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# Vivid™ E9 / Vivid™ E7 with XDclear BT'13 Service Manual

BASIC SERVICE DOCUMENTATION.  
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# Important Precautions

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## TRANSLATION POLICY

### WARNING

- (EN) English
- This Service Manual is available in English only.
- If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.
  - Do not attempt to service the equipment unless this Service Manual has been consulted and is understood.
  - Failure to heed this Warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.

### AVERTISSEMENT

- (FR) Français
- Ce manuel de maintenance est disponible en anglais uniquement.
- Si un client de la personne responsable de la maintenance demande une langue autre que l'anglais, il est de la responsabilité du client de fournir les services de traduction.
  - N'essayez pas d'effectuer vous-même la maintenance de l'équipement avant d'avoir préalablement lu et compris le manuel de maintenance.
  - Le non-respect cet avertissement peut entraîner des blessures dues à un choc électrique, une défaillance mécanique ou à d'autres éléments dangereux chez la personne en charge de la maintenance, l'opérateur ou le patient.

### ADVERTENCIA

- (ES) Español
- Este Manual de servicio está disponible en idioma inglés únicamente.
- Si un proveedor de servicio del cliente requiere un idioma distinto, es responsabilidad del cliente ofrecer servicios de traducción.
  - No intente reparar el equipo a menos que haya consultado y comprendido este Manual de servicio.
  - Si no presta atención a esta Advertencia, se pueden ocasionar lesiones al proveedor de servicio, al operador o al paciente por descarga eléctrica, por riesgos mecánicos o de otra índole.

## WARNUNG

(DE)  
Deutsch

Dieses Wartungshandbuch ist nur auf Englisch verfügbar.

- Wenn der Kundendiensttechniker eines Kunden eine andere Sprache als Englisch benötigt, unterliegt es der Verantwortung des Kunden eine Übersetzung anfertigen zu lassen.
- Warten Sie das Gerät nur, wenn Sie dieses Wartungshandbuch gelesen und verstanden haben.
- Die Nichtbeachtung dieses Warnhinweises kann zu Verletzungen des Kundendiensttechnikers, Anwenders oder Patienten durch Stromschläge, mechanische oder andere Gefahren führen.

## AVVERTENZA

(IT)  
italiano

Il presente Manuale di assistenza è disponibile solo in inglese.

- Se il fornitore di servizi di un cliente ne richiede una copia in una lingua diversa dall'inglese, è responsabilità del cliente fornire il servizio di traduzione.
- Non tentare di riparare l'apparecchio se questo Manuale di assistenza non è stato letto e compreso.
- Il mancato rispetto di questa avvertenza può comportare il rischio di lesioni al fornitore di servizi, all'operatore o al paziente causate da scosse elettriche o da pericoli di origine meccanica o di altro tipo.

## WAARSCHUWING

(NL)  
Nederlands

Deze servicehandleiding is alleen beschikbaar in het Engels.

- Als de serviceleverancier van een klant vraagt om een andere taal dan Engels, is het de verantwoordelijkheid van de klant om een vertaalde versie te bieden.
- Probeer geen onderhoud aan de apparatuur uit te voeren tenzij deze servicehandleiding is geraadpleegd en begrepen.
- Het niet opvolgen van deze waarschuwing kan bij de serviceleverancier, de operator of de patiënt leiden tot letsel door elektrische schokken, mechanische of andere gevaren.

## ADVERTÊNCIA

- Português  
(PT-BR)
- Este Manual de Manutenção está disponível apenas em Inglês.
- Caso um prestador de serviços do cliente solicite o manual em idioma diferente do inglês, é de responsabilidade do cliente o fornecimento de serviços de tradução.
  - Não tente realizar a manutenção do equipamento antes de ler e compreender este Manual de manutenção.
  - O não cumprimento desta advertência pode resultar em danos por choque elétrico e riscos mecânicos para o prestador de serviços, operador ou paciente.

## HOIATUS!

- Eesti  
(ET)
- Service Manual (Hooldusjuhend) on saadaval ainult ingliskeelsena.
- Kui kliendi teenusepakkuja nõue on, et juhend oleks mõnes muus keeles, korraldab juhendi tõlkimise klient.
  - Tutvuge enne seadme hooldustööde tegemist kindlasti juhendiga Service Manual (Hooldusjuhend).
  - Selle nõude eiramise korral võib teenindaja, kasutaja või patsient saada elektrilöögi, samuti võivad kaasneda muud ohud.

## OPOZORILO

- Slovenščina  
(SL)
- Ta servisni priročnik je na voljo samo v angleščini.
- Če ponudnik servisnih storitev za stranko potrebuje navodila v drugem jeziku, mora stranka sama poskrbeti za prevajanje.
  - Ne poskušajte servisirati opreme, ne da bi prej prebrali in razumeli servisni priročnik.
  - Če tega opozorila ne upoštevate, obstaja nevarnost električnega udara, mehanskih ali drugih nevarnosti in posledičnih poškodb ponudnika servisnih storitev, uporabnika opreme ali pacienta.

## 警告

- (JA) 日本語
- このサービスマニュアルは英語版のみ提供されています。
- お客様の保守担当者が英語以外のマニュアルを必要とされる場合は、お客様の負担にて翻訳サービスをご利用ください。
  - 装置の保守を行う前に、必ずサービスマニュアルを読み、内容を理解してください。
  - この警告に注意を払わない場合、保守担当者やオペレータ、患者に対して、電気ショック、機械またはその他の危険による傷害が発生する恐れがあります。

## 警告

- (ZH-CN) 简体中文
- 本维修手册仅提供英文版。
- 如果客户需要其它语种版本，请自行翻译。
  - 在维修机器前，请务必阅读并完全理解本维修手册。
  - 若违反本警告，有可能会给维修提供商、操作员或患者带来电击伤害、机械损伤或其它危害。

## VARNING

- (SV) Svenska
- Den här servicehandboken finns endast på engelska.
- Om en kunds servicetekniker kräver ett annat språk än engelska är det kundens ansvar att tillhandahålla en översatt version.
  - Försök inte att utföra service på utrustningen om du inte har läst igenom och förstått den här servicehandboken.
  - Om du inte tar hänsyn till den här varningen kan serviceteknikern, operatören eller patienten utsättas för elektriska stötar eller mekaniska eller andra faror, vilket kan leda till personskador.

## 警告

- (ZH-TW) 繁體中文
- 此服務手冊僅推出英文版。
- 若客戶的維修人員需要英文以外的其他語言版本，客戶需自行負責提供翻譯服務。
  - 在詳閱此服務手冊並充分理解其內容之前，請勿試圖開始維修設備。
  - 若忽視此警告，可能導致維修人員、操作人員或病患因為觸電、機械問題或其他危險而受傷。

## 경고

한글  
(KO)

- 이 서비스 설명서는 영어로만 제공됩니다.
- 고객의 서비스 공급자가 영어 이외의 언어를 요구하는 경우 번역 서비스를 제공할 책임은 고객에게 있습니다.
  - 이 서비스 설명서를 참조 및 이해하지 못한 경우 장비를 만지지 마십시오.
  - 이 경고를 무시한 경우 서비스 공급자, 오퍼레이터 또는 환자가 감전, 기계적 위험 또는 기타 위험으로 인한 부상을 입을 수 있습니다.

## ПРЕДУПРЕЖДЕНИЕ

На русском языке  
(RU)

Данное руководство по обслуживанию доступно только на английском языке.

- Если специалисту по техническому обслуживанию клиента требуется документация на каком-либо другом языке, ответственность за выполнение перевода возлагается на клиента.
- Приступайте к обслуживанию оборудования только после того, как изучите данное руководство по обслуживанию и полностью поймете его содержание.
- Несоблюдение данного требования может привести к травмированию специалиста по техническому обслуживанию, пользователя или пациента вследствие поражения электрическим током, механических и прочих повреждений.

## OSTRZEŻENIE

Polski  
(PL)

Niniejszy podręcznik serwisowy jest dostępny wyłącznie w języku angielskim.

- Jeżeli dostawca usług klienta posługuje się językiem innym niż angielski, za zapewnienie usług tłumaczeniowych odpowiada klient.
- Przed przystąpieniem do czynności serwisowych należy zapoznać się z informacjami zawartymi w niniejszym podręczniku serwisowym i je zrozumieć.
- W przeciwnym wypadku dostawca usług, operator lub pacjent mogą odnieść obrażenia spowodowane porażeniem prądem elektrycznym, działaniem elementów mechanicznych lub innymi zagrożeniami.

## ΠΡΟΕΙΔΟΠΟΙΗΣΗ

Ελληνικά  
(EL)

Το παρόν Εγχειρίδιο σέρβις διατίθεται μόνο στα Αγγλικά.

- Εάν ο πάροχος σέρβις του πελάτη απαιτεί γλώσσα εκτός των Αγγλικών, η παροχή μεταφραστικών υπηρεσιών αποτελεί ευθύνη του πελάτη.
- Μην επιχειρήσετε να επισκευάσετε τον εξοπλισμό εάν πρώτα δεν συμβουλευτείτε και κατανοήσετε το παρόν Εγχειρίδιο σέρβις.
- Σε περίπτωση μη τήρησης της παρούσας προειδοποίησης, ενδέχεται να προκληθεί τραυματισμός στον πάροχο σέρβις, το χειριστή ή τον ασθενή εξαιτίας ηλεκτροπληξίας καθώς και μηχανικών ή άλλων κινδύνων.

## FIGYELMEZTETÉS

Magyar  
(HU)

A szervizkézikönyv kizárólag angol nyelven érhető el.

- Amennyiben az ügyfél szolgáltatójának nem felel meg az angol nyelvű dokumentáció, úgy a fordításról az ügyfélnek kell gondoskodnia.
- Kizárólag úgy lásson hozzá a berendezés karbantartásához, hogy elolvasta és megértette a szervizkézikönyvben foglaltakat.
- Ezen figyelmeztetés figyelmen kívül hagyása esetén a szolgáltató, a kezelő vagy a páciens áramütést, mechanikus sérülést vagy más veszély által okozott személyi sérülést szenvedhet.

## VAROVANIE

Slovenčina  
(SK)

Táto servisná príručka je dostupná iba v anglickom jazyku.

- Ak poskytovateľ služieb zákazníkom vyžaduje iný jazyk ako anglický jazyk, jeho povinnosťou je zabezpečiť prekladateľské služby.
- Zariadenie nepoužívajte bez prečítania a porozumenia tejto servisnej príručky.
- Nedodržanie tejto výstrahy môže viesť k zraneniu poskytovateľa služieb, operátora alebo pacienta spôsobeného elektrickým šokom, mechanickým alebo iným nebezpečenstvom.



## VÝSTRAHA

- česky  
(CZ)
- Tato servisní příručka je k dispozici pouze v angličtině.
- Pokud poskytovatel služby zákazníkovi požaduje jiný jazyk než angličtinu, je odpovědností zákazníka poskytnout služby překladu.
  - Nepokoušejte se provádět servis zařízení, dokud si neprostudujete a neporozumíte servisní příručce.
  - Nevěnování pozornosti této výstraze může způsobit poskytovateli služeb, obsluze nebo pacientovi úraz elektrickým proudem, mechanická nebo jiná nebezpečí.

## UYARI

- Türkçe  
(TK)
- Servis Kılavuzu yalnızca İngilizce olarak mevcuttur.
- Müşterinin servis sağlayıcısı için kılavuzun İngilizce dışında başka bir dile çevrilmesi gerekiyorsa çeviri hizmeti sağlamak müşterinin sorumluluğudur.
  - Bu Servis Kılavuzu'na bakıp talimatları anlamadan ekipmanı kullanmaya çalışmayın.
  - Bu Uyarının göz ardı edilmesi servis sağlayıcısının, operatörün veya hastanın, elektrik çarpması, mekanik arıza ya da diğer tehlikeler nedeniyle yaralanmasına neden olabilir.

## ADVARSEL

- Dansk  
(DA)
- Denne servicemanual fås kun på engelsk.
- Hvis en kundes tjenesteudbyder kræver et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelsesydelse.
  - Forsøg ikke at udføre service på udstyret, medmindre denne servicemanual er læst og forstået.
  - Manglende overholdelse af denne advarsel kan medføre skade på serviceudbyderen, operatøren eller patienten som følge af elektrisk stød, mekaniske eller andre farer.

## ADVARSEL

- (NO) Norsk
- Denne servicehåndboken er bare tilgjengelig på engelsk.
- Hvis en kundes tjenestetilbyder krever et annet språk enn engelsk, er det kundens ansvar å tilby oversettelsestjenester.
  - Ikke forsøk å utføre service på utstyret før denne servicehåndboken er lest og forstått.
  - Dersom det ikke tas hensyn til denne advarselen, kan det føre til skader på tjenestetilbyderen, operatøren eller pasienten fra elektrisk støt, mekaniske eller andre farer.

## VAKAVA VAROITUS

- (FI) Suomi
- Tämä huolto-opas on saatavana vain englanniksi.
- Jos asiakkaan palveluntarjoaja tarvitsee oppaan jollain muulla kielellä, käänöspalveluiden hankkiminen on asiakkaan vastuulla.
  - Laitetta ei saa huoltaa ellei huolto-oppaaseen ole sitä ennen tutustuttu huolellisesti.
  - Jos tätä varoitusta ei noudateta, palveluntarjoaja, käyttäjä tai potilas saattaa saada sähköiskun, ja saattaa aiheutua mekaanisia tai muita vaurioita.

## ПРЕДУПРЕЖДЕНИЕ

- (BG) Български
- Настоящото Сервизно ръководство се предлага само на английски език.
- Ако доставчикът на сервизни услуги на клиента изисква ръководство на език, който се различава от английския, клиентът има отговорност да осигури адекватен превод.
  - Не правете опити за сервиз на оборудването, без да проверите и да разберете съветите в Сервизното ръководство.
  - Неспазването на това предупреждение може да доведе до нараняване на доставчика на сервизни услуги, оператора или пациента вследствие на токов удар, механична или други опасности.

## AVERTISMENT

Română  
(RO)

Acest manual de service este disponibil doar în engleză.

- Dacă furnizorul de servicii al unui client solicită altă limbă decât engleza, este responsabilitatea clientului să ofere servicii de traducere.
- Nu încercați să efectuați lucrări de service asupra echipamentului, în afară de cazul când ați consultat acest manual de service și l-ați înțeles.
- Nerespectarea acestui avertisment poate avea ca rezultat rănirea furnizorului de servicii, a operatorului sau a pacientului ca urmare a electrocutării, pericolelor mecanice sau a altor pericole.

## UPOZORENJE

Hrvatski  
(HR)

Ovaj servisni priručnik dostupan je samo na engleskom jeziku.

- Ako klijentov serviser zahtijeva jezik koji nije engleski, odgovornost klijenta je pružiti usluge prijevoda.
- Nemojte pokušavati servisirati opremu ako niste pročitali i razumjeli servisni priručnik.
- Ako ne poštujete ovo upozorenje, može doći do ozljede serviseru, operatera ili pacijenta prouzročene strujnim udarom, mehaničkim i drugim opasnostima.

## ĮSPĖJIMAS

Lietuvių k.  
(LT)

Šis priežiūros vadovas galimas tik anglų kalba.

- Jei kliento paslaugų teikėjas reikalauja kitos kalbos nei anglų, klientas atsako už vertimo paslaugos teikimą.
- Atlikite įrangos priežiūrą tik gerai susipažinę su priežiūros vadovu ir jį supratę.
- Nesilaikant šio įspėjimo galimas paslaugos teikėjo, operatoriaus ar paciento sužeidimas dėl elektros šoko, mechaninio ar kito pavojaus.

## BRĪDINĀJUMS

Latviski  
(LV)

Šī apkalpes rokasgrāmata ir pieejama tikai angļu valodā.

- Ja klienta pakalpojumu sniedzējam ir nepieciešama cita valoda, kas nav angļu valoda, klienta pienākums ir nodrošināt tulkojumu.
- Nemēģiniet apkalpot aprīkojumu, ja apkalpes rokasgrāmata nav izlasīta un izprasta.
- Ja šis brīdinājums netiek ievērots, pakalpojumu sniedzējs, operators vai pacients var gūt traumas no elektrošoka vai var rasties mehānisks vai cita veida apdraudējums.

## UPOZORENJE

Srpski  
(SR)

Ovaj priručnik za servisiranje dostupan je samo na engleskom jeziku.

- Ako klijentov serviser zahteva jezik koji nije engleski, odgovornost je na klijentu da pruži usluge prevođenja.
- Nemojte da pokušavate da servisirate opremu ako prethodno niste pročitali i razumeli ovaj priručnik.
- Ako ne poštujete ovo upozorenje, može doći do povređivanja servisera, operatera ili pacijenta uzrokovanog električnim udarom, mehaničkim i drugim opasnostima.

## AVISO

Português  
(Portugal)  
(PT-PT)

Este manual de assistência está disponível apenas em inglês.

- Se o prestador de serviços de assistência do cliente necessitar do manual noutra idioma, a disponibilização dos serviços de tradução é da responsabilidade do cliente.
- Não tente reparar o equipamento se não tiver consultado e compreendido este manual de assistência.
- O não cumprimento das instruções constantes neste aviso pode resultar em ferimentos no prestador de serviços de assistência, no operador ou no paciente devido a choques eléctricos, perigos mecânicos ou outros problemas.

## ПОПЕРЕДЖЕННЯ

Українська  
(UK)

Цей посібник із технічного обслуговування доступний лише англійською мовою.

- Якщо постачальнику послуг із технічного обслуговування потрібна інформація мовою, відмінною від англійської, відповідальність за надання послуг перекладу несе користувач.
- Технічне обслуговування обладнання можна виконувати лише після ознайомлення з посібником із технічного обслуговування та усвідомлення його змісту.
- Недотримання цього попередження може призвести до травм постачальника послуг, оператора або пацієнта, спричинених дією електричного струму, механічних або інших пошкоджень.

## PERINGATAN

Bahasa  
Indonesia  
(ID)

Panduan Servis ini hanya tersedia dalam Bahasa Inggris.

- Jika penyedia layanan pelanggan memerlukan bahasa di luar Bahasa Inggris, maka pelanggan bertanggung jawab untuk memberikan layanan tersebut.
- Jangan mencoba menyervis peralatan ini, kecuali Panduan Servis ini telah dijadikan rujukan dan dipahami dengan baik.
- Kelalaian memperhatikan Peringatan ini dapat menyebabkan cedera terhadap penyedia layanan, operator, atau pasien akibat bahaya kejutan listrik, mekanik, dan bahaya lainnya.

## คำเตือน

ไทย  
(TH)

คู่มือซ่อมบำรุงนี้มีเฉพาะภาษาอังกฤษเท่านั้น

- หากผู้ให้บริการของลูกค้าต้องการฉบับภาษาอื่นนอกเหนือจากภาษาอังกฤษ ลูกค้าต้องเป็นผู้รับผิดชอบในการจัดเตรียมคู่มือซ่อมบำรุงฉบับแปล
- โปรดอย่าซ่อมบำรุงอุปกรณ์โดยไม่ศึกษา และทำความเข้าใจคู่มือซ่อมบำรุงนี้
- หากไม่ปฏิบัติตามคำเตือนนี้อาจส่งผลให้ผู้ให้บริการ ผู้ใช้งานอุปกรณ์ หรือผู้ป่วยได้รับบาดเจ็บจากไฟฟ้าช็อต อันตรายจากกลไกของอุปกรณ์ หรืออันตรายอื่น ๆ

## CẢNH BÁO

(VI) Tiếng Việt

Hướng dẫn sử dụng dịch vụ này chỉ sẵn dùng bằng tiếng Anh.

- Nếu nhà cung cấp dịch vụ của khách hàng yêu cầu ngôn ngữ khác ngoài tiếng Anh, thì khách hàng phải có trách nhiệm cung cấp các dịch vụ dịch thuật.
- Không được tìm cách sửa chữa thiết bị trừ khi đã tham khảo và hiểu rõ Hướng dẫn sử dụng dịch vụ này.
- Bỏ qua lời cảnh báo này có thể gây thương tích cho nhà cung cấp dịch vụ, nhân viên vận hành hoặc bệnh nhân do sốc điện, những nguy hiểm về máy móc hoặc yếu tố khác.

## ЕСКЕРТУ

(KK) Қазақ тілінде

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

- Егер тұтынушылардың қызметтер жеткізушісі ағылшын тілінен басқа тілді талап етсе, аудару қызметтерімен қамтамасыз ету тұтынушының жауапкершілігіне кіреді.
- Осы қызмет көрсету нұсқаулығын түсініп, ол туралы кеңес алмайынша жабдыққа қызмет көрсетуге тырыспаңыз.
- Осы ескертуді орындамау электр тогының соғуы, механикалық немесе басқа да қауіптер салдарынан қызметтер жеткізушісінің, оператордың немесе емделушінің жарақаттануына алып келуі мүмкін.

## BABALA

(TL) Tagalog

Available lamang sa Ingles ang Manwal ng Serbisyonang ito.

- Kung ang kailangan lamang ng tagabigay ng serbisyo ng kustomer ng wika maliban sa Ingles, responsibilidad ng kustomer na magbigay ng serbisyo sa pagsasalin wika nito.
- Huwag subukan na iserbisyo ang mga kasangkapan maliban kung nakonsulta ang nauunawaan itong Manwal ng Serbisyo.
- Ang pagkabisyonang maunawaan ang Babalang ito ay maaring maging resulta ng pinsala sa tagabigay ng serbisyo, nagpapagana o pasyente mula sa pagkakakoryente, mekanikal o iba pang peligro.

## DAMAGE IN TRANSPORTATION

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

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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. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE personnel. 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.

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Mail the information to:

Service Documentation,  
GE Vingmed Ultrasound AS  
P.O.Box: 141  
NO 3191 HORTEN  
NORWAY

GE employees should use Post-Market Quality Management (PQM) to report service documentation issues.

## SERVICE SAFETY CONSIDERATIONS

 **DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**

 **WARNING USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.**

For a complete review of all safety requirements, see [Section 1-4 "Safety considerations" on page 1-12.](#)

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# Revision History

REVISION	DATE	REASON FOR CHANGE
1	2013-SEP-13	Initial release of manual.
2	2016-JAN-29	<ul style="list-style-type: none"> <li>• Update per change of CE notified body to TUV SÜD, CE 0123.</li> <li>• Updated 'Translation Policy' (language disclaimers).</li> <li>• Added information for Vivid E9 Vet</li> <li>• Added USB Flash Drive (UFD) as replacement for software and manual CDs and DVDs.</li> <li>• Added/updated FRU parts in Chapter 9.</li> </ul>

## List of Effected Pages

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	2	4-1 to <a href="#">4-50</a>	2	9-1 to <a href="#">9-84</a>	2
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2-1 to <a href="#">2-14</a>	2	7-1 to <a href="#">7-24</a>	2		
3-1 to <a href="#">3-54</a>	2	8-1 to <a href="#">8-294</a>	2		

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# CHAPTER 10

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# Chapter 1

## Introduction

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### Section 1-1 Overview

#### 1-1-1 Purpose of this chapter

This chapter describes important issues related to safely servicing VIVID E9 / VIVID E7. The service provider must read and understand all the information presented here before installing or servicing a unit.

#### 1-1-2 Contents in this chapter

1-1	Overview . . . . .	1-1
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## Section 1-2 Service manual overview

The service manual provides installation and service information for the VIVID E9 / VIVID E7 ultrasound scanning unit. It is divided in 10 chapters as shown below, in [Table 1-1 "Contents in this service manual" on page 1-2](#).

### 1-2-1 Contents in this manual

The service manual is divided into ten chapters.

In the beginning of the manual, before chapter 1, you will find the language policy for GE's service documentation, legal information, a revision overview and the Table of Contents (TOC).

An Index has been included after chapter 10.

**Table 1-1 Contents in this service manual**

CHAPTER NUMBER	CHAPTER TITLE	DESCRIPTION
1	<a href="#">Introduction</a>	Contains a content summary and warnings.
2	<a href="#">Site preparations</a>	Contains pre-installation requirements for the VIVID E9 / VIVID E7.
3	<a href="#">System setup</a>	Contains installation procedure with installation checklist.
4	<a href="#">General procedures and Functional checks</a>	Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5	<a href="#">Components and functions (theory)</a>	Contains block diagrams and functional explanations of the electronics.
6	<a href="#">Service adjustments</a>	Contains instructions on how to make any available adjustments to the VIVID E9 / VIVID E7.
7	<a href="#">Diagnostics / troubleshooting</a>	Provides procedures for running and diagnostic or related routines for the VIVID E9 / VIVID E7.
8	<a href="#">Replacement procedures</a>	Provides disassembly procedures and reassembly procedures for all changeable FRU.
9	<a href="#">Renewal parts</a>	Contains a complete list of replacement parts for VIVID E9 / VIVID E7.
10	<a href="#">Care &amp; maintenance</a>	Provides periodic maintenance procedures for VIVID E9 / VIVID E7.
N/A	<a href="#">Index</a>	A quick way to the topic you're looking for.



**1-2-2 Typical users of the Service Manual**

- Service Personnel (setup, maintenance, etc.)
- Hospital's Service Personnel
- Architectural Planners/Installation Planners (some parts of [Chapter 2 - Site preparations](#))

**1-2-3 VIVID E9 models covered by this manual**

**Table 1-2 VIVID E9 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000070	Vivid E9 with XDclear 4D Expert Option 17 inch LCD (100-230V)	GB200063 or GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.5	v113.0 or higher	N/A
GB000080	Vivid E9 with XDclear 4D Expert Option 19 inch LCD (100-230V)					
GB000075	Vivid E9 with XDclear 2D 17 inch LCD (100-230V)	GB200062 or GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	N/A
GB000085	Vivid E9 with XDclear 2D 19 inch LCD (100-230V)					
GB000090	Vivid E9 with XDclear Pro configuration 17 inch Monitor (100-230V)					
GB000095	Vivid E9 with XDclear Pro configuration 19 inch Monitor (100-230V)					

**1-2-4 VIVID E7 models covered by this manual**

**Table 1-3 VIVID E7 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000099	VIVID E7 Pro with XDclear configuration - 17 inch LCD	GB200062 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	v113.x
GB000100	VIVID E7 Pro with XDclear configuration - 19 inch LCD					

## 1-2-5 Product description

### 1-2-5-1 Overview of the VIVID E9 / VIVID E7 ultrasound scanners

The VIVID E9 and VIVID E7 ultrasound scanners are high performance digital ultrasound imaging systems with total data management.

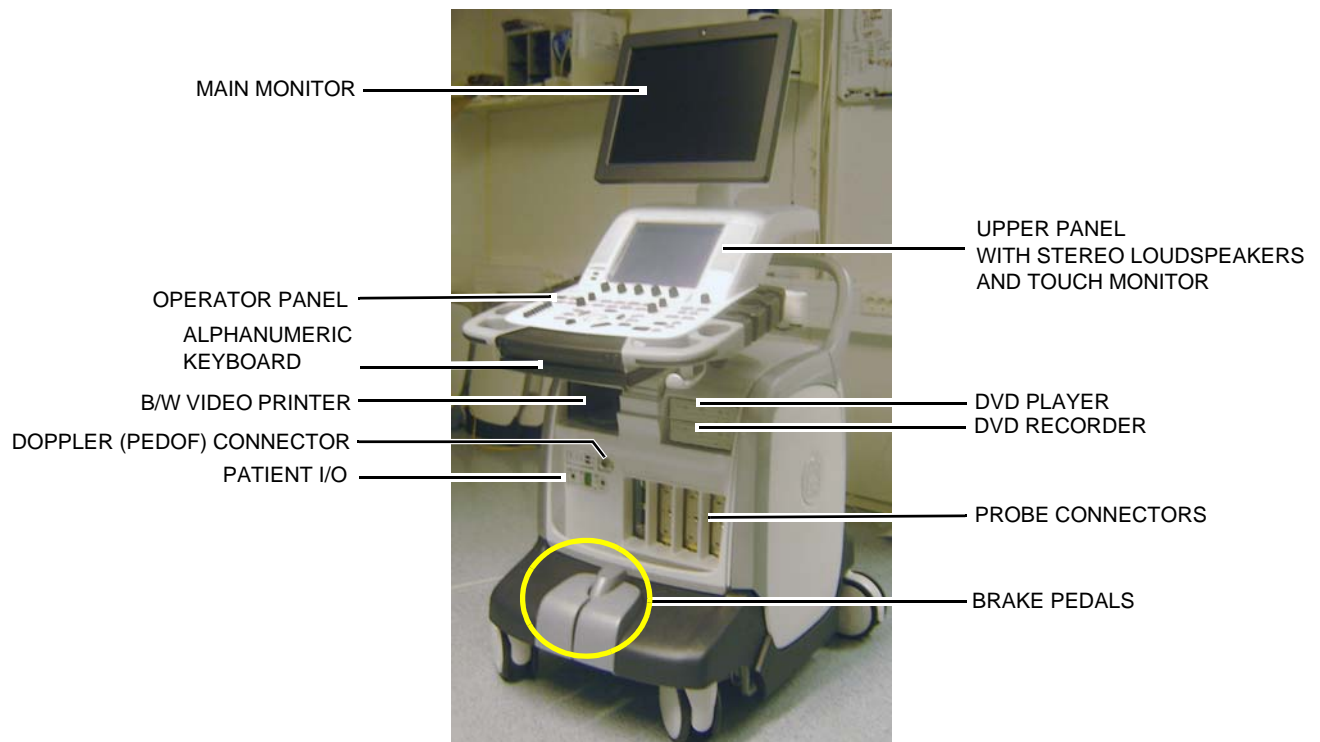
The system provides image generation in 4D (VIVID E9 Expert), 2D (B) Mode, Color Doppler, Power Doppler (Angio), M-Mode, Color M-Mode, PW and CW Doppler spectra, Tissue Velocity imaging, Advanced Strain and Contrast applications. The fully digital architecture of the VIVID E9 / VIVID E7 unit allows optimal usage of all scanning modes and probe types, throughout the full spectrum of operating frequencies.

Signal flow from the Probe Connector Panel to the Front End, and then over to the Back End Processor and finally to the monitor and peripherals.

System configuration is stored on the hard drive in the Back End Processor.

All necessary software is loaded from the hard drive on power up.

**Figure 1-1 VIVID E9 / VIVID E7 major components**



### 1-2-5-2 Purpose of the operator manual(s)

The operator manuals should be fully read and understood before operating the VIVID E9 / VIVID E7.

The online versions of the operator manuals are available via the Help function on VIVID E9 / VIVID E7's operator panel.

The translated online user manuals are available on a CD-ROM or on a USB Flash Drive (UFD) delivered with the system. They are also available on the Common Documentation Library (CDL) for downloading.

## Section 1-3 Important conventions

### 1-3-1 Conventions used in this book

#### 1-3-1-1 Model designations

This manual covers the VIVID E9 / VIVID E7 scanners listed in [1-2-3 "VIVID E9 models covered by this manual" on page 1-4.](#)

#### 1-3-1-2 Icons

Pictures, or icons, are used wherever they will reinforce the printed message. The icons, labels and conventions used on the product and in the service information are described in this chapter.

#### 1-3-1-3 Safety precaution messages

Various levels of safety precaution messages may be found on the equipment and in the service information. The different levels of concern are identified by a flag word that precedes the precautionary message. Known or potential hazards to personal are labeled in one of three ways:


- DANGER
- WARNING
- CAUTION

When a hazard is present that can cause property damage, but has absolutely no personal injury risk, a NOTICE is used.

 **DANGER** **DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE INSTRUCTIONS ARE IGNORED.**

 **WARNING** **WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY AND PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.**

 **CAUTION** **CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL OR CAN CAUSE MINOR PERSONAL INJURY AND PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED. EQUIPMENT DAMAGE POSSIBLE.**

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

Example: Disk drive may crash.

*NOTE:* Notes are used to provide important information about an item or a procedure.

*NOTE:* Be sure to read the notes; the information contained in a note can often save you time or effort.

1-3-2 Standard hazard icons















Important information will always be preceded by the exclamation point  contained within a triangle, as seen throughout this 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. Even if a symbol isn't used in this manual, it may be included for your reference.

Table 1-4 Standard hazard icons

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	HEAT	PINCH
 LASER LIGHT		 OR 

Some others icons make you aware of specific procedures that should be followed.

Table 1-5 Standard Icons that indicates that a special procedure is to be used

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION
		 EYE PROTECTION OR 
HAND PROTECTION	FOOT PROTECTION	
		

1-3-3 Product icons

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 1-6 Product icons sheet 1 of 4






LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
Identification and Rating Plate	- Manufacturer's name and address - Date of manufacture - Model and serial numbers - Electrical ratings	Rear of console near power inlet
Type/Class Label	Used to indicate the degree of safety or protection.	Rear of console
	Equipment Type BF (man in the box symbol) IEC 878-02-03 indicates B Type equipment having a floating applied part.	Probe connectors including Doppler probe connector
	Equipment Type CF (heart in the box symbol) IEC 878-02-05 indicates equipment having a floating applied part having a degree of protection suitable for direct cardiac contact.	Probe connectors and ECG connector. On newer systems also on the rear of the system.
	DEFIBRILLATOR-PROOF TYPE CF EQUIPMENT.	At the ECG connector on front of system.
Device Listing/Certification Labels	Laboratory logo or labels denoting conformance with industry safety standards such as UL or IEC.	Rear of console
<p>"CAUTION - This unit weighs ... Special care must be used to avoid ..."</p> 	This precaution is intended to prevent injury that may result if one person attempt to move the unit considerable distances or on an incline due to the weight of the unit.	On the console where easily seen during transport
	Do not push VIVID E9 / VIVID E7 sideways when casters are in break position. Instability may occur.	Both sides of Top Console
"DANGER - Risk of explosion used in..."	The system is not designed for use with flammable anesthetic gases.	Rear of console

Table 1-6 Product icons (cont'd) sheet 2 of 4








LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p>The system is not designed for use with flammable anesthetic gases.</p>	<p>Rear of console</p>
<p>VIVID E9 / VIVID E7 SCANNERS</p> 	<p><b>VIVID E9 / VIVID E7 SCANNERS</b>  “TESTED AND PRODUCTION MONITORED BY TUV PRODUCT SERVICE NRTL WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL2601-1 AND CAN/CSA C22.2 NO.601.1”</p>	<p>REAR OF CONSOLE ON VIVID E9 / VIVID E7</p>
 <p>(Introduced 1. January 2016.)</p>	<p>This unit carries the CE mark. The VIVID E9 / VIVID E7 unit complies with regulatory requirements of the European Directive 93/ 42/EEC concerning medical devices. It also complies with emission limits for a Group 1, Class B Medical Device as stated in EN 60601-1-2 (IEC 60601-1-2).</p>	<p>REAR OF CONSOLE</p>
 <p>(Used before 1. January 2016.)</p>	<p>This unit carries the CE mark. The VIVID E9 / VIVID E7 unit complies with regulatory requirements of the European Directive 93/ 42/EEC concerning medical devices. It also complies with emission limits for a Group 1, Class B Medical Device as stated in EN 60601-1-2 (IEC 60601-1-2).</p>	<p>REAR OF CONSOLE</p>
	<p>“CAUTION” The equilateral triangle is usually used in combination with other symbols to advise or warn the user.</p>	<p>VARIOUS</p>
	<p>“ATTENTION - Consult accompanying documents” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.</p>	<p>VARIOUS</p>
	<p>“CAUTION - Dangerous voltage” (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.</p>	<p>VARIOUS</p>

Table 1-6 Product icons (cont'd) sheet 3 of 4




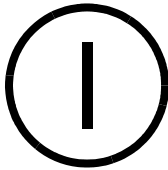



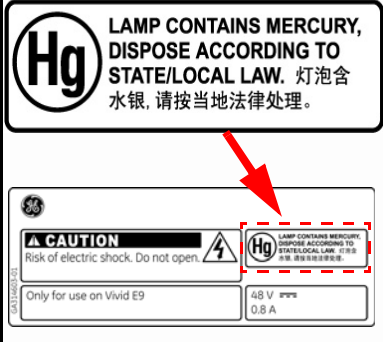
LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p><b>“PINCH POINT”</b> Indicates moving parts that may cause injury (such as LCD arm)</p>	<p>VARIOUS</p>
	<p><b>“Mains OFF”</b> Indicates the power off position of the mains power switch.</p>	<p>REAR OF SYSTEM ADJACENT TO MAINS SWITCH</p>
	<p><b>“Mains ON”</b> Indicates the Power ON position of the mains power switch. “ON” Indicates the power on position of the power switch. <b>CAUTION</b> <b>THE ON/OFF BUTTON ON THE OPERATOR PANEL DOES NOT ISOLATE MAINS SUPPLY</b></p>	<p>Rear of system</p>
	<p>On/off button <b>CAUTION</b> <b>SYSTEM SHUTDOWN USING THE ON/OFF BUTTON DOES NOT DISCONNECT VIVID E9 / VIVID E7 FROM MAINS VOLTAGE.</b> For disconnecting VIVID E9 / VIVID E7 from mains voltage after system shutdown, please set the circuit breaker close to the mains inlet to OFF as described in <a href="#">4-2-2 "Power shut down" on page 4-8.</a></p>	<p>Operating Panel</p>
	<p><b>“Protective Earth”</b> Indicates the protective earth (grounding) terminal.</p>	<p>USED SEVERAL PLACES INSIDE THE SCANNER.</p>
	<p><b>“Equipotential”</b> Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment as described in IEC60601-1.</p>	<p>REAR OF CONSOLE</p>
	<p>This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.</p>	<p>REAR OF CONSOLE</p>



Table 1-6 Product icons (cont'd) sheet 4 of 4

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p>This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the monitor display, contain mercury.)</p>	<p>REAR OF LCD Monitor</p>

## Section 1-4 Safety considerations

### 1-4-1 Introduction

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture and intended use of the equipment.


### 1-4-2 Human safety

- Operating personnel must not remove the system covers.
- Servicing should be performed by authorized personnel only.
- Only personnel who have participated in a VIVID E9 / VIVID E7 Training Seminar are authorized to service the equipment.
- Local laws may restrict this device for sale or use by or on the order of a physician.

**NOTE:** For VIVID E9 Vet, local laws may restrict this device for sale or use by or on the order of a veterinarian.

 **DANGER DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**







 **WARNING IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID E9 / VIVID E7, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.**

 **WARNING BECAUSE OF THE LIMITED ACCESS TO CABINETS AND EQUIPMENT IN THE FIELD, PLACING PEOPLE IN AWKWARD POSITIONS, GE HAS LIMITED THE LIFTING WEIGHT FOR ONE PERSON IN THE FIELD TO 16 KG (35 LBS). ANYTHING OVER 16 KG (35 LBS) REQUIRES 2 PEOPLE.**




 **WARNING HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE VIVID E9 / VIVID E7. ATTEMPTS TO MOVE THE UNIT CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.**
















1-4-2 Human safety (cont'd)

-  **WARNING** *WHEN THE TOP CONSOLE IS IN ITS LOCKED POSITION, THE GAS SHOCK IS COMPRESSED AND STORES MECHANICAL ENERGY. DURING NORMAL OPERATION THE TOP CONSOLE, THE WEIGHT OF THE MONITOR AND THE MECHANICAL FORCE OF THE GAS SHOCK ARE IN BALANCE. TAKE CARE IF/WHEN YOU ACTIVATE THIS GAS SHOCK. PERSONAL INJURY CAN OCCUR AFTER THE PANEL IS REMOVED AND THE SHOCK PRESSURE IS RELEASED. TAKE CARE WHEN YOU REPAIR THE ELEVATION ASSEMBLY.*
-  **WARNING** *USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.*
-  **WARNING** *EXPLOSION WARNING*  
*DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.*
-  **WARNING** *DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT BECAUSE OF THE DANGER OF INTRODUCING ADDITIONAL HAZARDS, ONLY INSTALL GE APPROVED PARTS. DO NOT PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.*
-  **WARNING** *ENSURE THAT THE ULTRASOUND SYSTEM IS TURNED OFF AND UNPLUGGED WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF. ULTRASOUND SYSTEM COMPONENTS MAY BE ENERGIZED. ALWAYS REFER TO THE ULTRASOUND SYSTEM'S PROPRIETARY SERVICE MANUAL FOR LOTO WARNINGS AND CAUTIONS*
-  **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF AND DISCONNECTED FROM POWER SOURCE. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF. ULTRASOUND SYSTEM COMPONENTS MAY BE ENERGIZED. ALWAYS REFER TO THE ULTRASOUND SYSTEM'S SERVICE MANUAL FOR LOTO WARNINGS AND CAUTIONS.*


**1-4-2 Human safety (cont'd)**

-  **WARNING** *BEWARE OF POSSIBLE SHARP EDGES ON ALL MECHANICAL PARTS. IF SHARP EDGES ARE ENCOUNTERED, THE APPROPRIATE PPE SHOULD BE USED TO REDUCE THE RISK OF INJURY.*
  
-  **WARNING** *TILTING THE CONSOLE REQUIRES TWO PEOPLE IN ORDER TO AVOID INJURY TO SERVICE PERSONNEL AND DAMAGE TO THE EQUIPMENT.*
  
-  **WARNING** *WEAR ALL PPE INCLUDING GLOVES AS INDICATED IN THE CHEMICAL MSDS.*

**1-4-3 Mechanical safety**

-  **WARNING** *WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS TO A UFD, A DVD OR TO HARDCOPY BEFORE DOING A SOFTWARE UPGRADE.*
-  **WARNING** *PRIOR TO ELEVATING SCANNER, VERIFY THAT THE KEYBOARD IS LOCKED IN ITS LOWEST POSITION. VERIFY THAT THE FRONT BRAKE IS LOCKED AND THE SCANNER IS UNABLE TO SWIVEL. VERIFY THAT THE REAR BRAKES ARE IN THE LOCKED POSITION.*
-  **WARNING** *WHEN THE UNIT IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE, USE EXTREME CAUTION SINCE IT MAY BECOME UNSTABLE AND TIP OVER.*
-  **WARNING** *ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.*
-  **WARNING** *NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.*
-  **WARNING** *THE SYSTEM SHOULD NOT BE MOVED WITH THE OPERATING PANEL EXTENDED. POSITION THE OPERATING PANEL IN ITS CENTERED AND LOCKED POSITION. LOWER THE OPERATING PANEL AS MUCH AS POSSIBLE BEFORE MOVING THE SYSTEM.*
-  **WARNING** *REMEMBER: IF THE FRONT CASTER SWIVEL LOCK IS ENGAGED FOR TRANSPORTATION, PRESSING THE RELEASE PEDAL ONCE DISENGAGES THE SWIVEL LOCK. YOU MUST DEPRESS THE RELEASE PEDAL A SECOND TIME TO ENGAGE THE BRAKE.*
-  **CAUTION** *BEFORE YOU MOVE OR TRANSPORT THE SYSTEM, MAKE SURE TO LOCK THE LCD MONITOR ARM FIRMLY AND FLIP DOWN THE MONITOR TO PREVENT DAMAGE TO THE SYSTEM.*
-  **CAUTION** *ALWAYS LOCK THE TOP CONSOLE (OPERATOR PANEL) IN ITS PARKING (LOCKED) POSITION BEFORE MOVING THE SCANNER AROUND.*
-  **CAUTION** *TO AVOID INJURY WHEN YOU MOVE THE LCD MONITOR AND THE MONITOR ARM, DO NOT PUT YOUR FINGER, HAND, OR OBJECT ON THE JOINT OF THE MONITOR OR THE MONITOR ARM.*
-  **CAUTION** *ENSURE THAT NOBODY TOUCH THE CONSOLE ARM/FROGLEG WHEN MOVING THE OPERATOR PANEL.*
-  **CAUTION** *DO NOT MOVE THE UNIT IF THE OPERATOR PANEL IS IN UNLOCKED POSITION.*
-  **CAUTION** *KEEP THE HEAT VENTING HOLES ON THE MONITOR UNOBSTRUCTED TO AVOID OVERHEATING OF THE MONITOR.*

### 1-4-3 Mechanical safety (cont'd)

 **CAUTION** VIVID E9 / VIVID E7 WEIGHS 128 KG (283 LB.) OR MORE, DEPENDING ON INSTALLED PERIPHERALS, WHEN READY FOR USE. CARE MUST BE USED WHEN MOVING IT OR REPLACING ITS PARTS. FAILURE TO FOLLOW THE PRECAUTIONS LISTED BELOW COULD RESULT IN INJURY, UNCONTROLLED MOTION AND COSTLY DAMAGE.



**ALWAYS:**

- BE SURE THE PATHWAY IS CLEAR.
- USE SLOW, CAREFUL MOTIONS.
- USE TWO PEOPLE WHEN MOVING ON INCLINES OR LIFTING MORE THAN 16 KG (35 LBS).

 **CAUTION** DO NOT TRANSPORT VIVID E9 / VIVID E7 IN A VEHICLE WITHOUT LOCKING THE CASTERS (WHEELS) AND SECURING IT.

 **CAUTION** USE PROTECTIVE GLASSES DURING DRILLING, FILING AND DURING ALL OTHER WORK WHERE EYES NEED PROTECTION.




 **CAUTION** USE SAFETY SHOES WHEN DOING WORK WHERE THERE IS ANY CHANCE OF FOOT DAMAGE.



 **CAUTION** USE PROTECTIVE GLOVES WHEN DRILLING AND CUTTING.



 **NOTICE** Be careful not to pinch any of the cables.

## 1-4-4 Electrical safety

### 1-4-4-1 Safe practices

Follow these guidelines to minimize shock hazards whenever you are using the scanner;

- The equipment chassis must be connected to an electrical ground.
- The VIVID E9 / VIVID E7 is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground.
- The power outlet used for this equipment should not be shared with other types of equipment.
- Both the system power cable and the power connector must meet international electrical standards.



**WARNING** *CONNECTING A VIVID E9 / VIVID E7 SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.*

### 1-4-4-2 Probes

Follow these guidelines before connecting a probe to the scanner:

- Inspect the probe prior to each use for damage or degradation to the:
  - housing
  - cable strain relief
  - lens
  - seal
  - connector pins
  - locking mechanism
- Do not use a damaged or defective probe.
- Never immerse the probe connector or adapter into any liquid.
- The system has more than one type of probe port. Use the appropriate probe port designed for the probe you are connecting.

1-4-5 Label, General Info - XDclear

Table 1-7 Label, General Info - XDclear sheet 1 of 4

DESCRIPTION	ILLUSTRATION
<p>Label, General Info - XDclear (International) (Introduced 1. JAN. 2016)</p>	
<p>Label, General Info - XDclear (International)</p>	
<p>Label, General Info - XDclear (International)</p>	
<p>Label, General Info - XDclear (International)</p>	



Table 1-7 Label, General Info - XDclear (cont'd) sheet 2 of 4

DESCRIPTION	ILLUSTRATION
<p>Label, General Info - BT13 Brazil (Introduced 1. JAN. 2016)</p>	
<p>Label, General Info - BT'12 / BT13 Brazil</p>	
<p>Label, General Info - XDclear (China) (Introduced 1. JAN. 2016)</p>	
<p>Label, General Info - XDclear (China)</p>	

Table 1-7 Label, General Info - XDclear (cont'd) sheet 3 of 4

DESCRIPTION	ILLUSTRATION
<p>Label, General Info - XDclear (Japan) (Introduced 1. JAN. 2016)</p>	<p><b>Vivid E9</b></p> <p>Management medical equipment / Specific safety management medical equipment          一般の名称: 汎用超音波画像診断装置          販売名: 汎用超音波画像診断装置 Vivid E9          定格電源: AC100V 50/60Hz          電源入力、製造番号は製造元銘版参照のこと          GEヘルスケア・ジャパン株式会社          東京都日野市旭が丘4-7-127</p> <p>Medical Electrical Equipment UL 60601-1 CAN/CSA C22.2 No. 601.1</p> <p>CLASS I TYPE CF</p> <p>GE Vingmed Ultrasound AS Strandpromenen 45, N-3191 Horten, Norway</p>
<p>Label, General Info - XDclear (Japan)</p>	<p><b>Vivid E9</b></p> <p>Management medical equipment / Specific safety management medical equipment          一般の名称: 汎用超音波画像診断装置          販売名: 汎用超音波画像診断装置 Vivid E9          定格電源: AC100V 50/60Hz          電源入力、製造番号は製造元銘版参照のこと          GEヘルスケア・ジャパン株式会社          東京都日野市旭が丘4-7-127</p> <p>Medical Electrical Equipment UL 60601-1 CAN/CSA C22.2 No. 601.1</p> <p>CLASS I TYPE CF</p> <p>GE Vingmed Ultrasound AS Strandpromenen 45, N-3191 Horten, Norway</p>
<p>Label, General Info - XDclear (Korea) (Introduced 1. JAN. 2016)</p>	<p><b>GE Healthcare</b> Model: <b>Vivid E9</b></p> <p>Management medical equipment / Specific safety management medical equipment          一般の名称: 汎用超音波画像診断装置          販売名: 汎用超音波画像診断装置 Vivid E9          定格電源: AC100V 50/60Hz          電源入力、製造番号は製造元銘版参照のこと          GEヘルスケア・ジャパン株式会社          東京都日野市旭が丘4-7-127</p> <p>Medical Electrical Equipment UL 60601-1 CAN/CSA C22.2 No. 601.1</p> <p>CLASS I TYPE CF</p> <p>GE Vingmed Ultrasound AS (노르웨이)</p> <p>수입자의 상호 및 주소: 지이헬스케어코리아 위 서울시 강남구 학동로 343 POBA 강남타워 7, 8층</p> <p>주의: 본 기기는 배관을 준수하여 사용되어야 합니다. 특정한 사용 예를 들면 태아의 상완 골지 목적의 사용 되어 제한됩니다.</p> <p>품명: 체내형초음파영상진단장치          형명: Vivid E9          품목허가번호: 수허 09-209호          사용목적: 진단을 위하여 환부에 초음파 에너지를 전송, 방사 선호를 수신하여 영상촬영 및 영상과 혈관의 영상촬영에 사용되는 초음파영상진단장치          제조번호 및 제조년월: 제조원의 표시기재사항 참조          포장단위: 1 Set          정격전압, 주파수, 소비전력: AC: 100 ~ 230 VAC, 50 ~ 60 Hz, 1100 W          보호형식 및 보호정도: 1 급기기, CF 형기기/BF형기기 (프로브)          본 제품은 의료기기임 Made in Norway</p>
<p>Label, General Info - XDclear (Korea)</p>	<p><b>GE Healthcare</b> Model: <b>Vivid E9</b></p> <p>Management medical equipment / Specific safety management medical equipment          一般の名称: 汎用超音波画像診断装置          販売名: 汎用超音波画像診断装置 Vivid E9          定格電源: AC100V 50/60Hz          電源入力、製造番号は製造元銘版参照のこと          GEヘルスケア・ジャパン株式会社          東京都日野市旭が丘4-7-127</p> <p>Medical Electrical Equipment UL 60601-1 CAN/CSA C22.2 No. 601.1</p> <p>CLASS I TYPE CF</p> <p>GE Vingmed Ultrasound AS (노르웨이)</p> <p>수입자의 상호 및 주소: 지이헬스케어코리아 위 서울시 강남구 학동로 343 POBA 강남타워 7, 8층</p> <p>주의: 본 기기는 배관을 준수하여 사용되어야 합니다. 특정한 사용 예를 들면 태아의 상완 골지 목적의 사용 되어 제한됩니다.</p> <p>품명: 체내형초음파영상진단장치          형명: Vivid E9          품목허가번호: 수허 09-209호          사용목적: 진단을 위하여 환부에 초음파 에너지를 전송, 방사 선호를 수신하여 영상촬영 및 영상과 혈관의 영상촬영에 사용되는 초음파영상진단장치          제조번호 및 제조년월: 제조원의 표시기재사항 참조          포장단위: 1 Set          정격전압, 주파수, 소비전력: AC: 100 ~ 230 VAC, 50 ~ 60 Hz, 1100 W          보호형식 및 보호정도: 1 급기기, CF 형기기/BF형기기 (프로브)          본 제품은 의료기기임 Made in Norway</p>

Table 1-7 Label, General Info - XDclear (cont'd) sheet 4 of 4

DESCRIPTION	ILLUSTRATION
<p>Label, General Info - BT'13 (Mexico) (Introduced 1. JAN. 2016)</p>	<p><b>Vivid E9</b></p> <p>Denominación Distintiva: Vivid E9 Sistema de Ultrasonido con Accesorios Modelo: VIVID E9 Fabricante: GE Vingmed Ultrasound AS 45 Strandpromenaden N-3191, Horten, Noruega No. de Serie: ver etiquetado principal Contenido: 1 Equipo Instrucciones de Uso: </p> <p>Solución de Problemas: </p> <p>Advertencias y Precauciones: </p>
<p>Label, General Info - BT'12/BT'13 (Mexico)</p>	<p><b>Vivid E9</b></p> <p>Denominación Distintiva: Vivid E9 Sistema de Ultrasonido con Accesorios Modelo: VIVID E9 Fabricante: GE Vingmed Ultrasound AS 45 Strandpromenaden N-3191, Horten, Noruega No. de Serie: ver etiquetado principal Contenido: 1 Equipo Instrucciones de Uso: </p> <p>Solución de Problemas: </p> <p>Advertencias y Precauciones: </p>
<p>Label, General Info Vivid E7 Pro BT'13 (China) (Introduced 1. JAN. 2016)</p>	<p><b>Vivid E7</b></p> <p>GE Vingmed Ultrasound AS Strandpromenaden 45, N-3191 Horten 挪威</p> <p>产品名称: 彩色超声诊断仪 型号: Vivid E7 输入电压: 100-230 VAC 输入频率: 50/60 Hz 最大输入功率: 1100 W CFDA注册号: 国食药监械(进)字2014第3233179号 产品标准编号: YZB/NOR 3599-2014 生产日期: 详见单独标签</p> <p>CLASS I TYPE CF</p> <p>应合法使用该设备, 某些国家相关法律禁止使用其做胎儿性别鉴定等。</p> <p>GE Vingmed Ultrasound AS Strandpromenaden 45, N-3191 Horten, Norway</p>
<p>Label, General Info Vivid E7 Pro BT'13 (China)</p>	<p><b>Vivid E7</b></p> <p>GE Vingmed Ultrasound AS Strandpromenaden 45, N-3191 Horten 挪威</p> <p>产品名称: 彩色超声诊断仪 型号: Vivid E7 输入电压: 100-230 VAC 输入频率: 50/60 Hz 最大输入功率: 1100 W CFDA注册号: 国食药监械(进)字2014第3233179号 产品标准编号: YZB/NOR 3599-2014 生产日期: 详见单独标签</p> <p>CLASS I TYPE CF</p> <p>应合法使用该设备, 某些国家相关法律禁止使用其做胎儿性别鉴定等。</p> <p>GE Vingmed Ultrasound AS Strandpromenaden 45, N-3191 Horten, Norway</p>


1-4-5 Label, General Info - XDclear (cont'd)

Table 1-8 Label, VIVID E9 Vet

DESCRIPTION	ILLUSTRATION
<p>Vet label for VIVID E9.</p>	<p>The illustration shows the front of the VIVID E9 Vet device with a callout box pointing to the label. The label contains the following information:</p> <ul style="list-style-type: none"> <li>GE logo</li> <li>Safety symbols: Hand, lightning bolt, warning triangle, and AP.</li> <li>Regulatory text: MEDICAL ELECTRICAL EQUIPMENT, UL 60601-1, CAN/CSA C22.2 No. 601.1</li> <li>Certification: TÜV SUD NRTL US</li> <li>CE mark</li> <li>CLASS I TYPE CF</li> <li>Compliance text: CISPR11 Group 1 Class A, Groupe 1 Classe A. This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.</li> <li>Product name: Vivid E9</li> <li>Other markings: D ONLY U.S., GE Vingmed Ultrasound AS, Strømsbrønnen 45, N-3330 Hurum, Norway.</li> </ul>






1-4-6 Label on Side Covers

Table 1-9 Label, Vet on Side Covers

DESCRIPTION	ILLUSTRATION
Vet labels on Side Covers.	

## Section 1-5 Dangerous procedure warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

-  **DANGER** **DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**
- 
-  **WARNING** ***IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID E9 / VIVID E7, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.***
-  **WARNING** ***EXPLOSION WARNING***  
***DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.***
-  **WARNING** ***DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT BECAUSE OF THE DANGER OF INTRODUCING ADDITIONAL HAZARDS, ONLY INSTALL GE APPROVED PARTS. DO NOT PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.***

## Section 1-6 Lockout/Tagout (LOTO) requirements

Follow OSHA Lockout/Tagout requirements (USA) or local Lockout/Tagout requirements by ensuring you are in total control of the AC power plug at all times during the service process.

To apply Lockout/Tagout (LOTO):

- 1.) Plan and prepare for shutdown.
- 2.) Shutdown the equipment.
- 3.) Isolate the equipment.
- 4.) Apply Lockout/Tagout Devices.
- 5.) Control all stored and residual energy.
- 6.) Verify isolation.

All potentially hazardous stored or residual energy is relieved.



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

## Section 1-7 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

GE Healthcare policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE Healthcare employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

*NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.*

*NOTE: The USER/SERVICE staff should dispose of all the waste properly, per federal, state, and local waste disposal regulations.*

The Ultrasound system is not meant to be used for long-term storage of patient data or images. The user is responsible for the data on the system and a regular backup is highly recommended.

If the system is sent for repair, please ensure that any patient information is backed up and erased from the system before shipping. It is always possible during system failure and repair to lose patient data. GE is not responsible for the loss of this data.

If PHI (Patient Healthcare Information) data needs to be sent to GE employees for service purposes, GE will ascertain agreement from the customer. Patient information shall only be transferred by approved service processes, tools and devices restricting access, protecting or encrypting data where required, and providing traceability in the form of paper or electronic documents at each stage of the procedure while maintaining compliance with cross-border restrictions of patient information transfers.



## Section 1-8 Electromagnetic compatibility (EMC)

### 1-8-1 What is EMC?

Electromagnetic compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due to interference from its environment or when the device produces unacceptable levels of emission to its environment. This interference is often referred to as radio-frequency or electromagnetic interference (RFI/EMI) and can be radiated through space or conducted over interconnecting power or signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

### 1-8-2 Compliance

VIVID E9 / VIVID E7 conforms to all applicable conducted and radiated emission limits and to immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

Applicable standards are: 47CFR Part 18, IEC60601-1-2:2001.


**NOTE:** *For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, clamps, are in good condition, installed tightly without skew or stress. Proper installation following all comments noted in this service manual is required in order to achieve full EMC performance.*

### 1-8-3 Electrostatic discharge (ESD) prevention

 **WARNING** **DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** **RISK OF ELECTRICAL SHOCK, SYSTEM MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.**

## Section 1-9 Customer assistance

### 1-9-1 Contact information

If this equipment does not work as indicated in this service manual or in the user manual, or if you require additional assistance, please contact the local distributor or appropriate support resource, as listed below.

Before you call, identify the following information, and acquire image (**Alt+D**) to send to the Customer Care team:

- System ID serial number.
- Software version.
- Date and time of occurrence.
- Sequence of events leading to issue.
- Is the issue repeatable?
- Imaging mode, probe, preset/application.
- Media brand, speed, capacity, type.
- Save secondary image capture, cine loop, 4D multi-volume loop.
- Detailed description of any problem encountered.
- Where applicable, save the appropriate log files. Remember to save the log files for each day on a separate media, labelled accordingly.

*NOTE: Restart the application before resuming clinical scanning.*

Table 1-10: Phone Numbers for Customer Assistance

LOCATION	PHONE NUMBER	
<b>USA</b> GE Healthcare Ultrasound Service Engineering 9900 Innovation Drive (RP-2123) Wauwatosa, WI 53226, USA	<b>USCAN</b> Service: On-site: Service Parts: OLC: Application Support:	1-800-437-1171 1-800-558-2040 1-800-321-7937 or 1-262 524-5300 1-800-682-5327 or 1-262-524-5698
<b>Canada</b>	<b>OLC - USCAN</b>	1-800-321-7937 1-800-668-0732
<b>Latin America</b>	<b>LATAM</b> Service: Application Support:	+1-262-524-5300 +1-262-524-5698
<b>EUROPE</b> Ultrasound Europe GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	<b>OLC - EUROPE</b> Support Phone: English/German, all segments Support Fax:	+49 (0) 212 2802 652 +33 1 3083 1300 +49 (0) 212 2802 431
<b>EAGM</b>	<b>OLC - EAGM</b> Phone: Egypt Service center: UAE Service center:	+49 (0) 212-2802-652 00202 2322 1252 00971 8003646
<b>APAC</b>	<b>Online Services Ultrasound Asia</b> ANZ - Service Support: Australia: Japan Support Center:  Korea: Singapore:	1800 647 855 +(61) 1-800-659-465 +(81) 42-648-2940 (Phone) +(81)-42-648-2905 (Fax) +(82) 2-1544-6119 +(65) 6291-8528 (Phone) +(65) 6291-7006 (Fax)
<b>China</b>	Phone:	+(86) 800-810 8188 +(86) 400-812 8188 +(86) 10-6788 2652
<b>India</b> Wipro GE Healthcare Pvt. Ltd. 4, Kadugodi Industrial Area, Bangalore - 560 067 India	Phone:	+(91) 1-800-425-8025 +(91) 1-800-425-7255 +(91) 1-800-102-7750

1-9-2 System manufacturer

Table 1-11 System manufacturer

MANUFACTURER	PHONE NUMBER	FAX NUMBER
GE VINGMED ULTRASOUND A/S STRANDPROMENADEN 45 P.O. BOX 141 NO-3191 HORTEN NORWAY	+47 3302 1100	+47 3302 1350

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# Chapter 2

## Site preparations

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### Section 2-1 Overview

#### 2-1-1 Purpose of this chapter

This chapter provides the information required to plan and prepare for the setup of a VIVID E9 / VIVID E7. Included are descriptions of the facility and electrical needs to be met by the purchaser of the unit.

#### 2-1-2 Contents in this chapter

2-1	Overview .....	2-1
2-2	General console requirements .....	2-2
2-3	Facility needs .....	2-10

## Section 2-2 General console requirements

### 2-2-1 Console environmental requirements

#### 2-2-1-1 If the unit is very cold or hot

When unpacking the Ultrasound system, allow the temperature of the Ultrasound system to stabilize before powering up. The following table describes guidelines for reaching operational temperatures from storage or transport temperatures.

 **CAUTION** IF THE UNIT IS VERY COLD OR HOT, DO NOT TURN ON ITS POWER UNTIL IT HAS HAD A CHANCE TO ACCLIMATE TO ITS OPERATING ENVIRONMENT.

**Table 2-1 VIVID E9 / VIVID E7 Acclimate Time**

°C	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
°F	-40	-31	-22	-13	-4	5	14	23	32	41	50	59	68	77	86	95	104	113	122	131	140	149	158
Hrs	20	18	16	14	12	10	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12

#### 2-2-1-2 Environmental specifications for VIVID E9 / VIVID E7 scanners

---

**Temperature Limits:**

- Operation:  
10 to 35 °C (50 to 95 °F)
- Storage and Transport:  
-20 to 60 °C (-4 to 140 °F)

---

**Humidity Limits:**

- Operation:  
30 - 60% rH non-condensing
- Storage and Transport:  
30 - 95% rH non-condensing

---

**Air Pressure Limits:**

- Operation:  
700-1060 hPa
- Storage and Transport:  
700-1060 hPa

---

**Heat Dissipation:**

- 3800 BTU/h

**2-2-1-3 Cooling**

The cooling requirement for the VIVID E9 / VIVID E7 scanner with monitor and on board peripherals, is up to 3800 BTU/h. This figure does not include cooling needed for lights, people, or other equipment in the room. Each person in the room places an additional 300 BTU/h demand on the cooling system.

**2-2-1-4 Lighting**

Bright light is needed for system installation, updates and repairs. However, operator and patient comfort may be optimized if the room light is subdued and indirect. Therefore a combination lighting system (dim/bright) is recommended. Keep in mind that lighting controls and dimmers can be a source of EMI which could degrade image quality. These controls should be selected to minimize possible interference.

## **2-2-2 Electrical requirements**

### **2-2-2-1 General requirements**

*NOTE: GE requires a dedicated power and ground for the proper operation of its Ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.*

*The VIVID E9 / VIVID E7 will function on voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power in North America, then a center tapped power source is required.*

#### **Sites with a mains power system with defined Neutral and Live:**

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the Ultrasound outlet.

#### **Sites with a mains power system without a defined Neutral:**

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the Ultrasound outlet.

*NOTE: Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.*



**2-2-2-2 Electrical requirements for VIVID E9 / VIVID E7**

In the table below, the electrical specifications for VIVID E9 and VIVID E7 includes monitor and on board peripherals.

**Table 2-2 Electrical specifications for VIVID E9 / VIVID E7**

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
<b>XDclear (S/W v113.x)</b>					
GB000070	Vivid E9 4D Expert Option 17 inch LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GB000080	Vivid E9 4D Expert Option 19 inch LCD				
GB000075	Vivid E9 2D 17 inch LCD				
GB000085	Vivid E9 2D 19 inch LCD				
GB000090	Vivid E9 Pro configuration 17 inch LCD				
GB000095	Vivid E9 Pro configuration 19 inch LCD				
GB000099	Vivid E7 'XDclear' 'Pro configuration' 17'				
GB000100	Vivid E7 'XDclear' 'Pro configuration' 19'				

The current drain will vary depending on the mains voltage.

- At 230 VAC the current may be up to 5 A.
- At 100 VAC the current may be up to 12 A.

**2-2-2-3 Site circuit breaker**



**CAUTION POWER OUTAGE MAY OCCUR. THE VIVID E9 / VIVID E7 SCANNER REQUIRES A DEDICATED SINGLE BRANCH CIRCUIT. TO AVOID CIRCUIT OVERLOAD AND POSSIBLE LOSS OF CRITICAL CARE EQUIPMENT, MAKE SURE YOU DO NOT HAVE ANY OTHER EQUIPMENT OPERATING ON THE SAME CIRCUIT.**

It is recommended that the branch circuit breaker for the unit be readily accessible.

**2-2-2-4 Site power outlets**

A dedicated AC power outlet must be within reach of the unit without extension cords. Other outlets adequate for the external peripherals, medical and test equipment needed to support this unit must also be present within 1 m (3.2 ft.) of the unit. Electrical installation must meet all current local, state, and national electrical codes.

**2-2-2-5 Unit power plug**

If the unit arrives without a power plug, or with the wrong plug, you must contact your GE dealer or the installation engineer must supply what is locally required.

**2-2-2-6 Power stability requirements**

**Voltage drop-out**

Max 10 ms.

**Power transients** (all applications)

Less than 25% of nominal peak voltage for less than 1 millisecond for any type of transient, including line frequency, synchronous, asynchronous, or aperiodic transients.

### 2-2-3 EMI limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. They also generate EMI. The VIVID E9 / VIVID E7 complies with limits as stated on the EMC label. However there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. These sources include:

- medical lasers,
- scanners,
- cauterizing guns,
- computers,
- monitors,
- fans,
- gel warmers,
- microwave ovens,
- light dimmers
- mobile phones
- in-house wireless phones (DECT phones)
- wireless computer keyboard and mouse
- air conditioning system
- High Frequency (HF) surgery equipment
- general AC/DC adapters

The presence of a broadcast station or broadcast van may also cause interference.

See [Table 2-3 on page 2-8](#) for EMI Prevention tips.

2-2-3-1 EMI prevention/abatement


Table 2-3 EMI prevention/abatement

EMI RULE	DETAILS
Be aware of RF sources	<ul style="list-style-type: none"> <li>Keep the unit at least 5 meters (15 feet) away from other EMI sources.</li> <li>Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.</li> </ul>
Ground the Ultrasound system	<ul style="list-style-type: none"> <li>Poor grounding is the most likely reason a unit will have noisy images.</li> <li>Check grounding of the power cord and power outlet.</li> </ul>
Install all screws, RF gaskets, covers, cores	<ul style="list-style-type: none"> <li>After you finish repairing or updating the system, replace all covers and tighten all screws.</li> <li>Any cable with an external connection requires a magnet wrap at each end.</li> <li>Install the Card Rack Cover over the Card Rack.</li> </ul> <p>Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.</p>
Replace broken RF gaskets	<ul style="list-style-type: none"> <li>If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket.</li> <li>Do not turn on the unit until any loose metallic part is removed.</li> </ul>
Do not place labels where RF gaskets touch metal	Never place a label where RF gaskets meet the unit. otherwise, the gap created will permit RF leakage. or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	<ul style="list-style-type: none"> <li>The interconnect cables are grounded and require ferrite beads and other shielding.</li> <li>Also, cable length, material, and routing are all important; do not change from what is specified.</li> </ul>
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly dress peripheral cables	<ul style="list-style-type: none"> <li>Do not allow cables to lie across the top of the Card Rack or hang out of the peripheral bays.</li> <li>Loop the excess length for peripheral cables inside the peripheral bays. attach the monitor cables to the frame.</li> </ul>

2-2-4 Probes environmental requirements

Table 2-4 Operation and storage temperatures for probes

	Electronic	PAMPTE
Operation:	10 to 40 °C (50 to 104 °F)	5 to 42.7 °C (41 to 108,9 °F)
Storage:	-20 to 50 °C (-4 to 122 °F)	-20 to 60 °C (-4 to 140 °F)
Temperatures in degrees Celsius (°C) conversion to degrees F: (°F) = (°C * 9/5) + 32		

 **CAUTION** PAMPTE probes are designed for storage temperatures of -20 to +60 degrees C (-4 to +140 degrees F).  
 Electronic probes are designed for storage temperatures of -20 to +50 degrees C (-4 to +122 degrees F).  
 When exposed to large temperature variations, the product should be kept at room temperature the needed time to stabilize its temperature before use.  
 Refer to [Table 2-1 "VIVID E9 / VIVID E7 Acclimate Time"](#) on page 2-2 to determine the needed settlement time.

**2-2-5 Time and manpower requirements**

Site preparation takes time. Begin Pre-installation checks as soon as possible, if possible, six weeks before delivery, to allow enough time to make any changes.



**WARNING** *HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE VIVID E9 / VIVID E7. ATTEMPTS TO MOVE THE UNIT CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.*



## Section 2-3 Facility needs

### 2-3-1 Purchaser responsibilities

The work and materials needed to prepare the site is the responsibility of the purchaser. Delay, confusion, and waste of manpower can be avoided by completing pre-installation work before delivery. Purchaser responsibility includes:

- Procuring the materials required.
- Completing the preparations before delivery of the ultrasound system.
- Paying the costs for any alterations and modifications not specifically provided in the sales contract.

*NOTE: All electrical installations that are preliminary to the positioning of the equipment at the site prepared for the equipment must be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing must also be performed by qualified personnel. The products involved (and the accompanying electrical installations) are highly sophisticated and special engineering competence is required. All electrical work on these products must comply with the requirements of applicable electrical codes. The purchaser of GE equipment must only utilize qualified personnel to perform electrical servicing on the equipment.*

The desire to use a non-listed or customer provided product or to place an approved product further from the system than the interface kit allows, presents challenges to the installation team. To avoid delays during installation, such variances should be made known to the individuals or group performing the installation at the earliest possible date (preferably prior to the purchase).

The ultrasound suite must be clean prior to delivery of the machine. Carpet is not recommended because it collects dust and creates static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact system reliability.

## 2-3-2 Required facility needs

*NOTE: GE requires a dedicated power and ground for the proper operation of its Ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.*

*The VIVID E9 / VIVID E7 will function on voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power in North America, then a center tapped power source is required.*

### **Sites with a mains power system with defined Neutral and Live:**

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the Ultrasound outlet.

### **Sites with a mains power system without a defined Neutral:**

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the Ultrasound outlet.

- Dedicated single branch power outlet of adequate amperage (see [Table 2-2 on page 2-5](#)) meeting all local and national codes which is located less than 2.5 m (8 ft.) from the unit's proposed location
- Door opening is at least 76 cm (30 in) wide
- Proposed location for unit is at least 0.3 m (1 ft.) from the wall for cooling
- Power outlet and place for any external peripheral are within 2 m (6.5 ft.) of each other with peripheral within 1 m of the unit to connect cables.

*NOTE: VIVID E9 / VIVID E7 has two outlets inside the unit, one is for the B/W printer and one spare.*

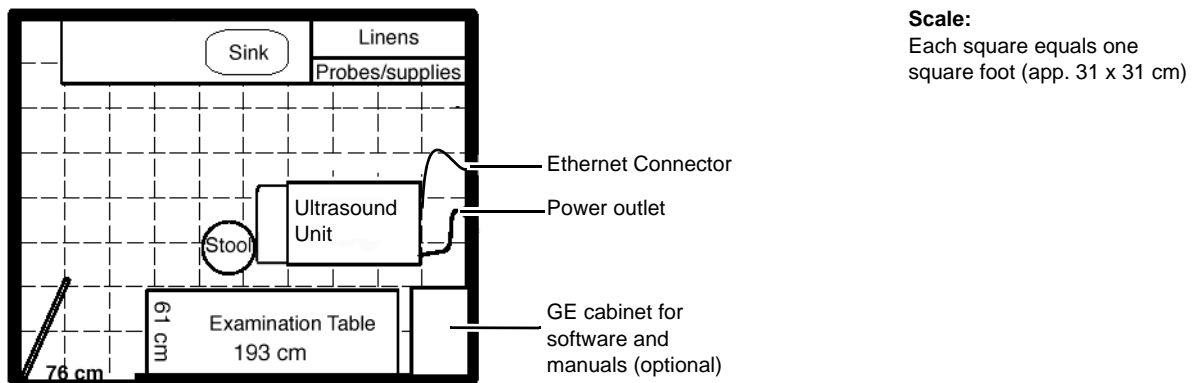
- Power outlets for other medical equipment
- Power outlets for test equipment within 1 m (3.2 ft.) of unit
- Clean and protected space to store probes (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

**2-3-3 Desirable features**

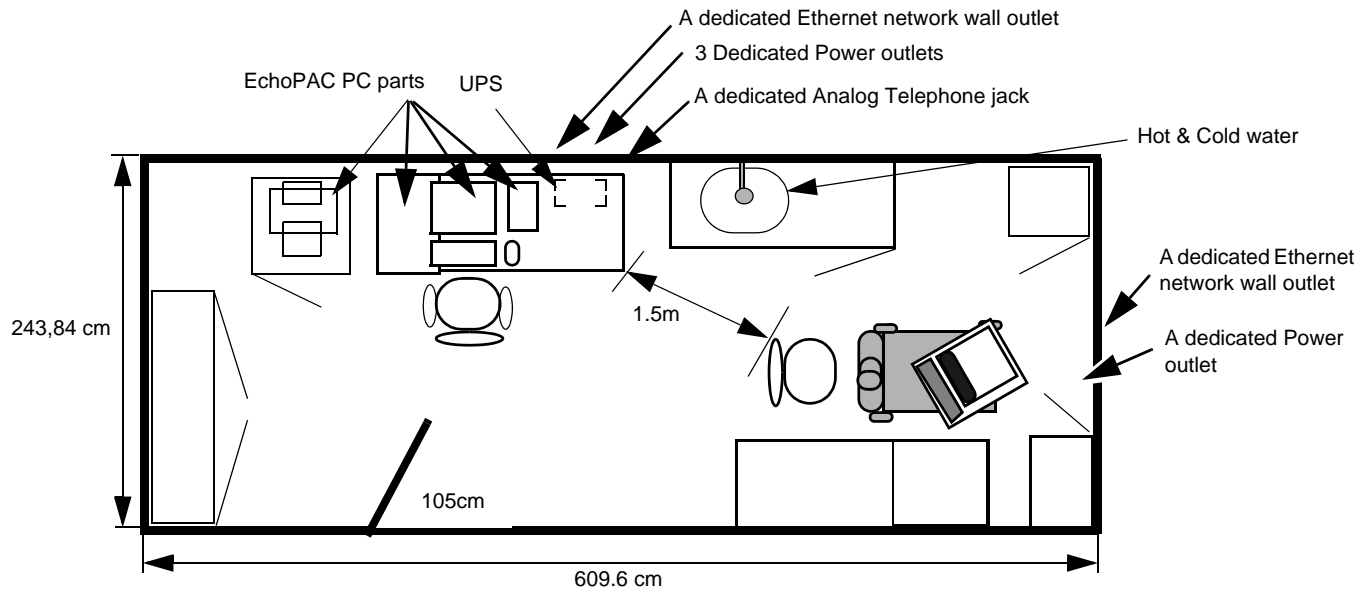
- Door is at least 92 cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Sink with hot and cold water
- Receptacle for bio-hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and equipment
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet ordered by GE for its software and proprietary manuals

**2-3-4 Minimal floor plan suggestion**

**Figure 2-1 Minimal Floor Plan, 2.5 m x 3 m (8 by 10 foot)**



**2-3-5 Suggested Floor Plan, VE9/VE7 and EchoPAC in Same Room**



**Figure 2-2 Suggested Room with EchoPAC PC and Ultrasound Scanner**



## 2-3-6 Networking setup requirements

### 2-3-6-1 Stand alone scanner (without network connection)

None.

### 2-3-6-2 Scanner connected to hospital's network

#### Supported networks:

10/100/1000 Mbit Ethernet/DICOM network (option)

### 2-3-6-3 InSite Requirements

InSite requires an Ethernet connection either via:

- 10/100 Mbit or 10/100/1000 Mbit Interface

### 2-3-6-4 Purpose of the DICOM network function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network. Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues. With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

### 2-3-6-5 DICOM option setup requirements

To configure the VIVID E9 / VIVID E7 to work with other network connections, the site's network administrator must provide information to complete the form in [Figure 2-3 "Worksheet for DICOM Network Information" on page 2-14](#). Ensure that there are no spaces in any field of the form.

#### Entries must include:

- A host name, local port number, AE Title, IP address and Net Mask for the VIVID E9 / VIVID E7.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.
- The host name, IP address, port and AE Title for each device the site wants connected to the VIVID E9 / VIVID E7 for DICOM APPLICATION INFORMATION. A field for the make (manufacturer) and the revision of the device, is also included. This information may be useful for error solving.

2-3-6-5 DICOM option setup requirements (cont'd)

Figure 2-3 Worksheet for DICOM Network Information

VIVID E9 / VIVID E7		Host Name	<input style="width: 150px; height: 20px;" type="text"/>	Local Port	<input style="width: 60px; height: 20px;" type="text"/>	IP Address	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>
		AE Title	<input style="width: 240px; height: 20px;" type="text"/>			Net Mask	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>
<b>ROUTING INFORMATION</b>				<b>Destination IP Addresses</b>		<b>GATEWAY IP Addresses</b>	
		ROUTER1	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>			Default	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>
		ROUTER2	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>				<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>
		ROUTER3	<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>				<input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/> . <input style="width: 40px; height: 20px;" type="text"/>
<b>DICOM APPLICATION INFORMATION</b>							
	<b>NAME</b>	<b>MAKE/REVISION</b>	<b>AE TITLE</b>	<b>IP ADDRESSES</b>			<b>PORT</b>
Store 1	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Store 2	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Store 3	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Store 4	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Store 5	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Store 6	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Worklist	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
Storage Commit	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
MPPS	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 140px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>

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# Chapter 3

## System setup

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### Section 3-1 Overview

#### 3-1-1 Purpose of this chapter

This chapter contains information needed to install VIVID E9 / VIVID E7. Included is a procedure that describes how to receive and unpack the equipment and how to file a damage or loss claim.

How to prepare the facility and unit of the actual installation, and how to check and test the unit, probes, and external peripherals for electrical safety are included in this procedure.

#### 3-1-2 Contents in this chapter

3-1	Overview . . . . .	3-1
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3-3	Receiving and unpacking the equipment . . . . .	3-4
3-4	Preparing for setup . . . . .	3-16
3-5	Completing the setup . . . . .	3-17
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3-7	Connectivity overview . . . . .	3-37
3-8	Connectivity setup . . . . .	3-38
3-9	Options Setup . . . . .	3-52
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## Section 3-2 Setup reminders

### 3-2-1 Average setup time

Table 3-1 Average installation time

DESCRIPTION	AVERAGE INSTALLATION TIME	COMMENTS
UNPACKING THE SCANNER	0.5 HOUR	
INSTALL SCANNER WO/OPTIONS	4 HOURS	DEPENDENT ON THE CONFIGURATION
DICOM NETWORK CONFIGURATION	2 HOURS OR MORE	DEPENDENT ON THE CONFIGURATION
INSTALL INSITE / ILINK	0.5 HOUR	


### 3-2-2 Setup warnings

 **DANGER** WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DON'T TOUCH THE UNIT!

 **CAUTION** IF THE UNIT IS VERY COLD OR HOT, DO NOT TURN ON ITS POWER UNTIL IT HAS HAD A CHANCE TO ACCLIMATE TO ITS OPERATING ENVIRONMENT.

Table 3-2 VIVID E9 / VIVID E7 Acclimate Time

°C	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
°F	-40	-31	-22	-13	-4	5	14	23	32	41	50	59	68	77	86	95	104	113	122	131	140	149	158
Hrs	20	18	16	14	12	10	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12

 **CAUTION** TO PREVENT ELECTRICAL SHOCK, CONNECT THE UNIT TO A PROPERLY GROUNDED POWER OUTLET. DO NOT USE A THREE TO TWO PRONG ADAPTER. THIS DEFEATS SAFETY GROUNDING.

 **CAUTION** DO NOT WEAR THE ESD WRIST STRAP WHEN YOU WORK ON LIVE CIRCUITS AND MORE THAN 30 V PEAK IS PRESENT.

 **CAUTION** DO NOT OPERATE THIS UNIT UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. SYSTEM PERFORMANCE AND COOLING REQUIRE THIS.

**3-2-2 Setup warnings (cont'd)**



**CAUTION OPERATOR MANUAL(S)**

**THE USER MANUAL(S) SHOULD BE FULLY READ AND UNDERSTOOD BEFORE OPERATING THE VIVID E9 / VIVID E7 AND KEPT NEAR THE UNIT FOR QUICK REFERENCE.**



**CAUTION ACOUSTIC OUTPUT HAZARD**

**ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE VIVID E9 / VIVID E7 PROBE IS WITHIN AIUM/NEMA STANDARDS, AVOID UNNECESSARY EXPOSURE. ULTRASOUND ENERGY CAN PRODUCE HEAT AND MECHANICAL DAMAGE.**




## Section 3-3 Receiving and unpacking the equipment


### 3-3-1 Purpose of this section

This section describes how to receive and unpack VIVID E9 / VIVID E7.

Two types of packages have been used; a Wooden Box and a Carton Box on a Wooden Pallet. Some of the Receiving and Unpacking instructions are specific for only one of the boxes. This will be stated where applicable.

### 3-3-2 Receiving and unpacking warnings

 **CAUTION** TWO PEOPLE ARE NEEDED TO UNPACK THE VIVID E9 / VIVID E7 BECAUSE OF THE WEIGHT. ATTEMPTS TO MOVE THE VIVID E9 / VIVID E7 CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.

 TWO PEOPLE ARE REQUIRED WHENEVER A PART WEIGHING 16 KG (35 LBS) OR MORE MUST BE LIFTED.

 **CAUTION** REMEMBER TO USE RELEVANT PERSONAL PROTECTING EQUIPMENT (PPE) DURING PACKING/UNPACKING. CHECK WITH YOUR LOCAL EHS REPRESENTATIVE.

### 3-3-3 Receiving the VIVID E9 / VIVID E7



#### 3-3-3-1 The Tilt & Shock indicators

##### Overview

Improper handling during transportation may harm the equipment inside the package even if the package itself is undamaged.

To make it easier to detection if the handling during transportation has been improper, a set of Tilt & Shock indicators have been attached to the transportation box.


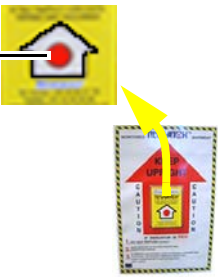
**Table 3-3 Shock and Tilt Watch**

Description	Illustration
ShockWatch	 <p>The illustration shows a rectangular label for ShockWatch. At the top, it says 'MONITORED SHIPMENT' followed by translations in German, French, and Spanish. Below this, it states 'IF SHOCKWATCH INDICATOR IS RED' with translations. There are three numbered instructions: 1. Do not refuse shipment, 2. Note on delivery receipt and inspect for damage, and 3. If damaged, leave in original container and packaging. To the right of the text is a yellow diamond-shaped warning sign with a black border that says 'SHOCKWATCH WARNING HANDLE WITH CARE'. At the bottom right of the label is the website 'www.shockwatch.com'.</p>
Tilt Watch	 <p>The illustration shows a rectangular label for TiltWatch XTR. At the top, it says 'TILTWATCH XTR MONITORED SHIPMENT'. In the center is a large red arrow pointing upwards with the text 'KEEP UPRIGHT' inside it. On either side of the arrow, the word 'CAUTION' is written vertically. Below the arrow, it says 'IF INDICATOR IS RED' followed by three numbered instructions: 1. DO NOT REFUSE SHIPMENT, 2. MAKE NOTATION ON DELIVERY RECEIPT AND INSPECT FOR DAMAGE, and 3. IF DAMAGE IS DISCOVERED, LEAVE IN ORIGINAL CONTAINER AND PACKAGING, AND REQUEST IMMEDIATE INSPECTION. At the bottom left, it says 'SVENSKA MARSH AB'.</p>

**3-3-3-2 Examine all packages**

Examine all packages closely at time of delivery, as described in the procedure below.

**Table 3-4 Examine all packages**

STEP	TASK	ILLUSTRATIONS
1	Is damage apparent? • If <b>YES</b> ; continue with the instructions in subsection <a href="#">3-3-3-3 - Damage in transportation</a> . • If <b>NO</b> ; continue with the next step.	
2	Is the Shock Indicator red colored inside the middle of the indicator? • If <b>YES</b> : The Shock Indicator has been activated. Continue with the instructions in subsection <a href="#">3-3-3-4 - If Shock Indicator has triggered or is missing</a> , then continue with the next step. • If <b>NO</b> : continue with the next step.	RED COLOR 
3	Is the Tilt Indicator red colored inside the middle of the indicator? • If <b>YES</b> : The Tilt Indicator has been activated. Continue with the instructions in subsection <a href="#">3-3-3-5 - If Tilt Indicator has triggered or is missing</a> before you continue with the next step. • If <b>NO</b> : continue with the next step	RED COLOR 
5	<b>Carton Box ONLY:</b> Continue with: <a href="#">3-3-4 "Unpacking VIVID E9 / VIVID E7 from the Carton Box" on page 3-9.</a>	



**3-3-3-3 Damage in transportation**

Follow this procedure if damage is apparent, or if the Tilt & Drop indicators show failure:

**Table 3-5 Damage in transportation**

STEP	TASK
1	Write "Damage In Shipment" on ALL copies of the freight or express bill <b>BEFORE</b> delivery is accepted or "signed for" by a GE representative or hospital receiving agent.
2	Report the damage to the carrier. <ul style="list-style-type: none"> <li>• Whether noted or concealed, damage <b>MUST</b> 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.</li> <li>• A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.</li> </ul>

**3-3-3-4 If Shock Indicator has triggered or is missing****Table 3-6 Shock Indicator has triggered or is missing**

STEP	TASK
1	<p><b>If the Shock Indicator is missing:</b> Note on the shipping papers at the time of receipt that the Shock Indicator label is missing.</p> <p><b>If the Shock Indicator has triggered:</b> Note on the shipping papers at the time of receipt that the Shock Indicator label was activated.</p>
2	Inspect the product for possible concealed damage.

3-3-3-5 If Tilt Indicator has triggered or is missing

Table 3-7 Tilt Indicator has triggered or is missing

STEP	TASK
1	<b>If the Tilt Indicator is missing:</b> Note on the shipping papers at the time of receipt that the Tilt Indicator label is missing. <b>If the Tilt Indicator has triggered:</b> Note on the shipping papers at the time of receipt that the Tilt Indicator label was activated.
2	Inspect the product for possible concealed damage.

### 3-3-4 Unpacking VIVID E9 / VIVID E7 from the Carton Box

#### 3-3-4-1 VIVID E9 / VIVID E7 Transportation Box Label on the Carton Box




The VIVID E9 / VIVID E7 Transportation Box Label is printed on four sides of the Carton Box.

Figure 3-1 VIVID E9 / VIVID E7 Transportation Box Label printed on the Carton Box (Example)

ICONS and SYMBOLS	DESCRIPTION	ICONS and SYMBOLS	DESCRIPTION	ICONS and SYMBOLS	DESCRIPTION
	KEEP AIR PRESSURE BETWEEN 70 kPa and 106 kPa		DO NOT STACK		FRAGILE, HANDLE WITH CARE
	KEEP TRANSPORTATION TEMPERATURE BETWEEN -20°C AND +60°C		TOP UPRIGHT TRANSPORTATION AND STORAGE		KEEP DRY, PROTECT FROM MOISTURE
	RELATIVE HUMIDITY BETWEEN 30 AND 95%		HANDLE WITH CARE		RECYCLING. RECYCLABLE PACKING PARTS
			MANUFACTURER		

3-3-4-2 Uncrating the VIVID E9 / VIVID E7

Table 3-8 Uncrating the VIVID E9 / VIVID E7 sheet 1 of 4

Step	Task	Illustration
1.	Cut the straps around the crate.	
2.	Remove the Top Cover.	
3.	Remove the Complete Column Left and Complete Column Right.	
4.	Remove the Box For Accessories.	

**Table 3-8 Uncrating the VIVID E9 / VIVID E7 (cont'd) sheet 2 of 4**





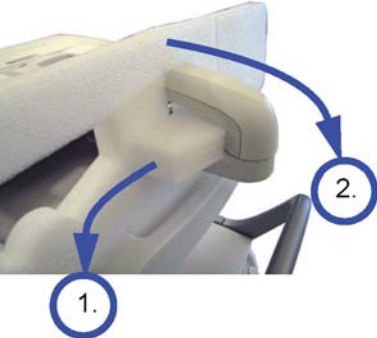



Step	Task	Illustration
5.	Remove the two Frames (sides) and the two Exit Ramp Bases.	
6.	Install the two Exit Ramp Base on the Complete Exit Ramp (the rear plate).	
7.	Remove the Support For Monitor.	

Table 3-8 Uncrating the VIVID E9 / VIVID E7 (cont'd) sheet 3 of 4

Step	Task	Illustration
8.	Remove the Complete Front Protection.	
9.	Remove the plastic bag from the VIVID E9 / VIVID E7.	
10.	Remove the Inlay UI Top.	
11.	Fold down the assembled Exit Ramp.	

**Table 3-8 Uncrating the VIVID E9 / VIVID E7 (cont'd) sheet 4 of 4**

Step	Task	Illustration
12.	Unlock the Front Brakes on the VIVID E9 / VIVID E7, but keep direction lock activated. The direction lock keeps the front wheels in position, and secures the direction stability when the system is rolled down the ramp from the pallet.	
13.	Unlock the Rear Brakes.	 <p>                     1 - Direction (Dir) Lock                      2 - Release Dir Lock and Front Brakes                      3 - Front Brakes                      4 - Rear Brakes                 </p>
14.	Carefully move the VIVID E9 / VIVID E7 down the ramp, with rear end first.	
15.	Assemble the empty transportation box and place all of the filling inside the box before you close it.  Close the box, and store it for possible future use.	

3-3-4-3 Packing materials for the Carton Box - recycling information

The packing materials for VIVID E9 / VIVID E7 are recyclable, refer to the table below.

Table 3-9 Packaging parts for VIVID E9 / VIVID E7 sheet 1 of 2
















Item	Description	Qty.	Material *)	Illustration
1.	Export pallet 1200 x 800	1	D	
2.	Complete base	1	A	
3.	Complete column left and right	2	A	
4.	Support for monitor	1	C	
5.	Inlay UI Top	1	C	
6.	Complete front protection	1	B	
7.	Exit ramp	1	A	
8.	Frame	2	A	 or 
9.	Exit ramp base	2	A	



Table 3-9 Packaging parts for VIVID E9 / VIVID E7 (cont'd) sheet 2 of 2

Item	Description	Qty.	Material *)	Illustration
10.	Box for extra accessories	1	A	
11.	Top cover 1140 x 755 x 150	1	A	
12.	Support plate, used to keep Front Protection in place if there are few or none probes included.	1	A	
13.	Protectors for Top Cover	2	A	
14.	Accessory Box	1	A	
15.	Plastic Bag Used to cover the Ultrasound system.	1	E	
	<b>*) Material type:</b>	A:	BB34bc with varnish C9068	
		B:	BB27c with varnish C9068	
		C:	PE foam, Stratocell	
		D:	Wood ISPM15	
		E:	TDS VCI2000 Co Ex film.	
			Recycling: Together with polyethylene @ 280 °C	

## Section 3-4 Preparing for setup

### 3-4-1 Verify Customer Order

Compare items received by the customer to that which is listed on the delivery order. Report any items that are missing, back ordered, or damaged.

### 3-4-2 Physical inspection

Verify that the system arrived intact (visual inspection).

If the system has been damaged, please refer to "Damage in Transportation" on page [xiii](#) in the beginning of this manual.

### 3-4-3 EMI protection

This unit has been designed to minimize the effects of Electro-Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

See [2-2-3 "EMI limitations" on page 2-7](#) for more information about EMI protection.

## Section 3-5 Completing the setup

### 3-5-1 Purpose of this section

This section describes how to complete the installation of VIVID E9 / VIVID E7.

### 3-5-2 System specifications

#### 3-5-2-1 System requirements verification

- Verify that the site meets the requirements listed in [Chapter 2](#) (see: "Facility needs" on page 2-10).
- Verify that the specifications below don't conflict with any on-site conditions.

#### 3-5-2-2 Physical dimensions

The physical dimensions of the VIVID E9 / VIVID E7 unit are summarized in [Table 3-10](#).

**Table 3-10 Physical dimensions of VIVID E9 / VIVID E7 with monitor and peripherals**

HEIGHT	WIDTH	DEPTH	UNIT
137.5/157.5	54.0	80.0	cm
54.1/62.0	21.2	31.4	Inches

#### 3-5-2-3 Mass with monitor and peripherals

**Table 3-11 Mass of VIVID E9 / VIVID E7 with monitor and peripherals**

MODEL	WEIGHT [KG]	WEIGHT [LBS]
VIVID E9 / VIVID E7	128	283

#### 3-5-2-4 Acoustic noise level

Less than 55 dB(A) at 20 degrees Celsius, measured in the operators head position, 20 cm in front of the keyboard's right corner, at 1.30 m above the floor, and in a distance of 1 meter at all four sides, 1 meter above the floor.

### 3-5-3 Electrical specifications

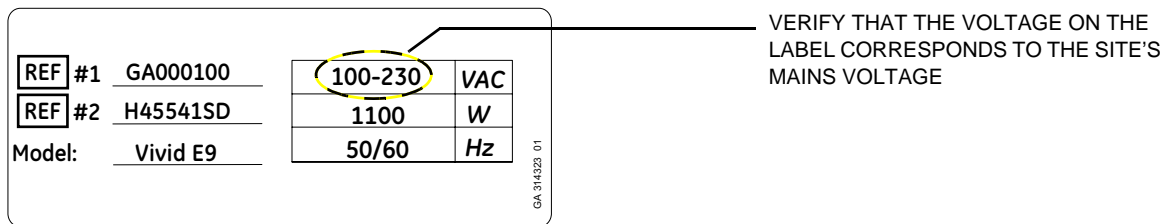
**⚠ WARNING** *CONNECTING A VIVID E9 / VIVID E7 UNIT TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE UNIT.*

#### 3-5-3-1 Verification of the system's voltage setting

Verify that the mains voltage specified for the unit is available on-site.

The voltage setting for the unit is found on a label near the Mains Power Circuit Breaker on the rear of the system.

**Figure 3-2 Mains Voltage Rating label**



#### 3-5-3-2 Electrical specifications for VIVID E9 / VIVID E7

In the table below, the electrical specifications for VIVID E9 and VIVID E7 includes monitor and on board peripherals.

**Table 3-12 Electrical specifications for VIVID E9 / VIVID E7**

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
<b>XDclear (S/W v113.x)</b>					
GB000070	Vivid E9 4D Expert Option 17 inch LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GB000080	Vivid E9 4D Expert Option 19 inch LCD				
GB000075	Vivid E9 2D 17 inch LCD				
GB000085	Vivid E9 2D 19 inch LCD				
GB000090	Vivid E9 Pro configuration 17 inch LCD				
GB000095	Vivid E9 Pro configuration 19 inch LCD				
GB000099	Vivid E7 'XDclear' 'Pro configuration' 17'				
GB000100	Vivid E7 'XDclear' 'Pro configuration' 19'				

The current drain will vary depending on the mains voltage.

- At 230 VAC the current may be up to 5 A.
- At 100 VAC the current may be up to 12 A.

### 3-5-4 Connections on the I/O Rear Panel

The Peripheral/accessory connector panel (I/O Rear Panel) is located at the rear of the Ultrasound system behind the rear door.

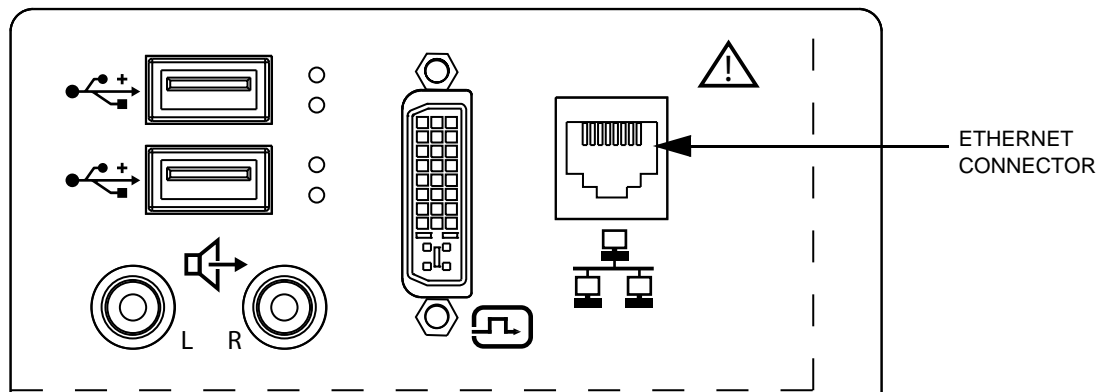
**NOTE:** *Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC60950 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC60601-1-1. Everybody who connects additional equipment to the signal input part or signal output part of VIVID E9 / VIVID E7, configures a medical system, and is therefore responsible that the system complies with the requirements of the valid version of IEC60601-1-1. If in doubt, consult the technical service department or your local representative for GE.*

#### 3-5-4-1 Connect Ethernet

Connect the network cable to the Ethernet connector on the BEP I/O board.

The connector is located on the connector panel on the rear side of VIVID E9 / VIVID E7.

**Figure 3-3 Ethernet connection on rear side of VIVID E9 / VIVID E7**



#### 3-5-4-2 Connect USB Flash Card

**NOTE:** *USB Flash Cards approved for VIVID E9 / VIVID E7 are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Cards will compromise this verification, and may cause interference on VIVID E9 / VIVID E7 itself, or on other electronic devices.*

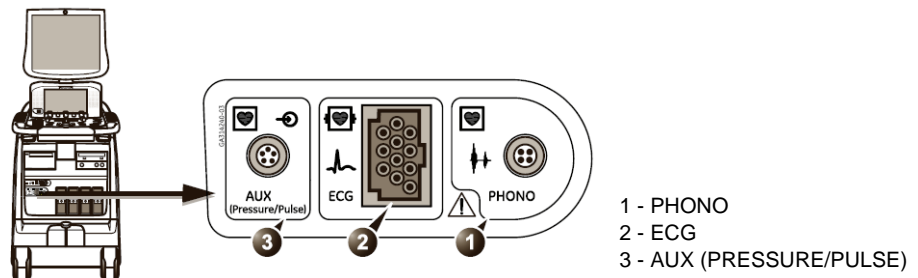
*For approved models, see: [Section 9-15 "Peripherals for VIVID E9 / VIVID E7" on page 9-51.](#)*

Install the USB Flash Card in one of the USB ports on the VIVID E9 / VIVID E7. Two ports are provided on the Operator Panel, to the left for the Touch Screen.

### 3-5-5 Connections on the Patient I/O panel

The Patient I/O panel is located on the front of VIVID E9 / VIVID E7.

Figure 3-4 Patient I/O Panel



#### 3-5-5-1 Connect ECG

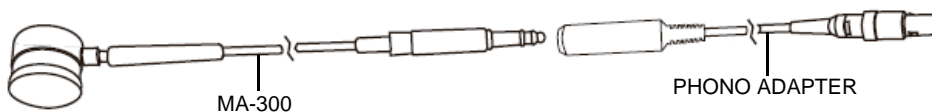
Connect the ECG cable to the ECG connector on the Patient I/O panel.

#### 3-5-5-2 Connect Heart Microphone (Phono)

The Heart Microphone has its corresponding Phono adapter. See [Section 9-19 "Physio TX Parts" on page 9-74](#).

Connect the Heart Microphone via the corresponding Phono Adapter to the Phono input on the Patient I/O panel.

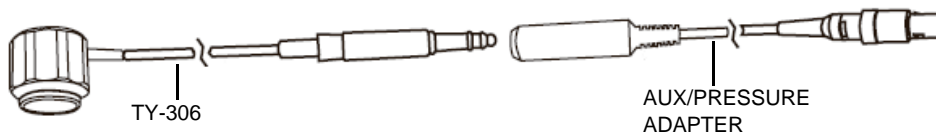
Figure 3-5 Heart Microphone (Phono)



#### 3-5-5-3 Connect Pulse Pressure Transducer

Connect the Pulse Pressure Transducer via the corresponding Auxiliary/Pressure Adapter to the Patient I/O panel. For Part Number and model information, see [Section 9-19 "Physio TX Parts" on page 9-74](#).

Figure 3-6 Pulse Pressure Transducer



## 3-5-6 Connecting Probes

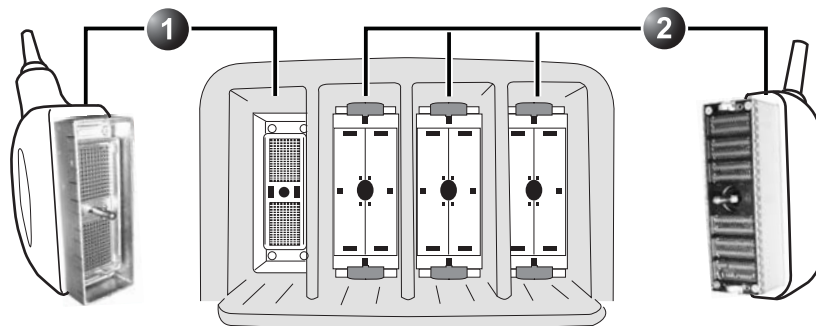
### 3-5-6-1 Introduction to Connecting Probes

Probes can be connected at any time, whether the unit is on or off.

The system has three types of probe ports; one PD probe port, three PDT probe ports (Figure 3-7) and a Doppler probe port.

- The PD probe port is compatible with the Vivid 7 probe connectors.
- The three PDT probe ports are specific to the VIVID E9 / VIVID E7 probe connectors.
- The Doppler probe port is used for CW Doppler probes (non-sector-probes), sometimes called PEDOF probes.

**Figure 3-7 Probe connectors**



- 1 - PD PROBE PORT: FOR VIVID 7 COMPATIBLE PROBE CONNECTORS
- 2 - PDT PROBE PORTS: FOR VIVID E9 / VIVID E7 SPECIFIC PROBE CONNECTORS


*NOTE! The Doppler probe port is not illustrated here.*

### 3-5-6-2 Connect a probe

*NOTE: It is not necessary to turn OFF power to connect or disconnect a probe.*

 **CAUTION DO NOT ALLOW THE PROBE HEAD TO HANG FREELY. EXCESSIVE IMPACT TO THE PROBE WILL RESULT IN IRREPARABLE DAMAGE.**

 **CAUTION TO PREVENT PROBE CONNECTOR PINS DAMAGE, OR PCB BOARD DAMAGE, DO NOT USE EXCESSIVE FORCE WHEN CONNECTING THE PROBES.**

 **CAUTION KEEP THE PROBE CABLES AWAY FROM THE WHEELS.  
DO NOT BEND THE PROBE CABLES  
DO NOT CROSS CABLES BETWEEN PROBES.**

- 1.) Before connecting the probe:
  - a.) Do a visual check of the probe pins and system sockets.
  - b.) Remove any dust or foam rests from the probe pins.
  - c.) Verify the probe and the probe cable for any visual damage.
- 2.) Hold the probe connector vertically with the cable pointing upward.
- 3.) Turn the connector locking handle counter-clockwise to the horizontal position.
- 4.) Align the connector with the probe port and carefully push into place.
- 5.) Turn the locking handle clockwise to the full vertical position to lock in place.
- 6.) Position the probe cable so that it is not resting on the floor.






### 3-5-6-3 Disconnect a probe

- 1.) Rotate the lock handle counter-clockwise to the horizontal position to unlock the connector.
- 2.) Remove the connector from the port.
- 3.) Ensure that the probe head is clean before placing the probe in its storage case, see [10-5-5 "Probe maintenance" on page 10-12](#) for cleaning instructions.



### 3-5-7 Power On/Boot Up

#### 3-5-7-1 Warnings

-  **DANGER** ALWAYS CONNECT THE UNIT TO A FIXED POWER SOCKET WHICH HAS THE PROTECTIVE GROUNDING CONNECTOR.
-  **DANGER** NEVER USE A THREE-TO-TWO PRONG ADAPTER; THIS DEFEATS THE SAFETY GROUND.
-  **DANGER** ENSURE THAT THE POWER CORD AND PLUG ARE INTACT AND THAT THE POWER PLUG IS THE PROPER HOSPITAL-GRADE TYPE (WHERE REQUIRED).
-  **CAUTION** SYSTEM REQUIRES ALL COVERS  
OPERATE THIS UNIT ONLY WHEN ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. THE COVERS ARE REQUIRED FOR SAFE OPERATION, GOOD SYSTEM PERFORMANCE AND COOLING PURPOSES.
-  **NOTICE** Use only power supply cords, cables and plugs provided by or designated by GE.

*NOTE:* Do not cycle the Circuit Breaker ON-OFF-ON in less than five (5) seconds. When turning OFF the Circuit Breaker, the system should de-energize completely before turning the circuit breaker ON.

#### 3-5-7-2 Power On / Boot Up - detailed procedure

For a detailed procedure, see: [4-2-1 "Power ON/Boot Up" on page 4-4.](#)

### 3-5-8 Power shut down

For a detailed procedure, see: [4-2-2 "Power shut down" on page 4-8.](#)

## Section 3-6 Configuration

### 3-6-1 Purpose of this section

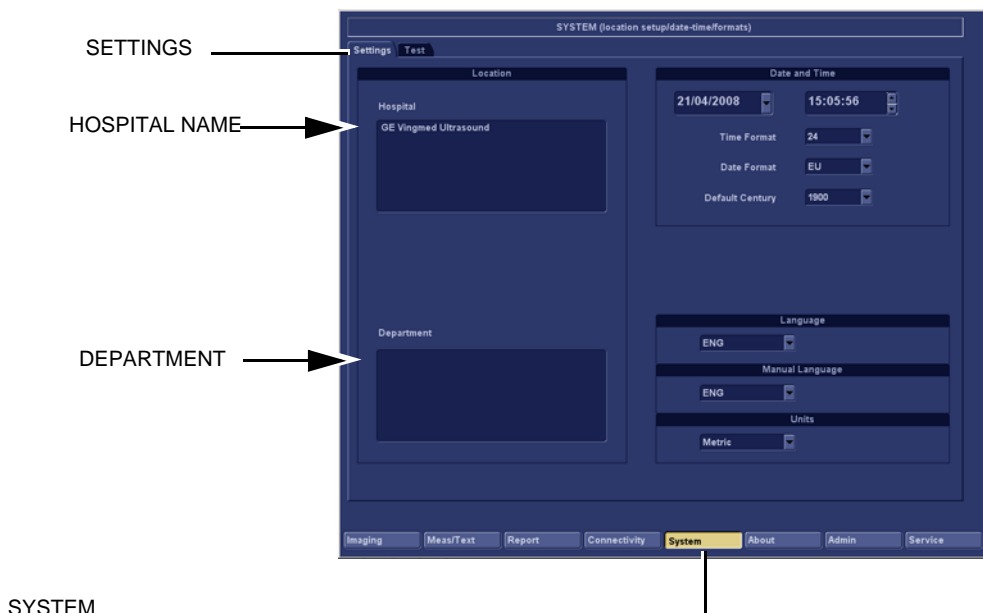
This section describes how to configure the VIVID E9 / VIVID E7.

### 3-6-2 VIVID E9 / VIVID E7 configuration

#### 3-6-2-1 Select System Settings screen

- 1.) Select **Config (F2)** and log on as *adm*, see [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **System** and then select **Settings**, if needed.

**Figure 3-8 Hospital and department name**



#### 3-6-2-2 Enter Location

**Table 3-13 Location name**

STEP	TASK	EXPECTED RESULT(S)
1	Select the Hospital field, see <a href="#">Figure 3-8</a> , and type the name of the hospital (max 64 characters).	The 24 first characters of this name are displayed on the scanning screen's title bar (after restart) All 64 are displayed on the image properties on saved images (after restart).
2	Select in the Department field, see <a href="#">Figure 3-8</a> , and type the name of the department (max 64 characters).	This name will be displayed on the image properties on saved images as soon as the unit has been restarted.

3-6-2-3 Date and time adjustments

Figure 3-9 Date and time adjustments

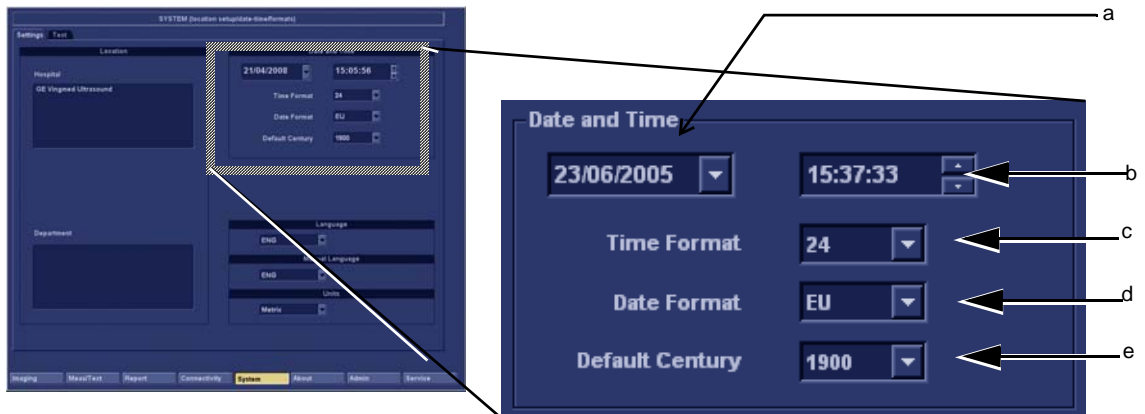


Table 3-14 Date and Time adjustments

STEP	TASK	EXPECTED RESULT(S)
1	Open the <b>System</b> (Configuration) Window, see 4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15. Select <b>System</b> , if needed.	The <b>System Settings</b> window is displayed.
2	Select the preferred <b>Date Format</b> , see (d) in Figure 3-9. DD = Date (two digits) MM = Month (two digits) YYYY = Year (four digits)	<b>EU</b> : the European/International "DD.MM.YYYY" format is used <b>US</b> : the American "MM.DD.YYYY" format is used
3	Select the preferred <b>Time Format</b> , see (c) in Figure 3-9.	<b>24</b> : the 24 hour format is used <b>12</b> : the 12 AM/PM hour format is used
4	Adjust the <b>date</b> , see (a) in Figure 3-9.	<b>New date</b> is displayed
5	Adjust the <b>time</b> , see (b) in Figure 3-9.	<b>New time</b> is displayed
6	Select <b>Default Century</b> (1900, 2000 or None), see (e) in Figure 3-9.	<b>1900</b> : the number <b>19</b> is automatically displayed when entering the year in the patient date of birth. To edit century, press <b>BACKSPACE</b> twice. <b>2000</b> : the number <b>20</b> is automatically displayed when entering the year in the patient date of birth. To edit century, press <b>BACKSPACE</b> twice. <b>None</b> : the four digits have to be typed when entering the year in the patient date of birth. The selected setting will be used as soon as the unit has been restarted.

3-6-2-4 Select User Interface Language

Figure 3-10 Select User Interface Language

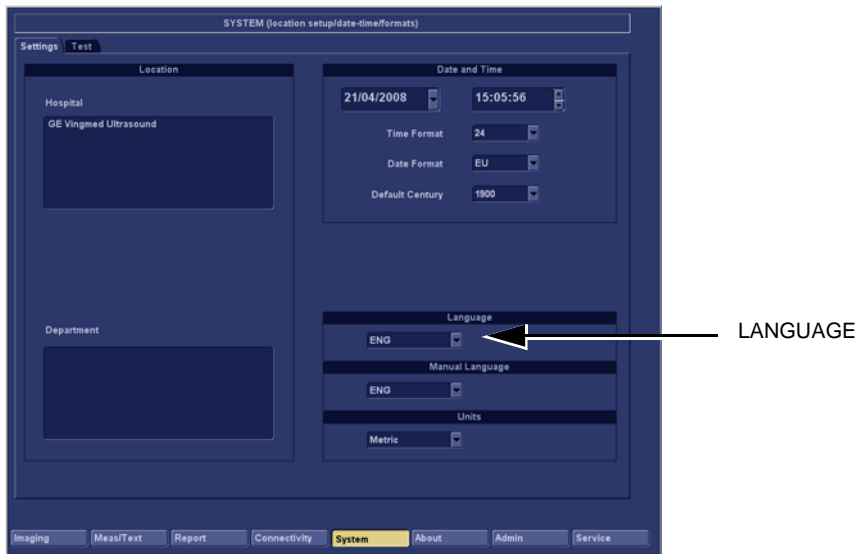


Table 3-15 Language Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see 4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15. Select <b>System</b> , if needed.	The <b>System Settings</b> window is displayed.
2.	Use the <b>Language</b> drop down dialog, see Figure 3-10, to select your preferred language for the on-screen interface.	The selected language will be used as soon as the unit has been restarted.

3-6-2-5 Select Online Manual Language

Figure 3-11 Online Manual Language Selection



Table 3-16 Online Manual Language Selection

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see 4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15. Select <b>System</b> , if needed.	The <b>System Settings</b> window is displayed.
2.	Use the <b>Manual Language</b> drop down dialog, see Figure 3-11, to select your preferred language.	The selected language will be used as soon as the unit has been restarted.

3-6-2-6 Select Units of Measure

Figure 3-12 Select Units of Measure

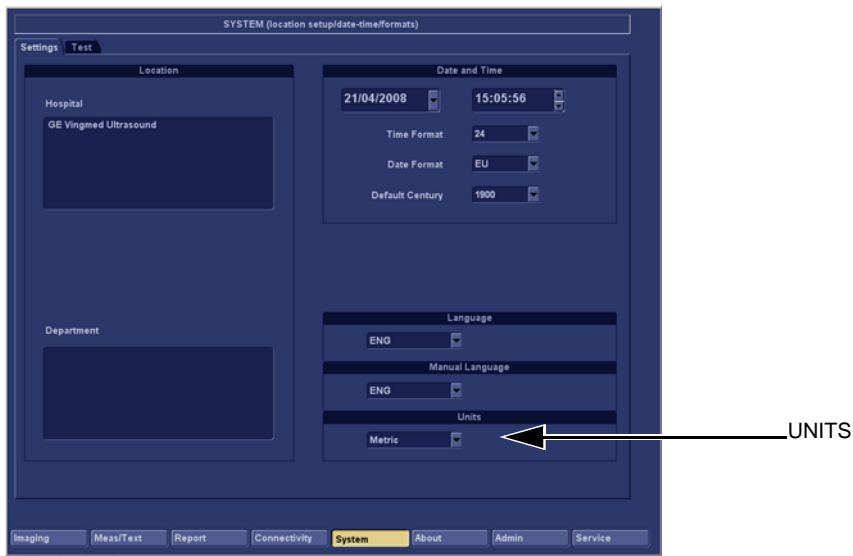


Table 3-17 Select Units of Measure

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see 4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15. Select System, if needed.	The <b>System Settings</b> window is displayed.
2.	Use the drop down dialog to select Metric or US Units.	The selected units (Metric or US) will be used for measurements as soon as the unit has been restarted.
3.	Restart the scanner.	All the changed settings will be used after the restart.

### 3-6-3 Service Screen setup

#### 3-6-3-1 Overview

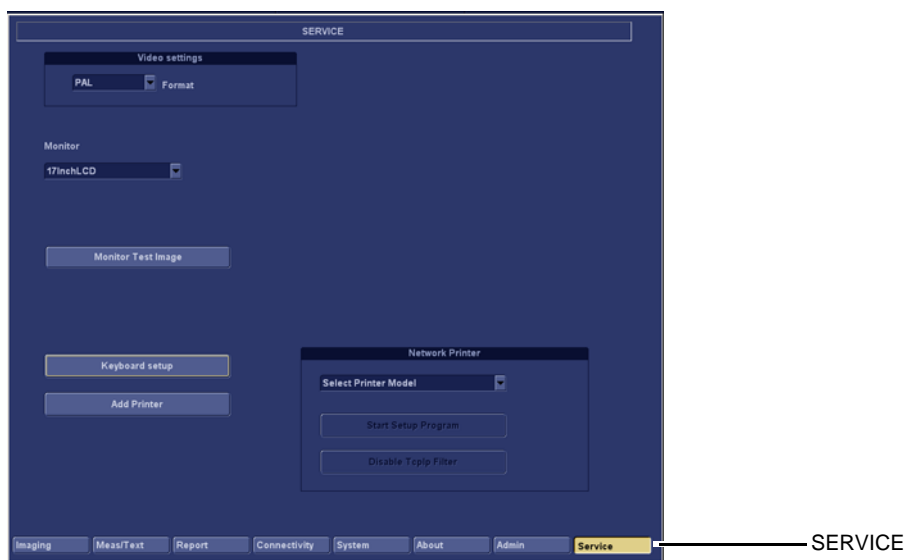
The Service Screen gives you access to:

- Select Video Format to be used by DVR
- Select DVR
- Adjust LCD's Contrast and Backlight Intensity
- Alphanumeric Keyboard Setups
- Printer Setup
- Monitor Selection

#### 3-6-3-2 Open Service Screen

- 1.) Press **Config (F2)** and log on as *adm*, see [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Service** (lower, right part of window) to view the Service Screen, see [Figure 3-13 on page 3-29.](#)

Figure 3-13 Service Screen

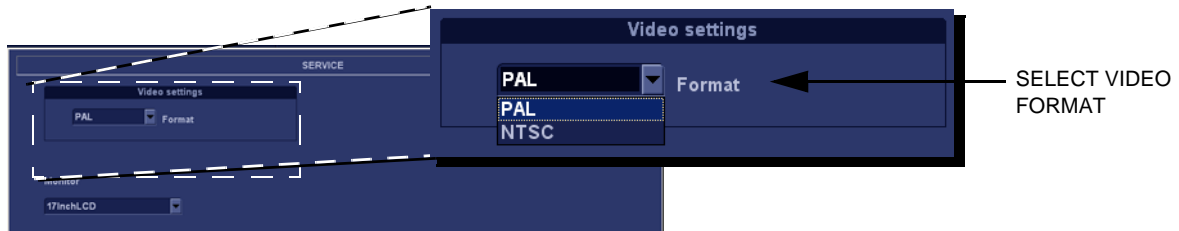


**3-6-3-3 Select Video Format, PAL or NTSC**

This selection must correspond to the Video Standard (PAL or NTSC) used at the location.

- From the **Video Settings** drop-down menu, select the correct video format (NTSC or PAL).

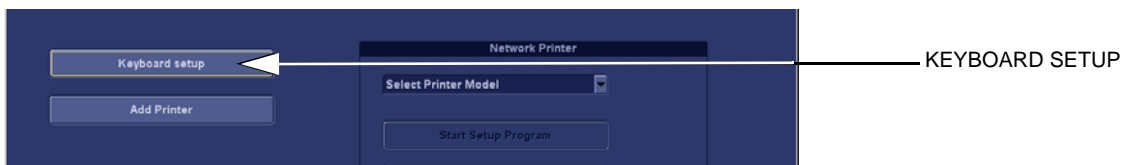
**Figure 3-14 Select Video Format**



**3-6-3-4 Alphanumeric Keyboard configuration**

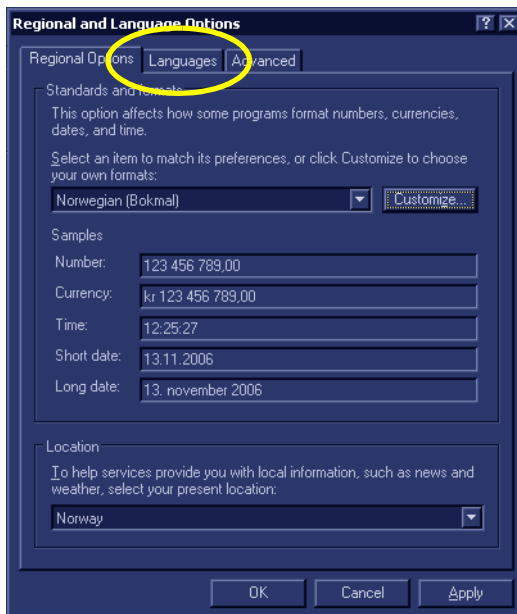
*NOTE: This Procedure is not required if the alphanumeric keyboard is a US keyboard, since the default setting is set to US English keyboards.*

**Figure 3-15 Select Keyboard Setup**



- 1.) Select **Keyboard Setup** to get access to **Keyboard Properties**.

**Figure 3-16 Select Keyboard Properties**



- 2.) Select **Languages**, to display the program languages screen.
- 3.) Use the Language used in menus and dialogs scroll bar to find the correct language for your use.



**3-6-3-5 Add Printer**

*NOTE: This function may be unavailable for some software versions and it will not always function due to that usually, a special Installation Wizard is to be used. Please follow instructions in the respective printer installation procedure for correct printer installation. See 3-6-4 "Optional Peripherals/Peripheral Connection" on page 3-33 for more information.*

**Figure 3-17 Add Printer**



1.) Select **Add Printer** to start the Add Printer (Installation) Wizard.

**Figure 3-18 Add Printer Wizard**



2.) Follow the instructions in the Wizard to install a new printer.

**3-6-3-6 Monitor Selection**

Some characteristics are different for the different LCD monitors.

**Figure 3-19 Select Monitor model**



Select the Monitor model in the Monitor pull-down menu.

**3-6-3-7     DVR (Option) Setup**

*NOTE:*     *Installation instructions for the Digital Video Recorder (DVR) option is included in the DVR Installation manual, Direction Number GA294614.*

**Selecting Offline mode**

Follow these steps to select Offline mode for the DVR:

- 1.) Install media in the DVR Recorder.
- 2.) Go into **Config (F2) > Service**.
- 3.) Select **Offline**.
- 4.) Reboot the VIVID E9 / VIVID E7.

## 3-6-4 Optional Peripherals/Peripheral Connection

### 3-6-4-1 Approved Internal Peripherals

This list covers the internal peripherals available for VIVID E9 / VIVID E7:

- Printer, Monochrome (Black & White), Digital
  - SONY UP-D897
  - MITSUBISHI Digital Monochrome Printer P95DE
- Digital Video Recorder (DVR)

### 3-6-4-2 External Peripherals (Optional) for Connection to USB

One of the external units listed below, may be connected to the USB port on the rear of the VIVID E9 / VIVID E7:

- **Footswitch**

Configuration of the footswitch is done on the **Config > Imaging > Application** screen.

For more information, refer to the VIVID E9 or VIVID E7 user manual.
- **External Data Storage:**
  - USB Flash Card
  - Desktop hard drive (2TB with RAID1)
- **COLOR Printers:**
  - SONY UPD-25MD
  - SONY UPD-23MD
  - MITSUBISHI Digital Color Printer CP30DW

**3-6-4-3 External Peripherals (Optional) for Connection to Ethernet (TCP/IP Network)**

When installing a new external printer, connected via Ethernet (TCP/IP Network), please refer to the respective printer's documentation.

The VIVID E9 / VIVID E7 supports the following network printers:

- HP OfficeJet Pro 8000
- HP OfficeJet PRO K5400dn
- HP OfficeJet PRO K550
- HP Color LaserJet 3600n
- HP Laser Jet Pro 400 color M451
- HP Color LaserJet CP2025n
- HP Inkjet 1200DTN
- HP Inkjet 1100DTN
- HP Deskjet 6127
- HP Deskjet 990 Cxi
- LEXMARK C762N
- LEXMARK C752N
- LEXMARK C750N
- EPSON 980N

### 3-6-5 Software Options Configuration

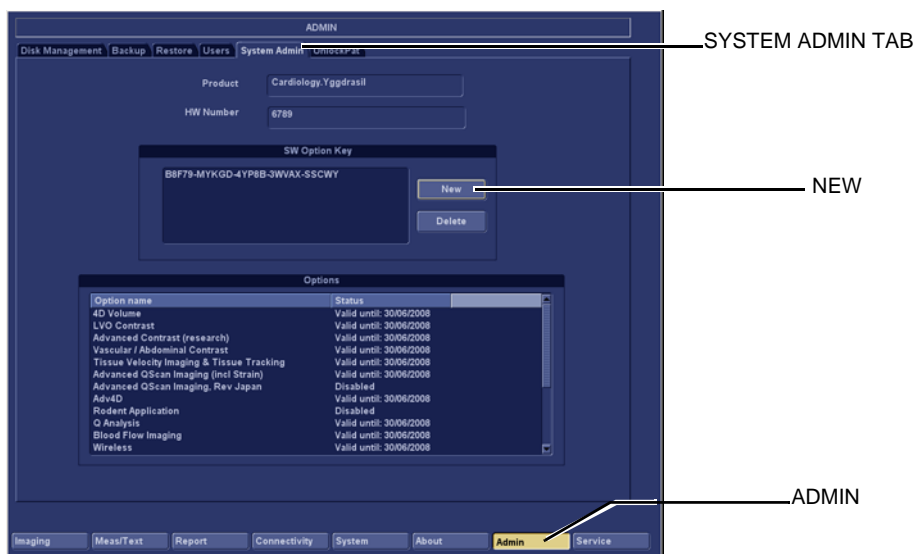
#### 3-6-5-1 Software Option installation introduction

A Password (Software Option String) enables a software option or a combination of software options. This password is specific for each VIVID E9 / VIVID E7.

#### 3-6-5-2 Installing a Software Option

- 1.) Press **Config (F2)** and log on as *adm*, see [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin** (lower part of window),
- 3.) Select the **System Admin** tab.

Figure 3-20 System Admin screen




**3-6-5-2 Installing a Software Option (cont'd)**

- 4.) Select **New** to open the New Key dialog where you type the Software Option Key (Alphanumeric String).

**Figure 3-21 Type Software Option Key (Alphanumeric string)**



**CAUTION**  **INCORRECT SOFTWARE OPTION KEY ENTRY WILL RESULT IN LOSS OF FUNCTIONALITY. IF SOFTWARE OPTION KEY IS NOT ACCEPTED BY THE ULTRASOUND SYSTEM, PLEASE CONTACT YOUR LOCAL GE SERVICE REPRESENTATIVE OR THE ONLINE CENTER.**

- 5.) Type the Password (Software Option Key (Alphanumeric string)).
- 6.) Press **Save** to save the new setting.
- 7.) Restart to save and activate the settings and adjustments you have done so far.

## Section 3-7 Connectivity overview

### 3-7-1 Physical connection

#### 3-7-1-1 Stand-alone VIVID E9 / VIVID E7

No network connection needed.

#### 3-7-1-2 "Sneaker Net" environment

No network connection needed.

Use removable media to move data from the VIVID E9 / VIVID E7 to another unit.

#### 3-7-1-3 Connection from VIVID E9 / VIVID E7 to an EchoPAC PC Workstation

- Direct Cable Connection from VIVID E9 / VIVID E7 to an EchoPAC PC Workstation via a Crossover Cable

You will only need a Crossover Cable for network use to connect the two units this way.

- a.) Connect one end of the crossed network cable to the network connector on the VIVID E9 / VIVID E7.
- b.) Connect the other end to the network connector to the EchoPAC PC Workstation, see chapter 3 in the EchoPAC PC Workstation Service Manual.

- Connection via a Peer-to-Peer Network

You will need a network hub and one network cable for each unit connected to the hub.

- Connection via Hospital Network

You will need one network cable to connect the VIVID E9 / VIVID E7 to a wall outlet on the hospital's network.

#### 3-7-1-4 Connection from VIVID E9 / VIVID E7 to a DICOM Server on a Network

You will need one network cable.

- 1.) Connect one end of the cable to the Ethernet connector on VIVID E9 / VIVID E7.
- 2.) Connect the other end of the cable to the wall outlet.

If a Peer-to-Peer Network is connected to the hospital's network, you may connect the VIVID E9 / VIVID E7 to the Peer-to-Peer Network.

## Section 3-8 Connectivity setup

*NOTE: If connected to a stand-alone network (Peer-to-Peer network with a VIVID E9 / VIVID E7 scanner, an EchoPAC PC workstation and an optional network printer), you should use default delivery settings.*

### 3-8-1 Introduction

To be able to use the network functions when connected to a hospital network, the scanner must have a proper network address.

- Before you can set up the scanner, you need to collect some information.
- The "[Worksheet for DICOM Network Information](#)" on page 2-14 can be used for gathering this information.
- Typical source for this information is the network administrator.

### 3-8-2 Compatibility

VIVID E9 / VIVID E7 can communicate with:

- EchoPAC PC
- Image Vault
- Other units via DICOM



### 3-8-3 Select TCP/IP Screen

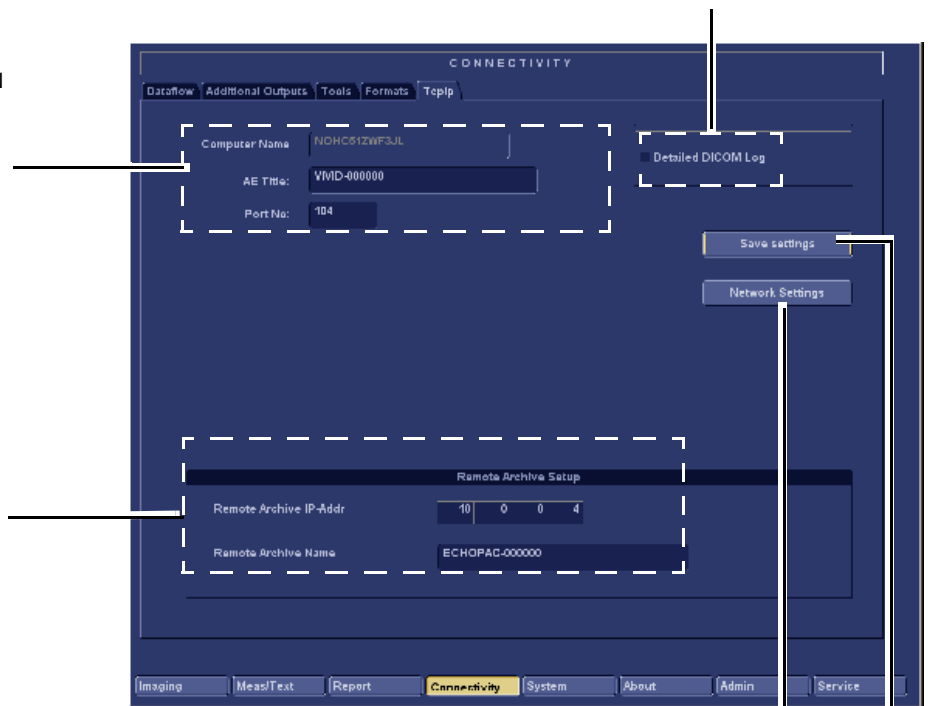
- 1.) Press **Config (F2)** and log on as *adm*, see 4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.
- 2.) If not already selected, select **Connectivity** from the bottom row of "buttons" on the screen.
- 3.) Select the **TCP/IP TAB** (it is named **Tcpip**). The resulting screen gives you an overview of many of the network settings for VIVID E9 / VIVID E7.

Figure 3-22 TCP/IP Overview screen for VIVID E9 / VIVID E7

**COMPUTER NAME / AE TITLE:**  
FOR VIVID E9 / VIVID E7, THIS NAME IS ON THE FORM: *VIVIDX-00NNNN*, WHERE "00NNNN" IS A NUMBER (NNNN IS THE SCANNER'S SERIAL NUMBER).  
**PORT NO:**  
DEFAULT PORT NUMBER: 104

**REMOTE ARCHIVE SETUP AREA:**  
IP SETTINGS AREA FOR A REMOTE ARCHIVE.  
EXAMPLE: *ECHOPAC PC (ECHOPAC7)*.  
**DEFAULT SETUP:**  
REMOTE ARCHIVE IP-ADDR: **10.0.0.4**  
REMOTE ARCHIVE NAME (THE NAME OF THE PC OR SERVER WITH THE REMOTE ARCHIVE): **ECHOPAC7-000001**

**DETAILED DICOM LOG:**  
SELECT TO TURN **DETAILED DICOM LOG** ON. (IT WILL BE TURNED OFF AFTER A RESTART)



**NETWORK SETTINGS:**  
USE **NETWORK SETTINGS** IF YOU NEED TO CHANGE VIVID E9 / VIVID E7's IP SETTINGS OR TURN DHCP ON OR OFF.

**SAVE SETTINGS**  
SELECT **SAVE SETTINGS** TO ARCHIVE ANY CHANGES YOU HAVE DONE TO THE TCP/IP SETTINGS

### 3-8-4 Changing the AE Title and/or Port Number (Port No.)

Figure 3-23 AE Title and Port No.



- 1.) To change **AE Title** and/or **Port No.**, edit the respective fields.
- 2.) Select **Save settings** to store your changes. This will bring up a new Warning screen.

Figure 3-24 Warning

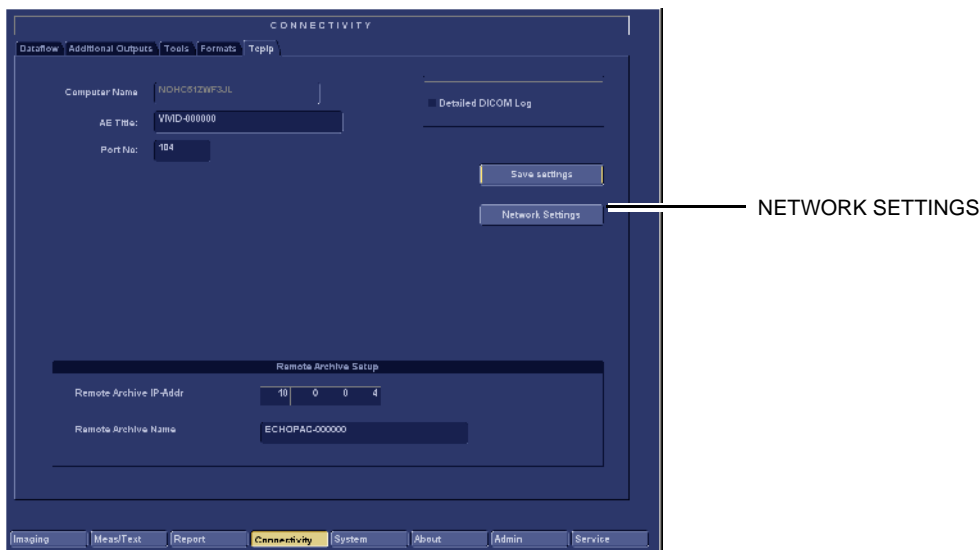


- 3.) Select **Ok** to save your changes or **Cancel** to return without saving any changes.
- 4.) Reboot VIVID E9 / VIVID E7 to activate the settings or continue with other Tcpip set-up tasks.

### 3-8-5 DHCP setup

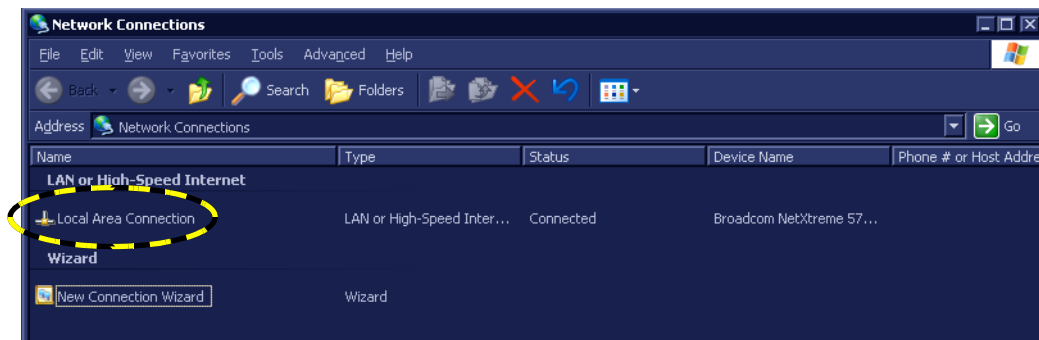
Follow the instructions below to configure the VIVID E9 / VIVID E7's use of DHCP.

Figure 3-25 Advanced Settings



- 1.) When in the TCP/IP screen, select **Network Settings** to display the **Network Connections** screen, see [Figure 3-26 "Network Connections" on page 3-41](#).

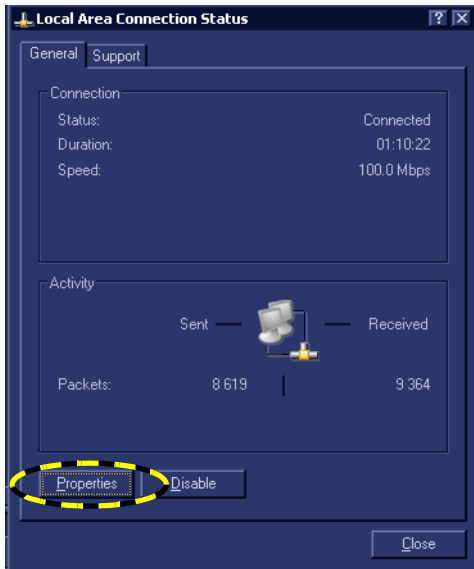
Figure 3-26 Network Connections



- 2.) Right-click **Local Area Connection** and select **Properties** from the pop-up menu to go to the **Local Area Connection Properties** screen (see next page).

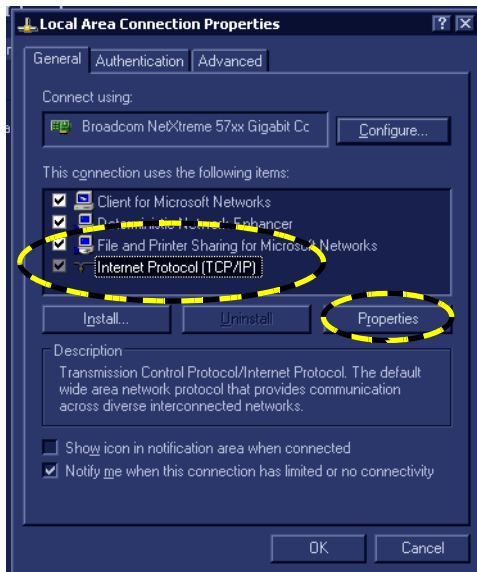
### 3-8-5 DHCP setup (cont'd)

Figure 3-27 Local Area Connection Status



3.) Select **Properties** to display the **Local Area Connection Properties**

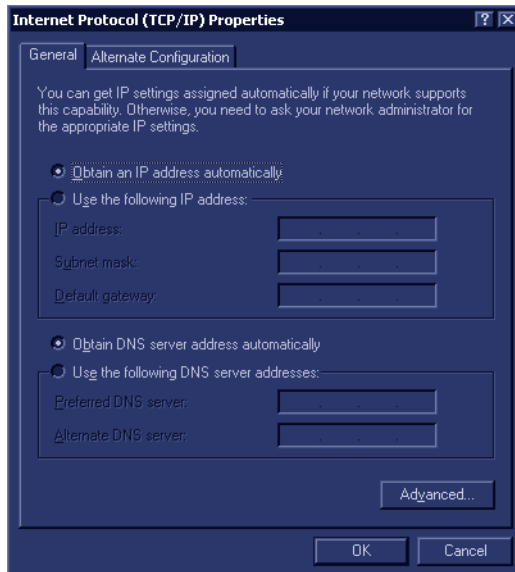
Figure 3-28 Local Area Connection Properties



4.) Select **Internet Protocol (TCP/IP)**, then select **Properties**.

### 3-8-5 DHCP setup (cont'd)

Figure 3-29 Internet Protocol (TCP/IP) Properties



**To turn DHCP on:**

- Select: **Obtain an IP address automatically.**

**To turn DHCP off:**

- 1.) Select: **Use the following IP address:**
- 2.) Enter the:
  - **IP address**
  - **Subnet mask**
  - **Default gateway**

**To save your new settings and close the open windows:**

- 1.) Select **OK** to save the setting and close the **Internet Protocol (TCP/IP) Properties** dialog.
- 2.) Select **OK** to close (and save) the **Local Area Connection Properties** dialog.
- 3.) Select **Close** to close the **Local Area Connection Status** dialog.
- 4.) Select the "x" in the upper right corner to close the **Network Connections** window.

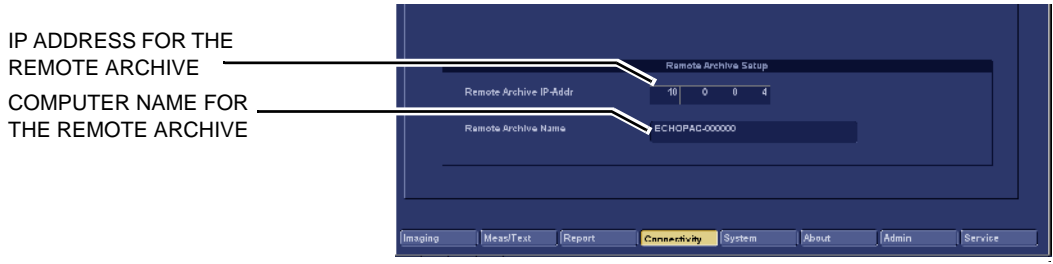
### 3-8-6 Set the Remote Archive's Network Information

To be able to connect to a remote archive, on a remote computer or server, you must configure VIVID E9 / VIVID E7 to communicate with it.

In the Remote Archive Setup area of the Tcpi screen (see example in [Figure 3-30](#)), enter the;

- 1.) Remote Archive IP address. (Default IP Address from factory: 10.0.0.4).
- 2.) Remote Archive Name. (Default Remote Archive Name from factory: ECHOPAC-000001).

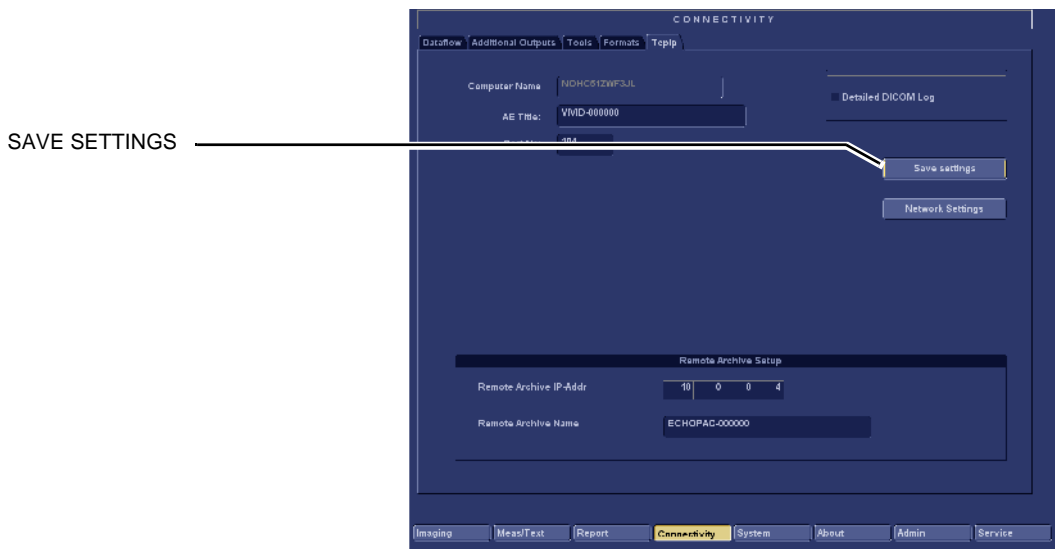
**Figure 3-30 TCP/IP Set-up for VIVID E9 / VIVID E7**



### 3-8-7 Save the New Settings

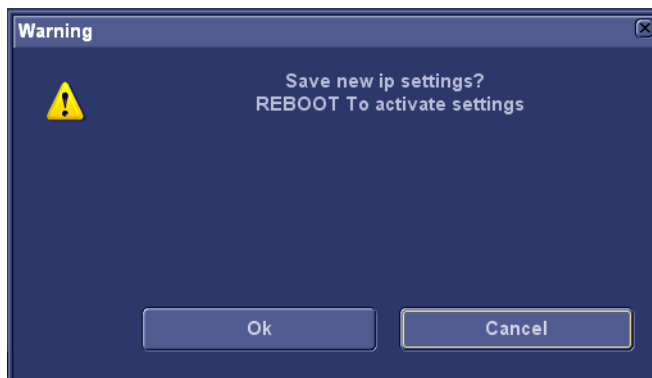
- 1.) Press **Save Settings** to save the new settings.

Figure 3-31 Save New TCP/IP settings



A Warning is displayed on the screen, see illustration below.

Figure 3-32 Warning



- 2.) Select **OK** to save the new settings. (By selecting **Cancel**, the previous settings will be kept.)
- 3.) The new settings are saved to a common settings file. After a restart, the settings are also included in other screens.
- 4.) Restart VIVID E9 / VIVID E7 to activate the changes.

**3-8-8 Create a new dataflow**

**3-8-8-1 Overview**

It is possible to make new dataflows by combining the predefined settings.

The table below describes the legal combination of inputs and outputs in a dataflow.

**Table 3-18 Allowed combinations of inputs and outputs in a dataflow**

OUTPUT →						
INPUT ↓	No Output	Database	Remote Database	DICOM Storage	Database + DICOM Storage	Remote Database + DICOM Storage
Database		X			X	
Remote Database			X			X
DICOM Worklist				X		
DICOM CD Read	X					
DICOM USB device Read	X					
Query/Retrieve	X					
Worklist/database		X			X	
Worklist/rem database			X			X
No input device				X		

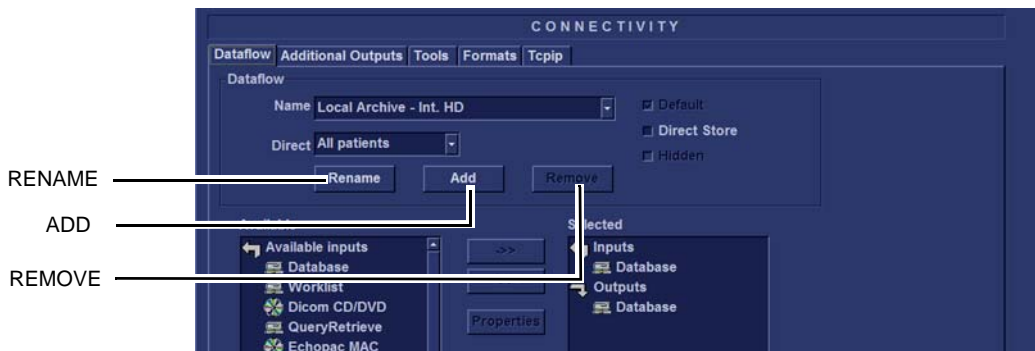


- 3-8-8-2 Prerequisite**
- **Software v112.1.3 and later: None.**

**3-8-8-3 Preparations - Log on as ADM (software v112.1.3 and later)**

- 1.) Select **Config (F2)**.
- 2.) Log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 3.) Select **Connectivity > Dataflow** to display the Dataflow screen (see [Figure 3-33.](#))

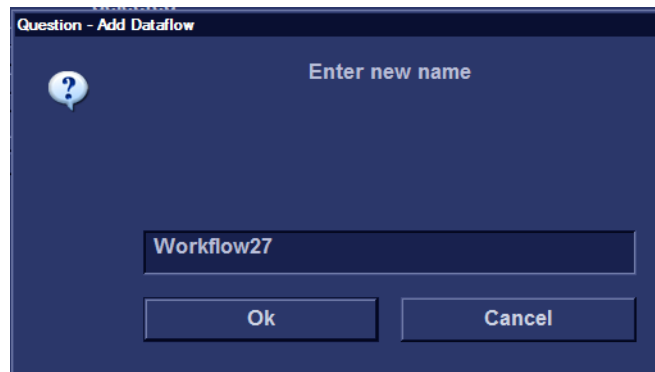
**Figure 3-33 Dataflow screen with extra buttons**



**3-8-8-4 To create a new dataflow**

1.) Select **Add** to start the creation of a new dataflow. This will bring up the **Enter new name** dialog.

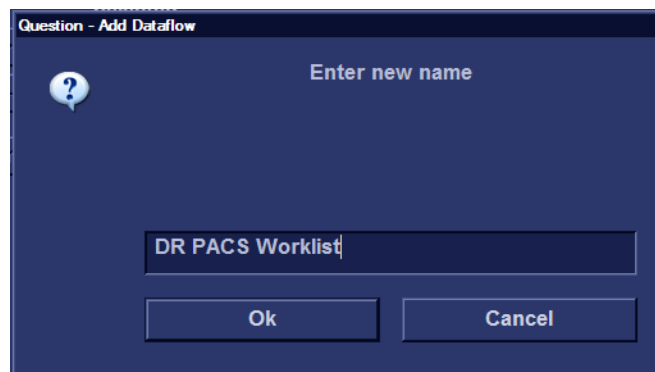
**Figure 3-34 Enter new name dialog**



2.) Enter the name for the new dataflow.

Example: DR PACS Worklist

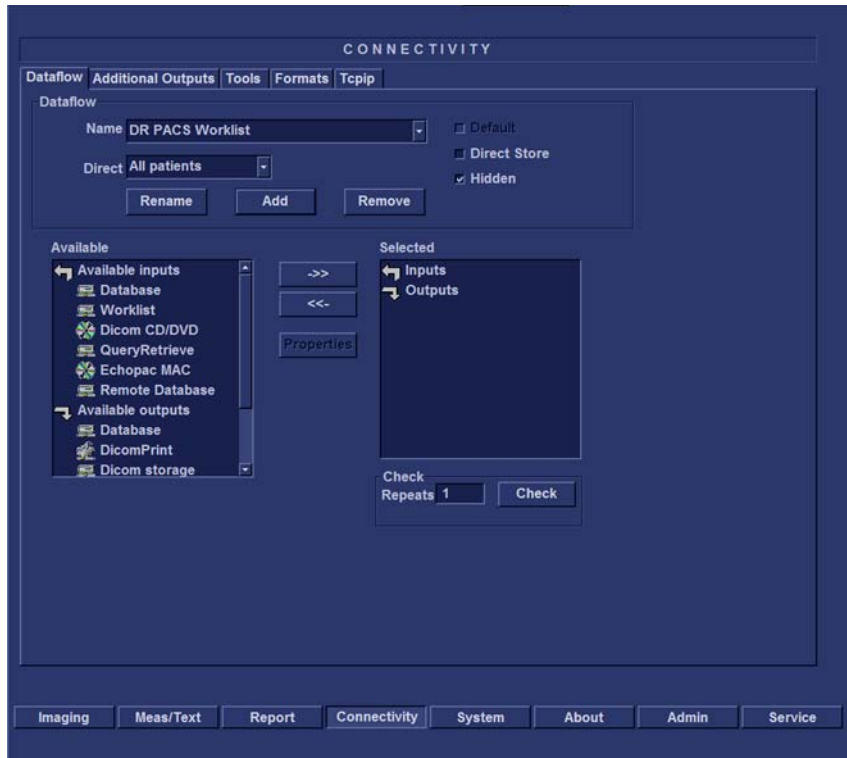
**Figure 3-35 Enter the name of the new dataflow**



3.) Select **Ok**.


- 3-8-8-4 To create a new dataflow (cont'd)  
The new dataflow is ready for set-up.

Figure 3-36 New dataflow is ready for set-up



**3-8-8-5 Create new dataflow with Worklist, Database and DICOM Storage**

To create a new dataflow with Worklist, Database and DICOM Storage, do the following in exactly these steps:

 **NOTICE** Failure to add destinations to the dataflow in the correct order may or will cause intermittent errors.

- 1.) Add the Worklist Input, highlight it, select properties, and name it (i.e.: DR PACS Worklist or just Worklist).  
Go to the IP Address field, scroll down and select <Modify>. This will allow you to edit or add IP Addresses (New Destinations/devices). If the correct IP Address is already in the list, just select it.
- 2.) Add the Database Input/Output, highlight it, select properties, and name it (i.e.: Local Archive - Int HD).  
Go to the IP Address field and (if the Database is to be the Local Archive) verify that "My Computer" is selected.  
  
The IP Address should then be correct and the Database Name and Archive File Location entries should auto-populate correctly.
- 3.) Add the DICOM Storage Output, highlight it, select properties, and name it (i.e.: DR PACS Store).  
Go to the IP Address field, scroll down and select <Modify>. This will allow you to edit or add IP Addresses (New Destinations/devices).  
  
If the correct IP Address is already in the list, just select it.

If you create the Dataflow in any other order or remove and add an entry later, you may or will receive "you are not connected to the Database" errors when trying to create a patient locally. The Worklist will work, however they can NOT save patients "created" on the Vivid 7 to the Archive while using that dataflow.

You can change the information on each entry in a Dataflow as long as you do NOT remove or add to the Dataflow out of sequence.

You should also set Direct Search to "All patients" for the new dataflow.

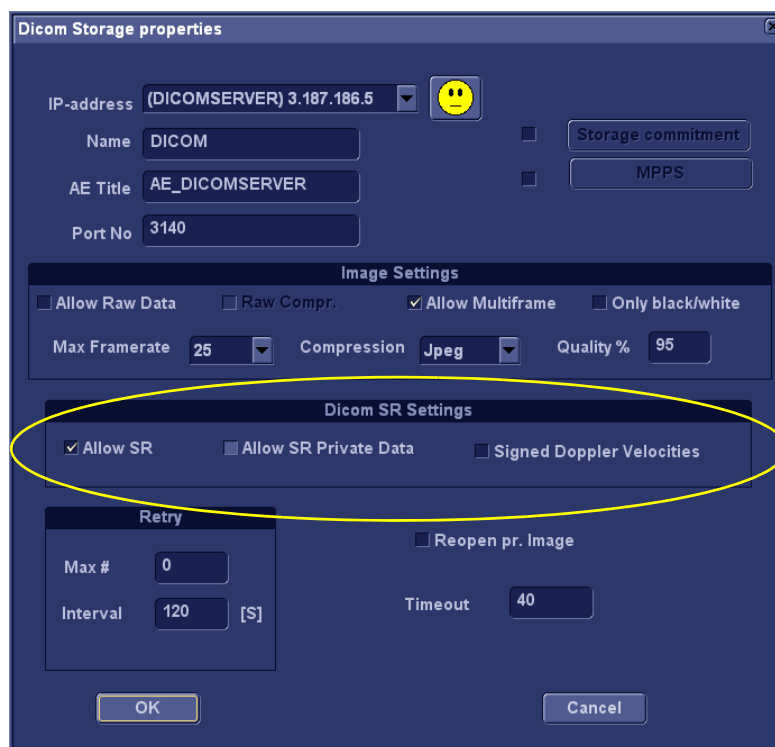
**3-8-8-6 Create new dataflow with Worklist and DICOM Storage**

This dataflow is intended for VIVID E9 / VIVID E7 scanners in a DICOM network, where the data should not be stored locally on the scanner.

To create a new dataflow with Worklist and DICOM Storage, do the following steps:

- 1.) Add a new dataflow in Config screen, Connectivity, Dataflow tab. Enter a name, e.g. **Worklist - DICOM Storage**.
- 2.) Select **OK**.
- 3.) Add the Worklist input. Configure (at least) **IP address**, **AE title** and **Port Number**.
- 4.) Select **OK**.
- 5.) Add the Dicom Storage output.
  - Configure (at least) **IP address**, **AE title** and **Port Number**. If the site has integrated EchoPAC PC and CA-1000, enable **Allow SR** and **Allow SR Private Data**. **Signed Doppler Velocities** is disabled by default. This means that signs for Doppler Velocities are removed in the DICOM SR.
  - See screen dump

**Figure 3-37 Dicom SR Settings**



- 6.) Select **OK**.
- 7.) If this dataflow should be the default at start-up, enable **Default** for the dataflow.

## Section 3-9 Options Setup

### 3-9-1 Software options

Most of the options for VIVID E9 / VIVID E7 are activated by installing a password (alphanumeric text string).

- For installation instructions, see: [3-6-5 "Software Options Configuration" on page 3-35](#).
- For available options, see: [Section 9-20 "Options - VIVID E9 / VIVID E7" on page 9-75](#).

### 3-9-2 Stereo vision

For descriptions and setup instructions, please refer to 'Stereo vision' in chapter 5 in the user manual.

### 3-9-3 Color Video Printer setup

*NOTE: The Color Video Printer is an option.*

An external Color Video Printer may be connected to one of the USB ports on VIVID E9 / VIVID E7.

*NOTE: SONY UP-D23MD/UP-D25MD and MITSUBISHI CP30DW are medical devices so they can be placed near the VIVID E9 / VIVID E7. The USB cable is 5 meters long, so it must be placed within reach of this cable.*

#### 3-9-3-1 Preparations for installing the CP30DW for the first time

- Set **Switch 1 and 2** on the rear side of the printer to **ON**.
  - Please refer to the documentation for the printer if you need help to locate the switches.
  - Please refer to the "Printer Driver Installation Manual", Direction GA294652, Rev. 4 (or newer) if you need to install a new printer driver.

#### 3-9-3-2 Generic installation instructions

- 1.) Connect the USB cable to the printer and to the USB port on VIVID E9 / VIVID E7's Rear Panel.
- 2.) Select the correct Power cable and connect it to the printer and to the mains power outlet.
- 3.) Switch on the power switch on the printer.

To be able to use the printer, the printer must be selected on the VIVID E9 / VIVID E7.

For more information, please refer to the "Printer Driver Installation Manual", Direction GA294652, Rev. 4 (or newer).

## Section 3-10

### Setup paperwork

*NOTE: During and after installation, the documentation (i.e. USB Flash Drive (UFD) or CD-ROMs with documentation, User's Manuals, Installation Manuals etc.) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user informations are available during the operation and service of the complete system.*

#### **3-10-1 User's Manual(s)**

Check that the correct user manual(s) or UFD/CD-ROM/DVD with user manuals, per software (SW) revision and language, for the system is included.

**3-10-2 Product Locator Installation Card**

*NOTE: The Product Locator Installation Card shown may not be the same as the provided Product Locator card.*

From the factory, a sheet with five Product Locator cards for transportation and one for Installation are included.

**Figure 3-38 Product Locator Installation Card (Example)**

	Mailing Address	GE Medical Systems Product Locator File P.O Box 414 Milwaukee, WI 53201-0414	GEMS-E Product Locator Administration BP 34 78533 Buc Cedex, FRANCE	Yokogawa Medical Systems Ltd. GEMSA Service Administration 4-7-127 Asahigaoka Hino-shi Tokyo 191, JAPAN				
	<table border="1"> <tr> <td>DESCRIPTION</td> <td>FDA</td> <td>MODEL</td> <td>REV</td> <td>SERIAL</td> </tr> </table>				DESCRIPTION	FDA	MODEL	REV
DESCRIPTION	FDA	MODEL	REV	SERIAL				
<b>SHIPMENT</b>	OCP		BS	ORD				
	DISTRICT		CUSTOMER NO.		DATE (MO-DA-YR)			
	DESTINATION NAME AND ADDRESS							
	ZIP CODE							
	Mailing Address	GE Medical Systems Product Locator File P.O Box 414 Milwaukee, WI 53201-0414	GEMS-E Product Locator Administration BP 34 78533 Buc Cedex, FRANCE	Yokogawa Medical Systems Ltd. GEMSA Service Administration 4-7-127 Asahigaoka Hino-shi Tokyo 191, JAPAN				
	<table border="1"> <tr> <td>DESCRIPTION</td> <td>FDA</td> <td>MODEL</td> <td>REV</td> <td>SERIAL</td> </tr> </table>				DESCRIPTION	FDA	MODEL	REV
DESCRIPTION	FDA	MODEL	REV	SERIAL				
SYSTEM I.D.	OCP		BS	ORD	EMPLOYEE NO.			
DISTRICT		ROOM		DATE (MO-DA-YR)				
CUSTOMER N°								
DESTINATION NAME AND ADDRESS								
ZIP CODE								
<b>INSTALLATION</b>								



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# Chapter 4

## General procedures and Functional checks

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### Section 4-1 Overview

#### 4-1-1 Purpose of this chapter

This chapter includes General Procedures and Functional Checks.

General Procedures is a collection of commonly used procedures. The procedures are available by cross references from other parts of this manual.

Functional Checks is a collection of procedures for quickly checking major functions of the VIVID E9 / VIVID E7 and diagnostics instructions using the built-in service software. These checks can be a great asset in determining whether the VIVID E9 / VIVID E7 is working as it should.

#### 4-1-2 Contents in this chapter

4-1	Overview . . . . .	4-1
4-2	General procedures . . . . .	4-3
4-3	Functional checks . . . . .	4-32
4-4	Site Log . . . . .	4-48

**4-1-3 Special Equipment required**

- An empty (blank) DVD+RW disc
- ECG Pads
- ECG Harness:
  - CABLE ECG MARQ. AHA/AMERICA, P/N:164L0025
  - LEADWIRES ECG MARQ. AHA/AMERICA, P/N: 164L0027
- or
  - CABLE ECG MARQ. IEC/EU+AS, P/N:164L0026
  - LEADWIRES ECG MARQ. IEC/EU+AS, P/N:164L0028
- At least one probe (ideally you should check all the site probes used by the system.)

## Section 4-2 General procedures



### NOTICE SYSTEM REQUIRES ALL COVERS

Operate this unit only when all board covers and frame panels are securely in place. The covers are required for safe operation, good system performance and cooling purposes.



### CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:








1. TURN OFF THE BREAKER.
2. UNPLUG THE SYSTEM.
3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.
4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

## 4-2-1 Power ON/Boot Up

### 4-2-1-1 Warnings

-  **DANGER** ALWAYS CONNECT THE UNIT TO A FIXED POWER SOCKET WHICH HAS THE PROTECTIVE GROUNDING CONNECTOR.
-  **DANGER** NEVER USE A THREE-TO-TWO PRONG ADAPTER; THIS DEFEATS THE SAFETY GROUND.
-  **DANGER** ENSURE THAT THE POWER CORD AND PLUG ARE INTACT AND THAT THE POWER PLUG IS THE PROPER HOSPITAL-GRADE TYPE (WHERE REQUIRED).
-  **CAUTION** SYSTEM REQUIRES ALL COVERS  
OPERATE THIS UNIT ONLY WHEN ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. THE COVERS ARE REQUIRED FOR SAFE OPERATION, GOOD SYSTEM PERFORMANCE AND COOLING PURPOSES.
-  **NOTICE** Use only power supply cords, cables and plugs provided by or designated by GE.

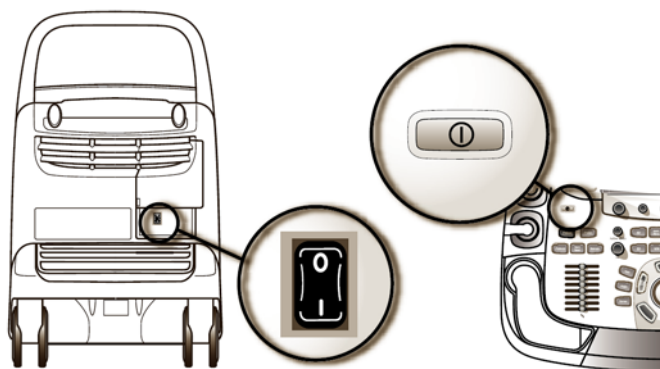
*NOTE: Do not cycle the Circuit Breaker ON-OFF-ON in less than five (5) seconds. When turning OFF the Circuit Breaker, the system should de-energize completely before turning the circuit breaker ON.*

**4-2-1-2 Connect AC (mains) Power to the VIVID E9 / VIVID E7**

Connecting AC Power to the VIVID E9 / VIVID E7 ultrasound unit, involves preliminary checks of the power cord, voltage level and compliance with electrical safety requirements.

- 1.) Ensure that the wall outlet is of appropriate type, and that the Circuit Breaker is turned off.
- 2.) Uncoil the power cable, allowing sufficient slack so that the unit can be moved slightly.
- 3.) Verify that the power cable is without any visible scratches or any sign of damage.
- 4.) Verify that the on-site mains voltage is within the limits indicated on the rating label near the Circuit Breaker on the rear of the unit.
- 5.) Connect the Power Cable's female plug to the Power Inlet at the rear of the unit.
- 6.) Lock the plug in position with the Retaining Clamp (ACC Clamp).
- 7.) Verify that the Mains Power Circuit Breaker is in OFF position, if not, switch it OFF.

**Figure 4-1 The Circuit Breaker and On/Off button**

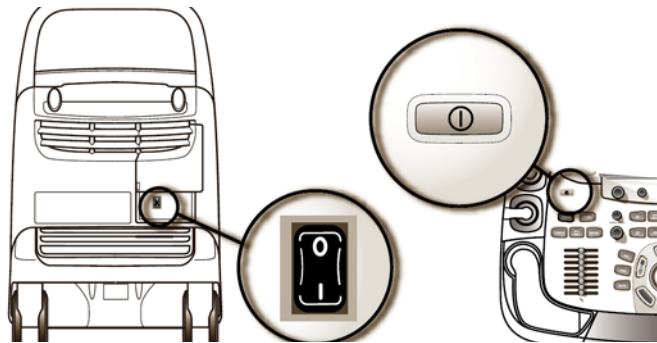


- 8.) Connect the Power Cable's other end (male plug) to a hospital grade mains power outlet with the proper rated voltage, and the unit is ready for Power ON/Boot Up.

4-2-1-3 Turn Unit ON

- 1.) Switch ON the Mains Power Circuit Breaker at the rear of the unit.

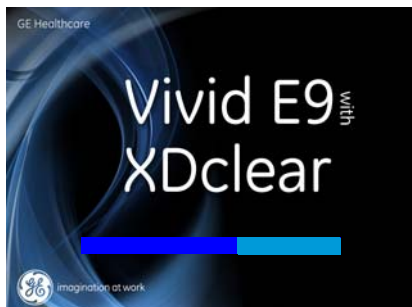
Figure 4-2 The Circuit breaker and On/Off button



You should hear a “click” from the relays in the AC Power and the unit is ready to boot.

- 2.) Press once on the **On/Off** key on the Operator Panel to boot the unit.  
During a normal boot, you may observe that:
  - a.) The unit’s ventilation fan starts on full speed, but slows down after a few seconds (listen to the fan sound).
  - b.) Power is distributed to the peripherals, Operator Panel (Console), Monitor, Front End Processor and Back End Processor.
  - c.) Back End Processor and rest of scanner starts with the sequence listed in the next steps:
  - d.) Back End Processor is turned ON and starts to load the software.
  - e.) The Start Screen is displayed on the monitor.
  - f.) A start-up bar indicating the time used for software loading, is displayed on the monitor.

Figure 4-3 Start-up bar



- g.) The software initiates and sets up the Front End electronics and the rest of the instrument.
- h.) The backlight in the keyboard is lit.

**4-2-1-3 Turn Unit ON (cont'd)**

- i.) As soon as the software has been loaded, either a 2D screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

**Figure 4-4 2D Screen on the display.**

**NOTE:** Total time used for start-up is typical one and a half minutes or less. If starting after a power loss or a lock-up, the start-up time may be up to four minutes.

## 4-2-2 Power shut down

When you switch off the unit, the system performs an automatic shutdown sequence.

**Figure 4-5 System - Exit menu**



The SYSTEM - EXIT menu, used when switching off the unit, gives you these choices:

- **Logoff**  
Use this button to log off the current user.  
The system remains ON and ready for a new user to log on.  
If the Logoff button is dimmed, it indicates that no user is logged on to the unit at the moment.
- **Shutdown**  
Use this button to shut down the system. The entire system will shut down. It is recommended to perform a full shutdown at least once a week.  
If the Shutdown button is dimmed, use the key-combination <Ctrl+Alt+R> to shut down the unit.
- **Cancel**  
Use this button to exit from the System-Exit menu and return to the previous operation.



**4-2-2-1 Complete Power Down**

- 1.) Before Power Down, lock the Top Console in its lower, locked position. This is required if you are going to move or transport the VIVID E9 / VIVID E7 to ensure maximum stability.

*NOTE: For service purposes, you may want to move the Top Console after Power Down. If you leave the Top Console in unlocked position, it will be sensed during Power Down, and the brakes that usually stabilize the position of the Top Console, will be released so you can move the Top Console in the XY directions.*

- 2.) Press once on the **On/Off** key on the Operator Panel to display the **System - Exit** menu.

**Figure 4-6 Press once on the key with the green light**




**Figure 4-7 Select Shutdown**



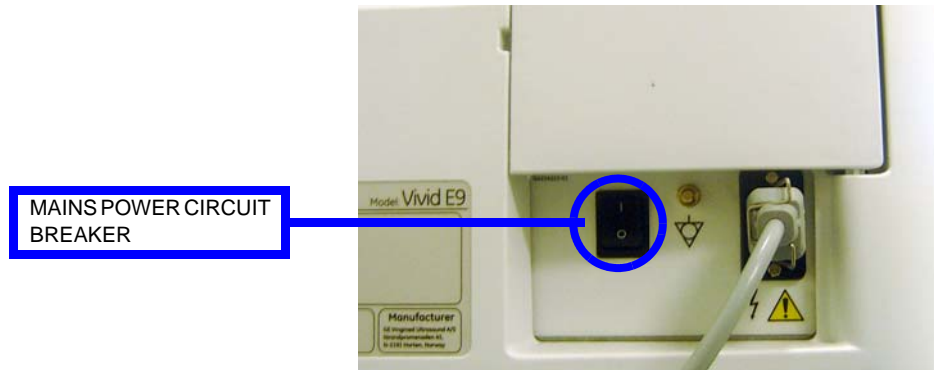
- 3.) Select Shutdown to do a complete power down of the unit.  
The Back End Processor will first turn off the scanner activity and print the message "Please wait - Shutdown in progress" in the LCD display on the Operator Panel.  
Next, it starts to shut down itself. The time to turn down the unit, including the Back End Processor, may vary from 10 seconds up to approximately 1 minute.  
The last thing that shuts down, is the light on the Operator Panel, indicating that you can continue with the next step.

4-2-2-1 Complete Power Down (cont'd)

 **NOTICE** Be sure to wait with the next step until the system has finished its shut-down. Failing to do so, may destroy data on the hard disk, making the system fail later.

- 4.) Switch off the Mains Power Circuit Breaker, located on the rear of the unit. This will cut power distribution within the unit.

**Figure 4-8 Circuit Breaker located at rear of the unit**



### 4-2-3 Top Console position adjustment

The system's Top Console can be freely moved in all directions. The vertical displacement of the Top Console is motor driven. The control buttons are located around the handles (Figure 4-9).


 **CAUTION** To avoid injury or damage, make sure nothing is within the range of motion before moving the Top Console. This includes both objects and people.

Figure 4-9 Top Console adjustment controls



1. Lock and brake release button: Unlock and move the Top Console horizontal.
2. Up/Down button: Move the Console up or down

#### 4-2-3-1 To raise/lower the Top Console

- 1.) Press and hold down the **Up/Down** button (Figure 4-9, button 2) accordingly to raise or lower the Top Console.
- 2.) Release the button when the Top Console is at the desired height.

#### 4-2-3-2 To unlock the Top Console

- 1.) Press and hold down the **Lock and brake release** button(s) (Figure 4-9, button 1) and pull the Top Console out of the locked position until the Top console is in the desired position.
- 2.) Release the button(s).

#### 4-2-3-3 To lock the Top Console

- 1.) Press and hold down the **Lock and brake release** button(s) (Figure 4-9, button 1) while pushing the Top Console in the locked position.
- 2.) Release the button(s).

#### 4-2-3-4 To move the floating Top Console

- 1.) The unlocked Top Console can be easily moved by pressing and holding down the **Lock and brake release** button(s) (Figure 4-9, button 1) and move the Top Console in any direction.
- 2.) Release the button when the Top Console is at the desired height.

**4-2-3-5 Manually releasing the XY Lock**

Even if the power is OFF, it is possible to manually release the console's XY-mechanism (frog leg).  
The release point is located on the rear of the XY Mechanism (Frog Leg).

**Figure 4-10 XY mechanism release**



- 1.) Insert a small tipped screwdriver or eq. into the release point and push until a “click” is heard. Some force may be required if the lock adjustment is tight adjusted.

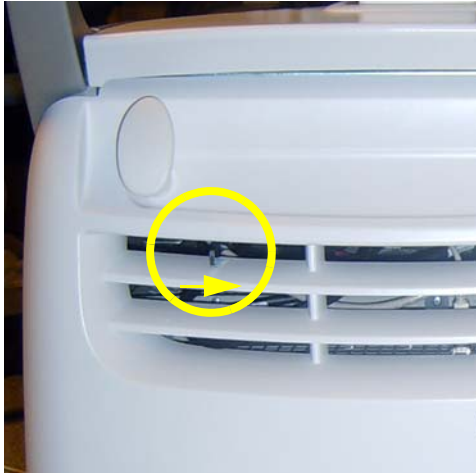
**Figure 4-11 Manually releasing the XY Lock**



- 2.) Move the console to the wanted position.

**4-2-3-6 Moving the Top Console up or down when Power is OFF**

The Z mechanism can be manually repositioned (moved up or down) in the event the drive gear is disconnected or has failed, or if the mains power is turned off or disconnected, or if it is a mains power failure.

**Figure 4-12 Up/Down Release Handle**

MOVE HANDLE (ABOVE THE ARROW IN THE ILLUSTRATION) TO THE RIGHT TO RELEASE THE Z MECHANISM

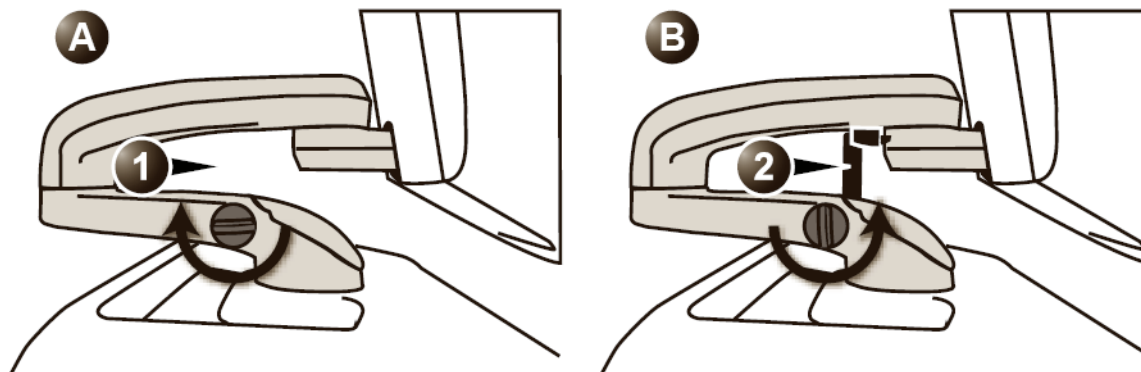


**WARNING OPERATOR CONSOLE CAN DROP UNEXPECTEDLY WHEN THE MECHANISM IS RELEASED.**

- Move the handle a few millimeters to the right side, to release the Z Mechanism (disengage the motor drive unit), and at the same time move the Top Console up or down, as required.

## 4-2-4 LCD Monitor position adjustment

Figure 4-13 LCD monitor position adjustment



- Unlocked LCD monitor
- Locked LCD monitor

### 4-2-4-1 To unlock the LCD monitor

- Turn the release knob counter clockwise to unlock the LCD monitor.  
The LCD monitor can be moved freely in all directions.

### 4-2-4-2 To lock the LCD monitor

- Turn the release knob clockwise to raise the lock and move the LCD monitor into the parked position.

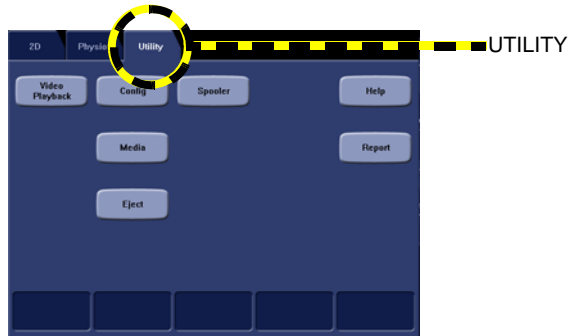
### 4-2-5 Logging on to VIVID E9 / VIVID E7 as 'ADM'

To select **Config**, choose either **Procedure A** or **Procedure B**:

A.) **Procedure A**: On the Touch Screen:

- 1.) Select the **Utility** tab.

Figure 4-14 Select Utility



- 2.) Then select **Config**.

Figure 4-15 Select Config

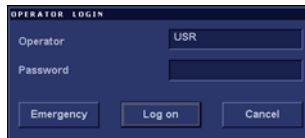


B.) **Procedure B**: On the alphanumeric keyboard:

- Press **F2**.

Both method A and B will bring up the **Operator Login** dialog where you must log on.

Figure 4-16 Operator Login



### 4-2-5 Logging on to VIVID E9 / VIVID E7 as 'ADM' (cont'd)

As default, two users are defined, USR and ADM.

- USR  
If you log on as **USR**, you will have access to do set-up tasks that a user may need to do during daily use.

Example: To select a printer.

As default, no password has been set for **USR**. Just type the name **USR** and select **Login**.

- ADM  
If you log on as **ADM**, you will have access to do general set-up and service adjustments.

Example: Adjust network and connectivity settings.

As default, the password for **ADM** is **ulsadm**. Select the name **ADM**, the password (**ulsadm**) and select **Login**.

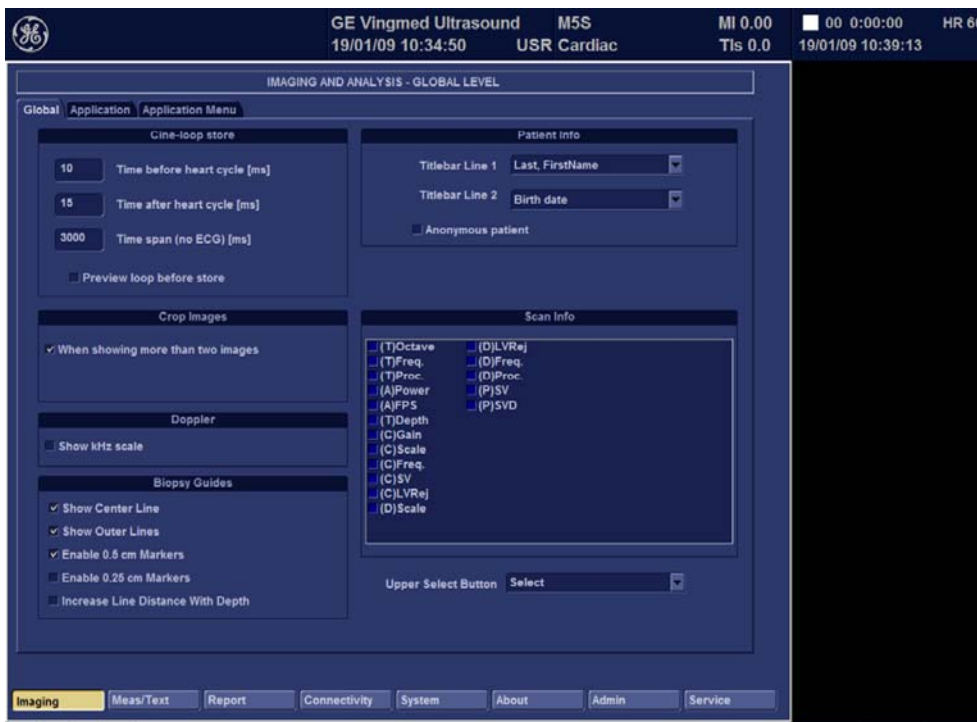
It is possible for the administrator (*ADM*) to establish new users and set unique passwords for each user, including a new password for ADM. If the login as ADM fails, contact the responsible person in the hospital to get access.

The **Emergency** button stores data only from current patient examination.

The **Cancel** button is used to cancel the login.

- If this is the first time the VIVID E9 / VIVID E7 is turned on, the **Imaging and Analysis - Global Level** window is displayed. (If another screen was displayed earlier, before logging out, or turning unit off, that screen will be displayed.)

Figure 4-17 Imaging and Analysis - Global Level window



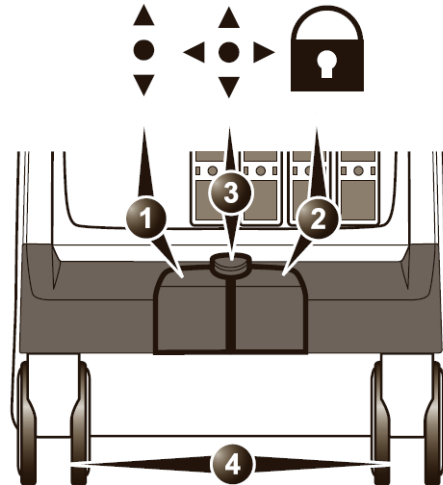


## 4-2-6 Moving and Transporting the VIVID E9 / VIVID E7

### 4-2-6-1 The Casters (Wheels) control

The wheels of the unit are controlled by the pedals located between the front wheels of the unit. Examine the wheels frequently for defects to avoid breaking or jamming.

Figure 4-18 Pedals



1. Swivel lock pedal
2. Full lock pedal (Parking brake)
3. Release active lock
4. Front wheels


- 1.) Press the right pedal to engage the Parking brake.
- 2.) Press the center pedal to release the Parking brake.
- 3.) Press the left pedal to engage the Swivel lock.
- 4.) Press the center pedal to release the Swivel lock.

### 4-2-6-2 To prepare the unit to be moved

- 1.) If not locked, move the keyboard console and LCD monitor to the park position (see: [4-2-3 "Top Console position adjustment" on page 4-11](#) and [4-2-4 "LCD Monitor position adjustment" on page 4-14](#)).
- 2.) Turn the system off, including the circuit breaker (see [4-2-2 "Power shut down" on page 4-8](#)), and remove the plug from the wall.
- 3.) Disconnect all cables linking the unit to any off-board peripheral devices and network.
- 4.) Secure the unit's power cable.
- 5.) Place all probes in the probe holder. Ensure that the probe cables do not protrude from the unit or interfere with the wheels.
- 6.) Ensure that no loose items are left on the unit.
- 7.) Fold down the monitor.
- 8.) Unlock the brake.

**4-2-6-3 To ensure safety while moving the unit**

- 1.) Ensure that the keyboard console and LCD monitor are in locked position (see: [4-2-3 "Top Console position adjustment" on page 4-11](#) and [4-2-4 "LCD Monitor position adjustment" on page 4-14](#)).

 **WARNING DO NOT MOVE THE UNIT IF THE KEYBOARD CONSOLE AND LCD MONITOR ARE IN FREE POSITION.**  
**ENSURE THAT THE HANDS OF THE PATIENT ARE AWAY FROM THE CONSOLE ARM WHEN MOVING THE KEYBOARD CONSOLE.**

- 2.) Proceed cautiously when crossing door or elevator thresholds. Grasp the front handle grips or the back handle bar and push or pull. Do not attempt to move the unit using cables or probe connectors. Take extra care while moving the unit on inclines.
- 3.) Ensure that the unit does not strike the walls or door frames.
- 4.) Ensure that the pathway is clear.
- 5.) Move the unit slowly and carefully.

 **CAUTION Avoid ramps that are steeper than 10 degrees.**

- 6.) Use two or more persons to move the unit over long distances or on inclines.

**4-2-6-4 Transporting the unit by vehicle**

Take extra care when transporting the unit by vehicle. In addition to the moving precautions listed on [4-2-6-3 "To ensure safety while moving the unit" on page 4-18](#), follow the procedure described below.

- 1.) If not locked, move the keyboard console and LCD monitor to the park position (see: [4-2-3 "Top Console position adjustment" on page 4-11](#) and [4-2-4 "LCD Monitor position adjustment" on page 4-14](#)).

 **WARNING DO NOT MOVE/LIFT THE UNIT IF THE KEYBOARD CONSOLE AND LCD MONITOR ARE IN FREE (UNLOCKED) POSITION.**

- 2.) Disconnect all probes and secure them in their boxes.
- 3.) Ensure that the transporting vehicle is appropriate for the unit's weight.
- 4.) Park the vehicle on a level surface for loading and unloading.
- 5.) Secure the unit while it is on the lift, to prevent rolling. Do not attempt to hold it in place by hand. Cushion the unit and strap the lower part so that it does not break loose.
- 6.) Ensure that the unit is secured inside the vehicle. Secure it with straps to the two hooks under the system to prevent movement while in transit.
- 7.) Drive cautiously to prevent vibration damage.

**4-2-6-5 At the new location**

- 1.) When the unit is in place at a new location, lock the wheel brakes.

## 4-2-7 Recording important settings and parameters



**NOTICE** An error, or a power loss may occur during the software loading.

Always keep a record of the settings for the VIVID E9 / VIVID E7 on paper. Verify if it is current before starting a software loading!

### 4-2-7-1 Overview

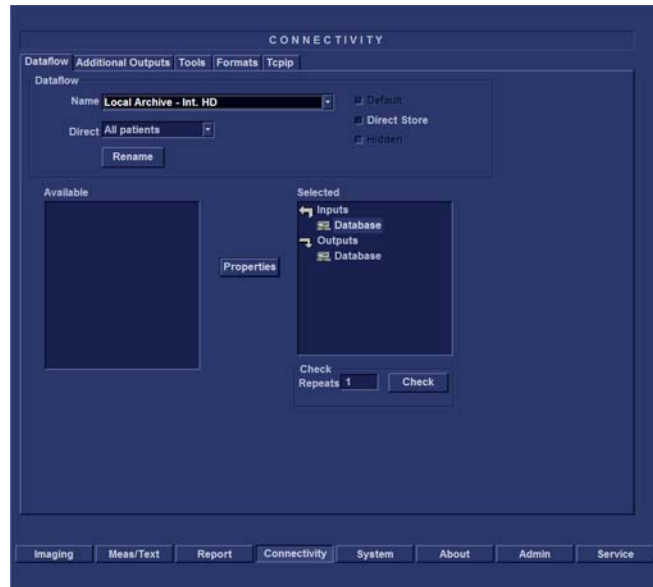
This subsection includes descriptions for recording data from the following screens:

- **Connectivity**
  - Dataflow (see: [4-2-7-2 "Connectivity — Dataflow" on page 4-20](#))
  - Additional Outputs (see: [4-2-7-3 "Connectivity — Additional Outputs" on page 4-21](#))
  - Tools (see: [4-2-7-4 "Connectivity — Tools" on page 4-22](#))
  - Formats (see: [4-2-7-5 "Connectivity — Formats" on page 4-22](#))
  - Tcpiip (see: [4-2-7-6 "Connectivity — Recording the TCP/IP settings" on page 4-23](#))
- **System**
  - Settings (see: [4-2-7-7 "System — Settings" on page 4-25](#))
- **About**
  - System Version (see: [4-2-7-9 "About — System Version" on page 4-26](#))
- **Admin**
  - Disk Management (see: [4-2-7-13 "Admin — Disk Management" on page 4-27](#))
  - Backup (see: [4-2-7-14 "Admin — Backup" on page 4-27](#))
  - Restore (see: [4-2-7-15 "Admin — Restore" on page 4-28](#))
  - Users (see: [4-2-7-16 "Admin — Users" on page 4-28](#))
  - System Admin (see: [4-2-7-17 "Admin — System Admin" on page 4-29](#))
- **Service**
  - Service screen (see: [4-2-7-18 "Service screen" on page 4-30](#))

### 4-2-7-2 Connectivity — Dataflow

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Connectivity > Dataflow**

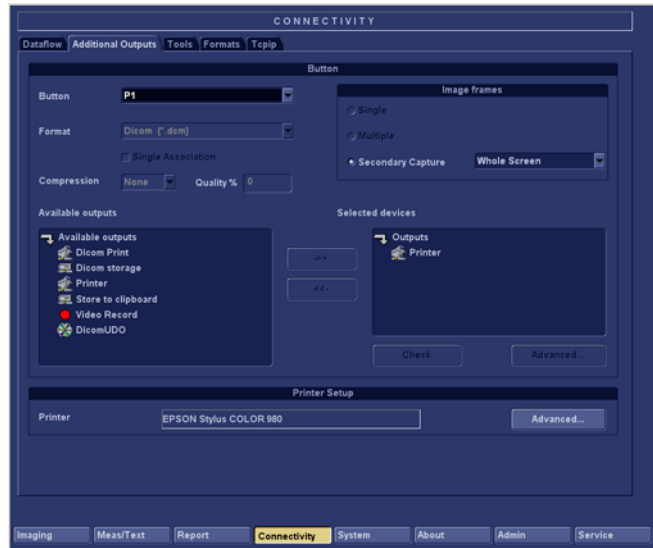
Figure 4-19 The Dataflow screen



- 3.) Record the settings for each Dataflow in use by the site.

**4-2-7-3 Connectivity — Additional Outputs**

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15](#).
- 2.) Select **Connectivity > Additional Outputs**.

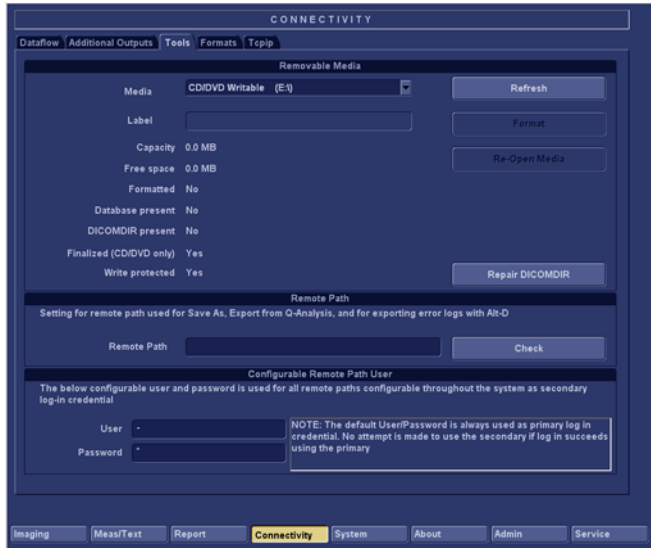
**Figure 4-20 Additional Outputs**

- 3.) Select Button **P1** in the **Button** pull-down menu.
- 4.) Record the settings for **Button P1**.
- 5.) Select Button **P2** in the **Button** pull-down menu.
- 6.) Record the settings for **Button P2**.
- 7.) Select Button **Record** in the **Button** pull-down menu.
- 8.) Record the settings for **Button Record**.

#### 4-2-7-4 Connectivity — Tools

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Connectivity > Tools**.

Figure 4-21 Tools



- 3.) If in use: Record the **Remote Path**.
- 4.) If in use: Record the **Configurable Remote Path User**. Also ensure that you have the correct **Password** for this user available, before you continue.

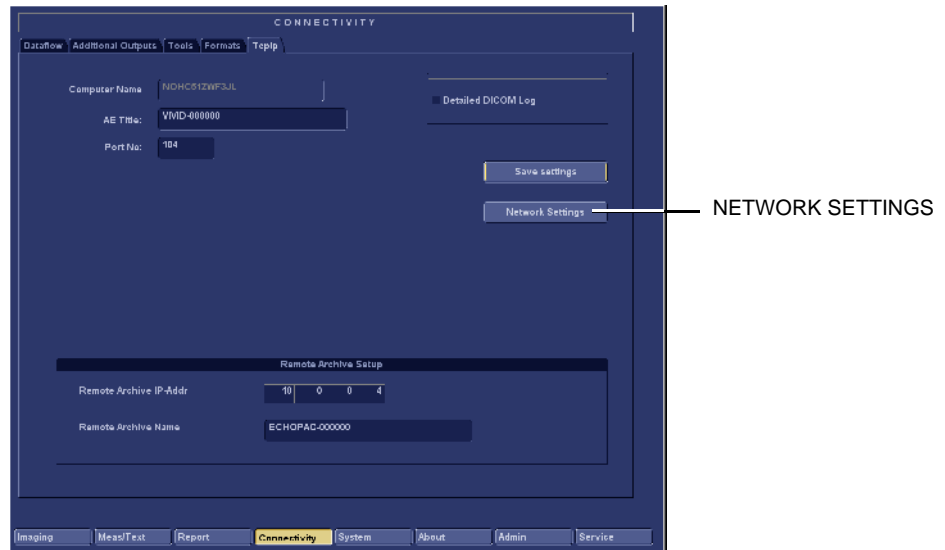
#### 4-2-7-5 Connectivity — Formats

Ensure that an Application Specialist have recorded the needed information from the **Formats** screen.

4-2-7-6 Connectivity — Recording the TCP/IP settings

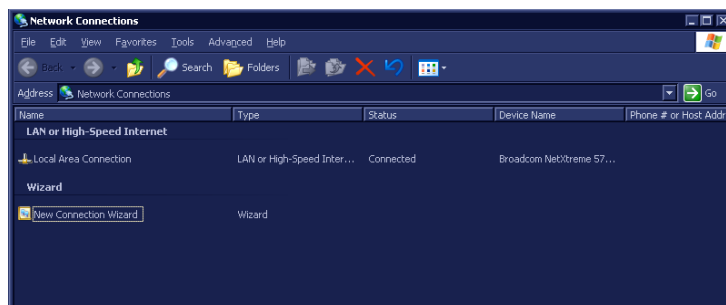
- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Connectivity > Tcpiip**.
- 3.) Record all settings in: [Table 4-1 "Record settings from Tcpiip screen and sub-screens" on page 4-24.](#)

Figure 4-22 Tcpiip screen, Example Settings



- 4.) Select **Network Settings**.

Figure 4-23 Tcpiip > Network Settings



- 5.) Double-click **Local Area Connection**.
- 6.) Select **Properties**.
- 7.) Double-click **Internet Protocol (TCP/IP)**.
- 8.) Select **Advanced...**
- 9.) Record the settings in [Table 4-1 "Record settings from Tcpiip screen and sub-screens" on page 4-24.](#)
  - Record if **DHCP** is Enabled.
  - Record **IP address**, **Subnet mask** and **Default gateways**

4-2-7-6 Connectivity — Recording the TCP/IP settings (cont'd)

Table 4-1 Record settings from Tcpi screen and sub-screens

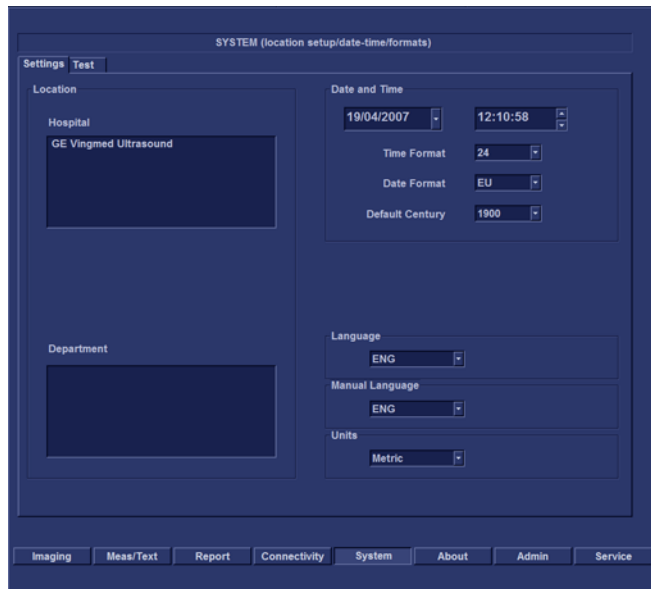
PARAMETER	VALUE			
COMPUTER NAME				
AE TITLE				
PORT NO				
<b>REMOTE ARCHIVE SETUP</b>				
REMOTE ARCHIVE IP-ADDR				
REMOTE ARCHIVE NAME				
<b>DHCP</b>				
DHCP	ENABLED ___ DISABLED ___			
<b>IP SETTINGS - IF DHCP IS DISABLED</b>				
IP ADDRESS				
SUBNET MASK				
DEFAULT GATEWAY				



4-2-7-7 System — Settings

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **System > Settings**.

Figure 4-24 Settings



- 3.) Record the following information for **Location**:
  - Hospital
  - Department
- 4.) Record the following information for **Date and Time**:
  - Time Format
  - Date Format
  - Default Century
- 5.) Record the selected **Language**.
- 6.) Record the selected **Manual Language**.
- 7.) Select the selected **Units**.

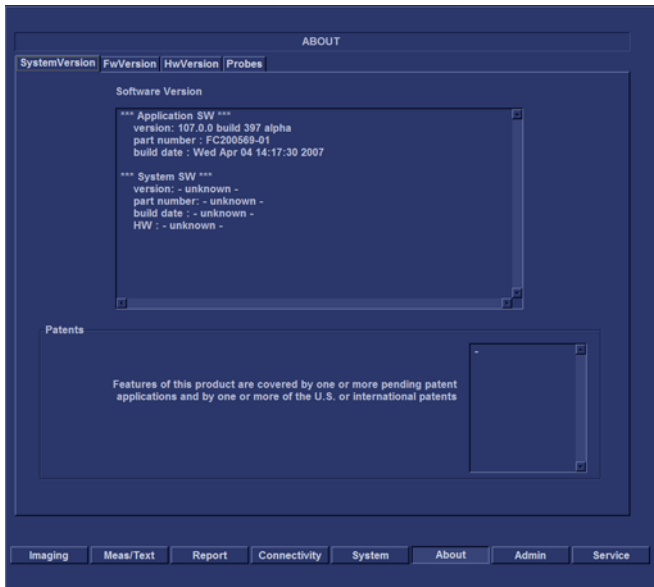
4-2-7-8 System — Test

There are no data on this screen that need to be recorded.

**4-2-7-9 About — System Version**

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **About > System Version**.

**Figure 4-25 Information available on the About tab**



- 3.) Record software and hardware versions in [Table 4-2 "Record Software versions" on page 4-26.](#)

**Table 4-2 Record Software versions**

DESCRIPTION	RECORD VERSIONS
APPLICATION SW VERSION	
SYSTEM SW VERSION	

**4-2-7-10 About — Firmware Version**

There are no data on this screen that need to be recorded.

**4-2-7-11 About — HW Version**

There are no data on this screen that need to be recorded.

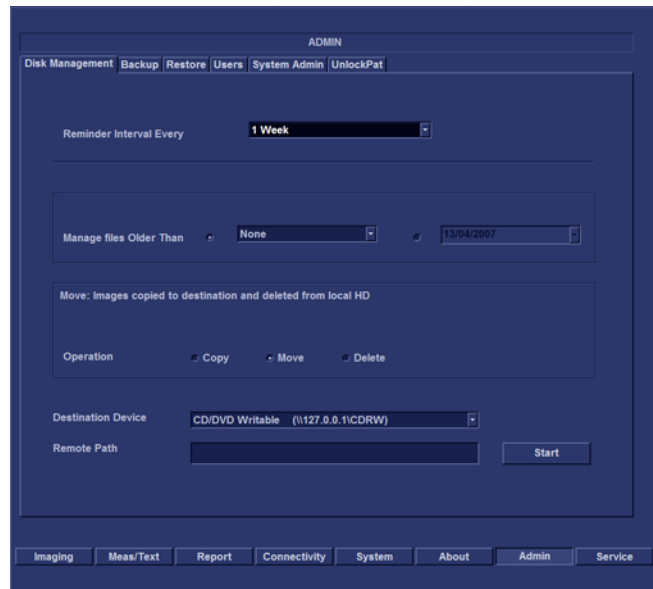
**4-2-7-12 About — Probes**

There are no data on this screen that need to be recorded.

#### 4-2-7-13 Admin — Disk Management

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > Disk Management**.

Figure 4-26 Disk Management



- 3.) Record the selected **Reminder Interval Every** setting.

#### 4-2-7-14 Admin — Backup

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > Backup**.
- 3.) Record **Remote Path**.

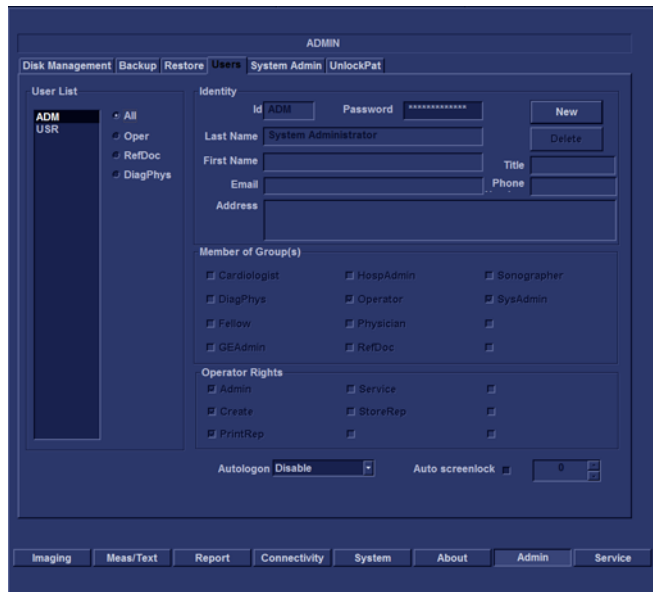
4-2-7-15 Admin — Restore

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > Restore**.
- 3.) Record **Remote Path**.

4-2-7-16 Admin — Users

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > Users**.

Figure 4-27 Users

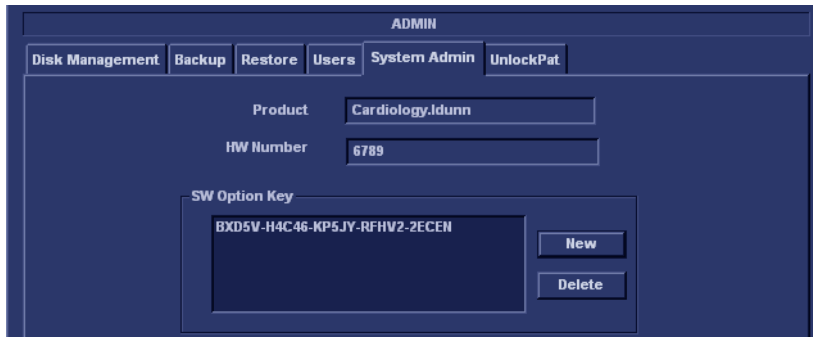


- 3.) Select and record all data for each user in the **User List**.

4-2-7-17 Admin — System Admin

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > System Admin**.

Figure 4-28 System Admin (Example)



- 3.) Record the **SW Option Key** - one or more alphanumeric strings - from the **SW Option Key** field.

**WARNING** *MAKE SURE THAT THE SOFTWARE OPTION KEY (ALPHANUMERIC PASSWORDS) HAVE BEEN RECORDED CORRECTLY. IF THE KEY IS INCORRECT, YOU WILL NOT BE ABLE TO LOG ON AFTER THE SOFTWARE INSTALLATION HAS BEEN COMPLETED. THE PASSWORD IS CASE SENSITIVE. HYPHENS MUST ALSO BE RECORDED. THERE MAY BE MORE THAN ONE PASSWORD.*

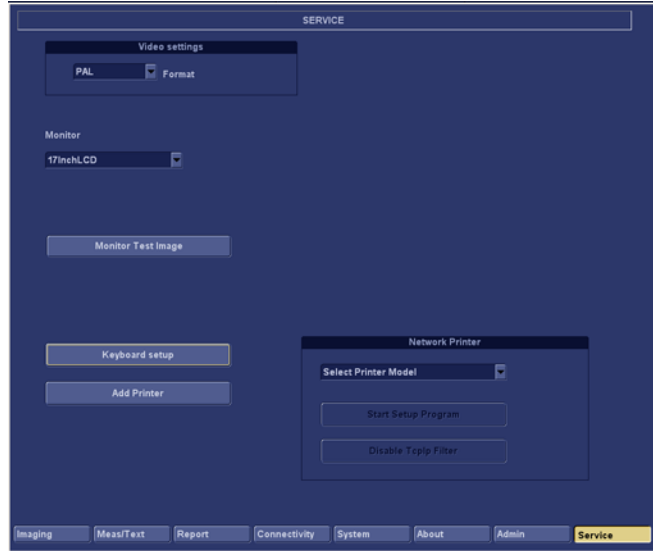
Table 4-3 Software Options Keys

SW OPTIONS KEYS

4-2-7-18 Service screen

- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).  
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 / VIVID E7 as 'ADM'" on page 4-15.](#)
- 2.) Select **Service**.

Figure 4-29 Service Settings



- 3.) Record **Video settings Format** in [Table 4-4 "Service screen settings" on page 4-30.](#)
- 4.) Record **Monitor** in [Table 4-4 "Service screen settings" on page 4-30.](#)

Table 4-4 Service screen settings

PARAMETER	VALUE
VIDEO-SETTINGS FORMAT	__PAL __NTSC
MONITOR	

## 4-2-8 Cleaning the Trackball from the outside (OP-5)

On the latest version of the Lower Operator Panel (OP-5), an optical trackball is used. If dust is interfering with the light in an optical trackball, cleaning is required.

### When cleaning is needed

- 1.) Power OFF the VIVID E9 / VIVID E7.

Figure 4-30 Trackball on 'new style' Lower panel



- 2.) Place your fingers onto the Top Locking Plate.
- 3.) Rotate the Top Locking Plate counterclockwise until it can be removed from the keyboard.
- 4.) Lift off the Top Locking Plate including the Rubber Dust Filtering Ring and trackball from the keyboard.
- 5.) Wipe off any oil or dust from the trackball using a cleaner or dry cloth.
- 6.) Wipe off any oil or dust from the trackball housing, rollers, etc., using a cleaner or cotton bud.



**CAUTION MAKE SURE NOT TO SPILL OR SPRAY ANY LIQUID INTO THE TRACKBALL HOUSING (KEYBOARD OR VIVID E9 / VIVID E7).**

**AVOID ORGANIC SOLVENTS THAT MAY DAMAGE THE MECHANICAL PARTS OF THE TRACKBALL ASSEMBLY.**

**DO NOT APPLY MUCH FORCE TO THE SMALL BALL.**


- 7.) Insert the trackball into the housing.
- 8.) Place the Top Locking Plate including the Rubber Dust Filtering Ring back on the OP and lock it by rotating it clockwise.

**NOTE:** *Plastic hood is not supposed to be flush due to curvature on the panel.*

### Test the Trackball

Power up the VIVID E9 / VIVID E7 and check that the trackball now works as intended.


**CAUTION** ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:



1. TURN OFF THE BREAKER.
2. UNPLUG THE SYSTEM.
3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.
4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

**WARNING** DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

## Section 4-3 Functional checks

### 4-3-1 Preparation

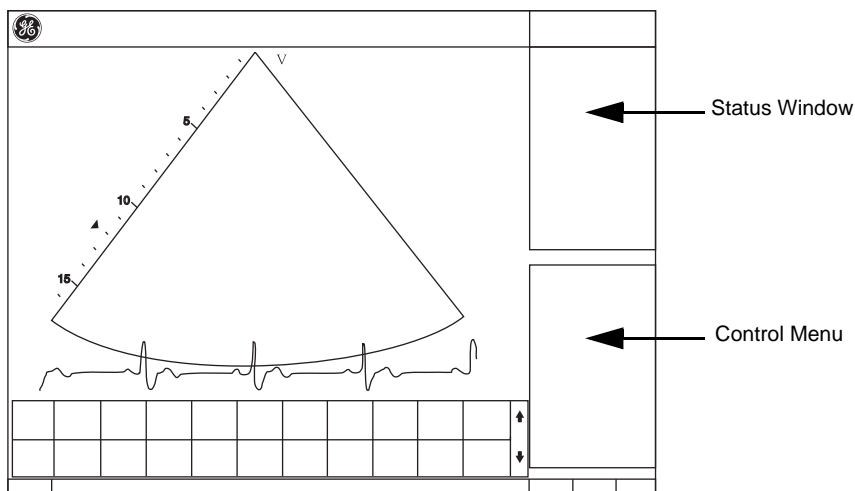
Turn on power to VIVID E9 / VIVID E7.

### 4-3-2 2D Mode (B mode) Checks

#### 4-3-2-1 Introduction

The 2D Mode is the system's default mode.

Figure 4-31 2D Mode Screen Example





**4-3-2-2 Preparations**

- 1.) Connect one of the probes.
  - See ["Connecting Probes" on page 3-21](#) for info about connecting the probes.
- 2.) Turn ON the scanner.
  - The 2D Mode window is displayed (default mode).

4-3-2-3 Adjust the 2D mode controls

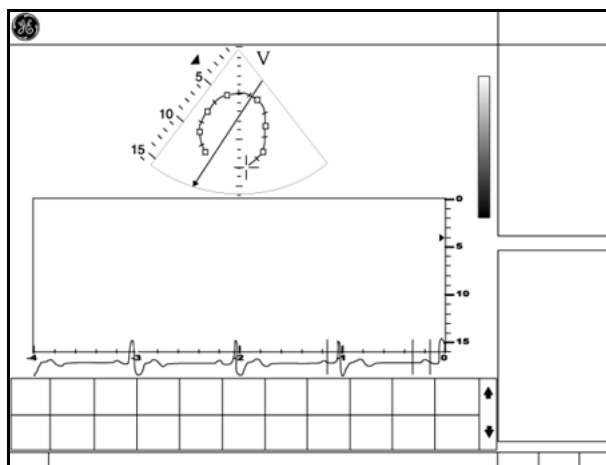
 **WARNING** *ALWAYS USE THE MINIMUM POWER REQUIRED TO OBTAIN ACCEPTABLE IMAGES IN ACCORDANCE WITH APPLICABLE GUIDELINES AND POLICIES.*

- 1.) Press **2D** on the Operator Panel to access 2D mode.
- 2.) These Image Controls are used to optimize the 2D picture. Verify that all the listed controls are working as intended:
  - Use **Gain** and **TGC** controls to optimize the overall image together with the **Power** control.
  - Use **Depth** to adjust the range to be imaged.
  - Use **Focus** to center the focal point(s) around the region of interest.
  - Use **Frequency** (move to higher frequencies) or **Frame rate** (move to lower frame rate) to increase resolution in image.
  - Use **Frequency** (move to lower frequency) to increase penetration.
  - Use the **Reject** control to reduce noise in the image.
  - Use the **DDP** control to optimize imaging in the blood flow regions and make a cleaner, less noisy image.
  - Use **UD Clarity** (Cardiac) or **UD Speckle reduce** (non-cardiac) to reduce image speckle. Extra care must be taken to select the optimal Speckle reduction level, as too much filtering of speckle can mask or obscure desired image detail.
  - Use **Adaptive reject** (Cardiac) to reduce near field haze and blood pol artifact without diluting tissue appearance of moving structures.

## 4-3-3 M Mode Checks

### 4-3-3-1 Introduction

Figure 4-32 M-Mode Screen Example



### 4-3-3-2 Preparations

- 1.) Connect one of the probes, to the scanner's left-most probe connector.
  - See 3-5-6 "Connecting Probes" on page 3-21 for info about connecting the probes.
- 2.) Turn ON the scanner.  
The 2D Mode window is displayed (default mode).
- 3.) Press **MM** on the Operator panel to bring up an M-Mode picture on the screen.
- 4.) Use the trackball to position the cursor over the required area of the image.

### 4-3-3-3 Adjust the M Mode controls

These Image Controls are used to optimize the M mode picture. Verify that all the listed controls are working as intended:

- Adjust **Horizontal sweep** to optimize the display resolution.
- Adjust **Gain** and **TGC** controls to adjust the range to be imaged.
- Use the **Frequency** (move to higher frequencies) or the **Frame rate** control (move to lower frame rate) to increase resolution in image.
- Use the **Frequency** (move to lower frequency) to increase penetration.
- Adjust **Focus** to move the focal point(s) around the region of interest in the M-Mode display.
- Adjust **Dynamic range** to optimize the useful range of incoming echoes to the available grey scale.
- Adjust **Compress** and **Edge Enhance** to further optimize the display.
- Adjust **Reject** to reduce noise while taking care not to eliminate significant low-level diagnostic information.

## 4-3-4 Color Mode Checks

### 4-3-4-1 Introduction

Color Flow screens are 2D or M Mode screens with colors representing blood or tissue movement. Color Flow may be selected both from 2D mode or from M mode or a combination of these.

### 4-3-4-2 Preparations

- 1.) Connect one of the probes to the scanner's left-most probe connector.
  - See "[Connecting Probes](#)" on page 3-21 for info about connecting the probes.
- 2.) Turn ON the scanner.

The 2D Mode window is displayed (default mode).

### 4-3-4-3 Select Color 2D Mode

- 1.) From an optimized 2D image, press **Color**.
- 2.) Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
- 3.) Press **Select**. The instruction **Size** should be highlighted in the trackball status bar.

*NOTE: If the trackball control Pointer is selected, press trackball to be able to select between Position and Size controls.*

- 4.) Use the trackball to adjust the dimension of the ROI.

### 4-3-4-4 Adjust the Color 2D Mode controls

- Adjust the **Active mode gain** to set the gain in the color flow area.
- Adjust **Scale** to the highest setting that provides adequate flow detection.

*NOTE: The scale value may affect FPS, Low Velocity Reject, and Sample Volume.*

- Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.
- Adjust **Variance** to detect flow disturbances.
- Adjust **Sample volume (SV)** to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows
- Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

*NOTE: Frequency setting may affect FPS, SV and Low Velocity Reject.*

- Adjust **Power** to obtain an acceptable image using the lowest setting possible.

*NOTE: The Power setting affects all other operating modes.*

**4-3-4-4 Adjust the Color 2D Mode controls (cont'd)**

Adjust the following settings to further optimize display of the image:

- Use **Invert** to reverse the color assignments in the color flow area of the display.
- Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.
- Use **Baseline** to emphasize flow either toward or away from the probe.
- Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area. Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

**4-3-4-5 Select Color M Mode**

- 1.) Select M Mode (See: [4-3-3 "M Mode Checks" on page 4-35](#)).
- 2.) Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
- 3.) Press **Select**. The instruction **Size** should be highlighted in the trackball status bar.

*NOTE: If the trackball control Pointer is selected, press trackball to be able to select between Position and Size controls.*

- 4.) Use the trackball to adjust the dimension of the ROI.

**4-3-4-6 Adjust the Color M Mode controls**

- Adjust the **Active mode gain** to set the gain in the color flow area.
- Adjust **Scale** to the highest setting that provides adequate flow detection.

*NOTE: The scale value may affect FPS, Low Velocity Reject, and Sample Volume.*

- Adjust **Low Velocity Reject** to remove low velocity blood flow and tissue movement that reduces image quality.
- Adjust **Variance** to detect flow disturbances.
- Adjust **Sample volume** (SV) to a low setting for better flow resolution, or a higher setting to more easily locate disturbed flows
- Adjust **Frequency** to optimize the color flow display. Higher settings improve resolution. Lower settings improve depth penetration and sensitivity. This does not affect the frequency used for 2D and M-Mode.

*NOTE: NOTE: Frequency setting may affect FPS, SV and Low Velocity Reject.*

- Adjust **Power** to obtain an acceptable image using the lowest setting possible.

*NOTE: The Power setting affects all other operating modes.*

Adjust the following settings to further optimize display of the image:

- Use **Invert** to reverse the color assignments in the color flow area of the display.
- Use **Tissue priority** to emphasize either the color flow overlay, or the underlying grey scale tissue detail.
- Use **Baseline** to emphasize flow either toward or away from the probe.
- Use **Radial** and **Lateral Averaging** to reduce noise in the color flow area. Radial and Lateral Averaging smooths the image by averaging collected data along the same horizontal line. An increase of the lateral averaging will reduce noise, but this will also reduce the lateral resolution.

## 4-3-5 PW/CW Doppler Mode Checks

### 4-3-5-1 Introduction

PW and CW Doppler are used to measure velocity (most often in blood).

Doppler mode can be done with a special pencil probe or with an ordinary probe. By using an ordinary probe, you can first bring up a 2D picture for navigation purpose and then add PW/CW Doppler.

### 4-3-5-2 Preparations

- 1.) Connect one of the probes to the scanner.
  - See [3-5-6 "Connecting Probes" on page 3-21](#) for info about connecting the probes.
- 2.) Turn ON the scanner  
The 2D Mode window is displayed (default mode).
- 3.) If needed, adjust the Display's Brightness and Contrast setting.
- 4.) Press **PW** or **CW** to start Pulsed Wave Doppler (PW) or Continuous Wave Doppler (CW).
- 5.) Use the trackball to select the Area of Interest (Sample Volume) in PW or direction of interest in CW.

### 4-3-5-3 Adjust the PW/CW Doppler Mode controls

Adjust the **Active mode gain** to set the gain in the spectral Doppler area.

- Adjust **Low velocity reject** to reduce unwanted low velocity blood flow and tissue movement.
- In PW mode, adjust **Sample volume** to low setting for better resolution, or higher setting to more easily locate the disturbed flows.
- Adjust the **Compress** setting to balance the effect of stronger and weaker echoes and obtain the desired intensity display.
- Adjust **Frequency** to optimize flow display. Higher setting will improve resolution and the lower setting will increase the depth penetration.
- Adjust **Frame rate** to a higher setting to improve motion detection, or to a lower setting to improve resolution.

*NOTE: Frequency and Frame rate settings may affect the Low Velocity Reject.*

- Adjust **Power** to obtain an acceptable image using the lowest setting possible. This is particularly important in CW mode, as the energy duty cycle is 100% (constant).

*NOTE: The Doppler Power setting affects only Doppler operating modes.*

- Adjust the following settings to further optimize the display of the image.
- Use the **Horizontal sweep** to optimize the sweep speed.
- To view signal detail, adjust **Scale** to enlarge the vertical spectral Doppler trace.
- Use **Invert** to reverse the vertical component of the spectral Doppler area of the display.
- Use **Angle correction** to steer the ultrasound beam to the blood flow to be measured.

## 4-3-6 Tissue Velocity Imaging (TVI) Checks

### 4-3-6-1 Introduction

TVI calculates and color codes the velocities in tissue. The tissue velocity information is acquired by sampling of tissue Doppler velocity values at discrete points. The information is stored in a combined format with grey scale imaging during one or several cardiac cycles with high temporal resolution.

### 4-3-6-2 Preparations

- 1.) Connect one of the probes, to the scanner's left-most probe connector.
  - See [Connecting Probes](#), page 3-21 for info about connecting the probes
- 2.) Turn ON the scanner  
The 2D Mode window is displayed (default mode).
- 3.) If needed, adjust the Display's Brightness and Contrast setting.
- 4.) Press **TVI**.
- 5.) Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
- 6.) Press **Select**. The instruction Size should be highlighted in the trackball status bar.

*NOTE: If the trackball control pointer is selected, press **trackball** to be able to select between Position and Size controls.*

- 7.) Use the trackball to adjust the dimension of the ROI.

### 4-3-6-3 Adjust the TVI Controls

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the **Scale** value.

*NOTE: The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.*

- TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

*NOTE: PW will be optimized for Tissue Velocities when activated from inside TVI.*

4-3-7 Probe/Connectors Check



**CAUTION TAKE THE FOLLOWING PRECAUTIONS WITH THE PROBE CABLES:**  
 - KEEP AWAY FROM THE WHEELS  
 - DO NOT BEND  
 - DO NOT CROSS CABLES BETWEEN PROBES

Table 4-5 Probe and Connectors Checks

Step	Task	Expected Result(s)
1.	Press <b>Probe</b> on the Operator Panel.	A list of the connected probes will pop up on the screen.
2.	If not already selected. Use the trackball to select the desired probe.	An application menu for the desired probe is listed on the screen.
3.	Trackball to the desired application Press <b>Select</b> to launch the application. To change application without changing the current probe, press <b>Appl.</b> on the Operator Panel.	The selected application starts.
4.	Verify no missing channels	All channels are functioning.
5.	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
6.	Test the probe in each active connector slot., see 3-5-6 "Connecting Probes" on page 3-21	It will display pictorial data each time
7.	Do a leakage test on the probe, see Section 10-6 "Electrical Safety Tests" on page 10-14	It passes the test.
8.	Repeat this procedure for all available probes.	



## 4-3-8 ECG Check

### 4-3-8-1 Introduction

The ECG capability on this unit, is intended as use as a trigger for measurements, but can also be viewed on the screen.

### 4-3-8-2 Parts needed

- ECG Harness, P/N:16L0026 + P/N:16L0028
  - ECG Pads, (3 pc)
- or
- ECG simulator

### 4-3-8-3 ECG Check

Table 4-6 ECG Check

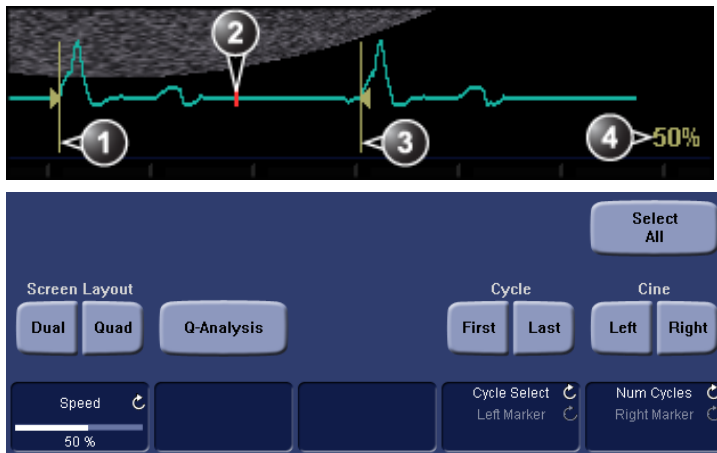
Step	Task	Expected Result(s)
1.	Connect the ECG harness to the connector on the front of the system.	The unit displays a straight curve along the bottom edge of the image sector on the screen.
2.	Connect the three leads to a ECG simulator, or Fasten the three ECG Pads to your body and connect the three leads to respective ECG Pad	When connecting, the signal on the screen will be noisy When the connection is completed, a typical clean ECG signal is displayed.

## 4-3-9 Cineloop Check

### 4-3-9-1 Introduction

A cineloop is a sequence of images recorded over a certain time frame. When using ECG the time frame can be adjusted to cover one or more heart cycles. When frozen, the System automatically displays the cineloop boundary markers on either side of the last detected heart cycle (Figure 4-33).

Figure 4-33 The Cineloop controls display



1. Left marker
2. Current frame
3. Right marker
4. Cine speed

### 4-3-9-2 Preparation

- 1.) Connect one of the probes to the scanner.
- 2.) Turn ON the scanner. The 2D Mode window is displayed (default mode).

### 4-3-9-3 Adjust the Cineloop controls

- 1.) Press **Freeze**.  
The left and right markers are displayed on either side of the last detected heart cycle on the ECG trace.
- 2.) Press **2D Freeze**.  
The selected heart beat is played back.
- 3.) Press **2D Freeze** to freeze the cineloop.  
Use the trackball to scroll through the acquisition and find the sequence of interest.
- 4.) Adjust **Cycle** select to move from heart beat to heart beat and select the heart cycle of interest.
- 5.) Adjust **Num cycles** to increase or decrease the number of heart beats to be played back.
- 6.) Adjust **Left marker** and **Right marker** to trim or expand the cineloop boundaries.

**4-3-10 Back End Processor checks**

- If all the previous tests have been passed successfully, the Back End Processor is most likely OK.

**4-3-11 Operator Panel Test**

- The Operator Panel is tested when the VIVID E9 / VIVID E7 is powered up as part of the start-up scripts, run at every start-up.

**4-3-12 Peripheral checks****4-3-12-1 Printer checks**

The internal printer is controlled from the **P1** and **P2** keys on the VIVID E9 / VIVID E7's Operator Panel.

The factory default is:

- **P1** for the internal printer
- **P2** for external (network) printer

**Table 4-7 Printer checks**

Step	Task	Expected Result(s)
1.	When scanning in 2D Color Mode, Press <b>Freeze</b> to stop image acquisition.	Image scanning stops with the last picture on the screen.
2.	Press <b>P1</b> on the Operator Panel	The image displayed on the screen is printed on the assigned printer.
3.	Press <b>P2</b> on the Operator Panel	The image displayed on the screen is printed on the assigned printer.
4.	Check if the print quality on the pictures from both printers are of expected quality.	

#### 4-3-12-2 Setup and Test a Printer Service

- 1.) Select Utility > Connectivity  
If you get a pop-up asking you to log on, select ADM.
- 2.) Select the Service tab.
- 3.) In the comb box "Select Service to Add" select "Standard Print" and click on Add.
- 4.) In the right pane Properties "Combo Box" Select the printer you wish to test. Set any other parameters you desire.
- 5.) In the left pane "Properties" Enter a name that describes the printer and configuration you just selected in the right pane.
- 6.) Select the Button tab.
- 7.) Select one of the "Physical Print Buttons" that you want to configure.
- 8.) In the right pane click on the service name you just created in the Services Tab.
- 9.) Click on the ">>" button. This will place this service in the PrintFlow View for the printer button you selected.
- 10.) Click on Save.

You have now configured a printer service and attached it to a print button.

Now you can test the printer by pressing the print button you just configured. If you configured it for 1 row and 1 column each time you press the print button you will get a print sent to the printer. If you configured some other combination of rows or columns you will have to push the printer button multiple times before a print is sent to the printer.

#### 4-3-12-3 View the Windows Printer Queues

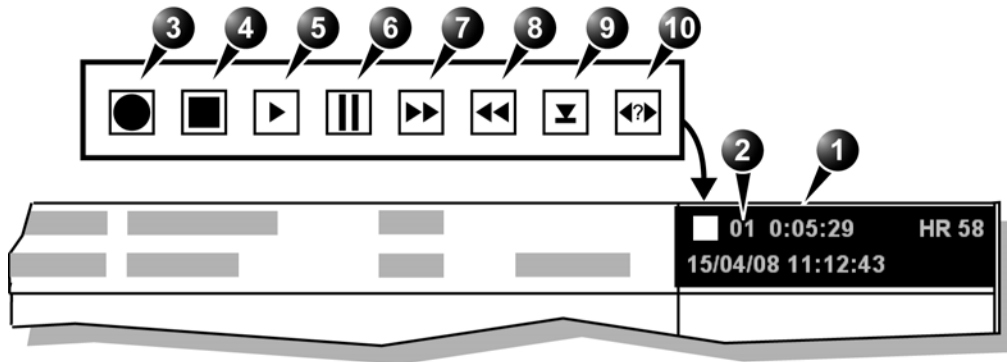
- 1.) Go to **Utility > System > Peripherals**
- 2.) Click on **Properties**.

4-3-12-4 DVR checks

Overview

The DVR is operated from VIVID E9 / VIVID E7's Operator Panel. The DVR status displayed on the screen indicates the current DVR function.

Figure 4-34 DVR status on the title bar



- |                    |                                |
|--------------------|--------------------------------|
| 1. Video counter   | 6. Pause (red while recording) |
| 2. Title number    | 7. Fast Forward                |
| 3. Recording (red) | 8. Rewind                      |
| 4. Stop            | 9. Eject                       |
| 5. Play            | 10. Search                     |

Tools

A blank DVD+RW disc.

Recording

- 1.) Insert a blank DVD+RW in the DVR unit.

*NOTE:* New disks need to be prepared for recording. The preparation takes about one minute. Observe the busy light on the DVR unit or the busy icon on screen.

- 2.) Create a patient record or open an existing one.
- 3.) Press **Record** on the Operator Panel.

A red dot is displayed in the DVR status area on the Title bar to indicate that recording has begun.

*NOTE:* A new title is created for each recording session.

- 4.) Press **Record** to toggle between pause and record.

*NOTE:* When recording is resumed after pause a new chapter is created.

- 5.) To stop recording, press **Stop/Eject** on the Touch Panel.

**4-3-12-4 DVR checks (cont'd)**

**Play back an examination**

- 1.) Insert the DVD to play back and wait while it is loading.
- 2.) Press **Playback** on the Touch Panel.
- 3.) Use the buttons on the Touch Panel to perform actions on the recorded session, such as stop, pause, rewind or fast forward. Press the dedicated **Prev** and **Next** buttons to change title or chapter.
- 4.) To find a patient record, press **Go to/Search** on the Touch Panel.  
The Video Counter/Search window is displayed.
- 5.) Select a title from the Recording title drop-down menu and press Search counter.  
Playback of the selected title is started.

**Ejecting the DVD**

- 1.) Press **Stop/Eject** twice to eject the disk.  
The Finalize window is displayed.
- 2.) Select:
  - **Yes:**  
The DVD is finalized and ejected. Finalized DVD cannot be reused for recording.
  - **No:**  
The DVD is ejected without being finalized. The DVD can be reused for recording additional titles, but it will not be playable on other DVD players without being finalized.

### 4-3-13 Mechanical Functions Checks

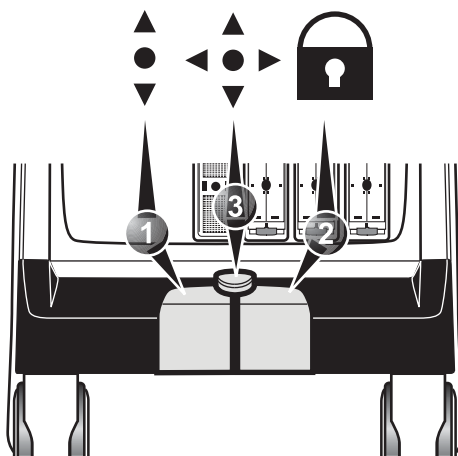
#### 4-3-13-1 Casters (Wheels), Brakes and Direction Lock Checks

The wheels are controlled by the pedals situated between the front wheels of the unit (see [Figure 4-35](#)). Examine the wheels frequently for defects to avoid breaking or jamming.

**Table 4-8 Wheel Characteristics**

WHEEL	CHARACTERISTICS
FRONT	SWIVEL, SWIVEL LOCK AND BRAKE
REAR	SWIVEL AND BRAKE

**Figure 4-35 Pedals**



Follow the steps below to verify that Brakes and Direction Locks function as intended.





- 1.) Press the right pedal  to engage the front wheel brakes. Apply a pressure on the scanner to verify that the brakes works as intended.
- 2.) Press the center pedal  to release the front wheel brakes.
- 3.) Press the left pedal  to engage the Swivel lock. Ensure that the wheels lock, making it impossible to turn the scanner to the sides.
- 4.) Press the center pedal  to release the Swivel lock.
- 5.) Apply the additional brakes on the rear wheels and verify that they function. When finished, release the additional brakes.





Table 4-9 Site Log (cont'd)

DATE	SERVICE PERSON	PROBLEM	COMMENTS

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# Chapter 5

## Components and functions (theory)

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### Section 5-1 Overview

#### 5-1-1 Purpose of this chapter

This chapter explains VIVID E9 / VIVID E7's system concepts, component arrangement, and subsystem functions. It also describes the Power Distribution System and the Common Service Desktop interface.

#### 5-1-2 Contents in this chapter

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**5-1-3 VIVID E9 models covered by this manual**

**Table 5-1 VIVID E9 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000070	Vivid E9 with XDclear 4D Expert Option 17 inch LCD (100-230V)	GB200063 or GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.5	v113.0 or higher	N/A
GB000080	Vivid E9 with XDclear 4D Expert Option 19 inch LCD (100-230V)					
GB000075	Vivid E9 with XDclear 2D 17 inch LCD (100-230V)	GB200062 or GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	N/A
GB000085	Vivid E9 with XDclear 2D 19 inch LCD (100-230V)					
GB000090	Vivid E9 with XDclear Pro configuration 17 inch Monitor (100-230V)					
GB000095	Vivid E9 with XDclear Pro configuration 19 inch Monitor (100-230V)					

*NOTE: When not otherwise specified, the contents in this manual applies to all VIVID E9 models.*

**5-1-4 VIVID E7 models and hardware/software compatibility**

**Table 5-2 VIVID E7 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000099	VIVID E7 Pro with XDclear configuration - 17 inch LCD	GB200062 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	v113.x
GB000100	VIVID E7 Pro with XDclear configuration - 19 inch LCD					

*NOTE: When not otherwise specified, the contents in this manual applies to all VIVID E7 models.*

## Section 5-2 InSite ExC

### 5-2-1 Introduction

InSite ExC is your direct link with a GE Online Service Engineer or Applications Support Engineer, or a Request for Service via the InSite ExC link at the bottom of the display screen.

### 5-2-2 InSite ExC Icon

The InSite ExC icon in the status bar change symbol and color depending on ongoing activity.

Figure 5-1 InSite ExC icon in the status bar



Clicking on the Icon brings up the InSite ExC menu.

Figure 5-2 InSite ExC Menu








#### Menu Choices

- **Service Desktop:** Opens the Service Desktop on the VIVID E9 / VIVID E7.
- **Request For Service.** Opens a service dispatch with GE Service.
- **Connect to GE.** Direct contact with GE Technical Support.

**5-2-3 InSite ExC Status**

Depending on the ongoing activity, the InSite ExC icon change.

**Table 5-3 InSite ExC Icons, depending on ongoing activity**

ICON	DESCRIPTION
	<p><b>Idle State - Online Center Is Not Connected</b>            Black and White Icon - InSite ExC activated but system not open for Technical Support access.</p>
	<p><b>Servicing State - Online Center Is Connected</b>            Yellow Icon - InSite ExC activated and Technical Support can look around on your system, see temperatures and voltage information, see status, get files stored with Alt &gt; D and look at logs, but cannot perform any service related functions.</p>
	<p><b>Disruptive State - Online Center Is Connected</b>            Red Icon with clock - InSite ExC activated.</p>
	<p><b>Disrupted State - Online Center Is Connected</b>            Red Icon with GE Logo - InSite ExC activated and Technical Support can look around on your system, run diagnostics, gather logs, and initiate VCO.</p>
	<p><b>Active Messaging State - Online Center Is Connected</b>            The system has received information from the GE remote service office.</p>

## 5-2-4 Initiating a Request for Service (RFS)

### To initiate an RFS

- 1.) Position the Windows pointer on top of the GE InSite ExC icon at the bottom of the display.
- 2.) Press the Right Trackball Set Key. This opens the RFS screen which sends a service dispatch directly to GE Service after you fill in the following information:
  - Items with a red asterisk
  - Problem type
  - Problem area
  - Problem description
  - Send
- 3.) After you have completed filling in all of this information, press Send to initiate the Request for Service.

Figure 5-3 Request for Service Contact Information

The screenshot shows a web-based form titled "Contact Information" for a Request for Service (RFS). The form is divided into several sections:

- Contact Information:** Includes fields for Last, First, Phone, Email, and Other System ID. The System ID is pre-filled with "LEP12401".
- Problem Type:** Two buttons labeled "Service" and "Applications".
- Problem Area:** Two dropdown menus. The "Service" dropdown is open, showing options: Hardware Electrical, Hardware Mechanical, Software, and Image Quality. The "Applications" dropdown is also open with the same options.
- Problem Description:** A large text area for describing the issue. Below it is a "Date/Time of Problem" field set to "07/10/2008 10:20" and a "New" button. A character count "300 characters left" is visible.
- Buttons:** "Send" and "Cancel" buttons are at the bottom.
- Footer:** A status bar at the bottom left shows "Connection: Checked Out" and a "Status" dropdown menu.

A red asterisk (\*) is placed next to the "Last", "First", "Phone", and "Problem Type" labels, indicating that these fields are required.

**5-2-5 Automatic Request for Service (ARFS)**

(This feature was introduced for software version v112.0 (BT'12))

If some important parameters are outside the predefined limits, an ARFS will be sent to GE via InSite.

The parameters in the table below are monitored:

**Table 5-4 Monitored parameters for ARFS**

#	Report Error (RFS)	Accepted Values	Comment
1.	DRX4_TOP (DRX1-4)	-10 °C - 80 °C	<b>If the temperature on any of the DRX cards rise above 80 °C (176 °F), an ARFS is generated.</b> (The lower temperature limit (-10 °C) is outside the operating temperature for the product, so the readings should never be as low as this temperature.)
2.	Rack Fan 1	100 - 5000 [RPM]	<b>If the fan speed is lower than 100 RPM, the fan has most likely stopped, and an ARFS is generated.</b> (The upper limit (5000 RPM) is above the speed that the fans can archive, so the readings should never be as high as this limit.)
3.	Rack Fan 2	100 - 5000 [RPM]	
4.	Rack Fan 3	100 - 5000 [RPM]	
5.	Rack Fan 4	100 - 5000 [RPM]	
6.	Probe CRC failure	N/A	<b>ARFS is generated on Probe CRC failure.</b>



## 5-2-6 InSite ExC Definitions

Here are definitions for the different InSite ExC states:

- **Virtual Console Observation (VCO).** Allows GE's Technical Support to control VIVID E9 / VIVID E7 functionality remotely.
- **Disruptive.** Allows GE's Technical Support person to connect to your system via VCO, to run diagnostics directly on your VIVID E9 / VIVID E7 system, and to collect system logs. When the system is in Disruptive Mode, the icons are red. There are two disruptive states. If you see a telephone with a clock, then the system is in Disruptive, Not Connected Mode. If you see a telephone with GE, then the system is in Disruptive, Connected Mode.
- **Non-Disruptive.** Allows GE's Technical Support person to look around on your system, but cannot perform any service-related functions, depending on whether InSite has connected or not connected. There are two Non-Disruptive states. If you see a black and white icon, InSite ExC is activated, but not open for Technical Support access. If you see a yellow icon, InSite ExC is activated and the Technical Support person can look around on your system, but cannot perform any service-related functions.
- **Connected.** InSite ExC is connected.
- **Not Connected.** InSite ExC is not connected.

*NOTE: When Disruptive mode has been activated or a diagnostic has been run, the message, "Due to Service testing reboot required," appears in red at the bottom of the display. It is recommended that you reboot the system before use. Make sure you disable disruptive mode before rebooting or the message will not be cleared.*

## 5-2-7 Exiting InSite ExC

To exit InSite ExC:

- 1.) Press the Left Trackball Set key.
- 2.) Select Connect to GE.
- 3.) Press the Right Trackball Set key. The GE Technical Support person then exits Disruptive Mode and VCO.
- 4.) Reboot your VIVID E9 / VIVID E7 system.

## **Section 5-3**

### **VIVID E9 / VIVID E7 overview**

#### **5-3-1 Purpose of this section**

The purpose of this section is to give you an overview of VIVID E9 / VIVID E7 and how it function.

#### **5-3-2 Introduction**

The VIVID E9 / VIVID E7 ultrasound unit is a high performance digital ultrasound imaging system with total data management.

The system provides image generation in 4D (model dependant), 2D (B) Mode, Color Doppler, Power Doppler (Angio), M-Mode, Color M-Mode, PW and CW Doppler spectra, Tissue Velocity imaging, advanced Strain and Contrast applications. The fully digital architecture of the VIVID E9 / VIVID E7 unit allows optimal usage of all scanning modes and probe types, throughout the full spectrum of operating frequencies.

### 5-3-3 VIVID E9 / VIVID E7 general description

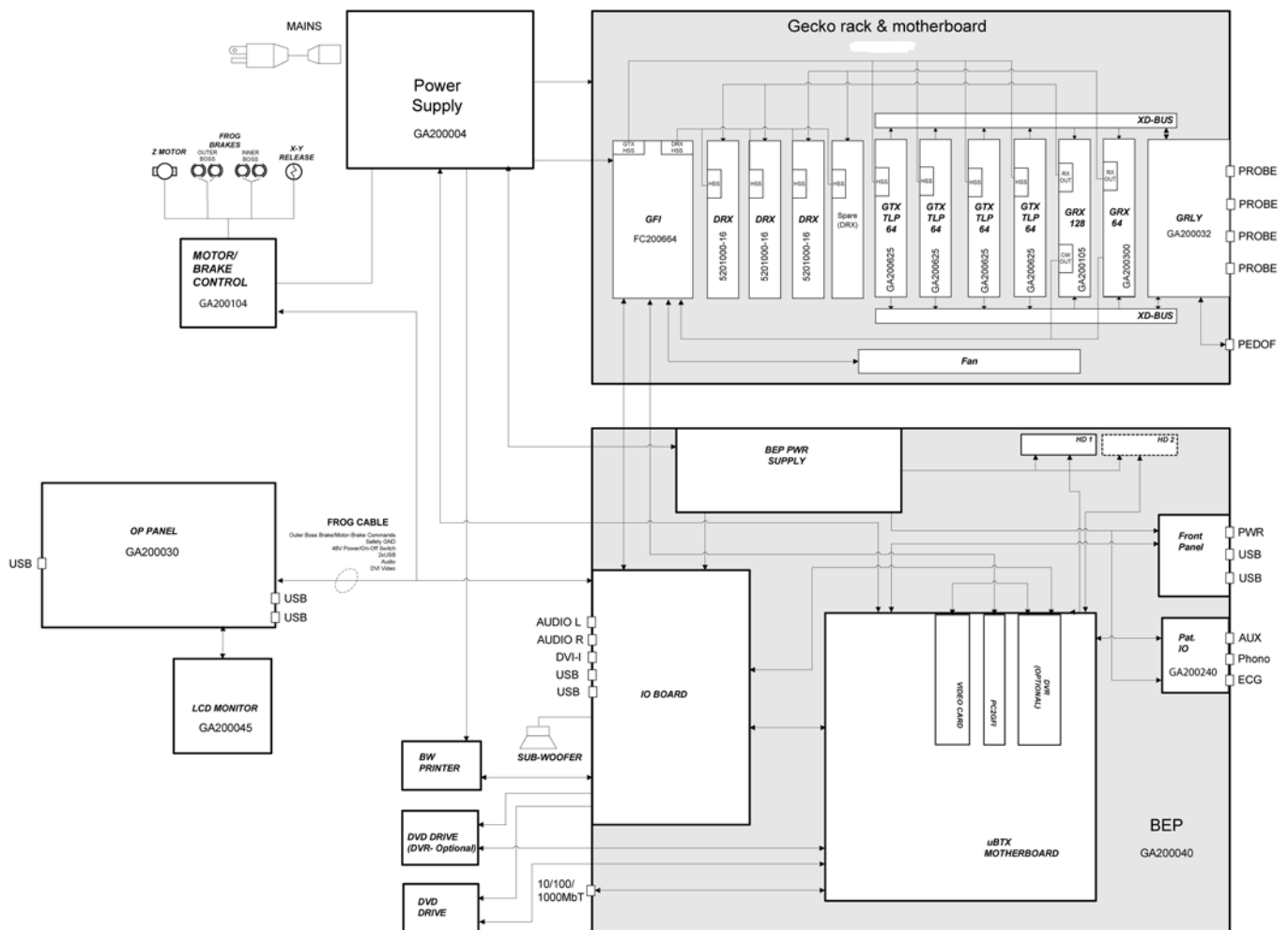
VIVID E9 / VIVID E7 is a digital beamforming system. Signal flow travels from the Probe Connector Panel to the Front End Electronics, then to the Back End Processor, and finally, the results are displayed on the monitor.

System configuration is stored on the hard drive, inside the Back End Processor (BEP), and all necessary software is loaded from the hard drive on power up.

A Physio module, the Patient I/O, is incorporated in the Back End Processor (BEP) to provide ECG signals to synchronize cardiac ultrasound image acquisition. Other analog signals, from devices such as treadmills (e.g. ECG and phono), may also be processed by the Patient I/O.

### 5-3-4 VIVID E9 / VIVID E7 block diagram

Figure 5-4 VIVID E9 / VIVID E7 block diagram



**NOTE:** Depending on VIVID E9 / VIVID E7 model and installed options, the number of cards and the part numbers on the cards will vary.

### **5-3-5 Signal flow overview**

The GTX board(s) in the Front End Processor, generates the strong bursts transmitted by the probes as ultrasound, into the body. The Transmit bursts are routed from the GTX board via the XD bus to the Relay board where the ultrasound probes are connected.

Weak ultrasound echoes from blood cells and body structure are received by the probes and routed via the Relay board and the XD bus to the RX boards. The RX boards amplifies these signals. Then the signals are routed to the DRX board(s) where the signals are A/D converted. The digital signals are then further processed on the DRX boards.

After amplification and digital signal processing in the Front End electronics, the signal is transferred via the PCIe bus to the Back End Processor. The Back End Processor receives input commands from the User Interface (Operator Panel), handles the communication with the rest of the system, delivers signals (digital video) to the LCD screen and the Touch Screen. controls and delivers digital video signals to an optional, internal, Digital Video Recorder, provides output to an optional, internal printer. The communication to the network (Ethernet) is also handled by the Back End Processor.

**5-3-6 System configuration and software**

System configuration is stored on a hard disk drive inside the Back End Processor.

At power up, all necessary software is loaded from the hard disk drive.

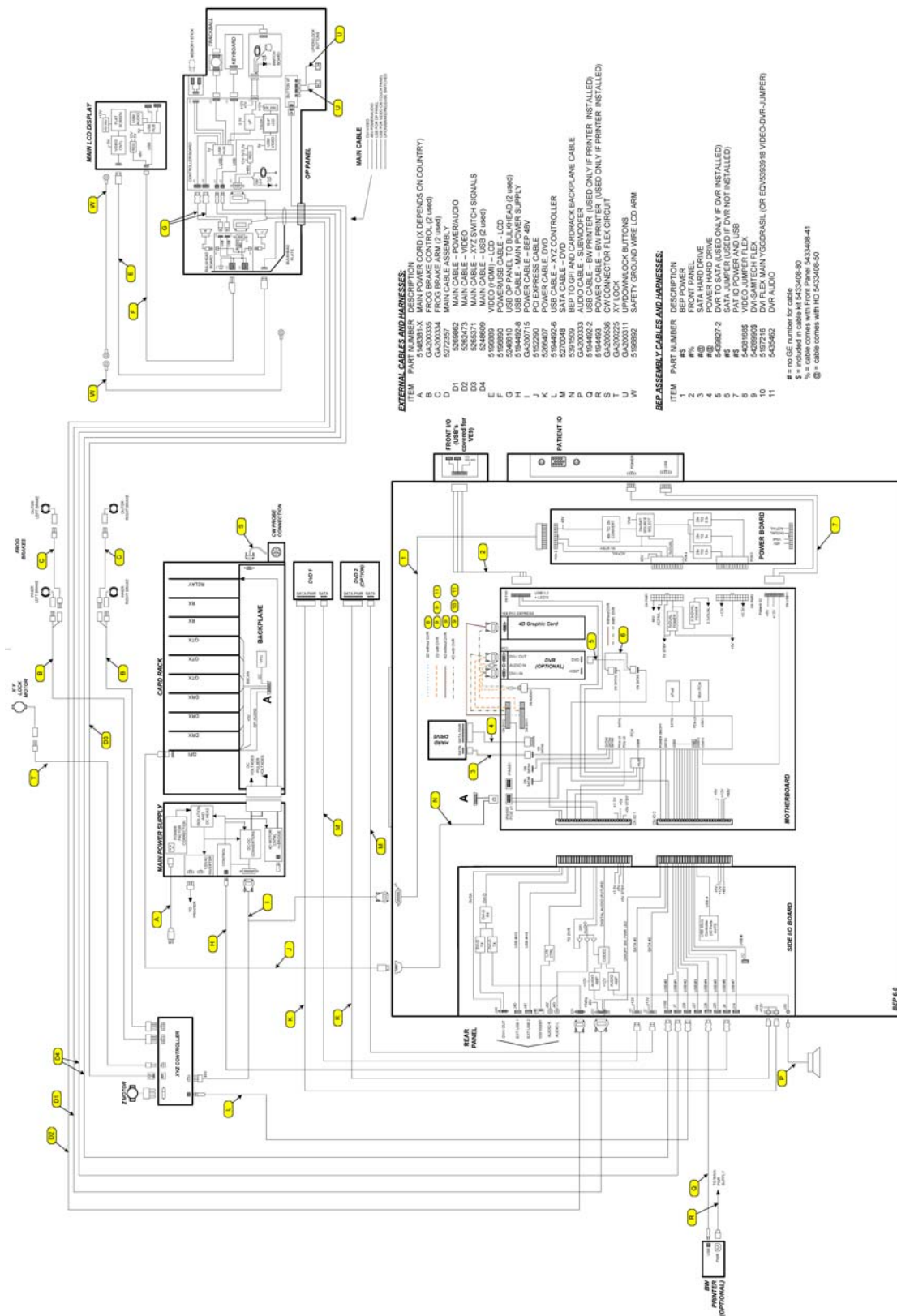
**5-3-7 The electronics**

VIVID E9 / VIVID E7 internal electronics are divided into two card cages:

- Front End Processor (FEP)  
The FEP is sometimes called "Front End Card Cage", "Front End", or only "Card Cage".
- Back End Processor (BEP)

### 5-3-8 VIVID E9 / VIVID E7 interconnection diagram

Figure 5-5 VIVID E9 / VIVID E7 w/ BEP6 interconnection diagram



## 5-3-9 VIVID E9 / VIVID E7's Operating Modes

### 5-3-9-1 2D-Mode (B-Mode)

2D-mode or B-Mode is a two-dimensional image of the amplitude of the echo signal. It is used for location and measurement of anatomical structures and for spatial orientation during operation of other modes. In 2D-mode, a two-dimensional cross-section of a three-dimensional soft tissue structure such as the heart is displayed in real time. Ultrasound echoes of different intensities are mapped to different gray scale or color values in the display. The outline of the 2D cross-section is a sector, depending on the particular transducer used. 2D-mode can be used in combination with any other mode.

### 5-3-9-2 Octave Imaging

In Octave Imaging, sometimes called "Tissue Harmonic Imaging", acoustic aberrations due to tissue are minimized by receiving and processing the second harmonic signal that is generated within the insonified tissue. VIVID E9 / VIVID E7's high performance Octave Imaging provides superb detail resolution and penetration, outstanding contrast resolution, excellent acoustic clutter rejection and an easy to operate user interface for switching into Octave Imaging mode. Coded Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration. It diminishes low frequency amplitude noise and improves imaging technically difficult patients. It may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver and hard-to-visualize fetal anatomy. Coded Harmonics may improve the 2D-Mode image quality without introducing a contrast agent.

### 5-3-9-3 M-Mode

In M-mode, soft tissue structure is presented as scrolling display, with depth on the Y-axis and time on the X-axis. It is used primarily for cardiac measurements such as valve timing on septal wall thickness when accurate timing information is required. M-mode is also known as T-M mode or time-motion mode. Ultrasound echoes of different intensities are mapped to different gray scale values in the display. M-mode displays time motion information of the ultrasound data derived from a stationary beam. Depth is arranged along the vertical axis with time along the horizontal axis. M-mode is normally used in conjunction with a 2D image for spatial reference. The 2D image has a graphical line (M-line) superimposed on the 2D image indicating where the M-mode beam is located.

### 5-3-9-4 Color Doppler Mode

Color Doppler is used to detect motion presented as a two-dimensional display. There are three applications of this technique:

- Color Flow Mode - used to visualize blood flow velocity and direction
- Power Doppler (Angio) - used to visualize the spatial distribution of blood
- Tissue Velocity Imaging - used to visualize tissue motion direction and velocity

### 5-3-9-5 Color Flow Mode

A real-time two-dimensional cross-section image of blood flow is displayed. The 2D cross-section is presented as a full color display, with various colors being used to represent blood flow (velocity, variance, power and/or direction). To provide spatial orientation, the full color blood flow cross-section is overlaid on top of the gray scale cross-section of soft tissue structure (2D echo). For each pixel in the overlay, the decision of whether to display color (Doppler), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft tissue structures and from the red blood cells. Blood velocity is the primary parameter used to determine the display colors, but power and variance may also be used. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures. Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. Color flow can be used in combination with 2D and Spectral Doppler modes.

**5-3-9-6 Power Doppler**

A real-time two dimensional cross-section of blood flow is displayed. The 2D cross-section is presented as a full color display, with various colors being used to represent the power in blood flow echoes. Often, to provide spatial orientation, the full color blood flow cross-section is overlaid on top of the gray scale cross-section of soft tissue structure (2D echo). For each pixel in the overlay, the decision of whether to display color (Doppler power), gray scale (echo) information or a blended combination is based on the relative strength of return echoes from the soft-tissue structures and from the red blood cells. A high pass filter (wall filter) is used to remove the signals from stationary or slowly moving structures. Tissue motion is discriminated from blood flow by assuming that blood is moving faster than the surrounding tissue, although additional parameters may also be used to enhance the discrimination. The power in the remaining signal after wall filtering is then averaged over time (persistence) to present a steady state image of blood flow distribution. Power Doppler can be used in combination with 2D and Spectral Doppler modes as well as with 4D mode.

**5-3-9-7 Tissue Velocity Imaging**

The Tissue Color Doppler Imaging is used for color encoded evaluation of heart movements. The Tissue Velocity Imaging image provides information about tissue motion direction and velocity.

**5-3-9-8 Pulsed (PW) Doppler**

PW Doppler processing is one of two spectral Doppler modalities, the other being CW Doppler. In spectral Doppler, blood flow is presented as a scrolling display, with flow velocity on the Y-axis and time on the X-axis. The presence of spectral broadening indicates turbulent flow, while the absence of spectral broadening indicates laminar flow. PW Doppler provides real time spectral analysis of pulsed Doppler signals. This information describes the Doppler shifted signal from the moving reflectors in the sample volume. PW Doppler can be used alone but is normally used in conjunction with a 2D image with an M-line and sample volume marker superimposed on the 2-D image indicating the position of the Doppler sample volume. The sample volume size and location are specified by the operator. Sample volume can be overlaid by a flow direction cursor which is aligned, by the operator, with the direction of flow in the vessel, thus determining the Doppler angle. This allows the spectral display to be calibrated in flow velocity (m/sec.) as well as frequency (Hz). PW Doppler also provides the capability of performing spectral analysis at a selectable depth and sample volume size. PW Doppler can be used in combination with 2D and Color Flow modes.

**5-3-9-9 4D Imaging**

*NOTE: The VIVID E7 does not support 4D.*

*NOTE: 4D is an option available for some VIVID E9 models.*

- Real-time, non-gated 4D imaging  
The 4D probes on the Vivid E9 enables real-time, non-gated 4D tissue and color imaging. The volume data is displayed in real-time with volume rendering techniques for visualization of valves and structures.
- Real-time, gated 4D imaging  
The 4D probes on the Vivid E9 enables the acquisition of larger tissue/color volumes with ECG gated acquisition. The data acquired is displayed in real-time so that the user can control the quality of the data acquired throughout the scanning process.

For more information on 4D, please refer to the VIVID E9 User Manual.



## Section 5-4 Top Console with LCD monitor and Operator Panel

### 5-4-1 Top Console description

#### 5-4-1-1 Introduction

The Top Console includes:

- LCD monitor on an adjustable arm
- Operator Panel with;
  - an ON/OFF switch
  - a touch screen and a switch board with controls for manipulating the picture quality and for use in Measure & Analyze (M&A)
  - an alphanumeric keyboard (QWERTY keyboard) on a drawer below the switch board.
- speakers for stereo sound output used during Doppler scanning/replay

#### 5-4-1-2 Connection between the Top Console and the rest of the VIVID E9 / VIVID E7

A flexible harness of electrical wires secures the connection between the Top Console and the rest of the VIVID E9 / VIVID E7.

### 5-4-1-3 The XYZ mechanism

The Top Console can be adjusted without moving the complete VIVID E9 / VIVID E7 console.

It can be moved;

- up/down (Z-axis)
- sideways to the left and to the right (X-axis)
- back and forth (Y-axis).

The vertical movement of the console is motor driven. The control buttons for the electrical motor are located around the handles. A gas spring inside the system assists in the Z-axis (vertical) movement.

The brakes used for locking the Top Console's X and Y movement are operated by electrical motors.

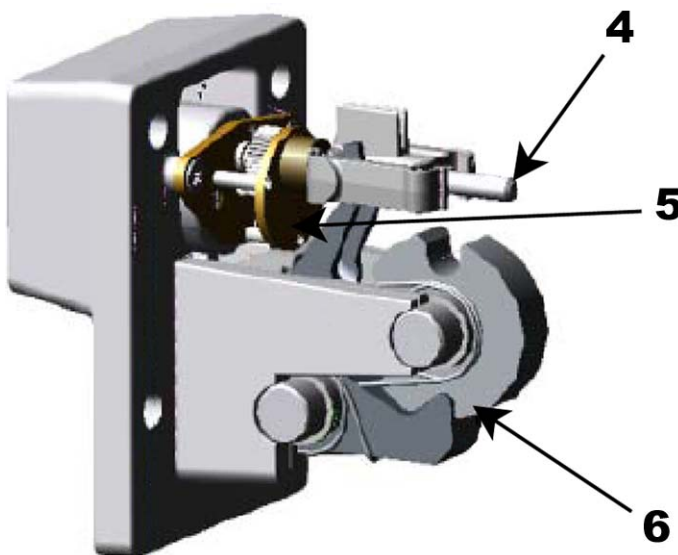
### 5-4-1-4 The XY Locking mechanism

In addition to the brakes described above, a Park Lock mechanism is used to lock the Top Console in the "park position" used during transportation.

#### Description of the Locking Mechanism

Figure 5-6 shows the Park Lock when the Operator Panel is in a locked position.

Figure 5-6 Park Lock in locked position

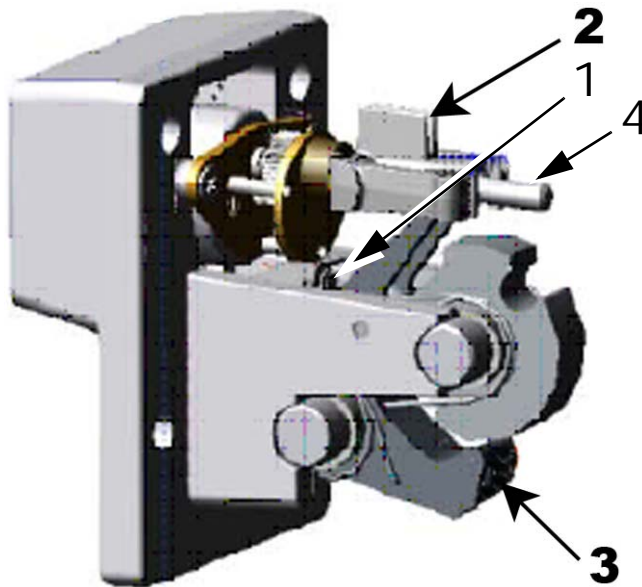


When the Operator Panel releases, the **Threaded Lead Screw** (4) rotates clockwise, moving the **Lock Nut** outwards and thus lowering the **Park Lock Lever** downwards and the Park Lock mechanism is released.

5-4-1-4 The XY Locking mechanism (cont'd)

The **Threaded Lead Screw** (4) then rotates CCW and returns to its original position. This is shown in [Figure 5-7 "Unlocked position" on page 5-17](#).

Figure 5-7 Unlocked position



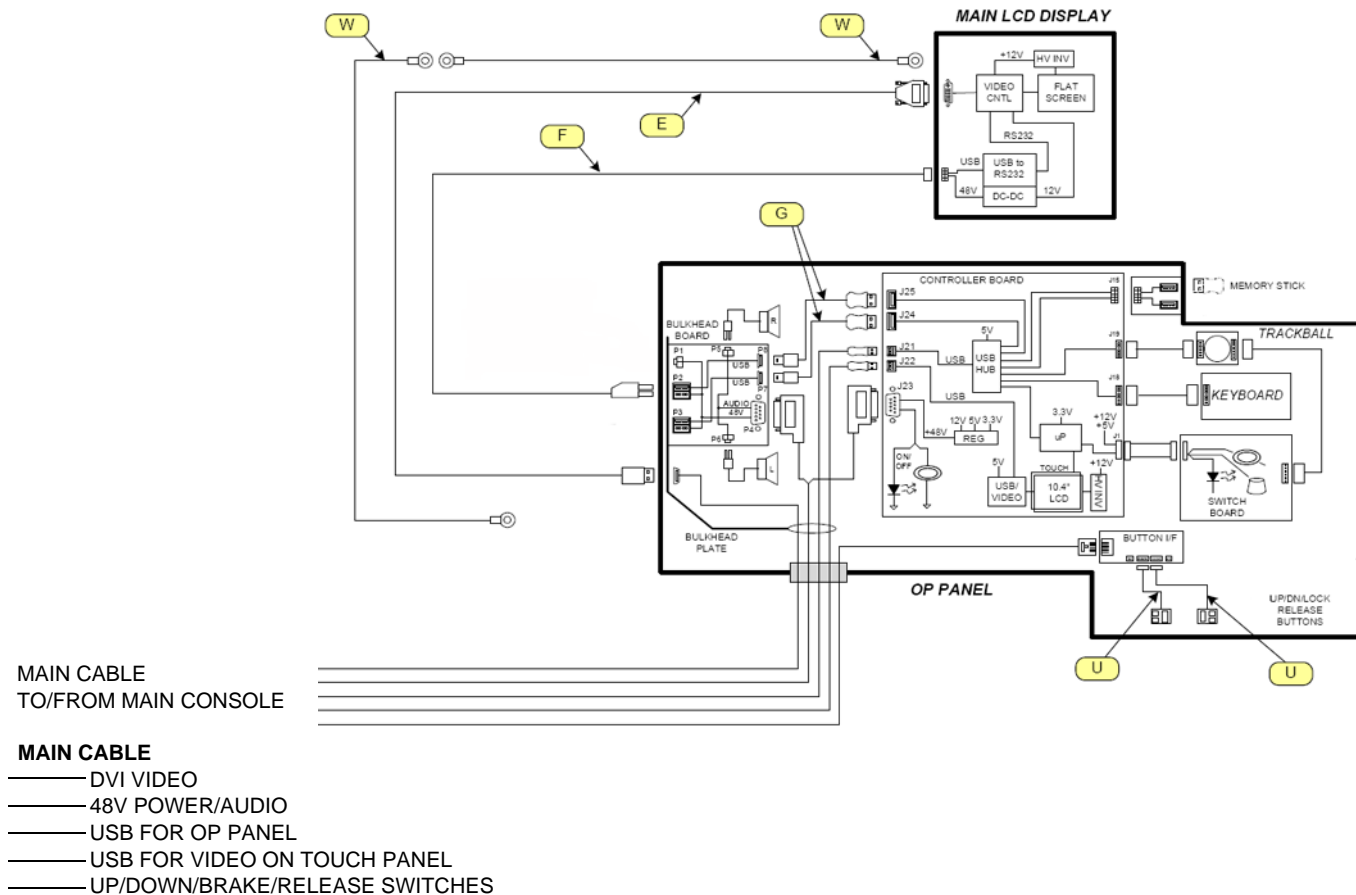
When the Operator Panel moves into locked position a micro switch (1) is activated.

The micro switch activation is used by the Motor Controller to detect when the Operator Panel is in locked position.

The XY (frogleg) brakes will stay ON if the VIVID E9 / VIVID E7 is powered down when the Operator Panel is locked. This enables release of the Park Lock, initiated by the micro switches on the Front Handle of the Operator Panel.

5-4-1-5 Top Console block diagram

Figure 5-8 Top Console block diagram



## 5-4-2 Operator Panel (Control Panel)

### 5-4-2-1 Operator Panel general description

The **Operator Panel** includes an On/Off switch, different controls for manipulating the picture quality, and controls for use in Measure & Analyze (M&A).

An alphanumeric keyboard is located on a drawer under the Operator Panel.

Figure 5-9 Operator Panel

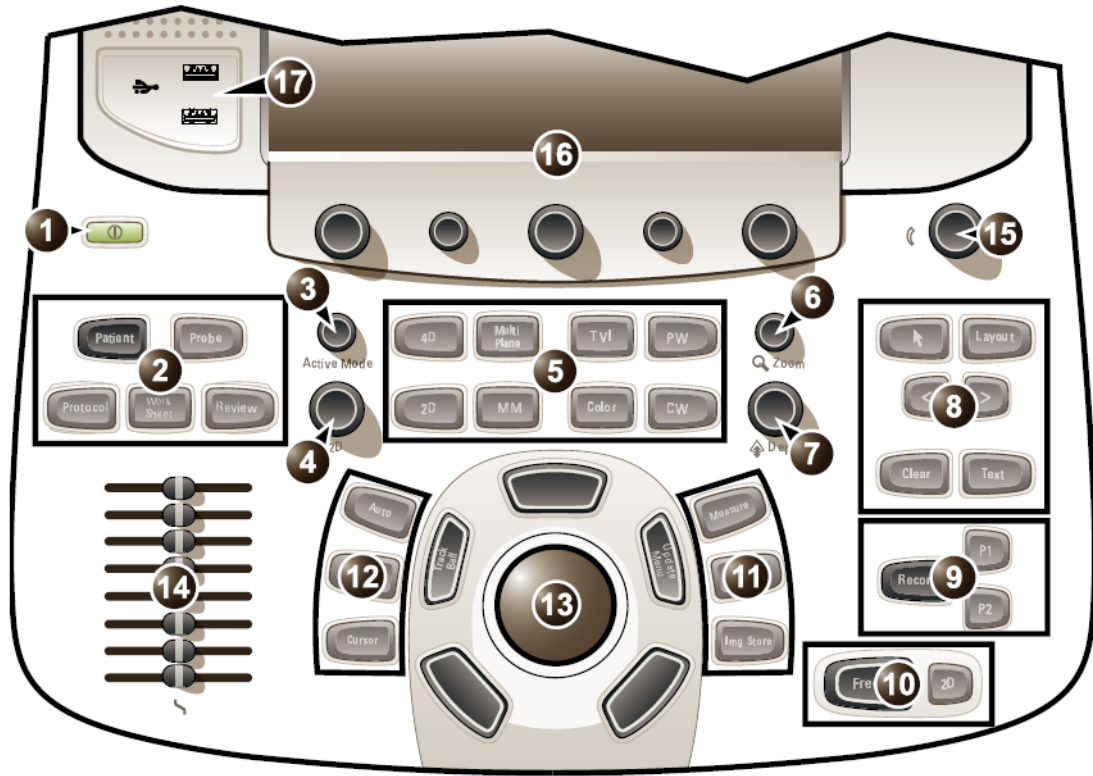


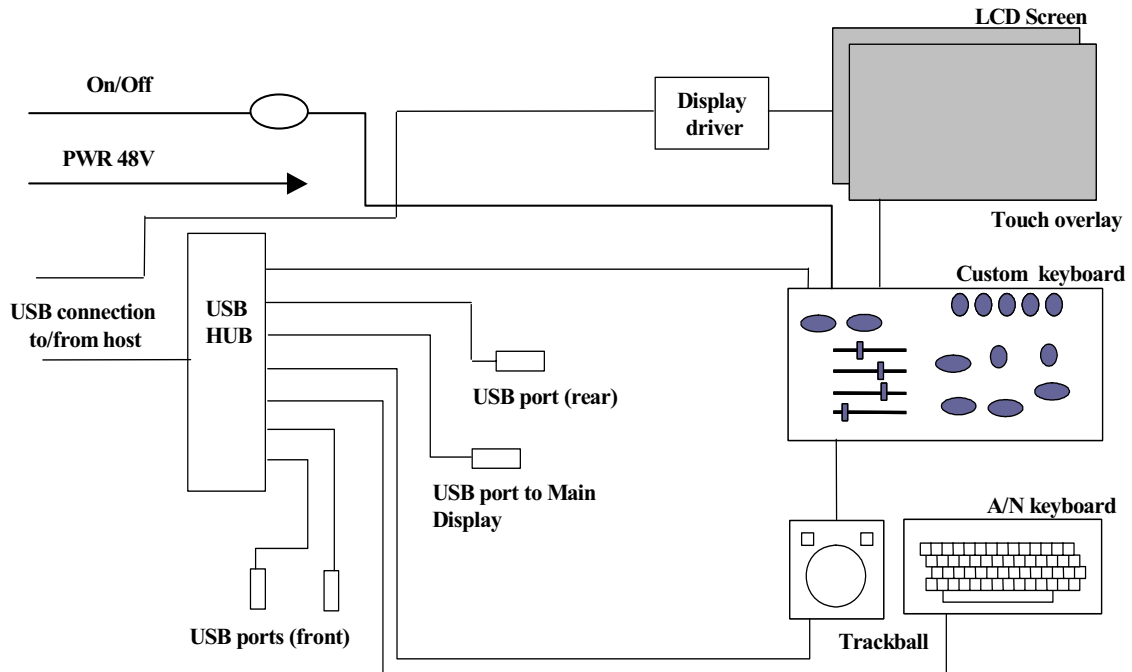
Table 5-5 Operator Panel - Callouts

1	On/Off button	9	Print, secondary capture
2	Patient selection, Probe selection, Protocol based acquisition, Worksheet and Image review	10	Freeze, 2D Freeze
		11	Measurement, image store
3	Active mode gain	12	Cursor, Angle, and Auto
4	2D Gain	13	Trackball
5	Scan mode selection	14	TGC sliders
6	Zoom	15	Speaker volume control
7	Depth	16	Touch Screen (Touch Panel)
8	Display controls, Annotation	17	USB ports

5-4-2-2 Operator Panel block diagram

The VIVID E9 / VIVID E7 Operator Panel is a complex user interaction device with several sub devices. This includes a trackball with buttons, an alphanumeric keyboard, a custom keyboard, and a touch panel overlay. See the diagram below for a simplified view of how these devices are interconnected.

Figure 5-10 Operator Panel block diagram



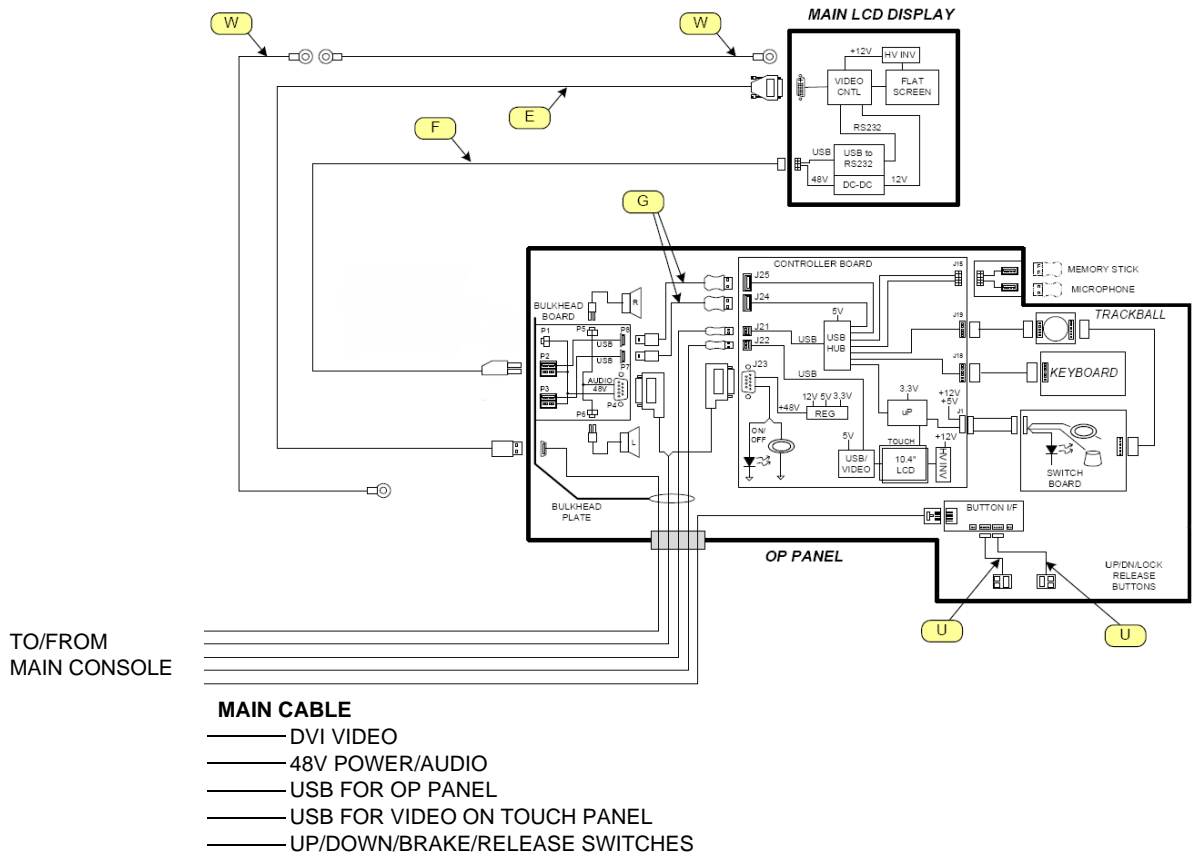
The custom keyboard is the main controller for the operating panel. It interfaces all of the additional rotaries, push buttons, potentiometers etc. It also connects to the touch panel overlay and handles the push events from this.

Additionally the custom keyboard also interfaces the trackball buttons. These buttons generate events for both the trackball device and the custom keyboard.

Other functions of the custom keyboard are:

- Volume control for the audio amplifier located in the host system.
- LCD display adjustments: Backlight.
- Download of firmware
- Controlling backlighting of all buttons and knobs, including the A/N keyboard.

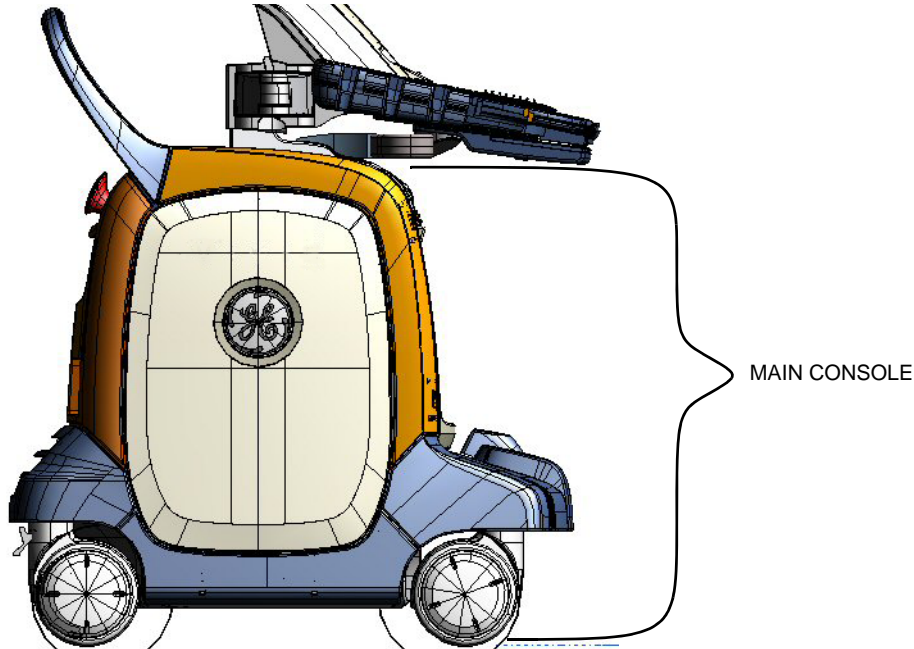
Figure 5-11 Top Console (with Operator Panel) block diagram



## Section 5-5 Main Console

### 5-5-1 Main Console description

Figure 5-12 Main Console



The Main Console hosts the:

- Patient I/O
- Front End Processor (FEP)
- Back End Processor (BEP)
- I/O Rear Panel (BEP I/O Board)
- Optional B/W printer
- One or two (optional) DVD drives
  - DVD drive #1 (the upper one) can be used to read and store data. This drive is also used for software installation during a software upgrade.
  - The optional, second DVD drive (DVR) is used to record and replay video, captured by the Digital Video Stream Recorder (option).
- Power Supply (Main LV Power)
- Lifting mechanism for the Frog Leg and Top Console
- Rear handle
- Front and Rear Casters with lock and brake mechanism

The Main Console consists of a frame that acts as the skeleton of the system. The other parts, listed above, are mounted to the frame. The outside of the Main Console is covered with plastic covers.



## Section 5-6 Air Flow control

### 5-6-1 General description

#### 5-6-1-1 Air Flow components

The Air Flow control includes the following components:

- Air filter in the air intake on the rear of the of the VIVID E9 / VIVID E7.
- Air filter in the air intake below the fans of the of the VIVID E9 / VIVID E7 (ref. next step).
- Fan unit on bottom of the VIVID E9 / VIVID E7.
- Two fans on top of the Card Rack.
- Fans inside the BEP and the Main Power Supply.
- Temperature sensors several places inside VIVID E9 / VIVID E7.
- Temperature control software on the BEP

#### 5-6-1-2 Software control

Software, running on the BEP, samples the temperature on each sensor.

- If the temperature rises, fan speed (and air flow) is increased.
- If the temperature decrease, the fan speed decrease.

If the temperature increase over a pre-defined level for each sensor, the scanner will shut down. It will then need to rest for a period of time, until the temperature inside the unit has decreased to an acceptable value, before it is possible to turn it on again. If the VIVID E9 / VIVID E7 power down due to high temperature inside the unit, it may indicate that the air filters need to be dusted or a failure situation.

## Section 5-7 Casters and Brakes

The VIVID E9 / VIVID E7 has four casters (wheels), the Front Casters and the Rear Casters.

- All Casters are mounted on swivels so they can change direction as needed.
- Additional, the Front Casters can be locked in fixed directions.
- Three plastic pedals are located at the front of the system.
- The pedals are mounted on the Pedal Mechanism. The Pedal Mechanism has two major functions. These are:
  - direction lock
  - parking brake

The third pedal is the release pedal, used to release the two other functions, if activated.

The direction lock and brake is operating on the front wheels. A lever placed on each of the front wheels give the interface to the pedal mechanism. These levers are engaged by rods being moved by a rotating bracket (Bracket Rotation). When the mechanism is engaged in either position, the pedal will not move back into a neutral position. This is to indicate which function that is activated. It will then be needed to release this by the release pedal.

- The Rear Casters have brakes that are operated individually for each caster.

## Section 5-8 Front End Processor (FEP)

### 5-8-1 Front End Card Rack description

The Front End Card Cage / Card Rack with the electronics is also called the Front End Processor (FEP).



**NOTICE** The cards have color-keys on the connectors to prevent installation in the wrong rack position. Do not change the color-keys position. Don't insert a card in the wrong position in the Card Rack. If the power is turned on with a card placed in the wrong position, the VIVID E9 / VIVID E7 will be destroyed.

#### 5-8-1-1 Front End Processor cards overview

**Table 5-6 The Front End Processor Card Positions**

SHORT NAME	COMPLETE NAME	MAX QTY IN SYSTEM	COMMENT
GRLY	RELAY BOARD	1	
GRX	RECEIVER BOARD	2	
GTX	TRANSMITTER BOARD	4	The number of cards in use vary by VE9 model and card model used.
FRONT PLANE / XD BUS	FRONT PLANE / TRANSDUCER BUS BOARD	2	Not shown in the illustration above. Two (2x) cards are always used.
DRX	DIGITAL RECEIVER BOARD	4	
GFI	GLOBAL RADIO FREQUENCY INTERFACE BOARD (GFI)	1	

**5-8-1-2 FEP's Location in the Unit**

The FEP is located on the right side of the system, behind the Right Side Cover.

**5-8-1-3 Input DC voltages**

These voltages comes from the Main Power Supply.

- + 24 VDC
- +/- 6 VDC
- +/- 15 VDC

**5-8-1-4 Input Pulser voltages**

- TSV1P: 0 VDC to +95 VDC
- TSV1N: 0 VDC to -95 VDC
- TSV2P: 0 VDC to +95 VDC
- TSV2N: 0 VDC to -95 VDC

These voltages comes from the Main Power Supply.

**5-8-1-5 Input signals**

- RX signals from probes
- BEP to Card Rack Backplane Cable
  - +5VDC (to GFI)

**5-8-1-6 Bidirectional signals**

- PCI Express cable
  - control signals from the BEP
  - digital data to the BEP
- BEP to Card Rack Backplane Cable
  - I<sup>2</sup>C bus
  - BSCAN

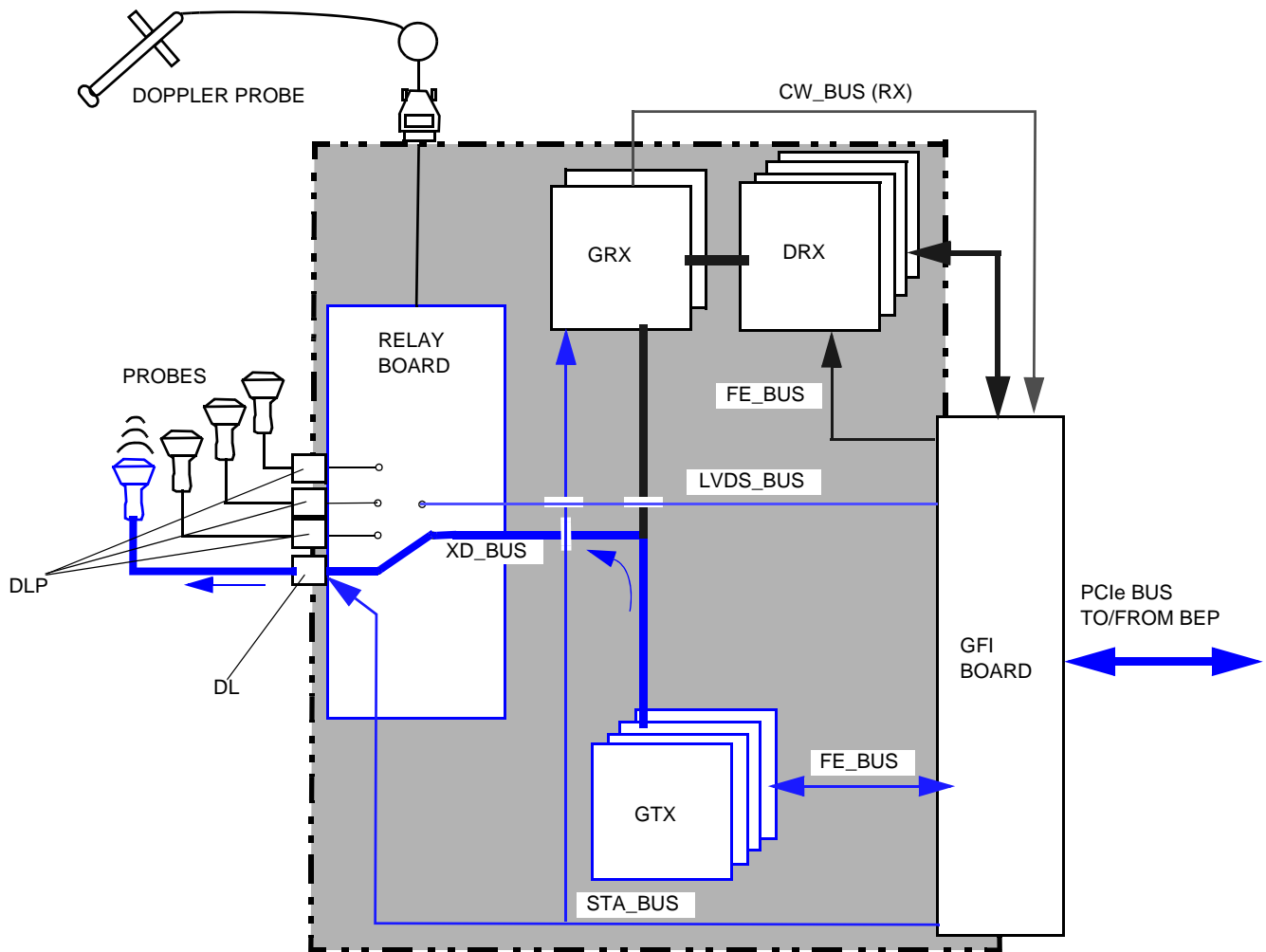
**5-8-1-7 Output signals**

- TX signals to probes
- BEP to Card Rack Backplane Cable
  - GFI audio (to BEP)

## 5-8-2 Transmitter and Receiver subsystem

### 5-8-2-1 Transmitter signal path

Figure 5-13 The Ultrasound Transmitter with up to four GTX boards.



**NOTE:** The number of cards depend on the VIVID E9 / VIVID E7 model, and options installed.

- The Global Radio Frequency Interface board (GFI) loads scan parameters via the FE\_BUS into local RAM on the GTX board(s) and on the DRX boards.
- The ultrasound transmit bursts are generated on the GTX board(s), initiated by the transmit trigger pulse (TXTRIG\_L). The transmit pulses are routed via the Front Plane (XD bus), located on the front side of the GTX, GRX and Relay boards, to the Relay board, where they are fed to the selected probe.

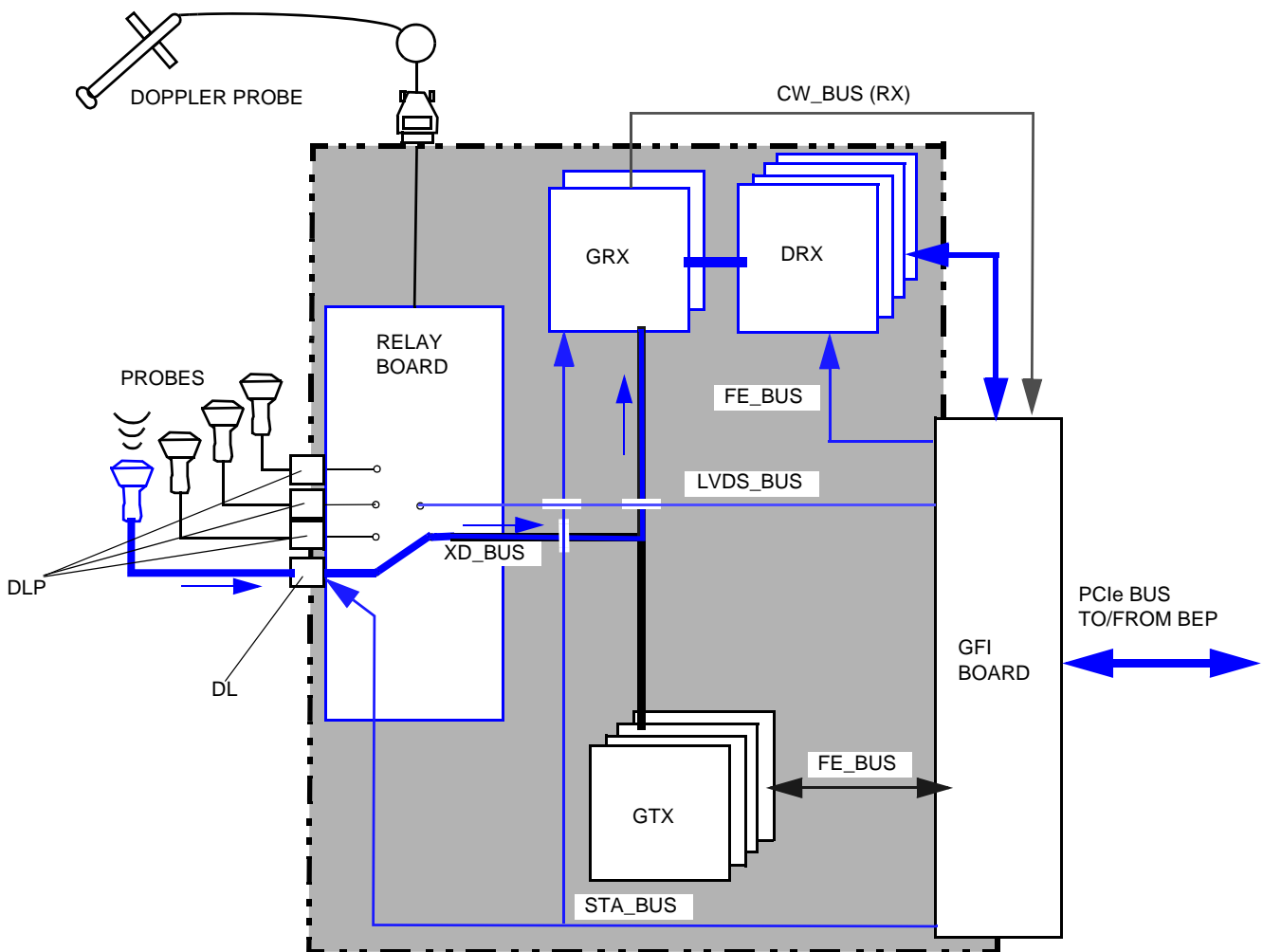
If the CW Doppler probe is selected, one of the TX channels from the GTX is routed via the Back Plane to a separate connector, then via a cable to the Doppler probe connector on the front of VIVID E9 / VIVID E7. In the Doppler probe, the signal is connected to one of the two probe elements.

**5-8-2-2 Phased and Linear Array probes**

- Phased and Linear Array probes consist of several identical transducer elements (e.g. 64, 128, 192).
- Four probes can be connected to the system at the same time. The probe connectors are physically located on the Relay Board, where one is selected and connected to the transmitter (GTX boards) and receiver (GRX board) through a number of relays.

**5-8-2-3 Receiver signal path**

**Figure 5-14 The Ultrasound Receiver**

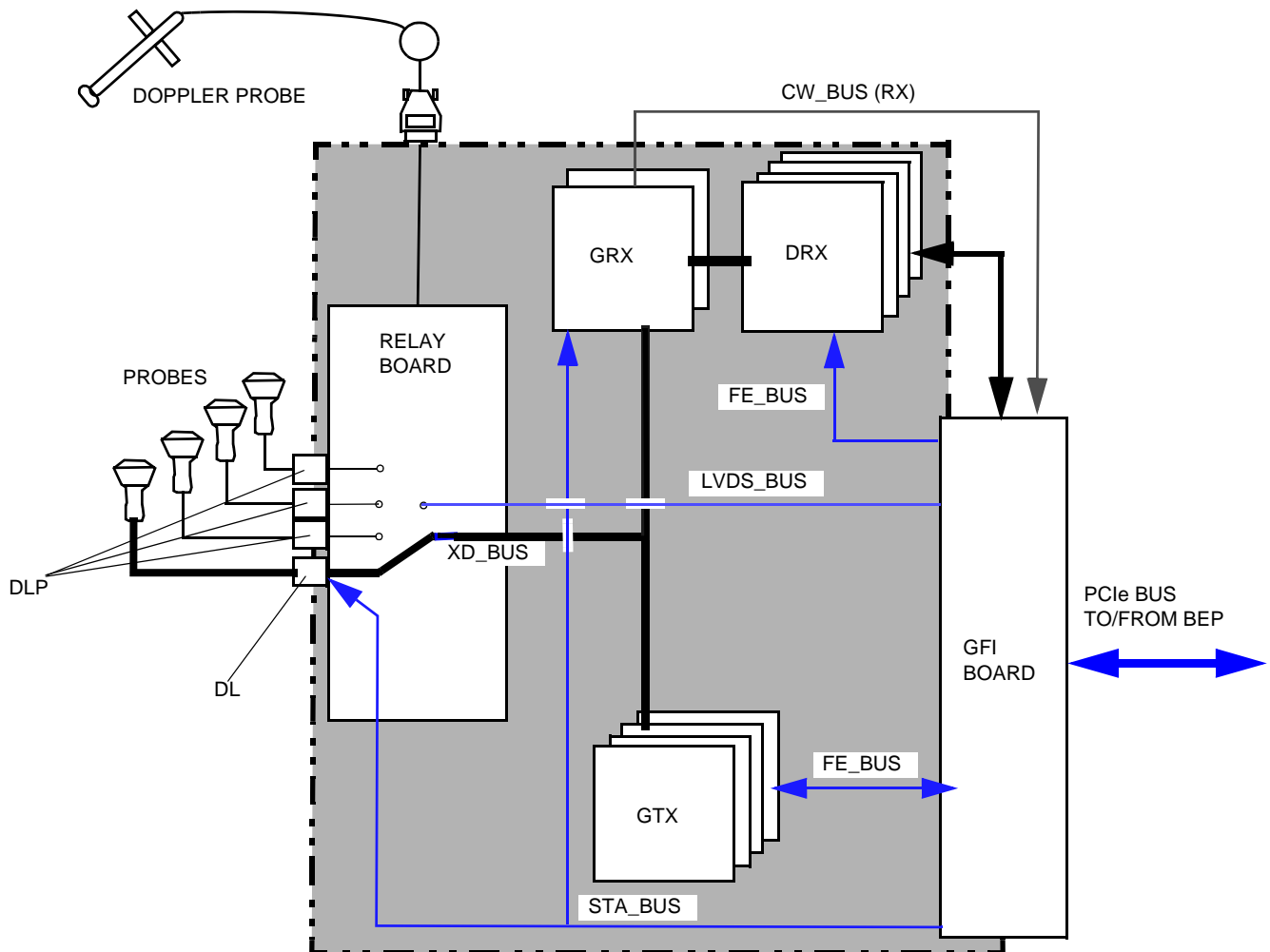


**NOTE:** The number of cards depend on the VIVID E9 / VIVID E7 model, and options installed.

- The reflected signal from body structures and blood cells are routed from the probe, via the Relay Board and the Front Plane to the GRX (receiver) boards, where pre-amplification and Analog Time Gain Compensation (ATGC) is performed. The gain is determined by an analog control signal (ATGC) generated by the Global Radio Frequency Interface board (GFI).
- The output channels from the GRX boards are fed to the DRX boards where the signals in each receiver channel are A/D converted. Then the beamforming for the received signals takes place.

5-8-2-4 Signal control

Figure 5-15 The Ultrasound Transmitter and Receiver Control Signals



NOTE: The number of cards depend on the VIVID E9 / VIVID E7 model, and options installed.

- The Global Radio Frequency Interface (GFI) board controls the GTX (transmitter) and GRX / DRX (analog and digital receiver boards). GFI loads all parameters to the GTX and DRX ASICs. It reads the probe identification, selects probe connector on Relay board and controls the high voltage multiplexer in linear probes.

In addition the GFI generates:

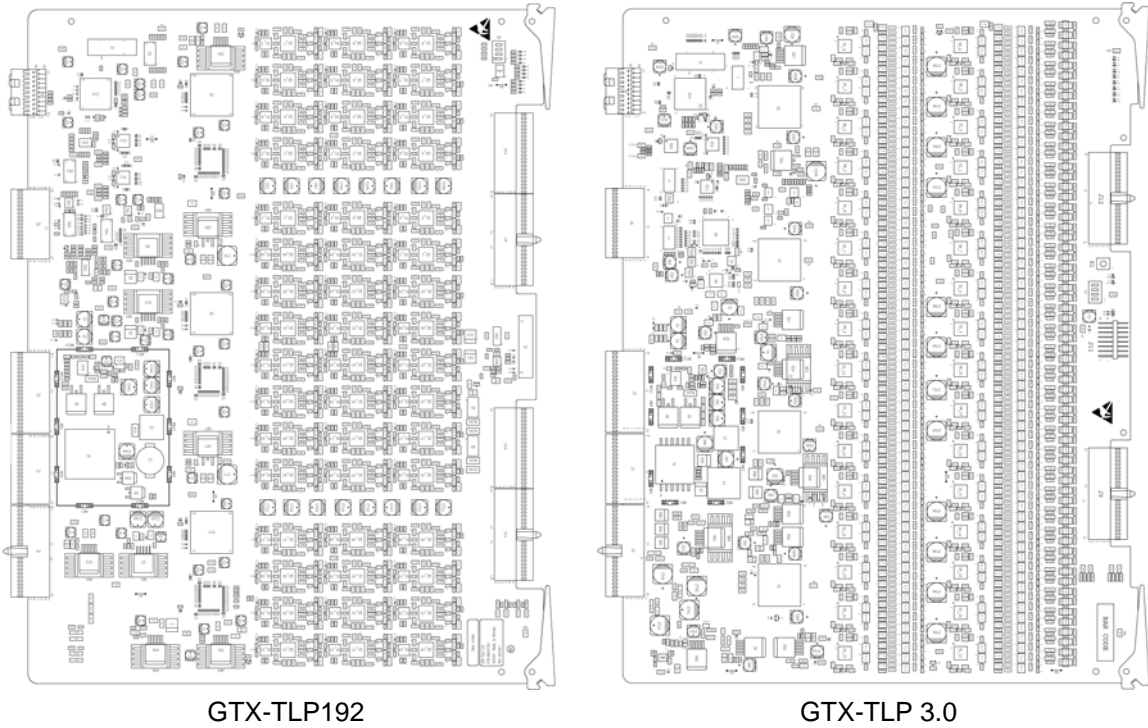
- the transmit trigger pulse for GTX
- a receive synchronization pulse (TXTRIG\_L) used by DRX
- a differential ATGC voltage used by GRX
- global 50 MHz and 200 MHz system clocks and Reset pulse (SRES)
- Test signal / Dither signal
- Probe ATGC for 3V probe

The output signals from the DRX is fed to the GFI for further signal processing. The result is transferred via the PCI Express (PCIe) bus to the BEP for more signal processing.

### 5-8-3 Transmitter Board (GTX)

#### 5-8-3-1 General description

Figure 5-16 GTX boards



#### GTX-TLP192

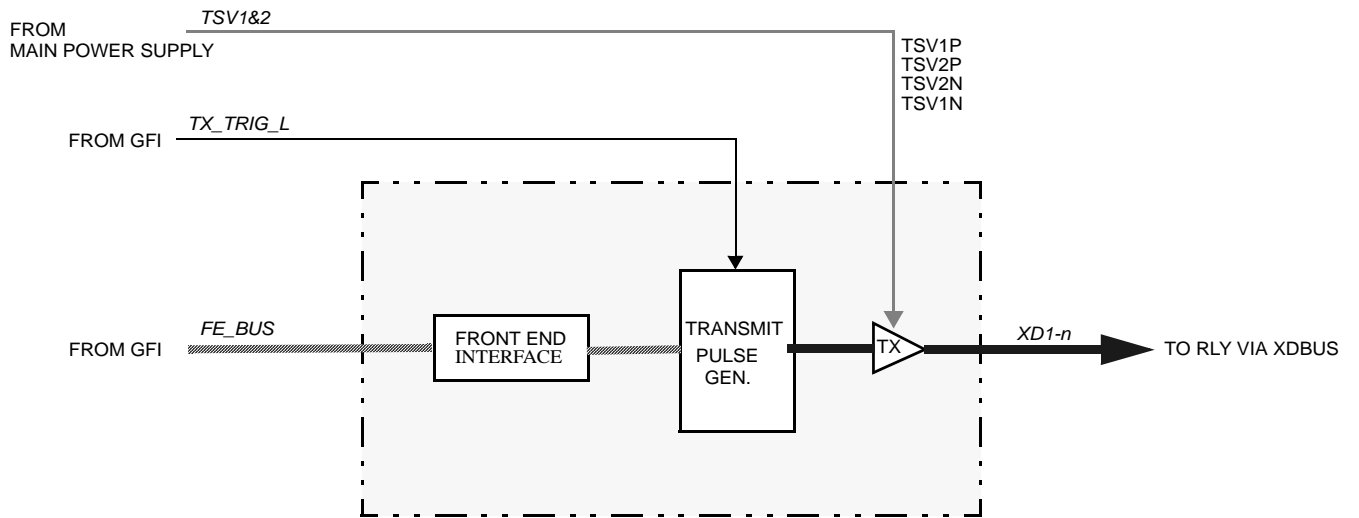
The GTX-TLP192 contains 192 individually controlled transmit channels on one board.

The GTX board(s) provide transmit pulses via the Front Plane (XD BUS) to the Relay board and then to the transducer array (the probes).



5-8-3-1 General description (cont'd)

Figure 5-17 Block Diagram for the GTX board (one channel illustrated)

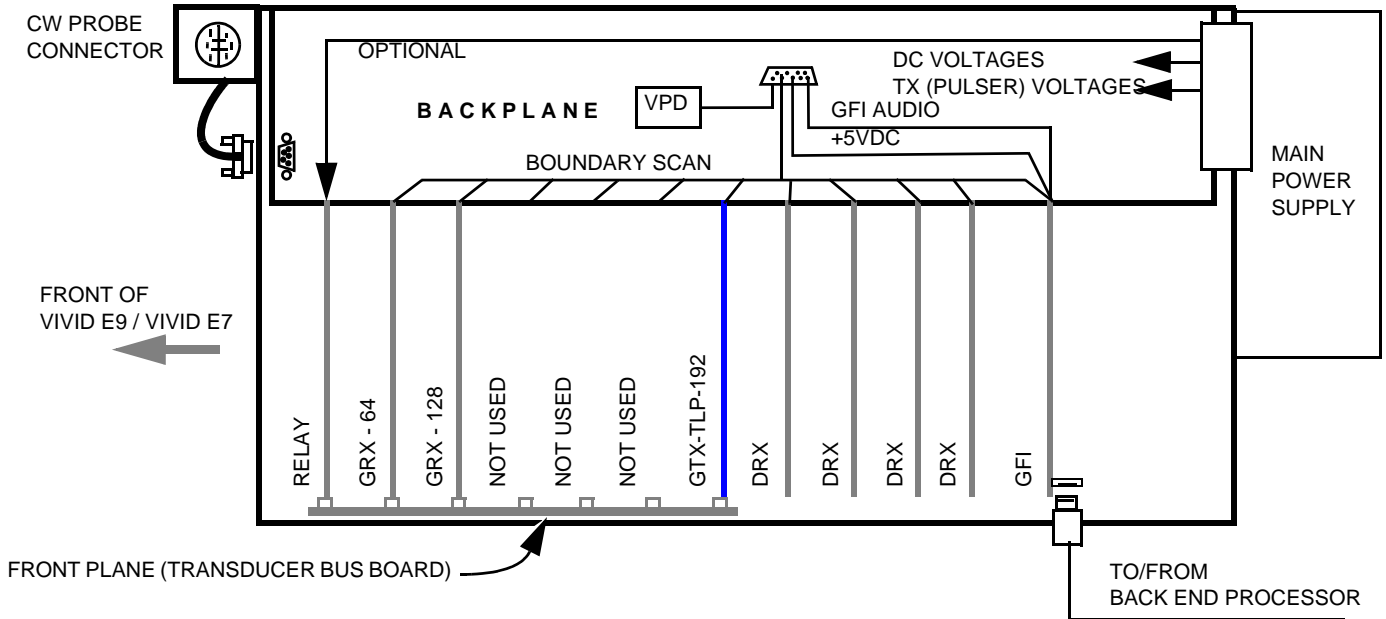


A pulse from the GFI board, TX\_TRIG\_L, trigs the Transmit Pulse Generators.

**TS Voltage 1** and **TS Voltage 2** from the Main Power Supply, supply the transmitters with the needed voltages to generate the correct ultrasound signals.

5-8-3-2 Location in the Unit

Figure 5-18 GTX TLP-192 board location - 192 TX channels



5-8-3-3 Input DC Voltages

The voltages are delivered from the Main Power Supply.

- +24 VDC  
The +24 VDC voltage is used to generate + 3.3 VDC, + 2.5 VDC, and several other voltages, internal on the card.
- + 6 VDC
- +/- 15 VDC

5-8-3-4 Input TX (Pulser) voltages

- TSV1P: 0 VDC to +95 VDC
- TSV1N: 0 VDC to -95 VDC
- TSV2P: 0 VDC to +95 VDC
- TSV2N: 0 VDC to -95 VDC

5-8-3-5 Outputs

- Pulses sent via the Front Plane to the selected probe.

5-8-3-6 LEDs on the GTX-192 board

Figure 5-19 LEDs on GTX-192

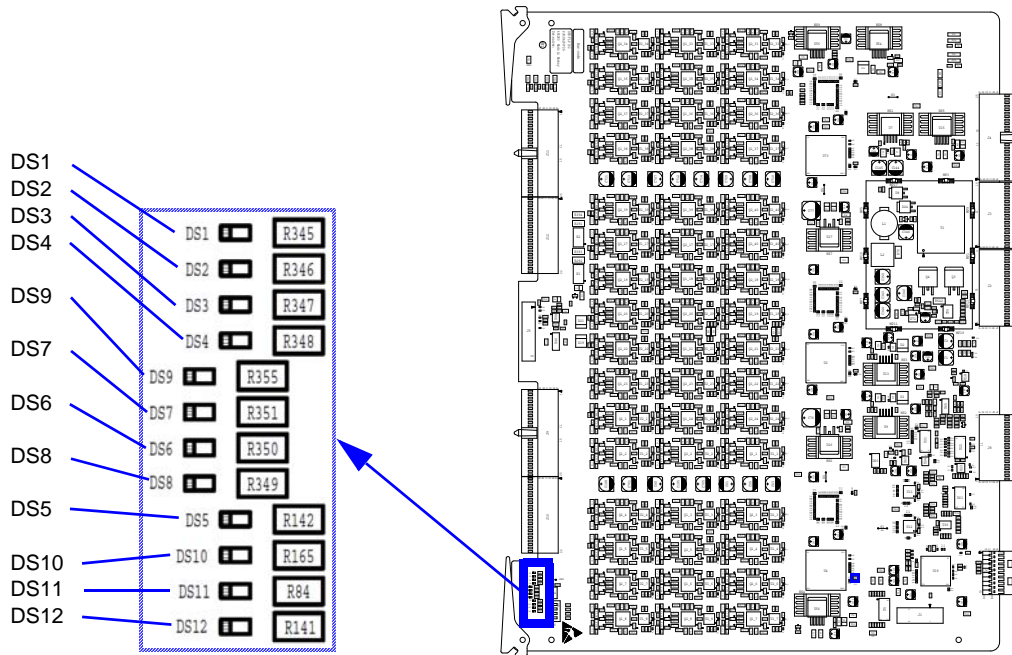


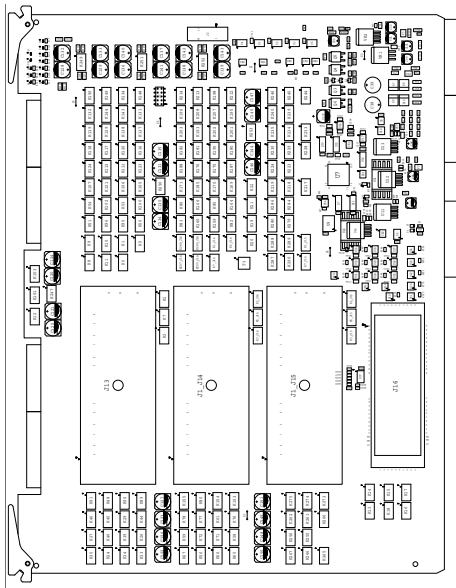
Table 5-7 LEDs on the GTX-192 board

LED NO.	COLOR	DESCRIPTION	NORMAL OPERATION	START UP	ERROR CONDITION
DS1	RED	DAVID_RESET			
DS2	GREEN	DCM_LOCKED			
DS3	GREEN	VSS, VDD_DR1 & VLL GOOD	LIT	LIT	
DS4	GREEN	TX_TRIGGER	LIT DURING SCANNING		
DS5	GREEN	DIGITAL POWER GOOD	LIT	LIT	
DS6	RED	FPGA_CTRL_REG(0)			
DS7	RED	DAVID_ERROR			
DS8	RED	GLOBAL_RESET			
DS9	RED	DAVID_CRC_ERROR			
DS10	YELLOW	CW MODE LED	LIT IN CW MODE		
DS11	GREEN	INIT_B			
DS12	GREEN	DONE			

## 5-8-4 Relay Board (RLY)

### 5-8-4-1 General description

Figure 5-20 Relay board



NOTE:  
THE PROBE CONNECTORS ARE  
MOUNTED ON THE SOLDER SIDE  
OF THE BOARD.

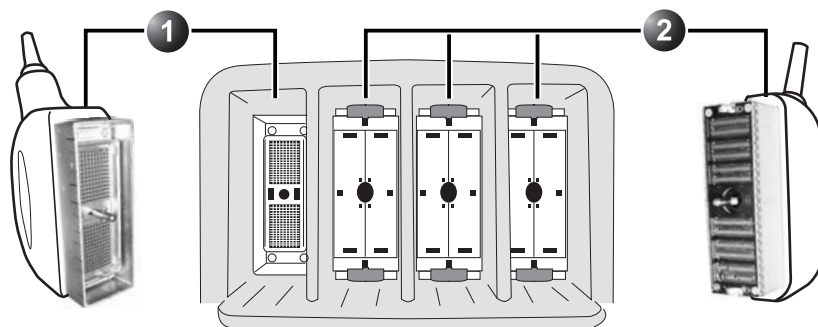
The main task of the Relay Board is to route the transducer channels between the active probe and the Transmitter or Receiver modules that are active.

Relays are used in order to switch the connections between the active probe connectors.

The module contain four probe connectors:

- one connector supports probes with 128 XD channels
- two connectors support probes with 192 XD channels
- one connector supports both probes with 192 XD channels and probes with 256 XD channels

Figure 5-21 Probe connectors



1 - PD PROBE PORT: FOR VIVID 7 COMPATIBLE PROBE CONNECTORS  
2 - PDT PROBE PORTS: FOR VIVID E9 / VIVID E7 SPECIFIC PROBE

The signals to the Doppler probe are routed via the FEP Backplane and cables to the Doppler probe connector. The Doppler Probe has two XD channels.

**5-8-4-2 Location in the Unit**

The Relay board is located in the Front End Rack on the end nearest to the front of the scanner.

**5-8-4-3 Input DC Voltages:**

- +15VDC
- +6VDC
- -6VDC
- -15VDC
- +100V PMXVPP (Voltage for Probe MUX)
- -100V PMXVNN (Voltage for Probe MUX)

**Voltages provided by regulators on the board:**

- +12 VDC
- +5 VDC
- +3.3 VDC
- -3.3 VDC
- -5 VDC

and

- LVDC (3.3 V/2.5A) for RT3D probe

**5-8-4-4 Input Signals**

- **Transmit period:**  
XMIT Pulses via the XD\_BUS
- **Receive period:**  
Echo signals from the selected probe

**5-8-4-5 Output Signals**

- **Transmit period:**  
XMIT Pulses to the selected probe
- **Receive period:**  
Echo signals via XD\_BUS to GRX cards

5-8-4-6 LEDs

Figure 5-22 LEDs on the Relay board

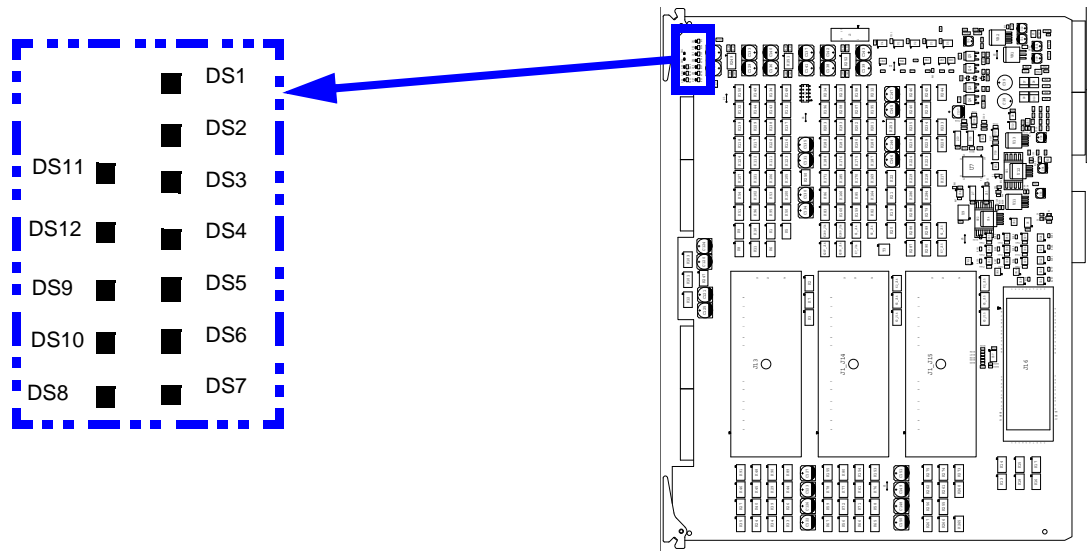


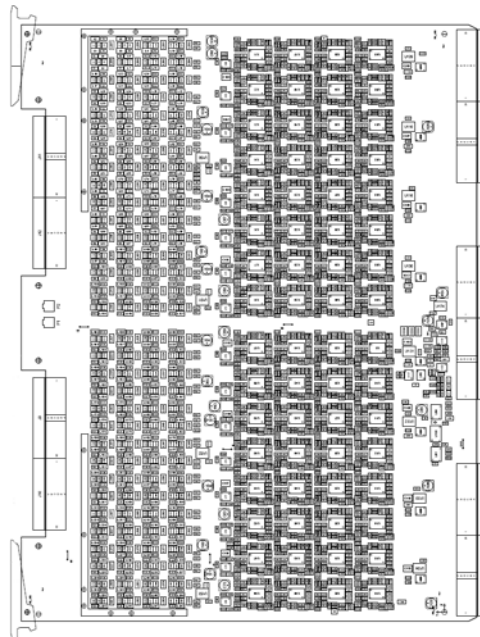
Table 5-8 LEDs on the Relay board

LED NO.	COLOR	DESCRIPTION	NORMAL OPERATION	START UP	ERROR CONDITION
DS1	GREEN	STATUS_LED	GREEN WHEN PROBE PRESENT IN CONNECTOR 4		
DS2	GREEN	-5V AVEE	LIT		
DS3	GREEN	+12V	LIT		
DS4	GREEN	VCC	LIT		
DS5	GREEN	LVDC	GREEN WHEN PROBE ACTIVE IN CONNECTOR 2, 3 OR 4		
DS6	GREEN	+3V3	LIT		
DS7	GREEN	DLP_AUX	LIT		
DS8, DS9, DS10, DS11 AND DS12 ARE DEBUG LEDS FOR PROBE CONNECTOR #4					
DS8	GREEN	DLP AUX (-3.3V)	LIT WHEN 4V ACTIVE IN PROBE CONNECTOR #4		
DS9	GREEN	DLP +12V	LIT WHEN PROBE ACTIVE IN CONNECTOR #4		
DS10	GREEN	DLP LVDC	LIT WHEN PROBE ACTIVE IN CONNECTOR #4		
DS11	GREEN	DLP PMX_VPP (+100V)	LIT WHEN PROBE ACTIVE IN CONNECTOR #4		
DS12	GREEN	DLP PMX_VNN (-100V)	LIT WHEN PROBE ACTIVE IN CONNECTOR #4		

## 5-8-5 Receiver Board (GRX)

### 5-8-5-1 General description

Figure 5-23 GRX board



The analog Receiver boards (GRX) receives the weak ultrasound echo signals from the probes, via the Relay board and the XD bus on the Front Plane boards. The main task for the GRX boards are to do Time Variable Amplification on the echo signals.

To support 192 analog receiving channels from the probes, two different GRX boards are used in VIVID E9 / VIVID E7:

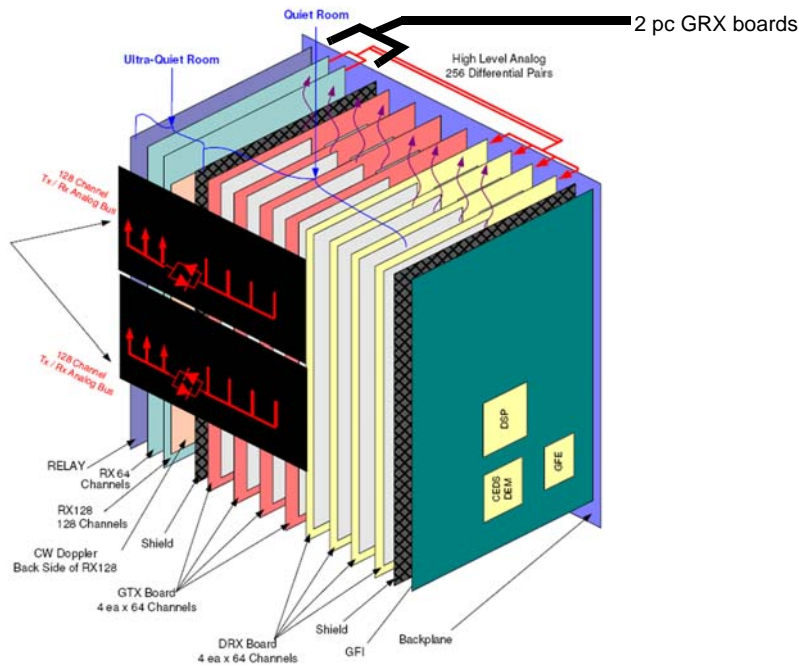
- 64 Channel Receiver board *without* analog CW Doppler
- 128 Channel Receiver board with analog CW Doppler

The 128 channel Receiver board also include the needed circuits to demodulate the CW Doppler signals from a Pedof probe.

**NOTE:** *Some probes, like the 3V and 4V, are pre-beamforming the received signals from the transducer elements down to 192 channels. These 192 channels are connected to the system as described above.*

5-8-5-2 Location in the Unit

Figure 5-24 GRX location



5-8-5-3 Input DC Voltages

- +6 VDC
- -5 VDC
- +15 VDC
- -15 VDC

5-8-5-4 Outputs

- After Time Variable Amplification the analog signals are sent via high level, analog, differential lines to the DRX board for A/D conversion and beamforming.
- When using the Pedof probe, the demodulated Doppler signals are sent to the DRX board for A/D conversion.

5-8-5-5 LEDs on the GRX board

The GRX board has four LEDs:



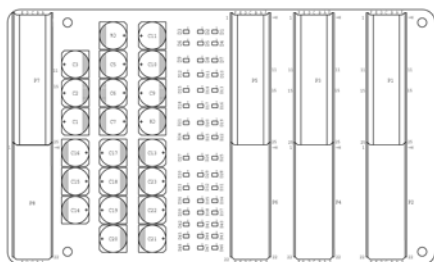
## 5-8-6 Front Plane boards (XD BUS)

### 5-8-6-1 General Description

The two Front Plane boards plug into the rear edge connectors on the Relay Board, the GTX Board(s) and on the GRX Board(s).

The XD signals, TX and RX signals to and from the probes (via the Relay Board) are routed via these boards.

Figure 5-25 Front Plane board for GTX w/192 channels (A)



A

### 5-8-6-2 Location in the Unit

The Front Plane boards plug into the connectors on the rear of the Relay board, the GTX board(s) and the GRX board(s).

## 5-8-7 Digital Receiver board (DRX)

### 5-8-7-1 General description

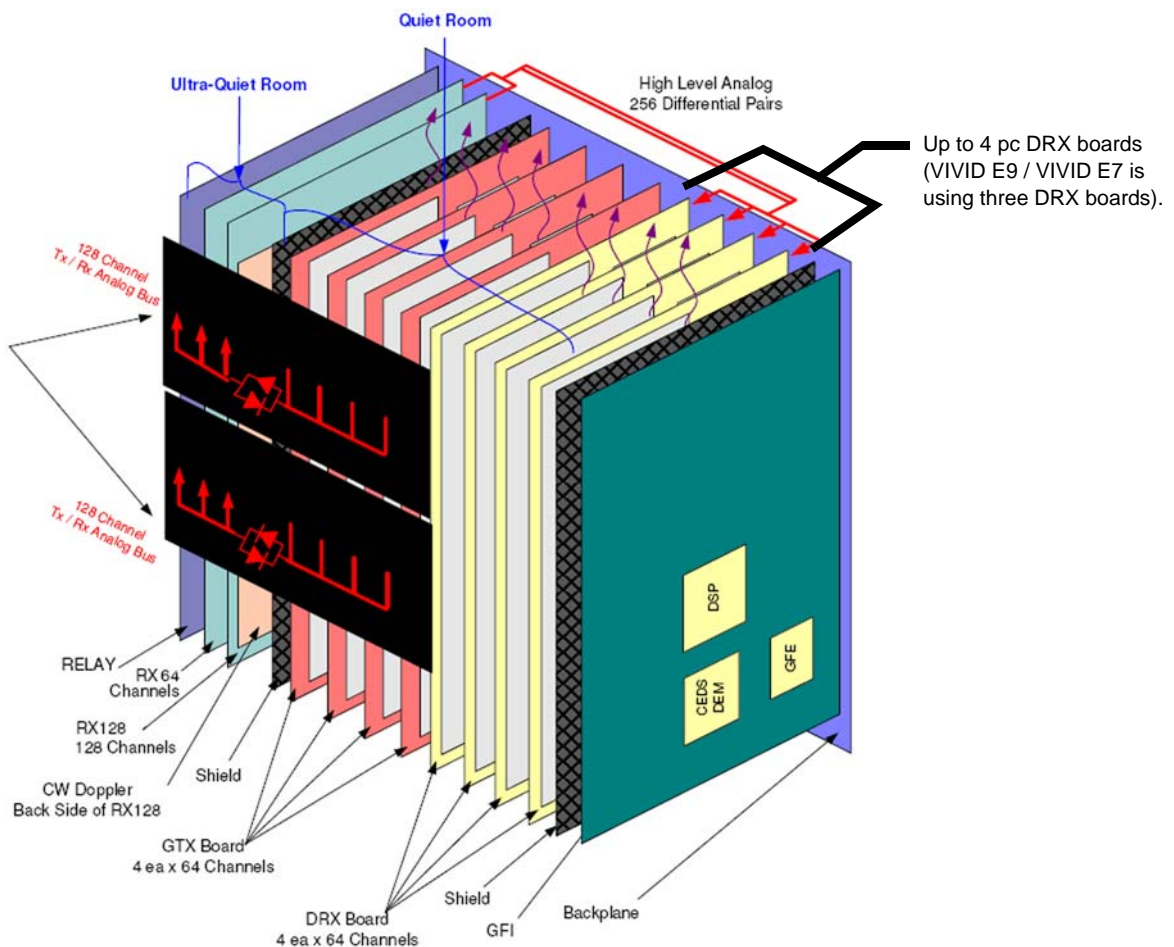
A DRX board provides two main functions to the beamformer:

- 1.) Conversion of analog RF input signals from 64 channels into streams of digital data, and
- 2.) Receive signal beamforming. The DRX performs optimal, range dependent focusing and steering to create multiple receive beams simultaneously.

Up to four DRX boards with 64 receiver channels each, can be used to support up to 256 receiver channels. Today we are using three DRX boards to support 192 receiver channels.

### 5-8-7-2 Location in the Unit

Figure 5-26 DRX location



**5-8-7-3 Input DC Voltages**

+24 VDC.

Other voltages are generated locally on the GRX:

- 3V3
- 2V5
- 2V5\_MGT\_Tx
- 1V8 (one for each Nathan column in use)
- 1V5

**5-8-7-4 Input Signals**

64 channels differential analog channels (via FEP Backplane, from GRX)

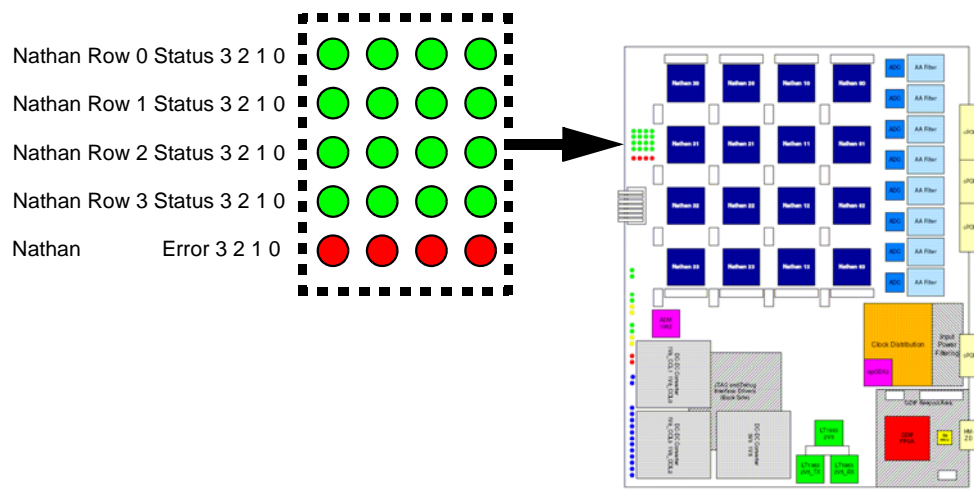
**5-8-7-5 Outputs**

Digital signal data to next DRX. Data from the last DRX card is sent to GFI.

**5-8-7-6 LEDs on the DRX board - the Nathan field**

The Nathan field has an array of LEDs that display Nathan status. There is one green LED per Nathan as well as one common red LED per Nathan row. The leds are arranged as follows:

**Figure 5-27 LEDs for Nathan (beamforming) circuits**



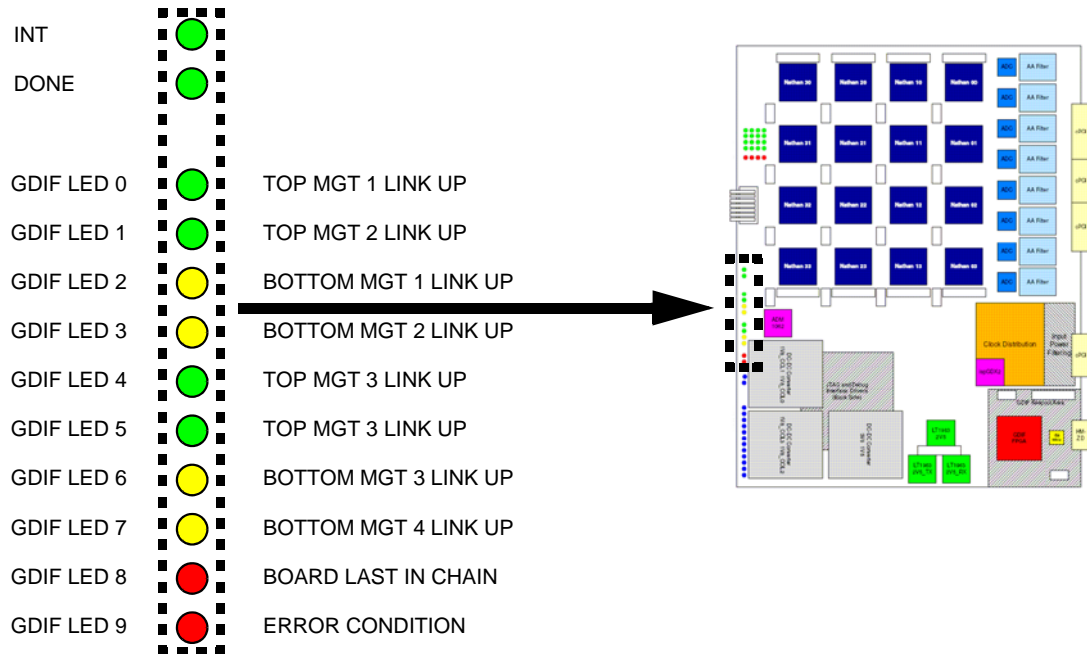
Each Nathan drives two signals connected to LEDs, a green “running light” and a red “error” status light.

**5-8-7-7 LEDs on the DRX board - the GDIF status display**

Programming status LEDs exist on the left side of the board. They indicate the programming status of the GDIF FPGA.

GDIF debug LEDs exist near the lower left side of the board. They are used for GDIF status display.

**Figure 5-28 GDIF status display**



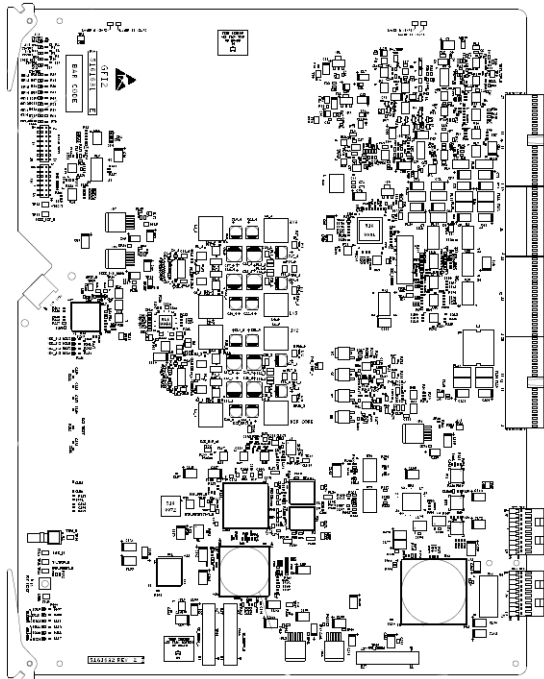
**5-8-7-8 Troubleshooting hints**

- During power up, the 4 x 4 LEDs (see [Figure 5-27 "LEDs for Nathan \(beamforming\) circuits" on page 5-41](#)) will be stable ON. If they blink at this time, it indicates an error.
- During scanning the 4 x 4 LEDs will blink: LEDs in first column will turn ON, then the LEDs in the next column are lit, then the LEDs in the third column and at last the LEDs in the fourth row. Next, the sequence will repeat.
- If the card starts, the voltages are OK.
- If it is artifacts in the picture (during scanning), you may try to interchange the position for the DRX boards, and scan again. If the artifacts moves to the left or to the right, it indicates an error on a DRX. If the artifact don't move, the problem is elsewhere in the signal chain.

## 5-8-8 Front End Interface Board (GFI)

### 5-8-8-1 General description

Figure 5-29 GFI2 board



The GFI is the Front End Processor's (FEP's) interface to the Back End Processor (BEP).

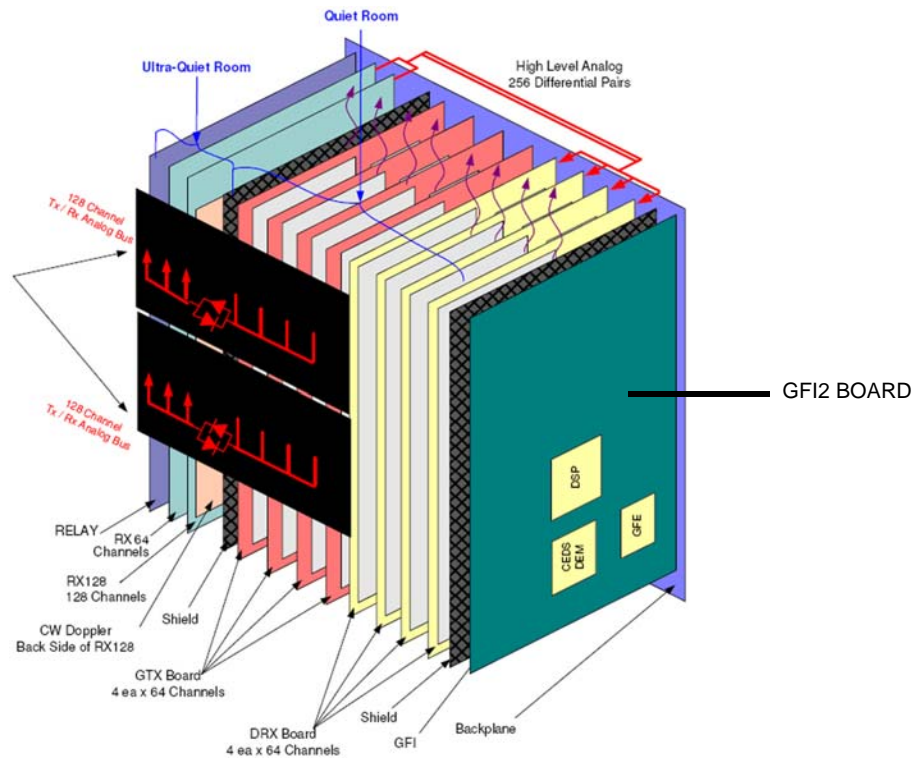
During boot, various setup parameters are downloaded from the BEP's hard drive, via the PCI Express bus to the GFI2 board. When a scanning mode is selected, or scanning parameters are adjusted, the GFI board receives setup parameters from the BEP and pass these on to the FE boards. The GFI also, based on some of these parameters, control some front end signals directly.

The digitized and beamformed ultrasound data, received from the DRX boards, are further processed on the GFI board before the result is sent to the BEP for use in the display system.

**5-8-8-2 Location in the Unit**

The GF12 board is plugged into the Back Plane as the right most board in the FE rack.

**Figure 5-30 GF12 location**



**5-8-8-3 Input DC Voltages**

- +24 DC (from Main LV Power via FEP Backplane)
- +/- 15 VDC
- +/- 6VA DC
- BEP5V

Other needed voltages are generated locally on the GFI.

**5-8-8-4 Clocks**

These clocks are generated on the board:

- 200 MHz for on board (GFI) use
- 200/50 MHz (for the RX board)
- 200 MHz for the RX board

**5-8-8-5 Outputs**

- PCI Express bus to BEP (connector J14 on the card)
- STA bus
- Other Control signals like TXTRIG etc.

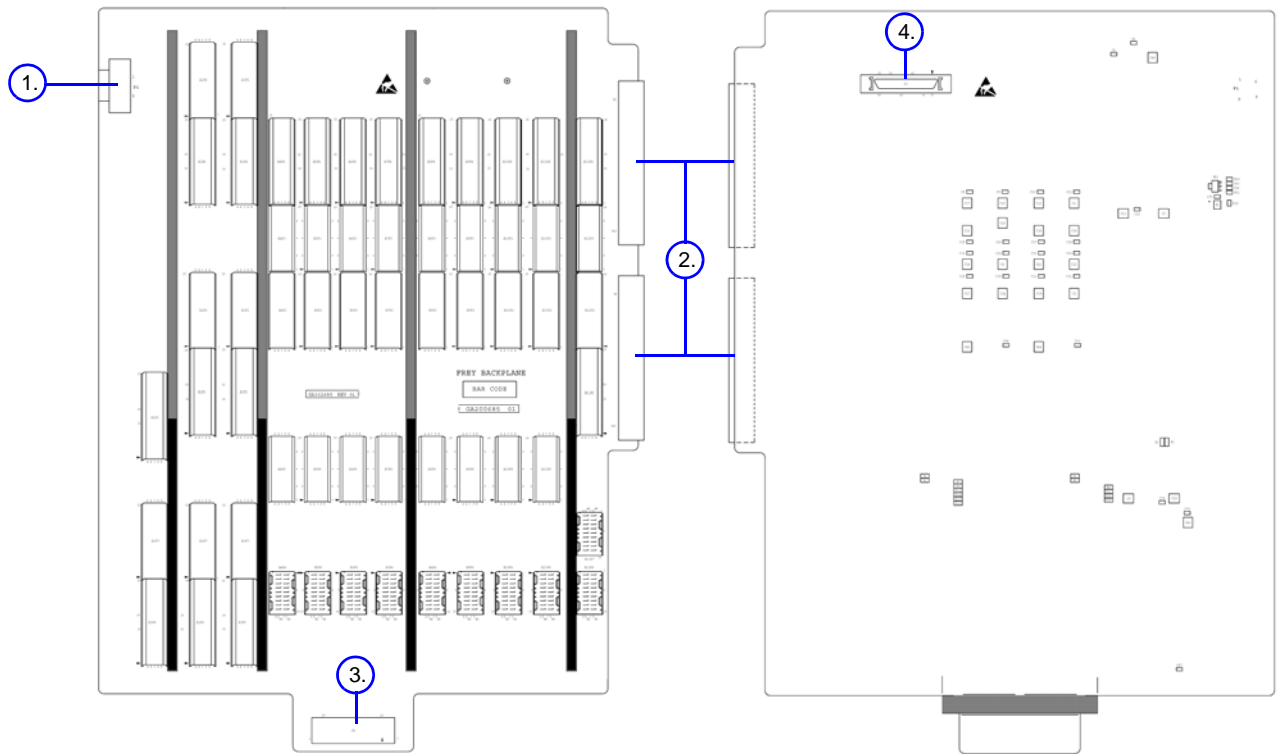
**5-8-8-6 LEDs on the GFI board****Table 5-9 LEDs on the GFI board**

LED NO.	COLOR	DESCRIPTION	NORMAL OPERATION	START UP	ERROR CONDITION
DS1	GREEN	3V3 STATUS	LIT		
DS2	GREEN	2V5 STATUS	LIT		
DS3	GREEN	1V8 STATUS	LIT		
DS4	GREEN	CORE DSP STATUS	LIT		
DS5	GREEN	1V2 STATUS	LIT		
DS6	GREEN	DRX1	LIT IF DRX 1 IS MISSING	DARK BEFORE STARTUP,	DARK IF THE FPGAs ON THE BOARDS HAVE NOT BEEN SUCCESSFULLY PROGRAMMED.
DS7	GREEN	DRX2	LIT IF DRX 2 IS MISSING		
DS8	GREEN	DRX3	LIT IF DRX 3 IS MISSING		
DS9	GREEN	DRX4	LIT IF DRX 4 IS MISSING		
DS10	GREEN	GTX1	LIT IF GTX 1 IS MISSING		
DS11	GREEN	GTX2	LIT IF GTX 2 IS MISSING		
DS12	GREEN	GTX3	LIT IF GTX 3 IS MISSING		
DS13	GREEN	GTX4	LIT IF GTX 4 IS MISSING		
DS14	GREEN	GFI-DONE			
DS15	GREEN	VDD_3V3	LIT		
DS16	GREEN	VDD_1V5	LIT		
DS17	GREEN	VDA_3V3	LIT		
DS18	GREEN	VDA_1V5	LIT		
DS19	GREEN	SD_DEBUG 0			
DS20	GREEN	SD_DEBUG 1			
DS21	GREEN	SD_DEBUG 2			
DS22	GREEN	GFE_DEBUG 0			
DS23	GREEN	GFE_DEBUG 1			
DS24	GREEN	GFE_DEBUG 2			

## 5-8-9 FEP Backplane

### 5-8-9-1 General description

Figure 5-31 FEP Backplane



#### Front side of the FEP Backplane

1. CW Doppler Connector
2. Power Connectors (2x)
3. Fan Connector

#### Rear side of the FEP Backplane

2. Power Connectors
4. FEP Backplane Connector

The front side of the FEP Backplane has connectors for the Front End boards (RELAY, GRX, GTX, DRX and GFI), the Main Power Supply, the BEP I/O Board, the Fan Connector and a connector for the CW probe signals.

On the rear side of the FEP Backplane, there is the FEP Backplane Connector with BSCAN signals, GFI Audio, +5V (from GFI) and I<sup>2</sup>C signals from the FEP Backplane.

- Voltages are distributed from the Main Power Supply to the different boards.
- Control signals and Clocks are distributed from the GFI board to the other boards.
- Low amplitude analog signals from GRX board to DRX board.
- Data signals are routed from DRX board to GFI board.
- The BSCAN signals, GFI Audio, +5V (from GFI) and I<sup>2</sup>C signals are routed to the BEP and/or BEP I/O Board, depending on the BEP model in use.

The only active electronics on the FEP Backplane is a I<sup>2</sup>C memory device for the Board Info and a voltage regulator for the power supply to the I<sup>2</sup>C memory.

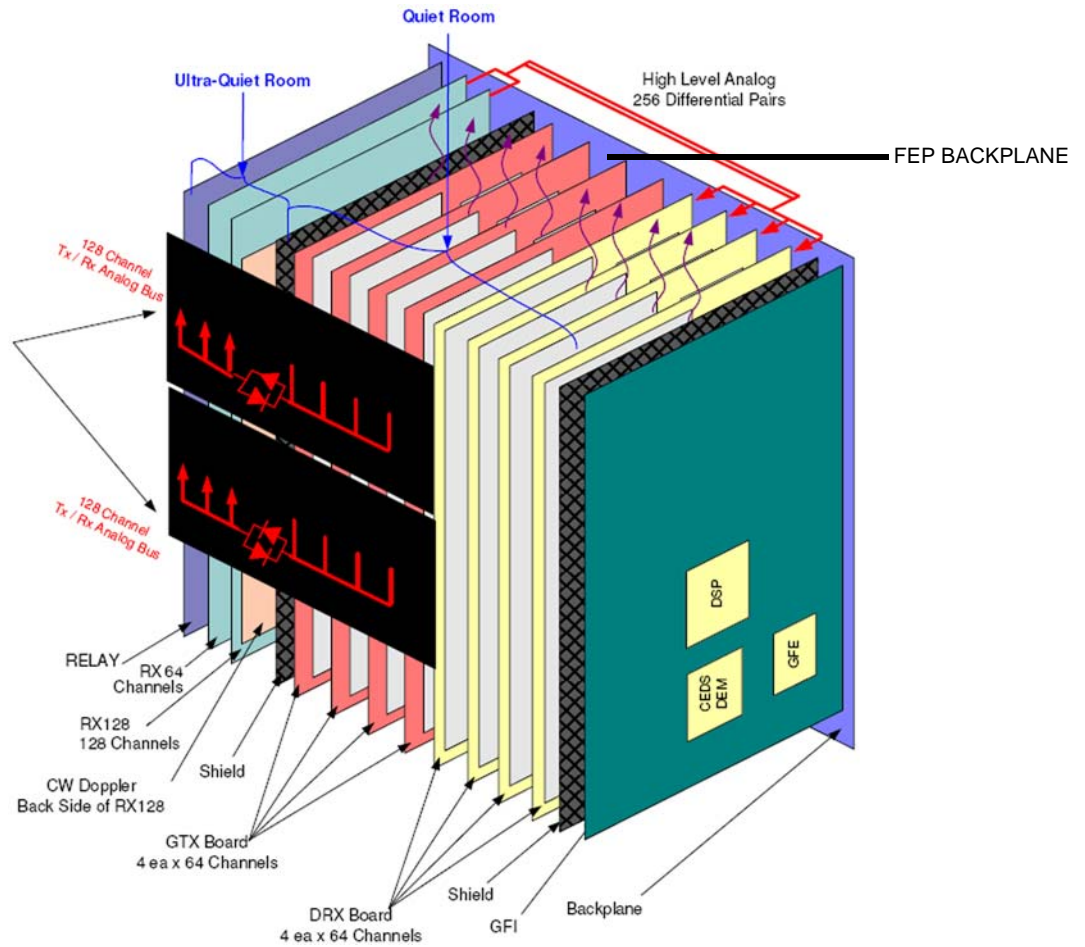
In addition, there are termination resistors and power supply bypass capacitors.



5-8-9-2 Location in the unit

The FEP Backplane is attached to the rear side of the Front End Card Rack.

Figure 5-32 FEP Backplane location



## **Section 5-9 Back End Processor (BEP)**

### **5-9-1 Purpose of this section**

The BEP and its sub-modules acts as the VIVID E9 / VIVID E7's central processor.

This chapter includes descriptions for the vital BEP modules.

### **5-9-2 Introduction**

The Back End Processor is a computer, designed specially for the use in the VIVID E9 / VIVID E7 ultrasound scanners made by GE.

### **5-9-3 Signal Flow and Processing**

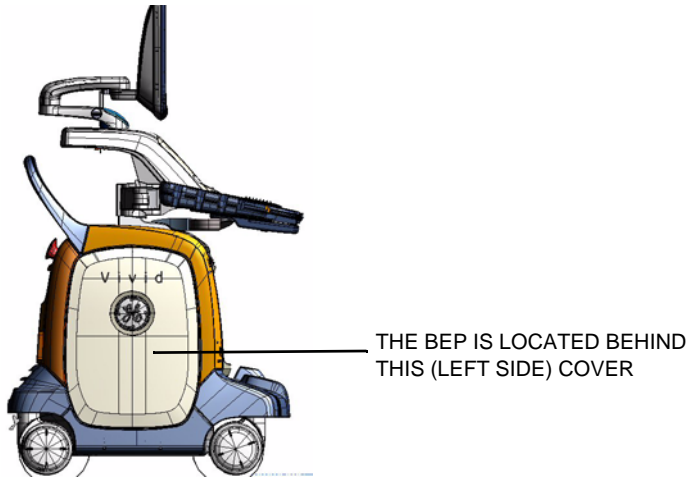
The Back End Processor receives the data from the Front End electronics, stores it in memory, performs scan conversion to pixel domain, and drives the system's monitors.

Back End Processor software is also processing the Color Flow, Doppler, M-Mode data and the 3D/4D data.

### 5-9-4 Location of the Back End Processor (BEP)

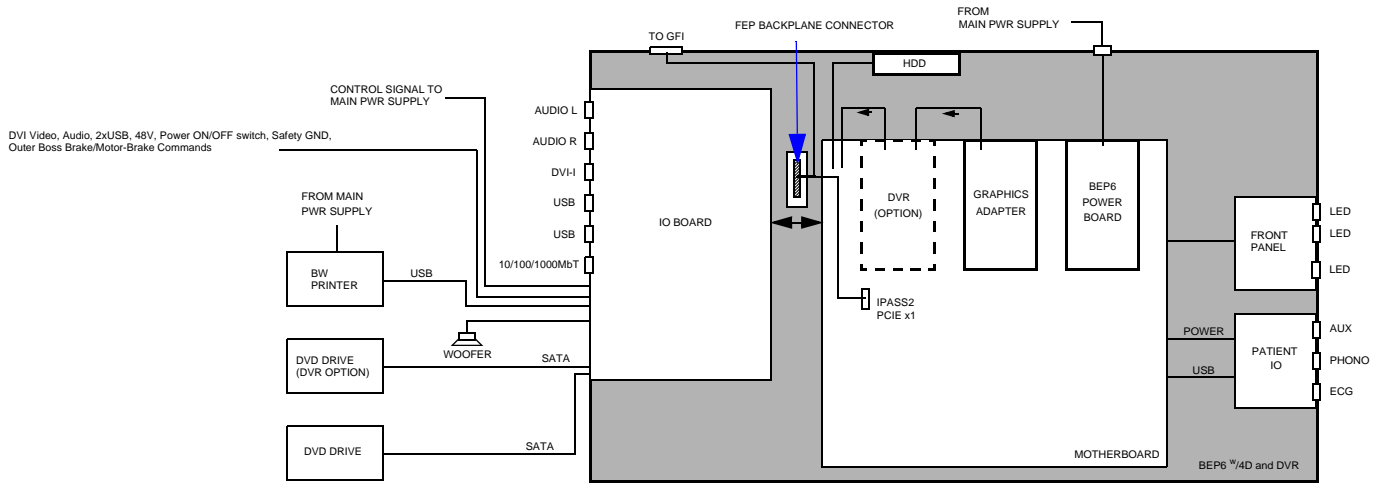
The BEP is located on the left side, inside the scanner, see [Figure 5-33](#).

**Figure 5-33 Back End Processor**



5-9-5 CPU/Back End Processor (BEP) - block diagram

Figure 5-34 BEP6 block diagram



## 5-9-6 BEP description

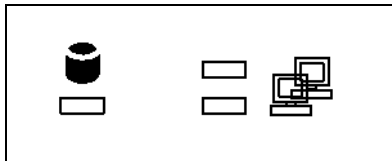
### 5-9-6-1 The EMC Enclosure House

- A power supply for local voltages
- A motherboard with RAM, a processor and PCI connectors for extension cards
- An I/O board on the rear of the BEP

### 5-9-6-2 Outside the EMC Enclosure House

- Front Panel with status lights (LEDs) for hard disk activity and network speed (upper LED) and network activity (lower LED).

**Figure 5-35 Front Panel**



- Patient I/O with AUX, Phono and ECG connectors.
- BEP I/O Board.

5-9-7 BEP6 Face, Top and Rear connections

Table 5-10 BEP6 Face connections

ITEM	DESCRIPTION	ILLUSTRATION
1.	J21 - Upper LCD Video Out (Main LCD Video)	<p>The illustration shows a vertical column of connectors and power points. Callout 1 points to the top connector (J21). Callout 2 points to the second connector (J3). Callout 3 points to the third connector (J2). Callout 4 points to a large multi-pin connector (J22). Callout 5 points to a test connector. Callouts 6-13 point to various panel and peripheral connectors (J100, J7, J28, J27, J26, J25, J4, J14). Callouts 14 and 15 point to power connectors (J29, J30). Callout 16 points to a center speaker connector (J33).</p>
2.	J3 - SA1 DVD (SATA to DVD)	
3.	J2 - SA2 SPARE (SATA to DVD)	
4.	J22 - A/V OUT (OP Console) <b>Pins of note:</b> 5: PWR_SW 6: 5V_STDBY 9-13: 48V 17, 22-25: GND 18: PWR_LED_P 21: PWR_LED_N	
5.	Test Connector (Factory Test) <b>Pins of note:</b> 5, 13, 23: Ground 3: 24V 4: 48V 8: 12V 9: 5V 10: AC_FAIL_N 11: 3.3V 12: 5V_STDBY 16: Not Used on Vivid E9 24: PWR_SW 25: PSON_N	
6.	J100 - OP Panel Video (USB)	
7.	J7 - OP Panel Buttons (USB)	
8.	J28 - XYZ Motor (USB)	
9.	J27 - Spare (USB)	
10.	J26 BW Printer (USB)	
11.	J25 - Spare (USB)	
12.	J4 - Main PS USB (USB)	
13.	J14 - Spare (USB)	
14.	J29 - Power (to peripherals) Pinout: 1, 2 - GND 3,5 - 12V 4,6 - 5V	
15.	J30- Power (to peripherals) 1, 2 - GND 3,5 - 12V 4,6 - 5V	
16.	J33 Center (Center Speaker / Sub-woofer)	

5-9-7 BEP6 Face, Top and Rear connections (cont'd)

Table 5-11 BEP6 Top connections

ITEM	DESCRIPTION	ILLUSTRATION
1.	J1 - Main PS 48V, 5V In	
2.	J5 - Front End Rack (PCIe to GFI)	

Table 5-12 BEP6 Rear connections

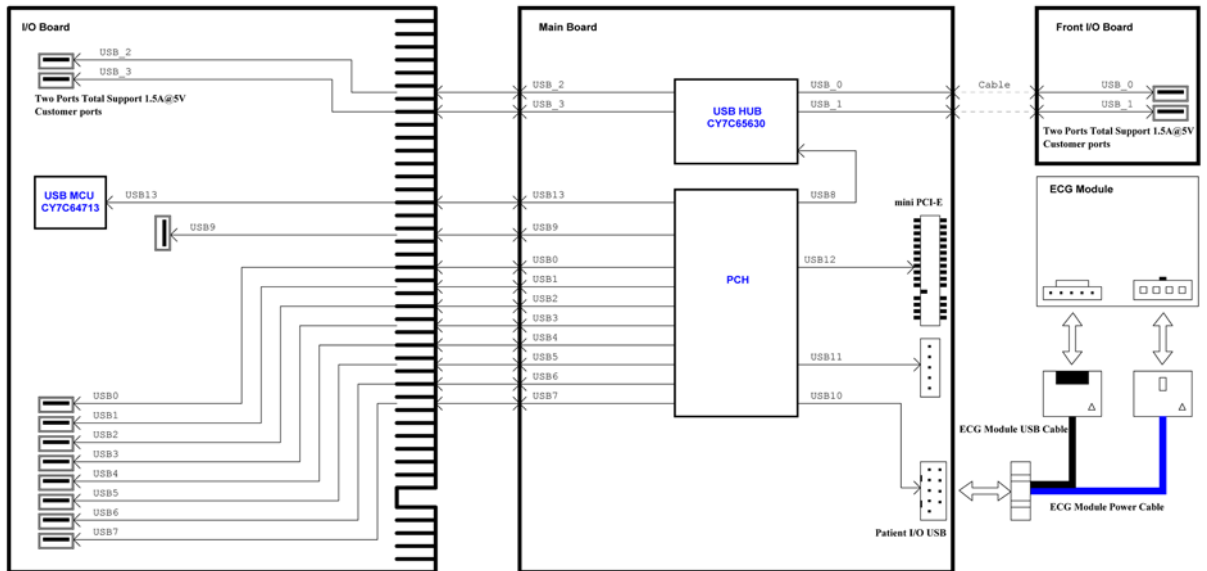
ITEM	DESCRIPTION	ILLUSTRATION
1.	J40 - Customer USB	
2.	J41 - Customer USB	
3.	J46 - LAN 10/100/1000 Mbit	
4.	J44 - Customer Video Out	
5.	J43 - Customer Audio	
6.	J42 - Customer Audio	

5-9-7-1 USB distribution

USB is used to communicate with, and/or control, many functions and devices in the VIVID E9 / VIVID E7.

The illustration below shows how the USB signals are distributed in BEP6.

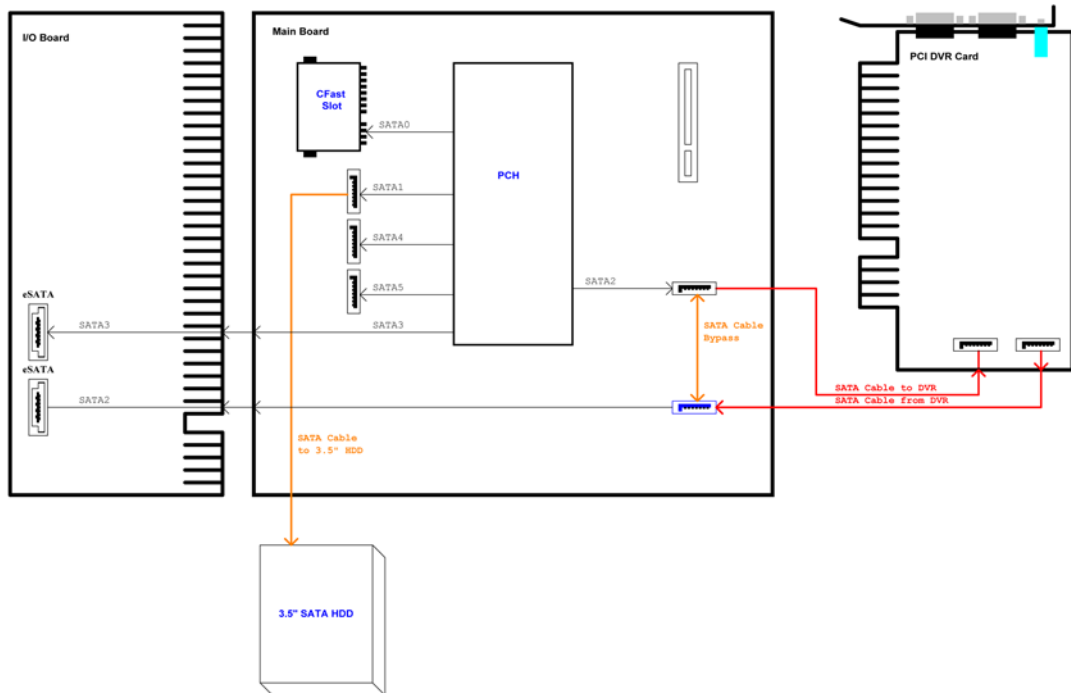
Figure 5-36 USB distribution in BEP6





5-9-7-2 SATA distribution - BEP6

Figure 5-37 BEP6 - SATA distribution



5-9-7-3 Use of Expansion Slots on BEP6 Motherboard

Use of Expansion Slots, listed from the rightmost slot:

- BEP 6.0 Power Board Assembly
- Graphics Adapter (Video Card)
- DVR Board (Optional)
- The I/O Board is plugged into a double slot on the left side of the motherboard.

5-9-8 Input DC Voltages

NOTE: The BEP is **not** connected to AC power.

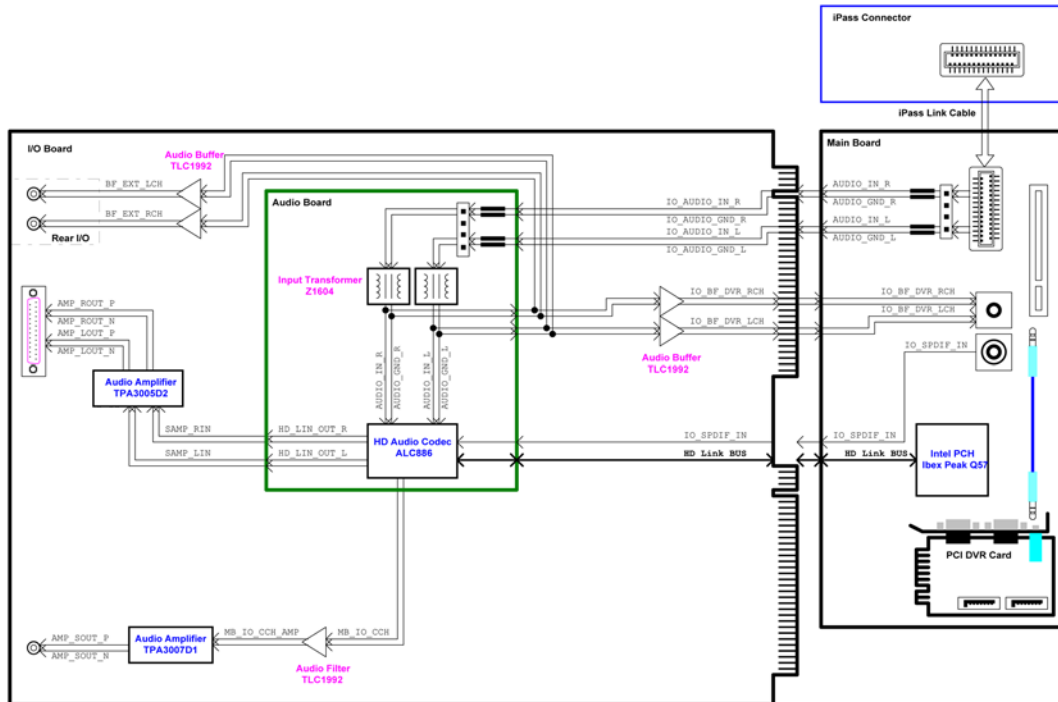
The BEP gets its power supply via the BEP Power Supply.

## 5-9-9 Input Signals

### BEP6:

- Audio signal path: GFI > FEP Backplane > BEP6 MBD > [a and b]  
 a: > IO Board > Audio Out  
 b: > DVR

Figure 5-38 Audio map - BEP6



## 5-9-10 Bi-directional signals

BEP6:

Table 5-13 BEP6 Bi-directional Signals

Signal Name	Description	Signal Path
PCIe	PCI Express	IPASS2 (BEP MBD) > Cable N (inside BEP) > J5 (BEP) > PCI Express Cable > GFI
Network	10/100/1000 Mbit	BEP MBD > IO > J46 (Rear Panel) (Routed via printed circuits on the cards.No cables are used.)

## 5-9-11 Outputs

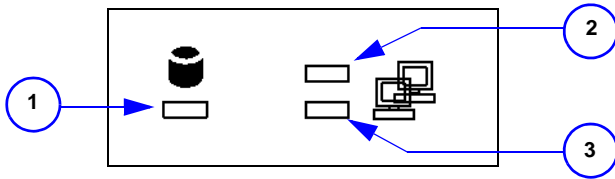
Table 5-14 Output Signals

Signal Name	Description	Signal Path
PSON_N		BEP POWER SUPPLY > Power Cable
DVI Out	Digital Video Interface Out	
AUDIO OUT (L)	Left channel	
AUDIO OUT (R)	Right channel	
AUDIO OUT (C)	Centre (Bass) channel	

**5-9-12 LEDs**

**5-9-12-1 LEDs on the BEP6 Front**

**Figure 5-39 Front Panel**



**Table 5-15 LEDs on the BEP's front**

ITEM	LED NAME	DESCRIPTION
1	ACT LED	<b>HD ACTIVITY</b> Blinks when the Hard Disk drive is active
2	SPD LED	<b>NETWORK SPEED</b> 10MBit: No Light 100 MBit: Amber Light 1000 Mbit: Green Light
3	ACT LED	<b>NETWORK ACTIVITY</b> Lit (green)

5-9-12-2 LEDs on the BEP6's Side Cover

Table 5-16 LEDs on the BEP6's Side Cover

DESCRIPTION	ILLUSTRATION
<p>The LEDs for the BEP6's Power Supply can be viewed without removing the BEP6's Front Cover</p> <p><b>Description of the LEDs (listed from the top):</b></p> <ul style="list-style-type: none"> <li>• ATX POWER OK</li> <li>• POWER ON</li> <li>• +3.3V</li> <li>• +5.5V STBY</li> <li>• +28V</li> <li>• +5V</li> <li>• POWER OK</li> <li>• +48V</li> <li>• +12V</li> </ul>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><b>REMOVE ALL OPTIONS (e.g. DVR, PATIENT I/O) BEFORE RETURNING TO SWAP</b></p> <p><b>BEP Rear</b></p> <ul style="list-style-type: none"> <li>J40 Customer USB</li> <li>J41 Customer USB</li> <li>Customer Audio</li> <li>J46 LAN</li> <li>10/100/1000</li> <li>J47 Customer Video Out</li> <li>J21 Upper LCD Video Out</li> <li>J22 M/I Out</li> <li>J23 SA1 DVD</li> <li>J24 SA2 SPARE</li> <li>J25 Test Connector</li> <li>J100 Op Panel Video</li> <li>J7 Op Panel Buttons</li> <li>J28 XYZ Motor</li> <li>J27 Spare</li> <li>J26 BW Printer</li> <li>J25 Spare</li> <li>J4 Main PS USB</li> <li>J14 Spare</li> <li>J29 Power Power</li> <li>J30 Power Power</li> <li>J33 Center</li> </ul> <p><b>BEP Face</b></p> <ul style="list-style-type: none"> <li>Reset</li> <li>On/Off</li> <li>J12 Options Dongle</li> </ul> <p><b>BEP Top</b></p> <ul style="list-style-type: none"> <li>J1 Main PS 48V, 5V In</li> <li>J5 Front End Rack (PCle to GFI)</li> </ul> <p><b>BEP Front</b></p> <ul style="list-style-type: none"> <li>SPD LED</li> <li>ACT LED</li> <li>ACT LED</li> </ul> <p><b>LED Legend:</b></p> <ul style="list-style-type: none"> <li>PLED2 ATX POWER OK</li> <li>PLED3 POWER ON</li> <li>PLED4 +3.3V</li> <li>PLED5 +5.5V STBY</li> <li>PLED6 +28V</li> <li>PLED1 +5V</li> <li>PLED7 POWER OK</li> <li>PLED2 +48V</li> <li>PLED2 +12V</li> </ul> <p><b>Pinouts:</b></p> <p>J22 pins of note:                      5 - PWR_SW                      6 - 5V_STDBY                      9-13 - 48V                      17, 22-25 - GND                      18 - PWR_LED_P                      21 - PWR_LED_N</p> <p>Test Connector pins of note:                      5, 13, 23 - Ground                      3 - 24V                      4 - 48V                      8 - 12V                      9 - 5V                      10 - AC_FAIL_N                      11 - 3.3V                      12 - 5V_STDBY                      16 - VBAT_TP (BEP 6.1 only)                      24 - PWR_SW                      25 - PSON_N</p> <p><b>WARNING:</b>                      J29-30 are for powering peripheral devices. They are not keyboard/mouse ports and will destroy any keyboard or mouse that is plugged into them.</p> <p><b>Power Pinout:</b>                      1, 2 - GND                      3, 5 - 12V                      4, 6 - 5V</p> <p style="text-align: right;">2000019305 Rev. 02</p> </div>

## 5-9-13 BEP Power Supply

### 5-9-13-1 Description

- BEP6.0 Power Board Assembly

*NOTE: The BEP Power Supply does not handle AC voltages.*

The BEP Power Supply receives its input DC voltage from the VIVID E9 / VIVID E7's Main Power Supply.

Dedicated control signals, are used for controlling the BEP Power Supply.

### 5-9-13-2 BEP6 Power Board Assembly Block Diagram

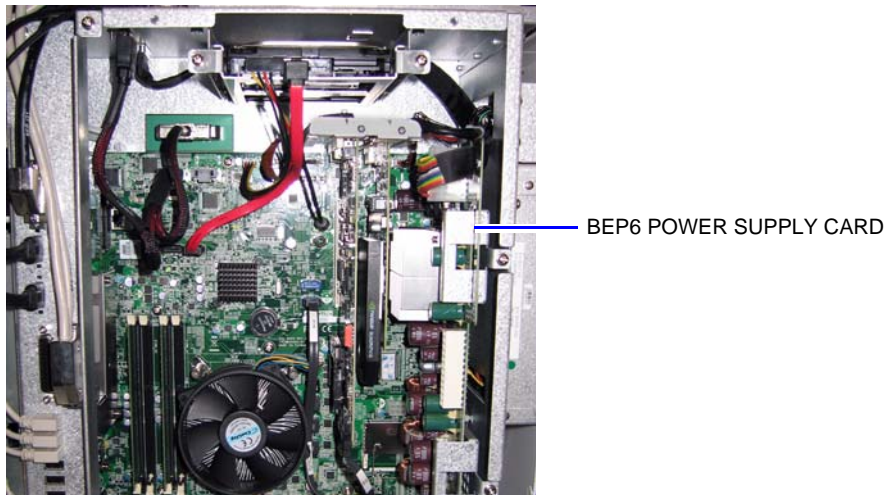
Table 5-17 BEP6 Power Supply Block Diagram

ITEM	DESCRIPTION	ILLUSTRATION
1.	This connector is not used in the VIVID E9 / VIVID E7.	<p>The diagram shows a vertical power board with four connectors: PCN 2 at the top, PCN 4 in the middle, PCN 3 below it, and PCN 1 at the bottom. PCN 2 is connected to a 48V input and provides 48V, ACFAIL, and 5V STBY signals. PCN 4 provides 48V, 5vDUAL, and control signals. PCN 3 provides 48V, Vbat, and control signals. PCN 1 provides 48V, Vbat, 5vDUAL, and ACFAIL signals. Internal components include a 48V TO 28V CONVERT, a 28V/BAT SOURCE SELECT, and three 28V TO converters (12v, 5v, 3.3v).</p>
2.	<p><b>PCN 2</b></p> <ul style="list-style-type: none"> <li>• +48 VDC from Main Power Supply &gt; "POWER CABLE – BEP 48V" (GA200715) &gt; connector J1 (on top of BEP6) &gt; PCN 2.</li> <li>• Control signals: ACFAIL and 5V STBY.</li> </ul>	
3.	<p><b>PCN 3</b></p> <p>This plug fits into the connector CN PWR2 on the BEP6's motherboard.</p> <ul style="list-style-type: none"> <li>• +12 VDC to the BEP6 motherboard.</li> <li>• + 5VDC to the BEP6 motherboard.</li> <li>• +3.3VDC to the BEP6 motherboard.</li> </ul>	
4.	<p><b>PCN 4</b></p> <p>This plug fits into the connector CN PWR1 on the BEP6's motherboard.</p> <ul style="list-style-type: none"> <li>• +48 VDC to the BEP6 motherboard.</li> <li>• Control signals: ACFAIL, 5V STBY and 5vDUAL</li> </ul>	

### 5-9-13-3 Location in the BEP6

The BEP6 Power Supply Card is located inside the BEP6, at the right-hand side (when opening the BEP).

Figure 5-40 BEP6 Power Supply Card location



- 5-9-13-4 Input Voltage**  
+48 VDC from the Main Power Supply.

**5-9-13-5 Output Voltages**

- +48V
- +12V
- +5V
- +3.3V
- +5Vstby

**5-9-13-6 LEDs on BEP6 Power Supply**

Nine LEDs on the BEP6 Power Supply can be viewed through holes in the BEP6 Front Cover.

For description of the LEDs, refer to the label on the BEP6's Front Cover or to:  
[5-9-12-2 "LEDs on the BEP6's Side Cover" on page 5-59.](#)



**5-9-14 IO Board****5-9-14-1 General description**

Different I/O Boards are used for BEP6 and BEP5:

- The BEP6 I/O Board has *two* connectors for connection to the BEP6 Motherboard.

The IO Board is interfacing between the:

- BEP and the connectors on the rear side of VIVID E9 (video/audio/USB)
- BEP and the Top Console
- BEP and the internal printer
- Audio for the speakers, the rear plugs and the DVR
- (BEP5 I/O ONLY) Boundary Scan from the BEP to boards in the Front End Card Rack

**5-9-14-2 Location in the unit**

At the rear of the BEP with the Rear panel available at the rear of the VIVID E9 / VIVID E7.

**5-9-14-3 Input DC voltages**

Internal in BEP from the BEP Power Supply.

## **5-9-15 Graphics Adapter**

### **5-9-15-1 General Description**

The Graphics Adapter converts the display data to video signals for the LCD (Main) screen, for the LCD/Touch screen and for the external video output on the rear of the VIVID E9 / VIVID E7.

### **5-9-15-2 Location in the Unit**

The Graphics Adapter is located in the PCI Express slot (PCI Express x16) inside the BEP cabinet.

### **5-9-15-3 Input Signals**

- Graphics data from the BEP (via the BEP's motherboard).

### **5-9-15-4 Output Signals**

- DVI to the LCD screen (main screen).
- Video to the external output on the rear of VIVID E9 / VIVID E7.

## **5-9-16 Internal Storage Devices**

VIVID E9 / VIVID E7 has these internal storage devices:

- SATA (Serial ATA) Hard Disk Drive (HDD) inside the Back End Processor cabinet (size: 160 GB, or more)
- CD/DVD drive available from front of VIVID E9 / VIVID E7. ONLY CD-R discs and DVD-R recordable discs are supported.
- The optional DVR uses DVD+RW discs.

## Section 5-10 Power distribution

### 5-10-1 Purpose of this section

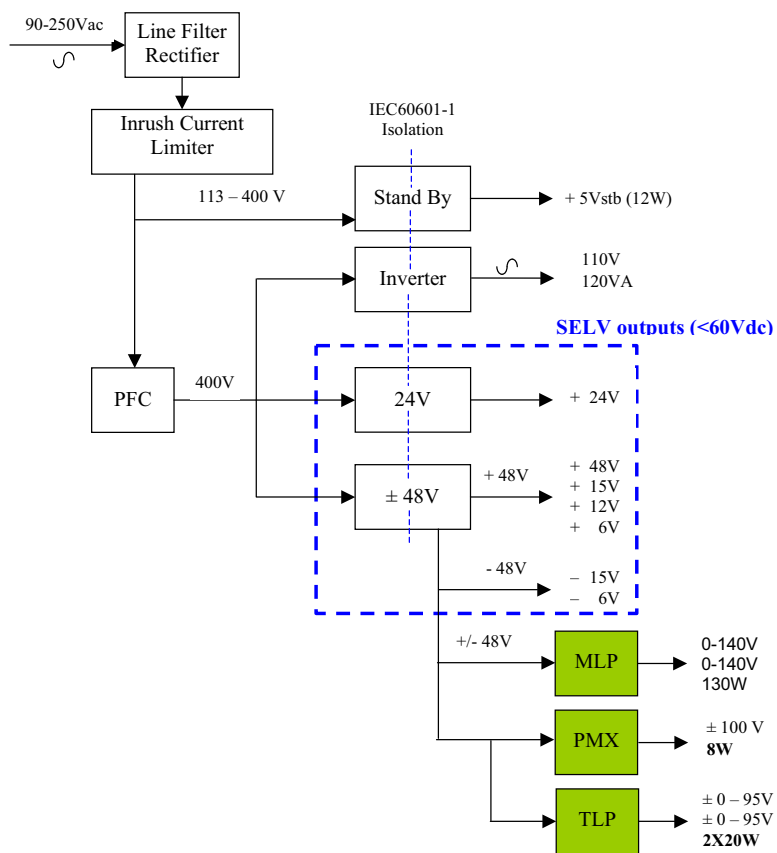
The power distribution within the VIVID E9 / VIVID E7 is described in this section.

### 5-10-2 Main Power Supply

#### 5-10-2-1 General description

The Main Power Supply's main task is to galvanically isolate the scanner from the on-site Mains Power System and to supply the various internal subsystems with AC or DC power.

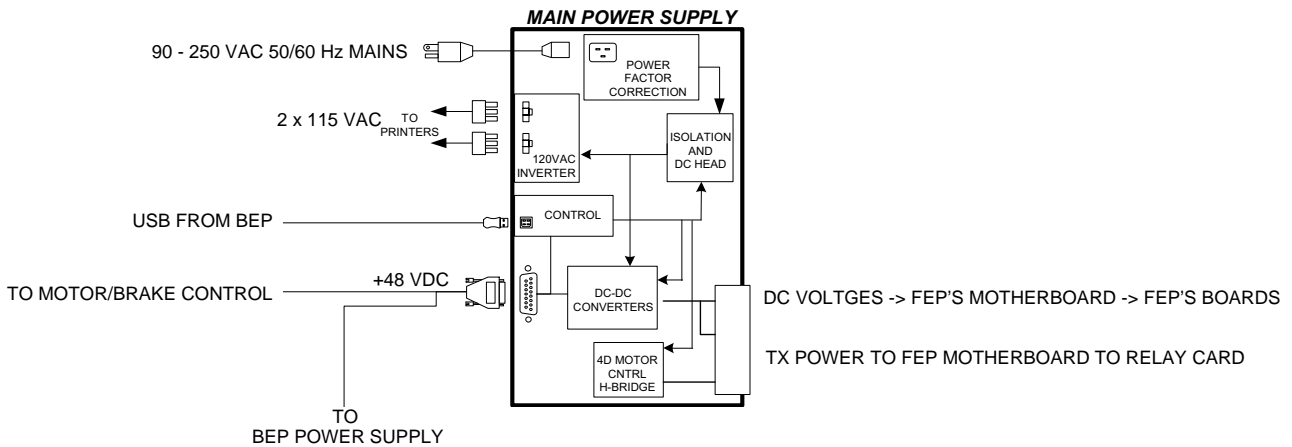
Figure 5-41 Main Power Supply Principle



5-10-2-1 General description (cont'd)

Power from the wall outlet (100 VAC to 230 VAC, 50/60 Hz) is connected to the Main Power Supply.

Figure 5-42 Main Power Supply block diagram



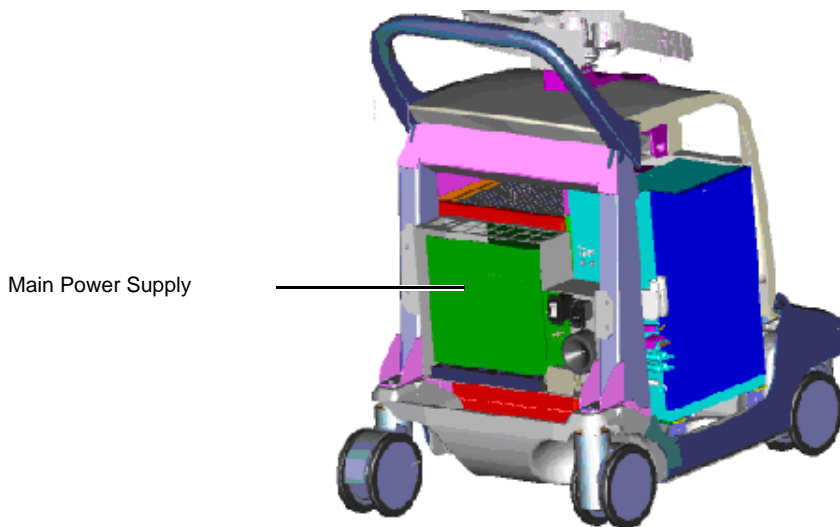
The Main Power Supply delivers the needed voltages to the rest of the system:

- Internal Peripherals (115 VAC)
- Front End Rack (DC power with several voltages)
  - +24 VDC
  - +/- 15 VDC
  - +11 VDC
  - +/-6V VDC
- Front End Rack (TXPSV1 and TXPSV2 for the transmitters)
- Front End Rack (PMXVOUT for the probe channel multiplexers)
- Back End Processor (48 VDC)
- Operator Panel, LCD, XYZ motors (48 VDC)

**5-10-2-1 General description (cont'd)**

The mains cord has plugs in both ends. A female plug connects to the scanner and a male plug to the wall outlet.

**Figure 5-43 Main Power Supply**



**5-10-2-2 Temperature Control**

The Main Power Supply is equipped with an internal fan with variable speed for temperature control. Both the temperature of the air entering the power supply and leaving the power supply are measured. The fan is controlled by software.

**5-10-2-3 Input**


Mains Power, 100 VAC to 230 VAC, 50/60 Hz

**Figure 5-44 L1 - Mains Inlet connector**



5-10-2-4 Bidirectional Signals  
USB bus

Table 5-18 USB connector

DESCRIPTION		COMMENTS
	PIN	SIGNAL NAME
	1	VCC
	2	D-
	3	D+
	4	GND
		Originates on the BEP. The USB is used to set the power supply to the correct transmit (XD) voltages.

5-10-2-5 Outputs

Table 5-19 Power outputs sheet 1 of 2

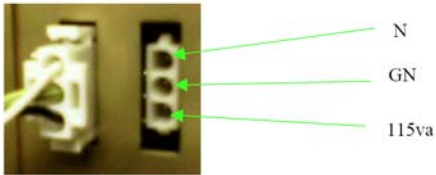
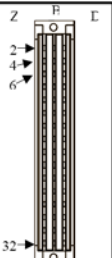
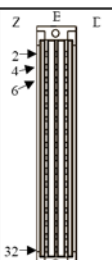
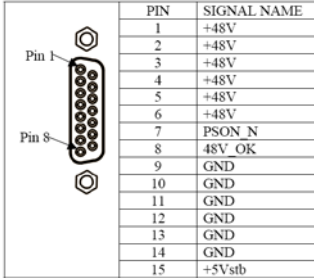
CONNECTOR	DESCRIPTION	COMMENTS																																																																							
P2	115 VAC OUT ON TWO CONNECTORS 	PERIPHERALS (B/W PRINTER)																																																																							
P3	Card Rack Connector  <table border="1"> <thead> <tr> <th rowspan="2">PIN Number</th> <th colspan="3">SIGNAL NAME</th> </tr> <tr> <th>Z</th> <th>B</th> <th>D</th> </tr> </thead> <tbody> <tr><td>2</td><td>TSV1/TxPS1P</td><td>TSV1/TxPS1P</td><td>TSV1/TxPS1P</td></tr> <tr><td>4</td><td>TSV2/TxPS2P</td><td>TSV2/TxPS2P</td><td>TSV2/TxPS2P</td></tr> <tr><td>6</td><td>GND</td><td>GND</td><td>GND</td></tr> <tr><td>8</td><td>TSV2/TxPS2N</td><td>TSV2/TxPS2N</td><td>TSV2/TxPS2N</td></tr> <tr><td>10</td><td>TSV1/TxPS1N</td><td>TSV1/TxPS1N</td><td>TSV1/TxPS1N</td></tr> <tr><td>12</td><td>GND</td><td>GND</td><td>GND</td></tr> <tr><td>14</td><td>TSON_STRB</td><td>CW_SPR1</td><td></td></tr> <tr><td>16</td><td>V_LEVEL_OK</td><td>4D_STB</td><td>PMXVOUTN</td></tr> <tr><td>18</td><td>TS-OK</td><td>GND</td><td>PMXVOUTP</td></tr> <tr><td>20</td><td>SPARE</td><td>4D_SPARE1</td><td></td></tr> <tr><td>22</td><td>GND</td><td>4D_VOL_TRIG</td><td>4D_STA</td></tr> <tr><td>24</td><td>4D_RESET_N</td><td>4D_VOL_DIR</td><td>4D_HALL</td></tr> <tr><td>26</td><td>GND</td><td>4D_FRAME_TRIG</td><td>4D_COS_DRV</td></tr> <tr><td>28</td><td>GND</td><td>GND</td><td>4D_COS_RTN</td></tr> <tr><td>30</td><td>4D_SPARE2</td><td>GND</td><td>4D_SIN_DRV</td></tr> <tr><td>32</td><td></td><td></td><td>4D_SIN_RTN</td></tr> </tbody> </table>	PIN Number	SIGNAL NAME			Z	B	D	2	TSV1/TxPS1P	TSV1/TxPS1P	TSV1/TxPS1P	4	TSV2/TxPS2P	TSV2/TxPS2P	TSV2/TxPS2P	6	GND	GND	GND	8	TSV2/TxPS2N	TSV2/TxPS2N	TSV2/TxPS2N	10	TSV1/TxPS1N	TSV1/TxPS1N	TSV1/TxPS1N	12	GND	GND	GND	14	TSON_STRB	CW_SPR1		16	V_LEVEL_OK	4D_STB	PMXVOUTN	18	TS-OK	GND	PMXVOUTP	20	SPARE	4D_SPARE1		22	GND	4D_VOL_TRIG	4D_STA	24	4D_RESET_N	4D_VOL_DIR	4D_HALL	26	GND	4D_FRAME_TRIG	4D_COS_DRV	28	GND	GND	4D_COS_RTN	30	4D_SPARE2	GND	4D_SIN_DRV	32			4D_SIN_RTN	FRONT END PROCESSOR - The 'TSON_STRB' signal is a watchdog for the Transmit Signal (TS).
PIN Number	SIGNAL NAME																																																																								
	Z	B	D																																																																						
2	TSV1/TxPS1P	TSV1/TxPS1P	TSV1/TxPS1P																																																																						
4	TSV2/TxPS2P	TSV2/TxPS2P	TSV2/TxPS2P																																																																						
6	GND	GND	GND																																																																						
8	TSV2/TxPS2N	TSV2/TxPS2N	TSV2/TxPS2N																																																																						
10	TSV1/TxPS1N	TSV1/TxPS1N	TSV1/TxPS1N																																																																						
12	GND	GND	GND																																																																						
14	TSON_STRB	CW_SPR1																																																																							
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PIN Number	SIGNAL NAME																																																																								
	Z	B	D																																																																						
2	GND	GND	GND																																																																						
4	+6V	+6V	+6V																																																																						
6	GND	GND	GND																																																																						
8	-6V	-6V	+6V																																																																						
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Table 5-19 Power outputs (cont'd) sheet 2 of 2

CONNECTOR	DESCRIPTION	COMMENTS																																
P5	+48 VDC 15PIN SUBD FEMALE  <table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>PIN</th> <th>SIGNAL NAME</th> </tr> </thead> <tbody> <tr><td>1</td><td>+48V</td></tr> <tr><td>2</td><td>+48V</td></tr> <tr><td>3</td><td>+48V</td></tr> <tr><td>4</td><td>+48V</td></tr> <tr><td>5</td><td>+48V</td></tr> <tr><td>6</td><td>+48V</td></tr> <tr><td>7</td><td>PSON_N</td></tr> <tr><td>8</td><td>48V_OK</td></tr> <tr><td>9</td><td>GND</td></tr> <tr><td>10</td><td>GND</td></tr> <tr><td>11</td><td>GND</td></tr> <tr><td>12</td><td>GND</td></tr> <tr><td>13</td><td>GND</td></tr> <tr><td>14</td><td>GND</td></tr> <tr><td>15</td><td>+5Vstb</td></tr> </tbody> </table>	PIN	SIGNAL NAME	1	+48V	2	+48V	3	+48V	4	+48V	5	+48V	6	+48V	7	PSON_N	8	48V_OK	9	GND	10	GND	11	GND	12	GND	13	GND	14	GND	15	+5Vstb	BACK END PROCESSOR AND MOTOR POWER  - The '48V_OK' indicates that the 48 VDC measured on the BEP, is OK. - The '+5Vstb' is always ON, and is connected to the BEP's motherboard and to the light in the ON/OFF button on the Operator Panel.
PIN	SIGNAL NAME																																	
1	+48V																																	
2	+48V																																	
3	+48V																																	
4	+48V																																	
5	+48V																																	
6	+48V																																	
7	PSON_N																																	
8	48V_OK																																	
9	GND																																	
10	GND																																	
11	GND																																	
12	GND																																	
13	GND																																	
14	GND																																	
15	+5Vstb																																	
P6	See: <a href="#">Table 5-18 "USB connector" on page 5-68.</a>	BACK END PROCESSOR																																
P7	GND STUD	GROUND STUD																																

**5-10-2-6 Fuses**

Ceramic body fuses inside the power supply. (Only to be replaced by the Main Power Supply manufacturer.)

**Fuses data:**

- 15 A Fast Acting type

**5-10-2-7 Current limiter, over-voltage protection and temperature watch-dog**

A current limiter will switch off the power if any of the outputs are overloaded.

Over-voltage Protection is provided for these voltages:

- + 3.3 V
- + 5 Vd
- +/- 5 Va
- +/- 15 Va

Voltage will be turned off if the temperature grows too high (temperature watch-dog).

## 5-10-3 Power Up Sequence Description

### 5-10-3-1 Overview

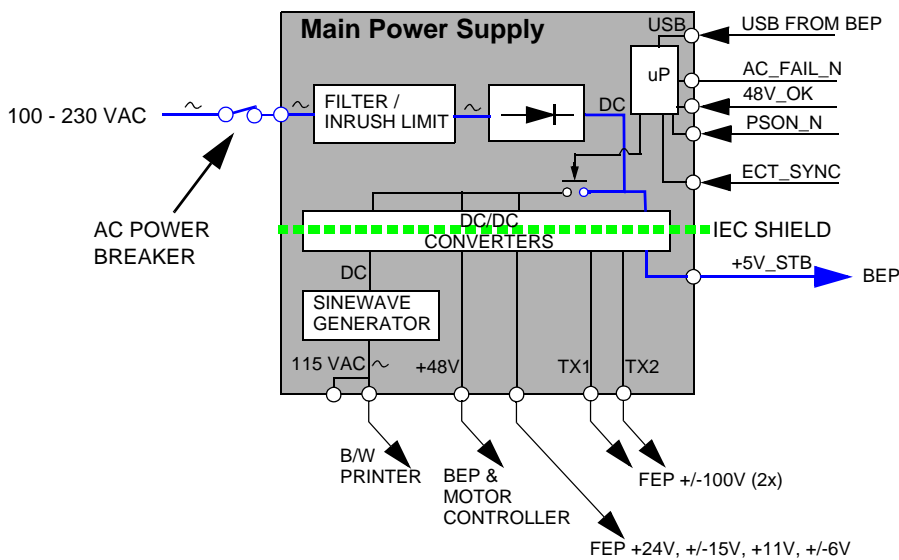
The Power Up Sequence can be divided in the following steps:

- 1.) Connect the mains power to the VIVID E9 / VIVID E7 and switch AC Breaker to ON position.
- 2.) Press the ON button on the Operator Panel.
- 3.) BEP (and system) power-up.

### 5-10-3-2 AC Breaker to ON position

Connect the mains power to the VIVID E9 / VIVID E7 and switch AC Breaker to ON position:

Figure 5-45 AC Breaker turned ON



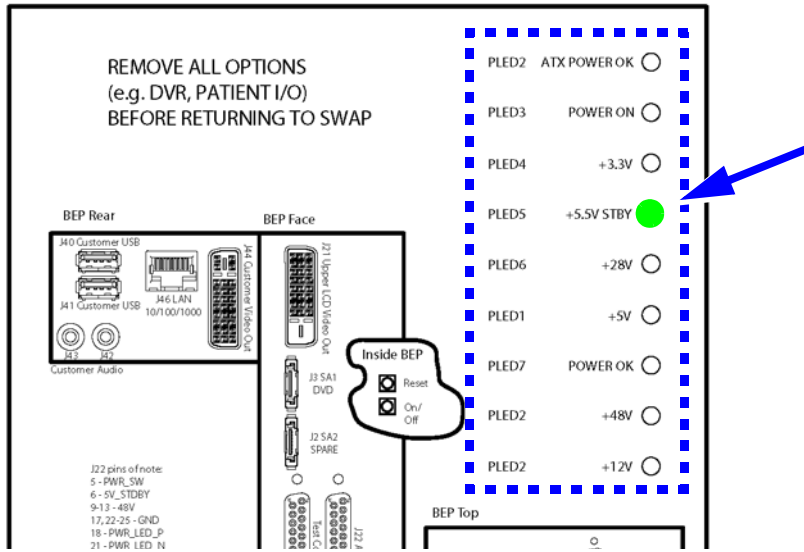
- The fans inside the Main Power Supply starts on a high speed and then settle to a lower speed.
- +5V\_STB (+5V DC Standby) power to BEP is turned on. It also gives power to the ON/OFF switch on the OP so it can be used.



5-10-3-2 AC Breaker to ON position (cont'd)

- The 5Vstdby LED is lit (green).

Figure 5-46 LEDs on BEP6 Power Supply (standby)

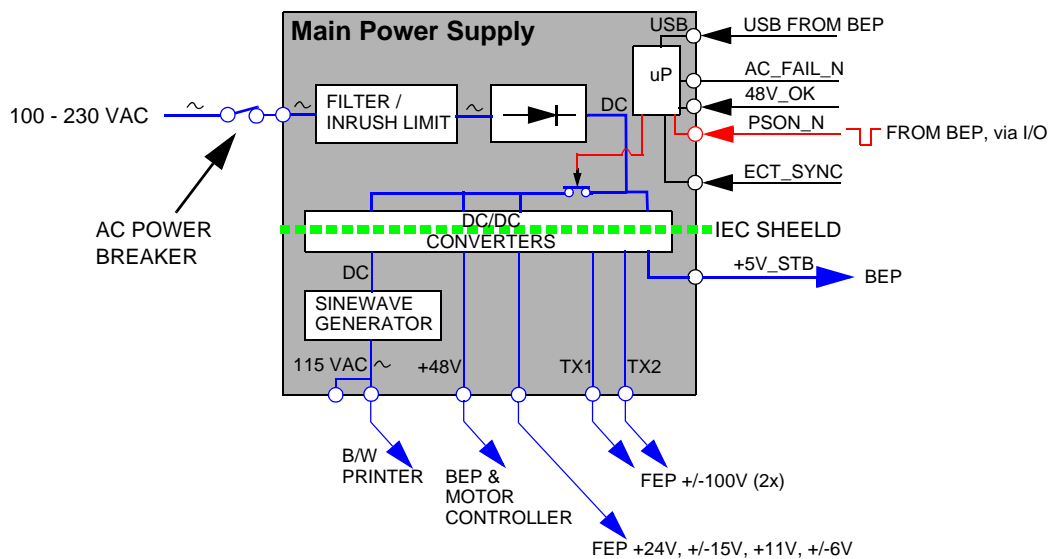


- The ON/OFF switch on the OP is lit (amber color).
- One green LED (LED-1) on the BEP's motherboard is lit.

**5-10-3-3 The ON/OFF button on the Operator Panel has been pressed**

When the ON/OFF switch is depressed, the BEP power is delivered to the different parts of the system so it can start the boot sequence:

**Figure 5-47 ON has been depressed**

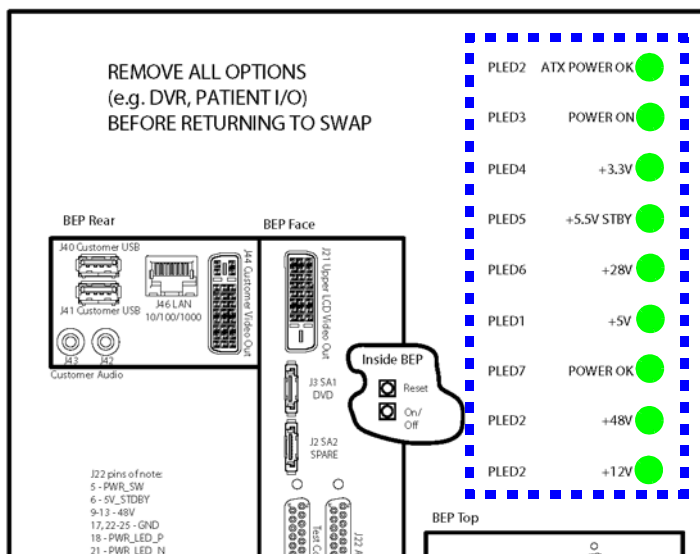


- The fans below the Front End Card Rack starts.
- The lights in the alphanumeric keyboard and in the Lower OP panel are turned on.
- AC Power to the B/W printer is turned on.

**5-10-3-3 The ON/OFF button on the Operator Panel has been pressed (cont'd)**

- Power to the BEP is turned on, so it can start to boot.

**Figure 5-48 LEDs on BEP6 Power Supply (powered)**



- Power to the Front End rack (FEP) is turned on and the LEDs on the cards in the Front End are lit (or start blinking).

**5-10-3-4 BEP Power-up**

As soon as the BEP Power Supply gets power from the Main Power Supply, the different voltages needed for the BEP are turned on and the BEP starts to boot:

- 1.) The BIOS is loaded.
- 2.) If present, the DVD drive is checked for a bootable disc. The USB ports are scanned for bootable media (UFD). If a UFD is found, the BEP starts to boot from the UFD.
- 3.) If no bootable removal media was found, the BEP starts to load the current System Software from the HDD and then the current Application Software.
- 4.) As soon as the software has been loaded, either a 2D screen is displayed on the screen, indicating that a probe has been connected, or a No Mode screen is displayed, indicating that no probe has been connected.

## **5-10-4 Power Down Sequence description**

### **5-10-4-1 Overview**

There are three possible scenarios for Power Down of the unit:

- Power Down
- Forced Power Down
- Power Loss

Each of the scenarios are described below.

### **5-10-4-2 Power Down**

Press the ON/OFF button (for a short time)

- 1.) BEP detects the contact of Power (ON/OFF) switch.
- 2.) PSON\_N goes high. This trigs the Main Power Supply to shut down the output voltages.
- 3.) Controller ACFAIL\_N output signal goes low.
- 4.) Controller TS\_OK output signal goes low.
- 5.) Controller turns OFF the TS (Transmit) voltages.
- 6.) Controller turns OFF the PMX (Probe MUX) voltages.
- 7.) Controller turns OFF voltages +/-15, +/-6, +11V, +24V.
- 8.) ACFAIL\_N output signal goes high.
- 9.) Controller turns OFF +48V.

**5-10-4-3 Forced Power Down**

*NOTE:* In case of total lockup of the system, hold the ON/OFF button down a few seconds to turn the system off.

Forced Power Down is initiated by depressing the ON/OFF button on the keyboard for a few seconds, until the power down sequence starts:

- 1.) BEP detects long-term contact of Power (ON/OFF) switch.
- 2.) PSON\_N goes high. This trigs the Main Power Supply to shut down the output voltages.
- 3.) Controller ACFAIL\_N output signal goes low.
- 4.) Controller TS\_OK output signal goes low.
- 5.) Controller turns OFF the TS (Transmit) voltages.
- 6.) Controller turns OFF the PMX (Probe MUX) voltages.
- 7.) Controller turns OFF voltages +/-15, +/-6, +11V, +24V.
- 8.) ACFAIL\_N output signal goes high.
- 9.) Controller turns OFF +48V.

**5-10-4-4 Power Loss**

A power loss may be due to:

- The Mains Switch has been switched to OFF
- The Mains cable has been disconnected
- Brown-out or power loss (burnout)

If a power loss (or error) occur, all power distribution within the unit is lost.

*NOTE:* This shut down sequence will typically be less than 1 second from the power failure is detected to all voltages have been shut down.

## Section 5-11 Input and Output (I/O) modules

### 5-11-1 Purpose of this section

This section describes the input/output modules on VIVID E9 / VIVID E7.

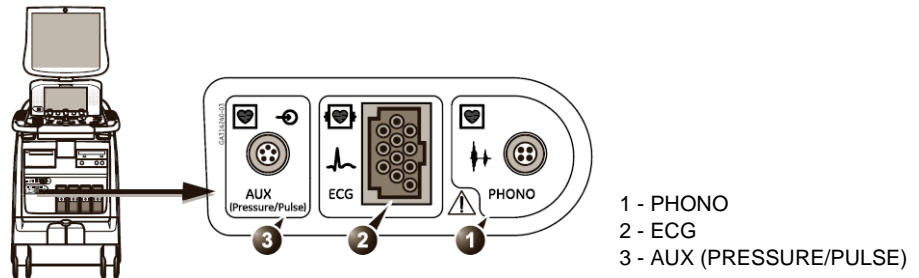
### 5-11-2 Patient I/O (Physio)

#### 5-11-2-1 General description

**NOTE:** *The ECG functionality of the Patient I/O module is not intended for patient monitoring nor to support alarm functionality. This input is intended as a tool for easier synchronization of images and cineloop control during ultrasound examinations.*

The Patient I/O panel is located on the front of VIVID E9 / VIVID E7.

**Figure 5-49 Patient I/O Panel**



The Patient IO contains the electronics for:

- Analog inputs - AUX (Pressure/Pulse)
- Phono
- ECG/Respiration

**5-11-2-1 General description (cont'd)**

The three inputs are separately isolated due to safety requirements.

The module extracts respiration from ECG signals from the ECG/Respiration input.

The scanned image that is displayed, is synchronized with the ECG, respiration and phono traces. In M-Mode or Doppler, the traces are synchronized to that particular mode's sweep. The operator can control the gain, the position and the sweep rate of the traces using the assignable controls.

AUX is capable of handling a pulse/pressure signal.

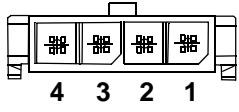
**5-11-2-2 Patient I/O Location**

The Patient I/O is located at the front of the Back End Processor with the connector panel available from the front of the Ultrasound system.

- 5-11-2-3 Input DC Voltages**  
 +5 VDC  
 +12 VDC

***Pinout for the DC input on the Patient I/O module***

**Table 5-20 DC input pinout on the Patient I/O Module**

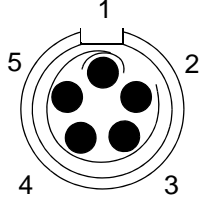
CONNECTOR	SIGNAL NAME
	<p style="text-align: center;"><b>DC INPUT</b></p> <ul style="list-style-type: none"> <li>• Pin 1: +12VDC</li> <li>• Pin 2: GND</li> <li>• Pin 3: GND</li> <li>• Pin 4: +5VDC</li> </ul>

- 5-11-2-4 Patient I/O - inputs**
- ECG / Respiration
  - Phono (from a phono heart microphone)
  - AUX - Analog Input (Pulse/Pressure)

***Pinout for the AUX connector***

The pinout for the AUX connector is described in the table below:

**Table 5-21 Pinout for the AUX Connectors**

CONNECTOR	SIGNAL NAME
	<p style="text-align: center;"><b>AUX</b></p> <ul style="list-style-type: none"> <li>• Pin 1: Input -</li> <li>• Pin 2: Input +</li> <li>• Pin 3: Gnd</li> <li>• Pin 4: Nasal Sensor 1</li> <li>• Pin 5: Nasal Sensor 2</li> </ul>

The AUX is default a 1 Vpp (Volt peak-to-peak) input with a max frequency of 300 Hz. It has a programmable high gain mode with a maximum input signal of 300 mVpp (millivolt peak-to-peak).

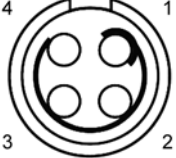
The inputs are differential. For a single ended sensor signal, the pin 1 (input -) should be connected to the GND of the sensor.



5-11-2-4 Patient I/O - inputs (cont'd)

*Pinout for the PHONO connector*

Table 5-22: Pinout for the PHONO connector

CONNECTOR (seen from front of connector)	SIGNAL NAME
	<p><b>PHONO</b></p> <ul style="list-style-type: none"> <li>• Pin 1: PCG (HI-Z signal)</li> <li>• Pin 2: GND</li> <li>• Pin 3: GND</li> <li>• Pin 4: +12V<sub>DC</sub></li> </ul>

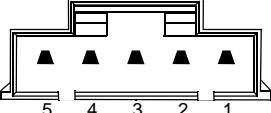
5-11-2-5 Patient I/O - outputs

USB2:

- Digital Trace Data
- Module ID PROM communication

*Pinout for the USB outlet on the Patient I/O module*

Table 5-23 USB outlet on the Patient I/O Module

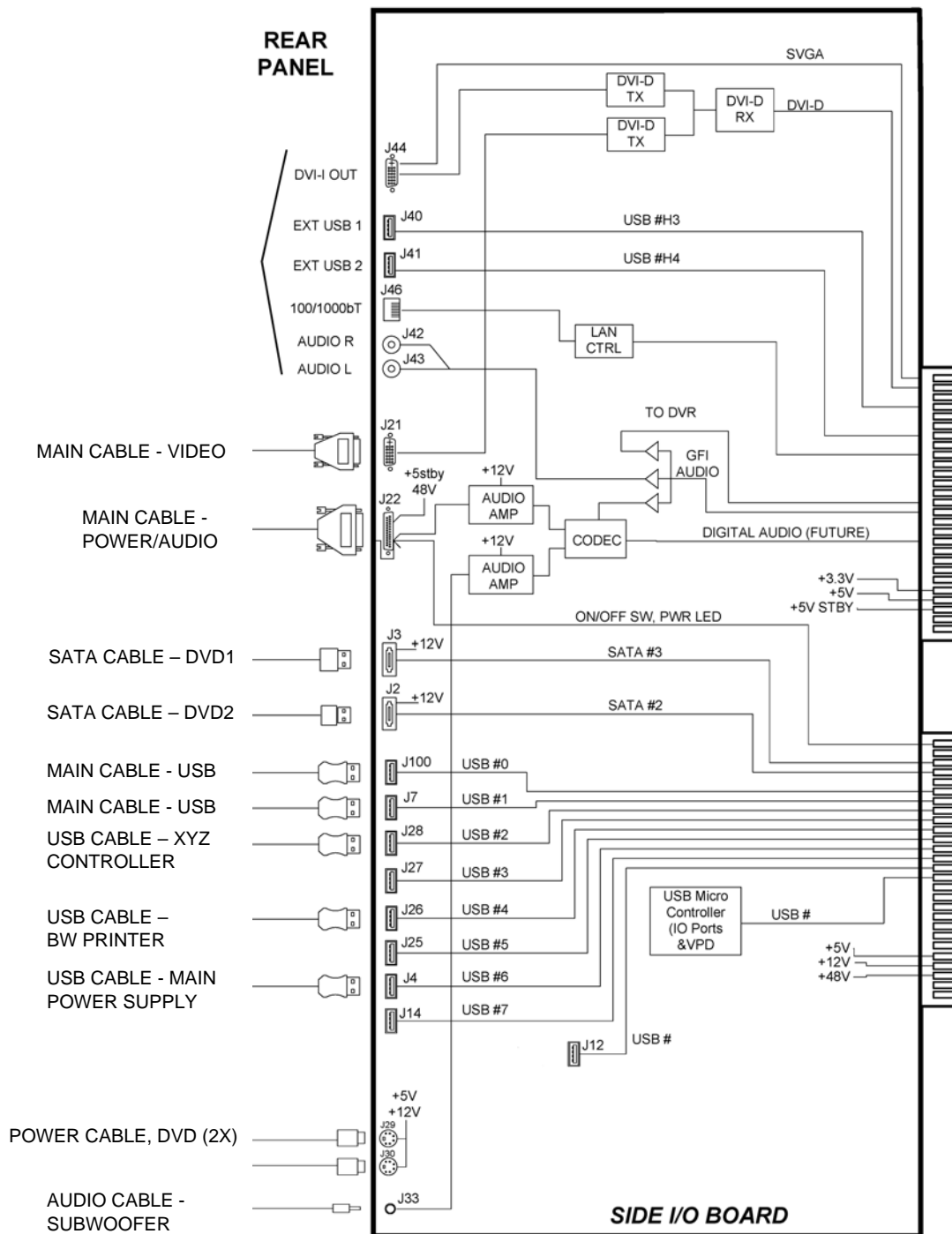
CONNECTOR	SIGNAL NAME
	<p style="text-align: center;"><b>USB 2</b></p> <ul style="list-style-type: none"> <li>• Pin 1: +5V (NOT USED BY PATIENT I/O)</li> <li>• Pin 2: D-</li> <li>• Pin 3: D+</li> <li>• Pin 4: GND</li> <li>• Pin 5: GND</li> </ul>

### 5-11-3 BEP6 I/O Board

#### 5-11-3-1 General description

BEP6's I/O board is the interface between the BEP and the rest of the system. It distributes USB to the Rear IO, the OP and to internal units (printer and Patient IO). It distributes SATA to the DVD(s). It splits video between the main monitor and rear video output. It also distributes audio to speakers and rear connectors.

Figure 5-50 BEP6's I/O Board Block Diagram



**5-11-3-2 Location in the Unit**

The I/O board is located inside the BEP with some connectors available on the rear of the system.

**5-11-3-3 Input signals**

- Supply voltage of 5V and 12V from BEP (and BEP Power Card).
- 5V STDBY from the BEP (and BEP Power Card) for OPIO (pass through).
- PWR\_ON signal from the Operator Panel to the BEP's Motherboard (pass through).
- Two USB ports for OP Panel (pass through)
- Two USB ports for the Rear IO
- One USB port for internal B/W printer
- One USB port for XYZ Controller
- Some unused USB ports
- Doppler audio (originating on the GFI board)
- Doppler audio mixed with Windows system sounds from BEP's motherboard
- DVI-I input from the BEP (from the Graphics Adapter or onboard video controller, or from the DVR Board).

**5-11-3-4 Output signals**

- 12V DC and 5V DC for Patient IO, DVD drive and HDD.
- 5V STDBY from the BEP power supply card for OPIO (pass through)
- USB ports
- Audio to the OP Panel for the speakers.
- External Audio outputs
- Audio to the woofer (center speaker)
- DVI-D output for Main Monitor (Digital Video)
- DVI-I output for External Monitor (only the Digital Video Signal is included)

**5-11-4 Probe Connectors**

The probe connectors are mounted on the Relay board.

## Section 5-12 Peripherals overview

### 5-12-1 Internal peripherals

#### 5-12-1-1 DVD Drive (Option on XDclear)

The DVD Drive is available from the front of the VIVID E9 / VIVID E7.

#### 5-12-1-2 Digital Video Stream Recorder (DVR (Option))

This is a kit with a Video Recorder Card inside the BEP and a DVD R/W unit used for export of the recorded video.

The DVD R/W unit is available from the front of the VIVID E9 / VIVID E7.

*NOTE: The DVD drive used for video recording, supports DVD+R/W.*

#### 5-12-1-3 Black & White Digital Graphic Printer

The B/W Printer is available from the front of the VIVID E9 / VIVID E7.

## 5-12-2 External peripherals

### 5-12-2-1 Footswitch

A three-button, wired footswitch can be connected to one of the USB ports at the rear side of the VIVID E9 / VIVID E7.



**CAUTION TO AVOID DAMAGE OF THE CABLE, KEEP THE CABLE AWAY FROM THE WHEELS. DISCONNECT THE FOOTSWITCH BEFORE MOVING THE SYSTEM.**

### 5-12-2-2 External Color Printer (Option)

A color video printer can be connected to the USB port on the rear of the VIVID E9 / VIVID E7.

### 5-12-2-3 USB Flash Drive (USB Flash Card) (option)

Due to the EMC requirements, only USB Flash Cards tested for use with VIVID E9 / VIVID E7 may be used.

For a list of available USB Flash Cards, see: [9-15-6 "USB Flash Drive \(UFD\) for data storage" on page 9-53.](#)

The following USB Flash Cards (USB Memory keys) have also been tested and approved for use with Vivid E9 / Vivid 7 but are out-of-stock:

- USB Memory Key 2GB Trancend (USB 2.0)
- The following USB Flash Cards, approved for Vivid 7, may also be used on the VIVID E9 / VIVID E7, but are not available for sale anymore:
  - Kingston DataTraveler Elite 256 MB
  - Sandisk Cruzer Micro 256 MB
  - Twin MOS K24-256MB Mobile Disk III
  - JMtek USB-Drive 256 MB

### 5-12-2-4 Ethernet

- Ethernet is connected to the I/O panel (BEP I/O board) on the rear of the VIVID E9 / VIVID E7. Printers and external servers may be available via the Ethernet network.

### 5-12-2-5 Network printers

For more information, see: [3-6-4-3 "External Peripherals \(Optional\) for Connection to Ethernet \(TCP/IP Network\)" on page 3-34.](#)

## **Section 5-13**

### **Product manuals**

The information needed to use and service the VIVID E9 / VIVID E7 scanner is collected in the documents described in this section.

#### **5-13-1 User documentation**

- VIVID E9 / VIVID E7 user manuals
- Reference manual
- Medical Ultrasound Safety - AIUM
- Special Probes user guide (delivered with the respective probes)

#### **5-13-2 Service documentation**

- Service Manual
- Unpacking/Packing Procedure

## Section 5-14 Common Service Desktop overview

### 5-14-1 Purpose of this section

This section describes the Common Service Desktop, as implemented on the VIVID E9 / VIVID E7.

### 5-14-2 Introduction

The Service Platform contains a set of software modules that are common to all ultrasound and cardiology systems containing a PC backend. This web-enabled technology provides linkage to e-Services, e-Commerce, and the iCenter, making GE's scanners more *e-enabled* than ever.

### 5-14-3 *iLinq* Interactive Platform Features

Many of the services of the Common Service Desktop come from its integration with *iLinq*. The following sections contain a brief introduction of *iLinq*'s features.

#### 5-14-3-1 Web Server/Browser

The Service Platform and other Service software use the *iLinq* web server and the Internet Explorer browser.

#### 5-14-3-2 Connectivity

*NOTE:* This feature that allow the customer to contact the GE OnLine Center are available for Warranty and Contract customers only.

This feature provides basic connectivity between the scanner and the OnLine Center (OLC).

#### 5-14-3-3 Contact GE

*NOTE:* This feature that allow the customer to contact the GE OnLine Center are available for Warranty and Contract customers only.

Allows for an on-screen one-touch button used to contact the OnLine Center and describe problems with their scanner in an easy and convenient way.

#### 5-14-3-4 Interactive Application

The main application is displayed in the form of HTML pages whenever the browser starts. This is the entry point for any user to start any *iLinq* application.

## **5-14-4 Global Service User Interface (GSUI)**

### **5-14-4-1 Internationalization**

The user interface provided by the service platform is designed for GE personnel and as such is in English only. There is no multi-lingual capability built into the Service Interface.

### **5-14-4-2 Service Login**

Select the phone icon in the status bar at the bottom of the scan display screen.

This icon links the user or the Field Engineer (FE) to the service login screen.



**5-14-4-3 Access / Security**

The service interface has different access and security user levels. Each user is only granted access to the tools that are authorized for their use.

**Table 5-24 Access Authorization**

USER LEVEL	ACCESS AUTHORIZATION	PASSWORD
Operator	Authorized access to specified diagnostics, error logs and utilities. Same acquisition diagnostic tests as GE Service.	uls
Administrator		uls
External Service		gogems

Every access request, whether successful or not, will be logged into a service access log that is viewable to authorized users.

**Section 5-15  
Restart VIVID E9 / VIVID E7 after diagnostics**

Always shutdown the system and reboot after a diagnostics session.

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# Chapter 6

## Service adjustments

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### Section 6-1 Overview

#### 6-1-1 Purpose of this chapter

This chapter describes how to adjust the VIVID E9 / VIVID E7.

#### 6-1-2 Contents in this chapter

6-1	Overview . . . . .	6-1
6-2	LCD Monitor adjustments . . . . .	6-2
6-3	Test the LCD Arm and LCD Monitor range of motion . . . . .	6-4
6-4	Backlight adjustment . . . . .	6-5
6-5	Touch Screen Calibration . . . . .	6-10
6-6	DC Offset Calibration (Front End Alignment) . . . . .	6-11
6-7	Adjusting the XYZ Mechanism . . . . .	6-12
6-8	Adjust time-out for DICOM servers. . . . .	6-17

## Section 6-2 LCD Monitor adjustments

### 6-2-1 Purpose of this section

This section describes how to adjust the 19" LCD monitor for optimal performance.

*NOTE:* On the 17 inch monitor, there are no adjustments on the monitor itself. To adjust the backlight, blue tint and contrast, see: [Section 6-4 "Backlight adjustment" on page 6-5](#).

### 6-2-2 Cautions and Warnings

Be aware of pinch points at hinges when adjusting LCD Arm and LCD Monitor.

### 6-2-3 Access to Adjustments

*NOTE:* Before starting these adjustments, ensure that the correct monitor (17" or 19") has been selected in the drop down menu on the Config > Service screen.

The monitor adjustment is done via three controls (buttons) on front of the monitor.

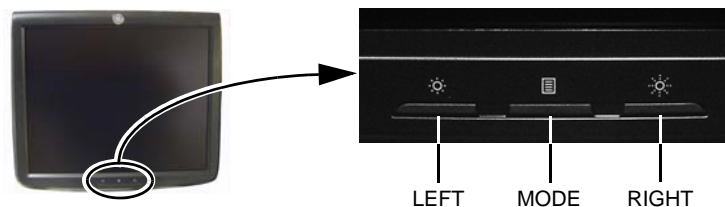
The LCD settings have been optimized at the factory, so normally, there should be no need for any further adjustments.

Default Brightness for the 19" LCD screen on VIVID E9 / VIVID E7 is: **89%**.

Under special light conditions, you may want to adjust the LCD screen's Brightness.

*NOTE:* Adjustments on the monitor will influence all modes. If you only want to change the settings for one mode, please refer to: [Section 6-4 "Backlight adjustment" on page 6-5](#).

Figure 6-1 LCD adjustment buttons



#### 6-2-3-1 Review Test Patterns

Through the Touch Panel, access Utilities / Test Patterns to review the test patterns.

The available test images are described in: [6-4-6 "Test Images" on page 6-7](#).

### 6-2-4 LCD Adjustment Procedure

Default Brightness is: **89%**.

#### 6-2-4-1 Brightness

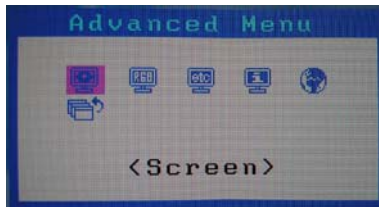
- To reduce the brightness, press the left arrow button. A popup box with the current brightness setting will be displayed on the screen.
- To increase the brightness, press the right button.
- Push the mode button once to remove the popup box from the screen and save the current values.

## 6-2-5 Advanced LCD adjustments

*NOTE: Do not adjust these settings unless necessary!*

To get access to the advanced adjustments, press the **Mode** button for **more than 10 seconds**. This will display the Advanced Menu on the screen.

**Figure 6-2 LCD Controls Advanced Menu**



The **Advanced Menu** has the following choices:

**Table 6-1 Advanced Menu**

MENU	PARAMETER	DEFAULT SETTING
Screen	Smoothing: 1 / 2 / 3 / 4 / 5	3
	Return	-
Color	Brightness: 0-100%	89%
	Contrast: 0-100%	100%
	Temperature: Custom / 9000K / 11000K / 13000K / 15000K	9000K
	Gamma: 2.0/2.1/2.2 /2.3/ 2.4 /2.5/ 2.6	2.4
	Gain: R/G/B 0-100%	Adjusted value at the factory
	Reset	-
Other	Return	-
	Screen Size: FullScreen / Enlarged / Normal	FullScreen
	Menu Position	Center
	Reset	-
Information	Return	-
	Resolution, fH/fV	-
Language	Model name, GPN No. (PSP No.), Serial No., Using time	-
	Japanese, English, German, French, Spanish, Italian, Swedish	English

### 6-2-5-1 Review Test Patterns

Through the Touch Panel, access Utilities / Test Patterns to review the test patterns.

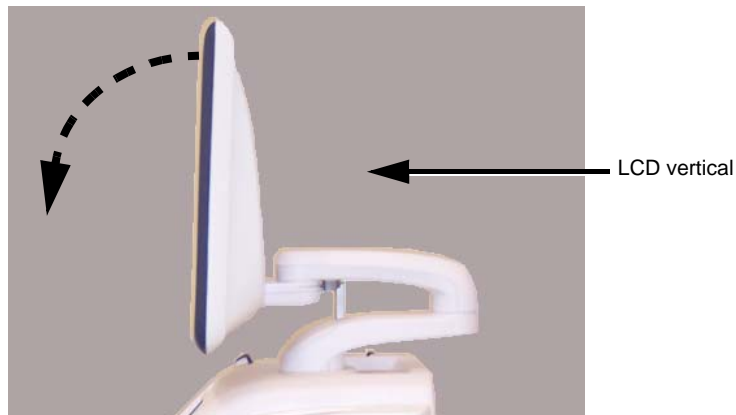
## Section 6-3 Test the LCD Arm and LCD Monitor range of motion

*NOTE: This procedure is valid for both the 17 inch and the 19 inch LCD monitors.*

Confirm LCD Arm and LCD Monitor have full range of motion.

- 1.) Move the LCD arm from side to side.
- 2.) Move the LCD from a face forward, vertical position to a face down, horizontal position (Figure 6-3).
  - Too tight: If the customer finds the LCD difficult to move from a vertical to horizontal position, use a 17mm wrench to loosen nuts at hinge. Be sure to loosen both sides equally. Start with 1/4 turn and test full 90 degree movement before loosening more.
  - Too loose: If the customer finds the LCD does not remain in place after adjusting the LCD from a vertical to horizontal position, use a 17mm wrench to tighten nuts at hinge. Be sure to tighten both sides equally. Start with 1/4 turn and test full 90 degree movement before tightening more.

**Figure 6-3 Test LCD Vertically and Horizontally**



**Figure 6-4 Adjusting LCD Hinge Nuts**



## Section 6-4 Backlight adjustment

### 6-4-1 Purpose of this section

This section describes how to adjust the backlight on the 17" LCD monitor.

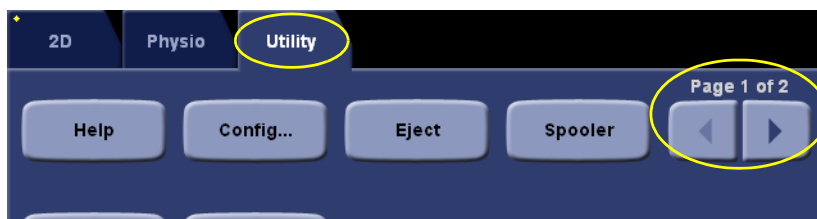
### 6-4-2 Cautions and Warnings

N/A

### 6-4-3 Accessing the Main LCD and Touch Screen Backlight Adjustments

- 1.) Select **Utility** on the **Touch Screen**.
- 2.) Ensure that **Page 1 of 2** is selected.

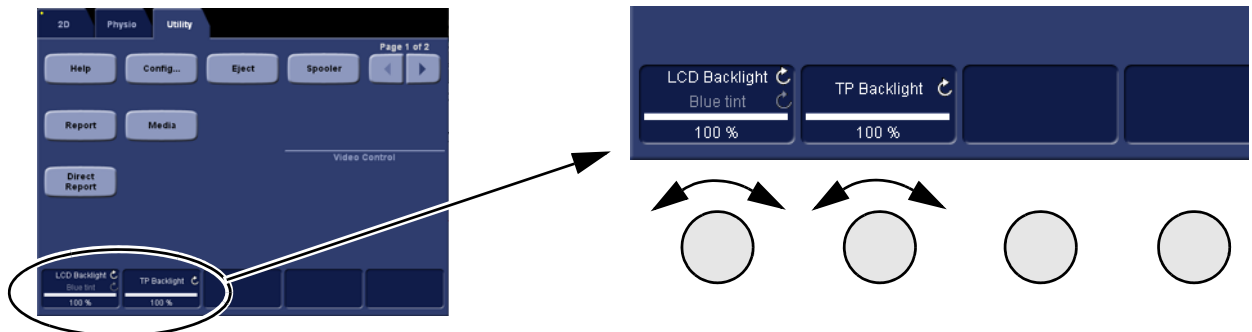
Figure 6-5 Utility screen - page 1



### 6-4-4 Backlight and Blue Tint Adjustment

On the **Utility** screen - **Page 1 of 2**, you can adjust the Backlight and the Blue tint on the Main LCD screen and the Backlight on the Touch Panel (TP).

Figure 6-6 Utility screen - page 1



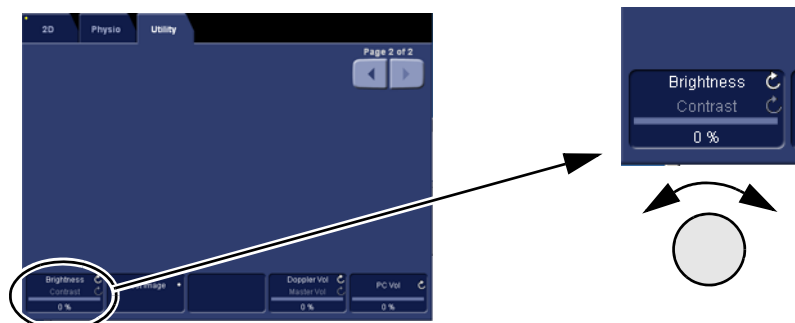
- Adjust the left most rotary to adjust the **LCD Backlight**.
- Push and adjust the left most rotary to adjust the **LCD Blue Tint**.
- Adjust the second rotary from the left side, to adjust the **Touch Panel (TP) Backlight**.

### 6-4-5 Adjust LCD Brightness and Contrast

Select **Page 2 of 2** on the **Utility** screen.

- Adjust the left most rotary to adjust the Main LCD's **Brightness**.
- Push and adjust the left most rotary to adjust the Main LCD's **Contrast**.

Figure 6-7 Adjust LCD Brightness and Contrast

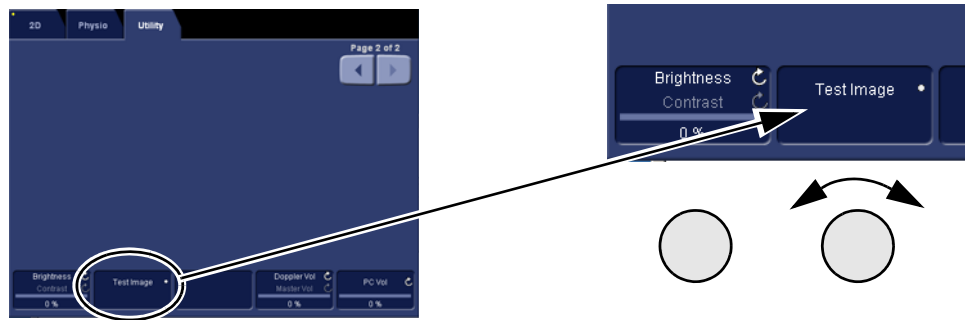




### 6-4-6 Test Images

Select **Page 2 of 2** on the **Utility** screen.

**Figure 6-8 Select Test Image**



- Turn the second rotary from the left side, to select between the **Test Images**. The Test Images are reproduced in Table 6-2.

**Table 6-2 Test Images sheet 1 of 3**

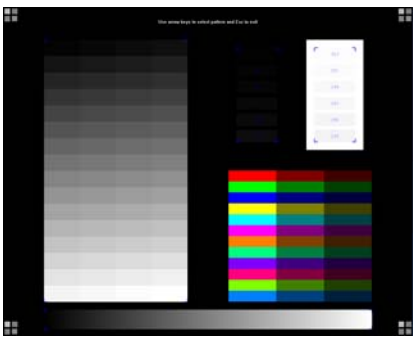
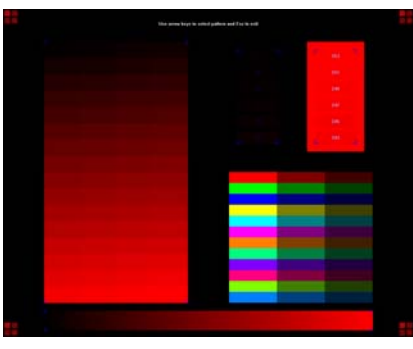
TEST IMAGE No.	TEST IMAGES	DESCRIPTION
1.		Test - Standard
2.		Test - Red grades

Table 6-2 Test Images (cont'd) sheet 2 of 3

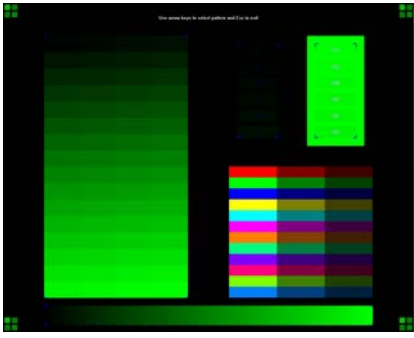
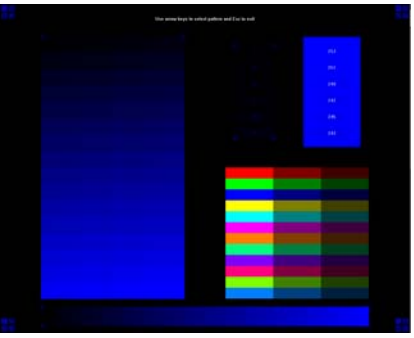
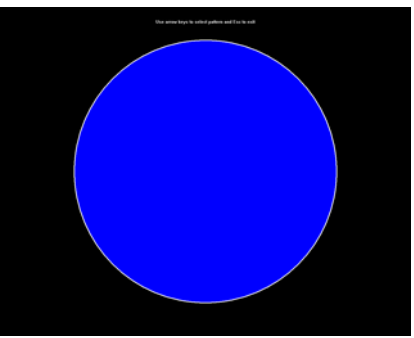
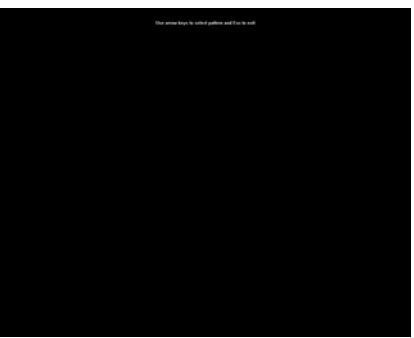

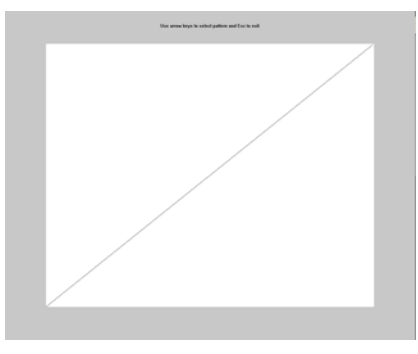
TEST IMAGE No.	TEST IMAGES	DESCRIPTION
3.		Test - Green grades
4.		Test - Blue grades
5.		Blue Circle on Black background
6.		Black

Table 6-2 Test Images (cont'd) sheet 3 of 3

TEST IMAGE No.	TEST IMAGES	DESCRIPTION
7.		White
8.		Straight Line

## Section 6-5 Touch Screen Calibration

The **Touch Screen Calibration** is found on the **Operator Panel Test Dialog**.

Follow these steps to open the Operator Panel Test Dialog:

- 1.) Select **Config (F2)**.
- 2.) Log on as **ADM**.
- 3.) Select **System > Test**.
- 4.) Select **Operator Panel Test**. This will open the Operator Panel Test Dialog ([Figure 6-9](#)).

**Figure 6-9** The Operator Panel Test Dialog



The **Calibrate** button is used to start to calibrate the position of the touch sensitive area on the Touch screen relative to the graphic artwork.

**Follow these steps to calibrate the Touch screen:**

- 1.) Select **Calibrate**. The Touch screen goes blank and display a cross in the screen's upper left corner.
- 2.) Point your finger on the centre of the cross and press slightly. This calibrates this point, and the cross moves to the screen's upper right corner.
- 3.) Point your finger on the centre of the cross and press slightly. This calibrates this point, and the cross moves to the lower right corner.
- 4.) Point your finger on the centre of the cross and press slightly. This calibrates this point, and the cross moves to the lower left corner.
- 5.) Point your finger on the centre of the cross and press slightly. This calibrates this last point.
- 6.) Select **Done**. The calibration is complete.

## Section 6-6 DC Offset Calibration (Front End Alignment)

### 6-6-1 Introduction

DC Offset Calibration (Front End Alignment) is performed to calibrate each ADC channel of the GRX inputs. The system calibrates the ADC to zero output when there is no signal on the input. These bias voltages are stored in the Back End Processor.

### 6-6-2 When to do a Front End Alignment

Do the Front End Alignment:

- when installing a new VIVID E9 / VIVID E7
- after software has been updated or replaced
- when DRX boards have been interchanged
- when a DRX board has been replaced
- when the Back End Processor has been replaced

### 6-6-3 Front End Alignment Procedure

The Front End Alignment is available on the Common Service Desktop interface.

- 1.) Disconnect all probes.
- 2.) Power on the VIVID E9 / VIVID E7.
- 3.) Select the InSite ExC icon (GE phone icon) on the screen to display the InSite ExC menu.

Figure 6-10 InSite ExC icon in the status bar



- 4.) Select Service Desktop.

Figure 6-11 InSite ExC Menu



- 5.) Select the Diagnostics tab.
- 6.) Open the Analog Receive folder.
- 7.) Select Execute to run the calibration.
- 8.) After completing the calibration, restart the VIVID E9 / VIVID E7.

## Section 6-7 Adjusting the XYZ Mechanism

### 6-7-1 Operator Panel XY movement - principle of operation

When the OP is in the locked position, press the left button "lock" of the Frogleg Controls, which causes the motorized park lock to release and releases the brakes, momentarily in the froglegs. This allows the OP to move in the XY direction.

When the console is not locked (floating), press the lock button, this will only release the brakes in the froglegs, to allow easy movement. When the lock button is pressed and the console is pushed back into the locked position, the U-bolt mechanically engages the park lock (similar to a car door). Pushing the lock button does not affect the locking action of the park lock, it only releases the brakes, to allow the OP to get pushed into the park lock easier. But, the lock button must be pushed to get the OP to the locked position. Once the OP is in the lock position and the lock button is released, you can hear the sound of the park lock rotating to engage the U-bolt.

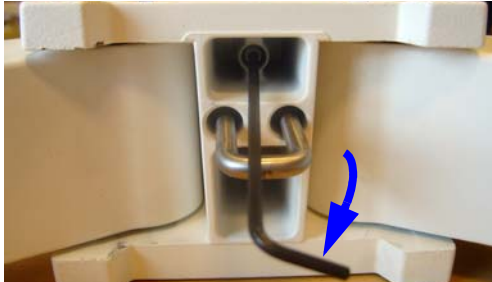
*NOTE: If the device brakes are not locked when trying to lock the OP, this can act as a "shock absorber" and make it more difficult for the park lock to lock.*

## 6-7-2 Adjusting the XY Lock

Use a 3 mm hex tool to adjust the XY Lock release for optimal lock and minimal slack in transport mode.

- Rotating the screw clockwise will tighten the Lock and reduce slack, but will also require more force for engaging the Lock.
- Rotating the screw counterclockwise will open the lock (more slack).

**Figure 6-12 Adjusting the XY Locking mechanism**



### **Follow the steps below to adjust the XY Lock:**

- 1.) Locate the hex screw behind the XY Assembly. This is the adjustment screw.

*NOTE: When turning the hex screw, do not exceed half turn increments. Overtightening will prevent the console from locking into place and too loose will make the console loose.*

- 2.) Use a 3 mm hex tool to rotate the adjustment screw clockwise to tighten the XY Lock. For optimal adjustment, rotate the adjustment screw 1/4 turn and test the Lock function. Repeat procedure if needed.  
Rotating the screw counterclockwise will loosen the lock.

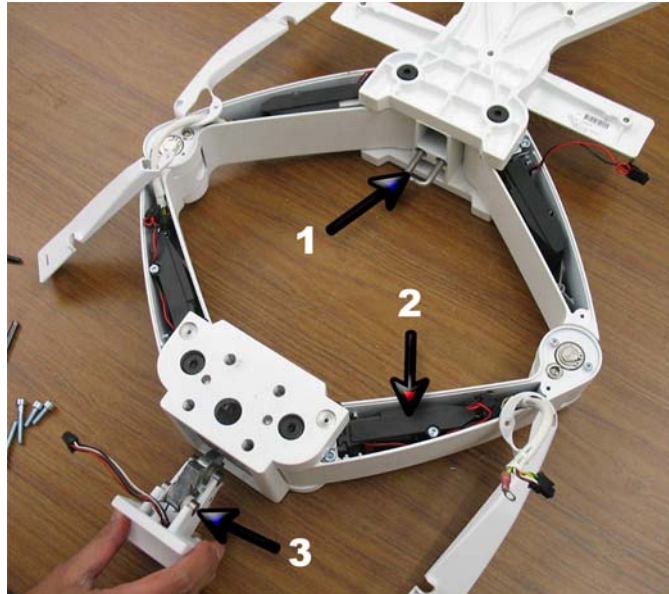
Too tight will reduce the slack and make it harder to engage the Lock. Make the adjustments in 1/4 turn increments and test the lock until the optimum adjustment is achieved.

## 6-7-3 XY Manual Release for Lock and Brake Mechanism and Adjustment

The following procedure is intended to release and adjust the XY mechanism.

### 6-7-3-1 XY Lock and Brake Mechanism Parts

Figure 6-13 XY Lock and Brake Mechanism Parts



- 1.) U-bolt
- 2.) Brakes (one inside each of the four XY arms)
- 3.) Park Lock (engages U-bolt)



**6-7-3-2 XY Lock Adjustment for Lock and Brake Mechanism**

Follow this procedure if the park lock is not working, or the lock does not respond when pressing the Frogleg Controls:

- 1.) Release the lock manually.
- 2.) Remove the four screws, Item 1. The screws's heads are marked with red color in the figure below.



**NOTICE** Be aware of the fragile power cable and do not pull the Park Lock out with force. It should fall out by just guiding.

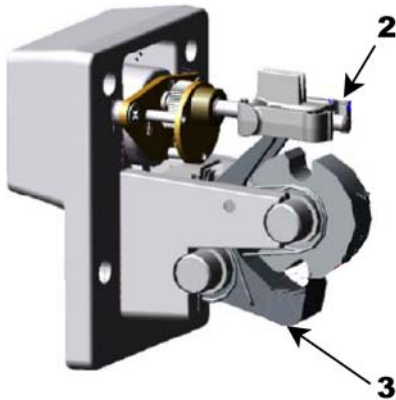
**Figure 6-14 Remove the Park Lock**



6-7-3-2 XY Lock Adjustment for Lock and Brake Mechanism (cont'd)

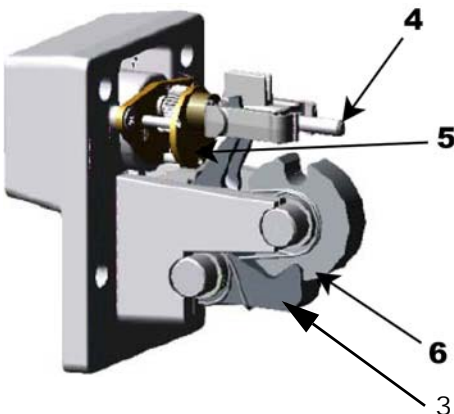
- If the **Park Lock Nut (2)** and the **Park Lock Lever (3)**, are in the positions illustrated in [Figure 6-15](#), the lock will not engage.  
(This occurred in some earlier systems. The nut and retainer did not return to the “charged” mode after unlock.)

Figure 6-15 Park Lock Failure



- By hand, rotate the **Threaded Lead Screw** on the actuator (4) counterclockwise until the **Lock Nut** is barely touching the **Bearing Housing (5)**.  
The two small plastic springs should just touch, but do not deform.

Figure 6-16 Park Lock adjustment

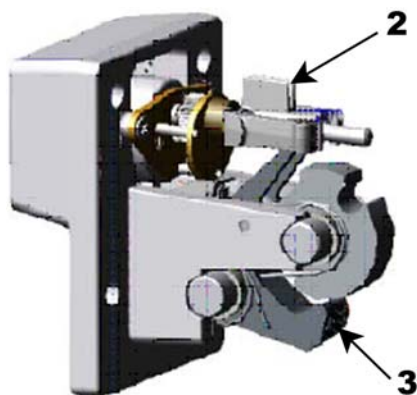


- Make sure the **Park Lock Lever (3)** is loose and can engage and hold the **Lock Wheel, (6)**, in locked position, as illustrated in [Figure 6-16](#).

#### 6-7-3-2 XY Lock Adjustment for Lock and Brake Mechanism (cont'd)

- Before reassembling the **Lock Assembly**, make sure the **Park Lock Nut (2)** and the **Park Lock Lever (3)** are in the position illustrated in [Figure 6-17](#).

Figure 6-17 Adjustment Set



#### 6-7-4 Using the Park Lock Properly

It is important to inform a customer of the following if they are experiencing problems with the XY park lock function.

Be sure to:

- Apply the brakes. The locking mechanism will not engage if the device can move when trying to park the console.
- Push the release button and gently guide the console into the locked position until the lock is engaged.
- Not apply any weight on the console or lean on it. If the console is not in the normal resting position, the lock will not engage when trying to park it.

#### 6-7-5 Adjusting the Z mechanism

There are no adjustments for the Operator Panel's vertical movement.

**Related information:**

[4-2-3-6 "Moving the Top Console up or down when Power is OFF" on page 4-13](#)

### Section 6-8 Adjust time-out for DICOM servers

If you are experiencing problems with slow responses from DICOM servers, increase the time-out in the DICOM server properties dialog.

Problems with slow responses may result in images being re-sent automatically and low transfer rates.

The retry settings can be used to make jobs retry on bad networks. There is no need to set retries for mobile (off-line) use.

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# Chapter 7

## Diagnostics / troubleshooting

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### Section 7-1 Overview




#### 7-1-1 Purpose of this chapter

This chapter describes how to setup and run the tools and software that help maintain image quality and system operation. Basic host-, system- and board-level diagnostics are run whenever power is applied. Some Service Tools may be run at the application level.

#### 7-1-2 Contents in this chapter

7-1	Overview . . . . .	7-1
7-2	Service Safety Considerations . . . . .	7-2
7-3	FAQ - Frequently Asked Questions . . . . .	7-2
7-4	Troubleshooting Tips . . . . .	7-4
7-5	Network Connectivity Troubleshooting . . . . .	7-8
7-6	Gathering Troubleshooting Data . . . . .	7-10
7-7	Screen Captures . . . . .	7-12
7-8	Motor Controller Test . . . . .	7-13
7-9	Troubleshooting . . . . .	7-15
7-10	Noise troubleshooting . . . . .	7-21

## Section 7-2 Service Safety Considerations

-  **DANGER** DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.
-  **WARNING** IF THE COVERS ARE REMOVED FROM AN OPERATING VIVID E9 / VIVID E7, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.
-  **WARNING** USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.

## Section 7-3 FAQ - Frequently Asked Questions

### 7-3-1 High System Temperature Error

*Question:*

What is the highest temperature when VIVID E9 / VIVID E7 starts giving the "High System Temperature" Error?

*Answer:*

- All Card Rack (PCBs, or Front End) sensors:
  - The limit for the first warning is 78 degrees centigrade (78 °C).
  - The system starts the shutdown sequence at 80 degrees centigrade (80 °C)
- DRX\_TOP sensors:
  - The limit for the first warning is 87 degrees centigrade (87 °C).
  - The system starts the shutdown sequence at 90 degrees centigrade (90 °C).
- Clean air filter:
  - The reminder "**Clean air filter**" is displayed at start-up of the VIVID E9 / VIVID E7, and is repeated at specific pre-defined intervals.

### 7-3-2 Reset the BEP from a Hang

*Question:*

It seems that the BEP is "hanging" - it's not responding at all. How do I Reset it?

*Answer:*

- 1.) Try this method first:

Press the ON/OFF switch on the Operator Panel for more than six seconds. This should cause the VIVID E9 / VIVID E7 to perform a "Forced Restart".
- 2.) If the instruction in step 1 didn't help, as the last solution, after waiting several minutes, switch off the power on the rear of the system.

### 7-3-3      **How to Release the Top Console when power is unavailable**

*Question:*

How to release the Z brakes (Up/Down) when without power?

*Answer:*

There is a lever behind the openings in the Rear Cover. Press the lever to the right to release the X/Y brakes. At the same time, push the Upper Console down. If you stop to press the lever, the Z brakes engage.

For more information, see: [4-2-3-6 "Moving the Top Console up or down when Power is OFF" on page 4-13.](#)

*Question:*

How to release the XY brakes when without power?

*Answer:*

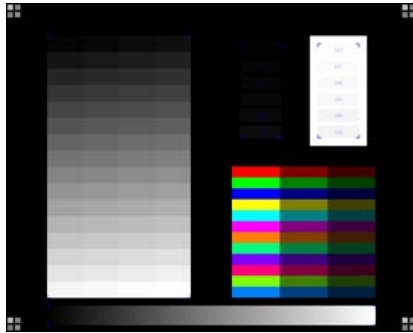
See the instructions in: [4-2-3-5 "Manually releasing the XY Lock" on page 4-12.](#)

## Section 7-4 Troubleshooting Tips

### 7-4-1 Shortcut Keys

This is a list of useful shortcuts for use during VIVID E9 / VIVID E7 service.

**Table 7-1 Shortcuts**

SHORTCUT	DESCRIPTION
Alt+B	BOOKMARK. PLACE A BOOKMARK IN LOGS.
Alt+D	SYSTEM PROBLEM REPORTING. See: <a href="#">7-6-2 "Collect a Trouble Image with Logs" on page 7-11.</a> PRINT SCREEN / Make a SCREENSHOT: See: <a href="#">7-6-2 "Collect a Trouble Image with Logs" on page 7-11.</a>
Alt+E	EJECT DEVICE (i.e.CD or DVD MEDIA)
Alt+Q	QUALITY TEST SCREEN. 
Alt+S	DICOM JOB SPOOLER
Ctrl+PrintScreen	SCREEN CAPTURE. See: <a href="#">Section 7-7 "Screen Captures" on page 7-12.</a>
F4	CLEAN THE SPOOLER



## 7-4-2 Image Artifacts Caused by Front End Boards

Image artifacts can be caused by any of the boards on the Front End. Artifacts may be caused by the power supply or board failures. It is important to use the Diagnostic tools on the service interface to try to narrow down the failure to one or two boards.

- Artifacts that look like white vertical lines, rain or snow cones in one or more areas of the image can be troubleshot in different ways:
  - One troubleshooting technique is to swap DRXs around to see if the artifact moves. (Pulling out the boards will keep the system from booting up; all the boards must be present for the system to operate)
  - Another approach is to run the Diagnostic Utilities to establish which channel the artifact affects. A channel is a signal path sent through the system boards. Any of these boards in the path can be causing the failure.
  - Be aware that the problem may only appear with one mode, probe or preset. Normally, in B-Flow the problem becomes more evident and may be easier to troubleshoot.
  - Check all the probes on all the ports. Remove all the probes, and then check each probe singly in every port.
    - If port-related, replace the Relay Board.
    - If the artifact only occurs with one probe, replace probe.
    - If the problem persists with the new probe, reload software. Do not reload presets until you have tested the system with the default settings and be sure that the problem does not persist. User Defined Presets can carry corruption back to the system.
  - If you suspect that the problem may be caused by software corruption, please note: Corrupt Presets can be identified by a problem in only one exam category using a specific probe, or a particular mode with a specific probe. Use the Clean Userdef function under Scanner Utilities, leaving the system with only the factory defaults. Be sure to back up the presets, including Connectivity configuration, TCP/IP page and Option strings before deleting the User defined files. Do NOT reload presets until you have tested the system.
  - Before performing Clean User Defs function, perform an Alt-D to capture the logs and preset files. If the problem is corrected with Clean User Defs, send in the log to the OLC so that the corrupted preset files can be reviewed.
  - After booting up the system, without starting any patient or accessing any menu, click on the Service and log in. Click on Utilities, then on Scanner utilities and then on "Clean User Defs". Select OK and that will clean the folder. Shutdown the system immediately, using the System Shutdown function under Scanner Utilities. After rebooting, the system will come up with default settings. Only reload presets from disk if you are sure they were stored before the corruption occurred. If only Imaging Presets are affected you can restore the Connectivity presets by using the selective Restore function.

## **7-4-3 Back End Processor**

### **7-4-3-1 System Halt Errors - Lock ups or Intermittent Problems**

- Collect Error Logs and send them to the OLC to be evaluated. (On the scan screen, press ALT+D). It is extremely important to give as much details as possible about the occurrence of the problem and the date and time it showed up.
- Reload the software.

### **7-4-3-2 CD/DVD Drive Failures**

- Check that the media (disk capacity and speed) is supported.
  - For the CD, the capacity is normally 700MB.
- If the CD drive is having problems, replace the CD Drive.
- If the problem persists, replace the BEP.

### **7-4-3-3 Image CD/DVD not read**

- Put the CD or DVD in a laptop and see if it can be read. If it can't be read, the disk is bad.
- If it can be read, make a copy at a low burn speed (8X). If the copy doesn't work replace CD-RW or DVD-R drive.

## 7-4-4 Operator Panel

### 7-4-4-1 No Audio

- Check volume settings in the application and also in Windows.
- Use headphones, (the type that you use on a personal CD player or a laptop) to test the audio output directly from the back of the BEP.
  - If no Audio is present on the BEP, reload software. If the problem persists, replace the BEP.
  - If Audio is present, follow the audio signal to the OP Panel (the audio amplifier is located in the upper OP panel). The Audio output from the BEP goes to the Internal I/O and from there to the OP Assembly (use an adapter to plug the headphones to the RCA outputs of the Internal I/O). If Audio outputs are working, replace Upper OP Assembly. Otherwise replace Internal I/O board.
  - Always measure the speakers' impedance; it should measure approximately 7 ohms. If speakers are bad, it is possible that the amplifier on the Upper OP Assembly might be defective, too.

### 7-4-4-2 No Video on LCD Display

- If the video is too dim, has dimmed areas or there is no video at all, replace the HV LCD inverter.
- Check the cabling within the system.
- If the HV LCD inverter is burnt, there is a possibility that the Digital Video Card on the PC also got damaged; in that case you can replace the Video Card.
- Replace the Video Adapter inside the BEP.
- Replace the Back End Processor if the problem continues.
- Replace the Upper Panel Assembly.

### 7-4-4-3 Wrong Key Activated on the Touch Panel

- Calibrate touch panel.
- Replace Upper Panel Assembly.

### 7-4-4-4 Touch Panel Not Responding

- Calibrate the Touch Panel.
- Reload software.
- Replace Upper Panel Assembly.

## 7-4-5 Probes

### 7-4-5-1 Probe Recognition

- Check all the probes on all the ports. Remove all the probes, and then check each probe singly in every port.
  - If the problems persist with all the probes, replace the GRLY board.
  - If only one probe fails to be recognized, replace the probe.

## 7-4-6 Software

### 7-4-6-1 Image or Patient Data Loss

If you experience image or patient data loss, generate an Alt+D log and/or if possible, generate a copy of the HDD data and submit a complaint.

## **Section 7-5 Network Connectivity Troubleshooting**

### **7-5-1 First Status**

Select the network icon on the bottom of the screen to get a first status for the network connectivity.

If the status reports No network, verify cabling.

### **7-5-2 Cannot connect to anything via the network**

- Check with your laptop if you can ping the VIVID E9 / VIVID E7 and the device (Printer or PACs).

### 7-5-3 No Verify

- Check if the device supports Verify.
- Check port and AE title info.
- Check if device is up and running. It may be up but in an error status. Reboot the device if possible. You also may need to reboot the VIVID E9 / VIVID E7.
- Use Network Sniffer (Alt+N).
- Reload software.

### 7-5-4 System Pings and Verifies OK, but does NOT Send

- Check if device is up and running. It may be up but in an error status. Reboot the device if possible. You may also need to reboot the VIVID E9 / VIVID E7.
- Check device configuration.
- Clean the spooler (F4).
- Check Connectivity configuration on the VIVID E9 / VIVID E7.
  - If it is a printer, check that the printer supports the film type and format. Some printers don't support different image sizes (or different formats, such as the Patient entry screen). If this is the case, the spooler may show the job in a "Done" status but the images never get printed. Try sending secondary capture.
  - If it is a storage device, check if the type of image selected is supported (color, gray, Multiframe)
  - If it is a Worklist broker, you must use a Dataflow in which your Worklist is the primary input. Otherwise it won't let you retrieve patients. Also check your Worklist search criteria configuration.
- Reload software.

## Section 7-6 Gathering Troubleshooting Data

### 7-6-1 Collect Vital System Information

The following information is necessary in order to properly analyze data or images being reported as a malfunction or being returned to the manufacturer:

Product Name = VIVID E9 or VIVID E7

Select **Config (F2) > About** screen.

#### **Applications Software**

- Application Software Version
- Application Software media Part Number and Revision

#### **System Software**

- System Software Revision
- System Software media Part Number and Revision

## 7-6-2 Collect a Trouble Image with Logs

If the system should malfunction, press the **Alt+D** keys simultaneously. This will collect a screen capture of the monitor, system presets and several log files in a date and time stamped “.zip” file.

*NOTE:* This function may also be used to make a Print Screen.

The **Alt+D** function is available at all times.

When **Alt+D** is pressed, a menu box appears that allows for;

- a place to enter a description of the issue
- a check box to indicate a System lockup
- a choice to Export to a pre-formatted CD-R/DVD-R or save to the Export directory D: drive (for remote viewing through InSite).

*NOTE:* You **MUST** select one of the available devices as the destination device if it is to be different than the default Export directory on the hard drive.

The screen capture is a bitmap which eliminates the possibility of artifacts from compression.

**Figure 7-1 System problem report (ALT+D dialog box)**



### 7-6-2-1 Advanced log options

- **Extensive Log** enables the creation of a log file containing additional information for the selected functionality.
- **Options** enables creation of a log file based on a selected bookmark or for a user configurable time frame. Different type of information can be selected to be part of the log file.

## Section 7-7 Screen Captures

### 7-7-1 Purpose of this Section

To capture screen images that can be used for diagnostic and troubleshooting purposes.

### 7-7-2 Ctrl+PrintScreen shortcut

A Ctrl+PrintScreen shortcut is available for quickly capturing the image displayed on the system. Images captured using this shortcut are saved in the D:\export directory using both the JPEG (.jpg) and raw DICOM (.dcm) formats.

The InSite connection will have access to the export folder on the "D:" drive to retrieve these images. This feature will allow the customer to quickly and easily acquire images that can then be viewed by the OLC.

### 7-7-3 To Capture a Screen Image Using the Shortcut

- 1.) With the desired image displayed on the screen, press **Ctrl** and **PrtSc** (print screen) keys simultaneously.
- 2.) From the touch panel, select **Utility > Service > Utilities > Common Utilities > Image Compress & Delete Utilities**.
- 3.) Select the check box for the image(s) you want to save in the **D:\export** directory.
- 4.) Select **Compress Files**.

A compressed file of the images is stored in D:\export. You may rely on the date and time of the Ctrl+PrtSc procedure to identify the most recent image recorded.

The uncompressed files are stored in d:\export\service\image.

### 7-7-4 above Restart VIVID E9 / VIVID E7 After Diagnostics

Always shutdown the system and reboot after a diagnostics session.

*NOTE: Do Not select "Cal Reset" after performing calibration. This will destroy the file located on the Back End Processor and the image quality will not be optimized.*



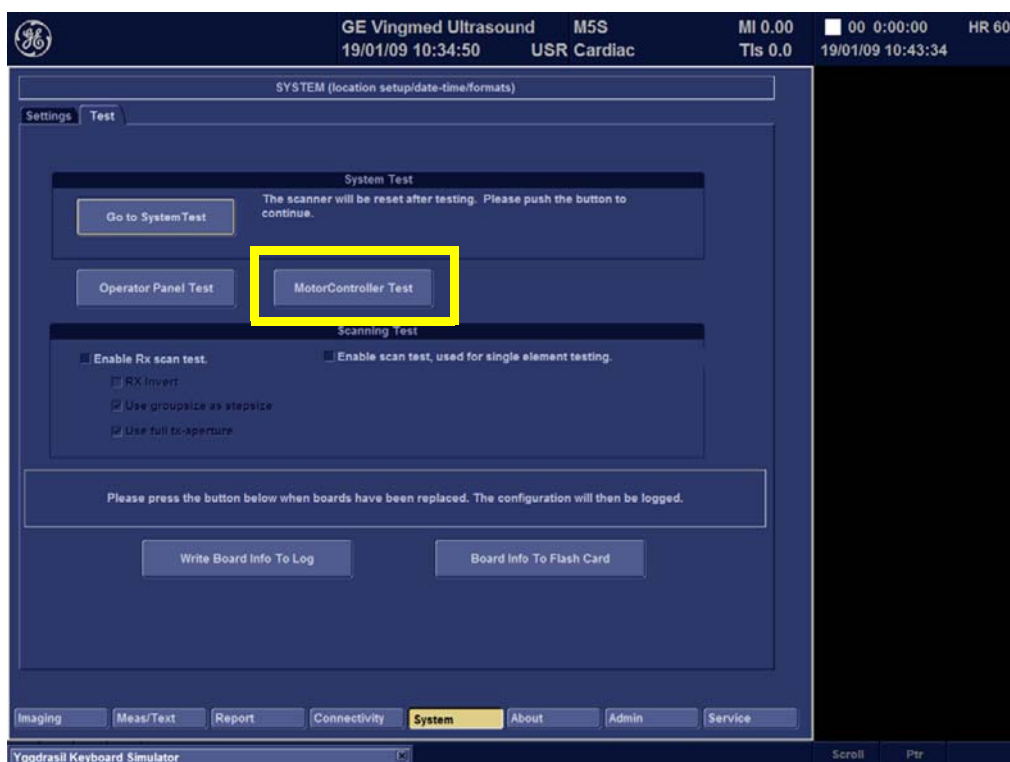
## Section 7-8 Motor Controller Test

This test program tests the XYZ Motor Controller. It also includes a software recovery procedure for Lock Release.

Follow this procedure to start the Motor Controller Test:

- 1.) Power up the VIVID E9 / VIVID E7.  
After scanner initialization is complete, continue with the steps below;
- 2.) Press **CONFIG ...** on the **Utility** tab on the **Touch Panel**.
- 3.) Log on as **ADM**. A password for the user **ADM** may be required.  
Select **System** from the bottom of the menu that appears on the monitor.
- 4.) Select **Test**.

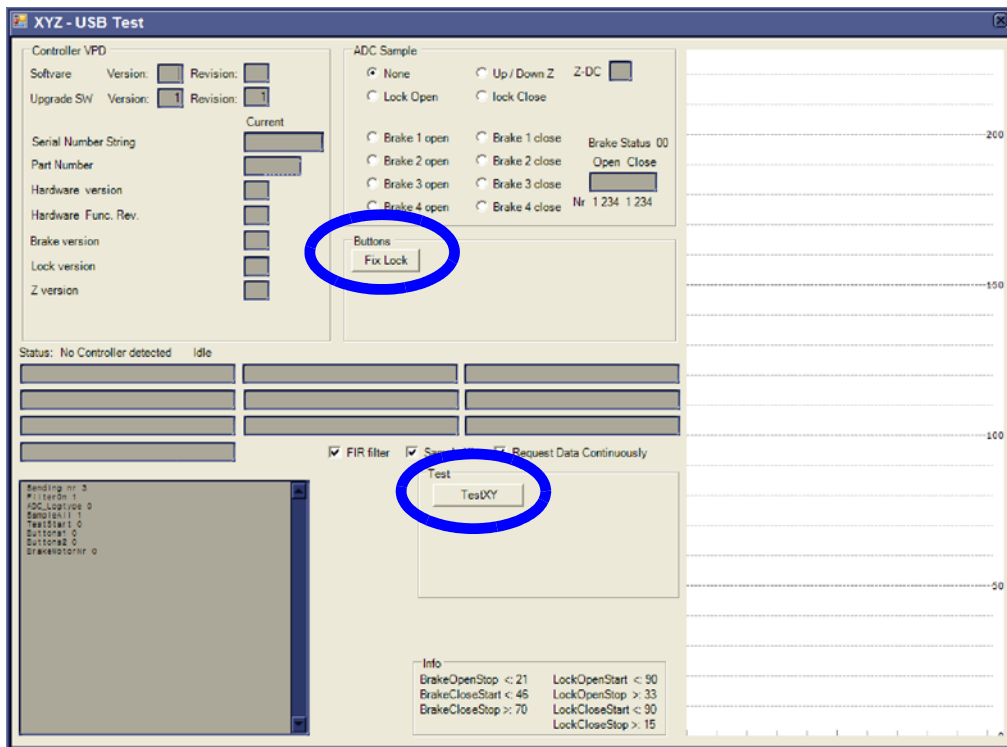
Figure 7-2 Test screen



- 5.) Select **MotorController Test**  
The following dialog is displayed on the screen.

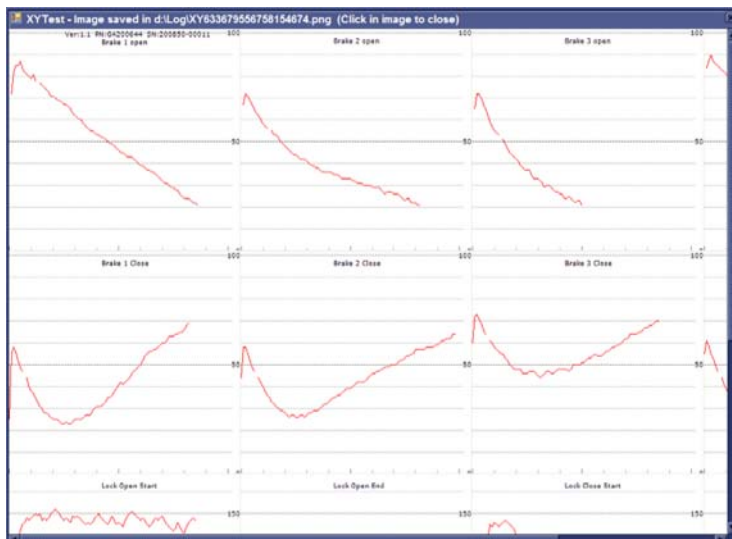
## Section 7-8 Motor Controller Test (cont'd)

Figure 7-3 Motor Controller Test dialog



- 6.) Push **Fix Lock** button.  
If in a quiet environment it should be possible to hear the **Lock Engine** engage for a few seconds.
- 7.) Check if the Lock function works now.  
If the lock still does not work, try to press the **TestXY** button and wait for this dialog to appear:

Figure 7-4 TestXY results



- 8.) Continue with step 2 in 7-9-3 "XY Lock is not working" on page 7-17.

## Section 7-9 Troubleshooting

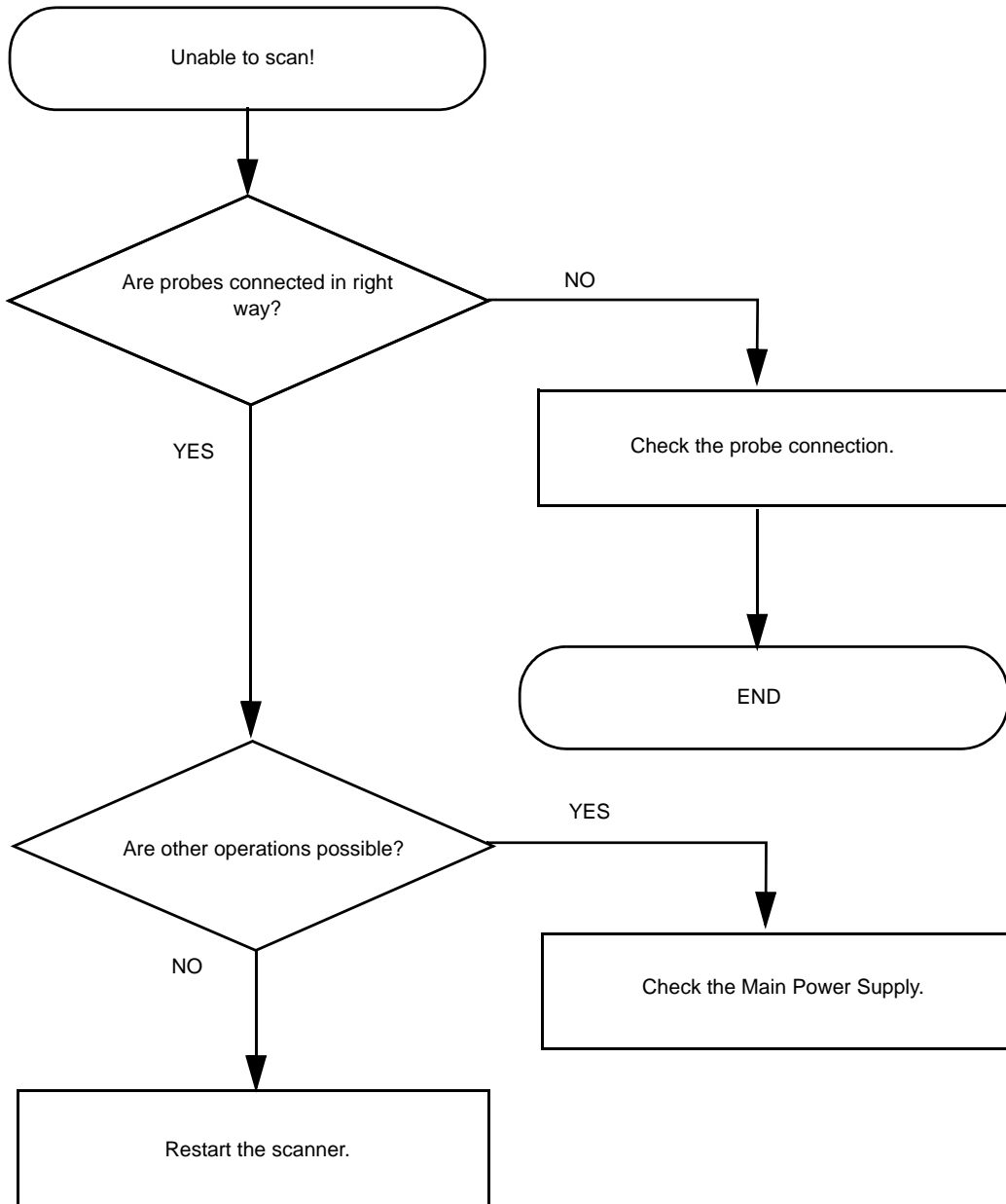
### 7-9-1 No Response from VIVID E9 / VIVID E7 - It locks up

If the system appears to be locked, please **wait at least 60 seconds** for the watchdog to trap the situation. This will, if the situation is trapped, bring up a dialog telling that the system is not responding.

- 1.) Press **Restart** to restart the application. This will save a special debug log. When the system restarts it will show a dialog where it requests you to save the log.
- 2.) Enter a descriptive text then press **Save**.
- 3.) To export the log, press **ALT+D**. This will bring up the same dialog again.
- 4.) Now, select destination and choose **Export** to write the log-files to selected destination.

7-9-2 Unable to scan

Figure 7-5 Unable to scan



### 7-9-3 XY Lock is not working

Follow the steps below to resolve this issue:

- 1.) Run the **XYZ Test Program** and select **Fix Lock**.  
See: [Section 7-8 "Motor Controller Test" on page 7-13](#).
- 2.) If the **Lock** still does not respond when pushing the buttons in front of the UI, release the Lock manually.
- 3.) Remove the **Park Lock** and adjust it manually.

### 7-9-4 XY Brake Motors Troubleshooting

*NOTE: Cables are not labeled at the XY controller, so right side and left side motors are not defined.*

When troubleshooting the XY brake motors, keep this in mind:

- The rear motors are #1 and #3.
- The front motors are #2 and #4.
- Motor #1 and #2 are on the same side.
- Motor #3 and #4 are on the same side (opposite to motor #1 and #2).

If you are in a silent environment, it may be possible to hear which motor is activated during the test.

### 7-9-5 Z Movement fails

- If it is impossible to lower the Top Console, but moving it upwards, works OK, it indicates that one of the control switches is stuck in "Up" position.
- If you have to help the Top Console up when moving upwards, but the motor assistance work OK when lowering the Top Console, it indicates that the gas spring inside the Z Mechanism is failing.
  - Replace the Z Mechanism.

### 7-9-6 Difficult to lock and release the alphanumeric keyboard

The release/lock mechanism is located to the right most section of the drawer, thus the force needed to release and lock the alphanumeric keyboard will increase significantly if the left most section of the keyboard is used.

**Figure 7-6 Best area to press to release (or lock) the alphanumeric keyboard**



- Press the right most section of the alphanumeric keyboard to release/lock it.

### 7-9-7 USB Footswitch

If there are any issues with the USB Footswitch, try this:

- Ensure that the USB plug is plugged into one of the USB connectors on the rear side of the VIVID E9 / VIVID E7.
- Verify that the software configuration is set up for the Footswitch (**Config > Imaging > Application screen**).
- Try a replacement USB Footswitch.

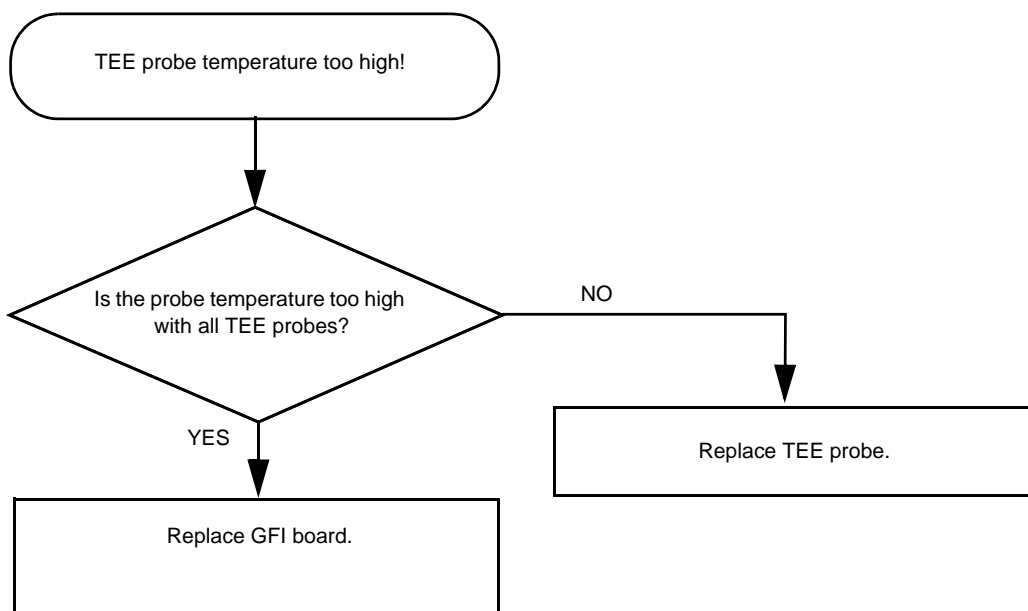
### 7-9-8 USB Device(s) stopped working

If a keyboard and mouse, or other equipment, not intended for connection to the VIVID E9 / VIVID E7, has been connected to any of the USB connectors on the front of the VIVID E9 / VIVID E7, all the USB devices may stop working due to an overload condition.

The work around is to use one of the USB ports on the I/O Rear Panel (BEP I/O Board).

#### 7-9-8-1 TEE Probe Temperature Too High

Figure 7-7 TEE Probe Temperature Too High



## 7-9-9 System Temperature Too High

When the temperature inside the VIVID E9 / VIVID E7 increase, the fan speed will increase to cool down the system. If the air filters become too dusty, a higher fan speed is required to keep the air stream at the needed level. When the fan speed increase, the fan noise will also increase.

- If the cooling air stream is insufficient to stabilize the interior temperature within the operating margin, the system will stop operating.
  - **Solution:** Clean or replace the filters.
- If a fan is worn out, it may be noisy, or stop working.
  - **Solution:** Replace the fan(s).



## Section 7-10 Noise troubleshooting

### 7-10-1 General Recommendations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. They also generate EMI. The VIVID E9 / VIVID E7 complies with limits as stated on the EMC label. However there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. Some of these sources include:

- medical lasers
- scanners
- cauterizing guns
- computers
- monitors
- fans
- gel warmers
- microwave ovens
- light dimmers
- portable phones

The presence of a broadcast station or broadcast van may also cause interference.

## 7-10-2 EMI Prevention/abatement

Table 7-2 EMI Prevention/abatement

EMI RULE	DETAILS
Be aware of RF sources	<ul style="list-style-type: none"> <li>Keep the unit at least 5 meters (15 feet) away from other EMI sources.</li> <li>Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.</li> </ul>
Ground the unit	<ul style="list-style-type: none"> <li>Poor grounding is the most likely reason a unit will have noisy images.</li> <li>Check grounding of the power cord and power outlet.</li> </ul>
Install all screws, RF gaskets, covers, cores	<ul style="list-style-type: none"> <li>After you finish repairing or updating the system, replace all covers and tighten all screws.</li> <li>Any cable with an external connection requires a magnet wrap at each end.</li> <li>Install the Card Rack Cover over the Card Rack.</li> </ul> <p>Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.</p>
Replace broken RF gaskets	<ul style="list-style-type: none"> <li>If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket.</li> <li>Do not turn on the unit until any loose metallic part is removed.</li> </ul>
Do not place labels where RF gaskets touch metal	Never place a label where RF gaskets meet the unit. otherwise, the gap created will permit RF leakage. or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	<ul style="list-style-type: none"> <li>The interconnect cables are grounded and require ferrite beads and other shielding.</li> <li>Also, cable length, material, and routing are all important; do not change from what is specified.</li> </ul>
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly dress peripheral cables	<ul style="list-style-type: none"> <li>Do not allow cables to lie across the top of the Card Rack or hang out of the peripheral bays.</li> <li>Loop the excess length for peripheral cables inside the peripheral bays. attach the monitor cables to the frame.</li> </ul>

### 7-10-2-1 Different Power Outlet

Connect the unit to another power outlet and verify if the noise changes or disappear.

*NOTE: GE requires a dedicated power and ground for the proper operation of its ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.*

**Sites with a mains power system with defined Neutral and Live:**

*The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the Ultrasound outlet.*

**Sites with a mains power system without a defined Neutral:**

*The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the Ultrasound outlet.*

*Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.*

### 7-10-2-2 Different System

Try another VIVID E9 / VIVID E7 at the same location and look for the same noise. If the noise is present on the new system too, the noise is most likely from an external source/equipment.

**7-10-2-3 Different Location**

Move the scanner to another location and verify if the noise changes or disappear. This may help you to locate an external noise source.

Try to move the scanner to:

- another location inside the room
- another room
- another floor

**7-10-2-4 Disconnect External Cables**

- Disconnect all external cables (network, all unused probes, ECG leads and verify if the noise disappears.

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# Chapter 8

## Replacement procedures

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### Section 8-1 Overview

#### 8-1-1 Purpose of this chapter

This chapter describes how to remove and install, or replace, modules and subsystems in VIVID E9 / VIVID E7. It also includes instructions for installing and re-installing the software.

#### 8-1-2 Contents in this chapter


8-1	Overview . . . . .	8-1
8-2	Warnings and important information . . . . .	8-2
8-3	Definitions of Left, Right, Front and Back . . . . .	8-6
8-4	Reloading the software . . . . .	8-7
8-5	Replacing Covers and Bumpers . . . . .	8-24
8-6	Top Console Parts Replacement Overview . . . . .	8-60
8-7	Replacing XYZ Parts . . . . .	8-160
8-8	Main Console parts replacement . . . . .	8-176
8-9	Casters and Brakes replacement . . . . .	8-194
8-10	Front End Processor (FEP) / Card Cage parts replacement . . . . .	8-204
8-11	Back End Processor (BEP) parts replacement . . . . .	8-229
8-12	Main Power Supply replacement . . . . .	8-273
8-13	I/O Modules replacement . . . . .	8-276
8-14	Peripherals replacement . . . . .	8-282


## Section 8-2 Warnings and important information

### 8-2-1 Purpose of this section

This section includes important information. Please read it before doing any of the procedures in this chapter.


### 8-2-2 Warnings

 **CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. TURN OFF THE BREAKER.
2. UNPLUG THE SYSTEM.
3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.
4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

 **WARNING *BECAUSE OF THE LIMITED ACCESS TO CABINETS AND EQUIPMENT IN THE FIELD, PLACING PEOPLE IN AWKWARD POSITIONS, WE HAVE LIMITED THE LIFTING WEIGHT FOR ONE PERSON IN THE FIELD TO 16 KG (35 LBS). ANYTHING OVER 16 KG (35 LBS) REQUIRES TWO PEOPLE.***

 **WARNING *AT LEAST TWO PERSONS ARE NEEDED WHEN REPLACING CASTERS (WHEELS) OR ADJUSTING BRAKES.***

 **WARNING *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.***



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING *THE WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT MUST NOT BE DISPOSED AS UNSORTED MUNICIPAL WASTE AND MUST BE COLLECTED SEPARATELY.***



***PLEASE CONTACT THE MANUFACTURER OR OTHER AUTHORIZED DISPOSAL COMPANY TO DECOMMISSION YOUR EQUIPMENT.***

## 8-2-2 Warnings (cont'd)



**WARNING** *Spare Part order for Vivid E9 VET:*

*The same spare parts used in the current VIVID E9 consoles can be used in the veterinary consoles.*

*When ordering any of the following, the Vet label(s) MUST be ordered as they need to be applied to the new part:*

- Side Covers - require label P/N: 5447716*
- Back Cover - require label P/N: GB200182*
- Probes - require label P/N: 5454608*



**CAUTION** When performing replacement procedures within a veterinary environment, return any used/ unused spare parts with the purple scrap marking label (regardless of the actual condition of the part) and add a description on the label stating that the items were removed from a veterinary environment.

### **8-2-3 Returning/Shipping Probes and Repair Parts**

Equipment being returned must be clean and free of blood and other infectious substances.

GE policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe). The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

*NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.*

### **8-2-4 Manpower - When two persons are needed**

These replacement procedures require two persons:

- Casters Replacement
- 3D monitor (Sony LMD-2451MT/LMD-2451TC) replacement (due to the size)

The rest of the replacement procedures can be carried out by one person.



8-2-5 Tools needed for servicing VIVID E9 / VIVID E7

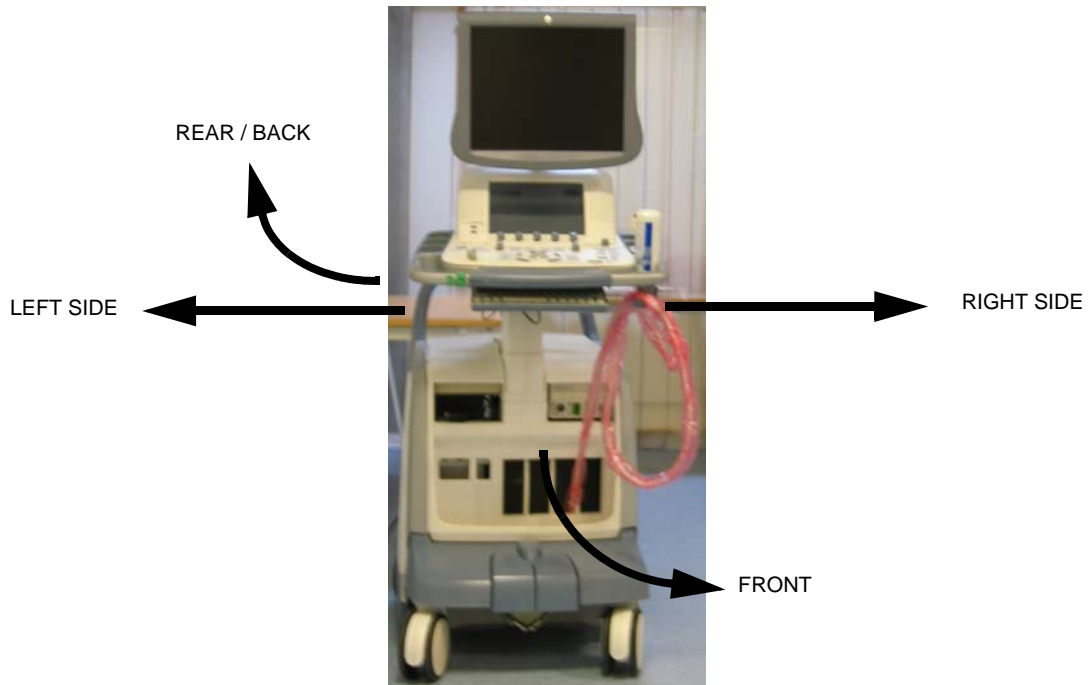
Table 8-1 Tools used for servicing VIVID E9 / VIVID E7

ITEM NO.	TOOL	SIZE	TORQUE	COMMENTS
1.	BIT # TX-10	M2.5		<ul style="list-style-type: none"> <li>• Use Torque specified in procedure.</li> <li>• If the torque is not indicated with the procedure, hand tighten the screws/nuts.</li> <li>• 90 degree "L" are suggested.</li> <li>• A full set of 90 degree "L" TORX wrenches are recommended.</li> </ul>
2.	BIT # TX-15	M3		
3.	BIT # TX-20	M4		
4.	BIT # TX-25	M5		
5.	BIT # TX-30	M6		
6.	BIT # TX-45	M10		
7.	FLAT BLADE SCREWDRIVER	3.2 mm		
8.	FLAT BLADE SCREWDRIVER	4 mm		
9.	FLAT BLADE SCREWDRIVER	6 mm		
10.	PHILLIPS SCREWDRIVER	PH1		
11.	PHILLIPS SCREWDRIVER	PH2		
12.	PHILLIPS SCREWDRIVER	PH3		
13.	HEX KEY	5 mm		(UNBRAKO KEY / ALLEN KEY)
14.	HEX KEY	8 mm		(UNBRAKO KEY / ALLEN KEY)
15.	HEX KEY	10 mm		(UNBRAKO KEY / ALLEN KEY)
16.	HEX KEY	M12	REAR CASTERS: 130 Nm	(UNBRAKO KEY / ALLEN KEY) REAR CASTERS
17.	Nut Driver	5 mm		
18.	Nut Driver	3/16 inch		
19.	Fix wrench	8 mm		
20.	Fix wrench	10 mm		
21.	Torque Wrench, Up to 81 Nm (130 Nm for Rear Casters)			Heavy mechanical parts may need a specific torque. Each procedure will indicate the torque needed.
22.	WHEEL CHANGE KIT	N/A	N/A	FC200829  WOODEN WEDGE BEVEL EDGED BOARD

### Section 8-3 Definitions of Left, Right, Front and Back

The Figure below illustrates what is Left, Right, Front and Rear (or Back) of the VIVID E9 / VIVID E7.

**Figure 8-1** Definition of Left, Right, Front and Back of VIVID E9 / VIVID E7



## Section 8-4 Reloading the software

### 8-4-1 Purpose of this section

This section describes how to reinstall the software on VIVID E9 / VIVID E7.

### 8-4-2 VIVID E9 / VIVID E7 models versus software requirement

#### 8-4-2-1 VIVID E9 models and hardware/software compatibility

**Table 8-2 VIVID E9 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UP-GRADED TO
GB000070	Vivid E9 with XDclear 4D Expert Option 17 inch LCD (100-230V)	GB200063 or GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.5	v113.0 or higher	N/A
GB000080	Vivid E9 with XDclear 4D Expert Option 19 inch LCD (100-230V)					
GB000075	Vivid E9 with XDclear 2D 17 inch LCD (100-230V)	GB200062 or GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	N/A
GB000085	Vivid E9 with XDclear 2D 19 inch LCD (100-230V)					
GB000090	Vivid E9 with XDclear Pro configuration 17 inch Monitor (100-230V)					
GB000095	Vivid E9 with XDclear Pro configuration 19 inch Monitor (100-230V)					

#### 8-4-2-2 VIVID E7 models and hardware/software compatibility

**Table 8-3 VIVID E7 Models and Hardware/Software Compatibility**

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UP-GRADED TO
GB000099	VIVID E7 Pro with XDclear configuration - 17 inch LCD	GB200062 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	v113.x
GB000100	VIVID E7 Pro with XDclear configuration - 19 inch LCD					

### **8-4-3 Customer provided prerequisite**

- Formatted and labelled media for Images storage.
- Formatted and labelled media for Patient Archive and User Defined Settings.
- Password for the user ADM.  
The default password for the user ADM is **ulsadm**.  
If the password has been changed by the site, you should record it for your own use, before you start the work on the VIVID E9 / VIVID E7.

### **8-4-4 Tools provided with the Ultrasound scanner at delivery or after an upgrade**

- VIVID E9 / VIVID E7 System software (UFD or DVD)
- Application software (UFD or CD)

If present:

- Patch for VIVID E9 / VIVID E7 (UFD or CD)
- Printer Driver Software (UFD or CD)

## 8-4-5 Data Management - moving all images



**NOTICE An error, or a power loss may occur.**

Always backup the Patient Archive and the System Configurations before loading the software! In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from VIVID E9 / VIVID E7 before doing backup of the Patient Database. Depending on the location set-up, either move the images to a remote server or to removable media.

As the images are moved, the database will point to the new location.

If the backup procedure is not completed correctly, the images and database information will be lost.

For instructions, please see "Disk management" in the User Manual.

## 8-4-6 Backing up the Patient Archive and System Configurations



**NOTICE An error, or a power loss may occur.**

Always backup the Patient Archive and the System Configurations before loading the software! In order to complete a successful restore of the Patient Database, as needed after a hard disk replacement, or if all the content on the hard disk has been erased, the images must be moved away from VIVID E9 / VIVID E7 before doing backup of the Patient Database. Depending on the location set-up, either move the images to a remote server or to removable media.


As the images are moved, the database will point to the new location.

If the backup procedure is not completed correctly, the images and database information will be lost.

Backup the Patient Archive and System Configurations.

For instructions, please see "Data Backup and Restore" in the User Manual.

## 8-4-7 Recording important settings and parameters

 **NOTICE** An error, or a power loss may occur during the software loading.  
It is considered to be a best practice to always keep a record on paper of the settings for the VIVID E9 / VIVID E7. Verify if it is current before you start to load software!

Always ensure that the following information is available regarding a remote printer:

- Printer Model (as selected on the VIVID E9 / VIVID E7.)
- The printer's IP Number.  
The printer's IP number is not easily available via the VIVID E9 / VIVID E7's menus. Print out a status sheet on the printer. For more information, please refer to the printer's documentation.
- If the printer is assigned to a key, record the key

### 8-4-8 When to load or reload the software

The software loading procedure is somewhat different, depending on why you need to load the software. Use the table below to make the choice.

**Table 8-4 Installation choices**

Why	Start here
<ul style="list-style-type: none"> <li>• The software installed on the VIVID E9 / VIVID E7 has become corrupted.</li> <li>• VIVID E9 / VIVID E7's configuration/setup has issues that are difficult to troubleshoot and resolve, so it may be easier to do a software reload, and start the setup from scratch.</li> </ul>	<p><a href="#">8-4-9 "Reloading the Software from Repository" on page 8-12.</a></p>
<p>The same as above, but it is impossible to access OLC.</p>	<p><a href="#">8-4-10 "Loading the software from USB Flash Drive (UFD)" on page 8-15</a></p>
<ul style="list-style-type: none"> <li>• You want to erase all data on the HDD</li> <li>• BEP or HDD has been exchanged.</li> <li>• The other methods failed.</li> </ul>	<p><a href="#">8-4-10 "Loading the software from USB Flash Drive (UFD)" on page 8-15</a></p>

## **8-4-9 Reloading the Software from Repository**

### **8-4-9-1 Introduction to Software Reload from Repository**

During the installation process, when the software was installed on the VIVID E9 / VIVID E7, the compressed original files, from the UFD or DVD and CD, were stored on a separate disk partition on the hard disk drive, labeled "REPOSIT" (Repository). If you are going to reinstall the software, you can install from these files. Usually, when reinstalling the software on the same HDD, you don't need to copy the files from UFD or DVD/CD once more!

### **8-4-9-2 Preparations**

Disconnect all external USB devices before starting the reload. (This is to ensure that the drive letters are not mixed up during the software reload.)

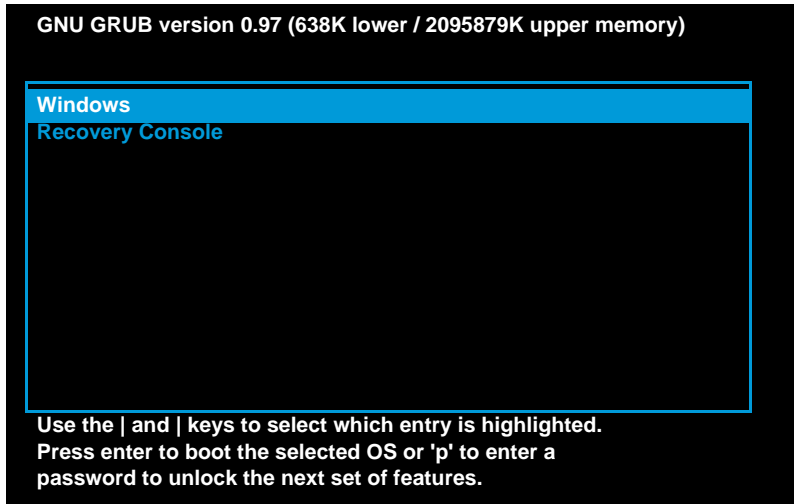


**8-4-9-3 Initiate software reload from the Recovery Console**

Ensure that the VIVID E9 / VIVID E7 is powered down.

- 1.) Depress the **On/Off** button on the **Operator Panel**. The VIVID E9 / VIVID E7 starts.
- 2.) Press the **Esc** button, on the alphanumeric keyboard, multiple times until the **GRUB** menu is displayed on the screen.

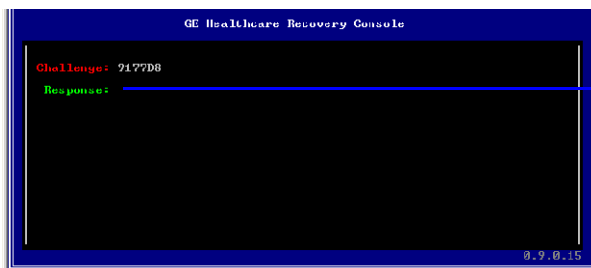
**Figure 8-2 GRUB menu**



USE THE ARROW DOWN KEY TO SELECT RECOVERY CONSOLE, THEN PRESS ENTER.

- 3.) On the **Grub** menu, select: **Recovery Console**.  
The Recovery Console is displayed.

**Figure 8-3 Recovery Console (Example)**



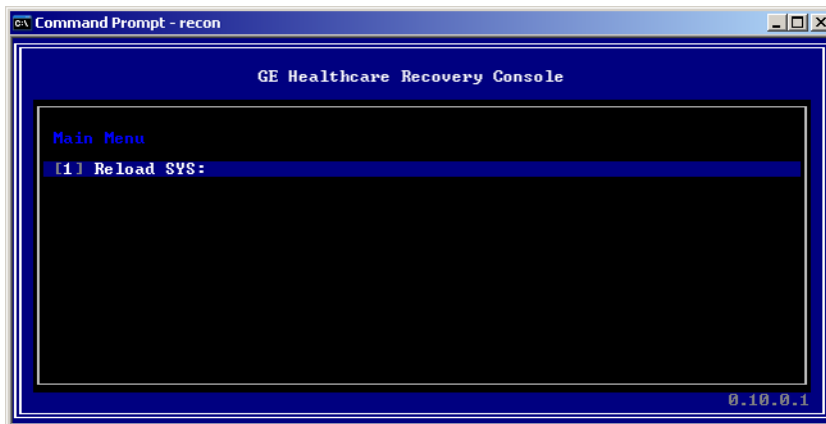
Enter the password (from OLC).

- 4.) Call the **Online Center (OLC)**.  
Tell **OLC** that you need a "**Challenge Code**", and on request, you must read the **Challenge String** on the screen. **OLC** will return a password that you need to type in as the **Response**.
- 5.) Enter the **Response Code (password)** you got from **OLC**.

**8-4-9-3 Initiate software reload from the Recovery Console (cont'd)**

If accepted, the screen below is displayed.

**Figure 8-4 Reload System Software**



6.) Press the **Enter** key on the keyboard. The software reload starts.

*NOTE: Time to complete the software reload is typically 15 to 25 minutes.*

- When the **System Software reload** is done, the VIVID E9 / VIVID E7 reboots.
- After the reboot, the VIVID E9 / VIVID E7 starts to load the Application Software. This is done without any interactions. The TCP/IP settings, Computer Name etc. are restored.
- The VIVID E9 / VIVID E7 shuts down.

**8-4-10 Loading the software from USB Flash Drive (UFD)**

**8-4-10-1 Installing the System Software (only for BEP6 / BEPY3)**

Follow the instructions in the table below to reload or load the software from UFD:

**Table 8-5 Reloading or loading the System software from UFD, sheet 1 of 3**



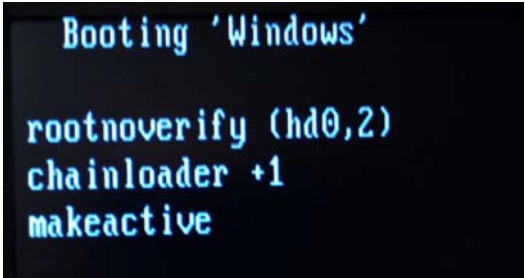
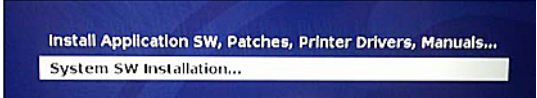
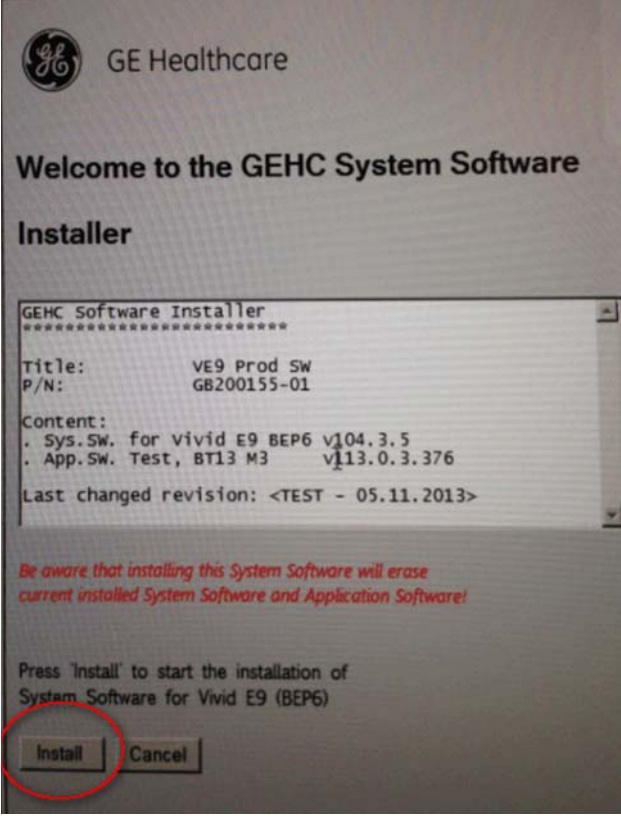


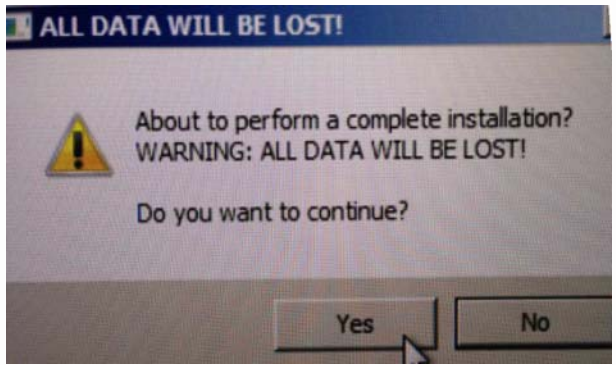
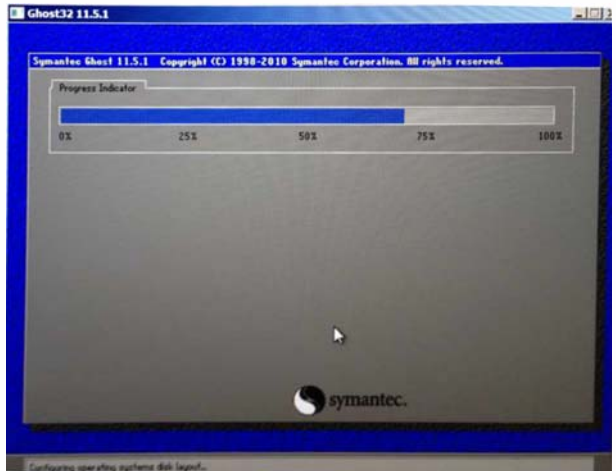

Step	Task	
1.	Check if the alphanumeric keyboard has the F11 key. • If present, continue to the next step. • If the keyboard does not have the F11 key (old keyboard), connect an external keyboard with the F11 key to one of the USB ports, and use this external keyboard during the boot. Another workaround is to go into BIOS and select USB as the primary boot device.	
2.	Disconnect all UFDs from the USB ports on the VIVID E9 / VIVID E7.	
3.	Plug in the <b>Software UFD</b> in one of the USB ports on the VIVID E9 / VIVID E7.	
4.	1. Push the power on button briefly. 2. Wait until the BIOS screen appears with: <b>"Loading..... BIOS"</b> 3. Then push the <b>F11</b> key once.	
5.	1. The Boot selection menu will now appear. 2. Select USB as boot device, 3. then press Enter. 4. The VIVID E9 will now reboot.	

Table 8-5 Reloading or loading the System software from UFD, sheet 2 of 3 (cont'd)

Step	Task	
6.	The VIVID E9 / VIVID E7 reboots.	
7.	Select <b>System Software Installation</b> and press <b>Enter</b> . Follow instructions on screen to install the system software (select <b>Install</b> ).	
8.	Select <b>Install</b> to continue installation.	
9.	Select <b>Yes</b> in the next dialog box. The installation continues.	

**Table 8-5 Reloading or loading the System software from UFD, sheet 3 of 3 (cont'd)**

Step	Task	
10.	<p><b>Keep User Data and Patient Archive?</b></p> <ul style="list-style-type: none"> <li>• Select <b>No</b> to perform a clean install. This will erase all patient data and user presets.</li> <li>• Select <b>Yes</b> to repair/upgrade the system sw partition. User Data and Patient Archive will remain intact.</li> </ul> <p>This starts to install the System Software image on the HDD. All the existing content on the HDD will be erased.</p>	
11.	<p>If a clean install of system SW was selected above, then you will be prompted with a warning that all data will be lost. Select <b>Yes</b> to continue.</p>	
12.	<p>The ghost program starts the clean install.</p>	
13.	<p>When System Software Installation is done (takes about four minutes), remove UFD, then select <b>OK</b> to continue.</p>	

8-4-10-2 Installing the Application Software (all BEPs)

Table 8-6 Reloading or loading the Application software from UFD, sheet 1 of 3

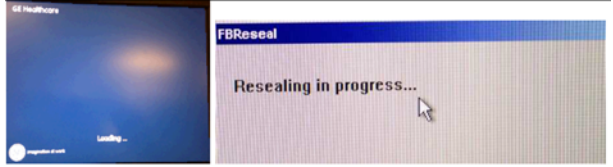
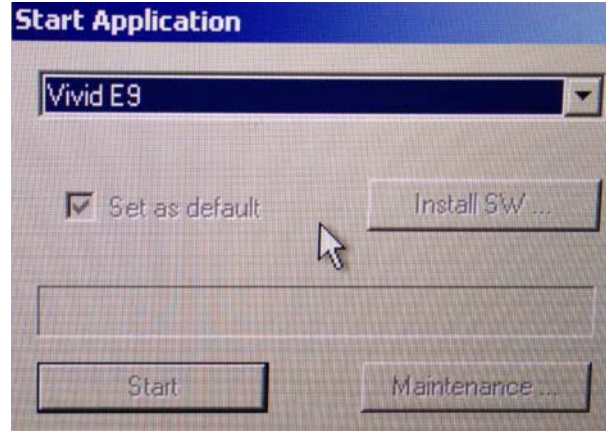
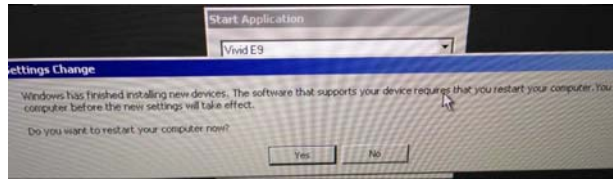
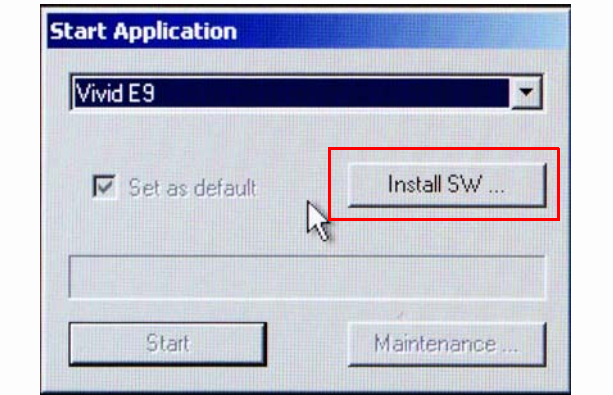


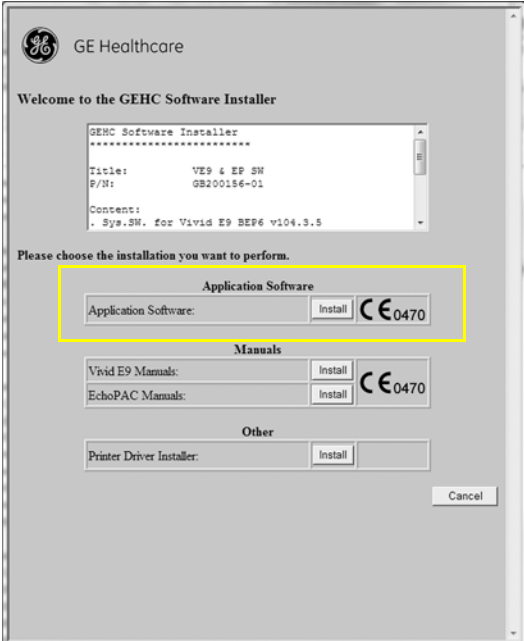
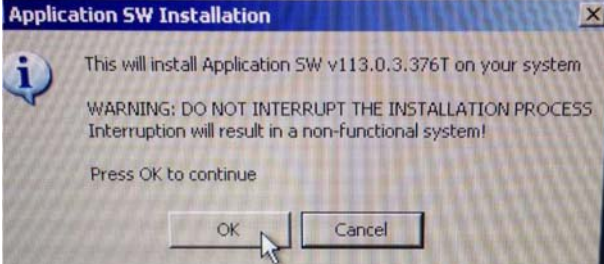

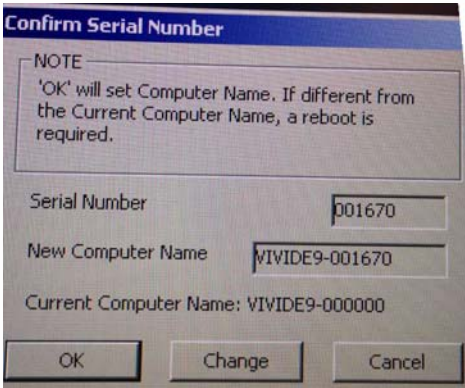
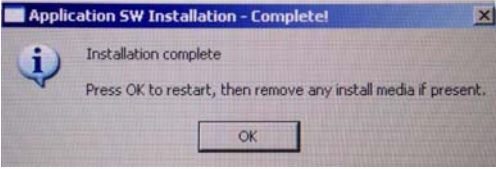
Step	Task	
1.	<p>A menu with "loading..." will appear on the monitor for appr 2 minutes. A menu with FBReseal will follow. DO NOT switch off the scanner during this process.</p>	
2.	<p>Re-insert the UFD when the "Start Application" dialogue box appears. It will take 10-15 seconds until the "Install SW..." button becomes active.</p>	
3.	<p>This dialogue box might not appear. Select <b>Yes</b> if it appears, the Ultrasound system will then reboot.</p>	
4.	<p>The "Install SW..." button has been activated. Select "Install SW..." to continue.</p>	
5.	<p>Select <b>OK</b> to continue.</p>	

Table 8-6 Reloading or loading the Application software from UFD, sheet 2 of 3 (cont'd)

Step	Task	
6.	Select <b>OK</b> to continue.	 <p>The StartLoader dialog box has a blue title bar with the text 'StartLoader' and a close button. Below the title bar is a yellow warning triangle icon. To the right of the icon, the text reads 'SW installation will start now'. At the bottom of the dialog are two buttons: 'OK' and 'Cancel'.</p>
7.	<p>The SW installer allows installation of:</p> <ul style="list-style-type: none"> <li>• Application SW</li> <li>• User Manuals</li> <li>• Printer Driver Installer</li> <li>• Security patches if applicable</li> </ul> <p>Select <b>Install</b> to continue.</p>	 <p>The GEHC Software Installer window features the GE Healthcare logo at the top left. Below the logo, it says 'Welcome to the GEHC Software Installer'. A text box contains the following information: 'Title: VES &amp; EP SW', 'P/N: GB200156-01', and 'Content: Sys.SW. for Vivid E9 BEP6 v104.3.5'. Below this, a section titled 'Please choose the installation you want to perform.' contains three categories: 'Application Software' (with an 'Install' button and a CE mark), 'Manuals' (with 'Vivid E9 Manuals' and 'EchoPAC Manuals' each having an 'Install' button and a CE mark), and 'Other' (with a 'Printer Driver Installer' and an 'Install' button). A 'Cancel' button is located at the bottom right.</p>
8.	Select <b>OK</b> to continue.	 <p>The Application SW Installation dialog box has a blue title bar with the text 'Application SW Installation' and a close button. Below the title bar is an information icon. The main text reads: 'This will install Application SW v113.0.3.376T on your system', followed by a warning: 'WARNING: DO NOT INTERRUPT THE INSTALLATION PROCESS. Interruption will result in a non-functional system!'. Below the warning, it says 'Press OK to continue'. At the bottom are two buttons: 'OK' and 'Cancel'.</p>

**Table 8-6 Reloading or loading the Application software from UFD, sheet 3 of 3 (cont'd)**

Step	Task	
9.	<p>The dialogue box <b>Set Serial Number</b> will appear if a clean install of System SW was selected.</p> <p><b>NOTE:</b> Numlock is deactivated by default, it must be activated to enable digits to be entered here. Activate numlock by pushing the numlock button once. The numlock button is located next to the F12 button on the alphanumeric keyboard.</p> <p>Enter the <b>Serial Number</b>, then select <b>OK</b>.</p>	
10.	<p>Select <b>OK</b> to continue.</p>	
11.	<p>When Application SW installation has completed (takes about 15 minutes), select <b>OK</b> to restart and finalize SW installation.</p> <p><b>Reminder:</b></p> <ul style="list-style-type: none"> <li>When Application SW has been installed DC-offset calibration must be performed.</li> <li>Also remember to select "Save Settings" from Connectivity/TCP/IP tab as described in 3-8-7 "Save the New Settings" on page 3-45.</li> </ul>	

**8-4-10-3 Installing the Latest Microsoft Software Patches (all BEPs)**

**Table 8-7 Installing the Latest Microsoft Software Patches from UFD (all BEPs)**

Step	Task	
<b>INSTALLING THE LATEST MICROSOFT SOFTWARE PATCHES</b>		
1.	<p>If the choice is available on the UFD, select the <b>Latest Microsoft Software patches</b>. Follow the instructions on the screen.</p>	



8-4-10-4 Installing the Translated User Manuals from UFD

Table 8-8 Installing the Translated User Manuals from UFD

Step	Task	
1.	The English User Manual was installed as part of the Application Software. To be able to select another User Manual language, the translated User Manuals must be installed next. Follow the instructions on the screen during the installation.	

8-4-10-5 Installing the MV Option Software from UFD

Table 8-9 Installing the MV Option Software from UFD

Step	Task	
1.	If the VIVID E9 has the MV option, the needed MV software must be installed from the UDF with Tomtec software. <i>DO NOT INSTALL THE OTHER TOMTEC SOFTWARE OPTIONS ON THE SCANNER. THEY ARE FOR USE ON ECHOPAC ONLY.</i> Follow the instructions on the screen during the installation.	

## 8-4-11 Setup after Software loading

*NOTE: Use this procedure if all partitions on the HDD have been erased during the software load.*

*NOTE: If only the software on C:\ has been replaced or updated, please go to: [8-4-12 "Verifications after the software has been re-loaded"](#) on page 8-23.*

- 1.) Restore the Patient Archive and System Configurations from the backup you made before the software loading.
  - For instructions, please see "Data Backup and Restore" in the User Manual.
- 2.) With your recordings from before the software loading, available, continue with the setup instructions starting in: [Section 3-6 "Configuration" on page 3-24](#). Correct the settings as needed.
- 3.) Continue with: [Section 3-8 "Connectivity setup" on page 3-38](#). Based on your recordings, correct the settings as needed.
- 4.) Continue with: [Section 3-9 "Options Setup" on page 3-52](#). Based on your recordings, correct the settings as needed.
- 5.) After a software load, you should always calibrate the Front End, as described in: [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11](#).
- 6.) Install the network printer (if any). Please refer to the Printer Driver Installation Manual.

**8-4-12 Verifications after the software has been re-loaded**

*NOTE: DO NOT use this procedure if all partitions on the HDD have been erased during the software load, but refer to: [8-4-11 "Setup after Software loading" on page 8-22](#).*

*NOTE: Use this procedure if only the software on C:\ has been updated or reloaded.*

- 1.) With your recordings from before the software loading available, continue with the setup instructions starting in: [Section 3-6 "Configuration" on page 3-24](#). Correct the settings if needed.
- 2.) Continue with: [Section 3-8 "Connectivity setup" on page 3-38](#). Based on your recordings, correct the settings if needed.
- 3.) Continue with: [Section 3-9 "Options Setup" on page 3-52](#). Based on your recordings, correct the settings as needed.
- 4.) After a software load, you should always calibrate the Front End, as described in: [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11](#).

## Section 8-5 Replacing Covers and Bumpers

### 8-5-1 Purpose of this section

This section describes how to replace the Covers and Bumpers on the VIVID E9 / VIVID E7.

### 8-5-2 Side Covers replacement

#### 8-5-2-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

#### 8-5-2-2 Side Covers removal

**NOTE:** *The removal procedure is easier if the rear lock is released first, and then the front lock.*

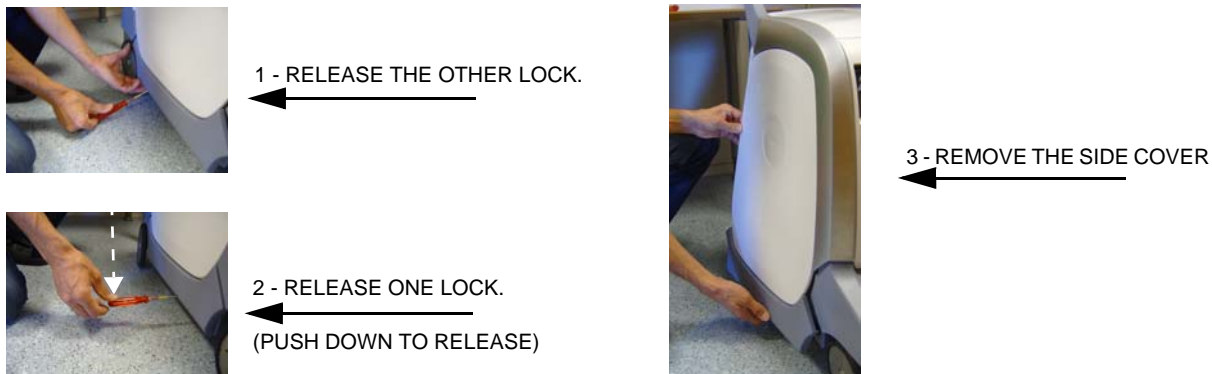
The Side Covers are “clicked” on to the VIVID E9 / VIVID E7 with two locks, located at the lower end of the cover. Two rectangular holes give access to the locks. By inserting a #1 Phillips screwdriver (10 - 16 cm / 4 - 6 inch length) (or similar size and length tool) into the holes and bending the handle on the screwdriver down to the floor, one lock at a time, you can release the locks. You may need to pull the cover outwards at the same time, to release the lock mechanism.

**8-5-2-2 Side Covers removal (cont'd)**

Follow these steps to remove one of the Side Covers:

- 1.) Push a #1 Phillips screwdriver into one of the rectangular holes in the Side Bumper until it reaches the lock mechanism.
- 2.) Push the handle on the screwdriver downwards to release the lock.

**Figure 8-5 Release locks and remove Side Cover**



- 3.) Repeat the steps above for the other lock.
- 4.) Lift the cover forward and up to remove it from the VIVID E9 / VIVID E7.
- 5.) Set it away on a safe place until you need it again.
- 6.) Repeat the steps above to remove the other Side Cover.

**Figure 8-6 Side Cover removed**

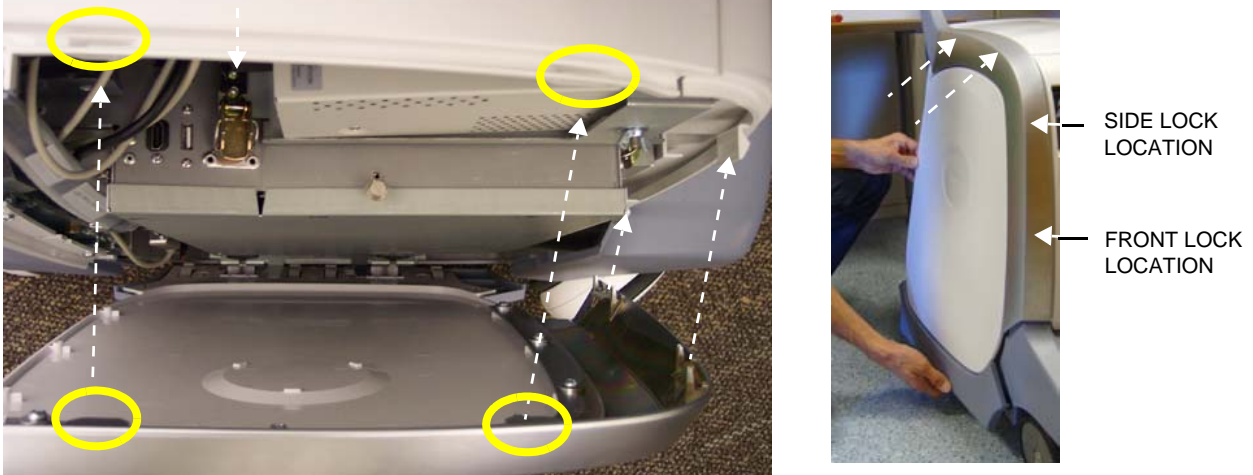


**8-5-2-3 Side Covers installation**

Follow these steps to install the Side Covers:

- 1.) Align tabs at the top inside of Side Cover with the slots on Top Cover.
- 2.) Place the top edge of the Side Cover so it hooks onto the Top Cover.

**Figure 8-7 Hook the Side Cover onto Top Cover**



- 3.) Align and squeeze the front edge of the side cover to latch it into place.
- 4.) Position the Side Cover's side lock first.
- 5.) Position the Side Cover's front lock.
- 6.) Align and squeeze the bottom front of the side cover to latch it into place.
- 7.) Position the Side Cover's rear lock, lifting up the rear tab and guiding it into place.
- 8.) Align and squeeze the bottom rear of the side cover to latch it into place.

## 8-5-3 Top Cover replacement

### 8-5-3-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.

**8-5-3-2 Top Cover removal procedure**

Follow these steps to remove the Top Cover:

- 1.) Remove two screws.

**Figure 8-8 Top Cover fixing screws (seen from above)**



- 2.) Remove the Top Cover.

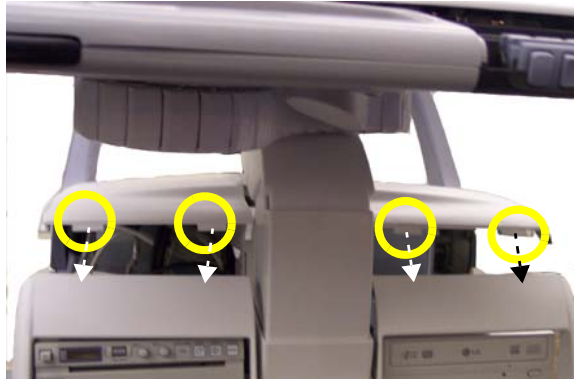


**8-5-3-3 Top Cover installation procedure**

Follow these steps to install the Top Cover:

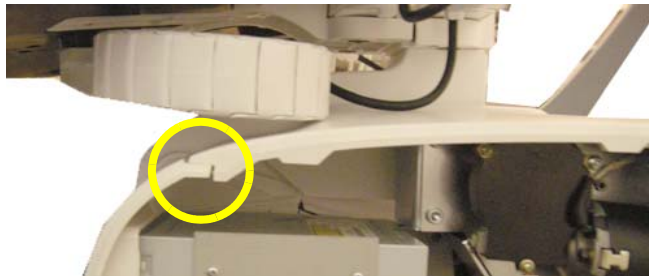
- 1.) Position the Top Cover onto the Front Cover at the four hooks.

**Figure 8-9 Hook Top Cover onto Front Cover (seen from front)**



- 2.) Hook Top Cover onto Front Cover.

**Figure 8-10 Hook Top Cover onto Front Cover (seen from side)**



- 3.) Install and tighten the two screws.

## 8-5-4 Side Bumpers Replacement Procedure

### 8-5-4-1 Overview

This procedure can be used for replacing both the left and the right bumpers. The bumpers are fastened with six screws to the side covers. To be able to unscrew and remove the screws, you must first remove the Side Cover(s).

### 8-5-4-2 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.

### 8-5-4-3 Side Bumpers removal

- 1.) Unscrew and remove the six screws and washers that fasten the Side Bumper to the Side Cover.
- 2.) Remove the Side Bumper from the Side Cover.

### 8-5-4-4 Side Bumpers installation

Follow these steps to install the Side Bumper:

- 1.) Align the fastening holes in the Side Bumper with the holes in the Side Cover.
- 2.) Fasten the screws with washer, one by one until all have been inserted.
- 3.) Tighten the screws
- 4.) Install the Side Cover.

## 8-5-5 Foot Rest Bumper replacement

### 8-5-5-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

### 8-5-5-2 Foot Rest Bumper removal

Follow these steps to remove the Foot Rest Bumper:

The Foot Rest Bumper is fixed with snap locks.

- 1.) Pull the Foot Rest Bumper upwards and over the pedals to release the snap locks, while freeing the side latches.

You may need to push down the pedals to be able to remove the Foot Rest Bumper.

**NOTE:** *In the illustration below (Figure 8-11), the Side Cover was removed to be able to view the Side Latch. You don't need to remove the Side Cover to perform this procedure.*

**Figure 8-11 Side latch**

SIDE LATCH FOR  
FOOT REST BUMPER



**8-5-5-3 Foot Rest Bumper installation**

Follow these steps to install the Foot Rest Bumper:

- 1.) Position the Foot Rest Bumper in place.
- 2.) Push the Foot Rest Bumper down and over the pedals.  
You may need to push down the pedals to be able to place the Foot Rest Bumper.
- 3.) Replace the Side Covers, if they were removed.

## 8-5-6 Front Cover replacement

### 8-5-6-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Foot Rest Bumper.

### 8-5-6-2 Front Cover removal

Follow these steps to remove the Front Cover:

- 1.) Unscrew the two (2 pc) screws that fix the Front Cover Assembly to the chassis.

**Figure 8-12 Fixing screws**



- 2.) Pull the upper end of the Front Cover out and upwards to free it from the pedals and the frame.

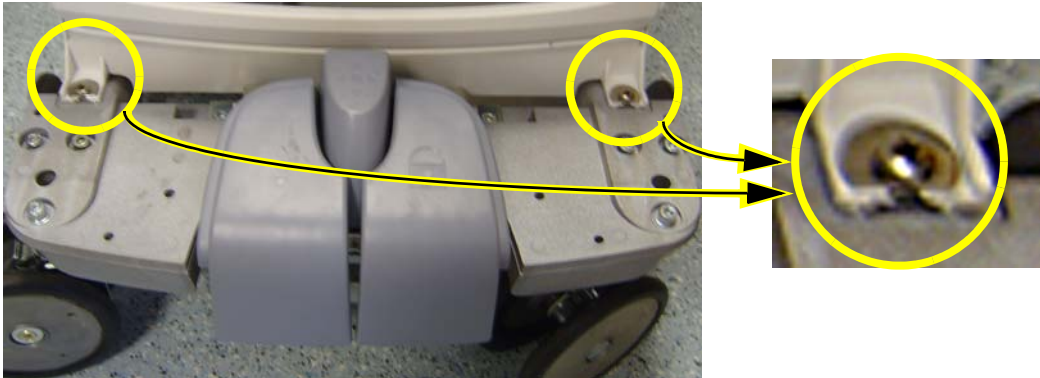
**8-5-6-3 Front Cover installation**

Follow these steps to install the Front Cover:

- 1.) Thread the Front Cover so it fits in between chassis and pedals.
- 2.) Align the Front Cover guide pins with holes in the frame.
- 3.) Fasten Front Cover with two (2 pc) screws and washers.

*NOTE: Orientate the washers as illustrated in the detail in the figure below.*

**Figure 8-13 Fixing screws with washers**



- 4.) Install the Foot Rest Bumper.
- 5.) Install the Top Cover.
- 6.) Install the Side Covers.

## 8-5-7 Plate Connectors w/Guide replacement

### 8-5-7-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Front Cover.
- 7.) Remove the Foot Rest Bumper.

### 8-5-7-2 Plate Connectors w/Guide removal

The Plate Connectors w/Guide is attached with hatches.

- 1.) Use a flat bladed screwdriver to loosen the hatches.
- 2.) Remove the Plate Connectors w/Guide

**8-5-7-3 Plate Connectors w/Guide installation**


- 1.) Position the plate and snap it into position.
- 2.) Install Front Cover.
- 3.) Install Foot Rest Bumper.
- 4.) Install Top Cover.
- 5.) Install Side Covers.



## 8-5-8 Filter Cover replacement

### 8-5-8-1 Preparations

When preparing for the replacement, you must perform the following steps:

	<p><b>CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</b></p> <ol style="list-style-type: none"><li>1. TURN OFF THE BREAKER.</li><li>2. UNPLUG THE SYSTEM.</li><li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li><li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.</li></ol> <p>Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.</p>
---	--



- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

### 8-5-8-2 Filter Cover removal

Follow these steps to remove the Filter Cover:

- 1.) Gently pull the Filter Cover out and away from the System.
- 2.) Inspect the Filter, and clean if necessary.

### 8-5-8-3 Filter Cover installation

Follow these steps to install the Filter Cover:

- 1.) Inspect the Filter, and clean if necessary.
- 2.) Place the Filter Cover into position and press the Filter Cover top corners until the Filter Cover locks engage.

## 8-5-9 Rear Cover replacement

### 8-5-9-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.  
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

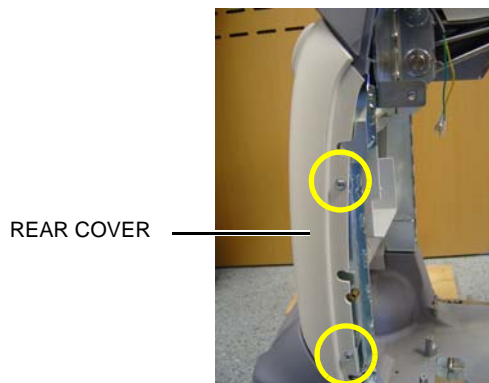
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Rear Bumper.
- 6.) Remove Filter Cover at rear.
- 7.) Remove Filter.

### 8-5-9-2 Rear Cover removal

Follow these steps to remove the Rear Cover:

- 1.) Remove two screws on each side of the Rear Cover.
- 2.) Lift the Rear Cover away.

**Figure 8-14 Rear Cover fixing screws**



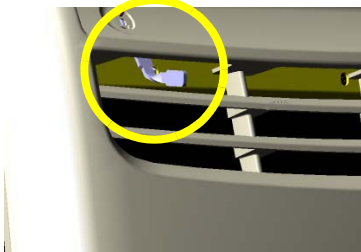
**8-5-9-3 Rear Cover installation**

Follow these steps to install the Rear Cover:

- 1.) Position the lower edge of the Rear Cover into place on the rear of the VIVID E9 / VIVID E7 frame.
- 2.) Tilt the top edge of the Rear Cover toward the VIVID E9 / VIVID E7 frame.

Be sure the Z mechanism's manual release handle extends through the air vent on the Rear Cover.

**Figure 8-15 Z-lever in upper air ventilation slot**



- 3.) Position the Rear Cover into place.
- 4.) Gently pull up on the Z mechanism's manual release handle to confirm proper position through the Rear Cover air vents.
- 5.) Install the four screws, two on each side. Install the two lower screws first, then the upper screws.
- 6.) Inspect the Filter, and clean if necessary.
- 7.) Install the Filter.
- 8.) Install the Filter Cover.
- 9.) Install the Rear Bumper.
- 10.) Install the Side Covers.

## 8-5-10 Door, I/O Panel replacement

### 8-5-10-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** ***ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.***  
***WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:***



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

### 8-5-10-2 Remove the I/O Door

Follow these steps to remove the Door I/O Panel:

- 1.) At the back of the VIVID E9 / VIVID E7, push a 4 mm flat blade screwdriver into the rectangular hole at the Door I/O panel until it reaches the lock mechanism.

**Figure 8-16 Door I/O Panel**



Door I/O

- 2.) Push the handle on the screwdriver to the left to release the lock.
- 3.) Open the Door I/O Panel.
- 4.) Hold the Door I/O Panel near the upper hinge, and pop hinge out and away from the upper hinge post on the Rear Cover.

**8-5-10-2 Remove the I/O Door (cont'd)**

**Figure 8-17 Hinge placement on Door I/O Panel**



**8-5-10-3 Install the I/O Door**

Follow these steps to install the Door I/O Panel:

- 1.) Place the Door I/O Panel into position by sliding lower hinge onto lower hinge post.
- 2.) Pop the upper hinge into place onto the upper hinge post.

## **8-5-11 Cable Hooks replacement**

### **8-5-11-1 Preparations**

When preparing for the replacement, you must perform the following steps:

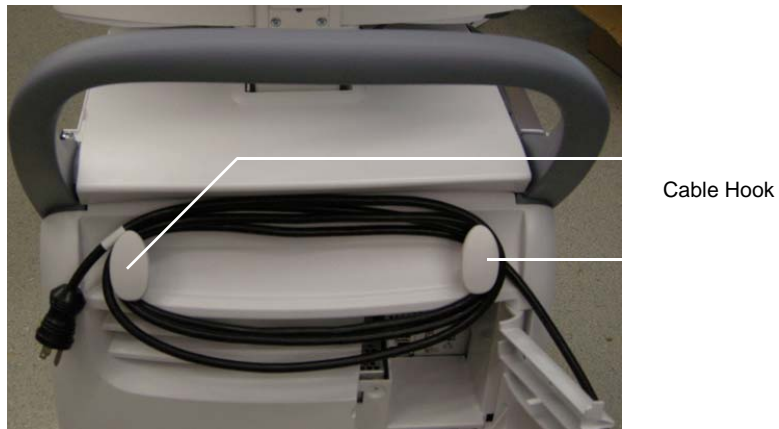
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Rear Bumper.
- 6.) Remove Filter Cover at rear.
- 7.) Remove Filter.
- 8.) Remove the Top Cover.
- 9.) Remove the Rear Cover.

**8-5-11-2 Cable Hook removal**

Follow these steps to remove the Cable Hook:

- 1.) Locate the Cable Hook(s).

**Figure 8-18 Door I/O Panel**



- 2.) Place the Rear Cover face down on a protected, flat surface.
- 3.) Remove the screw securing the Cable Hook.
- 4.) Repeat step 2 to remove the other Cable Hook, if necessary.

**Figure 8-19 Cable Hook screw placement**



**8-5-11-3 Cable Hook installation**

Follow these steps to install the Cable Hook:

- 1.) Position the Cable Hook on the Rear Cover.
- 2.) Install the screw to secure the Cable Hook to the Rear Cover.
- 3.) Repeat step 2 to replace the other Cable Hook, if necessary.
- 4.) Install the Rear Cover.
- 5.) Install the Top Cover.
- 6.) Inspect the Filter, and clean if necessary.
- 7.) Install the Filter.
- 8.) Install the Filter Cover at rear.
- 9.) Install the Rear Bumper.
- 10.) Install the Side Covers.



## 8-5-12 Rear Bumper replacement

### 8-5-12-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

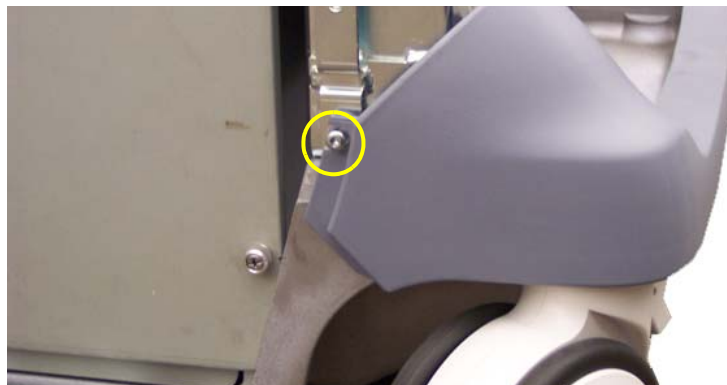
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove Side Covers.
- 5.) Remove Rear Cover.
  - [8-5-9 "Rear Cover replacement" on page 8-38.](#)

### 8-5-12-2 Rear Bumper removal procedure

Follow these steps to remove the Rear Bumper:

- 1.) Remove one screw on each side of the VIVID E9 / VIVID E7.

**Figure 8-20 Left screw placement for Rear Bumper**



- 2.) Remove the Rear Bumper.

### 8-5-12-3 Rear Bumper installation procedure

Follow these steps to install the Rear Bumper:

- 1.) Place the Rear Bumper into position
- 2.) Install the 2 screws to secure the Rear Bumper.

## 8-5-13 Rear Handle replacement

### 8-5-13-1 Preparations

When preparing for the replacement, you must perform the following steps:

**⚠ WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

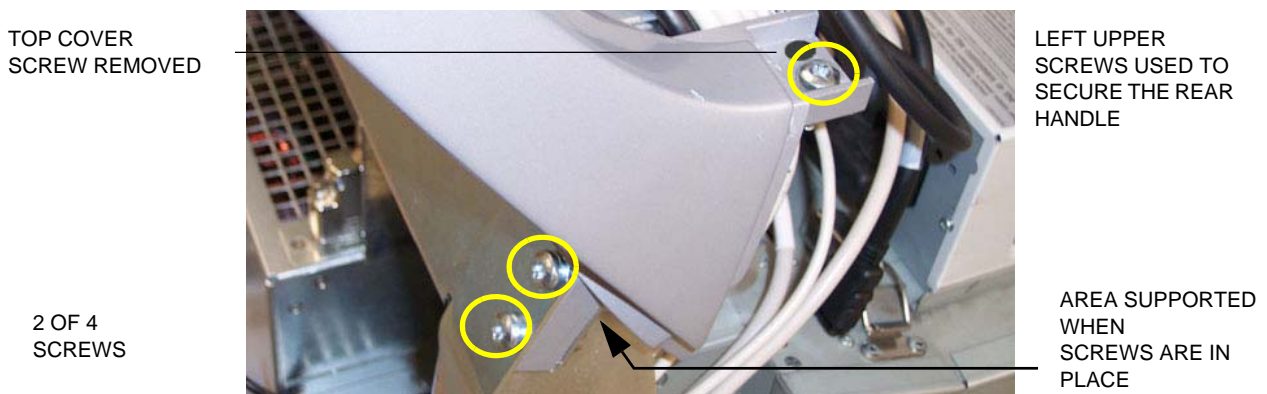
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Rear Cover.
- 6.) Remove the Top Cover.

### 8-5-13-2 Rear Handle removal procedure

Follow these steps to remove the Rear Handle:

- 1.) Remove the 2 upper screws, one on each side.
- 2.) Remove the 4 lower screws, two on each side.

**Figure 8-21 Three screws on each side (left side illustrated)**



- 3.) Lift the Rear Handle away.

### 8-5-13-3 Rear Handle installation procedure

Follow these steps to install the Rear Handle:

- 1.) Install the Rear handle in position so its fastening holes are flush with the holes in the frame.

- 2.) Install the two screws for the Rear Handle (torque=3Nm).
- 3.) Install the four hexcap screws for the Rear Handle.
- 4.) Install the Top Cover.
- 5.) Install the Rear Cover.
- 6.) Install the Side Covers.



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

## 8-5-14 Column Cover Assembly replacement

### 8-5-14-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

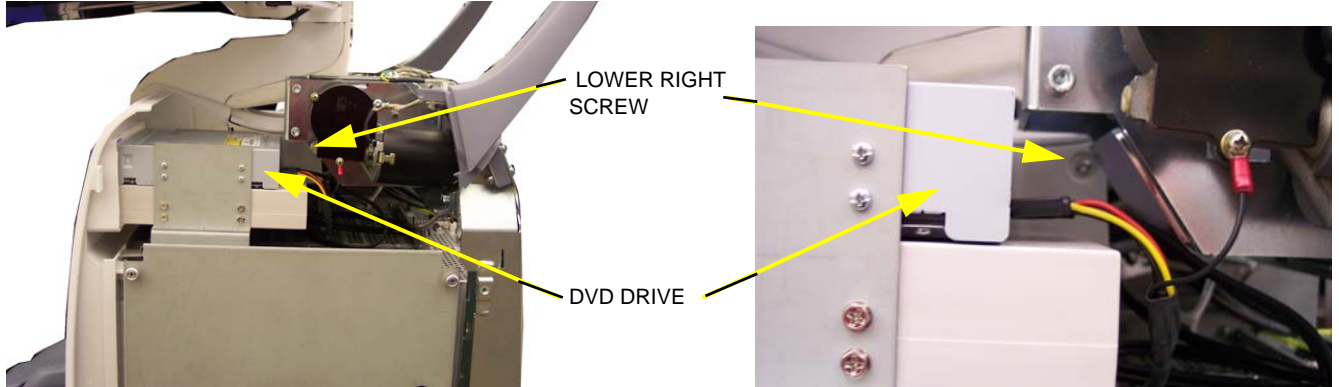
- 1.) Shut down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side covers.
- 5.) Remove the Top Cover.

**8-5-14-2 Column Cover Assembly removal**

Follow these steps to remove the Column Cover Assembly:

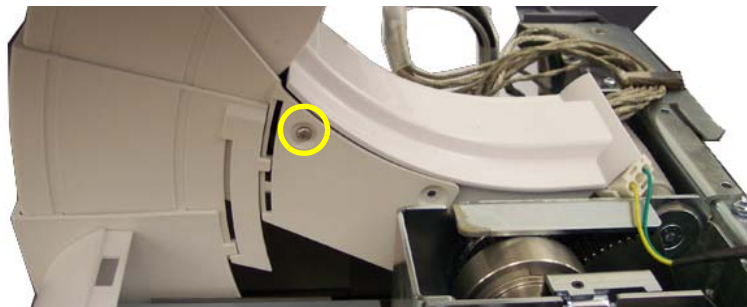
- 1.) Lower the console to lowest possible level.
- 2.) Remove the lower screw on the right side that is visible near the rear of the DVD drive.

**Figure 8-22 With console lowered, lower right side screw placement**



- 3.) Raise the console to full height.
- 4.) Remove the remaining screw on the right side that secures the Column Cover Assembly.

**Figure 8-23 With console raised, upper right side screw placement**



- 5.) Remove the 2 screws on the left side that secure the Column Cover Assembly.

**Figure 8-24 With console raised, left side screw placement**



- 6.) Remove Column Cover Assembly.

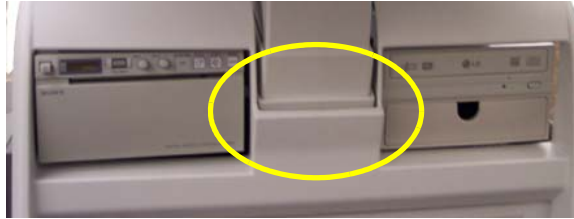
**NOTE:** *The Main Cable Cover will also be released.*

**8-5-14-3 Column Cover Assembly Installation**

Follow these steps to install the Column Cover Assembly

- 1.) Install the Main Cable Cover so the Column Cover Assembly overlaps Main Cable Cover edges.
- 2.) Install screws to Column Cover Assembly (tighten by hand).
- 3.) Position the lower Column Cover tab inside the Front Cover.

**Figure 8-25 Position the column cover inside the front cover**



- 4.) Install the Top Cover.
- 5.) Install the Side Covers.

## 8-5-15 Main Cable Cover replacement

### 8-5-15-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

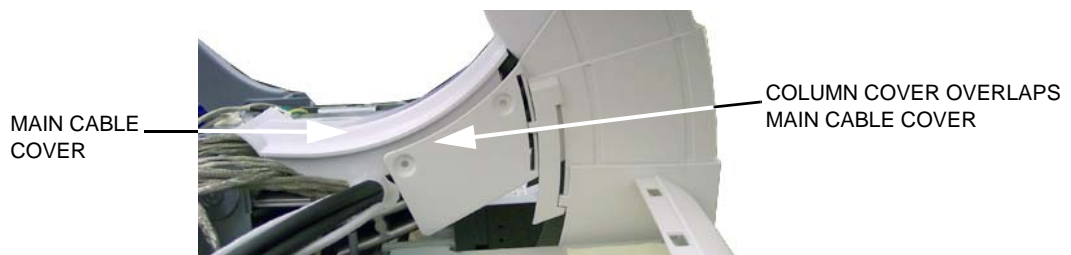
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the 4 screws to the Column Cover Assembly.

### 8-5-15-2 Main Cable Cover removal procedure

The Main Cable Cover is held by four screws. Follow these steps to remove the Main Cable Cover:

- 1.) Remove the Main Cable Cover.

**Figure 8-26 Main Cable Cover**



**8-5-15-3 Main Cable Cover installation procedure**

Follow these steps to install the Main Cable Cover:

- 1.) Install the Main Cable Cover so the Column Cover Assembly overlaps Main Cable Cover edges (see [Figure 8-26](#)).
- 2.) With the console raised to its full height, install the 3 screws to secure the Main Cable Cover and Column Cover Assembly.
- 3.) Lower the console and install the lower right side screw (See: [Figure 8-22 "With console lowered, lower right side screw placement" on page 8-49](#)).
- 4.) Position the lower Column Cover tab inside the Front Cover.

**Figure 8-27 Position the column cover tab inside the front cover**



- 5.) Install the Top Cover.
- 6.) Install the Side Covers.



## 8-5-16 Covers under XY / Frogleg motors replacement

### 8-5-16-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

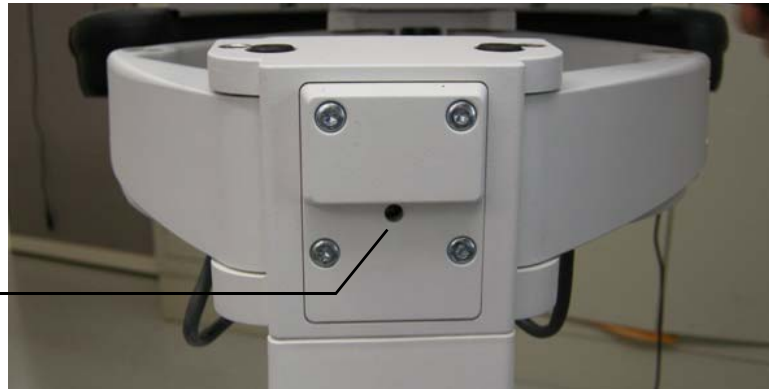
### 8-5-16-2 Covers under XY / Frogleg motors removal procedure

Follow these steps to remove the Covers under XY / Frogleg motors:

- 1.) At the rear of the VIVID E9 / VIVID E7, release the console's XY mechanism by inserting a screwdriver into the release point and pressing until release. Pull the console out to its extended position to gain access to the screws in the next step.

**Figure 8-28 XY mechanism release**

XY  
(FROGLEG)  
RELEASE



**8-5-16-2 Covers under XY / Frogleg motors removal procedure (cont'd)**

- 2.) Under the XY / Frogleg mechanism, identify the 4 separate covers. There are two types of covers, one type has two screws (1) and the other type has one screw (2).
- 3.) Remove the screws from the cover(s) to replace.

**Figure 8-29 XY / Frogleg mechanism covers, right side frog leg, from underneath**



- 4.) Pull down and slide the cover away from the XY mechanism. Be sure to flex the plastic slightly so the plastic clears the XY.

**Figure 8-30 Pull down and slide XY cover out**

PLASTIC MUST CLEAR FOR THE COVER TO RELEASE AND SLIDE OUT

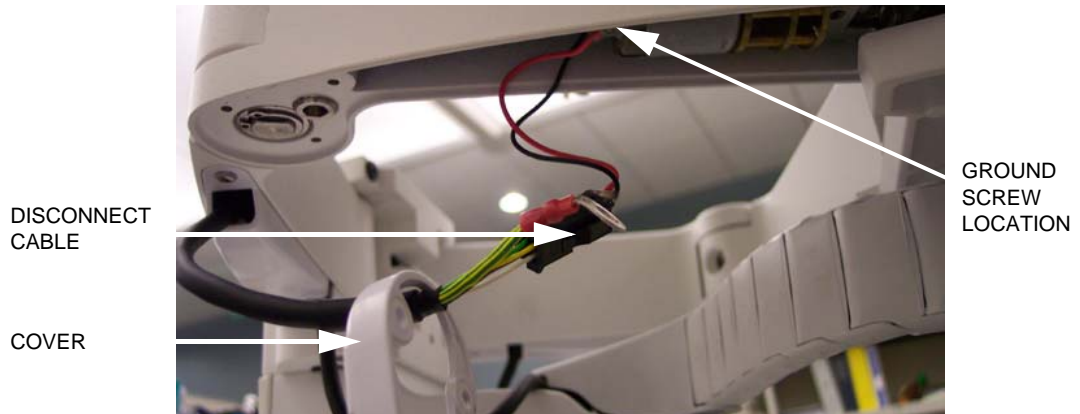


- 5.) Disconnect the cable.

**8-5-16-2 Covers under XY / Frogleg motors removal procedure (cont'd)**

- 6.) Remove the screw securing the ground.

**Figure 8-31 Remove the cover**



- 7.) Thread the cover(s) off the cable.

**8-5-16-3 Covers under XY / Frogleg motors installation procedure**

Follow these steps to install the Covers under XY / Frogleg motors:

- 1.) Thread the cover(s) on the cable.
- 2.) Perform a dry fit of the covers (confirm the covers face the correct way) before connecting the cable and ground.
- 3.) Install the screw securing the ground.
- 4.) Connect the cable.
- 5.) Slide cover(s) into place.
- 6.) Replace the screws to the covers.

## 8-5-17 Bulkhead Cover replacement

The Bulkhead Cover is the cover for the connector compartment at the rear side of VIVID E9 / VIVID E7's Top Console.

### 8-5-17-1 Preparations

When preparing for the replacement, you must perform the following steps:

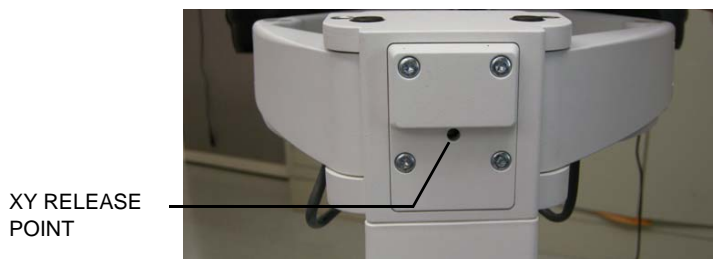
 **WARNING** ***ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.***  
***WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:***



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

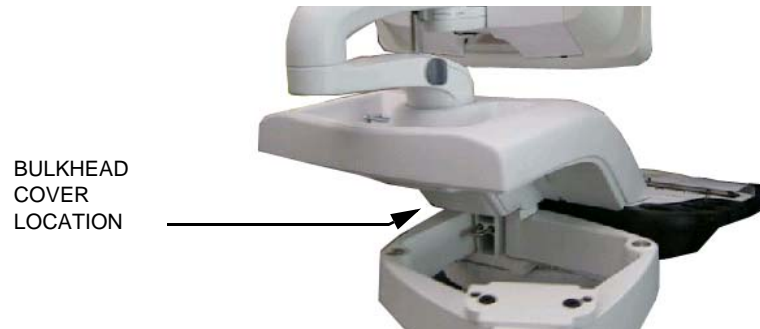
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) At the rear of the VIVID E9 / VIVID E7, release the console's frogleg mechanism by inserting a screwdriver into the release point and pressing until release. Pull the console out to its extended position to gain access to the screws in the next step.

**Figure 8-32 XY / Frogleg mechanism release**



8-5-17-1 Preparations (cont'd)

Figure 8-33 Bulkhead Cover location



8-5-17-2 Remove the Bulkhead Cover

Follow these steps to remove the Bulkhead Cover:

- 1.) Use thumbs to press upper lock tabs toward the front of the VIVID E9 / VIVID E7 to release the top of the Bulkhead Cover, or, if needed, use a 4 mm flat blade screwdriver to release the 2 lock tabs.

Figure 8-34 Upper tab lock placement on Bulkhead Cover

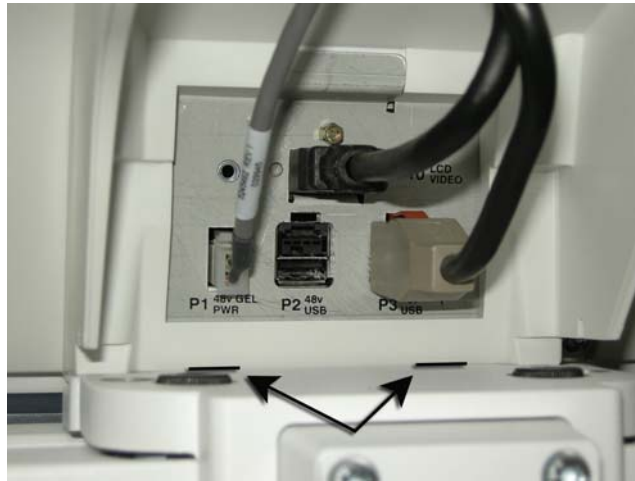


- 2.) Pull the Bulkhead Cover away from the VIVID E9 / VIVID E7.

**8-5-17-2 Remove the Bulkhead Cover (cont'd)**

**Figure 8-35 Bulkhead Cover removed**

BULKHEAD  
COVER  
LOWER TAB  
LOCKS



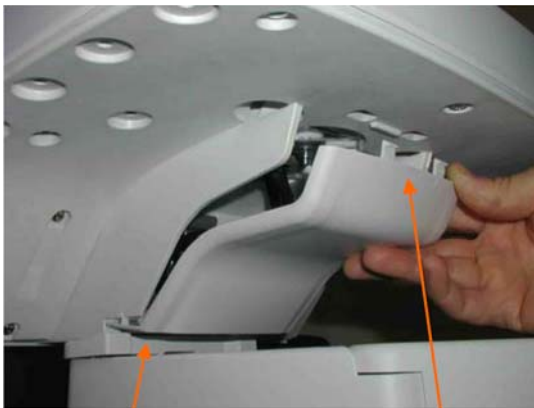
**8-5-17-3 Install the Bulkhead Cover**

Follow these steps to install the Bulkhead Cover:

- 1.) Place the Bulkhead Cover's mounting angle onto the lower edge of the bulkhead opening.

*NOTE:* Tuck any cables within the cover to avoid pinching the cables.

**Figure 8-36 Install Bulkhead Cover**



MOUNTING ANGLE

Tab locks

- 2.) Push the two upper tab locks into the openings in the Frame UI Carrier.

## 8-5-18 Bumper Boss Z Outer Replacement

### 8-5-18-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Move the Top Console to its upper position.



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 2.) Power down the VIVID E9 / VIVID E7.
- 3.) Disconnect the Mains Power Cable from the wall outlet.
- 4.) Disconnect all probes and external I/O cabling.

### 8-5-18-2 Remove the Bumper Boss Z Outer

- 1.) Remove the two fixing screws on the lower part of the Bumper Boss Z Outer.
- 2.) Remove the Bumper Boss Z Outer.

### 8-5-18-3 Install the Bumper Boss Z Outer

- 1.) Install the Bumper Boss Z Outer.
- 2.) Install the two fixing screws.

### 8-5-18-4 Calibration and adjustments

### 8-5-18-5 Verification

## Section 8-6 Top Console Parts Replacement Overview

### 8-6-1 Replacing the 17" LCD Monitor assembly

#### 8-6-1-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Move the User Interface (Top Console) to its lower, locked position.
- 3.) Disconnect the Mains Power Cable from the wall outlet.
- 4.) Disconnect all probes and external I/O cabling.

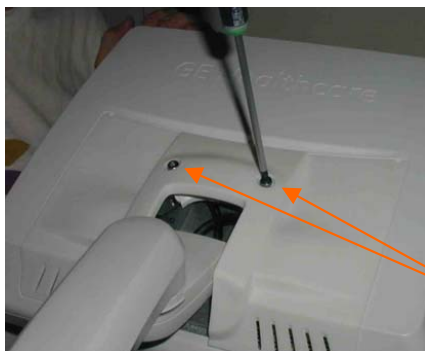
#### 8-6-1-2 Remove the 17" LCD Rear Cover

A cover at the rear side of the LCD Monitor assembly covers the two cables to the monitor. To get access to the cable connectors, remove the LCD Rear Cover.

Follow these steps to remove the LCD Rear Cover:

- 1.) For easy access, tilt the LCD Monitor forward to horizontal position.

**Figure 8-37 LCD Monitor assembly - rear view**



FIXING SCREWS

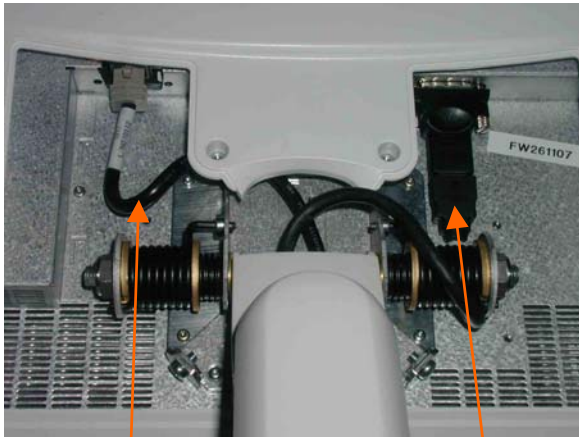
- 2.) Unscrew the two fixing screws on the rear side of the LCD Monitor assembly.
- 3.) Remove the LCD Rear Cover and place it on a safe place.



**8-6-1-3 Disconnect the 17" LCD Monitor Cables**

- 1.) Disconnect the two cables.

**Figure 8-38 Disconnect cables**



POWER/USB CABLE

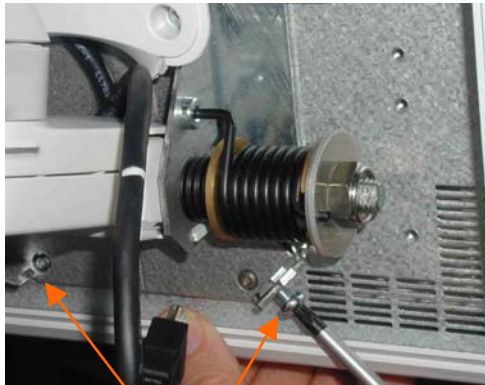
HDMI CABLE

- 2.) Tilt the monitor back to vertical position.

**8-6-1-4 Remove the 17" LCD Monitor assembly**

Two screws are used for fixing the LCD Monitor assembly to the LCD Arm Bracket.

**Figure 8-39 Fixing screws**



FIXING SCREWS

- 1.) Loosen and remove the screws
- 2.) Lift the LCD Monitor assembly upwards until you can lift it away from the LCD Arm Bracket.
- 3.) Place the LCD Monitor on a clean and safe place.

**Figure 8-40 LCD Bracket**

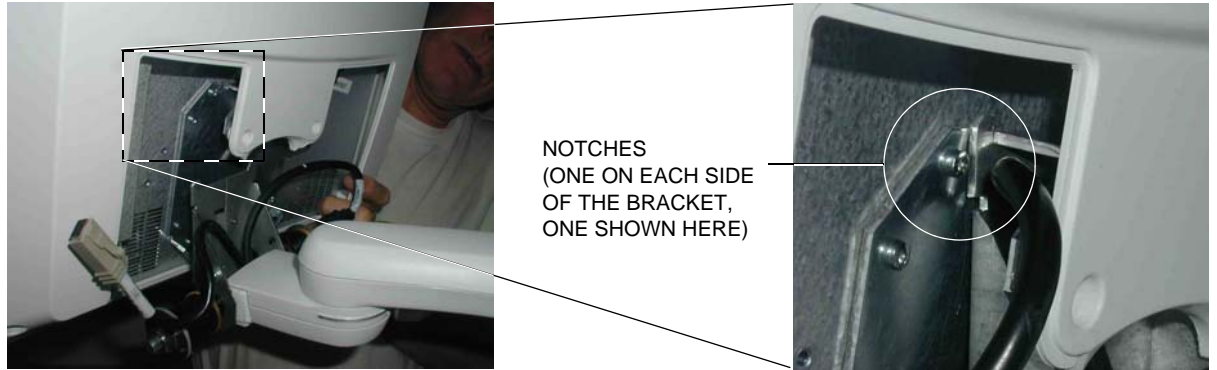


**8-6-1-5 Install the 17" LCD Monitor**

Follow these steps to install the LCD Monitor:

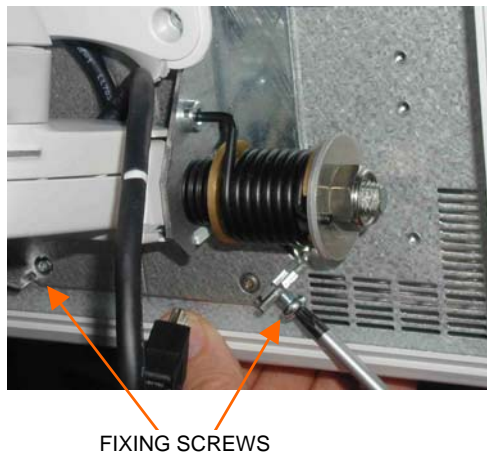
- 1.) Place the LCD assembly onto the LCD Arm Bracket. Be sure that the notches in the LCD fixing bracket is well aligned onto the corresponding positions on the LCD Arm Bracket.

**Figure 8-41 Install the LCD Monitor**



- 2.) Install the two screws (M5x8, Torque: 5.7 Nm).

**Figure 8-42 Two fixing screws**

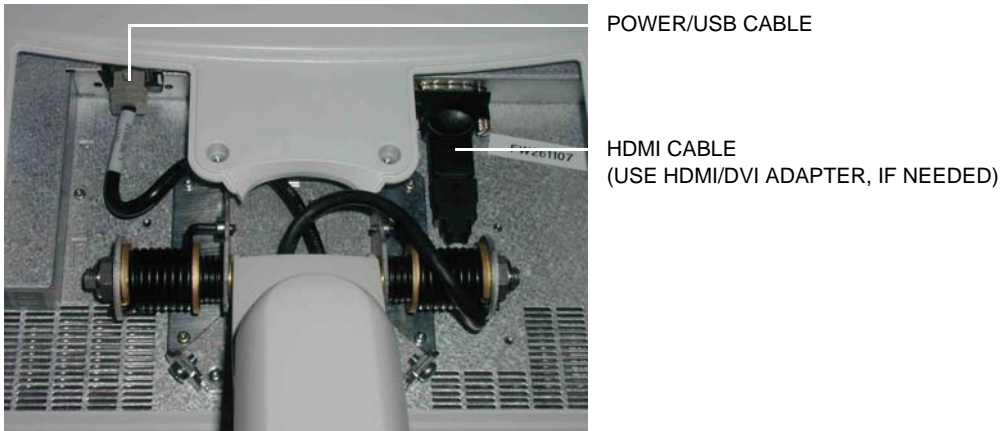


- 3.) Tilt the monitor to horizontal position.

**8-6-1-5 Install the 17" LCD Monitor (cont'd)**

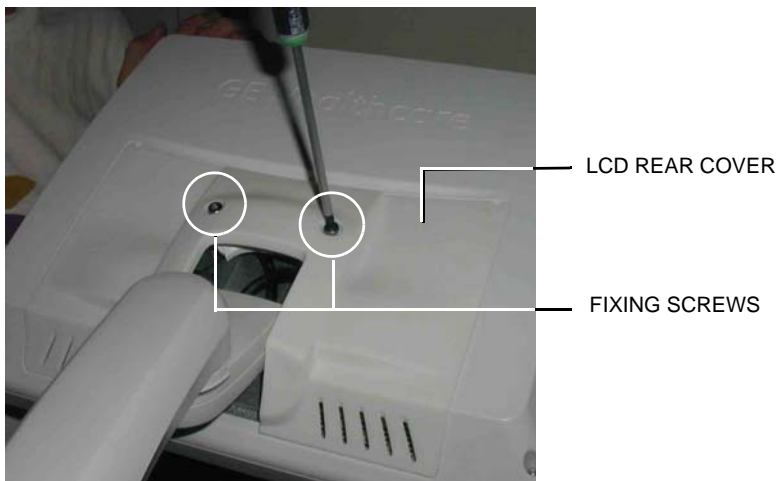
4.) Connect the two cables. Arrange the cables as illustrated in [Figure 8-43 - Connect cables](#).

**Figure 8-43 Connect cables**



5.) Install the LCD Rear Cover and fasten it with the fixing screws.

**Figure 8-44 LCD Monitor - Rear View**



## 8-6-2 Replacing the 19" LCD Monitor assembly

### 8-6-2-1 Manpower

One person, 15 minutes

### 8-6-2-2 Tools

For tools needed, please refer to: [8-2-5 "Tools needed for servicing VIVID E9 / VIVID E7" on page 8-5.](#)

### 8-6-2-3 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Move the User Interface (Top Console) to its lower position.
- 3.) Disconnect the Mains Power Cable from the wall outlet.
- 4.) Disconnect all probes and I/O cabling.

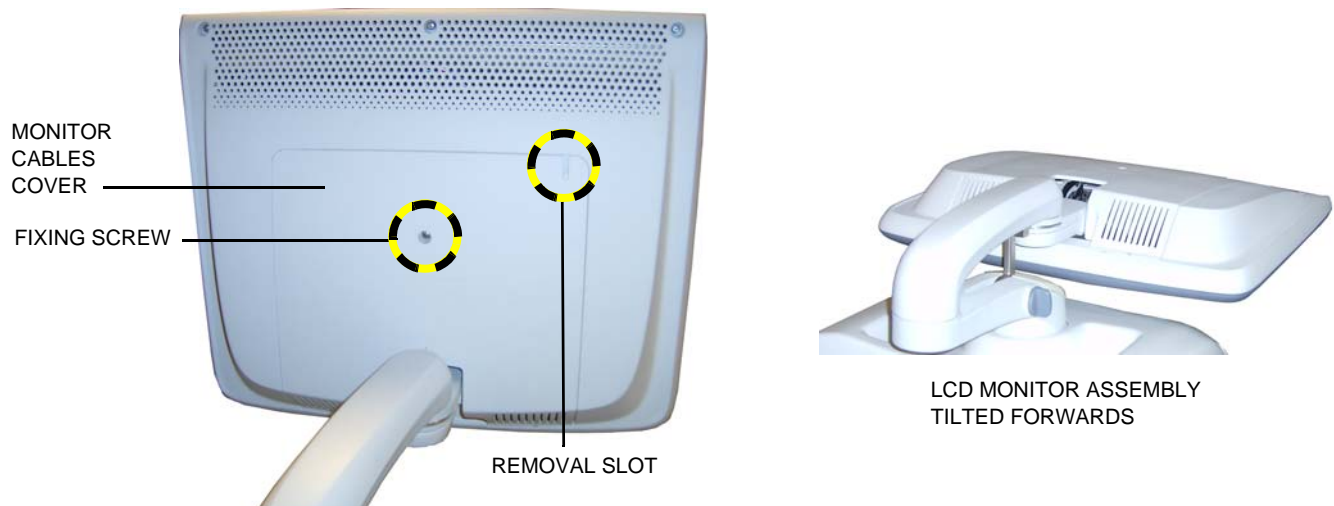
### 8-6-2-4 Remove the 19" LCD Monitor Cables Cover

A cover at the rear side of the LCD Monitor assembly covers the two cables to the monitor. To get access to the cable connectors, remove the Cable Cover.

Follow these steps to remove the Cable Cover:

- 1.) For easy access, tilt the LCD Monitor forward to horizontal position.

Figure 8-45 LCD Monitor assembly- rear view



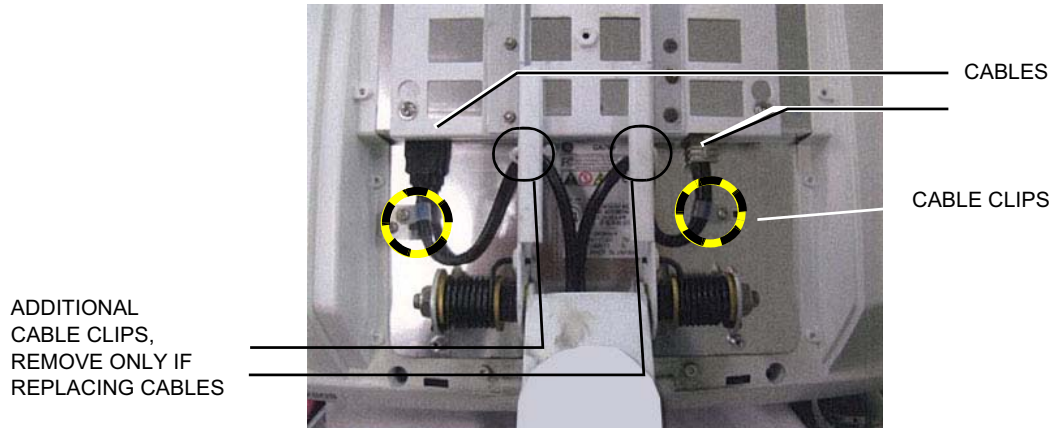
- 2.) Unscrew the fixing screw on the rear side of the LCD Monitor assembly.
- 3.) Remove the Monitor Cables Cover. Carefully insert a screwdriver into the Removal Slot" to separate the cover from the LCD Monitor assembly.
- 4.) Lift the cover away and place it on a safe place.

**8-6-2-5 Disconnect the 19" LCD Monitor Cables**

- 1.) Disconnect the two signal cables.
- 2.) Remove the 2 cable clips, if present.

*NOTE: If you are replacing any cables, you will also need to remove 2 additional cable clips at the bracket.*

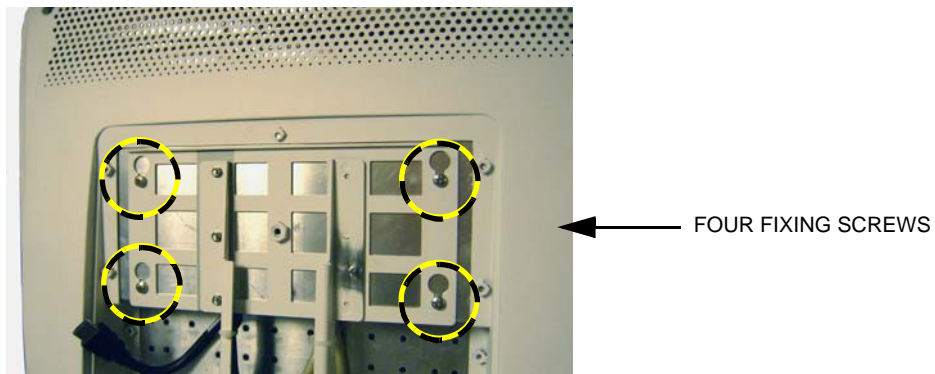
**Figure 8-46 Disconnect cable clips and cables**



**8-6-2-6 Remove the 19" LCD Monitor assembly**

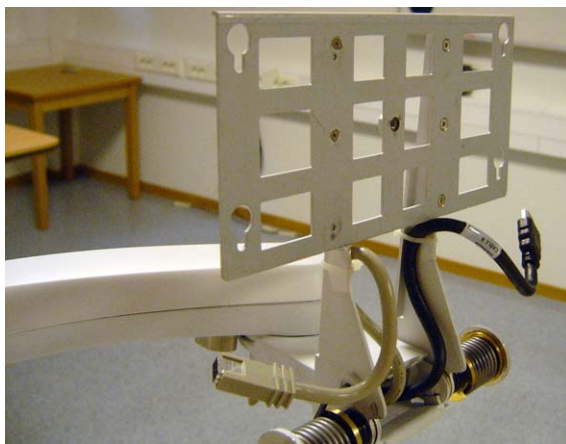
Four screws are used to hold the LCD Monitor assembly to the Monitor Bracket.

**Figure 8-47 Four fixing screws**



- 1.) Loosen the four screws by turning each screw between one half and one turn counter-clockwise. You don't need to remove the screws.
- 2.) Lift the LCD Monitor assembly upwards until you can lift it away from the Monitor Bracket.
- 3.) Place the LCD Monitor on a clean and safe surface.

**Figure 8-48 Monitor Bracket**



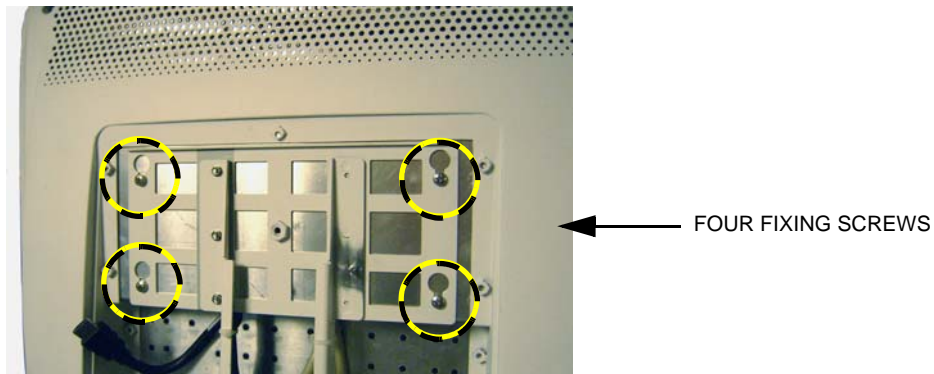


**8-6-2-7 Install the 19" LCD Monitor assembly**

Follow these steps to install the LCD Monitor:

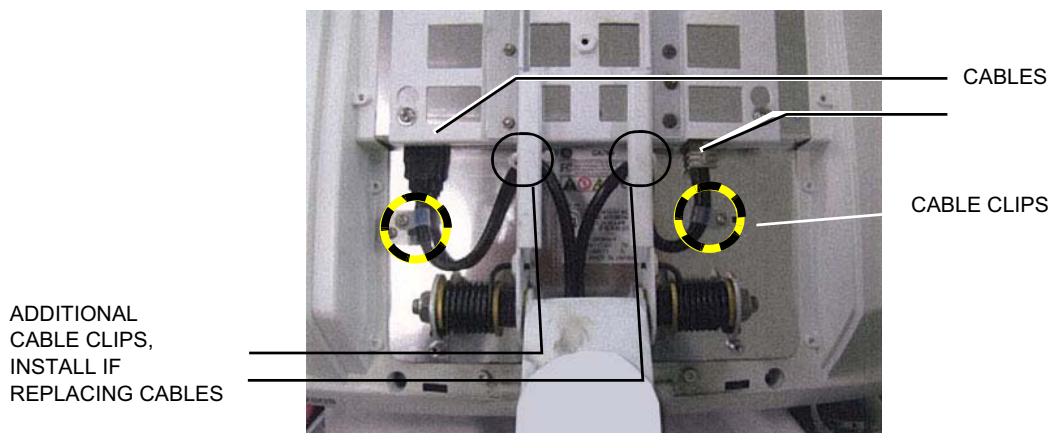
- 1.) Install the LCD Monitor assembly on the Monitor Bracket. Verify that all four fixing screws have engaged in their slots.
- 2.) Tighten the four screws.

**Figure 8-49 Four fixing screws**



- 3.) Tilt the monitor to horizontal position.
- 4.) Connect the cables.
- 5.) Connect the cable clips, if present.

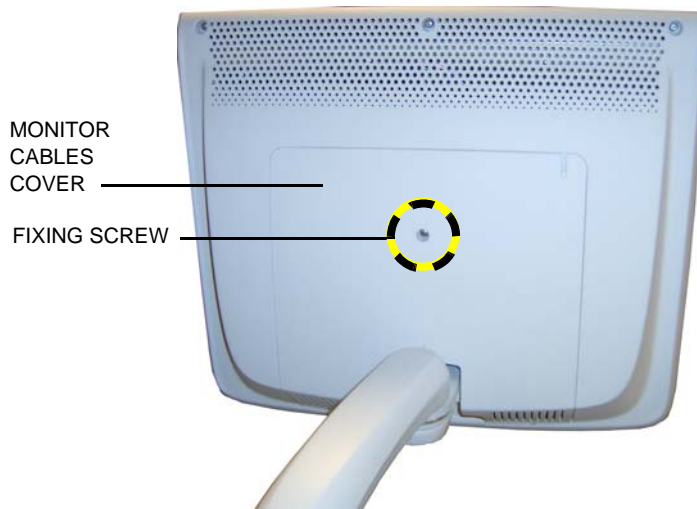
**Figure 8-50 Connect cables**



**8-6-2-8 Install the Monitor Cables Cover**

- 1.) Install the Monitor Cables Cover and fasten it with the fixing screw.

**Figure 8-51 LCD Monitor - rear view**



## 8-6-3 Replacing the LCD Arm assembly

### 8-6-3-1 60Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

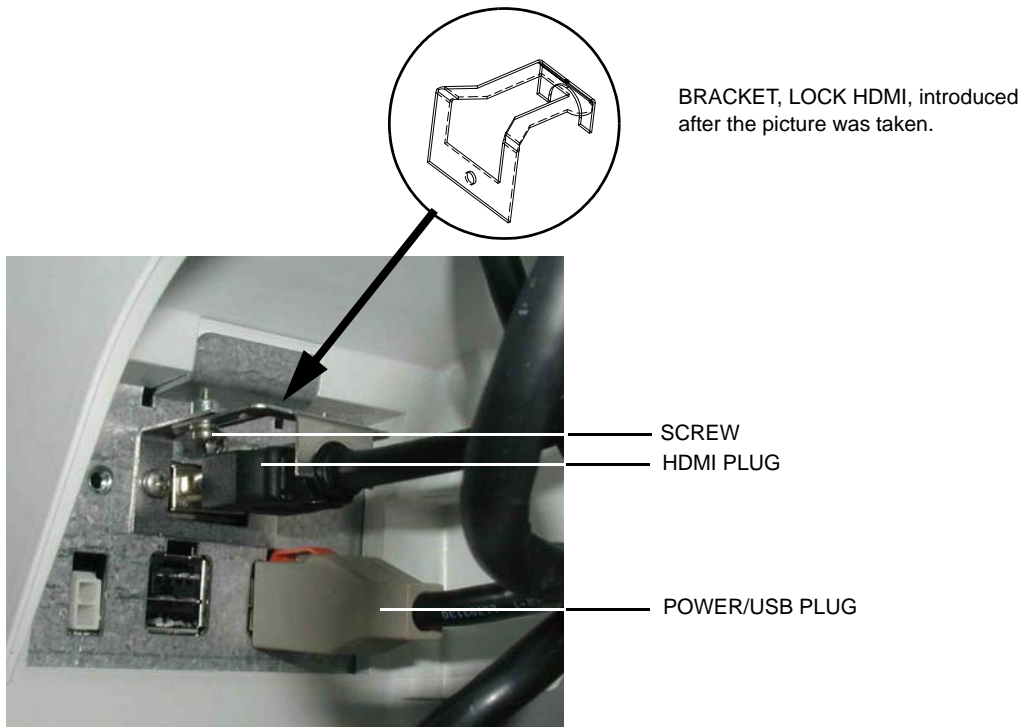
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Monitor assembly.
- 5.) Remove the Bulkhead cover.

**8-6-3-2 Disconnect the cables from the Bulkhead board**

Follow these steps to disconnect the cables from the Bulkhead board:

- 1.) Disconnect the Power/USB PLUG from the Bulkhead board.

**Figure 8-52 LCD Cables at Bulkhead**



- 2.) Bend the HDMI Connector Lock upwards, then disconnect the HDMI plug.

**8-6-3-3 Remove the LCD Arm assembly**

Follow these steps to remove the LCD Arm assembly:

**Figure 8-53 LCD Mount Lock Handle**



- 1.) Slide the LCD Mount Lock Handle into unlocked position.
- 2.) Move the LCD Arm from side to side when at the same time pulling upwards, until you can lift LCD Arm assembly away.

**8-6-3-4 Install the LCD Arm assembly**

Follow these steps to install the LCD Arm Assembly:

- 1.) Carefully install the LCD Arm assembly into position, first feeding the LCD Arm cables down through the console opening.

**Figure 8-54 LCD Arm installed onto the UI Frame Upper (Arm for 17" screen illustrated)**



- 2.) Push the LCD Mount Lock Handle into locked position.

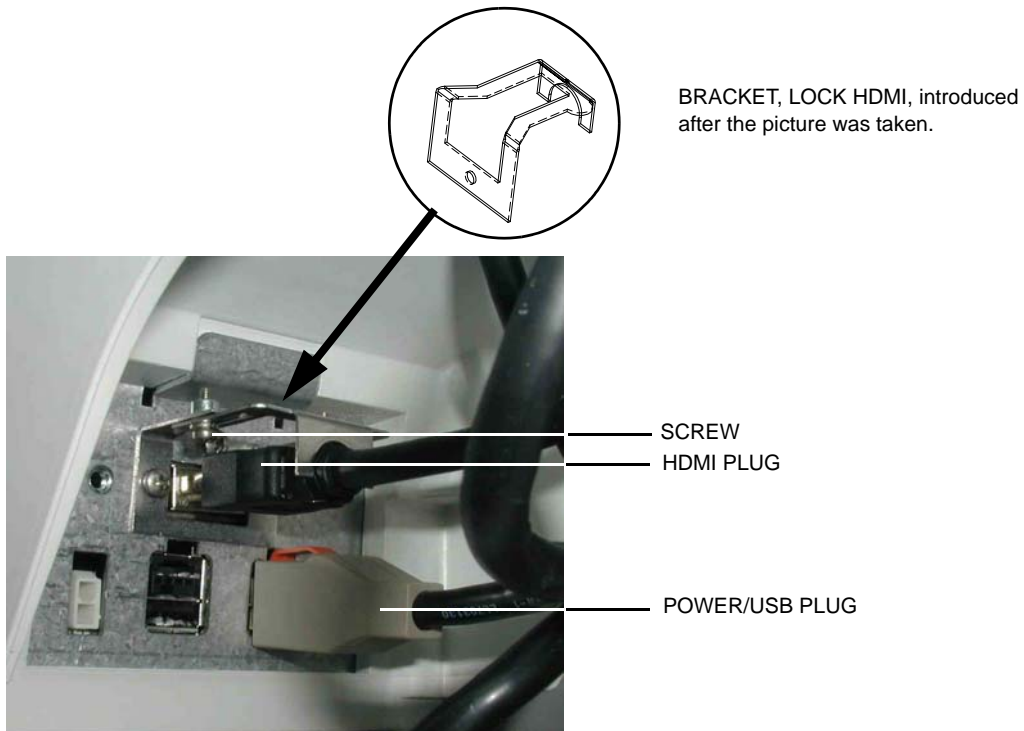
**Figure 8-55 LCD Mount Lock Handle**



**8-6-3-4 Install the LCD Arm assembly (cont'd)**

- 3.) Connect the LCD cables to the connectors on the Bulkhead.

**Figure 8-56 Bulkhead board connections**



- 4.) Install the Bulkhead Cover.
- 5.) Install the LCD monitor.

**8-6-3-5 Calibration and adjustments**

See: [Section 6-4 "Backlight adjustment" on page 6-5](#) for LCD Monitor calibration instructions.

## 8-6-4 Replacing the LCD Cables

### 8-6-4-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Monitor.
- 5.) Remove the LCD Arm.

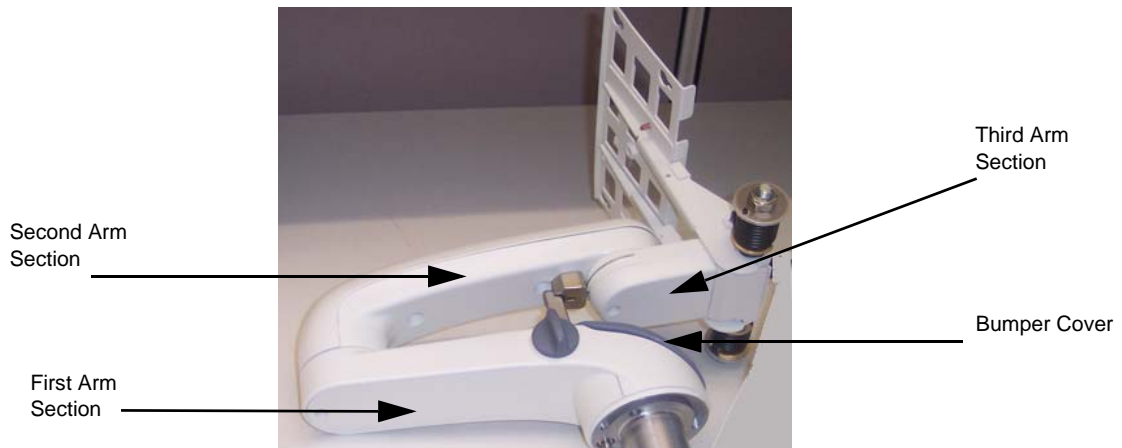
**8-6-4-2 Remove the LCD Cables**

Follow these steps to remove the LCD Cables:

*NOTE: When handling the arm, use the arm lock unless the arm is being turned. Locking will help stabilize the arm.*

*NOTE: LCD cable color may be different than pictured.*

**Figure 8-57 Three Arm Sections**



- 1.) Remove the two M4 x 8 screws holding the Bumper Cover to the Arm.

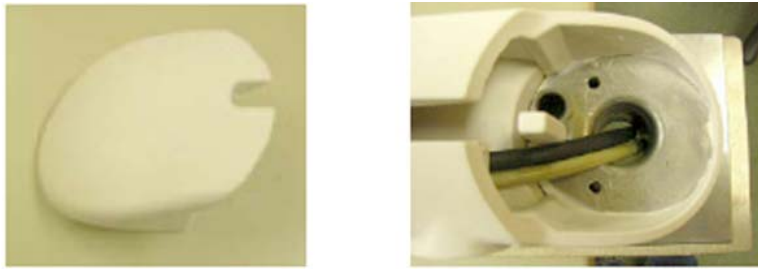
**Figure 8-58 Screws for Bumper cover**



**8-6-4-2 Remove the LCD Cables (cont'd)**

- 2.) Remove the bumper cover from the end of the first arm, as shown in Figure 8-59.

**Figure 8-59 Bumper Cover, Removed**



- 3.) Remove the covers from all three arm sections of the arm assembly.
  - a.) Remove the M4 x 8 screw holding the first arm section cover.
  - b.) Remove the M4 x 8 screw holding the third arm section cover.

**Figure 8-60 Third Arm Section Cover Removal**



**8-6-4-2 Remove the LCD Cables (cont'd)**

- c.) Remove the M4 x 16 screws holding the second arm section cover with Phillips screwdriver.

**Figure 8-61 Second Arm Section Cover Removal**



- 4.) Cut tie wraps securing cables in arm.
- 5.) Remove the cable(s) to be replaced.
- 6.) Mark cables: After removing the cable(s) to be replaced according to this section, stretch out both the existing and replacement cable side-by-side, and transfer any markings from existing cable to replacement cable.

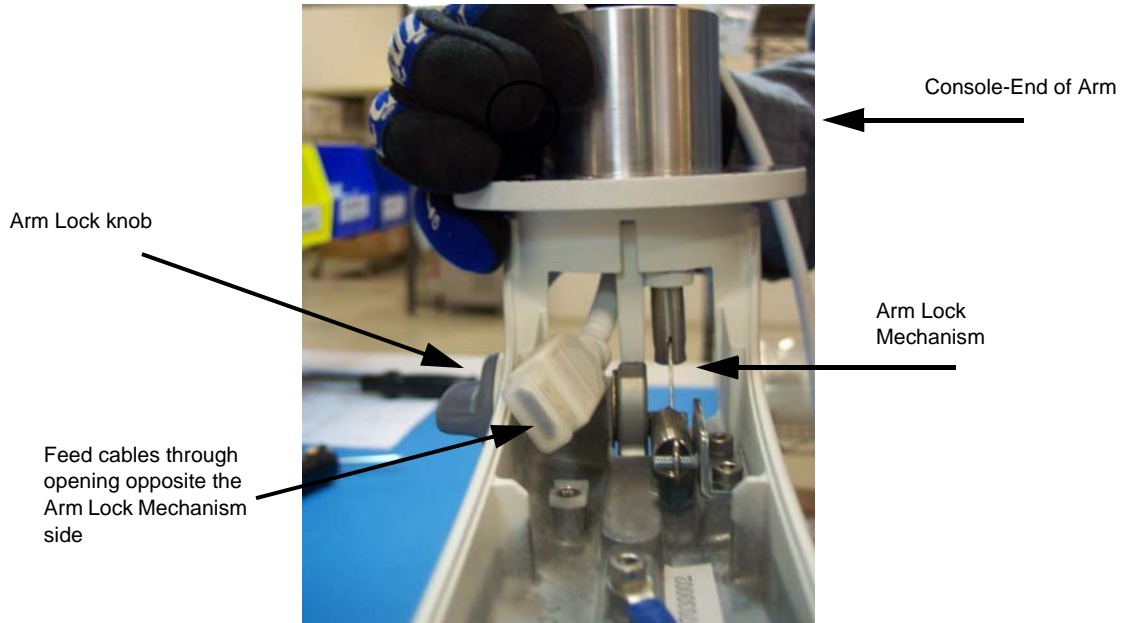
**8-6-4-3 Install the LCD Cables**

*NOTE: Do not over-stretch cables. Before putting covers on arms, be sure arm has full pivot motion/ rotation without stressing cables. If replacing more than one cable, begin with the thickest cable first.*

Follow these steps to install the LCD Cables:

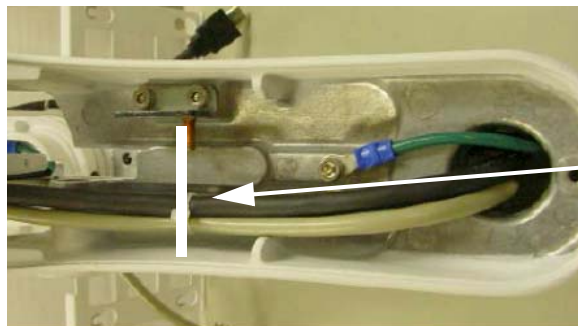
- 1.) Holding the monitor-end of the cable and starting at the console-end of the first arm section, thread the replacement cable(s) through the arm sections toward the monitor-end.

**Figure 8-62 Feed Cable through First Arm**



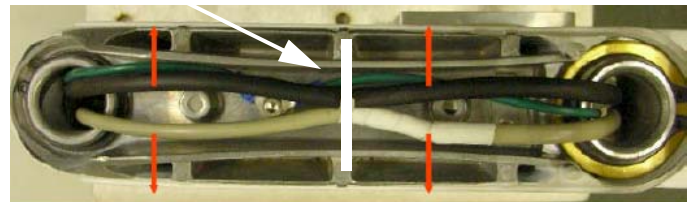
- 2.) Feed cable through opening opposite the arm lock mechanism side of first arm section.
- 3.) Make sure the cable markings **line up with the midpoint placement location for the first arm (Figure 8-63).**

**Figure 8-63 First (left) and Second Arm Section Midpoint Locations**



First Arm - Midpoint Location

Midpoint Locations

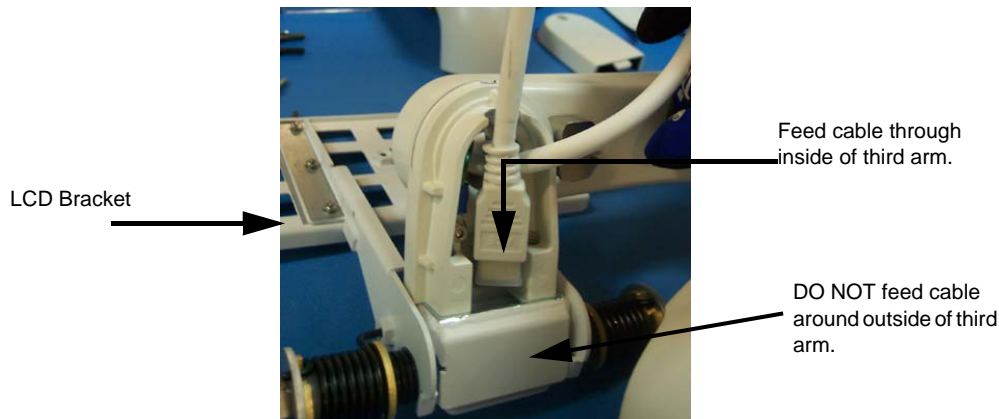


Second Arm - Midpoint Location

**8-6-4-3 Install the LCD Cables (cont'd)**

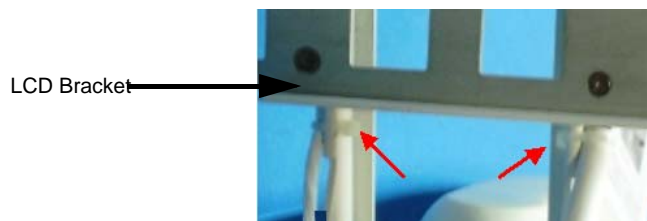
- 4.) Feed cable through opening for second arm section.
- 5.) Make sure the markings **line up with the midpoint placement location for the second arm** (Figure 8-64).
- 6.) Feed cable through opening for third arm section.

**Figure 8-64 Feed Cable through Third Arm**



- 7.) For the Video and Power cables, make sure the markings appear past the third arm LCD bracket.
- 8.) Connect the Power Cable and the Video Cable to the LCD bracket with clips (Figure 8-65).

**Figure 8-65 Clip location securing Power and Video Cables to bracket**



- 9.) Repeat steps for each cable replaced.

**NOTE:** Do not pull cables too tight. Before putting covers on arms, test arm motion and cable stress.

- 10.) Secure the cables in the locations indicated in Figure 8-63. Band the tie wrap through the clamp.
- 11.) Replace the second arm cover.
- 12.) Replace the third arm cover.
- 13.) Replace the first arm cover.
- 14.) Replace the bumper cover

**NOTE:** Rotate arm adapter assembly on arm to ensure movement is smooth and free from binding through full 180°.

- 15.) Reinstall the LCD arm.
- 16.) Reinstall the LCD monitor.

**NOTE:** Rotate arm to ensure movement is smooth and free from binding through full 180°. Make sure you do this with the arm in the proper upright position with the LCD end up.

**8-6-4-4 Calibration and adjustments**

See: [Section 6-4 "Backlight adjustment"](#) on page 6-5 for LCD Monitor calibration instructions.

## 8-6-5 LCD Mount Lock replacement

### 8-6-5-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Bulkhead Cover.

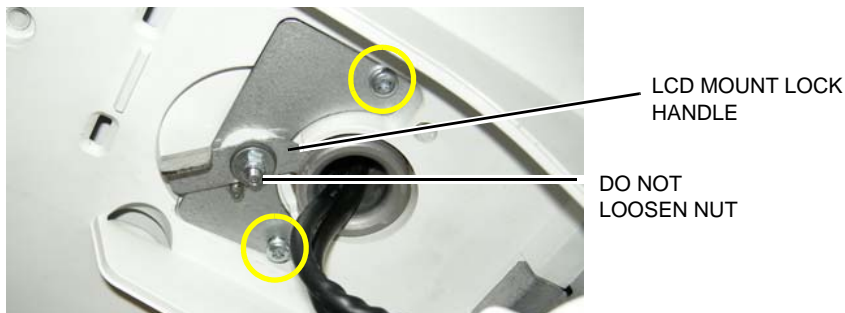
**8-6-5-2 LCD Mount Lock removal procedure**

Follow these steps to remove the LCD Mount Lock:

*NOTE: It is not necessary to remove the LCD Monitor or the LCD Arm.*

- 1.) Remove the 2 screws securing the LCD Mount Lock.

**Figure 8-66 Screw placement, LCD Mount Lock**



- 2.) Remove the LCD Mount Lock.

**8-6-5-3 LCD Mount Lock installation procedure**

Follow these steps to install the LCD Mount Lock:

- 1.) Position the LCD Mount Lock.
- 2.) Install the 2 screws securing the LCD Mount Lock.
- 3.) Install the Bulkhead Cover.

## 8-6-6 Replacing the Upper Operator Panel/Touch Panel Assembly

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-6-1 Preparations

When preparing for the replacement, you must perform the following steps:

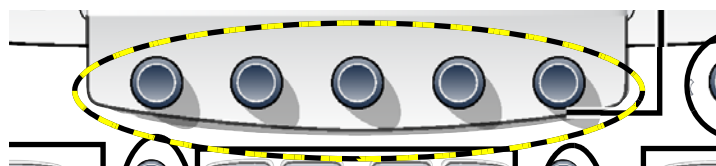
 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the five OP Panel Knobs along the base of the Upper OP Panel/Touch Panel assembly, see [Figure 8-67](#).

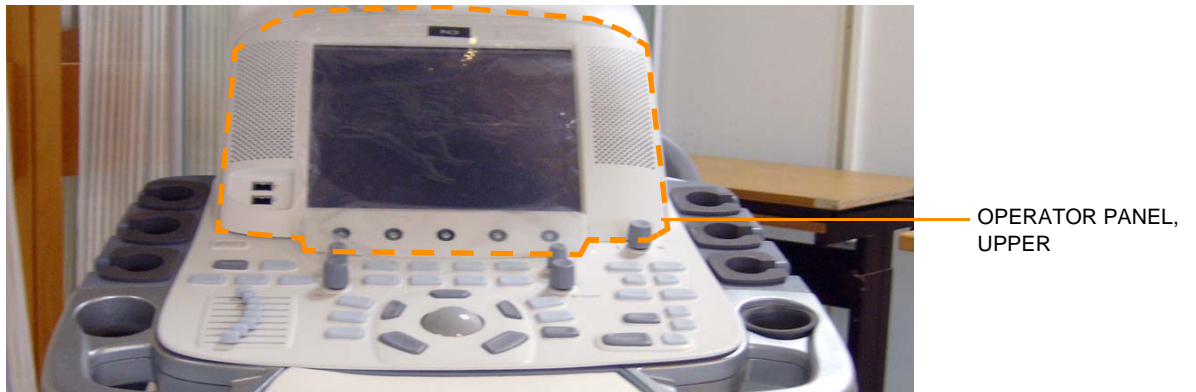
**Figure 8-67 Remove five knobs**





8-6-6-2 Remove the Upper OP Panel/Touch Panel Assembly

Figure 8-68 Upper OP Panel//Touch Panel Assembly



Follow these steps to remove the Upper OP Panel/Touch Panel assembly. Ensure that the OP Panel is in its uppermost position with the LCD out of the way:

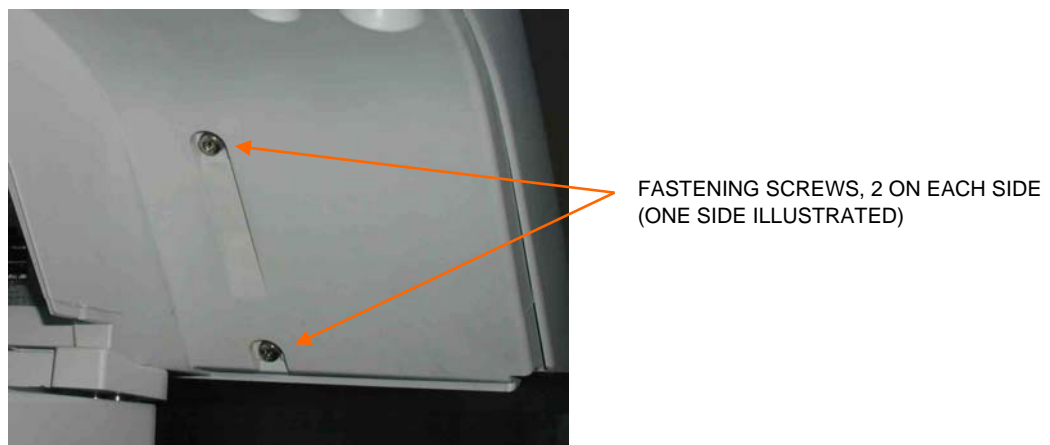
- 1.) At the rear of the VIVID E9 / VIVID E7, release the console's XY mechanism by inserting a screwdriver into the release point and pressing until release. Pull the console out to its extended position to gain access to the screws in the next step.

Figure 8-69 XY / Frogleg mechanism release



- 2.) Remove four screws with washers from the Operator Panel's back cover.

Figure 8-70 Upper Operator Panel's Back Cover



**8-6-6-2 Remove the Upper OP Panel/Touch Panel Assembly (cont'd)**

Be sure to remove the five OP Panel Knobs. See: [Figure 8-67 "Remove five knobs" on page 8-84.](#)



**NOTICE** Failure to remove the five OP Panel Knobs first could cause damage to the knob shafts.

- 3.) Lift the Upper OP Panel/Touch Panel assembly slightly from the bottom, and then tilt the top toward the front of the VIVID E9 / VIVID E7. There are tabs at the bottom of the Touch Panel Assembly. Pull straight up on these tabs.

*NOTE:* For better access, swing the LCD Monitor to the side.

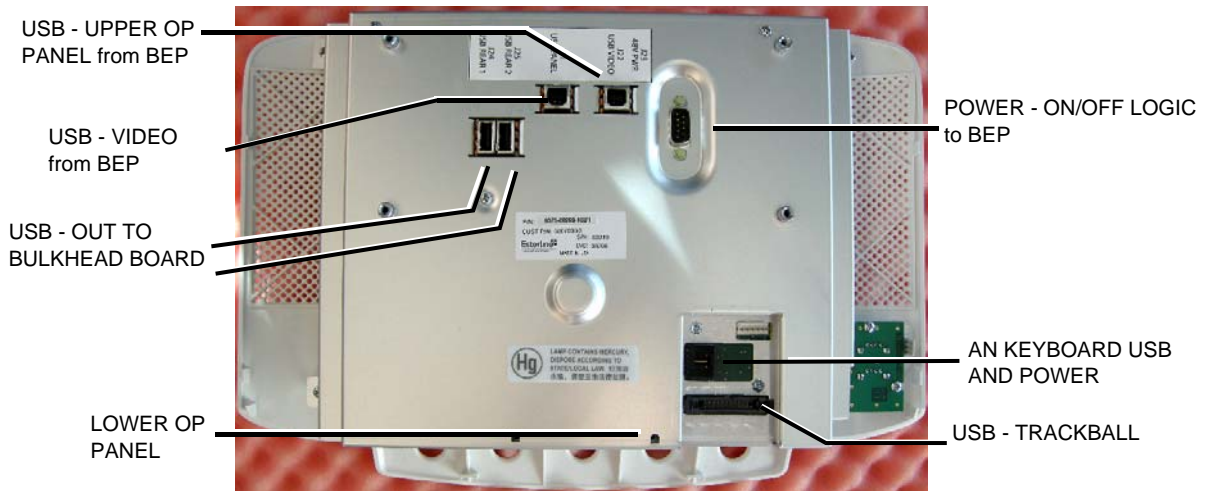
**Figure 8-71 Remove Upper OP Panel/Touch Screen Assembly**



**8-6-6-2 Remove the Upper OP Panel/Touch Panel Assembly (cont'd)**

- 4.) Disconnect the cables at the back of the Upper OP Panel/Touch Panel Assembly. See [Figure 8-72 "Upper OP Panel/Touch Panel assembly cable placement"](#) on page 8-87.

**Figure 8-72 Upper OP Panel/Touch Panel assembly cable placement**



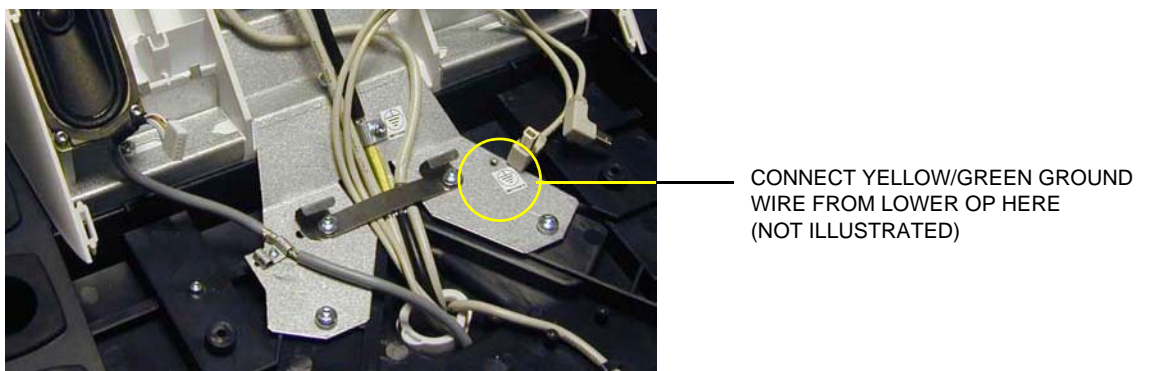
- 5.) Lift out the Touch Screen Assembly and place it on an ESD safe surface.

**8-6-6-3 Install the Upper OP Panel/Touch Panel Assembly**

Follow these steps to install the Upper OP Panel/Touch Panel Assembly:

- 1.) Place the Upper OP Panel/Touch Panel Assembly in the frame.
- 2.) Ensure that all Ground cables are connected as shown in [Figure 8-73 "OP Grounding"](#) on page 8-87.

**Figure 8-73 OP Grounding**

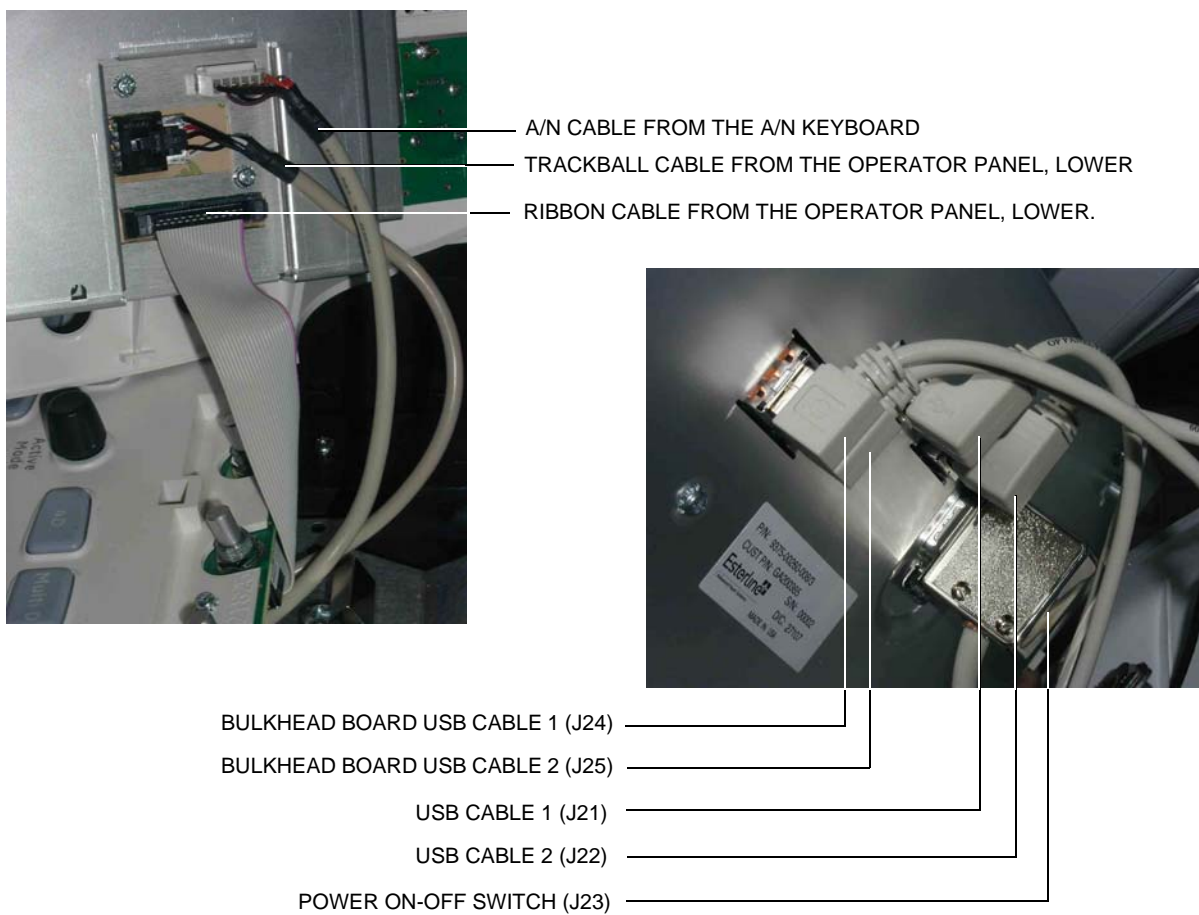


8-6-6-3 Install the Upper OP Panel/Touch Panel Assembly (cont'd)

**⚠ NOTICE** Do not apply stretch on the Ribbon Cable. If stretched, the connector on Operator Panel, Lower may break, resulting in a malfunction.

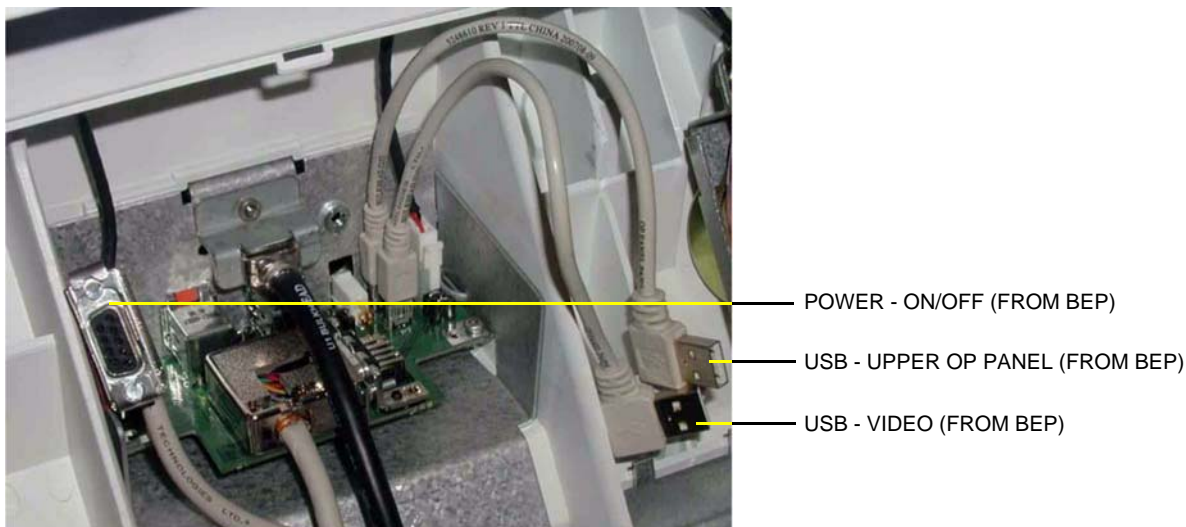
- 3.) Connect the following cables to the Operator Panel, Upper:
- Ribbon Cable from the Operator Panel, Lower
  - Trackball Cable from the Operator Panel, Lower
  - A/N Cable from the A/N Keyboard
  - Power/On-Off switch (part of Main Cable) in position J23
  - USB Cable 1 (part of Main Cable) in position J21
  - USB Cable 2 (part of Main Cable) in position J22
  - Bulkhead Board USB Cable 1 (from bulkhead position closest to the OP) in position J24
  - Bulkhead Board USB Cable 2 (from bulkhead position most far from the OP) in position J25

Figure 8-74 Cables on rear of Operator Panel, Upper



8-6-6-3 Install the Upper OP Panel/Touch Panel Assembly (cont'd)

Figure 8-75 Cables to Upper OP

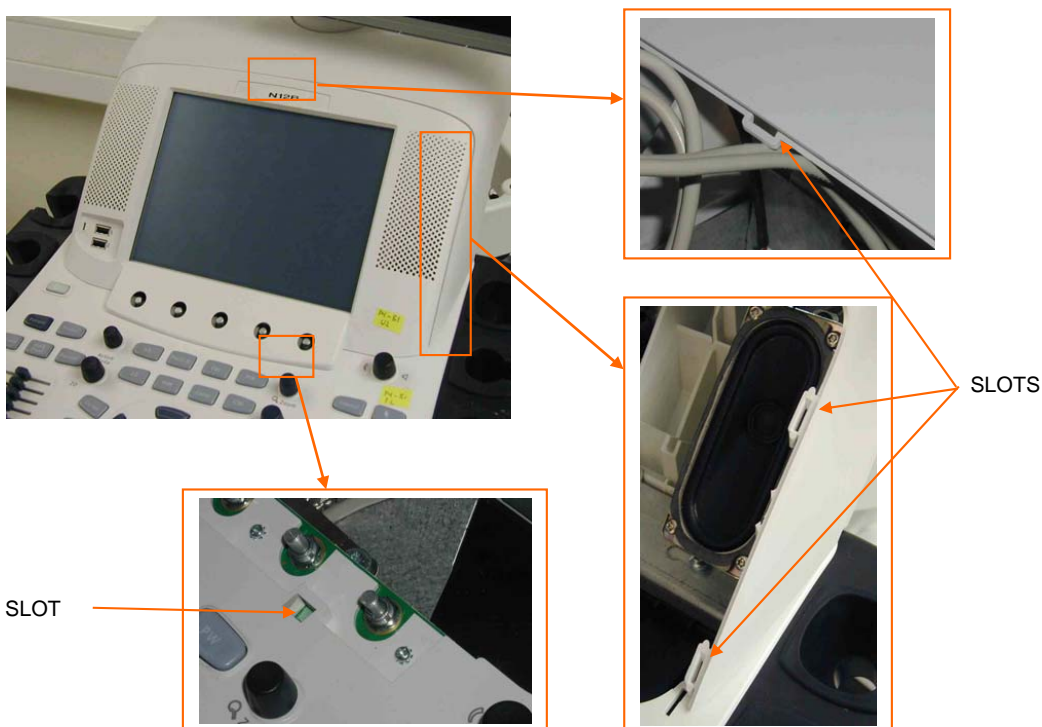


4.) Install the Upper OP Panel/Touch Panel Assembly by securing the 5 tabs and 2 hooks.



**NOTICE** Be careful not to pinch any of the cables when installing the Upper OP Panel/Touch Panel Assembly.

Figure 8-76 Slots for alignment tabs.



5.) Install the four screws to the Back Cover from behind.

6.) Install the five OP Panel Knobs.

## 8-6-7 Replacing the Frame w/LCD and Touch Screen

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-7-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove five OP Panel Knobs, see [Figure 8-77](#).

**Figure 8-77 Remove five knobs**

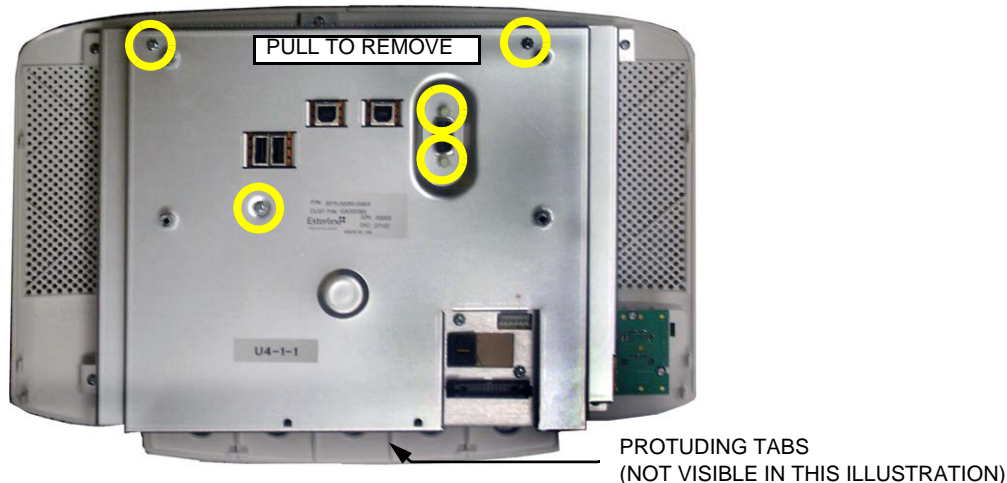


- 5.) Remove the Operator Panel, Upper.

**8-6-7-2 Remove the Frame w/LCD and Touch Screen**

- 1.) Place the Operator Panel, Upper, with the front down on a clean, antistatic surface.
- 2.) Remove the three (3x) fixing screws (Phillips #1) and the two screws at the D-SUB connector (3/16 inch nut driver), see: [Figure 8-78](#).

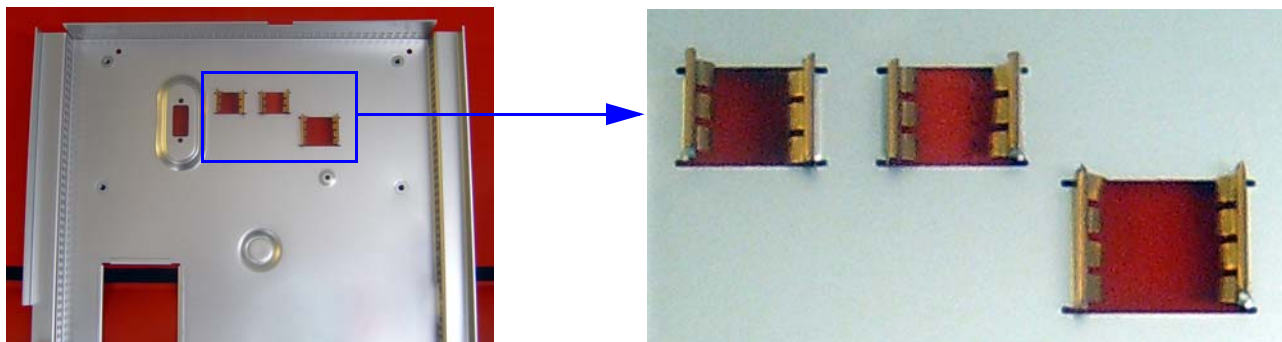
**Figure 8-78 Operator Panel, Upper, seen from the rear side**



**NOTE:** On some VIVID E9 / VIVID E7s, the openings for the USB connectors have EMC fingers attached on the right and left sides of each opening, ref. [Figure 8-79](#). Be careful to not loose these EMC fingers when you remove the LCD Cover. On newer VIVID E9 / VIVID E7s, the construction has been changed, so this issue has been resolved.

- 3.) Lift (pull) the upper part of the LCD Cover so you can release it from the four protuding tabs.

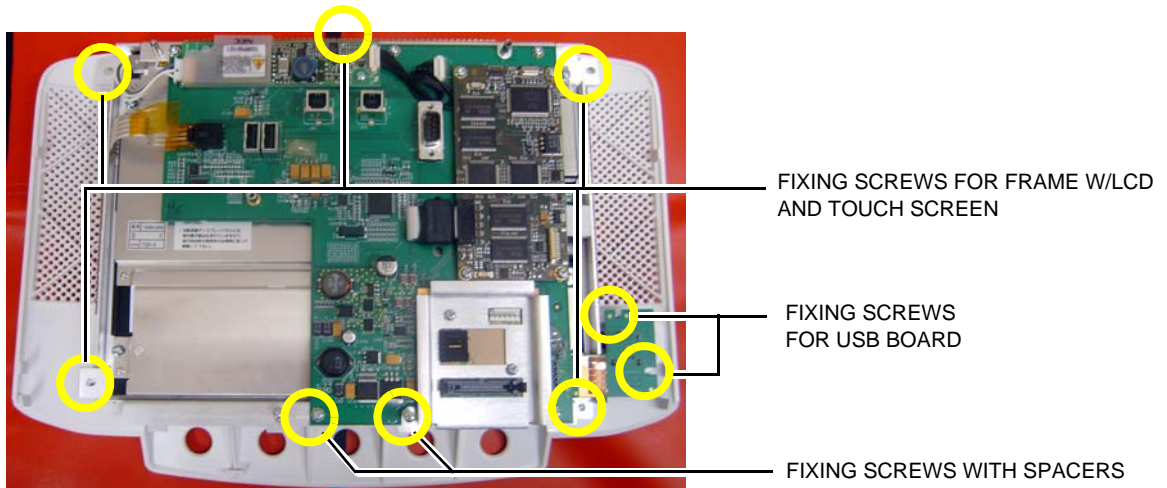
**Figure 8-79 EMC fingers at openings for USB connectors**



**8-6-7-2 Remove the Frame w/LCD and Touch Screen (cont'd)**

- 4.) Remove the two (2x) fixing screws with spacers, see: [Figure 8-80](#).
- 5.) Remove the five (5x) fixing screws used to fix the Frame w/LCD and Touch Screen to the LCD (plastic) Cover.
- 6.) Remove the two (2x) fixing screws used to fix the USB Connector Board to the LCD (plastic) Cover.
- 7.) Carefully, separate the Frame w/LCD and Touch Screen from the LCD (plastic) Cover.

**Figure 8-80 Operator Panel, Upper, without LCD Cover, seen from the rear side**



- 8.) Carefully separate the Frame w/LCD and Touch Screen and the Upper Bezel.

**Figure 8-81 Frame w/LCD and Touch Screen (left) and Upper Bezel (right)**



- 9.) Transfer the existing Main Controller Board to the new Frame w/LCD.
- 10.) Transfer the High Voltage Backlight Inverter to the new Frame w/LCD.



**8-6-7-3 Install the Frame w/LCD and Touch Screen**

- 1.) Place the Upper Bezel, with the front down on a clean, antistatic surface.
- 2.) Install the Frame w/LCD and Touch Screen so it aligns with the fixing screw holes on the Upper Bezel.
- 3.) Install the fixing screws.

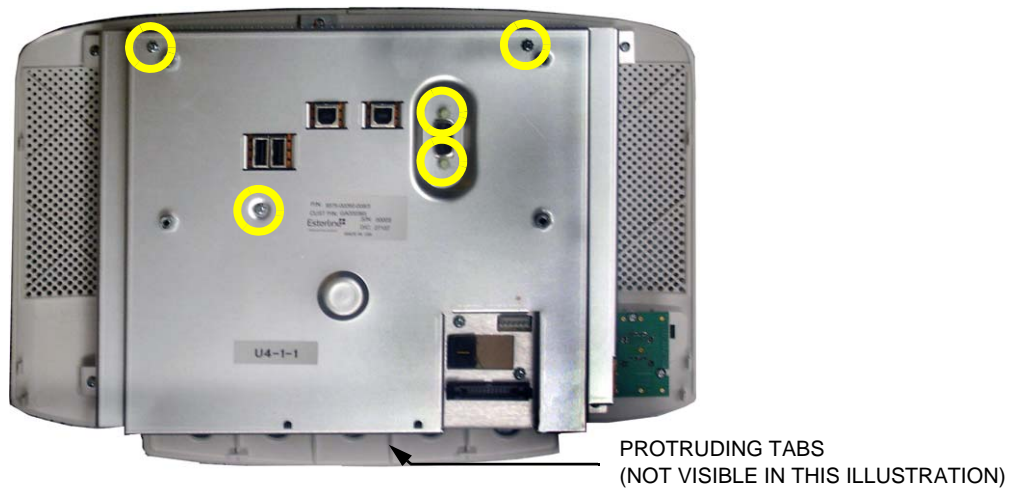
*NOTE:* Be careful so you don't bend the EMC fingers (see: [Figure 8-82](#)) when installing the LCD Cover.

**Figure 8-82 EMC fingers**



- 4.) Install the LCD Cover.
- 5.) Install the five (5x) fixing screws.

**Figure 8-83 Position for screws**



- 6.) Install the Operator Panel, Upper.
- 7.) Install the Control Knobs.

**8-6-7-4 Calibration and adjustments**

Run the Touch Screen Calibration in section [Section 6-5 "Touch Screen Calibration"](#) on page 6-10.

## 8-6-8 Replacing the Main Controller Board

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-8-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*

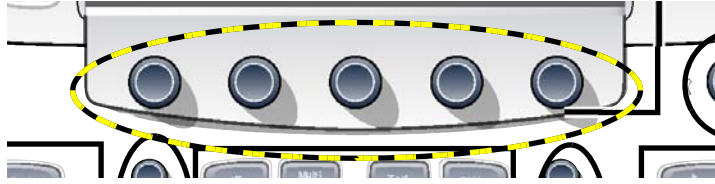


1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

**8-6-8-1 Preparations (cont'd)**

- 4.) Remove five OP Panel Knobs, see [Figure 8-84](#).

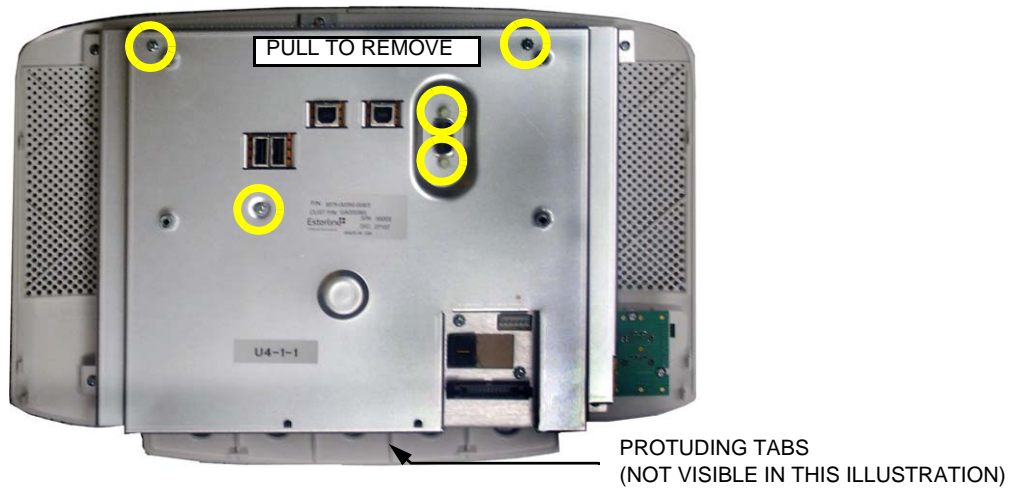
**Figure 8-84 Remove five knobs**

**8-6-8-2 Remove the Main Controller Board**

Follow these steps to remove the Main Controller assembly.

- 1.) Lift out the Upper OP Panel/Touch Panel Assembly and place it face down on an ESD safe surface.
- 2.) Remove the back cover by removing the three (3x) fixing screws (Phillips #1) and the two screws at the D-SUB connector (3/16 inch nut driver), see: [Figure 8-85 "Operator Panel, Upper, seen from the rear side" on page 8-96.](#)

**Figure 8-85 Operator Panel, Upper, seen from the rear side**



- 3.) Lift (pull) the upper part of the cover so you can release it from the four protruding tabs.

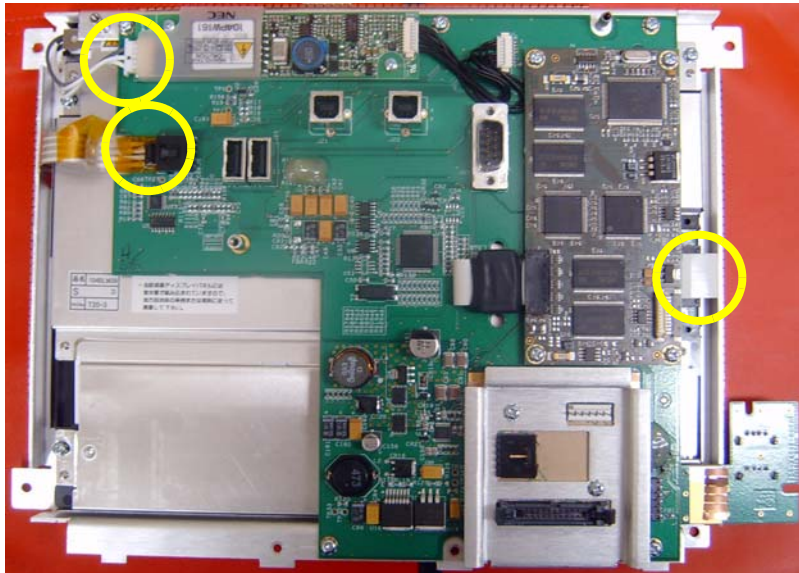
**NOTE:** Take care not to damage the EMC gasketing that goes around the Touch Panel Assembly, especially during re-assembly.

**8-6-8-2 Remove the Main Controller Board (cont'd)**

4.) Disconnect three (3x) cables:

- Disconnect the High Voltage cable (upper, left side in [Figure 8-86](#)).
- Disconnect the black connector (press on the "button" on the plug and at the same time pull it out of the connector).
- Disconnect the connector (right side in [Figure 8-86](#)).

**Figure 8-86 Disconnect three cables**



5.) Disconnect the plug on the black cable from the connector on the Main Controller board.

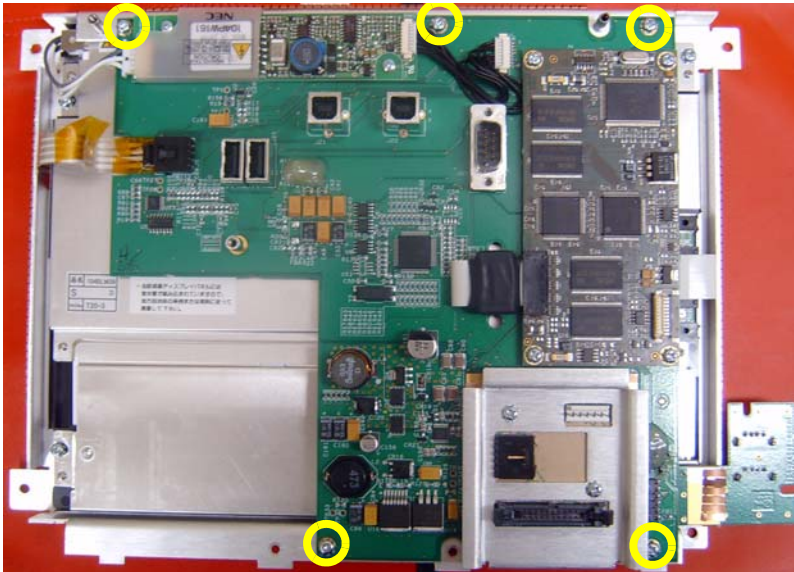
**NOTE:** *The Main Controller Board does not come with the High Voltage Inverter Board, BUT it does come with the USB Video Board.*

6.) If you are going to change the Main Controller board, you may want to remove the High Voltage Inverter board now. (See: [8-6-10 "High Voltage Inverter Board with Cable replacement"](#) on [page 8-102.](#)) If not, continue with the next steps.

**8-6-8-2 Remove the Main Controller Board (cont'd)**

- 7.) Unscrew and remove five (5x) screws. Store them in a safe place, you will need them for the installation.

**Figure 8-87 Remove screws**



- 8.) Remove the Main Controller Board.

**8-6-8-3 Main Controller Board installation procedure**

Follow these steps to install the Main Controller Board:

- 1.) Position the Main Controller Board with the USB board plugged in, so it aligns with the fixing screw holes in the LCD frame.
- 2.) Install the five (5x) screws (refer to [Figure 8-87](#)).
- 3.) If removed, install the High Voltage Inverter board.
- 4.) Connect the three (3x) cables (refer to [Figure 8-86](#)).

**NOTE:** Take care not to damage the EMC gasketing that goes around the Touch Panel Assembly, especially during re-assembly.

- 5.) Install the Back Cover.
- 6.) Install the Operator Panel, Upper.
- 7.) Install the Control Knobs.

## 8-6-9 USB Connector Board replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-9-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove five OP Panel Knobs, see [Figure 8-88](#).

**Figure 8-88 Remove five knobs**



**8-6-9-1 Preparations (cont'd)**

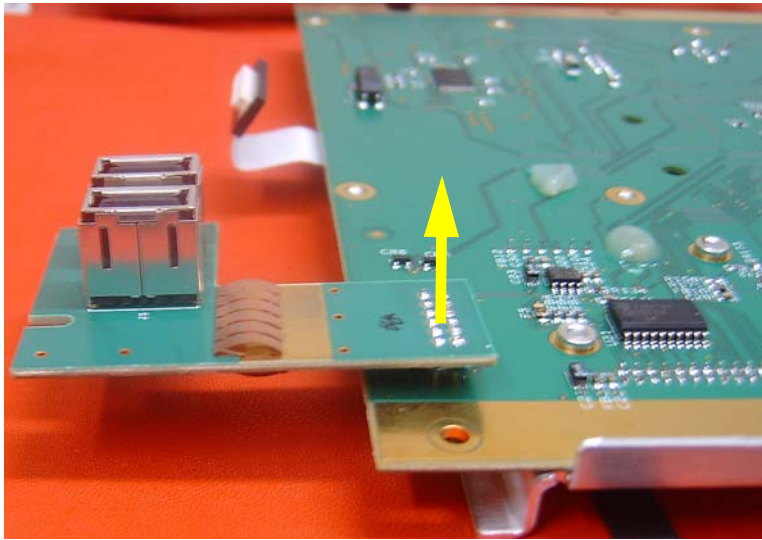
- 5.) Remove the Operator Panel, Upper.
- 6.) Remove the Main Controller Board.



**8-6-9-2 USB Connector Board removal procedure**

- 1.) Place the Main Controller Board on a clean, antistatic surface with the solder side up.

**Figure 8-89 Main Controller Board with USB board**



The USB Connector Board is plugged into the Main Controller Board.

- 2.) Pull the USB Connector Board upwards to disconnect it from the Main Controller Board.

**8-6-9-3 USB Connector Board installation procedure**

- 1.) Install the USB Connector Board.
- 2.) Install the Main Controller Board.
- 3.) Install the Operator Panel, Upper.
- 4.) Install the Control Knobs.

## 8-6-10 High Voltage Inverter Board with Cable replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-10-1 Preparations

When preparing for the replacement, you must perform the following steps:

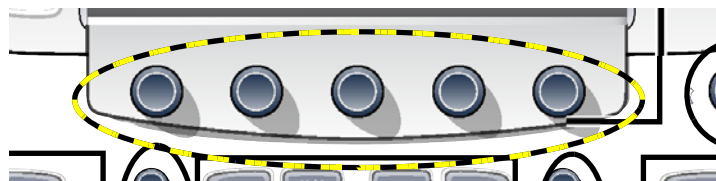
 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove five OP Panel Knobs, see [Figure 8-88](#).

**Figure 8-90 Remove five knobs**



- 5.) Remove the Operator Panel, Upper.

**8-6-10-2 High Voltage Inverter Board with Cable removal procedure**

- 1.) Disconnect the cables to the High Voltage Inverter Board.

**Figure 8-91 Remove cables**

- 2.) Remove the two fixing screws.

**Figure 8-92 Remove screws**

- 3.) Remove the High Voltage Inverter Board with Cable.

**8-6-10-3 High Voltage Inverter Board with Cable installation procedure**

- 1.) Align the board's fixing holes to the respective holes on the Main Controller Board.
- 2.) Install the two fixing screws. (Size: M 2.5)
- 3.) Plug in the new cable to the connector on the Main Controller Board.
- 4.) Install the Operator Panel, Upper.
- 5.) Install the Control Knobs.

## 8-6-11 Upper Bezel replacement

### 8-6-11-1 Upper Bezel removal

Figure 8-93 Upper Bezel



The Upper Bezel is what is left when you have removed the Frame w/LCD and Touch Screen.

- Use the procedure in [8-6-7-2 "Remove the Frame w/LCD and Touch Screen" on page 8-91](#), to remove the Upper Bezel.

### 8-6-11-2 Upper Bezel installation

- Use the procedure in [8-6-7-3 "Install the Frame w/LCD and Touch Screen" on page 8-93](#), to install the Upper Bezel.

## 8-6-12 Frame UI Upper replacement

### 8-6-12-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

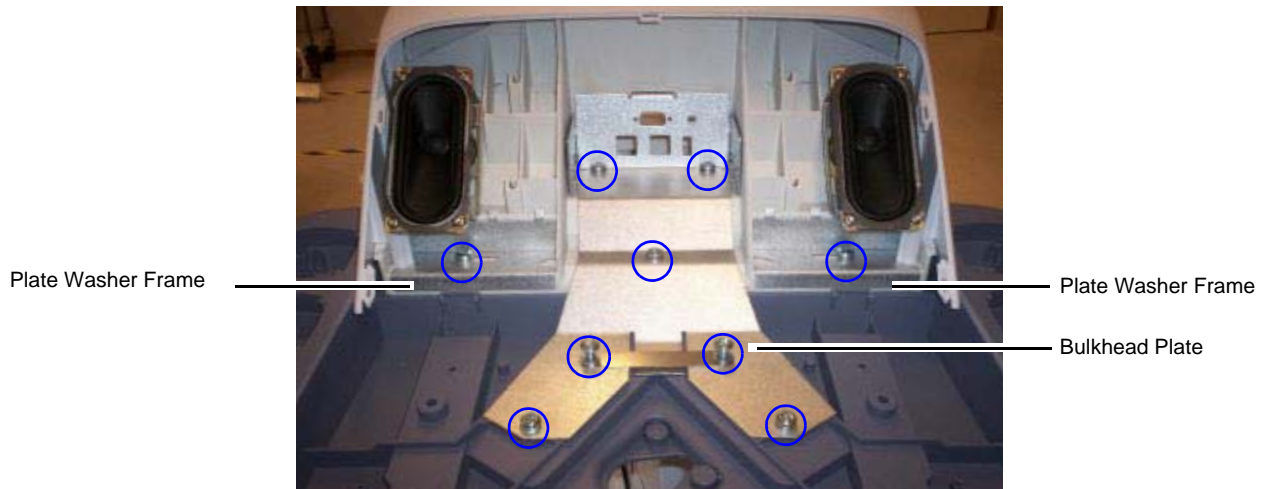
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Arm.
- 5.) Remove the Upper Operator Panel/Touch Panel Assembly.
- 6.) Remove the Lower Operator Panel.
- 7.) Remove the Bulkhead Board.
- 8.) Remove the Bulkhead Plate.

### 8-6-12-2 Remove the Frame UI Upper

The Bulkhead Plate is used to secure the Upper UI Frame to the Lower UI Frame.

**Figure 8-94 Bulkhead Plate and Plate Washer Frame**



- 1.) Remove the eleven fixing screws (see: [Figure 8-94 "Bulkhead Plate and Plate Washer Frame" on page 8-106](#)).
- 2.) Remove the Bulkhead Plate and the Cable Clamp.
- 3.) Remove the Frame UI Upper.

### 8-6-12-3 Install the Frame UI Upper

- 1.) Position the **Frame UI Upper** so it aligns with the holes for the fixing screws.
- 2.) Position the Bulkhead Plate so it aligns with the holes for the fixing screws.
- 3.) Install the seven fixing screws as described below:
  - The two upper screws are M6 x 20, Torque: 8.5 Nm.
  - The next screw is M6 x 45, Torque: 8.5 Nm.
  - The lower, left-most screw is M6 x 30, Torque 8,5 Nm. It is also used for a ground wire (not illustrated).
  - The three remaining lower screws are M6 x 25, Torque: 8.5 Nm. Two of the screws are also fixing the Cable Clamp (see: [Figure 8-130 "The Bulkhead Plate" on page 8-147](#)).
- 4.) Install the Operator Panel, Lower.
- 5.) Install the Bulkhead Board.
- 6.) Install the two Speaker assemblies.
- 7.) Install the Operator Panel, Upper.
- 8.) Install the Operator Panel Knobs.

## 8-6-13 Options Holder / Left or Right Support replacement

The Options Holder (the Left Support or Right Support) is the base piece that attaches to the upper console to support either a Transvaginal Probe Holder or a Storage Tray. The VIVID E9 / VIVID E7 can support one Left Options Holder and one Right Options Holder at the same time.

### 8-6-13-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

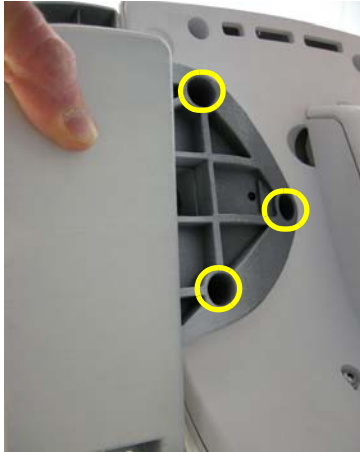
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Separate and remove the Storage Tray.

### 8-6-13-2 Options Holder removal procedure

Follow these steps to remove the Options Holder:

- 1.) From underneath the Upper Console, remove the 3 screws securing the Options Holder.

**Figure 8-95 Screws, beneath upper console**



- 2.) Remove the Options Holder from the Upper Console.

### 8-6-13-3 Options Holder installation procedure

Follow these steps to install the Options Holder:

- 1.) Position the Options Holder in place.
- 2.) Install the 3 screws securing the Options Holder.
- 3.) Install the Storage Tray to the Options Holder.

## 8-6-14 Knobs for Encoders and Slidepots replacement

### 8-6-14-1 Tools

No tools are needed for this procedure.

### 8-6-14-2 Knobs for Encoders and Slidepots removal procedure

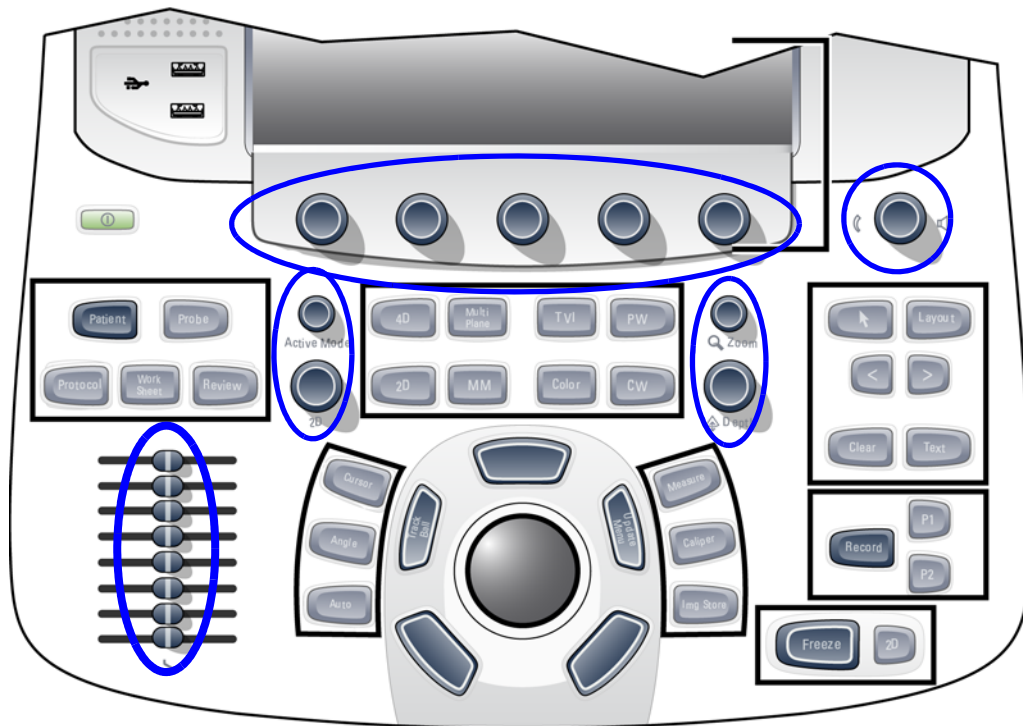
**NOTE:** *If you are going to remove the Upper Operator Panel, you only need to remove the five knobs below the Touch Screen.*

- 1.) Pull the knobs one by one until all knobs have been removed.
- 2.) Store the knobs in a clean place.



8-6-14-3 Knobs for Encoders and Slidepots installation procedure

Figure 8-96 Knobs for Encoders and Slidepots



Install the knobs one by one. Refer to the illustration above for the correct position for the knobs.

## 8-6-15 Replacing the Operator Panel, Lower

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-15-1 Read and Follow

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

### 8-6-15-2 Preparations

When preparing for the replacement, you must perform the following steps:

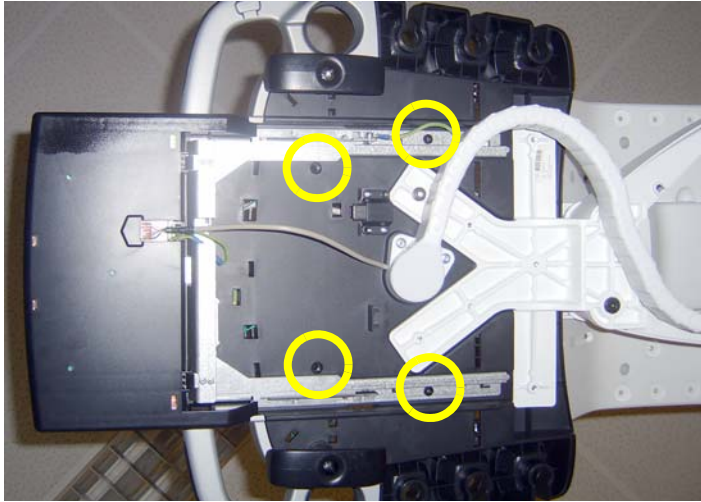
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove Operator Panel, Upper.

**8-6-15-3 Remove the Operator Panel, Lower**

Follow these steps to remove the Operator Panel:

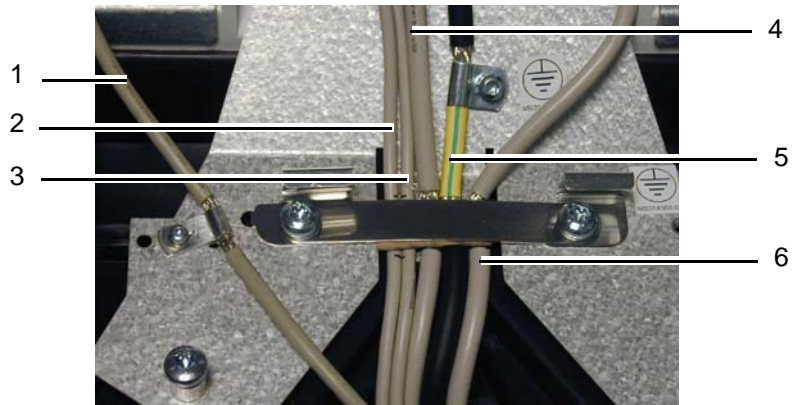
- 1.) Pull the Alphanumeric keyboard to its extended position to get access to the screws in the next step.

**Figure 8-97 OP seen from below**



- 2.) The screws are available from the underside of the Operator Panel tray. Unscrew and remove the four screws used for fixing the Operator Panel assembly to the Operator Panel tray.
- 3.) Loosen the screws for the cables grounding on the Bulkhead Bracket and move the OP Cables away from the bracket.

**Figure 8-98 OP Cables Grounding**



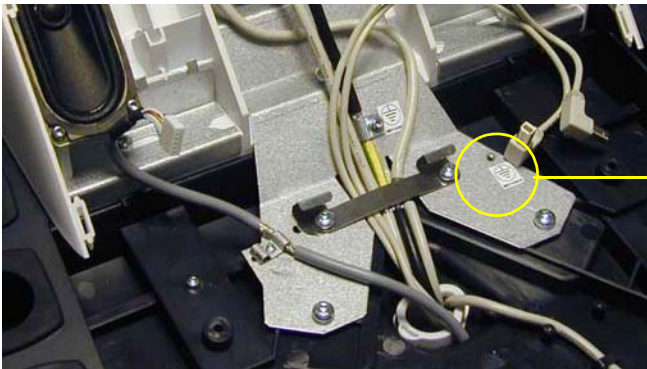
- 1 - Cable, A/N Keybd.
- 2 - USB2
- 3 - USB1

- 4 - Bulkhead cable
- 5 - HDMI Cable
- 6 - OP Cable

**8-6-15-3 Remove the Operator Panel, Lower (cont'd)**

- 4.) On the Bulkhead Bracket, loosen the ESD wire from the Lower Panel.

**Figure 8-99 OP Grounding**



YELLOW/GREEN GROUND WIRE FROM LOWER OP HERE (NOT ILLUSTRATED)

**Figure 8-100 Remove OP Panel Lower assembly**



FINGER

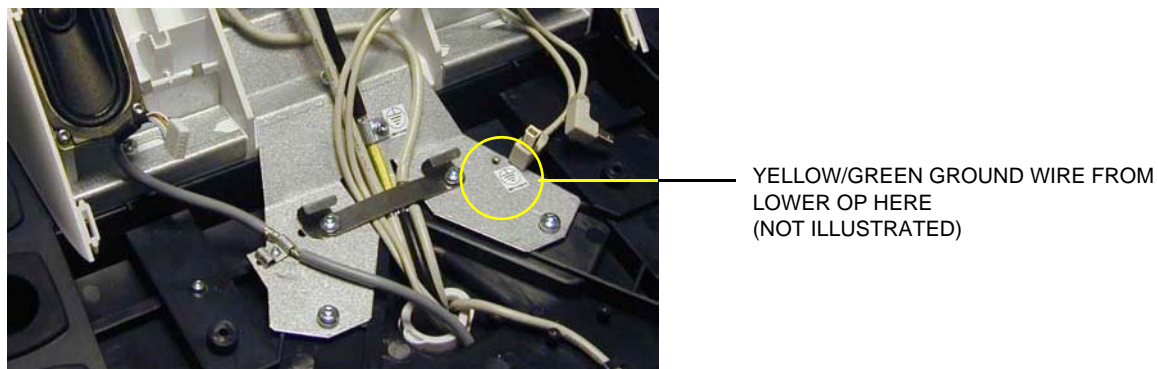
- 5.) Pull and lift the Operator Panel assembly up and away. Be careful to not destroy the fingers on each side of the Operator Panel, Lower.
- 6.) Store it on an ESD safe place.

**8-6-15-4 Install the Operator Panel, Lower**

Follow these steps to install the Operator Panel, Lower:

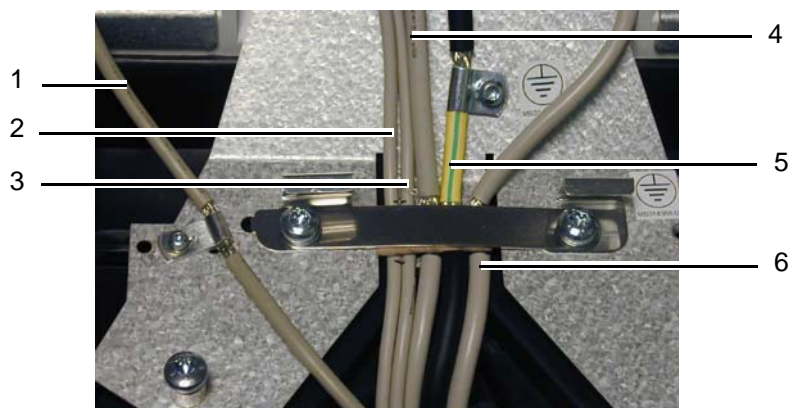
- 1.) Carefully, slide in the Operator Panel. Lower.  
Be careful with the fingers which have to be placed under the side walls of the UI Frame, Upper.
- 2.) On the Bulkhead Bracket, fasten the ESD wire from the Lower Panel.

**Figure 8-101 Lower OP Grounding**



- 3.) Attach the cables to the cable grounding brackets/points, as illustrated below.  
Since this feature is for the EMI compatibility the braid have to be exposed under the bracket and the cables have to be well locked by the bracket.

**Figure 8-102 OP Cables Grounding**



- |                       |                    |
|-----------------------|--------------------|
| 1 - Cable, A/N Keybd. | 4 - Bulkhead cable |
| 2 - USB2              | 5 - HDMI Cable     |
| 3 - USB1              | 6 - OP Cable       |

- 4.) Install the four fixing screws that fix the Operator Panel assembly to the Operator Panel tray (2 pc. M4x25 nearest to the front and 2 pc. M4 x 12 at the rear). The screws are entered from below the Operator Panel tray.
- 5.) Install the Operator Panel, Upper.

## 8-6-16 Replacing the Trackball

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-16-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*

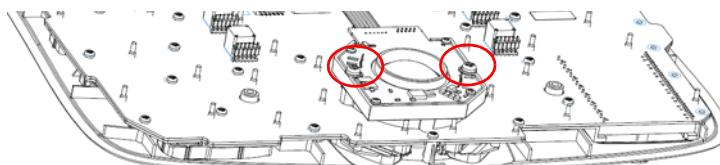


1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.
- 5.) Remove the Operator Panel, Lower and place it on a clean surface with the front down.

### 8-6-16-2 Remove the Trackball

**Figure 8-103 Trackball with fixing screws**



Follow these steps to remove the Trackball:

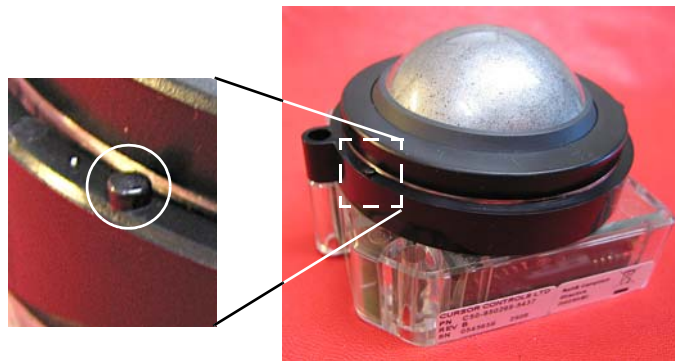
- 1.) Unplug the cable connectors from the Trackball.
- 2.) Use the Hex key to remove the two fixing screws with washers.
- 3.) Remove the Trackball and the Fixing Ring.

**8-6-16-3 Install the Trackball**

Follow these steps to install the Trackball:

- 1.) Install the Trackball with the Fixing Ring.

The Fixing Ring has small tabs on the top and bottom side, see figure below. The tabs are used to fix the Fixing Ring in the correct position, and are positioned on different locations on the top and the bottom sides of the ring. When used for the Vivid E9, install it so the fixing screw holes on the Fixing Ring align with the fixing screw holes on the Trackball assembly.



**Figure 8-104 Fixing Ring installed for use on the Vivid E9.**

- 2.) Install the two fixing screws with washers so it locks the Trackball and Fixing Ring in the correct position.
- 3.) Connect signal cable connectors to the Trackball.
- 4.) Install the Operator Panel, Lower.
- 5.) Install the Operator Panel, Upper.

## 8-6-17 Encoder Board replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-17-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.
- 5.) Remove the Operator Panel, Lower and place it on a clean surface with the front down.



**8-6-17-2 Encoder Board removal procedure**

- 1.) Disconnect the cable to the Encoder Board.
- 2.) Turn the Operator Panel, Lower with the front up.

**Figure 8-105 Fixing screws**

- 3.) Unscrew and remove 4 screws.
- 4.) Remove the Encoder Board.

**8-6-17-3 Encoder Board installation procedure**

- 1.) Position the Encoder board so the holes for the fixing screws aligns.
- 2.) Install the four screws.
- 3.) Turn the Operator Panel, Lower with the front down.
- 4.) Plug in the cable to the Operator Panel, Lower.
- 5.) Install the Operator Panel, Lower.
- 6.) Install the Operator Panel, Upper.

## 8-6-18 Lower Switch Board with Elastomer replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-18-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



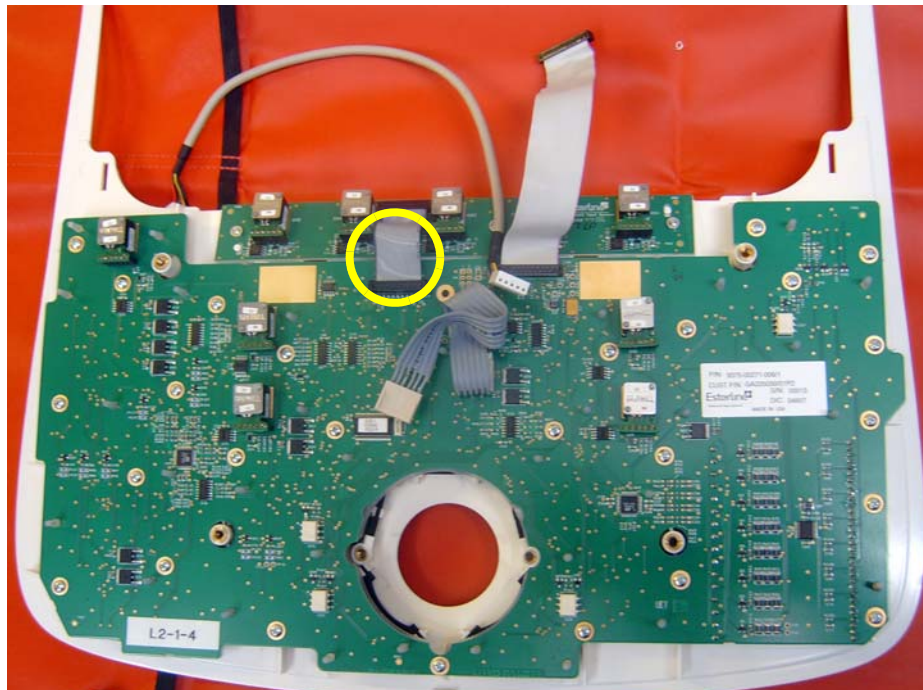
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.
- 5.) Remove the Operator Panel, Lower and place it on a clean surface with the front down.
- 6.) Remove the Trackball.

**8-6-18-2 Lower Switch Board with Elastomer removal**

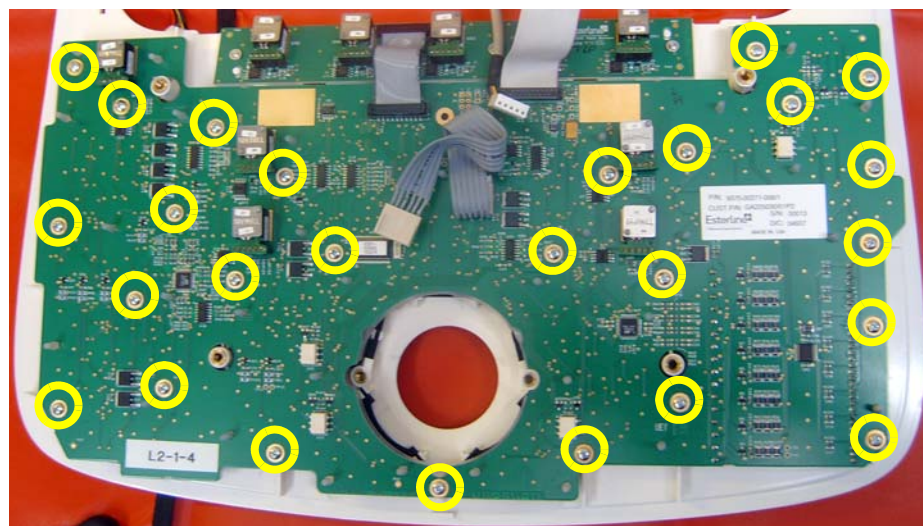
- 1.) Disconnect the cable to the Encoder Board.

**Figure 8-106 Lower Switch Board with Elastomer - Trackball already removed.**



- 2.) Remove the 26 fixing screws.

**Figure 8-107 Lower Switch Board with Elastomer - Trackball already removed.**



- 3.) Remove the Lower Switch Board with Elastomer. Store it in an ESD safe place.

**8-6-18-3 Lower Switch Board with Elastomer installation**

- 1.) Verify that all switch cups are in their correct positions.
- 2.) Position the Lower Switch Board with Elastomer in its correct position.
- 3.) Install the 26 fixing screws.
- 4.) Connect the cable to the Encoder Board.
- 5.) Install the Trackball.
- 6.) Install the Operator Panel, Lower.
- 7.) Install the Operator Panel, Upper.

## 8-6-19 Lower Bezel replacement

Figure 8-108 Lower Bezel



**WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-19-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.
- 5.) Remove the Operator Panel, Lower. Place it on a clean surface with the front down.
- 6.) Remove the Trackball.
- 7.) Remove the Encoder Board.
- 8.) Remove the Lower Switch Board with Elastomer.

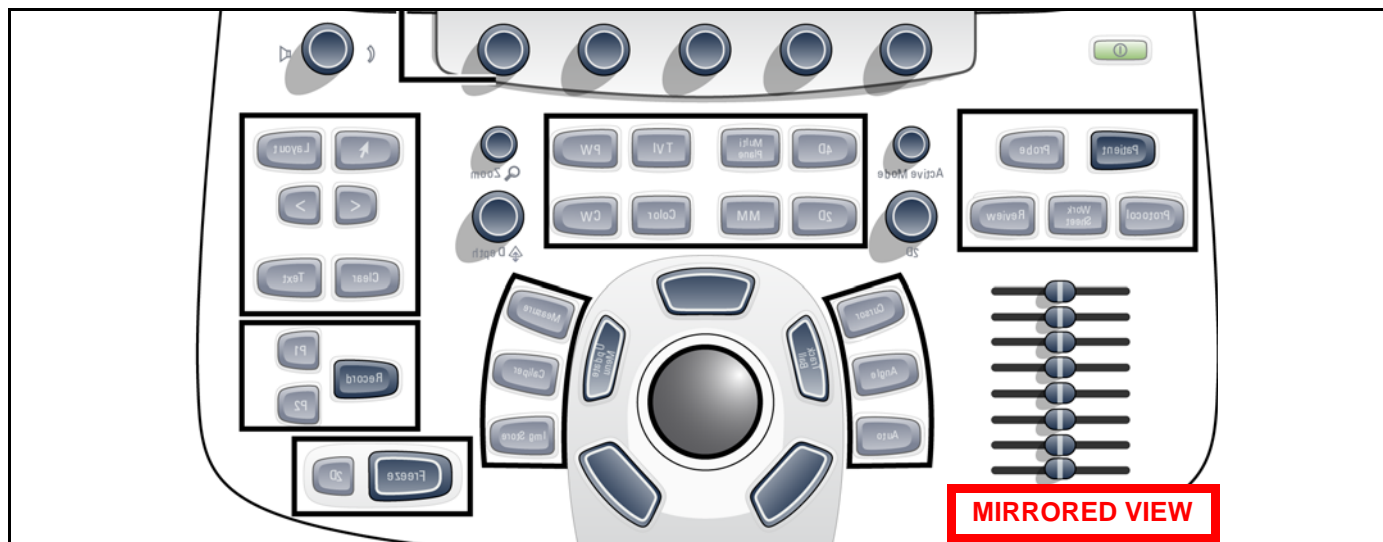
### 8-6-19-2 Remove the Lower Bezel

- 1.) Remove all the Switch Cups.  
If possible, place them in their relative position on a table, or other place where you can keep them until you start the reinstallation. If you are going to install a new Lower Bezel, you should move the Switch Cups over to the new Lower Bezel, one by one.
- 2.) When done, remove the Lower Bezel.

**8-6-19-3 Install the Lower Bezel**

- 1.) Install the Switch Cups in the correct positions on the Lower Bezel. Use the mirrored image in [Figure 8-109](#) as a reference.

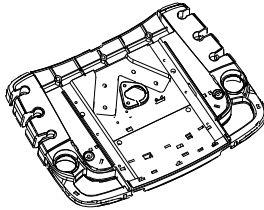
**NOTE:** THE ILLUSTRATION BELOW IS A MIRRORED ILLUSTRATION.  
USE IT FOR REFERENCE WHEN INSTALLING THE SWITCH CUPS!

**Figure 8-109 Mirrored illustration of the Switch Cups positions**

- 2.) Install the Lower Switch Board with Elastomer.
- 3.) Install the Encoder Board.
- 4.) Install the Trackball.
- 5.) Install the Operator Panel, Lower.
- 6.) Install the Operator Panel, Upper.
- 7.) Install the Knobs for Encoders and Slidepots.

## 8-6-20 Lower Frame Assembly replacement

Figure 8-110 Lower Frame Assembly



 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-20-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Arm.
- 5.) Remove the Upper Operator Panel/Touch Panel Assembly.
- 6.) Remove the Lower Operator Panel.
- 7.) Remove the Bulkhead Board.
- 8.) Remove Handle Left Top and Handle Right Top.
- 9.) Remove the Palm Rest.
- 10.) Remove the XYZ Buttons Frame.

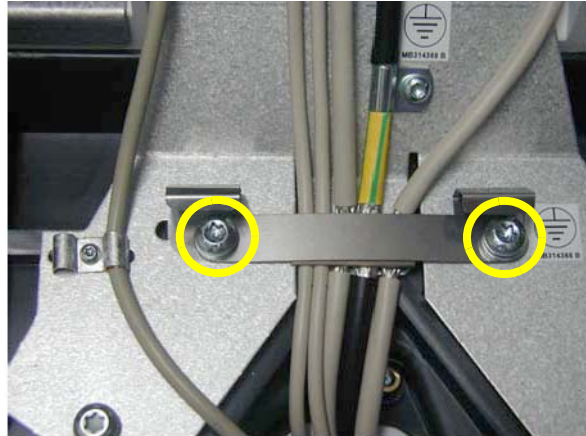


**8-6-20-2 Lower Frame Assembly removal procedure**

Follow these steps to remove the Lower Operator Panel Frame:

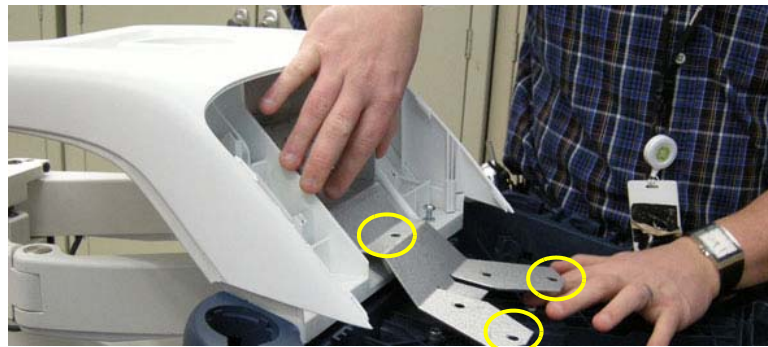
- 1.) Remove the 2 screws securing the Main Cable.

**Figure 8-111 Screw placement, Main Cable clamp**



- 2.) Remove the 5 remaining screws securing the Bulkhead Bracket.
- 3.) Remove the Bulkhead Bracket.

**Figure 8-112 Screw placement, bulkhead bracket**



- 4.) From underneath the Frame, pull the Main Cables through the Frame opening to free the Frame.
- 5.) Remove the Upper Frame.
- 6.) Remove two plastic Plate Washers on each side of the Bulkhead Bracket.
- 7.) Remove the Lower Operator Panel Frame.

**8-6-20-3 Lower Frame Assembly installation procedure**

Follow these steps to install the Lower Operator Panel Frame:

- 1.) Position the Lower Operator Panel Frame.
- 2.) Install the Upper Frame.
- 3.) Install the plastic Plate Washers on both side of the Bulkhead Bracket.
- 4.) Position the Bulkhead Bracket.
- 5.) Install the 5 screws to secure the Bulkhead Bracket.
- 6.) Install the XYZ Buttons Frame.
- 7.) Install the Palm Rest.
- 8.) Install the Main Cable at the Lower Operator Panel end.
- 9.) Install the Bulkhead Board.
- 10.) Install the Lower Operator Panel.
- 11.) Install the Upper Operator Panel/Touch Panel Assembly.
- 12.) Install the LCD Arm.

## 8-6-21 Operator Panel Cable Kit Replacement

### 8-6-21-1 Overview

The Operator Panel Cable Kit includes three different cables, as illustrated in [Figure 8-113](#).

- The Trackball USB Cable is used on the Operator Panel, Lower.
- The USB Video Board Flex Cable and the HV Inverter Cable are both used on the Operator Panel, Upper.

**Figure 8-113 The Operator Panel Cable Kit**



**TRACKBALL USB CABLE**  
Connects the Trackball to the Controller board.



**USB VIDEO BOARD FLEX CABLE**  
Connects the Touch Screen to the USB Video board.



**HV INVERTER CABLE**  
Connects the Touch Screen to the HV Inverter board.

## 8-6-21-2 Preparations

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper and place it on a clean surface with the front down.
- 5.) Remove the Operator Panel, Lower and place it on a clean surface with the front down.

### 8-6-21-3 Disconnect the Trackball USB Cable

The Trackball USB Cable is connected between the Trackball and the Main Controller board.

- Disconnect both ends of the cable and remove it.

### 8-6-21-4 Install the Trackball USB Cable

- 1.) Connect the Trackball USB Cable to the Trackball.
- 2.) Install the Operator Panel, Lower.
- 3.) Install the cable below the Ground Clamp.
- 4.) Connect the Trackball USB Cable to the Operator Panel, Upper.
- 5.) Install the Operator Panel, Upper.

### 8-6-21-5 Disconnect the USB Video Board Flex Cable

The USB Video Board Flex Cable is the connection between the USB Video Board and the LCD (Touch) Display.

- 1.) Remove the Rear Cover on the Operator Panel, Upper.
- 2.) Disconnect both ends of the cable and remove it.

**8-6-21-6 Install the USB Video Board Flex Cable**

- 1.) Connect the USB Video Board Flex Cable to the USB Video Board and the other end to the LCD (Touch) Display.
- 2.) Install the Rear Cover on the Operator Panel, Upper.
- 3.) Install the Operator Panel, Upper.
- 4.) If removed, install the Operator Panel, Lower.

**8-6-21-7 Disconnect the HV Inverter Cable**

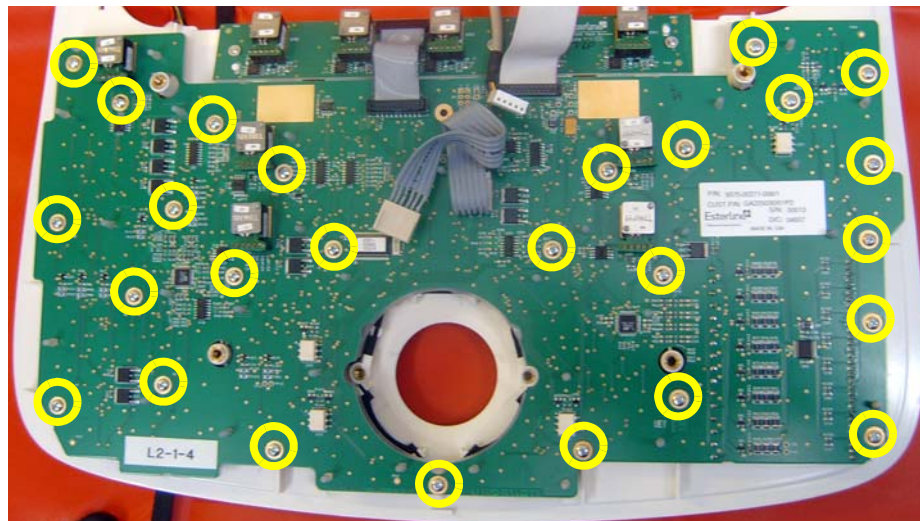
The HV Inverter Cable is the cable between the HV Inverter board and the Main Controller board.

- 1.) Remove the Rear Cover on the Operator Panel, Upper.
- 2.) Disconnect both ends of the cable and remove it.

**8-6-21-8 Install the HV Inverter Cable**

- 1.) Connect the HV Inverter Cable to the HV Inverter board and the other end to the Main Controller board.
- 2.) Install the Rear Cover on the Operator Panel, Upper.
- 3.) Install the Operator Panel, Upper.
- 4.) If removed, install the Operator Panel, Lower.

**Figure 8-114 Lower Switch Board with Elastomer - Trackball already removed**



## 8-6-22 Replacing the Alpha-Numeric Keyboard Assembly

### 8-6-22-1 Overview

The Alpha-Numeric Keyboard Assembly is not a FRU, but both the language specific keyboard, called the A/N keyboard, and the A/N Keyboard Enclosure are FRUs. These two parts together equals one Alpha-Numeric Keyboard Assembly.

### 8-6-22-2 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

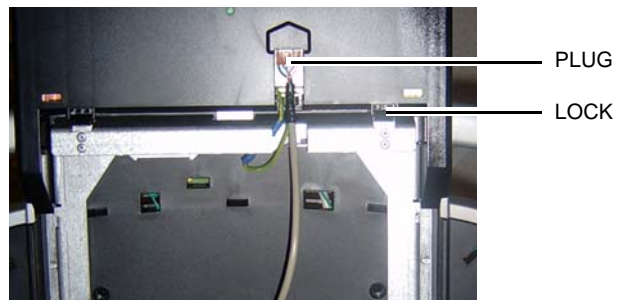
**8-6-22-3 Alphanumeric Keyboard Assembly removal procedure**

The Alphanumeric Keyboard is installed on a rail below the Operator Panel.

**Figure 8-115 Alphanumeric Keyboard**

Follow the steps below to remove the Alphanumeric Keyboard assembly:

- 1.) Disconnect the cable (plug) that is connected to the Alphanumeric Keyboard assembly.
- 2.) Disconnect the ESD cable.

**Figure 8-116 Alphanumeric Keyboard seen from below**

**8-6-22-3 Alphanumeric Keyboard Assembly removal procedure (cont'd)**

- 3.) Tilt down the Alphanumeric Keyboard assembly. If you are afraid to use the needed force, you may use a flat blade screwdriver to unlock the two locks illustrated in [Figure 8-116 "Alphanumeric Keyboard seen from below" on page 8-131](#).
- 4.) Move the Alphanumeric Keyboard assembly so it un-gage, then lift it away.

**8-6-22-4 Alphanumeric Keyboard assembly installation procedure**

Follow these steps to install the Alphanumeric Keyboard assembly:

- 1.) Install the Alphanumeric Keyboard assembly in the "hinges" on the rail.
- 2.) Tilt the Alphanumeric Keyboard assembly up so it locks in horizontal position.
- 3.) Connect the ESD cable.
- 4.) Connect the cable to the connector on the rear of the Alphanumeric Keyboard assembly.



## 8-6-23 Replacing the A/N Keyboard or the A/N Keyboard Enclosure

### 8-6-23-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



**CAUTION** **ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. TURN OFF THE BREAKER.
2. UNPLUG THE SYSTEM.
3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.
4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.

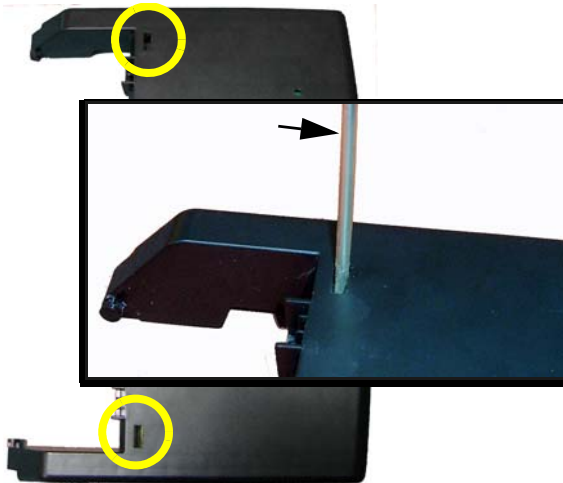
**Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.**

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Alpha-Numeric Keyboard Assembly from the VIVID E9 / VIVID E7.

**8-6-23-2 Disassemble the A/N Keyboard and the A/N Keyboard Enclosure**

- 1.) Place the Alpha-Numeric Keyboard Assembly on a table with the keys down.  
The A/N Keyboard Bottom Enclosure has two holes where you can access two of the fixing tabs to release them.
- 2.) Insert a thin screwdriver in one of the provided holes and use it to release the tabs by pressing as illustrated with the arrow in the figure below.

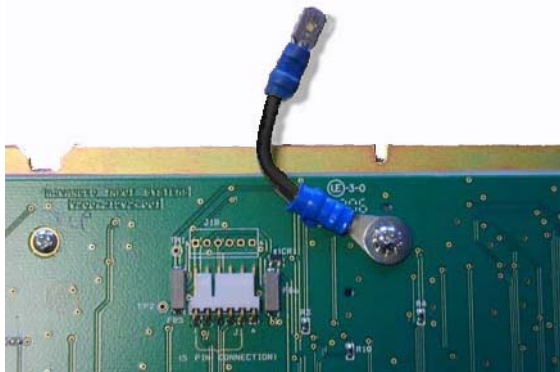
**Figure 8-117 Release the two tabs**



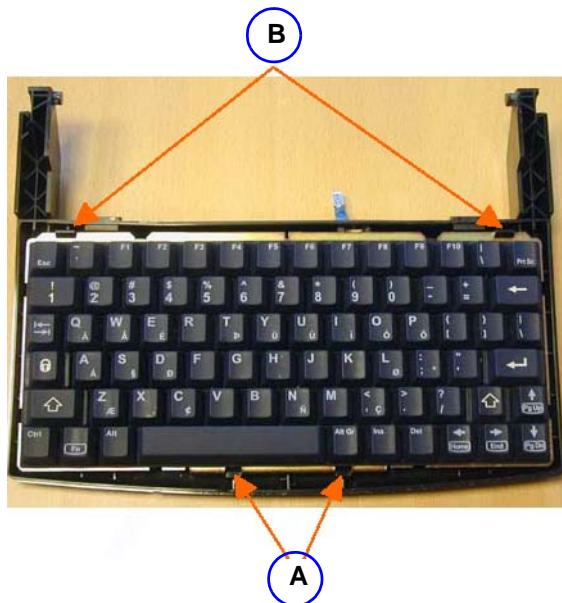
- 3.) Separate the A/N Keyboard Bottom Enclosure from the rest of the A/N Keyboard Assembly.
- 4.) You can now separate the A/N Keyboard from the A/N Keyboard Top Enclosure, by releasing the fixing tabs, one by one, until the parts are separated.

**8-6-23-3 Assemble the A/N Keyboard and the A/N Keyboard Enclosure**

- 1.) If not already done, connect the Ground Cable to the A/N Keyboard, using the current screw and two additional washers (tooth, 3.2mm). Use one washer under and one washer over the cable shoe. (Torque: 2.3 Nm.)

**Figure 8-118 Install Ground Cable**

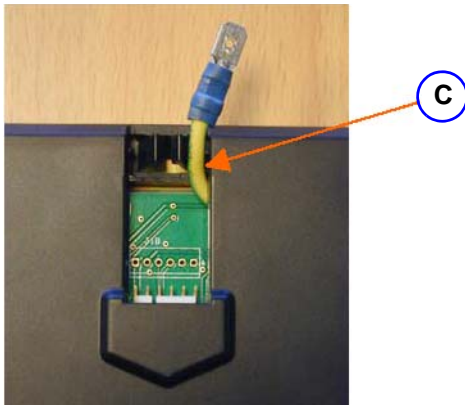
- 2.) Install the A/N keyboard into the A/N Keyboard Bottom Enclosure. First position the keyboard under the front clips (A) then press the rear side of the keyboard under the rear clips (B).

**Figure 8-119 Install A/N keyboard into the A/N Keyboard Bottom Enclosure**

**8-6-23-3 Assemble the A/N Keyboard and the A/N Keyboard Enclosure (cont'd)**

- 3.) Position the Ground Cable (C) in the opening of the A/N Keyboard Bottom Enclosure.

**Figure 8-120 Ground Cable (C) in the opening of the A/N Keyboard Bottom Enclosure**



- 4.) Install the A/N Keyboard Top Enclosure onto the keyboard by snapping the eight small clips on the Top Enclosure onto the keyboard metal base plate. The eight positions are marked in the figure below.

**Figure 8-121 Install A/N Keyboard Top Enclosure**



**8-6-24 Wagon AN Drawer Sheet Met. Assembly replacement****8-6-24-1 Preparations**

When preparing for the replacement, you must perform the following steps:



**CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



- 1. TURN OFF THE BREAKER.**
- 2. UNPLUG THE SYSTEM.**
- 3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.**
- 4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.**

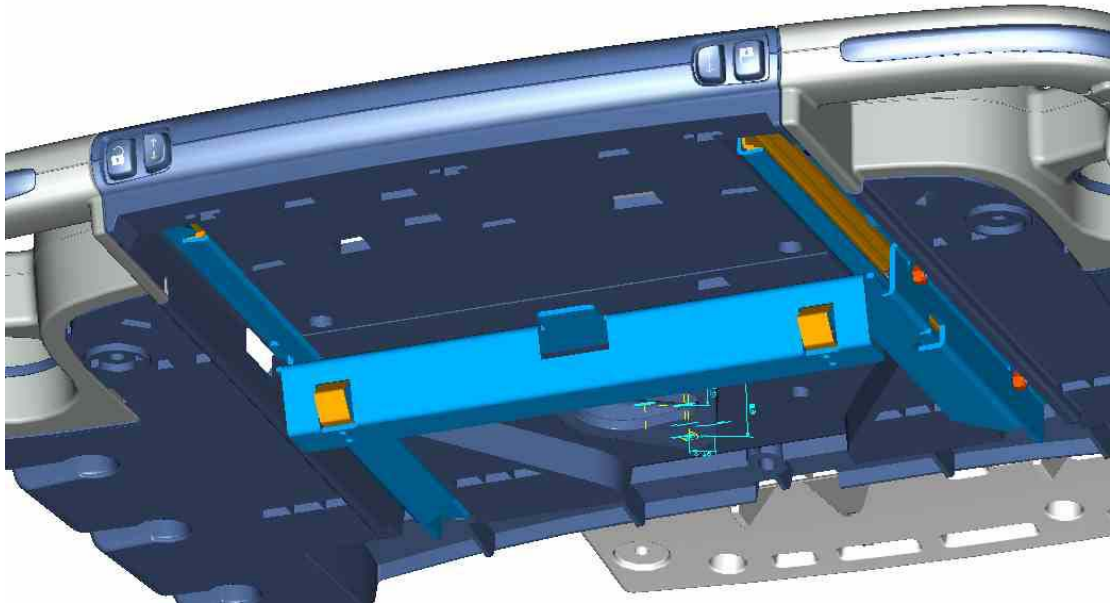
**Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.**

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Upper OP Panel/Touch Panel assembly.
- 5.) Remove the Lower Operator Panel.
- 6.) Remove the Alphanumeric Keyboard Assembly.

**8-6-24-2 Wagon AN Drawer Sheet Met. Assembly removal**

The Wagon AN Drawer Sheet Met. Assembly is located below the User Interface.

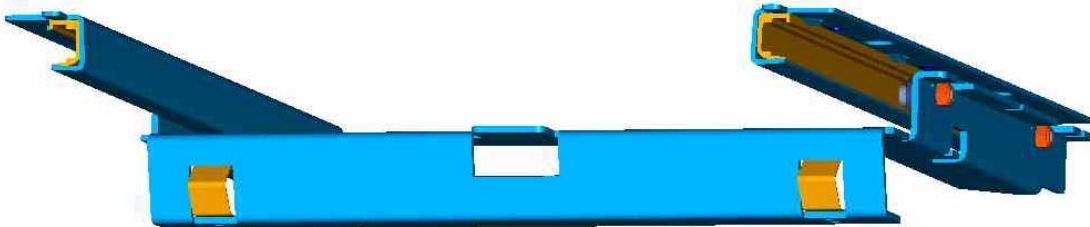
**Figure 8-122 Wagon AN Drawer Sheet Met. Assembly**



- 1.) Remove the six screws that fix the Wagon AN Drawer Sheet Met. Assembly to the UI Console (three screws on each side).
- 2.) Remove the Wagon AN Drawer Sheet Met. Assembly.

**8-6-24-3 Wagon AN Drawer Sheet Met. Assy installation**

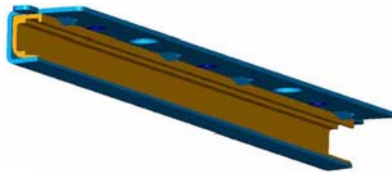
**Figure 8-123 The Wagon AN Drawer Sheet Met. Assy.**



- 1.) Position the Wagon AN Drawer Sheet Met. Assy below the UI Console as illustrated in [Figure 8-122 "Wagon AN Drawer Sheet Met. Assembly" on page 8-138](#). Ensure that the wagon is running free, before you tighten the screws in the next step.
- 2.) Install the six fixing screws M4 x 8, Torque: 2.5 Nm.
- 3.) Install the Alphanumeric Keyboard.
- 4.) Install the Lower OP Panel.
- 5.) Install the Upper OP Panel.

## 8-6-25 J-Rail Assy replacement

Figure 8-124 J-Rail Assy



### 8-6-25-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**

**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



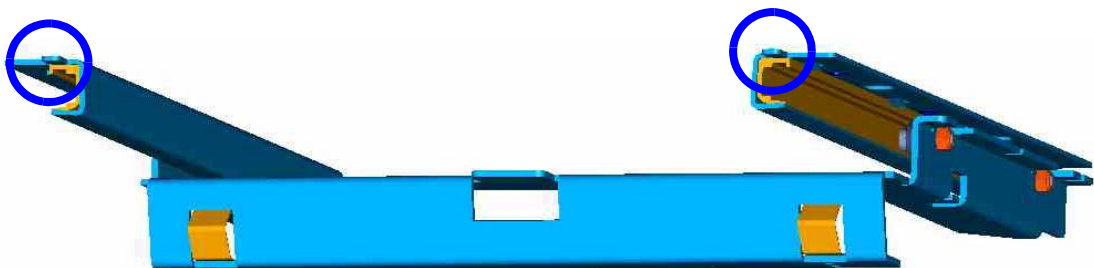
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Upper OP Panel/Touch Panel assembly.
- 5.) Remove the Lower Operator Panel.
- 6.) Remove the Alphanumeric Keyboard Assembly.
- 7.) Remove the Wagon AN Drawer Sheet Met. Assy.

### 8-6-25-2 J-Rail Assy removal

Figure 8-125 The Wagon AN Drawer Sheet Met. Assy.



- 1.) Bend up the tab so it doesn't stop the Wagon, A/N Drawer Sheet Met. Assy.
- 2.) Slide the Wagon, A/N Drawer Sheet Met. Assy out of the J-Rail.
- 3.) If needed, repeat this procedure for the other J-Rail Assy.

**8-6-25-3 J-Rail Assy installation procedure**

- 1.) Slide the Wagon, A/N Drawer Sheet Met. Assy into the J-Rail w/Lining.
- 2.) Put a Shrink Tube onto the front tab.
- 3.) Bend down the tab.
- 4.) If needed, repeat the three steps above for the other **J-Rail Assy**.
- 5.) Position the Wagon AN Drawer Sheet Met. Assy below the UI Console as illustrated in [Figure 8-122 "Wagon AN Drawer Sheet Met. Assembly" on page 8-138](#). Ensure that the wagon is running free, before you tighten the screws in the next step.
- 6.) Install the six fixing screws M4 x 8, Torque: 2.5 Nm.
- 7.) Install the Alphanumeric Keyboard.
- 8.) Install the Lower OP Panel.
- 9.) Install the Upper OP Panel.



## 8-6-26 Replacing the Speaker Assembly

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-26-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

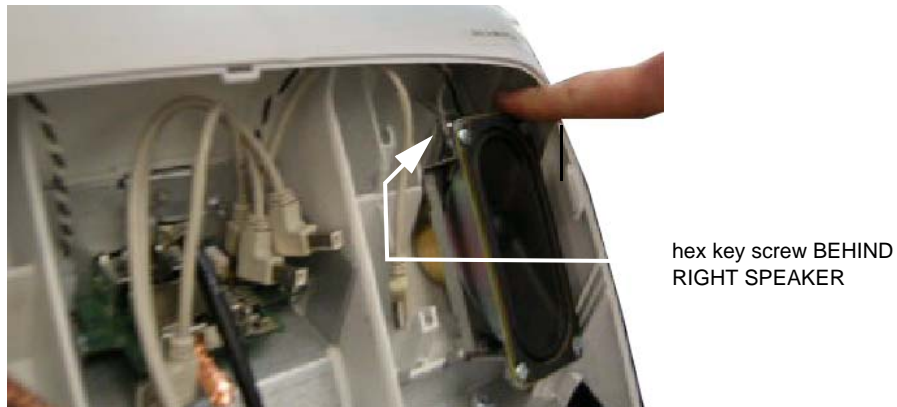
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.

**8-6-26-2 Remove the Speaker Assembly**

Follow these steps to remove one of the Speaker Assemblies:

- 1.) Remove the hex key screw, fixing the Speaker Bracket to the OP frame.

**Figure 8-126 Speaker hex key screw**



- 2.) Disconnect the Speaker Cable from the Bulkhead board.
- 3.) Remove the Speaker.
- 4.) Repeat steps 1 - 3 for the other Speaker assembly, if necessary.

**8-6-26-3 Install the Speaker Assembly**

Follow these steps to install the Speakers:

- 1.) Position the Speaker.
- 2.) Install the hex key screw, fixing the Speaker Bracket to the OP frame.

*NOTE: Check that the speaker bottom edge is tight or the speaker may rattle.*

- 3.) Connect the Speaker Cable to the Bulkhead board.
- 4.) Repeat steps 1 - 3 for the other Speaker.
- 5.) Install the Operator Panel, Upper.

## 8-6-27 Replacing the Bulkhead Board

The Bulkhead board is located behind the Upper OP Panel/Touch Panel assembly.

### 8-6-27-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



**WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

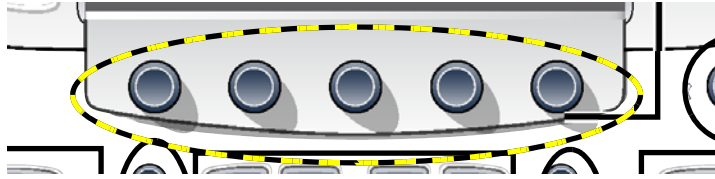
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

**8-6-27-1 Preparations (cont'd)**

4.) Remove five knobs, see [Figure 8-127](#).

**Figure 8-127 Remove five knobs**



5.) Remove the Upper OP Panel.

**8-6-27-2 Remove the Bulkhead Board**

**Figure 8-128 Bulkhead Board screws**



Follow these steps to remove the Bulkhead Board:

- 1.) Disconnect the cables from the Bulkhead Board:
  - cable from Main Cable
  - cables to left and right speaker
  - two short USB cables (Bulkhead Board to OP)
- 2.) Unscrew and remove two screws.
- 3.) Remove the Bulkhead Board.

**8-6-27-3 Install the Bulkhead Board**

Follow these steps to install the Bulkhead Board:

- 1.) Slide the Bulkhead Board into the correct position.
- 2.) Install the two screws (M3 x 6, Torque: 1.2 Nm).
- 3.) Install the cables from the Bulkhead Board:
  - two short USB cables (Bulkhead Board to OP)
  - cables to left and right speaker
  - cable from Main Cable
- 4.) Install the Upper OP panel and the five rotary knobs.
- 5.) Connect probe(s) and external cables (network and mains power).

## 8-6-28 Bulkhead, Plate, Extended replacement

### 8-6-28-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove five OP Panel Knobs, see [Figure 8-127](#).

**Figure 8-129 Remove five knobs**

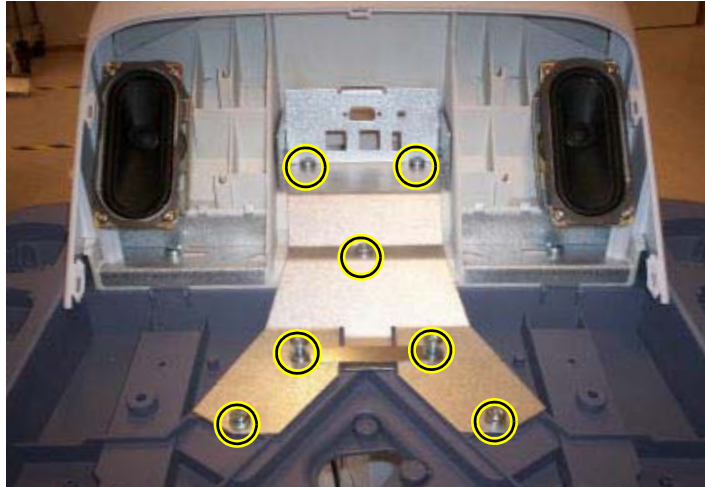


- 5.) Remove the Operator Panel, Upper.
- 6.) Remove the two Speaker Assemblies.
- 7.) Remove the Bulkhead board.
- 8.) Remove the Operator Panel, Lower.

**8-6-28-2 Remove the Bulkhead Plate**

The Bulkhead Plate is used to secure the Upper UI Frame to the Lower UI Frame.

**Figure 8-130 The Bulkhead Plate**



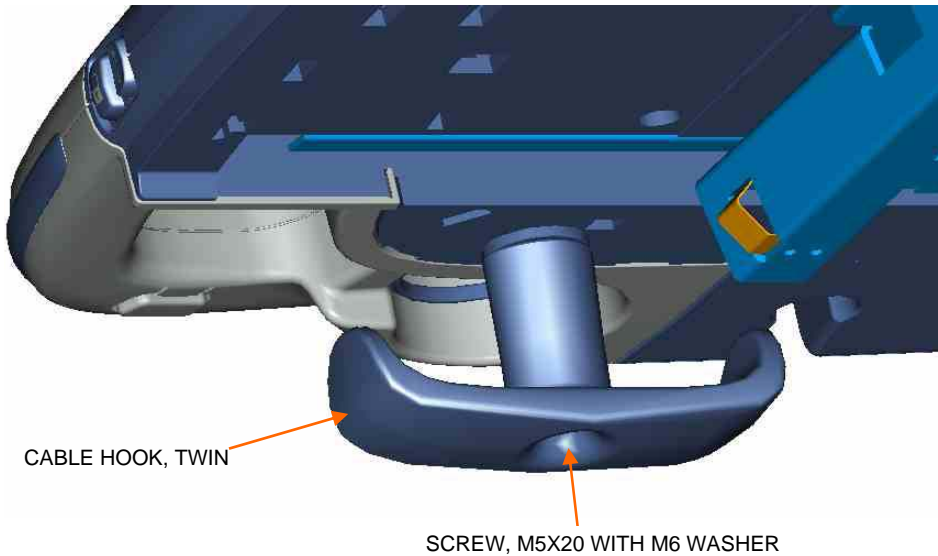
- 1.) Remove the seven fixing screws (see: [Figure 8-130 "The Bulkhead Plate" on page 8-147](#)).
- 2.) Remove the Bulkhead Plate and the Cable Clamp.

**8-6-28-3 Install the Bulkhead Plate**

- 1.) Position the Bulkhead Plate so it aligns with the holes for the fixing screws.
- 2.) Install the seven fixing screws as described below:
  - The two upper screws are M6 x 20, Torque: 8.5 Nm.
  - The next screw is M6 x 45, Torque: 8.5 Nm.
  - The lower left-most screw is M6 x 30, Torque: 8.5 Nm.
  - The three other lower screws are M6 x 25, Torque: 8.5 Nm. Two of the screws are also fixing the Cable Clamp (see: [Figure 8-130 "The Bulkhead Plate" on page 8-147](#)).
- 3.) Install the Operator Panel, Lower.
- 4.) Install the Bulkhead Board.
- 5.) Install the two Speaker assemblies.
- 6.) Install the Operator Panel, Upper.
- 7.) Install the Operator Panel Knobs.

## 8-6-29 Probe Cable Hook Twin replacement

Figure 8-131 Cable Hook, Twin



### 8-6-29-1 Remove the Cable Hook, Twin

- 1.) Unscrew the fastening screw. (It has been locked with Lock-Tite, so you may need to apply a little extra force to unscrew the screw.)
- 2.) Remove the **Cable Hook, Twin**.

### 8-6-29-2 Install the Cable Hook, Twin

- 1.) Position the **Cable Hook, Twin** as shown in [Figure 8-131 "Cable Hook, Twin" on page 8-148](#).
- 2.) Fix it in place by using an M5x20 screw with an M6 washer. Lock-Tite has to be used.  
Torque: 50 Ncm (fingertight).



## 8-6-30 Non-Magnetic Touch Latch replacement

### 8-6-30-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Pull out the Alphanumeric keyboard to get access to the Touch Latch.

### 8-6-30-2 Non-Magnetic Touch Latch removal procedure

- 1.) Unscrew two screws.
- 2.) Remove the Non-Magnetic Touch Latch.

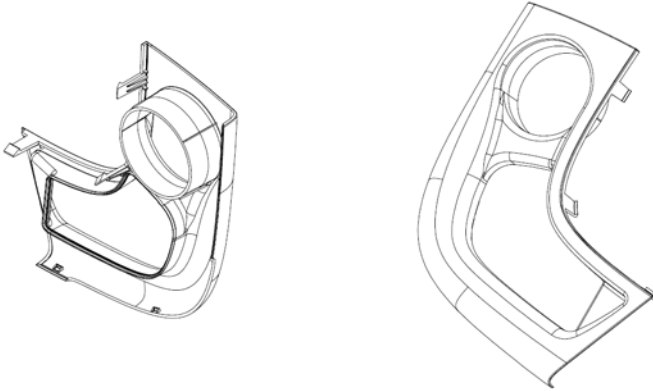
### 8-6-30-3 Non-Magnetic Touch Latch installation procedure

- 1.) Position the Non-Magnetic Touch Latch and fasten it with one screw.
- 2.) Install the other screw.

Ensure that the Non-Magnetic Touch Latch works as intended.

## 8-6-31 Handle, Left Top / Handle Right Top, replacement

Figure 8-132 Handle, Left, Top



### 8-6-31-1 Preparations

- 1.) Power down the VIVID E9 / VIVID E7 and disconnect the Mains Power Cable.
- 2.) Remove the buttons below the Touch Panel.
- 3.) Remove the Upper Operator Panel.
- 4.) Remove the Lower Operator Panel.

**8-6-31-2 Handle Left Top / Handle Right Top removal**

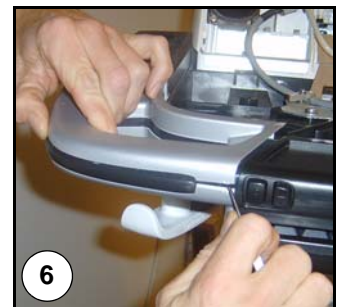
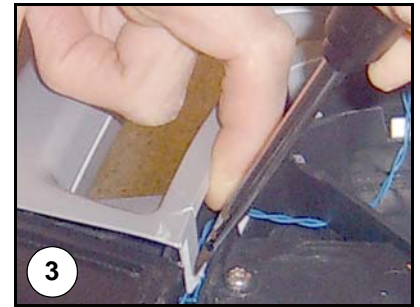
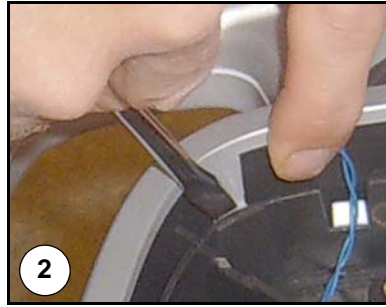
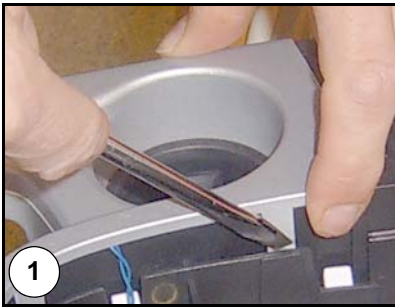
Hatches are used to attach the Handle Left Top and Handle Right Top to the Lower UI.

*NOTE:* Be careful when doing this procedure. It is easy to break the plastic hatches.

*NOTE:* The screwdriver positions in [Figure 8-133 "Release Hatches" on page 8-151](#) indicates where the hatches are located.

- 1.) Use a thin screwdriver to release the hatches, one by one as illustrated in [Figure 8-133 "Release Hatches" on page 8-151](#), until you can remove the Handle Left Top or Handle Right Top.

**Figure 8-133 Release Hatches**



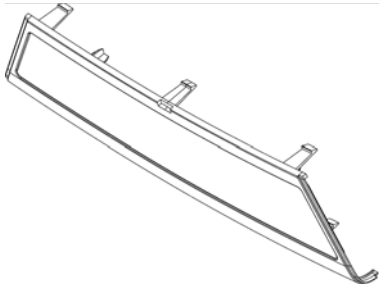
- 2.) Remove the Handle Left Top or Handle Right Top.
- 3.) If needed, repeat the previous steps for the other handle.

**8-6-31-3 Handle Left Top / Handle Right Top installation**

- 1.) Remove the Gel Cups (if present).
- 2.) Install the Handle, Left Top / Handle, Right Top by pressing them into the UI Frame, Lower.
- 3.) Install the Gel Cups you removed in step 1.
- 4.) Install the Operator Panel, Lower.
- 5.) Install the Operator Panel Upper.

## 8-6-32 Palm Rest ASSY replacement

Figure 8-134 The Palm Rest ASSY



### 8-6-32-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**

**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Upper Operator Panel.
- 5.) Remove the Lower Operator Panel.
- 6.) Remove Handle Left Top and Handle Right Top.

**8-6-32-2 Palm Rest ASSY removal**

Follow these steps to remove the Palm Rest:

- 1.) Release the lock mechanisms securing the Palm Rest ASSY.
- 2.) Remove the Palm Rest ASSY.

**8-6-32-3 Palm Rest ASSY installation**

Follow these steps to install the Palm Rest ASSY:

- 1.) Ensure the XYZ Buttons cable runs along the lower tray cable channel so that the cable is not pinched when the Palm Rest is replaced.
- 2.) Replace the Palm Rest ASSY.
- 3.) Install Handle Left Top and Handle Right Top.
- 4.) Install the lock mechanisms securing the Palm Rest Cover.
- 5.) Replace the Lower Operator Panel.
- 6.) Replace the Upper Operator Panel.

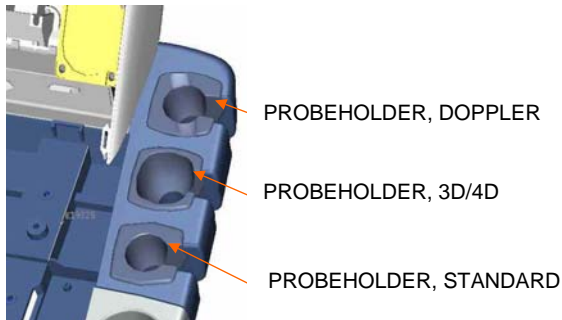
## 8-6-33 Replacing the Probe Holder Inserts

### 8-6-33-1 Introduction

The Probe Holder Inserts are soft rubber inserts, used to protect the probes from scratches, when stored on the VIVID E9 / VIVID E7. You can place the Probe Holder Inserts in any of the desired places on the edge of the Operator Panel. The following types of inserts are available:

- Probe Holder Insert STD
- Probe Holder Insert 3D
- Probe Holder Softinsert Doppler

**Figure 8-135 Probe holders (used on both sides)**



### 8-6-33-2 Manpower

One person, 1 minute.

### 8-6-33-3 Tools

No tools needed.

### 8-6-33-4 Preparations

- 1.) Disconnect and remove all the probes.
- 2.) Store the probes in a safe place.

### 8-6-33-5 Removal

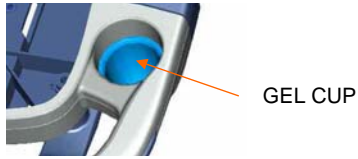
To remove a Probe Holder Insert, grab it and pull or push it upwards.

### 8-6-33-6 Installation

To install a Probe Holder Insert, place it so it fits one of the probe positions on the side of the Operator Panel.

## 8-6-34 Replacing the Gel Cup

Figure 8-136 Gel Cup (used on both sides)



The Gel Cup is a soft insert used for storing the gel bottle on the scanner so it is easy to access during scanning.

For replacement instructions, see: [8-6-33 "Replacing the Probe Holder Inserts" on page 8-154](#).

### 8-6-35 Up-Down Button Board (Buttons Frame UI Assy) replacement

These buttons are also called the XYZ Buttons.

The XYZ Buttons, located on the palm rest, control the XY and Z movement.

Figure 8-137 Top Console adjustment controls



1. Lock and brake release button: Unlock and move the Top Console horizontal.
2. Up/Down button: Move the Console up or down

- Push one of the buttons marked “1”, and then reposition the XY (horizontal) location of the upper console. Three seconds after pushing the left button, the 4 motors in the XY Frog Leg lock to stabilize the console.
- Toggle one of the buttons marked “2” to reposition the Z (vertical) location of the upper console. Toggle up to raise, or down to lower, the console.

Figure 8-138 XYZ Buttons



 **WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



### 8-6-35-1 Preparations

When preparing for the replacement, you must perform the following steps:



#### **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**

**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Upper OP Panel/Touch Panel assembly.
- 5.) Remove the Lower Operator Panel.
- 6.) Remove the Handle Top Left and Handle Top Right.
- 7.) Remove the Palm Rest Cover.

### 8-6-35-2 XYZ Buttons removal procedure

Follow these steps to remove the XYZ Buttons:

- 1.) Disconnect the cable to the XYZ Buttons.
- 2.) Gently pop the XYZ Buttons Frame out of the Palm Rest section of the Lower Op Panel frame handle.

### 8-6-35-3 XYZ Buttons installation procedure

- 1.) Insert the XYZ Buttons Frame into the Palm Rest section of the Lower Op Panel frame handle.
- 2.) Connect the cable to the XYZ Buttons Frame.
- 3.) Ensure the XYZ Buttons Frame cable runs along the Lower Op Panel cable channel so that the cable is not pinched when the Palm Rest is replaced (see Figure 8-117).
- 4.) Replace the Palm Rest.
- 5.) Replace the Handle Top Left and Handle Top Right.
- 6.) Replace the Lower Operator Panel.
- 7.) Replace the Upper OP Panel/Touch Panel assembly.

## 8-6-36 Button IF Board Assy replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-6-36-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Upper OP Panel/Touch Panel assembly.
- 5.) Remove the Lower Operator Panel.
- 6.) Remove Handle Left Top and Handle Right Top.
- 7.) Remove the Palm Rest Cover.

**8-6-36-2 Button IF Board removal procedure**

**Figure 8-139 Button IF Board**



- 1.) Disconnect all the five (5x) connectors from the board.
- 2.) Push the TABs away to release the board.
- 3.) Remove the board.

**8-6-36-3 Button IF Board installation procedure**


- 1.) Install the Button IF Board into the UI Frame, Lower by pressing it under the small hooks.
- 2.) Ensure the XYZ Buttons Frame cable runs along the Lower Op Panel cable channel so that the cable is not pinched when the Palm Rest is replaced (see Figure 8-117).
- 3.) Install the Handle Left Top and Handle Right Top.
- 4.) Replace the Palm Rest.
- 5.) Replace the Lower Operator Panel.
- 6.) Replace the Upper OP Panel/Touch Panel assembly.

## Section 8-7 Replacing XYZ Parts

**8-7-1** replaceable parts for the XYZ mechanism **XY Mechanism replacement**

**8-7-1-1** 3 hours **Preparations**

When preparing for the replacement, you must perform the following steps:

 **WARNING** **ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Rear Cover.
- 5.) Remove the LCD Monitor assembly.
- 6.) Remove the LCD Arm assembly.
- 7.) Remove the Operator Panel, Upper.
- 8.) Remove the Operator Panel, Lower.
- 9.) Remove the Bulkhead Board.
- 10.) Remove the Bulkhead Plate.
- 11.) Remove the Upper Frame Assembly.
- 12.) Remove the Lower Frame Assembly.
- 13.) Disconnect Brake Cables.

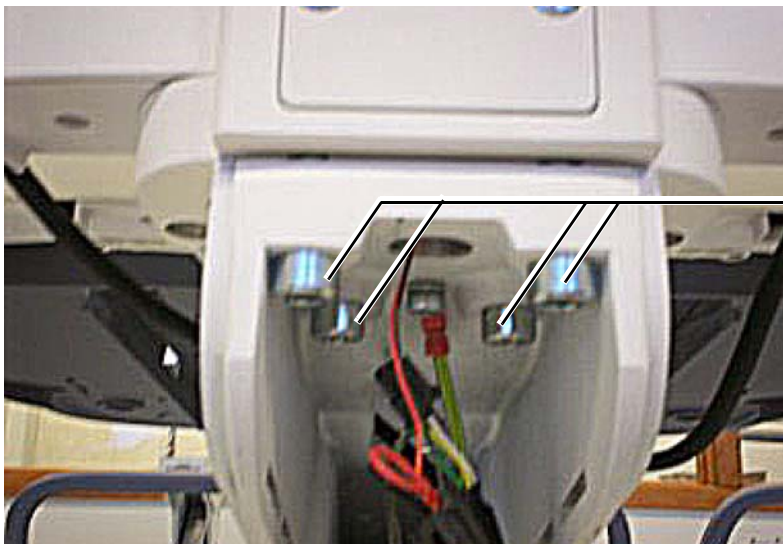
8-7-1-2 XY Mechanism removal procedure

Figure 8-140 Operator Panels have been removed



NOTE!  
MAIN CABLE IS NOT SHOWN IN  
THIS PICTURE.

Figure 8-141 Remove screws for the XY (Frogleg) mechanism



REMOVE FOUR (4X) SCREWS

- 1.) From the rear side of the VIVID E9 / VIVID E7, remove the four (4x) fixing screws.
- 2.) Remove the XY mechanism.

**8-7-1-3 XY Mechanism installation procedure**

- 1.) Position the XY mechanism so it aligns with the holes for the four fixing screws.
- 2.) Install the four fixing screws.
- 3.) Install the Lower Frame Assembly.

*NOTE: Ensure that Bumper Z enters the slide at the back, before tighten the screws.*

- 4.) Install the Upper Frame Assembly.
- 5.) Install the Bulkhead Plate.
- 6.) Install the Bulkhead Board.
- 7.) Install the Operator Panel, Lower.
- 8.) Install the Operator Panel, Upper.
- 9.) Install the LCD Arm assembly.
- 10.) Install the LCD Monitor assembly.
- 11.) Install the LCD Rear Cover.

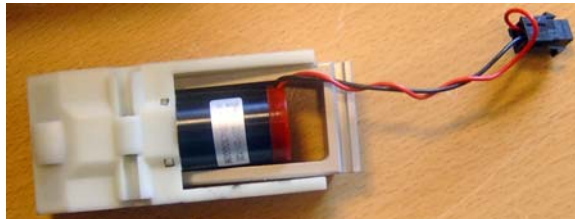
If it is difficult to lock the XY mechanism in parked position, the locking mechanism need adjustments.

**Related information:**

- [Section 6-7 "Adjusting the XYZ Mechanism" on page 6-12](#)
- [4-2-3 "Top Console position adjustment" on page 4-11](#)

## 8-7-2 XY Brake Assy replacement

Figure 8-142 XY-Brake Assy



### 8-7-2-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Make sure the XY arms are in the unlocked (floating) position.

**NOTE:** *While VIVID E9 / VIVID E7 is shutting down, make sure the XY arms are in the unlocked (floating) position and hold the brake release/XY unlock button until VIVID E9 / VIVID E7 is fully shut down. This will remove tension from the brake shoes and allow for much easier brake assembly removal.*

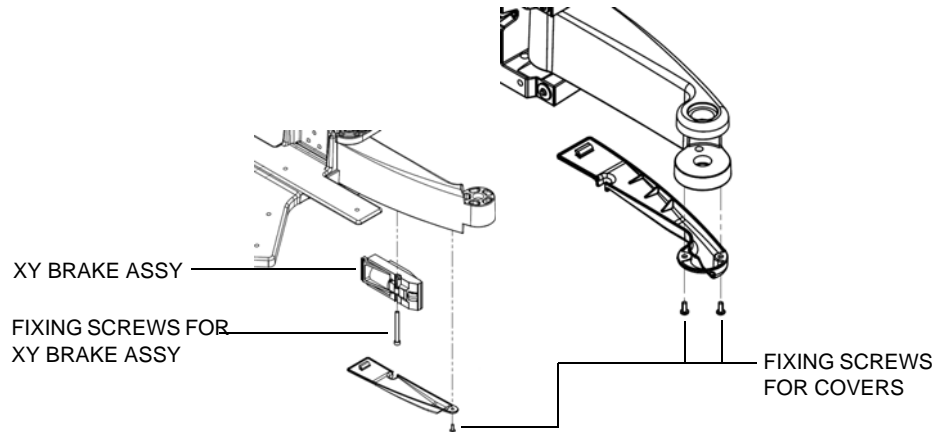
- 2.) Power down the VIVID E9 / VIVID E7.
- 3.) Disconnect the Mains Power Cable from the wall outlet.
- 4.) Disconnect all probes and external I/O cabling.

### 8-7-2-2 XY-Brake Assy removal procedure

The four (4x) XY-Brake Assemblies are located inside the XY (froglegs), one in each leg. To remove one XY-Brake ASSY, follow these steps:

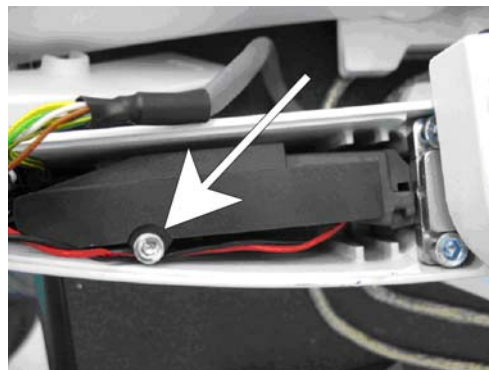
- 1.) Unscrew and remove the screw(s) that fix the cover to the leg.

**Figure 8-143 Covers, XY Brake ASSY and fixing screws**



- 2.) Remove the cover.
- 3.) Disconnect the XY Brake cable.
- 4.) Unscrew and remove the fixing screw for the XY Brake Assy.

**Figure 8-144 XY Brake Retaining Screw**

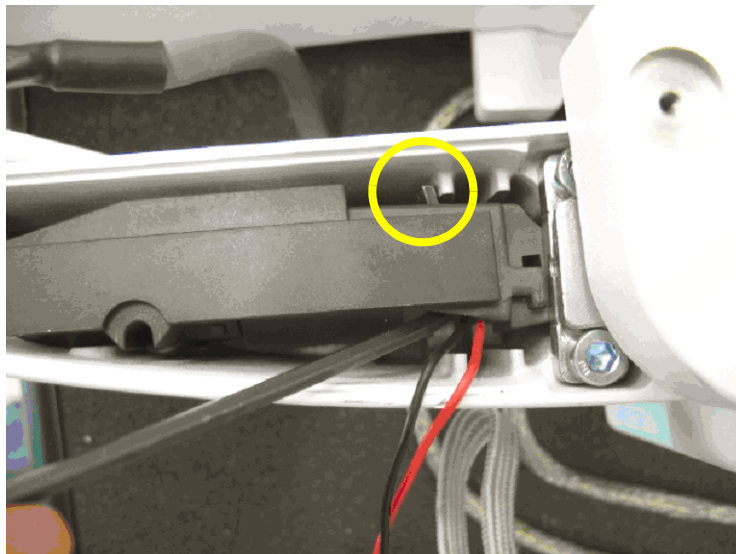


- 5.) Remove the brake retainer screw.
- 6.) Disconnect the brake motor wire connector.
- 7.) Using a 3 mm, "L" Allen wrench, slide the short "L" end of the wrench between the motor and the metal part of the brake ramp. The short "L"-end, should be visible as shown in Figure 8-145. BE CAREFUL not to pinch the brake motor wires. See: [Figure 8-146 "XY Brake Allen wrench placement - reference" on page 8-165.](#)



8-7-2-2 XY-Brake Assy removal procedure (cont'd)

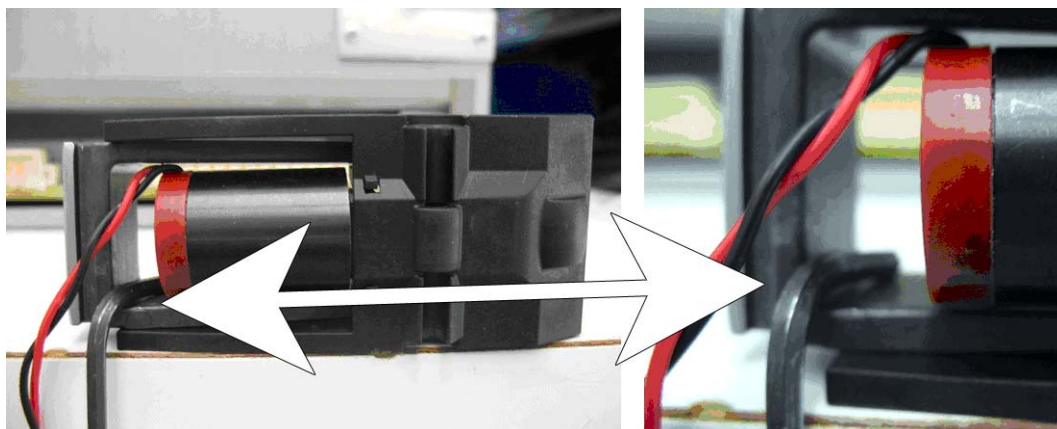
Figure 8-145 XY Brake Removal



8.) Gently, but firmly, pull down on the long end of the allen wrench. The brake assembly will slide out of the slot it mates with in the brake shoe.

*NOTE:* Figure 8-146 shows the XY brake removed and demonstrates placement of the Allen wrench.

Figure 8-146 XY Brake Allen wrench placement - reference



**8-7-2-3 XY-Brake Assy installation procedure**

*NOTE: Be careful when fighting screws that are entered into plastic. Use 2-3 Nm. If you tighten too much, the internal screw-threads in the plastic are destroyed, and the plastic part must be replaced.*

- 1.) Position the XY-Brake Assy into the arm. You may need to turn the axle on the motor (by hand) to adjust the lever so it fits.
- 2.) Install the fixing screw for the XY Brake Assy.
- 3.) Connect the cable from the motor to the XY Brake cable.
- 4.) Position the Cover so it aligns with the hole(s) for the fixing screw(s).
- 5.) Install the fixing screws:
  - The covers for the front legs are fixed with one screw. Use low Torque, max 2.5 Nm (Plastic part)
  - The covers for the rear legs are fixed with two screws. Use low Torque, max 2.5 Nm (Plastic part)

## 8-7-3 XY Park Lock replacement

### 8-7-3-1 Preparation

Unlock the XY, either by using the release knobs or by manually release the lock.

- 1.) At the rear of the VIVID E9 / VIVID E7, release the console's XY mechanism by inserting a screwdriver into the release point and pressing until release.

**Figure 8-147 XY mechanism release**



### 8-7-3-2 XY Park Lock removal

- 1.) Remove four screws.

**Figure 8-148 Remove four screws**



- 2.) Carefully pull out the XY Park Lock assembly.
- 3.) Disconnect the cable at the connector.
- 4.) Remove the XY Park Lock assembly.

### 8-7-3-3 XY Park Lock installation

- 1.) Install the cable from the XY Park Lock assembly in the assigned connector.
- 2.) Position the XY Park Lock assembly.
- 3.) Install the four screws.

### 8-7-3-4 Verification

Verify that the XY locks and unlocks as intended.

If needed, adjust the locking mechanism as described in:  
[Section 6-7 "Adjusting the XYZ Mechanism" on page 6-12.](#)

## 8-7-4 Z-Mechanism replacement

Figure 8-149 Z-Mechanism



### 8-7-4-1 4 hours Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

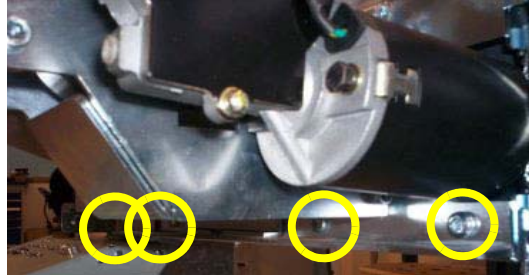
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Rear Cover.
- 5.) Remove the LCD Monitor assembly.
- 6.) Remove the LCD Arm assembly.
- 7.) Remove the Operator Panel, Upper.
- 8.) Remove the Operator Panel, Lower.
- 9.) Remove the Bulkhead Board.
- 10.) Remove the Bulkhead Plate.
- 11.) Remove the Upper Frame Assembly.
- 12.) Remove the Lower Frame Assembly.
- 13.) Remove the XY (Frogleg) Assembly.
- 14.) Remove the XYZ Control Box

**8-7-4-2 Z-Mechanism removal procedure**

The Z-Mechanism is fastened with several screws.

- 1.) Remove four (4x) screws from the lower part of the Z-Mechanism.

**Figure 8-150 Remove four (4x) screws**



- 2.) Remove four (4x) screws.

**Figure 8-151 Remove four (4x) screws**



- 3.) Lift the Z-Mechanism away.

**Figure 8-152 Lift the Z-Mechanism away.**

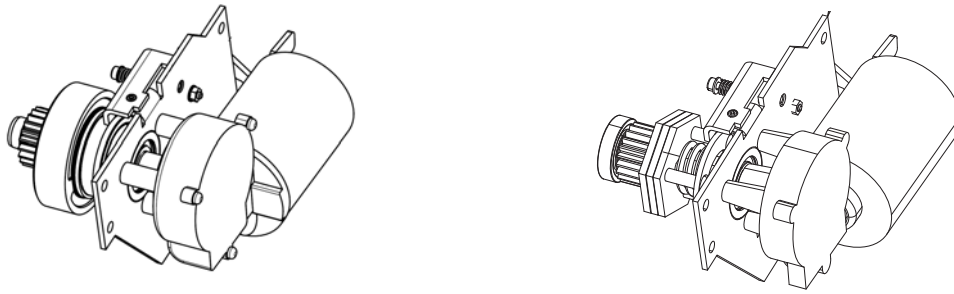


**8-7-4-3 Z-Mechanism installation procedure**

- 1.) Position the Z-Mechanism so the holes for the fixing screws align.
- 2.) Install two (2x) M6x16 Countersunk and two (2x) M6x16 screws.
- 3.) Install four (4x) M6x16 (lower part of unit).
- 4.) Install the XY (Frogleg) Mechanism.
- 5.) Install the Lower Frame Assembly.
- 6.) Install the Upper Frame Assembly.
- 7.) Install the Bulkhead Plate.
- 8.) Install the Bulkhead Board.
- 9.) Install the Operator Panel, Lower.
- 10.) Install the Operator Panel, Upper.
- 11.) Install the LCD Arm assembly.
- 12.) Install the LCD Monitor assembly.
- 13.) Install the LCD Rear Cover.

## 8-7-5 Drive Gear Assembly replacement

Figure 8-153 Drive Gear Assembly (2 models illustrated)



### 8-7-5-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**

**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Remove the Left Side Cover.
- 6.) Remove the Top Cover.
- 7.) Optional, for easier access, remove the Rear Cover.

**8-7-5-2 Drive Gear Assembly removal procedure**

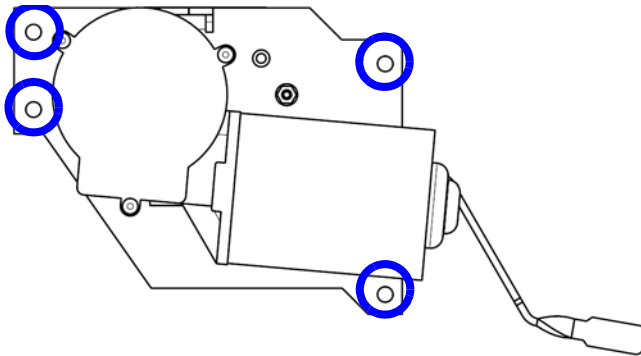
**Figure 8-154 Drive Gear Assembly location**



The Drive Gear Assembly is a part of the Z Mechanism. To remove the Drive Gear Assembly, follow these steps:

- 1.) Disconnect the motor cable from the XYZ Control Box.
- 2.) Unscrew and remove the four fixing screws.

**Figure 8-155 Remove four screws**

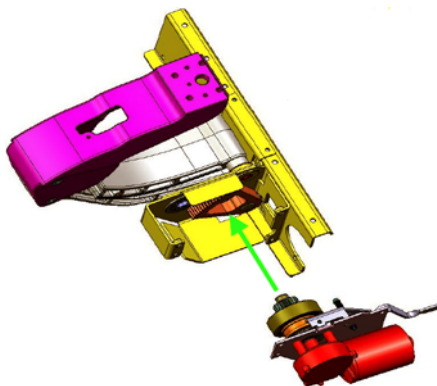


- 3.) Pull the unit away. You may need to either operate the Z-release lever when pulling, or move the Top Console slightly up or down to make the wheel disengage from the gear.

**8-7-5-3 Drive Gear Assembly installation procedure**

- 1.) Position the Drive Gear Assembly in the correct position. You may need to either operate the Z-release lever when positioning, or move the Top Console slightly up or down to engage the teeth on the wheel with the teeth on the gear.

**Figure 8-156 Install the Drive Gear Assembly**



- 2.) Install the four (4x) fixing screws with washers. (M6 x 16, Torque: 9,5 Nm.)

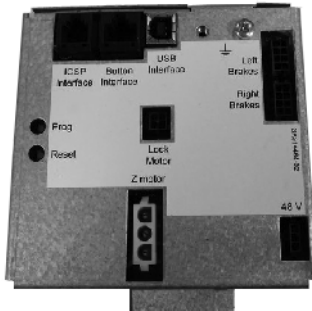


**8-7-5-3 Drive Gear Assembly installation procedure (cont'd)**

- 3.) Connect the cable from the motor to the XYZ Control Box.
- 4.) Power up the unit and verify that the XYZ function as intended.
- 5.) Power down the unit.
- 6.) Install the Top Cover.
- 7.) Install the Rear Cover.
- 8.) Install the Right Side Cover.
- 9.) Install the Left Side Cover.

## 8-7-6 XYZ Control Assembly replacement

Figure 8-157 XYZ Control Assembly



### 8-7-6-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

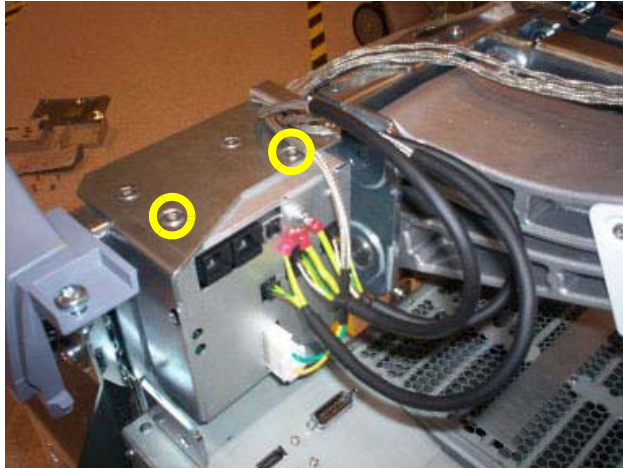
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the Rear Cover.
- 6.) Remove the Top Cover.

**8-7-6-2 XYZ Control Assembly removal procedure**

- 1.) Disconnect the cables to the **XYZ Control Assembly**.
- 2.) Unscrew and remove two (2x) screws.

**Figure 8-158 XYZ Control Assembly removal**



- 3.) Pull the top of the XYZ Control Assembly forwards, up and away from the bracket.

**8-7-6-3 XYZ Control Assembly installation procedure**

- 1.) Thread the XYZ Control Assembly into position.
- 2.) Install the three screws at the top, rear. (M6x16 sunken. Torque: 9.8 Nm.)
- 3.) Install the two remaining screws on the top. (M4x8, sunken. Torque: 4.9 Nm.)
- 4.) Connect the cables to the XYZ Control Assembly.
- 5.) Install the Top Cover.
- 6.) Install the Rear Cover.
- 7.) Install the Left Side Cover.

## **Section 8-8**

### **Main Console parts replacement**

#### **8-8-1 Purpose of this section**

This section describes how to replace the replaceable parts in the Main Console.

#### **8-8-2 Rear Filter and “handle type” Bottom Filter replacement**

##### **8-8-2-1 Preparations**

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Filter Cover.

**8-8-2-2 Remove and clean the filters**

Clean the air filters to ensure that a clogged filter does not cause the VIVID E9 / VIVID E7 to overheat and reduce system performance and reliability. It is recommended the filters be cleaned quarterly (once every three months) or more often in locations where high levels of dust are present.

The VIVID E9 / VIVID E7 has two air filters which need to be cleaned. The top air filter is located on the back of the VIVID E9 / VIVID E7 below the power cord and the bottom air filter is located underneath the VIVID E9 / VIVID E7.

Follow these steps to remove and clean the rear filter and the "handle type" bottom filter.

**Table 8-10 Removing and cleaning filters, sheet 1 of 3**



	Steps	Corresponding Graphic
1.	<p>Power down the VIVID E9 / VIVID E7 before removing the filters to prevent any loose or knocked-off debris from entering the Fan Tray.</p> <p>Walk the VIVID E9 / VIVID E7 forward until the caster is in position to access the filter handle. The right side, rear caster must be in-line and away from the VIVID E9 / VIVID E7.</p>	
2.	<p>Lock the Brakes.</p>	

Table 8-10 Removing and cleaning filters, (cont'd) sheet 2 of 3

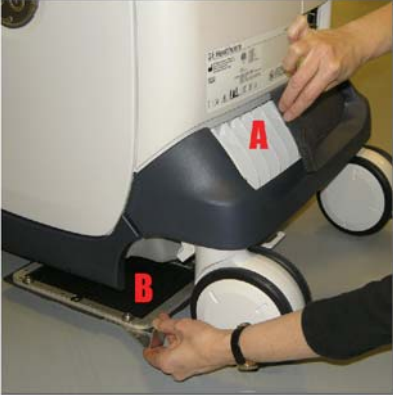



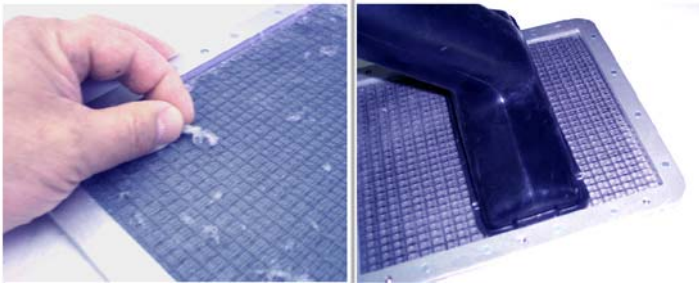
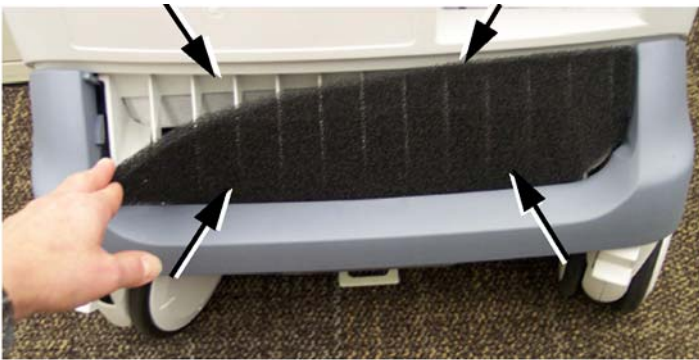

	Steps	Corresponding Graphic
3.	Filter Locations	
	<p><b>A. Rear Filter</b> - Remove the Cover and then remove the filter.</p>	
	<p><b>B. Bottom Filter</b> - Remove the Filter Assembly by lowering the handle.</p> <p><i>NOTE: The handle for the bottom filter is located in the same location for both Filter Assemblies.</i></p>	
4.	<p>Clean the Rear Filter after it is removed by removing excess lint or dust from the soiled side; or vacuum if necessary.</p>	



Table 8-10 Removing and cleaning filters, (cont'd) sheet 3 of 3

	Steps	Corresponding Graphic
5.	<p>Clean the Bottom Filter after it is removed by removing excess lint or dust from the soiled side. If necessary, use a clean, soft brush; or vacuum.</p>	
6.	<p>Reinstall the rear filter and tuck the edges of the filter under the Rear Bumper and Rear Cover. Reinstall Filter Cover.</p>	
7.	<p>Reinstall Bottom Filter by positioning the filter under the VIVID E9 / VIVID E7 and placing the handle into the stowed position. The filter will be drawn to the filter mounting magnets.</p>	

## 8-8-3 Rear Air Filter replacement

### 8-8-3-1 Preparations

When preparing for the replacement, you must perform the following steps:

 	<p><b>CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</b></p> <ol style="list-style-type: none"><li>1. TURN OFF THE BREAKER.</li><li>2. UNPLUG THE SYSTEM.</li><li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li><li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION.</li></ol> <p><b>Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.</b></p>
---	---

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Filter Cover.

### 8-8-3-2 Filter removal procedure

Grab the Filter and remove it.

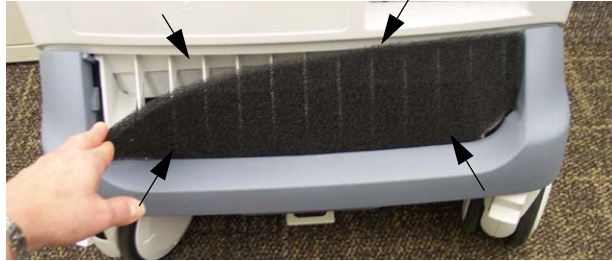


**8-8-3-3 Filter installation procedure**

Follow these steps to install the Filter:

- 1.) Install the Filter.
- 2.) Tuck the edges of the filter under the Rear Bumper and Rear Cover.

**Figure 8-159 Tuck Filter behind Rear Bumper and Rear edges**

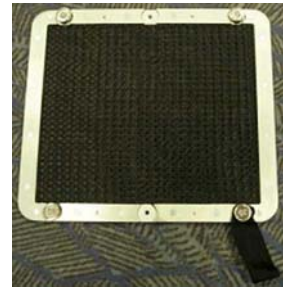


- 3.) Install the Filter Cover.

## 8-8-4 Bottom “nylon strip” Air Filter replacement

### 8-8-4-1 Overview

Figure 8-160 Bottom “nylon strip” Air Filter



The bottom air filter is held in place with magnets. A tab made of Nylon (Nylon Strip) extends from the air filter. The tab can be accessed on the right side of the VIVID E9 / VIVID E7.

### 8-8-4-2 Preparations

**CAUTION** Lock the VIVID E9 / VIVID E7's wheels prior to removing/cleaning the air filter. This prevents the VIVID E9 / VIVID E7 from moving unexpectedly.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Kneeling down on the right side of the VIVID E9 / VIVID E7 enables you to access the air filter tab.
- 5.) Locate the tab extending from the air filter on the bottom of the VIVID E9 / VIVID E7.


**8-8-4-3 Filter removal procedure**

- 1.) Thread a long screwdriver through the extending cloth loop (tab).
- 2.) Pull down the screwdriver to release the filter from the unit.

**Figure 8-161 Release of the bottom air filter**



- 3.) Remove the filter.

 **CAUTION DO NOT operate the unit without the air filters in place.**

**8-8-4-4 Filter Cleaning**

You may either use a vacuum cleaner to vacuum the filter, or if needed, clean the filter by rinsing with water.

 **CAUTION Allow the air filter to dry thoroughly before re-installing it in the unit.**

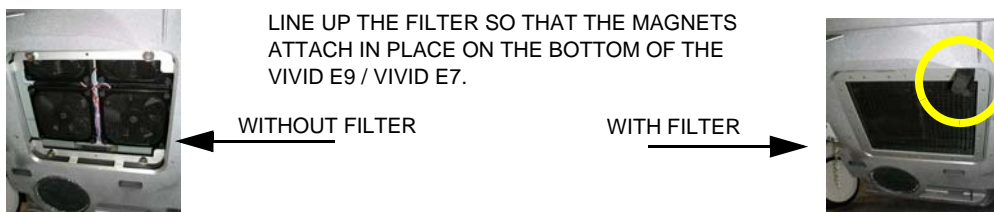
After cleaning the filter by rinsing with water, allow it to dry completely before re-installing.

When dry, install the filter as described next.

**8-8-4-5 Filter installation procedure**

- Install the filter at the bottom of the VIVID E9 / VIVID E7. Align it in position (see: the tab in [Figure 8-162](#)). The magnets will help to position it correct.

**Figure 8-162 VIVID E9 / VIVID E7 seen from below**



## 8-8-5 Fan Assembly replacement

### 8-8-5-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover

**8-8-5-2 Fan Assembly removal procedure**

Follow these steps to remove the Fan Assembly:

- 1.) Disconnect the PCIe express cable from the GFI board visible at the front of the Card Rack Cover.
- 2.) Unscrew the thumb screws of the Card Rack Cover.
- 3.) Remove the Card Rack Cover.
- 4.) Pull the Fan Assembly out of the frame.

**Figure 8-163 Fan Assembly removal**

**8-8-5-3 Fan Assembly installation procedure**

Follow these steps to install the Fan Assembly:

- 1.) Align the Fan Assembly with the rails in the frame and push it into position.
- 2.) Install the Card Rack Cover.
- 3.) Install the thumb screws of the Card Rack Cover.
- 4.) Connect the PCIe express cable to the GFI board connector.

## 8-8-6 Replacing Fan Screen and Fan Screen Frame

### 8-8-6-1 Remove the Fan Screen and Fan Screen Frame

- 1.) Remove the fan drawer as describen in the service manual.
- 2.) Remove the rubber bushings that holds the old fan screens.
- 3.) Remove the old fan screen and fan screen frame.

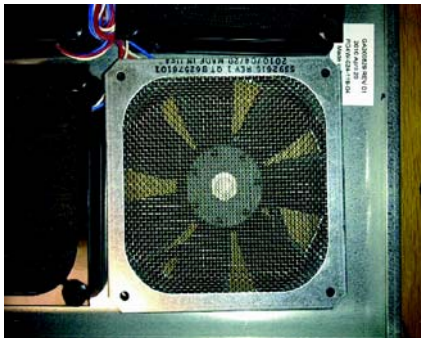
Figure 8-164 Remove Rubber Bushings



### 8-8-6-2 Install the new Fan Screen and Fan Screen Frame

- 1.) Place the new fan screen and fan screen frame ontop of the fan.

Figure 8-165 New Fan Screen and Fan Screen Frame ontop of the fan



- 2.) Place the rivet bushing into the frame screen hole.

Figure 8-166 New Fan Screen and Fan Scree Frame ontop of the fan



**8-8-6-2 Install the new Fan Screen and Fan Screen Frame (cont'd)**

- 3.) Hold the frame screen firmly down onto the fan.

Figure 8-167 Hold the frame screen firmly down onto the fan



- 4.) Press the rivet pin firmly down to secure the fan screen.
- 5.) Install the Fan Drawer back into the VIVID E9 / VIVID E7.

## 8-8-7 Main Cable replacement

Figure 8-168 Main Cable



 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-8-7-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.



### 8-8-7-1 Preparations (cont'd)

- 4.) Remove five OP Panel Knobs, see [Figure 8-127](#).

**Figure 8-169 Remove five knobs**



- 5.) Remove the Operator Panel, Upper.
- 6.) Remove the Operator Panel, Lower.
- 7.) Remove the Left Side Cover.
- 8.) Remove the Top Cover.
- 9.) Remove the Main Cable Cover.

### 8-8-7-2 Main Cable removal procedure

Three cable connectors must be disconnected in the Operator Panel area:

- 1.) The cable with the D-SUB connector was disconnected from the Controller Board when you removed the Operator Panel, Upper.
- 2.) Disconnect the HDMI cable from the Bulkhead.
- 3.) Disconnect the cable from the Z switch (Up/Down control).
- 4.) If not already done, unscrew the fixing screws on the Ground (GND) Clamp on the Bulkhead Bracket, so you can release the cables from the clamp.

Two cables are connected to the XY (Frog) brakes. They are routed to connectors inside the rear XY (Frog) legs. To disconnect these cables, follow this procedure:

- 1.) Remove the covers on the rear XY (Frog) legs.
- 2.) Disconnect the cables.

Two (2x) cables (from the Main Cable) are connected to the XYZ Control box.

- Disconnect the two cables.

The remaining two cables originate on the I/O at the BEP.

- 1.) Disconnect the DVI cable from J22.
- 2.) Disconnect the D-SUB from J21.

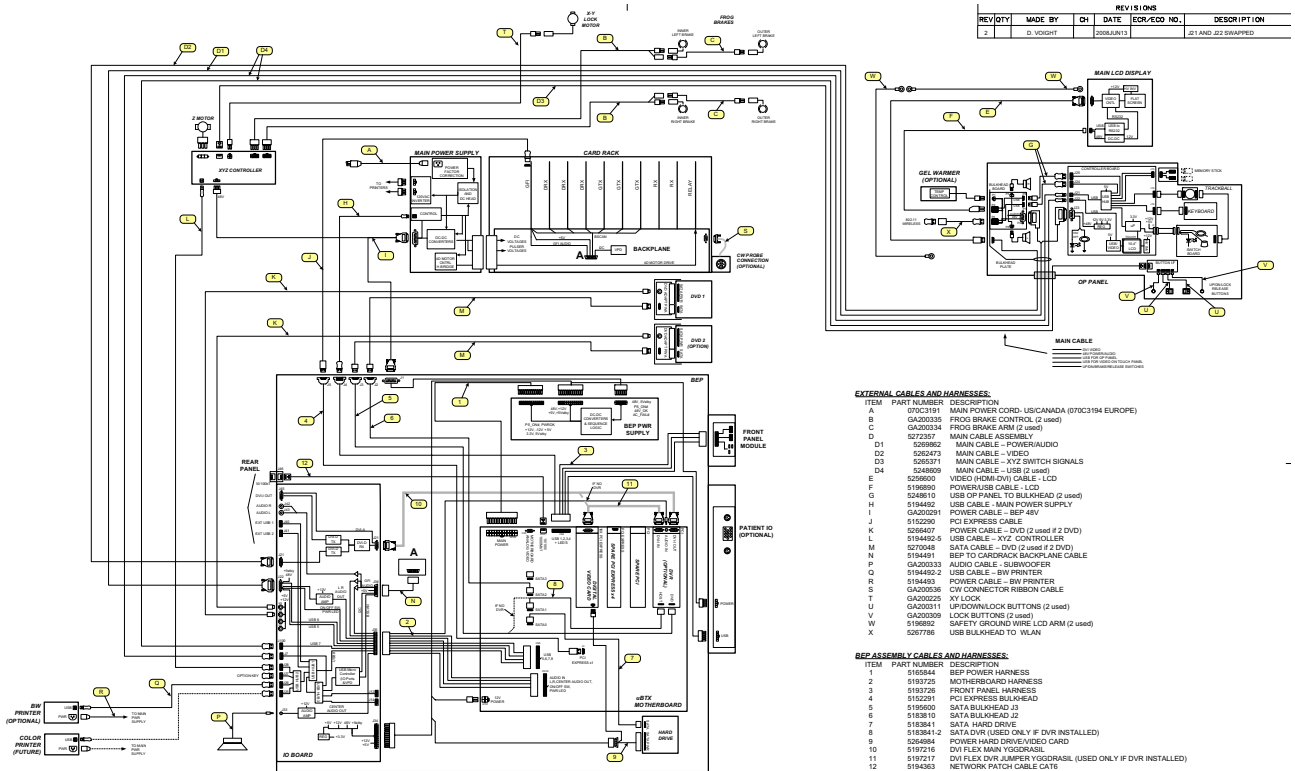
**8-8-7-2 Main Cable removal procedure (cont'd)**

The Cable Chain is attached with two screws in the UI end and one screw in the other end.

- 1.) Remove two screws from the Cable Chain's anchor point at the lower UI.
- 2.) Remove one screw on the other end of the Cable Chain.
- 3.) Remove the Main Cable, including the Cable Chain away from the VIVID E9 / VIVID E7.

**8-8-7-3 Main Cable installation procedure**

**Figure 8-170 VIVID E9 / VIVID E7 Cable Diagram**



- 1.) Route the Main Cable, including the Cable Chain into its position.
- 2.) Install the two (2x) screws used to attach the Cable Chain to the UI.
- 3.) Install the screw at the other end of the Cable Chain.
- 4.) Connect the D-SUB to J21 on the BEP I/O.
- 5.) Connect the DVI to J22 on the BEP I/O.
- 6.) Connect two (2x) cables to the XYZ Control box.
- 7.) Route and connect the two XY cables.
- 8.) Connect the HDMI connector to the Bulkhead.
- 9.) Install the Cable Clamps.
- 10.) Connect the cable to the Z-switch.
- 11.) Power up VIVID E9 / VIVID E7.
- 12.) Verify that the XYZ functions operate as they should.
- 13.) Power down VIVID E9 / VIVID E7.
- 14.) Install all covers.

## 8-8-8 Subwoofer replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-8-8-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

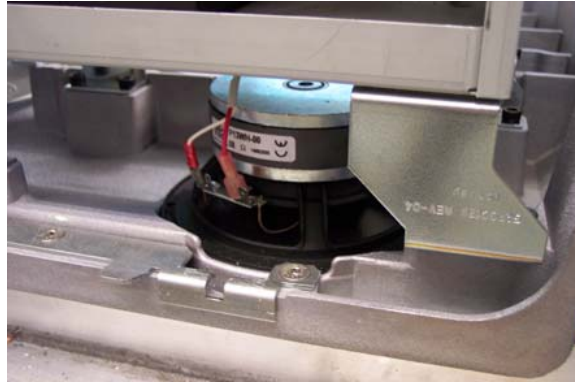
- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the BEP.

**8-8-8-2 Sub Woofer removal procedure**

Follow these steps to remove the Sub woofer:

- 1.) Remove the six (6x) hex key screws securing the Sub woofer to the chassis.

**Figure 8-171 Sub woofer**



- 2.) Remove the Sub woofer.

**8-8-8-3 Sub woofer installation procedure**

Follow these steps to install the Sub woofer:

- 1.) Place the Sub woofer in position at the base of the chassis.
- 2.) Install the six (6x) hex key screws securing the Sub woofer to the chassis.
- 3.) Replace the BEP.

**8-8-8-4 Verification**

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Power up the VIVID E9 / VIVID E7.
- 2.) Turn the volume control on at the OP Panel.
- 3.) Select PW mode and press on the selected probe to ensure the sub woofer produces sound.


## Section 8-9 Casters and Brakes replacement

 **WARNING** *AT LEAST TWO PERSONS ARE NEEDED WHEN REPLACING CASTERS (WHEELS) OR ADJUSTING BRAKES.*

### 8-9-1 Rear Casters replacement

8-9-1-1 **Manpower**  
Two people

8-9-1-2 **Preparations**  
When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Rear Bumper.
- 6.) Remove the Rear Cover.
- 7.) Ensure OP Panel is in lower position, use handle and push down manually.

**8-9-1-3 Rear Casters removal procedure**

- 1.) Turn Front Casters so they are pointing forwards.
- 2.) Activate Direction Lock.
- 3.) Put the Bevel Edged Board on the floor.



**WARNING PRIOR TO ELEVATING ULTRASOUND SYSTEM:**

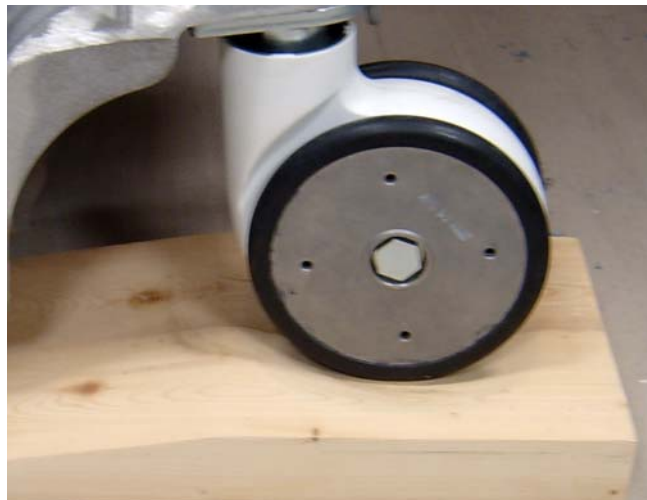
- verify that the floating Operating Panel is locked in its lowest, parking position.
- verify that the front brake is locked and the Ultrasound system is unable to swivel.
- verify that the rear brakes are in the locked position.



**WARNING USE EXTREME CAUTION AS LONG AS VIVID E9 / VIVID E7 IS UN-STABLE, NOT RESTING ON ALL FOUR CASTERS.**

- 4.) Pull the VIVID E9 / VIVID E7 backwards up the board incline. This will lift the Rear Wheel on the opposite side of the System from the floor.
- 5.) Turn the Rear Caster that stands on the Bevel Edged Board in the direction as shown in [Figure 8-172](#).

**Figure 8-172 Pull VIVID E9 / VIVID E7 backwards up the board incline**



- 6.) Activate the brakes.
- 7.) The VIVID E9 / VIVID E7 is now nearly balanced between one Front and one Rear Caster.
- 8.) Make the VIVID E9 / VIVID E7 rest on both Front Casters and lift the Rear Caster. Put the Wooden Wedge under the chassis. This will stabilize the VIVID E9 / VIVID E7 with one Rear Caster free from the floor. This Rear Caster can now be removed.
- 9.) Unscrew and remove the fixing bolt. Save the bolt for later use.
- 10.) Remove the Rear Caster.

**8-9-1-4 Rear Casters installation procedure**

- 1.) Position the Caster so it align with the hole for the fixing bolt.
- 2.) Install the fixing bolt (M12 X 40 mm). Use a 10 mm HEX key, Torque: 130 Nm.
- 3.) Remove the Wooden Wedge.
- 4.) Roll the VIVID E9 / VIVID E7 off the Bevel Edged Board.
- 5.) To replace the other Rear Caster, repeat all the steps, starting from [8-9-1-3 "Rear Casters removal procedure" on page 8-195](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the VIVID E9 / VIVID E7.
- 6.) Install the Rear Cover.
- 7.) Install the Rear Bumper.
- 8.) Install the Side Covers.



## 8-9-2 Front Casters replacement

### 8-9-2-1 Manpower

Two person

### 8-9-2-2 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Foot Rest Bumper.

**8-9-2-3 Front Casters removal procedure**

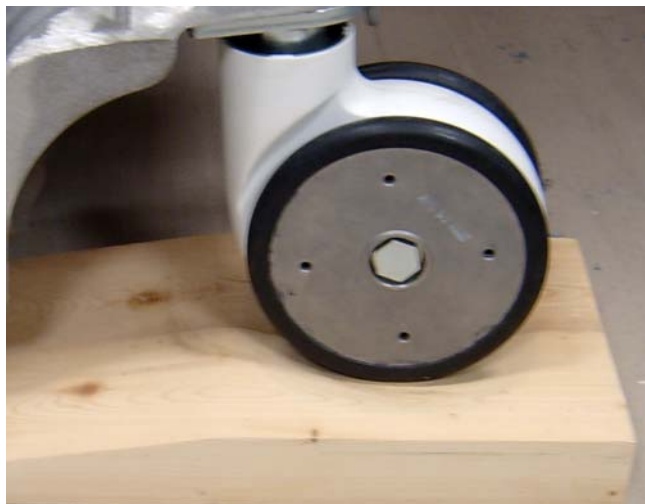
- 1.) Turn Front Casters so they are pointing forwards.
- 2.) Activate Direction Lock.
- 3.) Put the Bevel Edged Board on the floor.

**⚠ WARNING** *PRIOR TO ELEVATING SCANNER, VERIFY THAT THE FLOATING OPERATOR PANEL IS LOCKED IN ITS LOWEST, PARKING POSITION.*

**⚠ WARNING** *USE EXTREME CAUTION AS LONG AS VIVID E9 / VIVID E7 IS UN-STABLE, NOT RESTING ON ALL FOUR CASTERS.*

- 4.) Pull the VIVID E9 / VIVID E7 backwards up the board incline. This will lift the Rear Wheel on the opposite side of the System from the floor.
- 5.) Turn the Rear Caster that stands on the Bevel Edged Board in the direction as shown in [Figure 8-172](#).

**Figure 8-173 Pull VIVID E9 / VIVID E7 backwards up the board incline**



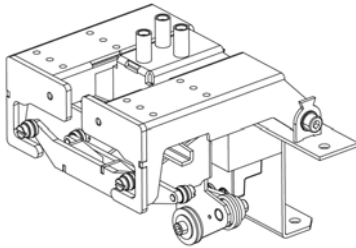
- 6.) The VIVID E9 / VIVID E7 is now nearly balanced between one Front and one Rear Caster.
- 7.) Make the VIVID E9 / VIVID E7 rest on both Rear Casters and lift the Front Caster.
- 8.) Put the Wooden Wedge under the chassis. This will stabilize the VIVID E9 / VIVID E7 with one Front Caster free from the floor.
- 9.) Unscrew and remove the fixing screws for the Front Caster that is free from the floor. Save the screw for later use.
- 10.) Remove the Caster.

**8-9-2-4 Front Casters installation procedure**

- 1.) Position the Caster so it align with the fastening screw.
- 2.) Install the three fixing screws (M8 x 20 mm), Torque: 20.5 Nm.
- 3.) Remove the Wooden Wedge.
- 4.) Roll the VIVID E9 / VIVID E7 off the Bevel Edged Board.
- 5.) To replace the other Front Caster, repeat all the steps from [8-9-2-3 "Front Casters removal procedure" on page 8-198](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the VIVID E9 / VIVID E7.
- 6.) Install the Foot Rest Bumper.
- 7.) Install the two side covers.

## 8-9-3 Pedal Mechanism replacement

Figure 8-174 Pedal Mechanism Assembly



### 8-9-3-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

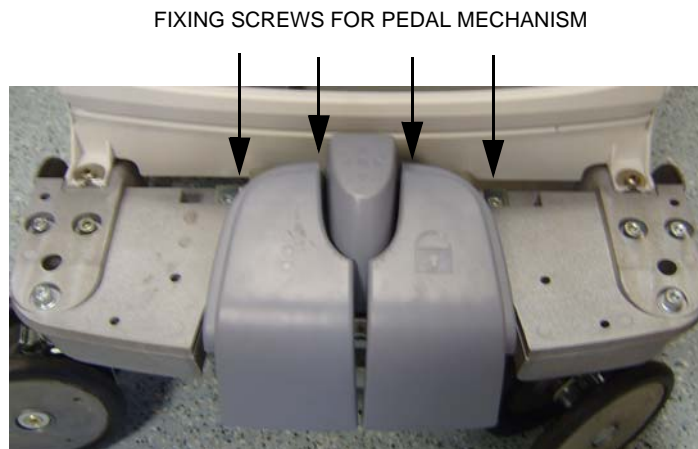
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Foot Rest Bumper.
- 6.) Remove the Top Cover.
- 7.) Remove the Front Cover.

### 8-9-3-2 Pedal Mechanism removal procedure

- 1.) Disconnect the rods from the Pedal Mechanism. This is done by pulling the ball joints apart.
- 2.) Four screws are used to fix the Pedal Mechanism to the chassis. Unscrew and remove the screws.

**Figure 8-175 Fixing screws**



- 3.) Lift away the Pedal Mechanism.

### 8-9-3-3 Pedal Mechanism installation procedure

- 1.) Position the Pedal Mechanism and install the four fixing screws (Torque: 20.5 Nm).
- 2.) Connect the rods by snapping on the ball joints.
- 3.) Verify that the pedals work as intended:
  - a.) Push down brake pedal (from “free” position), release it and verify the pedal to return quickly up to half position.
  - b.) Try to move the VIVID E9 / VIVID E7 back and forward; and verify that the brake pedal stay in brake mode.
  - c.) Push down direction lock pedal and verify the pedal to return quickly.
  - d.) Move VIVID E9 / VIVID E7 and verify Casters stay in direction lock mode.
  - e.) At push down, observe the “Latches” to come over pivot T-Shape, and interfere by engaging.
- 4.) Install the Front Cover.
- 5.) Install the side covers.
- 6.) Install the Foot Rest Bumper.

## 8-9-4 Brake Pedal replacement



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Foot Rest Bumper.
- 6.) Remove the Top Cover.
- 7.) Remove the Front Cover.
- 8.) Remove the Pedal Mechanism.

### 8-9-4-1 Brake Pedal removal procedure

The pedal is fixed to the Pedal Mechanism with four (4x) hex key screws from below.

- 1.) Unscrew and remove the four screws.
- 2.) Remove the Brake Pedal.

**8-9-4-2 Brake Pedal installation procedure**

- 1.) Position the Brake Pedal so you can install the fixing screws.
- 2.) Install the four fixing screws.

**8-9-5 Pedal Release replacement**

This pedal, placed in the middle, is fixed with three screws. With this in mind, please refer to [8-9-4 "Brake Pedal replacement" on page 8-202](#) for replacement instructions.

**8-9-6 Pedal Dir Lock replacement**


This pedal is fixed to the Pedal Mechanism in the same manner as the Brake Pedal. With this in mind, please refer to [8-9-4 "Brake Pedal replacement" on page 8-202](#) for replacement instructions.

## Section 8-10 Front End Processor (FEP) / Card Cage parts replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.*



**8-10-1 Front End parts overview**

The table below list the positions of the cards. Position #1 is nearest the probe connectors (front of unit).

**Table 8-11 FEP Cards per VIVID E9 / VIVID E7**

CARD POSITION	ABBREVIATION	CARD NAME	TOTAL NUMBER OF CARDS PER SYSTEM
			XDclear
			SW v113.x
1	RLY	RELAY BOARD	1x
2	GRX64	ANALOG RECEIVER BOARD	1x
3	GRX128	ANALOG RECEIVER BOARD	1x
4	GTX-TLP192	TRANSMITTER BOARD	1x
5	NOT USED	EMPTY	NOT USED
6	NOT USED	EMPTY	NOT USED
7	NOT USED	EMPTY	NOT USED
9	DRX	EMPTY	NOT USED
9	DRX	DIGITAL RECEIVER BOARD	3x
10	DRX	DIGITAL RECEIVER BOARD	
11	DRX	DIGITAL RECEIVER BOARD	
12	GFI	GLOBAL RADIO FREQUENCY INTERFACE	1x
N/A	FRONT PLANE / XD BUS FOR GTX-TLP192	THE FRONT PLANE BOARDS CONNECT TO THE BACK OF THE RELAY BOARD, THE GTX BOARD(S) AND THE GRX BOARDS	2x

## 8-10-2 Front End (FEP) Cover replacement

### 8-10-2-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*




1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

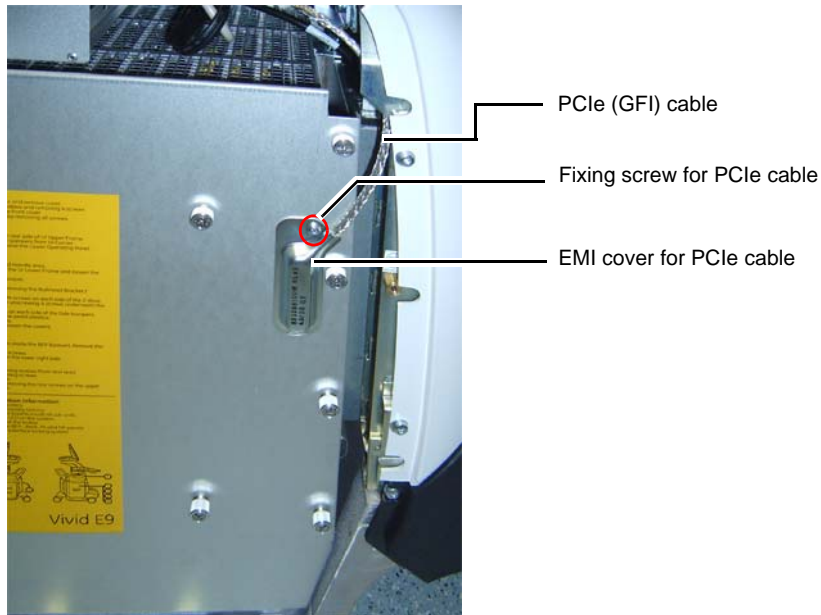
 **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.*

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.

**8-10-2-2 FEP Cover removal procedure**

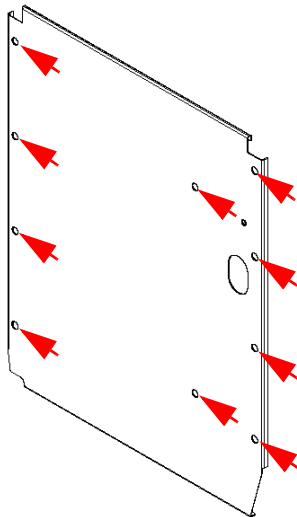
An EMI cover is used to ground the PCIe (GFI) cable to the FEP cover.

**Figure 8-176 EMI cover for PCIe cable**



- 1.) Unscrew the fixing screw for the cover for the PCIe (GFI) cable.
- 2.) Remove the cover for the PCIe cable.
- 3.) Unplug the PCIe Cable.
- 4.) Unscrew the FEP Cover's ten fixing screws.

**Figure 8-177 FEP Cover's fixing screws**



- 5.) Remove the FEP Cover.

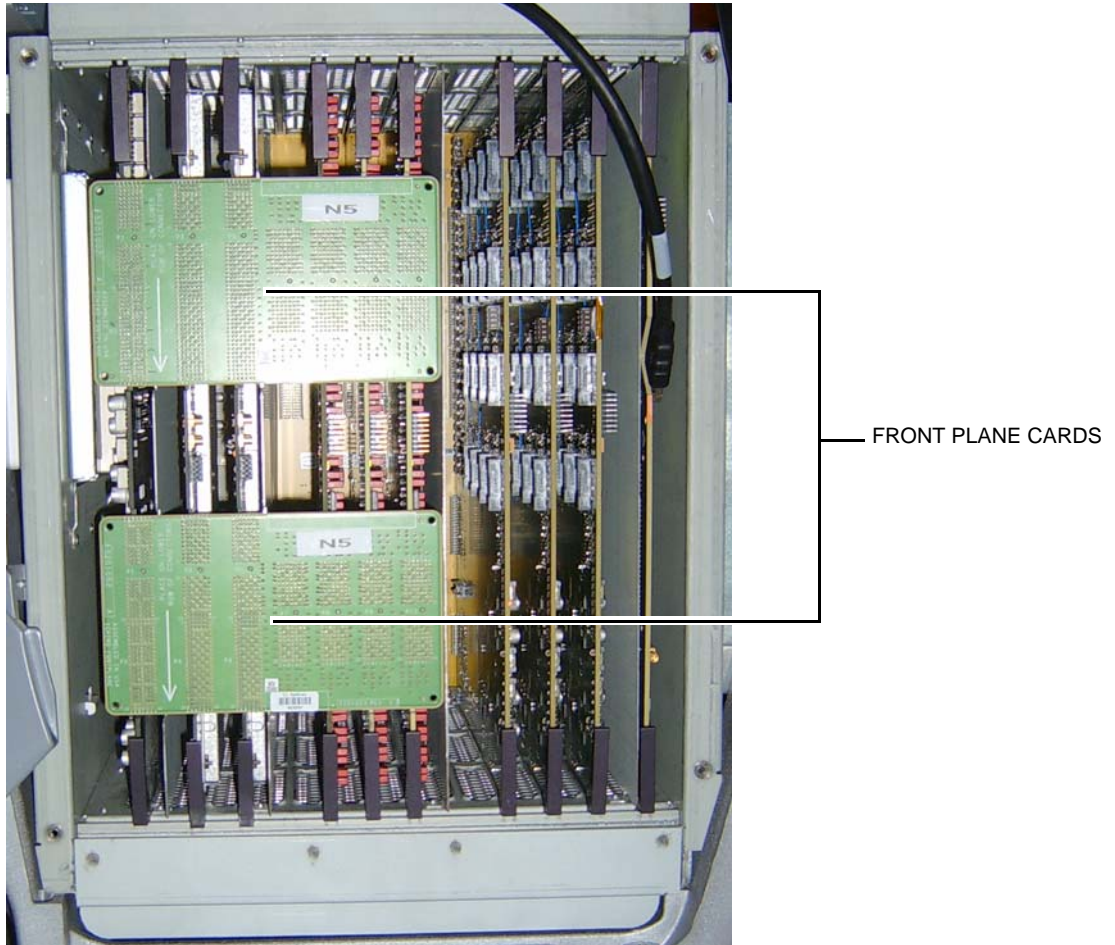
**8-10-2-3 FEP Cover installation procedure**

*NOTE: Do not use any tools when you tighten the finger screws.*

- 1.) Install the FEP Cover and fasten it with the ten fixing screws.  
Use your fingers to tighten the screws.
- 2.) Plug in the PCIe cable in the GFI board. The connector on the GFI card is available through the opening in the FEP Cover.
- 3.) Install the EMI cover for the PCIe cable.
- 4.) Fasten the EMI cover for the PCIe cable with the M4 fixing screw.
- 5.) Install the side cover.

8-10-3 Front Plane / XD BUS replacement

Figure 8-178 Front Plane cards



### 8-10-3-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**




1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.


 **WARNING RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.**


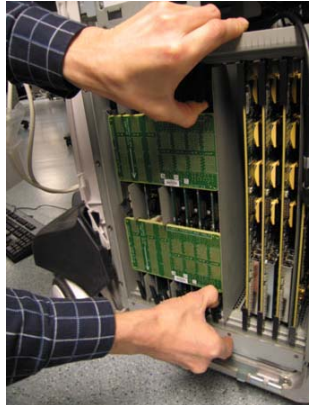

 **WARNING PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.**


- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Remove the cover for the PCIe (GFI) cable.
- 6.) Unplug the PCIe Cable.
- 7.) Unscrew the FEP Cover's ten fixing screws.
- 8.) Remove the FEP Cover.

**8-10-3-2 Front Plane Boards removal procedure**

Follow these steps to remove the Front Plane Boards:

 **NOTICE** Read through the removal and installation steps completely before performing. Perform the steps carefully to avoid damage to the Front Plane Board connectors.

These steps help unseat the Front Plane Boards from the other boards:		
1.	Start by pulling out the Relay Board slightly.	
2.	Secondly pull the RX Board slightly out.	
3.	Repeat once more for the Relay Board.	

4.	Repeat the same also for the RX Board.	
5.	Holding the upper and lower edges of the upper Front Plane Board with both hands, rock the upper Front Plane Board evenly away from the GRLY and RX boards. Be careful not to bend the connector pins.	
6.	Repeat the previous step for the Lower Front Plane Board.	

**NOTE:** *Even if only one Front Plane Board is replaced, remove both so that the Relay Board and GTX Board(s) are returned to proper position before installing the Front Plane Board.*



**8-10-3-3 Front Plane Cards installation procedure**

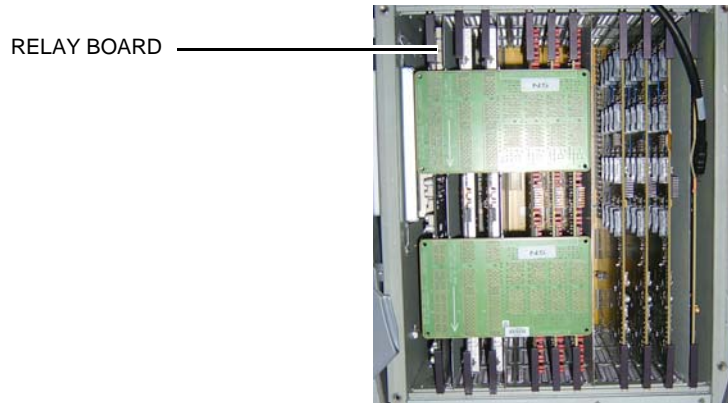
Follow these steps to install the Front Plane Cards:

*NOTE: The silk print on the two cards say "Lower Frontplane only" This statement is from an earlier design, and is not valid anymore.*

- 1.) Install the GRLY, CRX and GTX boards.
- 2.) Holding the upper and lower edges of the board with both hands, carefully install the lower Front Plane Board. Ensure that you do not bend any of the connector pins during the installation.  
Be sure to apply even pressure across the board and to apply gentle, even pressure at the 4 corners of the Front Plane Board to make full contact with the other boards.
- 3.) Repeat step 2 for the other Front Plane Card.
- 4.) Install the FEP Cover and fasten it with its fixing screws.
- 5.) Plug in the PCIe (GFI) Cable.
- 6.) Install the cover for the PCIe cable to the front of the GFI board.
- 7.) Install the Right Side Cover.

## 8-10-4 Relay Board (RLY) replacement

Figure 8-179 Relay Board location



**8-10-4-1 Preparations**

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.



**WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



**WARNING RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.**



**WARNING PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.**

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the cover for the PCIe (GFI) cable.
- 5.) Unplug the PCIe Cable.
- 6.) Unscrew the FEP Cover's ten fixing screws.
- 7.) Remove the FEP Cover.
- 8.) Carefully remove the two Front Plane Boards.

**8-10-4-2 Relay Board removal procedure**

Follow these steps to remove the Relay Board:

- 1.) Pull out the Relay Board.
- 2.) Place it on an ESD safe place.

**8-10-4-3 Relay Board installation procedure**

Follow these steps to install the Relay Board:

- 1.) Carefully align the Relay Board with the rails and push it. Push the card to the left, so it enters correct in the mechanical slide, before you push it in position so it is seated in the Back Plane connectors.
- 2.) Carefully install the two Front Plane Boards.
- 3.) Install the FEP Cover and fasten it with its fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install the Right Side Cover.

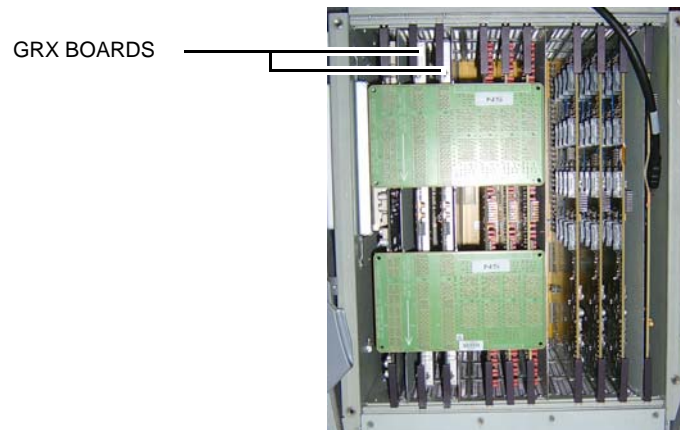
**8-10-4-4** part have **Calibration and adjustments**

Calibrate the Front End A/D converters as described in:

- [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

## 8-10-5 Receiver Board (GRX) replacement

Figure 8-180 GRX Boards location



### 8-10-5-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**




1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.**

 **WARNING PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.**

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Remove the cover for the PCIe (GFI) cable.
- 6.) Unplug the PCIe Cable.
- 7.) Unscrew the FEP Cover's ten fixing screws.
- 8.) Remove the FEP Cover.
- 9.) Carefully remove the two Front Plane Boards.

**8-10-5-2 GRX Board removal procedure**

Follow these steps to remove the GRX Board:

- 1.) Pull out the GRX Board.
- 2.) Place it on an ESD safe place.

**8-10-5-3 GRX Board installation procedure**

*NOTE: The 128 channel board (GRX128) is positioned in the right hand position (nearest the GFI), the 64 channel board (GRX64) is positioned in the left hand position.*

Follow these steps to install the GRX Board:

- 1.) Carefully align the GRX Board with the rails and push it in till it is seated in the Back Plane connectors.
- 2.) Carefully install the two Front Plane Boards.
- 3.) Install the FEP Cover and fasten it with its fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install the Right Side Cover.

**8-10-5-4 Calibration and adjustments**

Calibrate the Front End as described in: [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

## 8-10-6 Transmitter Board (GTX) replacement

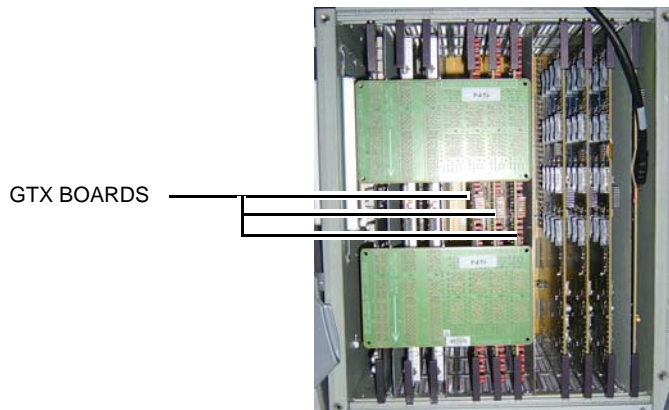
### 8-10-6-1 Overview

Two different GTX board models have been used:

- GTX - TLP 3.0  
This board has 64 TX channels.
- GTX-TLP192  
This board has 192 TX channels.

*NOTE:* When a GTX-TLP192 is used , it is occupying the rightmost TX-slot.

**Figure 8-181 GTX Boards location**





**8-10-6-2 Preparations**

When preparing for the replacement, you must perform the following steps:

**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**

**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

**WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**

1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

**WARNING RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.****WARNING PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDs ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.**

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Remove the cover for the PCIe (GFI) cable.
- 6.) Unplug the PCIe Cable.
- 7.) Unscrew the FEP Cover's ten fixing screws.

**8-10-6-2 Preparations (cont'd)**

- 8.) Remove the FEP Cover.
- 9.) Carefully remove the two Front Plane Boards.

**8-10-6-3 GTX Board removal procedure**

Follow these steps to remove the GTX Board:

- 1.) Pull out the GTX Board.
- 2.) Place it on an ESD safe place.

**8-10-6-4 GTX Board installation procedure**

Follow these steps to install the GTX Board:

*NOTE: If a GTX-TLP192 is used, it must be positioned in the right-most TX slot.*

- 1.) Carefully align the GTX Board with the rails and push it in till it is seated in the Back Plane connectors.
- 2.) Carefully install the two Front Plane Boards.
- 3.) Install the FEP Cover and fasten it with its fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install the Right Side Cover.

## 8-10-7 Digital Receiver Board (DRX) replacement

### 8-10-7-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*




1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.*

 **WARNING** *PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.*

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Remove the cover for the PCIe (GFI) cable.
- 6.) Unplug the PCIe Cable.
- 7.) Unscrew the FEP Cover's ten fixing screws.
- 8.) Remove the FEP Cover.

**8-10-7-2 DRX Board removal procedure**

Follow these steps to remove the DRX Board:

- 1.) Remove the DRX Shield.
- 2.) Pull out the DRX Board.
- 3.) Place it on an ESD safe place.

**8-10-7-3 DRX Board installation procedure**

Follow these steps to install the DRX Board:

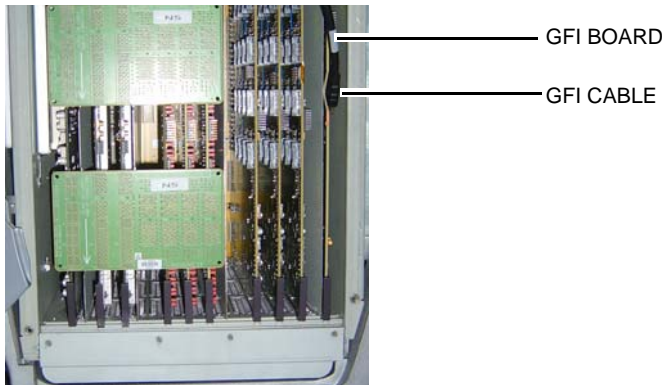
- 1.) Carefully align the DRX Board with the rails and push it in till it is seated in the Back Plane connectors.
- 2.) Install the DRX Shield.
- 3.) Install the FEP Cover and fasten it with its fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install the Right Side Cover.

**8-10-7-4 Calibration and adjustments**

Calibrate the Front End as described in: [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11](#).

## 8-10-8 GFI Board replacement

Figure 8-182 GFI Board location



### 8-10-8-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.


BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-10-8-1 Preparations (cont'd)

 **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.*

 **WARNING** *PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.*

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Right Side Cover.
- 5.) Unscrew the fixing screw for the cover for the PCIe (GFI) cable.
- 6.) Remove the cover for the PCIe cable.
- 7.) Unplug the PCIe Cable.
- 8.) Remove the FEP Cover.

### 8-10-8-2 GFI Board removal procedure

Follow these steps to remove the GFI Board:

- 1.) Pull out the GFI Board.
- 2.) Place it on an ESD safe place.

### 8-10-8-3 GFI Board installation procedure

Follow these steps to install the GFI Board:

- 1.) Carefully align the GFI Board with the rails and push it in till it is seated in the Back Plane connectors.
- 2.) Install the FEP Cover.
- 3.) Install the FEP Cover's fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install the Right Side Cover.

### 8-10-8-4 Calibration and adjustments

Calibrate the Front End as described in: [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

3 hours

 **WARNING** ***ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.***  
***WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:***



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

 **WARNING** ***DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.***



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.



## Section 8-11 Back End Processor (BEP) parts replacement

### 8-11-1 Back End Processor (BEP) replacement

- If the old BEP is a BEP5 with 4D, and the new BEP is a BEP6, a new Graphics Adapter is needed.
- If present, the DVR Board must be moved over from the old to the new BEP.

#### 8-11-1-1 Warnings



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.



**WARNING WHEN YOU RETURN THE USED BEP TO YOUR LOCAL PARTS ORGANIZATION, MAKE SURE YOU REMOVE ALL PATIENT DATA FROM THE HARD DRIVE, GIVEN THAT THE HARD DRIVE IS STILL FUNCTIONAL.**

**IN SOME COUNTRIES, YOU MAY BE REQUIRED TO DELETE ALL SOFTWARE FROM THE DISK BEFORE RETURNING THE BEP TO THE PARTS WAREHOUSE. FOLLOW YOUR LOCAL POLICIES.**



**WARNING BEFORE YOU DISPOSE OF THE HARD DRIVE, MAKE SURE YOU REMOVE ALL PATIENT DATA FROM THE HARD DRIVE, GIVEN THAT THE HARD DRIVE IS STILL FUNCTIONAL.**

**IN SOME COUNTRIES, YOU MAY BE REQUIRED TO DELETE ALL SOFTWARE FROM THE DISK BEFORE RETURNING THE HARD DRIVE TO THE PARTS WAREHOUSE. FOLLOW YOUR LOCAL POLICIES.**

**8-11-1-2 Preparations**

**When preparing for the replacement, you must perform the following steps:**

- 1.) Record the VIVID E9 / VIVID E7's **TCPIP settings** and installed **Option strings**.
- 2.) Export the **Patient Archive images** to a server or to external media.
- 3.) Back up the **Report Archive, User-Defined Configuration (Customer Presets), and Service settings**.
- 4.) **-100.** If possible, wipe the HDD partitions as described here: Reload the system software from DVD. Select A: to overwrite all content on HDD.
- 5.) Power down the VIVID E9 / VIVID E7.
- 6.) Disconnect the **Mains Power Cable** from the wall outlet.
- 7.) Disconnect all probes and external I/O cabling.
- 8.) Disconnect **all probes**.
- 9.) Remove the **Side Covers**.
- 10.) Remove the **Top Cover**.
- 11.) Remove the **B/W Printer**.
  - Disconnect the **Power Cable** from the **rear of the printer**.
  - Disconnect the **signal cable** from the **I/O panel**.
  - Loosen the printer bracket wing nut.
  - Slide the printer (with signal cable) forward, out of the VIVID E9 / VIVID E7.
- 12.) For easier access in the next steps, remove the VIVID E9 / VIVID E7's **Front Cover**.

8-11-1-3 Back End Processor (BEP) removal procedure

**WARNING** DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

Follow these steps to remove the BEP:

- 1.) Disconnect all I/O cables.
- 2.) Disconnect the cables at the top of the BEP.
- 3.) Unlatch the two latches that clamp the printer bracket to the top of the BEP.

Figure 8-183 Printer Bracket (BEP6)

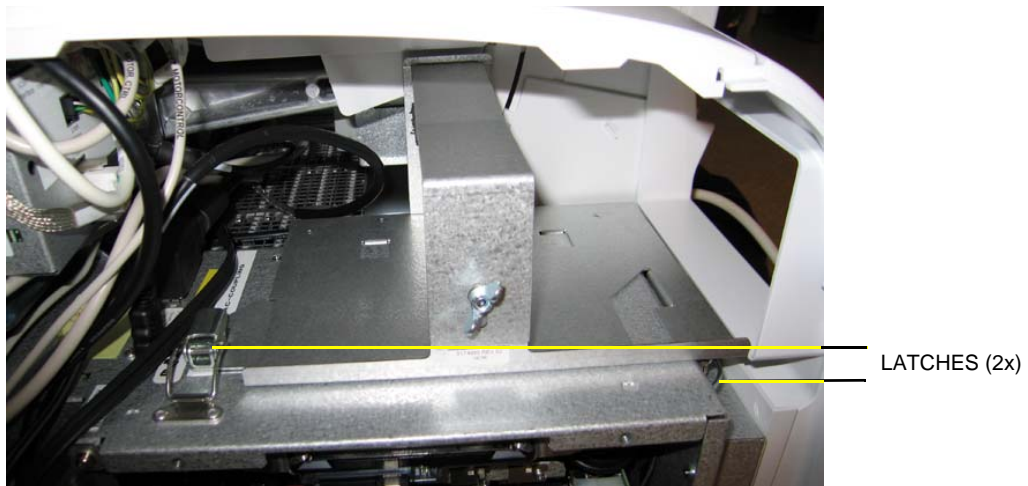
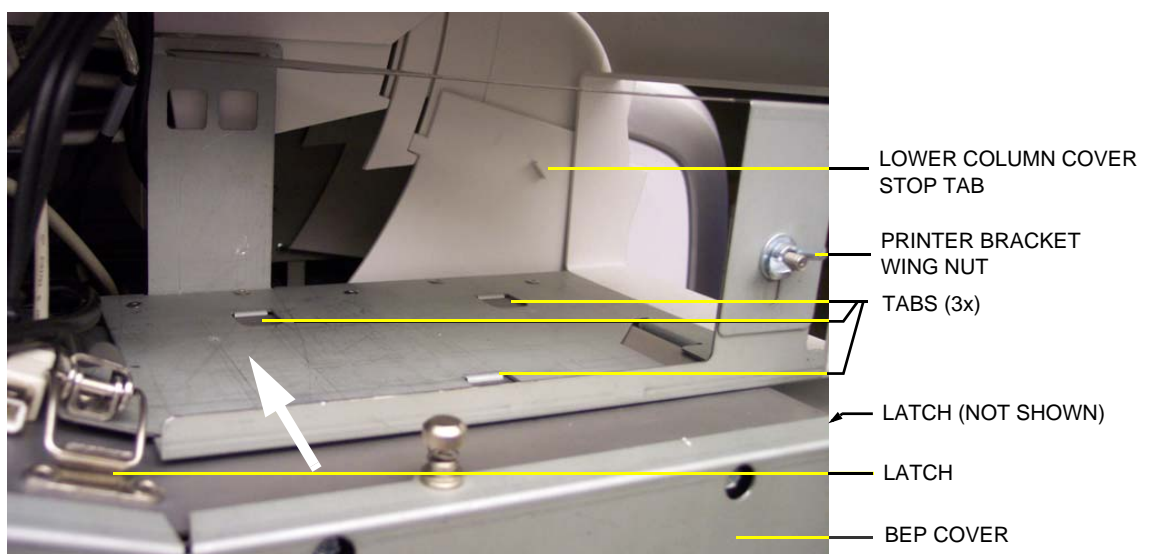


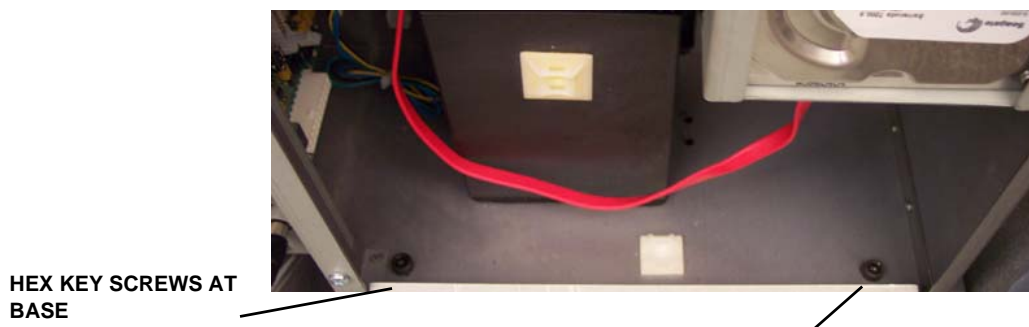
Figure 8-184 Printer Bracket (first version for BEP5)



**8-11-1-3 Back End Processor (BEP) removal procedure (cont'd)**

- 4.) Tilt the Front Cover forward just until the Column Cover Stop Tabs clear.
- 5.) Lift the Lower Column Cover.
- 6.) Push the printer bracket toward the FEP approximately 1.3 cm (1/2 inch) to free the 3 tabs from the BEP. Push in the direction of the white arrow in [Figure 8-184](#).
- 7.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 8.) Remove the Printer Bracket from the BEP.
- 9.) Remove the two hex key screws at the inside base of the BEP.

**Figure 8-185 BEP hex key screws**



- 10.) Reach inside the BEP and disconnect the **Boundary Scan Cable** from the the FEP Backplane Connector. It is available through a cut out in the BEP's Rear Cover.

**Figure 8-186 Boundary Scan cable connects BEP to Back Plane (BEP5 is illustrated)**



- 11.) Slide the entire BEP out of chassis.

8-11-1-4 Prepare the new BEP for installation



**WARNING** *BEFORE YOU DISPOSE OF THE HARD DRIVE, OR RETURN THE BEP TO THE LOCAL PARTS ORGANIZATION, MAKE SURE YOU REMOVE ALL PATIENT DATA FROM THE HARD DRIVE, GIVEN THAT THE HARD DRIVE IS STILL FUNCTIONAL.*

*IN SOME COUNTRIES, YOU MAY BE REQUIRED TO DELETE ALL SOFTWARE FROM THE DISK BEFORE RETURNING THE HARD DRIVE TO THE PARTS WAREHOUSE. FOLLOW YOUR LOCAL POLICIES.*

- 1.) If installed, remove the DVR Board from the existing BEP and install it in the replacement BEP. For instructions, see: [8-14-2 "Digital Video Recorder \(DVR\) replacement" on page 8-284.](#)
- 2.) If 4D is installed:
  - If the BEP you removed was a BEP6, and the new BEP is a BEP6, you can move over the Graphics Adapter.
  - If the BEP you removed was a BEP5, and the new BEP is a BEP5, you can move over the Graphics Adapter.
  - If the BEP you removed was a BEP5, and the new BEP is a BEP6, you must also order a new Graphics Adapter.

**8-11-1-5 Back End Processor (BEP) installation procedure**

Follow these steps to install the BEP:

- 1.) Slide the BEP into the left side of the chassis frame.
- 2.) Install the two (2x) hex key screws at the inside base of the BEP.
- 3.) Reach inside the BEP and connect the Boundary Scan Cable to the BEP's Backplane.

**NOTE:** *If you do not reconnect the internal BEP cable (Boundary Scan Cable) to the Backplane, the VIVID E9 / VIVID E7 will power up, but will not scan. The BEP will launch into simulator mode.*

- 4.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 5.) Replace the Printer Bracket at the top of the BEP.  
Be sure the lip, on the underside of the bracket, hooks on the edge of the Card Rack, and the 3 tabs insert into the slots on the top of the BEP frame. The lip "clamps" the Card Rack and BEP together. This is a tight fit.
  - 6.) Lower the Lower Column Cover.
  - 7.) Position the Front Cover to engage the Column Cover Stop Tabs.
  - 8.) Latch the two latches that clamp the Printer Bracket to the top of the BEP.
  - 9.) Slide the B&W printer into the Printer Bracket and connect the cables to the back of the printer.
  - 10.) Tighten the Printer Bracket Wing Nut to secure the printer.
  - 11.) Connect all I/O cables at top and/or face of the BEP, including the printer cables.
  - 12.) Install the Top Cover (if removed), the Front cover (if removed) and the side covers.
  - 13.) If applicable, install the correct software on the new BEP.
  - 14.) Enter the VIVID E9 / VIVID E7's TCPIP settings and Option strings.
  - 15.) Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.

**8-11-1-6 Calibration and adjustments**

Calibrate the Front End A/D converters as described in:

- [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

## 8-11-2 Back End Processor Power Supply replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-11-2-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



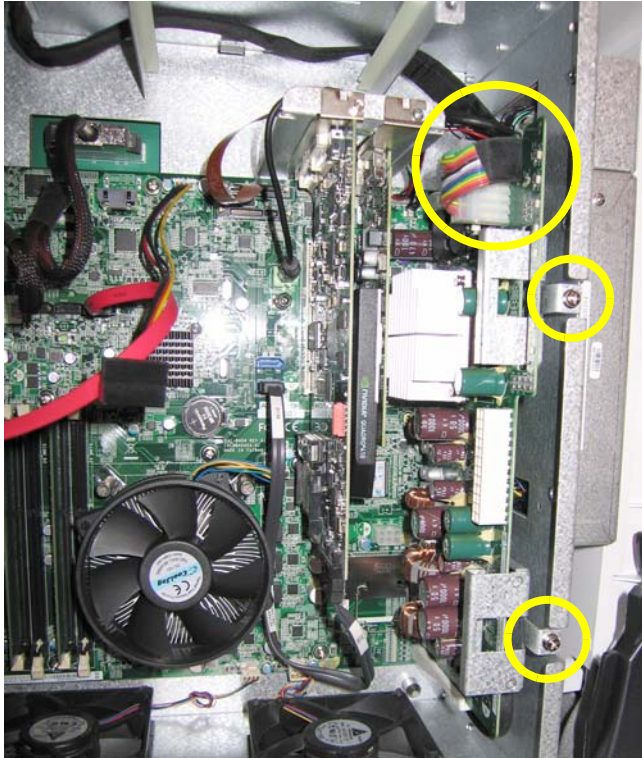
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.



8-11-2-2 Remove BEP6 Power Board Assembly

Figure 8-187 BEP6 Power Board Assembly removal



Follow these steps to remove the BEP6 Power Board Assembly:

- 1.) Unplug the cable (plug) at the top of the BEP6 Power Board Assembly.
- 2.) Remove the two screws that secure the BEP6 Power Board Assembly.
- 3.) Slide the BEP6 Power Board Assembly out of the BEP. You will need to apply some force - use the two brackets as handles. Refer the two small yellow rings in [Figure 8-187 - BEP6 Power Board Assembly removal](#) (above).
- 4.) To install the BEP6 Power Board Assembly, go to: [8-11-2-3 "Install the BEP6 Power Board Assembly" on page 8-238.](#)

**8-11-2-3 Install the BEP6 Power Board Assembly**

Follow these steps to install the BEP6 Power Board Assembly:

- 1.) Position the BEP6 Power Board Assembly so it enters the two guides and slide the BEP6 Power Board Assembly in so it is plugged into the BEP6's backplane. You may need to apply a pressure to make it slide into position.
- 2.) Install the two screws that secure the BEP6 Power Board Assembly to the BEP frame.
- 3.) Plug in the cable plug in the connector near the top of the BEP6 Power Board Assembly.
- 4.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

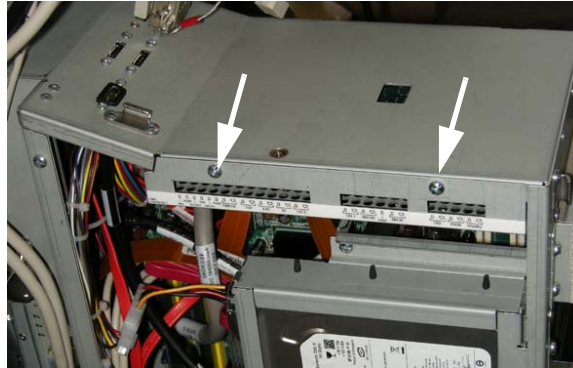
- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 5.) Replace the Left Side Cover.

**8-11-2-4 Remove BEP5 Power Supply**

Follow these steps to remove the BEP5 Power Supply:

- 1.) Remove the two screws on the Power Supply.

**Figure 8-188 BEP Power Supply Fixing Screws**



- 2.) Gently insert a flat screwdriver between the power supply and the BEP frame to create enough space to get hold on the power supply.

**Figure 8-189 BEP Power Supply removal**



- 3.) Pull the Power Supply toward you while gently rocking the board up and down, freeing the 2 pins connected at the back of the board.
- 4.) To install the BEP5 Power Supply, go to:  
[8-11-2-5 "Install BEP5 Power Supply" on page 8-240.](#)

**8-11-2-5 Install BEP5 Power Supply**

Follow these steps to install the BEP5 Power Supply:

- 1.) With the 2 pins pointing to the back of the BEP, guide the pins into the 2 holes in the top right of the BEP. Apply a pressure to make it slide into position.
- 2.) With the pins in place, replace the 2 screws that secure the front of the power supply to the BEP frame.
- 3.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 4.) Replace the Left Side Cover.

## 8-11-3 Hard Disk Drive (HDD) replacement

*NOTE: BEP HDD replacement requires a software installation.*

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-11-3-1 Preparations

 **WARNING** *BEFORE YOU DISPOSE OF THE HARD DRIVE, MAKE SURE YOU REMOVE ALL PATIENT DATA FROM THE HARD DRIVE, GIVEN THAT THE HARD DRIVE IS STILL FUNCTIONAL.*

*IN SOME COUNTRIES, YOU MAY BE REQUIRED TO DELETE ALL SOFTWARE FROM THE DISK BEFORE RETURNING THE HARD DRIVE TO THE PARTS WAREHOUSE. FOLLOW YOUR LOCAL POLICIES.*

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*

*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

**When preparing for the replacement, you must perform the following steps:**

- 1.) Record the VIVID E9 / VIVID E7's TCPIP settings and installed Option strings.
- 2.) Back up the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.  
You will perform a Restore after the install.

**8-11-3-1 Preparations (cont'd)**

- 3.) If possible, wipe the HDD partitions as described here: Reload the system software from DVD.  
Select A: to overwrite all content on HDD.
- 4.) Power down the VIVID E9 / VIVID E7.
- 5.) Disconnect the Mains Power Cable from the wall outlet.
- 6.) Disconnect all probes and external I/O cabling.
- 7.) Remove the Left Side Cover.
- 8.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

**8-11-3-2 BEP6 Hard Disk Drive (HDD) removal procedure**

Follow these steps to remove the HDD:

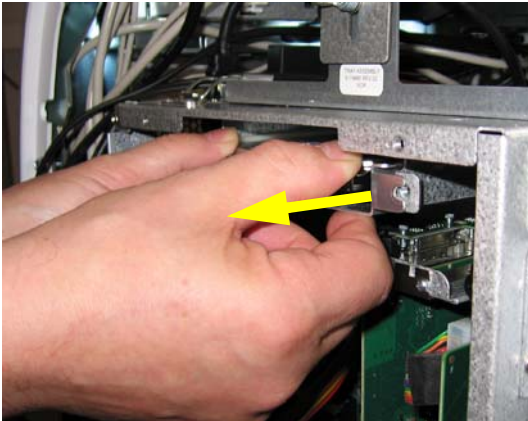
- 1.) Disconnect the cables connecting the HDD.
- 2.) Remove the two screws that secures the HDD Bracket to the BEP's frame.

**Figure 8-190 BEP6 HDD screws**



- 3.) Get hold of the HDD assembly, see figure below, and pull it out.

**Figure 8-191 Pull out the HDD assembly**



**8-11-3-3 BEP6 Hard Disk Drive (HDD) installation procedure**

- 1.) Position the HDD Assembly so it enters the two guides and slide the HDD in. You may need to apply a pressure to make it slide into position.
- 2.) Install the two screws that secures the HDD Bracket to the BEP's frame.
- 3.) Connect the two HDD cables to the HDD.
- 4.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.
- 5.) Replace the Left Side Cover.
- 6.) Connect the Mains Power Cable to the wall outlet.
- 7.) Power up the VIVID E9 / VIVID E7.
- 8.) Install the System software and the Application software.
- 9.) Enter the VIVID E9 / VIVID E7's TCPIP settings and Option strings.
- 10.) Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.
- 11.) Continue with [8-11-3-6 "Calibration and adjustments" on page 8-246](#).



**8-11-3-4 BEP5 Hard Disk Drive (HDD) removal procedure**

Follow these steps to remove the HDD:

- 1.) Remove the screw that secures the HDD bracket.

**Figure 8-192 BEP Hard Disk Drive screw**



SCREW SECURES  
HDD BRACKET

- 2.) Swing the HDD bracket out.
- 3.) Disconnect the cables connecting the HDD.
- 4.) Lift the bracket up, freeing the hinge tabs from the slots.

**Figure 8-193 BEP Hard Disk Drive**



HDD BRACKET  
HINGES

### 8-11-3-5 BEP5 Hard Disk Drive (HDD) installation procedure

Follow these steps to install the Hard Disk Drive:

- 1.) Slide the HDD bracket hinges into the BEP frame slots.
- 2.) Connect the cables to the HDD.
- 3.) Swing the HDD bracket into place.
- 4.) Install the screw that secures the HDD bracket.
- 5.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

- 6.) Replace the side cover.
- 7.) Connect the Mains Power Cable to the wall outlet.
- 8.) Power up the VIVID E9 / VIVID E7.
- 9.) Install the System software and the Application software.
- 10.) Enter the VIVID E9 / VIVID E7's TCPIP settings and Option strings.
- 11.) Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.

### 8-11-3-6 Calibration and adjustments

Calibrate the Front End A/D converters as described in:

- [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

## 8-11-4 Graphics Adapter replacement

### 8-11-4-1 Overview

*NOTE:* On BEP6 without 4D, the graphics circuits (Intel® HD Graphics and Intel® Graphics Media Accelerator) are included on the BEP's motherboard. A Video Bypass Board is plugged into the graphics port for signal routing purpose.

#### **BT'13 scanners:**

These Graphics Adapters may be used, depending on the VIVID E9 / VIVID E7 model and BEP model:

- BT'13 with BEP6 with 4D: Nvidia Quadro 410
- BT'13 with BEP6 without 4D: Video Bypass Board

8-11-4-2 Warnings

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

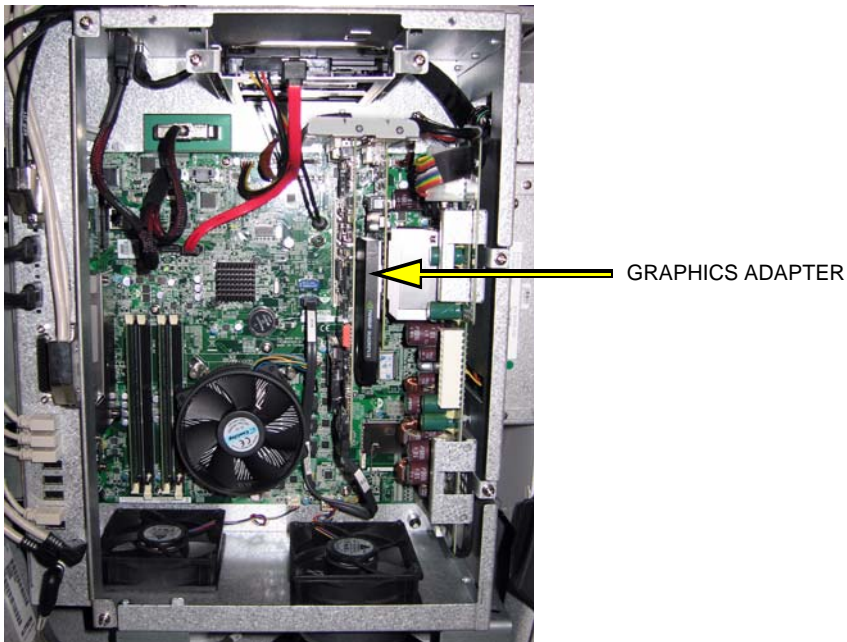
**8-11-4-3 Preparations - BEP5/BEP6**

When preparing for the removal, or replacement, of a Graphical Adapter, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 6.) Next;
  - for BEP6, continue with:  
[8-11-4-4 "Removing the Graphics Adapter from the BEP6" on page 8-250.](#)

8-11-4-4 Removing the Graphics Adapter from the BEP6

Figure 8-194 Graphics Adapter position in BEP6

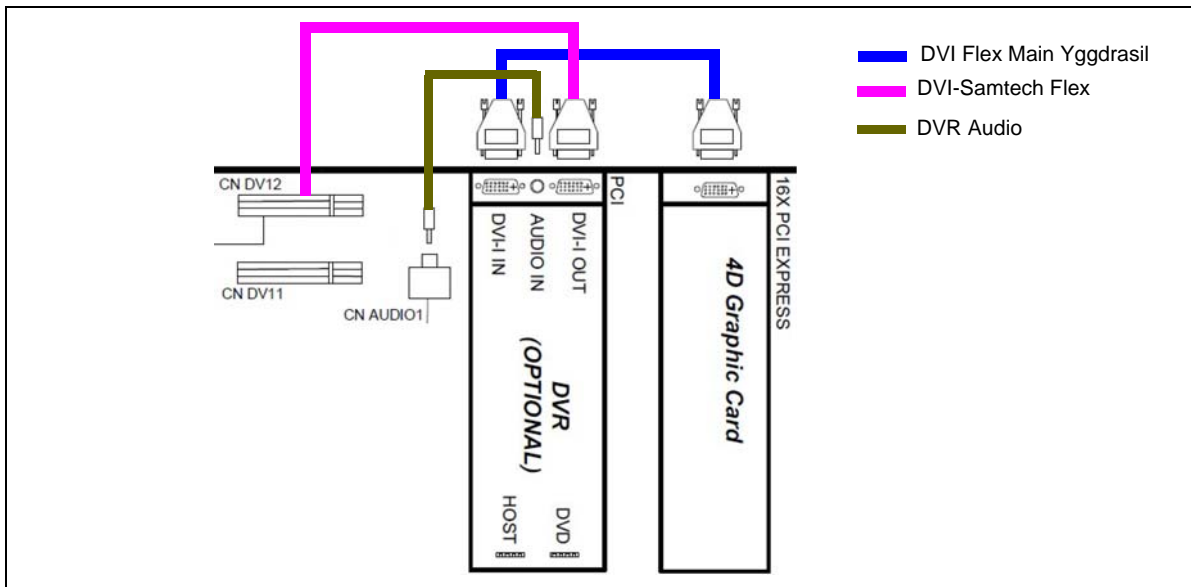


- 1.) Remove the HDD to get easier access in the rest of the procedure.
- 2.) Unscrew the fixing screws from the connector at top of the Graphics Adapter.
  - If DVR is installed: the flex between the Graphics Adapter and the DVR board uses finger screws.
  - Without DVR: the flex from the motherboard is fixed with Hex screws.
- 3.) Disconnect the plug.
- 4.) Remove the fixing screw for the Graphics Adapter.
- 5.) Pull out the Graphics Adapter.

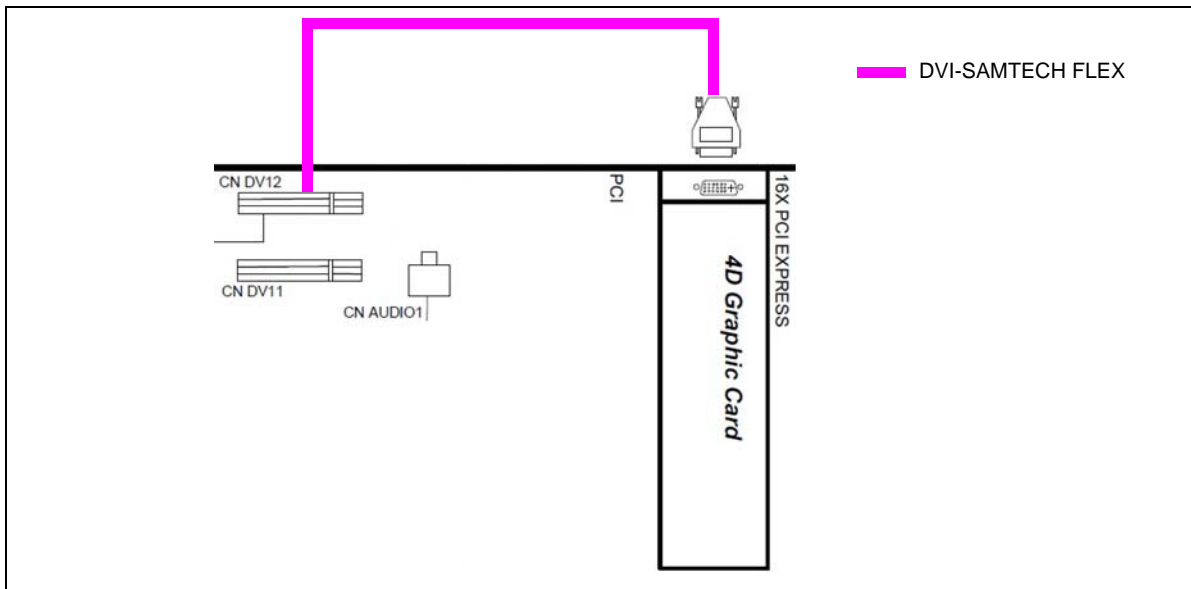
**8-11-4-5 Installing the Graphics Adapter in the BEP6**

Follow these steps to install the (new) Graphics Adapter:

- 1.) Plug in the (new) Graphics Adapter.
- 2.) Insert and fasten the fixing screw.
- 3.) Plug in the cables you removed earlier.
  - Connections if DVR is installed in the BEP6:



- Connection if the BEP6 is without DVR:



- 4.) Install the fixing screws you removed earlier.
- 5.) Install the HDD.

**8-11-4-5 Installing the Graphics Adapter in the BEP6 (cont'd)**

6.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

- 7.) Replace the Left Side Cover.
- 8.) Connect the Mains Power Cable to the wall outlet.
- 9.) Power up the VIVID E9 / VIVID E7.



**8-11-4-6 Removing the Video Bypass Board in the BEP6**

- 1.) Unscrew and remove the fixing screws from the connector at top of the Video Bypass Board.
- 2.) Pull out the Video Bypass Board.

**8-11-4-7 Installing the Video Bypass Board in the BEP6**

- 1.) Plug in the (new) Video Bypass Board.
- 2.) Insert and fasten the fixing screw.
- 3.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.
- 4.) Replace the Left Side Cover.
- 5.) Connect the Mains Power Cable to the wall outlet.
- 6.) Power up the VIVID E9 / VIVID E7.
- 7.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

## 8-11-5 BEP Front Module replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-11-5-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*  
*WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the BEP.

**8-11-5-2 Front Module removal procedure**

Follow these steps to remove the Front Module:

- 1.) Place the BEP on a table for better access (and ergonomics).
- 2.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 3.) Remove the Graphics Adapter to get better access.
- 4.) Disconnect the Front Module Cable from the motherboard.

**NOTE:** See [8-11-3 "Hard Disk Drive \(HDD\) replacement" on page 8-241 for more information.](#)

- 5.) Remove the two screws securing the Front Module to the BEP frame.

**Figure 8-195 Front Module screw placement**



- 6.) Remove the Front Module.

### 8-11-5-3 Front Module installation procedure

Follow these steps to install the Front Module:

- 1.) Install the Front Module into the BEP frame. Be sure the Front Module lip slides into the Module opening.

**Figure 8-196 Lip on the Front Module**



- 2.) Install the two screws securing the Front Module to the BEP frame.
- 3.) Connect the Front Module Cable to the connector on the motherboard.
- 4.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 5.) Replace the Side Cover.
  - 6.) Install the BEP.
  - 7.) Connect the Mains Power Cable to the wall outlet.
  - 8.) Power up the VIVID E9 / VIVID E7.

## 8-11-6 BEP6 Fan replacement

NOTE: This procedure describes how to replace the two fans installed to the bottom of the BEP6.

NOTE: The CPU fan is not replaceable.



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.



**WARNING DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.**



**ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).**

**FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.**



**WARNING RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF.**

**AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS.**

**ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.**

### 8-11-6-1 Manpower

One person, 75 minutes.

### 8-11-6-2 Tools

For tools needed, please refer to: [8-2-5 "Tools needed for servicing VIVID E9 / VIVID E7" on page 8-5.](#)

### 8-11-6-3 Preparations

When preparing for the replacement, you must perform the following steps:

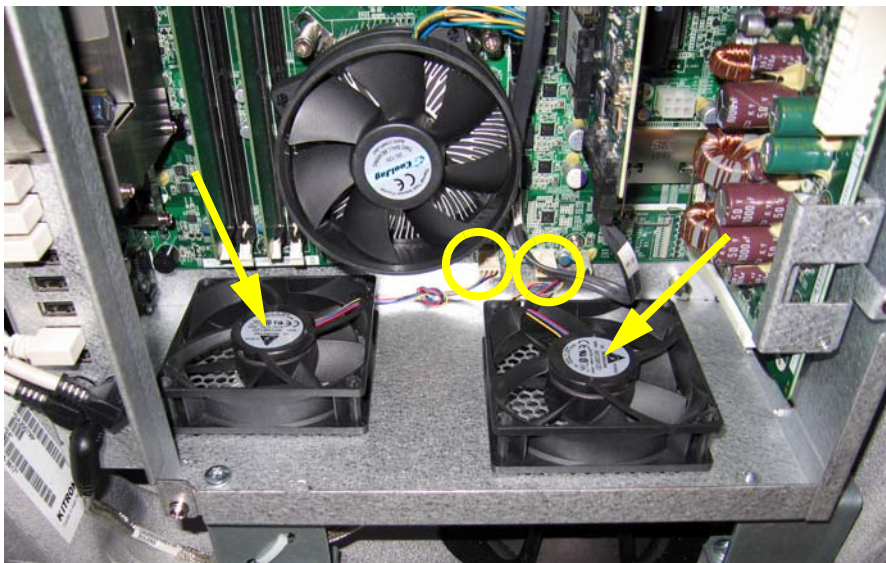
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 6.) Remove the BEP and place it on a table.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)
- [8-11-1 "Back End Processor \(BEP\) replacement" on page 8-229.](#)

### 8-11-6-4 Back End Processor Fan removal

Figure 8-197 BEP replaceable fans



Follow these steps to remove one of the Back End Processor fans:

- 1.) Locate the BEP Fan(s) inside the BEP (see arrows in [Figure 8-197.](#))
- 2.) Disconnect the fan's plug from the connector on the motherboard.
- 3.) Cut the head (end) of the four rubber mounts, and remove the fan from the BEP frame.

**8-11-6-5 Back End Processor Fan installation**

Follow these steps to install the replacement fan:

- 1.) Position the new fan in position so its mounting holes are aligned with the respective holes in the BEP frame. Ensure that it is turned so the wire will reach the plug on the motherboard and so it will blow the correct way, when running.  
(See: [Figure 8-197 "BEP replaceable fans" on page 8-258.](#))
- 2.) Insert the thin end of one of the new rubber mounts from the BEP frame's outside and through the fan's fastening hole.
- 3.) Pull the rubber mount so the thicker part of the rubber mount is pulled through the fan's fastening hole.
- 4.) Repeat the steps above for the three other rubber fasteners.
- 5.) When done, cut away the excessive thin rubber from the rubber fastener.
- 6.) Plug in the fan's plug to the connector on the motherboard.
- 7.) Install the BEP in the VIVID E9 / VIVID E7.
- 8.) You may want to power up the VIVID E9 / VIVID E7 for a short time, just to check that the new fan is running OK, and running (blowing) the correct way, before you continue. Turn the VIVID E9 / VIVID E7 off again, as soon as possible (within a few minutes), due to the risk of overheating when the covers are removed.
- 9.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 10.) Install the Left Side Cover.

## 8-11-7 BEP Power In Cable replacement

### 8-11-7-1 Introduction

The **J1 chassis connector** on the **BEP Power In Cable** is fixed to the top of the BEP6 frame. The other end is plugged into **PCN 2** on the **BEP6 Power Board**.

The **BEP Power In Cable** is included in the **BEP6.X Cable Kit - Spare Part**, Part Number 5433408-80.

### 8-11-7-2 Preparations

To get better access, you should remove the BEP from the VIVID E9 / VIVID E7 before you start to replace the cable.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect **all probes and external cables**.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **Top Cover**.
- 6.) Remove the **B/W Printer**.
- 7.) For easier access in the next steps, remove the **Front Cover**.
- 8.) Remove the **BEP** and place it on a table for easy access.
- 9.) Remove the **HDD** assembly.

### 8-11-7-3 BEP Power In Cable removal

Follow these steps to remove the **BEP Power In Cable**:

- 1.) Disconnect the cable from **PCN 2** on the **BEP6 Power Board**.
- 2.) The **J1** connector is fixed to the BEP6 frame with two screws (from below) and nuts (above). Remove the two nuts and screws.
- 3.) Remove the **HDD Bracket**. It is fixed to the frame with four Phillips screws from above.
- 4.) Remove the **BEP Power In Cable**.



**8-11-7-4 BEP Power In Cable installation**

Follow these steps to install the BEP Power In Cable:

- 1.) Connect the new **BEP Power In Cable** to **PCN 2** on the **BEP6 Power Board**.
- 2.) Install the **J1** connector in the frame with the two screws (from below) and the nuts (above).
- 3.) Install the **HDD Bracket**. Ensure that the **BEP Power In Cable** is routed above the HDD Bracket before you fix it to the frame with the four Phillips screws from above.
- 4.) Install the **HDD**.
- 5.) Install the **BEP** in the VIVID E9 / VIVID E7.
- 6.) Install all the cables to the BEP.
- 7.) Install the **BEP Cover**.
- 8.) Install the **B/W Printer**.
- 9.) Install the VIVID E9 / VIVID E7 **covers** you removed earlier.

## 8-11-8 SATA Jumper replacement

The **SATA Jumper** connects **CN DV11** to **CN DV12** in 2D systems without DVR.

The jumper is included in the **BEP6.X Cable Kit - Spare Part**, Part number 5433408-80.

### 8-11-8-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

### 8-11-8-2 SATA Jumper removal

Disconnect the **SATA Jumper** from the connectors **CN DV11** and **CN DV12** on the motherboard.

### 8-11-8-3 SATA Jumper installation

- 1.) Install the **SATA Jumper** in the connectors **CN DV11** and **CN DV12** on the motherboard.
- 2.) Install the **BEP Cover**.
- 3.) Install the **Left Side Cover**.

## 8-11-9 Patient I/O Interface Cable replacement

The Patient I/O Interface Cable connects the Patient IO to the BEP's motherboard.

It is included in the BEP6.X Cable Kit - Spare Part, Part Number 5433408-80.

### 8-11-9-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

### 8-11-9-2 Patient I/O Interface Cable removal


Follow these steps to remove the **Patient I/O Interface Cable**:

- 1.) Remove the **BEP Power Board**. This is required to get access to the **Patient I/O Interface Cable**.
- 2.) Unplug the two connectors (Power and USB) from the Patient I/O.
- 3.) Unplug the connector from **CN USB11** on the BEP's motherboard.

**8-11-9-3 Patient I/O Interface Cable installation**

Follow these steps to install the **Patient I/O Interface Cable**:

- 1.) Connect the two connectors (Power and USB) to the Patient I/O.

 **CAUTION BE AWARE OF CORRECT ORIENTATION OF THE PATIENT I/O CABLE CONNECTOR WHEN CONNECTING TO CN USB11 ON THE BEP'S MOTHERBOARD. ON SOME BEPS, THE KEYING TO PREVENT ERROR MAY BE MISSING.**

- 2.) Connect the other end of the cable to **CN USB11** on the BEP's motherboard.
- 3.) Install the **BEP Power Board**.
- 4.) Install the **BEP Cover**.
- 5.) Install the **Left Side Cover**.

## 8-11-10 Video Jumper (Flex) replacement

The **Video Jumper (Flex)** is used in VIVID E9 / VIVID E7 with 2D and without DVR.

The jumper is included in the **BEP6.X Cable Kit - Spare Part**, Part Number 5433408-80.

### 8-11-10-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)

### 8-11-10-2 Video Jumper (Flex) removal

Follow these steps to remove the **Video Jumper (Flex)**:

- 1.) Flip the retainer levers on the side of the connectors **CN DV11** and **CN DV12** to the side.
- 2.) Unplug and remove the **Video Jumper (Flex)**.

### 8-11-10-3 Video Jumper (Flex) installation

Follow these steps to install the **Video Jumper (Flex)**:

- 1.) Connect the two connectors on the **Video Jumper (Flex)** to **CN DV11** and **CN DV12** (on the BEP's motherboard).
- 2.) Install the **BEP Cover**.
- 3.) Install the **Left Side Cover**.

## 8-11-11 DVI to Samtec Jumper (Flex) replacement

The DVI to Samtec Jumper (Flex) is included in the BEP6.X Cable Kit - Spare Part, Part Number 5433408-80.

### 8-11-11-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)

### 8-11-11-2 DVI to Samtec Jumper (Flex) removal

The number of cables in use, depends on the configuration:

- 4D with DVR: one cable is used.
- 4D without DVR: one cable is used.
- 2D with DVR: two cables are used.
- 2D without DVR does not use this cable.

Follow these steps to remove the **DVI to Samtec Jumper (Flex)**:

- 1.) Disconnect the cable from CN DV12 (on the motherboard).
- 2.) Repeat the step above for the second cable, if installed.

**8-11-11-3 DVI to Samtec Jumper (Flex) installation**

Follow these steps to install the **DVI to Samtec Jumper (Flex)**:

- 1.) Install the **DVI to Samtec Jumper(s) (Flex(es))**
  - **4D with DVR:**
    - Install the **DVI to Samtec Jumper (Flex)** between **CN DV12** on the MBD and **DVI OUT** on the **DVR board**.
  - **4D without DVR:**
    - Install the **DVI to Samtec Jumper (Flex)** between **CN DV12** on the MBD and **the Graphics Adapter**.
  - **2D with DVR:**
    - 1.) Install one **DVI to Samtec Jumper (Flex)** between **CN DV12** on the MBD and **DVI OUT** on the **DVR board**.
    - 2.) Install one **DVI to Samtec Jumper (Flex)** between **CN DV11** on the MBD and **DVI IN** on the **DVR board**.
- 2.) Install the **BEP Cover**.
- 3.) Install the **Left Side Cover**.

## 8-11-12 SATA Cable - DVR to BEP6 MBD replacement

### 8-11-12-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 6.) Remove the BEP and place it on a table.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)
- [8-11-1 "Back End Processor \(BEP\) replacement" on page 8-229.](#)

### 8-11-12-2 SATA Cable - DVR to BEP6 MBD removal

Follow these steps to remove the **SATA Cable - DVR to BEP6 MBD**:

- 1.) Unplug the **SATA Cable** from the **DVD** connector on the DVR.
- 2.) Unplug the other end of the **SATA Cable** from the **CN SATA5** connector on the motherboard.

### 8-11-12-3 SATA Cable - DVR to BEP6 MBD installation

Follow these steps to install the **SATA Cable - DVR to BEP6 MBD**:

- 1.) Connect the **SATA Cable** to the **CN SATA5** connector on the motherboard.
- 2.) Connect the other end of the **SATA Cable** to the **DVD** connector on the DVR.
- 3.) Install the **BEP Cover**.
- 4.) Install the **Left Side Cover**.



## 8-11-13 DVI Flex Main Yggdrasil replacement

### 8-11-13-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)

### 8-11-13-2 DVI Flex Main Yggdrasil removal

- 1.) Disconnect one end of the **DVI Flex Main Yggdrasil** from the connector on the Graphics Adapter.
- 2.) Disconnect the other end of the **DVI Flex Main Yggdrasil** from the DVI-IN connector on the DVR.

### 8-11-13-3 DVI Flex Main Yggdrasil installation

- 1.) Install one end of the **DVI Flex Main Yggdrasil** to the DVI-IN connector on the DVR.
- 2.) Install the other end of the **DVI Flex Main Yggdrasil** to the connector on the Graphics Adapter.
- 3.) Install the **BEP Cover**.
- 4.) Install the **Left Side Cover**.

## 8-11-14 DVR Audio cable replacement

### 8-11-14-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

#### Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-24.](#)

### 8-11-14-2 DVR Audio cable removal

- 1.) Disconnect one end of the **DVR Audio cable** from the connector on the DVR Board.
- 2.) Disconnect the other end of the **DVR Audio cable** from the connector on the motherboard.

### 8-11-14-3 DVR Audio cable installation

- 1.) Install one end of the **DVR Audio cable** to the connector on the motherboard.
- 2.) Install the other end of the **DVR Audio cable** to the connector on the DVR Board.
- 3.) Install the **BEP Cover**.
- 4.) Install the **Left Side Cover**.

## 8-11-15 BEP6 to GFI and Card Rack Backplane Cable replacement

### 8-11-15-1 Preparations

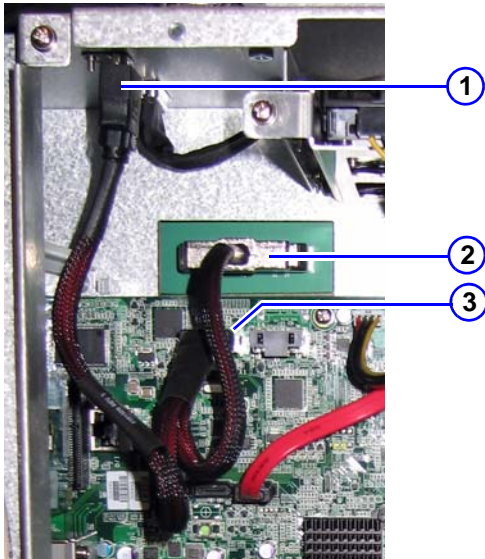
When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the **Left Side Cover**.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

### 8-11-15-2 BEP6 to GFI and Card Rack Backplane Cable removal

- 1.) Reach inside the BEP and disconnect the **Boundary Scan Cable** from the **FEP Backplane Connector**.

Figure 8-198 Boundary Scan cable connects BEP to FEP Back Plane (BEP view)



1. Chassis Connector for PCIe to GFI
2. FEP Backplane Connector
3. PCIE L5 Connector

- 2.) Disconnect the plug from the **PCIE L5 Connector** on the BEP Motherboard.
- 3.) Unplug the **GFI cable** outside (on the top of) the BEP chassis.
- 4.) Unscrew the 3 mm fixing screw for the **Chassis Connector**.  
You can now remove the **BEP6 to GFI and Card Rack Backplane Cable**.

### 8-11-15-3 BEP6 to GFI and Card Rack Backplane Cable installation

- 1.) Connect the **Boundary Scan Cable** to the **FEP Backplane Connector**.
- 2.) Connect the **PCIE L5 plug** to the **PCIE L5 Connector** on the **BEP Motherboard**.
- 3.) Position the **Chassis Connector** in the cut out in the chassis and fasten it with the 3 mm screw.
- 4.) Plug in the **GFI PCIe Cable** in the Chassis Connector (from the outside of the BEP chassis).
- 5.) Install the **BEP Cover**.
- 6.) Install the **Left Side Cover**.

## Section 8-12 Main Power Supply replacement



**WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-12-1 Preparations



**WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.*



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

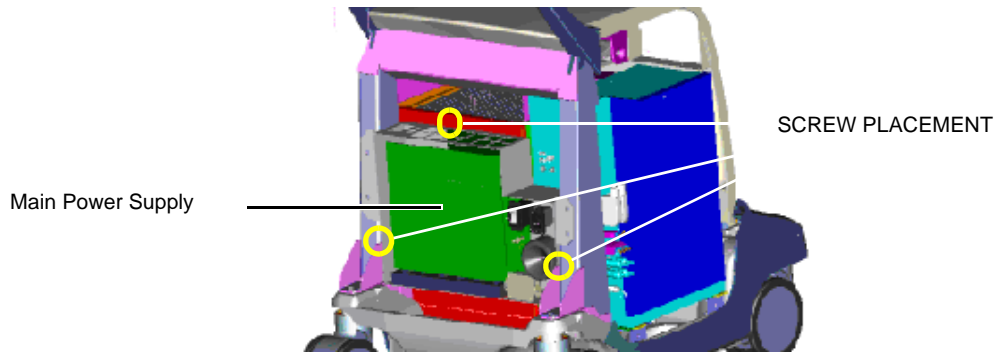
When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Filter Cover.
- 7.) Remove the Rear Cover.

## 8-12-2 Main Power Supply removal procedure

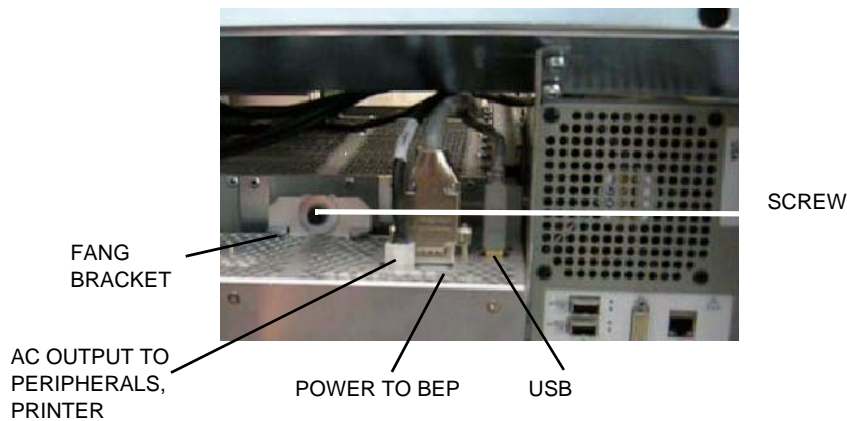
Follow these steps to remove the Main Power Supply:

**Figure 8-199 Main Power Supply**



- 1.) Disconnect the cables on top of the power supply.
- 2.) Remove the three screws that secure the Main Power Supply.

**Figure 8-200 Main Power Supply cables**



- 3.) Ease the Main Power Supply away from the fang bracket.
- 4.) Pull/slide the entire Main Power Supply backwards until the connectors to the Front End Processor are unseated.
- 5.) Lift the Main Power Supply away.

### 8-12-3 Main Power Supply installation procedure

Follow these steps to install the Main Power Supply:

- 1.) Place the Main Power Supply base on the VIVID E9 / VIVID E7 frame, and then tilt the top of the Main Power Supply toward the rear of the Card Cage until the Main Power Supply is vertical.

**Figure 8-201 Main Power Supply installation**



CONNECTORS TO  
BACKPLANE IN THE  
CARD CAGE.

- 2.) Slide the Main Power Supply forward to seat the connectors on the Card Cage.
- 3.) Engage the tab onto the Fang.
- 4.) Install the three screws.
- 5.) Connect the cables at the top of the Main Power Supply.
- 6.) Fill out and attach the Rating Plate.
- 7.) Install the Rear Cover.
- 8.) Install the Filter Cover.
- 9.) Install the Top Cover.
- 10.) Install both Side Covers.

## Section 8-13 I/O Modules replacement

### 8-13-1 Patient I/O Assembly replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

#### 8-13-1-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.



**8-13-1-1 Preparations (cont'd)**

- 4.) Remove Left Side cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 6.) BEP6 Only: Remove the BEP6 Power Board Assembly.

**8-13-1-2 Patient I/O module removal procedure**

Follow these steps to remove the Patient I/O module:

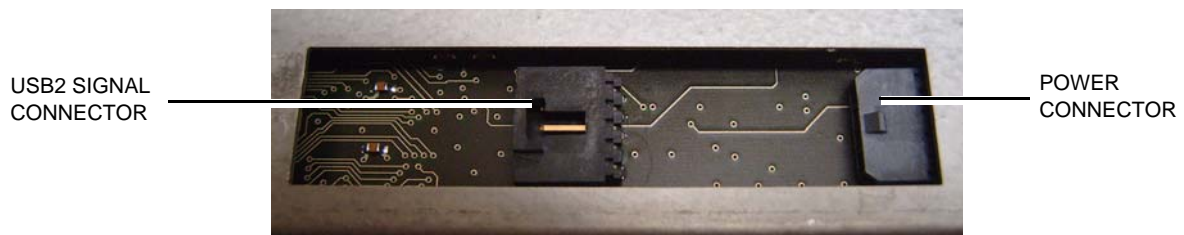
- 1.) Inside the BEP there is an opening for the Power and USB cables to the Patient I/O module. Disconnect the Power cable connector and the USB cable connector from the Patient I/O module.
- 2.) Remove one screw inside the BEP.
- 3.) Remove the two fastening screws on the Patient I/O module's mounting bracket.
- 4.) Pull the Patient I/O module sideways, out of the frame.

**8-13-1-3 Patient I/O installation procedure**

Follow these steps to install the Patient I/O:

- 1.) Align the Patient I/O with the opening and push it into its final position.
- 2.) Connect the Power and USB cables (inside the BEP).

**Figure 8-202 Power and USB connectors (rear side of Patient I/O)**



- 3.) Install two fastening screws on the mounting bracket.
- 4.) Install the BEP6 Power Board Assembly.

**8-13-1-3 Patient I/O installation procedure (cont'd)**

5.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

6.) Install the Left Side Cover, see [8-5-2-3 "Side Covers installation" on page 8-26](#).

## 8-13-2 Side I/O Board Assembly replacement

 **WARNING** *DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.*



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

### 8-13-2-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING** *ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:*

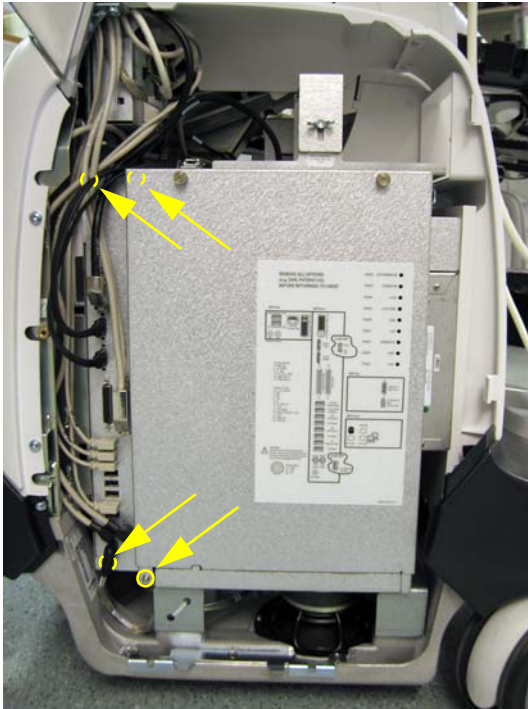


1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.

8-13-2-2 BEP6 Side I/O Board Assembly removal

Figure 8-203 Position of screws (two are hidden by cables, one is behind the BEP Cover)



Follow these steps to remove the BEP6 Side I/O Board Assembly:

- 1.) Disconnect the cables connected to the face of the BEP6 Side I/O Board Assembly.
- 2.) Remove the four screws connecting the BEP6 Side I/O Board Assembly to the BEP.
- 3.) Pull the BEP6 Side I/O Board Assembly out of the BEP.

**8-13-2-3 BEP6 Side I/O Board Assembly installation**

Follow these steps to install the BEP6 Side I/O Board Assembly:

- 1.) Guide the BEP6 Side I/O Board Assembly into the BEP frame.
- 2.) Be sure the three tabs on the end of the I/O fit into the three slots in the back of the BEP frame.
- 3.) Install the four screws connecting the I/O to the BEP.
- 4.) Reconnect the I/O cabling.
- 5.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
  - b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
  - c.) Install the fixing screw(s) for the BEP Cover:
    - On BEP6 there are two finger screws on the top of the BEP Cover.
- 6.) Install the Left Side Cover.

## Section 8-14 Peripherals replacement

### 8-14-1 DVD R/W drive replacement

The VIVID E9 / VIVID E7 may be equipped with one or two DVD drives. If two drives are installed, one is for storing data and one for recording the streaming video from the optional DVR board inside the BEP. On units without the DVR option, a Drive Bay Storage Box is installed in the empty DVD drive location.

#### 8-14-1-1 Preparations

When preparing for the replacement, you must perform the following steps:

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.

**8-14-1-2 DVD R/W drive removal procedure**

Follow these steps to remove the DVD R/W drive:

- 1.) Raise the console height to the highest level.
- 2.) Remove the 4 screws securing the right side of the DVD R/W drive.

**Figure 8-204 Screw placement for right side of DVD R/W drive**



- 3.) Tilt the Front Cover forward just until the Column Cover stop tabs clear.
- 4.) Raise the Column Cover to access and remove the 4 screws securing the left side of the DVD R/W drive.
- 5.) Disconnect the cables to the DVD R/W drive.
- 6.) Slide the DVD R/W drive out the front of the VIVID E9 / VIVID E7.
- 7.) If Power Connection is different on new and old DVD R/W drive: Move the DVD Interface Board, Part Number 5301204, from the old DVD R/W drive that you removed, to the new DVD R/W drive.

**8-14-1-3 DVD R/W drive installation procedure**

Follow these steps to install the DVD R/W drive:

- 1.) Slide the DVD R/W drive into position.
- 2.) Install the 8 screws to secure the DVD R/W drive.
- 3.) Connect the cables to the DVD R/W drive.
- 4.) Install the Covers.

## 8-14-2 Digital Video Recorder (DVR) replacement


The Digital Video Recorder is a circuit board located in the BEP. The DVR board is connected to a DVD drive, accessible from the front of the VIVID E9 / VIVID E7. The DVD drive automatically stores data recorded by the DVR.

### 8-14-2-1 Warnings

 **WARNING** ***DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.***



1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** ***RISK OF ELECTRICAL SHOCK, VIVID E9 / VIVID E7 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.***

 **WARNING** ***ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7. WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:***



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
  2. TURN OFF THE BREAKER.
  3. UNPLUG THE VIVID E9 / VIVID E7.
  4. MAINTAIN CONTROL OF THE POWER PLUG.
  5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.



**8-14-2-2 Preparations**

When preparing for the replacement, you must perform the following steps:

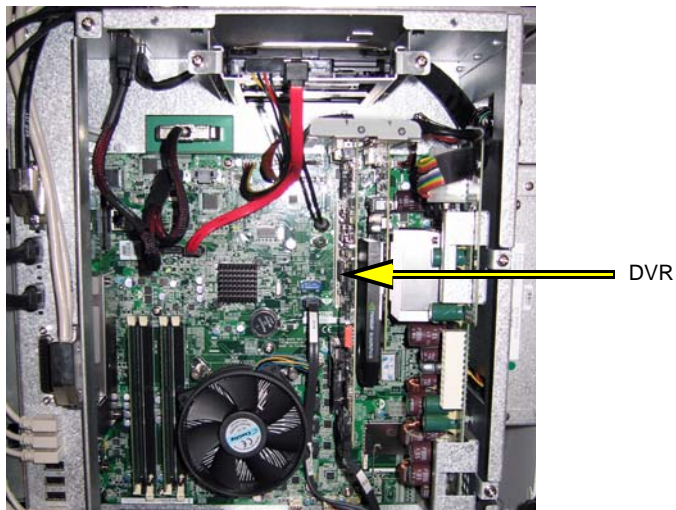
- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
  - a.) Loosen the BEP Cover's fixing screw(s).
    - On BEP6 there are two finger screws on the top of the BEP Cover.
  - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
  - c.) Set the **BEP Cover** aside.
- 6.) For easier access to the DVR Board, remove the Hard Disk Drive.

**Next (select what applies):**

- [8-14-2-3 "BEP6 - Digital Video Recorder removal procedure" on page 8-286.](#)

8-14-2-3 BEP6 - Digital Video Recorder removal procedure

Figure 8-205 DVR board position in BEP6



Follow these steps to remove the Digital Video Recorder from a BEP6:

- 1.) Locate the DVR Board inside the BEP6.
- 2.) Unscrew the fixing screws from the connector at top of the DVR.
  - The flex between the Graphics Adapter and the DVR board uses finger screws.
  - The flex from the motherboard is fixed with Hex screws.
- 3.) Disconnect the audio jack and the two flex cables where they attach to the DVR Board.
- 4.) Disconnect the DVR to SATA Cable.
- 5.) Remove the fixing screw for the DVR board.
- 6.) Pull out the DVR board.

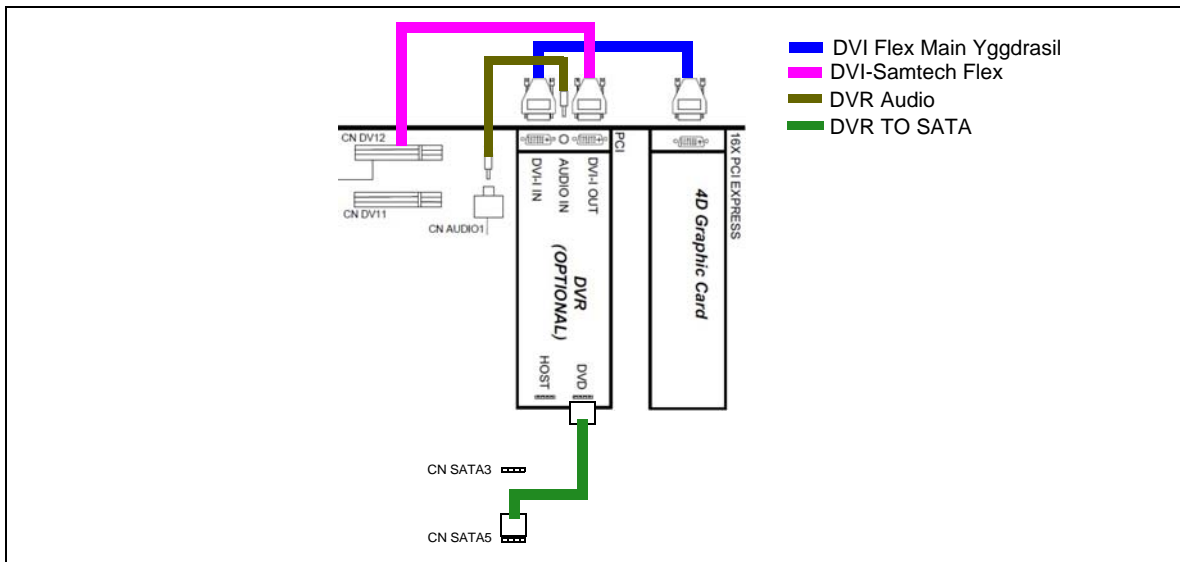
**Next:**

- [8-14-2-4 "BEP6 - Digital Video Recorder installation procedure" on page 8-287.](#)

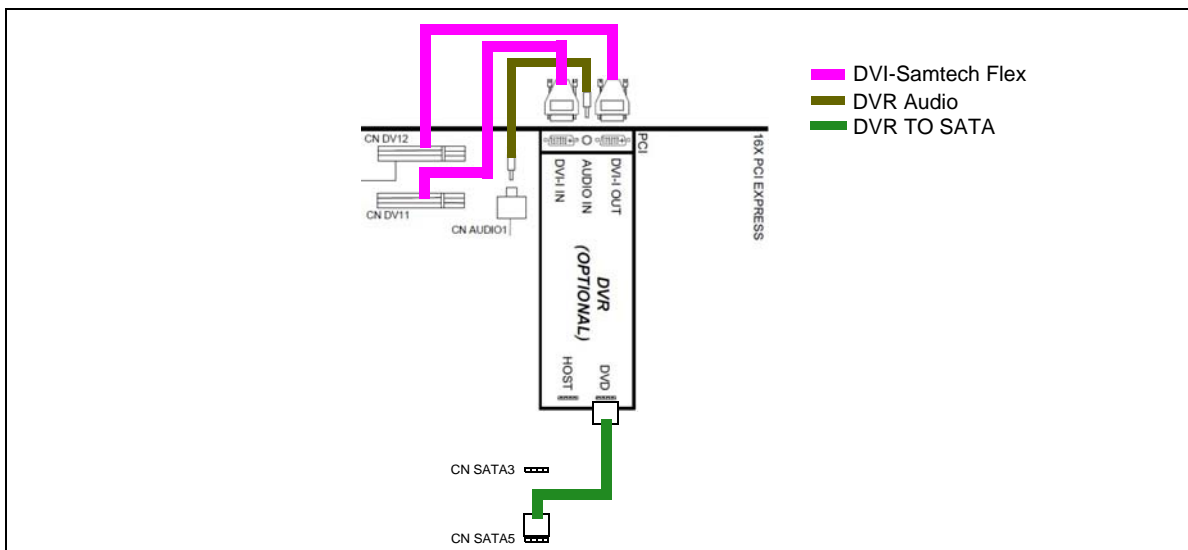
**8-14-2-4 BEP6 - Digital Video Recorder installation procedure**

Follow these steps to install the Digital Video Recorder:

- 1.) Plug in the (new) DVR Board in the correct slot.
- 2.) Insert and fasten the fixing screw.
- 3.) Plug in the cables you removed earlier:
  - Connections if the DVR Board is installed in a VIVID E9 with 4D:



- Connections if the DVR Board is installed in a VIVID E9 / VIVID E7 with 2D:



- 4.) Install the fixing screws you removed earlier.
- 5.) Install the HDD.

**8-14-2-4 BEP6 - Digital Video Recorder installation procedure (cont'd)**

6.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

7.) Install the Left Side Cover.

8.) Install the BEP Cover as described in these steps:



**NOTICE** Be careful not to pinch any of the cables when installing the BEP Cover.

- a.) Insert the base of the BEP Cover inside the base of the BEP.  
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9 / VIVID E7.
- c.) Install the fixing screw(s) for the BEP Cover:
  - On BEP6 there are two finger screws on the top of the BEP Cover.

3.) Take out the DVD+RW from the DVD drive.

4.) Do a playback from the internal disk by pushing the Playback button.

## 8-14-3 Black & White Digital Graphic Printer replacement

### 8-14-3-1 Preparations

When preparing for the replacement, you must perform the following steps:



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.

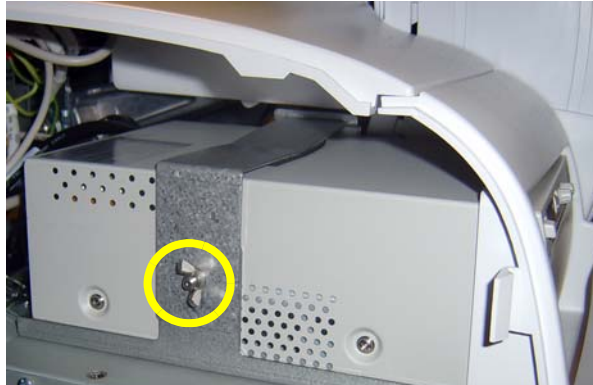
### 8-14-3-2 Black & White Digital Graphic Printer removal procedure

Follow these steps to remove the Black & White Digital Graphic Printer:

- 1.) Disconnect the cables from the back of the printer.
- 2.) Loosen the printer bracket wing nut that secures the printer.
- 3.) Slide the printer out.

**Figure 8-206 Black & White Digital Graphic Printer**

PRINTER BRACKET  
WING NUT



### 8-14-3-3 Black & White Digital Graphic Printer installation procedure

Follow these steps to install the Black & White Digital Graphic Printer:

- 1.) Slide the printer into the printer bracket until the face is flush with the VIVID E9 / VIVID E7.
- 2.) Tighten the printer bracket wing nut to secure the printer in the printer bracket.
- 3.) Connect the cables to the back of the printer.
- 4.) Replace the Left Side Cover.

## 8-14-4 USB Flash Card replacement

### 8-14-4-1 Removing the USB Flash Card

- 1.) Select Utility > Eject. The Eject device menu is displayed.
- 2.) Select the USB Flash Card.
- 3.) The selected media is prepared for ejection.
- 4.) Remove the USB Flash Card.

### 8-14-4-2 Installing the USB Flash Card

Plug the USB Flash Card into one of the USB ports on the VIVID E9 / VIVID E7.

## 8-14-5 Color Video Printer Replacement

### 8-14-5-1 Preparations



**WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**



**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- Power down the VIVID E9 / VIVID E7.

### 8-14-5-2 Color Video Printer removal

- If you are going to move the VIVID E9 / VIVID E7 to another location:
  - 1.) Switch off the power on the printer.
  - 2.) Disconnect the USB cable from the VIVID E9 / VIVID E7.
- If you are going to replace the printer:
  - 1.) Switch off the power on the printer.
  - 2.) Disconnect the USB cable from the printer.
  - 3.) Remove the printer.

### 8-14-5-3 Color Video Printer installation

#### Preparation

- MITSUBISHI color printer CP30DW:
  - Set Switch 1 and 2 on the rear side of the printer to ON.  
Please refer to the documentation for the printer if you need help to locate the switches.
- If you are installing a new printer model, please refer to the Printer Driver Installation Manual, Direction Number GA294652 revision 4 or higher, for installation and setup instructions.

#### General installation instructions

- 1.) Connect the USB cable to the printer and to the USB port on VIVID E9 / VIVID E7's Rear Panel.
- 2.) Connect the power cable to the printer and to the mains power outlet.
- 3.) Switch on the power on the printer.

## 8-14-6 GFI PCIe Cable replacement

The GFI PCIe Cable connects the GFI Board in the Front End Card Rack (FEP) to the top of the Back End Processor (BEP).

### 8-14-6-1 Preparations

When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9 / VIVID E7.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both the **Left Side Cover** and the **Right Side Cover**.

### 8-14-6-2 Remove the GFI PCIe Cable

Follow these steps to remove the GFI PCIe Cable:

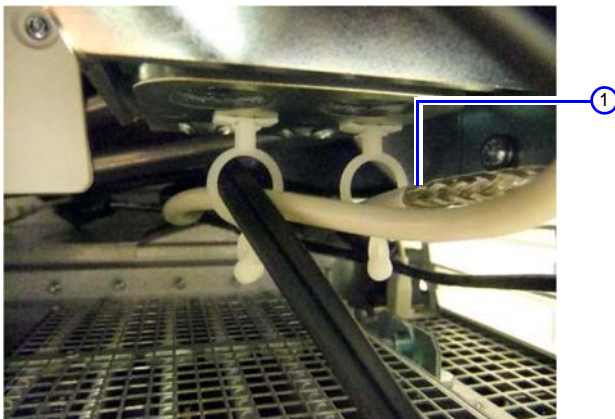
- 1.) Disconnect the GFI PCIe Cable from the top of the BEP.
- 2.) Disconnect the GFI PCIe Cable from the GFI board as described in these steps:
  - a.) On the Front End Card Rack, remove the cover for the GFI PCIe Cable connector.
  - b.) Unplug the GFI PCIe Cable.
- 3.) Loosen the GFI PCIe Cable from the cable clip.
- 4.) Remove the GFI PCIe Cable.

### 8-14-6-3 Install the GFI PCIe Cable

Follow these steps to install the GFI PCIe Cable:

- 1.) Route the new **GFI PCIe Cable** between the top of the BEP and the top of the FEP.
- 2.) Secure it with the cable clip illustrated in [Figure 8-207](#).

**Figure 8-207** GFI PCIe Cable secured with cable clip



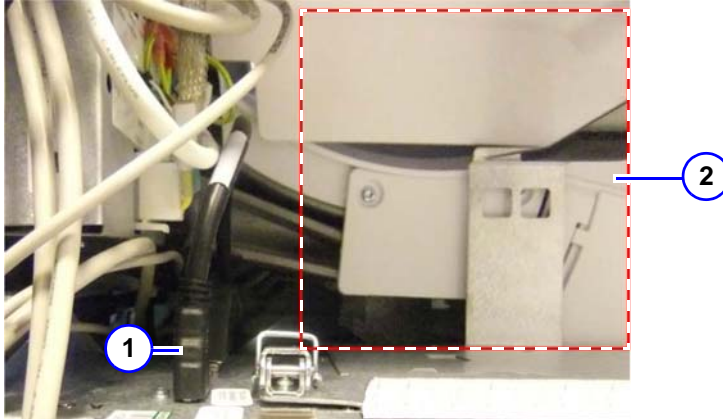
1. GFI PCIe Cable secured with cable clip.

- 3.) Connect the GFI PCIe Cable to the GFI board as described in these steps:
  - a.) Plug in the GFI PCIe Cable in the connector on the GFI board.
  - b.) Install the cover for the GFI PCIe Cable.



**8-14-6-3 Install the GFI PCIe Cable (cont'd)**

- 4.) Connect the other end of the GFI PCIe Cable to the connector on top of the BEP.  
Ensure that the GFI PCIe Cable is kept out of the drawn box area in [Figure 8-208](#), as there is a risk that the Z Mechanism damage the cable.

**Figure 8-208 Keep cables out of the marked area**

1. GFI PCIe Cable (at top of BEP)
2. **Keep cables out of the marked area**

- 5.) Install the **Left Side Cover and the Right side Cover**.

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# Chapter 9

## Renewal parts

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### Section 9-1 Overview

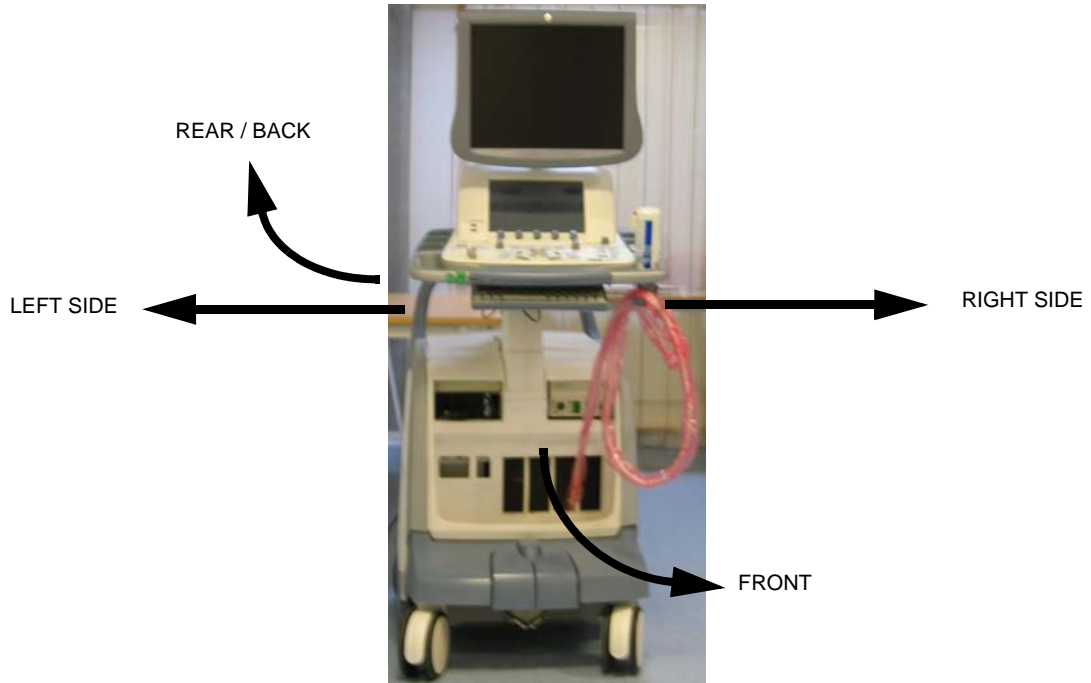
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## Section 9-2 Definitions of Left, Right, Front and Back

The Figure below illustrates what is Left, Right, Front and Rear (or Back) of the VIVID E9 / VIVID E7.

Figure 9-1 Definition of Left, Right, Front and Back of VIVID E9 / VIVID E7



## Section 9-3 List of Abbreviations

Table 9-1 List of Abbreviations

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
3D	THREE DIMENSIONAL (SEE RT3D and 4D)		
4D	FOUR DIMENSIONAL IS THE SAME AS THREE DIMENSIONAL + REALTIME	HDD	HARD DISK DRIVE
ACP	AC CONTROLLER (AC POWER)	I/O	INPUT/OUTPUT
ACT	AC TRANSFORMER	InSite EXC	InSite with Express Connect
ASSY	ASSEMBLY	INT	INTERNAL
BEP	BACK END PROCESSOR	LCD	LIQUID CRYSTAL DISPLAY
BEPY1	SEE DESCRIPTION IN: <a href="#">5-9-2 "Introduction" on page 5-48.</a>	MBD	MOTHERBOARD
BEPY2	SEE DESCRIPTION IN: <a href="#">5-9-2 "Introduction" on page 5-48.</a>	OP	OPERATOR PANEL
BEPY3	SEE DESCRIPTION IN: <a href="#">5-9-2 "Introduction" on page 5-48.</a>	PC	PERSONAL COMPUTER (Back End Processor)
BEP5	SEE DESCRIPTION IN: <a href="#">5-9-2 "Introduction" on page 5-48.</a>	PCIe	PCI Express
BEP6	SEE DESCRIPTION IN: <a href="#">5-9-2 "Introduction" on page 5-48.</a>	PS	POWER SUPPLY
CRU	CUSTOMER REPLACEABLE UNIT	PWA	PRINTED WIRE ASSEMBLY
CTRL	CONTROL	PWR	POWER
CW	CONTINUOUS DOPPLER	QTY	QUANTITY USED PER VIVID E9 / VIVID E7
DMM	DIGITAL MULTIMETER	RT3D	REAL TIME THREE DIMENSIONAL (Same as 4D)
ECG	ELECTRO CARDIO GRAPHY	RX	RECEIVER
EXT.	EXTERNAL	TX	TRANSMITTER
FEP	FRONT END PROCESSOR, ALSO CALLED: "CARD RACK"	TXPS	TRANSMITTER POWER SUPPLY. Most places in this manual the name "Main Power Supply" is used, since this combined power supply delivers both the high voltages to the transmitter circuits and the +48 VDC power to the rest of the VIVID E9 / VIVID E7.
FRU Y	REPLACEMENT PART/SPARE PART	UFD	Usb Flash Drive. Other terms used: 'USB/Mem stick', 'USB Flash Card', 'USB Memory Key' and 'USB Drive'
FRU N	NOT A SPARE PART	XFRMR	TRANSFORMER

## Section 9-4 VIVID E9 / VIVID E7 models and hardware/software compatibility

### 9-4-1 VIVID E9 models and hardware/software compatibility

Table 9-2 VIVID E9 Models and Hardware/Software Compatibility

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000070	Vivid E9 with XDclear 4D Expert Option 17 inch LCD (100-230V)	GB200063 or GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.5	v113.0 or higher	N/A
GB000080	Vivid E9 with XDclear 4D Expert Option 19 inch LCD (100-230V)					
GB000075	Vivid E9 with XDclear 2D 17 inch LCD (100-230V)	GB200062 or GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	N/A
GB000085	Vivid E9 with XDclear 2D 19 inch LCD (100-230V)					
GB000090	Vivid E9 with XDclear Pro configuration 17 inch Monitor (100-230V)					
GB000095	Vivid E9 with XDclear Pro configuration 19 inch Monitor (100-230V)					

### 9-4-2 VIVID E7 models and hardware/software compatibility

Table 9-3 VIVID E7 Models and Hardware/Software Compatibility

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GB000099	VIVID E7 Pro with XDclear configuration - 17 inch LCD	GB200062 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.5	v113.0 or higher	v113.x
GB000100	VIVID E7 Pro with XDclear configuration - 19 inch LCD					

## Section 9-5 Software overview

### 9-5-1 XDclear Software (Application Software Version 113)

#### 9-5-1-1 Software on UFD

Table 9-4 Software on UFD used for XDclear (v113)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	UFD VE9 & EP SW	GB200156	The UFD includes: <ul style="list-style-type: none"> <li>• System software for BEP6</li> <li>• MS Security patches</li> <li>• Application Software</li> <li>• Printer Driver Software</li> <li>• User Manuals</li> <li>• Service Manual</li> </ul>	1	N	N
2.	UFD VE9 & EP SW	GB200156-12	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.6 for BEP 6</li> <li>• Application Software V.113 R.1.5</li> </ul>	1	N	Y
3.	UFD VE9 & EP SW	GB200156-11	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.6 for BEP 6</li> <li>• Application Software V.113 R.1.4</li> </ul>	1	N	Y
4.	UFD VE9 & EP SW	GB200156-10	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.6 for BEP 6</li> <li>• Application Software V.113 R.1.3</li> </ul>	1	N	Y
5.	UFD VE9 & EP SW	GB200156-07	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.6 for BEP 6</li> <li>• Application Software V.113 R.1.2</li> </ul>	1	N	Y
6.	UFD VE9 & EP SW	GB200156-06	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.6 for BEP 6</li> <li>• Application Software V.113 R.1.1</li> </ul>	1	N	Y
7.	UFD VE9 & EP SW	GB200156-03	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.5 for BEP 6</li> <li>• Application Software V.113 R.0.6</li> </ul>	1	N	Y
8.	UFD VE9 & EP SW	GB200156-02	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.5 for BEP 6</li> <li>• Application Software v.113.0.5</li> </ul>	1	N	Y
9.	UFD VE9 & EP SW	GB200156-01	UFD - Service edition <ul style="list-style-type: none"> <li>• System software v.104.3.5 for BEP 6</li> <li>• Application Software v.113.0.3</li> </ul>	1	N	Y

9-5-1-2 System Software used for XDclear (BT'13)

Table 9-5 System Software used for XDclear

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VIVID E9 SYSTEM SOFTWARE (BEP6)	GB200015	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) FOR BEP6. LATEST SYSTEM SOFTWARE (2015 NOV 30): v104.3.6	1	N	N
2.	VIVID E9 System Software Spare Part (BEP6)	GB200015-03	Vivid E9 System software v.104.3.6 for BEP6	1	N	Y
3.	VIVID E9 System Software Spare Part (BEP6)	GB200015-02	Vivid E9 System software v.104.3.5 for BEP6	1	N	Y



9-5-1-3 Application Software used for XDclear (BT'13)

Table 9-6 Application Software used for XDclear

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Vivid E9 and EchoPAC PC Application SW	GB200066	APPLICATION SOFTWARE INSTALLATION CD, LATEST APPLICATION SOFTWARE (2015 NOV 30): v113.0.6 The software is labeled Version 113 Revision 0.6	1	N	N
2.	VE9 and EPPC Application SW - Service Edition	GB200066-06	APPLICATION SOFTWARE v113.0.6	1	N	Y
3.	VE9 and EPPC Application SW - Service Edition	GB200066-05	APPLICATION SOFTWARE v113.0.5	1	N	Y
4.	VE9 and EPPC Application SW - Service Edition	GB200066-04	APPLICATION SOFTWARE v113.0.3	1	N	Y

9-5-1-4 Software Patches and Miscellaneous Software used for XDclear (BT'13)

Table 9-7 Software Patches and Miscellaneous Software used for XDclear

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
<b>Software Patches</b>						
1.	Vivid E9 and EchoPAC PC MS Security Patch	GA200973-03	FOR THE FOLLOWING SYSTEM SOFTWARE VERSION: <ul style="list-style-type: none"> <li>• v104.3.x</li> </ul> The patches must be installed after the installation of system software and application software. This security patch CD includes the following patches: <ul style="list-style-type: none"> <li>• MS11-006 Vulnerability in Windows Shell Graphics Processing Could Allow Remote Code Execution.</li> <li>• MS11-020 Vulnerability in SMB Server Could Allow Remote Code Execution.</li> <li>• MS11-042 Vulnerabilities in Distributed File System could allow remote code execution</li> <li>• MS11-043 Vulnerabilities in SMB Client Could Allow Remote Code Execution.</li> <li>• MS12-054 Vulnerabilities in Windows Networking Components Could Allow Remote Code Execution (Updated 2013-JNOV.20)</li> </ul>	1	N	Y

**Section 9-6**  
**Covers and Bumpers**

Table 9-8 COVERS - VIVID E9 / VIVID E7 sheet 1 of 4

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	COVER FRONT	GA307022	FRONT COVER 	1	N	Y
2.	PLATE CONNECTORS W/GUIDE	GA307056		1	N	Y
3.	COVER LEFT ASM	GA200107	LEFT SIDE COVER ASSEMBLY 	1	N	Y
4.	COVER RIGHT ASM	GA200108	RIGHT SIDE COVER ASSEMBLY 	1	N	Y
5.	COVER TOP	GA307023	TOP COVER 	1	N	Y

Table 9-8 COVERS - VIVID E9 / VIVID E7 (cont'd) sheet 2 of 4

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	COVER REAR ASM	GA200232	REAR COVER ASSEMBLY 	1	N	Y
7.	Door I/O PANEL	GA307046		1	N	Y
8.	CABLE HOOK	GA307047		2	N	Y
9.	BUMPER REAR	GA307008		1	N	Y
10.	COVER FILTER	GA307515	FILTER COVER 	1	Y	Y
11.	BUMPER FOOTREST ASSY	GA200005	FRONT BUMPER FOOTREST 	1	N	Y
12.	HANDLE REAR	GA307029		1	N	Y
13.	BUMPER LEFT	GA307006		1	N	Y

Table 9-8 COVERS - VIVID E9 / VIVID E7 (cont'd) sheet 3 of 4



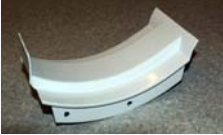



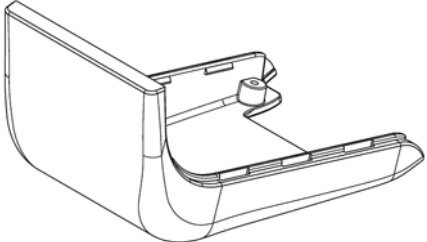
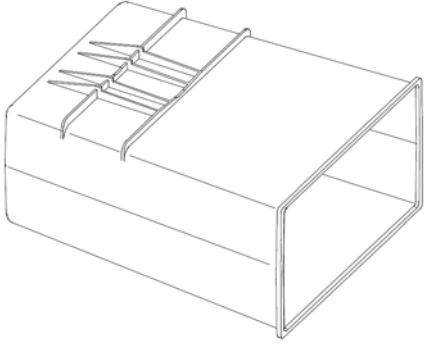
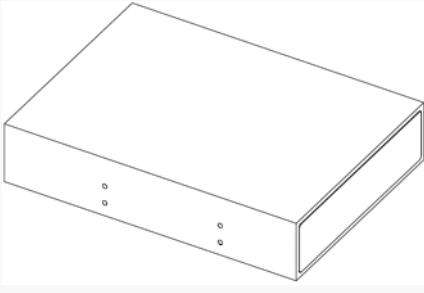
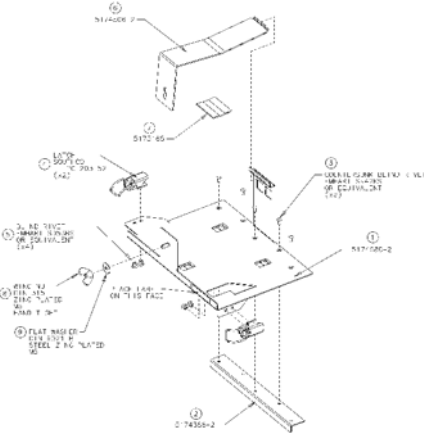
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
14.	BUMPER RIGHT	GA307007		1	N	Y
15.	COLUMN COVER ASSY	GA200359		1	N	Y
16.	COVER CABLE MAIN	GA307192		1	N	Y
17.	HANDLE LEFT TOP, METAL FINISH	GA307233		1	N	Y
18.	HANDLE RIGHT TOP, METAL FINISH	GA307235		1	N	Y
19.	BULKHEAD COVER	GA307061		1	N	Y
20.	BUMPER BOSS Z OUTER (Frogleg Bolt cover, rubber)	GA307188		1	N	Y

Table 9-8 COVERS - VIVID E9 / VIVID E7 (cont'd) sheet 4 of 4

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
21.	BW PRINTER FILLER BOX	5309088	USED ON UNITS WITHOUT INTERNAL B/W PRINTER 	1	N	Y
22.	STORAGE DRAWER FOR 5 1/4 INCH DRIVE BAY WHITE DRAWER, METAL HOUSING (DRIVE BAY STORAGE DRAWER)	5267580-3	USED ON UNITS WITHOUT DVR AND / OR DVD OPTION 	1 or 2	N	Y
23.	PRINTER TRAY FOR BEP 6	5174885-2		1	N	Y

**Section 9-7**  
**Top Console parts**

**9-7-1 LCD Monitor parts**

Table 9-9 LCD parts sheet 1 of 2


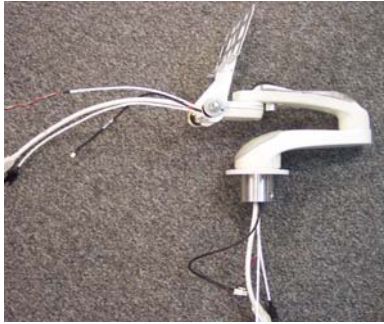
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
<b>17 INCH MONITOR AND PARTS</b>						
1.	LCD MONITOR 17"	GB200058	17 INCH LCD MONITOR WITH LED BACKLIGHT 	1	N	Y
2.	LCD MONITOR 17"	GA200550	17 INCH LCD MONITOR 	1	N	Y
3.	LCD ARM FOR 17" LCD	5199125		1	N	Y
<b>19 INCH MONITOR AND PARTS</b>						
4.	LCD MONITOR 19"	5198551	19 Inch LCD Monitor for VIVID E9 	1	N	Y

Table 9-9 LCD parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	LCD ARM FOR 19" LCD	5183750		1	N	Y

9-7-2 Operator Panel (OP) parts




9-7-2-1 OP-6 parts

Table 9-10 OP-6 parts sheet 1 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
<b>OPERATOR PANEL UPPER 6</b>						
1.	VIVID E9 OPERATOR PANEL UPPER 6, LED BACKLIGHT	GB200092		1	N	Y
2.	FRAME W. LED BACKLIGHT LCD AND TOUCHSCREEN - spare part	5207000-65	Video Interface cable is included 	1	N	Y
3.	LED BACKLIGHT DRIVER WITH CABLES	5207000-64	 1. - LED Backlight Driver Board 2. - Interface Cable to LCD Display 3. - Interface Cable to Main Board The two interface cables are included.	1	N	Y
4.	HV INVERTER WITH CABLE - ERG VERSION	5207000-6	Supporting CMO display (OP Upper GA200865, GB200091 and GB200092). 	1	N	Y



Table 9-10 OP-6 parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	UPPER BEZEL	GA200437	 <p>This part is compatible with all OP versions.</p>	1	N	Y
<b>OPERATOR PANEL LOWER 6</b>						
1.	Operator Panel Lower 6	GB200148		1	N	Y
2.	OP LOWER BEZEL 4	GB200152	<p>Enlarged hole for trackball. For use with Operator Panel, Lower 5 and Operator Panel, Lower 6</p> 	1	N	Y

9-7-2-2 OP-5 parts

Table 9-11 OP-5 parts sheet 1 of 2

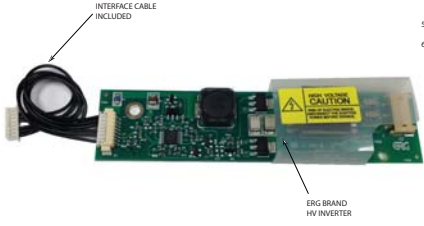





ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
<b>OPERATOR PANEL UPPER 5</b>						
1.	Vivid E9 Operator Panel Upper 5	GB200091 GOING OBSOLETE	Use GB200092 as a replacement when GB200091 becomes unavailable.	1	N	Y
2.	HV INVERTER WITH CABLE - ERG VERSION	5207000-6	Supporting CMO display (OP Upper GA200865, GB200091 and GB200092).  The image shows a green printed circuit board (PCB) which is the HV inverter. It has a black cable with a circular connector attached to one end. A yellow warning label with a triangle and the word 'CAUTION' is on the board. Labels with arrows point to the 'INTERFACE CABLE INCLUDED' and the 'ERG BRAND HV INVERTER'.	1	N	Y
<b>OPERATOR PANEL LOWER 5</b>						
1.	OPERATOR PANEL, LOWER 5	GB200030 GOING OBSOLETE	 The image shows the front view of the operator panel. It features a central trackball, several rows of buttons, and a control knob. The panel is white with grey accents. <p>On this OP, the Top Locking Plate including the Rubber Dust Filtering Ring can be detached from outer side of the Operator Panel for cleaning purposes (do not need to get inside the panel). This part is backward compatible.</p>	1	N	Y
2.	OP LOWER BEZEL 4	GB200152	Enlarged hole for trackball. For use with Operator Panel, Lower 5 and Operator Panel, Lower 6  The image shows the bezel for the operator panel. It is a white plastic component with a central circular cutout for the trackball and several rectangular cutouts for buttons. It has a slightly textured surface.	1	N	Y

Table 9-11 OP-5 parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	OP Lower Bezel 2.	GB200024 GOING OBSOLETE	<p>With enlarged hole in bezel for new trackball. For OP-5 ONLY:</p>  <p>Use GB200152 as replacement when GB200024 becomes unavailable</p>	1	N	Y
4.	Laser Trackball Assembly.	GB200217	<p>Replaces Replaces GA200742 and GB200017 For OP-5 and OP-6: On this trackball, the top locking plate including the rubber dust filtering ring can be detached from outer side of the Operator Panel for cleaning purposes (do not need to get inside the panel). The new Laser Trackball Assembly can be used with old versions of Operator Panel Upper.</p>  <p>Dust Gasket, Rubber Type, for older Lower Panels with small trackball opening in the bezel. (To be used together with the complete Trackball Assembly, by just replacing the Dust Gasket.)</p> 	1	N	Y

9-7-3 Top Console PCBs

Table 9-12 Top Console PCBs sheet 1 of 3

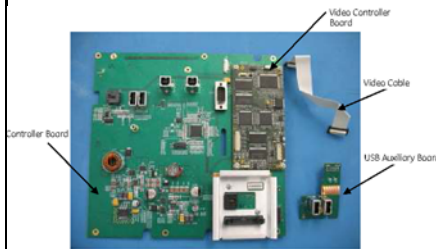


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
<b>PCB FRUs on the Upper OP</b>						
1.	Main board, Video board, Video Cable, USB Aux Board	5207000-50	Replaces 5207000-40 when it becomes obsolete.	1	N	Y
2.	Main board, Video board, Video Cable, USB Aux Board	5207000-40 Going OBSOLETE	 <p>For OP-4. May be used as a replacement for 5207000-30 on OP-3. Install with the old video cable on OP-3.</p>	1	N	Y
3.	USB CONNECTOR BOARD 3 for Upper OP Panel	5207000-41		1	N	Y
4.	Main Ctrl Bd. w/USB Video Bd. & Cable	5207000-30 Going OBSOLETE	 <p>For OP-3. This part is going obsolete. If unavailable, you may use 5207000-40 as a replacement, but install with the old video cable.</p>	1	N	Y

Table 9-12 Top Console PCBs (cont'd) sheet 2 of 3

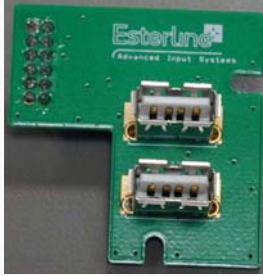
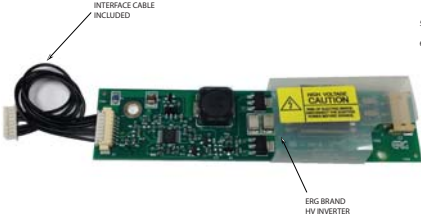

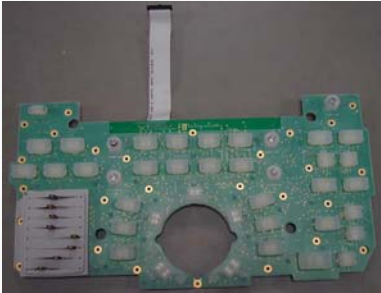



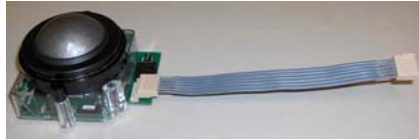

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	USB Connector Board 2	GA200717 Going OBSOLETE		1	N	Y
6.	HIGH VOLTAGE INVERTER BOARD WITH CABLE (Replaces GA200442)	5207000-6		1	N	Y
7.	HIGH VOLTAGE INVERTER BOARD WITH CABLE	GA200442 Going OBSOLETE.		1	N	Y
<b>PCB FRUs on the Lower OP</b>						
8.	Lower Switch Board with Elastomer	GA200440		1	N	Y
9.	Encoder Board	GA200443		1	N	Y
10.	Encoder w. Push Button	066E2306	 Replaces GA200447.	5	N	Y

Table 9-12 Top Console PCBs (cont'd) sheet 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
11.	BUTTON IF BOARD ASSY	GA200286		1	N	Y




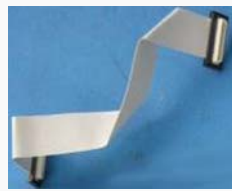




9-7-4 Trackball parts

Table 9-13 Trackball parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Laser Trackball Assembly with over-voltage protection	GB200217	<p>Replaces GA200742 and GB200017</p> <ul style="list-style-type: none"> <li>• Complete Laser Trackball with connector for USB interface.</li> <li>• Trackball Switch Cable - for connecting the switches located around the Trackball to the USB interface.</li> <li>• Screws/washers for fixing the Trackball to the Lower Operator Panel.</li> </ul> 	1	N	Y
2.	Dust Gasket and Fixing Ring for <u>Laser</u> Trackball, Vivid E9.	GA200971	 <p>NOTE! THESE PARTS ARE NOT COMPATIBLE WITH THE INDUCTIVE TRACKBALL USED ON OP-1.</p>	1	N	Y

9-7-5 Operator Panel Cable Kit for VIVID E9 / VIVID E7

Table 9-14 Operator Panel Cable Kit for VIVID E9 / VIVID E7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Operator Panel Cable Kit for VIVID E9 (OP Cable Kit 2)	5207000-46	<ul style="list-style-type: none"> <li>OP Cable Kit 2 is for use with GA200865 (Upper OP Panel 4).</li> <li>OP Cable Kit 2 can also be used for GA200822 (Upper OP Panel 3) as a second choice if GA200446 is unavailable.</li> </ul>	1	N	Y
			<b>Trackball USB Cable</b> For connection between Trackball and Main Controller Board. 			
			<b>Trackball Switch Cable (First version)</b> For connecting the switches located around the Trackball to the USB interface. 			
			<b>Trackball Switch Cable (Second Version)</b> For connecting the switches located around the Trackball to the USB interface. 			
			<b>USB Video Board Flex Cable (New type - CMO display)</b> For connection between the USB Video Board and the LCD Display. (Connectors in opposite direction). 			
			<b>USB Video Board Flex Cable (Old type - NEC display)</b> For connection between the USB Video Board and the LCD Display. (Connectors in same direction) 			
			<b>HV Inverter Cable</b> For connection between the HV Inverter Board and the Main Controller Board. 			
			<b>Not Used for VIVID E9 / VIVID E7</b> 			
			<b>Cable tie (2x)</b> For fixing Trackball USB Cable. (Not Illustrated).			
2.	CABLE, A/N KEYBOARD, USB & 12V	GA200368		1	N	Y



9-7-6 Button Kits and Knobs

Table 9-15 Button Kits and Knobs sheet 1 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Button Kit, Danish	066E3230		1	N	Y
2.	Button Kit, Dutch	066E3231		1	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 2 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	Button Kit, Universal English	066E3221		1	N	Y
4.	Button Kit, Finnish	066E3229		1	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 3 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	Button Kit, French	066E3222		1	N	Y
6.	Button Kit, German	066E3223		1	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 4 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	Button Kit, Spanish	066E3224		1	N	Y
8.	Button Kit, Portuguese	066E3225		1	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 5 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	Button Kit, Italian	066E3226		1	N	Y
10.	Button Kit, Swedish	066E3227		1	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 6 of 7

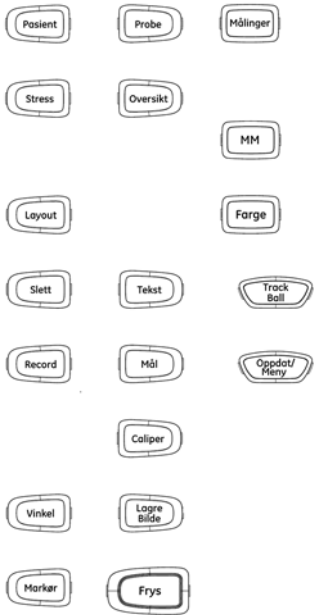

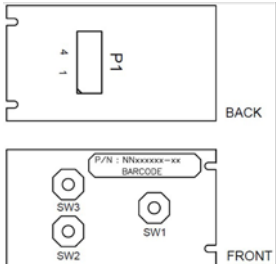

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
11.	Button Kit, Norwegian	066E3228		1	N	Y
12.	BUTTON FRAME, UI ASSY	GA200270	<p>SWITCHES ASSY FOR XY CONTROL</p>  <p><i>This ASSY includes the following parts:</i></p> <ul style="list-style-type: none"> <li>• Up-Down Button Board: GA200285</li> <li>• Button, XY-Break</li> <li>• Button, Z-Lift</li> <li>• Bracket, Buttons</li> </ul>	2	N	Y
13.	UP-DOWN BUTTON BOARD	GA200285	<p>Circuit Board <i>without</i> Plastic Front Cover and Buttons.</p> 	2	N	Y

Table 9-15 Button Kits and Knobs (cont'd) sheet 7 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
14.	Knobs - Encoders and Slidepots	GA200445	KNOB KIT FOR OP 	1	Y	Y

**9-7-7 Alphanumeric (AN) Keyboard parts**

**9-7-7-1 AN Keyboard Keysonic KSK-5001 U**

**Table 9-16 AN Keyboard Keysonic KSK-5001 U sheet 1 of 3**







ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Cable USB Keysonic AN Keyboard	GB200064		1	N	Y
2.	A/N Keyboard, Universal	GB200057-1	 Includes Enclosure	1	N	Y
3.	A/N Keyboard, Danish	GB200057-9	 Includes Enclosure	1	N	Y
4.	A/N Keyboard, Dutch	GB200057-10	 Includes Enclosure	1	N	Y
5.	A/N Keyboard, French	GB200057-2	 Includes Enclosure	1	N	Y
6.	A/N Keyboard, German	GB200057-3	 Includes Enclosure	1	N	Y



Table 9-16 AN Keyboard Keysonic KSK-5001 U (cont'd) sheet 2 of 3

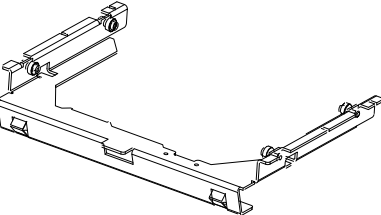

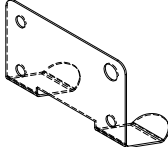
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	A/N Keyboard, Spanish	GB200057-4	 <p>Includes Enclosure</p>	1	N	Y
8.	A/N Keyboard, Portuguese	GB200057-5	 <p>Includes Enclosure</p>	1	N	Y
9.	A/N Keyboard, Italian	GB200057-6	 <p>Includes Enclosure</p>	1	N	Y
10.	A/N Keyboard, Swedish	GB200057-7	 <p>Includes Enclosure</p>	1	N	Y
11.	A/N Keyboard, Norwegian	GB200057-8	 <p>Includes Enclosure</p>	1	N	Y
12.	Wagon AN Drawer KS Asm	GB200089		1	N	Y

Table 9-16 AN Keyboard Keysonic KSK-5001 U (cont'd) sheet 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
13.	NON-MAGNETIC TOUCH LATCH, PR-21P	080X1424		2	N	Y
14.	SPRING AN LATCH	GA307643		1	N	Y

**9-7-8 Common Top Console parts**

The parts listed below can be used on all VIVID E9 / VIVID E7 systems.

**Table 9-17 Other Common Top Console parts sheet 1 of 6**

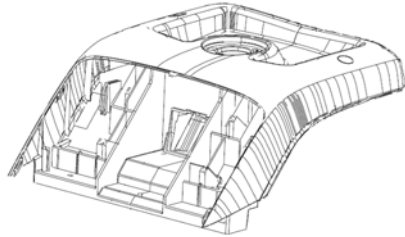

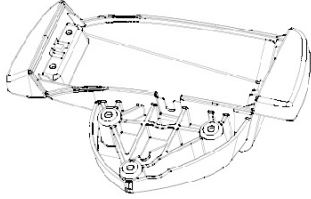
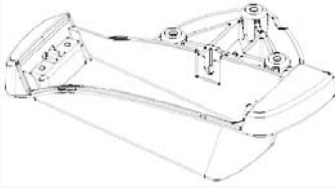

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	FRAME UI UPPER ASM	GA200392		1	N	Y
2.	USB Socket Cover	5207000-54		1	N	Y
3.	LEFT SUPPORT ASSEMBLY	5307245	Options holder 	1	N	Y
4.	RIGHT SUPPORT ASSEMBLY	5307243	Options holder 	1	N	Y
5.	TRAY UNIT ASSEMBLY	5307236-2	Replaces 5307236. 	2	N	Y

Table 9-17 Other Common Top Console parts (cont'd) sheet 2 of 6

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	UPPER BEZEL	GA200437		1	N	Y
7.	LCD MOUNT LOCK ASSY	GA200302		1	N	Y
8.	Frame <sup>w</sup> /LCD and TouchScreen	5207000-39 GOING OBSOLETE	CMO LCD display 			
9.	OP LOWER BEZEL 3	GB200151	Small hole for trackball. 	1	N	Y
10.	OP LOWER BEZEL	GA200438 GOING OBSOLETE	Small hole for trackball.  Use GB200151 as replacement when GA200438 becomes unavailable.	1	N	Y

Table 9-17 Other Common Top Console parts (cont'd) sheet 3 of 6



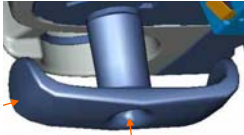

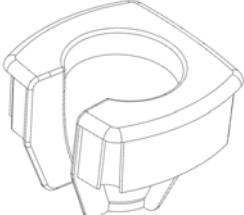
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
11.	SPEAKER WITH CABLE	GA200743 5265030	 <p>GA200743 replaces 5265030</p>	2	N	Y
12.	Cable, A/N Keyboard, USB & 12V	GA200368		1	N	Y
13.	CABLE HOOK, TWIN	GA307069		2	N	Y
14.	PROBEHOLDER INSERT 3D	GA307073	 <p>PROBEHOLDER SOFTINSERT FOR 3D/4D PROBES</p>	1	Y	Y
15.	PROBEHOLDER INSERT STD	GA307072	 <p>PROBEHOLDER INSERT FOR STANDARD PROBES</p>	1	Y	Y

Table 9-17 Other Common Top Console parts (cont'd) sheet 4 of 6

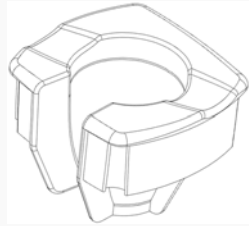


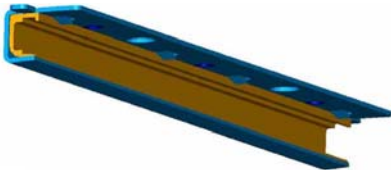
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
16.	PROBEHOLDER SOFTINSERT DOPPLER	GA307074	 PROBEHOLDER INSERT FOR DOPPLER (PEDOF) PROBE	1	Y	Y
17.	GEL CUP	GA307239		1	Y	Y
18.	SOFT INSERT GEL CUP	GA307676		1	Y	Y
19.	WAGON AN DRAWER SHEET MET. ASSY	GA200304		1	N	Y
20.	J-RAIL + LINING (J-RAIL ASSY)	GA200544		2	N	Y
21.	NON-MAGNETIC TOUCH LATCH, PR-21P	080X1424		2	N	Y

Table 9-17 Other Common Top Console parts (cont'd) sheet 5 of 6

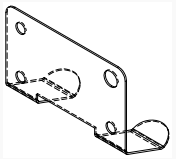
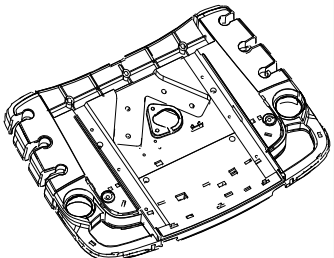
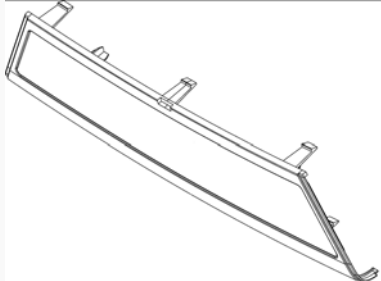
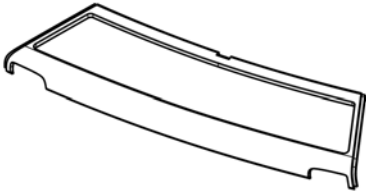

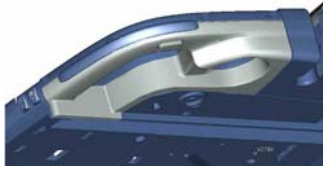
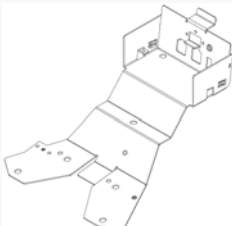
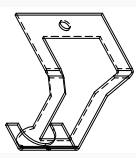
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
22.	SPRING AN LATCH	GA307643		1	N	Y
23.	FRAME, UI LOWER ASSEMBLY (LOWER FRAME ASSEMBLY)	GA200358		1	N	Y
24.	PALM REST ASSY	GA200605	PALM REST + PALM REST PAD 2 	1	N	Y
25.	PALM REST	GA307063	 PALM REST PAD	1	N	Y
26.	Handle, Left Lower	GA307234		1	N	Y

Table 9-17 Other Common Top Console parts (cont'd) sheet 6 of 6

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
27.	Handle, Right Lower	GA307236		1	N	Y
28.	Bulkhead, Plate, Extended	GA307059		1	N	Y
29.	BRACKET, LOCK HDMI 2	GA307624		1	N	Y



**Section 9-8**  
**XYZ parts**

Table 9-18 XYZ parts sheet 1 of 2



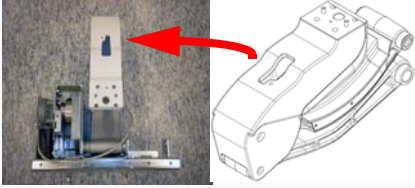
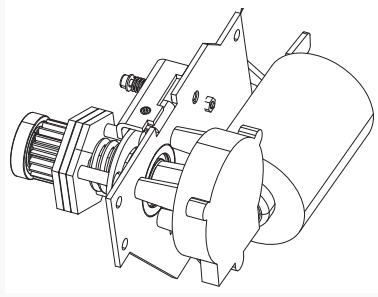
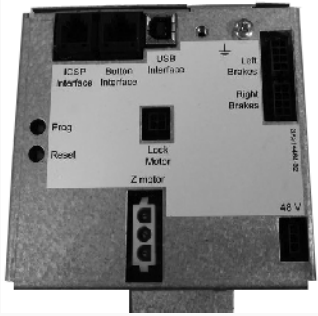
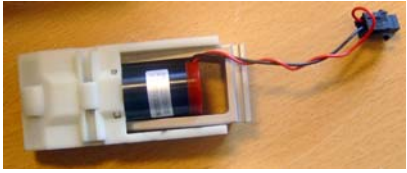

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	XY MECHANISM	GA200946	"FROG LEG" Replaces GA200036 <i>NOTE! This part requires that either the XYZ controller, Part Number GA200795 or Part number GA200994, is installed.</i>	1	N	Y
2.	XY MECHANISM	GA200036	"FROG LEG" 	1	N	Y
3.	Z-MECHANISM	GA200039		1	N	Y
4.	Z-Mech Sub Assy	GA200134		1	N	Y
5.	DRIVE GEAR ASSEMBLY	GA200750		1	N	Y

Table 9-18 XYZ parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	XYZ Controller Module	GA200994	 <p>The image shows a rectangular printed circuit board (PCB) for the XYZ Controller Module. It features several labeled components: 'ICSP Interface' and 'Button Interface' on the left; 'USB Interface' at the top center; 'Lock Motor' and 'Z motor' at the bottom center; and 'Left Brakes' and 'Right Brakes' on the right side. There are also 'Prog' and 'Reset' buttons on the left. A '48 V' label is visible at the bottom right corner.</p>	1	N	Y
7.	XY BRAKE ASSY	GA200952	 <p>The image shows a white plastic housing for the XY Brake Assembly. Inside the housing, a blue and red motor is visible, connected to a red and blue wire harness.</p>	4	N	Y
8.	PARK LOCK	GA200161	<p>XY Park Lock</p>  <p>The image shows a white plastic component, the XY Park Lock, with a metal bracket and a locking mechanism. It is connected to a red and blue wire harness.</p>	1	N	1

## Section 9-9 Main Console parts

Table 9-19 Main Console parts sheet 1 of 2

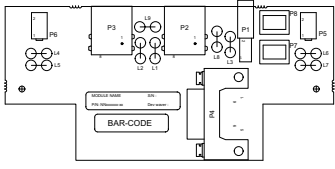
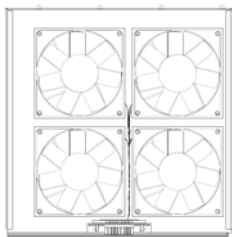
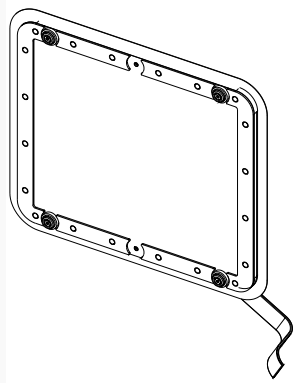


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BULKHEAD BOARD ASSY	5482676	Replaces GA200290. 	1	N	Y
2.	Fan for VE9 cardcage	098A0093	Spare part for VE9 Fan Tray / Fan Drawer	1	N	Y
3.	FAN DRAWER ASSY COMPLETE	GB200014	Replaces GA200829 and 5141940. Requires Application Software v110.1.11 or later, or v112.0 or later. (Ferrite included) 	1	N	Y
4.	AIR FILTER ASSEMBLY	5316340-2	DUST FILTER WITH HANDLE, LOCATED AT BOTTOM OF VIVID E9 / VIVID E7. 5316340-2 REPLACES GA200828 	1	N	Y
5.	FILTER DUST REAR	GA307351		1	Y	Y

Table 9-19 Main Console parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	CABLE MAIN - Top Console	5272357		1	N	Y

**Section 9-10**  
**Casters (Wheels) parts**

Table 9-20 Casters (Wheels) parts sheet 1 of 2

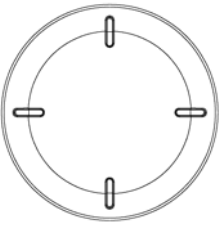
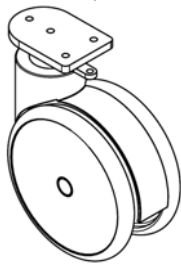
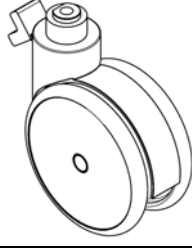
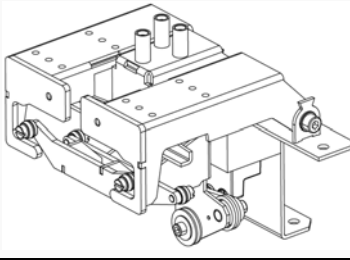


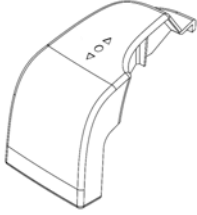
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Wheel cap for VE9 casters GA200245 and GA200246	GA307888	Replacement CAP with snap-on locks 	8	N	Y
2.	CASTERS, FRONT W/BRAKE AND LOCK	GA200245	FRONT CASTERS (FRONT WHEELS) 	2	N	Y
3.	CASTERS, REAR SIVIWEL AND BRAKE	GA200246	REAR CASTERS (REAR WHEELS) 	2	N	Y
4.	PEDAL MECHANISM ASSEMBLY	GA200070		1	N	Y
5.	PEDAL BRAKE	GA307052		1	N	Y

Table 9-20 Casters (Wheels) parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	PEDAL RELEASE	GA307053		1	N	Y
7.	PEDAL DIR LOCK	GA307054		1	N	Y


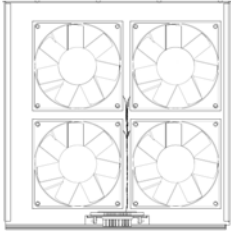
## Section 9-11 Front End Processor (FEP) Card Rack parts

### 9-11-1 Front End Processor Card Rack - BT'12 and XDclear (BT'13) with 2D

NOTE: For use in VIVID E9 with Part Number GB000075, GB000085, GB000090 and GB000095.

NOTE: For use in VIVID E7 with Part Number: GB000099 and GB000100.


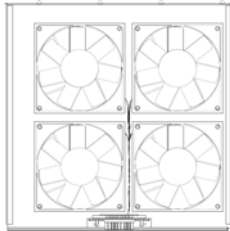
Table 9-21 Front End Processor Card Rack parts (2D)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	GRLY v2	GA200695	RELAY BOARD	1	N	Y
2.	GRX64	GB200025	RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
3.	GRX128 WITH CW	GB200020	RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
4.	GTX-TLP192mkII	GA200726-2	TRANSMITTER BOARD, 192 CHANNELS	1	N	Y
5.	FRONT PLANE	GA200760	USED IN BOTH UPPER AND LOWER POSITION	2	N	Y
6.	DRX6 MLA4	5301040-6	DIGITAL RECEIVER BOARD with 4 MLA	3	N	Y
7.	GFI 2	5161631-3	RADIO FREQUENCY INTERFACE	1	N	Y
8.	Cable Doppler MBD- Rot. ADPT. Box	GA200536	Doppler Cable 	1	N	Y
9.	Fan Drawer Assy Complete	GB200014		1	N	Y

**9-11-2 Front End Processor Card Rack - BT'11, BT'12 and XDclear with 4D Expert Option (BT13)**

NOTE: For use in VIVID E9 with Part Number GB000070 (BT13) and GB000080 (BT13).

**Table 9-22 Front End Processor Card Rack parts - BT'13**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	GRLY v2	GA200695	RELAY BOARD	1	N	Y
2.	GRX64	GB200025	RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
3.	GRX128 WITH CW	GB200020	RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
4.	GTX-TLP192mkII	GA200726-2	TRANSMITTER BOARD, 192 CHANNELS	1	N	Y
5.	FRONT PLANE	GA200760	USED IN BOTH UPPER AND LOWER POSITION	2	N	Y
6.	DRX6 MLA16	5301160-6	DIGITAL RECEIVER BOARD 16 MLA	3	N	Y
7.	GFI 2	5161631-3	RADIO FREQUENCY INTERFACE	1	N	Y
8.	Cable Doppler MBD- Rot. ADPT. Box	GA200536	Doppler Cable 	1	N	Y
9.	Fan Drawer Assy Complete	GB200014		1	N	Y



## Section 9-12 Back End Processor (BEP) Spare Parts

### 9-12-1 BEP6 Spare Parts

Table 9-23 BEP6 Spare Parts sheet 1 of 2





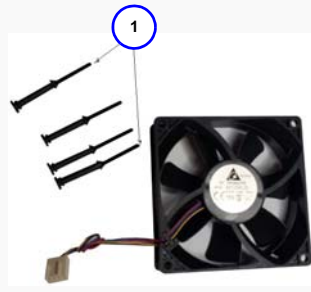


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BEP6.0 WITHOUT 4D	GB200002-03	BACK END PROCESSOR - BEP6 (without 4D) System software requirement: v104.3.4 (or higher)	1	N	Y
2.	BEP6.0 SIDE IO BOARD ASSEMBLY	5433408-1		1	N	Y
3.	BEP 6.0 POWER BOARD ASSEMBLY	5433408-20		1	N	Y
4.	BEP6.0 FRONTIO ASSEMBLY WITHOUT USB PORTS	5433408-41		1	N	Y
5.	BEP6.X HDD ASSEMBLY - SPARE PART (Including brackets)	5433408-50		1	N	Y
6.	Fan Bottom Advantech	5433408-70	 1 - FOUR (4x) MOUNTS INCLUDED	2	N	Y

Table 9-23 BEP6 Spare Parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	Graphics Adapter for BEP6.0 with 4D	066E0362	<p>NVIDIA QUADRO 410</p>  <p>Used on VIVID E9s with BEP6 and 4D.</p>	1	N	Y
8.	BEP6.X Video By-Pass Board	5433408-90		1	N	Y
9.	"Intel® HD Graphics" and "Intel® Graphics Media Accelerator". - BEP6	N/A	Included on the BEP6's Motherboard	1	N	N
10.	Digital Video Recorder Circuit Board	5135840	<p>OPTION</p> <p>May be used with all BEPs</p>	1	N	Y
11.	All BEP6 cables	See Section 9-17-6-1 "BEP6 cables" on page 9-63				

## Section 9-13 Main Power Supply

Table 9-24 Main Power Supply

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Main power supply Vivid E9	GA200730-03		1	N	Y

## Section 9-14 I/O modules

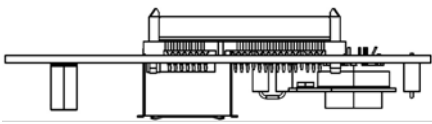
Table 9-25 I/O Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Patient IO module III - RoHS	GB200010-2	Replaces GB200010	1	N	Y
2.	PATIENT IO	GB200010	Replaces GA200240.	1	N	Y
3.	BEP6.0 SIDE IO BOARD ASSEMBLY	5433408-1	I/O ASSEMBLY For: GB200001 and GB200002.	1	N	Y

## Section 9-15 Peripherals for VIVID E9 / VIVID E7


### 9-15-1 DVD drives

Table 9-26 DVD drives

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	DVD Drive SATA DVD Multi Writer LG GH24NS95	066E8899	To replace 066E0854 and 066E0855	1 or 2	N	Y
2.	DVD Drive SATA Sony Optiarc AD-7280S-0B	066E0855 Going OBSOLETE	Replaces 066E0854	1 or 2	N	Y
3.	DVD Interface Board	5301204		1	N	Y

### 9-15-2 Printer, Internal

Table 9-27 Printer, B/W, Internal

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	B & W PRINTER	GA100980/ 066E2961	MITSUBISHI Digital Monochrome Printer P95DE	1	N	Y
2.	B & W PRINTER	FC100942/ 066E0111	SONY UP-D897SYN DIGITAL GRAPHIC B/W PRINTER - USB 	1	N	Y
3.	VIDEO PAPER UPP110HD BOX OF 10 ROLLS	CAT# E14731GE		1	N	N

### 9-15-3 Printers, External - USB

Table 9-28 Printer, External - USB sheet 1 of 2


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
4.	Mitsubishi Digital Color Printer CP30D	066E2963	Spare Part (printer) For Japan	1	Y	Y
5.	Mitsubishi Digital Color Printer CP30DW-Z	066E2964	Spare Part (printer) All other countries (Not for Japan)	1	Y	Y

Table 9-28 Printer, External - USB (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	CABLE, POWER 1XX VAC	070C3561		1	Y	Y
7.	MAINS CABLE 3P HP PN DM293A #ABJ,JAP	070C1502				
8.	MAINS CABLE 3P HP PN DM293A #AB2 CHI	070C1501				
9.	COLOR PAPER UPC21L SONY	CAT# E70151SA	COLOR PAPER, LARGE A6	1	N	N

9-15-4 Printers, Network

Table 9-29 Printer, Color, Network

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	COLOR PRINTER HP OFFICEJET PRO 8000 100-240V  SPARE PART:	EY100153 OBSOLETE  066E0427 OBSOLETE	Replaced by: <ul style="list-style-type: none"> <li>• 066E3023 HP Color Printer (230V) / 066E3024 HP Color Printer (115V)</li> <li>• GA200652-02 Printer installer v.1.0.7</li> </ul>  Color Printer HP Officejet Pro 8000 100-240V CB092A	1	N	Y

**9-15-5 Digital Video Stream Recorder****Table 9-30 Digital Video Stream Recorder**


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Digital Video Stream Recorder (OPTION)	GB200048		1	N	Y
2.	DVD Assembly for Vivid E9	GA200618	DVD drive + bracket (part of GA200614)	1	N	Y
3.	DVR Board	See: <a href="#">Section 9-12 "Back End Processor (BEP) Spare Parts" on page 9-47.</a> Digital Video Disc Recorder - Board is installed in BEP				
4.	Cable - DVD Power, FREY	Cable K, See: <a href="#">9-17-6 "Back End Processor (BEP) cables" on page 9-63</a>				

**9-15-6 USB Flash Drive (UFD) for data storage****Table 9-31 USB Flash Drive (UFD) for data storage**

ITEM	Part Name	Part Number	Description	QTY	CRU	FRU
1	USB Memory Key 8GB	066E0753	Kingston DataTraveler 410	1	Y	Y
2	USB Memory Key 4GB	066E0754	SanDisk Cruzer Slice	1	Y	Y

9-15-7 USB Hard Drive with RAID1



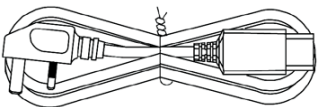


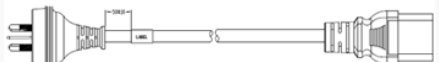
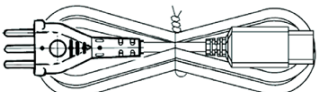
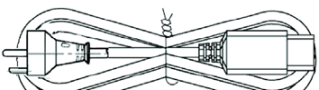

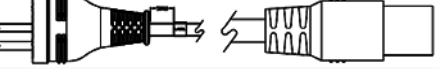

Table 9-32 USB Hard Drive with RAID1

ITEM	Part Name	Part Number	Description	QTY	CRU	FRU
1.	External USB HD with RAID1 data protection mirrored hard disk	EY100452		1	N	N
2.	USB Hard Drive ICY BOX with RAID1	066E0856		For installation instructions, see: EchoPAC PC and Vivid E9 Installation Manual for ICY BOX Desktop Hard Drive, Direction Number EY194452.	1	N
3.	Hard Drive 3,5 inches 2TB SATA for ICY BOX	066E0857	Spare HDD	2	N	Y



## Section 9-16 Mains Power Cables - VIVID E9 / VIVID E7

Table 9-33 Mains Power Cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	MAINS POWER CABLE - CHINA	5148381-5 H4000ZC		1	Y	N
2.	MAINS POWER CABLE - EUROPE (CONTINENTAL EU POWER CORD)	5148381-3 H4000ZB		1	Y	N
3.	MAINS POWER CABLE - UK/ IRELAND (UK/IRELAND POWER CORD)	5148381-4 H4000ZD		1	Y	N
4.	MAINS POWER CABLE - JAPAN	5148381-2 H4000ZK		1	Y	N
5.	MAINS POWER CABLE - NORTH AMERICA	5148381 H4000ZA		1	Y	N
6.	MAINS POWER CABLE - AUSTRALIA	5323129 5148381-6 H4000ZG	5323129 replaces 5148381-6 	1	Y	N
7.	MAINS POWER CABLE - SWITZERLAND	5148381-7 H4000ZL		1	Y	N
8.	MAINS POWER CABLE - DENMARK	5148381-8 H4000ZE		1	Y	N
9.	MAINS POWER CABLE - ARGENTINA	5323275/ 5148381-9 H4000ZH		1	Y	N
10.	MAINS POWER CABLE - ISRAEL	5322309/ 5148381-10 H4000ZJ		1	Y	N
11.	MAINS POWER CABLE - INDIA (CA-NET NETZKABEL INDIEN)	5323270/ 5148381-11 H4000ZF		1	Y	N
12.	MAINS POWER CABLE - BRAZIL (CA-NET NETZKABEL BRASILIEN 20A, 3M )	KTZ280186		1	Y	Y

**Section 9-17**  
**Internal Cables - VIVID E9 / VIVID E7**

**9-17-1 Cable Harness**

**Table 9-34 Cable Harness sheet 1 of 2**


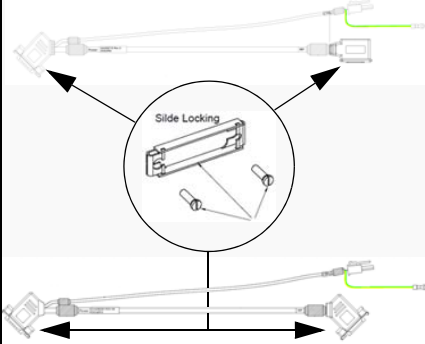




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	CABLE HARNESS UPDATED WITH NEW DVD SOLUTION	GA200075		1	N	Y
<b>CONTENT IN GA200075</b>						
2.	CABLE, XY-LOCK	GA200225	CABLE T (XYZ CONTROLLER - LOCK MOTOR) 	1	N	Y
3.	CABLE POWER-CONTROLLER-BEP FOR VIVID E9 / VIVID E7	GA200715	CABLE I (J1 - MAIN POWER SUPPLY - XYZ CONTROLLER) (The upper version of the cable was introduced 2011.)  GA200715 replaces GA200291	1	N	Y
4.	CABLE, SUB WOOFER	GA200333	CABLE P (J33 - SUBWOOFER) 	1	N	Y
5.	CABLE-PCI EXPRESS ON HDMI, BEP-CARDRACK, FREY	5152290	PCI EXPRESS CABLE (GFI to BEP-J5)	1	N	Y
6.	CABLE - BEP TO BACKPLANE, FREY	5194491	CABLE N	1	N	Y
7.	CABLE - USB, BEP TO MAIN SUPPLY, FREY	5194492	CABLE H (J4 - MAIN POWER SUPPLY)	1	N	Y
8.	CABLE - USB, BEP TO BW PRINTER, FREY	5194492-2		1	N	Y

Table 9-34 Cable Harness (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	Cable - USB BEP to XYZ MOTOR CONTROLLER	5194492-5		1	N	Y
10.	CABLE - AC POWER BW PRINTER, FREY	5194493	CABLE R (MAIN POWER SUPPLY - BW PRINTER)	1	N	Y
11.	CABLE - DVD POWER FULLY SHIELDED	5266407	CABLE K (J30 - DVD 1 or DVD 2) 	2	N	Y
12.	CABLE - DVD eSATA FULLY SHIELDED	5270048	CABLE M (J2 - DVD 1 or DVD 2) 	2	N	Y
13.	MAIN CABLE ASSEMBLY, FREY	5272357	CABLE D, FROGLEG CABLE <ul style="list-style-type: none"> <li>• DVI VIDEO (BEP &gt; OP PANEL)</li> <li>• 48V POWER/USB6 (BEP &gt; OP PANEL)</li> <li>• AUDIO/ON/OFF/USB5 (BEP &gt; OP PANEL)</li> </ul> UP/DOWN/BRAKE/RELEASE SWITCHES (OP PANEL > MOTOR/BRAKE CONTROL) 	1	N	Y

9-17-2 Top Console Cables

Table 9-35 VIVID E9 / VIVID E7 Top Console cables sheet 1 of 2


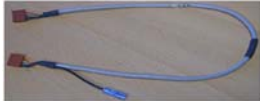




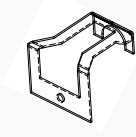




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Cable USB Keysonic AN Keyboard	GB200064		1	N	Y
2.	CABLE AN KEYBOARD, USB & 12V	GA200368	J18 - KEYBOARD. USB and 12V 	1	N	Y
3.	OPERATOR PANEL CABLE KIT	GA200446 GOING OBSOLETE	 TRACKBALL USB CABLE  USB VIDEO BOARD FLEX CABLE  HV INVERTER CABLE	1	N	Y
4.	CABLE MAIN	5272357	CABLE D, FROGLEG CABLE • DVI VIDEO (BEP > OP PANEL) • 48V POWER/USB6 (BEP > OP PANEL) • AUDIO/ON/OFF/USB5 (BEP > OP PANEL) UP/DOWN/BRAKE/RELEASE SWITCHES (OP PANEL > MOTOR/BRAKE CONTROL) 	1	N	Y
5.	BRACKET, LOCK BULKHEAD CONNECTORS	GA307978	For mechanically securing the monitor HDMI cable and the monitor Power/USB cable to the rear side of the UI bulkhead. 	1	N	Y

Table 9-35 VIVID E9 / VIVID E7 Top Console cables sheet 2 of 2 (cont'd)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	BRACKET, LOCK HDMI 2	GA307624	TO FIX THE LCD HDMI CONNECTOR TO THE BULKHEAD BACKSIDE. 	1	N	Y
7.	CABLE, USB OP-BULKHEAD	5248610	CABLE G USB (short cable inside the UI) (J24 - P7), (J25 - P8)	2	N	Y
8.	CABLE, XYZ UP/DOWN	GA200311	CABLE U UP/DOWN/LOCK BUTTONS 	2	N	Y
9.	LCD Monitor Arm Cable Kit	GA200668	- Powerd_USB_cable_frey - L9 19" LCD Video Cable	1	N	Y
10.	Powerd_USB_cable_frey	5196890		1	N	Y
11.	L9 19" LCD Video Cable	5256600		1	N	Y


9-17-3 XYZ Controller cables

Table 9-36 XYZ Controller cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BRAKE CONTROL LEFT / RIGHT	GA200335	CABLE B (XYZ CONTROLLER - INNER FROG BRAKES)	2	N	Y
2.	BRAKE ARM LEFT RIGHT - CABLE	GA200334	CABLE C (INNER BRAKE - OUTER BRAKE) 	2	N	Y
3.	MAIN CABLE - XYZ SWITCH SIGNALS	SEE MAIN CABLE	[PART OF MAIN CABLE] CABLE D3 (XYZ CONTROLLER - OP PANEL)	1	N	N
4.	POWER CABLE - BEP 48V	GA200291	CABLE I (J1 - MAIN POWER SUPPLY - XYZ CONTROLLER) 	1	N	Y
5.	CABLE USB A-B HIGH SPEED	5194492-2	CABLE L, USB CABLE (J28 - XYZ CONTROLLER)	1	N	Y
6.	XY - LOCK	GA200225	CABLE T (XYZ CONTROLLER - LOCK MOTOR) 	1	N	Y

9-17-4 Main Power Supply cables

Table 9-37 Main Power Supply cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	MAINS POWER CABLE	See: <a href="#">Section 9-16 "Mains Power Cables - VIVID E9 / VIVID E7" on page 9-55</a>				
2.	CABLE USB A-B HIGH SPEED	5194492-2	CABLE H (J4 - MAIN POWER SUPPLY)	1	N	Y
3.	POWER CABLE - BEP 48V	GA200291	CABLE I (J1 - MAIN POWER SUPPLY - XYZ CONTROLLER) 	1	N	Y
4.	POWER CABLE - BW PRINTER	5194493	CABLE R (MAIN POWER SUPPLY - BW PRINTER)	1	N	Y

9-17-5 Front End Processor (FEP) cables

Table 9-38 Front End Processor (FEP) cables

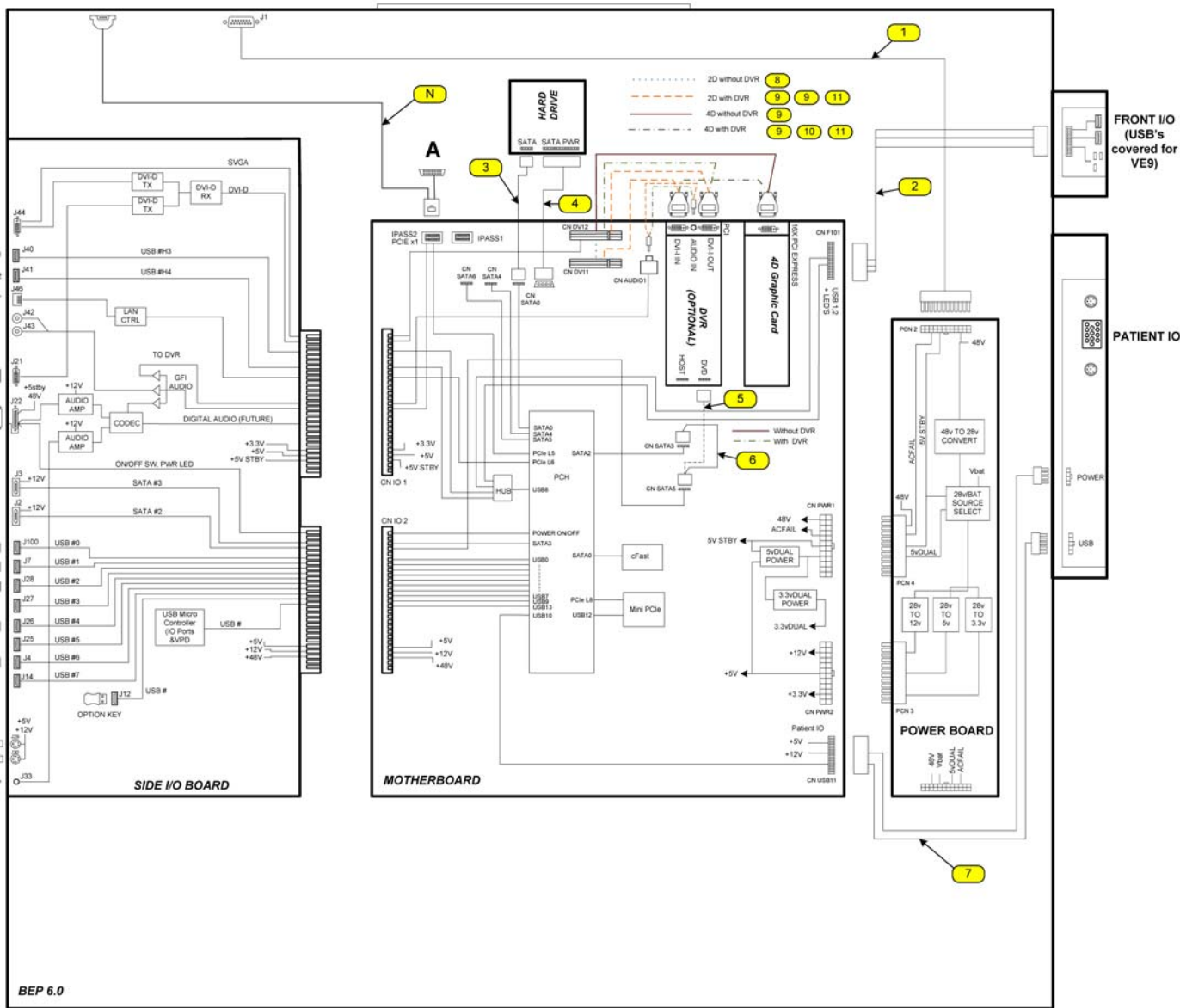
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	PC2GFI CARD CABLE	5152290	PCI EXPRESS CABLE (GFI to BEP-J5)	1	N	Y
2.	BEP - BACKPLANE CABLE	5194491	CABLE N	1	N	Y
3.	Cable Doppler MBD - Rot. ADPT. Box	GA200536		1	N	Y



9-17-6 Back End Processor (BEP) cables

9-17-6-1 BEP6 cables

Figure 9-2 BEP6 internal cables



9-17-6-1 BEP6 cables (cont'd)

Table 9-39 BEP6 Internal Cables sheet 1 of 2

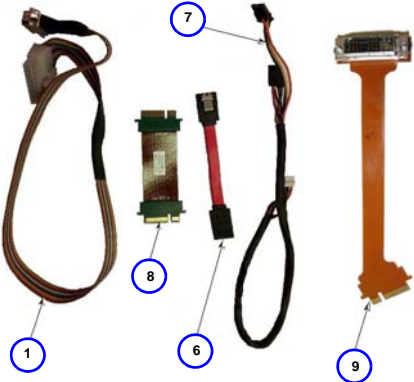

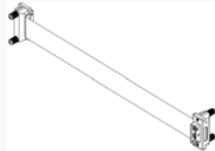

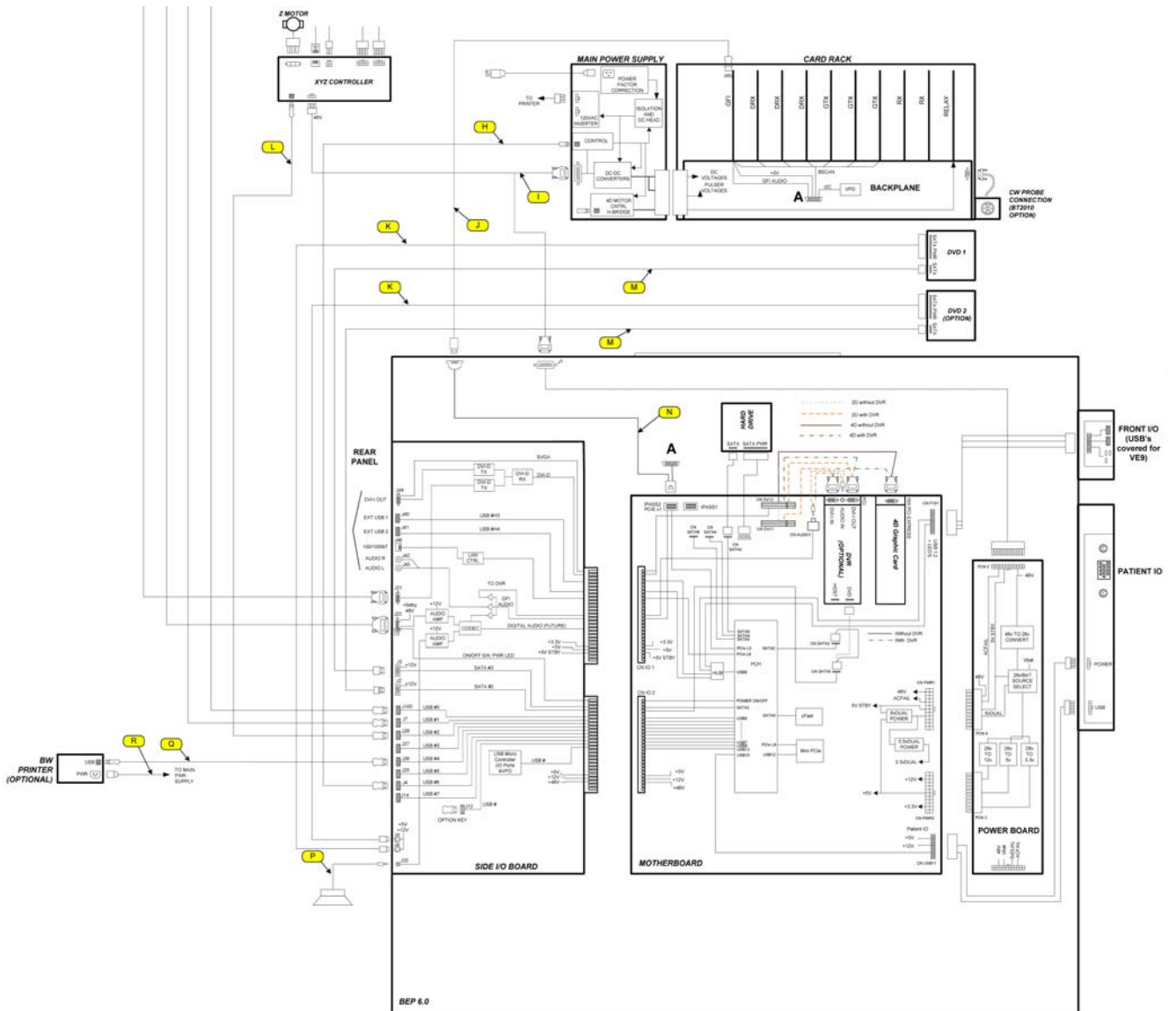
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
0.	BEP6.X CABLE KIT - SPARE PART	5433408-80	 <p>1 - BEP POWER IN CABLE 6 - SATA JUMPER 7 - PATIENT I/O INTERFACE CABLE 8 - VIDEO JUMPER (FLEX) 9 - DVI TO SAMTEC JUMPER (FLEX)</p>	1	N	Y
1.	BEP POWER IN CABLE	INCLUDED IN CABLE KIT 5433408-80.		1	N	N
2.	FRONT PANEL	CABLE INCLUDED IN BEP6.0 FRONT IO ASSEMBLY WITHOUT USB PORT 5433408-41.		1	N	N
3.	SATA HARD DRIVE	CABLE COMES WITH HDD 5433408-50.		1	N	N
4.	POWER HARD DRIVE	CABLE COMES WITH HDD 5433408-50.		1	N	N
5.	DVR TO SATA	5439827-2	<p>USED ONLY IF DVR IS INSTALLED.</p> 	1	N	Y
6.	SATA JUMPER	INCLUDED IN CABLE KIT 5433408-80. USED IF DVR NOT INSTALLED.		1	N	N
7.	PAT IO POWER AND USB	INCLUDED IN CABLE KIT 5433408-80.		1	N	N
8.	VIDEO JUMPER FLEX	INCLUDED IN CABLE KIT 5433408-80.		1	N	N
9.	DVI-SAMTECH FLEX	INCLUDED IN CABLE KIT 5433408-80.		1	N	N
10.	DVI FLEX MAIN YGGDRASIL	5197216		1	N	Y
11.	DVR AUDIO	5435462		1	N	Y

Table 9-39 BEP6 Internal Cables (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
N.	Refer to: <a href="#">Table 9-40 "BEP6 External Cables and Harnesses"</a> on page 9-67.					

9-17-6-1 BEP6 cables (cont'd)

Figure 9-3 BEP6 External Cables



9-17-6-1 BEP6 cables (cont'd)

Table 9-40 BEP6 External Cables and Harnesses sheet 1 of 3




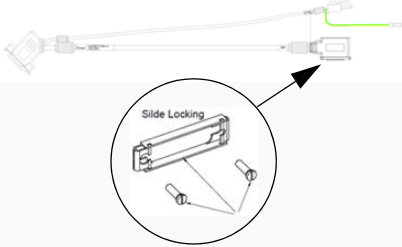
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
A	MAIN POWER CORD	5148381-X	X DEPENDS ON COUNTRY. For illustrations, see: <a href="#">Section 9-16 "Mains Power Cables - VIVID E9 / VIVID E7"</a> on page 9-55.	1	Y	Y
B	FROG BRAKE CONTROL	GA200335	CABLE B (XYZ CONTROLLER - INNER FROG BRAKES)	2	N	Y
C	FROG BRAKE ARM	GA200334	CABLE C (INNER BRAKE - OUTER BRAKE) 	2	N	Y
D	MAIN CABLE ASSEMBLY	5272357		1	N	Y
D1	MAIN CABLE – POWER/AUDIO		Part of: 5272357 - MAIN CABLE ASSEMBLY	1	N	N
D2	MAIN CABLE – VIDEO		Part of: 5272357 - MAIN CABLE ASSEMBLY	1	N	N
D3	MAIN CABLE – XYZ SWITCH SIGNALS		Part of: 5272357 - MAIN CABLE ASSEMBLY	1	N	N
D4	MAIN CABLE – USB		Part of: 5272357 - MAIN CABLE ASSEMBLY	2	N	N
H	CABLE - USB, BEP6 TO MAIN SUPPLY, FREY	5194492-8	USB CABLE - MAIN POWER SUPPLY 	1	N	Y
I	Cable Power-Controller-BEP for Vivid E9	GA200715	POWER CABLE – BEP 48V CABLE I (J1 - MAIN POWER SUPPLY - XYZ CONTROLLER) 	1	N	Y

Table 9-40 BEP6 External Cables and Harnesses (cont'd) sheet 2 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J	CABLE-PCI EXPRESS ON HDMI, BEP-CARDRACK, FREY	5152290	PCI EXPRESS CABLE	1	N	Y
K	CABLE - DVD POWER FULLY SHIELDED	5266407	POWER CABLE, DVD CABLE K (J30 - DVD 1) (J29 - DVD 2) 	1 or 2	N	Y
L	CABLE - USB BEP TO XYZ MOTOR CONTROLLER	5194492-6	USB CABLE – XYZ CONTROLLER	1	N	Y
M	CABLE - DVD eSATA FULLY SHIELDED	5270048	SATA CABLE – DVD CABLE M (J2 - DVD 2) (J3 - DVD 1) 	1 or 2	N	Y
N	BEP6 TO GFI AND CARDRACK BACKPLANE CABLE	5391509		1	N	Y
P	AUDIO CABLE - SUBWOOFER	GA200333	CABLE P (J33 - SUBWOOFER) 	1	N	Y
Q	USB CABLE – BW PRINTER	5194492-2	USED ONLY IF PRINTER INSTALLED	1	N	Y

Table 9-40 BEP6 External Cables and Harnesses (cont'd) sheet 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
R	POWER CABLE – BW PRINTER	5194493	USED ONLY IF PRINTER INSTALLED	1	N	Y

9-17-7 Peripherals Cables

Table 9-41 Peripherals Cables





ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	POWER CABLE - BW PRINTER	5194493	CABLE R (MAIN POWER SUPPLY - BW PRINTER)	1	N	Y
2.	POWER CABLE - DVD	5266407	CABLE K (J30 - DVD 1) 	1	N	Y
3.	POWER CABLE - DVD	5266407	CABLE K (J29 - DVD 2) 	1	N	Y
4.	SATA CABLE - DVD	5270048	CABLE M (J2 - DVD 1) 	1	N	Y



Table 9-41 Peripherals Cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	SATA CABLE - DVD	5270048	CABLE M (J3 - DVD 2) 	1	N	Y

**Section 9-18**  
**ECG cables - VIVID E9 / VIVID E7**

Table 9-42 ECG Cables sheet 1 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	ECG CABLE SET	FC200389	CONTENT: - CABLE - CABLE ECG NICOLAY - ADAPTER RCA MALE -BNC FEMALE - ADAPTER RCA FEMALE - 6 - ADAPTER RCA FEMALE - 3	1	Y	Y
2.	CABLE ECG MARQ. AHA / AMERICA	164L0025		1	Y	Y
3.	CABLE ECG MARQ. IEC / EU + AS	164L0026		1	Y	Y
4.	LEADWIRES ECG MARQ. AHA / AMERICA	164L0027		1	Y	Y
5.	LEADWIRES ECG MARQ. IEC/EU+AS	164L0028		1	Y	Y
6.	ECG cable neo AHA	164L0029		1	N	N
7.	ECG cable neo IEC	164L0030		1	N	N
8.	ECG cable, neo, AHA	2017004-001	Multi-Link 3-lead ECG Care cable neonatal DIN, AHA (3.6 m/12ft) Used together with neonatal leads H45571RJ	1	N	N
9.	ECG cable, neo, IEC	2017004-003	Multi-Link 3-lead ECG Care cable neonatal DIN, IEC (3.6 m/12ft) Used together with neonatal leads H45571RK	1	N	N

Table 9-42 ECG Cables (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
10.	Lead/electr neo AHA 600	2009101-404	Neonatal cloth electrode with preattached leadwire, AHA, DIN, 3/pouch, 600/box Used together with neonatal ECG cable H45571RD.	1	N	N
11.	Lead/electr neo IEC 600	2009101-406	Neonatal cloth electrode with preattached leadwire, IEC, DIN, 3/pouch, 600/box Used together with neonatal ECG cable H45571RE.	1	N	N
12.	Adapter, ECG 3-lead	414371-001	ECG Cable Adapter, Multi-link 3-lead DIN adapter This adapter can be used together with adult ECG cables H45571PY (AHA) or H45571RA (IEC) and neonatal ECG leads/electrodes H45571RJ (AHA) or H45571RK (IEC).	1	N	N


Table 9-43 Vivid E9 Vet Labels

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Vet product Label for VE9	GB314182		1	N	Y
2.	Side Cover Label	5410085		2	N	Y
3.	VET PRODUCT LABEL	5454608	FOR PROBE's CONNECTOR	*	N	Y

\*) Each probe used on a VIVID E9 Vet must be labeled with a Vet Product label on the probe connector.

**Section 9-19**  
**Physio TX Parts**

**Table 9-44 Physio TX Parts**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	PCG MICROPHONE MA-300HDS WITH ADAPTER.	GB200036	Replaces FD200036	1	Y	Y
2.	Adapter for MA300 heartmicrophone	FC200658	 PHONO ADAPTER	1	Y	Y



**Section 9-20**  
**Options - VIVID E9 / VIVID E7**

**9-20-1 Options - VIVID E9 / VIVID E7 - XDclear, application software v113**

**Table 9-45 Options - VIVID E9 / VIVID E7 - XDclear, application software v113 sheet 1 of 2**

ITEM	PART NAME	CAT # or PART NUMBER	COMMENTS
<b>ADVANCED OPTIONS</b>			
1.	LVO CONTRAST IMAGING	H45561MY	
2.	VASCULAR CONTRAST	H45561MZ	
3.	ADVANCED CONTRAST IMAGING	H45571GY	
4.	AFI PRODUCTIVITY PACKAGE	H45561GX	
5.	IMT	H45561GY	
6.	LV Mass Only	H45561NA	
7.	4D Strain and LV Mass	H45561NB	
8.	Stress	H45561NC	
9.	Auto 2D EF	H45561ND	
10.	Rodent	H45561NE	
11.	4V Enable	H45561RJ	
12.	Advanced Qscan Imaging (Not for Japan)	H45561RK	
13.	Advanced Qscan Imaging (Japan)	H45561RL	
14.	MV Assessment (Tomtec)	H45571GZ	
15.	4D Polarised Stereo Vision Interface	H45571HA	
16.	Vivid E9 Advanced Bundle	H45571FA	•
17.	TEE Interface Module	H45571FK	
18.	Quantitative Analysis Package	H45571FL	
19.	Tissue Tracking	H45571FM	
20.	MPEGVue and eVue	H45571FN	
21.	Scan Assist Pro	H45571FP	
22.	DICOM Connectivity Package	H45571FR	
<b>OTHER</b>			

Table 9-45 Options - VIVID E9 / VIVID E7 - XDclear, application software v113 (cont'd) sheet 2

ITEM	PART NAME	CAT # or PART NUMBER	COMMENTS
23.		5380960-2	Replaces 5380960
		H46732LF 5380960	This part is replacement for H4910FT / 5331575. 
24.	Tri-pedal USB Footswitch	H4910FT 5331575 OBSOLETE	  Obsolete from GE.
25.	DVR Option for Vivid E9.	H45551NS/ GB200048	<b>Includes parts for installing DVR into both BEP5 and BEP6.</b> <b>KIT INCLUDES:</b> <ul style="list-style-type: none"> <li>• Digital Video Recorder Circuit Board (5135840)</li> <li>• DVI Flex, DVR jumper, Yggdrasil BEP (5197217)</li> <li>• DVI Flex, Main, Yggdrasil BEP (5197216)</li> <li>• Cable - DVD Power fully shielded (5266407)</li> <li>• Cable - DVD eSATA fully shielded (5270048)</li> <li>• DVD Assembly for VIVID E9 / VIVID E7 (GA200618)</li> <li>• Label, DVR (GA314384)</li> <li>• Flex Cable - DVI to SAMTEC Video Jumper (5428990)</li> <li>• Cable - DVR Audio BEP6 (5435462)</li> <li>• SATA Cable - DVR to BEP6 MB (5439827-2)</li> </ul>

**Section 9-21**  
**Product Manuals for VIVID E9 / VIVID E7**

**9-21-1 Product manuals for VIVID E9 with XDclear, S/W v113.x**

*NOTE: The User manuals and the Service manual (PDF files) are located on the VIVID E9 Online Manual Multi language CD set, Part Number: GB200133. The manuals are also included on the UFD. Paper copies may be ordered from GE.*

**Table 9-46 Product Manuals for VIVID E9 with XDclear sheet 1 of 2**

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BT13 Vivid E9 User manual - Bulgarian	GB092101		1	N	N
2.	BT13 Vivid E9 User manual - Chinese	GB092102		1	N	N
3.	BT13 Vivid E9 User manual - Croatian	GB092103		1	N	N
4.	BT13 Vivid E9 User manual - Czech	GB092104		1	N	N
5.	BT13 Vivid E9 User manual - Danish	GB092105		1	N	N
6.	BT13 Vivid E9 User manual - Dutch	GB092106		1	N	N
7.	BT13 Vivid E9 User manual - English	GB092107		1	N	N
8.	BT13 Vivid E9 User manual - Estonian	GB092108		1	N	N
9.	BT13 Vivid E9 User manual - Finnish	GB092109		1	N	N
10.	BT13 Vivid E9 User manual - French	GB092110		1	N	N
11.	BT13 Vivid E9 User manual - German	GB092111		1	N	N
12.	BT13 Vivid E9 User manual - Greek	GB092112		1	N	N
13.	BT13 Vivid E9 User manual - Hungarian	GB092113		1	N	N
14.	BT13 Vivid E9 User manual - Indonesian	GB092114		1	N	N
15.	BT13 Vivid E9 User manual - Italian	GB092115		1	N	N
16.	BT13 Vivid E9 User manual - Japanese	GB092116		1	N	N
17.	BT13 Vivid E9 User manual - Korean	GB092117		1	N	N
18.	BT13 Vivid E9 User manual - Latvian	GB092118		1	N	N
19.	BT13 Vivid E9 User manual - Lithuanian	GB092119		1	N	N
20.	BT13 Vivid E9 User manual - Norwegian	GB092120		1	N	N
21.	BT13 Vivid E9 User manual - Polish	GB092121		1	N	N
22.	BT13 Vivid E9 User manual - Portuguese (Europe)	GB092122		1	N	N
23.	BT13 Vivid E9 User manual - Portuguese (Brazil)	GB092123				
24.	BT13 Vivid E9 User manual - Romanian	GB092124		1	N	N
25.	BT13 Vivid E9 User manual - Russian	GB092125		1	N	N
26.	BT13 Vivid E9 User manual - Serbian	GB092126		1	N	N
27.	BT13 Vivid E9 User manual - Slovak	GB092127		1	N	N
28.	BT13 Vivid E9 User manual - Slovenian	GB092128		1	N	N
29.	BT13 Vivid E9 User manual - Spanish	GB092129		1	N	N



Table 9-46 Product Manuals for VIVID E9 with XDclear (cont'd) sheet 2 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
30.	BT13 Vivid E9 User manual - Swedish	GB092130		1	N	N
31.	BT13 Vivid E9 User manual - Turkish	GB092131		1	N	N
32.	BT13 Vivid E9 Reference manual - English	GB092132	REFERENCE MANUAL, ENGLISH	1	N	N
<b>SERVICE MANUALS</b>						
1.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GB050018	For carton box	1	N	N
2.	VIVID E9 / VIVID E7 SERVICE MANUAL, ENGLISH	GB091046	FOR BT'13 ONLY	1	N	N
3.	Printer Driver Installation Manual	GA294652		1	N	N
4.	Vivid E9 DVR Option Installation Manual	GA294614	Revision 4.	1	N	N
5.	ICY BOX Desktop Hard Drive Installation manual for EchoPAC PC, EchoPAC SW Only and Vivid E9	EY194452		1	N	N

9-21-2 Product manuals for VIVID E7 with XDclear, S/W v113.x

Table 9-47 Product Manuals for VIVID E7 with XDclear

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Vivid E7 User manual - Chinese	GB092138		1	N	N
2.	Vivid E7 User manual - English	GB092137		1	N	N
3.	Vivid E7 Reference manual - English	GB092135	REFERENCE MANUAL, ENGLISH	1	N	N
<b>SERVICE MANUALS</b>						
4.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GB050018	For carton box	1	N	N
5.	VIVID E9 / VIVID E7 SERVICE MANUAL, ENGLISH	GB091046	FOR S/W v113 ONLY	1	N	N
6.	Printer Driver Installation Manual	GA294652		1	N	N
7.	Vivid E9 DVR Option Installation Manual	GA294614	Revision 4.	1	N	N
8.	ICY BOX Desktop Hard Drive Installation manual for EchoPAC PC, EchoPAC SW Only and Vivid E9	EY194452		1	N	N

**9-21-3 Probes Documentation****9-21-3-1 6VT-D Probe Care Cards****Table 9-48 6VT-D Probe Care Cards**

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	6VT-D Probe Care Card, English and Chinese	KX192613		1	N	N
2.	6VT-D Probe Care Card, French and German	KX192615		1	N	N
3.	6VT-D Probe Care Card, multi language	KX192655	Bulgarian, Croatian, Czech, Danish, Dutch, Estonia, Finnish, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Latvian, Lithuanian Norwegian, Polish, Portugese, Romanian, Russian, Slovenian, Serbian, Slovakian, Spanish, Swedish, Turkish	1	N	N

**9-21-3-2 6T/6T-RS/6Tc/6Tc-RS/6Tv/9T/9T-RS Probe Care Cards****Table 9-49 6T/6T-RS/6Tc/6Tc-RS/6Tv/9T/9T-RS Probe Care Cards**

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	TEE Probe Care Card, English and Chinese	KX192042		1	N	N
2.	TEE Probe Care Card, French and German	KX192068		1	N	N
3.	TEE Probe Care Card, multi language	KX192656	Bulgarian, Croatian, Czech, Danish, Dutch, Estonia, Finnish, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Latvian, Lithuanian Norwegian, Polish, Portugese, Romanian, Russian, Slovenian, Serbian, Slovakian, Spanish, Swedish, Turkish	1	N	N

9-21-3-3 TEE Probes user manuals

Table 9-50 TEE Probes user manuals

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	TEE Probes user manual - Hungarian	KX192076		1	N	N
2.	TEE Probes user manual - Slovak	KX192077		1	N	N
3.	TEE Probes user manual - Romanian	KX192078		1	N	N
4.	TEE Probes user manual - Czech	KX192079		1	N	N
5.	TEE Probes user manual - Latvian	KX192080		1	N	N
6.	TEE Probes user manual - Lithuanian	KX192081		1	N	N
7.	TEE Probes user manual - Turkish	KX192082		1	N	N
8.	TEE Probes user manual - Estonian	KX192083		1	N	N
9.	TEE Probes user manual - Korean	KX192084		1	N	N
10.	TEE Probes user manual - Serbian	KX192240		1	N	N
11.	TEE Probes user manual - Bulgarian	KX192241		1	N	N
12.	TEE probes User manual - Croatian	KX192410		1	N	N
13.	TEE PROBES USER MANUAL ENGLISH, GERMAN, FRENCH, SIMPL. CHINESE	KZ192871		1	N	N
14.	TEE PROBES USER MANUAL ITALIAN	KZ192874		1	N	N
15.	TEE PROBES USER MANUAL SPANISH	KZ192875		1	N	N
16.	TEE PROBES USER MANUAL PORTUGUESE	KZ192876		1	N	N
17.	TEE PROBES USER MANUAL JAPANESE	KZ192877		1	N	N
18.	TEE PROBES USER MANUAL SWEDISH	KZ192879		1	N	N
19.	TEE PROBES USER MANUAL NORWEGIAN	KZ192880		1	N	N
20.	USER MANUAL DANISH	KZ192881		1	N	N
21.	TEE PROBES USER MANUAL POLISH	KZ192882		1	N	N
22.	TEE PROBES USER MANUAL FINNISH	KZ192883		1	N	N
23.	TEE PROBES USER MANUAL GREEK	KZ192884		1	N	N
24.	TEE PROBES USER MANUAL RUSSIAN	KZ192885		1	N	N
25.	TEE PROBES USER MANUAL DUTCH	KZ192886		1	N	N

## 9-21-3-4 TEE Probe Accessories user manual

Table 9-51 TEE Probes Accessories user manuals

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	TEE Probes Accessories User manual - Bulgarian	KX192345		1	N	N
2.	TEE Probes Accessories User manual - Croatian	KX192662		1	N	N
3.	TEE Probes Accessories User manual - Czech	KX192338		1	N	N
4.	TEE Probes Accessories User manual - Danish	KX192329		1	N	N
5.	TEE Probes Accessories User manual - Dutch	KX192334		1	N	N
6.	TEE Probes Accessories User manual - English, French German, Simpl. Chinese	KX192322		1	N	N
7.	TEE Probes Accessories User manual - Estonian	KX192342		1	N	N
8.	TEE Probes Accessories User manual - Finnish	KX192331		1	N	N
9.	TEE Probes Accessories User manual - Greek	KX192332		1	N	N
10.	TEE Probes Accessories User manual - Hungarian	KX192335		1	N	N
11.	TEE Probes Accessories User manual - Indonesian	KX192663		1	N	N
12.	TEE Probes Accessories User manual - Italian	KX192323		1	N	N
13.	TEE Probes Accessories User manual - Japanese	KX192326		1	N	N
14.	TEE Probes Accessories User manual - Korean	KX192343		1	N	N
15.	TEE Probes Accessories User manual - Latvian	KX192339		1	N	N
16.	TEE Probes Accessories User manual - Lithuanian	KX192340		1	N	N
17.	TEE Probes Accessories User manual - Norwegian	KX192328		1	N	N
18.	TEE Probes Accessories User manual - Polish	KX192330		1	N	N
19.	TEE Probes Accessories User manual - Portuguese	KX192325		1	N	N
20.	TEE Probes Accessories User manual - Romanian	KX192337		1	N	N
21.	TEE Probes Accessories User manual - Russian	KX192333		1	N	N
22.	TEE Probes Accessories User manual - Serbian	KX192344		1	N	N
23.	TEE Probes Accessories User manual - Slovakian	KX192336		1	N	N
24.	TEE Probes Accessories User manual - Slovenian	KX192664		1	N	N
25.	TEE Probes Accessories User manual - Spanish	KX192324		1	N	N
26.	TEE Probes Accessories User manual - Swedish	KX192327		1	N	N
27.	TEE Probes Accessories User manual - Turkish	KX192341		1	N	N
28.	TEE Probes Accessories User manuals CD	KX192346		1	N	N

9-21-3-5 Intraoperative Probes User's Manuals

Table 9-52 Intraoperative (IO) Probes User's Manuals

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	IO Probes User manual, English French German and Chinese	KX192055		1	N	N
2.	IO Probes User manual, Italian	KX192056		1	N	N
3.	IO Probes User manual, Spanish - Latin American	KX192057		1	N	N
4.	IO Probes User manual, Portuguese - Brazilian	KX192058		1	N	N
5.	IO Probes User manual, Japanese	KX192059		1	N	N
6.	IO Probes User manual, Swedish	KX192060		1	N	N
7.	IO Probes User manual, Norwegian	KX192061		1	N	N
8.	IO Probes User manual, Danish	KX192062		1	N	N
9.	IO Probes User manual, Polish	KX192063		1	N	N
10.	IO Probes User manual, Finnish	KX192064		1	N	N
11.	IO Probes User manual, Greek	KX192065		1	N	N
12.	IO Probes User manual, Russian	KX192066		1	N	N
13.	IO Probes User manual, Dutch	KX192067		1	N	N
14.	IO Probes user manual - Hungarian	KX192085		1	N	N
15.	IO Probes user manual - Slovak	KX192086		1	N	N
16.	IO Probes user manual - Romanian	KX192087		1	N	N
17.	IO Probes user manual - Czech	KX192088		1	N	N
18.	IO Probes user manual - Latvian	KX192089		1	N	N
19.	IO Probes user manual - Lithuanian	KX192090		1	N	N
20.	IO Probes user manual - Turkish	KX192091		1	N	N
21.	IO Probes user manual - Estonian	KX192092		1	N	N
22.	IO Probes user manual - Korean	KX192093		1	N	N

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# Chapter 10

## Care & maintenance

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### Section 10-1 Overview

#### 10-1-1 Periodic maintenance inspections

It has been determined by engineering that your VIVID E9 / VIVID E7 system does not have any high wear components that fail with use, therefore no Periodic Maintenance inspections are mandatory.

However, some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.






#### 10-1-2 Purpose of this chapter

This chapter describes **Care & Maintenance** on the VIVID E9 / VIVID E7 and peripherals. These procedures are intended to **maintain the quality** of the VIVID E9 / VIVID E7's **performance**. Read this chapter completely and familiarize yourself with the procedures before performing a task.

#### 10-1-3 Contents in this chapter

10-1	Overview . . . . .	10-1
10-2	Why do maintenance . . . . .	10-2
10-3	Maintenance task schedule . . . . .	10-3
10-4	Tools required . . . . .	10-5
10-5	System maintenance . . . . .	10-6
10-6	Electrical Safety Tests . . . . .	10-14
10-7	When there's too much leakage current ... . . . .	10-28

## 10-1-4 Warnings

-  **DANGER** THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE ULTRASOUND SYSTEM POWER PLUG AND OPEN THE MAIN CIRCUIT BREAKER BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.
-  **CAUTION** PRACTICE GOOD ESD PREVENTION. WEAR AN ANTI-STATIC STRAP WHEN HANDLING ELECTRONIC PARTS AND EVEN WHEN DISCONNECTING/CONNECTING CABLES.
-  **CAUTION** DO NOT PULL OUT OR INSERT CIRCUIT BOARDS WHILE POWER IS ON.
-  **CAUTION** DO NOT OPERATE THIS UNIT UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE. SYSTEM PERFORMANCE AND COOLING REQUIRE THIS.
-  **CAUTION** TO ENSURE THE MUTUAL PROTECTION AND SAFETY OF SERVICE PERSONNEL AND OUR CUSTOMERS, ALL EQUIPMENT AND WORK AREAS MUST BE CLEAN AND FREE OF ANY HAZARDOUS CONTAMINANTS BEFORE A SERVICE ENGINEER STARTS A REPAIR. THIS INCLUDES, BUT IS NOT LIMITED TO, DECONTAMINATION AND/OR STERILIZATION, DEPENDING ON THE APPLICATION OR USE OF THE MEDICAL DEVICE.

## Section 10-2 Why do maintenance

### 10-2-1 Keeping records

It is good business practice that ultrasound facilities maintain records of periodic and corrective maintenance. The Ultrasound Periodic Maintenance Inspection Certificate provides the customer with documentation that the Ultrasound Scanner is maintained on a periodic basis.

A copy of the *Ultrasound Equipment Quality Check* form should be kept in the same room or near the VIVID E9 / VIVID E7.

### 10-2-2 Quality assurance

In order to gain accreditation from organizations such as the American College of Radiology (USA), it is the customer's responsibility to have a quality assurance program in place for each VIVID E9 / VIVID E7. The program must be directed by a medical physicist, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program. Contact GE for coverage and/or price for service.



## Section 10-3 Maintenance task schedule

### 10-3-1 How often should maintenance tasks be performed?

The Care and Maintenance task schedule (provided on page 10-3) specifies how often your VIVID E9 / VIVID E7 should be serviced and outlines items requiring special attention.

**NOTE:** *It is the customer's responsibility to ensure the VIVID E9 / VIVID E7 care & maintenance is performed as scheduled in order to retain its high level of safety, dependability and performance.*

Your GE Service Representative has an in-depth knowledge of your VIVID E9 / VIVID E7 ultrasound scanning system and can best provide competent, efficient service. Contact GE for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Care and Maintenance Task Schedule assumes that you use your VIVID E9 / VIVID E7 for an average patient load (10-12 per day) and not use it as a primary mobile Ultrasound system which is transported between diagnostic facilities.

**NOTE:** *If conditions exist which exceed typical usage and patient load, then it is recommended to increase the periodic maintenance frequencies.*

**Table 10-1 Customer Care Schedule sheet 1 of 2**

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Clean Probes	●*				* or before each use
Clean Probe Holders	●				
Clean Air Filters		●			more frequently depending on your environment
Clean Console			●		
Inspect AC Mains Cable			●		Mobile Unit Check Weekly
Inspect Cables and Connectors			●		
Clean Monitor and Touch Panel			●		
Inspect Wheels, Casters, brakes and Swivel Locks			●		Mobile Unit Check Daily
Check Operator Panel Movement			●		Mobile Unit Check Daily
Console Leakage Current Checks				●	also after corrective maintenance
Peripheral Leakage Current Checks				●	also after corrective maintenance
Surface Probe Leakage Current Checks				●	also after corrective maintenance

**Table 10-1 Customer Care Schedule (cont'd) sheet 2 of 2**

Service at Indicated Time	Daily	Weekly	Monthly	Per Facilities QA Program	Notes
Endocavity Probe Leakage Current Checks				●	also after corrective maintenance
Transesophageal Probe Leakage Current Checks				●	also after corrective maintenance
Surgical Probe Leakage Current Checks				●	also after corrective maintenance
Functional Checks				●	also after corrective maintenance

## Section 10-4 Tools required

*NOTE:* A list of required tools for servicing the VIVID E9 / VIVID E7, please refer to:  
[8-2-5 "Tools needed for servicing VIVID E9 / VIVID E7" on page 8-5.](#)

## Section 10-5 System maintenance

### 10-5-1 Preliminary checks

The preliminary checks take about 15 minutes to perform.

Refer to the VIVID E9 / VIVID E7 user documentation whenever necessary.

**Table 10-2 System preliminary checks**

Step	Item	Description
1.	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Power up	<ul style="list-style-type: none"><li>• Turn the VIVID E9 / VIVID E7 power on and verify that all fans and peripherals turn on.</li><li>• Watch the displays during power up to verify that no warning or error messages are displayed.</li></ul>
3.	Probes	Verify that the VIVID E9 / VIVID E7 properly recognizes all probes.
4.	Displays	Verify proper display on the monitor and touch panel.
5.	Presets	Backup all Customer Presets to an appropriate media.
6.	Image Archive	Back up the Image Archive onto appropriate media.

## 10-5-2 Functional checks

*NOTE:* See also Chapter 4.

The functional checks take about 60 minutes to perform. Refer to the VIVID E9 / VIVID E7 user documentation whenever necessary.

### 10-5-2-1 System checks

**Table 10-3 System Functional Checks**

Step	Item	Description
1.	B-Mode	Verify basic B-Mode (2D) operation. Check the basic controls that affect this mode of operation.
2.	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic controls that affect this mode of operation.
3.	Doppler Modes	Verify basic Doppler operation (PW and CW). Check the basic system controls that affect this mode of operation.
4.	M-Mode	Verify basic M-Mode operation. Check the basic system controls that affect this mode of operation.
5.	4D Mode	Where applicable, verify basic 4D Mode operation. Check the basic controls that affect this mode of operation.
6.	Applicable Software Options	Verify the basic operation of all optional modes such as Multi-Image, 4D, Contrast, Harmonics, Cine, Stress Echo, ... etc. Check the basic system controls that affect each options operation.
7.	System Diagnostic	Perform the Automatic Tests.
8.	Operator Panel test	Perform the Operator Panel Test Procedure.
9.	Touch Panel	Verify basic Touch Panel display functions.
10.	Monitor	Verify basic monitor display functions.
11.	Peripherals	See: <a href="#">10-5-2-2 "Peripheral/option checks" on page 10-8.</a>

**10-5-2-2 Peripheral/option checks**

If any peripherals or options are not part of the VIVID E9 / VIVID E7 configuration, the check can be omitted.

**Table 10-4 GE Approved Peripheral/Hardware Option Functional Checks**

Step	Item	Description
1.	Media	Verify media drive(s) read/write properly. Clean if necessary.
2.	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3.	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4.	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5.	EKG	Verify basic operation with customer
6.	Footswitch	Verify that the footswitch is functioning as programmed. Clean as necessary.

**10-5-2-3 Mains cable inspection**

**Table 10-5 Mains Cable Inspection**

Step	Item	Description
1.	Unplug Cord	Disconnect the mains cable from the wall and the VIVID E9 / VIVID E7.
2.	Inspect	Inspect it and its connectors for damage of any kinds.
3.	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4.	Verify	Inlet connector retainer is functional.

10-5-3 Physical inspection


Table 10-6 Physical Checks

Step	Item	Description
1.	Labeling	Verify that all VIVID E9 / VIVID E7 labeling is present and in readable condition.
2.	Scratches & Dents	Inspect the console for dents, scratches or cracks.
3.	Covers	Verify all covers are secured in place and are properly aligned with other covers. Replace any covers that are damaged.
4.	Input Power	Refer to: <a href="#">10-5-2-3 "Mains cable inspection" on page 10-8.</a>
5.	External I/O	Check all connectors for damage and verify that the labeling is good.
6.	Wheels & Brakes	<ul style="list-style-type: none"> <li>• Check all wheels and casters for wear and verify operation of foot brake, to stop the VIVID E9 / VIVID E7 from moving, and release mechanism.</li> <li>• Check all wheel locks and wheel swivel locks for proper operation.</li> </ul>
7.	Probe Holders	Inspect the Probe Holders for cracks or damage.
8.	Control Panel (Op Panel)	Inspect alphanumeric keyboard and Operator Panel. Record any damaged or missing items.
9.	Control Panel (Op Panel) Movement	<ul style="list-style-type: none"> <li>• Verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions.</li> <li>• Ensure that Operator Panel (Operator Control Panel) latches in position as required.</li> </ul>
10.	Control Panel (Op Panel) Lights	Check for proper operation of all operator panel and TGC lights.
11.	LCD	<p>Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Confirm that the LCD arm allows:</p> <ul style="list-style-type: none"> <li>• swivelling the screen to the left and to the right</li> <li>• folding the screen to the locked position</li> <li>• release and adjustment backwards and forwards</li> <li>• can be adjusted in the up/down positions.</li> </ul>
12.	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to footswitch assembly and probe strain or bend reliefs.
13.	Shielding and Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
14.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.

## 10-5-4 Cleaning

### 10-5-4-1 General cleaning

Frequent and diligent cleaning of the VIVID E9 / VIVID E7 ultrasound unit reduces the risk of spreading infection from person to person, and also helps to maintain a clean working environment.

 **CAUTION** When performing cleaning procedures, to prevent the risk of system damage, always observe the following precautions:

- Use only cleaning materials and solutions as recommended in the procedures described in the VIVID E9 / VIVID E7 user manual.
- Do not use any solutions or products not listed in the VIVID E9 / VIVID E7 user manual.
- Never use thinner, benzene, ethanol or methanol alcohol, abrasive cleaners, or other strong solvents, as these may cause damage to the cabinet or LCD panel. Only use isopropyl alcohol, when instructed to do so.
- Do not spray any liquid directly onto the VIVID E9 / VIVID E7 covers, LCD Display or keyboard!
- Do not allow any liquid to drip or seep into the system.
- DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.
- Make sure not to spill or spray any liquid on the controls, into the VIVID E9 / VIVID E7 cabinet, or in the probe connection receptacle.
- Prior to cleaning, turn OFF power to the VIVID E9 / VIVID E7 and disconnect the mains cable.

Refer to the user manual for the VIVID E9 / VIVID E7 for cleaning instructions.



**10-5-4-2 Air Filter cleaning**

**CAUTION** Lock the wheels before removing/cleaning the air filters. This prevents the Ultrasound system from moving unexpectedly.

**DO NOT** operate the unit without the air filters in place.

The VIVID E9 / VIVID E7 has two air filters, one at the rear (Rear Air Filter) and one below the Card Rack (Bottom Filter).

Two bottom filters have been used:

- “nylon strip” Bottom Filter (units manufactured before November 2010)
- “handle type” Bottom Filter (introduced November 2010)

Please refer to the respective air filter replacement and cleaning instructions:

- [8-8-2 "Rear Filter and "handle type" Bottom Filter replacement" on page 8-176](#)  
or
- [8-8-3 "Rear Air Filter replacement" on page 8-180](#)
- [8-8-4 "Bottom "nylon strip" Air Filter replacement" on page 8-182](#)

## 10-5-5 Probe maintenance

### 10-5-5-1 Probe related checks

Table 10-7 Probe Related Checks

Step	Item	Description
1.	Probe Holders	Clean probe holders. (they may need to be soaked to remove excess gel).
2.	Probes	Thoroughly check the VIVID E9 / VIVID E7 probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins.
3.	Probes	Verify that the VIVID E9 / VIVID E7 properly recognizes all probes.

### 10-5-5-2 Basic probe care

The VIVID E9 / VIVID E7 user manuals and various probe handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

Ultrasound probes can be easily damaged by improper handling. See the user manual and probe care cards for more details. Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.


Any evidence of wear indicates the probe cannot be used.


Do a visual check of the probe pins and VIVID E9 / VIVID E7 sockets before plugging in a probe.


TEE and Interoperative probes often have special considerations and individual probe user manuals. For TEE and Interoperative probes also refer to their separate user manuals.

**10-5-5-3 Cleaning and disinfecting probes**

 **WARNING** *TO HELP PROTECT YOURSELF FROM BLOOD BORNE DISEASES, WEAR APPROVED DISPOSABLE GLOVES. THESE ARE MADE OF NITRILE DERIVED FROM VEGETABLE STARCH TO PREVENT ALLERGIC LATEX REACTIONS.*

 **CAUTION** Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty.  
DO NOT soak or wipe the lens with any product not listed for the probe. Doing so could result in irreparable damage to the probe.  
Follow care instructions that came with the probe.

 **CAUTION** Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

 **CAUTION** Transesophageal and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.

**10-5-5-4 Cleaning probes**

For cleaning instructions, refer to "Cleaning and disinfecting probes" in the VIVID E9 / VIVID E7 user manual.

**10-5-5-5 Disinfecting probes**

For disinfecting instructions, see: "Cleaning and disinfecting probes" in the VIVID E9 / VIVID E7 user manual.

## Section 10-6 Electrical Safety Tests

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

### 10-6-1 Safety Test Overview

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
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BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

The electrical safety tests in this section are based on **NFPA 99 Standard for Health Care Facilities** and **IEC 62353 Medical electrical equipment – Recurrent test and test after repair of medical electrical equipment**. These standards provide guidance on evaluating electrical safety of medical devices which are placed into service and are intended for use in planned maintenance (PM) or testing following service or repair activities. They differ somewhat from the standards that are used for design verification and manufacturing tests (e.g., IEC 60601-1 and UL 60601-1) which require a controlled test environment and can place unnecessary stress on the VIVID E9 / VIVID E7.

These tests may refer to specific safety analyzer equipment as an example. Always refer to the safety analyzer's user manual that will be used to perform the tests.

Prior to initiating any electrical test, the VIVID E9 / VIVID E7 must be visually inspected. Perform the following visual checks:

- Check for missing or loose enclosure covers that could allow access to internal live parts.
- Examine the mains cord, mains plug and appliance inlet for damaged insulation and adequacy of strain relief and cable clamps.
- Locate and examine all associated transducers. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.

**Equipment users must ensure that safety inspections are performed whenever damage is suspected and at least every 12 months in accordance with local authorities and facility procedures. Do not use the VIVID E9 / VIVID E7 or individual probes which fail any portion of the safety test.**



**WARNING** *TO MINIMIZE RISK OF ELECTRIC SHOCK, ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE ELECTRICAL SAFETY INSPECTIONS AND TESTS.*



**CAUTION** To avoid electrical shock, the unit under test **MUST NOT** be connected to other electrical equipment. Remove all interconnecting cables and wires. The unit under test must not be contacted by users or patients while performing these tests.



**CAUTION** Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.

## 10-6-2 Leakage Current Limits

 **WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9 / VIVID E7.**  
**WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:**



1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9 / VIVID E7.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

The following acceptance limits and test conditions are summarized from NFPA 99 and IEC 62353 and in some cases are lower than that specified by the standards.

In accordance with these standards, fault conditions like Reverse Polarity of the supply mains and Open Neutral are no longer required for field evaluation of leakage current. Because the main source of leakage current is the mains supply, there are different acceptance limits depending on the configuration of the mains (100-120VAC or 230-240VAC).

 **CAUTION Compare all safety-test results with safety-test results of previously performed safety tests (e.g. last year etc). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE for further analysis.**

**Table 10-8 Leakage Current Limits for Operation on 100-120 Volt mains (US/Canada/Japan)**

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit mA
Chassis/Enclosure Leakage	On and Off	Open	0.3
Type BF Applied Parts	On (transmit)	Closed Open	0.1 0.5
Type CF Applied Parts	On (transmit)	Closed Open	0.01 0.05
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05

10-6-2 Leakage Current Limits (cont'd)

Table 10-9 Leakage Current Limits for System Operation on 230-240 Volt Mains

Leakage Current Test	System Power	Grounding/PE Conductor	Limit mA
Chassis/Enclosure Leakage	On	Open and Closed	0.5
Type BF Applied Parts	On (transmit)	Closed Open	0.1 0.5
Type CF Applied Parts	On (transmit)	Closed Open	0.01 0.05
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05



Table 10-10 ISO and Mains Applied Limits\*

Probe Type	Measurement
BF	5.0 mA
CF	0.05 mA

\* **ISO** and **Mains Applied** refer to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.

NOTE: *Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC 60601 or AS/NZS 3551.*

Table 10-11 Equipment Type and Test Definitions

Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For ultrasound equipment, this includes transducers and ECG leads.	
Type BF	Body Floating or non-conductive ultrasound probes which are marked with the 'man in box' BF symbol. This includes all transducers.	
Type CF	Cardiac Floating or non-conductive intraoperative probes for direct cardiac contact and isolated ECG connections so marked with the 'heart in box' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required test for Type CF applied parts.	

### 10-6-3 Grounding Continuity

**⚠ DANGER ELECTRIC SHOCK HAZARD. THE PATIENT MUST NOT BE CONTACTED TO THE EQUIPMENT DURING THIS TEST.**

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2 ohms**. Reference the procedure in the IEC60601-1.

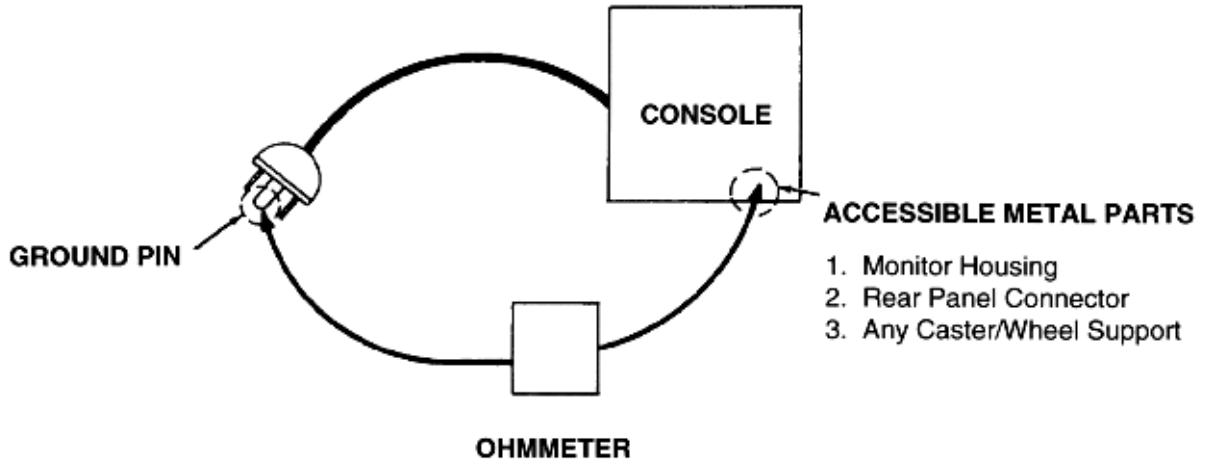



Figure 10-1 Ground Continuity Test



## 10-6-4 Chassis Leakage Current Test

 **DANGER** **ELECTRIC SHOCK HAZARD. WHEN THE METER'S GROUND SWITCH IS OPEN, DON'T TOUCH THE VIVID E9 / VIVID E7!**

 **CAUTION** Equipment damage possibility. Never switch the Polarity and the status of Neutral when the VIVID E9 / VIVID E7 is powered ON. Be sure to turn the VIVID E9 / VIVID E7 power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the VIVID E9 / VIVID E7 may be damaged.

### 10-6-4-1 Definition

This test, also known as Enclosure Leakage current test, measures the current that would flow through a grounded person who touches the accessible conductive parts of the equipment during normal and fault conditions.

The test verifies the isolation of the power line from the chassis.

The testing meter is connected to parts of the equipment, easily contacted by the user or patient.

Measurements should be made under the test conditions specified in:

- [Table 10-8 on page 10-16](#),  
or:
- [Table 10-9 on page 10-17](#),  
as applicable.

Record the highest reading.

**10-6-4-2 Generic Procedure**

The test verifies the isolation of the power line from the chassis.

The testing meter is connected from accessible metal parts of the case to ground.

Measurements should be made under the test conditions specified in:

- [Table 10-8 on page 10-16](#),  
or:
- [Table 10-9 on page 10-17](#),  
as applicable.

Record the highest reading of current.

- 1.) Connect Safety analyzer to wall AC power outlet.
- 2.) Plug the equipment under test power cable into the receptacle on the panel of the meter.
- 3.) Connect the meter to an accessible metal surface of the scanner using the cable provided with the meter.

**Table 10-12 Chassis leakage current test locations**

TEST	CONDITION
1	Mounting screw for probe receptacle
2	Wheel support
3	Mounting screw for LCD or CRT housing
4	Mounting screw for peripheral plugged into unit
5	Mounting screw for other peripheral powered by unit

- 4.) Select the Chassis or Enclosure leakage function on the meter.

*NOTE: For more information, refer to the safety analyzer's user manual.*

- 5.) Test opening and closing the ground with the scanner on and off as indicated in:
  - [Table 10-8 on page 10-16](#),  
or:
  - [Table 10-9 on page 10-17](#),  
as applicable.

The maximum allowable limit for chassis source leakage is also shown in:

- [Table 10-8 on page 10-16](#), or
- [Table 10-9 on page 10-17](#),  
as Chassis/Enclosure Leakage.

## 10-6-5 Isolated patient lead (source) leakage—lead to ground



**CAUTION** Equipment damage possibility. Never switch the Polarity when the unit is powered ON. Be sure to turn the unit power OFF before switching the polarity using the POLARITY switch. Otherwise, the unit may be damaged.

### 10-6-5-1 Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made under the test conditions specified in:

- [Table 10-8 on page 10-16](#),  
or:
- [Table 10-9 on page 10-17](#),  
as applicable.

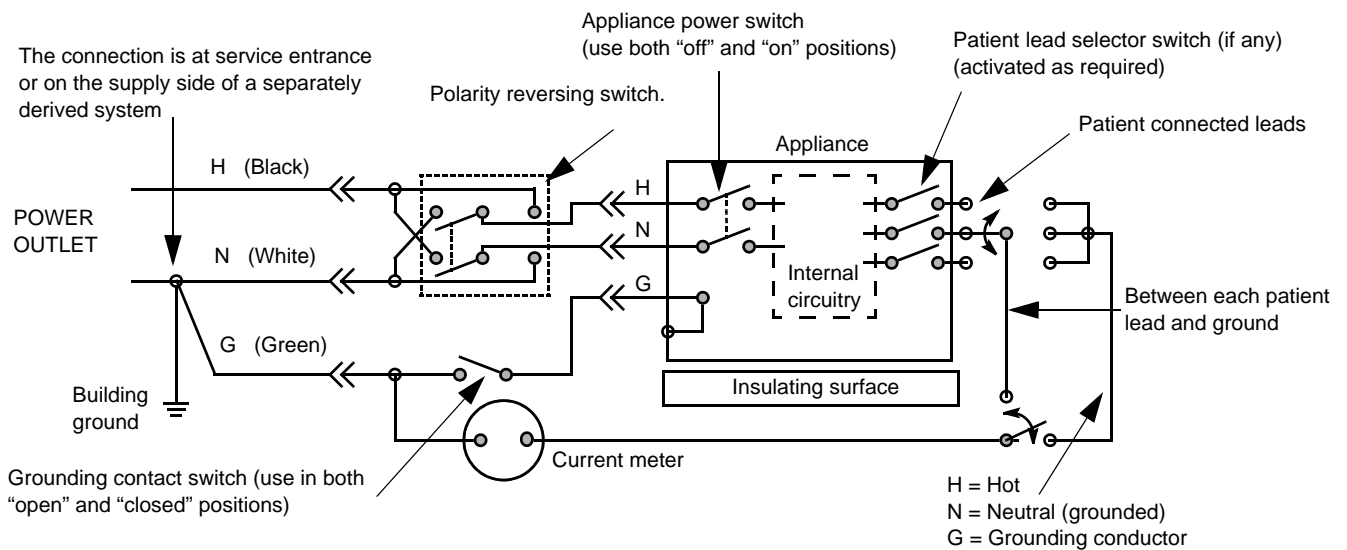
For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

**10-6-5-2 Generic Procedure**

Measurements should be made under the test conditions specified in:

- [Table 10-8 on page 10-16,](#)  
or:
- [Table 10-9 on page 10-17,](#)  
as applicable.

For each combination, the operating controls such as the lead switch should be operated to find the worst case condition.



**Figure 10-2 Test circuit for measuring patient lead leakage**


**10-6-6 Isolated patient lead (source) leakage—lead to lead**

Select and test each of the ECG lead positions (except ALL) on the LEAD selector, testing each to the power and ground condition combinations found in:

- [Table 10-8 on page 10-16](#), or
- [Table 10-9 on page 10-17](#), as applicable.

Record the highest leakage current measured.

## 10-6-7 Probe leakage current test

 **DANGER DO NOT USE THE PROBE IF THE INSULATING MATERIAL HAS BEEN PUNCTURED OR OTHERWISE COMPROMISED. INTEGRITY OF THE INSULATION MATERIAL AND PATIENT SAFETY CAN BE VERIFIED BY SAFETY TESTING ACCORDING TO IEC60601-1.**

### 10-6-7-1 Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

*NOTE: Some leakage current is expected on each probe, depending on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.*

**10-6-7-2 Generic procedure on probe leakage current**

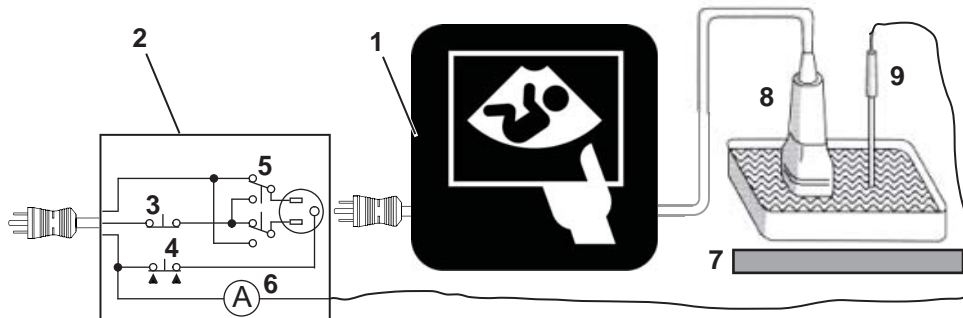
The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the ultrasound system and active. This method measures the actual leakage current resulting from the transducer RF drive.

*NOTE: Refer to the safety analyzer's user manual that will be used to perform the tests.*

**10-6-7-2 Generic procedure on probe leakage current (cont'd)**

For each combination, the probe must be active to find the worst case condition.

**Figure 10-3 Set up for probe leakage current**



- |                      |                              |                     |
|----------------------|------------------------------|---------------------|
| 1. Ultrasound System | 4. Ground Switch             | 7. Isolator         |
| 2. Tester            | 5. Polarity Reversing Switch | 8. Ultrasound Probe |
| 3. Neutral Switch    | 6. Meter                     | 9. Saline Probe     |

The ultrasound probe's imaging area is immersed in the Saline solution along with a grounding probe from the test meter to complete the current path.

**NOTE:** Follow manufacturer's recommendations for handling saline solution. Refer to their Material Safety Data Sheet (MSDS) for more information.

**NOTE:** Each probe will have some amount of leakage current, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.



10-6-7-2 Generic procedure on probe leakage current (cont'd)



**DANGER** TO AVOID PROBE DAMAGE AND POSSIBLE ELECTRIC SHOCK, DO NOT IMMERSE PROBES INTO ANY LIQUID BEYOND THE LEVEL INDICATED IN THE PROBE USERS MANUAL.  
DO NOT TOUCH THE PROBE, CONDUCTIVE LIQUID OR ANY PART OF THE UNIT UNDER TEST WHILE DOING THE TEST.

Follow the test conditions and test limits described in:

- [Table 10-8 on page 10-16](#),  
or:
- [Table 10-9 on page 10-17](#),  
as applicable for every probe.



**CAUTION** Equipment damage possibility. Never switch the Polarity or the status of the Neutral when the Ultrasound system is powered on. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the POLARITY switch and/or the NEUTRAL switch on the leakage meter to avoid possible power supply damage.

## Section 10-7

### When there's too much leakage current ...

#### 10-7-1 Chassis Fails

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work-around, check the other outlets to see if they could be used instead.

*NOTE: No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.*

#### 10-7-2 Probe Fails

Test the probe in another connector to isolate if the fault lies with the probe or the VIVID E9 / VIVID E7.

*NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable leakage current for body surface contact probe differs from inter-cavity probe. Be sure to enter the correct probe type in the appropriate space on the check list.*

If excessive leakage current is slot dependent, inspect the system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

#### 10-7-3 Peripheral Fails

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

#### 10-7-4 Still Fails

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

#### 10-7-5 New Unit

If the leakage current measurement tests fail on a new VIVID E9 / VIVID E7 and if situation can not be corrected, submit a Safety Failure Report to document the VIVID E9 / VIVID E7 problem. Remove the VIVID E9 / VIVID E7 from operation.

#### 10-7-6 ECG Fails

Inspect cables for damage or poor connections.

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