



**GE Medical Systems  
Kretz Ultrasound**

# **Technical Publication**

**Direction KTI105947**

**Revision 1**

## **GE Medical Systems - Kretztechnik Voluson® 730Pro / 730ProV (BT'04) Service Manual**

- *Voluson® 730Pro / 730ProV systems with Serial number A31501 -*
- *Voluson® 730Pro / 730ProV systems with Software version SW 4.0.0 (or higher)*
- *Voluson® 730Pro / 730ProV systems that were upgraded to BT'04*

**CE 0123**

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## Important Precautions

- 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.

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- CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.
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- DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
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- VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

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

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

**ATENÇÃO**

- 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.

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このサービスマニュアルには英語版しかありません。

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## OMISSIONS & ERRORS

If there are any omissions, errors or suggestions for improving this documentation, please contact the GE Healthcare Global Documentation Group with specific information listing the system type, manual title, part number, revision number, page number and suggestion details.

Mail the information to: Service Documentation, 4855 W. Electric Ave (EA-53), Milwaukee, WI 53219.

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

## Revision History

Revision	Date	Reason for change
1	September 30, 2004	Initial Release (from Software Version 4.0.x onwards)

## List of Effected Pages

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	1	Chapter 2 - Pre-Installation pages 2-1 to 2-10	1	Chapter 7 - Diagnostics/Troubleshooting pages 7-1 to 7-30	1
Important Precautions pages i to iv	1	Chapter 3 - Installation pages 3-1 to 3-52	1	Chapter 8 - Replacement Procedures pages 8-1 to 8-22	1
Rev History/LOEP pages v to vi	1	Chapter 4 - Functional Checks pages 4-1 to 4-46	1	Chapter 9 - Replacement Parts pages 9-1 to 9-34	1
Table of Contents pages vii to xxii	1	Chapter 5 - Theory pages 5-1 to 5-56	1	Chapter 10 - Care & Maintenance pages 10-1 to 10-26	1
Chapter 1 - Introduction pages 1-1 to 1-12	1	Chapter 6 - Service Adjustments pages 6-1 to 6-4	1	Index pages I to IV	1
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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® 730Pro / 730ProV 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
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1-3	Safety Considerations	1-7
1-4	EMC, EMI, and ESD	1-10
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#### 1-1-2 Purpose of Service Manual

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

- 1.) **Chapter 1 - Introduction:** Contains a content summary and warnings.
- 2.) **Chapter 2 - Pre-Installation:** Contains pre-installation requirements for the Voluson® 730Pro / 730ProV.
- 3.) **Chapter 3 - Installation:** 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® 730Pro / 730ProV.
- 7.) **Chapter 7 - Diagnostics/Troubleshooting:** Provides procedures for running diagnostic or related routines for the Voluson® 730Pro / 730ProV.
- 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® 730Pro / 730ProV.
- 10.) **Chapter 10 - Care & Maintenance:** Provides periodic maintenance procedures for the Voluson® 730Pro / 730ProV.

### 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 Models Covered by this Manual

Table 1-2 Voluson® 730Pro / 730ProV Model Designations

Part Number	Description
H48651BA	Voluson® 730Pro / 730ProV (BT'04) Console 230V/50Hz
H48651BB	Voluson® 730Pro / 730ProV (BT'04) Console 115V USA
H48651BC	Voluson® 730Pro / 730ProV (BT'04) Console 115V
H48651BD	Voluson® 730Pro / 730ProV (BT'04) Console 100V JAPAN
H48651BE	Voluson® 730Pro / 730ProV (BT'04) Console 230V KOREA
H48651BF	Voluson® 730Pro / 730ProV (BT'04) Console 230V CHINA



#### NOTICE This manual applies to:

- Voluson® 730Pro / 730ProV systems with Serial number A31501 - (onwards),
- Voluson® 730Pro / 730ProV systems with Software version 4.0.x (or higher) installed, and/or
- Voluson® 730Pro / 730ProV systems that were upgraded to (BT'04)



#### NOTICE The Voluson® 730Pro V is a downgraded version of the Voluson® 730Pro.

That means not all options are available on the Voluson® 730Pro V  
(marked with \* in the sections of the Manuals).

The Voluson® 730Pro V is **only distinguished by the System type**, see: *Figure 7-1: System Setup - System Info page (e.g. V730 Pro)* on page 7-2; it has **NO own serial number!**

### 1-1-5 Purpose of Operator Manual(s)

The Operator Manual(s) should be fully read and understood before operating the Voluson® 730Pro / 730ProV 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** DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE INSTRUCTIONS ARE IGNORED.
  -  **WARNING** WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY AND PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.
  -  **CAUTION** Caution is used to indicate the presence of a hazard that will or can cause minor personal injury and property damage if instructions are ignored.
  -  **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
A stylized lightning bolt symbol.	Two interlocking gears.	The trefoil symbol.
LASER	HEAT	PINCH
A sunburst-like laser beam symbol with the text "LASER LIGHT" below it. <b>LASER LIGHT</b>	A triangle containing three wavy lines representing heat.	A hand being pinched by a pair of fingers.

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
A hand touching a metal surface with a diagonal slash through it.	A tag attached to a lockout device with the text "TAG & LOCKOUT".	A head profile wearing safety glasses with the text "EYE PROTECTION" below it.

### 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
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.	
	"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

Table 1-5 Product Icons (Continued)

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	"CAUTION - Dangerous voltage" (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Rear side of Monitor
	"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 side of Power Supply
	"Equipotentiality" Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Rear side of Power Supply

## 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® 730Pro / 730ProV Training are authorized to service the equipment.

### 1-3-3 Mechanical Safety

-  **WARNING** **WHEN THE UNIT IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE, USE EXTREME CAUTION SINCE IT MAY BECOME UNSTABLE AND 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® 730Pro / 730ProV 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:**  
Be sure the pathway is clear.  
Use slow, careful motions.  
Use two people when moving on inclines or lifting more than 16 kg (35 lbs).



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

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

- Secure the unit in an upright position.
- Lock the wheels (brake)
- DO NOT use the Control Panel as an anchor point.
- Place the probes in their carrying case.
- Eject any Magneto Optical disk or CD from their drive.

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

### 1-3-4 Electrical Safety

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.

### 1-3-5 Labels Locations

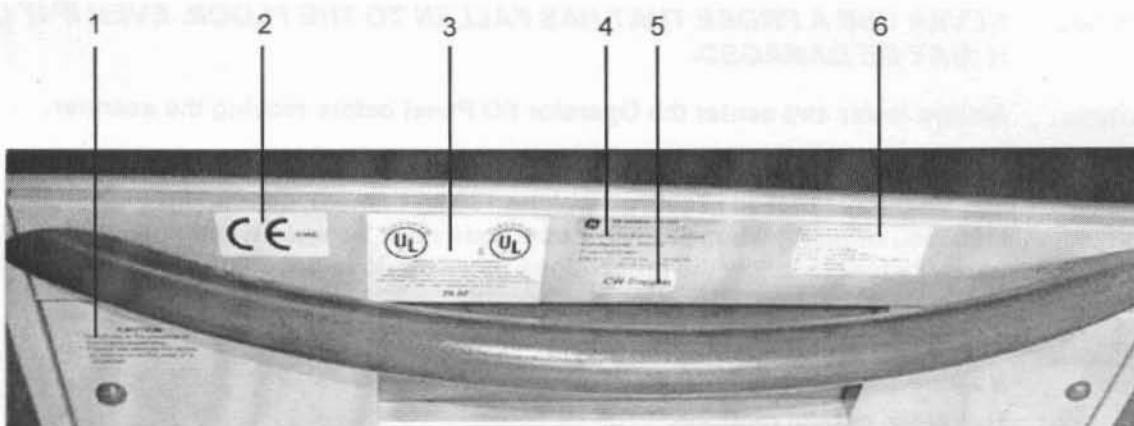


Figure 1-1 Labeling

- 1.) Caution Label
- 2.) CE-Label
- 3.) UL-Label
- 4.) Identification plate
- 5.) CW-Doppler (only if the CW-Doppler option is installed)
- 6.) Homologation label (for Japan only)

### 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 by ensuring you are in total control of the electrical Mains plug.

### 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 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 EMC, EMI, and ESD

### 1-4-1 Electromagnetic Compatibility (EMC)

Electromagnetic compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due 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® 730Pro / 730ProV.

### 1-4-2 CE Compliance

The Voluson® 730Pro / 730ProV 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. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE EQUIPOTENTIALITY CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (TO THE RIGHT OF THE POWER CONNECTOR).**
- 2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.**

## 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

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

Location	Phone Number
USA/ Canada GE Medical Systems Ultrasound Service Engineering 4855 W. Electric Avenue Milwaukee, WI 53219	1-800-437-1171
Customer Answer Center	1-800-682-5327 1-262-524-5698 Fax: +1-414-647-4125
Latin America GE Medical Systems Ultrasound Service Engineering 4855 W. Electric Avenue Milwaukee, WI 53219	1-262-524-5300
Customer Answer Center	1-262-524-5698 Fax: +1-414-647-4125
Europe GE Medical Systems Kretztechnik GmbH & Co OHG Service Department - Ultrasound Tiefenbach 15 A-4871 Zipf Austria	Tel: +43 7683 3800-0 Fax: +43 7682 3800-47
Customer Answer Center	Tel: +33-13083-1300
Asia GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Plaza Singapore 169730	Tel: +65 6291-8528 +81 426-482950  Fax: +65 6272-7006

## 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

# Chapter 2

## Pre-Installation

### Section 2-1 Overview

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

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

**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

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

The cooling requirement for the Voluson® 730Pro / 730ProV is 3446 BTU/hr. This figure does not include cooling needed for lights, people, or other equipment in the room. 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 Medical Systems 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.

#### 2-2-2-1 Voluson® 730Pro / 730ProV Power Requirements

Table 2-3 Electrical Specifications for Voluson® 730Pro / 730ProV

Voltage	Tolerances	Current	Frequency
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%)

#### 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® 730Pro / 730ProV 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 Unit Power Plug

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

## 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® 730Pro / 730ProV complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.

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

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

- medical lasers,
- scanners,
- cauterizing guns,
- computers,
- monitors,
- fans,
- gel warmers,
- microwave ovens,
- light dimmers
- portable phones.

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

see Table 2-4 for EMI Prevention tips

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

EMI Rule	Details
Be aware of RF sources	Keep the unit at least 5 meters or 15 feet away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the unit	Poor grounding is the most likely reason a unit will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, RF gaskets, covers, 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.
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. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly 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 Scan Probe Environmental Requirements

Operation: Ambient temperature 18° to 30° C

Storage: -10° to 50° C

**NOTE:** Temperature in degrees C. Conversion to degrees F =  $^{\circ}\text{C}$  ( $9/5$ ) + 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® 730Pro / 730ProV. Attempts to move the unit considerable distances or on an incline by one person could result in injury or damage or both.



## 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 to verify that all needed steps have been taken. 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 Required Features

**NOTE:** *GE Medical Systems 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.*

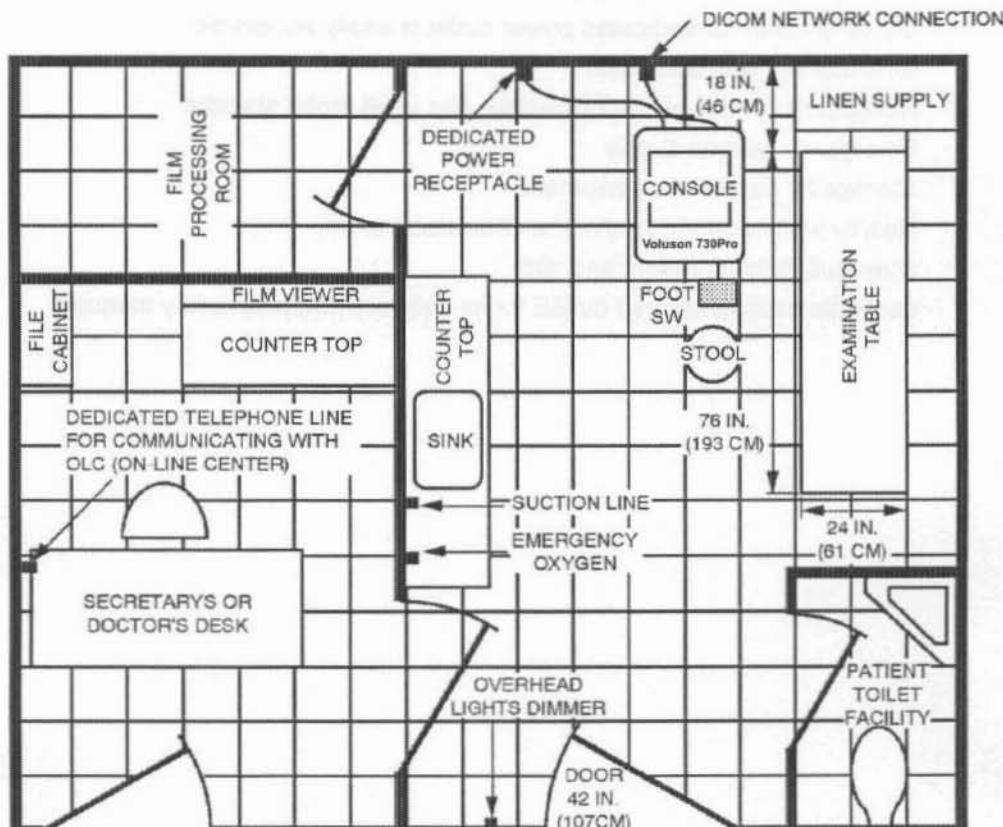
- Door opening is at least 76 cm (30 in) wide.
- Proposed location for unit is at least 0.3 m (1 ft.) from the wall for cooling
- Power outlet and place for any external peripheral are within 2 m (6.5 ft) of each other with peripheral within 1 m of the unit to connect cables.

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

### 2-3-3 Desirable Features

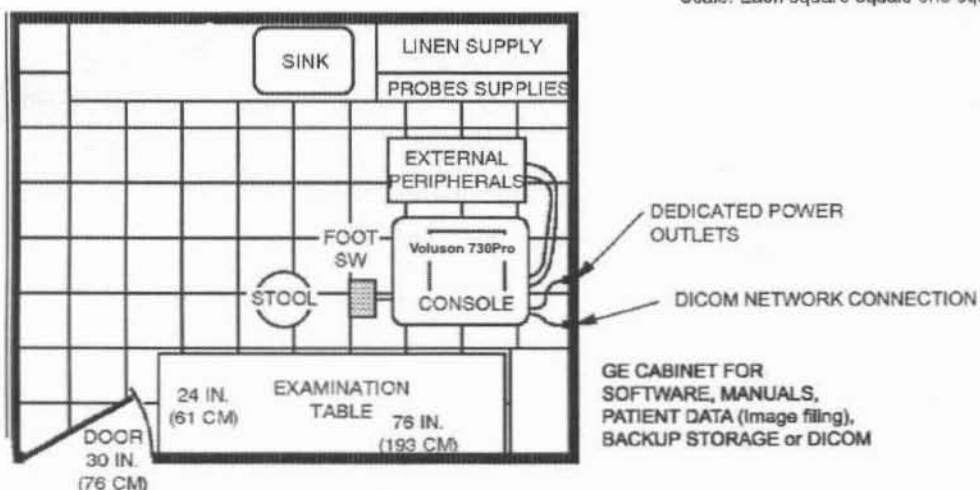
- Door is at least 90 cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Sink with hot and cold water
- Receptacle for bio-hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and equipment
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet ordered by GE for its software and proprietary manuals

## 2-3-4 Minimal Floor Plan Suggestion



A 14 by 17 foot Recommended Floor Plan

Scale: Each square equals one square foot



An 8 by 10 foot Minimal Floor Plan

Figure 2-1 Minimal Floor Plan

## 2-3-5 Networking Pre-installation Requirements

### 2-3-5-1 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.

### 2-3-5-2 DICOM Option Pre-installation Requirements

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

Information must include:

- A Station name, AE Title, IP address and Net Mask for the Voluson® 730Pro / 730ProV.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION. Only if necessary (e.g. for Internet access).

Installation see: Section 3-12 "Network IP Address Configuration" on page 3-49.

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# Chapter 3

## Installation

### Section 3-1 Overview

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

This chapter contains information needed to install the unit. Included are procedures to receive, unpack and configure the equipment.

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

Section	Description	Page Number
3-1	Overview	3-1
3-2	Installation Reminders	3-1
3-3	Receiving and Unpacking the Equipment	3-4
3-4	Preparing for Installation	3-6
3-5	Connection of Auxiliary Devices	3-7
3-6	Completing the Installation	3-20
3-7	Printer Installation	3-23
3-8	System Configuration	3-39
3-9	Available Probes	3-46
3-10	Software/Option Configuration	3-47
3-11	Connectivity Installation Worksheet	3-48
3-12	Network IP Address Configuration	3-49
3-13	Paperwork	3-51

### Section 3-2 Installation 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

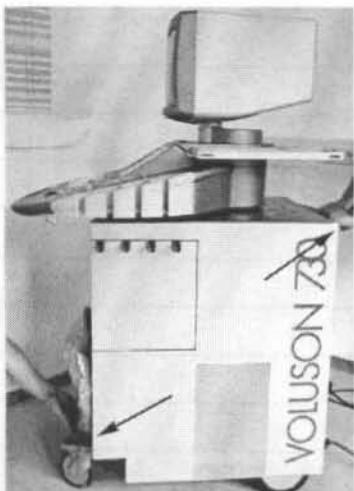
### 3-2-2 Installation Warnings

- 1.) Since the Voluson® 730Pro / 730ProV weighs approximately 136 kg (300 lb.) without options, preferably two people should unpack it. Two people are also preferable for installing any additional items in excess of 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.) After being transported, the unit may be very cold or hot. If this is the case, allow the unit to acclimate before you turn it on. It requires one hour for each 2.5°C increment its 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	2	4	6	8	10	12	14	16	18	20	



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 pulling, moving or lifting the system

#### 3-2-2-1 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.

#### 3-2-2-2 Operator I/O Panel Position

If weight is placed on the Operator I/O Panel in its extended position the console could tip over.

**WARNING** The system should NOT be moved with the Operator I/O Panel extended.  
Move the Operator I/O Panel to its centered and locked position.

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

### 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 a chance 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. System performance and cooling require this.
- CAUTION** **OPERATOR MANUAL(S)**  
The User Manual(s) should be fully read and understood before operating the Voluson® 730Pro / 730ProV and kept near the unit for quick reference.
- CAUTION** **ACOUSTIC OUTPUT HAZARD**  
Although the ultrasound energy transmitted from the Voluson® 730Pro / 730ProV probe is within FDA limits, avoid unnecessary exposure.  
Ultrasound energy can produce heat and mechanical damage.



#### ENVIRONMENTAL STORAGE AND SHIPPING CONDITIONS

-10°C to +40°C  
+14°F to +104°F

max. 90% RH no condensation  
700 to 1060 hPa

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® 730Pro / 730ProV.

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!

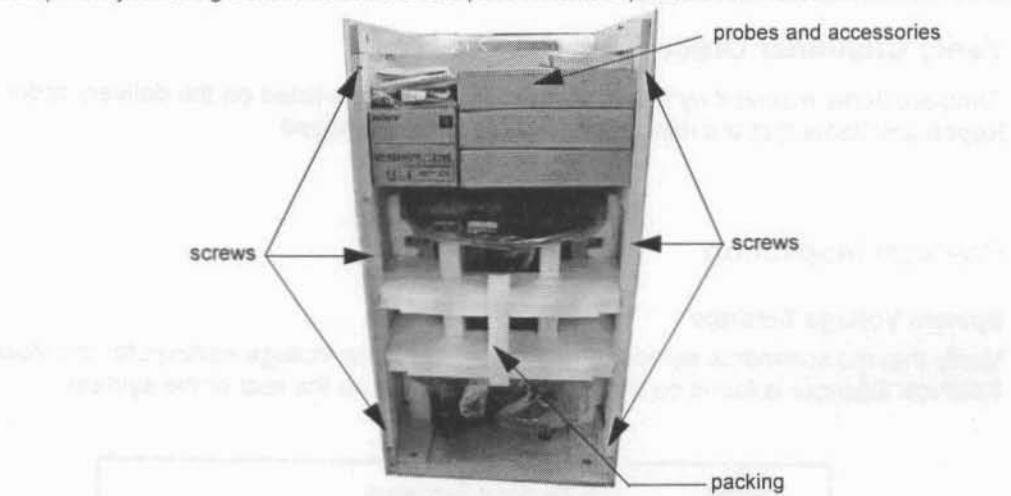
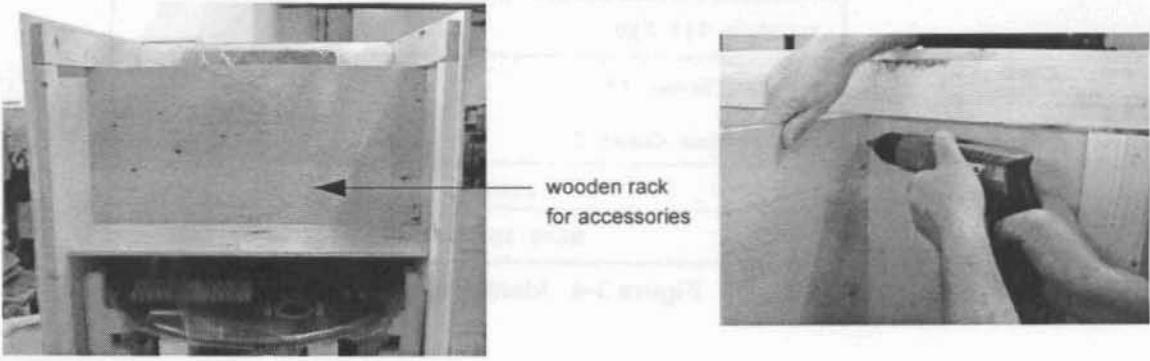
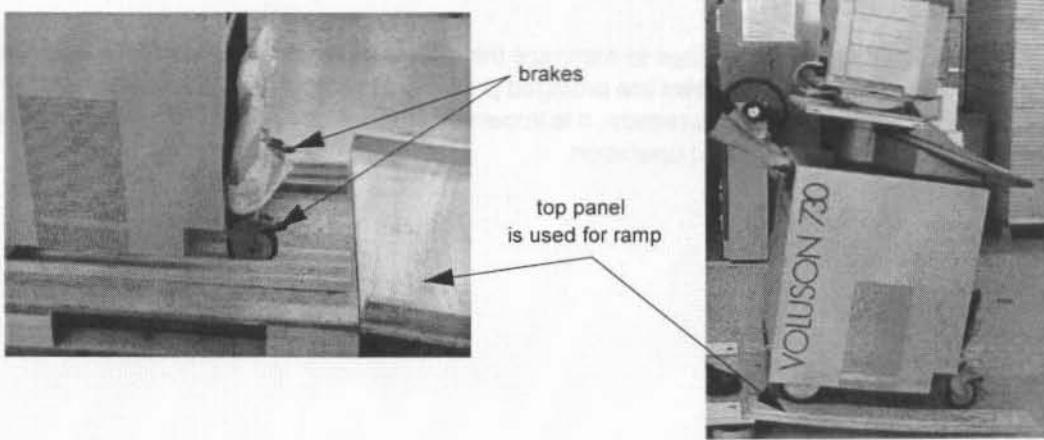
Unpack the devices such a way that packaging can be reused.

A drill with size 20 torx bit and/or a Phillips 2 screwdriver is 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>  

**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> 
3.	<p>Loosen all screws to remove the wooden rack for accessories as well as the left, right and back panel.</p> 
4.	<p>Carefully remove foam packing material and plastic bag from the ultrasound unit and monitor.</p>
<p><b>Caution:</b> Two people are needed in the next step due to the weight of the equipment.</p>	
5.	<p>Disengage the brakes and slowly move unit down the ramp (top panel).</p> 
<p><b>Note:</b> Packing crate and material should be stored for future use.</p>	

## Section 3-4 Preparing for Installation

### 3-4-1 Verify Customer Order

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

### 3-4-2 Physical Inspection

#### 3-4-2-1 System Voltage Settings

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

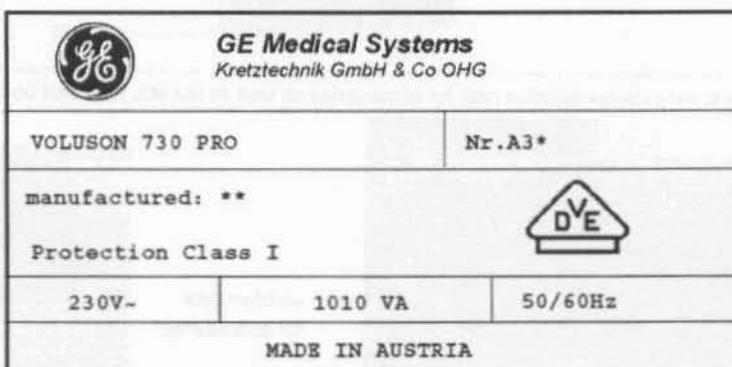


Figure 3-4 Identification Plate

**WARNING** **CONNECTING A Voluson® 730Pro / 730ProV 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 Electo-Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

## Section 3-5 Connection of Auxiliary Devices

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

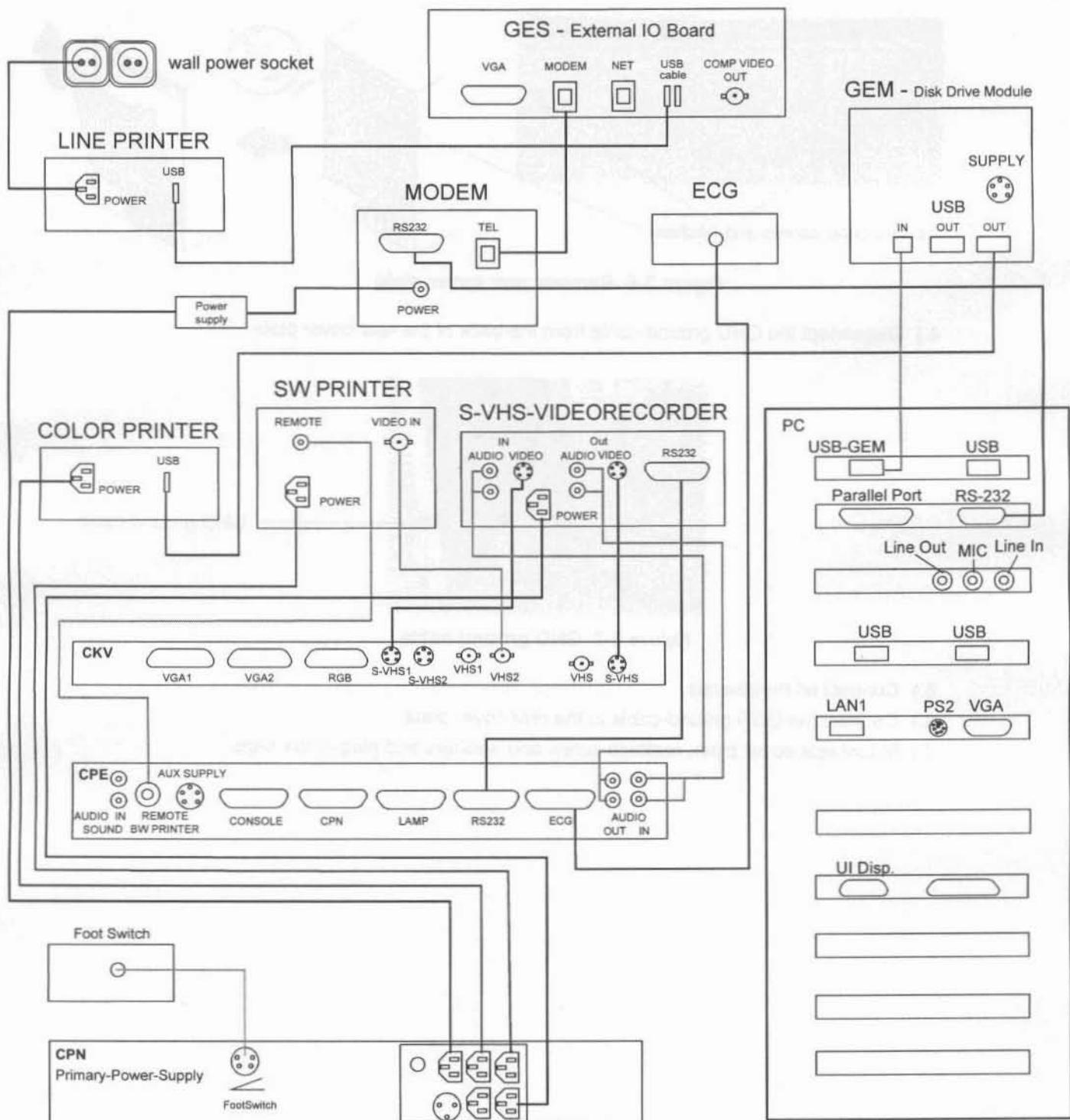


Figure 3-5 Connection of Peripherals

## Section 3-5 Connection of Auxiliary Devices (cont'd)

- 1.) Remove rear cover plate, see Figure 3-6.
- 2.) Carefully remove plastic caps using a knife and loosen screws and washers.
- 3.) When the cover is loose on top, pull the rear cover out and move upwards.

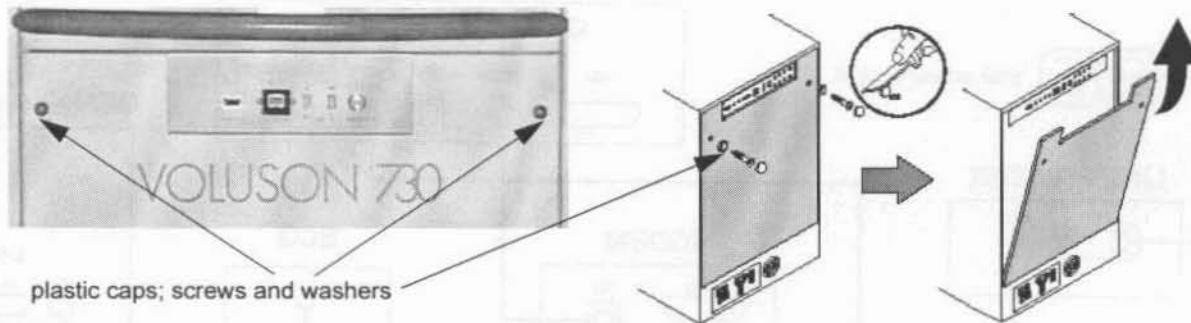


Figure 3-6 Remove rear cover plate

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

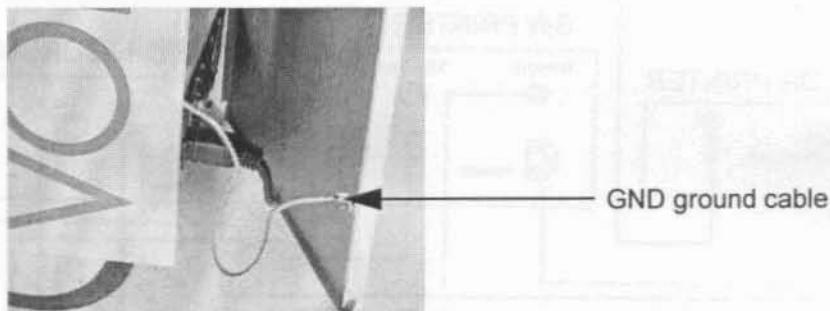


Figure 3-7 GND ground-cable

- 5.) Connect all Peripherals.
- 6.) Connect the GND ground-cable at the rear cover plate.
- 7.) Mount rear cover plate, reattach screw and plug-in the caps.

### 3-5-1 Monitor Connection

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

### 3-5-2 Foot Switch Connection

**NOTE:** To adjust the Foot Switch, refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.3, System Setup - Peripherals.

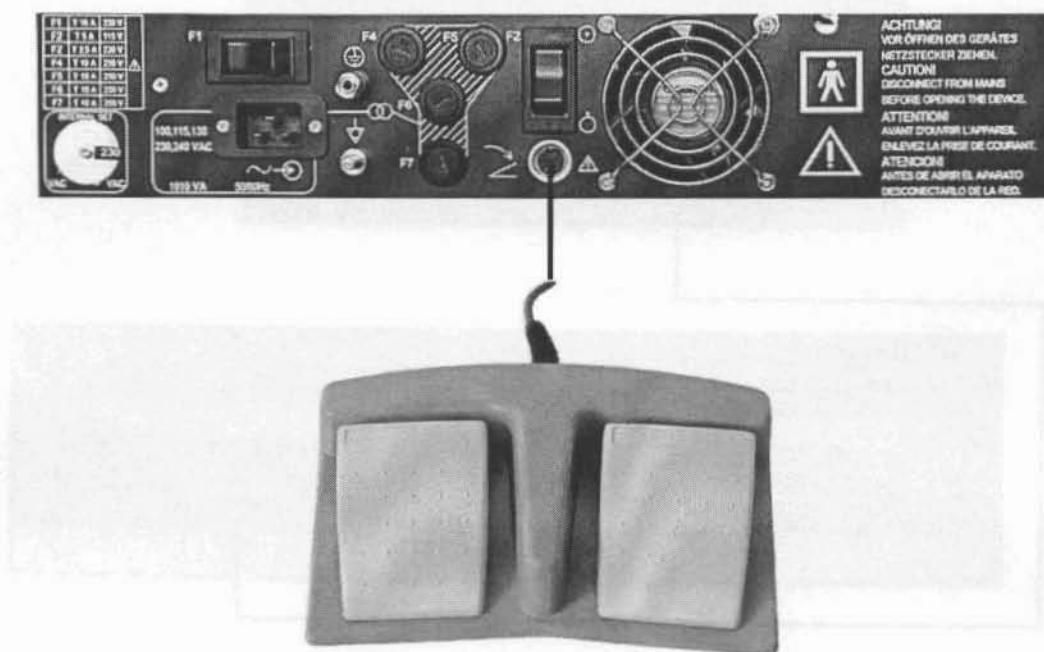


Figure 3-8 Foot Switch Connection Scheme

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

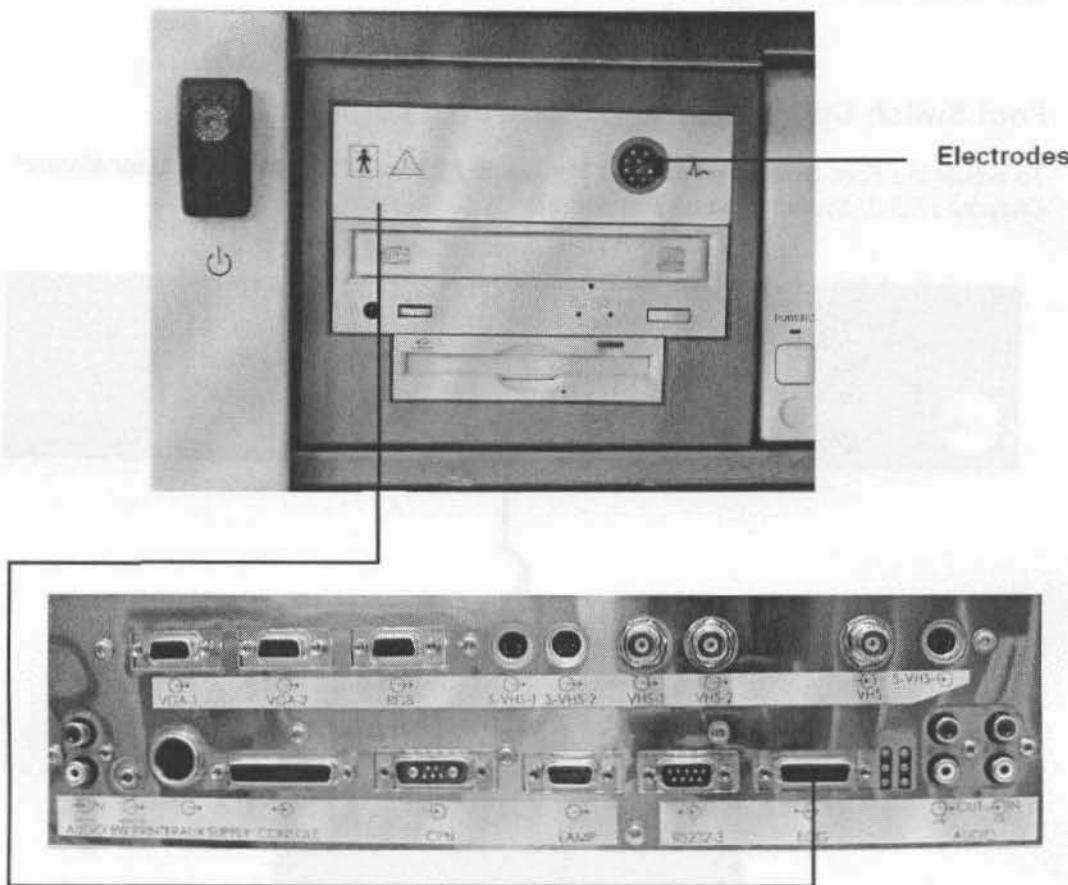


Figure 3-9 ECG Connection Scheme

### 3-5-4 Global Modem Connection

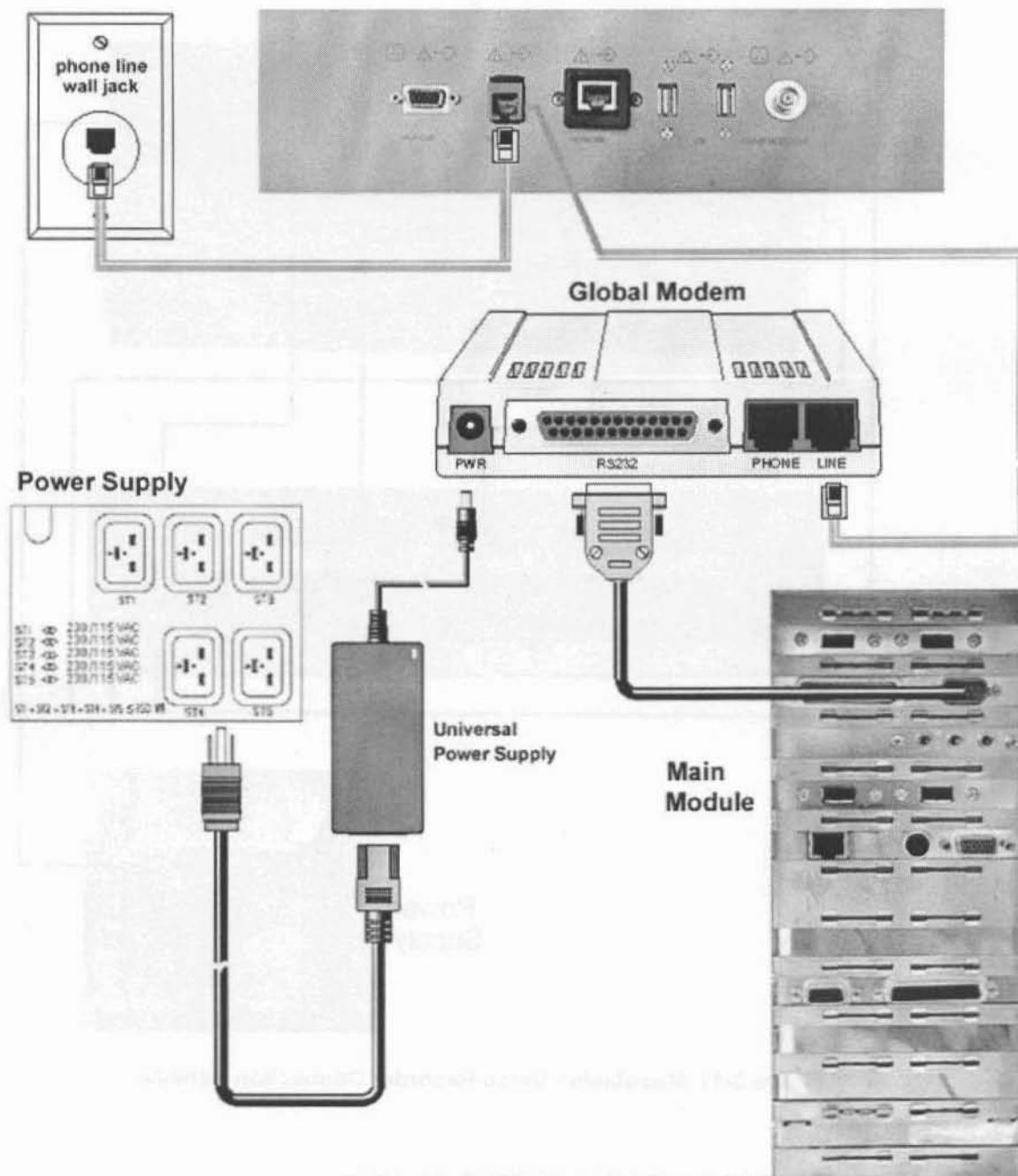


Figure 3-10 Global Modem Connection Scheme

**⚠ 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.

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

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

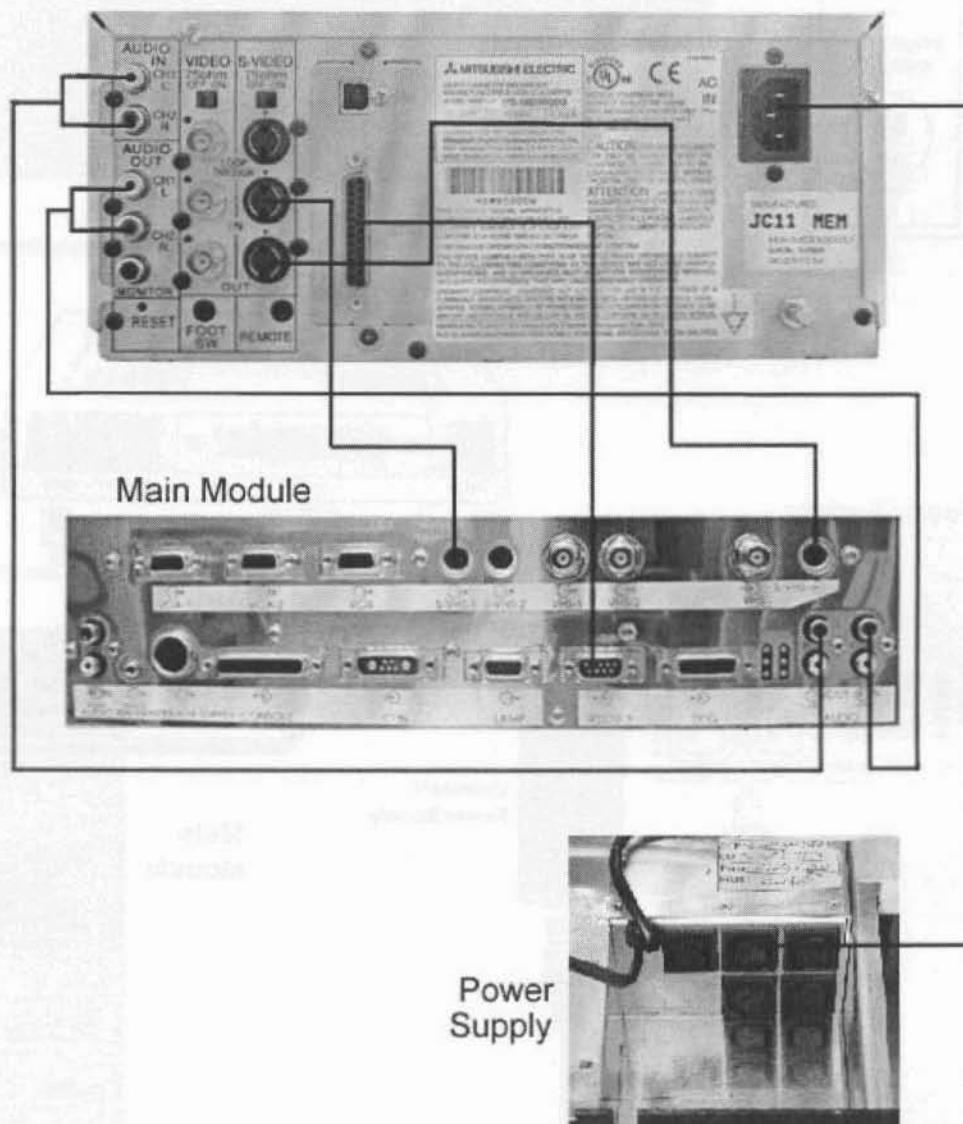


Figure 3-11 Mitsubishi - Video Recorder Connection Scheme



**NOTICE** Please use the proper connection set and remote cable.  
see: Section 9-12 "Optional Peripherals and Accessories" on page 9-24.



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

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

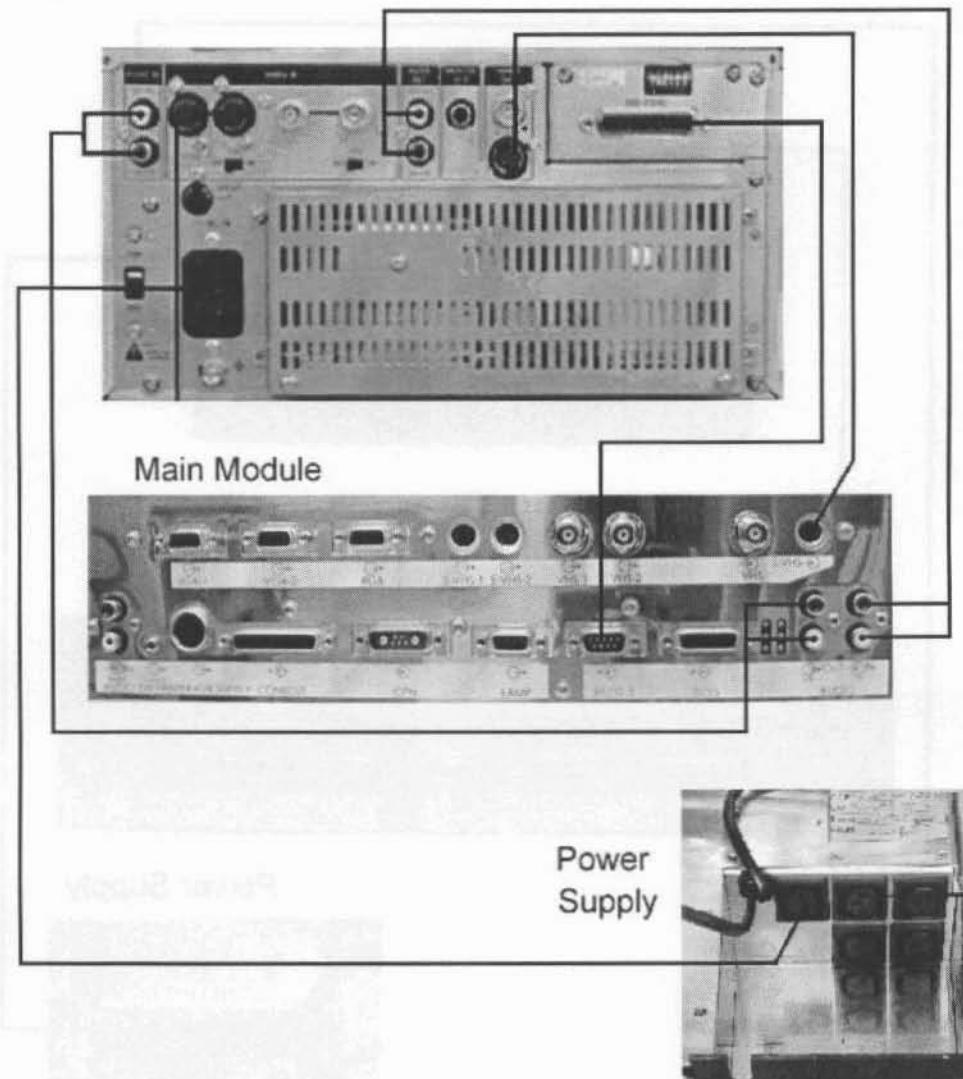
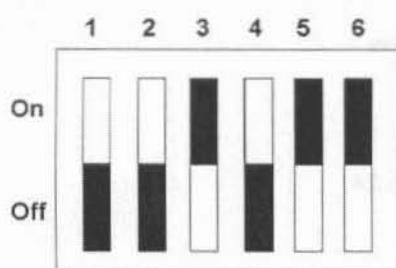


Figure 3-12 Video Recorder Connection Scheme



Set DIP Switches on back of the VCR as shown:

**Switch 1:** OFF-Audio is muted during fast playback

**Switch 2:** OFF-FF/REW mode is used during searches.

**Switch 3:** ON-VCR counter is reset upon cassette ejection.

**Switch 4:** OFF-The VCR can be controlled by the system.

**Switch 5 + 6:ON**-The Baud rate is set to 19200 bit/sec  
(must be the same as Voluson® 730Pro / 730ProV)

Figure 3-13 DIP Switches



**NOTICE** Please use the proper connection set and remote cable.  
see: Section 9-12 "Optional Peripherals and Accessories" on page 9-24.

3-5-6 B/W Video Printer Connection

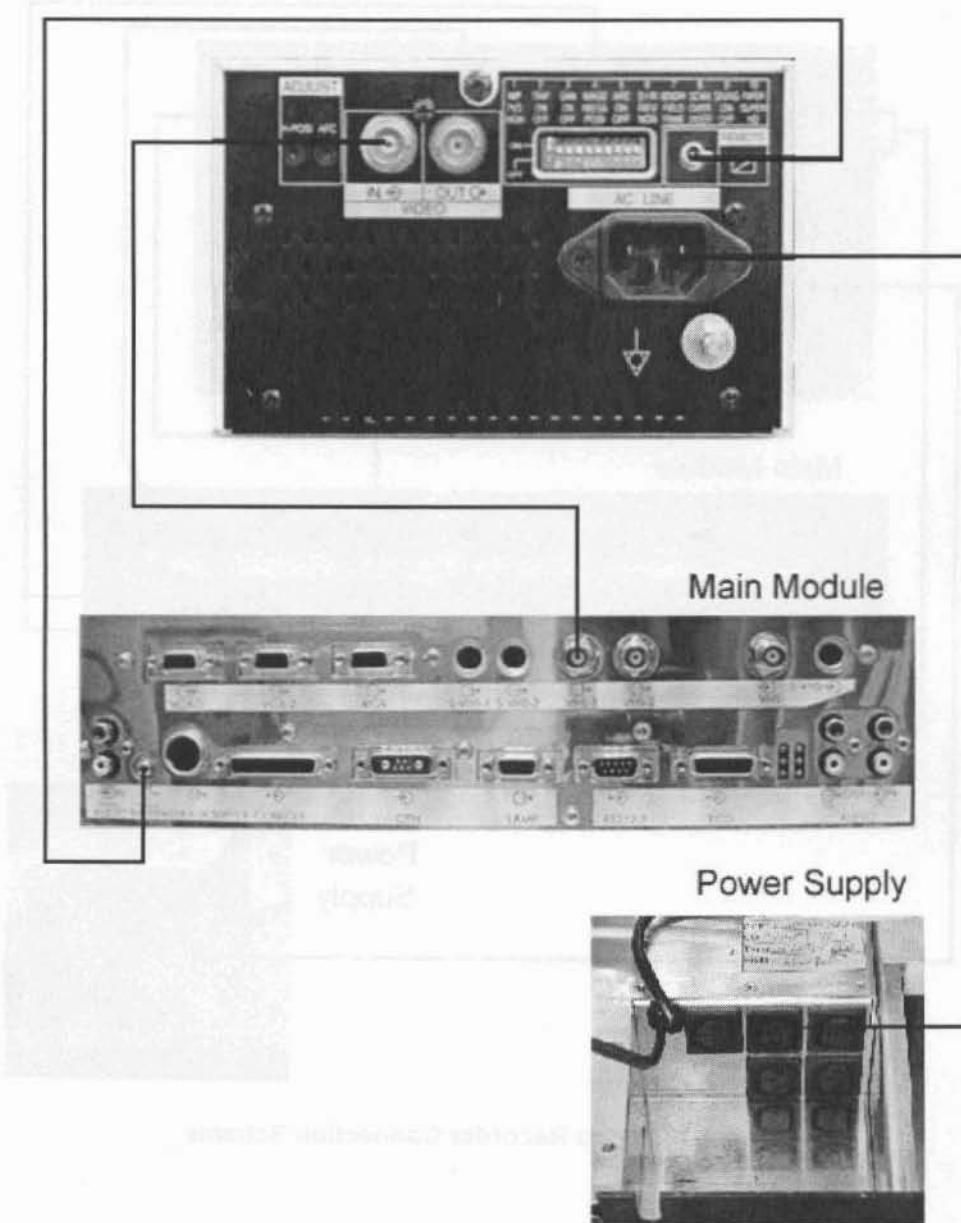


Figure 3-14 B/W Video Printer Connection Scheme

**NOTICE** Please use the proper connection set.  
see: Section 9-12 "Optional Peripherals and Accessories" on page 9-24.

### 3-5-7 Line Printer Connection

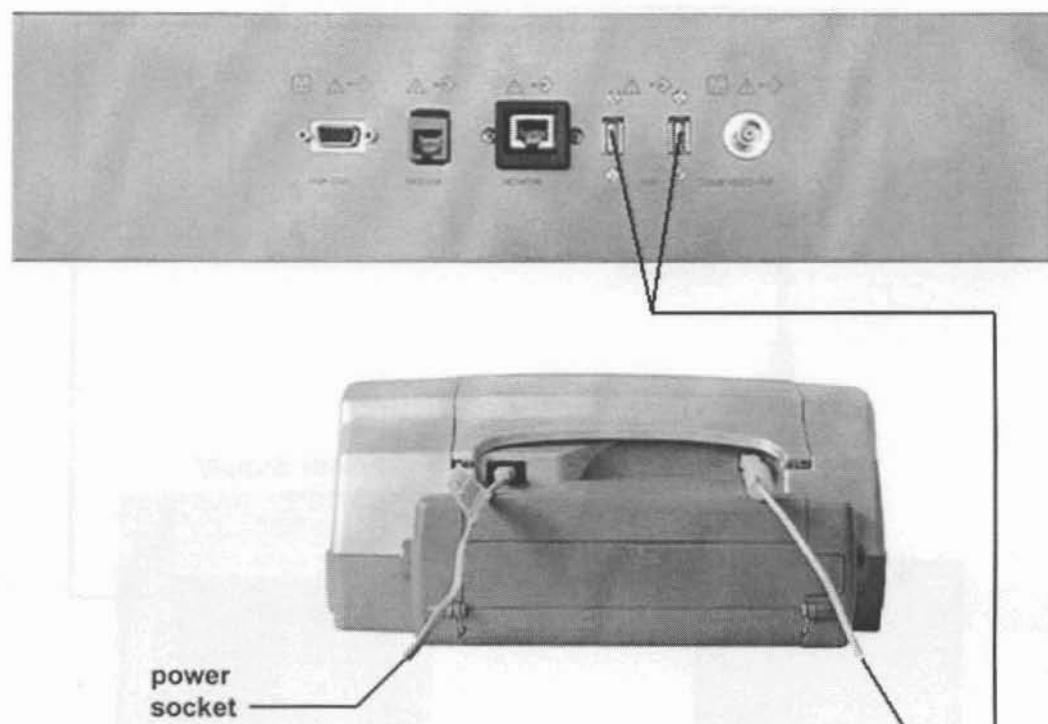


Figure 3-15 Line Printer Connection Scheme

- CAUTION** Please observe that the Line Printer (HP 990cxi or HP 995c) has to be located outside of the patient environment (acc. IEC 60601-1 / UL 2601-1).
- 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.

**NOTE:** For further installation instructions see:  
Section 3-7-1 "Installing Line Printer HP 990cxi or HP 995c" on page 3-24.

### 3-5-8 Digital Color Printer Connection

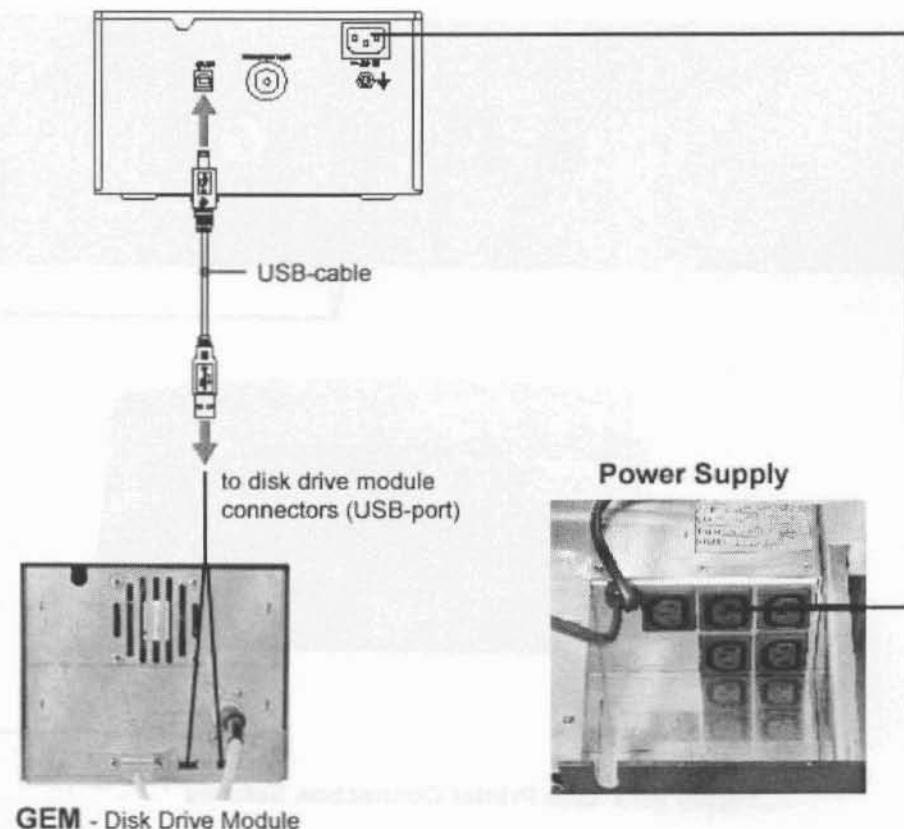


Figure 3-16 Digital Color Printer Connection Scheme

- 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® 730Pro / 730ProV 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 9-24.
- 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 3-26.

### 3-5-9 Bluetooth Printer Connection

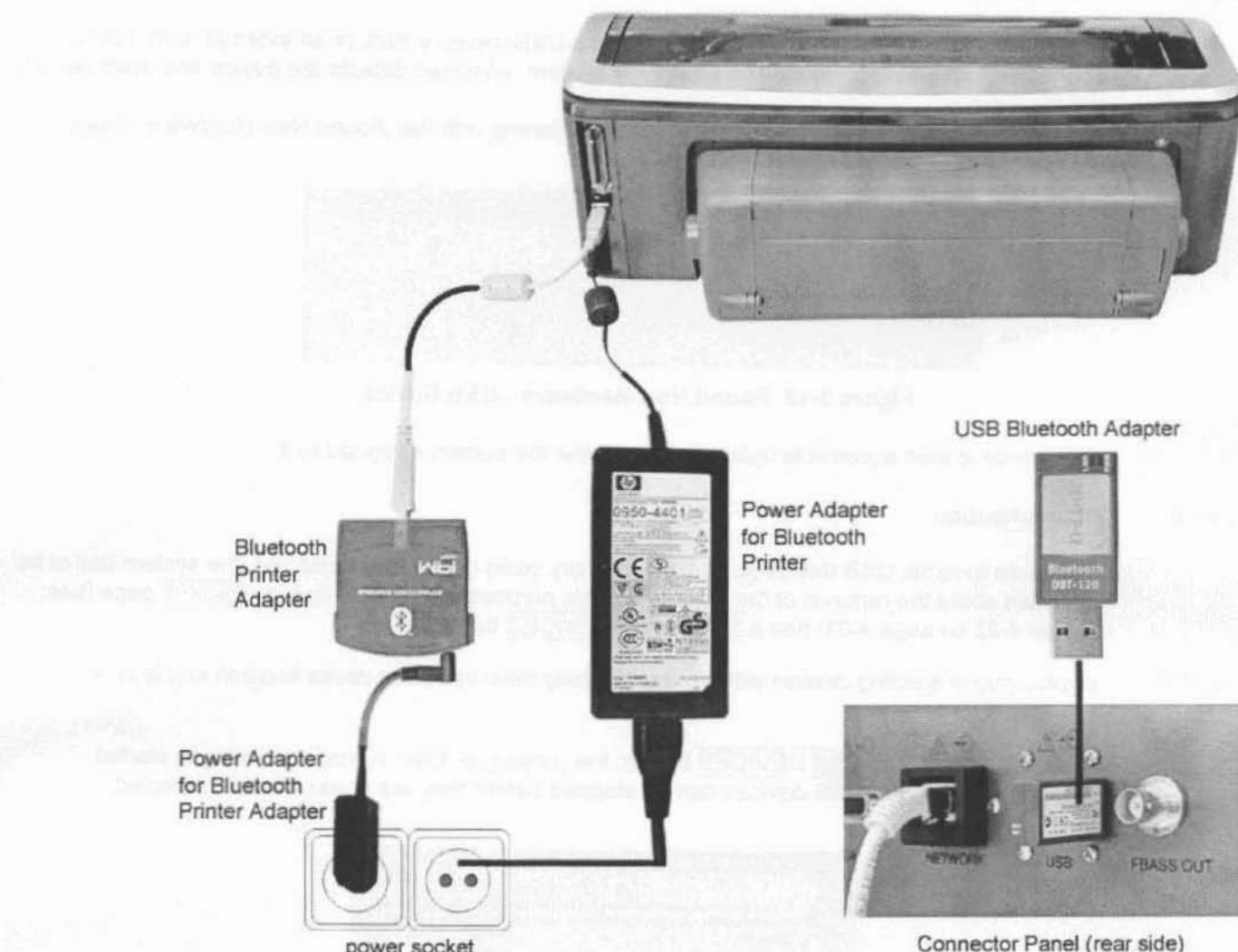


Figure 3-17 Bluetooth Printer Connection Scheme

- CAUTION** Please observe that the complete Bluetooth Printer Assembly has to be located outside of the patient environment (acc. IEC 60601-1 / UL 2601-1).
- CAUTION** The used printer (HP 5600 Series) 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: Section 9-12 "Optional Peripherals and Accessories" on page 9-24.

### 3-5-10 External USB-Devices

#### 3-5-10-1 Connection

When an external USB-storage device (such as a USB-memory stick or an external hard disk) is connected to the Voluson® 730Pro / 730ProV 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.

#### 3-5-10-2 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 4-31](#)) has a STOP USB DEVICES button.

**NOTE:** *Unplugging or ejecting devices without first stopping them can often cause to crash and lose 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

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:).

### 3-5-10-2 Disconnection (cont'd)

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.



**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!*



**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 Installation

### 3-6-1 Power On / Boot Up

#### 3-6-1-1 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 only** - Switch ON the Circuit Breaker at the rear of the system.

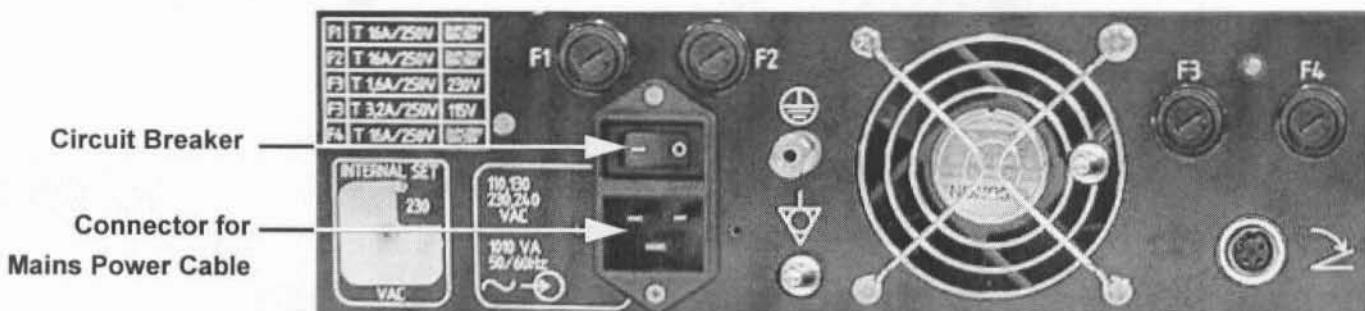


Figure 3-22 Circuit Breaker at rear of system with CPN80 installed

**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.

#### 3-6-1-2 Back-end Processor Boot Up

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

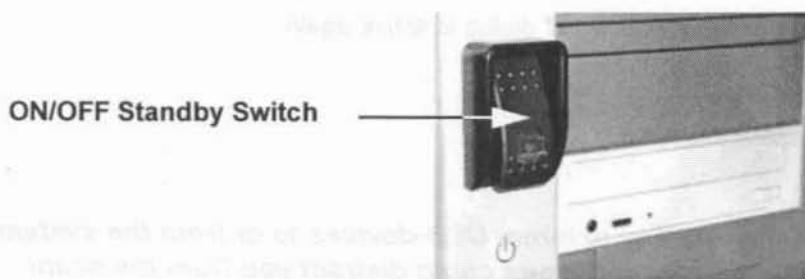


Figure 3-23 ON/OFF Standby Switch

When the **ON/OFF Standby** switch left below the Control Panel is pressed once, the System (including the Back-end Processor) starts and the software code is distributed to initiate the scanner. Boot up time is about 2 minutes.

**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.)

### 3-6-2 Power Off/ Shutdown

**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.

#### 3-6-2-1 Back-end Processor Power Down

- 1.) Press the ON/OFF Standby switch left below the Control Panel; see: Figure 3-23.

#### 3-6-2-2 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.

- 3.) Disconnection of the Mains Power Cable is necessary. For example: Repairing the scanner.  
Unscrew the 2 screws and remove the pull-out protection to disconnect the cable from the system, or unplug the cable from the wall socket.

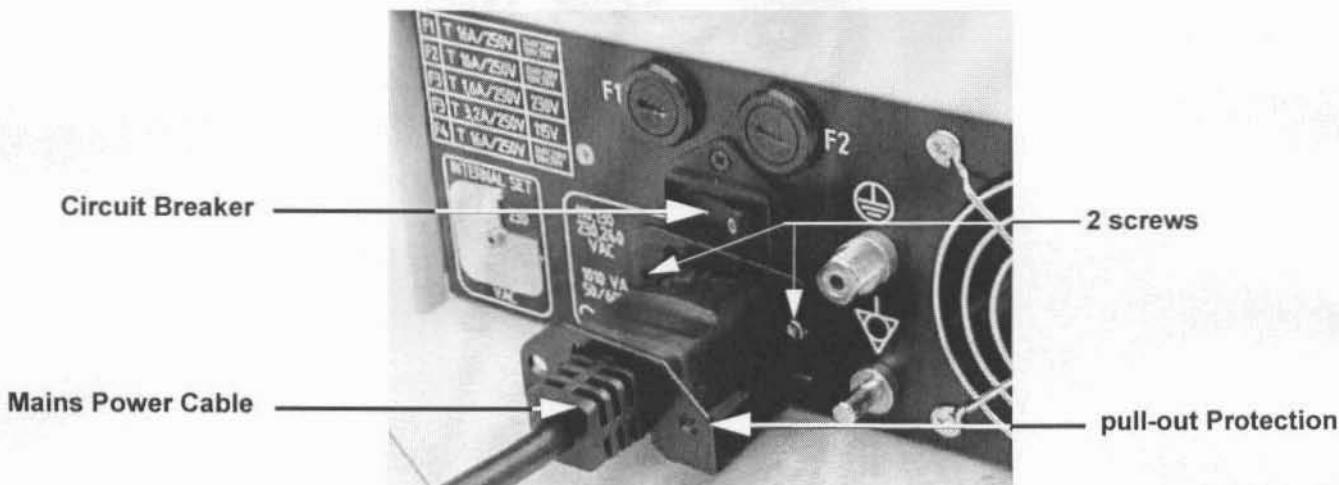


Figure 3-24 Circuit Breaker, Protection and Power Cable on back of Voluson® 730Pro / 730ProV

- 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.) Open the right-hand side door, remove the probe cable from the cable holder and close the door.
- 7.) Turn the probe locking handle counterclockwise. Pull the connector straight out of the probe port.



**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).

### 3-6-3 Transducer Connection

**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.

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

- 1.) Ensure that the transducer twist lock lever is at horizontal position.
- 2.) Insert the transducer connector on the receptacle guide pin until it touches the receptacle mating surface.
- 3.) 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.
- 4.) Open the right-hand side door, lay the cable into the intended cable holder and close the door.

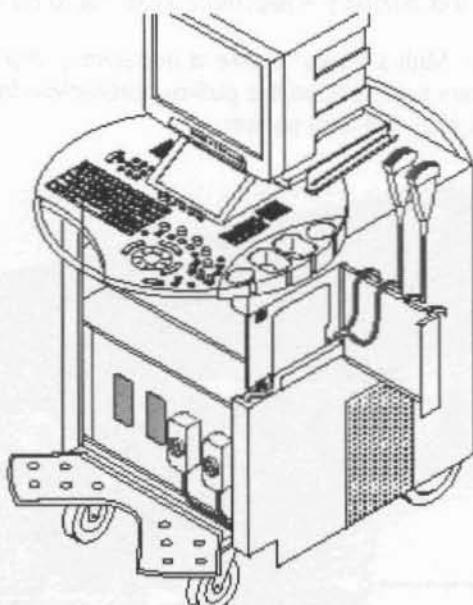


Figure 3-25 Transducer Connection



**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.

## Section 3-7 Printer Installation

**NOTE:** For Connection schemes refer to Chapter 21 in the Basic User Manual of Voluson® 730Pro / 730ProV or see: Figure 3-5 on page 3-7.

For further installation instructions see:

- Section 3-7-1 "Installing Line Printer HP 990cxi or HP 995c" on page 3-24.
- Section 3-7-2 "Installing Digital Color Printer Sony UP-D21MD or UP-D23MD" on page 3-26.
- Section 3-7-3 "Printer Installation manually" on page 3-28.
- Section 3-7-4 "Adjustment of Printer Settings" on page 3-33.

**CAUTION** The Bluetooth Printer Connection Set as well as the color printer HP 5600 Series 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 3-6-2 on page 3-21.
- 2.) Connect the printer as described on page 3-8 and reinstall the rear cover plate.

**NOTE:** For connection schemes refer to Section 3-5-7 on page 3-15 or see: Figure 3-5 on page 3-7.

**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 990cxi or HP 995c printer software/driver

Perform the following steps if this printer was never installed on the Voluson® 730Pro / 730ProV!

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

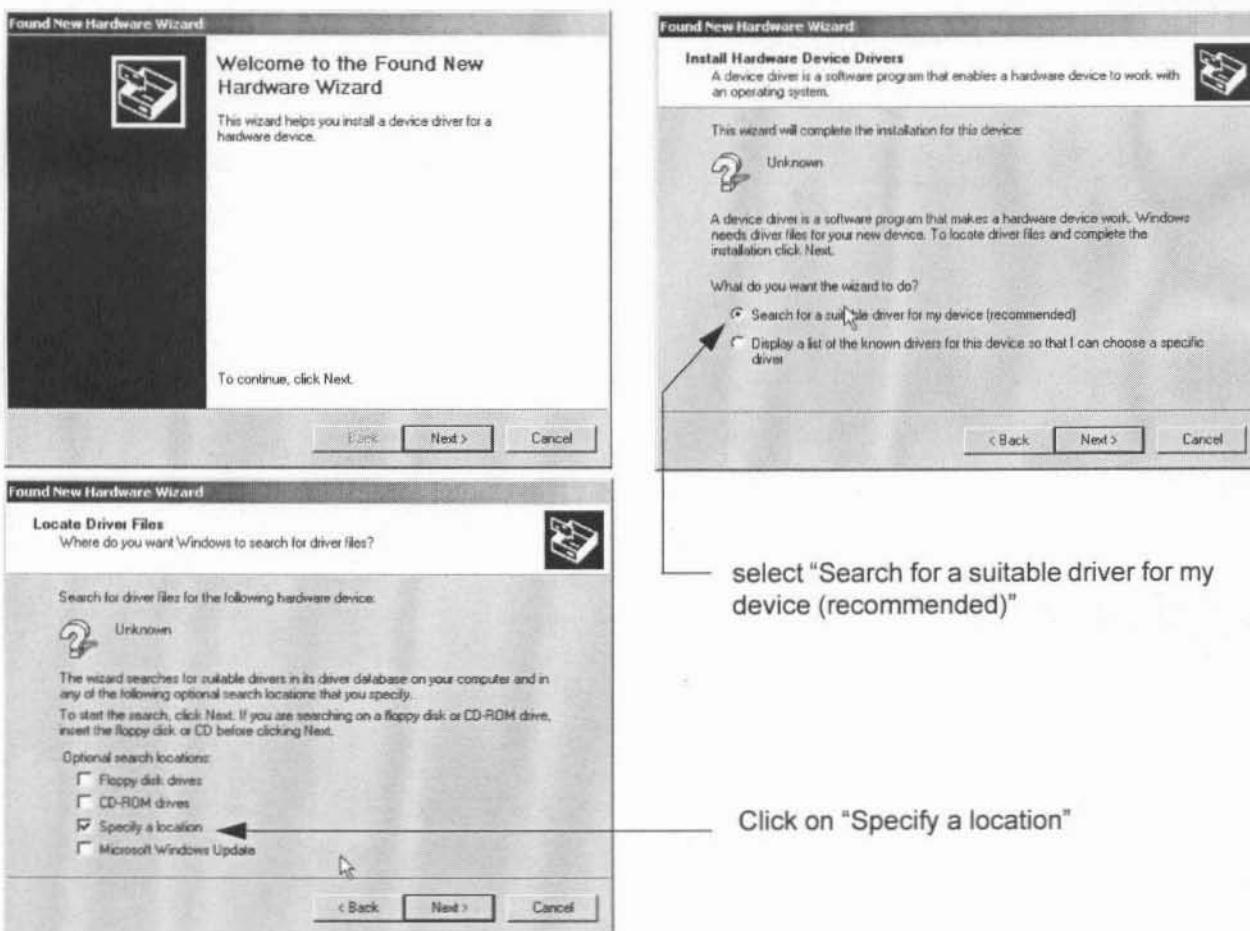


Figure 3-26 Found New Hardware Wizard

3-7-1-1 Install the HP 990cxi or HP 995c printer software/driver (cont'd)

- 5.) Click the NEXT buttons to start the Hardware Wizard and to locate the driver files.
- 6.) 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.

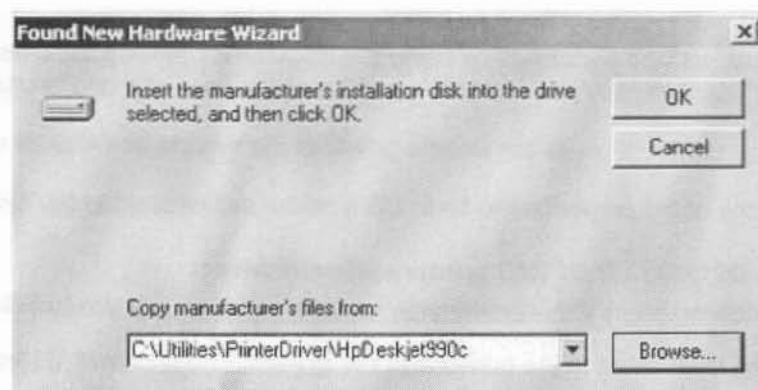


Figure 3-27 Search for Network path on hard disk

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

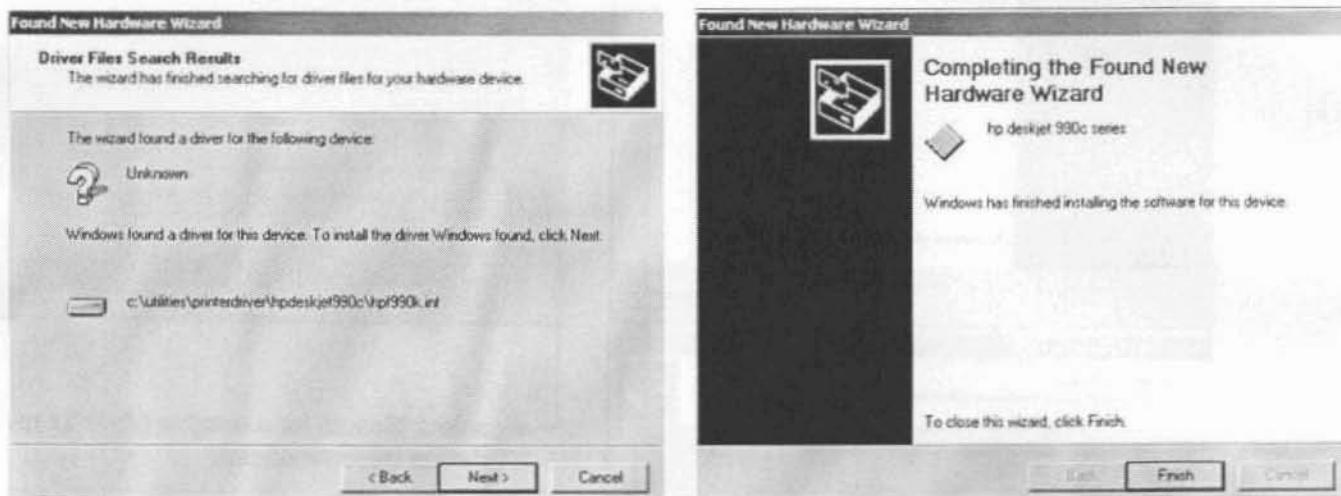


Figure 3-28 Confirm correct path and finish the Installation

- 9.) 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 3-33.

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

- 1.) Power off/Shutdown the system as described in: Section 3-6-2 on page 3-21.
- 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 or see: Figure 3-5 on page 3-7.

 **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® 730Pro / 730ProV!

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

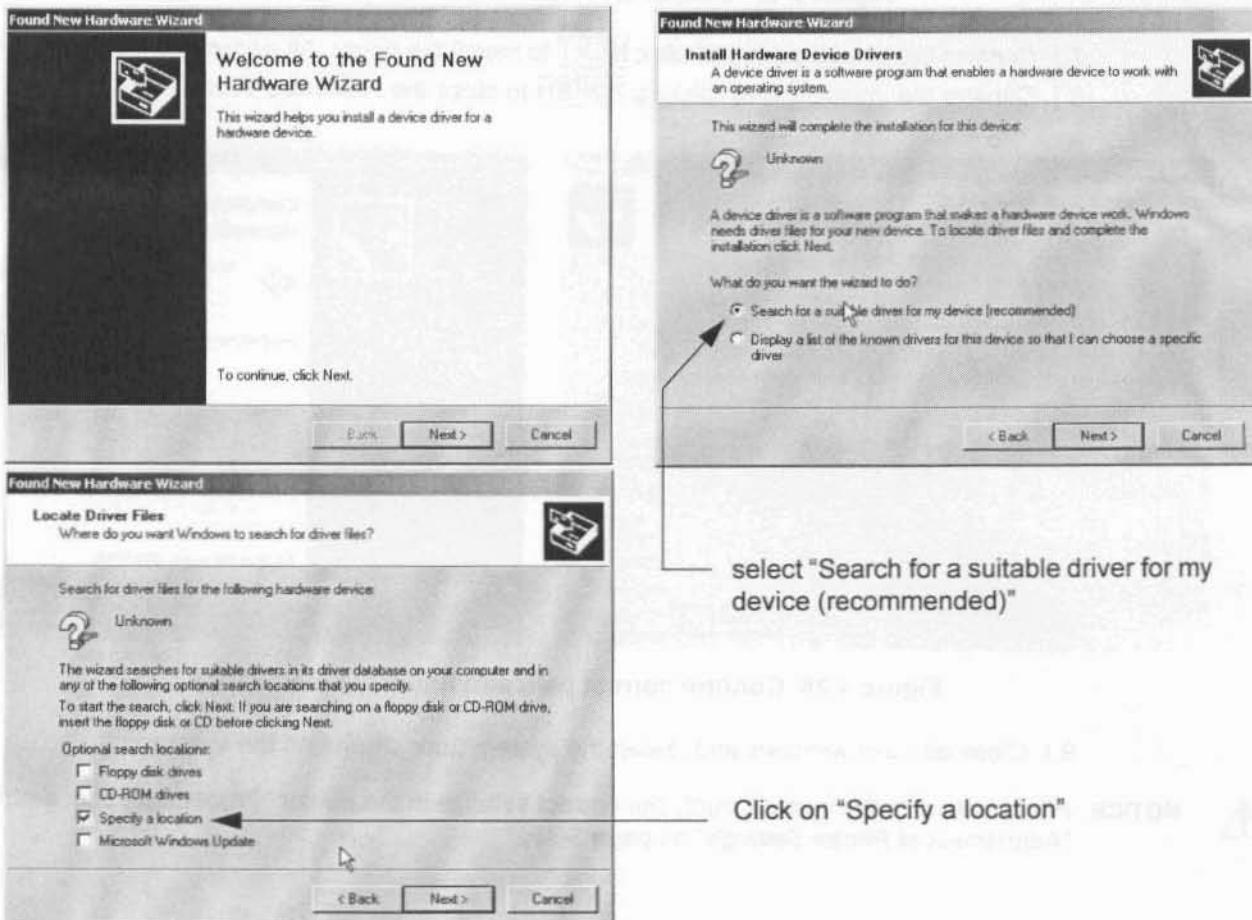


Figure 3-29 Found New Hardware Wizard

- 5.) 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)

- 6.) 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.

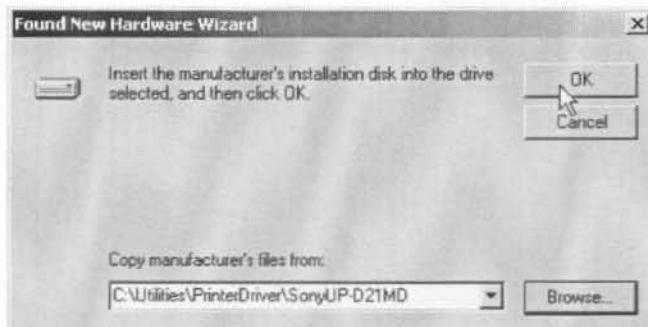


Figure 3-30 Search for Network path

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

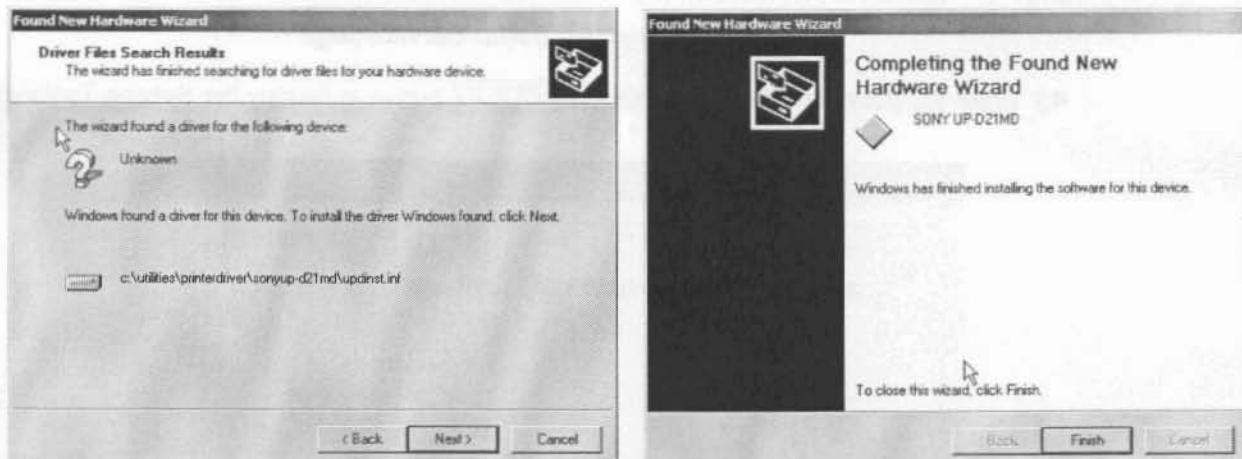


Figure 3-31 Confirm correct path and finish the Installation

- 10.) 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 3-33.

### 3-7-3

### Printer Installation manually

- 1.) On the control panel, press the **UTILITIES** key.
- 2.) In the "Utilities" menu on the left side of the screen, select **SYSTEM** to invoke the setup desktop.
- 3.) Select the **SERVICE** page. The "password window" appears automatically.

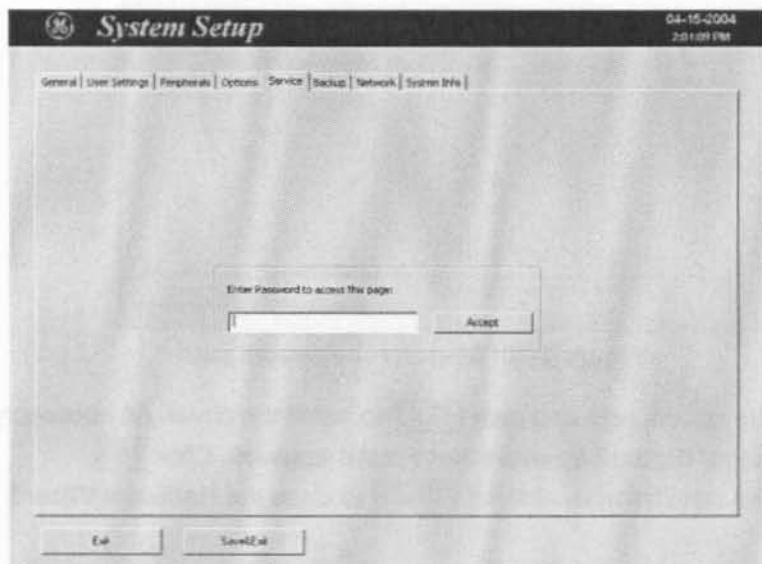


Figure 3-32 System Setup Service page

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

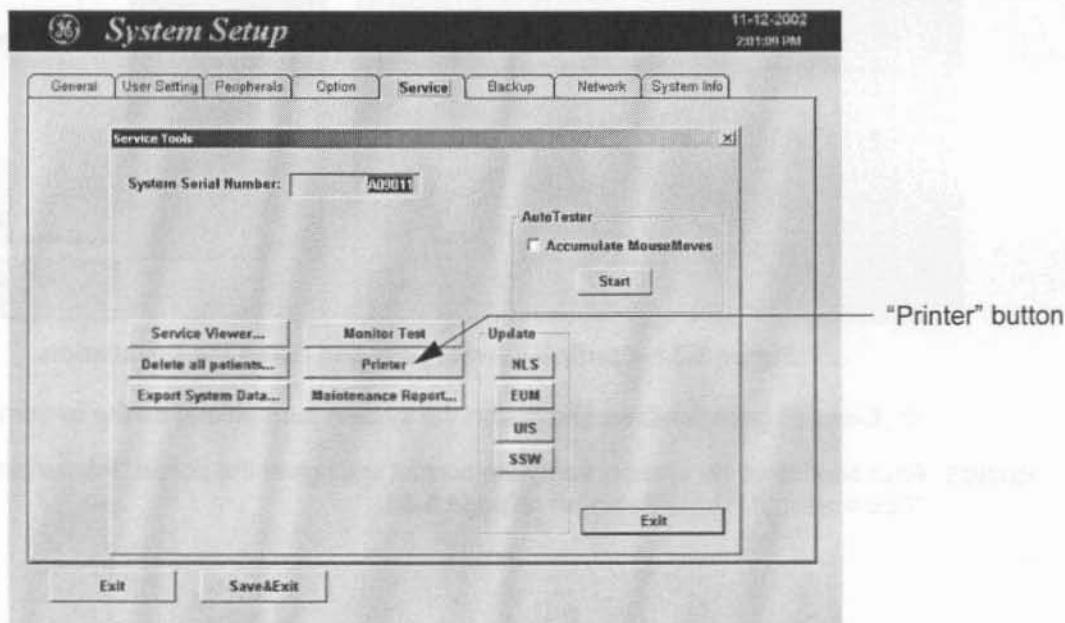


Figure 3-33 Service Tools window

- 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.

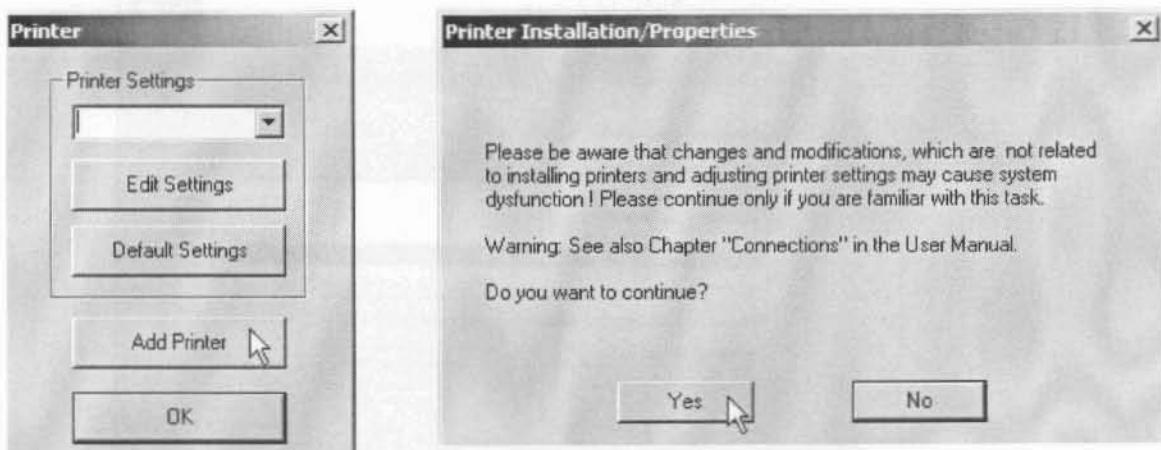


Figure 3-34 Add Printer and Printer Installation/Properties

- 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.

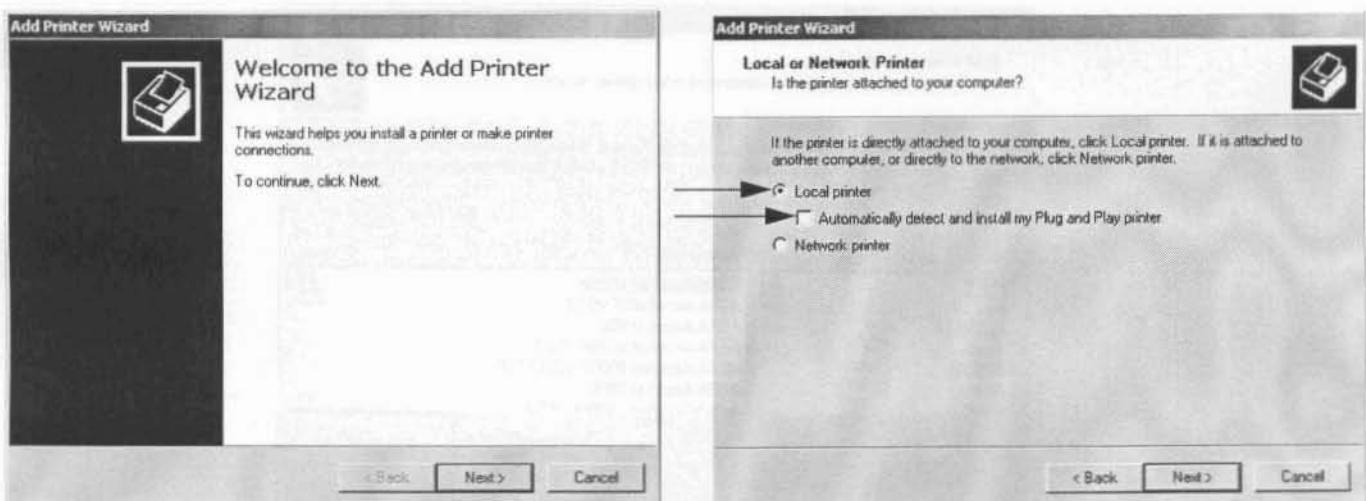


Figure 3-35 Add Printer Wizard

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

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

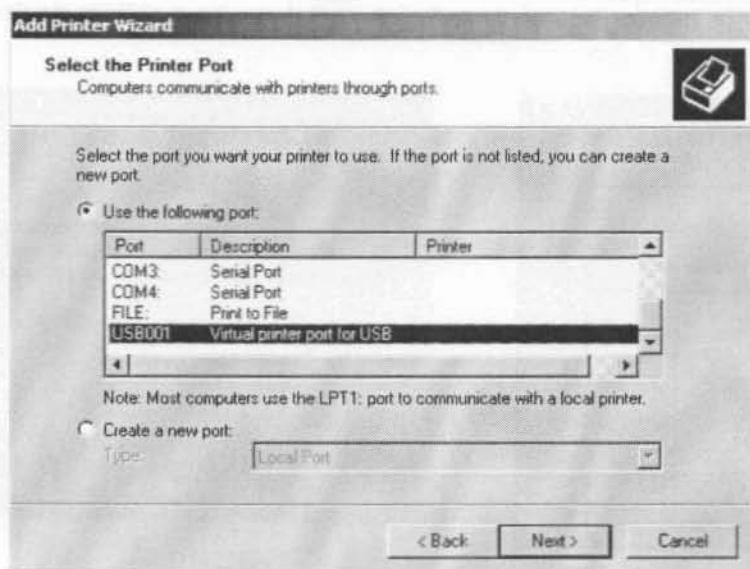


Figure 3-36 Select Printer Port

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

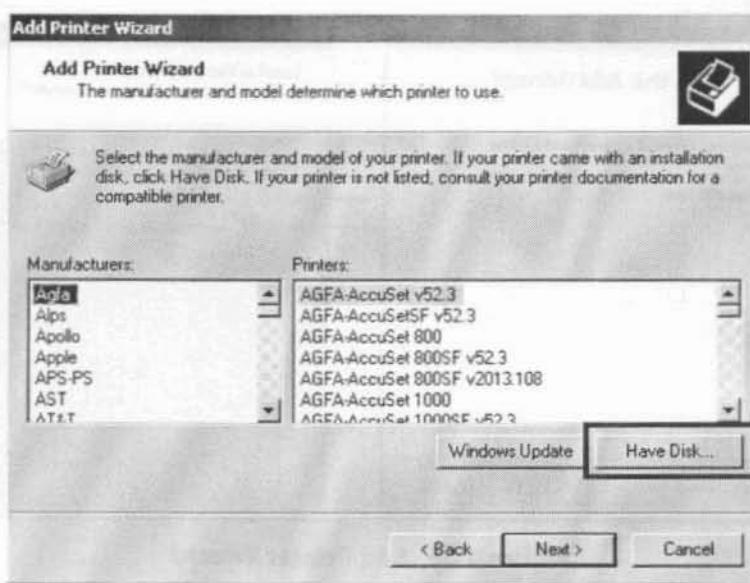


Figure 3-37 Have Disk...

- 11.) Use the BROWSE button to search the Printer Driver path.

- for Line Printer HP 990cxi C:\Utilities\PrinterDriver\HPDeskjet990c
- for Line Printer HP 995c C:\Utilities\PrinterDriver\HPDeskjet995c
- for Digital Color Printer UP-D21MD C:\Utilities\PrinterDriver\SonyUP-D21MD
- for Digital Color Printer UP-D23MD C:\Utilities\PrinterDriver\SonyUP-D23MD

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

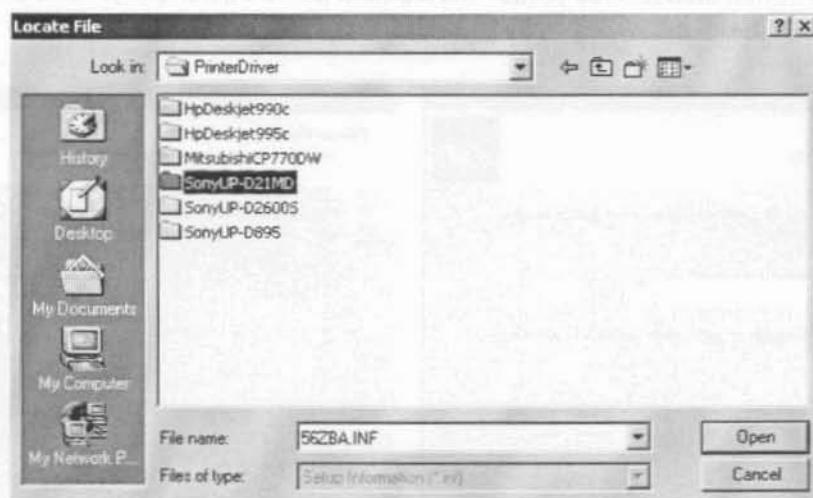


Figure 3-38 Select Printer Driver path (C:\Utilities\PrinterDriver\....)

12.) Click OPEN.

13.) Verify the selected Printer Driver path and confirm with OK.



Figure 3-39 verify selected Printer Driver path

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

- 14.) Select the manufacturer and model of your printer and confirm with the NEXT button.
- 15.) Assign a name, decide if the printer should be used as default printer and confirm with NEXT.  
see: Figure 3-40.

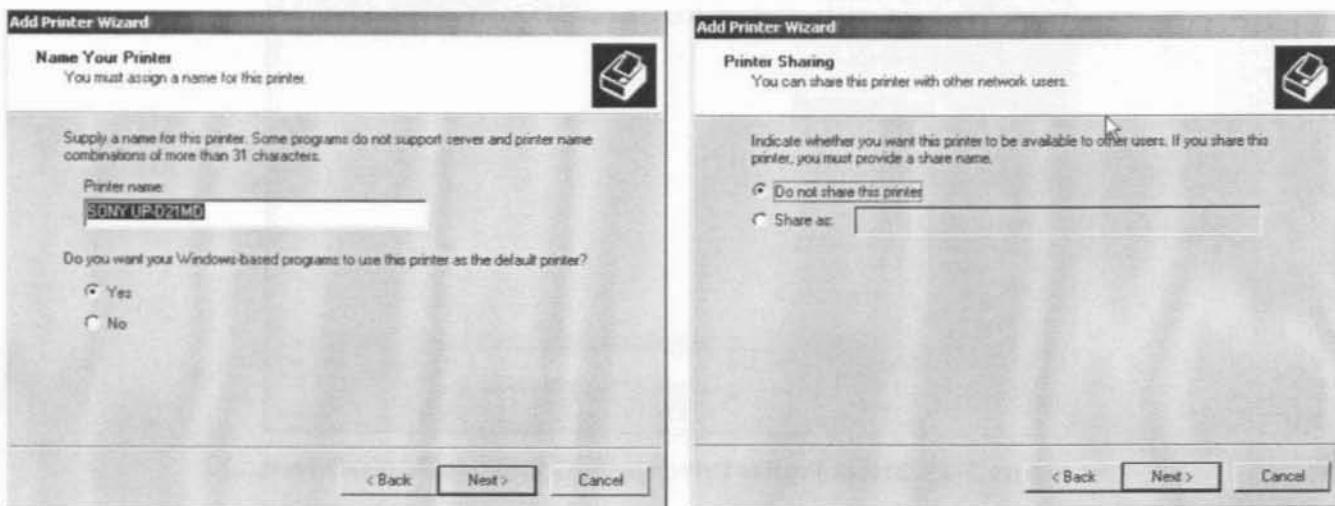


Figure 3-40 Assign name and select Printer Sharing - no

- 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 3-33.

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

- 1.) After system restart, press the UTILITIES key, and then select SYSTEM from the menu area.
- 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.

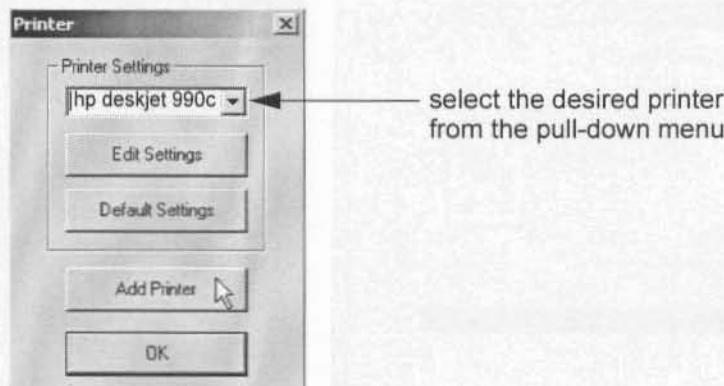


Figure 3-42 Select the desired printer

To adjust the HP 990cxi / HP 995c printer see: Section 3-7-4-1 "HP 990cxi / HP 995c- Printer Settings".

To adjust the UP-D21MD / UP-D23MD Printer see: Section 3-7-4-2 "UP-D21MD / UP-D23MD - Printer Settings".

To adjust the Bluetooth HP 5600 Series printer see: Section 3-7-4-3 "HP 5600 Series - Printer Settings"



**WARNING** *After each printer installation, the leakage currents have to be measured acc. IEC 60601-1 resp. UL2601-1.*

3-7-4-1 HP 990cx / 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.

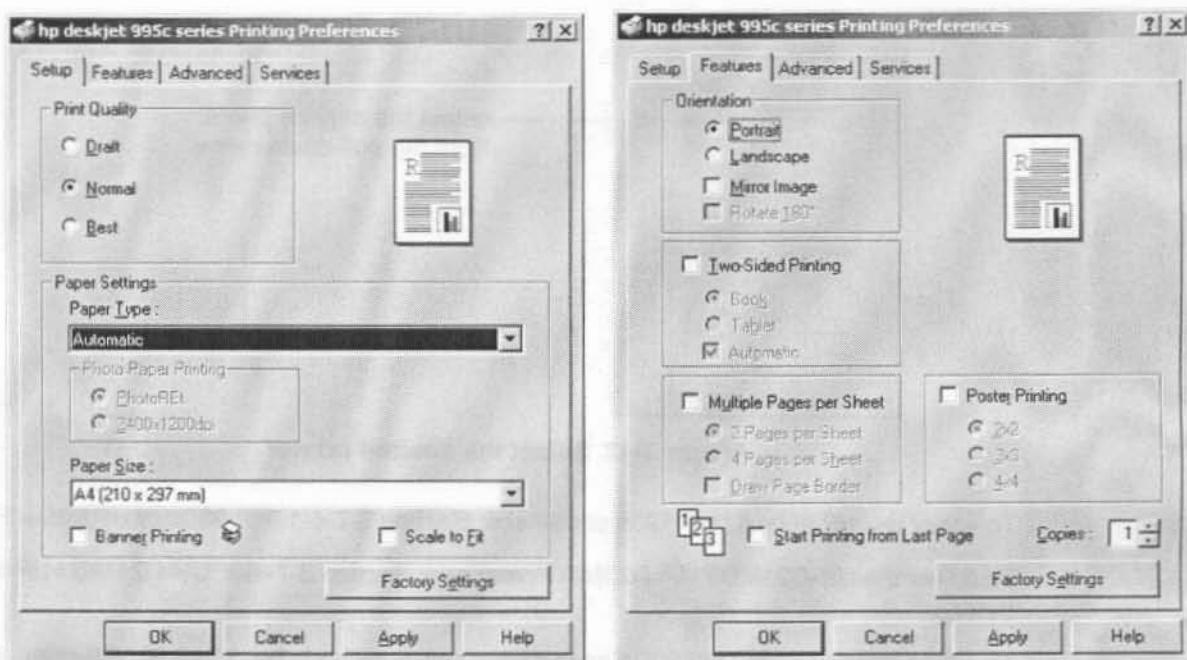


Figure 3-43 HP Printer - Settings

- 5.) For saving the adjusted printer settings click APPLY and then OK.
- 6.) Select the POTS 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 990cx / HP 995c printer as Report Printer;  
see: Section 3-7-5 "Printer Remote Control Selection" on page 3-38.
- 9.) Print report page(s) containing measurements.  
For operation see Basic User Manual of Voluson® 730Pro / 730ProV.
- 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)

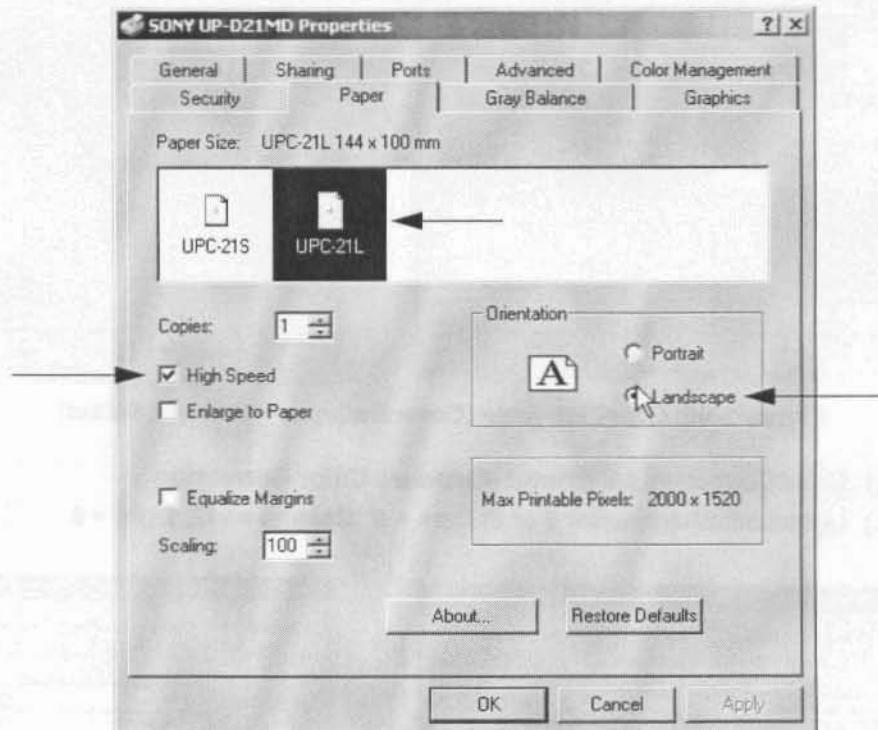


Figure 3-44 Paper page

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:

- Color Balance: Cyan = 0; Magenta = 0; Yellow = 0
- Gamma Select: **Gamma 1**

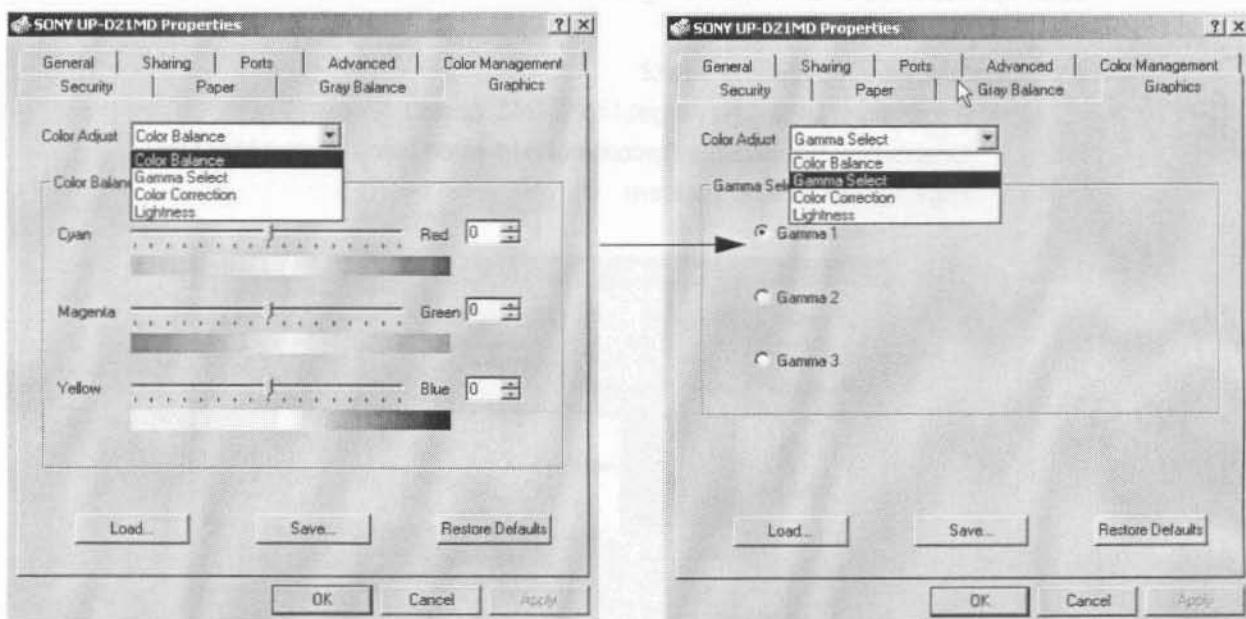


Figure 3-45 Graphics page (Color Balance + Gamma Select)

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

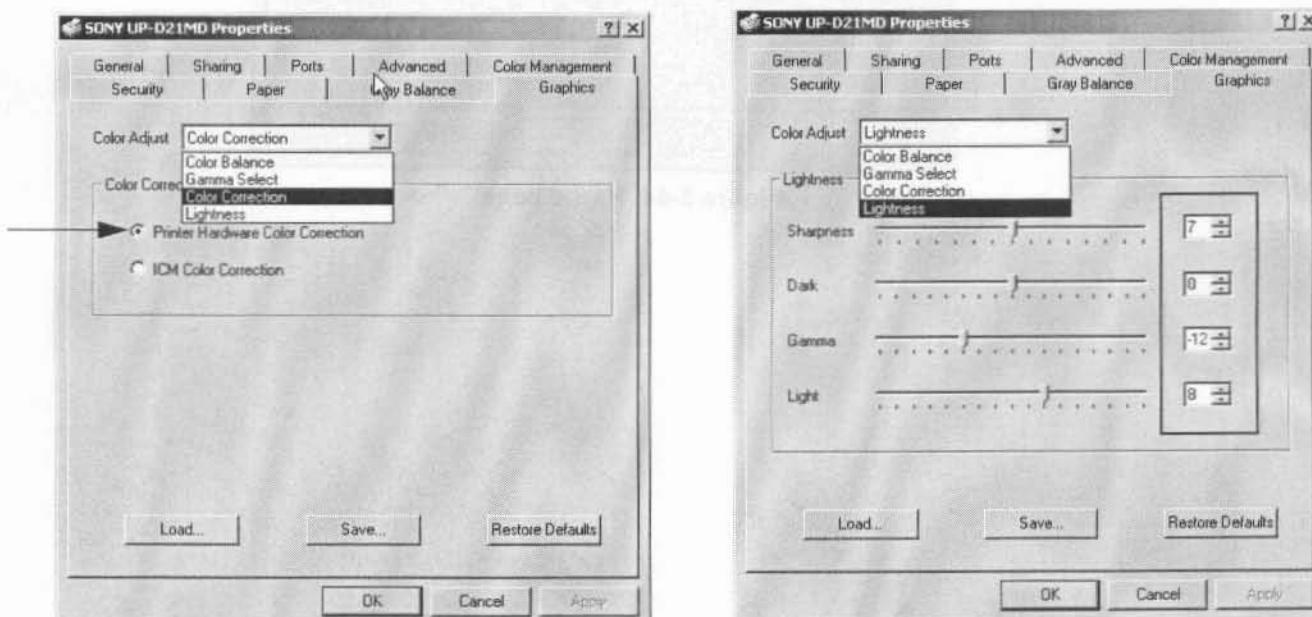


Figure 3-46 Graphics page (Color Correction + Lightness)

- 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.

### 3-7-4-3 HP 5600 Series - Printer Settings

**CAUTION** The Bluetooth Connection Set as well as the color printer HP 5600 Series MUST NOT be installed by the user! For installation please contact your local distributor or GE service representative.

- 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 PAPER/QUALITY page and select the adequate paper size.

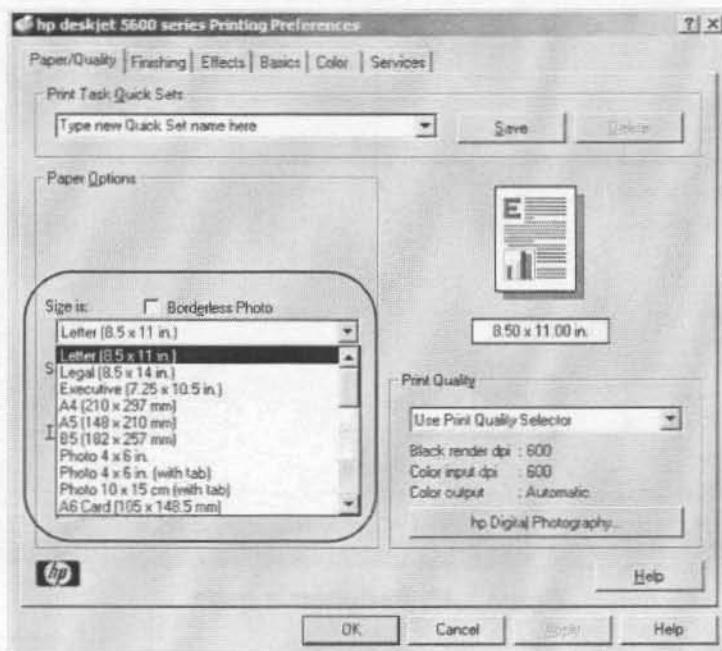


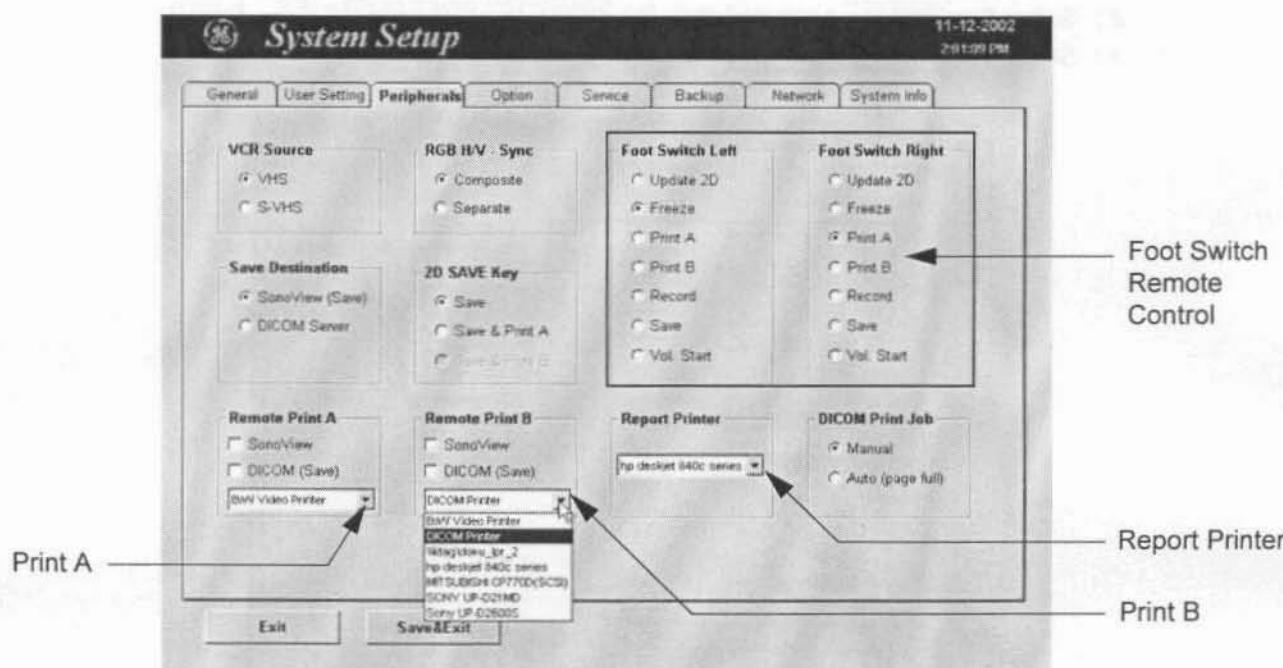
Figure 3-47 Paper/Quality page

- 4.) For saving the adjusted paper size settings click APPLY and then OK.
- 5.) In the next window, click OK again.  
Finally close the 'Printers' -window with the close button and exit System Setup with SAVE&EXIT.
- 6.) Assign the HP 5600 Series printer as Report Printer;  
see: Section 3-7-5 "Printer Remote Control Selection" on page 3-38.
- 7.) Print report page(s) containing measurements.  
For operation see Basic User Manual of Voluson® 730Pro / 730ProV.
- 8.) **Turn off** the system!

### 3-7-5 Printer Remote Control Selection

To assign the Remote **PRINT A** key, Remote **PRINT B** key and Report Printer to desired Printer:

- 1.) On the control panel, press the **UTILITIES** key.
  - 2.) In the "Utilities" menu on the left side of the screen select **SYSTEM** to invoke the setup desktop.
  - 3.) Select the **PERIPHERALS** page.



**Figure 3-48** 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.

## Section 3-8 System Configuration

### 3-8-1 System Specifications

#### 3-8-1-1 Physical Dimensions of Voluson® 730Pro / 730ProV

The physical dimensions of the Voluson® 730Pro / 730ProV unit are summarized in Table 3-5. Table 3-6 lists the size of Voluson® 730Pro / 730ProV, with monitor and without on-board peripherals.

Table 3-5 Physical Dimensions of Voluson® 730Pro / 730ProV

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

#### 3-8-1-2 Weight without Monitor and Peripherals

Table 3-6 Weight of Voluson® 730Pro / 730ProV with Monitor and without other Peripherals

Model	Weight [kg]	Weight [lbs.]
Voluson® 730Pro / 730ProV	136	300

#### 3-8-1-3 Acoustic Noise Output

max. 57dB(A)

### 3-8-2 Electrical Specifications

Table 3-7 Electrical Specifications for Voluson® 730Pro / 730ProV

Voltage	Tolerances	Current	Frequency
100 VAC	±10%	10.10 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: 110V or 225V.



**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 !

### 3-8-3 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

To invoke the Setup procedure:



- 1.) Press the **UTILITIES** key on the Control Panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item 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

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

Select the GENERAL page in the System Setup see: Figure 3-49.

- 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.

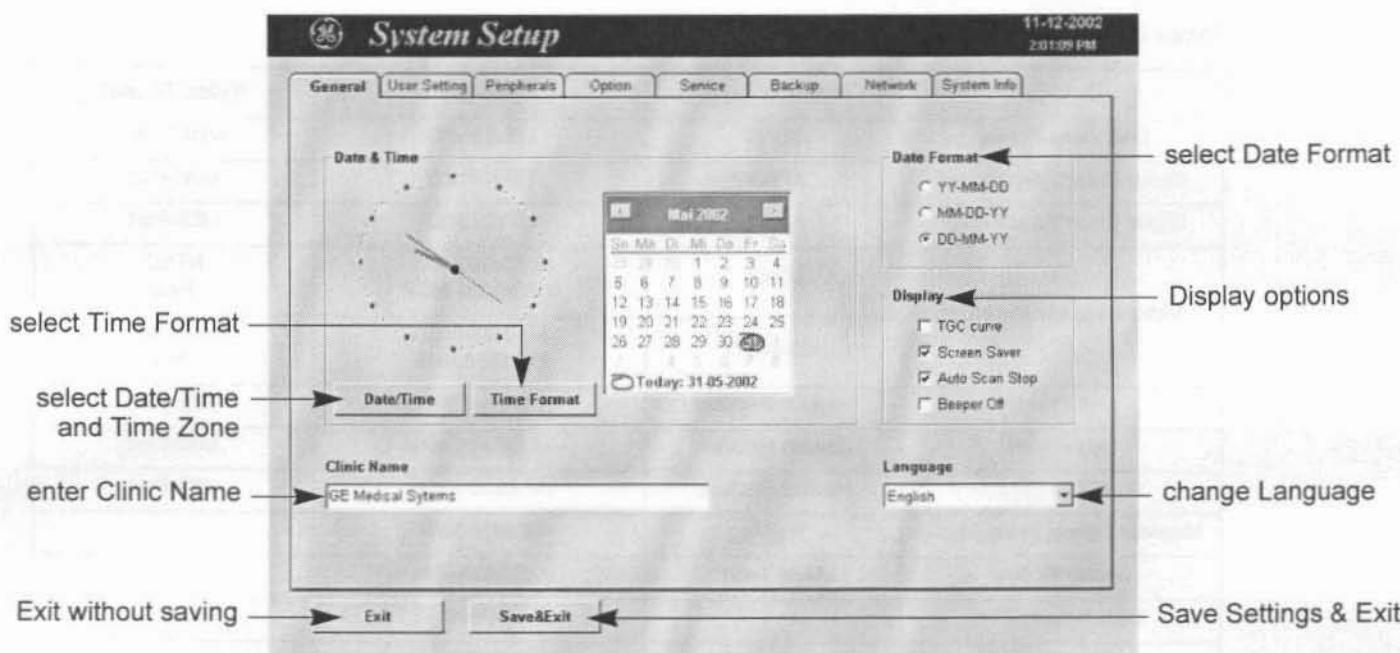


Figure 3-49 System Setup - General page

### 3-8-3-2 How to enter Hospital Name

Select the GENERAL page in the System Setup see: Figure 3-49.

- 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.

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

Select the GENERAL page in the System Setup see: Figure 3-49.

- 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.

### 3-8-4 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: 110V or 225V.



**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 3-8 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
Digital Color Video Printer	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 990cx	USB-Port
Line Printer	Hewlett Packard	hp deskjet 995c	USB-Port
Bluetooth Printer	Hewlett Packard	HP 5600 series	USB-Port
Magneto-Optical Drive (MOD)	Fujitsu	MCM3130AP	
Global Modem	Multi-Tech	MT5634ZBA	
ECG Preamplifier		MAN6	
Footswitch		MFT7	

3-8-5      External I/O Connection Panel (GES)

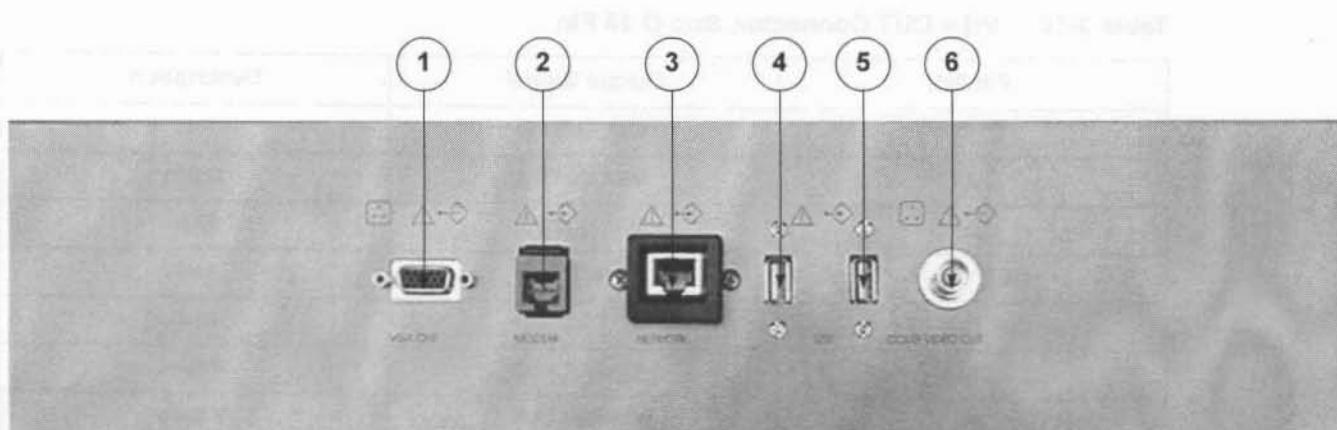


Figure 3-50 External I/O Panel Connectors

Table 3-9    External I/O Connector Descriptions

Item	Connector Name	Table Number	Description		
1	VGA OUT	Table 3-10	print out VGA signal with monitor/printer		
2	MODEM	Table 3-11	RJ-11 with global adapter kit for modem connection		
3	NETWORK	Table 3-12	DICOM input/output twisted pair RJ-45 10/100 megabit/s		
4	USB-1	Table 3-13	USB port		
5	USB-2	Table 3-13	USB port		
6	COMP VIDEO OUT	Table 3-14	BNC Connector, Color Video Output		

3-8-5-1 External I/O Pin Outs

**Table 3-10 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 3-11 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 3-12 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 3-13 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 3-14 COMP VIDEO OUT Connector**

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

**Table 3-15 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

### 3-8-6 Video Specification

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

**Table 3-16 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

#### Electrical Specifications on VGA Connector

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

**Table 3-17 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

Refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.1, System Setup - General, for information on configuring items like Clinic Name, Language, Display, Date/Time, Date Format and Time Format.

For information on configuring User Settings, refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.2, System Setup - User Settings.

For information on configuring assignment of PRINT keys, Foot Switch, Save Destination, VCR Source, etc., refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.3, System Setup - Peripherals.

For information on configuring Software Options, refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.4, System Setup - Options.

For information on configuring Connectivity, refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 17.3.7, System Setup - Network.

For information on configuring the Measure Setup, refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 18.

## Section 3-11 Connectivity Installation Worksheet

Site System Information			
Site:	Floor:	Comments:	
Dept:	Room:		
Serial #:	Type:	REV:	

### CONTACT INFORMATION

Name	Title	Phone	E-Mail Address
[ ] [ ] [ ] [ ]	[ ] [ ] [ ] [ ]	[ ] [ ] [ ] [ ]	[ ] [ ] [ ] [ ]

### TCP/IP Settings

Name - AE Title:	
<b>IP Settings</b>	
IP Address:	
Subnet Mask:	
Default Gateway:	
<b>Remote Archive Setup</b>	
Remote Archive IP:	
Remote Archive Name:	

Services (Destination Devices)					
Device Type	Manufacturer	Name	IP Address	Port	AE Title
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

## Section 3-12 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® 730Pro / 730ProV.  
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.) Press the **UTILITIES** key on the Control panel once to display the Utilities menu.
- 2.) Select **SYSTEM** and then open the **NETWORK** page on the System Setup desktop screen.
- 3.) Click the **NETWORK CONFIGURATION** button, read the message and confirm with **YES**.

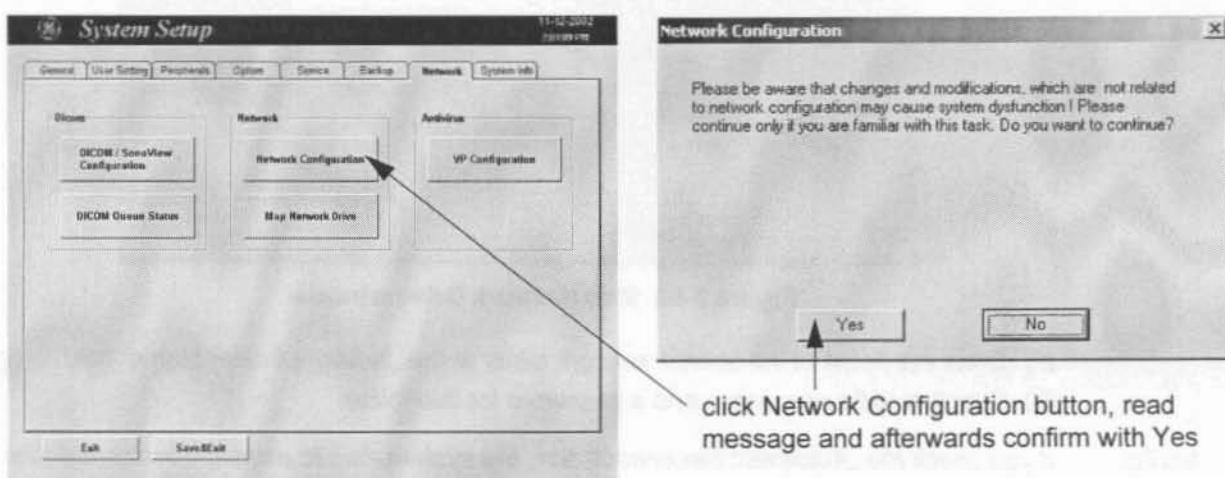


Figure 3-51 Network Configuration

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

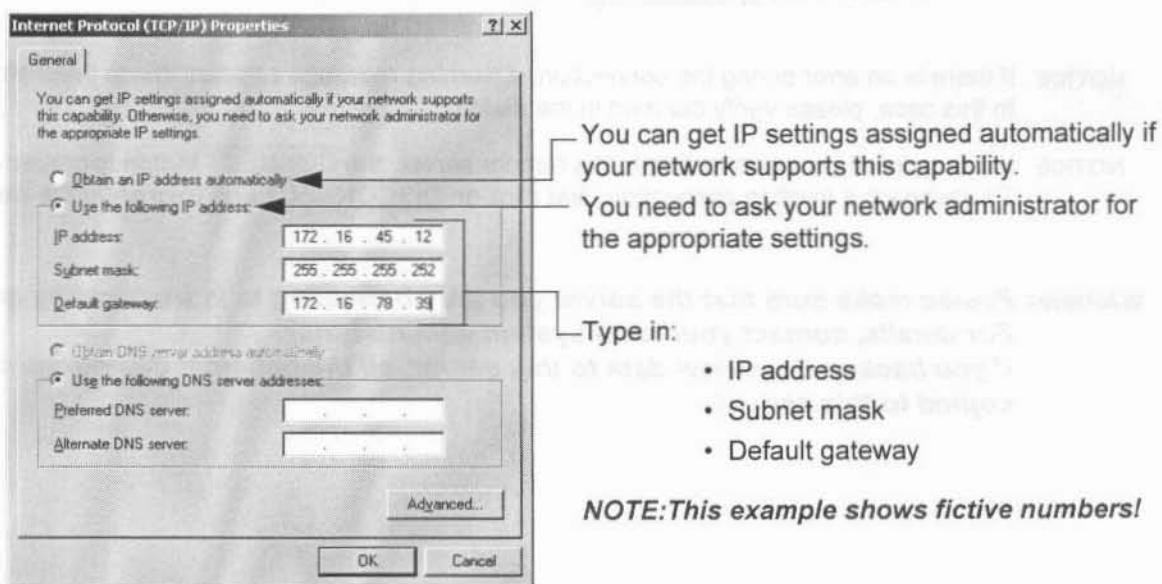


Figure 3-52 Internet Protocol (TCP/IP)

To specify a DICOM Address, follow the instructions described in the Basic User Manual, Chapter 17.3.7 of the Voluson® 730Pro / 730ProV.

### 3-12-1 Map Network Drive

- 1.) Select the MAP NETWORK DRIVE button (in the System Setup - **Network** page, see: Figure 3-51) to open a dialog where the system can be connected to a shared network drive of another server.

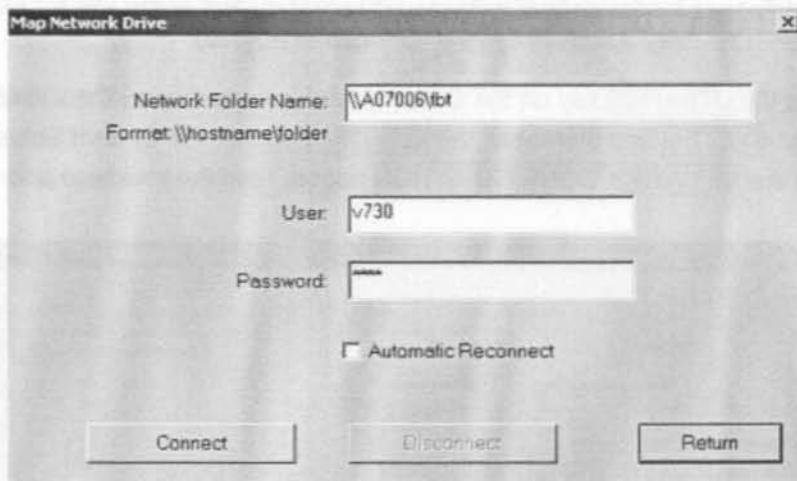


Figure 3-53 Map Network Drive window

- 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 3-13 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.

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

PRINTED IN USA

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® 730Pro / 730ProV 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	4-31
4-6	Software Configuration Checks	4-41
4-7	Peripheral Checks	4-42
4-8	Mechanical Function Checks	4-43
4-9	Site Log	4-44

 **NOTICE** Most of the information pertaining to this Functional Checks chapter is found in the Voluson® 730Pro / 730ProV Basic User Manual (Direction number KTI105938).

### Section 4-2 Required Equipment

- An empty (blank) DVD/CD+(R)W or MO Disk.
- At least one transducer. See "Probes" on page 9-28 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.

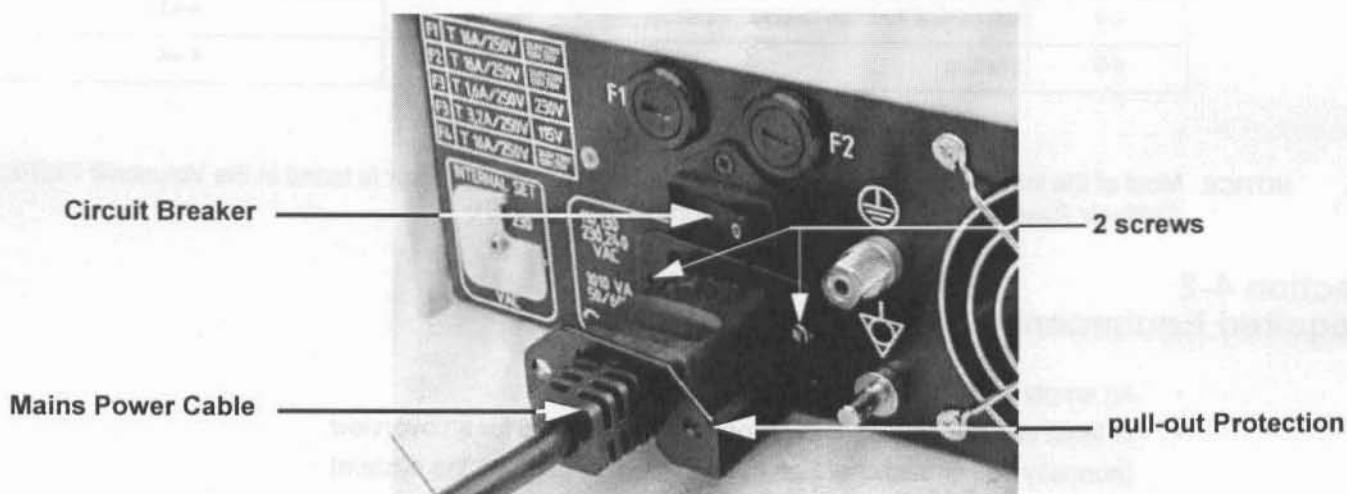


Figure 4-1 Circuit Breaker, Protection and Power Cable on back of Voluson® 730Pro / 730ProV

- 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.

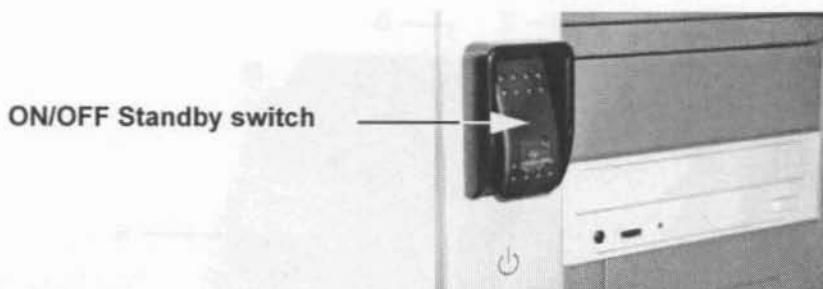


Figure 4-2 ON/OFF Standby Switch

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.

Depending on the BIOS-Version no status messages are displayed during this process.  
Boot up time is about 2 minutes.

**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.*

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

**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.*

##### 4-3-2-1 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.
- 3.) Disconnection of the Mains Power Cable is necessary. *For example: Relocating the scanner.  
Unscrew the 2 screws and remove the pull-out protection to disconnect the cable from the system,  
or unplug the cable from the wall socket.*

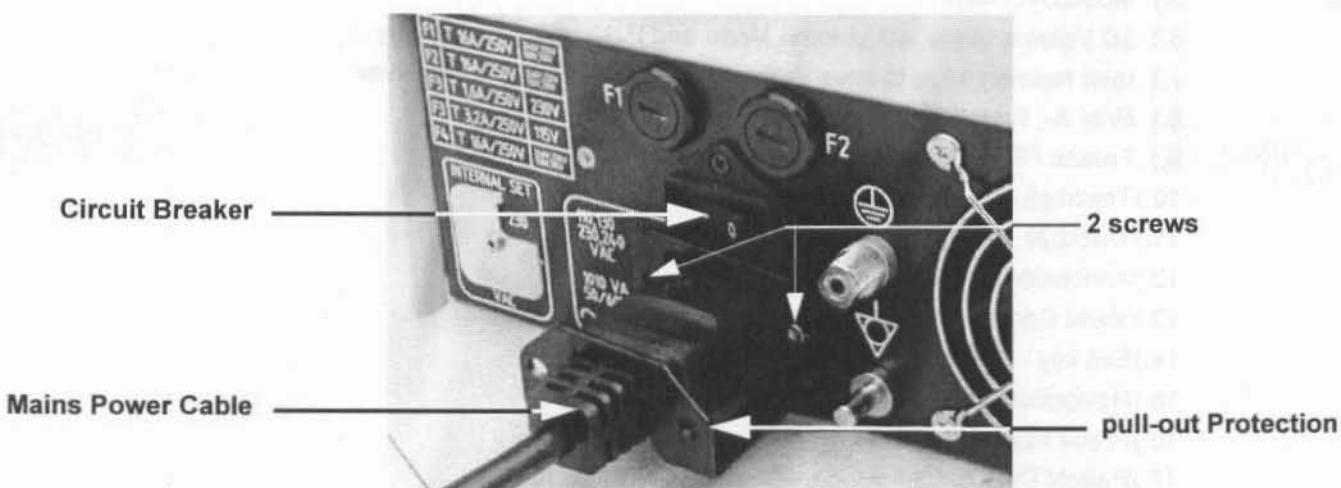


Figure 4-3 Circuit Breaker, Protection and Power Cable on back of Voluson® 730Pro / 730ProV

## 4-3-3 System Features

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

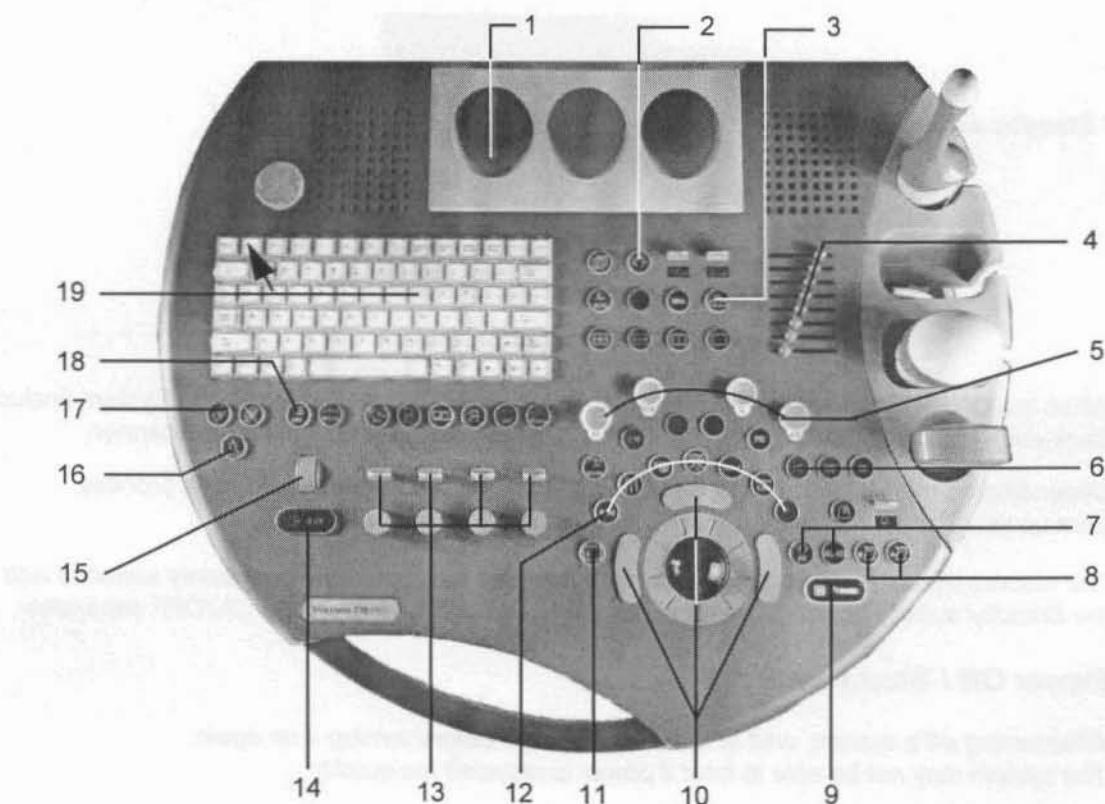


Figure 4-4 Control Panel Tour

- 1.) Ultrasound scanning gel holder
- 2.) Sonoview (Image Management) key
- 3.) VCR Remote Control key
- 4.) TGC - Slider Controls
- 5.) Mode/Gain keys
- 6.) 3D Volume Mode, 4D Volume Mode and Harmonic Imaging key
- 7.) Inter memory keys to save to Sonoview or send to DICOM server
- 8.) Print A-, Print B-Trigger key
- 9.) Freeze / Run key
- 10.) Trackball and Trackball keys
- 11.) Trackball Menu Navigation key
- 12.) Annotation and Measurement keys
- 13.) Menu Control digipots and toggle switch controls
- 14.) Exit key
- 15.) Navigation wheel (Menu control element)
- 16.) Probe key
- 17.) Patient Data Entry key
- 18.) Utilities key
- 19.) Keyboard with shortcut function keys and F1 key to invoke the Electronic User Manual (EUM)

#### 4-3-3-2 Menu Control

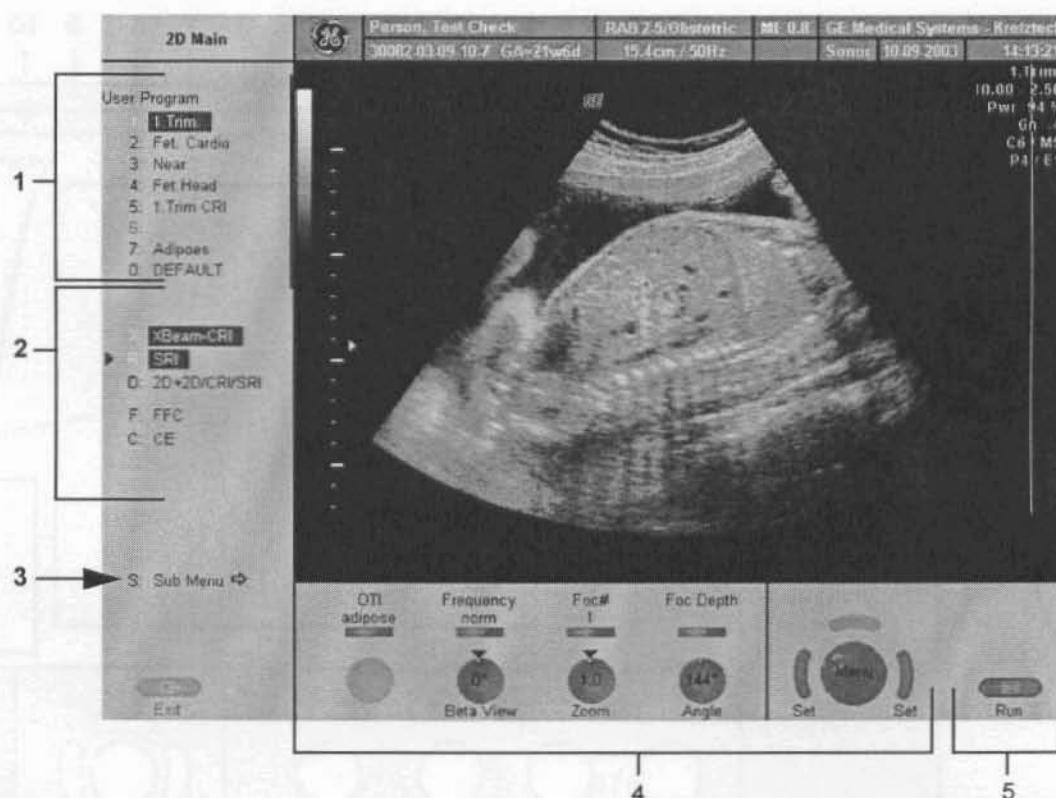


Figure 4-5 Menu Control Area- 2D Main Menu

- 1.) User Program: shows all setting for the active application. The active one is highlighted
- 2.) Additional functions which are supported by the selected Mode.
- 3.) Sub Menu: to adjust settings of the selected Scan mode.
- 4.) Status Area: shows the current functionality of the digipots, toggle switch controls and the trackball
- 5.) Status of the FREEZE key

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

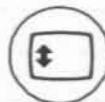
#### DIGIPOTS, TOGGLE SWITCH CONTROLS and TRACKBALL

Activated functions are easily controlled by these controls. By rotating resp. switching, they deliver digital pulses and can be selected by program call-up.

They are displayed in the status area by their location, their function, and their actual value of setting.

#### NAVIGATION WHEEL and corresponding KEYBOARD-SHORTCUT FUNCTIONS

The available menus are shown in the menu area on the left side of the screen. The current menu selection is highlighted. Roll the navigation wheel and the blue arrow moves to another selection. Press the navigation wheel to select the desired item. The corresponding keyboard shortcuts (1, 2, 3, etc.) are shown to the right of the actual function.



If the **TRACKBALL MENU NAVIGATION** key is illuminated, the trackball is consequently assigned to select the menu items in the menu area on the left side of the screen.  
Pressing **SET** (the left or right trackball key) starts selected menu function.

4-3-3-3 Monitor Display

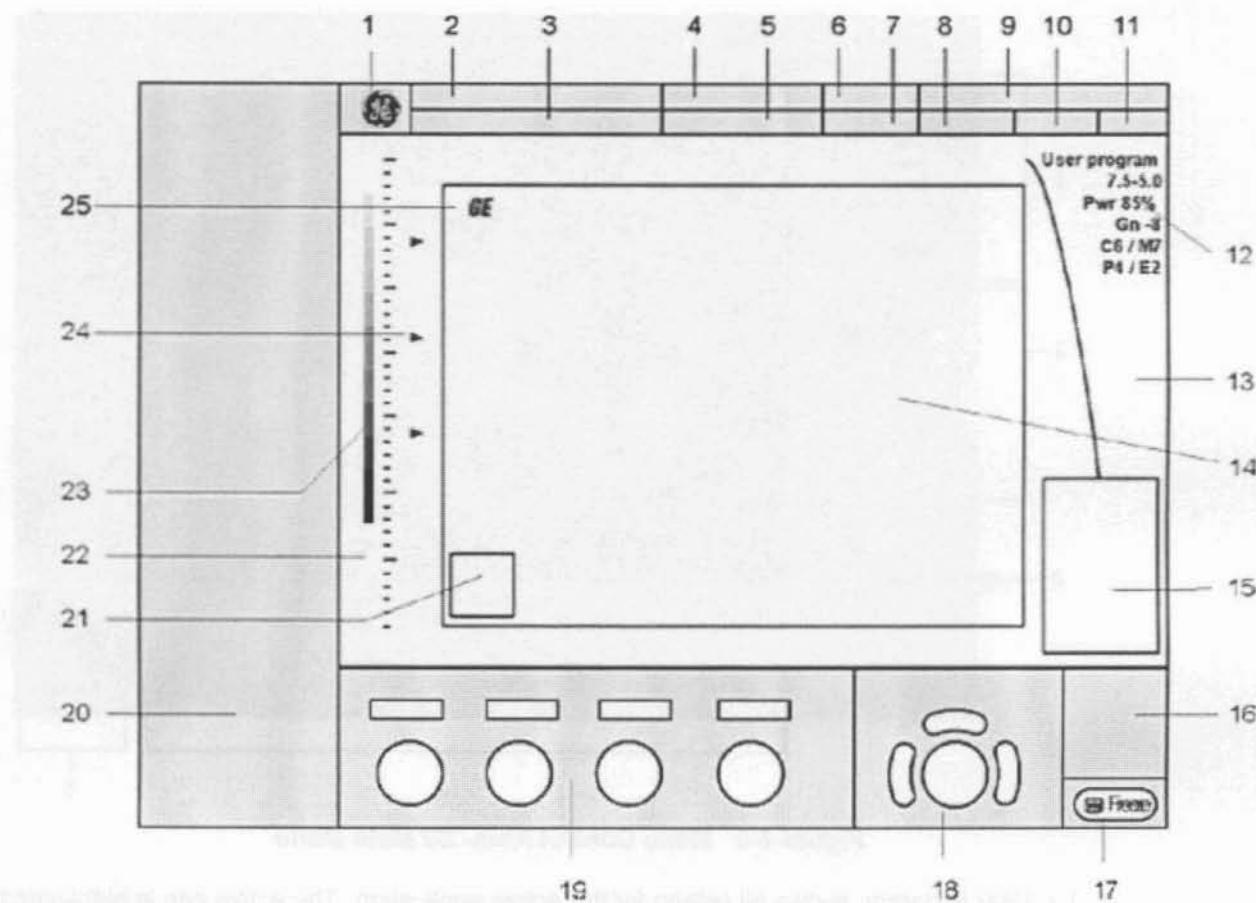


Figure 4-6 Monitor Display Tour

Table 4-2 Monitor Display Features

1. Logo	14. Image Area
2. Patient Name (Last-, First-, Middle Name)	15. Measurement results
3. Patient ID-number ; GA (Gestational Age)	16. Status (volume box, saved images, gray map)
4. Probe / Application	17. Status area of the Freeze key
5. Depth / Frame rate	18. Status area of the trackball
6. Mechanical Index	19. Status area of digipots and flip switch controls
7. Thermal Index	20. Menu (Softkey) area
8. Sonographers Name	21. Bodymarks
9. Hospital Name (Identification)	22. Depth scale markers
10. Date	23. Gray scale wedge
11. Time	24. Focal zone marker(s)
12. Image Info	25. Orientation marker
13. TGC curve	

## 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)
- M Mode
  - MCFM Mode
- Spectral Doppler Modes
  - PW - Pulsed Wave Doppler
  - CW - Continuous Wave Doppler
- Color Doppler Modes
  - CFM - Color Flow Mode
  - PD - Power Doppler
  - TD - Tissue Doppler
- Volume Modes
  - 3D Static
  - 4D Real Time
  - 4D Biopsy\*
  - VOCAL II\*

**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 Menu and which Mode is selected.  
Some function only appear in the menu area and the status area of the digipots and flip switch controls if they are available for the selected Probe.

 **NOTICE** Not all Options are available on the Voluson® 730Pro V (marked with \* in this manual).

#### 4-4-1 2D Mode Checks

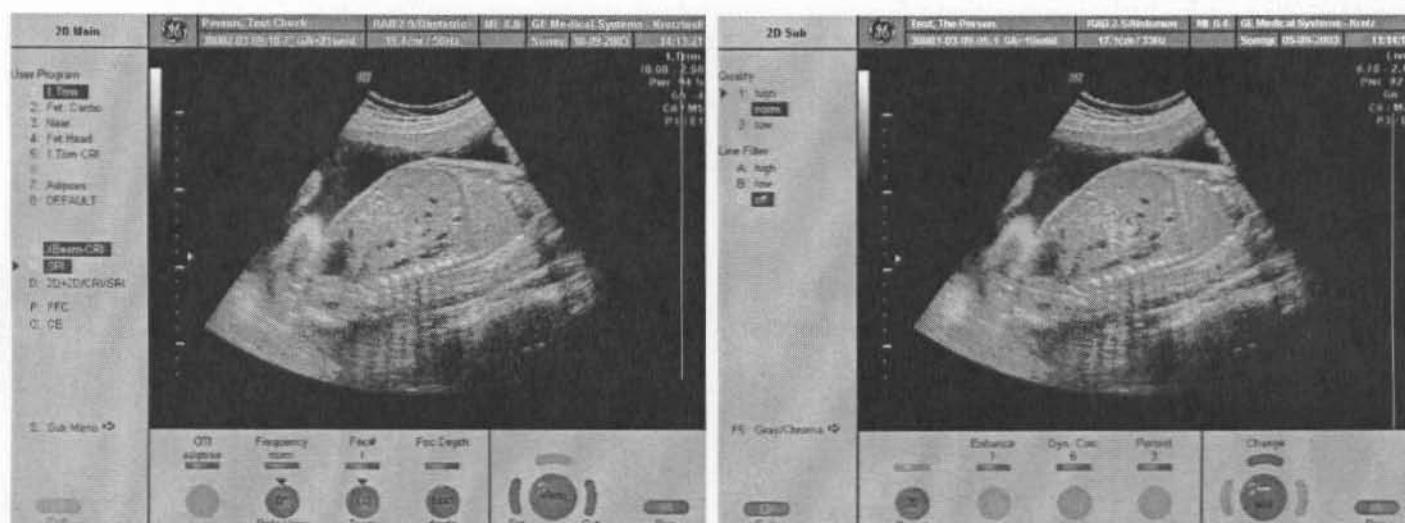


Figure 4-7 2D Main and 2D Sub

Table 4-3 2D Mode Functions

Step	Task	Expected Results
1	2D Mode Gain	Rotate the <u>2D MODE</u> key to adjust the sensitivity (brightness) of the entire image.
2	Transmit Power 	Optimizes image quality and allows user to reduce beam intensity.
3	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.
4	Screen Format (Dual, Quad, Single) 	Press this keys to change the display Mode from Single to <u>DUAL</u> or <u>QUAD</u> display mode. Press the <u>SINGLE</u> format key or the <u>2D MODE</u> key to change from Dual or Quad to Single display.
5	Image Orientation 	Use the <u>LEFT/RIGHT</u> respectively the <u>UP/DOWN</u> keys on the control panel to alternate the image orientation. The orientation marker on the screen shows the actual orientation.
6	2D Automatic Optimization 	Pressing the <u>AUTO</u> key causes automatic optimization of the gray scale to enhance the contrast resolution. Pressing again: optimization will be updated and remain active. Press the <u>AUTO</u> key twice to switch off the Automatic Optimization in 2D.
7	XBEAM-CRI * (CrossBeam Compound Resolution Imaging)	Pulses are transmitted not only perpendicularly to the acoustic window, but also in oblique directions. The advantages of XBeam-CRI are enhanced contrast resolution with better tissue differentiation and clear organ borders.

Table 4-3 2D Mode Functions

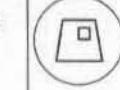
Step	Task	Expected Results
8	<u>SRI</u> * (Speckle Reduction Imaging)	Speckle Reduction Imaging is a smoothing type filter to reduce speckle in the ultrasound image.
9	<u>2D+2D/SRI</u> *	Changes the Single image display to two simultaneous half images. The left frame shows only the 2D Mode image. The right frame shows the 2D Mode image with <u>SRI</u> information.
10	<u>2D+2D/CRI/SRI</u> *	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 <u>XBEAM CRI</u> and <u>SRI</u> information.
11	<u>FFC</u> (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.
12	<u>CE</u> (Coded Excitation)	Coded Excitation improves image resolution and penetration in the far field. This allows to use a higher frequency on technically difficult patients.
13	<u>LINEAR / TRAPEZOID</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.
14	High Resolution Zoom 	Press this key in write mode. The displayed zoom box can be placed over the entire 2D image area, also the size and position of the zoom box can be changed. Press the <u>HR-ZOOM</u> key again to activate the zoom and again to exit the High Resolution Zoom function.
15	Harmonic Imaging 	Press the <u>HI</u> key on the control panel to switch on/off the Coded Harmonic Imaging function in 2D Mode provided the active probe allows this function.
16	<u>FREQUENCY</u> resp. <u>HARM.FREQU.</u> in case of Harm. Imaging	To adjust the range of the receive frequency. high resolution / lower penetration, mid resolution / mid penetration, or lower resolution / high penetration
17	<u>OTI</u> (Optimized Tissue Imaging)	OTI™ allows to "fine tune" the system for scanning different kinds of tissue.
18	<u>FOC #</u>	Increases the number of transmit focal zone, so that you can tighten up the beam for a specific area.
19	<u>FOC DEPTH</u>	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.
20	<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.
21	<u>BETA 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.
22	<u>ZOOM</u>	Image magnification (Pan Zoom) in read-/ and write mode.
23	<u>QUALITY</u>	Control to improve the resolution by reducing the frame rate. Respectively reducing the resolution by increasing the image frame rate.
24	<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.

Table 4-3 2D Mode Functions

Step	Task	Expected Results
25	<u>ENHANCE</u>	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.
26	<u>DYN.CON.</u>	Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.
27	<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.
28	<u>CRI ENHANCE *</u>	If this filter is set to "high", the XBeam-CRI image is smoothed. CRI Enhance setting "off" leads to a sharper impression of the XBeam-CRI image. This function is only available if <u>X-BEAMCRI</u> is switched on.
29	<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).
30	<u>EXIT</u>	Press the <u>EXIT</u> key on the control panel to exit the 2D Sub menu.

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

#### 4-4-2 M Mode Checks

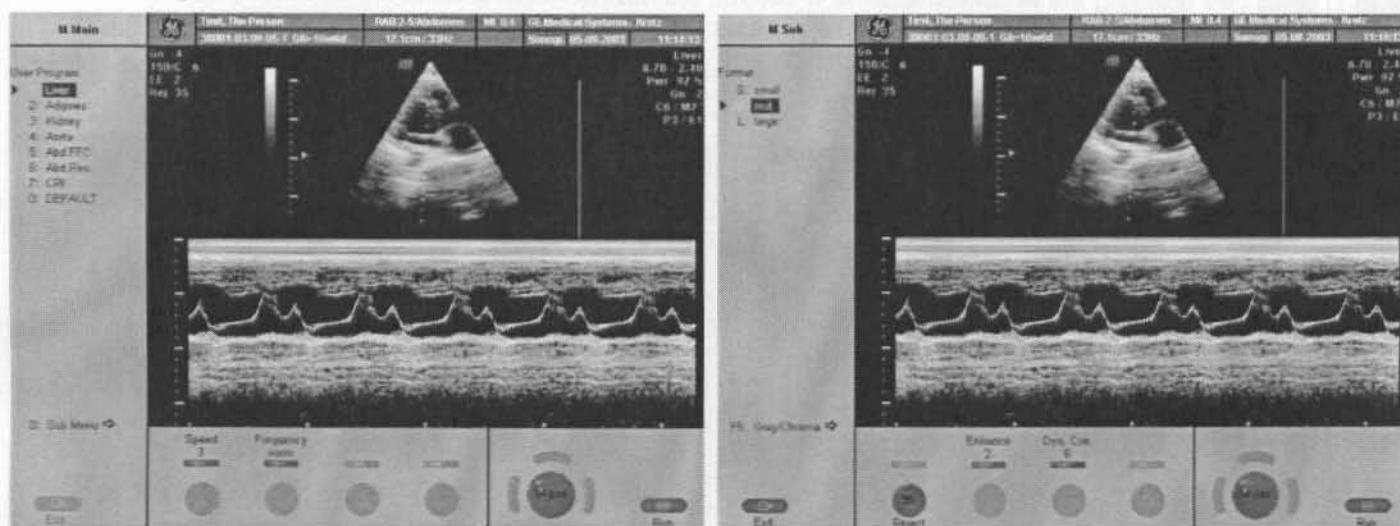


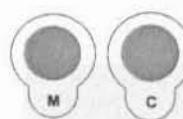
Figure 4-8 M Main and M Sub

Table 4-4 M Mode Functions

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

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

#### 4-4-2-1 MCFM Mode Check



By pressing the **M** control and the **C** control, the MCFM mode is switched on in the preparation mode. The M-cursor with M-Color window appears on the active 2D image.

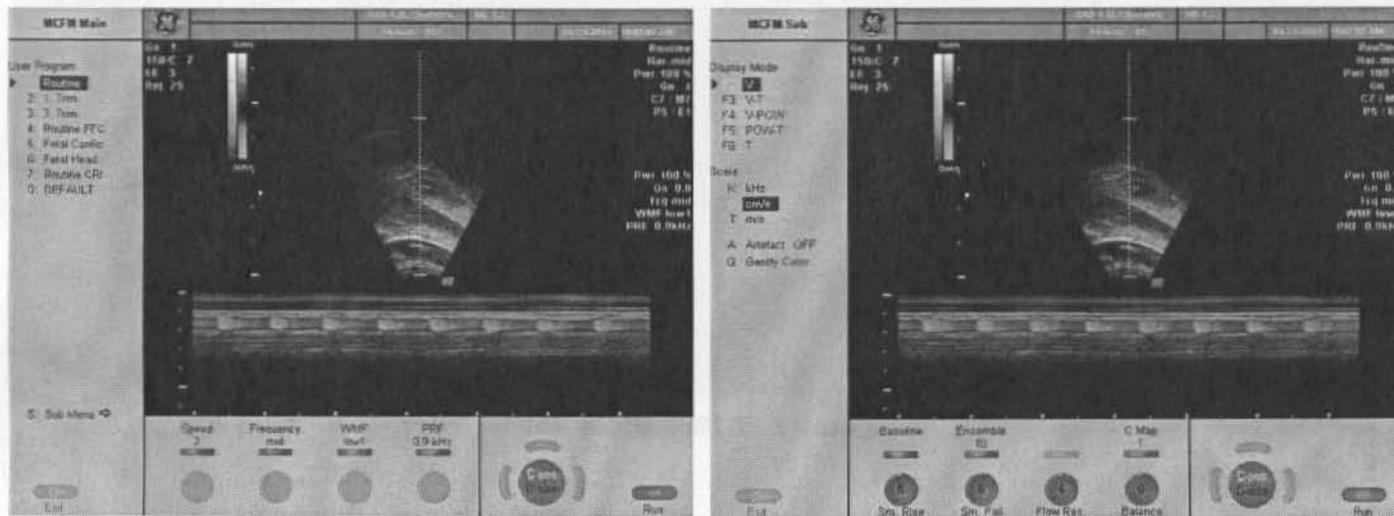


Figure 4-9 MCFM Main and MCFM Sub Menu

For further details refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 6.4.

#### 4-4-3 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.

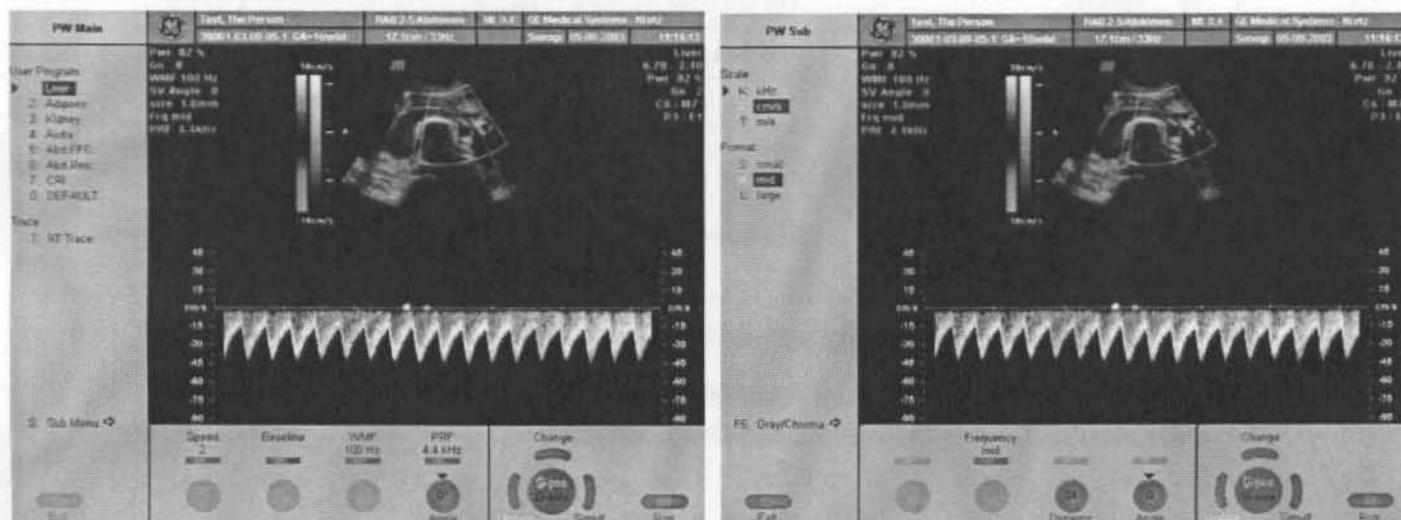
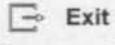


Figure 4-10 PW Main and PW Sub

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 2D single 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	Steering 	The steering function is only possible with linear probes.
5	<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.
6	Invert 	This function inverts the Doppler spectrum display in relation to the direction of the flow. (The Invert function is possible in read and write mode.)
7	<b>SPEED</b>	By touching up or down, four different sweep speeds can be selected.
8	<b>BASELINE</b>	Adjusting the baseline is possible in read- and write Mode (up/down in 8 steps).
9	<b>WMF</b> (Wall Motion Filter)	Used to eliminate Doppler "noise" that is caused by vessel wall motion.

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

Step	Task	Expected Results
10	<u>PRF</u>	The Velocity Range display is governed by the pulse repetition frequency (PRF). Exceeding the maximum PRF, the HPRF-Mode is automatically switched on.
11	<u>ANGLE</u>	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°.
12	<u>SCALE</u>	To select the displayed measuring unit (in relation to the zero-line).
13	<u>FORMAT</u>	For selection of either one of three formats.
14	<u>FREQUENCY</u>	Serves for selection of the required transmit frequency for actual gate position.
15	<u>DYNAMIC</u>	Dynamic Range adjusts the display cutoff of the Doppler analysis waveform.
16	Exit 	Press the <u>EXIT</u> key on the control panel to exit the PW or CW Sub menu.

For further details see: Voluson® 730Pro / 730ProV Basic User Manual:

- Chapter 7.1, PW Mode (Pulsed Wave Doppler)
- Chapter 7.2, CW Mode (Continuous Wave Doppler)

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

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

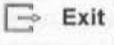


Figure 4-11 CFM Main and CFM Sub Menu

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>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.
4	Steering 	Beam Steering is only possible with linear probes in CFM and PD Mode.
5	Invert 	The color of the color wedge inverts around the baseline. (impossible in PD Mode)
6	<u>QUALITY</u>	Improves the Color Resolution by reducing the image frame rate, respectively vice versa.
7	<u>FREQUENCY</u>	It serves for selection of the Transmit Frequency which also depends on the Color Box position.
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>ZOOM</u>	Image magnification (PAN-Zoom) in read- and write mode.

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

Step	Task	Expected Results
11	<u>DISPLAY MODE</u>	To select the CFM- Display Mode (V; V-T; V-Pow; Pow-T; or T).
12	<u>SCALE</u> (CFM, TD)	The maximum velocities are displayed above and under the color scale in kHz, cm/s or m/s.
13	<u>LINE FILTER</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.
14	<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.
15	<u>ARTEFACT</u> (on/off)	Switch on/off the artifact suppression.
16	<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)
17	<u>ENSEMBLE</u>	Controls the number of pulses to constitute one Color- or Power-Doppler line in the display.
18	<u>LINE D.</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.
19	<u>C-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.
20	<u>SM. RAISE</u>	To select different filter periods for raising velocity. Filtering of the rise velocity leads to noise suppression.
21	<u>SM. FALL</u>	To select different filter periods for falling velocity. This filter leads for "prolongation" of the display flow.
22	<u>FLOW RES.</u>	The "Flow Resolution" function controls the axial resolution of color in the display. It adjusts the axial sample depth of color pixels.
23	<u>BALANCE</u>	The Balance controls the amount of Color display over bright echoes and helps to confine color within the vessels wall.
24	<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 fewer signals than a higher setting)
25	Exit 	Press the <u>EXIT</u> key on the control panel to exit the CFM, PD or TD Sub menu.

For further details refer to the Voluson® 730Pro / 730ProV Basic User Manual:

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

## 4-4-5 Volume Mode Checks

**NOTICE** Real Time 4D (freeware on Voluson® 730ProV), RT\_4D\_Biopsy\* and VOCAL II\*\* are Options. If these options is not a part of the system configuration, the appendant checks can be omitted.

**NOTE:** *Different menus are displayed depending on which Menu and which Volume Mode (Static 3D, Real Time 4D, 4D Biopsy) is selected.*

### 4-4-5-1 Pre-Volume Mode Functions

1. select the desired Volume Acquisition Mode:

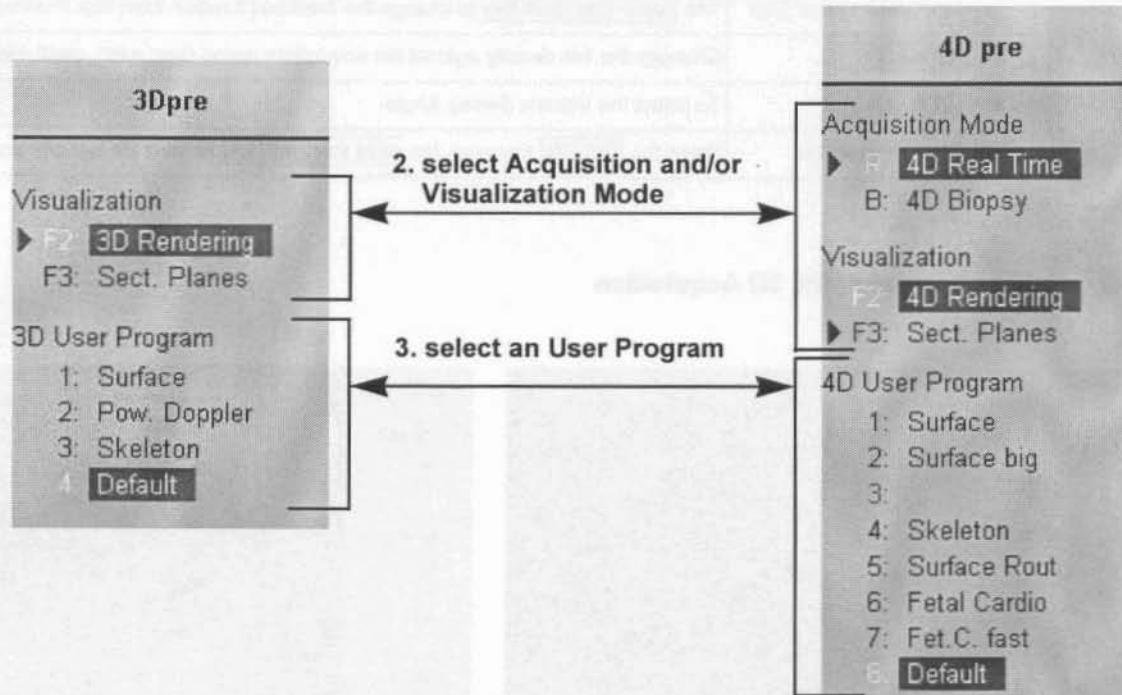
3D

Volume Acquisition: Static 3D

4D

Volume Acquisition: Real Time 4D

The Volume Mode function is switched on, the "3D Pre" respectively "4D Pre" menu appears on the screen (write mode) and the volume box appears on the Image area.



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

Figure 4-12 Pre-Volume Mode menus

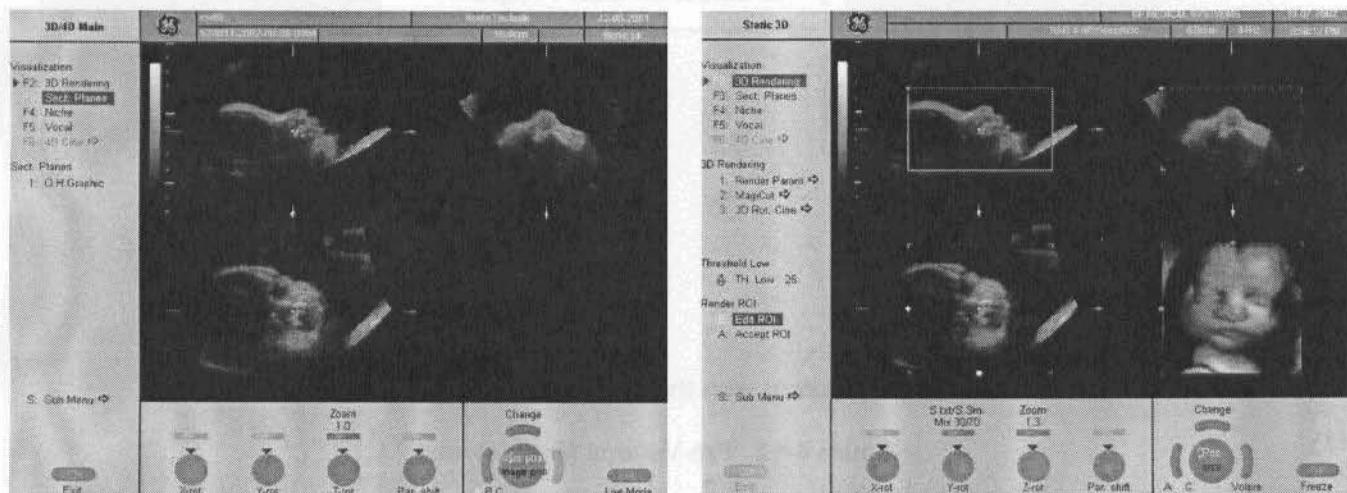
Table 4-7 Pre-Volume Mode Functions

Step	Task	Expected Results
1	<u>3D RENDERING</u>	3D Static volume acquisition + rendered 3D image (also in combination with PD or CFM Mode)
1	<u>SECT. PLANES</u>	3D Static volume acquisition resp. 4D volume acquisition without rendered 3D image

**Table 4-7 Pre-Volume Mode Functions**

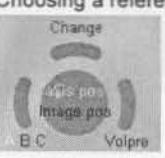
Step	Task	Expected Results
2	<u>4D REAL TIME</u>	Real Time 4D - continuous volume acquisition and parallel calculation of 3D rendered images
3	<u>4D BIOPSY</u> *	Real Time 4D Biopsy continuous volume acquisition and parallel calculation of 3D rendered image.
4	(Diagram: A circle containing a 2x2 grid of squares)	- Quarter size display of Sectional Planes without 3D image or - Quarter size display of Sectional Planes + rendered 3D image <u>(Note:</u> The display depends on selected Acquisition- and Visualization Mode!)
5	(Diagram: A circle containing a 2x1 grid of squares)	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)
6	(Diagram: A circle containing a single square)	- Full size display of a the reference image or - Full size display of the rendered 3D image. <u>(Note:</u> The display depends on selected Acquisition- and Visualization Mode!)
7	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.
8	<u>QUALITY</u>	Changes the line density against the acquisition speed (low, mid1, mid2, high1, high2).
9	<u>VOL. ANGLE</u>	To select the Volume Sweep Angle.
10	Start Acquisition	Press the <u>FREEZE</u> key resp. the <u>right trackball key</u> to start the Volume acquisition.

#### 4-4-5-2 Functions after the 3D Acquisition



**Figure 4-13 3D/4D Main - Sectional Planes and Image Rendering**

Table 4-8 Functions after the 3D Acquisition

Step	Task	Expected Results
1		<u>X-ROT</u> : Rotation about X-axis of the reference image. <u>Y-ROT</u> : Rotation about the Y-axis of the reference image. <u>Z-ROT</u> : Rotation about the Z-axis of the reference image.
2		<u>PAR. SHIFT</u> : 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 compiled to a 3D section aspect. The aspect shows quasi a spatial cut into the reference image.
4	<u>O.H. GRAPHIC</u>	Display of orientation help image figure.
5		Press the <u>left trackball key</u> repeatedly to choose the Reference image among A, B or C. Choosing a reference image automatically determines the control functions of the rotary controls and the trackball for the liberal adjustment of a sectional plane.
6	<u>Initial Condition</u> 	Resets the rotations and translations of a volume section to the initial (start) position.
7		To change the image orientation of the rendered 3D image.
8	<u>ZOOM</u>	The 3D image as well as the sectional planes can be varied by their aspect ratio.
9	<u>S.TXT/S.SM. MIX</u>	To adjust the mix ratio between two calculated modes.
10	<u>TH. LOW</u> respectively <u>PD LOW</u> in case of 3D+PD	All echoes below the level will be disregarded for calculation of the surface. 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 PARAM.</u>	To select the Render Mode (Basic Mode and Render Algorithm)

4-4-5-3 Sub Menu

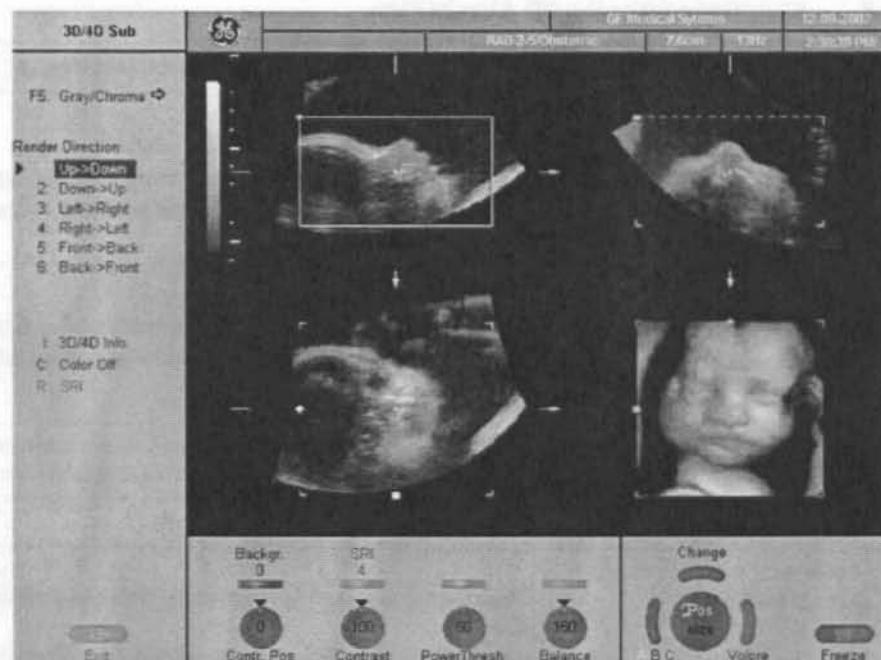


Figure 4-14 3D/4D Sub Menu

Table 4-9 Sub Menus

Step	Task	Expected Results
1	<u>RENDER VIEW DIRECTION</u>	To select the desired Render View Direction (green line symbolizes direction of the view). <u>Note:</u> The Render View Direction keys are not available in Static 3D Sectional Planes.
2	<u>GRAY/CHROMA</u>	Depending on individual requirements a "harder" or "softer" image can be obtained.
3	<u>3D/4D INFO</u>	On/Off switch to show full or reduced Image Info parameter on screen.
4	<u>COLOR OFF</u>	On/Off switch to show an acquired 3D+CFM or 3D+PD image with or without the color information.
5	<u>SRI *</u>	Speckle Reduction Imaging (SRI) can be activated in all 3D/4D modes (except Full size display) to reduce speckle which interferes with the sectional planes (A, B and C). <u>Note:</u> The rendered 3D image is not affect.
6	<u>BACKGR.</u>	Adjusts the contrast of the screen background from dark to bright. <u>Note:</u> This key is not available in Static 3D Sectional Planes mode.
7	<u>CONTR. POS</u>	To set the start point of the gamma curve bending. (Graphic display on screen) <u>Note:</u> This key is not available in Static 3D Sectional Planes mode.
8	<u>CONTRAST</u>	To set the contrast of the bending. (Graphic display on screen) <u>Note:</u> This key is not available in Static 3D Sectional Planes mode.
9	<u>POWER THRESH.</u>	Only available if a 3D+CFM or a 3D+PD image is acquired. <u>Note:</u> This key is only available if a 3D+CFM or a 3D+PD image is acquired.
10	<u>BALANCE</u>	Only available if a 3D+CFM or a 3D+PD image is acquired. <u>Note:</u> This key is only available if a 3D+CFM or a 3D+PD image is acquired.

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

#### 4-4-6 Using Cine

##### 4-4-6-1 Activating Cine

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

##### 4-4-6-2 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.

##### 4-4-6-3 Activating 2D Auto Cine

- 1.) After Freeze press the **LEFT TRACKBALL KEY**.
- 2.) Select the start image of the sequence by rotating the **START** digipot. The selected image is simultaneously displayed.
- 3.) Turn the **END** digipot to the end image 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 press the **RIGHT OR LEFT TRACKBALL KEY**.

After stopping the sequence, move the **TRACKBALL** to display the images one by one.

##### 4-4-6-4 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 screen: **Cine xxx/Loop or Cine/Loop xxx**.

##### 4-4-6-5 Activating 3D Rotation Cine

- 1.) After 3D Volume acquisition select the **3D ROT. CINE** item from the menu area.
- 2.) Select the **ROTATION ANGLE** from the menu area or select it manually with the **START** and **END** digipot rotary controls.
- 3.) Select the **STEP ANGLE** and the **ROTATION AXIS**.
- 4.) Select **CALCULATE** or press the **RIGHT OR LEFT TRACKBALL KEY** to start the calculation.
- 5.) To start/stop the 3D Rotation Cine sequence press the **RIGHT OR LEFT TRACKBALL KEY**.

##### 4-4-6-6 Activating 4D Cine

- 1.) After Real Time 4D acquisition press the Freeze key to display the "4D Cine" menu.
- 2.) Press the **LEFT TRACKBALL KEY** (Toggle function: Start/Stop).
- 3.) Select the Cine Mode direction and the review **SPEED**.
- 4.) To start/stop the Real Time 4D Cine sequence press the **LEFT TRACKBALL KEY**.

**NOTE:** After stopping a 3D Rotation Cine sequence or a Real Time 4D Cine sequence, move the **TRACKBALL** to display the images one by one.

#### 4-4-7 Generic Measurements

**NOTE:** Different menus are displayed depending on:

- the currently selected Application and Display Mode,
- the selected "Study",
- and the settings in the Measure Setup - **MEASURE & CALC** page.

For further details refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 13.



##### General remarks to perform Generic Measurements:

- By pressing the **CALIPER** key on the control panel the Generic Measurement function is switched on.
- Selection of the desired measurement marks is done with the **NAVIGATION WHEEL** or by pressing the corresponding keyboard shortcuts.
- If the **TRACKBALL MENU NAVIGATION** key is illuminated, the trackball is consequently assigned to select the menu items in the menu area on the left side of the screen.
- 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 Measure Setup, also the **FREEZE** key can be used for confirming the last measuring mark of the currently performed measurement.
- To cancel the measurement of the currently selected item, select **CANCEL** or press **BACKSPACE**.
- To delete the results of the last measured item, select **DELETE** or press **BACKSPACE**.
- To delete all measurement results of the selected "Study" from the monitor as well as from the corresponding Worksheet, select the **CLEAR GROUP** or press the **DELETE** key.
- All measurement results will be automatically included in the "Generic" patient worksheet.
- To erase measurement results, press the **CLEAR ALL** key on the control panel or the **DELETE MEAS.** key on the keyboard.
- To exit from Generic measurements, 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**.

#### 4-4-7-1 Distance and Tissue Depth Measurements (2D and M Mode)

- 1.) Press the **CALIPER** key and then select the **GENERIC DIST.** in the menu area.
- 2.) Select the appropriate item from the menu area. 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, or to re-adjust the traced line, press the upper trackball key.

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

**NOTE:** To alternate the control from one **cursor** to the other, press **CHANGE** (the upper trackball key).  
To re-adjust a traced line, press **UNDO** (the upper trackball key) repeatedly.

#### 4-4-7 Generic Measurements (cont'd)

##### 4-4-7-2 Circumference/Area Measurements

- 1.) Press the **CALIPER** key and then select the **GENERIC AREA** in the menu area.
- 2.) Select the corresponding item from the menu area. 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 a "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, or to readjust a traced line, press the 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, select **DELETE** or press the **BACKSPACE** key on the keyboard.  
The original caliper is displayed to restart the measurement.
- To exit the measurement function, press the **CALIPER** key or **EXIT** key on the control panel.

##### 4-4-7-3 Volume Measurements

- 1.) Press the **CALIPER** key and then select the **GENERIC VOLUME** in the menu area.
- 2.) Select the appropriate item.
- 3.) Perform the measurement(s) using the **TRACKBALL** and **SET** (right or left trackball key).  
For further details: see 4-4-7-1 and 4-4-7-2.

###### 4-4-7-3-1 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 **MULTIPLANE** item.
- 3.) Select the first section through the body by rotating the **REF.SLICE** 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 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 / NEXT** flip switch control.

**NOTE:** To erase the results, select the **INIT** item at the menu area.

#### 4-4-7 Generic Measurements (cont'd)

##### 4-4-7-4 Measurements in Spectral Doppler Mode

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

###### 4-4-7-4-1 Auto Trace

- 1.) Press the **CALIPER** key and then select the **GENERIC** in the menu area.
- 2.) Select **AUTO TRACE** item from the menu area on the left side of the screen.  
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 **SET** 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!*

###### 4-4-7-4-2 Manual Trace

- 1.) Press the **CALIPER** key and then select the **GENERIC** in the menu area.
- 2.) Select the **MANUAL TRACE** item from the menu area. 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.

###### 4-4-7-4-3 Heart Rate

- 1.) Press the **CALIPER** key and then select the **GENERIC** in the menu area.
- 2.) Select the **HR** item from the menu area. A line appears on the screen.
- 3.) Move the line with the **TRACKBALL** to the start point of the period and press **SET** (right or left trackball key). A second line appears.
- 4.) Move the second line to the end point of the period.
- 5.) Select the number of "HR cycles" for the measurement with the digipot.
- 6.) Press the **SET** (right or left trackball key) again to fix the line. The Heart Rate is displayed.

NOTE: *For further Doppler Measurements and other details refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 13*

#### 4-4-8 Calculations

The Voluson® 730Pro / 730ProV system supports calculation packages and application-oriented patient Worksheets (Reports) for following applications:

- Abdomen Calculations
- Small Parts Calculations
- Obstetric Calculations
- Cardiology Calculations
- Urology Calculations
- Vascular Calculations
- Gynecology Calculations
- Pediatric Calculations
- Neurology Calculations
- Orthopedics Calculations

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

**NOTE:** Different menus are displayed depending on:

- the currently chosen Application
- the selected Display Mode,
- the selected "Study",
- and the settings in the Measure Setup - **MEASURE & CALC** page.

For further details refer to the Voluson® 730Pro / 730ProV Basic User Manual, Chapter 14



**General remarks to perform Calculations:**

- By pressing the **CALC** key on the control panel the Calculation function is switched on.
- Selection of the desired measurement marks is done with the **NAVIGATION WHEEL** or by pressing the corresponding keyboard shortcuts.
- If the **TRACKBALL MENU NAVIGATION** key is illuminated, the trackball is consequently assigned to select the menu items in the menu area on the left side of the screen.
- 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 Measure Setup, also the **FREEZE** key can be used for confirming the last measuring mark of the currently performed measurement.
- To cancel the measurement of the currently selected item, select **CANCEL** or press **BACKSPACE**.
- To delete the results of the last measured item, select **DELETE** or press **BACKSPACE**.
- To delete all measurement results of the selected "Study" from the monitor as well as from the corresponding Worksheet, select the **CLEAR GROUP** or press the **DELETE** key.
- All measurement results will be automatically included in the "Generic" patient worksheet.
- To erase measurement results, press the **CLEAR ALL** key on the control panel or the **DELETE MEAS.** key on the keyboard.
- To exit from Generic measurements, press the **CALIPER** key or the **EXIT** key on the control panel.

#### 4-4-8-1 Worksheet (Report) Pages



Press the **WORKSHEET** key on the control panel to view the "application dependent" patient worksheet pages that contain the results of calculations and measurements. Any stored patient worksheet can be edited, printed, transferred, saved to Sonoview or sent to DICOM server.

## 4-4-9 Probe/Connectors Usage

### 4-4-9-1 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.

### 4-4-9-2 Activating the probe

- 1.) Press the **PROBE** key to activate the "Probe Select" menu.
- 2.) Select the appropriate probe using the **TRACKBALL** and the **TRACKBALL KEYS**.
- 3.) Upon selection of an "Application", the programmed user presets appear.
- 4.) Clicking a "Setting" field causes loading of the preset.

The probe is initialized, the main menu (2D mode) and the ultrasound image appears on the monitor in write mode (real time display).

### 4-4-9-3 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® 730Pro / 730ProV 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.

### 4-4-9-4 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.

#### 4-4-10 Image Management (Sonoview)

For Sonoview - Image Management functionality refer to Chapter 15 in the Basic User Manual of Voluson® 730Pro / 730ProV. 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

#### 4-4-11 Using the 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

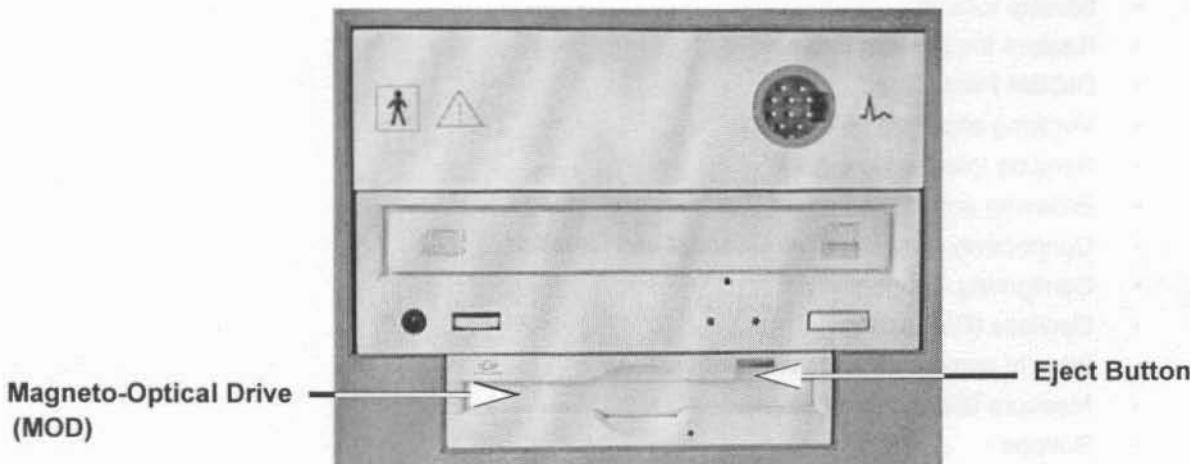


Figure 4-16 Magneto-Optical Drive

- 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.

#### 4-4-11-1 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 4-27*.

- 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.

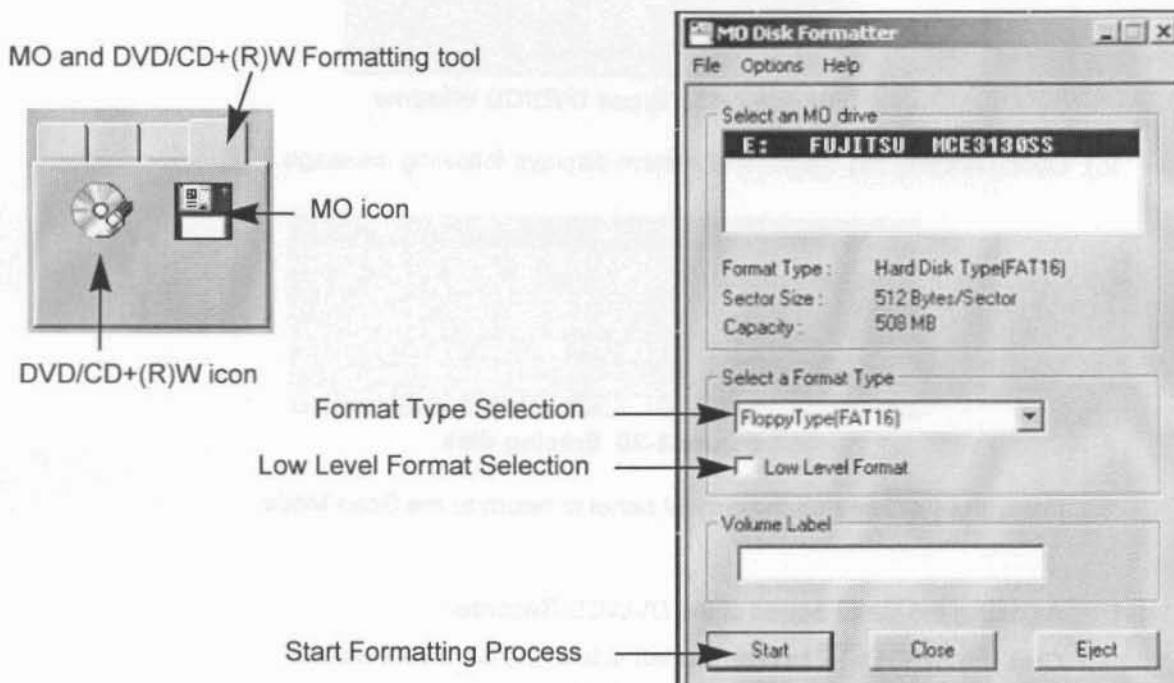


Figure 4-17 MO Disk Formatter Window

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

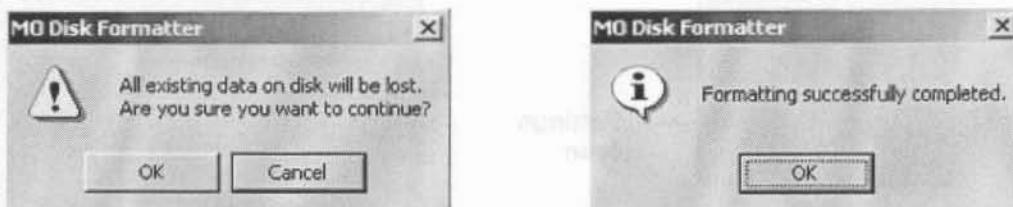


Figure 4-18 MO Disk Formatter messages

- 5.) Select the CLOSE button and press the EXIT key on the control panel to return to the Scan Mode.

#### 4-4-11-1 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.

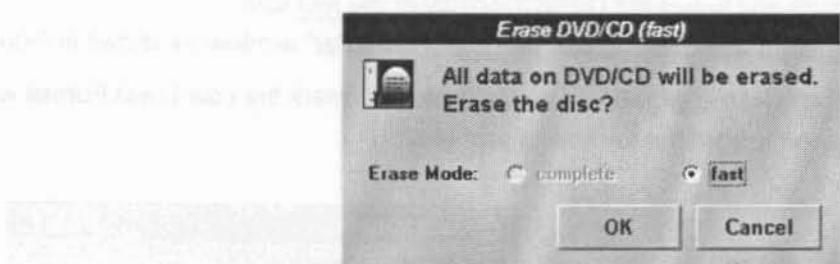


Figure 4-19 Erase DVD/CD Window

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

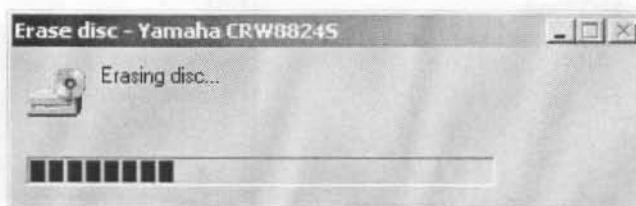


Figure 4-20 Erasing disk

- 3.) Press the EXIT key on the control panel to return to the Scan Mode.

##### 4-4-11-1-1 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.

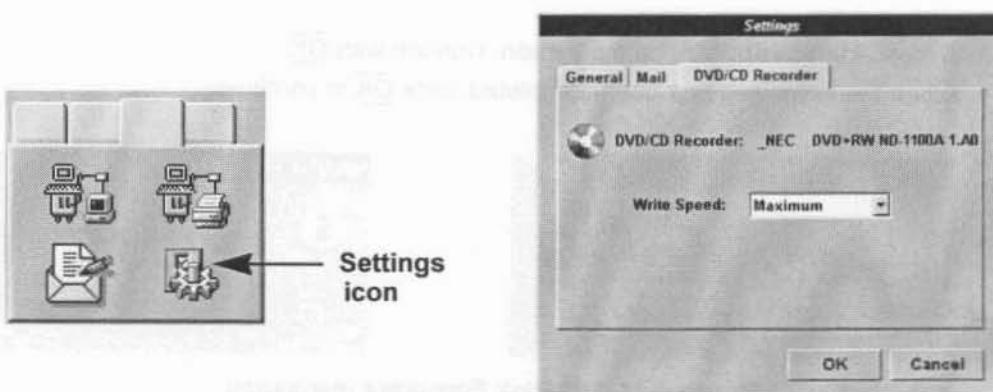


Figure 4-21 Settings of the DVD/CD Recorder

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

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

- 1.) Press the **UTILITIES** key on the control panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area to activate the setup desktop screen.
- 3.) Select the **BACKUP** page.

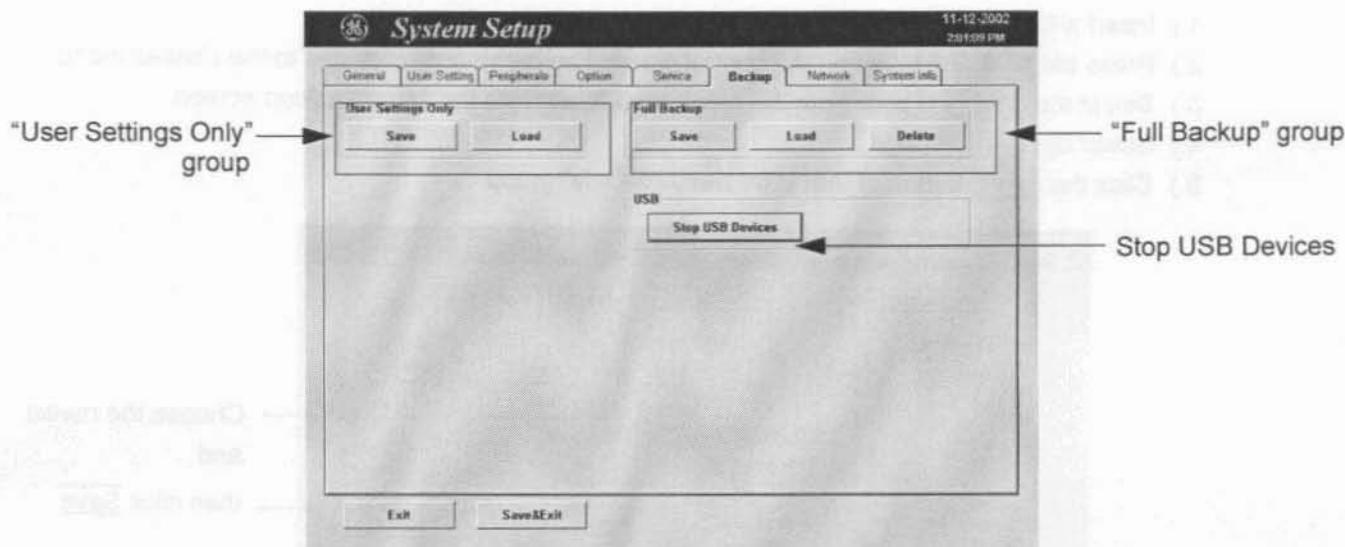


Figure 4-22 System Setup - Backup page

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 4-32
- Section 4-5-2 "Load User Settings Only (Application Settings)" on page 4-33

**B.) Full Backup**

- Section 4-5-3 "Save Full Backup (Presets, Configurations & Application Settings)" on page 4-35
- Section 4-5-4 "Load Full Backup (Presets, Configurations & Application Settings)" on page 4-37
- Section 4-5-5 "Delete Full Backup (Presets, Configurations & Application Settings)" on page 4-39

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 3-12-1 "Map Network Drive" on page 3-50
- 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 3-5-10 "External USB-Devices" on page 3-18.

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

The User Settings contains:

- User Programs
- Auto Text
- 3D/4D Programs

- 1.) Insert a DVD/CD+(R)W or MO (Magneto-Optical Disk) into the drive.
- 2.) Press the **UTILITIES** key on the control panel. The menu area changes to the Utilities menu.
- 3.) Select the **SYSTEM** item from the menu area to activate the setup desktop screen.
- 4.) Select the **BACKUP** page.
- 5.) Click the **SAVE** button of the "User Settings Only" group.

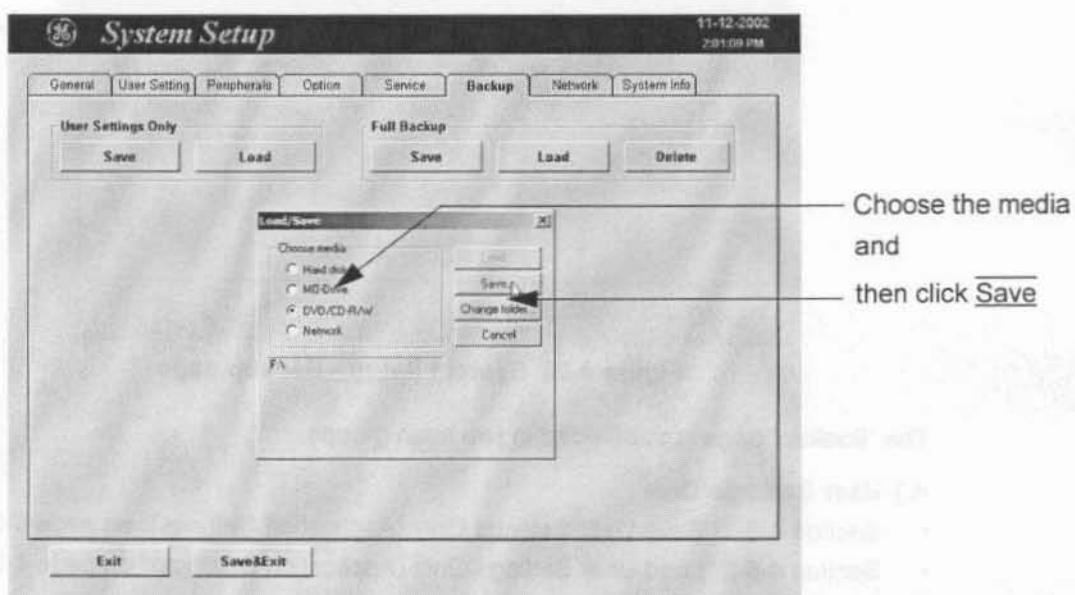


Figure 4-23 User Settings Only - Save window

- 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:\User Settings.

- 1.) Insert the DVD/CD+(R)W or MO (Magneto-Optical Disk) into the drive.
- 2.) Press the **UTILITIES** key on the control panel. The menu area changes to the Utilities menu.
- 3.) Select the **SYSTEM** item from the menu area to activate the setup desktop screen.
- 4.) Select the **BACKUP** page and click the **LOAD** button of the "User Settings Only" group.

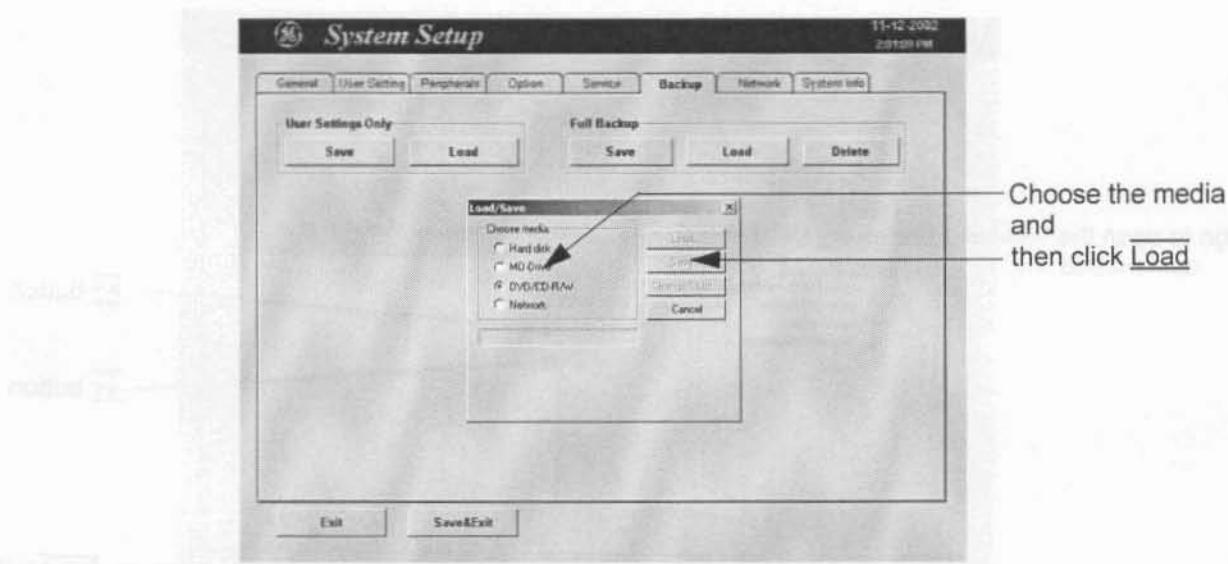


Figure 4-24 User Settings Only - Load window

- 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 recommended to use Application settings which are adapted for the systems software version!

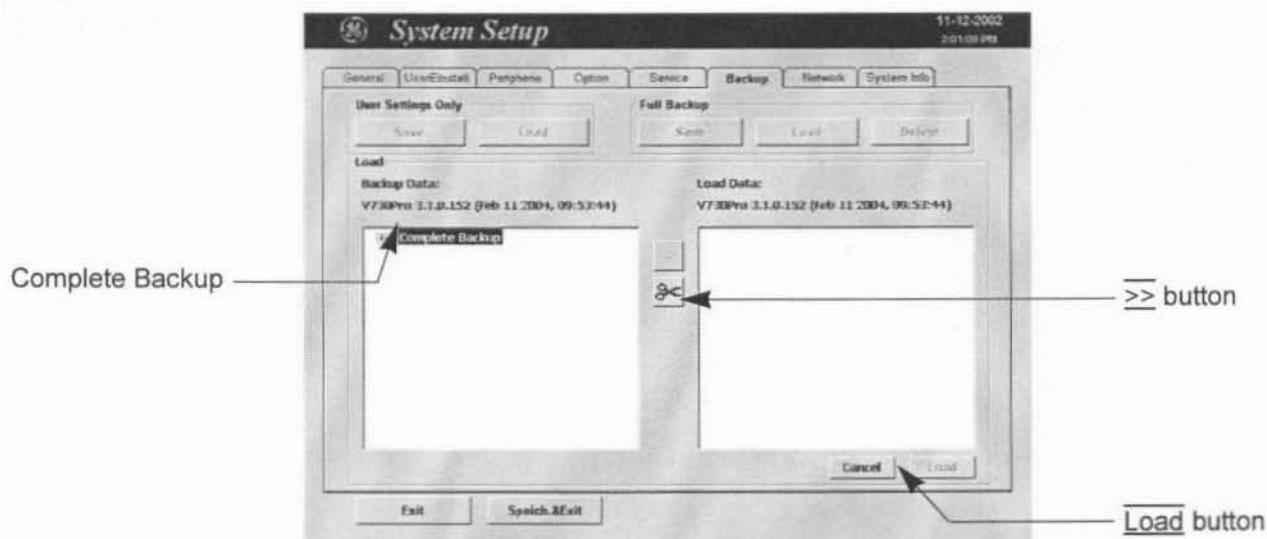


Figure 4-25 Load Backup Data

#### 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 **>>** 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 **-** sign to open the content tree.

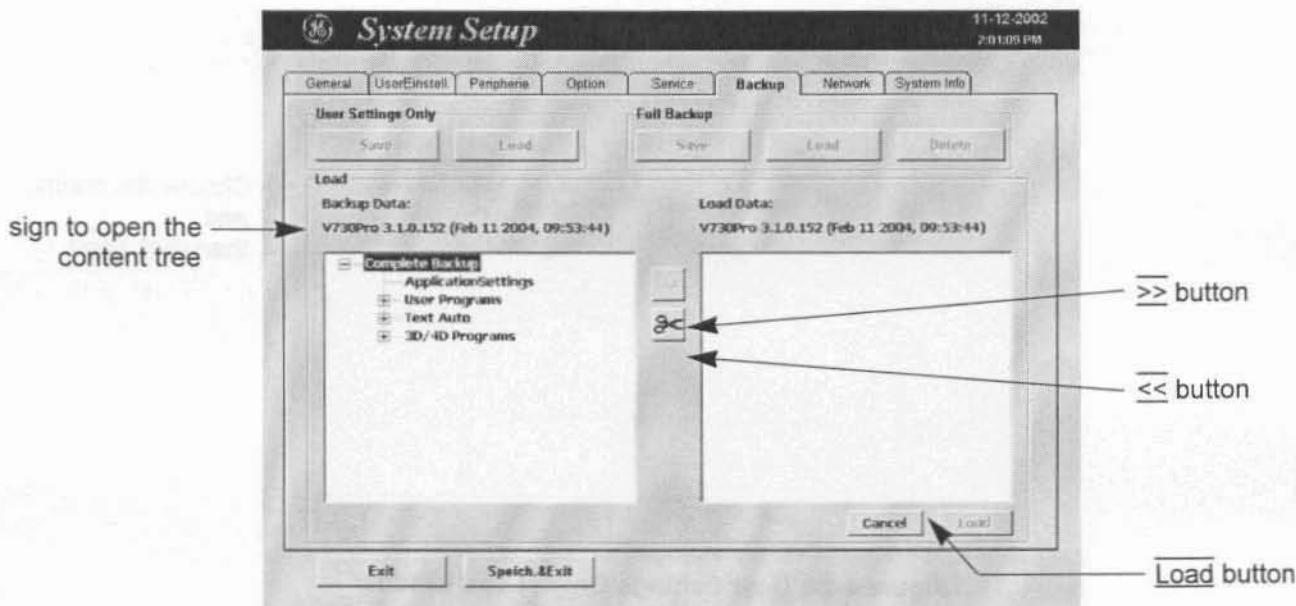


Figure 4-26 Load only parts of the Backup

- 2.) Click the **>>** button to copy the selected item into the Load Data field.
- 3.) To return selected items from the Load Data field to Backup Data field select the **<<** button.
- 4.) 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.) Press the **UTILITIES** key on the control panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area to activate the setup desktop screen.
- 3.) Select the **BACkUP** page and click the **SAVE** button of the "Full Backup" group.

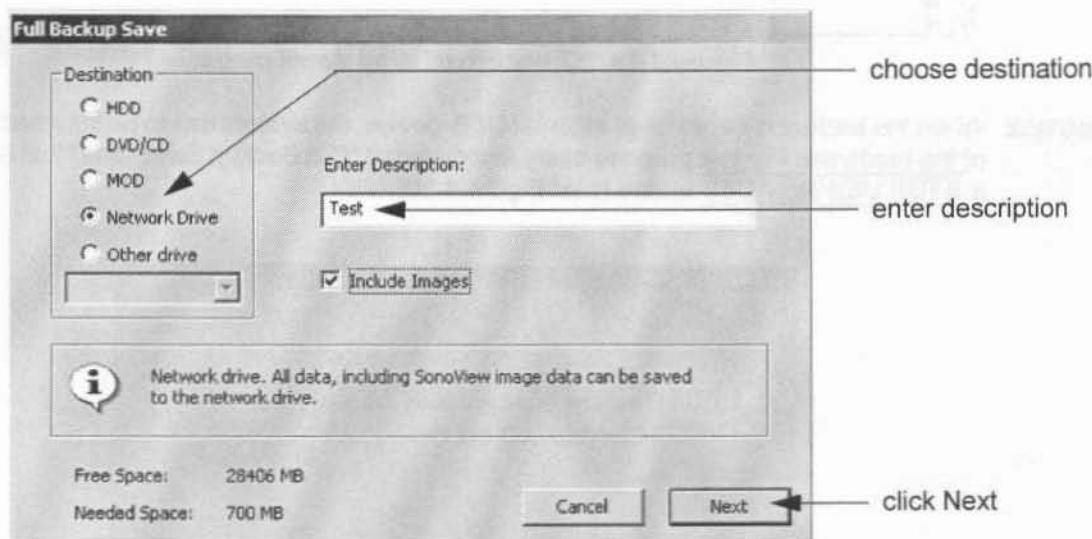


Figure 4-27 Full Backup Save

- 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.

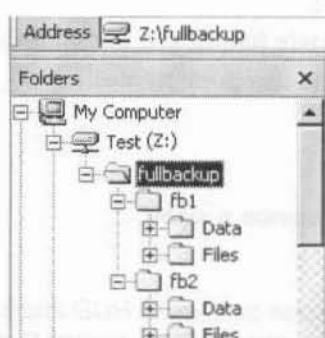
After copying the data, the Voluson® 730Pro / 730ProV reboots and the application starts again.

#### 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 3-12-1 "Map Network Drive" on page 3-50), 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:

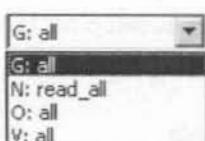


The sub folders have the names *fbX* where *X* is a number (e.g., Z:\fullbackup\fb1).

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 enumeration 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).

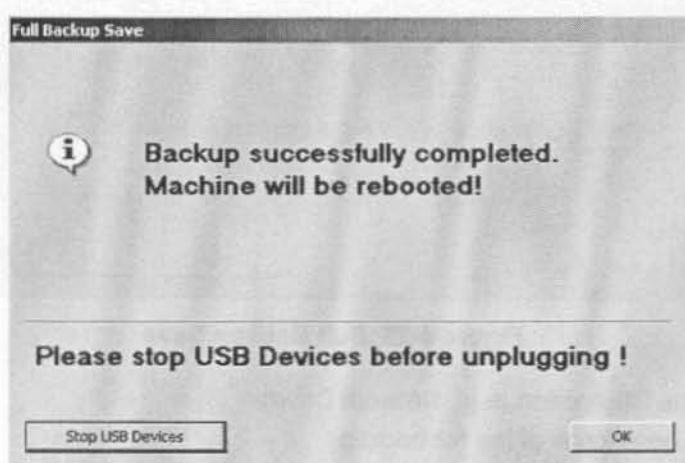


Figure 4-30 Please stop USB Devices before unplugging!

For further details review: Section 3-5-10 "External USB-Devices" on page 3-18.

#### 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 4-35.

The "Full Backup" loading procedure replaces (overwrites) ALL the existing data on the local hard drive of the Voluson® 730Pro / 730ProV system!

 **CAUTION** There are circumstances where it is not possible to load (restore) all the data.  
The following rules specify the 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® 730Pro / 730ProV 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), 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.) Press the UTILITIES key on the control panel. The menu area changes to the Utilities menu.
- 2.) Select the SYSTEM item from the menu area to activate the setup desktop screen.
- 3.) Select the BACkUP page and click the LOAD button of the "Full Backup" group.

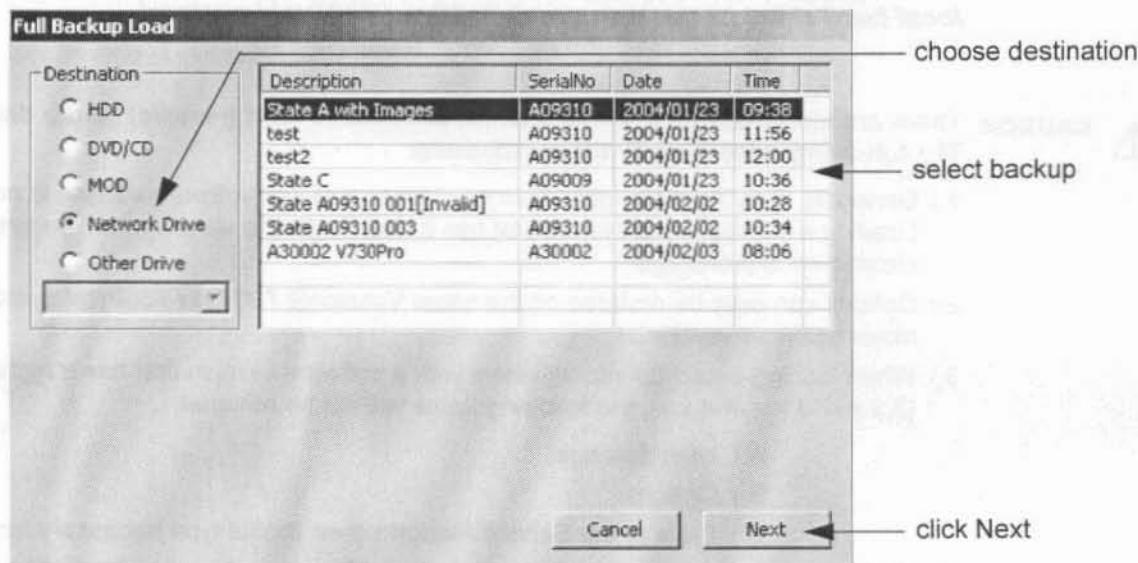


Figure 4-31 Full Backup Load

- 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.

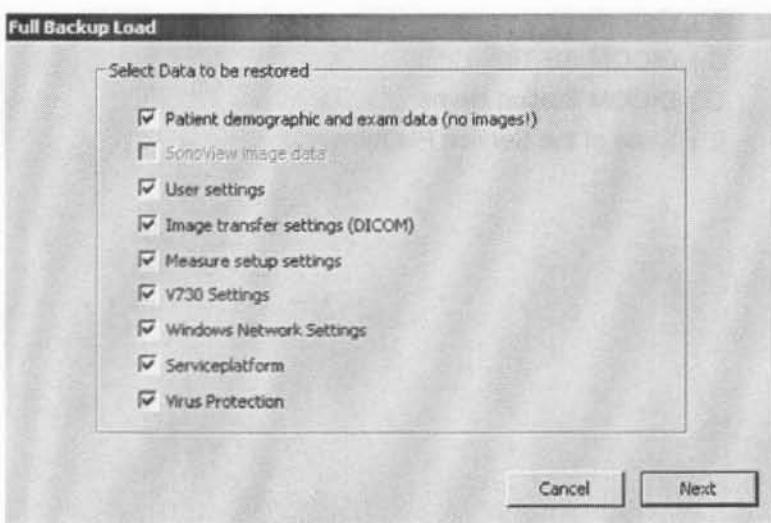


Figure 4-32 Select Data to be restored

- 7.) Select the data to be restored to the Voluson® 730Pro / 730ProV 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.

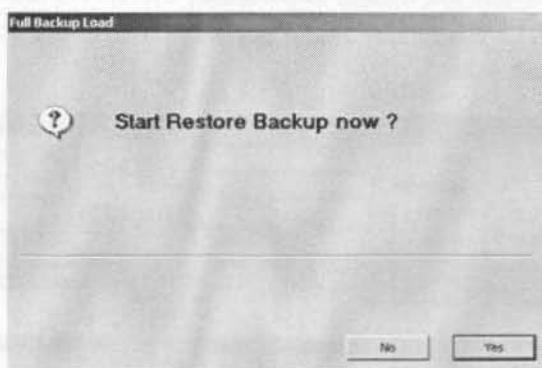


Figure 4-33 Start Restore Backup now?

**⚠ 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® 730Pro / 730ProV reboots and the application starts again.

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

- 1.) Press the UTILITIES key on the control panel. The menu area changes to the Utilities menu.
- 2.) Select the SYSTEM item from the menu area to activate the setup desktop screen.
- 3.) Select the BACKUP page and click the DELETE button of the "Full Backup" group.

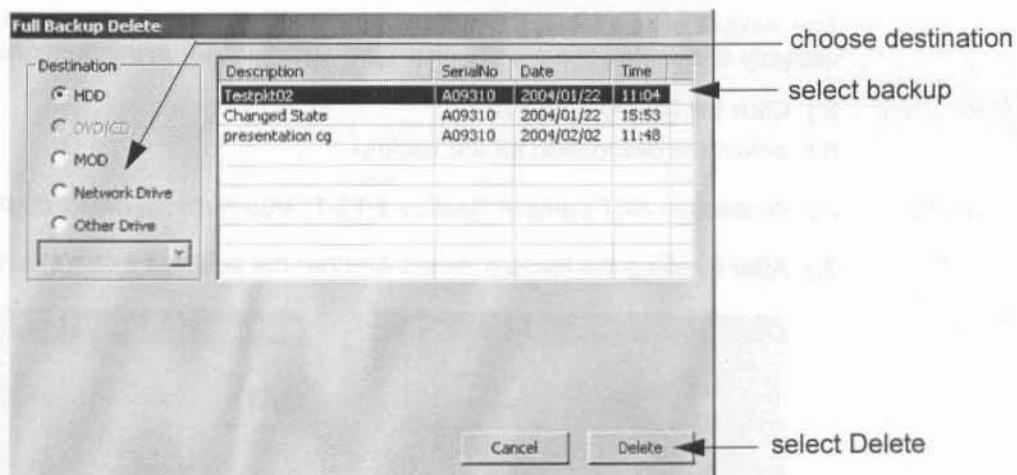


Figure 4-34 Full Backup Delete

- 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 4-4-11-1 "Formatting Media" on page 4-29.
- 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.

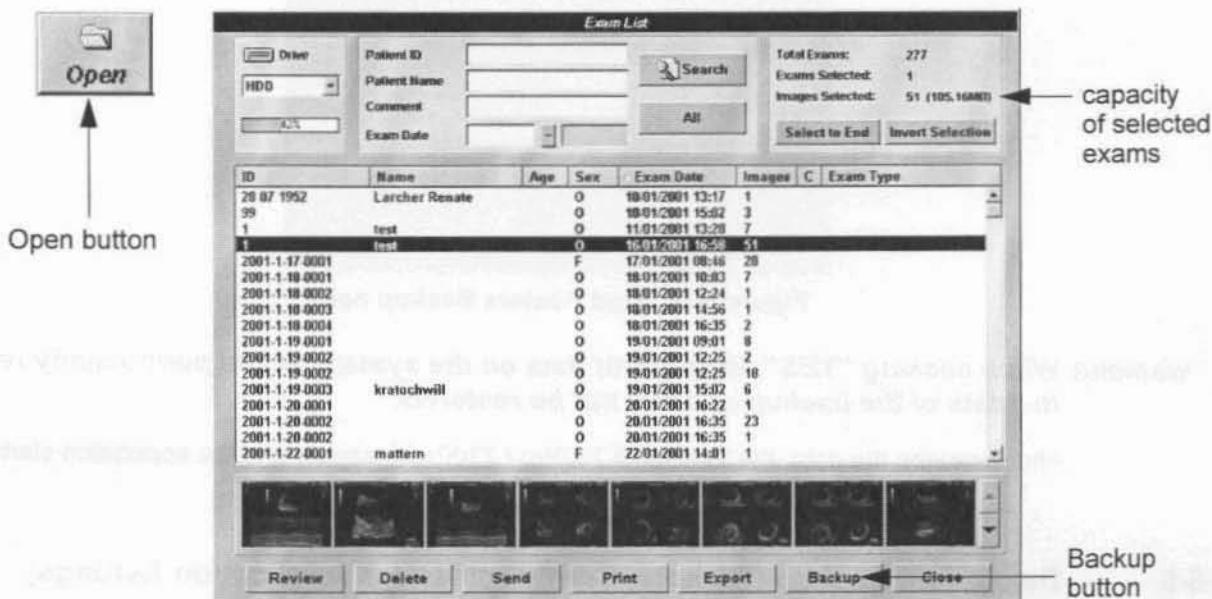


Figure 4-35 Sonoview Screen

- 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 3-12-1 "Map Network Drive" on page 3-50 first.

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

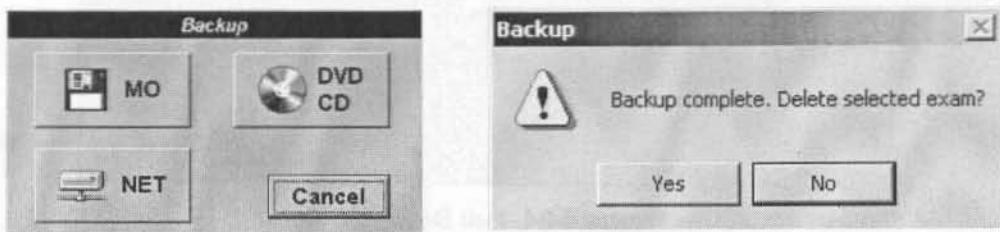


Figure 4-36 Backup windows

**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® 730Pro / 730ProV!

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

## Section 4-6 Software Configuration Checks

Press the **UTILITIES** key and select the **SYSTEM** item from the "Utilities" menu - which is shown in the menu area on the left side of the screen. The System Setup desktop offers different pages to check:

**Table 4-10 Software Configuration (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 Settings: Check settings of the "Patient ID" field	settings 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 the customer
8	Peripherals: Check Save Destination assignment	assigned as desired by the customer
9	Peripherals: Check 2D Save key assignment	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 options are set up correct	D = Demo , I = Inactive , P = Permanent
12	Network: Check DICOM, Sonoview and Network configuration	settings assigned as desired by the customer

Press the **UTILITIES** key and select the **MEASURE** item from the "Utilities" menu - which is shown in the menu area on the left side of the screen.

The Measure Setup desktop offers three different pages to check.



- NOTICE** Parameters and possible adjustments depend on the selected Application.  
To view, add, delete, reorder, edit or when creating a new parameter (in the **MEASURE & CALC** page), it is very important that all items are chosen correctly and that the relevant item is highlighted.

For further information refer to Chapter 18 in the Basic User Manual of Voluson® 730Pro / 730ProV.

**Table 4-11 Measurement Setup Checks**

Step	Task	Expected Result(s)
11	Measure & Calc: Check all settings for all applications	setting assigned as desired by the customer
2	Application Parameters: Check all settings for all applications	setting assigned as desired by the customer
3	Global Parameters: Check all settings	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 <u>FREEZE</u> key.	Stop image acquisition.
2	Press the <u>PRINT A</u> or <u>PRINT B</u> key on the Control Panel.	The image displayed on the screen is printed on printer, depending on the key assignment configuration
3	Press the <u>VCR</u> key on the Control Panel twice.	VCR starts recording (REC - will be displayed on the screen)
4	Press the <u>VCR</u> key twice again.	VCR stops recording
5	Press the <u>VCR</u> key on the Control Panel once.	The "VCR Remote Control" menu is displayed in the menu area as well as the status area on the screen.
6	Press the <u>RECORD</u> digipot or select the <u>RECORD</u> item from the menu area.	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 the <u>STOP</u> digipot or select the <u>STOP</u> item from the menu area.	To Stop recording The video status icon is changed to (Pause)
8	Press the <u>PLAY</u> digipot or select the <u>PLAY</u> item from the menu area.	To start, Play back an examination
9	Press the <u>EXIT</u> key on the control panel.	to return to the scanning mode
10	Use the assignable keys on the control panel (their functions are shown in the status area) or select the corresponding item from the menu area on the screen.	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 <u>ECG</u> key on the control panel to display the "ECG" menu on in the screen.	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



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 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

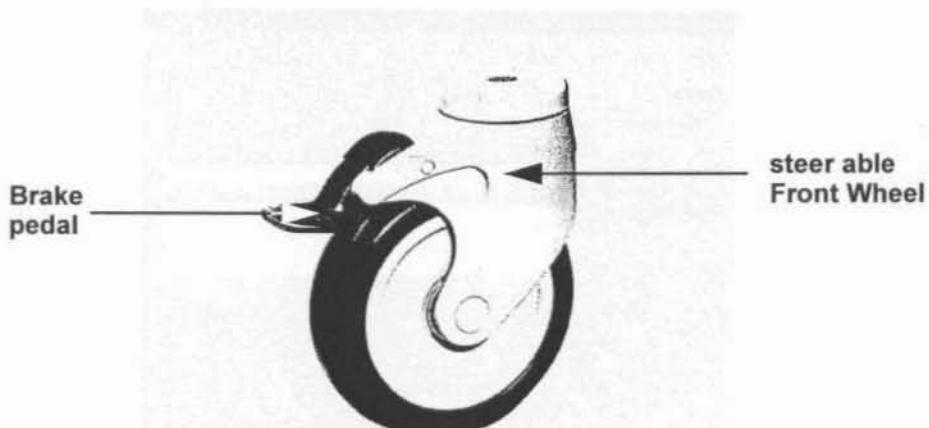


Figure 4-38 Front Wheel with Brake

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.) Press the **UTILITIES** key on the Control Panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area to activate the setup desktop 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.

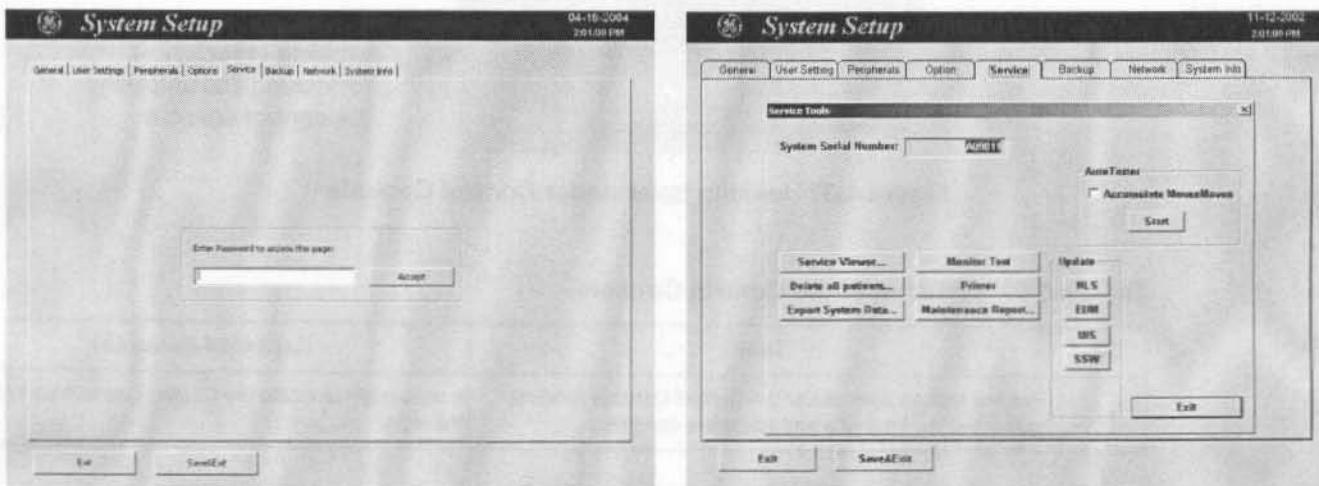


Figure 4-39 System Setup Service page and Service Tools window

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

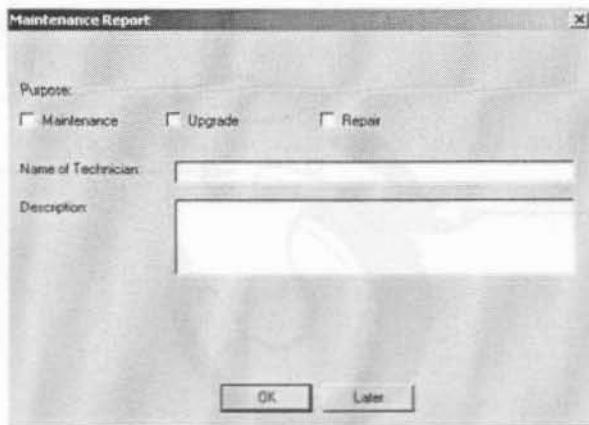


Figure 4-40 Maintenance Report

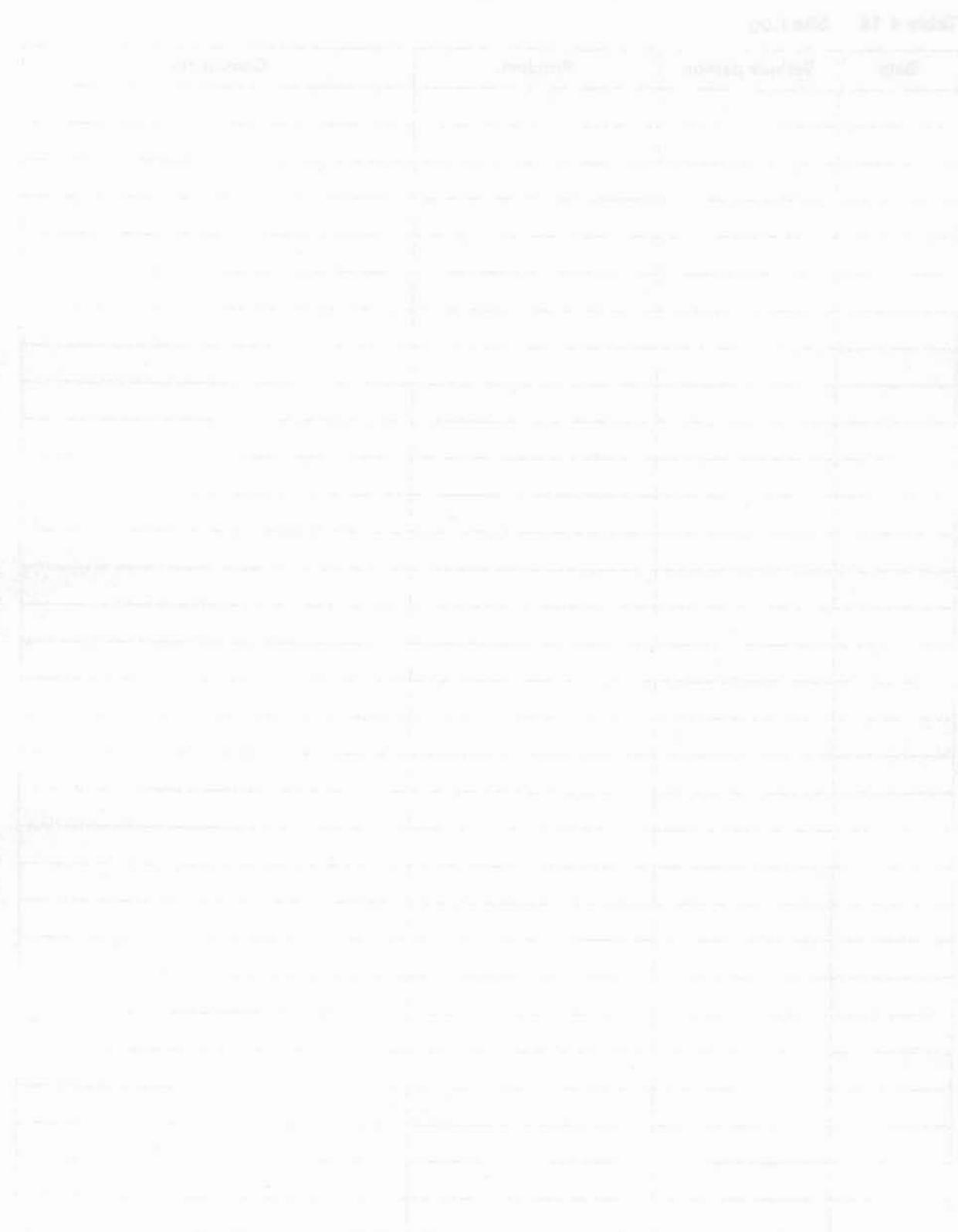
- 6.) Fill in the requested information and click **OK**.
- 7.) Click the **EXIT** button on the Service Tools window and the **EXIT** button on the System Setup Service page.

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

## **4-9-2 Site Log - Paper Documentation**

**Table 4-16 Site Log**

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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® 730Pro / 730ProV'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
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5-5	BackEnd Processor	5-26
5-6	Internal I/O	5-30
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5-9	External I/O	5-39
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## Section 5-2 General Information

Voluson® 730Pro / 730ProV 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 and Color Doppler Imaging (CFM, PD and TD)
- M Mode + MCFM Imaging
- Doppler (PW, CW)
- 3D Mode and Real Time 4D Imaging
- Different combinations of the above modes

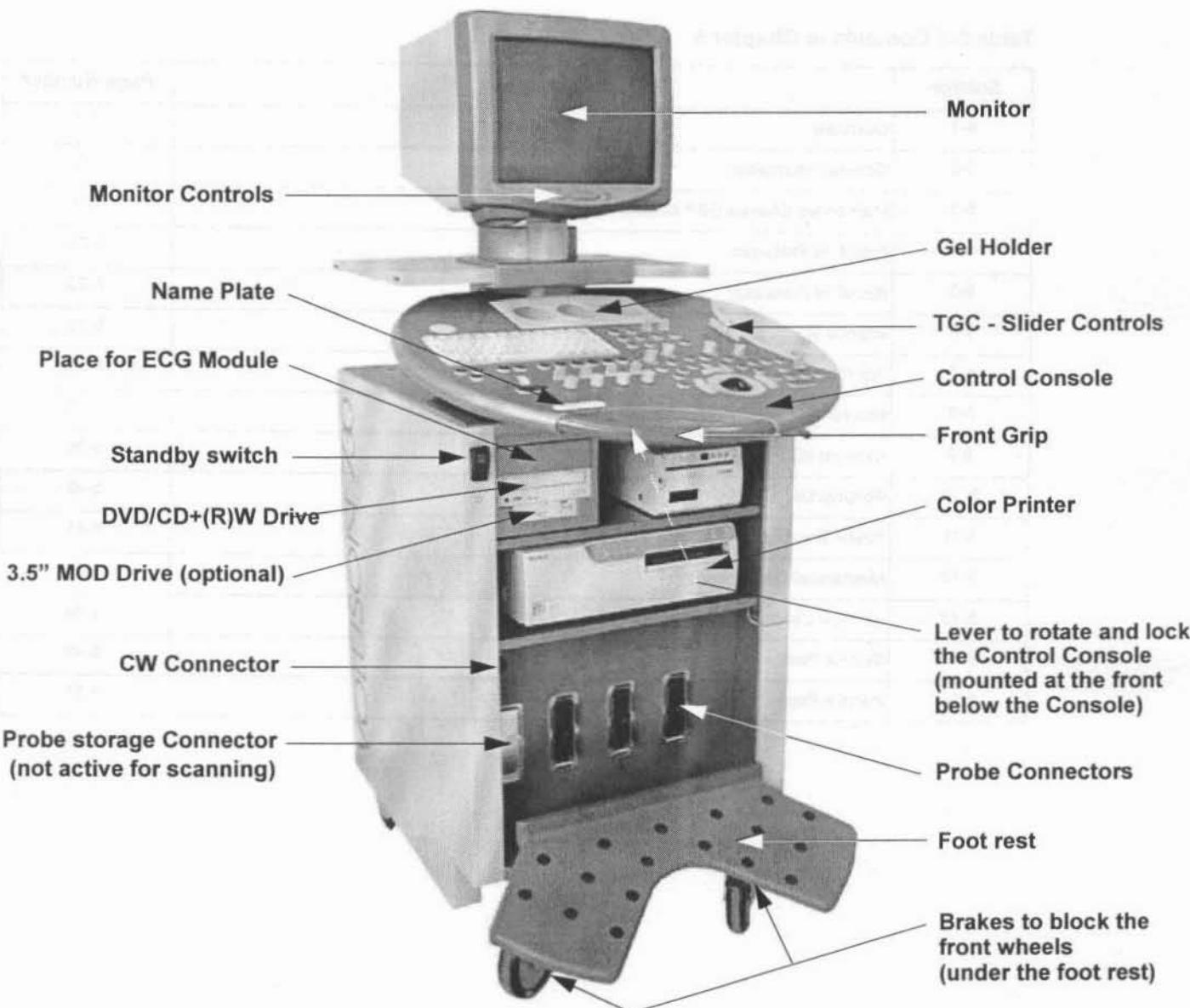


Figure 5-1 Voluson® 730Pro / 730ProV Major Components

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

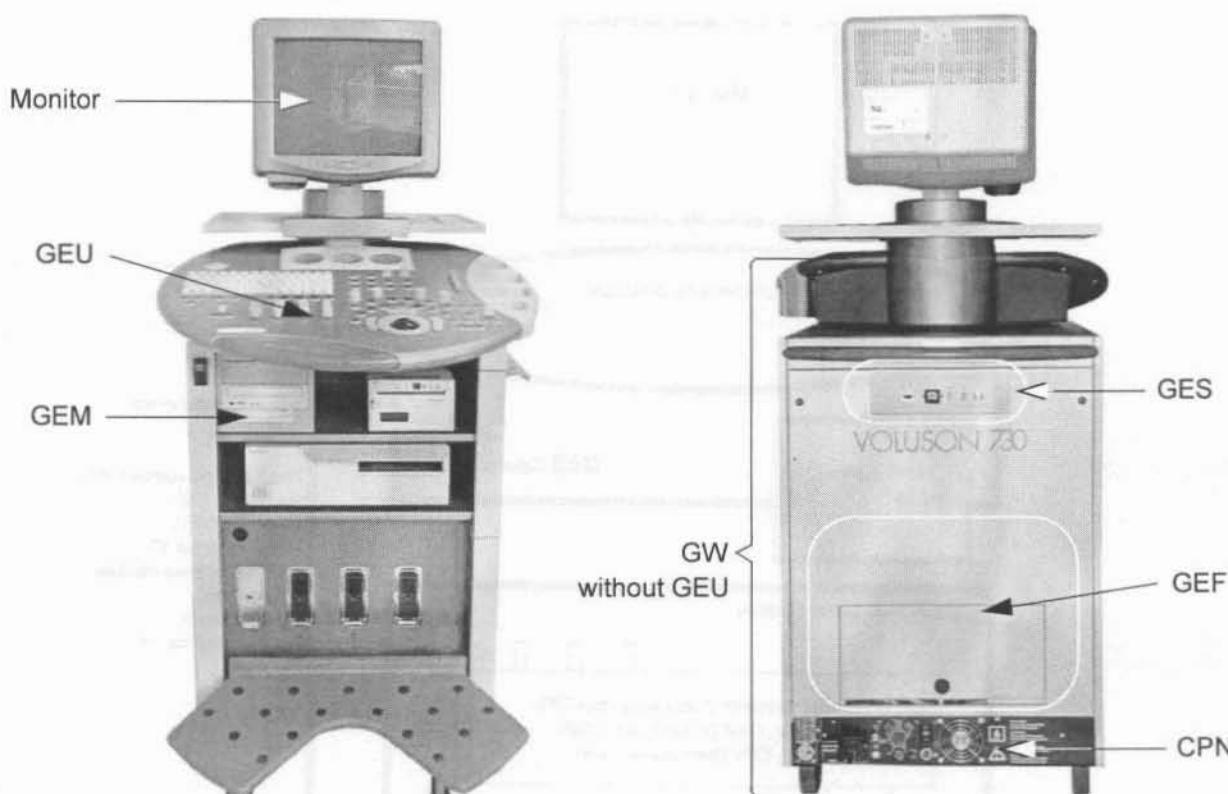


Figure 5-2 Major System Components

### Major System Components:

- GEF: Main Board Chassis: Section 5-3 on page 5-19
  - Front-End processor Section 5-4 on page 5-20
  - Back-End processor Section 5-5 on page 5-26
- GEU: Top Console User interface (System I/O with hard keys)  
Section 5-7 on page 5-33
- 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)

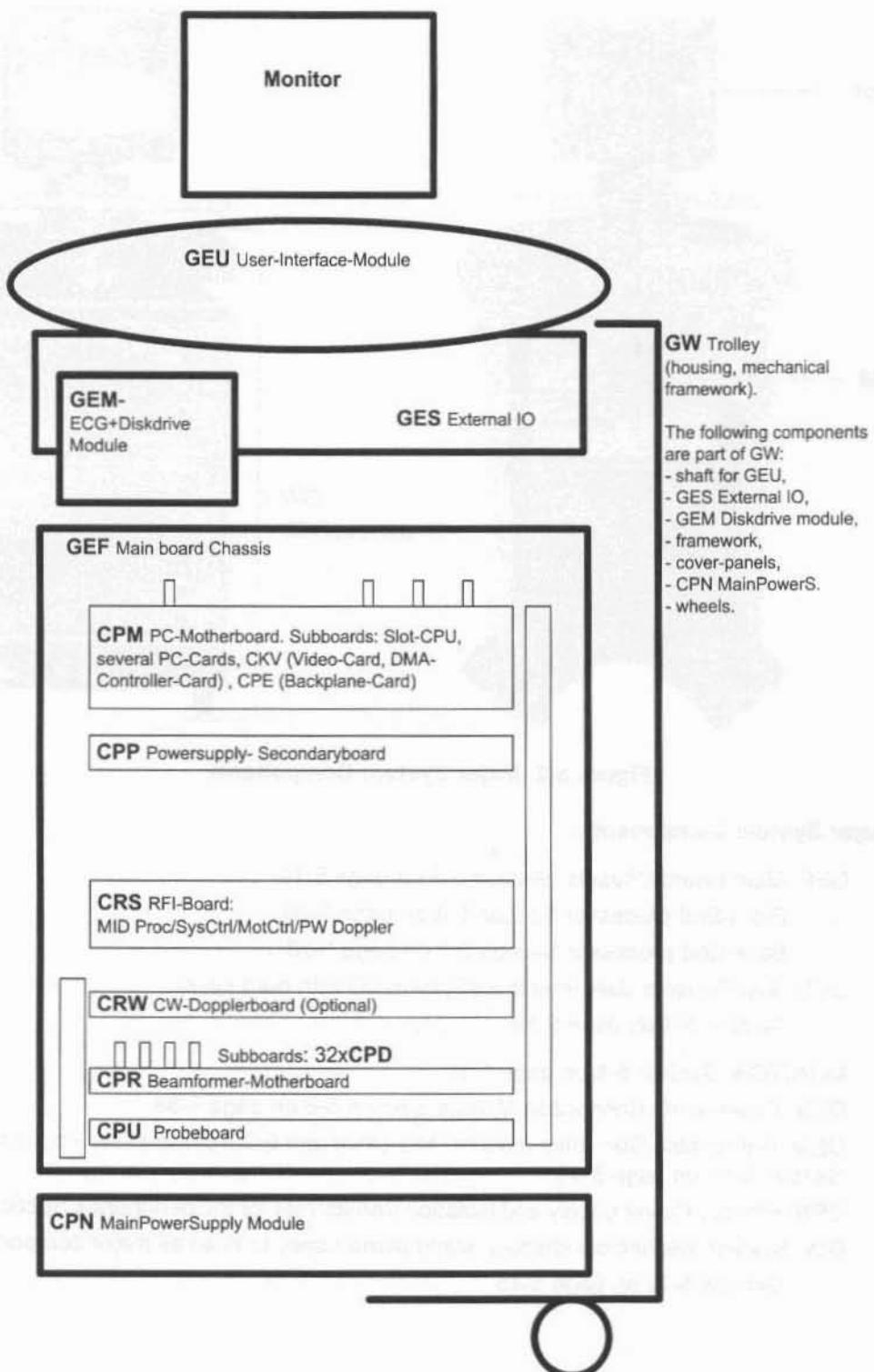


Figure 5-3 Basic Block diagram of Voluson® 730Pro / 730ProV

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

The Voluson® 730Pro / 730ProV 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® 730Pro / 730ProV 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 following application packages:

- Abdomen (ABD)
- Obstetrics (OB)
- Gynecology (GYN)
- Cardiology (CARD)
- Urology (URO)
- Vascular (VAS)
- Neurology (NEURO)
- Small Parts (SM P)
- Pediatrics (PED)
- Orthopedics (ORTHO)

The Voluson® 730Pro / 730ProV 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.

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

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® 730Pro / 730ProV Basic User Manual.

### 5-2-1 Description of Voluson® 730Pro / 730ProV 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 Coded Harmonic Imaging (HI)

In 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® 730Pro / 730ProV's high performance HI provides superb detail resolution and penetration, outstanding contrast resolution, excellent acoustic clutter rejection and an easy to operate user interface. 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 value 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.

#### 5-2-1-2-1 MCFM Mode (M Mode + Color Flow Mode)

Color Flow Mode and Color M Mode are Doppler modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the 2D mode or M mode image. Color Flow overlays color on the M mode trace using velocity and variance color maps. The Color Flow wedge overlays the 2D mode image and M mode timeline.

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

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 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 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® 730Pro / 730ProV 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.

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.

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® 730Pro / 730ProV 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

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.

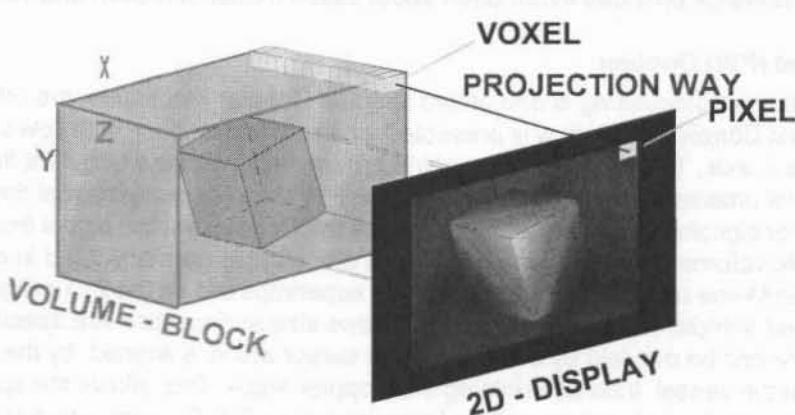


Figure 5-4 Principle: Volume Rendering

5-2-3 Block diagram Voluson® 730Pro / 730ProV

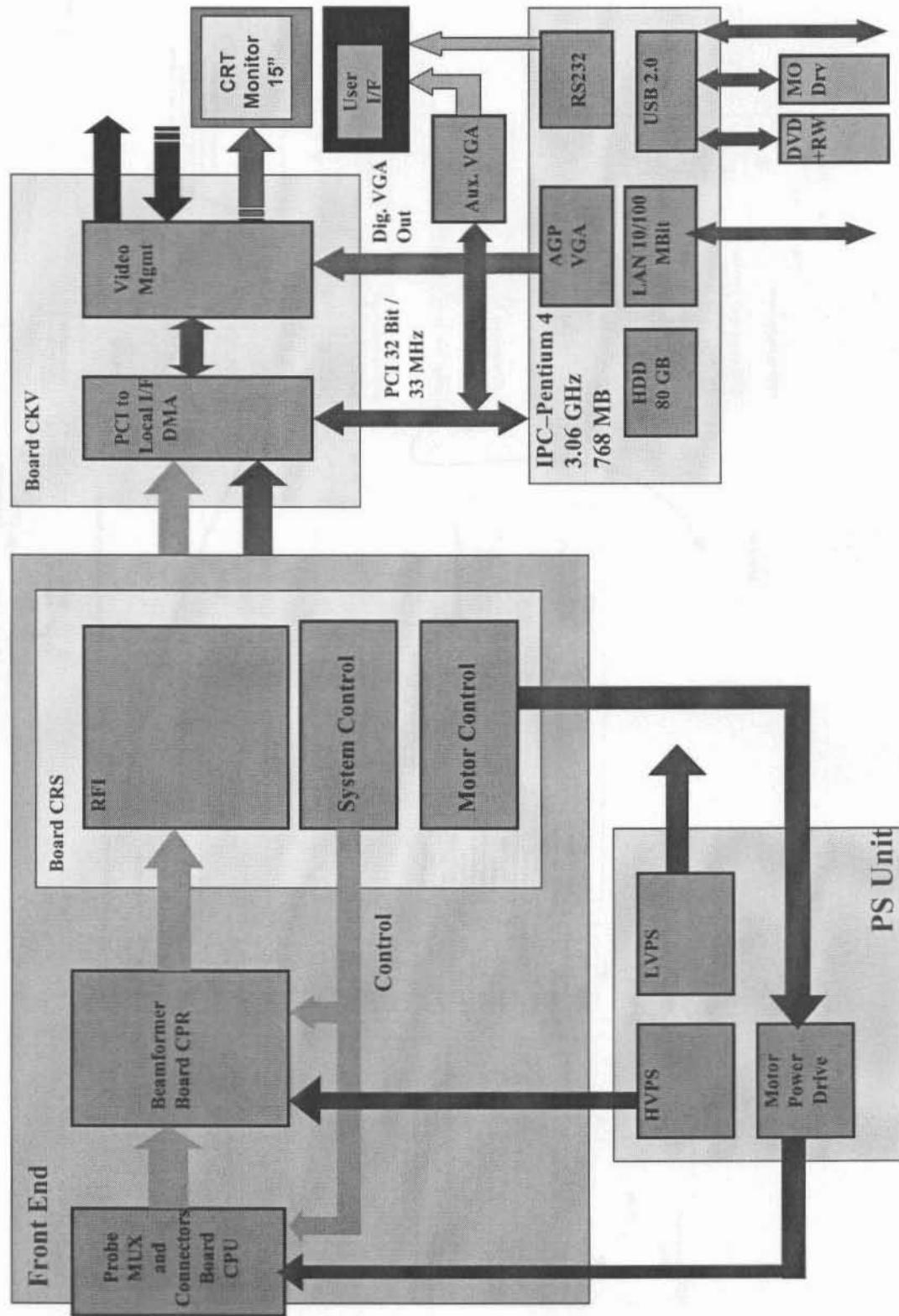
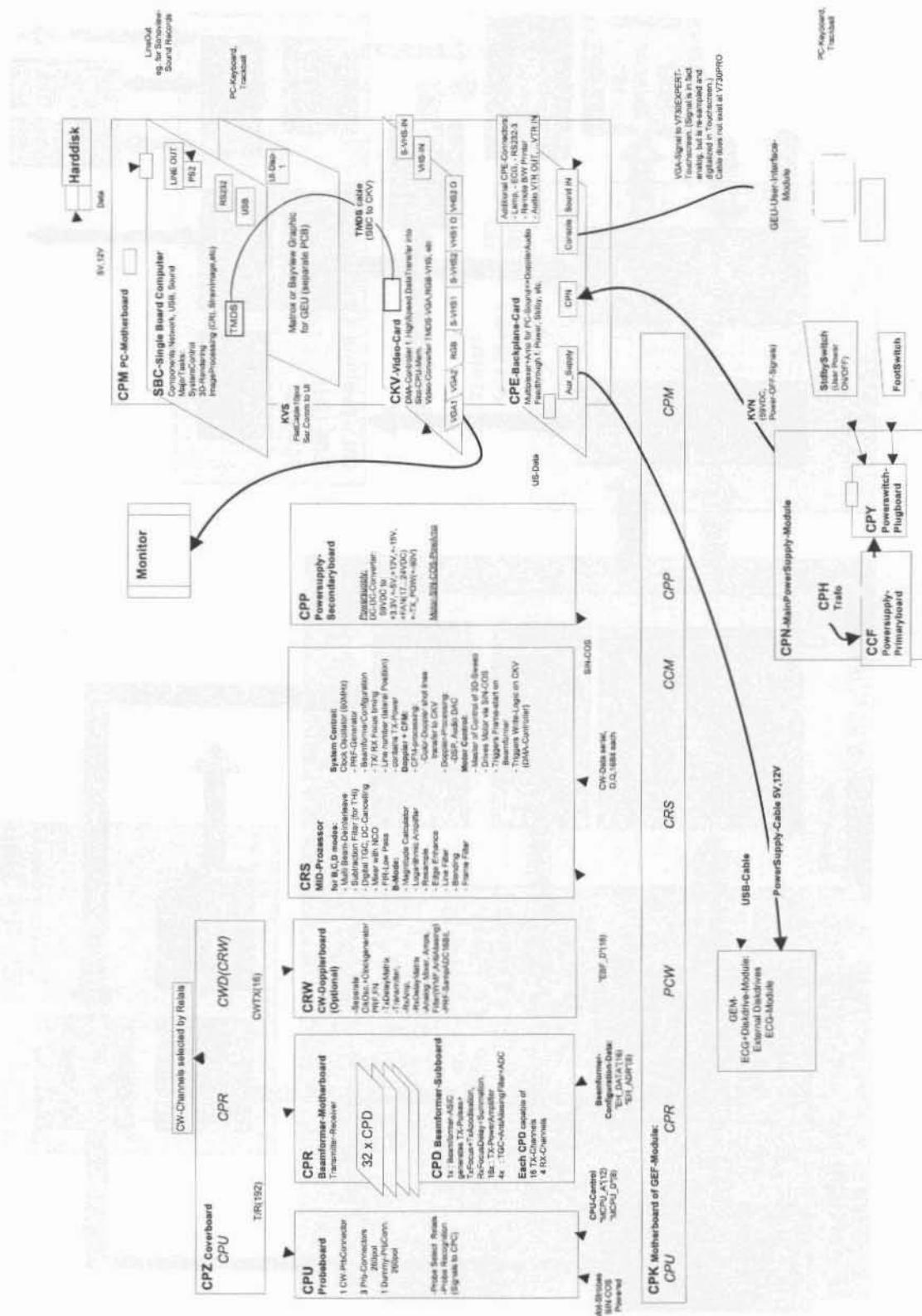


Figure 5-5 Top Level Architecture

5-2-3

## Block diagram Voluson® 730Pro / 730ProV (cont'd)



**Figure 5-6 Voluson® 730Pro / 730ProV - Block diagram**

## 5-2-4 Dataflow Control Description

This section describes functions of Voluson® 730Pro / 730ProV 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 5-16 on page 5-27

### 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 HI-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 (Pixelrate Conversion), MagnitudeCalculator (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 Pixelorder  
**shot1pix1-shot2pix1-shot3pix1-shot4pix1 -**  
**shot1pix2-shot2pix2-shot3pix2-shot4pix2...**  
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.) HI (Coded Harmonic Imaging)

In one method of HI the RX-Frequency is doubled, so that the radial resolution is increased due to the higher RX-Frequency.

The second method of HI 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.) XBeam-CRI (CrossBeam - Compound Resolution Imaging)\*

Does not need any special functions of CRS.

Image is composed of more than one different-direction-steered images. PC-calculated.

#### 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 **XBeam CRI-Mode (CrossBeam Compound Resolution Imaging)\***  
see: 5-2-4-1 B-Mode
- 5-2-4-9 **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.

#### 5-2-4-10 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

 **NOTICE** Not all Options are available on the Voluson® 730Pro V (marked with \* in the following sections of the Service Manual).

To activate the software options:

- 1.) Press the **UTILITIES** key on the control panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area and then select the **OPTION** page.

For details see: Basic User Manual Voluson® 730Pro / 730ProV, chapter 17.3.4

**Table 5-2 Software Options**

	SW-Options	Description
1	Real Time 4D	5-2-5-1 Real Time 4D
2	DICOM	5-2-5-2 DICOM
3	CrossBeam-CRI*	5-2-5-3 XBeam CRI - CrossBeam Compound Resolution Imaging*
4	VOCAL II*	5-2-5-4 VOCAL II - Virtual Organ Computer-aided Analysis*
5	RT_4D_Biopsy*	5-2-5-5 Real Time 4D Biopsy*
6	SRI*	5-2-5-6 SRI - Speckle Reduction Imaging*

**NOTE:** Additional options are not yet implemented in the Voluson® 730Pro / 730ProV.

#### 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 16 volumes/second (at Voluson® 730Pro V up to 10 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® 730Pro / 730ProV 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

**XBeam CRI - CrossBeam 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 CrossBeam 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.

5-2-5-4

**VOCAL II - Virtual Organ Computer-aided Analysis\***

Diagnosis and therapy of cancer is one of the most important issues in medical care.

The VOCAL II - Imaging program allows completely new possibilities in cancer diagnosis, therapy planning and follow-up therapy control.

**VOCAL II offers different functions:**

- Manual or Semi automatic Contour detection of structures (such as tumor lesion, cyst, prostate, etc.) and subsequent volume calculation.  
The accuracy of the process can be visually controlled by the examiner in multi-planar display.
- Construction of a virtual shell around the contour of the lesion. The wall thickness of the shell can be defined. The shell can be imagined as a layer of tissue around the lesion, where the tumor vascularization takes place.
- Automatic calculation of the vascularization within the shell by 3D color histogram by comparing the number of color voxels to the number of grayscale voxels.

5-2-5-5

**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.

5-2-5-6

**SRI - Speckle Reduction Imaging\***

A type of image noise or interference is generally considered undesirable and can obscure the quality or interpretation of B-mode images. Although somewhat associated with the underlying echogenicity of tissue scatters, image speckle characteristics such as brightness, density or size have no apparent value in determining tissue structure or related properties. The elimination of or significant reduction in speckle improves the quality or diagnostic potential of the image.

The method applied in the subject modification utilizes a nonlinear diffusion filtering technique that permits effective speckle reduction in real time. The speckle reduction filter is available to the user in all B-mode imaging, independent of the transducer used.

## 5-2-6 Description of Hardware Options

Table 5-3 Hardware Options

	HW-Options	Description
1	CW-Doppler	5-2-6-1 CW - Continuous Wave Doppler
2	ECG Digital Module	5-2-6-2 ECG Preamplifier
3	MOD (Magneto-Optical Drive)	5-2-6-3 MOD (Magneto-Optical Drive)
4	Scan/Freeze Foot switch	5-2-6-4 Scan/Freeze Foot switch
5	Global Modem	5-2-6-5 Global Modem

### 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

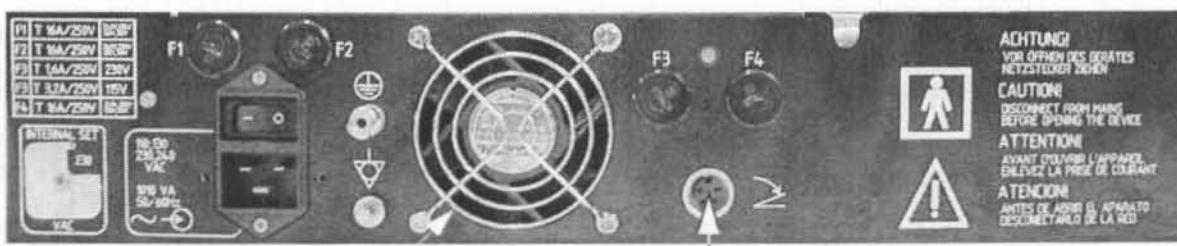
MAN6 (internal, digital version)

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 5-7 Foot-switch Connector on CPN

### 5-2-6-5 Global Modem

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

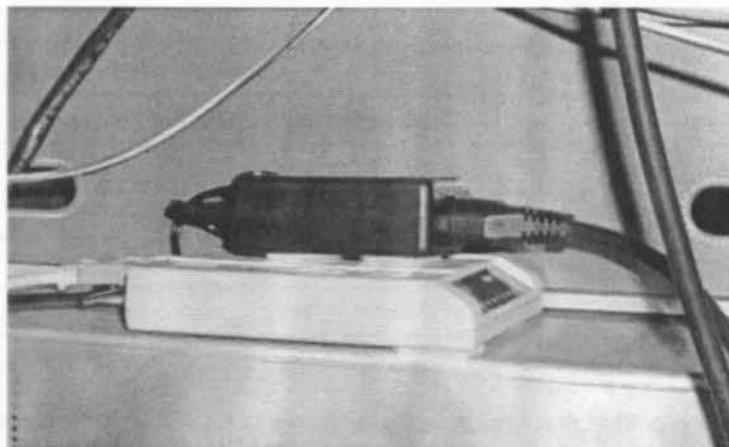


Figure 5-8 Modem (placed on the GEF-box)

5-2-6-5-2 LEDs

The Modem has 10 LEDs on its front.



Figure 5-9 LEDs on Modem's Front Panel

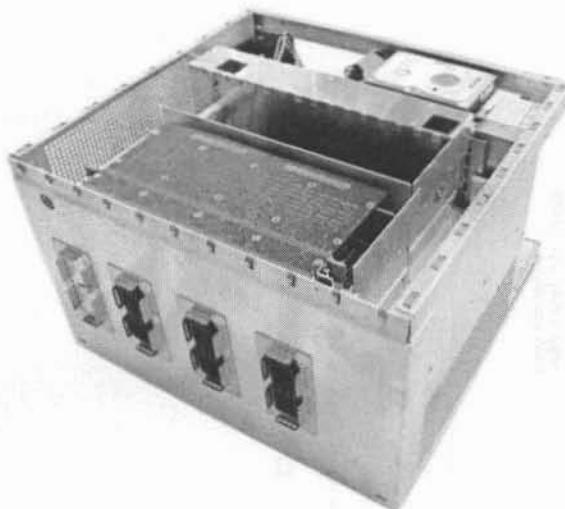
Table 5-4 LEDs on Modem

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
■ - Red	33 (V.34 Mode)	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.
■ - Red	14 (V.32bis Mode)	At speeds below 14 kbs, these LEDs are OFF.
■ - 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

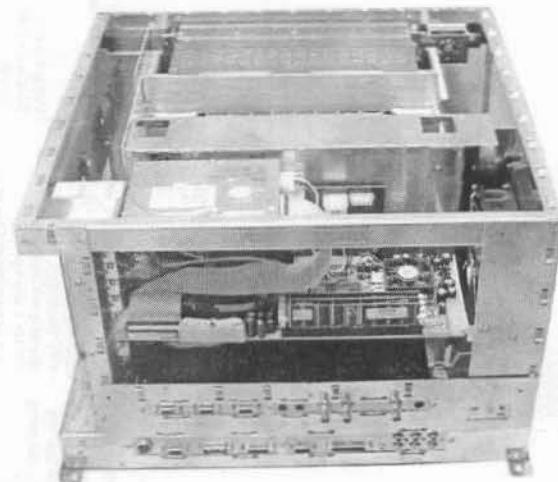
## Section 5-3 Main board Chassis GEF Module

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.

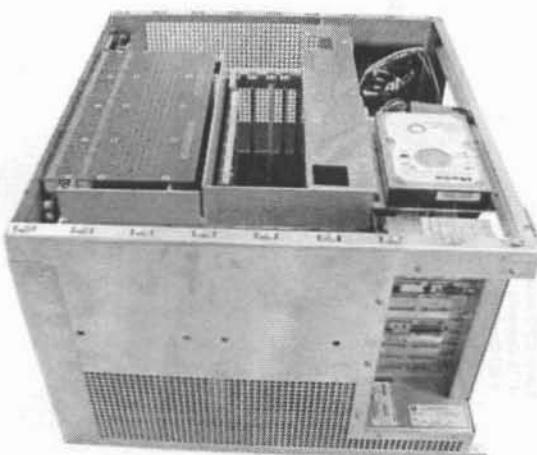
Front



Rear with Internal I/O (Audio Video)



View from Right  
with Internal I/O (PC-part)



Top View

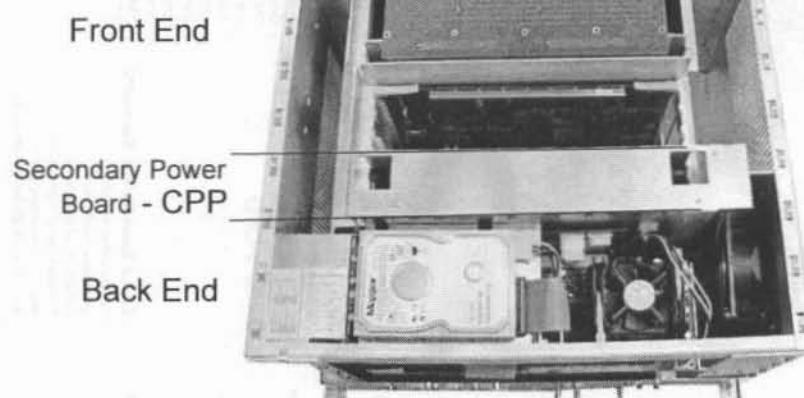


Figure 5-10 Mechanic of GEF Module

## Section 5-4 FrontEnd Processor

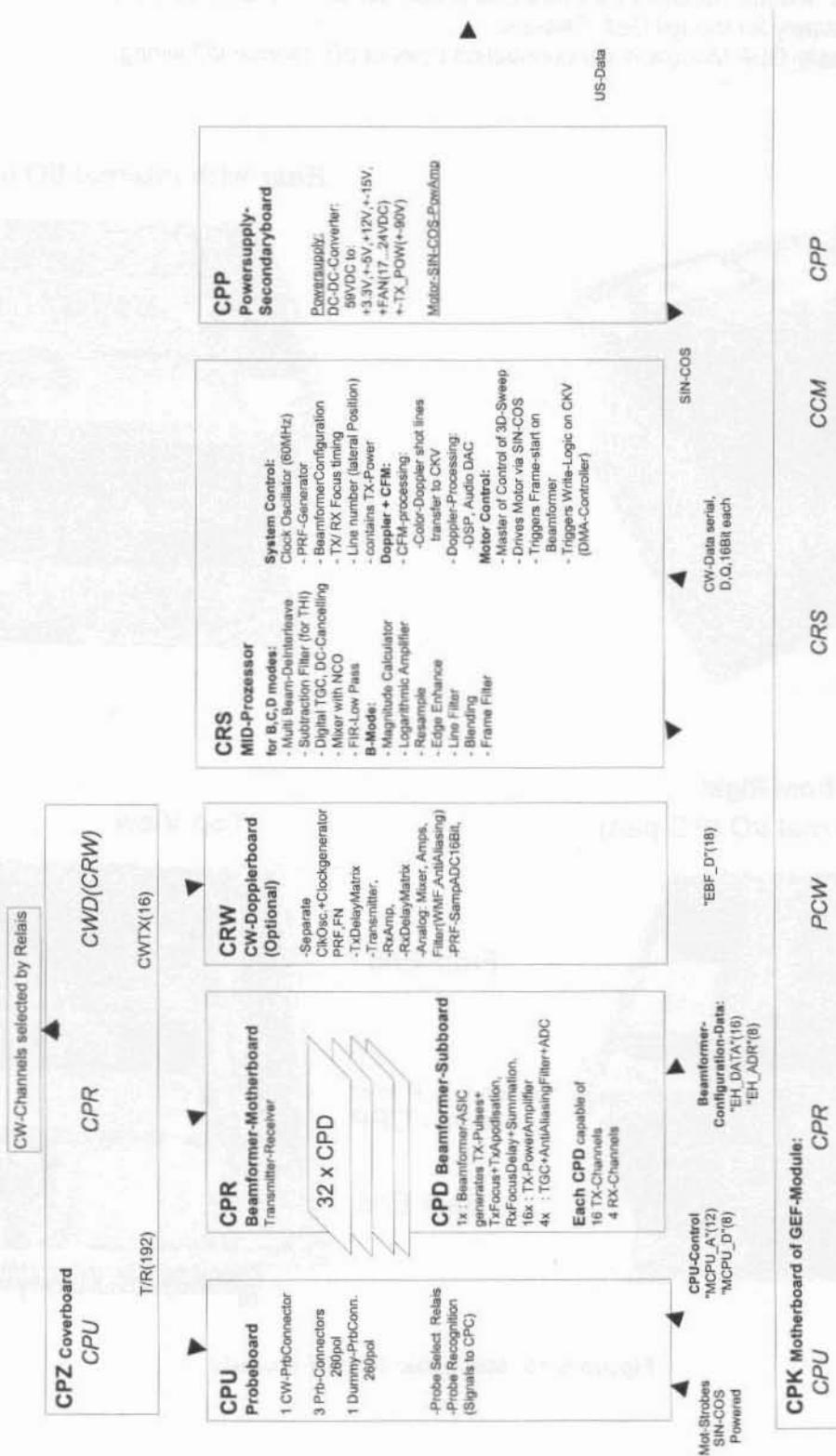


Figure 5-11 FrontEnd Processor - Block diagram

## 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

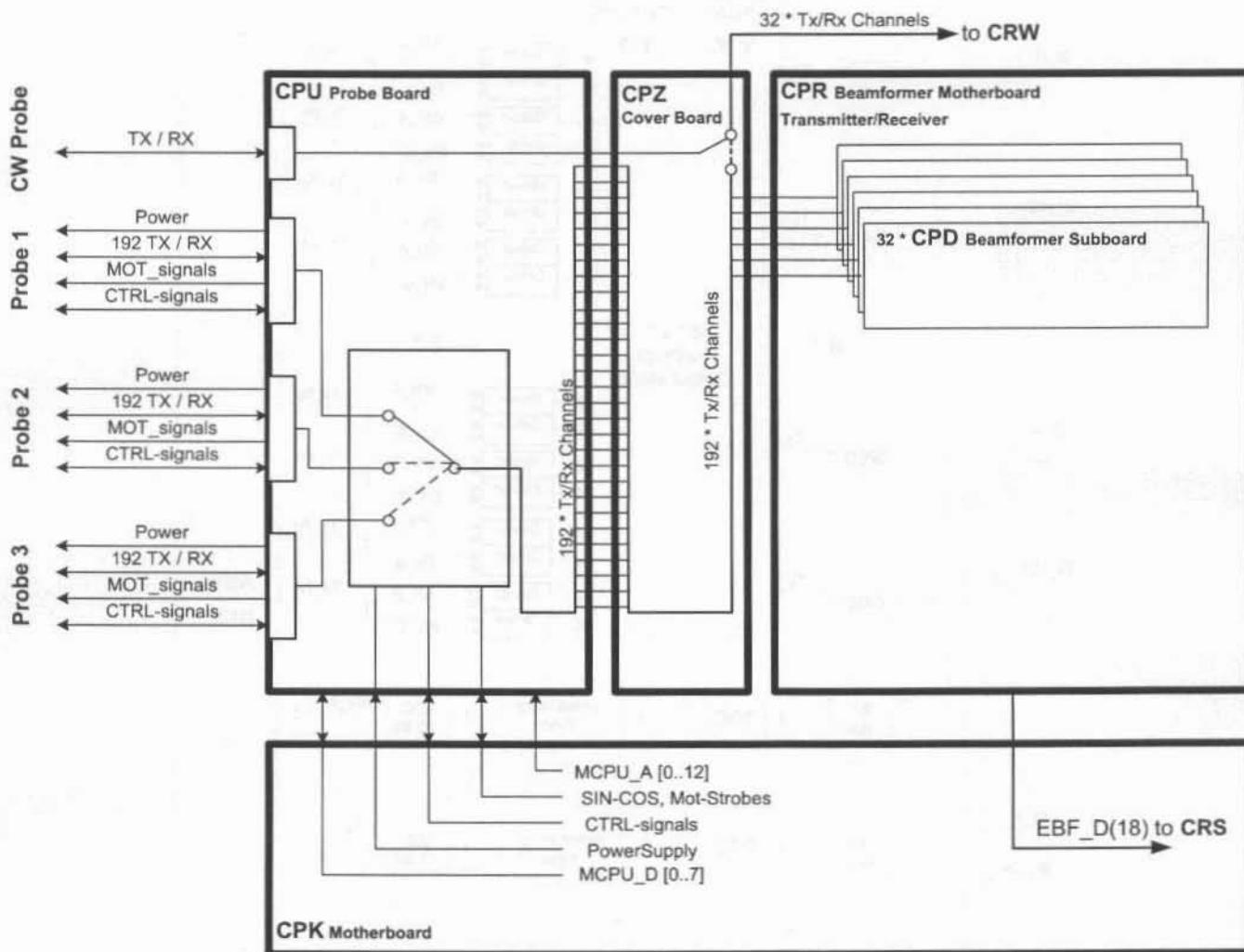


Figure 5-12 CPU + Beamformer (CPR)

### 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 5-22)

#### 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

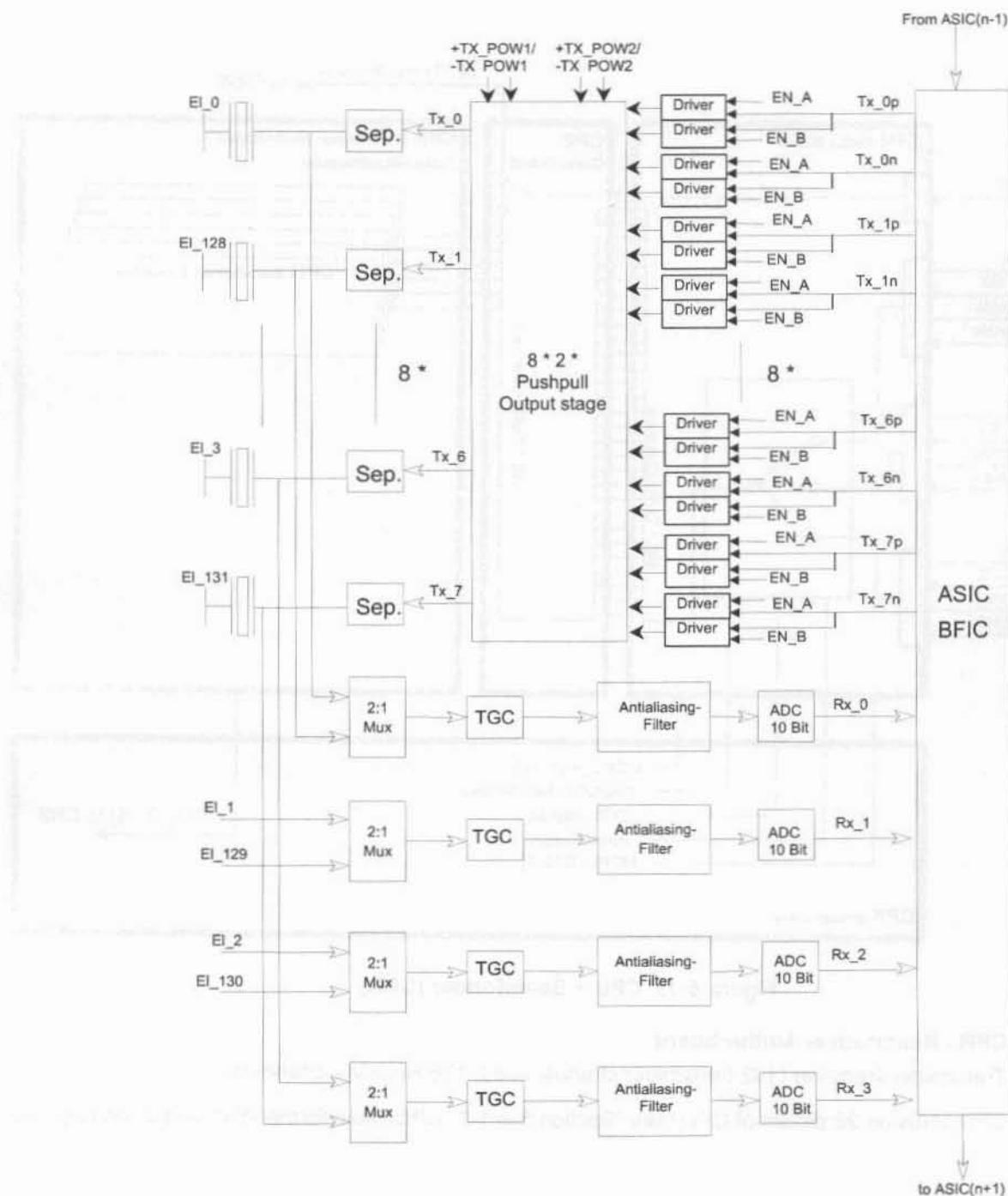


Figure 5-13 Block diagram CPD

**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 HI)
  - 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

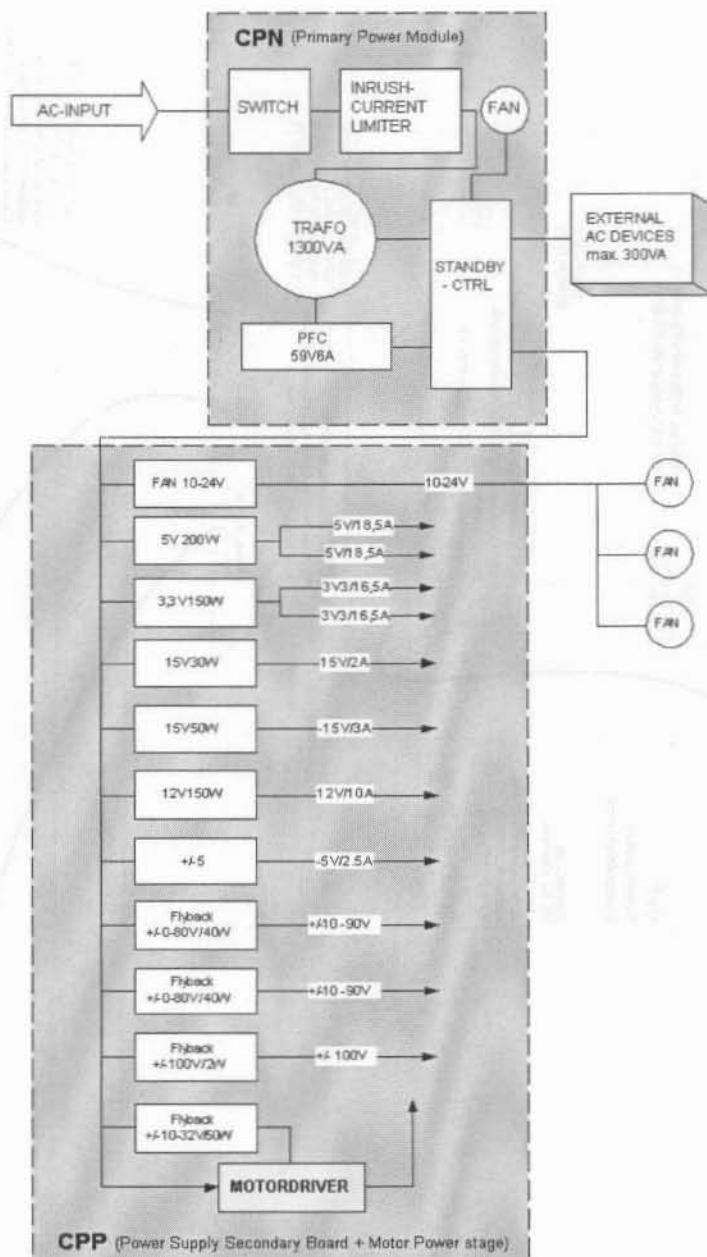


Figure 5-14 Block diagram CPP

## Section 5-5 BackEnd Processor

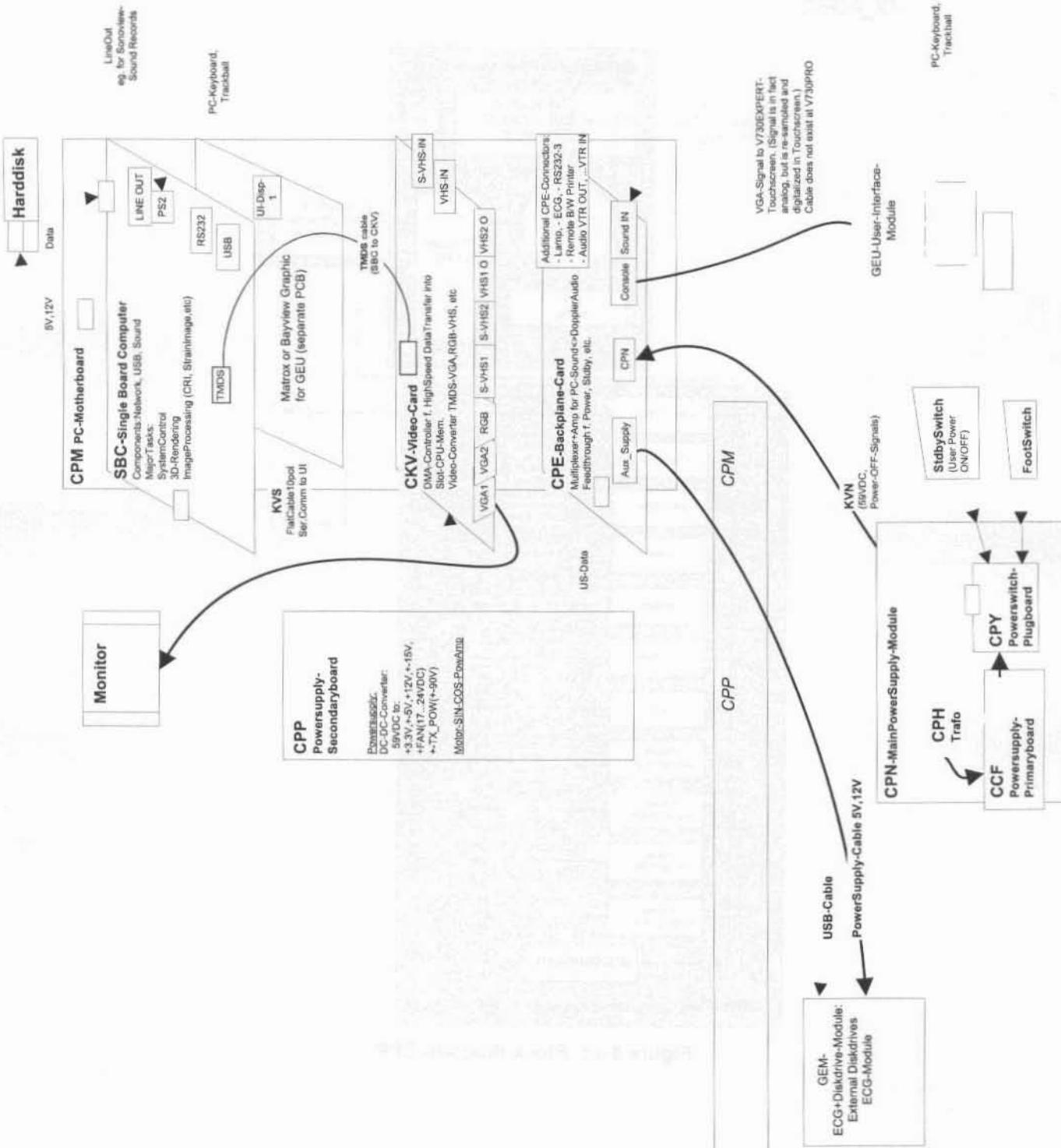
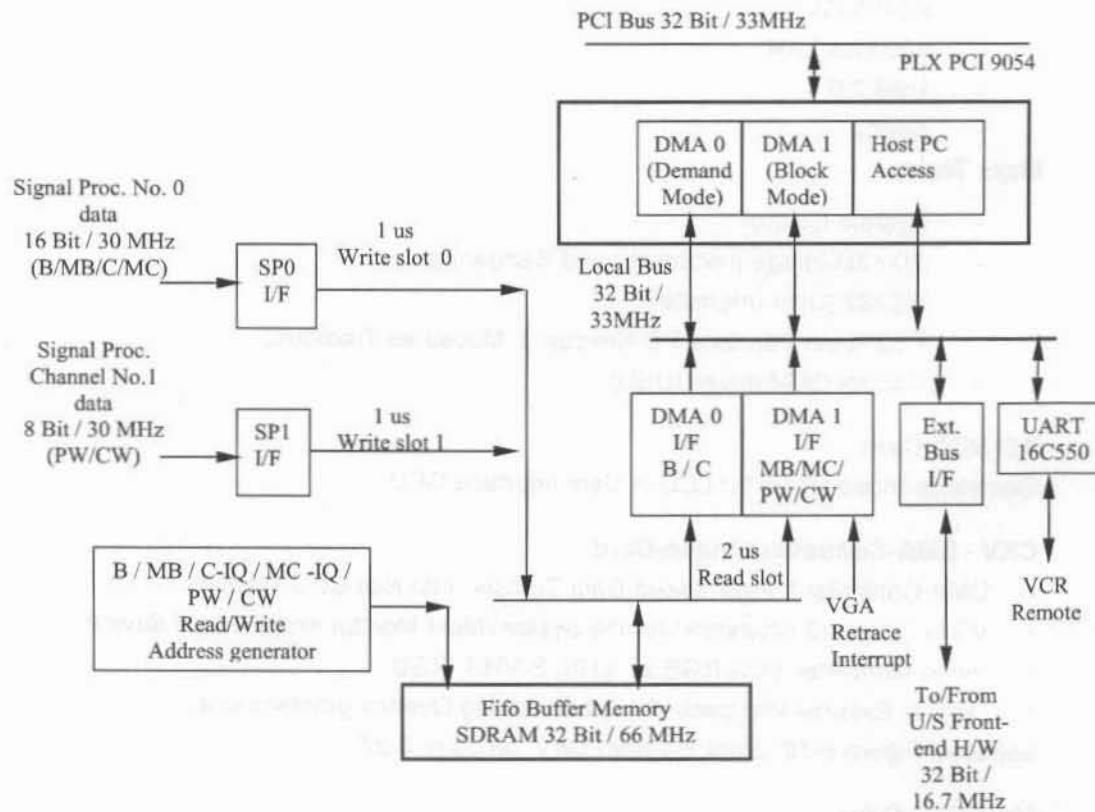


Figure 5-15 BackEnd Processor - Block diagram

## 5-5-1 Block diagram CKV

### DMA Controller



### Video I/O

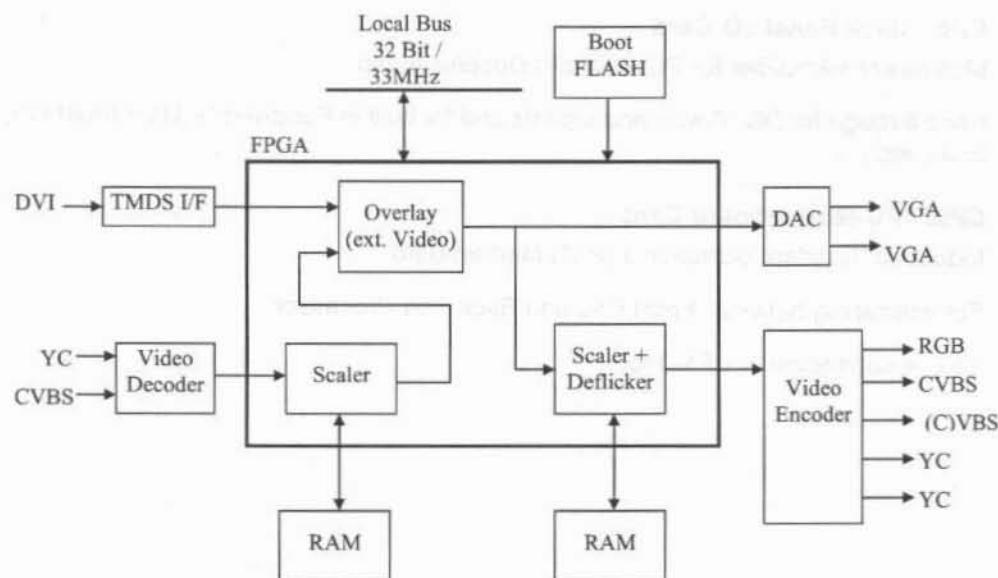


Figure 5-16 Block diagram CKV

## 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 5-16: Block diagram CKV on page 5-27*

### 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 5-24

## Section 5-6 Internal I/O

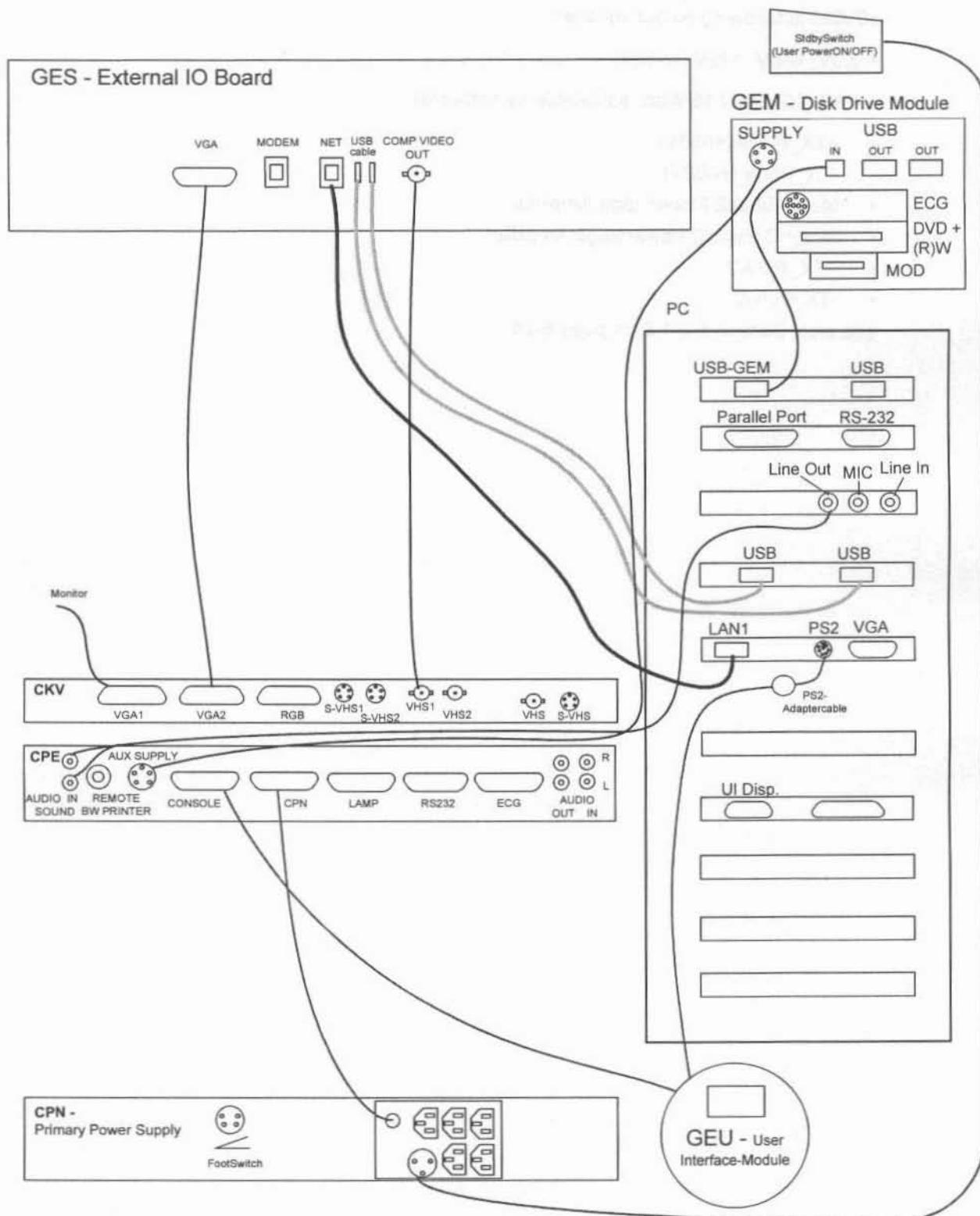


Figure 5-17 Internal I/O

## Section 5-6 Internal I/O (cont'd)

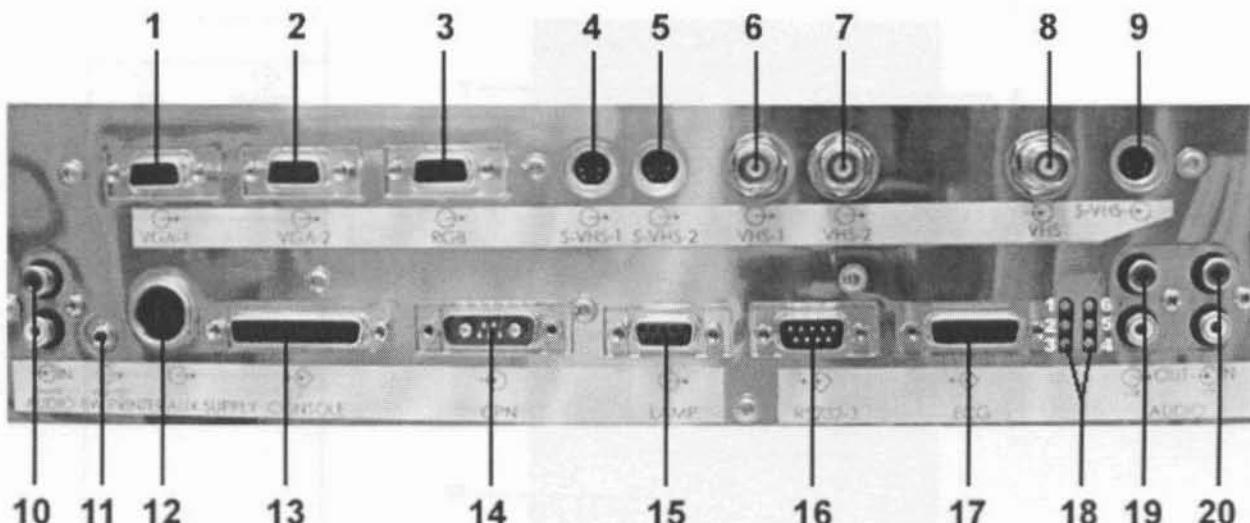
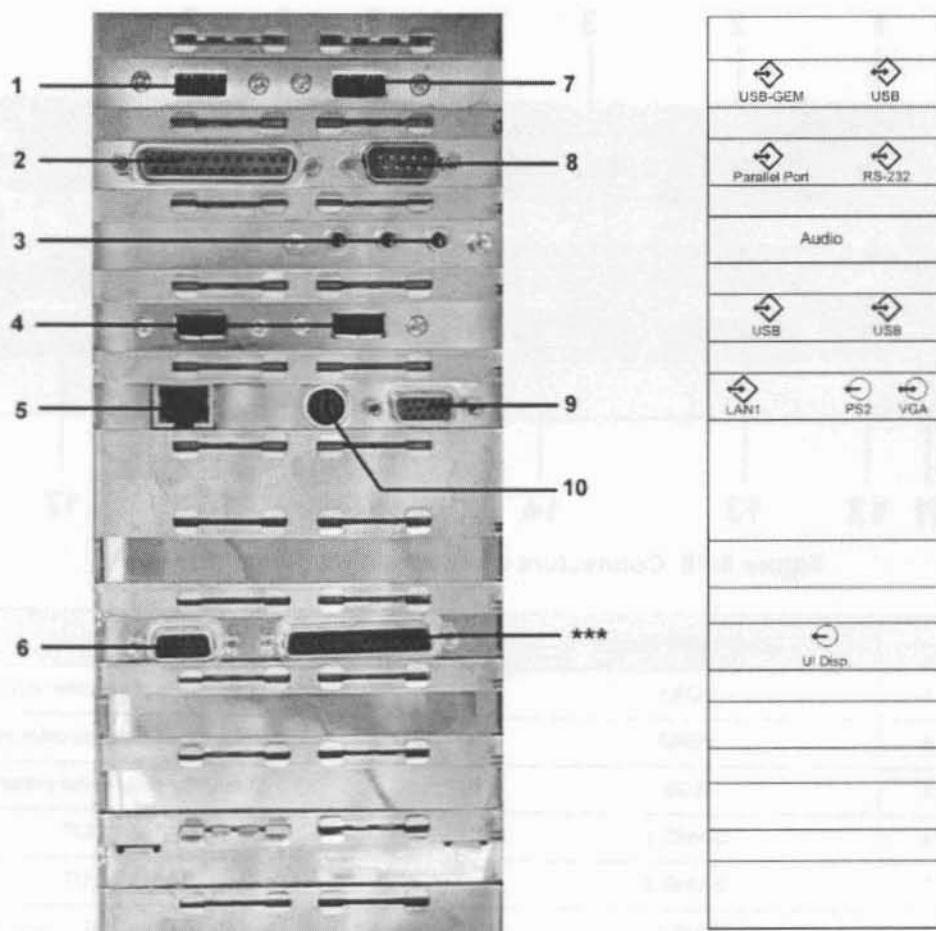


Figure 5-18 Connectors on the Main Module of the GEF

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: Section 7-3-1 on page 7-3) 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 5-19** 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 Soundcard
4	USB	USB port connectors
5	LAN1	Connector for Network twisted pair RJ-45 10/100 megabit/s
6	UI Disp.	NOT USED in the Voluson® 730Pro / 730ProV
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® 730Pro / 730ProV Operator Control Panel (OCP) consists of the following electronic subassemblies and/or functional components:

- 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

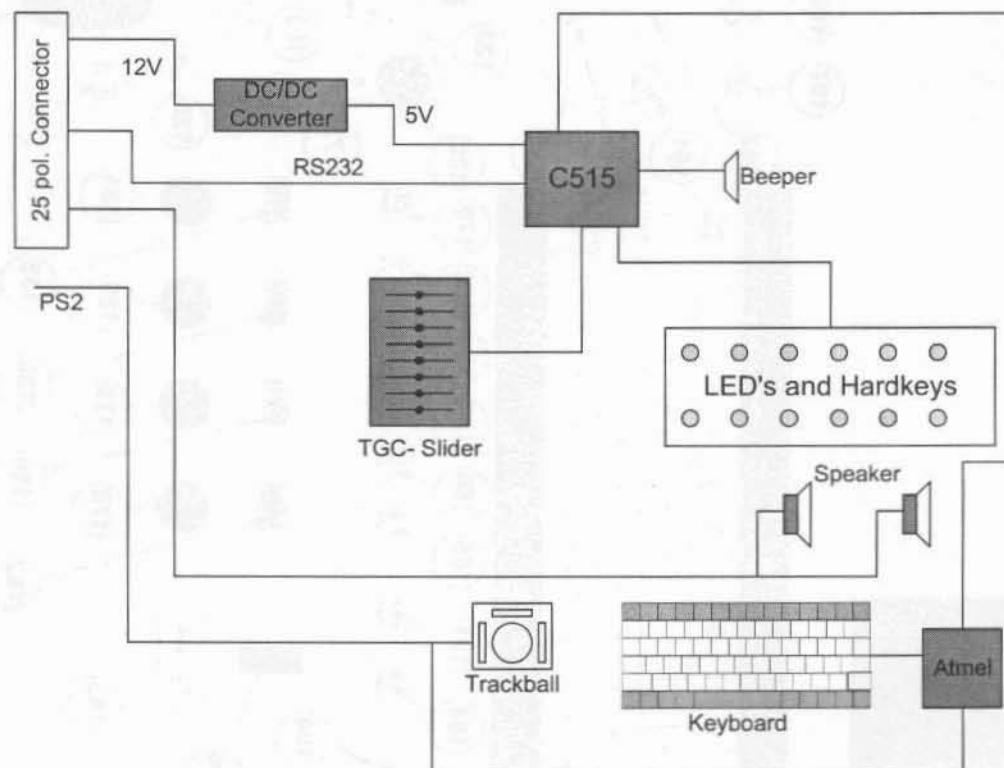
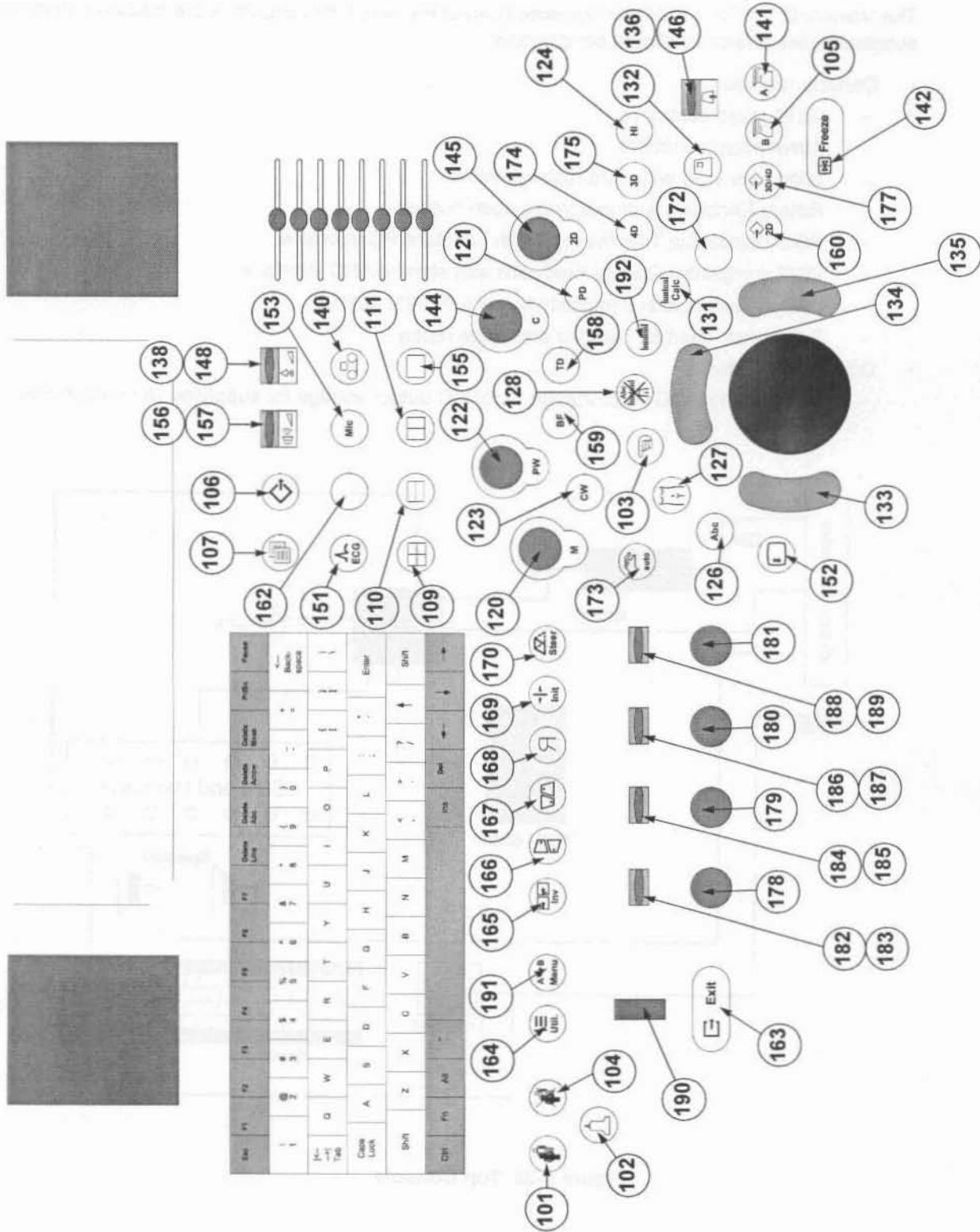


Figure 5-20 Top Console

## Section 5-7 Top Console (cont'd)



**Figure 5-21 Voluson® 730Pro / 730ProV - Control Console**

Table 5-5 Voluson® 730Pro / 730ProV - key codes

key code	Description	Voluson® 730Pro / 730ProV - 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			
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	HI	Harmonic Imaging			
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			
131	MeasCalcs	Calculation tables			
132	HR_Zoom	High Resolution Zoom			
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			
138	AcousticPW	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)			

Table 5-5 Voluson® 730Pro / 730ProV - key codes

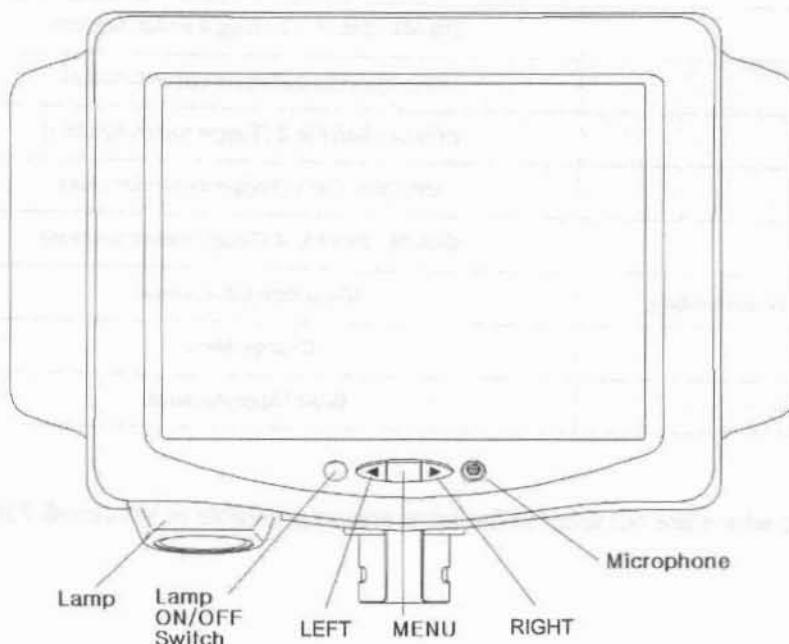
key code	Description	Voluson® 730Pro / 730ProV - Functionality	X	X	X
146	B_Depth	DOWN - penetration depth of the B-image			
148	AcousticPWr	DOWN - acoustic output (Power)			
151	ECG	ECG line ON/OFF			
152	Trackball Navigation	Trackball Menu Navigation			
153	MIC	Microphone			
155	Single Format	Single-Screen format			
156	Speaker Volume	UP - speaker volume			
157	Speaker Volume	DOWN - speaker volume			
158	SieScape	SieScape (at the time being this feature is not yet implemented)			
159	BiFlow	BiFlow (at the time being this feature is not yet implemented)			
160	Save 2D	to save/send 2D images and sequences			
162		NOT USED			
163	Exit	Exit			
164	Utilities	Utilities Menu			
165	Invert	Invert			
166	Left/Right	image orientation of 3D-image			
167	UP/Down	up/down image orientation			
168	Mirror	left/right image orientation			
169	Init	reset to initial position in volume mode			
170	Steering	Beam steering			
172		NOT USED			
173	OTO	Automatic Optimization			
174	4D-Mode	4D-Mode ON/OFF			
175	3D-Mode	3D-Mode ON/OFF			
177	Save 3D/4D	to save/send 3D and 4D images and sequences			
178	Soft 1	Soft_Switch 1			
179	Soft 2	Soft_Switch 2			
180	Soft 3	Soft_Switch 3			
181	Soft 4	Soft_Switch 4			
182	Soft_Flip 1	UP - Soft Flip 1 (Toggle switch function)			
183	Soft_Flip 1	DOWN - Soft Flip 1 (Toggle switch function)			

Table 5-5 Voluson® 730Pro / 730ProV - key codes

key code	Description	Voluson® 730Pro / 730ProV - Functionality	X	X	X
184	Soft_Flip 2	UP - Soft Flip 2 (Toggle switch function)			
185	Soft_Flip 2	DOWN - Soft Flip 2 (Toggle switch function)			
186	Soft_Flip 3	UP - Soft Flip 3 (Toggle switch function)			
187	Soft_Flip 3	DOWN - Soft Flip 3 (Toggle switch function)			
188	Soft_Flip 4	UP - Soft Flip 4 (Toggle switch function)			
189	Soft_Flip 4	DOWN - Soft Flip 4 (Toggle switch function)			
190	Menu Selector (Wheel Switch)	Menu Navigation wheel			
191	Change Menu	Change Menu			
192	Measure_User	Basic Measurements			

 **NOTICE** Key codes which are not listed in the table are not available at Voluson® 730Pro / 730ProV.

## 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 5-22 Monitor Adjustment buttons**

For further details refer to: Section 6-3 "Monitor Adjustment" on page 6-2.

## Section 5-9 External I/O

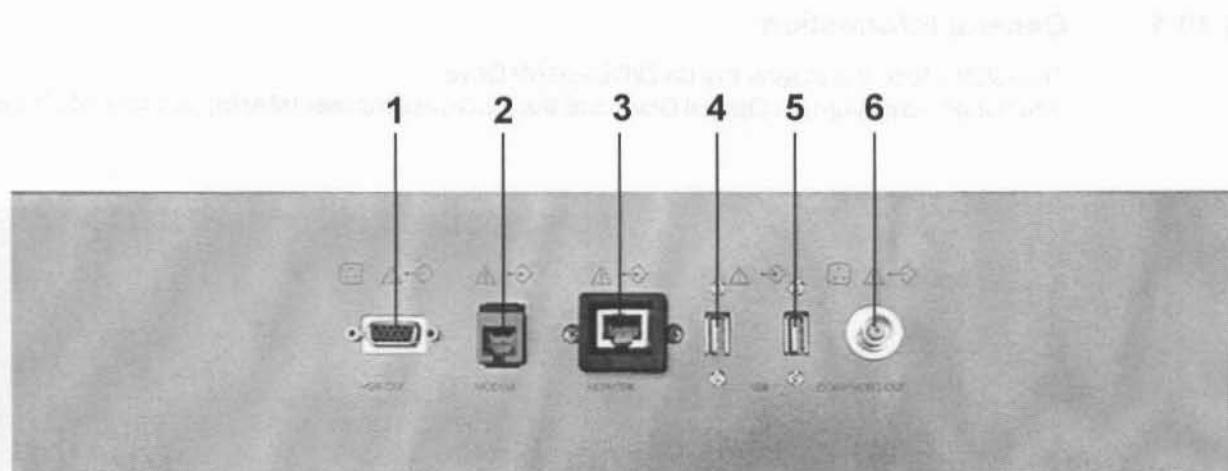


Figure 5-23 External I/O Panel Connectors

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 port
5	USB-2	USB port
6	COMP VIDEO OUT	BNC Connector, Color Video Output

## Section 5-10 Peripherals

### 5-10-1 General Information

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.

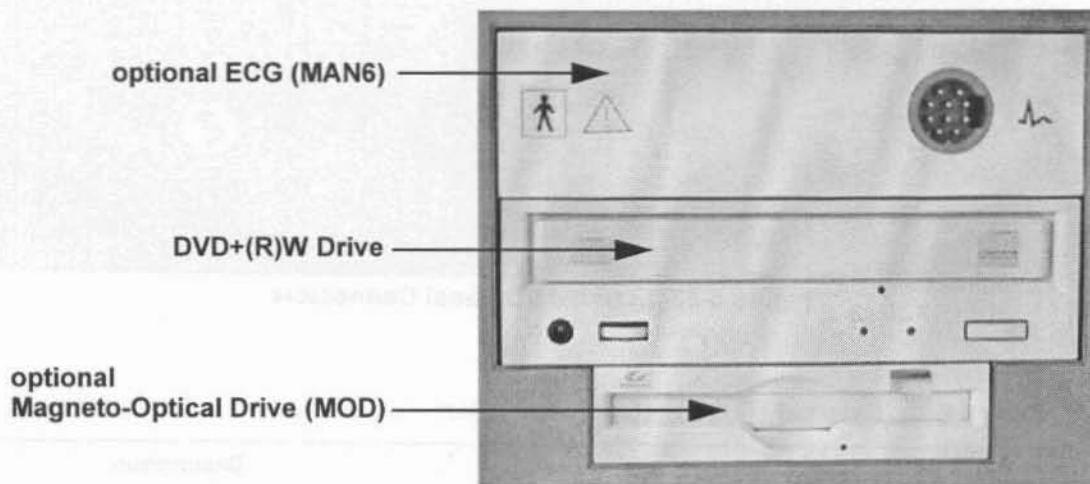


Figure 5-24 GEM incl. optional MOD and ECG

#### 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

Read Speed: max. 12x DVD ROM (max. 16200 kByte/s); max. 40x CD ROM (max. 6000 kByte/s)

Write Speed: DVD+R: 4x CLV (5520 kByte/s), DVD+RW: 2.4x CLV (3300 kByte/s),  
CD-R: 16x CLV (2400 kByte/s), CD-RW: 10x CLV (1500 kByte/s)

Access Time: DVD: 140ms; CD: 120ms

Recordable and Re-writable DVD's and CD's are ideal for any storage purpose and offer complete security and reliability for important data.

#### 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

### 5-11-1 CPN6 - Primary Power Module

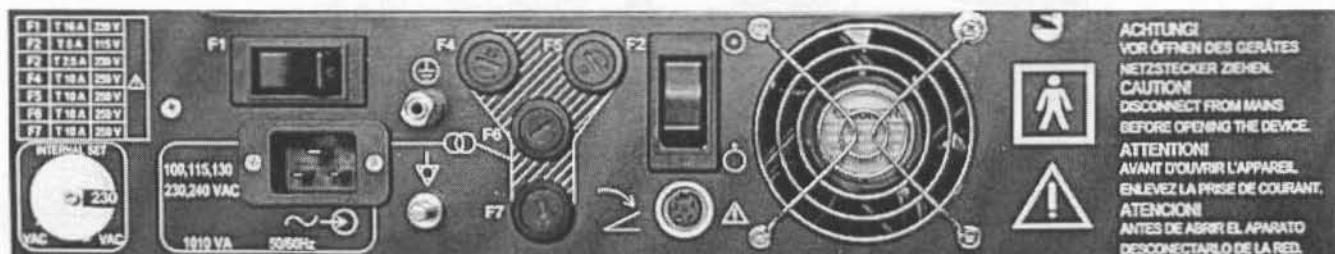


Figure 5-25 Primary Power Module - CPN6

#### 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.

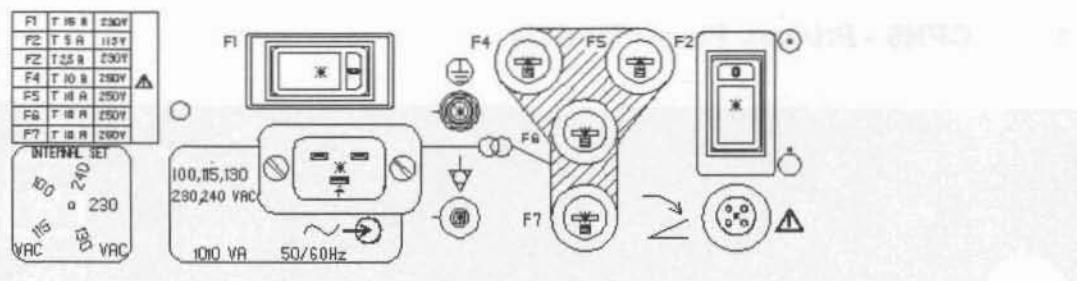
NOTE: The system mains supply input voltage can be set to: 110V, 130V, 230V, 240V.  
The output voltages may be set to 115V or 230VAC (independent from the input voltages)

#### 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 5-26 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 - Primary Power Module



Figure 5-27 Primary Power Module - CPN80

### 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

- 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 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.

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)

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

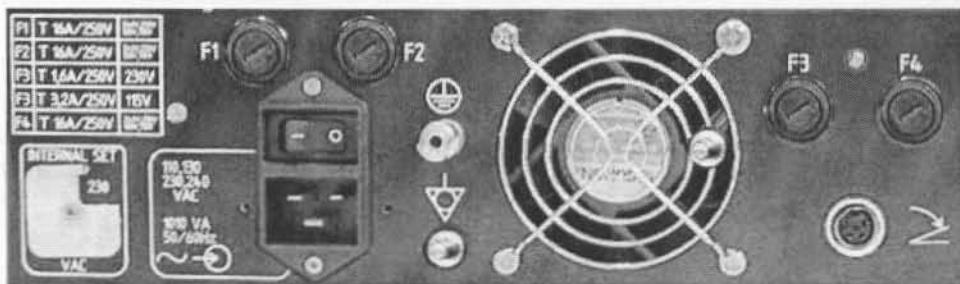


Figure 5-28 Fuses of CPN80

### 5-11-2-4 Fuses inside CPN80

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 7-3.

- 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

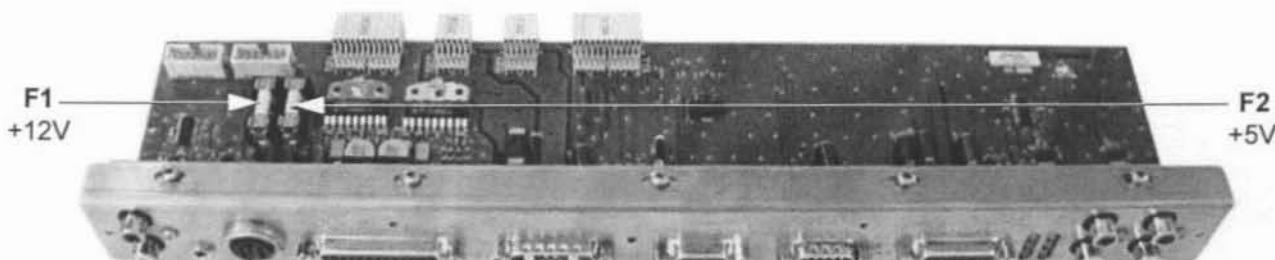


Figure 5-29 fuses for disk drives

## Section 5-12 Mechanical Descriptions

### 5-12-1 Physical Dimensions

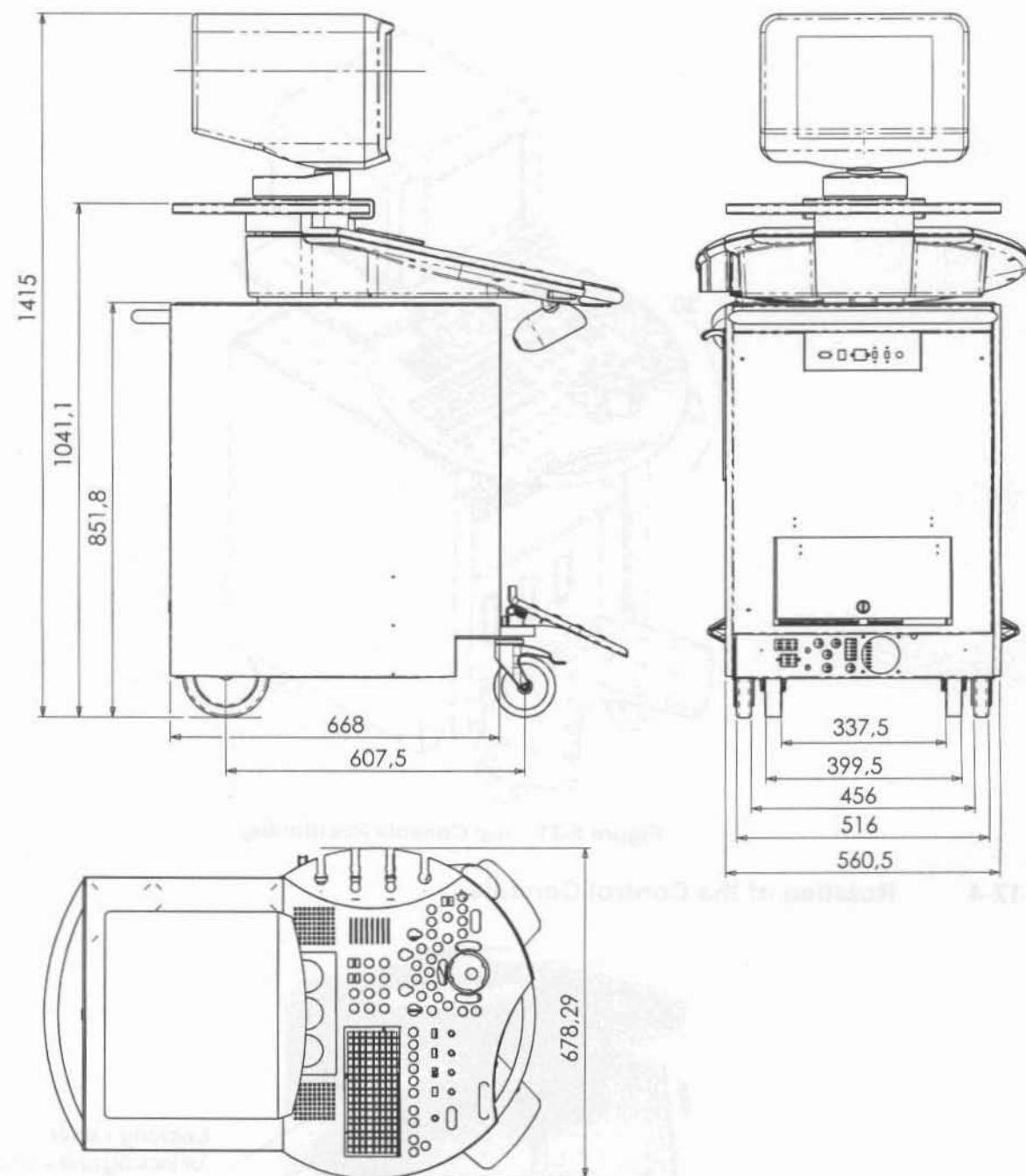


Figure 5-30 Physical Dimensions

#### 5-12-2 Monitor

- Tilt: 11° forwards and backwards
- Swivel: +/-90° rotation.

#### 5-12-3 Top Console Positioning

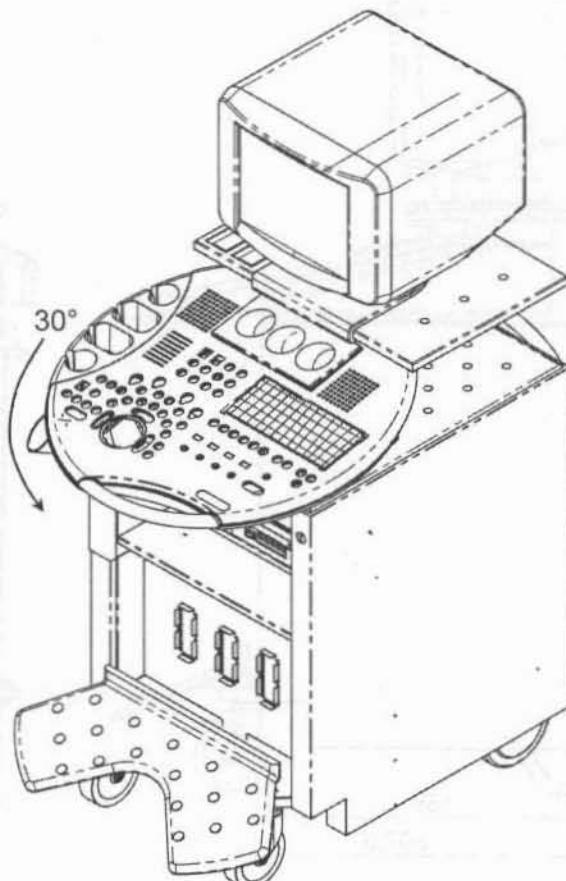


Figure 5-31 Top Console Positioning

#### 5-12-4 Rotation of the Control Console



Figure 5-32 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

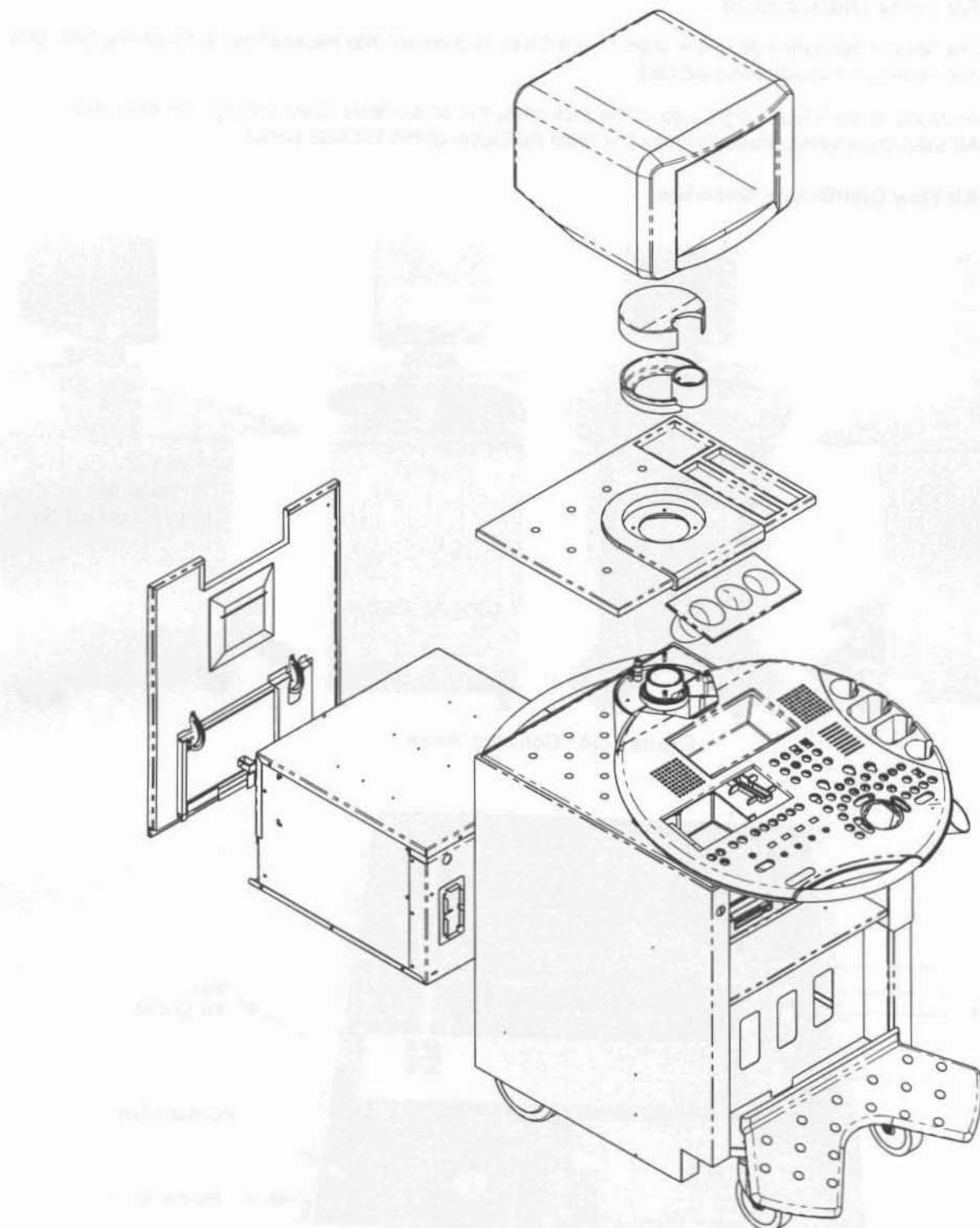


Figure 5-33 Assembly Drawing GW & GEU & Monitor

## 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 5-34 Console Views

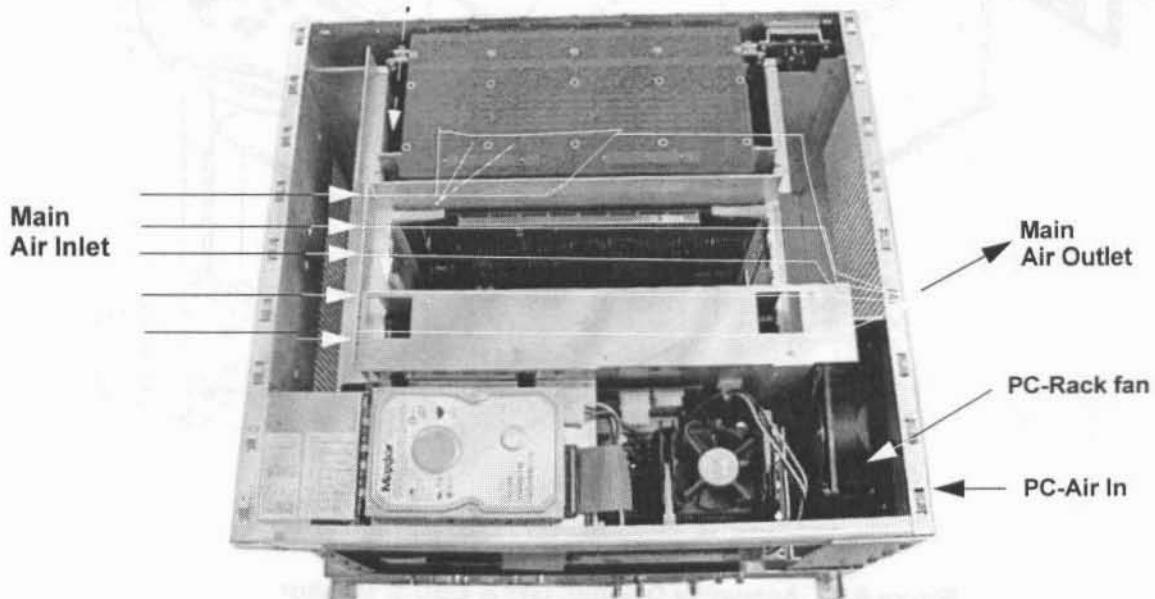


Figure 5-35 Air Flow Control

## 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® 730Pro / 730ProV, the iLINQ selection item is available in the menu area (on the left side of the screen) of the "Utilities" menu.  
By selecting this item, the Netscape® browser starts the "iLinq Home Page".

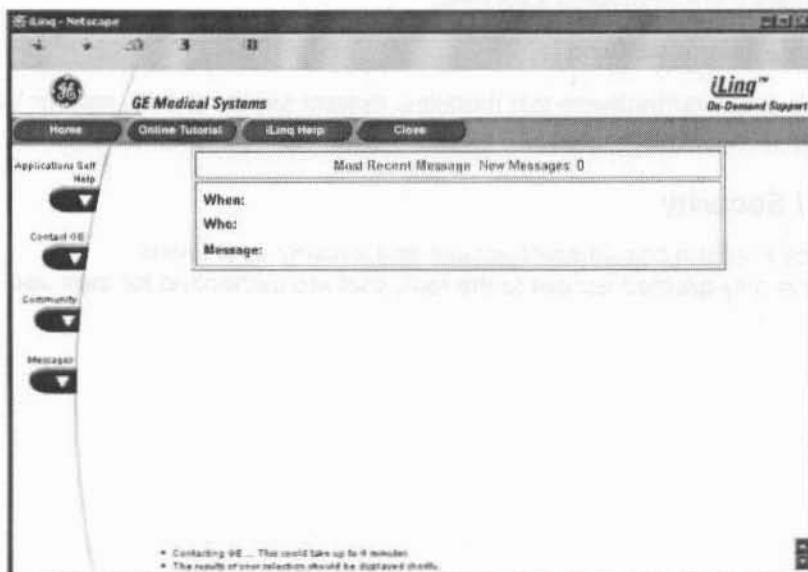


Figure 5-36 iLinq Home Page

## 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.) Press the **UTILITIES** key on the Control Panel. The menu area changes to the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area to activate the setup desktop screen.
- 3.) Select the **SERVICE** page. The "password window" appears automatically.

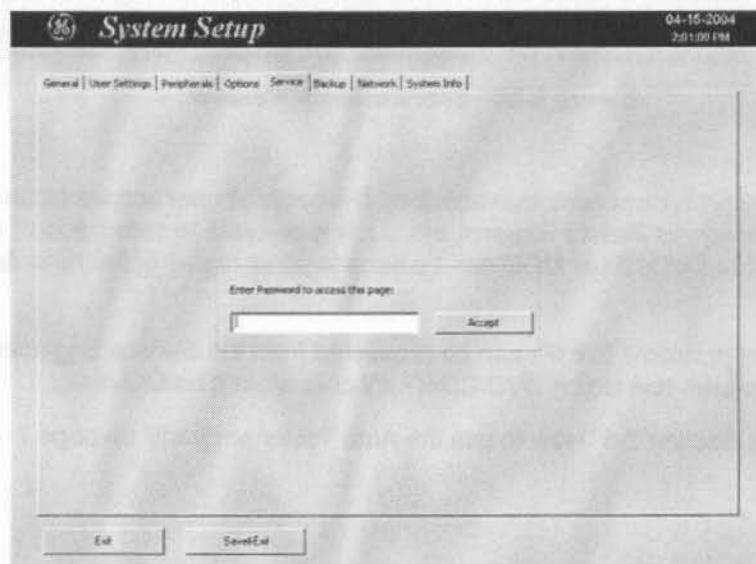


Figure 5-37 System Setup Service page

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

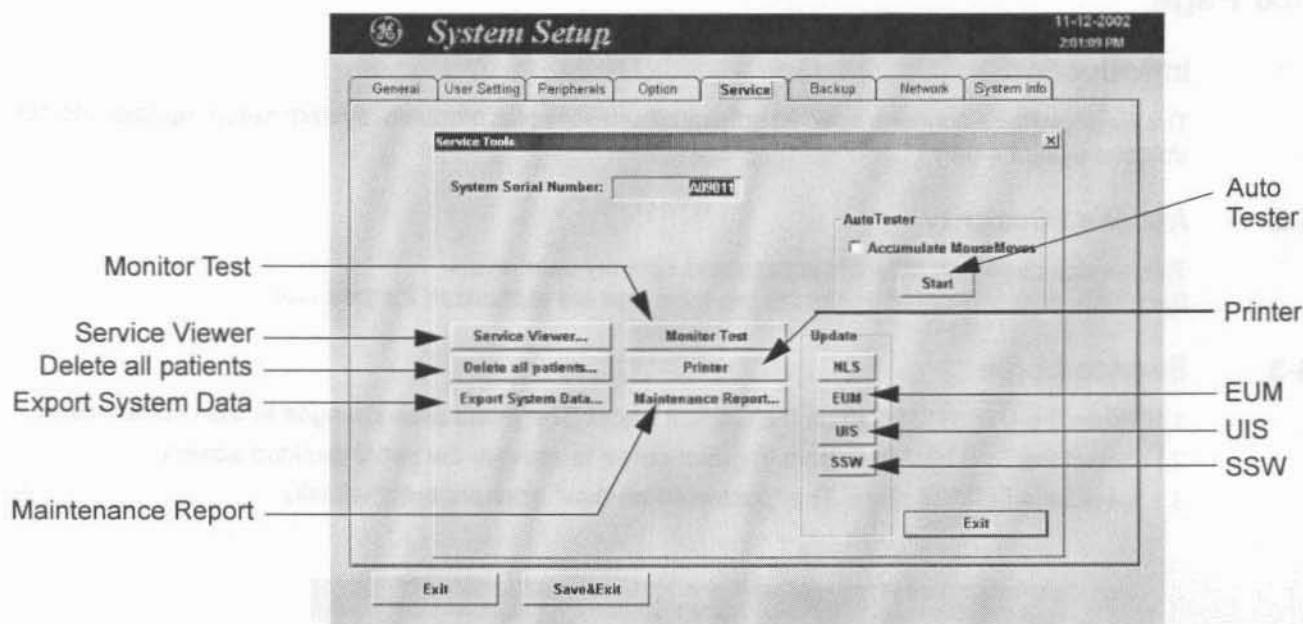


Figure 5-38 Service Tools window

#### 5-15-3-1 Auto Tester File

Autotest is a log function of customer activities. It records all user actions (scanning, 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 5-39 Kretztechnik E-Service

#### 5-15-3-3 Delete all Patients

- 1.) Click the DELETE ALL PATIENTS... button. Following WARNING message appears on the screen.

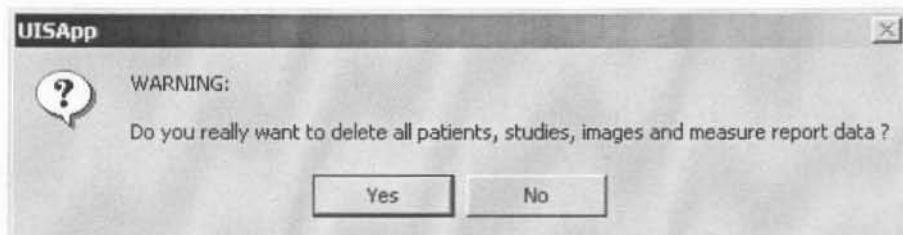


Figure 5-40 Warning message

**⚠ 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 "Export Log's and System Data" on page 7-4.

#### 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.

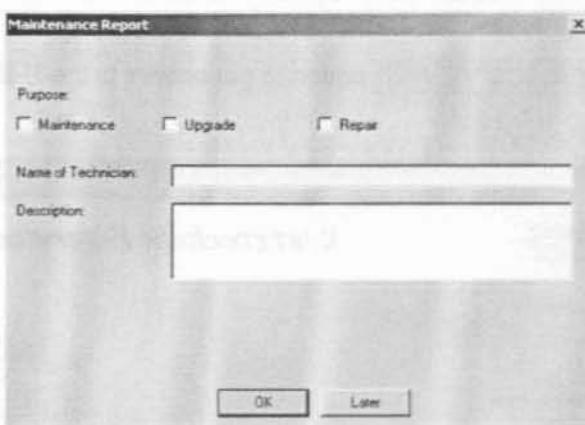


Figure 5-41 Maintenance Report

- 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 (see: Figure 5-41) 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.

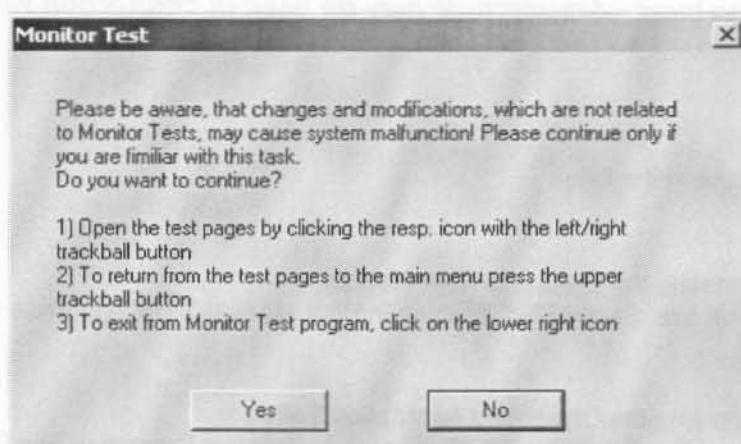


Figure 5-42 Monitor Test - Instructions

- 2.) Read the displayed instructions. Afterwards confirm with YES.  
The Monitor Test main menu appears on the screen.

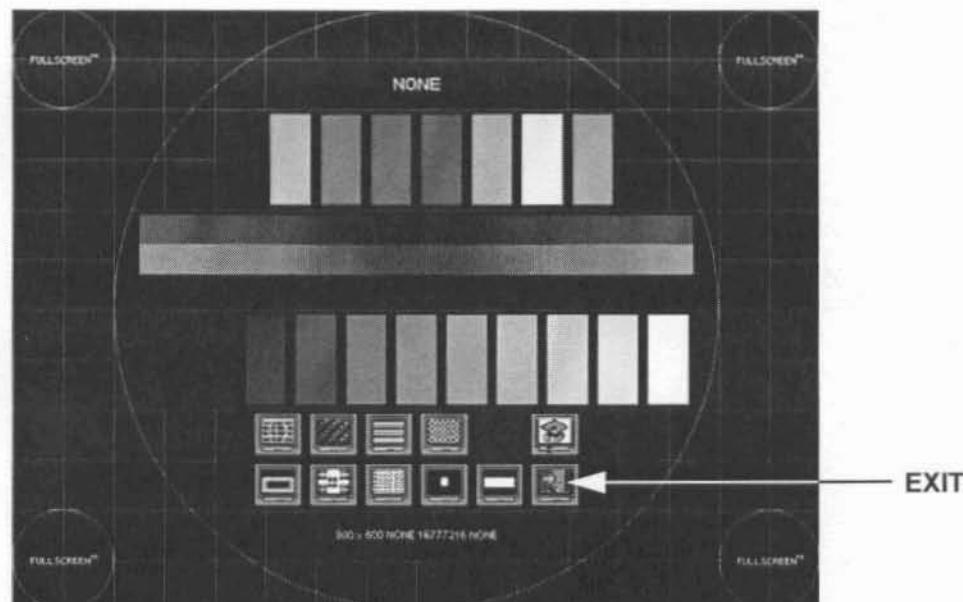


Figure 5-43 Monitor Test - Main menu

- 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**

Installation of the Line Printer is possible without entering the Windows Desktop.  
Operation see: 3-7-3 "Printer Installation manually" on page 3-28.

 **WARNING** *Only accessories explicitly recognized and released by the system manufacturer GE Medical Systems - Kretztechnik may be used in connection with the system.*

5-15-3-8 **Update**

5-15-3-8-1 **NLS**

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	6-3
6-5	Trackball Adjustment	6-4

### 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.

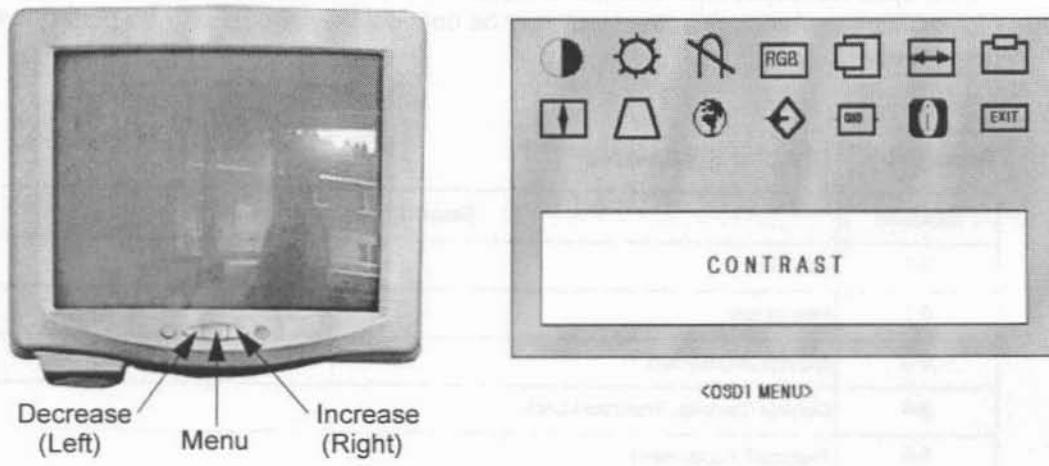


Figure 6-1 Monitor Adjustment buttons

- **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 3 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.

## 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.

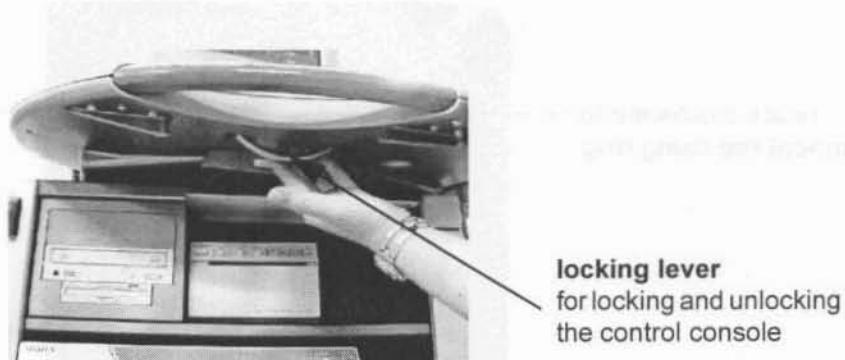


Figure 6-2 Locking Lever under Control Console

- 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.

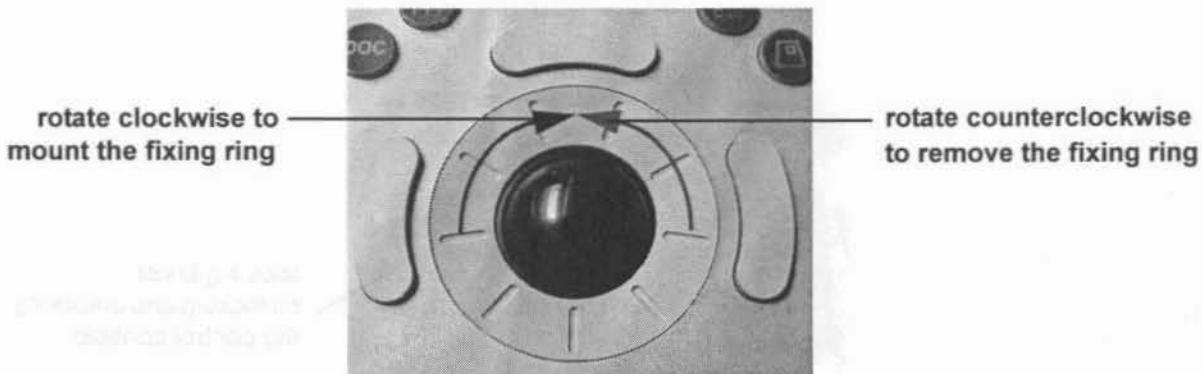


Figure 6-3 Trackball with fixing ring

- 2.) Adjust the trackball for smooth running by rotating the black securing ring.

- CCW: smooth run
- CW: tighten run

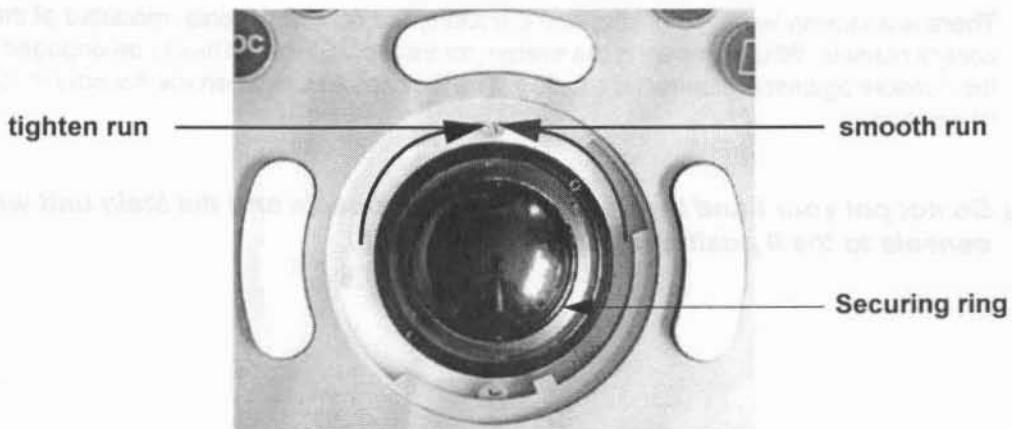


Figure 6-4 Trackball - Securing Ring



**NOTICE** Avoid tightening of thread caused by improper mounting of securing ring!

- 3.) Mount the outer fixing ring by turning it clockwise. see Figure 6-3

# 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 (InSite) 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**

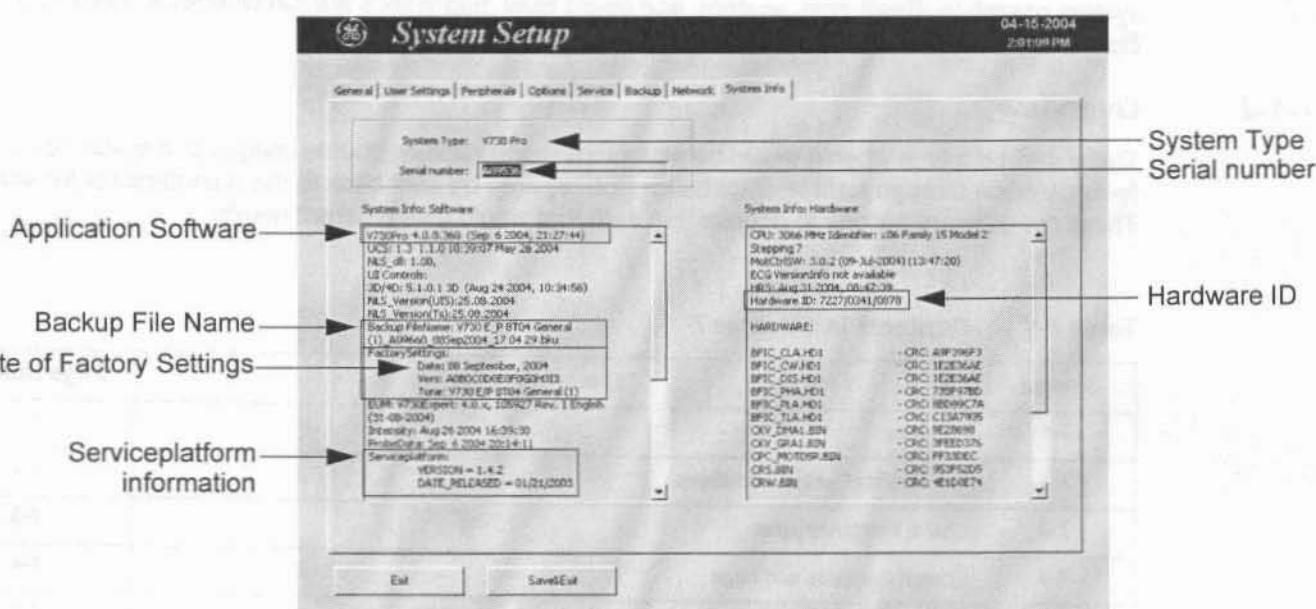
Section	Description	Page Number
7-1	Overview	7-1
7-2	Collect Vital System Information	7-2
7-3	Check Points Voltages	7-3
7-4	Screen Captures and Logs	7-4
7-5	How to use the Auto Tester program	7-7
7-6	Minimum Configuration to Boot/Scan	7-10
7-7	Troubleshooting Trees and Instructions	7-11
7-8	Error Messages	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:

Press the **UTILITIES** key, select the **SYSTEM** item and then enter the **SERVICE 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.

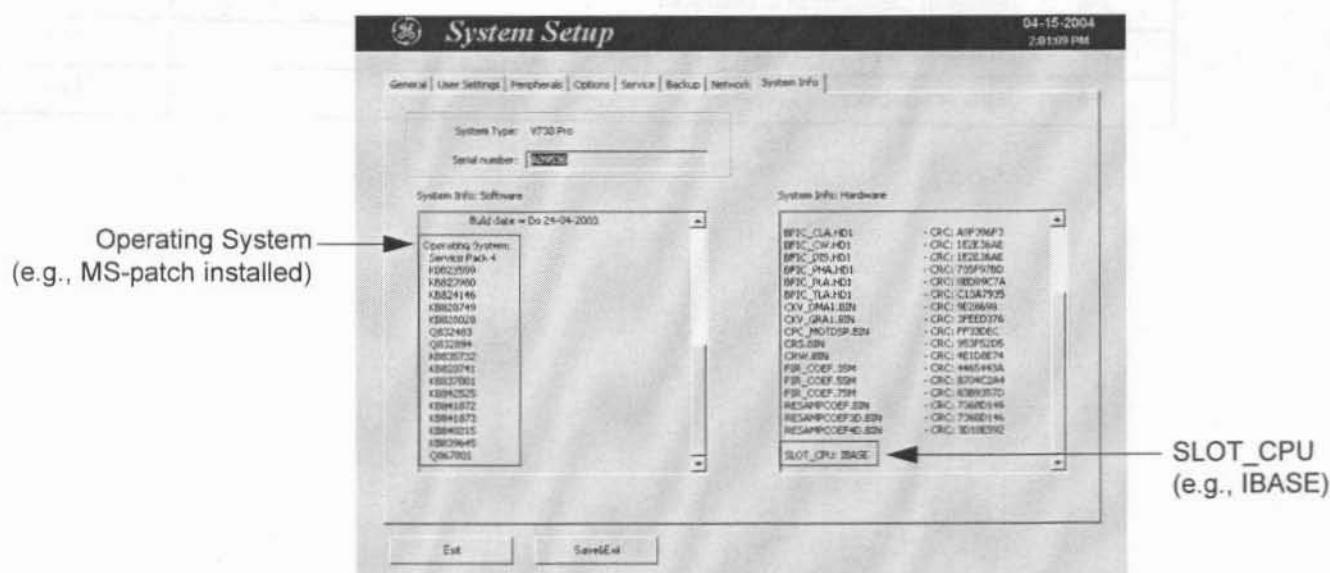
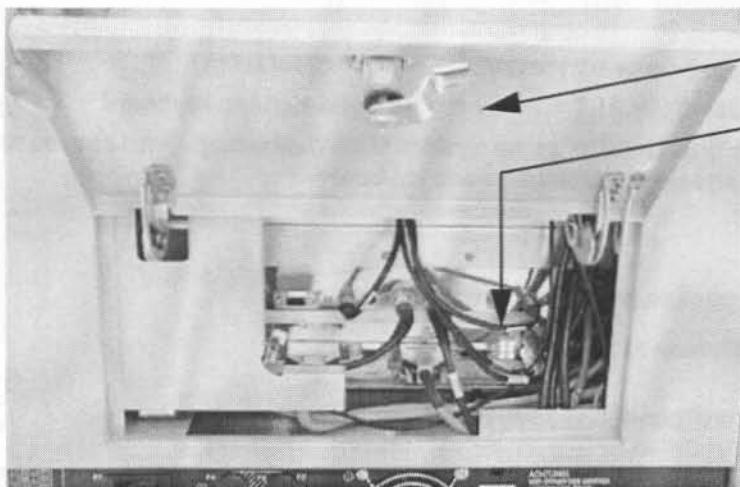


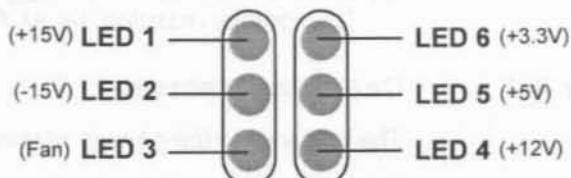
Figure 7-1 System Setup - System Info page (e.g. V730 Pro)

## Section 7-3 Check Points Voltages

### 7-3-1 How to check power

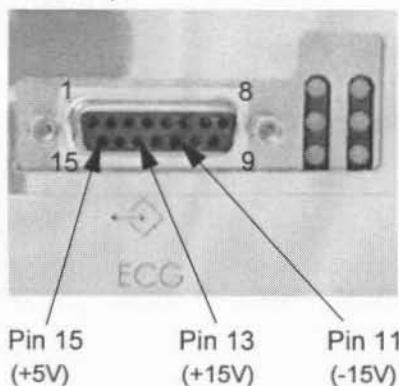


Open the locking, flap the service lid on the back of the Voluson® 730Pro / 730ProV upwards, and check the status of the Diagnostic LED's.

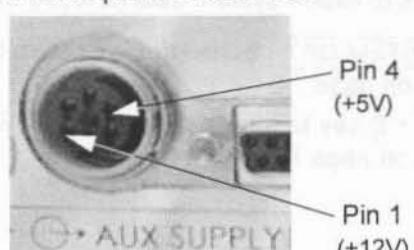


In case of problems, check the above voltages with a Digital Volt Meter (DVM) to Ground.

**LED 1, 2 and 5**  
ECG connector  
on Backpanel of GEF-Box

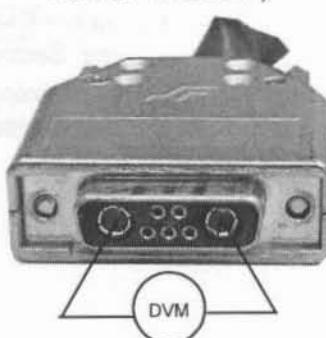


**LED 4**  
AUX Supply (= GEM Power connector)  
on Backpanel of GEF-Box

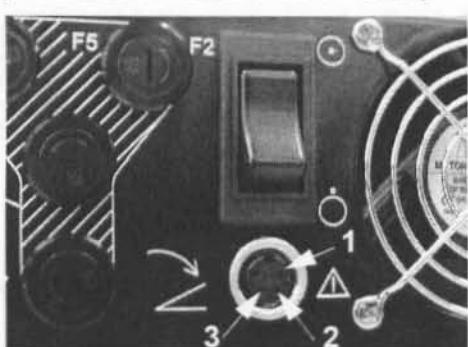


Location of fuses on CPE;  
see: Section 5-11-3-1 on page 5-44

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)



CPN6  
CPN80

**LED orange (at CPN80 only)**  
visual check for 59V:  
orange LED (at CPN80 power supply) is lightening

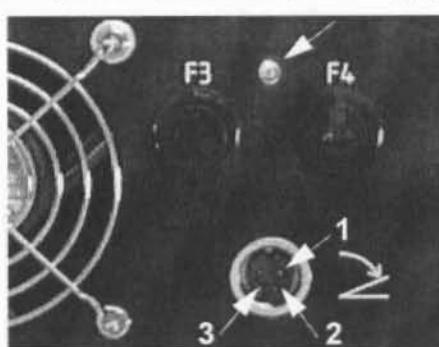


Figure 7-2 Diagnostic LED's and corresponding voltage check points

## 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
- C.) creates one snapshot (**Alt-D.bmp**) + "Full Backup" of the System state (fullbackup -> fb1) saved on D:\export by pressing the **ALT + D** key on the alpha-numeric 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 2D** key on the control panel 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 MO-Disk (jpg, bmp or tiff).

### 7-4-2 Export Log's and System Data

There are two possibilities to export system data (and log's):

- 1.) via the **EXPORT SYSTEM DATA** button in the System Setup **SERVICE** page;  
see: Section 7-4-2-1 on page 7-5
- 2.) by pressing the **ALT + D** key to save a snapshot and "Full Backup" of the System state;  
see: Section 7-4-2-2 on page 7-6

7-4-2-1 Export Log's and System Data (via Service Page)

- 1.) Press the UTILITIES key, select the SYSTEM item from the menu area.
- 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.

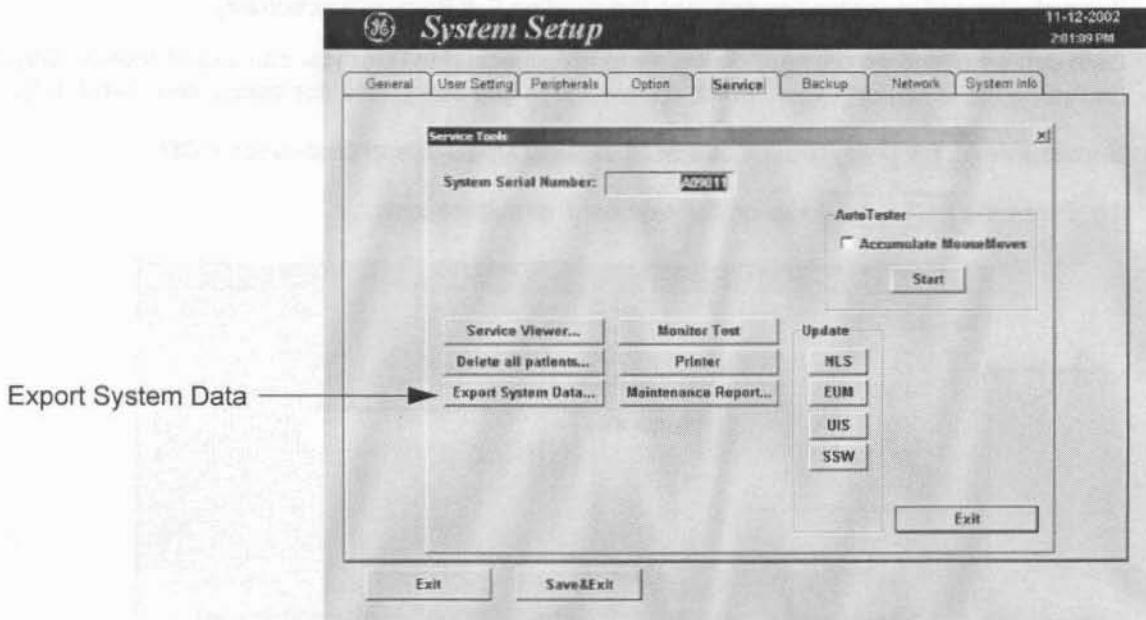


Figure 7-3 Service Tools window

- 4.) Click on the EXPORT SYSTEM DATA... button, to export dump-files (see: 7-4-2-1-1), text files, th Event Log File, the full Service Database and information about probes, boards, software, option and service actions to DVD/CD Drive (or the optional MO drive).

7-4-2-1-1 Dump-file

Every time an error message like Figure 7-4 is produced, a dump-file and a text file containing th error dump and the error message are created in D:\export. Up to 20 dump files are stored there



Figure 7-4 system has encountered a problem

After clicking on OK the system reboots automatically.

#### 7-4-2-2 Export System Data (by pressing the ALT + D key)

**ALT + D** uses "Full Backup" to gather data from the system. In addition it creates one screenshot (Alt-D.bmp) of the point in time when **ALT + D** was pressed.

The main use is when R&D or OLC need detailed information about the system (e.g., when experiencing strange behaviour or when the problem should be investigated by R&D).

It is **not** intended to replace or enhance the existing Full Backup functionality.

Data can be stored on the hard disk (D:\export\fullbackup\fb1), or you can export them to DVD/CD (including the D:\export folder, which contains logs and dump-files; for details see: 7-4-2-1-1).

**NOTE:** Successive **ALT + D** keystrokes overwrite existing snapshots at destination HDD.

- 1.) Press the **ALT + TAB** key on the keyboard. simultaneously.

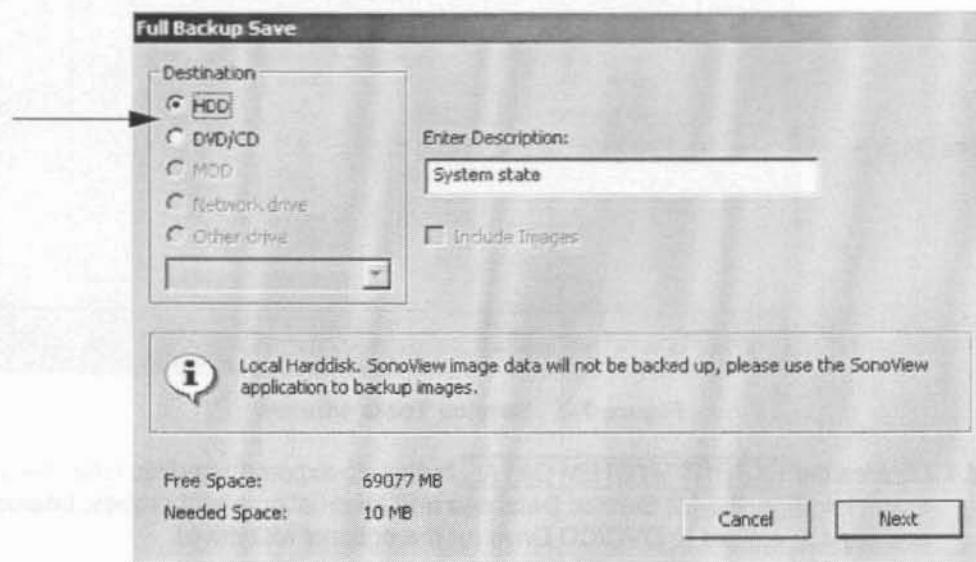


Figure 7-5 select destination for "System state" backup

- 2.) Select the destination of the "System state" backup among HDD or DVD/CD.

- 3.) Select the **NEXT** button to start the backup process.

After saving the data, the Voluson® 730Pro / 730ProV reboots and the application starts again.

## Section 7-5

### How to use the Auto Tester program

- 1.) Press the UTILITIES key and select the SYSTEM from the menu area on the left side of the screen.
- 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.

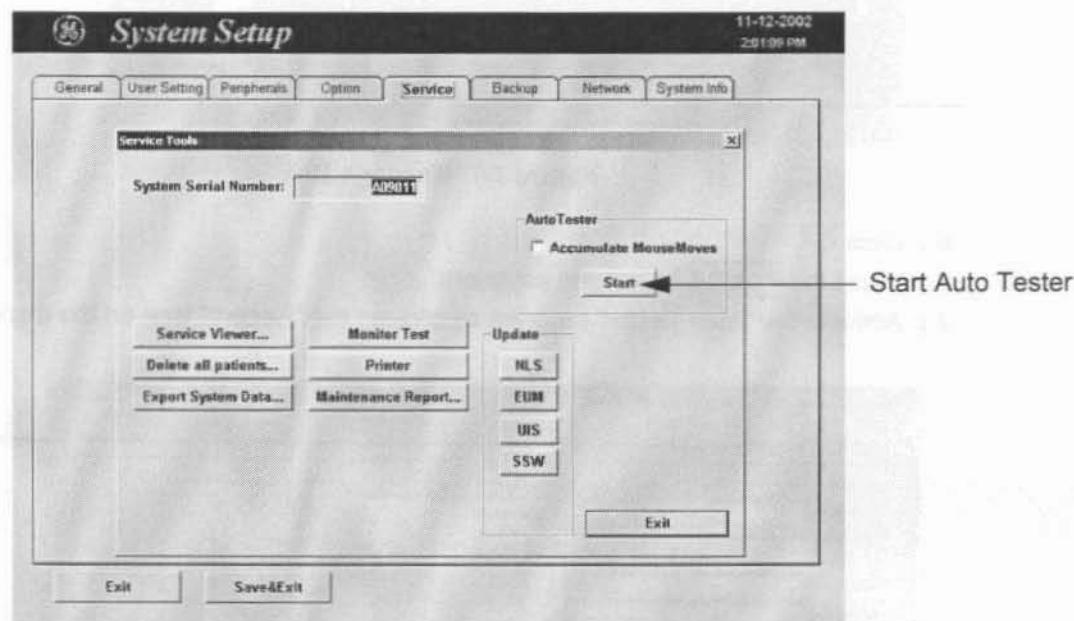


Figure 7-6 Service Tools window

- 4.) Activate the "Auto Tester" program by clicking the START button.

## Section 7-5 How to use the Auto Tester program (cont'd)

The following message box appears.

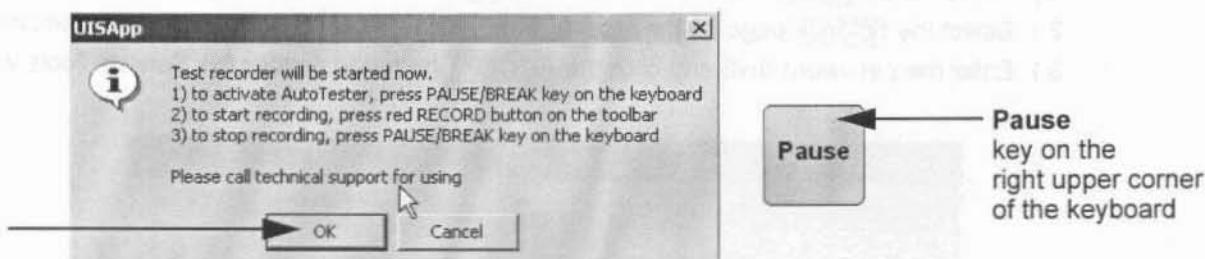


Figure 7-7 Message Box

- 5.) Click OK.
- 6.) Press the PAUSE key on the keyboard.
- 7.) Activate the "Auto Tester" program by clicking the "Record" icon on the displayed screen.

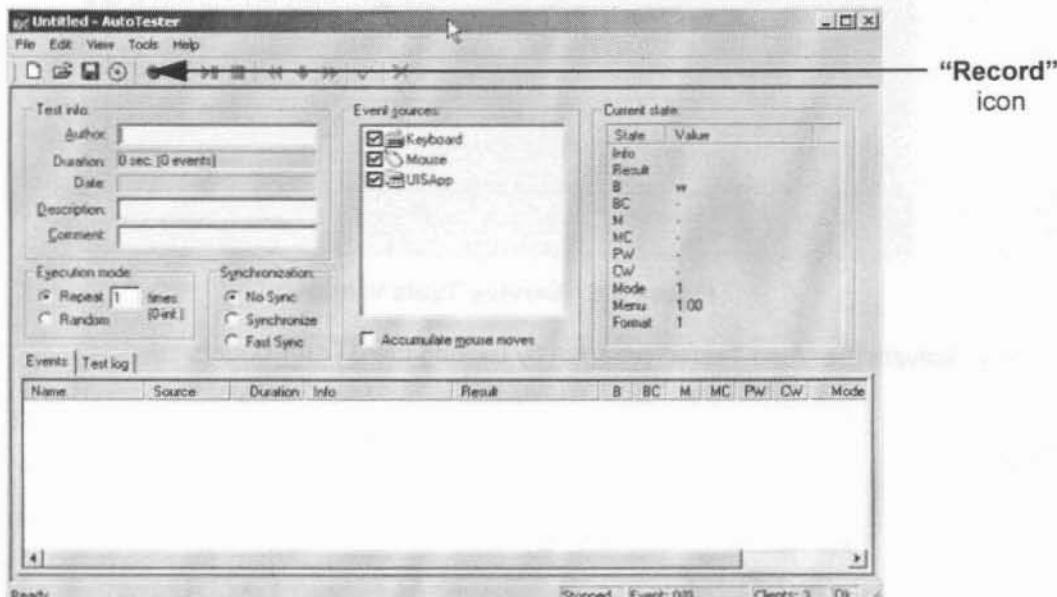


Figure 7-8 Start Auto Tester

- 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 7-9 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.

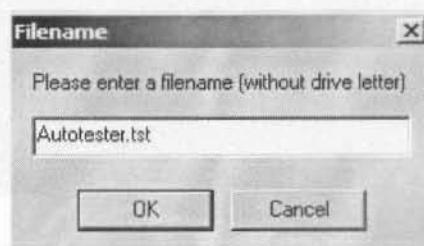


Figure 7-10 Enter a Filename

- 12.) After clicking OK, the following message boxes will appear.

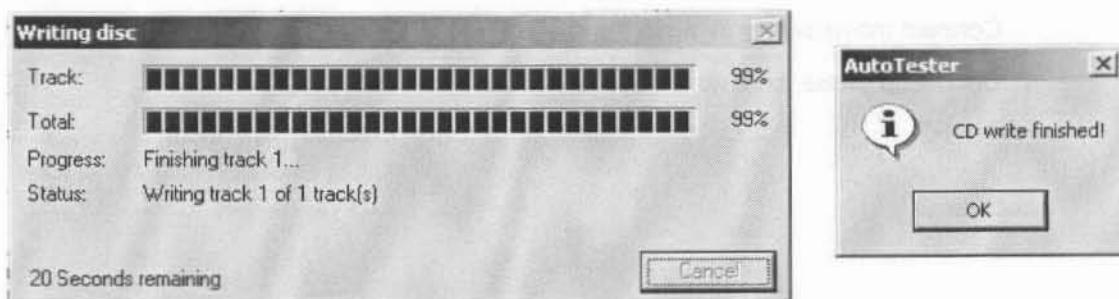


Figure 7-11 CD Burn Process

- 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 7-12

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 - NOT used at Voluson® 730Pro / 730ProV)

c.) VGA (Monitor)

d.) Console

e.) CPN (Primary Power Supply)

f.) Standby switch

g.) Monitor (Power Supply)

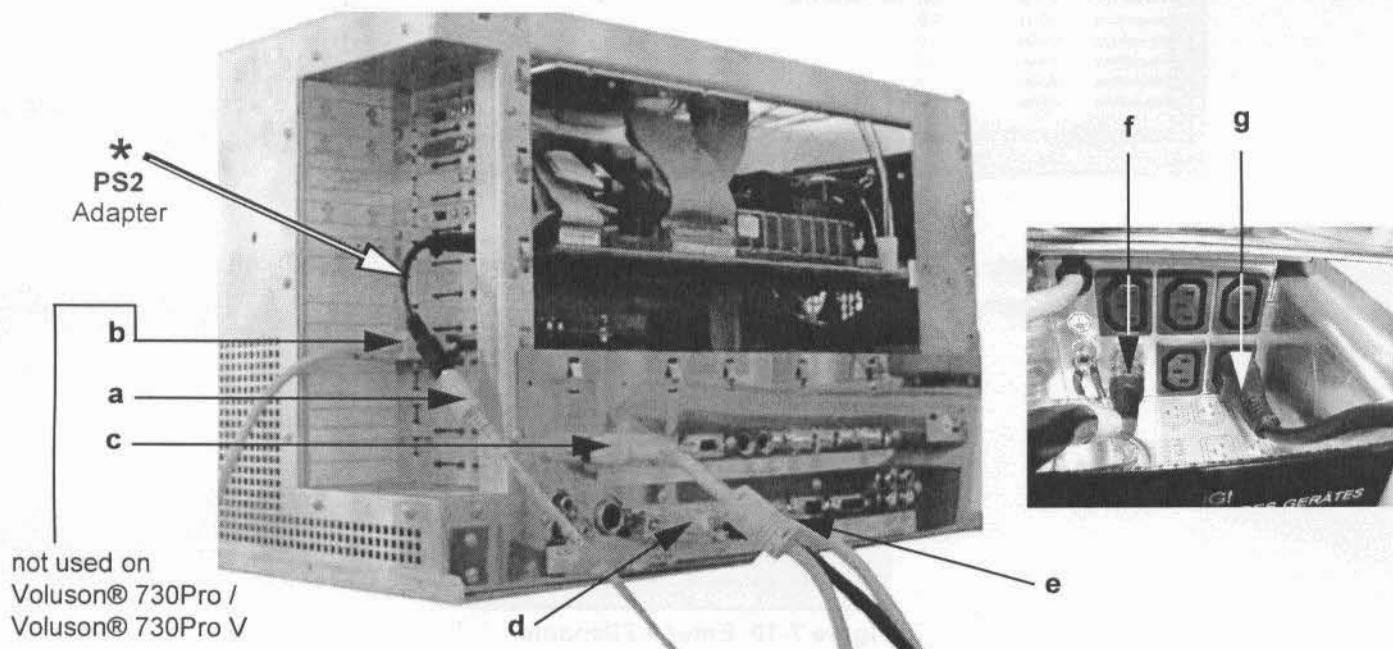


Figure 7-12 cable- minimum configuration

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

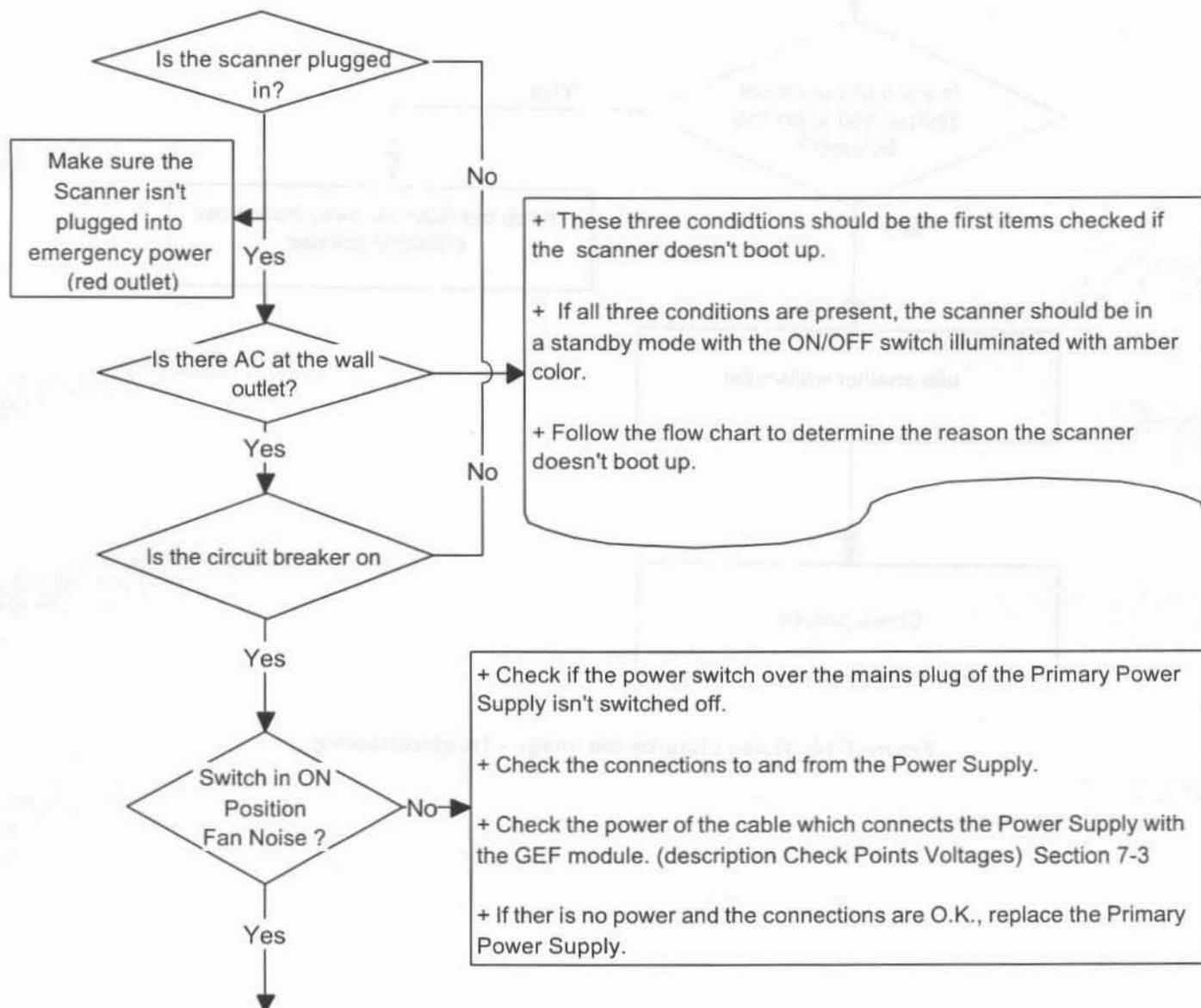


Figure 7-13 System does not boot up

### 7-7-2 Noise disturbs the Image

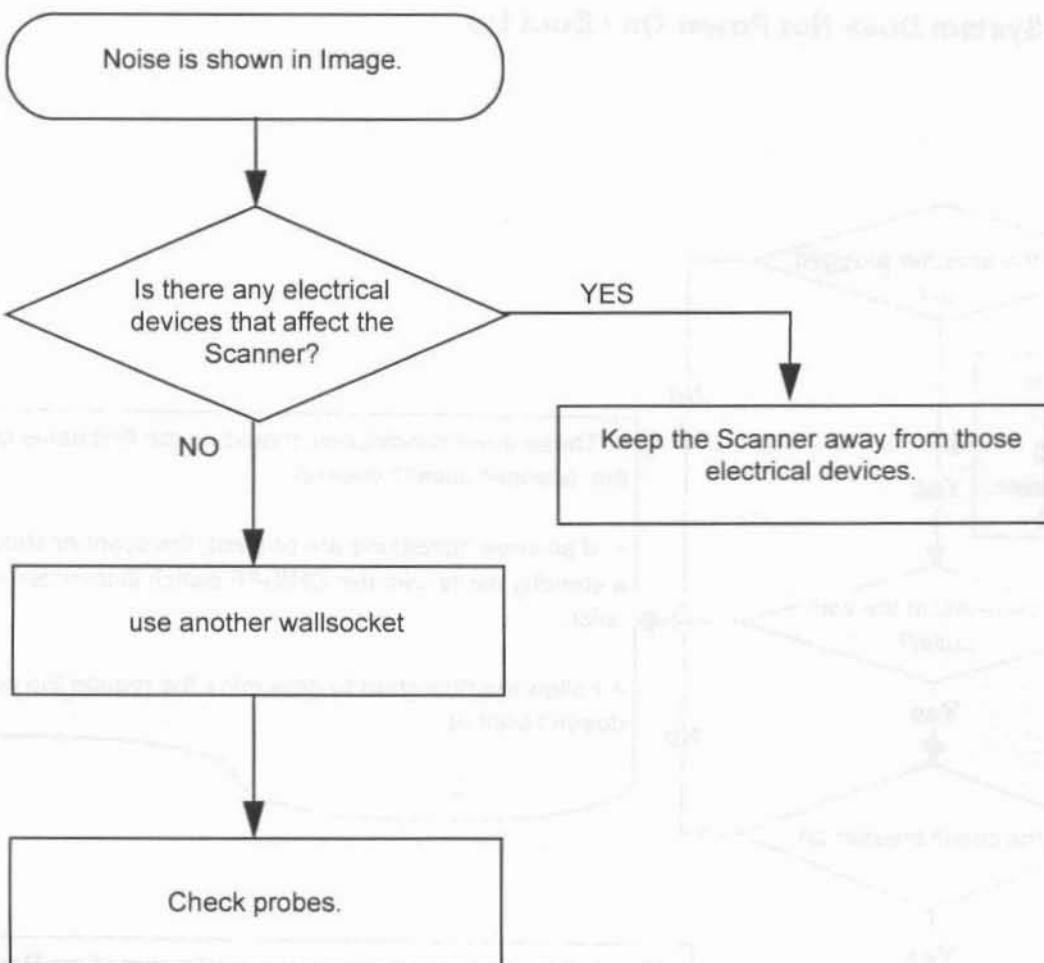


Figure 7-14 Noise disturbs the Image - Troubleshooting

7-7-3      Trackball

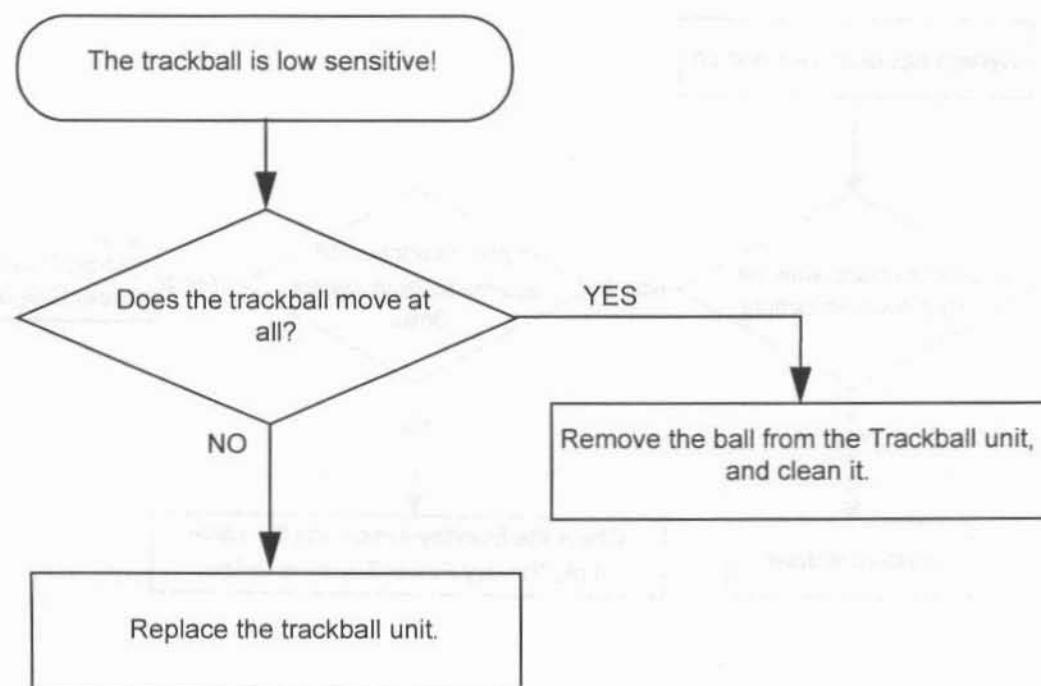


Figure 7-15 Trackball - Troubleshooting

7-7-4 System Does Not Power Off / Shutdown

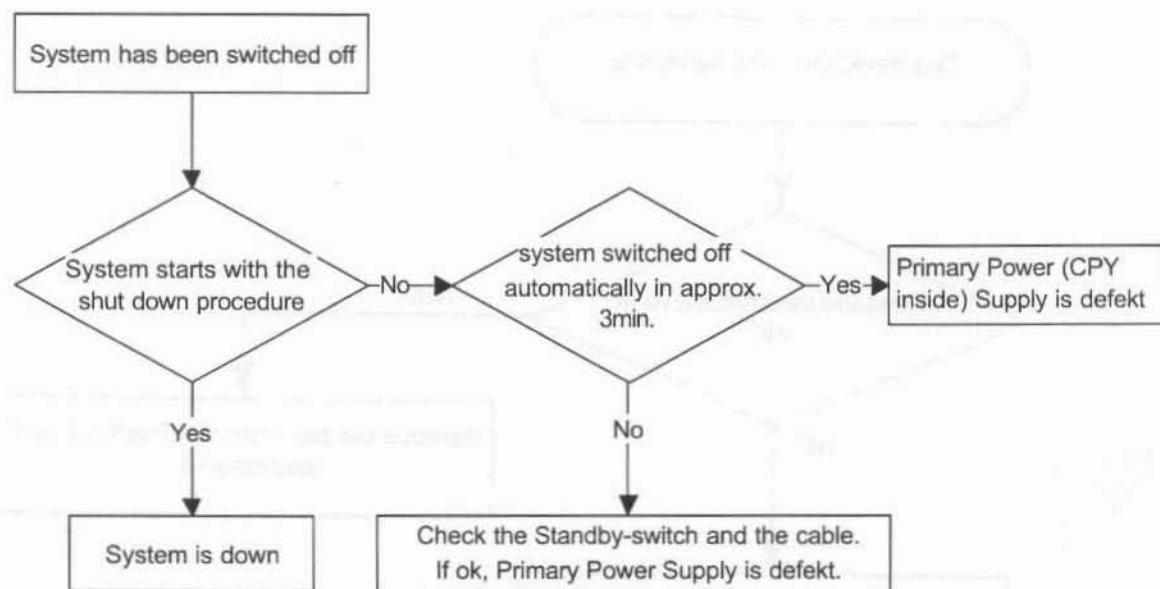


Figure 7-16 Power Off / Shutdown - Troubleshooting

## 7-7-5 Monitor Troubleshooting

Fault symptom	Check these items
No image	Check the power cord is properly connected.
	CPN6 only: Check the Power Switch of Peripherals (F2) on back of system is set to the "ON" position.
	CPN80 only: 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.
Color is not uniform	Check if video is present on backplane.
	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.

7-7-6 Unable to Record to VCR

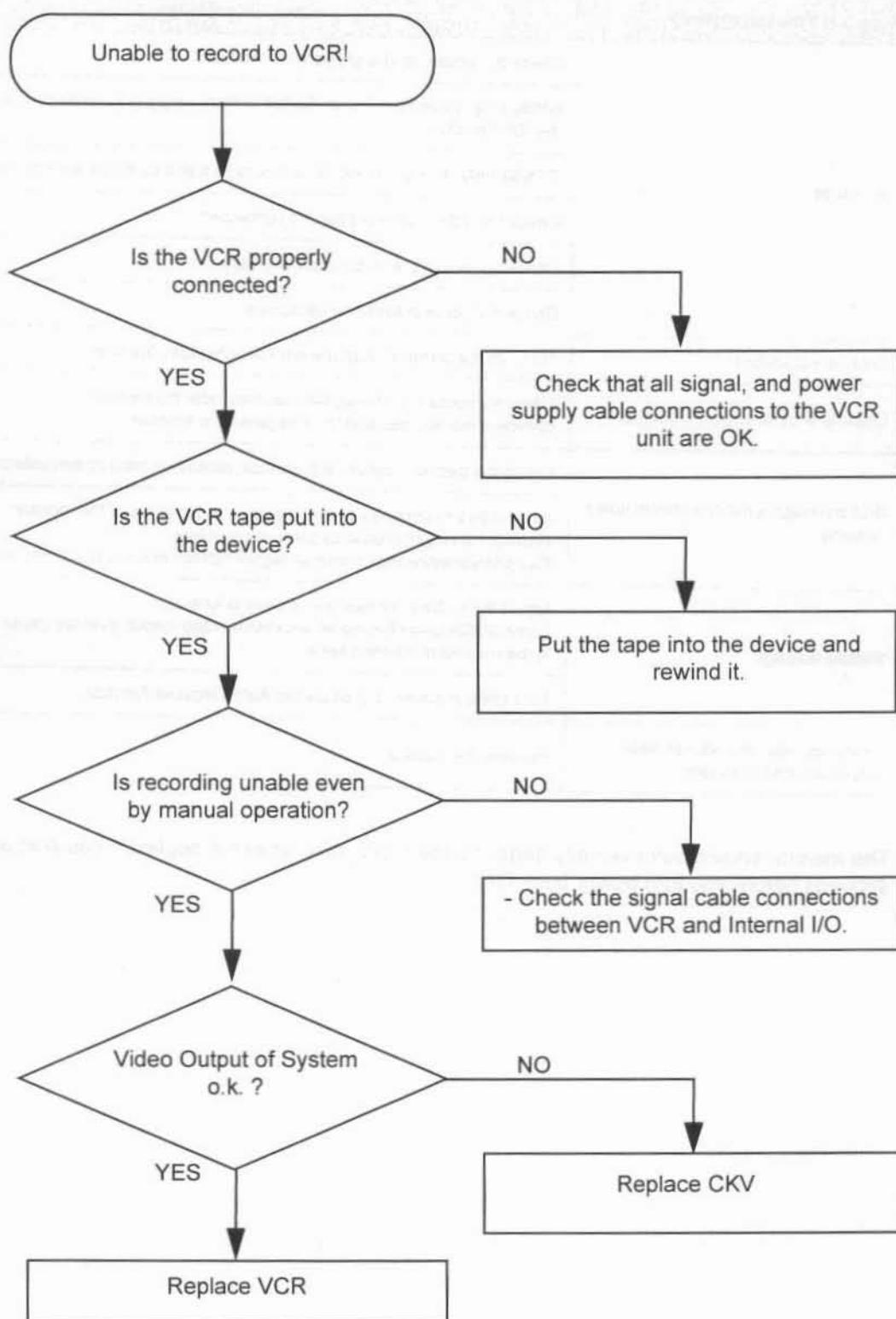


Figure 7-17 VCR - Troubleshooting

## 7-7-7 Printer Troubleshooting

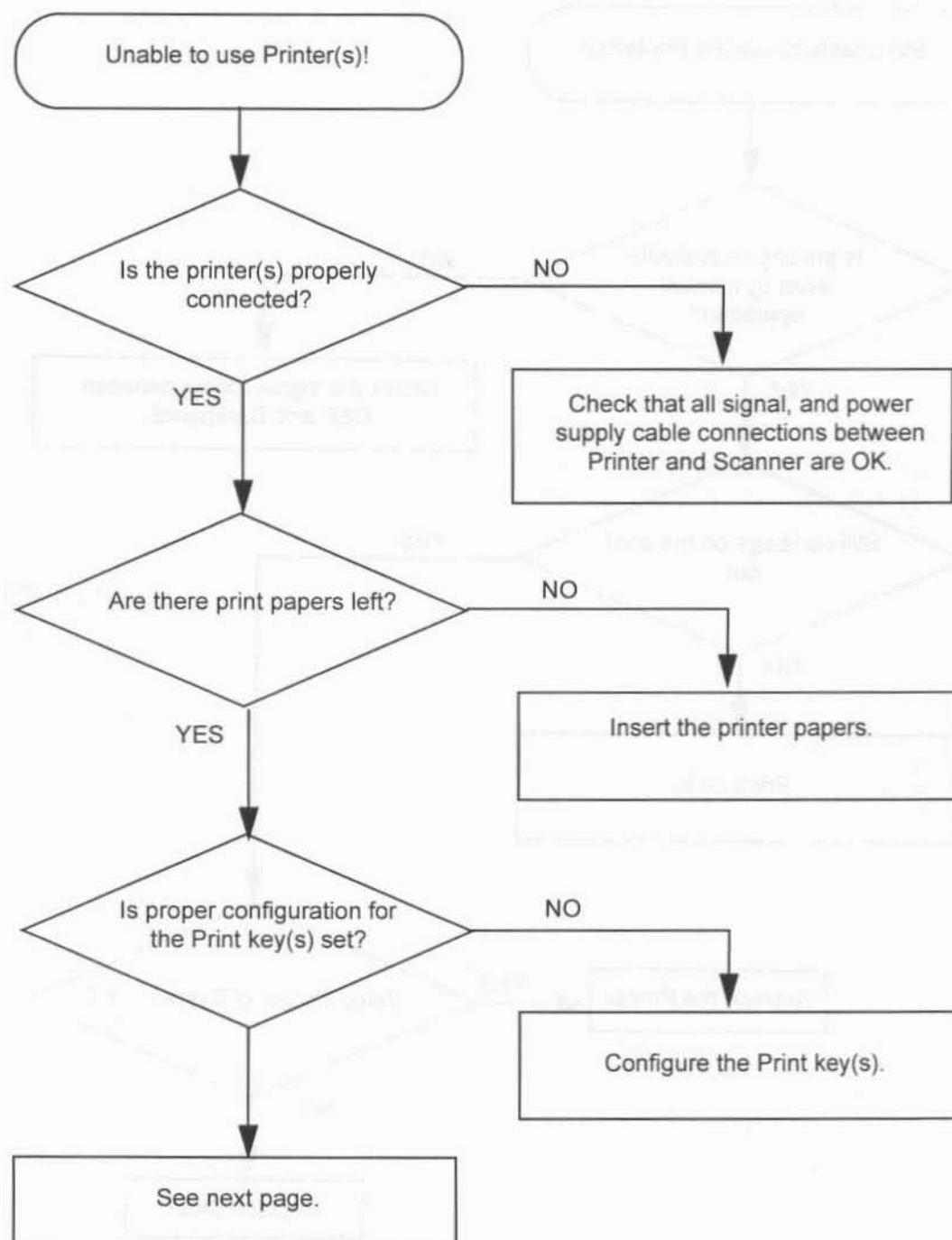


Figure 7-18 Printer - Troubleshooting

7-7-7 Printer Troubleshooting (cont'd)

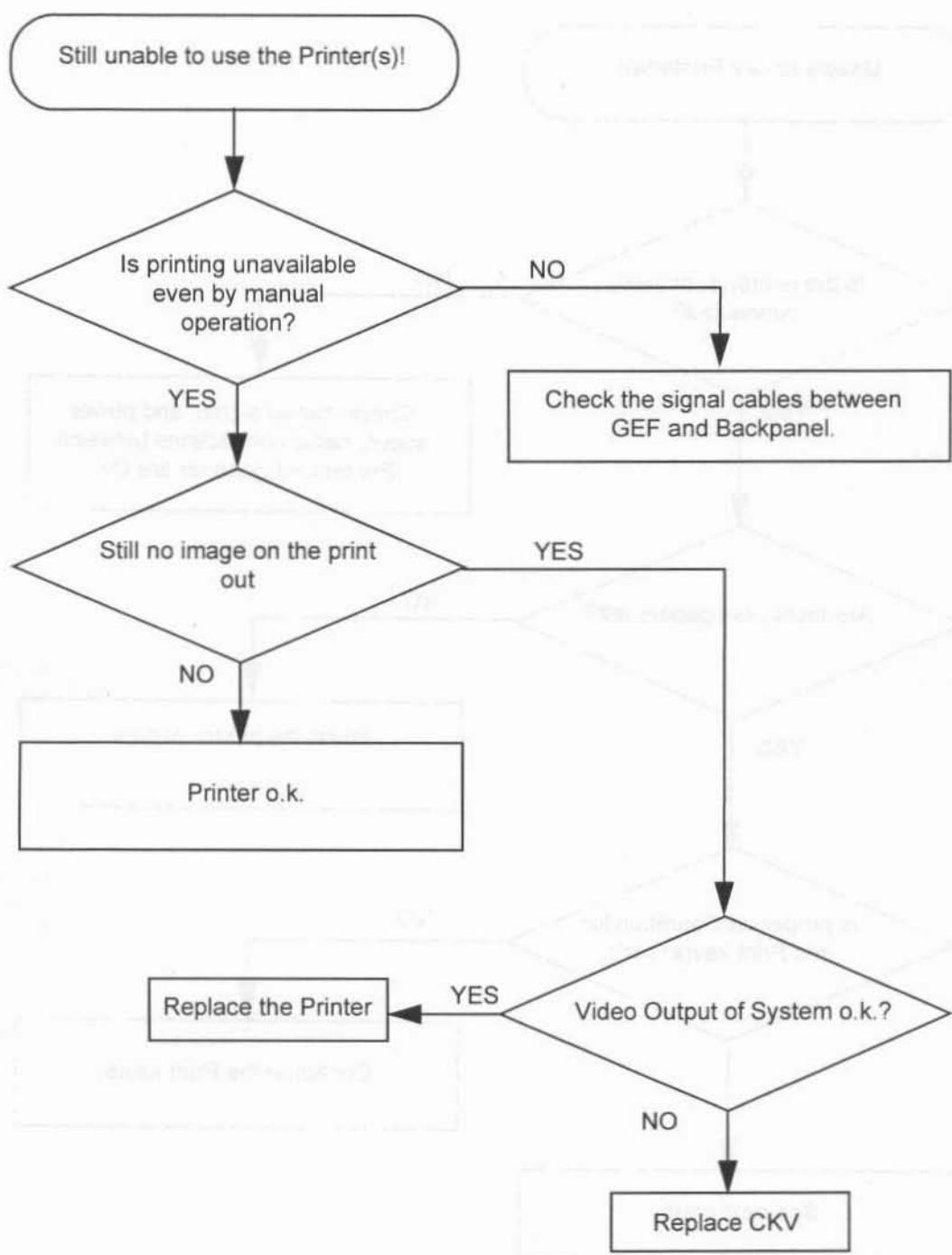


Figure 7-19 Printer Troubleshooting (cont'd)

### 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 7-20.
- 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.

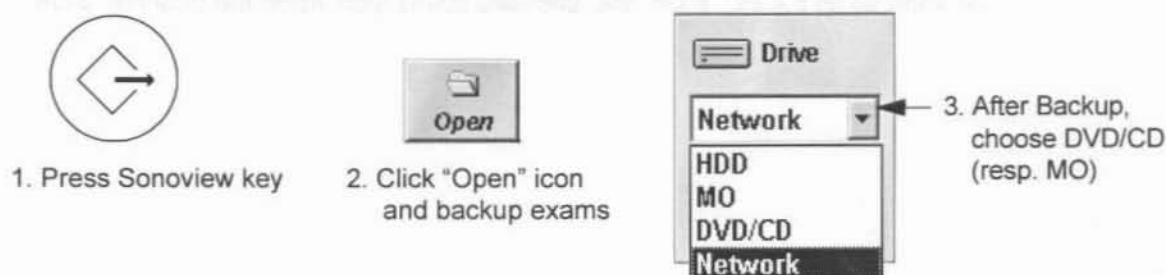


Figure 7-20 To backup exams to DVD/CD+(R)W resp. MO-Disk

**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 7-3

### 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 7-20.
- 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 7-3

## 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	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: .....	restart the system
Can't open: C:\V730\Distribution\Hardware\patterndat.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 Mode_4D	restart the system

Error Messages	Actions
CtrlMvGrpRepresentations::isInWriteMode not supported for mode nr xx	restart the system
CW quant TX Frequ out of range	restart the system
CW_BaseLinePos 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
D:\SERVICE\ConflIndexFile is corrupt	restart the system
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
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
ECG_InterfaceToHW::vLookupForNewSamples() allocating expanded buffer[xxx] for TimeStamps failed!!	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 CreateCineImage	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 a 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
Persistance 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 off 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::addListener called within Transaction!!	restart the system
RepresentationManager::Destructor caused exception, Open Transaction!!	restart the system

Error Messages	Actions
RepresentationManager::pActualUnitWrtAddr called within Transaction!!	restart the system
RepresentationManager::pNextUnitsCompleted called within Transaction!!	restart the system
RepresentationManager::removeAllListener called within Transaction!!	restart the system
RepresentationManager::removeListener called within Transaction!!	restart the system
RepresentationManager::vClear called within Transaction!!	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
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 called within Transaction!!	restart the system
RepresentationManager::vResizeBufferLength caused exception, replay buffer is not empty!!	restart the system
RepresentationManager::vSetGeoDescription called within Transaction!!	restart the system
RepresentationManager::vSetReplayParams called within Transaction!!	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::bDILineFilter call failed!!	restart the system
RT_4DTissueFilterBlock::bDILineFrameFilter 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::vCheckIQDataSizeAndUpdateTable s: Memory allocation failed	restart the system
RT_ColorFlowFilterBlock::vDebugDrawIQDataCurve: Memory allocation failed	restart the system

Error Messages	Actions
RT_ConnectionMngr::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 != 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
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 Registry not closed	restart the system
The System detected a problem with your harddisk. Please do not reboot or shut down the machine! Please contact your service department as soon as possible.	if possible, <ul style="list-style-type: none"> <li>• save "Full Backup" (see: Section 4-5-3 on page 4-35) to "DVD/CD", "Network", or "Other drive" (including images)</li> <li>• if not currently done, save all images via Sonoview (see: Section 4-5-6 on page 4-40).</li> <li>• call technical support</li> </ul>

Error Messages	Actions
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.
ViewerConMngr::vAssembleCF_DFE: attempt to get ECG_Consumer_2D- or ECG_Draw_2D-Block from ECGViewer Objects failed!!	restart the system
ViewerConMngr::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.*

Table 8-1 Chapter 8 Contents

Section	Description	Page Number
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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.

**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 8-2

## Ultrasound Application Software (UIS) Installation Procedure

### 8-2-1 Introduction

**NOTICE** 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

### 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

## 8-2-4 Preparations (cont'd)

- 1.) Press the **UTILITIES** key on the control panel once to display the Utilities menu.
- 2.) Select the **SYSTEM** item from the Utilities menu - which is displayed on the left side of the screen.
- 3.) Select the **SYSTEM INFO** page on the System Setup desktop screen to see which Software/Hardware version is installed in the unit.

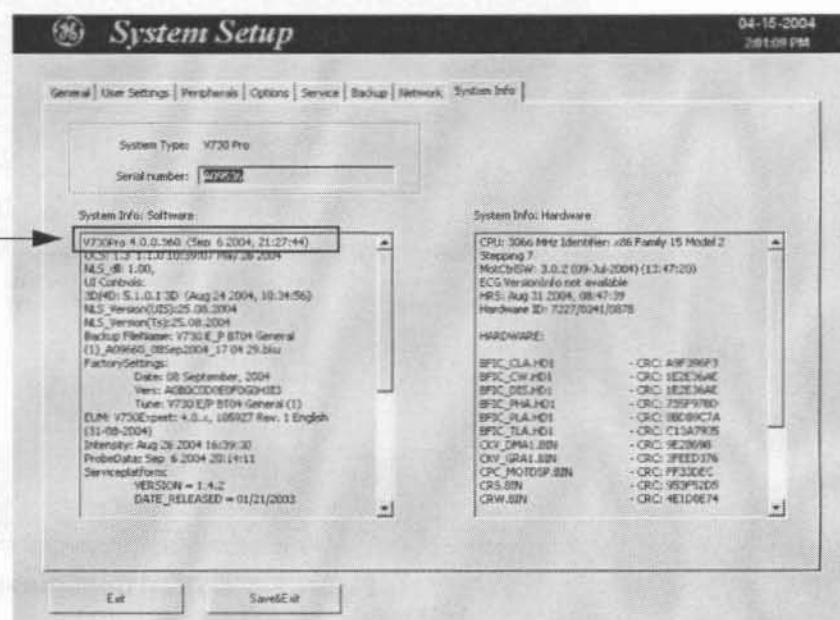


Figure 8-1 Version check

- 4.) Select the **OPTION** page on the System Setup desktop screen to see which Options are installed.

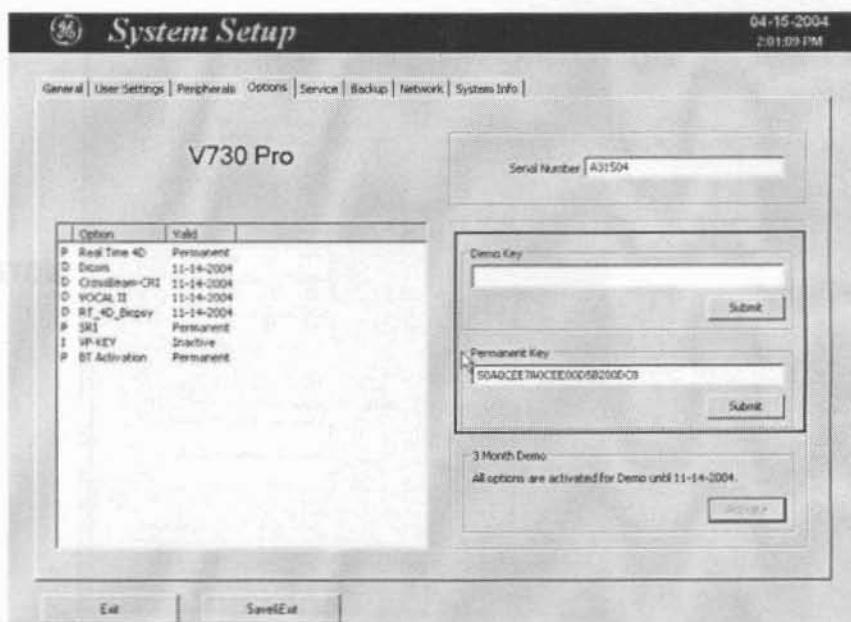


Figure 8-2 Option page



**NOTICE** Please print out the **OPTION** page or write down all the option codes which are shown in the "Key" fields!

## 8-2-4 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.

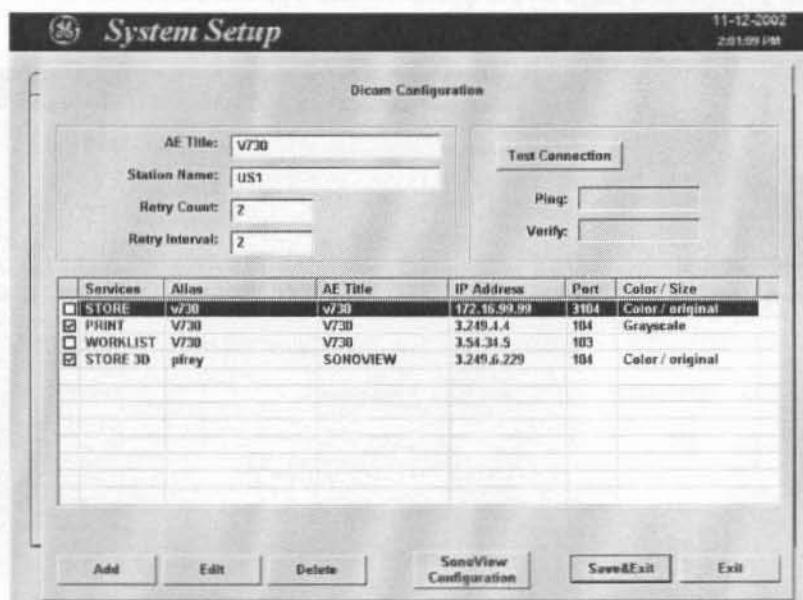


Figure 8-3 DICOM Configuration

**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.

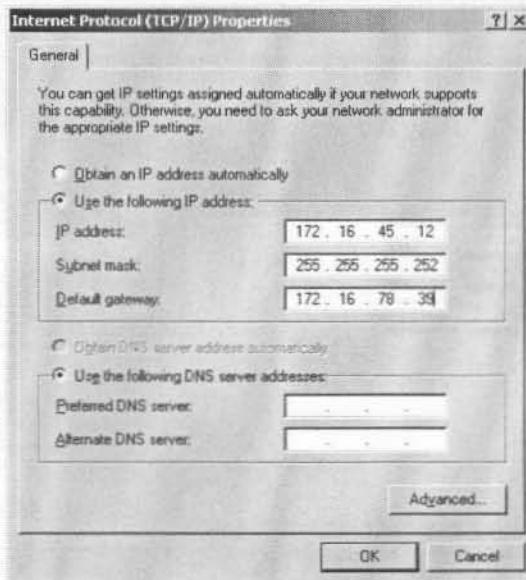


Figure 8-4 Internet Protocol (TCP/IP)

**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 into the drive.
- 2.) Press the UTILITIES key and then select SYSTEM item from the Utilities menu.
- 3.) Select the SERVICE page.

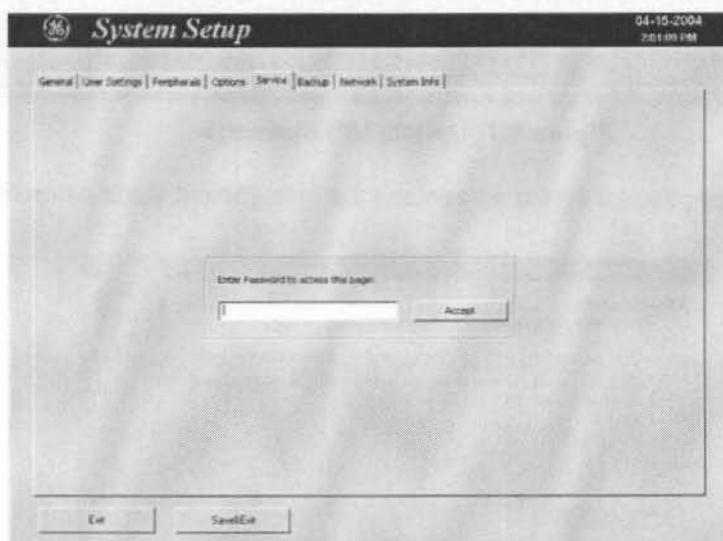


Figure 8-5 System Setup Service

- 4.) Type in the password SHE and click ACCEPT.

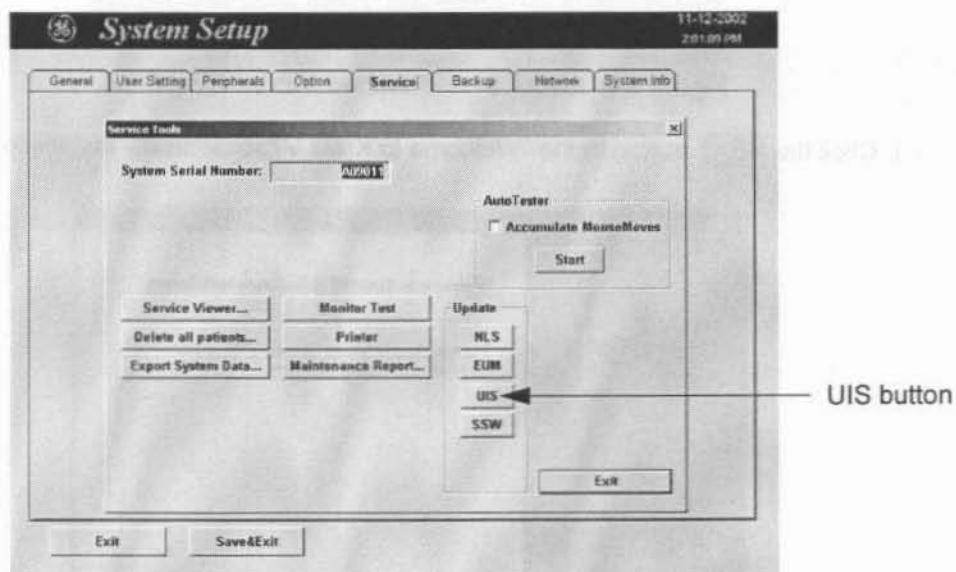


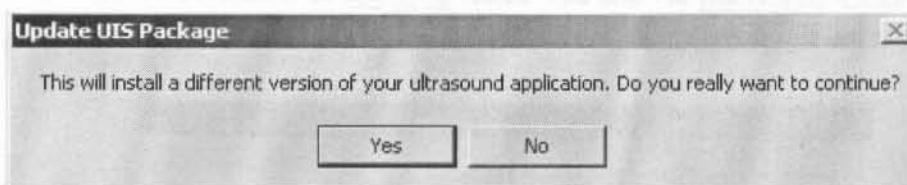
Figure 8-6 Service Tools

- 5.) Click on the UIS button for updating the Ultrasound Application Software.

8-2-5

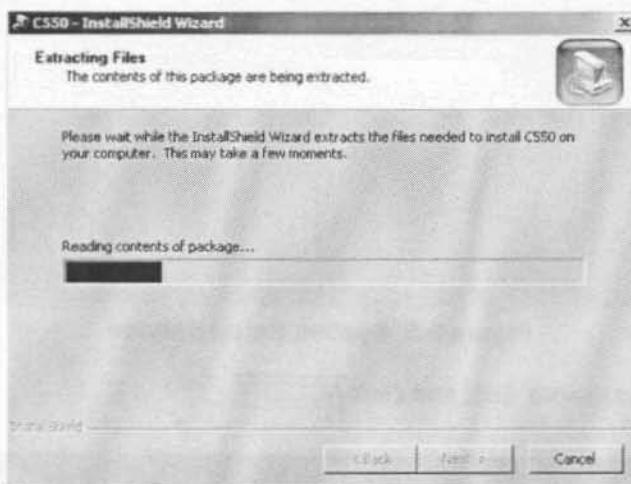
**Software - Installation Procedure (via Service Page) (cont'd)**

- 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:

- 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 4-33

## Section 8-4 Full Backup (Presets, Configurations & Appl. Settings) Loading Procedure

### 8-4-1 Introduction

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 4-37

## 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.) Press the **UTILITIES** key on the control panel once to display the Utilities menu.
- 3.) Select the **SYSTEM** item from the Utilities menu - which is displayed on the left side of 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.

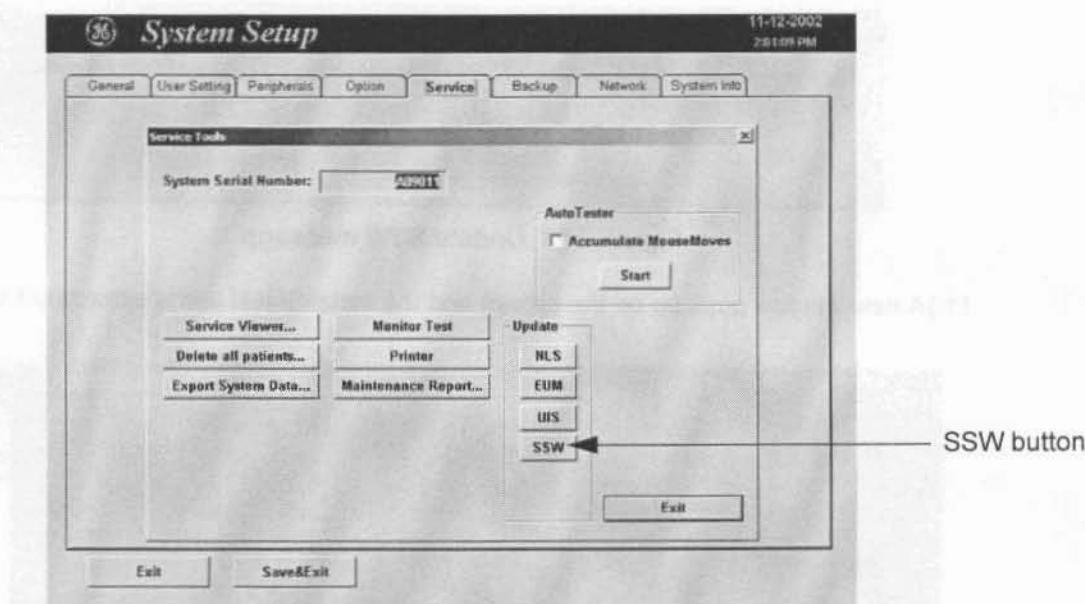


Figure 8-11 Service Tools

- 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.

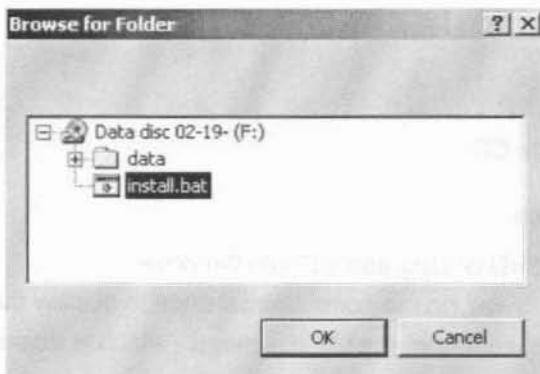


Figure 8-12 Browse for Folder

- 10.) Confirm the following message with YES.

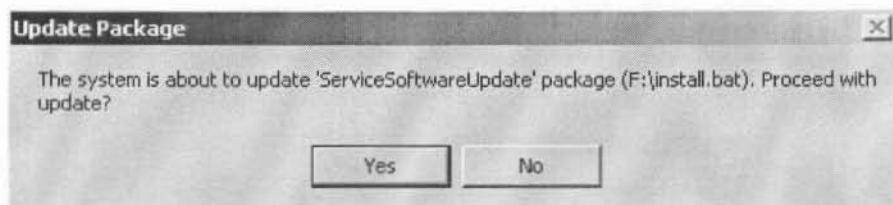


Figure 8-13 Update SSW message

- 11.) A new window pops up on the screen and the InstallShield starts extracting files.

```
C:\WINNT\system32\cmd.exe
F:\>copy .\data\Shutdown.jar "c:\v730\Distribution\ServicePF\target\service\svcp
form\servlets"
1 file(s) copied.

F:\>copy .\data\uncKill.bat "C:\v730\Distribution\ServicePF\target\bin\"
1 file(s) copied.

F:\>copy .\data\KillProcessByHandle.exe "C:\v730\Distribution\ServicePF\target\bin\
"
1 file(s) copied.

F:\>copy .\data\BashCmd1.bat "C:\v730\Distribution\ServicePF\target\service\ini
te\bin\
"
1 file(s) copied.

F:\>copy .\data\DistinctInstall.exe "C:\v730\Distribution\ServicePF\target\servi
ce\temp\
"
1 file(s) copied.

F:\>c:\qwin\bin\hash.exe -c "chmod -u /c/v730/Distribution/ServicePF/target/se
rvice/insite/bin/lipadmin ; chmod -u /c/v730/Distribution/ServicePF/target/servi
ce/insite/bin/PPP_Server"

F:\>pause
Press any key to continue . . .
```

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.) Press the **UTILITIES** key on the control panel once to display the Utilities menu.
- 4.) Select the **SYSTEM** item from the menu area 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.

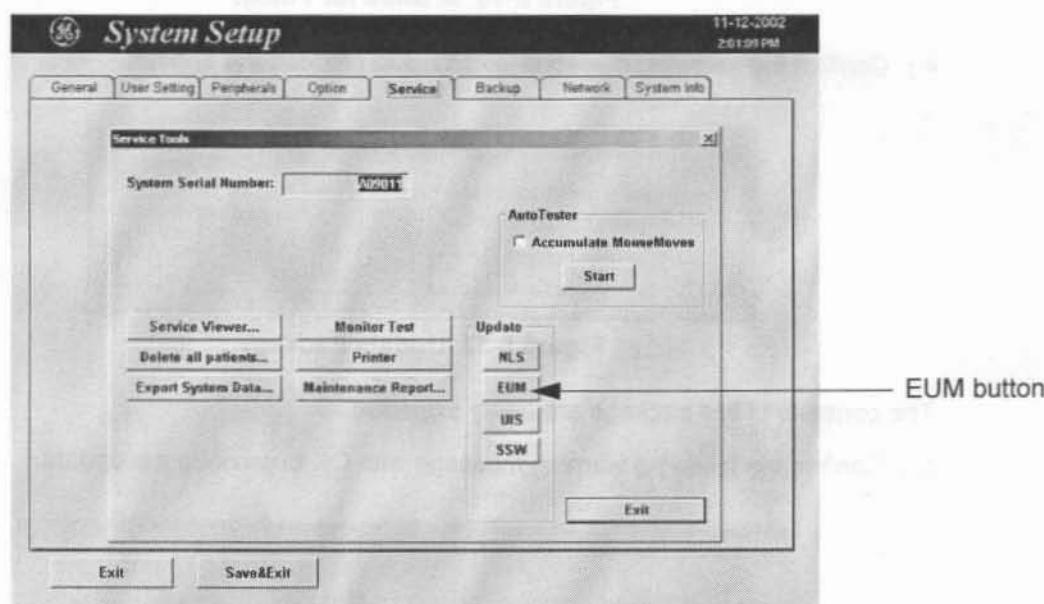


Figure 8-15 Service Tools

#### 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\_V730Pro.exe** file and click OK.



Figure 8-16 Browse for Folder

- 4.) Confirm the following message with YES to proceed the update.

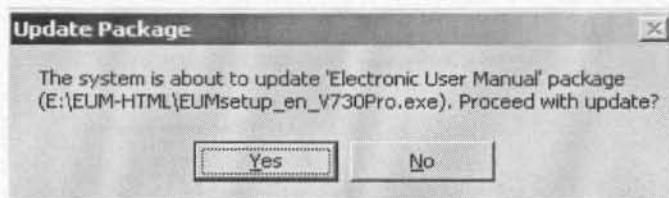


Figure 8-17 Update Package

The contents of this package are being extracted.

- 5.) Confirm the following warning message with OK to proceed the update.

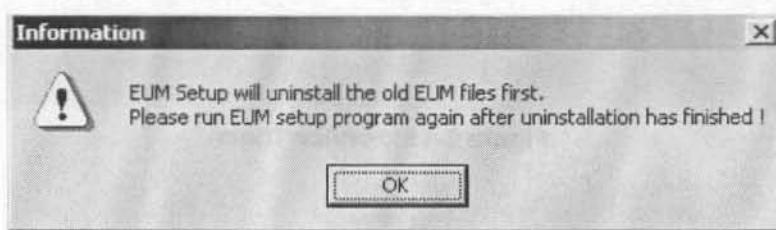


Figure 8-18 confirm warning message

- 6.) Confirm the "Maintenance Complete" message: «InstallShield Wizard has finished performing maintenance operations on V730 Pro 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\_V730Pro.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 messages with the NEXT key).
- 12.) After successfully installation of the Electronic User Manual, click FINISH to exit the wizard.



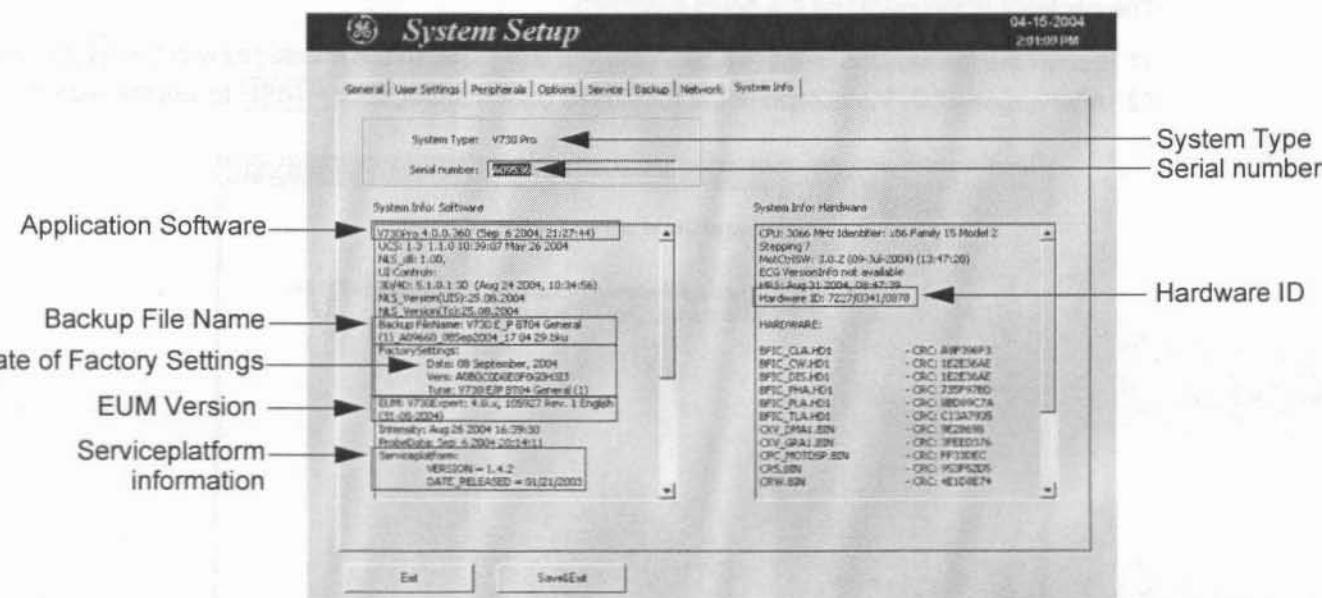
Figure 8-19 Complete Installation

- 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.

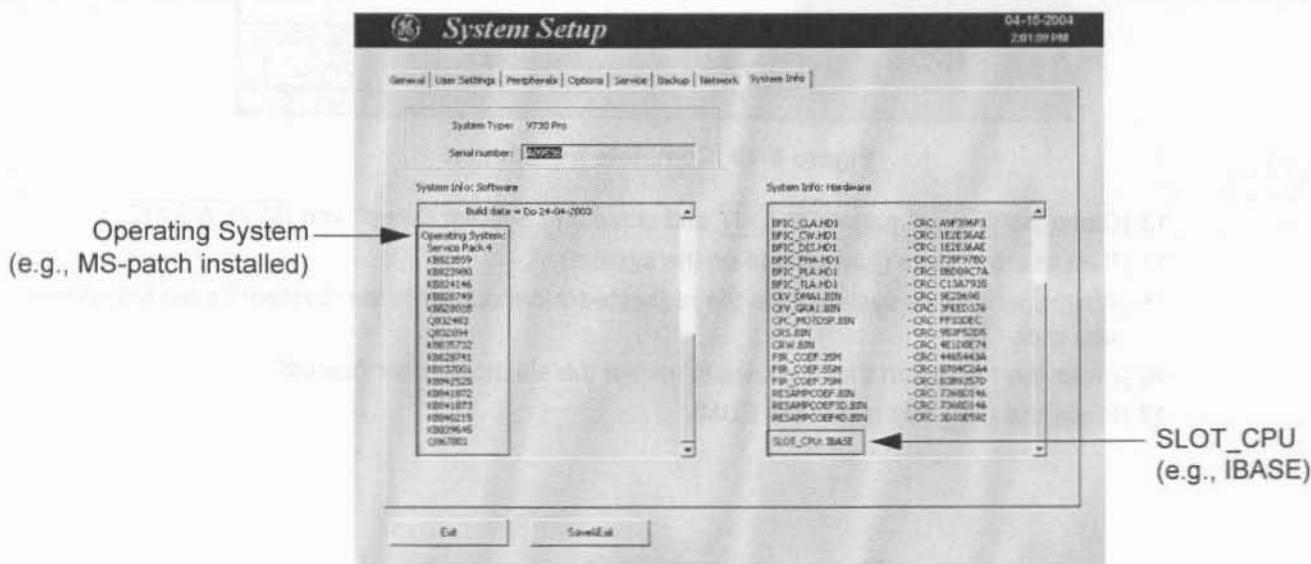
## **Section 8-7**

### **Software and Functional Checks after the Upgrade**

- 1.) Press the **UTILITIES** key on the control panel once to display the Utilities menu.
  - 2.) Select the **SYSTEM** item from the Utilities menu - which is displayed on the left side of the screen.
  - 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

**NOTICE** Not all Options are available on the Voluson® 730Pro V (marked with \* in this manual).

Following Options are available:

- Real Time 4D
- DICOM
- CRI (Compound Resolution Imaging)\*
- VOCAL\*
- RT\_4D\_Biopsy\*

**NOTE:** Additional option fields are not yet implemented in the Voluson® 730Pro / 730ProV.

### 8-8-1 Operation for activating Options

- 1.) Press the **UTILITIES** key on the control panel once to display the Utilities menu.
- 2.) Select the **SYSTEM** item from the menu area to invoke the setup desktop on the screen.
- 3.) Select the **OPTION** page where you can see which options are installed in the system.

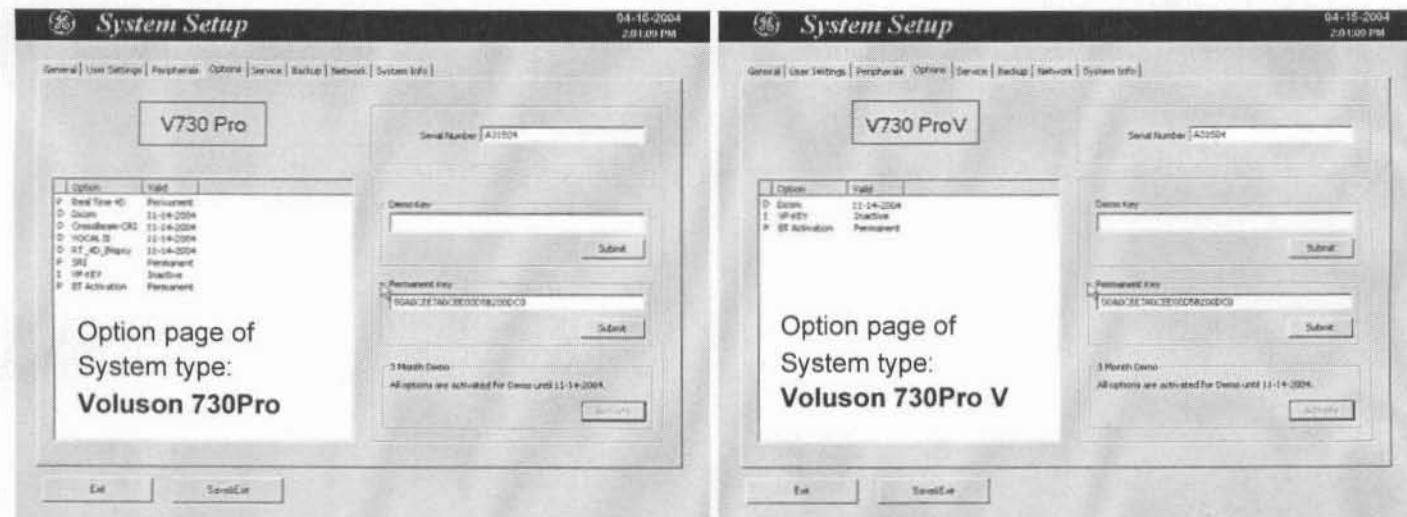


Figure 8-21 Option page in the System Setup

- **D = Demo** (Option is activated for demo and expires on the date shown in the "Valid" column)
- **I = Inactive** (Option is not activated)
- **P = Permanent** (Option is permanently activated [purchased] )

#### 8-8-1-1 Operation for installing a "Demo Key" or a "Permanent Key":

- 1.) Position the cursor inside the input field desired and press the **right/left trackball** key.
- 2.) If one exists, clear/edit the current key code.
- 3.) Enter the encrypted serial code with the keyboard and then click on **SUBMIT**.  
(The code will be checked.)
- 4.) Click the **SAVE&EXIT** button.

**NOTE:** After activating a key code, restart (turn off and on) the Voluson® 730Pro / 730ProV system.

## Section 8-9

### Transfer of Patient Database and Images from System-to-System

#### 8-9-1 Introduction

**NOTICE** It is possible to backup Sonoview Image data to a Mapped Network Drive (Z:1)

**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:1). This means that both systems have to be:

- a BT'04
- 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 3-12-1 "Map Network Drive" on page 3-50)

### 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.

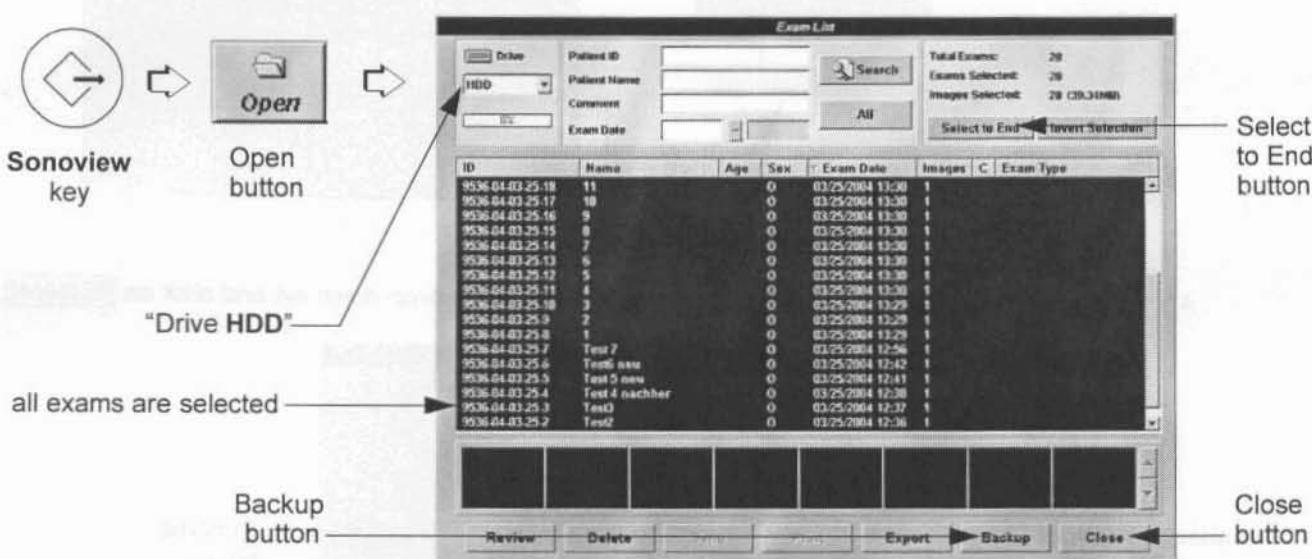


Figure 8-22 Step 1.) to 5.)

- 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® 730Pro / 730ProV!

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.

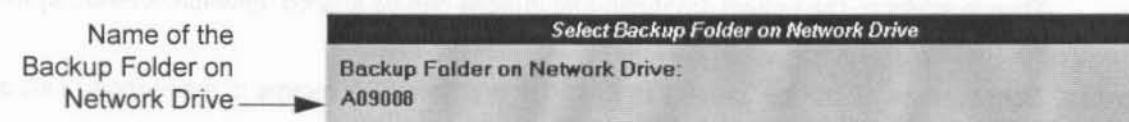


Figure 8-23 Backup Folder on Network Drive

- 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.

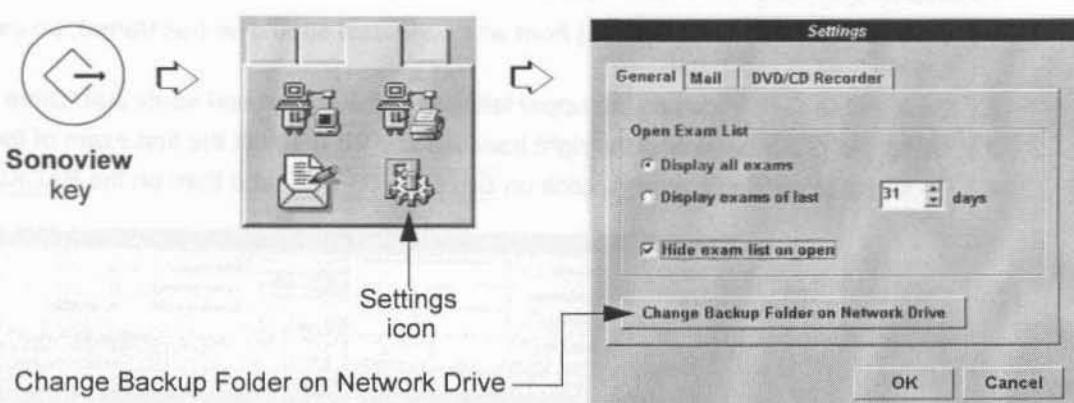


Figure 8-24 Step 1.) to 3.)

- 4.) Choose folder of the “old” system (e.g., A09008) from the drop-down list and click on RENAME.

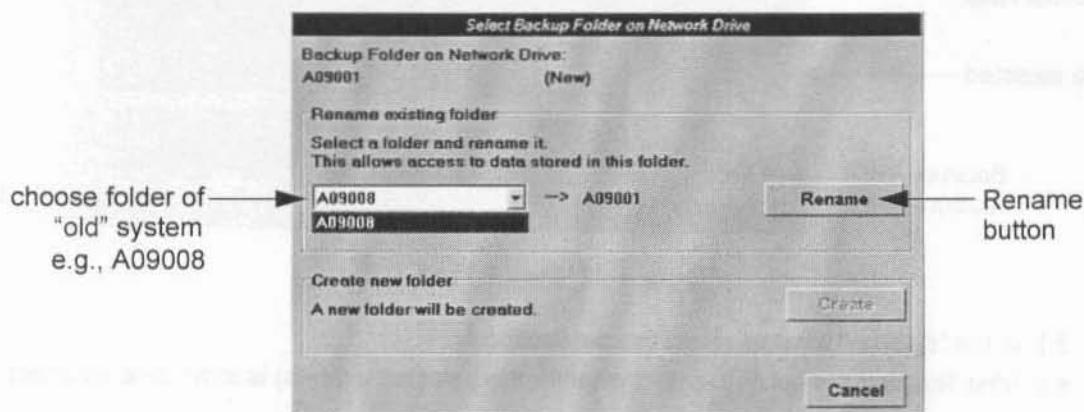


Figure 8-25 Select folder of “old” system and rename it

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.

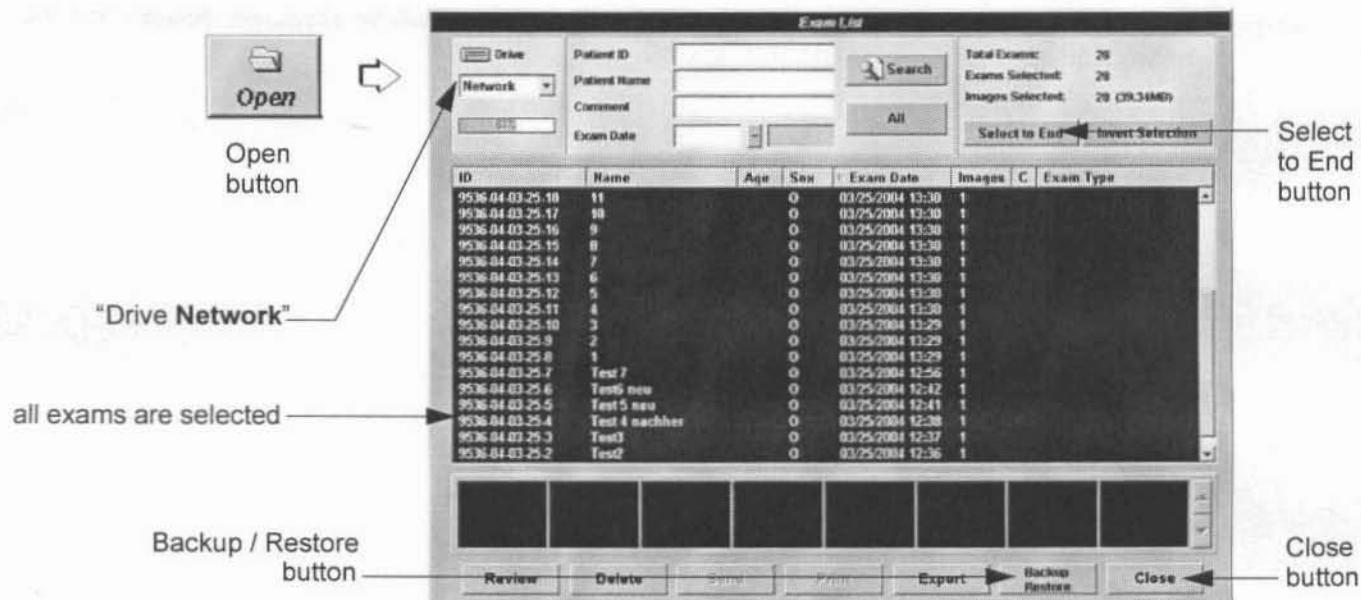


Figure 8-26 Step 5.) to 9.)

- 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.

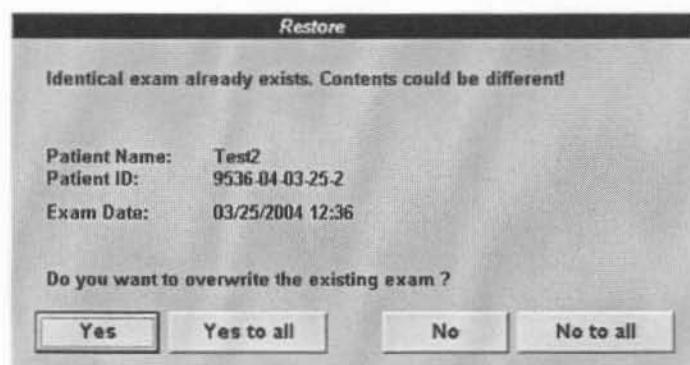


Figure 8-27 Identical exam already exists

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 3-6-2 on page 3-21.

#### 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.



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 Trackball top fixation ring

### 8-11-1 Manpower

One person, 5 min.

### 8-11-2 Trackball top fixation ring - Replacement Procedure

- 1.) Remove the fixation ring by turning it counterclockwise.

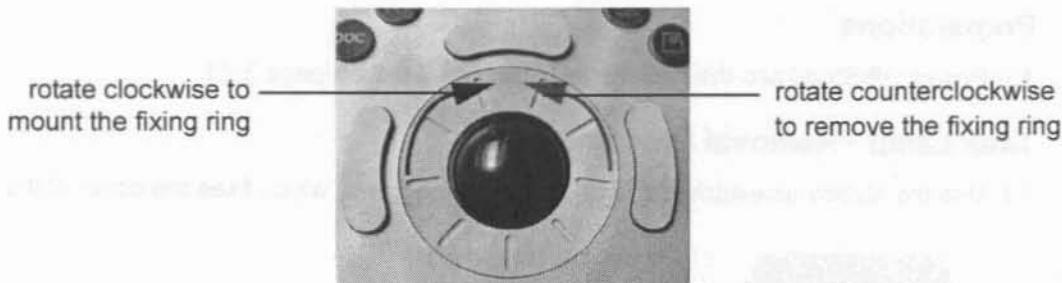


Figure 8-29 Trackball with top fixation ring

- 2.) Mount the fixation ring by turning it clockwise.

## Section 8-12 Replacement of Digipots, Slider controls and Spring inside those Caps

### 8-12-1 Manpower

One person, 5 min.

### 8-12-2 Tools

small-sized slotted screwdriver or tweezers

### 8-12-3 Cap and/or Spring - Removal Procedure

- 1.) Remove the cap (for Rotation digipots or for Slider-potentiometer TGC).
- 2.) If necessary, pull-out the spring inside the cap using a small-sized slotted screwdriver or tweezers.

### 8-12-4 Cap and/or Spring - Installation Procedure

- 1.) If you have to replace the spring, press it into the cap.
- 2.) Mount the cap (for Rotation digipots or for Slider-potentiometer TGC).

# 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® 730Pro / 730ProV.

**Table 9-1    Contents in Chapter 9**

Section	Description	Page Number
9-1	Overview	9-1
9-2	List of Abbreviations	9-2
9-3	Parts List Groups	9-3
9-4	Housing (GW) and additional Console Hardware	9-4
9-5	User Interface (GEU Top Console)	9-6
9-6	Monitor + Monitor replacement parts	9-8
9-7	Disk Drives (GEM)	9-9
9-8	Main Power Module (CPN)	9-10
9-9	Main Board Module (GEF)	9-12
9-10	Options and Upgrades	9-17
9-11	Miscellaneous Cables	9-18
9-12	Optional Peripherals and Accessories	9-24
9-13	Probes	9-28
9-14	Biopsy Needle Guides	9-33

## 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, 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	Table 9-3 on page 9-5	GW -Console housing (except GEU and GEM)
200-	User Interface (GEU Top Console)	Table 9-4 on page 9-7	GEU - User interface: Keyboard, TGC Unit
250-	Monitor + Monitor replacement parts	Table 9-5 on page 9-8	Monitor (Any) + Monitor replacement parts
300-	Disk Drives (GEM)	Table 9-6 on page 9-9	GEM - Disk Drive module (with or without MAN)
400-	Main Power Module (CPN)	Table 9-7 on page 9-11	CPN - Primary power module
500- 510- 570-	Main Board Module (GEF) • FrontEnd (US-Part) • FrontEnd (US-Part) cont'd • Back Processor (PC-Part)	Table 9-8 on page 9-12 Table 9-9 on page 9-13 Table 9-10 on page 9-14 Table 9-11 on page 9-16	GEF - Main Board Module Ultrasound (FrontEnd)  PC-Boards (Backend Processor)
600-	Options and Upgrades	Table 9-12 on page 9-17	
700-	Miscellaneous Cables	Table 9-13 on page 9-18	
800-	Optional Peripherals and Accessories • Optional Peripherals and Access. cont'd	Table 9-14 on page 9-25 Table 9-15 on page 9-26	Printers, Video Recorder, ECG-Module (MAN)
	System Manuals	Table 9-16 on page 9-27	
900- 906- 920- 930-	Probes • 2D curved array Transducers • 2D linear- and phased array Transducers • Real-Time 4D Volume Probes • Real-Time 4D Volume Probes cont'd • CW-Pencil Probes	Table 9-17 on page 9-28 Table 9-18 on page 9-29 Table 9-19 on page 9-30 Table 9-20 on page 9-31 Table 9-21 on page 9-32	
950	Biopsy Needle Guides	Table 9-22 on page 9-34	

## Section 9-4 Housing (GW) and additional Console Hardware



Figure 9-2 Housing (GW) and additional Console Hardware

Table 9-3 Housing (GW) and additional Console Hardware

Item	Part Name	Part Number	Description	Qty	FRU
101	Rear Handle for Trolley	KTZ220031	Rear Handle for Trolley	1	1
102	Blind Cap for rear screws	KTZ208109	covers housing screws to make them invisible	2	1
103	Rear Metal Cover Plate	KTZ154699	Rear metal cover plate complete	1	2
104	Side Panel left	KTZ208762	side panel left complete	1	2
105	Monitor Mounting Plate Voluson® 730Pro / 730ProV	KTZ134111	Monitor mounting plate	1	1
106	Side Panel right	KTZ208763	side panel right complete	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.	1	1
108	Rear Wheel (Ø175 mm x 32)	KTZ211081	Rear wheel non-steerable	2	1
109	Blind Cap for Wheel	KTZ14M871	Cover for the rear wheels	2	1
110	Steerable Wheel	KTZ211080	Front wheel steerable	2	1
111	Foot rest	KTZ207126	Foot rest	1	1
112	GW130 Trolley Voluson® 730Pro / 730ProV	KTZ154695	Housing with wheels, backpanel with connectors and cables	1	2
113	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
114	Hinge for Foot rest	KTZ220018	Hinge for Foot rest	2	1
115	Top Cover of Trolley	KTZ208119	Top Cover of Trolley	1	1
116	Standby Switch	KTZ207125	Standby Switch left below the control panel	1	1
117	Probe Cable Guide	KTZ14M787	Probe Cable Guide	4	1
118	Pull-out Protection	KTZ14B667	Pull-out Protection for Mains Power cable	1	1

## Section 9-5 User Interface (GEU Top Console)

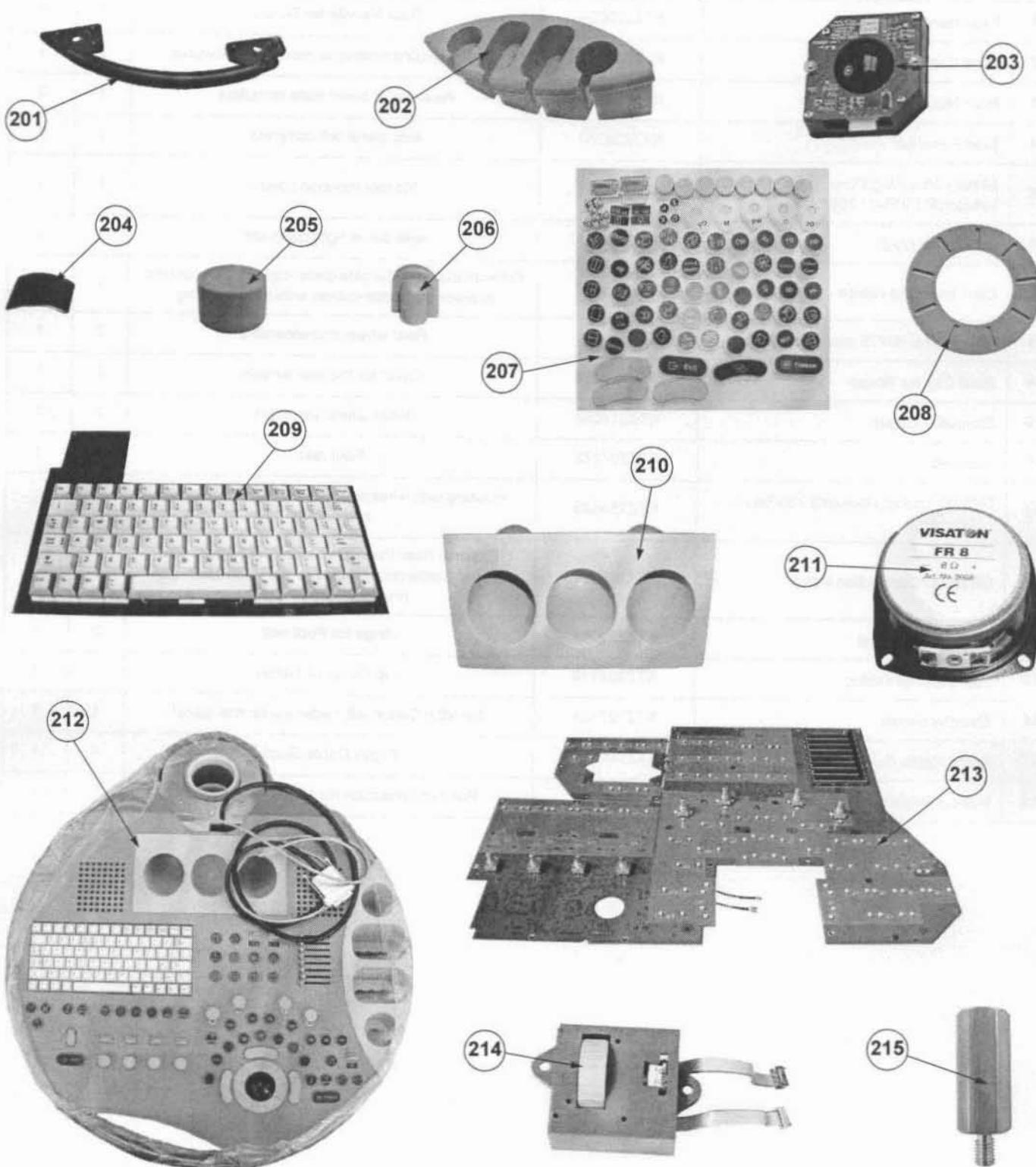


Figure 9-3 User Interface (GEU)

**Table 9-4 User Interface (GEU)**

Item	Part Name	Part Number	Description	Qty	FRU
201	Front Handle User Interface	KTZ220039	Voluson® 730Pro / 730ProV Front Handle	1	1
202	Probe Holder Kit V730	KTZ207105	right hand Probe holder part	1	1
203	Trackball Kit V730	KTZ208264	generates X-Y-Coordinates of Trackball-Movements like moving a PC-Mouse	1	1
204	Spring for Cap (digipots, slider controls)	KTZ208187	spring for TGC slider controls and rotation digipots	16	1
205	Cap for Rotation Digipots	KTZ208318	Cap for Rotation control (digipot)	8	1
206	Cap for Slide-potentiometer (TGC)	KTZ208319	Cap for TGC slider controls	8	1
207	Keytop Kit Voluson® 730Pro / 730ProV	KTZ207558	Keytop Kit Voluson® 730Pro / 730ProV	1	1
208	Trackball top fixation ring	KTZ208256	Trackball top fixation ring	1	1
209	Alpha-numeric keyboard V730Pro	KTZ208217	Alpha-numeric keyboard for Voluson® 730Pro / 730ProV	1	1
210	Gel holder Voluson® 730Pro / 730ProV	KTZ134521	Gel holder Voluson® 730Pro / 730ProV	1	1
211	Loudspeaker for Top Console	KTZ208132	Loudspeaker on GEU User Interface	2	1
212	GEU60A User Interface Voluson® 730Pro / 730ProV	KTZ154688	keyboard, trackball, special knobs, switches	1	1
213	Hard key Board for Voluson® 730Pro / 730ProV	KTZ208284	Hardkey Board(s) for Voluson® 730Pro / 730ProV (large board - Part A ; small board - Part B)	1	1
214	Wheel control for V730Pro	KTZ208257	Wheel control for Voluson® 730Pro / 730ProV	1	1
215	Distance Rod for GEU	KTZ14B596	Distance Rod for GEU	1	1

## Section 9-6 Monitor + Monitor replacement parts

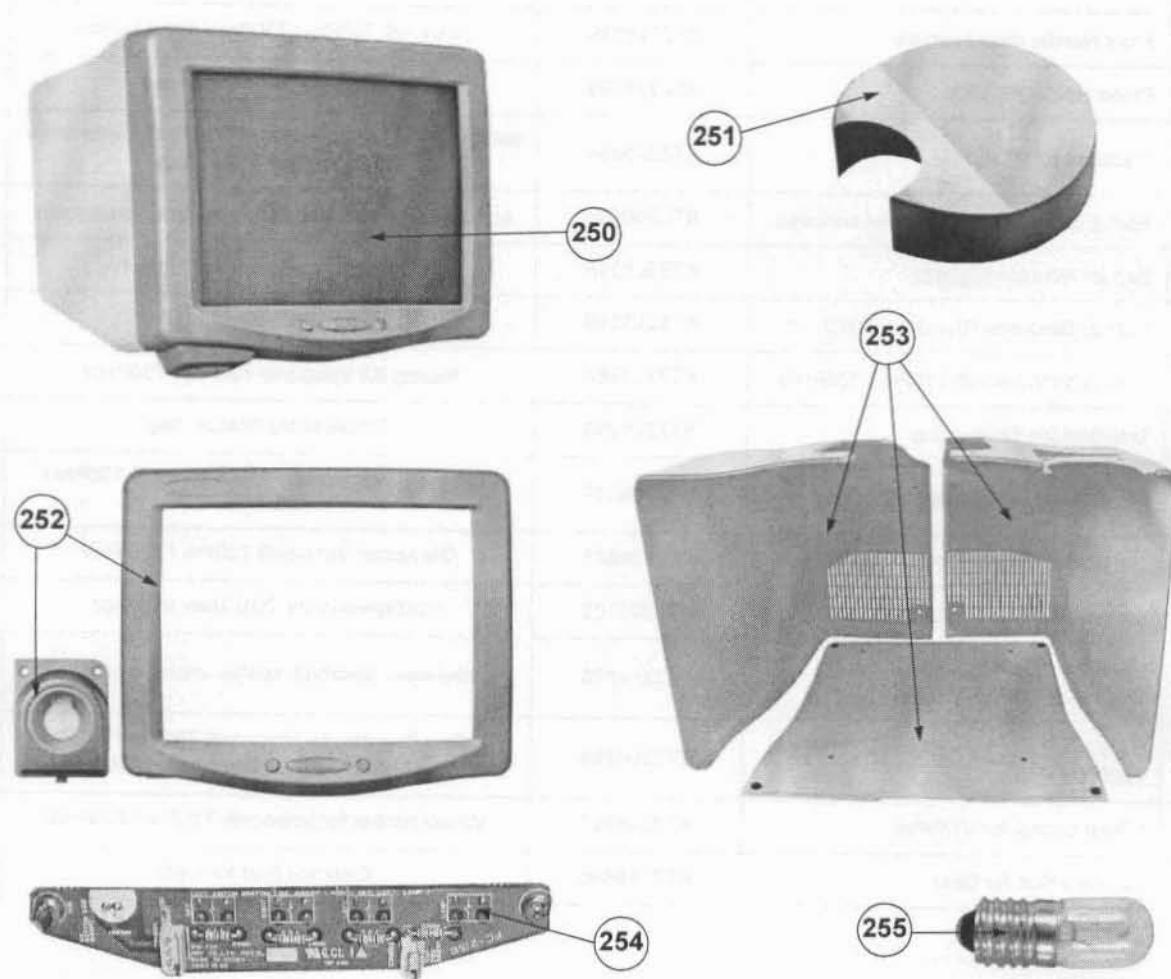


Figure 9-4 Monitor + Monitor replacement parts

Table 9-5 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 Foot Cover	KTZ134365	Monitor Foot Cover	1	1
252	Set Monitor front housing	KTZ208445	Set Monitor front housing (incl. cover for lamp)	1	1
253	Set Monitor rear housing	KTZ208446	Set Monitor rear housing (left-, right-, and top cover)	1	1
254	Monitor Switch Assembly	2300008	Common part with L5 and L3	1	1
255	Task Lamp	2317347	Common part with L5 and L3	1	1

## Section 9-7 Disk Drives (GEM)

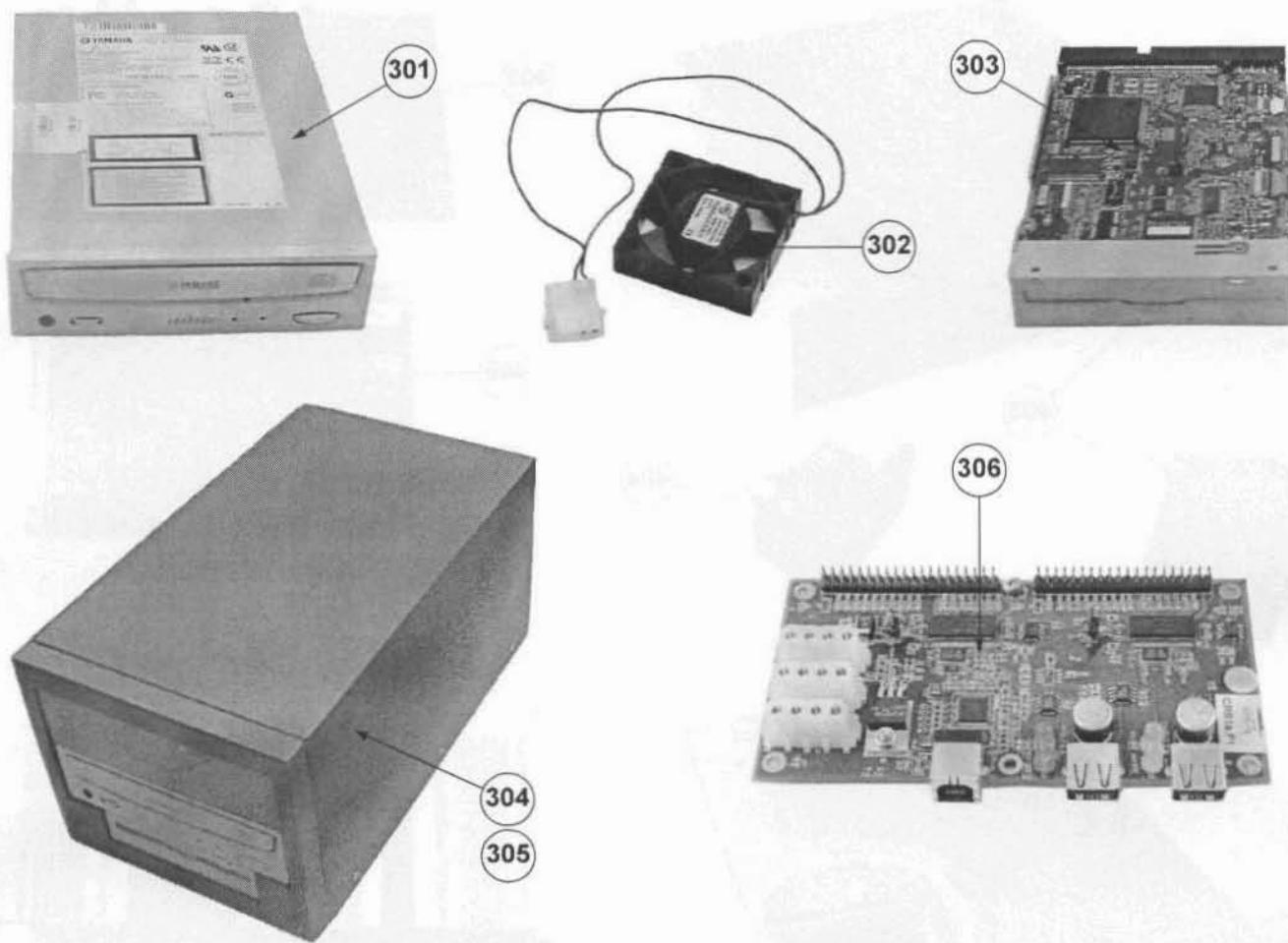


Figure 9-5 Disk Drives (GEM)

Table 9-6 Disk Drives (GEM)

Item	Part Name	Part Number	Description	Qty	FRU
301	IDE DVD+(R)W Drive	KTZ207256	DVD+(R)W Writer internal (no own cabinet)	1	1
302	Fan axial 62 x 62 x 14 mm	KTZ207602	Fan for Air-Cooling of GEM (SCSI-Drive-Module)	1	1
303	IDE MO-Disk Drive 1.3 GB internal	KTZ207269	Magneto-Optical-Drive 1.3GB internal (no own cabinet)	1	1
304	GEM10-10A MO-Drive + DVD+(R)W	KTZ195887	MO-Drive and DVD+(R)W	1	2
305	GEM20A DVD-(R)W	KTZ195962	DVD-(R)W (without MO-Drive)	1	2
306	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 9-6 Main Power Module (CPN)

Table 9-7 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 - KTZ207486)	1	1
402	CPY3.P3 Power Switch	KTZ195471	Board to switch on and shut down Ultrasound System <b>(only used with CPN6)</b>	1	1
403	Mains Power switch (F1)	KTZ207733	Mains Power Switch (F1) therm. protected 16A 2 Pol. <b>(only used at CPN6)</b>	1	1
404	Mains Power Input connector	KTZ207574	Mains Power Input connector <b>(only used at CPN6)</b>	1	1
405	CPN80 Power Supply Module	KTZ207486	CPN80 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 used with CPN80 - KTZ207486)</b>	1	1
407	CCF100.P1 Power Primary Board	KTZ209339	Power Primary Board <b>(only used with CPN80 - KTZ207486)</b>	1	1
408	Mains Power switch and Input connector	KTZ209340	Mains Power Switch and Input Connector <b>(only used at CPN80 - KTZ207486)</b>	1	1
409	Fuse 10 Ampere 6.3 x 32	KTZ208239	Electric Current Overflow Protection GEF <b>(only used at CPN6)</b>	4	1
410	Fuses 16 Ampere 6.3 x 32 (10 pcs.)	KTZ209341	used at primary and secondary side <b>(only used at CPN80 - KTZ207486)</b>	3	1
411	Fuses 3.2 Ampere 6.3 x 32 (10 pcs.)	KTZ209342	fuse for auxiliary power output at 110V setting <b>(only used at CPN80 - KTZ207486)</b>	1	1
412	Fuses 1.6 Ampere 6.3 x 32 (10 pcs.)	KTZ209343	fuse for auxiliary power output at 230V setting <b>(only used at CPN80 - KTZ207486)</b>	1	1
413	KVN2 - Fan for Primary Power Supply	KTZ195440	KVN2 - Fan for Primary Power Supply (CPN)	1	1

## Section 9-9 Main Board Module (GEF)

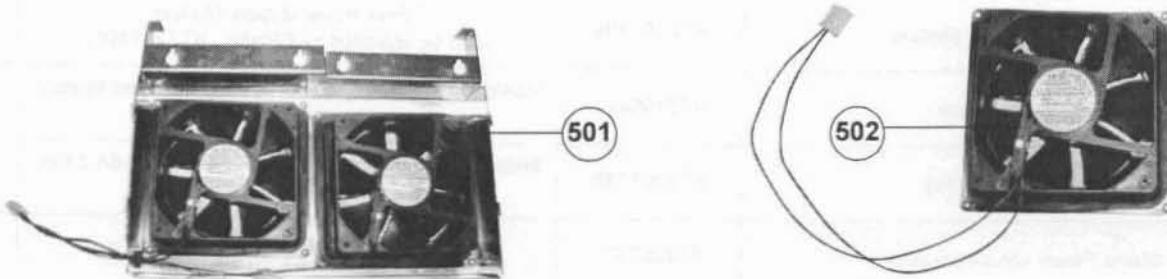


Figure 9-7 Main Board Module (GEF)

Table 9-8 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)

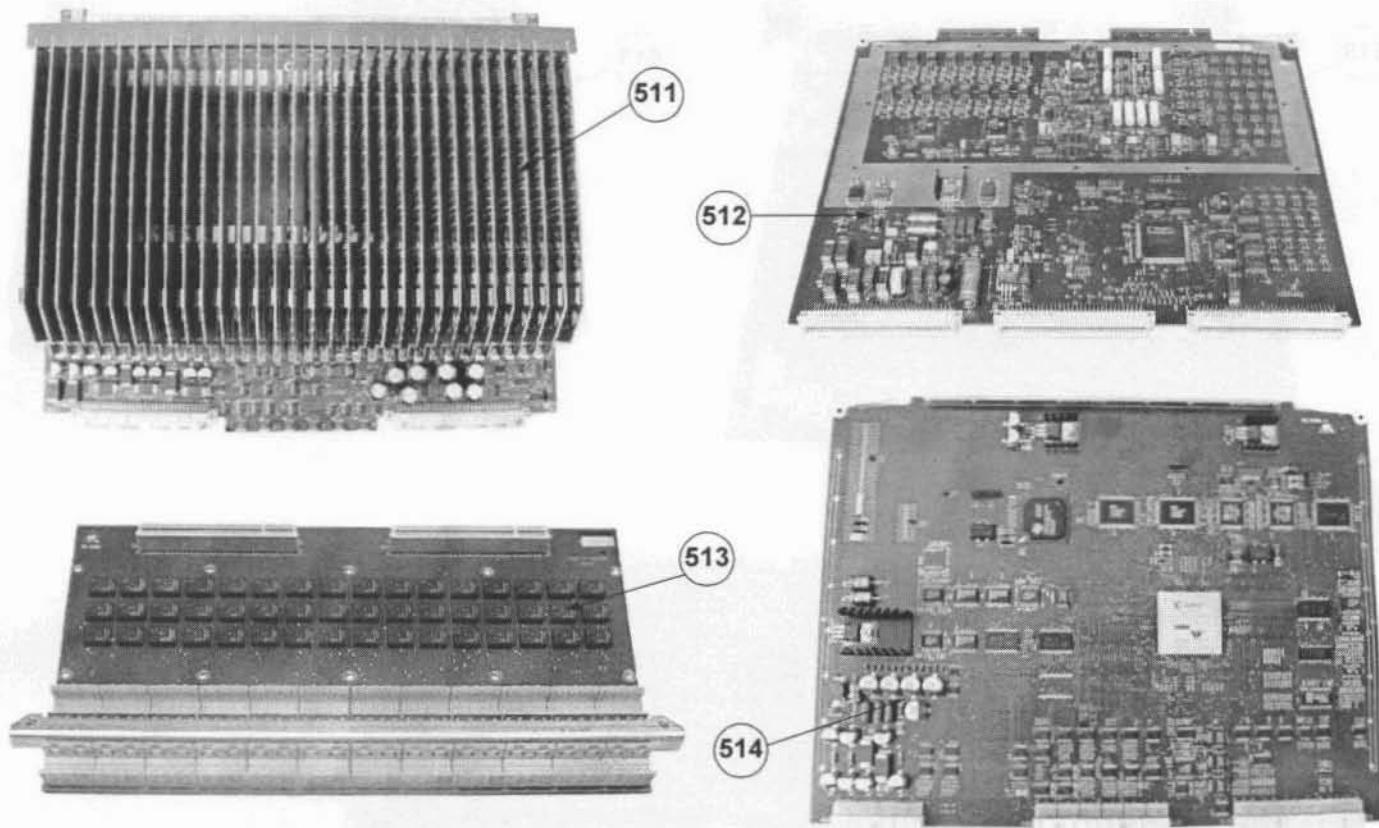


Figure 9-8 FrontEnd (US-Part)

Table 9-9      FrontEnd (US-Part)

Item	Part Name	Part Number	Description	Qty	FRU
511	CPR82.P11 Beam former Board	KTZ195904	Beam former Board	1	1
512	CRW2e.P2 CW Doppler Board	KTZ195723	CW-Doppler Board	1	1
513	CPZ50-50a.P3 Cover board	KTZ195592	electrical signal connection between CPU, CPR and CW-Board; contains Relays for Signal to CW-Board.	1	1
514	CRS4.P3 Signal Processing Board	KTZ195998	Signal Processing Board	1	1

9-9-1 FrontEnd (US-Part) (cont'd)

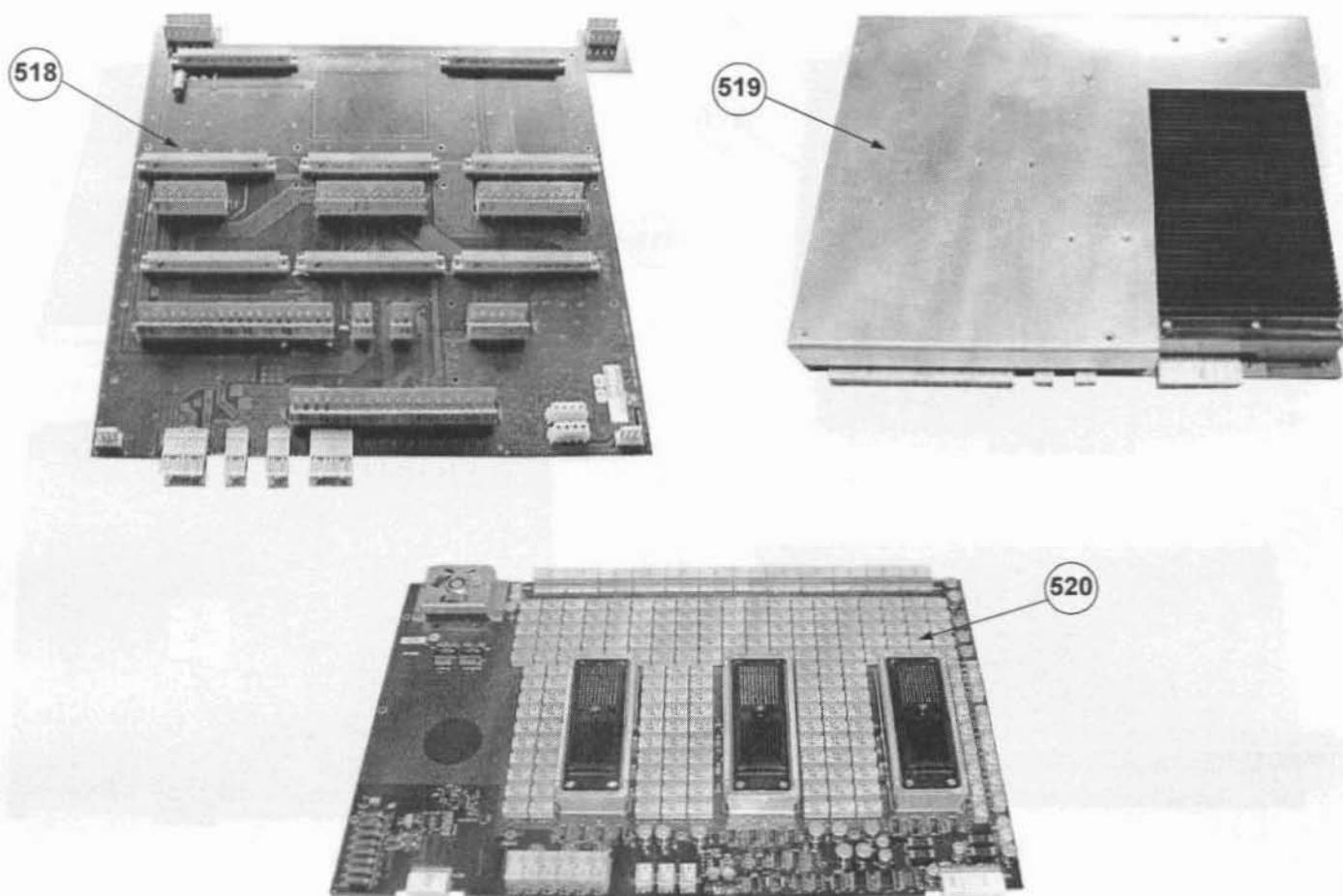


Figure 9-9 FrontEnd (US-Part) cont'd

Table 9-10 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)

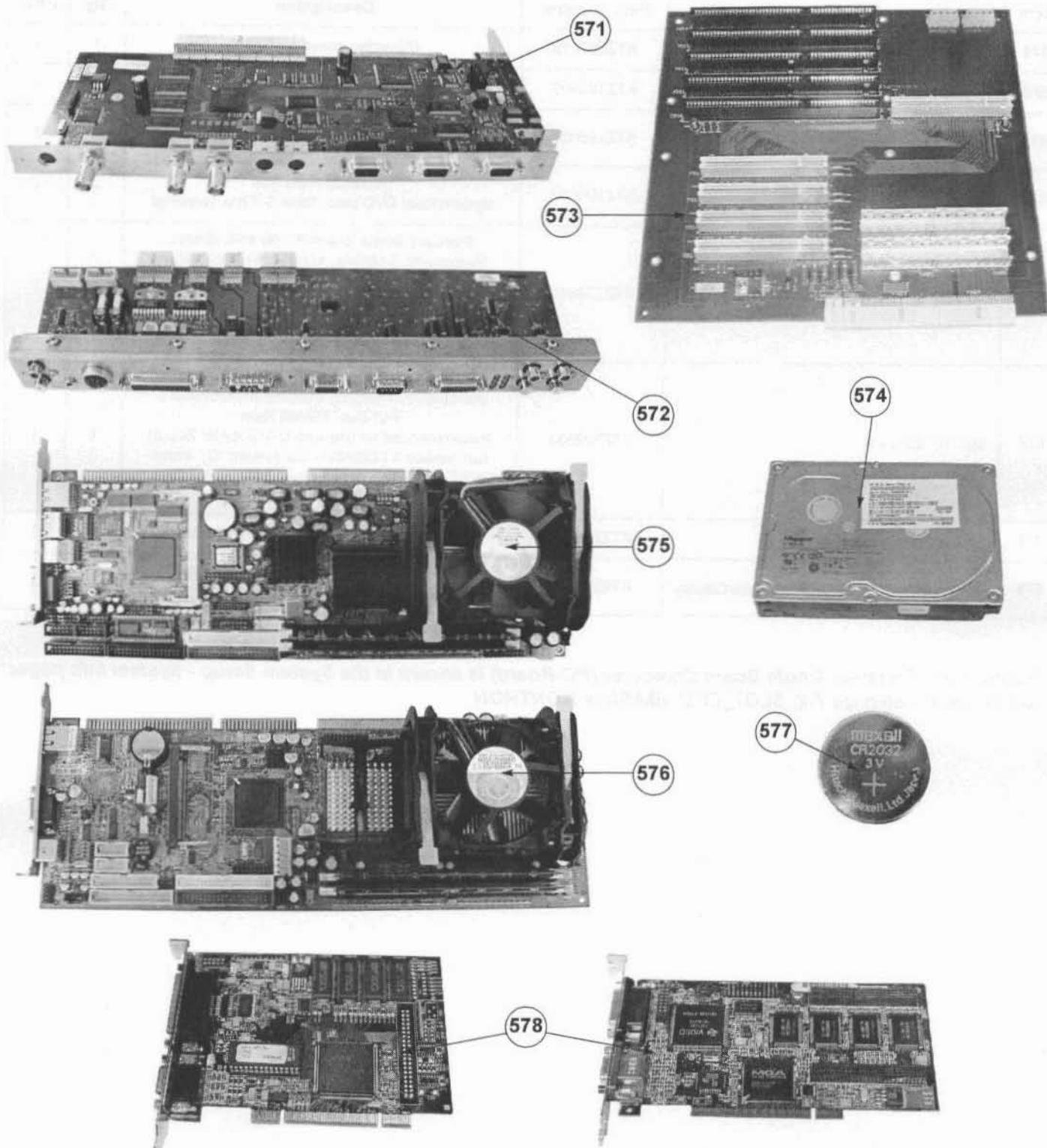


Figure 9-10 Back Processor (PC-Part)

Table 9-11 Back Processor (PC-Part)

Item	Part Name	Part Number	Description	Qty	FRU
571	CKV81.P6 Video management Board	KTZ207418	PC-Video converter Board	1	1
572	CPE80.P5 Motherboard - Extension	KTZ195902	Motherboard Extension	1	1
573	CPM3.P2 Motherboard	KTZ195699	electrical Signal- and Supply-Connection between all PC-Plug-In-Boards	1	1
574	Universal Hard disk for all Voluson 730 (V730, V730Expert and V730Pro) systems	KTZ196003	Universal Hard disk System/Boot DVD (see: Table 9-12) is required	1	1
575	SBC BT'03/'04 *	KTZ208570	Standard Single Board-PC (IBASE IB820), Pentium-IV, 3.06GHz, 400MHz-FrontSideBus, PCI-Bus, 768MB Ram can replace KTZ209332, but system "C:" image <b>MUST</b> be loaded! In this case, System/Boot DVD (see: Table 9-12) is required	1	1
576	SBC BT'03/'04 K *	KTZ209332	Standard Single Board-PC (Kontron), Pentium-IV, 3.06GHz, 400MHz-FrontSideBus, PCI-Bus, 768MB Ram (recommended for use with CW-Doppler Board) can replace KTZ208570, but system "C:" image <b>MUST</b> be loaded! In this case, System/Boot DVD (see: Table 9-12) is required	1	1
577	Lithium Battery CR2032 (3V)	KTZ208791	Lithium Battery CR2032 (3V) for SBC-Board	1	1
578	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

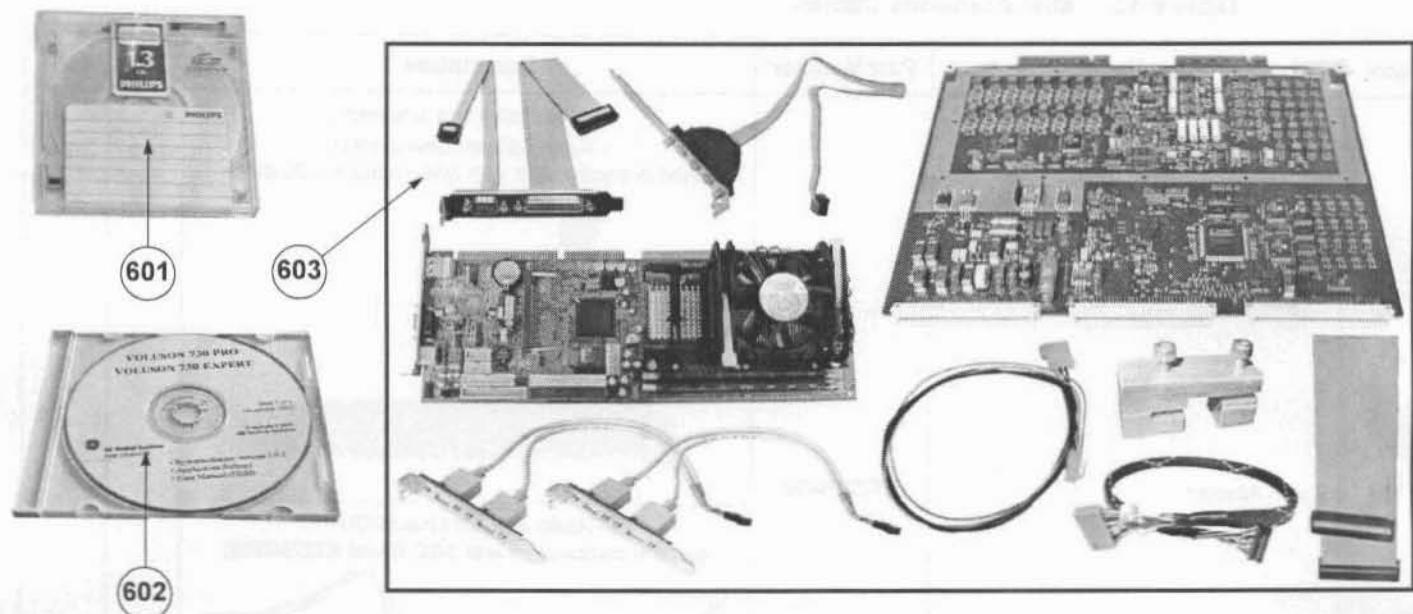


Figure 9-11 Options and Upgrades

Table 9-12 Options and Upgrades

Item	Part Name	Part Number	Description	Qty	FRU
601	MO Disk Media 1.3GB	KTZ207077	MO-Disk Media (Standard)	1	1
602	System/Boot DVD (SW4.0.0)	KTZ196046	bootable DVD for System HDD recovery ( <b>SW4.0.0</b> ) <u>Contents:</u> updated Linux rescue partition, System C: Image (Windows 2000, MSPatches: KB823559, KB823980, KB824146, KB828749, KB828028, KB835732, KB828741, KB837001, KB842526, KB841872, KB841873, KB840315, KB839645, Q822483, Q867801 and Q832894, Kontron SBC supplied, Distinct NW-Sniffer), UISApp, Backup, EUM and Database Repair Tool	N	1
603	CW-Doppler Upgrade Kit	H48641AA	CW-Doppler Upgrade Kit incl. upgrade instructions	N	N/A

## Section 9-11 Miscellaneous Cables

Table 9-13 Miscellaneous Cables

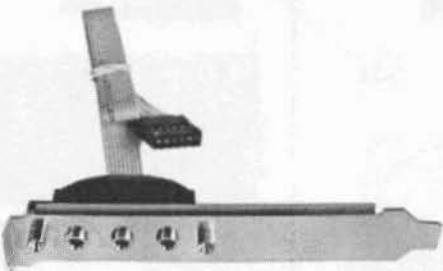
Item	Part Name	Part Number	Description	Qty	FRU
701	Audio Adapter	KTZ208439	<p>Set contains two adapters:</p> <ul style="list-style-type: none"> <li>• Audio Adapter Line-IN/OUT (used in combination with SBC-Board KTZ208570)</li> </ul>  <p>• Audio Adapter Line-IN/OUT (used in combination with SBC-Board KTZ209332)</p> 	1	1
702	Adapter slot parallel serial	KTZ208148	Adapter Parallel port / serial COM1	1	1
703	Adapter Cable PS2	KTZ208137	Adapter for GEU PS2-cable (only used in combination with SBC-Board KTZ208570)	1	1

Table 9-13 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 9-13 Miscellaneous Cables

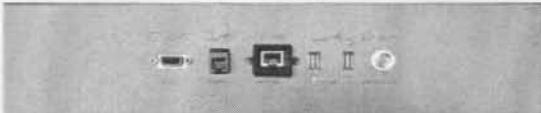
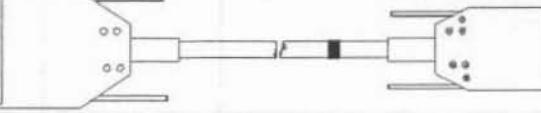
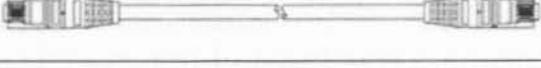
Item	Part Name	Part Number	Description	Qty	FRU
709	GES8 I/O Connection Panel	KTZ195901	External Rear Panel with electrical Signal- and Supply-Connection-Cables to the Voluson® 730Pro / 730ProV Main-Unit (internal) Rear-Panel. 	1	1
710	KGS10 Cable Power GEM-GEF	KTZ195464	Electrical Power-Supply for Drives (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® 730Pro / 730ProV 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 9-13 Miscellaneous Cables

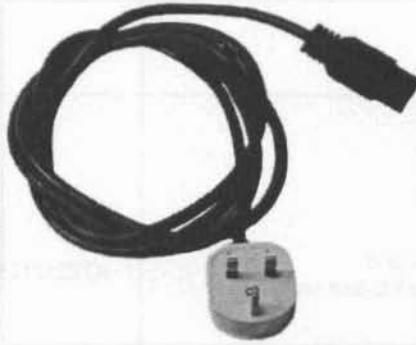
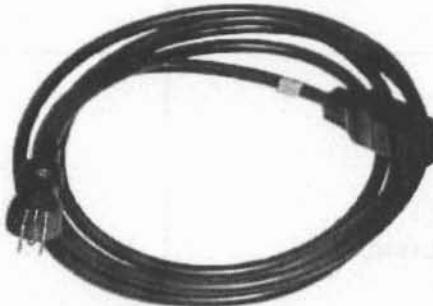
Item	Part Name	Part Number	Description	Qty	FRU
716	Power Cord Europe 230V	KTZ212317	Power Cord Europe 230V/240V 	1	1
717	Power Cord Japan (Hosp.grade)	KTZ212448	Power Cord Japan Hospital Grade 	1	1
718	Power Cord UK	KTZ212441	Power Cord United Kingdom 240V 	1	1
719	Power Cord USA Hosp.Grade	KTZ212402	Power Cord USA Hospital Grade 	1	1

Table 9-13 Miscellaneous Cables

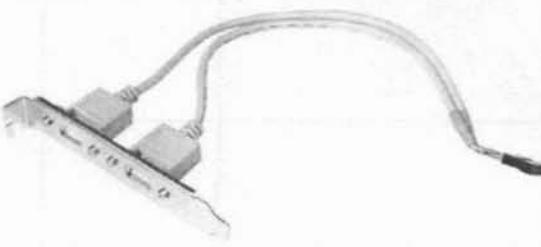
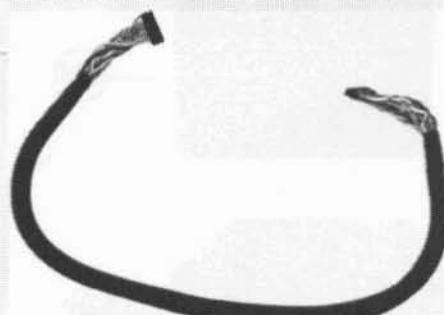
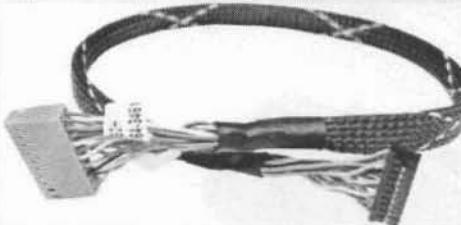
Item	Part Name	Part Number	Description	Qty	FRU
720	USB to ICP CPU Board	KTZ207029	<p><b>Set contains two parts:</b></p> <p>USB for PC-Slot, Connector on Backpanel. Cables are connected to PC-Board. Leads the USB-signals to the PC-Backpanel (used in combination with SBC-Board KTZ208570)</p> 	2	1
			<p>USB for PC-Slot, Connector on Backpanel. Cables are connected to PC-Board. Leads the USB-signals to the PC-Backpanel (used in combination with SBC-Board KTZ209332)</p> 		
721	USB Cable A to B (from GEM to PC-part on GEF)	KTZ212125	USB Cable from Disk Drive Module (GEM) to connector "USB-GEM" on the PC-part of main board module (GEF)	1	1
722	VGA cable HD15-HD15	KTZ212275	VGA cable HD15-HD15	1	1

Table 9-13 Miscellaneous Cables

Item	Part Name	Part Number	Description	Qty	FRU
723	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 SBC-Board KTZ209332)</p> 	1	1
724	Modem Data Cable	KTZ212199	Data Cable for (optional) Global Modem	1	1
725	Modem Power Connection Cable	KTZ212032	Power Connection Cable for (optional) Global Modem	1	1

## Section 9-12 Optional Peripherals and Accessories



Figure 9-12 Optional Peripherals and Accessories

**Table 9-14 Optional Peripherals and Accessories**

Item	Part Name	Part Number	Description	Qty	FRU
801	Sony B/W Video Printer UP-895MD (CE)	KTZ211332 (H46801A)	NTSC/PAL	1	1
802	PPP55 Connection Set	KTZ195643	Connection Set UP-895MD	1	1
803	Sony Digital Color Printer UP-D23MD	KTZ211373 (H46831B)	USB-Port	1	1
804	PZP60 Connection Set	KTZ195776	Connection Set UP-D23MD	1	1
805	(Bluetooth) Printer HP 5600 Series	KTZ211503 (H46631L)	USB-Port (Bluetooth Connection Set is required)	1	1
806	Bluetooth Connection Set	KTZ196002 (H46631M)	Bluetooth Connection Set (HP 5600 Series only)	1	1
807	Sony VCR SVO-9500 MD	KTZ211317 (H46801D)	NTSC	1	1
808	Sony VCR SVO-9500 MDP	KTZ211318 (H46801C)	PAL	1	1
809	Mitsubishi VCR HS-MD3000U	KTZ211368 (H46801D)	NTSC (can replace Sony VCR SVO-9500 MD)	1	1
810	Mitsubishi VCR HS-MD3000E	KTZ211369 (H46801C)	PAL (can replace Sony VCR SVO-9500 MDP)	1	1
811	PRR50 Connection Set	KTZ195492	Connection Set for VCR without remote control	1	1

## Section 9-12 Optional Peripherals and Accessories (cont'd)

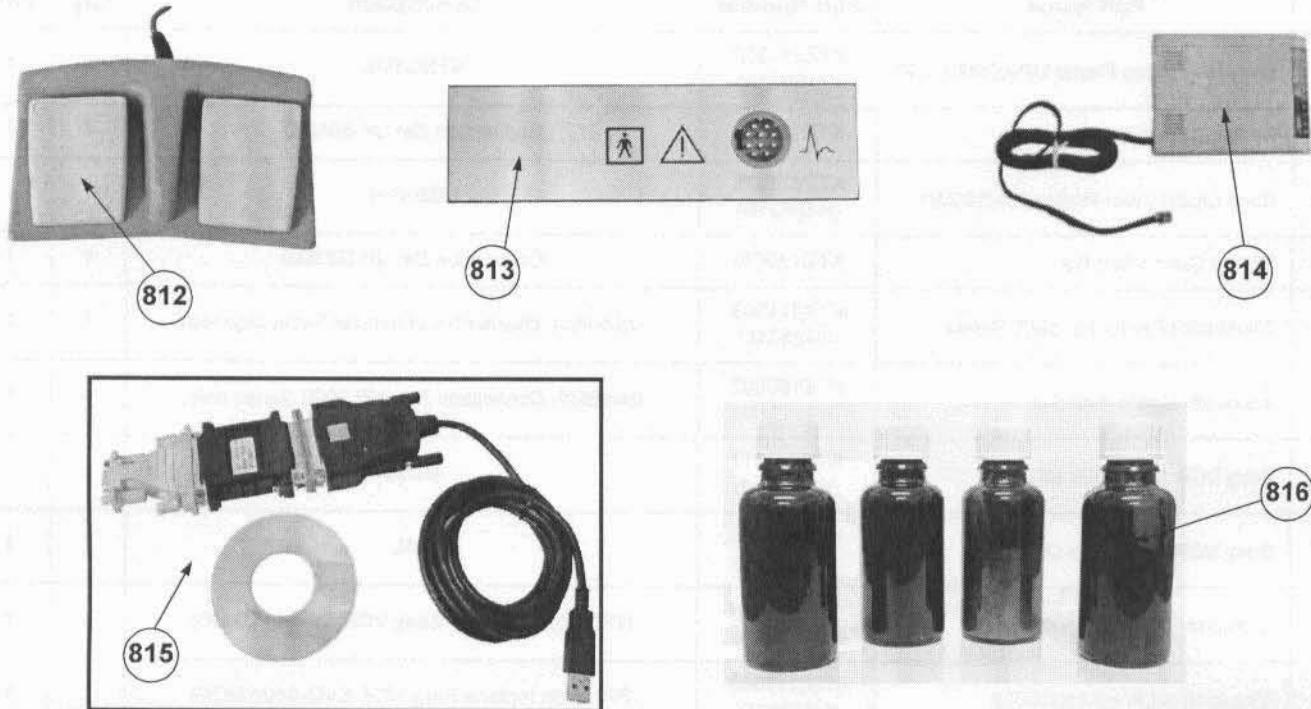


Figure 9-13 Optional Peripherals and Accessories cont'd

Table 9-15 Optional Peripherals and Accessories cont'd

Item	Part Name	Part Number	Description	Qty	FRU
812	Foot switch (MFT7)	KTZ195446 (H46681D)	Foot switch	1	1
813	ECG-preamplifier (MAN 6)	KTZ154644 (H46681H)	consists of ECG-preamplifier and patient connection cable	1	1
814	Global Modem (Analog)	2245794 (H48641C)	Global Modem analog (Common Part with L9 and V7) use modem cable: KTZ212199 + KTZ212032	1	1
815	USB-RS232 Connection kit PRY	KTZ195858	Converter from USB to RS-232 Serial Port	1	1
816	Touch-up Paint Set (gray-blue)	KTZ154680	contains blue, dark-gray, bright-gray and black 4x 2cl bottles incl. brush	1	1

Table 9-16 System Manuals

Item	Part Name	Part Number	Kretz #	Description	Qty	FRU
	Voluson® 730Pro / 730ProV Service Manual	KTZ105947	KTI105947		1	N
<b>System User Manuals</b>						
	Basic User Manual, Voluson® 730Pro / 730ProV, English		KTI105938		1	N
	Basic User Manual, Voluson® 730Pro / 730ProV, German				1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, English	H48641BJ	KTI105939		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, German	H48641BK	KTI105940		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, Spanish	H48641BL	KTI105941		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, Portuguese	H48641BM	KTI105942		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, Italian	H48641BN	KTI105943		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, French	H48641BP	KTI105944		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, Chinese	H48641BR	KTI105945		1	N
	Instruction Manual, Voluson® 730Pro / 730ProV, Japanese	H48641BS	KTI105946		1	N
	Advanced Reference Manual Voluson® 730Pro / 730ProV, English	H48651DF	KTI105951		1	N

## Section 9-13 Probes

### 9-13-1 2D-Probes

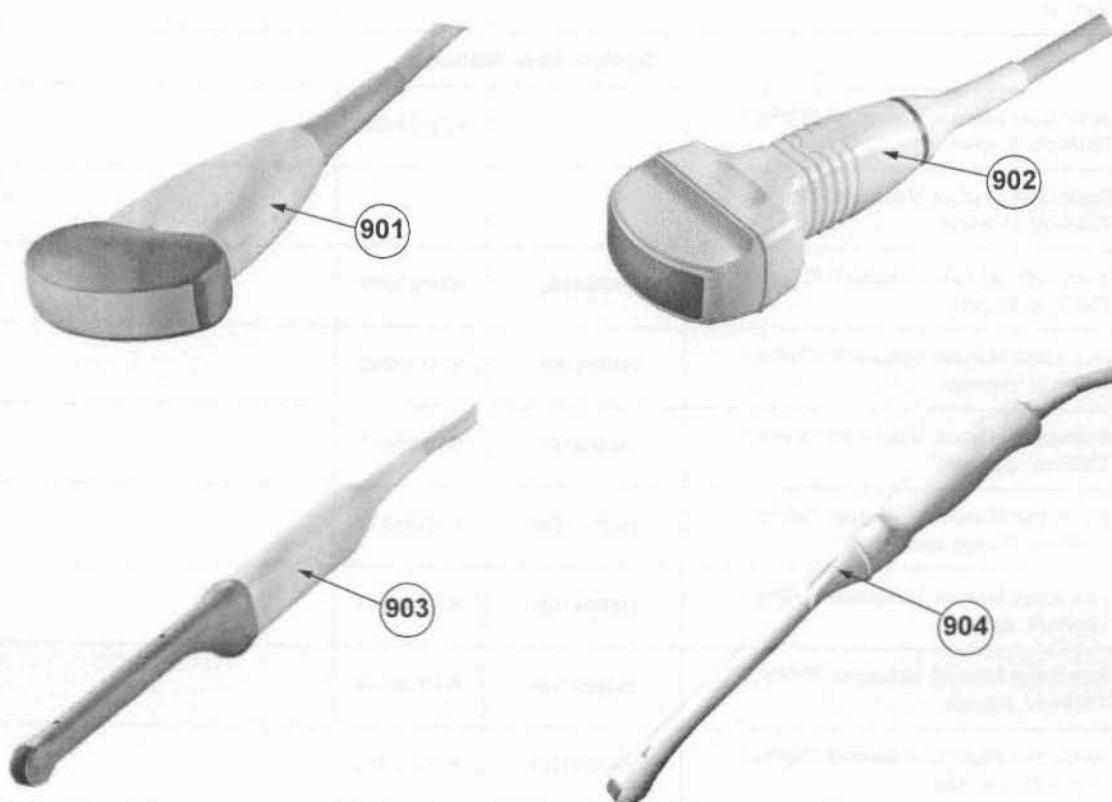


Figure 9-14 2D curved array Transducers

Table 9-17 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	
904	IC5-9H	5118195 (H40412LN)	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)

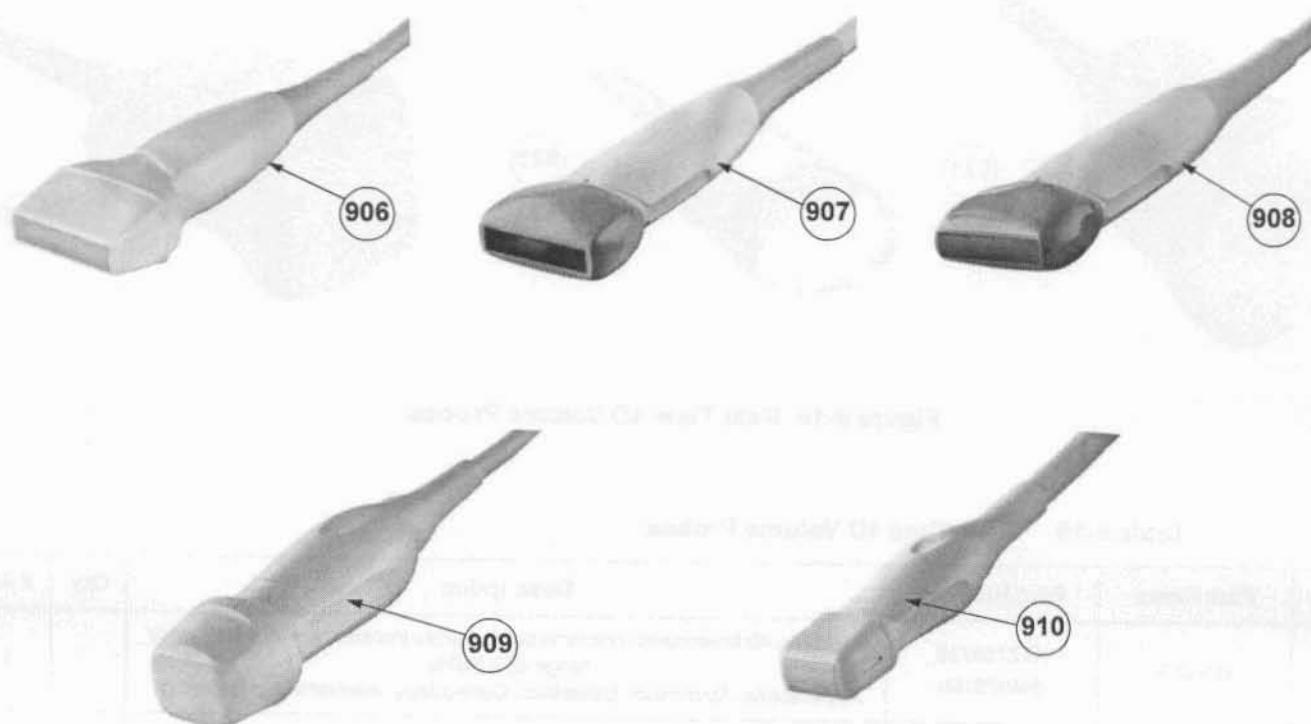


Figure 9-15 2D linear- and phased array Transducers

Table 9-18 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

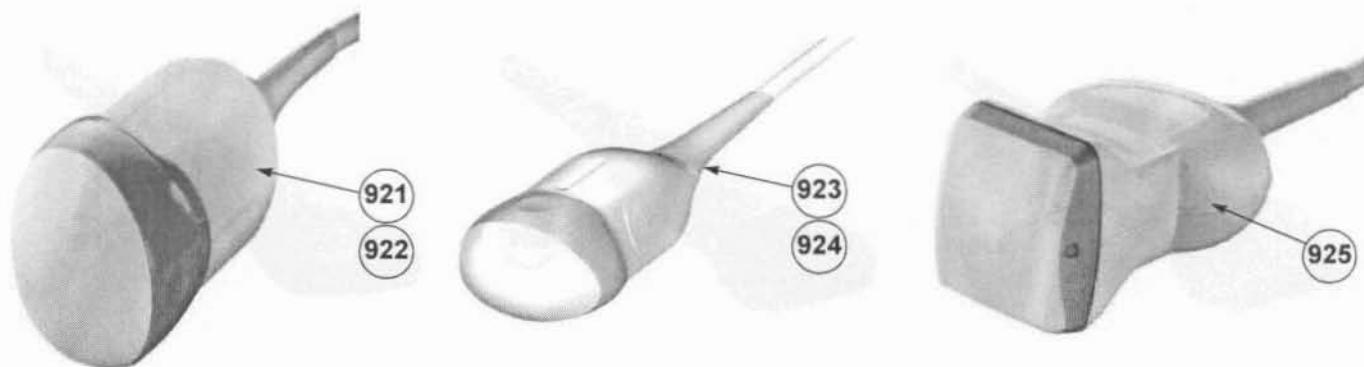


Figure 9-16 Real-Time 4D Volume Probes

Table 9-19 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	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	
924	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	
925	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	

9-13-2 Real-Time 4D Volume Probes (cont'd)



Figure 9-17 Real-Time 4D Volume Probes

Table 9-20 Real-Time 4D Volume Probes

Item	Part Name	Part Number	Description	Qty	FRU
926	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
927	RIC5-9H	KTZ156920 (H48651DA)	Real-time 4D broadband electronic curved-array transducer with a frequency range of 4-8MHz. Applications: Abdominal, OB, Gyn, Pediatrics, Interventional Radiology		1
928	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
929	RNA5-12	KTZ156936 (H48651DB)	Real-time 4D neonatal broadband electronic curved array transducer with a frequency range of 5-9MHz. Applications: Obstetrics, Pediatrics/Neonatology, Cardiology, Small Parts		1

9-13-3 CW-Pencil Probes



Figure 9-18 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 9-19 Biopsy Needle Guides

Table 9-22 Biopsy Needle Guides

Item	Part Name	Part Number	Description	Qty	FRU
850	**** (disposable)	E83851MJ	disposable Biopsy needle guide for probe IC5-9H needle diameter: < 1.65 mm		N
851	**** (reusable)	H40412LN	reusable Biopsy needle guide for probe IC5-9H needle diameter: < 1.65 mm		N
852	PEC42	H46721F	reusable Biopsy needle guide for probe IC5-9 needle diameter: < 1.8 mm		N
853	PEC63	H46721R	reusable Biopsy needle guide for probe RIC5-9 / RIC5-9H needle diameter: < 1.8 mm		N
854	PEC64	H46721B	reusable Biopsy needle guide for probe SP6-12 needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N
855	PEC65	H46721M	reusable Biopsy needle guide for probe RAB2-5 / RAB4-8P needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N
856	PEC69	H46721S	reusable Biopsy needle guide for probe RRE6-10 needle diameter: < 1.4 mm		N
857	PEC71	H46721D	reusable Biopsy needle guide for probe AB2-7 needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N
858	PEC74	H48621Y	reusable Biopsy needle guide for probe RAB2-5L / RAB4-8L needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N
859	PEC75	H46721W	reusable Biopsy needle guide for probe RSP5-12 needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N
860	PEC76	H48651DG	reusable Biopsy needle guide for probe RNA5-9 needle diameter: < 1 mm, 1.4 mm, 2.2 mm		N

# Chapter 10

## Care & Maintenance

### Section 10-1 Overview

#### 10-1-1 Periodic Maintenance Inspections

It has been determined by engineering that your Voluson® 730Pro / 730ProV system does not have any high wear components that fail with use, therefore no Periodic Maintenance Inspections are mandatory. 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 scanner 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	10-11
10-7	Electrical Safety Tests	10-11
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. System performance and cooling require this.

## 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 Periodic Maintenance 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 physicists, 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 Care & Maintenance Task Schedule (see: page 10-3) specifies how often your Voluson® 730Pro / 730ProV should be serviced and outlines items requiring special attention.

**NOTE:** *It is the customer's responsibility to ensure the Voluson® 730Pro / 730ProV 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® 730Pro / 730ProV 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 Care & Maintenance Task Schedule assumes that you use your Voluson® 730Pro / 730ProV 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 Periodic Maintenance 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 Periodic Maintenance 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	Clean Top surface, Monitor 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 Periodic Maintenance 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						<b>Twice Annually</b>
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 Section 10-5-2 on page 10-7					•	Also after corrective maintenance or as required by your facilities QA program.

## 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 Periodic 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 Preliminary Checks**

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Fill in the 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.
6	Presets	"Full Backup" all customer presets on Hard disk and/or DVD (see: Section 4-5-3 "Save Full Backup (Presets, Configurations & Application Settings)" on page 4-35).

## 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 CRI, Real Time 4D and VOCAL. 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	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 model configuration.

#### 10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to Table 3-8, "Approved Peripherals," on page 42 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 images 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

**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.
2	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).
3	Monitor	Clean Top surface and Monitor and with a fluid detergent in warm water on a soft, damp cloth.

## 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.
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® 730Pro / 730ProV.

## 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	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).
2	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.

### 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® 730Pro / 730ProV 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® 730Pro / 730ProV for details on cleaning.

**NOTE:** *To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.*

**NOTE:** *Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty. DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe. Follow care instructions that came with the probe.*

**NOTE:** *Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.*

## 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 13.7 of the Basic User Manual of Voluson® 730Pro / 730ProV. 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.

Test the system, peripherals and probes for leakage current. Excessive leakage current can cause injury or death in sensitive patients. High leakage current can also indicate degradation of insulation and a potential for electrical failure. Do not use probes or equipment having excessive leakage current.

To minimize the risk that a probe may shock someone the customer should:

- Not use a probe that is cracked or damaged in any way
- Check probe leakage current:
  - \* once a year on surface probes
  - \* twice a year on endocavitory 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	N/A
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	0.05 mA	0.05 mA	0.05 mA	0.05 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

**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	N/A	0.025 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. These tests are: grounding continuity, chassis leakage current, probe leakage current, and 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.

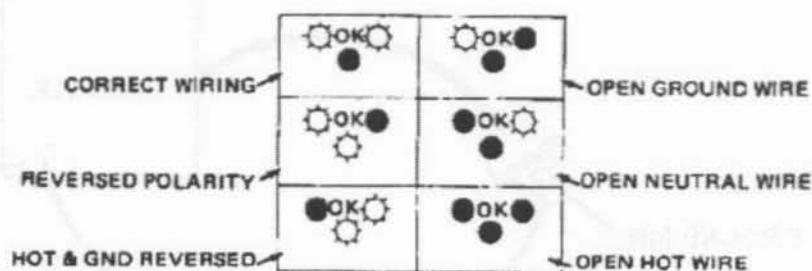
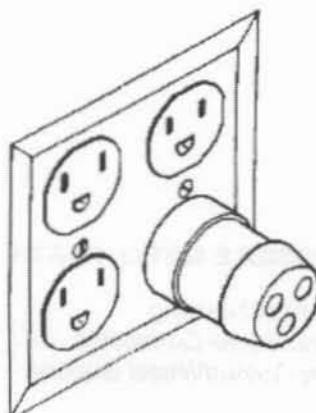


Figure 10-1 Typical Outlet Tester

**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 IEC 601-1.1.

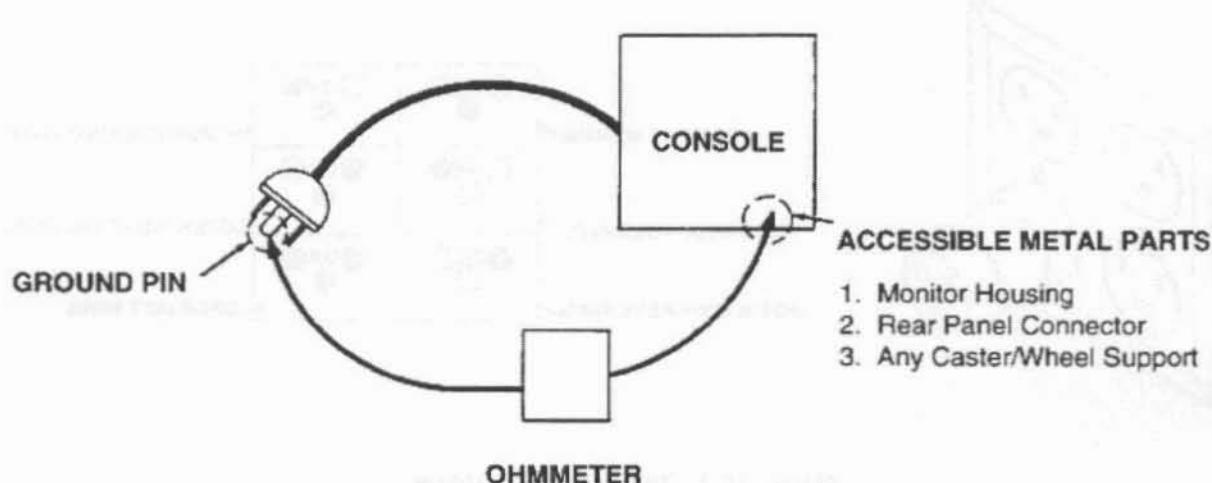


Figure 10-2 Ground Continuity Test

### 10-7-4-1 Meter Procedure

Follow these steps to test the ground wire resistance.

- 1.) Turn the Voluson® 730Pro / 730ProV unit OFF.
- 2.) Plug the unit into the meter, and the meter into the tested AC wall outlet.
- 3.) Plug the black chassis cable into the meter's "CHASSIS" connector and attach the black chassis cable clamp to an exposed metal part of the Voluson® 730Pro / 730ProV 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.

**CAUTION** Electric Shock Hazard. When the meter's ground switch is OPEN, don't 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.

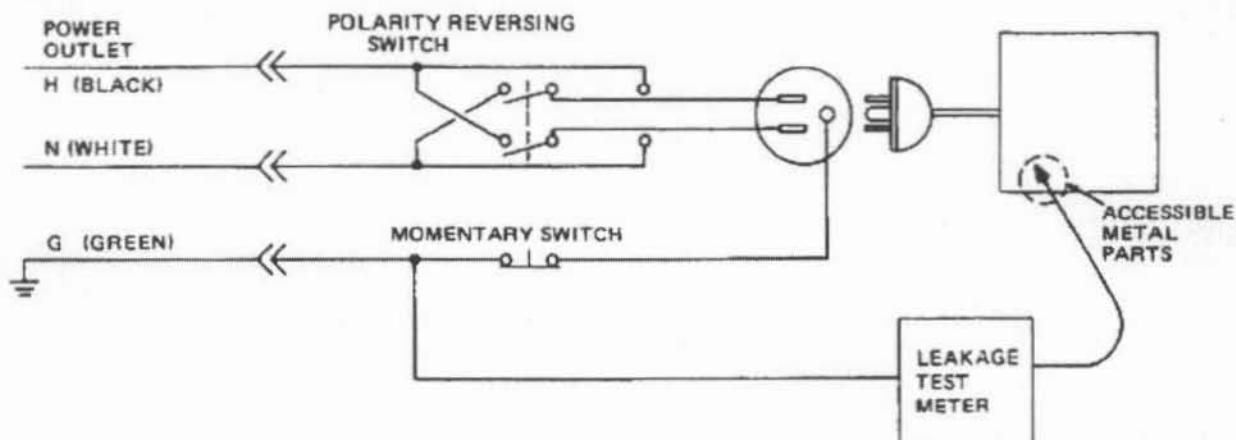


Figure 10-3 Set Up for Chassis Source Leakage Current,  
IEC 601-1 Clause 19 - Continuous Leakage Currents and  
Patient, Auxiliary Currents

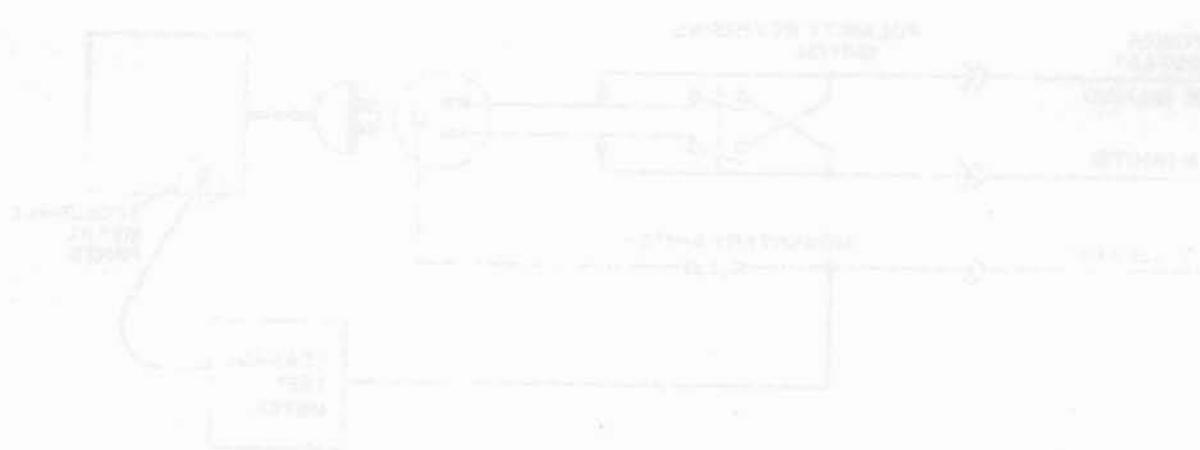
When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to ground will be indicated in any of the current ranges. The maximum allowable limit for chassis source leakage is shown in Table 10-11.

- 7.) Follow the test conditions described for respective test points shown in Table 10-14.

**Table 10-14 Chassis Leakage Current Test Condition**

TEST	CONDITION
1	Mounting screw for probe receptacle
2	Wheel support
3	Mounting screw for CRT housing
4	Mounting screw for peripheral plugged into unit
5	Mounting screw for other peripheral powered by unit

- 8.) Keep a record of the results with other hard copies of PM data kept on site.



#### 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 10-15 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.

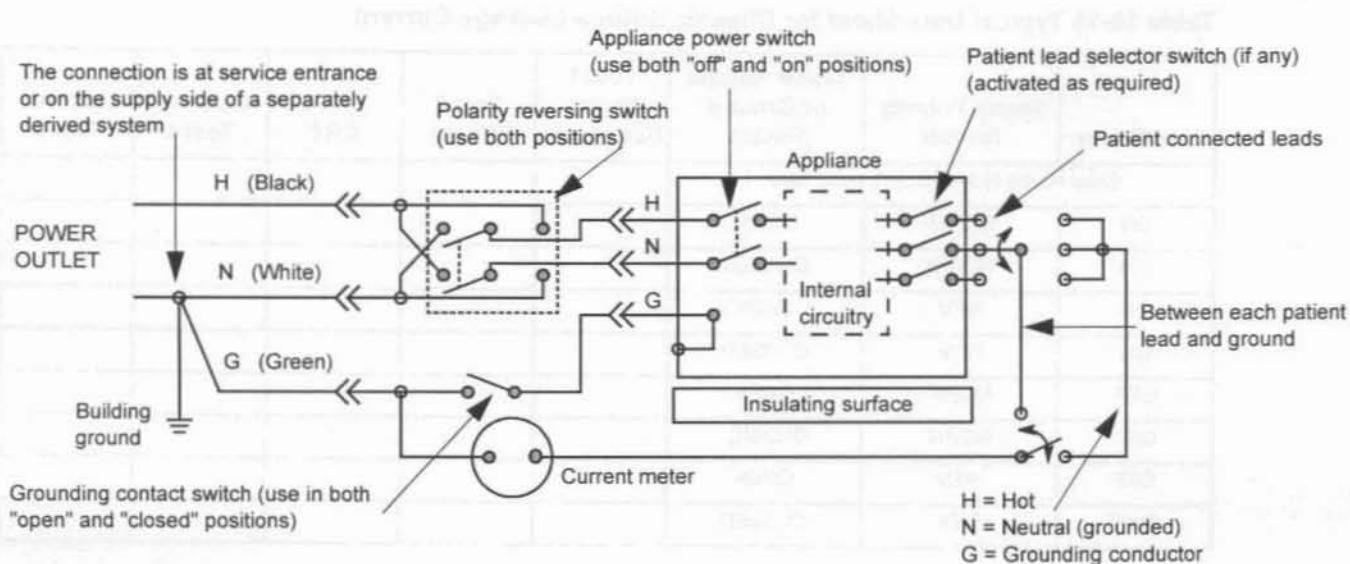


Figure 10-4 Test Circuit for Measuring Non-Isolated Patient Leads

Table 10-16 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 10-17 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 10-18 Maximum Allowance Limit for ECG Leakage Current**

	AC Power Source	Maximum Allowance Limit
Patient Lead Isolation Current Test	115V	20uA
	220/240V	5mA

**Table 10-19 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.

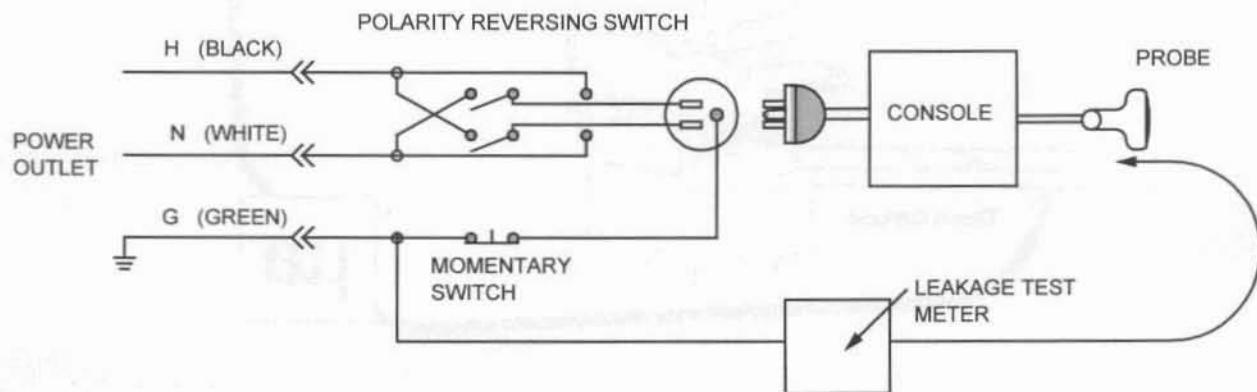


Figure 10-5 Set Up for Probe Leakage Current

**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

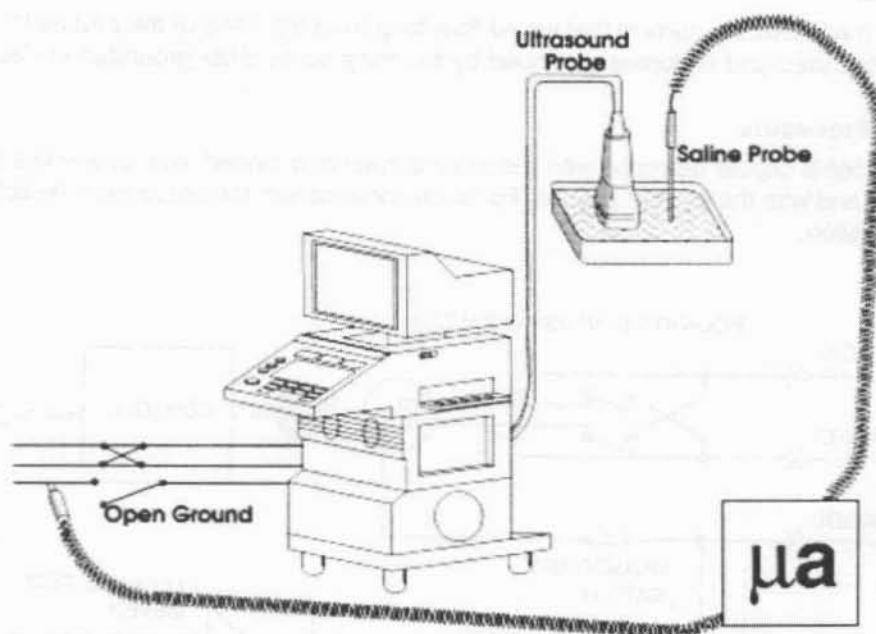


Figure 10-6 Check Without Probe Adapter

Follow these steps to test each transducer for leakage current.

- 1.) Turn the Voluson® 730Pro / 730ProV 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.
- 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 10-20 for every transducer.
- 10.) Keep a record of the results with other hand copies of PM data.

#### 10-7-9-4 Data Sheet for Transducer Source Leakage Current

The test passes when all readings measure less than the values shown in Table 10-12 and Table 10-13. Record all data on the Ultrasound Inspection Certificate.



**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.**

Table 10-20 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...

### 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.*

### 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.*

If excessive leakage current is slot dependent, inspect the system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

### PERIPHERAL FAILS

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

### STILL FAILS

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

### NEW UNIT

If the leakage current measurement tests fail on a new unit and if situation can not be corrected, submit a Safety Failure Report to document the system problem. Remove unit from operation.

### ECG FAILS

Inspect cables for damage or poor connections.

## ULTRASOUND INSPECTION CERTIFICATE

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/Contract/HBS
System Type		Model Number:	Serial Number:	Manufacture Date:
Probe 1:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 2:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 3:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 4:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 5:	Frequency:	Scan Format*:	Model Number:	Serial Number:
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 1Ground Continuity				
Peripheral 2 Leakage Current				
Peripheral 2Ground Continuity				
Peripheral 3 Leakage Current				
Peripheral 3Ground 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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