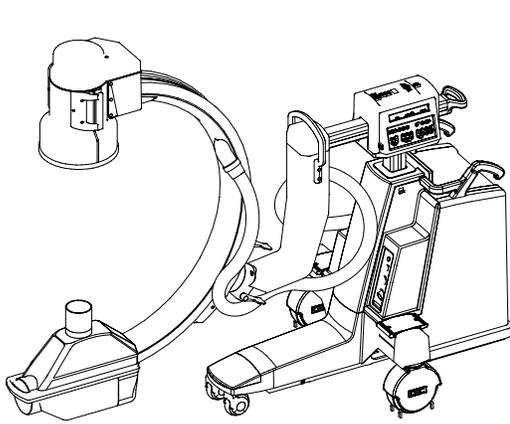


# 9600 System Periodic Maintenance Procedure

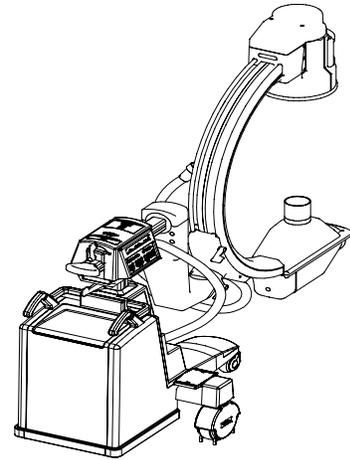
00-880606-02

GE OEC Medical Systems, Inc.

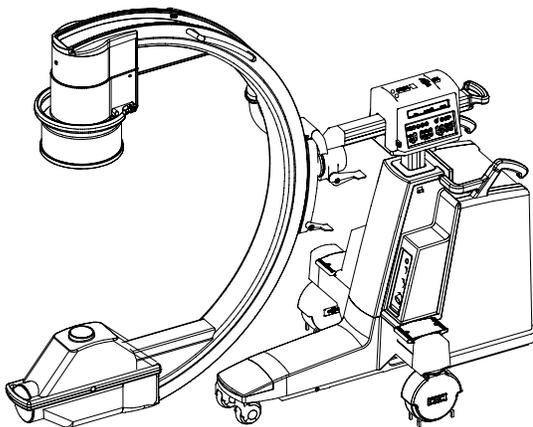
Rev. C



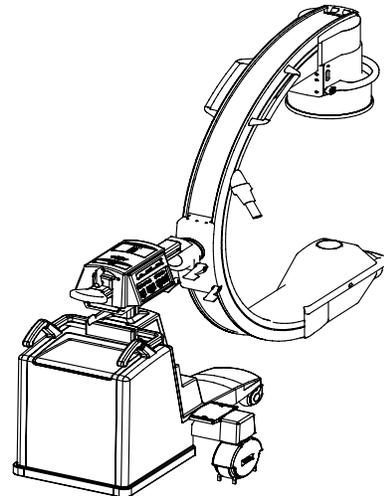
9600 Standard system, left-front view



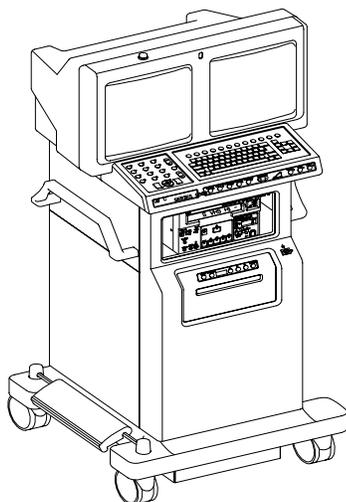
9600 Standard system, right-rear view



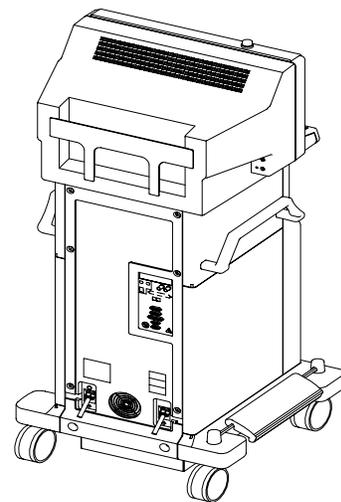
9600 Super-C system, left-front view



9600 Super-C system, right-rear view



9600 Workstation, front view



9600 Workstation, rear view

This manual may not be reproduced,  
in whole or in part, without the written permission of OEC Medical Systems, Inc.

This procedure does not contain any steps which can be performed by the system operator. The steps contained in this procedure should not be attempted by anyone who is not specifically trained or authorized by OEC to work on the 9600 system.

The contents of this document are accurate at the time of publication. However, changes in design and additional features can, at any time, be incorporated in the hardware and software and may not be reflected in this version of the document. Contact OEC Technical Support for clarification, if discrepancies arise.

CAUTION: Federal law restricts this device to sale by, or on the order of, a physician.

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The 9600 Mobile Imaging System  
is manufactured under the following U.S. Patents:  
4.768.216; 4.797.907; 4.209.706.  
Other Patents Pending.

## Revision History

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<u>Rev</u>	<u>Dash</u>	<u>Date</u>	<u>Change Description</u>
Rev A	-01	March 1998	Initial release
Rev B	-01	September 1998	Statement added to printing instructions (p. 1) to print the master copy on a post-script printer
Rev C	-02	January 2002	PM Report/Checklist was modified. Procedure was update to reflect changes.

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## GENERAL INSTRUCTIONS

Use this procedure in conjunction with the C-Arm Periodic Maintenance (PM) Report/Checklist 00-884521-01. Enter the required information at the top of this form (“Customer Name”, “Street”, etc.) prior to performing the PM test procedures. During testing, place a check mark next to each test completed, and (where applicable) record the measured values; if adjustments to these values are made, note them on the form in the comments section.

Note that the numbered sections and their titles in this document match those on the C-Arm PM Inspection Report form.

Required tools, test equipment, paints, torx screw specs., lubricants, and adhesives are listed near the end of this document, in section 6 (“Test Equipment Used”); refer to the Contents on the previous page.

Log all test equipment used on the PM Inspection Report form in the #6 block near the bottom, “Test Equipment Used.”

*NOTE: Test equipment must have current calibration dates. Do not use test equipment with expired calibration stickers.*

The Series 9600 has been through several product iterations, and thus there are differences between older systems and those manufactured today. The information contained in this version of the manual is accurate at the time of the manual’s release; however, product changes and improvements can occur at any time and may not be reflected here.

This document distinguishes differences between systems by referring to the systems serial number and/or date of manufacture, or by citing different product lines such as standard or Super-C/Cardiac systems.

To aid in these procedures, refer (if necessary) to the **9600 System Service Manual**, p/n 00-878772.

Read the following “Safety” section, perform the procedures in the “Preparation” section, then begin the tests with section 1, “Safety Inspections.”

## SAFETY

### INGRESS OF WATER AND SOLUTIONS

The system must never be operated or stored in locations where conductive fluids, like water and saline solution, might spill on the equipment.

Always unplug the AC power cable from the wall outlet before cleaning the equipment. Do not allow water, soap, or other liquids to drip into the equipment and cause short circuits, electric shock and fire hazards.

### UNAUTHORIZED MODIFICATIONS

Under no circumstances should the safety interlock in the system be bypassed, jumpered, or otherwise disabled.

*NOTE: All OEC systems comply with International Electrotechnical Commission safety standard IEC-601. Do not connect any external device to the system that does not meet the requirements of IEC-601. Only devices provided or approved by OEC Medical Systems, Inc. should be connected to the system.*

## MOTORIZED MECHANICAL OPERATION

The Vertical Column and L-Arm are motorized. Observe them continuously while operating their motors to avoid collision with people and equipment. (Note that the Super-C system does not use an L-Arm.)

If covers are removed, use extreme care when operating motorized features. Do not wear loose clothing that may be caught by gears or chains. Keep hands and fingers clear of motorized equipment while the motors are in operation.

## TRAINED SERVICE PERSONNEL

Serious injury and property damage can result from incorrectly performed service procedures. Observe all operating and safety procedures discussed in this document.

**WARNING** Procedures should be performed by service personnel specifically trained by OEC Medical Systems, Inc. to calibrate the Series 9600 System.

## ELECTRICAL SHOCK

**WARNING** This system can generate lethal voltages. Observe safe electrical testing procedures when performing periodic maintenance procedures.

**WARNING** After taking X-rays, the high voltage cables can retain a lethal charge, even if you power down the system. High voltages can arc several inches from their terminals if the cables are removed from the connector wells. Use caution when disconnecting high voltage cables even when the power is turned OFF. If you remove these connections, immediately discharge their contacts against the high voltage tank case (ground).

**WARNING** Use caution when working near the batteries and their connections. Remove metal rings and watchbands that may inadvertently come in contact with the battery terminals. Severe skin burns could result if such metal articles were shorted across the battery terminals.

## X-RADIATION EXPOSURE

The X-ray tube assembly produces X-radiation when energized. Never operate this device without X-ray shielding in place. Use lead shielding and draping to protect personnel.

**WARNING** Lead aprons, radiation monitors and appropriate radiation shields must be utilized by personnel while performing tests. Living human anatomy should never be used as a phantom or demonstration aid.

**CAUTION** Many of the PCB's in this system contain components which are sensitive to Electro-Static Discharge (ESD). Observe ESD safety procedures.

### WARNING LABELS

The following warning labels may be found on the system.

**X-RAY  
SAFETY  
WARNING**

**WARNING  
THIS X-RAY UNIT MAY BE DANGEROUS  
TO PATIENT AND OPERATOR UNLESS  
SAFE EXPOSURE FACTORS AND  
OPERATING INSTRUCTIONS ARE  
OBSERVED**

**ELECTRICAL  
SAFETY  
WARNING**

**WARNING  
UNIT CONTAINS INTERNAL  
EXPOSED ELECTRICALLY  
HAZARDOUS PARTS. DISCONNECT  
POWER AND BATTERIES BEFORE  
SERVICING.**

### WARNING SYMBOLS

The following symbols may be found on the Mobile C-Arm:

**DANGEROUS  
VOLTAGE  
PRESENT**

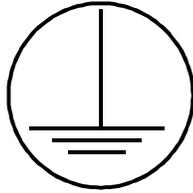


Dangerous voltages are present use safety precautions.

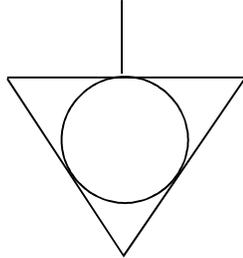
**DANGEROUS  
VOLTAGE  
PRESENT**



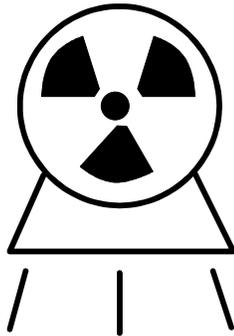
Dangerous voltages are present use safety precautions.

**EARTH  
GROUND**

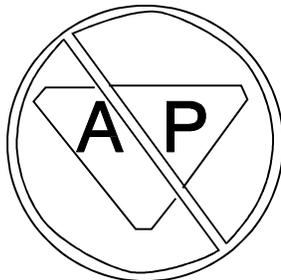
The protective earth ground should be the last electrical connection broken and the first electrical connection made during servicing procedures.

**POTENTIAL  
EQUALIZA-  
TION**

GRN/YEL wire is used to indicate protective earth conductors, accessible parts connected to earth parts, and potential equalization conductors.

**EMITTING  
X-RAY  
SOURCE**

This symbol indicates the presence or potential of producing ionizing X-radiation.

**NON-A/P**

This symbol indicates that equipment is non-anesthetic proof and should not be operated in the presence of flammable vapors, liquids or other substances.

## PREPARATION

### REMOVE POWER AND COVERS

**WARNING** Electrical circuits inside the equipment use voltages that are capable of causing serious injury or death from electrical shock. Use appropriate precautions.

1. If the system has power applied, turn the Workstation keyswitch to the **OFF** position, then unplug the Workstation's AC power cord from the wall outlet.
2. Remove the Workstation rear cover, left side cover, and open the electronic card rack rear door. Refer to the 9600 System Service Manual.

3. C-Arm cover removal is different for (older) systems without center pivot steering and those (newer) systems equipped with center pivot steering.

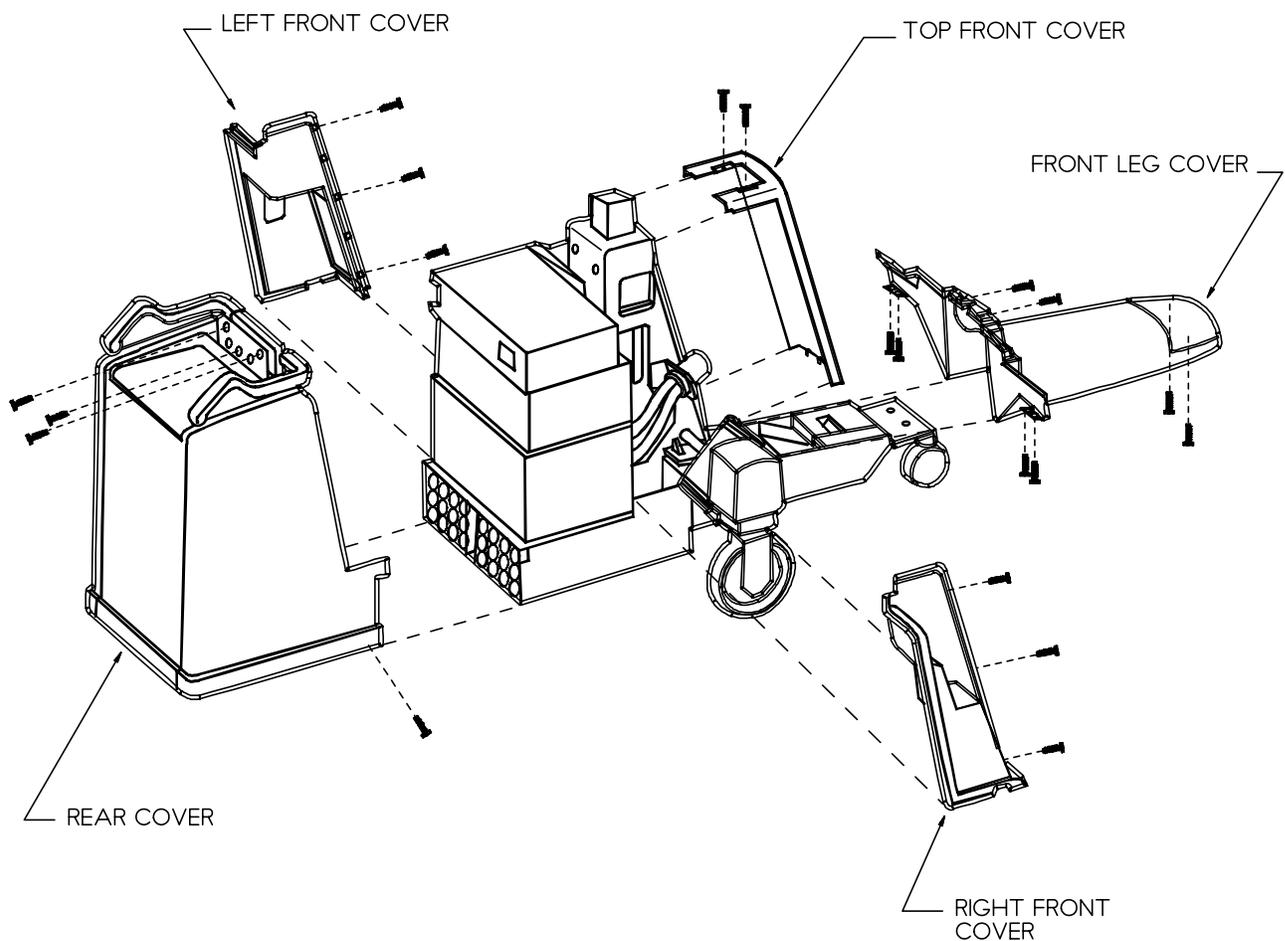
For older systems without center pivot steering: remove the front leg cover, right front cover, left front cover, top front cover, and rear cover. Refer to 9600 System Service Manual (and see the illustration below).

For newer systems with center pivot steering: remove the front leg cover, right front cover, left front cover, and top front cover. Then loosen the 2 upper set screws on the steering shafts' compression coupler so the upper shaft is disconnected from the lower shaft and the rear cover can be removed freely, then remove the rear cover. Refer to 9600 System Service Manual (and see the illustration, next page).

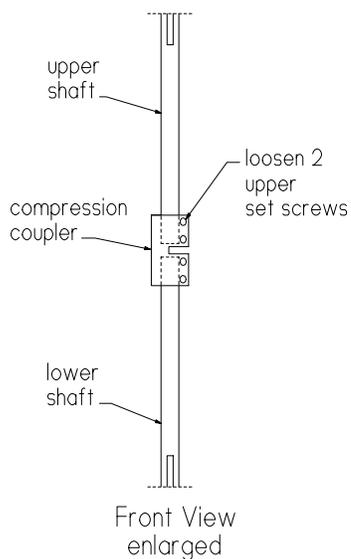
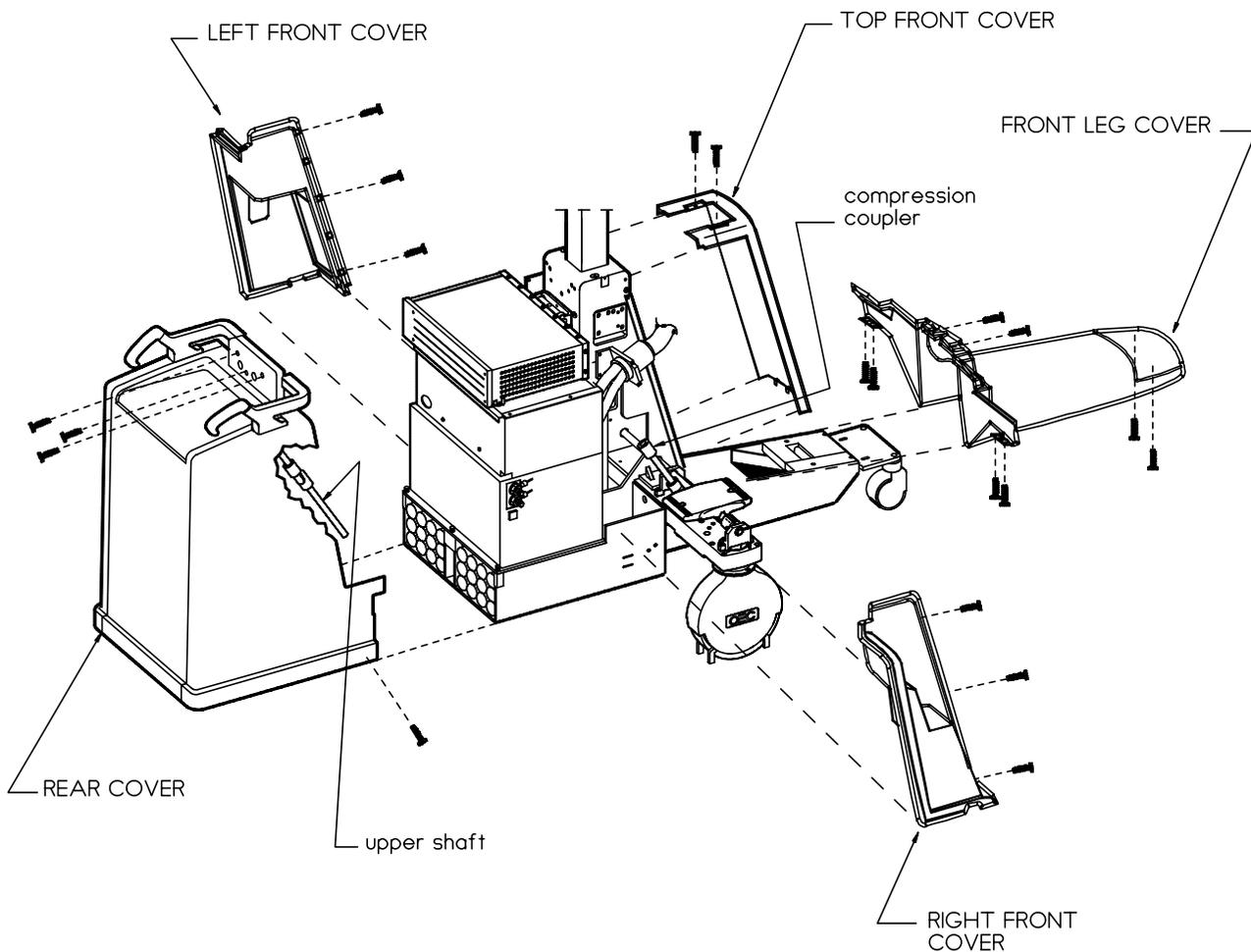
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### Removing the Mobile C-Arm covers, old system without center pivot steering

---



**Removing the Mobile C-Arm covers, newer system with center pivot steering**



## COVER REINSTALLATION WHEN PM PROCEDURE IS COMPLETE

- When all necessary steps are complete and access to components beneath the covers is no longer required, reinstall all previously removed covers in reverse order from which they were removed.

If the system is equipped with center pivot steering, use the following procedures for reinstallation of the mainframe rear cover (and refer to the illustration below):

- Position the rear cover so the upper steering shaft can fit into the compression coupler on the lower steering shaft.
- Position the rear wheels forward, then slide the upper shaft into the coupler to where there is a 1/4-inch to 3/8-inch gap between the ends of the shafts.

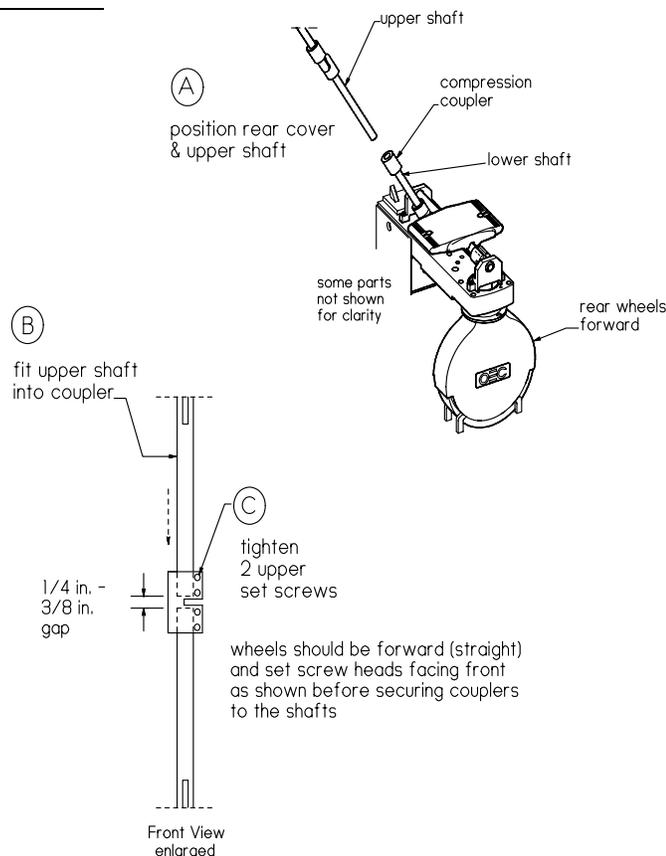
**CAUTION:** Be sure the wheels are positioned forward (straight) and the set screw heads face directly front when inserted in the couplers before securing the couplers to the shafts. If not installed in this front-aligned position, there is a chance the set screw heads could scrape against the inside of the right front cover when turning the wheels to the right.

- Align the steering handle with the rear wheels, then tighten (but do not Loctite) the two upper set screws on the coupler and torque them to 48 in.-lbs. Or, if using a torque screwdriver, torque to 39 in.-lbs. max., then 1/8-inch more turn with an allen wrench.
- Reinstall the mainframe rear cover, top front cover, left front cover, right front cover, and front leg cover.

---

### Reinstallation, C-Arm rear cover with center pivot steering

---



# 1. SAFETY INSPECTIONS

## 1.1 MECHANICAL INSPECTIONS

### BRAKES

#### INSPECT WIG WAG & BRAKE

1. Engage the Wig-Wag brake.
2. Verify that the Wig-Wag brake locks the forward mechanics in any position within the range of motion ( $11^{\circ}$  either side of center position).

#### INSPECT FLIP FLOP & BRAKE

1. Tighten the Flip Flop brake and verify that the Flip Flop does not move.

#### INSPECT C-ARM ORBITAL BRAKE

1. Engage the brake by turning the brake handle  $90^{\circ}$ .
2. Verify that the brake is engaged and that the C-Arm will not move.

#### INSPECT CROSS-ARM BRAKE

1. Engage the brake.
2. Verify that the brake is engaged and that the Cross-Arm will not move. The brake handle should tighten the brake with a minimum of travel. Excessive movement may indicate brake wear.
3. Refer to the **Non-Motorized Movements**, *Cross-Arm Motion* section in these procedures if the Cross-Arm brake requires adjustment.

### LOCKS

#### MOBILE C-ARM

1. Select the **LOCK** mode:
  - Systems with center pivot steering: the **LOCK** mode is both the front-locked (front-depressed) and the rear-locked (rear-depressed) pedal positions.
  - Most older systems without center pivot steering: the **LOCK** mode is the rear-locked (rear-depressed) pedal position only. However, some older systems have the **LOCK** mode in the front-locked position.

Attempt to push the C-Arm and verify that the caster/wheel assemblies are locked in place; the casters should not pivot and the wheels should not roll.

## WORKSTATION

1. Select the **LOCK** mode, with the pedal pressed completely down, then attempt to push the Workstation and verify that the caster/wheel assemblies are locked in position and do not move.

## STEERING

### MOBILE C-ARM

#### Systems with center-pivot steering:

1. Select a **LOCK** mode (front-locked or rear-locked pedals), grasp the right steering handle, then turn it 90° max. left and right and verify the caster/wheel assemblies pivot freely, moving in the same direction as the steering handle.
2. Select the **FREE** steering (or neutral) mode, with the pedals in the flat position, then push the C-Arm while steering it in various directions and verify the caster/wheel assemblies turn freely and move in the same direction as the right steering handle.

#### Older systems without center-pivot steering:

1. Select the **STEER** mode, with the pedals in the forward-locked position, then push the C-Arm and verify that the casters lock in the forward (straight) position and the wheels roll freely. Note however that some older systems use the rear-lock position for caster locking.
2. Select the **FREE** steering (or neutral) mode, with the pedals in the flat position, then push the C-Arm while steering it in various directions and verify the caster/wheel assemblies turn freely and move in the same direction as the C-Arm is steered.

## WORKSTATION

1. Select the **STEER** mode, with the pedal in the up position, then push the Workstation and verify that the casters lock in place and the wheels roll freely in a straight line.
2. Select the **FREE** steering mode, with the pedal in the center (halfway up) position, then push the Workstation and verify that the caster/wheel assemblies turn freely and move in the same direction as the Workstation is steered.

## WHEELS/CASTERS

### MOBILE C-ARM

1. With the pedals in the **FREE** steering mode, push the C-Arm a significant distance and verify that the wheels roll smoothly without vibrating and that they are securely attached to the casters. Visually inspect the wheels for damage.

## WORKSTATION

1. With the pedal in the **FREE** steering mode, push the Workstation a significant distance and verify that the wheels roll smoothly without vibrating and that they are securely attached to the casters. Visually inspect the wheels for damage.

## NON-MOTORIZED MOVEMENTS

### WIG WAG

1. Release the Wig-Wag brake.
2. Verify that the forward mechanics pivot to either side of center position.

### FLIP FLOP (C-ARM LATERAL MOTION)

1. Release the Flip Flop brake and rotate the C-Arm in a lateral (or “radial”) direction.
2. Verify smooth rotation.

### C-ARM ORBITAL MOTION

*NOTE: If testing a Super-C system (which does not use an L-Arm), skip to the Super-C System section below.*

**WARNING** Observe safety procedures when operating mechanical features.

#### L-Arm (Non-Super-C) system:

1. Release the C-Arm orbital brake and rotate the C-Arm through the bearings in both directions. The C-Arm should rotate smoothly without roughness or vibration.
2. If roughness or vibration is detected while rotating the C-Arm, first check the bearing races for contaminants and then remove the C-Arm from the flip-flop assembly and inspect the bearings. Refer to the **9600 System Service Manual**.

#### Super-C System:

1. Starting with the C-Arm in a position perpendicular to the floor, lock the C-Arm orbital brake, unlock the flip-flop brake and rotate the C-Arm until the C-Arm is horizontal with the floor.
2. Lock the flip-flop brake, release the C-Arm orbital brake and rotate the C-Arm through the bearings in both directions. The C-Arm should rotate smoothly without roughness or vibration.
3. Engage the C-Arm orbital brake, unlock the flip-flop brake and rotate the C-Arm 180° so that the C-Arm is again horizontal with the floor.
4. Lock the flip-flop brake, release the C-Arm orbital brake and again rotate the C-Arm through the bearings in both directions. The C-Arm should rotate smoothly without roughness or vibration.
5. If roughness or vibration is detected while rotating the C-Arm, first check the bearing races for contaminants and then remove the C-Arm from the flip-flop assembly and inspect the bearings. Refer to the **9600 System Service Manual**.

### CROSS-ARM MOTION

*NOTE: For Cross-Arm locking on older systems, the Cross-Arm brake shoe presses against the roller in the Cross-Arm housing. On newer systems, the brake shoe presses against the Cross-Arm itself (see the illustrations, following pages). Continue with the appropriate sub-section after step 3*

*below* (Older Cross-Arm Brake Systems *below* or Newer Cross-Arm Brake Systems, *next page*).

1. Release the horizontal Cross-Arm brake.
2. Verify that the bearings in the housing are properly adjusted.
3. The Cross-Arm should slide smoothly through the Cross-Arm housing without binding and the bearings should make contact at all times.

#### **Older Cross-Arm Brake Systems:**

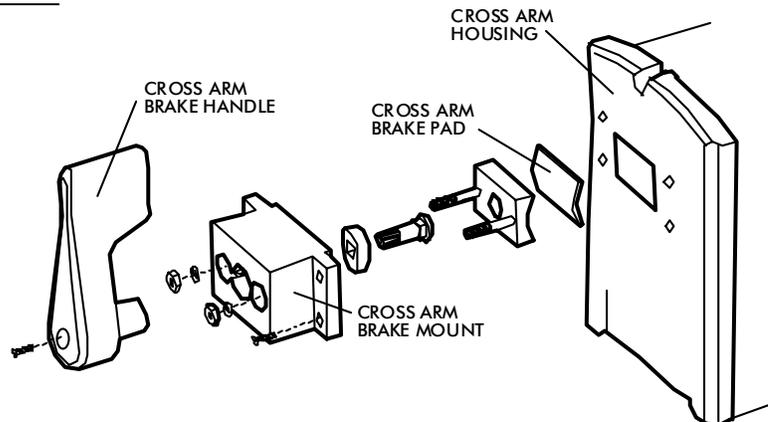
*NOTE: If it is necessary to visually inspect a polyurethane stop, the Control Panel housing must be removed.*

4. If brake tension requires adjustment, remove the Torx screw securing the brake handle to the brake assembly and then remove the brake handle. Refer to the illustration below.
  - A. After removing the brake handle, turn the handle counter clockwise and reinstall the brake handle on the brake assembly.
  - B. Turn the handle clockwise to tighten the brake. If the brake does not tighten after repositioning the brake handle, it may indicate a worn brake assembly.

---

#### **Horizontal Cross-Arm Brake, older systems**

---



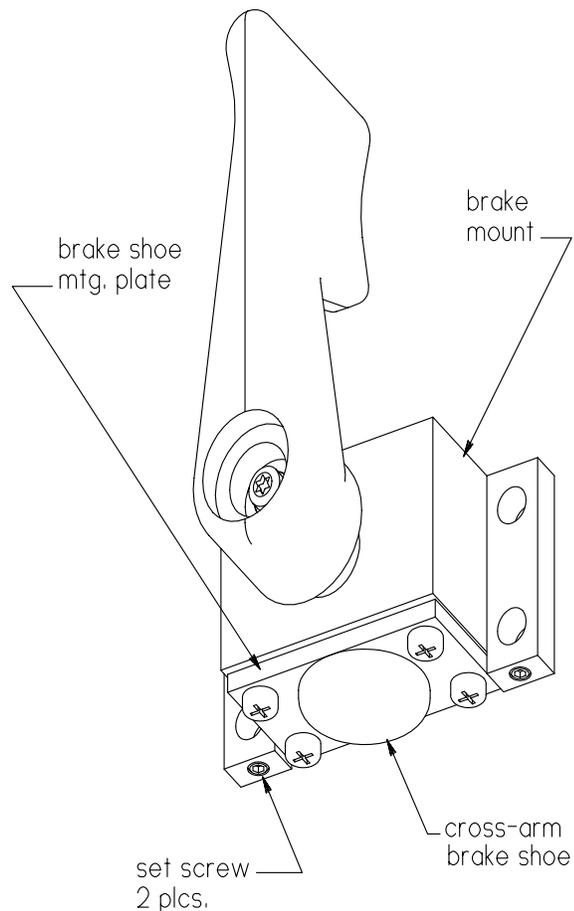
**Newer Cross-Arm Brake Systems:**

5. If brake tension requires adjustment, turn the handle approx. 5 - 10 degrees to the right so as to push the brake shoe down onto the Cross-Arm and to move the brake mount up for adequate clearance between the brake and Cross-Arm when the brake is unlocked. The brake shoe should be barely touching the Cross-Arm.
6. Tighten the 4 torx screws to secure the brake mount to the Cross-Arm housing.
7. With the handle in the slightly angled position, use Loctite 222 and tighten the two bottom set screws.
8. Turn the handle approx. 90 degrees to the right to lock the Cross-Arm, then grasp the Cross-Arm handle and attempt to move the Cross-Arm in and out to ensure it's locked in place. If the Cross-Arm can still move, make adjustments again with the brake shoe and set screws.

---

**Horizontal Cross-Arm  
Brake, newer systems**

---



## INSPECT STATIC DRAG WIRE

1. Verify the drag wires underneath the Mobile C-Arm and the Workstation are touching the floor.
2. Verify the wires are securely attached.

## 1.2 ELECTRICAL INSPECTIONS

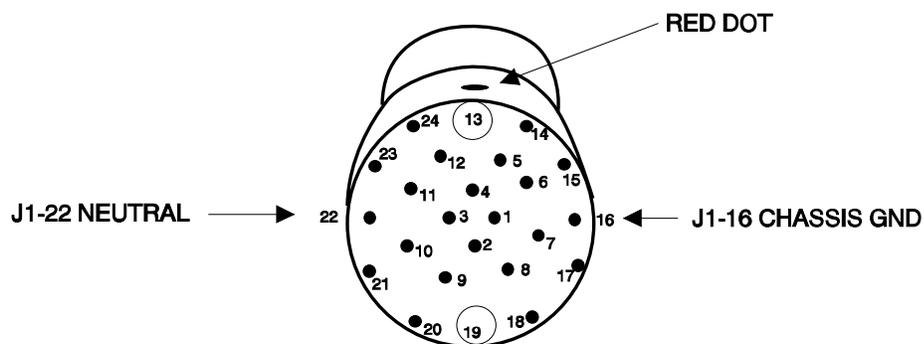
### GROUND CONTINUITY

**WARNING** Do not perform this continuity test with the AC plug plugged into a power receptacle. Pins 13 and 19 are phase 1 and phase 2 power.

1. Verify the system power cord is disconnected from the AC receptacle.
2. Remove the clear plastic shield located below the elapsed time indicator that prevents access to the isolation transformer (T1).
3. Verify continuity between the following:

From	To	Spec
Interconnect Cable J1-16 (Chassis)	AC Power Plug Ground Pin	< 0.5 $\Omega$
Interconnect Cable Shield (Metal Casing)	AC Power Plug Ground Pin	< 0.5 $\Omega$
Isolation xformer, CT (secondary)	Interconnect J1-22	< 0.5 $\Omega$

#### Interconnect Connector (J1) Pin Insertion End



4. Connect the Interconnect Cable to the Mobile C-Arm and verify continuity between the following:

From	To	Spec
Mobile C-Arm Second Earth Ground (Bottom left beneath Front Leg Cover)	AC Power Plug Ground Pin	< 0.5 $\Omega$
Workstation Equipotentiality Stud (Underneath the bottom right side)	AC Power Plug Ground Pin	< 0.5 $\Omega$

5. Record only the highest resistance on the PM form.

## **ELECTRICAL PLUG/POWER CORD**

1. Inspect the Workstation AC power cable for damage and wear.

## **INTERCONNECT CABLE and PINS**

1. Inspect the interconnect cable; verify that the cable, Mobile C-Arm connector, and pins are not damaged. Verify the LEMO connector strain relief is torqued to 60 inch/lbs.

## **MOTORIZED FUNCTIONS / LIMIT SWITCHES**

**WARNING** Observe safety procedures when operating motorized features.

1. Make sure the Interconnect Cable is connected to the C-Arm.
2. Plug the AC power cord into the wall receptacle.
3. Turn the Workstation keyswitch to **ON**.

## **VERTICAL LIFT**

1. Raise the vertical column until the upper limit switch is activated.
2. Lower the vertical column until the lower limit switch is activated.
3. Verify smooth motor operation.
4. Observe that no drift occurs when the switch is released.

## **L-ARM ROTATION**

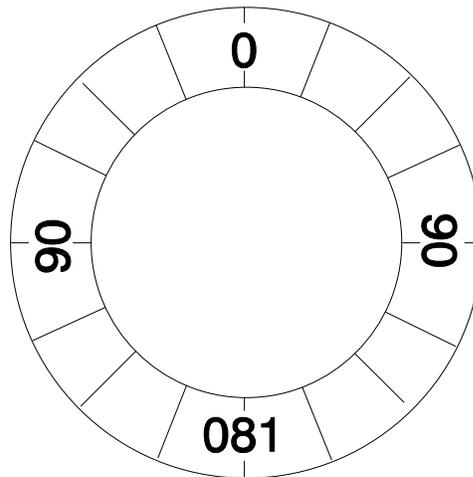
*NOTE: This test is NA (non-applicable) if testing a Super-C system (which does not use an L-Arm).*

1. Fully retract the cross arm.
2. With the L-Arm in the lower vertical position, rotate the L-Arm approximately 190 degrees counter clockwise, until the limit switch engages and disables motor operation.
3. Rotate the L-Arm back to the lower vertical position and then rotate the L-Arm approximately 190 degrees clockwise, until the limit switch engages and disables motor operation. Motor operation should be smooth with no vibration.

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**L-Arm Rotation Scale**

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**CAMERA ROTATION**

1. Press the **CAMERA ROTATE** key on the C-Arm control panel.
2. Rotate the camera clockwise to full stop, then rotate the camera counter clockwise to full stop and verify that the camera motor rotates the camera through a 360° range.
3. Verify that the camera rotation icon rotates properly as the camera is rotated.

For the following three sections, turn the Workstation keyswitch to **OFF**, then switch it back to **ON** and verify the operations as listed.

**TECHNIQUE DISPLAY**

1. After turning the Workstation keyswitch to **ON**, verify the X-ray technique displays on the C-Arm control panel.

**CONTROL PANEL LAMPS**

Check the switch lamps on both control panels (Boost, Image Reversal, etc.) on the mainframe. Ensure that each one lights when its associated switch is pressed.

**WARNING** Some of the following steps produce X-rays. Use appropriate precautions.

**“X-RAY ON” LAMPS**

1. Press the X-ray ON button on the top of the C-Arm control panel and verify that its lamp lights when the button is pressed. Verify that the “X-ray ON” lamp on the Workstation also lights when the button is pressed.

## COLLIMATOR CONTROLS

1. While pressing the X-ray **ON** button, press the **COLLIMATOR IRIS** buttons and verify the collimator iris closes and opens.
2. While pressing the X-ray **ON** button, press the **COLLIMATOR SHUTTER** buttons and verify the collimator shutter closes and opens.
3. While pressing the X-ray **ON** button, press the **COLLIMATOR ROTATE** buttons and verify the collimator shutter rotates clockwise and counterclockwise.

## 1.3 X-RAY CONTROL INSPECTIONS

**WARNING** The following steps produce X-rays. Use appropriate precautions.

### 5-MINUTE FLUORO TIMER

1. Verify that the fluoro timer counts up while taking X-rays.
2. Verify that the alarm sounds when 5 minutes have elapsed on the fluoro timer.
3. Verify that the fluoro timer resets when the Alarm Reset button is pressed for 5 seconds.

### EMERGENCY OFF SWITCHES

1. Press one of the two **FAST STOP** buttons and verify the message "*INTERLOCKS OPEN*" is displayed on the C-Arm display.
2. Press any button on the C-Arm control panel to reboot the C-Arm. The C-Arm will reboot.
3. Repeat steps 1 and 2 with the second **FAST STOP** button.

### FOOTSWITCH CONTROL

1. Connect the footswitch to the C-Arm power panel (if it isn't already).
2. Press the **SCOUT FLUORO** footswitch and verify that X-ray ON switch illuminates and an audible alarm can be heard as long as the switch is pressed. Verify that the averaging LEDs turn off on the Workstation from panel while in Scout Fluoro.
3. Press the **SAVE** footswitch. Verify a number (1-200) is displayed in the center of the right monitor.
4. Press the **BOOST/DIG. SPOT** footswitch and verify that X-ray ON switch illuminates and an audible alarm can be heard as long as the switch is pressed.
5. Enable **BOOST** on the control panel, press the **BOOST/DIG. SPOT** footswitch for 5 seconds and verify the alarm sounds at twice the normal rate.
6. Press the **DIGITAL PROCESS FLUORO** footswitch and verify that X-ray ON switch illuminates and an audible alarm can be heard as long as the switch is pressed.

## HANDSWITCH CONTROL

1. Connect the handswitch control to the C-Arm power panel (if it isn't already).
2. Press the **SCOUT FLUORO** handswitch and verify that the X-ray ON switch illuminates and an audible alarm can be heard as long as the switch is pressed. Verify that the averaging LEDs turn off on the Workstation front panel while in Scout Fluoro.
3. Press the **SAVE** handswitch. Verify a number (1-200) is displayed in the center of the right monitor.
4. Press the **PROC/BOOST** handswitch and verify that the X-ray ON switch illuminates and an audible alarm can be heard as long as the switch is pressed.
5. Enable BOOST on the control panel, press the **PROC/BOOST** handswitch for 5 seconds and verify the alarm sounds at twice the normal rate.

## CONTROL PANEL CONTROLS

### CONTROL PANEL DIAGNOSTICS

1. Press and hold the **C-ARM MODE** button until the message "*Loading Status*" appears on the control panel display.

*NOTE: Eventually the message "STATUS V n.nn" will indicate that you have entered the status mode.*

*NOTE: Scroll through the choices listed within the menu by pressing either the kVp or mA switches.*

2. Scroll to the **Panel Diagnostics** menu and select it by pressing any switch on the control panel.
3. Run the **Panel LED Test**, **Panel Key Test**, and the **Panel kV/mA Test**.

*NOTE: To read the information or values contained under a menu item, display the item name and press any control panel switch.*

4. Select **Exit This Menu** and press any control panel switch.
5. Select **Exit To System** and press any control panel switch.

*NOTE: While returning to normal system operation, the Control Panel Display will display the message: "Loading System."*

### NORMAL/MAG1/MAG2

1. Press the X-ray field size key and verify that it can select each of the three field sizes. Each field size's LED should light when selected.

### L-R

1. Press the **L-R** key and verify that it swaps video images on the left and right Workstation monitors.

### CART MODE

1. Press the **CART MODE** key repetitively and verify that the Workstation toggles through all cart modes (dependent on purchased options).

**BOOST/ENABLE\***

1. Press the **BOOST/ENABLE** key for approx. 5 seconds and verify BOOST is selected and its LED lights.

\*Cardiac systems are always in the boost mode.

**IMAGE REVERSAL**

1. While taking X-rays, press the **IMAGE REVERSAL** key and verify image reversal for each of four image positions. The image position's LED should light when selected.

**KVP CONTROL**

1. Select Manual Fluoro Mode, then press the **KVP CONTROL** key and verify kVp can be adjusted.

**MA CONTROL**

1. Press the **MA CONTROL** key and verify that mA can be adjusted in **MANUAL FLUORO** mode and mAs can be adjusted in **FILM** mode.

**ABS SELECT**

1. Press the **ABS SELECT** key and verify the different ABS tables can be selected and loaded.

## 2. POWER SUPPLIES & BATTERY INSPECTIONS

### 2.1 SYSTEM BATTERIES

**GENERATOR BATTERIES**

This procedure can be used to verify that a fully charged set of battery packs is performing adequately.

**WARNING** The following steps produce X-rays. Use appropriate precautions.

1. Remove the Torx screw on the right side of the electronic Card Rack and swing the Card Rack out on its hinge to expose the Battery Charger PCB.
2. In **FILM** mode, set the technique for 75 kVp @ 200 mAs.
3. Make an exposure and verify that the Bargraph LED located on the Battery Charger PCB indicates 160 or 170 Volts.
4. If the bargraph voltage indicates less than 160 Volts, measure across the battery terminal with a DMM while making an exposure. If the batteries measure less than 160 Volts, weak battery packs or a fault on the Battery Charger PCB may be indicated.

## SRAM BATTERY DATE CHECK

1. Check for a label on the rear door of the electronics cabinet that is marked “SRAM BATTERY REPLACED” followed by the date replaced. If the label is not there or the date replaced was 1 year ago or longer the SRAM battery must be replaced and a new label made and affixed.

## SRAM BATTERY REPLACEMENT

**WARNING** Do not remove the SRAM from the Solid State Drive when performing this procedure.

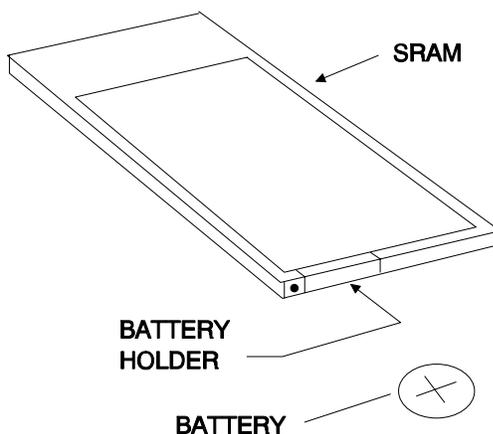
The LED closest to the SRAM is a “status” LED it will illuminate RED during disk access if the battery needs to be replaced. The second LED is a “busy” LED that indicates when the SRAM is being accessed. If both LED’s illuminate RED during disk access the battery is not charged adequately.

1. With the SRAM **in** the Solid State Disk, use a jewelers screw-driver to remove the screw securing the battery holder.
2. Remove the battery holder and the battery.
3. Replace the battery with a new 3V, lithium ,165 mAH, battery P/N 74-122904-00. Verify the + sign is pointing up. Make up a label that says “SRAM Battery Replaced” and then the current date and affix it to the back door of the electronics cabinet of the workstation.

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### SRAM Battery Replacement

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## 2.2 DC POWER SUPPLIES

### MONITOR CART / WORKSTATION

**WARNING** Electrical circuits inside the equipment use voltages that are capable of causing serious injury or death from electrical shock. Use appropriate precautions.

1. On the Image Processing PCB, measure the following voltage:

GND	To	Adjust	Measurement	Tolerance
P3-5	P3-1	PS1 @ R14	+5 VDC	±0.1 VDC

### MAINFRAME (ONLY PERFORM IF THE SRAM BATTERY IS REPLACED)

**WARNING** Electrical circuits inside the equipment use voltages that are capable of causing serious injury or death from electrical shock. Use appropriate precautions.

1. Open the Electronic Rack Cover to gain access to the Technique Processor PCB.
2. Measure the +5 VDC on the Technique Processor PCB. If the +5 voltage does not meet the tolerance indicated then adjust R11 on PS1 until the correct tolerance is displayed on the DMM.

GND	To	Measurement	Tolerance
C9 -	C9 +	+5.05 VDC	± 0.05 VDC

## 3. IMAGE QUALITY INSPECTIONS

**WARNING** The following steps produce X-rays. Use appropriate precautions.

### 3.1 DOSE RATE

Entrance exposure is the amount of radiation available at the entrance point of patient anatomy. Entrance exposure is measured 12" (or 30 cm) above the surface of the Image Intensifier in the center of the X-ray beam. This measurement is used to represent the average thickness of patient anatomy.

#### 5R and 10R Systems

FDA requirement 80-8035, Section 1020.32, part D2 states the maximum FLUORO entrance exposure is either 5R/min or 10R/min depending on the manufacturing date. If a system was manufactured before May 19, 1995, the maximum entrance exposure allowed is 5R/min. On or after May 19, 1995, the maximum entrance exposure allowed is 10R/min. This impacts 9600s as indicated by the following system serial numbers:

- 5R systems = S/N 69-0001 to 69-1160
- 10R systems = S/N 69-1161 and higher

Refer to the 9600 System Service Manual to perform the Entrance Exposure calibration. Be sure to refer to the correct Entrance Exposure documentation (5R or 10R) depending upon the serial number of your system.

**DOSE RATE (MAX. KV & MA)**

1. Using a dosimeter for the measurements, record the Actual Dose Rate, max. kV and mA, on the PM Inspection Report form.

**HIGH LEVEL CONTROL (BOOST)**

1. Using a dosimeter for the measurements, record the Actual Dose Rate, max. kV, BOOST mode, on the PM Inspection Report form.

**X-RAY GENERATOR ACCURACY VERIFICATION TESTS (ANNUAL PM)**

These tests measure the kVp accuracy of the system.

**WARNING** The following steps produce X-rays. Use appropriate precautions.

**FLUORO MODE**

Set the system to **FLUORO MANUAL** mode. Use a kVp meter or Dynalyzer for the measurements.

**SET KVP****FLUOROSCOPIC KVP ACCURACY @ 1 MA**

1. Enter 1.0 mA beam current. Take exposures at 60, 90 and 120 kVp and insure that the values are within  $\pm 5\%$ .

**FLUOROSCOPIC KVP ACCURACY @ MAXIMUM MA**

1. Set the mA technique to the maximum possible setting for each kVp value. Take exposures at 60, 90 and 120 kVp and insure that the values are within  $\pm 5\%$ .
2. Check the "KVP ACCURACY CHECKED" box and note any discrepancies in the comments section on the PM form.

## 3.2 FLUORO RESOLUTION

### FLUORO RESOLUTION

1. Install the Image Resolution Tool at a 45° angle to the image intensifier grid.
2. Press the X-ray **ON** switch and verify that the image resolution meets the following line pairs/millimeter in each field size.

FIELD SIZE	9-inch Image Intensifier		12-inch Image Intensifier	
	60 Hz lp/mm	50 Hz lp/mm	60 Hz lp/mm	50 Hz lp/mm
NORMAL	1.4 lp/mm	1.2 lp/mm	1.0 lp/mm	1.0 lp/mm
MAG1	2.0 lp/mm	1.7 lp/mm	1.3 lp/mm	1.4 lp/mm
MAG2	2.4 lp/mm	2.0 lp/mm	1.6 lp/mm	2.0 lp/mm

3. Record the line pairs/millimeter for each field size on the PM Inspection Report form.

## 3.3 FLUORO PENETRATION TEST

### KV TRACKING NORMAL AUTO MODE

1. Select the **STANDARD** ABS Table.
2. Select **AUTO FLUORO** technique mode and the **NORMAL** field size.
3. Make exposures with one, two, and three copper filters added in the beam path and verify that the kVp tracks as indicated in the following list. Record the resulting kVp and mA values on the PM form.

NUMBER OF FILTERS	kVp Range
one	60 ± 3 kVp
two	70 ± 3 kVp
three	78 ± 3 kVp

## 4. PREVENTATIVE MAINTENANCE ACTIONS

### AIR FILTERS CLEANED, 9600 COOLING KIT

This procedure is applicable only if the system (Std. C-Arm or Super C-Arm) is equipped with the 9600 Cooling Kit, which includes the ventilated HV cable cover and air vent filters.

1. Switch **OFF** the Workstation keyswitch (if not already switched off), then remove the HV cable cover from the X-ray tube (if not already removed). You may want to disconnect the fan wires for easier access to the inside of the cover.

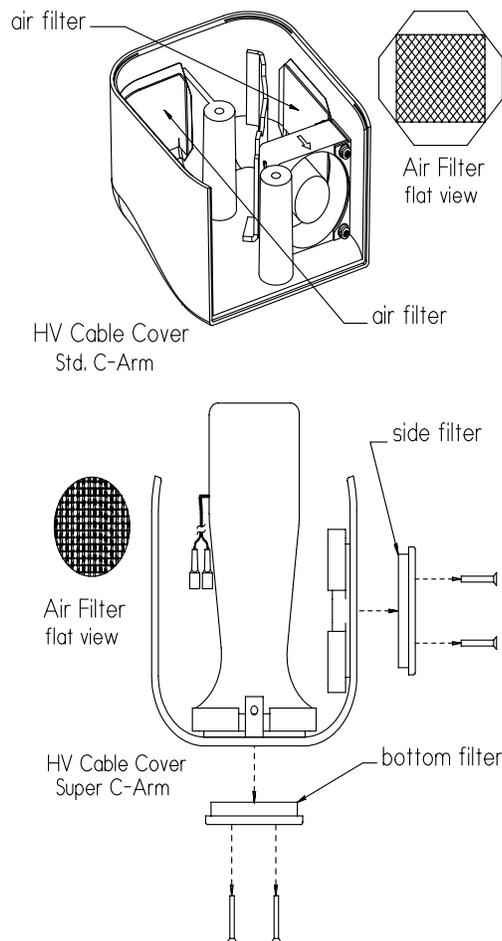
*NOTE: For the Super-C, remove the 4 mtg. screws from each vent insert (bottom and side insert), then remove the inserts to access the filters.*

2. Note the two air filters for Std. C and Super-C, inside the cover attached over the air vents. Clean each filter and make sure they are free of dust, lint or any substance which would inhibit air flow.
3. Reconnect the 2 fan wires (if disconnected) and note their color code (black to black, red to red), then reattach the HV cable cover to the X-ray tube.

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### HV Cable Cover Filters, Std. C-Arm & Super C-Arm

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## SYSTEM FUNCTION TESTS

### TV CAMERA ALIGNMENT

1. Press the **CAMERA ROTATE** key on the C-Arm control panel, rotate the camera through the full 360° range and verify if the rotation indicators are calibrated.
2. If the rotation indicators require adjustment perform the following steps:

**WARNING** The following steps produce X-rays. Use appropriate precautions.

- A. Insert the Workstation boot disk into the disk drive.
- B. Press the **SETUP OPTIONS** switch and access the *Setup Options* menu.
- C. Next highlight the *Access Level 2 (Service)* menu and press **ENTER**.
- D. Enter the *Video Calibration* sub-menu and run the *Camera Rotation Calibration* program.

*NOTE: This program will automatically calibrate the camera rotation indicator displayed on the left monitor to the actual degree of rotation from the stop position. When the program is complete, return the system to normal operation.*

- E. During fluoro exposure, rotate the camera and verify that the simulated stop position displayed on the monitor coincides with the actual stop position.
- F. Make an exposure and note the vertical and horizontal orientation of the image, then discontinue the exposure.
- G. Rotate the camera and observe the indicator arrow as it rotates around the perimeter of the image. Discontinue rotation and note where the arrow is pointing toward the image.
- H. Make another exposure and verify that the pointer has moved from its location in the previous image to the top of the monitor in the new image.

## **DIGITAL CINE (OPTION)**

1. Record and play back some images on the digital cine disk drive and verify disk drive operation.

## **IMAGE STORAGE**

1. Perform the following steps to verify proper operation of Image Storage using **SAVE**:
  - A. Get an image on the left monitor then press the **SAVE** key. Verify a number (1-200) is displayed in the center of the right monitor.
  - B. Press the **SAVE** footswitch. Verify a number (1-200) is displayed in the center of the right monitor.
  - C. Press the **SAVE** handswitch. Verify a number (1-200) is displayed in the center of the right monitor.
2. Press the **DISKVIEW** key on the Workstation to verify the image has been saved.

## **DIGITAL SPOT**

Verify proper operation of Boost/Dig. Spot (optional feature) with the following steps:

1. Cover the II with a lead cover.
2. Select the **MAG1** field size.

3. Press the **BOOST/DIG. SPOT** footswitch and verify the mA increases to 12 mA (standard systems) or 60 mA (Cardiac systems) and the audible alarm beeps at twice the normal rate.
3. Press the **PROC BOOST** handswitch and verify the mA remains at 12 mA (standard systems) or 60 mA (Cardiac systems) and the audible alarm beeps at twice the normal rate.

## ONE SHOT

Verify proper operation of One Shot with the following steps:

1. Select **ONE-SHOT** with high averaging on the Workstation.
2. Press the **SCOUT FLUORO** footswitch and verify that the Workstation mode display switches to Fluoro, without Averaging.
3. Release the footswitch and verify that the display returns to **ONE-SHOT** with high averaging.
4. Press the **DIGITAL PROCESS FLUORO** footswitch and verify that the exposure is averaged and integrated, and the exposure automatically terminates.

## ROADMAP (OPTION)

Verify proper operation of Roadmap with the following steps:

1. Press the **ROADMAP** key on the front panel (peak opacification will automatically be turned ON when ROADMAP is selected).
2. Verify the mask selection screen appears on the right monitor.
3. Verify the **CREATE MASK** option is selected.
4. Create a subtraction mask by making an exposure and allowing the image to stabilize before releasing the key.
5. Take another exposure and rotate the camera. The new image will be subtracted from the original mask.

## SUBTRACTION (OPTION)

Verify proper operation of Subtraction with the following steps:

1. Press the **SUBTRACT** key on the front panel.
2. Begin a Fluoro exposure.
3. The technique will be locked on the displayed image and the subtraction mask will be acquired. Verify the system starts acquiring images in the digital cine mode.
4. The subtraction mask will appear as a flat gray image on the left monitor.

5. Continue the exposure while rotating the camera. Verify that the new image is subtracted from the original mask.

### **ZOOM (OPTION)**

Verify proper operation of Zoom with the following steps:

1. Display an image on the left monitor.
2. Press the **ZOOM** key on the trackpad panel and observe the region of interest (ROI) box on the left monitor displays 2X magnification.
3. Press the **SUPER KEY** to cycle through 2X and 4X magnification.
4. Press the **TRACKPAD** to move the ROI box within the image.

### **SHARPEN (OPTION)**

Verify proper operation of Sharpen with the following steps:

1. Take an exposure and press the **SHARPEN** key on the trackpad panel.
2. Verify that the dark image detail is enhanced.
3. Take another exposure and then press and hold **SHARPEN** while pressing the trackpad.
4. Verify the amount of edge enhancement varies.

### **DIGITAL FLUOROGRAPHY (PULSE)**

1. Cover the II with a lead cover, then press the **BOOST ENABLE** switch for 6 seconds to enable the boost function.
2. Select the **MAG1** field size.
3. Press the **DIGITAL PROCESS FLUORO** footswitch and verify the kVp tracks to 120 kVp.
4. Press the **PROC BOOST** handswitch and verify the mA remains at 12 mA (standard systems) or 60 mA (Cardiac systems) and the audible alarm beeps at twice the normal rate.

### **CARDIAC (OPTION)**

Verify proper operation of the following functions on a Cardiac system:

1. If the system is Cardiac-only, the Cardiac ABS table is automatically loaded during bootup.
2. If the system is Cardiac-only, pressing the ABS select key displays the word **CARDIAC** on the C-Arm control panel.
3. The Cardiac autohistogram is automatically selected.

4. Boost is automatically enabled and the Boost Enable LED on the C-Arm control panel illuminates.
5. Boost mode cannot be disabled.
6. The **PULSE** and **BOOST ENABLE** keys on the C-Arm control panel are disabled; the Cardiac software blocks all input from these keys.
7. Chole and One-Shot modes are disabled.
8. Averaging rates are 1, 2, 4, or 8 FPS (frames-per-sec.); the default rate is 1 FPS.
9. The only Acquire Image rate allowed is 30 FPS (for 60 Hz systems) or 25 FPS (for 50 Hz systems).
10. Pressing **BOOST** activates Pulse mode.
11. Pulse mode generates a fixed rate of 30 PPS (pulses-per-sec.) for 60 Hz systems, or 25 PPS for 50 Hz systems. Other pulse rates cannot be selected and the Select Pulse Rates screen is not available.
12. **SCOUT FLUORO** is not active in pulse mode.
13. Maximum pulse (Boost) exposure rate is 20 seconds; after 20 sec., exposure is automatically terminated and **BOOST OVERTIME** displays on the control panel.
14. Maximum mA is 60 mA.
15. kV range is 40 - 120 kV.

### **LAST IMAGE HOLD**

Verify proper operation of Last Image Hold by using Recall (Not on SP):

1. Save a few images and note the order they were saved in.
2. Press the **RECALL** key.
4. Verify the last image saved is displayed on the left monitor.

### **COOLING FAN (OPTION)**

Applicable only for systems equipped with the 9600 Cooling Kit (Std. C-Arm and Super C-Arm) which includes the ventilated HV cable cover.

1. Switch **OFF** the Workstation keyswitch, then remove the HV cable cover from the X-ray tube but do not disconnect the cooling fan wires.
2. Switch **ON** the Workstation keyswitch and ensure that the fan turns on at approx. the same time the keyswitch is switched on.
3. Ensure proper fan operation. Blade rotation should not be sluggish and there should be no obstructions inside the fan itself. Fan air should blow air directly onto the X-ray tube heat sink.

## SYSTEM ACCESSORIES TESTED

### VTR (OPTION)

Test VCR Record:

1. Press **VCR RECORD**.
2. Begin imaging and watch the VTR counter count-up. Stop imaging and the counter should stop counting.
3. Press the VCR **PLAY** button.
4. Press the VCR **REWIND** button and rewind the tape.
5. Verify that the VCR recorded.

### THERMAL PRINTER (OPTION)

1. Print out some images and verify that the printer is operational.

### HARD COPY CAMERA (OPTION)

1. Take some images with the Hard Copy Camera and verify the camera operation.

### JAZ DRIVE (OPTION)

*NOTE: Refer to the Supplement, Removable Cine Storage, 00-879857, to aid in testing Jaz drive operation.*

Verify proper operation of the Jaz drive with the following tests:

1. Copy images from the Workstation hard drive and Workstation floppy diskette to the Jaz drive.
2. Copy images from the Jaz drive to the Workstation hard drive and Workstation floppy diskette.

### HEART LAB (OPTION)

Access the heart lab Q-card, then follow the steps on the Q-card to test the heart lab software for proper operation.

### LASER CAMERA INTERFACE (OPTION)

Take an X-ray, then print it out on the laser printer to test the laser camera interface components for proper operation.

## DICOM MODULE (OPTION)

Access the DICOM Q-card, then follow the steps on the Q-card to test the DICOM box module for proper operation.

## MECHANICAL LUBRICATIONS PERFORMED (ANNUAL PM)

### LUBRICATE COLLIMATOR

1. Remove the X-ray Tube Housing cover and the Collimator Cover to expose the Collimator.

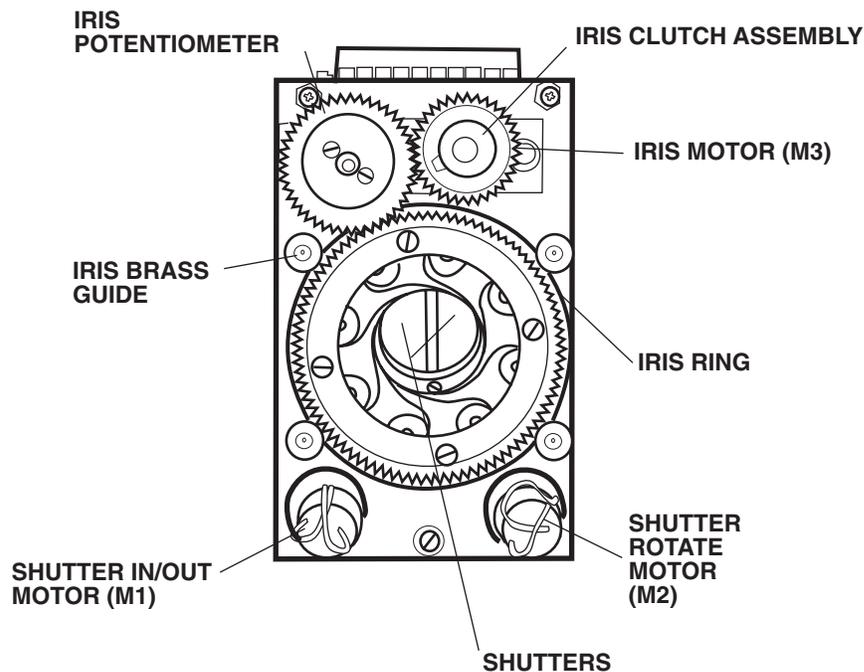
*NOTE: Do not over lubricate the Collimator Iris Ring. Use Permatex Super Lube P/N: 88-299483-00 or equivalent.*

2. Sparingly lubricate the edge of the Collimator Iris Ring that rotates through the Iris Brass Guides.

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### Bottom View of the Collimator

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### LUBRICATE VERTICAL COLUMN CHAINS

1. Operate the vertical lift motor until the upper limit switch is reached.

2. Reach through the access holes in the casting and spray the horizontal and vertical chains lightly with Permatex Super Lube Spray P/N - 88-299485-00.

## 5. X-RAY BEAM ALIGNMENT VERIFIED (annual pm only)

**WARNING** The following steps produce X-rays. Use appropriate precautions.

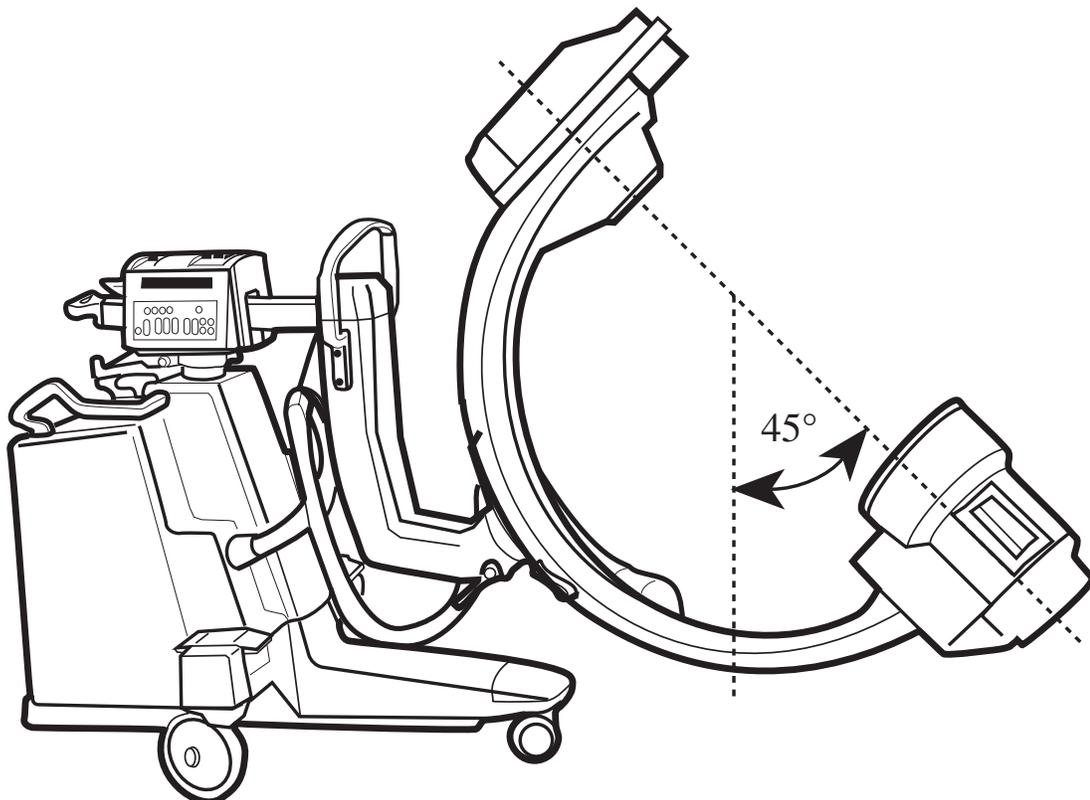
### Setup

1. To nominalize C-Arm flexure, release the C-Arm brake and position the C-Arm at a 45° angle as shown below.
2. Attach the Beam Alignment Tool on the Image Intensifier.

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#### C-Arm Positioning

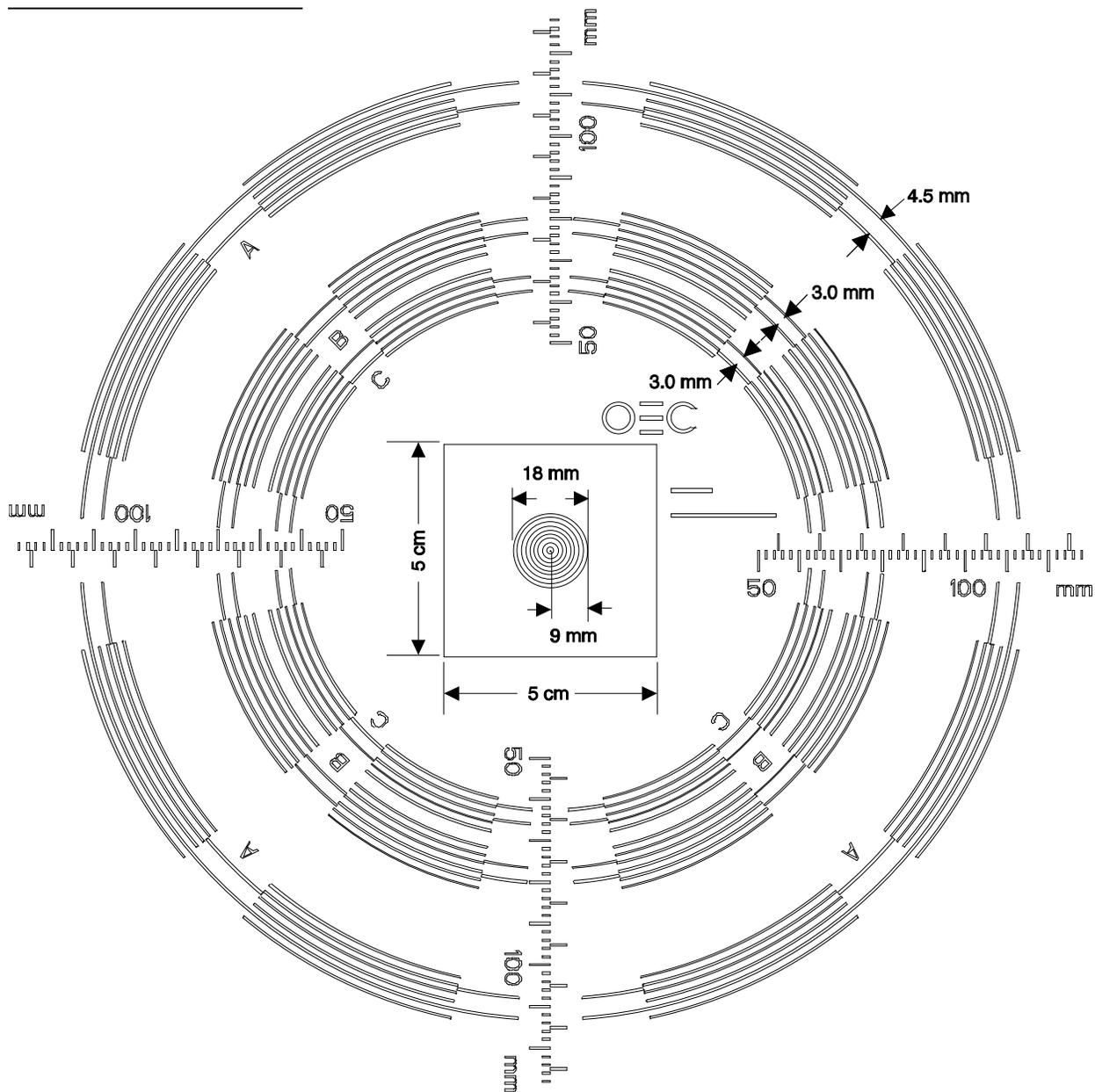
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**Beam Alignment Mask**


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## BEAM ALIGNMENT VERIFICATION

1. Load a film cassette in the alignment tool. Make the following four exposures on one sheet of film:
2. Select **Manual - Fluoro, Normal field** and then **Film** mode. Take a 50 kVp @ 0.9 mAs exposure.
3. Select **Manual - Fluoro, MAG 1 field** and then **Film** mode. Take a 50 kVp @ 0.9 mAs exposure.
4. Select **Manual - Fluoro, MAG 2 field** and then **Film** mode. Take a 50 kVp @ 0.9 mAs exposure.

5. Select **Manual - Fluoro** and completely close the collimator iris. Select **Film mode**. Take a 50 kVp @ 0.9 mAs exposure.
6. Remove the film cassette and develop the film.
7. Verify the exposure, with the collimator iris closed, is within 50 mm square in the middle of the alignment tool. If a stop sign pattern is displayed, measure the image from the center of flats.
8. Using the film, measure and record the **Normal** field X and Y exposure diameters.
9. Make a **Normal** mode fluoro exposure. Using the scale on the beam alignment tool, measure and record the X and Y diameters displayed within the digital mask on the Workstation.
10. Calculate and record the absolute value of the difference between the film and Workstation X axis values as follows:  $XN = | X_{\text{Step 8}} - X_{\text{Step 9}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the XN value on the form.
11. Calculate and record the absolute value of the difference between the film and Workstation Y axis values as follows:  $YN = | Y_{\text{Step 8}} - Y_{\text{Step 9}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the YN value on the form.
12. Calculate and record the sum of XN and YN as follows:  $\text{SumN} = XN + YN$ .  
  
Verify the sum is less than or equal to 36 mm (4% SID).  
  
Write the SumN value on the form.
13. Using the film, measure and record and **MAG 1** field X and Y exposure diameters. If a stop sign pattern is displayed, measure the image from the center of flats. If curvature of the flat side is observed, measure from the center of the flats as though the sides were flat (connecting corner to corner in a straight line).
14. Make a **MAG 1** mode fluoro exposure. Using the scale on the alignment tool, measure and record the X and Y diameters displayed within the digital mask on the Workstation.
15. **MAG 1** field — Calculate and record the absolute value of the difference between the film and Workstation X axis values as follows:  $X1 = | X_{\text{Step 13}} - X_{\text{Step 14}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the X1 value on the form.

16. MAG 1 field — Calculate and record the absolute value of the difference between the film and Workstation Y axis values as follows:  $Y1 = | Y_{\text{Step 13}} - Y_{\text{Step 14}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the Y1 value on the form.
17. MAG 1 field — Calculate and record the sum of X1 and Y1 as follows:  $\text{Sum1} = X1 + Y1$ .  
  
Verify the sum is less than or equal to 36 mm (4% SID).  
  
Write the Sum1 value on the form.
18. Using the film, measure and record and **MAG 2** field X and Y exposure diameters. If a stop sign pattern is displayed, refer to preceding step to determine how to make the measurement.
19. Make a **MAG 2** mode fluoro exposure. Using the scale on the alignment tool, measure and record the X and Y diameters displayed within the digital mask on the Workstation.
20. MAG 2 field — Calculate and record the absolute value of the difference between the film and Workstation X axis values as follows:  $X2 = | X_{\text{Step 18}} - X_{\text{Step 19}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the X2 value on the form.
21. MAG 2 field — Calculate and record the absolute value of the difference between the film and Workstation Y axis values as follows:  $Y2 = | Y_{\text{Step 18}} - Y_{\text{Step 19}} |$   
  
Verify the difference is less than 28 mm (3% SID).  
  
Write the Y2 value on the form.
22. MAG 2 field — Calculate and record the sum of X2 and Y2 as follows:  $\text{Sum2} = X2 + Y2$ .  
  
Verify the sum is less than or equal to 36 mm (4% SID).  
  
Write the Sum2 value on the form.
23. Using the film taken in steps 1 - 6 and ruler, verify the center of the image is centered on the sheet of film — (X offset + Y offset) is less than 16 mm (13/16") — 2% SID.  
  
Write this value on the form as CENTER.
24. If all of the previous steps pass successfully record the results on the PM form and then continue with the next procedure. Otherwise perform the Beam Alignment procedure contained in the 9600 System Service Manual. If beam alignment could not be tested, record why it could not be done on the PM form.

## 6. TEST EQUIPMENT USED

**TYPE**

Record the equipment type on the PM Inspection Form.

**MODEL**

Record the equipment model numbers on the PM Inspection Form.

**SERIAL NUMBER**

Record the equipment serial numbers on the PM Inspection Form.

**CALIBRATION DUE DATE**

Record the equipment calibration due date on the PM Inspection Form.

**TOOLS**

In addition to common hand tools, the following tools are required:

- Torx Screwdriver Set
- Spline Driver, .048, P/N 00-900920-01

**TEST EQUIPMENT**

- Oscilloscope Tektronix 2236 or equivalent
- Digital Volt-Ohm-Meter
- Dosimeter (Keithley Model 35050, PMX II non-invasive meter or equivalent)
- Model 96030 ion chamber or equivalent
- kVp meter
- Bore Sight Tool, P/N 00-877589
- Resolution Tool
- Lead Apron
- 1 mm Copper Filter (3 each req'd), P/N 00-877682-01
- 9600 Boot and Diagnostic Disk (software), P/N 00-877444-01
- 9" Beam Alignment Tool, P/N 00-878105-01
- 12" Beam Alignment Tool, P/N 00-878867-01

## PM FORM COMPLETION

Verify that the PM Form has been completely and correctly filled out. Make sure to obtain a customer signature.

## PAINT KITS

PART NUMBER	DESCRIPTION
900524-11	Paint Kit, Elite Gray, Texture
900524-12	Paint Kit, Rhinestone, Texture
900524-13	Paint Kit, Windswept, Texture

## TORX CRESTCUP TORQUE SPECIFICATIONS

TORX SCREW SIZE	NOMINAL TORQUE VALUE	ACCEPTABLE RANGE
4-40	6 lbs./in	5-8 lbs./in
6-32	15 lbs./in	13-16 lbs./in
8-32	22 lbs./in	21-24 lbs./in
10-32	30 lbs./in	28-31 lbs./in

## LUBRICATION AND ADHESIVES

- Alcohol Prep Pads
- Permatex Industrial Super Lube P/N - 88-299483-00 (Collimator)
- Permatex Super Lube Spray P/N - 88-299485-00 (Lift Chains)
- Mobile Synthetic SH-32 P/N - 88-299481-00 (for Gears)
- Dow Corning BR2+ P/N - 88-299477-00 (Flip Flop Bearing)

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