

## Electronic Signature Information

<b>Name</b>	DOC1251058
<b>Revision</b>	1
<b>Type</b>	Controlled Document
<b>Title</b>	7700_PM_Procedure
<b>Originator</b>	100034953_thorsten__cleve
<b>Release Date</b>	04/02/2013 09:39:54 AM
<b>Obsolete Date</b>	

Name	Reason For Change	File Size (Bytes)
7700_PM_Procedure_130117.doc	7700 PM procedure	1664000

Route	Signer	Function	Status	Comments	Completion Date
R-5345559	100000346_vincent__lesage		Approve		28 Mar 2013 14:25:05 GMT

Periodic Review

**There are no signatures or routes related to this business object.**

Obsolescence Approval

**There are no signatures or routes related to this business object.**

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+ Indicates a task was reassigned from an original assignee

# GE Healthcare

## GE OEC 7700 Compact / Series

### Periodic Maintenance Procedure



DOC1251058

Rev A

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**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****警告****(ZH-CN)**

本维修手册仅提供英文版本。

如果维修服务提供商需要非英文版本，客户需自行提供翻译服务。

未详细阅读和完全理解本维修手册之前，不得进行维修。

忽略本警告可能对维修人员，操作员或患者造成触电、机械伤害或其他形式的伤害。

**VÝSTRAHA****(CS)**

Tento provozní návod existuje pouze v anglickém jazyce.

V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka.

Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.

V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.

**ADVARSEL****(DA)**

DENNE ServiceManual FINDES KUN PÅ ENGELSK.

HVIS en kundes TEKNIKER HAR BRUG FOR ET ANDET SPROG END ENGELSK, ER DET KUNDENS ANSVAR AT SØRGE FOR OVERSÆTTELSE.

FORSØG IKKE AT SERVICERE UDSTYRET MEDMINDRE DENNE servicemanual har VÆRET KONSULTERET OG ER FORSTÅET.

MANGLENDE OVERHOLDELSE AF DENNE ADVARSEL KAN MEDFØRE SKADE PÅ GRUND AF ELEKTRISK, MEKANISK ELLER ANDEN FARE FOR TEKNIKEREN, OPERATØREN ELLER PATIENTEN.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****WAARSCHUWING  
(NL)**

DEZE ONDERHOUDSHANDLEIDING IS ENKEL IN HET ENGELS VERKRIJGBAAR.

ALS HET ONDERHOUDSPERSONEEL EEN ANDERE TAAL VEREIST, DAN IS DE KLANT VERANTWOORDELIJK VOOR DE VERTALING ERVAN.

PROBEER DE APPARATUUR NIET TE ONDERHOUDEN VOORDAT DEZE ONDERHOUDSHANDLEIDING WERD GERAADPLEEGD EN BEGREPEN IS.

INDIEN DEZE WAARSCHUWING NIET WORDT OPGEVOLGD, ZOU HET ONDERHOUDSPERSONEEL, DE OPERATOR OF EEN PATIËNT GEWOND KUNNEN RAKEN ALS GEVOLG VAN EEN ELEKTRISCHE SCHOK, MECHANISCHE OF ANDERE GEVAREN.

**warning**

(EN)

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, or from mechanical or other hazards.

**HOIATUS  
(ET)**

KÄESOLEV TEENINDUSJUHEND ON SAADAVAL AINULT INGLISE KEELES.

KUI KLIENDITEENINDUSE osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.

ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.

käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****VAROITUS  
(FI)**

TÄMÄ HUOLTO-OHJE ON SAATAVILLA VAIN ENGLANNIKSI.

jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.

älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.

mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.

**ATTENTION  
(FR)**

Ce Manuel de service 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'intervenIR 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  
(DE)**

Diese Serviceanleitung existiert nur in englischer Sprache.

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

Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.

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

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**ΠΡΟΕΙΔΟΠΟΙΗΣΗ** ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ ΔΙΑΤΙΘΕΤΑΙ ΣΤΑ ΑΓΓΛΙΚΑ  
(EL) ΜΟΝΟ.

ΕΑΝ ΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ ΕΝΟΣ ΠΕΛΑΤΗ ΑΠΑΙΤΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕ ΓΛΩΣΣΑ ΕΚΤΟΣ ΤΩΝ ΑΓΓΛΙΚΩΝ, ΑΠΟΤΕΛΕΙ ΕΥΘΥΝΗ ΤΟΥ ΠΕΛΑΤΗ ΝΑ ΠΑΡΕΧΕΙ ΥΠΗΡΕΣΙΕΣ ΜΕΤΑΦΡΑΣΗΣ.

ΜΗΝ ΕΠΙΧΕΙΡΗΣΤΕ ΤΗΝ ΕΚΤΕΛΕΣΗ ΕΡΓΑΣΙΩΝ ΣΕΡΒΙΣ ΣΤΟΝ ΕΞΟΠΛΙΣΜΟ ΕΚΤΟΣ ΕΑΝ ΕΧΕΤΕ ΣΥΜΒΟΥΛΕΥΤΕΙ ΚΑΙ ΕΧΕΤΕ ΚΑΤΑΝΟΗΣΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ.

ΕΑΝ ΔΕ ΛΑΒΕΤΕ ΥΠΟΨΗ ΤΗΝ ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΑΥΤΗ, ΕΝΔΕΧΕΤΑΙ ΝΑ ΠΡΟΚΛΗΘΕΙ ΤΡΑΥΜΑΤΙΣΜΟΣ ΣΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ, ΣΤΟ ΧΕΙΡΙΣΤΗ Ή ΣΤΟΝ ΑΣΘΕΝΗ ΑΠΟ ΗΛΕΚΤΡΟΠΛΗΞΙΑ, ΜΗΧΑΝΙΚΟΥΣ Ή ΑΛΛΟΥΣ ΚΙΝΔΥΝΟΥΣ.

**FIGYELMEZTETÉS** EZEN KARBANTARTÁSI KÉZIKÖNYV  
(HU) KIZÁRÓLAG ANGOL NYELVEN ÉRHETŐ EL.

HA A VEVŐ SZOLGÁLTATÓJA ANGOLTÓL ELTÉRŐ NYELVRE TART IGÉNYT, AKKOR A VEVŐ FELELŐSSÉGE A FORDÍTÁS ELKÉSZÍTTETÉSE.

NE PRÓBÁLJA ELKEZDENI HASZNÁLNI A BERENDEZÉST, AMÍG A KARBANTARTÁSI KÉZIKÖNYVBEN LEÍRTAKAT NEM ÉRTELMEZTÉK.

EZEN FIGYELMEZTETÉS FIGYELMEN KÍVÜL HAGYÁSA A SZOLGÁLTATÓ, MŰKÖDTETŐ VAGY A BETEG ÁRAMÜTÉS, MECHANIKAI VAGY EGYÉB VESZÉLYHELYZET MIATTI SÉRÜLÉSÉT EREDMÉNYEZHETI.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****AÐVÖRUN**

(IS)

ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.

Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu.

Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.

brot á sinna þessari aðvörðun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.

**Avvertenza**

(IT)

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

IL NON RISPETTO 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**

(JA)

- このサービスマニュアルには英語版しかありません。
- 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ください。
- 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。



**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****ADVARSEL**  
(NO)

DENNE SERVICEHÅNDBOKEN FINNES BARE PÅ  
ENGELSK.

HVIS KUNDENS SERVICELEVERANDØR TRENGER ET  
ANNET SPRÅK, ER DET KUNDENS ANSVAR Å SØRGE FOR  
OVERSETTELSE.

IKKE FORSØK Å REPARERE UTSTYRET UTEN AT DENNE  
SERVICEHÅNDBOKEN ER LEST OG FORSTÅTT.

MANGLENDE HENSYN TIL DENNE ADVARSELEN KAN  
FØRE TIL AT SERVICELEVERANDØREN, OPERATØREN  
ELLER PASIENTEN SKADES PÅ GRUNN AV ELEKTRISK  
STØT, MEKANISKE ELLER ANDRE FARER.

**OSTRZEŻENIE**  
(PL)

NINIEJSZY PODRĘCZNIK SERWISOWY DOSTĘPNY JEST  
JEDYNIE W JĘZYKU ANGIELSKIM.

JEŚLI DOSTAWCA USŁUG KLIENTA WYMAGA JĘZYKA  
INNEGO niź ANGIELSKI, ZAPEWNIENIE USŁUGI  
TŁUMACZENIA JEST OBOWIĄZKIEM KLIENTA.

NIE PRÓBOWAĆ SERWISOWAĆ WYPOSAŻENIA BEZ  
ZAPOZNANIA SIĘ I ZROZUMIENIA NINIEJSZEGO  
PODRĘCZNIKA SERWISOWEGO.

NIEZASTOSOWANIE SIĘ DO TEGO OSTRZEŻENIA MOŻE  
SPOWODOWAĆ URAZY DOSTAWCY USŁUG, operatorA  
LUB PACJENTA W WYNIKU PORAŻENIA  
ELEKTRYCZNEGO, ZAGROŻENIA MECHANICZNEGO  
BĄDŹ INNEGO.

**ATENÇÃO**  
(PT)

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 noutra 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.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**ATENȚIE**  
**(RO)**

ACEST MANUAL DE Service ESTE DISPONIBIL NUMAI ÎN LIMBA ENGLEZĂ.

DACĂ UN FURNIZOR DE SERVICII PENTRU CLIEȚI NECESITĂ O ALTĂ LIMBĂ DECÂT CEA ENGLEZĂ, ESTE DE DATORIA CLIENTULUI SĂ FURNIZEZE O TRADUCERE.

NU ÎNCERCAȚI SĂ REPARAȚI ECHIPAMENTUL DECÂT ULTERIOR CONSULTĂRII ȘI ÎNȚELEGERII ACESTUI MANUAL DE service.

IGNORAREA ACESTUI AVERTISMENT AR PUTEA DUCE LA RĂNIREA DEPANATORULUI, OPERATORULUI SAU PACIENTULUI ÎN URMA PERICOLELOR DE ELECTROCUTARE, MECANICE SAU DE ALTĂ NATURĂ.

**ОСТОРОЖНО!**  
**(RU)**

Данное руководство по обслуживанию предлагается только на английском языке.

Если сервисному ПЕРСОНАЛУ клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.

ПЕРЕД ОБСЛУЖИВАНИЕМ ОБОРУДОВАНИЯ ОБЯЗАТЕЛЬНО ОБРАТИТЕСЬ К ДАННОМУ РУКОВОДСТВУ И ПОЙМИТЕ ИЗЛОЖЕННЫЕ В НЕМ СВЕДЕНИЯ.

Несоблюдение требований данного предупреждения может привести к тому, что специалист по обслуживанию, оператор или пациент получат удар электрическим током, механическую травму или другое повреждение.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****upozornenie****(SK)**

Tento návod na obsluhu je k dispozícii len v ANGLIČTINE.

AK ZÁKAZNÍKOV POSKYTOVATEĽ SLUŽIEB VYŽADUJE INÝ JAZYK AKO ANGLIČTINU, POSKYTNUTIE PREKLADATEĽSKÝCH SLUŽIEB JE ZODPOVEDNOSŤOU ZÁKAZNÍKA.

NEPOKÚŠAJTE SA O OBSLUHU ZARIADENIA SKÔR, AKO SI NEPREČÍTATE NÁVOD NA OBLUHU A NEPOROZUMIETE MU.

ZANEDBANIE TOHTO UPOZORNENIA MÔŽE VYÚSTIŤ DO ZRANENIA poskytovateľa služieb, OBSLUHUJÚCEJ osoby alebo pacienta elektrickým prúdom, do mechanického alebo iného nebezpečenstva.

**ATENCION****(ES)**

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.

**Varning****(SV)**

EN HÄR SERVICEHANDBOKEN FINNS BARA TILLGÄNGLIG PÅ ENGELSKA.

M EN KUNDS SERVICETEKNIKER HAR BEHOV AV ETT ANNAT SPRÅK ÄN ENGELSKA ANSVARAR KUNDEN FÖR ATT TILLHANDAHÅLLA ÖVERSÄTTNINGSTJÄNSTER.

ÖRSÖK INTE UTFÖRA SERVICE PÅ UTRUSTNINGEN OM DU INTE HAR LÄST OCH FÖRSTÅR DEN HÄR SERVICEHANDBOKEN.

M DU INTE TAR HÄNSYN TILL DEN HÄR VARNINGEN KAN DET RESULTERA I SKADOR PÅ SERVICETEKNIKERN, OPERATÖREN ELLER PATIENTEN TILL FÖLJD AV ELEKTRISKA STÖTAR, MEKANISKA FAROR ELLER ANDRA FAROR.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**DİKKAT**  
**(TR)**

U SERVİS KILAVUZUNUN SADECE İNGİLİZCESİ  
MEVCUTTUR.

ĞER MÜŞTERİ TEKNİSYENİ BU KILAVUZU İNGİLİZCE  
DIŞINDA BİR BAŞKA LİSANDAN TALEP EDERSE, BUNU  
TERCÜME ETTİRMEK MÜŞTERİYE DÜŞER.

servis kılavuzunu okuyup anlamadan ekipmanlara  
mÜDAHALE ETMEYİNİZ.

u uyariya uyulmaMASI, ELEKTRİK, MEKANİK VEYA DİĞER  
TEHLİKELERDEN DOLAYI TEKNİSYEN, OPERATÖR VEYA  
HASTANIN YARALANMASINA YOL AÇABİLİR.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

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## GE OEC 7700 Compact / Series Periodic Maintenance Procedure

# 1. Introduction

This manual describes the periodic maintenance of the GE OEC 7700 compact and series system and a definition of the responsibilities and instructions for reporting, and verifying system operation.

# 2. Safety Procedures

Under no circumstances should the safety interlocks in the system be bypassed, jumped or otherwise disabled. Never operate or store the system in a location where conductive fluids such as water, saline solution, etc., can spill on any part of the equipment unless you cover the system with a protective waterproof draping.

## 2.1. Explosion Hazard

Never operate the system in the presence of flammable anesthetics or other flammable or explosive liquids, vapors, or gases. Vapors and gases can ignite by electrical arcs that can occur during the normal operation of switches, circuit breakers, push buttons and other circuit components.

If flammable substances are present before you apply system power, do not plug in or turn on the system.

If you detect flammable substances after the system has been turned on, do not touch any of the controls, switches, knobs or cables. Evacuate all personnel immediately, then ventilate the room to clear the air of the flammable vapor or gas. Remove any volatile liquids that are producing flammable vapors to a safe storage area.

## 2.2. Electrical Safety

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

**WARNINGS:**     **This equipment contains high power electrical components and only personnel familiar with the circuitry and its operation should provide service. Some components may maintain a charge with the power cord disconnected.**  
                  **Observe safety precautions when measuring high voltage electronics. Steps within this procedure produce x-rays. Use appropriate precautions.**

## GE OEC 7700 Compact / Series Periodic Maintenance Procedure

Areas where hazardous voltages exist include:

Transformers	- 100 - 240 volts
Video Monitors	- 100 - 240 volts and High AC/DC Voltages
Image Intensifier	- 50,000 volts
Generator	- 110,000 volts

- Observe the following precautions when you remove system covers:
- Observe the two-person rule when working near lethal voltages. A person who is familiar with the emergency power removal procedure must be in attendance. This person must remain clear of the machine and be prepared to turn it off in an emergency.
- Be familiar with the components being serviced and the locations of hazardous voltages in the assembly where you work.
- High voltage cables and capacitors can retain a charge even when you remove all power from the system. Avoid touching these unless you are certain the charge has dissipated to ground.
- Some high-energy capacitors in the system should be shorted to ground through an adequate resistance to avoid a burn hazard.
- A protective earth ground stud, located on the bottom left side of the system base, and marked with the international symbol shown below on the left. It also has a distinctly colored decal at the base of the stud as shown below on the right.

### 3. General Safety

**CAUTION:** *Serious injury and property damage can result from incorrectly performed service procedures. Observe all operating and safety procedures contained within this manual.*

**CAUTION:** *The procedures in this section should be performed by service personnel specifically trained by OEC Medical Systems to calibrate the 7700 System.*

**WARNING:** **This system is capable of generating lethal voltages. Observe safe electrical testing procedures when performing periodic maintenance procedures on the system.**

**WARNING:** **Lead aprons, radiation monitors and appropriate radiation shields must be used 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.*

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

## 4. Tools, Test Equipment & parts

In addition to standard FSE tools and test equipment, the following special tools and test equipment are required to complete this PM procedure

<b>Tool</b>	<b>Qty</b>	<b>p/n</b>
Copper Filters, 1mm thick	3	00-877682
Converging Lines Resolution Tool	1	00-900860-01
Beam Alignment Tool	1	00-877680-01

<b>Parts</b>	<b>Qty</b>	<b>p/n</b>
Seal for skin space holder w/o Laser X-ray	1	00-419156-01
Seal for skin space holder with Laser X-ray	1	00-419155-01
Seal tape	1	00-906419-01
Grease	1	00-904587-01

## 5. 7700 Periodic Maintenance Form DOC1251059

The 7700 Periodic Maintenance Form DOC1251059 or any equivalent document must be completed as the procedures in this manual are performed. If the system does not pass a portion of the procedure, correct the problem before proceeding with the PM.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

## 6. Begin PM Form

At the top of the 7700 Periodic Maintenance Form check whether you are performing a Semi-Annual or Annual PM.

Completely fill in the customer information block, including the System Serial Number and the Field Service Report (FSR) Number.

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

While performing the Periodic Maintenance procedures log all test equipment used in the Test Equipment Used block of the Periodic Maintenance Form. Make sure to include the manufacturer, model number, serial number, and calibration due date on all Test Equipment.

Complete the checklist page 2 except of the accessory functional test when performing a Semi-Annual PM. Complete all Sections when performing an Annual PM. Circle Pass or Fail on the PM Form as each test section is completed. Fill in actual measured values where indicated on the PM Form.

## GE OEC 7700 Compact / Series Periodic Maintenance Procedure

# 7. Inspection

## 7.1. Rear Cover Removal

1. Unplug the system power cord from the AC power receptacle.
2. Remove the two screws located on the lower front section of the rear cover and the screw located on each side of the cover.
3. Move the cover straight back from the rear of the machine.
4. Pull the cover away from the system.
5. Remove the ground wire.

## 7.2. Operating Hours Indicator

This function is only possible if the system is a series

1. Note down the operating hours from the service menu

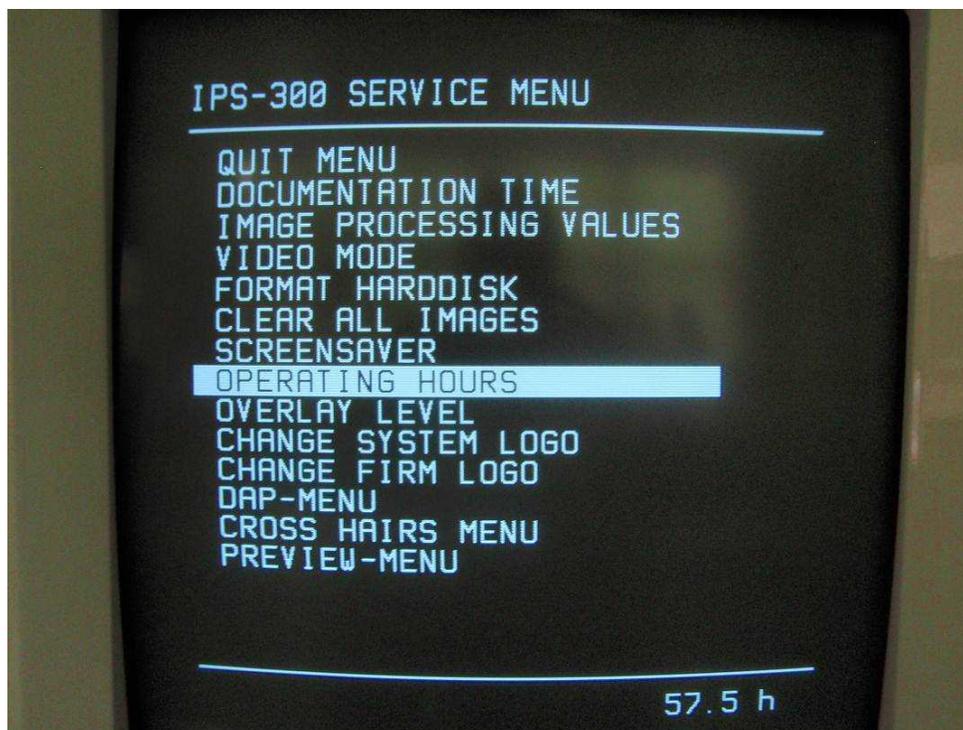


Figure 1 Service menu

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****7.3. Grease gear worm**

Use special grease 00-904587-01 only.

1. Turn system on
2. Lift system to maximum down position
3. Grease gear worm



**Figure 2 Grease gear worm**

4. Lift system to maximum top position and again to down position
5. Repeat this 3 times
6. Reduce over amount of grease



**Figure 3 Reduce over amount of grease**

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

## 8. System Operational Checks

In the steps below, check for ease of movement without excessive play.

1. Check the **Steering Handle** of the system for proper operation.
2. Check the **Locking Pedals / Brakes** of the system and of the workstation for proper operation. Lock the system in place by pressing the locking pedals down completely.
3. Check the **Wig Wag** movement of the system from side to side. Verify proper operation of the wigwag lock.
4. Check the **Flip Flop** movement of the system and integrity of the **Pivot Point**. Check proper action of the pivot lock.
5. Check the **Cross Arm** movement of the system. Verify proper operation of the cross arm lock
6. Check the **Radial Movement** of the system and verify there is adequate resistance to stop the C-Arm when the brake is applied.
7. Inspect the **AC power cable** and **Interconnect cable** for proper strain relief. Inspect the power cable assembly and interconnect cable assembly for any damage. Look for any signs of damage or abrasion to the cable jacket and inspect each plug for loose pins.
8. Inspect the **Signal cables** for proper strain relief (e.x. handswitch, footswitch, etc).
9. Inspect **Seals** of the X-ray generator
  - inspect seal for skin space holder:  
is there any and in good condition?  
Otherwise mount / replace  
seal 00-419156-01 for skin space holder w/o Laser X-ray  
seal 00-419155-01 for skin space holder with Laser X-ray
  - inspect seal tape below bumper around X-ray generator cover  
is there any and in good condition?  
Otherwise mount / replace p/n 00-906419-01
10. Verify or mount the **skin spacer** as directed by state regulation.

### 8.1. Power ON System

1. Plug the AC power cord into the system and then the wall receptacle.
2. Turn the system on by pressing the green START button on the control panel.
3. The system will display the fluoro screen on the monitors when the system has initialized.
4. Verify that the cooling fans operate.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

## 9. Measure Line Voltage Regulation

**NOTE:** This test is only required if Radiography Mode is enabled.

Check the line voltage in each room where the equipment operates. Do not assume the line voltage will be constant throughout the hospital.

Verify voltage compatibility in all hospital rooms where this machine will operate. If a particular room is unavailable, write "NA" in the location, voltage and plug compatibility blanks on the checklist. A room is not plug compatible when the plug requires an adapter. Notify the hospital if any rooms are not plug compatible.

1. Measure the AC line voltage at the wall receptacle.

**NOTE:** In the next step, the voltage measured at the wall receptacle will drop immediately after the exposure terminates. Read the meter at this time.

2. Measure the line voltage at the wall receptacle again while making a radiographic exposure (80 mAs @ 110 kVp).
3. Calculate the percentage line voltage regulation using the following formula and record the results on the Installation Report/Checklist.

$$100 \times (V_n - V_l) / V_l$$

where:         $V_n$  = No load voltage  
                    $V_l$  = Max load voltage

4. If the results above do not fall within the range of 0 to 15 percent, inform the hospital that an in-house wiring problem exists.  
 (This problem results in a violation of a provision of the Federal Performance Standards 21 CFR 1020.30)

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

# 10. Inspect / Adjust System Power Supply Voltages

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

1. The power supplies for the system are located in a perforated metal enclosure on the left side of the electronic cabinet in the mainframe. There are two separate power supplies in the enclosure.
2. Locate the output voltage wire bundle coming from the top power supply (NG1). This wire bundle exits the enclosure on the left side and has a 15-pin connector on the end of the bundle. The 15-pin connector is designated as P1. Measure the voltages listed below and record them on the PM Form.

GND	To	Adjust	Voltage	Tolerance
P1-2 (Black)	P1-5 (Red)	R 39	+5 V	+0,5 / -0,25 V
P1-2 (Black)	P1-4 (Yellow)	Not adjustable	+24 V	+/- 1,5 V
P1-2 (Black)	P1-1 (Blue)	Not adjustable	+16 V	+/- 1,5 V

3. Locate the output voltage wire bundle coming from the bottom power supply (NG2). This wire bundle exits the enclosure on the left side and has a 9-pin connector on the end of the bundle. The 9-pin connector is designated as P2. Measure the voltages listed below and record them on the PM Form.

GND	To	Adjust	Voltage	Tolerance
P2-2 (Black)	P2-1 (Red)	R 39	+5 V	+0,5 / -0,25 V
P2-2 (Black)	P2-4 (Grey)	Not adjustable	+12 V	+/- 1,5 V
P2-2 (Black)	P2-5 (Grey)	Not adjustable	-12 V	+/- 1,5 V

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****Inspect / Adjust 6.00V Ref. Voltage at B54 TP „c”**

Please measure the reference voltage of 6.00V at test point “c” (see picture below). The tolerance is +/- 0.05 Volt (5.95V – 6.05V) and use the spindle potentiometer R4 for adjustments if necessary.

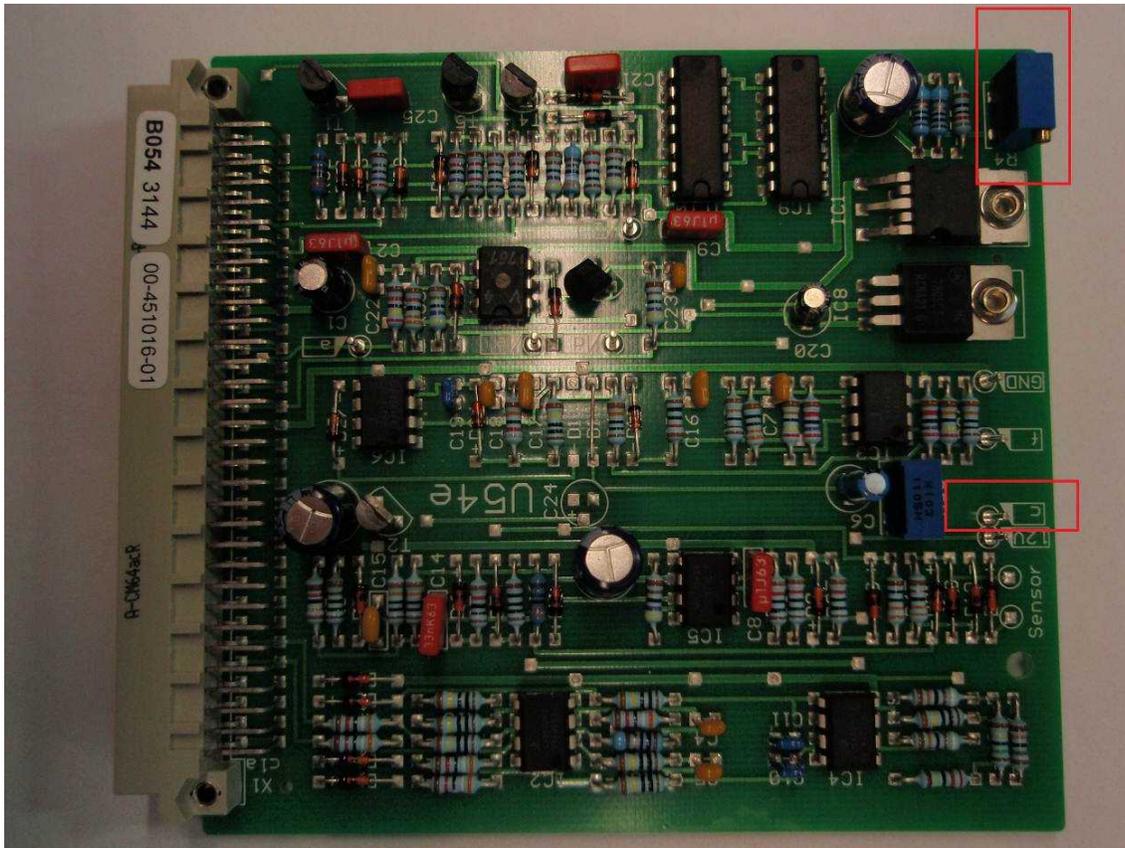


Figure 4 Board B504

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

# 11. Electrical safety tests

## General

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

Depending of each local country regulation concerning the Leakage Current Test based on IEC62353 :2007 you may have to pass the following Electrical Safety tests.

If your country is not concerned by such tests skip this Chapter and go to next chapter ( paragraph 12)

After performance of electrical safety testing a functional test of the device must be passed. Described tests and acceptance criteria are based on IEC62353:2007.

## Recommendations

GE recommends that you perform all safety tests presented in this chapter. Some country agency's do require these tests after field equipment repairs (e.g. Germany).

- upon receipt of the device
- every twelve months thereafter, and
- each time the main enclosure is disassembled or a circuit board is removed, tested, repaired, or replaced.

## Test conditions

Perform Electrical safety tests under normal ambient conditions of temperature, humidity, and pressure.

## Test equipment

Item	Specification
Leakage Current Tester*	equivalent to the circuits shown below.
Digital Multimeter (DMM)	AC volts, Ohm

\*able to deliver a current of at least 200mA into 500mΩ. Open circuit voltage shall not exceed 24V

## Pretests

### Power outlet test

Verify that the power outlet is wired correctly per the country's electrical code standard before starting the following electrical safety tests. The results of the following tests will be inaccurate unless a properly wired power outlet is used.

### Power cord and plug

Verify the power cord being used with the C-arm and/or Monitor Cart is good. The following are a couple of things to check for in this regard:

- Failure of the power cord strain relief is very common. Often times users of the equipment pull on the power cord itself, rather than the power cord plug, to

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

unplug the patient monitor from a wall receptacle. If in doubt, test for continuity through each conductor of the power cord connector and plug.

- Verify line, neutral, and ground conductors are properly connected to the power cord plug and are not short-circuited. Rewire and tighten these, or replace the power cord, as necessary.

Verify the same for the interconnect cable between C-arm and Monitor

**Tests**

Electrical Safety Test shall be performed as required by IEC 62353 “Medical electrical equipment – Recurrent test and test after repair of medical electrical equipment”. Consult your country/local safety agency if in question.

Connection lines such as data lines or functional earth conductors need to be disconnected to prevent incorrect measurements.

If the measured values are between 90 % and 100 % of the acceptable limit, previously measured values shall be taken into consideration for the assessment of the electrical safety of the device. A significant increase could indicate a problem. If such previous data values are not available, reduced intervals between electrical safety tests shall be taken into account.

**Protective Earth Resistance**

7700 System is available in different configurations following limits are applicable.

Limits:

Configuration	Detachable Power Cord	Protective Earth Resistance
Compact	Yes	200mΩ for System 100mΩ for power cord or 300mΩ if measured together
Monitor Cart	Yes	300mΩ
Compact Plus	Yes	300mΩ
Series	Yes	300mΩ

**Equipment Leakage Currents**

Due to IEC 62353 one of the following methods of measuring the equipment leakage currents may be used:

- Alternative method
- Direct method
- Differential method

For 7700 mobile C-arm the differential method is recommended. The maximum allowed current in normal condition is for 200-240V - 2500 μA and for 100-120V – 500 μA.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure****Note:**

7700 C-arms are designed to be in compliance with IEC 60601-1:1988+IEC 60601-1:1988/A1:1991+IEC 60601-1:1988/A2:1995 and applicable collateral and particular standards. Therefore the limit of 2500  $\mu\text{A}$  for the leakage current is justified by these standards for mobile C-arms (the limit of 500 $\mu\text{A}$  defined in IEC 62353 is therefore not applicable).

**Measurement of insulation resistance**

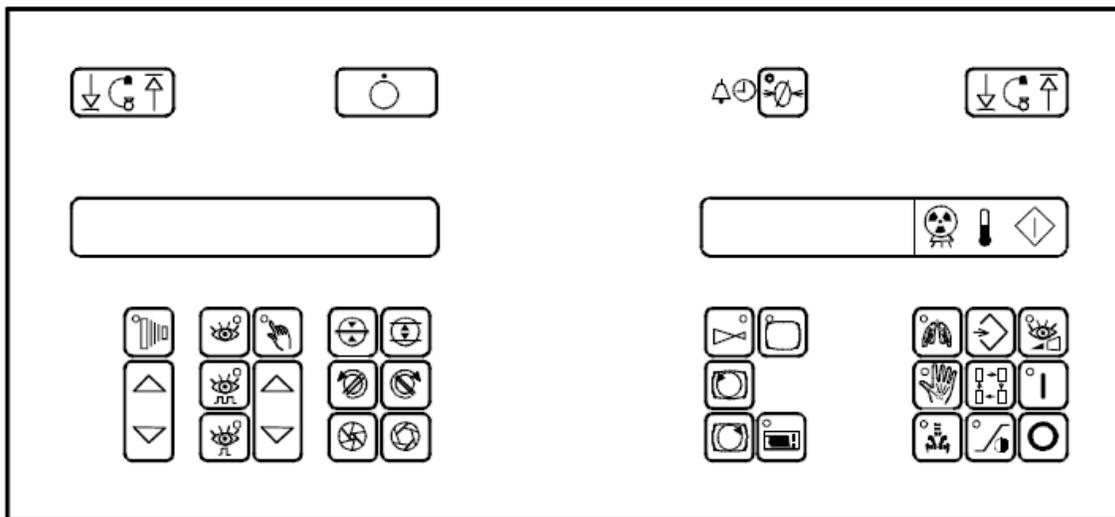
Insulation resistance shall be measured between the mains part and protective earth. Insulation resistance measurements shall be performed with 500 V (D.C.). The insulation resistance shall be at minimum 2 M $\Omega$ .

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

# 12. C-Arm Functional Verification

**WARNING:** Steps within this procedure produces X-rays. Use appropriate precautions.

*NOTE:* Use the illustration below as a reference when performing the Operational Verification.



1. Press the C-up and C-down buttons  and verify that the c-arm lifts smoothly from top to bottom limits.
2. Press the Auto Fluoro button  repeatedly and verify that the LED turns on and off. With Auto Fluoro active (LED on) press the x-ray button and verify that the kV and mA automatically servo by monitoring the kV and mA display. Verify that an image appears on the monitor. Verify that the mA display shows the mA value while x-rays are being taken.
3. Press the Pulse Fluoro button  repeatedly and verify that the LED turns on and off. With Pulse Fluoro active (LED on) press the x-ray button and verify that the system produces pulsed X-rays and that an image appears on the monitor.
4. Press the Snapshot button  repeatedly and verify that the LED turns on and off. With Snapshot active (LED on) press the x-ray button and verify that an exposure is taken and then automatically terminates. The image should remain on the monitor until the next exposure is taken.
5. Press the Auto Fluoro button  and then the kV button  and verify that both LED's illuminate. Press the kV-up/down button and verify that the kV can be changed from 36 to 110kV.
6. If applicable press the Film button  repeatedly and verify that LED turns on and off. With Film active (LED on) press the Film Timer-up/down button and verify that you can select a time from 0.1 sec. to 4 sec. as shown on the seconds display. Take a number of film shots at various kV and

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

7. While taking x-rays in the Auto Fluoro mode press the slot collimator open and close buttons



and verify that the collimator opens and closes.

8. While taking x-rays in the Auto Fluoro mode press the slot collimator rotate buttons



and verify that the collimator rotates in both directions.

9. While taking x-rays in the Auto Fluoro mode press the iris collimator open and close buttons



and verify that the iris opens and closes.

10. Press the Magnification button



repeatedly and verify that the LED turns on and off. With Magnification active (LED on) verify that the iris collimator sizes down and the image on the monitor changes to the small field mode when x-rays are taken.

11. Press the Image Reversal button



repeatedly and verify that the LED turns on and off. With Image Reversal active (LED on) verify the image reverses horizontally when x-rays are taken.

12. Press the Image Rotation buttons



and verify that the image on the monitor rotates in both directions. Press both keys simultaneously and verify that the image rotates to the normal orientation and automatically stops.

13. Press the Thorax Surgery button



repeatedly and verify that the LED turns on and off. With Thorax Surgery active (LED on) take an x-ray and verify that a live image appears on the monitor.

14. Press the Hand Surgery button



repeatedly and verify that the LED turns on and off. With Hand Surgery active (LED on) take an x-ray and verify that the field size automatically decreases because the iris collimator closes partially.

15. Place lead aprons on the image intensifier to attenuate the beam. Press the Hip Surgery button



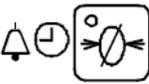
repeatedly and verify that the LED turns on and off. With Hip Surgery active (LED on) take an x-ray and verify that the mA increases to a maximum of 6mA.

16. Obtain an image on the monitor and press the Save button



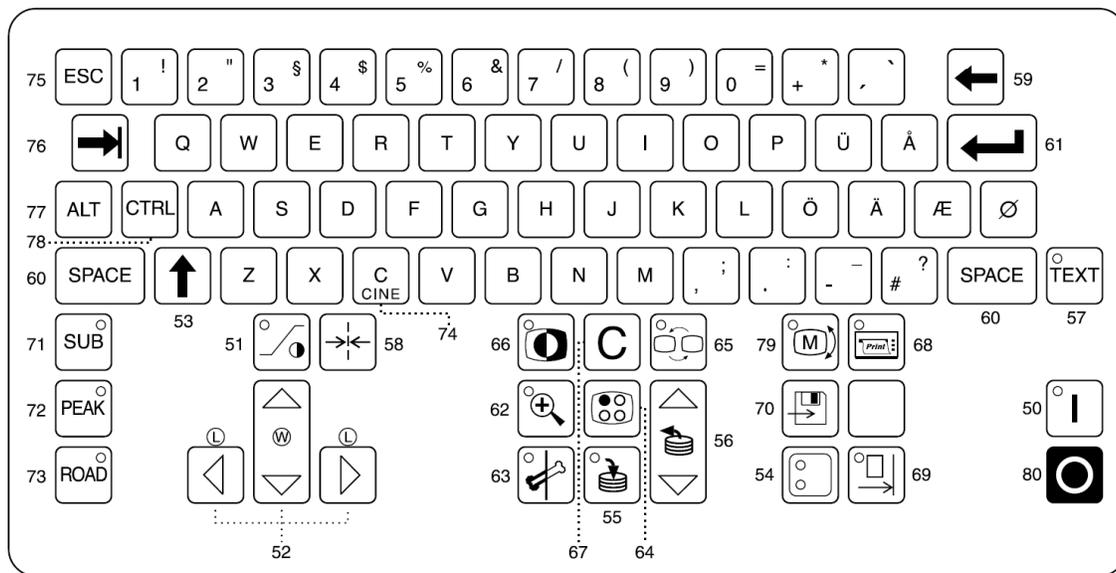
Verify that the image is saved by noting the image storage number which will appear on the monitor.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

17. Save 4 distinct images in memory using the Save button . Press the Image Recall button  repeatedly and verify that the saved images are displayed in sequence on the monitor.
18. Press the Auto-Histo button  repeatedly and verify that the LED turns on and off. Verify that when the Auto-Histo is active (LED on) the x-ray images are optimized for contrast and brightness automatically
19. Press the Low Dose button  repeatedly and verify that the LED turns on and off. Verify that when Low Dose is active (LED on) the technique is reduced in comparison to a normal Auto Fluoro exposure.
20. Press and hold the Alarm Reset button  for at least 2 seconds and verify that the accumulated fluoro time shown on the display is cleared to zero.
21. Verify that fluoro x-rays can be taken using the footswitch. Verify that film exposures cannot be taken using the footswitch.
22. Press the Fast Stop button  and verify that power is immediately interrupted.

GE OEC 7700 Compact / Series Periodic Maintenance Procedure

# 13. Workstation Functional Verification



1. To check the functionality of the workstation please create an new Patient.
2. Make fluoro until you have one picture in good quality.

3. Store that picture to the new created patient by using the button



**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

## 14. Perform Accessory Functional Test

### 14.1. Laser Aiming Devices

Turn on the laser aiming devices (II and/or x-ray generator). Verify that you are able to see any laser beam.

### 14.2. DICOM Interface

Test that the Network status is "Network connected". Press the Network Status button on the hand control, the Keypad will display "Network connected". If not follow the Quick reference guide and the Installation Instructions DICOM AAM-CA to install the DICOM Interface.

If the site uses the DICOM interface option, please recommend using the RJ45 Adaptor, which features a quick release mechanism to disconnect the Ethernet patch cable without damage to components when the cable is being pulled roughly.

The RJ45 adaptor can be ordered for all 7700 systems as a replacement part (00-454024-XX). This option can easily be installed by the user in accordance with the instructions provided in Technical Bulletin 12TB001.

### 14.3. Backside Monitor

Verify that you are able to see any picture on the monitor.

### 14.4. HCC Camera

Verify the functionality of the HCC Camera by creating an X-Ray film. Put an film in the cassette and select the Film mode with the button . Exposure X-Ray and verify that the film is clearly visible illuminated.

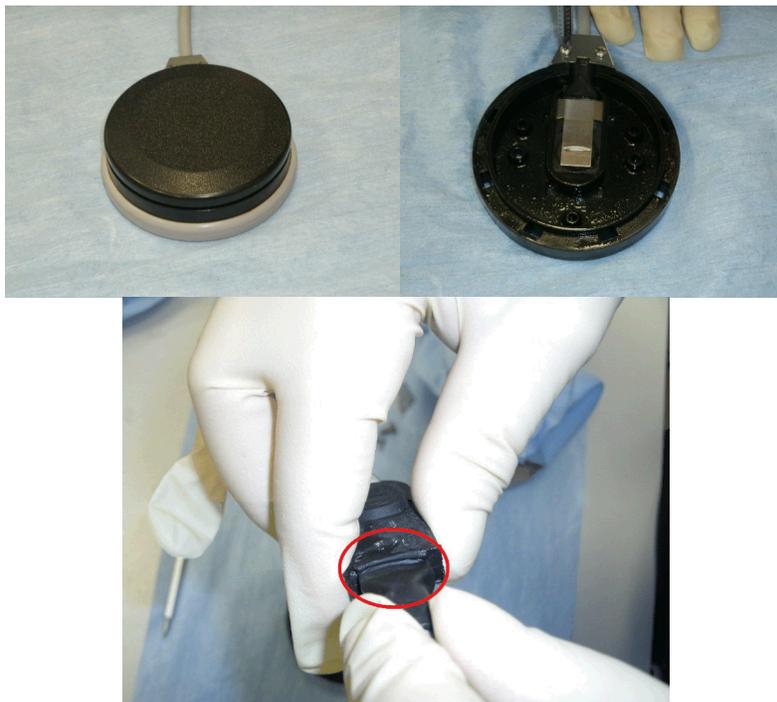
### 14.5. Thermal Printer

Press the **Thermal Printer** button to print the left monitor image through the thermal printer.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**14.6. Footswitch**

Please inspect the switching element of the Footswitch according to the table below and if you find the rubber cover defective or porous (you can see an example in the pictures below) please exchange the complete Footswitch.



**Figure 5 Example of defective rubber cover**

Single footswitch	
00-452366-01	Inspect the switching element
00-452366-02	Inspect the switching element
00-453653-01	Inspect the switching element
00-453653-02	Inspect the switching element
Double footswitch	
00-453366-01	Inspect the switching element
00-453333-01	Inspect the switching element

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## 15. Beam Alignment Test

**WARNING** *This procedure produces X-rays. Take appropriate precautions to protect yourself and others from unnecessary exposure.*

1. Install beam alignment template
2. Check that the normal field is within the A ring.
3. Check that Mag is within the B ring.
4. Verify that the collimator is centered.
5. Remove beam alignment template.

## 16. Radiographic / Fluoro Verification/Alignment

### 16.1. Image Resolution

Place the Converging Lines Resolution Tool (00-900860-01) on the image intensifier assembly. Select NORMAL field size, then MAG mode. Check image resolution in line-pairs-per millimeter (lp/mm) during live imaging (auto fluoro mode) for each field size. Minimum acceptable resolution is:

<b>FIELD SIZE</b>	<b>Minimum Resolution</b>
<b>Normal</b>	min. 1,2 LP/mm
<b>MAG 1</b>	min. 1,6 LP/mm
<b>MAG 2</b>	min. 1,8 LP/mm

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**16.2. Dose Rate**

US only: according 21CFR1020.32 (d) (2) (ii)

Entrance exposure is the amount of radiation available at the entrance point of patient anatomy. Entrance exposure is measured 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. Refer to the Service Manual for directions on performing the Entrance Exposure calibration.

**WARNING** *This procedure produces X-rays. Take appropriate precautions to protect yourself and others from unnecessary exposure.*

1. Select max. kV & mA
2. Using a dosimeter measure the dose rate. Limit is < 81 mGy/min.
3. Indicate if adjustments were made on the Checklist.

**16.3. kV/mA Tracking**

**WARNING** *This procedure produces X-rays. Take appropriate precautions to protect yourself and others from unnecessary exposure.*

1. Select AUTO FLUORO mode. (Manual key unlocked) Select Standard Fluoroscopy Mode
2. Verify that the kVp tracks up and down during X-rays as material thickness increase and decrease per the ranges below:

<b>1mm Copper Filters</b>	<b>kVp RANGE</b>
1 Copper Filter	56 – 62
2 Copper Filters	66 – 72
3 Copper Filters	73 – 79

3. When failed refer to the CAMERA ALIGNMENT section of the 7700 Service Manual for instructions on verifying and adjusting the fluoro beam alignment.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**16.4. Dose Test**

**WARNING** *This procedure produces X-rays. Take appropriate precautions to protect yourself and others from unnecessary exposure.*

Control mode: Fluoro / kV-Automatic

Put the Test tool (25mm AL+1,5mmCu) on the tube and make x-ray in the KV-Automatic – Mode. After you received an acceptable picture please lock the KV by pressing the lock

button  to this value.

Now put the metering chamber in the middle of the measuring circuit. Adjust with mechanical collimator from the CCD camera 0,550µGy/s (+ 0,02µGy/s).

1. Make x-ray and measure with your equipment dose. Acceptance criteria see following tables:

2. Select Fluoro Mode  

	Normal	Mag
<b>Dose [µGy/s] Limits</b>	0,55	1,1

3. Select ½ dose mode  

	Normal	Mag
<b>Dose [µGy/s] Limits</b>	0,275	0,55

4. Select Hip mode (without ½ dose!)  

	Normal	Mag
<b>Dose [µGy/s] Limits</b>	0,55	1,1

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

# 17. Generator Accuracy Verification/Calibration

## 17.1. Verify X-Ray Calibration

Refer to the KV CALIBRATION and MA CALIBRATION section of the 7700 Service Manual for instructions on checking the kV and mA. The table below lists the techniques to check and the tolerances allowed. If any portion of the Generator Accuracy Verification fails to meet specifications proceed to section Perform X-Ray Calibration of the PM procedure.

**TEST TECHNIQUE KV TOLERANCE MA TOLERANCE**

displayed		measured		maximum deviation
kV	mA	kV	mA	
60				10 %
70				
80				
90				
100				
110				

If the Calibration Accuracy Verification passes proceed with section Radiographic and Fluoro Verification/Alignment of the PM procedure.

## 17.2. Perform X-Ray Calibration

Refer to the KV CALIBRATION and MA CALIBRATION section of the 7700 Service Manual for instructions on performing the generator calibration.

After performing the generator calibration repeat section "Verify X-Ray calibration" of the PM procedure. If any portion of the Generator Accuracy Verification fails to meet specifications contact Technical Support before continuing with the PM.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

**17.3. Check DAP Calibration**

**WARNING** *This procedure produces X-rays. Take appropriate precautions to protect yourself and others from unnecessary exposure.*

**Note:** *Only if a DAP unit is installed, a calibration check is necessary.*

**Note:** *Necessary equipment: Beam Alignment Template, external x-ray measurement, for instance PTW-DIADOS with BMS*

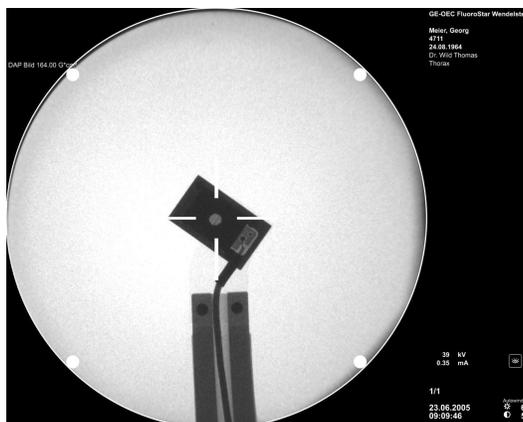
**Attention:** *to start with the adjustment there is not allowed to be anything between x-ray generator and II*

There are different system configurations for the DAP with different manuals to calibrate. Please choose the corresponding manual according to the table and the board which is installed in the system below.

Board B112	00-441048-03 Installation Manual DAP 05
	00-441098-02 Installation Manual DAP+Laser 01
	Manual for OEC_7700 Service-Setup01
Board B345	Manual for OEC_7700 Service-Setup B345_03

Check Calibration:

1. Place the measurement probe exact in the middle on II side. Set your equipment to dose (Dosis)



**Figure 6 probe placement**

2. Take measurements when system is warmed-up. In normal mode manually set for 75 kV. Collimate down until it touches the 4" ring of the Beam Alignment Template.
3. Now produce X-ray until the dosimeter reads around 2,5mGy (approx. 30 seconds).
4. Multiply the exact shown value with 90 cm<sup>2</sup> to get the Dose Area Product. 90 cm<sup>2</sup> result from the open area of the collimator. The correction factor results as the quotient: External measured and calculated Dose Area Product (Fex) to shown value (Fin) on the monitor Correction value = Fex / Fin

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

5. Put the determined correction value in the DAP menu under „Correction Value“ and then repeat the measurement from above.
6. Measured value, calculated value and the shown value should now only have a maximum difference of +/- 10%. Write values into the test protocol that is in the Appendix.
7. To control, repeat measurements with 50 kV and 110 kV and write into the test protocol. These values can have a maximum difference of +/- 30 %.

**Limits**

Valuation: Display Error [%]

75 kV	+/-	10	%
50 kV	+/-	30	%
110 kV	+/-	30	%

DAP correction value

w/o Laser	1,2 – 1,6
with Laser	0,5 – 0,9

**Caution**      *If the DAP correction values are not in the above range, repeat the calibration procedure.*  
*If the values are still outside the limits:*  
 1. *check cabeling*  
 2. *replace DAP*  
*and repeat calibration procedure*

## 18. Inspect and Clean Fans

1. Locate system fans.
2. Clean fans

## 19. Complete Paper Work

1. Make sure that all portions of the PM Checklist are completed.
2. Return the Installation PM Checklist to GEHC immediately.

**GE OEC 7700 Compact / Series Periodic Maintenance Procedure**

