

Detector Rear Heater Replacement



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Revision 1
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Language Policy

Direction 2128126 - Language Policy For Service Documentation

ПРЕДУПРЕЖ ДЕНИЕ (BG)	<p>Това упътване за работа е налично само на английски език.</p> <ul style="list-style-type: none">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 пациента в резултат на токов удар, механична или друга опасност.
警告 (ZH-CN)	<p>本维修手册仅提供英文版本。</p> <ul style="list-style-type: none">如果客户的维修服务人员需要非英文版本，则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服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。
警告 (ZH-HK)	<p>本服務手冊僅提供英文版本。</p> <ul style="list-style-type: none">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。
警告 (ZH-TW)	<p>本維修手冊僅有英文版。</p> <ul style="list-style-type: none">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。
UPOZOR- ENJE (HR)	<p>Ovaj servisni priručnik dostupan je na engleskom jeziku.</p> <ul style="list-style-type: none">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.Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.

VÝSTRAHA (CS)	<p>Tento provozní návod existuje pouze v anglickém jazyce.</p> <ul style="list-style-type: none"> • V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka. • Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
ADVARSEL (DA)	<p>Denne servicemanual findes kun på engelsk.</p> <ul style="list-style-type: none"> • 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 uden at læse og forstå denne servicemanual. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
WAAR- SCHUWING (NL)	<p>Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.</p> <ul style="list-style-type: none"> • Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden alvorens 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)	<p>This service manual is available in English only.</p> <ul style="list-style-type: none"> • If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services. • Do not attempt to service the equipment unless this service manual has been consulted and is understood. • Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.
HOIATUS (ET)	<p>See teenindusjuhend on saadaval ainult inglise keeles.</p> <ul style="list-style-type: none"> • 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.

<p>VAROITUS (FI)</p>	<p>Tämä huolto-ohje on saatavilla vain englanniksi.</p> <ul style="list-style-type: none"> • 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.
<p>ATTENTION (FR)</p>	<p>Ce manuel d'installation et de maintenance est disponible uniquement en anglais.</p> <ul style="list-style-type: none"> • Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire. • Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance 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.
<p>WARNUNG (DE)</p>	<p>Diese Serviceanleitung existiert nur in englischer Sprache.</p> <ul style="list-style-type: none"> • 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.
<p>ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)</p>	<p>Το παρόν εγχειρίδιο σέρβις διατίθεται στα αγγλικά μόνο.</p> <ul style="list-style-type: none"> • 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 δεν 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>	<p>Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.</p> <ul style="list-style-type: none"> • 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>	<p>Þessi þjónustuhandbók er aðeins fánleg á ensku.</p> <ul style="list-style-type: none"> • 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>	<p>Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.</p> <ul style="list-style-type: none"> • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.
<p>警告 (JA)</p>	<p>このサービスマニュアルには英語版しかありません。</p> <ul style="list-style-type: none"> • 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>	<p>본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다.</p> <ul style="list-style-type: none"> • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다. • 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오. • 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자, 사용자 또는 환자에게 부상을 입힐 수 있습니다.
<p>BRĪDINĀJUMS (LV)</p>	<p>Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.</p> <ul style="list-style-type: none"> • Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu. • Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas. • Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.

<p>ĮSPĖJIMAS (LT)</p>	<p>Šis eksploataavimo vadovas yra tik anglų kalba.</p> <ul style="list-style-type: none"> • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas. • Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploataavimo vadovo. • Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.
<p>ADVARSEL (NO)</p>	<p>Denne servicehåndboken finnes bare på engelsk.</p> <ul style="list-style-type: none"> • Hvis kundens serviceleverandør har bruk for 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.
<p>OSTRZEŻENIE (PL)</p>	<p>Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.</p> <ul style="list-style-type: none"> • Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go. • Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.
<p>ATENÇÃO (PT-BR)</p>	<p>Este manual de assistência técnica encontra-se disponível unicamente em inglês.</p> <ul style="list-style-type: none"> • Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.
<p>ATENÇÃO (PT-PT)</p>	<p>Este manual de assistência técnica só se encontra disponível em inglês.</p> <ul style="list-style-type: none"> • Se qualquer outro serviço de assistência técnica solicitar este manual noutra idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.

<p>ATENȚIE (RO)</p>	<p>Acest manual de service este disponibil doar în limba engleză.</p> <ul style="list-style-type: none"> • 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.
<p>ОСТОРОЖН О! (RU)</p>	<p>Данное руководство по техническому обслуживанию представлено только на английском языке.</p> <ul style="list-style-type: none"> • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод. • Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.
<p>UPOZOR- ENJE (SR)</p>	<p>Ovo servisno uputstvo je dostupno samo na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke 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 mehaničkih i drugih opasnosti.
<p>UPOZORNE- NIE (SK)</p>	<p>Tento návod na obsluhu je k dispozícii len v angličtine.</p> <ul style="list-style-type: none"> • Ak zákaznikov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obsluhu a neporozumiete mu. • Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.
<p>ATENCIÓN (ES)</p>	<p>Este manual de servicio sólo existe en inglés.</p> <ul style="list-style-type: none"> • 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>	<p>Den här servicehandboken finns bara tillgänglig på engelska.</p> <ul style="list-style-type: none"> • 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>OPOZORILO (SL)</p>	<p>Ta servisni priročnik je na voljo samo v angleškem jeziku.</p> <ul style="list-style-type: none"> • 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.
<p>DİKKAT (TR)</p>	<p>Bu servis kılavuzunun sadece ingilizcesi mevcuttur.</p> <ul style="list-style-type: none"> • Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

Damage in Transportation

All packages should be closely examined at time of delivery. If damage is apparent, have notation "damage in shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

To file a report:

- Call 1-800-548-3366 and use option 6.
- Fill out the GIQ workflow for any items missing, damaged, OBF/FOI for in process installs: http://supportcentral.ge.com/ProcessMaps/form_new_request.asp?prod_id=268679&form_id=573167&node_id=1916016&map_id=&reference_id=&reference_type
- Contact your local service coordinator for more information on this process.

Rev. Nov. 10, 2017

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



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 Healthcare PQR Process to report all omissions, errors, and defects in this publication.

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1 Readme

1.1 Revision History

Revision	Date	Reason for change
1	June 07, 2019	Initial Release

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2 Prepace Publication Conventions

2.1 Preface

Purpose: Standardize conventions for representing information in a uniform way of communicating information to a reader in a consistent manner. Conventions are used so that the reader can easily recognize the actions or decisions that must be made. There are a number of character and paragraph styles used in this publication to accomplish this task. Please become familiar with them before proceeding forward.

2.2 Safety & Hazard Information

2.2.1 Text and Character Representation

Within this publication, different paragraph and character styles have been used to indicate potential hazards. Paragraph prefixes, such as hazard, caution, danger and warning, are used to identify important safety information. Text (Hazard) styles are applied to the paragraph contents that is applicable to each specific safety statement. Words describe the type of potential hazard that may be encountered and are placed immediately before the paragraph it modifies. Safety information will normally include:

- Type of potential Hazard
- Nature of potential injury
- Causative condition
- How to avoid or correct the causative condition

EXAMPLES OF HAZARD STATEMENTS USED

It's important that you read and understand hazard statements, and not just ignore them.



SEVERE PERSONAL INJURY

DANGER IS USED WHEN A HAZARD EXISTS WHICH WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF INSTRUCTIONS ARE IGNORED. THEY CAN INCLUDE:

- ELECTROCUTION
- CRUSHING
- RADIATION



SEVERE PERSONAL INJURY

WARNING IS USED WHEN A HAZARD EXISTS WHICH COULD OR CAN CAUSE SERIOUS PERSONAL INJURY OR DEATH IF INSTRUCTIONS ARE IGNORED. THEY CAN INCLUDE:

- POTENTIAL FOR SHOCK
- EXPOSED WIRES
- FAILURE TO TAG AND LOCKOUT SYSTEM POWER COULD ALLOW FOR UN-COMMANDED MOTION.



MINOR PERSONAL INJURY

Caution is used when a hazard exists which can or could cause minor injury to self or others if instructions are ignored. They include for example:

- Loss of critical patient data
- Crush or pinch points
- Sharp objects




PROPERTY DAMAGE ONLY

Notice is used when a hazard is present that can cause property damage but has absolutely no personal injury risk. They can include:

- Disk drive will be destroyed
- Internal mechanical damage, such as to the x-ray tube
- Coasting the rotor through resonance.

2.2.2 Graphical Representation

Important information will always be preceded by the exclamation point  contained within a

triangle, as seen throughout the Preface chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm.

2.3 Publication Conventions

2.3.1 *General Paragraph and Character Styles*

Prefixes are used to highlight important non-safety related information. Paragraph prefixes (such as Purpose, Example, Comment or Note) are used to identify important but non-safety related information. Text styles are also applied to text within each paragraph modified by the specific prefix.

EXAMPLES OF PREFIXES USED FOR GENERAL INFORMATION:

Purpose:

Introduces and provides meaning as to the information contained within the chapter, section or subsection (such as used at the beginning this chapter, for example).

NOTE

Conveys information that should be considered important to the reader.

Example:

Used to make the reader aware that the paragraph(s) that follow are examples of information possibly stated previously.

Comment:

Represents “additional” information that may or may not be relevant to your situation.

2.3.2 Page Layout

Publication Part Number & Revision Number

Publication Title

The current section and its title are always shown in the footer of the left (even) page.

An exclamation point in a triangle is used to indicate important information to the user.

Paragraphs preceded by **Alphanumeric** characters (e.g. numbers) contain information that must be followed in a **specific order**.

The current chapter and its title are always shown in the footer of the right (odd) page.

Paragraphs preceded by a **symbol** (e.g. bullets) contain information that has **no specific order**.

Headers and footers in this publication are designed to allow you to quickly identify your location. The document part number and revision number appear in every header on every page. Odd numbered page footers indicate the current chapter, its title and current page number. Even numbered page footers show the current section and its title, as well as the current page number.

2.3.3 Computer Screen Output/Input Text Character Styles

Within this publication, mono-spaced character styles (fonts) are used to indicate computer text that is either screen input or output. Mono-spaced fonts, such as courier, are used to indicate text direction. When you type at your keyboard, you are generating computer input. Occasionally you will see the math operator “greater-than” and “less-than” symbols used to indicate the start and finish of variable output. When reading text generated by the computer, you are reading it as computer generated output. In addition to direction, characters are italicized (e.g. *italics*) to indicate information specific to your system or site.

Example: Fixed Output

This paragraph's font represents computer generated screen "fixed" output. Its output is fixed from the sense that it does not vary from application to application. It is the most commonly used style used to indicate filenames, paths and text that do not change from system to system. The character style used is a fixed width such as courier.

Example: Variable Output

This paragraph's font represents computer screen output that is "variable". It is used to represent output that varies from application to application or system to system. Variable output is sometimes found placed between greater-than and less-than operators for clarification. For example: <variable_ouput> or <3.45.120.3>. In both cases, the < and > operators are not part of the actual input.

Example: Fixed Input

This paragraph's font represents fixed input. It is computer input that is typed-in via the keyboard. Typed input that does not vary from application to application or system to system. Fixed text the user is required to supply as input. For example: cd /usr/3p

Example: Variable Input

This paragraph's font represents computer input that can vary from application to application or system to system. With variable text, the user is required to supply system dependent input or information. Variable input sometimes is placed between greater-than and less-than operators. For example: <variable_input>. In these cases, the (<>) operators would be dropped prior to input. For example: ypcat hosts | grep <3.45.120.3> would be typed into the computer as

ypcat hosts | grep 3.45.120.3

without the greater-than and less-than operators.

2.3.4 Buttons, Switches and Keyboard Inputs (Hard & Soft Keys)

Different character styles are used to indicate actions requiring the reader to press either a hard or soft button, switch or key. Physical hardware, such as buttons and switches, are called hard keys because they are hard wired or mechanical in nature. A keyboard or on/off switch would be a hard key. Software or computer generated buttons are called soft keys because they are software generated. Software driven menu buttons are an example of such keys. Soft and hard keys are represented differently in this publication.

Example: Hard Keys

A power switch **ON/OFF** or a keyboard key like **ENTER** is indicated by applying a character style that uses both over and under-lined bold text. This is a hard key.

Example: Soft Keys

Whereas the computer **MENU** button that you would click with your mouse or touch with your hand uses over and under-lined regular text. This is a soft key.

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3 Procedure

3.1 Detector Rear Heater Replacement

Prerequisites

Table 1 Personnel requirements

Required persons	Preliminary requirements	Procedure	Finalization
3	minutes	8 hours (without system calibration)	Fast calibration for each system

Table 2 Tools and test equipment

These Tools are NOT supplied with this Heater Replacement kit				
Item	Quantity	Effectivity	Part number	Manufacturer
12mm long hex driver	1	-	(supplied with system)	-
VCT lift arm assembly	1 set	-	(supplied with system)	-
Hex driver extension for counter weight holder	1	-	(supplied with system)	-
Torx Power Bit T20	1	-	(supplied with system)	-
10mm hex bit socket drive – supplied with system	1	-	(supplied with system)	-
FE torque wrench kit	1	-	46-268445G1 or 5135228 or equivalent	-
Large Torque wrench for gantry balance –	1	-	46-268521G1, order from Tool Depot	-

Tools and test equipment continued				
These Tools are NOT supplied with this Heater Replacement kit				
Item	Quantity	Effectivity	Part number	Manufacturer
VCT chain hoist (Chain hoist with roller arm/hook instead of 2 hooks will not work)	1	-	order from Tool Depot	-
Module alignment gage (Optional)	1	-	5172309, order from Tool Depot	-
These Tools are supplied with this Heater Replacement kit				
Item	Quantity	Effectivity	Part number	Manufacturer
Seating tool for Halo and HD	1	-	5224687	-
Seating tool for L-fine , Saturn outer slot	1	-	5134928	-
Bias tool for Halo inner, VCT etc	1	-	5134603	-
Bias tool for L-fine Saturn outer	1	-	5164726	-
Heater rework scraper 200B	1	-	5344178	-
Center guide S	1	-	5452623	-
Side guide S	16	-	5455104	-
Handy Roller	1	-	5454287	-
DAS-Detector Lift Hook Assembly	1	-	5142366	-
Thread Protector	2	-	5125078	-
Cushion to protect pins of card cage	2	-	5818855	-
Module keeping bag	57	-	5138897	-
Soft hummer	1	-	5818856	-

Table 3 Consumables

These items shall be prepared at field side.				
Item	Quantity	Effectivity	Part number	Manufacturer
Isopropyl alcohol or Ethanol or Equivalent to clean-up adhesive	1 bottle	-	-	-
Soft cotton cloth/ Paper wipers/ paper towels/ waste cloth	-	-	-	-
Hand towels for clean-up	-	-	-	-
Loctite 242 or 243	-	-	-	-
Tie-wraps(zip-tie)	AR			

Table 4 Replacement parts

These parts are supplied with this Heater Replacement kit				
Item	Quantity	Effectivity	Part number	Manufacturer
VCT 3 Zone Heater RoHS	2pcs (one for spare)	-	5315086	-
Adhesive tape with nickel mesh	4pcs x 10m x 20mm 4pcs x 20mm x 30mm	-	-	-
M12 150mm screw	5pcs (4x for End Plate screws, 1x for Top Mount screw)	-	-	-
M12 nut	2pcs (2x for Detector rail nut)	-	-	-
40mm Washer	2pcs (For Detector rail nut)	-	-	-
30mm Center mounting Washer	1pcs (For Detector Top Mount screw)	-	-	-

Table 5 Safety





		<p>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.</p>
		<p>Follow ALL required safety and PPE procedures customary for your organization, when working on this product.</p>
<p>NOTE</p> <p>Follow ALL required safety stated at each system service manual.</p>		

Table 6 Required conditions

Condition	Reference	Effectivity
Only trained service personnel should service the GE CT Scanner.	-	-
Static strap and monitor must be used when working inside the detector.	-	-

Overview

This procedure describes how to replace the Detector rear heater for 64/32Slice VCT system. The Detector models are:

- Sherlock
- Halo
- Sturn
- LS32
- Colorado

Last Revised:	March 26, 2019
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NOTICE

The following parts damage may occur if you are not careful. Extreme care must be taken.

- Plenum locating pins on both end of DAS
- Digital connectors in between modules and backplane.
- Alignment pins and slots of module sensor and detector collimator.
- All other parts harness etc.

3.1.1 Gantry preparation

Procedure

1. Move the table full back out of the gantry but leave it up to use as a work table.
2. Stop the rotor of X-ray tube in case of Liquid Bearing Tube before HVDC off. Refer to Liquid Bearing Tube Rotor stop procedure for details.
3. Remove the right side gantry cover and disable Axial Drive and HVDC from the service switch panel.
4. Position the detector at 12 o'clock and lock gantry rotation.
5. Shut down all gantry power from the service switch panel.
6. Remove all gantry covers.

Refer to **Replacement > Gantry > Enclosure > (Cover Removal Procedures)**.

7. Cover the Tube Collimator port to protect it against dropped tools or screws. (Cloth or any other available item)

3.1.2 Resistance Check of the Rear Heater

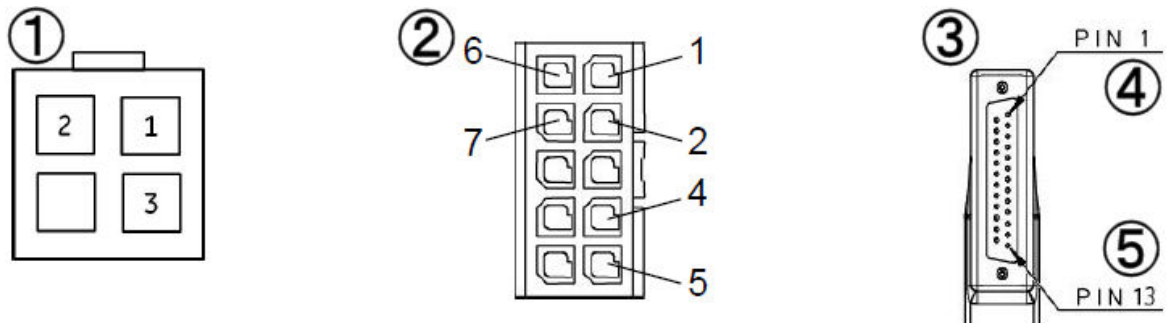
Procedure

1. Disconnect two connectors of the front heater from the routing board.
2. Disconnect J1 (for old type DHC: J3) cable connector from the DHC.
3. Measure the resistance of the rear heater with reference to the following check items.

	Measuring Point A	Measuring Point B	Resistance
Low Channel Side	Routing Board J6-3pin	Detector Frame	□ Open
	Routing Board J6-3pin	DHC Cable J1-10pin (J3-7pin for old type DHC)	□ 25~35Ω
High Channel Side	Routing Board J5-1pin	Detector Frame	□ Open

(continued)			
	Measuring Point A	Measuring Point B	Resistance
	Routing Board J5-1pin	DHC Cable J1-8pin (J3-2pin for old type DHC)	□ 25~35Ω
	Routing Board J5-2pin	Detector Frame	□ Open
	Routing Board J5-2pin	DHC Cable J1-13pin (J3-5pin for old type DHC)	□ 10~15Ω

Figure 1 Connectors



①	Routing Board J5/J6 Connector
②	DHC Cable J3 (Old Type) Connector
③	DHC Cable J1 (New Type) Connector
④	Pin 1
⑤	Pin 13

If the resistance is not within specification, need to replace rear heater.

3.1.3 Balance Weight and Air Plenum Removal

Procedure

1. Remove the gantry balance weights over top of the detector casting. Keep them in order to put them back in the exact same order when done.
2. Remove the Detector Air Plenum as shown in Detector Air Plenum Removal/Installation.

NOTE

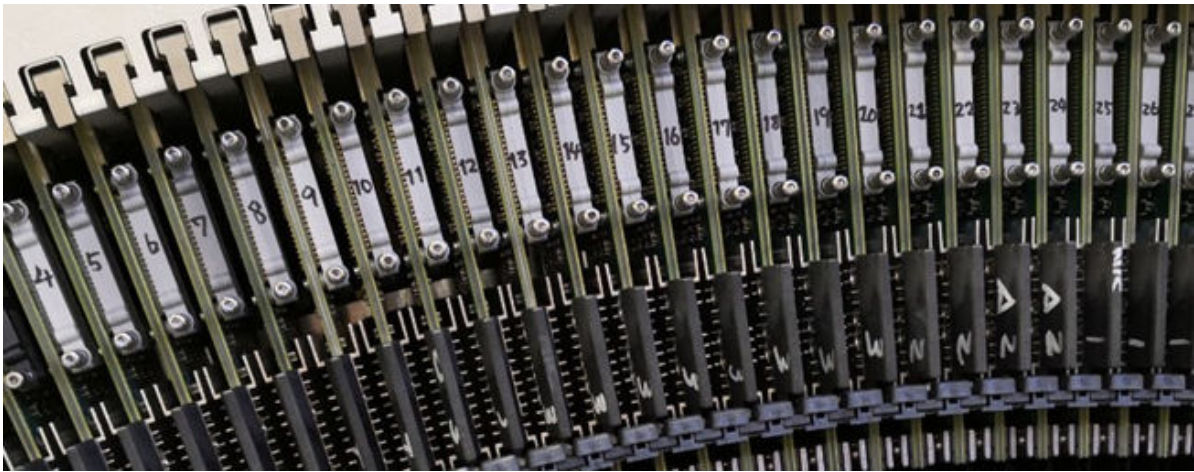
Reminder that using the mouse right button on the above document link and selecting "Open in new Window" will keep this document open at the same time for ease in use. Can leave the Air Plenum instructions open for later use when reinstalling the plenum.

Figure 2 Without Balance Weight and Air Plenum

3.1.4 FRDM removal

Procedure

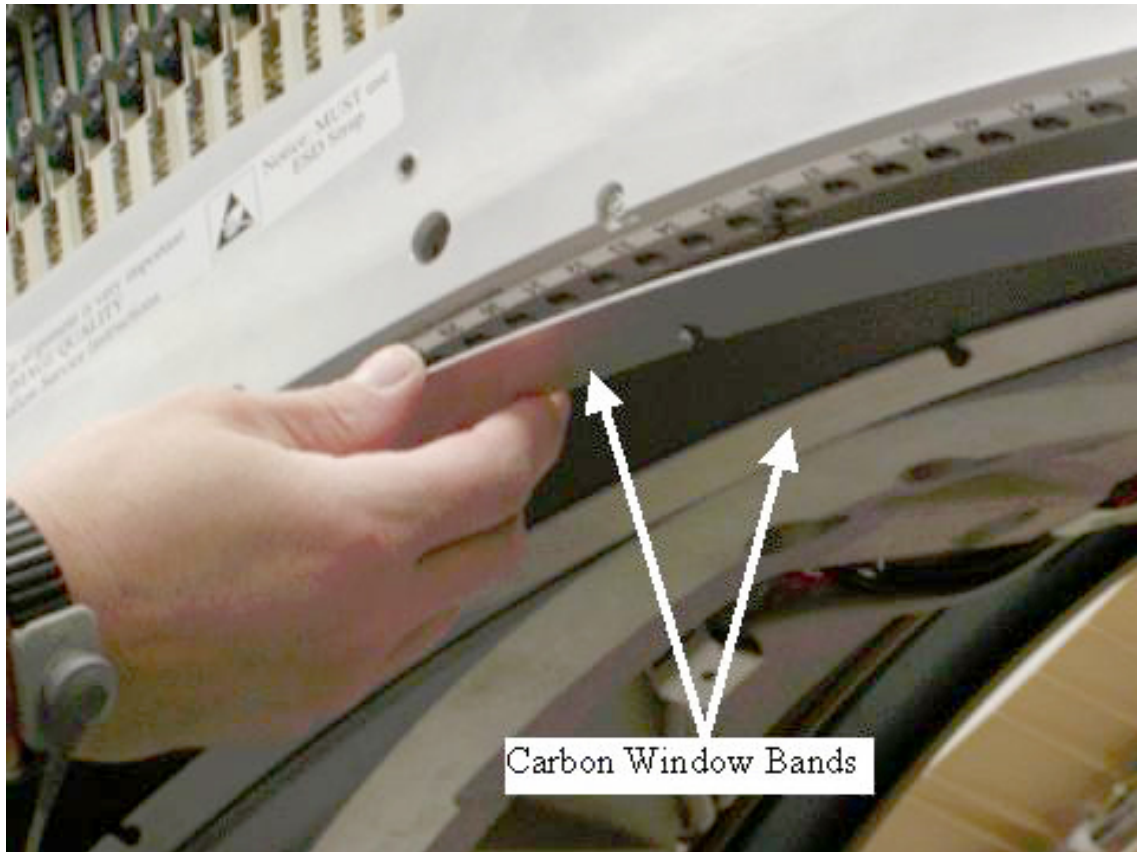
1. Mark the slot position number on each module, before removing the FRDM. All modules must be returned to exactly the same slot.

Figure 3 Numbering on Module

2. Remove all FRDMs as follows, and keep the removed FRDM with the ESD plastic bag included in the tool kit.
 - a. Make sure ESD strap is in use prior to continuing.
The order of the following steps is critical to success. Do **NOT** change the order. Read each step and cautions completely prior to performing that step.
 - b. Remove cover band end screws (not captive) and loosen 4 middle screws, then slide off the screw cover bands. See [Figure 4 on page 16](#). Remove the middle screws if needed, the cover bands are slotted in the middle.

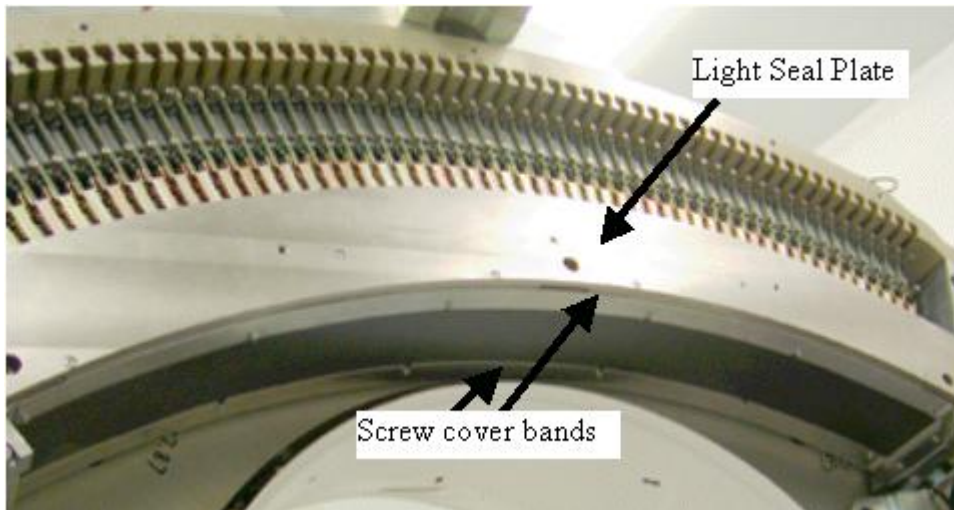
If any of the cover band screws are right next to the screw holes for the module being replaced, those screws will need to be removed so they don't interfere with the module seating tool used during module installation.

Figure 4 Screw Cover Bands

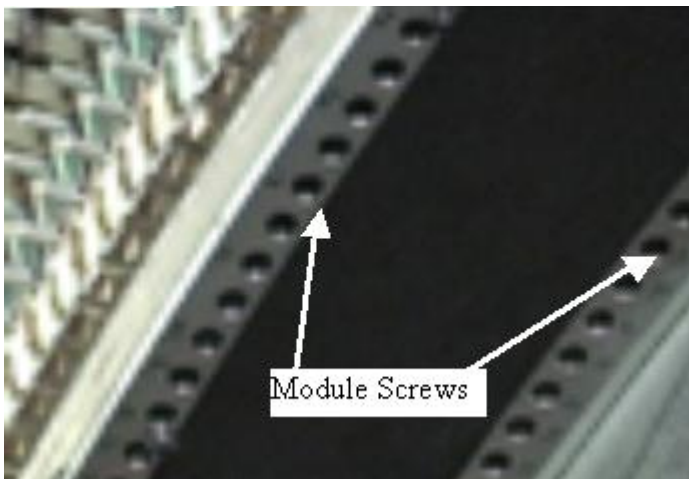


- c. Remove torx screws (not captive) on the light seal plate with the supplied bit, then lift off the light seal plate. See [Figure 5 on page 17](#).

If the detector does not have torx screws on the light seal plate, the use a hex wrench to remove the screws. Replace with torx screws supplied with the replacement module during reassembly. Early detectors had hex head screws that will deform with usage.

Figure 5 Light Seal Plate

- d. Put on gloves (supplied with system) before continuing to avoid introducing any contaminants on the detector module or around the detector collimator.
- e. Remove module screws on either side of carbon window for the module being replaced. See [Figure 6 on page 17](#).

Figure 6 Module Screws

- f. Completely loosen the digital cable thumb screws until they pull back freely from the backplane. Do **NOT** release the wedge clamp yet. See [Figure 7 on page 18](#).

Figure 7 Digital Screws and Wedge Clamp



- g. Pull both cable screws away from the backplane approximately 3/8" (8mm) to release the cable edge card connector from the backplane.
- h. Remove the light seal clip on each side of the module. Use the Multi-Tool supplied as shown in [Figure 8 on page 19](#). There are two different designs for this tool (see [Figure 9 on page 19](#))

NOTE

Early 64 slice Sherlock (VDAS64) detectors and all 32 slice detectors manufactured before JULY 2009 did not have light seal clips so this step can be skipped if the clips are not installed.

- Insert the MultiTool pin into the Light Seal clip hole, tilt the tool up to pull clip out then pull straight out to finish removing clip.
- Tool has a magnet to keep metal clips from falling into gantry during removal. The newer clips are plastic, so make sure to catch these clips during removal, as the magnetic tool will have no effect.

Figure 8 Light Seal Clip Removal

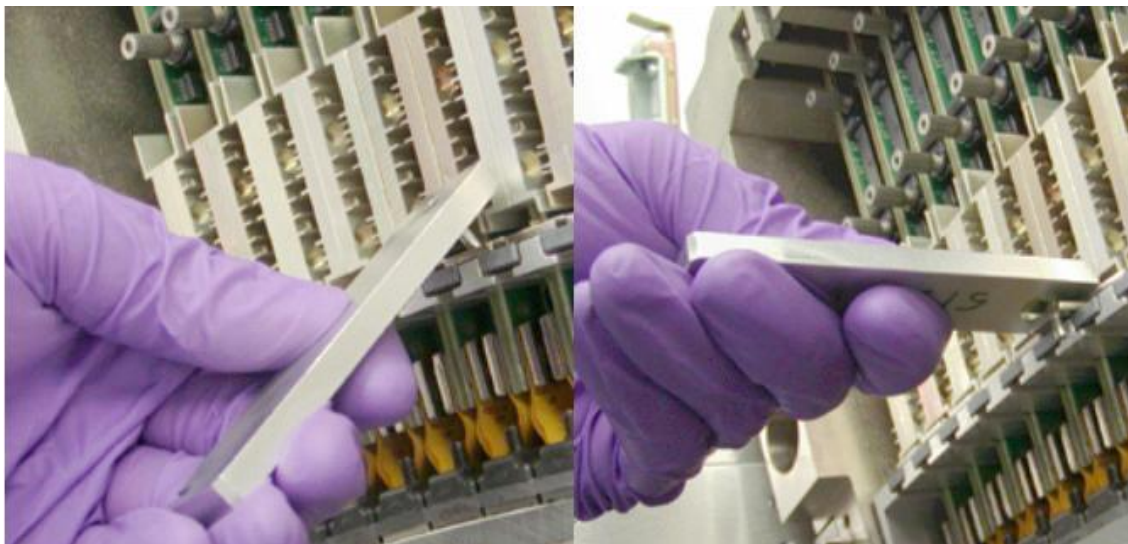
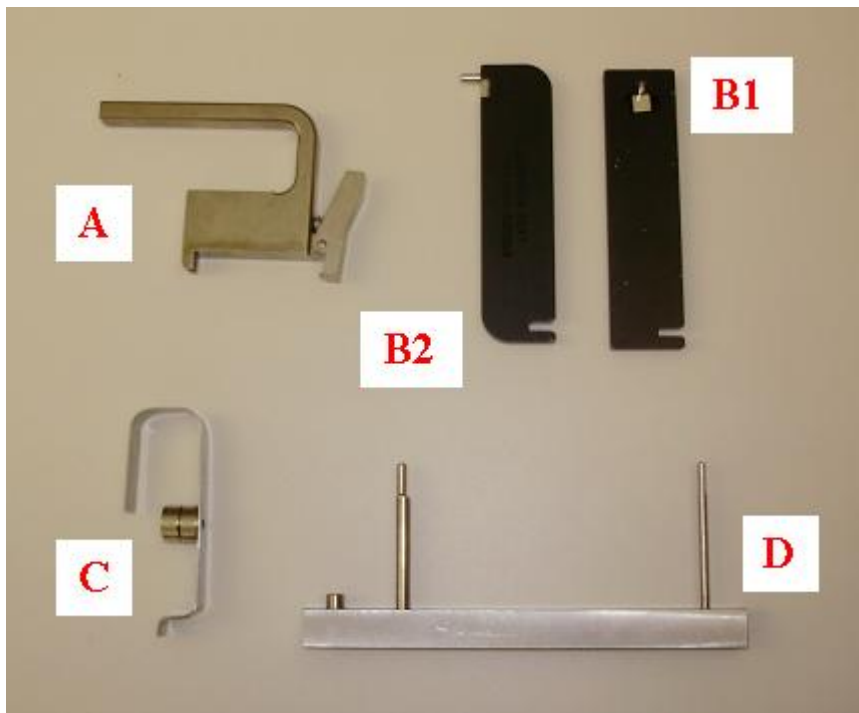


Figure 9 Special Tools



- i. Release and remove the wedge clamp.
Releasing the wedge clamp prior to disconnecting the digital cable from the backplane can damage the digital cable screws or the backplane connector.
- j. Slide the ESD plastic sheet between the AD board and heat sink, along the Z direction, as shown in the left illustration in [Figure 11 on page 20](#). If module is between two modules, two ESD plastic sheets are required, one in front and one in back of module as shown.

If necessary, gently wiggle the sheet while inserting to place as far into the detector as possible, but do not force the sheet in place with excessive pressure.

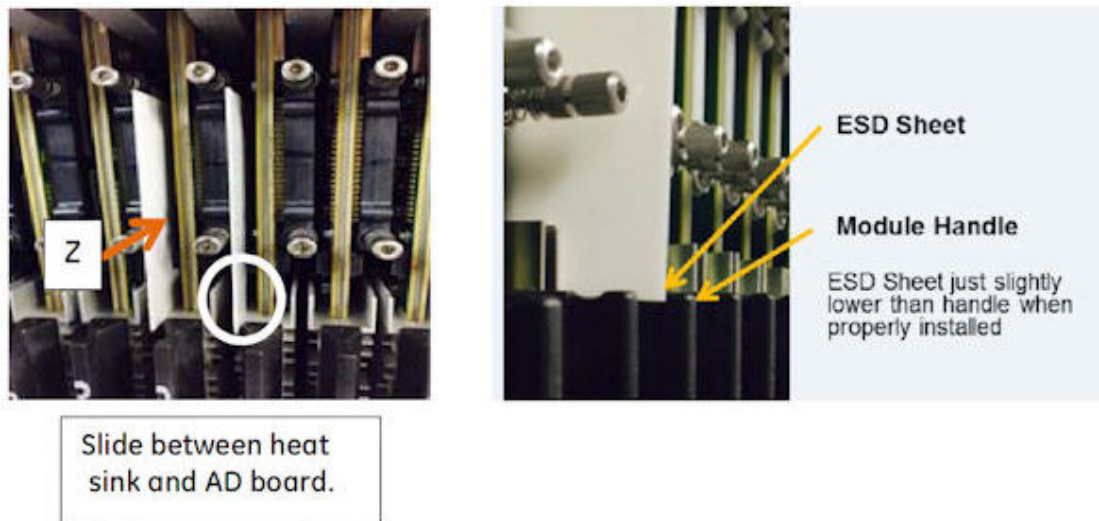
The ESD plastic sheet should be just slightly below module handle when properly inserted.

Figure 10 ESD Plastic Sheet



0.031 IN TH X 3.5 IN WD X 5 IN LGTH Acetal Static Dissipative material (GE Part# 5719795)

Figure 11 Usage of ESD Plastic Sheet



- k. Hold onto the module built in black handle and one of the digital cable screws. Lift the module up until the Light seal collar completely clears the brackets it is resting between then slide it out. See [Figure 12 on page 21](#) and [Figure 13 on page 22](#).
- Module alignment notches on the Light seal collar and the pins at the other end of the board must clear the alignment slots to allow the module to slide out of the detector.
 - A digital cable screw can be held with the other hand to aid in guiding the module up and out if needed.
 - If the module does not seem to move up, check the digital cable. Make sure it is released from the backplane.
 - If the module seems to be stuck to the rail such that the flex connections are pulling up when the entire assembly is lifted up, **STOP**. Completely insert the Controlled Seating Tool (seen in [Figure 55 on page 59](#)) into the detector rails for that module. This will keep the module from hitting the detector collimator plates while you gently push up with a

finger on the detector module front edge to release it from the detector rails. Remove the seating tool and continue to remove the module from the detector.

Figure 12 Module Removal

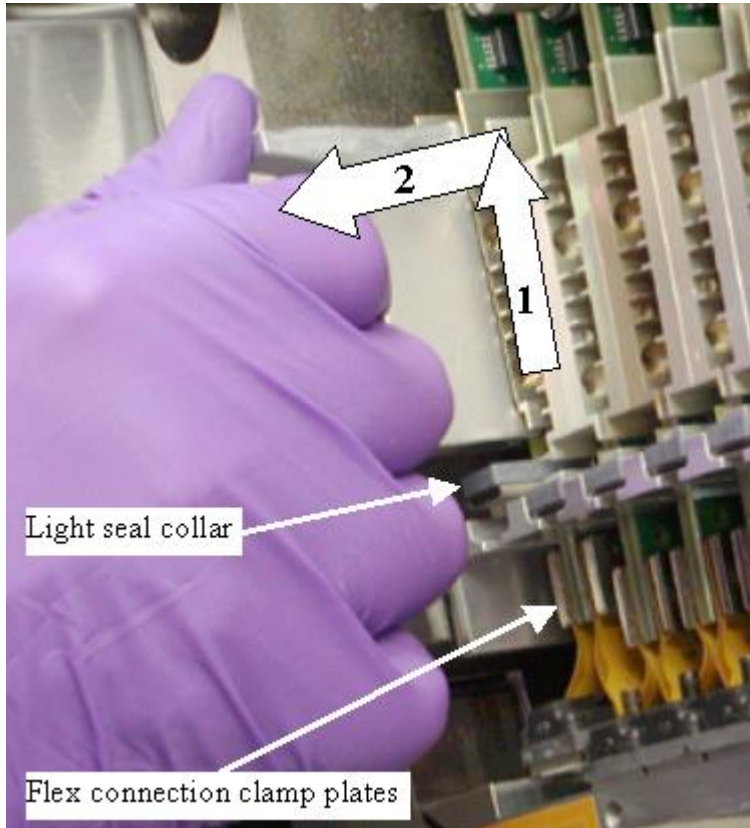
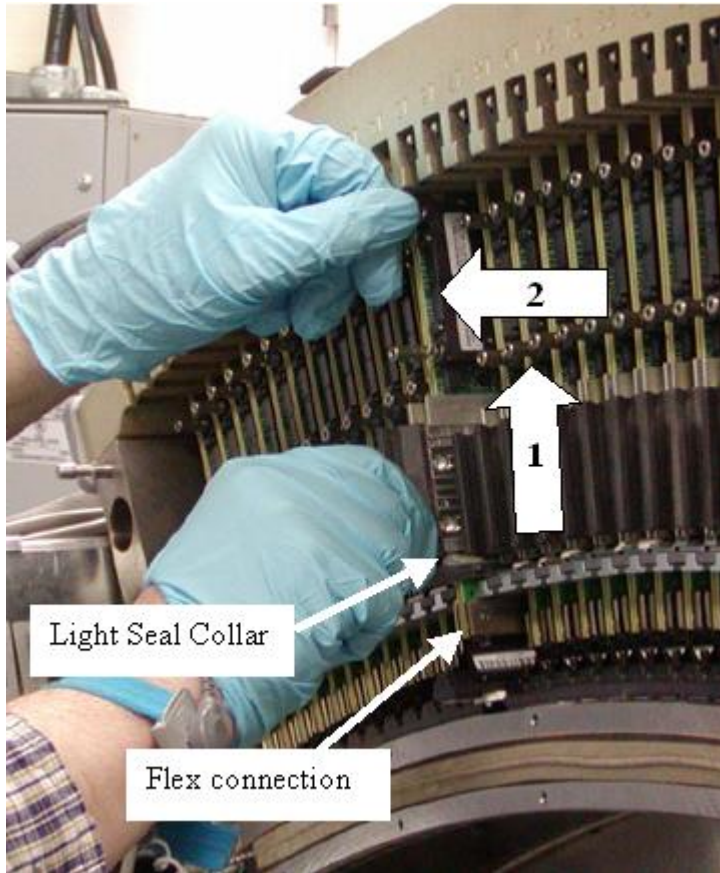


Figure 13 Module Alignment Pins



NOTE

After removing the module avoid touching the flex connection or detector module face. Hold the module by the heat sink or metal bracket on the opposite end of the of the assembly.

- i. After removing the module visually inspect the detector rails to see if any Thermal Mount pads from the detector module were left (Some early modules had this problem). The module front end can also be inspected to see if both side pads are still in place. See [Figure 14 on page 23](#). The pads are seen as thin white squares on the plates that the mounting screws go through. Carefully remove any pads left on the rails without touching the detector collimator plates. Any damage to the collimator plates will require full detector replacement. Procedure VCT Detector Thermal pad Removal must be used to remove any thermal pads.

Figure 14 Detector Module Front End

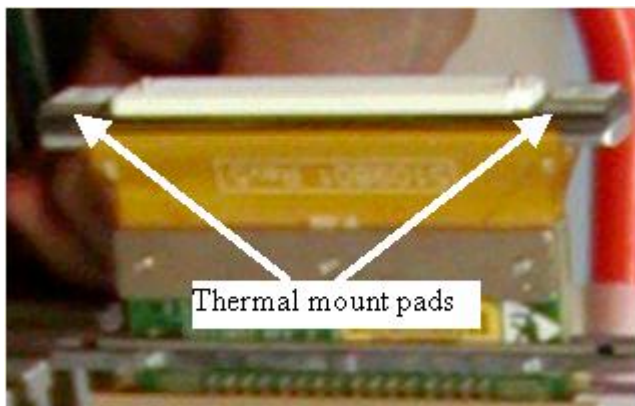


Figure 15 Digital Detector Housing

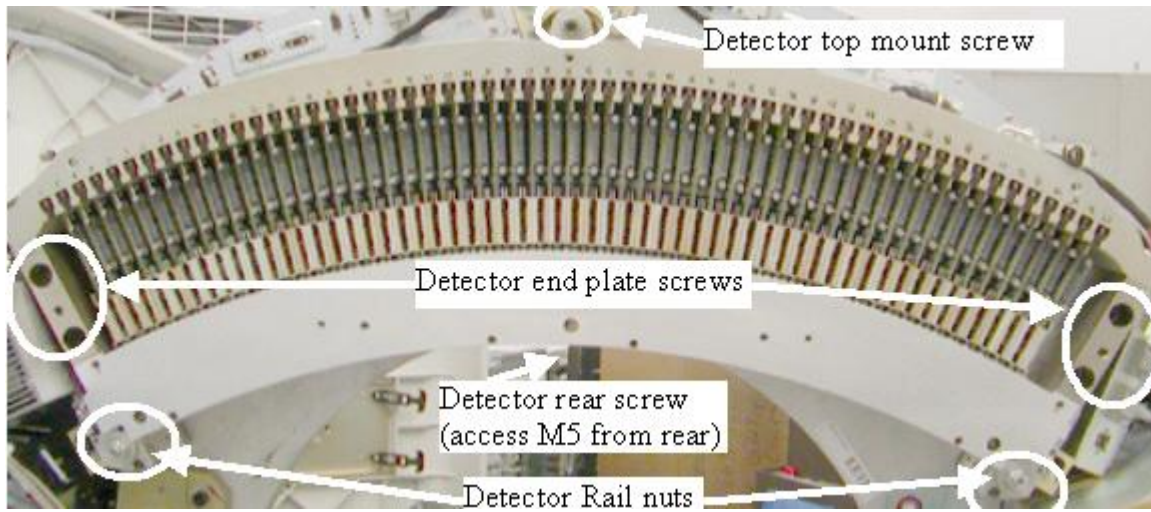


3.1.5 Detector removal from Gantry

Procedure

1. Install the gantry lift fixture with detector extension arm and the chain hoist.
2. Remove the detector top mount screw and discard only the screw, keep the large washer (new mount screw supplied). See [Figure 16 on page 24](#).

Figure 16 Digital Detector Mount Points



3. Move the top cover support out of the way.
 - a. Use a marker to draw a line on the top cover mount joint such that it can easily be put back in place later.
 - b. Remove the bottom screws and loosen the top screws of the top cover mount to pivot it up and out of the way.



POSSIBLE FALLING OBJECT

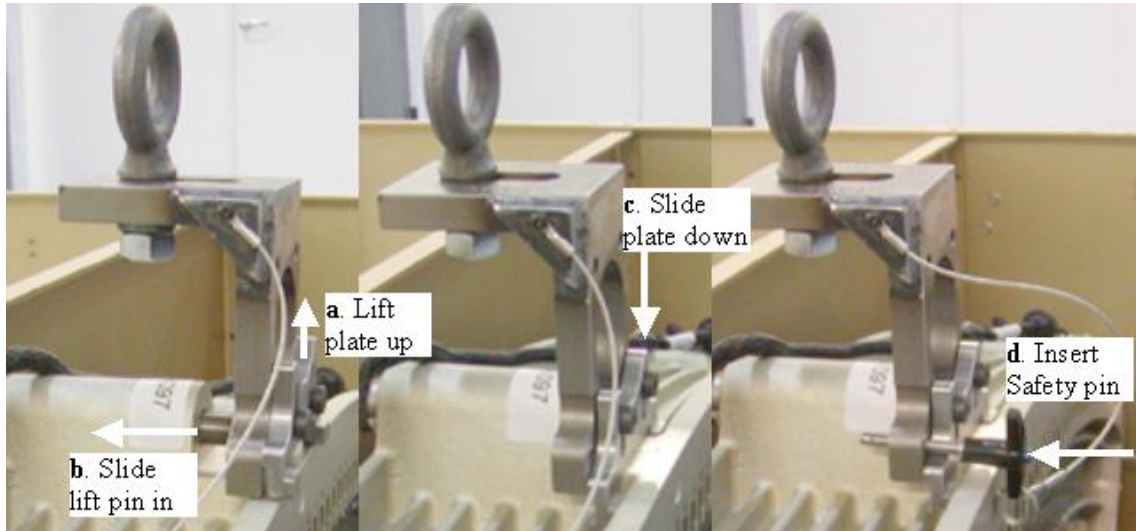
Detector may fall off hoist if the detector lift hook is not properly installed

Make sure the slide plate is pinned in the “down” position prior to moving detector

4. Attach the lift hook to the Detector top mount screw hole. The rod is inserted into the top mounting hole and the slide fits down into the casting to lock the lift hook in place. Make sure the safety pin is installed to keep the slide portion of the hook captive in the detector top casting.
 - a. Lift the slide plate up to allow the lift pin to be inserted into the detector top mount hole.
 - b. Slide the lift pin completely into the top mount hole.
 - c. Make sure the slide plate is down behind the front edge of the detector casting.
 - d. Insert the safety pin into the hole on either side of the slide plate to lock the plate in the down position.

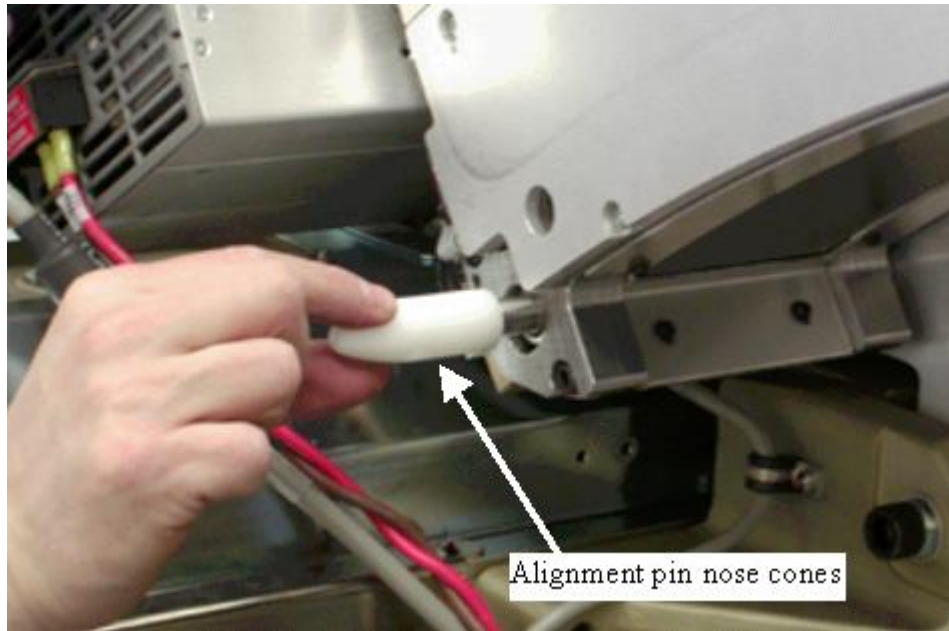
NOTE

#id_SL2527879-421872/SL930356-421872 shows hook installation on detector in crate for clarity without extra components in the way. On the gantry, the balance weight failsafe rod goes through the large hole seen in the lift hook. The failsafe rod does not exist on older VCT systems.

Figure 17 VCT Detector Lift Hook

5. Attach the hoist to the lift hook and take up slack on the chain.
6. Remove the 4 detector end plate screws (2 on each end) and discard the screws keeping the washers.
7. Remove 2 detector rail nuts and discard. New nuts are in the supplied mounting kit.
8. Attach the alignment pin nose cones on each side of the detector to protect the threaded ends of the alignment pins during removal and installation. See [Figure 18 on page 26](#).

Figure 18 Alignment pin nose cones

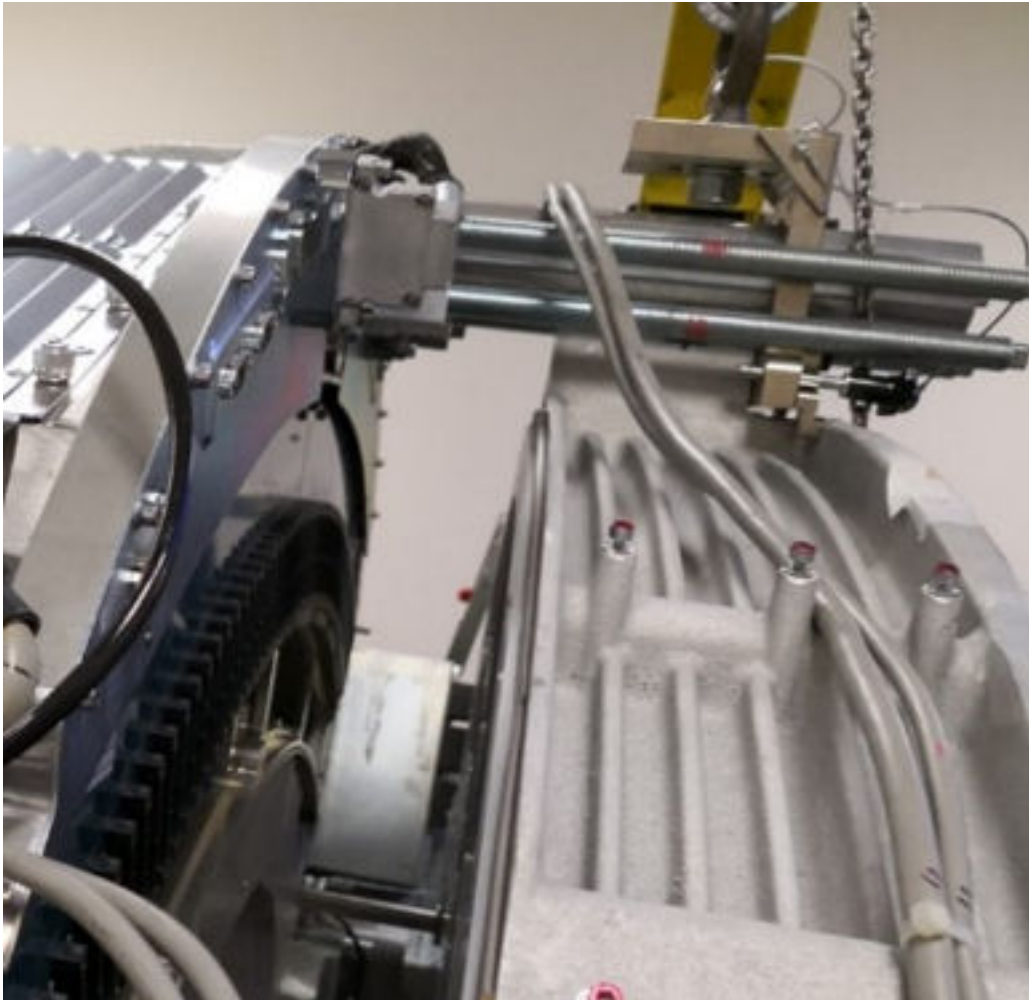


9. Remove the M5 hex screw (4mm hex wrench) from the rear of the gantry (keep and reuse this screw). See [Figure 16 on page 24](#).
10. Slide the digital detector away from the backplane to access the routing boards on either side of the detector.
11. Disconnect the black harness from both sides of the detector.
12. Slowly slide the digital detector away from gantry watching for any cable or other component obstructions.

NOTE

Detector is sensitive to high humidity. If there is a bag included in the crate for return, refer to the instructions supplied with the crate when repackaging the detector.

Figure 19 Detector Removal





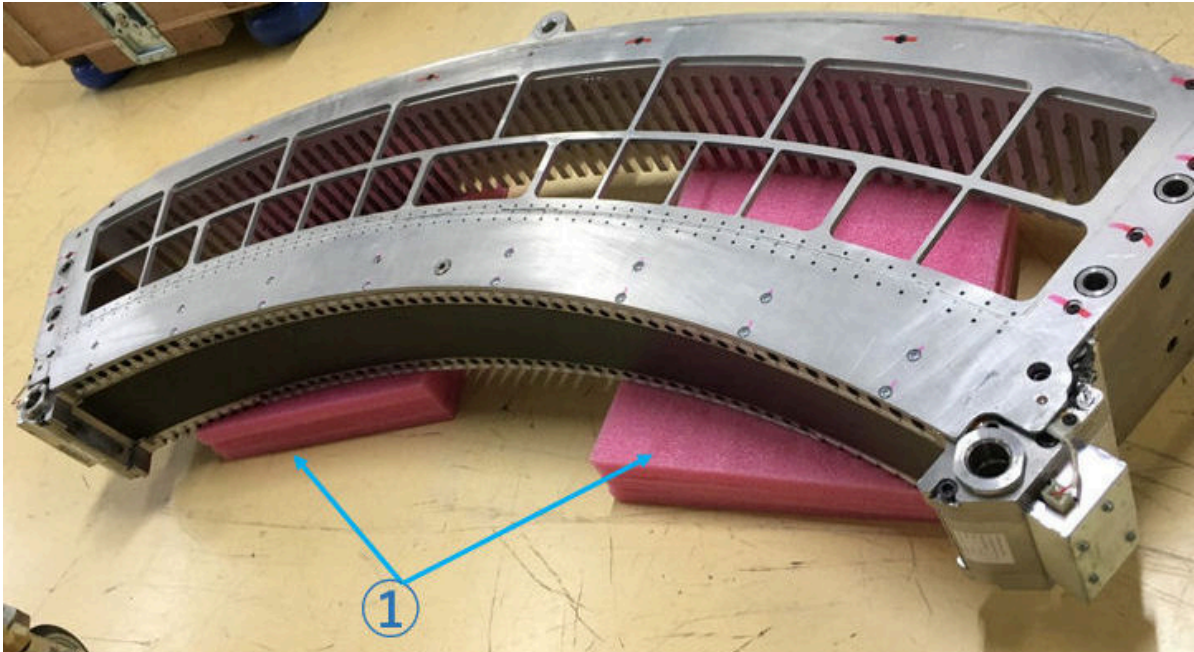
NOTICE

Do not damage the plenum locating pins on both sides of the DAS and thermistor cable, when lowering the Card Cage (Digital Detector Housing).

Figure 20 Thermistor cable



13. Lower the Card Cage (Digital Detector Housing) and place it on cushions with rear side up.

Figure 21 Detector on Cushions

①	Cushions. Use pink Foams included in Rear Heater replacement kit.
---	----------------------------------------------------------------------

3.1.6 Card Cage Panel removal



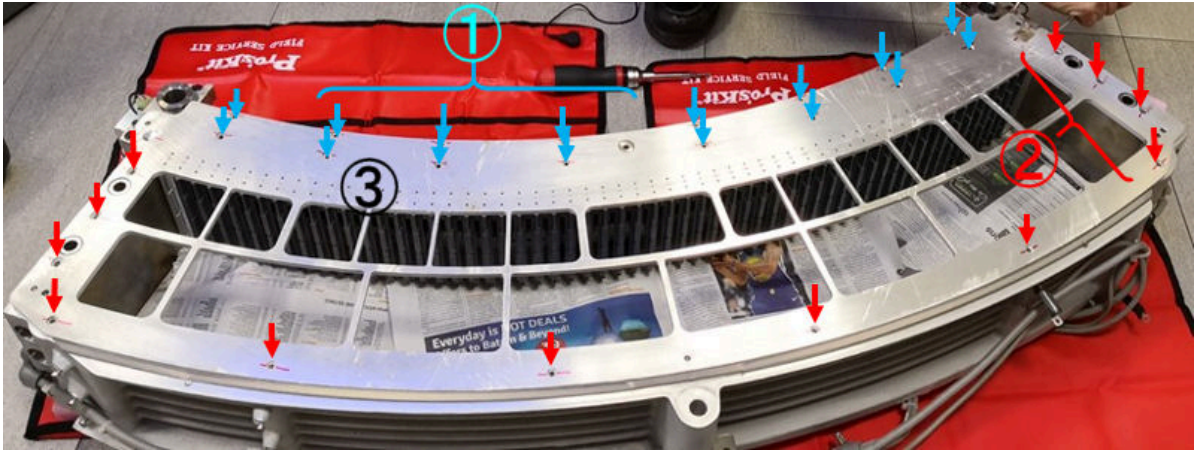
NOTICE

Do not deform the card cage panel and positioning pins when removing the card cage panel.

Procedure

1. Remove M4 Torx screws (x16) and M4 Hex screws (x12) using T20 screwdriver bit.

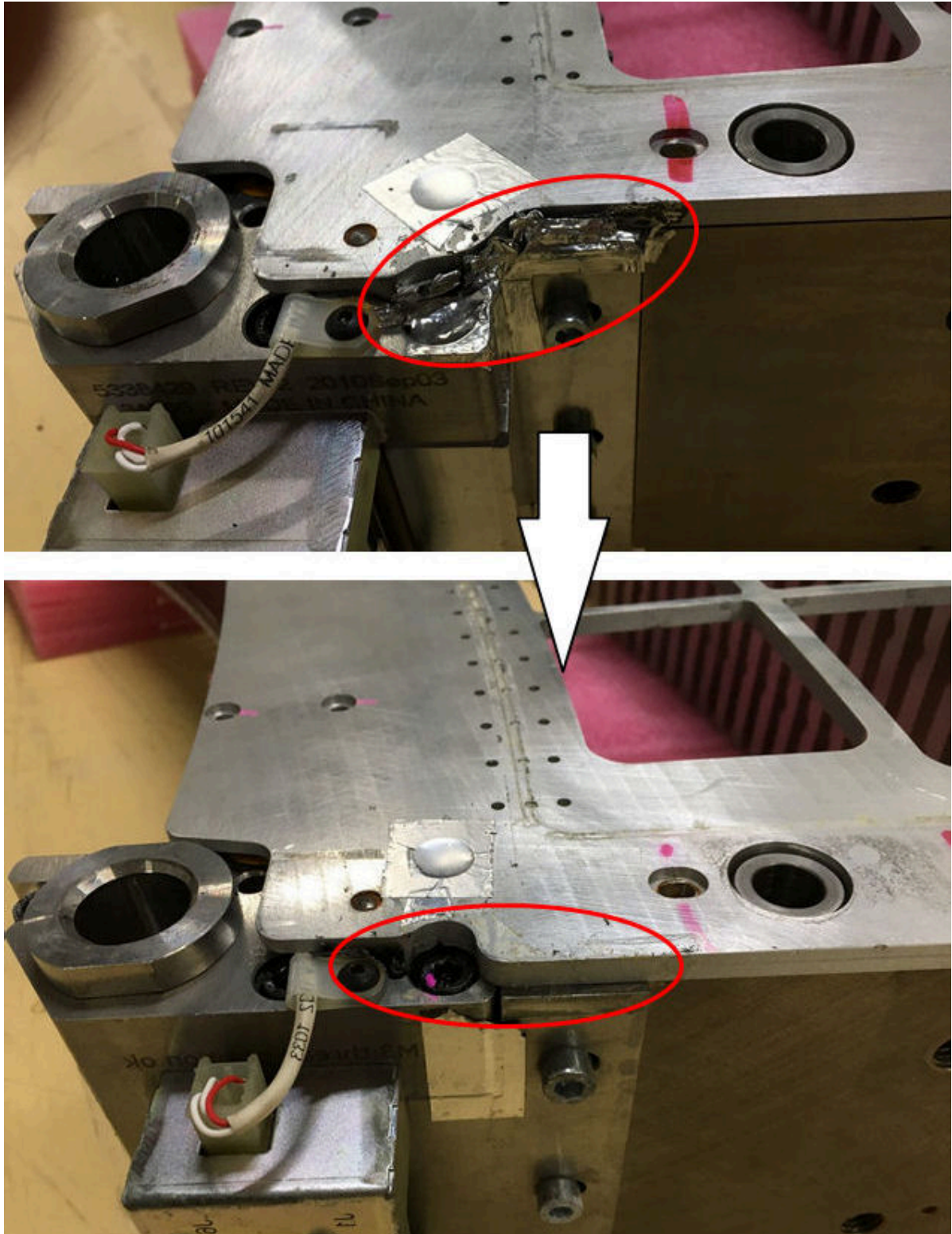
Figure 22 Screws Removal



①	16 pieces of M4 Torx Screws
②	12 pieces of M4 Hex Screws
③	Card Cage Panel

2. Remove the Aluminium tape.

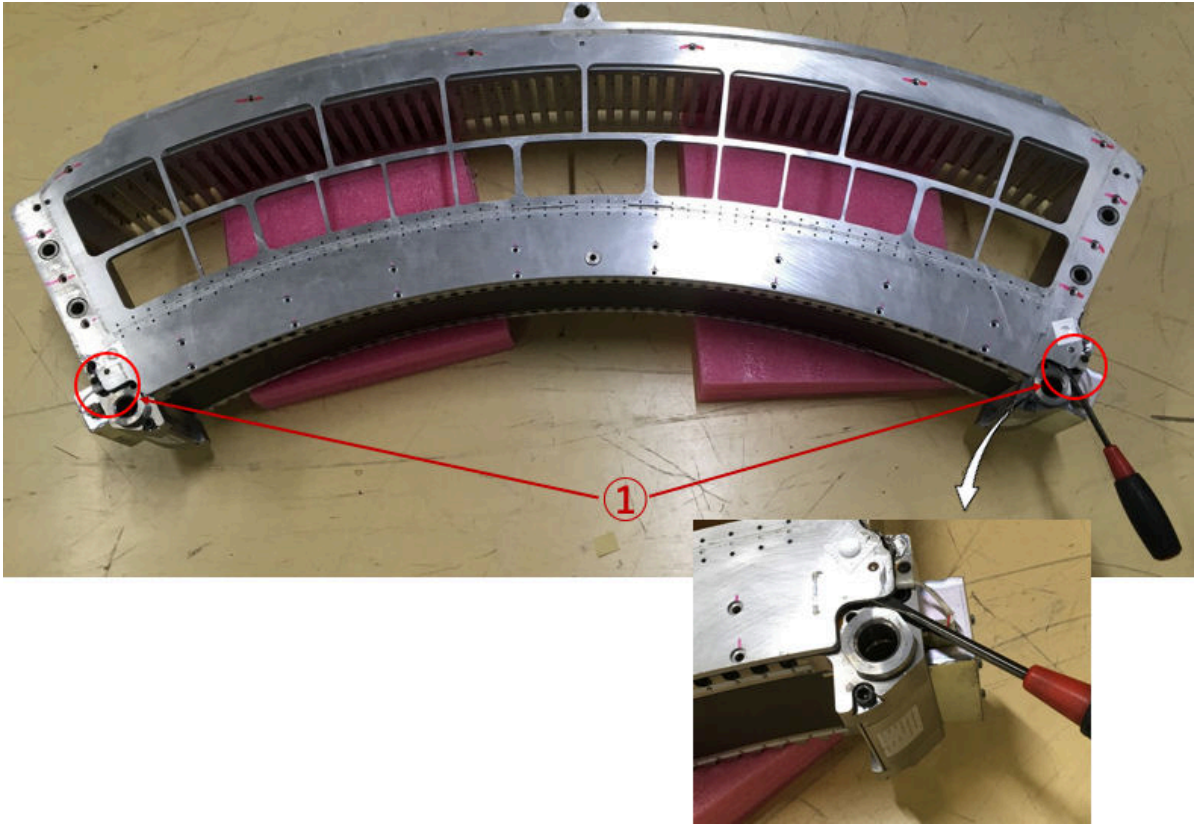
Figure 23 Aluminium tape Removal



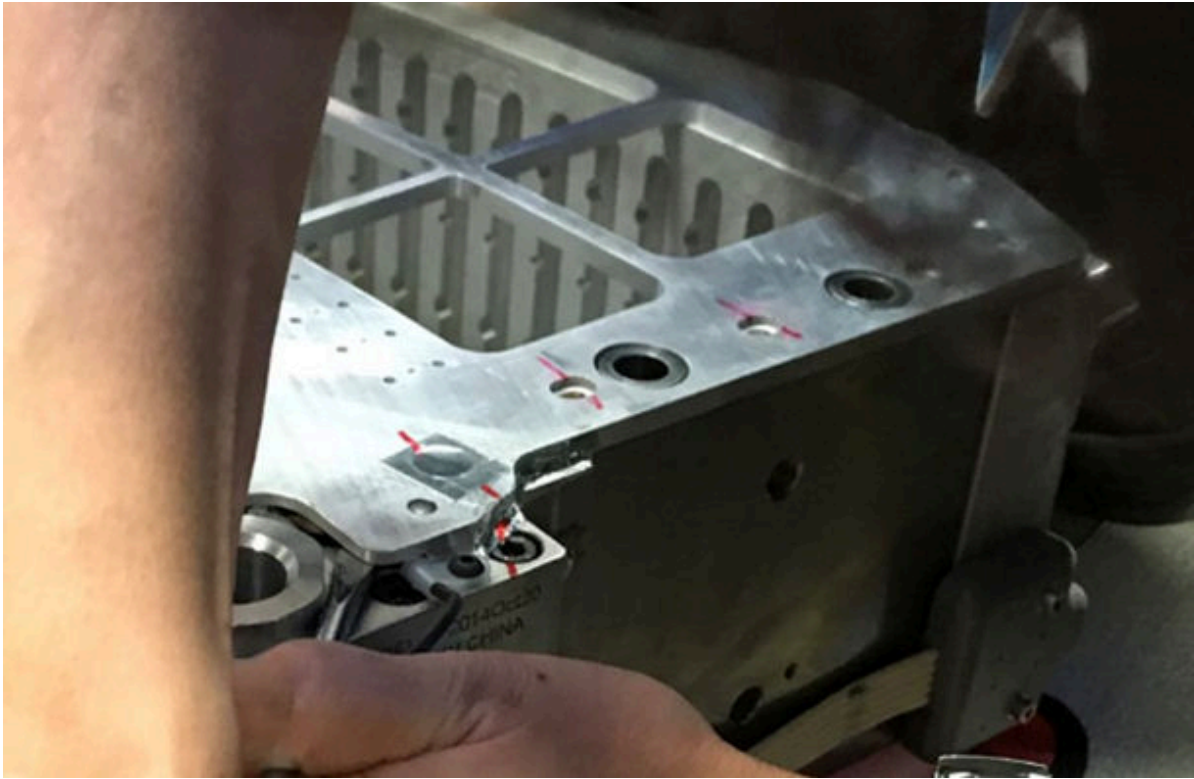
Procedure

3. Insert the tip of a flathead screwdriver into the space ① as shown in illustration below. Using a flathead screwdriver as a crowbar, lift the card cage panel slightly.

Figure 24 Card Cage Panel



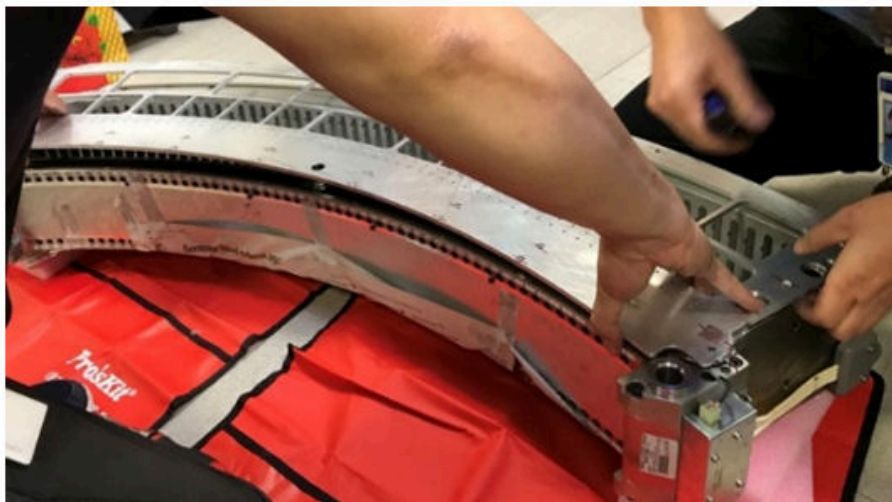
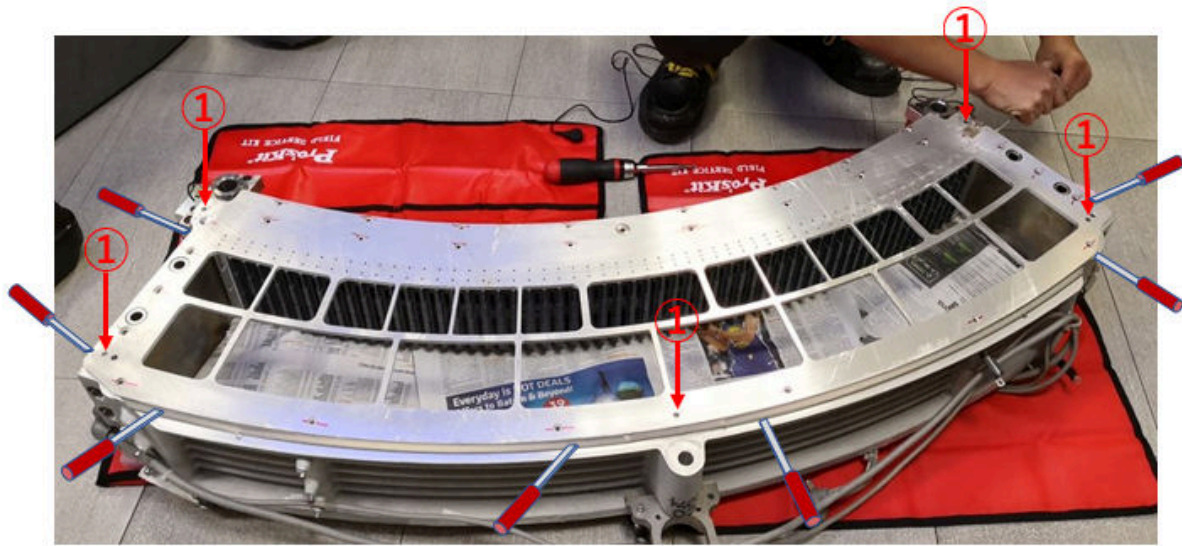
①	Space
---	-------

Figure 25 Side View - Card Cage**NOTICE**

Do not deform the card cage panel and positioning pins when removing the card cage panel.

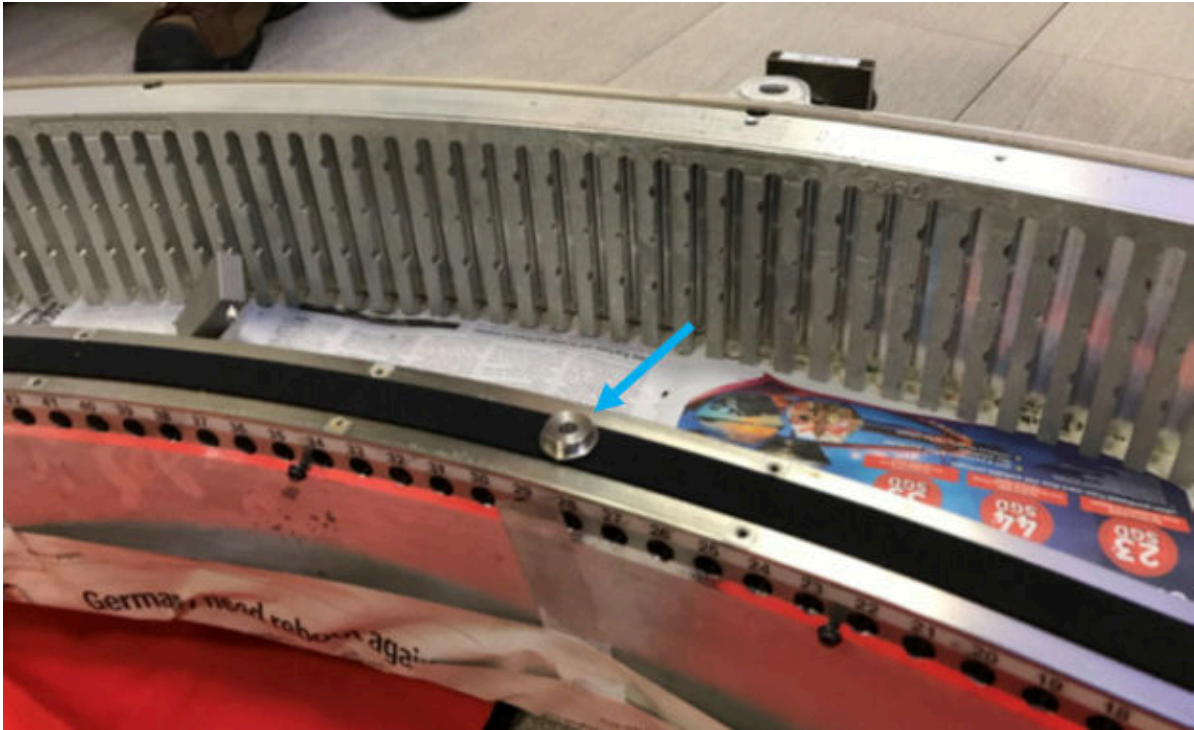
4. Insert a flathead screwdriver in the space created around between the Card Cage Panel and the Card Cage End Plate (left and right side) or the Card Cage Casting, and lift the Card Cage Panel gradually and evenly as in above step (step 2), then disengage the Card Cage Panel from the Card Cage Casting.

Figure 26 Card Cage Panel Removal



①	Locating Pin
---	--------------

5. Remove the center spacer and keep it.

Figure 27 Center Spacer

3.1.7 Rear Heater Removal

Disconnect the cable connectors of the heater and remove the Heater and Adhesive tapes from the detector rail. Keep the cable clamps and screws.

3.1.8 New Heater Attachment

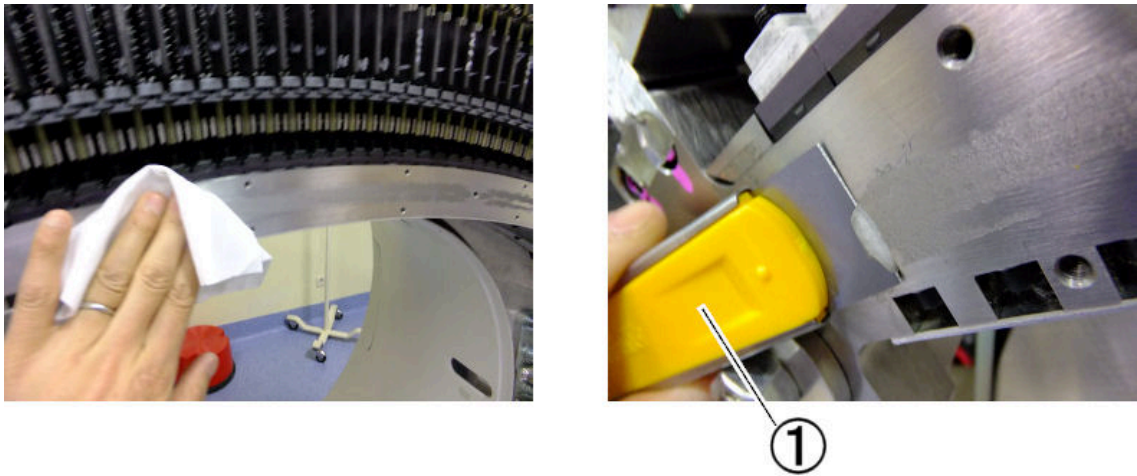
NOTE

Perform the replacement of the heater under the detector is mounted on the gantry. The illustrations in this procedure should be used only as a guide.

Procedure

1. Clean the surface of rail real side as follows:
 - a. Moisten the remaining (old) adhesive on the detector rail by alcohol pads (or equivalent).
 - b. Scrape the softened (macerate) adhesive off using a scraper.
 - c. Wipe off the remaining (old) adhesive completely from the attaching surface of the detector rail using alcohol pads (or equivalent).

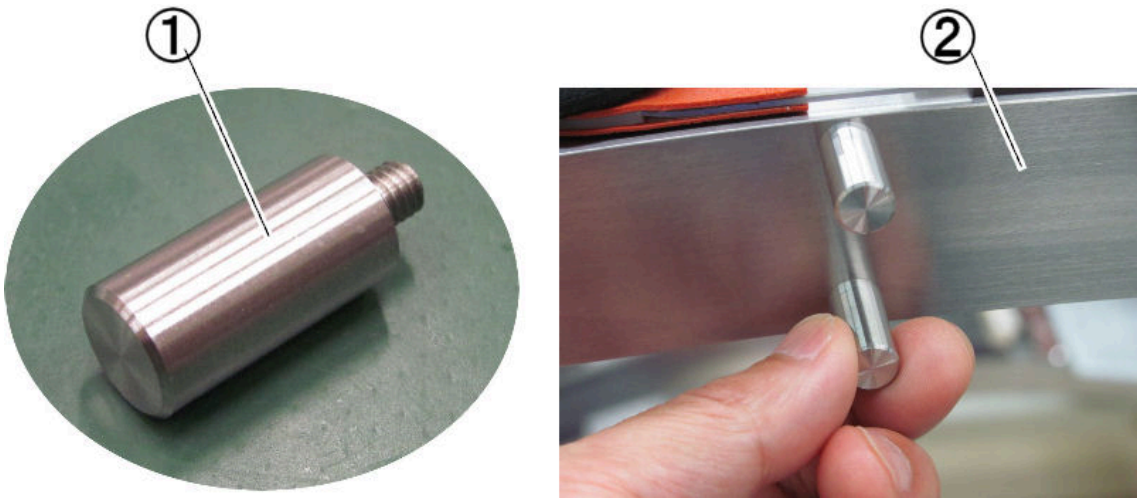
Figure 28 Detector Rail



①	Scraper
---	---------

2. Attach new heater on rear side of the rail as follows:
 - a. Set 16 guide pins to the lower and upper portion of the detector rail.

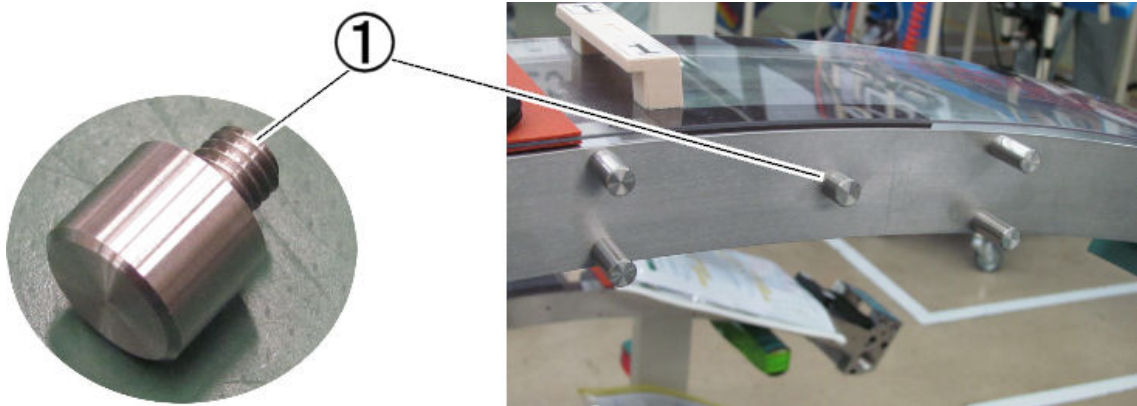
Figure 29 Guide Pin



①	Guide Pin
②	Detector Rail

- b. Set a center guide pin to the front rail.

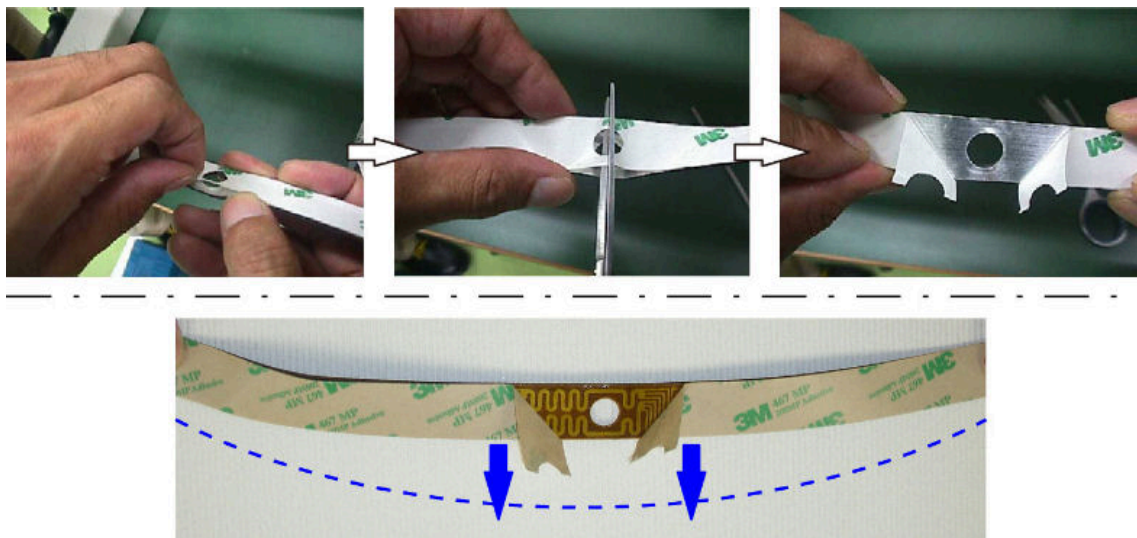
Figure 30 Center Guide Pin



①	Center Guide Pin
---	------------------

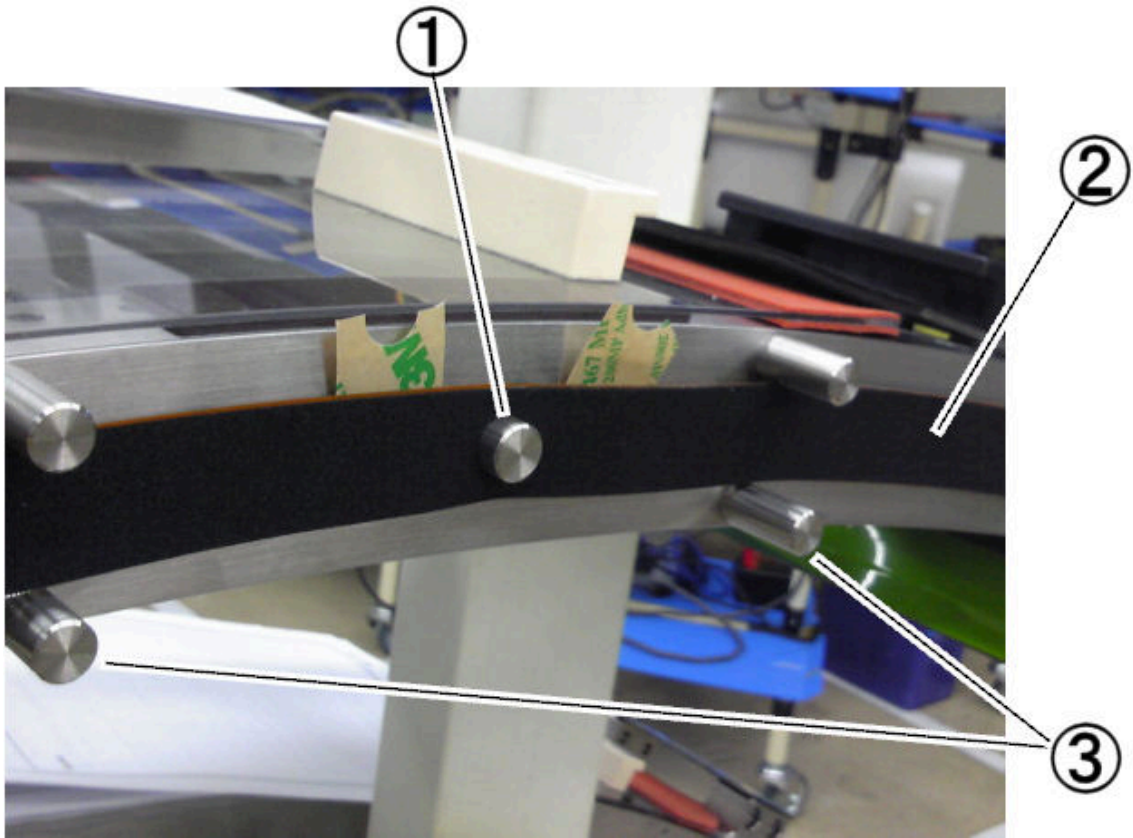
- c. Peel the backing sheet a few centimeters at the center portion of the heater, and make a cut in the backing sheet, then bend the backing sheet toward the outside of arc of the heater.

Figure 31 Backing Sheet of the Heater



- d. Set the center hole of the heater to the center guide pin temporarily, and put it on the lower eight guide pins.

Figure 32 Center Hole of the Heater

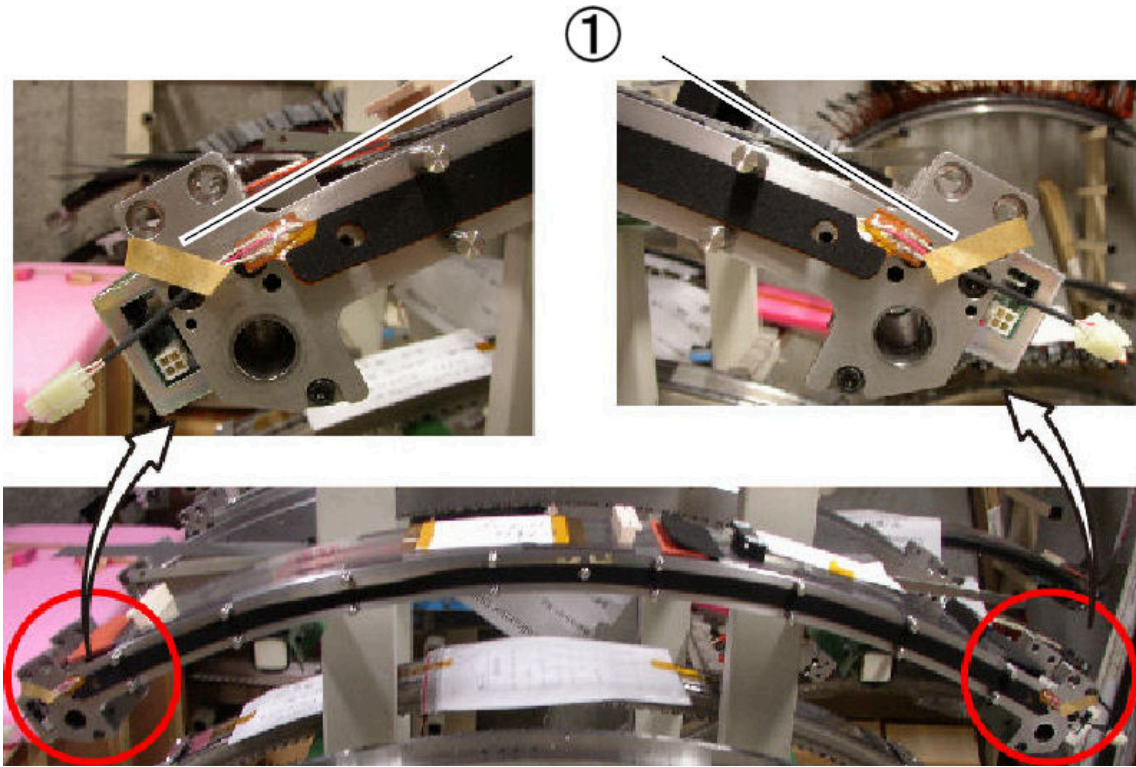


①	Center Guide Pin
②	Heater
③	Lower Guide Pin

- e. Adjust the position of the heater so that it is in the middle position between the lower guides pins and the upper guide pins.

If the both ends of the heater hang down, temporarily fix them using an adhesive tape.

Figure 33 Setting of the Heater



①	Adhesive Tape
---	---------------



NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !



NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !



NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

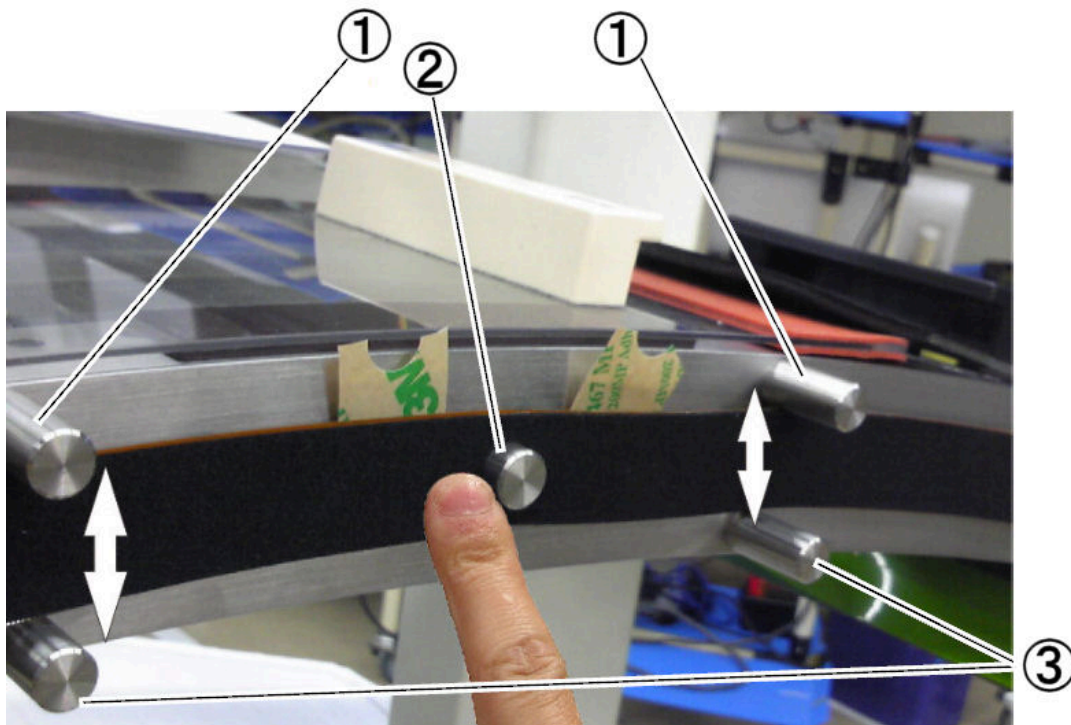


NOTICE

Do not adjust the position of the hole at the left end of the heater by stretching so that it is centered in the thermistor hole.

- f. At the left portion of the detector (low channel side):
 - i. Adjust the position of the heater so that it is in the middle position of the lower and upper first guide pins.
 - ii. Press the heater around the center guide pin by finger to attach it to the front rail.

Figure 34 Center guide pin and Heater Attachment



①	Upper First Guide Pins
②	Center Guide Pin
③	Lower First Guide Pins

- iii. Adjust the position of the heater so that it is in the middle position of the lower and upper first guide pins, and hold it by hand.

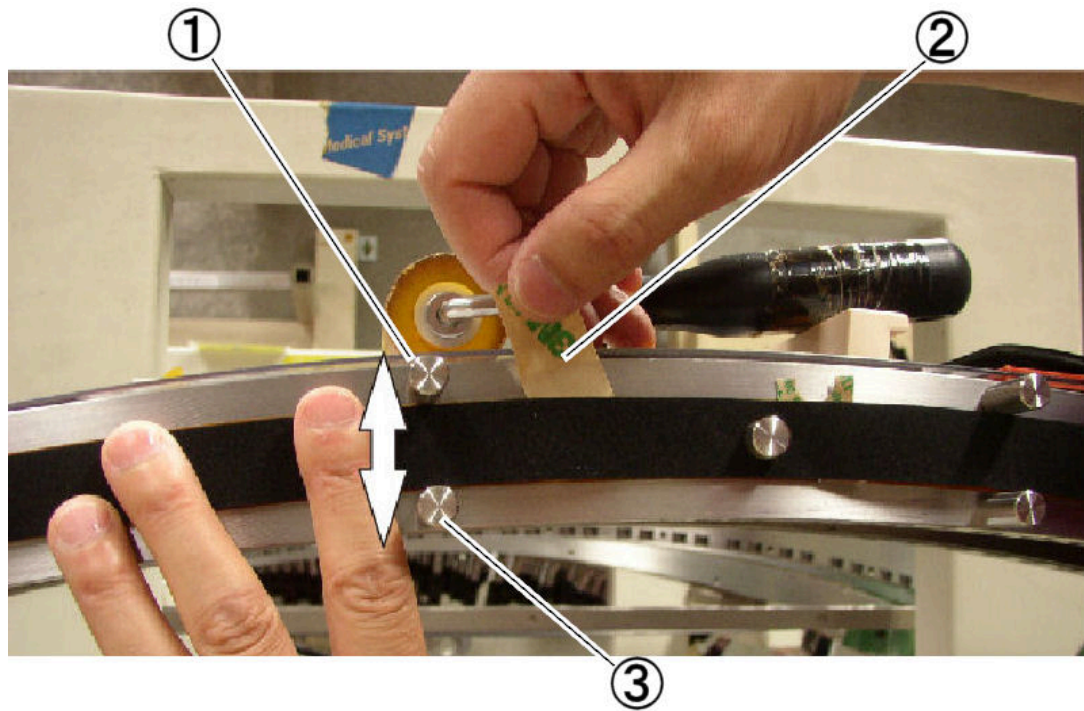


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- iv. Peel away the backing sheet of the heater up to the first guide pin.

Figure 35 First Guide Pins and Backing Sheet



①	Upper First Guide Pin
②	Backing Sheet
③	Lower First Guide Pin

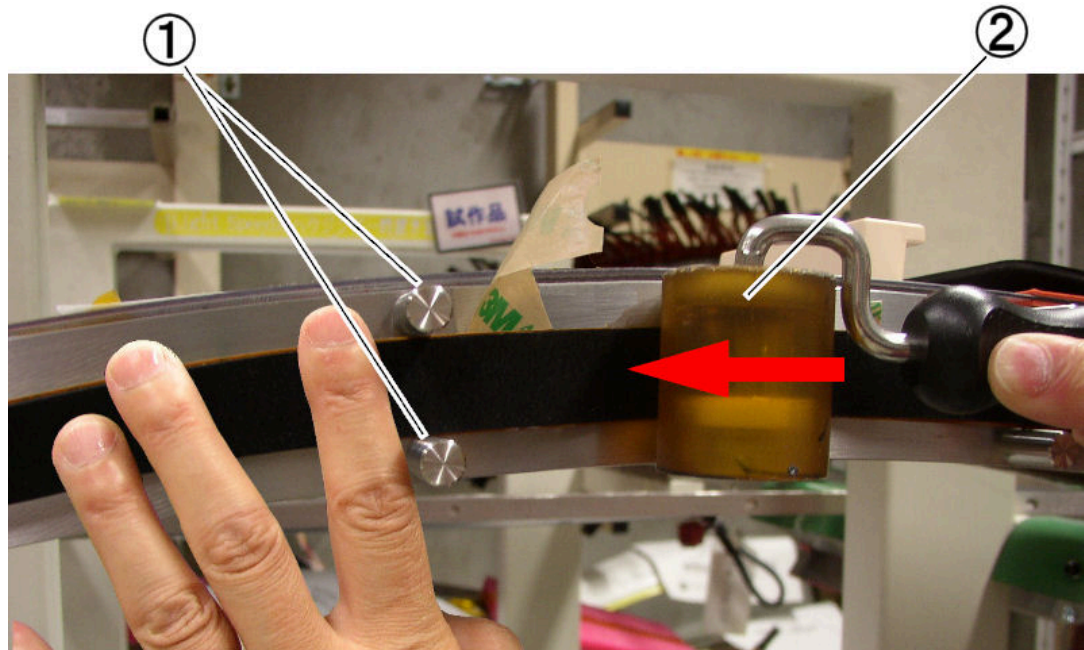


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- v. Press the heater against the front rail using a roller to attach it to the front rail (The roller movement is outward from the center only).

Figure 36 The first guide pin and Heater Attachment



①	First Guide Pins
②	Roller

- vi. Remove the first guide pins (upper and lower portions) from the front rail.
- vii. Adjust the position of the heater so that it is in the middle position of the lower and upper second guide pins, and hold it by hand.

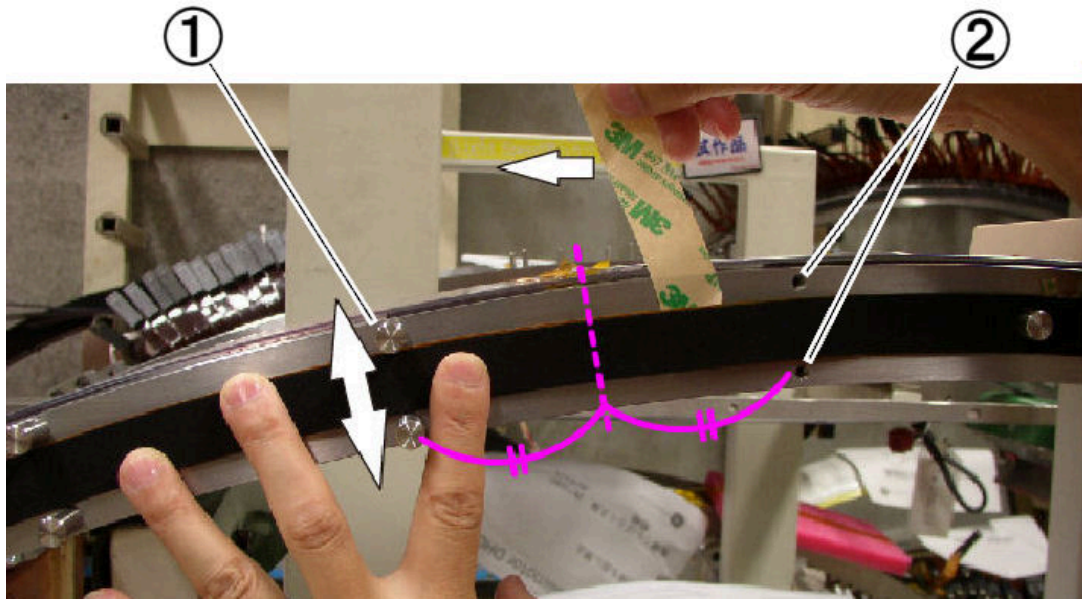


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- viii. Peel away the backing sheet of the heater up to the intermediate position between the first guide pin and the second guide pin.

Figure 37 The second Guide Pin and Backing Sheet



①	Second Guide Pin
②	Screw Holes (for the First Guide Pins)

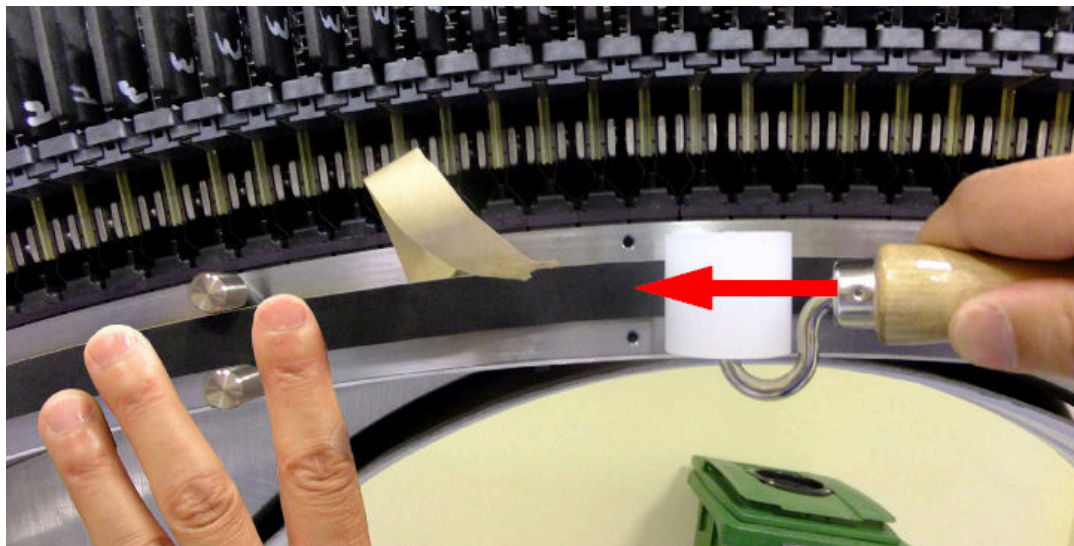


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- ix. Press the heater against the detector using a roller to attach it to the front rail (The roller movement is outward from the center only).

Figure 38 Heater Attachment



- x. Adjust the position of the heater so that it is in the middle position of the lower and upper second guide pins, and hold it by hand.

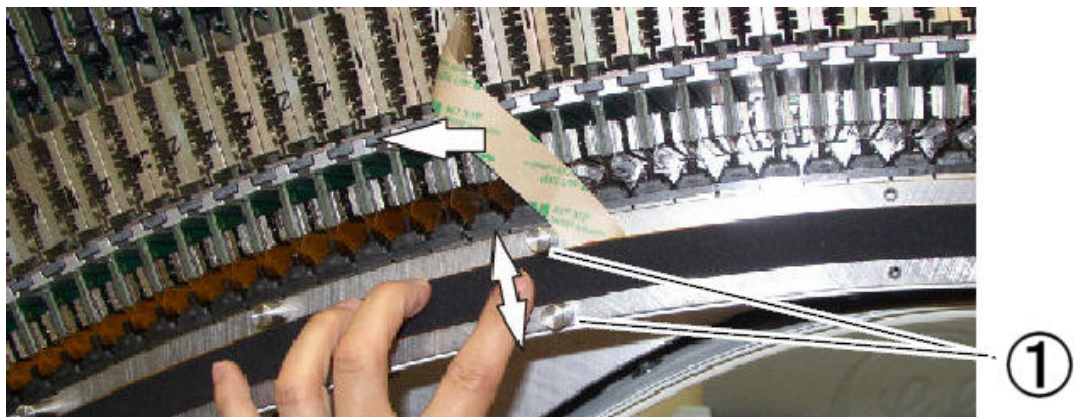


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- xi. Peel away the backing sheet of the heater up to the second guide pin.

Figure 39 The second Guide Pin and Backing Sheet



①	Second Guide Pins
---	-------------------

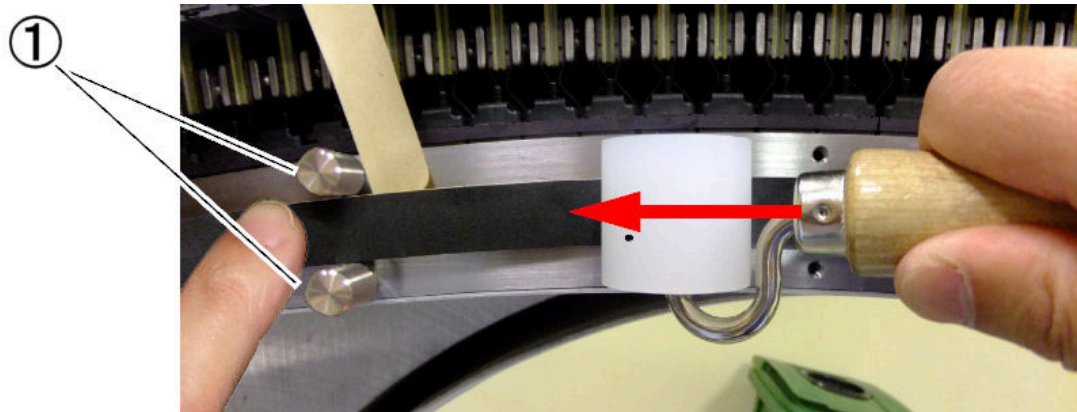


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- xii. Press the heater against the detector using a roller to attach it to the front rail (The roller movement is outward from the center only).

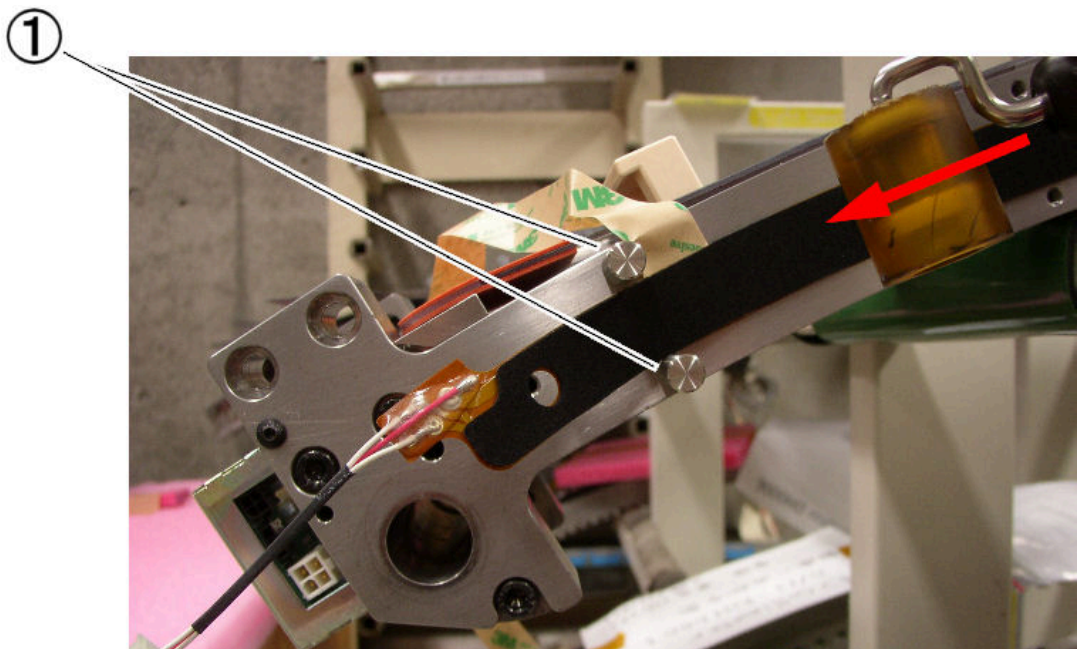
Figure 40 The second Guide Pin and Heater Attachment



①	Second Guide Pins
---	-------------------

- xiii. In a similar way as vi.) through xii.) , attach the rest of the heater at left portion up to the fourth guide pin.

Figure 41 The Fourth Guide Pins and Heater Attachment



①	The Fourth Guide Pins
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- xiv. Remove the fourth guide pins (upper and lower portions).

**NOTICE**

Do not adjust the position of the hole at the left end of the heater by stretching so that it is centered in the thermistor hole.

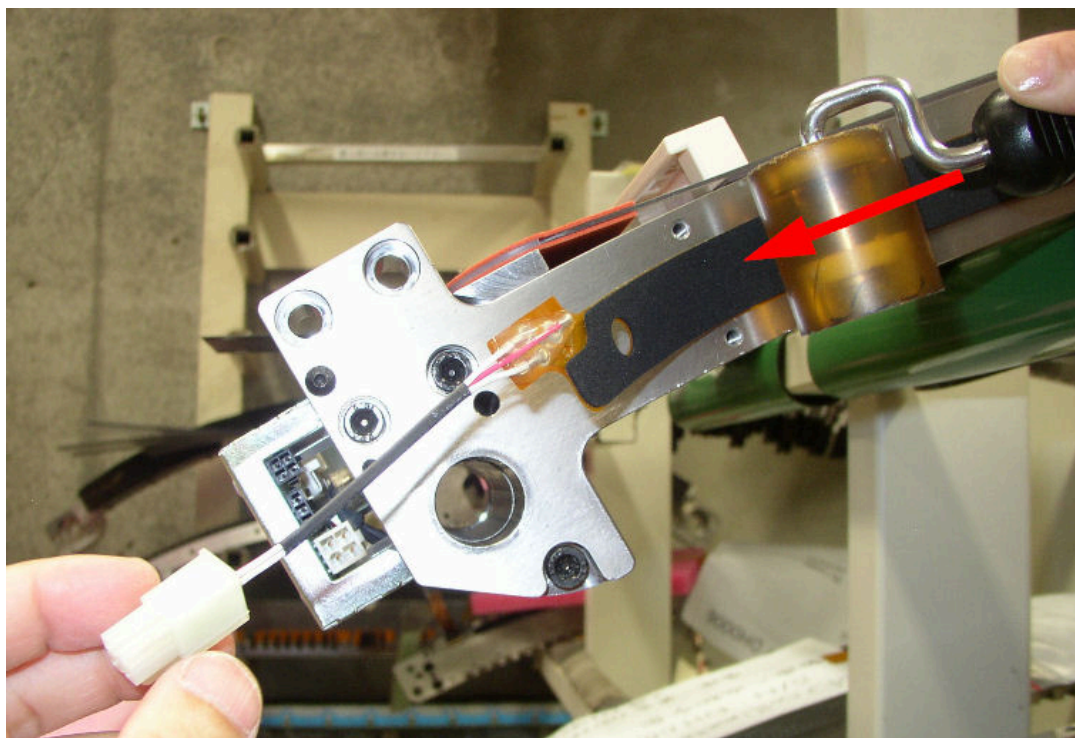
- xv. Remove the adhesive tape if it is attached in sub-step e.).

**NOTICE**

Do not adjust the position of the hole at the left end of the heater by stretching so that it is centered in the thermistor hole.

- xvi. Peel away the backing sheet of the heater, and press the heater against the detector using a roller (The roller movement is outward from the center only.)

Figure 42 Heater Attachment - Left End (Low Channel Side)





NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- g. At the right portion of the detector (high channel side) :
 - i. Remove the center guide pin.
 - ii. Attach the heater of the right portion according to sup-step f.).

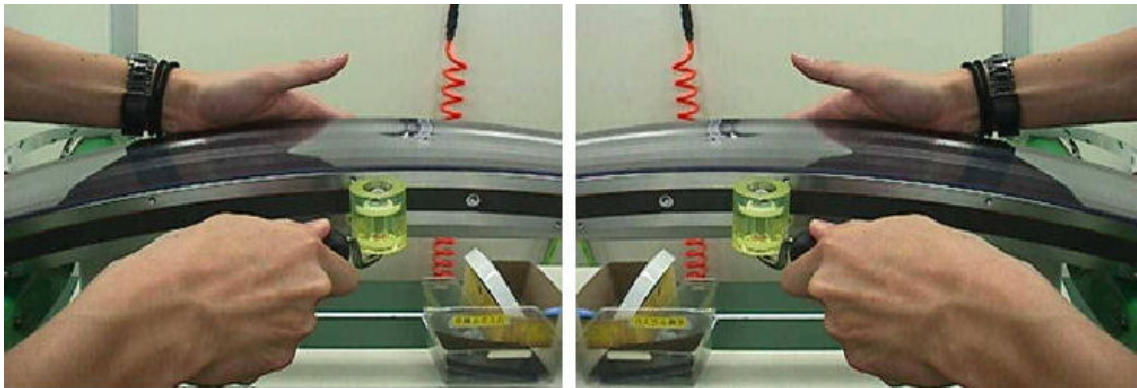


NOTICE

The movement (operation) of the roller is outward from the center, in one direction only !

- h. Press and roll the heater with the roller to check if there is no air in the joint area and there is no abnormal noise, and verify that the heater is securely attached to the detector.

Figure 43 Heater Attachment Verification



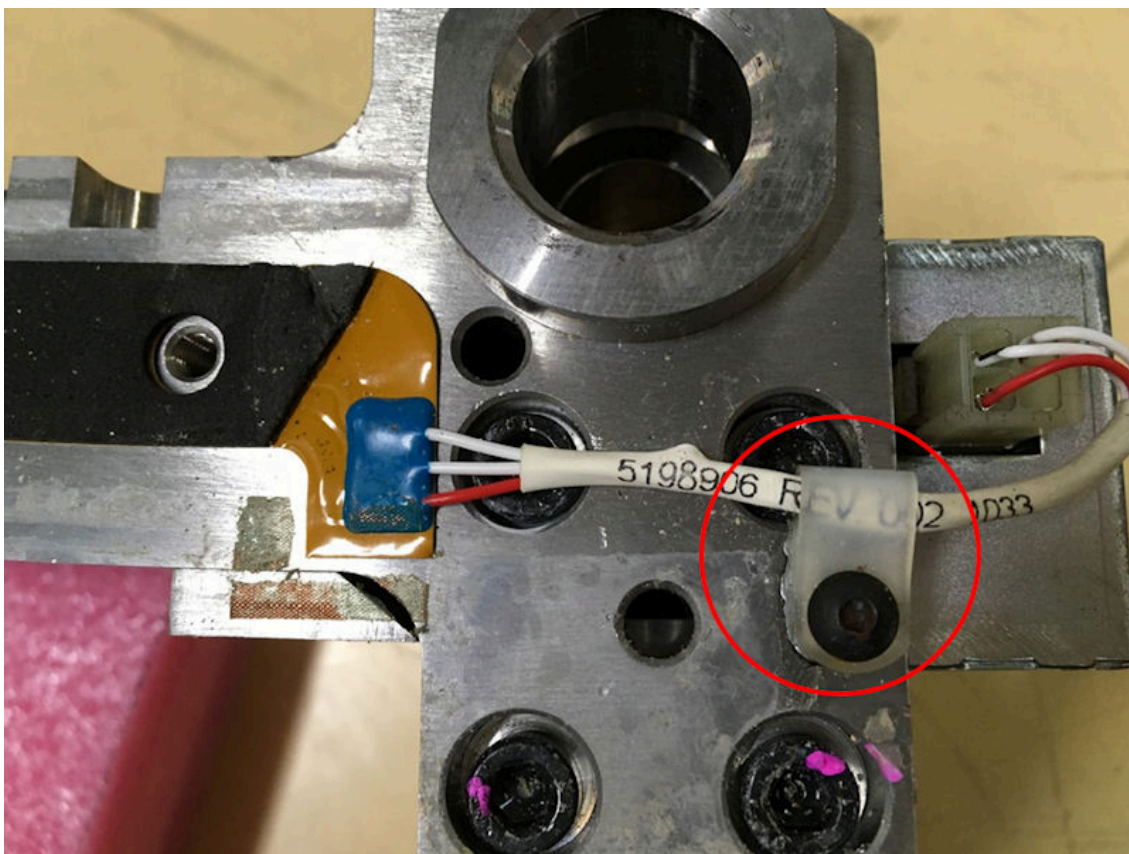
- 3. Attach cable clamps to hold heater cable at both end as follows:
 - a. Apply Loctite 243 to a screw, and fix the thermistor cable and heater cable to the right side of the detector using a cable clamp.

Figure 44 Loctite 243 and Cable Cramp (High Channel Side)



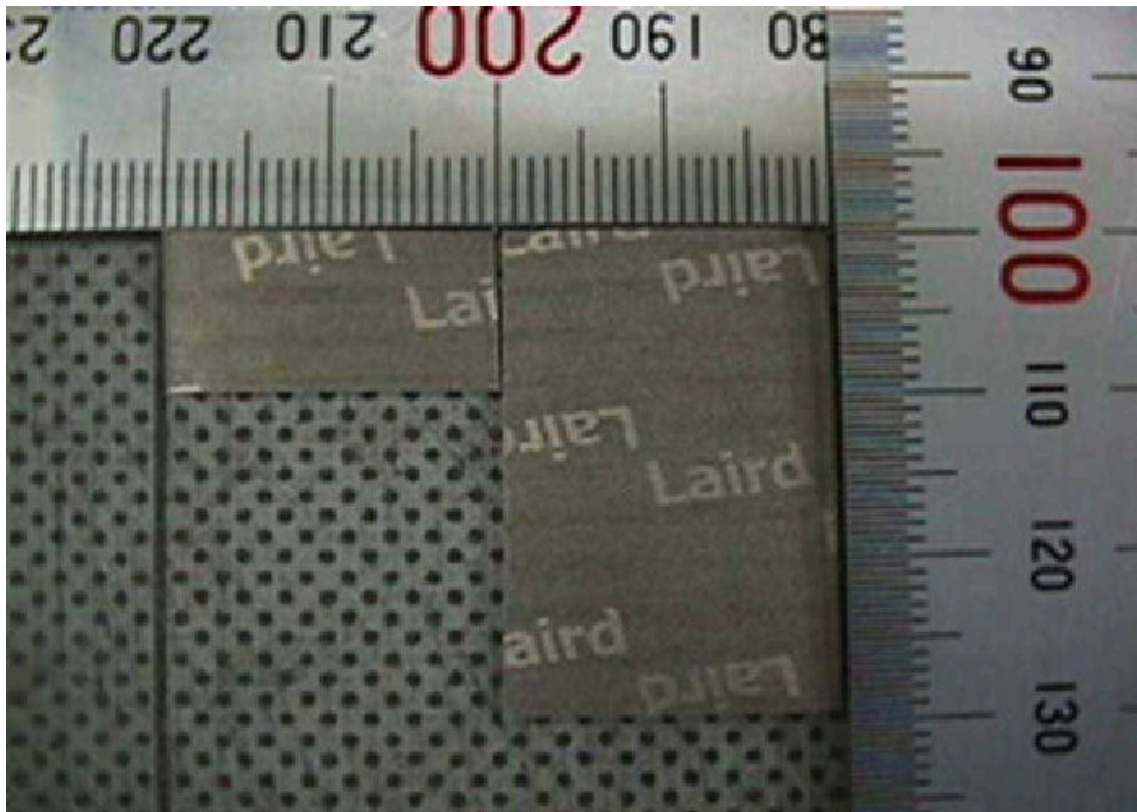
- b. Set the cable clamp as shown in illustration below.

Figure 45 Cable Clamp Setting (High Channel Side)



- c. Prepare EMI tapes, one is 30 mm x 20 mm, and the other is 10 mm x 20 mm.

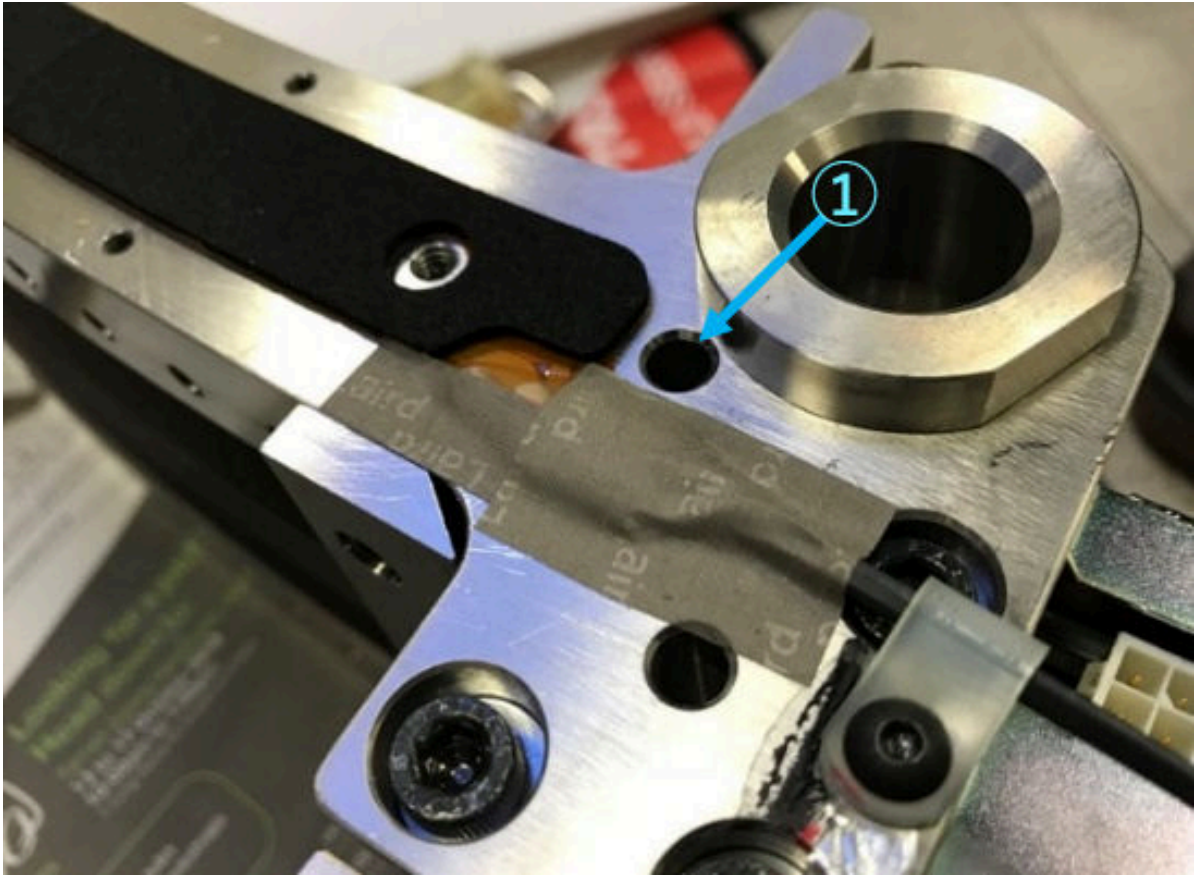
Figure 46 EMI Tapes



4. Attach EMI adhesive tapes 10x20mm, 20x30mm supplied with Heater replacement kit onto both ends of heater and cables as shown in the illustration below.

Do not cover alignment hole of detector rail. (EMI adhesive tape 15x475mm is not used for rear heater.)

Figure 47 Alignment hole and Locating hole



①	Alignment hole
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5. Connect the heater cables at both end to High/Low Channel Routing Board.

3.1.9 Card Cage Panel Attachment

Procedure

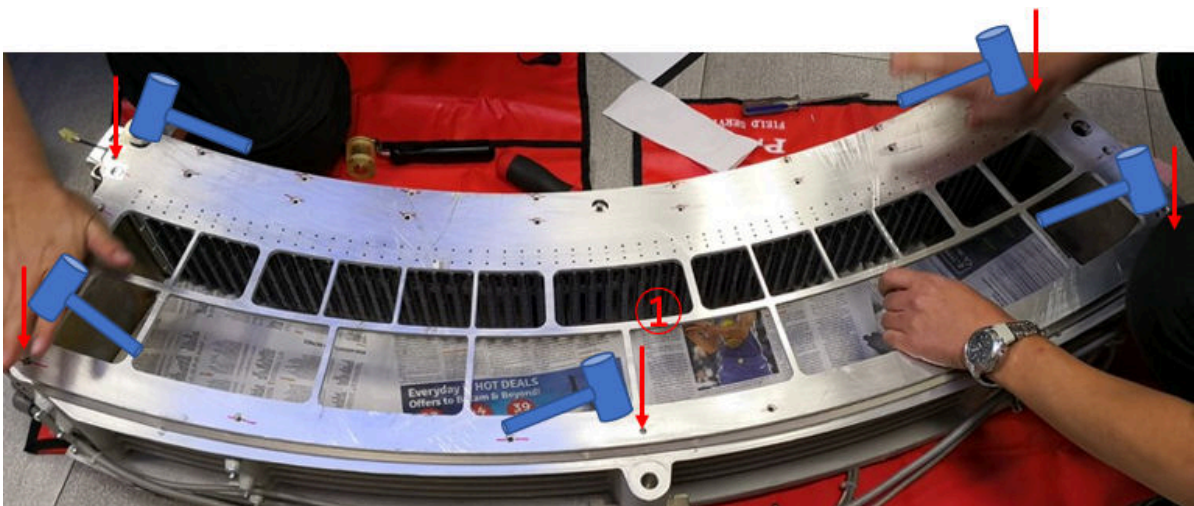
1. Install the Center Spacer on the Detector rail

Figure 48 Center Spacer



2. Place the card cage panel on the card cage (Digital Detector Housing) so that the positioning pins of the card cage align with the holes of the card cage panel. Gradually and evenly insert each positioning pin of the card cage into the hole of the card cage panel using the soft hammer.

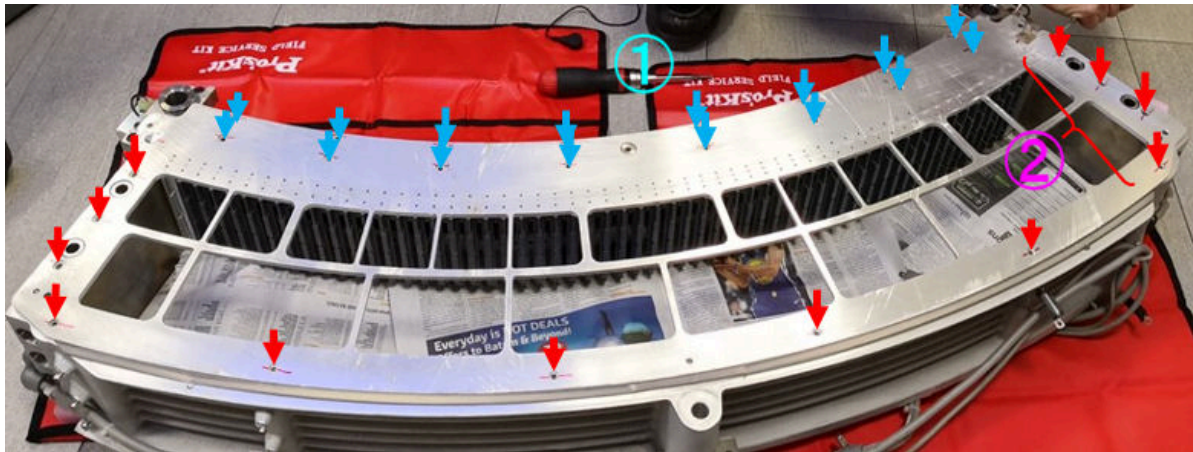
Figure 49 Card Cage Panel Re-Attachment



①	5 locations with pins
---	-----------------------

3. Apply Loctite 242 or 243 to 12 M4 hex screws, using that screws, secure the card cage panel to the card cage with the following torque.
4. Apply Loctite 242 or 243 to 16 M4 Torx screws, using that screws, secure the card cage panel to the Detector rail with the above torque.

Figure 50 Card Cage Panel Securing



①	16 pieces of M4 Torx Screws
②	12 pieces of M4 Hex Screws

N-m	lbf-ft	lbf-in	kgf-cm
1.4	1.0	12	14

3.1.10 Card Cage (Digital Detector Housing) attach onto DAS plate on Gantry

Lift the Card Cage Assembly (Digital Detector Housing) and re-install it onto DAS plate as follows:

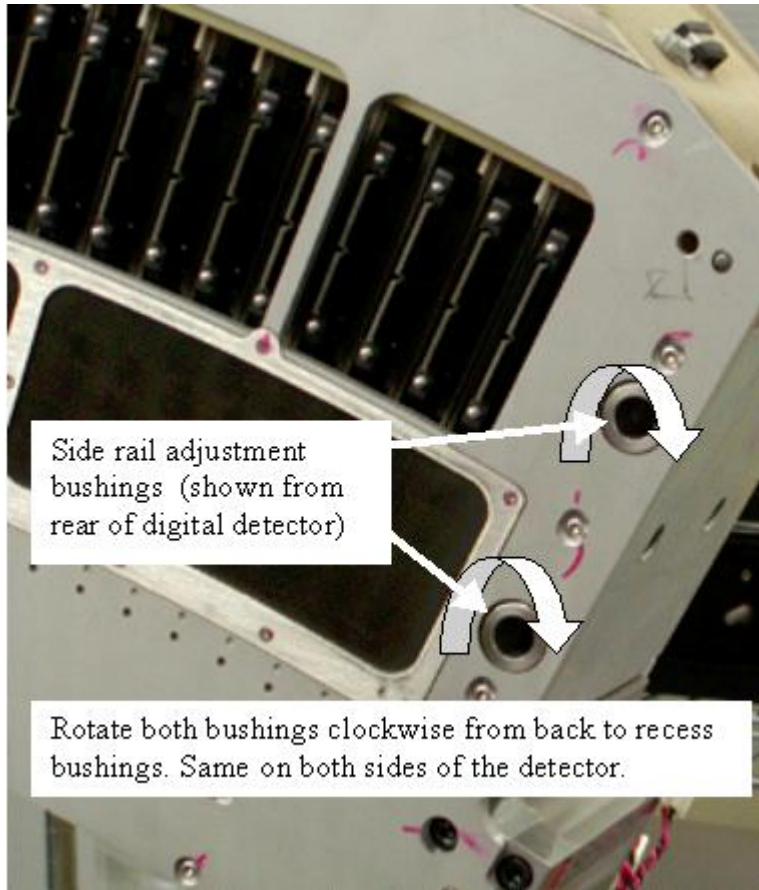
NOTE

Re-use all nuts, washers and screws.

Procedure

1. On the back side on each end of the detector, rotate the adjustment bushings clockwise as looking from the back of the detector to make sure they are not sticking out prior to detector installation. See [Figure 51 on page 54](#).

Figure 51 Digital Detector Adjuster Bushings

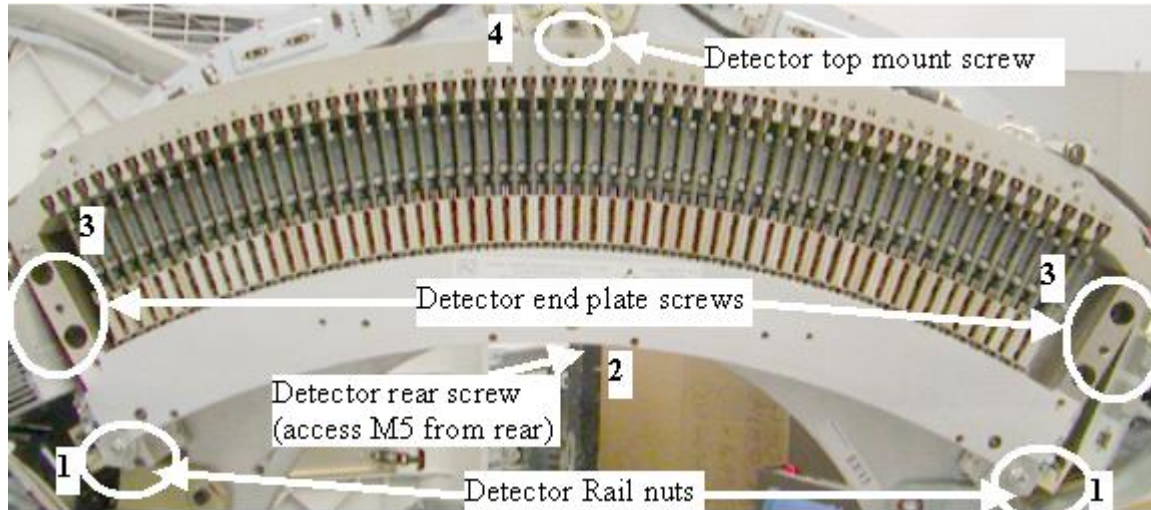


2. Rotate the top center mount screw adjustment bushing (on the DAS plate) clockwise so it is not sticking out of the plate. This bushing and the side bushings will be readjusted in an upcoming step just prior to putting the screws in.
3. Carefully slide the detector onto the alignment pins. Connecting the cables to the routing boards on each side of the detector as you slide it on will make that task easier.
4. Remove the nose cone alignment pin guides and install the new detector rail nuts (with lock washers). See [Figure 52 on page 55](#) for an overview of the mounting order.

NOTE

Use the new mounting hardware supplied with the detector as noted.

Figure 52 Digital Detector order of mounting



5. Torque detector rail nuts in a 2-step process using the torque settings shown in [Table 7 on page 55](#) and [Table 8 on page 55](#).

Table 7 Rail Nut Initial Torque setting

50 N-m	37 lb-ft	442 lb-in	510 Kg-cm
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Table 8 Rail Nut Final Torque setting

100 N-m	73.8 lb-ft	885 lb-in	1019 Kg-cm
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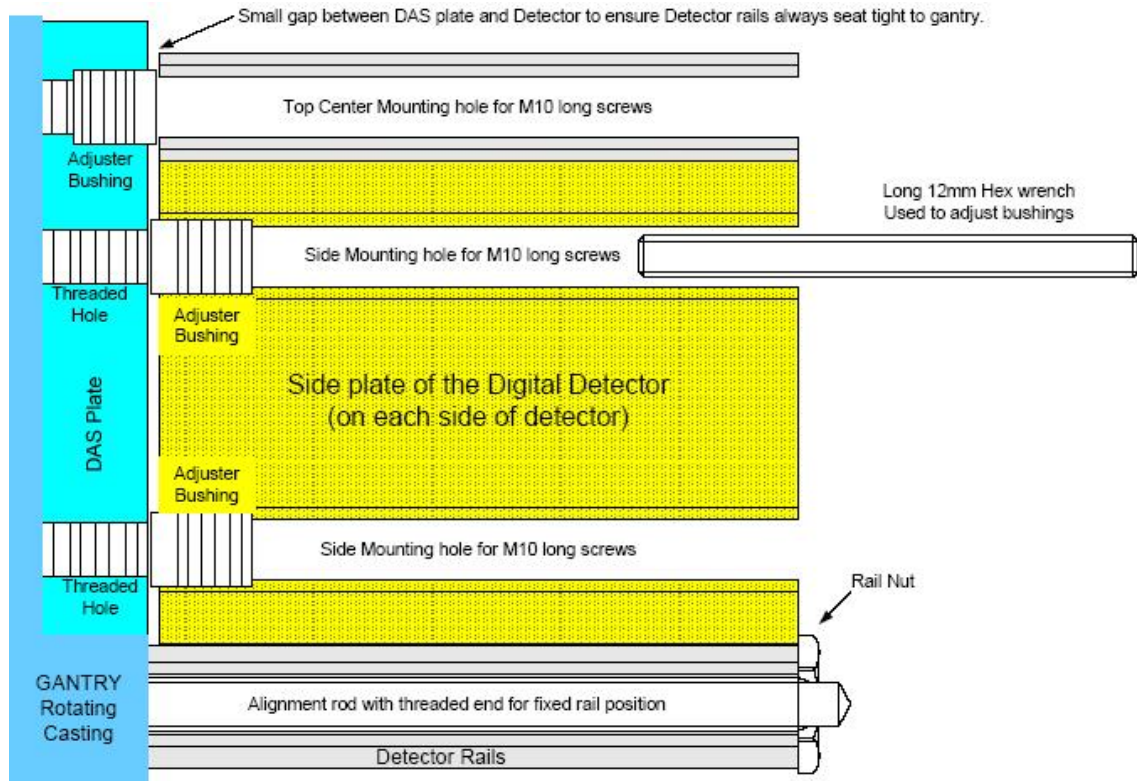
6. Install the rear screw and torque to the values shown in [Table 9 on page 55](#).

Table 9 Detector M5 - 4mm backside screw

4.6 N-m	3.4 lb-ft	40 lb-in	46.9 Kg-cm
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7. Insert a long 12 mm hex bit (don't use a ratchet handle), supplied with the system, into the holes for the end plate screws to access the spacers. Turn clockwise until the spacers are tight using your hands only, no wrench (bushing will be against the DAS plate). See [Figure 53 on page 56](#).
 - a. The adjuster bushings are just to take up any space between the detector end plates and the DAS plate.
 - b. Using more than hand force will cause the detector casting to bow when torquing the last screws.

Figure 53 Detector Adjuster Bushing Drawing



8. Install the new detector end plate screws (2 per side) making sure the large washers are on the screws. They must have the large washer required for proper seating.
9. Torque the 4 detector end plate screws first to the initial setting and then all 4 to the final settings shown [Table 10 on page 56](#) and [Table 11 on page 56](#).

Table 10 End Plate Mount Screw Initial Torque setting

61 N-m	41 lb-ft	498 lb-in	564 Kg-cm
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Table 11 End Plate Mount Screw Final Torque setting

112.5 N-m	83 lb-ft	996 lb-in	1148 Kg-cm
-----------	----------	-----------	------------

10. Insert a long 12 mm hex bit (no wrench) into the top mount hole to access the spacer. Turn **counter clockwise** until the spacer is tight using your hands only, no wrench (bushing will be against the detector casting).
 - a. This is just to take up any space between the Detector casting and the DAS plate.
 - b. Using more than hand force will cause the detector casting to bow when torquing the screw.
11. Install the new top mount screw with large washer and torque first to the initial setting and then to the final setting shown in [Table 12 on page 57](#) and [Table 13 on page 57](#).

Table 12 Top Mount Screw Initial Torque setting

61 N-m	41 lb-ft	498 lb-in	564 Kg-cm
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Table 13 Top Mount Screw Final Torque setting

112.5 N-m	83 lb-ft	996 lb-in	1148 Kg-cm
-----------	----------	-----------	------------

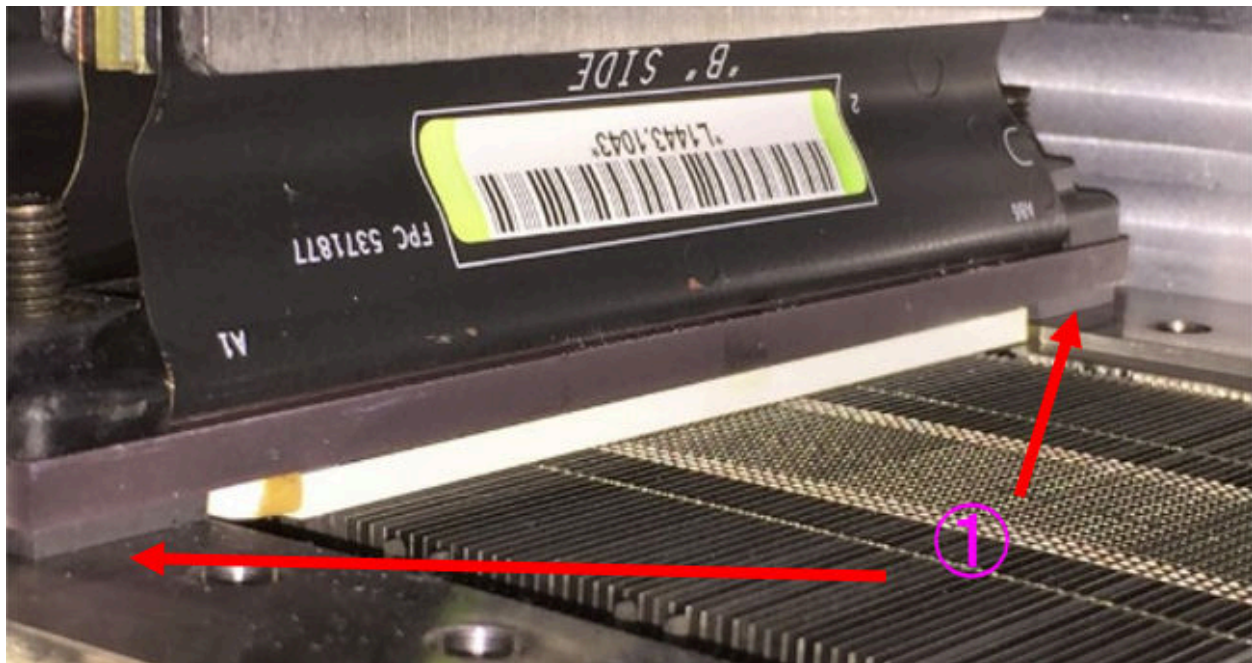
3.1.11 FRDM re-installation

Re-install all modules into same slot as original slot one by one.

Before tightening the screws of the module, perform the following checks:

- Make sure that the surface of the module and the rail contact securely.
- Make sure that the alignment pin of the module matches the slot of the collimator comb.

Figure 54 Module Attachment



NOTE

Installing the modules are better to start from the side where the connection of the digital connector to the backplane is easily viewable.

- In the case of 64 slices system, in the direction from the lower channel to the upper channel
- In the case of 32 slices system, in the direction from the upper channel to the lower channel

Procedure

1. The order of the following steps is critical to success. Do **NOT** change the order. Read each step and cautions completely prior to performing that step.

NOTE

Do not touch the detector module face or flex connections. Handle the module by the heat sink, black handle, or metal bracket on the opposite end of the assembly.

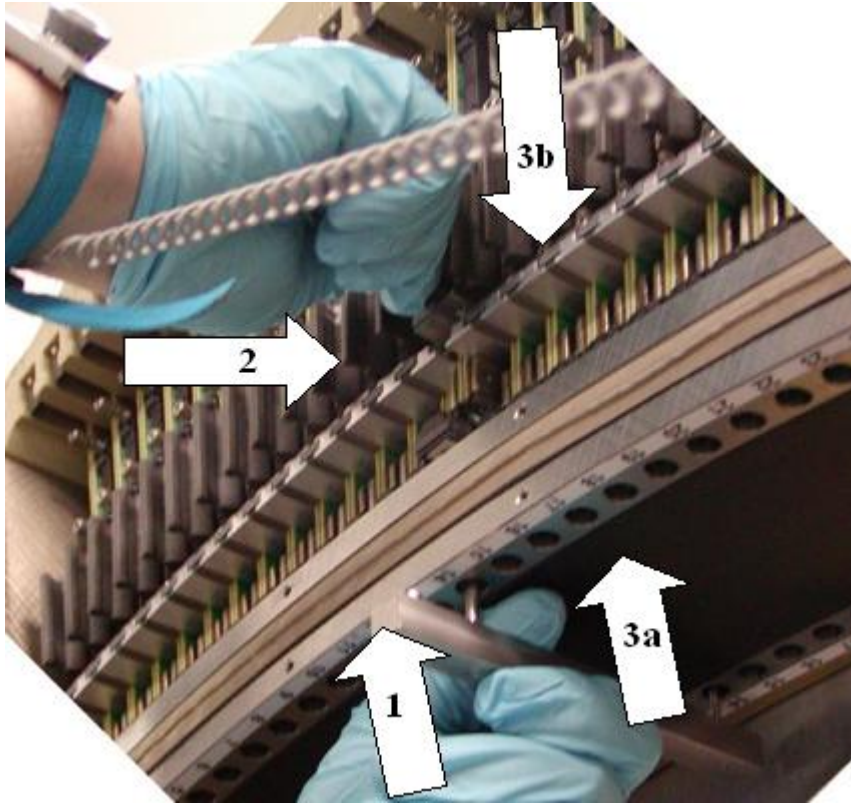
2. Install the module using the following order of steps. (See [Figure 55 on page 59](#) for illustrated process with numbered references)
 - a. With one hand, insert the Controlled Seating Tool part way (1) so pins do not extend above detector rails to avoid scratching the detector module during insertion. Putting your thumb between the tool and the detector can help control the tool insertion while you insert the module.
 - b. Slide the ESD plastic sheet between the AD board and heat sink, along the Z direction, as shown in the left illustration in [Figure 11 on page 20](#). If module is between two modules, two ESD plastic sheets are required, one in front and one in back of module as shown.

The ESD plastic sheet should be just slightly below module handle when properly inserted.
 - c. With the other hand, insert the Module in (2) toward backplane using the black handle.

The Detector light seal brackets must be between the module flex connection plates and module light seal plate as shown in [Figure 13 on page 22](#) to allow module to slide into detector.
 - d. Push the Controlled Seating Tool completely up into detector rails (3a) then lower module down (3b) on top of the seating tool so that the module screw holes engage the seating tool. This will ensure that the module alignment pins do not hit the detector collimator plates during module insertion.

NOTE

- The module must be seated on the detector rail. **DO NOT** force it into position. The module will seat on the rail when the module alignment pins are properly aligned.
- You may have to push the top of the board toward the backplane to engage the top alignment pins if the digital cable is pushing the board away from the backplane.
- If the Controlled Seating Tool is not used, detector collimator damage may result resulting in outer row image quality issues.

Figure 55 Module Insertion

3. Remove the seating tool only after the module is seated on the detector rails.
4. Attach the bias tool to the detector rail to push the module against the back detector rail with a known force. See [Figure 56 on page 60](#). The SATURN_64_HD detector requires a slightly different bias tool, which is shown in C2 of [Figure 57 on page 60](#). Gloves can be removed at this point.

Figure 56 Bias Tool

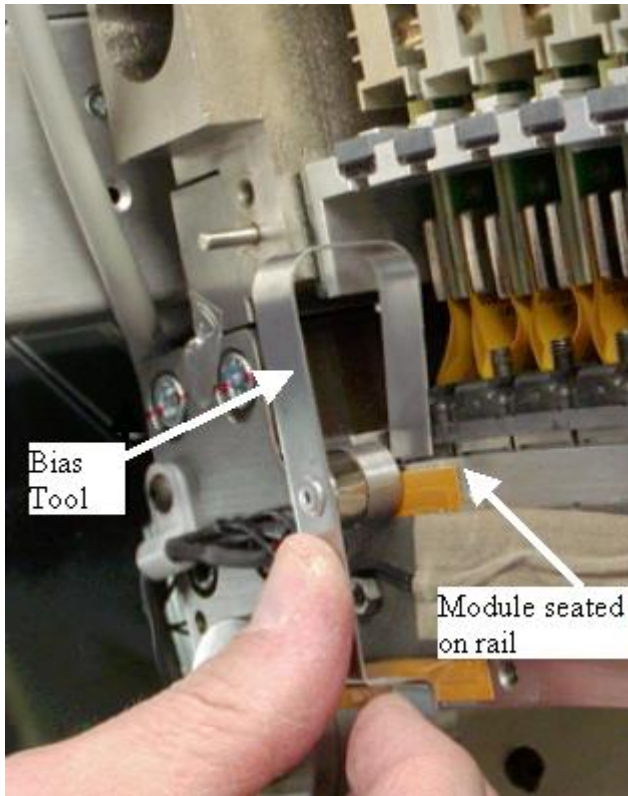
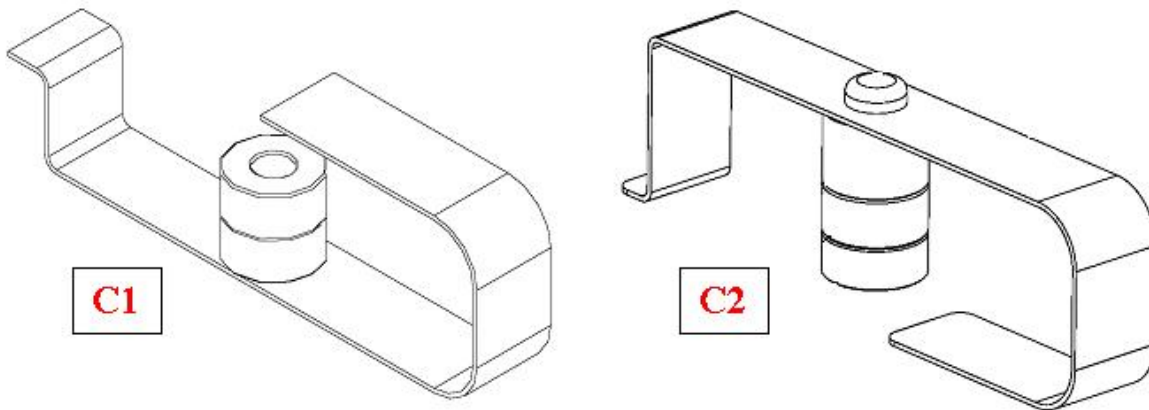


Figure 57 Bias tool reference



#id_SL1462495-361560 /SL2933751-361560 Key	
C1	Bias tool used with VCT 64 modules
C2	Bias tool used with VCT 32 and HDAS_SATURN_64 modules

5. Insert both module screws on either side of the carbon window and torque to the value shown in [Table 14 on page 61](#). Torque the back screw first.

NOTE

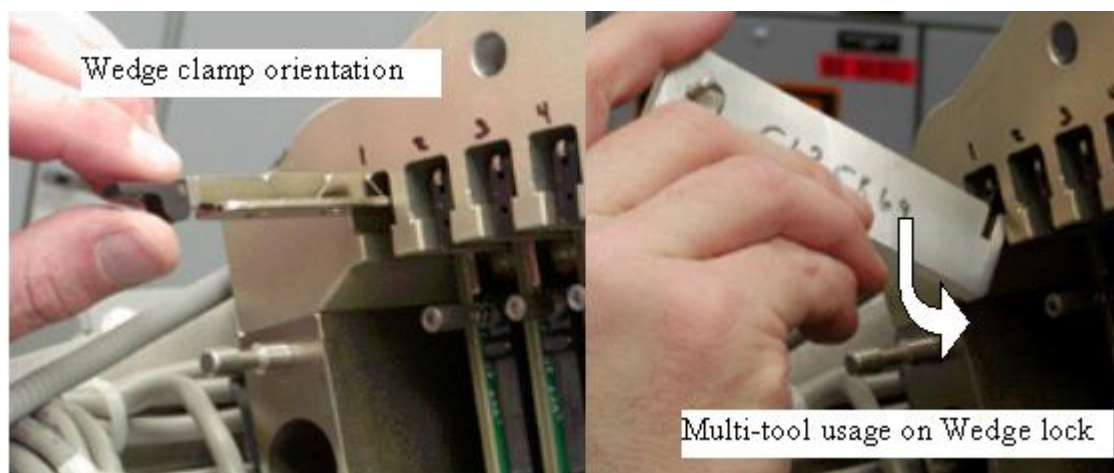
Do NOT push up on the module screws. Pushing up may unseat the module and damage the detector collimator plates when the screws are tightened.

Table 14 Detector Module Screw Torque

1.1 N-m	0.8 lb-ft	10 lb-in	11.5 Kg-cm
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6. Remove the bias tool from the detector rail.
7. Insert the wedge clamp and lock it. (Orientation: Plate of the wedge clamp against the board)

Figure 58 Wedge Clamp Insertion



8. After locking the wedge clamp, carefully install and finger tighten both digital cable thumb screws using the process below to help avoid cross threading. The screws will go in easy when properly aligned.
 - a. Pull the digital cable screws away from the backplane initially and then in toward backplane to help initial connector alignment. Use a flashlight if necessary to see if the connector is aligned to the backplane socket. A "click" can be heard when you set down the screws indicating the screws have hit the backplane threaded socket.
 - b. Rotate the screws counter clockwise to hear a clicking sound made by the threads of the screw and threads of the socket. This will insure that the screws are lined up to the connector prior to threading them in.
 - c. Start both screws into the sockets. Thread both screws in together so the cable edge connector is pulled into the backplane straight. Stop and back out the screws if any squeak is heard as this indicates cross threading. Try rotating the screws counter clockwise until you hear a second "click". This can help if the screw was previously cross threaded to avoid the crossed threads.

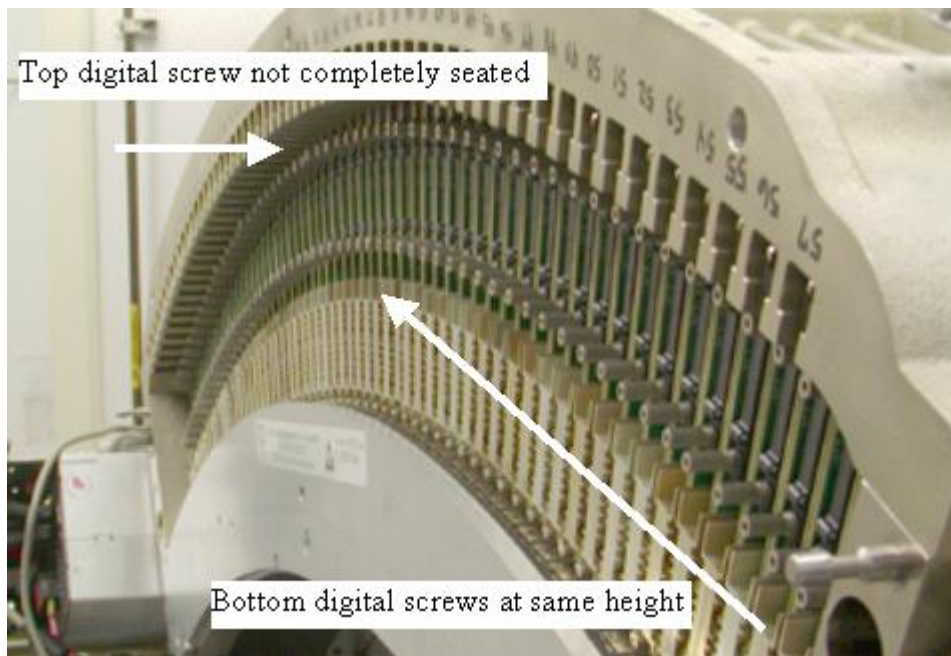
- d. May need to carefully pull the digital cable screws to one side to help alignment if needed while performing steps a-c above.
- e. Torque the screws per [Table 15 on page 62](#).

Table 15 Digital Cable Screw Torque

0.4 N-m	0.3 lb-ft	3.5 lb-in	4 kg-cm
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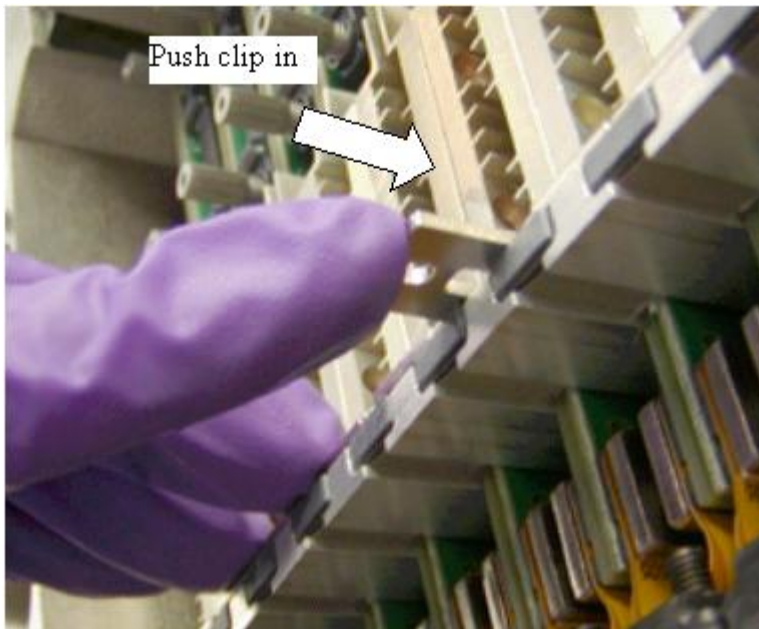
- 9. Look across the modules from the side to make sure the digital cable screws are seated to the same height as the rest of the modules. This will indicate proper connection. See [Figure 59 on page 62](#) for example side view. Note a top screw may not be fully seated in this view. Bottom screws all appear at same height.

Figure 59 Module Screws Side View



- 10. Insert the light seal clips on either side of the module (for all modules replaced). See [Figure 60 on page 63](#).

Figure 60 Light Seal Clip Insertion



11. Suggested but not Mandatory: Use the Deionizing fan to remove any static buildup during the replacement process. Hold the fan within 2 feet of the replaced module for 60 seconds.
12. Visually inspect the light seal plate for any hair or other debris. Wipe clean prior to installation to avoid getting debris inside detector.
13. Install the light seal cover being careful around thermistor wires, using torx head screws. Torque screws to the value shown in [Table 16 on page 63](#).

Table 16 Light Seal Screw Torque

2.5 N-m	1.8 lb-ft	22 lb-in	25.5 Kg-cm
---------	-----------	----------	------------

14. Install the screw cover bands (both bands are identical) and torque the screws to the value shown in [Table 17 on page 63](#).

NOTE

The end screws on the screw cover band next to the rotating base frame can not be reached with the torque driver. Just snug them carefully with an offset hex wrench. Do not overtighten.

Table 17 Screw Cover Band Torque

0.8 N-m	0.6 lb-ft	7 lb-in	8.1 Kg-cm
---------	-----------	---------	-----------

3.1.12 Plenum Installation and Balance weight installation

Procedure

1. Install the Detector Air Plenum as shown in Detector Air Plenum Removal/Installation.
2. Install the gantry balance weights in the same order as removed. Torque as defined in Gantry Balance Procedure

3.1.13 Harnessing

Procedure

1. On the Low Channel side (by 48V Power Supply) route the cables listed below together and route between studs in position as shown in [Figure 61 on page 65](#) and [Figure 62 on page 65](#).
 - a. 4 DAS Power and CFC/DHCB Power (5 cables)
 - b. Generator, CFC, 2 Fiber Optic, Routing board interconnect (5 cables)
 - c. 4 DAS Power cables
 - d. Generator, CFC, Routing board interconnect (3 cables) (NOTE: CFC cable moves to B with 2006 style plenum)
 - e. RCIB, CFC/DHCB Power, 2 Fiber Optic (4 cables)

NOTE

Make sure all cable slack is pulled toward the 48V power supply and that all harnessing is secured as defined. Failure to properly strap down cabling will result in the cables hitting the stationary frame during high speed rotation.

Figure 61 Low Channel Side Cable drawing

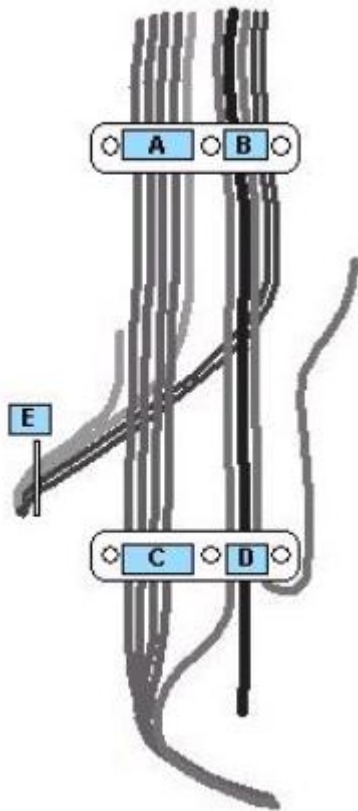
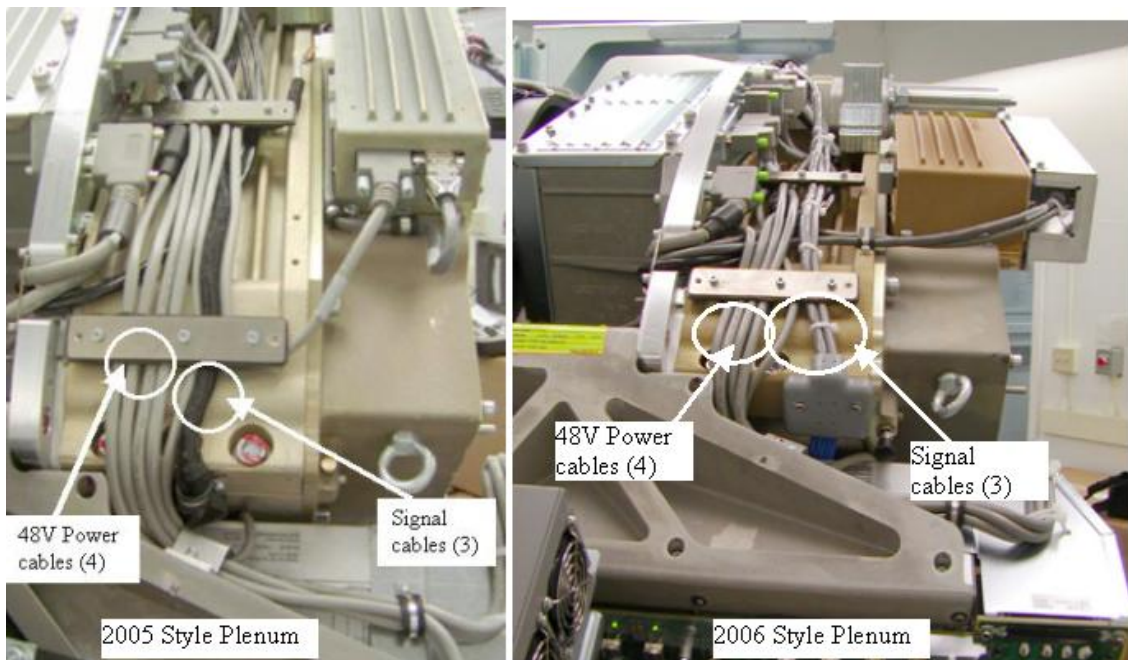
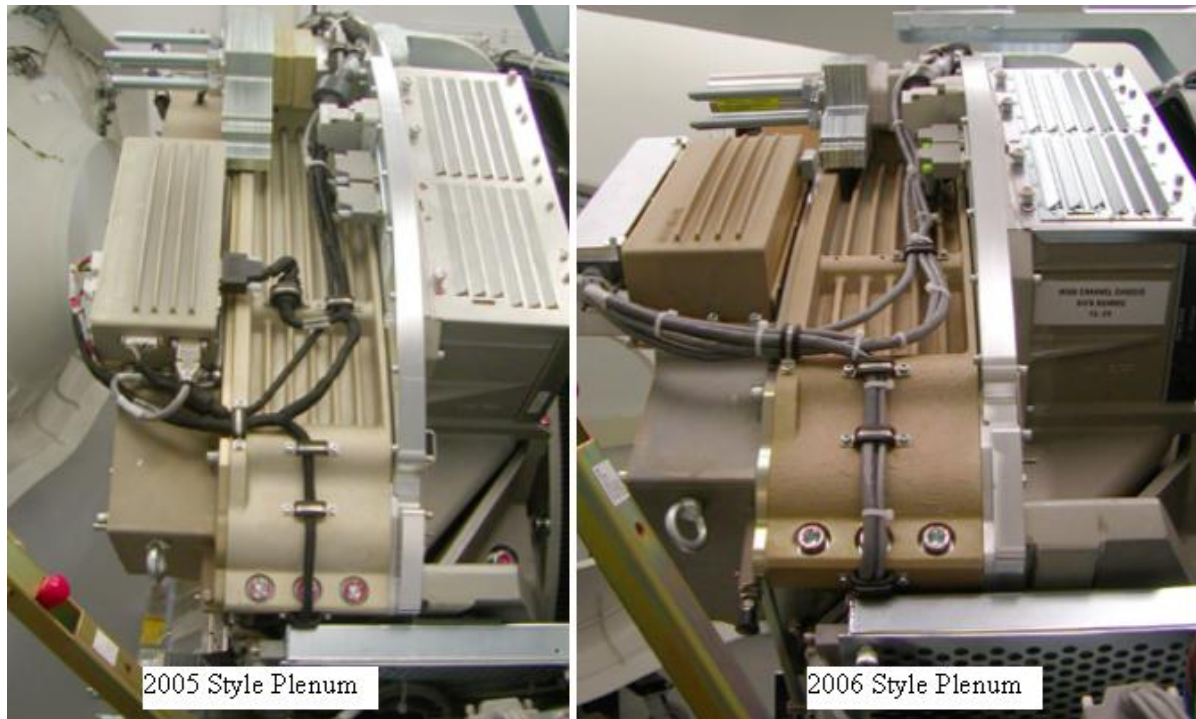


Figure 62 Low channel side cabling



2. On the High Channel side (ORP side) route the harness as shown in [Figure 63 on page 66](#).

Figure 63 High Channel side cabling



3. Make sure the front cover display is connected to allow the follow on testing. Don't need to put covers on until ready for calibrations.
4. Turn on the gantry 120VAC at the service switch panel.
5. Release the gantry rotational lock.
6. Rotate the gantry by hand looking for any potential loose cabling or connectors. Review the cable routing to make sure it is consistent with the definitions in this section.
7. Enable HVDC and gantry Axial drive from the service switch panel.

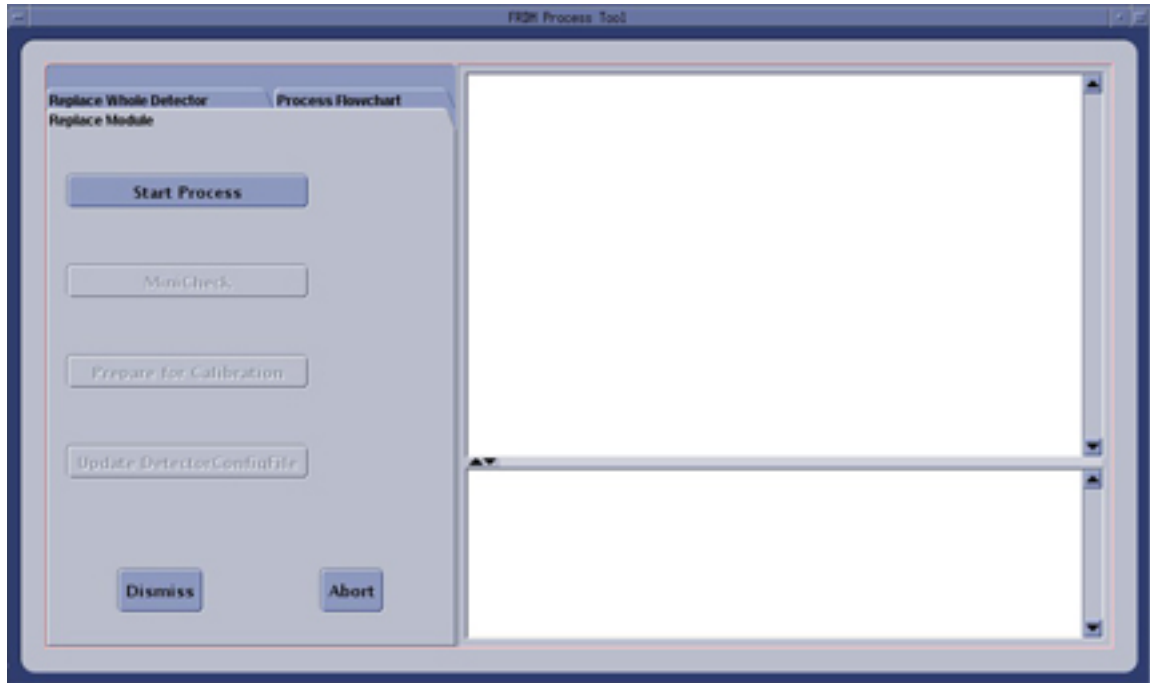
3.1.14 Detector testing

Perform MiniCheck in Replace module of FRDM Wizard , mA Ratio Test , Auto Test in DASTools

Procedure

1. At the console start the **FRDM Wizard** from the Common Service Desktop Replacement tab. [Figure 64 on page 67](#) shows the main screen.

Figure 64 Process Tool



2. From the **FRDM Process Tool** currently open at the console select **MiniCheck** and acknowledge the pop up window if the gantry is ready to rotate.

NOTE

The Wizard will first read the HART data from all detector modules. This will take less than 60 seconds. If this process takes longer, then the communication path to the detector has locked up. Abort the FRDM Wizard, reset the gantry power or perform a scan hardware reset, then restart the Wizard and try again.

The alignment check will start after the scan button is pressed when prompted. (Non-rotating scan)

If needed later, The alignment check can also be run from a Unix Shell. Open a Unix shell and type the following command: **zalignmentWizard**

3. The alignment check will run 2 scans and show plots as shown in [Figure 65 on page 68](#). Processing will take approximately 2 minutes after the scans are run.

NOTE

The plot window must be closed using the **File** menu before **DASTools** GUI will open.

Figure 65 Alignment Check Display

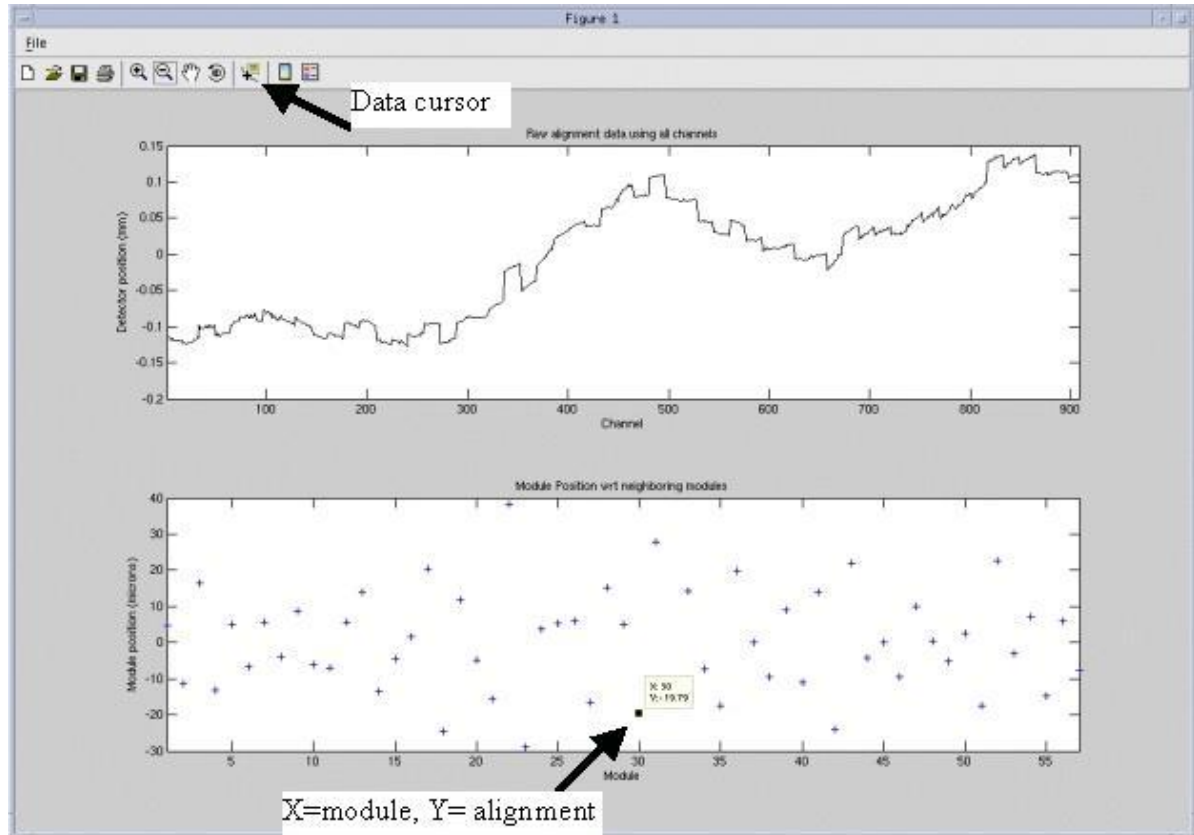


Table 18 Alignment Specifications

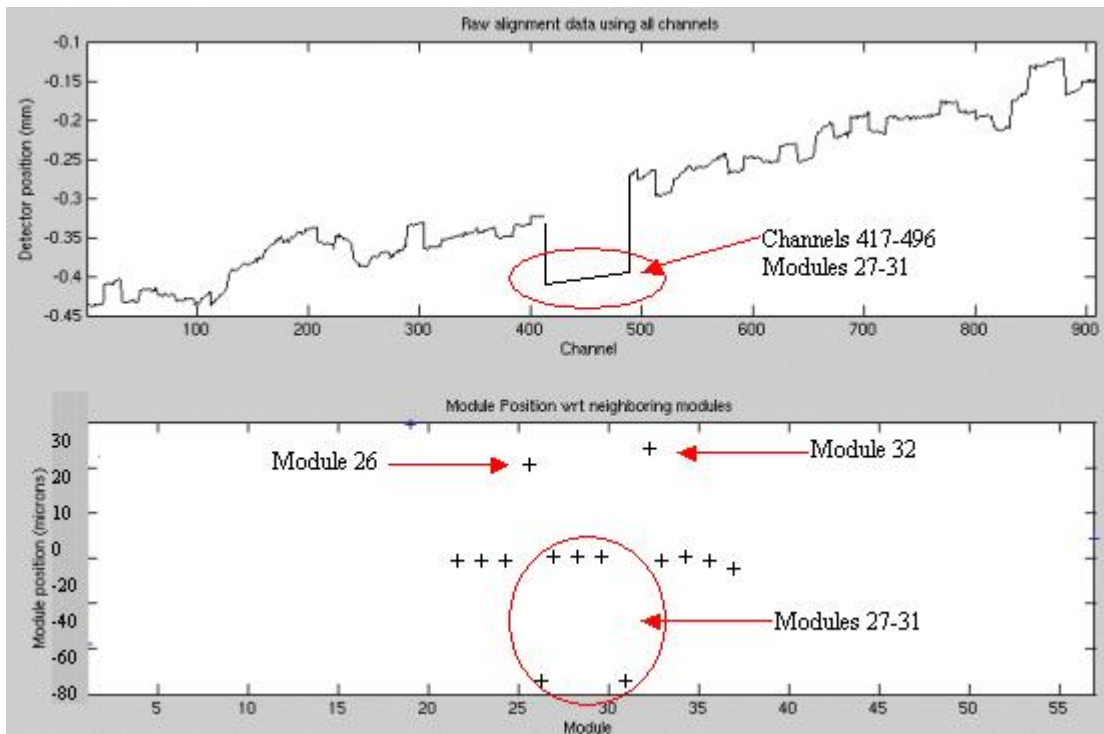
Modules	Specifications	Notes
(Outer Modules) 1-26, 32-57	+/- 75	Only look at modules you replaced. Do NOT move other modules. Some factory modules may not be within this specification.
(Center Modules) 27 and 31 ONLY	+/- 48	If the module alignment using the bias tool does not position the module within specification, Use the special "Module adjust tool" instructions to make adjustments.
(Center Modules) 28, 29, 30	+/- 32	If the module alignment using the bias tool does not position the module within specification, Use the special "Module adjust tool" instructions to make adjustments.

4. Check the bottom graph to make sure the module is within specifications defined by [Table 18 on page 68](#). Use the following guidelines for looking at the plots.

- a. The plots autoscale to fit the data. First look at the Y-scale of the bottom plot. If the upper and lower values are at or less than the specification, then all points in the plot are within specification.
- b. Module 1 and 57 are plotted on the very edge of the plots. In the example of [Figure 65 on page 68](#), Module 1 can be found at +5 just above the zero mark. Module 57 can be found at -8 on the right side edge of the plot.
- c. For any questionable plot point, select **Data Cursor** from the top tool bar and then use the mouse cursor to select the module “+” on the bottom graph. A small window will appear showing the module number and plot value. For example module 30 in [Figure 65 on page 68](#) is shown to be at -19.
- d. If more than two side by side modules are replaced at once an out of alignment condition can occur if none of the modules were aligned with the bias tool. This signature is different than any single module. See [Figure 66 on page 69](#).

All 5 modules are out of alignment with the rest of the detector as seen on the top graph, yet modules 26, 27, 31, and 32 show out of alignment. This is further explained in the alignment wizard user instructions. Note this potential condition and see that it is the center 5 modules that all need to be repositioned as shown in the top graph. Modules 26 and 32 are effected due to the common edge with modules 27 and 31 and will show better results after the center set is repositioned.

Figure 66 Center Module Offset Example



See alignmentWizard User Instructions for more details if needed.

5. If the module alignment check does not pass; perform the following:

- a. Reopen the Detector following all previous cautions and steps in [Balance Weight and Air Plenum Removal on page 14](#) and [FRDM removal on page 15](#) loosening module screws without actually removing them to allow module realignment.

NOTE

If you are working with one of the center 5 modules (27-31), try to reposition the module using the bias tool once. If the module does not align properly follow the special instructions in the Center Module Alignment Procedure to perform special manual alignment.

- b. Always use the bias tool to push the module toward the back rail. After the bias tool is installed, torque the module screws to the value shown in [Table 14 on page 61](#).
 - c. Re-assemble the system per [Plenum Installation and Balance weight installation on page 64](#).
 - d. Exit the plot from the previous alignment scan using the File menu (do not minimize the window), Dismiss the DASTools GUI that shows up and select **MiniCheck** again to rerun the alignment wizard test. Rerun the module alignment check to verify proper alignment, perform this step again if alignment is still not passing.
6. After the alignment plot is closed (not minimized, must exit the window) the DASTools GUI will automatically show up. From the **DASTools** interface run the following rotating tests.
 - a. Select and Run **mA Ratio Test** (creates/updates the bad channel map)
 - b. Select and Run the **Auto Test** from DASTools.
 7. If all the checks pass continue with the next step. If anything fails, troubleshoot per the failed test.
 8. Perform any desired quick checks if problem was not a digital issue that was already verified by the mini check tests.

3.1.15 Gantry Reassembly

Procedure

1. Install all gantry covers remembering to enable Axial Drive just before installing gantry right side cover. Gantry covers MUST be in place prior to running calibrations.

Refer to **Replacement > Gantry > Enclosure > (Cover Removal Procedures)**.

3.1.16 System calibration

If all modules are installed in the same original slot, need to perform Fast cal, and no need to perform Collimator Cal and Detail Cal.

3.1.17 Finalization

Procedure

1. Perform the Quality Assurance Test.

2. From the **FRDM Process Tool** currently open at the console select **Update Detector Configuration** when the system is ready for customer operation. This will read and update the new detector configuration and perform any background cleanup of temporary software files created by the tool during the replacement process.
3. Perform a **Save State** to save the new calibrations.

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