

Optima CT540 Performix Tube Upgrade Instruction

Service Documentation



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Rev 2

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IMPORTANT PRECAUTIONS

LANGUAGE

<p>警告 (ZH-CN)</p>	<ul style="list-style-type: none"> • 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。
<p>VÝSTRAHA (CS)</p>	<ul style="list-style-type: none"> • 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.
<p>ADVARSEL (DA)</p>	<ul style="list-style-type: none"> • 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.
<p>WAARSCHUWING (NL)</p>	<ul style="list-style-type: none"> • 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.
<p>WARNING (EN)</p>	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none">• 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.
VAROITUS (FI)	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• 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.
ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)	<ul style="list-style-type: none">• Το παρόν εγχειρίδιο σέρβις διατίθεται στα αγγλικά μόνο.• Εάν το άτομο παροχής σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει υπηρεσίες μετάφρασης.• Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό εκτός εάν έχετε συμβουλευτεί και έχετε κατανοήσει το παρόν εγχειρίδιο σέρβις.• Εάν δε λάβετε υπόψη την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στο άτομο παροχής σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.

<p>FIGYELMEZTETÉS (HU)</p>	<ul style="list-style-type: none"> • Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el. • Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése. • Ne próbálja elkezdni 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.
<p>AÐVÖRUN (IS)</p>	<ul style="list-style-type: none"> • 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 aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.
<p>AVVERTENZA (IT)</p>	<ul style="list-style-type: none"> • Il presente manuale di manutenzione è disponibile soltanto in inglese. • Se un addetto alla manutenzione 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.
<p>警告 (JA)</p>	<ul style="list-style-type: none"> • 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。
<p>경고 (KO)</p>	<ul style="list-style-type: none"> • 본 서비스 지침서는 영어로만 이용하실 수 있습니다 . • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우 , 번역 서비스를 제공하는 것은 고객의 책임입니다 . • 본 서비스 지침서를 참고했고 이해하지 않는 한은 해당 장비를 수리하려고 시도하지 마십시오 . • 이 경고에 유의하지 않으면 전기 쇼크 , 기계상의 혹은 다른 위험으로부터 서비스 제공자 , 운영자 혹은 환자에게 위해를 가할 수 있습니다 .

BRDINJUMS (LV)	<ul style="list-style-type: none">• Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.• Ja klienta apkalpes sniedzējam nepieciešama informācija citā valodā, nevis angļu, klienta pienākums ir nodrošināt tulkošanu.• Neveiciet aprīkojuma apkalpi bez apkalpes rokasgrāmatas izlasīšanas un saprašanas.• Šī brīdinājuma neievērošana var radīt elektriskās strāvas trieciena, mehānisku vai citu risku izraisītu traumu apkalpes sniedzējam, operatoram vai pacientam.
ĮSPĖJIMAS (LT)	<ul style="list-style-type: none">• Šis eksploatavimo vadovas yra prieinamas tik anglų kalba.• Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, numatyti vertimo paslaugas yra kliento atsakomybė.• Nemėginkite atlikti įrangos techninės priežiūros, nebent atsižvelgėte į šį eksploatavimo vadovą ir jį supratote.• Jei neatkreipsite dėmesio į šį perspėjimą, galimi sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų paslaugų tiekėjui, operatoriui ar pacientui.
ADVARSEL (NO)	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.• Jeśli dostawca usług klienta wymaga języka innego niż 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-BR)	<ul style="list-style-type: none">• 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.

ATENÇÃO (PT-PT)	<ul style="list-style-type: none">• 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 língua, 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 colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.
ATENȚIE (RO)	<ul style="list-style-type: none">• Acest manual de service este disponibil numai în limba engleză.• Dacă un furnizor de servicii pentru clienți 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)	<ul style="list-style-type: none">• 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.
UPOZORENJE (SR)	<ul style="list-style-type: none">• Ovo servisno uputstvo je dostupno samo na engleskom jeziku.• Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilacke usluge.• Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.• Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehanickih i drugih opasnosti.
UPOZORNENIE (SK)	<ul style="list-style-type: none">• Tento návod na obsluhu je k dispozícii len v angličtine.• Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.• Nepokúšajte sa o obsluhu zariadenia skôr, ako si neprečítate návod na obsluhu a neporozumiete mu.• Zanedbanie tohto upozornenia môže vyústiť do zranenia poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, do mechanického alebo iného nebezpečenstva.

<p>ATENCION (ES)</p>	<ul style="list-style-type: none">• Este manual de servicio sólo existe en inglés.• Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual.• 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.
<p>VARNING (SV)</p>	<ul style="list-style-type: none">• Den här servicehandboken finns bara tillgänglig på engelska.• Om en kunds servicetekniker har behov av ett annat språk än engelska ansvarar kunden för att tillhandahålla översättningstjänster.• Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken.• Om 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.
<p>DIKKAT (TR)</p>	<ul style="list-style-type: none">• Bu servis kilavuzunun sadece ingilizcesi mevcuttur.• Eğer müşteri teknisyeni bu kilavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.• Servis kilavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.• Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.
<p>ПРЕДУПРЕЖДЕН ИЕ (BG)</p>	<ul style="list-style-type: none">• Това упътване за работа е налично само на английски език.• Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.• Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.• Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациент в резултат на токов удар или механична или друга опасност.
<p>警告 (ZH-HK)</p>	<ul style="list-style-type: none">• 本服務手冊僅提供英文版本。• 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。• 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。• 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他危險。
<p>警告 (ZH-TW)</p>	<ul style="list-style-type: none">• 本維修手冊僅有英文版。• 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。• 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。• 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。

UPOZORENJE (HR)	<ul style="list-style-type: none">• Ovaj servisni priručnik dostupan je na engleskom jeziku.• Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.• Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.• Zanimarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.
OPOZORILO (SL)	<ul style="list-style-type: none">• Ta servisni priručnik je na voljo samo v angleškem jeziku.• Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.• Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.• Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write "Damage In Shipment" on ALL copies of the freight or express bill BEFORE delivery is accepted or "signed for" by a GE representative or 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.

To file a report:

Fill out a report on <http://egems.med.ge.com/edq/home.jsp>

Contact the local service coordinator.

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.

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 anyone 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 materials and devices are available. It is urged that such materials or devices be used.

LITHIUM BATTERY CAUTIONARY STATEMENTS



CAUTION
Risk of
Explosion

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.



ATTENTION
Danger
d'Explosion

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

OMISSIONS & ERRORS

Customers, please contact your GE Sales or Service representatives.

GE personnel, please use the GEMS CQA Process to report all omissions, errors, and defects in this publication.

Revision History

Revision	Date	Reason for change
1	05/14/2015	Initial release.
2	07/07/2017	Add OpenOC16 information.

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Chapter 1

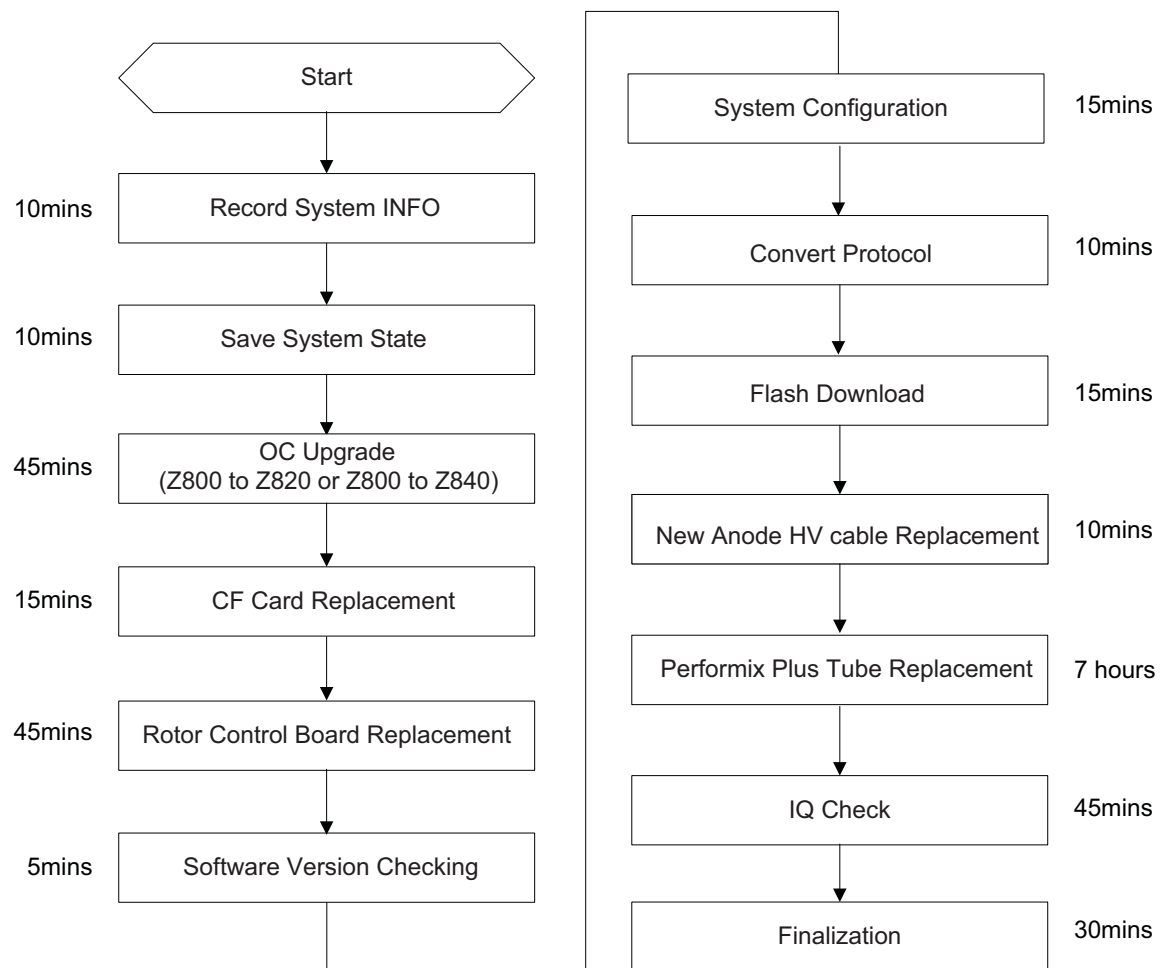
Upgrade Overview

Performix Tube Upgrade Kit is only available for Optima CT540 with Performix Ultra Tube (BB) and NIO16 Console Z800 Host Computer.

This upgrade instruction is to guide FE how to upgrade Tube and Console on CT-only Optima CT540 system:

- Performix Tube Upgrade: from Ultra (BB) to Plus (LB)
- Console Upgrade:
 - For Tang system: from NIO16 with Z800 to NIO16 with Z820.
 - For Tang E system: from NIO16 with Z800 to OpenOC16 with Z840.

Section 1.0 Flowchart



Section 2.0 Material List

Verify that the contents of upgrade kit are correct according to the material list below.

2.1 B-Cat Inventory

Description	Number	
	ASiR	Non ASiR
SGB IB Upgrade Kit	B77412CB	
CT540 TP/SW Collector	B77072CB	
NIO Console without Cover	B76992CB	
Console Cover Kit	B77092CB	B70762RT

Table 1-1 B-Cat Inventory (Z800 to Z820)

Description	Number	
	ASiR	Non ASiR
SGB IB Upgrade Kit	B77412CB	
CT540 TP/SW Collector	B79502CB	
OpenOC16 GEHW	B79532CB	
OpenOC16 ASiR Collector	B79842CB	N/A

Table 1-2 B-Cat Inventory (Z800 to Z840)

2.2 Upgrade Kit List (B77412CB)

Mark	Number	Qty.	Description
1	5429083-2	1.0	Performix Plus Anode HV Cable Assembly for HP60 Systems
2	5452506	1.0	Performix Plus rotation board for upgrade kit
3	5339643-2	1.0	HARNESS, SMART ID to Power IF to Generator
4	1000-M12C150-07	2.0	M12x150 SHCS
5	2203-M12-07	2.0	M12 Lock Washer
6	2000-M12-03	2.0	M12 flat washer
7	5693109-1EN	1.0	Optima CT540 Performix Tube Upgrade Kit Instruction
8	5446991	1.0	Peformix Plus Conversion Kit Caution Warning Labels
	1 5456327	2.0	Stator Cable Rewire Caution Label (unused)
	2 5441253	1.0	Aux Box Upgraded Notice Label
	3 5449801	1.0	HEMIT Notice Label – Order upon failure (unused)
	4 5446964	1.0	Tube Caution Label (unused)
	5 5445414	1.0	HEMIT Notice Label -Replace Before LB installation (unused)
	6 5477727	1.0	Service Switch Panel Notice Label
7 5477728	1.0	High Speed Notice Label	
9	5693275	1.0	CT540 Conversion Kit Locator Card
10	U0203AC	20.0	CLAMP CV_200
11	5332268-2	1.0	Compact Flash Memory for GLU Positioning Cj
12	D3889T	1.0	Performix Plus Green Tube Unit
13	5408703	2.0	DP to DVI Cable, 3 Meter

Table 1-3 SGB IB Upgrade Kit (5693160)

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Chapter 2

Upgrade Procedure

Section 1.0

Preparation in Site

1.1 Record System INFO Information

Write down all of the system INFO information in Console Information Sheets, please refer to the Service Methods CD 5350500-2EN rev20 or later service manual.

Note: ORP type must be recorded in advance according to the following steps.

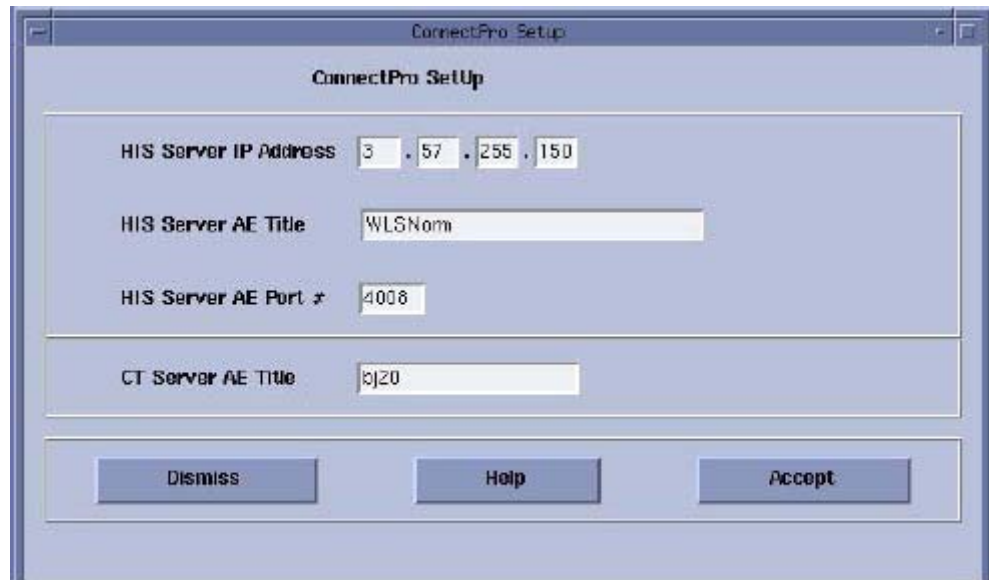
- 1.) Open a shell.
- 2.) Type: rlogin orp.
- 3.) Type: d 0x10000000
- 4.) The content of 0x10000000 to 0x1000000B is for ORP/SCORP/ORPSV board.

```
*****  
10000000: 3534 3337 3632 312d 3035 3032 ffff 0000 *5437621-0502....*  
10000010: 3534 3834 3639 322d 3003 ffff ffff ffff *5484692-0....*  
*****
```

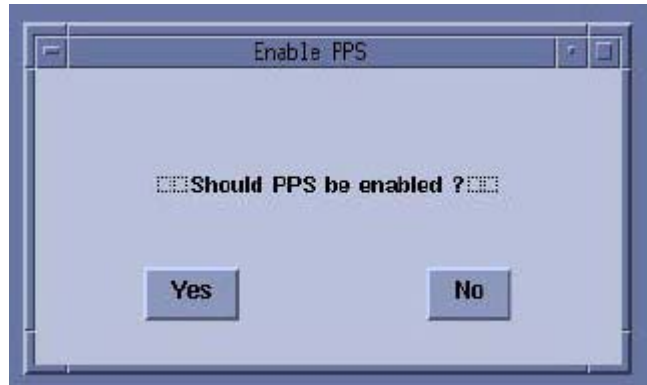
- 5.) If the content is 5437621, the board is ORPSV, others are SCORP.

1.1.1 Record PPS Server Information

- 1.) Open a Unix Shell, type: **installhisris**.
- 2.) Press [Enter], the following illustration appeared, record the data then press [Accept].



3.) Press [Yes].

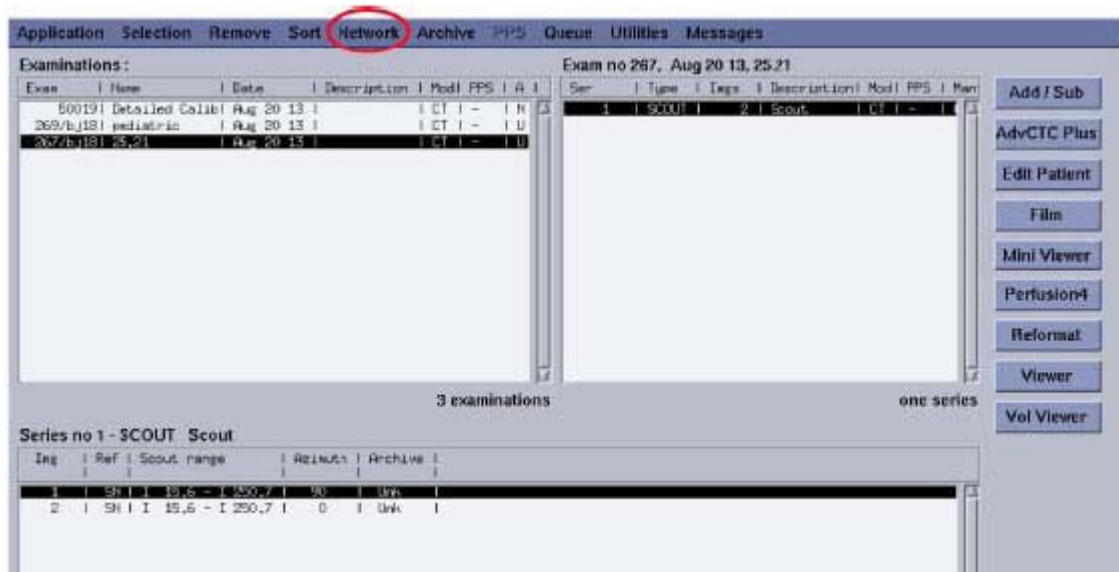


4.) Record PPS data then press [Accept].

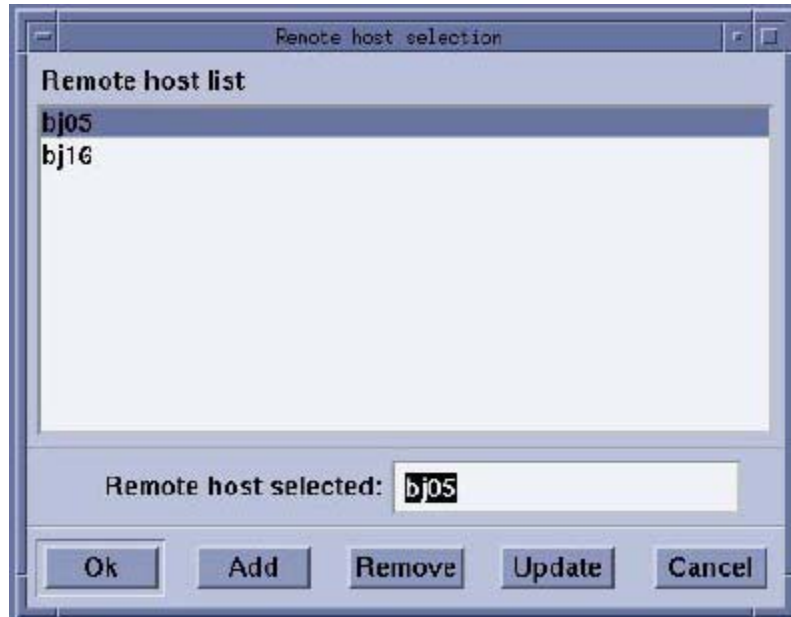


1.1.2 Record All Remote Host Network Information

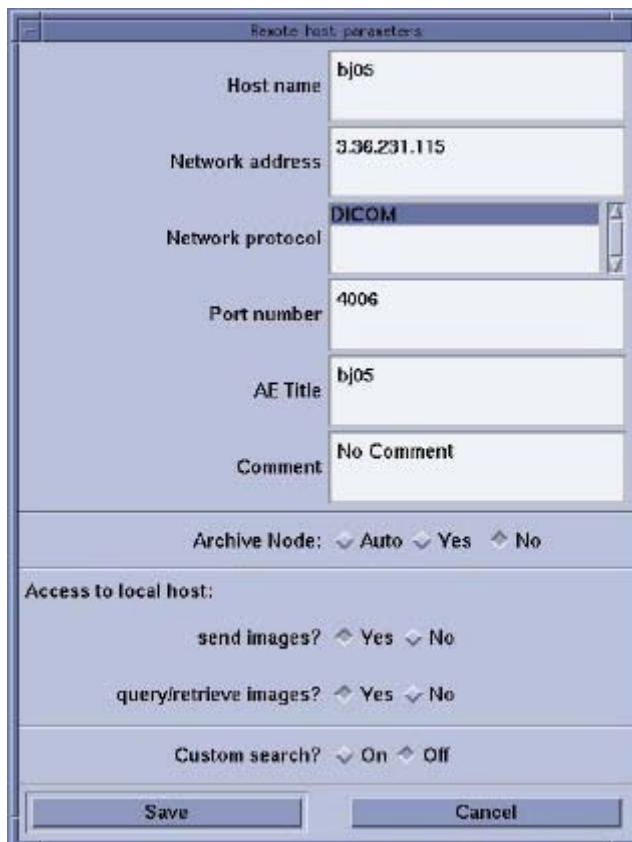
- 1.) Select [ImageWorks] from the desktop.
- 2.) Select [Network].



- 3.) Click [Select remote host] on the Network list menu.
- 4.) Select Remote host from the Remote host list, then click [Update].

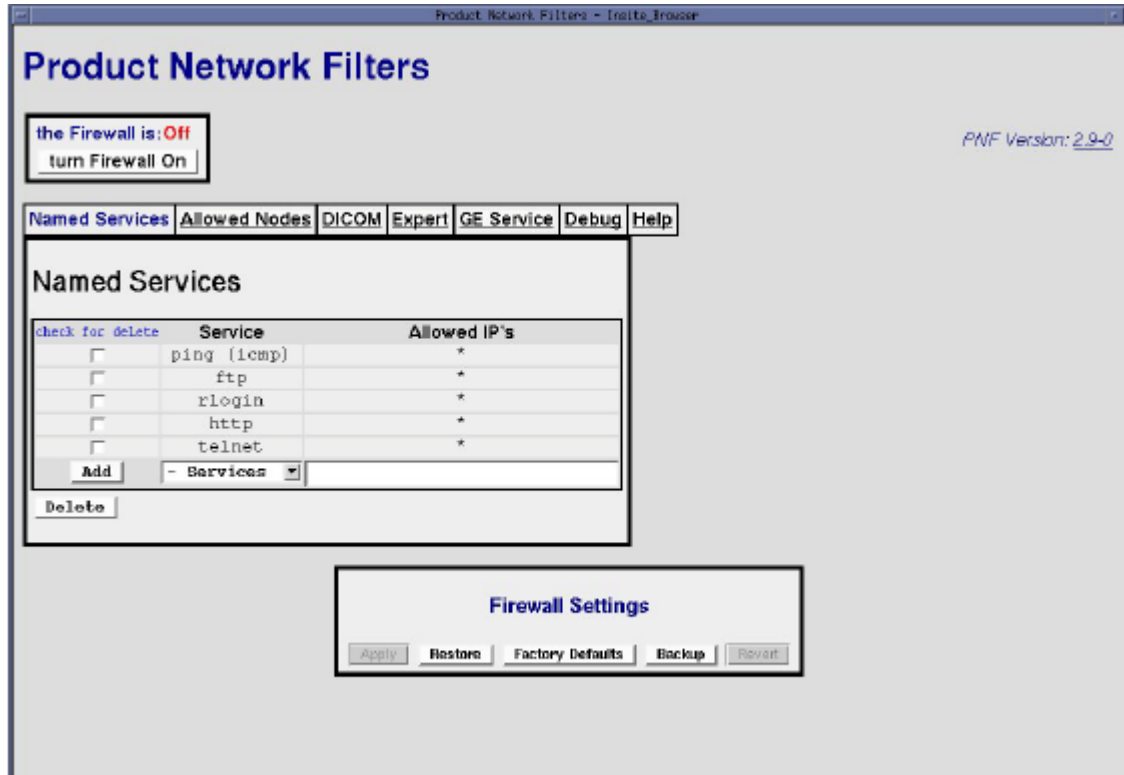


- 5.) Record the Network information as below.



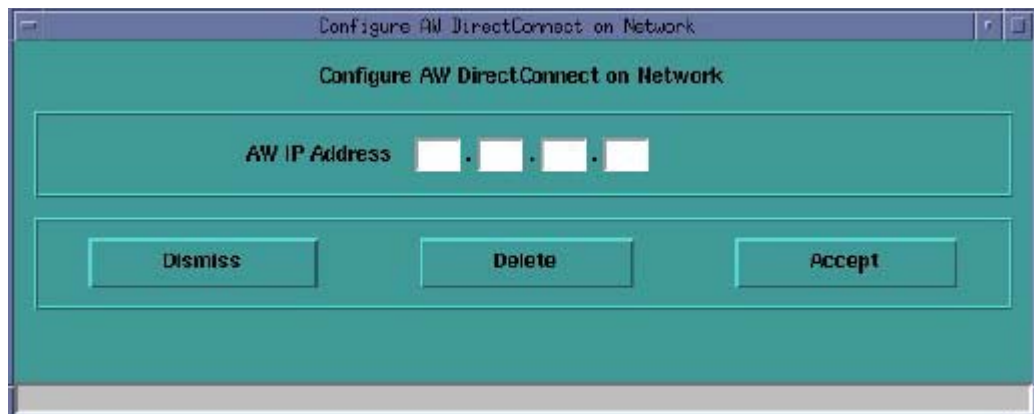
1.1.3 Record Product Network Filters (PNF) Information

- 1.) Select [Service] from the desktop.
- 2.) Select in sequence: Configuration -> Configure PNF.
- 3.) Record PNF information.



1.1.4 Record AW IP for Direct Information

- 1.) Select [Service] from the desktop.
- 2.) Select in sequence: Configuration -> Configure AW DirectConnect and record AW IP address.



- 3.) Select in sequence: Configuration -> Configure AW Server Client and record AW server INFO.



1.1.5 Record Option Information Licenses

- 1.) Open a Unix Shell, type **swokinstall -p**.
- 2.) Write down if you have any of the following options installed. After the OC upgrade (from CTT to SUSE) you will need to go to the e-License Tool to gather the new keys. The e-License Web site to make the needed keys (url is)

<http://eLicense.gehealthcare.com/eLicense/>

Option Name	B-Cat on Z800 (CTT System)	B-Cat on Z820/Z840 (SUSE System)
<i>AutoBone Xpress</i>	B7870JD	B75042AE
<i>AVA Xpress</i>	B7870JC	B75022AE
<i>Advantage CTC Pro3D</i>	B7864KL	B75032AE
<i>CardIQ Xpress</i>	B7870JB	B75052AE
<i>CT Perfusion 4 Neuro (OC)</i>	B7870HN	B75062AE
<i>CT Perfusion 4 Multi-Organ (OC)</i>	B7870HM	B75072AE

1.2 Save System State

Refer to the latest service methods (5350500-2EN rev20 or later) to understand the detailed Save State Procedure and other information saving procedure.

Note: If a Save State was just completed, it can be omitted here.

Note: When performing Save/Restore System State, make sure there is **ONLY** one USB storage device plugged in USB ports of both Console and Media Tower simultaneously, otherwise it may result in incorrect data storage.

- 1.) Insert the System State DVD-RAM media into the peripheral tower drive or USB media in any of the console's USB ports.
- 2.) Select [Service Desktop] -> [Utilities].

- 3.) Select [System State] for DVD-RAM media or [System State - USB] for USB media. The System State Save/Restore screen appears.
- 4.) Select [All] to select all calcs, characterization, etc.
- 5.) Select [Save].
- 6.) If DVD-RAM or USB is ready, select [Yes].
- 7.) When completed select [Dismiss].
- 8.) Remove System State DVD-RAM media from the peripheral tower or USB media from USB port.

Section 2.0 Console Upgrade

2.1 NIO16 Console (Z800) Removal



NOTICE Make Sure to follow all Lockout/Tagout requirements while performing this procedure.

- 1.) Shut down the system and power off the Operator Console power switch.
- 2.) Switch OFF the breaker in the Power Distribution Box (hospital supply).

Note: If there is UPS, switch OFF the UPS output.

- 3.) Visually verify proper labeling of each cable and disconnect all console rear cables.
- 4.) Disconnect the cables between the old console and system (Gantry, PDU and local hospital network).
- 5.) Remove the old OC aside.

2.2 Console Installation

2.2.1 NIO16 Console (Z820) Installation

2.2.1.1 Preparative

Figure 2-1 System Interconnect Diagram (with Z820 Host Computer)

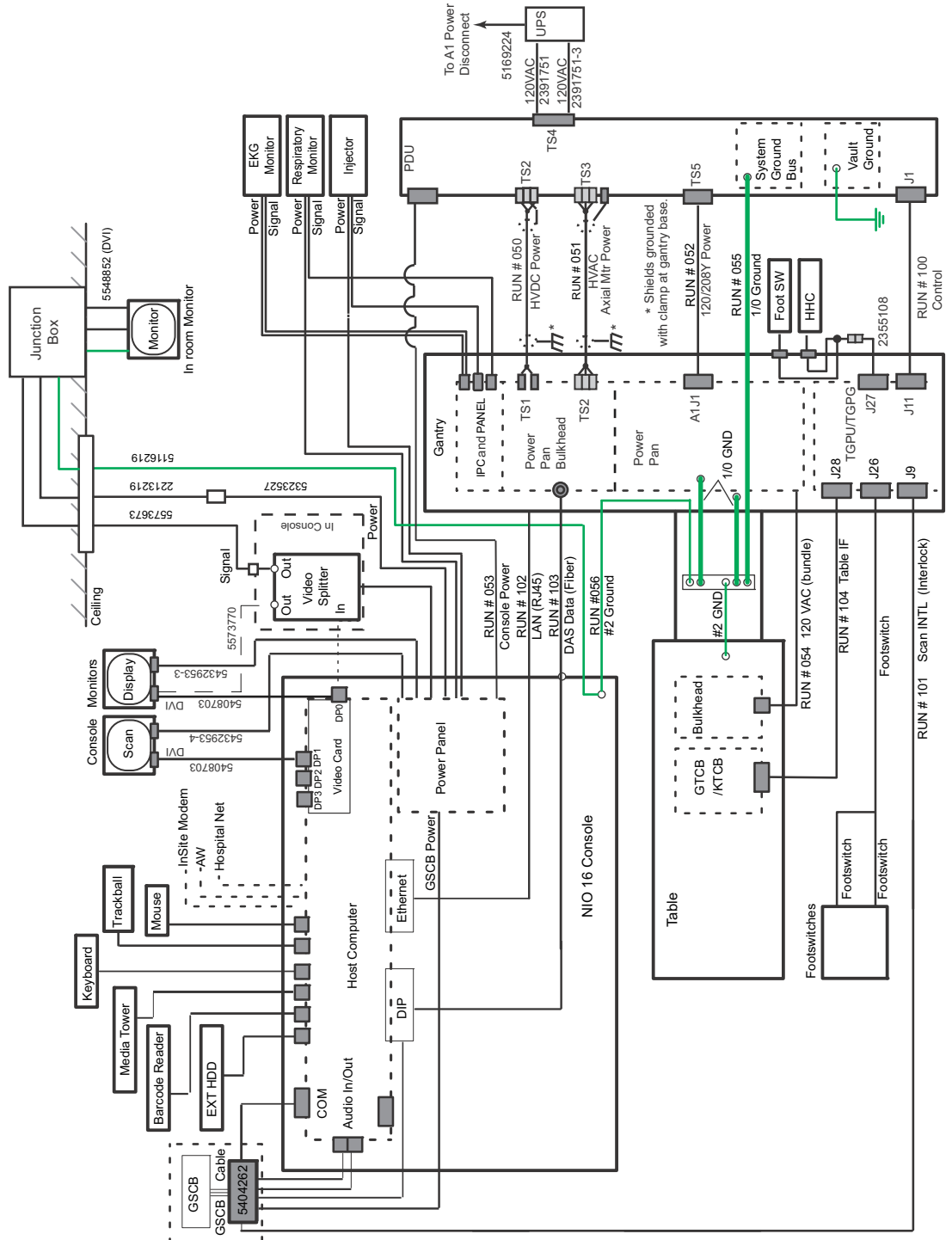


Table 2-1 System Interconnect Cables for Console

No.	Description	Long Cable	Short Cable
53	LVAC Power Cable - PDU to Operator Console	2343531	2343531-2
56	Ground, Raceway to Console	2371450-3	2371450-4
101	Signal Cable - Gantry to Console	5419981	5419981-2
102	Signal Cable (Ethernet) - Gantry to Console	2373436-2	2373436-3
103	Data Cable (Fiber Optic) - Gantry to Console	5432019	

2.2.1.2 Unpack NIO16 Console with Z820 PC

Please read details about NIO16 installation procedure in Service Manuals.

- 1.) Unpack console packaging.
 - a.) Remove all items from the console.
 - b.) Remove all packaging and discard per local requirement.
 - c.) Place the step-board under the front edge of the skid and step on it to raise the front edge of the skid as in [Figure 2-3](#).

Figure 2-3 Step-Board Used to Raise Front Edge of Skid



- d.) Remove the two front cushions from the bottom of the skid.

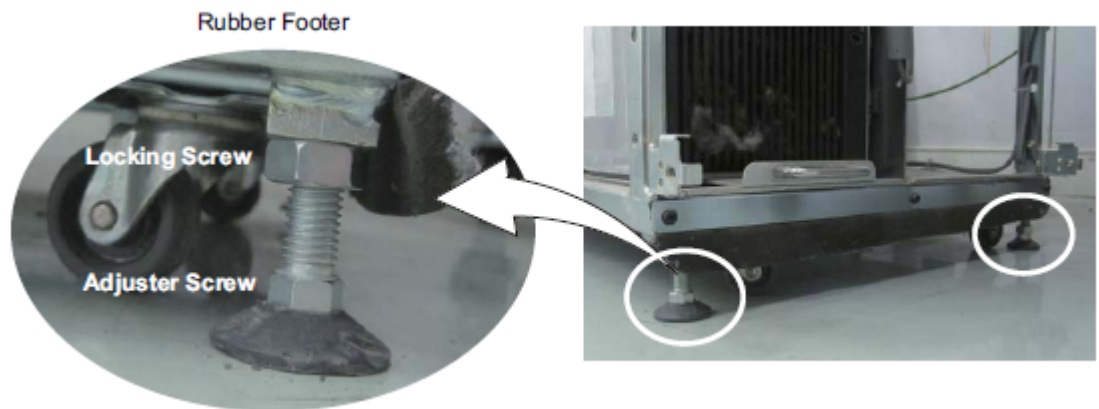
Figure 2-4 Cushion on Bottom of Skid



- e.) Lift up on the strap on the front of the step-board ([Figure 2-3](#)) to lower the skid. Remove the step-board.
- f.) Ensure the console stabilizers are in line with the notched portion at the front of the skid. This will allow enough clearance to smoothly roll the console down the ramps.

- 2.) Move and place the console to the operator room.
- 3.) Adjust two rubber footer to prevent console from sliding.

Figure 2-5 Rubber Footer Adjustment



- 4.) Remove the Host PC support bracket from left side of Z820.

Figure 2-6 Host PC Support Bracket



2.2.1.3 GPU Card Installation

Note: If customer does not purchase ASiR option, please ignore this section.
Please refer to ASiR Upgrade Installation Manual (5344359-1EN_r5 or later) to install GPU card (shipped with B77092CB) in Z820 Host Computer.

2.2.1.4 NIO16 Console Cable Connections

Figure 2-7 Z820 Host Computer Connections

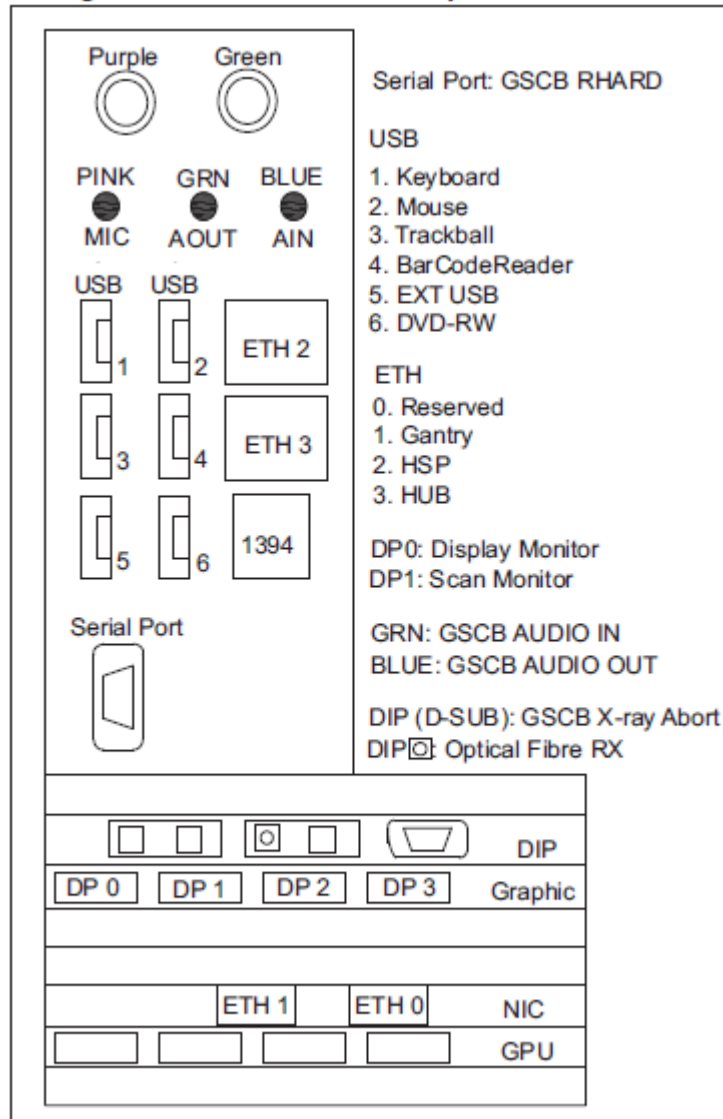
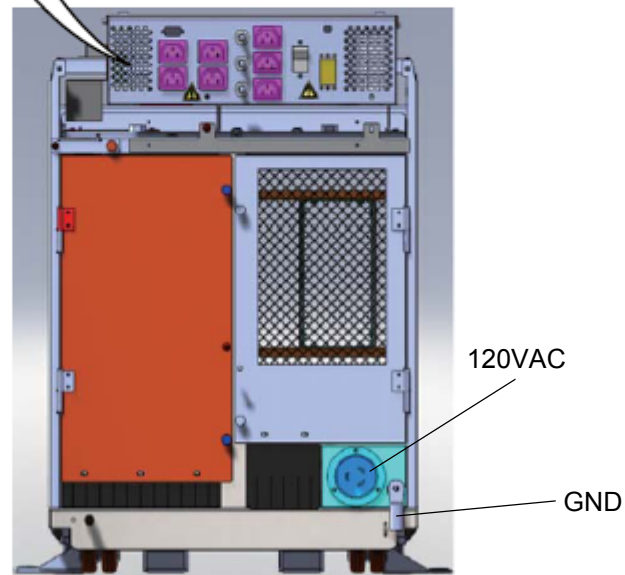
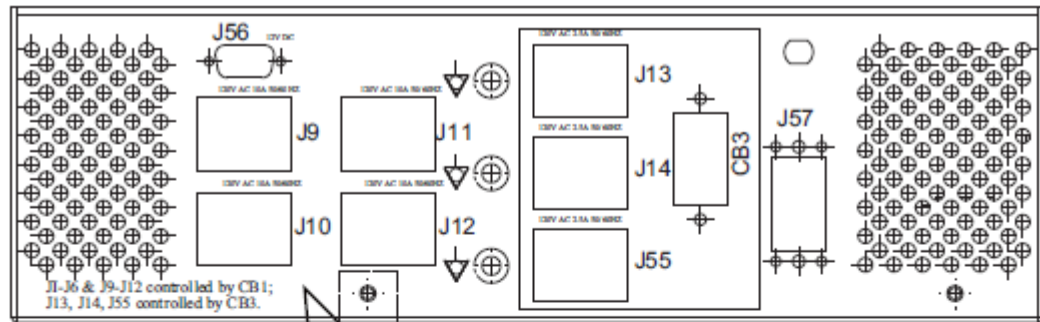


Figure 2-8 NIO16 Console AC Box Assignments



Number	Description
J9	Display Monitor Power Connection
J10	Scan Monitor Power Connection
J11	Peripheral Media Tower Power Connection
J12	In-Room Monitor Connection
J13	Injector Power Connection
J14	RPM Power Connection
J56	GSCB Power Connection

- 1.) Connect the Keyboard and Mouse cables to NIO16 Console Z820 Host Computer.
- 2.) Connect GSCB cable connectors to NIO16 Console AC Box and Z820 Host Computer according to [Figure 2-9](#) and [Table 2-2](#).

Figure 2-9 GSCB and Cable



Table 2-2 GSCB Cable Connectors

Description	To
GSCB Cable	DB9/M Black - AC Box J56 Voice Blue - Host Computer Audio In Voice Green - Host Computer Audio Out DB9/F Gray - Host Computer RS232 DB9/F Black - Host Computer DIP

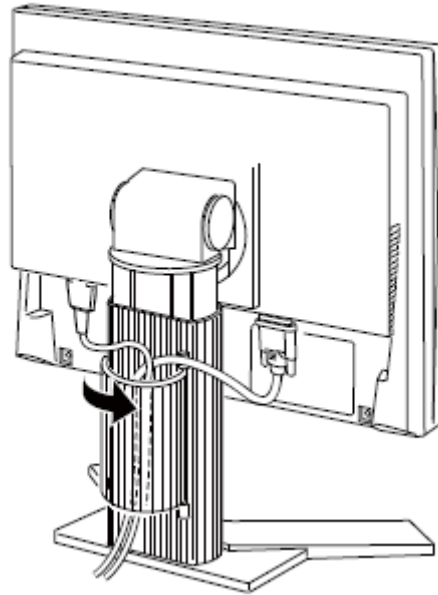
- 3.) Connect Media Tower cable connectors to NIO16 Console AC Box and Z820 Host Computer.
- 4.) Connect the LCD Monitors for Z820 Host Computer.
 - a.) Remove the old Video cable from the LCD Monitors.
 - b.) Connect the new Video cable (5408703, shipped with upgrade kit) between Z820 Host Computer and LCD Monitor.

Figure 2-10 Video Cable and Power Cable for LCD Monitor



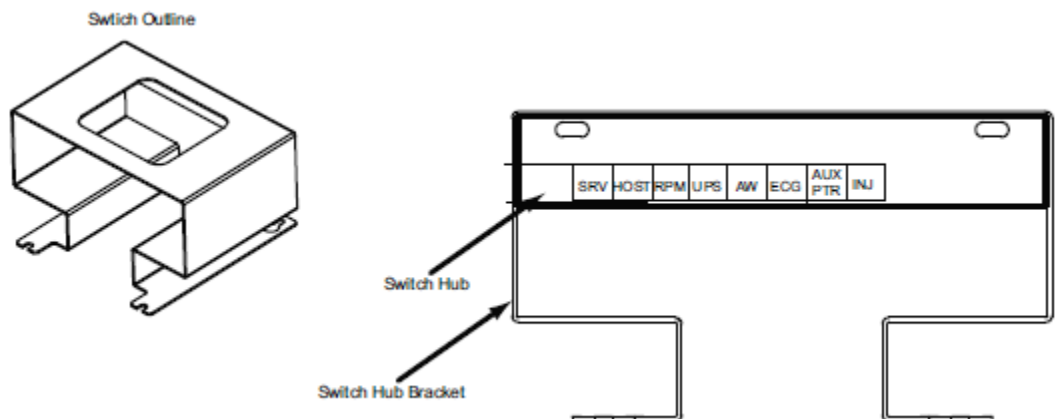
- c.) Connect the LCD Monitor power cables to NIO16 Console AC Box.
 - Scan Monitor
Video Cable: from Console Host DP1 to Monitor DVI
Power Cable: from Console AC Box J10 to Monitor
 - Image Monitor
Video Cable: from Console Host DP0 to Monitor DVI
Power Cable: from Console AC Box J9 to Monitor
- d.) Route LCD video cable and power cable.

Figure 2-11 Cable Routing and Keeper



- 5.) Plug cables into Switch Hub on console if request.
- 6.) Connect other cables to Z820 Host Computer according to [Figure 2-7](#).

Figure 2-12 Switch Hub Connections



- 7.) Connect the NIO16 Console power cable and Ground cable to the Console Power Panel.

2.2.1.5 Console Cover Installation

Refer to Console Cover Installation procedure in 5350500-2EN rev20 or later service manual.

Note: If customer purchases ASiR option, the Console Covers are black or else they are white.

2.2.2 OpenOC16 Console (Z840) Installation

2.2.2.1 Preparative

Figure 2-13 System Interconnect Diagram (with Z840 Host Computer)

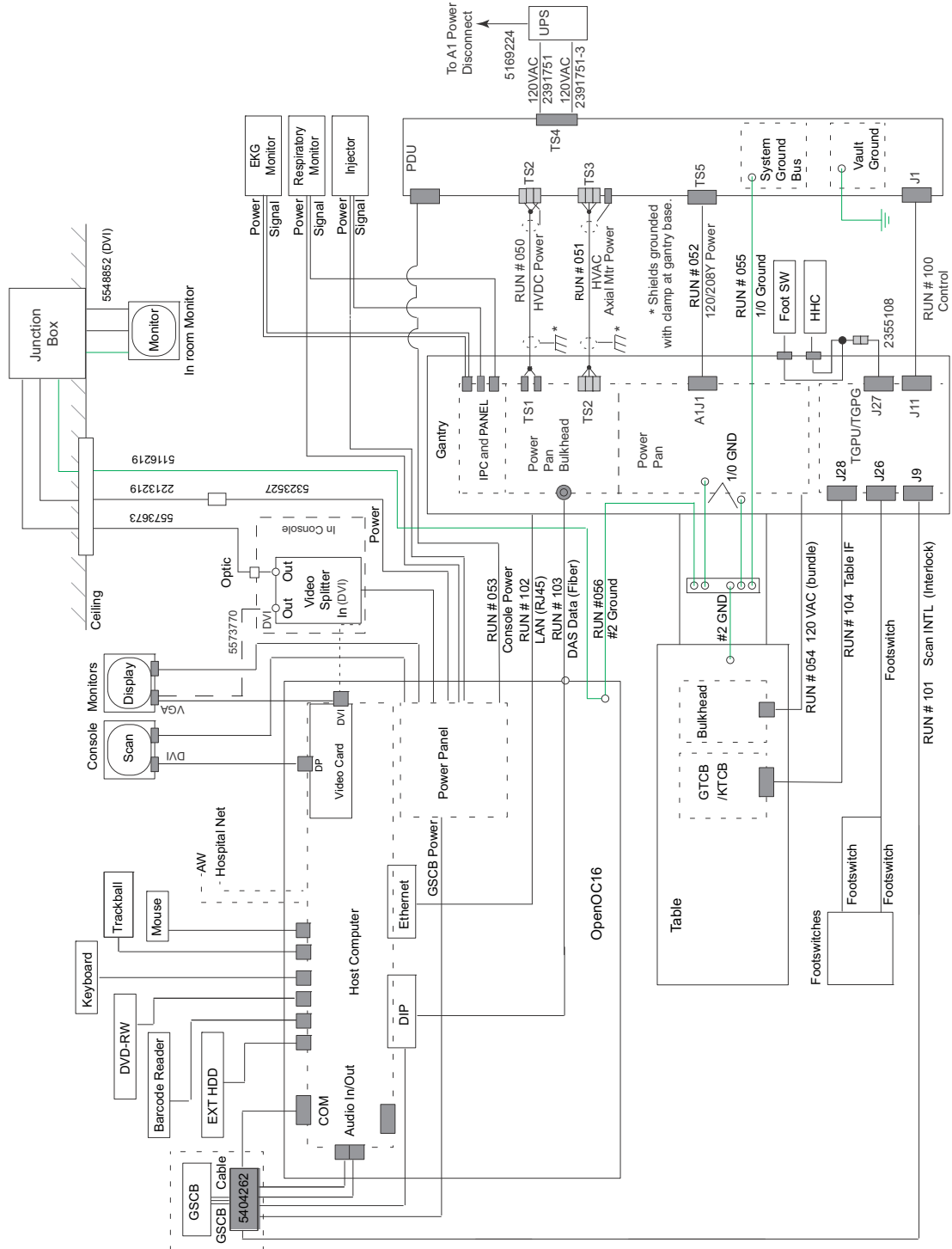


Table 2-3 System Interconnect Cables for Console

No.	Description	Long Cable	Short Cable
53	LVAC Power Cable - PDU to Operator Console	2343531	2343531-2
56	Ground, Raceway to Console	2371450-3	2371450-4
101	Signal Cable - Gantry to Console	5419981	5419981-2
102	Signal Cable (Ethernet) - Gantry to Console	5432020	2373436-3
103	Data Cable (Fiber Optic) - Gantry to Console	5432019	

2.2.2.2 Unpack OpenOC16 Console

Please read details about OpenOC16 installation procedure in Service Manuals.

- 1.) Unpack console packaging.
 - a.) Prize up buckles by using screwdriver and remove the packaging covers.

Figure 2-15 OpenOC16 Packaging Box



- b.) Remove all packaging and discard per local requirement.

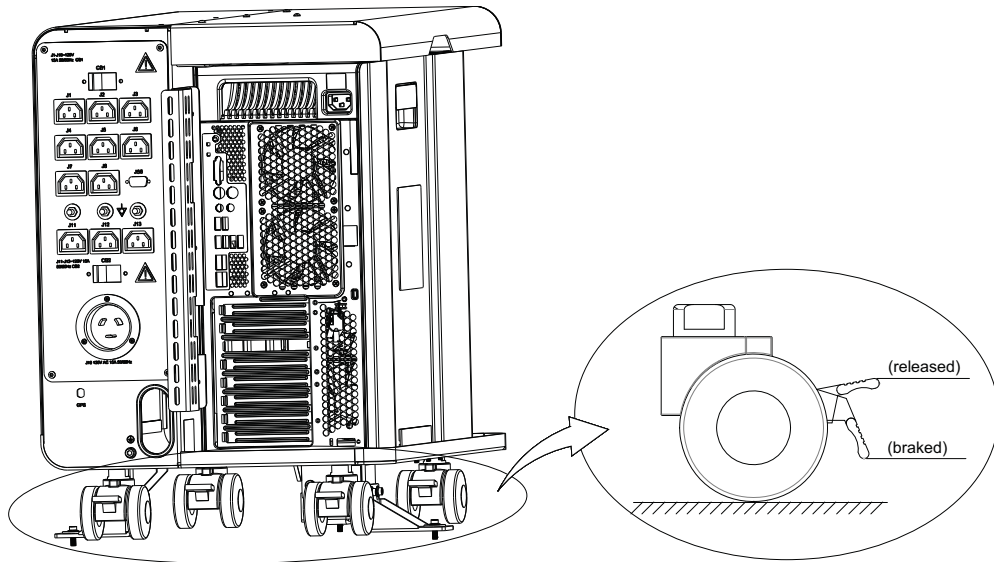
Figure 2-16 Remove all packaging



- 2.) Move and place the console to the operator room.

3.) Adjust console position, and then pedal four wheel brakes to prevent console from sliding.

Figure 2-17 Wheel Brake



2.2.2.3 GPU Card Installation

Note: If customer does not purchase ASiR option, please ignore this section.

Please refer to ASiR Upgrade Installation Manual (5771958-1EN) to install GPU card (shipped with B79842CB) in Z840 Host Computer.

2.2.2.4 OpenOC16 Console Cable Connections

Figure 2-18 Z840 Host Computer Connections

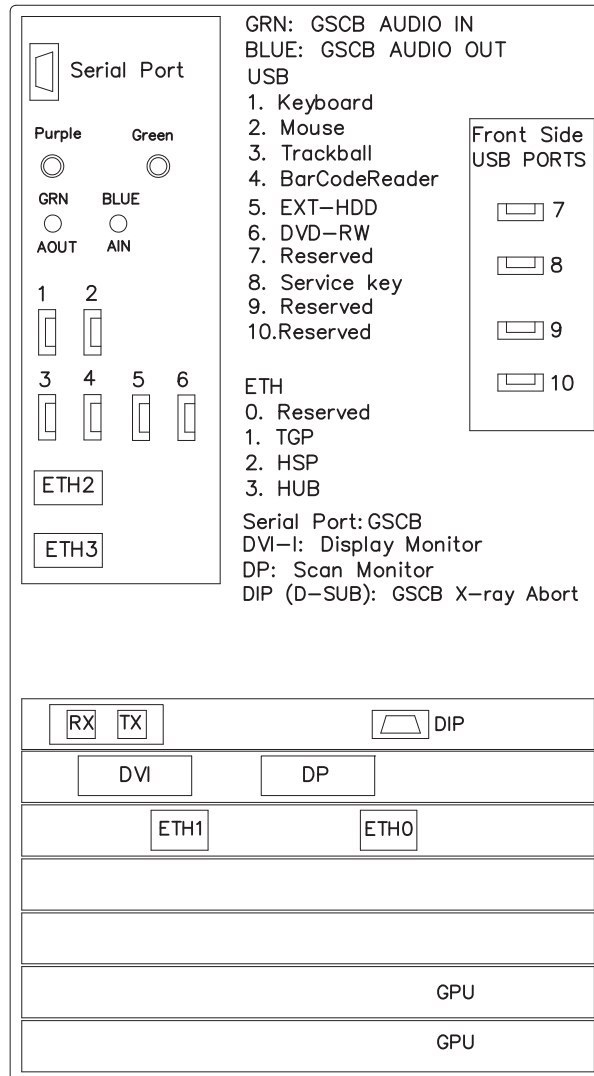


Figure 2-19 OpenOC16 Console Rear View



Number	Description
J1	Scan Monitor Power Connection
J2	Display Monitor Power Connection
J4	In-Room Monitor Connection
J5	Peripheral Media Tower Power Connection
J12	RPM Power Connection
J13	Injector Power Connection
J56	GSCB Power Connection

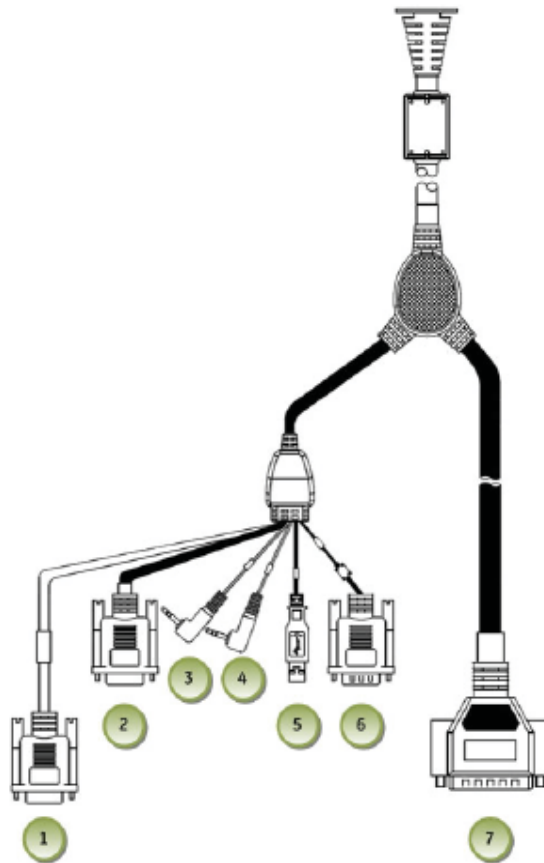
- 1.) Connect the Keyboard and Mouse (5763460, shipped with B79532CB) to Z840 Host Computer.
 If the length of keyboard and mouse cables is not enough, add the following extension cables (shipped with B79532CB).

Description	PN#
Keyboard Ext Cable	5431909
Mouse Ext Cable	5458346

Table 2-4 keyboard and Mouse Extension Cables

- 2.) Connect GSCB cable connectors to OpenOC16 AC Box and Z840 Host Computer according to [Figure 2-20](#) and [Table 2-5](#).

Figure 2-20 GSCB Cable



#	ITEM	DESCRIPTION
1	DB9/F Black	Host PC DIP Serial Port
2	DB9/F Gray	Host PC RS232
3	Green Audio	Host PC Audio Out (Green)
4	Blue Audio	Host PC Audio In (Blue)
5	USB	Empty
6	DB9/M Black	AC Box J14
7	DB25/M Black	TGP Gantry Cable

Table 2-5 GSCB Cable Connectors

- 3.) Connect the media tower cables.
 - a.) Remove the old media power cable (5432953-2).
 - b.) Connect the new media power cable (5432953-6, shipped with B79532CB) to OpenOC16 AC Box J5.
 - c.) Connect the USB cables to Z840 Host Computer.

Description	PN#	Qty
USB Cable (PMT)	5315370	2
Power Cable, Tower to AC Box	5432953-6	1

Table 2-6 Media Tower Cables

- 4.) Connect the LCD Monitors for Z840 Host Computer.
 - a.) Remove the old video cables (5408703 and 5332107-2) from the LCD monitors.
 - b.) Remove the old power cables (5432953-4 and 5432953-3) from the LCD monitors.
 - c.) Connect the new video cables and power cables (shipped with B79532CB) to OpenOC16 AC Box and Z840 Host Computer.
 - Scan Monitor
Video Cable: from Console Host DP to Monitor DVI
Power Cable: from Console AC Box J1 to Monitor

Figure 2-21 Video Cable and Power Cable for Scan Monitor



- Image Monitor
Video Cable: from Console Host DVI-I to Monitor VGA
Power Cable: from Console AC Box J2 to Monitor

Figure 2-22 Video Cable and Power Cable for Display Monitor

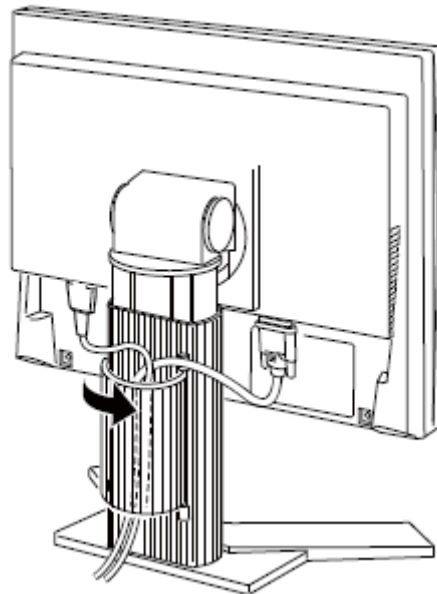


Description	PN#
Scan Monitor Power Cable	5478299-5
Scan Monitor Video Cable	5408703-2
Image Monitor Power Cable	5478299-6
Image Monitor Video Cable	5366259

Table 2-7 LCD Monitor Cables

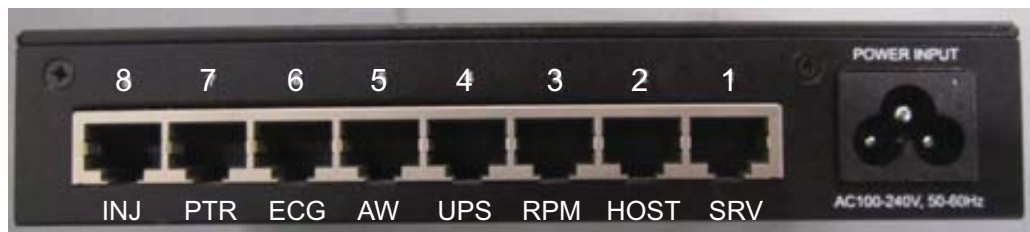
d.) Route LCD video cable and power cable.

Figure 2-23 Cable Routing and Keeper



- 5.) Plug cables into the Switch Hub on console if request.
- 6.) Connect other cables to Z840 Host Computer according to [Figure 2-18](#).

Figure 2-24 Switch Hub Connections



- 7.) Connect the OpenOC16 Console power cable and ground cable according to [Figure 2-19](#).

Section 3.0 CF Card Replacement

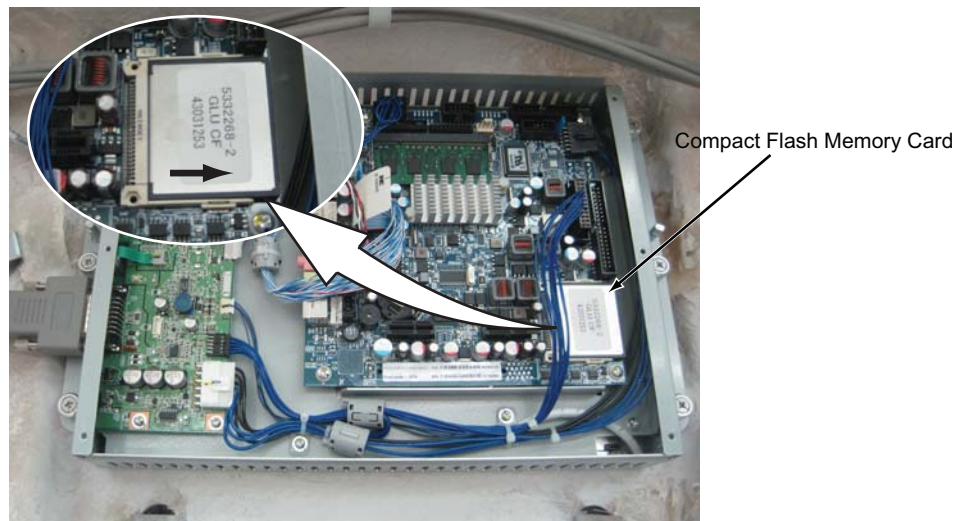
- 1.) Remove the right side gantry cover.
- 2.) Turn off the Axial Drive, 120VAC and HVDC switches on the Gantry Service Switch Panel.
- 3.) Remove the gantry left side, top, scan window and front covers.
- 4.) Remove the GLU Cover by unscrewing its six screws.

Figure 2-25 GLU Cover Removal



- 5.) Slide the old CF Card out of the Slot in the direction of arrow as shown below.

Figure 2-26 CF Card Removal



- 6.) Insert the new CF card into slot of the LCD Unit Board.
- 7.) Reinstall the GLU Cover.

Section 4.0

Rotor Control Board Replacement

4.1 Requirements

Tools and Equipment

- Standard Service Tools Kit

Consumables

- Thermal conductivity grease in rotor board kit (P/N 5134927)

Replacement Parts

- Rotor Control Board in rotor board kit (P/N 5456518)
- Stator Cable (P/N 2381533-2).

Required Conditions

- Before beginning this procedure, please read the gantry safety information in 5350500-2EN rev15 or later service manual.

4.2 Auxiliary Assembly Removal



DANGER

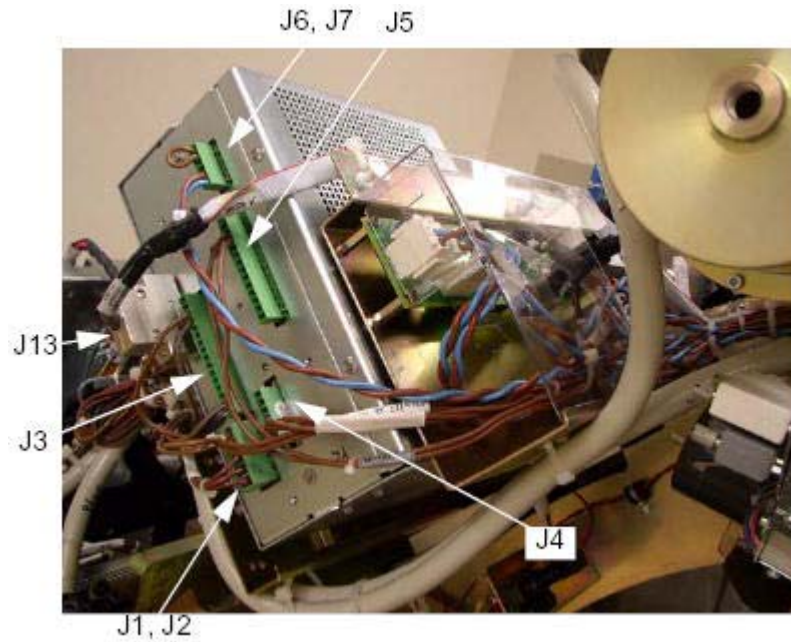
POTENTIAL FOR SHOCK.

VOLTAGE MAY BE PRESENT.

USE PROPER LOCKOUT/TAGOUT PROCEDURES.

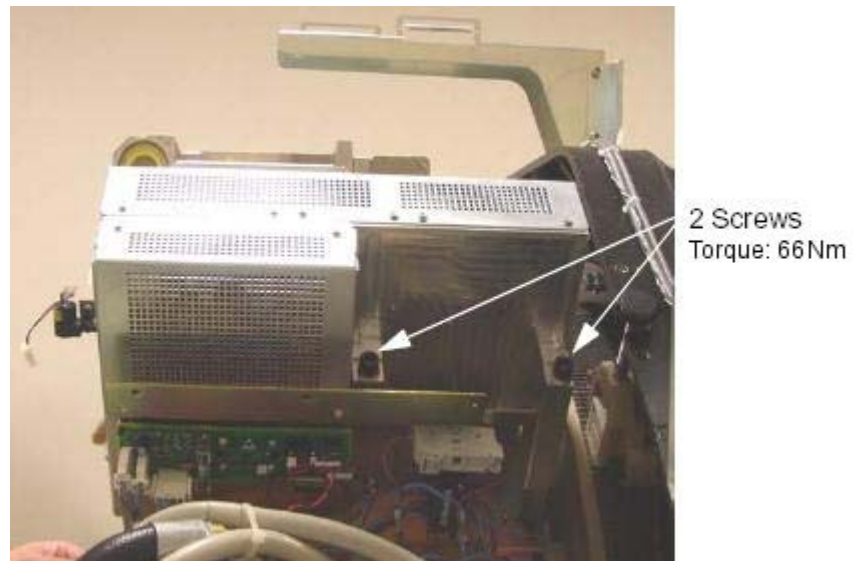
- 1.) Remove the right side gantry cover.
- 2.) Turn off the Axial Drive and HVDC switches on the Gantry Service Switch Panel.
- 3.) Rotate the gantry until the Auxiliary Assembly reaches the 2 o'clock position.
- 4.) Turn off 120VAC switch on the Service Switch Panel
- 5.) Engage gantry rotational lock and check that the gantry is securely locked by attempting to rotate the gantry by hand.
- 6.) Turn off power at main disconnect (A1) panel. Use proper Lockout/Tagout procedures.
- 7.) Remove gantry top and front covers.
- 8.) Cut any tie-wraps holding the cables to the Auxiliary Box
- 9.) Disconnect the following cable connector from the Auxiliary Box.
 - * J1Connector (<-> stator cable will be replaced with 2381533-2)
 - * J2 DC Bus Power supply
 - * J3 Connector (<-> HEMIT Tank)
 - * J4 Connector (<-> Power Unit)
 - * J5 Connector (<-> Power Unit)
 - * J6/J7 Connector (<-> TB1)
 - * J13 Connector (<-> Power Unit)
 - * GND Connector

Figure 2-27 Auxiliary Box Cable Connections



10.) Unscrew the 2 screws, and remove the auxiliary box from the Gantry.

Figure 2-28 Auxiliary Box Removal



4.3 Rotor Control Board Replacement

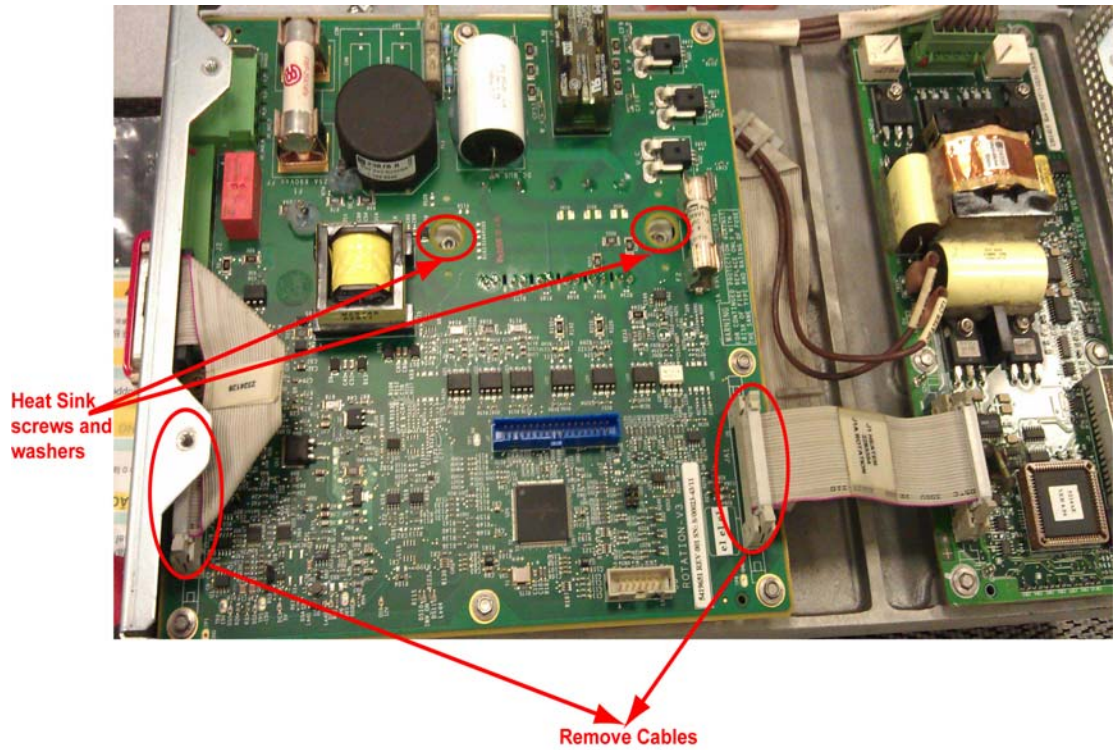
- 1.) Place the Auxiliary Box on a flat surface, then remove the front cover by unscrewing its 12 screws.

Figure 2-29 Aux Box Cover Removal



- 2.) Disconnect all cables to Rotor Control Board, unscrew all the screws, and remove the old Rotor Control Board. Be sure to remove screws and washers from heat sink also (see [Figure 2-30](#)).

Figure 2-30 Old Rotor Control Board Removal



- 3.) Remove old thermal grease from groove.

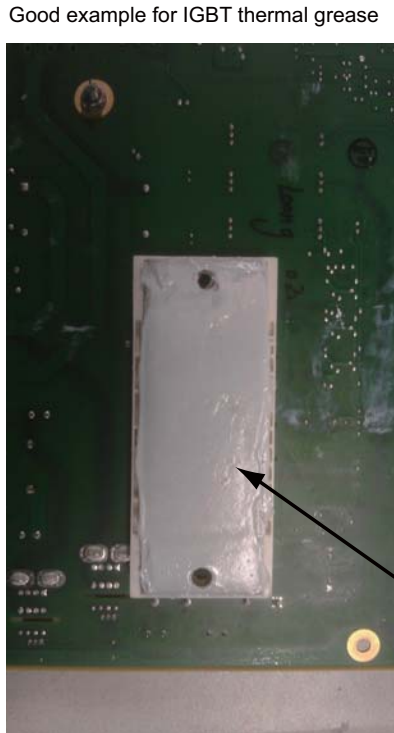


- 4.) Put on gloves and apply thermal conductivity grease (P/N 5134927) on IGBT heat sink of the new rotor board (P/N5456518) (see [Figure 2-31](#)), then install the new rotor board to Auxiliary Box and re-connect cables.



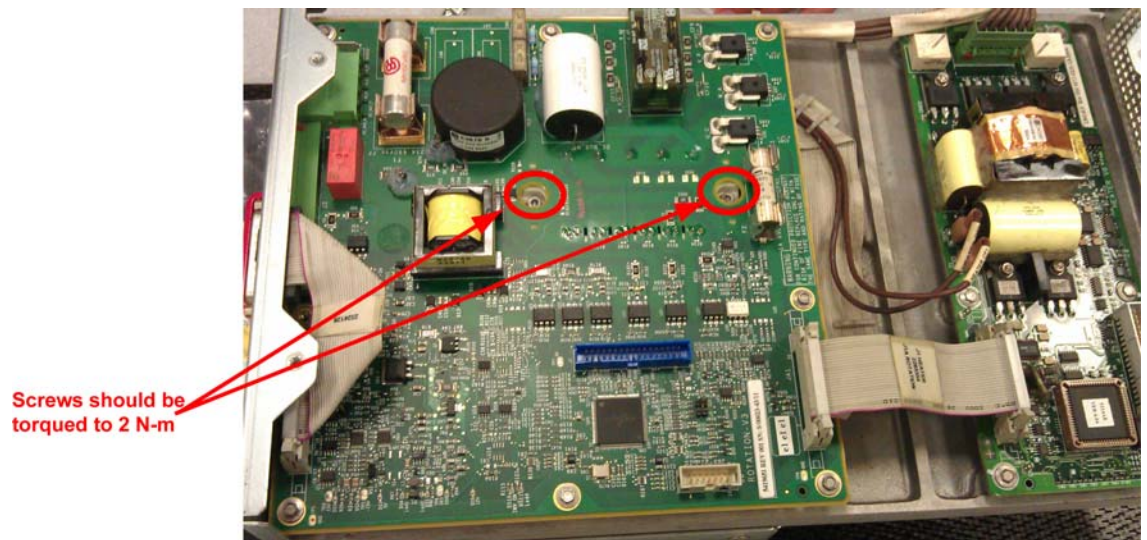
NOTICE The thermal conductivity grease should be applied evenly (see as below).

Figure 2-31 Rotor control Board IGBT Heat Sink



5.) Torque the two screws to the following final value.

2 Nm	20 Kg-cm	1.5 ft-lbs	18 in-lbs
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6.) Re-install the front cover of Auxiliary Box.

4.4 Auxiliary Box Installation

- 1.) Attach NOTICE label (P/N 5441253) (“This Auxiliary Box has been upgraded. Order 2324118-7 upon failure.”) as shown below illustration on the Auxiliary Box cover to identify the rotor control board has been upgraded.



- 2.) Ensure that Lockout/Tagout procedure has been applied, and that gantry power is removed.
- 3.) Ensure that gantry rotational lock is engaged and gantry does not rotate by attempting to rotate gantry by hand.
- 4.) Install the Auxiliary Box using bolts from the Performix Tube Upgrade Kit (5693160).
 - a.) Screws information:

Part Number	Qty	Description
1000-M12C150-07	2.0	M12x150 SHCS
2203-M12-07	2.0	M12 Lock Washer
2000-M12-03	2.0	M12 flat washer

Please place the washers in the sequence as below:



b.) Torque the two screws to the following pre-load value.

30 Nm	305 Kg-cm	22 ft-lbs	265 in-lbs
-------	-----------	-----------	------------

c.) Torque the two screws to the following final value.

66 Nm	675 Kg-cm	49 ft-lbs	590 in-lbs
-------	-----------	-----------	------------

5.) Connect all cable connectors except stator cable.

Section 5.0 LFC Procedure

LFC procedure is needed, refer to LFC Procedure in 5350500-2EN rev20 or later Service Manual.

5.1 Hardware Configuration

Note: Select the appropriate **Hardware Configuration** for the system according to be recorded in [Section 1.1: Record System INFO Information](#).

Note: Select **[Tube Type]** to **Performix_Plus_(LB)** in **Hardware Setting** window.



Note: Select the correct **ORP Type** according to be recorded in [Section 1.1: Record System INFO Information](#).



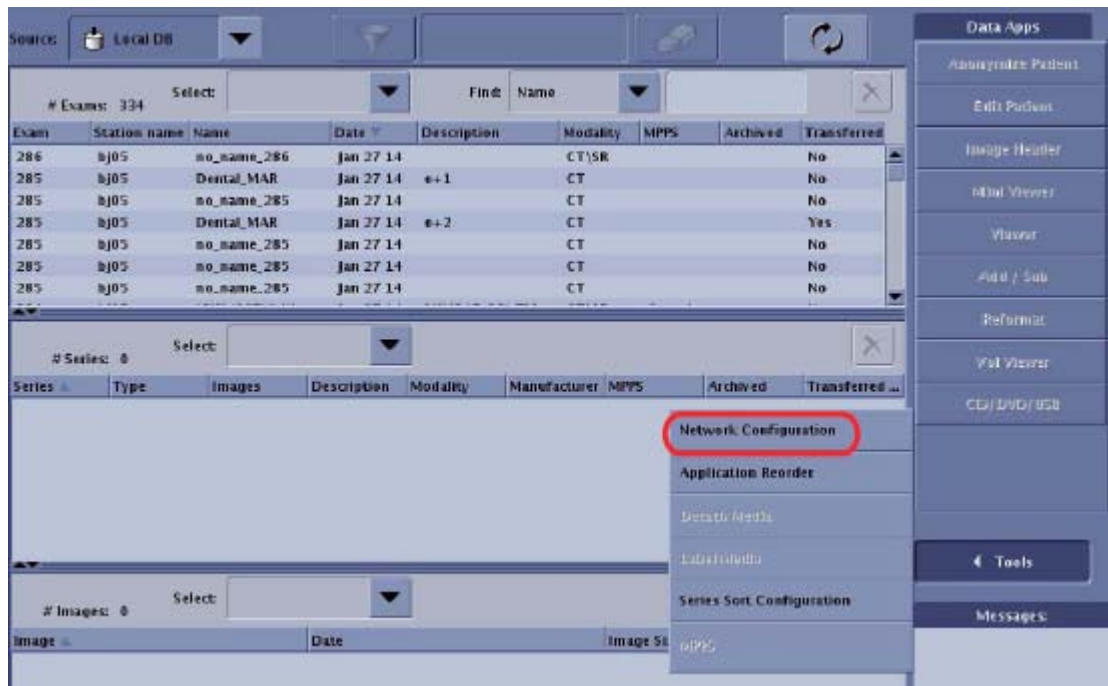
5.2 Restore System State

- 1.) Insert a previously saved system state DVD-RAM media into the peripheral tower drive or USB media in any of the console's USB ports.
- 2.) Wait until the media is ready.
- 3.) Select [Service] -> [Utilities].
- 4.) Select [System State] for DVD-RAM media or [System State - USB] for USB media. The System State Save/Restore screen appears.
- 5.) Select [All].
- 6.) Select [Restore]. The Restore System State box appears.
- 7.) Select [Yes]. A message at the end of the System State Log window should display: Restore System State Completed Successfully.

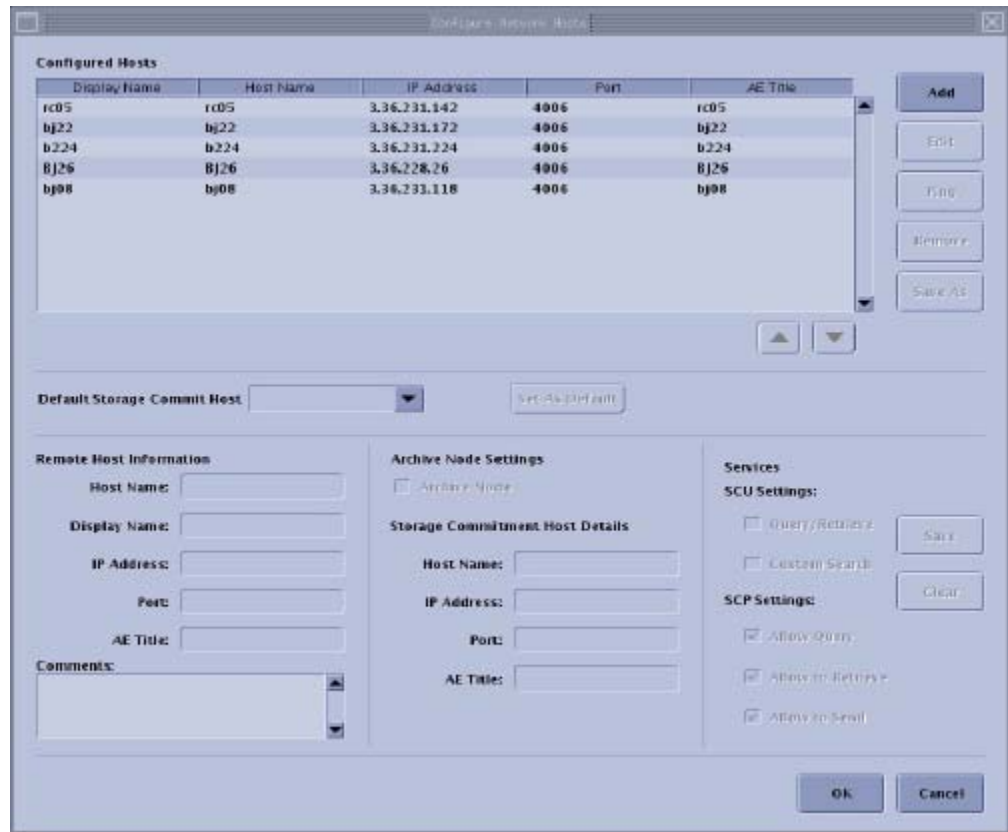
- Note: If the site installed 6 options (refer to [Section 1.1.5](#)). Error message will be pop-up during this time, please click [ok] to continue. Option Name is different between CTT system and SUSE system.
- 8.) When completed, select [Cancel].
- Note: If Does Check option is installed, Dose Audit tool starts up when Reconfig Info or Protocol is selected. That shows configuration and Protocol summary. Press [Quit] to continue.
- 9.) Select [Yes] when the Scan Hardware Reset pop-up appears.
 - 10.) When completed, select [Dismiss].
 - 11.) Remove System State media and place in a safe location.
 - 12.) Verify Restore System State.

5.3 Configure System Information on SUSE System

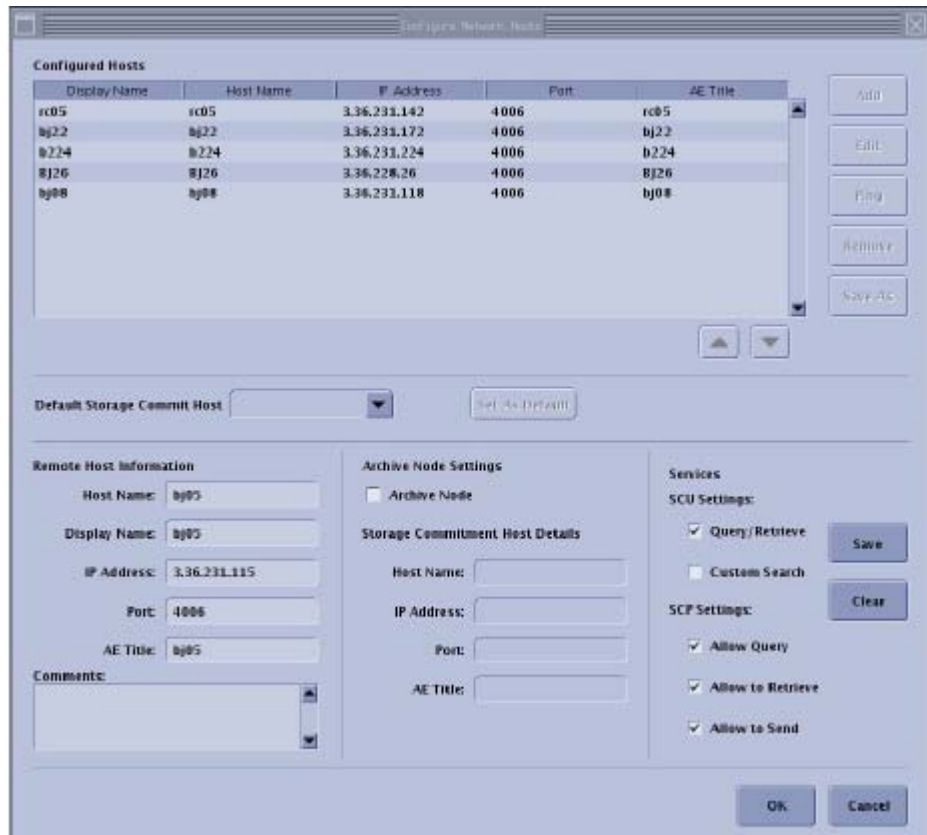
- 1.) Configure PPS server information. Please refer to [Section 1.1.1](#).
- 2.) Configure all remote network information.
 - a.) Select [ImageWorks] from the desktop.
 - b.) Select in sequence: Tools -> Network Configuration.



c.) Select [Add].



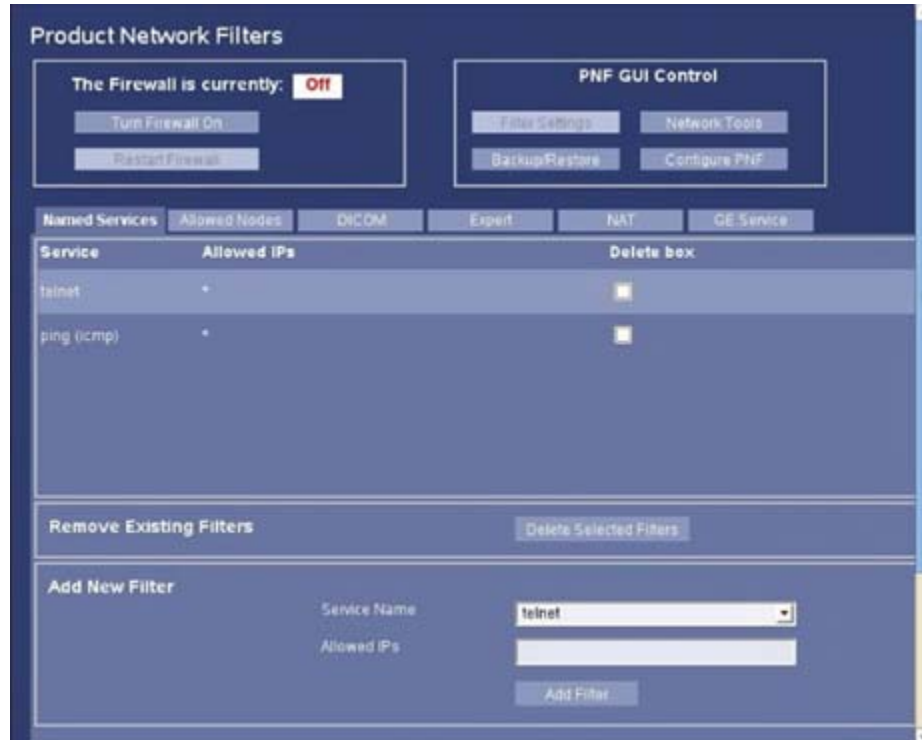
d.) Input the Host Name then press [Enter].



3.) Configure PNF information.

a.) Select [Service] from the desktop.

b.) Select in sequence: Configuration -> Configure PNF.



4.) Configure AW IP for direct information, please refer to [Section 1.1.4](#).

Section 6.0 Convert Protocol

It's necessary for protocol conversion because the protocol of CTT system is not available in SUSE system.

- 1.) Open a Unix Shell, type:
{ctuser@hostname} **su -**
Passwrod: **#bigguy**
- 2.) [root@hostname] # **/usr/g/scripts/conv_proto** <Enter>
- 3.) Input **y** then press [Enter] to convert protocols.
Do you want to convert protocols? [Y/N]
- 4.) Below information should show if the convert protocols successfully:
Success, process finished.

Note: After finishing the user protocol convert, make sure every protocol can be opened by protocol management and save the current system state to another new media.

Section 7.0 Flash Download

Note: The Flash Download takes anywhere from 5-30 minutes, depending on which subsystems require updates.

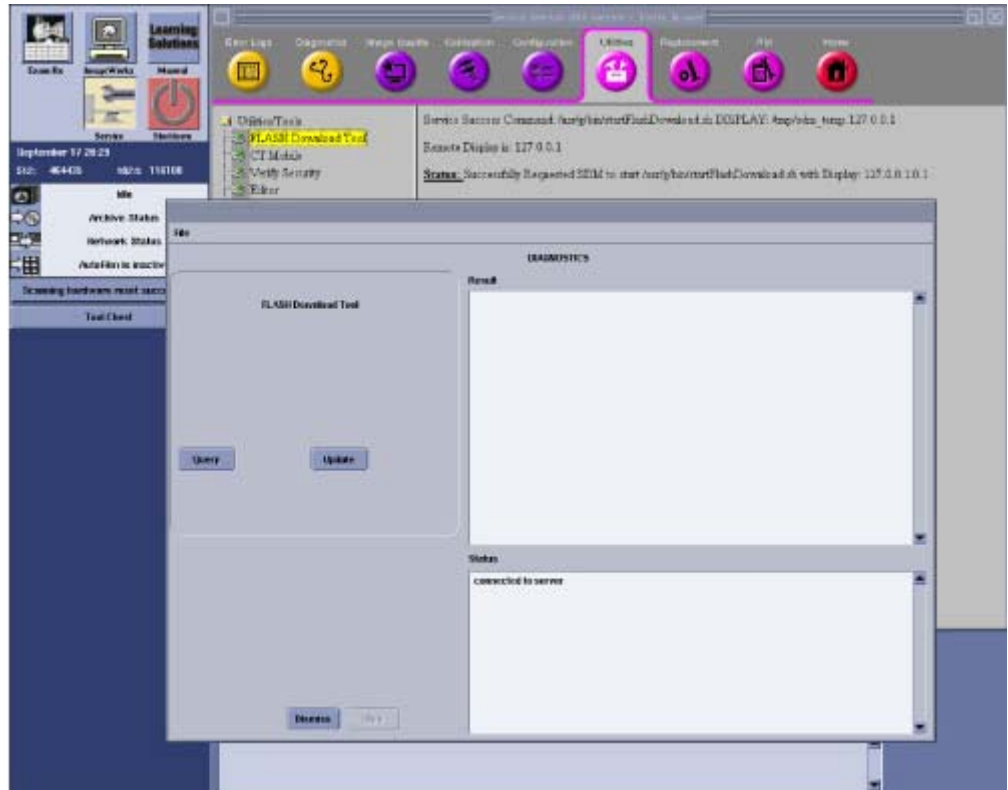
- 1.) Perform the Flash Download Utility found on the Common Service Desktop - Utilities Tab, select [Flash Download].

Figure 32 Common Service Desktop - Utilities Tab, Flash Download



- 2.) When the Flash Download Window opens, Select [Update].

Figure 33 Flash Download Window5



- 3.) Once the Gantry Hardware Flash Downloads successfully, select [Dismiss].
- 4.) Close the Common Service Desktop.

Section 8.0 ASiR Option Installation

Note: If customer does not purchase ASiR option, please ignore this section.

8.1 Check GPU Card

Please refer to ASiR Upgrade Installation Manual to check GPU card.

- NIO16 Console with Z820: 5769390-1EN
- OpenOC16 with Z840: 5344359-1EN

8.2 Option Installation

- 1.) Un-install Neuro 3D Filter option if needed. (This option conflicts with ASIR Application.)
- 2.) Install the Recon Enhancement Option software (5344374-2) using Option Install menu.
 - NIO16 Console with Z820: shipped with B77092CB
- 3.) OpenOC16 with Z840: shipped with B79842CB
- 4.) Install ASIR option software (5350779-3) using Option Install menu.
 - NIO16 Console with Z820: shipped with B77092CB
 - OpenOC16 with Z840: shipped with B79842CB
- 5.) Confirm that system started up normally.

Section 9.0 Tube Replacement

9.1 Requirements

Personnel

- 1 person

Tools and Test Equipment

- Tube hoist and boom
- HV bleeder kit


Consumables


- Transformer oil
- Dry Wipes or Paper Towel

Replacement Parts

- Performix Plus Tube (PN D3889T/D3890T)
D3889T is Performix Plus Tube Unit-Green
D3890T is Performix Plus Tube Unit-Eco-Tube
- Smart ID cable (5339643-2)
- New anode HV cable (5429083-2)

9.2 Safety

 **WARNING** **POTENTIAL FOR ELECTRIC SHOCK.**
LETHAL VOLTAGES MAY BE PRESENT IN THE GANTRY.
FOLLOW PROPER ELECTRICAL LOCK-OUT/TAG-OUT PROCEDURES.

 **WARNING** **POTENTIAL FOR PERSONAL INJURY (PINCH, CRUSH, ENTANGLEMENT OR IMPACT INJURIES ARE POSSIBLE).**
GANTRY HAS ROTATING ASSEMBLY.
USE THE GANTRY'S ROTATIONAL LOCK, TO PREVENT UNCOMMANDED MOTION OF THE GANTRY'S ROTATING ASSEMBLY.



NOTICE Potential HV Cable Damage.
Do not sharply bend HV cables, or damage the cables. The minimum allowed radius of bent HV cables is 6.35 cm (2.5 in.).



NOTICE Follow ALL required safety and PPE procedures customary for your organization, when working on this product.

9.3 Overview

Figure 2-34 Tube Removal Diagram

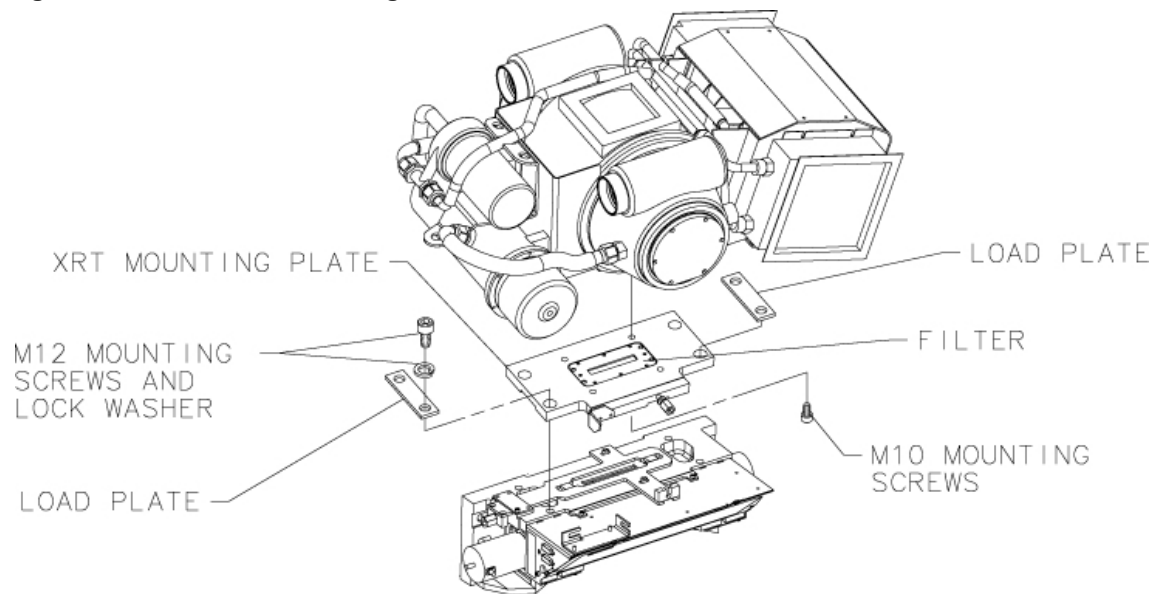
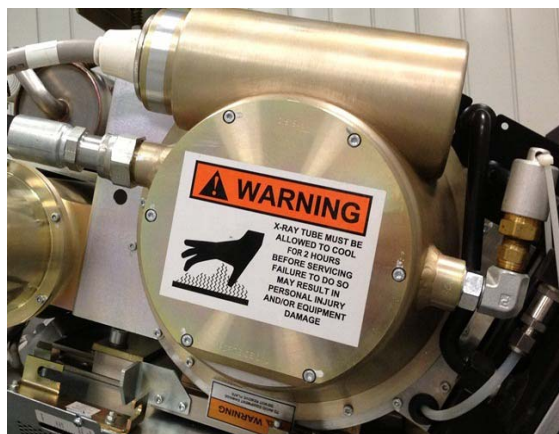


Figure 2-35 Performix Ultra Tube and Plus Tube Appearance Difference

Performix Ultra Tube



Performix Plus Tube



9.4 Procedure

9.4.1 Data Entry

Note: The following procedure is required prior to the actual tube replacement. If you perform the data entry after tube replacement, the system will set the tube heat data to the maximum, and you will have to wait for a pretty long time until the tube heat data lowers.

NOTICE Please insert Secure Service Access Generation 2 (SSA2) Class M key for Tube replacement.

- 1.) Open [SERVICE DESKTOP].
- 2.) Enter the data of the new tube:
 - a.) Select [REPLACEMENT].
 - b.) Select [NEW TUBE CONFIG], select a proper Tube Unit Failure Code (reason for tube replacement), Insert Serial #, and Housing Serial # of a new tube, then click on OK.

Figure 2-36 Change Tube Information Screen

The screenshot shows a software dialog box titled "Change Tube Information". It features a "Current Tube Information" section with a dropdown menu for "Tube Unit Failure Code" currently set to "PT: Pulled Tube (No Failure)". Below this is a "New Tube Type" section with a dropdown menu open, listing options: "OR: OtherRotor Related", "PF: Overheat/Pump Failure", "PT: Pulled Tube (No Failure)", and "RF: Frozen Rotor". The "Tube Type is:" field is populated with "Gemini". There are also input fields for "Insert Serial Number" and "Housing Serial Number". At the bottom of the dialog are "OK" and "Cancel" buttons.

c.) Shutdown OC.

9.4.2 Performix™ Ultra Tube Removal

DANGER ELECTROCUTION HAZARD
HIGH VOLTAGES PRESENT.
USE PROPER LOCKOUT/TAGOUT PROCEDURES BEFORE REPLACING
COMPONENTS. SEE SAFETY MENU OF SERVICE DOCUMENT GUI FOR
APPROPRIATE PROCEDURES.

DANGER CRUSH HAZARD.
UNEXPECTED GANTRY ROTATION CAN CAUSE SERIOUS INJURY.
USE THE GANTRY ROTATION LOCK TO LOCK OUT GANTRY ROTATION.
SEE SAFETY MENU OF SERVICE DOCUMENT GUI FOR APPROPRIATE
PROCEDURES.

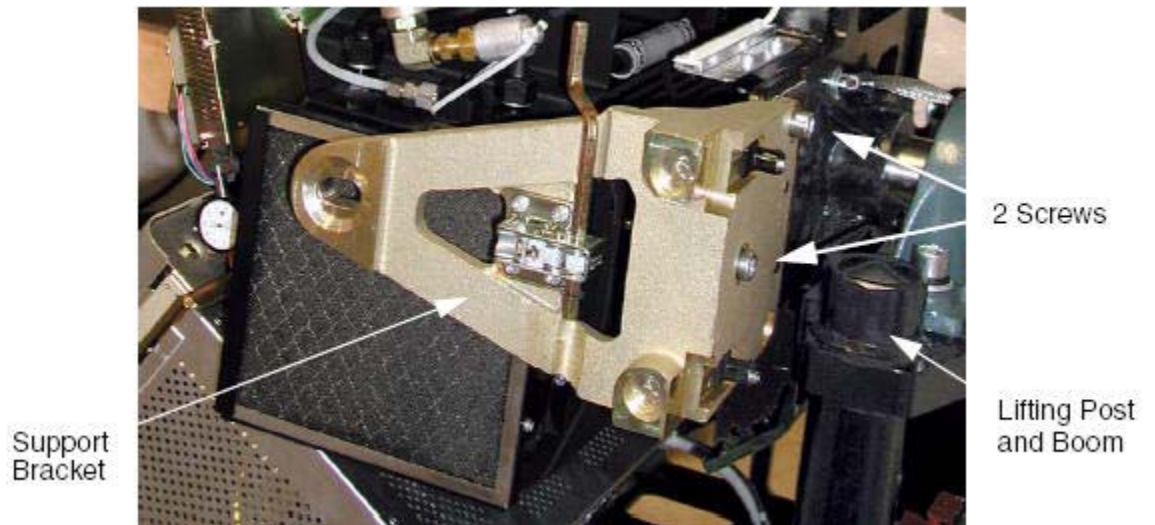
- 1.) Remove and set aside gantry side, top and front covers.
- 2.) Slide out the gantry rear cover, and rotate the top fan assembly outward.

Figure 2-37 Top Fan Assembly



- 3.) Remove the M12 screws holding support bracket for the right front gantry cover and set the assembly aside. It may be necessary to tilt the gantry back to remove the third bolt (not normally installed).

Figure 2-38 Right Front Gantry Cover Support Bracket



NOTICE If the gantry must be tilted, remember to tilt the gantry back to zero degrees.

- 4.) Ensure that Lockout/Tagout procedure has been applied, and that gantry power is removed. Ensure Axial Drive, HVDC, 120VAC are in OFF position.
- 5.) Unlock the Gantry rotation lock, and rotate the Gantry by hand until the tube reaches the 3 o'clock position.

Note: It may be easier to loosen the M12 tube mounting bolts with the tube at about the 2 o'clock position before locking the tube at the 3 o'clock position. Simply loosen the tube mounting bolts one half (1/2) turn. Do not remove the bolts yet.

Figure 2-39 Tube Angle to Loosen and Torque M12 Screws



↑ **WARNING**

CRUSH POINT.

IF THE GANTRY IS NOT SECURELY LOCKED, UPON REMOVAL OF THE X-RAY TUBE, THE GANTRY WILL VIOLENTLY ROTATE DUE TO WEIGHT IMBALANCE. ENSURE THE GANTRY IS SECURELY LOCKED BY ATTEMPTING TO ROTATE THE GANTRY BY HAND.

↑ **NOTICE**

Make sure the tube is at 90 degrees so the tube hangs at the correct engagement angle for removal and installation.

- 6.) Engage gantry rotational lock, and check that the gantry is securely locked by attempting to rotate the gantry by hand.

↑ **WARNING**

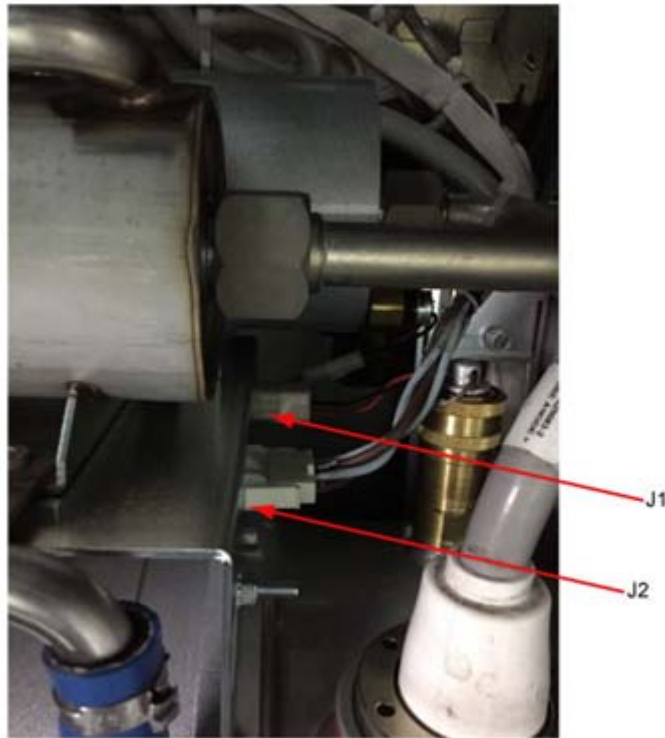
SEVERE INJURY POSSIBLE.

IF THE HOIST HOOK'S LOCK NUT IS LOOSE, THEN THE X-RAY TUBE MIGHT DROP FROM THE HOIST, WITH THE RESULTING IN SERIOUS INJURY TO SERVICE PERSONNEL.

BEFORE USING THE HOIST, CHECK TO MAKE CERTAIN THAT THE HOOK'S LOCK NUT IS NOT LOOSE. IF IT IS LOOSE, DO NOT USE THE HOIST. INSTEAD, ORDER A NEW HOIST.

- 7.) Disconnect the 12 pin tube I.D. system cable and the 4 pin mate-n-lock pump and fan power system cable, from the top of the tube unit J1 and J2.

Figure 2-40 Tube J1 and J2 Location



- 8.) Disconnect the ground strap from the top of the tube unit.
- 9.) Remove the anode and the cathode cables from the tube:
 - a.) Carefully cut tie-wraps securing HV cables. Note HV cable routing.
 - b.) Loosen each cable's locking ring with the spanner wrench.
 - c.) Pull each cable terminal out of its receptacle on the tube unit.
 - d.) Remove the old anode cable and keep its terminals in JIGs.
 - e.) Ground the end of the cables to the Gantry frame.
 - f.) Wipe up any oil that drips from the cable terminal.
 - g.) Use paper towels to soak up any oil in the wells.



CAUTION

Crush Hazard.

Remove the mounting bars in the following (lower/upper) order to lessen the risk of injury to your hand. Keep one hand under the bolt and pressure plate while unfastening it. This is to prevent them from falling into the fan that is attached to the tube.

Note: It may be easier to tape the socket to the extension. This will prevent the socket from being dislodged on the tube radiator assembly.

- 10.) Insert the lifting post, boom and chain hoist.
- 11.) The XRT is attached to the Collimator with a Tube Mount Bracket Assembly. Remove the mounting plate & XRT from the Collimator by removing the four M12 cap screws and lock washers, and two load plates, with a hex socket driver. With your hand, reach behind the radiator to the screws from either side of the XRT center section while removing the bolts with two 12-inch extensions (24 inch length) on a ratchet. Throw these M12 bolts and washers away, as they should not be reused.

12.) Carefully swing the tube clear of the gantry.

Note: Be careful not to damage the fragile copper filter or lead shield in the mounting plate for the next step.

↑ **WARNING**

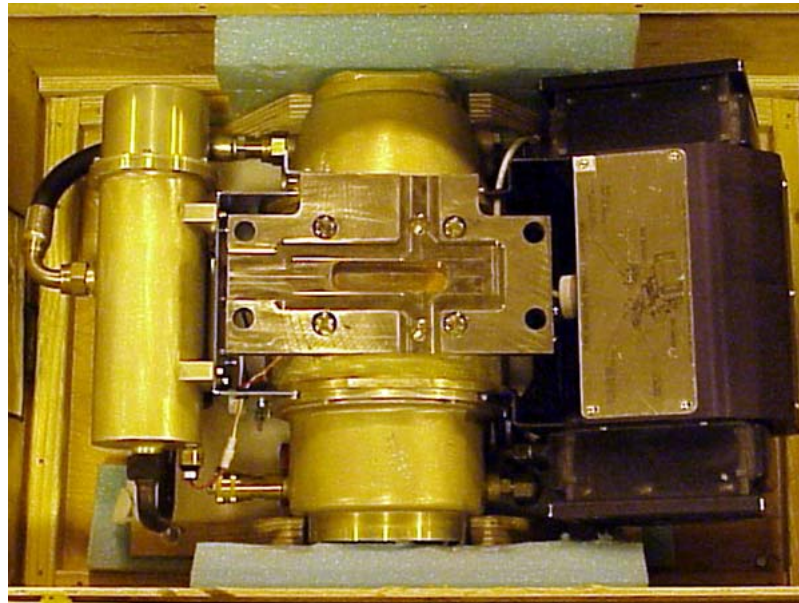
SEVERE INJURY POSSIBLE.

TUBE CAN SEPARATE FROM GANTRY.

DO NOT REMOVE FACTORY INSTALLED MOUNTING PLATE.

13.) If the replacement tube has a mounting plate attached (see [Figure 2-41](#)), DO NOT REMOVE IT. Skip step [14.](#)) and step [15.](#))

Figure 2-41 Tube Shipped with Mounting Plate Attached



↑ **NOTICE**

Potential for IQ Artifacts.

When removing the mounting plate from the tube, be careful with the Copper Filter. It should be free of debris, scratches and dust. Particles create artifacts in the image by affecting the attenuation properties of the copper filter.

14.) If the replacement tube does NOT have a mounting plate attached, remove the mounting plate by removing the four M10 (P/N 46-328416P20) hex head screws. Throw these bolts and washers away, as they should not be reused.

15.) If new tube has no mounting plate attached, inspect the copper filter. The copper filter should be clean, dent and scratch free.

- If contamination is visible (see [Figure 2-42](#)), clean the collimator.
- Discoloration is acceptable.

Figure 2-42 Extremely Contaminated Copper Filter



Note: Perform the following inspection before installing the new tube unit. Also look at the tube side of the copper filter when you are swapping the interposer plate.

The following tools are required for this inspection procedure:

- * Phillips #2 Screwdriver
- * Flat blade Screwdriver
- * Bright Flashlight

16.) Inspect the Bowtie Filter. It is possible that the Bowtie Filter is contaminated and the Primary Copper Filter is not contaminated.

a.) Remove the Collimator Control Board Sheet Metal Cover. See [Figure 2-43](#).

Figure 2-43 Collimator Control Board Cover



WARNING

**POTENTIAL FOR SHOCK.
VOLTAGE IS PRESENT.
DO NOT ATTEMPT TO MOVE THE FILTER WITH POWER ON.**



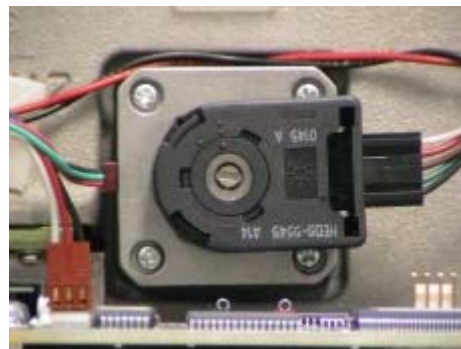
NOTICE

Do not force the filter if it feels stuck. Damage to the limit switch can result.

Do not move the filter more than necessary for inspection. The filter can fall off the drive screw.

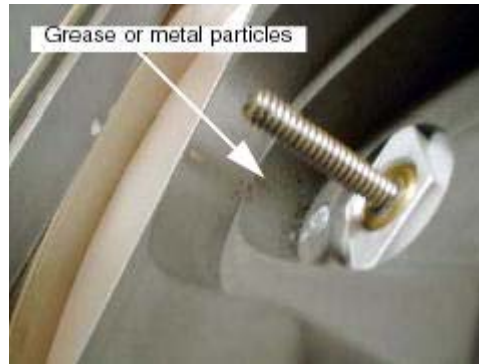
- b.) With power removed from the gantry, use a flat blade screwdriver and position the bowtie filter assembly so it is visible through the input port or tube side of the collimator assembly.
- CCW will move the filter into the beam. See [Figure 2-44](#).
 - Do not move the filter back to the home position

Figure 2-44 Filter Position Adjuster



- c.) Using a flashlight, inspect the bowtie filter for contamination. Reference [Figure 2-45](#). Look through the input port or tube side of the collimator. If contamination is visible, clean the collimator.

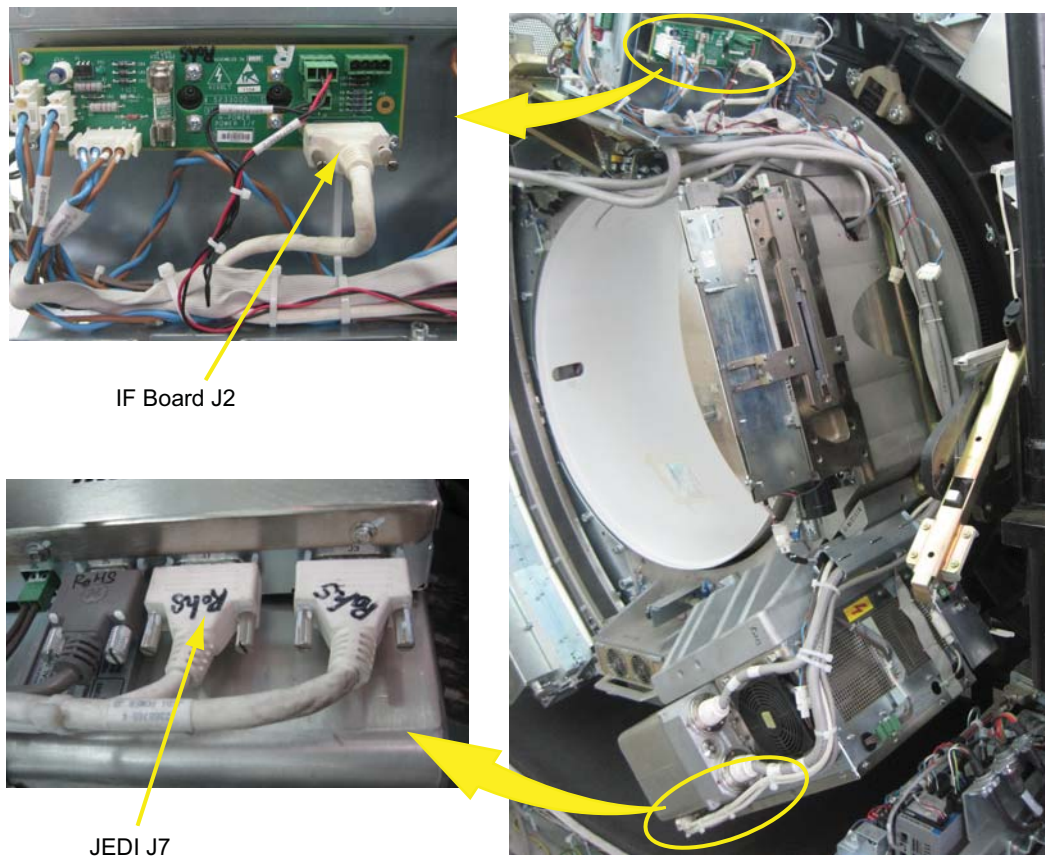
Figure 2-45 Contaminated Bowtie Filter



17.) Remove the plastic cover from the power I/F board.

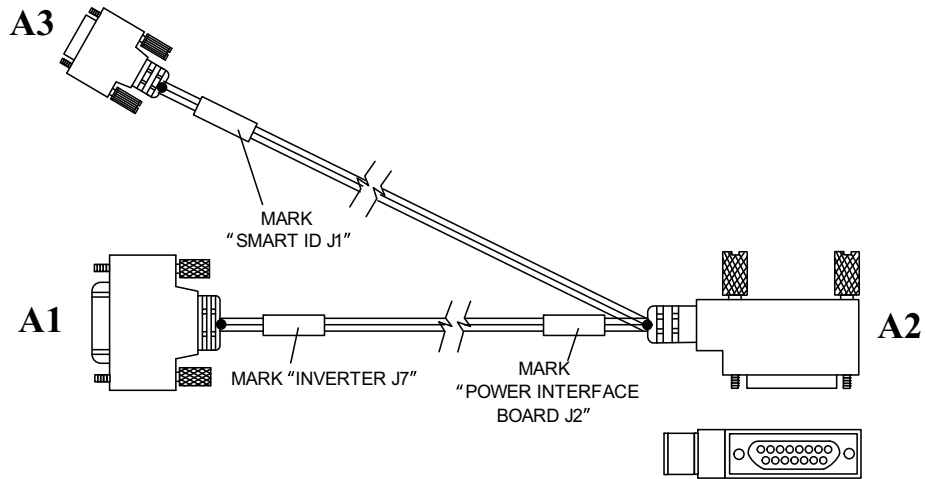
18.) Disconnect the old Smart ID cable (2368768-2) between the JEDI J7 and IF Board J2, and remove it from Gantry.

Figure 2-46 Smart ID Cable Disconnection



- 19.) Get the new Smart ID cable (5339643-2) from the Upgrade Kit, route and fix it, keep sufficient length for cable connection.
- A1 to JEDI J7
 - A2 to Power IF board J2
 - A3 to Tube Smart ID J1

Figure 2-47 Smart ID Cable 5339643-2



9.5 Performix™ Plus Tube Installation

↑ DANGER CRUSH HAZARD.
UNEXPECTED GANTRY ROTATION CAN CAUSE SERIOUS INJURY.
NEVER SERVICE THE GANTRY WITH THE AXIAL DRIVE ENABLED. USE THE GANTRY ROTATION LOCK TO LOCK OUT GANTRY ROTATION. SEE SAFETY MENU OF SERVICE DOCUMENT GUI FOR APPROPRIATE PROCEDURES.

↑ DANGER ELECTROCUTION HAZARD.
HIGH VOLTAGES PRESENT.
USE PROPER LOCKOUT/TAGOUT PROCEDURES BEFORE REPLACING COMPONENTS. SEE SAFETY MENU OF SERVICE DOCUMENT GUI FOR APPROPRIATE PROCEDURES.

↑ WARNING SEVERE INJURY TO PATIENT COULD OCCUR.
USING THE WRONG BOLTS COULD PLACE STRESS ON BOLTS, CAUSING TUBE TO SEPARATE FROM GANTRY.
USE PROPER BOLTS.

- 1.) Allow the tube unit to warm to room temperature before you install it.

↑ WARNING SEVERE INJURY POSSIBLE.
TUBE CAN SEPARATE FROM GANTRY.

DO NOT REMOVE FACTORY INSTALLED MOUNTING PLATE.

- 2.) If the new tube has a factory installed mounting plate, DO NOT REMOVE IT. Skip to step 4.)
- 3.) Attach the mounting plate from the old tube using new M10 x 25mm bolts provided with the tube. Do NOT use Loctite.
 - Finger tighten all four (4) bolts
 - Torque all four (4) bolts to the following specification:

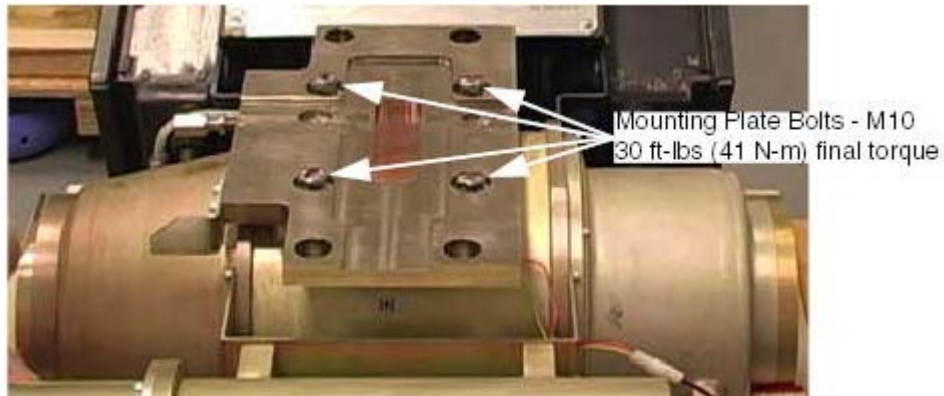
15 ft-lbs	20 N-m	180 in-lbs	210 kg-cm
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This seats each bolt, enabling you to visually ensure that the mounting holes are not stripped while applying final torque.

Apply final torque on all four bolts:

30 ft-lbs	41 N-m	360 in-lbs	420 kg-cm
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Figure 2-48 Tube and Mounting Plate



NOTICE Potential for IQ artifacts.

When attaching the mounting plate on the tube, be careful with the Copper Filter. It should be free of debris, scratches and dust. Particles create artifacts in the image. Use a lint free wipe to clean, if needed.

- 4.) Re-check facility power and make sure it is off.
- 5.) Use the hoist to lift the new tube unit:
 - a.) Position the tube on the gantry: The “crosses” on the mounting plate and on the collimator should fit in perfectly when the tube is aligned properly.

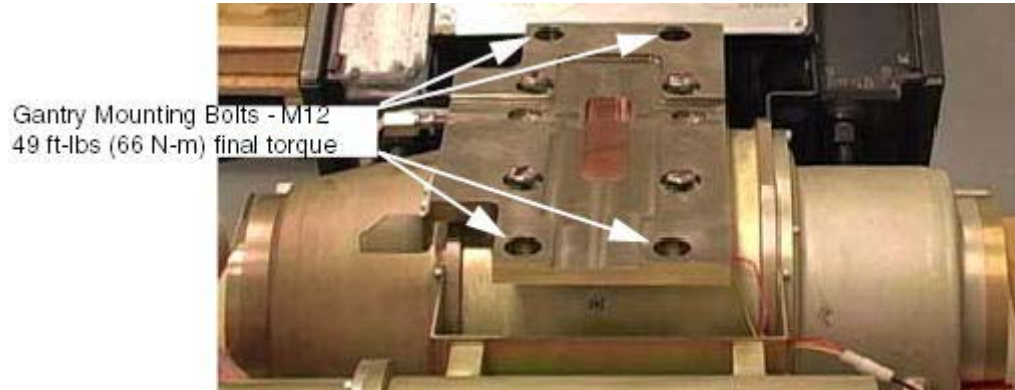
- Note:
- To ease installation, fasten the top pressure plate to the rotating structure first. Then attach the bottom pressure plate.
 - Use new bolts and washers from tube crate. Make sure to select the proper bolts. There are instructions in the crate, and on the tube itself.
 - b.) Fasten the lower and upper and pressure plates to the rotating structure with the four M12 (50 mm) bolts, and set pre-load torque to:

25 ft-lbs	33 N-m	295 in-lbs	340 kg-cm
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c.) Set final torque to:

49 ft-lbs	66 N-m	590 in-lbs	680 kg-cm
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Figure 2-49 Tube and Mounting Plate

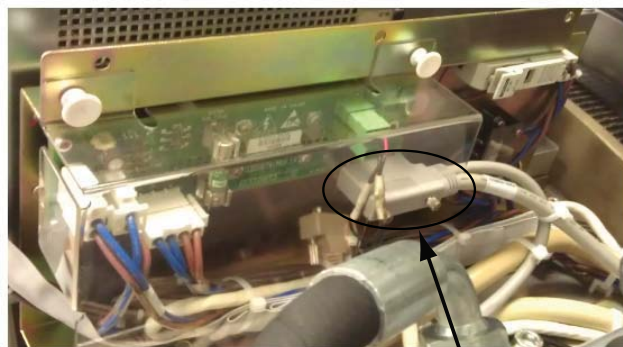


- 6.) Attach the new Smart ID cable connectors:
- J1 Connector (<-> Tube Smart ID, see [Figure 2-50](#))
 - J2 Connector (<-> I/F Board, see [Figure 2-50](#))
 - J7 Connector (<-> JEDI, see [Figure 2-50](#))

Figure 2-50 Smart ID Cable Connection



To Tube J1



To I/F Board J2



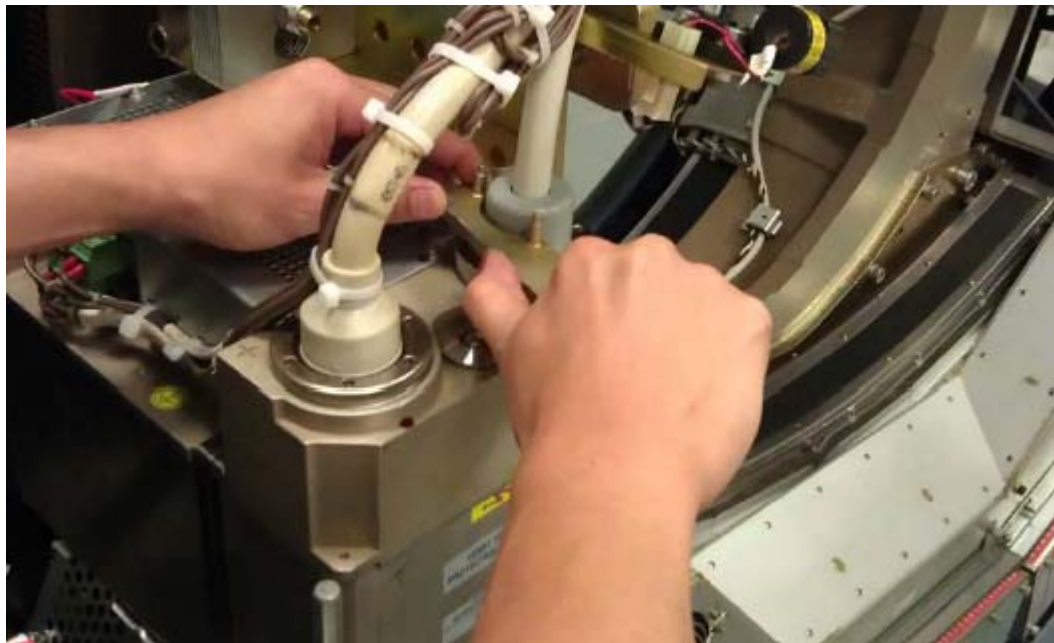
To JEDI J7

- 7.) Install the plastic cover to the power I/F board.
- 8.) Install the cable support bracket (5501319, shipped with Tube assembly) to cover the smart ID cable connector of Tube.
- 9.) Fasten the grounding strap to the 1/4-20 ground stud on top of the tube unit.
- 10.) Remove the plastic cap plug from both cable receptacles on the tube unit.

Note: Take care not to lose the rubber quad rings for the High Voltage cables.

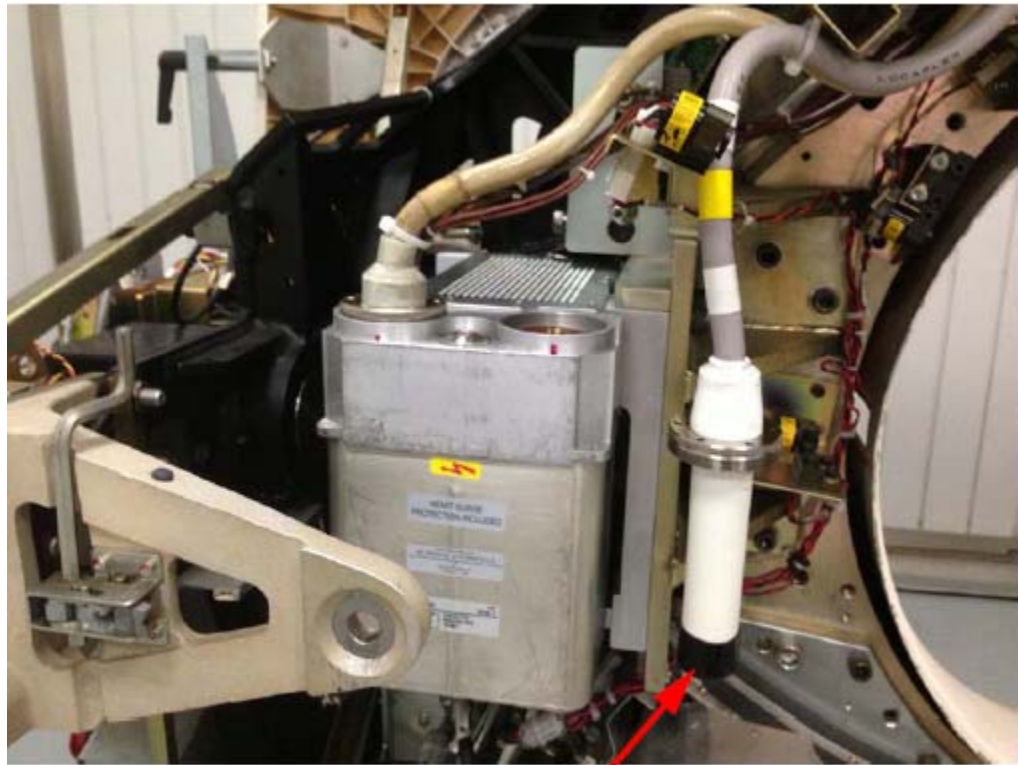
- 11.) Lightly wet the new rubber quad ring with transformer oil.
- 12.) Return the quad ring to its slot at the top of the receptacle retaining ring.
- 13.) Pour transformer oil (917) into the receptacles to a depth of 10 mm (0.375 in).
- 14.) Remove the old anode HV cable (5128609-7) from HEMIT tank ST+ terminal.
 - a.) Loosen the anode cable's locking ring with the spanner wrench.

Figure 2-51 Loosen the Anode Cable Locking Ring



- b.) Pull the anode cable terminal out of its receptacle and keep it in the protective CAP (see [Figure 2-52](#)). This CAP comes from new anode cable in upgrade kit.

Figure 2-52 Loosen the Anode Cable Locking Ring



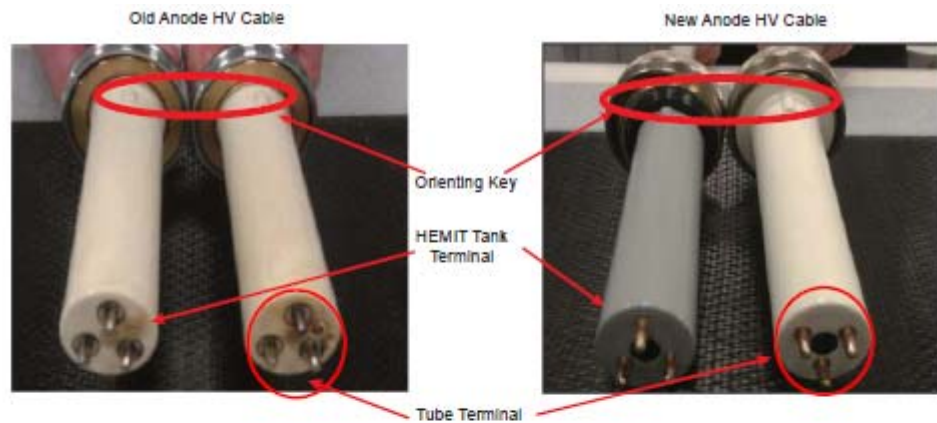
Remove and Keep the Cable Terminal

- c.) Wipe up any oil that drips from the cable terminal.
- d.) Replenish the well with transformer oil to a depth of 10mm (0.375in).

15.) Install/route the new anode HV cable (P/N 5429083-2).

Note: The old and new anode cable have terminals with different orientations to prevent incorrect tube installation.

Figure 2-53 Old and New Anode HV Cable Compare



New Anode HV Cable Terminals




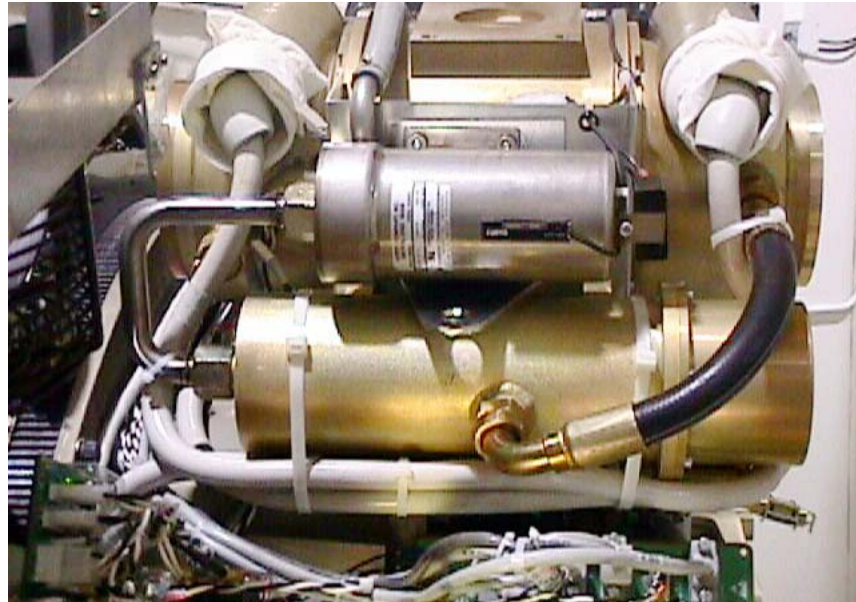
 **NOTICE** Incorrectly routed or secured HV cables will result in damage to the HV cables and/or other parts of the gantry.
16.) Be sure to route the HV cable as shown in [Figure 2-54](#).

Figure 2-54 HV Cables Properly Routed and Secured



17.) Align the cable terminal orienting key with the notch in the receptacle.



NOTICE

Do not over tighten the locking ring. Over tightening can deform the cable plug sealing surfaces, break the oil seal between receptacle and housing, twist the receptacle, and disrupt internal wiring.

18.) Slowly insert the cathode and anode cables to engage the connector pins, and seat the cable in the well.

- Tighten the cable locking ring.

Note:

Use service wrench to turn the threaded ring $\frac{1}{4}$ to $\frac{1}{2}$ of a full turn after the gap is closed and friction is felt by hand.

- Rotate the cable strain relief for a clean cable dress.



NOTICE

IF YOU GET OIL ON YOUR HANDS, WASH THEM NOW.

19.) Carefully wipe up all excess oil.

20.) Secure the HV Cables using large tie-wraps as shown in [Figure 2-54](#).

21.) Disconnect hoist from tube and boom.

22.) Remove the post and boom from the gantry.

23.) Check for oil leaks:

- Wrap rags or paper towels around the cable horns, and tape them into place.
- Manually rotate the tube to the 6 o'clock position.
- Return the tube to the 3 o'clock position
- Remove the toweling and wipe up all excess oil.
- Wipe off the cable horns, locking rings and strain reliefs with an alcohol-dampened rag.
- Repeat with a dry rag.
- Wrap the cable strain reliefs and locking rings with a single layer of absorbent paper tissue. You can use two inch wide strips cut from a paper napkin.

- Wrap the bottom edge of the paper around the top end of the cable horn, and tape it in place.
 - Extend the top edge of the paper over the top of the locking ring, and tape it to the plastic cable strain relief.
 - Remove paper after leak check.
- 24.) If oils leaks are found, tighten the locking ring slowly until there is no leakage, paying attention to not over tighten.

9.6 Tube Replacement Finalization

- 1.) Checklist
 - New mounting bolts and washers are used for mounting the tube; old mounting bolts and washers are discarded.
 - Proper torque specifications are followed for all fasteners, refer to Torque Wrench Information in 5350500-2EN rev20 or later service manual.
 - Tie-wraps and cables are in place.
- 2.) Restore system power at the main disconnect panel.
- 3.) Turn on gantry 120 VAC, HVDC ENABLE and AXIAL DRIVE ENABLE on the service switch panel. Wait at least 10 minutes to warm up the filament.
- 4.) Perform Tube Install Certification, refer to LFC Procedure in 5350500-2EN rev20 or later service manual.
- 5.) Open a shell and type "tube_name" to check smart ID cable connection. Command must be available with application startup. if result output is PERENNA, means smart ID cable connected to tube is OK. Otherwise, need to check/re-connect the smart ID cable.
- 6.) Perform tube alignment and calibration:

Note: For detailed procedures, refer to latest service manual for existing system with Performix™ Plus and JEDI 60DC generator.

- If you have a system with the detector and collimator previously aligned before this tube change and there are no image quality issues, use the "Quick Tube Change" procedure below in the order described.
 - a.) Gantry Rotation Safety Check
 - b.) Reset TnT Data in JEDI Generator Tool
 - c.) Filament Calibration
 - d.) Plane of Rotation (POR) Alignment
 - e.) CBF/SAG Alignment Process
 - f.) ISO Alignment Procedure
 - g.) Meter Verification
 - h.) HV Tank Feedback Resistor Verification (bleeder test)
 - i.) HHS Scans (Adv)
Tube Usage Information is found on the Common Service Desktop following path:
Error Logs>Tube Usage>Details.
 - j.) Gantry Balance Procedure, refer to Gantry Balance Procedure in 5350500-2EN rev20 or later Service Methods CD.
 - k.) Hot ISO Alignment
 - l.) Z-Slope
 - m.) DAS Gain Calibration
 - n.) Collimator Calibration

- o.) Detailed Cals
- p.) N Number Check
- q.) System Scanning Test
- r.) Quality Assurance Test - (Need to do EA3 registration as DCadmin and AVexceeding users, detail information refer to 5350500-2EN rev20 or later Service Methods CD.)
- If you cannot follow the quick tube change procedure for any reason, perform the retest steps below in the order described.
 - a.) Install TubeInstallFlex option through eLicense, as needed.
 - b.) Gantry Rotation Safety Check
 - c.) Reset TnT Data in JEDI Generator Tool
 - d.) Filament Calibration
 - e.) Plane of Rotation (POR) Alignment
 - f.) CBF/SAG Alignment Process
 - g.) ISO Alignment Procedure
 - h.) Meter Verification
 - i.) HV Tank Feedback Resistor Verification (bleeder test)
 - j.) HHS Scans (Adv)
Tube Usage Information is found on the Common Service Desktop following path:
Error Logs>Tube Usage>Details.
 - k.) Gantry Balance procedure, refer to Gantry Balance Procedure in 5350500-2EN rev20 or later service manual.
 - l.) Hot ISO Alignment
 - m.) Z-Slope
 - n.) DAS Gain Calibration
 - o.) Collimator Calibration
 - p.) Detailed Cals
 - q.) N Number Check
 - r.) System Scanning Test
 - s.) Quality Assurance Test - (Need to do EA3 registration as DCadmin and AVexceeding users, detail information refer to 5350500-2EN rev20 or later Service Methods CD.)



NOTICE

Keep the old Anode Cable in safe place at customer side. This cable will be needed/used when this performix Plus (LB) tube is removed and Performix Ultra (BB) tube will be installed in the future.

Section 10.0 IQ Check

Image Quality Check may include the following:

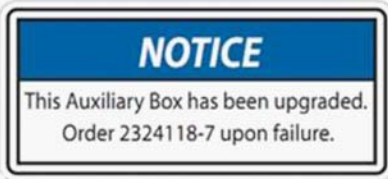

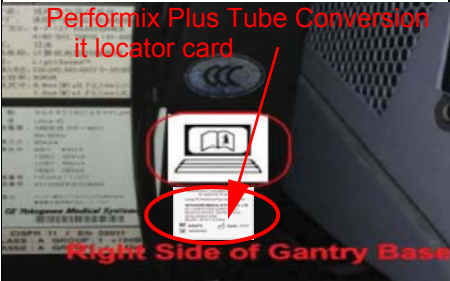
- 1.) Alignment
 - a.) MTF with GE Performance phantom, both axial and helical images, comparing with spec.
 - b.) Aliasing test, both cold and hot.
 - c.) Z-Beam motion.
- 2.) Noise/Artifacts



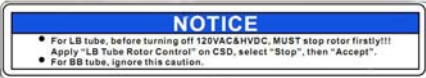
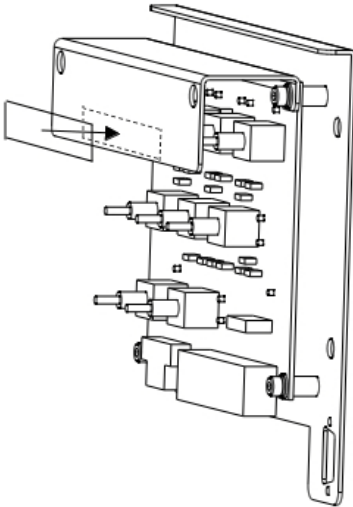
- a.) Noise measurement with 20 cm water phantom, comparing with spec.
- b.) Cone beam artifact.
- 3.) Microphonics - Check image quality (lack of rings, streak and/or center artifacts).
- 4.) Clever DAS Gain - Confirm that the DAS gains used in the patient scans match those in the calcs.
- 5.) CT Number Uniformity - Check both water and poly phantoms' CT number uniformity, comparing with spec.

Section 11.0 Checking and Attaching Labels and Emblems

- 1.) Turn off Axial Drive and HVDC switches on gantry service panel.
- 2.) Check and attach the provided rating plate, labels and Emblems.

Check and attach appropriate language caution labels. **Before attaching label, thoroughly clean the machine surface where to attach the label.** Refer to the table below for proper location and attaching method.

Description	Part Number	Illustration	Location	Qty
Aux Box Upgraded Notice Label	5441253		Attach on Auxiliary Box 	1
CT540 Conversion Kit Locator Card	5693275	<p>THIS PRODUCT HAS BEEN MODIFIED BY ADDITION OF KIT</p> <p>GE HANGWEI MEDICAL SYSTEMS CO. LTD West Area of Building No.3, No.1 Yongchang North Road, Beijing Economic and Technological Development Area, BEIJING 100176 CHINA</p> <p>Optima CT540 Performix Plus Conversion kit</p> <p>REF MODEL: 5693160 SN SERIAL: MANUFACTURED :</p>	Find a proper place to attach the locator card on Gantry Base 	1

Service Switch Panel High Speed Notice Label	5477728	 <p>NOTICE</p> <p>Gantry High Speed rotation is set to 2 s/r in service mode by upgrade FMI for Performix Plus Tube (LB).</p>		1
Service Switch Panel Notice Label	5477727	 <p>Notice</p> <ul style="list-style-type: none"> For LB tube, before turning off 120VAC&HVDC, MUST stop rotor firstly!!! Apply "LB Tube Rotor Control" on CSD, select "Stop", then "Accept". For BB tube, ignore this caution. 		1

- 3.) Re-install Gantry covers.
 - Turn off 120VAC switch on Gantry Service Panel
 - Install Gantry front cover.
 - Install Gantry Left Side cover.
 - Install Gantry top covers.
 - Turn on HVDC, 120V AC, and Axial Drive switches on the Gantry Service Panel. Press E-Reset.
 - Install Gantry Right Side cover.
- 4.) Update GIB with the Product Locator Card information. Go to the following address to access the site: http://gib.gehealthcare.com/gib/gib_entry.jsp

Section 12.0 Finalization

- 1.) Insite Check out, refer to 5350500-2EN rev20 or later Service Methods CD.
- 2.) Save System State
 - a.) Insert the Save System State DVD into the Peripheral Tower DVD-RW drive.
 - b.) Select [SERVICE DESKTOP].
 - c.) If reloading software, select [UTILITIES].
 - d.) Select [SYSTEM STATE].
 - e.) Select [ALL] to select all the calcs, characterization, etc.
 - f.) Select [SAVE].
 - g.) If applicable, select [OK] when the following message appears: System State Media Status: Please insert a DVD into the drive and press Save again
 - h.) When completed select [DISMISS].
 - i.) Close the Service Desktop window in the upper left corner of the screen.
- 3.) Install Gantry side and front covers and keep other components in the kit at customer safe place for further usage in site.

Components to be kept in customer site:

 - Old Anode HV Cable
- 4.) Send the following information to Performix.Plus@ge.com:
 - Liquid Bearing tube serial number
 - LB tube install date, LB tube kAs
 - LB tube exams
 - System ID

www.gehealthcare.com

