



***GE Medical Systems***

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# **Technical Publications**

**2204313–100**

**Revision 6**

## **ADVANTAGE 3D XR 1.X & 2.X sm Service Manual**

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## **WARNING**

**X-RAY EQUIPMENT IS DANGEROUS TO BOTH PATIENT AND OPERATOR  
UNLESS MEASURES OF PROTECTION ARE STRICTLY OBSERVED**

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful x-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 60 of the ICRP, and with applicable national standards.

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## WARNING



**DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS  
THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD**

If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.

This Service Manual is available in English only.

Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.

## ATTENTION



**NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS  
TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS**

Ce Manuel de maintenance n'est disponible qu'en anglais.

Si le technicien du client a besoin de ce manuel dans une autre langue que l'anglais, c'est au client qu'il incombe de le faire traduire.

Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.

## ATENCION



**NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO,  
SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**

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.

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.

## WARNUNG



**ERSUCHEN SIE NICHT DIESE ANLAGE ZU WARTEN,  
OHNE DIESE SERVICEANLEITUNG GELESEN UND VERSTANDEN ZU HABEN.**

Diese Serviceanleitung existiert nur in englischer Sprache.

Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.

Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.

## ATENÇÃO



**NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E  
COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA**

Este Manual de Assistência Técnica só se encontra disponível em Inglês.

Se qualquer outro serviço de assistência técnica, que não a GEMS, solicitar estes manuais noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução.

O não cumprimento deste aviso pode por em perigo a segurança do técnico, operador ou paciente devido a choques elétricos, mecânicos ou outros.

## AVVERTENZA



**SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO**

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.

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.

### 警告



- ・このサービスマニュアルには英語版しかありません。
- ・GEMS以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- ・このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
- ・この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

### 注意:



- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。



## HOW TO USE THE MANUAL

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**CHAPTER 2** SOFTWARE CONFIGURATION

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**CHAPTER 3** PREVENTIVE MAINTENANCE

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**CHAPTER 4** CORRECTIVE MAINTENANCE

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## CHAPTER 1 – 3D XR SOFTWARE INSTALLATION

# 1

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**JOB CARD IST 001A – Software Installation ADV 3D XR Version 1.X**

Time: 1 h – Personnel: 1 field engineer

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1

**1 SUPPLIES**

The 3D XR software package includes :

- A CD-ROM containing the software to be used with AW 3.1.
- A floppy containing the license key.
- A sheet containing a software protection key value.

**2 TOOLS REQUIRED**

None

**3 SAFETY PRECAUTIONS**

None

**4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is a connection link between the DLX and the AW 3.1 workstation.
- DLX has the Dicom Transfer option configured.
- Advanced X-Ray package is installed on AW 3.1.

(Refer appropriate DLX and AW 3.1 Service Manuals instructions)

**Voxtool option (3D CT/MR, NAVIGATOR, 3D VR) is configured as per customers FDO.**

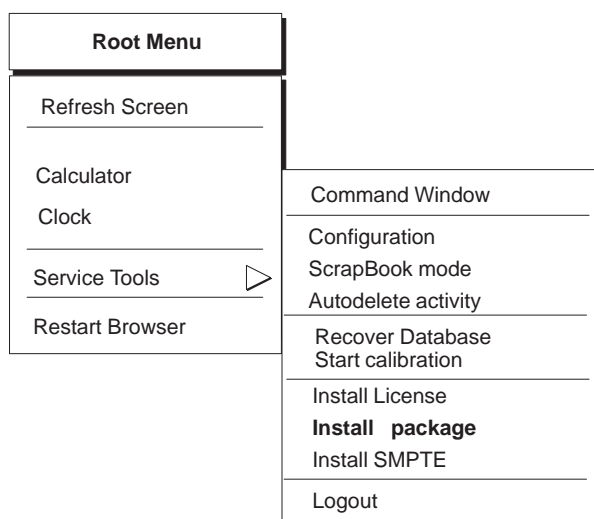
## 5 INSTALLATION PROCEDURE

1. Login as sdc if not already logged in as sdc:

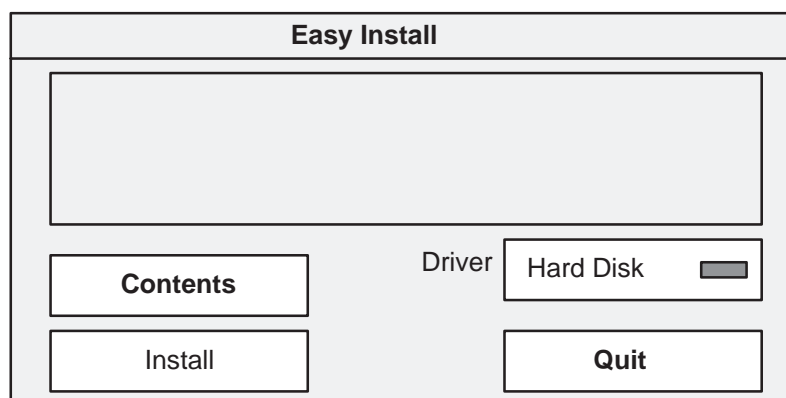
```
console login: sdc [Return]
Password:      adw3.1 [Return]
```

**Note:** DO NOT login as “root” to install the software. The installation procedure may appear to work, but you will not be able to start any of the software packages.

2. Insert 3D XR software CD-ROM into drive and a KEY FLOPPY in the floppy drive.  
If the KEY FLOPPY is not available, then the licence key will be entered manually in step 6.
3. Select *Install package* from the Service Tools submenu within the Root Menu.



The installation window pops up.



4. Click on *Hard Disk* button on the Driver Menu and select CD-ROM.

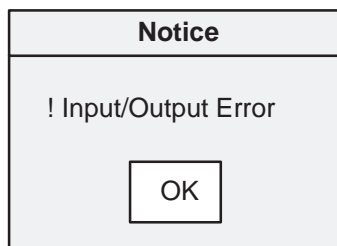
5. Click on *Contents*.

The message :

*ADVANTAGE 3DXR Application*

appears in the window

**Note:** If the following window pops up, you probably have selected the wrong media (Floppy / CD-ROM), or the concerned drive is defective.

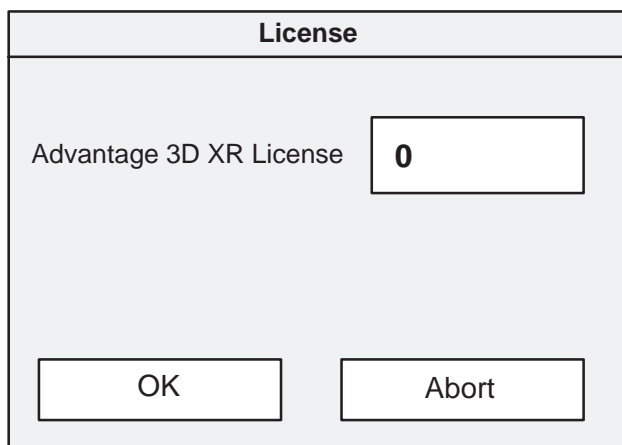


6. Click on *Install* button.

The message :

*Enter the software key value, or 0 to enter no key*

appears in the window and a new window pops up



7. If a KEY FLOPPY is in the floppy drive as indicated in step 2., then verify that 0 (zero) is written in the *License* field.  
Otherwise, click into the *License* field and type in the value of the 3D XR software protection key found in the sheet supplied with the CD-ROM.
8. Click on *OK* to accept License installation.

9. Click on *Install Application* button.

Message : *Reading Please wait*  
 followed by : *Enter the software key value, or 0 if a floppy is already in place*  
 appears in the window and a new window pops up

The image shows a Windows-style dialog box titled "License". The main area contains the text "3D Analysis License" on the left and a text input field on the right containing the digit "0". At the bottom of the dialog, there are two buttons: "OK" on the left and "Abort" on the right.

10. If a KEY FLOPPY is in the floppy drive as indicated in step 2., then verify that 0 (zero) is written in the *License* field.

Otherwise, click into the *License* field and type in the value of the 3D XR software protection key found in the sheet supplied with the CD-ROM.

11. Click on *OK* to accept License installation.

At this point, a number of messages are printed on the screen which tell the operator what is going on.

Wait till this message is displayed:

To actually run the package, logout, and login as sdc.  
 ... Done.

12. Click on the *Quit* button of the *Easy Install* window to exit the installation program.

The CD-ROM and the KEY FLOPPY are ejected from their drives.

13. The 3D XR software is now installed.

The default Autostart configuration is as follow:

- 3D reconstruction Autostart: ON
- 3D calibration Autostart: ON
- 3D visualisation Autostart: ON

If modification of this configuration is needed please refer to Jobcard CNF 001.



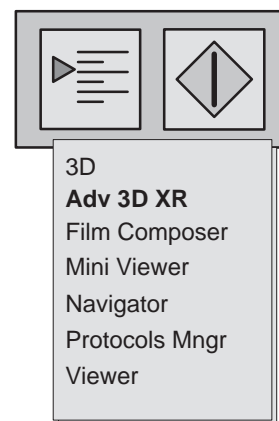
## 14. Logout and Login again as sdc :

console login : **sd**c [Return]  
Password : **adw3.1** [Return]

The 3D XR package installation is complete and available through the application selection button located in the middle top of the Browser. (See opposite Illustration)

If this is the first time installation, please execute the full calibration procedure described in “ADVANTX SYSTEM” Operator Manual.

**Note:** During the first calibration of a New Acquisition System, the 3DXR Software asks for a System’s Name to be associated with this particular Acquisition System. Type a name and press <OK> to terminate the calibration process.



## 15. Execute Jobcard VF001 Chapter 5 for Functional Checks.

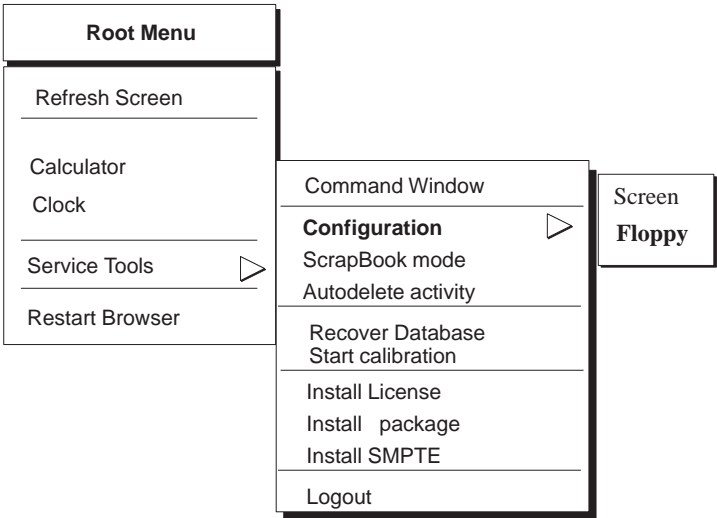
## 16. Execute Jobcard VF002 Chapter 5 for Functional Checks.

6 SAVING CONFIGURATION

Once the option software has been properly installed, you should search for software protection key value, in order to store it and ease future re-installation.

You may save the Software Protection key (together with the other option keys) on the Site Configuration diskette, if available, or make a new Site Configuration diskette.

In order to do that, insert your Configuration diskette (or a blank floppy) into drive, and from the Root Menu, Service Tools, select the **Configuration to Floppy** utility.



The *Configuration* utility proposes to format the diskette if not already done, then stores the newly installed software protection key, together with the other applications keys and some specific parameters to the Network hosts.

7 INSTALLATION COMPLETION

Fill in the Product Locator cards and forward them to the address indicated.

**JOB CARD IST 001B – Software Installation ADV 3D XR Version 2.X**

Time: 1 h – Personnel: 1 field engineer

1 of 6

1

**1 SUPPLIES**

The 3D XR software package includes :

- A CD-ROM containing the software to be used with AW 3.1.
- A floppy containing the license key.
- A sheet containing a software protection key value.

**2 TOOLS REQUIRED**

None

**3 SAFETY PRECAUTIONS**

None

**4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is a connection link between the DLX and the AW 3.1 workstation.
- DLX has the Dicom Transfer option configured.
- Advanced X-Ray package is installed on AW 3.1.

(Refer appropriate DLX and AW 3.1 Service Manuals instructions)

**Voxtool option (VOLUME ANALYSIS, NAVIGATOR, 3D VR) is configured as per customers FDO.**

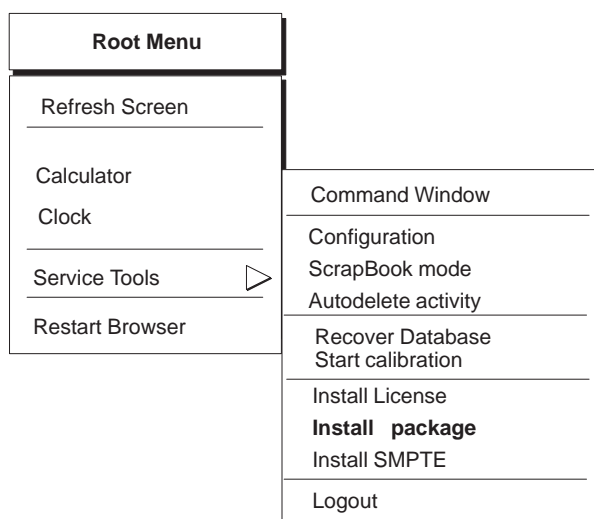
## 5 INSTALLATION PROCEDURE

1. Login as sdc if not already logged in as sdc:

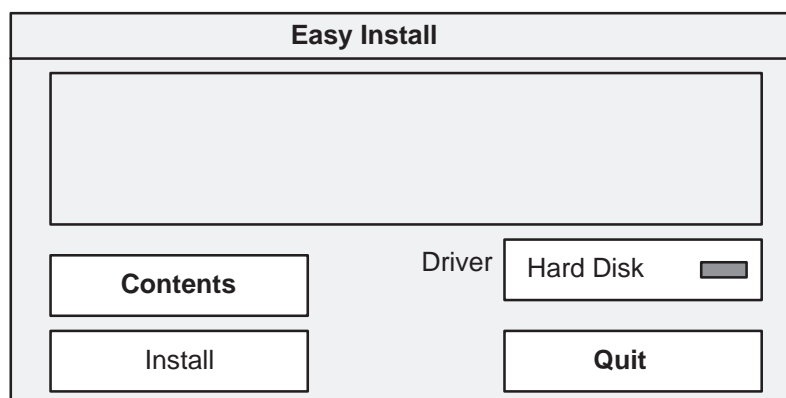
```
console login: sdc [Return]
Password:      adw3.1 [Return]
```

**Note:** DO NOT login as “root” to install the software. The installation procedure may appear to work, but you will not be able to start any of the software packages.

2. Insert 3D XR software CD-ROM into drive and a KEY FLOPPY in the floppy drive.  
If the KEY FLOPPY is not available, then the licence key will be entered manually in step 6.
3. Select *Install package* from the Service Tools submenu within the Root Menu.



The installation window pops up.



4. Click on *Hard Disk* button on the Driver Menu and select CD-ROM.

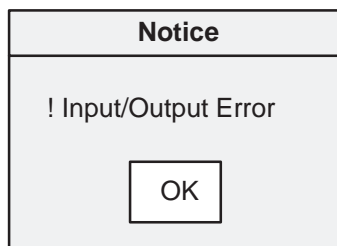
5. Click on *Contents*.

The message :

*ADVANTAGE 3DXR Application*

appears in the window

**Note:** If the following window pops up, you probably have selected the wrong media (Floppy / CD-ROM), or the concerned drive is defective.

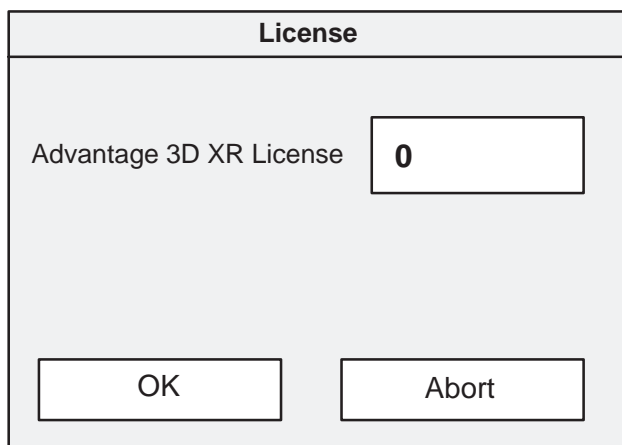


6. Click on *Install* button.

The message :

*Enter the software key value, or 0 to enter no key*

appears in the window and a new window pops up



7. If a KEY FLOPPY is in the floppy drive as indicated in step 2., then verify that 0 (zero) is written in the *License* field.  
Otherwise, click into the *License* field and type in the value of the 3D XR software protection key found in the sheet supplied with the CD-ROM.
8. Click on *OK* to accept License installation.

At this point, a number of messages are printed on the screen which tell the operator what is going on.

Wait till this message is displayed:

To actually run the package, logout, and login as sdc.  
... Done.

9. Optional COILS/CLIPS software installation. If the customer ordered this option (see FDO) then proceed with the following steps:

- In the *Easy Install* window, click on CD-ROM button on the Driver Menu and select *Hard Disk*.
- Click on *Contents*. A list of applications appears on the right.
- Select *ADVANTAGE 3D XR COILS/CLIPS* and verify that no other application is selected in the list.
- Insert the KEY FLOPPY in the floppy drive.
- Click on *Install* button. The COILS/CLIPS option is installed.

**Note:** If the KEY FLOPPY is not inserted in the drive then a pop-up window will prompt for a manual entry of the software KEY.

10. Click on the *Quit* button of the *Easy Install* window to exit the installation program.  
The CD-ROM and the KEY FLOPPY are ejected from their drives.

11. The 3D XR software is now installed.

The default Autostart configuration is as follow:

- 3D reconstruction Autostart: ON
- 3D calibration Autostart: ON
- 3D visualisation Autostart: ON

If modification of this configuration is needed please refer to Jobcard CNF 001.

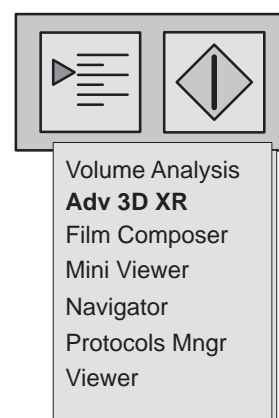
12. Logout and Login again as sdc :

```
console login : sdw [Return]
Password : adv3.1 [Return]
```

The 3D XR package installation is complete and available through the application selection button located in the middle top of the Browser. (See opposite Illustration)

If this is the first time installation, please execute the full calibration procedure described in “ADVANTX SYSTEM” Operator Manual.

**Note:** During the first calibration of a New Acquisition System, the 3DXR Software asks for a System's Name to be associated with this particular Acquisition System. Type a name and press <OK> to terminate the calibration process.



13. Execute Jobcard VF001 Chapter 5 for Functional Checks.

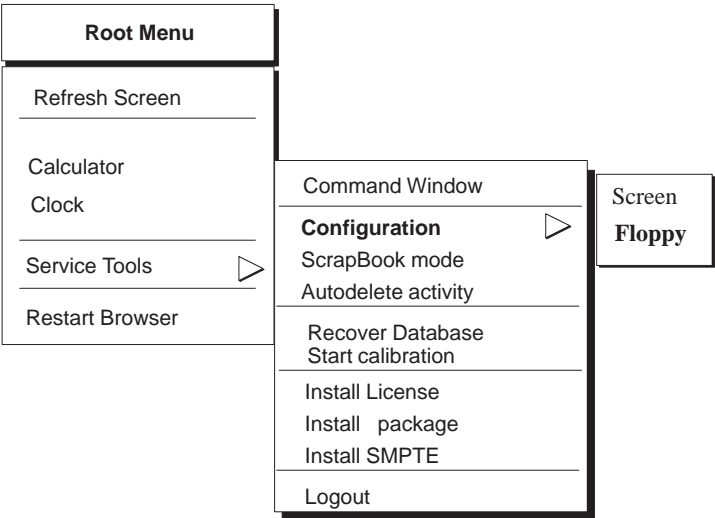
14. Execute Jobcard VF002 Chapter 5 for Functional Checks.

6 SAVING CONFIGURATION

Once the option software has been properly installed, you should search for software protection key value, in order to store it and ease future re–installation.

You may save the Software Protection key (together with the other option keys) on the Site Configuration diskette, if available, or make a new Site Configuration diskette.

In order to do that, insert your Configuration diskette (or a blank floppy) into drive, and from the Root Menu, Service Tools, select the **Configuration to Floppy** utility.



The *Configuration* utility proposes to format the diskette if not already done, then stores the newly installed software protection key, together with the other applications keys and some specific parameters to the Network hosts.

7 INSTALLATION COMPLETION

Fill in the Product Locator cards and forward them to the address indicated.

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1



## **JOB CARD IST 002A – Network Connection Installation – DLX without Digital Gateway**

Time: 3 h – Personnel: 1 field engineer

1 of 1

1

### **1 SUPPLIES**

DLX DICOM Ethernet option.

### **2 TOOLS REQUIRED**

None

### **3 SAFETY PRECAUTIONS**

None

### **4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is no connection link between the DLX and the AW 3.1 workstation.
- DLX has not the Dicom Transfer option configured.

### **5 NETWORK CONNECTION BETWEEN AW3.1 AND DLX**

1. Follow the instructions in Chapter 4 Section 1 of “Advantage Workstation V3.1 PIM” and the instructions in Chapter 9 “Networking” Sections 1–5 and 1–10 of “Advantage Workstation (V3.1) PIM”.
2. Follow the IST 16 O (SS4 or Ultra Sparc 5) in a DLX Service Manual 2132665–100 Revision 8 or higher.

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1

## **JOB CARD IST 002B – Network Connection Installation – DLX with a Digital Gateway & Fast Ethernet Interface/Combo**

Time: 3 h – Personnel: 1 field engineer

1 of 6

1

### **1 SUPPLIES**

None

### **2 TOOLS REQUIRED**

None

### **3 SAFETY PRECAUTIONS**

None

### **4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is no connection link between the DLX and the AW 3.1 workstation.
- There is no connection link between the Digital Gateway and the AW 3.1 workstation.
- DLX has the Digital Gateway and the Fast Ethernet Interface option installed and configured.

### **5 NETWORK CONNECTION BETWEEN AW3.1 AND THE DIGITAL GATEWAY WITH A FAST ETHERNET INTERFACE**

1. Follow the instructions in Chapter 4 Section 1 of “Advantage Workstation V3.1 pim” and the instructions in Chapter 9 “Networking” Sections 1–5 and 1–10 of “Advantage Workstation (V3.1)”.
2. If you have a GEMnet Digital Gateway Service Manual 2208780–100 Revision 0 or higher, then use the Job Card that describes the Fast Ethernet Digital Gateway connection to an AW3.1 station. Otherwise continue in paragraph 6 of this manual.

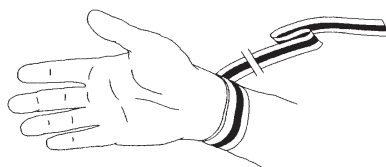
## 6 SAFETY PRECAUTIONS

**WARNING**

**BE SURE ALL POWER IS OFF TO THE DLX SYSTEM CABINET BEFORE BEGINNING THIS PROCEDURE**

- Set the DLX1 A72 VDP/options AC Power.
- Switch on the DLX cabinet to OFF.
- Shut down the Sun station.
- At the dlxlogin: prompt, type:  
dlxlogin: **halt** <cr>  
The OK prompt appears. Power OFF the Sun workstation.
- Power OFF the Digital Gateway.
- Power OFF the UPS, if present.
- Power OFF the Main Power Source (XFMR), refer to Job Card IST1 E.
- Disconnect power to DLX1 A72 cabinet bulkhead, and XFMR power to DLX1 A73.

**Note:** To avoid equipment damage take the usual precautions against static electricity for this procedure. Wear an antistatic wrist strap when handling the Ethernet board.



## 7 CONNECTION

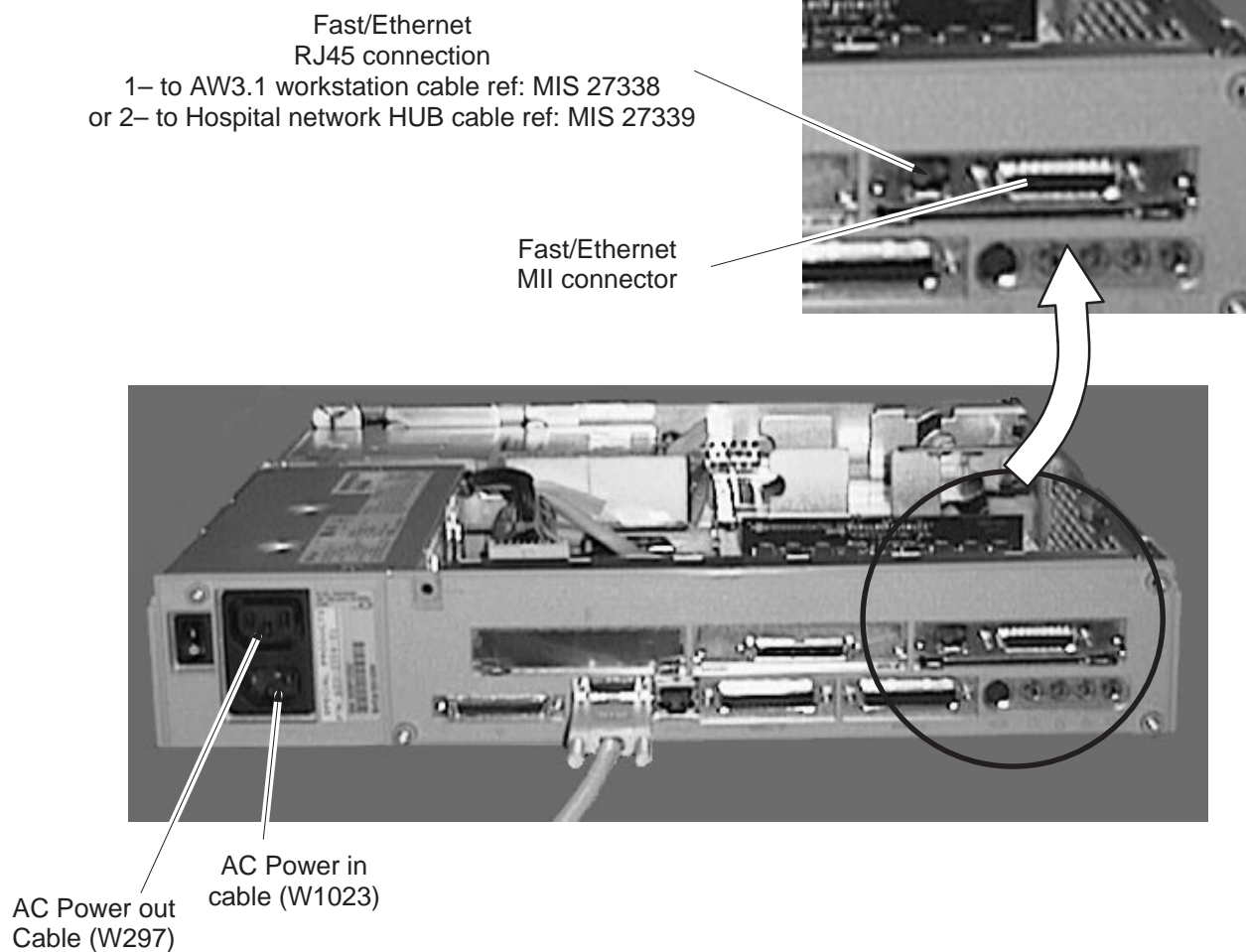
### 7-1 Direct connection

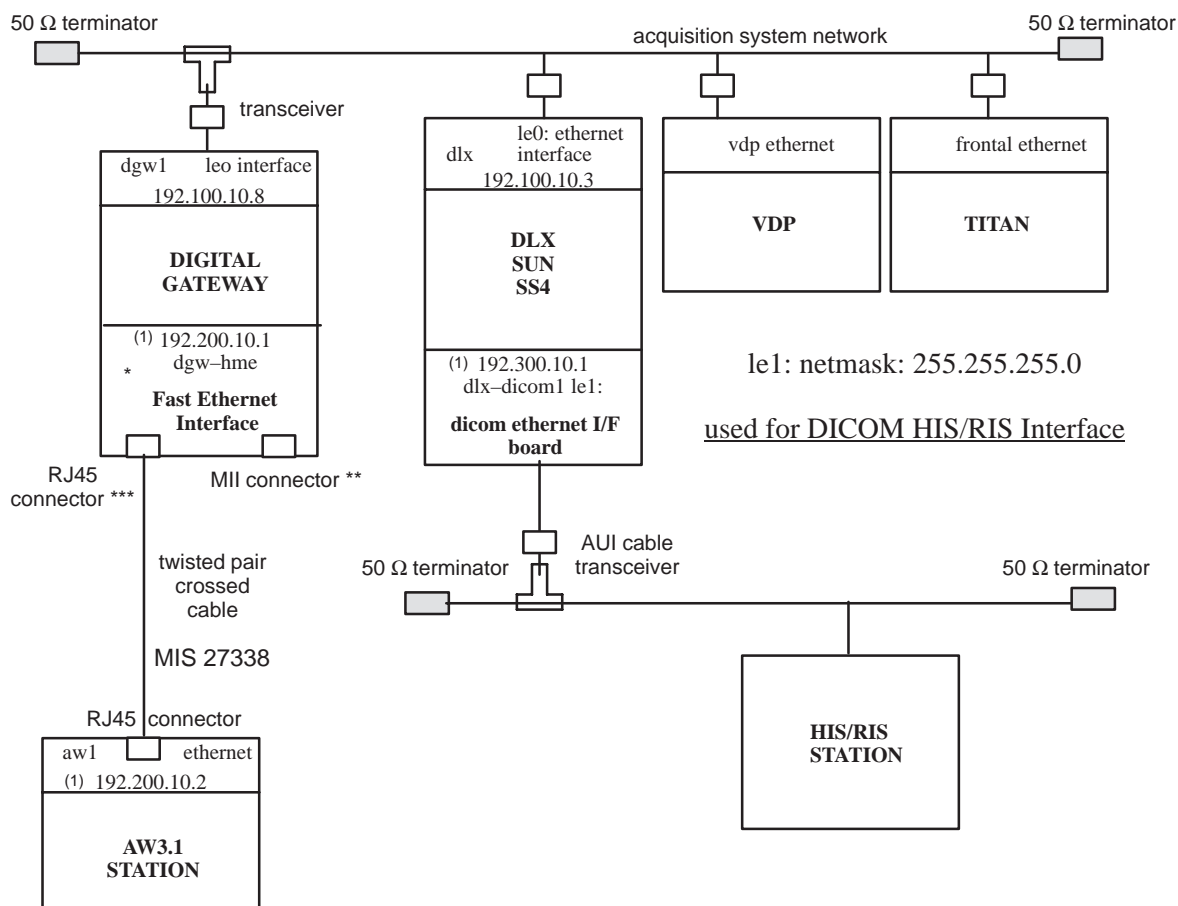
Connect the crossed twisted pair cable (MIS 27338) into the RJ45 connector of the AW3.1 station and the RJ45 connector of the Digital Gateway Fast Ethernet Interface. See Illustration 1 and Illustration 2.

### 7-2 Connection to a HUB

Connect a twisted pair cable (MIS 27339) into the RJ45 connector of the Digital Gateway and into the RJ45 connector of a HUB (Wall Box). See Illustration 1 and Illustration 3.

# Illustration 1 – Ethernet Gateway



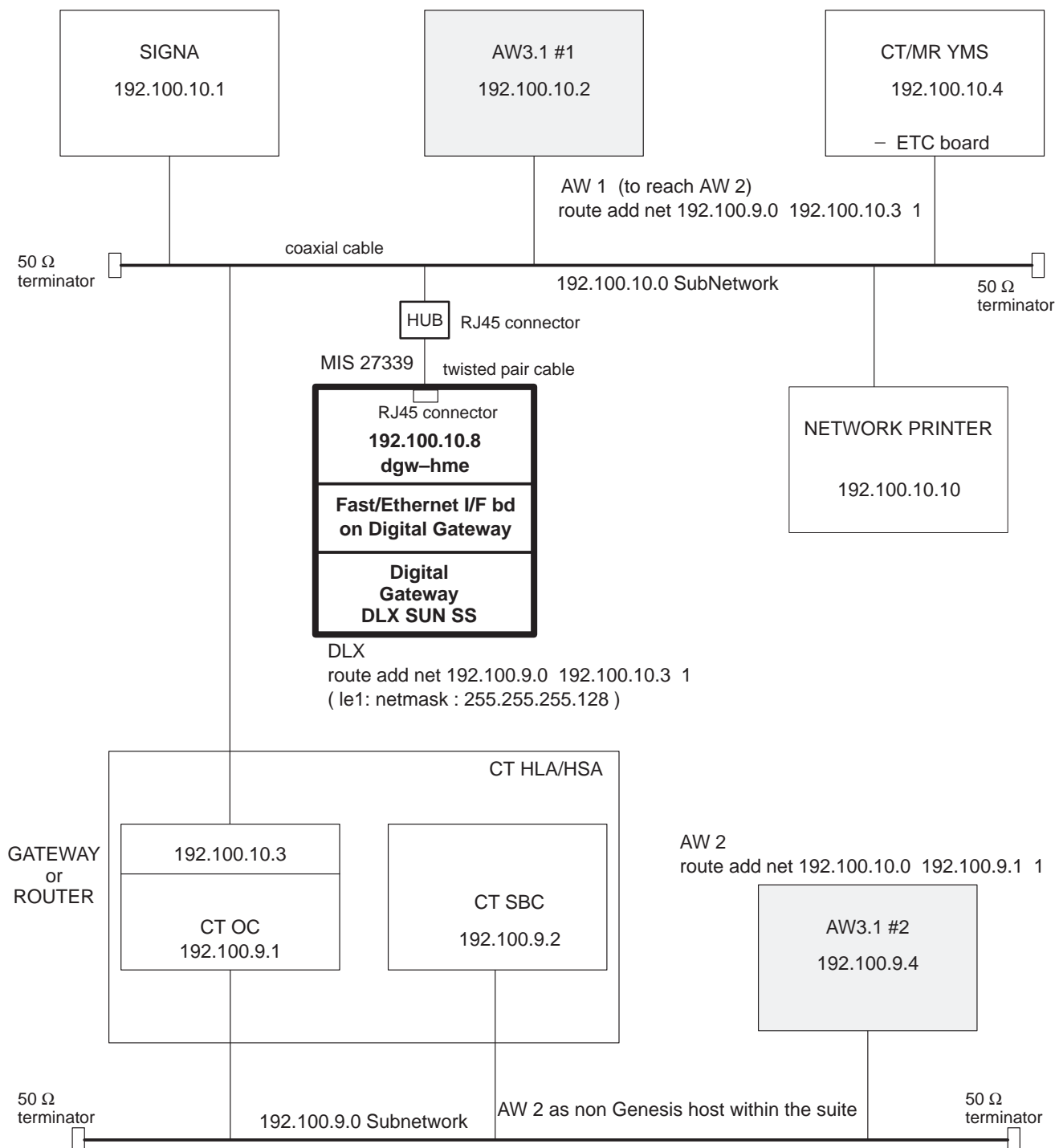
**Illustration 2 – Basic workstations network with no router – DLX with a Fast Ethernet Gateway**

**Note \*:** the Fast Ethernet Interface can operate at either 10 or 100 Mb/s (auto configured).

**Note \*\*:** the Digital Gateway MII connector can be used with a MII to AUI Interface and one AUI transceiver. In this case, the RJ45 cable must be removed.

**Note \*\*\*:** the Digital Gateway RJ45 connector can be used to connect to a HUB. In this case, the RJ45 twisted pair cable is not crossed.

**Note (1):** I.P. Addresses are for example only.

**Illustration 3 – Workstations subnetworks with one router – DLX with a Digital Gateway and a Fast Ethernet Interface**

## 8 POWER ON

- Power ON the DLX1 A72 system power.
- Power ON the UPS, if present.
- Power ON the DLX1 A2 Sun workstation.
- Power ON the Digital Gateway.
- Once the system has booted, check that the dlx login> prompt is displayed on the flat panel screen.



## JOB CARD IST 003 – Demo/Reference Images Installation

1 of 4

1

### 1 SUPPLIES

3D XR CDROM containing the Demo/Reference exams.

### 2 TOOLS REQUIRED

None

### 3 SAFETY PRECAUTIONS

None

### 4 PREREQUISITES

- AW 3.1 is configured on fully operational.
- Advanced X-Ray package is installed on AW 3.1.
- Advantage 3D XR application is installed.

## 5 INSTALLATION PROCEDURE

Login as sdc using the adw3.1 password.

1. Open a command window from the “ROOT MENU” Service Tools.
2. Move the arrow inside the window.
3. Run the Advantage 3D XR Service program by typing the following command:

“3dxrservice” [Return]

### Advantage 3D XR application – MAIN MENU

Field interventions.....	1
Auto-start modes.....	2
Demo exams installation.....	3

=====  
Enter your choice or <Enter> to display the current menu [?,q]

4. Enter the number that corresponds to the extra Exams installation, 3 and press [Return]  
A new menu appears:

### Demo exams Menu

Install PATIENT demo exam.....	31
Install IQ PHANTOM demo exam.....	32
Install all demo exams.....	33

=====  
Enter your choice or <Enter> to display the current menu [?,q]

5. Select one of the following installation options:
  - a. Enter 31 and **[Return]** to install the patient DEMO images and associated calibration images.
  - b. Enter 32 and **[Return]** to install the Image Quality phantom DEMO images and associated calibration images.
  - c. Enter 33 and **[Return]** to install all DEMO exams.

6. Insert the Advantage 3D XR application CDROM into the drive, close the door and press **[Return]**

```
Loading Advantage Windows extra exam from cdrom .....  
Exam Names .....  
.....  
Advantage Windows extra exams installed
```

7. If after extra exams are needed go back to step 5.  
When done loading extra exams then select "Q" and press **[Return]** to quit the 3dxrservice program, logout and login again as SDC.

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## CHAPTER 2 – SOFTWARE CONFIGURATION

JOB CARD	DESIGNATION	Page
CNF 001	Autostart Configuration	39

Blank page.

2

**JOB CARD CNF 001 – 3DXR Configuration**

Time: 1 h – Personnel: 1 field engineer

1 of 4

**1 SUPPLIES**

Not applicable.

**2 TOOLS REQUIRED**

Not applicable.

**3 SAFETY PRECAUTIONS**

Not applicable.

**4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is a connection link between the DLX and the AW 3.1 workstation.
- DLX has the Dicom Transfer option configured.
- Advanced X-Ray package is installed on AW 3.1.
- Advanced 3DXR application installed.

## 5 AUTOSTART CONFIGURATION

For description of the functionality of the Autostart modes, please refer to OM.

1. Open a command window from the Root Menu Service Tools.
2. Move the arrow inside the window.
3. Run the Advantage 3dxrservice program by typing the following command:

“3dxrservice” [Return]

### Advantage 3D XR application – MAIN MENU

Field interventions.....	1
Auto-start modes.....	2
Demo exams installation.....	3

=====

Enter your choice or <Enter> to display the current menu [?,q]

4. Enter the number that corresponds to the Autostart mode selection, 2 and press [Return]  
A new menu appears:

### Auto-start modes Menu

3D reconstruction auto-start.....	21
3D calibration auto-start.....	22
3D visualization auto-start.....	23

=====

Enter your choice or <Enter> to display the current menu [?,q]



Enter the number that corresponds to the Autostart mode to be modified and press **[Return]**

A new menu appears:

```
===== autostart mode for reconstruction (currently On) =====
```

**autostart mode**

**1 Off**

**2 On**

**Please choose the new autostart mode (default: On) [?,??,q]: Off**

**reconstruction autostart : Off**

**Please confirm [y,n,?,q] y**

**You have to logout and login to take into account the modification.**

Enter "On" or "2" to activate the selected mode or "Off" or "1" to deactivate it and press **[Return]**.

Confirm your choice by typing "y" and **[Return]**.

Enter "Q" **[Return]** to quit the 3dxrservice program.

5. Close the command window.

6. Logout and login again as "sdc" for the change to be effective.

## 6 CONFIGURATION OF THE ADVANTX AND DLX SOFTWARE

The Advantx and DLX Software must be configured by an authorized General Electric Company Service Representative.

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## CHAPTER 3 – PREVENTIVE MAINTENANCE

JOB CARD	DESIGNATION	Page
PM 001	Preventive Maintenance	45

Blank page.

## JOB CARD PM 001 – Preventive Maintenance

Time: 2 h – Personnel: 1 field engineer

1 of 2

Periodicity: Every year

---

### 1 SUPPLIES

The 3D XR CDROM containing the demo exam (optional)

(Needed, if the demo exam named 3DIQDEMO is not stored on the AW 3.1).

I.Q. phantom (available on site).

Absorption filter (available on site).

### 2 TOOLS REQUIRED

None

### 3 SAFETY PRECAUTIONS

As usual with X-Ray equipment.

### 4 PREREQUISITES

- AW 3.1 workstation is configured and fully operational.
- There is a connection link between the DLX and the AW 3.1 workstation.
- DLX has the Dicom Transfer option configured.
- Advanced X-Ray package is installed on AW 3.1.

(Refer appropriate DLX and AW 3.1 Service Manuals instructions)

3D XR application installed and acquisition system calibrated for 3D.

### 5 APPLY JOBCARD VF001

If any issue is found, please refer to the Troubleshooting Chapter.

### 6 APPLY JOBCARD VF002

If any issue is found, please refer to the Troubleshooting Chapter.

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## CHAPTER 4 – CORRECTIVE MAINTENANCE

JOB CARD	DESIGNATION	Page
CM 001	Corrective Maintenance	49

Blank page.



## JOB CARD CM 001 – Corrective Maintenance

Time: 1 h – Personnel: 1 field engineer

1 of 4

### 1 SUPPLIES

HELIX and GRID PHANTOMS.

### 2 TOOLS REQUIRED

Not Applicable.

### 3 SAFETY PRECAUTIONS

As usual when servicing X-Ray equipment.

### 4 PREREQUISITES

3DXR application installed and fully operational.

### 5 INTRODUCTION

This procedure **MUST** be executed if any **Service intervention** on the acquisition system has potentially modified 3D Spin acquisition parameters. Such intervention makes the previous 3D calibration obsolete.

Hereafter is a non-exhaustive list of such interventions.

- Any intervention on gantry that needs to recalibrate the gantry potentiometers.
- C-Arc belts replacement or tension adjustment.
- C-Arc “rollers” adjustment or replacement.
- Pivot “tooth wheels” replacement or dismount-remount.
- X-Ray tube replacement.
- HELIX and/or GRID phantom replacement.
- Image Intensifier realignment.
- Image Intensifier elevator dismount-remount.
- Image Intensifier replacement or dismount/remount.
- TV Camera head re-adjustment or replacement.

- Pick-up Tube replacement or re-adjustment or rotation.
- TV camera re-calibration.
- TV camera disassembly-reassembly.
- Image Gate dismount-remount or replacement
- VIC circuit board replacement or readjustment.
- Any change in the environment that affected the surrounding magnetic field characteristics.
- Positioner or DLX or Titan Software upgrade.

**WARNING**

**IF YOU ARE IN DOUBT ABOUT THE IMPACT OF YOUR INTERVENTION ON THE 3D CALIBRATION THEN EXECUTE THIS PROCEDURE.**

## 6 PROCEDURE

1. Execute the 3D calibration.

**Note:** If the calibration processing ends before the end of this procedure, a pop-up window “*Abnormal Behavior of the System*” may appear. Please ignore that message and continue with this procedure.

2. Open a command window from the root pop-up menu, service Tools.
3. Move the arrow inside the window.
4. Run the Advantage 3D XR Service Program by typing the following command:  
**3dxrservice [return]**

### Advantage 3D XR application – MAIN MENU

Field interventions.....	1
Auto-start modes.....	2
Demo exams installation.....	3

=====  
Enter your choice or <Enter> to display the current menu [?,q]

5. Enter the number corresponding to the Service Intervention Registration, **1** and press **[return]**.  
A new menu appears:

### Field intervention registration Menu

Register an intervention.....	11
Register an intervention (from OLC).....	12
Show list of registered interventions.....	13

=====  
Enter your choice or <Enter> to display the current menu [?,q]

6. Enter **11** and press **[return]**.

**Please select in the browser the Helix series of the new calibration:**

**Validate selection** ..... **1**

**Abort** ..... **2**

**Your selection:**

Go to the AW3.1 Browser.

In the AW3.1 Browser, select Helix sequence (the type appearing in the series level is “3D HEL”)  
from the calibration performed in step 1 of this procedure.

Minimize the Browser and move the arrow inside the command window.

Type **1** and press **[return]**. See list in Section 5.

**Please enter a description of the Service intervention:**

Please type a short text describing the service intervention performed on the acquisition system  
and press **[return]**.

A summary of the submitted parameters is displayed and waits for your confirmation.

**Following parameters will be declared:**

**Machine Id** ..... **32**

**Intervention date** ..... **05 Mar 1998**

**Intervention time** ..... **17 : 01 : 30**

**Intervention description** ..... **Image Intensifier realignment**

**Accept** ..... **1**

**Do not accept** ..... **2**

If the displayed parameters are correct, then press **1 [return]**. Otherwise, press **2** and **[return]**  
and go back to step 6.

7. Select “Q” **[return]** to quit the 3dxrservice program and close the command window.

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## CHAPTER 5 – FUNCTIONAL CHECKS

JOB CARD	DESIGNATION	Page
VF 001	3D Functional Checks	55
VF 002	2D Subtraction Quality Check.	65

Blank page.

**JOB CARD VF 001 – 3D FUNCTIONAL CHECKS**

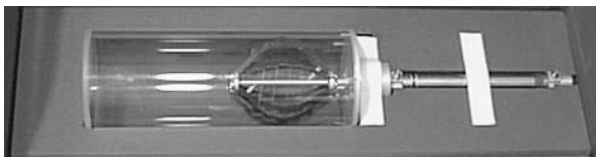
Time: 2 h – Personnel: 1 field engineer

1 of 10

**1 SUPPLIES**

- 3D Image quality phantom.
- Filter 2207691.
- Injector.

3D IQ Phantom

**2 TOOLS REQUIRED**

One 150 ml syringe or larger

**3 SAFETY PRECAUTIONS**

As usual when operating X-Ray equipment.

**4 PREREQUISITES**

- AW 3.1 workstation is configured and fully operational.
- There is a connection link between the DLX and the AW 3.1 workstation.
- DLX has the Dicom Transfer option configured.
- Advanced X-Ray package is installed on AW 3.1.
- 3D XR software is installed on AW 3.1.
- System in Application State.

(Refer appropriate DLX and AW 3.1 Service Manuals instructions)

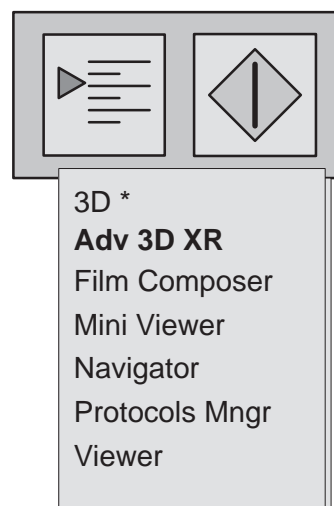
## 5 ACQUISITIONS ON 3D I.Q. PHANTOM

### 5-1 Checking Calibration (AW3.1 Workstation)

Check if appropriate calibration is available:

- Select Adv 3D XR application from browser application menu.
- Select the “**Calibration Schedule**” button.

Advantage 3D XR – Calibration Schedule – V:S3D_Bxx.xx.x	
Acquisition Room: Room xxxxxxxx	
FOV	Calibration
32	Valid until: Sep 20 1997
22	Valid until: Sep 20 1997
16	Not available
<div>Room Select   Calibration   History   Close</div>	



\* This is “Volume Analysis” in Version 2.X of ADV 3D XR software.

- Check that the 22 cm (9”) field of view has a valid calibration.

If calibration is invalid, “NOT AVAILABLE” displayed on the screen, please execute the calibration procedure described in the “System” Operator Manual.

### 5-2 Adjusting Acquisition Parameters (Advantx Console)

- Acquisition Mode: 3D spin patient.
- Injection Mode: Auto-inject
- X-Ray Tube Focal Spot: 0.6 mm.
- Dose: B
- II Field of View 22 cm (9”)
- Inject-Image Delay:  $\geq 7.5$  seconds
- X-Ray Filter: Use 1 mm stainless steel filter, Part No., 2207691
- Anti-scatter Grid No.



### 5–3 Adjusting the Injector

Program the following injection parameters:

- Volume to be injected: 130 milliliters.
- Injection Rate: 20 milliliters/second.
- Rise Time: 0.5 seconds.

### 5–4 Preparing the Acquisition, Positioning the Phantom

- Place the phantom at the end of the table, on the head rest. The tabletop head rest should be slotted into the groove provided in the foam support
- Install an empty 150–ml syringe (or larger) on the injector head.
- Using the plastic tube, connect the injector syringe to the air inlet nozzle located at the rear end of the jack.
- Manually operate the injector so as to push the phantom fully forward (jack extended – See Illustration 2)
- Center the phantom in Fluoroscopy to the  $L=0^\circ$ ,  $C=0^\circ$ ,  $P=0^\circ$  position (lateral and longitudinal centering) then to the  $L=0^\circ$ ,  $C=0^\circ$ ,  $P=90^\circ$  or  $-90^\circ$  position (vertical central position). Perform this procedure with care so that all parts of the phantom are within the field of view during acquisition apart from the two metal end castings at the top and bottom of the image, which may be partially truncated (truncate them equally).
- Move the phantom to the rear stop position (outside field of view – See Illustration 1) by manually pulling fully out the injector syringe piston. Be careful not to move the table or the phantom support. Disconnect and then reconnect the syringe's plastic tube to balance the air pressure.
- Arm the injector.

### 5–5 Image Acquisition

- Create a “phantom\_3DIQ” patient on the DLX.
- Select AW3.1 Workstation as the network host destination in DLX.
- Perform a complete 3D spin acquisition (masks + opacified images).



**Do not move the phantom until the end of this procedure since a 3D pos angulation check has to be performed.**

- Check that you have 44 subtracted images and that all parts of the phantom are within the field of view in all images, apart from the two metal end castings at the top and bottom of the image.

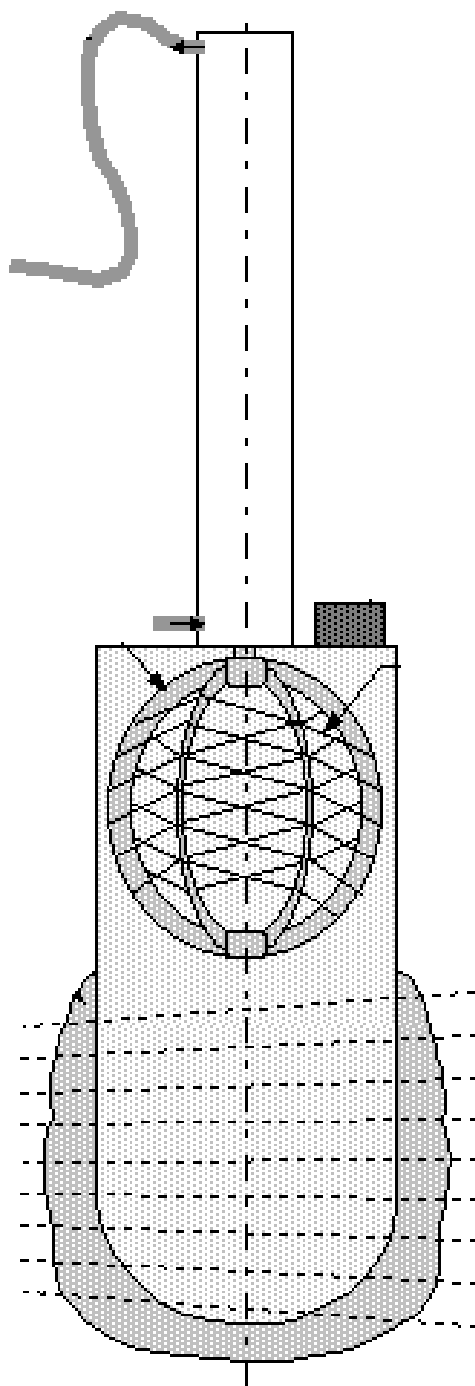


Illustration 1 –

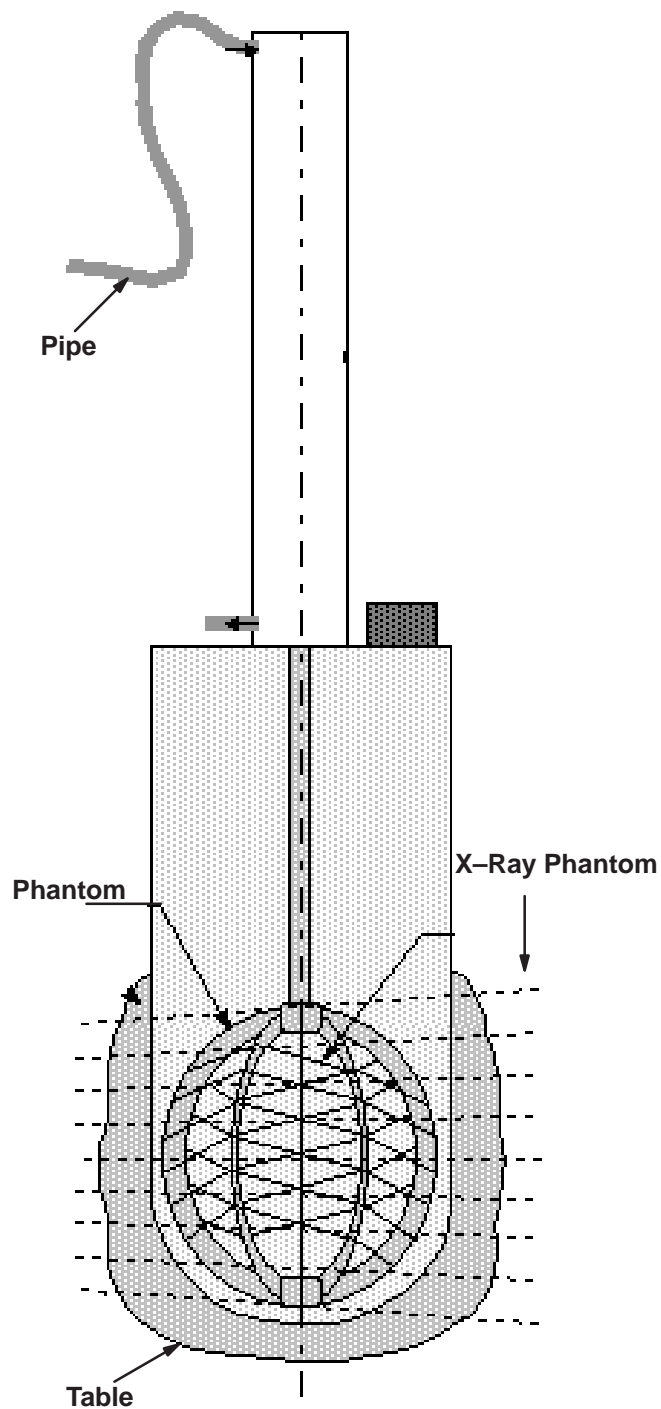


Illustration 2 –

## 5–6 Network transfer

At the end of the acquisition an automatic data transfer over the network will start.

During this transfer , check the following status on the DLX: using the Network icon:

### 5–6–1 NETWORK Icon

The “**Net**” icon provides the following functions:

- Display and management of the TRANSFER Queue
- Host management.

The “**Net**” Icon is always present, even if the queue is empty (no items selected), as it provides the host selection function.

Click on the “**Net**” icon to display the “TRANSFER QUEUE” Menu:

NETWORK QUEUE				
Patient	Examination	Seq/Photo	Hostname	Status
RCA STENOSIS	CARDIAC	ball	awa4	Sent
LCA + BYPASS	HEART	ball	awa4	Sent
JOHN	CORON	seq #2	awa4	Active
LEGS PHANTOM	LEGS	seq #2	awa4	Pending
Phnato_3DIQ	HEAD		awa4	Pending

Help	Delete All Selected	Clear Pending	Retry Failed	Select host
------	------------------------	------------------	-----------------	----------------

### 5–6–2 Verify the status of your transfer:

Status can take the following values:

- **SENT**, when item is transferred with success
- **FAILED**, when transfer of item failed. In this case, the item remains in the queue, and is not automatically erased. It is removed from the queue only by use of the DELETE ALL SELECTED key (see below). It can also be returned in the queue with PENDING status by use of the RETRY FAILED key (see below).
- **ACTIVE**: the item is currently being transferred. Following status is either SENT or FAILED depending on the final status.
- **PENDING**: waiting to be processed.

The queue displays the last 30 remaining SENT items (**First In First Out**). All the SENT items are no longer displayed when the list is up to 30. FAILED items are held in the queue, until an explicit **Delete All Selected** is requested by the user.

Multiple selection of items is possible.

When the transfer status is “sent”, go on the AW 3.1 and verify in the AW 3.1 browser that you received your 3D Acquisition Data.

## 5–7 3D Reconstruction

If the 3D reconstruction autostart mode is OFF then:

1. Select the 3D series of the acquired I.Q. phantom in the browser.
2. Select Adv 3D XR application in the browser application menu
3. Select the START button to start the reconstruction.

The 3D I.Q. phantom exam appears in the 3D XR window with the active status and the percentage of completion.

- ADV 3D XR Version 1.X

Advantage 3D XR – Reconstruction – V: S3D_Bxx.xx.x				
Patient Name	Series	Date and time		State
Patient 1	3	Oct 20 1997	10:23.22	Failed
Patient 1	5	Oct 20 1997	11:04.35	Completed
Patient 2	1	Oct 20 1997	15:21.44	Active 30%
Patient 3	2	Oct 20 1997	16:55.46	Pending
Patient 4	4	Oct 20 1997	18 16.38	Pending
<div> <div>Abort</div> <div>Start</div> </div> <div> <div>Pause</div> <div>Calibration</div> </div> <div> <div>Clear</div> <div>Calib schedule</div> </div> <div> <div>Quit</div> </div>				

- ADV 3D XR Version 2.X

Advantage 3D XR – Reconstruction – V: S3D_Bxx.xx.x					
Patient Name	Series	Date and time		Type	State
Patient 1	3	Oct 20 1997	10:23.22	V	Failed
Patient 1	5	Oct 20 1997	11:04.35	V	Completed
Patient 2	1	Oct 20 1997	15:21.44	V	Active 30%
Patient 3	2	Oct 20 1997	16:55.46	CC	Pending
Patient 4	4	Oct 20 1997	18 16.38	V	Pending
<div> <div>Coils/Clips</div> <div>Start</div> </div> <div> <div>Abort</div> <div>Calibration</div> </div> <div> <div>Pause</div> <div>Calib schedule</div> </div> <div> <div>Clear</div> <div>Quit</div> </div>					

The computation time is between 2 minutes and 15 minutes depending on the hardware/software configuration.

When the reconstruction is over, the status of the exam changes to "completed" and a new series of images appears in the browser. The type of the series is "3D".

If the 3D visualization autostart mode is OFF then:

Double click on the 3D series in the browser to run the 3D visualization application.

Examine the 3D reconstruction and if necessary also the reference 3D I.Q. images.

**Note:** To Install the reference 3D I.Q. images in the browser see the job card IST 003.

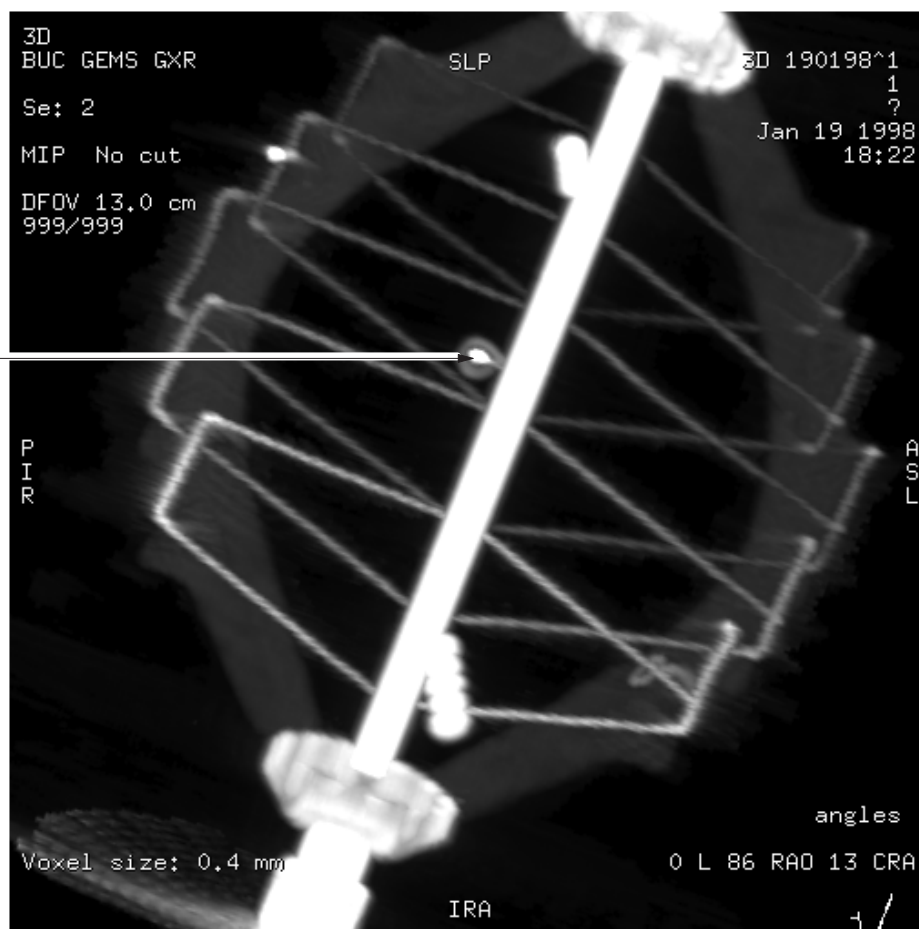
**Note:** In case of ADV 3D XR Version 2.X, the *COILS/CLIPS* button should be:

- Active if the *COILS/CLIPS* option has been installed.
- Inactive if the *COILS/CLIPS* option has not been installed.

## 5-8 3D Assisted Positioning

1. In the 3D view, rotate the volume so that the point is precisely centered in the ring. This will define the gantry angles used for a 3D Image acquisition.  
Verify that the message “UNREACHABLE POSITION” is not displayed at the bottom right of the 3D view.

Illustration 3 –



2. Right click on the 3D view and select the “send angulation to DLX” option in the menu.

Transfer of angulation done

OK

Click on .

3. Select the 3D Pos button in the "Advanced Processing" Menu on the DLX

Verify that the displayed patient name and acquisition date correspond to these of the original 3D Acquisition.

3D Pos

LAO: 10°  
CRA: 25°  
L: 2°

**John SMITH**  
**25-Apr-1997 15:49**

Send to Positioner

Exit

ADVANCED PROCESSING

☐ Integrated Mask

☐ Integrated Image

☐ Landscape

☐ Max Opacification

Subtraction

Region Stats

Compas

Pixel Shift

3D Pos

Help

Exit

Click on the Send to Positioner button.

**Note:** The angles showed in the picture are an example only!

4. Use the Autopos OPERATOR 0 memory 1 to reach the requested angulation.

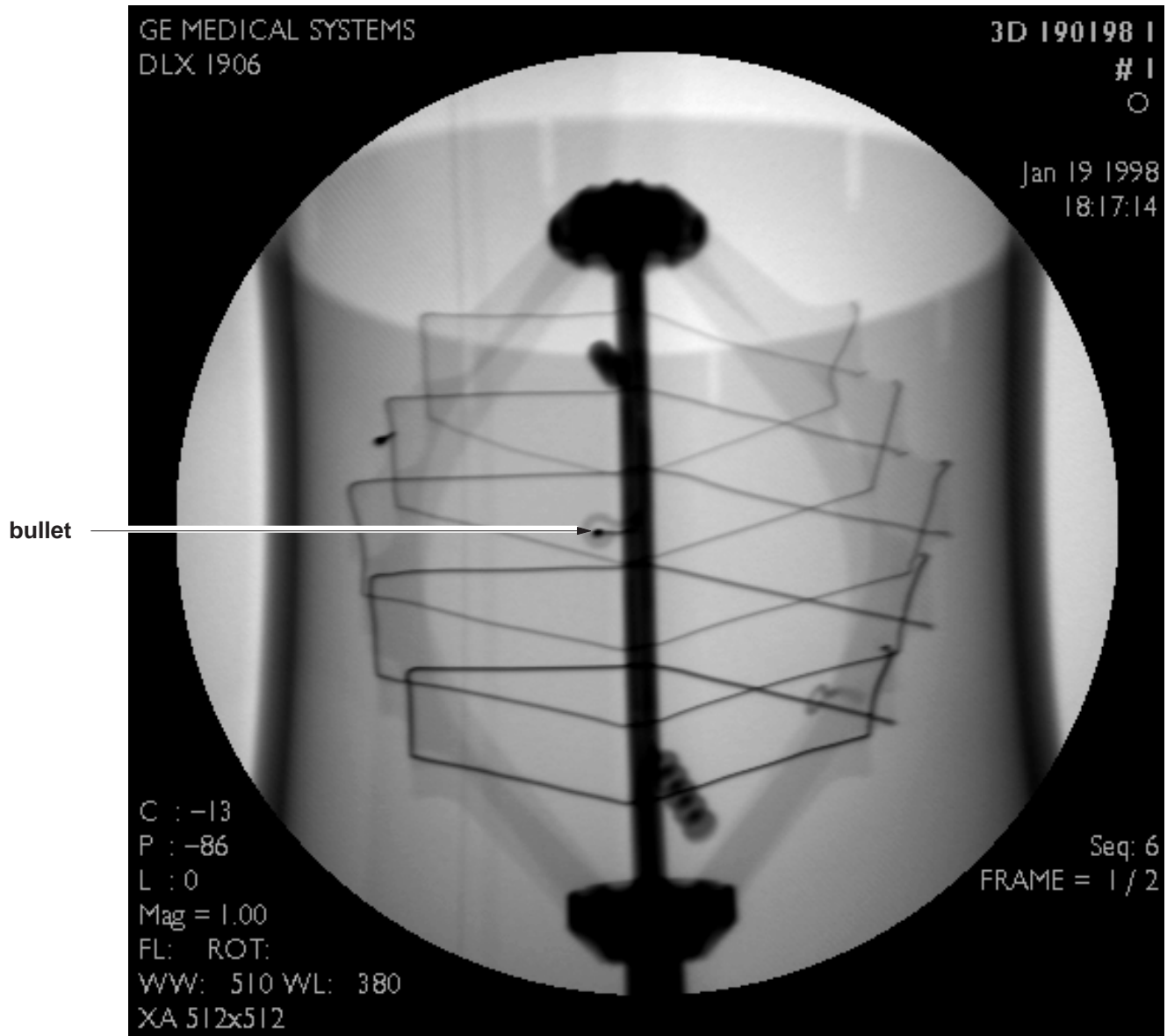
**Note:** The table can be **translated** to avoid collisions.

5. Make a DSA acquisition with the following parameters:

- kV: 60
- mA: 160
- dose: B
- focal spot: 0.6 mm
- matrix : 512
- FOV : 22 cm (9")
- No injection (Auto Inject "OFF")

6. Verify on the DLX picture that the bullet is located inside the external boundaries of the ring.  
(The bullet should be located in the center of the image. If not, translate (LONG, LAT and Vertical the table – DO NOT ROTATE THE TABLE).

Illustration 4 –





**JOB CARD VF 002 – 2D SUBTRACTION QUALITY CHECK**

Time: 2 h – Personnel: 1 field engineer

1 of 2

**1 DESCRIPTION**

This Jobcard allows to verify that the 2D mask to image misregistration (pixel shift) is within specification.

**2 PROCEDURE**

1. Place the Helix phantom on the table and center it as described in Advantx System Operator Manual.

2. Perform a complete 3D acquisition of the phantom.

**Adjusting Acquisition Parameters (Advantx Console)**

- Acquisition Mode: 3D spin patient.
- X-Ray Tube Focal Spot: 0.6 mm.
- Dose: B
- II Field of View 32 cm (12") for LCA+/LCALP+/LCV+/LCN+,  
22 cm (9") for LC+/LCLP+

3. On the DLX, make a subtracted review of the phantom.
4. Select the image with the worst visual misregistration.
5. Using the DLX keypad, cancel the pixel shift in the area of the image where it is the worst. Write down the X and Y values.
6. Calculate the translation value:  $T = \sqrt{X^2 + Y^2}$
7. If there is still a misregistration at the border of the image, cancel and write down the new  $X_1$  and  $Y_1$  values. Calculate  $R = \sqrt{(X_1 - X)^2 + (Y_1 - Y)^2}$
8. If  $T + R$  is greater than 1 pixel (for LCA+/LCALP+/LCV+/LCN+) or 1.4 pixel (for LC+/LCLP+), then refer to Chapter 8 "TROUBLESHOOTING".

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## CHAPTER 6 – IMAGE QUALITY

JOB CARD	DESIGNATION	Page
IQ 001	3D Image Quality Analysis	69

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## JOB CARD IQ 001 – 3D Image Quality Analysis

Time: 1 h – Personnel: 1FE

1 of 6

### 1 SUPPLIES

Not Applicable.

### 2 TOOLS REQUIRED

Not Applicable.

### 3 SAFETY PRECAUTIONS

Not Applicable.

### 4 PREREQUISITES

Not Applicable.

### 5 INJECTION PARAMETERS.

#### 5–1 Injected Volume.

This is the total amount of injected contrast medium expressed in milliliters. The value can be programmed on the injector. **The exact quantity injected is given by the injector when injection is complete.**

#### 5–2 Injection Rate.

This is the quantity of contrast medium injected per time unit expressed in milliliters per second. **The minimum rate for a 3D Spin Acquisition is around 2.5 ml/sec.**

#### 5–3 Injection Duration.

This is the length of time during which contrast medium is injected. **Injection time should be:**

- **5 seconds for a 3D Spin Acquisition at the speed of 40° per second (on LC+, LCV+, LCN+, LCLP+).**
- **6 seconds for a 3D Spin Acquisition at the speed of 35° per second (on LCA+/LCALP+).**

#### 5–4 Programming Injection.

Two of the three parameters above will be programmed on the injector; the third is calculated by the instrument using the following formula:

$$\text{Injection Duration} = \frac{\text{Injected Volume}}{\text{Rate}}$$

You should check that none of the parameters are below the minimum values required for acquisition.

## 5–5 Inject to First Image Delay.

This is the delay required for the contrast medium to propagate so that vessel opacification is acceptable from the first image in the sequence. The delay (on average 1.5 seconds for a carotid injection) depends on the patient, the exact position of the catheter, the rise time programmed on the injector, etc. If a 2D sequence was acquired before the 3D Spin, you are advised to check the delay on the 2D sequence.

## 5–6 Injection Rise Time.

This is the time that the injector will take to reach the nominal rate, and is generally programmed to less than 0.1 seconds. If it should prove necessary to program a longer time, this should be taken into account when calculating the Inject–First Image Delay.

# 6 ANALYSING 2D SPIN IMAGES.

The quality of 3D images naturally depends on the quality of the 2D sequence images used for reconstruction. We will analyse the main parameters which are essential for the quality of the reconstructed 3D image.

## 6–1 Vessel opacification.

Proper vessel opacification throughout the opacified image spin acquisition sequence is essential for the final result. Quality criteria (§ 6–1–1 to 6–1–5 in below) can be examined on the DLX by reviewing the subtracted images from the spin sequence.

### 6–1–1 First Opacified Image.

This is the image on which complete opacification of the injected vessel (carotid, vertebral vessel, etc.) and the main distal arteries can be observed. The first opacified image should in theory correspond to the first spin image.

If the first opacified image is later than the third image in the opacified spin sequence, this indicates that injection has taken place too late.

**Cause of fault → Inject to First Image Delay too long.**

If the first spin image features major opacification of the entire vascular network (minor distal arteries visible), this indicates that injection has taken place too early.

**Cause of fault → Inject to First Image Delay too short.**

Here, there is the risk of there being no opacification at the end of the sequence.

### 6–1–2 Last Opacified Image.

This is the image in which the contrast medium no longer opacifies the main injected vessel, and the rest of the network remains visible on the image. This image should be one of the last images in the opacified image sequence, or even occur once the sequence has been completed.

**Cause of fault: → Inject–First Image Delay too short.**

**and/or → Insufficient Injection Time**

### 6–1–3 Number of Opacified Images, Effect on 3D Reconstruction.

The number of opacified images is the number of images between the first and last opacified image in the sequence. Only these images aid 3D reconstruction.

Other images in the sequence (non–opacified or incorrectly opacified images) do not aid 3D reconstruction in any way, and may even reduce its quality. Above five non–opacified images, the 3D reconstruction begins to be significantly affected.

**The quality of the 3D reconstruction decreases when the number of non–opacified images increased.**

### 6–1–4 Vessel Contrast.

Vessel contrast in 2D images is a very important parameter for the quality of the 3D reconstruction.

It is not however simple to evaluate subtracted images through observation alone. It is possible to measure it using the DLX advanced function “Region of Interest Statistics” by comparing the image level on the main vessels with the background levels of the surrounding image.

**Cause of fault:** → **Insufficient contrast medium rate (or concentration).**  
**and/or** → **Presence of parenchyma and/or veins (see § 6–1–5 below).**  
**and/or** → **Incorrect beam quality (filtration, KV, etc.).**

### 6–1–5 Presence of Parenchyma and/or Veins.

The presence of parenchymal or venous time on the second part of the spin sequence may reduce the quality of the 3D reconstruction due to its negative effect on vessel contrast and the addition of undesired opacified elements onto part of the sequence.

**Cause of fault:** → **Injection too early.**  
**and/or** → **Patient hemodynamics.**  
**and/or** → **Contrast medium rate (or concentration) too high**  
**at start of sequence.**

### 6–2 Presence of Glare Areas.

Overexposed areas may affect the quality of the 3D reconstruction in certain cases, either by cutting vessels on 2D images, which causes data loss and may lead to the appearance of artifacts (false stenoses or even false thromboses) on the 3D images, or, if there are large overexposed areas on the periphery, by creating subtraction artifacts which will produce false information in the final result.

**Cause of fault:** → **Patient not properly centered.**  
**and/or** **Contour filters not used or incorrectly adjusted.**  
**and/or** **Equipment incorrectly adjusted (iris adjustment, etc.).**

Contour filters are indispensable in 40 cm fields of view, 30 cm fields of view and also in 22 cm fields of view in many cases. It is recommended that you use them systematically on these field sizes. They may also be useful in 16 cm and 11 cm fields of view for making the edges of the image uniform.

### 6–3 Subtraction Quality.

It is essential that the patient is properly immobilised in order to obtain good quality 3D images. In order to ensure that information added by 2D images during reconstruction is coherent, the patient undergoing the examination must not move throughout the acquisition sequence.

Subtraction quality is a criterion which may be used to estimate patient stability during acquisition. If the slightest movement is made between the acquisition of the mask image and the acquisition of the corresponding opacified image, subtraction artifacts proportional to the distance of the movement will appear. This will cause general blurring and loss of contrast on small vessels in the 3D image.

**Cause of fault:** → **Generally caused by patient movement (use an appropriate restraining device).**

**and/or** → **Incorrect firing positions (review system settings).**

As examples, Illustration 1 and Illustration 2 below represent good and poor subtraction quality respectively.



Illustration 1 –

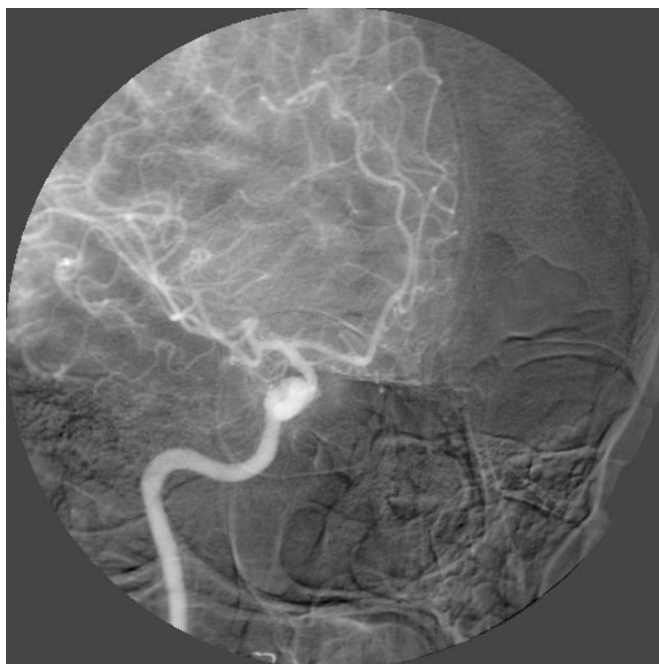


Illustration 2 –



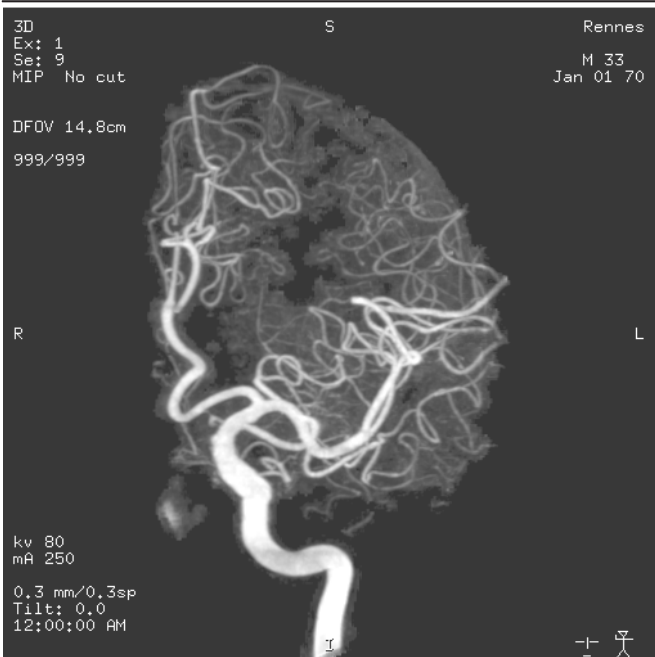


Illustration 3 –

Example of good quality 22-cm field 3D reconstruction, front MIP view, with good vessel contrast and good visibility of small vessels which stand out clearly from the noise.

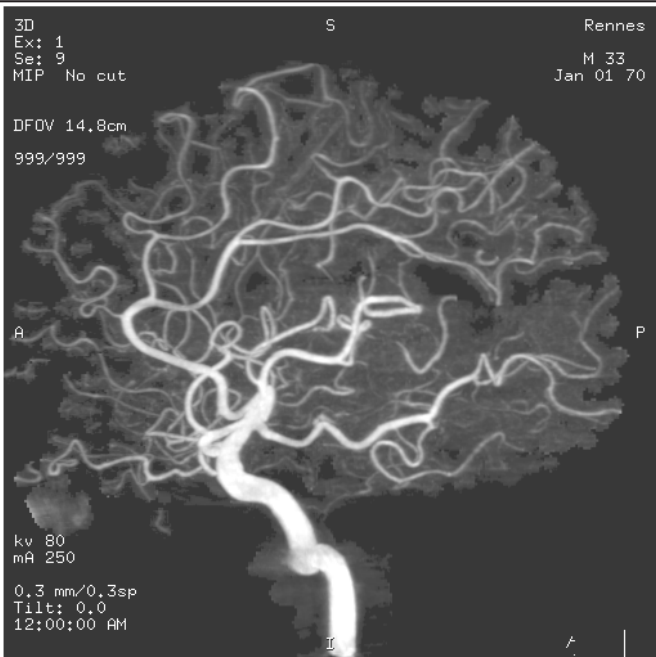


Illustration 4 –

Example of 3D reconstruction, same patient as in Illustration 3, profile MIP view, with good vessel contrast and good visibility of small vessels which stand out clearly from the noise.

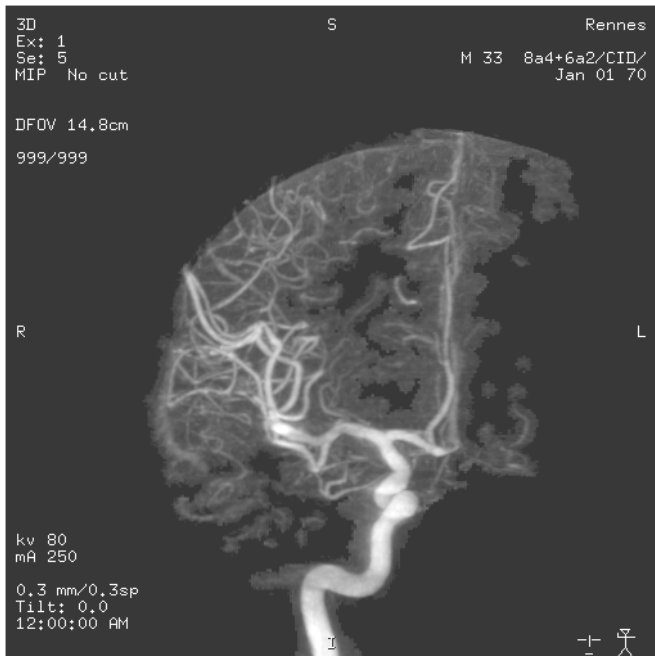


Illustration 5 –

Example of mediocre quality 22-cm field 3D reconstruction, front MIP view, with poor vessel contrast and poor visibility of small vessels which stand out only faintly from the noise.

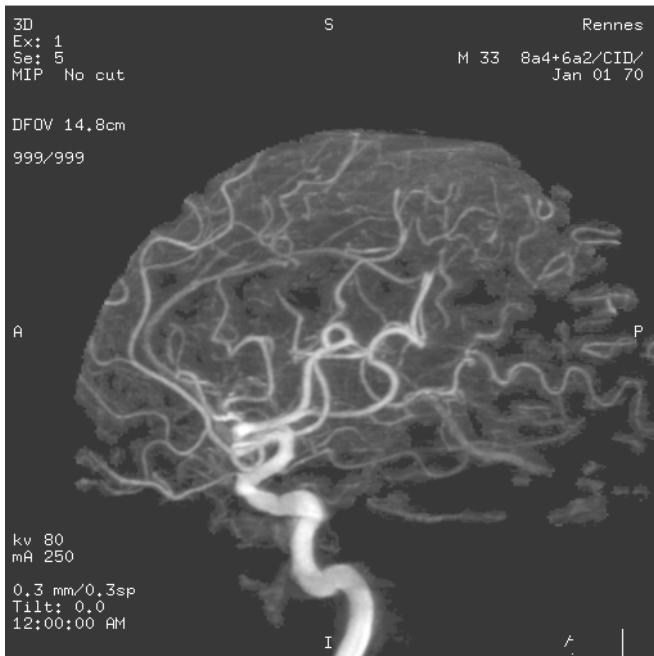


Illustration 6 –

Example of mediocre quality 3D reconstruction, same patient as in Illustration 5, profile MIP view, with poor vessel contrast and poor visibility of small vessels which stand out only faintly from the noise.

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## CHAPTER 7 – UNINSTALL SOFTWARE

JOB CARD	DESIGNATION	Page
UI 001	UNINSTALL SOFTWARE	77

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## JOB CARD UI 001 – UNINSTALL SOFTWARE

Time: 1/2 h – Personnel: 1 field engineer

1 of 2

### 1 UNINSTALLATION PROCEDURE

This procedure uninstalls the 3D XR Software package, or the COILS/CLIPS option (Version 2.X only).

1. Login as *sd*c if not already logged in as *sd*c:

```
console login: sdc [Return]
Password : adw3.1 [Return]
```

**Note:** DO NOT login as “root” to uninstall the software.

2. Open a Command Window from the Service Tools submenu within the Root Menu.
3. Move the arrow inside the window.
4. If this is a final uninstallation, then the calibration database must be deleted: type the following commands: **3dxrdbdelete** <return>  
Type **Y** and <return> to confirm the deletion.
5. Change to the *install* directory by typing:

```
cd /export/home/sdc/install [Return]
```

6. To uninstall the COILS/CLIPS option only (Version 2.X), run the following script:

```
./uninstall. spin3dcoil [Return]
```

To uninstall the complete 3D XR package, run the following script:

```
./uninstall. spin3d [Return]
```

```
Setting defaults environ. parameters
Application not declared
Application not declared
Removing 3D XR package
3D XR package removed
```

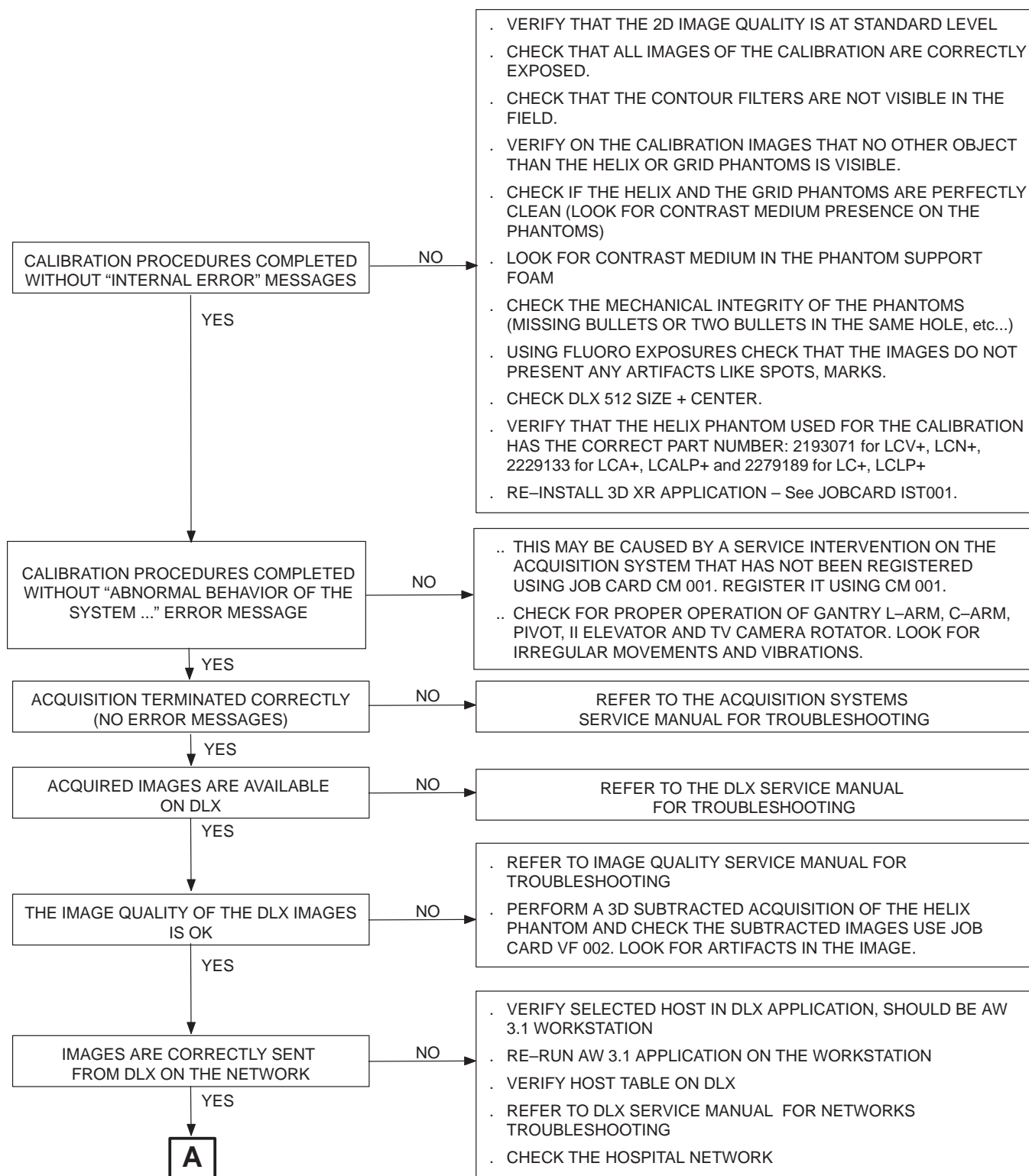
If applicable proceed to Voxtool and/or Navigator uninstallation. Refer to Voxtool and/or Navigator Service Manual.

7. Logout and login as *sd*c again to validate uninstallation.

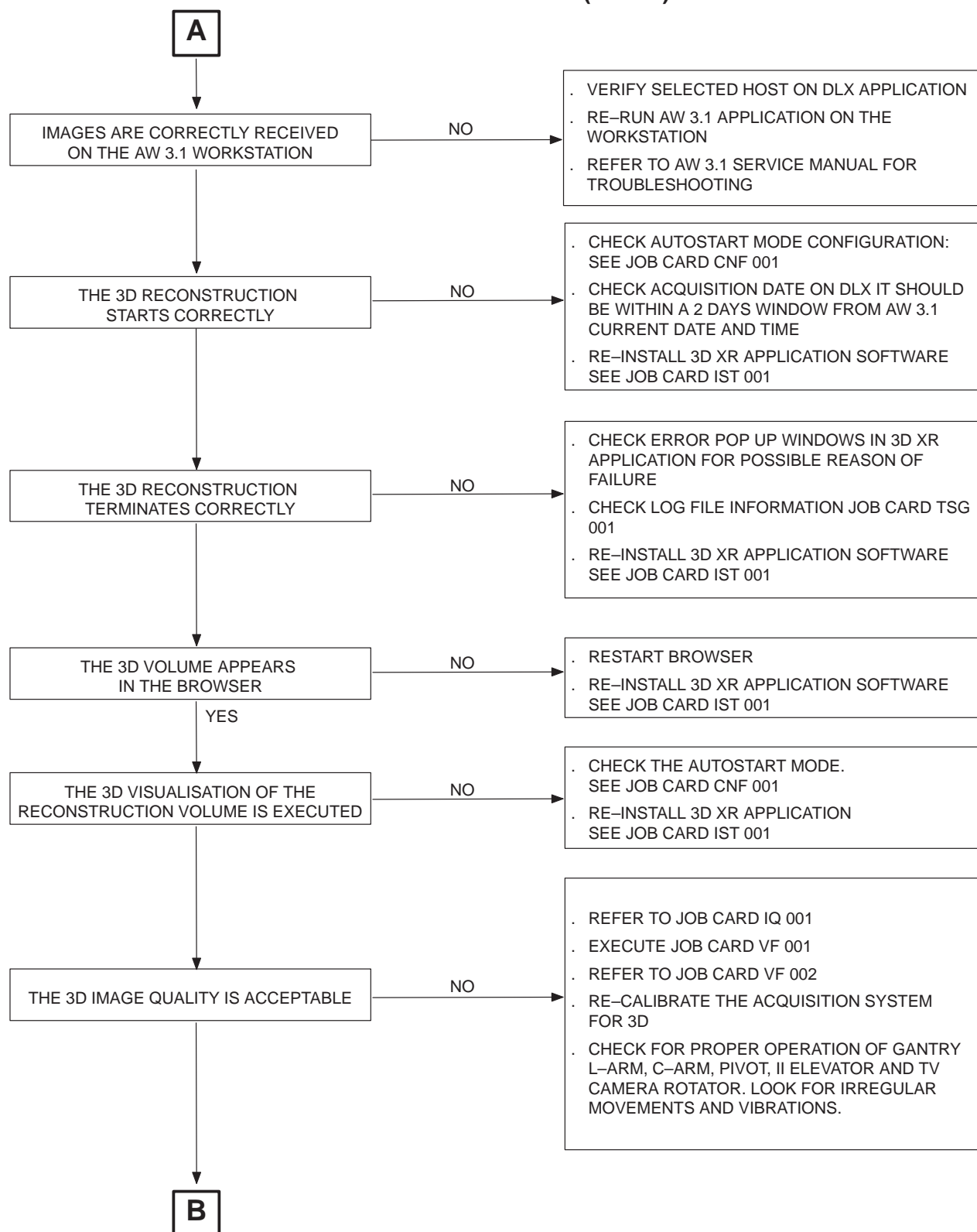
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## CHAPTER 8 – TROUBLESHOOTING

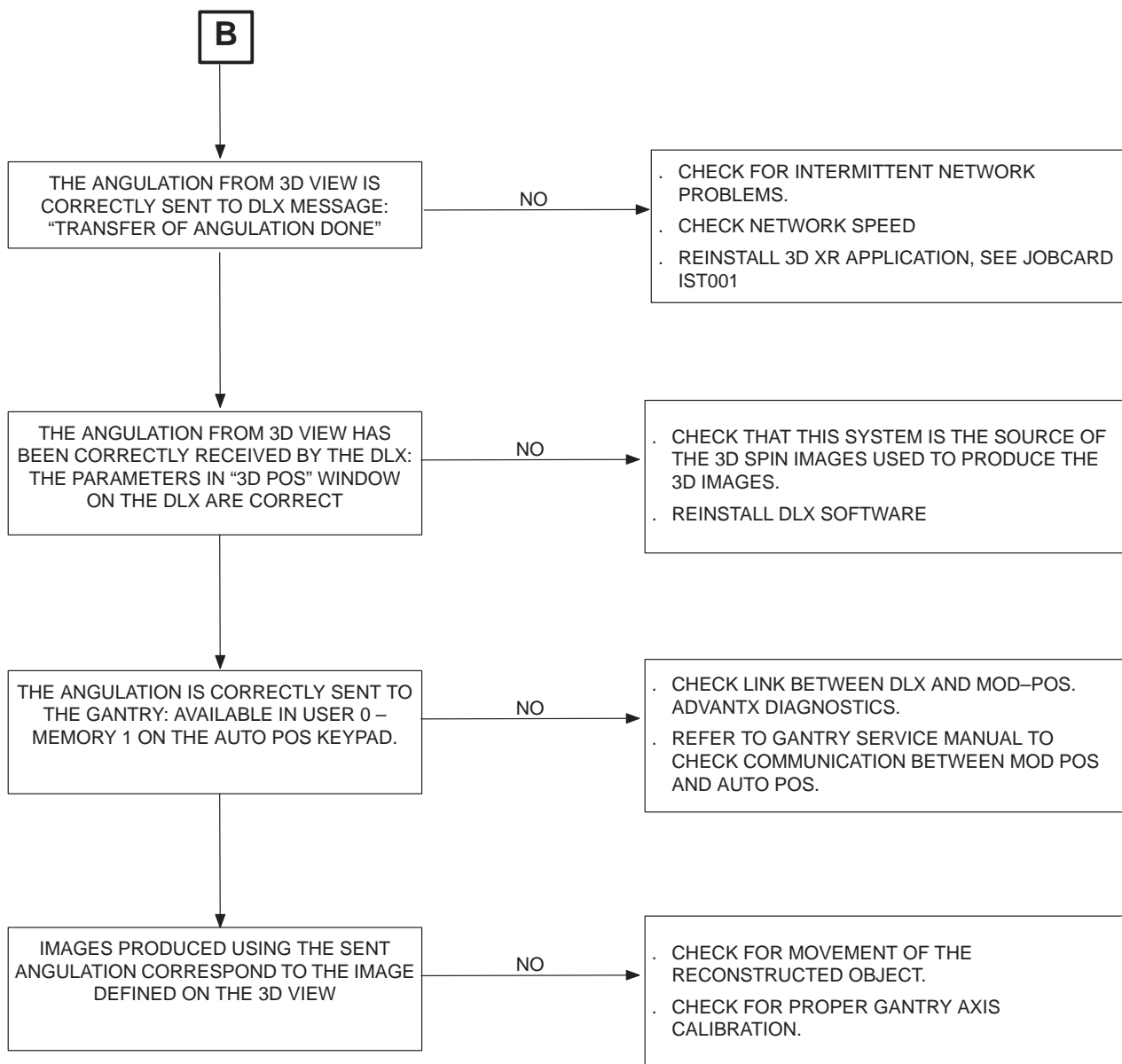


## TROUBLESHOOTING (Cont'd)





## TROUBLESHOOTING (Cont'd)



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## JOB CARD TSG 001 – LOG FILES INFORMATION

Personnel: 1 field engineer

1 of 5

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Logfiles for Advantage 3D XR application (in directory /export/home/sdc/logfiles) :

- Spin3D.log                      Logs Adv. 3D XR main application
- Spin3DCalib.log                Logs of calibration controller
- Spin3DRecon.log               Logs of reconstruction controller

**Note:** To read compressed log files, use the following commands:

```
. uncompress < log file name.Z >  
. more < log file name >
```

## Advantx Error Codes:

ERROR CODE	English Text on Console	English Text on Inroom monitor	Debug Text on AdvantX Console	Context
6754	Too many images missing. May degrade 3D images	MISSING IMAGES	NUMBER OF ACQUIRED IMAGES IS BELOW EXPECTATIONS	In 3D application/patient, when more than 5 images have been lost during acquisitions (if this acquisition has started (dyn) and even if it was aborted), this message is displayed at prep/release (this is just a warning)
6754				
6754				
6754				
6754				
6754				
6755	Missing Images, repeat the last acquisition	REPEAT ACQUISITION	ONE OR MORE IMAGES HAVE BEEN LOST	In 3D application/calibration, when at least one image have been lost during acquisition (if this acquisition has started (dyn) and even if it was aborted), this message is displayed at prep/release: the sequence sequence is not validated(images not sent)
6756	Select full FOV for helix acquisition	SELECT FULL FOV	SELECTED FOV IS INCOMPATIBLE WITH CURRENT CAL SEQUENCE	In 3D application/calibration, helix sequence selected, if the current FOV (that can be selected by MAG button on TSSC) is not full field, this message is disp at prep/depress and the acquisition can't start. Correct by selecting full field with MAG 0.
6757	Calibration completed	CALIBRATION COMPLETED	NO CAL SEQUENCE SELECTED (ALL DONE)	In 3D application/calibration, when all sequences have been done, this message is displayed at prep/depress and the acquisition can't start. Correct by selecting a sequence (helix or grid)
6758	Calibration aborted, redo all calibrations	REDO ALL CALIBRATIONS	RE-DO CALIBRATION: START WITH HELIX	In 3D calibration, when helix is depressed (while already acquired) or at prep/depress when table has moved between two sequences or still at prep when calibration time is over (30 min timeout), this message is displayed.
6758				
6758				

## JOB CARD TSG 001 – LOG FILES INFORMATION

3 of 5

ERROR CODE	Recommended action for doctors	Recommended action for service
6754	If heat units reached (specific message), wait until tube cools down and can do the run.	If DLX dis is almost full and image compression bad (image too noisy), the DLX might run out of disk space during the run.
6754	If the expose hand switch was released (even for a short time) during the acquisition : redo the acquisition	Missing sync from SMA : can be a bad encoder on pivot axis
6754	If heat units reached (specific message), wait until tube cools down and can do the run. If the expose hand switch was released (even for a short time) during the acquisition : redo the acquisition	False collision detected during acquisition : check for collision error in erlog. If some occurred during the 3D run, and user tells there was no real collision, fix collision detection system.
6754	If heat units reached (specific message), wait until tube cools down and can do the run. If the expose hand switch was released (even for a short time) during the acquisition : redo the acquisition	
6754	Acquisition has been stopped by emergency stop or collision : redo the acquisition	
6754	If the advantx console is used during the acquisition (e.g; switching from summary screen to fluoro screen), about 2 images are lost. If this is done 2 or 3 times, we may lose too many images.	
6755	See error 6754 (but this one can occur more often)	See error 6754 (but this one can occur more often)
6756	reselect the mag 0.	Not a failure. Normal operation. Reselect mag0
6757	Normal operation. This prevents redoing unwanted calibration acquisitions after all calibration acquisitions have been done. Redoing a grid or the helix is possible, but requires the associated button to be selected on the console.	Normal operation. This prevents redoing unwanted calibration acquisitions after all calibration acquisitions have been done. Redoing a grid or the helix is possible, but requires the associated button to be selected on the console.
6758	The Helix button has been reselected. redo full calibration	The Helix button has been reselected. redo full calibration
6758	Table has moved. redo full calibration	Table has moved. redo full calibration
6758	30mn timeout has expired. Redo the calibration	30mn timeout has expired. Redo the calibration

ERROR CODE	English Text on Console	English Text on Inroom monitor	Debug Text on AdvantX Console	Context
6759	Try again or call service	TRY AGAIN OR CALL SERVICE	POS INTERLOCK (TABLE MOTION): NO ANSWER	In 3D application/calibration, at prep/depress, when pos didn't answer to table position status request before timeout (10s) this message is displayed.
6760	Helix Calibration	Helix Calibration	Helix calibration	In 3D helix is selected. Disappear at prep on
6761	Grid Calibration	Grid Calibration	Grid Calibration	In 3D, grid is selected. Disappear at prep on
6762	Camera temperature not yet stabilized, 3D calibration degraded	3D CALIBRATION DEGRADED	ASC: NOT ENOUGH TIME SINCE LAST BOOT. CAMERA MAY BE TOO COLD	If the system warm start has been on for less than an hour, the calibration acquisition is not relevant. At prep time
6762				
6763	less than 1 hour since system on, 3D image quality may be degraded	3D images may be degraded	ASC : Not enough time since last boot. Camera may be too cold	If the system warm start has been on for less than an hour, the patient acquisition should be enabled. At prep time, an error message
6763				
4B09	Autopos position not reached	POSITION NOT REACHED	POS : AUTOPOS SEQUENCE WAS NOT COMPLETED	The user releases the Autopos keys before the completion of the Autopos sequence
4B0A	Autopos position unreachable	UNREACHABLE POSITION	POS : AUTOPOS SEQUENCE CAN NOT BE REACHED	The requested Autoposition can not be reached (Outside max limits. Need info from LA)
4B0B	3D Calibration Test in progress	3D CALIB TEST IN PROGRESS	POS : 3D CALIBRATION TEST IN PROGRESS	Test Run in calibration 3D. The message is different to inform the user that he will not have to do the test return again if no motion is detected on the gantry axis
4B0C	Ready to perform the 3D Calibration Test	READY FOR 3D CALIB TEST	POS : READY TO PERFORM THE 3D CALIBRATION TEST	Message displayed at the beginning of the calibration phase, or every time the positioner has lost its "Ready State"
4418	3D not possible on restored patients, create a new patient	CREATE A NEW PATIENT	DLX: PATIENT UID DIFFERENT FROM DLX ID	At prep time, if the patient UID (DLX ID) is different from DLX ID for any 3D type sequences (for the acquisition patient)
6766	Camera temperature not yet stabilized, 3D calibration not recommended	3D CALIB NOT RECOMMENDED	ASC: NOT ENOUGH TIME SINCE LAST BOOT. CAMERA MAY BE TOO COLD	User pushes Cal button in technical summary screen less than one hour after warm on (or cold start)

## JOB CARD TSG 001 – LOG FILES INFORMATION

5 of 5

ERROR CODE	Recommended action for doctors	Recommended action for service
6759	Generic message. Call service if this problem occurs several times	Can occur specifically because of 3D (i.e. only when 3D functions are used) if there is communication problems between positioner and positioner module. Check communication : CPU/BIU & VASC IO board in positioner module. and the CPU board in pos rack.
6760	Normal operation, Information message	Normal operation, Information message
6761	Normal operation, Information message	Normal operation, Information message
6762	The 6762 message is logged. The calibration may be bad, resulting in bad 3D IQ and/or CFM reported an error. This log tells that the calibration has been done before camera temperature was stabilized.	If this is a user complaint : Check errorlog. The 6762 message is logged. If the calibration is bad, this log tells that the calibration has been done before camera temperature is stabilized.
6762		If the system has been rebooted without being turned off or switched to service mode, it was out of application for less than 1 minute. The camera temperature is still compatible with 3D calibration after a few minutes. In this case ignore the message.
6763	The 6763 message is logged. The acquisition may be bad, resulting in bad 3D IQ. This log tells that the acquisition has been done before camera temperature was stabilized.	Check errorlog. The 6763 message is logged. The acquisition may be bad, resulting in bad 3D IQ. This log tells that the acquisition has been done before camera temperature was stabilized.
6763		If the system has been rebooted without being turned off or switched to service mode, it was out of application for less than 1 minute. The camera temperature is still compatible with 3D acquisition after a few minutes. In this case ignore the message.
4B09	Normal operation. Clear collision if any (e.g. move the table). Press the move button again.	
4B0A	Normal for compass or 3D pos operation. Use less extreme angles or, if this angulation is critical, try moving the patient head.	
4B0B	Normal operation, Information message	Normal operation, Information message
4B0C	Normal operation, Information message	Normal operation, Information message
4418	Normal operation, Information message	Normal operation, Information message
6766	Normal warning Message.	Normal warning Message.

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## CHAPTER 9 – ERROR MESSAGES AND RECOMMENDATIONS

### 1 RECONSTRUCTION MESSAGE LIST

No.	Message text	Possible cause
R 1	Series No.1: This series is not a 3D ACQ.	Manual running of 3D reconstruction on an inappropriate image series (2D standard angio images, grid or helix image series, etc.).
R 2	Series No. 1: Unable to process this series. Please call Service.	One or more fields in the series heading have an incorrect value.
R 3	Series No. 1: Unable to process this series, there is not enough usable images.	The number of valid (mask and opacified) image pairs is below the minimum requirement of 40 to carry out proper 3D reconstruction.
R 4	Series No. 1: Unable to process this series, no calibration in field of view.	Calibration data required for 3D reconstruction are not available, i.e., * The FOV corresponding to the series to be reconstructed has not been calibrated. * The calibration is not recent enough.
R 5	Series No. 1: Unable to process this series, this system is not calibrated.	Calibration data required for 3D reconstruction are not available, i.e., * No calibration has been performed for this room. * The calibration data have been lost, e.g., installation of more than four rooms.
R 6	Series No. 1: Unable to process this series, no valid calibration data available.	Calibration data required for 3D reconstruction are not available, i.e., * The acquisition date for this series is more than seven days from the nearest date for available calibrations.
R 7	Series No. 1: Unable to process this series, a reconstruction already exists.	This series has already been reconstructed, it is available in the database.
R 8	Series No. 1: Internal error during the processing, try again.	Processing error due to a lack of resources (memory, etc.), you may succeed if you try again.
R 9	Series No. 1: Internal error during the processing. 3D reconstruction impossible.	Unrecoverable processing error due to an inconsistency in the data acquired.
R 10	Series No. 1: Do you really want to abort the 3D reconstruction?	Confirmation request for user-requested cancellation of reconstruction processing.
R 11	Series No. 1: The queue is not empty, do you really want to quit?	User action on "Quit" button when processing is not complete. Possible actions: * Confirm stoppage of processing in progress by clicking "OK". * Wait for the processing in progress to finish by clicking "Cancel".
R 12	This series is already in the queue.	User request to process a series which is already in the 3D reconstruction queue.
R 13	Series No. 1: Unable to process this series, disks are full.	There is not enough disk space available to perform a 3D reconstruction. Free disk space (e.g., by archiving and deleting archived data) then restart the process.

No.	Message text	Possible cause
R 14	Unable to process a multi selection. Please do single selection.	Attempt to run a calibration after selecting several series from the AW Browser. Series must be selected and launched one by one.
R 15	Series No. 1: No vessels reconstruction available. Start a vessels reconstruction first, then a coils/clips reconstruction afterwards.	There is no vessels XA volume of this series in the examination, nor in the reconstruction queue. Run the vessels reconstruction
R 16	Series No 1: The existing vessels reconstruction is not compatible with current software. Delete the vessels reconstruction in the browser and start it again. Then start a coils/clips reconstruction afterwards.	Delete the vessels reconstruction and launch it again. Launch coils/clips reconstruction afterwards.
R 17	Series No 1 : No coils/clips reconstructed.	No coils and clips have been found in this series. Coils/clips reconstruction cannot be performed.
R 18	Series No 1 : The selection does not correspond to a vessels reconstruction.	The selected job corresponds to a coils/clips reconstruction, not to a vessels reconstruction.
R 19	Series No 1 : Unable to process this selection: the 2D series is no longer available.	The 2D series (of type 3D ACQ) has been deleted by the user.

## 2 CALIBRATION MESSAGE LIST

No.	Message text	Possible cause
C 1	Series No. 1: Internal error during the processing, try again.	Processing error due to a lack of resources (memory, etc.), you may succeed if you try again. Check Log File.
C 2	Series No. 1: Internal error during the processing.	Unrecoverable processing error due to an inconsistency in the data acquired. Perform another calibration acquisition. Check Log Files : TSG001 and use Troubleshooting Chapter 8.
C 3	Series No. 1: This series is not a 3D calibration spin.	Manual running of 3D reconstruction on an inappropriate image series (2D standard angio images, 3D ACQ type image series, etc.).
C 4	Series No. 1: Unable to process this series. Please call Service.	One or more fields in the series (DICOM Header) have an incorrect value. Check Log file: TSG001.
C 5	Series No. 1: Unable to process this series, there is not the right number of images.	The number of images in the series differs from the number required for calibration (44 images).
C 6	Unable to process a multi selection. Please do single selection.	Attempt to run a calibration after selecting several series from the AW Browser. Series must be selected and launched one by one.
C 7	Series No. 1: This series has already been processed.	This series has already been processed and the calibration data are available in the database.
C 8	Series No. 1: This series is already in the queue.	Manual running of a 3D calibration on an image series which is already in the calibration processing queue.
C 9	Not Used.	
C 10	Processing is not yet completed. Do you really want to stop it?	Confirmation request for cancellation of processing in progress caused by a user request to quit the application.
C 11	No valid calibration available. 3D reconstructions are impossible.	The user has tried to consult the calibration schedule when the calibration database is empty. 3D reconstructions will not be possible until a calibration has been performed.
C 12	No disk space to store calibration processing results.	There is not enough disk space available to perform a calibration. Free disk space (e.g., by archiving and deleting archived data) then restart the process.
C 13	Abnormal behavior of the system. Please call Service.	An instability in the acquisition system has been detected. This may be caused by a Service Intervention on the Acquisition System that has not been registered using Job Card CM 001. See Troubleshooting Chapter 8.
C 14	This room name is already used. Modification will be discarded.	Attempt to name an acquisition room with a name already used for another room. Enter another name for one of them.
C 15	Not used.	

### 3 3D–ASSISTED POSITIONING MESSAGES

No.	Message text	Possible cause.
<b>P 1</b>	Invalid destination host.	The IP number of the destination DLX is incorrect. Check the DLX Host Table.
<b>P 2</b>	Transfer of angulation failed. Try sending again or reach this angulation manually.	The transfer of the angulation to the DLX failed (due to Network error or hardware failure...) Try sending again. If the problem persists, copy the angles on the AW screen and move manually the positioner to this angulation.
<b>P 3</b>	Activate “Machine” or “Anatomical” mode before sending angles.	Attempt to send angles to the DLX when the angle display mode is deactivated. Reactivate one of the display modes before resending the angles.
<b>P 4</b>	Transfer of angulation done.	The angles were transferred to the DLX normally.
<b>P 5</b>	The cranial or caudal angulation is greater than the gantry can attain. Do you want to send it anyway?	Attempt to send angles to the DLX that the gantry will probably not be able to reach. Try to find another angulation by positioning the model differently.

## **CHAPTER 10 – RENEWAL PARTS**

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ABBREVIATIONS

ITEM NO.
–
– 6

Not illustrated.  
Item No. 6 not illustrated.

FRU
1
2
N

Field Replaceable Unit.  
Critical.  
Not critical.  
Not available.

REP
Y

Repairable.

QTY
PL
AR

Previously listed as an assembly or subassembly.  
As required.

APP

Applies to.



Viewing direction.



Renewal Parts

APPLICABILITY	
blank	
A	
B	
C	

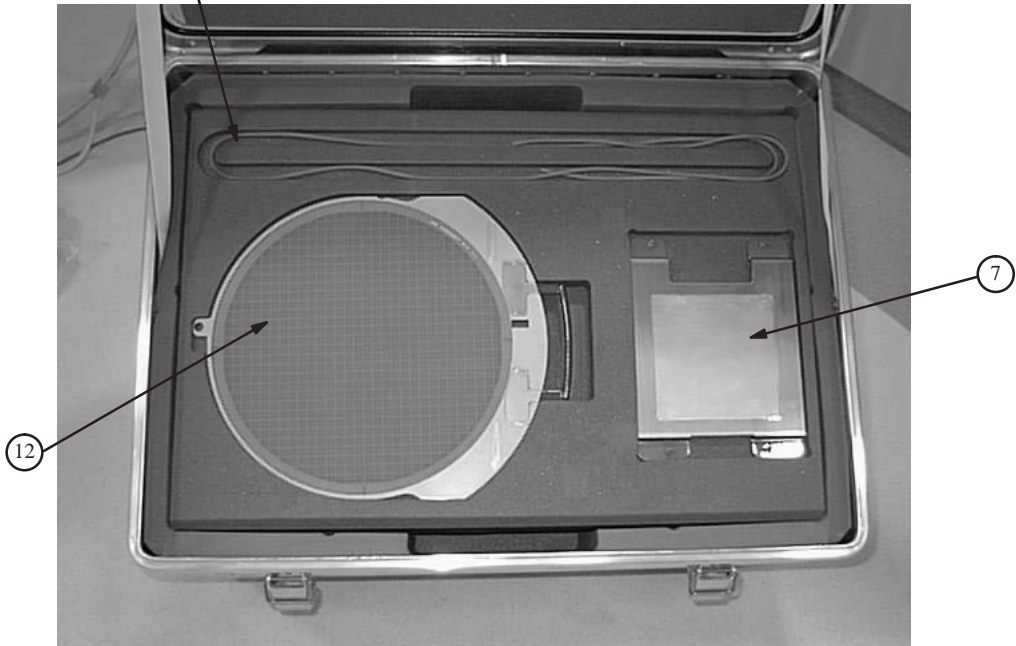
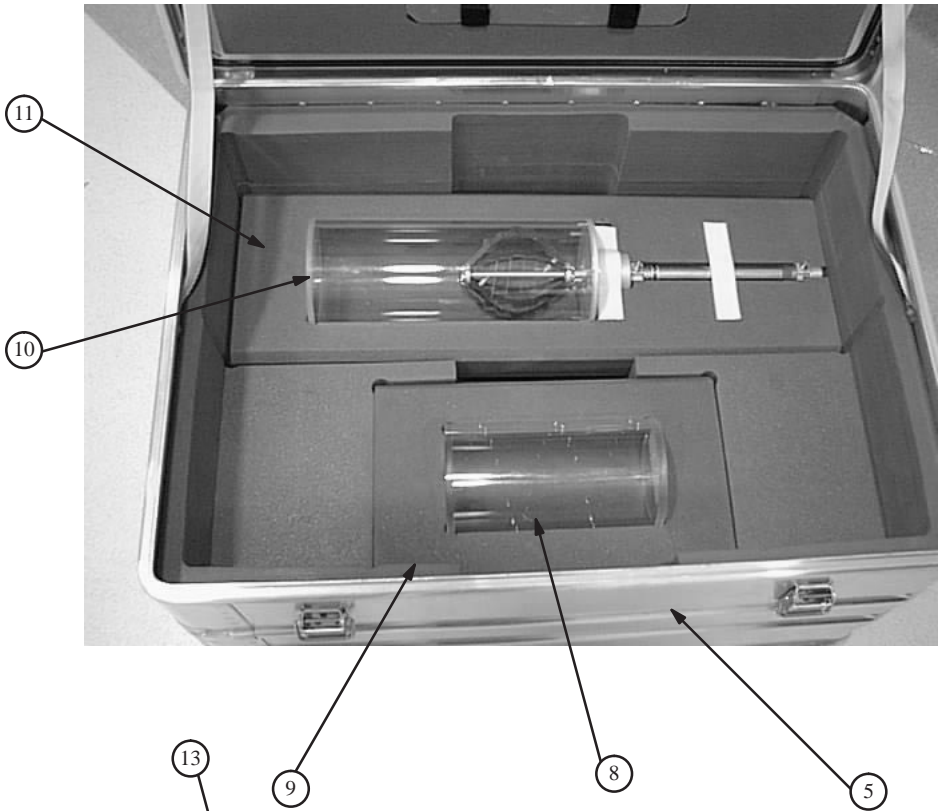




ILLUSTRATION 1  
3D XR FRU LIST

ITEM NO.	PART NO.	FRU	REP	DESCRIPTION	QTY	APP
				1 2 3 4 5		
– 1	2196952	N		• 3D XR SOFTWARE PACKAGE (V 1.X)	1	
– 2	2208803	1		• • 3D XR SOFTWARE BACKUP SET (CDROM)	1	
– 3	2183833–3	1		• • SOFTWARE PROTECTION KEY DISKETTE	1	
– 4	2196952–2	N		• 3D XR SOFTWARE PACKAGE (V 2.X)	1	
– 5	2261193	1		• • 3D XR SOFTWARE BACKUP SET (CDROM)	1	
– 6	2183833–3	1		• • SOFTWARE PROTECTION KEY DISKETTE	1	
– 7	2193069	N		• 3D ACQUISITION OPTION FOR LCV+, LCN+	1	
8	2193070	N		• • SUITCASE EQUIPPED FOR II 32 CM 3D OPTION	1	
– 9	2193076	N		• • • SUITCASE FOR II 32 CM 3D OPTION	1	
10	2207691	N		• • • STEEL FILTER	1	
11	2193071	1		• • • HELIX FOR II 32 CM	1	
12	2193077	1		• • • • FOAM HOLDER FOR 32 CM HELIX	1	
13	2193073	2		• • • TEST PHANTOM FOR 3D	1	
14	2193087	2		• • • • FOAM HOLDER FOR 3D TEST PHANTOM	1	
15	2193072	1		• • • CALIBRATION GRID FOR II 32 CM	1	
16	2208939	N		• • •RP LATEX PIPE	1	
– 17	2204313–100	2		• 3D XR SERVICE MANUAL (V 1.X & V 2.X)	1	
– 18	2201875–100	2		• 3D XR OPERATOR MANUAL (V 1.X) (ENGLISH)	1	
– 19	2201875–101	2		• 3D XR OPERATOR MANUAL (V 1.X) (FRENCH)	1	
– 20	2201875–106	2		• 3D XR OPERATOR MANUAL (V 1.X) (SPANISH)	1	
– 21	2201875–108	2		• 3D XR OPERATOR MANUAL (V 1.X) (GERMAN)	1	
– 22	2201875–111	2		• 3D XR OPERATOR MANUAL (V 1.X) (ITALIAN)	1	
– 23	2201875–127	2		• 3D XR OPERATOR MANUAL (V 1.X) (PORTUGUESE)	1	
– 24	2201875–140	2		• 3D XR OPERATOR MANUAL (V 1.X) (JAPANESE)	1	

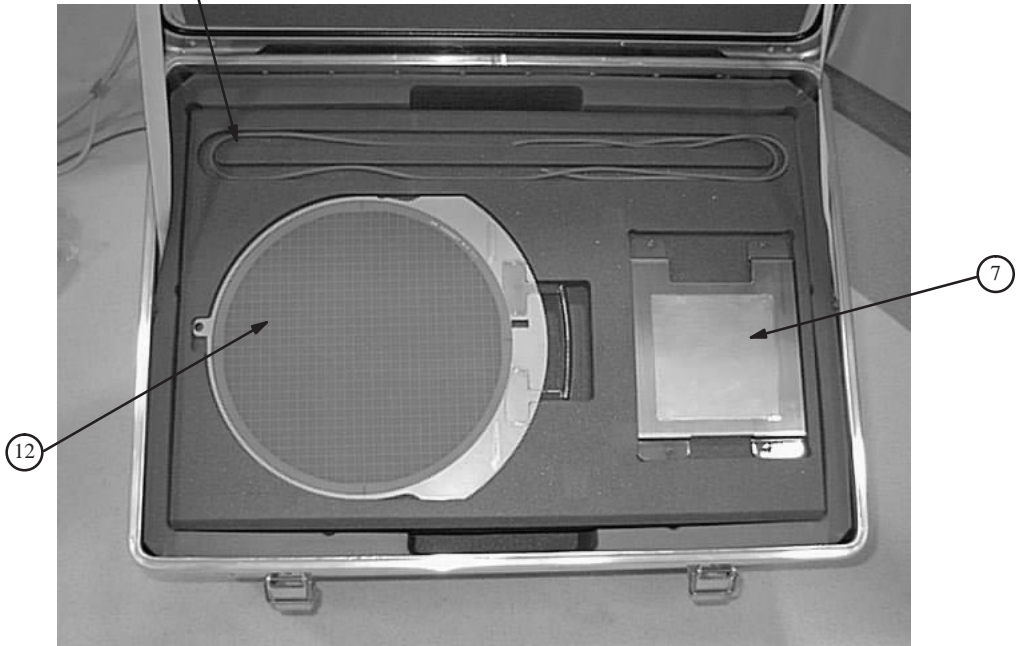
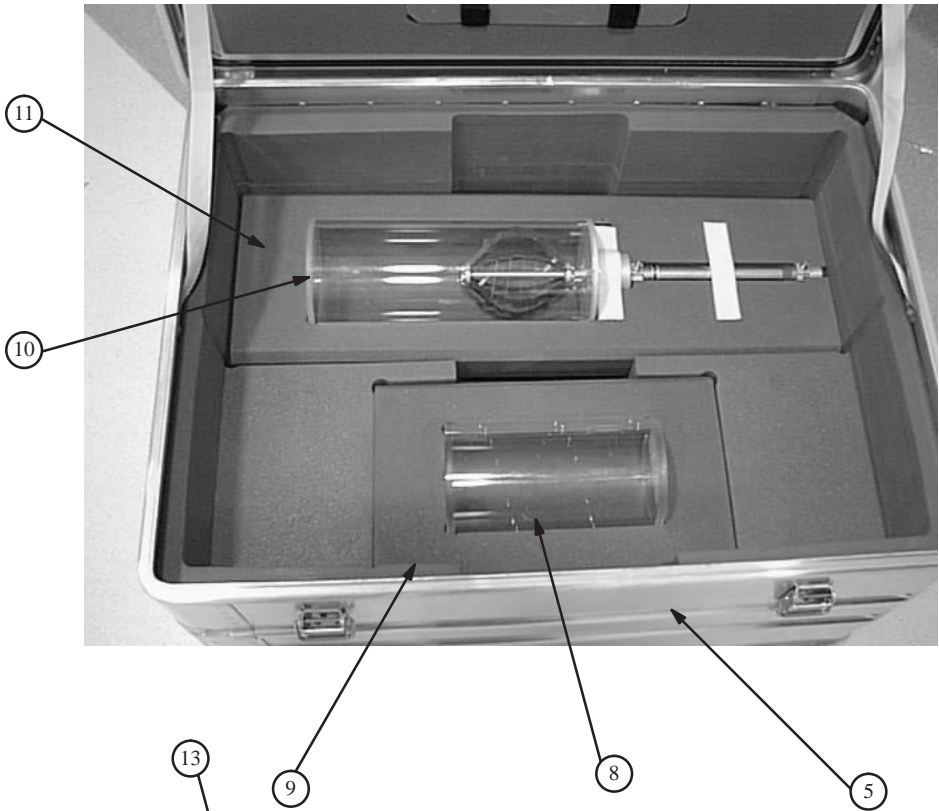


ILLUSTRATION 1  
3D XR FRU LIST (CONTINUED)

ITEM NO.	PART NO.	FRU	REP	DESCRIPTION	QTY	A P P
				1 2 3 4 5		
– 25	2259902–100	2		• 3D XR OPERATOR MANUAL (V 2.X) (ENGLISH)	1	
– 26	2259902–101	2		• 3D XR OPERATOR MANUAL (V 2.X) (FRENCH)	1	
– 27	2259902–106	2		• 3D XR OPERATOR MANUAL (V 2.X) (SPANISH)	1	
– 28	2259902–108	2		• 3D XR OPERATOR MANUAL (V 2.X) (GERMAN)	1	
– 29	2259902–111	2		• 3D XR OPERATOR MANUAL (V 2.X) (ITALIAN)	1	
– 30	2259902–127	2		• 3D XR OPERATOR MANUAL (V 2.X) (PORTUGUESE)	1	
– 31	2259902–140	2		• 3D XR OPERATOR MANUAL (V 2.X) (JAPANESE)	1	
– 32	2231061	N		• 3D ACQUISITION OPTION FOR LCA+, LCALP+	1	
– 33	2229131	N		• • SUITCASE EQUIPPED FOR II 40 CM 3D OPTION	1	
– 34	2229132	N		• • • SUITCASE FOR II 40 CM 3D OPTION	1	
– 35	2207691	N		• • • STEEL FILTER	1	
– 36	2229133	1		• • • HELIX FOR II 40 CM	1	
– 37	2229136	1		• • • • FOAM HOLDER FOR 40 CM HELIX	1	
– 38	2193073	2		• • • TEST PHANTOM FOR 3D	1	
– 39	2193087	2		• • • • FOAM HOLDER FOR 3D TEST PHANTOM	1	
– 40	2193092	1		• • • CALIBRATION GRID FOR II 40 CM	1	
– 41	2207660	N		• • • RP LATEX PIPE	2	
–			•	• •		
– 42	2280327	N		• 3D ACQUISITION OPTION FOR LC+, LCLP+	1	
– 43	2276871	N		• • SUITCASE EQUIPPED FOR II 22 CM 3D OPTION	1	
– 44	2276869	N		• • • SUITCASE FOR II 22 CM 3D OPTION	1	
– 45	2193073	2		• • • TEST PHANTOM FOR 3D	1	
– 46	2193087	2		• • • • FOAM HOLDER FOR 3D TEST PHANTOM	1	
– 47	2207691	1		• • • • FILTRE EP= 1MM (SUPPORT)		
– 48	2279189	1		• • • CALIBRATION GRID KIT FOR II 22 CM	1	
– 49	2279190	1		• • • HELIX PHANTOM	1	
– 50	2207660	N		• • • RP LATEX PIPE	2	

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**REVISION HISTORY**

REV	DATE	REASON FOR CHANGE	PAGES
0	13–Mar–1998	Initial release	110
1	10–june–1998	Made various changes to text for accuracy and usability.	110
2	03–July–1998	Made various changes to text for accuracy and usability. – New VF002 – Logfiles information completed with Advantx error code.	110
3	01–Feb–1999	3D introduction to LCA+	94
4	06–Dec–1999	Made various changes to text for accuracy and usability. Introduction of 3D Evolution Program: Version 2 3D XR.	102
5	18–Sept–2000	Updated for LC+	102
6	15–Feb–2001	Updated for LCALP+ and LCLP+	102

<b>NUMBER</b> 2204313–100TPH	<b>SIZE</b> A4	<b>REVISION</b> 6
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