GE Medical Systems

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Technical Publications

Direction 2216876–100

Revision 8

Revolution™ XQ/i™ System Calibration and Functional Checks

Table of Contents, AWS, Power–Up & Detector

Book 1 of 2

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WARNING

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

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

WARNUNG

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

AVISO

- **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.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO 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.**

AVVERTENZA

- **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.**

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。

REVISION HISTORY

REV	DATE	REASON FOR CHANGE
0	April. 7, 2000	Initial release.
1	May 10, 2000	Changed command in Section 6 of Appendix B.
2	Oct. 5, 2000	Revised Table D–11.
3	Sept.23, 2003	Improved Cal & Config procedure's accuracy and completeness, added process flowcharts for system config/cal/func check and Advantx generator config/cal.
4	Oct. 6, 2003	Improvements to accuracy and completeness: Regulatory Test chapter (Compliance), Incomplete cross references fixed.
5	May 7, 2004	Added material for IP Server (Cotello). Added configuration information for HHP barcode scanner.
6	June 23, 2004	Updated procedures for wallstand conditioner due to new manufacturer (SMC).
7	June 22, 2016	Delete user name and password .
8	July 28, 2016	Updated Rev number in header.

IMPORTANT! . . . X-RAY PROTECTION

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, Medical Systems Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that everyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, Medical Systems Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective material and devices are available. It is urged that such materials or devices be used. United States Federal law restricts this device to use by or on the order of a physician.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing shall be performed by qualified GE Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

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

DAMAGE IN TRANSPORTATION

<u>All packages should be closely examined at time of delivery.</u> If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **<u>before</u>** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14** day period.

Call Traffic and Transportation, Milwaukee, WI (414) 827–3468 / 8*285–3468 **immediately** after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section "S" of the Policy & Procedure Bulletins.

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OVERVIEW

SECTION 1
INTRODUCTION

1-1 General

This manual describes the initial power–up, configuration, calibration and functional check of a Revolution XQ/i system. Chapters ar in the order that that should be followed for initial installation of system. The appendices contain common utilities and additional procedures that are used partially during the initial system installation.

1-2 Software Overview

Normally, all system software is pre–loaded on the system as delivered. If it becomes necessary to re–load any system software, it is also provided with the system on separate CDROM(s). Procedures to load software that software is included in Appendix B, Loading Software, of this manual.

1-3 Cable and Grounding Checks

Before proceeding with the procedures in this manual, verify that all system interconnects and grounds are connected properly and in accordance with the system MIS Map.

SECTION 2
CONFIGURATION, CALIBRATION AND FUNCTIONAL CHECK FLOWCHART

Start of Configuration, Calibration and Functional Check

AWS Workstation Functional Checks:	System Cal. & Func. Chks. Direction, Ch. 1
Configure AWS	Sec. 1, page 1
AWS Network Setup	Sec. 3, page 11
Site Information Configuration	Sec. 4, page 25
CD–R Configuration (SUN Ultra 10 only)	Sec. 5, page 31
Bar Code Reader Configuration	Sec. 6, page 36
AWS Monitor Setup	Sec. 7 & Sec. 8, pages 40 & 43 respectively
DICOM Printer Setup & Calibration	Sec. 9, page 56

AWS Workstation Functional Checks:	System Cal. & Func. Chks. Direction, Ch. 2
User Preferences	Sec. 1, page 67
Network Operational Checks	Sec. 2, page 72
AWS Options Check	Sec. 3, page 72

Advantx Configuration:	System Cal. & Func. Chks. Direction, Ch. 3
C028 – Procedure Edit Config.	Sec. 6-3, page 85
C004 – Tube ’a’ Type Selections *(skip if new installation)*	Sec. 6-4, page 87
C014 – Tube HUR Alarm Config.	Sec. 6-5, page 91
C006 – Function Config.	Sec. 6-6, page 92

Advantx Calibration:	System Cal. & Func. Chks. Direction, Ch. 3
R022 – Generator Function Check XL/XS	Sec. 7-5, page 98
T006 – Tube 1 Warranty *(skip if new installation)*	Sec. 7-7, page 103
X010 – Tube 1 Warmup	Sec. 7-8, page 105
R024 – KV Meter Freq. Response *(skip if new installation)*	Sec. 7-9, page 106
R025 – mA/mAs Calibration *(skip if new installation)*	Sec. 7-10, page 110
R021 – Generator kVp Meter Calibration *(skip if new installation)*	Sec. 7-11, page 112
X011 – Tube Run–in and Stability	Sec. 7-12, page 121
R017 – Line Regulation	Sec. 7-13, page 125
R003 – XL/XS Initial Filament Drive *(skip if new installation)*	Sec. 7-14, page 128
R020 – XL/XS Filament Boost *(skip if new installation)*	Sec. 7-15, page 132
R006 – Tailing Compensation Calibration *(skip if new installation)*	Sec. 7-16, page 136

Regulatory Tests (Collimator):	**System Cal. & Func. Chks. Direction, Ch. 7**
Light to X–ray Field	Sec. 1-2-2, page 219
Light Field Intensity	Sec. 1-2-3, page 219
Center to Center Error	Sec. 1-2-4, page 219
Field Size Indicator	Sec. 1-2-5, page 220
Size to Size	Sec. 1-2-6, page 220

Database Backup	**System Calibration & Functional Checks Direction, Ch. 7, Sec. 2**

End of Calibration and Configuration Flowchart

CHAPTER 1 –ACQUISITION WORKSTATION (AWS) INSTALLATION

For information on the installation of the AWS Workstation (ADS Enclosure, monitor, CD–R Writer, Bar Code Reader, and Advantx console) refer to Chapter 4 of Direction 2219415–100, *Revolution XQ/i System Installation*.

SECTION 1
AWS POWER-UP AND INITIAL CONFIGURATION

1-1 Before You Begin

Ignore various sub–system errors (such as: Image Detector Not Ready), that may occur during configuration of the workstation, because the entire system is not powered up yet.

1-2 Prerequisites

Before starting AWS power–up, verify the following physical items are complete:

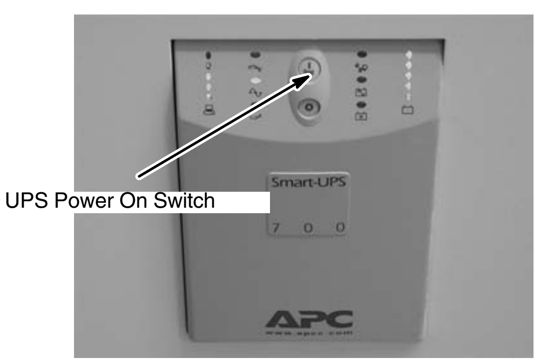
– Acquisition Workstation, monitor, keyboard, mouse, and mouse pad are installed and connected
– AWS power connection (120 VAC or 220 VAC) is connected to control booth AC receptacle and that the receptacle has power
– AWS Ethernet network RJ45 Twisted Pair cable is connected to control booth Hospital Network receptacle (RJ45 jack)
– Hospital DICOM 3.0 Network connection is operational and is running 10baseT or 100baseT

Ensure the following Revolution XQ/i network identity information is available from the Hospital network administrator:

– Hostname
– Internet Protocol (IP) Address
– Subnet Netmask IP Address (if applicable)

1-3 Power–Up AWS

1. Power on the AWS by using the UPS power switch.



2. After the workstation completes power–up testing, verify that no LED's remain lit on the keyboard.

1-4 Perform Sys–Unconfig

Perform **sys–unconfig** as follows:

A Login as root:

Type name **[Return]** at the console login prompt.

Type password **[Return]** at the Password prompt.

Console Login Screen

```
          .
          .
          .
+--------------------------+
| ADS Routes configuration |
+--------------------------+
The system is ready.
<hostname> console login:
Password:
```

B At the root prompt, type:

sys–unconfig [Return]

The monitor displays a Warning message.

Root Login Screen

```
          .
+--------------------------+
| ADS Routes configuration |
+--------------------------+
The system is ready.
<hostname> console login:
Password:
Last login: Wed May 19 17:31:30 on console
May 26 17:15:04 <hostname> login: ROOT LOGIN/ dev/console
Sun Microsystems Inc.   SunOS 5.7
(Generic May 1996)
{hostname}[1] sys-unconfig
```

C At the continue ? prompt, type: **y [Return]**

The system automatically performs a shutdown. Wait approximately 1 minute for the UPS to complete shutdown.

Sys–Unconfig Warning Message

```
          .
          .
          .
          .
Last login: Wed May 19 17:31:30 on console
May 26 17:15:04 <hostname> login: ROOT LOGIN/ dev/console
Sun Microsystems Inc.   SunOS 5.5.1              (Generic May 1996)
You have mail
{hostname}[1] sys-unconfig
          WARNING
This program will unconfigure your system. It will cause it
to revert to a “blank” system – it will not have a name or know
about other systems or networks.

This program will also halt the system.

Do you want to continue (y/n) ?
```

1-5 Configure ADS

1. Power on the AWS by using the UPS power switch.
2. Enter the Hospital designated Hostname, Network Connectivity selection, Network Interface, and IP Address for the Revolution XQ/i Workstation as follows:

A Select if the Revolution XQ/i will be connected to a network:

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Network Connectivity Screen

```
-   Network Connectivity  -------------------------------------------------

Specify Yes if the system is connected to the network by one of the Solaris
or vendor network/communication Ethernet cards that are supported on the
Solaris CD. See your hardware documentation for the current list of
supported cards.

Specify No if the system is connected to a network/communication card that
is not supported on the Solaris CD, and follow the instructions listed under
Help.

                  Networked :

                  [X]  Yes
                  [ ]  No

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

B Select **No** to continue at the “Use DHCP?” prompt.

```
                  Use DHCP :

                  [ ]  Yes
                  [X]  No
```

C Select **hme1** as the primary network interface for the Ultra 10 workstation or select **eri0** for the SunBlade 150 workstation:

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Primary Network Interface Screen

```
 Primary Network Interface

On this screen you must specify which of the following network adapters is
the system's primary network interface. Usually the correct choice is the
lowest number. However, do not guess; ask your system administrator if
you're not sure.

> To make a selection, use the arrow keys to highlight the option and
  press Return to mark it [X].

                  Primary Network Interface :

                  [ ]  hme0
                  [X]  hme1

F2_Continue    F6_Help
```

D Type in the Revolution XQ/i **Host Name**:

Type designated host name at the Hostname prompt.

The hostname is used by the hospital HIS/RIS system or DICOM 3.0 Broker (designated by the radiology department administrator for the Revolution XQ/i).

Press **F2** to continue.

Host Name Entry Screen

```
 Host Name

On this screen you must enter your host name, which identifies this system
on the network. The name will be unique within your domain; creating a
duplicate host name will cause problems on the network after you install
Solaris.

A host name must be at least two characters; it can contain letters,
digits, and minus signs (-).

                  Hostname :

F2_Continue
```

NOTICE:
Avoid Network Communication Errors!

The Hostname must not exceed 12 characters and must not use the following characters:

. ! $ ” ‘ ’ { } [ ] * @ # ? ^ _ /

3. Enter the IP Address, Subnet Selection, and Netmask Entry for the Revolution XQ/i Workstation as follows:

A Type in the Revolution XQ/i **IP Address**:

Type designated IP Address at the IP Address prompt.

Press **F2** to continue.

IP Address Entry Screen

```
 -  IP Address   ----------------------------------------------------------

On this screen you must enter the Internet Protocol (IP) address for this
system. It must be unique and follow your site's address conventions, or a
system/network failure could result.

IP addresses contain four sets of numbers separated by periods (for example
129.200.9.1)

              IP Address :

---------------------------------------------------------------------------
F2_Continue    F6_Help
```

B Select if the Revolution XQ/i will be connected as part of a subnet:

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Subnet Selection Screen

```
 -  Subnets  ---------------------------------------------------------------

On this screen you must specify whether this system is part of a subnet
If you specify incorrectly, the system will have problems communicating on
the network after you reboot.

> To make a selection, use the arrow keys to highlight the option and
  press Return to mark it [X].

               System part of a subnet :

               [X]  Yes
               [ ]  No

---------------------------------------------------------------------------
F2_Continue    F6_Help
```

C Type in the Revolution XQ/i **Netmask** (if applicable):

Type designated **Netmask** at the **Netmask** prompt.

Press **F2** to continue.

Netmask Entry Screen

```
 -  Netmask  ---------------------------------------------------------------

On this screen you must specify the netmask of your subnet. A default
netmask is shown; do not accept the default unless you are sure it is
correct for your subnet. A netmask must contain four sets of numbers
separated by periods (for example 255.255.255.0).

               Netmask :

---------------------------------------------------------------------------
F2_Continue    F6_Help
```

Note: A netmask must be entered for Solaris 8 OS. If the hospital does not provide a subnet, use the following default: 255.255.255.0

D Select **No** at the “Enable IPU6?” prompt.

Press **F2** to continue.

```
 -  Subnets  --------------------------------------------------------------

              Enable IPU6:

              [ ]  Yes
              [X]  No

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

E Verify Hostname, Networked, Primary Network Interface, and IP Address entries are correct:

If incorrect, press **F4**.

If correct, press **F2** to continue.

Network Confirmation Screen

```
 Confirm information

> Confirm the following information. If it is correct, press F2;
  to change any information, press F4.

                Host name :
               Networked : Yes
   Primary Network Interface : hme1 or eri0
              IP Address :

--------------------------------------------------------------------------
F2_ContinueF4_Change   F6_Help
```

F Select **No** at the “Configure Kerberos Security?” prompt.

Press **F2** to continue.

```
 -  Subnets  --------------------------------------------------------------

              Configure Kerberos Security?:

              [ ]  Yes
              [X]  No

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

G Verify Kerberos Security is set to **NO**.

Press **F2** to continue.

```
 -  Subnets  --------------------------------------------------------------

              Confirm  Kerberos Security?:

              [ ]  Yes
              [X]  No

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

4. Enter the Name Service selection as follows:

A Select **None** as the Revolution XQ/i **Name Service**:

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Name Service Selection Screen

```
 -  Name Service  --------------------------------------------------------

On this screen you must provide name service information. Select the name
service that will be used by this system, or None if your system will either
not us a name service at all, or if it will use a name service not listed
here.

> To make a selection, use the arrow keys to highlight the option
and press Return to mark it [X].

               Name Service :
               [ ]            NIS+
               [ ]            NIS
               [ ]            DNS
               [X]            None

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

B Verify Name Service selection is set to **None**:

If incorrect, press **F4.**

If correct, press **F2** to continue.

Network Confirmation Screen

```
 -  Confirm Information  -------------------------------------------------

> Confirm the following information. If it is correct, press F2;
  to change any information, press F4.

Name Service : None

--------------------------------------------------------------------------
F2_Continue    F4_Change      F6_Help
```

C If in the USA or region that does NOT use daylight saving time, select the appropriate Region that the Revolution XQ/i will be installed.

In other regions, select “other – offset from GMT” See Note below.

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Time Zone Selection Screen – Regions

```
 -  Time Zone  -----------------------------------------------------------

On this screen you must specify your default time zone. You can specify a
time zone in three ways: Select one of the geographic regions from the
list, select other - offset from GMT, or other - specify time zone file.

To make a selection, use the arrow keys to highlight the option and
press Return to mark it [X].

               Regions :

               [ ]  Africa
               [ ]  Asia, Eastern
               [ ]  Asia, Western
               [ ]  Australia/New Zealand
               [ ]  Canada
               [ ]  Europe
               [ ]  Mexico
               [ ]  South America
               [X]  United States
               [ ]  other - offset from GMT
               [ ]  other - specify time zone file

--------------------------------------------------------------------------
F2_Continue    F6_Help
```

Note: When the system is configured using the “offset from GMT”, the system clock will NOT automatically adjust for Daylight Saving Time. The system clock can be adjusted by using UTILITIES/ GENERAL from the SERVICE DESKTOP.

D

Select the appropriate Time Zone (if applicable) where the Revolution XQ/i will be installed:

Use the arrow keys to move the cursor.

Press **Return** to make the selection.

Press **F2** to continue.

Time Zone Selection Screen – Time Zone

```
-  Time Zone  -------------------------------------------------------------

> To make a selection, use the arrow keys to highlight the option and
  press Return to mark it [X].

               Time Zone :

               [ ]  Eastern
               [ ]  Central
               [ ]  Mountain
               [ ]  Pacific
               [ ]  East - Indiana
               [ ]  Arizona
               [ ]  Michigan
               [ ]  Samoa
               [ ]  Alaska
               [ ]  Aleutian
               [ ]  Hawaii

---------------------------------------------------------------------------
F2_Continue    F5_Cancel      F6_Help
```

E

If the displayed Date and Time values are incorrect, enter the correct values:

Use the arrow keys to move the cursor.

Type correct value.

Press **F2** to continue.

Date and Time Selection Screen

```
 -  Date and Time  -------------------------------------------------------

> Accept the default date and time or enter
  new values

Date and time : yyyy-mm-dd hh:mm

               Year (4 digits):
                Month (1-12) :
                  Day (1-31) :
                 Hour (0-23) :
               Minute (0-59) :

---------------------------------------------------------------------------
F2_ContinueF6_Help
```

F

Verify that Time Zone, and Date and Time entries are correct:

If incorrect, press **F4**.

If correct, press **F2** to continue.

Network Confirmation Screen

```
-   Confirm information  -------------------------------------------------

> Confirm the following information. If it is correct, press F2;
  to change any information, press F4.

                    Time Zone :
                Date and Time :

---------------------------------------------------------------------------
F2_ContinueF4_Change   F6_Help
```

Note: Avoid Root Password Entry Problems! Be sure to turn the CAPS–LOCK key OFF before entering the Root Password.

5. Enter the “root password” for the Revolution XQ/i system, as follows:

   Type **the password**
   Press **[Return]**

   Re–type **the password**
   Press **[Return]**

   The system responds with **System identification is completed** and automatically reboots and returns to the **<hostname> console login :** prompt.

   Root Password Selection Screen

```
On this screen you can create a root password.

A root password can contain any number of characters, but only the first eight
characters in the password are significant. (For example, if you create
'a1b2c3d4e5f6' as your root password, you can use 'a1b2c3d4' to gain root
access).

You will be prompted to type the root password twice; for security, the password
will not be displayed on the screen as you type it.

> If you do not want a root password, press RETURN twice.

    Root Password :

> Press Return to continue.
```

6. If you have a Sun Ultra 10 computer or a SunBlade 150 computer with a SMC switch/media converter, skip to step 7.

   If you have a SunBlade 150 computer with a transceiver mounted on the rear of the Sun computer chassis, you must perform the following:

   a. Login as root. Type **user name [Return]** at the console login prompt.

   b. Type **password [Return]** at the Password prompt.

   Console Login Screen

```
              .
              .
              .
+--------------------------+
| ADS Routes configuration |
+--------------------------+
The system is ready.
<hostname> console login:
Password:
```

   c. Type **cd /export/home/sdc/senovision/scripts [Return]** at the prompt.

   d. Type **transceiver_on [Return]** at the prompt.

   Note: If you execute the **transceiver_on** script by mistake and begin experiencing communication errors with the IDC, you can return to the original configuration as follows:

   – Login as root. Type login name at the console login prompt.
   – Type password **[Return]** at the Password prompt.
   – Type **cd /export/home/sdc/senovision/scripts [Return]** at the prompt.
   – Type **transceiver_off [Return]** at the prompt.

7. Start Revolution XQ/i AWS Application Software as follows:

   NOTE – SunBlade 150 Only: Login prompt may be obstructed by a transceiver message. Press **[Return]** several times to view login prompt.

Start Application Software:

Type username **[Return]** at console login prompt.

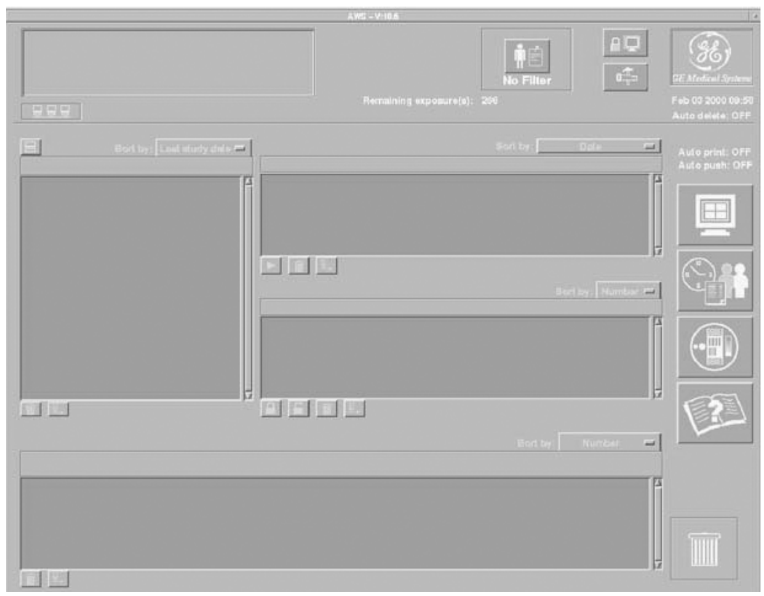
Type password**[Return]** at the Password prompt.

After 30 seconds, the monitor displays the Main Browser Screen.

Console Login Screen

```
ADS Routes Configuration
The system is ready.
<hostname> console login:
Password:
```

Main Browser Application Screen

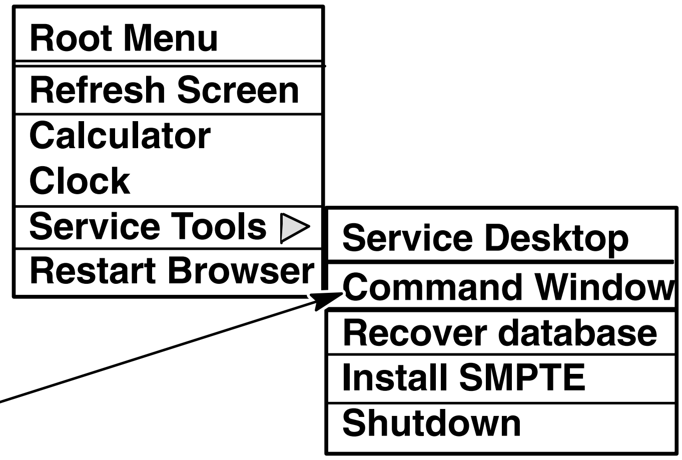


1-6 Hospital Router Configuration

If the site has a router connection to its network, it is necessary to configure it on the workstation. Follow the procedure listed below:

Note: Before proceeding, it is necessary to have the **IP address of the router** between the subnets, from the hospital network administration.

1. Open a Terminal window by first minimizing the Main Browser and all other windows. Then, select **Command Window** from the Root Menu, as shown:



Open a Terminal window:

Drag cursor to
Service Tools >
Command Window
and release mouse button.

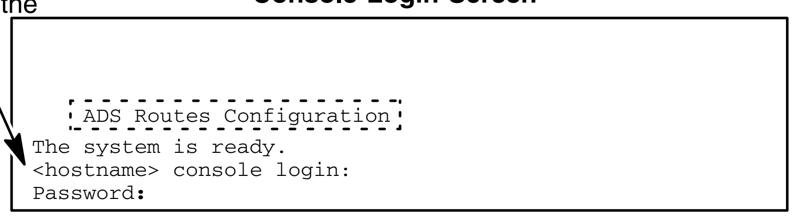
2. Enter User Name **[Return]** at the prompt.
3. Enter Password at the Password prompt.
4. Enter: **cd /export/home/sdc/senovision/scripts [Return]** at the prompt.
5. Enter: **./install.defaultrouter x.xx.xxx.xxx [Return]** at the prompt. (IP address of the hospital router)
6. Enter: **exit [Return]** at the prompt.
7. Enter: **more /etc/defaultrouter [Return]** at the prompt.
8. The system returns **x.xx.xxx.xxx** (IP address of the hospital router entered in step 5)
9. Close the terminal window and shutdown the system selecting **Shutdown** from the **Root Menu**. See Menus above.
10. Restart the system by turning on power at the UPS.
11. Start Revolution XQ/i AWS Application Software as follows:

Type user name**[Return]** at the console login prompt.

Type password **[Return]** at the Password prompt.

After 30 seconds, the monitor displays the Main Browser Screen.

Console Login Screen



SECTION 2
LOADING OPERATOR MANUAL ON AWS

See Appendix B, Section 3 in this Direction for instructions on loading the operator manual onto the AWS.

SECTION 3
AWS NETWORK SET–UP

3-1 Introduction

Configuring the Revolution XQ/i to communicate with various network devices on the hospital network is accomplished through three configuration menus available on the Main (local) Browser Tools menu. These three menu selections essentially allow you to configure remote host destinations that the Revolution XQ/i System will “push” images to. These menu selections are:

– Network Management (Workstations, Archival Devices, or combinations – PACS)
– Worklist Management (HIS/RIS Systems)
– Printer Management

3-2 Basic Network Requirements

The Revolution XQ/i System requires that the hospital network must:

– Have a cabling definition that is either 10BaseT or 100BaseT, and
– Be using the DICOM 3.0 Network Protocol

In addition, all the network devices that the Revolution XQ/i will be communicating with on the hospital network system must be DICOM 3.0 Protocol compliant devices. Each device must have a DICOM 3.0 Conformance Statement document that states:

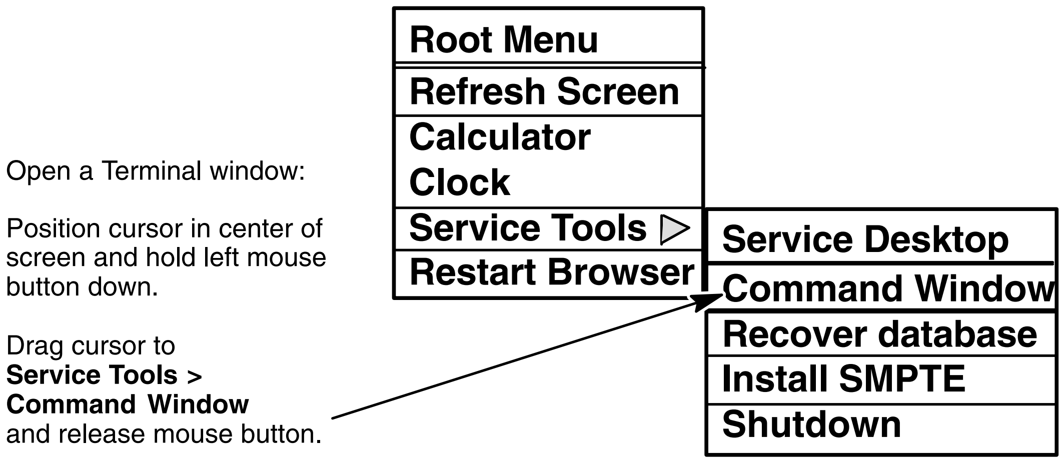
– What DICOM 3.0 function or service (Application Entity) the device provides (Server, Storage, Query/Retrieve, Print, Worklist)
– The Application Entity Title of each of the DICOM 3.0 services that the device provides, and
– The Local Listening Port Number for each of the DICOM 3.0 services that the device provides

3-3 DX Burn on Send / No–Burn Configuration

The ADS shall have the ability to configure the system in NO BURN or BURN ON SEND mode on a per network–host basis. Whether a host can be configured as NO BURN or BURN ON SEND depends on if the host can accept DICOM DX IOD images with VOI LUT support or not.

– If the host accepts DICOM DX images with VOI LUT support, configure the host as NO BURN.
– Otherwise configure the host as BURN ON SEND.

1. Open a Terminal window by first minimizing the Main Browser and all other windows. Then, select **Command Window** from the Root Menu, as shown:



2. Enter: **cd /export/home/sdc/scripts [Return]** at the prompt.
3. Enter: **perl Set_DX_Send <hostlabel of PACS> [Return].**

   Note: The **<hostlabel of PACS>** can be obtained by selecting Browser—>Tools—>Network Management. Click on the remote host and press UPDATE.

4. The following message will appear:

```
Configuring BURN ON SEND MODE FOR DX IMAGES
By setting the BURN ON SEND MODE to YES the
generated DX images will have the VOI LUT
burnt into image pixels data.

By setting the BURN ON SEND MODE to NO the
DX images will have the VOI LUT Seq. stored
in the DICOM header.

Note: Restart Browser after changing mode.
Please Enter AETitle :
```

5. Enter: **<AETitle> [Return].**
6. The following message will appear:

```
Enter your choice as an integer:
0 is for DX NO BURN MODE (mode by default)
1 is for DX BURN ON SEND MODE

Choice ?"
```

7. Enter **“0” or “1” [Return].**

Note: This configuration is dependent on the site configuration. Please consult a hospital network administrator with any questions.

8. Restart the browser from the Root Menu as shown above.

Recommended configuration for some Workstation Products

“Burn on Send”	“No–Burn”
Pathspeed 7.12	Radworks 5.1
Pathspeed 8.0	eFilm
AW3.1	Pathspeed 8.1
AW4.0	

3-4 Revolution XQ/i Network DICOM Services

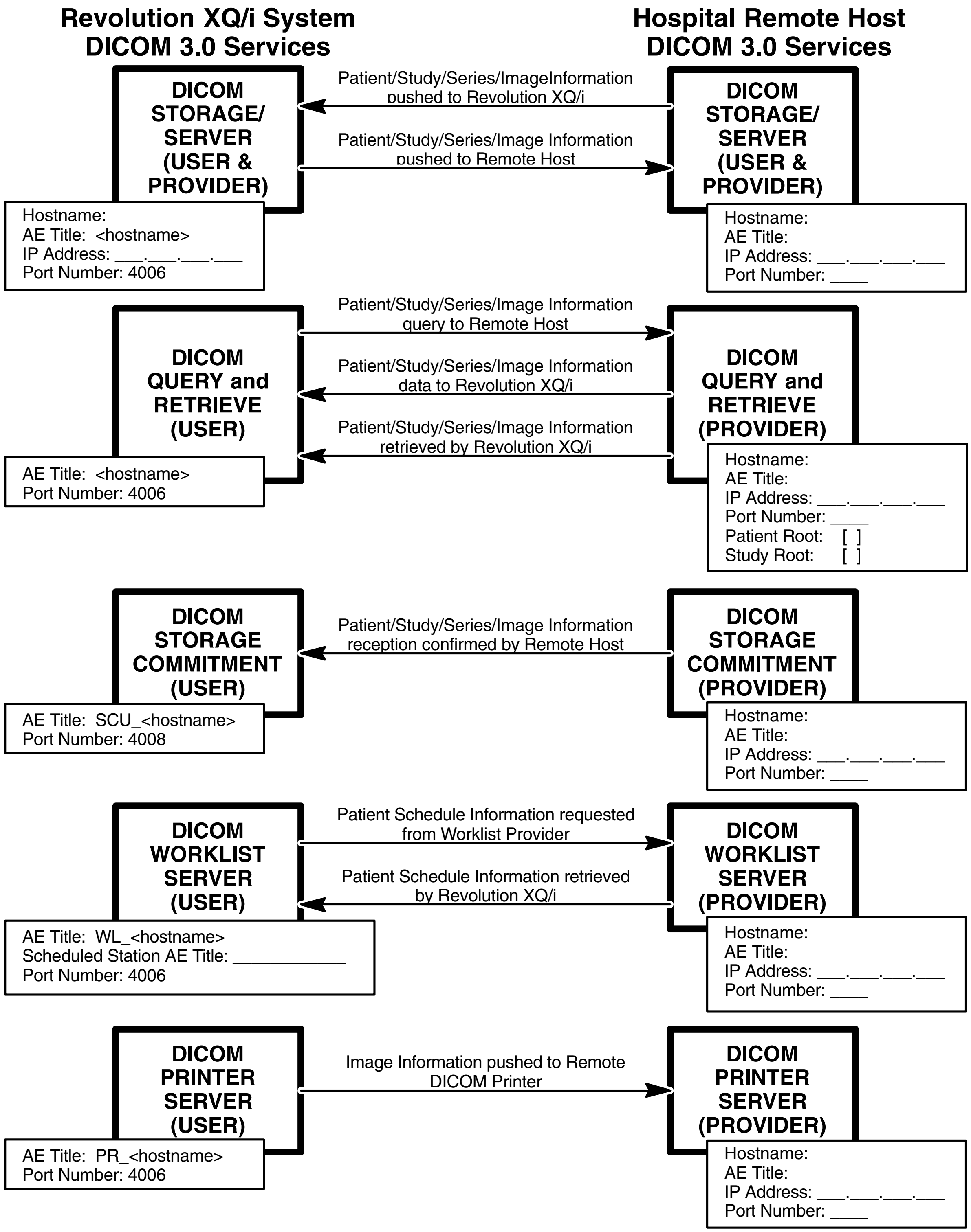
The Revolution XQ/i supports five basic DICOM 3.0 services or functions as a basic user (versus provider). The functions and their Application Entity Title formats are as follows where <hostname> is the hostname entered in Chapter 1, Section 1–5, Configure ADS.

For further information on compatible printers contact your On–Line service representative.

1. **Server** (Transfer of Patients/Studies/Series/Images to a Remote Host)
   DICOM Storage/Server = **<hostname>**
2. **Worklist Server** (Worklist retrieval from a hospital RIS system)
   DICOM Worklist Server = **WL_<hostname>**
3. **Storage Commitment** (Transfer of Patients/Studies/Series/Images to a Remote Host confirmed by the Remote Host)
   DICOM Storage Commitment = **SCU_<hostname>**
4. **Print** (Transfer of Images to a Remote DICOM Printer)
   DICOM Printer Server = **PR_<hostname>**
5. **Query/Retrieve** (Review a Remote Host Patient/Study/Series/Image Database and transfer of Patient/Study/Series/Image data to the Revolution XQ/i System)
   DICOM Query and Retrieve = **<hostname>**
6. **Test Hosts** tab under Medical Application preferences
   DICOM Test Hosts server = **merge**

3-5 Prerequisites

Prior to configuring the AWS for use on the hospital network, ensure you have the hospital Remote Host network identity information from the hospital network administrator and the DICOM 3.0 Conformance Statement for each device.



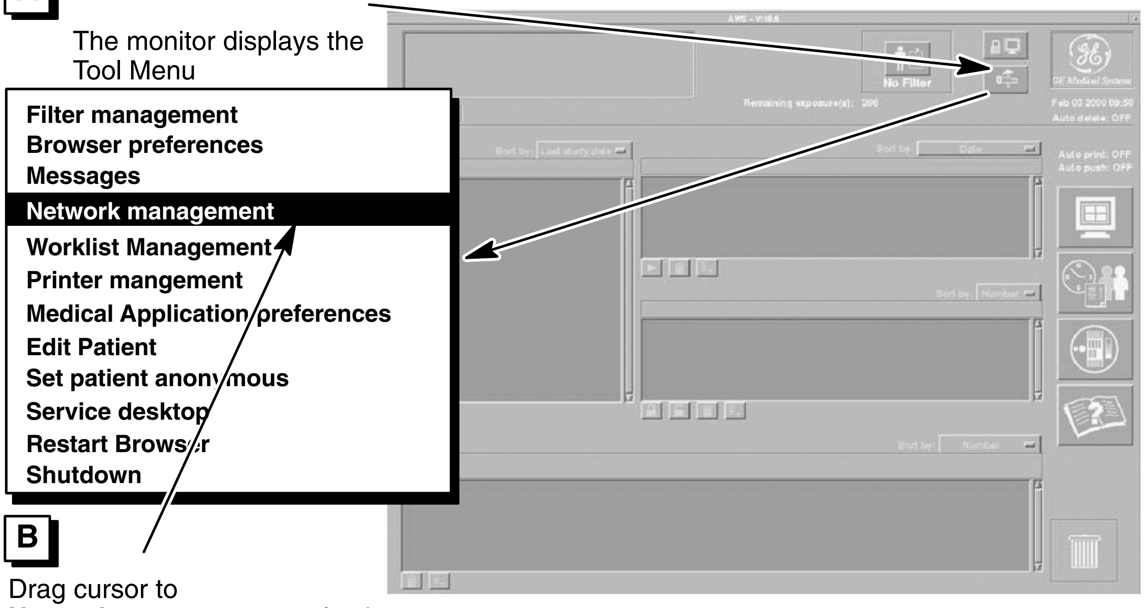
3-6 Configure Remote Host Device Parameters

1. Select the **Network Management** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

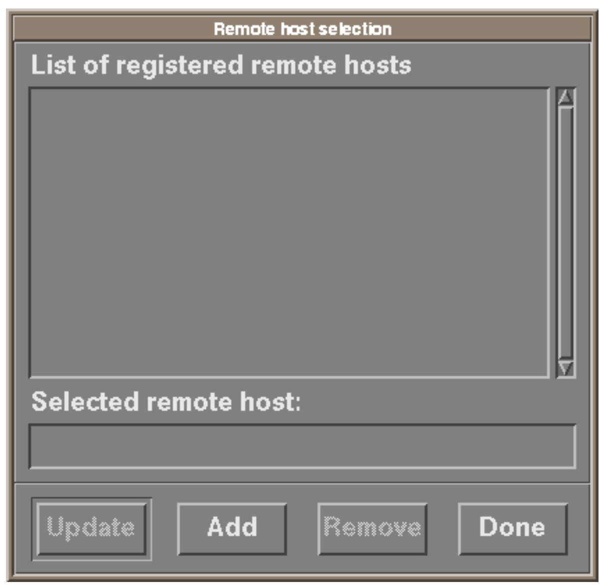
Main Browser Application Screen



B Drag cursor to **Network management** selection and release mouse button

The monitor displays the **Remote host selection** pop–up screen

Remote host selection screen



The **Remote host selection** pop–up screen displays all currently registered Remote Hosts.

Click On:

to open the **Remote Host Parameter** Screen & update an existing Remote Host set of parameters

to open the **Remote Host Parameter** Screen & add a new Remote Host's set of parameters

to remove a selected Remote Host from the list of registered Remote Hosts

to close the **Remote Host Selection** pop–up screen

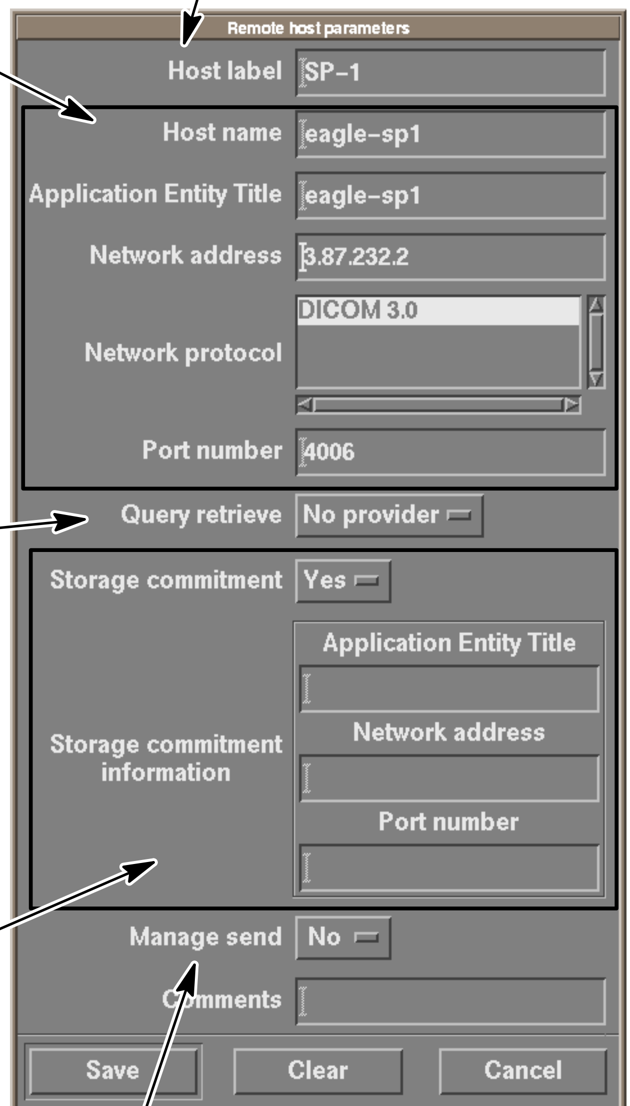
C Click on **Add** button on the Remote host selection screen to display the **Remote Host Parameter Screen**.

2. Enter the hospital provided network identity parameters for each DICOM 3.0 Remote Host device (Workstation, Archival Device, PACS System, etc.):

A Using the cursor and keyboard, fill in all required parameter fields on the **Remote Host Parameter Screen**.

Entry defines the Remote Host Icon Name on Local Browser Screen

DICOM Storage/Server Network Information (destination where Revolution XQ/i will “push” images to)



DICOM Query/Retrieve Service Class Provider Capability information (destination where Revolution XQ/i can “look” at images on a Remote Host via the Remote Browser Screen & “pull” images from that Remote Host)**.**

Select File Hierarchy as follows:

- **Patient Root**
  Remote Host is organized by Patients, Exams (Studies), Series, and Images
- **Study Root**
  Remote Host is organized by Exams (Studies), Series, and Images
- **No Provider**
  Remote Host is not a Query/ Retrieve Service Class Provider

DICOM Storage Commitment Service Class Provider Capability information (destination that has the ability to confirm reception of “pushed” images from the Revolution XQ/i and acknowledge archival)

NOTICE: The Storage Commitment capability is only available for remote host devices using DX Image type Presentation Context. The Revolution XQ/i System will not request storage commitment from devices using the “CR Fallback” mode.

B Click on **Save** button to add each new device to the **Remote Host Selection Screen**.

Select **Yes** if the customer wants the Study (Exam) List to indicate that a study has been sent to an Remote Host (“**S**” indication for Report Status). This feature is not an Archival confirmation of storage – only an indication that the study was sent.

Note: After completing this procedure, you must restart the browser.

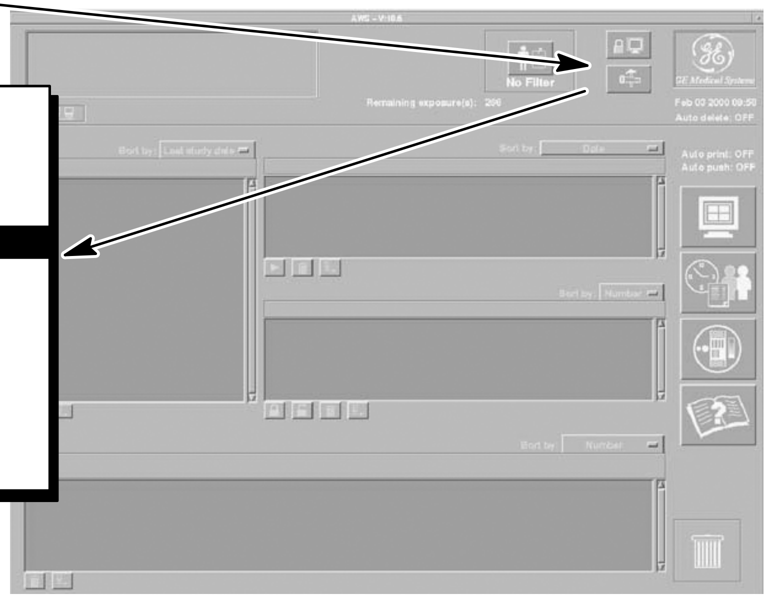
3-7 Configure HIS/RIS System Network Parameters

1. Select the **Worklist Management** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

Main Browser Application Screen

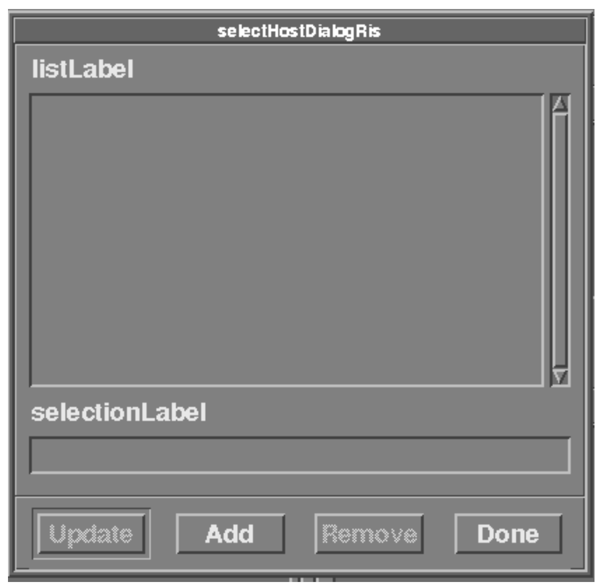


Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

B Drag cursor to **Worklist Management** selection and release mouse button

The monitor displays the **RIS host selection** pop–up screen

RIS Host Selection Screen



The **RIS host selection** pop–up screen displays all currently registered RIS Hosts.

Click On:

Update to open the **RIS Host Parameter** Screen & update an existing HIS/RIS Host set of parameters

Add to open the **RIS Host Parameter** Screen & add a new HIS/RIS Host's set of parameters
Note: Only one RIS Host can be configured on the system.

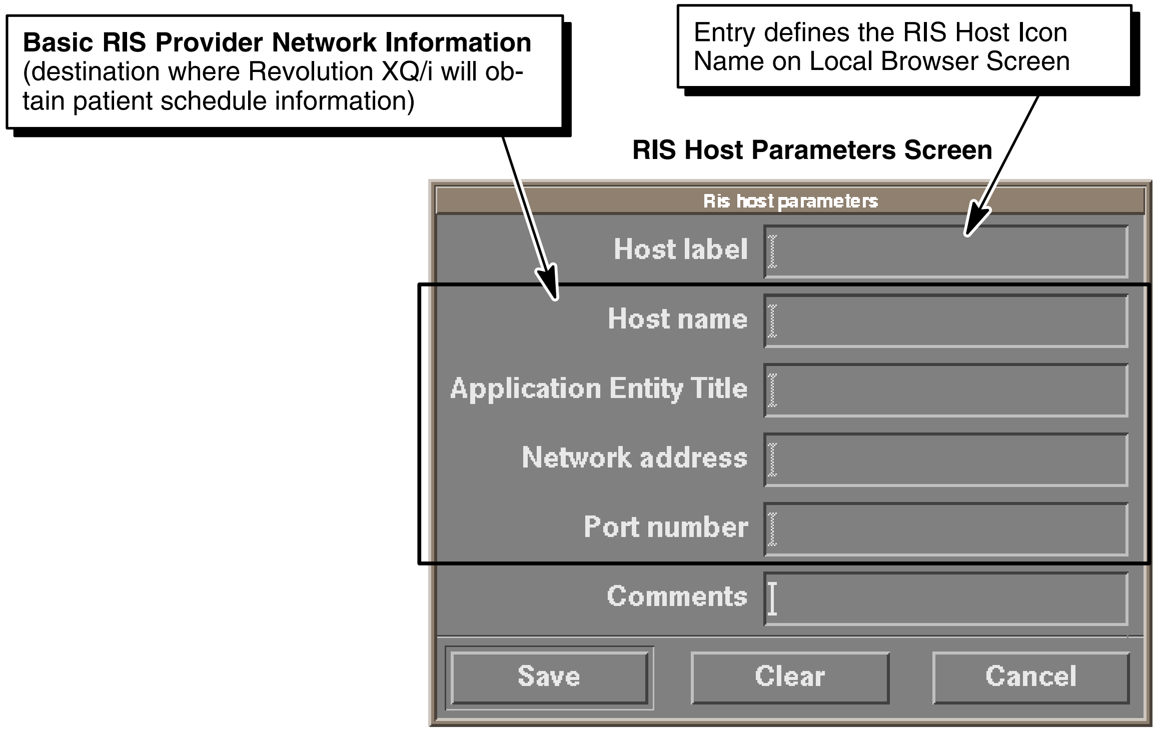
Remove to remove a selected HIS/RIS Host from the list of registered HIS/RIS Hosts

Done to close the **RIS Host Selection** pop–up screen

C Click on **Add** button on the RIS Host selection screen to display the **RIS Host Parameter Screen**

2. Enter the hospital provided network identity parameters for the DICOM 3.0 HIS/RIS system:

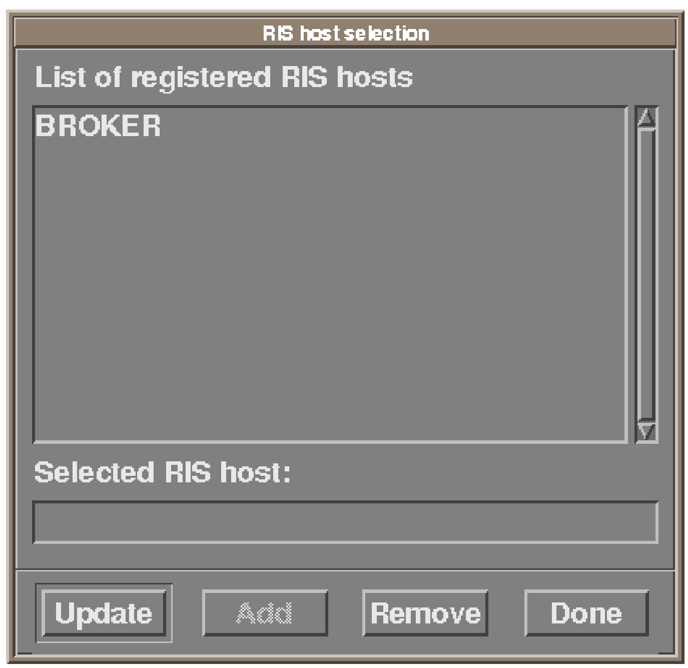
A Using the cursor and keyboard, fill in all required parameter fields on the **RIS Host Parameter Screen**



B After all parameters for the given device are entered, click on the **Save** button

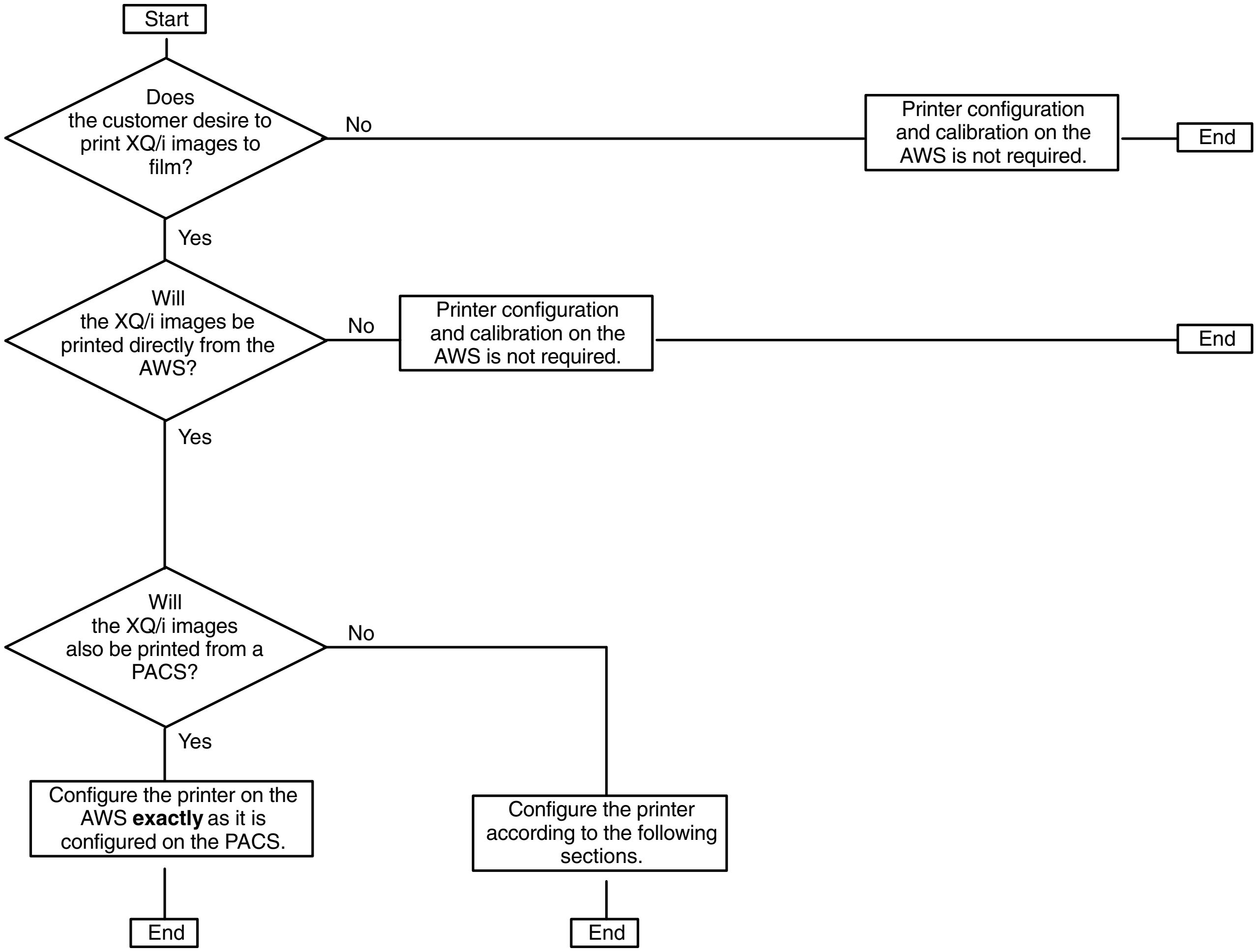
The monitor displays the **RIS host selection** pop–up screen.

NOTE: Browser must be restarted for host to work properly.



3-8 Configure Printer Network Parameters

The following diagram shows printer options.

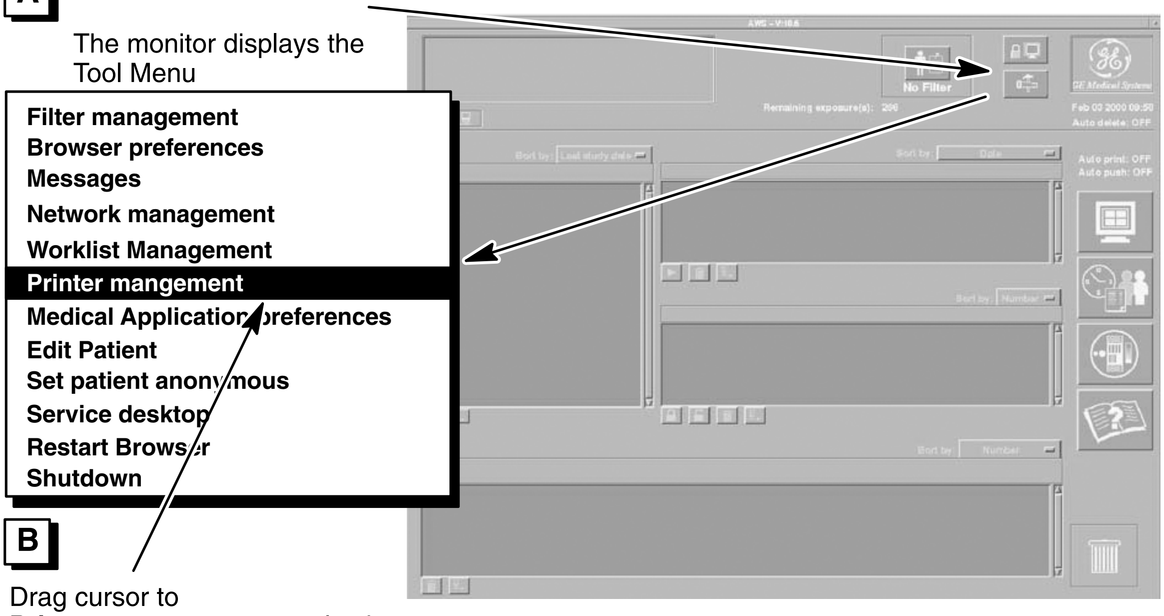


1. Select the **Printer Management** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

Main Browser Application Screen

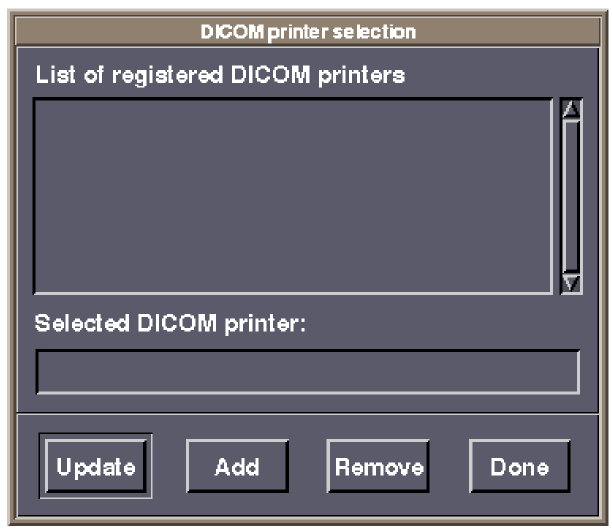


B

Drag cursor to **Printer management** selection and release mouse button

The monitor displays the **DICOM Printer selection** pop–up screen

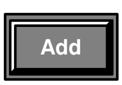
DICOM Printer Selection Screen



The **DICOM Printer Selection** pop–up screen displays all currently registered DICOM Printers.

Click On:

to open the **DICOM Printer Parameter** Screen & update an existing printer's set of parameters



to open the **DICOM Printer Parameter** Screen & add a new printer's set of parameters

to remove a selected printer from the list of registered DICOM printers

to close the **DICOM Printer Selection** pop–up screen

C Click on **Add** button on the DICOM Printer selection screen to display the **DICOM Printer Parameter Screen**.

2. Enter the hospital–provided network identity parameters for each DICOM 3.0 Printer or print spooler device:

Note: Refer to the Network Information appendix for specific parameter values for various types of printers or print spoolers that have been tested with Revolution XQ/i systems.

A Using the cursor and keyboard, fill in all required parameter fields on the **DICOM Printer Parameter Screen**

Entry defines the Printer Icon Name on Local Browser Screen
NOTE: Do NOT use spaces in DICOM Printer Label

DICOM Printer Network Information (printer or spooler where Revolution XQ/i will “push” images to)

Always set **Layouts** to ***One–On–One***

Ensure both **Slide Format** selections ***are deselected***

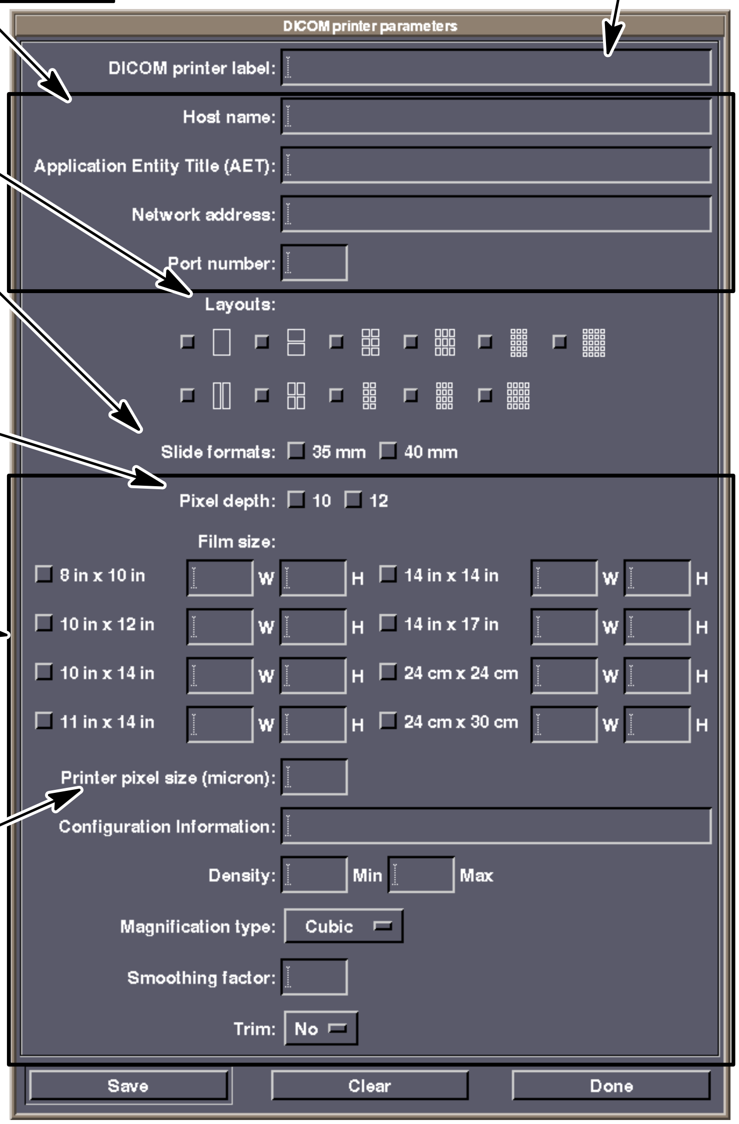
NOTE:
Select 10 or 12, but NOT both, for **Pixel Depth.** Verify that the pixel depth matches what is defined in Appendix D for the printer being configured. 8 bit is NOT a supported pixel depth.

Eight parameter value selections are Printer Type dependent.

See the Network Information appendix for parameter values.

NOTE:
Pixel Size must be entered in order for True Size and Fit To Film printing to operate correctly.

DICOM Printer Parameter Screen



B After all parameters for the given device are entered, click on the **Save** button

The monitor displays the **DICOM Printer selection** pop–up screen

3-9 Configure Revolution XQ/i on Hospital DICOM 3.0 Network Devices

To ensure proper network operation, you may need to declare the Revolution XQ/i system on the devices that the Revolution XQ/i system is communicating with. The following steps are to configure the remote hosts connected to the Revolution XQ/i system and are performed on the remote hosts, not on the Revolution XQ/i system.

For example:

If the hospital wants to "push" images to the Revolution XQ/i system from a Review Station, you will need to configure the Review Station with the Revolution XQ/i system network configuration parameters.

HIS/RIS Systems & Brokers (Revolution serves as a Worklist receiver)

Note: In this configuration, the Revolution XQ/i system communicates with the HIS/RIS broker to receive the list of scheduled procedures (Worklist).

1. In the network configuration set–up for the device sending the hospital worklist information to the Revolution XQ/i system, enter the following parameter information:
   > **Network Protocol** of the Revolution XQ/i = **DICOM 3.0**
   > **Hostname** (provided by the hospital network administrator)
   > **IP Address** (provided by the hospital network administrator)
   > **Application Entity Title** of the Revolution XQ/i = **WL_<Hostname>**
   > **Scheduled Station Application Entity Title** (provided by the hospital radiology department administrator)
   > **Port Number** of the Revolution XQ/i = **4006**

For systems that do not support DX type modality, see Section 3-10.

Remote Host Devices (Revolution serves as a DICOM image receiver)

Note: In this configuration, the Revolution XQ/i system receives images from remote host(s), using DICOM protocol.

2. In the network configuration set–up for the device(s) sending images to the Revolution XQ/i system, enter the following parameter information:
   > **Network Protocol** of the Revolution XQ/i = **DICOM 3.0**
   > **Hostname** (provided by the hospital network administrator)
   > **IP Address** (provided by the hospital network administrator)
   > **Application Entity Title** of the Revolution XQ/i = **<Hostname>**
   > **Port Number** of the Revolution XQ/i = **4006**

Remote Host Devices (Revolution serves as a DICOM image receiver that supports Storage Commitment)

Note: In this configuration, the Revolution XQ/i system receives images from remote host(s), using DICOM protocol, and sends acknowledgement that images were successfully received.

3. In the network configuration set–up for the device(s) sending images to the Revolution XQ/i system, enter the following parameter information:
   - **Network Protocol** of the Revolution XQ/i = **DICOM 3.0**
   - **Hostname** (provided by the hospital network administrator)
   - **IP Address** (provided by the hospital network administrator)
   - **Application Entity Title** of the Revolution XQ/i = **SCU_<Hostname>**
   - **Port Number** of the Revolution XQ/i = **4008**

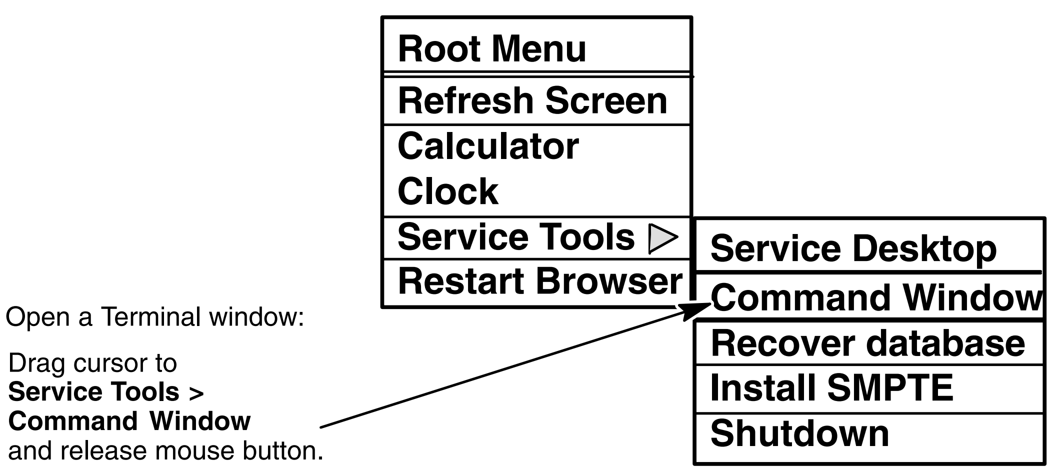
DICOM 3.0 Printers (Revolution sends images to a network printer(s))

4. In the network configuration set–up for the printer(s) receiving images from the Revolution XQ/i system, enter the following parameter information:
   - **Network Protocol** of the Revolution XQ/i = **DICOM 3.0**
   - **Hostname** (provided by the hospital network administrator)
   - **IP Address** (provided by the hospital network administrator)
   - **Application Entity Title** of the Revolution XQ/i = **PR_<Hostname>**
   - **Port Number** of the Revolution XQ/i = **4006**

3-10 Alternate Modality Query Configuration

The default configuration for Worklist Query is DX type modality. The system can also be configured for CR or OT modality types. To change modalities, proceed as follows:

1. Open a Terminal window by first minimizing the Main Browser and all other windows. Then, select **Command Window** from the Root Menu, as shown:



2. Enter: **cd /export/home/sdc/senovision/config [Return]** at the prompt.

3. Enter: **textedit WorklistConfig.cfg [Return]** at the prompt.
4. Find the line containing **DXModalityLetters=DX**
5. Edit the line to read **DXModalityLetters=CR** or **OT** as desired.
6. Perform a **FILE SAVE** from the **FILE** pull down menu to save the changes.
7. Double click in the upper left corner of the Terminal Window to close the window.
8. Maximize the Browser ICON to continue.

SECTION 4

SITE INFORMATION CONFIGURATION

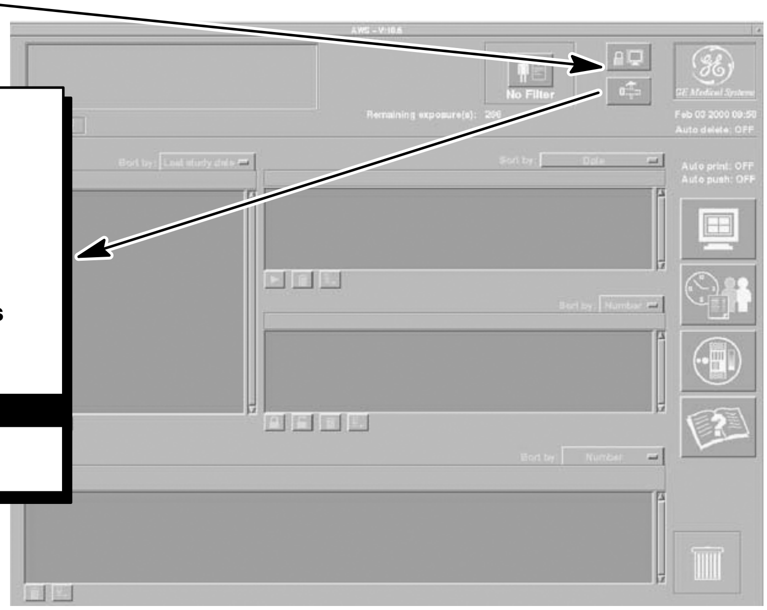
4-1 Site Configuration

1. Enter the **Configuration Summary Screen** by selecting the **Service Desktop** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

Main Browser Application Screen



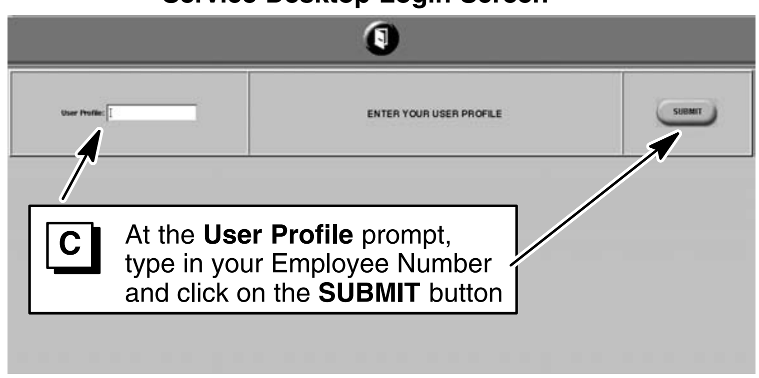
Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

B

Drag cursor to **Service desktop** selection and release mouse button

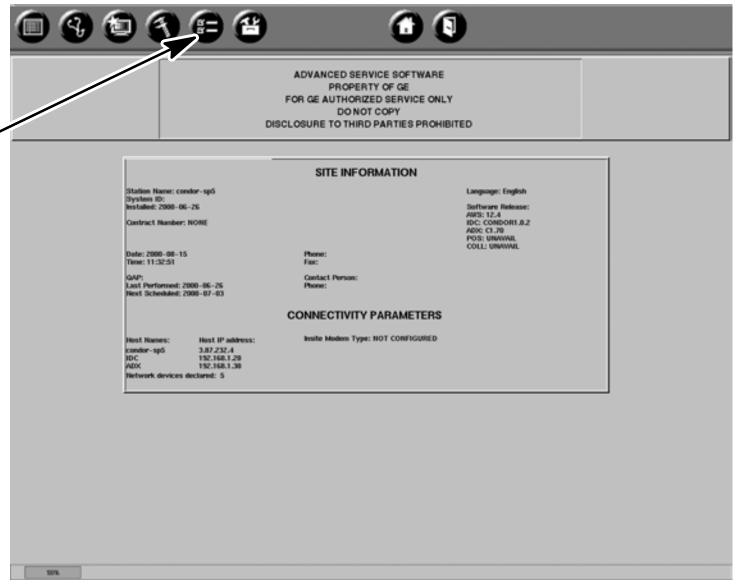
After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen



C At the **User Profile** prompt, type in your Employee Number and click on the **SUBMIT** button

Service Login Screen



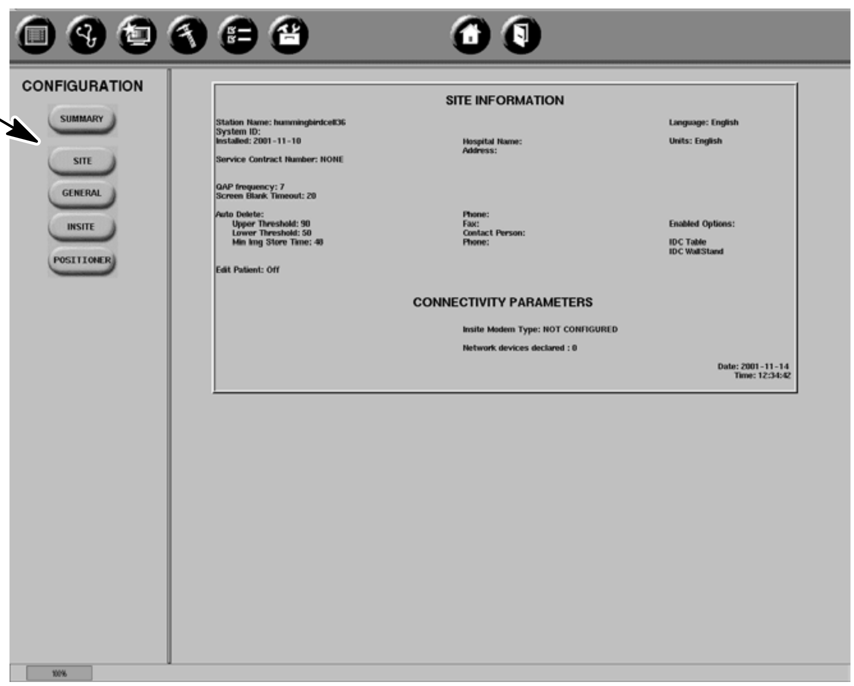
D

Click on the **CONFIGURATION** icon button to display the **Configuration Summary Screen**

2. Update the Site Information parameters on the **Site Information Configuration** Screen:

A Click on the **SITE** button

Configuration Summary Screen



The monitor displays the **Site Information Configuration Screen**

B Fill in the Site Information Fields:

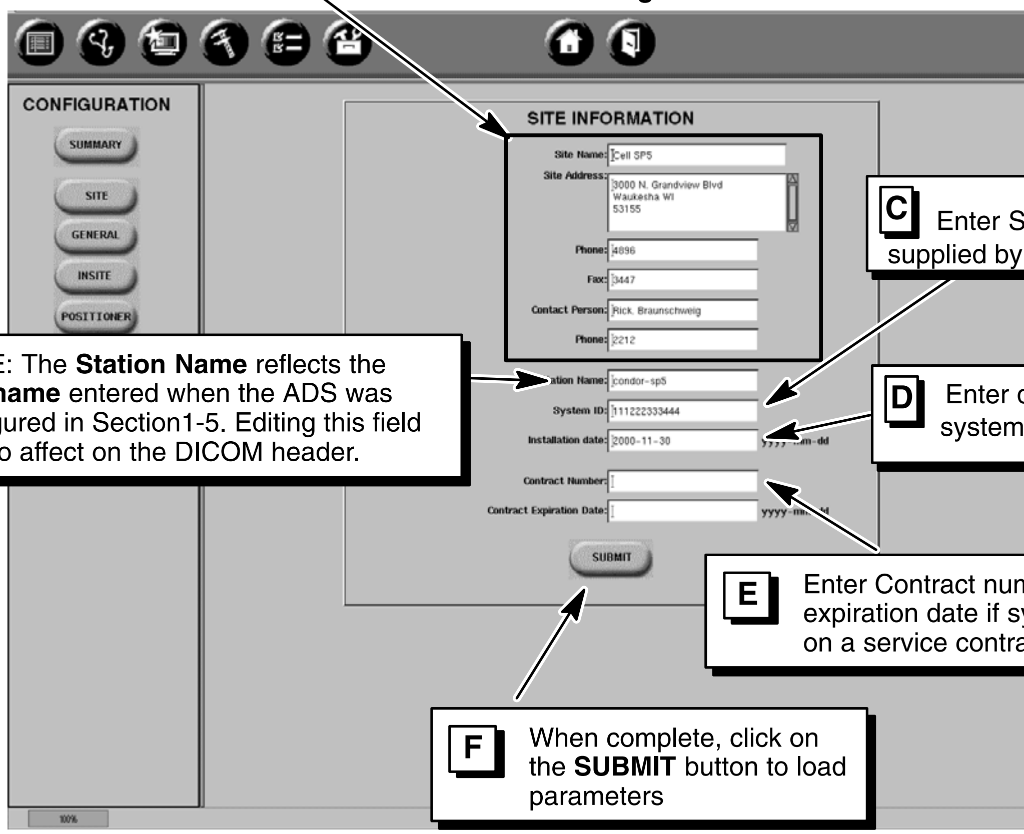
- **Site Name** = Hospital Name
- **Site Address**
- **Phone** = Room Phone Number
- **Fax** = Hospital/Department FAX Number
- **Contact Person** = Hospital Person
- **Phone** = Contact Person Phone Number

NOTICE:
Avoid Data Truncation Errors!

The Site Name and Site Address fields must not use the following characters:

” or ”>

Site Information Configuration Screen



NOTE: The **Station Name** reflects the **Hostname** entered when the ADS was configured in Section1-5. Editing this field has no affect on the DICOM header.

C Enter System ID supplied by CARES

D Enter date the system transfers.

E Enter Contract number and expiration date if system is on a service contract.

F When complete, click on the **SUBMIT** button to load parameters

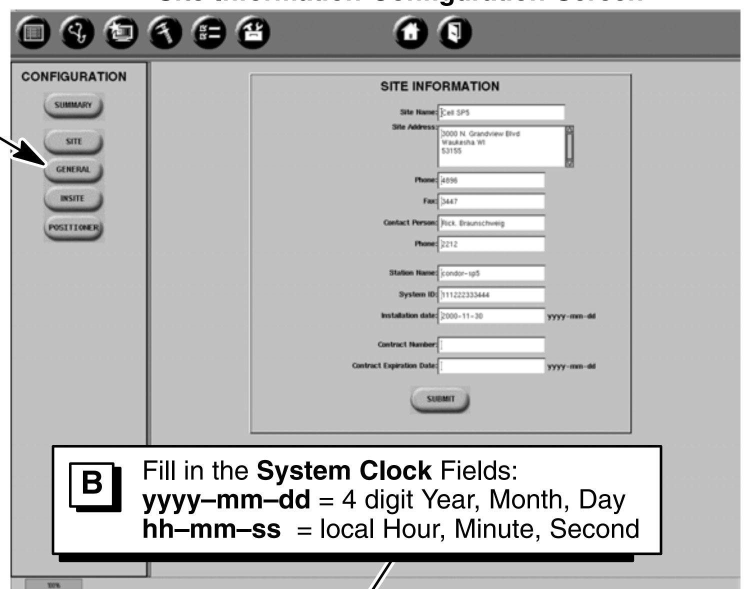
4-2 General Configuration

1. Update the General Information parameters on the General Information Configuration Screen. If the system is in a non–USA location that observes Daylight Saving and was configured using the "offset from GMT" time zone, the system clock must be adjusted for Daylight Saving using this screen.

A Click on the **GENERAL** button

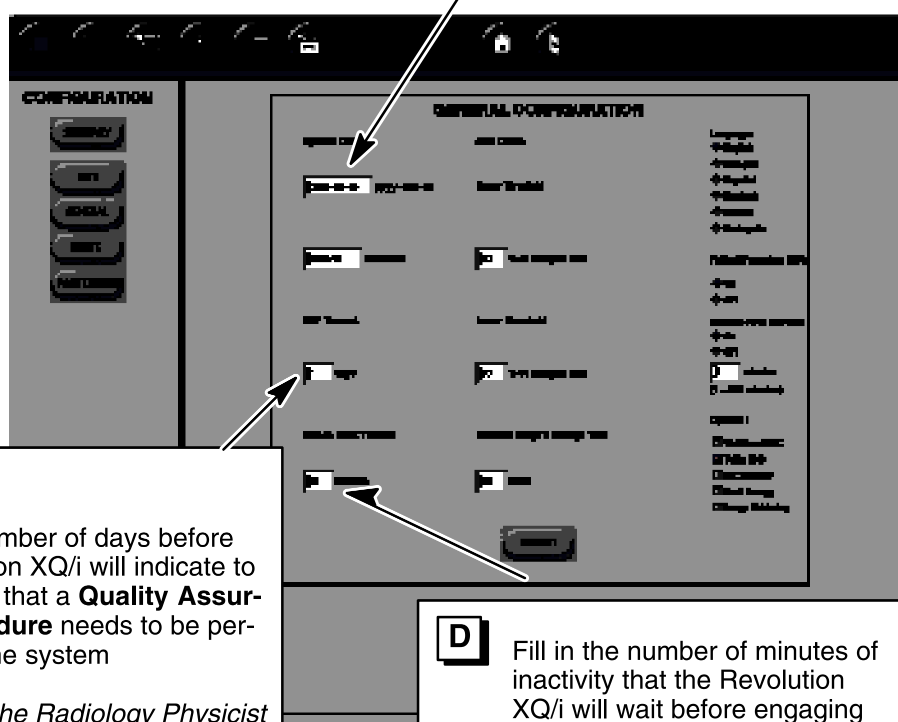
The monitor displays the **General Information Configuration Screen**

Site Information Configuration Screen



B Fill in the **System Clock** Fields:
yyyy–mm–dd = 4 digit Year, Month, Day
hh–mm–ss = local Hour, Minute, Second

General Information Configuration Screen

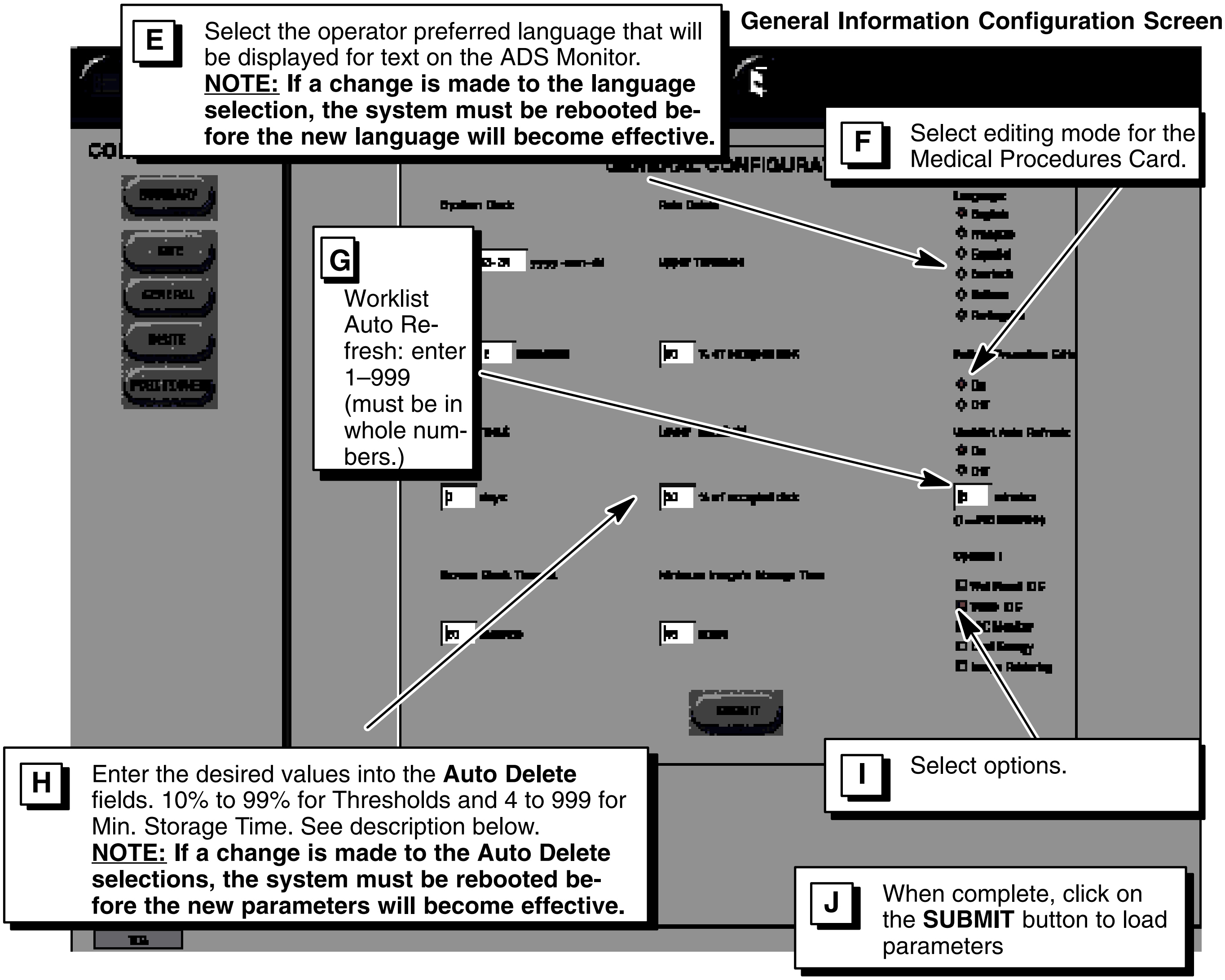


C Fill in the number of days before the Revolution XQ/i will indicate to the operator that a **Quality Assurance Procedure** needs to be performed on the system

Check with the Radiology Physicist to determine preferred cycle for performing operator QAP Checks.

D Fill in the number of minutes of inactivity that the Revolution XQ/i will wait before engaging the screen saver on the ADS Monitor

General Information Configuration Screen



4-2-1 Auto Delete

When the image disk reaches the entered Upper Threshold % capacity the system begins deleting stored images until the entered Lower Threshold % capacity is reached. It does this using images that have been stored longer than the entered Minimum Image's Storage Time in hours.

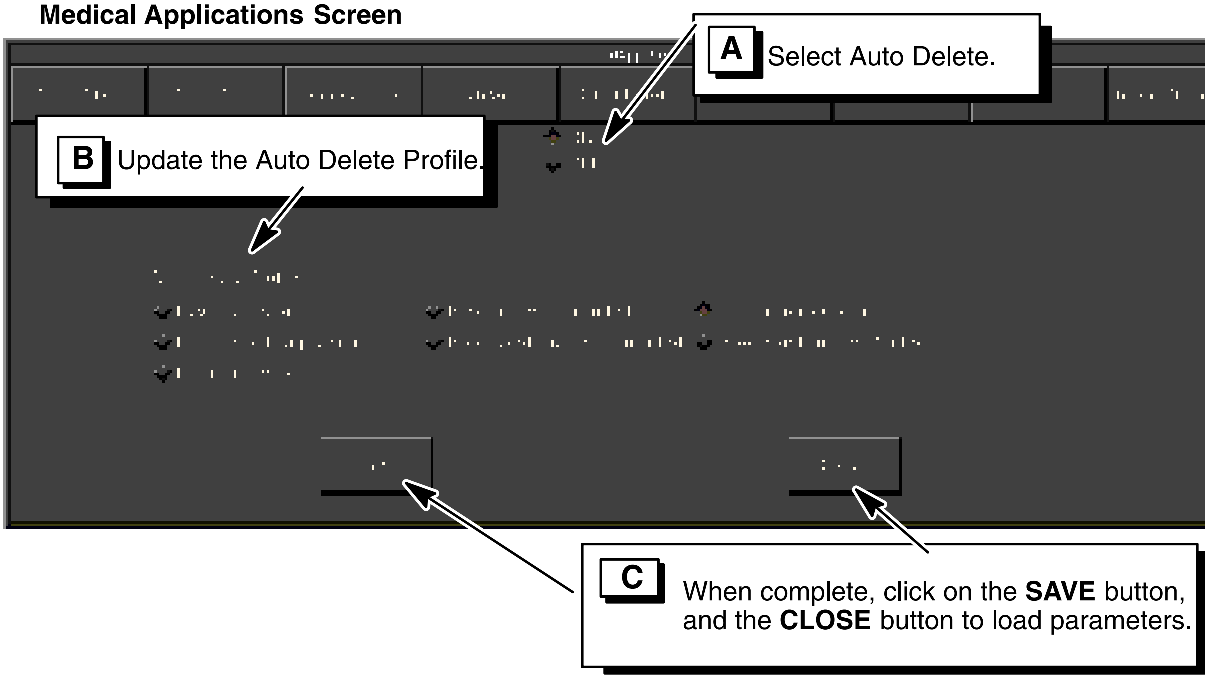
If there are not enough images that have been stored longer than the minimum number of hours, the deletion process will stop and not start again until the Upper Threshold is reached again.

– The AWS must be SHUTDOWN and re–started before any data changes can be recognized and loaded by the necessary sub–systems.

– Configuration of the Auto Delete process is a combination of the SUIF Configuration and the Medical Applications menu. See the screen below.

Note: Autodelete does not work on time base configuration only. It must be turned on at the Medical Applications menu, which requires a constraint selection.

Medical Applications Screen



Auto Delete On Image Send

Network hosts must have “Managed Send” on for the following selections:

– Raw Images Sent
– Processed Images Sent
– Both Images Sent

Auto Delete On Storage Commit

Network hosts must be set up for and support storage commit for the following selections:

– Raw Images Committed
– Processed Images Committed
– Both Images Committed

Auto Delete On Print

Images must be printed.

Note: If any image, in any series, in any study of the patient has an image marked as Quality check not OK, which results in the status flag (s, c, or f) not being set, the patient will not be queued for deletion.

SECTION 5
CD–R (CDROM) WRITER CONFIGURATION (SUN ULTRA 10 ONLY)

The Sun Ultra 10 workstation contains an internal CDROM drive. This drive is read–only and has no writing capability. If the customer wishes to archive image data to CDROM media, they must purchase the 'CD–R Writer' option that provides an external, write–capable, CDROM drive.

The SunBlade 150 workstation also contains an internal CDROM drive. However, this drive is both read and write capable. Therefore, there is no need for an external 'CD–R Writer' option for the SunBlade 150 workstation.

5-1 Prerequisites

Before configuring the CD–R Writer Option, verify the following are complete:

– CD–R Writer drive SCSI data cable is connected from the CD–R Writer to the AWS SCSI port.
– CD–R Writer power cord is connected from the CD–R Writer to the AWS power strip.
– CD–R Writer SCSI Bus ID is set to **2** (switch is located on back of CD–R Writer).
– CD–R Writer Power Switch is **ON**.
– CD–R Writer **KEYNUMBER** is available.
  > This must already be on–hand.
  > It is obtained from the OnLine Center after providing them with the system **hostid**.

5-2 Power–Up AWS

1. Power on the AWS by using the UPS power switch.
2. After the workstation completes power–up testing, verify that no LED's remain lit on the keyboard.

5-3 Reset AWS SCSI Bus

Reset AWS SCSI Bus as follows:

A Login as root:

Type the username at the console login prompt.

Type the password at the Password prompt.

Console Login Screen

```
LD_LIBRARY_PATH: Undefined  variable
Network configuration:
    Status    (1 = OK; 0 = KO)                     = 1
    Mode      (0 = half duplex; 1 = full duplex)  = 1
    Speed     (0 = 10MB; 1 = 100MB)                = 1
expr: syntax error
 /devices/pseudo/mm@0:null
The system is ready.
<hostname> console login:
Password:
```

B At the root prompt, type:

halt [Return]

Root Login Screen

```
LD_LIBRARY_PATH: Undefined  variable
Network configuration:
    Status    (1 = OK; 0 = KO)                     = 1
    Mode      (0 = half duplex; 1 = full duplex)  = 1
    Speed     (0 = 10MB; 1 = 100MB)                = 1
expr: syntax error
 /devices/pseudo/mm@0:null
The system is ready.
<hostname> console login: root
Password:
Last login: Wed May 19 17:31:30 on console
May 26 17:15:04 <hostname> login: ROOT LOGIN/ dev/console
Sun Microsystems Inc.   SunOS 5.5.1               (Generic May 1996)
You have mail
{hostname}[1] halt
```

Root Login Screen

C At the OK prompt, type:

boot –r [Return]

```
LD_LIBRARY_PATH: Undefined  variable
Network configuration:
    Status    (1 = OK; 0 = KO)                      = 1
    Mode      (0 = half duplex; 1 = full duplex)  = 1
    Speed     (0 = 10MB; 1 = 100MB)               = 1
expr: syntax error
 /devices/pseudo/mm@0:null
The system is ready.
<hostname> console login: root
Password:
Last login: Wed May 19 17:31:30 on console
May 26 17:15:04 {hostname} login: ROOT LOGIN/ dev/console
Sun Microsystems Inc.   SunOS 5.5.1                (Generic May 1996)
You have mail
{hostname}[1] halt
{month day time} {hostname} halt: halted by root
{month day time} {hostname} sysload: going down on signal
{month day time} rpcbind: rpcbind terminating on signal
syncing file systems ....... done
Program Terminated
OK []  boot -r
```

The system automatically reboots to the <hostname> console login screen.

5-4 Install CD–R Writer Software Drivers

1. Install CD–R Writer Software Drivers as follows:

A Start Application Software:

Type the user name at the console login prompt.

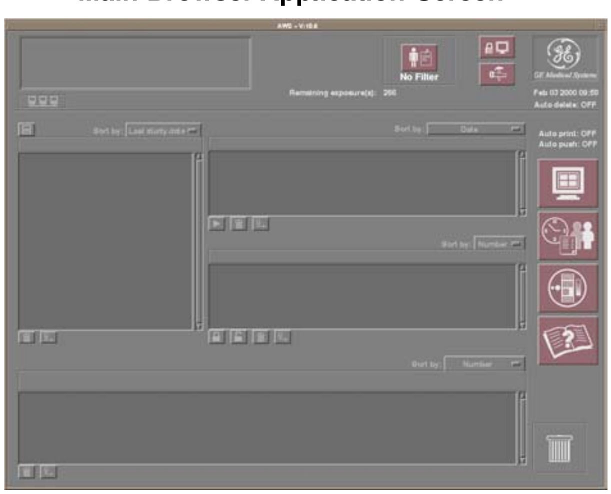
Type the password at the Password prompt.

Console Login Screen

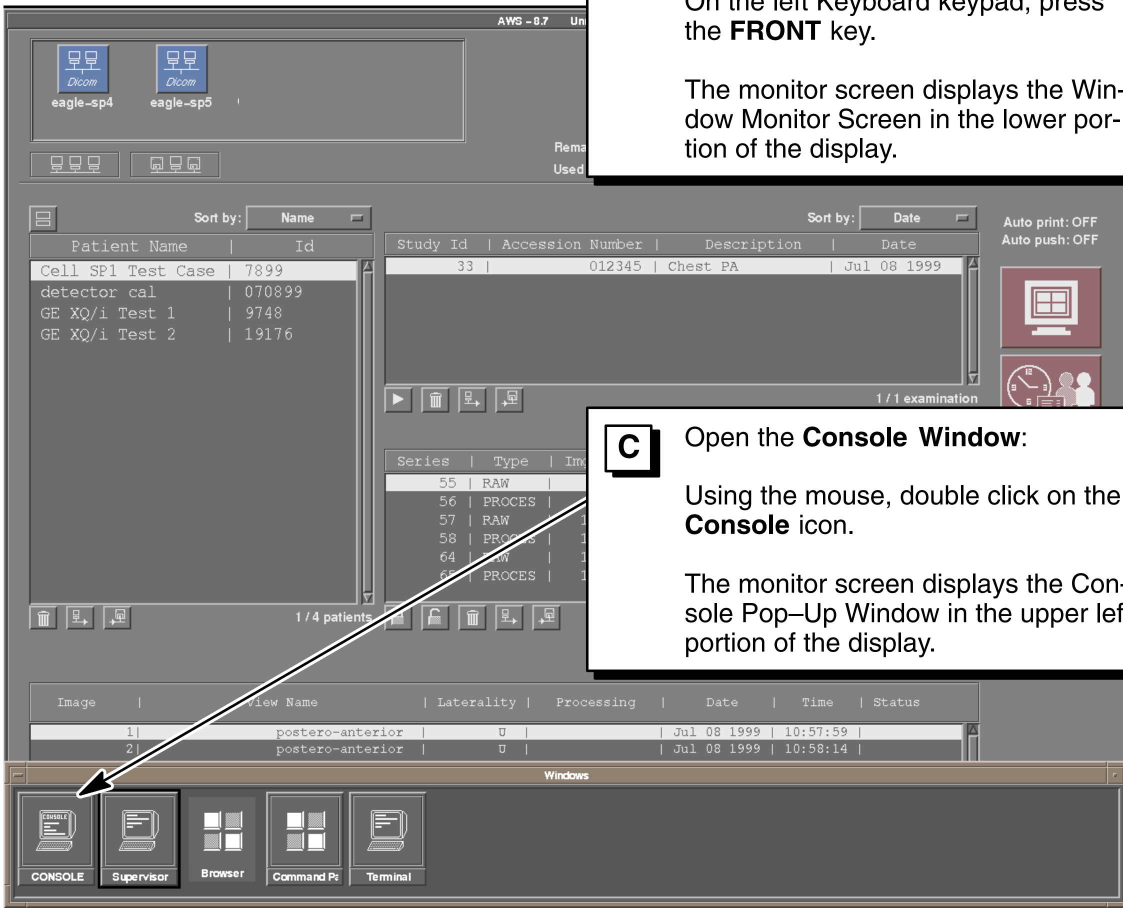
```
LD_LIBRARY_PATH: Undefined  variable
Network configuration:
    Status    (1 = OK; 0 = KO)                      = 1
    Mode      (0 = half duplex; 1 = full duplex)  = 1
    Speed     (0 = 10MB; 1 = 100MB)               = 1
expr: syntax error
 /devices/pseudo/mm@0:null
The system is ready.
<hostname> console login:
Password:
```

After 30 seconds, the monitor displays the Main Browser Screen.

Main Browser Application Screen



Main Browser Application Screen With Window Monitor Screen



B Open the **Window Monitor Screen**:

On the left Keyboard keypad, press the **FRONT** key.

The monitor screen displays the Window Monitor Screen in the lower portion of the display.

C Open the **Console Window**:

Using the mouse, double click on the **Console** icon.

The monitor screen displays the Console Pop–Up Window in the upper left portion of the display.

D Login as su – root:

Hit **[Return]** to display the prompt.

Type login name **[Return]** at the prompt.

Type the password at the Password prompt.

E Change directory to **install**:

Type **cd export/home/sdc/install [Return]** at the prompt.

Console Pop–Up Window

```
{hostname} [1}
Password ;
{month day time} {hostname} su: 'su root' succeeded for sdc on /dev/pts/0
Sun Microsystems Inc.   SunOS 5.5.1                (Generic May 1996)
You have mail
{sdc@<hostname>}[1] cd export/home/sdc/install
{sdc@<hostname>}[2] ./install.cdr 12345678
```

F Install CD–ROM Software Drivers:

Type **./install.cdr xxxxxxxx [Return]** at the prompt using the KEYNUMBER (xxxxxxxx) provided by the On–Line Center.

Note: If the monitor displays “DRIVERS ALREADY INSTALLED”, type **./uninstall.cdr**, type **y [Return]** for package removal prompts, and repeat step F.

2. Re–Boot the Workstation as follows:

A Re–Boot the Workstation:

Type **reboot -- -r [Return]** at the prompt.

During the reboot cycle, verify the screen displays the CD–R Writer declaration.

Console Pop–Up Window

```
{hostname} [1]
Password ;
{sdc@<hostname>}  [1] cd export/home/sdc/install
{sdc@<hostname>}  [2] ./install.cdr 12345678
.... CDR OPTION SUCCESSFULLY INSTALLED  ....
****************************************************************************
WARNING: You have to shutdown the system before using CDR, by the command:
reboot -- -r
****************************************************************************
{sdc@<hostname>}[3] reboot  --  -r
```

```
KPAR_cdr0:    Read-Only Direct Access device as target 2,lun 0
KPAR_cdr0:    Identification YAMAHA xxxxxx (model number)
```

B Start Application Software:

Type the user name at the console login prompt.

Type the password at the Password prompt.

After 30 seconds, the monitor displays the Main Browser Screen.

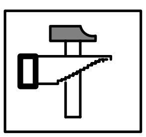
Console Login Screen

```
LD_LIBRARY_PATH: Undefined  variable
Network configuration:
    Status    (1 = OK; 0 = KO)                     = 1
    Mode      (0 = half duplex; 1 = full duplex)   = 1
    Speed     (0 = 10MB; 1 = 100MB)                = 1
expr: syntax error
/devices/pseudo/mm@0:null

+---------------------------------------------------------------------------+
      ADS Routes Configuration
+---------------------------------------------------------------------------+

The system is ready.
<hostname> console login:
Password:
```

5-5 Enable CD–R Writer Icons on Browser Screen

Enable CD–R Writer Icons on Browser Screen as follows:

TOOLS ICON



TOOLS MENU

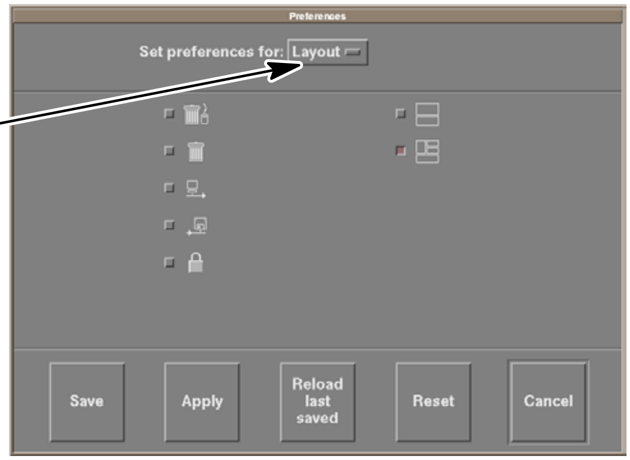
A Click on **Tools** icon in the upper right corner of browser

Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

B Move cursor to **Browser preferences** selection and click mouse button

Browser Preferences Selection Screen – Layout Selections

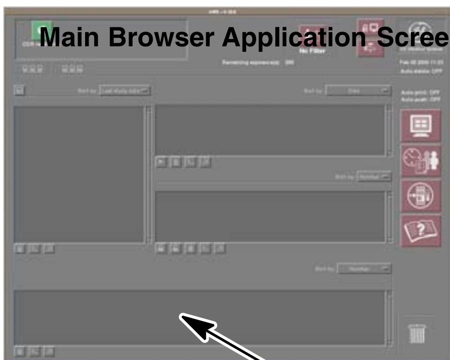
The monitor displays one of the **Browser Preferences selection** pop–up screens

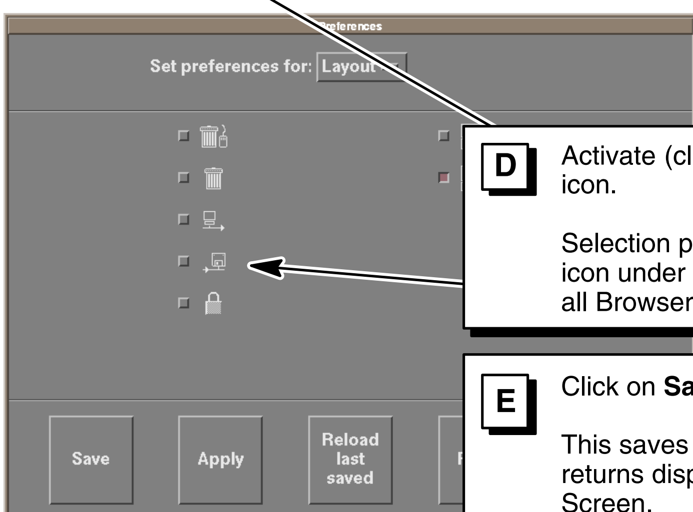


C

The selection should default to **Layout** otherwise, click on **Layout** to set preferences for browser icon display selection

Main Browser Application Screen





D

Activate (click on) **Save on CD** icon.

Selection places the **Save on CD** icon under each Panel Display on all Browser Screens.

E

Click on **Save** button.

This saves the configuration and returns display to the Main Browser Screen.

Browser Preferences Selection Screen – Layout Selections

SECTION 6
BAR CODE READER CONFIGURATION

6-1 HHP IMAGETEAM 3800/3900 Bar Code Reader (used with SunBlade 150)

The HHP IMAGETEAM 3800/3900 User's Guide that is supplied with the bar code reader is required.

6-1-1 Adding Carriage Return for the HHP IMAGETEAM 3800/3900 Bar Code Reader

If the customer requires the addition of a carriage return to each scanned line, use the following procedure to program the HHP IMAGETEAM bar code reader:

1. Use the bar code reader to scan the bar code shown on page 4–3 in the User's Guide.

6-1-2 Setting Factory Defaults for the HHP IMAGETEAM 3800/3900 Bar Code Reader

To program the HHP IMAGETEAM bar code reader back to the factory default state, use the following procedure:

1. Use the bar code reader to scan the bar code shown on page 12–1 in the User's Guide.
2. **No further configuration is required for normal use of the HHP IMAGETEAM bar code reader.**

6-1-3 Character Stripping for the HHP IMAGETEAM 3800/3900 Bar Code Reader (optional)

If the customer requires character stripping of the first character of a bar code, use the following procedure to program the HHP IMAGETEAM bar code reader:

1. Use the bar code reader to scan the "Enter Data Format" bar code on page 5–4 in the User's Guide.
2. Use the bar code reader to scan the following bar codes on the Programming Chart, which is located at the rear of the User's Guide:

   0 0 9 9 9 9 9 9 9 9 F 5 0 1 F 1 0 0 Save

3. If character stripping is no longer desired, use the bar code reader to scan the "Factory Default" bar code (as shown above) to return the bar code reader to basic configuration (factory default state) for the Revolution system.

6-2 Unitech 690 USB Bar Code Reader (used with SunBlade 150)

6-2-1 Configuration Procedure for the Unitech 690 USB Bar Code Reader

Reset to Factory Defaults

To program the Unitech 690 USB bar code reader back to the factory default state, use the following procedure:

1. Use the bar code reader to scan the bar code shown below.

Factory Default

2. **No further configuration is required for normal use of the Unitech 690 USB bar code reader.**

6-2-2 Character Stripping for the Unitech 690 USB Bar Code Reader (optional)

If the customer requires character stripping of the first character of a bar code, use the following procedure to program the Unitech 690 USB bar code reader:

1. Use the bar code reader to scan the two bar codes shown below: top one first, bottom one second.

Setup Chart

...OF000C402

C7C8.

2. If character stripping is no longer desired, use the bar code reader to scan the “Factory Default” bar code (as shown above) to return the bar code reader to basic configuration (factory default state) for the Revolution system.

6-3 Welch Allyn Bar Code Reader (used with Sun Ultra 10)

6-3-1 Required Material

The Master Universal Programming Guide that is supplied with the Bar Code Reader is required.

6-3-2 Configuration Procedure for Welch Allyn Bar Code Reader

1. Power on the Link Box (refer to page 38, step 6 of the vendor manual – Master Universal Programming Guide).
2. Use the bar code reader to scan the “Default Configuration” bar code found at the bottom center of page 6 in the Master Universal Programming Guide.
3. Scan the “START” configuration (page 39 of Master Universal Programming Guide).
4. Scan “Keyboard–Wedge Mode Activated” (page 39 of Master Universal Programming Guide).
5. Scan 0 – 9 – 8 [SUN Keyboard code] (page 39 of Master Universal Programming Guide).
6. Scan “END” (page 39 of Master Universal Programming Guide).

Note: For the site, the Welch Allyn Bar Code Reader is pre–configured to read the six formats found on page 12 of the Master Universal Programming Guide.

6-3-3 Character Stripping for the Welch Allyn Bar Code Reader (optional)

If the customer requires character stripping of the first character of a bar code, use the following procedure to program the Welch Allyn bar code reader:

Use the bar code reader to scan the following bar codes found in the Master Universal Programming Guide:

1. Turn to Chapter 7 (The Editing Mode) in the Master Universal Programming Guide.
2. On the lower left corner of the page, scan ”Start”.
3. On the ’Phase A’ page (page 96) , scan ”Format #1 start of construction”.
4. On the ’Phase B1’ page, scan ”New selection”.
5. On the ’Phase B2’ page, scan ”Variable Number Accepted”.
6. On the ’Phase B3’ page, scan ”All Ports”.
7. On the ’Phase B4’ page, scan ”No match required with pre–defined char”.
8. On the ’Phase C0’ page, scan ” 2 Fields”.
9. On the ’Phase C1–Define Field #1’ page, scan ”Access” (With A Fixed Number Of Characters).
10. On the rear cover of book (Numeric pad), scan ”1”.
11. On the ’Phase C1–Define Field #1’ page, scan ”Validation” (With A Fixed Number Of Characters).
12. On the ’Phase C1–Define Field #2’ page, scan ”Yes” (Or This Field Is The Last Variable Field).
    Make sure this is scanned from <u>Define Field #2.</u>
13. On the ’Phase C3’ page, scan ”Access” (Number Of Fields To Be Transmitted).
14. On the rear cover of book (Numeric pad), scan ”1”.
15. On the ’Phase C3’ page, scan ”Validation” (Number Of Fields To Be Transmitted).
16. On the ’Phase C3’ page, scan ”Access” (Field Positions And Cancellation).

17. On the 'Phase C3' page, scan "Field #2".
18. On the 'Phase C3' page, scan "Validation" (Field Positions And Cancellation).
19. On the 'Phase D' page, scan "End of Construction of Format #1".
20. On the 'Phase E' page, scan "Activated on Format #1".
21. On the lower right corner of the page, scan "End".

6-3-4 Reset to Basic Configuration

If character stripping is no longer desired, use the bar code reader to scan the following bar codes. This will return the bar code reader to basic configuration for the Revolution system.

1. Use the bar code reader to scan the “Default Configuration” bar code found at the bottom center of page 6 in the Master Universal Programming Guide.
2. Scan the “START” configuration (page 39 of Master Universal Prog. Guide).
3. Scan “Keyboard–Wedge Mode Activated” (page 39 of Master Universal Prog. Guide).
4. Scan 0 – 9 – 8 [SUN Keyboard code] (page 39 of Master Universal Prog. Guide).
5. Scan “END” (page 39 of Master Universal Prog. Guide).

SECTION 7

AWS MONITOR SET–UP WITH FLAT PANEL MONITOR

7-1 Prerequisites

Before starting AWS Monitor Set–Up, verify the following are complete:

– AWS, monitor, keyboard, mouse are installed and interconnected.

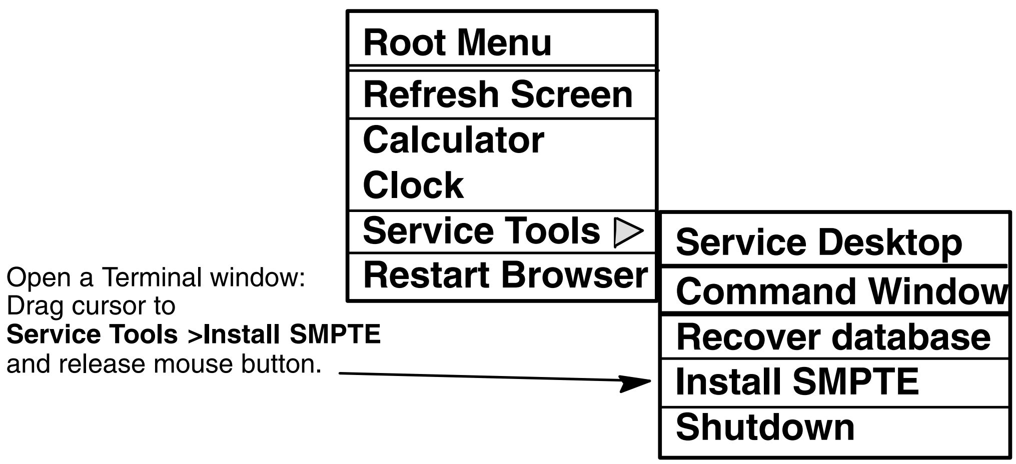
– AWS power connection (120 VAC or 220 VAC) is connected to control booth AC receptacle and that the receptacle has power.

– AWS has been powered up and monitor has been on for at least 20 minutes.

– Make sure the monitor is located where it has the proper ambient light conditions – dim room with no echoes on the monitor. Day light must be avoided since it affects the IQ of the monitor.

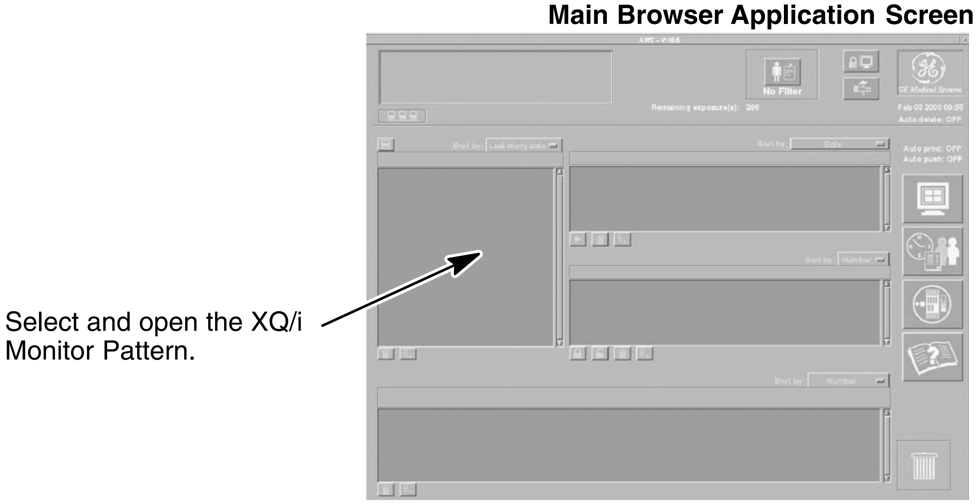
7-2 Display the SMPTE Test Pattern on the Monitor

1. Open a Terminal window by first minimizing the Main Browser and all other windows. Then, select **Install SMPTE** from the Root Menu, as shown:



2. On the Main Browser screen, select and open the XQ/i Monitor Pattern from the Patient Name window.

Main Browser Application Screen



3. View the SMPTE pattern per Illustration 1–1.

ILLUSTRATION 1–1
SMPTE PATTERN ON BROWSER

AWS Monitor SMPTE Test Pattern

7-3 NEC 1880SX Calibration

1. Verify that the SMPTE image is visible on the monitor.

   For more information about OSM (On–Screen Manager) and Controls, see the NEC MultiSync LCD1880SX User's Manual.

Reset Monitor

2. Press **+** , **–** , ◀ , or ▶ keys to access the OSM pop–up menu.
3. Press **EXIT** ▶ to select the second **Tools** icon.
4. Press the **SELECT/1<–>2** button and ▶ to select the **Reset** icon.
5. Press the **SELECT/1<–>2** button and the Reset button to reset the monitor.

Verify Settings

6. Press **EXIT** ▶ to select **i** (info) tab.
7. Press the **SELECT/1<–>2** button.
8. Press **CONTROL** ◀ or ▶ to select **Mode** on the pop–up menu.
9. Press **SELECT/1<–>2** (press either button one time only) to view settings.

10. Verify that the resolution is 1280 x 1024 and the vertical frequency is either 60Hz or 75Hz.

Position Adjust

11. Press **EXIT** twice to select the **Position Controls** tab.
12. Press the **SELECT/1<–>2** button.
13. Press ▶ followed by **+** or **–** to adjust image left/right position, down/up position, H. size, fine and auto settings.

Color Adjust

14. Press **EXIT** once followed by ▶ to select **RGB** tab.
15. Press the **SELECT/1<–>2** button.
16. Press **CONTROL** ◀ or ▶ to select **Native** on pop–up menu.

Brightness/Contrast Adjust

17. Press **EXIT** once.
18. Press **+** or **–** to adjust image brightness**.**
19. Press **CONTROL** ◀ or ▶ to select **Auto** on pop–up menu.
20. Press the **SELECT/1<–>2** button.
21. Press **CONTROL** ◀ or ▶ to select **Brightness Adjust** on pop–up menu.
22. Press **ADJUST +** or **–** to adjust brightness.
23. Adjust the brightness so that the 95% white square is visible into the 100% white. If a spot meter is available, measure the luminance in the white and verify that it is between 135 Cd/m^2 and 205 Cd/m^2. See Illustration 1–1.
24. Press **CONTROL** ◀ or ▶ to select **Contrast Adjust** on pop–up menu.
25. Press **ADJUST +** or **–** to adjust contrast.
26. Adjust the contrast so that the 5% black square is visible into the 0% black. If a spot meter is available, measure the luminance in the black and verify that it is between 0.8 Cd/m^2 and 1.2 Cd/m^2. See Illustration 1–1.
27. Repeat steps 21 through 26 until the both conditions are met at the same time.
28. Do not change other monitor settings.

SECTION 8
AWS MONITOR SET–UP FOR GE # 2190125–3 FROM IMAGE SYSTEMS CORP

8-1 Prerequisites

Before starting AWS Monitor Set–Up, verify the following are complete:

- AWS, monitor, keyboard, mouse are installed and interconnected.
- AWS power connection (120 VAC or 220 VAC) is connected to control booth AC receptacle and that the receptacle has power.
- AWS has been powered up and monitor has been on for at least 20 minutes.

8-1-1 Required Tools

The following tools are required to properly set–up the AWS Monitor: Flexible ruler with metric scale

8-1-2 Supplied Tools

The following tools are provided with each Revolution XQ/i System to aid in setting up the AWS Monitor:

- Image System Remote Commander (RC1) **2190157**
- Grey reference card 18% (or equivalent) **2110360**

8-2 Using the Supplied Remote Commander (RC1)

Adjustments to the AWS Monitor are made using a hand–held digital controller.

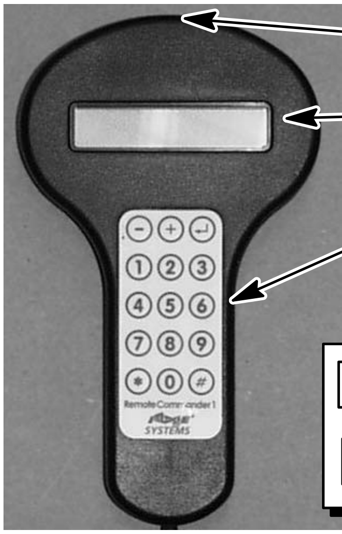
When connected to the monitor, the RC1 accesses microprocessors in the monitor electronics. Internal parameters may be monitored and adjusted using the the service tool keypad and display. The RC1 also functions as a light meter.

See Illustration 1–2 for a descriptive view of the Remote Commander RC1 Monitor Calibration Tool. Refer to Table 1–1 for a listing of functions available with the tool.

8-3 Connecting Remote Commander to Monitor

- Remove the rear connector access panel on the back of the monitor.
- Connect the 3.5 mm jack plug on the RC1 tool to the **Calibration** connector on the back of the monitor.

ILLUSTRATION 1–2
REMOTE COMMANDER RC1 MONITOR CALIBRATION TOOL



Selecting Between Processors:

1. Press **#** key
Tool displays: ***Processor?***

2. Press **1** to select the I/O Interface Board (Unit 1) or ...

Press **2** to select the Remote Commander (RC1).

Selecting Functions Directly:

3a. Press ***** key
Tool displays: ***Function??***

4. Press two digit function code (See Table 1–1).

Selecting Functions by Scrolling:

3b. Press ↵ key

Tool displays next function name in list for the Processor Unit (See Table 1–1).

TABLE 1–1
REMOTE COMMANDER RC1 MONITOR CALIBRATION TOOL FUNCTIONS & CONTROLS

Unit	Select Code	Display	Parameter Description	Value	Adjustable?	Scroll
Unit 1	1	Unit 1:	I/O Interface Board Processor			
	00	Unit 1:	Name & Software Revision	IP3–C	No	↓
	01	Date:	Software Revision Date	(month/day/year)	No	↓
	02	Hours:	Total Hours of Operation	0 – 9999	No	↓
	03	Cycles:	Total # of ON/OFF cycles	0 – 9999	No	↓
	10	Vert Size	Vertical Size	–128 to +127	Yes	→ 1 ↓
	11	Vert Pos	Vertical Position	–128 to +127	Yes	2 ↓
	12	Horiz Size	Horizontal Size	–128 to +127	Yes	3 ↓
	13	Horiz Pos	Horizontal Position	–128 to +127	Yes	4 ↓
	20	White level	Video gain brightness intensity	–128 to +127	Yes	5 ↓
	21	Black level	Raster brightness intensity	–128 to +127	Yes	6 ↓
	22	Rotation	Magnetic field correction	–128 to +127	Yes	7 ↓
	30	Hsync:	Horizontal input frequency	50 – 150 Hz	No	8 ↓
	31	Vsync:	Vertical input frequency	45 – 255 Hz	No	9 ↓
	40	B/W Mode:	A/B brightness mode switch	A or B	Yes	↑ 10
Unit 9	9	Unit 9:	Remote Commander Processor			
	00	Unit 9:	Name & Software Revision	RC1–E	No	↓
	01	Date:	Software Revision Date	(month/day/year)	No	↓
	10	Lambda:	Light meter function	0 – 500 cd/m^2	Yes	→ 1 ↓
	11	Black value	Display black value setting	value cd/m^2	Yes	2 ↓
	12	White value	Display white value setting	value cd/m^2	Yes	↑ 3
	21	Set black	Set black value (use +/– keys)	value cd/m^2	Yes	Direct
	22	Set white	Set white value (use +/– keys)	value cd/m^2	Yes	Direct
	24	Select unit	Toggles units: cd/m^2 or ft Lamberts	Cd or fL	Yes	Direct

8-4 Entering AWS Service Desktop

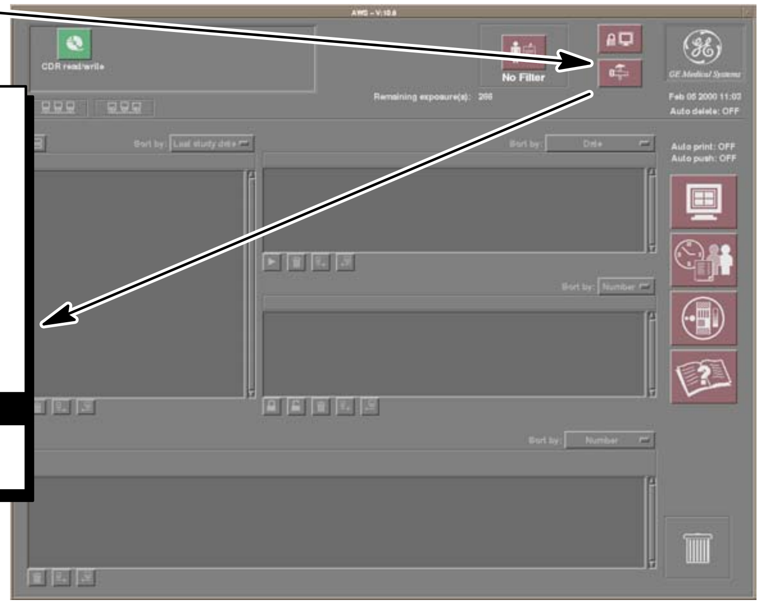
1. Enter the **Calibration Home Page Screen** by selecting the **Service Desktop** selection from the Tools menu on the Main Browser Screen:

1. Click on the **Tools Icon**

The monitor displays the Tool Menu

- **Filter management**
- **Browser preferences**
- **Messages**
- **Network management**
- **Worklist Management**
- **Printer mangement**
- **Medical Application preferences**
- **Edit Patient**
- **Set patient anonymous**
- **Service desktop**
- **Restart Browser**
- **Shutdown**

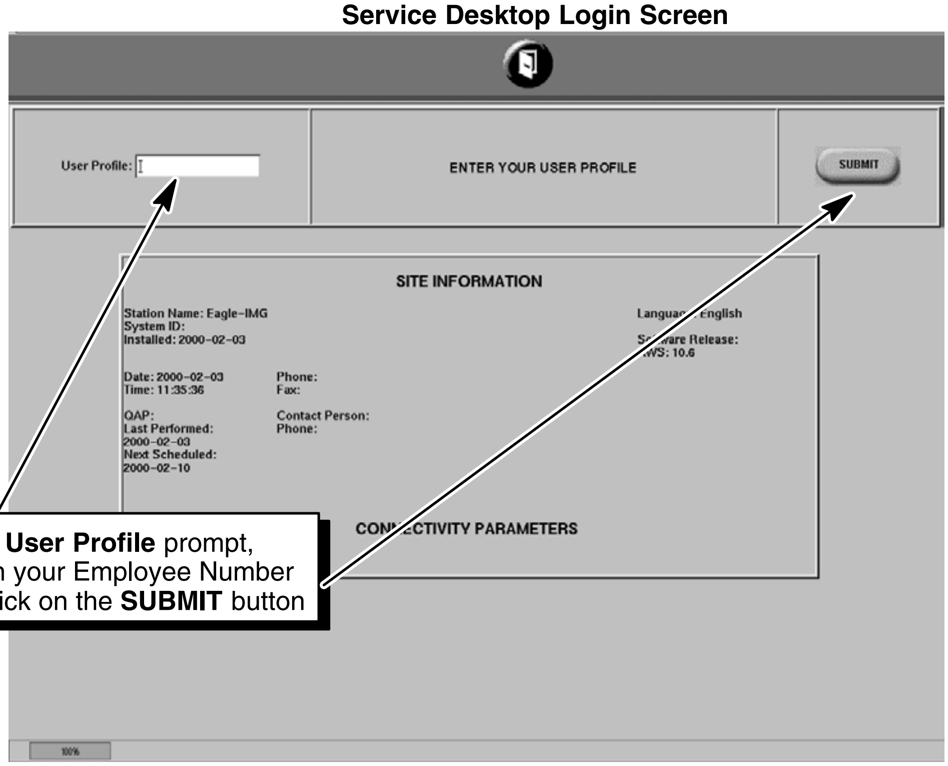
Main Browser Application Screen



2. Drag cursor to **Service desktop** selection and release mouse button

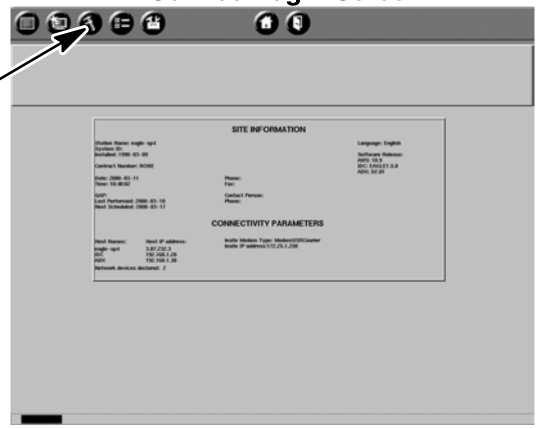
After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen



3. At the **User Profile** prompt, type in your Employee Number and click on the **SUBMIT** button

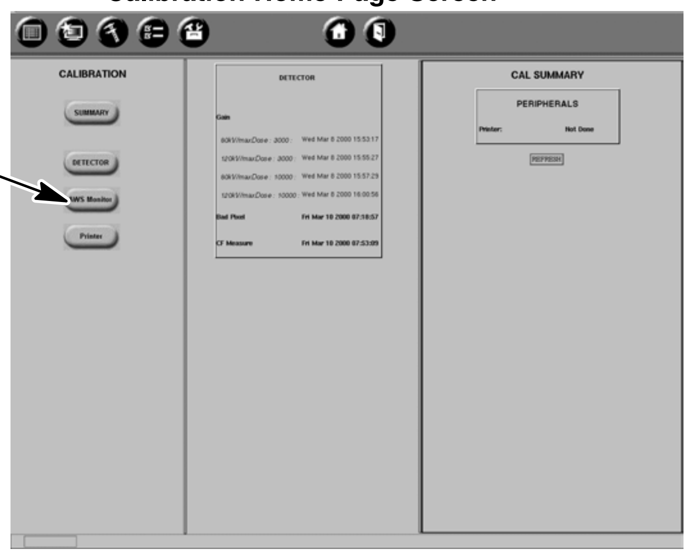
Service Login Screen



1. Click on the **CALIBRATION** icon button to display the **Calibration Home Page Screen**

2. Enter the **AWS Monitor Brightness & Contrast calibration** routine from the Calibration Home Page Screen:

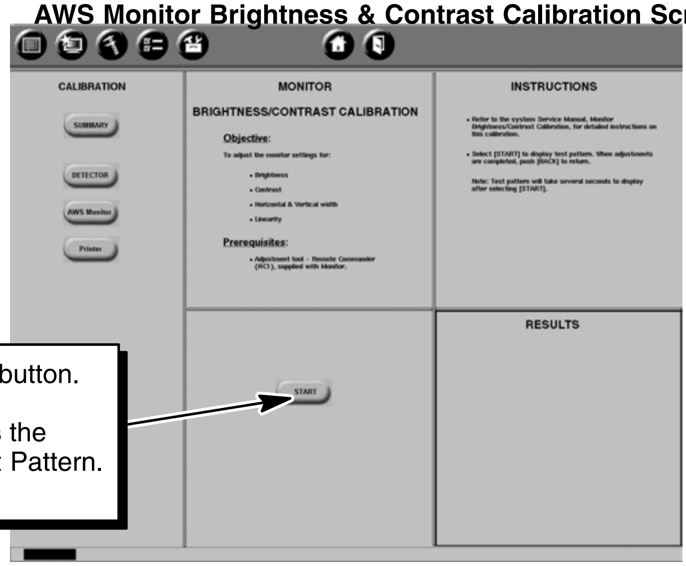
Calibration Home Page Screen



1. Click on the **AWS Monitor** button

The monitor displays the **AWS Monitor Brightness & Contrast Calibration Screen**

AWS Monitor Brightness & Contrast Calibration Screen



2. Click on the **START** button.

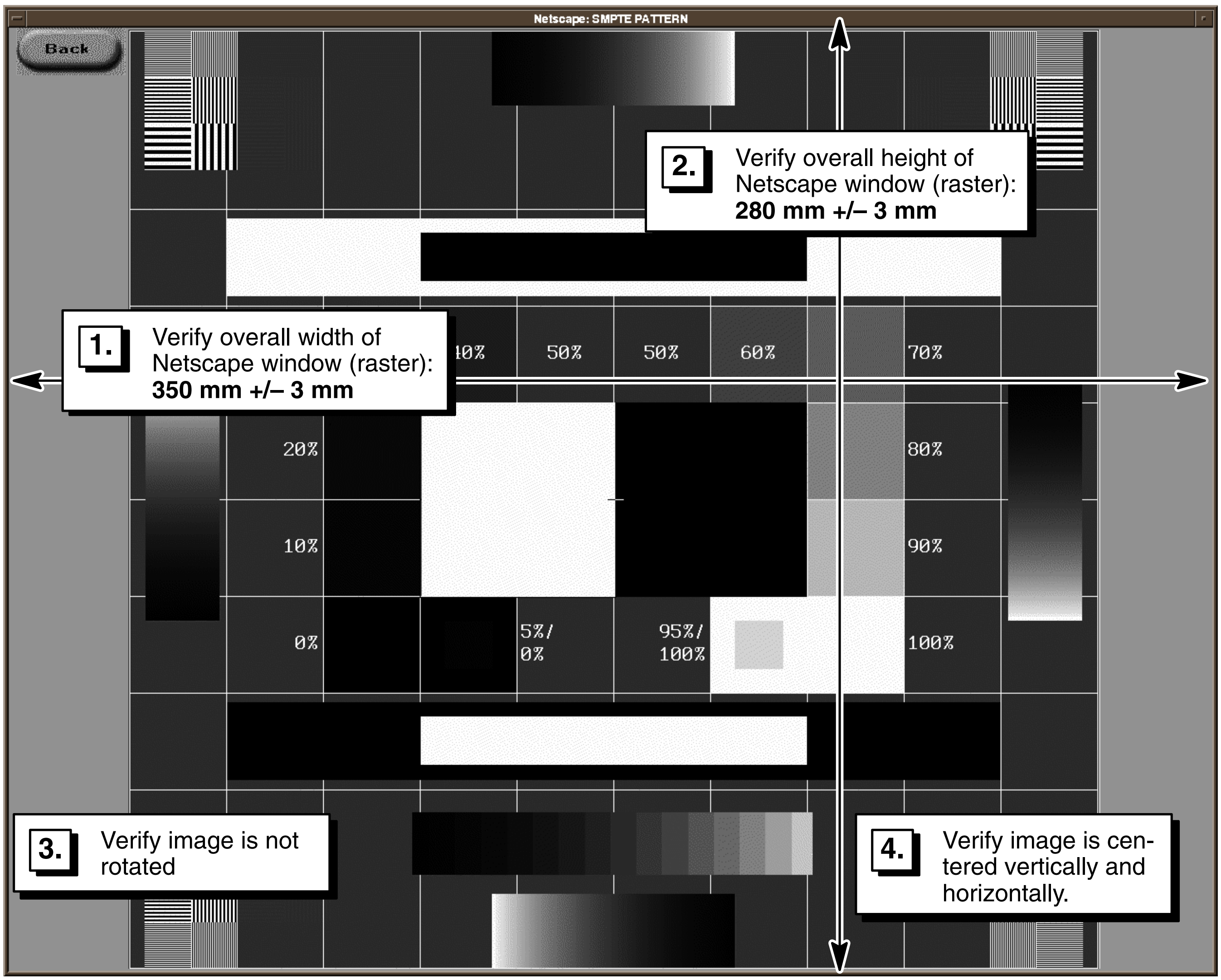
The monitor displays the SMPTE Monitor Test Pattern. See Illustration 1–3.

8-5 AWS Monitor Geometry Check/Adjust

8-5-1 Check Pattern Width, Height, Rotation, and Centering

Using a flexible ruler, verify SMPTE pattern geometry on monitor meets specifications (Width, Height, Rotation, Centering) as shown in Illustration 1–3. Adjust as required using the Remote Commander functions.

ILLUSTRATION 1–3
AWS MONITOR SMPTE TEST PATTERN – GEOMETRY ADJUSTMENTS



8-6 AWS Monitor Linearity Checks

8-6-1 Check Horizontal & Vertical Linearity

1. Using a flexible ruler, measure and record the length of the line segments listed in Table 1–2. See Illustration 1–4 for line segment end point notations.
2. Verify horizontal and vertical linearity specifications are met by calculating the differences between the line segments as listed in Table 1–2.

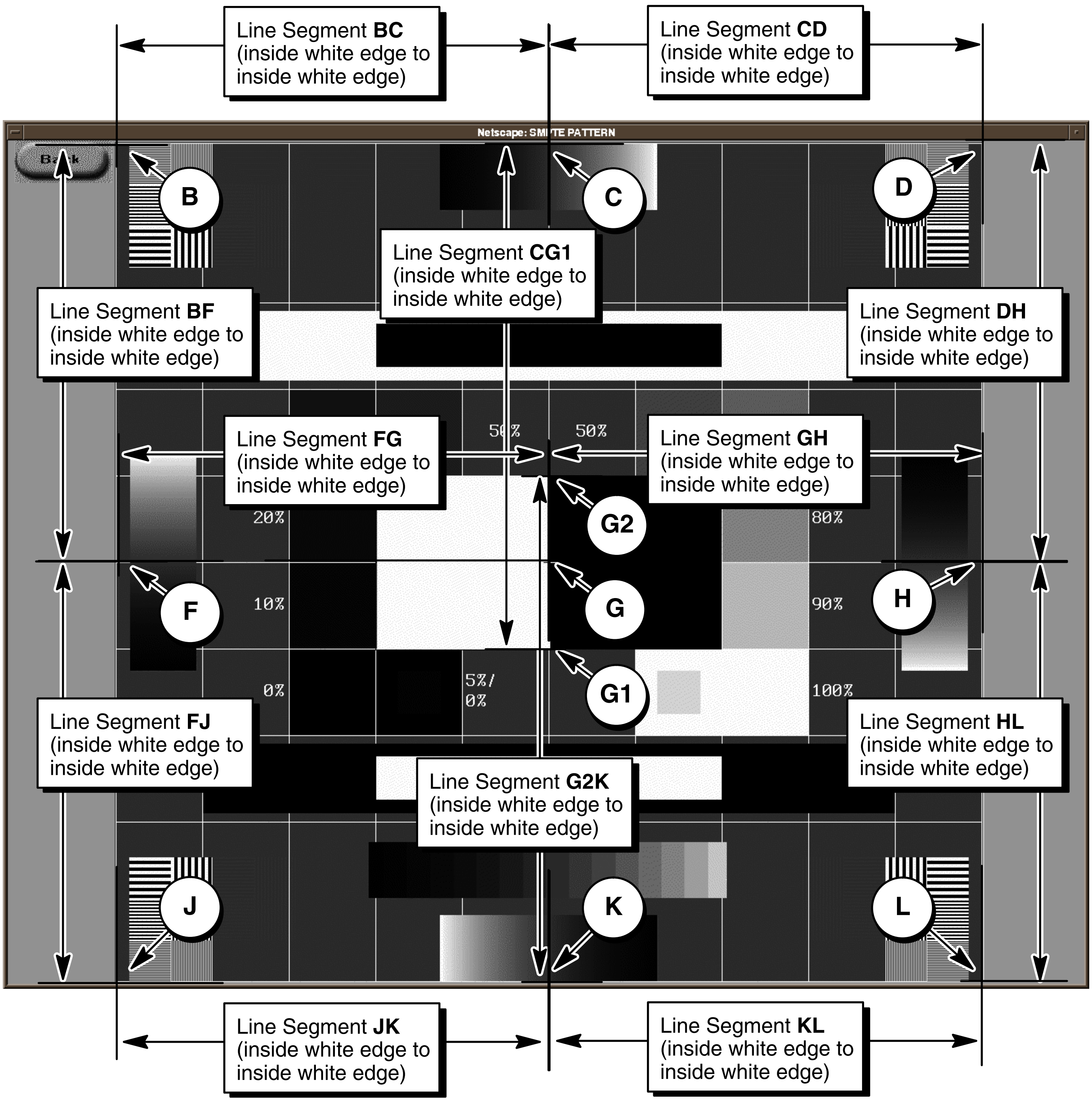
NOTICE

Avoid Customer dissatisfaction with Image Quality!
There are no linearity adjustments on the monitor if the monitor fails these horizontal or vertical linearity specifications. If the calculated linearity value is greater than specified, replace the monitor to ensure optimum image quality viewing for the customer.

TABLE 1–2
AWS MONITOR HORIZONTAL AND VERTICAL LINEARITY CHECKS

Axis	1st Line Segment		2nd Line Segment		Linearity Verification		
	Points	Record	Points	Record	Calculate	Record	Specifications
Horizontal	B to C	mm	C to D	mm	BC – CD	mm	+/– 3 mm
	F to G	mm	G to H	mm	FG – GH	mm	+/– 1.5 mm
	J to K	mm	K to L	mm	JK – KL	mm	+/– 3 mm
Vertical	B to F	mm	F to J	mm	BF – FJ	mm	+/– 3 mm
	C to G1	mm	G2 to K	mm	CG1 – G2K	mm	+/– 1.5 mm
	D to H	mm	H to L	mm	DH – HL	mm	+/– 3 mm

ILLUSTRATION 1–4
AWS MONITOR SMPTE TEST PATTERN – HORIZONTAL & VERTICAL LINEARITY CHECKS



8-7 Control Booth Ambient Light Estimation

NOTICE

Avoid Customer dissatisfaction with Image Quality!

Ensure that the ambient light around the monitor is less than 50 lux. If the ambient light is greater than 50 lux, the image quality on the monitor display cannot be guaranteed. If this test demonstrates that a level of greater than 50 lux for the ambient light around the monitor, inform the customer of this condition.

In addition, monitor screen luminance cannot exceed 275 Cd/m^2 (80 fL) without loss of resolution!

8-7-1 Set–Up Normal Working Conditions Ambient Light

– Verify the AWS Monitor is placed in the control booth viewing area as it will be in normal use.

– Verify lighting in the area is at a level normally desired by the hospital staff.

8-7-2 Set–Up Remote Commander for use as a Light Meter

Set the Remote Commander for use as a light meter measuring in cd/m^2 units:

1. Press: **# 9** keys to select the RC1 processor.
2. Press: *** 10** keys to select the light measurement function.
3. Press: *** 24** keys to select the unit select function.
4. Press: **+ or –** keys to toggle the selection until the display indicates **cd**
   NOTE: 1 cd/m2 = 3.4 fL

8-7-3 Measure Ambient Light (with gray card)

1. Place the gray reference card against (and parallel to) the monitor screen.
2. Point the meter toward the gray reference card at approximately 300 mm (12 inches) from the card. Ensure there is no shadow on the measurement surface (yourself, for example). ***Verify the meter reads less than 2.8 cd/m^2***. See Table 1–3.

TABLE 1–3
DETERMINING AMBIENT LIGHT VALUES USING LIGHT METER WITH GRAY REFERENCE CARD (2110360)

Basic Formula	Ambient Light Value (IA in lux)	Reflected Ratio (RR for gray card)	Measured Light (ML)	
			in cd/m2	in Foot Lamberts (1 cd/m^2 = 3.4 fL)
IA = π x ML/RR	35 lux	0.18	2.0 cd/m^2	6.8 fL
	40 lux	0.18	2.3 cd/m^2	7.8 fL
	45 lux	0.18	2.6 cd/m^2	8.8 fL
	50 lux	0.18	**2.8 cd/m^2**	**9.5 fL**
	55 lux	0.18	3.1 cd/m^2	10.9 fL

8-7-4 Measure Ambient Light (without gray card)

- Physically rotate the monitor left or right to 90 degrees.
- Point the meter toward the side of the monitor cover at approximately 300 mm (12 inches) from the cover surface. Ensure there is no shadow on the measurement surface (yourself, for example). ***Verify the meter reads less than 12 cd/m²***. See Table 1–4.

TABLE 1–4
DETERMINING AMBIENT LIGHT VALUES USING LIGHT METER AND MONITOR REAR COVER SURFACE

Basic Formula	Ambient Light Value (IA in lux)	Reflected Ratio (RR for monitor rear cover)	Measured Light (ML)	
			in cd/m2	in Foot Lamberts (1 cd/m² = 3.4 fL)
IA = π x ML/RR	35 lux	0.75	8.3 cd/m²	28 fL
	40 lux	0.75	9.5 cd/m²	32 fL
	45 lux	0.75	11 cd/m²	36 fL
	50 lux	0.75	**12 cd/m²**	**41 fL**
	55 lux	0.75	13 cd/m²	44 fL

8-8 Brightness and Contrast Adjustment

8-8-1 Set–Up Remote Commander as a Light Meter

Set the Remote Commander for use as a light meter measuring in cd/m² units:

1. Press: **# 9** keys to select the RC1 processor.
2. Press: *** 10** keys to select the light measurement function.
3. Press: *** 24** keys to select the unit select function.
4. Press: **+ or –** keys to toggle the selection until the display indicates: **cd**
   NOTE: 1 cd/m2 = 3.4 fL

8-8-2 Set B/W Mode

Set the Remote Commander **B/W Mode** to **A**:

1. Press: **# 1** keys to select the Interface Module processor.
2. Press: *** 40** keys to select the B/W Mode function.
3. Press: **+ or –** keys to toggle the selection until the display indicates: **A**

8-8-3 Set Stored Black & White Values

Set the Stored Black and White values on Remote Commander:

1. Press: **# 9** keys to select the RC1 processor.
2. Press: *** 21** keys to select Black Level calibration.
3. *Press and hold* : **+ or –** keys until the display indicates: **1**

4. Press: *** 22** keys to select White Level calibration.
5. *Press and hold* : **+ or –** keys until the display indicates: **171**
   NOTE: This value is equivalent to 50 Foot Lamberts

8-8-4 Check Stored Black & White Values

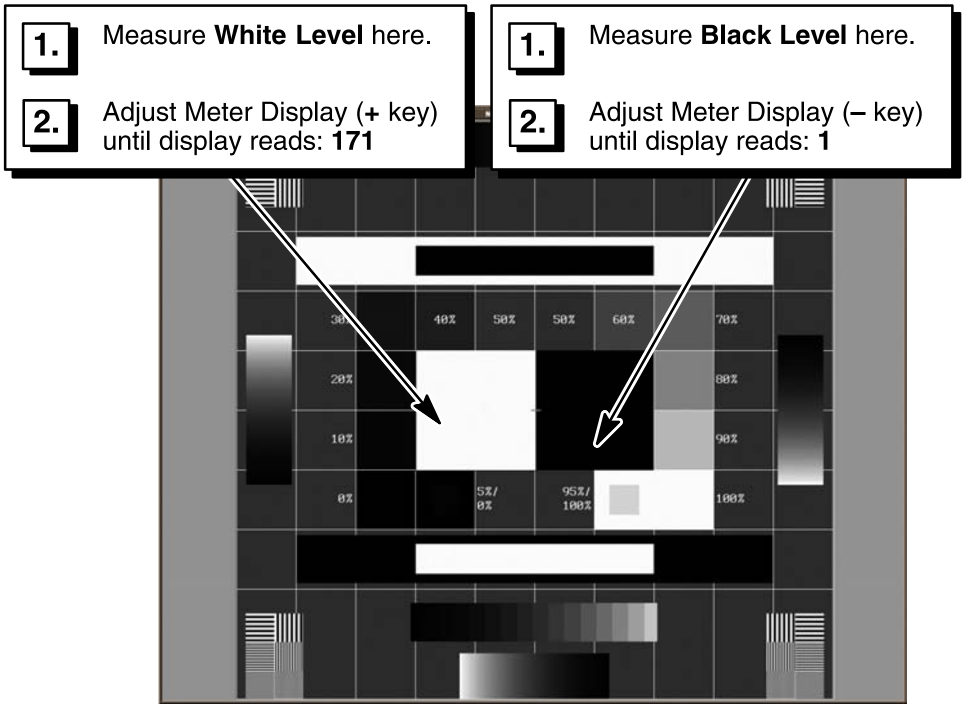
Check the Stored Black and White values on Remote Commander:

1. Press: **# 9** keys to select the RC1 processor.
2. Press: *** 11** keys to display the stored Black Level value.
3. Press: *** 12** keys to display the stored White Level value.

8-8-5 Set Monitor Black & White Values to Stored Meter Values

1. Set the Remote Commander for use as a light meter measuring in cd/m^2 units:
   a. Press: **# 9** keys to select the RC1 processor.
   b. Press: *** 10** keys to select the light measurement function.
2. Adjust Monitor Black Level to Meter Stored value (1 cd/m^2):
   a. Measure the brightness of the central black box of the SMPTE pattern (meter should touch the screen). The meter displays the Monitor Black Level output. See Illustration 1–5.
   b. *Press and hold*: **–** key until the display indicates: **1**
3. Adjust Monitor White Level to Meter Stored value (171 cd/m^2):
   a. Measure the brightness of the central white box of the SMPTE pattern (meter should touch the screen). The meter displays the Monitor White Level output. See Illustration 1–5.
   b. *Press and hold*: **+** key until the display indicates: **171**
4. Repeat steps 2. and 3. until both Monitor levels have been correctly set.

ILLUSTRATION 1–5
AWS MONITOR SMPTE TEST PATTERN – MEASURING BLACK & WHITE LEVELS



8-8-6 Check Monitor Brightness and Contrast Adjustments

1. Verify that the following gray levels can be clearly distinguished (See Illustration 1–6):
   - 5% black square and the 95% white square.
   - Each of the 10% step levels (10% through 100%).
   - Each of the step levels in the gray scale map.
2. If the gray levels are not clearly distinguishable:
   - Ensure the Ambient Light Value is not above 50 lux.
   - Repeat Monitor Brightness & Contrast Calibration.

Note: Under certain site conditions (where the ambient light cannot be reduced to 50 lux), or if requested by the customer, you may find it necessary to re–adjust the Black Level value in the range of 0.5 cd/m^2 to 3 cd/m^2. Black levels above 3 cd/m^2 will affect image quality.

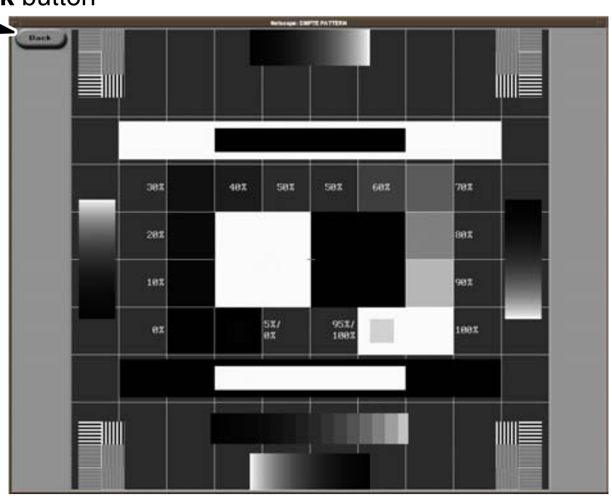
ILLUSTRATION 1–6
AWS MONITOR SMPTE TEST PATTERN – CHECKING MONITOR BRIGHTNESS & CONTRAST ADJUSTMENTS

3. Exit Monitor Brightness and Calibration Routine.

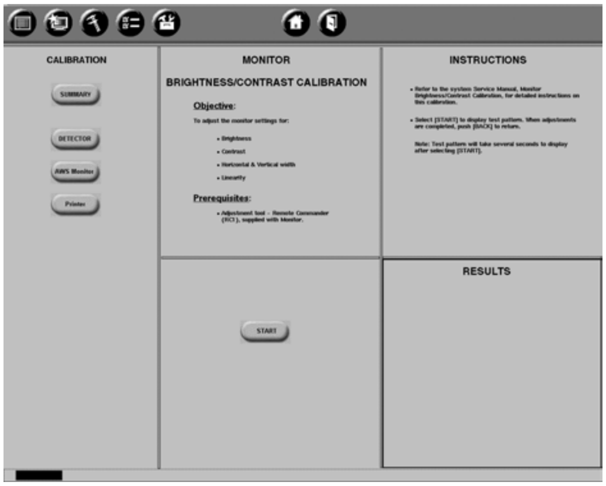
Click on the **Back** button

The monitor displays the **AWS Monitor Brightness & Contrast Screen**

AWS Monitor SMPTE Test Pattern



AWS Monitor Brightness & Contrast Calibration Screen



SECTION 9
DICOM PRINTER SET–UP AND CALIBRATION

9-1 Prerequisites

Before starting DICOM Printer Set–Up, verify the following are complete:

- AWS, monitor, keyboard, mouse are installed and interconnected.
- AWS power connection (120 VAC or 220 VAC) is connected to control booth AC receptacle and that the receptacle has power.
- AWS is connected to an operational DICOM 3.0 Network and has been declared as a host on the network.
- AWS Network Printer Configuration has been completed for all the DICOM Printers the system will be directly sending images to.
- All hospital network DICOM Printers the system will be directly sending images to are powered on and ready. Refer to Illustration 1–7 for printing options.
- Revolution XQ/i Demonstration Test Images loaded onto Main Browser.

9-1-1 Required Tools

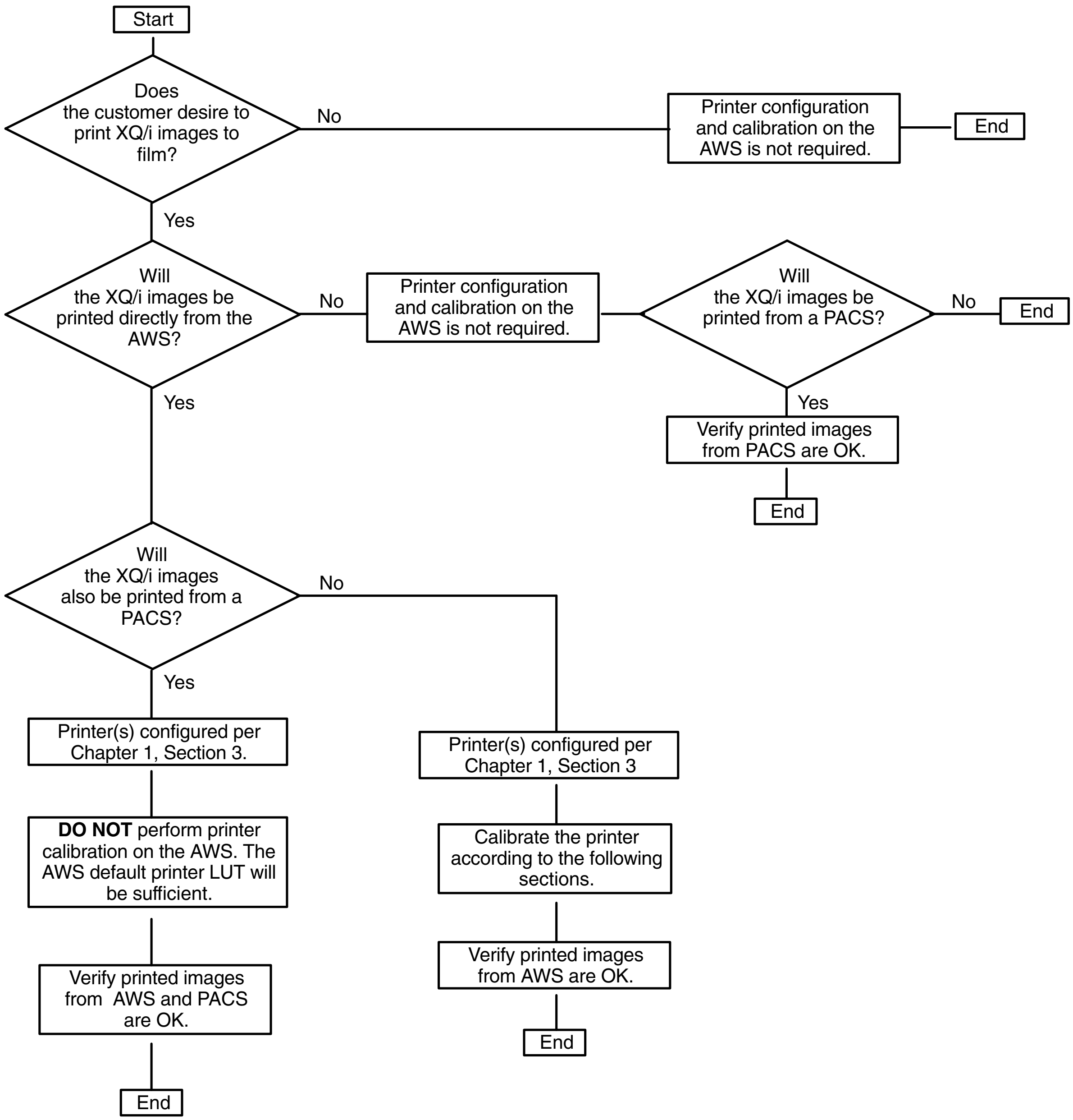
The following tools are required to properly set–up DICOM Printers:

- Densitometer (X–Rite 301 or equivalent)
- Special Fuji densitometer filter (Fuji 3543 printers only)

9-1-2 Additional Information

For further information on compatible printers, see *gemedical.com*

ILLUSTRATION 1–7
PRINTING OPTIONS



9-2 Printer Operational Check

This section is performed to verify printer network connectivity prior to printer calibration.

1. Select a Print Test Image from the Demonstration Image files on the Main Browser:

Main Browser Application Screen

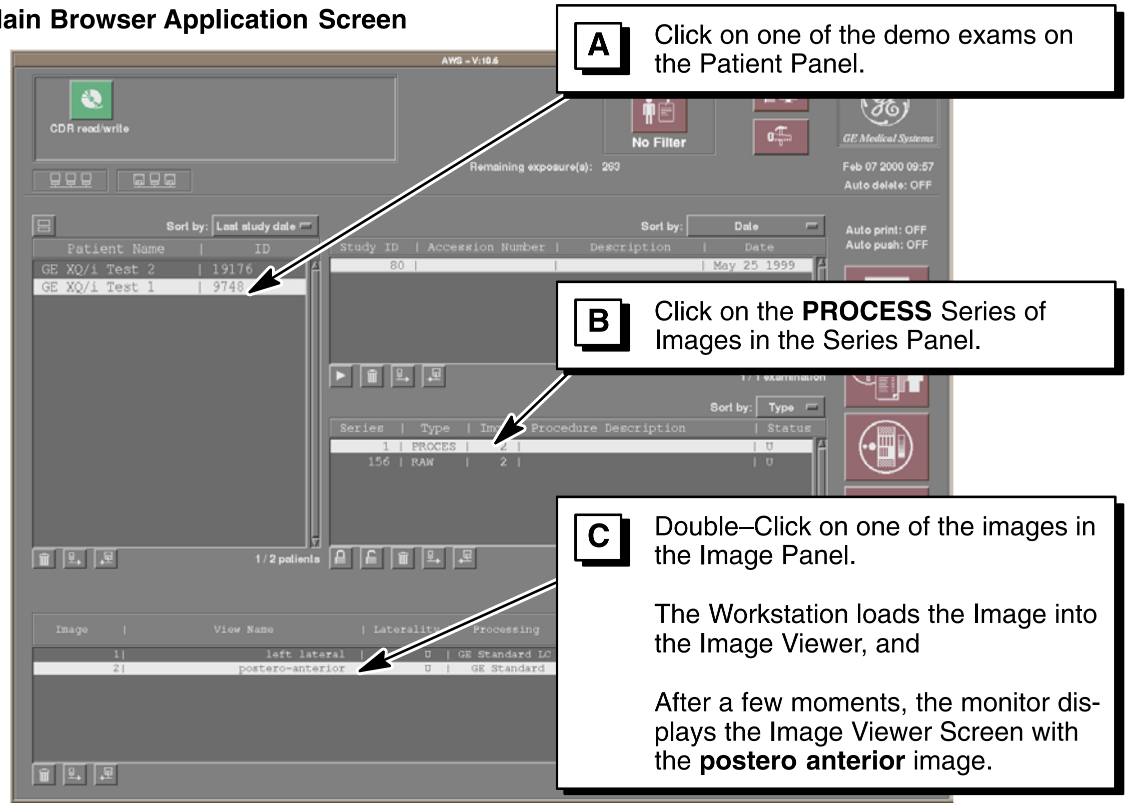
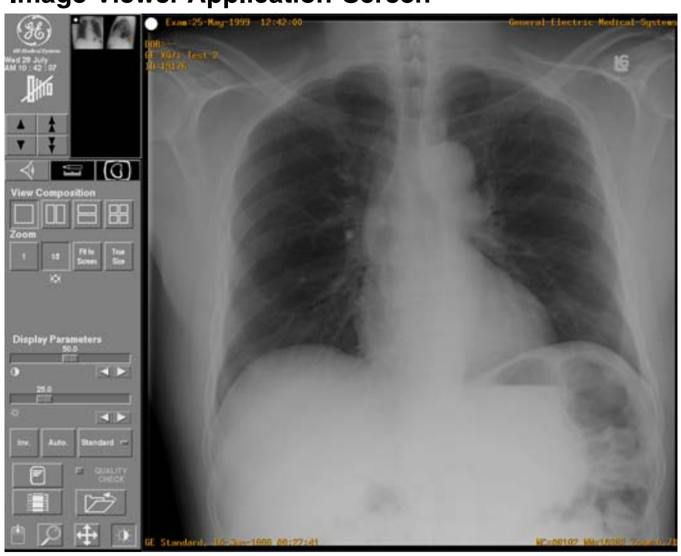
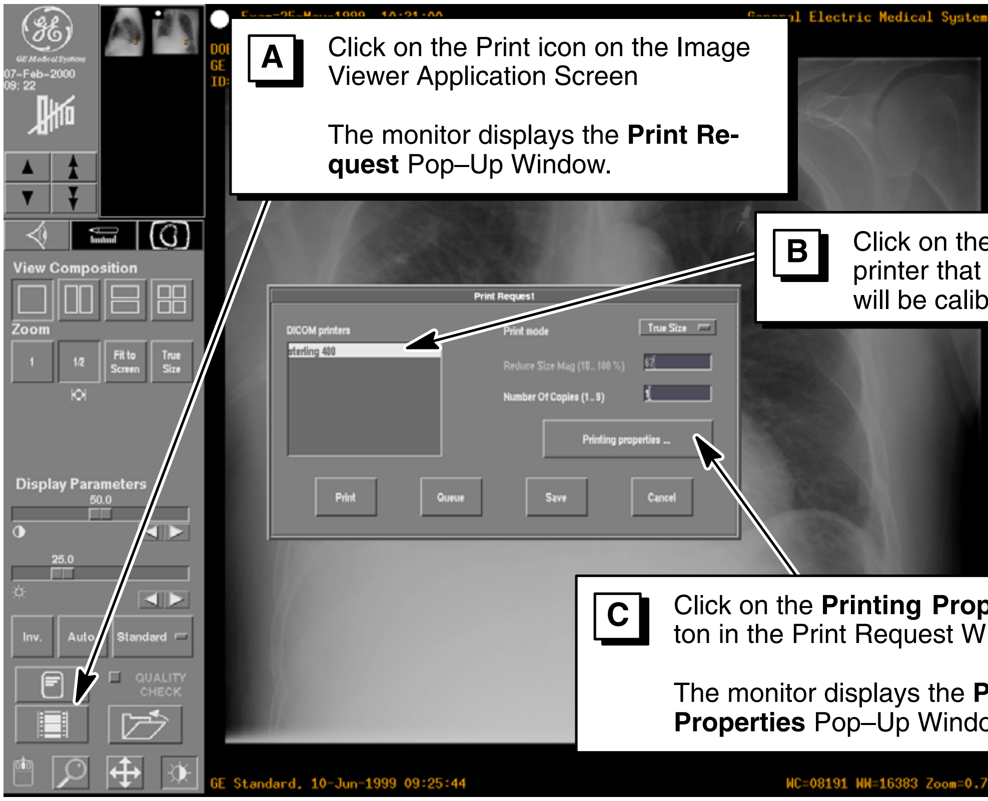


Image Viewer Application Screen



2. Print the selected Test Image from the Image Viewer Screen:

Image Viewer Application Screen with Print Request Pop–Up Window



A Click on the Print icon on the Image Viewer Application Screen

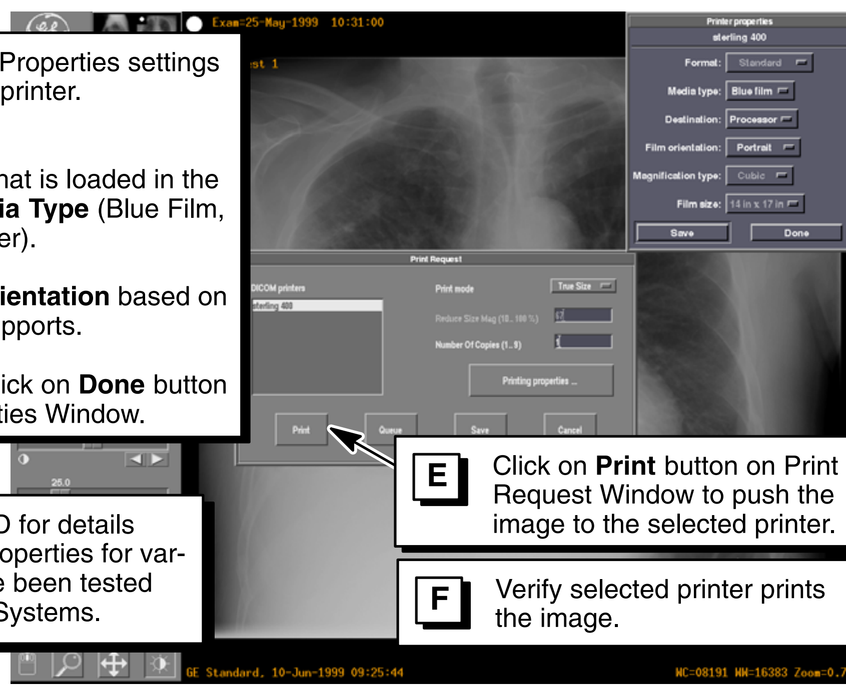
The monitor displays the **Print Request** Pop–Up Window.

B Click on the primary printer that the system will be calibrated to.

C Click on the **Printing Properties** button in the Print Request Window.

The monitor displays the **Printer Properties** Pop–Up Window.

Image Viewer Application with Printer Properties Pop–Up Window



D Verify the Printing Properties settings are correct for the printer.
For example:

Select the media that is loaded in the printer as the **Media Type** (Blue Film, Clear Film, or Paper).

Select the **Film orientation** based on what the printer supports.

When complete, click on **Done** button on Printing Properties Window.

Note: See Appendix D for details concerning printing properties for various printers that have been tested with Revolution XQ/i Systems.

E Click on **Print** button on Print Request Window to push the image to the selected printer.

F Verify selected printer prints the image.

9-3 Entering AWS Service Desktop

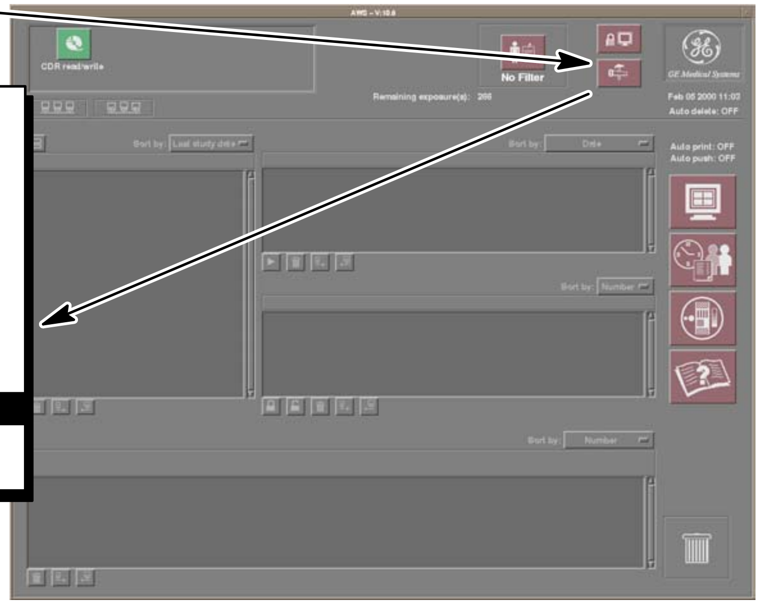
1. Enter the **Calibration Home Page Screen** by selecting the **Service Desktop** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

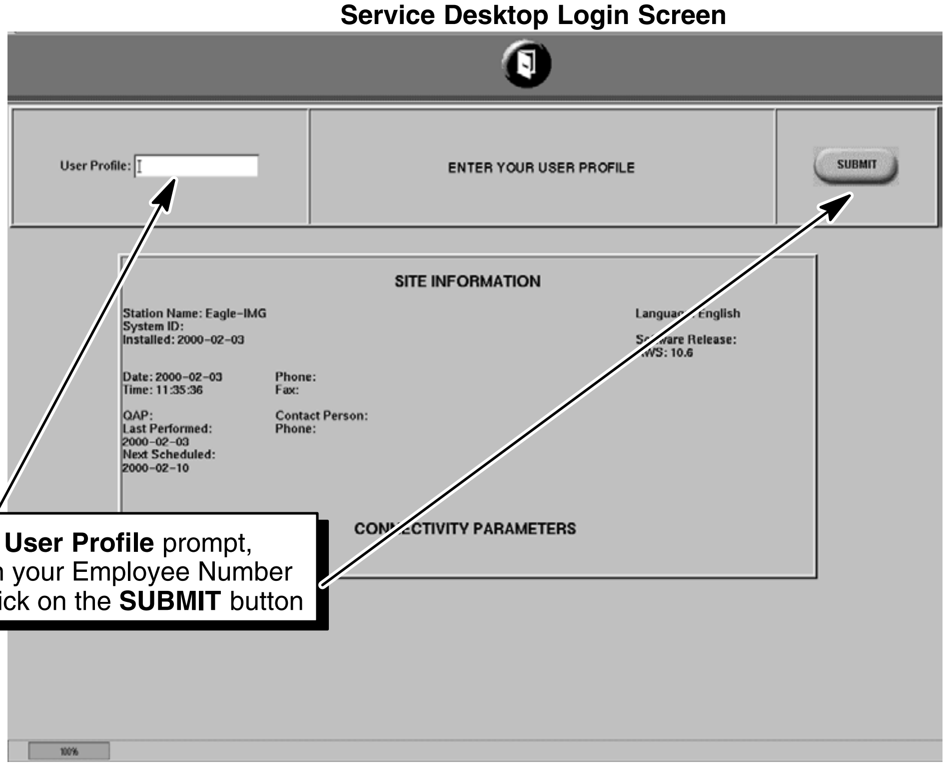
Main Browser Application Screen



B Drag cursor to **Service desktop** selection and release mouse button

After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen

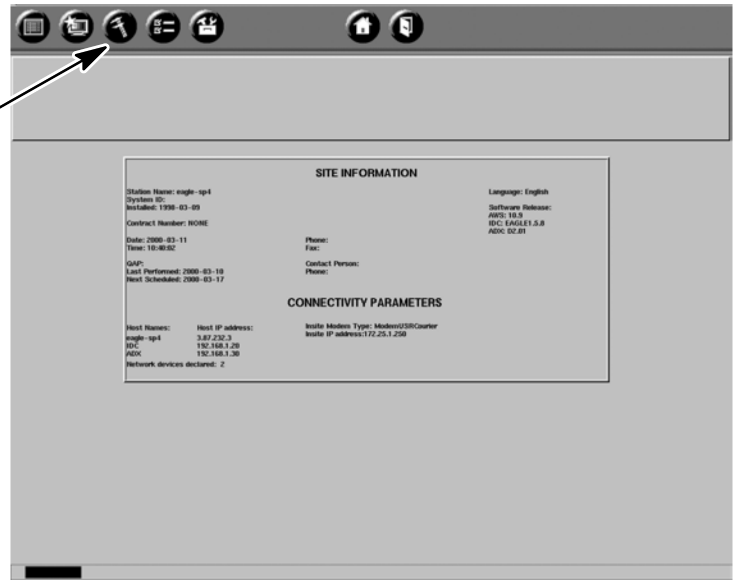


C At the **User Profile** prompt, type in your Employee Number and click on the **SUBMIT** button

Service Login Screen

D

Click on the **CALIBRATION** icon button to display the **Calibration Home Page Screen**

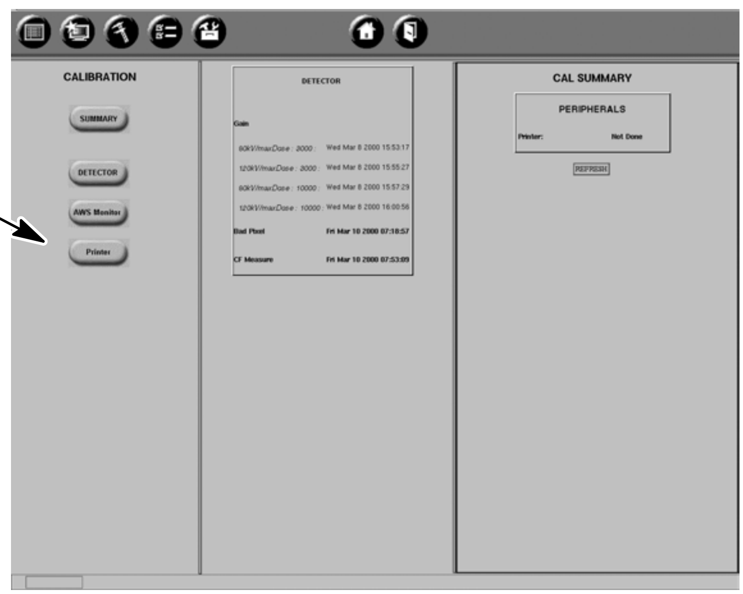


2. Start the **Printer Calibration** routine from the Calibration Home Page Screen:

Calibration Home Page Screen

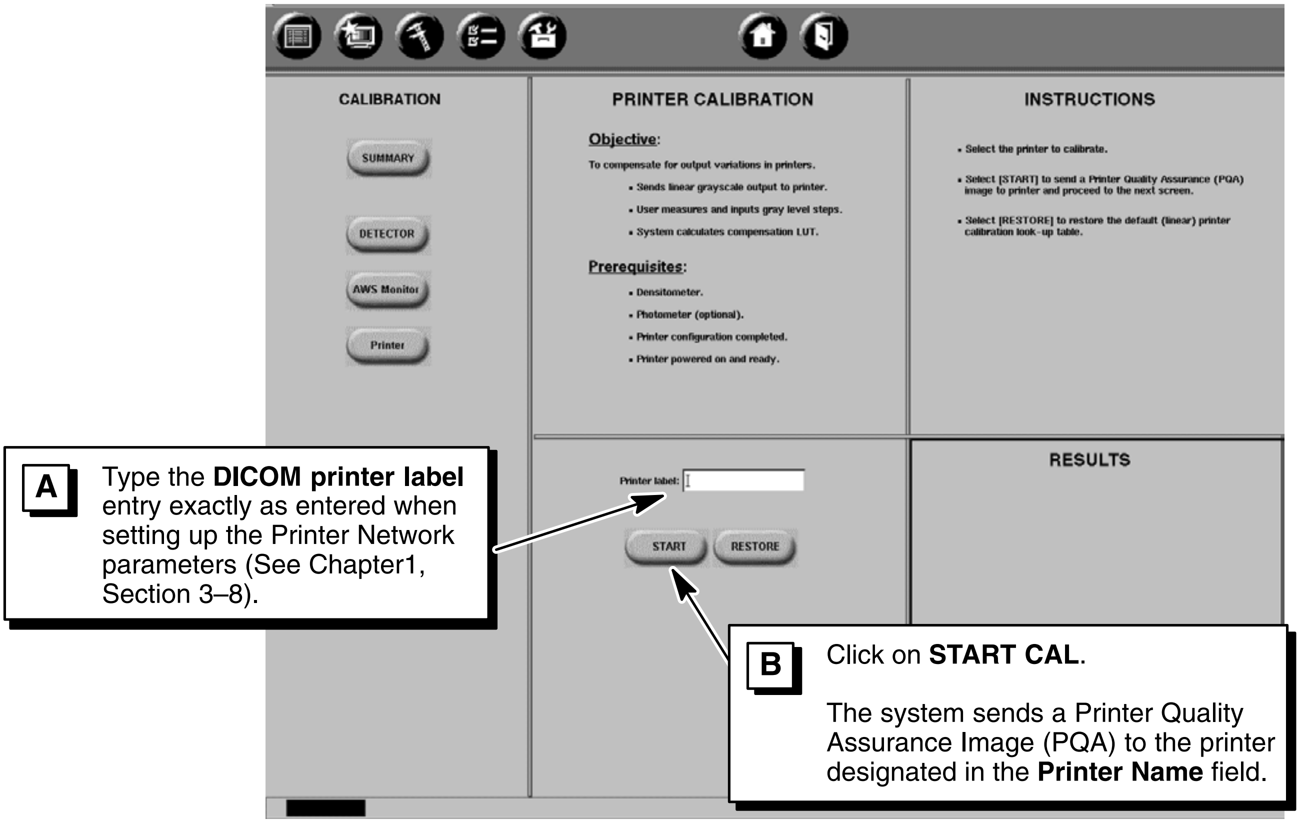
Click on the **Printer** button

The monitor displays the **Initial Printer Calibration Screen**



9-4 Printer Compensation LUT Calibration

Initial Printer Calibration Screen



1. Retrieve the Printer Quality Assurance Image (PQA) from the printer identified in the **Printer name** field.
2. Measure the optical density of the 1st and 24th steps on both sides of the PQA film image (See Illustration 1–8). Use the side with the greatest range of black to white.

Note: Densitometer must be nulled with no film present. The Optical Density reading at Step 24 must equal the Optical Density of un–printed film, typically 0.15 to 0.30, not 0.00.

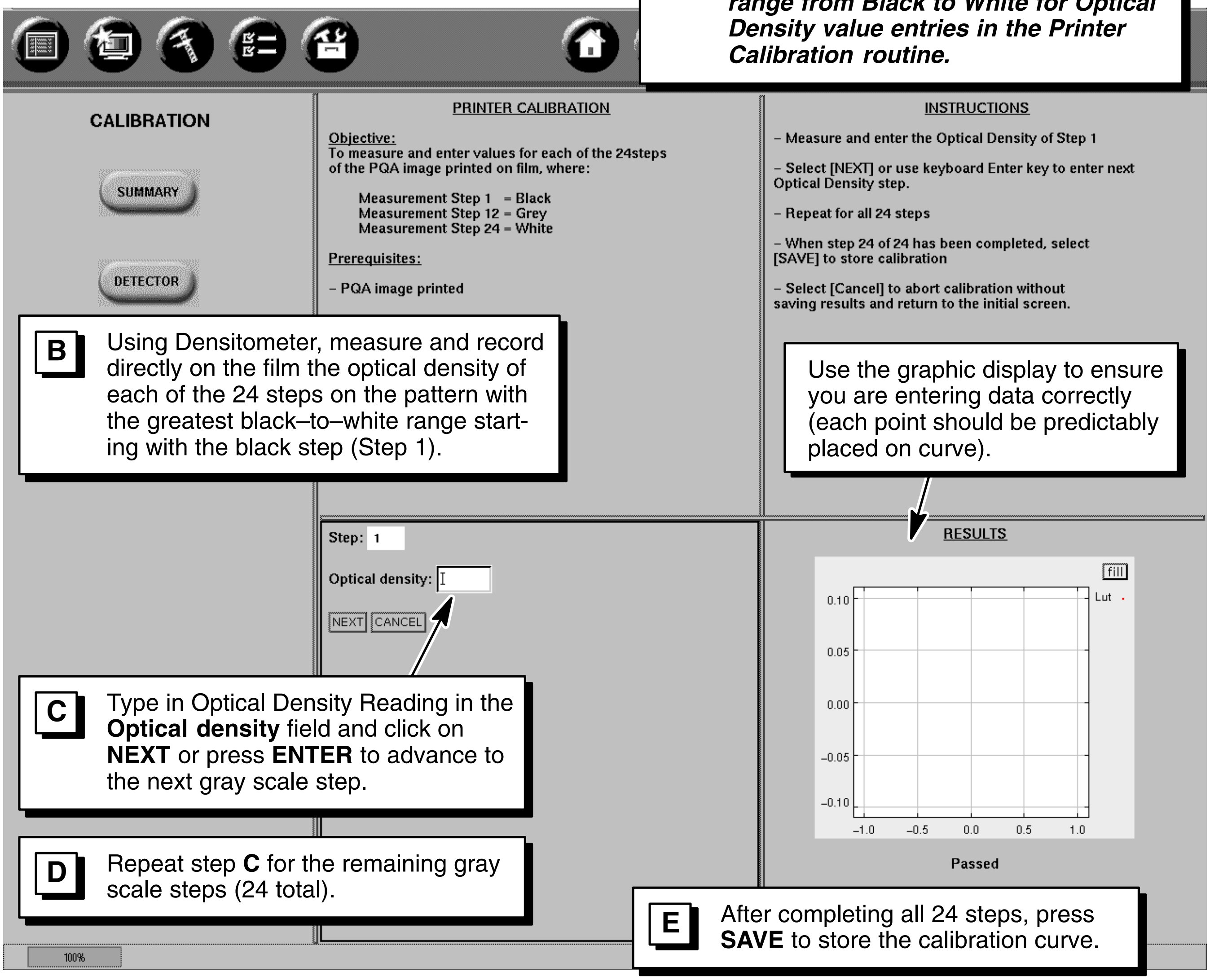
3. Complete the **Printer Compensation LUT calibration** routine for each selected DICOM network printer the system will be directly sending images to.

Note: For Fuji 3543 Printers, ensure you are using the special Fuji densitometer filter for measuring film optical density.

A Using Densitometer, measure the 1st and 24th steps of both 24 step patterns on each side of the film. Compare Optical Density range (Black to White) on each side of printed image.

Use the side that has the greatest range from Black to White for Optical Density value entries in the Printer Calibration routine.

Printer Compensation LUT Calibration Procedure Screen



B Using Densitometer, measure and record directly on the film the optical density of each of the 24 steps on the pattern with the greatest black–to–white range starting with the black step (Step 1).

Use the graphic display to ensure you are entering data correctly (each point should be predictably placed on curve).

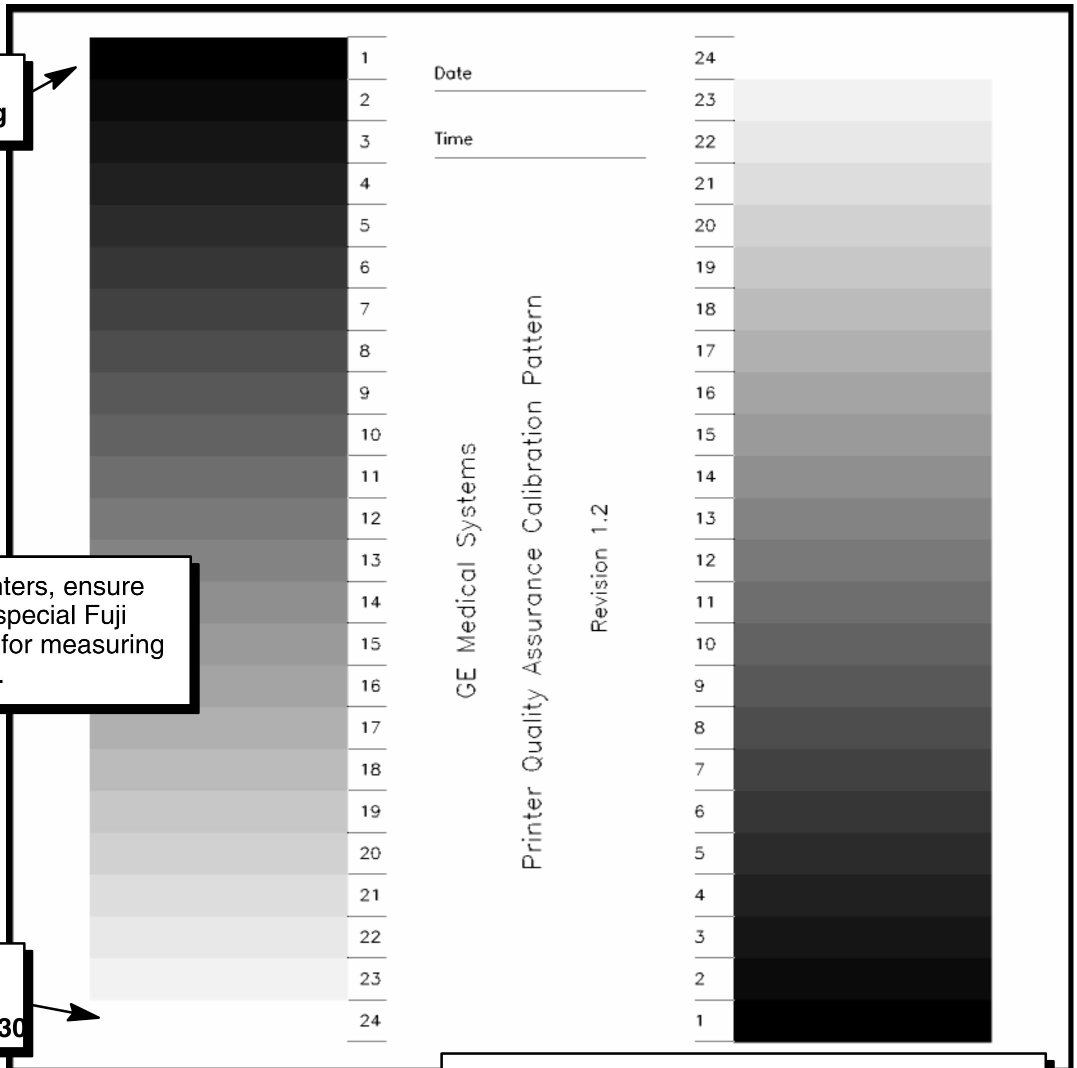
C Type in Optical Density Reading in the **Optical density** field and click on **NEXT** or press **ENTER** to advance to the next gray scale step.

D Repeat step **C** for the remaining gray scale steps (24 total).

E After completing all 24 steps, press **SAVE** to store the calibration curve.

ILLUSTRATION 1–8
PRINTER QUALITY ASSURANCE (PQA) TEST PATTERN – READING AND LOADING 24 STEP GRAY LEVELS

Step 1 Optical Density Reading



Note: For Fuji Printers, ensure you are using the special Fuji densitometer filter for measuring film optical density.

Step 24 Optical Density Reading typically 0.15 – 0.30

A Using Densitometer, measure the 1st and 24th steps of both 24 step patterns on each side of the film. Compare Optical Density range (Black to White) on each side of printed image.

Use the side that has the greatest range from Black to White for Optical Density value entries in the Printer Calibration routine.

NOTICE:
Avoid Printer Black Level Registration Errors!

Dry Thermal Printers (ie: Agfa Drystar 3000, Sterling Contact 400) are inherently slow to react to changes from black to white. This will be apparent when measuring the 24th step in each pattern (the right pattern 24th step will have a greater optical density value than the left pattern 24th step).

To avoid entering a low value for Black in the Printer Calibration routine, always use the pattern that provides the greatest OD range from Black to White.

B Using Densitometer, measure and record directly on the film the optical density of each of the 24 steps on the pattern with the greatest black–to–white range starting with the black step (Step 1).

9-5 Printer Operational Check

This section is performed to verify that the printed images are OK.

1. Select a Print Image Test from the Demonstration Image files on the Main Browser:

Main Browser Application Screen

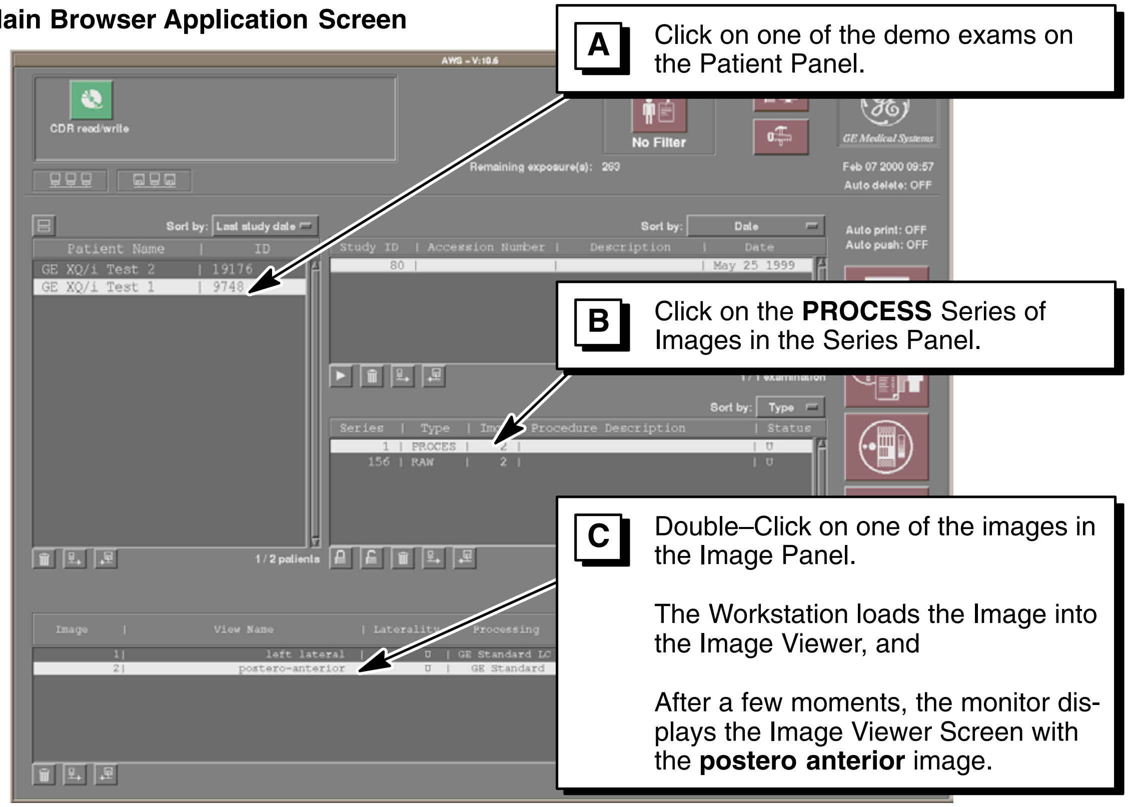
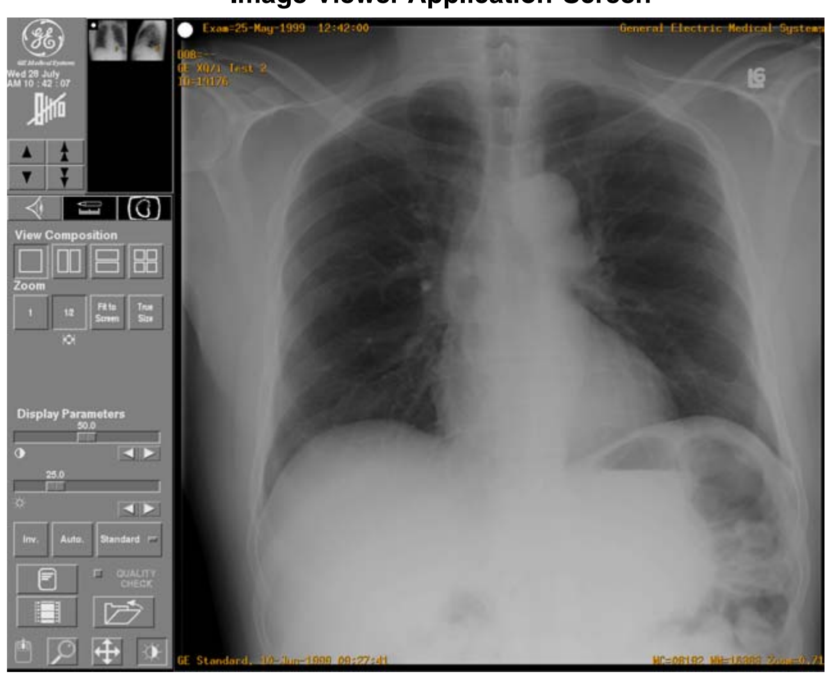
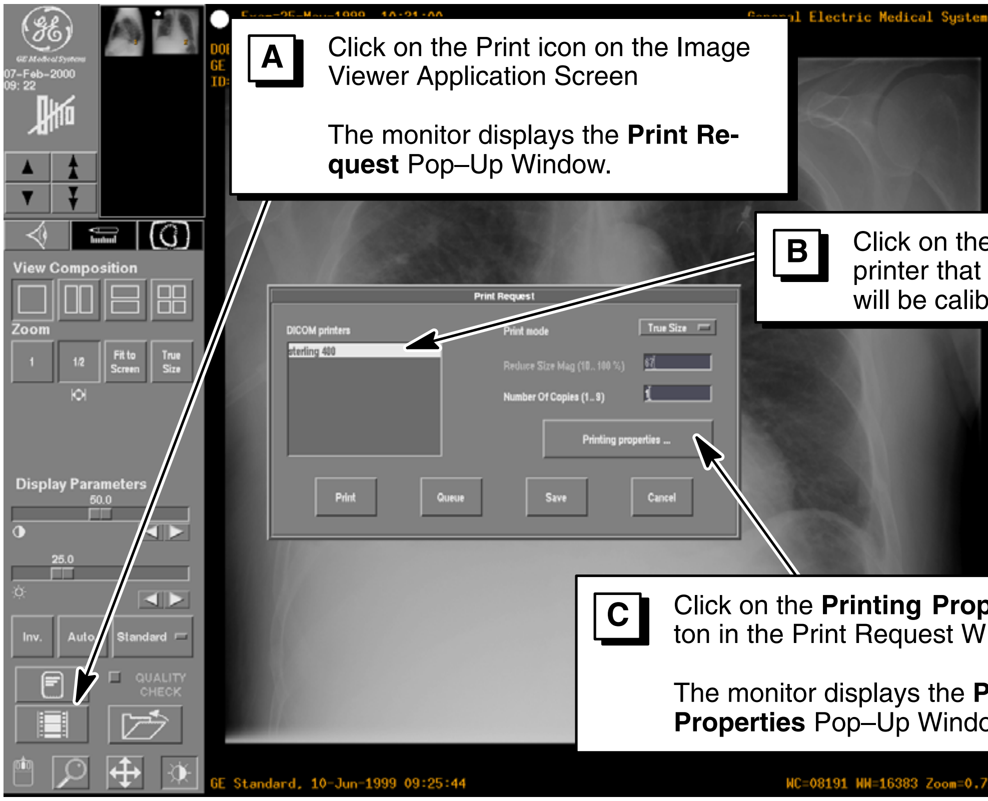


Image Viewer Application Screen



2. Print the selected Test Image from the Image Viewer Screen:

Image Viewer Application Screen with Print Request Pop–Up Window



A Click on the Print icon on the Image Viewer Application Screen

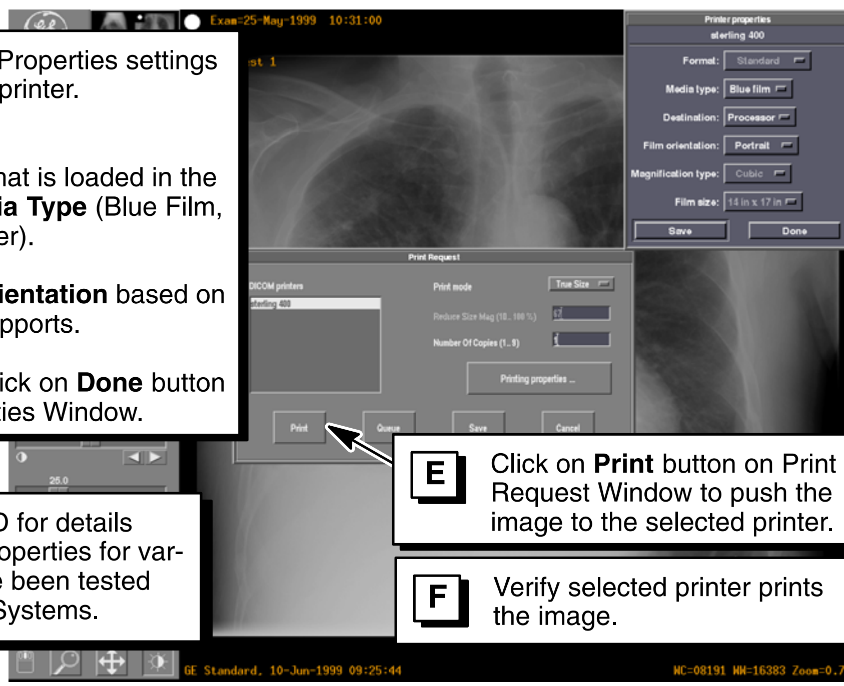
The monitor displays the **Print Request** Pop–Up Window.

B Click on the primary printer that the system will be calibrated to.

C Click on the **Printing Properties** button in the Print Request Window.

The monitor displays the **Printer Properties** Pop–Up Window.

Image Viewer Application with Printer Properties Pop–Up Window



D Verify the Printing Properties settings are correct for the printer.
For example:

Select the media that is loaded in the printer as the **Media Type** (Blue Film, Clear Film, or Paper).

Select the **Film orientation** based on what the printer supports.

When complete, click on **Done** button on Printing Properties Window.

Note: See Appendix D for details concerning printing properties for various printers that have been tested with Revolution XQ/i Systems.

E Click on **Print** button on Print Request Window to push the image to the selected printer.

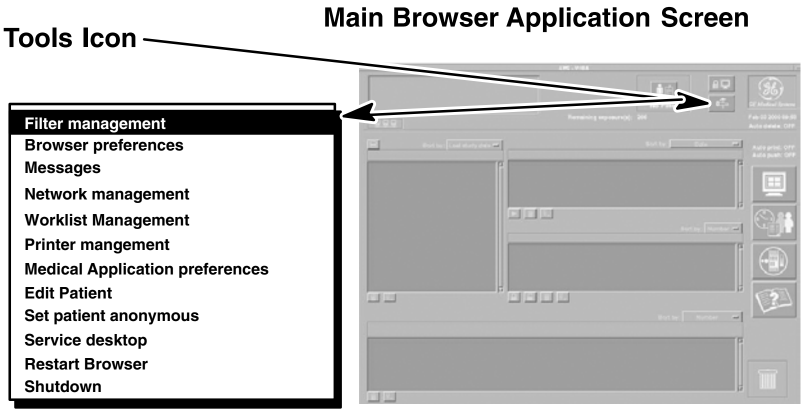
F Verify selected printer prints the image.

CHAPTER 2 –AWS USER PREFERENCES & FUNCTIONAL CHECKS

SECTION 1
USER PREFERENCES

1-1 Filter Management Set–up

1. Click on the **Tools Icon.** The monitor displays the Tool Menu
2. Drag cursor to **Filter management** selection and release mouse button. The monitor displays the **Filter selection** pop–up screen.

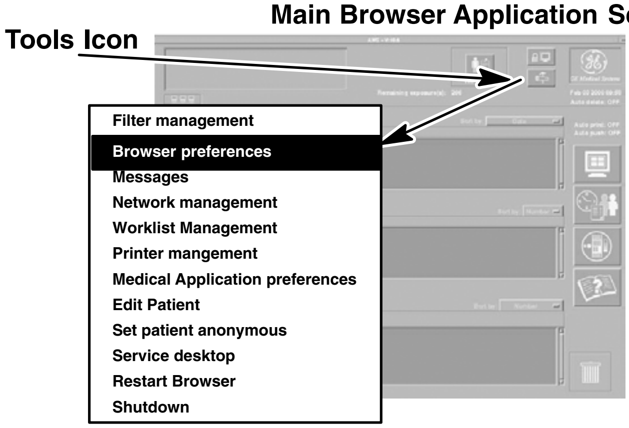


3. The **Filter selection** pop–up screen displays all currently registered Filters. Click on one of the following to perform the associated action:
   > Update – opens the **Filter Parameter** Screen & update an existing Filter set of parameters.
   > Add – opens the **Filter Parameter** Screen & add a new Filter’s set of parameters
   > Remove – removes a selected Filter from the list of registered Filters
   > Close – closes the **Filter Selection** pop–up screen
4. Click on **Add** button on the Filter selection screen to display the **Filter Parameter Screen**.

1-2 Browser Preferences

1. Click on the **Tools Icon.** The monitor displays the Tool Menu
2. Drag cursor to **Browser preferences** selection and release mouse button.

Main Browser Application Screen



The monitor displays the **Preferences selection** pop–up screen.

Preferences selection screen

The **selection** pop–up screen displays all currently registered Remote Hosts.

> **Save** – to store in memory the selections that are currently applied.

> **Apply** – to set selections that have just been made, before saving them to memory.

> **Reload Last Saved** – to restore the last selections that were stored in memory.

> **Reset** – to return selections to default values.

> **Cancel** – to close the **Preferences selection** pop–up screen.

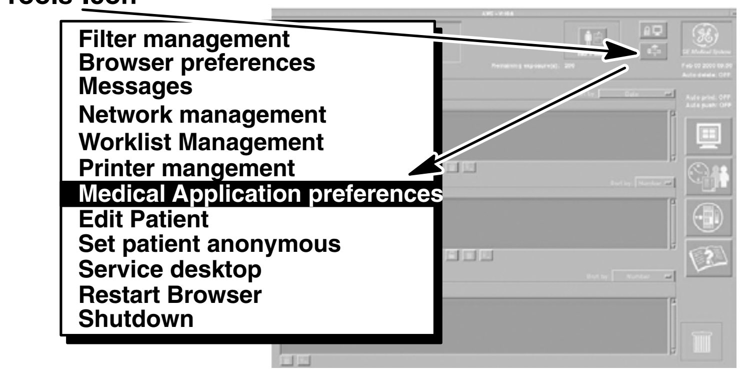
3. Click on desired selections, then **Apply**, and **Save.**

1-3 Medical Application Preferences

1. Click on the **Tools Icon.** The monitor displays the Tool Menu

Main Browser Application Screen

Tools Icon

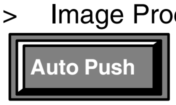


2. Drag cursor to **Medical Application preferences** selection and release mouse button.

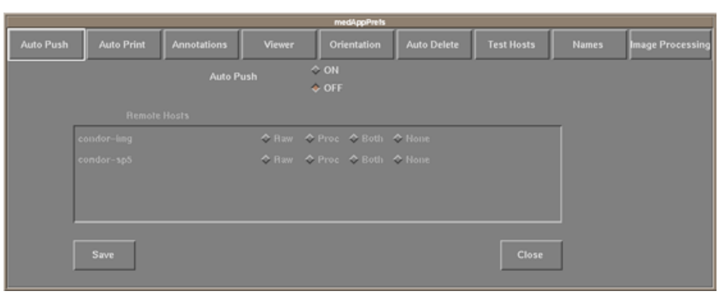
   The monitor displays the first of nine **Medical Application selection** pop–up screens (see next pages for other Medical Application screen displays). The data to be entered on these screens is site specific. Consult the Operator Manual and hospital personnel for details.

3. Make desired selections from the appropriate screens. Choose from:

   > Auto Push
   > Auto Print
   > Annotations
   > Quality Check
   > Orientation
   > Auto Delete
   > Test Hosts
   > Names
   > Image Processing

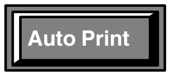


Auto Push selection screen

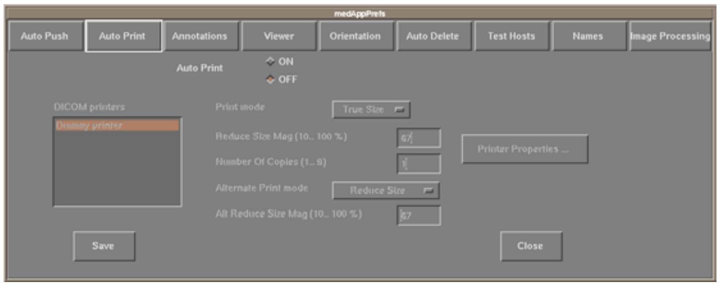


4. When complete, click on **Save** to store selections in memory.

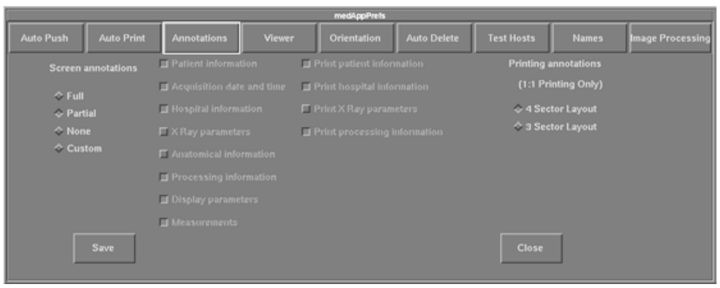
5. When all Medical Application selections have been saved, click on **Close** to exit the pop–up screen.

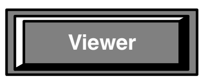


Auto Print selection screen

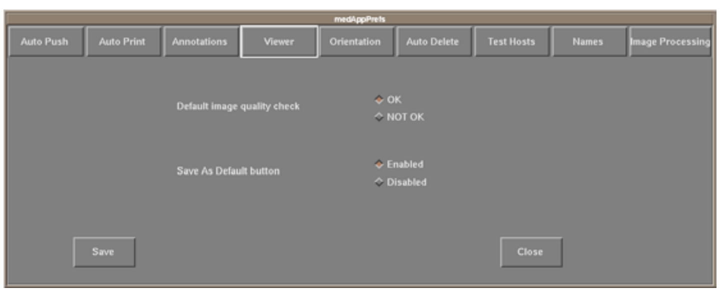


Annotations selection screen

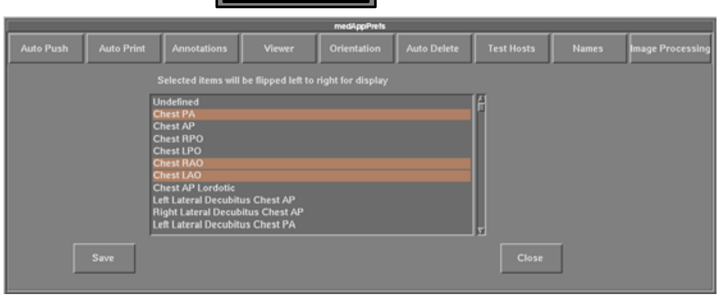




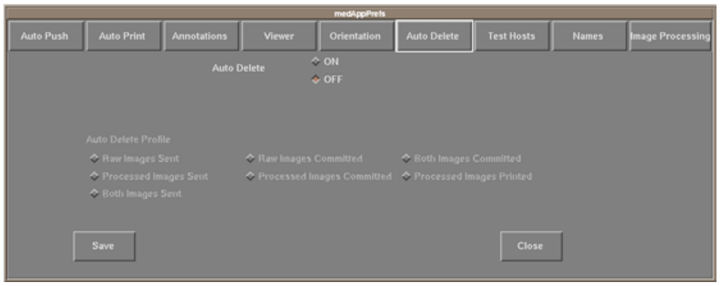
Viewer selection screen



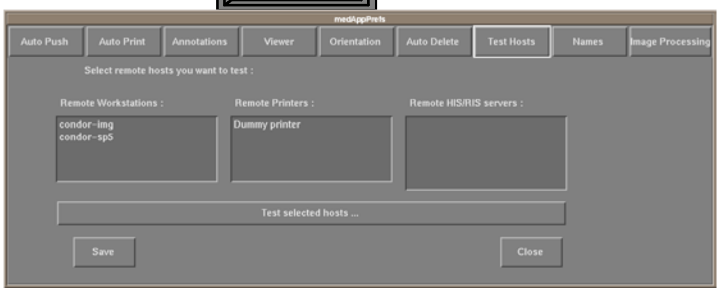
Orientation selection screen



Auto Delete selection screen



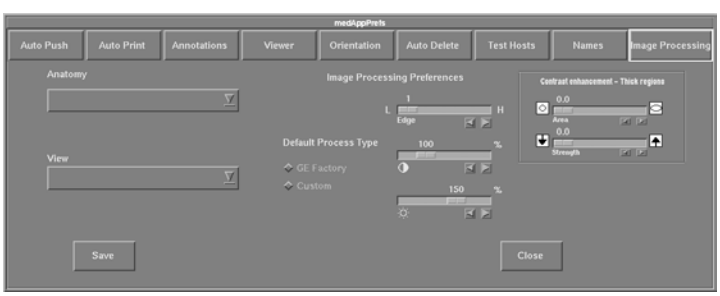
Test Hosts selection screen



Note: A successful Test Host operation assures operability. A failure for Test Host does not absolutely imply there is a problem.

Names selection screen

Image Processing selection screen



SECTION 2
NETWORK OPERATION – DICOM VERIFICATION TEST

2-1 Prerequisites

The following information is required to run this test:

– AWS Local Application Title (refer to Network Flow Audit form)
– Remote (target) Workstation: Application Title, IP Address and TCP Port

2-2 Procedure

1. Open a Terminal window by first minimizing the Main Browser and all other windows. Then, select **Command Window** from the Root Menu:
   a. Open a Terminal window
   b. Drag cursor to **Service Tools > Command Window** and release mouse button.
2. To invoke the DICOM verification SCU Program,
   Enter: **`sendecho [Return]`**
3. The program will prompt you for the Local Application Entity Title. (From Network Flow Audit)
   Enter: **`local_app_title [Return]`**
4. The program will prompt you for the Remote Application Title. This is the title of the target workstation that you want to echo.
   Enter: **`target_app_title [Return]`**
5. The program will prompt you for the IP address of the target workstation.
   Enter: ***`IP Address`*** **(example: 111.222.333.444)** **`[Return]`**
6. The program will prompt you for the TCP port of the target workstation.
   Enter: ***`port`*** **(example: 104)** **`[Return]`**
7. After a brief pause, the program displays the results of the test.
   A successful test should appear as follows:

```
MergeCOM-3 (tm) Echo Check Facility      Version 2.3.1
Copyright (c) Merge Technologies, Inc. 1996. All rights reserved.
1R
Elapsed time = 0 seconds - 1 messages, 0.0 seconds per message
Echo check successful
```

8. To finish test, **close Terminal Window.**

SECTION 3
AWS OPTIONS – BAR CODE READER

1. Select “New Patient”
2. Scan “CODE 39” found at the back of the vendor manual.
3. Verify that the correct information was scanned in.

CHAPTER 3 – POWER–UP, CONFIGURATION & CALIBRATION

SECTION 1
GROUND RESISTANCE VERIFICATION

1-1 Required Test Equipment

Any resistance measuring device capable of reading 0.1 ohm.

1-2 Procedure

1. Measure the resistance between the tube stand chassis ground and the SCPU main ground (PU A1 SW1 GND). Verify that it is less than 0.1 ohm.
2. Measure the resistance between the wall stand chassis ground and the SCPU main ground (PU A1 SW1 GND). Verify that it is less than 0.1 ohm.

SECTION 2
SYSTEM CABINET LINE VOLTAGE AND FREQUENCY CONFIGURATION

WARNING **POTENTIAL FOR PERSONAL INJURY.**
SYSTEM POWER MUST BE OFF BEFORE PROCEEDING WITH THIS SECTION. ENSURE PROPER LOCKOUT/TAGOUT PRACTICES ARE USED ON SYSTEM MAIN POWER SOURCE.

2-1 Line voltage configuration in Cabinet Rear Panel SCPU A3

1. With a voltage multimeter measure the nominal voltage of the line to which the SCPU V2 is to be connected.
2. Verify that the line voltage is within acceptable limits compared to the nominal voltage.
3. On the top of the Power Unit Transformer SCPU A3 T1 (see Illustrations 3–1 and 3–2), connect the wire marked 380–480 to one of the following taps: 380-405-430-455-480, according to the measured nominal line voltage. The selected tap must be the value nearest to the nominal line voltage.

2-2 Frequency configuration in Cabinet Rear Panel SCPU A3

1. Determine the nominal frequency of the line to which the SCPU V2 is supposed to be connected.
2. On the top of the Power Unit Transformer SCPU A3 T1 (see Illustrations 3–1 and and 3–2), connect the wire marked 220-240 V to the transformer tap:
   > 220 if the line frequency is 50 Hz
   > 240 if the line frequency is 60 Hz

2-3 Line voltage Configuration in Room Distribution Panel SCPU A1

At the bottom of the Room Distribution Panel, locate the Auto Transformer SCPU A1 T1 (see Illustrations 3–1 and and 3–2) and connect the wire marked XF 380-480 V to one of the following taps:

380-400-420-440-460-480 V, according to the line voltage.

The selected tap must be the value nearest to the nominal line voltage.

Note: The XF 380–480 V wire may actually be labeled as 400 V.

ILLUSTRATION 3–1
POWER UNIT TRANSFORMER SCPU A3 T1 WIRING

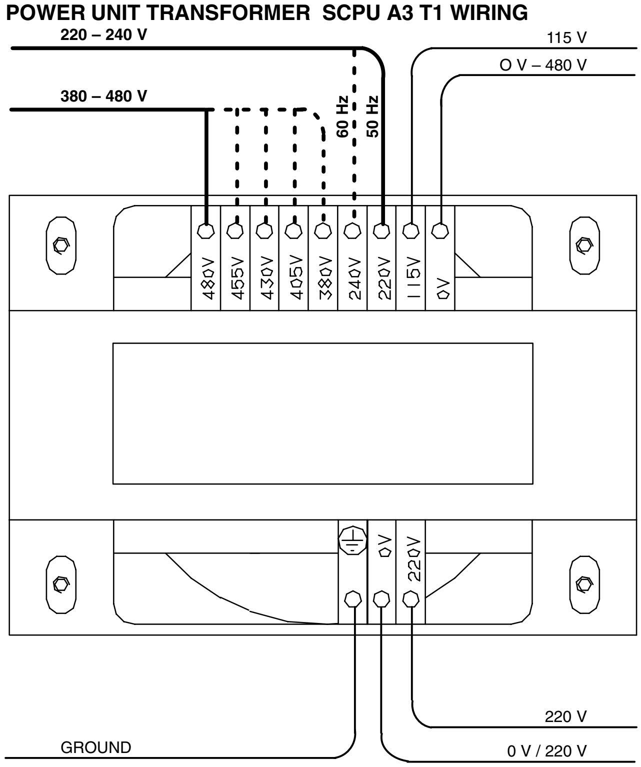
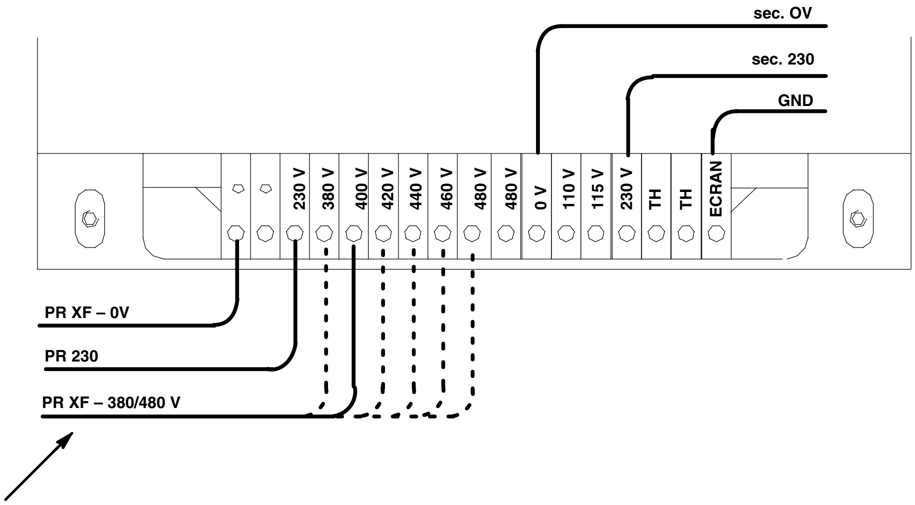


ILLUSTRATION 3–2
POWER UNIT TRANSFORMER SCPU A1 AT1 WIRING



NOTE: This wire may be labeled as 400V.

2-4 Wiring

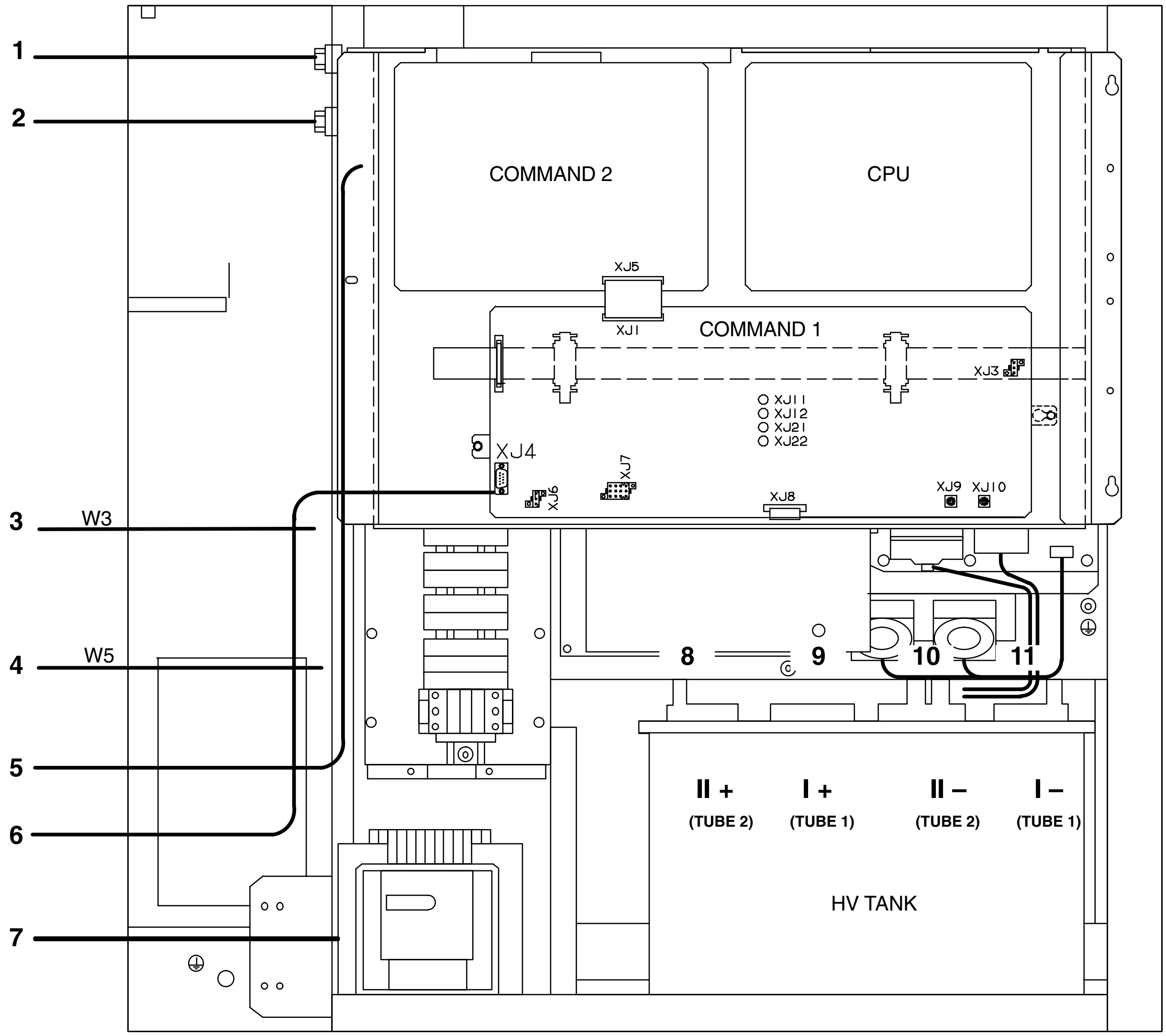
Refer to appropriate system MIS maps and charts and make the necessary wiring connections (see Illustrations 3–3 and 3–4).

Cables to be connected at installation are listed in Table 3–1. (Some cables are supplied with the SCPU V2.)

TABLE 3–1
CABLE CONNECTIONS

NAME	CONNECT FROM (SCPU V2)	CONNECT TO
Stator X–ray tube 1	ST1	X–ray tube housing 1
W3	Room Distribution (FS2 3/4)	Top Cabinet 480 Vac
36006301	XJ3 CPU Board	A25 J17 Bulkhead Kernel SKL1
2102471	XJ4 Command 1 Board	A25 J18 Bulkhead Kernel SKL1
Main supply (3 phases + gnd)	Main switch SW1	Room Supply Circuit Breaker
HV I + Anode X–ray tube 1	HV Tank (A2)	X–ray tube housing 1
HV I – Cathode X–ray tube 1	HV Tank (A2)	X–ray tube housing 1

ILLUSTRATION 3–3
SCPU V2 CABINET WIRING



* Cable 7 must be attached to the chassis by plastic ty–raps.

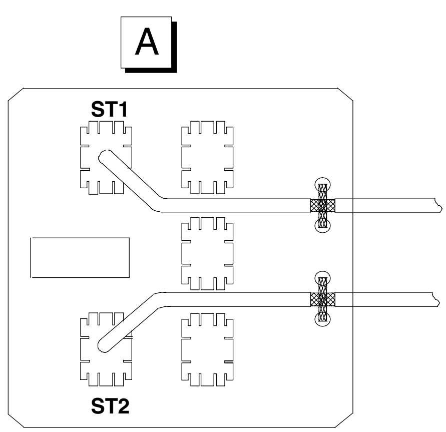
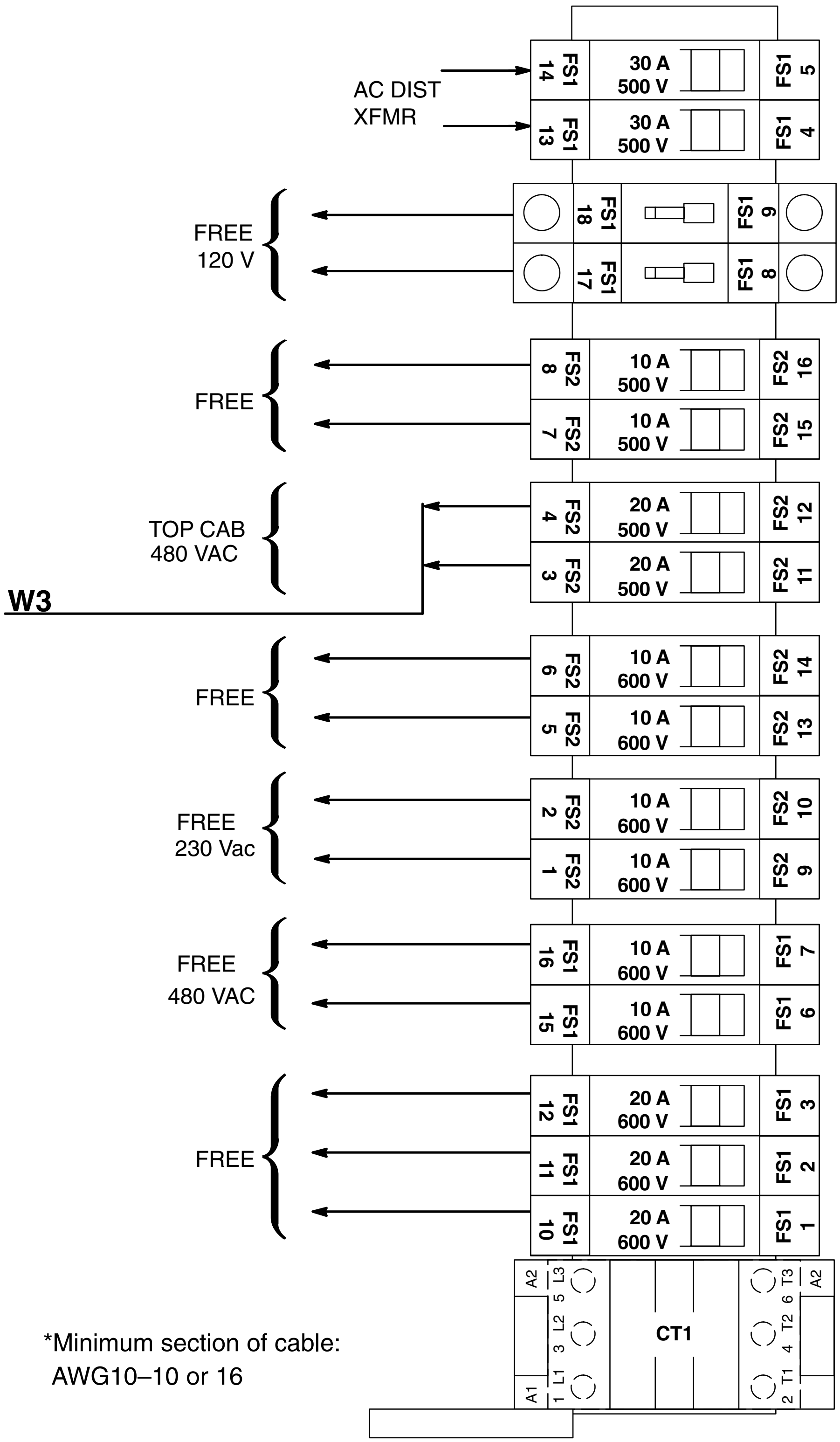


ILLUSTRATION 3–4
ROOM DISTRIBUTION SCPU A1 A1 WIRING



SECTION 3
CONDITIONER START–UP AND INITIAL SYSTEM POWER–UP

3-1 Pre–requisites

System power is off.

3-2 Required Materials

NOTICE **Potential for Equipment Damage.**
Do not use tap water tap water. Only use material supplied in Coolant Kit.

Coolant kit 2295518

3-3 Conditioner Types

1. The conditioner used in the Revolution XQ/i system is manufactured by ThermoTek or SMC (see below). Most illustrations in this section show the older conditioner (ThermoTek).

THERMOTEK CONDITIONER
(WALLSTAND)

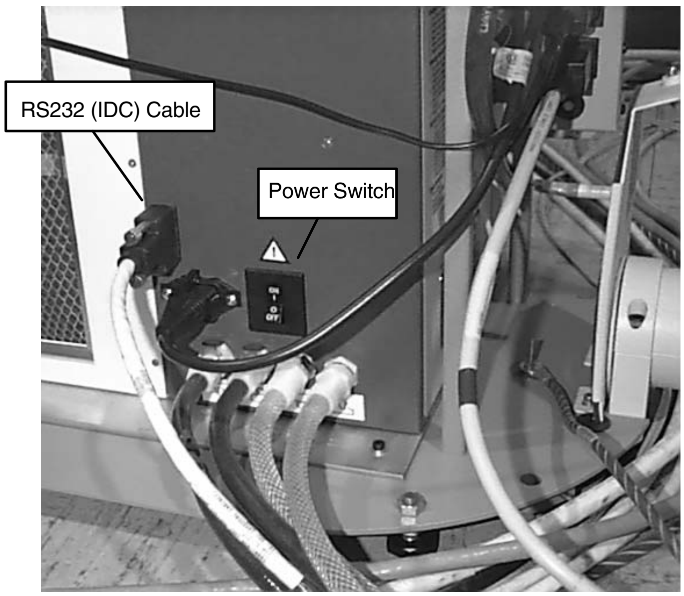
SMC CONDITIONER
(WALLSTAND)

3-4 DSA Conditioner Prep

1. Remove covers from DSA.
2. Disconnect the RS232 (IDC) cable, located near the conditioner power switch. See Illustration 3–5.

3. Remove 2 screws from the front of the DSA power supply, tilt it up and lock it in place with its support bar.

ILLUSTRATION 3–5
DSA CONDITIONER

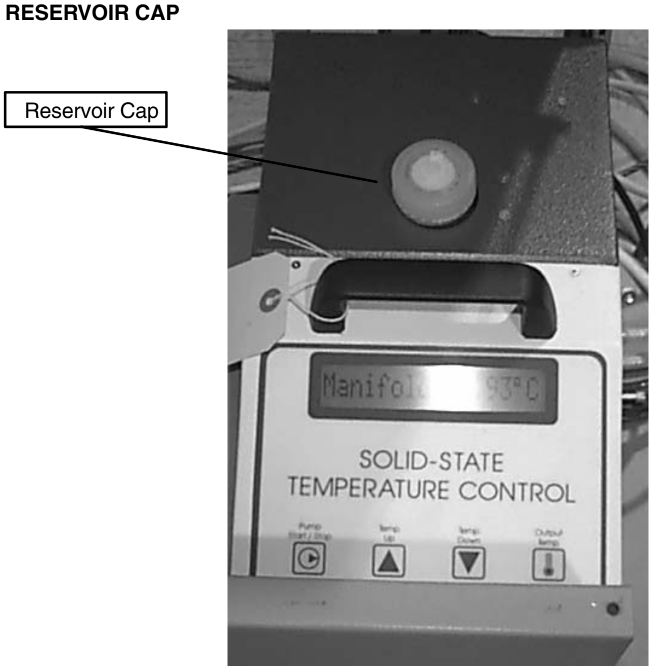


THERMOTEK CONDITIONER

SMC CONDITIONER

4. Unscrew the conditioner reservoir cap (see Illustration 3–6).
5. Fill the conditioner reservoir with the coolant provided in the kit. For the initial fill, the bottle labeled FLUSH or FILL may be used. The contents is the same.

ILLUSTRATION 3–6
RESERVOIR CAP



3-5 System Power–up

1. Apply power
   a. Set the main circuit breaker located on the front panel of the SCPU power unit to the **ON** position.
   b. Verify all POWER circuit breakers in the system cabinets are **ON**.
2. Boot system
   a. Press **RESET** pushbutton switch on ASC front panel (see Illustration 3–7) or Advantx console (see Illustration 3–8). Re–setting from the Advantx console provides a faster boot.
   b. Press the **STANDBY ON** button on the right front of the systems cabinet.
   c. Press the green **ON/OFF** pushbutton switch on the Advantx console. See Illustration 3–8.

ILLUSTRATION 3–7
ASC FRONT PANEL

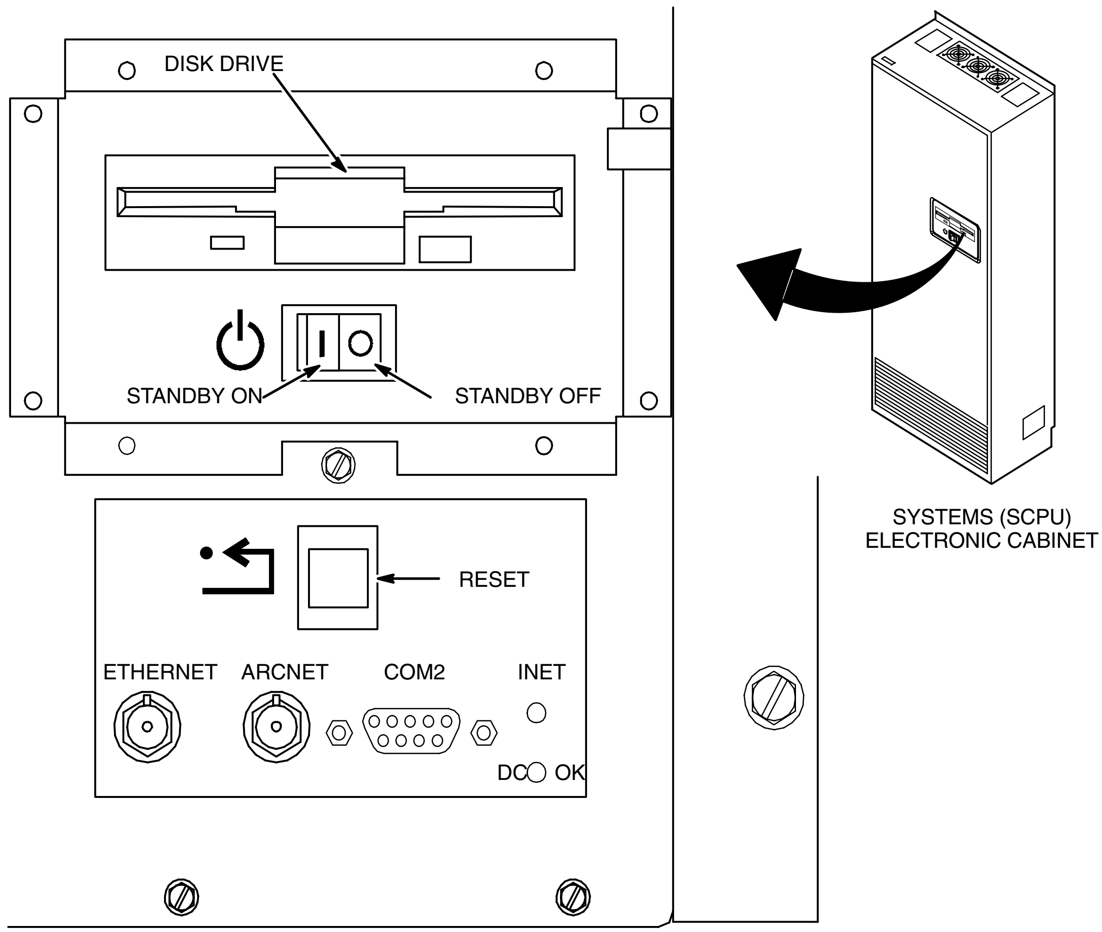
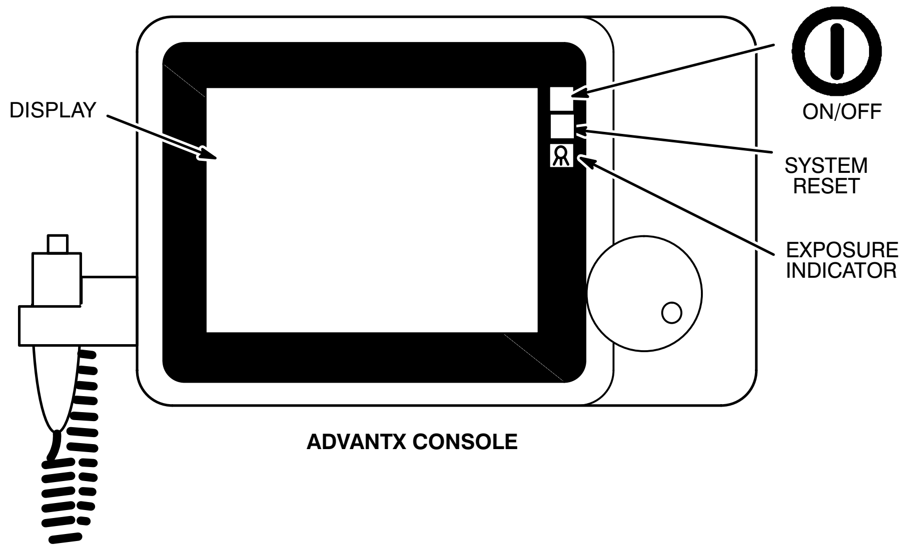


ILLUSTRATION 3–8
ADVANTX SYSTEM CONSOLE



3-6 Final Conditioner Start–up

1. After system power is applied, verify that the conditioner and DSA also power on. (Verify Conditioner Power Switch is **ON**.) Wait for it to start pumping (approximately 5 seconds). Then as the fluid level in the reservoir starts to go down, pour in additional coolant, at a rate that maintains a nearly full reservoir.

Note: Do not add liquid too quickly or the reservoir will overflow.

2. Continue to pour in the coolant until the fluid level in the reservoir no longer goes down.
3. Allow the conditioners to continue pumping and watch the fluid level in the reservoir for approximately 30 seconds. If some bubbling occurs and the fluid level goes down, pour in more liquid until the reservoir is once again full.

Note: Because a slow rate of evaporation can occur in the conditioners, verify that the fluid level is right up to the brim of the reservoir before putting the cap back on. Add liquid, if necessary.

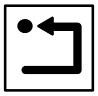
4. Replace the cap on the conditioner reservoirs.

3-7 Emergency Stop Check

1. Verify that when the Emergency Stop button is pressed, it removes all power supplied to the system equipment except for the workstation.
2. With system power still off, reconnect the RS232 (IDC) cable to the conditioner.
3. Power system on again, using procedure described earlier in this section.
4. Unlock the power supply in the DSA and screw it back into its original place.
5. Put the covers back onto the DSA.

SECTION 4
ENABLE COLLIMATOR FIELD LIGHT SWITCH ON CONSOLE HANDSWITCH

1. Reload console FLASH memory as follows:
   a. Open Advantx console and set SW1–5 to ON (opposite setting of SW1–1&2).
   b. Reboot the system by pushing the System Reset button on the Advantx console.

   c. Set SW1–5 to OFF (same setting as SW1–1&2) and close the console.
2. Verify that pushing the Trial/Field Light button on the handswitch causes the collimator field light to turn on.

SECTION 5
ADVANTX CONFIGURATION

5-1 Before You Begin

Once the Advantx portion of the Configuration is started, the system must not be RESET or powered off at the systems cabinet until all of the required configuration steps are completed. Failure to do so, may cause the system to “hang” which will then require a complete re-initialization of the database and require the Advantx configuration process to be restarted from the beginning.

Configuration procedures written in this manual are specifically for the Revolution XQ/i system. They are designed to optimize service and installation. Other options may be displayed on the configuration software screens during these procedures that do not relate to this system. These are not explained in this manual and should be ignored.

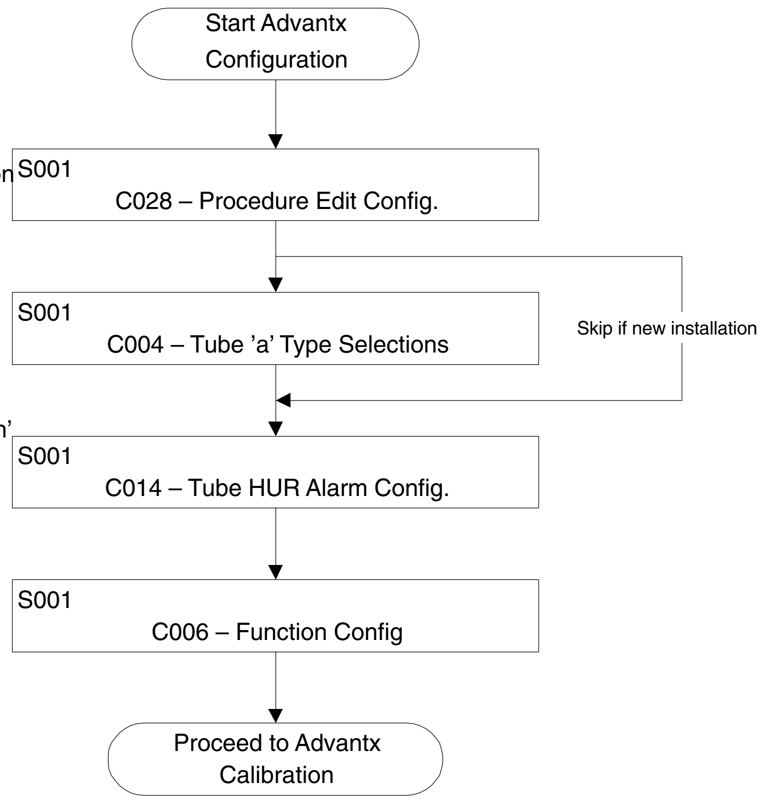
5-2 Service Mode Access

To access Advantx configuration, the system must be placed into service mode operation. Instead of using service laptop tools, this can be done by making a selection on the ADS workstation. From the service desktop window, select the Utilities icon, and then select Mode Transition found under Advantx Tools. From the Mode Transition window, select Service. (Refer to the “Utilities” appendix for Mode Transition details)

5-3 Advantx Configuration Flowchart

Advantx Generator Configuration Flowchart

Some of the Advantx configuration procedures have already been performed at the factory. Therefore, there is no need to repeat these specific procedures during system installation. Any configuration procedure that has been factory adjusted will be identified in the ’Before You Begin’ section of each procedure.



5-4 Advantx Sequence Menus

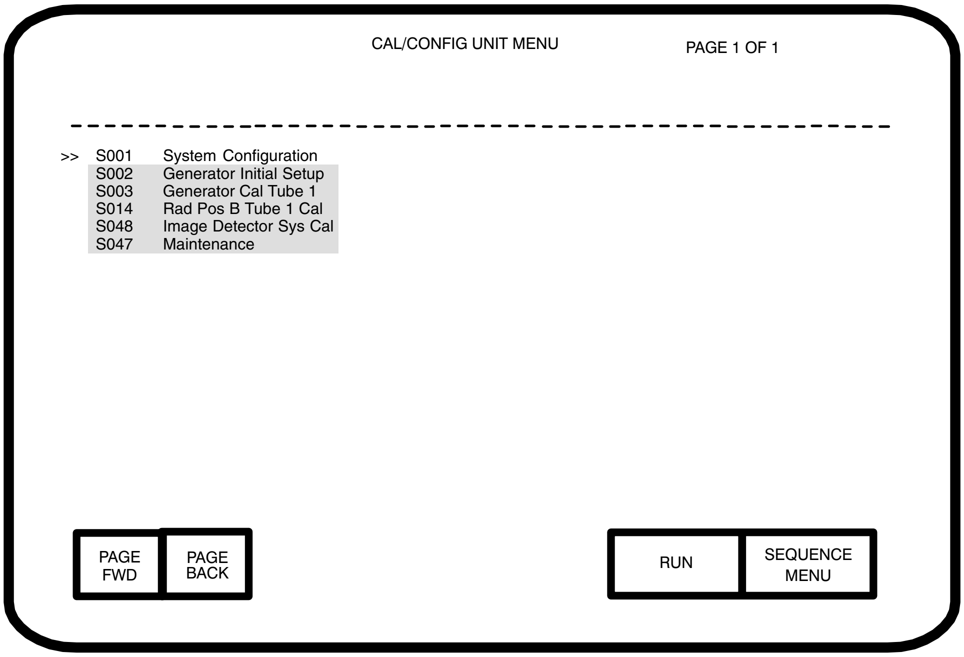
The system Smart Sequencer generates the applicable sequence menus that must be accomplished in order for an Advantx System to be fully calibrated. Section 1 illustrates the sequence menu screens and associated calibration units comprising a sequence menu that may be observed when performing a system calibration. The sequence menus shown are all inclusive of the units that can comprise the sequence.

SECTION 6
SEQUENCE MENU SCREENS

6-1 Main Sequence Screen

Select S001 from the Main Sequence Menu.

MAIN SEQUENCE MENU SCREEN DISPLAY

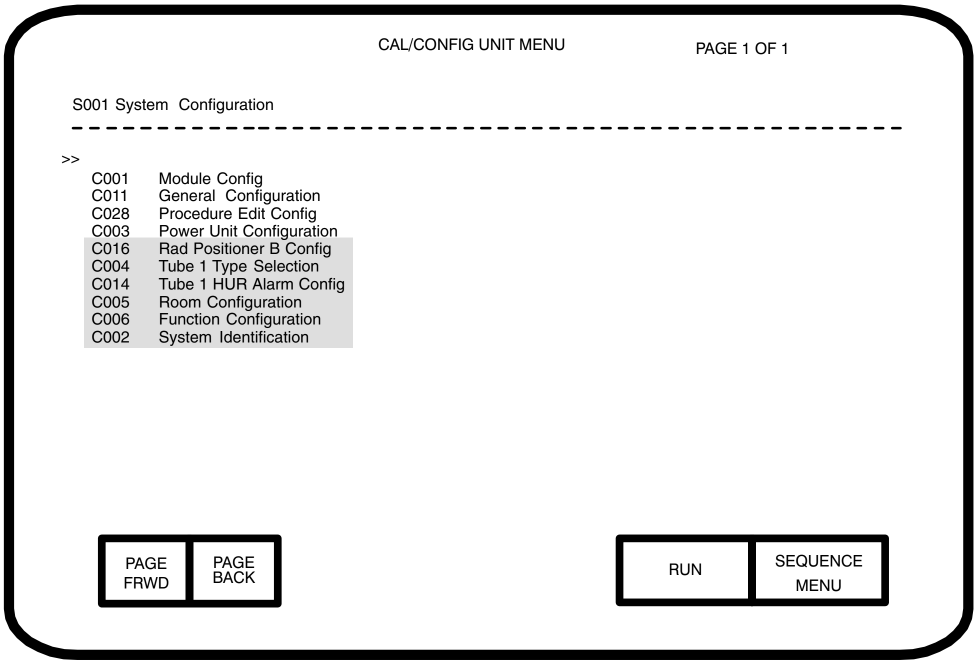


Note: Sequences S002 through S047 do not appear on the screen until S001 is completed.

6-2 S001, System Configuration

Select C014 and C002 from the System Configuration Menu.

S001 SCREEN DISPLAY



Note: Configuration units C016 through C002 do not appear on the screen until the first four units (C001 C011, C028 and C003) are completed.

6-3 C028, Procedure Edit Config

This function can be done via the ADS workstation without the need for a service laptop. Refer to the ADS workstation configuration section.

6-3-1 Description

Configuration Unit C028 is used to setup a system software key lock that controls access to Procedure Edit within the autoprotocol application. The unit is used to enable or disable a Data Edit Key parameter in the database. If the Data Edit Key parameter is enabled, a special floppy key must be in the system drive to allow entry into Procedure Edit. If the Data Edit Key parameter is disabled, access to procedure edit is available at all times. The special floppy key used to invoke lockout is produced by the Laptop Service Tool. Refer to Laptop Service Tool procedures.

6-3-2 Equipment Required

None

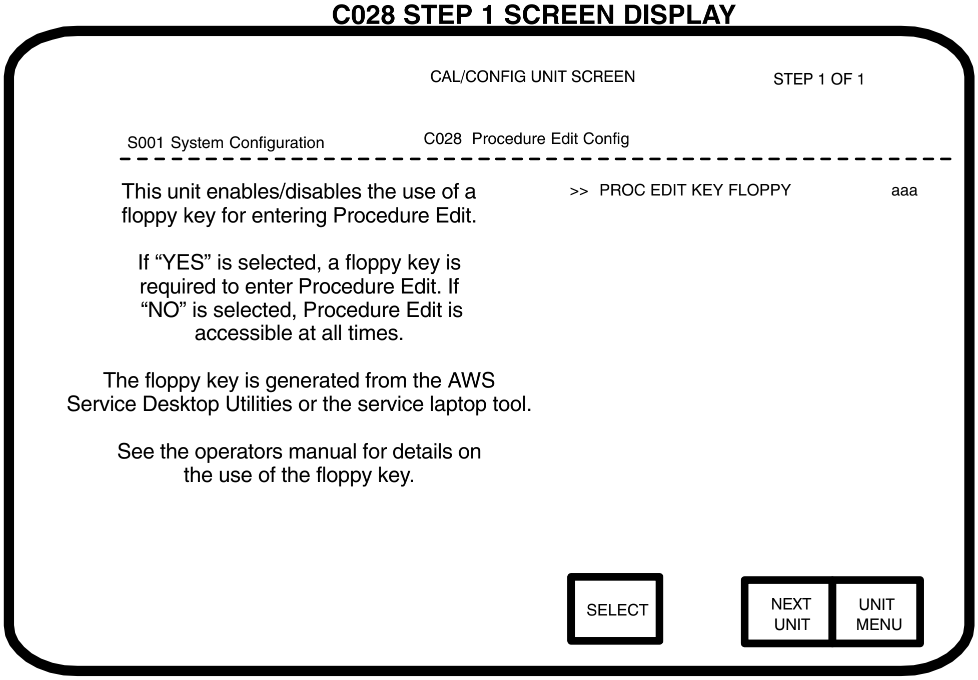
6-3-3 Config Procedure

If the unit is being run for the first time, the default parameter (NO) is displayed on the screen for the PROC. EDIT KEY parameter. If the unit was previously run, the current status of the PROC. EDIT KEY parameter is displayed (YES or NO).

Enable/Disable Software Key lock.

1. Touch the SELECT softkey to activate PROC. EDIT KEY parameter.
2. Use the console dial to enter (YES or NO). If the Data Edit Key parameter is set to YES, a special floppy key must be in the system drive to allow access to Procedure Edit. If the Data Edit Key parameter is set to NO, free access to procedure edit is provided.
3. Touch the SELECT softkey again to enter the selection in the database.
4. Touch NEXT UNIT or UNIT MENU softkey to exit.

C028 STEP 1 SCREEN DISPLAY



6-4 C004, Tube ‘a’ Type Selection

6-4-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled ’Digital Rad SCAT Scorecard’, which was shipped with the system.

6-4-2 Description

Configuration Unit C004 configures the type of tube used in the system. The unit provides selection of tube type, focal spot size, and mA range limits for small focal spot. Three steps are required to configure a tube. A screen display is provided for each step.

Note: Any previous selections are highlighted in reverse video. If the unit has not been run previously, no entries will be highlighted. Refer to FDO (Field Delivery Order) form to determine the type of X–ray tube that is installed on the system.

6-4-3 Equipment Required

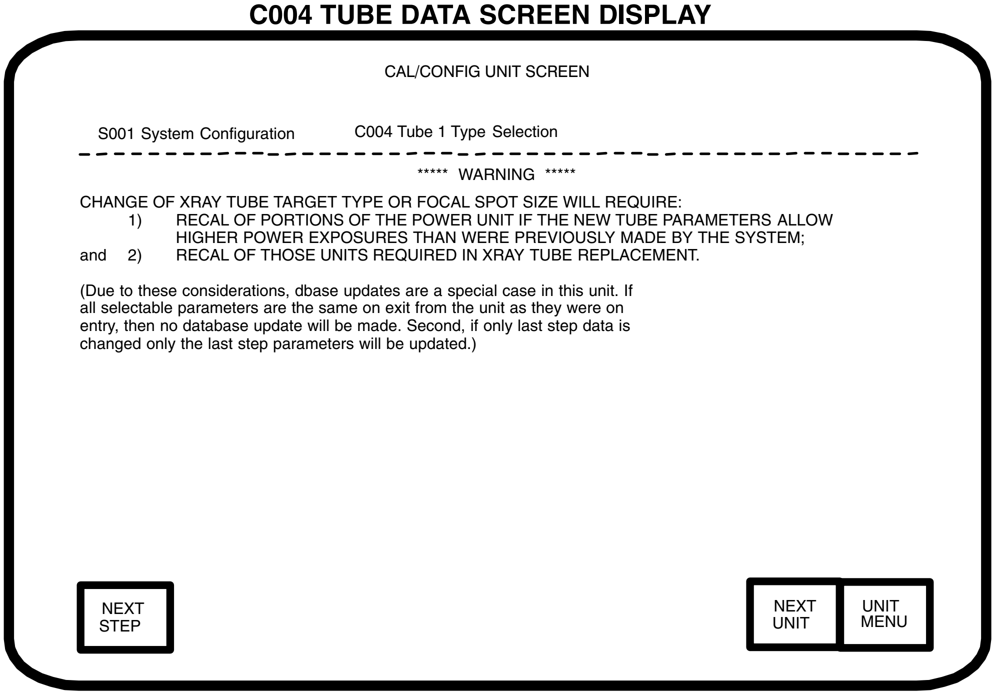
None.

6-4-4 Cal Procedure

1. **Set Tube Data Parameters**. Touch NEXT STEP softkey to proceed to Step 2.

Note: GE is not responsible for non–GE X–ray tubes, and therefore, no special X–ray tube data floppies will be provided for these X–ray tubes.

C004 TUBE DATA SCREEN DISPLAY



Note: CHANGES TO THE X–RAY TUBE TARGET TYPE, OR FOCAL SPOT, REQUIRE THE FOLLOWING ACTIONS:

a. RECAL OF PORTIONS OF THE GENERATOR IF THE NEW TUBE PARAMETERS PERMIT HIGHER POWER EXPOSURES THAN WERE PREVIOUSLY MADE.

b. RECAL OF THE UNITS REQUIRED IN X–RAY TUBE REPLACEMENT (REF UNIT M002 IN MAINTENANCE SEQUENCE S047).

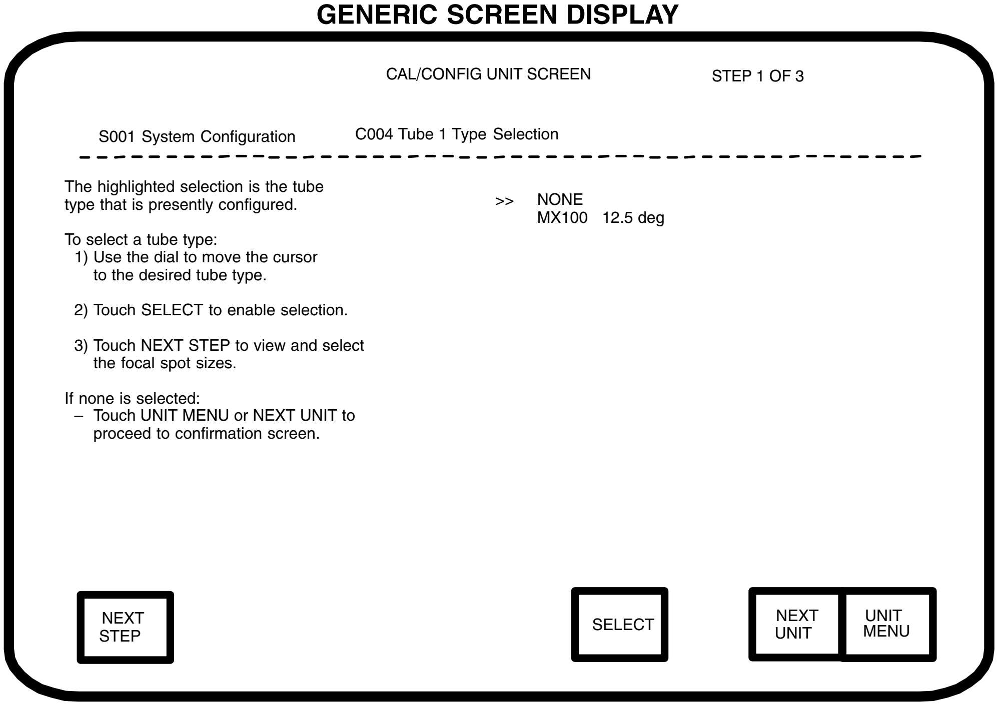
2. **Select the tube type** (**MX100 12.5 deg)**) by positioning the cursor to the left of the desired selection with the console dial. At initial configuration, a tube type must be selected. If the NEXT STEP softkey is touched and no selections have been made, the warning message “MAKE TUBE SELECTION BEFORE PROCEEDING TO NEXT STEP” is displayed.

Note: Selecting NONE provides a method of deleting a previously configured X–ray tube. When NONE is selected, the NEXT STEP softkey is removed from the unit screen display and exit can only be accomplished through a “Confirmation Screen”. Touching the NEXT UNIT or UNIT MENU softkey displays the “Confirmation Screen”. Make sure that you understand the instructions and softkey functions on this screen display before exiting the unit.

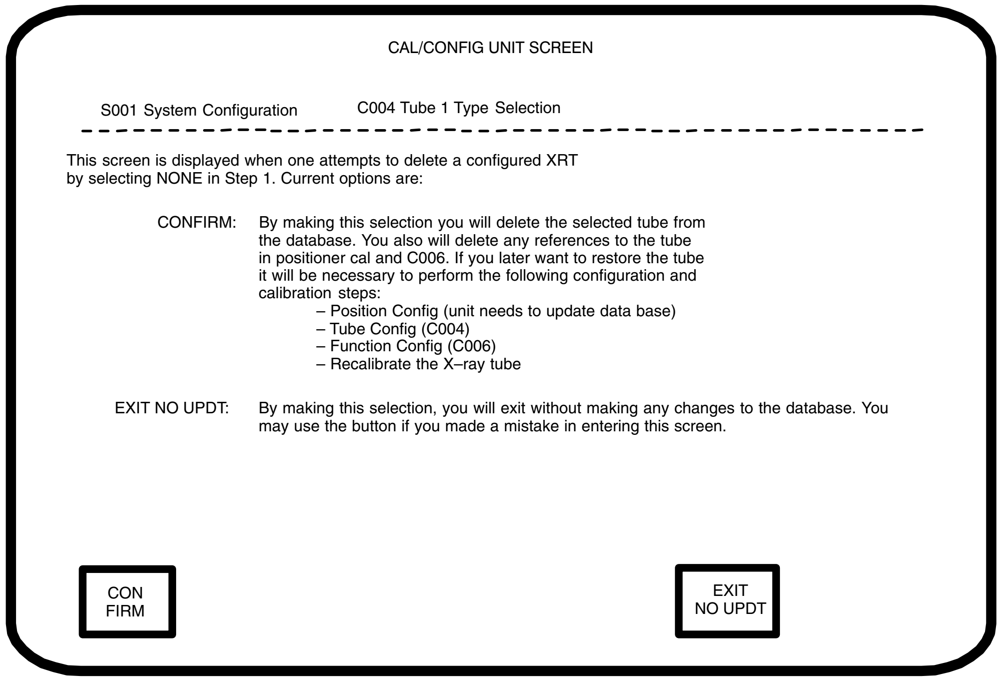
a. Touch the SELECT softkey. The selection is highlighted in reverse video.

b. Touch NEXT STEP softkey to proceed. A “PROCESSING” message is displayed while down loading the applicable X–ray tube data for screen presentation in Step 3.

GENERIC SCREEN DISPLAY



CONFIRMATION SCREEN DISPLAY

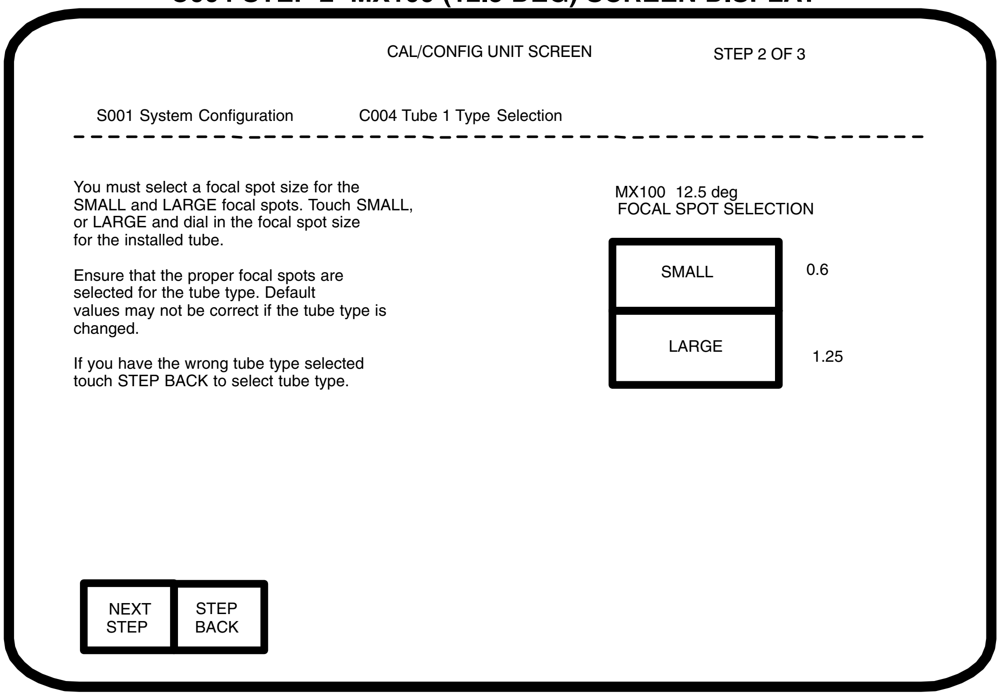


3. **Select Focal Spot Size.** Select the focal spot sizes corresponding to the tube type selected in Step 2. For this system configuration, select 0.6 mm and 1.25 mm focal spots. If you made a wrong tube selection in Step 2, you may return to Step 2 and correct your selection by touching the STEP BACK softkey.

Note: Ensure that the proper focal spots are selected for the tube type. Default values may not be correct if the tube type is changed.

MX100 (12.5 deg) – Selection of both small and large focal spot size is required. Touch SMALL softkey. Use the console dial to enter the applicable small focal spot size. Touch LARGE softkey. Use the console dial to enter the applicable large focal spot size. After making the appropriate selections, touch NEXT STEP softkey to proceed to Step 4.

C004 STEP 2 MX100 (12.5 DEG) SCREEN DISPLAY



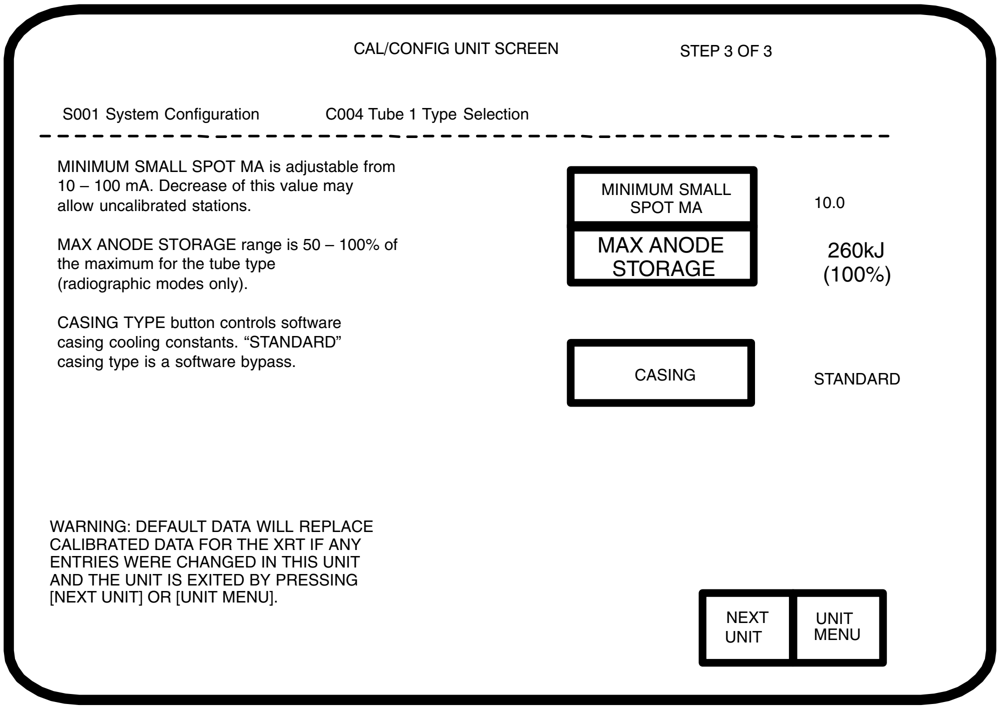
4. **Set mA Limit, Maximum Anode Heat Storage and Casing**

   MA LIMIT – MA Limit is used to set the minimum mA range limit for the small focal spot size of an X–ray tube if required by applications. To change the minimum mA limit, touch the MINIMUM SMALL SPOT MA softkey and, using the console dial, enter the desired mA value. For this system configuration, a value of **10 mA** should be entered.

   MAXIMUM ANODE HEAT STORAGE – Permits the operator to set the heat capacity of an X–ray tube to a de-rated value. The default value is the fully rated maximum (in kilojoules) of the tube which is indicated on the screen as 100 percent. To adjust the maximum anode heat storage range of the X–ray tube (radiographic modes only), touch the MAX ANODE STORAGE softkey and use the dial to enter the desired de-rating. The range of adjustment is 50 percent to 100 percent of the maximum for the applicable tube type.

   CASING TYPE – For this system configuration, a value of **STANDARD** should be entered.

C004 STEP 3 SMALL SPOT SCREEN DISPLAY



6-5 C014, Tube 1 HUR Alarm Config

6-5-1 Description

Configuration Unit C014 is used to disable or select a heat units remaining (HUR) alarm that provides an audible signal at the console whenever the heat units remaining parameter of an X-ray tube drops to a specified level. When the alarm function is selected, the unit can also be used to set the heat unit remaining level at which the alarm is activated. Only one step is required to accomplish the configuration.

6-5-2 Equipment Required

None

6-5-3 Config Procedure

Upon entering the unit for the first time, the default setting for alarm is OFF and a value of 20 is indicated for the HUR level. With alarm OFF, the default HUR level can be disregarded.

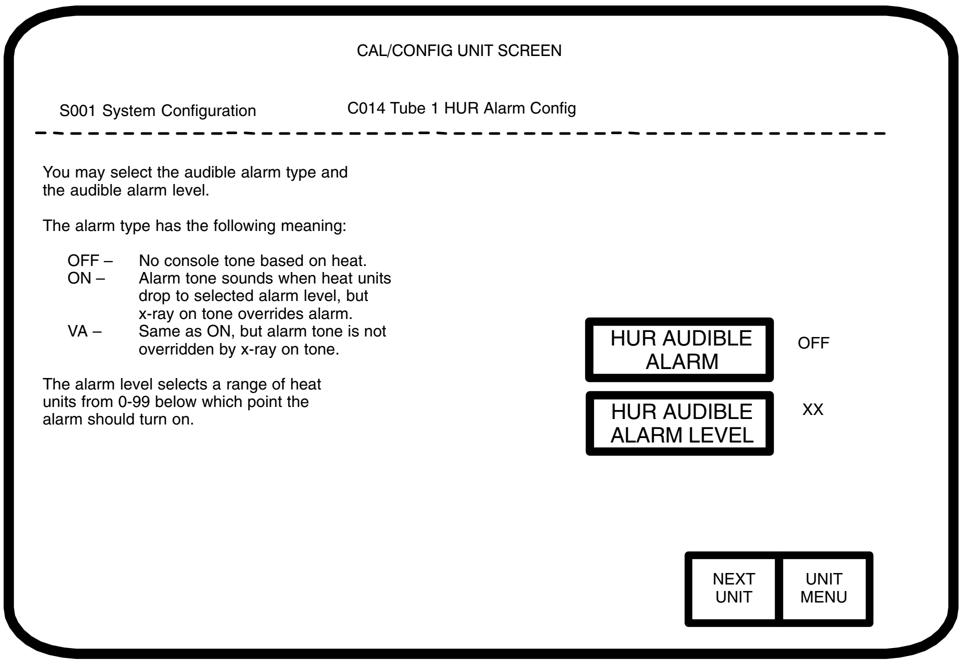
HUR alarm requirements are configured as follows:

1. Touch the HUR AUDIBLE ALARM softkey. The softkey is highlighted and the console dial is enabled to provide the following selections:
   - > **OFF** Disables HUR alarm. No console alarm tone will be activated based on heat units remaining.
   - > **ON** Enables the HUR alarm. Alarm tone will be activated at the console whenever the heat units remaining parameter drops to a specified level. However, X-ray ON tone will override HUR alarm tone.
   - > **VA** Same as ON selection, except x-ray ON tone will not override HUR alarm tone.

Note: If either ON or VA alarm is selected, you must establish the desired heat unit remaining level at which the alarm is activated or the default value of 20 will be entered.

2. Touch the HUR AUDIBLE ALARM LEVEL softkey. Use the console dial to enter the heat unit remaining level (0-99) at which alarm activation is desired.
3. Touch NEXT UNIT or UNIT MENU softkey to exit and proceed to the next configuration unit.

C014 SCREEN DISPLAY



6-6 C006, Function Configuration

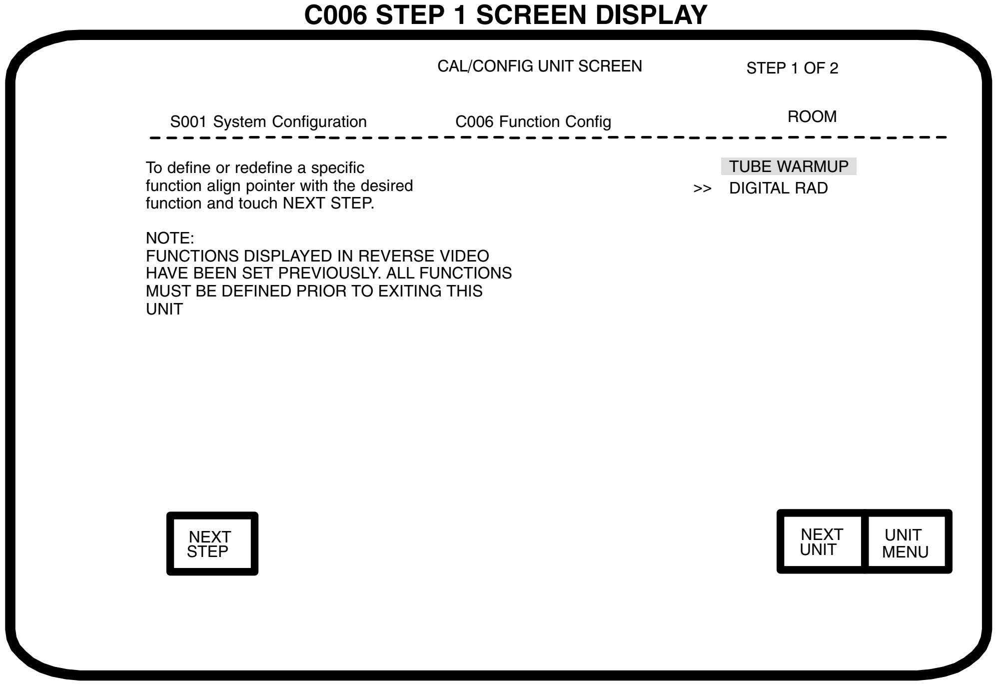
6-6-1 Before You Begin

1. Step 2 of Configuration Unit C006 requires that all information be entered before allowing you to STEP BACK, and continue.
2. When entering this unit after a Database Initialization, error code/message A811 “APPLICATIONS NOT FULLY DEFINED” may be displayed. Since all applications have not been defined by system configuration at this time, disregard the message. The unit will function properly.

6-6-2 Procedure

1. Select Function Label. Align pointer with **DIGITAL RAD** and then touch NEXT STEP.

C006 STEP 1 SCREEN DISPLAY



2. Define Function Labels
   a. Align pointer with LABEL LINE #1 and then touch SELECT. At the keyboard screen, type **DIGITAL** (in uppercase). Select DONE.
   b. Align pointer with LABEL LINE #2 and then touch SELECT. At the keyboard screen, hit SPACE BAR twice, then type **RAD** (in uppercase). Select DONE.
   c. Align pointer with APPLICATION NAME and then touch SELECT. Turn dial to select **DIGITAL RAD** and touch SELECT.
   d. Align pointer with BIPLANE and then touch SELECT. Turn dial to select **NO** and touch SELECT.
   e. Align pointer with SYNCH/NON–SYNCH and then touch SELECT. Turn dial to select **SYNCH** and touch SELECT.
   f. Align pointer with TUBE NUMBER and then touch SELECT. Turn dial to select **1** and touch SELECT.

g. Align pointer with RECEPTOR NUMBER and then touch SELECT. Turn dial to select **DIGITAL RAD** and touch SELECT.

C006 STEP 2 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN STEP 2 OF 2

S001 System Configuration C006 Function Configuration ROOM

Reprogram LABEL LINEs as desired.
If APPLICATION NAME is unclear, refer to the manual.

BIPLANE is yes only if the mode is biplane.
Set SYNC/ NON–SYNCH only as described in Manual.

Set TUBE NUMBER on LFX. Fluoro tube is always 1 (SU well). Rad tubes can be any.

RECEPTOR NUMBER for RAD pos refers to trans panel location. Table Top is NONE. Tomo is the bucky. See manual for Film Changers or any that are not clear.

Touch STEP BACK when done.

>>	LABEL LINE #1	: DIGITAL
	LABEL LINE #2	: RAD
	APPLICATION NAME	: DIGITAL RAD
	BIPLANE	: NO
	SYNCH/NON–SYNCH	: SYNCH
	TUBE NUMBER	: 1
	RECEPTOR NUMBER	: DIGITAL RAD

STEP BACK

SELECT

SECTION 7

ADVANTX CALIBRATION

7-1 Before You Begin

Some of the Advantx calibration procedures have already been performed at the factory. Refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system (inside pink envelope attached to System cabinet). If procedures have been factory–calibrated, there may be no need to repeat these specific calibrations during system installation. Any calibration that has been factory adjusted will be noted in the "**Before You Begin**" section of each calibration procedure.

NOTICE

Potential for Radiation Damage to Detector.
Many of the Advantx calibration units require the X–ray beam to be pointed away from the digital detector before taking exposures. Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

Calibration procedures written in this manual, are specifically for the Revolution XQ/i system. They are designed to optimize service and installation. Other options may be displayed on the calibration software screens during these procedures that do not relate to this system. These are not explained in this manual and should be ignored.

After selecting a calibration unit for the initial time, wait 5 seconds and cycle console power to initialize each unit.

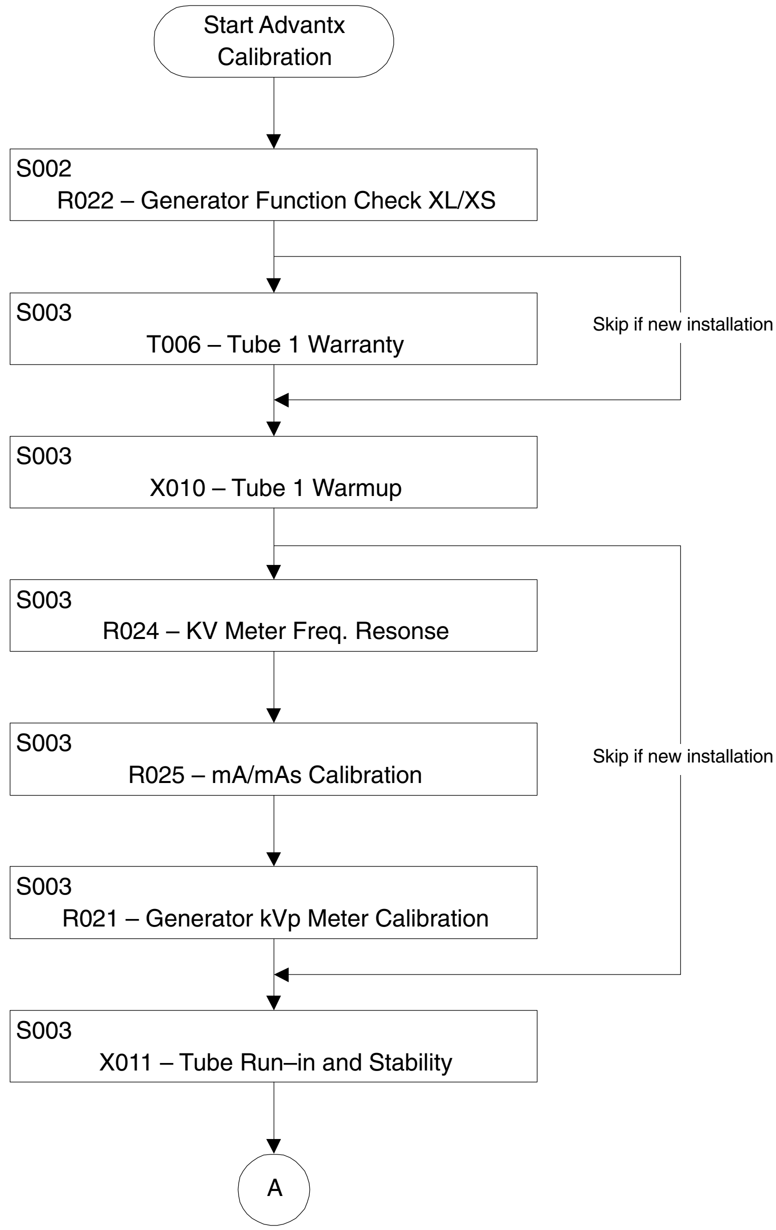
7-2 Service Mode Access

To access Advantx calibration, the system must be placed into service mode operation. Refer to the "Utilities" appendix for Mode Transition details.

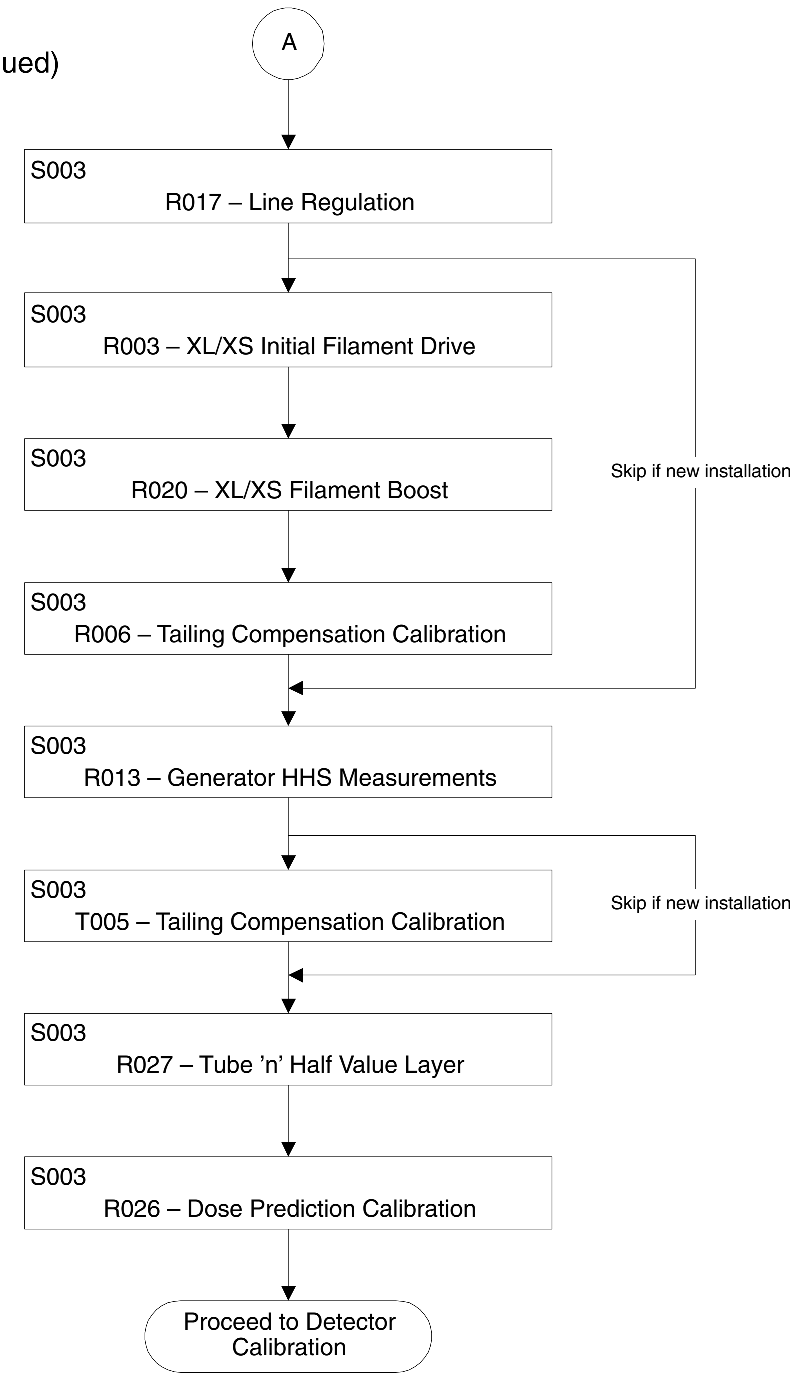
7-3 Advantx Calibration Flowchart

Advantx Generator Calibration Flowchart

Some of the Advantx calibration procedures have already been performed at the factory. Therefore, there is no need to repeat these specific procedures during system installation. Any calibration procedure that has been factory adjusted will be identified in the 'Before You Begin' section of each procedure.

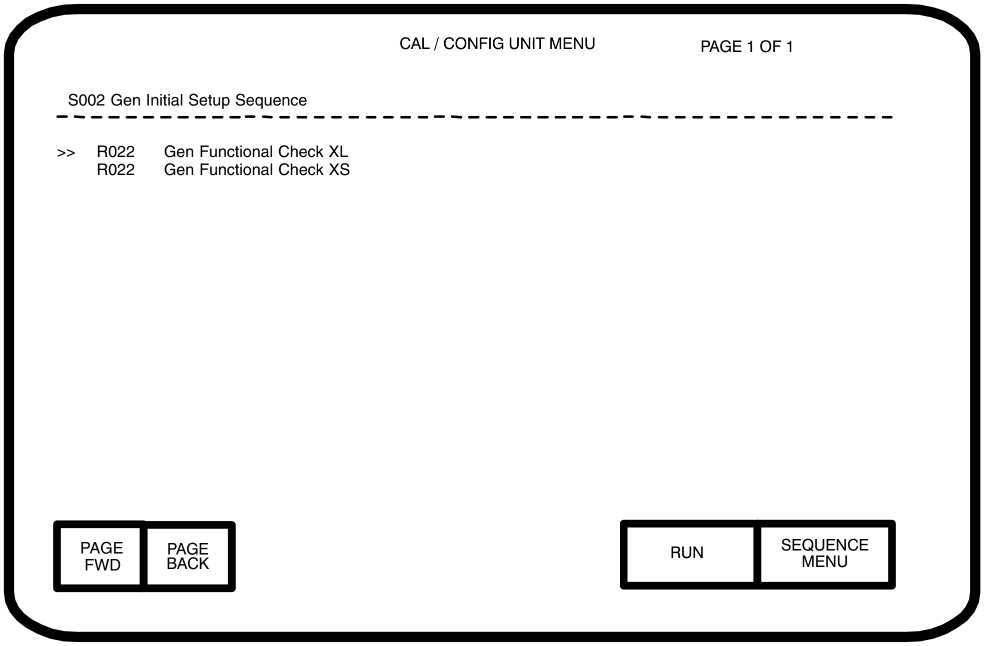


Advantx Generator
Calibration Flowchart (continued)



7-4 S002, Gen Initial Setup Sequence

S002 TYPICAL SCREEN DISPLAY



7-5 R022, Generator Functional Check

7-5-1 Description

Calibration Unit R022 is used to verify generator (Power Unit) functionality. The unit is run at the time of initial system installation and any time thereafter that a preventive maintenance check of the generator is desired. When run at the time of initial system installation, the unit provides a quick test of the generator to determine that exposures can be taken before proceeding with a full RAD calibration sequence. After a full RAD calibration has been accomplished, the unit can then be used as a preventive maintenance tool to provide a quick check of generator performance at selected mA stations.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

Do not attempt to use this unit for X–ray tube checks. R022 is only intended for generator functional checks (Cal Unit R013 performs X–ray tube checks).

7-5-2 Equipment Required

None.

7-5-3 Special Instructions

– When entering R022, the collimator blades may not always close automatically and error codes 4E02, 4A6B and 7001 may be displayed on the screen. If this condition occurs, touch POSITION COLLIMATOR softkey. The unit will display a collimator adjust screen that contains the quad controls for adjusting collimator blade position.

- Upon entry into the unit, the collimator blades (on systems configured with auto–collimators) are automatically moved to a fully closed position.
- On systems configured with a manual collimator, the POSITION COLLIMATOR softkey does not appear on the unit screen display. Field size (blade position) must be adjusted manually at the collimator.

7-5-4 Functional Check

Perform generator initial functional check as follows:

1. Touch the UNCALED softkey. This signals the system that X–ray tube filament drive has not been calibrated (Ref. Cal Unit R003) and sets the unit to default values that will permit a functional check to verify that exposures can be taken without damaging the X–ray tube.
2. Verify that the following screen functions are set as follows:

CLOSED/OPEN	Set to CLOSED
INITIAL KVP	Disabled
SYNC/NON–SYNC	Set to Sync

3. Press the PREP and EXPOSE switches to verify that exposures can be taken. If exposures can be taken, exit the unit and proceed with RAD calibration. If exposures cannot be taken, perform diagnostics to determine problem before proceeding with any additional calibration.

Note: After releasing the PREP switch, the next PREP should not be initiated for at least 15 seconds.

7-5-5 Maintenance Check

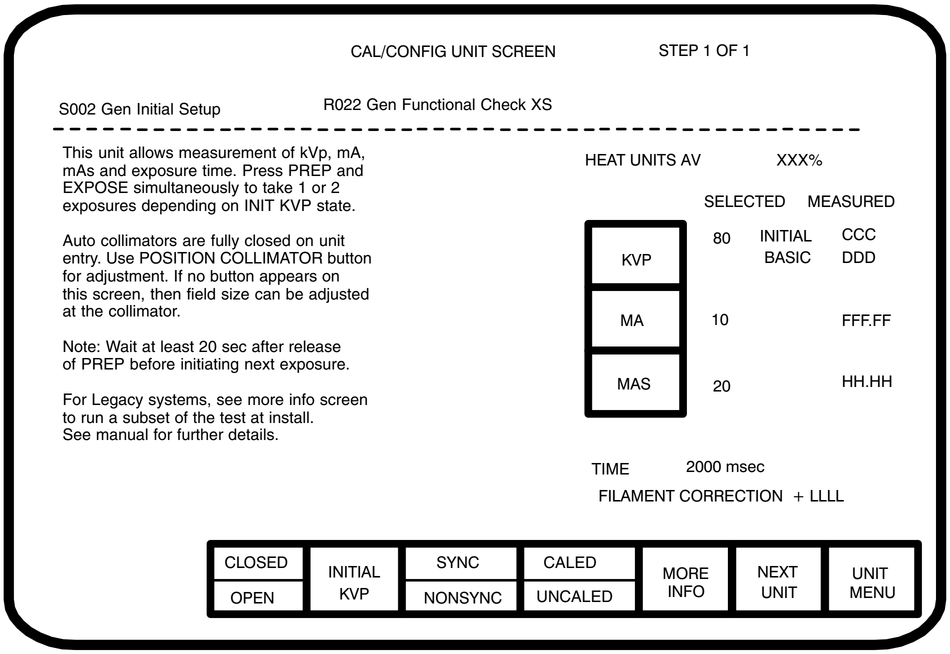
Perform generator preventive maintenance check as follows:

1. Touch the CALED softkey. This signals the system that the X–ray tube filament drive has been calibrated (Ref. R003). The unit softkey functions can be set as required by the system configuration to perform a functional check.
2. Set the function softkeys to the function required by the system configuration.
3. Use the appropriate softkey selection (KVP, MA, and MAS) and the console dial to enter the desired kVp, mA, and mAs parameters.
4. Press the PREP and EXPOSE switches. If INITIAL KVP was enabled, the system will first take an exposure of 10 msec to measure INITIAL KVP, a second exposure, at the selected exposure time, will then measure BASIC kVp, mAs, and exposure time.

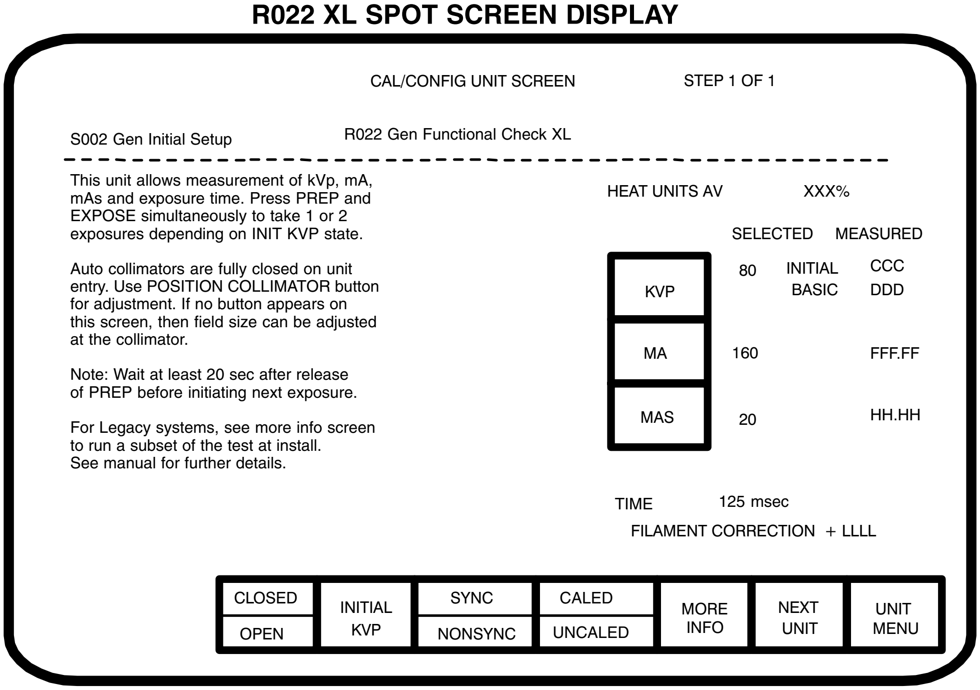
Note: When INITIAL KVP is selected and the selected exposure time is equal to or less than 10 msec, only one exposure is taken and the measured value of kVp is displayed as both INITIAL and BASIC kVp.

5. After releasing the PREP switch, the next PREP should not be initiated for at least 15 seconds.
   a. Repeat taking exposures at selected mA stations to verify proper operation of the power unit.
   b. Touch NEXT UNIT or UNIT MENU softkey to exit.

R022 XS SPOT SCREEN DISPLAY



R022 XL SPOT SCREEN DISPLAY



R022 “MORE INFO” SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN STEP 1 OF 1

S002 Gen Initial Setup R022 Gen Functional Check

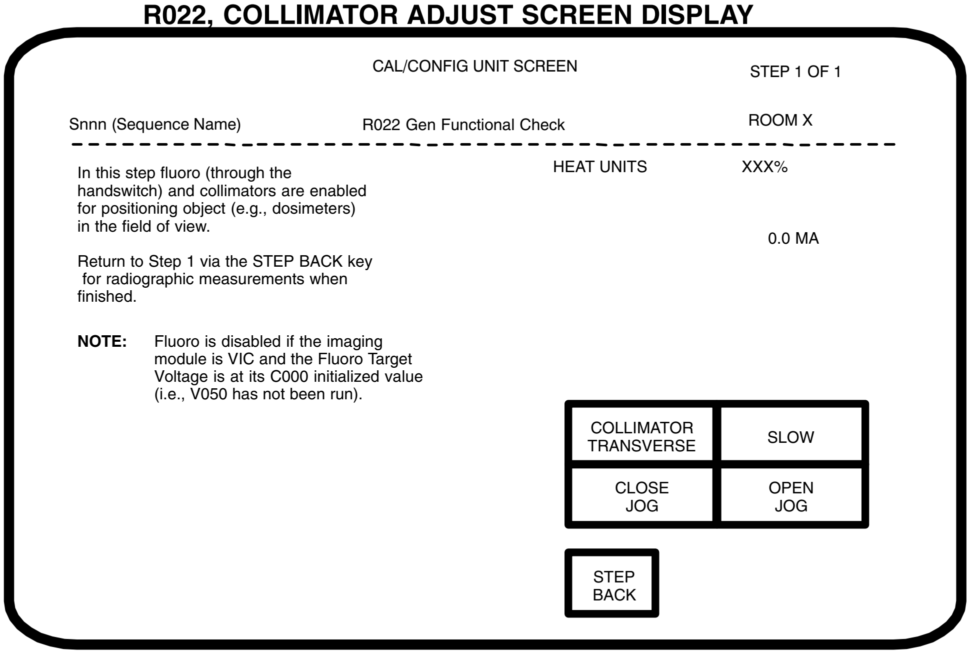
BUTTON	FUNCTION OF BUTTON
OPEN/CLOSED	Controls whether exposures are taken with open or closed loop mA control. Application uses CLOSED loop.
INIT KVP	Controls whether initial kVp will be measured with a short exposure before the selected exposure.
SYNC/NONSYNC	Controls whether exposures will be taken in SYNC or NON–SYNC line contacting mode. LFX power limitations are worse in NONSYNC mode. Film changer and photospot are normally configured to NONSYNC.
CAL/UNCAL	Is used to signal the software if the X–ray tube filament drive (R003) has been calibrated.
KVP, MA, MAS	Are used with the dial to select kVp, mA, and mAs.

STEP BACK | PAGE | LINE | PREV NEXT

Collimator Blade Adjustment

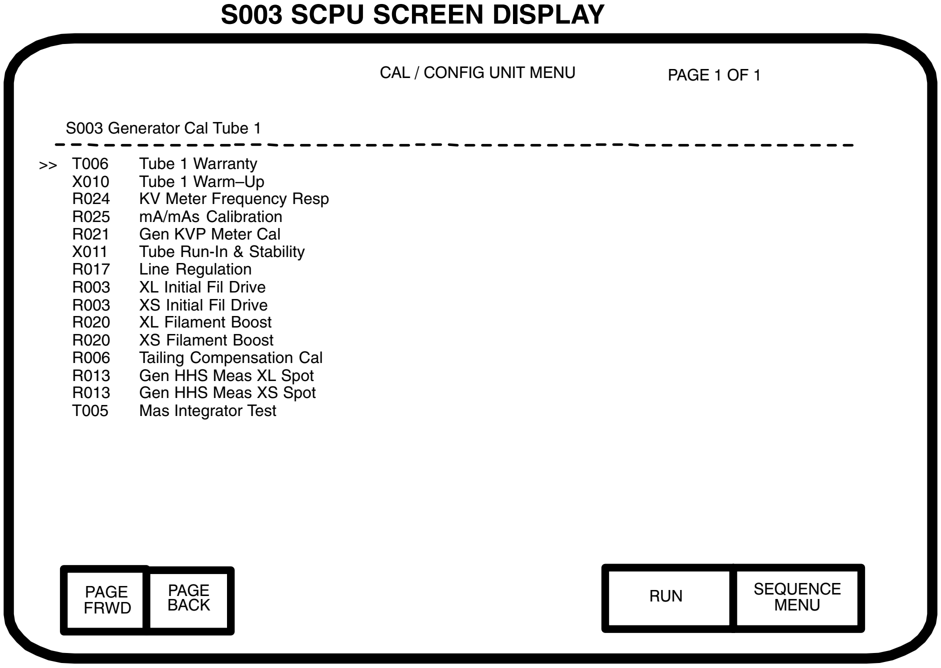
1. Take and maintain an exposure. Use the quad softkeys on the collimator adjust screen to position the collimator blades to the desired position.
2. Terminate the exposure and touch STEP BACK softkey to return to Step 1 screen and perform the appropriate radiographic measurements.

R022, COLLIMATOR ADJUST SCREEN DISPLAY



7-6 S003 – Generator Tube 1 Cal Sequence – SCPU

S003 SCPU SCREEN DISPLAY



7-7 T006, Tube n Warranty

7-7-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

This procedure should be performed whenever the X–ray tube is replaced.

To exit this unit and unhighlight it in the sequence without affecting tube warranty data: 1) select RESET TOTAL, 2) DO NOT select EXECUTE, 3) then EXIT the unit.

7-7-2 Description

Calibration Tool Unit T006 provides a method of tracking and recording X–ray tube warranty data. The unit tracks a variety of usage parameters. The actual parameters displayed on the unit screen will vary according to the type of system for which the tube is configured. Two numbers are tracked for each usage parameter. The first number tracks total time since the system was first configured. The second number is a reference value that tracks total usage time since the last tube replacement. This number will be saved when a service person changes tubes and performs a warranty reset. The unit does not calibrate values.

7-7-3 Equipment Required

None.

7-7-4 Reset Procedure

A database initialization will reset all tube warranty data. If the warranty data is to be retained, manually record the warranty parameters before proceeding with the database initialization.

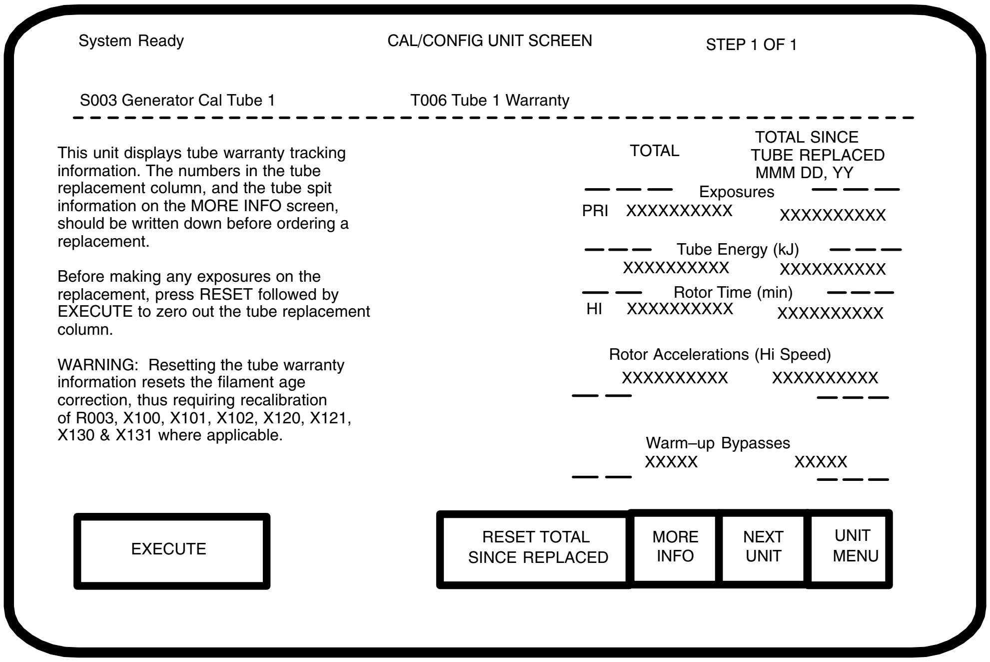
If a tube warranty reset is required, proceed as follows:

1. Record the usage times displayed in the TOTAL SINCE TUBE REPLACED column for each parameter listed for the X–ray tube being replaced. **Include this data with the tube being returned to the factory.**
2. After a new X–ray tube is installed, touch the RESET TOTAL SINCE REPLACED softkey. When enabled the softkey is highlighted in reverse video. Then touch the EXECUTE softkey. All usage values in the TOTAL SINCE TUBE REPLACED column are reset to zero.

Note: Resetting the tube warranty also resets the tube Filament age correction parameters (Filament Aging and Fil Age (Last Cal)). This requires a recalibration of R003.

3. Touch NEXT UNIT or UNIT MENU softkey to exit.

T006 READ TUBE WARRANTY SCREEN DISPLAY



PRI is the number of primary timed (i.e., radiographic) exposures (excluding tube warmups).

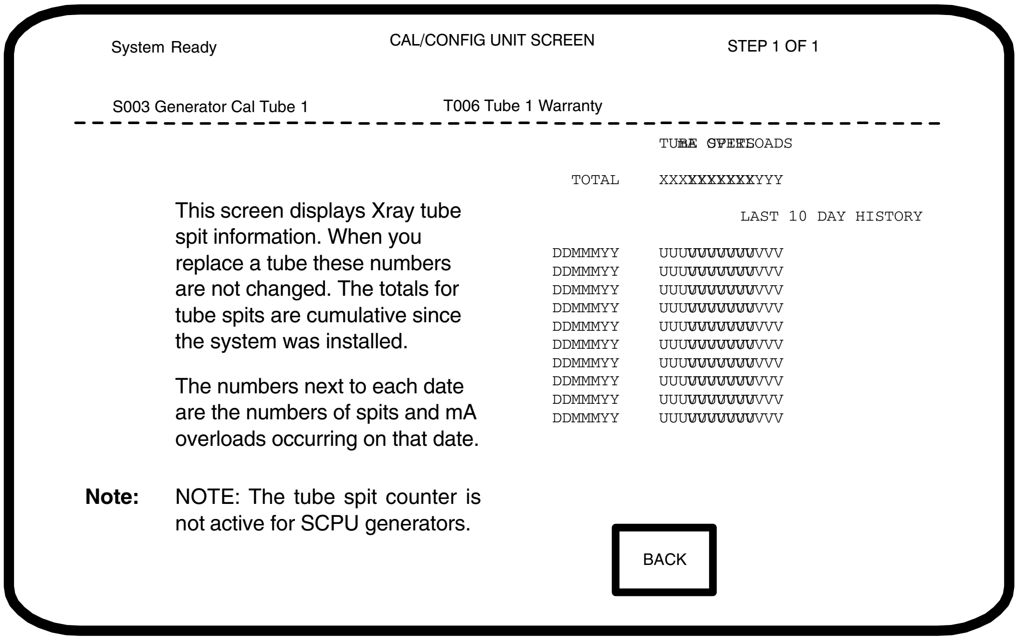
TUBE ENERGY is the number of kilojoules input to the X–ray tube in primary timed, secondary timed, and secondary continuous modes.

HI is the time (in minutes) that the rotor has been at high speed.

ROTOR ACCELERATIONS is the number of times that the rotor has been accelerated to high speed (0 minus HI) plus (LO minus HI).

WARM–UP BYPASSES is the number of times that a recommended tube warmup has been bypassed.

T006 "MORE INFO" SCREEN DISPLAY



YYYYYYYYYY is the number of mA overloads since systems installation.

DDMMMYY is the date associated for each value of UUUUUUUUUU and VVVVVVVVVV. The dates are displayed in descending order with today's date on top.

UUUUUUUUU is the number of spits for each day of operation for the last ten days.

VVVVVVVVVV is the number of mA overloads for each day of operation for the last ten days.

7-8 X010, Tube (n) Warmup

7-8-1 Description

Calibration Unit X010 provides a system controlled method of accomplishing an X–ray tube warmup. The unit is semi–automated; parameters are automatically set according to the tube type. Only one step is required to accomplish a tube warmup.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

Note: The calibration unit should be run whenever an X–ray tube has been out of use for two or more hours.

7-8-2 Equipment required

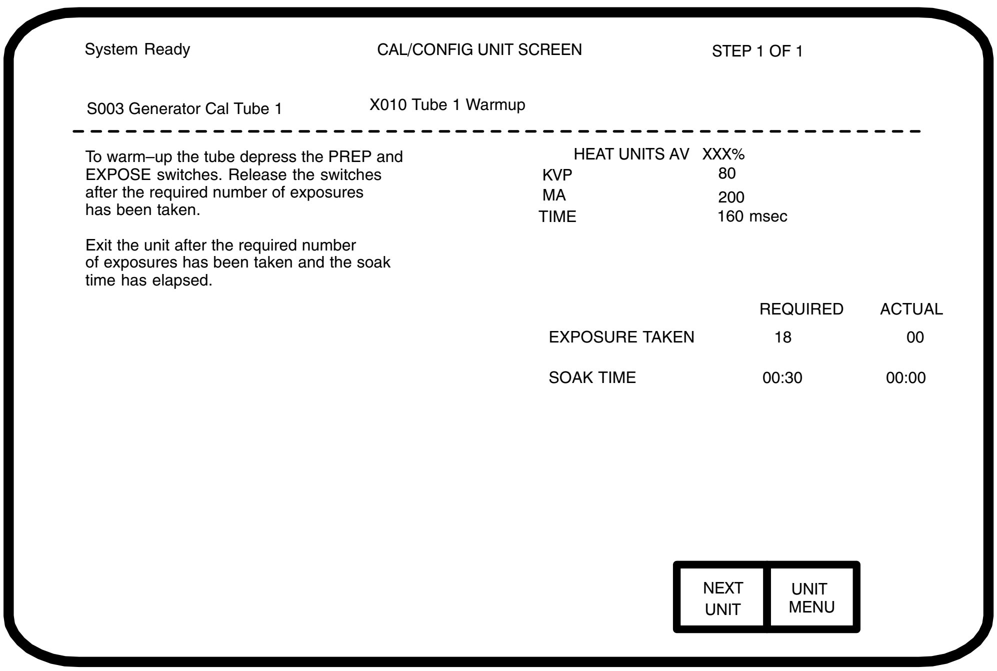
None.

7-8-3 Cal Procedure

Perform tube warm-up as follows:

1. Initiate the X–ray tube warmup by pressing the PREP and EXPOSE switches on the console handswitch. The unit will take a series of primary timed exposures at the values indicated on the console screen.
2. Release the switches after the required number of exposures have been taken. The unit will enter a soak time period.
3. After the SOAK TIME has elapsed, the console will emit a short audio tone and the message “TUBE WARM-UP COMPLETE” will be displayed.
4. Touch NEXT UNIT or UNIT MENU softkey to exit the unit.

X010 SCREEN DISPLAY



7-9 R024, KV Meter Frequency Response Calibration

7-9-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled ’Digital Rad SCAT Scorecard’, which was shipped with the system.

This procedure should be performed whenever the high voltage transformer is replaced.

7-9-2 Description

Calibration Unit R024 is used to adjust the kVp response for two metering channels within the power unit kVp metering subsystem. This calibration may have been performed in the factory. Check setup first before proceeding with a full calibration.

1. Step 1 places a Keithley meter in the X–ray beam to center and collimate down to the active area of the Keithley.
2. Step 2 performs the adjustment by first calibrating the Positive kV metering channel and then the Negative kV metering channel. Test exposures are automatically set to 120 kVp at 100 ms (100 kVp 160 mA for MX 150). The adjustment procedure uses the output from the Keithley as the stored display on the oscilloscope. The resultant kV metering waveforms are then analyzed for best response.
3. Best response is considered to be a kV waveform with a rising edge that is as square as possible without any overshoot or undershoot If observation indicates the need for adjustment on either the positive or negative kV metering channels, adjust the appropriate potentiometer on the Cmd 1 board after each successive test exposure.

Note: Because only one kV metering channel can be adjusted at a time, the opposite channel is disabled. A kV reference signal is automatically applied to the disabled channel when either the NEGATIVE KV METER or POSITIVE KV METER softkey is enabled.

4. When activated, the NORMAL OPERATION softkey removes the kV reference voltage and permits the metering circuit to meter the actual kV inputs from the cathode and anode input from the internal bleeder.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-9-3 Equipment Required

Keithley kVp Divider with filter packs (Model 35080A), dual channel storage oscilloscope, calibration fixture (2222557) and test leads.

7-9-4 Special Instructions

The following special instructions relate to the operation of this calibration unit.

1. A functional description of the unit is provided on a “MORE INFO” screen that can be accessed by touching the MORE INFO softkey on the Step 2 screen display. Read the “MORE INFO” screen to become familiar with the operation of the unit and softkey functions on the screens before proceeding with the calibration.
2. Refer to Keithley operator manual (supplied with the instrument) for instructions pertaining to the application of correction factors associated with a filter pack. You must take filtration effects and linearity corrections into consideration to ensure accuracy. Refer to paragraph 4.7 and 4.8 in Keithley manual.

Note: This unit must be re–run whenever the power unit high voltage tank is replaced.

Cal Procedure

1. Step 1, set up the system per the following: *(ignore screen display instructions)*
   a. Install filter pack P/N 37617C (50kV – 150kV) on Keithley.
   b. Slide calibration fixture onto collimator rails.
   c. Position Keithley in fixture so that filter pack is centered and **facing** X–ray beam. See Illustration 3–9.
   d. Using coaxial test lead, connect the Keithley to the oscilloscope.
   e. Use the collimator field light to center the Keithley in the X–ray beam.
   f. Touch NEXT STEP when setup is complete.

R024 STEP 1 SCREEN DISPLAY

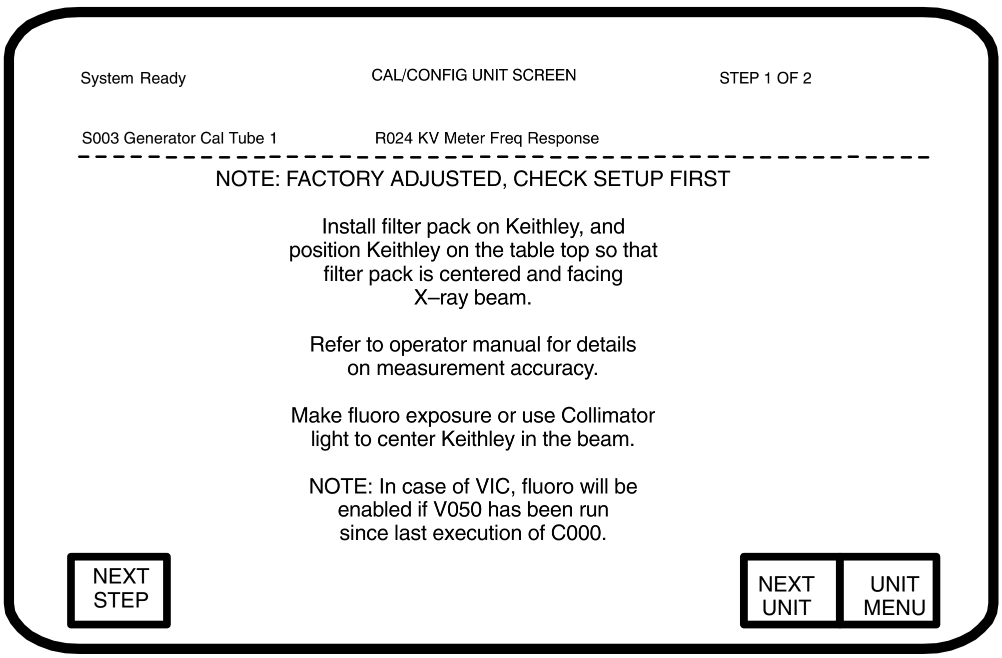
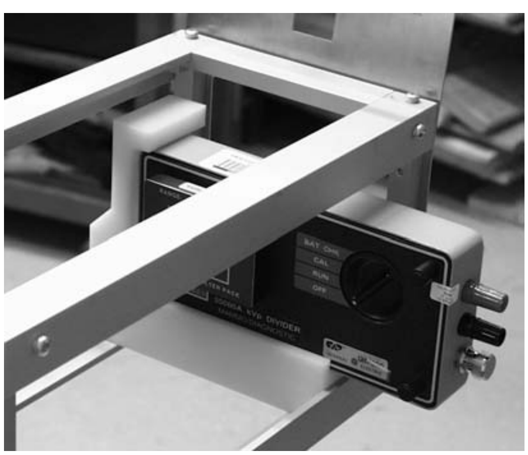


ILLUSTRATION 3–9
CALIBRATION FIXTURE SET–UP



2. **Step 2, Perform Calibration**
   a. Touch the POSITIVE KV METER softkey.

b. Press the PREP and EXPOSE switches on the handswitch to take and maintain an exposure.

c. While maintaining the exposure, adjust potentiometer P1 (CW reduces overshoot) on the SCPU Command 1 board to obtain a kV waveshape on the oscilloscope that has the most rapid risetime without overshoot or undershoot. Store this kV waveshape on the oscilloscope as a reference waveshape.

d. Touch the NEGATIVE KV METER softkey.

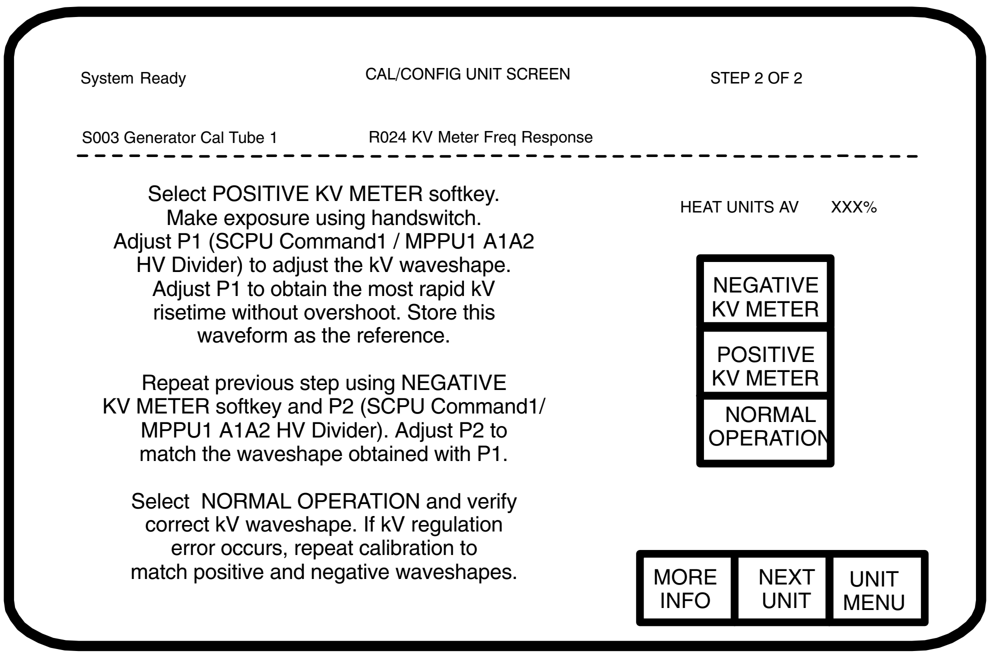
e. Press the PREP and EXPOSE switches on the handswitch to take and maintain an exposure.

f. While maintaining the exposure, adjust potentiometer P2 (CW reduces overshoot) on the SCPU Command 1 board to match the negative kV waveshape on the oscilloscope to the positive kV waveshape obtained with P1 adjustment (Reference waveform stored on scope).

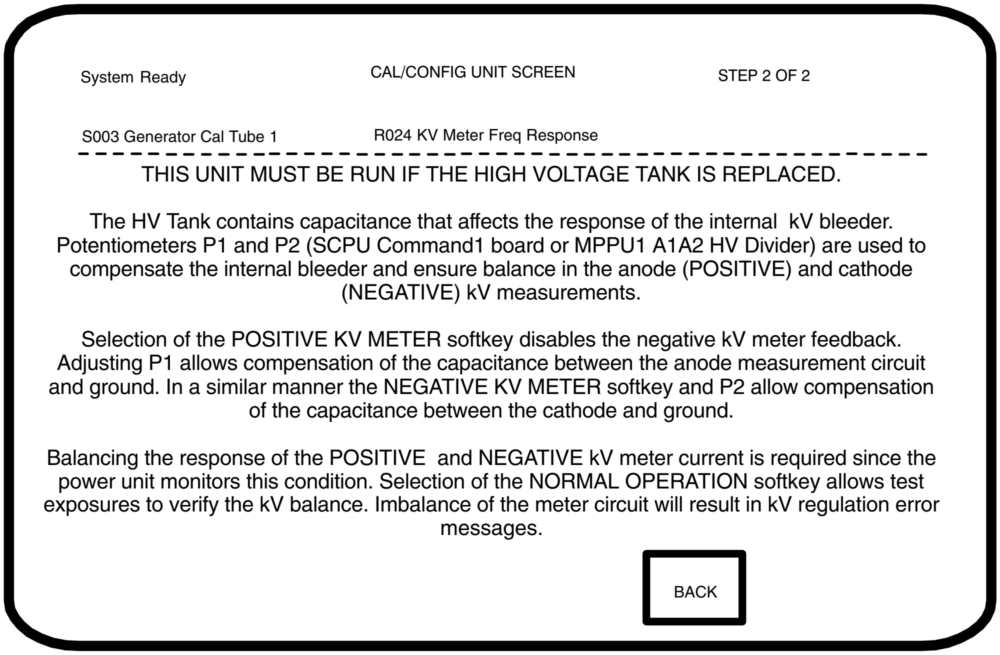
g. Touch the NORMAL OPERATION softkey.

h. Verify that the correct kV waveshape is displayed on the oscilloscope. If a kV regulation error occurs, you must repeat the calibration to obtain a better match of the positive and negative waveshapes.

R024 STEP 2 SCREEN DISPLAY



R024 MORE INFO SCREEN DISPLAY



7-10 R025, mA/mAs Calibration

7-10-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled ’Digital Rad SCAT Scorecard’, which was shipped with the system.

7-10-2 Description

Calibration Unit R025 is used to calibrate the mA meter gain of systems configured with the SCPU power unit. The mAs meter is calibrated at the same time by integrating the reference mA over a 400 ms time period. Only one step is required to accomplish the calibration.

7-10-3 Equipment Required

Digital Multimeter (DMM w/ammeter function)

7-10-4 Special Instructions

- A functional description of the unit is provided on a “MORE INFO” screen that can be accessed by touching the MORE INFO softkey on the Step 1 screen display. Read the “MORE INFO” screen to become familiar with the unit and softkey functions before proceeding with the calibration.
- When an mA measurement has been completed, you cannot repeat the measurement without re–running the unit.
- The VIEW DBASE softkey is always active, i.e., before making any measurements and after all measurements have been made.

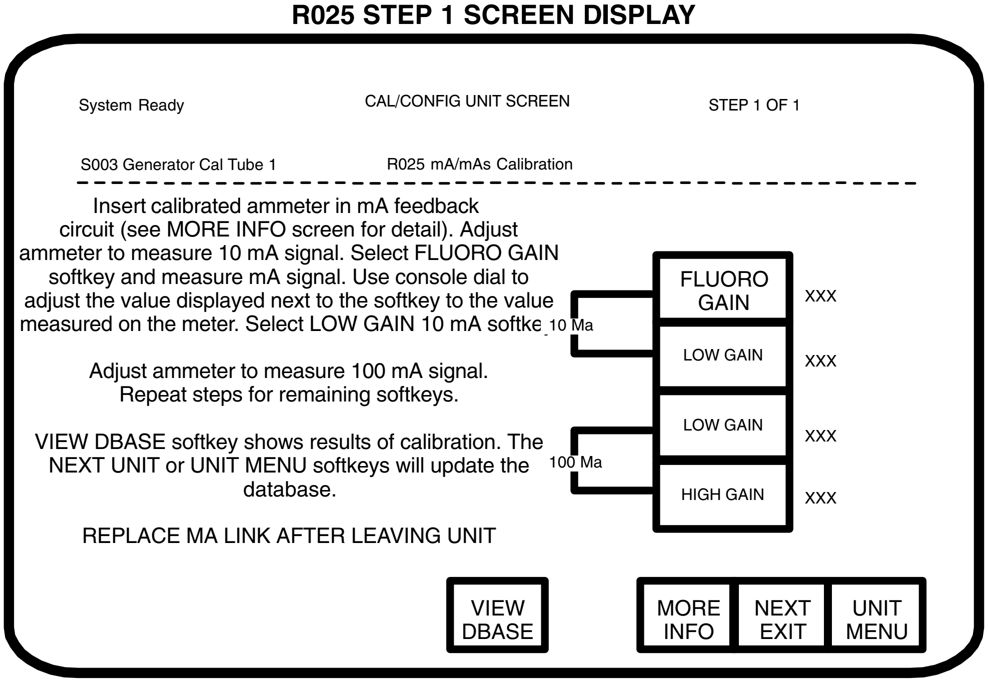
7-10-5 Test Setup

Remove mA link from SCPU A4 A1, Command 1 board. Then, set DMM to measure amperes (DC) and insert DMM across ST1A–ST1B on SCPU A4 A1, Command 1 board.

7-10-6 Cal Procedure – Step 1 Screen

1. Set ammeter to measure 10 mA signal.
2. Touch the 10 mA FLUORO GAIN softkey and note the mA indicated on the ammeter. Use the console dial to adjust the value displayed next to the softkey to the value measured on the ammeter.
3. Touch the 10 mA LOW GAIN softkey and note the mA indicated on the ammeter. Use the console dial to adjust the value displayed next to the softkey to the value measured on the ammeter.
4. Set ammeter to measure 100 ma signal.
5. Touch the 100 mA LOW GAIN softkey and note the mA indicated on the ammeter. Use the console dial to adjust the value displayed next to the softkey to the value measured on the ammeter.
6. Touch the 100 mA HIGH GAIN softkey and note the mA indicated on the ammeter. Use the console dial to adjust the value displayed next to the softkey to the value measured on the ammeter.
7. Touch the VIEW DBASE softkey to examine results of the calibration.
8. Disconnect DMM from power unit.
9. Replace the mA link.
10. Touch the NEXT UNIT or UNIT MENU softkey to exit

R025 STEP 1 SCREEN DISPLAY



R025, MORE INFO SCREEN DISPLAY

System Ready CAL/CONFIG UNIT SCREEN STEP 1 OF 1

S003 Generator Cal Tube 1 R025 mA/mAs Calibration

Insert ammeter on MPPU1 A1 A1 (Measure and Commutation Board) across XJ3 or on SCPU A4 A1 (Command1) across ST1A–ST1B.

The internal mA measurement (with no correction factor applied) is displayed as Uncorrected mA above the softkeys.
Three mA measurement scales are required by the power unit: Fluoro Scale, Low Scale (10–100 mA), High Scale (100–1500 mA).
The meter gain (slopes) and offsets are calculated based on the measurements made with the four softkeys and are interactive.

The mAs meter is calibrated at the same time by integrating the reference mA over a 400 millisecond period.

When a measurement has been completed it cannot be repeated unless the unit is rerun. The VIEW DBASE softkey is active before making any measurements and after all four measurements have been completed.

BACK

R025 STEP 1 (REVIEW DATABASE) SCREEN DISPLAY

System Ready CAL/CONFIG UNIT SCREEN STEP 1 OF 1

S003 Generator Cal Tube 1 R025 mA/mAs Calibration

The existing database values are shown on the right side of the screen. The results of the new calibration (if it has been completed) are shown in parenthesis.

Press BACK to return tp Step 1 screen.

Press MORE INFO for an explanation of the calibration theory.

Press NEXT UNIT or UNIT MENU to update the database and exit the unit.

Current NVRAM Values (New Calibration Values)	mA	mAs
OFFSET	XXX (X.XX)	XXX (X.XX)
FLUORO GAIN	XXX (X.XX)	XXX (X.XX)
LOW GAIN	XXX (X.XX)	XXX (X.XX)
HIGH GAIN	XXX (X.XX)	XXX (X.XX)

BACK | MORE INFO | NEXT EXIT | UNIT MENU

7-11 R021, Generator kVp Meter Calibration

7-11-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

7-11-2 Description

Calibration Unit R021 is used to calibrate the kVp meter of the SCPU power unit. The cal procedure consists of two steps. Step 1 automatically calibrates mA. Step 2 takes exposures in either an automatic or manual mode and performs calibration calculations. Step 2 also allows the operator to view and adjust the calibration data using a VERIFY/ADJUST screen display. A data viewing screen allows the operator to view the collected data to determine whether further calibration/adjustment is required.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-11-3 Theory

The power unit contains a D/A converter that generates an analog voltage for closed loop kV control and an A/D converter that provides a digital output from the analog voltage representing the kV. The value loaded into the D/A and a measured value are considered one set of measurements while the value returned from the A/D and a measured value are considered another set of measurements. The unit uses a least squares fit of data to a straight line to perform the conversions between the digital value loaded into the system and the actual kVp read back.

7-11-4 Equipment Required

Keithley kVp Divider with filter packs (Model 35080A), oscilloscope, calibration fixture, and test leads.

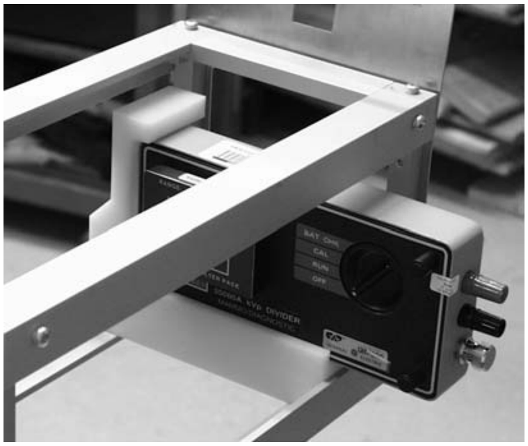
7-11-5 Test Setup

Setup the system for calibration as follows: (See Illustration 3–10 for typical test setup).

1. Install filter pack (P/N 37617C) on Keithley.
2. Slide calibration fixture onto collimator rails.
3. Position Keithley in calibration fixture so that filter pack is centered and facing the X–ray beam.
4. Using coaxial test lead, connect the Keithley to the oscilloscope.
5. Set oscilloscope controls as follows:

TRIGGER:	Internal
VERT AMPL:	2 volts/div
TIME BASE:	20 ms/div

ILLUSTRATION 3–10
CALIBRATION FIXTURE SET–UP



7-11-6 Special Instructions

The following special instructions relate to the operation of this calibration unit.

– A functional description of the unit is provided on a “MORE INFO” screen that can be accessed by touching the MORE INFO softkey on the Step 2 screen display. Read the “MORE INFO” screen to become familiar with the unit and softkey functions before proceeding with the calibration.

– A View Mode can be entered **before taking any exposures in Step 2** by touching the VERIFY/ADJUST softkey on the Step 2 screen. This allows the operator to proceed directly to a VIEW/ADJUST screen display to view and adjust the existing database values without taking exposures.

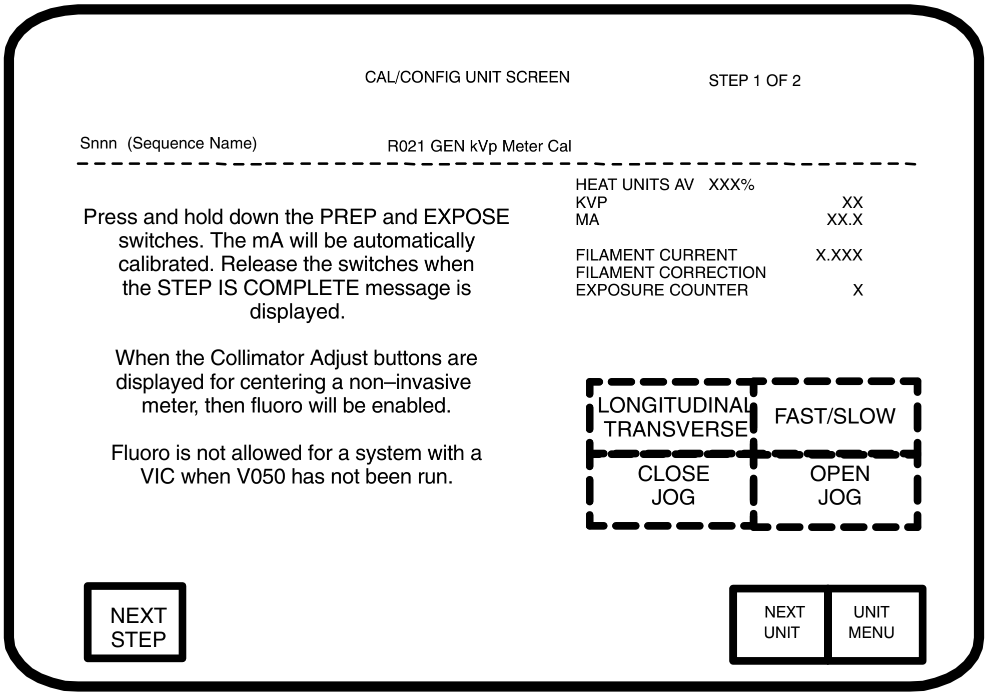
Note: One of the peculiarities of this unit is that once you enter the Verify/Adjust screen in the View Mode, you must exit and re–enter the unit to get to the Cal Mode.

– Refer to Keithley operator manual (supplied with the instrument) for instructions pertaining to the application of correction factors associated with a filter pack. You must take filtration effects and linearity corrections into consideration to ensure accuracy of this calibration. Refer to paragraph 4.7 and 4.8 in Keithley manual.

7-11-7 Cal Procedure Step 1, Calibrate mA.

1. Press the PREP and EXPOSE switches. The unit will automatically calibrate mA.
2. When the message “STEP IS COMPLETE” is displayed, release the PREP and EXPOSE switches.
3. Make sure that the collimator blades are full open so that the sensor area of the Keithley filter pack is fully exposed when performing Step 2.
4. Touch NEXT STEP softkey to proceed to Step 2.

R021 STEP 1 SCREEN DISPLAY



7-11-8 Step 2. KV Meter Calibration.

Step 2 can be set to operate in either an automatic or manual mode by touching the AUTO/MANUAL softkey on the Step 2 screen. However, upon entering the unit, Step 2 is automatically set to the AUTO (default) mode. The automatic mode is normally used when performing the calibration unit for the first time. The manual mode is normally used to make recal exposures.

7-11-9 Step 2. Auto Exposure Mode.

1. In the AUTO Mode, the unit is automatically configured to take exposures of 100 msec at 250 mA and highest kVp (based on tube type). The mA is set for closed loop operation and the power unit is set to measure kVp after a 25 msec time delay from the start of an exposure. In the AUTO Mode the system will alternate taking single exposures at high kVp and low kVp until data for at least two exposures at each of the kVp values is obtained. The KVP DEMAND softkey is inactive in the AUTO mode. Perform the AUTO Mode calibration as follows:

Note: If your Keithley Kit does not contain a 37617C Filter Pack (50–150 kVp range) you must change the filter pack to conform to the kVp of the exposure being taken (60 kVp or 120 kVp). Not all filter packs cover the entire kVp range. Ensure the proper filter pack is in place on Keithley for each exposure.

2. Take an exposure and measure the kVp indicated on the oscilloscope. Ignore the first 25 msec of the waveform when taking the measurement. The exposure counter on the Step 2 screen is incremented. After the first exposure is taken, the NEXT UNIT, UNIT MENU, and VERIFY/ADJUST softkeys are disabled until the required number of exposures are taken.
3. Touch the KVP softkey and use the console dial to enter the measured kVp value.

Note: If desired, a previous exposure can be cancelled by touching the CANCEL LAST MEASUREMENT softkey. The number of exposures indicated on the screen will be decremented by one and the values from the previous exposure will be re-displayed on the screen.

4. Take another exposure (the unit is automatically set at 60 kVp). Measure the kVp on the oscilloscope. Ignore the first 25 msec of the waveform when taking the measurement.

Note: The software allows the operator to take exposures with modified kVp values (using the console dial). However, this causes the software to accept the value displayed and results in an error in the database calculations.

5. Touch the KVP softkey and use the console dial to enter the measured kVp value.
6. Continue taking exposures and entering the measured value at the alternate kVp values until the required number of exposures have been obtained (two at high kVp and two at low kVp). The number of exposures is indicated on the Step 2 screen.
7. Exposures at the same kV are expected to be repeatable. Differences of as much as 1 kV should be viewed with suspicion.
8. Exit from Step 2 is accomplished as follows:

   Touch the NEXT UNIT or UNIT MENU softkey. The unit will automatically perform a data verification. If the verification is successful, exit from the unit is accomplished

   OR

   If the data verification fails, an error message “DATA OUT OF RANGE” is displayed on the console and exiting the unit from Step 2 is prohibited. Touch the VERIFY/ADJUST softkey on the Step 2 screen to proceed to the VERIFY/ADJUST screen display.

7-11-10 Step 2. Manual Exposure Mode

1. Touch the AUTO/MANUAL softkey to set the unit to the manual mode.
2. Touch the DEMAND KVP softkey and use the console dial to enter the kVp selected for the first exposure. The range of adjustment is in 1 kV steps between the minimum and maximum kVp allowed for the X–ray tube and selected focal spot size.

Note: If your Keithley Kit does not contain a 37617C Filter Pack (50–150 kVp range) you must change the filter pack to conform to the exposure being taken (60 kVp or 120 kVp). Not all filter packs cover the entire kVp range. Ensure the proper filter pack is in place on Keithley for each exposure.

3. Take an exposure and measure the kVp indicated on the oscilloscope. Ignore the first 25 msec of the waveform when taking the measurement. The exposure counter on the Step 2 screen is incremented. After the first exposure is taken, the NEXT UNIT, UNIT MENU, and VERIFY/ADJUST softkeys are disabled until the required number of exposures are taken.
4. Touch the KVP softkey and use the console dial to enter the measured kVp value.

Note: If desired, a previous exposure can be cancelled by touching the CANCEL LAST MEASUREMENT softkey. The number of exposures indicated on the screen will be decremented by one and the values from the previous exposure will be re-displayed on the screen.

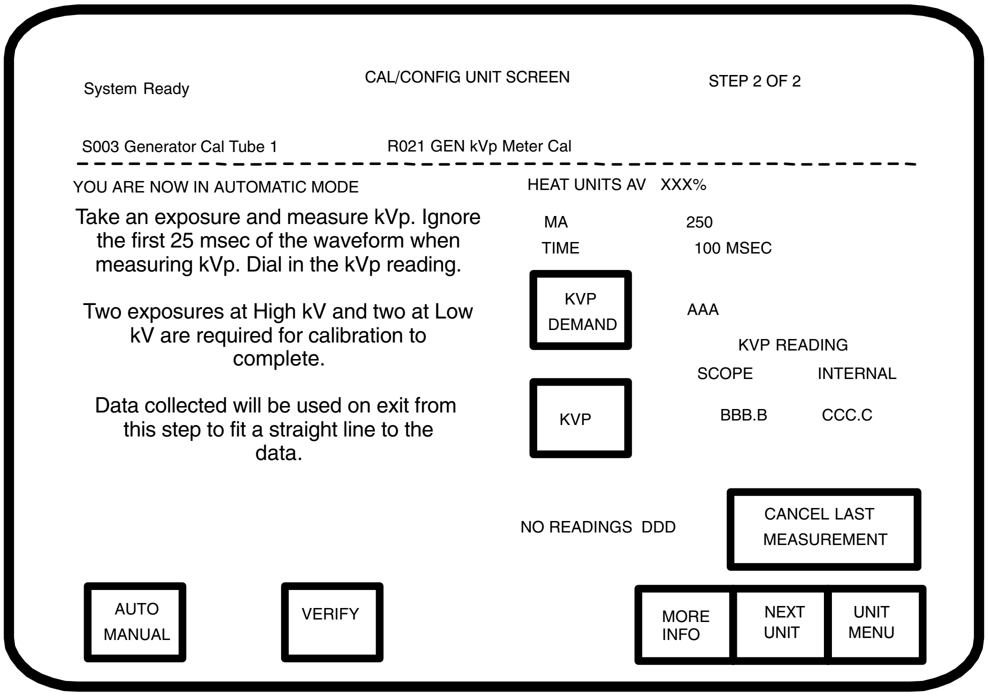
5. Continue taking exposures and entering the measured value until at least two exposures 50 kVP apart have been taken. The number of exposures is indicated on the Step 2 screen.
6. Exit from Step 2 is accomplished as follows:

   Touch the NEXT UNIT or UNIT MENU softkey. The unit will automatically perform a data verification. If the verification is successful, exit from the unit is permitted.

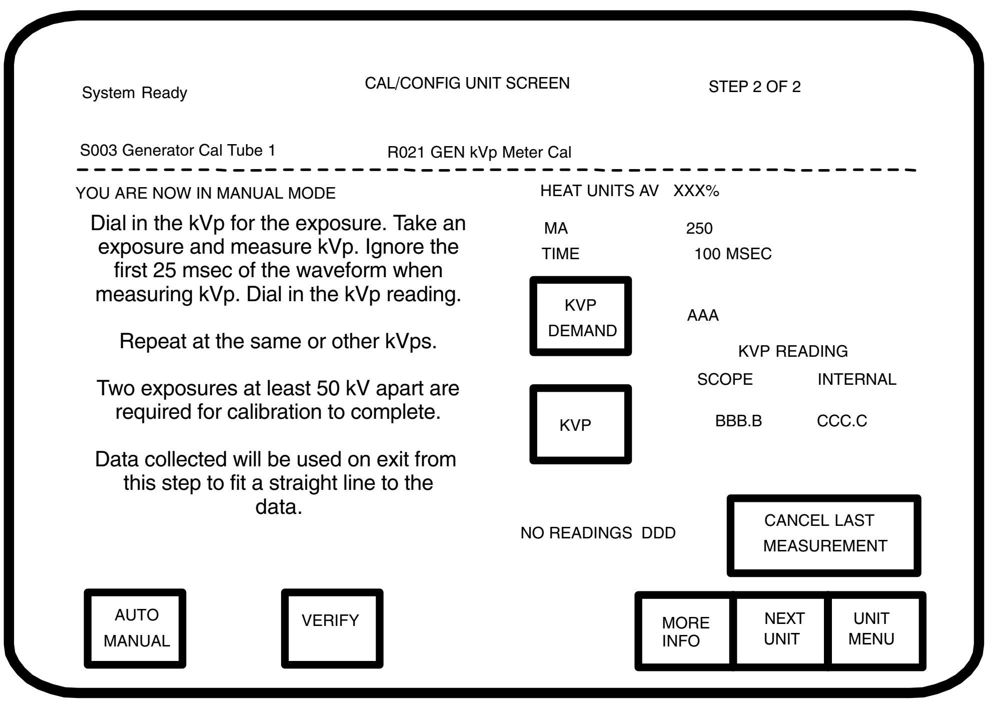
   OR

If the data verification fails, an error message “DATA OUT OF RANGE” is displayed on the console and exiting the unit from Step 2 is prohibited. Touch VERIFY/ADJUST softkey on the Step 2 screen to proceed to the VERIFY/ADJUST screen display.

R021 STEP 2 AUTOMATIC MODE SCREEN DISPLAY



R021 STEP 2 MANUAL MODE SCREEN DISPLAY



R021 STEP 2 "MORE INFO" SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 2 OF 2

S003 Generator Cal Tube 1 | R021 GEN kVp Meter Cal

This unit is used to calibrate kVp for power units with closed loop kV for Demand DAC and Readback A/D in either automatic or manual mode.

If the values for the fitting constants are out of normal range, a warning message is displayed on trying to exit this unit. This can be overridden, and the database updated with the constants displayed in the VERIFY/ADJUST screen, by the use of the CONFIRM button.

The VERIFY/ADJUST screen, entered via the VERIFY/ADJUST button, is not needed for calibration. It can be entered with or without making exposures to view and/or adjust the existing database values—however manual adjustment of the fitted values is not recommended. From the VERIFY/ADJUST screen, one can view the error distribution of collected data to the fitted straight line via the VIEW DATA button, or return to Step 2 (via RECAL), to take exposures with the new fitted values.

Please remember measurement corrections when using non–invasive meter.

BACK

7-11-11 Verify/Adjust Screen Display

If you could not exit the unit in Step 2 due to a "DATA OUT OF RANGE" error, you can exit from this screen and save the data (after viewing the values you are storing) in the database. This should only be used as a temporary measure, until such time as the hardware can be repaired.

1. This screen display can be used to view and modify the Demand and Readback kVp constants **currently** stored in the database without taking exposures (entered in the View Mode) or to view and modify the **new** values for Demand and Readback kVp constants obtained in Step 2. The following error messages may be displayed upon entering the VERIFY/ADJUST screen.
   a. "KVP SLOPE OUT OF RANGE" is displayed if either the Demand or Readback slope values are outside the range 0.85 – 1.15.
   b. "MAXIMUM DEVIATION GREATER THAN 2 KV" is displayed if the maximum deviation of the computed reading is more than 2 kV from the actual reading.

Note: The OFFSET and SLOPE softkeys are always active whether the VERIFY/ADJUST screen was entered from the View Mode or from Step 2 after exposures were taken.

2. Adjust the KVP DEMAND and KVP READBACK values displayed on the screen as required to meet specification. Touch the applicable kVp Demand or kVp Readback OFFSET and/or SLOPE softkey and use the console dial to enter adjustments.

Note: It is recommended that you do not make changes to the OFFSET and SLOPE values, but always use the calibration unit software to calculate new values.

OFFSET: An increase in offset will move values for all kVP by an equal amount.

SLOPE: An increase of slope will affect higher kVp more than lower kVp.

3. Exit from the VERIFY/ADJUST screen can be accomplished using one of the following methods:

   To exit the Cal Unit, touch the NEXT UNIT or UNIT MENU softkey. The unit will again perform a data verification. If the values of the fitting constants are out of normal range, a warning message, “DATA OUT OF RANGE” is displayed and a CONFIRM softkey appears on the VERIFY/ADJUST screen. To override this condition, touch the CONFIRM softkey. Touching the softkey, will permit exit from the unit and the database will be updated with the constants displayed on the VERIFY/ADJUST screen.

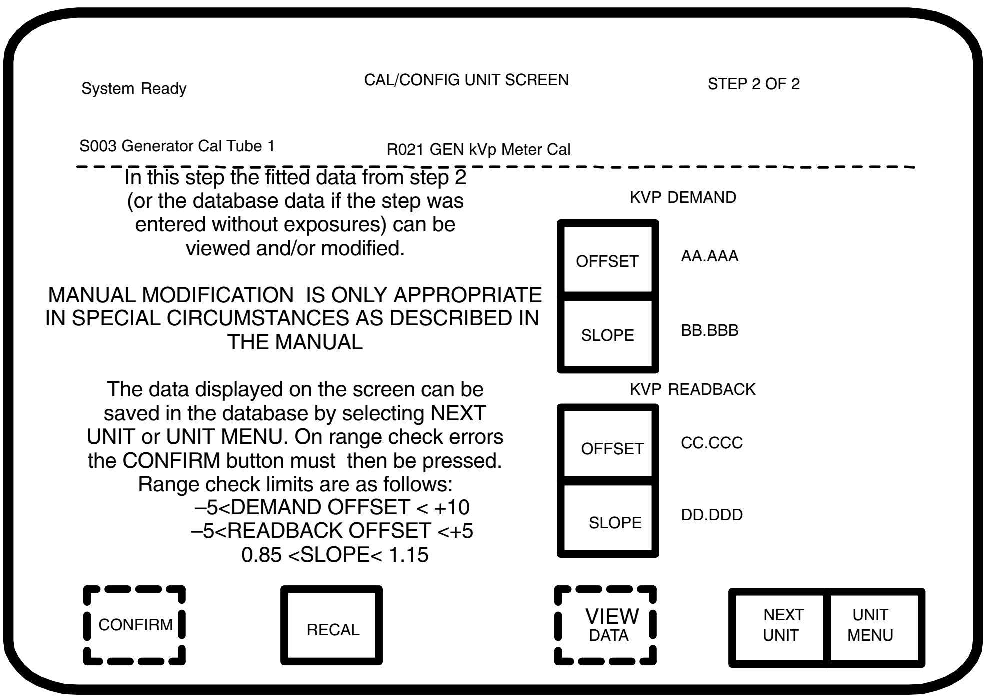
   OR

   Touch the RECAL softkey to return to Step 2 to take another set of exposures with new fitted values.

   OR

   Touch the VIEW DATA softkey to proceed to VIEW DATA screen (remember, the VIEW DATA softkey is not displayed in the View Mode). On exit from VERIFY /ADJUST screen, the standard deviation of the mean for both Demand and Readback is computed and the results are displayed on the VIEW DATA screen.

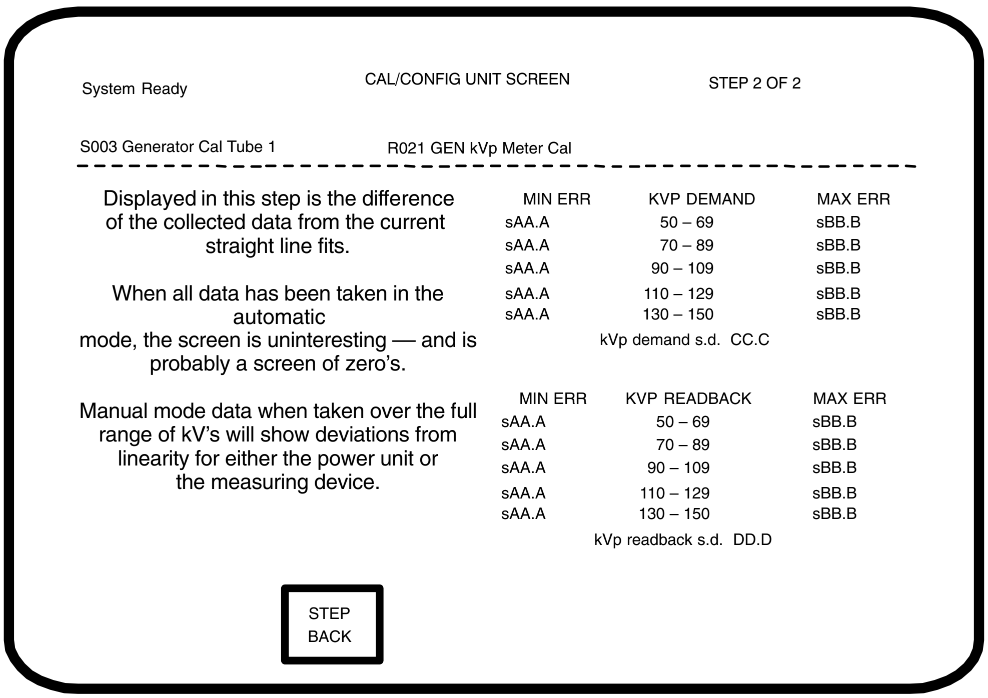
R021 VERIFY/ADJUST SCREEN DISPLAY



7-11-12 View Data Screen

1. The VIEW DATA screen shows how well the constants fit the data acquired in Step 2. The Data displayed can be used as a guide for modifications to the constants established in the VERIFY/ADJUST screen.
2. Review the difference of each reading from the straight line fit for both KVP Demand and KVP Readback. The MIN ERR and MAX ERR for each of the five ranges is displayed on the screen.
3. If you have taken exposures in the AUTO mode, you should observe errors of less than 0.1 if the system is operating properly. If this is not the case, a complete recalibration may be in order.
4. Touch the STEP BACK softkey to return to the VERIFY/ADJUST screen. Modify the constants as required or exit the unit from the VERIFY/ADJUST screen.

R021 VIEW DATA SCREEN DISPLAY



7-12 X011, Tube Run–in and Stability

7-12-1 Description

Calibration Unit X011 is used to perform run–in, stability, and high voltage seasoning on new X–ray tubes. The unit uses a software driven routine that is performed in conjunction with the unit console screen presentation. The procedure is semi–automated; parameters are automatically set, timing delays are controlled, exposures are counted, etc. There are three steps to the procedure. Step 1 calibrates the required mA stations. Step 2 performs run–in procedures to de–gas the tube and heat soak the tube anode. Step 3 performs stability (high voltage seasoning) procedures to evenly distribute charges in the tube to prevent "tube spits." The Step 1 screen also permits access to a "More Info" screen that provides additional information regarding the running of the unit if tube spits are encountered in Step 1.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-12-2 Equipment required

Storage oscilloscope, test probe (times 10), and test leads, and an external bleeder, PN 46–154766G1 (Only if the internal bleeder is not working).

7-12-3 Special Instructions

The following special instructions pertain to the running of this unit.

– The X–ray tube must be properly warmed–up.
– In some generator board failure modes, the error feedback is always zero (0). This may cause calibration unit X011 to run to completion taking only one X–ray exposure at each step. When running this unit be aware of situations where the FILAMENT CORRECTION value indicated on the console screen is always zero (0) since this indicates a generator board failure.
– A "CASING Rem" parameter is displayed on Steps 1 thru 3 of the unit screens. This parameter indicates the amount of heat units remaining on the tube casing as measured in kilojoules. If the "CASING Rem" value decreases to 0, exposures are automatically terminated until the tube casing cools.

7-12-4 Test Setup

Setup the system as follows: Connect oscilloscope Channel 1 to SCPU A4 A1 TP26 (kVp) and Channel 2 to SCPU A4 A1 TP25 (kVn). Connect scope ground lead to SCPU A4 A1 GND5. The scale factor is 1.0 volt/8kV.

7-12-5 Cal Procedure Step 1, Calibrate mA Stations.

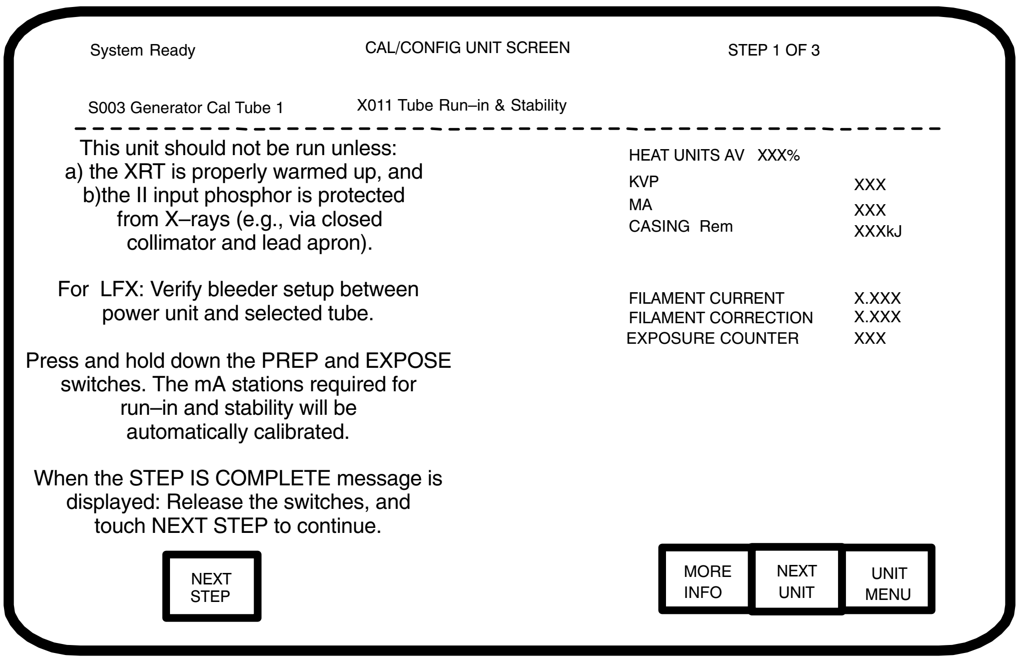
1. Press and hold the PREP and EXPOSE switches. The unit will automatically step through and calibrate the mA stations required for tube run–in and stability.
2. Terminate the exposure when the "STEP IS COMPLETE" message is displayed on the console screen.

Note: If tube spits prevent you from finishing Step 1 of the calibration, touch the “MORE INFO” softkey to access a More Info screen. Perform the procedure indicated on the More Info screen before attempting X–ray tube replacement. Tube spits should not be confused with an mA overload condition which occurs when filament emission limits are exceeded.

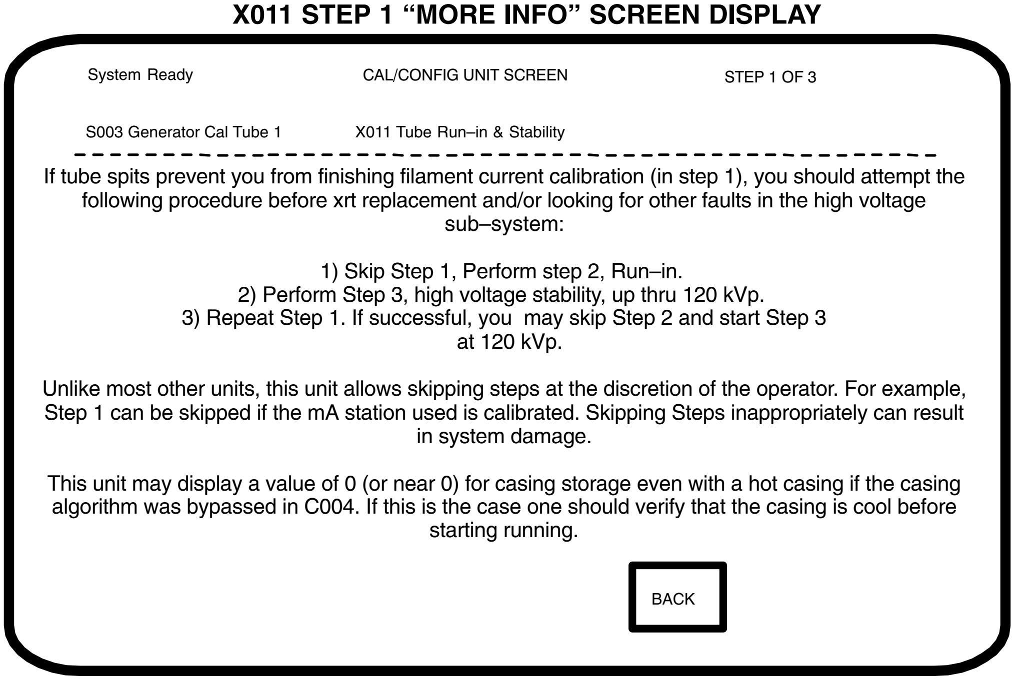
3. Allow the X–ray tube to cool for 10 to 15 minutes before proceeding to Step 2.
4. Touch NEXT STEP softkey to proceed to Step 2.

Note: This Unit may display a value of 0 (or near 0) for casing storage even with a hot casing if the casing algorithm was bypassed in C004. If this is the case, verify that the casing is cool before starting Run–In.

X011 STEP 1 SCREEN DISPLAY



X011 STEP 1 “MORE INFO” SCREEN DISPLAY



7-12-6 Step 2. Run–in Procedures.

Note: Step 2 automatically configures the system for exposures at database specified values of kVp, mA, and exposure time.

1. Press and hold the PREP and EXPOSE switches. The unit automatically takes each required exposure after a required delay time. The data field of the screen display is continually updated with time, heat units, and number of exposures.

   EXPOSURES TAKEN – ACTUAL field is initially set to zero and is incremented after each exposure**.**

   TIME SINCE LAST EXPOSURE – ACTUAL field is set to zero after each exposure and will up–count at one second intervals.

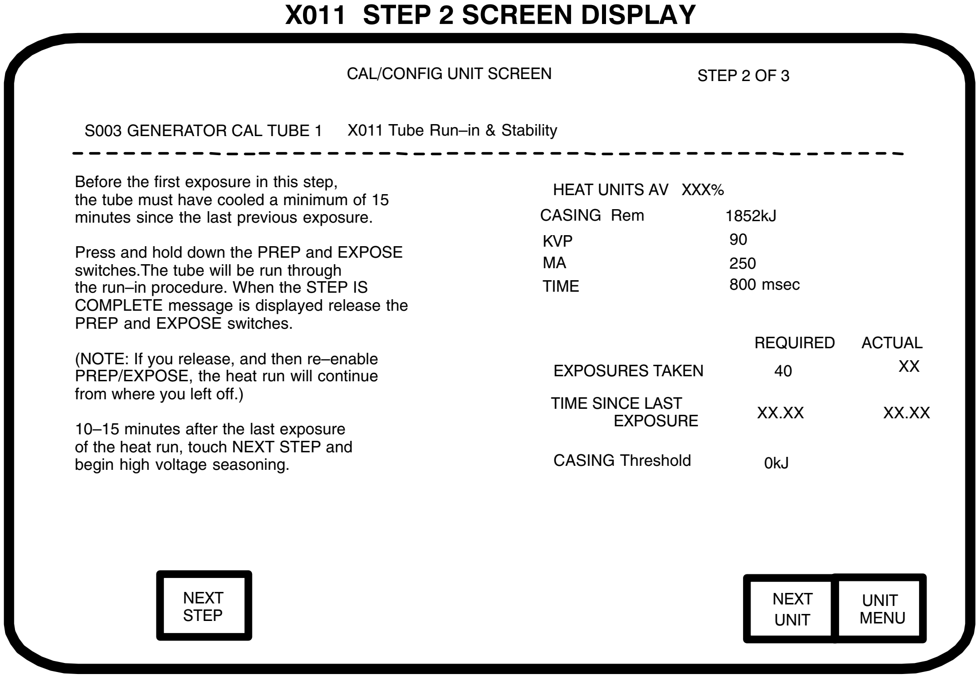
Note: The first exposure is inhibited if the energy stored in the tube casing is greater than the value indicated in the CASING Threshold parameter and the message “CASING COOLING REQUIRED TO INITIATE RUNIN” is displayed on the screen. When the casing cools below the CASING Threshold value, the message is removed from the screen and exposures may be taken.

2. When the “STEP IS COMPLETE” message is displayed on the console screen, release PREP and EXPOSE switches.

Note: If you release the PREP and EXPOSE switches while performing the run–in procedure and then re–enable the switches, the heat run–in will continue from the point of interruption.

3. Allow the X–ray tube to cool for 10 to 15 minutes before proceeding to Step 3.
4. Touch NEXT STEP softkey to proceed to Step 3.

X011 STEP 2 SCREEN DISPLAY

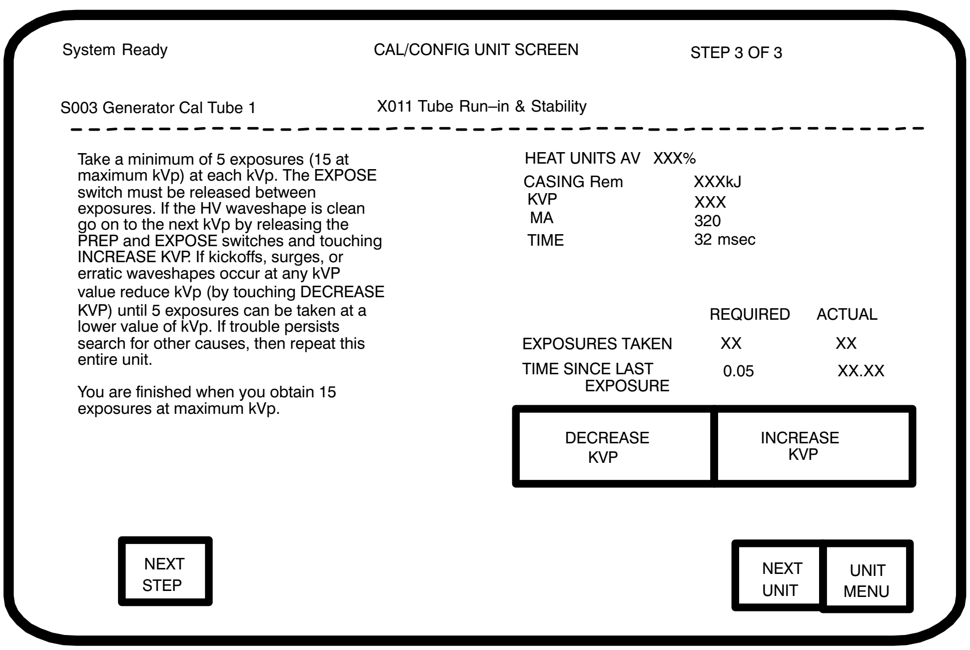


7-12-7 Step 3. Stability Procedures (High Voltage Seasoning).

Step 3 automatically configures the system to take exposures at database specified values. The kVp is manually sequenced, from an initial starting value through database configured kVp values to the maximum kVp allowed for the generator/tube combination configured.

1. Press the PREP and EXPOSE switches. Take a minimum of 5 exposures at each kVp value (except at the highest kVp where 15 exposures are required). The EXPOSE switch must be released between exposures. The EXPOSURES TAKEN – REQUIRED field is set to 5 at every kVp value (15 at highest kVp). The EXPOSURES TAKEN – ACTUAL field is initially set to zero and is incremented after each exposure. The TIME SINCE LAST EXPOSURE – REQUIRED field is set to 5 seconds. The TIME SINCE LAST EXPOSURE – ACTUAL field is set to zero and will up–count at 1 second intervals. The field is reset to zero after each exposure.
2. If the HV waveform observed on the scope is clean, go on to the next higher kVp value by first releasing the PREP/EXPOSE switches and then touching the INCREASE KVP softkey.
3. If kickoffs or erratic waveforms are observed at any kVp value, reduce the kVp to a lower value by touching the DECREASE KVP softkey. Repeat taking exposures at the new lower kVp value until five exposures can be obtained.
4. Continue sequencing through the kVp levels until the maximum kVp level is reached. The calibration is complete when fifteen exposures can be taken at maximum kVp without encountering a tube spit. **Allow the tube to cool to 60% heat units before proceeding with the next calibration unit in the sequence.**
5. Touch NEXT UNIT or UNIT MENU softkey to exit.

X011 STEP 3 SCREEN DISPLAY



7-13 R017, Line Regulation

7-13-1 Description

Calibration Unit R017 is used to measure the percent of line regulation (variation) from a no–load to a max–load condition to ensure that the power unit used in the system operates within HHS specifications. The unit is run on systems configured with an SCPU power unit. In order to cover the variations in power units that may be configured on an Advantx system, two separate screen–driven Cal Procedures are provided for R017. One for systems with LFX or MPPU power unit and one for systems with SCPU power unit. The appropriate R017 unit screen presentations are automatically displayed as a function of the system Smart Sequencer.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

Note: This calibration unit must be re–run whenever the existing X–ray tube is replaced with a tube of a higher kV rating.

7-13-2 Equipment Required

Oscilloscope (dual channel, storage type) w/X10 probe, and digital voltmeter.

Note: No special test setup is required when running R017 on systems configured with an SCPU power unit. The unit automatically measures effective line regulation and displays the results of full load and no load comparisons as LED indications (Ref DS1 and DS2 on MAIN PS board). When LED's are lighted they indicate line regulation is acceptable.

7-13-3 Step 1. Calibrate Highest mA Station of Tube

1. Take and maintain an exposure. The system will automatically take successive exposures and calibrate the initial filament drive for the highest mA station of the generator/tube combination under test. Terminate the exposure when the "STEP IS COMPLETE" message is displayed.

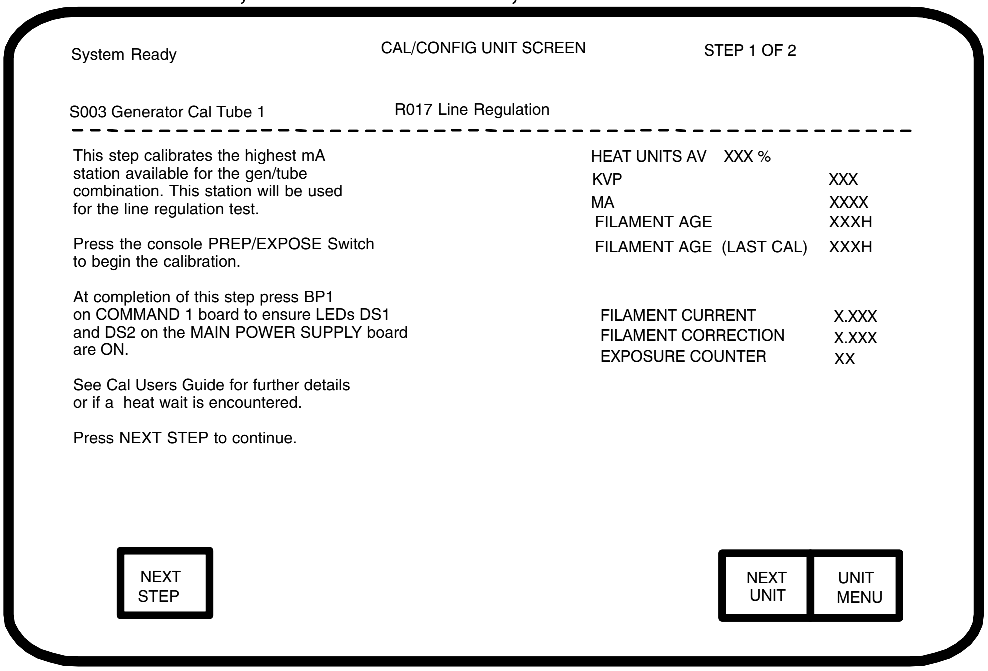
Note: If the tube heat limit is reached, continue to hold the PREP and EXPOSE switches. The calibration will restart and continue after the tube cools.

2. At completion of this step, press BP1 on COMMAND 1 board and verify that DS1 (80 kW) and DS2 (64 kW) LED's on MAIN POWER SUPPLY board are ON.

Note: During calibration of initial filament drive it is possible for the LEDs to turn off even when the line regulation is acceptable. If this condition occurs, pressing BP1 on the Command board should reset the LEDs.

3. Touch NEXT STEP softkey to proceed to Step 2.

R017, CAL PROCEDURE 2, STEP 1 SCREEN DISPLAY



7-13-4 Step 2. Verify Line Regulation

This Step verifies that line regulation is within acceptable limits at the highest mA station available for the power unit/X–ray tube combination. Touch the MORE INFO softkey on the Step 2 screen display for a summary of the SCPU power unit line regulation calibration procedure.

1. Press the console PREP/EXPOSE switches to take an exposure.
2. After the exposure, check LED status on the MAIN PS board as follows:

   DS1 ON: Test passed for 80 kW units.

   DS2 ON: Test passed for 64 kW units.

Note: A condition where DS1 is ON and DS2 is OFF indicates a possible hardware fault. Re–run the calibration test. If the condition still exists, a hardware fault with the SCPU measurement circuit is indicated.

3. IF test failed, the line impedance is excessive. You must upgrade the site AC distribution system. Then re–run R017.

R017, CAL PROCEDURE 2, STEP 2 SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 2 OF 2

S003 Generator Cal Tube 1 | R017 Line Regulation

HEAT UNITS AV XXX %
KVP XXX
MA XXXX

This step verifies that the line regulation is acceptable at the highest mA station available for the gen/tube combination.

Press the console PREP/EXPOSE switch to make an exposure.

At completion check LED status:

DS1 ON: Test passed for 80 kW units.
DS2 ON: Test passed for 64 kW units.

If test fails then line impedance is excessive. Upgrade site AC distribution.

MORE INFO | NEXT UNIT | UNIT MENU

R017, CAL PROCEDURE 2 STEP 2 “MORE INFO” SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 2 OF 2

S003 Generator Cal Tube 1 | R017 Line Regulation

This unit measures the effective line regulation by monitoring the no load and full load DC Bus voltage in the SCPU power unit. The results of these comparisons are shown by the LED’s DS1 (80 kW SCPU) and DS2 (64 kW SCPU) on the SCPU MAINPS board. When the LED’s are ON they indicate the line regulation is acceptable.

During calibration of the initial filament drive it is possible for the LED to turn off even when the line regulation is acceptable. The LED’s are reset by BP1 on the Command1 board.

It should never be possible for DS1 to remain ON while DS2 is OFF. If such a condition occurs it indicates a possible hardware fault. The test should be rerun. If the condition persists a hardware fault exists with the SCPU measurement circuit.

BACK

7-14 R003, Tube 1 XS or XL Initial Filament Drive Calibration

7-14-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

7-14-2 Description

Calibration Unit R003 calibrates the initial filament drive at each mA stations of each focal spot size (small, XS; and large, XL; focal spots). An Automatic Cal Mode or Manual Cal Mode can be selected to perform the calibration. Normally, the Automatic Cal Mode (the default mode) is used to calibrate initial filament drive and the Manual Cal Mode is only used when calibration of initial filament drive for an mA station cannot be obtained in the Automatic Cal Mode or a verification of an mA station is required. If the Manual Cal Mode is selected, the time to perform the calibration is much longer.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-14-3 Equipment Required

Exposure control service tool (optional) and an external bleeder, PN 46–154966G1, (only if the internal bleeder is not working).

7-14-4 Test Setup

Connect exposure control service tool (optional) to the console in place of the console handswitch.

7-14-5 Special Instructions

The following special requirements should be observed when running this unit.

– The Filament Age and Fil Age (Last Cal) parameters displayed on the Step 1 screen provide a visual indication of the filament aging characteristics of the system X–ray tube.

  Filament Age: Tracks and displays a continuous record of changes in filament aging (in HEX value) since X–ray tube installation (initial value of 0010H).

  Fil Age (Last Cal): Displays the Hex value of filament aging set in the last calibration (initial value when a tube is installed is FFFFH). The Fil Age (Last Cal) parameter will be set equal to the Filament Age parameter after a calibration is completed.

  As the X–ray tube ages, changes in the Filament Age value may be observed. If the difference between the Filament Age value and Fil Age (Last Cal) value reaches a delta limit of 3BH, a "recal required" message is displayed. This warning message is displayed upon entering either the Applications or Service Mode to indicate to the user that a mandatory recalibration of the system is required.

  > Allow at least 15 minutes of cooling time before repeating this unit on any focal spot of the tube under test.
  > The Filament Current and Filament Correction values displayed on the unit screen during the running of this unit are not actual values and require the application of engineering scale factors to achieve the actual value.

- If a HEAT WAIT occurs during the calibration, leave the PREP and EXPOSE switches on the exposure control service tool in the ON position. When the tube cools, the exposures will continue.
- If you release the PREP and EXPOSE switch when running in the Automatic Cal Mode, you will return to Step 1 in the calibration procedure.
- When running this unit be aware of situations where the FILAMENT CORRECTION value indicated on the console screen is always zero (0). This may cause calibration unit R003 to run to completion taking only one X–ray exposure at each step.

Note: When running this unit, you can exit at any step in the calibration (if required) with the unit part way complete and the steps completed will update NV RAM accordingly. However, since you did not complete “all” of the calibration, the G5 database parameter will not be updated and the unit will not be un-highlighted on the sequence menu. Therefore, ensure that you return to the point of exit and complete the Calibration Unit before proceeding with the calibration of the system.

7-14-6 Cal Procedure

An Automatic Cal Mode or Manual Cal Mode may be used to calibrate the initial filament drive. Using the Automatic Cal Mode, the unit will automatically calibrate each mA station of the selected focal spot size of an X–ray tube starting at the smallest mA station and ending at the largest mA station. Each mA station is a Step in the calibration. Exposures are automatically taken at each step until the filament drive is calibrated. The unit Manual Cal Mode permits a calibration (or a verification) of any individual mA station.

7-14-7 Automatic Cal Mode

1. Upon entering the unit, the Automatic Cal Mode is the default mode and the AUTO softkey on the console screen is highlighted.
2. Take and maintain exposures.The unit will automatically calibrate the initial filament drive for each mA station.

Note: Each station has a 20 exposure limit and a 6.5 A filament current limit If either of these conditions are encountered, the unit will switch to the Manual Cal Mode and the error message “EXPOSURE OUTSIDE CALIBRATION LIMITS” is displayed. Refer to Manual Cal Procedure.

3. Perform a manual calibration of the mA station at which the switch to the Manual Cal Mode occurred. After completing a manual calibration of the mA station, return to the Automatic Cal Mode by touching the AUTO softkey on the Manual Cal Mode screen display.

Note: Depending on the point at which the switch to the Manual Cal Mode occurred, it may be advantageous to complete the calibration in the Manual Cal Mode rather than to incur additional switching between the Automatic and Manual Cal Modes.

4. Continue the calibration in the Automatic Cal Mode. The unit will pickup the calibration at the mA station (step) at which the switch to Manual Cal Mode occurred. When all mA stations have been properly calibrated, a CAL COMPLETE message will be displayed. Terminate exposures.

Note: Touch the NEXT UNIT or UNIT MENU softkey to exit.

7-14-8 Manual Cal Mode

1. To enter the Manual Cal Mode (other than from a mode switch encountered when running the Automatic Cal Mode), touch the MANUAL softkey on the screen display. The Manual Cal Mode screen will be displayed and the MANUAL softkey is highlighted.
2. Press SELECT STATION to select desired mA or kVp stations using the console dial. SELECT STATION is active when either (a) station cal is complete or, (b) Filament Demand is above 7.0 volts (b needs HHS verification with R013).
3. Using the PREP/EXPOSE switches, take manual exposures one at a time. Allow about 5 seconds between activation of PREP and EXPOSE on the handswitch to permit filament temperature to stabilize. The software will automatically enter a value of FILAMENT CORRECTION after each exposure. If the filament correction is not within acceptable limits an “EXPOSURE OUTSIDE CALIBRATION LIMITS” message will be displayed.

Note: It is recommended that you first allow the Calibration Unit software to calculate and change the FILAMENT CORRECTION on it’s own before making filament corrections using the console dial.

4. If dialed–in filament corrections are required, touch the APPLIED FILAMENT CURRENT softkey and enter a FILAMENT CORRECTION value with the console dial. Dial in 1/2 the FILAMENT CORRECTION value for each new exposure to get fastest convergence. For large focal spots, the amount of filament correction is between 1/3 and 1/2 of the filament correction displayed (Example: If filament correction is 0.030, dial in 0.010).
5. Touch the APPLIED FILAMENT CURRENT softkey again to enter the correction before continuing with exposures.
6. Repeat taking exposures and making corrections until the “STEP COMPLETE” message appears on the screen or the maximum allowable filament current limit (6.5 A) is reached. If the maximum allowable filament current limit is reached and the filament correction is still not within allowable limits, the message “MAX FILAMENT CURRENT” is displayed. When either the “STEP COMPLETE” message or the “MAX FILAMENT CURRENT” message is displayed, the NEXT STEP softkey is enabled to permit return to the Automatic Cal Mode for completion of the remaining steps in the calibration.

Note: Beware of the following:

> You must proceed with the initial filament drive calibration until all mA stations (steps in the calibration) are completed even if the “MAX FILAMENT CURRENT” message is displayed again for another mA station. If all steps in the calibration are not completed and you attempt to exit the unit, the unit will remain highlighted on the sequence menu to indicate an incomplete calibration.

> The “MAX FILAMENT CURRENT” message indicates that an acceptable limit cannot be obtained for the mA station being calibrated and that the mA station may not meet the requirements of HHS. In this case, you must run Service Unit R013 and verify HHS compliance for that mA station.

7. **Do one of the following:**

   Touch the NEXT STEP softkey to return to the Automatic Cal Mode and complete the calibration of the remaining mA stations in that mode. **All steps must be completed in order to de-highlight the unit on the sequence menu.**

   or

   If the Manual Cal Mode was **initially selected** as the calibration method to be used for the **entire** calibration, and all mA stations have been properly calibrated, touch the NEXT UNIT or UNIT MENU softkey on the Manual Cal Mode screen display to exit the unit.

R003, AUTO MODE SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF XX

S003 Generator Cal Tube 1 | R003 Tube # (XS, XM, XL) Init Fil Drive

YOU ARE NOW IN AUTOMATIC MODE.
(LFX: Must have a bleeder connected to the power unit and the selected tube.)

Press and hold down the PREP/EXPOSE switches. Each mA station will be automatically calibrated. Release the switches when the CALIBRATION COMPLETE message is displayed.

Note: Allow 15 minutes of cooling time before repeating this unit on any focal spot of this tube.

HEAT UNITS AV XXX %

KVP	XXX
MA	XXXX
FILAMENT AGE	XXXXH
FIL AGE (LAST CAL)	XXXXH
MAX FIL CURRENT	X.XXX
ACTUAL FIL CURRENT	X.XXX
EXPOSURE COUNTER	XX

AUTO / MANUAL | NEXT UNIT | UNIT MENU

R003, MANUAL MODE SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF 1

S003 Generator Cal Tube 1 | R003 Tube # XS (XM, or XL) Init Fil Drive

YOU ARE NOW IN MANUAL MODE.
(LFX: Must have a bleeder connected to the power unit and the selected tube.)

Press SELECT STATION to enable dial to change mA–kVp stations. Use the Prep/Expose switches for each exposure.
Press APPLIED FILAMENT CORRECTION to use dial to modify filament correction for the next shot. SELECT STATION is active when, a) station cal is complete, or b) fil demand is above 7.0V (b needs HHS verification).

Note: Allow 15 minutes cooling before repeating this unit on any focal spot of this tube.

HEAT UNITS AV XXX %

KVP	XXX
MA	XXXX
FILAMENT AGE	XXXXH
FIL AGE (LAST CAL)	XXXXH
MAX FIL CURRENT	X.XXX
ACTUAL FIL CURRENT	X.XXX
FILAMENT CORRECTION	X.XXX
EXPOSURE COUNTER	XX

APPLIED FILAMENT CORRECTION | X.XXX

AUTO / MANUAL | NEXT STEP | SELECT STATION | NEXT UNIT | UNIT MENU

7-15 R020, Tube n Filament Boost

7-15-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

7-15-2 Description

Calibration Unit R020 adjusts filament boost current to ensure that maximum current is applied to the filament of the X–ray tube at the end of the 400 msec PREP cycle. The adjustment minimizes variations in mAs between exposures, taken with and without delay, by momentarily boosting the filament current to speed heating of the filament to the proper emission level. The calibration unit is divided into several separate units each of which is used to adjust the filament boost for a specific tube focal spot size. The applicable unit (s) are automatically displayed on the appropriate Rad Cal sequence menu by the system Smart Sequencer. The units that should be displayed on the sequence menu are listed below.

R020 – Tube(n) XS Fil Boost

R020 – Tube(n) XL Fil Boost

The unit name on the console screen indicates the focal spot size to be calibrated. The sequence name indicates the tube number. Each calibration unit consists of a number of steps to accomplish the adjustment. Each step is supported by a screen display that automatically presents a tube related setpoint (MA/KVP) for adjusting boost current.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

Additional information pertaining to the running of this unit is presented on a "MORE INFO" screen that may be accessed by touching the MORE INFO softkey on the Step 1 screen.

7-15-3 Cal Procedure Overview

The procedure requires that you take three different exposures at each step (mA/kV setpoint) presented on the selected tube filament boost unit and obtain waveforms of mA and kV at the first and third exposures. The first exposure waveform (called the Reference Exposure) and third exposure waveform (called the Calibration Exposure) are saved on the scope and then compared and evaluated to see if a filament boost adjustment is required. The second exposure is only required to advance the primary contactor so that waveform measurements are made on the same contacting phase of the line (no waveforms are saved on second exposure). The difference between the first and third exposure is that the first exposure is taken with a 5 second delay between PREP and EXPOSE switch activation to permit the filament to reach maximum temperature. The third exposure is taken without a delay between PREP and EXPOSE. The waveform comparison should indicate that the filament boost is high enough so that the mA and kV waveforms are the same for an exposure with no delay and an exposure with delay.

It may not always be necessary to monitor kV in addition to mA on the oscilloscope. It is however, highly recommended to monitor kV in addition to mA when the mA is less than 50 mA.

7-15-4 Equipment Required

Oscilloscope (dual trace, storage type) and associated test leads.

7-15-5 Test Setup

Connect oscilloscope to power unit as follows:

1. Connect Channel A scope probe to MEAS_MA test point SCPU A4A1TP15. (mA >= 100, 200 mA/volt) (mA<100,20 mA/volt)
2. Connect Channel B scope probe to MEAS_KV test point SCPU A4A1TP2. The scale factor at this point is 16 kV/volt (1.0V/16 kV).

   Set scope controls as follows:

VERT AMPL:	2 volts/div (both channels)
TIME BASE:	2 msec/div (both channels)

   Chopped Mode

   Channel 1 Trigger, Positive slope

   Single sweep, Storage Mode

7-15-6 Cal Procedure, Reference Exposure – Delay

1. Take a “Reference Exposure” by pressing the PREP switch on the console handswitch. Hold for 5 seconds or more before pressing EXPOSE switch (to allow filament to be boosted to maximum temperature) and observe waveform on oscilloscope.
2. Press SAVE REF pushbutton on the oscilloscope to store the waveforms. These waveforms are considered to be the “reference Exposure” for mA and kV which is to be used later for comparison with a “Cal Exposure.”
3. Take another exposure to advance contacting phase. (Do not store the second waveforms).

7-15-7 Calibration Exposure – No Delay

1. Wait 15 to 20 seconds to allow filament to cool down.
2. Take a “Cal Exposure” by pressing the PREP and EXPOSE switches with **no** delay after PREP.
3. Press SAVE on oscilloscope to retain waveforms before releasing the exposure switch.

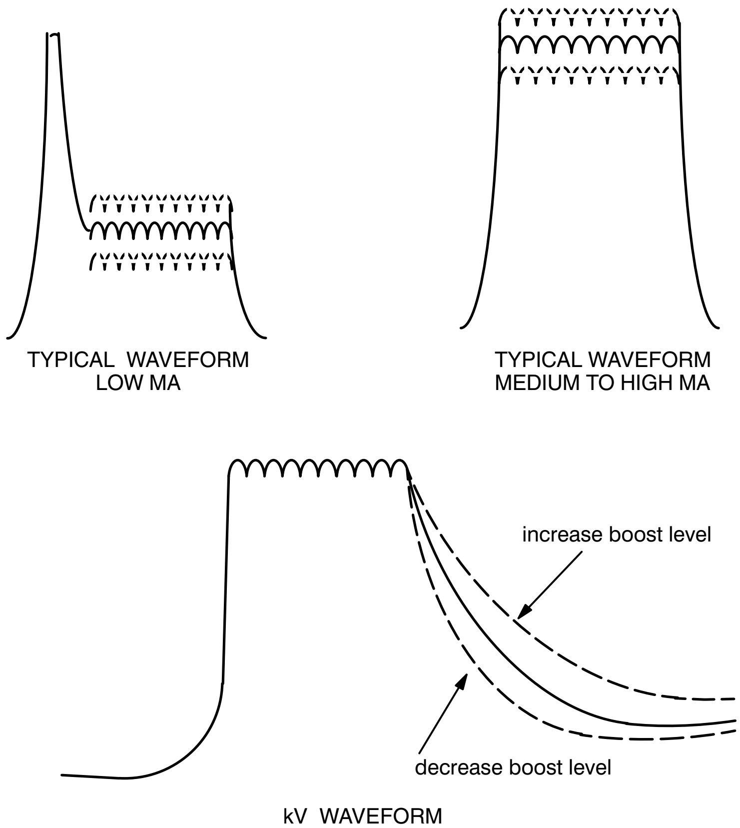
7-15-8 Measurement (See Illustration 3–11)

Compare the mA and kV “Ref Exposure” to “Cal Exposure.”

1. The amplitude of the mA waveform in the “Ref Exposure” and “Cal Exposure” should be the same.

2. The decay time of the kV waveform in the “Ref Exposure” and “Cal Exposure” should be the same (kV comparison is preferred when the mA is below 50 mA).

ILLUSTRATION 3–11
R020 MA/KV WAVEFORMS



3. If the waveforms do not match, touch the FILAMENT BOOST softkey and use the console dial to make adjustments to the boost level. Increasing the boost level will increase the amplitude of mA waveform and decrease the decay time of the KV waveform. Repeat as required to match waveforms. Boost limitations are as follows:

   a. Maximum Boost Adj – Each filament level has an associated maximum filament boost level. If the maximum filament boost level is reached during calibration without matching the Reference and Calibration waveforms, accept the results and proceed to the next step in the calibration unit. The maximum boost level is intended to prevent excessive current on inverters A and B. However, some systems may still sense an overcurrent condition and indicate either of the following error messages:

      “EXCESSIVE CURRENT ON INVERTER A”

      “EXCESSIVE CURRENT ON INVERTER B”

      If either error condition occurs, wait 5–10 seconds for the system to settle. Then use the console dial to adjust FILAMENT BOOST to a lower value.

   b. Error code 4296 may occasionally appear during the execution of this unit. This indicates that a hardware limit correction has been exceeded. Decrease the filament drive correction until it is at least 0.2 A below the trip point of the error. Take several exposures to verify that no error code is displayed. The proper adjustment of filament boost will be a compromise in this case

Note: The error code 4296 inhibits exposures in Applications. This presents a greater problem than a slight under correction of filament boost.

4. Touch NEXT STEP softkey to proceed to the next filament setpoint and repeat the filament boost procedure.

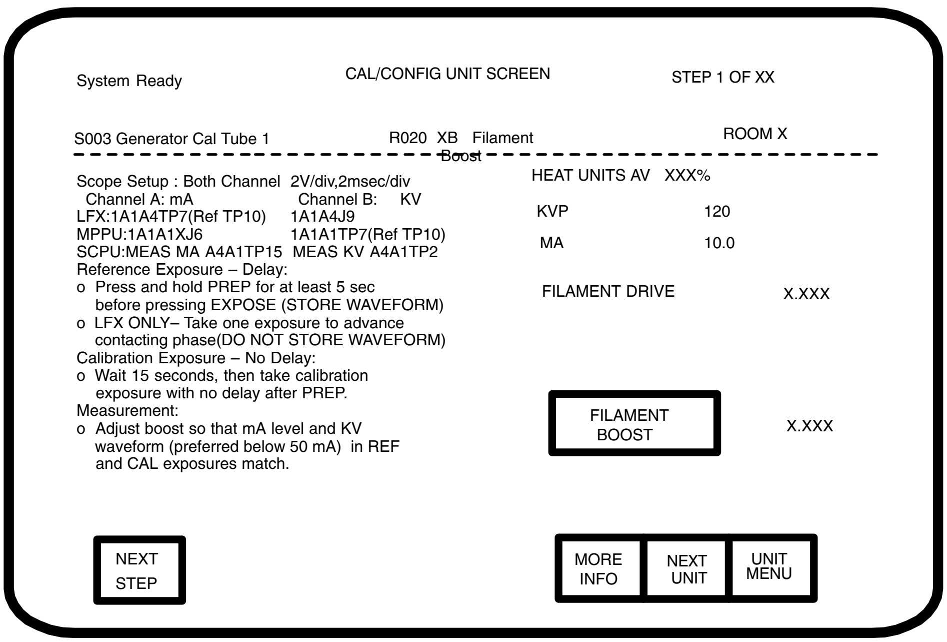
Note: When the last setpoint in the filament boost is displayed, the NEXT STEP softkey is replaced by a RECAL softkey. The RECAL softkey permits a return to Step 1 for re–calibration of setpoints.

5. When all filament setpoints have been properly adjusted, touch NEXT UNIT or UNIT MENU softkey to exit. There is no “Cal Complete” message display for this unit.

Note: No exposures are required in R020 while increasing the filament boost values for this adjustment.

6. After the filament boost value in the last step has been increased, touch the UNIT MENU softkey to exit the unit and update the NVRAM database.
7. Rerun unit R013 to recheck the calibration values.

R020 SCREEN DISPLAY



R020 "MORE INFO" SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF XX

S003 Generator Cal Tube 1 | R020 XB Filament Boost | ROOM X

It is possible that you may reach the limits of boost, without being able to get a match between fast and slow prep waveforms. This is especially true at the lower mA stations on the small focal spot when boosting from fluoro standby levels — in this case a minimum boost of zero will not allow the filament to cool to the proper levels. This is not a problem if the system still meets its HHS accuracy specs

Error 4296 may occasionally appear during execution of this unit. This indicates that a hardware limit for correction has been exceeded. If 4296 occurs, decrease the correction until the filament drive is at least 0.2 amp below the trip point of the error. Since the filament boost may be slightly different for the different phases of the LFX, (successive exposures alternate phases), take several exposures to verify that no errors occur. The proper adjustment of boost will be a compromise in these cases.

Note that the 4296 error in application will inhibit exposures – – a much greater problem than a slight undercorrection of filament boost.

BACK

7-16 R006, Tailing Compensation Calibration

7-16-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

7-16-2 Description

Calibration Unit R006 adjusts the X–ray exposure window to compensate for the HV decay time after termination of an exposure. The calibration unit is a prerequisite to AEC calibration. Only one step is required to complete the calibration.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-16-3 Equipment Required

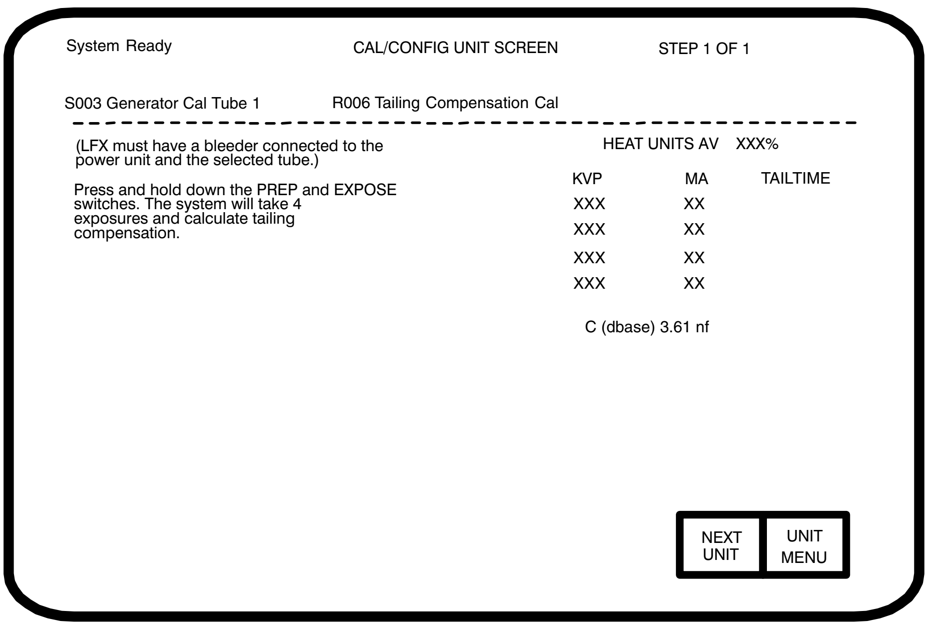
External bleeder, PN 46–154966G1, (if the internal bleeder is not working).

7-16-4 Cal Procedure

Perform the calibration as follows:

1. Press the PREP and EXPOSE switches. The system will step through four calibration points taking an exposure at each point. After each exposure, the unit will compute the tail time for each calibration point and display this value on the console screen. The tail time for each point in the calibration is calculated using a capacitance value stored in the database and displayed as ”C(dbase) X.XX nf” on the console screen. A “CAL COMPLETE” message is displayed after completion of all tail time calculations.
2. Touch the NEXT UNIT or UNIT MENU softkey to exit the unit. An “Updating NV database” message is displayed while the calibration data is being loaded into the system.

R006 SCREEN DISPLAY



7-17 R013, Generator HHS Measurements

7-17-1 Description

Calibration Unit R013 is used to verify that the X–ray system meets the requirements of HHS. The calibration unit provides measurement of kVp, mA, mAs, and exposure time to verify that the power unit meets the HHS requirements pertaining to reproducibility, linearity, and accuracy.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-17-2 Equipment Required

Keithley non–invasive kVp meter.

7-17-3 Test Setup

If viewing of kV waveform is desired, connect oscilloscope to SCPU A4 A1 TP26 (kVp). Connect scope ground lead to SCPU A4 A1 GND5. The scale factor is 8 kV/volt (1.0 V/8 kV).

7-17-4 Special Instructions

The following special instructions relate to the running of this unit.

– If any measured mA value is outside the tolerance range, rerun R003 for that focal spot. Then, recalibrate and retest all stations for that focal spot.
– Upon entry into the unit, the collimator blades are not in the fully closed position, as indicated by the screen display. Adjust blades to desired open position by touching POSITION COLLIMATOR softkey. The unit will proceed to a Step 2 screen that provides controls for adjusting blade position.
– If a manual collimator is configured, the POSITION COLLIMATOR softkey does not appear on the screen. Field size must be adjusted at the collimator.
– If this unit is used to perform “functional tests” other than HHS measurements, the power unit should be set to the CLOSED loop operating mode and the INITIAL KVP function must be disabled or the X–ray tube may be damaged.
– Additional information on the operation of this unit is provided on a “MORE INFO” screen that can be accessed by touching the MORE INFO softkey on the Step 1 screen display.

7-17-5 Cal Procedure – Step 1

Perform the measurements as follows. Be sure to record information for HHS records, while running this Cal unit.

1. Set the CLOSED/OPEN softkey to CLOSED.
2. Set SYNC/NONSYNC to SYNC.

⚠ CAUTION **If INITIAL KVP is enabled when running this unit, erratic values for the Initial KVP parameter may be displayed on the console screen (can indicate zero) at low mAs or short exposure times.**

3. Set INITIAL KVP to off.

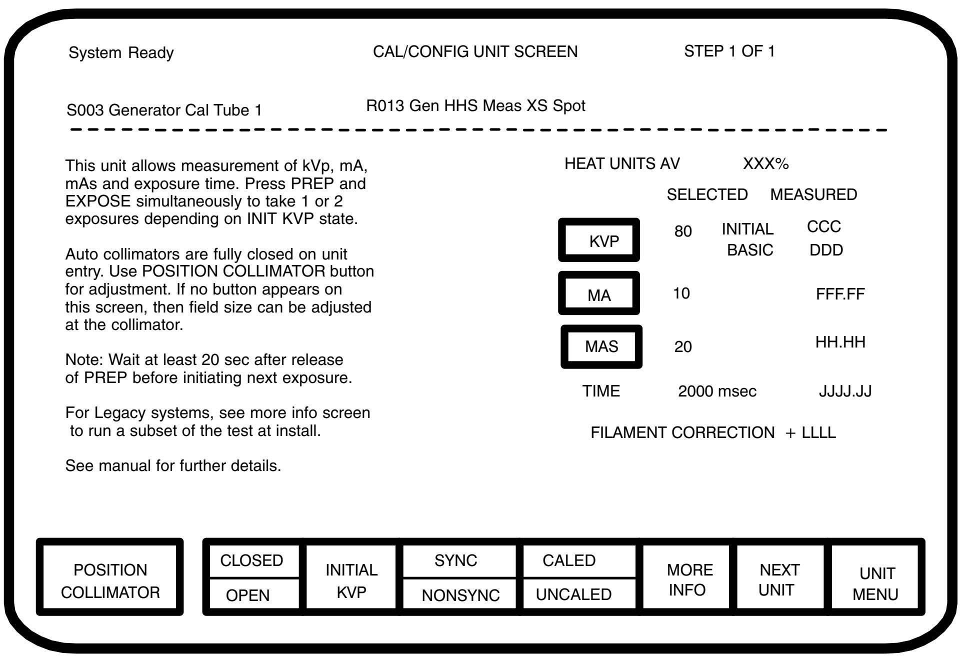
4. Set the CALED/UNCALED softkey to CALED if the X–ray tube filament drive has been calibrated (Ref. Cal Unit R003, Init. Filament Drive Cal).
5. Refer to *Direction 46–013894 System Field Test for HHS* and perform the required tests at the kVp, mA, and mAs values specified.
6. Use the console dial and appropriate softkeys (KVP, MA and MAS) to enter the parameters to be measured.
7. Press the PREP and EXPOSE switches to take measurements. The unit displays all measured mAs values.

Note: When INITIAL KVP is enabled, and the selected exposure time is less than or equal to 10 msec, only one exposure is taken and the measured value of kVp is displayed as both INITIAL and BASIC. The measured value of mAs and exposure time is also displayed.

Note: Wait at least 20 seconds after release of PREP before initiating the next exposure.

8. Record measurements on the Accuracy Charts supplied in *Direction 46–013894, System Field Test for HHS.*
9. Continue taking measurements and recording results of tests specified until all HHS requirements are completed.
10. Touch NEXT UNIT or UNIT MENU to exit.

R013 XS SPOT SCREEN DISPLAY



R013 XL SPOT SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF 1

S003 Generator Cal Tube 1 | R013 Gen HHS Meas XL Spot

This unit allows measurement of kVp, mA, mAs and exposure time. Press PREP and EXPOSE simultaneously to take 1 or 2 exposures depending on INIT KVP state.

Auto collimators are fully closed on unit entry. Use POSITION COLLIMATOR button for adjustment. If no button appears on this screen, then field size can be adjusted at the collimator.

Note: Wait at least 20 sec after release of PREP before initiating next exposure.

For Legacy systems, see more info screen to run a subset of the test at install.

See manual for further details.

HEAT UNITS AV XXX%

	SELECTED		MEASURED
KVP	80	INITIAL	CCC
		BASIC	DDD
MA	500		FFF.FF
MAS	20		HH.HH
TIME	40 msec		JJJJ.JJ

FILAMENT CORRECTION + LLLL

POSITION COLLIMATOR	CLOSED / OPEN	INITIAL KVP	SYNC / NONSYNC	CALED / UNCALED	MORE INFO	NEXT UNIT	UNIT MENU

R013 "MORE INFO" SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF 1

S003 Generator Cal Tube 1 | R013 Gen HHS Meas

Page 1 of 2

BUTTON	FUNCTION OF BUTTON
OPEN/CLOSED	Controls whether exposures are taken with open or closed–loop mA control. Application uses CLOSED loop.
INIT KVP	Controls whether initial kVp will be measured with a short exposure before the selected exposure.
SYNC/NONSYNC	Controls whether exposures will be taken in SYNC or NON–SYNC line contacting mode. LFX power limitations are worse in NONSYNC mode. Film changer and photospot are normally configured to NONSYNC.
CALED/UNCALED	Is used to signal the software if the X–ray tube filament drive (R003) has been calibrated.
KVP, MA, MAS	Are used with the dial to select kVp, mA, and mAs.

If any flags go up:
a. Perform meter calibrations R024, R025, and R021, and repeat steps 1 and 2.
b. If an mA flag goes up, recalibrate the mA stations in R003.
c. If a linearity flag goes up but not an mA or kV flag on the same row, then you may attempt to recalibrate just in the area of the linearity flag.

STEP BACK	PAGE	LINE	PREV / NEXT

R013 "MORE INFO" SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF 1

S003 Generator Cal Tube 1 | R013 Gen HHS Meas

Page 2 of 2

For Legacy systems, the R013 testing has been performed in SCAT. Only a subset of the test needs to be repeated in the field as described below and in STP–177.

Perform this test for the rad and fluoro tubes. Use Keithley non–invasive kV meter and software version 3382 form. Go to technique accuracy section.

For each filament, take a minimum of 3 exposures, one at 60, 80, and 130 kVp. The suggested mA for these tests is XS = 100mA and XL = 500mA, or examine the factory data, and choose those mA with the worst accuracy. Record new data, OVER–WRITING the factory data. If the "Pass" flags remain intact, then you are finished with the Technique Accuracy and Indirect Linearity test.

[STEP BACK] [PAGE] [LINE] [PREV NEXT]

R013, COLLIMATOR ADJUST SCREEN DISPLAY

System Ready | CAL/CONFIG UNIT SCREEN | STEP 1 OF 1

S003 Generator Cal Tube 1 | R013 Gen HHS Measurement | ROOM X

In this step fluoro (through the handswitch) and collimators are enabled for positioning object (e.g., dosimeters) in the field of view.

Return to Step 1 via the STEP BACK key for radiographic measurements when finished.

NOTE: Fluoro is disabled if the imaging module is VIC and the Fluoro Target Voltage is at its C000 initialized value (i.e., V050 has not been run).

HEAT UNITS XXX%

0.0 MA

[COLLIMATOR TRANSVERSE] [SLOW]
[CLOSE JOG] [OPEN JOG]
[STEP BACK]

7-18 T005, MAS Integrator Test

7-18-1 Before You Begin

This procedure may already have been performed at the factory. Therefore, there may be no need to repeat this procedure during system installation. To verify that this procedure was factory–calibrated, refer to document STP–179, titled 'Digital Rad SCAT Scorecard', which was shipped with the system.

7-18-2 Description

Calibration Tool Unit T005 provides a functional check of the backup mAs integrator in accordance with the requirements of HHS (Refer to Direction 13894, Tab 3). The test verifies that the backup mAs integrator limits exposure time to 550 mAs. The unit automatically configures the system for exposures at 70 kVp, minimum mA (per applicable X–ray tube focal spot size), and maximum expose time. This Calibration Tool Unit does not calibrate values.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-18-3 Equipment Required

None.

7-18-4 Test Procedure

Perform the Test as follows. Be sure to record information for HHS records, while running this Cal unit.

1. Press the PREP and EXPOSE switches on the console handswitch to take an AEC primary timed exposure.
2. After the exposure, the measured expose time and calculated mAs will be displayed on the console screen. The backup mAs integrator is set to 550 mAs. If the calculated mAs is outside the range of 540 to 560 mAs, touch the BACKUP mAs GAIN softkey and use the console dial to adjust for proper mAs value. (A change in gain of 0.01 is equivalent to 4.0 mAs).

Note: If after the exposure, the calculated mAs is greater than 600 mAs error code A12C "BACKUP MAS, INTEGRATOR TEST HAS FAILED" will appear on the console screen. To correct for this indication, touch BACKUP MAS GAIN softkey and use the console dial to adjust for proper mAs value.

3. Repeat the exposure and readjust if necessary until mAs is within 540 to 560 mAs.

Note: If T005 test fails but other units work and you can take exposures, run the backup MAS meter diagnostic test. If the other units also fail and/or you can still take exposures, run the power unit and safety contactor diagnostic tests.

4. Touch NEXT UNIT or UNIT MENU to exit the unit.

T005 BACKUP MAS INTEGRATOR TEST SCREEN DISPLAY

System Ready   CAL/CONFIG UNIT SCREEN   STEP 1 OF 1

S003 Generator Cal Tube 1   T005 MAS Integrator Test

Press the console PREP and EXPOSE switch to take an exposure.

The backup mAs integrator is set at 550mAs.

If calculated mAs is outside the range

540 to 560 mAs

then adjust the MAS METER GAIN and repeat the exposure.

NOTE: Exposures in this unit are normally terminated with Error 4260 (causing other error messages, e.g. 422D).

HEAT UNITS AV 100%

KVP	70
MA	XXX
MAXIMUM TIME	3.750 SEC
MINIMUM TIME	F.FFF SEC
CALCULATED MAS	GGG
BACKUP mAs GAIN	1.00

NEXT UNIT | UNIT MENU

7-19 S014 Rad Pos B Tube 1 Calibration Sequence

S014 TYPICAL SCREEN DISPLAY

CAL / CONFIG UNIT MENU   PAGE 1 OF 1

S014 RAD Pos B Tube 1 Cal

>> P030 Collimator Offset Adjust
P007 Long Collim Servo Damp
P008 Trans Collim Servo Damp
P102 Coll to X–ray Tube Align

PAGE FWD | PAGE BACK | RUN | SEQUENCE MENU

7-20 P030, Collimator Offset Adjustment

This is a factory calibration. Verify first before re-calibrating.

7-20-1 Description

Calibration Unit P030 is used to check/adjust the longitudinal and transverse feedback voltage for the Ultranet collimator. The feedback voltage is measured when the blades are in the closed position. The feedback voltage must be –0.75 Vdc +/– 0.09 Vdc. An audible test tone at the console indicates that the feedback voltage is within specification. Two steps are required to accomplish the calibration.

A console screen display is provided for each step.

7-20-2 Equipment Required

Standard tool kit and digital voltmeter (DVM).

7-20-3 Cal/Config Unit Screen, Step 1 of 2 (Longitudinal)

If it is necessary to adjust the longitudinal and/or transverse feedback potentiometers, make adjustments slowly to prevent over adjustment before the tone is heard.

1. Touch the ENABLE TONE softkey. The unit automatically positions the collimator blades to the closed position and disables the servos for both blades. If an audible tone is present at the console, the longitudinal feedback voltage is within specification and adjustment is not required.
2. Touch NEXT STEP softkey to proceed to Cal/Config Unit Screen Step 2 of 2, Check/Adjust Transverse Feedback Voltage.

   If no tone is heard, adjustment of the longitudinal feedback potentiometer is required. Perform the adjustment according to the procedure given below:

   Ultranet Over–Table

   a. Remove rear connector cover from collimator.
   b. To expose feedback potentiometers, remove six screws securing main cover to collimator. Then, pull off cover in a direction opposite that of the X–ray tube port.
   c. Connect DVM as indicated below:

      RAD Systems: Tube 1, RP1 A1 A7 TP6 (Ref TP9)

      Tube 2, RP1 A1 A8 TP6 (Ref TP9)
   d. Deactivate ENABLE TONE softkey.
   e. Turn knob to open blades. While opening blades, observe large brass gear that engages with smaller brass gear on shaft of longitudinal feedback potentiometer.
   f. Determine which of two setscrews in the large brass gear is least accessible when the collimator blades are in the **closed** position. Using a 1.5 mm hex key wrench, loosen this setscrew only.
   g. Touch the ENABLE TONE softkey. After the collimator blades have closed, loosen the second setscrew in the large brass gear. Then, slowly rotate large gear until a tone is heard at the console.
   h. Verify that the DVM indicates –0.75 Vdc +/– 0.09 Vdc to ensure that the adjustment is correct.
   i. Tighten one setscrew to lock position of large brass gear. Ensure that the tone is still heard and that the DVM indication is still correct.
   j. Over table only: Turn knob to open blades. Tighten second setscrew in large brass gear.

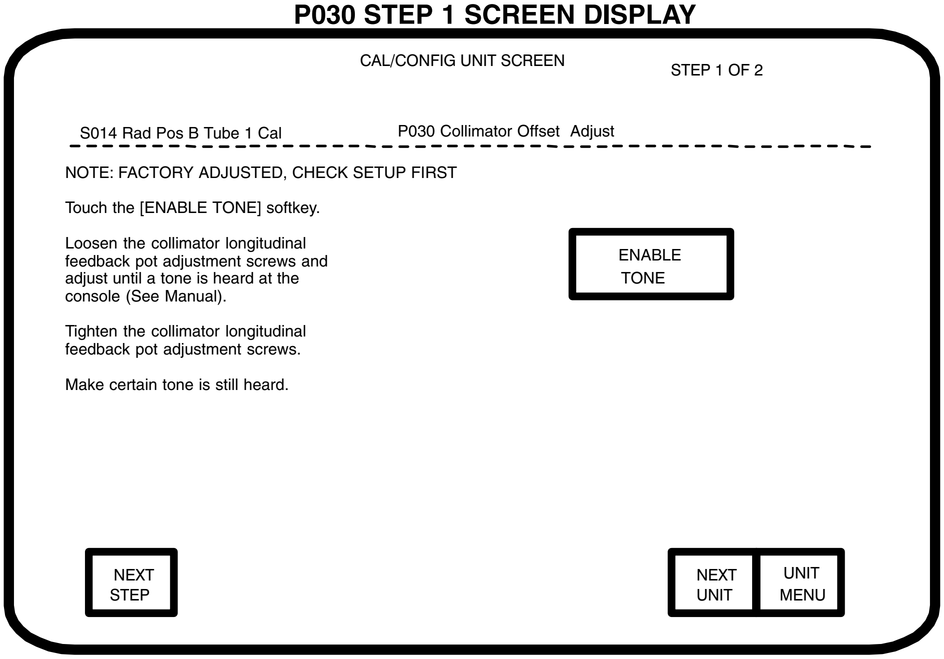
Note: Observe the following:

> Touch ENABLE TONE softkey to disable tone.

> Perform Cal/Config Unit Screen Step 2 of 2 checks before reassembling the collimator. It may also be necessary to make adjustments to the transverse feedback voltage potentiometer.

3. After the applicable longitudinal feedback voltage adjustment is completed, touch the NEXT STEP softkey to proceed to Cal/Config Unit Screen Step 2 of 2.

P030 STEP 1 SCREEN DISPLAY



7-20-4 Cal/Config Unit Screen Step 2 of 2, (Transverse)

1. Touch the ENABLE TONE softkey. If an audible tone is present at the console, the transverse feedback voltage is within specification and adjustment is not required.

   If “no tone is heard”, adjustment of the transverse feedback potentiometer is required. Perform the adjustment according to the procedure given below:

   a. Remove rear connector cover from collimator.

   b. To expose feedback potentiometers, remove six screws securing main cover to collimator. Then, pull off cover in a direction opposite that of the X–ray tube port.

   c. Connect DVM as indicated below:

      Tube 1, RP1 A1 A7 TP5 (Ref TP9)

      Tube 2, RP1 A1 A8 TP5 (Ref TP9)

   d. Deactivate ENABLE TONE softkey.

   e. Turn knob to open blades. While opening blades, observe large brass gear that engages with smaller brass gear on shaft of transverse feedback potentiometer.

   f. Determine which of two setscrews in the large brass gear is **least** accessible when the collimator blades are in the closed position. Using a 1.5 mm hex key wrench, loosen this setscrew only.

   g. Touch the ENABLE TONE softkey. After the collimator blades have closed, loosen the second setscrew in the large brass gear. Then, slowly rotate large gear until a tone is heard at the console.

   h. Verify that the DVM indicates –0.75 Vdc +/– 0.09 Vdc to ensure that the adjustment is correct.

i. Tighten one setscrew to lock position of large brass gear. Ensure that the tone is still heard and that the DVM indication is still correct.

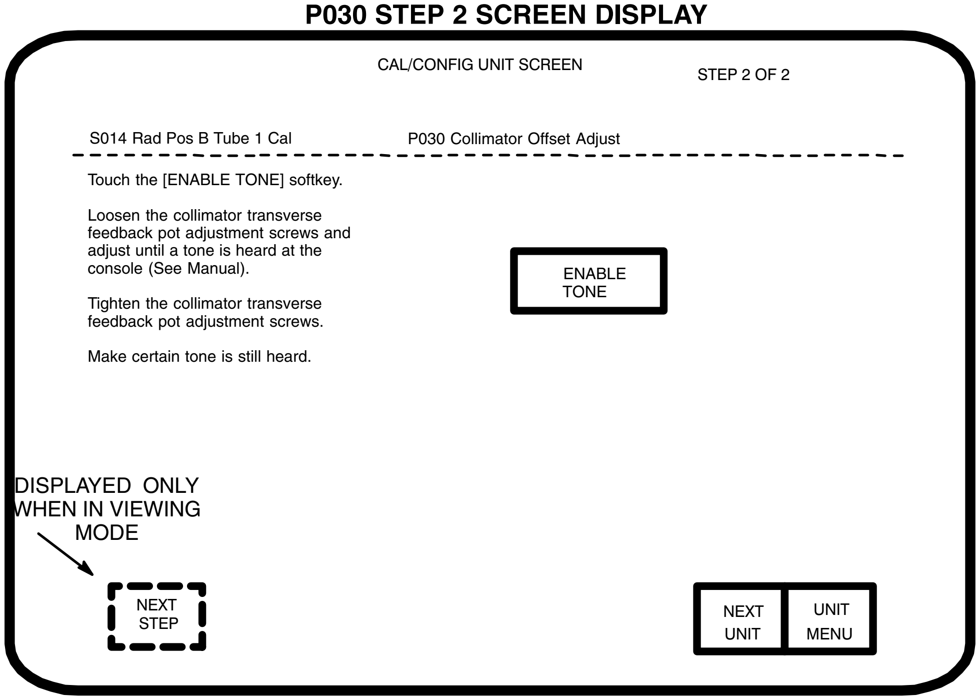
j. Over table only: Turn knob to open blades. Tighten second setscrew in large brass gear.

k. Install main cover and rear cover on collimator.

Note: If the longitudinal feedback voltage was adjusted in Cal/Config Unit Screen, Step 1 of 2, reassemble the collimator before exiting the unit.

2. Touch NEXT UNIT or UNIT MENU softkey to exit.
3. After the applicable transverse feedback voltage adjustment is completed, touch the NEXT UNIT or UNIT MENU softkey to exit the unit.

P030 STEP 2 SCREEN DISPLAY



7-21 P007, Longitudinal Collimator Servo Damping

7-21-1 Description

Calibration Unit P007 is used to adjust Longitudinal Collimator Servo Damping. The unit automatically drives the collimator blades to a good starting position for performing the damping adjustment. The adjustment is performed while observing the servo motor drive signal on an oscilloscope.

7-21-2 Equipment Required

Oscilloscope, test leads, and non–metallic trimpot adjusting tool.

7-21-3 Test Setup

Connect the oscilloscope to the following test point:

TEST POINT	ADJUSTMENT
RP1 A1 A7 TP2 (REF TP9)	RP1 A1 A7 R31

Set oscilloscope controls as follows:

VERT AMPL: 10V/div.   Auto Trigger

TIME BASE: 20 msec./div. DC Coupled

7-21-4 Cal Procedure

Perform the adjustment as follows:

1. Turn Accuracy Adjustment potentiometer R31 clockwise (CW) until the collimator blades just begin to oscillate and the waveform observed on the oscilloscope is as indicated in Illustration 3–12.
2. Slowly turn R31 counterclockwise (CCW) until the collimator blades stop oscillating and the waveform observed on the oscilloscope is as indicated in Illustration 3–13. Then, adjust R31 an extra 1/2 turn CCW. If oscillations still appear, turn R31 slightly more CCW.
3. Touch the NEXT UNIT or UNIT MENU softkey to exit the calibration unit.

P007 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN STEP 1 OF 1

S014 Rad Pos B Tube 1 Cal P007 Long Collim Servo Damp

NOTE: NEW R+F SYSTEMS HAVE FACTORY ADJUST–
ED UNDERTABLE COLLIMATORS, VERIFY FIRST.

Connect scope to TP2 (ref TP9) on
collimator board. Set scope to
10 V/Div, 20 msec/Dv.

Turn R31 (Accuracy Adjustment) CW until
blades begin to oscillate. Then turn R31
CCW until oscillations stop. Refer to
waveform illustration in manual. Turn
R31 an extra 1/2 turn CCW.

If any oscillation appears later, turn R31
slightly more CCW

Touch NEXT UNIT or UNIT MENU to exit
this unit.

NEXT UNIT | UNIT MENU

Note: The waveform illustrations shown are theoretical waveforms. The actual stabilized signal waveform is not a flat line but consists of low amplitude spikes.

ILLUSTRATION 3–12
SERVO OSCILLATING

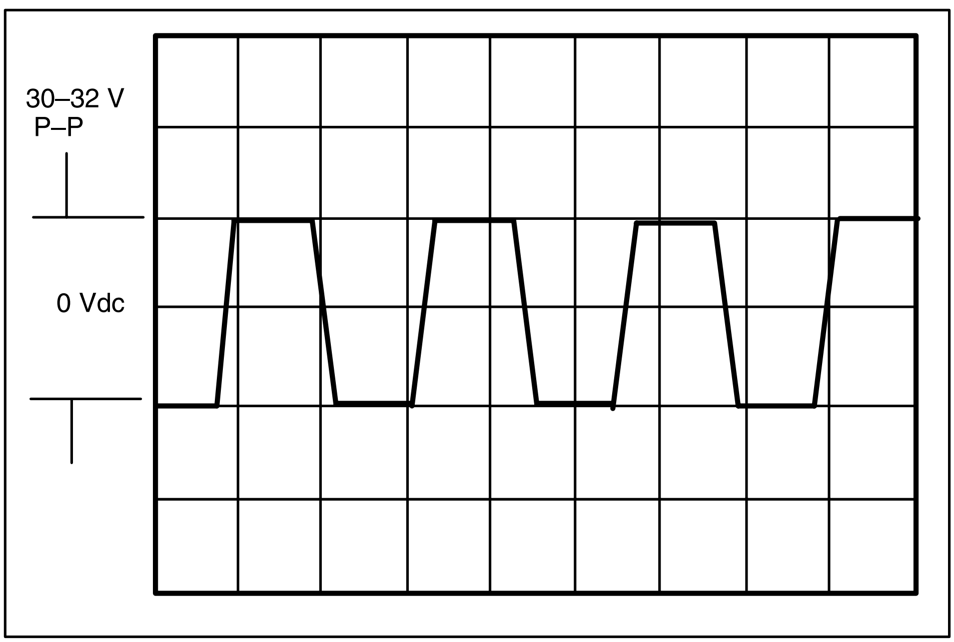
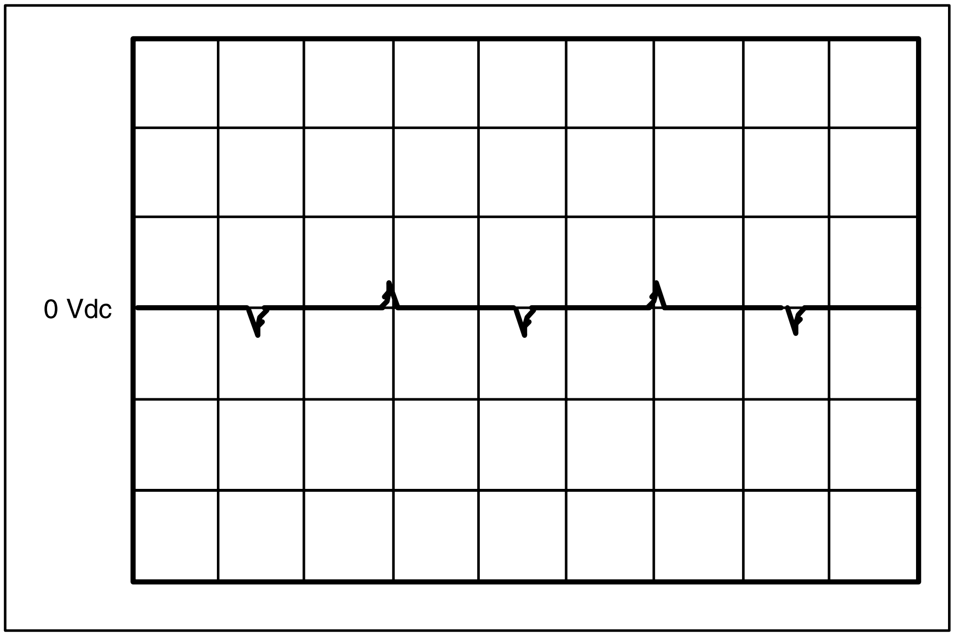


ILLUSTRATION 3–13
SIGNAL STABILIZED



7-22 P008, Transverse Collimator Servo Damping

7-22-1 Description

Calibration Unit P008 is used to adjust Transverse Collimator Servo Damping. The calibration unit automatically drives the collimator blades to a good starting position for performing the damping adjustment. The adjustment is performed while observing the servo motor drive signal on an oscilloscope.

7-22-2 Equipment Required

Oscilloscope, test leads, and non–metallic trimpot adjusting tool.

7-22-3 Test Setup

Connect the oscilloscope to the following test point:

TEST POINT	ADJUSTMENT
RP1 A1 A7 TP1 (REF TP9)	RP1 A1 A7 R30

Set oscilloscope controls as follows:

VERT AMPL: 10V/div. Auto Trigger

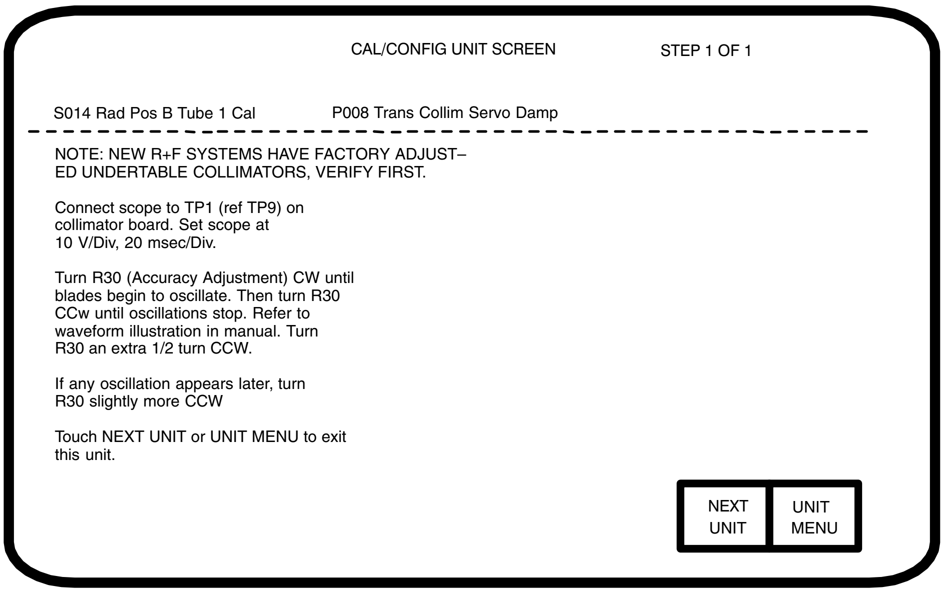
TIME BASE: 20 msec./div. DC Coupled

7-22-4 Cal Procedure

Perform the procedure as follows:

1. Turn Accuracy Adjustment potentiometer R30 clockwise until the collimator blades just begin to oscillate and the waveform observed on the oscilloscope is as indicated in Illustration 3–12, Calibration Unit P007 (previous page).
2. Slowly turn R30 counterclockwise until the collimator blades stop oscillating and the waveform observed on the oscilloscope is as indicated in Illustration 3–13, Calibration Unit P007 (previous page). Then, adjust R30 an extra 1/2 turn counterclockwise. If oscillations still appear, turn R30 slightly more CCW.
3. Touch the NEXT UNIT or UNIT MENU softkey to exit the calibration unit.

P008 SCREEN DISPLAY



7-23 P102, Collimator to X–ray Tube Alignment

The collimator is factory aligned and should only be adjusted when an X–ray tube or collimator is replaced.

7-23-1 Description

Calibration Unit P102 is used to locate the center position of the collimator mounting ring with respect to the focal spots of an X–ray tube. The unit determines the correct position of the ring before securing it to an X–ray tube. The alignment is accomplished using manual procedures (no software driven functions are provided).

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-23-2 Equipment Required

Collimator Alignment Tool (CAT) (P/N 46–166390G2), and Standard tool kit.

7-23-3 Cal Procedure Collimator Alignment

1. Remove the collimator from the collimator mounting ring by loosening the collimator retaining screws and attach the CAT to the mounting ring.
2. Select the SMALL FOCAL SPOT before proceeding with exposures.
3. Take an exposure and view the output of the CAT (best viewed with room lights off). See Illustration 3–14.
4. After the exposure, adjust collimator adapter plate to align the focal spot image to the CAT crosshairs as indicated below.
   a. The requirement is to center the focal spots symmetrically about the crosshairs of the CAT. See Illustration 3–14. Use the FOCAL SPOT softkey to toggle between the small and large focal spots.

Note: A complete 4 second exposure must be taken prior to changing the Focal Spot.

   b. Align to equalize the difference between the two spots. That is, the distance of the center of the small spot with respect to the crosshairs of the CAT (distance X1) should be equal to the distance between the center of the large spot and the crosshairs of the CAT (distance X2). A compromise setting may be necessary.
5. Touch NEXT UNIT or UNIT MENU softkey to exit the unit.

P102 SCREEN DISPLAY

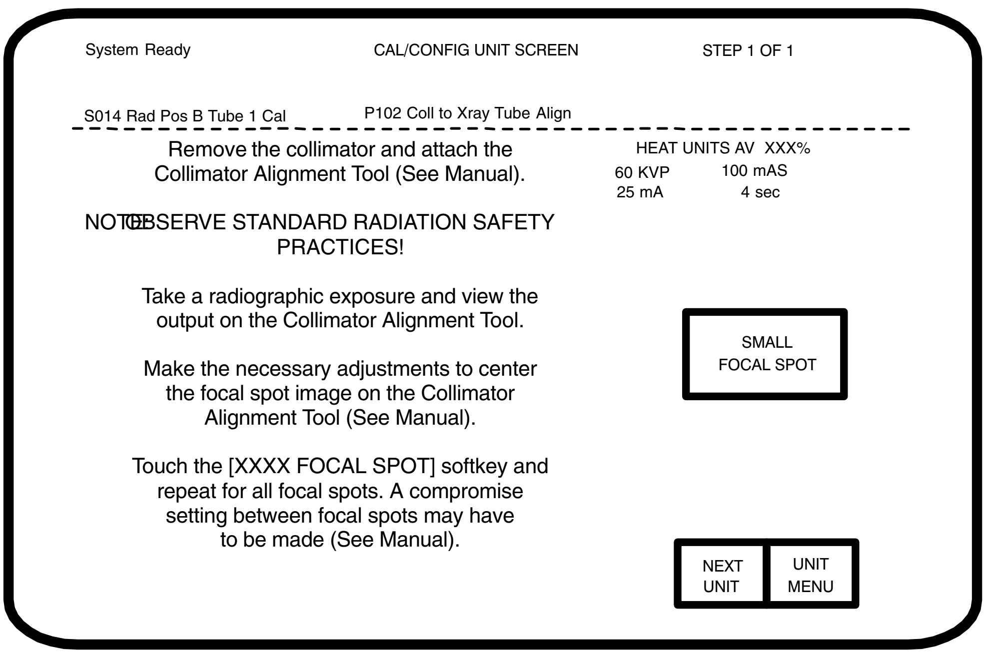
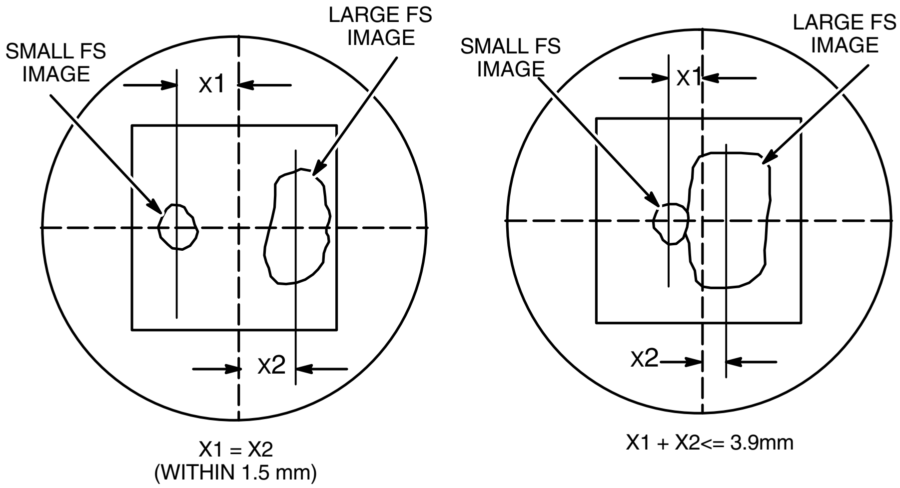
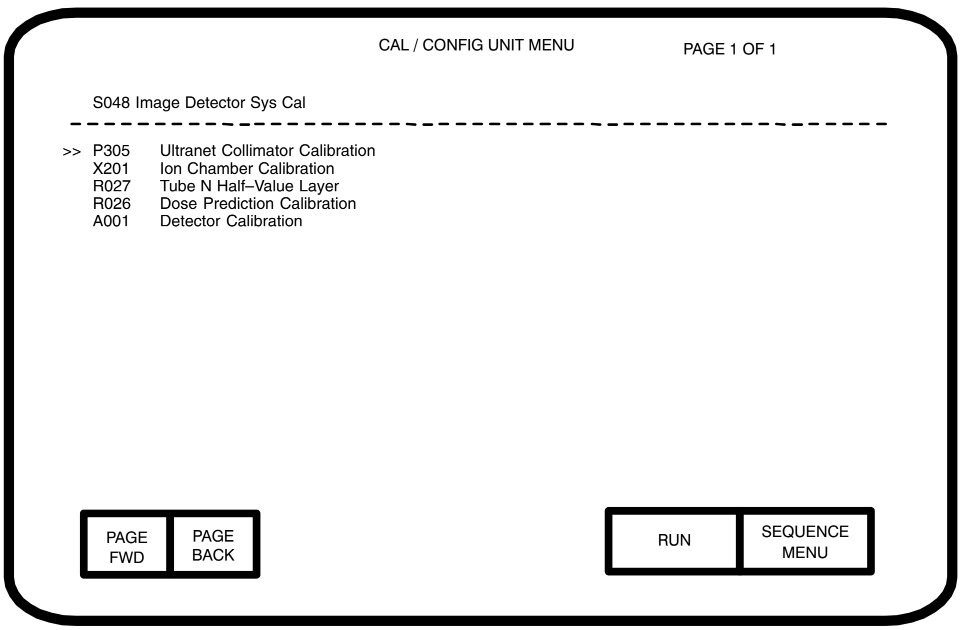


ILLUSTRATION 3–14
CAT OUTPUT IMAGE ALIGNMENT



7-24 S048 Image Detection System Calibration Sequence

S048 TYPICAL SCREEN DISPLAY



7-25 P305, Ultranet Collimator Calibration

7-25-1 Description

Calibration Unit P305 is used to set the gain and offset values for the open and closed positions of the longitudinal and transverse blades of the Ultranet Collimator. Five steps are required to accomplish the calibration. When properly completed, steps one through three will display STEP COMPLETE, which signifies that the user can proceed to the next step.

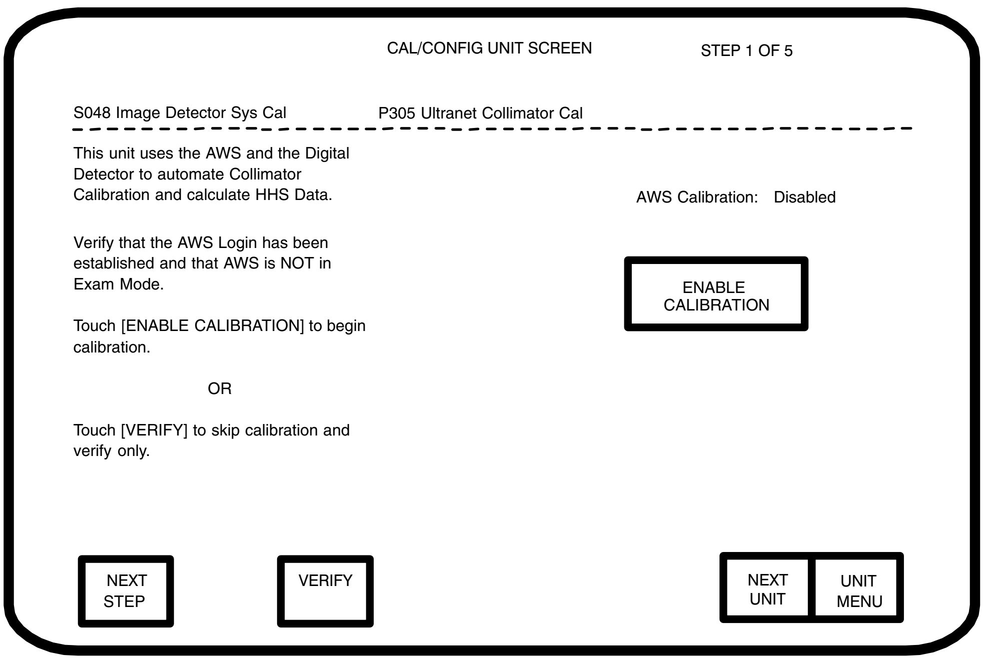
7-25-2 Equipment required

None.

7-25-3 Cal Procedure

1. Follow screen instructions described by each step. Step 1 of 5 screen verifies that the AWS is properly set–up for this calibration unit. At this step, it is possible to select VERIFY and run through this unit without altering any settings.

P305 STEP 1 SCREEN DISPLAY



2. Step 2 verifies horizontal and vertical alignment of the tube stand to the receptor stand. The Gain and Offset Adjustment values are only displayed after two successive exposures have been taken (one at LOW position and one at HIGH position).

   LOW Position = 5 cm above the lowest (end–of–travel) position
   HIGH Position = 5 cm below the highest (end–of–travel) position

3. Follow the 5 steps described on the screen.
4. If vertical alignment adjustments are required, refer to the Table 3–2 and Illustration 3–15 for identification of potentiometers. Typically it takes less than three iterations of the Adjustment Procedure to complete this step.

7-25-4 Re–adjustment Procedure for Offset/Gain Calibration

If vertical alignment can not be achieved because P44 reaches its limits, do the following re–adjustment:

1. Lower the RECEPTOR and TUBE STAND carriages to their lowest position.
2. Switch the collimator to the OVERRIDE mode by turning the key switch. Verify that both carriages are at their mechanical limits.
3. Adjust the following potentiometers on the Servo Control board to midrange.

   P40 – Tube stand gain (30 turns)
   P41 – Receptor stand gain (30 turns)
   P44 – Tube stand offset (22 turns)
   P45 – Receptor stand offset (22 turns)

4. On the Control board measure the feedback voltages as follows:

   TP10 (Tube position) = 2VDC
   TP11 (Receptor position) = 2 VDC
   TP28 (Ground) = Reference

5. If necessary, adjust position feedback potentiometers on the top of each stand to obtain above voltages. Loosen the two screws that secure the mounting bracket and carefully move the belt to a new position on the pulley sprockets.
6. To verify proper operation, raise both carriages to their highest position. Voltage should be 8VDC.
7. Switch the collimator to the AUTOMATIC mode by turning the key switch.
8. Lower the RECEPTOR to the DOWN 50 position marked on the wall stand and allow the tube stand to align itself.
9. Turn on the field lamp and verify the alignment of the collimator cross hairs with the center of the patient barrier is within 1 cm.
10. Perform Step 2 of the procedure by selecting the **Stand at Low Position**.
11. Continue taking exposures at the low position and adjusting P44 until the reported offset is less than 0.05 mm. **Stand at Low Position** must be re–selected for each exposure.
12. If offset is positive, turn P44 CCW. If offset is negative, turn P44 CW.
13. Raise the RECEPTOR to the UP 50 position marked on the wall stand and allow the tube stand to align itself.
14. Perform Step 2 of the procedure by selecting the **Stand at High Position**.
15. Continue taking exposures at the high position and adjusting P44 until the reported offset is less than 0.05 mm. **Stand at High Position** must be re–selected for each exposure.
16. If offset is positive, turn P44 CCW. If offset is negative, turn P44 CW.

17. After STEP COMPLETE is displayed, continue calibration as instructed on the Advantx Service screen.
    > STEP COMPLETE may occur even if some misalignment is still present. This is acceptable and the user should continue. (Tolerances are approximately: +/– 3 mm Vertical and +/–10 mm Horizontal.)
    > A horizontal misalignment indicates problems with the physical installation of the stands. Physical re–alignment may be required.

P305 STEP 2 SCREEN DISPLAY

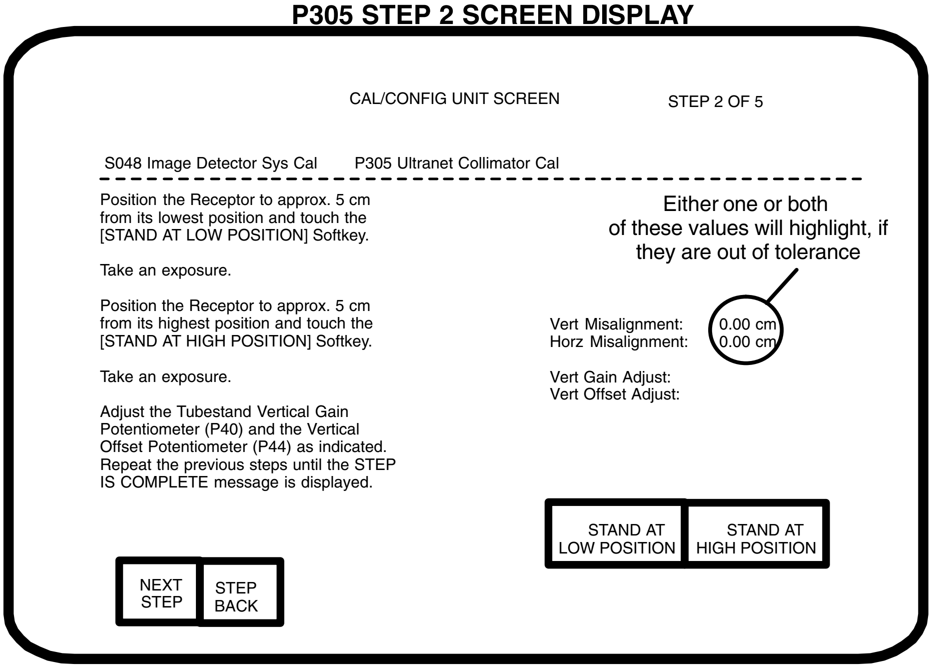
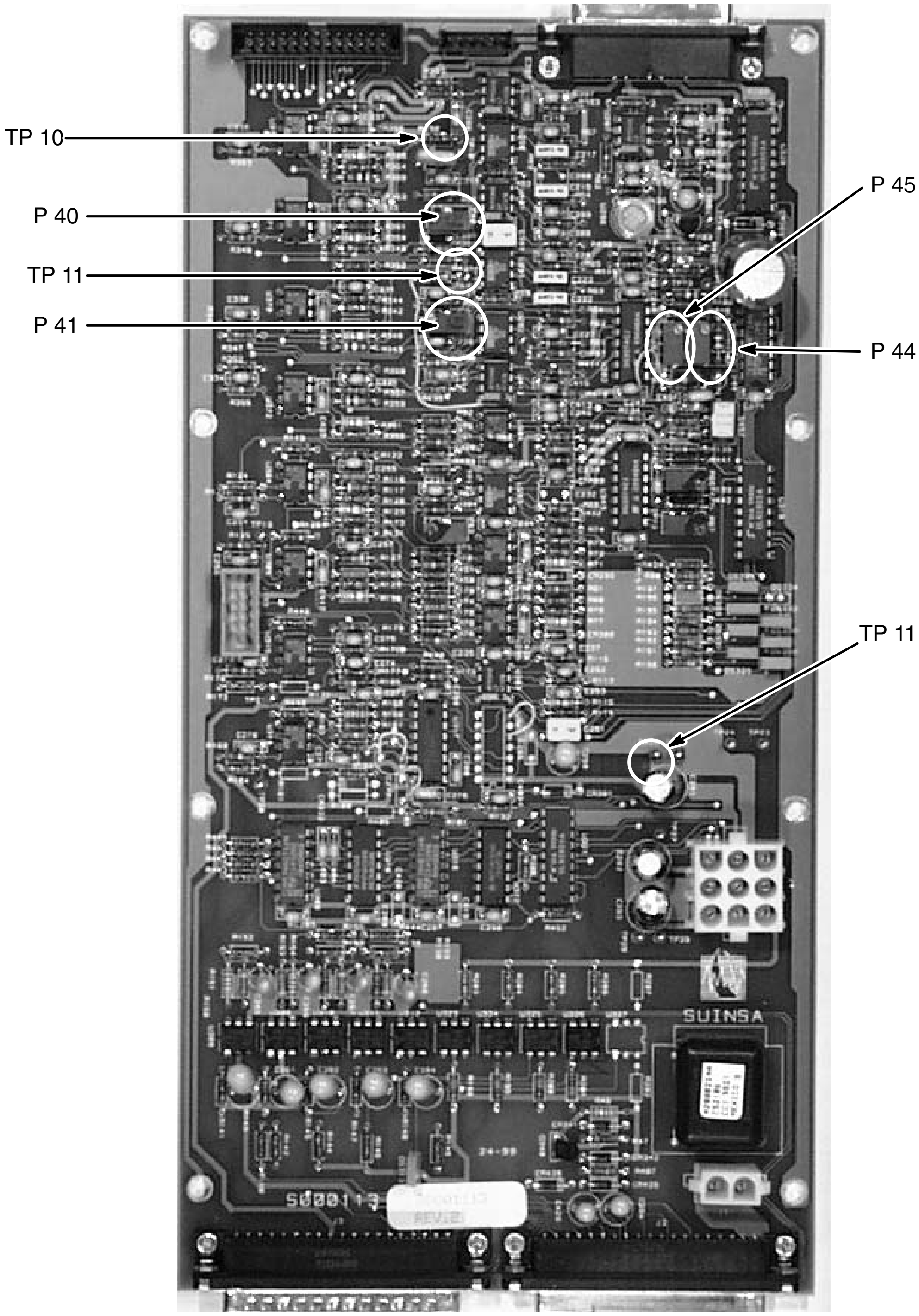


TABLE 3–2
VERTICAL OFFSET AND GAIN POTENTIOMETERS

Pot #	Function	Comments
P40	Tube stand pot gain adjustment	Modifies the mm/volt ratio of the TS pot feedback
P44	TS Pot offset adjustment	Use to align Collimator cross–hairs to patient barrier. Approximately 2mm per 1/4 turn.

ILLUSTRATION 3–15
TUBESTAND GAIN AND OFFSET POTENTIOMETERS



18. Step 3 calibrates the gains and offsets.

Note: Close the collimator blades evenly during this step. Do not slam them shut.

P305 STEP 3 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN   STEP 3 OF 5

S048 Image Detector Sys Cal   P305 Ultranet Collimator Cal

Using the Collimator Control Knobs, manually close the Collimator Blades. Verify that the blades are closed using the Collimator Field Light.

Touch the [Set Position] Softkey.

Press and hold the Prep and Expose switch to take an exposure. Release when complete.

NOTE: To repeat this step (after taking an exposure), start at the beginning of this step by closing the Collimator Blades.

Touch [NEXT STEP] to continue.

	Long	Trans
Current Gain:	2681	2734
Current Offset:	294	302

SET POSITION

NEXT STEP | STEP BACK

19. Step 4 aligns the collimator field light. During this step, the collimator blades should be set to 24 cm in the lateral direction and 30 cm in the longitudinal direction.

P305 STEP 4 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN   STEP 4 OF 5

S048 Image Detector Sys Cal   P305 Ultranet Collimator Cal

Using Collimator Field Light, verify that the Collimator Blades are set to 24 x 30 cm.

If the Field Light is offset relative to the 24 x 30 cm outline by more than 1.5 cm, the Collimator Lamp requires adjustment. Refer to the Calibration Users Guide for instructions.

When the Field Light is aligned to the 24 x 30 cm outline, touch [NEXT STEP] to continue.

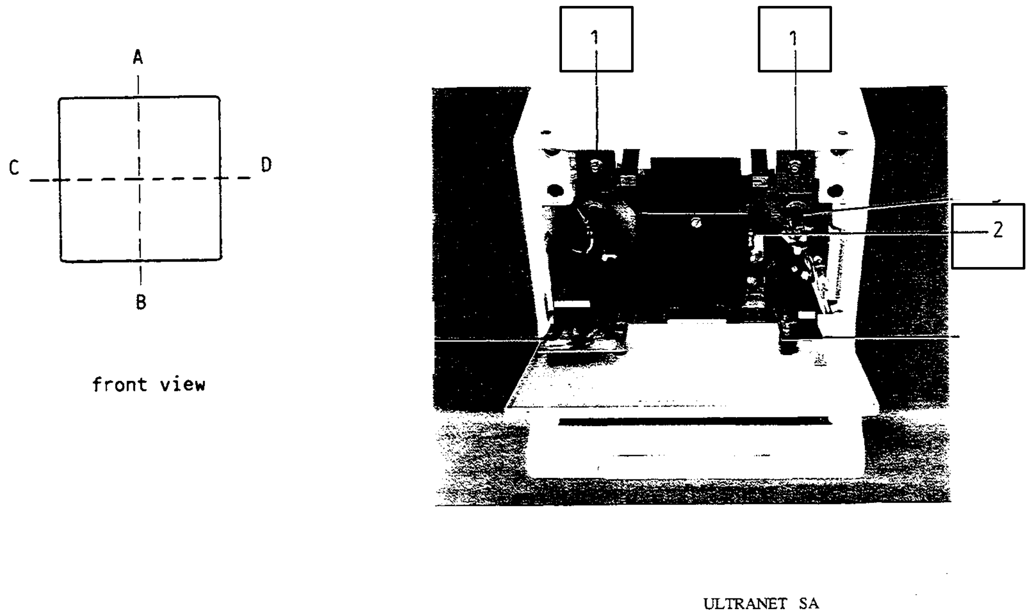
NEXT STEP | STEP BACK

20. If required, adjust the collimator field light per instructions below.
    a. Remove the collimator front panel.

b. To adjust in C–D direction loosen the two screws [1]. Refer to Illustration 3–16.

c. To adjust in A–B direction loosen one screw [2]. Refer to Illustration 3–16.

ILLUSTRATION 3–16
COLLIMATOR FIELD LIGHT ADJUSTMENTS



21. Step 5 verifies the calibration and HHS requirements.

Note: During this procedure, the collimator must be rotated in the **clockwise** direction, as you face the collimator.

P305 STEP 5 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN STEP 5 OF 5

S048 Image Detector Sys Cal P305 Ultranet Collimator Cal

With no collimator rotation, press and hold the Prep and Expose switch to take an exposure. Release when complete.

Rotate the Collimator to –45 degrees. Press and hold the Prep and Expose switch 5 times to take a series of 5 exposures.

Record the calculated data at the right. Select [RECAL] if additional calibration is required. Refer to the Calibration Users Guide for additional details.

NOTE: Start at the beginning of this step when pressing the Prep and Expose switch again after the series of 5 exposures.

CALCULATED DATA

Vert Misalignment :	0.00 cm
Horz Misalignment :	0.00 cm
% Of Field Size :	0.00

18 x 18 cm	aa.a x aa.a cm
24 x 24 cm	aa.a x aa.a cm
30 x 30 cm	aa.a x aa.a cm
35 x 35 cm	aa.a x aa.a cm
43 x 43 cm	aa.a x aa.a cm

NEXT STEP | STEP BACK | RECAL | NEXT UNIT | UNIT MENU

22. Selecting RECAL causes the unit to be run again, starting at step #2.

23. Selecting STEP BACK allows moving back in the procedure one step at–a–time. This allows a choice of which step to start running again.

7-26 X201, ION Chamber Calibration

7-26-1 Description

This unit calibrates the ion chamber to produce the proper output across all three areas. There are three steps required to complete the calibration.

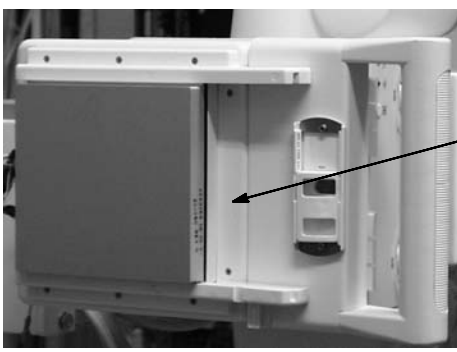
7-26-2 Equipment Required

Flat Field phantom.

7-26-3 Test Setup

1. Verify that the collimator is aligned to the receptor.
2. Insert Flat Field phantom as indicated in Illustration 3–17.

ILLUSTRATION 3–17
FLAT FIELD PHANTOM INSERTION



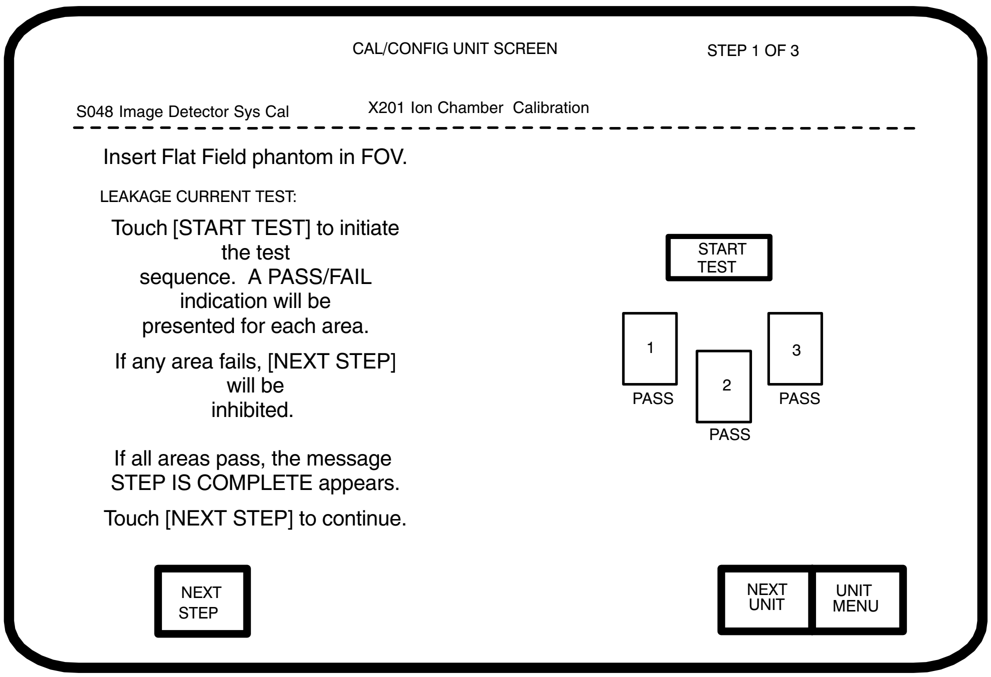
Slide flat field phantom into the collimator rails

7-26-4 Cal Procedure

Follow the screen instructions described by each step.

1. Step 1 checks the ion chamber leakage current.

X201 STEP 1 SCREEN DISPLAY



Note: If the ion chamber does not pass Leakage Current Test, replace the ion chamber.

2. Step 2 sets up the balance between the 3 ion chamber cells.
3. Follow screen instructions to press and hold the console handswitch until all three exposures are complete.

4. Adjust the potentiometers, as directed. Refer to Illustration 3–18 for location of potentiometers.

   On screen adjustments may appear to be unusual for this step, but they must be followed to accurately complete the calibration.

X201 STEP 2 SCREEN DISPLAY

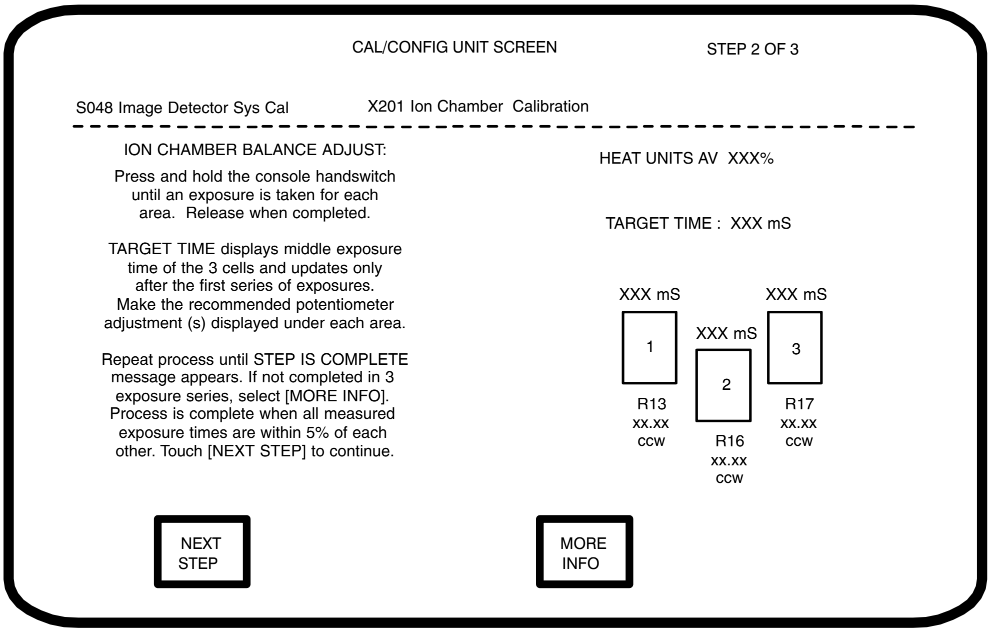
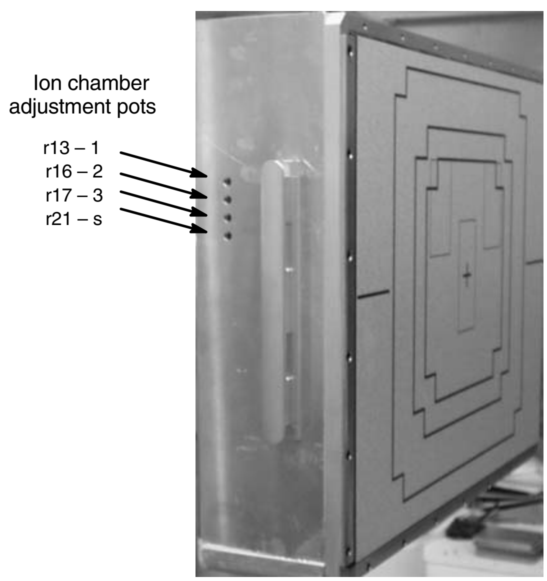


ILLUSTRATION 3–18
ION CHAMBER POTENTIOMETER LOCATIONS



5. Step 3 sets up the ion chamber sensitivity.

6. Adjust the potentiometer, as directed. Refer to Illustration 3–18 for location of potentiometer.

X201 STEP 3 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN   STEP 3 OF 3

S048 Image Detector Sys Cal   X201 Ion Chamber Calibration

ION CHAMBER SENSITIVITY ADJUST:

Flat Field phantom required in FOV.

Press and hold the console handswitch until the exposure is completed.

If SENSITIVITY indicates FAIL, adjust Sensitivity Potentiometer (S / R21) as indicated, either Clockwise (CW) or Counter–Clockwise (CCW). Repeat the process until SENSITIVITY indicates PASS. If PASS is not indicated, after 3 exposures, select [MORE INFO].

When SENSITIVITY indicates PASS, select [NEXT UNIT] or [UNIT MENU] to exit.

HEAT UNITS AV XXX%

SENSITIVITY: PASS (FAIL)

ADJUST POTENTIOMETER: XX.XX CCW (CW)

NEXT STEP | MORE INFO | NEXT UNIT | UNIT MENU

X201 MORE INFO SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN   STEP X OF 3

S048 Image Detector Sys Cal   X201 Ion Chamber Calibration

If unable to perform complete balance adjustment after 3 exposure series, initialize the balance potentiometers as follows :

Step 2 – Balance Pots :
#1, #2, #3 – Set all pots fully Counter–Clockwise (30 turns).
#1, (R13, left cell) – Set 13 turns clockwise.
#2, (R16, center cell) – Set 10 turns clockwise.
#3, (R17, right cell) – Set 13 turns clockwise.

If unable to complete sensitivity adjustment after 3 exposures, initialize the sensitivity potentiometer as follows :

Step 3 – Sensitivity pot R21 (Labeled as “S”) :
Set pot fully Counter–Clockwise (30 turns).
Set 9.5 turns clockwise.

Repeat calibration step after initialization of potentiometers.

BACK

7-27 R027, Tube N Half–Value Layer

7-27-1 Description

Calibration Unit R027 is used to measure the half value layer radiation parameter to ensure system compliance with HHS requirements and/or system specifications. The unit is automatically configured for fixed exposures at 80 kVp, 50 mA, 50 milliseconds. Four steps are required to accomplish the verification.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

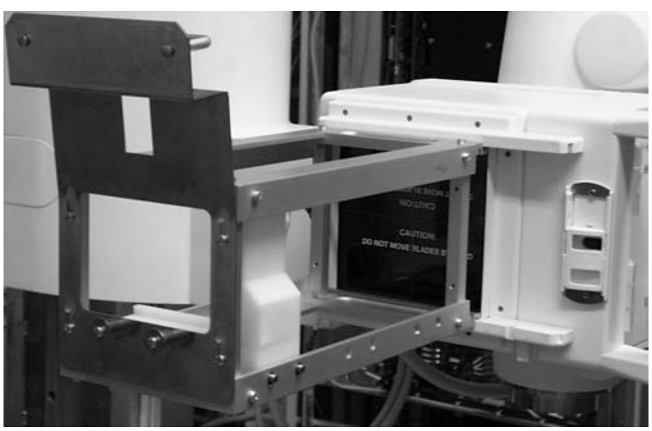
7-27-2 Equipment Required

– Keithley kVp Divider with filter packs (Model 35080A)
– Dosimeter (Keithley, MDH, or equivalent)
– Absorber plate (3.5 x 4 x 2.5 mm of 1100 aluminum), 46–173632G1
– Calibration fixture, 2222557
– Direction 46–013894*, System Field Test for HHS.*

7-27-3 Test Setup

Slide the calibration fixture onto the collimator rails as shown in Illustration 3–19.

ILLUSTRATION 3–19
CALIBRATION FIXTURE POSITIONING

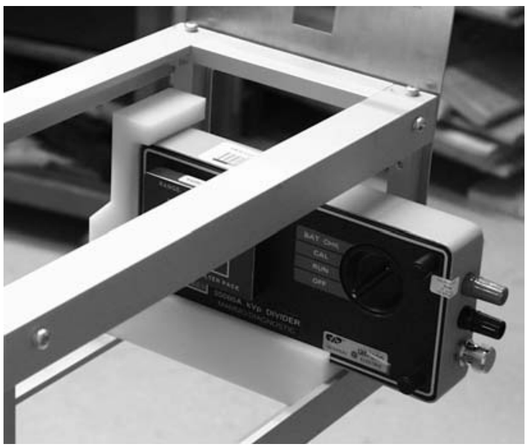


7-27-4 Procedure

Follow the screen instructions described by each step. Be sure to record information for HHS records, while running this Cal unit. Step 1 measures kVp.

1. Install filter pack (P/N 37617C) on Keithley and position it in calibration fixture so that filter pack is centered and facing the X–ray beam (Keithley should be set up 55 cm from focal spot). See Illustration 3–20.

ILLUSTRATION 3–20
KEITHLEY POSITIONING



R027 STEP 1 SCREEN DISPLAY

CAL/CONFIG UNIT SCREEN   STEP 1 OF 4

S048 Image Detector Sys Cal   R027 Tube 1 Half–Value Layer

Position the kVp meter filter pack in the test fixture. Refer to Cal Users Guide and Direction 46–013894 for additional details.

Using collimator field light, collimate to the kVp meter filter pack.

Press and hold the console handswitch until an exposure is taken. Release when complete.

Enter MEASURED KVP.

HEAT UNITS AV XXX%

80 KVP	2.5 mAs
50 MA	50 mSec

[MEASURED KVP] XX kVp

[NEXT STEP]   [NEXT UNIT] [UNIT MENU]

2. Step 2 measures radiation.

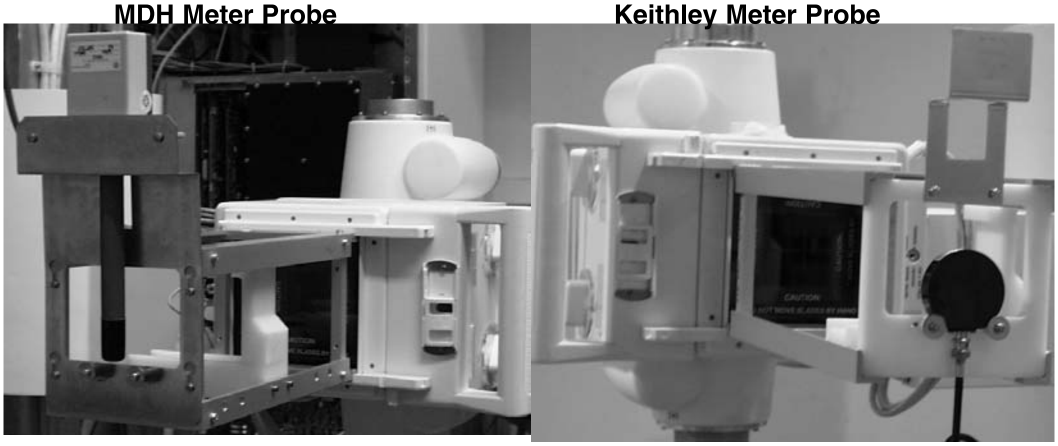
Note: The measured exposure value must be entered in units of “mR”. Use the following conversion formulas, if required:

Dose value (mR) = Dose value (uGy) / 8.76
Dose value (mR) = Dose value (mGy) x 1000 / 8.76

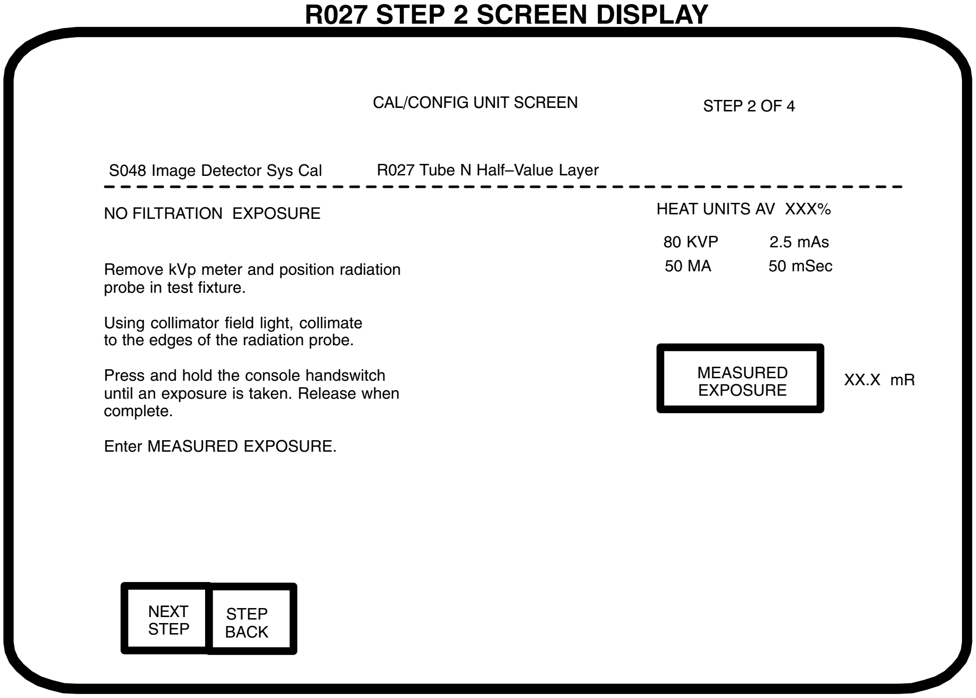
3. Position radiation probe so that it is centered in the calibration fixture as shown in Illustration 3–21 (radiation probe should be set up 65 cm from focal spot).

ILLUSTRATION 3–21
RADIATION PROBE POSITIONING

MDH Meter Probe **Keithley Meter Probe**



R027 STEP 2 SCREEN DISPLAY

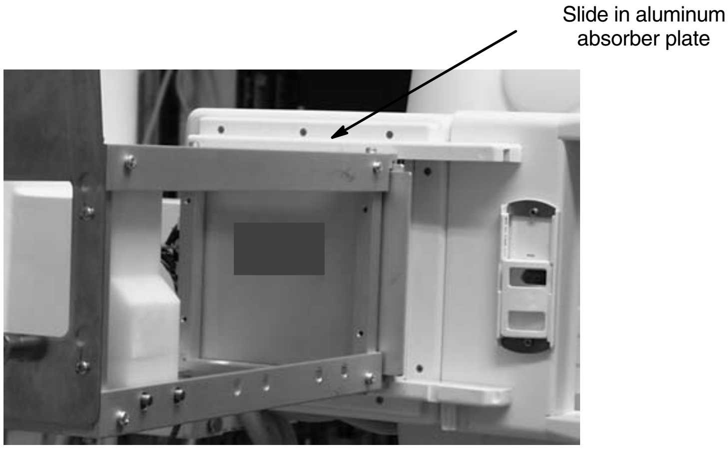


4. Step 3 measures half–value layer radiation.

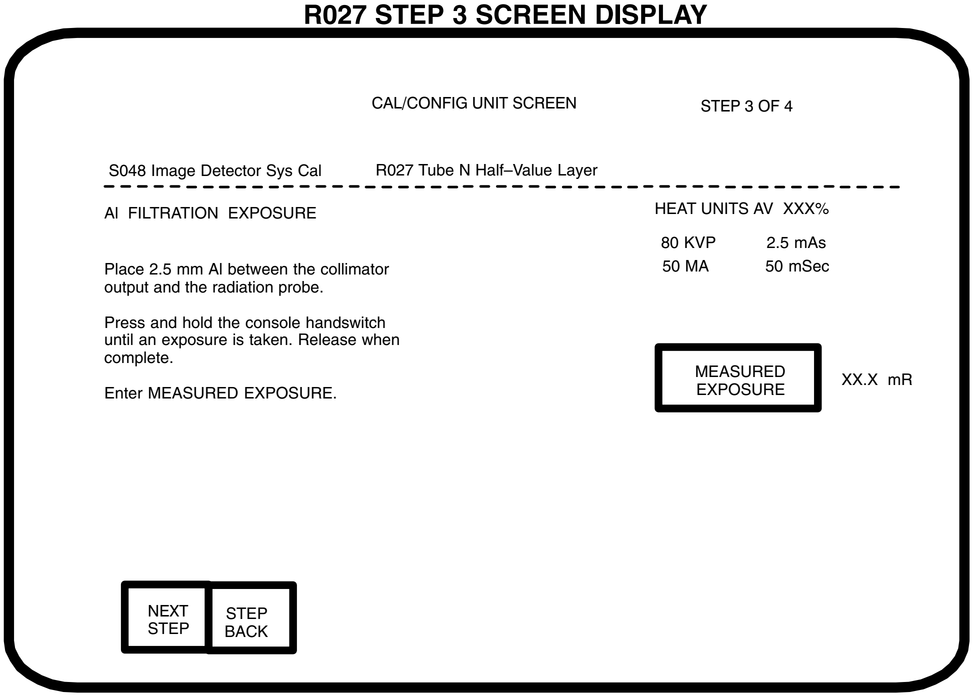
Note: The measured exposure value must be entered in units of “mR”. Use the following conversion formulas, if required:
Dose value (mR) = Dose value (uGy) / 8.76
Dose value (mR) = Dose value (mGy) x 1000 / 8.76

5. With the radiation probe still in place from step 2, slide the aluminum absorber plate down into the calibration fixture, as shown in Illustration 3–22.

ILLUSTRATION 3–22
ABSORBER PLATE POSITIONING

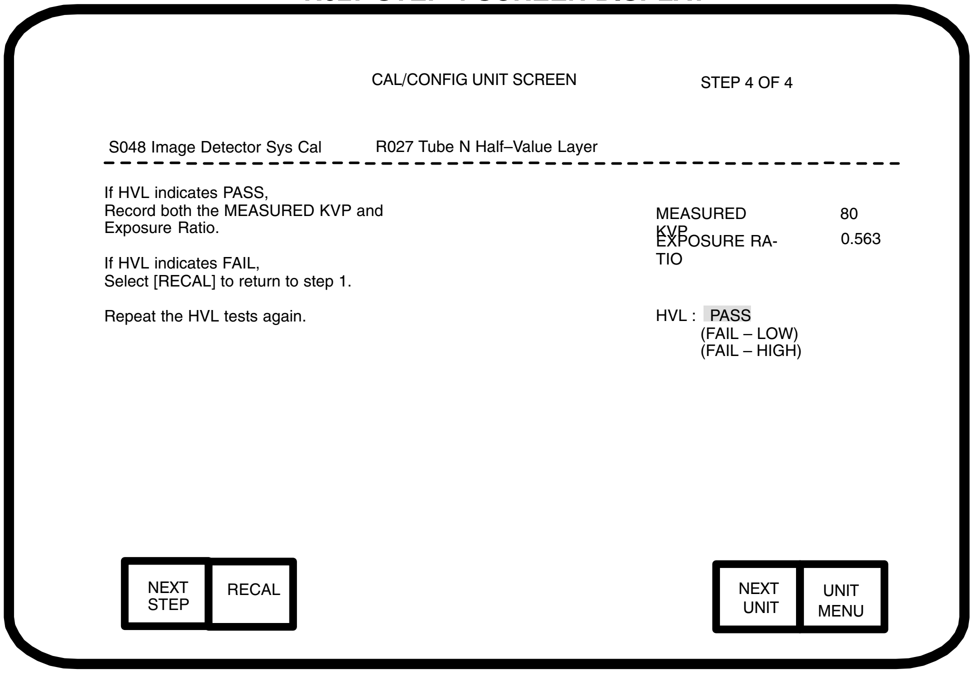


R027 STEP 3 SCREEN DISPLAY



6. Step 4 indicates PASS/FAIL criteria and provides final values for recording.

R027 STEP 4 SCREEN DISPLAY



7-27-5 Acceptance criteria:

Measured kVp	75	76	77	78	79	80	81	82	83	84	85
Minimum Ratio	.523	.527	.531	.535	.539	.542	.546	.550	.553	.557	.560
Maximum Ratio	.586	.590	.594	.597	.602	.606	.609	.613	.616	.620	.625

Note: The ratios for 80 kVp setpoint correspond to the system HVL specification of 2.6 mm / 2.9 mm Aluminum at 71 kVp. (measured using a kVp meter with 1 kVp accuracy)

The collimator is shipped from the factory with 0.5 mm of Aluminum filtration to meet the HVL requirement. If the R027 unit fails, order a new collimator. Do **NOT** alter the thickness of the Aluminum filter.

7-28 R026, Dose Prediction Calibration

7-28-1 Description

Calibration Unit R026 establishes a radiation reference level for dose prediction. Only one step is required to complete the calibration.

NOTICE

Potential for Radiation Damage to Detector.
Before making any calibration exposures, verify that the system has positioned the X–ray tube and detector so that the detector is not in the X–ray beam.

7-28-2 Equipment Required

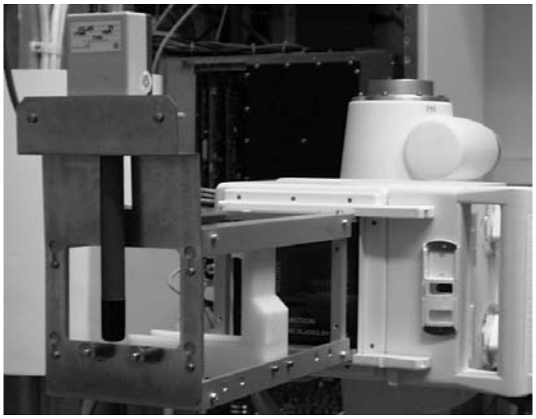
Dosimeter (Keithley, MDH, or equivalent) and calibration fixture (2222557).

7-28-3 Test Setup

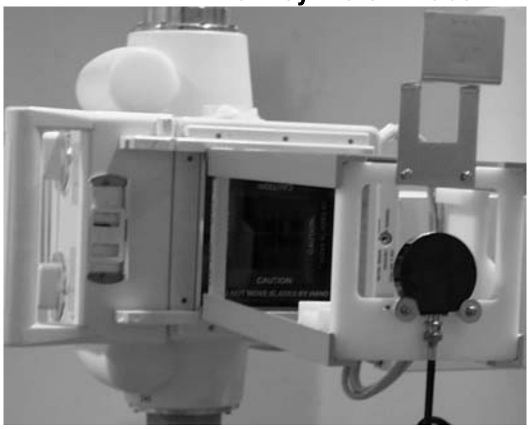
1. Slide the calibration fixture onto the collimator rails and position the radiation probe as shown in Illustration 3–23 (radiation probe should be set up 65 cm from focal spot).
2. Set collimator blades for a 20 x x20 cm opening using the collimator control knobs.

ILLUSTRATION 3–23
RADIATION PROBE POSITIONING

MDH Meter Probe



Kiethley Meter Probe



7-28-4 Cal Procedure

As with other calibration units, exposures will not be allowed when the generator is in a heat wait condition.

There are established limits for minimum and maximum measured exposure values. Turning the console dial beyond these set limits will cause an error message to be displayed. If this occurs, check the initial set–up and repeat the procedure.

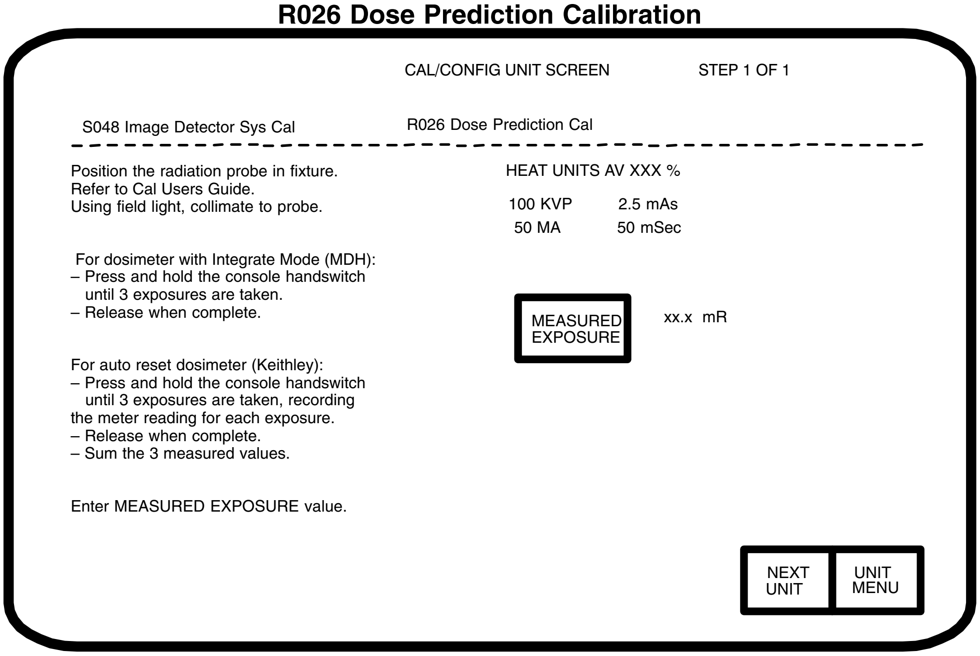
1. Follow the screen instructions.

2. Measured exposure value must be entered in units of “mR”. Use the following conversion formulas, if required:

   Dose value (mR) = Dose value (uGy) / 8.76

   Dose value (mR) = Dose value (mGy) x 1000 / 8.76

R026 Dose Prediction Calibration

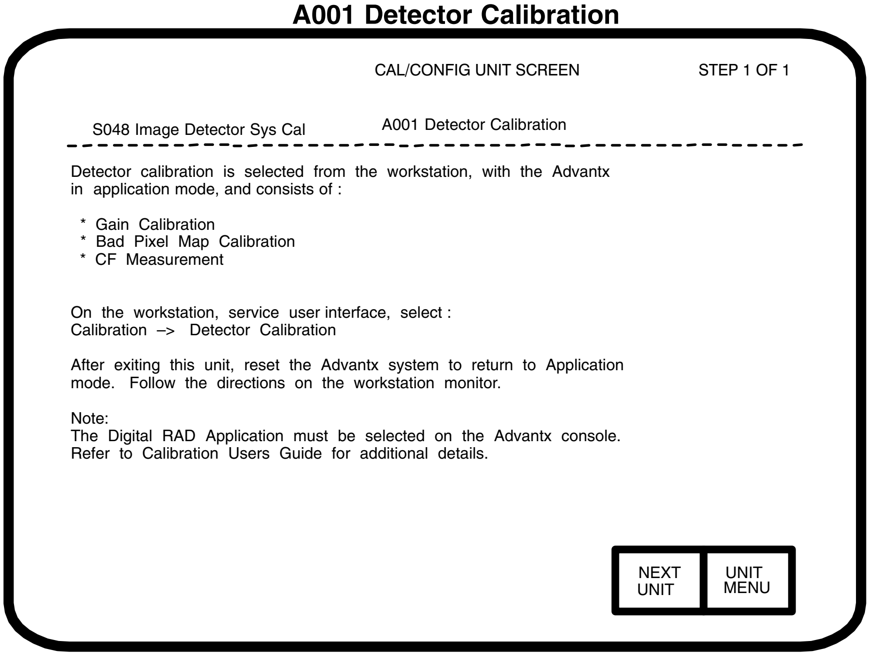


7-29 A001, Detector Calibration

7-29-1 Description

This calibration is not performed at the Advantx console but requires the system to be in Applications mode, follow screen instructions.

A001 Detector Calibration



7-29-2 Procedure

Refer to the Detector Calibration chapter.

CHAPTER 4 –DETECTOR CALIBRATION

SECTION 1
INTRODUCTION

NOTICE

Potential for Data Loss.
Perform a database backup, as described in the Utilities appendix, before starting this procedure.

1-1 Before You Begin

There are three procedures required to calibrate the Image Detector. All three procedures must be completed sequentially for accurate calibration.

– Bad Pixel Calibration – (Creates a map of defective pixels that are either isolated, in rows, in columns, or in clusters.)
– Pixel Gain Variation Calibration – (Creates Gain Maps used to compensate for gain nonconformities due to Detector Pixel variations, Electronic Gain variations, and range of kVp selections.)
– CF Measurement – (Measures the Conversion Factor of the Detector and update the Advantx database AEC Gain Value.)

If the flat field phantom has any scratches, dents, or other imperfections on the large surfaces, it must be replaced before doing detector calibration.

1-2 Prerequisites

Before starting Image Detector Calibration, verify the following:

– Advantx Console is in a **Digital RAD** application.
– AWS Workstation is not in an exam acquisition mode.

1-3 Supplied Tools

The following tools are provided with each Revolution XQ/i System to aid in calibrating the Image Detector:

– Flat Field Phantom	2222354
– X–ray Calibration Fixture	2222557

1-4 Equipment Required

The following tools are not provided with each Revolution XQ/i System but are required to aid in calibrating the Image Detector: Dosimeter (Keithley, MDH, or equivalent)

1-5 Calibration Unit Overview

1-5-1 Full Calibration

The procedures listed below are all the detector calibration units that must be performed for a complete detector calibration.

1-5-2 Bad Pixel Calibration

The Bad Pixel routine is used to detect all defective pixels. After initial installation or after a detector is replaced, the Bad Pixel routine may be run alone if:

- QAP fails isolated defect specification
- Pixel or line artifacts appear in images

The Bad Pixel routine is independent of the other calibration routines and therefore the others do not need to be re–run.

1-5-3 Gain Calibration

The Gain calibration routine is used to calibrate a gain coefficient for each pixel in order to achieve uniform gain across the detector. After initial installation or after a detector is replaced, the Gain calibration routine (all 4 kVp/Gain calibrations) may be run alone if:

- QAP fails any uniformity specification
- Contour artifacts appear in images

The Gain calibration routine is independent of the other calibration routines and therefore the others do not need to be re–run.

After initial installation or after a detector replacement, if any component in the X–ray path is replaced, such as:

- X–ray tube,
- Beam quality filtration,
- Collimator,
- Ion chamber.

Run the Gain calibration (all 4 kVp/Gain calibrations) and CF measurement routines.

1-5-4 CF Measurement

The CF Measurement routine is used to update the Titan AEC dose calibration parameters. After initial installation or after a detector is replaced, the CF Measurement routine may be run alone if:

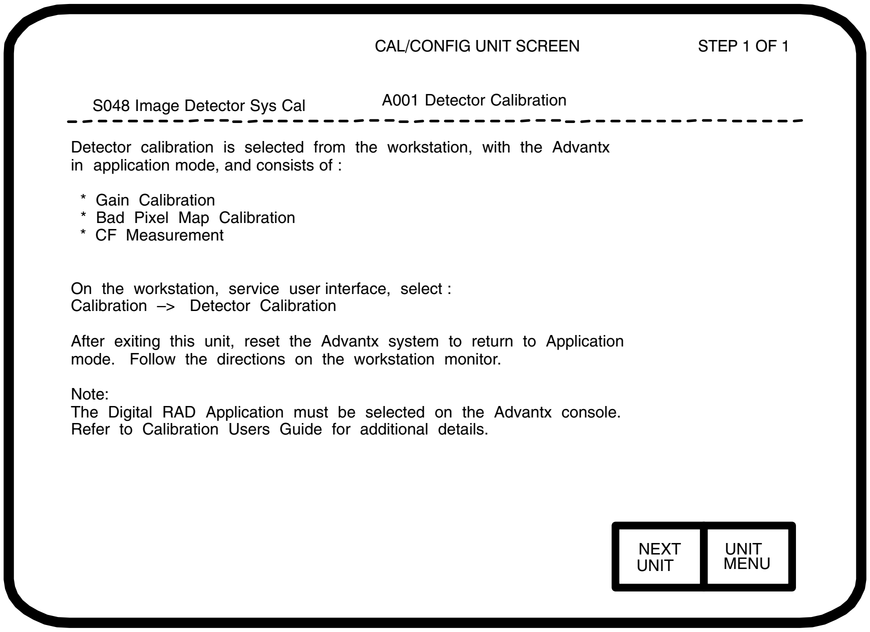
- Ion chamber is re–calibrated
- QAP results have changed by more than 10% during a two week interval.

The CF Measurement routine is independent of the other calibration routines and therefore the others do not need to be re–run.

1-6 Advantx Cal Unit A001: Detector Calibration Screen

This calibration is not performed at the Advantx console but requires the system to be in Applications mode, follow screen instructions.

A001 Detector Calibration



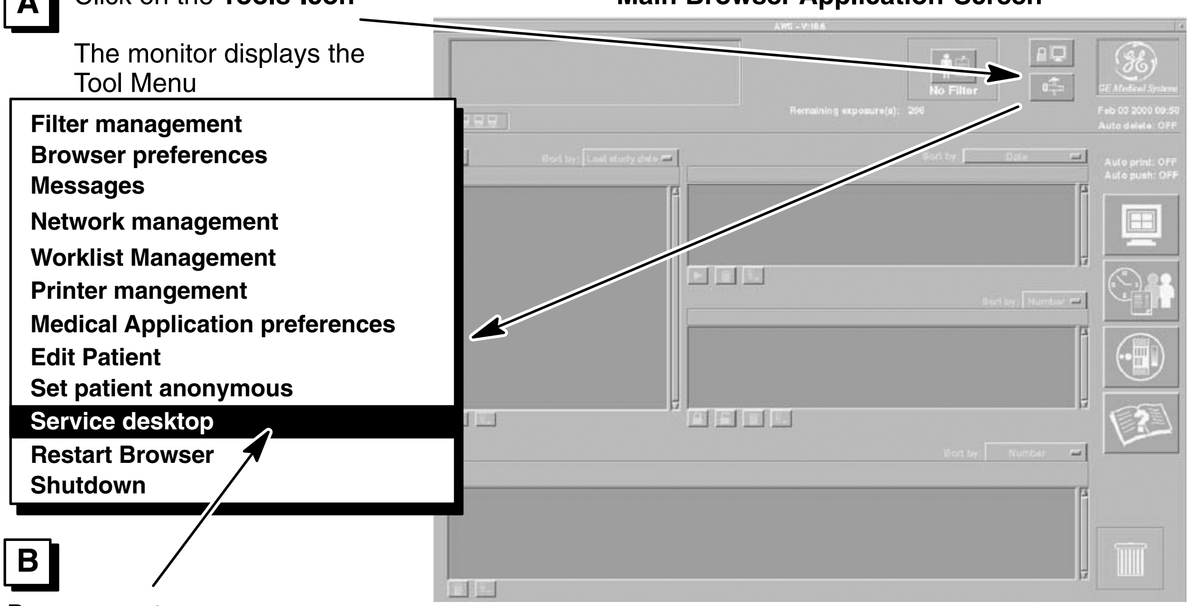
1-7 Entering AWS Service Desktop

1. Enter the **Calibration Home Page Screen** by selecting the **Service Desktop** selection from the Tools menu on the Main Browser Screen:

A Click on the **Tools Icon**

Main Browser Application Screen

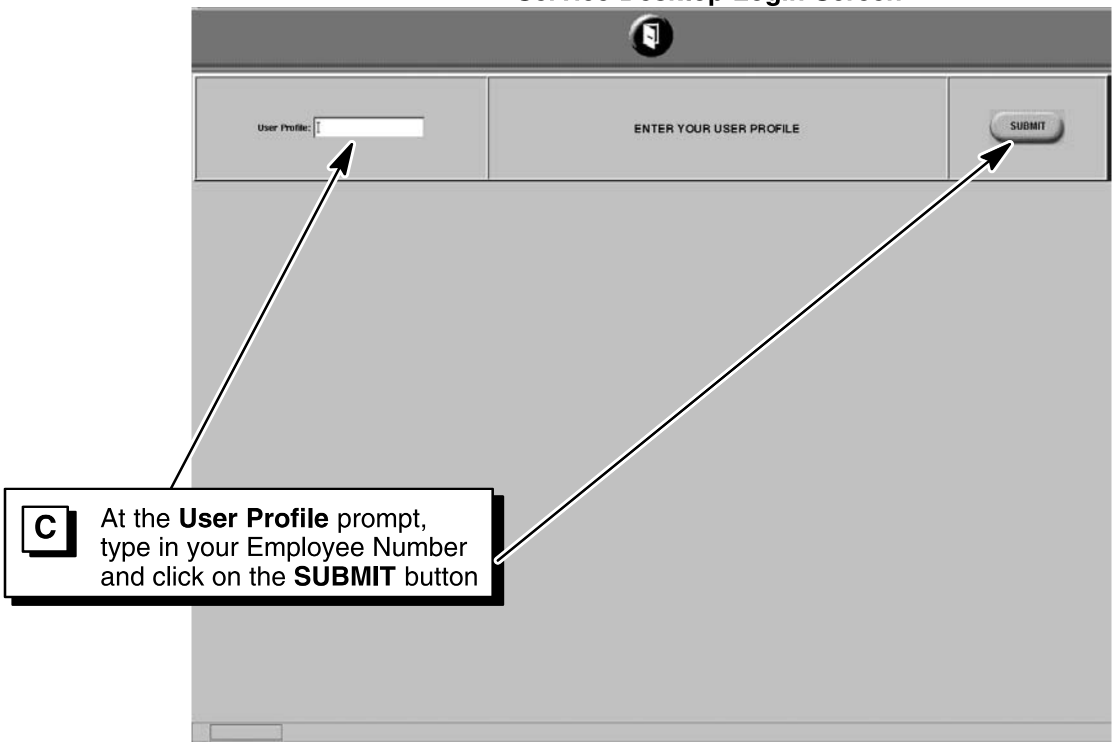
The monitor displays the Tool Menu



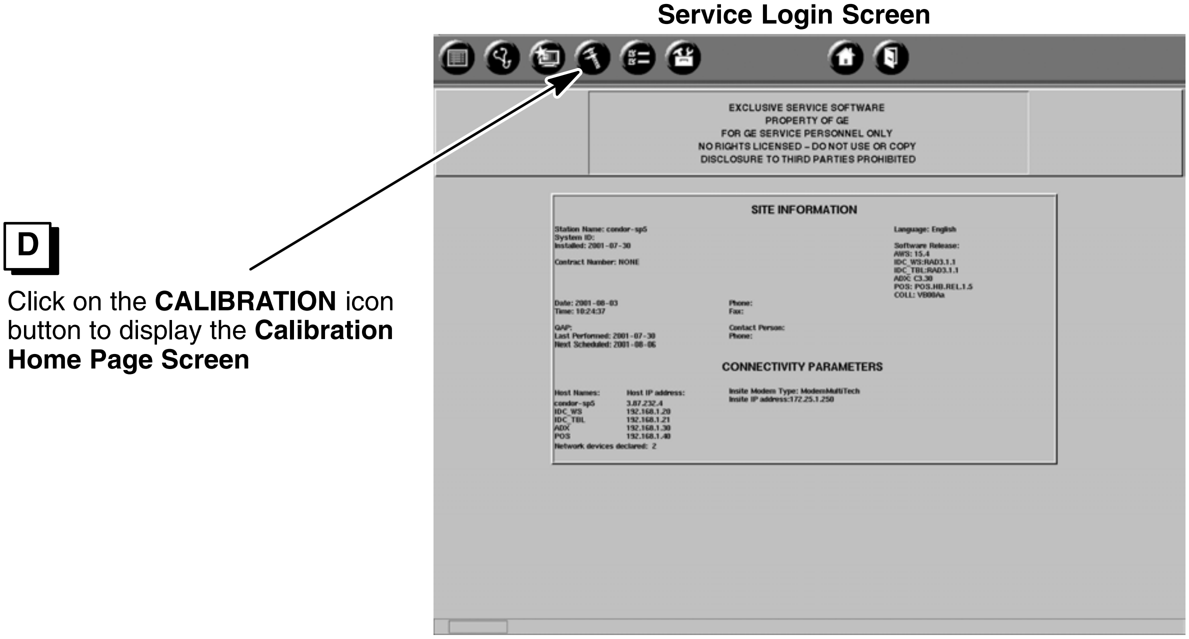
B Drag cursor to **Service desktop** selection and release mouse button

After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen



Service Login Screen



1-8 Bad Pixel Map Calibration

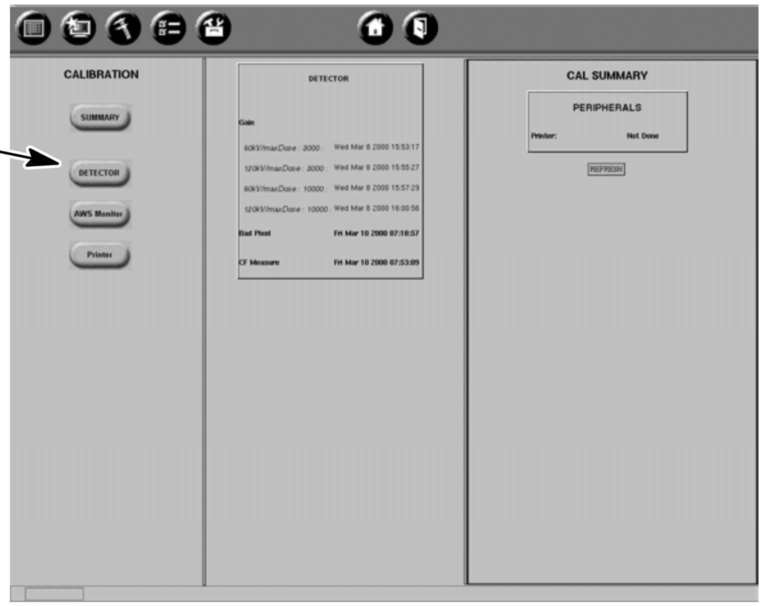
Note: After the Image Detector calibration has begun, the cursor will change into a stop watch shape for the rest of the procedure. THIS DOES NOT ALWAYS INDICATE THAT THE WORKSTATION IS PROCESSING. Pay attention to the updated instructions and ignore the shape of the cursor throughout Image Detector calibration.

1-8-1 Bad Pixel Map Calibration Procedure

1. Enter the **Bad Pixel** calibration routine from the **Initial Detector Calibration** Screen:

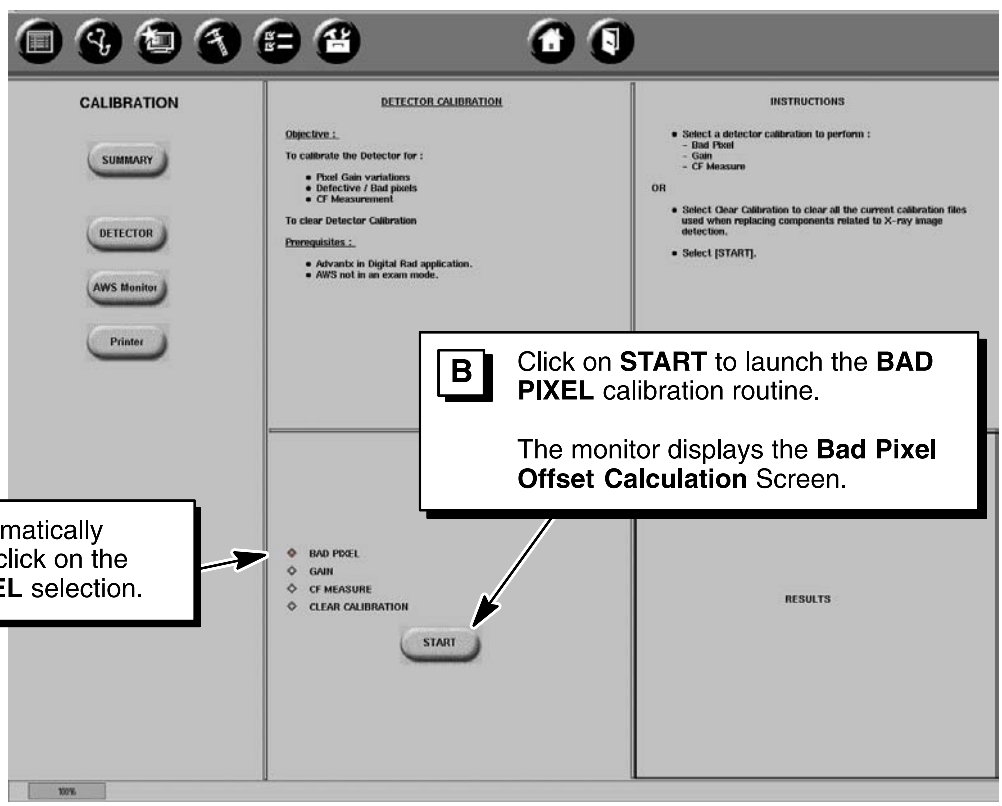
Calibration Home Page Screen

Click on the **Detector** button



The monitor displays the **Detector Calibration Home Page Screen**

Detector Calibration Home Page Screen



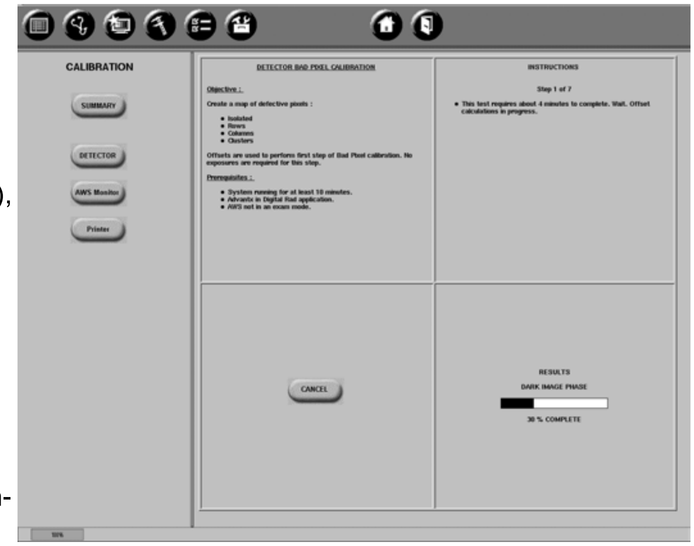
A If not automatically selected, click on the **BAD PIXEL** selection.

B Click on **START** to launch the **BAD PIXEL** calibration routine.

The monitor displays the **Bad Pixel Offset Calculation** Screen.

2. Initialize Advantx Console RAD techniques:

Bad Pixel Offset Calculation Screen



The **BAD PIXEL** calibration routine:

- Automatically selects and locks default techniques on the Advantx console (the console will beep & briefly display, then clear a message),
- Automatically sets the collimator blades to 45 cm x 45 cm size (slightly larger than the detector), and
- Displays the Initial **Bad Pixel Calibration Screen** (Dark Image processing).

For the first few minutes, images without X–rays are being acquired. After the processing is completed, the **Bad Pixel Initial Status Screen** is displayed.

3. Bad Pixel Gain Calibration collimator set–up:

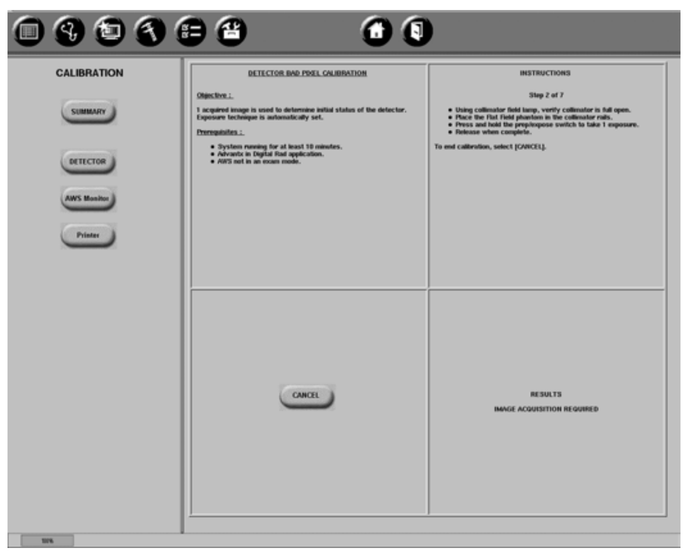
A Using the Collimator Field Lamp, verify collimator blades are fully opened.

B Insert Flat Field Phantom. See below.

C Take **ONE** X–ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

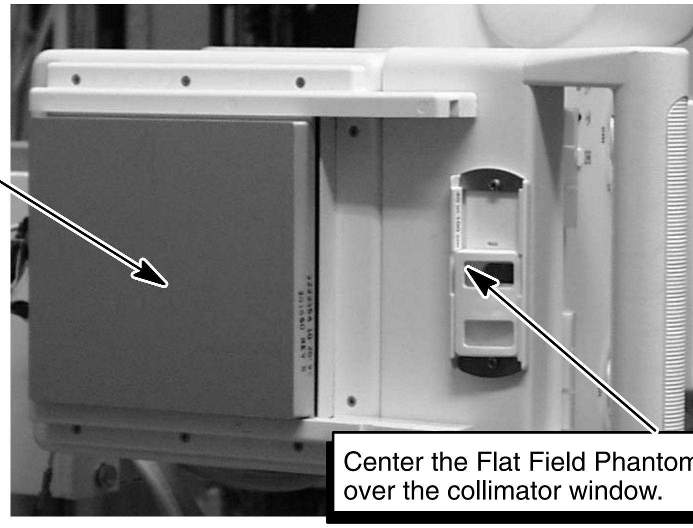
D After acquiring one exposure, release Advantx Console Prep/Expose Switch.

Bad Pixel Initial Status Screen



4. Bad Pixel Gain Calibration Flat Field Phantom set–up:

Installing Flat Field Phantom in Collimator Rails

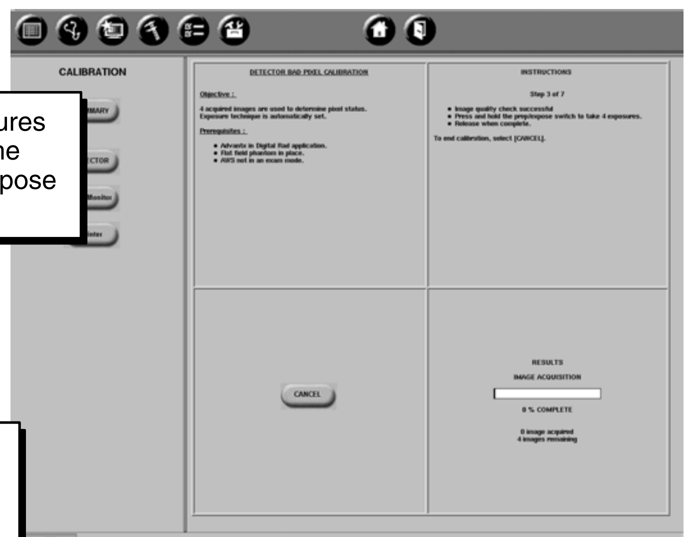


Insert Flat Field phantom into the collimator slide rails.

Center the Flat Field Phantom over the collimator window.

5. Acquire **FOUR** Bad Pixel Gain Calibration exposures:

Bad Pixel Calibration Status Screen



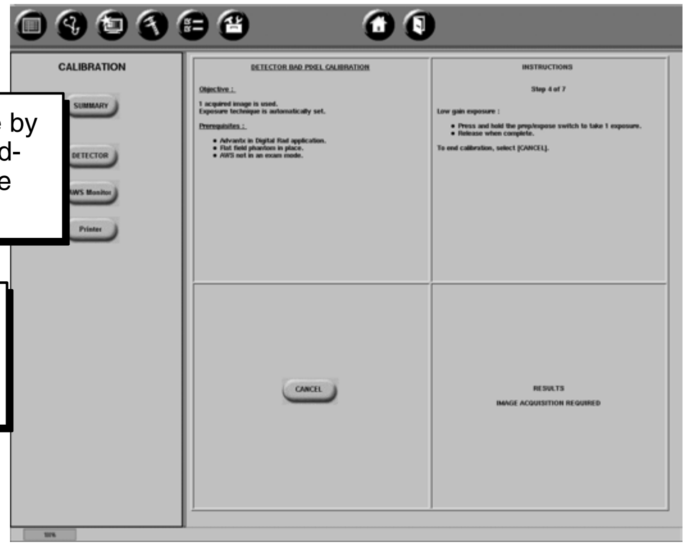
A Take **FOUR** X–ray Exposures by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **FOUR Gain** exposures, release Advantx Console Prep/ Expose Switch.

After a few moments, the AWS monitor displays the **Bad Pixel Low Gain Calibration Screen**.

6. Acquire **ONE** Bad Pixel Low Gain Calibration exposure:

Bad Pixel Low Gain Calibration Screen



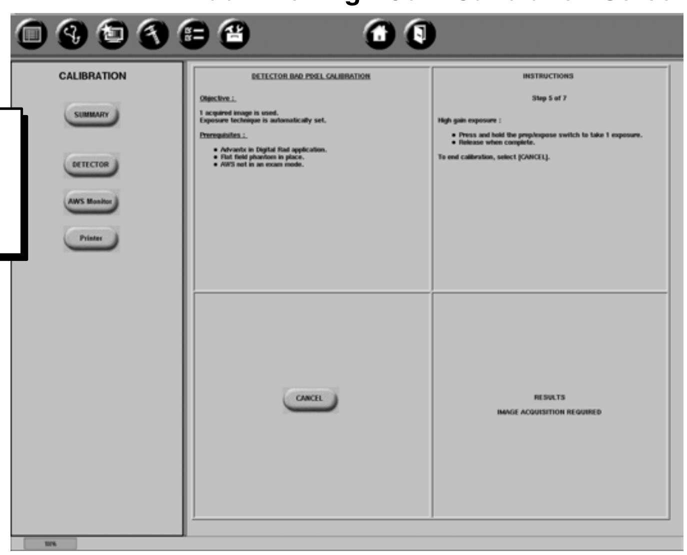
A Take **ONE** X–ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **ONE Low Gain** exposure, release Advantx Console Prep/ Expose Switch.

After a few moments, the AWS monitor displays the **Bad Pixel High Gain Calibration Screen**.

7. Acquire **ONE** Bad Pixel High Gain Calibration exposure:

Bad Pixel High Gain Calibration Screen



A Take **ONE** X–ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

NOTE: This is a long exposure.
Be sure to keep the prep/expose
held for entire duration.

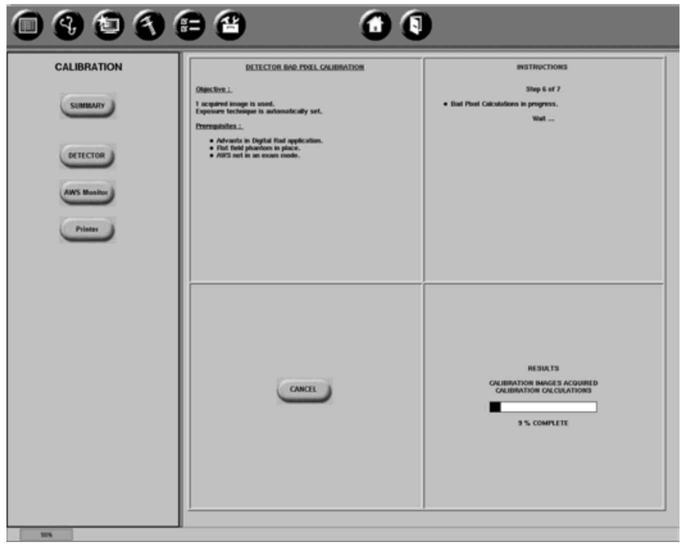
B After acquiring **ONE High Gain** exposure, release Advantx Console Prep/ Expose Switch.

After a few moments, the AWS monitor displays the **Bad Pixel Calibration In Progress Screen**.

8. Wait for processing to be completed.

When the **Bad Pixel Calculations** are complete the monitor displays the **Bad Pixel Complete** screen.

Bad Pixel Calibration In Progress Screen

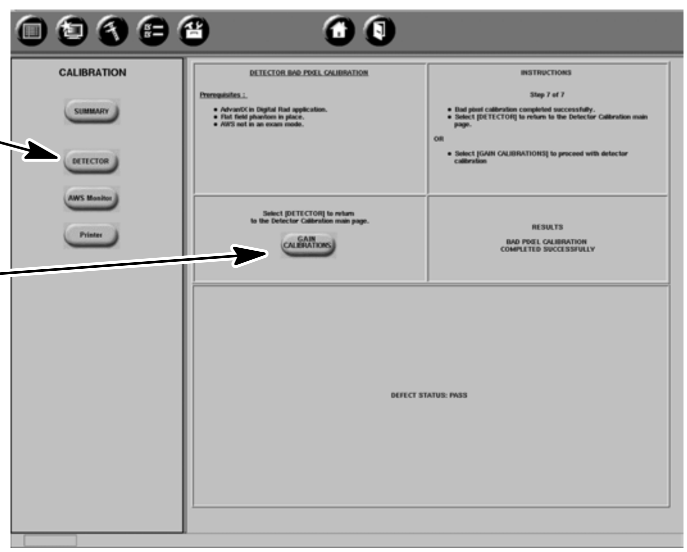


9. Exit the Bad Pixel Calibration Routine:

Bad Pixel Complete Screen

When the **BAD PIXEL Calibration routine** indicates completion, exit the routine:

- Click on **DETECTOR** to return to the Initial Detector Calibration Screen, or
- Click on **GAIN CALIBRATIONS** to display the Detector Gain Technique Initialization Screen.



1-8-2 Status Report

A DEFECT STATUS: FAIL message means the number of bad pixels detected is greater than the specified limit, either in cluster grouping sizes or individually.

Perform the following steps to determine what action must be taken:

– Verify that no foreign objects appear in the path of the X–rays. i.e., lead dust, screws, etc.
– Rerun Bad Pixel calibration, if PASS continue
– If FAIL again, replace detector

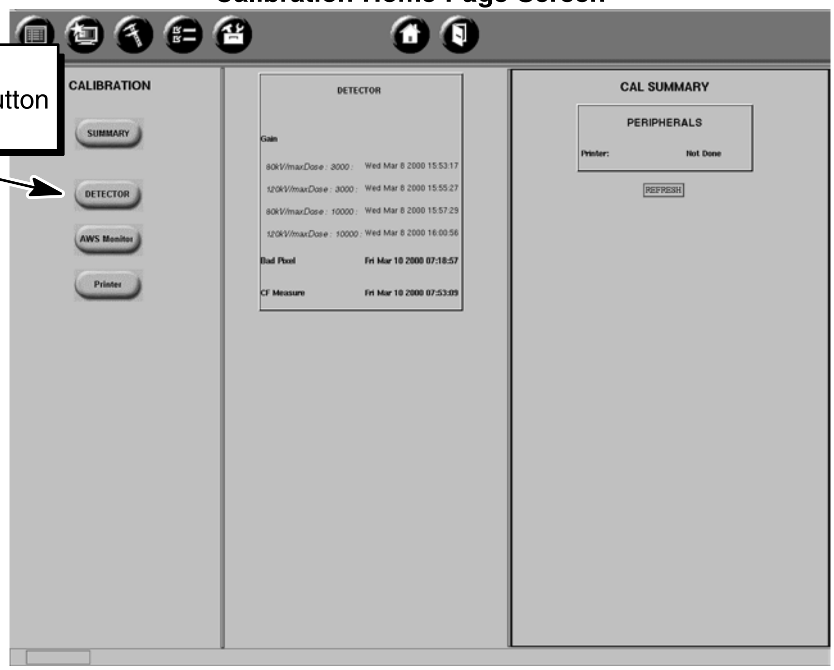
1-9 kVp Gain Calibration

Bad Pixel calibration must be run just prior to performing this procedure.

1-9-1 Gain Calibration Procedure

Enter the **kVp Gain** calibration routine from the **Detector Calibration Home Page**:

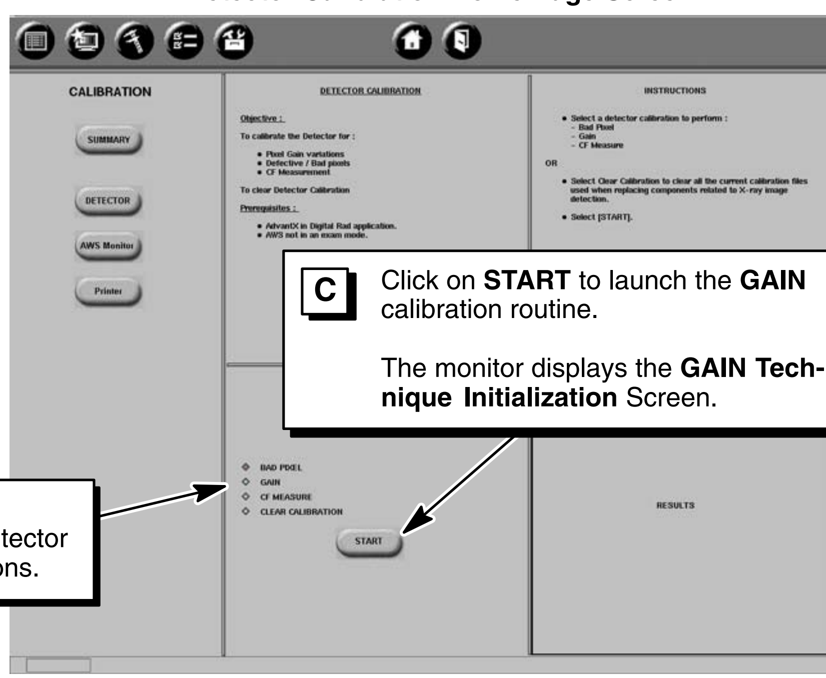
Calibration Home Page Screen



A Click on the **Detector** button

The monitor displays the **Detector Calibration Home Page Screen**

Detector Calibration Home Page Screen



B Click on the **GAIN** selection of the Detector Calibration selections.

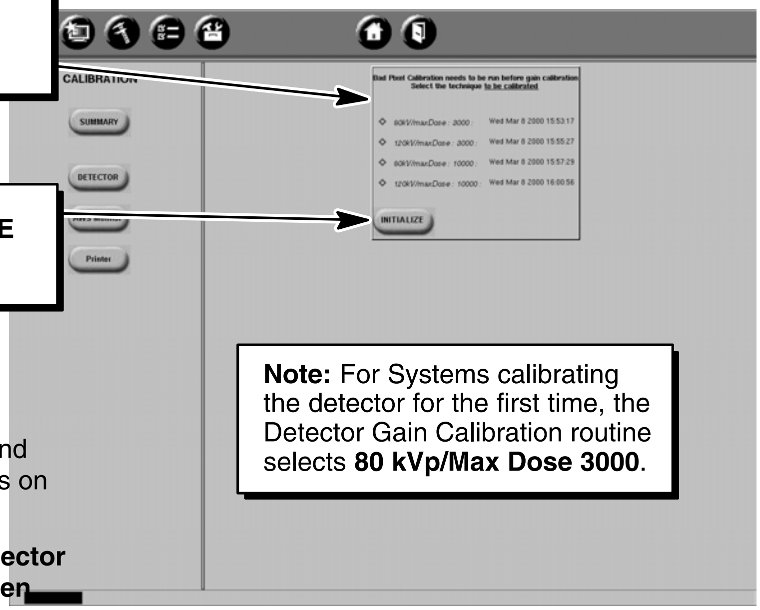
C Click on **START** to launch the **GAIN** calibration routine.

The monitor displays the **GAIN Technique Initialization** Screen.

1-9-2 80 kVp/Max Dose 3000 Gain Calibration

1. Initialize Advantx Console RAD techniques for 80 kVp/Max Dose 3000:

Gain Technique Initialization Screen



A Click on the **kV: 80, max Dose: 3000** button

B Click on the **INITIALIZE** button

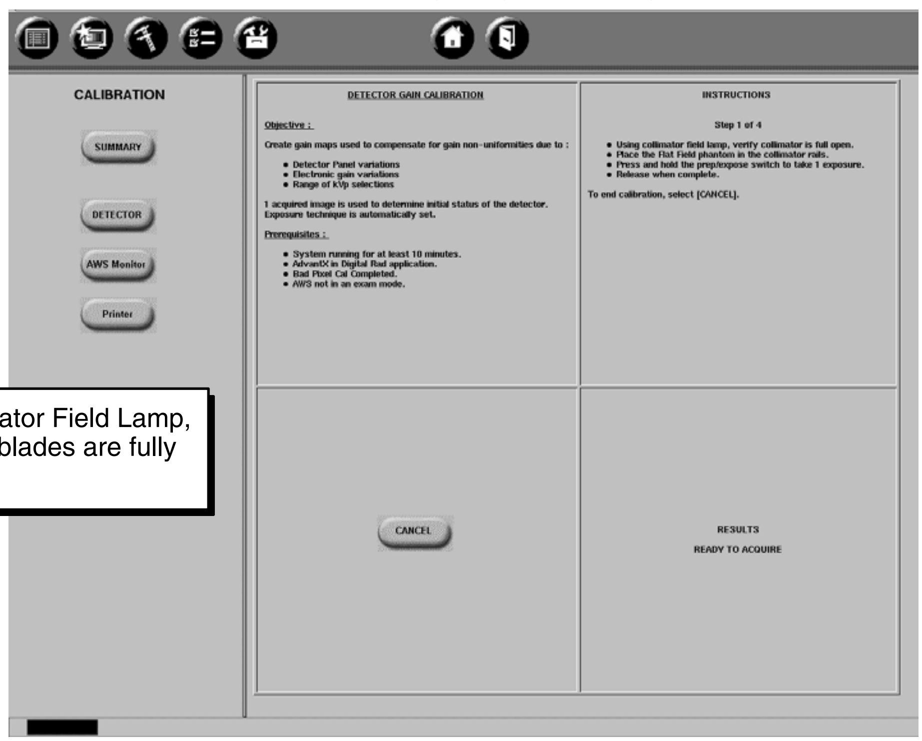
The **DETECTOR GAIN** calibration routine:

- Automatically selects and locks default techniques on the Advantx Console,
- Displays the **Initial Detector Gain Calibration Screen**

Note: For Systems calibrating the detector for the first time, the Detector Gain Calibration routine selects **80 kVp/Max Dose 3000**.

2. kVp Gain Calibration collimator set–up

Initial Detector Gain Calibration Screen



Using the Collimator Field Lamp, verify collimator blades are fully opened.

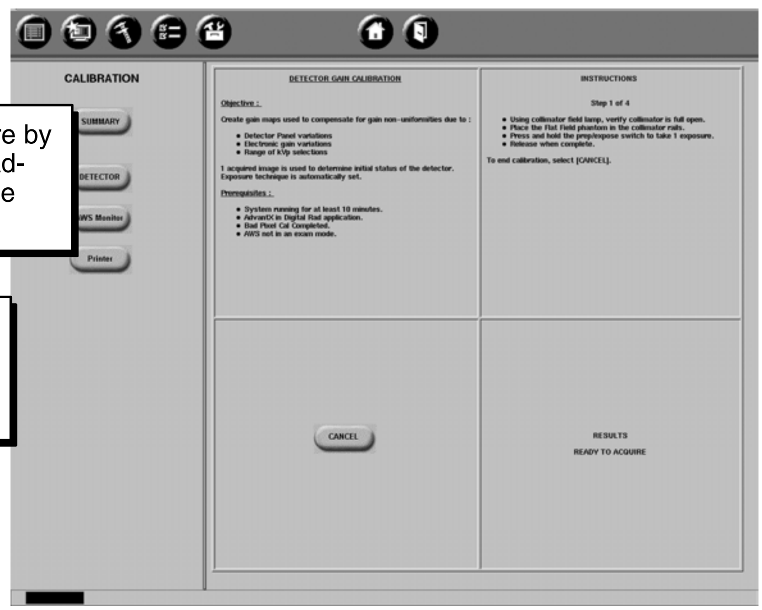
3. kVp Gain Calibration Flat Field phantom set–up:

Insert Flat Field phantom into the collimator slide rails.

Installing Flat Field Phantom in Collimator Rails

4. 80 kvp/Max Dose 3000 ***Initial*** Gain Calibration exposure

Initial Detector Gain Calibration Screen



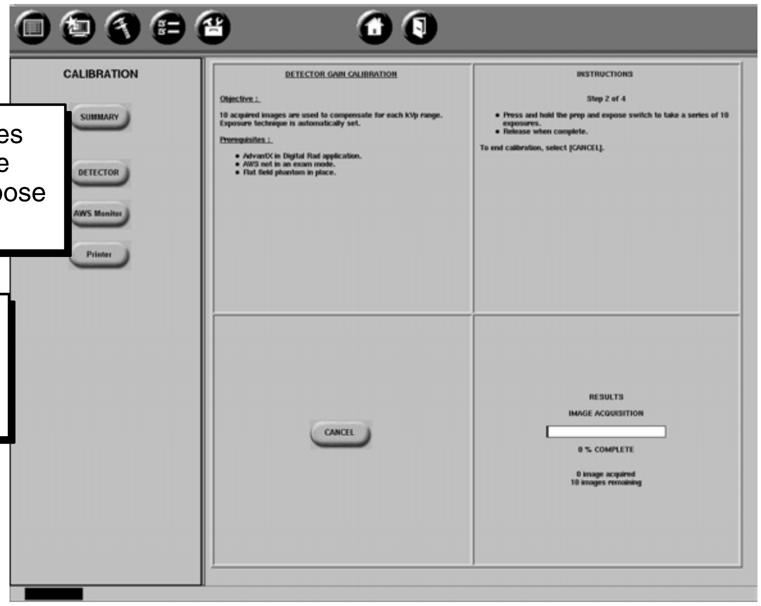
A Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **ONE Initial** exposure, release Advantx Console Prep/Expose Switch.

After a few moments, the AWS monitor displays the **kVp Compensation Gain Calibration Screen**.

5. 80 kvp/Max Dose 3000 ***kVp Comp*** Gain Calibration (10) exposures

kVp Compensation Gain Calibration Screen



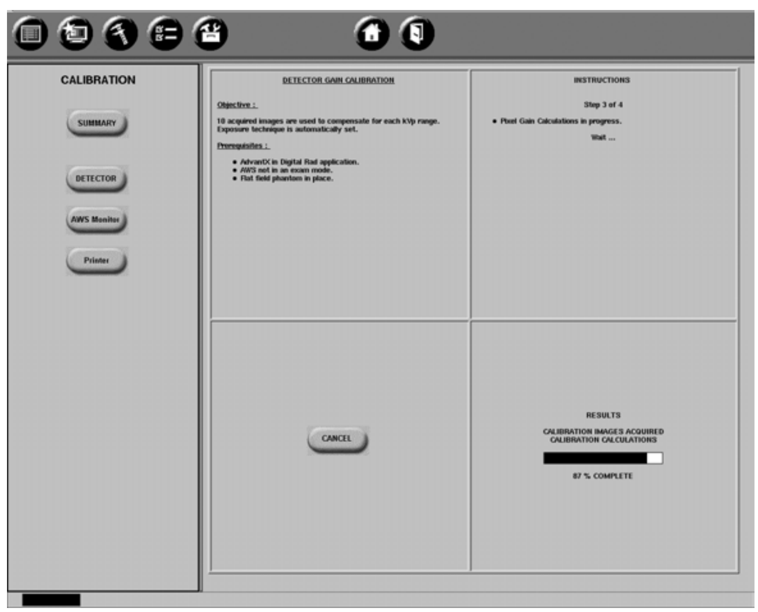
A Take **TEN** X–Ray Exposures by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **TEN kVp Comp** exposures, release Advantx Console Prep/ Expose Switch.

After a few moments, the AWS monitor displays the **Gain Calculation Screen**.

6. Wait for processing to be completed

Gain Calculation Screen



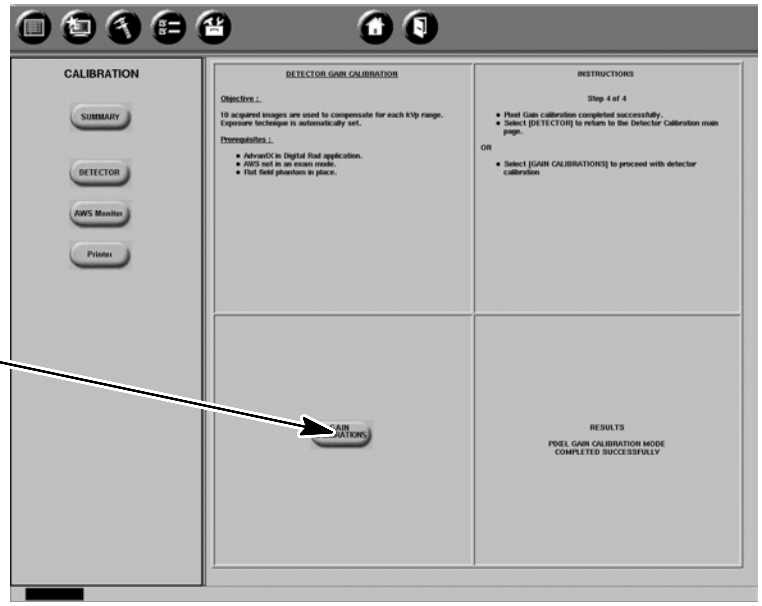
When the **Gain Calculations** are complete the monitor displays the **Gain Calculations Complete** screen.

7. Exit the 80 kVp/Max Dose 3000 Gain Calibration Routine

Gain Calibration Complete Screen

When the **GAIN Calibration routine** indicates completion, exit the routine:

- Click on **GAIN CALIBRATIONS** to display the Detector Gain Technique Initialization Screen.



1-9-3 120 kVp/Max Dose 3000 Gain Calibration

1. Initialize Advantx Console RAD techniques for 120 kVp/Max Dose 3000

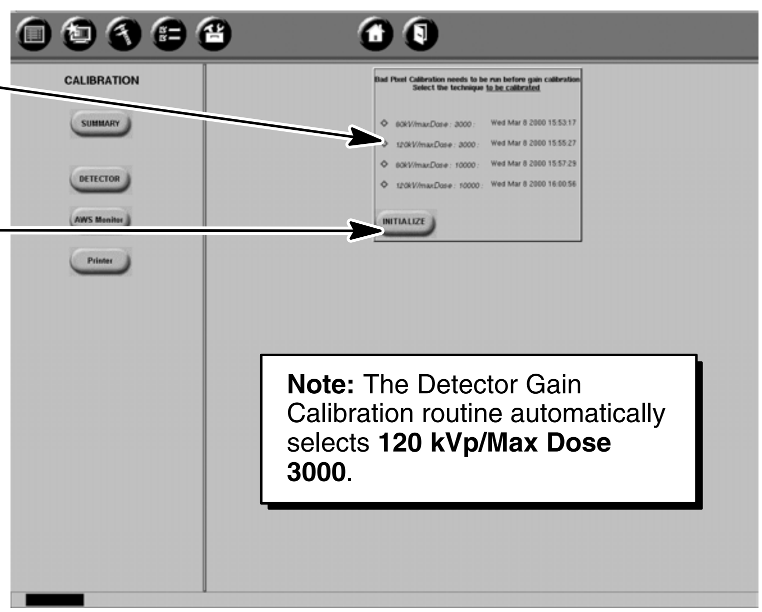
Gain Technique Initialization Screen

A Click on the **kV: 120, max Dose: 3000** button

B Click on the **INITIALIZE** button

The **DETECTOR GAIN** calibration routine:

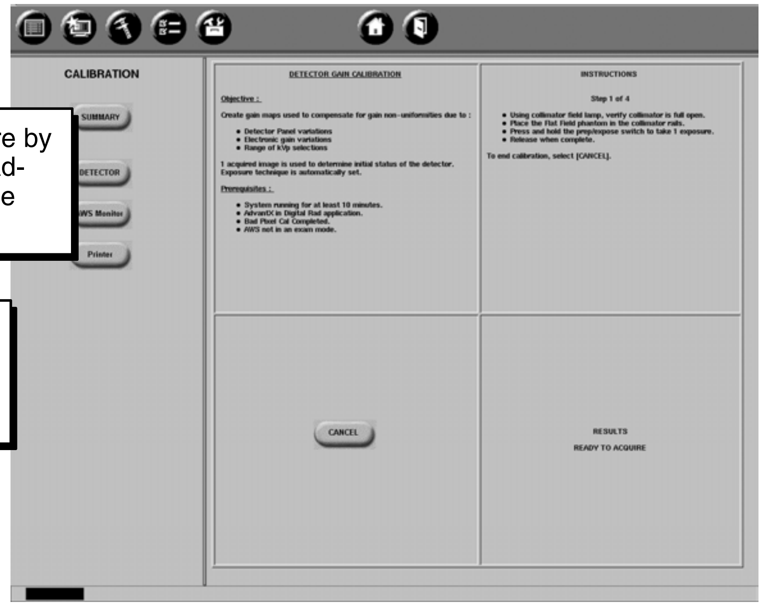
- Automatically selects and locks default techniques on the Advantx Console,
- Displays the **Initial Detector Gain Calibration Screen**.



Note: The Detector Gain Calibration routine automatically selects **120 kVp/Max Dose 3000**.

2. 120 kvp/Max Dose 3000 ***Initial*** Gain Calibration exposure

Initial Detector Gain Calibration Screen



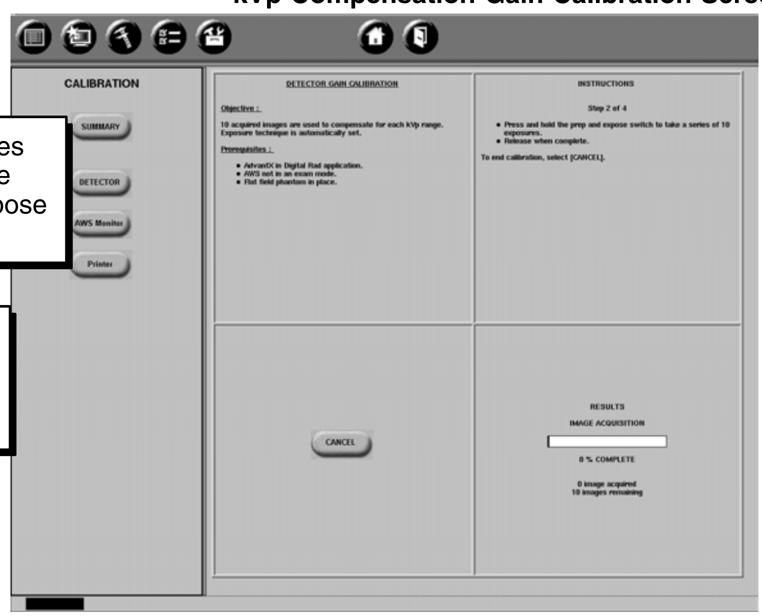
C Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

D After acquiring **ONE Initial** exposure, release Advantx Console Prep/Expose Switch.

After a few moments, the AWS monitor displays the **kVp Compensation Gain Calibration Screen**.

3. 120 kvp/Max Dose 3000 ***kVp Comp*** Gain Calibration (10) exposures

kVp Compensation Gain Calibration Screen



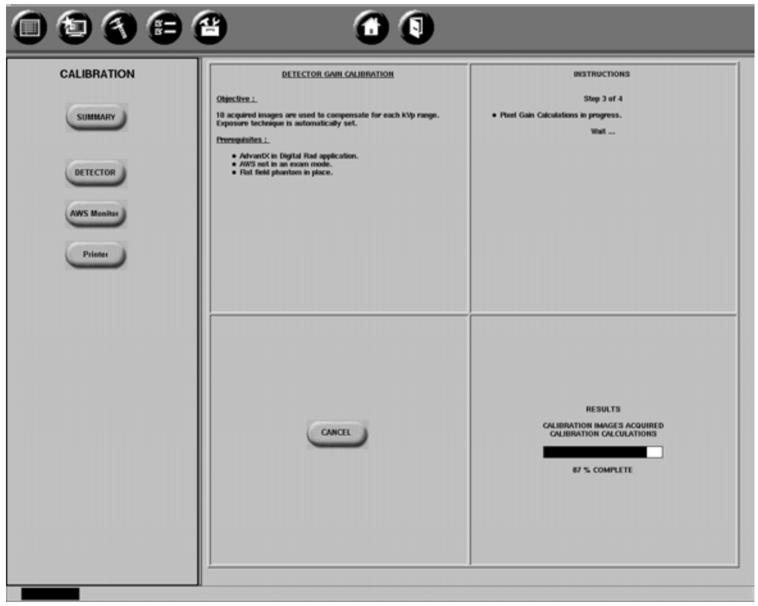
A Take **TEN** X–Ray Exposures by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **TEN kVp Comp** exposures, release Advantx Console Prep/Expose Switch.

4. Wait for processing to be completed

Gain Calculation Screen

When the **Gain Calculations** are complete the monitor displays the **Gain Calculations Complete** screen.

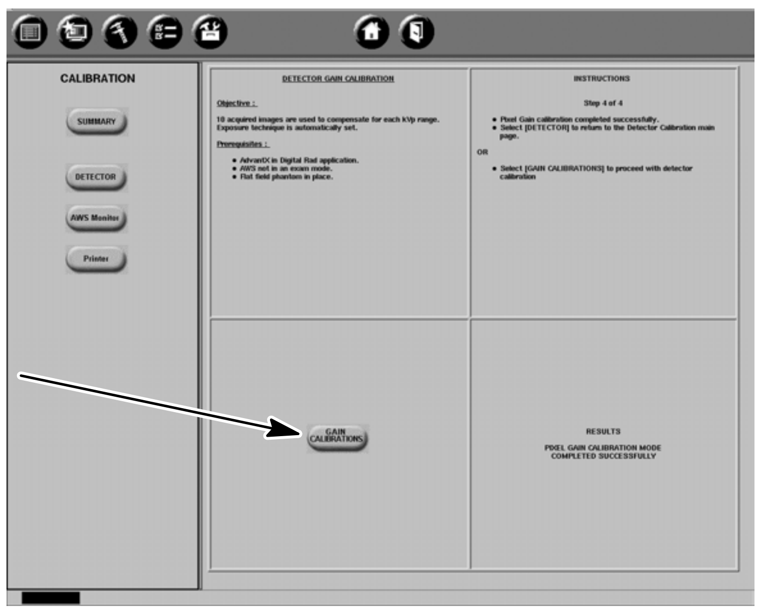


5. Exit the 120 kVp/Max Dose 3000 Gain Calibration Routine

When the **GAIN Calibration routine** indicates completion, exit the routine:

Gain Calibration Complete Screen

Click on **GAIN CALIBRATIONS** to display the Detector Gain Technique Initialization Screen.



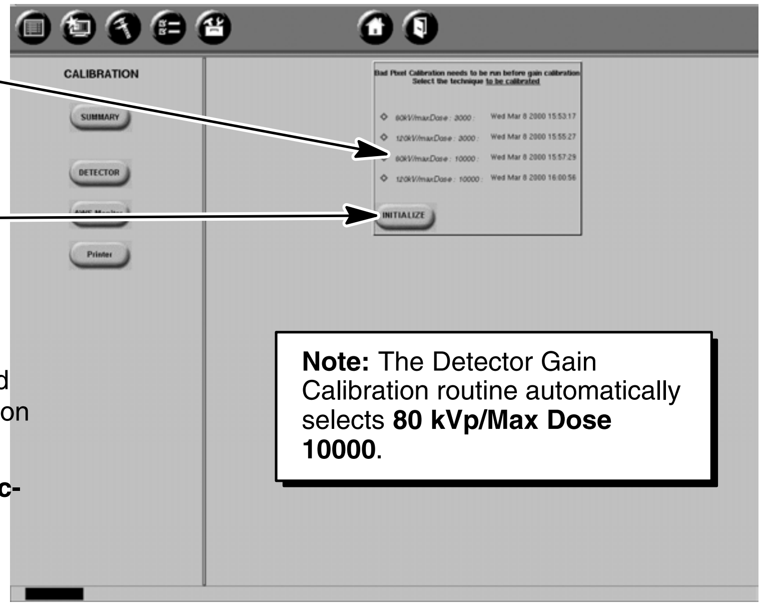
1-9-4 80 kVp/Max Dose 10000 Gain Calibration

1. Initialize Advantx Console RAD techniques for 80 kVp/Max Dose 10000

Gain Technique Initialization Screen

A Click on the **kV: 80, max Dose: 10000** button

B Click on the **INITIALIZE** button



The **DETECTOR GAIN** calibration routine:

- Automatically selects and locks default techniques on the Advantx Console,
- Displays the **Initial Detector Gain Calibration Screen**.

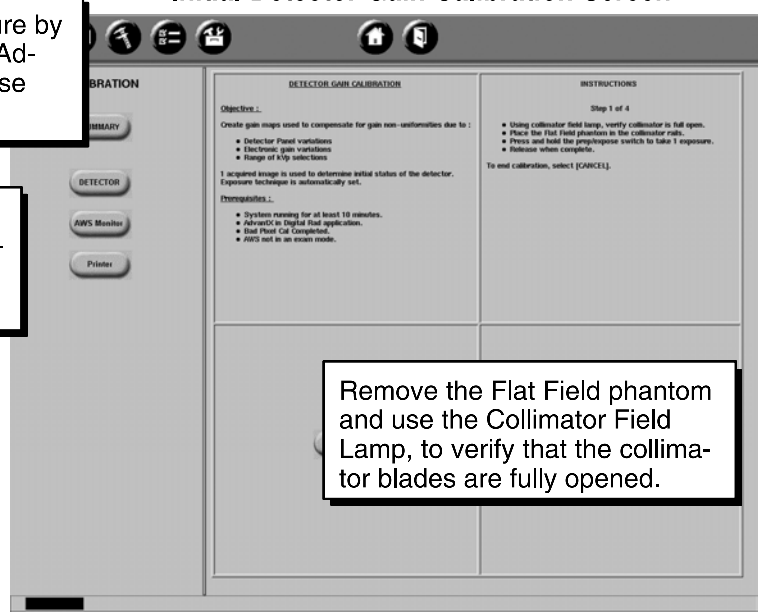
Note: The Detector Gain Calibration routine automatically selects **80 kVp/Max Dose 10000**.

2. 80 kvp/Max Dose 10000 ***Initial*** Gain Calibration exposure

Initial Detector Gain Calibration Screen

C Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

D After acquiring **ONE Initial** exposure, release Advantx Console Prep/Expose Switch.

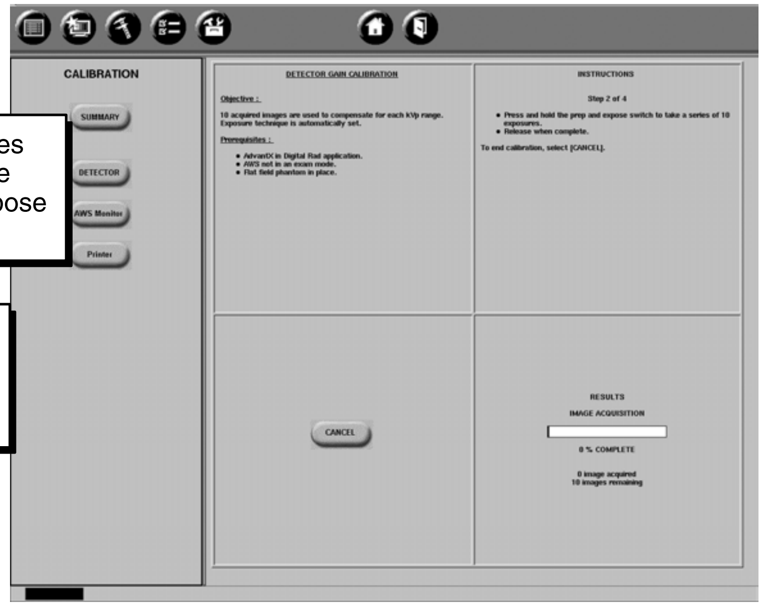


Remove the Flat Field phantom and use the Collimator Field Lamp, to verify that the collimator blades are fully opened.

After a few moments, the AWS monitor displays the **kVp Compensation Gain Calibration Screen**.

3. 80 kvp/Max Dose 10000 ***kVp Comp*** Gain Calibration (10) exposures

kVp Compensation Gain Calibration Screen



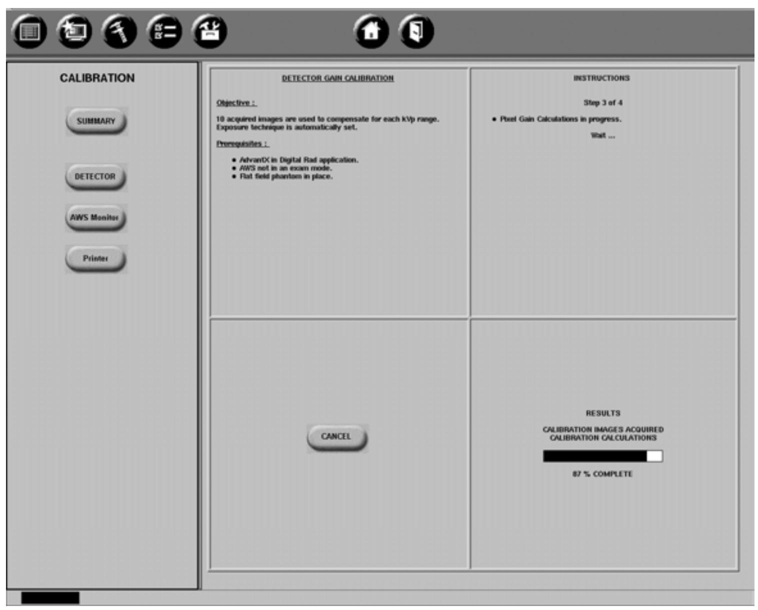
A Take **TEN** X–Ray Exposures by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **TEN kVp Comp** exposures, release Advantx Console Prep/ Expose Switch.

4. Wait for processing to be completed

Gain Calculation Screen

When the **Gain Calculations** are complete the monitor displays the **Gain Calculations Complete** screen.

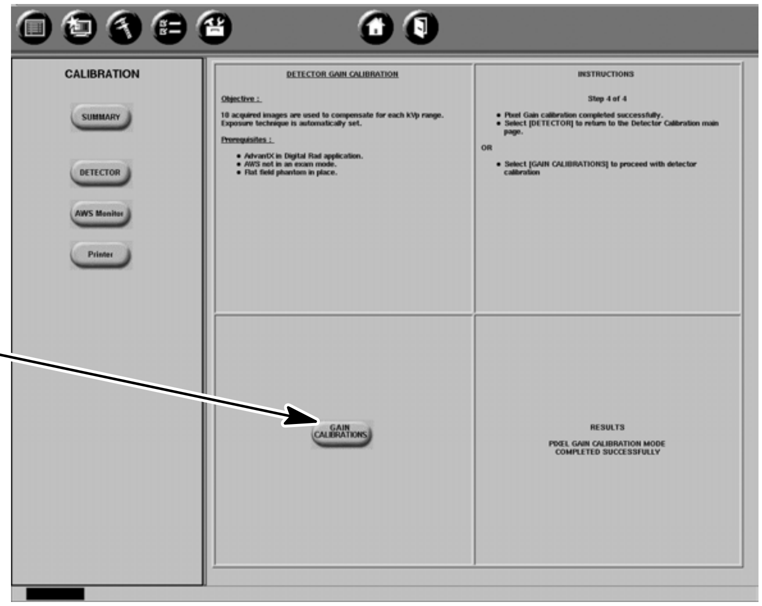


5. Exit the 80 kVp/Max Dose 10000 Gain Calibration Routine:

Gain Calibration Complete Screen

When the **GAIN Calibration routine** indicates completion, exit the routine:

- Click on **GAIN CALIBRATIONS** to display the Detector Gain Technique Initialization Screen.



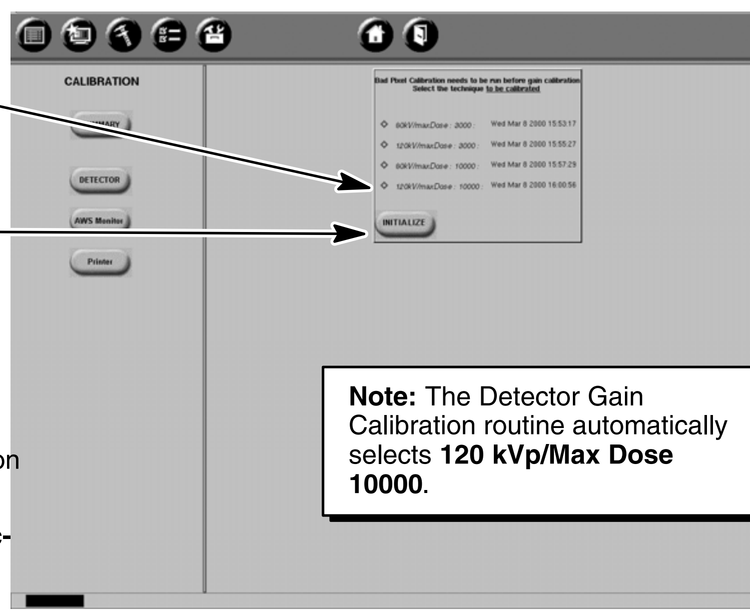
1-9-5 120 kVp/Max Dose 10000 Gain Calibration

1. Initialize Advantx Console RAD techniques for 120 kVp/Max Dose 10000:

Gain Technique Initialization Screen

A Click on the **kV: 120, max Dose: 10000** button

B Click on the **INITIALIZE** button



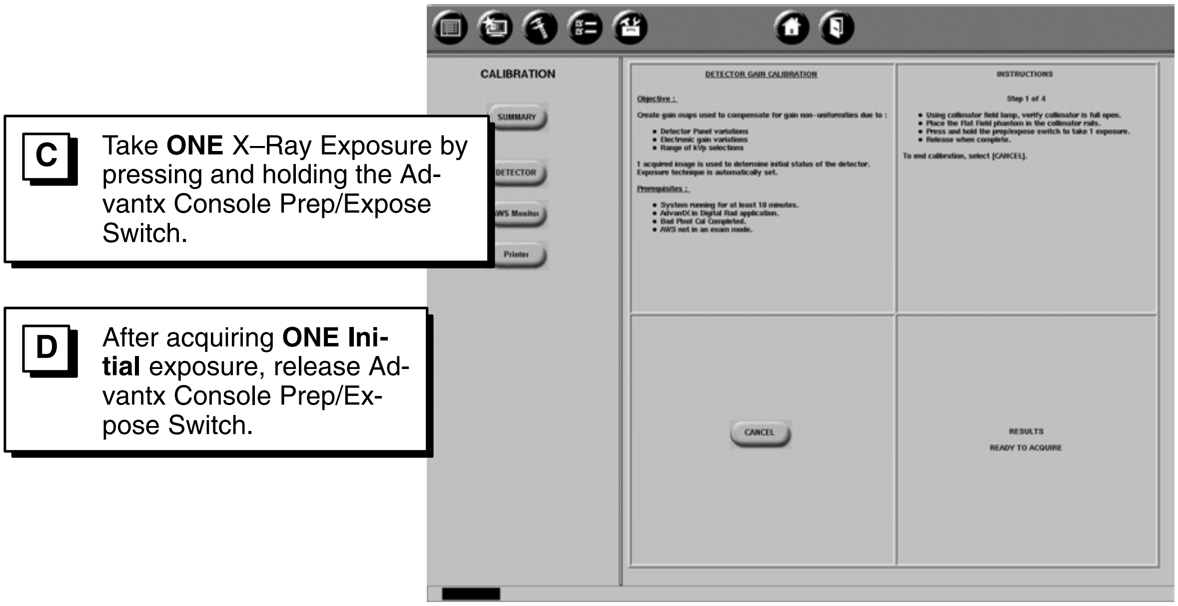
The **DETECTOR GAIN** calibration routine:

- Automatically selects and locks default techniques on the Advantx Console,
- Displays the **Initial Detector Gain Calibration Screen**.

Note: The Detector Gain Calibration routine automatically selects **120 kVp/Max Dose 10000**.

2. 120 kvp/Max Dose 10000 ***Initial*** Gain Calibration exposure

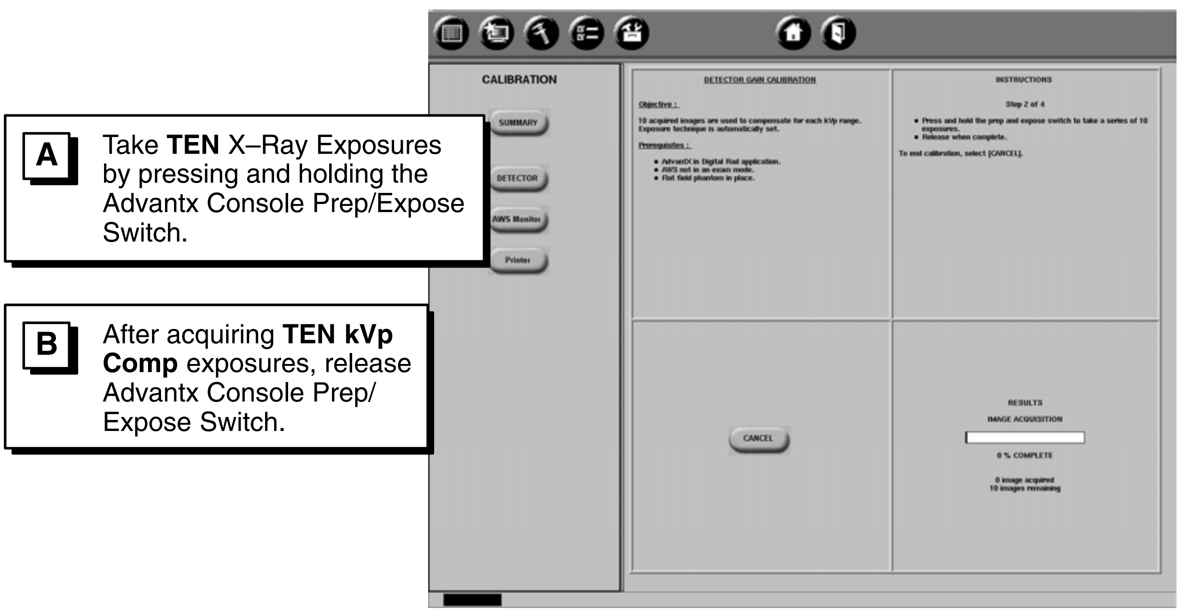
Initial Detector Gain Calibration Screen



After a few moments, the AWS monitor displays the **kVp Compensation Gain Calibration Screen**.

3. 120 kvp/Max Dose 10000 ***kVp Comp*** Gain Calibration (10) exposures

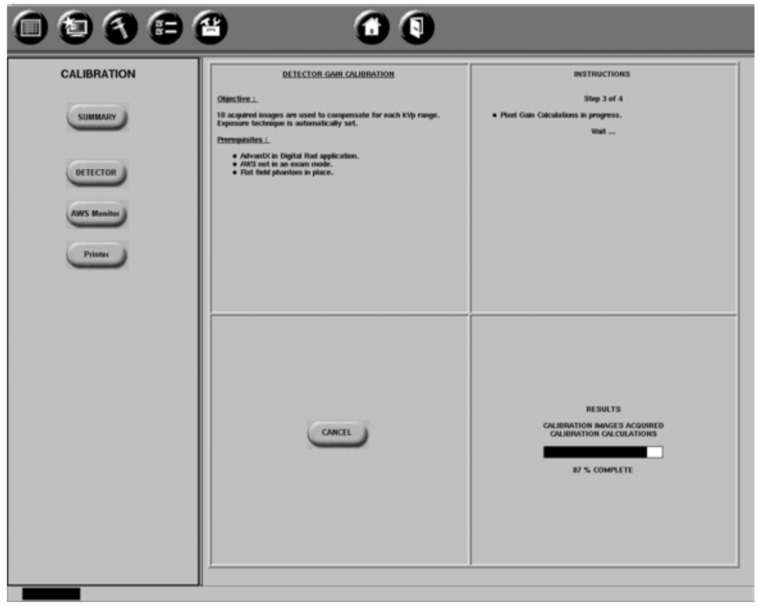
kVp Compensation Gain Clibration Screen



4. Wait for processing to be completed:

Gain Calculation Screen

When the **Gain Calculations** are complete the monitor displays the **Gain Calculations Complete** screen.

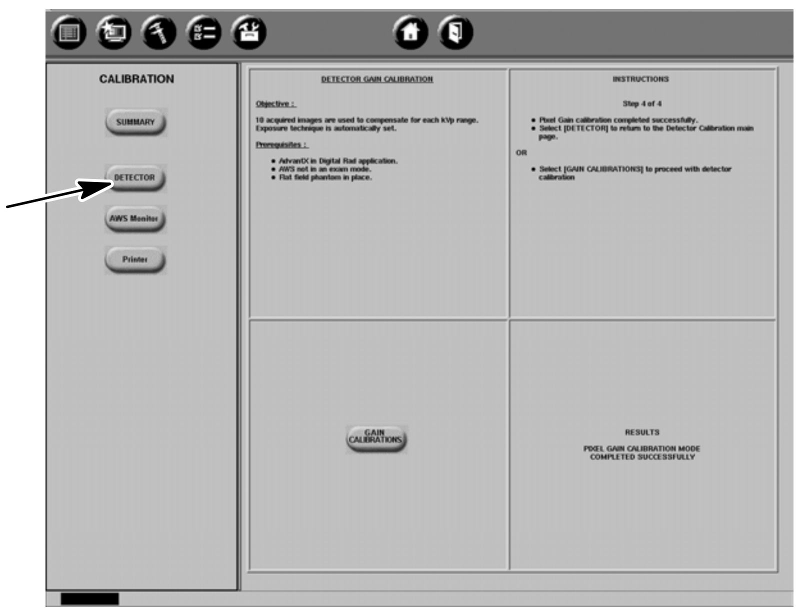


5. Exit the 120 kVp/Max Dose 10000 Gain Calibration Routine:

Gain Calibration Complete Screen

When the **GAIN Calibration routine** indicates completion, exit the routine:

- Click on **DETECTOR** to return to the Initial Detector Calibration Screen.

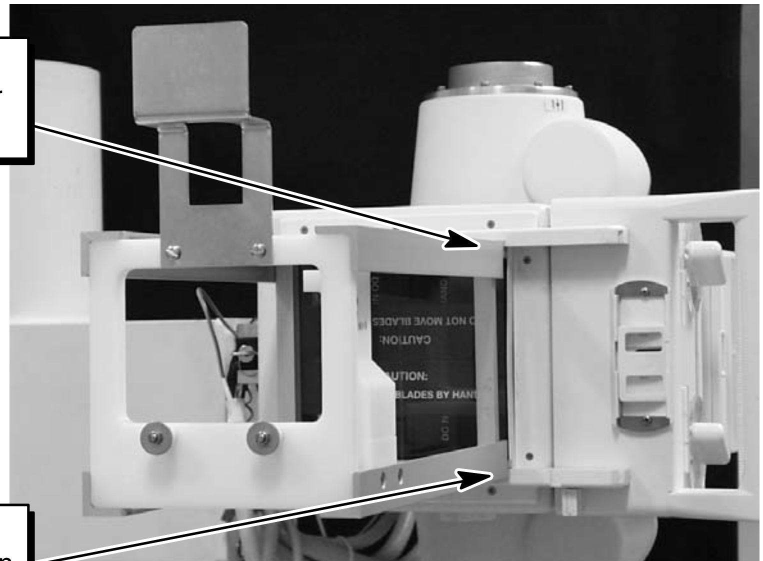


1-10 CF Measurement

1-10-1 System Set–Up

Setup the System for Detector CF Measurement Calibration:

A Insert X–Ray Calibration Fixture into the collimator slide rails.

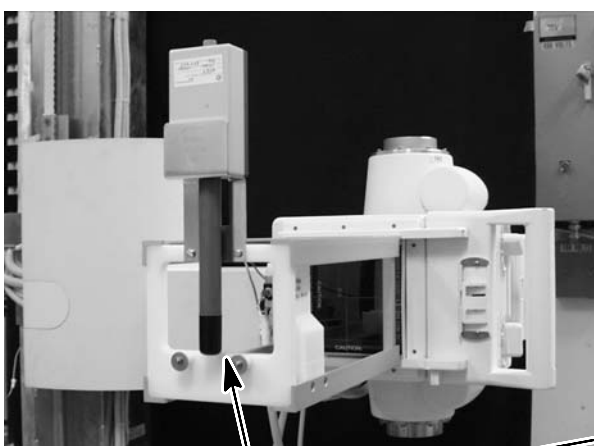


B Insert Flat Field phantom into the X–Ray Calibration Fixture.

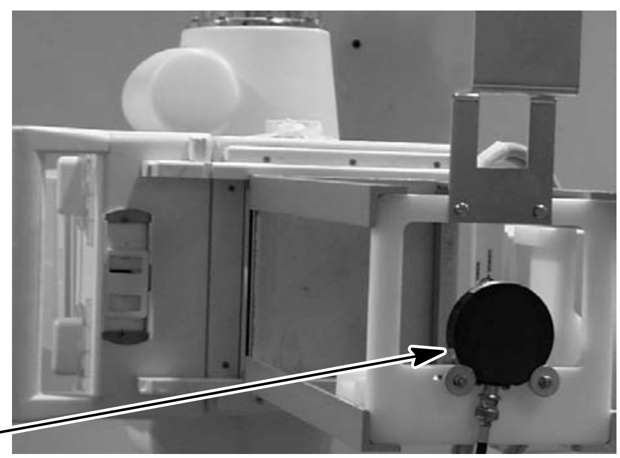
Installing X–Ray Calibration Fixture in Collimator Rails

Installing Radiation Probes into X–ray Calibration Fixture

MDH Meter Probe



Keithley Meter Probe



C Insert small chamber probe of Dosimeter into X–Ray Calibration Fixture. (Probe should be 65 cm from focal spot.

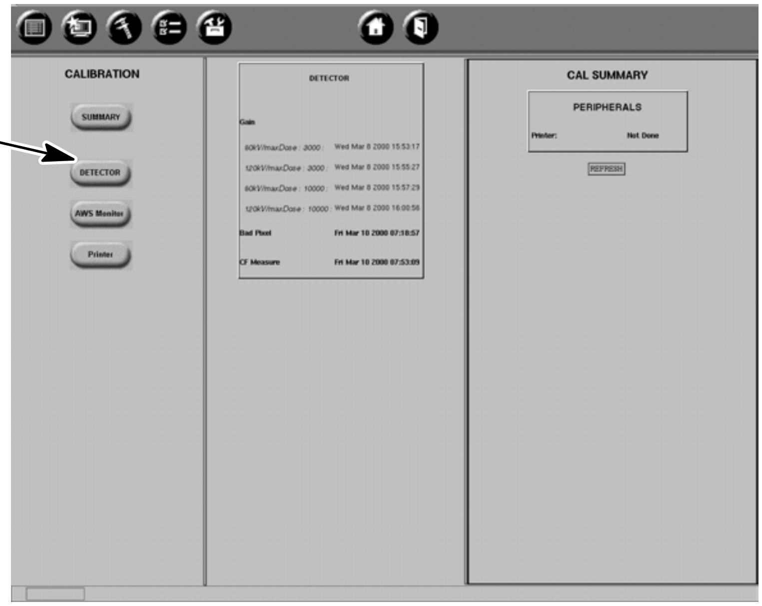
D Prepare Dosimeter to measure Dose in **mR**.

1-10-2 CF Measurement Calibration Procedure

1. Enter the **CF Measurement** calibration routine from the **Initial Detector Calibration** Screen:

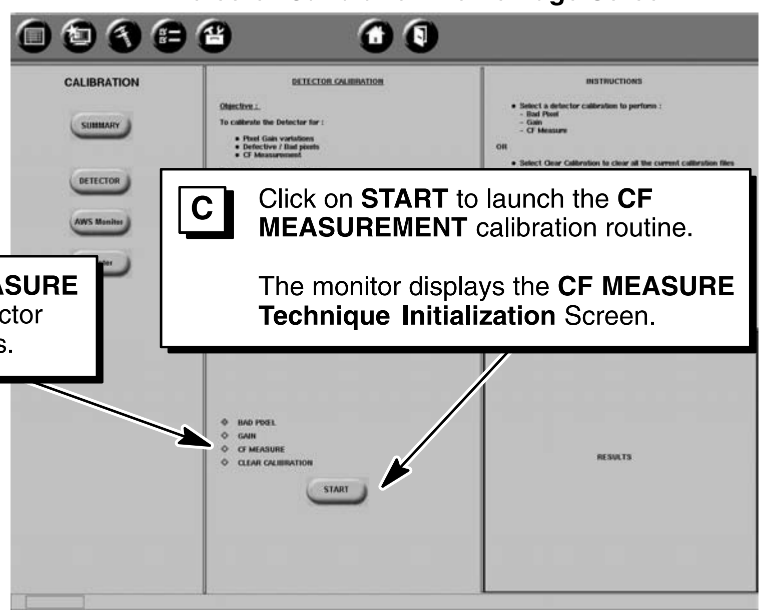
Calibration Home Page Screen

A Click on the **Detector** button



The monitor displays the **Detector Calibration Home Page Screen**

Detector Calibration Home Page Screen



B Click on the **CF MEASURE** selection of the Detector Calibration selections.

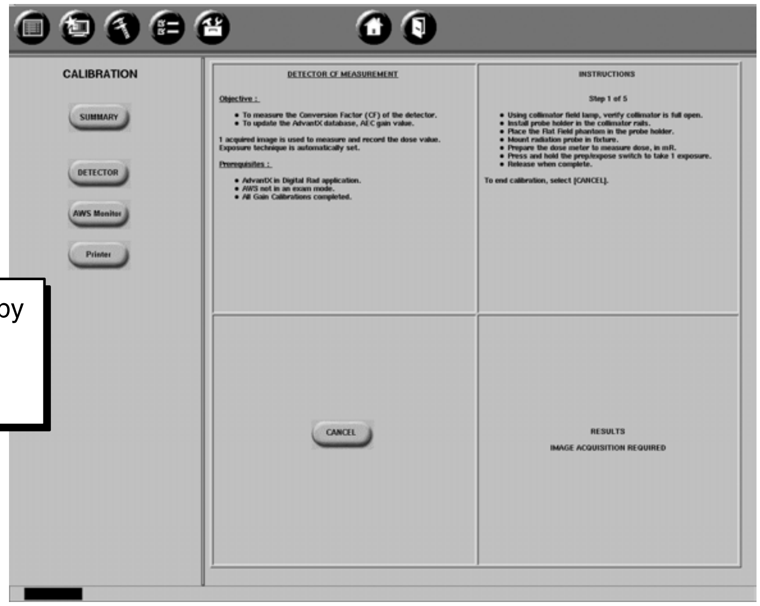
C Click on **START** to launch the **CF MEASUREMENT** calibration routine.

The monitor displays the **CF MEASURE Technique Initialization** Screen.

The **CF MEASUREMENT** calibration routine automatically selects and locks default techniques on the Advantx Console.

2. Initialize CF Measurement Advantx Console RAD techniques and acquire **ONE** CF Dose Measurement exposure:

CF Measurement Technique Initialization Screen



A Follow the steps on the screen to setup the system CF measurements

B Using the Collimator Field Lamp, verify collimator blades are fully opened.

C Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

D After acquiring **ONE Dose Measurement** exposure, release Advantx Console Prep/Expose Switch.

After a few moments, the AWS monitor displays the **CF Dose Entry Screen**.

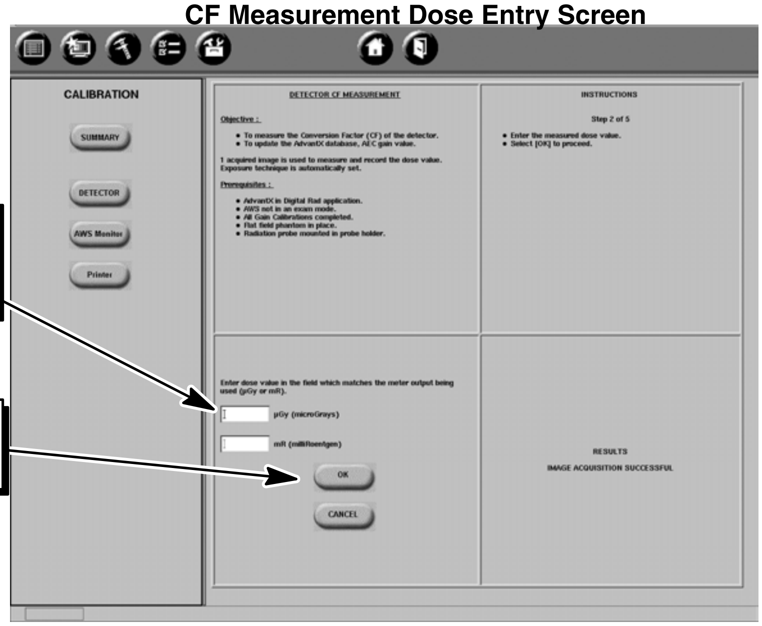
3. Enter the Dosimeter value measured in the Dose Measurement exposure:

Note: The measured exposure value must be entered in units of “mR”. Use the following conversion formulas, if required:

Dose value (mR) = Dose value (uGy) / 8.76

Dose value (mR) = Dose value (mGy) $\times$ 1000 / 8.76

CF Measurement Dose Entry Screen



A Enter the Dosimeter displayed Dose value into the appropriate field.

B Click on **OK** button to proceed to next step.

After a few moments, the AWS monitor displays the **CF Conversion Factor Acquisition Screen**.

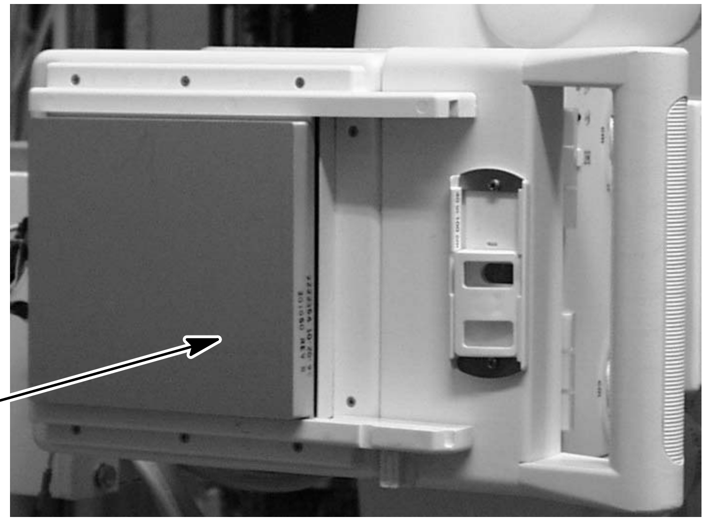
4. Remove the Calibration Fixture and insert Flat Field phantom into Collimator rails:

C Remove Dosimeter Probe from X–Ray Calibration Fixture.

D Remove Flat Field phantom from X–Ray Calibration Fixture.

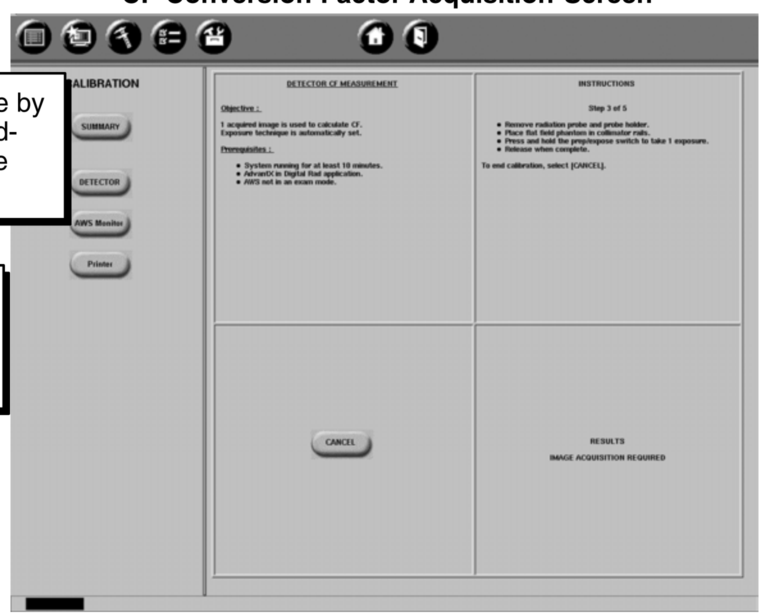
E Remove X–Ray Calibration Fixture from the collimator slide rails.

F Insert Flat Field phantom into the collimator slide rails.



a. Acquire **ONE** CF ***Conversion Factor*** exposure:

CF Conversion Factor Acquisition Screen



A Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

B After acquiring **ONE Conversion Factor** exposure, release Advantx Console Prep/Expose Switch.

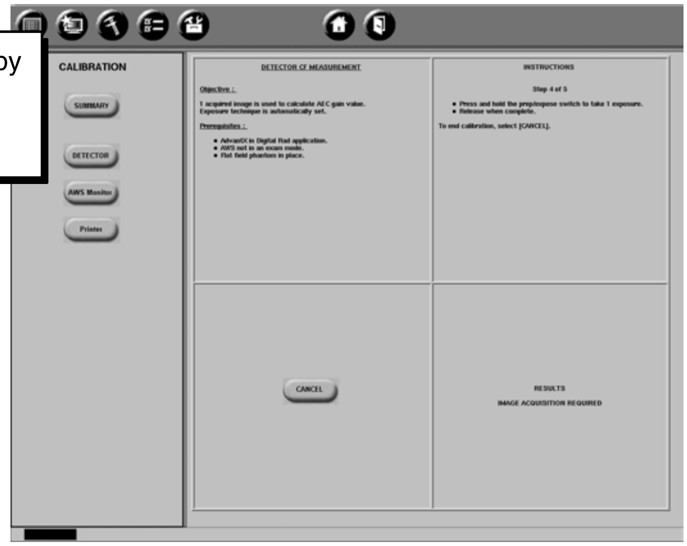
After a few moments, the AWS monitor displays the **CF AEC Gain Calibration Screen**.

b. Acquire **ONE** CF ***AEC*** exposure:

CF AEC Gain Calibration Screen

C Take **ONE** X–Ray Exposure by pressing and holding the Advantx Console Prep/Expose Switch.

D After acquiring **ONE AEC Gain** exposure, release Advantx Console Prep/ Expose Switch.



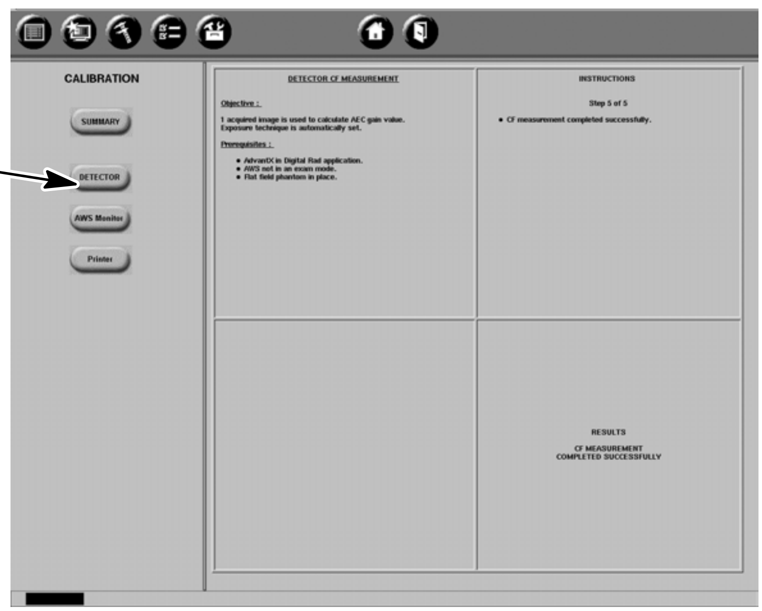
After a few moments, the AWS monitor displays the **CF Measurement Calibration Complete Screen**.

5. Exit the **CF Measurement** Calibration Routine:

CF Measurement Calibration Complete Screen

When the **CF MEASUREMENT Calibration routine** indicates completion, exit the routine:

- Click on **DETECTOR** to return to the Initial Detector Calibration Screen.



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Revision 8

Revolution™ XQ/i™ System Calibration and Functional Checks

COLLIMATION, IQ, REGULATORY TESTS, AWS FUNCTIONS, LFC & DICOM 3.0 PRINT CONFIGURATION

Book 2 of 2

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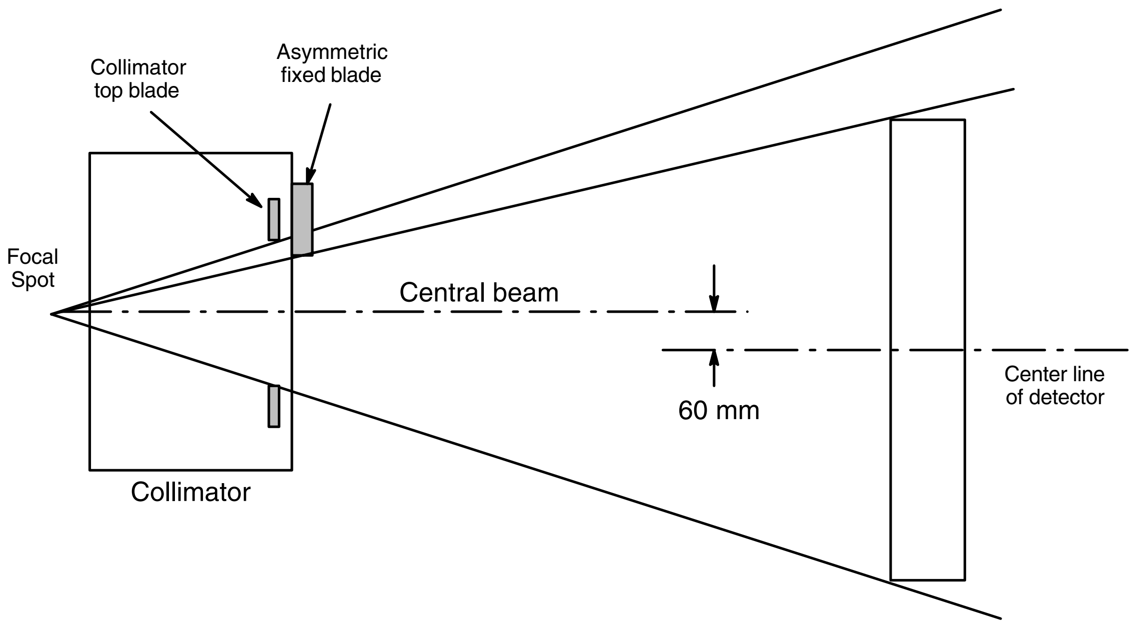
CHAPTER 5 –ASYMMETRIC COLLIMATION OPTION

This Chapter should only be completed if the site has purchased the Asymmetric Collimation Option. Proceed to the next Chapter if Asymmetric Collimation is not being installed.

This option allows the lower portion of the image to be collimated up from the bottom while the top remains fixed until the upper blade is lower than the fixed blade.



SECTION 1
ADVANTX CONFIGURATION

1. Put the Advantx system in Service mode.
   a. Select Tools menu ICON
   b. Select Service Desktop
   c. Select Utilities
   d. Select Mode Transition
   e. Select Service Mode
   f. Exit the Service Desktop
2. Select S001– System Configuration
3. Select C016 – RAD Positioner B Configuration
4. Select YES for ASYM Collimation
5. Reset the system at the Advantx console.
6. Select a Chest PA procedure.

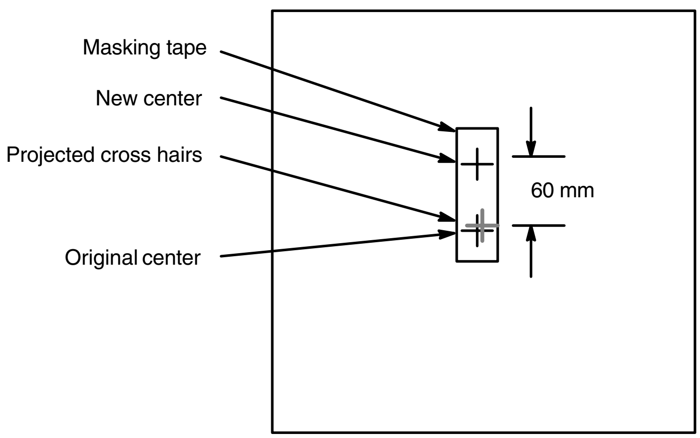
SECTION 2
ADS CONFIGURATION

1. Minimize the Browser if open and open a Command Window.
2. Enter **cd /export/home/sdc/senovision/scripts [Return]** at the prompt.
3. Enter **./SetCollimationMode.sh** at the prompt.
4. Enter **1** at the prompt.

   0 – for Symmetric Mode
   1 – for Asymmetric Mode
5. Restart the Browser.

SECTION 3
ASYMMETRIC COLLIMATION CALIBRATION

1. Place a 4” piece of masking tape along the vertical centerline of the patient barrier starting 1/2” below the original center and running toward the top.



2. Turn on the collimator light and put a mark on the tape where the projected cross hairs hit the tape.
3. Measure up 60 mm and make another mark on the tape.
4. On the receptor stand, loosen the 2 hex mounting bolts that secure the bracket holding the vertical position feedback potentiometer.
5. Carefully adjust the potentiometer until the projected cross hairs of the collimator light pattern are on the mark that is 60 mm above the starting mark.
6. Verify the collimator blades are open to full field of view.
7. Insert the flat field phantom and put the system in the acquisition mode.
8. Make an exposure at the 50 DOWN position and verify that the top collimator blade are not visible on the image and the bottom collimator blade is not quite visible when viewing a raw image. If necessary adjust P44 (TS offset) on the Control board (same pot used in P305).
9. Repeat step 8 at the CENTER and 50 UP positions.

Note: If P305 needs to be run at any time after Asymmetric Collimation is installed, the Asymmetric Collimation option must be physically removed and the Advantx and AWS must be re–configured for symmetrical collimation. The Asymmetrical Collimator option must re–installed after P305 is completed.

CHAPTER 6 – IMAGE QUALITY TESTING

SECTION 1
INTRODUCTION

The purpose of this section is to describe the procedure for executing the Quality Assurance Process (QAP) for the system.

Note: If the flat field phantom has any scratches, dents, or other imperfections on the large surfaces, it must be replaced.

Sequentially follow the procedure as described in this section. Many background tasks have been automated and require, that certain steps must be followed as specified.

For additional information regarding the contents of this section such as; detailed description of the QAP tests and QAP troubleshooting tips, refer to the Image Quality appendix.

The Quality Assurance Process consists of a series of tests to quantify the quality of the system. This section describes the procedure to perform the automated image quality testing as part of the system. This process uses a composite (QAP) phantom, as well as a flat–field phantom. The QAP phantom is a composite of a common “center piece” that is inserted into the phantom carrier; refer to Illustration 4–1. A sample image using the QAP phantom is shown on the next page; refer to Illustration 4–2.

ILLUSTRATION 4–1
QAP PHANTOM (CARRIER + QAP INSERT) P/N 2220170 & 2220515

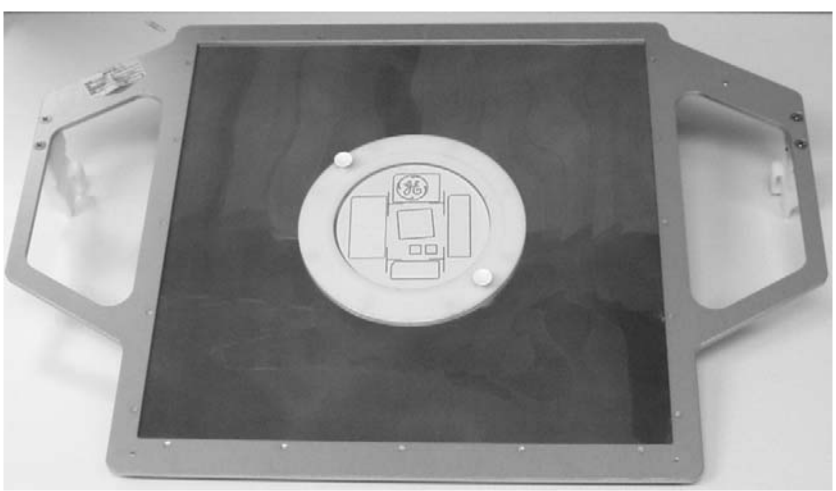
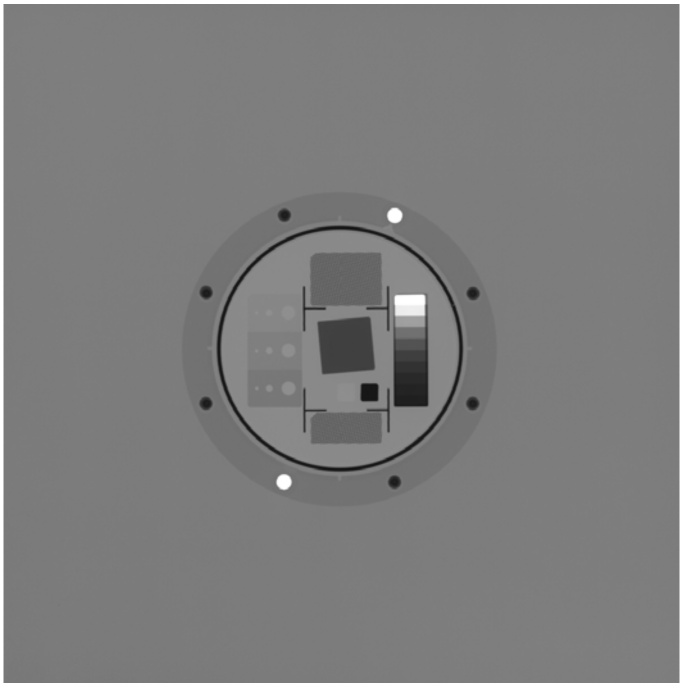
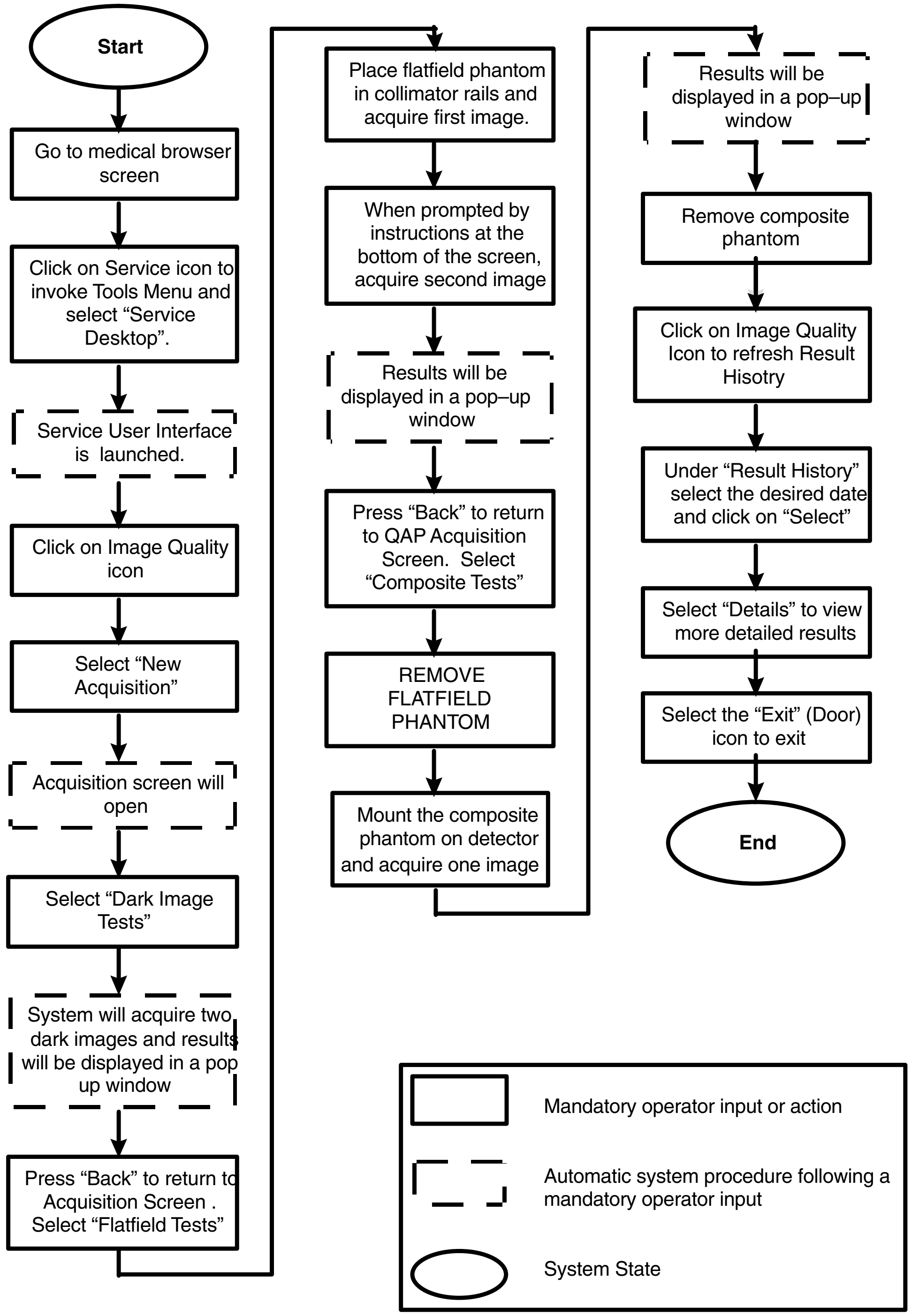


ILLUSTRATION 4–2
SAMPLE QAP IMAGE



QAP Procedure Flow Chart



SECTION 2
QAP PROCEDURE

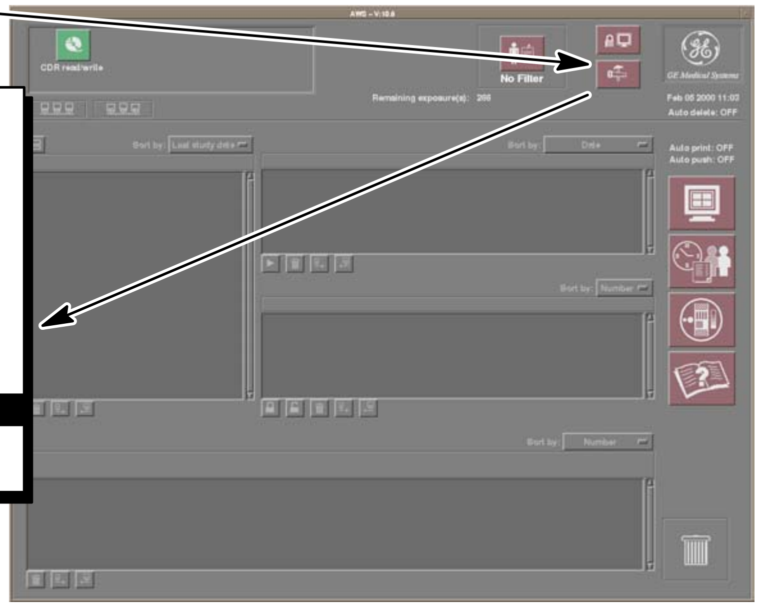
2-1 Start QAP Application

– Exit patient image acquisition screen, if necessary.
– Put system in Digital RAD mode at Advantx console, not Tube Warmup.
– Enter the **Image Quality Home Page Screen**:

A Click on the **Tools Icon**

The monitor displays the Tool Menu

Main Browser Application Screen



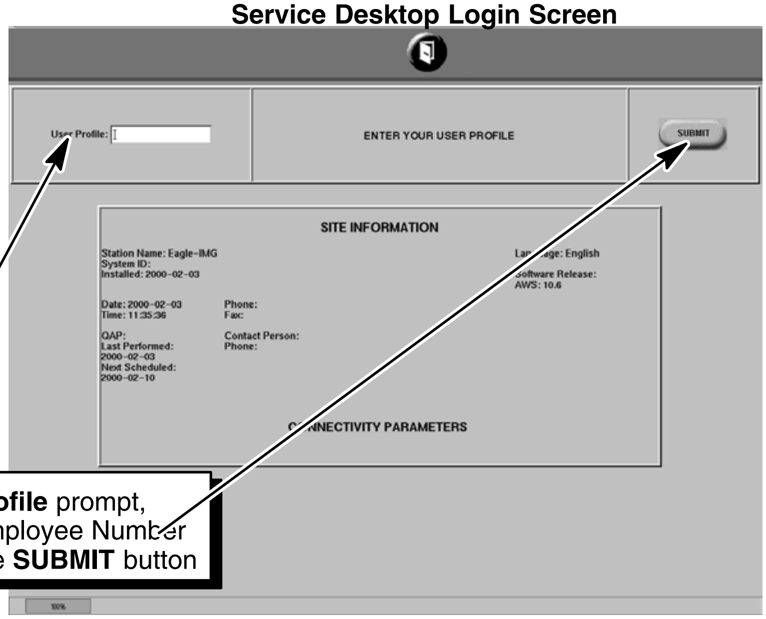
Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

B

Drag cursor to **Service desktop** selection and release mouse button

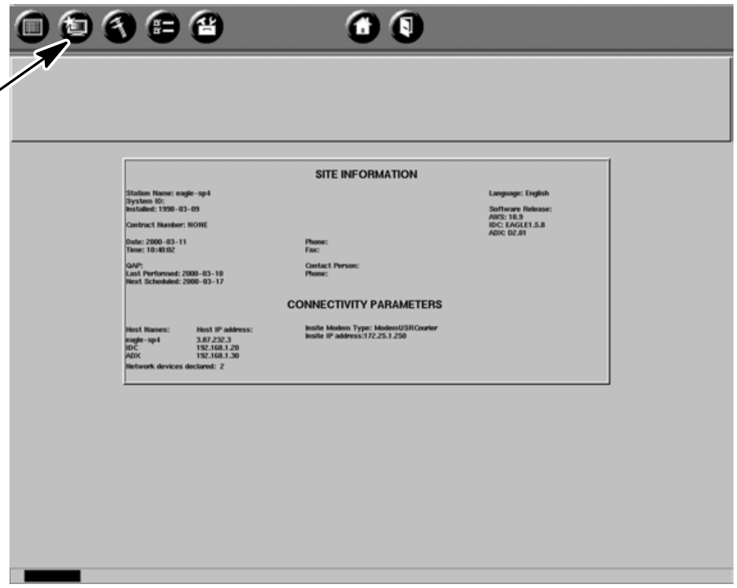
After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen



C At the **User Profile** prompt, type in your Employee Number and click on the **SUBMIT** button

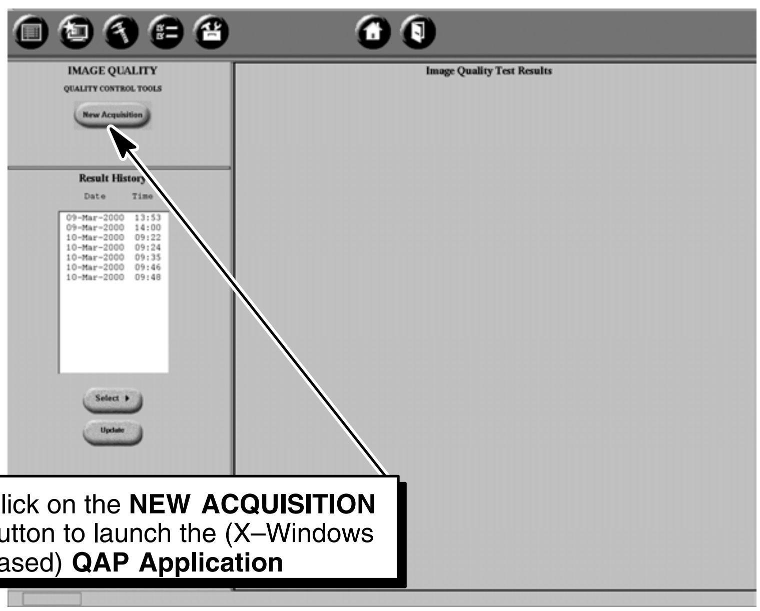
Service Login Screen



D

Click on the **IMAGE QUALITY** icon button to display the **Image Quality Home Page Screen**

Image Quality Home Page Screen



E

Click on the **NEW ACQUISITION** button to launch the (X–Windows based) **QAP Application**

2-2 Perform Dark Image Tests

QAP Application Screen

A Click on **DARK IMAGE TESTS**

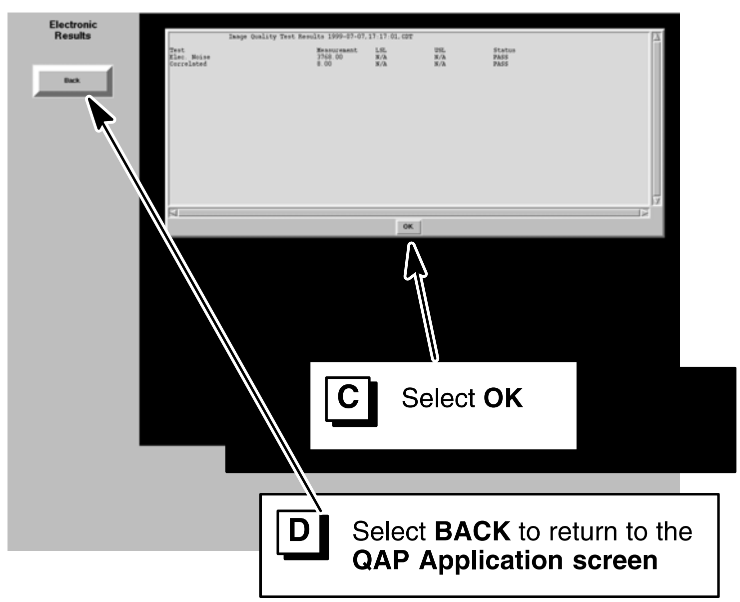
The system will automatically acquire images without exposing the detector.

Dark Image Test Results Screen

B

After processing, the results are displayed.

Verify a “**PASS**” status for each test.

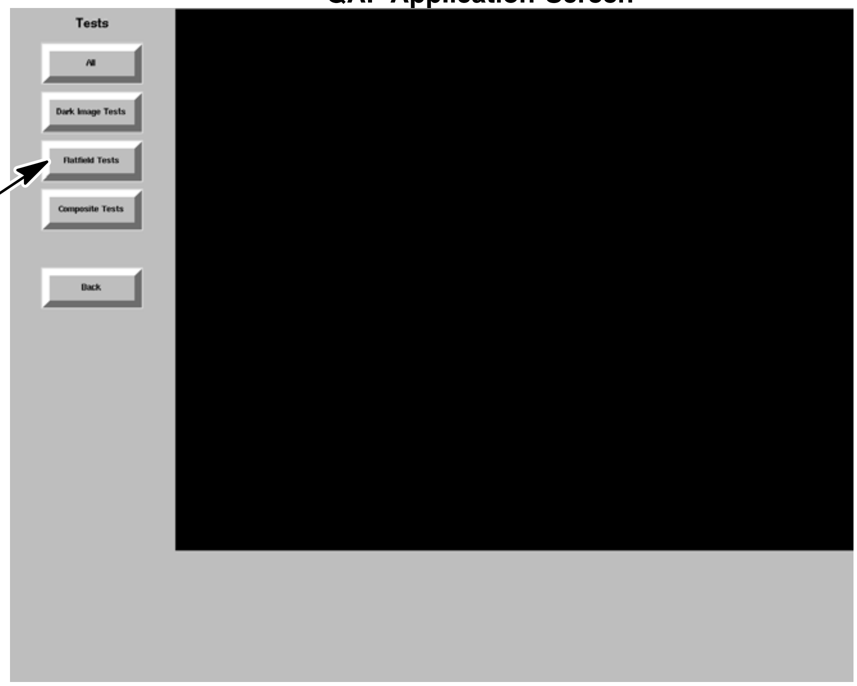


C Select **OK**

D Select **BACK** to return to the **QAP Application screen**

2-3 Perform Flat Field Tests

QAP Application Screen

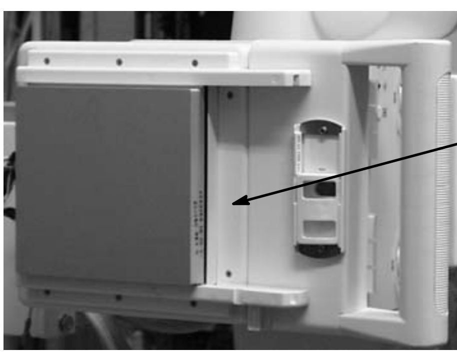


1 Click on **FLAT–FIELD TESTS**

Follow the instructions on the bottom of the screen which correlate to the steps below:

a. Place the aluminum flat–field phantom (p/n 2222354) in the collimator rail. Refer to Illustration 4–3.

ILLUSTRATION 4–3
FLAT FIELD PHANTOM INSERTION



Slide flat field phantom into the collimator rails

b. The acquisition technique will be automatically set on the Advantx sub–system and the collimator blades will be set to fully open. (The Advantx console may beep and briefly display, then remove an automatic setting message.)

c. Verify the technique is: FIXED, 0.6 mm Focal Spot, 80 kVp, 200 mA, 20 mAs.

d. Verify the collimator is fully open - (approximately 43 cm x 43 cm size, which is slightly larger than the detector)

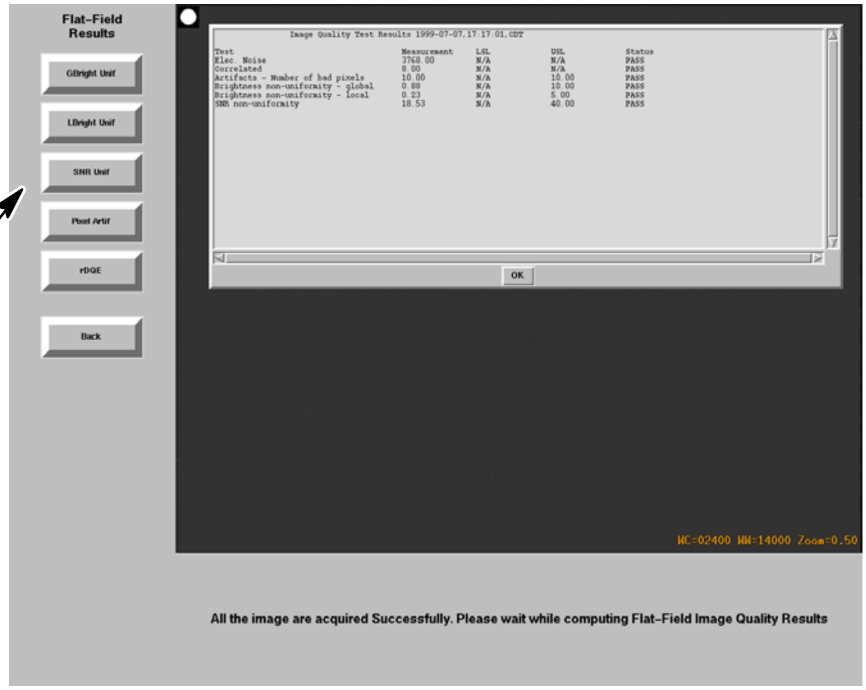
e. Acquire two images.

Flat Field Test Results Screen

2 After processing, the results are displayed.

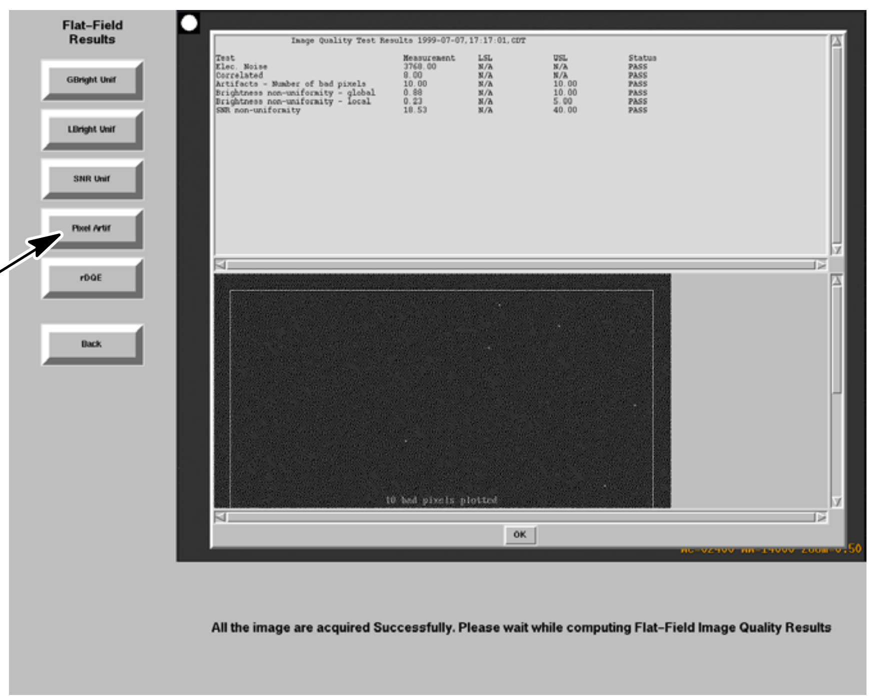
Verify a "**PASS**" status for each test.

3 To view **graphical test results**, select one of the desired test buttons that are listed.

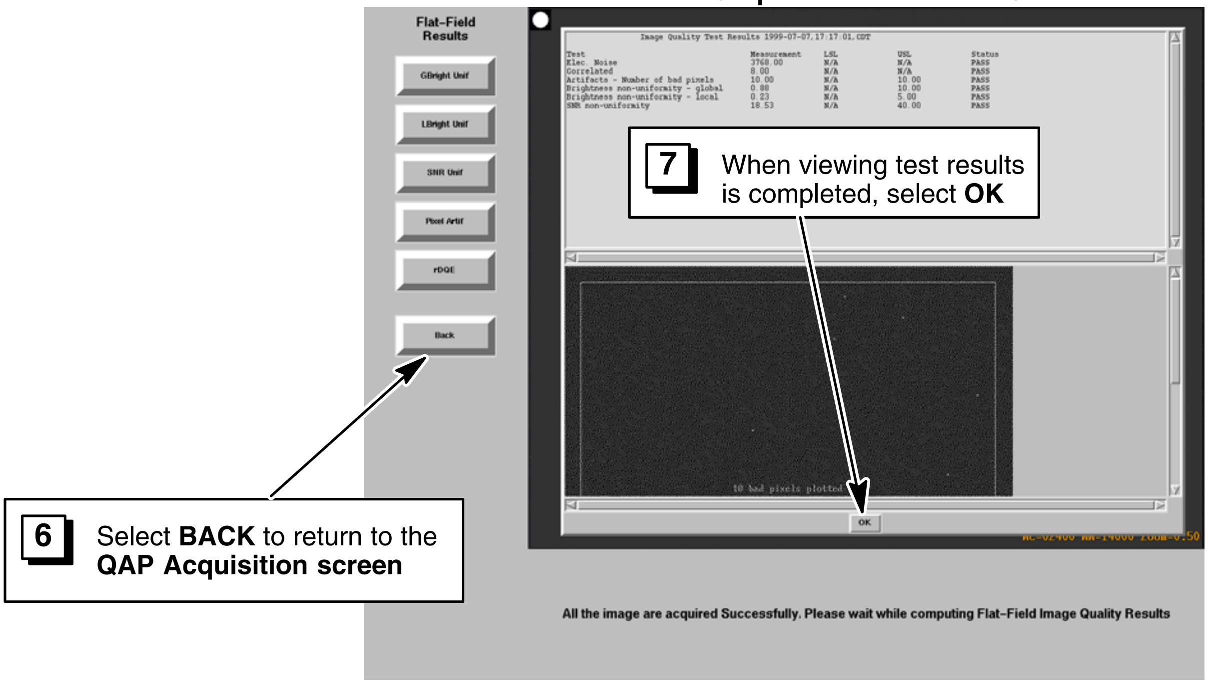


Pixel Artifact Graphical Test Results Screen

4 For example, selecting **Pixel Artif** will display Pixel Artifact graphical test results.

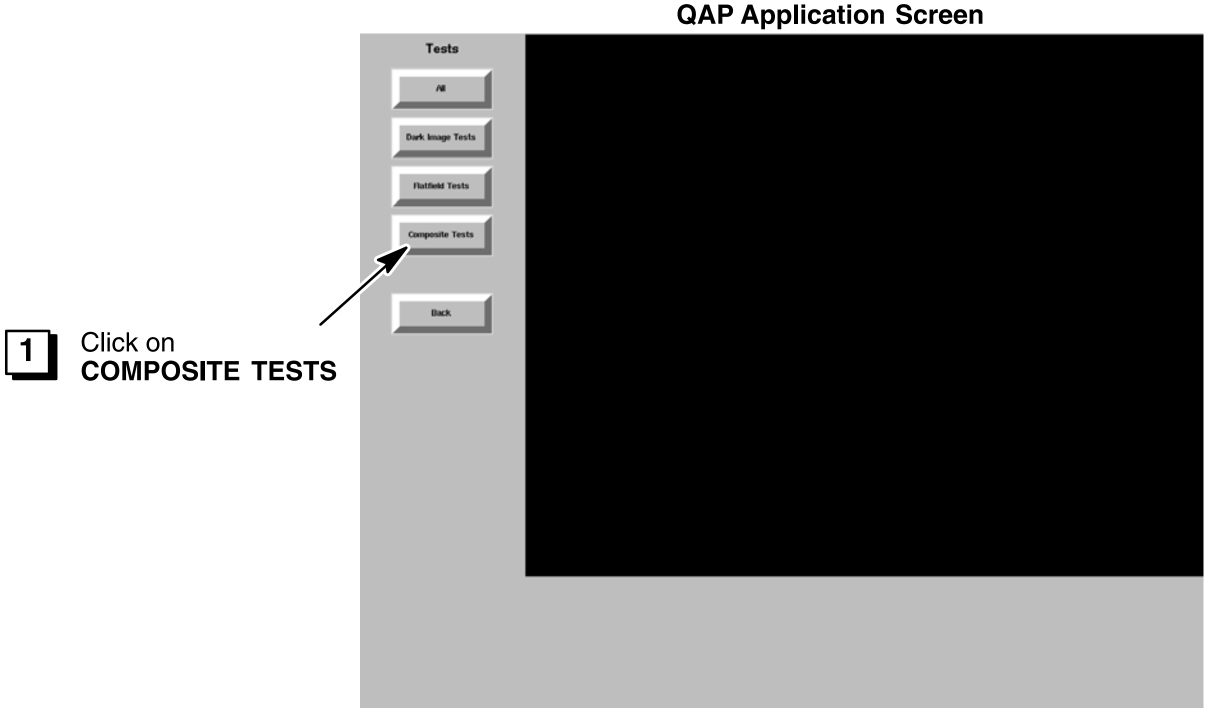


Pixel Artifact Graphical Test Results Screen



2-4 Perform QAP Phantom Image Tests

QAP Application Screen



Follow the instructions on the bottom of the screen which correlate to the steps below:

a. Remove the Aluminum flat–field phantom from the collimator rails.

Note: Before proceeding, verify that the detector is in a “locked” position. This is done by pushing up and down on the detector and making sure that it does not move.

b. Mount the QAP phantom on the detector.

c. The acquisition technique will be automatically set on the Advantx sub–system and the collimator blades will be set to fully open.

d. Verify the technique is: FIXED, 0.6 mm Focal Spot, 80 kVp, 200 mA, 20 mAs.

e. Verify the collimator is fully open - (approximately 43 cm x 43 cm size, which is slightly larger than the detector)

f. Acquire one image.

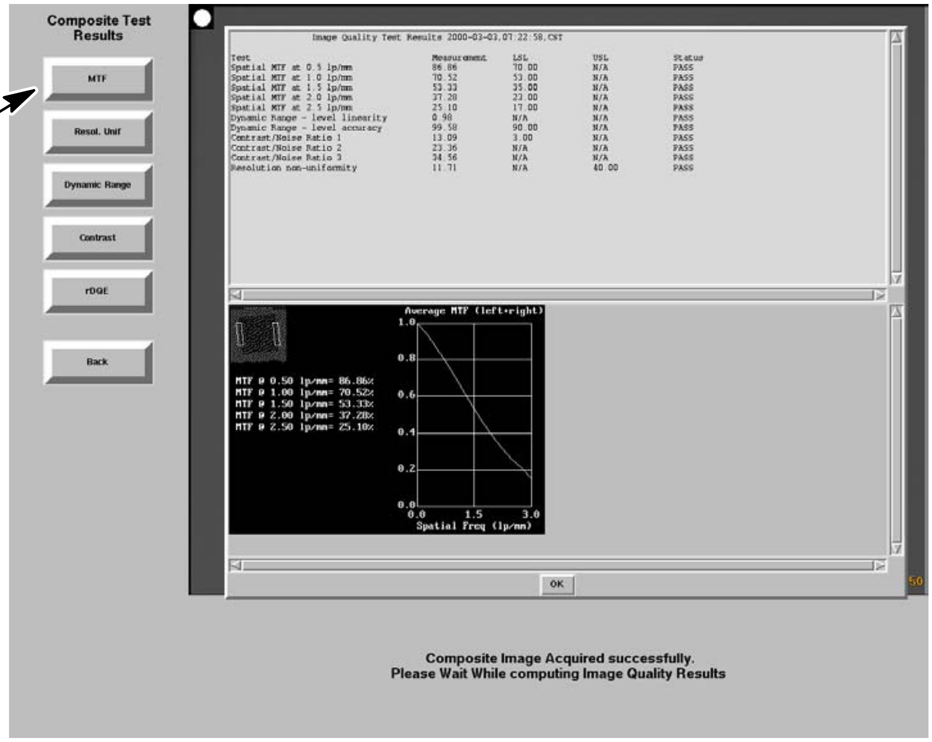
2 After processing, the results are displayed.

Verify a “**PASS**” status for each test.

3 To view **graphical test results**, select one of the desired test buttons that are listed.

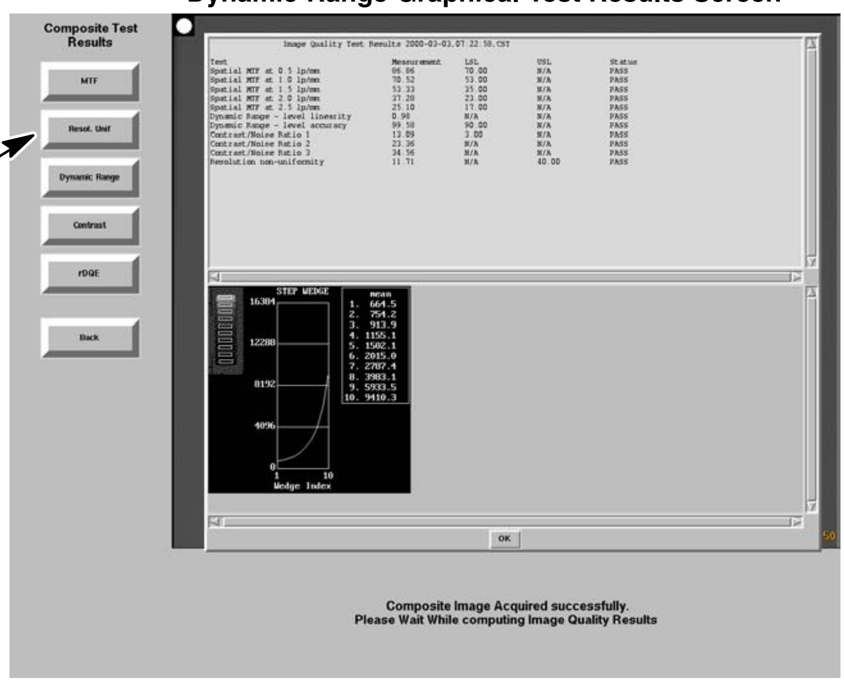
QAP Results Screen

MTF Graphical Test Results Screen



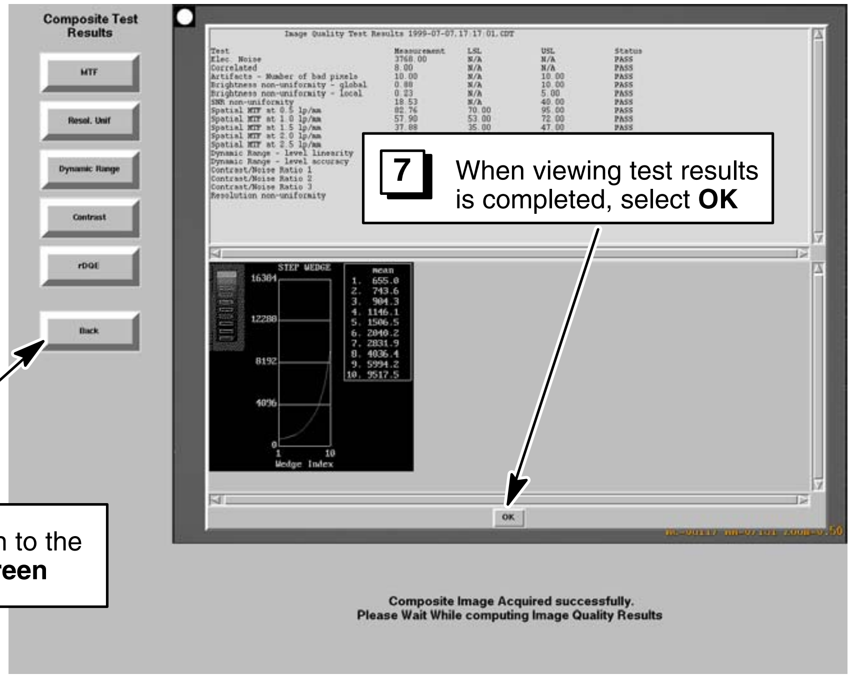
4 For example, selecting **MTF** will display MTF graphical test results.

Dynamic Range Graphical Test Results Screen



5 For example, selecting **DYNAMIC RANGE** will display Dynamic Range graphical test results.

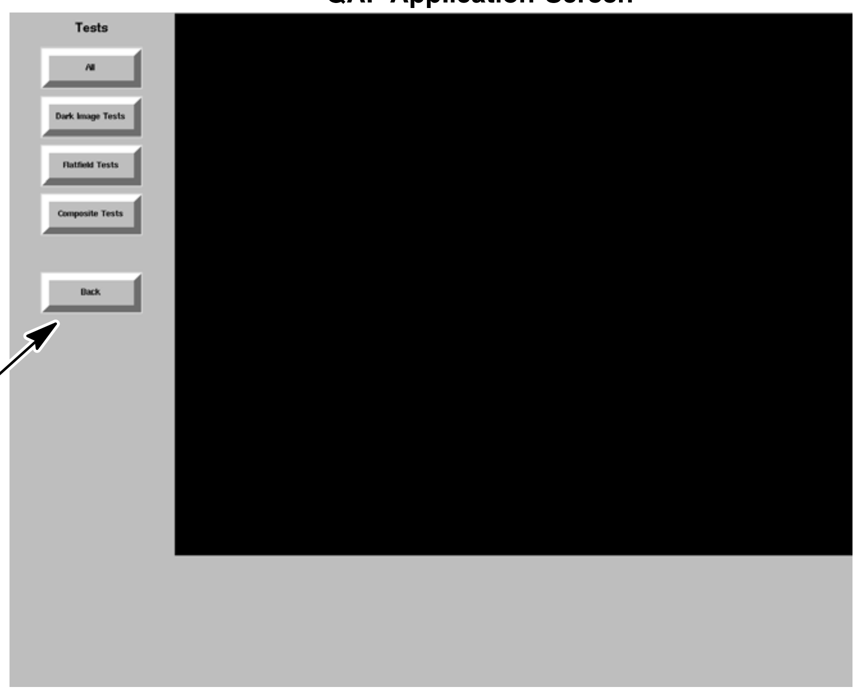
Dynamic Range Graphical Test Results Screen



7 When viewing test results is completed, select **OK**

6 Select **BACK** to return to the **QAP Acquisition screen**

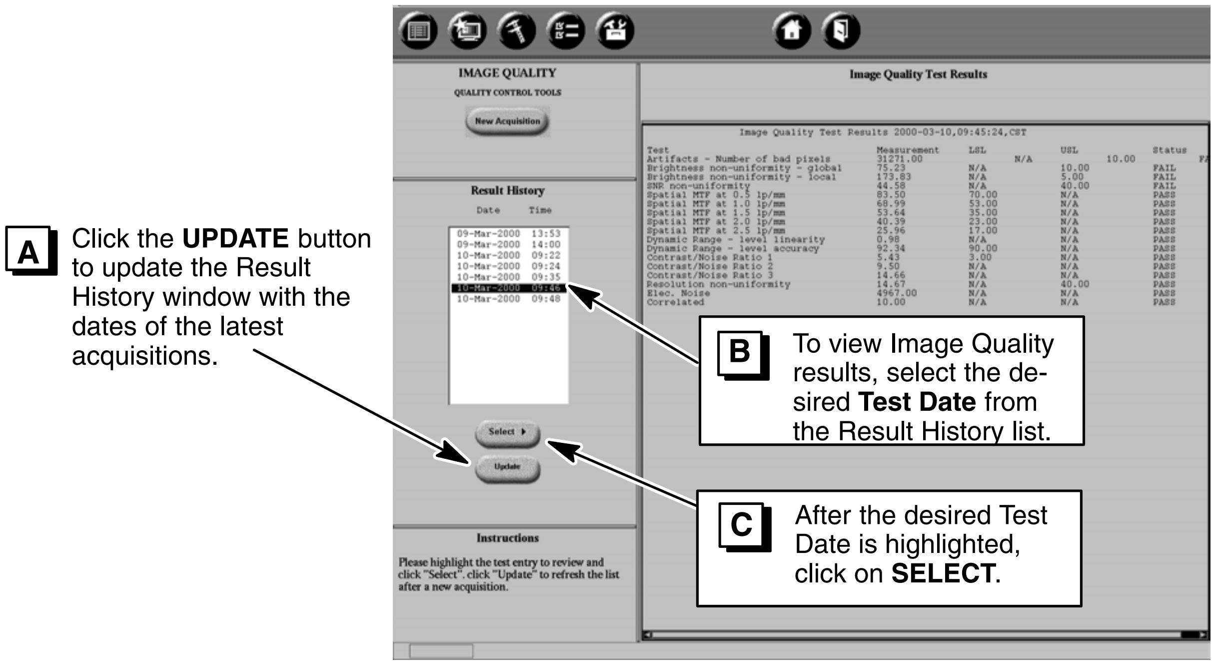
QAP Application Screen



8 Click on **BACK** to return to the Image Quality Home Page

2-5 Reviewing Results

Image Quality Results Summary Screen



SECTION 3
DIGITAL RADIOGRAPHY – AEC DOSE VERIFICATION PROCEDURE

3-1 Scope

The purpose of this document is to define a procedure to measure the calibrated system dose for the Digital Rad applications when using the Automatic Exposure Control (AEC) mode. This will allow the user to perform a system quality check thereby verifying system set–up and calibration. A dosimeter, Flat Field Phantom and probe holder are required for this test.

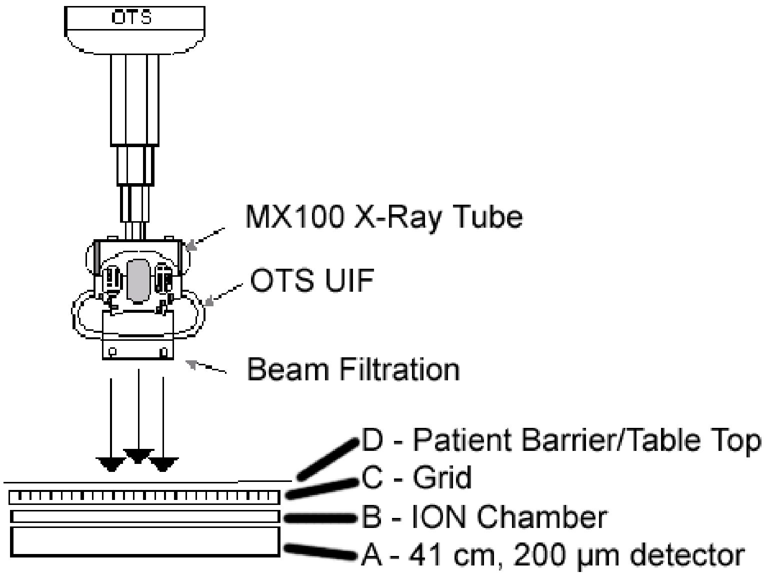
3-2 Theory

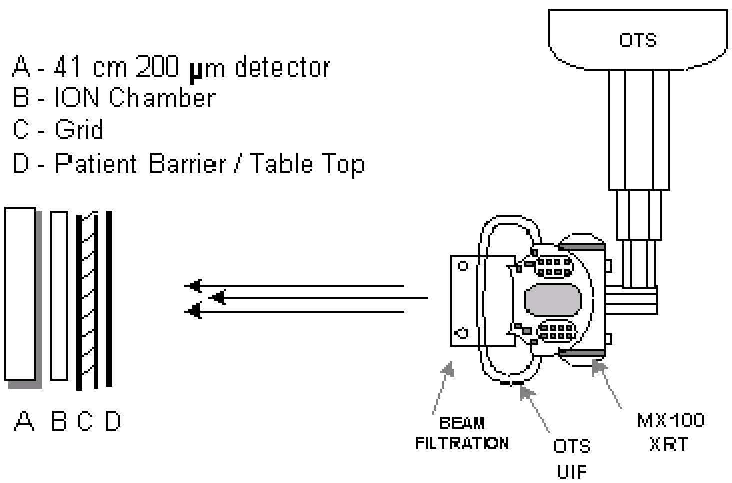
Typically, for the Digital Chest procedure as defined in Procedure Edit (PE), the default dose selection is equivalent to 400 speed. 400 speed is defined as requiring 2.5 micro Gy of exposure to produce a 1.0 OD (optical density) change.

For film systems : 400 speed film requires 2.5 micro Gy exposure 1.0 OD + fog, approximately1.2 OD

For typical film systems, the flat–field film OD is calibrated for a range of 1.3 OD to 1.6 OD. Revolution XQ/i systems are designed to calibrate the 400 speed selection @ 80 kVp with 20 mm Al Flat Field Phantom to 3.4 micro Gy entrance dose to the detector (including primary beam and back–scatter).

This set–up yields an equivalent patient dose (exposure level into the patient) as a typical 400 speed film system calibrated for a flat–field film OD within the range of 1.3 OD to 1.6 OD.





For XQ/i calibration, the expected dose at the probe holder (65 cm from the focal spot), in application mode with 400 speed and 80 kVp selected, should be 3.4 micro Gy, reference scaled by the three attenuation constants: C1, C2, and G4.

Where;

C1 – accounts for the air absorption and the distance difference between the probe and detector

C2 – accounts for the attenuation of the patient barrier and the Ion chamber

G4 – accounts for the SNR sensitivity change of the detector based on the presence of a grid

TABLE 7–1
C1, C2, and G4 for the Currently Available Digital Radiography Products

Product	C1	C2	G4	Comments
Revolution XQ/i Wall Stand	0.119	0.577	1.0	SID = 180 cm, Grid installed

To improve the accuracy of the dose measurement at the probe holder, the verification procedure is performed at the 100 speed setting, increasing the measured dose by four times. Using the 100 speed setting and allowing a +/– 10% error band to account for calibration and measurement tolerances, the measured probe holder dose value must be within the range given in the table below.

TABLE 7–2
Acceptable Dose Measurement Range vs. Product Under Test

Product	Acceptable Probe Holder Dose Range	
	micro Gy	**mR**
Revolution XQ/i Wall Stand	178.3 to 217.9	20.3 to 24.9

3-3 Procedure

1. Verify that the procedure to be used from Procedure Menu is set for 100 speed in Procedure Edit. If a 100 speed procedure does not exist, create a new procedure and set the speed to 100.
2. At the console, select the intended 100 speed procedure from Procedure Menu. Modify the technique to: AEC, center Ion chamber only, 80kVp, 25mA, XS.
3. Set positioner:
   > Collimator to full FOV

   > Detector or Tube tracking centered

   > Install 20 mm Al Flat Field Phantom in the collimator rails.

   Take exposure and record the exposure time from the console (ms) **a** = _______
4. Remove 20 mm Al Flat Field Phantom and install the probe holder in the collimator rails. Install 20 mm Al Flat Field Phantom and dosimeter probe into probe holder.
5. At the console, select: Fixed Time, 80kVp, 25mA, XS, and choose the mAs station with an exposure time just **below** the exposure time (ms) value recorded in step 3.
   Record the exposure time selection (ms) **b** = _______
6. Take exposure and record the dosimeter reading **B** =
7. At the console, choose the mAs station with an exposure time just **above** the exposure time (ms) value recorded in step 3. Leave everything else the same.
   Record the exposure time selection (ms) **c** = _______
8. Take exposure and record the dosimeter reading **C** =_______
9. Calculate AEC dose as follows:
   AEC Dose = {[(**C** – **B**) x (**a** – **b**)] / (**c** – **b**)} + **B**

   AEC Dose = ______________

3-4 Conclusion

AEC is properly calibrated if the dose measured at the probe holder is within the range specified below.

Product	Acceptable Probe Holder Dose Range	
	micro Gy	**mR**
Revolution XQ/i Wall Stand	178.3 to 217.9	20.3 to 24.9

SECTION 4
DATABASE BACKUP

After the system is fully calibrated and quality tests have been completed, the database should be backed up. Refer to Appendix A, Section 6.

The Advantx system must not be left in the Debug mode. From the browser, select **Service Desktop**, **Utilities**, **Advantx Tools** and return the system to normal operating conditions. Refer to the appropriate Calibration and Configuration direction for the procedure to reset the virtual DIP switch settings and disable the DEBUG mode.

CHAPTER 7 –REGULATORY TESTS AND FINAL STEPS

SECTION 1
HHS REGULATORY COMPLIANCE

1-1 RAD / Beam Quality Tests

1. Complete the Customer, Configuration and Test Equipment sections of HHS DATA RECORD form 3382. The X–ray generator subsystem is **Advantx–E SCPU**.
2. Complete the Control and Tube Assembly Tests as described in Tab 3 of *Direction 46–013894 System Field Test for HHS*. Record test results on form 3382.
3. Complete the Beam Quality Test (Half–Value Layer) as described in Tab 4 of *Direction 46–013894 System Field Test for HHS*. Record test results on form 3382.

1-2 HHS Collimator Tests

1-2-1 SID

Not required for this system (SID is fixed).

1-2-2 Light to X–ray Field

Perform per Section 4 of Tab 6 in Direction 46–013894 System Field Test for HHS.
(Misalignment rejection limit is <=1.8% of SID. HHS limit is 2% SID.)

1-2-3 Light Field Intensity

Perform per Section 10 of Tab 6 in Direction 46–013894 System Field Test for HHS.

(Not less than 16 foot–candles or not less than the minimum voltage at the collimator lamp socket per table 4.)

1-2-4 Center to Center Error

1. Verify that the collimator key switch is in the normal position.
2. Place the wallstand at its midrange of travel and verify that the tube tracks with the wallstand and that the “green” auto collimation lamp is illuminated on the collimator.
3. Manually collimate to an approximately 10” x 10” (25 cm x 25 cm) size at the wallstand as viewed with the collimator light.
4. Insert the flat field phantom in the collimator rails.
5. Start a new exam, and take an exposure using 60 KVP, small focal spot and AEC. Verify that the image is transferred to the Acquisition workstation (AWS).
6. Select the measurement function on the AWS and scribe the X–ray field diagonally using the corners of the X–ray field to find the center.
7. Select the measurement function on the AWS again, and find the center of the detector image by scribing from the corners of the image.

8. Select the measurement function on the AWS again, and place one cursor on the X–ray field center and the other cursor on the detector image center. Read the distance displayed for that measurement.
9. Determine the center to center error using the formula:

   (center to center difference) cm / 180 cm x 100
10. Verify the center to center error is <= 1.8% of SID. The actual HHS rejection limit is 2% of SID.
11. Repeat the above steps (1 – 10) using the large focal spot.
12. Using the focal spot with the worst accuracy (the largest % of error), repeat the above steps (1 – 10) with the wallstand at its minimum and maximum heights of travel. The same rejections limits in step (10) apply. Record the position with the worst error using form 3382, HHS Data Record.
13. Remove the flat field phantom from the collimator rails.

1-2-5 Field Size Indicator

1. Verify that the collimator key switch is in the normal position and that the tubestand tracks the wallstand.
2. Manually collimate to a 24 cm x 24 cm opening as read on the collimator indicators for a 180 cm SID.
3. Insert the flat field phantom in the collimator rails.
4. Start an exam and take a 60 KVP, 50 mA, AEC exposure. Verify that the image is transferred to the work station.
5. Select the measurement tool at the ADS workstation and measure the X–ray field size openings of both sets of collimator blades by positioning the first cursor on one blade and then positioning the second cursor on the opposite blade so that the generated measurement is perpendicular to the blades. Read the actual size off the measure tool. Do this for both directions.
6. Determine the collimator blade indicator to actual size error using the formula:

   (indicated transverse – actual transverse) cm / 180 cm x 100

   (indicated longitudinal – actual longitudinal) cm / 180 cm x 100
7. Verify that the difference between the indicated field size and the actual field size does not exceed 1.7% in either direction. Actual HHS limit is 2% of SID.
8. Remove the flat field phantom from the collimator rails.

1-2-6 Size to Size

1. Set the wallstand at midrange of its vertical travel, verify that the tube tracks the wallstand position, and verify that the “green” auto lamp is illuminated at the collimator. Select the largest collimator size selection at the remote arm (41 cm x 41 cm).
2. Rotate the collimator 45 degrees and mark either the transverse or longitudinal blades with a piece of solder or other marker on the collimator window for identification. (To rotate the collimator, the trim covers must not be installed on the tube or collimator).
3. Insert the flat field phantom in the collimator rails.
4. Start an exam and take a 60 KVP, 50 mA, AEC exposure. Verify that the image is transferred to the work station.
5. Using the measurement tool on the ADS workstation, measure the width of the opening for each set of blades.

6. Determine the size to size error using the formula:

   (actual size transverse – 41 cm) / 180 cm x 100

   (actual size longitudinal – 41 cm) / 180 cm x 100

7. Verify that both the transverse and the longitudinal size to size errors are <= 2.8% of SID. Verify that the sum of both errors is <= 3.8 SID. Actual HHS rejection limits are 3% and 4% respectively.
8. Repeat the above steps (1 – 7) for the smallest field size selection, substituting the actual selected size for the “41” in each formula.
9. If both the largest size and the smallest size meet the accuracy specifications, all intermediate sizes are also acceptable.
10. Remove the flat field phantom from the collimator rails.

SECTION 2
DATABASE BACKUP

Perform complete database backup, refer to Backup procedure in the Utilities appendix.

SECTION 3
FINAL INSTALLATION AND ADMINISTRATIVE TASKS

1. Remove proprietary hardware key from AWS enclosure and reset AWS. This will change system status from proprietary to normal operation.
2. Install all covers on system equipment. (Refer to Installation manual for procedure.)
3. Remove trash, remove installation equipment and tools, clean up room and store service manuals.
4. Fill out Product Locator Cards and return them.
5. Record installation time in Service database.

APPENDIX A – AWS FUNCTIONS

This appendix contains AWS functions which may be used at various times during initial system installation or during subsequent service visits.

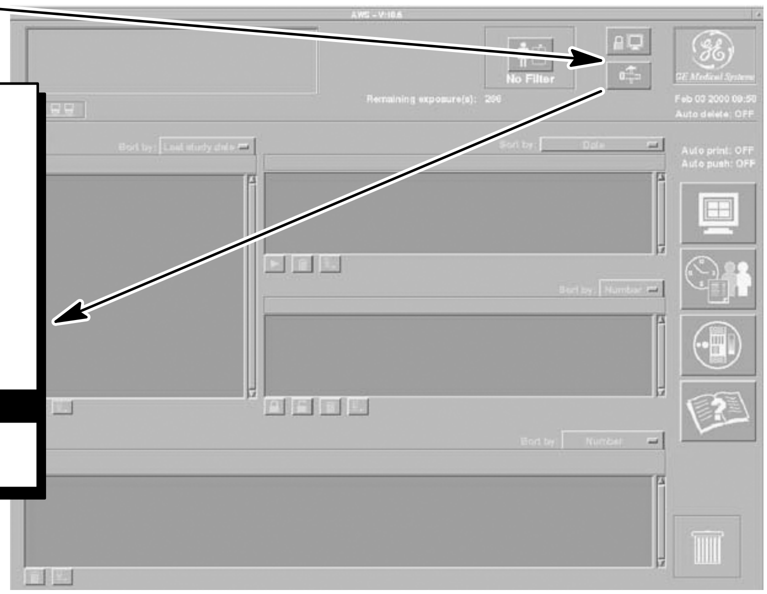
SECTION 1
SERVICE DESKTOP ACCESS

Service desktop functions are selected via the Service Desktop.

1. Click on the **Tools Icon**

The monitor displays the Tool Menu

Main Browser Application Screen

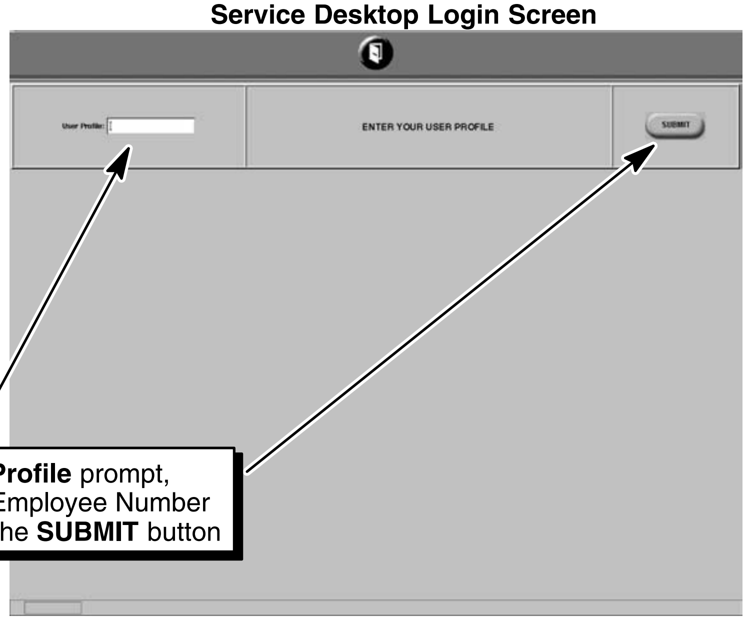


Filter management
Browser preferences
Messages
Network management
Worklist Management
Printer mangement
Medical Application preferences
Edit Patient
Set patient anonymous
Service desktop
Restart Browser
Shutdown

2. Drag cursor to **Service desktop** selection and release mouse button

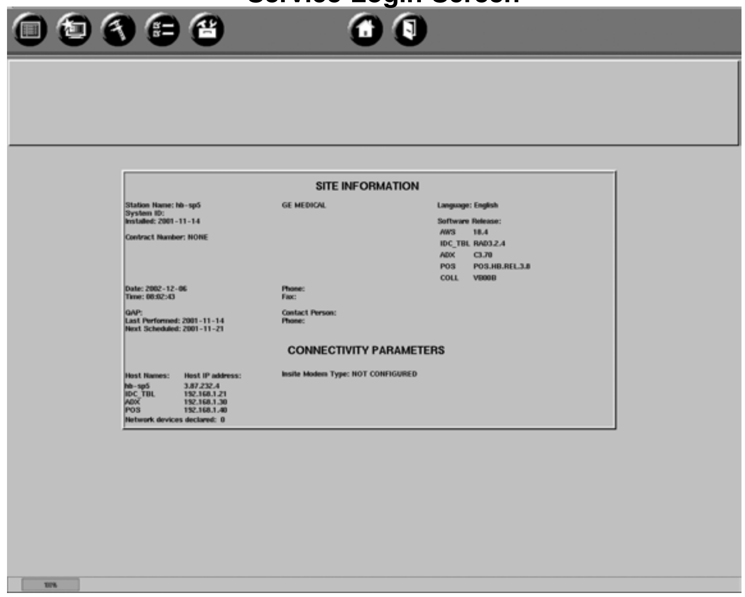
After a few moments, the monitor displays the **Service Desktop Login Screen**

Service Desktop Login Screen



3. At the **User Profile** prompt, type in your Employee Number and click on the **SUBMIT** button

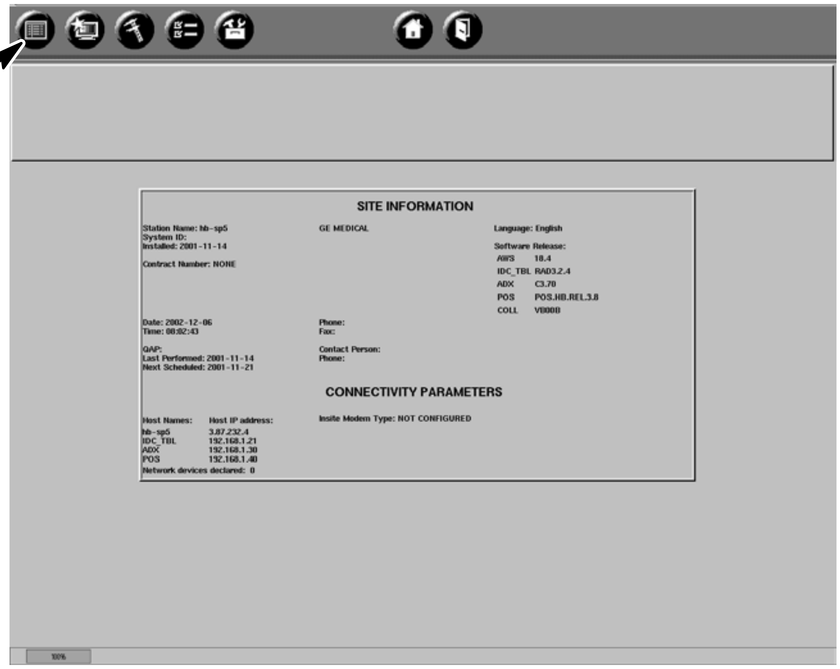
Service Login Screen



Note: While entering the Service Desktop or when doing diagnostics, it is possible for a small Netscape WARNING window to pop up in the upper left hand corner of the screen while the system is performing some background functionality. Ignore the message since it has no effect on the operation of the system.

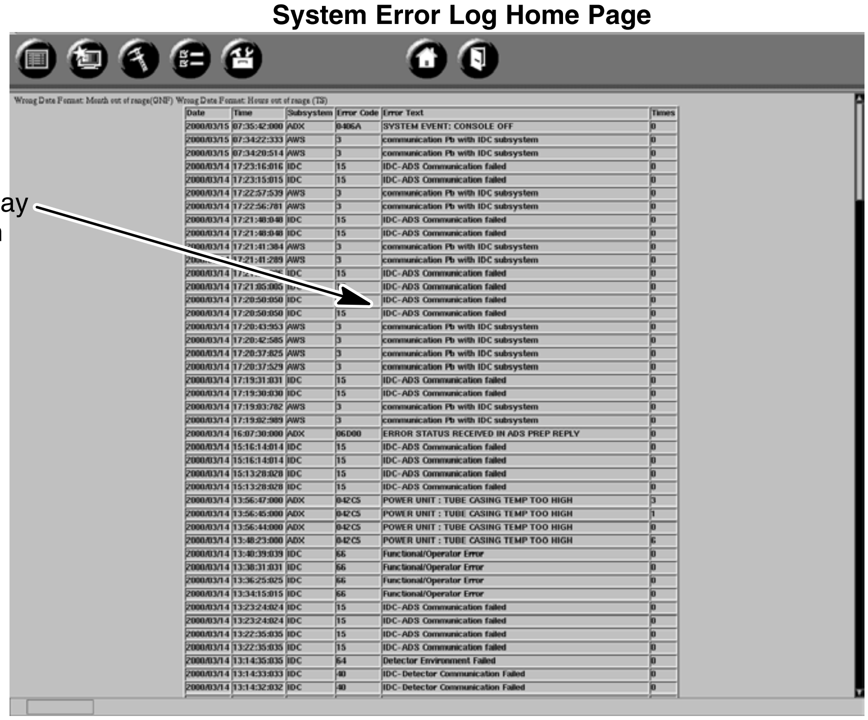
SECTION 2
ERROR LOG

Service Login Screen



1. Click on the **ERROR LOG** icon button to display the **System Error Log Home Page**

System Error Log Home Page



2. If additional error information exists, a system error log message is underlined. To display the extended message, click on the underlined message.

Multiple Occurrences of Errors

If there are multiple occurrences of the same error, the system reports the errors as a total of all the consecutive occurrences and not one line for each error.

For multiple occurrences, the actual report will be displayed when the error log is interrogated will contain 2 or 3 lines.

The first line will report a 0 in the TIMES column if it is the first of a string of the same error.

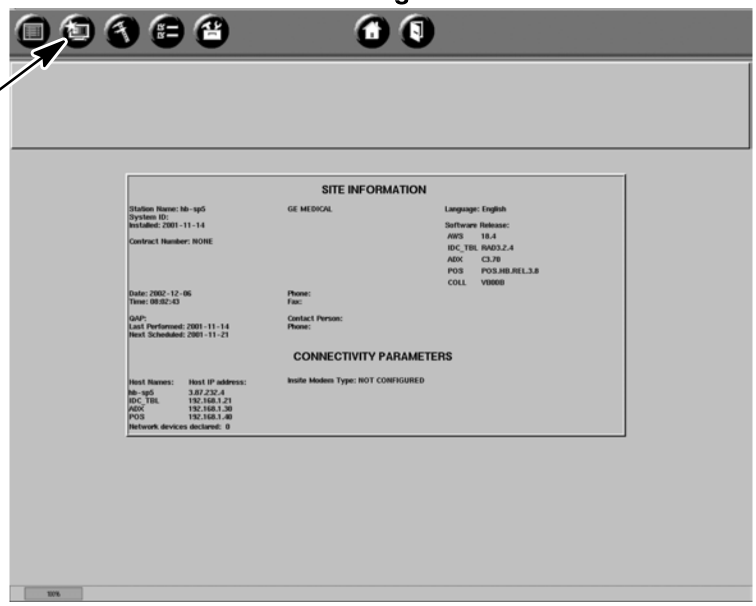
The second line will report a 1 in the TIMES column if it is the second of a string of the same error. If there are only two occurrences of the same error the report will show just two lines.

The third line will report the "total number" of occurrences of the error in the TIMES column if it occurred 3 or more times. It includes the first 2 occurrences.

SECTION 3
IMAGE QUALITY

This function is used to acquire image data needed to analyze the image quality.

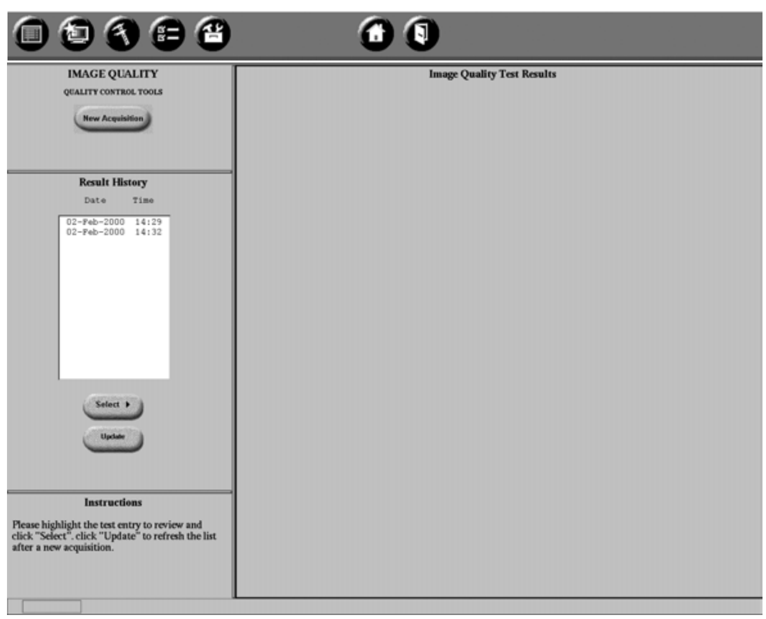
Service Login Screen



1.

Click on the **IMAGE QUALITY** icon button to display the **Image Quality Home Page Screen**

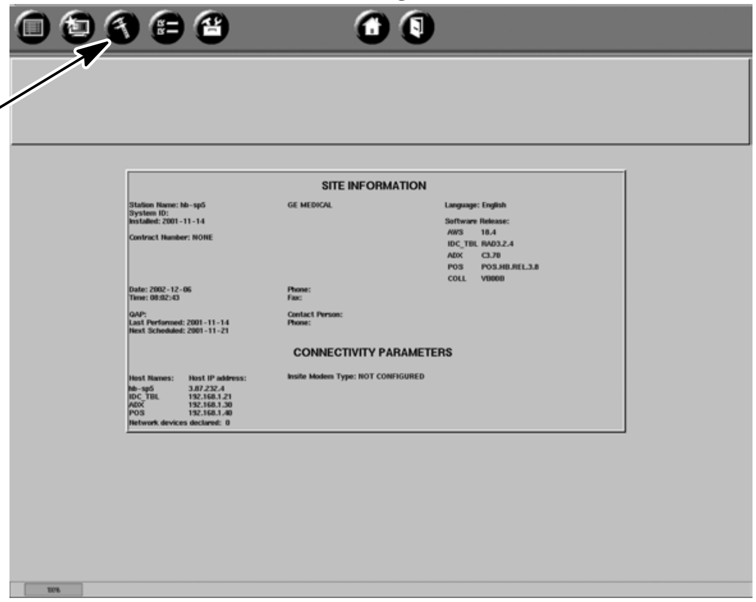
Image Quality Home Page Screen



SECTION 4
CALIBRATION

This function is used to calibrate the detector, AWS monitor, and the printer assigned to the system.

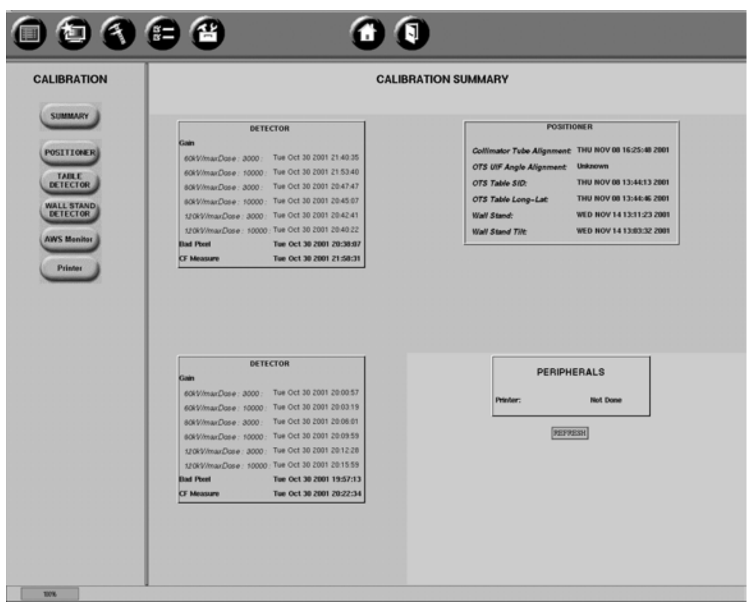
Service Login Screen



1.

Click on the **CALIBRATION** icon button to display the **Calibration Home Page Screen**

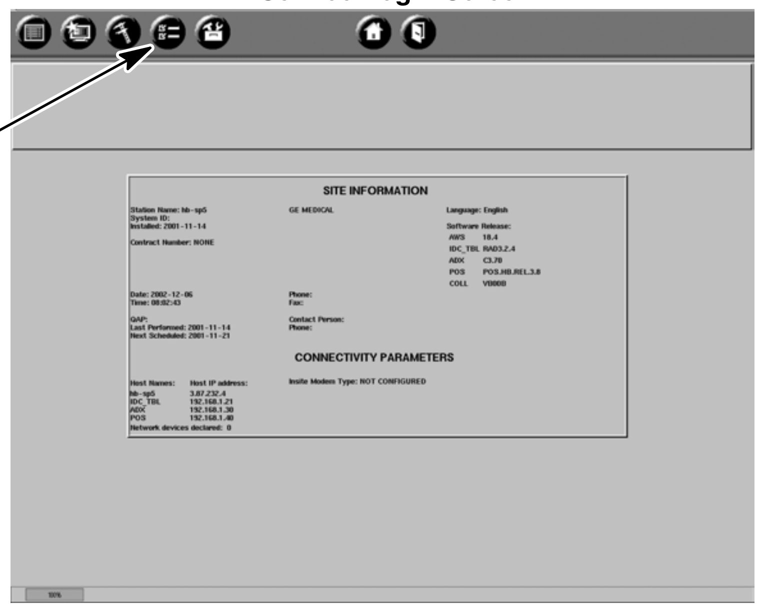
Calibration Home Page Screen



SECTION 5
CONFIGURATION

This function is used to configure Site parameters, General configuration parameters and to configure Insite dialout and IP parameters.

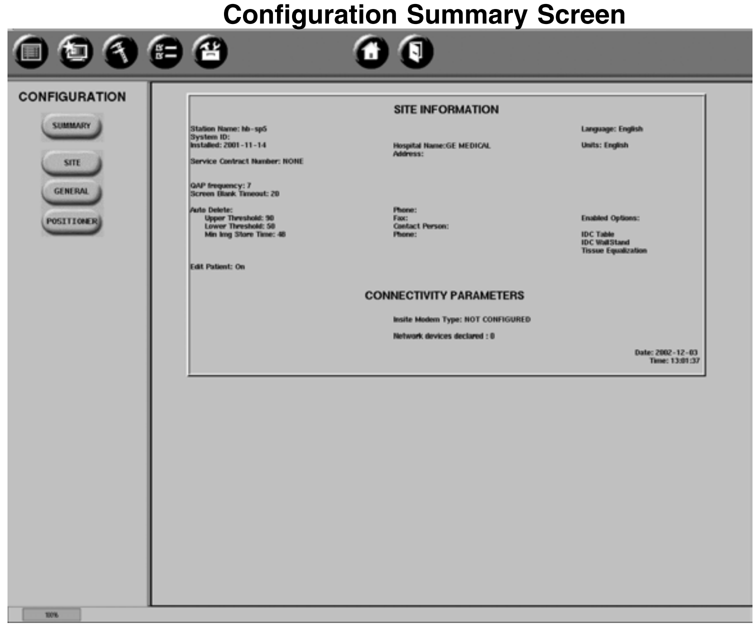
Service Login Screen



1.

Click on the **CONFIGURATION** icon button to display the **Configuration Summary Screen**

Configuration Summary Screen



SECTION 6 UTILITIES

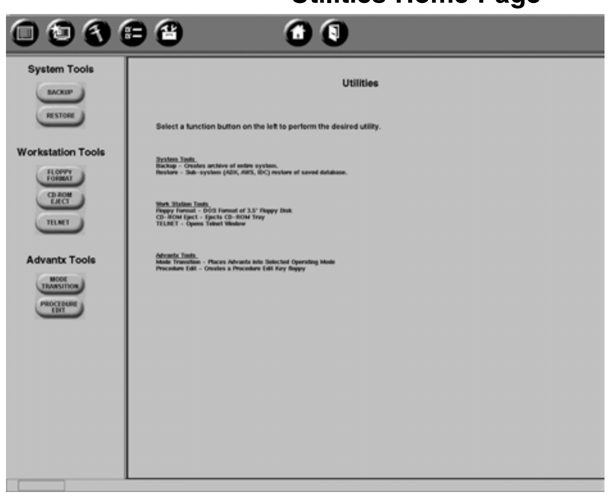
This function is used to implement the Backup and Restore commands. It is also used to Format a floppy and enter a TELNET session.

In addition, the utilities function is used to perform Mode transitions on the Advantx system and Procedure Edit.

Service Login Screen

1. Click on the **UTILITIES** icon button to display the **Utilities Home Page**

Utilities Home Page



6-1 System Tools

6-1-1 Database Backup Overview

By performing a “backup,” the system will save data of the IDC, the Advantx, and the AWS onto the hard drive of the workstation. It also simultaneously saves the Advantx and workstation data onto a floppy disk. Refer to table A–1, for a more detailed description of the backup data.

Note: The IDC data is only saved to the workstation hard drive. It is not included with the data that is also saved onto the floppy disk.

The system only saves the last 2 backups onto the workstation hard drive. The latest backup becomes AWS Backup 1, any previous AWS Backup 1 becomes AWS Backup 2, and any previous AWS Backup 2 is overwritten and is no longer available.

TABLE A–1
BACKUP DATA

Subsystem	Backup Files	Saved to Hard Drive	Saved to Floppy	Saved to KEY Floppy
Advantx	:db:frt_cc.dat (cal.–config.) :db:frt_rt.dat (run time) :etc:hosts (host) :d:dbase1.aup (auto protocols) AUPBKUP.DAT (auto protocols)	Y Y Y Y N	Y Y Y N N	N N N N Y
Acquisition Workstation (AWS) configuration and calibration data	ads.tar ads_hd.tar iop.tar iip.data.Z	Y Y Y Y	Y N Y Y	NA NA NA NA
IDC	All software (Calibration files, Configuration files)	Y	N	NA

6-1-2 Backing Up Databases to Floppy

Before You Begin

– **You must format the floppy in the ADS drive using UTILITIES before you do a backup, or the backup will be corrupted.**

– Once the backup procedure is started, a [Cancel] button is available to stop the process. If [Cancel] is selected, it is necessary to exit and then re–enter the Service Desktop before being able to continue with a backup procedure.

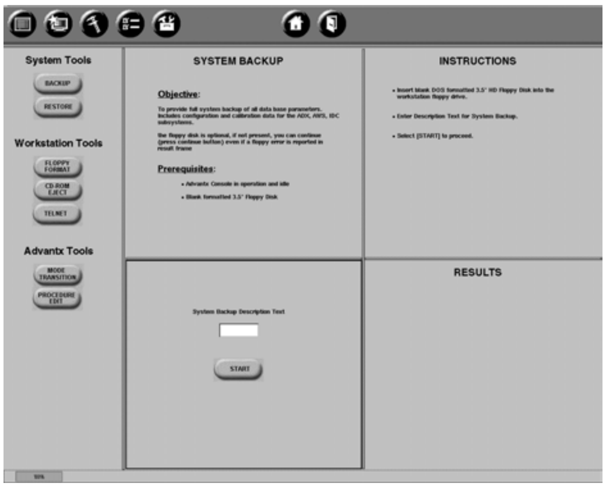
– Do not attempt to eject the floppy before the backup operation is complete. If the floppy is removed while it is being written to, there is the potential for the system to crash.

Procedure

1. From the Utilities Home Page, select **BACKUP** under System Tools and follow screen instructions. A maximum of 9 characters is allowed for the System Backup Description Text. A status message will appear after the process is complete. However, you may get a “backup successful” message <u>even though data was not successfully written to the floppy disk</u>. Proceed to step 2 to verify that the backup data was written to the floppy.
2. After the backup is complete (approximately 4 minutes), put the backup floppy in your laptop and make sure the floppy contains the “subsys” folder. If the “subsys” folder exists, continue on to step 3. If the “subsys” folder does not exist, repeat step 1 to repeat the backup procedure.

3. Remove the floppy, label it with the backup name and date, and store it in a safe location for the room.

Note: The backup must be saved to a floppy. If a floppy is not inserted per the initial instructions, an error message is displayed along with two buttons: [Continue] and [Cancel]. Do NOT select [Continue], as the data will only be saved to the workstation hard drive.

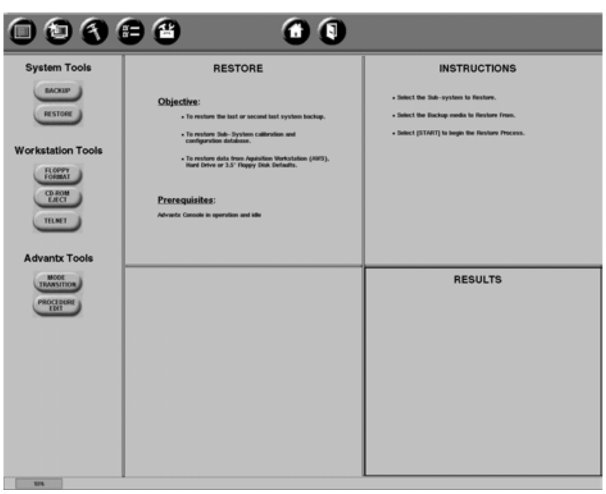


6-1-3 Database Restore

The restore function is used for retrieving Advantx, AWS, and IDC data. It allows a choice for the sub–system, source, and date of the previously saved data. If restoring data from floppy disk, install the backup floppy into the drive before proceeding.

Note: The IDC data is only available from the workstation hard drive. It is not available with the other data that was saved onto the floppy disk.

From the Utilities Home Page, select **RESTORE** under System Tools and follow screen instructions. A reboot prompt message will appear after the process is complete. Be sure to reboot the entire system as instructed, after the restore process.



6-1-4 Backup and Restore of Site–Specific Image Processing Parameters (Looks)

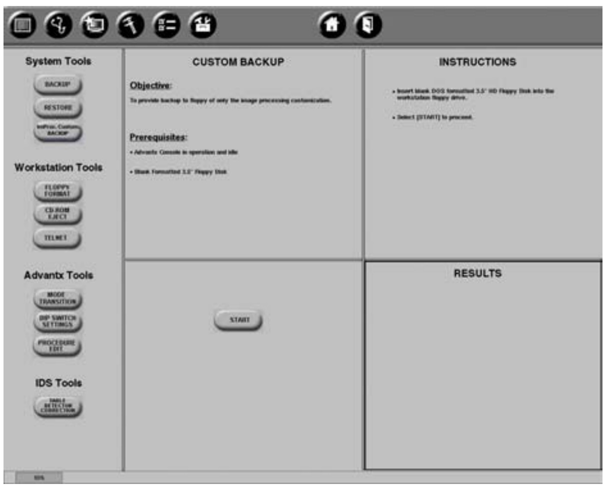
In the event a site would like to re–use their customized looks on other Revolution systems but not transfer all of the data contained in a Backup/Restore procedure, the following procedure can be executed to store the customized look data onto a floppy. This floppy can then be used to load the looks onto another Revolution system.

Backup Procedure

This step will save customized image processing files onto a floppy disk.

1. Insert a blank floppy into the ADS floppy drive.

2. Select “**ImProc Custom Backup**”.



3. Select “**Start**” button.

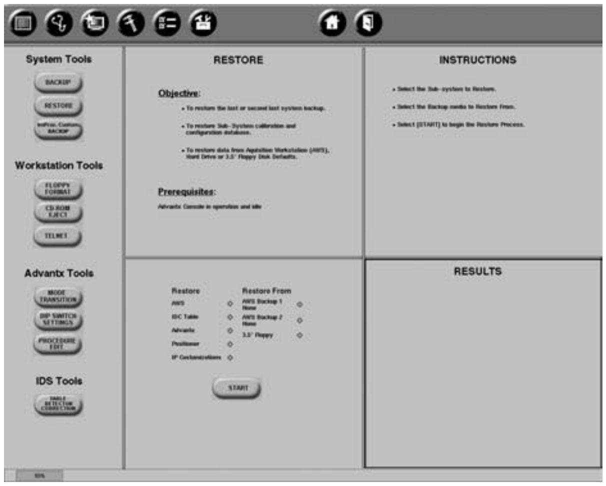
4. When the backup is complete, remove the floppy disk. Write protect the floppy disk and label it “Customized Looks” along with current date and customer name/room. Do not use this disk for any other backup purposes; the disk should only contain data related to customized looks.

Restore Procedure

This step will copy the customized image processing files from a floppy disk onto the Revolution system.

1. Insert the floppy disk containing the backup file into the ADS floppy drive.

2. Select restore “**IP Customizations**” and restore from “**3.5 floppy**”.

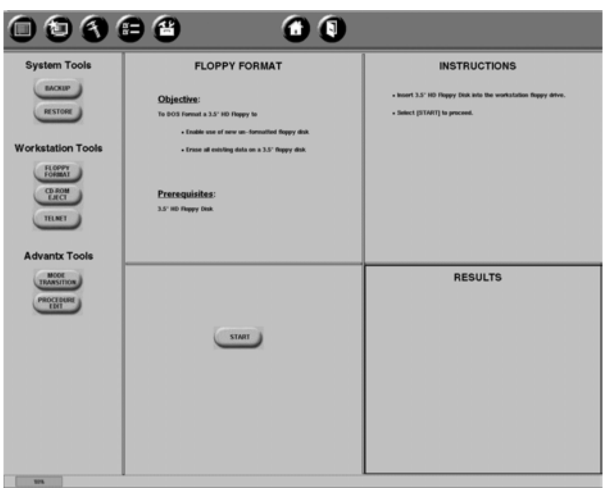


3. Select “**Start**” button.

6-2 Workstation Tools

6-2-1 Floppy Format

This procedure will perform DOS format of 3.5 inch Floppy Disk. From the Utilities Home Page, select **FLOPPY FORMAT** under Workstation Tools and follow screen instructions.



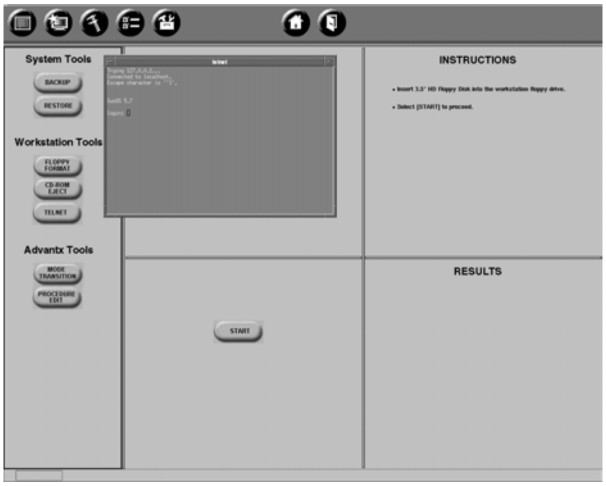
6-2-2 AWS CDROM Eject

This procedure will open the CDROM tray, if a CDROM was already installed. From the Utilities Home Page, select **CDROM EJECT** under Workstation Tools. The CDROM must be in the drive long enough for the system to recognize its presence before the CDROM EJECT button will work.

Note: To open the tray for inserting a CDROM, press the right button on the CDROM drive.
Once the system recognizes the presence of a CDROM it can ONLY be ejected using the CDROM EJECT button in the UTILITIES homepage.

6-2-3 TELNET

This procedure opens a new pop–up Terminal Window (TELNET session). From the Utilities Home Page, select **TELNET** under Workstation Tools.



6-3 Advantx Tools

6-3-1 Mode Transition

Description

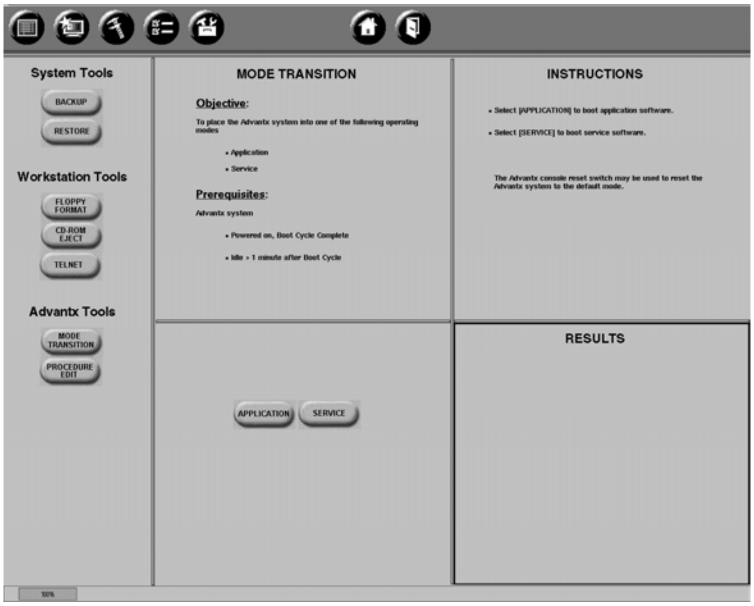
Mode Transition allows for switching between Applications, Service or Diagnostics software on the Advantx sub–system.

Note: The Diagnostic mode must be entered from Applications and not Service.

Note: Following an Advantx cold boot or reset, mode transition is disabled for approximately one minute after the applications screen is displayed on the console. The user must wait one minute following an Advantx boot cycle, before attempting mode transition.

Procedure

From the Utilities Home Page, select **MODE TRANSITION** under Advantx Tools and follow screen instructions.



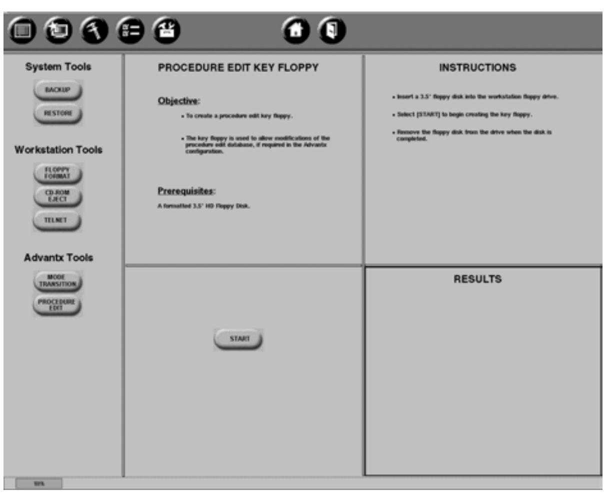
6-3-2 Procedure Edit Key

Description

The Procedure Edit Key selection allows for the creation of a floppy key that restricts access to the Procedure Edit function of this system.

Procedure

From the Utilities Home Page, select **PROCEDURE EDIT** under Advantx Tools and follow screen instructions.



APPENDIX B – LOADING SOFTWARE

SECTION 1
PREPARATION FOR SOFTWARE INSTALLATION

1-1 Prerequisites

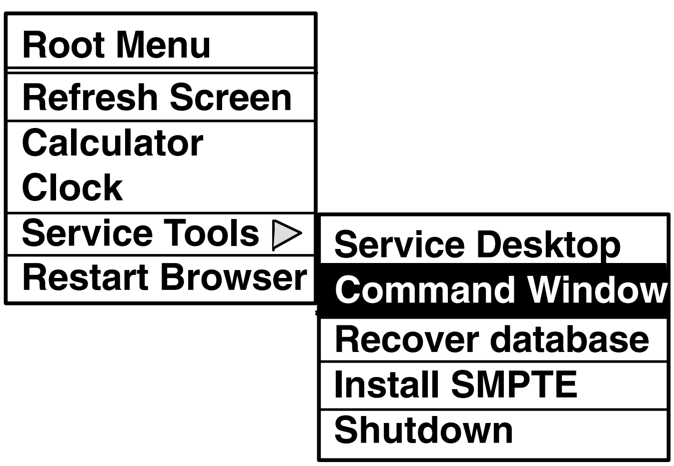
Obtain the following required material and information before starting this procedure:

– Solaris 8 set of 2 CDROMs (in 1 case)
– ADS Jump Start floppy
– One formatted floppy (for system backup)
– AWS host name (refer to User Profile on Service Desktop screen)
– AWS IP address (refer to User Profile on Service Desktop screen)
– AWS Netmask address (refer to Networkflow Audit form)
– Software (SW) key number (see following)

1-2 Record System Data

You should record, for re–use later, the following system information: Software Key, Burn/No Burn, Defaultrouter, Netmask, HostID Number and IP Address.

1. Minimize Main Browser and any other open windows on the AWS.
2. Open a Terminal window:
   a. Position cursor in center of screen and hold left mouse button down.
   b. Drag cursor to **Service Tools > Command Window** and release mouse button.



3. At the prompt, type:

   {hostname}[1] **env | grep SOFTWARE_KEY [Return]**

   Record the Software Key number after it is displayed: _____

4. At the prompt, type:

   {hostname}[2] **env | grep DX_BURN [Return]**

Record the DX_BURN value (yes or no) after it is displayed:_

5. At the prompt, type:

`{hostname}[3]` **`more /etc/defaultrouter`** **[Return]**

Note: *Will return "no such directory" if default router not used.*
Record the Defaultrouter IP address after it is displayed:____

6. At the prompt, type:

`{hostname}[4]` **`more /etc/netmasks`** **[Return]**

Record the Netmask after it is displayed: ______(nnn.nnn.nnn.n)

7. At the prompt, type:

`{hostname}[5]` **`hostid`** **[Return]**

Record the hostid after it is displayed:_________

8. At the prompt, type:

`{hostname}[6]` **`ifconfig -a`** **[Return]**

Record the hospital assigned IP address after it is displayed:(hme1) ____

9. Close the Terminal Window.

1-3 Record Names, Dates, and Addresses

The following items will be reloaded when the database is restored from the backup. In the event that an error occurs, it is suggested that the following items be recorded and verified after the database is restored.

1. Open the Browser from the task bar.
2. From the **Tools menu** select **Service Desktop**.
3. From the Service Desktop Homepage record the following:
   > Hostname and IP addresses = __________ , ______________
   > Install date = ____________
   > Contract number = ____________
   > Insite IP address = ____________
   > Modem type = __________________
4. Call the OLC and request the Key for the External CDROM for the system hostid recorded, if needed.

   CDROM key = ____________

1-4 Record Medical Application Preferences

The following items will be reloaded when the database is restored from the backup. In the event that an error occurs, it is suggested that the following items be recorded and verified after the database is restored.

From the **Tools menu** select **Medical Application Preferences.**

– Auto Push – Select Auto Push and record the settings for all Remote hosts
– Auto Print – Select Auto Print and record the settings for all configured printers

- Annotations – Select Annotations and record selected information
- Quality Check – Select Quality Check and record selected information
- Orientation – Select Orientation and record selected (highlighted) orientations
- Auto Delete – Select Auto Delete and record selected information
- Test Hosts – NA
- Names – Select Names and record Operators, Performing Physicians, and Referring Physicians for later re–entry.

1-5 Record General Configuration Data

The following items will be reloaded when the database is restored from the backup. In the event that an error occurs, it is suggested that the following items be recorded and verified after the database is restored.

1. From the **Tools menu** select **Service Desktop**.
2. From the **Service Desktop** select **Configuration.**
3. From the **Configuration** screen select **General**.
4. Record the following data:
   > QAP Timeout = ____________

   > Screen Blank Timeout = ___________

   > Language = __________

   > Edit Patient = ______

1-6 Record Site Information

The following items will be reloaded when the database is restored from the backup. In the event that an error occurs, it is suggested that the following items be recorded and verified after the database is restored.

1. From the **Tools menu** select **Service Desktop**.
2. From the **Service Desktop** select **Configuration.**
3. From the **Configuration** screen select **Site**.
4. Record the following data:
   > Site Name = ____

   > Site Address = ____

   > Phone (site) = ______________________

   > FAX = _________________________

   > Contact Person = ____

   > Phone (contact) = __________________________

   > Station Name = _________________________________

   > System ID = _____________________

   > Installation Date = ________________

   > Contract Number = _______________

   > Contract Expiration date = ______________

   > Exit **Service Desktop**

SECTION 2

AWS SOFTWARE LOAD FROM COLD

NOTICE **Potential for Data Loss:**

1. If the AWS is fully functional, perform a complete database backup, including backup to floppy (use procedure listed earlier in Appendix A, Section 6 [Utilities]).
2. All patient data will be lost during software installation. Archive all image data before beginning this procedure.

TABLE B-1
INSTALLATION STEP SUMMARY

Step	User Actions	Time Estimate
Booting the CDROM	Insert Solaris CDROM Insert ADS Jump Start floppy Launch installation	3 min
Configuration	Get system parameters	1 to 3 min depending on user
Solaris installation	None	15 min
Application installation	Insert ADS CDROM	30 min

Note: Before starting the Load From Cold, verify that there is no CD in the CD writer and turn off the CD writer (for Ultra 10 workstation only).

2-1 Booting the CDROM

1. To start installing the OS, eject and remove any CD that may be in the drive, then proceed to the OK prompt using one of the two steps below:

   > **Starting with workstation OFF:**
   Power the Workstation and monitor ON.
   Stop the automatic boot with both keys **[STOP]** and **[A]**.
   OK prompt must be displayed on screen.

   > **Starting with workstation ON:**
   From the TOOLS menu select SHUTDOWN.
   Power the Workstation and monitor ON.
   Stop the automatic boot with both keys **[STOP]** and **[A]**.
   OK prompt must be displayed on screen.

2. Insert the Solaris Disk 1 of 2 in the CD–ROM drive.
   Insert the **ADS Jump Start** floppy in the floppy drive.

Note: *Solaris 8 has two CDs (both CDs are in the same case)*.

3. To set the NVRAM parameters to their default values, at the OK prompt type the command:
   `set-defaults` **[Return]**

4. To launch the installation, type the command:
   `boot  cdrom  –  install` **[Return]**
   (This step takes approximately 3 minutes before Solaris panel is displayed on screen.)

Note: Verify that there is a single space after the word boot and on each side of the dash:
`boot`<space>**`cdrom`**<space>**`-`**<space>**`install`**

If the command syntax is not correct, the following messages are displayed:

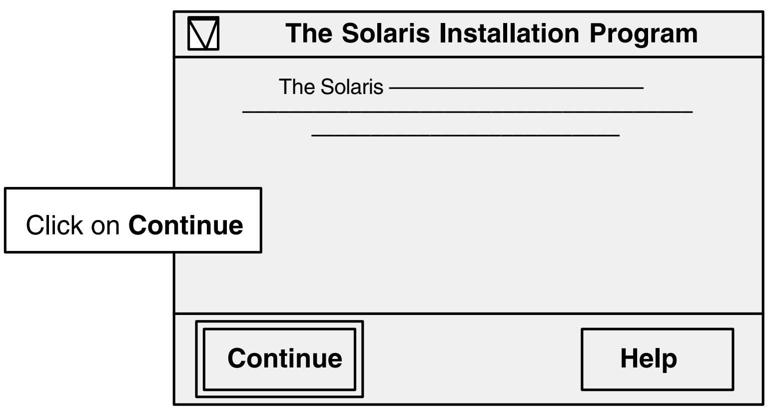
Incorrect Command	Message
`boot cdrom - install`	after a reboot attempt : `boot: cannot open cdrom-install`
`boot cdrom - install`	`boot : cannot open cdrom-`
`boot cdrom - install`	`warning : boot will not enable cache`

2-2 Installation Configuration

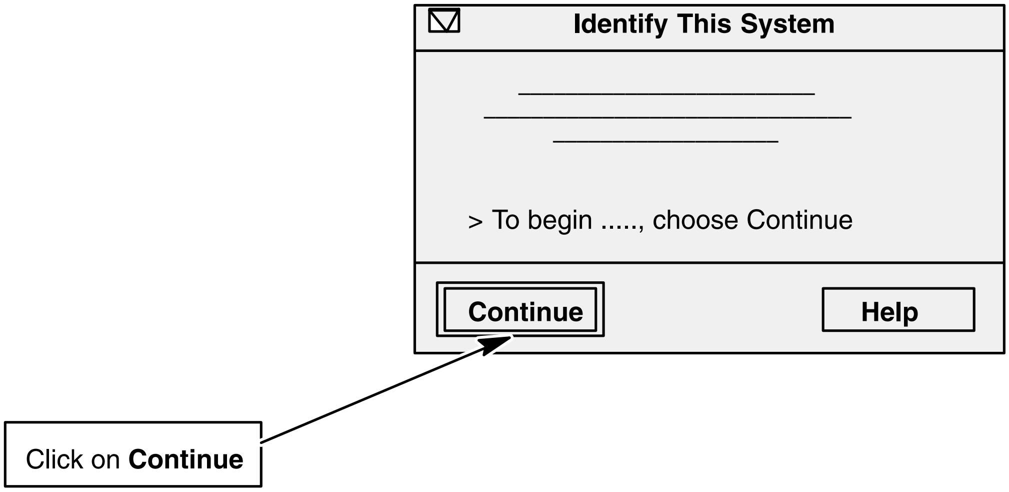
After boot, OS installation program is launched automatically:

Note: Ignore any pop–up message that may occur at this time.

1. At the **Select Language** screen, select the desired language (0 – English, 1 – French).
2. At the **Select Locale** screen, select the locale (0 – English, C–7–bit ASCII), and press **[Return]**.
3. At the **Solaris Installation Program** screen, read the displayed information.

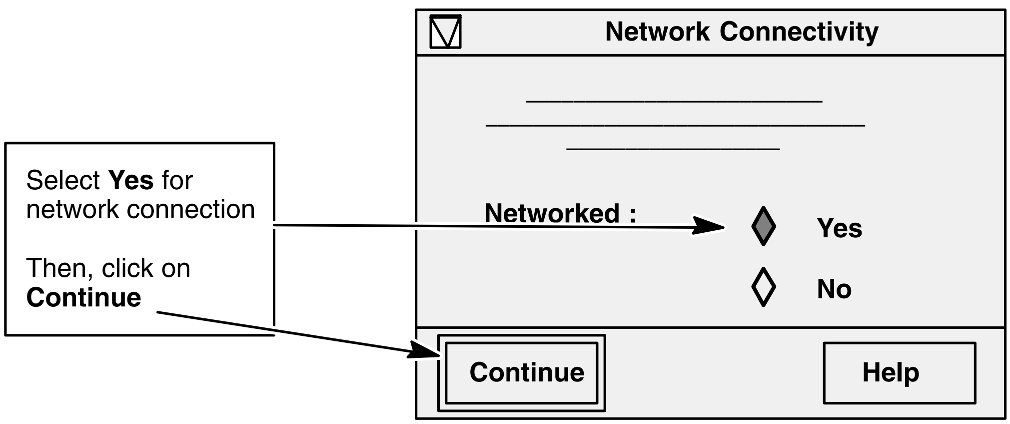


4. At the **Identify This System** screen, read the displayed information.

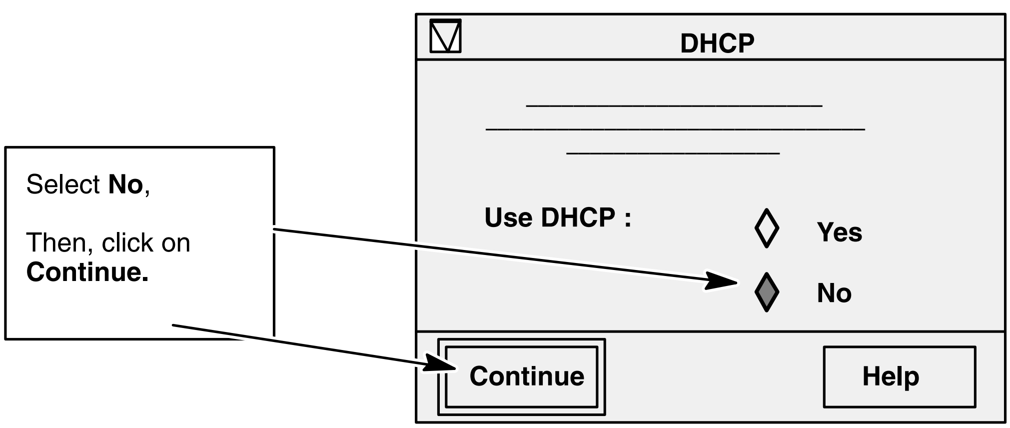


5. At the **Network Connectivity** screen, select **YES**.

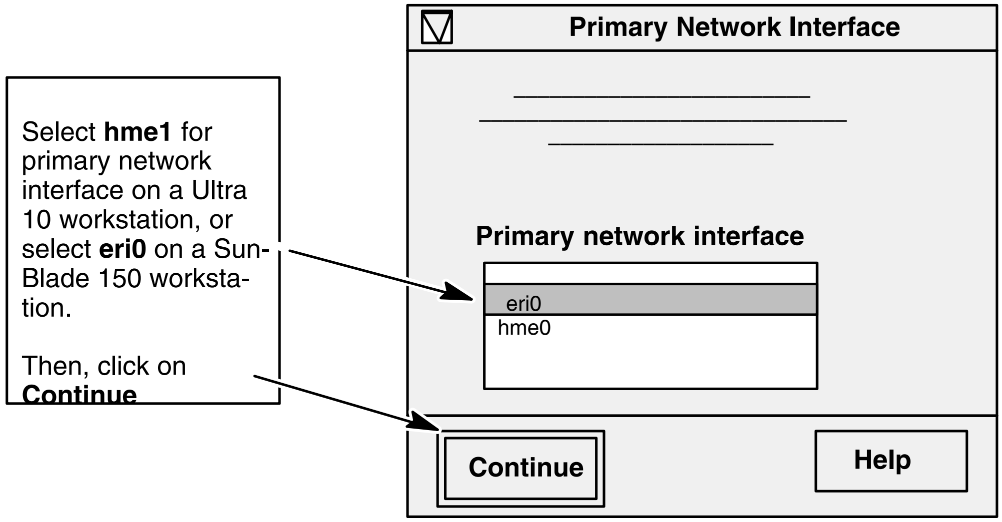
   Select YES even though there is no intent to connect the workstation to a network at the present time.



6. At the **DHCP** screen, select **NO**.



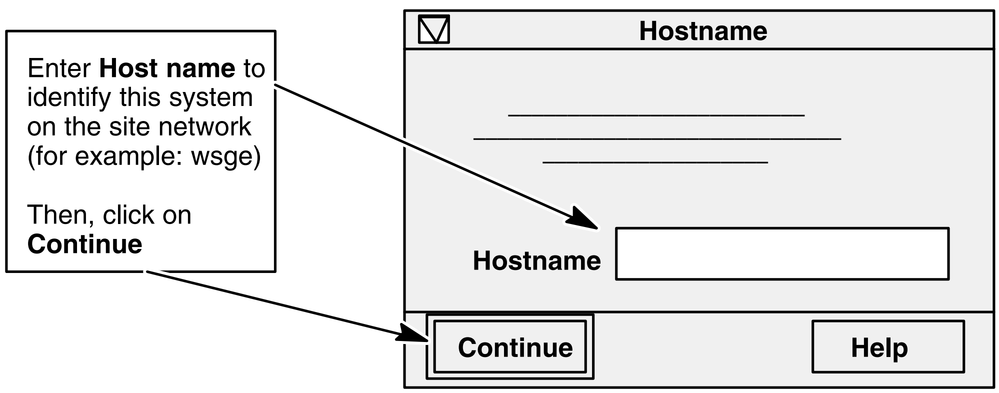
7. At the **Primary Network Interface** screen, select **hme1** (for Ultra 10) or **eri0** (for SunBlade 150).



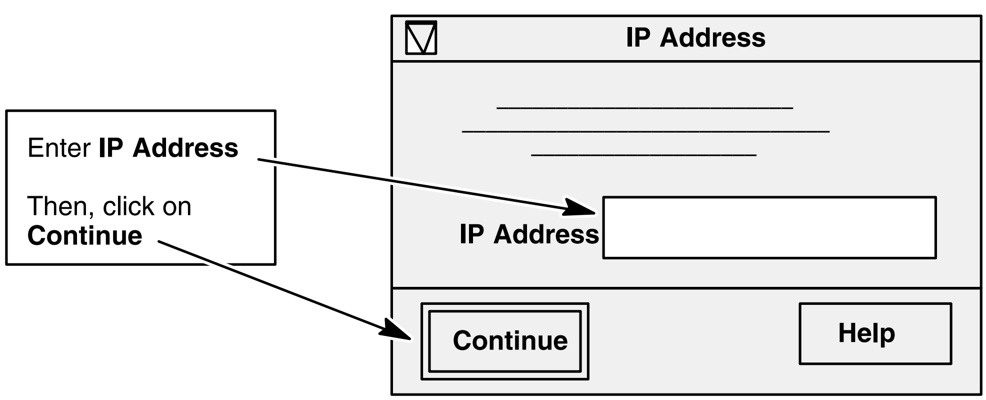
8. At the **Hostname** screen, enter the hospital selected name.

Note: THE HOSTNAME MUST NOT EXCEED 12 CHARACTERS AND MUST NOT USE THE FOLLOWING CHARACTERS:

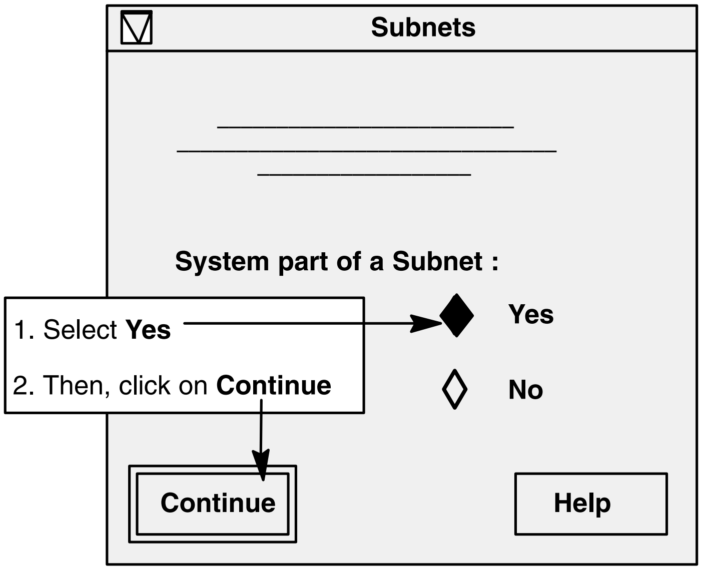
. ! $ " ` ' { } [ ] * @ # ? ^ _ / etc...
ONLY USE ALPHANUMERICAL CHARACTERS WITHOUT SPACE. IT IS ALSO POSSIBLE TO USE – (dash).



9. At the **IP Address** screen, enter the hospital selected IP address.

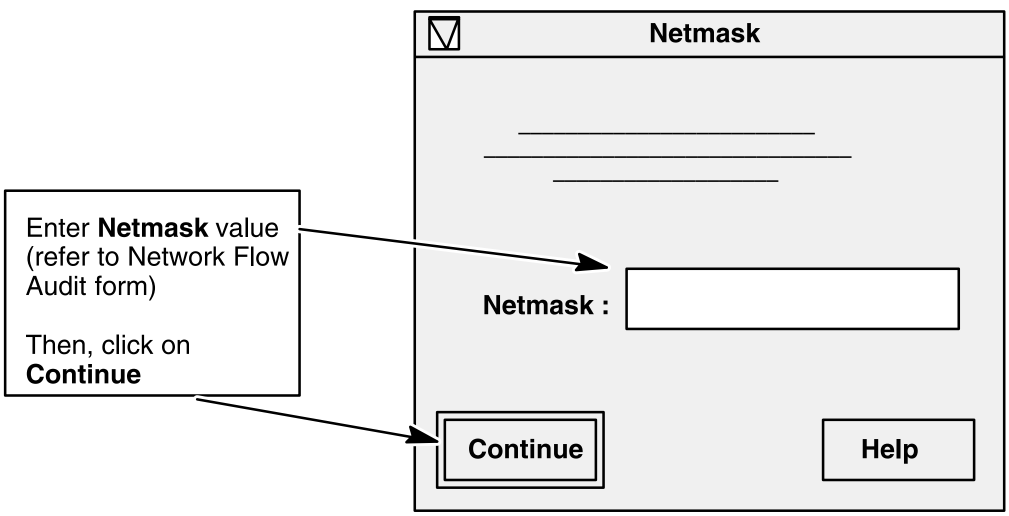


10. At the **Subnets** screen, select **No** if no netmask is required and select **Yes** only if the hospital network administrator requires a network with netmasks.

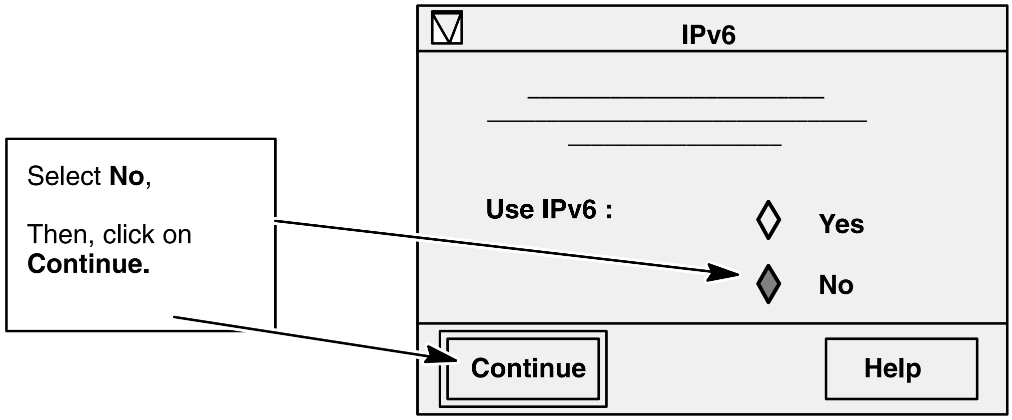


11. When **Yes** is selected at the **Subnet** screen, the **Netmask** screen appears. A netmask, furnished by the hospital (refer to Network Flow Audit), must be entered. The format is four sets of numbers separated by periods. (e.g. `xxx.xxx.xxx.xxx`)

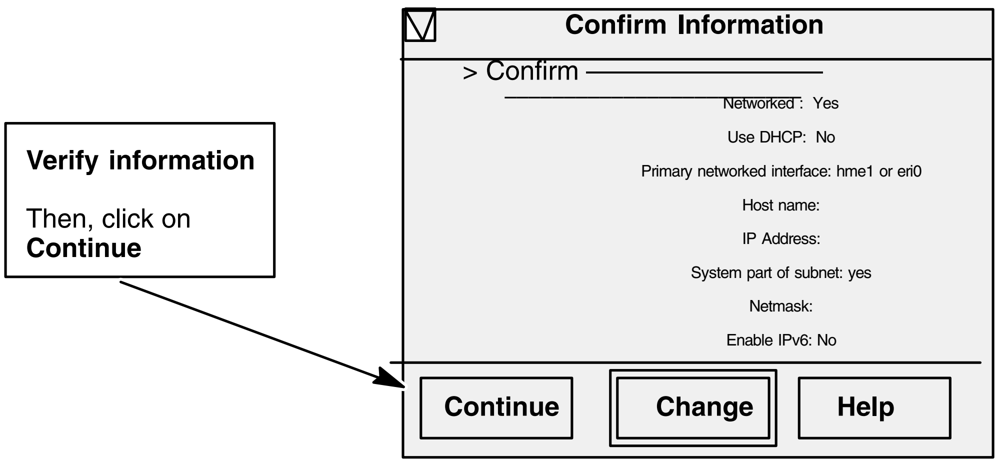
Note: At the Netmask screen, you enter the subnet mask. The netmask field cannot be left blank.



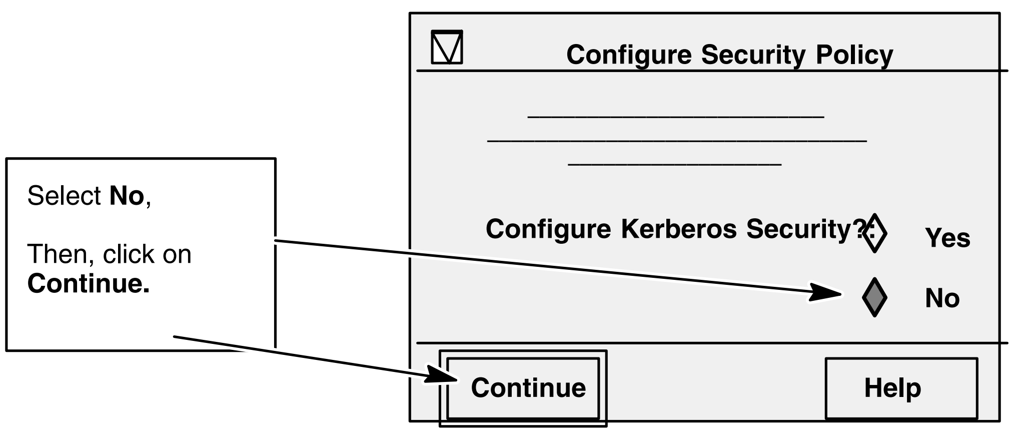
12. At the **IPv6** screen, select **NO**.



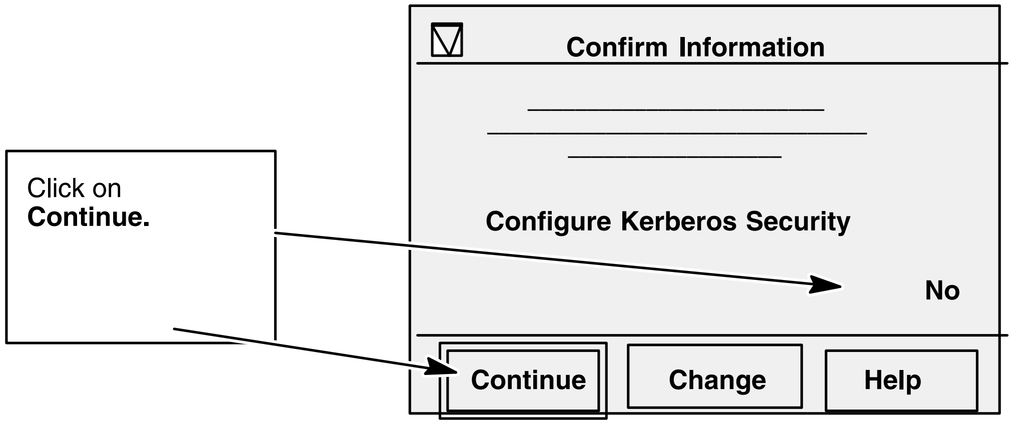
13. At the **Confirm Information** screen, confirm data or change if necessary.



14. At the **Configure Security Policy** screen, select NO.

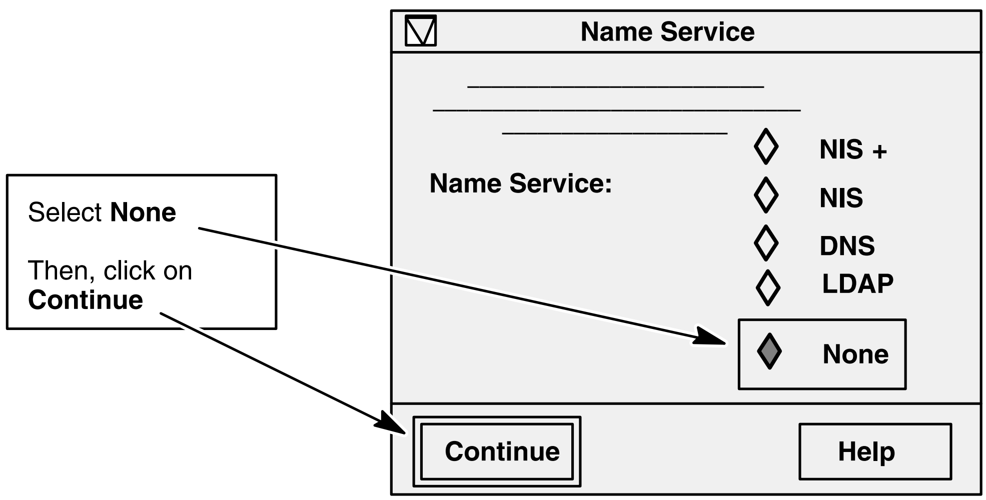


15. At the **Confirm Information** screen, verify **NO**.

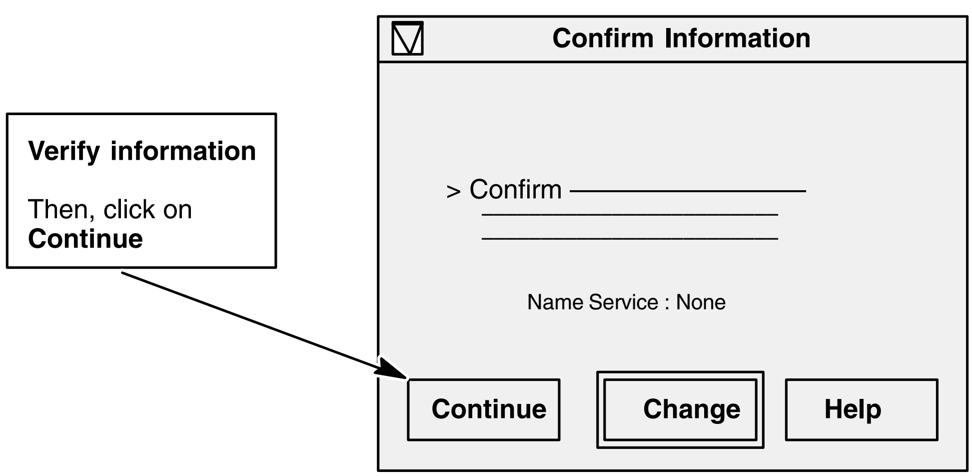


16. At the Name Service screen, select **None**.

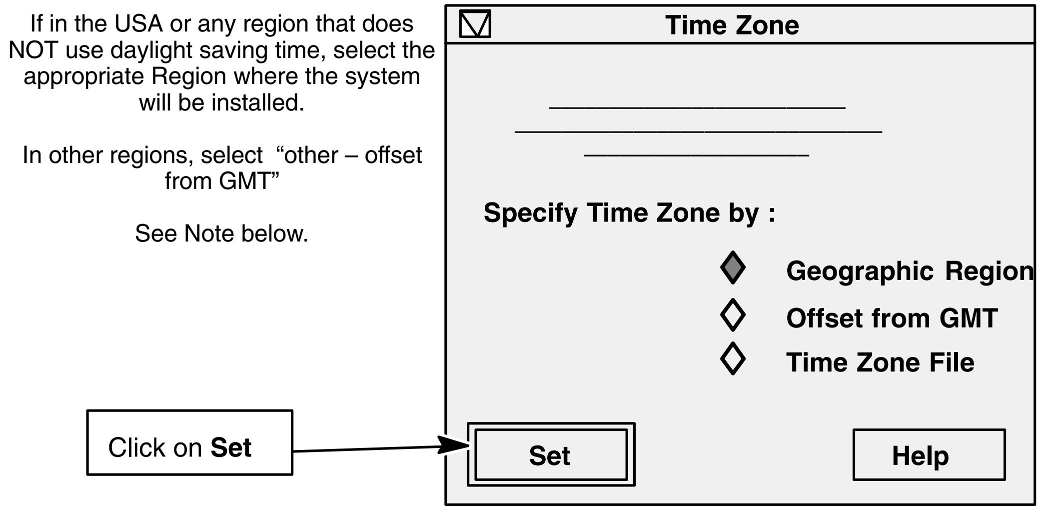
Note: DO NOT SELECT NIS+ OR NIS CLIENT.



17. At the **Confirm Information** screen, confirm data or change if necessary.

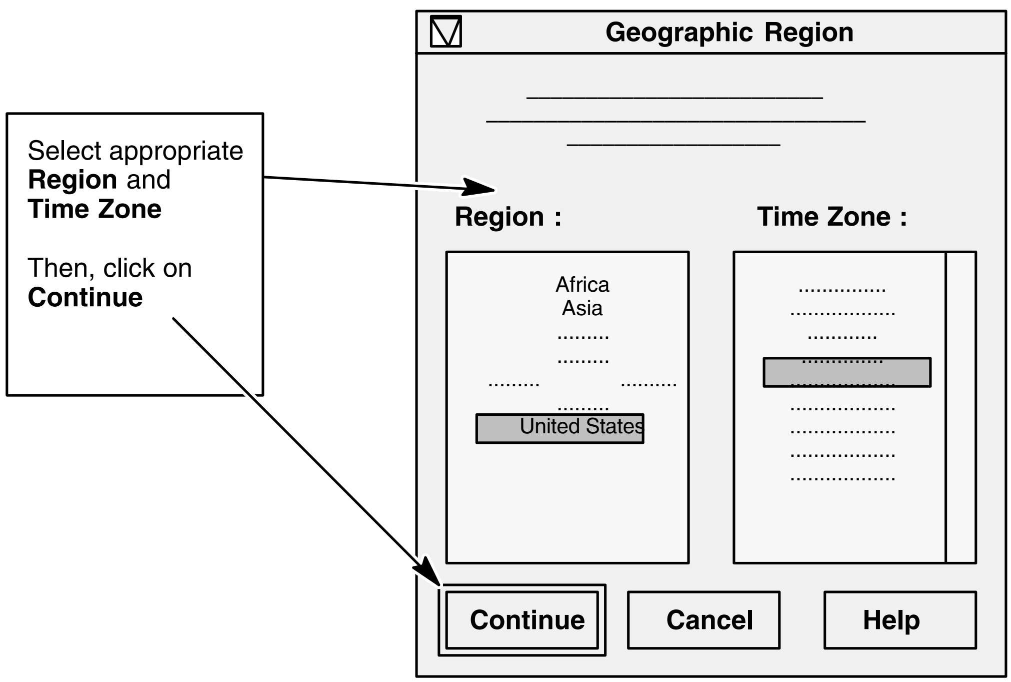


18. At the **Time Zone** screen, select the desired method to specify the default time zone.

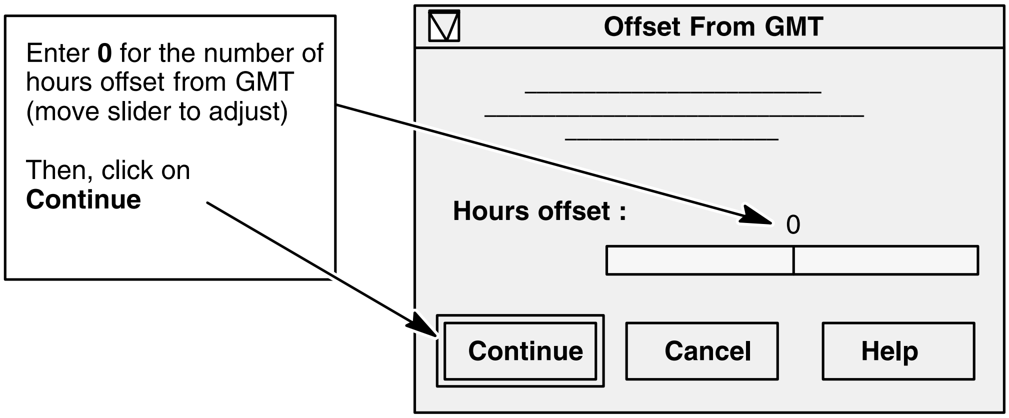


Note: When the system is configured using the "offset from GMT", the system clock will NOT automatically adjust for Daylight Saving Time. The system clock can be adjusted by using **UTILITIES/GENERAL** from the **SERVICE DESKTOP.**

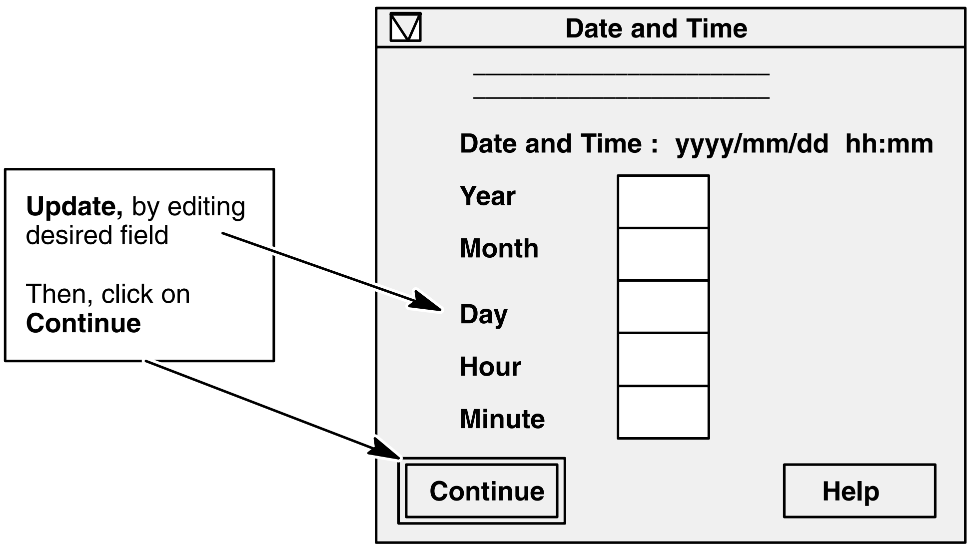
19. At the **Geographic Region** screen, select the region and the time zone where the site is located.



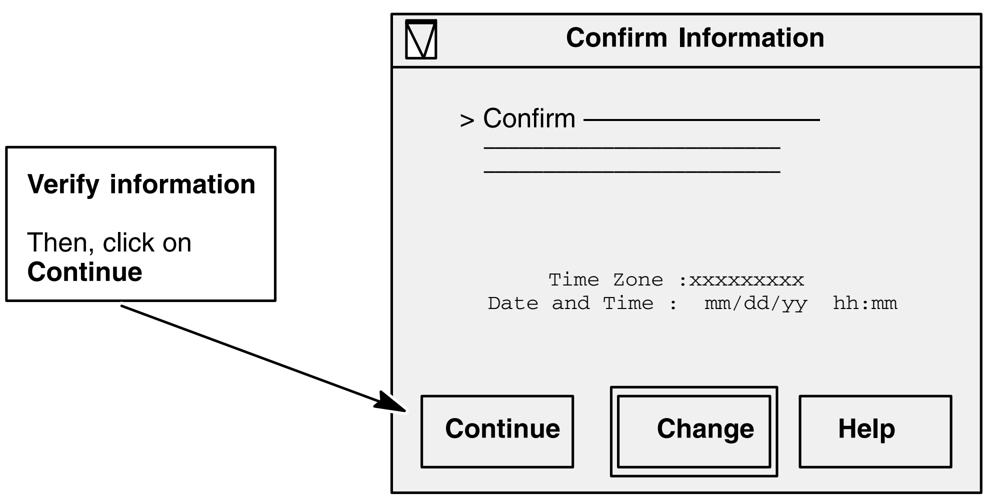
20. At the **Offset From GMT** screen, enter 0 for the number of hours offset from GMT.



21. At the **Date and Time** screen, accept the default time or modify as necessary.



22. At the **Confirm Information** screen, confirm data or change if necessary.



Note: Disk 1 installation procedure takes 15 minutes, after which the system will reboot.

23. When Disk 1 has ejected, you will be asked to insert Disk 2.
    Remove Disk 1 from the CD–ROM drive.
24. Insert Disk 2 (Disk 2 is in the same case with Disk 1).
25. Wait for an indication that the CD (Disk 2) has been recognized by the system, and press **[Return]**.

    The Disk 2 installation procedure will take approximately one (1) minute. When this procedure is complete, the ADS Application Install procedure will begin.

2-3 Application Installation

After OS is installed, the Solaris 8 Disk 2 is ejected.

1. Remove the OS CDROM and the ADS Jump Start floppy.
2. User is asked to install from CDROM or install from network. Press **[Return]** to install from CD–ROM.
3. Install ADS Application CDROM in drive. Wait for the system to recognize the CD.
4. In response to the ADS Application installation window prompt:

   Hit Enter when CD inserted or [q/Q] to quit

   Hit : **[Return]**

   The system will start loading the software. The Application software installation takes approximately 30 minutes.
5. When the install is complete, the CDROM will eject and return, then the system will reboot automatically.
6. At the login prompt, enter user name and password:

Note: SunBlade 150 Only: The login prompt may be obstructed by a transceiver message. Press **[Return]** several times to view login prompt.

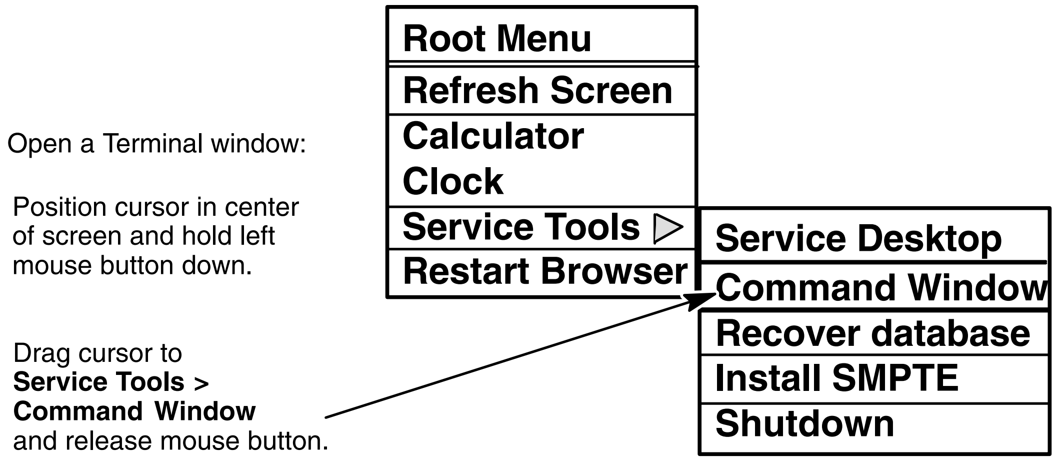
7. ADS CD is ejected. Remove CDROM.
8. A system information window will appear with the following statement:

   `Invalid software key for AWS station. Please check with your GE System Administrator that the correct software protection key is installed.`

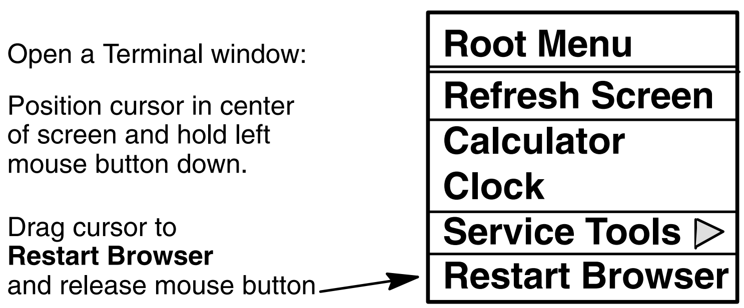
   Click **[OK]**.

Note: Ignore the AWS Reset Status window.

9. Open a Terminal window. Then, select **Command Window** from the Root Menu, as shown:



10. Enter: `cd  /export/home/sdc/install` **[Return]**
11. Enter the command: `./install.key` **[Return]**
12. Enter the software key number and confirm.
13. Select **Restart Browser** from the Root Menu.



14. Restore AWS database from floppy per instructions in Appendix A, Section 6 (Utilities).
15. Remove floppy disk when restore is completed.

Note: Skip step 16 if your workstation is a SunBlade 150.

16. Perform External CD–R Writer Configuration per instructions in Chapter 1, Section 5, if the site has this option (Sun Ultra 10 only).
17. If the site has a router connection to its network, it is necessary to configure it on the workstation. Install Default Router per Chapter 1, Section 1–6, Hospital Router Configuration. If not, skip this step.
18. Review all Medical Application Preferences and select Save for each category (refer to Chapter 2, Section 1).
19. For the selection of “General” configuration parameters, customer purchased options (such as Dual Energy and Image Foldering) and Insite functionality checkout, contact your local GE service engineer.

Note: Dual Energy and Image Foldering are customer purchased options and should only be enabled if the customer has purchased them.

20. Load the IDC CDROM into the Sun workstation drive**,** close tray, and wait 60 seconds for the system to recognize the CD.

Note: If the ADS is a SunBlade 150, you must type: **adsMountCdrom [Return]**.

21. Update IDC backup and restore script files:

    Type: **update_idc_files [Return].**
22. After the IDC complete message, type: **cd ~ [Return].**
23. After the IDC complete message, type: **exit [Return]**
24. Remove IDC CDROM from drive and close tray.
25. Perform a complete system backup, as described earlier in this appendix. This will save Advantx, IDC, and AWS data to the AWS.

SECTION 3
IP SERVER SOFTWARE LOAD FROM COLD

Two CD/DVD disks are required for the IP Server load from cold. These disks are:

> Linux OS Software – Basic; XR/d, XQ/i DIE OS 3.1.2.210; part # 2400239–2

> Application Software – Basic; XR/d, XQ/i DIE 1.4.5; part # 2400356–2

1. To load the Linux OS software, place the DIE OS 3.1.2.210 DVD (part # 2400239–2) in the IP Server PC DVD drive and close the drive.
2. Reset the IP Server PC by pressing the reset button on the front panel.
3. Wait appromately 18 minutes for the load to complete (the IP Server PC ejects the DVD when complete).
4. Remove the DIE OS 3.1.2.210 CD from the IP Server PC CD–ROM drive and close the drive.
5. Reset the IP Server PC by pressing the reset button on the front panel, then wait approximately 90 seconds before proceeding to the next step.
6. If not already done, contact the local GE service person to configure the ADS to use the ”IP Server”:
   – Select **Service Tools/Service Desktop/Configuration/General**.
   – Check the ”IP Server” option box.
   – Exit the Service Desktop.
   – Shutdown the ADS:
     > On the browser, select **Service Tools/Shutdown**.
   – After the shutdown is complete (approximately 2 minutes) press the UPS ON pushbutton.
   – Logon with: username and password
7. To load the IP Server software, place the DIE 1.4.5 DVD (part # 2400356–2) in the SUN computer CD–ROM drive and close the drive. *The IP Server software will be loaded onto the SUN computer, then the SUN computer will FTP the files over to the IP Server.*
8. Open an ADS command window and enter the following commands:
   – Type **`adsMountCdrom [Return]`**.
   – Type **`su - root[Return]`**.
   – Enter the root password: [Return].
   – Type **`cd /cdrom/cdrom0 [Return]`**.
   – Type **`./ipserver.install [Return]`**.
   – Wait approximately 15 seconds for the application installation to complete.
   – Type **`exit [Return]`**.
   – Type **`adsEjectCdrom [Return]`**.
9. Remove the DIE 1.4.5 CD from the SUN computer CD–ROM drive and close the drive.
10. Restart the ADS browser:
    – On the browser, select **Service Tools/Restart Browser**.

SECTION 4
LOADING OPERATOR MANUAL ON AWS

Requirements

The operator manual must be installed from the CDROM onto the AWS whenever the AWS software has been reloaded.

Operator Manual Loading Procedure

This procedure copies the operator manual from the CDROM to the AWS hard drive. One or two languages can be installed. Once the first language selection is made, all previously stored languages will be erased.

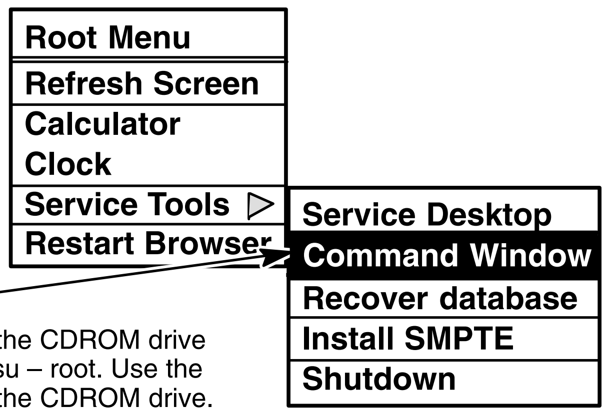
1. Put the operators manual CD (2296976–271) in the ADS CDROM drive.

2. Minimize Main Browser and any other open windows on the AWS.

3. Open a Terminal window:

Position cursor in center of screen and hold left mouse button down.

Drag cursor to **Service Tools > Command Window** and release mouse button.



NOTE: If the ADS is a SunBlade 150, the CDROM drive must be mounted before logging in to su – root. Use the **adsMountCdrom** command to mount the CDROM drive.

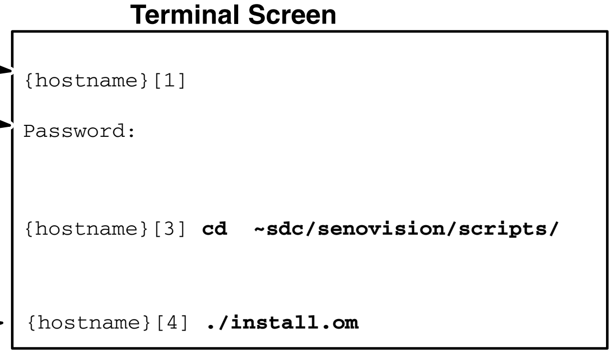
4. Login as root:
Type login name **[Return]** at the prompt.

5. Type password **[Return]** at the Password prompt.

6. At the prompt, type:
cd ~sdc/senovision/scripts/ **[Return]**

7. At the prompt, type:
./install.om **[Return]**

Terminal Screen

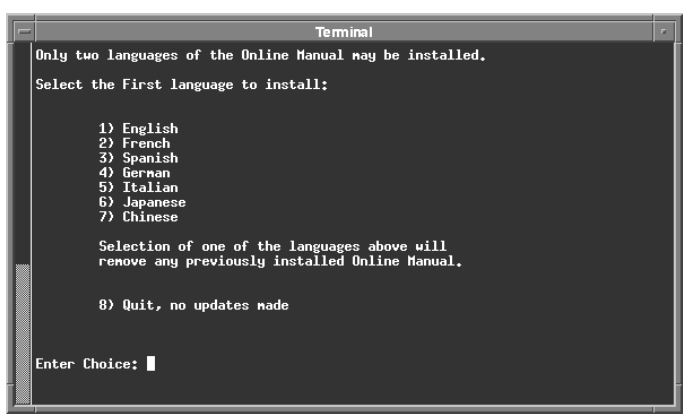


8. Enter the number of the first language to be installed :

All previously installed languages will be erased.

or

Enter **8** to exit without installing a language.
Previously stored languages will not be affected.



9. Enter the number of the second language to be installed :

or

Enter 8 to exit without installing a second language.

10. At the prompt, type:
`cd ~` **[Return]**

NOTE: If the ADS is a SunBlade 150, you must type **`exit`** **[Return]** to exit at the root level. Then you may use the **`adsEjectCdrom`** command to eject the cdrom.

11. At the next prompt type:
`eject` **[Return]** to open the CDROM drive tray.

12. At the prompt, type:
`exit` **[Return]**

Terminal Screen

```
{hostname}[5] cd ~

{hostname}[6] eject

{hostname}[7] exit
```

SECTION 5
LOADING DEMO IMAGES ON AWS

Procedures are described in detail in Direction 2270268–100, Image Processing Defaults Toolkit.

SECTION 6
IDC SOFTWARE INSTALLATION

6-1 Prerequisites

The IDC software CDROM must be inserted into the SUN workstation CDROM drive before proceeding.

Note: This procedure uses an ICD Rescue floppy to boot or reload software. When an IDC is reset/re–booted with the IDC Rescue floppy in the floppy drive, a full software load from scratch must be performed.

This procedure copies the IDC files from the CDROM to the AWS hard drive, deletes all files from the IDC, and transfers the IDC files from the AWS hard drive to the IDC. No calibration files will remain.

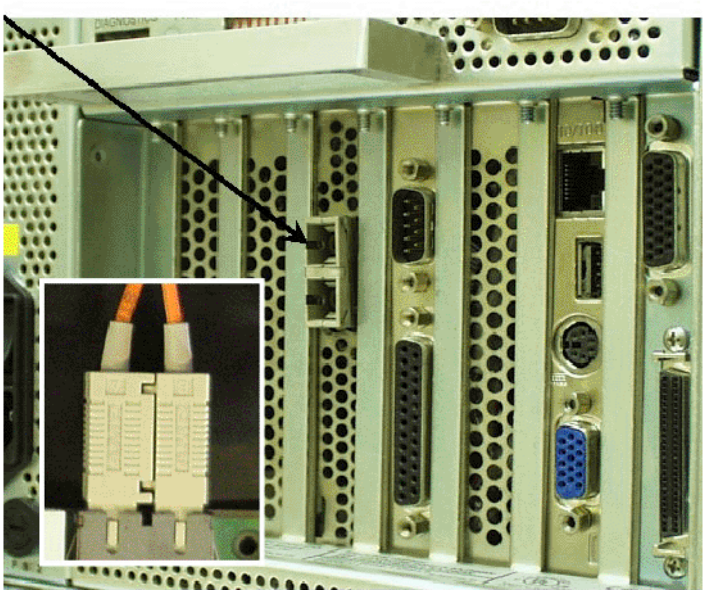
Note: XQ/i systems with IDC part numbers equal to or lower than 2286100 should load IDC 3.4.0. XQ/i systems with IDC part numbers higher than 2286100 should load IDC 4.1.3. The IDC part number is difficult to locate, therefore it is easier to identify the IDC by observing the IDC fiber cable connector as shown on the following page.

- For SC–type connector – load IDC 3.4.0 software
- For LC–type connector – load IDC 4.1.3 software

6-2 Identification of System Type (by fiber cable connector)

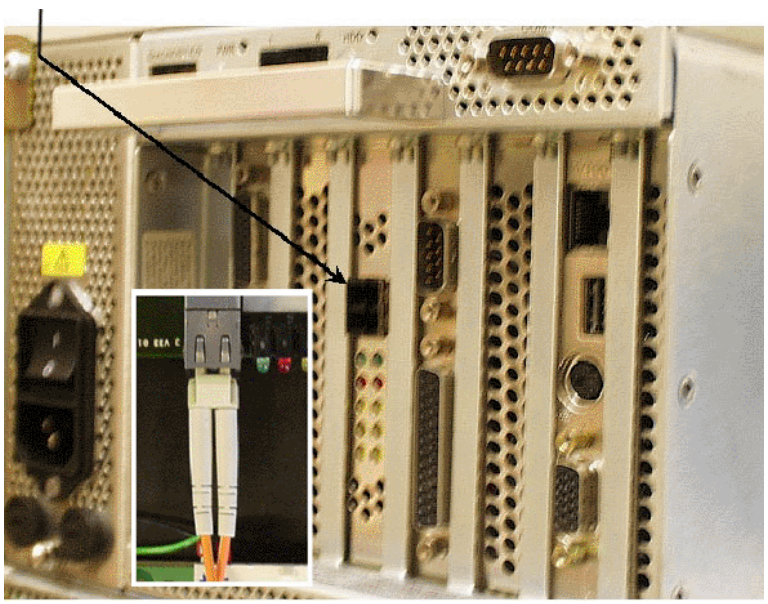
You can identify your IDC type by the style of the fiber connector. Refer to the following illustrations.

SC–Type Fiber Cable Connector



For IDC with SC–type connector, load IDC 3.4.0 software

LC–Type Fiber Cable Connector



For IDC with LC–type connector, load IDC 4.1.3 software

6-3 IDC Software Load Procedure

1. Minimize Main Browser and any other open windows on the AWS.

2. Open a Terminal window:
Position cursor in center of screen and hold left mouse button down.

Drag cursor to **Service Tools >Command Window** and release mouse button.

Root Menu
- Refresh Screen
- Calculator
- Clock
- Service Tools ▷
- Restart Browser

Service Tools submenu
- Service Desktop
- Command Window
- Recover database
- Install SMPTE
- Shutdown

NOTE: If the ADS is a SunBlade 150, the CDROM drive must be mounted before logging in to su – root. Use the **`adsMountCdrom`** command to mount the CDROM drive.

3. Login as root:

Type login name **[Return]** at the prompt.

Type password **[Return]** at the Password prompt.

Terminal Screen

```
{hostname}[1]

Password:
```

4. Load IDC CDROM into the SUN workstation drive, close tray, and wait 60 seconds for the system to recognize the CD.

5. At the prompt, type: **`cd   /cdrom/cdrom0/iqst/install`** **[Return]**

6. At the prompt, type: **`./installIdc.sh`** **[Return]**

7. Hit the **[Return]** key and the IDC software will begin loading.

Note: The lock tab on IDC Rescue floppy cannot be in the WRITE PROTECTED position.

8. When file transfer is complete, insert the IDC Rescue floppy in the IDC.

Terminal Screen

```
{hostname}[2] cd  /cdrom/cdrom0/iqst/install

{hostname}[3] ./installIdc.sh
-----------------------------------------------
This procedure will install IDC on ADS.

hit [Return] key when ready or [q/Q] to quit.
-----------------------------------------------
IDC files transfer from CDROM to AWS is
completed...
```

9. Boot the IDC by cycling its power. IDC Rescue floppy V2.3 added hard disk formatting and partitioning to the load process. Wait 4 minutes for the IDC Rescue floppy to complete. If you do not wait long enough, the ADS will not be able to ping the IDC.

10. Remove IDC Rescue floppy and reboot IDC.

11. At the prompt, type: **`./script_release_from_scratch idc`** **[Return]**

12. Hit the **[Return]** key and the IDC software will begin loading.

13. Enter the number for the desired selection and press **[Return]**

Terminal Screen

```
{hostname}[5] ./script_release_from_scratch idc

 ----------------------------------------------
 This procedure will install IDC on ADS.

 hit [Return] key when ready or [q/Q] to quit.
 ----------------------------------------------

 ------ Installation Menu ------

 1. Revolution XQ/i WallStand
 2. Revolution XR/d WallStand
 3. Revolution XR/d Table
 4. Exit Installation
 -------------------------------
    Enter your choice


IDC files transfer from AWS to IDC is completed
```

14. At the prompt,type: **`telnet idc`** **[Return]**

15. At the prompt,type: **`cd "/idc"`** **[Return]**
Verify return value =0=0x0

16. At the prompt,type: **`rm "bootrom.sys"`** **[Return]**
Verify return value =0=0x0

17. At the prompt,type: **`mkbootAta 0,0, "bootrom.ata"`** **[Return]**
Verify return value =0=0x0

18. At the prompt,type: **`logout`** **[Return]**

Terminal Screen

```
{hostname}[6] telnet  idc

{hostname}[7] cd  "/idc"

{hostname}[8] rm  "bootrom.sys"

{hostname}[9] mkbootAta 0,0, "bootrom.ata"

{hostname}[10] logout
```

19. Type: **`exit`** **[Return]**
Type: **`pwd`** **[Return]** to verify that current directory is **/export/home/sdc.**

20. Update **IDC** backup and restore script files:
Type: **`update_idc_files`** **[Return]**

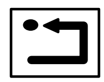
CD will automatically eject.

21. Remove the IDC CDROM from drive and close tray.

Note: If the system has a V1 detector (see Section 5–4), the **volt.txt** file must be deleted using the following steps:

From the Root menu, open a Command window.
At the prompt enter: **ftp idc [Return]**
At the login prompt enter: **[Return]**
At the password prompt enter: **[Return]**
At the prompt enter: **cd /idc [Return]**
At the prompt enter: **ls [Return]** to verify the presence of the volt.txt file
At the prompt enter: **del volt.txt [Return]**
At the prompt enter: **ls [Return]** to verify the volt.txt file is not there
At the prompt enter: **quit [Return]**

22. Reboot the IDC by pushing the **[System Reset]** button on the Advantx console.

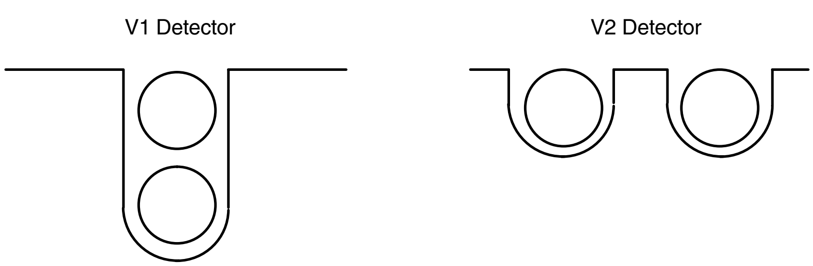


23. Close the Terminal window.

Note: After loading the IDC, it may take several minutes for the SUIF home page to report the correct software revision. Do not wait or try to reload the software again; just continue the procedure and check the software revision later.

6-4 V1 vs V2 Detector Identification

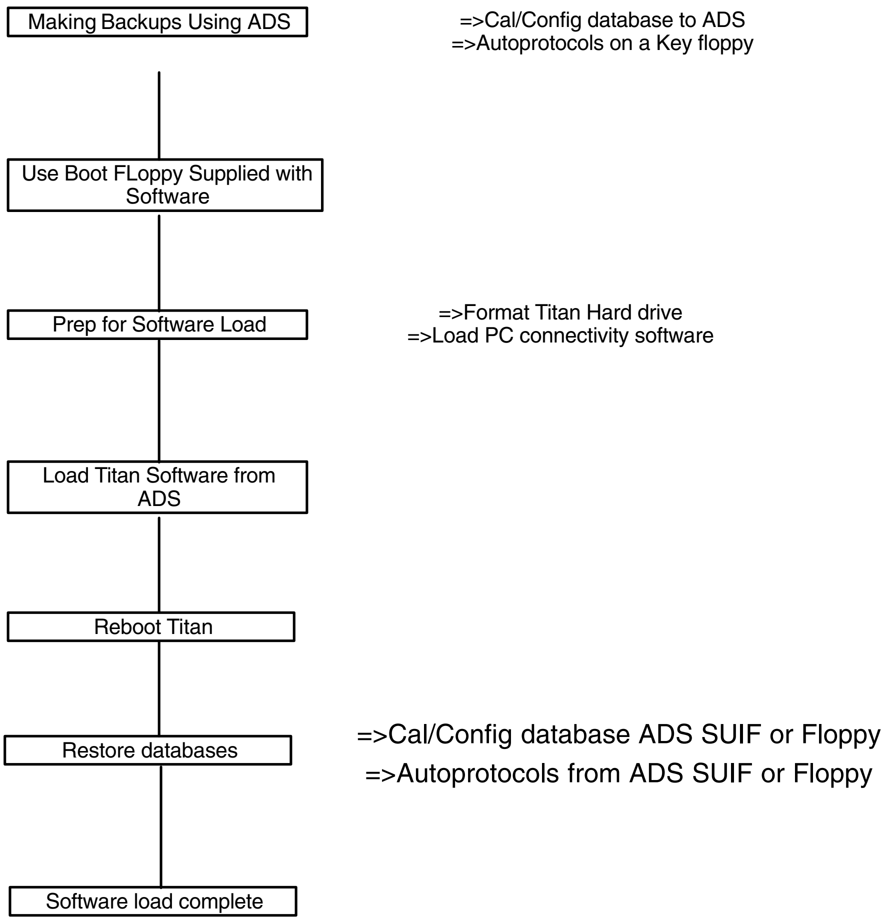
To determine if the detector is a V1 or V2 remove the top cover of the detector housing and observe the orientation of cooling hoses. V1 detectors have the hoses stacked vertically in 1 opening and V2 detectors have the hose positioned horizontally in 2 openings. See diagram below.



SECTION 7
ADVANTX SOFTWARE INSTALLATION

7-1 Overview

The following flow chart gives an overview of the Advantx software Load From Cold installation process. It assumes that no databases have been previously saved and does a complete Load from Cold followed by a restore of the saved databases. The detailed process is described in Sections 7-2 through 7-6.



7-2 Database Backup

Before beginning an Advantx software Load From Cold or Advantx software Upgrade, the Cal/Config and the Run Time databases must be stored on the ADS hard drive and the Autoprotocols must be stored on a Procedure Edit Key floppy.

7-2-1 Required Equipment and Software

- ADS
- Advantx–E Software
- Autoprotocol floppy
- Advantx–E Software load cable (2358020)

7-2-2 Backup Procedure

1. Back up the system to the ADS using the SUIF.
2. Create Key Floppy (if needed)
   a. From **Tool Menu/Service Desktop/Utilities** select **Procedure Edit.**
   b. Insert a blank formatted floppy in the ADS Workstation floppy drive.
   c. Select **Start**.
   d. Select **Exit.**
   e. Remove the Key floppy from the ADS Workstation.
3. Save Autoprotocols to the Key Floppy
   a. Insert the Key floppy in the Titan floppy drive.
   b. On the Advantx console, touch the **Procedure Menu** softkey.
   c. From the Procedure Menu screen, touch the **Proc Edit** softkey.
   d. From Procedure Edit screen, touch the **More** softkey twice to display the **Save/Retrieve** softkey.
   e. Touch the **Save/Retrieve** softkey.
   f. From the Save/Retrieve screen, touch **Save Backup.**
   g. Touch **Continue** to save the Autoprotocols on the Key floppy in the Titan.
   h. Touch **Edit Done** to exit.

7-3 Prepare the Advantx–E for Software Load

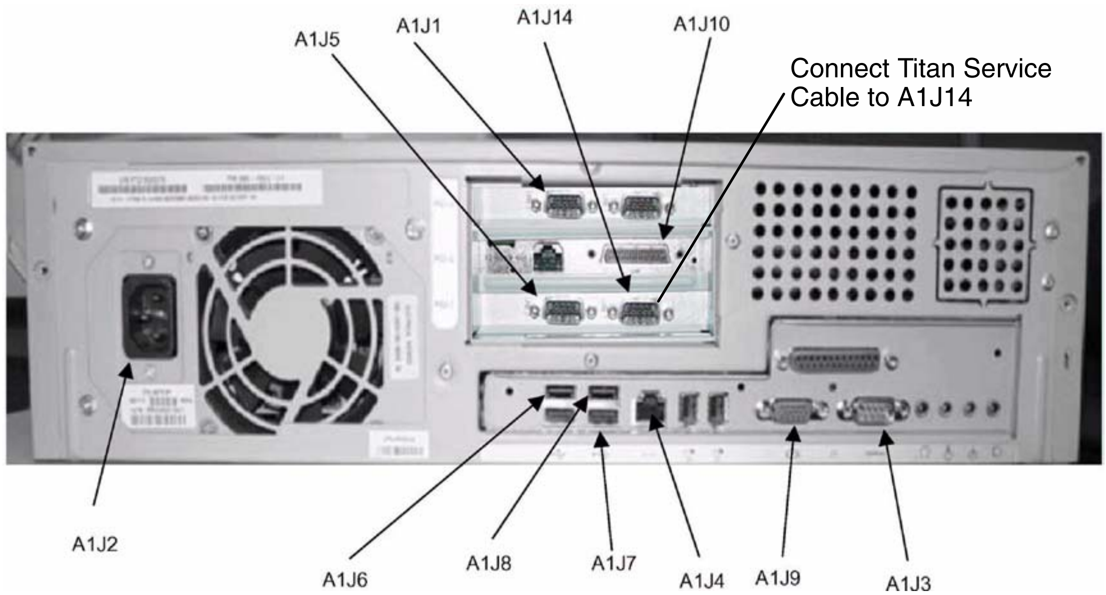
Note: Before beginning this section, verify that the proper software CD and boot floppy disk are present.

1. Connect the serial Titan Service Cable (2358020) for the Titan software load to the Titan COM1 connector on top of the Titan module. Check the label on this end of the cable to ensure it says “TITAN”.

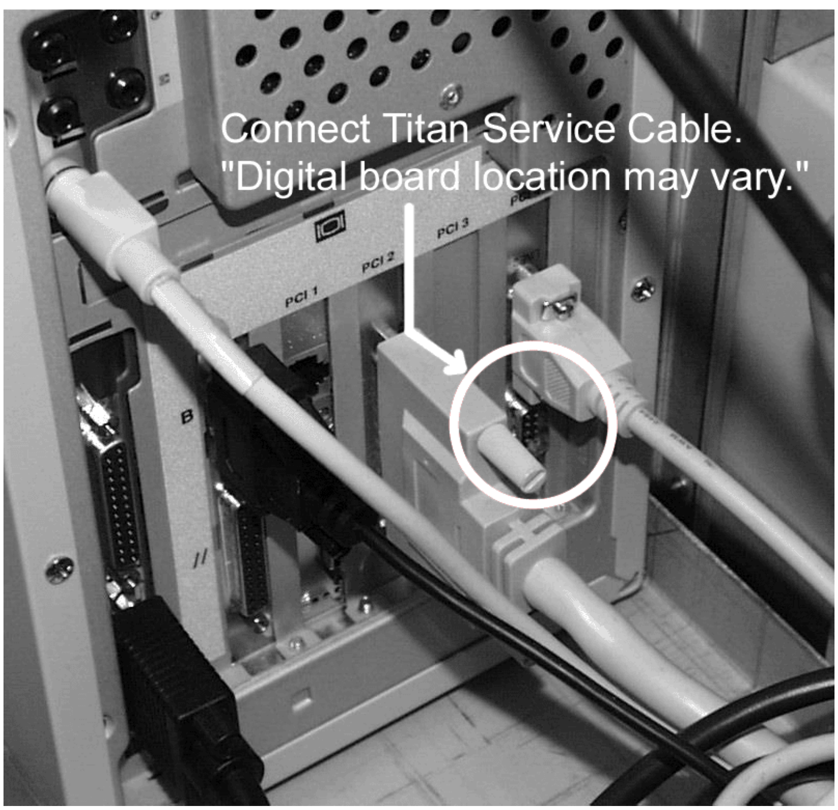
Note: If the serial Titan Service Cable has been previously installed, it may already be connected to the workstation and run through the cable rack to the left side of the Systems Cabinet, where the remainder of the cable has been coiled up for storage.

2. Connected the other end of the Titan Service Cable to the ADS workstation. Refer to the following illustrations for connection to the Sun Ultra 10 or SunBlade 150 workstations.

Service Cable Connection (SUN SunBlade 150)



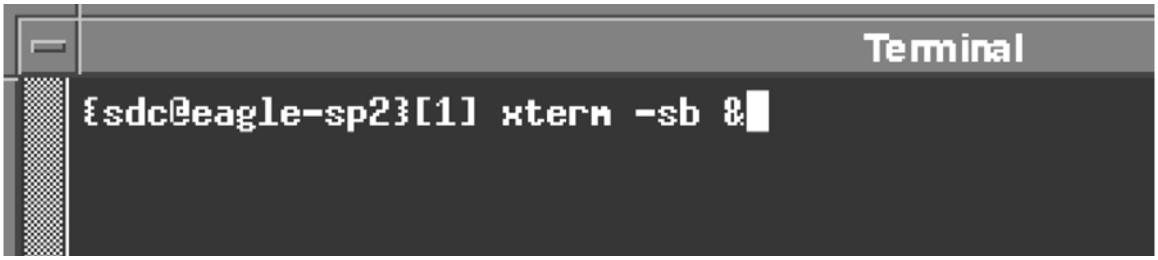
Service Cable Connection (SUN Ultra 10)



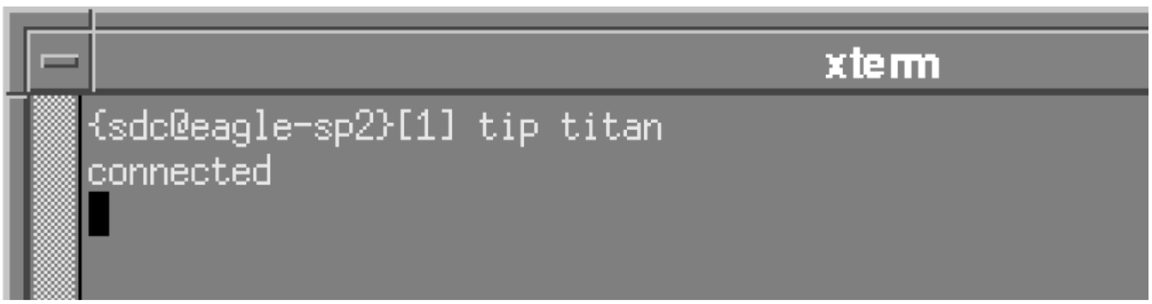
3. Install the Boot floppy in the Titan floppy drive.
4. On the ADS, minimize the browser. Open a command window by right–clicking on the desktop and selecting **Service Tools,** then **Command Window.**

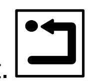
5. In the terminal window, type **`xterm -sb & [Return]`**
   An xterm window will open.

Note: This command does not work when the user is root.



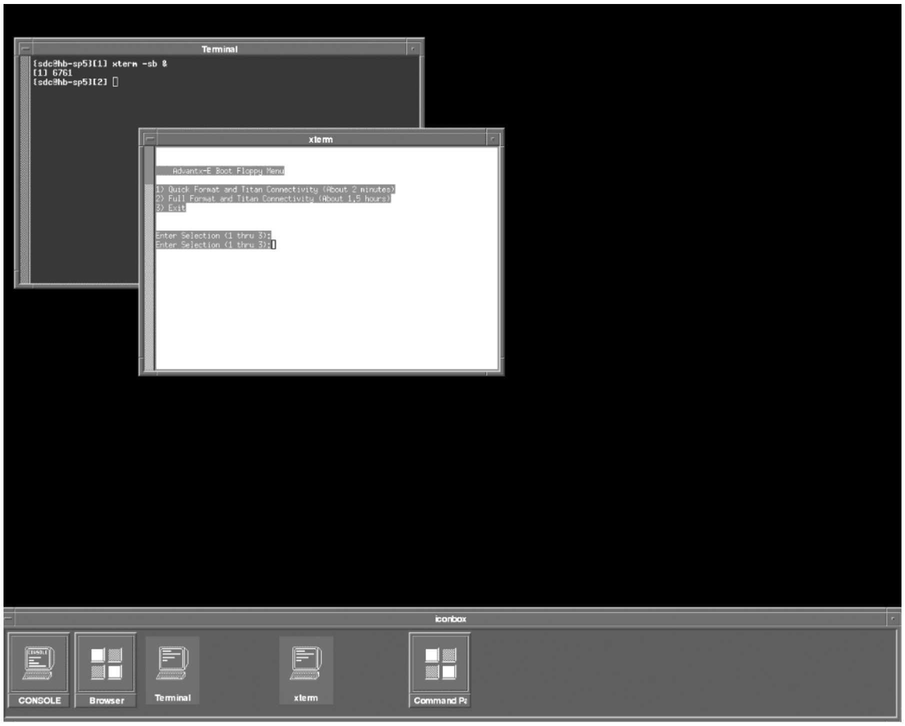
6. In the xterm window, type **`tip titan [Return]`**. The system should return “connected.”



7. Reset the Titan by pressing the **[reset]** button on the front. 

Note: If message says “`all ports busy`”, make sure serial cable is connected properly.

8. Quickly enter **`1`**, `Make Floppy Default` Drive.



9. Enter **1**, `Quick Format and Titan Connectivity` (approx. 2 minutes)
10. Wait for the message, “`Target file load.`”
11. Close the xterm window.

7-4 Advantx Software Installation Procedure

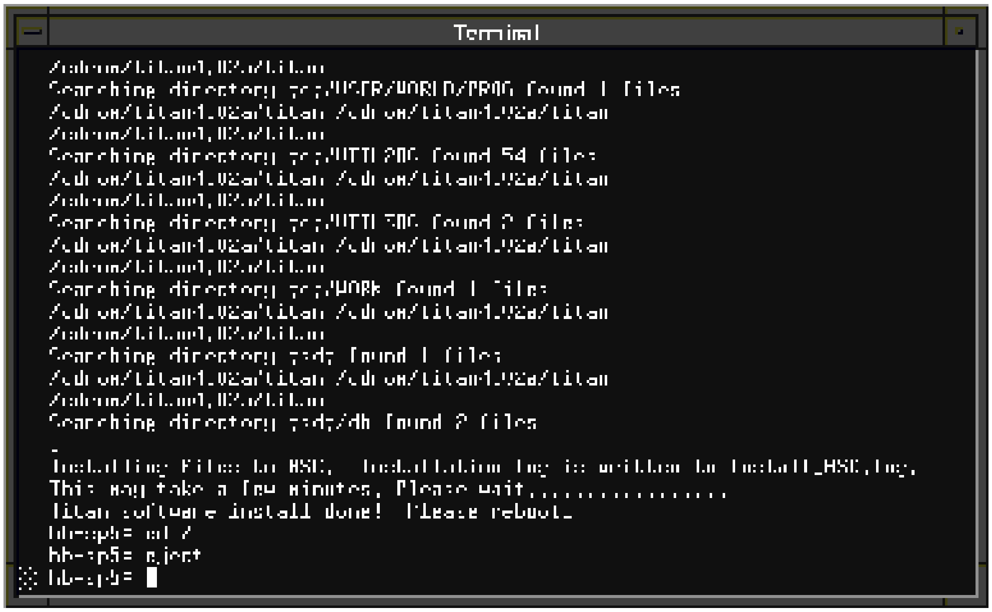
1. Place Advantx software CD in CD–ROM drive.

Note: If ADS is a SunBlade 150, use the **`adsMountCdrom`** command to mount the CDROM drive.

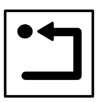
2. Login as root, type login name **[Return]** at the prompt.

   Type password **[Return]** at the password prompt.
3. From the ADS terminal window, type **`cd /cdrom/cdrom0/titan`** **[Return]**.

4. Type **`./titan.install`** **[Return]**. The installation process will take approximately 3 minutes.



5. After the installation process is complete, remove the Boot floppy from the Titan drive and reboot the system by pushing the **System Reset** button on the Advantx console.



6. Type **`cd   /`** **[Return]**.

Note: If you are using the SunBlade 150, you must type **`exit`** **[Return]** to exit at the root level. Then you may use the **`adsEjectCdrom`** command to eject the cdrom.

7. Type **`eject`** **[Return]** to remove the CDROM disk.

7-5 Restore the Databases

Restore the Advantx–E Cal/Config, Runtime, and Auto Protocol databases using the Utilities menu on the ADS SUIF.

7-6 Auto Protocol (Aup) Software Installation Procedure

This procedure will copy the latest default Auto Protocol procedures from the XQ/i ADX Cx.xx CDROM onto a Procedure Edit Key floppy disk and use the Key floppy disk to load the procedures onto the Advantx.

7-6-1 Create a floppy with the default Auto Protocol procedures as follows:

1. Create a Procedure Edit Key floppy using **Tool Menu**>**ServiceDesktop**>**Utilities**>**Procedure Edit.**
2. Insert the Revolution XQ/i Application Software–Basic **<u>XQ/i ADX Dx.xx</u>** CD into the service laptop CDROM drive.

3. Using Windows Explorer, copy the default procedures from the CD to the Key floppy as follows:
   a. Copy CD file: **`E:\ASCEDM\Dx_xx\AUTOPROS\REVXQI.DAT`**
   (where `E:` is the appropriate letter for the laptop CD drive and `Dx_xx` is the appropriate software release)
   b. Copy file to: Key floppy disk and rename it **`Aupbkup.dat`**
4. Remove the Key floppy disk from the service laptop floppy drive.

7-6-2 Install the default Auto Protocol procedures as follows:

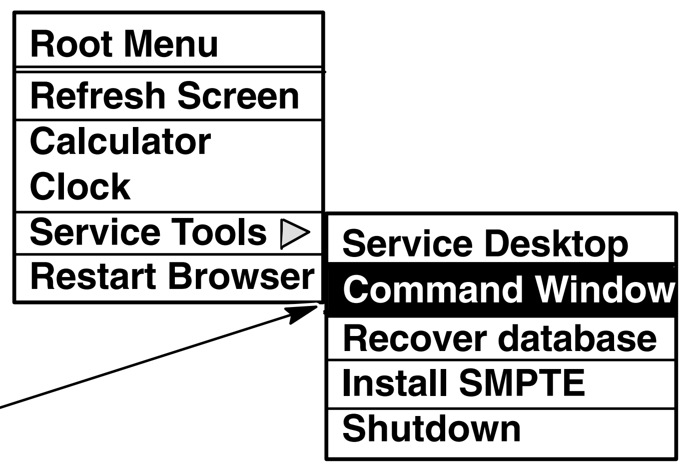
1. Insert created Key floppy into the Advantx floppy drive.
2. From the Procedure Menu screen, touch the **Proc Edit** softkey.
3. From the Procedure Edit screen, touch the **More** softkey twice to display the **Save/Retrieve** softkey.
4. Touch the **Save/Retrieve** softkey.
5. From the Save/Retrieve screen, touch the **Retrieve Backup** softkey.
6. Touch the **Continue** softkey to load the Auto Protocols from the Key floppy onto the Advantx.
7. Touch the **Edit Done** softkey to exit.

SECTION 8
UN–INSTALL CD–R WRITER (ULTRA 10 ONLY)

1. Minimize Main Browser and any other open windows on the AWS.

2. Open a Terminal window:
Position cursor in center of screen and hold left mouse button down.

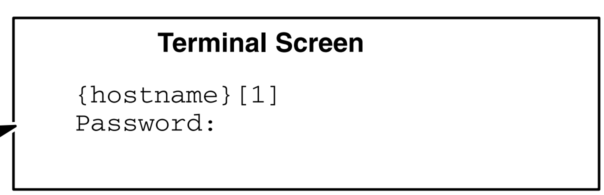
Drag cursor to
Service Tools >
Command Window
and release mouse button.



3. Login as root:

Type login name **[Return]** at the prompt.

Type password **[Return]** at the Password prompt.



4. To change directory to find the de–install driver, at the prompt, type:
cd /export/home/sdc/install [Return]

5. To run the deinstall process, at the prompt, type:
./uninstall.cdr [Return]

Terminal Screen

```
{hostname}[2] cd  /export/home/sdc/install
{hostname}[3] ./uninstall.cdr
```

6. After the system indicates that the deconfiguration is complete, type:
exit [Return]

7. Restart the browser:

Position cursor in center of screen and hold left mouse button down.

Drag cursor to **Restart Browser** and release mouse button.

Root Menu

- **Refresh Screen**
- **Calculator**
- **Clock**
- **Service Tools ▷**
- **Restart Browser**

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APPENDIX C – IMAGE QUALITY

This appendix supplements the Image Quality Evaluation section, listed in Chapter 6. It contains some detailed information regarding individual QAP tests and also has a section on troubleshooting tips.

SECTION 1
QAP TEST INFORMATION

1-1 AUTOMATIC TEST SEQUENCE OPTION

There is an optional selection that is available at the start of the QAP tests which can run an automated sequence of all the QAP tests, as performed from the customer interface. To select this option, click on **ALL** when the QAP Application screen is first displayed. The tests will run in sequential order with different screens that prompt the user for phantom placement and image acquisitions.

All results will be displayed at the end of the acquisitions, however no **graphical** result displays are available with this option.

QAP Application Screen

Click on: **ALL**

The system will start running Dark Image Tests. When complete, the system will sequentially run through the remaining QAP tests.

1-2 QAP TEST DESCRIPTIONS

1-2-1 Pixel Artifacts

The pixel artifact test is a measure of the number of bad pixels in a flat–field image. The number of bad pixels is calculated by computing the histogram of all pixels in the flat–field image excluding a 1.5 cm border. The histogram is adjusted to exclude outliers, and the mean and standard deviation of this adjusted histogram are calculated. All pixels with a value greater than 7 times the standard deviation above or below the mean pixel value are flagged as bad. Refer to Illustration C–1.

ILLUSTRATION C–1
BAD PIXEL GRAPHICAL DISPLAY

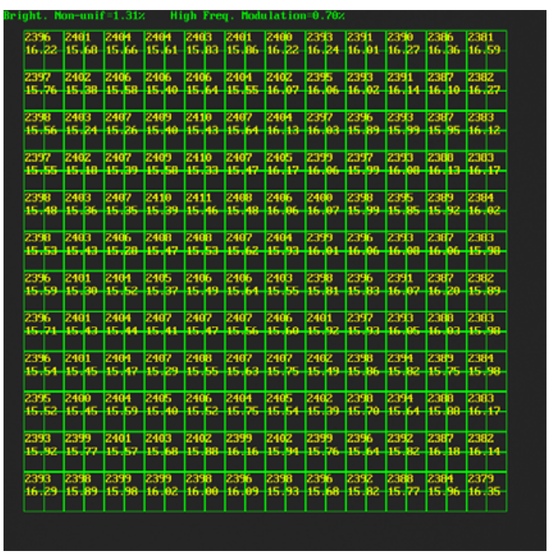
1-2-2 Global Brightness Non–Uniformity

Brightness non–uniformity measures the uniformity in grayscale using a flatfield image. Mean gray levels are measured inside regions of interest (ROI) of size 3 cm x 3 cm in size, overlapped by 1.5 cm, with a 1.5 cm border around the entire image as shown in Illustration C–2. The mean and standard deviation of each ROI are calculated. The Brightness non–uniformity (BNU) is calculated as:

BNU = [(Max–Min) / Mean]*100

where Max, Min, and Mean are the maximum, minimum, and mean of the mean gray values in entire population of ROIs.

ILLUSTRATION C–2
BRIGHTNESS NON–UNIFORMITY GRAPHICAL DISPLAY



1-2-3 Local Brightness Non–Uniformity

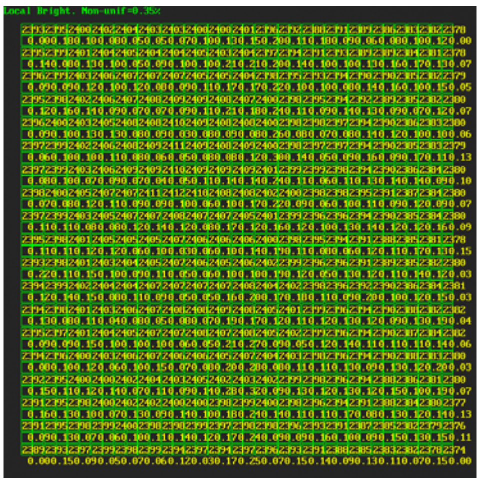
Local Brightness Non–Uniformity is a measure of the variance in mean gray values between neighboring ROIs in a flat–field image. It is calculated by measuring the mean gray values of non–overlapping ROIs of size 1 cm x 1 cm with a 1.5 cm border around the entire image as shown in Illustration C–3. The mean gray level of each ROI is compared to the mean gray level of all eight neighboring ROIs, and a non–uniformity (contrast) value for each ROI is calculated as:

Contrast = 100 * Max (MaxN – Mean, Mean – MinN) / Mean

where MaxN is the greatest mean value of neighboring ROIs, MinN is the smallest mean value of neighboring ROIs, and Mean is the mean value of the ROI for which contrast is being calculated.

Local Brightness Non–Uniformity (LBNU) is the maximum contrast value over entire image.

ILLUSTRATION C–3
LOCAL BRIGHTNESS NON–UNIFORMITY GRAPHICAL DISPLAY



1-2-4 SNR Non–Uniformity

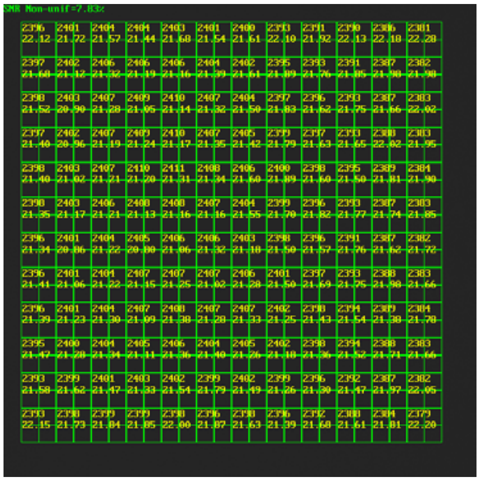
SNR Non–Uniformity is a measure of the ability of the system to deliver the same SNR across the entire image. It is calculated by measuring the ratio between the mean value and the standard deviation in ROIs of size 3 cm x 3 cm, overlapping by 1.5 cm, with a 1.5 cm border around the entire image as shown in Illustration C–4. The mean value is computed from a single exposure flat–field image, while the standard deviation is computed in a difference image of two consecutive flat–field images and then normalized by sqrt(2).

The SNR non–uniformity factor is calculated using these ratios as:

[(MaxRoi – MinRoi) / MeanRoi]*100

where MaxRoi, MinRoi, and MeanRoi are the maximum, minimum, and mean SNR over all ROIs.

ILLUSTRATION C–4
SNR NON–UNIFORMITY GRAPHICAL DISPLAY

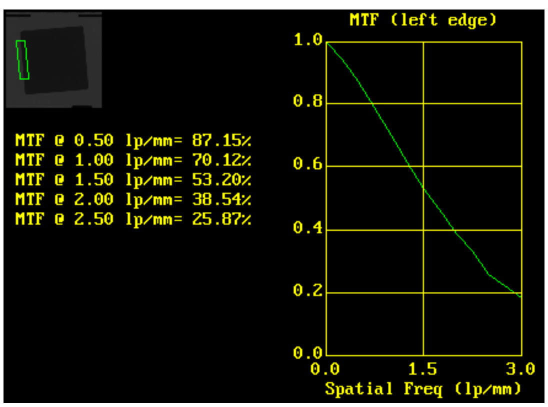


1-2-5 Spatial MTF

The spatial modulation transfer function (MTF) is a measure of the resolution of the system as a function of spatial frequency. It is measured using the tungsten coupon in the center of the QAP phantom. The coupon is automatically detected in the image and an ROI is placed on the left edge as shown in Illustration C–5. The MTF curve is computed using the following steps:

1. Determine initial (x, y) coordinates for edge points along each row.
2. Fit a straight line to the above edge points.
3. Combine edge profiles along all rows to obtain the edge response function curve.
4. Obtain line spread function by differentiating the edge response function.
5. Obtain MTF curve by computing Fourier transform of the line spread function

ILLUSTRATION C–5
MTF GRAPHICAL DISPLAY



1-2-6 Level Accuracy

Level accuracy is a measure of the ability of the system to deliver the reference gray level to the output image. The mean gray values in the 10 steps of the copper step wedge are measured in ROI's horizontally centered on each step as shown in Illustration C–6. At the given exposure parameters, the measured levels shall consistently achieve the target gray level. This is combined into a summary measure using the normalized sum of squared differences.

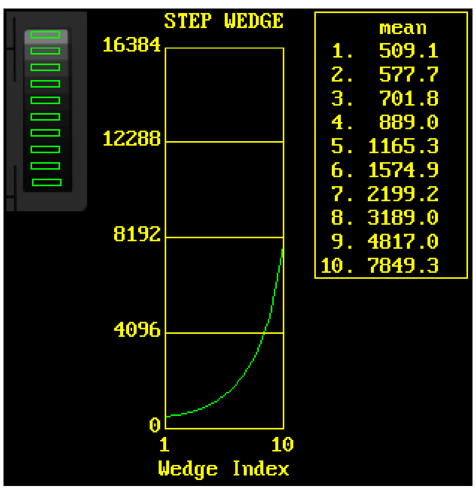
Level_Accuracy=(1/N)*SUMover i (Mi – Ti) / Ti

where Mi is the mean value of step i, Ti is the target value of step i, and N is the number of steps (default is 10).

1-2-7 Level Linearity

The linearity of the detector is measured by calculating the mean gray values in the 10 steps of the copper step wedge in ROI's centered on each step as shown in Illustration C–6. The linearity is defined as R–squares estimate from linear regression with the linear equation y=ax+b. Here y = ln(gray value).

ILLUSTRATION C–6
STEP WEDGE GRAPHICAL DISPLAY



1-2-8 Small Signal Contrast

Small signal contrast measures the ability to visualize objects with low contrast. It is measured using the aluminum step wedge with through holes. The contrast is the change between the mean gray value on the step and the hole. The contrast to noise ratio (CNR) is the contrast normalized by the standard deviation of gray values in a ROI on the step. See Illustration C–7. There are three steps of different thickness, resulting in measurements at low, medium, and high contrasts.

The formulas used for computing contrast and CNR are as follows:

Contrast = [(MeanHole – MeanStep) / MeanStep] * 100

CNR = Contrast / StdSep

where, MeanHole and MeanStep are the mean gray levels in largest through hole (disk) and the step (background), respectively. The StdStep is the standard deviation of gray values in the step (background).

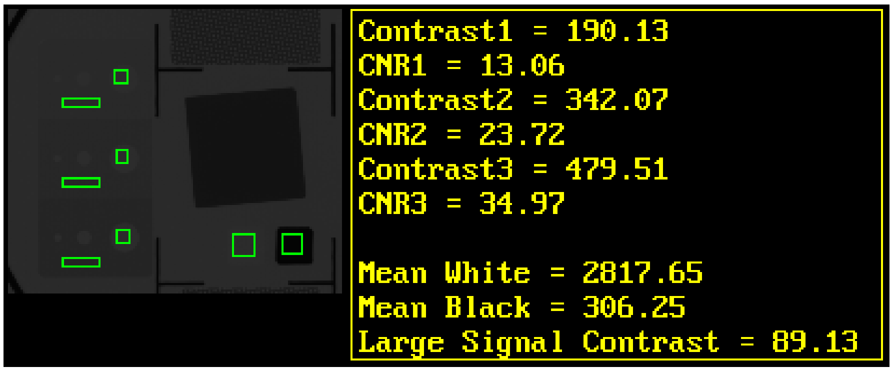
1-2-9 Large Signal Contrast

Large signal contrast measures the consistency in imaging large contrast objects. It is calculated from ROIs placed on the “black” lead blocker and “white” through hole located below the MTF coupon shown in Illustration C–7.

LSC = [(MeanWhite – MeanLead)/MeanWhite]*100

where MeanWhite and MeanLead are the mean gray levels of the two ROIs.

ILLUSTRATION C–7
CONTRAST GRAPHICAL DISPLAY



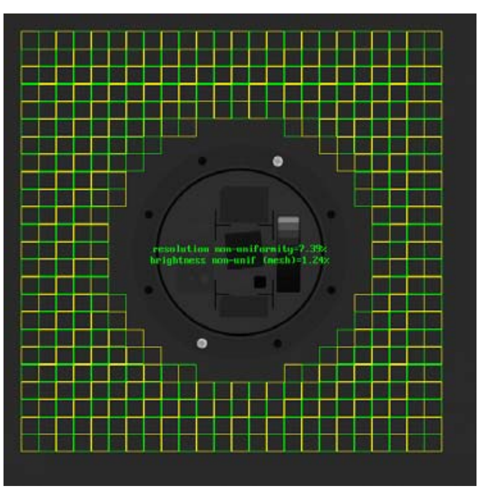
1-2-10 Resolution Non–Uniformity

The Resolution Non–Uniformity (RNU) is a measure of the spatial non–uniformity of the system, measured at fixed spatial frequencies. The ratio of standard deviation to mean value is measured inside ROIs of size 3 cm x 3 cm, overlapped by 1.5 cm, with a 1.5 cm border around the entire image as shown in Illustration C–8. The center region is not usable for uniformity measurements. The resolution non–uniformity is defined as:

RNU = [(Max – Min) / Mean]*100

where; Min, Mean, and Max are the minimum, mean, and maximum values of the standard deviation to mean ratios over all ROIs.

ILLUSTRATION C–8
RESOLUTION NON–UNIFORMITY

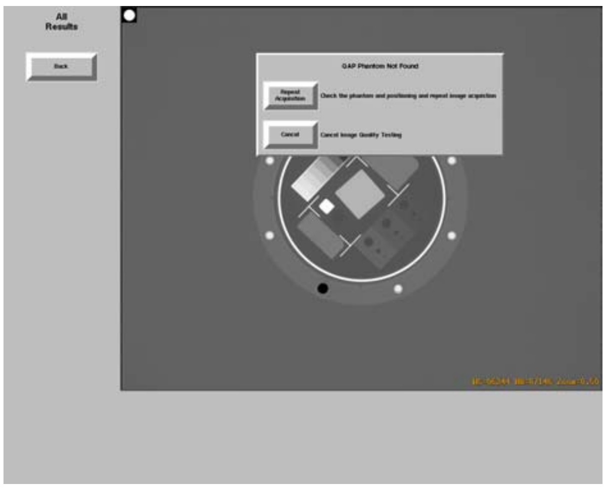


SECTION 2

TROUBLE SHOOTING TIPS

– If composite phantom tests fail, make sure the flat–field phantom is not in the collimator rail.
– If flat–field tests fail, check the collimator blade position and make sure they are fully open. That is, they are in 43 cm x 43 cm position.
– If the application fails to detect/verify the composite QAP phantom, an error message will be displayed as shown in Illustration C–9. Check the orientation of the phantom, making sure that the phantom insert or the overall phantom is not rotated too much.

ILLUSTRATION C–9
QAP PHANTOM NOT FOUND SCREEN



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APPENDIX D – DICOM 3.0 PRINTER CONFIGURATION PARAMETERS

The following tables contain DICOM 3.0 Printer Network Parameter information for Printers or Print Spoolers that have been through compatibility tests. Use this information (detailed parameter values) to complete the Printer Parameter Screen information required to declare DICOM 3.0 Printers for the Revolution XQ/i System. For configuration information on printers not listed here, please consult the printer manufacturer and/or IIS.

TABLE D–1
AGFA DRYSTAR 3000 PRINTER PARAMETER VALUES

<table>
<tr><th rowspan="2">PRINTER OR PRINT SPOOLER</th><th colspan="3">PRINTER PARAMETER VALUES</th></tr>
<tr><th>PARAMETER</th><th>PARAMETER VALUE</th><th>COMMENTS</th></tr>
<tr><td rowspan="16">Agfa Drystar 3000</td><td>Application Entity Title (AET):</td><td>drystar</td><td>AE Titles may be site specific. Be sure to check on–site.</td></tr>
<tr><td>Port number:</td><td>104</td><td></td></tr>
<tr><td>Layouts:</td><td>1:1, 1:2, 2:1, 2:2</td><td></td></tr>
<tr><td>Slide Formats:</td><td>Not Applicable</td><td>Not supported: Do not select</td></tr>
<tr><td>Pixel Depth:</td><td>12</td><td></td></tr>
<tr><td rowspan="3">Film Size:</td><td>14 in x 17 in (35x43) W = 4256
L = 5174</td><td>AGFA Layout – Portrait 2411</td></tr>
<tr><td>11 in x 14 in W = 3300
L = 4256</td><td>AGFA Layout – Portrait 9014</td></tr>
<tr><td>8 in x 10 in W = 2388
L = 2972</td><td>AGFA Layout – Portrait 9006</td></tr>
<tr><td>Printer Pixel Size (micron):</td><td>79.4</td><td></td></tr>
<tr><td>Configuration Information:</td><td>PERCEPTION_LUT=LINEAR (no spaces)</td><td></td></tr>
<tr><td>Density:</td><td>Min = 20
Max = 300</td><td></td></tr>
<tr><td>Magnification Type:</td><td>CUBIC</td><td></td></tr>
<tr><td>Smoothing Factor:</td><td>140</td><td></td></tr>
<tr><td>Trim:</td><td>NO</td><td>Not supported</td></tr>
<tr><td colspan="3">General Comments:
– Supports Clear and Blue Film. If medium selected (Clear, Paper) does not match the printer, the job will be queued until the correct film is loaded.
– AGFA layouts are specific to maximum printable area layouts.
– Please consult the AGFA technical representative to install custom layouts.
– Only 14x17 film was tested with this printer.
– Trim is not supported by this printer.</td></tr>
</table>

Note: Avoid print job failures by having printer vendor ensure that the Confirmation Level (DICOM Connectivity) at the printer is set to ∅ (accept all). Failure to set this level on the printer will result in failed print jobs.

Note: Custom layout must be configured by printer vendor for accurate image sizing. In addition to the above layouts the following layouts must be installed by AGFA print representative:

FILM SIZE	FORMAT	P/L	AGFA LAYOUT
14 x 17	1:1	P	2411
14 x 17	1:2	P	9001
14 x 17	2:1	P	9000
14 x 17	2:2	P	9002
14 x 17	1:1	L	2511
14 x 17	1:2	L	9003
14 x 17	2:1	L	9004
14 x 17	2:2	L	9005
11 x 14	1:1	P	9014
11 x 14	1:2	P	9102
11 x 14	2:1	P	9103
11 x 14	2:2	P	9104
11 x 14	1:1	L	9018
11 x 14	1:2	L	9202
11 x 14	2:1	L	9203
11 x 14	2:2	L	9204
8 x 10	1:1	P	9006
8 x 10	1:2	P	9009
8 x 10	2:1	P	9008
8 x 10	2:2	P	9010
8 x 10	1:1	L	9007
8 x 10	1:2	L	9012
8 x 10	2:1	L	9011
8 x 10	2:2	L	9013

TABLE D–2
AGFA LR3300 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	PARAMETER VALUE	COMMENTS
Agfa LR3300	**Application Entity Title (AET):**	AGFA_MG3000	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** (35x43) **W** = 4256 **L** = 5174	AGFA Layout – Portrait 2411
		11 in x 14 in **W** = 3300 **L** = 4256	AGFA Layout – Portrait 9014
		8 in x 10 in **W** = 2388 **L** = 2972	AGFA Layout – Portrait 9006
	Printer Pixel Size (micron):	79.4	
	Configuration Information:	PERCEPTION_LUT=LINEAR (no spaces)	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	140	
	Trim:	NO	Not supported
	General Comments: Wet Laser Printer Supports Clear and Blue Film. If medium selected (Clear, Paper) does not match the printer, the job will be queued until the correct film is loaded. Printer not validated, however it uses the same interface as the AGFA Drystar 3000 and AGFA LR5200.		

Note: Avoid print job failures by having printer vendor ensure that the Confirmation Level (DICOM Connectivity) at the printer is set to ∅ (accept all). Failure to set this level on the printer will result in failed print jobs.

Note: Custom layout must be configured by printer vendor for accurate image sizing. In addition to the above layouts the following layouts must be installed by AGFA print representative:

FILM SIZE	FORMAT	P/L	AGFA LAYOUT
14 x 17	1:1	P	2411
14 x 17	1:2	P	9001
14 x 17	2:1	P	9000
14 x 17	2:2	P	9002
14 x 17	1:1	L	2511
14 x 17	1:2	L	9003
14 x 17	2:1	L	9004
14 x 17	2:2	L	9005
11 x 14	1:1	P	9014
11 x 14	1:2	P	9102
11 x 14	2:1	P	9103
11 x 14	2:2	P	9104
11 x 14	1:1	L	9018
11 x 14	1:2	L	9202
11 x 14	2:1	L	9203
11 x 14	2:2	L	9204
8 x 10	1:1	P	9006
8 x 10	1:2	P	9009
8 x 10	2:1	P	9008
8 x 10	2:2	P	9010
8 x 10	1:1	L	9007
8 x 10	1:2	L	9012
8 x 10	2:1	L	9011
8 x 10	2:2	L	9013

TABLE D–3

AGFA LR5200 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
Agfa LR5200	**Application Entity Title (AET):**	lr5200	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** (35x43) **W** = 4256 **L** = 5174	AGFA Layout – Portrait 2411
		11 in x 14 in **W** = 3300 **L** = 4256	AGFA Layout – Portrait 9014
		8 in x 10 in **W** = 2388 **L** = 2972	AGFA Layout – Portrait 9006
	Printer Pixel Size (micron):	79.4	
	Configuration Information:	PERCEPTION_LUT=LINEAR (no spaces)	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	140	
	Trim:	NO	Not supported
	General Comments: High Resolution Wet Laser Printer Capable of multiple film cassette sizes.		

Note: Avoid print job failures by having printer vendor ensure that the Confirmation Level (DICOM Connectivity) at the printer is set to ∅ (accept all). Failure to set this level on the printer will result in failed print jobs.

Note: Custom layout must be configured by printer vendor for accurate image sizing. In addition to the above layouts the following layouts must be installed by AGFA print representative:

FILM SIZE	FORMAT	P/L	AGFA LAYOUT
14 x 17	1:1	P	2411
14 x 17	1:2	P	9001
14 x 17	2:1	P	9000
14 x 17	2:2	P	9002
14 x 17	1:1	L	2511
14 x 17	1:2	L	9003
14 x 17	2:1	L	9004
14 x 17	2:2	L	9005
11 x 14	1:1	P	9014
11 x 14	1:2	P	9102
11 x 14	2:1	P	9103
11 x 14	2:2	P	9104
11 x 14	1:1	L	9018
11 x 14	1:2	L	9202
11 x 14	2:1	L	9203
11 x 14	2:2	L	9204
8 x 10	1:1	P	9006
8 x 10	1:2	P	9009
8 x 10	2:1	P	9008
8 x 10	2:2	P	9010
8 x 10	1:1	L	9007
8 x 10	1:2	L	9012
8 x 10	2:1	L	9011
8 x 10	2:2	L	9013

TABLE D–4

FUJI FM DPL PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
FUJI FM DPL	**Application Entity Title (AET):**	fuji–printer	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	Port number may be site specific. Be sure to check on–site.
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 3500 **L** = 4240	
		11 in x 14 in **W** = 2540 **L** = 3600	
		8 in x 10 in **W** = 1998 **L** = 2510	
	Printer Pixel Size (micron):	100	
	Configuration Information:	CS000	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	SHARP	
	Trim:	NO	
	General Comments: The following configurations must be configured by the Fuji printer representative to print correctly sized images: – LUT1 as SAR17 for calling AE_TITLE. – Trim width at 1 pixel for calling AE_TITLE. – Globally configure “a margin between image” for 0 pixels. – Globally configure “Image layout” for spread.		

TABLE D–5

FUJI DRYPIX 1000 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
FUJI DryPix 1000	**Application Entity Title (AET):**	DRYPIX1000	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	Port number may be site specific. Be sure to check on–site.
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**11 in x 14 in** **W** = 2962 **L** = 4096	
		8 in x 10 in **W** = 2280 **L** = 2877	
	Printer Pixel Size (micron):	84.67	
	Configuration Information:	CS000	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	SHARP	
	Trim:	NO	
	General Comments: The following configurations must be configured by the Fuji printer representative to print correctly sized images: – LUT1 as SAR17 for calling AE_TITLE. – Trim width at 1 pixel for calling AE_TITLE. – Globally configure “a margin between image” for 0 pixels. – Globally configure “Image layout” for spread. – A densitometer filter (FUJI part number 605S0003) must be used when performing printer calibration.		

TABLE D–6

FUJI DRYPIX 3000 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	PARAMETER VALUE	COMMENTS
FUJI DryPix 3000	**Application Entity Title (AET):**	DRYPIX3000	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	Port number may be site specific. Be sure to check on–site.
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 4072 **L** = 4972	
	Printer Pixel Size (micron):	84.67	
	Configuration Information:	CS000	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	SHARP	
	Trim:	NO	
	General Comments: The following configurations must be configured by the Fuji printer representative to print correctly sized images: – LUT1 as SAR17 for calling AE_TITLE. – Trim width at 1 pixel for calling AE_TITLE. – Globally configure “a margin between image” for 0 pixels. – Globally configure “Image layout” for spread. – A densitometer filter (FUJI part number 605S0003) must be used when performing printer calibration. **CAUTION:** ONLY 14x17 film should be used with this printer. Any other film size used may print films with incorrect measurements.		

TABLE D–7

KODAK 8700 / KODAK 9410 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
Kodak 8700	**Application Entity Title (AET):**	9410	AE Titles may be site specific. Be sure to check on–site.
	Port number:	1024	
	Layouts:	1:1, 1:2, 2:1, 2:2	1:2 only valid for portrait 2:1 only valid for landscape
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 4096 **L** = 5221	
	Printer Pixel Size (micron):	78.1	
	Configuration Information:	LUT=Wkstn2a.w87,2 (no spaces)	
	Density:	**Min** = **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	15	
	Trim:	NO	
	General Comments: The following configurations must be configured by the Kodak printer representative: – Calling AE_TITLE must be declared in 9410 host table or print will be rejected. – Pixel correction turned off. – TFT emulation enabled. Landscape printing will be functional only if a Kodak 8800 is installed. **CAUTION:** Customer will get incorrect image sizing if unsupported formats (i.e. portrait 2:1 or landscape 1:2) are used.		

TABLE D–8

KODAK 160 / KODAK MIM 200 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
Kodak 160	**Application Entity Title (AET):**	NER_ANY	AE Titles may be site specific. Be sure to check on–site.
	Port number:	5040	
	Layouts:	1:1, 1:2, 2:1, 2:2	1:2 only valid for portrait 2:1 only valid for landscape
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 4361 **L** = 5348	
	Printer Pixel Size (micron):	78.1	
	Configuration Information:	LUT=0,0 (no spaces)	
	Density:	**Min** = **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:		Not supported
	Trim:	NO	Do not change
	General Comments: The following configurations must be configured by the Kodak printer representative: – MIM 200 must be configured for “ROWS WITH COMMON TEXT” OFF. Trim must always be OFF for this printer. **CAUTION:** Customer will get incorrect image sizing if unsupported formats (i.e. portrait 2:1 or landscape 1:2) are used.		

TABLE D–9

KODAK 8500 / KODAK MIM 200 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	PARAMETER VALUE	COMMENTS
Kodak 8500	**Application Entity Title (AET):**	ner_8500	AE Titles may be site specific. Be sure to check on–site.
	Port number:	5040	
	Layouts:	1:1, 1:2, 2:1, 2:2	1:2 only valid for portrait 2:1 only valid for landscape
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 3388 **L** = 4277	
	Printer Pixel Size (micron):	78.15	
	Configuration Information:	LUT=Wkstn2a.w87,2 (no spaces)	
	Density:	**Min** = **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	15	
	Trim:	NO	

TABLE D–10

KODAK 969 / KODAK 9400 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	PARAMETER VALUE	COMMENTS
Kodak 969	**Application Entity Title (AET):**	IMN_Print Server	AE Titles may be site specific. Be sure to check on–site.
	Port number:	1024	
	Layouts:	1:1, 1:2, 2:1, 2:2	1:2 only valid for portrait 2:1 only valid for landscape
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** **W** = 4096 **L** = 4996	
	Printer Pixel Size (micron):	81	
	Configuration Information:	LUT=0,6 (no spaces)	
	Density:	**Min** = **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	15	
	Trim:	NO	
	General Comments: The following configurations must be configured by the Kodak printer representative: – Set printer TFT to ver693c0. Customer should always select destination “magazine” if no processor is connected. **CAUTION:** Customer will get incorrect image sizing if unsupported formats (i.e. portrait 2:1 or landscape 1:2) are used.		

TABLE D–11

STERLING CONTACT 400 PRINTER PARAMETER VALUES

PRINTER OR PRINT SPOOLER	PRINTER PARAMETER VALUES		
	PARAMETER	**PARAMETER VALUE**	**COMMENTS**
Sterling Contact 400	**Application Entity Title (AET):**	contact	AE Titles may be site specific. Be sure to check on–site.
	Port number:	104	
	Layouts:	1:1, 1:2, 2:1, 2:2	
	Slide Formats:	Not Applicable	Not supported: Do not select
	Pixel Depth:	12	
	Film Size:	**14 in x 17 in** (35x43) **W** = 4256 **L** = 5174	AGFA Layout – Portrait 2411
		11 in x 14 in **W** = 3300 **L** = 4256	AGFA Layout – Portrait 9014
		8 in x 10 in **W** = 2388 **L** = 2972	AGFA Layout – Portrait 9006
	Printer Pixel Size (micron):	79.4	
	Configuration Information:	PERCEPTION_LUT=LINEAR (no spaces)	
	Density:	**Min** = 20 **Max** = 300	
	Magnification Type:	CUBIC	
	Smoothing Factor:	140	
	Trim:	NO	Not Supported
	General Comments: Supports Clear and Blue Film. If medium selected (Clear, Paper) does not match the printer, the job will be queued until the correct film is loaded. AGFA layouts are specific to maximum printable area layouts. Please consult the AGFA technical representative to install custom layouts. Only 14x17 film was tested with this printer. Trim is not supported by this printer.		

Note: Avoid print job failures by having printer vendor ensure that the Confirmation Level (DICOM Connectivity) at the printer is set to ∅ (accept all). Failure to set this level on the printer will result in failed print jobs.

Note: Custom layout must be configured by printer vendor for accurate image sizing. In addition to the above layouts the following layouts must be installed by AGFA print representative:

FILM SIZE	FORMAT	P/L	AGFA LAYOUT
14 x 17	1:1	P	2411
14 x 17	1:2	P	9001
14 x 17	2:1	P	9000
14 x 17	2:2	P	9002
14 x 17	1:1	L	2511
14 x 17	1:2	L	9003
14 x 17	2:1	L	9004
14 x 17	2:2	L	9005
11 x 14	1:1	P	9014
11 x 14	1:2	P	9102
11 x 14	2:1	P	9103
11 x 14	2:2	P	9104
11 x 14	1:1	L	9018
11 x 14	1:2	L	9202
11 x 14	2:1	L	9203
11 x 14	2:2	L	9204
8 x 10	1:1	P	9006
8 x 10	1:2	P	9009
8 x 10	2:1	P	9008
8 x 10	2:2	P	9010
8 x 10	1:1	L	9007
8 x 10	1:2	L	9012
8 x 10	2:1	L	9011
8 x 10	2:2	L	9013

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