to the PC-Backpanel                      (used in combination with "KONTRON" SBC-Boards                      KTZ209332 and/or KTZ300422)</p> 		
725	USB Cable A to B (from GEM to PC-part on GEF)	KTZ212125	<p>USB Cable from Disk Drive Module (GEM) to connector                      "USB-GEM" on the PC-part of main board module (GEF)</p> 	1	1

Table 9-14 Miscellaneous Cables

Item	Part Name	Part Number	Description	Qty	FRU
726	VGA cable HD15-HD15	KTZ212275	VGA cable HD15-HD15 	1	1
727	Cable TMDS (Digital Video cable from SBC to CKV)	KTZ208600	<p><b>Set contains two cables:</b></p> <p>Cable TMDS (Digital Video Cable from SBC to CKV)                      (used in combination with SBC-Board KTZ208570)</p>  <p>Cable TMDS (Digital Video Cable from SBC to CKV)                      (used in combination with "KONTRON" SBC-Boards                      KTZ209332 and/or KTZ300422)</p> 	1	1

## Section 9-12 Optional Peripherals and Accessories



Figure 9-12 Optional Peripherals and Accessories

**Table 9-15 Optional Peripherals and Accessories**

Item	Part Name	Part Number	Description	Qty	FRU
801	Analog B/W Video Printer (Sony UP-895MD)	KTZ211332 (H46801A)	Analog B/W Video Printer NTSC/PAL	-	1
802	PPP55 Connection Set	KTZ195643	Connection Set UP-895MD	-	1
803	Digital Color Printer (Sony UP-D21MD)	KTZ211357	USB-Port (obsolete)	-	1
804	Digital Color Printer (Sony UP-D23MD)	KTZ211373 (H46831B)	USB-Port (can replace UP-D21MD)	-	1
805	PZP60 Connection Set	KTZ195776	Connection Set UP-D21MD or UP-D23MD	-	1
806	HP Line Printer HPdeskjet 990cxi	KTZ211102	USB-Port (obsolete)	-	1
807	HP Line Printer HP deskjet 995c	KTZ211107	USB-Port (obsolete)	-	1
808	PZP56 Connection Set	KTZ195882	Connection Set HPdeskjet 990cxi / 995c (can replace PZP55 KTZ195749)	-	1
809	Line Printer (Bluetooth) HP 5600 Series or Olivetti Job Jet 210 (license product of HP)	KTZ211503 (H46631L)	(Bluetooth Connection Set KTZ196002 is required) replaced by KTZ220510	-	1
810	Line Printer Bluetooth (HP 5940)	KTZ220510 (H48651WE)	Line Printer Bluetooth (USB-Port) <b>without</b> cartridge (Bluetooth Connection Set KTZ196002 is required) can be replaced by Canon printer KTZ300182	-	1
811	Bluetooth Connection Set	KTZ196002 (H46631M)	Bluetooth Connection Set (HP 5600 + 5900 Series and Olivetti Job Jet 210 <b>only</b> )	-	1
812	Line Printer Bluetooth (Canon Pixma MP600 or MP610)	KTZ300182 (H48661MT)	Line Printer Bluetooth incl. Ink, Bluetooth Adapters + power cable US and EU (replaces HP printer KTZ211503 and KTZ220510)	-	1
813	Line Printer Destination Set	KTZ280057 (H48661MW)	Line printer power cable set for US, EU and ROW (rest of world)	-	1
814	Sony VCR SVO-9500 MD	KTZ211317 (H46801D)	NTSC	-	1
815	Sony VCR SVO-9500 MDP	KTZ211318 (H46801C)	PAL	-	1
816	Mitsubishi VCR HS-MD3000U	KTZ211368 (H46801D)	NTSC (can replace Sony VCR SVO-9500 MD)	-	1
817	Mitsubishi VCR HS-MD3000E	KTZ211369 (H46801C)	PAL (can replace Sony VCR SVO-9500 MDP)	-	1
818	PRR50 Connection Set	KTZ195492	Connection Set for VCR without remote control	-	1

**NOTE:** *The illustrations may not correspond to the actual product!*

## Section 9-12 Optional Peripherals and Accessories (cont'd)



Figure 9-13 Optional Peripherals and Accessories cont'd

Table 9-16 Optional Peripherals and Accessories cont'd

Item	Part Name	Part Number	Description	Qty	FRU
821	Foot switch (MFT7)	KTZ195446 (H46681D)	Foot switch	-	1
822	ECG-preamplifier (MAN 6)	KTZ154644 (H46681H)	consists of ECG-preamplifier and patient connection cable	-	1
823	Global Modem (Analog)	2245794 (H48641C)	Global Modem analog (Common Part with L9 and V7) use modem cable: KTZ212199 + KTZ212032	-	1
824	USB-RS232 Connection kit PRY	KTZ195858	Converter from USB to RS-232 Serial Port	-	1
825	Touch-up Paint Set (gray-blue)	KTZ154680	contains blue, dark-gray, bright-gray and black 4x 2cl bottles incl. brush	-	1
826	RIC-Holder	KTZ225469	Probe holder used for Real-time 4D endocavity probes (RIC) during disinfection process	-	1
	DVD+RW Disk blank	KTZ196204 (H48641D)	DVD+RW Disk (re-writable)	-	
	MO Disk Media 1.3GB	KTZ207077 (H46681M)	MO-Disk Media (Standard)	-	1

**Table 9-17 System Manuals**

Item	Part Name	Part Number	Kretz #	Description	Qty	FRU
	Voluson® 730Expert Service Manual	KTZ105899	105899		1	N
<b>System User Manuals</b>						
	Basic User Manual, Voluson® 730Expert, English		105890		1	N
	Basic User Manual, Voluson® 730Expert, German	H48651C	105916		-	N
	Instruction Manual, Voluson® 730Expert, English	H48631B	105891		-	N
	Instruction Manual, Voluson® 730Expert, German	H48631E	105892		-	N
	Instruction Manual, Voluson® 730Expert, Spanish	H48631F	105893		-	N
	Instruction Manual, Voluson® 730Expert, Portuguese	H48631G	105894		-	N
	Instruction Manual, Voluson® 730Expert, Italian	H48631J	105895		-	N
	Instruction Manual, Voluson® 730Expert, French	H48631K	105896		-	N
	Instruction Manual, Voluson® 730Expert, Chinese	H48631L	105897		-	N
	Instruction Manual, Voluson® 730Expert, Japanese	H48631M	105898		-	N
	Advanced Reference Manual Voluson® 730Expert, English	H48621A	105878		-	N

## Section 9-13 Probes

### 9-13-1 2D-Probes



Figure 9-14 2D curved array Transducers

Table 9-18 2D curved array Transducers

Item	Part Name	Part Number	Description	Qty	FRU
901	AB2-7	KTZ195757 (H46701T)	electronic broadband curved array transducer, frequency range of 2-7 MHz Applications: Abdominal, Obstetrics, Gynecology, Urology, Pediatrics	-	1
902	AC2-5	KTZ195784 (H46701U)	electronic broadband curved array transducer, frequency range of 2-5 MHz Applications: Abdominal, Obstetrics, Gynecology, Pediatrics	-	1
903	IC5-9	KTZ195386 (H46701F)	electronic endocavity broadband curved array transducer, frequency range of 5-9 MHz and a field-of-view of max. 150° Applications: Obstetrics, Gynecology, Urology	-	1

9-13-1 2D-Probes (cont'd)

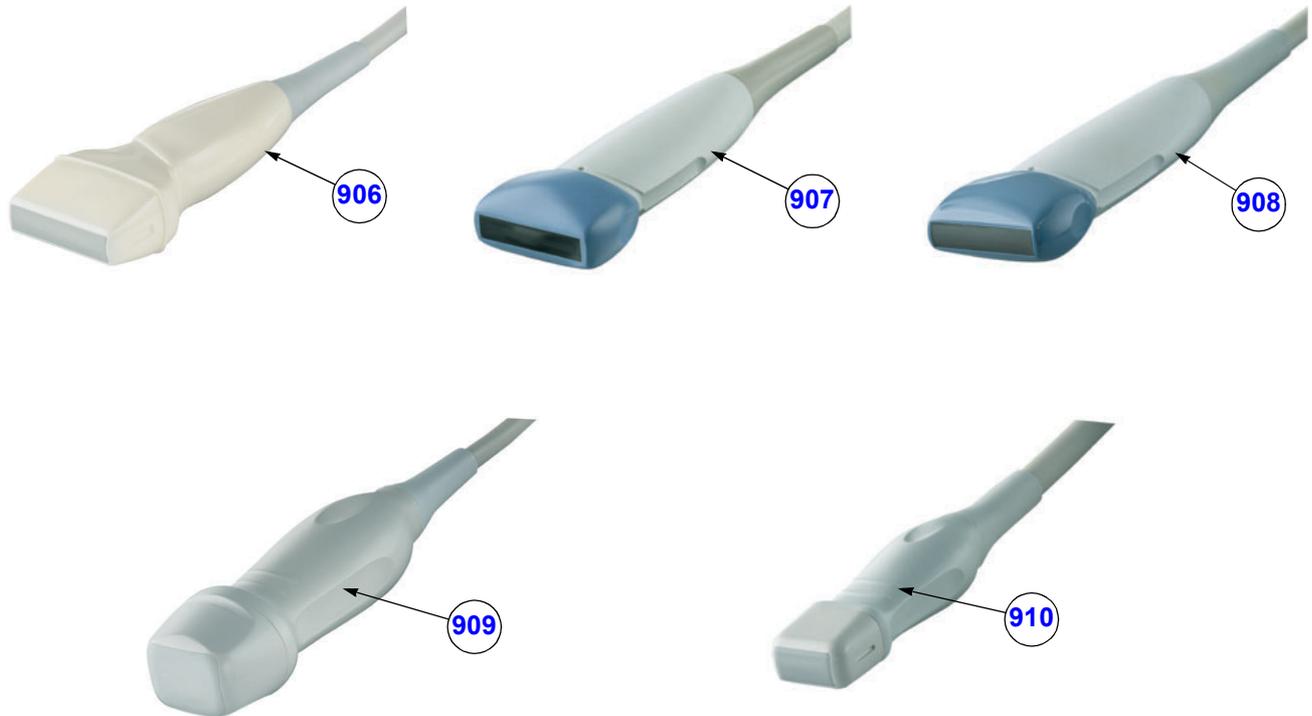


Figure 9-15 2D linear- and phased array Transducers

Table 9-19 2D linear- and phased array Transducers

Item	Part Name	Part Number	Description	Qty	FRU
906	SP4-10	KTZ195530 (H46701A)	electronic broadband linear array transducer, frequency range of 4-10 MHz, electronically steerable Applications: Small Parts, Peripheral Vascular, Pediatrics, Orthopedics	-	1
907	SP6-12	KTZ195362 (H46701B)	electronic broadband linear array transducer, frequency range of 6-12 MHz, electronically steerable Applications: Small Parts, Peripheral Vascular, Pediatrics, Orthopedics	-	1
908	SP10-16	KTZ195531 (H46701C)	electronic broadband linear array transducer, frequency range of 10-16 MHz, electronically steerable Applications: Small Parts, Orthopedics	-	1
909	PA2-5P	KTZ195773 (H46701V)	electronic broadband phased array transducer, frequency range of 2-5 MHz Applications: Abdominal, Cardiology, Transcranial	-	1
910	PA6-8	KTZ195532 (H46701J)	electronic broadband phased array transducer, frequency range of 6-8 MHz Applications: Cardiology, Pediatrics/Neonatology	-	1

## 9-13-2 Real-Time 4D Volume Probes

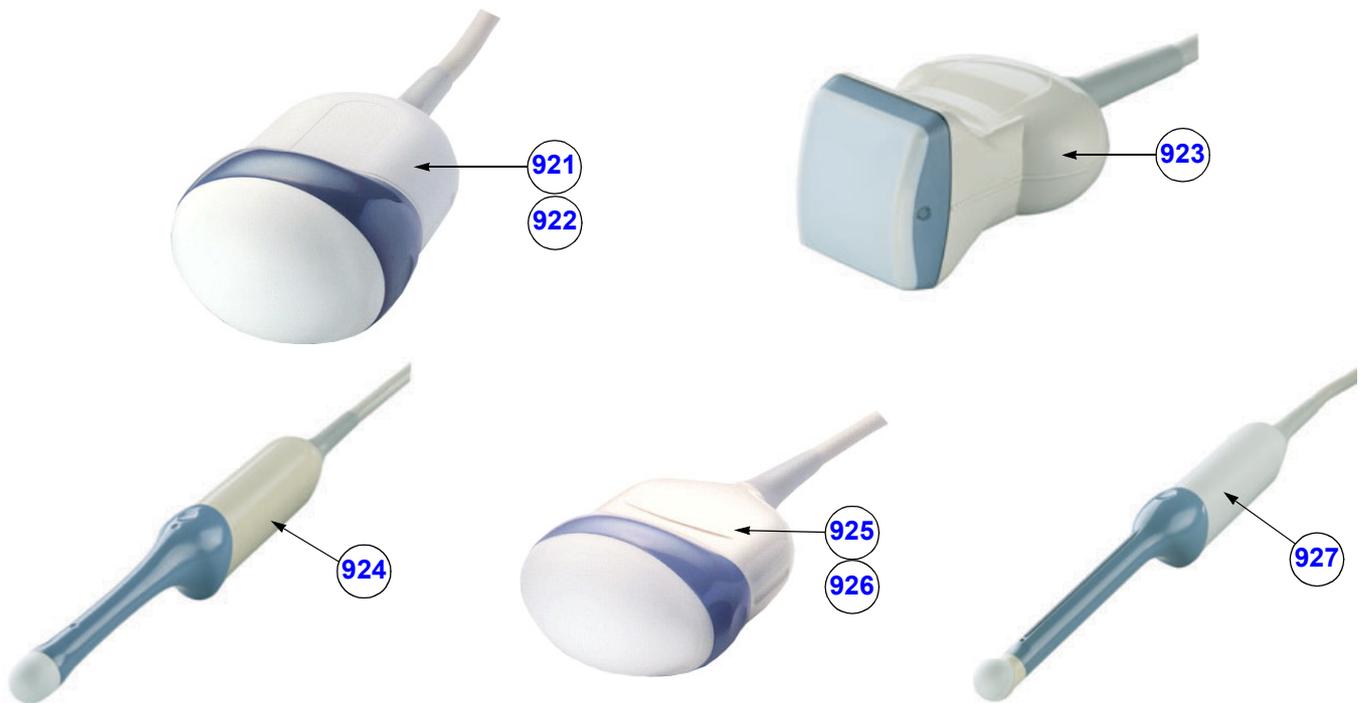


Figure 9-16 Real-Time 4D Volume Probes

Table 9-20 Real-Time 4D Volume Probes

Item	Part Name	Part Number	Description	Qty	FRU
921	RAB2-5	KTZ156736 (H46701M)	Real-time 4D broadband electronic curved-array transducer with a frequency range of 2-5MHz. Applications: Abdominal, Obstetrics, Gynecology, Interventional Radiology	-	1
922	RAB4-8P	KTZ156767 (H46701N)	Real-time 4D broadband electronic curved-array transducer with a frequency range of 4-8MHz. Applications: Abdominal, OB, Gyn, Pediatrics, Interventional Radiology	-	1
923	RSP5-12	KTZ195763 (H46701W)	Real-time 4D broadband electronic linear array transducer with a frequency range of 5-12MHz and a scan width of 40 mm. Applications: Small Parts, Periph.Vascular, Pediatrics, Urology, Orthopedics	-	1
924	RIC5-9	KTZ195242 (H46701R)	Real-time 4D endocavity broadband electronic curved array transducer with a frequency range of 5-9MHz. Applications: Gynecology/Fertility, Obstetrics, Urology	-	1
925	RAB2-5L	KTZ156845 (H48621X)	Real-time 4D broadband electronic curved-array transducer with a frequency range of 2-5MHz. Applications: Abdominal, Obstetrics, Gynecology, Interventional Radiology	-	1
926	RAB4-8L	KTZ156846 (H48621Z)	Real-time 4D broadband electronic curved-array transducer with a frequency range of 4-8MHz. Applications: Abdominal, OB, Gyn, Pediatrics, Interventional Radiology	-	1
927	RRE6-10	KTZ195534 (H46701S)	Real-time 4D Multi-Plane electronic broadband curved array transrectal transducer with a frequency range of 6-10 MHz. Applications: Urology, Rectal wall	-	1

9-13-3 CW-Pencil Probes



Figure 9-17 CW- Pencil Probes

Table 9-21 CW- Pencil Probes

Item	Part Name	Part Number	Description	Qty	FRU
931	PCW4.0	KTZ195540 (H46701L)	single element Continuous Wave (CW) Doppler pencil probe with a nominal operating frequency of 4.0 MHz (no B-image) Applications: Cardiology, Pediatrics	-	1
932	SCW2.0	KTZ195538 (H46701K)	single element Continuous Wave (CW) Doppler pencil probe with a nominal operating frequency of 2.0 MHz (no B-image) Applications: Cardiology (suprasternal)	-	1

## Section 9-14 Biopsy Needle Guides



Figure 9-18 Biopsy Needle Guides

**Table 9-22 Biopsy Needle Guides**

Item	Part Name	Part Number	Description	Qty	FRU
850	PEC42	H46721F	reusable Biopsy needle guide for probe IC5-9 needle diameter: < 1.8 mm	-	N
851	PEC63	H46721R	reusable Biopsy needle guide for probe RIC5-9 needle diameter: < 1.8 mm	-	N
852	PEC64	H46721B	reusable Biopsy needle guide for probe SP6-12 needle diameter: < 1 mm, 1.4 mm, 2.2 mm	-	N
853	PEC65	H46721M	reusable Biopsy needle guide for probe RAB2-5 / RAB4-8P needle diameter: < 1 mm, 1.4 mm, 2.2 mm	-	N
854	PEC69	H46721S	reusable Biopsy needle guide for probe RRE6-10 needle diameter: < 1.4 mm	-	N
855	PEC71	H46721D	reusable Biopsy needle guide for probe AB2-7 needle diameter: < 1 mm, 1.4 mm, 2.2 mm	-	N
856	PEC74	H48621Y	reusable Biopsy needle guide for probe RAB2-5L / RAB4-8L needle diameter: < 1 mm, 1.4 mm, 2.2 mm	-	N
857	PEC75	H46721W	reusable Biopsy needle guide for probe RSP5-12 needle diameter: < 1 mm, 1.4 mm, 2.2 mm	-	N



**NOTICE** A sales order has to be obtained for the Biopsy Needle Guides.

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# Chapter 10

## Care & Maintenance

### Section 10-1 Overview

#### 10-1-1 Periodic Maintenance Inspections

It has been determined by engineering that your Voluson® 730Expert system 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.

#### 10-1-2 Purpose of Chapter 10

This chapter describes **Care & Maintenance** on the Voluson® 730Expert system and its peripherals. These procedures are intended to **maintain the quality** of the ultrasound **systems performance**. Read this chapter completely and familiarize yourself with the procedures before performing a task.

**Table 10-1 Contents in Chapter 10**

Section	Description	Page Number
10-1	Overview	10-1
10-2	Why do Maintenance	10-2
10-3	Maintenance Task Schedule	10-2
10-4	Tools Required	10-5
10-5	System Maintenance	10-6
10-6	Using a Phantom	10-12
10-7	Electrical Safety Tests	10-12
10-8	When There's Too Much Leakage Current...	10-24
	Ultrasound INSPECTION CERTIFICATE	10-25

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

 **DANGER** THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND SWITCH OFF THE MAIN CIRCUIT BREAKER (F1) BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.

 **CAUTION** Do not pull out or insert circuit boards while power is ON.

 **CAUTION** DO NOT operate this unit unless all board covers and frame panels are securely in place, to ensure optimal system performance and cooling. When covers are removed, EMI may be present.

## Section 10-2 Why do Maintenance

### 10-2-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of quality checks and corrective maintenance. The Ultrasound Inspection Certificate (see: [page 10-25](#)) provides the customer with documentation that the ultrasound scanner is maintained on a periodic basis.

A copy of the Ultrasound Inspection Certificate should be kept in the same room or near the scanner.

### 10-2-2 Quality Assurance

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

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. Please contact us for coverage information and/or price for service.

## Section 10-3 Maintenance Task Schedule

### 10-3-1 How often should care & maintenance tasks be performed?

The Customer Care Schedule (see: [page 10-3](#)) specifies how often your Voluson® 730Expert should be serviced and outlines items requiring special attention.

**NOTE:** *It is the customer's responsibility to ensure the Voluson® 730Expert care & 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 Voluson® 730Expert ultrasound scanning system and can best provide competent, efficient service. Please contact us for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Customer Care Schedule assumes that you use your Voluson® 730Expert for an average patient load (10-12 per day) and not use it as a primary mobile unit which is transported between diagnostic facilities.

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

Abbreviations used in the Customer Care Schedule [Table 10-2](#):

- D = Daily
- W = Weekly
- M = Monthly
- A = Annually

10-3-1 How often should care & maintenance tasks be performed? (cont'd)

Table 10-2 Customer Care Schedule

Item	Service at Indicated Time	D	W	M	A	Notes
Air Filter Grid	Clean the air filter grid with vacuum cleaner from outside (left side of the system front view).			•		more frequently depending on your environment
Air Filter Grid	Remove back panel and board chassis and clean the housing from inside. (vacuum cleaner and soft brush)				•	more frequently depending on your environment
AC Mains Cable	Inspect AC Mains Cable			•		Mobile Unit Check weekly
Cables and Connectors	Remove the Back Panel and check if all cables are well seated and if there is no mechanical damage visible; Check if they are fixed and well seated at the correct position.				•	also after corrective maintenance
User Interface	Clean alphanumerical keyboard, Functional keys, Digital potentiometers, TGC-Shift potentiometers. (vacuum cleaner, lukewarm soap water on a soft, damp cloth)		•			Be careful not to get the cloth too wet so that moisture does not enter the loudspeakers, TGC-Slider, or other keys!
Monitor and Touch Panel	Clean Top surface, Monitor, Touch Panel and Probe holder with a fluid detergent in warm water on a soft, damp cloth.		•			Be careful not to get the cloth too wet so that moisture does not enter the entire system.
Mechanical parts	Clean and inspect the mechanical function of wheels, casters, brakes and swivel locks as well as side door, foot rest, front and rear handle, and monitor holder. Remove Dust and Coupling gel.			•		Mobile Unit Check Daily
Control Panel movement	Check Turn mechanism				•	Mobile Unit Check Daily
Trackball Check	Check proper operation (Cursor movement X, Y direction)	•				If failure occurs go to trackball cleaning.
Trackball Cleaning	Remove top trackball cover; open the trackball housing and take out the trackball. Clean the X, Y axes of the trackball (soft tissue and screwdriver shaft.				•	Please record it in the systems setup maintenance report
Disk Drives (Sonoview Data Backup)	Test Image filing (Sonoview) Import and Export data capability (MO-, CD-RW Drive)		•	•		save the image filing data monthly or weekly on CD depending on the number of examinations
Safe Probe Operation	Clean probes and probe cables and check acoustic lens housing (cracks) and probe cables. In case of mechanical damage, don't use them! <b>Danger:</b> Safety risk for operator and patient.	•				or before each use
Probe Air bubbles	To detect air bubbles in filling liquid, shake the probe carefully and check abnormal noise.					
Probe connectors	Remove dust/dirt of all probe connectors. Clean with vacuum cleaner if dust is visible.			•		

**Table 10-2 Customer Care Schedule**

Item	Service at Indicated Time	D	W	M	A	Notes
Console Leakage Current Checks					•	Also after corrective maintenance or as required by your facilities QA program.
Peripheral Leakage Current Checks					•	Also after corrective maintenance or as required by your facilities QA program.
Surface Probe Leakage Current Checks					•	Also after corrective maintenance or as required by your facilities QA program.
Endocavity Probe Leakage Current Checks					•*	Also after corrective maintenance or as required by your facilities QA program.
Measurement Accuracy Checks					•	Also after corrective maintenance or as required by your facilities QA program.
Probe/Phantom Checks	Check axial and lateral resolution (see Basic User Manual Technical specifications). Check Gain and TGC changes, vary the focus and check reaction on screen.				•	Also after corrective maintenance or as required by your facilities QA program.
Functional Checks of all probes <a href="#">Section 10-5-2 on page 10-7</a>					•	Also after corrective maintenance or as required by your facilities QA program.

\* Twice a year is recommended.

## Section 10-4 Tools Required

### 10-4-1 Special Tools, Supplies and Equipment

#### 10-4-1-1 Specific Requirements for Care & Maintenance

**Table 10-3 Overview of Requirements for Care & Maintenance**

Tool	Part Number	Comments
Digital Volt Meter (DVM)		minimum 5% accuracy, 3.5 digit and 200 Ohm range required
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 240 V system 3M #2204 Large adjustable wrist strap 3M #2214 Small adjustable wrist strap 3M #3051 conductive ground cord
Anti Static Vacuum Cleaner	46-194427P278 46-194427P279	120V 230V
Safety Analyzer	46-285652G1	DALE 600 KIT (or equivalent) for electrical tests
SVHS VCR Cassette	E7010GG E7010GF	60 minute 120 minute
SVHS VCR Head Cleaner		see VCR user manual for requirements
3.5" MOD MEDIA	E8381AA E8381AB KTZ207077	blank 128 M disk blank 230 M disk blank 1.3 GB MO-disk
3.5" MOD Media Cleaner	2117811	cleans the diskettes
3.5" MOD Head Cleaner Kit	2148392	cleans the drive heads
QIQ Phantom	E8370RB	RMI Grayscale Target Model 403GS
CD-RW Media		(minimum quad speed)
DVD+RW Disc Media blank	H48641D	blank 4,7GB DVD+RW disc
B/W Printer Cleaning Sheet		see printer user manual for requirements
Color Printer Cleaning Sheet		see printer user manual for requirements
Disposable Gloves		
Screwdriver PH0		
Screwdriver PH1		
Screwdriver PH2		

## Section 10-5 System Maintenance

### 10-5-1 Preliminary Checks

The preliminary checks take about 15 minutes to perform. Refer to the system user documentation whenever necessary.

**Table 10-4 System Checks**

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Fill in the top of the Periodic Maintenance (PM) Inspection Certificate. Note all probes and system options.
3	Power up	Turn the system power on and verify that all fans and peripherals turn on. Watch the displays during power up to verify that no warning or error messages are displayed.
4	Probes	Verify that the system properly recognizes all probes.
5	Displays	Verify proper display on the monitor and Touch Panel.
6	Presets	"Full Backup" all customer presets on Hard disk and/or DVD (see: <a href="#">Section 4-5-3 "Save Full Backup (Presets, Configurations &amp; Application Settings)"</a> on page 4-33).

## 10-5-2 Functional Checks (see also Chapter 4)

The functional checks take about 60 minutes to perform. Refer to the system user documentation whenever necessary.

### 10-5-2-1 System Checks

**Table 10-5 System Functional Checks**

Step	Item	Description
1	B Mode	Verify basic B Mode (2D) operation. Check the basic system controls that affect this mode of operation.
2	M Mode	Verify basic M Mode operation. Check the basic system controls that affect this mode of operation.
3	C Mode	Verify basic CFM Mode (Color Flow Mode) operation. Check the basic system controls that affect this mode of operation.
4	PD Mode	Verify basic PD Mode (Power Doppler Mode) operation. Check the basic system controls that affect this mode of operation.
5	Doppler Modes	Verify basic Doppler Mode operation (PW and CW if available). Check the basic system controls that affect this mode of operation.
6	3D Mode	Verify basic 3D Mode operation. Check the basic system controls that affect this mode of operation.
7	*Applicable Software Options	Verify the basic operation of all optional modes such as Real Time 4D, RT_4D Biopsy, VOCAL, B-Flow, XTD-View, Diagnostics (Spatio-Temporal Image Correlation), CRI (Compound Resolution Imaging), VCI (Volume Contrast Imaging), etc. Check the basic system controls that affect each options operation.
8	Keyboard Test	Perform the Keyboard Test Procedure to verify that all keyboard controls are OK.
9	Monitor	Verify basic Monitor display functions.
10	Touch Panel	Verify basic Touch Panel display functions.
11	Measurements	Scan a gray scale phantom and use the measurement controls to verify distance and area calculation accuracy. Refer to the Basic User Manual, Chapter 13, for measurement accuracy specifications.

**NOTE:** \* Some software may be considered standard depending upon system configuration.

### 10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to [Table 3-7, "Approved Peripherals,"](#) on [page 3-43](#) for a list of approved peripherals.

**Table 10-6 Approved Peripheral/Hardware Option Functional Checks**

Step	Item	Description
1	VCR	Verify record/playback capabilities of the VCR. Clean heads and covers if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	Line Printer	Verify hardcopy output of the Line printer. Clean heads and covers if necessary.
5	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
6	Footswitch	Verify that the footswitch is functioning as programmed. Clean as necessary.
7	DVD and/or MO-Drive	Verify that the DVD-drive and/or optional MO-drive reads/writes properly (export/recall image in Sonoview)
8	Modem	Verify modem remote connection
9	ECG	Verify basic operation with customer.

### 10-5-3 Input Power

#### 10-5-3-1 Mains Cable Inspection

**Table 10-7 Mains Cable Inspection**

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall and system.
2	Inspect	Inspect it and its connectors for damage of any kind.
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.
4	Verify	Inlet connector retainer is functional.

### 10-5-4 Cleaning

#### 10-5-4-1 General Cleaning

Frequent and diligent cleaning of the Voluson® 730Expert ultrasound system reduces the risk of spreading infection from person to person, and also helps to maintain a clean work environment.

**Table 10-8 General Cleaning**

Step	Item	Description
1	Console	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. <b>Caution:</b> DO NOT allow any liquid to drip or seep into the system.
2	Monitor and Touch Panel	Clean Top surface, Monitor and Touch Panel with a fluid detergent in warm water on a soft, damp cloth. <b>Caution:</b> DO NOT spray any liquid directly onto the Covers, Monitor, keyboard, Touch Panel etc.

## 10-5-5 Physical Inspection

**Table 10-9 Physical Checks**

Step	Item	Description
1	Labeling	Verify that all system labeling is present and in readable condition.
2	Scratches & Dents	Inspect the console for dents, scratches or cracks.
3	Control Panel	Inspect keyboard and control panel. Note any damaged or missing items. (Replace faulty components as required.) Verify proper operation of Control Panel backlighting and TGC sliders.
4	Control Panel Movement	Verify ease of control panel (Operator I/O Panel) movement in acceptable direction. Ensure that it latches in position as required.
5	Wheels & Brakes	Check all wheels and casters for wear and verify operation of foot brake, to stop the unit from moving, and release mechanism. Check all wheel locks and wheel swivel locks for proper operation.
6	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.
7	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.
8	External I/O	Check all connectors for damage and verify that the labeling is good.
9	Op Panel Lights	Check for proper operation of all operator panel key illuminations (flash once during system start-up).
10	Monitor Light	Check for proper operation of any monitor lights if available.
11	External Microphone	Check for proper operation of any external microphones by recording an audio test if available.



**NOTICE** There is no Microphone built in and released for Voluson® 730Expert.

## 10-5-6 Optional Diagnostic Checks

Optionally you can access the diagnostic software as described in Chapters 5 or 7. View the error logs and run desired diagnostics.

## 10-5-7 Probe Maintenance

### 10-5-7-1 Probe Related Checks

Table 10-10 Probe Related Checks

Step	Item	Description
1	Probes	Thoroughly check the system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins.
2	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).

### 10-5-7-2 Basic Probe Care

The Basic User Manual provides 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. Review the Basic User Manual of Voluson® 730Expert 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 system sockets before plugging in a probe.

### 10-5-7-3 Basic Probe Cleaning

Refer to the Basic User Manual of Voluson® 730Expert for details on cleaning.

 **CAUTION** 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 Voluson® 730Expert Basic User Manual and/or care card. Doing so could result in irreparable damage to the probe and/or Voluson® 730Expert system.

 **CAUTION** Follow the Care Card instructions supplied with each probe (inside the transducer boxes) for disinfectants and gels that are compatible with the surface material of the probes.

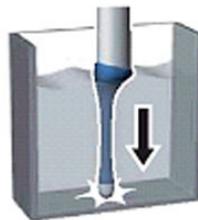
 **CAUTION** To help protect yourself from blood borne diseases, when cleaning and handling probes, wear approved, non-allergenic disposable gloves.

 **NOTICE** Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

 **CAUTION**

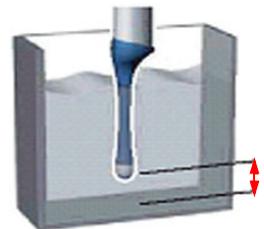


Please be aware of the sensitive probe head. TAKE EXTREME CARE!



NEVER place or store a probe on its scan head!

OK



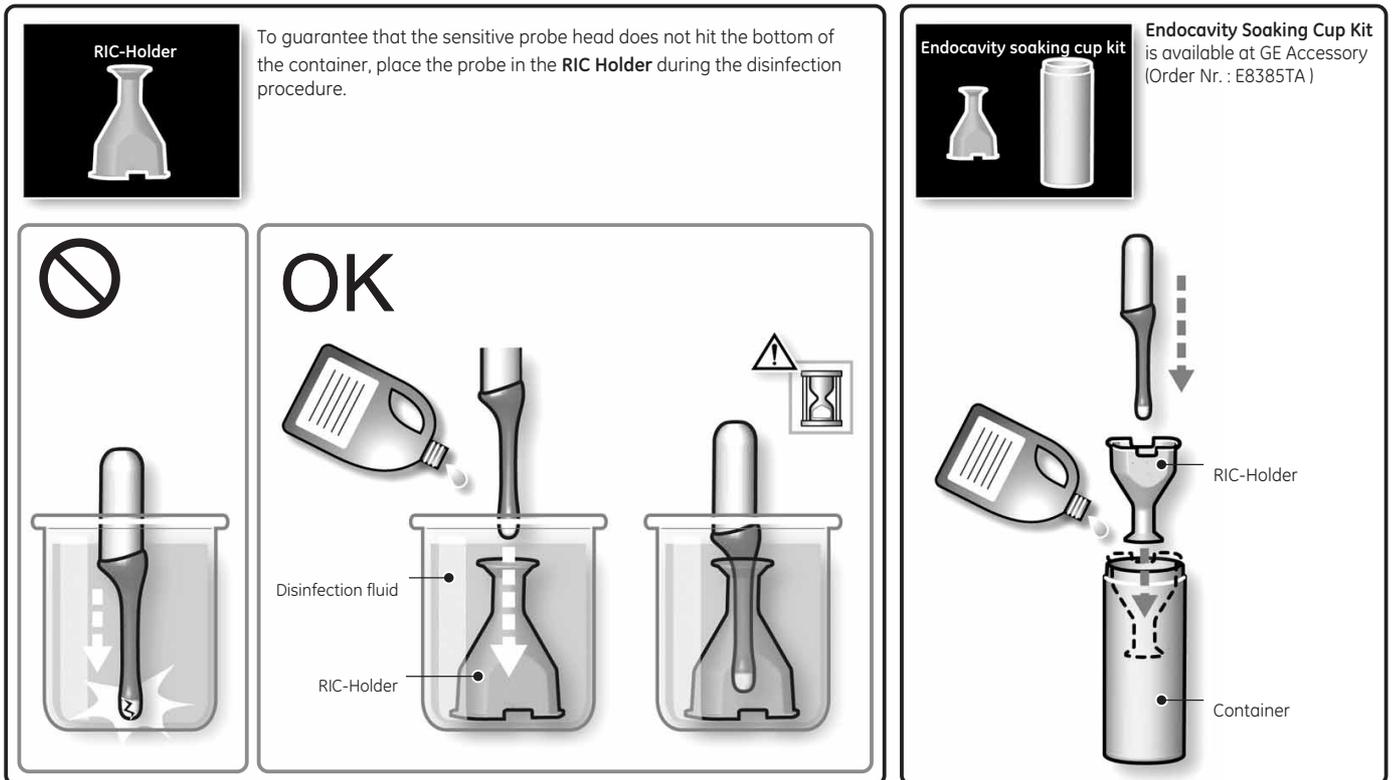
When disinfecting a probe, ensure that there is sufficient space between the probe and the container bottom!

**10-5-7-4 Disinfection by means of the RIC-Holder**

Especially for Real-time 4D endocavity probes (RIC), it is necessary to take extreme care when transporting the system with the probe attached, or during the disinfection process. Inadequate handling may lead to dead elements, shocked head mechanics, etc.

The RIC-Holder (especially developed for RIC Real-time 4D endocavity probes) guarantees that the sensitive probe head does not hit the bottom of the container during the disinfection procedure.

**NOTE:** Operation instructions are supplied with each RIC-Holder (KTZ225469).



## Section 10-6 Using a Phantom

Refer to the User Manual of the Phantom for information on using a phantom and quality assurance tests. For measurement accuracy of the system review chapter 13.5 of the Basic User Manual of Voluson® 730Expert. To get comparable results, use Multi-purpose phantom, Model 539-05 from ATS Laboratories Inc.

## Section 10-7 Electrical Safety Tests

### 10-7-1 Safety Test Overview

The electrical safety tests in this section are based on and conform to NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. They are intended for the electrical safety evaluation of cord-connected, electrically operated, patient care equipment. If additional information is needed, refer to the NFPA 99 (For USA) and IEC 60601-1 documents.

-  **WARNING** ***THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 12 MONTHS ACCORDING TO THE REQUIREMENTS OF THE PATIENT SAFETY STANDARD IEC-EN 60601-1. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE SAFETY INSPECTIONS MENTIONED ABOVE.***
-  **CAUTION** To avoid electrical shock, the unit under test must not be connected to other electrical equipment. Remove all interconnecting cables and wires. The unit 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.
-  **WARNING** ***Test the Voluson® 730Expert system, peripherals and probes for leakage current. Excessive leakage current can cause FATAL INJURY OR DEATH. 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:
  - \* once a year on surface probes
  - \* once a year (twice a year is recommended) on endocavitary probes
  - \* whenever probe damage is suspected

## 10-7-2 GEMS Leakage Current Limits

The following limits are summarized for NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

**Table 10-11 Chassis Leakage Current Limits—Accessible Metal Surfaces**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
USA	N/A	0.3 mA	0.3 mA	0.3 mA
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA

**Table 10-12 Type BF Applied Part Leakage Current Limits - Non-Conductive (Floating) Surface and Cavity Probes**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

**Table 10-13 Type CF Applied Part Leakage Current Limits - Surgical Probes and ECG Connections**

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.01 mA	0.05mA	0.05 mA	0.05 mA	0.05 mA
Other	0.01 mA	0.05 mA	0.05 mA	0.05 mA	0.05 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.

- Grounding Continuity
- Chassis Leakage Current
- Probe Leakage Current
- ECG Leakage Current

All measurements are made with an electrical safety analyzer.

### 10-7-3 Outlet Test - Wiring Arrangement - USA & Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

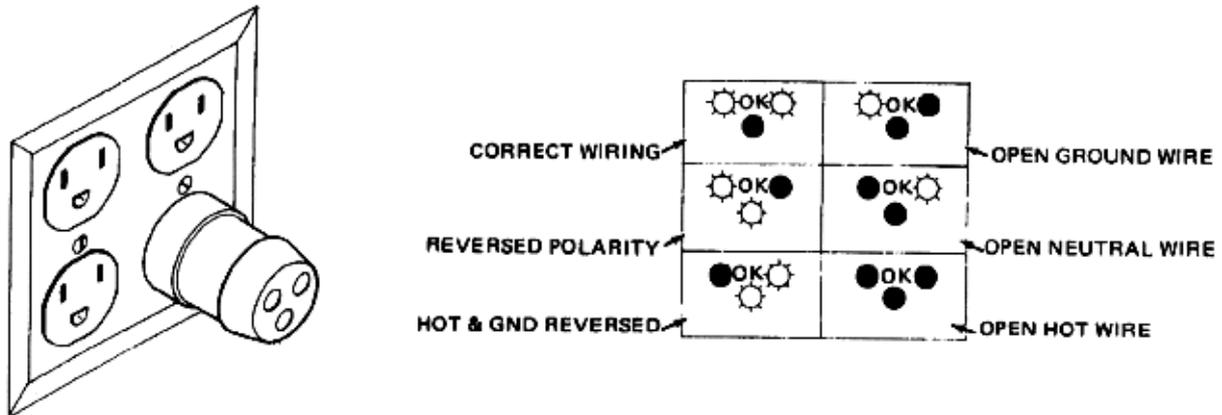


Figure 10-1 Typical Outlet Tester

**NOTE:** No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

## 10-7-4 Grounding Continuity



**CAUTION 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.



**Figure 10-2 Ground Continuity Test**



**CAUTION Lacquer is an isolation barrier! Resistor may be high-impedance! Measure only on blank parts, stated in [Figure 10-2](#) above.**

### 10-7-4-1 Meter Procedure

Follow these steps to test the ground wire resistance.

- 1.) Turn the Voluson® 730Expert unit OFF.
- 2.) Connect one of the Ohmmeter probes to the tested AC wall outlet (Ground pin).
- 3.) Using the other Ohmmeter probe, touch the exposed metal part of the Voluson® 730Expert unit.
- 4.) Set the meter's **Function** switch to the **Resistance** position.
- 5.) Set the meter's **Polarity** switch to the **OFF** (center) position.
- 6.) Measure and record the ground wire resistance.

## 10-7-5 Chassis Leakage Current Test

### 10-7-5-1 Definition

This test measures the current that would flow in a grounded person who touched accessible metal parts of the bedside station if the ground wire should break. The test verifies the isolation of the power line from the chassis.

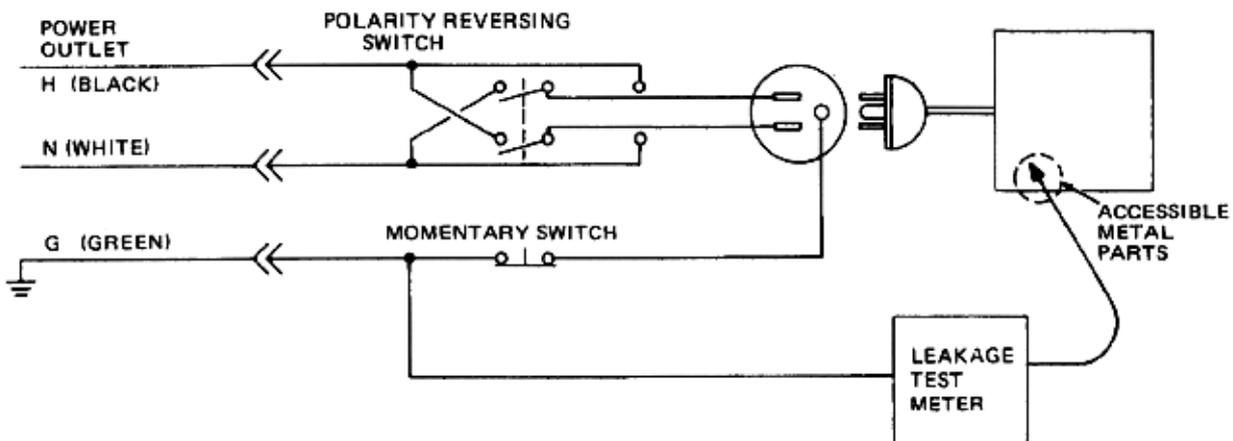
The meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit On and Off, with the power line polarity Normal and Reversed. Record the highest reading.

**⚠ DANGER Electric Shock Hazard.**  
When the meter's ground switch is OPEN, DO NOT touch the unit!

**⚠ CAUTION Equipment damage possibility. Never switch the Polarity and the status of Neutral when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the unit may be damaged.**

### 10-7-5-2 Generic Procedure

The test verifies the isolation of the power line from the chassis. The testing meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading of current.



**Figure 10-3 Set Up for Chassis Source Leakage Current, IEC 60601-1 Clause 19 - Continuous 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 10-11](#).

**10-7-5-3 Data Sheet for Chassis Source Leakage Current**

The test passes when all readings measure less than the value shown in [Table 10-11](#).  
 Record all data on the Ultrasound Inspection Certificate.

**Table 10-14 Typical Data Sheet for Chassis Source Leakage Current**

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Probe Connector	Test 2 Wheel	Test 3 CRT	Optional Test 4	Optional Test 5
Enter Name of tested peripheral here:							
ON	NORM	OPEN					
ON	NORM	CLOSED					
ON	REV	OPEN					
ON	REV	CLOSED					
OFF	NORM	OPEN					
OFF	NORM	CLOSED					
OFF	REV	OPEN					
OFF	REV	CLOSED					

**10-7-6 Isolated Patient Lead (Source) Leakage–Lead to Ground**

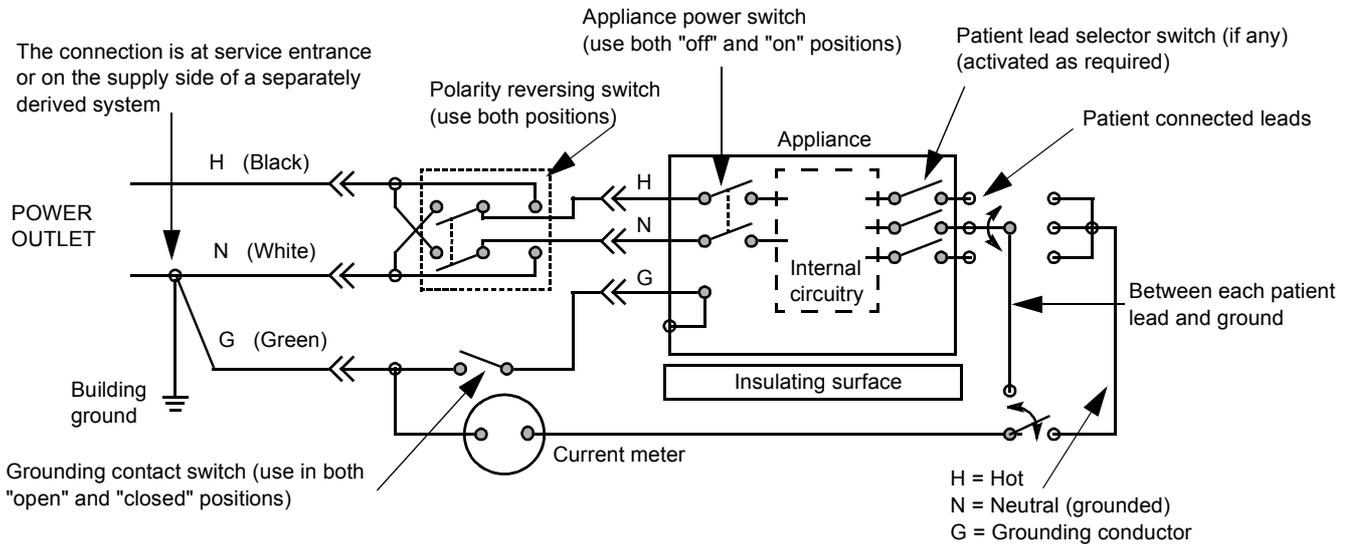
**10-7-6-1 Definition**

This test measures the current which would flow to ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface. Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the ultrasound console Off and On. For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

 **CAUTION** **Equipment damage possibility. Never switch the Polarity when the unit is powered ON. Be sure to turn the unit power OFF before switching the polarity using the POLARITY switch. Otherwise, the unit may be damaged.**

**10-7-6-2 Generic Procedure**

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the operating controls such as the lead switch should be operated to find the worst case condition.



**Figure 10-4 Test Circuit for Measuring Non-Isolated Patient Leads**

**Table 10-15 Testing Power Conditions**

ECG Power	Meter's Polarity Switch	Meter's Neutral Switch
ON	NORM	CLOSED
ON	NORM	OPEN
ON	REVERSE	CLOSED
ON	REVERSE	OPEN
OFF	NORM	CLOSED
OFF	NORM	OPEN
OFF	REVERSE	CLOSED
OFF	REVERSE	OPEN

**10-7-7 Isolated Patient Lead (Source) Leakage—Lead to Lead**

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-LEAD position. Select and test each of the five ECG lead positions (except ALL) on the LEAD selector, testing each to the power condition combinations found in the table. Record the highest leakage current measured.

### 10-7-8 Isolated Patient Lead (Sink) Leakage-Isolation Test

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-ISO. Select the ALL position on the lead selector. Depress the rocker switch to ISO TEST to test lead isolation.



**CAUTION** Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.

**NOTE:** *It is not necessary to test each lead individually or power condition combinations as required in previous tests.*

**10-7-8-1 Data Sheet for ECG Leakage Current**

The test passes when all readings measure less than the value shown in the table below.  
 Record all data on the Ultrasound Inspection Certificate.

**Table 10-16 Maximum Allowance Limit for ECG Leakage Current**

	AC Power Source	Maximum Allowance Limit	
		GROUND OPEN	GROUND CLOSED
Patient Lead to Ground Leakage Current Test and Patient Lead to Lead Leakage Current Test	115V	10uA	10uA
	220/240V	500uA	10uA

**Table 10-17 Maximum Allowance Limit for ECG Leakage Current**

	AC Power Source	Maximum Allowance Limit
Patient Lead Isolation Current Test	115V	20uA
	220/240V	5mA

**Table 10-18 Typical Data Sheet for ECG Leakage Current**

ECG Power	Tester Polarity Switch	Tester Ground Switch	Tester Lead Selector				
			RL	RA	LA	LL	C
ON	NORM	CLOSED					
ON	REVERSE	CLOSED					
ON	NORM	OPEN					
ON	REVERSE	OPEN					
OFF	NORM	CLOSED					
OFF	REVERSE	CLOSED					
OFF	NORM	OPEN					
OFF	REVERSE	OPEN					

## 10-7-9 Probe Leakage Current Test

### 10-7-9-1 Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

### 10-7-9-2 Generic Procedure

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the probe must be active to find the worst case condition.

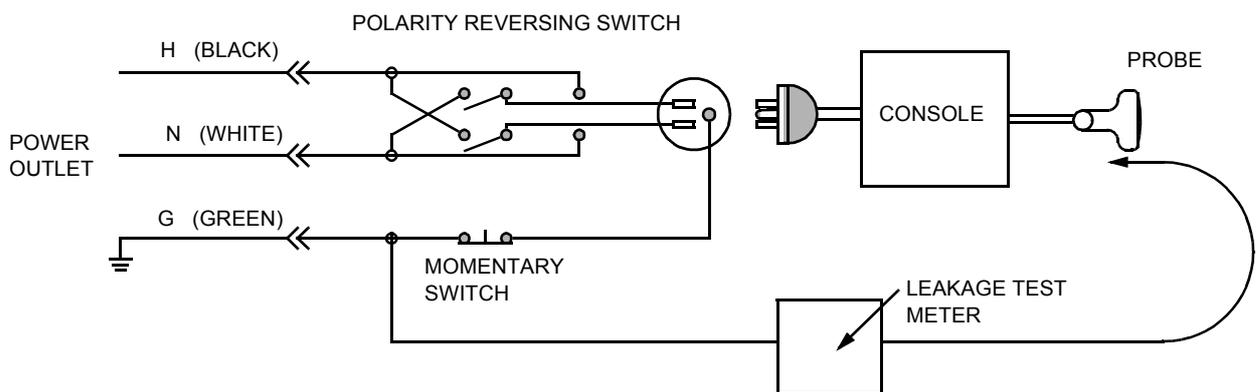
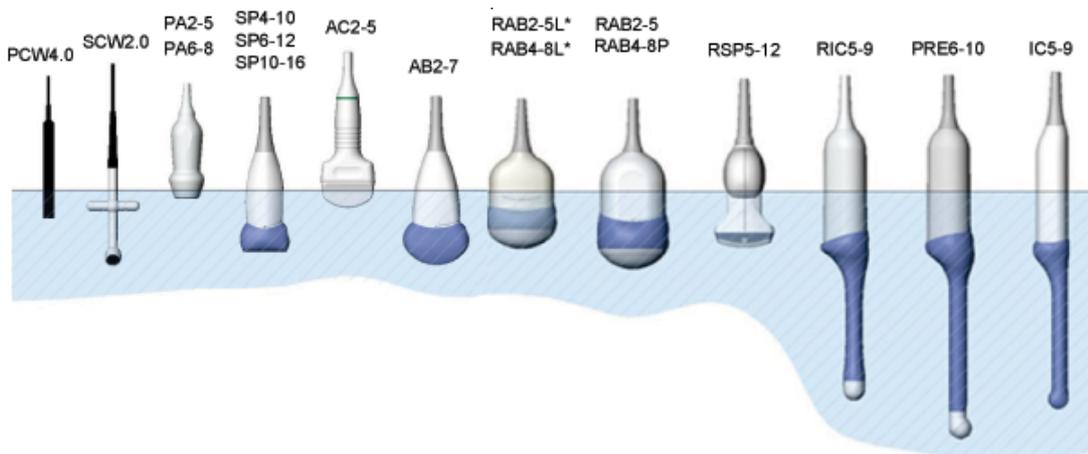


Figure 10-5 Set Up for Probe Leakage Current

**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.



10-7-9-3 No Meter Probe Adapter Procedure

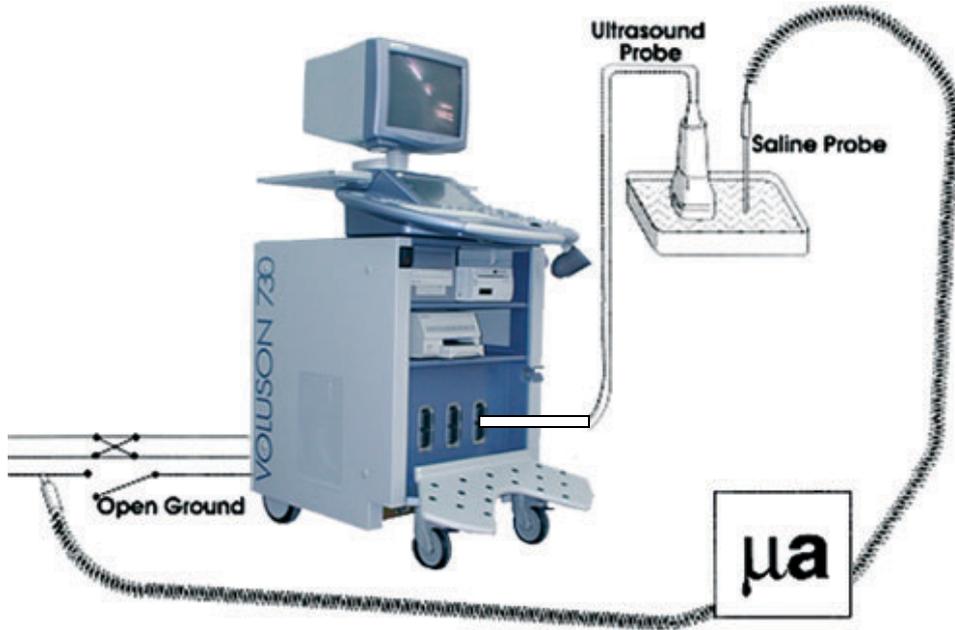
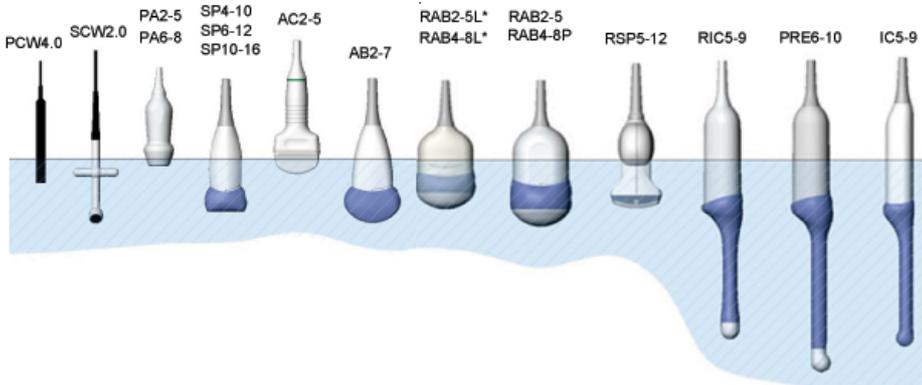


Figure 10-6 Check Without Probe Adapter

Follow these steps to test each transducer for leakage current.

- 1.) Turn the Voluson® 730Expert unit OFF.
- 2.) Plug the unit into the test meter, and the meter into the tested AC wall outlet.
- 3.) Plug the external probe into the meter's "EXTERNAL" connector.
- 4.) Set the meter's "FUNCTION" switch to EXTERNAL position.
- 5.) Connect the probe for test with the connector of the console.
- 6.) Add the saline probe and the imaging area of the probe into the saline bath.

**CAUTION** Make sure not to immerse the probe into the liquid beyond the immersion level.



- 7.) Have unit power ON for the first part; turn it OFF for the second half.
- 8.) Depress the ISO TEST rocker switch and record the highest current reading.
- 9.) Follow the test conditions described in [Table 10-19](#) for every transducer.
- 10.) Keep a record of the results with other hard copies of Preventive Maintenance (PM) data or corrective actions taken.

**10-7-9-4 Data Sheet for Transducer Source Leakage Current**

The test passes when all readings measure less than values shown in [Table 10-12](#) and [Table 10-13](#). Record all data on the Ultrasound Inspection Certificate (see: [page 10-25](#)).

 **CAUTION** When the units power is ON, never switch the Polarity and the status of Neutral. Be sure to turn OFF power to the unit before switching them, using the POLARITY switch and/or the NEUTRAL switch. *Failure to comply with this warning may cause damage to the unit!*

**Table 10-19 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	

## Section 10-8 When There's Too Much Leakage Current...

### 10-8-1 Chassis Fails

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work around, check the other outlets to see if they could be used instead.

**NOTE:** *No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.*

### 10-8-2 Probe Fails

- Test the probe in another connector to isolate if the fault lies with the probe or the scanner.

**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.*

- Test the probe in another connector to isolate if the fault lies with the probe or the scanner.  
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.

### 10-8-3 Peripheral Fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

#### 10-8-3-1 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.

### 10-8-4 New Unit

If the leakage current measurement tests fail on a new unit and if situation can not be corrected, submit a Safety Failure Report to document the system problem. Remove unit from operation.

### 10-8-5 ECG Fails

Inspect cables for damage or poor connections.

**ULTRASOUND INSPECTION CERTIFICATE**

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/Contract/HBS
<b>System Type</b>		Model Number:	Serial Number:	Manufacture Date:
Probe 1:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 2:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 3:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 4:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 5:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 6:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 7:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 8:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 9:	Frequency:	Scan Format*:	Model Number:	Serial Number:

\* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

**FUNCTIONAL CHECKS**

**PHYSICAL INSPECTION AND CLEANING**

Functional Check (if applicable)	OK? or N/A	Physical Inspection and Cleaning (if applicable)	Inspect	Clean
B-Mode Function		Console		
M-Mode Function		Monitor		
Doppler Modes Functions		Touch Panel		
Color Modes Functions		Air Filter		
3D-Mode Function		Probe Holders		
Applicable Software Options		External I/O		
Applicable Hardware Options		Wheels, Brakes & Swivel Locks		
Control Panel		Cables and Connectors		
Monitor		Approved Peripherals (VCR, CD-RW, MOD, Printers)		
Touch Panel				
Measurement Accuracy				

**COMMENTS:**

---



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**ELECTRICAL SAFETY**

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct ground & wiring config.)				
System Ground Continuity				
Chassis Source Leakage Current - Probe				
Chassis Source Leakage Current - Wheel				
Chassis Source Leakage Current - CRT				
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				
Peripheral 2 Ground Continuity				
Peripheral 3 Leakage Current				
Peripheral 3 Ground Continuity				

**PROBES**

Probe Number (from previous page)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				
Probe 4:				
Probe 5:				
Probe 6:				
Probe 7:				
Probe 8:				
Probe 9:				

Final Check. All system covers are in place. System scans with all probes as expected.

Accepted by: \_\_\_\_\_

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