GE Healthcare

CT Cardiac Gating Option Installation

SERVICE DOCUMENTATION

2380526-100
Rev 3

IMPORTANT PRECAUTIONS

LANGUAGE

ПРЕДУПРЕЖДЕНИЕ
(BG)

- ТОВА УПЪТВАНЕ ЗА РАБОТА Е НАЛИЧНО САМО НА АНГЛИЙСКИ ЕЗИК.
- АКО ДОСТАВЧИКЪТ НА УСЛУГАТА НА КЛИЕНТА ИЗИСКА ЕЗИК, РАЗЛИЧЕН ОТ АНГЛИЙСКИ, 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.

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 ELEKTRICKÉHOP 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.

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.

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 EQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ETE CONSULTE 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.

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

(EL)

- ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ ΔΙΑΤΙΘΕΤΑΙ ΣΤΑ ΑΓΓΛΙΚΑ 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 ΕΠΙΧΕΙΡΗΣΕΤΕ 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

(HU)

- EZEN KARBANTARTÁSI KÉZIKÖNYV 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.

AÐVÖRUN

(IS)

- ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.
- EF AÐ ÞJÓNUSTUVEITANDI VIÐSKIPTAMANNS ÞARFNAST ANNAS TUNGUMÁLS EN ENSKU, ER ÞAÐ SKYLDA VIÐSKIPTAMANNS AÐ SKAFFA TUNGUMÁLAÞJÓNUSTU.
- 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.

AVVERTENZA

(IT)

- IL PRESENTE MANUALE DI MANUTENZIONE E DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE E 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。**

경고

(KO)

- 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.

BRĪDINĀJUMS

(LV)

- 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)

- 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)

- 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 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)

- 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 ASSISTÉNCIA TÉCNICA
- O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

ATENȚIE

(RO)

- 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 ŞI 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.

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 SOLO EXISTE EN INGLES.
- SI ALGUN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLES, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCION
- NO SE DEBERA DAR SERVICIO TECNICO 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)

- 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.

DİKKAT

(TR)

- BU SERVİS KILAVUZUNUN SADECE İNGİLİZCESİ MEVCUTTUR.
- EĞER MÜŞTERİ TEKNİSYENİ BU KILAVUZU İNGİLİZCE DIŞINDA BİR BAŞKA LİSANDAN TALEP EDERSE, BUNU TERCÜME ETTİRMEK MÜŞTERİYE DÜŞER.
- SERVİS KILAVUZUNU OKUYUP ANLAMADAN EKİPMANLARA MÜDAHALE ETMEYİNİZ.
- BU UYARIYA UYULMAMASI, ELEKTRİK, MEKANİK VEYA DİĞER TEHLİKELERDEN DOLAYI TEKNİSYEN, OPERATÖR VEYA HASTANIN YARALANMASINA YOL AÇABİLİR.

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 General Electric 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:

- Call 1-800-548-3366 and use option 8.
- Fill out a report on http://egems.med.ge.com/edq/home.jsp
- Contact your local service coordinator for more information on this process.

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, Healthcare 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, Healthcare 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.

IMPORTANT...RADIOACTIVE MATERIAL HANDLING

Only employees formally trained in radioactive materials handling and this equipment are authorized by the GE Healthcare Radiation Safety Officer to use radioactive materials to service this equipment.
GE Healthcare Services is required to notify the applicable U.S. state agency PRIOR to any source service event involving pin source handling. See NUC/PET Radioactive material guides for specific instruction or contact your EHS Specialist.

A radiation survey must be performed when a pin source has been removed and replaced. See Radiation Survey Form Instructions or contact your EHS Specialist.
Rev 2 (July 21, 2005)

OMISSIONS & ERRORS

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

REVISION HISTORY

Date	Rev	Change Description
6/16/ 2003	0	Initial Draft
4/8/2005	1	Updated to add TGPU/MSUB references and illustrations
3/ 11/ 2006	2	Updated to include VCT references and illustrations
4/9/2008	3	Clarified the installation of the RJ45 connector

TABLE OF CONTENTS

1 - CARDIAC GATING THEORY

1.1 MODE 1 (SCOUT)

This mode functions as a normal Scout with the exception that there is a selection button in the Scout View/Editor that allows the selection of "Gating". When this button is selected (manually or via protocol), the button becomes backlit with blue and the gating hardware and firmware is enabled. With proper connections and an EKG/ECG signal provided to the system, the heart rate will be displayed in the button.

If the hardware has a fault or is not connected properly, the button will become red and the Confirm button will not be active. In addition, a message window will appear indicating a problem has been detected.

An additional error condition can happen if the heart rate input stops for a duration of greater than 5 beats. This condition will result in an error message window appearing. The heart rate must be re-established and the error acknowledged. The delay in this error message is intended to minimize false errors due to irregular heart rates.

1-1 MODE 2 (CINE)

The image reconstruction of a heart requires data from a minimum of 240 degrees in a single plane of rotation. For the data to produce optimum images, the heart must be scanned during a time of no or little motion. The Gating device allows us to know when the heart will be in a state of rest. With this information we can program the scanner to take images during that rest cycle. If the heart rate is too high, motion artifact will appear in the images.

The parameters that we are dealing with are:
TRIGGER DELAY - Time from receiving gating pulse until X-ray is turned on. This value is set in the Scan RX and can be from 30% to 60% of the cardiac cycle. The default setting is 47%.
INTERVAL - Time from image to image. This value is set in the Scan RX and can be set to 50 or 100 milliseconds.
NUMBER OF IMAGES - The total number of images selected for a single cardiac cycle. This value is set in the Scan RX and can be set to 1, 3, or 5
DURATION - Time the X-ray on. This value is a calculated value based on the Scan RX values listed above. The equation for Duration is:
Duration = (Number of Images - 1) (Interval) + 530 milliseconds

2 - LIGHTSPEED PROSPECTIVE GATING OPTION INSTALLATION

2.0 Overview

The CT Cardiac (Prospective) Gating Option hardware is shipped ready for immediate installation. The following installation procedure describes the preferred installation, which installs the hardware on the RIGHT side of the gantry. However, the Gantry Options Board (GO Board) can be installed on the left side of the Gantry, if desired.

Note

Cardiac can only be operated from one side of the gantry-the side where the Gantry Options board is located. If the customer wishes to operate Cardiac from the left side, then the GO board must be mounted in the left base cover (as opposed to the right, as is described in this manual).

Note

If the system is located in a Small Room site, (When viewed from the back of the scanner the right side of Gantry is positioned very close to a wall), Cardiac Option MUST be located on the left side of the gantry when facing the back of the gantry, (Tube hoist side). No exceptions.

2.1 Installation Procedure

Table 2-1 Part List

MARK	NUMBER	QTY	DESCRIPTION/NAME
3	2228295	1.0	RJ45 FEEDTHRU CONNECTOR
4	2290289	2.0	PLASTIC RECEPTACLE CAP FOR S & B SERIES LEMO CONNECTORS SIZE 1B
7	5198566	1.0	cable-gantry - exg pro
9	5199780	1.0	cable-cardiac - pulmonary
10	2280889	1.0	GANTRY OPTION BOARD
15	2354761	1.0	CABLE CARDIAC/PULMONARY
1	2288882-3	1.0	11 HOLE BULKHEAD FOR SMARTVIEW AND CARDIAC OR PULMONARY
2	2288882-4	1.0	8 HOLE BULKHEAD FOR CARDIAC AND/OR PULMINARY
5	46-328417P74	1.0	SCREW HEXAGON SOCKET 3 MM 10 MM
6	46-328425P1	4.0	NUT HEXAGON 4 MM
8	2380526-100	1.0	CT CARDIAC GATING OPTION INSTALLATION
11	2288879	1.0	BRACKET,GANTRY OPTIONS BD MTG
12	46-328417P4	6.0	SCREW HEXAGON SOCKET 4 MM 12 MM ZINC PLATED, STEEL
13	46-328432P2	10.0	WASHER LOCK - SPRING 4.1 MM 7.6 MM ZINC PLATED, SPRING STEEL
14	46-328430P2	6.0	WASHER PLAIN - NORMAL 4.3 MM 9 MM ZINC PLATED, STEEL

The following procedure assumes a right side setup. That is, it assumes Customer access to the cardiac feature via the right side of the gantry when viewing gantry from the rear.

2-2-1 Preparation - Cover Removal

1. Lower table to home (lowest) position.
2. Use an 8mm Hex wrench to unlatch the side cover from the front cover. See Figure 2-1.

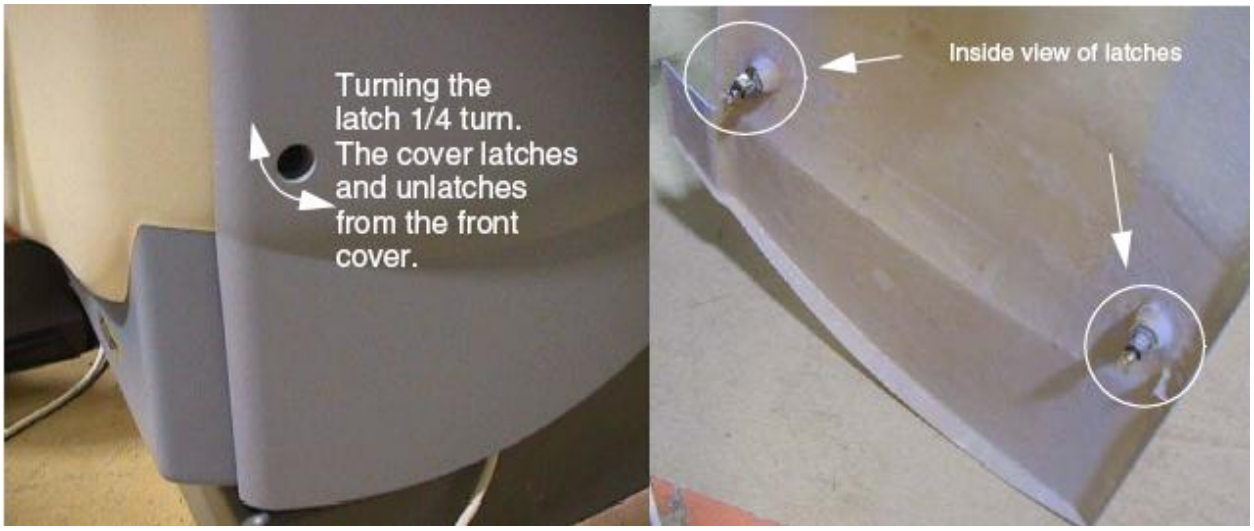

FIGURE 2-1 SIDE COVER LATCHES

3. Remove the right side cover by lifting it upward to release the two (2) latches, located on the top edge of the cover. Once removed, the Service Switch Panel should be exposed.
4. Turn OFF all 3 switches (Axial Drive, HVDC, 120 VAC) on the Service Switch Panel.
5. If installed, remove both lower left/right/front rear base covers (2, 3 and 4) respectively, to gain access to the Option mount Bracket 1, as shown in Figure 2-2).

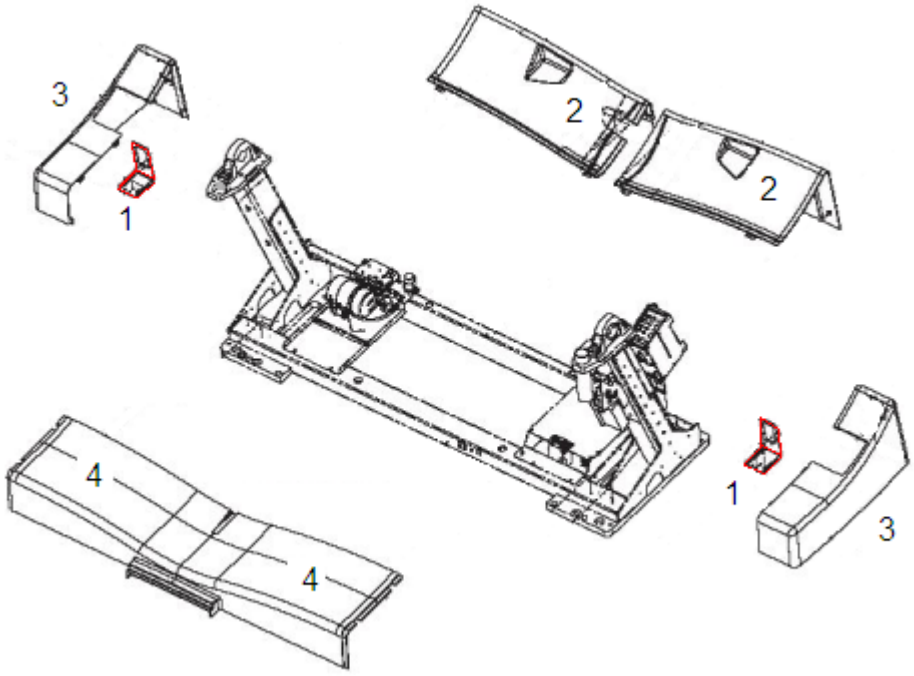

FIGURE 2-2 GANTRY BASE COVERS, EXPLODED VIEW

6. Determine which side to mount the gantry option on, and remove the existing blank bulkhead cover from the mounting bracket.

Note:

If there is no Customer preference install this option on the left side of the gantry when viewing the gantry from the back. (Opposite side of Gantry Drive System).

2-2-2 Installation

There are two bulkhead covers included with the kit with different graphics/Icons on them. Their physical installation to bracket 1 is the same. Bracket 1 is not included with this kit. It is located on gantry base behind the base covers. Determine which option the customer has and install the most appropriate cover. (In most cases you will be installing cover 2288882-3).

- 11 Hole Bulkhead Cover- (2288882-3)
  - Cardiac (ECG/EKG)
  - Respiratory
  - SmartView
  - Ethernet/Remote Cardiac Monitor
- 8 Hole Bulkhead Cover (2288882-4)
  - Cardiac (ECG/EKG)
  - Respiratory

1. Attach the appropriate bulkhead cover to the base cover-mounting bracket (Bracket 1), using two (2) nuts (Figure 2-3).

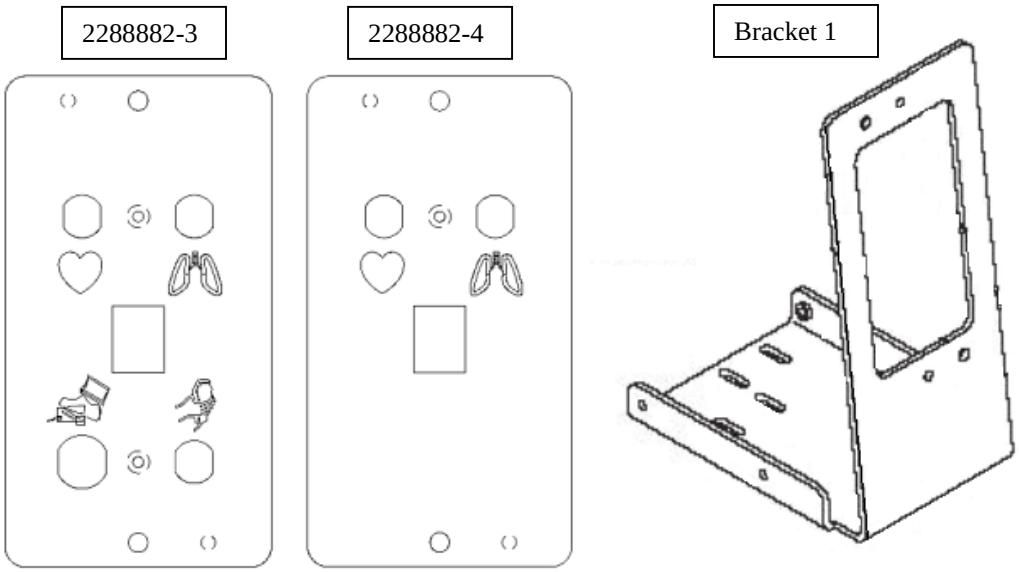

FIGURE 2-3 MOUNTING BRACKET 1 AND COVER PLATES

2. Attach the “Y” cable (PN# 5199780) connectors to the bulkhead cover. (See Figure 2-4).

Note:

The red mark on both cable ends should be either both up or both down.

a. Remove the outer conical nut from the Lemo cable ends.
b. Insert the lemo connector marked “Cardiac” through the appropriate hole (Heart Icon) from the back of the bulkhead cover. If necessary, adjust the inner nut to accommodate for the thickness of the plate.
c. Tighten the outside conical nut first, so that the connector and nut are flush. If necessary, gently adjust the inside nut to ensure that the connector and external conical nut are flush with each other.
d. Gently tighten the inner nut.

3. Repeat step 2 for the end of the cable marked “Pulmonary”.
4. Secure the Cable- Cardiac/Pulmonary Bulkhead cable (PN# 5199780) to J3 of the Gantry Options Board.

Note:
This cable is not included with the kit. Shown for clarity purposes.

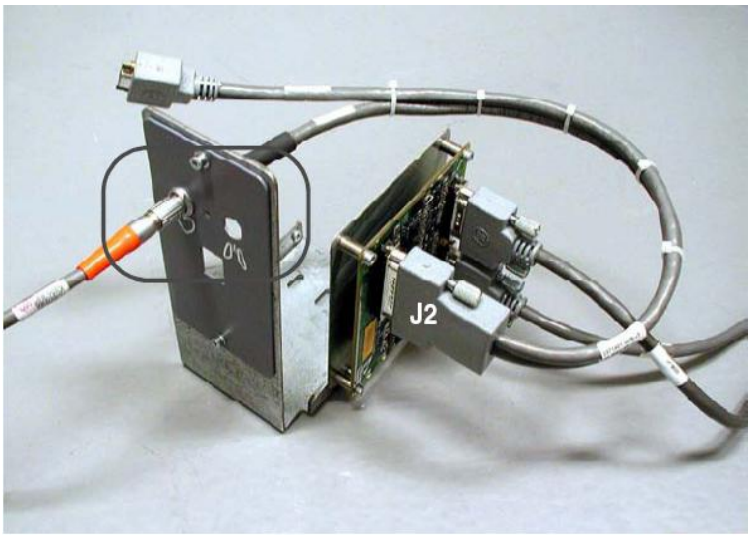

FIGURE 2-4 RIGHT SIDE MOUNTING BRACKET, WITH GO BOARD, BULKHEAD, AND CABLES

5. Attach the Gantry Options Board mounting bracket (Bracket 2, shown in Figure 2-5) to the base cover mounting bracket 1 (Refer to Figure 2-4).

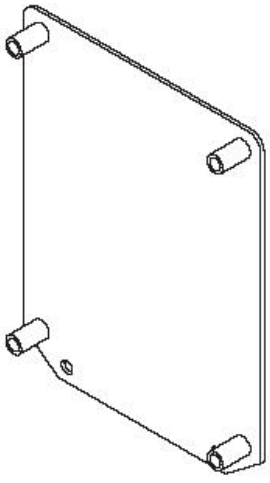

FIGURE 2-5 GANTRY OPTIONS BOARD MOUNTING BRACKET (BRACKET 2)

6. Attach the Gantry Options (GO) Board to the mounting bracket (Bracket 2). Make sure that J2 is at the top of the board. (See Figure 2-4 for proper orientation.)

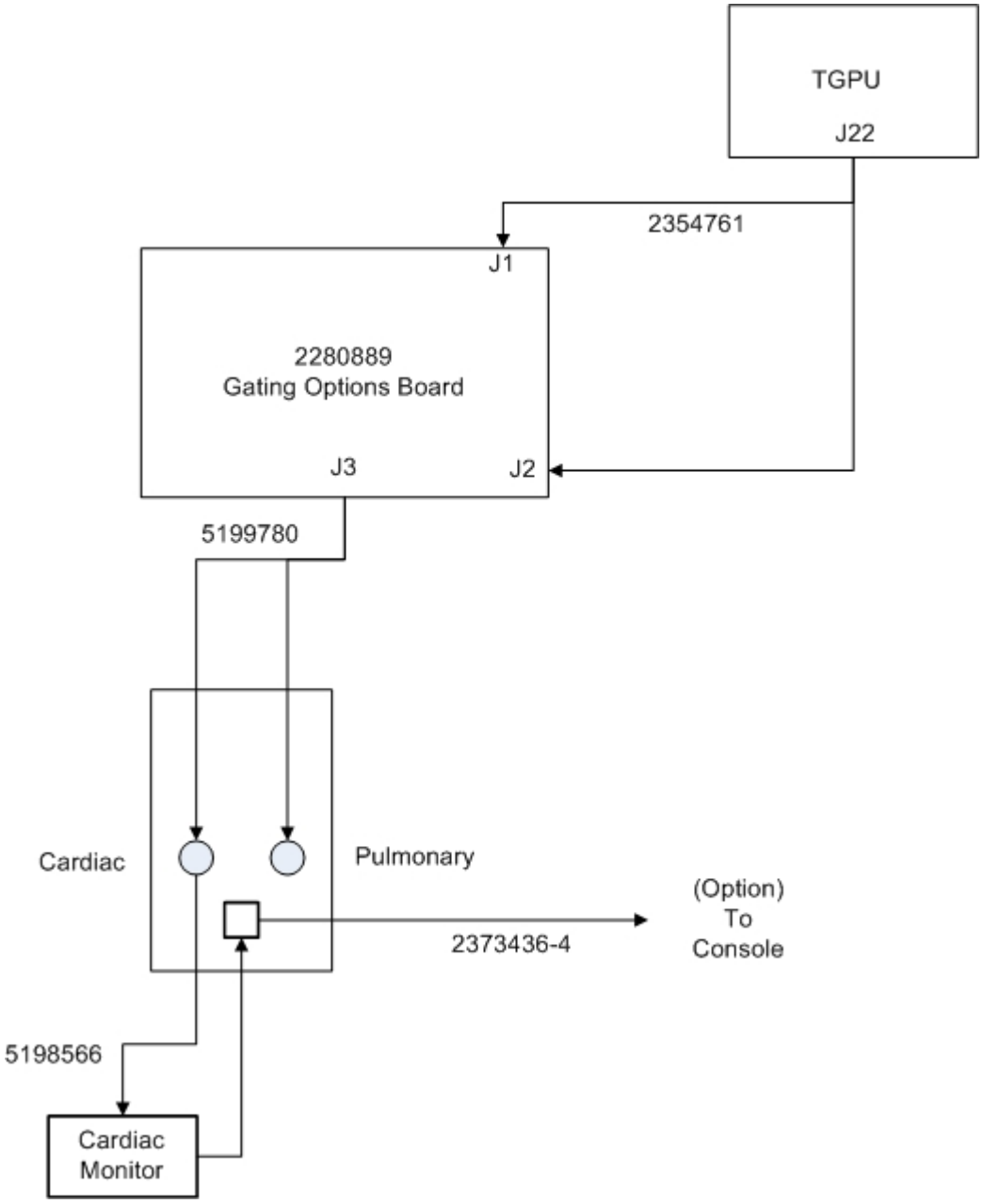

FIGURE 2-6 FUNCTIONAL INTERCONNECT DIAGRAM CARDIAC CABLE LAYOUT

7. On the TGPU (or MSUB), connect cable to TGPU (or MSUB) (PN# 2354761) to connector J22 (Refer to Figure 2-6 and 2-7).

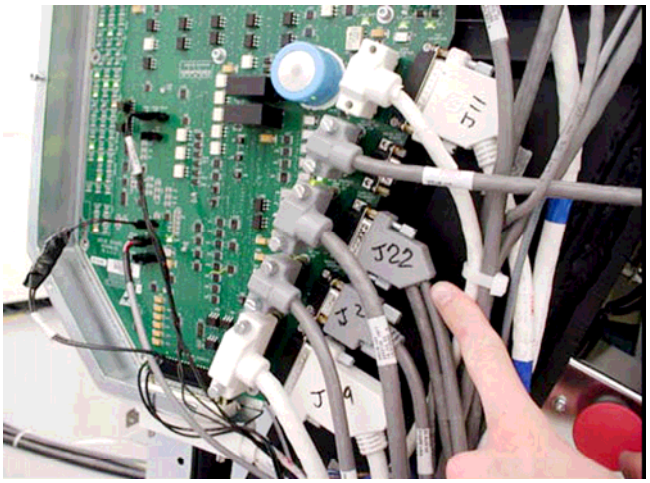

FIGURE 2-7 LOCATING J22 ON MSUB (OR TGPU) BACKPLANE

8. Secure the other end of the cable (PN# 2354761) to J1 and J2 of the Gantry Options Board. Route the cable with any cable bundles across the base of the gantry and use cable ties to secure the cable to the existing cable bundles.
9. Attach the two plastic receptacle caps for the Lemo connectors. (PN# 2290289) using the hardware provided.

FIGURE 2-8 ATTACH RECEPTICAL CAPS

2-2-3 Operators Console RJ 45 Connection

1. At the back of the Operators Console locate the RJ45 Cardiac Monitor cable pre-wired at system Installation (PN# 2373436-4). Plug this cable into the EKG/ECG output. Refer to figure 2-9.

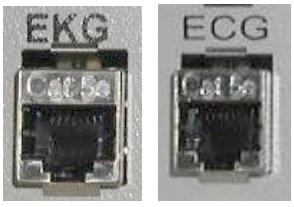

FIGURE 2-9 CONSOLE CONNECTORS USED FOR VCT EKG/ECG VIEWER

2. Make sure the Cardiac Monitor is setup to output EKG/ECG Data to the Ethernet port. (For IVY monitors this switch is located on the back of the monitor).
3. Locate the RJ45 Feed through (PN# 2228295) located in the kit. There are two types of RJ45 feed through connectors. A metal cased type and a plastic type. To proceed:

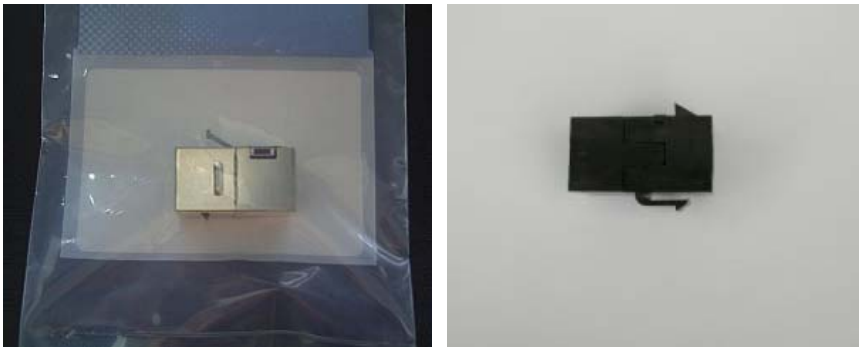

FIGURE 2-10: TWO TYPES OF RJ45 FEED THROUGH CONNECTORS

a. If you have the metal cased version, insert it into the square hole from the front side of the Gating Options panel and snap it in place with the flexible metal snap at the BOTTOM of the hole.
b. If you have the plastic type, refer to Figure 2-11. Push the RJ 45 connector into the square hole from the FRONT of the Option Panel by inserting the top catch behind the panel and then swinging the connector down forcing the Flexible Snap to engage into the bottom of the square hole, locking it into place. The Block must be installed so the longest part of the block is facing OUT.

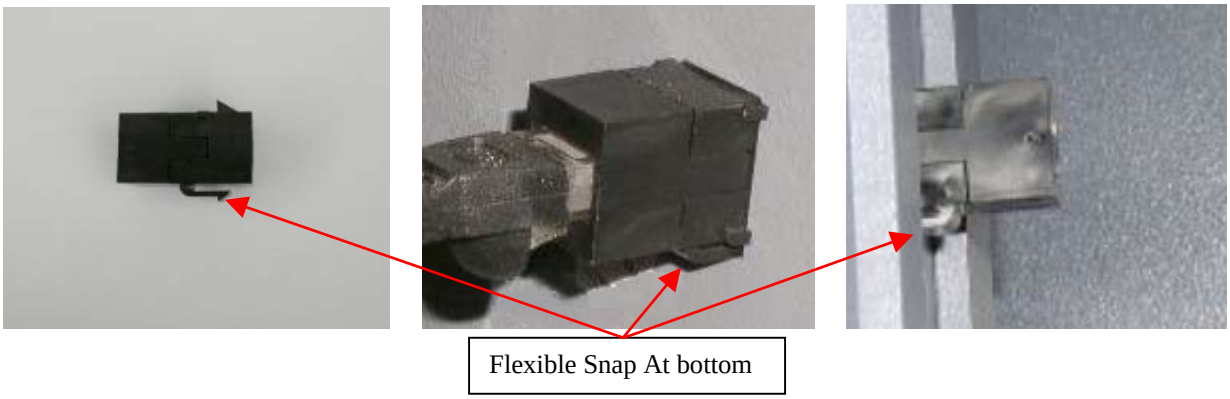

FIGURE 2-11 CORRECT OREINTATION AND INSTALLATION OF THE RJ45 FEEDTHROUGH

IMPORTANT NOTE!

This plastic type of RJ45 Feed through connector (PN# 2228295) has a hard stop that should be at the top of the connector and a flexible snap that should be at the BOTTOM of the connector when properly installed.

4. At the back of the Gantry Options panel at the Gantry, attach the other end of the RJ45 Cardiac Monitor cable pre-wired at system Installation (PN# 2373436-4) to the RJ45 Feed through block just installed. (Behind the Gating Options panel).

2-2-4 Finishing Up - Testing & Cover Re-Installation

1. Restore Power to the system. The Power LED on the Gantry Options Board should be lit.
2. Run a Cardiac Hardware Function Check. Refer to Section 3.
3. Run a test scan, before installing the covers.
4. Install all covers.

3 - CARDIAC HARDWARE FUNCTION TEST

3-1 - Setup Cardiac Monitor -Test EKG/ECG Waveform

The general steps are as follows. Because the Cardiac Monitor types may vary over time, always refer to the operator's manual that came with the Cardiac Monitor for the specific procedures on how to correctly attach the version of monitor present, and prep it for a test waveform. The procedure here outlines a typical setup.

3-1-1 Systems with IVY monitor- EKG/ECG Viewer

Systems using the IVY Cardiac Monitor or equivalent cardiac monitor design, may route the cardiac information back to the console. Systems with older versions of cardiac monitors may not have this feature. If the system has an IVY cardiac monitor or equivalent:

1. At the back of the IVY Monitor there is a slide switch marked "Disk Storage/ Ethernet. Make sure this switch is in the Ethernet position to enable the data to be viewed at the Operators Console.
2. Connect the data cable (RJ 45) that came with the cardiac monitor from the back of the IVY cardiac monitor to the Cardiac Option panel RJ45 connector. (This will route the cardiac information to the console).
3. Connect the EKG/ECG Leads to the test output of the Cardiac Monitor.
4. Open the Cardiac Viewer at the Host display, to view the cardiac information.

Note:

Any remaining cable length (if extra) should be wrapped in a figure 8 to avoid creation of any loops.

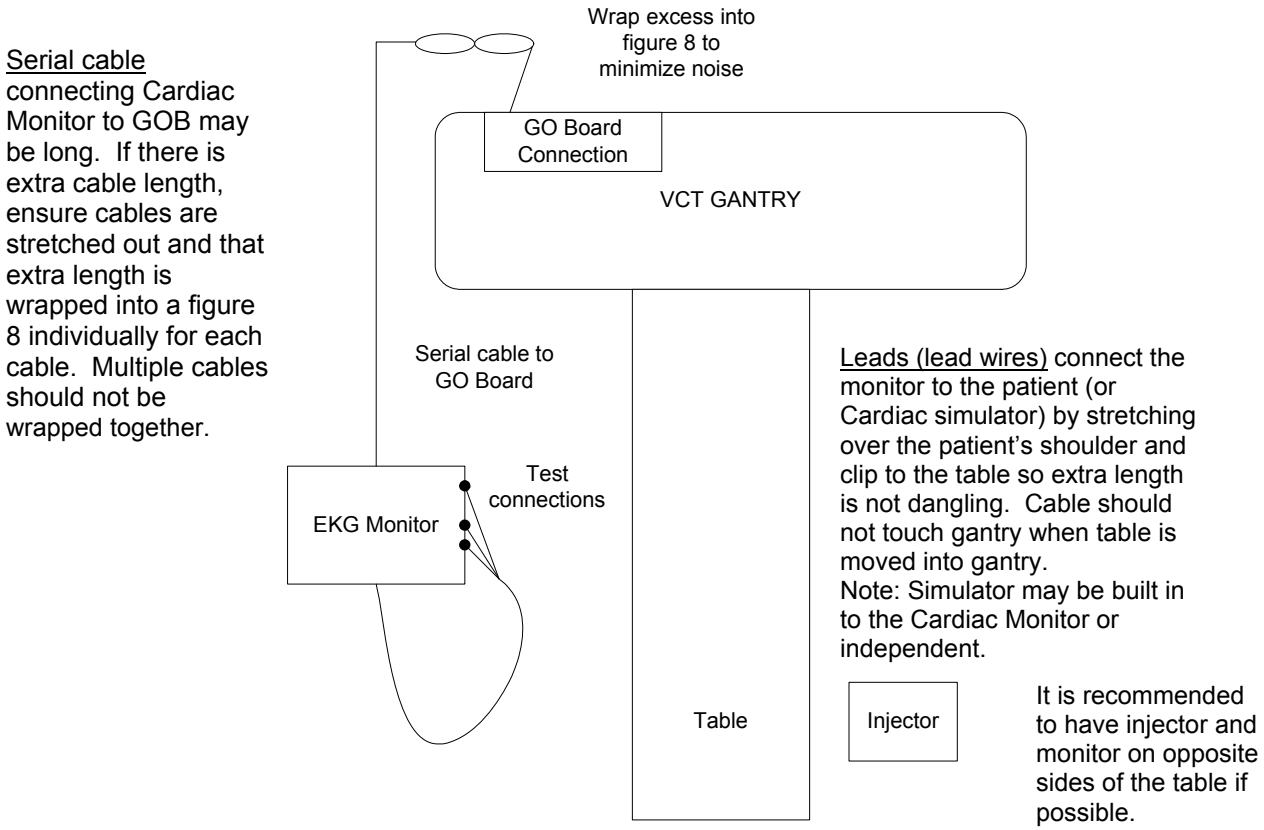

FIGURE 3-1: SAMPLE SETUP

1. Ensure waveform appears on the Cardiac Viewer on the Host Display. If not:
   a. Check the cable connection between the console and the Cardiac Option panel (RJ 45 connector) at the gantry.
   b. Check to make sure the switch at the rear of the IVY cardiac monitor is set in the "Ethernet" position.
   c. Check the ECG/EKG Leads are set up to the test output on the cardiac monitor and there is a test waveform on the cardiac monitor display.

Note:

Check to make sure that the slide switch marked "Disk Storage/ Ethernet at the back of the IVY Cardiac Monitor is set to ETHERNET.

2. Check to ensure the GO Board is receiving the signal by selecting a cardiac-gated protocol and ensuring the gating button on the console reads the (BPM) Beats Per Minute.
3. If gating button is red, toggle the software Gating Option on and off:
4. On the console select: **Gating** and turn the option off.
5. Select: **Accept.**
6. Reselect, turning the "Gating" option back on.
7. Select: **Accept**.
8. If HR (Cardiac Trace) does not appear, signal may not be reaching the GOB. Check the cabling. Continue troubleshooting the configuration until the gating option is functioning, as it should.
9. This completes the service functional test of the hardware installed.

Note:

To test further functionality, requires the aid of the CT Scanner Operator/ Technologist or CT Applications Specialist depending on the options purchased and version of scanner this option has been installed on. Cardiac Protocols may vary. Refer to the CT Scanner Operators Manual for details on how to setup and run tests for different applications functions of the Cardiac feature. If necessary, refer to appendix A.

3-1-2 General Cardiac Monitor Function Check

1. The general steps are as follows. Each Cardiac Monitor will be slightly different. There may be a built in test feature on some monitors or it may be necessary to connect a cardiac simulator. The simulator would come with the Cardiac Monitor separately if it was need for that monitor type. Always refer to the operator's manual that came with the Cardiac Monitor for the specific procedures on how to correctly attach the version of monitor present and prep it for a test waveform. The basic steps are as follows:
2. Connect the serial cable from the back of the monitor to the (GO Board) Cardiac Option Interface panel.
3. Connect the EKG/ECG Leads to the test output of the Cardiac Monitor or connectors of the Cardiac heartbeat simulator. If using a simulator, turn on the cardiac heartbeat simulator and set the heart rate to between 60 and 80 bpm (beats per minute). Refer to Figure 3-2 for the possible variations of EKG/ECG lead setup.
4. Select the EKG/ECG output waveform and observe the waveform on the Cardiac Monitor.

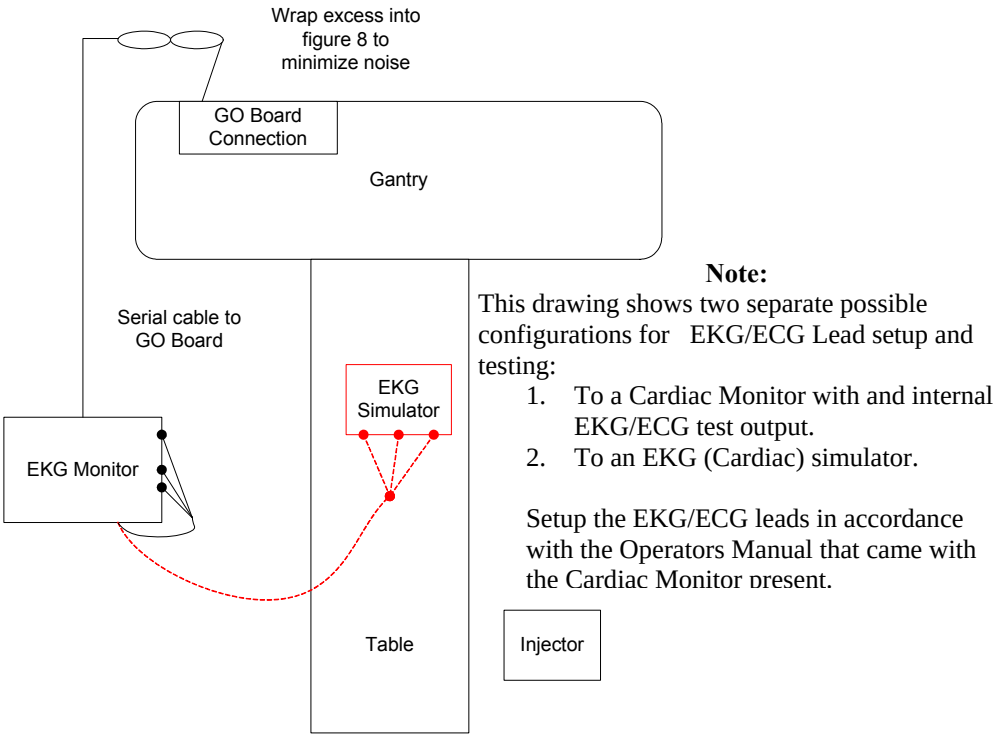

FIGURE 3-2: TWO DIFFERENT EKG/ECG LEAD CONNECTIONS

5. This completes the service functional test of the hardware installed.

NOTE:

To test further functionality, requires the aid of the CT Scanner Operator/ Technologist or CT Applications Specialist depending on the options purchased and version of scanner this option has been installed on. Cardiac Protocols may vary. Refer to the CT Scanner Operators Manual for details on how to setup and run tests for different applications functions of the Cardiac feature. If necessary, refer to appendix A.

APPENDIX A - GENERAL STEPS -TESTING CARDIAC MONITOR CONFIGURATIONS

This section may be useful for the testing the Cardiac function with other models of the Cardiac Monitor. The Customer must have the CACS (SmartScore) software package, and it must be installed on the Advantage Windows workstation to use this procedure. The System Operators manuals and Cardiac Monitor Operators manuals may be a better resource for accurately setting up and testing cardiac functionality with different protocols. Testing these applications should be done with the aid of a CT Operator/Technologist.

A-1 Attaching the Cardiac Monitor to the Cardiac Interface Panel on gantry

1. The general steps are as follows. Each Cardiac Monitor will be slightly different. Refer to the operator's manual that came with the Cardiac Monitor for the specific procedures on how to correctly attach the version of monitor present.
2. Turn on the Cardiac Monitor.
3. Locate the GE Connect symbol in the bottom right corner of the monitor screen (Figure A-1). The symbols vary with the model of the Cardiac Monitor.
4. If necessary, disconnect the serial cable from the back of the monitor to the (GO Board) Cardiac Option Interface panel.
5. The symbol should indicate a disconnection.

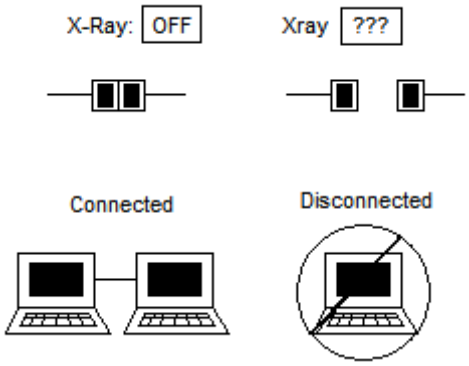

FIGURE A-1 CONNECTION INDICATORS

6. Connect the serial cable from the back of the monitor to the (GO Board) Cardiac Option Interface panel.
7. Make sure the symbol closes, indicating a connection.("X-Ray ??? should change to "X-Ray OFF".
8. Connect the gray cardiac interface cable to the front of the monitor.
9. Connect the cardiac cable to the interface cable by matching the colored ends of the flexible cable to the corresponding colored connectors on the EKG/ECG interface cable.
10. Connect the patient leads to the Cardiac heartbeat simulator.
11. Turn on the cardiac heartbeat simulator and set the heart rate to between 60 and 80 bpm (beats per minute).
12. Select the EKG/ECG output waveform and observe the waveform on the display.
13. Cardiac Monitor data output capability varies. You can save the cardiac data to a floppy disk media or transfer the data via an Ethernet connection by manually switching between these two modes. Consult the Operators Manual that came with the Cardiac Monitor, for the location of the switch. If stored to a floppy media disk, this data can be viewed on an Advantage Windows Workstation running the CACS Application.

14. To proceed:
    a. If you do not have an Cardiac Monitor with this capability, you cannot perform this test.
    b. If you do not have and an Advantage Windows workstation with CACS (SmartScore) Application installed, you cannot perform this test.
15. If you have an Cardiac Monitor with this function proceed as follows:

A-2 For Cardiac Monitors with a Floppy disk output capability

1. Acquire the cardiac EKG/ECG data from the monitor as described in the Cardiac Monitor manual that came with the unit. (Instructions to do this will vary with Make and Model of Cardiac Monitor.)
2. Insert a blank formatted floppy media disk into the Cardiac Monitor.
3. On the console, prescribe and acquire a 15 second helical scan of air using the appropriately gated (SmartScore) protocol.
4. Record Patient ID number:_____.
5. Enter the same Patient ID number into the EKG/ECG machine and “Arm”. (Newer Cardiac Monitors may not require input of the Patient ID. It will be transferred to the monitor automatically). The messages X-Ray ON and STORING DATA will appear on the display.
6. Acquire the scan, 15 second CT Helical scan of air. (50-60 seconds of data is all that can be stored on the media)
7. The X-Ray ON message will appear on the Cardiac Monitor.
8. Once the scan completes the message X-Ray OFF will appear.
9. Wait for the Cardiac Monitor to save the EKG/ECG data to the media. (Approximately 10 seconds after X-Ray OFF you will see the messages, STORAGE COMPLETE and WRITE TO DISK will appear.
10. After the message DISK Write SUCCESSFUL, remove the media from the drive.
11. Insert the media containing the cardiac date into the Advantage Windows Workstation and start the CACS (SmartScore) application.

Note:

The actual operation of the Advantage Windows Workstation may vary from the general steps listed below. This operation should be performed by a person qualified to use the Advantage Windows Workstation and is familiar with the Cardiac data retrieval process specific to the software version being used on the AWS. The general steps are as follows:

1. On the AWS Select the CACS (SmartScore) application.
2. Insert the floppy disk.
3. Select the **INPUT** tab.
4. Select **UPDATE** to locate the EKG/ECG file on the media disk.
5. Select the **EKG/ECG file name** and click OK.
6. Select the **ANALYSIS** tab. (Make sure the EKG/ECG waveform appears on the screen.
7. Return to the **INPUT** tab, select **EJECT**, and remove the media.
8. Quit the CACS (SmartScore) application.
9. Prepare the Cardiac Monitor for the next patient by either clearing the history, (Enter same patient ID and select CLEAR MEMORY, or completing a full power cycle of the Cardiac Monitor.
10. To clear Patient ID memory for storage of an entirely new sequence press CLEAR PATIENT ID soft key.

APPENDIX B - GENERAL TESTS - APPLICATIONS FUNCTIONALTESTING

This section can be used to test functionality of the Gating Option using different applications. It should be noted that specific application functional testing might vary from site to site depending on the applications installed on the system. This section provides a general description of how to test other applications. In this section three scans will be performed during these tests. It may be necessary to consult wit the CT Technologist or Applications specialist for the exact application they wish to test. First, a Scout scan will be used to verify connection and recognition of the EKG/ECG signal from the patient through to the scanner. Second, a Gated Cine scan will be completed to verify the proper operation of the scanner with the EKG/ECG signal controlling the X-ray Start signal. This test will also verify communication back to the cardiac device for the recording of the EKG/ECG signal. The third and final test will verify that stopping the heart rate will cause the scanner to complete the current image and wait for the next EKG/ECG pulse before starting the next image.

Note:

The following test can all be done without the CardIQ SnapShot option installed.

B-1 Test Setup

General setup as follows:

1. Position a phantom on the table for imaging during the following tests.
2. Attach an EKG/ECG simulator to the EKG/ECG device and verify proper operation of the EKG/ECG device (see *Operator Manual* for EKG/ECG device).
3. Connect EKG/ECG device output to the Gantry per installation instructions.
4. Select a heart rate on the EKG/ECG simulator of 60 bpm.
5. Select the appropriate GE defined acquisition protocol. (Such as SmartScore) 60 BPM gated.

B-2 Scout Scan

1. General setup as follows:
2. Set system as detailed in Test Setup.
3. In the Scout View/Edit screen select the “Gating” button.
4. Verify that the heart rate seen on the cardiac device matches the display in the gated button on the Scout View/Edit screen (+/- 1 beat per minute).
5. Change the heart rate on the EKG/ECG device and verify that the scanner display changes to match that on the EKG/ECG device.

Note:

There will be a delay to the update on the scanner display due to 4-beat averaging done in the scanner.

6. Turn off the cardiac device and verify that the Gating button turns red and then “Gray Out” indicating that the gating feature is no longer selectable.
7. Turn the cardiac device on and verify that the Gating button is now selectable.
8. Verify that the heart rate is once again displayed on the scanner.
9. Complete the Scout scan and verify normal operation of the localizer for defining the scanning range.

B-3 First Image Series

1. General setup as follows:
2. Set system as detailed in Test Setup.

3. Set the cardiac simulator for a heart rate of 60 BPM.
4. Set the trigger delay to default value on the gating button on the CT Console Display.
5. Select 1 image per R to R interval.
6. Verify the following values:
7. R to R interval = 1000 m. sec.
8. Set Trigger Delay = 700 msec. (This may vary from system to system. The trigger delay in milliseconds should equal r to r interval in milliseconds, times phase percent (i.e. 1000 msec * 70% = 700 msec). Refer to Operators documentation.
9. Cine Duration = 600 m. sec. (This will vary from system to system from 0.8 to 0.5 to 0.35 seconds. Confirm that cine duration matches expected result for the system.)
10. Complete the scan and confirm that recon creates images.

B-4 Second Image Series

1. Following the First Image Series, select "Repeat Image Series"
2. Set the cardiac simulator for a heart rate of 75 bpm.
3. Set the trigger delay to default value.
4. Select 1 image per R to R interval.
5. Verify that R to R interval, Trigger Delay, Cine Duration are equal to values used in step 5 of section B-3.
6. Begin the scan and turn off the cardiac simulator after the first image is complete.
7. After the first x-ray on cycle is complete, (As viewed on the Dynaplan screen) switch to the exam Rx desktop and verify that the current image is completed and the error message “Scanner Hardware Stopped Scan”, is displayed in the Real Time Information Window.
8. Verify that the Operator cannot confirm/continue/resume scan.
9. Turn the cardiac simulator on, select **OK** in the error message window, and press **Resume**.
10. Verify that the scan completes and recon creates images.

APPENDIX C - GANTRY OPTIONS (GO) BOARD FUNCTION AND THEORY

C-1 Cardiac Gating Support

The GO board is the interface between the Cardiac Monitor, and TGPU (or MSUB). "R" peak pulses sent from the Cardiac Monitor and captured by the MSUB (or TGPU) firmware during any cardiac acquisition, can be used to retrospectively "gate" the reconstruction process for cardiac applications (Figure C-1).

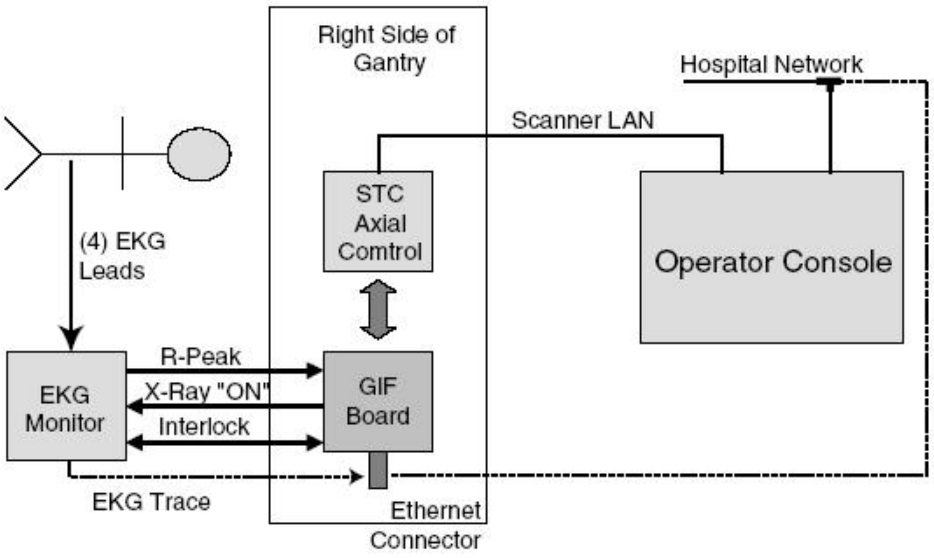

FIGURE C-1 CARDIAC GATING DATA/CONTROL FLOW

C-2 Signals To/From Cardiac Monitor

1. The signals to and from the Cardiac Monitor include:
2. "R peak" pulse, EKG/ECG ~TGPU (or MSUB)
3. X-ray command / "X-ray On", TGPU (or MSUB) ~ EKG/ECG
4. Interlock / Integrity Signal
5. Signal voltages from the EKG/ECG are 5V TTL @ 2.0 amps, and the duration of the R peak pulse is 100 - 300 milliseconds. The Interlock/Integrity line is essential for safety/regulatory. A break or short in the scanner-monitor connection is detected using this signal.

C-3 Connectors

The Gantry-EKG/ECG-Pro Cable connects the Cardiac Monitor to the GO board. This cardiac gating cable includes a 9 pin sub-D connector on one end, which plugs into the EKG/ECG serial port and a 7-pin LEMO male connector on the scanner end of the cable.

C-4 Patient Isolation

Similar to the optical isolation functionality provided by the LightSpeed ISO board, the GO board provides patient isolation for the EKG/ECG signals.

C-5 LEDs

To facilitate troubleshooting, the GO board includes two LEDs: a Power LED and a Pulse LED ("R" peak LED indicator). The Power LED is on whenever the board is receiving power from the MSUB (or TGPU). The Pulse LED illuminates for the duration of the R peak pulse.

C-6 RJ 45 Feed-Through Connector

The GO board Options Panel includes an RJ 45 "feed through" connector to facilitate the Remote Cardiac Viewer feature on VCT scanners. This is simply a pass-through mechanical connector to facilitate remote cardiac display. The cardiac monitor cable is pre-wired at system Installation (PN# 2373436-4) through the cable trough to the Console from the gantry.

C-7 Respiratory Gating Support

The GO board supports respiratory gating by allowing a RPM (Real Time Positioning) device to be connected to the scanner using the same interface board but a different port as is provided for cardiac gating.
The RPM device monitors breathing by tracking an object placed on the chest or abdomen of the patient using a video camera. Signal from the camera is processed, and a volume vs. time curve is generated for the patient. The gating system generates a pulse when the volume deviates from a preset limit. The interface circuit must accept this pulse and turn on X-ray at the leading edge of the pulse.

C-8 Heating and Cooling Parameters (GO Board)

- Temperature range: 0 degrees C to +55 degrees C for normal applications operation
- Temperature gradient: 5 degrees C/hour
- Humidity range: 0% to 85% non-condensing
- Pressure range (altitude): 700 hPA - 1060 hPA

C-9 Electrical Connections

- Leakage current: Less than 10 ma across the GOBIF.
- Respiratory cable shielding: No connection between scanner and respirator grounds.
- Shielding/grounding: Incoming cables are shielded twisted pairs.
- Connectors: Press fit Sub-D (C-Pin EMI compliant).

C10 Power

- Voltage: +5Vdc voltage margin will be:
- Idle: 4.75Vdc - 5.25Vdc (-5% -> +5.0%)
- Active: 4.75Vdc - 5.25Vdc (-5% -> +5.0%)

Current: 55mA typical, with only 5.00V power applied to board, 100mA max @ 5 volts with all outputs active and driving appropriate l

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Imagination at work

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