

Technical Publications

2219596 Revision 4

CT Eµ / Sytec 1600i / Sytec 1800i Periodic Maintenance Manual

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Operating Documentation

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 NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

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。



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.



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

All packages should be closely examined at time of delivery. 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) 827–3449 / 8*285–3449 **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.



OMISSIONS & ERRORS

GE personnel, please use the GEMS CQA Process to report all omissions, errors, and defects in this documentation. Customers, please contact your GE Sales or Service representatives.



CAUTION

Do not use the following devices near this equipment. Use of these devices near this equipment could cause this equipment to malfunction.

Devices not to be used near this equipment:

Devices which intrinsically transmit radio waves such as; cellular phone, radio transceiver, mobile radio transmitter, radio—controlled toy, etc.

Keep power to these devices turned off when near this equipment.

Medical staff in charge of this equipment is required to instruct technicians, patients and other people who may be around this equipment to fully comply with the above regulation.

LIST OF EFFECTIVE PAGES

| REV | DATE | PRIMARY REASON FOR CHANGE |
|--------|------------|--------------------------------|
| 0 lu | l 1 1008 | Initial release. |
| | * | |
| | * | Class A Manual release. |
| | | PM Report, MOD Cleaning |
| 3 Ap | r. 2, 1999 | MOD Cleaning |
| 4 Dec. | 29, 2000 | Added "Phantom Check" (PM0110) |
| | | |

LIST OF EFFECTIVE PAGES

| PAGE/ITEM REV | ITEMREV | ITEM REV | ITEM REV | ITEMREV |
|----------------------|------------------|--------------|----------|------------------|
| Title page 4 | PM0103 1 | GANTRY | PM0504 1 | PM0605 1 |
| a to d 1 | PM0104 1 | PM0301 1 | PM0505 1 | PM0606 1 |
| A 4 | PM0105 1 | PM0302 1 | PM0506 1 | PM0607 1 |
| B blank | PM0106 1 | PM0303 1 | PM0507 1 | PM0608 1 |
| i to ii 4 | PM0107 1 | PM0304 1 | PM0508 1 | PM0609 1 |
| | PM0108 1 | PM0305 1 | PM0509 1 | |
| Periodic Maintenance | PM0109 1 | PM0306 1 | PM0510 1 | MOD |
| | PM0110 4 | PM0307 1 | PM0511 1 | PM0701 1 |
| General1 | | | PM0512 1 | PM0702 1 |
| Schedule4 | | DAS/DETECTOR | PM0513 1 | PM0703 3 |
| PM Report 4 | OPERATOR CONSOLE | PM0401 1 | PM0514 1 | PM0704 1 |
| | PM0201 1 | PM0402 1 | | |
| PM Procedure | PM0202 1 | | XG/PDU | APPENDIX |
| | PM0203 1 | TABLE | PM0601 1 | A–1 to A–41 |
| SYSTEM | PM0204 1 | PM0501 1 | PM0602 1 | |
| PM0101 1 | PM0205 1 | PM0502 1 | PM0603 1 | |
| PM0102 1 | PM0206 1 | PM0503 1 | PM0604 1 | Blank/Rear Cover |

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| Caution Label Check |
| Image Check (Image Performance) |
| Check Error Logs |
| Perform Filter Curve Test |
| Check Ground Cable Terminals |
| Check DAS Count |
| Image Performance |
| Phantom Check |
| |
| Verify Audio Function |
| Clean Air Filter |
| Inspect FANs |
| Verify Track Ball for smooth operation |
| Clean Display monitor / Touch panel / Console exterior / Console interior |
| Check Cables / Power Cable Terminals |
| |
| Check Rotation Safety |
| Clean Mylar ring cover |
| Verify cables and hardware are tight |
| Gantry Cover Cleaning |
| Check Positioning Light |
| Check Gantry Anchor / Gantry Isolation |
| Check drive belt for wear |
| |
| Check/Clean Detector face |
| |

PM0402 Verify Detector heater control

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| PM0502 | Check Table Cover |
| PM0503 | Check Gap Sponge |
| PM0504 | Gap between Table Cover and Cradle |
| PM0505 | Check Cradle Rail |
| PM0506 | Holder Stability Check |
| PM0507 | Check Touch Sensor operation |
| PM0508 | Verify Unlatch Function |
| PM0509 | Check Gantry / Table interlock |
| PM0510 | Clean Cradle tray / Table Cover |
| PM0511 | Check for Oil Leak |
| PM0512 | Greass-up |
| PM0513 | Check Table anchors / Table Isolation |
| PM0514 | Inspect FANs |
| XG/PDU | |
| PM0601 | Check / Clean Radiator FAN |
| PM0602 | Check X-ray tube oil and HV connector |
| PM0603 | Check HV Tank and HV connector |
| PM0604 | Check HV Cable connection |
| PM0605 | Check Tube overheat safety |
| PM0606 | Check Parts |
| PM0607 | Check KV and mA |
| PM0608 | Inspect FANs |
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| PM0701 | Clean Air Filter (full height MOD only) |
| PM0702 | Inspect FAN |
| PM0703 | Dry/Wet Cleaning |
| PM0704 | Check Image archive operation |

GENERAL

INTRODUCTION

BEFORE STARTING A PERIODIC MAINTENANCE, READ THE SAFETY GUIDELINES MANUAL THOROUGHLY TO PREVENT EQUIPMENT DAMAGE, PERSONAL HARM, HARM TO OTHERS OR DEATH DURING SERVICE.

Recommended PM frequency is one time a year for CT $E\mu$ / Sytec 1600i / Sytec 1800i scanners. The frequency may vary due to local ordinance and the usage of the system, the system availability etc. If you need more PMs, order extra copies of this document or copy the schedules.

TOOLS

GENERAL TOOLS

- Service Manuals
- Socket Head Wrench Set
- Torque Wrench
- Protractor
- Oscilloscope
- Digital Multimeter
- Grease (Shell Alvania #2 or equivalent)
- Alcohol (ethyl alcohol—no water addition, or isopropychol disinfectant alcohol)
- CRC of equivalent (WD40, etc...)
- Cloth
- Kim Wipe or equivalent
- Soft tissue
- Glass Cleaner
- Dust bag
- Vacuum Cleaner
- MOD Cleaner kit
- Film Holder, Developer, and type52 Polaroid Film (For X-ray alignment, adjustment, not used in the PM)
- Densitometer
- RS232C Terminal (e.g., J3100)

SPECIAL TOOLS

- HV Divider, HV Cables, and Wrench for HV Cable
- Silicone Oil
- Grease Gun

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SCHEDULE

Recommended PM frequency is one time a year for CT $E\mu$ / Sytec 1600i / Sytec 1800i scanners. The frequency may vary due to local ordinance and the usage of the system, the system availability etc. If you need more PMs, order extra copies of this document or copy the schedules.

Priority Code

| Pr (Priority) – | Description |
|-----------------|---|
| 1 | Safety and Regulatory |
| 2 | Image Quality |
| 3 | Procedures that make the system unavailable for scanning |
| 4 | Procedures that can be performed while the customer is scanning |

Frequency Code

| Fr (Frequency) – | | Description |
|------------------|----------|-------------------|
| Α | Annually | (every 12 months) |

Safety and Regulatory

| ITEM | SUB- SYSTEM | DESCRIPTION | Pr | Fr | Estimated Time |
|--------|----------------|---|----|----|-------------------|
| PM0101 | System | Verify Emergency OFF buttons (Gantry / Console / XG) | 1 | Α | • |
| PM0102 | System | Check x–ray ON lights or buzzer/operation of scan abort | 1 | Α | • |
| PM0103 | System | Caution Label Check | 1 | Α | • |
| PM0105 | System | Check Error Logs | 1 | Α | • |
| PM0110 | System | Phantom Check | 1 | Α | • |
| PM0201 | O.C | Verify Audio Function | 1 | Α | • |
| PM0501 | Table | Check Head Holder | 1 | Α | • |
| PM0502 | Table | Check Table Cover | 1 | Α | • |
| PM0503 | Table | Check Gap sponge | 1 | Α | • |
| PM0504 | Table | Gap between Table Cover and Cradle | 1 | Α | • |
| PM0505 | Table | Check Cradle Rail | 1 | Α | • |
| PM0506 | Table | Holder Stability Check | 1 | Α | • |
| PM0507 | Table | Check Touch Sensor operation | 1 | Α | • |
| PM0508 | Table | Verify Unlatch Function | 1 | Α | • |
| PM0509 | Table | Check Gantry / Table interlock | 1 | Α | • |

Image Quality

| ITEM | SUB- SYSTEM | DESCRIPTION | Pr | Fr | Setimated Time |
|--------|----------------|---------------------------------|----|----|-------------------|
| PM0104 | System | Image Check (Image Performance) | 2 | Α | * |
| PM0302 | Gantry | Clean Mylar ring cover | 2 | Α | • |
| PM0401 | DAS | Check/Clean Detector face | 2 | Α | • |
| | | Subtotal | | | 1:05 |

SCHEDULE (continued)

System Performance

| ITEM | SUB- SYSTEM | DESCRIPTION | Pr | Fr | Estimated Time |
|--------|----------------|---|----|----|----------------|
| PM0106 | System | Perform Filter Curve Test | 3 | Α | 0:15 |
| PM0107 | System | Check Ground Cable Terminals | 3 | Α | 0:05 |
| PM0108 | System | Check DAS Count | 3 | Α | 0:15 |
| PM0109 | System | Image Performance | 2 | Α | 1:00 |
| PM0202 | O.C | Clean Air Filter | 3 | Α | 0:10 |
| PM0203 | O.C | Inspect FANs | 3 | Α | 0:10 |
| PM0204 | O.C | Verify Track Ball for smooth operation | 3 | Α | 0:15 |
| PM0205 | O.C | Clean Display monitor/Touch panel/Console exterior/interior | 4 | Α | 0:15 |
| PM0206 | O.C | Check Cables / Power Cable Terminals | 3 | Α | 0:10 |
| PM0301 | Gantry | Check Rotation Safety | 3 | Α | 0:15 |
| PM0303 | Gantry | Verify cables and hardware are tight | 3 | Α | 0:15 |
| PM0304 | Gantry | Gantry cover cleaning | 4 | Α | 0:10 |
| PM0305 | Gantry | Check Positioning light | 3 | Α | 0:10 |
| PM0306 | Gantry | Check Gantry anchor / Gantry Isolation | 3 | Α | 0:05 |
| PM0307 | Gantry | Check drive belt wearing | 3 | Α | 0:05 |
| PM0402 | DAS | Verify Detector Heater Control | 3 | Α | 0:05 |
| PM0510 | Table | Clean Cradle tray / Table cover | 4 | Α | 0:15 |
| PM0511 | Table | Check for Oil Leakage | 3 | Α | 0:05 |
| PM0512 | Table | Grease-up | 3 | Α | 0:20 |
| PM0513 | Table | Check Table anchors / Table isolation | 3 | Α | 0:05 |
| PM0514 | Table | Inspect FANs | 3 | Α | 0:15 |
| PM0601 | XG/PDU | Check/Clean Radiator FAN | 3 | Α | 0:10 |
| PM0602 | XG/PDU | Check X-ray tube oil and HV connector | 3 | Α | 0:20 |
| PM0603 | XG/PDU | Check HV Tank and HV connector | 3 | Α | 0:20 |
| PM0604 | XG/PDU | Check HV cable connection | 3 | Α | 0:05 |
| PM0605 | XG/PDU | Check Tube over heat safety | 3 | Α | 0:15 |
| PM0606 | XG/PDU | Check Parts | 3 | Α | 0:10 |
| PM0607 | XG/PDU | Check KV and mA | 3 | Α | 0:30 |
| PM0608 | XG/PDU | Inspect FANs | 3 | Α | 0:05 |
| PM0609 | XG/PDU | Check Power Cable Terminals | 3 | Α | 0:05 |
| PM0701 | MOD | Clean Air Filter (full height MOD only) | 3 | Α | *1 (0:05) |
| PM0702 | MOD | Inspect FANs | 3 | Α | *1 (0:05) |
| PM0703 | MOD | Dry/Wet Cleaning | 3 | Α | *1 (0:05) |
| PM0704 | MOD | Check Image archive operation | 3 | Α | *1 (0:05) |
| | | Subtotal Total | | | 6:40 7:45 |
| | | iotai | | | 7.40 |

*1:Option

CT E μ / Sytec 1600i / Sytec 1800i PM Report (1/2)

| Site : | | <u>Date :</u> |
|------------------------|--|---------------------------------------|
| System ID : | | Dispatch No. : |
| Check Item | | Result |
| Safety and Regula | tory | |
| System | _Verify Emergency OFF buttons (Ganti Check X–ray ON lights or buzzer / Op Caution Label Check Check Error Logs | ry/Console/PDU)peration of scan abort |
| Console | Phantom Check | |
| Table | _Verify Audio Function Check Head Holder | |
| | Check Table Cover Check Gap Sponge Gap between Table Cover and Cradle Check Cradle Rail Holder Stability Check Check Touch Sensor operation Verify Unlatch Function Check Gantry / Table interlock | |
| Image Quality | | |
| System | , , | |
| Gantry DAS/Detector | • | |
| Comment: | | |
| | | |
| | | |
| | | |
| | | |

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CT E μ / Sytec 1600i / Sytec 1800i PM Report (2/2)

| System Performar | nce | |
|------------------|---|---|
| System | _Perform Filter Curve Test | |
| Oyotom | Check Ground Cable Terminals | - |
| | Check DAS Count | - |
| | Image Performance | |
| Console | _Clean Air Filter | - |
| 0013010 | Inspect FANs | |
| | Verify Track Ball for smooth operation | |
| | Clean Display monitor/Touch panel/Console exterior/Console interior | |
| | Check Cables / Power Cable Terminals | |
| Gantry | _Check Rotation Safety | |
| Gantry | Verify cables and hardware are tight | |
| | Gantry Cover Cleaning | |
| | Check Positioning Light | |
| | Check Gantry Anchor / Gantry Isolation | |
| | Check drive belt wearing | |
| DAS/Detector | Verify Detector heater control | |
| Table | Clean Cradle tray / Table Cover | |
| Table | · | |
| | Check for Oil Leakage | |
| | Grease–up | - |
| | | - |
| XG/PDU | Inspect FANs | |
| AG/PDU | Check / Clean Radiator FAN | - |
| | Check X–ray tube oil and HV connector | |
| | Check HV Tank and HV connector | |
| | Check HV Cable connection | |
| | Check Tube overheat safety | - |
| | Check Parts | |
| | Check KV and mA | |
| | Inspect FANs | |
| MOD | Check Power Cable Terminals | |
| MOD | _Clean Air Filter (full height MOD only) | |
| | Inspect FAN | |
| | Dry/Wet Cleaning | |
| | Check Image archive operation | - |
| | | |
| nent: | | |
| | | |

| SYSTEM | 1/1 | PM-0101 |
|--|----------------------|---------|
| Purpose: Verify emergency off buttons (Gantry/Console/PDU) | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

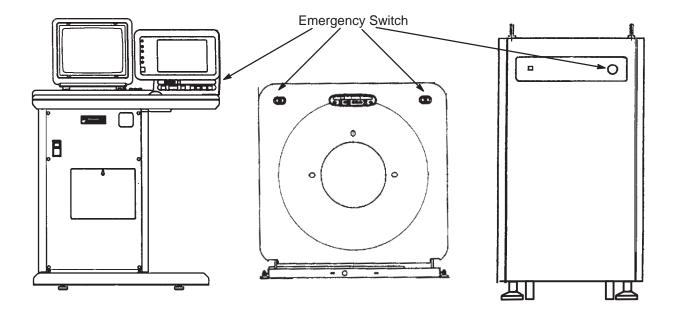
PREREQUISITES

None

TASK DESCRIPTION

- 1. Press an emergency OFF switch on the Gantry front panel and verify that the power for Table/Gantry (Servo Amp, Gantry control, and Table/Tilt) is removed.
- 2. Turn the power switch of the Operator Console OFF, then ON again. Verify that all systems, including Table/ Gantry, are turned ON.
- 3. Repeat this check for all the other emergency switches on the Gantry(six in all), PDU, and Operator Console (See illustration 1–1).
 - Two(2) switches on the Gantry front panel.
 - Four(4) switches on the Gantry frame.
 - One(1) switch on the PDU cabinet.
 - One(1) switch on the Operator Console.

Illustration 1–1 Emergency Switch Location



| SYSTEM | 1/1 | PM-0102 |
|---|----------------------|---------|
| Purpose: Check x-ray on lights and buzzer/Operation of scan abort | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



Do not enter scan room unprotected when x-rays are present.

- 1. Check the X-ray ON lights and X-ray buzzer for the following :
 - a. Perform an axial scan.
 - b. Verify that the X-ray buzzer is heard during X-ray exposure.
 - c. Verify that the X-ray ON lights illuminates on the Gantry front panel.
 - d. Verify that the X-ray room (Gantry room) warning lights connected to the system are operating normally.
- 2. Check the operating of scan abort for the following:
 - a. Perform an axial scan.
 - b. Press the Abort switch on the Operator Console while performing a scan and verify that X–ray exposure is terminated.

| SYSTEM | 1/1 | PM-0103 |
|------------------------------|----------------------|---------|
| Purpose: Caution label check | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

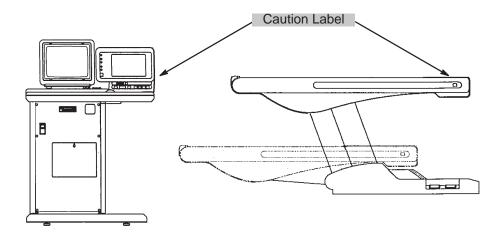
PREREQUISITES

None

TASK DESCRIPTION

1. Every caution label is securely attached to the Table front end. If they have come off, replace them (See illustration 1–2).

Illustration 1–2 Caution Label Location



| SYSTEM | 1/1 | PM-0104 |
|--|----------------------|---------|
| Purpose: Image Check (Image Performance) | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Set the water phantom to the phantom holder.
- 2. Perform axial scans and verify that the image has no artifact.
- 3. Verify that the water CT number and air CT number equal 0 ± 3 and -1000 ± 5 respectively.
- 4. If the means and standard deviations are out of specifications, or artifacts are present, schedule time to look into possible problems.

| SYSTEM | 1/1 | PM-0105 |
|--------------------------|----------------------|---------|
| Purpose: Check error log | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

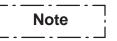
None

PREREQUISITES

None

TASK DESCRIPTION

Service Lines: Specific and detailed information concerning the error including (but not limited to): —Additional problem descriptions cause information. Information indicating what was supposed to happen, what did happen, and how it was detected (for example, expected value vs. actual value, name of file attempted to open, etc.). This includes any information concerning abnormal conditions related to the error.



Refer to ERROR CODE AND MESSAGE LIST in the SYSTEM tab of the DIAGNOSTICS Manual.

| SYSTEM | 1/1 | PM-0106 |
|------------------------------------|----------------------|---------|
| Purpose: Perform Filter Curve Test | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

Note

Refer to BOW-TIE FILTER CURVE TEST in the GANTRY tab of the FUNC-TIONAL CHECK / ADJUSTMENT Manual.

- 1. Switch OFF the 'Scan' switch at the Gantry rear base.
- 2. Remove the Gantry front and both side covers.
- 3. Switch ON the 'Scan' switch.
- 4. Perform two air stationary scans with the filter installed and removed.

Scan 1 Scan 2 AZIMUTH : 0 deg AZIMUTH : 0 deg SCAN TIME : 3.3 sec SCAN TIME : 3.3 sec THICKNESS : 10 mm THICKNESS: 10 mm K۷ K۷ : 120 kV : 120 kV MA : 40 mA MA : 40 mA SERIES NO. : 1 SERIES NO. : 2

(Others) : (defaults) : (defaults)

FILTER : INSTALLED FILTER : REMOVED

Note

For filter removal, refer to the Component Replacement manual. (Switch OFF the 'Scan' switch prior to removing the filter!)

- 5. Check the filter curve using SUPPORT DISPLAY. (Check that the curve is smooth)
- 6. Visually check the filter for discoloration or cracks. Replace if necessary.

| SYSTEM | 1/1 | PM-0107 |
|---------------------------------------|----------------------|---------|
| Purpose: Check Ground Cable Terminals | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Inspect that all the ground cables are securely connected on terminals.

| SYSTEM | 1/1 | PM-0108 |
|--------------------------|----------------------|---------|
| Purpose: Check DAS Count | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

This check verifies that the x–ray tube dose falls within specifications by checking DAS Counts. This check should be performed when the x–ray tube is replaced.

1. Perform an axial scan.

AXIAL SCAN

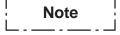
SCAN TIME : 5.0 sec THICKNESS : 10 mm XG, ROTOR : XG ON KV : 120 kV MA : 60 mA SERIES NO. : 1

(Others) : (defaults)

Bow-tie filter: Installed

2. Verify that MEAN MAX data are within specifications as described below:

For system with Xe type detector:



Refer to DAS COUNT CHECK in the X-RAY GENERATOR tab of the FUNC-TIONAL CHECK / ADJUSTMENT Manual.

| SYSTEM | 1/1 | PM-0109 |
|----------------------------|----------------------|---------|
| Purpose: Image Performance | Estimated Time: 1:00 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Perform Image Performance Check.



Refer to the following items in the SYSTEM tab of the FUNCTIONAL CHECK / ADJUSTMENT Manual.

- Image Performance
- 2. If the measure value is out of specification, perform the following;
 - KV and mA Check
 - Calibration
 - Phantom Calibration
 - CT Number Adjustment



Refer to the following items in the SYSTEM tab and X–RAY GENERATOR tab of the FUNCTIONAL CHECK / ADJUSTMENT Manual.

- KV and mA Check
- Calibration
- CT Number Adjustment

After Calibration or CT Number adjustment, perform Image Performance Check again.

| SYSTEM | 1/1 | PM-0110 |
|------------------------|----------------------|---------|
| Purpose: Phantom Check | Estimated Time: 0:05 | Rev 4 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

Verify visually that phantoms are intact from any damage or scratches which affect the use.

| OPERATOR CONSOLE | 1/1 | PM-0201 |
|--------------------------------|----------------------|---------|
| Purpose: Verify Audio Function | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Verify that the Operator can properly hear sounds in the Scan room through the speaker.
- 2. Verify that the voice of the Operator can be properly heard in the Scan room through the microphone while stepping on the foot switch.
- 3. If necessary, adjust the intercom volumes on the Operator Console (refer to Audio Function in the *Operator Console tab of the FUNCTIONAL CHECK / ADJUSTMENT Manual.*



In case sound from the scan room is noisy, replace the microphone in the Gantry.

| OPERATOR CONSOLE | 1/1 | PM-0202 |
|----------------------------|----------------------|---------|
| Purpose: Clean Air filters | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

Vacuum Cleaner

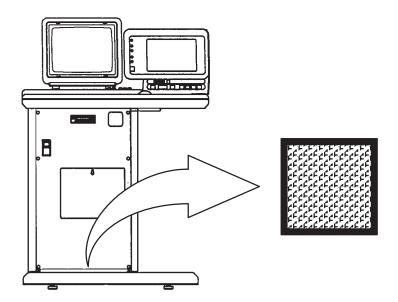
PREREQUISITES

None

TASK DESCRIPTION

1. Clean each air filter of the Operator Console using a vacuum cleaner (See illustration 2–1).

Illustration 2–1 Air Filter Location



| OPERATOR CONSOLE | 1/1 | PM-0203 |
|-----------------------|----------------------|---------|
| Purpose: Inspect FANs | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

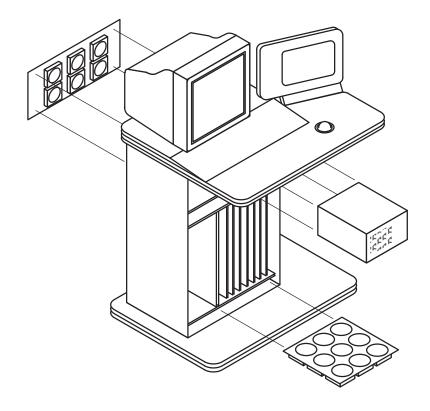
TASK DESCRIPTION

- 1. Verify that the power to the Operator Console is OFF.
- 2. Remove the Operator Console Front cover.
- 3. Turn ON power to the Operator Console.
- 4. Using a flashlight, or by feeling for the proper airflow, check that the FAN is operating normally.
- 5. FANs should also be free of dirt and should operate quietly. If any FAN is defective, replace the unit.



- Six(6) at upper rear side of the Operator Console.
- One(1) behind the 5VDC power supply.
- Nine(9) at the bottom of the nest chassis.

Illustration 2–2 FAN Location



| OPERATOR CONSOLE | 1/1 | PM-0204 |
|---|----------------------|---------|
| Purpose: Verify Tackball for smooth operation | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

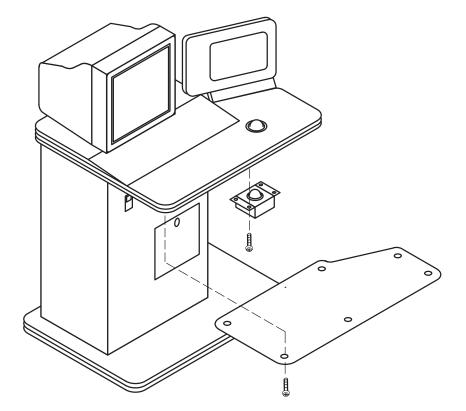
None

TASK DESCRIPTION

- 1. Verify that the power to the Operator Console is ON.
- 2. Check that the trackball operate smoothly in all directions, without jittering.
- 3. Display crosshair cursor on the monitor.
- 4. Verify that the trackball movement is smooth.

 If not smooth, clean 2 shafts on the trackball unit with alcohol and cotton swab (See illustration 2–3).

Illustration 2–3 Trackball Check



Note

Check also the trackball on the Diagnostic Console if installed.

| OPERATOR CONSOLE | 1/1 | PM-0205 |
|---|----------------------|---------|
| Purpose: Clean Display monitor/Touch panel/Console exterior | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

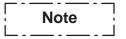
None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Verify that the power to the Operator Console is OFF.
- 2. Remove the CRT cover and its front cover. Clean the CRT screen using Glass Cleaner, etc. Clean also the plasma display; do not use any alcohol for the black seal surrounding the plasma panel.



Be careful not to bump the display monitor contrast and brightness knobs.

| OPERATOR CONSOLE | 1/1 | PM-0206 |
|---|----------------------|---------|
| Purpose: Check Cables / Power Cable Terminals | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

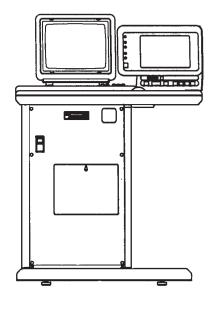
None

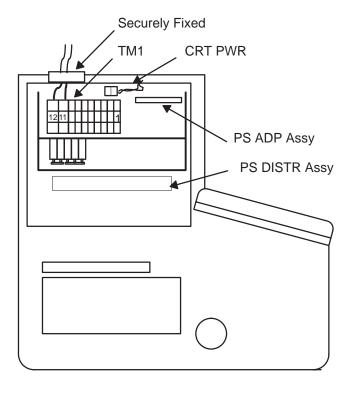
TASK DESCRIPTION

- 1. Verify that the power to the Operator Console is OFF.
- 2. Remove the Operator Console front cover.
- 3. Verify that all the cables within the Operator Console are properly installed/secured.

 In particular, inspect well the 5VP/S cables where they connect to the +5V power bar. These must not be loose.
- 4. Lower the CRT to a safe position on the floor.
- 5. Remove the two(2) rubber caps and two(2) screws from the top of the Operator Console and remove the top cover.
- 6. Switch OFF the Operator Console power breakers. Refer to illustration 2–4.
- 7. Verify that the power cables (AC 100 V) are securely connected on terminals within the Operator Console.

Illustration 2–4 Power Cable Terminal Check





| GANTRY | 1/3 | PM-0301 |
|--------------------------------|----------------------|---------|
| Purpose: Check Rotation Safety | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

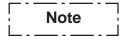
None

TASK DESCRIPTION



TO ENSURE SAFETY, TURN THE SCAN SWITCH OFF AT THE REAR GANTRY BASE AND SWITCH OFF THE [SYS/OFF/MNL] ON THE TGP BOARD WHEN WORKING ON THE GANTRY.

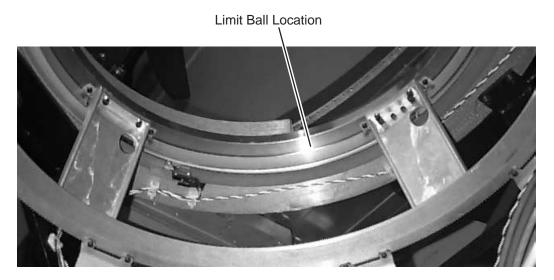
- 1. Move the Gantry to the home and 0° tilt position.
- 2. Switch OFF the 'Scan' and 'Control' switches on the rear Gantry base.
- 3. Remove the mylar ring and the Gantry rear cover.
- 4. Switch ON the 'Control' switch at the rear Gantry base.
- 5. Verify that there are no obstacles in the rotation path of the Gantry.



The Gantry is normally held by the dynamic brake and electromagnetic brake on the motor. The service switch ON release both brakes allowing the Gantry to be rotated hand easily.

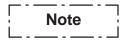
- 6. Turn ON the service switch on the Sub-board.
- 7. Verify that there is a limit ball in the Gantry.

Illustration 3–1 Limit Ball Location



| GANTRY | 2/3 | PM-0301 |
|--------------------------------|----------------------|---------|
| Purpose: Check Rotation Safety | Estimated Time: 0:15 | Rev 1 |

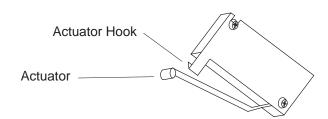
- 8. Rotate the Gantry in the CCW direction by hand until the CCWR limit switch is activated by limit ball.
- 9. Verify that the "GLMIT" LED on the TGP board is ON.
- 10. Turn OFF the service switch on the Sub-board.
- 11. Set the TGP service switch to OFF-FIX-SLOW-CW position and then to MNL-FIX-SLOW-CW position.
- 12. Verify that the Gantry dose not rotate.
- 13. Turn ON the service switch on the Sub-board.
- 14. Rotate the Gantry in the CW direction by hand until the home position.



If the limit ball remains trapped by the limit switch, release the limit switch by pushing the limit ball down.

15. Unhook the actuator hook of the limit switch.

Illustration 3–2 Limit Switch

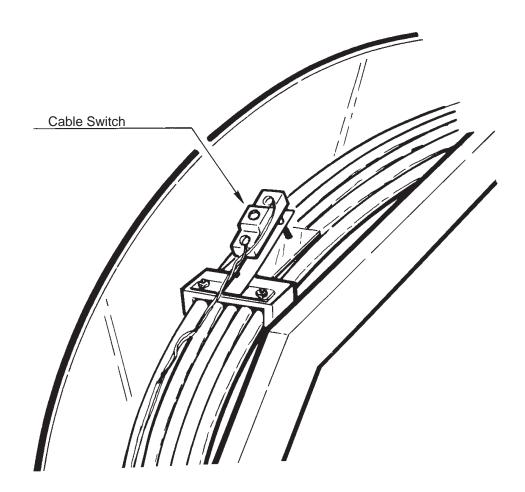


- 16. Turn OFF the "Control" switch, wait a few seconds, and turn it ON again.
- 17. Verify that the "GLIMIT" LED on the TGP board is OFF
- 18. Repeat the steps 8 thru 17 for CW direction.

| GANTRY | 3/3 | PM-0301 |
|--------------------------------|----------------------|---------|
| Purpose: Check Rotation Safety | Estimated Time: 0:15 | Rev 1 |

- 19. Rotate the Gantry to the 6 o'clock position.
- 20. Push ON the Cable Switch. (This switch detects if the take up cable is loose)

Illustration 3-3 Cable Switch



- 21. Verify that the "GLMIT" LED on the TGP board is ON.
- 22. Turn OFF the "Control" switch, wait a few seconds, and turn it ON again.
- 23. Verify that the "GLIMIT" LED on the TGP board is OFF.
- 24. Turn OFF the service switch on the Sub-board.
- 25. END

| GANTRY | 1/1 | PM-0302 |
|---------------------------------|----------------------|---------|
| Purpose: Clean Mylay ring cover | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



Use proper procedures to avoid blood-borne pathogens.

The maintenace tasks which follow include procedures concerned with the cleaning of equipment (Table Tray, Gantry Cover, etc.). Refer to local/ company guidelines for those procedures, especially where body fluids or other possible contaminates are present.

- 1. Check the Mylay ring cover for the following:
 - Check that no scratches or damage are present on the Mylar ring cover.
 - Check that the ring surface is clean, free of contrast agent or smudge; if not, clean it.
 - Contrast agent can be wiped clean using warm water.
 - Check that the ring is properly installed in the Gantry opening.

| GANTRY | 1/1 | PM-0303 |
|---|----------------------|---------|
| Purpose: Verify cables and hardware are tight | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

- 1. Set the Gantry to the 0_ tilt position and lower the table to its lowest position.
- 2. Switch OFF the "Scan" and "Table/Tilt" switches at the Gantry rear base.
- 3. Remove all Gantry covers (front, rear and both sides).
- 4. Set the Service switch of the Sub Board to ON.
- 5. Rotate the gantry by hand(CW/CCW) and make sure all cables, harness, and other hardware are firmly attached.
- 6. END

| GANTRY | 1/1 | PM-0304 |
|--------------------------------|----------------------|---------|
| Purpose: Gantry cover cleaning | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Clean Gantry covers.



Use proper procedures to avoid blood-borne pathogens.

The maintenace tasks which follow include procedures concerned with the cleaning of equipment (Table Tray, Gantry Cover, etc.). Refer to local/ company guidelines for those procedures, especially where body fluids or other possible contaminates are present.



Do not attach cleaning detergent around Microphone.

a. Use a cloth and a mild detergent or alcohol to clean the covers.

| GANTRY | 1/1 | PM-0305 |
|-----------------------------------|----------------------|---------|
| Purpose: Check Positioning lights | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

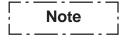
None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

- 1. Push the 'POSN Light' button.
- 2. Verify that the Gantry rotates to the Home position, and both internal and external positioning lights are turned ON. (The Gantry does not rotate, if it is already positioned at the Home position.)



If the positioning lights are not turned ON, posh the reset switch on the TGP Board once and perform the above.

- 3. Check if both internal and external positioning lights are properly adjusted.
- 4. Verify that the positioning lights are turned OFF automatically after approximately 1 minute.

| GANTRY | 1/1 | PM-0306 |
|---|----------------------|---------|
| Purpose: Check Gantry anchor / Gantry isolation | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

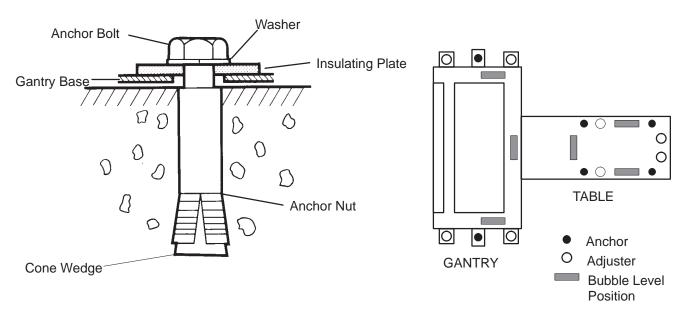
1. Inspection that the Gantry is firmly anchored to the floor by two anchor bolts and that no cracks exist on the insulating plate for each anchor bolt.



If any anchor bolts are loose, tighten it to the specified torque.

• Specified Torque: 40 kgf-cm

Illustration 3–4 Proper Anchor Position and Alternative Anchor Position



2. Verify that the Gantry is in no contact with the floor. If not, adjust feet for isolation.

| GANTRY | 1/1 | PM-0307 |
|-----------------------------------|----------------------|---------|
| Purpose: Check drive belt wearing | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

- 1. Switch OFF the "Scan" switch at the gantry rear base.
- 2. Remove the Gantry rear and both side covers.
- 3. Remove the gear box cover (4 screws).
- 4. Switch ON the service switch at the left side of the TGP board.
- 5. Rotate the Gantry by hand(CW/CCW) and inspect condition of drive belt. Check for cracks, wear, or fraying. Make sure to check the entire drive belt.
- 6. Replace drive belt if necessary.

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| DAS/DETECTOR | 1/1 | PM-0401 |
|--------------------------------------|----------------------|---------|
| Purpose: Check / Clean Detector Face | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

- 1. Set the Gantry to the 0_ tilt position and lower the table to its lowest position.
- 2. Switch OFF the "Scan" and "Table/Tilt" switches at the Gantry rear base.
- 3. Remove the Gantry front and both side covers.
- 4. Clean dust from the Detector surface using a vacuum cleaner, and use a cloth and an alcohol to clean it.

| DAS/DETECTOR | 1/1 | PM-0402 |
|---|----------------------|---------|
| Purpose: Verify Detector heater control | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

- 1. Set the Gantry to the 0_ tilt position and lower the table to its lowest position.
- 2. Switch OFF the "Scan" and "Table/Tilt" switches at the Gantry rear base.
- 3. Remove the Gantry front and both side covers.
- 4. Remove the Detector Temperature Controller Box cover.
- 5. Verify that the "D3" LED in the Detector temperature controller cycles, blinks, on and off.
- 6. Touch the Detector surface with a hand to verify that the temperature is approximately 36 degrees.

| TABLE | 1/1 | PM-0501 |
|----------------------------|----------------------|---------|
| Purpose: Check Head Holder | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Check each head holder on site for the following:
 - The latch hook stops at each of the lock and release positions.
 - The hook axis has not become weak.
 - No cracks exist on the acrylic resin parts; especially inspect well the rib root (where the patient's neck is placed), and parts around the flat head screws.
 If any crack is found, replace the head holder.
 - No flat head screws are loose. If loosened, tighten those. (Torque: 8 kg-cm; turn the grip of the screwdriver using thumb, index finger, and middle finger, which gives approximately this torque.)
 Tighten the loosened screws only, and <u>DO NOT</u> excessively tighten the screws, which will cause cracks.
 - All velcro tape is securely attached to the head holders. If not the case, replace the velcro tape.
- If system has "Metal-Free Cradle". check each head holder and cradle on site for the following:
 - Check that the lock hook is securely attached to each head holder.
 If not, tighten the loosened flat head screw. <u>Do not over tighten screws</u>.
 - Repeat the same check for the cradle side lock hook.

| TABLE | 1/1 | PM-0502 |
|----------------------------|----------------------|---------|
| Purpose: Check Table Cover | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Check that the Table Cover is not deformed and not damaged. Also check that the Table Cover does not interfere with the cradle.

| TABLE | 1/1 | PM-0503 |
|---------------------------|----------------------|---------|
| Purpose: Check Gap sponge | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Check that two pieces of sponge are securely attached to the Table front end. If they have come off, replace them.

| TABLE | 1/1 | PM-0504 |
|---|----------------------|---------|
| Purpose: Gap between Table Cover and Cradle | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Check that the position of the table cover and the cradle are parallel, and the gap between them is 7mm or less.



Refer to the following items in the TABLE tab of the FUNCTIONAL CHECK / AD-JUSTMENT Manual.

- Gap between Frame and Cradle
- Gap between Cradle and Cradle support

| TABLE | 1/2 | PM-0505 |
|----------------------------|----------------------|---------|
| Purpose: Check Cradle Rail | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

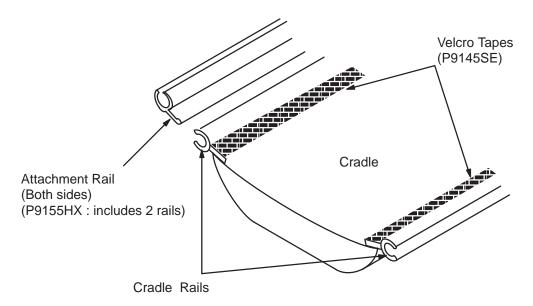
None

TASK DESCRIPTION

Attachment Rail Type

- 1. Check the cradle for the following (See Illustration 5–1):
 - Check that the Velcro tape of the cradle rails is securely attached. If the Velcro tape has come off, replace it.
 - Check that the attachment rails are not damaged or cracked. If damaged, replace them.
 - Check that the cradle rails are not damaged or cracked. If damaged, replace the cradle as an assembly.

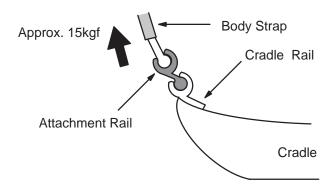
Illustration 5–1 Cradle Rail



| TABLE | 2/2 | PM-0505 |
|----------------------------|----------------------|---------|
| Purpose: Check Cradle Rail | Estimated Time: 0:05 | Rev 1 |

 Set the body strap to the attachment rails, then pull the strap by the force of approx. 15 kgf, using a spring balance. Verify that the strap do NOT be removed from the rail. If not, replace the attachment rail. (See Illustration 5–2)

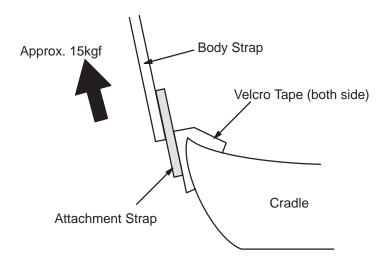
Illustration 5–2 Body Strap Attachment



Attachment Strap Type

- 1. Check the cradle for the following (See Illustration 5–3):
 - Check that the Velcro tape of the cradle edge rails is securely attached. If the velcro tape has come off, replace it.
 - Set the attachment strap and body strap to the Velcro tape as shown, then pull the body strap by the force
 of approx. 15 kgf, using a spring balance. Verify that the strap do NOT be removed from the Velcro tape.
 If not, when attachment strap is correct, replace the Velcro tape.

Illustration 5–3 Body Strap Attachment



| TABLE | 1/2 | PM-0506 |
|---------------------------------|----------------------|---------|
| Purpose: Holder Stability Check | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

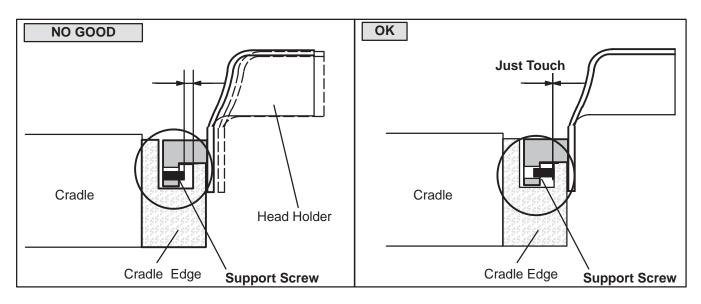
PREREQUISITES

None

TASK DESCRIPTION

- 1. Verify that the following holders is not loose by hand, when they are attached to the cradle edge.
 - Axial Head Holder
 - Cradle Extender
 - Head Holder
 - Phantom Holder
 - Coronal Holder

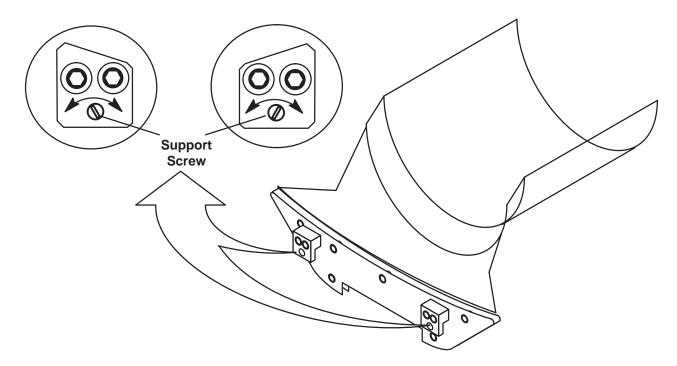
Illustration 5–4 Head Holder Stability



| TABLE | 2/2 | PM-0506 |
|---------------------------------|----------------------|---------|
| Purpose: Holder Stability Check | Estimated Time: 0:05 | Rev 1 |

2. If not, adjust the support screw so that the gap between Cradle Edge and Head holder is just touched. (See Illustration 5–5).

Illustration 5–5 Head Holder Support Screw



| TABLE | 1/1 | PM-0507 |
|---------------------------------------|----------------------|---------|
| Purpose: Check Touch sensor operation | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Press the Touch Sensor during the Table DOWN operation, and verify that the Table DOWN movement stops. Repeat this for all touch sensors.



To resume the Table down motion, first move the Table slightly UP, then perform the Table DOWN operation.

| TABLE | 1/1 | PM-0508 |
|----------------------------------|----------------------|---------|
| Purpose: Verify Unlatch Function | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

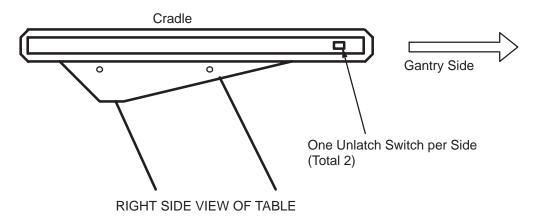
PREREQUISITES

None

TASK DESCRIPTION

- 1. Place a person or a suitable weight substitute on the cradle.
- 2. Drive the cradle to the furthest out position from the Gantry.
- 3. Move the cradle into the Gantry by pushing the "IN" button.
- 4. During cradle movement, push the Latch SW. The cradle should stop moving and the Gantry Display should go blank indicating that the cradle is unlatched.
- 5. Push the Latch SW again.
- 6. Release the "IN" button, then push it and verify that the cradle starts to move and the Gantry Display changes to normal (millimeters).
- 7. Repeat the same check for the opposite unlatch switch.

Illustration 5–6 Unlatch Switch Location



| TABLE | 1/1 | PM-0509 |
|--|----------------------|---------|
| Purpose : Check Gantry/Table interlock | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Raise the Table to the highest position.
- 2. Tilt the Gantry to the 0 deg. position.
- 3. Move the cradle to an position except the out limit position.
- 4. Move the Table down until it stops automatically; this is the interlock position, but that the cradle in/out function can still operate.
- 5. Move the cradle to the out limit position.
- 6. Verify that the Table can be lowered to the lowest position.
- 7. Repeat steps 1 through 3 with other tilt angles.

| TABLE | 1/1 | PM-0510 |
|--|----------------------|---------|
| Purpose: Clean cradle tray / Table cover | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Clean Table covers and cradle.



Use proper procedures to avoid blood-borne pathogens.

The maintenace tasks which follow include procedures concerned with the cleaning of equipment (Table Tray, Gantry Cover, etc.). Refer to local/ company guidelines for those procedures, especially where body fluids or other possible contaminates are present.

- a. Clean dust from the Table top cover (tray) using a vacuum cleaner.
- b. Clean the Table covers.
- c. Be sure to wipe off contrast from the cradle edge extrusion.

| TABLE | 1/1 | PM-0511 |
|--------------------------------|----------------------|---------|
| Purpose: Check for Oil Leakage | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Verify that no oil has leaked from the cylinder, pump, hoses, etc. Verify that the Table does not lower on its own when the Table is left unoperated for some time.

| TABLE | 1/1 | PM-0512 |
|--------------------|----------------------|---------|
| Purpose: Grease-up | Estimated Time: 0:20 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

• SHELL ALVANIA grease #2 or equivalent

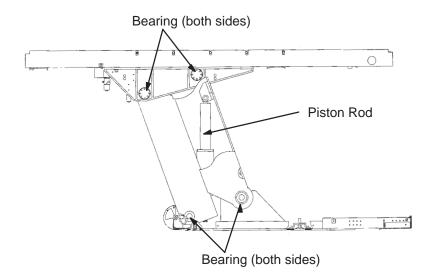
PREREQUISITES

None

TASK DESCRIPTION

- 1. Remove the cradle, the cradle tray and the bottom Table cover.
- 2. Apply grease (SHELL ALVANIA grease #2 or equivalent) to the joint bearings (total eight(8) bearings) of the table linkage.
 - (Pack grease between the inner and outer races of the ball bearing using your finger.)
- 3. Apply grease (SHELL ALVANIA grease #2 or equivalent) to the piston rod surface of the hydraulic cylinder.

Illustration 5–7 Table Bearing Grease–Up



| TABLE | 1/1 | PM-0513 |
|--|----------------------|---------|
| Purpose: Check Table anchors / Table isolation | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

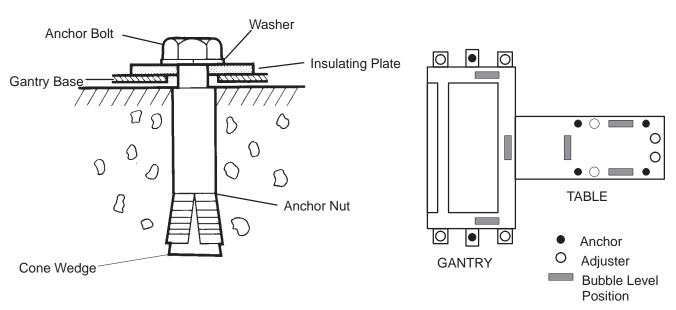
1. Inspect that the Table is firmly anchored to the floor, by four bolts and that no cracks exist on the insulating plate for each anchor bolt.



If any anchor bolts are loose, tighten it to the specified torque.

• Specified Torque: 40 kgf-cm

Illustration 5–8 Proper Anchor Position and Alternative Anchor Position



2. Verify that the Table is in no contact with the floor. If not, adjust feet for isolation.

| TABLE | 1/1 | PM-0514 |
|-----------------------|----------------------|---------|
| Purpose: Inspect FANs | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

Check Cradle Drive assy FAN

- 1. Switch OFF the "Scan" switches, and switch ON the "Table/Tilt" switch on the Gantry rear base.
- 2. Move the Table to its highest position.
- 3. Move the cradle out its fully retracted position (farthest from Gantry).

Table P9225AM/P9225AQ:

• Remove the cradle and the cradle tray.

Table 2129568/2129571:

- Remove the front bottom table cover.
- 4. Using a flashlight, or by feeling for the proper airflow, check that the FAN is operating normally.
- 5. The FAN should also be free of dirt and should operate quietly.

| X-RAY GENERATOR / PDU | 1/1 | PM-0601 |
|-----------------------------------|----------------------|---------|
| Purpose: Check/Clean Radiator FAN | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

1. Verify that the radiator FANs for the X–ray tube cooling are operating normally, and not blocked with dust. Vacuum clean if necessary.

| X-RAY GENERATOR / PDU | 1/1 | PM-0602 |
|--|----------------------|---------|
| Purpose: Check X-ray Tube oil and HV connector | Estimated Time: 0:20 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



Electric Shock hazard. Wait more than five minutes following the last scan before performing the following procedure.

- Set the Gantry to the 0_ tilt position and lower the table to its lowest position.
- 2. Switch OFF the "Scan" and "Table/Tilt" switches at the Gantry rear base.
- 3. Remove all Gantry covers (front and both sides).
- 4. Set the Service switch of the Sub Board to ON.
- 5. Position the X–ray tube to the 3 o'clock position (as viewed from the Table) and switch OFF the service switch.
- 6. Turn OFF the OC power switch and then lock and tag—out the main system breaker. Then, remove the HV connectors and verify the following:
 - The oil in the HV wells is pure.
 - The amount of the oil has not reduced, if reduced, replenish it with fresh oil (silicone oil).
 - No air exists inside the tube. (Verify this by peeping, looking, through the window.)
- 7. Check the HV (high voltage) connectors for the following:
 - No cracks exist on the candle stick surface.
 - The connector pins are clean.
 - The rubber packing is not damaged.

| X-RAY GENERATOR / PDU | 1/1 | PM-0603 |
|---|----------------------|---------|
| Purpose: Check HV tank oil and HV connector | Estimated Time: 0:20 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



Electric Shock hazard. Wait more than five minutes following the last scan before performing the following procedure.

- 1. Turn OFF the breaker CB1 and wait five minuted.
- 2. Measure the voltage between the terminal 1 and 2 of the TM1 of FIL CONT ASSY (280VDC). Check that the voltage is zero.
- 3. Remove the HV (high voltage) connectors from the HV TANK and verify the following:
 - No oil has leaked from the HV tank, check for air bubbles in the viewing port.
 - The oil in the well is pure.
 - The amount of the oil in the HV well has not reduced, if reduced, replenish it with fresh oil (silicone oil).
- 4. Check the HV (high voltage) connectors for the following:
 - No cracks exist on the candle stick surface.
 - The connector pins are clean.
 - The rubber packing is not damaged.

| X-RAY GENERATOR / PDU | 1/1 | PM-0604 |
|------------------------------------|----------------------|---------|
| Purpose: Check HV cable connection | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

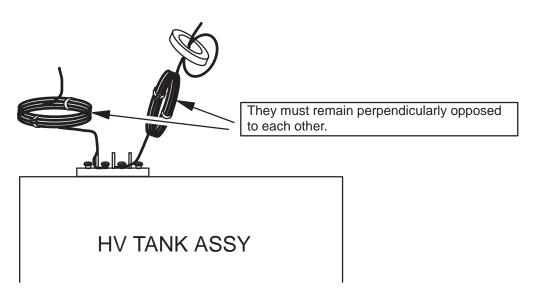
TASK DESCRIPTION



Electric Shock hazard. Wait more than five minutes following the last scan before performing the following procedure.

- 1. Turn OFF the breaker CB1 and wait five minuted.
- 2. Measure the voltage between the terminal 1 and 2 of the TM1 of FIL CONT ASSY (280VDC). Check that the voltage is zero.
- 3. Check that the connection portions of the cables from HV INVERTOR to HV TANK are firmly tightened.
- 4. Check that the physical position of the cable loops connected to the HV TANK is perpendicularly opposed to each other (See illustration 6–1).

Illustration 6–1 Cable Position



| X-RAY GENERATOR / PDU | 1/1 | PM-0605 |
|-------------------------------------|----------------------|---------|
| Purpose: Check Tube overheat safety | Estimated Time: 0:15 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ROTATION HAZARD! WHEN YOU PRESS THE 'POSN LIGHT' BUTTONS (LARGE BUTTON AND SMALL BUTTON), THE GANTRY QUICKLY ROTATES TO THE 0 DEG. POSITION. IF IT IS NECESSARY TO PLACE ANY PART OF YOUR BODY INSIDE OR NEAR THE GANTRY, SWITCH OFF THE 'SCAN' SWITCH FIRST.

Check for overheat error by performing the following:

- 1. Rotate the Gantry to 90 degree tube position.
- 2. Turn OFF the System Power at the Operator Console.
- 3. Disconnect one of the cable connected to the Thermal and Pressure Switch at Terminal side (terminal #9).
- 4. Turn ON the System Power at the Operator Console.
- 5. Check that the LED OVH in the Power Cont board lights on.

| X-RAY GENERATOR / PDU | 1/1 | PM-0606 |
|-----------------------|----------------------|---------|
| Purpose: Check Parts | Estimated Time: 0:10 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

- 1. Check the Rotor control for discolored or burnt parts, strange noise, and presence of smoke.
- 2. Check the Front part of the X–ray Generator for discolored or burnt parts, strange noise, and presence of smoke. Give special attention to the resistors, relays and transformers.
- 3. **For 3 Phases**: Replace relays (RL16 and 17) if necessary. (The life for these relays are 100,000 turns.)

| Relay | Description | Estimated Life |
|-------|--------------------|---|
| RL16 | Rotor on/off relay | If 300 times turned in one day. |
| | | 100,000 / (300times x 365days) = 1 year |
| RL17 | HV on/off relay | If 30 times turned in one patient. |
| | | 100,000 / (30times x 30patients x 365days) = 0.3 year |

| X-RAY GENERATOR / PDU | 1/3 | PM-0607 |
|--------------------------|----------------------|---------|
| Purpose: Check KV and mA | Estimated Time: 0:30 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

HV Divider

PREREQUISITES

None

TASK DESCRIPTION

Check Voltage:

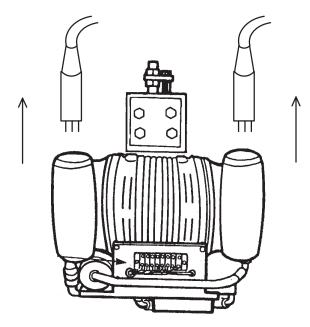
1. Perform Warm-Up scans if necessary.



Electric Shock hazard. Before performing the following procedures, wait more five minutes since last scan.

- 2. Switch OFF the 'Scan' switch on the rear Gantry base.
- 3. Remove all the Gantry covers (front, rear, and both sides).
- 4. Turn ON the service switch on the Sub-board.
- 5. Rotate the Gantry to the 90 degree position and insert the Azimuth lock pin.
- 6. Turn OFF the service switch on the Sub-board.
- 7. Disconnect the HV cables from the X-ray tube.

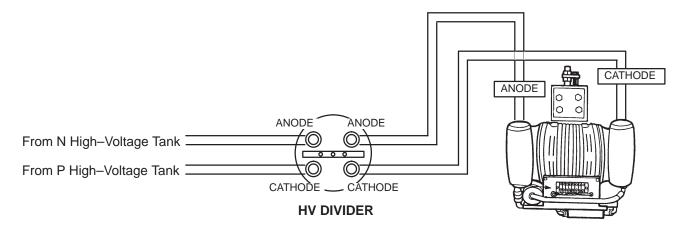
Illustration 6–2 HV Cable and X–ray Tube



| X-RAY GENERATOR / PDU | 2/3 | PM-0607 |
|--------------------------|----------------------|---------|
| Purpose: Check KV and mA | Estimated Time: 0:30 | Rev 1 |

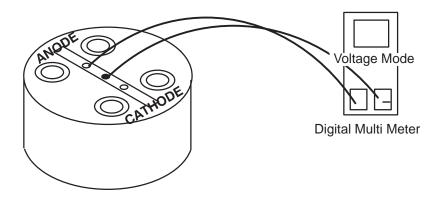
- 8. Connect the HV cables disconnected to step 7 to one side of the divider (illustration 6–3).
- 9. Connect the cables from other side of the divider to the X-ray tube (illustration 6-3).

Illustration 6–3 HV Divider Connection



10. Select the multimeter to the voltage mode and connect the probes to the HV divider's terminal corresponding to anode and ground.

Illustration 6–4 High VoltageMeasurement (Anode Side)



11. Place the multimeter in the position that can be seen from the Operator Console.

| X-RAY GENERATOR / PDU | 3/3 | PM-0607 |
|--------------------------|----------------------|---------|
| Purpose: Check KV and mA | Estimated Time: 0:30 | Rev 1 |



Do not turn ON the 'Scan' switch.

12. Perform STATIONARY scan with the following parameters :

STATIONARY SCAN

SCAN TIME : 5.0 sec THICKNESS : 10 mm XG, ROTOR : XG ON KV : 120 kV MA : 40 mA SERIES NO. : 1

(Others) : (defaults)

- 13. Verify that the multimeter reads $60 \pm 4.2V$.
- 14. Change the probes to the HV divider's terminal corresponding to cathode and ground.
- 15. Repeat the steps 11 through 13 for the cathode side.
- 16. Disconnect the divider HV cables from X-ray tube.
- 17. Disconnect the HV cables connected to the divider input side and connect them to the X-ray tube.
- 18. Release the Azimuth lock pin.
- 19. Switch ON the 'Scan' switch on the rear Gantry base.

Check Current:

1. Generate X–ray with 120kv and 100mA and check that the mA meter indicates 100 \pm 5mA.

Note

If the measured value is out of specification, perform the following items in the X-RAY GENERATOR tab of the FUNCTIONAL CHECK / ADJUSTMENT Manual.

- KV AND mA
- mA CALIBRATION (for Single Phase)

| X-RAY GENERATOR / PDU | 1/1 | PM-0608 |
|-------------------------------------|----------------------|---------|
| Purpose: Inspect FANs (for 3Phases) | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

Check XG FANs

1. Verify that the FANs installed on the XG rear cover and HV INV assy are operating.

| X-RAY GENERATOR / PDU | 1/1 | PM-0609 |
|-------------------------------------|----------------------|---------|
| Purpose: Check Power Cable Terminal | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION



ELECTRIC SHOCK HAZARD !! DANGEROUS VOLTAGES EXIST WITHIN THE UNIT, USE EXTREME CARE TO AVOID INJURY TO PERSONNEL AND EQUIPMENT.

- 1. Turn OFF the [Power] switch on the OC front panel.
- 2. Turn OFF the breaker in the Power Distribution Box (hospital supply).

For 3 Phases:

- Check that the 200V three phase terminals (TM1–1,2,3) are properly in place and firmly tightened.
- Check that the 100V single phase terminals (TM1-10,11) are properly in place and firmly tightened.

For Single Phase:

- Check that all power cables are properly in place and firmly tightened.
- Check that all metal plates on the Transformer Coupling Board are tightly connected.

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| MOD | 1/1 | PM-0701 |
|--|----------------------|---------|
| Purpose: Clean Air Filter (full height MOD only) | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

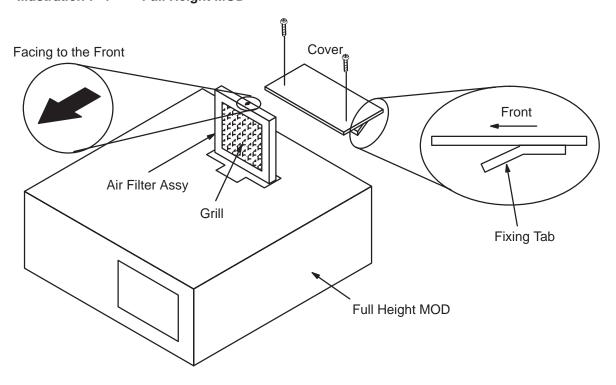
TASK DESCRIPTION

Two type of MOD, full height or Half height, exist in the field. Only the Full height MOD (P9199EJ, P9199EK, or P9329DA) contains the air filter. (The Half height MOD does NOT contain it)

Therefore, this maintenance item can be skipped for a Half height MOD.

- 1. Turn the Operator Console OFF.
- 2. Turn the MOD upside down.
- 3. Remove the two screws and filter cover.
- 4. Remove the air filter assy from MOD.
- 5. Clean the filter using a vacuum cleaner, or replace it, if necessary.
- 6. Install the air filter assy into the MOD with the arrow mark (♠) facing to the front (with the grill of the filter case facing to the front).
- 7. Install the filter cover with the its fixing tab.

Illustration 7-1 Full Height MOD



| MOD | 1/1 | PM-0702 |
|-----------------------|----------------------|---------|
| Purpose: Inspect FANs | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Verify that the FAN of the MOD are operating.

| MOD | 1/1 | PM-0703 |
|---|----------------------|---------|
| Purpose: Dry / Wet Cleaning (Full Height – <u>HITACHI</u> MOD only) | Estimated Time: 0:05 | Rev 3 |

SPECIAL TOOLS/SUPPLIES

MOD Cleaner Kit

PREREQUISITES

None

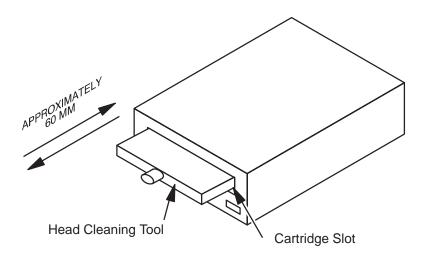
TASK DESCRIPTION

Dry Cleaning



- Instruct the user to perform this procedure once a week.
- After using 10 times, replace the cleaning brush (U0027ZA).
- Keep the brush in place that is free from dust and any external force.
- 1. Turn OFF the Power Switch of the Operator Console.
- 2. Clean the down side of the cartridge slot entrance of the MOD unit.
- 3. Install the brush (U0027ZA) onto to the Head Cleaning Tool.
- 4. Insert the Head Cleaning Tool fully into the cartridge slot with the brush facing to the sown side and move it back and forth in the range of 60 mm approximately, three or four times (See illustration 7–2)

Illustration 7–2 Dry Cleaning



Wet Cleaning

 Use the Cleaner kit available in the Service Station. Follow the instruction containing in the kit, If necessary, order the consumption material (U0035ZA) of the Cleaner kit.

| MOD | 1/1 | PM-0704 |
|--|----------------------|---------|
| Purpose: Check image archive operation | Estimated Time: 0:05 | Rev 1 |

SPECIAL TOOLS/SUPPLIES

None

PREREQUISITES

None

TASK DESCRIPTION

1. Read an image of the MOD and verify that no error occur.

APPENDIX A - SYMBOLS AND CLASSIFICATION

| Symbol | Publication | Description | |
|---------|-------------|--|--|
| ~ | 417–5032 | Alternating Current | |
| 3~ | 335–1 | Three-phase Alternating Current | |
| 3 N | 335–1 | Three–phase Alternating Current with neutral conductor | |
| | | Direct Current | |
| = | 417–5019 | Protective Earth (Ground) | |
| | 348 | Attention, consult ACCOMPANYING DOCUMENTS | |
| | 417–5008 | OFF (Power: disconnection from the mains) | |
| | 417–5007 | ON (Power: connection to the mains) | |
| <u></u> | | Warning, HIGH VOLTAGE | |
| | | Emergency Stop | |

| Symbol | Publication | Description |
|-------------------|-------------|---|
| † | | Type B |
| | 417–5339 | X-ray Source Assembly Emitting |
| | 417–5009 | Standby |
| \Diamond | | Start |
| → | | Table Set |
| | | Abort |
| (4) (4) (3) | | Intercom |
| 1/6 | | (on Operator Console) Power On: light on Standby: light off |

| Symbol | Description |
|--|--|
| 0 | Microphone (Mic) |
| | Contrast |
| -,\\-\ | Brightness |
| -10°C -10°C | System storage prior to installation: Maintain storage temperature between –10° C and +60° C |
| 0.01 | System storage prior to installation: Maintain non-condensing storage humidity below 95% |
| Humidity 5–95% Excluding Condensation | DO NOT store system longer than 90 days |
| Air Pressure 750–1060hPa | System storage and shipment: Maintain Air Pressure between 750 and 1060hPa |

CLASS 1 EQUIPMENT

Any permanently installed equipment containing operator or patient accessible surfaces must provide backup protection against electric shock, in case the BASIC INSULATION fails. In addition to BASIC INSULATION, Class1 equipment contains a direct connection to a PROTECTIVE (EARTH) CONDUCTOR which prevents shocks when a person touches a broken piece of equipment or touches two different equipment surfaces simultaneously.

TYPE B EQUIPMENT

CLASS I, II, or III EQUIPMENT or EQUIPMENT with INTERNAL ELECTRICAL POWER SOURCES provide an adequate degree of protection against electric shock arising from (allowable) LEAKAGE CURRENTS or a breakdown in the reliability of the protective earth connection.

ORDINARY EQUIPMENT

Enclosed EQUIPMENT without protection against the ingress of water.

OPERATION OF EQUIPMENT

CONTINUOUS OPERATION WITH INTERMITTENT LOADING.

Operation in which EQUIPMENT is connected continuously to the SUPPLY MAINS. The stated permissible loading time is so short that the long term on—load operating temperature is not attained. The ensuing interval in loading is, however, not sufficiently long for cooling down to the long term no—load operating temperature.

EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN or NITROUS OXIDE

CLEANING

The ProSpeed S series system is NOT WATERPROOF. It is NOT designed to protect internal components against the ingress of liquids. Clean external system surfaces (Gantry, table, consoles and accessories) with a soft cloth dipped in hot water and wrung DAMP/DRY. (NOT dripping!) IF NECESSARY, use only mild (dish washing liquid) soap to remove dirt.



Avoid damage to equipment! Some "spray and wipe" cleaners etch and permanently cloud clear plastic surfaces!! Use only warm water and mild liquid soap to clean surfaces.



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